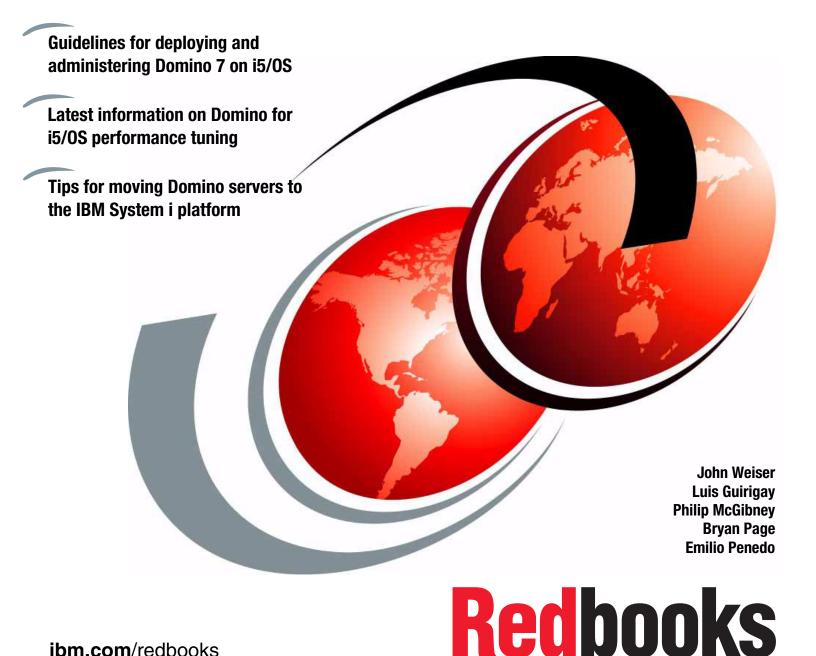


Draft Document for Review February 19, 2007 3:16 pm



# **Implementing Domino 7** for i5/0S





# International Technical Support Organization

# Implementing Domino 7 for i5/OS

January 2007

<b>Note:</b> Before using this information and the product it supports, read the information in "Notices" on page ix.

#### First Edition (January 2007)

This edition applies to Domino 7 for i5/OS for use with i5/OS Version 5 Release 3 and later.

This document created or updated on February 19, 2007.

#### © Copyright International Business Machines Corporation 2007. All rights reserved.

Note to U.S. Government Users Restricted Rights -- Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

# **Contents**

	gs to know before installing Domino	
	alling Domino	
	What happens when Domino 7 is installed	
	Direct call to InstallShield using setup.exe	
	Using iSeries Navigator	
	Using LODRUN	
3.2.5	Using RSTLICPGM	55
3.3 Veri	fying if Domino was successfully installed	56
3.3.1	Using iSeries Navigator	56
3.3.2	Using the i5/OS command line	57
3.4 Mult	i-versioning	59
3.4.1	Multi-versioning when installing using the Domino Installation Wizard	59
3.4.2	Multi-versioning when installing using LODRUN	61
3.5 Addi	itional language support	63
3.5.1	Installing additional languages using the Language Pack Installer	63
3.5.2	Installing additional languages using the LODRUN command	71
3.6 Insta	alling the iSeries Navigator Lotus Domino plug-in	82
	Plug-in install immediately after installation of Domino 7 for i5/OS	
	Plug-in install sometime after installation of Domino 7 for i5/OS	
	4. Configuring a Domino 7 server on i5/OS	
	figuring a first Domino server	
4.1.1	Methods to configure a Domino server	90
4.1.2	What happens during the configuration of the first Domino server	91
4.1.3	Using domwzd.exe to configure a new Domino server	92
4.1.4	Using CFGDOMSVR to configure a new Domino server	108
4.1.5	Using iSeries Navigator to configure a new Domino server	122
4.2 Con	figuring an additional Domino server	123
4.2.1	Registering an additional Domino server	124
	Handling the ID file for an additional server	
	Verifying the connection to the Domino registration server	
	Using DOMWZD.EXE to configure an additional Domino server	
	Using CFGDOMSVR to configure an additional Domino server	
	5. Administering Domino 7 on i5/OS	
5.1 Usin	g iSeries Navigator	154
	Starting Domino services	
	Stopping Domino services	
5.1.3	Displaying Domino jobs	158
5.1.4	Domino server properties	159
5.1.5	Deleting a Domino server	167
5.1.6	Launching the Lotus Domino Administrator client	168
5.2 Usin	g i5/OS commands	169
5.2.1	Working with Domino servers	169
5.2.2	Start Domino Server (STRDOMSVR)	173
5.2.3	End Domino Server (ENDDOMSVR)	174
	Update Domino Server (UPDDOMSVR)	
	Set Domino Environment (SETDOMENV)	
	Run Domino Command (RUNDOMCMD)	
	Work with Subsystems (WRKSBS)	
	Work with Active Jobs (WRKACTJOB)	
	g the Java Server Console	
	Starting the Java Server Console	

5.4 Using the Web Administrator client	
5.5 Using the Domino Administrator client	182
	400
Chapter 6. Domino 7 performance tuning on i5/OS	
6.1 Defining Domino 7 performance on the i5/OS	
6.1.1 Prioritized strategies	
6.1.2 Categorizing performance bottlenecks on the 15/OS	
6.2.1 Performance and i5/OS commands	
6.2.2 Performance Management for System i5	
6.2.3 Management Central	
6.2.4 Performance Tools for iSeries (5722-PT1)	
6.2.5 Collection Services	
6.2.6 Performance Explorer (PEX)	
6.2.7 iDoctor	
6.2.8 Domino 7 cross platform performance tools	
6.3 Installing performance management tools for the i5/OS	
6.3.1 i5/OS Performance Explorer pre-installed for i5/OS	
6.3.2 Setting up Management Central	
6.3.3 Installing Performance Tools for the i5/OS	
6.4 Measuring Domino 7 performance standards on the i5/OS	
6.4.1 Work with System Status (WRKSYSSTS)	
6.4.2 Work with Disk Status (WRKDSKSTS)	
6.4.3 Work with System Activity (WRKSYSACT)	
6.4.4 Performance analysis using Management Central	
6.4.5 Memory resource performance analysis	
6.5 Preserving performance on your Domino 7 server	
6.5.1 Collecting Domino 7 performance data on the i5/OS	
6.5.2 Managing resources on the i5/OS	
6.5.3 Special performance considerations for Domino databases	
6.6 Domino 7 performance bottlenecking on the i5/OS	
6.6.1 Analyzing the system for performance bottlenecks	
6.6.2 Bottleneck analysis for memory resources	
6.6.3 Bottleneck analysis for Disk Input/Output (I/O)	
6.6.4 Bottleneck analysis for network resources	
6.7 Improving Domino 7 performance expectations on i5/OS	242
6.7.1 CPU resource performance tuning - choosing processor priority	242
6.7.2 Memory resource performance tuning - choosing a memory pool to use	
6.7.3 Disk input/output (I/O) performance tuning	245
6.7.4 Network resource performance tuning	246
Chapter 7. Moving your Domino server to the System i platform	
7.1 Migration considerations	
7.1.1 Transaction logging	
7.2 Moving your Domino server using a graphical interface	
7.2.1 Copying ID files to the i5/OS integrated file system	
7.2.2 Configuring a Domino for i5/OS server using domwzd.exe	
7.2.3 Replacing the configuration databases	
7.2.4 Moving the data	
7.2.5 Starting the Domino server	
7.3 Moving your Domino server using a 5250 emulation session	
7.3.1 Copying ID files to the i5/OS integrated file system	
7.3.2 Configuring a Domino for i5/OS server using CEGDOMSVR	シスク

7.3.3	Replacing the configuration databases	287
7.3.4	Starting the Domino server	288
Chapter	8. Problem determination	289
8.1 Serv	rer crash	290
8.1.1	More about the Notes Server Diagnostic tool (NSD)	291
8.1.2	How to troubleshoot Domino server crashes	293
8.1.3	My Domino server keeps crashing or won't start	295
8.1.4	Crash data to collect if engaging Lotus support	297
8.1.5	Consistency checks and FIXUP	297
8.1.6	Transaction logging	299
8.1.7	Automatic Diagnostic Collection Tool	300
8.1.8	Cleaning up orphaned shared memory or semaphores	303
8.2 Dom	iino server hangs and slowdowns	309
8.2.1	What data to collect to provide to Lotus Support	310
8.2.2	A further explanation of semaphore debug	312
8.3 Perf	ormance	314
8.3.1	High server workload	315
8.3.2	Steps to take to find the root cause of high CPU	315
8.3.3	Data to gather while the CPU is running high on your system	318
8.3.4	Using iSeries Navigator to investigate a performance issue	320
8.4 Addi	tional troubleshooting parameters	326
8.4.1	MEMCHECK	330
Chapter	9. Domino 7 backup and recovery using BRMS	333
	IS and how it works with Domino	
9.1.1	BRMS concepts	334
9.1.2	How Domino online backups work	334
	Configuring BRMS to work with Domino	
	Save and restore scenarios of Domino data using BRMS	
	orming a full online backup of a Domino server	
9.2.1	Using iSeries Navigator to perform the full online backup	337
	Using a 5250 emulation session to perform the full backup	
9.3 Perf	orming a Domino incremental online backup	343
	Changes required to provide for Domino incremental backups	
	Using iSeries Navigator to perform an incremental backup	
	Using a 5250 emulation session to perform an incremental backup	
	overing data from a Domino full online backup	
	Using iSeries Navigator to restore data from full online backup	
	Using a 5250 emulation session to restore data from a full online backup	
	overing data from a Domino incremental online backup	
	Using iSeries Navigator to restore from incremental online backup	
	Using a 5250 session to restore data from an incremental online backup	
	grated file system directories used by BRMS	
	Directories used when implementing full online backups	
	Directories used when implementing incremental online backups	
	comization options available via the notes.ini file	
Appendi	ix A. Configuring Domino for i5/OS to use System i SSL	371
	requirements	
	setup Domino to use system SSL	
•	ling the Digital Certificate Management (DCM) server	
	ing a local Certificate Authority (CA)	
	ing a Certificate Store	

Creating a certificate for Domino using software encryption	
Appendix B. Adding presence awareness to your Domino 7 environment  Installing Sametime 7 Limited Use on i5/OS	398
Verifying if Sametime is working correctly	
Adding presence awareness to Domino Web Access	406
Creating Connection documents	
Setting up Domino SSO authentication	
Sametime not working with Domino Web Access	
Appendix C. Domino Access for Microsoft Outlook	415
Requirements	
What's new in Domino R7	
Installation and configuration	416
Related publications	425
IBM Redbooks	
Other publications	
Online resources	
Help from IBM	
Index	431

# **Notices**

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing, IBM Corporation, North Castle Drive, Armonk, NY 10504-1785 U.S.A.

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

#### **COPYRIGHT LICENSE:**

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs.

## **Trademarks**

The following terms are trademarks of the International Business Machines Corporation in the United States, other countries, or both:

#### **Trademarking:**

Refresh the IBM trademark list.

Run the Toolkit  $\rightarrow$  RXFM  $\rightarrow$  Maintenance  $\rightarrow$  Refresh-Toolkit-Rxfm-Rex-Scripts.rex tool.

#### Trademark search:

Open the book file.

Run the  $Toolkit \rightarrow RXFM \rightarrow Editor\_tools \rightarrow Trademark-Search.rex$  tool.

#### Trademark mark first use of a trademark:

Run the  $Toolkit \rightarrow RXFM \rightarrow Editor\_tools \rightarrow Trademark-Mark-First-Occurrence.rex$  tool.

The following terms are trademarks of other companies:

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.

# **Preface**

With the introduction of IBM Lotus Notes and Domino 7, IBM Lotus continues to set the standard for innovation in the messaging and collaboration market that Lotus defined two decades ago. With Lotus Notes and Domino 7, IBM has enhanced the scalability, security features, administration, interoperability, productivity, and performance, enabling companies to achieve the most from their infrastructure.

Upgrading to the latest version of Lotus Notes and Domino can help your organization to realize high return on investment, potentially lower your cost of ownership, and help improve user productivity and business responsiveness.

This IBM Redbook targets system administrators who plan to implement or upgrade to Domino 7 for i5/OS in their organization. It provides tips and techniques to help you successfully deploy and administer Domino 7 servers on i5/OS. The primary focus is to explain the installation, configuration, and performance tuning of Domino 7 in this environment. This redbook also provides information on moving Domino servers to the System i platform as well information on backup and recovery and troubleshooting Domino 7 servers running on i5/OS.

### The team that wrote this redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization, Poughkeepsie Center.



**John Weiser** is an Advisory Software Engineer with IBM Global Services in Rochester, Minnesota. He has been working with the System i platform since 1995 and has been involved with Domino when it first became available on the IPCS and then natively available on i5/OS in 1998. John currently holds Lotus System Administration PCLP and CLP status for Domino R4, R5, R6 and R7.



Luis Guirigay is an IT Specialit with Ascendant Technology LLC (http://www.atech.com), an IBM Premier Business Partner based in Austin, TX. Luis has more than 7 years of IT experience in Lotus Domino and related products, such as Sametime, Quickplace and Lotus Workflow, and 2 years of experience with the System i Platform. Luis has co-authored the following redbooks: Deploying Workplace on IBM System i, SQL Performance Diagnosis on IBM DB2 for i5/OS and Preparing for and Tuning the SQL Query Engine on DB2 for i5/OS. He is a Dual IBM Certified Advanced Professional in Application Development and System Administration for Notes and Domino 5, 6 and 7 and an IBM Certified Specilist for Collaborative Solutions. Lately, Luis has been focusing on projects involving WebSphere Portal. He holds a Bachelor of Science degree in Computer Engineering from Rafael Belloso Chacin University, Venezuela.



Philip McGibney is the technical team lead for Domino on iSeries in Lotus Customer Support EMEA. He began working for IBM in 2000 as an AS/400 system administrator and later as a Domino software engineer. Philip has experience in data processing, operations, communications, and technical support on mostly midrange systems, such as DECS, Digital Vax, Wang, and AS/400, mainly in the agricultural and financial services sector. He has overseen many platform conversion issues, designed help desk and technical support infrastructures, and coordinated disaster recovery procedures for many companies. Philip attended the Vocational Educational College in Dublin, Ireland.



Bryan Page is a Lotus Domino Technical Services Advisor facilitating implementation and support of commercial strategic outsourcing engagements at IBM. He is currently a member of IBM Integrated Technology Delivery's eMail and Collaboration Services organization in Server Systems Operations. Bryan has over seven years of Lotus Domino System Administration background, with five years primarily focused on support of Domino for System i platforms. He is a Dual IBM Certified Professional in System Administration and Application Development for Lotus Notes/Domino 5 and 6/6.5. Bryan holds a Bachelor of Science degree in Chemistry and Mathematics from Morehouse College in Atlanta, Georgia.



Emilio Penedo is a Senior Lotus Consultant with ABSystems, S.A. de C.V. (http://www.absystems.biz), an IBM Advanced Business Partner based in Mexico City. Emilio has more than 15 years of IT experience. Since 1998 he works on Domino extended porfolio solutions such as Document Manager, Quickplace, Sametime and LVC. He is a Certified Domino Administrator 5, 6 and 7, and an IBM Certfied Specialist for Domino on System i and p platforms. He was a co-author for the redbook "Exchange Migration and iNotes Implementation on the IBM eSrever iSeries Server". Emilio has recently been working on Mobile and SAP integration to Lotus Domino projects. He holds a Bachelor Degree in Mechanical Engieering from La Salle University in Mexico.

Thanks to the following people for their contributions to this project:

Barb Foss
César G. Miramontes Catón
Martha Miriam Godinez Cervantes
Moises Gabriel Gonzalez Mejia
Laurie Miller
Joe Peterson
Steve Sparrow
IBM Domino for i5/OS development team

Thomas Gray
Debbie Landon
Joanna Pohl-Misczyk
Jenifer Servais
ITSO, Poughkeepsie Center
International Technical Support Organization, Rochester Center

## Become a published author

Join us for a two- to six-week residency program! Help write an IBM Redbook dealing with specific products or solutions, while getting hands-on experience with leading-edge technologies. You'll have the opportunity to team with IBM technical professionals, Business Partners, and Clients.

Your efforts will help increase product acceptance and customer satisfaction. As a bonus, you'll develop a network of contacts in IBM development labs, and increase your productivity and marketability.

Find out more about the residency program, browse the residency index, and apply online at:

ibm.com/redbooks/residencies.html

## **Comments welcome**

Your comments are important to us!

We want our Redbooks to be as helpful as possible. Send us your comments about this or other Redbooks in one of the following ways:

▶ Use the online **Contact us** review redbook form found at:

ibm.com/redbooks

Send your comments in an email to:

redbooks@us.ibm.com

Mail your comments to:

IBM Corporation, International Technical Support Organization Dept. HYTD Mail Station P099 2455 South Road Poughkeepsie, NY 12601-5400



# 1

# Introduction to Lotus Notes and Domino 7

This chapter introduces Lotus Notes and Domino 7 and provides a brief overview of this newest release from Lotus. It also provides a high-level look at what is new with Domino 7, specifically what is new for Domino 7 for i5/OS. Finally, it outlines some of the Domino extended products that are supported.

## 1.1 What is Domino?

Domino is the world's most successful groupware product. Domino is software, a framework. an infrastructure that connects people to anyone, anywhere, any time. Domino is hard to define because it adapts to so many different tasks. Domino is an environment that makes it easier for you to productively perform unstructured work using a wealth of rapidly changing information and knowledge. Domino is middleware that lets you add the 'human touch' to the Web and to your business-to-business interactions.

#### A robust, versatile architecture

Domino is built on several key foundations that make it perfect for the applications that today's knowledge workers need and extendable for the applications of the future:

- A unique related database architecture that combines structured and unstructured data. The foundation for a different type of application than what we build with DB2 and OLTP.
- ► A messaging infrastructure that lets users and applications send anything to anyone. Rich, full-function e-mail is just one example. With Domino, people can send messages to applications and applications can send messages to people or to other applications which is critical for workflow and business process automation.
- A rich application development environment that's visual, event-driven, fun, and easy to use.
- Unmatched replication capability that's perfect for today's distributed, mobile workforce. Information can exist in multiple places: central servers, distributed servers, desktops, disconnected laptops. Domino keeps it all in sync.

#### A flexible application environment

What kind of applications are appropriate for Domino? Many, as the thousands available from Lotus ISVs demonstrate. They fall into several broad groups:

- Collaborative applications that track information (like ISO9000 projects, legal cases, FDA approval processes), disseminate information (corporate policy documents, HR procedures, tips and techniques), and share ideas (discussion forums).
- ▶ Web applications that focus on information sharing, collaboration, and business process automation. A Domino database is a collection of documents (just like a Web site). It has built-in capabilities for sorting and viewing in different ways, for managing the documents (complete with built-in workflow for approval), and for e-mail integration. All things you need for a good Web site.
- Knowledge management, the next wave of applications to manage and leverage intellectual capital, the new currency of business.

Even as new features are made available with each Domino release, Domino 7 continues to protect your investment. As shown in Figure 1-1, by providing backwards compatibility such that release 2 applications from 10 years ago can still be used with today's Domino 7 server.

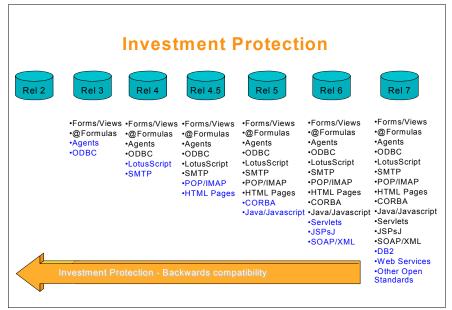


Figure 1-1 Domino investment protection

#### 1.1.1 Enhancements in Domino 7

The Domino 7 enhancements discussed in this section can help reduce time and costs associated with administration, systems management, software deployment and configuration.

#### Domino domain monitoring

The Domino domain monitoring feature provides monitoring capabilities and fast recognition and reporting of critical server issues by delivering a single, feature-oriented view through which administrators can see the status of multiple Domino servers across one or more domains. This customizable tool enables administrators to assess the overall health of all Domino servers in the enterprise and locate problems that may need attention. When a problem is reported, Domino domain monitoring suggests probable causes and provides possible solutions to fix the problem. It also displays any correlated events, enabling administrators to see if the same problem has been reported on other servers.

#### **Activity trends**

Domino 7 incorporates the activity trends feature formerly delivered as a separate product called IBM Tivoli Analyzer for Lotus Domino software. This integrated software technology provides powerful, predictive analysis tools to help administrators predict growth and sizing requirements within the Domino server environment and to plan for potential hardware and software changes. Additional capabilities include workload balancing and change management tools to help keep your infrastructure running at an optimal level, and seamless integration with the Domino 7 administration client.

#### Mail policies and policy lockdown

Domino software has long provided features that enable policy-based administration and management for Lotus Notes desktop settings. With Domino policy-based administration, you can easily set standards and enforce IT policies across the organization. With Domino 7, you have the option to lock down the settings, and policies can be extended to cover mail and calendar settings stored in user mail files.

#### Security and anti-spam enhancements

Domino 7 offers improvements to Lotus Notes ID management and enhanced security features. These include application programming interfaces for manipulating secure e-mail and the option to use 1024 bit RSA encryption keys and 128 bit symmetric keys for the Lotus Notes remote procedure call (RPC) protocol. Enhanced anti-spam features include the use of domain name system (DNS) whitelists containing public lists of acceptable sources.

#### **Expanded interoperability and integration**

Domino 7 software helps you extend the reach of your Domino data and applications through support for Web services and open standards and an option to use IBM DB2 Universal Database as an alternative data store.

Domino 7 offers native support for Web services, including a Web services hosting environment based on Simple Object Access Protocol (SOAP). IBM Lotus Domino Designer 7 application development tool provides complementary enhancements including a Web services design element and built-in support for Web Services Description Language (WSDL). The combination of these capabilities can help you easily extend and integrate your applications with Java™ 2 Enterprise Edition (J2EE) and Microsoft®.NET environments, often with less time and effort and using existing skills. Support for open standards also makes it easy to integrate Domino solutions with other IBM software, including IBM Workplace Collaboration Services, IBM Workplace Services Express and IBM WebSphere Portal software.

#### **Rooms and Resources Manager**

Domino 7 has centralized the processing of room and resource reservations into a new Rooms and Resources Manager (RnRMgr) task. The Rooms and Resources Manager is designed to prevent overbooking of rooms or resources and is responsible for both the processing of all workflow that is related to reserving a room or resource as well as accurately updating the Busytime database.

Rooms and Resources Manager handles functionality previously handled in multiple places such as router, the Rooms and Resources Template and the Schedule Manager. Regardless of where the reservation request is created, that is, either in the Resource Reservations database, a user's calendar, or using the Internet, the reservation request will not have any conflicts with other reservations. The Rooms and Resources Manager task accepts the same server console commands that the Schedule Manager does because it performs the same functionality

#### **Enhanced support for Linux**

On July 10, 2006, IBM announced a new platform option for IBM Lotus Notes software: Lotus Notes for Linux®. Beginning July 24, 2006, Lotus Notes licensees will be able to run Lotus Notes 7.0.1 software on select Linux client operating systems.

With Lotus Notes for Linux, companies will be able to use Lotus Notes on a Linux workstation in a supported fashion, without using virtualization software like WINE or VMWare, without installing Workplace Managed Client, and without waiting for a future release of the Lotus Notes client.

#### Lotus access for SAP solutions

Domino 7.0.1 introduced five out-of-the-box capabilities that let you integrate SAP business applications and workflow with your Lotus Notes collaboration client at no additional charge:

- ▶ Time reporting
- Vacation/leave request

- ► Contact management
- ► Workflow integration
- Report generation

Domino 7.0.2 software will add two more capabilities:

- Meeting scheduling
- Employee/manager self-service

**Note:** For SAP and Domino applications integration, IBM provides LOTUS SAP CONNECTOR, refer to the white paper *Lotus Integration Technologies for SAP* available at the following Web site:

ftp://ftp.software.ibm.com/software/lotus/info/Domino/SAPandDomino042002.zip

#### **Lotus Notes and Domino 7.0.2**

Version 7.0.2 of the Domino software is planned to be more than just a maintenance release. In addition to delivering software fixes, IBM plans to add bonus features such as a Lotus Notes Smart Upgrade 'run as admin' utility, new platform options and enhanced integration capabilities.

Lotus Notes and Domino 7.0.2 software will expand support for open standards through:

- A new calendar option to import information from standards-based internet calendars into the Lotus Notes calendar.
- ► Lotus Domino eXtensible Markup Language (DXL) support for outlines, shared columns, shared files, and style sheets.
- ► HTML application programming interface (API) to convert Lotus Notes forms, views and documents to HyperText Markup Language (HTML).

# 1.2 Why choose i5/OS as your Domino server platform?

Domino runs on seven different server platforms. What makes the System i platform standout from the crowd? People use phrases about outstanding partnerships to describe Domino together with i5/OS:

- ► A marriage made in heaven
- Bringing the best together for business
- Uniting two 'hall of fame' technologies

#### 1.2.1 i5/OS architecture and Domino

Why? Because the two architectures complement each other so well. They're both versatile and integrated. They're both independent of underlying technology, which means they can change with the times. Put them together and they deliver values that are critical to your business success.

#### Reliability and availability

The System i family builds on the iSeries history of robust hardware and software reliability. It is applications that are always available when your users need them. It is the application subsystem architecture that isolates Domino applications from each other and from other work, which means that applications stay up and running consistently. And if a problem occurs, i5/OS automatically stops and restarts the Domino server without affecting other activity on the system.

#### Scalability

On the System i platform, you can grow your Domino workload with the same operating system and the same skill. With the combination of advanced scalable technology and architectural advances for Domino servers, the System i platform is achieving extraordinary results. For the latest Notesbench results, see the Domino for i5/OS Web site at the following address:

http://www.ibm.com/servers/eserver/iseries/domino/scalerecord.html

#### Integration

Domino for i5/OS is designed to integrate with many built-in i5/OS services including security, backup and recovery, directory, systems management, iSeries Navigator, Java virtual machine (JVM), and IBM DB2 Universal Database for iSeries. Furthermore, the System i5 platform is the only system that allows deployment of Linux, Java, UNIX, Microsoft Windows, and Domino-based applications on a single system.

Domino for i5/OS applications can take advantage of direct real-time access to the DB2 Universal Database for i5/OS database, with or without programming. Users can embed the results of a DB2 Universal Database for iSeries query into a Notes document without needing programming. Domino for i5/OS allows access to DB2 Universal Database for i5/OS from Domino application development tools and APIs. This access is direct, without needing an Open Database Connectivity (ODBC) driver or a middleware communications layer when the application code runs on the server rather than the client.

#### Mixed workload

With Domino partitioning and i5/OS subsystems, customers can safely and reliably run multiple instances of Domino doing different types of Domino applications on the same system footprint. And, on traditional System i machines, customers can combine Domino with other non-Domino work, like enterprise resource planning (ERP) applications.

#### Speed of deployment

The System i reputation for speedy deployment extends to Domino. Because so much is built-in and pre-integrated into i5/OS, the administrator has less work to do when the System i machine arrives. Administrators can move quickly to the task of delivering services to end users.

#### Ease of administration

System i machine have a 'built for business' design. The capabilities an administrator needs are integrated and consistent, which means less money spent on people managing servers and more time available to deliver real value to the business.

#### Lower total cost of ownership

The primary benefits of installing Domino for i5/OS include data integration, centralized management, and solution consolidation. Domino for i5/OS offers customers a single hardware platform to manage both their line of business applications and their collaborative applications. Customers with a Domino implementation on i5/OS do not need to invest in an additional hardware platform, operating system software, or skills needed to maintain this environment. Furthermore, the ability to run Domino applications and a Linux firewall or spam filter on the same system connected with a gigabit virtual ethernet gives you unmatched flexibility. Powerful functionality coupled with unique integration and simplified systems management make Domino for i5/OS one of the most cost-effective investments possible, now and in the years to come.

#### 1.2.2 What's new with Domino 7 for i5/OS?

Domino 7 for i5/OS uses the licensed program ID of 5733-LD7 for the installed product identifier. Domino 7 for i5/OS is only available through the Passport Advantage ordering process. For more information see the Passport Advantage Web site:

http://www.ibm.com/software/sw-lotus/services/cwepassport.nsf/wdocs/passporthome

Domino 7 for i5/OS is only supported on IBM i5/OS V5R3 or later. Domino 7 cannot be installed and is not supported on OS/400 V5R2.

**Attention:** Support for i5/OS Cluster Enabled Domino has been removed, use Domino clustering instead.

#### Domino administration using iSeries Navigator tasks on the Web

Beginning with i5/OS V5R4, administration of Domino servers from iSeries Navigator tasks on the Web is now supported. This feature allows you to perform most of the same tasks that you can perform when using the Domino plug-in for iSeries Navigator Windows® interface, but from a Web browser.

The iSeries Navigator Web interface for Domino differs from the iSeries Navigator Windows interface for Domino in that it is shipped with i5/OS. Whereas the iSeries Navigator Windows interface for Domino is shipped as an iSeries Navigator plug-in as part of the Domino for i5/OS product. Therefore, there is no need for any update operation to run on the client in order to get a newer version of the iSeries Navigator Web interface for Domino. Whenever you update to a new i5/OS level, you get the latest version of the iSeries Navigator Web interface for Domino.

#### New WRKDOMSVR options

Domino 7 for i5/OS is changing the way support troubleshoots a hang. The following new options are available from the Work with Domino Servers (WRKDOMSVR) display:

- ► Option 14 = Work with support files
- ► Option 15= Work with NSDs
- ► Option 16= Dump server call stacks

To see these new options from the Work with Domino Servers (WRKDOMSVR) display, press the function 23 key (shift and F11).

This new functionality works well in Domino multi-version environments.

Prior to Domino 7 for i5/OS, the DMPSVRSTKS functionality was available in the form of a downloadable tool at the following URL:

http://www.ibm.com/servers/eserver/iseries/domino/devtools/dmp/

Domino 7 for i5/OS introduced the Dump Domino Server Call Stacks (DMPDOMSVRC) CL command that reads the pid.nbf file under the data directory of the specified Domino server to determine which jobs will have their call stacks dumped.

For additional information on Domino 7 for i5/OS problem determination, see Chapter 8, "Problem determination" on page 289.

#### **Multi-versioning**

Domino 7 continues to provide support for Domino multi-versioning on the same i5/OS partition. Multi-versioning supports the following functionality:

- Install new releases with no user interruption
- Update Domino servers on demand
- ► Test new releases
- ► Keep older multi-version capable Domino releases to run applications
- Consolidate multiple Domino servers in just one i5/OS partition

For additional information on multi-versioning, see the IBM Redbook, *Lotus Domino 6 Multi-Versioning Support on the IBM eServer iSeries Server*, SG24-6940:

http://www.redbooks.ibm.com/abstracts/sg246940.html?Open

# 1.3 Domino extended products for i5/OS

IBM Lotus software provides additional collaboration products that run on top of a Domino server. This includes the following products:

- Domino Fax for i5/OS
- Sametime
- ▶ QuickPlace
- Domino Document Manager
- ► Lotus Enterprise Integrator

For detailed information go to the following Lotus Domino for i5/OS Extended product updates Web site:

http://www.ibm.com/servers/eserver/iseries/domino/support/extprod.html

#### 1.3.1 Domino Fax for i5/OS

IBM Integrated Domino Fax for i5/OS (5733-FXD) enables Lotus Notes users to send and receive faxes directly from their Lotus Notes client using their current telephone system and Domino infrastructure. Users simply specify the intended recipients in the  $Fax\ To$  field. Inbound faxes arrive in the recipient's inbox promptly and privately.

Domino Fax for i5/OS supports more than just simple text. You can also fax Notes memos containing rich text and graphics. You can format and fax files attached to your Notes memo. And with the Print-to-Fax driver, Notes users can send faxes directly from within a Microsoft Windows application, such as word processing or spreadsheet software.

#### 1.3.2 IBM Lotus Sametime

IBM Lotus Sametime 7 is IBM's market-leading platform for real-time collaboration. It is based on three on demand capabilities:

- ▶ **Presence awareness:** see, in advance, if someone or an application is available to collaborate, share information and/or take action.
- ► Instant messaging: ability to virtually converse through the exchange of text or audio, or video-based information in real-time.
- ▶ **Web conferencing:** share information, an application or an entire desktop or engage in team whiteboarding.

Though basic in nature, this combination presents customers with virtually unlimited possibilities. In fact, over fifteen million people worldwide use Lotus Sametime everyday to gain instant access to people and information, bring together geographically dispersed team members, and help improve individual and team productivity.

#### 1.3.3 IBM Lotus QuickPlace

IBM Lotus QuickPlace 7 is an enterprise-ready, self-service work space expressly designed for team collaboration. With Lotus QuickPlace, users can instantly create secure workspaces for their team, providing them with a virtual work space to communicate, coordinate and collaborate on any project or specialized initiative. Key Lotus QuickPlace capabilities include:

- ► Coordination: people, tasks, plans, and resources.
- ▶ Collaboration: ideas and discussion, issues, shared documents, and files.
- ► Communication: actions and decisions, key findings and lessons, and knowledge capture.

Organizations of all sizes can take advantage of Lotus Quickplace, right out-of-the-box or they can easily customize it to meet their unique business requirements.

### 1.3.4 IBM Lotus Domino Document Manager

Capture, organize, manage and re-use business documents and content easily using IBM Lotus Domino Document Manager's secure, distributed document library with built-in collaborative capabilities. Lotus Domino Document Manager is a collaborative document management system for organizing documents for effective shared access by authorized work teams or individuals. The software manages multiple versions, automates document processes like review and approval.

And, with complementary offerings, it helps provide the foundation for Web content management and document lifecycle management solutions. Transparent integration with e-mail and desktop applications help users easily organize important e-mail attachments and content to share and re-use in a safe, managed library environment.

## 1.3.5 IBM Lotus Enterprise Integrator

IBM Lotus Enterprise Integrator for Domino is an enterprise application integration and server-based data access tool that provides industrial strength, real-time data access, bidirectional data movement, exchange, transformation, and synchronization among a wide range of applications and data sources supported by Lotus Connectors. These data sources include Lotus Domino, IBM DB2 Universal Database, Oracle, Sybase, Microsoft SQL Server and Microsoft Access using Object Link Embedding database (OLE DB), file system, text and Open Database Connectivity (ODBC) data sources.

Lotus Enterprise Integrator can easily and seamlessly perform enterprise-scale interactions in real time, on a scheduled or event-driven basis, on a one-time basis, or simply on demand. The point-and-click user interface helps to ease an otherwise complex and daunting integration project.



# 2

# Prerequisites for running Domino 7 on i5/OS

This chapter describes the hardware and software requirements for Domino 7 servers running on i5/OS. These are the conditions which must be met and verified prior to attempting the installation and configuration of a Domino 7 server on i5/OS.

# 2.1 Deciding on the proper version of Domino 7 for i5/OS

When deciding what version of Domino 7 for the i5/OS you would like to install on a System i machine, it is important to be aware of the specific versions of Domino 7 currently available from IBM. Over regular intervals throughout each year, IBM provides updated levels of various product lines. For the latest information regarding the current versions of Domino 7 for the i5/OS, refer to the following Lotus Domino for i5/OS Domino 7 updates Web site:

http://www.ibm.com/servers/eserver/iseries/domino/support/mr70.html

IBM provides for the Domino 7 product and subsequent updates to the product, three classes of code packages available for the i5/OS. Following is an explanation of the three code packaging types and why it is important to stay aware of these code packages as they become available or are identified as being needed:

► Lotus Domino Maintenance Releases (MRs)

MRs are regularly scheduled updates to Domino feature releases. They are denoted by the use of a third digit in the release number. For example, Domino 7.0.1 is a Maintenance Release for Domino 7.0. In similar fashion, the initial release of the Domino 7 product made available is now considered Domino 7.0.0. Maintenance Releases typically follow a four-month development cycle and are available for download from the Internet for Passport Advantage members. See 2.1.2, "Obtaining the Domino 7 software for i5/OS" on page 14 for details.

Lotus Domino Fix Packs

Fix Packs are issued as needed to fix specific problems that are identified between scheduled Maintenance Releases (MRs) of Domino. These are pre-packaged module enhancements created to provide a greater level of preventative service and stability when using a specific maintenance release of Domino. Normally, the installation of a Fix Pack eliminates the need for certain individual PTFs to be installed within an environment. When you download a Domino Fix Pack, you will find that the fix is packaged and installed on your system as an i5/OS PTF. Fix Packs are released as necessary and are available for Passport Advantage members to download from the Internet.

In earlier versions of Domino, Fix Packs were previously referred to as Critical Fixpacks, Maintenance Updates (MUs) and Quarterly Maintenance Updates (QMUs). They should be thought of primarily as base code fixes developed for a specific Maintenance Release.

▶ Lotus Domino Program Temporary Fixes

Also known as *hotfixes* or PTFs, these are module enhancements provided directly from Lotus Support to improve the functionality of the Domino Maintenance Release code, even enhancing applied Fix Packs if necessary. These are delivered on an as needed basis dependent upon the customized configuration of a Domino 7 environment. There is no need to request PTFs for your environment unless advised to do so by Lotus Support.

**Note:** Understanding the difference between i5/OS cumulative (cume) and recommended group PTFs for Domino 7 is also necessary. Consult the i5/OS Information Center at the following URL for a better understanding of i5/OS cumulative and group PTFs:

http://publib.boulder.ibm.com/infocenter/iseries/v5r4/topic/rzam8/rzam8fixconcepts1.htm

#### Domino 7 release notes

Administrators planning to install Domino 7 for the i5/OS should check the release notes for technical updates when considering any particular Maintenance Release or Fix Pack. This review is critical as release notes provide administrators with information such as:

- ▶ Updated listings of the latest System i hardware and i5/OS software requirements
- Updated guidance associated with server configuration
- ► Alerts regarding the need for specific i5/OS PTFs needed prior to Domino installation
- ► Enhancements and features not previously available in Domino

Release notes exist for every Maintenance Release and Fix Pack of Domino 7 available. IBM strongly recommends applying the latest Fix Pack available for the latest Maintenance Release to make use of the most advanced Domino 7 functionality available. Accordingly, a review of the release notes of the Fix Pack decided upon would be in order prior to any installation attempt of either a Maintenance Release or Fix Pack. The release notes for every Domino 7 release can be found on the Lotus Documentation Web site:

http://www.lotus.com/ldd/notesua.nsf/RN

In addition to the basic Domino 7 information that you will find in the release notes respective to your chosen Domino 7 Maintenance Release and Fix Pack, make it a priority to also read the release notes chapter on Domino for i5/OS to most effectively maximize the success of any Domino 7 for i5/OS implementation.

#### 2.1.1 Domino 7 for i5/OS product options

For every Maintenance Release of Domino 7, the following product options are available to be installed:

#### ▶ \*BASE option

This option defines the product options that can be installed for a specific product ID. \*BASE must be installed before any other product options can be installed.

#### ► Product option

This option contains the programs, data, and template files needed to run a specific release of Domino. You must select this option to install and configure a Domino server. For example, 5733LD7 option 11 is the product option for Domino version 7.0.1.

#### ▶ C API option

Listed as option 1, this option contains the header files and modules for creating Notes C applications that can run on a Domino 7 server on i5/OS.

If you have application developers who make use of advanced Domino Designer coding techniques within either Domino databases or by connecting compatible technologies with your Domino 7 for i5/OS environment, you may want to include them in the verification that the latest C API option will suffice for their intended programming needs.

**Important:** You can install the C API option 1 later if you are not sure you need it. However, be aware that only one instance of this option can be installed on an i5/OS partition. For more information, see 'Installing multiple releases of Domino' in Chapter 12 of the i400hlp.nsf help database. To determine if a more recent version of the C API is available, check the Domino Developer Tools section of the Domino for i5/OS Developer Resources Web site:

http://www.ibm.com/servers/eserver/iseries/domino/devresources.html

#### Multiple language support

With Domino 7 for i5/OS, you can run more than one language on a Domino server or can have Domino servers running with different languages using the Domino Language Pack and multi-lingual database support. If you plan to run more than one language on a Domino server, you must install the language pack in addition to the Domino software. During the Domino installation process, you have the opportunity to specify whether or not you will be using multiple languages. If so, the language pack installation process will automatically be launched. For more information on using multiple languages, see 'Using National Language Versions' in Chapter 20 of the i400hlp.nsf help database.

See 3.5, "Additional language support" on page 63for details on how to install a Domino Language Pack.

### 2.1.2 Obtaining the Domino 7 software for i5/OS

To obtain the Domino 7 software for i5/OS, your organization can either request the software from your IBM Business Partner or engage IBM directly. IBM makes the Lotus Domino 7 software for i5/OS available to both individual customers and IBM Business Partners through the use of the IBM Passport Advantage system.

Larger enterprises with multiple sites often leverage the full IBM Passport Advantage offering, while smaller enterprises with fewer sites rely upon IBM Passport Advantage Express. These offerings allow organizations running Domino 7 the ability to perform tasks such as:

- Acquiring software licenses
- ► Renewing and reinstating licenses for software maintenance
- Purchasing and maintaining varying levels of technical support

For more information on IBM Passport Advantage, refer to the following Web site:

http://www-306.ibm.com/software/howtobuy/passportadvantage/

#### Accessing Domino software via Passport Advantage

Passport Advantage can be used to request the Domino 7 media in both physical and electronic formats. A Passport Advantage account will allow you to download the software via the Internet from a designated location created for you by IBM, or ask that the software be shipped to you at an additional cost.

If you have difficulty with using Passport Advantage to make either of these requests, contact the Lotus Support Center for assistance. For contact numbers or further assistance, contact Lotus using the following Web site:

http://www-306.ibm.com/software/lotus/support/

# 2.2 Hardware requirements

Before installing Domino 7 for the i5/OS, the appropriate System i hardware is needed to ensure that the installation and configuration of Domino 7 for i5/OS can be completed successfully.

The following hardware configurations are required for environments running Domino 7 servers on i5/OS:

- ► IBM System i5 model 270 or 8xx servers (excluding System i5 800-2463)
- ► IBM System i5 model 520 and above (excluding System i5 520-0900)

To verify that your System i model meets the requirements for Domino 7, you can use the following Display System Value (DSPSYSVAL) CL command to show you the model number of your System i machine:

DSPSYSVAL SYSVAL (QMODEL)

You can use the following Work with Hardware Resources (WRKHDWRSC) CL command to provide the processor capacity and interactive card information:

WRKHDWRSC TYPE(\*PRC)

#### 2.2.1 Disk space and memory: required verses recommended minimums

Between 0.5 and 1.0 megabytes (MB) of memory and 75 MB of free disk space should be available for every user that will have a mail file on your Domino 7 for i5/OS server.

Table 2-1 provides the minimum values for memory and disk space needed in order to successfully install and configure Domino 7 on i5/OS. While you can run Domino 7 for i5/OS using the required minimums shown, it is recommended that your System i hardware prior to Domino 7 installation include a minimum of 512 MB base memory and a minimum of 2.0 gigabytes (GB) of available disk space.

Table 2-1 Minimum and recommended memory and disk space prerequisites

Prerequisite	Required minimum	Recommended minimum
Base memory	288 MB	512 MB
Free disk space	1.6 GB	2.0 GB

When staging the optimal amount of memory and available disk space in preparation for your Domino 7 server on the i5/OS, keep in mind that the recommendations in Table 2-1 are general guidelines. To obtain more specific recommendations regarding Domino for i5/OS and your assumed load of users on your system, take advantage of the IBM Systems Workload Estimator. The estimator can be found online at the following Web site:

http://www-912.ibm.com/estimator

# 2.3 Software requirements

Domino 7 for the i5/OS can only be run on System i machines running i5/OS V5R3 and above. The only exception to this is the initial Release 7.0.0, which is only supported on V5R3. Domino 7.0.1, 7.0.2, and later releases are supported on systems running either V5R3 or V5R4. Use Table 2-2 as a guide to ensure that you are using a version of i5/OS that is compatible with the release of Domino 7 that you are planning to install.

Table 2-2 Domino 7 and i5/OS compatibility

i5/OS version	Can Domino 7 be installed?	Is Domino 7 supported?
V5R2 and below	No	No
V5R3 and above	Yes	Yes (7.0.0 version in V5R3 only)

Before you install Domino 7 for i5/OS, you must install the software necessary to support Domino 7 servers on your system. The following System i software is required:

- ► 5722SS1, option 12 Host Servers
- ► 5722SS1, option 30 Qshell
- ▶ 5722TC1 TCP/IP Connectivity Utilities for i5/OS
- ► 5722JV1 IBM Developer Kit for Java (\*BASE)
- ▶ 5722JV1, option 6 Java Developer Kit 1.4

**Tip:** To determine which software is currently installed on your system, enter the Display Software Resources (DSPSFWRSC) CL command on an i5/OS command line and press Enter. On the Display Software Resources display, the Resource ID column shows the program number, such as 5722TC1 for the TCP/IP Connectivity Utilities for i5/OS.

### 2.3.1 Program Temporary Fixes (PTFs)

In addition to the prerequisite software listed above, it is recommended that you ensure that you have the latest program temporary fixes (PTFs) installed. Domino for i5/OS requires cumulative PTF packages and individual PTFs. Each cumulative PTF package or individual PTF includes installation instructions. For required system fixes specific to i5/OS V5R4 and V5R3 see the Lotus Domino for i5/OS Required System Fixes Web site:

http://www.ibm.com/servers/eserver/iseries/domino/support/ptf.html

For Frequently Asked Questions about PTFs and Domino updates see the following Web site:

http://www.ibm.com/servers/eserver/iseries/domino/domptfgi.html#domupdate

#### **Group PTFs**

A group PTF is a single PTF that you can order. It provides a logical set of PTFs that affect a specific function. You can find information on all group PTFs by release on the Preventive Service Planning Web page at:

http://www-912.ibm.com/s\_dir/sline003.nsf/sline003home

Table 2-3 is a list of generally recommended i5/OS Group PTFs that can affect Domino implementations on i5/OS.

Table 2-3 i5/OS Group PTFs

Group PTF	Description	
Java	All Domino installations should have the latest Java Group PTF installed.	
DB2 Universal Database	Install if moving data between Domino and DB2 Universal Database.	
IBM HTTP Server	Install if using the IBM HTTP (powered by Apache) Server.	
BRMS	Install if using Backup Recovery and Media Services (BRMS).	
TCP/IP	For network communications.	

Table 2-4 lists the specific group PTF numbers for i5/OS V5R3 and V5R4.

Table 2-4 Group PTF numbers for i5/OS V5R3 and V5R4

Group PTF	i5/OS V5R3	i5/OS V5R4
Java	SF99269	SF99291
DB2 Universal Database	SF99503	SF99504
IBM HTTP Server	SF99099	SF99114
BRMS	SF99185	SF99186
TCP/IP	SF99314	SF99315

#### Verifying Group PTFs

To verify the correct group PTF levels are installed on your system, perform the following steps:

- 1. Sign on to a 5250 emulation session on your i5/OS instance.
- 2. Enter the Work with PTF Groups (WRKPTFGRP) CL command on a command line and press Enter.
- 3. In the Work with PTF Groups display (Figure 2-1), which lists the group PTFs installed on your system, as well the level, verify that each group PTF shows a status of Installed.

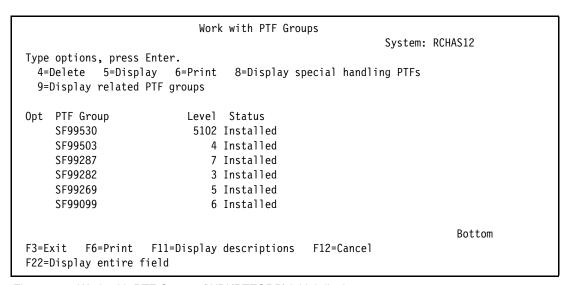


Figure 2-1 Work with PTF Groups (WRKPTFGRP) initial display

4. The initial Work with PTF Groups display provides limited information. For a more descriptive display of the group PTF information, press F11 (Display descriptions) and you see the group PTF descriptions like the example shown in Figure 2-2.

```
Work with PTF Groups
                                                           System:
                                                                    RCHAS12
Type options, press Enter.
 4=Delete 5=Display 6=Print 8=Display special handling PTFs
 9=Display related PTF groups
Opt PTF Group
                          CUMULATIVE PTF PACKAGE C4272530
    SF99530
    SF99503
                          DB2 UDB FOR ISERIES
    SF99287
                         WEBSPHERE APP SERVER V5.0 (BASE EDITION)
                       WEBSPHERE PORTAL EXPRESS/EXPRESS PLUS SERVICE PACK
    SF99282
    SF99269
                          JAVA
    SF99099
                          IBM HTTP SERVER FOR ISERIES
                                                                      Bottom
F3=Exit
         F6=Print
                    F11=Display status F12=Cancel
F22=Display entire field
```

Figure 2-2 Work with PTF Groups (WRKPTFGRP) display, showing the descriptions

You can also use iSeries Navigator to verify the installed group PTFs on your system. From iSeries Navigator, click **My Connections**  $\rightarrow$  **systemname**  $\rightarrow$  **Configuration and Service**  $\rightarrow$  **Fixes Inventory**  $\rightarrow$  **Fix Groups** as shown in Figure 2-3.

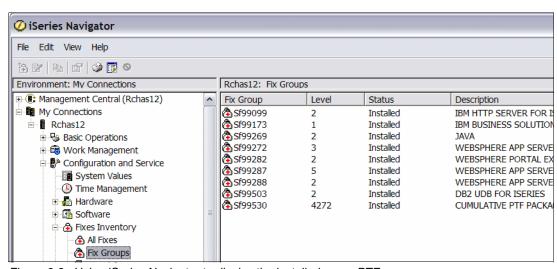


Figure 2-3 Using iSeries Navigator to display the installed group PTFs

For more information, refer to the following Web sites:

- ► Methods and instructions for ordering group PTFs
  http://www.ibm.com/servers/eserver/support/iseries/fixes/orderfix.html
- ► Fix Central http://www-912.ibm.com/eserver/support/fixes/fcgui.jsp

#### Verifying individual PTFs

To determine if the required individual PTFs are installed on your i5/OS instance, perform the following steps:

- 1. Sign onto a 5250 emulation session on your i5/OS instance.
- 2. Enter the following Display Program Temporary Fix (DSPPTF) CL command on an i5/OS 5250 command line and press Enter:

```
DSPPTF LICPGM(productID)
```

In this example, for product ID, we type 5722SS1.

3. In the Display PTF Status display, you see the PTFs that have been applied for a particular product. Figure 2-4 shows the PTFs installed for i5/OS V5R3.

```
Display PTF Status
                                                          System: RCHAS12
Product ID . . . . . . . . . . :
                                        5722SS1
IPL source . . . . . . . . . . . . ##MACH#B ##SERV#P
Release of base option . . . . . . . . V5R3M0 L00
Type options, press Enter.
  5=Display PTF details 6=Print cover letter 8=Display cover letter
     PTF
                                                         IPL
Opt ID
              Status
                                                         Action
     TCO4272 Temporarily applied
                                                         None
     TC04209 Permanently applied
                                                         None
     TCO4153 Superseded
                                                         None
     TCO4118 Superseded
                                                         None
     TC04083 Superseded
                                                         None
     TCP0039 Temporarily applied
                                                         None
     TCP0038 Superseded
                                                         None
     TCP0037 Superseded
                                                         None
     TCP0036 Superseded
                                                         None
                                                                     More...
F3=Exit F11=Display alternate view F17=Position to F12=Cancel
```

Figure 2-4 Displaying PTF status for i5/OS V5R3 (5722SS1)

You can also use iSeries Navigator to verify the installed individual PTFs on your system. From iSeries Navigator, click **My Connections**  $\rightarrow$  **systemname**  $\rightarrow$  **Configuration and Service**  $\rightarrow$  **Fixes Inventory**  $\rightarrow$  *licensed program* as shown in Figure 2-5.

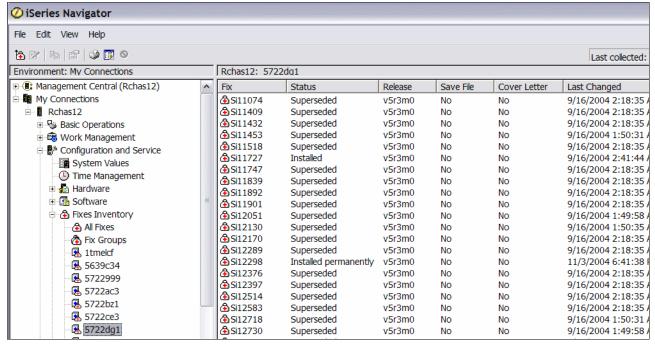


Figure 2-5 Using iSeries Navigator to display installed individual PTFs

### 2.3.2 Additional i5/OS requirements for optional administration support

Domino 7 for i5/OS allows administrators to manage Domino 7 servers in a variety of ways, including:

- Domino 7 Administrator client
- ► Domino 7 Web Admin client
- ▶ 5250 Emulation programs
- ▶ iSeries Access for Windows
- ► iSeries Access for the Web
- ▶ Java Server Console

The additional resources in Table 2-5 list what must be installed in order for these functionalities to be leveraged within your environment.

Table 2-5 Optional prerequisites for use with Domino 7 for i5/OS servers

If you wish to use	Which allows	Then you must install
iSeries Access for Microsoft Windows	i5/OS administration from a Windows workstation	5722XW1 - IBM iSeries Access Base 5722XE1 - IBM iSeries Access for Windows iSeries Access for Windows Service Packs
iSeries Access for the Web	i5/OS administration from a Web browser	5722DG1 - IBM HTTP Server for iSeries  Also, either of the following: 5733W60 - WebSphere Application Server V6 (BASE) 5722WE2- WebSphere Application Server V6 Express In addition to the latest Group PTF for 5733W60

If you wish to use	Which allows	Then you must install
Java Server Console	Manage Domino servers from workstations that support Java	5722AC3 - Crypto Access Provider 128-bit (required for i5/OS V5R3 only)
IBM HTTP Server Plug-in for Domino (available for V5R4 only running Domino 7.0.1 and above)	Forwarding of HTTP traffic to Domino 7 servers	5722DG1 - IBM HTTP Server HTTP Server Group PTF PTF SI19429 - Domino plug-in for HTTP server

For the latest information on iSeries Access for Windows Service Packs, see the following Web site:

http://www.ibm.com/eserver/iseries/access/casp.html

## 2.3.3 i5/OS administrative authority requirements

You want to ensure that you have access to user IDs with the appropriate authorities. The higher the privileges on the user ID being used, the better the chances you won't have difficulty installing any of the prerequisite and extended software resources to allow the desired functionalities to be available before, during, and after the configuration of your first Domino 7 for i5/OS server.

An i5/OS user ID with \*SECADM (Security Administration) and \*ALLOBJ (All Object) special authorities is required to install Domino 7 using the techniques discussed in Chapter 3, "Installing Domino 7 on i5/OS" on page 41. QSECOFR is an example of a user ID that has security officer privileges under i5/OS. In addition to having command line capability, QSECOFR is the default administrator ID on your System i machine.

An i5/OS user ID with \*SECADM,\*ALLOBJ, \*IOSYSCFG (System Configuration) and \*JOBCTL (Job Control) authorities is required to configure Domino 7 servers using the techniques discussed in Chapter 4, "Configuring a Domino 7 server on i5/OS" on page 89.

Throughout this redbook you will notice that the user ID of QSECOFR is used in many of the examples provided. It will be noted when the usage of the QSECOFR user ID is mandatory. Otherwise, keep in mind that any i5/OS user ID with the proper authorities will suffice when performing installation and configuration tasks respectively.

For more information on user class authorities, visit the IBM System i Information Center at: http://publib.boulder.ibm.com/iseries/

## 2.3.4 Domino 7 for i5/OS precautions for LEI installations

1.3, "Domino extended products for i5/OS" on page 8 mentions other collaboration products that are available for use in conjunction with Domino 7 for the i5/OS. If you intend to make use of these products, it is important that you are aware of the versions of Domino which are compatible with them. Consult the Lotus Software for i5/OS Compatibility Guide located at the following Web site to verify the products that will work best with the version of Domino 7 that you will be using:

http://www.ibm.com/servers/eserver/iseries/domino/domino6/pdf/releasesupport.pdf

When preparing for a Domino 7 installation that will also involve installation of LEI, it is critical that you perform the following tasks prior to attempting the installation of LEI:

Consult the LEI Installation documentation for the LEI product level being installed. The LEI Installation Guide and the Release Notes for the LEI product level that has been chosen can be found on the Lotus product documentation repository:

http://www-10.lotus.com/ldd/notesua.nsf

▶ Ensure that product 5799-PTL, iSeries Tools for Developers, is installed. This product will be used during your installation of LEI to allow the use of the VNC server which will be needed to complete your LEI installation. You can verify if this product is installed by using the Display Software Resources (DSPSFWRSC) CL command. If you do not see the product 5799-PTL, iSeries Tools for Developers listed, it can be downloaded from the following Web site:

http://www.ibm.com/servers/enable/site/porting/tools/

Add the parameter EIUse0SMemory=1 to the notes.ini file of the Domino 7 for i5/OS server once the configuration steps from Chapter 4, "Configuring a Domino 7 server on i5/OS" on page 89 have been completed. This variable is required for LEI activities to function correctly that return large result sets and use a sort order. The variable grants LEI access to additional memory resources.

## 2.4 TCP/IP considerations for Domino

Before you configure your first Domino server, you must plan server and organizational naming and security. In addition, you must understand your existing network configuration and how Domino will fit into the network. If you are adding an additional server to an existing Domino infrastructure, you must have already registered the Domino server and its server ID and password must be available.

Domino 7 for i5/OS uses TCP/IP for Lotus Notes client and Domino server connections. Before you install Domino on i5/OS, you must:

- Decide on a naming convention for your Domino servers
- Create, activate, and verify the necessary i5/OS TCP/IP interfaces

## 2.4.1 Naming your Domino servers

Hierarchical names provide unique identifiers to servers and users across your organization. When you register new servers and users, the hierarchical names drive their certification, or their level of access to the system, and control whether users and servers in different organizations and organizational units can communicate with one another.

Because hierarchical naming is the cornerstone of Domino security, planning it is a critical task. We recommend that you perform this task seriously and familiarize yourself with the hierarchical naming conventions before you configure your first Domino server.

Before you configure Domino servers, create a diagram of your company's organization and then use the diagram to help you plan a meaningful Domino server naming scheme. After you create the name tree, create certifier IDs to implement the naming structure and ensure a secure system.

A hierarchical name scheme uses a tree structure that reflects the actual structure of your company. The organization name is at the top of the tree, which is usually the company name. The organizational units, which you create to suit the structure of the company are beneath

the organization name. You can organize the structure geographically, departmentally, or both.

A hierarchical name reflects a user's or server's place in the hierarchy and controls whether users and servers in different organizations and organizational units can communicate with each another. A hierarchical name may include the following components:

- Common name (CN) Corresponds to a user's name or a server's name. All names must include a common name component.
- Organizational unit (OU) Identifies the location of the user or server in the organization. Domino allows for a maximum of four organizational units in a hierarchical name. Organizational units are optional.
- ► Organization (O) Identifies the organization to which a user or server belongs. Every name must include an organization component.
- Country (C) Identifies the country in which the organization exists. The country is optional.

The close relationship between the TCP/IP host names and Domino server names makes it important to think about the Domino server name. A Domino server may have a long name, even with embedded spaces. For example, Acme Domino Server One would be a valid name for a Domino server. This type of naming is possible in Domino environments. However, it is not a valid TCP/IP host name.

By default, when a Lotus Notes client (or another Domino server) tries to connect to a Domino server through the TCP/IP protocol, it uses the common name (CN), which is the first part of the hierarchical name, as the TCP/IP hostname. Such a naming convention can use connection documents to translate between the Notes/Domino name and the TCP/IP hostname or IP address.

**Important:** The first Domino server on i5/OS cannot have a space in its name. In fact, we recommend that you do not use any Domino server names with spaces or underscores. Additional configuration is required to allow client connection and you may have problems managing the Domino server easily. A simple solution is to use a short name with no spaces or underscores in it, such as DOMSVR1. The TCP/IP host name and the Domino server name can then be the same.

#### Giving the Domino server and the System i machine the same name

The easiest way to name a Domino 7 for i5/OS server is to use the existing hostname of the System i machine. If you have an existing TCP/IP network, the System i TCP/IP host name is probably already defined in the Domain Name System (DNS) server or HOSTS files of the clients. This makes configuration much easier. Use the Configure TCP/IP (CFGTCP) menu, option 12 (or the Change TCP/IP Domain (CHGTCPDMN) command) to find out or define the host name of your System i machine.

**Note:** The TCP/IP host name of the System i machine may be identical to the System i machine name (this is recommended for a single server system). However, these are two different parameters and are totally independent.

#### Naming the Domino server and the System i machine differently

Even though it may be the most obvious approach, it is not always possible to use the existing System i machine name as the Domino server name. For example, if you plan to configure more than one logical Domino server (a partitioned server) on the same System i machine, each Domino server must have its own unique name.

Because all Domino 7 servers for i5/OS use i5/OS TCP/IP interfaces, the System i machine can be known in the network by more than one host name. This allows Domino to use a different host name from other i5/OS applications. Two concepts supported by the i5/OS TCP/IP implementation enable this, *multi-homing* and *multi-hosting*.

▶ Multi-homing allows more than one (up to 128 per line, but not more than 512 per System i machine) Internet addresses to be defined on a single network adapter (represented by a communications line description). If you decide that each Domino server will use its own unique TCP/IP address, then create a TCP/IP interface for each Internet address associated with each Domino server.

**Note:** Your System i machine's multi-homed host capability allows for multiple IP addresses on the machine, which you can think of as logical interfaces. These logical interfaces can be associated with one or more physical interfaces. These physical interfaces may be connected to the same or different networks. This allows you to specify either a single interface or multiple interfaces for a line description and use IP aliasing.

▶ Multi-hosting (or name aliasing) allows you to assign up to four host names (aliases) to the same IP address within the i5/OS host table, or even more on DNS name servers. If you decide that more than one Domino 7 server for i5/OS will share a TCP/IP address, distinguished by name and port number, then just add aliases to the existing host table entries, either in the i5/OS host table, a DNS name server database, or the Notes client host tables.

**Note:** If you do not have a DNS name server, make sure that all clients and the i5/OS host table contain entries to translate the server (non-qualified) host name to a numerical Internet address. For example, the host name DOMSVR1 must be translated using a host table or DNS to an IP address, for example 10.1.2.3.

#### **Deciding on the Domino domain name**

A Domino domain is a group of Domino servers that share the same Domino Directory (names.nsf). As the control and administration center for Domino servers in a domain, the Domino Directory contains, among other documents, a Server document for each Domino server and a Person document for each Notes user.

#### Planning for Domino domains

There are four basic scenarios for setting up Domino domains:

- ► The first scenario, which many small and medium size companies use, involves creating only one Domino domain and registering all servers and users in one Domino Directory. This scenario is the most common and the easiest to manage.
- ► The second scenario is common when a large company has multiple independent business units. In this case, one organization spread across multiple domains may be the best scenario. Then all servers and users are members of the same organization, and each business unit administers its own Domino Directory.
- ► A third scenario is common when multiple companies work closely together yet want to retain individual corporate identities. Then one domain and multiple organizations may work best.
- Finally, the fourth scenario involves maintaining multiple domains and multiple organizations. This scenario often occurs when one company acquires another.

Sometimes the decision to create multiple Domino domains is not based on organizational structure at all. For example, you may want to create multiple Domino domains if you have slow or unreliable network connections that prohibit frequent replication of a single, large directory. Keep in mind that working with multiple domains requires additional administrative work and requires you to set up a system for managing them.

Domains can be used as a broad security measure. For example, you can grant or deny a user access to servers and databases, based on the domain in which the user is registered. Using an extended ACL is an alternative to creating multiple domains, because you can use the extended ACL to specify different levels of access to a single Domino Directory, based on organization name hierarchy.

For more information on Domino domain names, refer to the Domino 7 Administrator Help database.

## 2.4.2 Domain Name System (DNS)

The Domain Name System (DNS) is an application that enables a TCP/IP host (in our case, either a Domino server or a Notes client) to determine the IP address associated with a given host name.

**Note:** There is no relationship between the Domino domain name and the domain name mentioned in reference to TCP/IP throughout this section.

The DNS is similar to a telephone book. The user looks up the name of the person or organization to be called and cross references the name to a telephone number. In the case of a DNS, it is the IP address or information on how to find the IP address that is returned. It is a hierarchical client/server-based distributed database. Name servers are programs that contain information about some segment of the network in a database and make it available to the clients.

In many environments, you will need to register the intended hostname for your Domino servers with the network administration team that manages your company's DNS configuration. If you have a firewall positioned between your company's servers and the Internet and you wish to use Domino's SMTP functionality to send and receive Internet mail, you will want to ensure that Domino server's fully qualified hostname is permitted to communicate inbound and outbound on port 25. You will also want to ensure that the Mail Exchange (MX) records are in place to allow the proper routing of messages to your Domino servers.

## 2.4.3 HOSTS file configuration

We recommend that you use a DNS address resolution in your network, because hosts file changes are not flexible. If you do not have a DNS for your TCP/IP network (or you do not want to use it), use the TCP/IP host table entries on i5/OS and the client workstations (see Table 2-6) to associate the host names with the Internet addresses. On Windows clients, the host table is implemented with an ASCII file called HOSTS.

Table 2-6 Location of the HOSTS file on Windows workstations

Windows version	HOSTS file directory location		
Windows 98	[X:]\WINDOWS\		
Windows NT/Windows 2000	[X:]\WINNT\SYSTEM32\DRIVERS\ETC\		

Windows version	HOSTS file directory location		
Windows XP	[X:]\WINDOWS\SYSTEM32\DRIVERS\ETC\		
[X:] represents the letter of the drive where Windows has been installed on your machine.			

If you do not find a file called HOSTS on your PC, search for a file called HOSTS.SAM. Rename or copy it to HOSTS (no extension) and edit it to contain the names of your Domino servers, along with the appropriate IP addresses. Figure 2-6 shows the HOSTS file being edited with the DOS Edit command.

Figure 2-6 Example of a HOSTS file on a Windows 2000 system

To create or modify the host table on i5/OS, use the Configure TCP/IP (CFGTCP) menu, option 10 (Work with TCP/IP host table entries). See Figure 2-7.

		Work with TCP/I	P Host Table Entri	es System:	RCHAS10
Туре	e options, press	Enter.			
1=	Add 2=Change	4=Remove 5=Dis	splay 7=Rename		
	Internet	Host			
0pt	Address	Name			
10.1.2.1		RCHAS10.RCHLAND	O.IBM.COM		
10.1.2.3 DOMSVR1.RCHLAND.IBM.COM DOMSVR1					
	127.0.0.1	LOOPBACK LOCALHOST			
		LUCALIIUST			Bottom
F3=E	Exit F5=Refresh	F6=Print list	F12=Cancel F17	7=Position to	Bottom

Figure 2-7 Example of i5/OS host table entries

## 2.4.4 Configuring TCP/IP on i5/OS

To allow Lotus Notes clients or Web browsers to connect to Domino 7 servers on i5/OS, you must configure and start the i5/OS TCP/IP support. This section provides the minimum steps that you must perform to activate TCP/IP on i5/OS. It is not meant to replace existing i5/OS TCP/IP documentation.

Before you can make use of TCP/IP on i5/OS, a communications line description for a TCP/IP interface must exist.

TCP/IP interface A logical interface used to configure the TCP/IP address of a logical

network source or destination that will remain active.

Line description An i5/OS object (\*LIND) that allows a user to define the type of TCP/IP

interface associated with a specific Internet address on a communications network. See Table 2-7 for a listing of TCP/IP

interface types.

Table 2-7 Line description details for user-defined TCP/IP interface types

User-defined interface type	Line description specified using
Ethernet	CRTLINETH, prior to adding a new TCP/IP interface.
*LOOPBACK	ADDTCPIFC, only if the first octet of the Internet address being added is 127.
*VIRTUALIP	ADDTCPIFC, when using circuitless interfaces.
*OPC	ADDTCPIFC, when adding an OptiConnect interface.

For additional assistance with the creation of line descriptions prior to adding a new TCP/IP interface, contact your System i Support Center or reference the System i Information Center:

http://publib.boulder.ibm.com/infocenter/iseries

## 2.4.5 Creating a new TCP/IP interface

The following steps explain how to add a TCP/IP interface to i5/OS. The procedure will associate an Internet address with an existing line description to allow that Internet address to communicate on your organization's TCP/IP network from the System i machine.

- 1. Sign on to your System i machine with a user profile that has the following special authorities. See 2.3.3, "i5/OS administrative authority requirements" on page 21 for additional information on authorities.
  - \*ALLOBJ
  - \*SECADM
  - \*IOSYSCFG
- 2. From the i5/OS command line, type **CFGTCP** and press Enter to display the Configure TCP/IP menu.

3. On the Configure TCP/IP menu (Figure 2-8), type option 1 (Work with TCP/IP interfaces) and press Enter to Work with TCP/IP Interfaces on your System i machine.

```
CFGTCP
                               Configure TCP/IP
                                                                       RCHAS10
                                                             System:
Select one of the following:
    1. Work with TCP/IP interfaces
    2. Work with TCP/IP routes
    3. Change TCP/IP attributes
     4. Work with TCP/IP port restrictions
     5. Work with TCP/IP remote system information
    10. Work with TCP/IP host table entries
    11. Merge TCP/IP host table
    12. Change TCP/IP domain information
    20. Configure TCP/IP applications
    21. Configure related tables
    22. Configure point-to-point TCP/IP
Selection or command
===> 1
                                    F12=Cancel
F3=Exit
          F4=Prompt
                      F9=Retrieve
```

Figure 2-8 Configure TCP/IP (CFGTCP) menu

4. On the Work with TCP/IP Interfaces display, type an option 1 (Add) in the Opt column and enter the Internet address of the new interface on the blank line in the Internet Address column. Press Enter (Figure 2-9).

```
Work with TCP/IP Interfaces
                                                                      RCHAS10
                                                            System:
Type options, press Enter.
        2=Change
                     4=Remove
                                5=Display
                                            9=Start
                                                      10=End
 1=Add
     Internet
                      Subnet
                                          Line
                                                    Line
Opt Address
                                       Description Type
                      Mask
 _1_ 10.1.2.3
    10.1.2.1
                      255.255.255.0
                                       ETHLINE
                                                    *ELAN
                                       *LOOPBACK
                                                    *NONE
     127.0.0.1
                      255.0.0.0
    192.168.9.106
                      255.255.255.0
                                       PRIVATE
                                                    *ELAN
F3=Exit
             F5=Refresh
                          F6=Print list
                                          F11=Display interface status
F12=Cancel
             F17=Top
                          F18=Bottom
```

Figure 2-9 Work with TCP/IP Interfaces display

- 5. On the Add TCP/IP Interface (ADDTCPIFC) display (Figure 2-10), enter the following information and press Enter:
  - The name of the line description for the new interface.
  - The subnet mask for the new interface.

```
Add TCP/IP Interface (ADDTCPIFC)
Type choices, press Enter.
Internet address . . . . . > '10.1.2.3'
Line description . . . . . . . < Enter Description > Name, *LOOPBACK...
Subnet mask . . . . . . . < Enter Subnet Mask>
Alias name . . . . . . . . . . . . .
                                   *NONE
Associated local interface . . .
                                   *NONE
Type of service . . . . . . . .
                                   *NORMAL
                                                 *MINDELAY, *MAXTHRPUT...
                                                 576-16388, *LIND
Maximum transmission unit . . .
                                   *LIND
Autostart . . . . . . . . . . . .
                                   *YES
                                                 *YES, *NO
                                                 001-FFF
PVC logical channel identifier
               + for more values
X.25 idle circuit timeout . . .
                                   60
                                                 1-600
X.25 maximum virtual circuits .
                                   64
                                                 0-64
X.25 DDN interface . . . . . .
                                   *N0
                                                 *YES, *NO
                                   *MSB
                                                 *MSB, *LSB
TRLAN bit sequencing . . . . .
                                  F12=Cancel F13=How to use this display
         F4=Prompt
                     F5=Refresh
F3=Exit
F24=More keys
```

Figure 2-10 Add TCP/IP Interface (ADDTCPIFC) CL command

## 2.4.6 Activating and verifying the new TCP/IP interface

Perform the following steps to activate and verify the newly added TCP/IP interface:

1. If it is not already started, start the TCP/IP support by typing the Start TCP/IP (STRTCP) CL command on the i5/OS command line and press F4 to prompt the command. See Figure 2-11. After confirming the desired settings press Enter to start TCP/IP.

**Tip:** If you do not see the F11=Display interface status at the bottom of the Work with TCP/IP interfaces display, you know that the TCP/IP support has not been started.

```
Start TCP/IP (STRTCP)
Type choices, press Enter.
                         Additional Parameters
Start application servers . . .
                                 *YES
                                               *YES, *NO
Start TCP/IP interfaces . . . . *YES
                                               *YES, *NO
Start point-to-point profiles .
                                 *YES
                                               *YES, *NO
                                               *YES, *NO
Start IPv6 . . . . . . . . . . .
                                 *YES
F3=Exit
         F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys
```

Figure 2-11 Start TCP/IP (STRTCP) CL command

- 2. From the Configure TCP/IP menu, type option 1 (Work with TCP/IP interfaces) and press Enter to return to the Work with TCP/IP Interfaces display shown Figure 2-9 on page 28.
- 3. To start the new TCP/IP interface, type option 9 (Start) next to the TCP/IP address and press Enter.
- 4. Press F11 (Display interface status) to see whether the new interface is active.

#### TCP/IP interface verification using PING (VFYTCPCNN) command

Verify that your TCP/IP connection is active using the Verify TCP/IP Connection (VFYTCPCNN) CL command, also known as PING. The easiest way to see the results of the PING command is to use the i5/OS Command Entry display. Perform the following steps:

- On the i5/OS command line, type the following command and press Enter:
   CALL QCMD
- 2. Press F10 to include detailed messages.
- Type PING and press F4 to prompt the command (Figure 2-12). Enter the Internet address
  you defined when creating your TCP/IP interface in 2.4.4, "Configuring TCP/IP on i5/OS"
  on page 27 and press Enter.

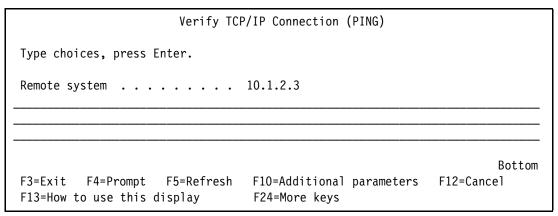


Figure 2-12 Verify TCP/IP Connection (PING) command

4. The connection verification statistics should appear, as shown in Figure 2-13.

```
Command Entry
                                                                       RCHAS10
                                                           Request level:
All previous commands and messages:
     End of requests.
 3 > STRTCP
 3 > PING RMTSYS('10.1.2.3')
     Verifying connection to host system 9.5.92.18.
     PING reply 1 from 10.1.2.3 took 2 ms. 256 bytes. TTL 64.
     PING reply 2 from X10.1.2.3 took 0 ms. 256 bytes. TTL 64.
     PING reply 3 from 10.1.2.3 took 0 ms. 256 bytes. TTL 64.
     PING reply 4 from 10.1.2.3 took 0 ms. 256 bytes. TTL 64.
     PING reply 5 from 10.1.2.3 took 0 ms. 256 bytes. TTL 64.
     Round-trip (in milliseconds) min/avg/max = 0/0/2.
     Connection verification statistics: 5 of 5 successful (100 %).
                                                                         Bottom
Type command, press Enter.
===>
F3=Exit
         F4=Prompt
                      F9=Retrieve
                                    F10=Exclude detailed messages
F11=Display full
                       F12=Cancel
                                     F13=Information Assistant
                                                                 F24=More keys
```

Figure 2-13 Results of using the PING command to verify the TCP/IP connection

**Note:** Verifying the connection by using the (numerical) IP address is not normally sufficient to ensure that the Lotus Notes clients or other Domino servers can connect to your Domino 7 server on i5/OS. The Lotus Notes clients also assume that the name of the Domino server to connect to is known as a TCP/IP host name. See 2.4.1, "Naming your Domino servers" on page 22 for more details.

## 2.5 Considerations when upgrading to Domino 7 for i5/OS

If you plan to install Domino 7 for i5/OS on an System i machine with Domino 6 servers running Domino versions 6.0, 6.0.1 or 6.0.2, all of your Domino servers will be upgraded to Domino 7 automatically during install. If you have Domino servers configured for 6.0.3 or 6.5 or later, you can use the Update Domino Server (UPDDOMSVR) command to upgrade your servers to the desired versions of Domino 7. For more information on UPDDOMSVR, see 5.2.4, "Update Domino Server (UPDDOMSVR)" on page 175.

## 2.5.1 Verifying release functionality before the upgrade

For the purposes of this example, lets assume that we want to upgrade a Domino server called DOMSVR1 to a Domino 7 Maintenance Release. The process outlined in this section can assist you in preparing for the upgrade that is being scheduled.

#### Identifying the initial Domino release of the server being upgraded

Perform the following steps to identify the initial release of Domino for the Domino server to be upgraded:

 From the i5/OS command line, type the Work with Domino Servers (WRKDOMSVR) CL command and press Enter to see all the Domino servers currently configured on the system. See Figure 2-14.

```
Work with Domino Servers
                                                             System:
                                                                       RCHAS10
Type options, press Enter.
 1=Start server
                     2=Change server
                                       5=Display console
                                                            6=End server
 7=Submit command
                     8=Work console
                                       9=Work server jobs
 11=Change current directory 12=Work object links
                                                       13=Edit NOTES.INI
                                       Domino
     Domino
Opt Server
                           Subsystem
                                       Status
                          DOMSVR1
                                       *STARTED
     DOMSVR1
     DOMSVR2
                          DOMSVR2
                                       *ENDED
                                                                         Bottom
Parameters or command
===>
F3=Exit
         F5=Refresh
                       F9=Retrieve
                                     F10=Sort by name
                                                         F11=Display library
F12=Cancel
             F17=Top
                       F18=Bottom
                                     F23=More Options
                                                         F24=More keys
```

Figure 2-14 Work with Domino Servers (WRKDOMSVR) command

2. On the Work with Domino Servers display, press the F11 key (Display library) to display the libraries and releases of the existing Domino servers on the system. In our example (as shown in Figure 2-15) it is confirmed that DOMSVR1 is currently running Domino 6.5.4.

```
Work with Domino Servers
                                                             System:
                                                                       RCHAS10
Type options, press Enter.
 1=Start server
                     2=Change server
                                       5=Display console
                                                           6=End server
                     8=Work console
                                       9=Work server jobs
 7=Submit command
 11=Change current directory 12=Work object links
                                                       13=Edit NOTES.INI
     Domino
                                                    Domino
0pt
    Server
                                                    Release
                           Subsystem
                                       Library
                          DOMSVR1
                                        QDOMIN0654 6.5.4
     DOMSVR1
                          DOMSVR2
                                       QDOMIN0652 6.5.2
     DOMSVR2
                                                                         Bottom
Parameters or command
F3=Exit
             F5=Refresh
                          F9=Retrieve
                                        F10=Sort by name
                                                            F11=Display path
F12=Cancel
             F17=Top
                          F18=Bottom
                                        F23=More Options
                                                            F24=More keys
```

Figure 2-15 Work with Domino Servers display showing the libraries and releases of Domino

#### Check for Fix Packs and PTFs in use for the initial Domino release

Once you have verified the initial maintenance release or releases of the Domino server to be upgraded, you must factor in the possibility that fixes may have been applied while this release has been running on your production environment to add to the overall stability of Domino on your system. The two release enhancement categories that you should be concerned with checking for are:

- Program Temporary Fixes Also known as hotfixes or PTFs, these are module enhancements provided directly from Lotus Support to improve the functionality of the Domino Maintenance Release code. These are delivered on an as needed basis associated with the customized configuration of a Domino environment.
- Fix packs These are pre-packaged module enhancements created to provide a greater level of preventative service and stability when using a specific maintenance release of Domino. Normally, the installation of a fix pack eliminates the need for certain individual PTFs to be installed within an environment.

In order to verify the fix packs and PTFs installed for the version of the Domino server being upgraded to Domino 7, use the Display Program Temporary Fix (DSPPTF) CL command. For the purposes of the example in this section, we will continue with the example scenario where we have determined that DOMSVR1 is currently running Domino 6.5.4. Perform the following steps:

- From an i5/OS command line, type the Display Software Resources (DSPSFWRSC) CL command and press Enter to display the software resources currently installed on your system.
- 2. From the Display Software Resources display, use the Page Up and Page Down keys to scroll through the listing of licensed products until you locate the product number associated with the initial release of Domino running on the Domino server that is scheduled for upgrade. In our example, shown in Figure 2-16, the licensed product number for Domino 6.5.4 is 5733L65, option 14.

```
Display Software Resources
                                                         System: RCHAS10
Resource
  ΙD
         Option Feature Description
5722XW1
         *BASE 5050 iSeries Access Base
5722XW1
         *BASE
                  2924
                         iSeries Access Base
                  5101
5722XW1
                         iSeries Access Option 1
        1
5733L65
        14
                  5050
                         Lotus Domino 6.5: Release 6.5.4
5733L65
         14
                  2924
5733L65
         *BASE
                  5050
                         Lotus Domino 6.5 (5724E70)
                         Lotus Domino 6.5 (5724E70)
5733L65
         *BASE
                  2924
5733L65
        15
                  5050
                         Lotus Domino 6.5: Release 6.5.5
                  2924
                         Lotus Domino 6.5: Release 6.5.5
5733L65
         15
                         Licensed Internal Code - AJDGP01 9400DGP
AJDGP01
        *BASE
                  5050
                                                                     More...
Press Enter to continue.
         F11=Display libraries/releases
F3=Exit
                                         F12=Cancel
F19=Display trademarks
```

Figure 2-16 Display Software Resources (DSPSFWRSC) command

- 3. Press F3 to exit the list of licensed products.
- 4. From an i5/OS command line, type the following Display PTF (DSPPTF) CL command and press Enter to display the PTFs and fix packs installed associated with Domino 6.5.4:

DSPPTF LICPGM(5733L65) RLS(V6R5M4)

Where (for this example):

5733L65 is the licensed product number obtained from DSPSFWRSC

V6R5M4 is the format to designate that, in a multi-versioned environment where there
could be groups of hotfixes and fix packs for each level of Domino on the system, only
hotfixes and fix packs associated with Domino 6.5.4 should be identified.

See Figure 2-17.

**Note:** You will only need the RLS parameter if you are already on a multi-version capable Domino Maintenance Release (6.0.3/6.5 or above). In earlier versions of Domino for i5/OS that were not multi-version capable, only one Domino Maintenance Release could be installed on an i5/OS partition at a time. Thus all that is necessary in environments which fit that description is the license product number of the single level of Domino installed. For example: DSPPTF LICPGM (5733LD6). See 2.6, "Overview of Domino for i5/OS multi-version capabilities" on page 38.

```
Display PTF Status
                                                            System:
                                                                      RCHAS10
Product ID
                                          5733L65
IPL source
                                          ##MACH#B
                                          V6R5M4
Type options, press Enter.
 5=Display PTF details
                        6=Print cover letter 8=Display cover letter
                                                          IPL
    PTF
Opt ID
              Status
                                                          Action
    SI20418 Temporarily applied
                                                          None
    SI18786 Permanently applied
                                                          None
    LD00262 Temporarily applied
                                                          None
    LD00192 Temporarily applied
                                                           None
                                                                        Bottom
F3=Exit
         F11=Display alternate view
                                      F17=Position to
                                                        F12=Cancel
This is a subsetted list of PTFs.
```

Figure 2-17 Display PTF Status (DSPPTF) command

- 5. Record the PTF IDs listed in the Display PTF Status display. Fix Packs and individual PTFs are displayed. In the case of the display shown in Figure 2-17, verifying this information with Lotus Support would confirm that Domino 6.5.4 Fix Pack 2 is installed on this system, superseding the Fix Pack 1 PTF for 6.5.4, with two additional individual hotfixes applied as well.
- 6. Now that you have the associated IDs and PTFs recorded, confirm with Lotus that the SPRs associated with the problems resolved by the fix packs and PTFs are also fixed in the version of Domino 7 to which you are upgrading. In the scenario that some of them are not, you may want to discuss the availability of existing fix packs and PTFs that might be available for your desired release of Domino 7 to aid in maintaining stability and user availability within your Domino infrastructure.

## 2.5.2 Additional concerns associated with standard upgrade implementation

This section addresses some additional items that you should be aware of when upgrading to Domino 7.

#### Rooms and Resources Manager task considerations

Domino Room and Resource management technology has been enhanced for Domino 7. Instead of depending upon the busytime.nsf database and the scheduler task as was the case in earlier versions, reservation of rooms and resources are now facilitated through a new server task called RnRMgr. In the situation that the Domino server(s) being upgraded house the Resource Reservations databases, it is critical that you note that these databases will need to be upgraded to the Domino 7 Resource Reservation Database template, resrc7.ntf.

**Important:** Resource Reservation databases running on upgraded Domino 7 servers with RRD database templates from earlier versions of Domino will have problems processing requests beneath the new RnRMgr task. For more information, reference technote 1219243:

http://www-10.lotus.com/ldd/r5fixlist.nsf/FixPrint/02BEFB21338B787B852570EC0011 0A59/?OpenDocument

The following steps are the recommended path for ensuring that your RRD databases are processed appropriately before and after an upgrade to Domino 7 on the i5/OS. Prior to upgrading your Domino server with RRD databases to Domino 7, open the RRD databases via the Domino Designer 7 client and note the agents that are enabled in the RRD database.

Immediately following the upgrade of a Domino server housing a Rooms and Resources Reservation Database (RRD), perform the following steps:

- 1. From an i5/OS command line, type the Work with Domino Servers (WRKDOMSVR) CL command and press Enter.
- 2. From the Work with Domino Servers display, type an option 13 (Edit NOTES.IN) next to the Domino server that was upgraded and press Enter. In the Domino server's notes.in file, remove RnRMgr from the ServerTasks line. This prevents the Domino 7 server from disabling auto processing for your Domino 6 RRD databases when the Domino 7 server starts. Press F3 to save and exit the changes.
- 3. From the Work with Domino Servers display, type an option 1 (Start) next to the Domino server that was upgraded and press Enter to start the Domino server.
- From a Lotus Notes client using an Administrator's ID, upgrade your Domino 6 RRD databases to the Domino 7 RRD template via **Database** → **Replace Design**. Do NOT use Load Convert.
- In each RRD database upgraded to the Domino 7 template, select Actions → Upgrade to enable the Domino 7 router to send acceptances or declines from the newly upgraded RRD database.
- 6. Open the newly upgraded RRD database in Domino Designer and re-enable the agents that were identified prior to the Domino server upgrade.
- 7. Start the RnRMgr task manually on your Domino 7 server using the load RnRMgr command from the Domino server console.
- 8. Lastly, add the RnRMgr task back to the Servertasks line of the Domino server's notes.ini file, so that the task will begin automatically on the next Domino server restart.

#### **Domino Directory upgrade considerations**

Once you have upgraded your Domino servers to Domino 7 from an earlier Domino version, be aware that the process for upgrading the Domino Directory to the new design level may have changed. After starting each Domino 7 server for the first time, you MUST use the Work with Domino Console (WRKDOMCSL) CL command and answer the console prompt that asks whether you would like to upgrade the Domino Directory to the Domino 7 design. It is

recommended that you plan to answer either 'Y', for yes, or 'N' for no before the time of a server's upgrade. You must answer this question before service can be restored on the Domino server that has been upgraded.

For more information on Domino Directory upgrades and preserving directory customizations, consult the Domino 7 Upgrade Guide available at the following Web site:

http://doc.notes.net/uafiles.nsf/docs/domino7b2/\$File/v7 admin upgrade.pdf

## 2.5.3 Lotus Sametime and upgrades to Domino 7 on i5/OS

Important: The scenarios described in this section can occur when you are:

- ▶ Upgrading Sametime servers that are not yet multi-version capable (such as Domino 6.0, 6.0.1 and 6.0.2) by installing the Domino 7 server code. If you plan to install Domino 7 for i5/OS on a System i machine with Domino 6 servers running Domino versions 6.0, 6.0.1 or 6.0.2, all of your Domino servers will be upgraded to Domino 7 automatically during the install.
- ▶ Upgrading multi-version capable Sametime servers (Domino 6.0.3/6.5 and later) using the Update Domino Server (UPDDOMSVR) CL command. For more information on UPDDOMSVR, see 5.2.4, "Update Domino Server (UPDDOMSVR)" on page 175.

The following precautions should be considered for any Domino server running Sametime that is being upgraded to Domino 7 for i5/OS or any Domino server running Domino Web Access that communicates with a Sametime server, or that is also a Sametime server.

## STLINKS and STLINKS.SAV precautions

Prior to upgrading to Domino 7 on one of the server types described above, it is very important to understand the distinction between the STLINKS and STLINKS.SAV directories:

#### **STLINKS**

A directory with this name is located within the Domino server data directory beneath the <\data>/domino/html/sametime directory. See Figure 2-18. The STLINKS directory holds files that enable Sametime integration with Domino Web Access.

```
Work with Object Links
                     /Lotus/domsvr1/data/domino/html/SAMETIME
Type options, press Enter.
 2=Edit 3=Copy 4=Remove
                            5=Display
                                        7=Rename 8=Display attributes
 11=Change current directory ...
0pt
     Object link
                                   Attribute
                                                Text
                           Tvpe
     STLINKS
                           DIR
                                                                    Bottom
Parameters or command
F3=Exit F4=Prompt F5=Refresh F9=Retrieve F12=Cancel
                                                          F17=Position to
F22=Display entire field
                                 F23=More options
```

Figure 2-18 Initial Domino install: STLINKS exists, but STLINKS.SAV does not

#### STLINKS.SAV

A directory with this name can be found within the Domino server data directory, within the <\data>/domino/html/sametime directory, under specific circumstances. When the upgrade to Domino 7 occurs, the files currently in existence in the STLINKS directory are backed up to this directory ONLY if the directory either does not exist or is empty.

The first time that a Domino Maintenance Release (MR) upgrade occurs on a Domino server (from Domino release 6.5.5 to release 7.0.1, for example), the following will occur:

- ► The directory < data > /domino/html/sametime/STLINKS.SAV will be created
- ► The contents of < data > /domino/html/sametime/STLINKS will be backed up to the newly created STLINKS.SAV directory

To ensure that the Sametime customizations on your Domino server are preserved upon multiple upgrades to later releases, Lotus recommends either:

- Copying the latest files found within the STLINKS directory into the STLINKS.SAV directory
- Removing all files from the STLINKS.SAV directory beforehand, so that a subsequent Domino 7 install or upgrade will copy the latest files to that directory as a backup for STLINKS.

## 2.5.4 Upgrading servers running LEI to Domino 7 on i5/OS

When upgrading a Domino server running Lotus Enterprise Integrator (LEI) to Domino 7 for i5/OS, it is important to keep in mind that you may have to upgrade the LEI product in your environment at the same time that the Domino product is upgraded. Check the LEI installation guide associated with the version of LEI that you currently have in use to ensure that you plan to take the appropriate actions to keep your instance(s) of LEI functioning appropriately.

#### For example:

- ► LEI 7.0.1 requires Domino 7.0.1
- ► LEI 7.0 requires Domino 7.0
- ► LEI 6.5.5 requires Domino 6.5.5

Thus, if you are upgrading from Domino 6.5.5 or lower to Domino 7.x, it will be of the utmost importance that you upgrade the LEI product to a version compatible with Domino 7.x. For more details on LEI compatibility and Domino, consult the online Lotus Software for i5/OS Compatibility Guide:

http://www.ibm.com/servers/eserver/iseries/domino/domino6/pdf/releasesupport.pdf

When preparing for a Domino 7 upgrade that will involve the upgrade of an LEI product, it is critical that you perform the following tasks prior to attempting the upgrade of LEI:

► Install product 5799-PTL, iSeries Tools for Developers

This product will be used during your upgrade of LEI to allow the use of the VNC server, which you will need to perform your LEI upgrade. This product can be obtained via download at the following Web site:

http://www.ibm.com/servers/enable/site/porting/tools/

► Add the parameter EIUse0SMemory=1 to the notes.ini file of the Domino server being upgraded.

This variable is required for LEI activities to function correctly that return large result sets and use a sort order. The variable grants LEI access to additional memory resources.

## 2.6 Overview of Domino for i5/OS multi-version capabilities

Staring with the 6.0.3 and 6.5.0 releases of Domino, IBM introduced multi-version capabilities for Domino on i5/OS. Previous implementations of multiple Domino releases on one system required separate logical partitions (LPARs) of i5/OS, which is not always a viable solution. With the advent of multi-versioning, Domino for i5/OS supports multiple releases of Domino on the same i5/OS LPAR or partition.

This added capability is designed to allow increased flexibility for Domino for i5/OS users. You can now run different applications on different release levels of Domino in one i5/OS partition. One significant advantage of this capability is that you do not have to end Domino servers of one release in order to install another release. Since the existing Domino servers that are configured to use one release are not automatically updated when installing a different release of Domino, these servers can remain active. This provides a very useful environment for running production servers on one release and testing new servers and applications on another release without impacting each other. Operating in this mixed environment can help increase the stability of both testing and production environments.

Installing and using multiple versions of Domino on one partition is optional. You can still operate in a single version environment, but there may be some action you need to take to make sure your environment works with these multi-version enabled releases. For details on multi-versioning that are not covered in this redbook see the IBM Redbook *Lotus Domino 6 Multi-Versioning Support on the IBM eServer iSeries Server* available at:

http://www.redbooks.ibm.com/abstracts/sg246940.html?Open

## 2.6.1 Multi-version terms and concepts

This section describes some of the terms and concepts that are important in a multi-version capable environment.

#### Release

A major release, also called *version*, of Domino such as Domino 7 includes significant changes or enhancements to the product. Each version has Maintenance Releases, also called MRs. For example, MRs of Domino 7 are referred to as 7.0.x.

In a multi-version capable environment, any number of multi-version capable Domino versions and releases can be installed at the same time. For example, you can install Domino 6.5.0, 6.5.1, and 7.0 on the same i5/OS partition. These releases and versions do not have to be installed or removed in any particular order.

**Important:** Installing a multi-version capable release on the same i5/OS partition as a release that is not multi-version capable will result in an automatic upgrade of each Domino server to the multi-version capable release. You cannot install a release that is not multi-version capable on the same i5/OS partition as releases that are multi-version capable. For example, you cannot install Domino 6.0.2 (which is not multi-version capable) on the same i5/OS partition where 6.0.3, 6.5.0, or 7.0 are installed.

#### Primary release

For systems with multiple versions installed, the term *primary release* is a way of indicating which installed release provides the most function. The primary release is always the most recently shipped release installed on a partition. For example, on a server with Domino 6.0.3 and 6.5.0 installed, 6.5.0 is the primary release. If 6.0.4 is installed later, 6.0.4 becomes the primary release. If 7.0 is installed after 6.0.4, then 7.0 becomes the primary release.

There are some situations where Domino will default settings to those of the primary release. In these situations, manual steps are required to manipulate the settings of a Domino server with a release other than the primary release.

#### Multi-version capable

This term refers to releases of Domino 6.0.3 and later, Domino 6.5.0 and later, and Domino 7 or later. All releases of Domino prior to 6.0.3 and 6.5.0, including all R5 releases, are not multi-version capable.

#### Logical partition (LPAR)

Logical partitions allow you to distribute resources within a single system to make it function as if it were two or more independent servers. LPAR technology allows for virtual and shared resources, dynamic load balancing, and much more. For more information on System i LPAR technology, see the following Web site:

http://www.ibm.com/eserver/iseries/lpar

#### **Partition**

This term is used synonymously with LPAR. If you are not using multiple LPARs on a system, then the term 'partition' would mean the system itself.

#### **Updating a Domino server**

The term *updating* is sometimes used synonymously with *upgrading*. These two terms are emerging to imply two different things. Updating refers to applying a newer release of software, while upgrading refers to hardware.

With multi-version capable releases of Domino for i5/OS, the Domino servers are no longer updated automatically during product installation. The only exception to this is when installing a multi-version capable release over a release that is not multi-version capable. After installing a multi-version capable release of Domino, either by itself or upgrading an existing multi-version capable release, you must also use the Update Domino Server (UPDDOMSVR) CL command for each Domino server that you want to update to a later release. See 5.2.4, "Update Domino Server (UPDDOMSVR)" on page 175 for details.

## 2.6.2 Preparing for multi-version capable releases

For Domino releases that are not multi-version capable, the software is installed into the library QNOTES and the directory /QIBM/PRODDATA/LOTUS/NOTES. To enable multiple versions of Domino on a single partition, several significant changes will be seen by all administrators and developers whether they choose to install one or multiple releases of Domino:

- ▶ Beginning with Domino 6.0.3 and 6.5.0, every Domino release is now multi-version capable and is installed into its own unique library and directory. For example, Domino 6.5.0 is installed into library QDOMINO650 and directory /QIBM/PRODDATA/LOTUS/DOMINO650. Domino 6.0.3 is installed into library QDOMINO603 and directory /QIBM/PRODDATA/LOTUS/DOMINO603. Domino 7.0 is installed into library QDOMINO700 and directory /QIBM/PRODDATA/LOTUS/DOMINO700.
- ► Prior to multi-versioning support, all Domino releases installed into library QNOTES and directory /QIBM/PRODDATA/LOTUS/NOTES. With multi-versioning, the QNOTES library and /QIBM/PRODDATA/LOTUS/NOTES directory still exist but are shared among the multi-version capable releases.

- ▶ Every new release of Domino is packaged as a Domino product option so that when it is installed, it uses its own product library and product directory. For example, release 6.0.3 for 5733LD6 is installed using option 13 of that product. Release 6.5.0 for 5733L65 is installed using option 10 of that product. New releases of these products will be installed with their own options for that product.
- ► For major new versions of Domino, new licensed product IDs are used. For example, Domino 6.0.x uses 5733LD6, Domino 6.5.x uses 5733L65, and Domino 7.0 uses 5733LD7.



# 3

## **Installing Domino 7 on i5/OS**

This chapter describes the different methods that are available to install Domino 7 on i5/OS. It also explains how to install the Domino plug-in for iSeries Navigator and includes information on additional language support.

## 3.1 Things to know before installing Domino

Before you install and configure your first Domino server, you must plan server and organizational naming and security. In addition, you must understand your existing network configuration and how Domino will fit into the network.

Some important things you need to know are:

▶ Is my server properly sized? Properly sizing your system is crucial to the success of your Domino environment. IBM provides an online tool called the IBM Systems Workload Estimator, to help you assess your environment and provide sizing recommendations. This tool is located at the following Web address:

http://www-912.ibm.com/estimator

- ▶ I already have Domino installed. What can I do? If you already have Domino servers configured on the system make sure you stop these servers and all Domino subsystems before installing the Domino 7 for i5/OS software. However, if all configured Domino servers are multi-version capable servers, you can install the Domino software while they are still running. We will discuss more about multi-version capable servers in 3.4, "Multi-versioning" on page 59.
- ▶ Other languages support? You can run more than one language on a Domino server or can have Domino servers running with different languages using the Domino Language Pack and multi-lingual database support. These language packs are available some weeks after the particular release is available. Go to 3.5, "Additional language support" on page 63 for more information.

Also, be sure you have reviewed the information in Chapter 2, "Prerequisites for running Domino 7 on i5/OS" on page 11before installing Domino on your i5/OS.

## 3.2 Installing Domino

For every Maintenance Release of Domino 7, the following product options are available to be installed:

#### ▶ \*BASE option

This option defines the product options that can be installed for a specific product ID. \*BASE must be installed before any other product options can be installed.

#### ► Product option

This option contains the programs, data, and template files needed to run a specific release of Domino. You must select this option to install and configure a Domino server. For example, 5733LD7 option 11 is the product option for Domino version 7.0.1.

#### C API option

Listed as option 1, this option contains the header files and modules for creating Notes C applications that can run on a Domino 7 server on i5/OS.

**Important:** You can install the C API option 1 later if you are not sure you need it. However, be aware that only one instance of this option can be installed on an i5/OS partition. For more information, see 'Installing multiple releases of Domino' in Chapter 12 of the i400hlp.nsf help database.

Table 3-1 summarizes the various methods available to launch the installation of Domino 7 on i5/OS.

Table 3-1	Installation	methods	available to	) install	Domino 7	on i5/OS

Method	Invoked from	Media	
Domino Server Installation Wizard (using InstallShield)	<ul> <li>▶ Direct call to InstallShield (setup.exe)</li> <li>▶ iSeries Navigator</li> <li>▶ EZ-Setup</li> </ul>	<ul><li>Local CD drive</li><li>System i optical drive</li></ul>	
LODRUN	i5/OS CL command	System i optical drive	
RSTLICPGM	i5/OS CL command	i5/OS save file (SAVF)	

**Note:** When you use the iSeries Navigator or EZ-setup installation method, they still use the InstallShield software provided by the Windows operating system. However, it is not called directly by you. Although there are several ways to initiate the installation, all use the same underlying code in the RSTLICPGM command to perform the installation.

Figure 3-1 shows the questions you I need to answer in order to select the best installation method according to your skills.

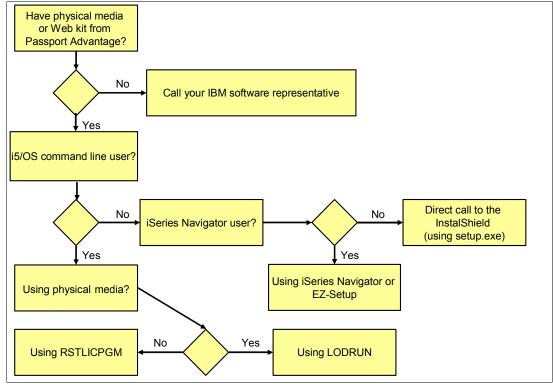


Figure 3-1 Installation methods flowchart

**Important:** Using the compressed file obtained from Passport Advantage you will only be able to install through the Domino Server Installation Wizard using the setup.exe file or using the RSTLICPGM command.

## 3.2.1 What happens when Domino 7 is installed

The following actions occur during the installation process:

- Licensed program objects, such as programs (\*PGM) and service programs (\*SRVPGM), are placed in the release-specific library, such as QDOMINO700, QDOMINO701 or QDOMINO702.
- Miscellaneous objects, such as the following, are placed in the QUSRNOTES library:
  - All the Domino server subsystem descriptions
  - All the data queues and job queues for the Domino servers
  - The status of the Domino servers
- Basic Domino files, such as .nsf and .ntf types, and files that contain symbolic links to the programs, service programs, and other objects in the release-specific library are created in the release-specific directory in the i5/OS integrated file system, such as /QIBM/ProdData/Lotus/DOMINO702. These symbolic links provide access to the objects in the release-specific library from the integrated file system.
- ► The /QIBM/USERDATA/LOTUS/NOTES directory is created in the i5/OS integrated file system. Users who create programs to be accessed by Domino must add symbolic links to their programs in this directory.
- ▶ The QNOTES user profile is created for use by Domino and Notes application programs that run on the Domino server. This user profile is intended for use of system functions by Domino and for integration with the underlying i5/OS security mechanisms. Therefore, it does not have a password. Individual users cannot use the QNOTES user profile to sign on to the system. The QNOTES user profile should not be deleted.

## 3.2.2 Direct call to InstallShield using setup.exe

To make a direct call to the InstallShield interface you will need to execute the setup.exe file. This file is included in either the Domino 7 for System CD or in the folder created when you uncompressed the file from the Passport Advantage. Since most installs are done from the electronic image downloaded from Passport Advantage we will be detailing installation steps for that method.

To install Domino 7 for i5/OS, perform the following steps:

 Double click on the self extracting executable file you obtained from Passport Advantage and click **OK** to uncompress it as shown in Figure 3-2



Figure 3-2 Uncompressing the file

2. Select the location of the files to be extracted and click **Unzip** to start the process as shown in Figure 3-3.

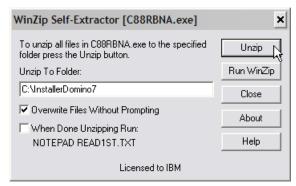


Figure 3-3 Location of the files to be extracted

3. Click **OK** to continue as shown in Figure 3-4.



Figure 3-4 Files extracted successfully

4. One of the unzipped files will be the setup.exe file. Double click on this file to begin the installation (Figure 3-5).

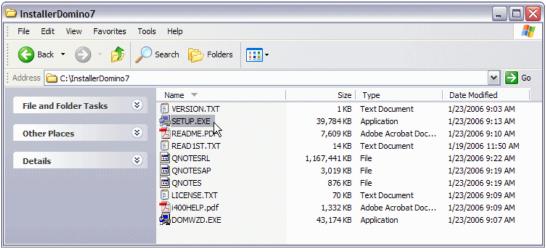


Figure 3-5 Executing setup.exe

5. Click **Next** on the Welcome to the InstallShield Wizard for Lotus Domino window (Figure 3-6).

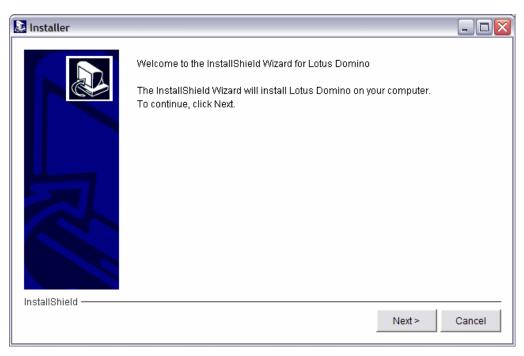


Figure 3-6 InstallShield Welcome

6. Read the International Program License Agreement and select the I accept the terms of the license agreement option (Figure 3-7). Click Next.



Figure 3-7 License agreement

7. Sign on to the System i machine by entering the system name or IP address, your user ID and password information as shown in Figure 3-8. You must have the required user authority to perform this installation. See 2.3.3, "i5/OS administrative authority requirements" on page 21 for more information.

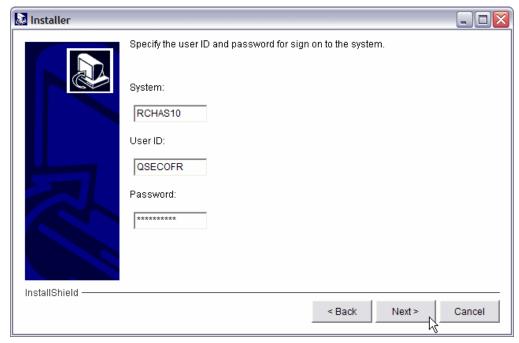


Figure 3-8 Signing on to the System i machine

8. Select the type of Domino server to install (Figure 3-9) according to the type of license you purchased. Click **Next** to continue.

The types of Domino servers are:

- Domino Messaging Server: The Domino Messaging Server includes the following capabilities, designed for the company that requires only messaging:
  - Mail, calendar and scheduling.
  - Personal information management (PIM) functions, such as a personal directory.
  - · Discussion databases, teamrooms, reference databases with basic workflow.
  - Domino partitioning (the capability to run more than one instance of Domino on the same machine using one copy of the Domino code).
- Domino Utility Server: The Domino Utility Server includes the following capabilities, designed for collaborative applications where the number of users is high or difficult to track (for example, a Web application for customer self-service).
  - Access to non-mail collaborative applications, use of individual mail files is not allowed.
  - Client access licenses are not required for Web browser access to non-mail applications, even when user authentication is involved.
  - Access from a Lotus Notes client is allowed, but the Lotus Notes software and client access license must be acquired separately.
  - Domino partitioning (the capability to run more than one instance of Domino on the same machine using one copy of the Domino code).
  - Domino clustering for failover and load balancing.
  - Limited use entitlement to WebSphere Application Server.

- Entitlement to Domino Document Manager and Lotus Workflow.
- Domino Enterprise Server: The Domino Enterprise Server includes the following capabilities, designed to extend return on investment by including the business benefit of Domino applications, and is designed for environments requiring high availability:
  - Mail, calendar and scheduling, PIM (directory) functions, discussion database, reference databases, teamrooms, reference databases with basic workflow.
  - Access to collaborative applications developed in-house using Domino Designer (a separate client product) or by an IBM Business Partner.
  - Authenticated access requires the user to have a client access license (CAL). For anonymous access, a CAL is not required.

**Note:** Authentication is involved whenever the application requires secure validation of a user's unique identity

- Domino partitioning (the capability to run more than one instance of Domino on the same machine using one copy of the Domino code).
- · Domino clustering for failover and load balancing.
- · Limited use entitlement to IBM WebSphere Application Server.

For further explanation on Domino licensing see the following URL:

http://www-142.ibm.com/software/sw-lotus/products/product4.nsf/wdocs/dominofaq

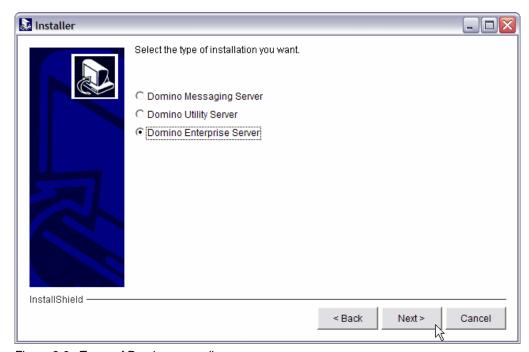


Figure 3-9 Types of Domino server licenses

9. Select the Domino 7 for i5/OS options you want to install (Figure 3-10). Click Next.

**Note:** If this is not the first multi-version capable release to be installed on your system, refer to 3.4.1, "Multi-versioning when installing using the Domino Installation Wizard" on page 59.

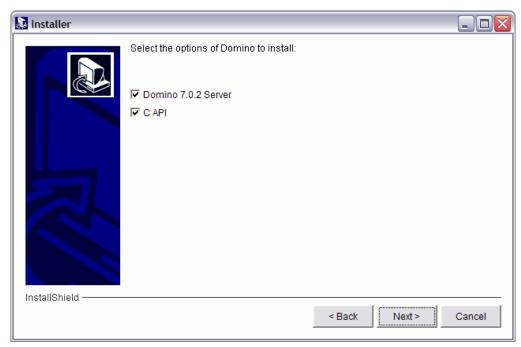


Figure 3-10 Domino 7 for i5/OS options

10. Verify the options you selected (Figure 3-11) and click **Next** to continue.

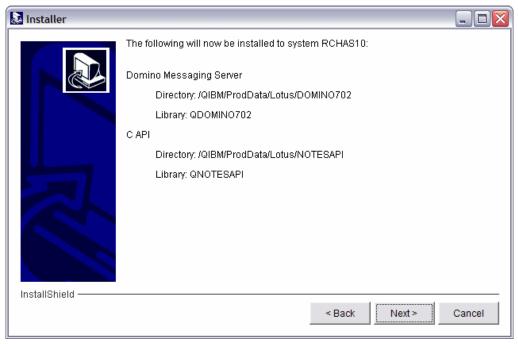


Figure 3-11 Verifying options to be installed

11. You now see a progress bar (Figure 3-12) and will need to wait until the installation process is completed.

**Important:** On some systems, this process can take more than one hour.

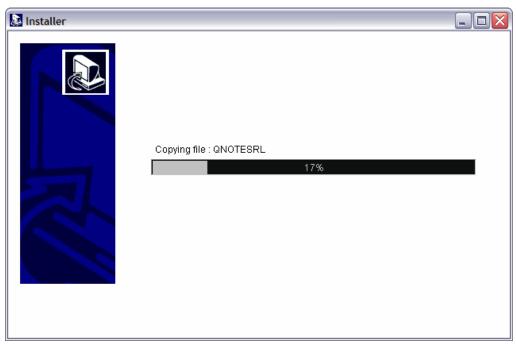


Figure 3-12 Installation progress bar

12.I When the installation is complete you should receive a confirmation message as shown in Figure 3-13. Click **Finish** to exit InstallShield.

**Note:** By selecting the **Launch the Domino setup wizard to configure a new server** option (new in 7.0.2), you will start this process after this windows closes.



Figure 3-13 Domino 7 for i5/OS successfully installed

## 3.2.3 Using iSeries Navigator

In this section we will show you how to start the InstallShield process using the iSeries Navigator, since the steps to install Domino using the Domino Server Installation wizard are the same as using the setup.exe method (see 3.2.2, "Direct call to InstallShield using setup.exe" on page 44), we just explain the steps to invoke Installshield from iSeries Navigator.

To start the Domino Server Installation wizard from iSeries Navigator, perform the following steps:

1. Start iSeries Navigator and log on the system where you want to install Domino.

2. Select the System i machine you want to work with and click **Network**. Right-click **Servers** and select **Install and Configure Domino** as shown in Figure 3-14.

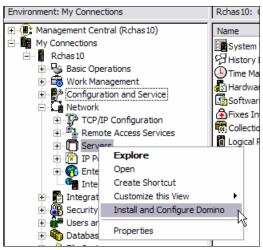


Figure 3-14 Installing Domino using iSeries Navigator

3. The Welcome to the Lotus Domino Server Installation wizard window opens. Click **Next** to continue (Figure 3-15).

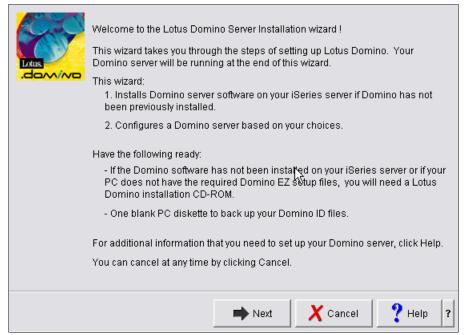


Figure 3-15 Welcome window

4. Select the location of the installation media (Figure 3-16) and click Next.

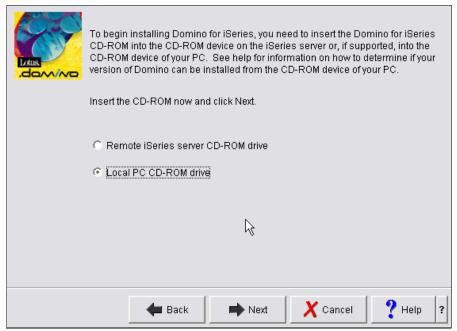


Figure 3-16 Selecting the location of the installation media

5. After this point you will be prompted with steps similar to the ones noted earlier in 3.2.2, "Direct call to InstallShield using setup.exe" on page 44 starting with step 5 on page 46.

## 3.2.4 Using LODRUN

Installing Domino 7 using the Load and Run (LODRUN) CL command requires the original medias provided by IBM. To perform the installation using the LODRUN command, perform the following steps:

- 1. Sign on to a System i 5250 emulation session with a user profile that has at least \*ALLOBJ and \*SECADM special authorities.
- 2. Insert the Lotus Domino for iSeries CD 1 in the System i optical drive. From an i5/OS command line enter the following LODRUN command and press Enter:

LODRUN DEV(\*OPT) DIR('/OS400')

More...

3. Read the International Program License Agreement and press Enter to continue (Figure 3-17).

International Program License Agreement

Part 1 - General Terms

By DOWNLOADING, INSTALLING, COPYING, ACCESSING, OR USING THE PROGRAM YOU AGREE TO THE TERMS OF THIS AGREEMENT. IF YOU ARE ACCEPTING THESE TERMS ON BEHALF OF ANOTHER PERSON OR A COMPANY OR OTHER LEGAL ENTITY, YOU REPRESENT AND WARRANT THAT YOU HAVE FULL AUTHORITY TO BIND THAT PERSON, COMPANY, OR LEGAL ENTITY TO THESE TERMS. IF YOU DO NOT AGREE TO THESE TERMS,

- DO NOT DOWNLOAD, INSTALL, COPY, ACCESS, OR USE THE PROGRAM; AND

- PROMPTLY RETURN THE PROGRAM AND PROOF OF ENTITLEMENT TO THE PARTY FROM WHOM YOU ACQUIRED IT TO OBTAIN A REFUND OF THE AMOUNT YOU PAID. IF YOU DOWNLOADED THE PROGRAM, CONTACT THE PARTY FROM WHOM YOU ACQUIRED IT.

"IBM" is International Business Machines Corporation or one of its subsidiaries.

"License Information" ("LI") is a document that provides information

Figure 3-17 International Program License Agreement

F12=Cancel

(C) COPYRIGHT IBM CORP.

4. Select the products you want to install and press Enter to continue as shown in Figure 3-18.

ENTER=Accept

**Note:** If this is not the first multi-version capable release to be installed on your system, refer to 3.4.2, "Multi-versioning when installing using LODRUN" on page 61.

```
Install Lotus Domino Licensed Program (5733LD7)
Type options, press Enter.
  1=Install
          Product
                    Installed
Option 0
          Option Status
                                   Description
  1
          12
                    *N0
                                   Lotus Domino 7: Release 7.0.2
  1
          1
                    *N0
                                   C API Release 7
F3=Exit
            ENTER To Continue
 (C) COPYRIGHT IBM CORP. 1989, 2006. ALL RIGHTS RESERVED.
```

Figure 3-18 Selecting product options to install

F3=Exit

5. After a few minutes (this time will depend of the System i model you are working with) the installation process will ask you to insert the Lotus Domino for iSeries CD 2 in the System i optical drive. Press Enter to continue. SeeFigure 3-19.

```
Lotus Domino for iSeries

Please insert the Lotus Domino for iSeries CD 2 and then press ENTER.

Otherwise, you may cancel the installation by pressing F3=Exit and reattempt the installation. Note that you will have to start from the beginning using the CD 1 again.

F3=Exit ENTER=Continue
```

Figure 3-19 Prompt to insert the Lotus Domino for iSeries CD 2

6. After a few minutes the installation process will end, it will show the message Command LODRUN ended successfully. Go to the additional message information by pressing F1 for more information. See Figure 3-20.

```
Additional Message Information
Message ID . . . . :
                          LNT0997
                                       Severity . . . . . :
                                                                00
Message type . . . . :
                          Completion
Date sent . . . . :
                          07/25/06
                                       Time sent . . . . :
                                                                15:15:55
Message . . . :
                   Command LODRUN ended successfully.
Cause . . . . :
                  The command indicated ended without errors.
Recovery . . . : None required.
                                                                    Bottom
Press Enter to continue.
F3=Exit
         F6=Print
                   F9=Display message details
F10=Display messages in job log
                               F12=Cancel
                                            F21=Select assistance level
```

Figure 3-20 Additional message information

## 3.2.5 Using RSTLICPGM

Using the Restore License Program (RSTLICPGM) CL command requires you to have the save files of QNOTES and QNOTESRL on the i5/OS. The save file of QNOTESAP is only required if you want to install the C API option.

Perform the following next steps to complete the installation using RSTLICPGM:

1. Use FTP to transfer the save files to the i5/OS integrated file system. See Example 3-1.

Example 3-1 Transferring save files to the i5/OS integrated file system

```
C:\>cd InstallerDomino7
C:\InstallerDomino7>ftp 192.168.9.104
```

```
Connected to 192.168.9.104.
220-OTCP at DOM7SVR1.ITSO.COM.
220 Connection will close if idle more than 5 minutes.
User (192.168.9.104:(none)): itsouser
331 Enter password.
Password:
230 ITSOUSER logged on.
ftp> bin
200 Representation type is binary IMAGE.
ftp> put qnotes mylib/qnotes
200 PORT subcommand request successful.
150 Sending file to member QNOTES in file QNOTES in library MYLIB.
226 File transfer completed successfully.
ftp: 896016 bytes sent in 0.13 Seconds 6892.43Kbytes/sec.
ftp> put qnotesrl mylib/qnotesrl
200 PORT subcommand request successful.
150 Sending file to member QNOTESRL in file QNOTESRL in library MYLIB.
226 File transfer completed successfully.
ftp: 1195459584 bytes sent in 138.26 Seconds 8646.52Kbytes/sec.
ftp> put qnotesap mylib/qnotesap
200 PORT subcommand request successful.
150 Sending file to member QNOTESAP in file QNOTESAP in library MYLIB.
226 File transfer completed successfully.
ftp: 3076096 bytes sent in 0.06 Seconds 7322.66Kbytes/sec.
ftp> quit
221 OUIT subcommand received.
C:\InstallerDomino7>
```

2. Now that you have the save files copied into the System i machine use the following RSTLICPGM commands to install Domino 7 from the save files:

```
rstlicpgm licpgm(5733LD7) dev(*savf) option(*base) savf(mylib/qnotes)
rstlicpgm licpgm(5733LD7) dev(*savf) option(12) savf(mylib/qnotesrl)
rstlicpgm licpgm(5733LD7) dev(*savf) option(1) savf(mylib/qnotesap)
```

## 3.3 Verifying if Domino was successfully installed

There are two options to verify if the Domino 7 software was successfully installed on the System i machine. You can use either iSeries Navigator or a 5250 emulation session.

## 3.3.1 Using iSeries Navigator

Perform the following steps using iSeries Navigator to verify that Domino was successfully installed:

- 1. Start iSeries Navigator and select the System i machine where you installed Domino 7.
- 2. Click Configuration and Services  $\rightarrow$  Software  $\rightarrow$  Installed Products.

3. In the right pane, look for the product id of 5733LD7 as shown in Figure 3-21.

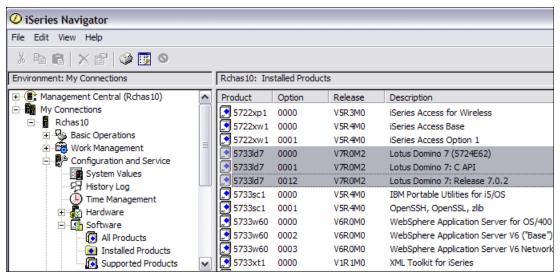


Figure 3-21 Using iSeries Navigator to verify if Domino 7 was installed.

## 3.3.2 Using the i5/OS command line

You can verify if Domino7 was properly installed by using the Display Software Resources (DSPSFWRSC) CL command. The result is shown in Figure 3-22.

			Display Software Resources System: RCHAS10			
Resource			System: RCHASTO			
ID	Ontion	Feature	Description			
5722XW1	•	2924	iSeries Access Base			
0, ==,=		5101	100.100 1.00000 2.000			
5733LD7		5050	Lotus Domino 7 (5724E62)			
	*BASE		Lotus Domino 7 (5724E62)			
5733LD7	1	5050	Lotus Domino 7: C API			
5733LD7	12	5050	Lotus Domino 7: Release 7.0.2			
5733LD7	12	2924	Lotus Domino 7: Release 7.0.2			
5733SC1	*BASE	5050	IBM Portable Utilities for i5/0S			
5733SC1	*BASE	2924	IBM Portable Utilities for i5/0S			
5733SC1	1	5050	OpenSSH, OpenSSL, zlib			
5733W60	*BASE	5050	WebSphere Application Server for OS/400 V6			
5733W60	2	5102	WebSphere Application Server V6 ("Base")			
5733W60	3	5103	WebSphere Application Server V6 Network Deployment			
5733XT1	*BASE	5050	XML Toolkit for iSeries			
			More			
Press Ent	Press Enter to continue.					
F3=Exit F11=Display libraries/releases F12=Cancel						
F19=Displ	F19=Display trademarks					

Figure 3-22 Display Software Resources

#### Installed status values

Following is a description of the installed status values you might see on the LICPGM displays. You can use these values to determine whether you can use a product or whether you need to upgrade a licensed program. If you do not see a value of \*COMPATIBLE, you can check the other installed status values for how to proceed.

#### ▶ \*COMPATIBLE

The product is installed. Its version, release, and modification is compatible with the installed level of the operating system. You can use this program with the installed level of the operating system.

#### ► \*ERROR

Either the product has not installed successfully or the product is only partially installed. For example, a language or a language object for the product is not installed. Use the Check Product Option (CHKPRDOPT) CL command to determine the cause of the failure. To determine the cause of a missing object, enter GO LICPGM and select options 10 and 50.

**Note:** The product lists now show many products, such as Programming Request for Price Quotations (PRPQ), licensed program offerings (LPO), and non-IBM products. This \*ERROR status might have existed before the upgrade to the current operating system release, but was not detected. Use the CHKPRDOPT command to find out why the product shows an \*ERROR, and contact your software provider if you need help correcting the problem.

#### ▶ \*BACKLEVEL

The product is installed. Its version, release, and modification is not compatible with the currently installed level of the operating system. To correct this problem, install a current release of this product. And if you have secondary languages, install a new release of these languages as well, using LICPGM menu option 21.

**Note:** If you use a licensed program that is listed as \*BACKLEVEL, you run the risk of having an information mix up between release levels, or some portions of the licensed program might not work properly. An installed status value of \*COMPATIBLE is desired.

#### ▶ \*BKLVLOPT

The product is installed. Its version, release, and modification is not compatible with the currently installed level of the base product that is associated with the option. To correct this problem, install a current release of this option.

#### \*BKLVLBASE

The product is installed, but its associated base product is not compatible with this option. To correct this problem, install a current release of the base product.

#### ▶ \*NOPRIMARY

The product is installed, but the language for the product is not the same as the primary language of the operating system. To correct this problem, install the primary language for the product.

**Note:** If this product is an LPO, PRPQ or non-IBM product, it is possible that the licensed program (from the manufacturer) is not available in the primary language of the operating system.

#### \*INSTALLED

The product is installed, but might or might not be compatible with the installed level of the operating system.

**Note:** Licensed programs that are part of the single set will be listed on the display panel as \*INSTALLED. You will need to verify that the release level of the licensed program is compatible with the release level of the operating system.

# 3.4 Multi-versioning

For an overview of multi-versioning, see 2.6, "Overview of Domino for i5/OS multi-version capabilities" on page 38. When you are installing Domino 7, and you already have installed a multi-version capable release of Domino, you will be asked if you want to keep the other releases installed. In this section, we show you these windows when you are using the Domino Installation Wizard or the LODRUN command.

## 3.4.1 Multi-versioning when installing using the Domino Installation Wizard

The Domino Installation Wizard will add some additional steps if you already have a multi-version capable release of Domino previously installed on the system. Perform the following steps to install an additional release of Domino to your System i machine:

1. Select the Domino options to install and click **Next** to continue (Figure 3-23).

**Attention:** The C API option is not multi-version capable. Only one instance of this option can be installed on one i5/OS partition at a time.

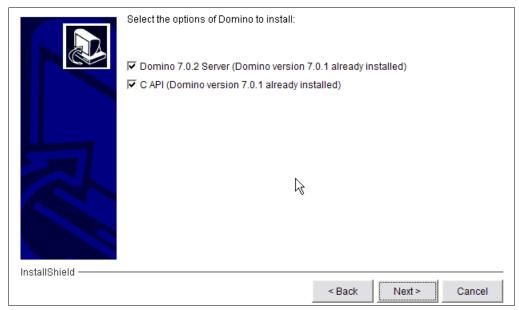


Figure 3-23 Selecting the options of Domino to install

2. If you choose to install the C API, you will see the window shown in Figure 3-24. Click **Yes** to continue.



Figure 3-24 Prompt to overwrite the previous C API option

 Select the Attempt to delete the previous release option if you want to delete any other installed releases of Domino (Figure 3-25). This requires that any Domino server currently running that release is ended. Leave it unchecked to keep the previous Domino releases installed. Click Next to continue.

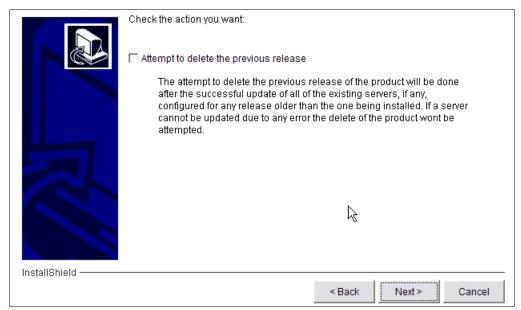


Figure 3-25 Option to delete existing versions of Domino installed

4. After this point, the installation process will be the same. After a successful installation, from iSeries Navigator go to Services → Software → Installed Products to check the installed releases as shown in Figure 3-26.

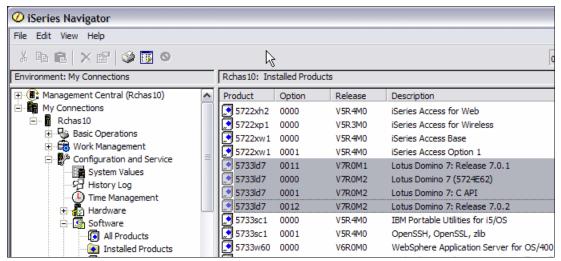


Figure 3-26 Multiple Domino releases installed

## 3.4.2 Multi-versioning when installing using LODRUN

The installation process will add some additional steps if you already have a multi-version capable release of Domino previously installed on the system. Perform the following steps to install an additional release of Domino to your System i machine when using the LODRUN command:

1. Select the Domino options to install and press Enter (Figure 3-27).

**Attention:** The C API option is not multi-version capable. Only one instance of this option can be installed on one i5/OS partition at a time.

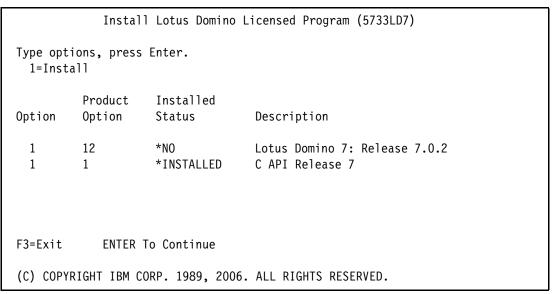


Figure 3-27 Installing Domino options

2. If you want to keep the other releases of Domino installed, select option 0 and press Enter to continue (Figure 3-28).

**Attention:** When installing using the Domino Installation wizard, the option to delete the previous installed version is not selected by default, but, when installing using LODRUN, the option to delete the previous installed releases is selected by default.

```
Option Install Actions

System: RCHAS10

Type choices, press Enter:

Install action
Choice Possible choices

Delete currently installed release . . 0 0=Do not Delete,1=Delete

F3=Exit F12=Cancel
```

Figure 3-28 Option Install actions

 After this point, the installation process will be the same. After a successful installation, use the DSPSFWRSC CL command as shown in Figure 3-29 to check the installed releases.

Display Software Resources						
_			System:	RCHAS10		
Resource						
ID	Option	Feature	Description			
5722XW1	*BASE	2924	iSeries Access Base			
5722XW1	1	5101	iSeries Access Option 1			
5733LD7	11	5050	Lotus Domino 7: Release 7.0.1			
5733LD7	11	2924	Lotus Domino 7: Release 7.0.1			
5733LD7	*BASE	5050	Lotus Domino 7 (5724E62)			
5733LD7	*BASE	2924	Lotus Domino 7 (5724E62)			
5733LD7	1	5050	Lotus Domino 7: C API			
5733LD7	12	5050	Lotus Domino 7: Release 7.0.2			
5733LD7	12	2924	Lotus Domino 7: Release 7.0.2			
5733SC1	*BASE	5050	IBM Portable Utilities for i5/OS			
5733SC1	*BASE	2924	IBM Portable Utilities for i5/OS			
5733SC1	1	5050	OpenSSH, OpenSSL, zlib			
5733W60	*BASE	5050	WebSphere Application Server for OS/400 V6			
5733W60	2	5102	WebSphere Application Server V6 ("Base")			
				More		
Press Ent	Press Enter to continue.					
F3=Exit F11=Display libraries/releases F12=Cancel						
F19=Display trademarks						
5733LD7 5733LD7 5733LD7 5733SC1 5733SC1 5733SC1 5733W60 5733W60 Press Ent	1 12 12 *BASE *BASE 1 *BASE 2 er to co	5050 5050 2924 5050 2924 5050 5050 5102 ntinue.	Lotus Domino 7: C API Lotus Domino 7: Release 7.0.2 Lotus Domino 7: Release 7.0.2 IBM Portable Utilities for i5/OS IBM Portable Utilities for i5/OS OpenSSH, OpenSSL, zlib WebSphere Application Server for OS/400 V6 WebSphere Application Server V6 ("Base")	More		

Figure 3-29 Display Software Resources

# 3.5 Additional language support

Starting with Domino 6 you can deploy more than one language on a Domino server or have Domino servers with different languages by using a language pack and multi-lingual database support. In this section we explain how to install these language packs using different methods.

The IBM Lotus Domino Server Language Pack Installer adds, replaces, and removes language packs from your Domino server. Language packs include translated versions of standard Domino system templates such as the Discussion and Mail templates as well as certain binary files required by the server.

The available options to install the additional languages to your Domino servers are:

- Using the Language Pack Installer that is provided on the Language Pack CD.
  For details, see 3.5.1, "Installing additional languages using the Language Pack Installer" on page 63.
- Using the i5/OS Load and Run (LODRUN) CL command.
   For details, see 3.5.2, "Installing additional languages using the LODRUN command" on page 71.

## 3.5.1 Installing additional languages using the Language Pack Installer

This section describes the steps to install additional languages to your Domino servers using the Language Pack Installer. In our example we are installing the language pack for Spanish. Perform the following steps:

**Note:** At the time this redbook written, the language pack for 7.0.2 was not yet available. Since the process is the same, we show how to install the Spanish language pack for Domino 7.0.1

- 1. Execute the file called DomLP701\_iSeries.EXE on the language pack CD.
- 2. Sign on into the System i machine where you want to install the language pack (Figure 3-30).



Figure 3-30 Signing on to the System i machine

3. Select the language to be used for this wizard (Figure 3-31).



Figure 3-31 Selecting the language for the wizard

4. On the Welcome to the IBM Lotus Domino Server Language Pack Installer, click **Next** to continue (Figure 3-32).



Figure 3-32 Welcome window

5. Read the software license agreement shown in Figure 3-33 and select the I accept the terms in the license agreement option. Click Next.



Figure 3-33 Software License Agreement

6. The installer lists the Domino server program directory where the language pack will be installed. You can also select any of the existing Domino servers where you want to install the language pack. If you want to apply the language pack to all Domino servers, select the **Select all partitions** checkbox and click **Next**. See Figure 3-34.

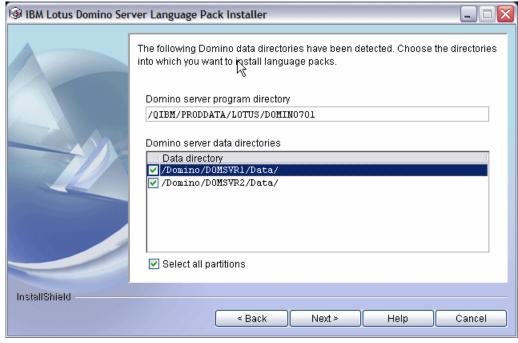


Figure 3-34 Selecting the Domino servers to install the language pack

- 7. Select the language pack installation method. For our example, we select the Add Language Pack to Domino server option and click Next to continue (Figure 3-35). Following is an explanation for all the available options. You can also click Help for help on these options.
  - Add Language Pack to Domino server: Installs language packs by merging translated forms, views, and other design elements with your existing language templates. The Language Pack Installer also installs additional files for Web enablement. You can add more than one language pack to a Domino server, and you can select which templates to add to the server. By default, the Language Pack Installer adds all translated templates to the Domino server.
  - Replace Language Pack: Overwrites the current language of the Domino server with the selected language pack. You can only replace one language pack at a time.
  - Remove Language Pack from Domino server: Uninstalls specified language packs
    from the Domino server by removing the translated forms, views, and other design
    elements from your templates. You can only remove languages added by previous
    installs of Language Pack Installer.



Figure 3-35 Specifying how to install the language pack

 The installer checks for available disk space and validates the Domino version. The language pack must be at the same version level as the Domino code. Click **Next** (Figure 3-36).

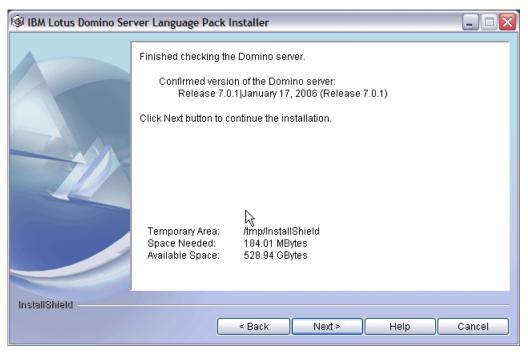


Figure 3-36 Confirming language pack to be installed

9. Select the language to install (Figure 3-37). Click **Select Files** to verify all the templates that will use the new language.

**Note:** Multiple languages can be available, it will depend on your installer. Also, you can customize the language pack installation by choosing which language packs and templates to add, which ones to replace, and which ones to remove from the Domino server.



Figure 3-37 Available languages

10. Select the templates that will use this language pack (Figure 3-38). During the language pack installation process, translated database templates are added to the current ones in the Domino server data directory. You can select all the templates or decide to install only some of them. By default, all the templates are selected. Click **OK**.



Figure 3-38 Templates list

11. Confirm the information shown in Figure 3-39 and click Next.



Figure 3-39 Confirmation window

12.A status bar displays the progress of the language pack installation as shown in Figure 3-40.

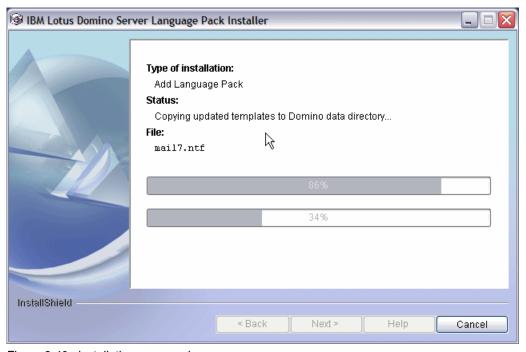


Figure 3-40 installation progress bars

13.A message informs you of the successful installation of the language pack, click **Finish** to exit the installation wizard (Figure 3-41).

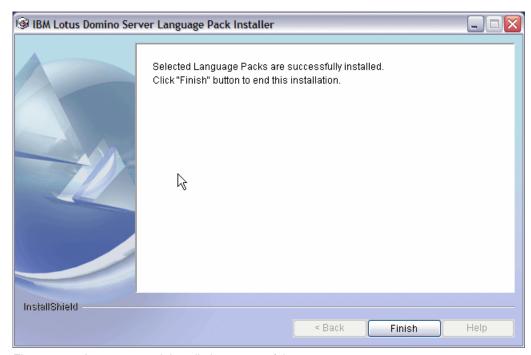


Figure 3-41 Language pack installation successful

The additional language packs are now successfully installed. To use the translated version for the Domino databases, you must refresh the design of the databases. Refer to the 'Creating Multilingual Applications' section of the Lotus Domino Designer 7 Help database (help7\_designer.nsf) for more information. Figure 3-42 shows an example of a translated mail database.



Figure 3-42 Spanish mail database

## 3.5.2 Installing additional languages using the LODRUN command

This section describes the steps to install additional languages to your Domino servers using the LODRUN CL command. In our example we are installing the language pack for Spanish. Perform the following steps:

**Note:** At the time this redbook written, the language pack for 7.0.2 was not yet available. Since the process is the same, we show how to install the Spanish language pack for Domino 7.0.1

- 1. Place the Domino Language Pack CD into the System i optical drive.
- From an i5/OS command line, type the following LODRUN command: LODRUN DEV(\*OPT) DIR('/OS400')
- 3. The language code installation process starts. After a few seconds, an installation console is displayed. Type the option that corresponds to the language to be used by the wizard and press Enter (Figure 3-43).

**Tip:** If you do not see all the text on the Language Pack Installer console displayed, you can use the Page Up and Page Down keys to see all the text.

```
Java Shell Display
 Attaching Java program to /QOPT/C89A6ES/DomLP701 Suite.jar.
 ______
Select a language to be used for this wizard.
 [] 1 - Portuguese (Brazil)
 [ ] 2 - Czech
 [] 3 - Danish
 [ ] 4 - Dutch
 [X] 5 - English
 []6 - Finnish
   ] 7 - French
 [] 8 - German
===> 5
F3=Exit
       F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-43 Selecting the language of the wizard

4. Type a 0 and press Enter to continue (Figure 3-44).

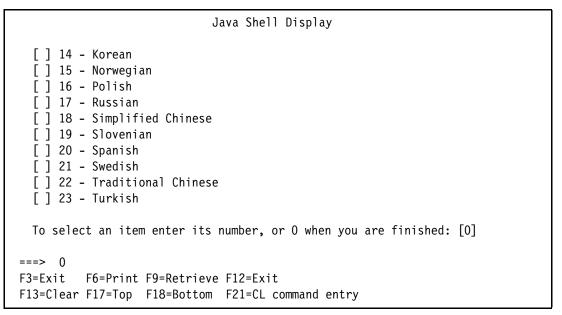


Figure 3-44 Language Pack installation wizard

5. Type a 1 and press Enter to continue (Figure 3-45).

```
Java Shell Display

Welcome to the IBM Lotus Domino Server Language Pack Installer

The IBM Lotus Domino Server Language Pack installer adds, replaces, and removes Language Packs from the Domino server. Language Packs include translated resource files and templates.

If you have English-language or customized templates that you want to maintain, copy those files to a directory outside of the Domino data directory.

Software License Agreement will be displayed at next screen.

Press 1 for Next, 3 to Cancel or 4 to Redisplay [1]

===> 1

F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-45 Welcome to the IBM Lotus Domino Server Language Pack Installer

6. Press Enter to display the Software Licensing Agreement (Figure 3-46).

Java Shell Display

Software Licensing Agreement
Press Enter to display the license agreement on your screen. Please read the agreement carefully before installing the Program. After reading the agreement, you will be given the opportunity to accept it or decline it. If you choose to decline the agreement, installation will not be completed and you will not be able to use the Program.

===>
F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry

Figure 3-46 Software Licensing Agreement

7. Read through the Software Licensing Agreement by pressing Enter (Figure 3-47).

Java Shell Display

"License Information" ("LI") is a document that provides
 information specific to a Program. The Program's LI is
 available at http://www.ibm.com/software/sla/. The LI may
 also be found in a file in the Program's directory, by the
 use of a system command, or as a booklet which accompanies
 the Program.

Press Enter to continue viewing the license agreement, or, Enter 1 to
 accept the agreement, 2 to decline it or 99 to go back to the previous
 screen.

===>
F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry

Figure 3-47 Reading through the software licensing agreement

8. Type a 1 to accept the software license agreement and press Enter. Then type a 1 again and press Enter to continue (Figure 3-48).

```
Java Shell Display

You have completed viewing the license agreement. Enter 1 to accept
the agreement or 2 to decline it. If you choose to decline the
agreement, installation will not be completed and you will not be
able to use the Program.
> 1

Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]

===> 1
F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-48 Accepting the software licensing agreement terms

9. The Language Pack installer detects the existing Domino server data directories. Select the Domino servers where you want to install the language pack (Figure 3-49). In our example, we type Y to install the language pack on all the existing Domino servers. Press Enter.

```
Java Shell Display

Language Pack installer has detected multiple data directories.
You can install Language Packs to one or all of these data directories.

Domino server data directory:
[ ] /Domino/DOM7SVR1/Data/
[ ] /Domino/DOM7SVR2/Data/

Do you want to install Language Packs to all data directories? [Y]es or
[N]o: [Y]

===> Y
F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-49 Selecting the Domino server data directories to install the language pack

10. Type a 1 and press Enter to continue (Figure 3-50).

```
Java Shell Display

The following Domino data directories have been detected. Language Pack will only be installed into the selected data directories.

Domino server program directory
: /QIBM/PRODDATA/LOTUS/DOMINO701

Domino server data directory
[X] /Domino/DOM7SVR1/Data/
[X] /Domino/DOM7SVR2/Data/

Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]

===> 1
F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-50 Continuing with the language pack installer wizard

- 11. Select the language pack installation method. For our example, we select the Add Language Pack to Domino server option by typing an option 1 and pressing Enter (Figure 3-51). Following is an explanation for all the available options:
  - Add Language Pack to Domino server: Installs language packs by merging translated forms, views, and other design elements with your existing language templates. The Language Pack Installer also installs additional files for Web enablement. You can add more than one language pack to a Domino server, and you can select which templates to add to the server. By default, the Language Pack Installer adds all translated templates to the Domino server.
  - Replace Language Pack: Overwrites the current language of the Domino server with the selected language pack. You can only replace one language pack at a time.
  - Remove Language Pack from Domino server: Uninstalls specified language packs from the Domino server by removing the translated forms, views, and other design elements from your templates. You can only remove languages added by previous installs of Language Pack Installer.

```
Replace Language Pack
Overwrites files and/or designs of the Domino server, with translated files of the selected language.

Remove Language Pack from Domino server
Remove files and/or designs, of selected languages, from the files of the Domino server.

[] 1 - Add Language Pack to Domino server
[] 2 - Replace Language Pack
[] 3 - Remove Language Pack from Domino server

To select an item enter its number, or 0 when you are finished [0]:

===> 1
F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-51 Language Pack Installer options

12. Type a 0 and press Enter to continue (Figure 3-52).

```
Java Shell Display

[ ] 1 - Add Language Pack to Domino server
[ ] 2 - Replace Language Pack
[ ] 3 - Remove Language Pack from Domino server

To select an item enter its number, or 0 when you are finished [0]:
> 1

[X] 1 - Add Language Pack to Domino server
[ ] 2 - Replace Language Pack
[ ] 3 - Remove Language Pack from Domino server

To select an item enter its number, or 0 when you are finished [0]:

===> 0

F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-52 Continuing with the language pack installer wizard

13. The Language Pack Installer will check the templates and will copy the new language resources to the Domino server data directory (Figure 3-53).

```
Java Shell Display
   Obtaining language information from templates...
 Copied from: /Domino/DOM7SVR1/Data/
          bookmark.ntf
          discsw7.ntf
          doclbw7.ntf
          dwa7.ntf
          forms6.nsf
          forms7.nsf
          inotes6.ntf
          journal6.ntf
         mail7ex.ntf
         mail7.ntf
===>
F3=Exit
         F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-53 Obtaining language information from the templates

14. The installer checks for available disk space and validates the Domino version. The language pack must be at the same version level as the Domino code. Type a 1 and press Enter to confirm the installation (Figure 3-54).

```
Java Shell Display

Finished checking the Domino server.

Confirmed version of the Domino server:
Release 7.0.1|January 17, 2006 (Release 7.0.1)

Please select Next and continue the installation.

Temporary Area: /tmp/
Space Needed: 184.01 MBytes

Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]

===> 1
F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-54 Confirmation screen

15. Select the language(s) you want to add to the Domino servers (Figure 3-55) and press Enter.

```
Java Shell Display

Default language: English

Current languages:.

The following Language Packs are available. Select the Language Packs you want to add.

[] 1 - Spanish

To select an item enter its number, or 0 when you are finished [0]:

===> 1

F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-55 Selecting language to install

16. Type a 0 and press Enter to continue (Figure 3-56).

```
Java Shell Display

The following Language Packs are available. Select the Language Packs you want to add.

[] 1 - Spanish

To select an item enter its number, or 0 when you are finished [0]:

> 1

[X] 1 - Spanish

To select an item enter its number, or 0 when you are finished [0]:

===> 0

F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-56 Continuing with the language pack installer wizard

17. Confirm the installation by typing a 1 and pressing Enter (Figure 3-57).

```
Java Shell Display

Confirm the selected language(s) for installation.

Default language: English

Current languages: .

Language Pack selection:

[X] Spanish

Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]

===> 1

F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-57 Confirm the selected language(s) for installation

18. Select the templates to use the new language pack, then type a 0 and press Enter to continue (Figure 3-58). You can select all the templates or decide to install only some of them. By default, all the templates are selected.

```
Java Shell Display
   [X]
      1
           bookmark.ntf
   [X] 2
           - discsw7.ntf
   [X]
       3
           doclbw7.ntf
           - dwa7.ntf
           - inotes6.ntf
   [X]
       6
           - journal6.ntf
       7
           - mail7ex.ntf
      8
          mail7.ntf
      9
           - pernames.ntf
   [X]
   [X]
      10 - resrc7.ntf
       11 - teamrm7.ntf
   [X]
       12 - Core Files
    To select an item enter its number, or 0 when you are finished [0]:
===> 0
F3=Exit
         F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-58 Selecting the templates which will use the new language

19. Type a 1 and press Enter to continue (Figure 3-59).

```
Java Shell Display
      bookmark.ntf
                              Х
      discsw7.ntf
                              Х
      doclbw7.ntf
                              Х
      dwa7.ntf
                              Х
      inotes6.ntf
                              Х
      journal6.ntf
                              Х
     mail7ex.ntf
                              Х
     mail7.ntf
                              Х
      pernames.ntf
                              Х
      resrc7.ntf
                              Х
      teamrm7.ntf
                              Х
      Core Files
 Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
===>
F3=Exit
          F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-59 Confirmation screen

20. Confirm the settings and type a 1 and press Enter (Figure 3-60).

```
Java Shell Display
    Confirm the following settings. Select the "Next", to begin the
    installation, using the selected Language Pack(s).
    Install type of Language Pack:
     Add Language Pack
    Program directory:
      /QIBM/PRODDATA/LOTUS/DOMINO701
   Data directory which Language Pack installed to:
      /Domino/DOM7SVR1/Data/
      /Domino/DOM7SVR2/Data/
    Install language:
      Spanish
 Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
===> 1
         F6=Print F9=Retrieve F12=Exit
F3=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-60 Confirming the settings

21. Wait until all the components are added to the selected Domino servers (Figure 3-61).

```
Java Shell Display

Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
> 1

Adding selected language components...

es - bookmark.ntf
es - discsw7.ntf
es - doclbw7.ntf
es - dwa7.ntf
es - iNotes6.ntf
es - journal6.ntf
es - mail7ex.ntf
es - mail7.ntf
===>
F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-61 Adding selected language components

22. When the process is completed, a message informs you of the successful installation of the language pack. Type a 3 and press Enter to exit the installer (Figure 3-62).

```
Java Shell Display

Selected Language Packs are successfully installed.

Please select "Finish" to end this installation.

Press 3 to Finish or 4 to Redisplay [3]

===> 3

F3=Exit F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top F18=Bottom F21=CL command entry
```

Figure 3-62 Language pack successfully installed

Figure 3-63 shows the Spanish language installed on the System i machine, the new language is installed as feature 2931.

		D	PSUACIO			
D			System: RCHAS10			
Resource						
ID	•	Feature	•			
5722XW1	*BASE	2924	iSeries Access Base			
5722XW1	1	5101	iSeries Access Option 1			
5733LD7	*BASE	5050	Lotus Domino 7 (5724E62)			
5733LD7	*BASE	2924	Lotus Domino 7 (5724E62)			
5733LD7	1	5050	Lotus Domino 7: C API			
5733LD7	11	5050	Lotus Domino 7: Release 7.0.1			
5733LD7	11	2924	Lotus Domino 7: Release 7.0.1			
5733LD7	11	2931	Lotus Domino 7: Release 7.0.1			
5733SC1	*BASE	5050	IBM Portable Utilities for i5/0S			
5733SC1	*BASE	2924	IBM Portable Utilities for i5/0S			
5733SC1	1	5050	OpenSSH, OpenSSL, zlib			
5733W60	*BASE	5050	WebSphere Application Server for OS/400 V6			
5733W60	2	5102	WebSphere Application Server V6 ("Base")			
5733W60	3	5103	WebSphere Application Server V6 Network Deployment More			
Press Ent	Press Enter to continue.					
F3=Exit F11=Display libraries/releases F12=Cancel F19=Display trademarks						

Figure 3-63 Verifying the installed language packs

# 3.6 Installing the iSeries Navigator Lotus Domino plug-in

iSeries Navigator offers a powerful graphical interface for Windows clients so you can manage and administer System i machines. It is fully integrated with the client desktop in the Windows environment. You can use iSeries Navigator to set up, manage, and administer one or multiple Domino servers. This requires you to install the Domino plug-in for iSeries Navigator.

The Domino plug-in for iSeries Navigator is a separately installed subcomponent of iSeries Navigator that allows you to perform the following tasks:

- ► Configure Domino for i5/OS servers
- Access Domino for i5/OS server properties
- Start and stop Domino for i5/OS servers
- ► Launch the Domino Administrator client
- Register Domino users
- View or modify a Domino server's NOTES.INI file

Although the Domino plug-in is installed as a subcomponent of iSeries Navigator, it is delivered via Domino for i5/OS. Since the plug-in ships with Domino for i5/OS rather than with iSeries Access for Windows, you must install the Domino plug-in from an System i machine on which Domino is installed.

**Important:** Every time you install a new release of Domino onto your system, you should update the Domino plug-in to the new version shipped with the new release of Domino.

If you are familiar with a graphical user interface, such as Windows, you may prefer to use iSeries Navigator to manage your Domino servers. Figure 3-64 shows iSeries Navigator with the Domino plug-in installed.

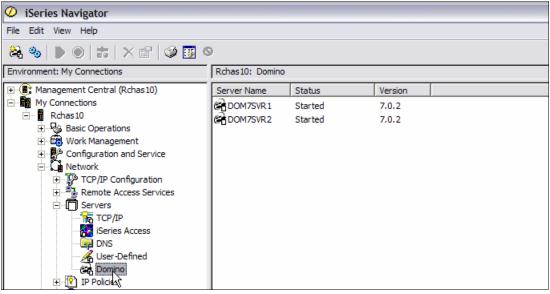


Figure 3-64 Using iSeries Navigator to administer Domino servers on a System i machine

## 3.6.1 Plug-in install immediately after installation of Domino 7 for i5/OS

Perform the following next steps to install the Domino plug-in for iSeries Navigator immediately after installing Domino 7 for i5/OS:

When Domino is installed on the System i machine, the next time you start iSeries
 Navigator, it will automatically detect a new plug-in to download as shown in Figure 3-65.
 Click Yes to install it.

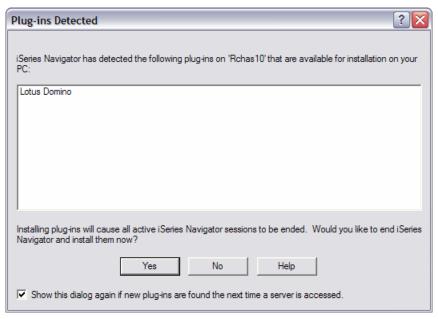


Figure 3-65 iSeries Navigator plug-in detected

2. Sign into your system as shown in Figure 3-66 and click **OK**.



Figure 3-66 Signing on to the System i machine

3. Select the Lotus Domino plug-in and click Next as shown in Figure 3-67.

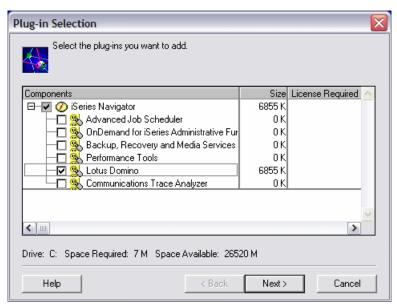


Figure 3-67 Selecting the Lotus Domino plug-in

4. Click Next to start the installation of the Domino plug-in (Figure 3-68).



Figure 3-68 Start copying files

iSeries Access for Windows Setup is now complete.

5. Click **Finish** to exit the installation process (Figure 3-69).

Figure 3-69 Setup completed

## 3.6.2 Plug-in install sometime after installation of Domino 7 for i5/OS

In the scenario that you unchecked 'Show this dialog again if new plug-ins are found the next time the server is accessed' and click **No** on the Plug-ins Detected window shown in Figure 3-65 on page 84, the Lotus Domino plug-in will not be installed for use with iSeries Navigator. Perform the following steps in the case that you wish to now enable the Domino plug-in for iSeries Navigator:

1. In the top menu bar of iSeries Navigator, click **View**. In the drop-down window, make sure that Taskpad has a checkmark to the left of it as shown in Figure 3-70.

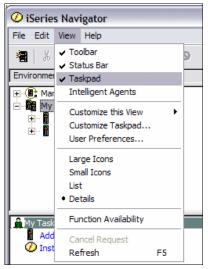


Figure 3-70 iSeries Navigator Taskpad enablement

2. In the bottom right hand corner of your iSeries Navigator window, the Taskpad is displayed. Click the **Install Plug-ins** option.

3. On Install Plug-ins window (Figure 3-71), select the System i machine that has that latest release of Domino installed and click **OK**.

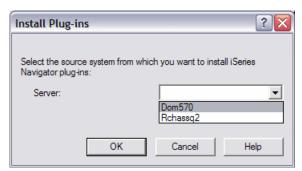


Figure 3-71 iSeries Navigator Install Plug-ins

4. You will be prompted to sign in to the System i machine that you have selected as shown in Figure 3-72. Click **OK**.



Figure 3-72 Signing on to the System i machine

5. At this point, the iSeries Access for Windows install procedure is called as is shown in Figure 3-73.

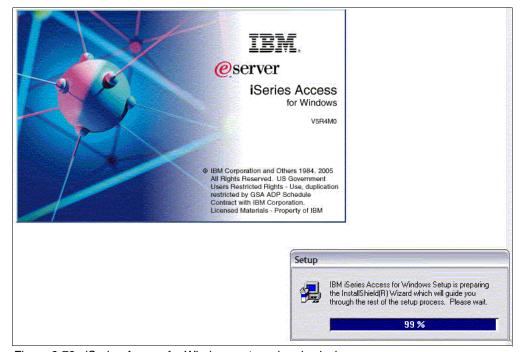


Figure 3-73 iSeries Access for Windows setup wizard splash screen

6. You are then prompted to sign on to the iSeries Netserver (Figure 3-74), enter your i5/OS user ID and password again and click **OK**.

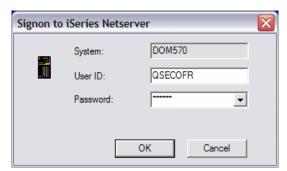


Figure 3-74 Signing on to iSeries Netserver

7. From this point, follow the steps provided in 3.6.1, "Plug-in install immediately after installation of Domino 7 for i5/OS" on page 83, beginning from step 3 on page 85.



# 4

# Configuring a Domino 7 server on i5/OS

After successfully installing the Domino 7 for i5/OS software, the next logical step is to configure a Domino server. This chapter describes the different methods that are available to configure your first Domino 7 for i5/OS server. This chapter also discusses considerations when adding additional Domino servers into an existing Domino domain.

## 4.1 Configuring a first Domino server

The first section of this chapter covers configuring the first Domino server in a new Domino domain. If you are configuring an additional Domino server into an existing Domino domain, see 4.2, "Configuring an additional Domino server" on page 123.

## 4.1.1 Methods to configure a Domino server

You can use any of the following methods to configure a Domino 7 for i5/OS server:

► Domino Server Setup wizard (domwzd.exe)

The Domino Server Setup wizard was first introduced in release 6.0 and replaced the R5 Web-based Domino setup wizard. The wizard is written in Java and no longer requires the special slim-downed version of HTTP be installed on the system. This wizard is a common Java source part implementation for all 6.0 and 7.0 platforms, although, the common part does include some minor platform-unique code and panels.

InstallShield support is a Java based installer, consistent to all Domino platforms. Changes in the product install options contain:

- Removed functions such as C++ API and Toolkit which are now available as a Web downloadable feature.
- Moved functions such as the Operations Navigator features and the single sign-on option.
- Changed functions such as the C API is now part of the base option installation.

For details on how to configure a Domino server using the Domino Server Setup wizard (domwzd.exe), see 4.1.3, "Using domwzd.exe to configure a new Domino server" on page 92.

► Configure Domino Server (CFGDOMSVR) CL command

The Configure Domino Server (CFGDOMSVR) CL command configures a Domino server or removes a previously configured Domino server. You can use this command to configure either a first Domino server or an additional Domino server.

For details on how to configure a Domino server using the Configure Domino Server (CFGDOMSVR) CL command, see 4.1.4, "Using CFGDOMSVR to configure a new Domino server" on page 108.

Using iSeries Navigator

Using iSeries Navigator to configure a Domino server invokes the Domino Server Setup wizard (domwzd.exe). Before you can use iSeries Navigator to configure a Domino server, you must have the current Domino plugin installed (see 3.6, "Installing the iSeries Navigator Lotus Domino plug-in" on page 82).

For details on how to configure a Domino server using iSeries Navigator, see 4.1.5, "Using iSeries Navigator to configure a new Domino server" on page 122.

As shown in Figure 4-1, the domwzd.exe, EZ-Setup and iSeries Navigator configuration methods all access the Domino Server Setup wizard and follow the same Java graphical user interface for configuration with some minor variations on the menus displayed.

**Note:** Two additional configuration methods not discussed in this chapter but noted on Figure 4-1 are using EZ Setup and setup.exe as they also lead into the already described Domino Server Setup wizard.

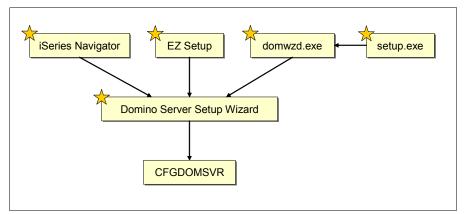


Figure 4-1 Options available to configure a Domino server on i5/OS

## 4.1.2 What happens during the configuration of the first Domino server

The following occurs when configuring the first Domino server in a new Domino domain on i5/OS:

- Creates a new domain for the Domino servers.
- Enables the appropriate network and serial ports.
- ► Creates the Domino Directory (names.nsf) for the Domino domain.
- ► Creates a certifier ID for your organization. The certifier ID file is saved in the same directory you choose for the Domino data files and gives it the default name of CERT.ID.
- Creates a Certifier document in the Domino Directory. This document describes the certifier ID.
- ► Creates a server ID for the new server. The server ID file is saved in the same directory you choose for Domino data files and gives it the default name of SERVER.ID.
- Certifies the server ID with the organization certifier ID or organizational unit certifier ID.
- ► Creates a Server document in the Domino Directory. This document describes the first server based on information that you specify during configuration.
- Creates a Person document in the Domino Directory for the Domino administrator specified during configuration.
- Creates a user ID and a password for the Domino administrator and attaches it as a file called USER.ID to the administrator's Person document in the Domino Directory.
- Certifies the administrator's user ID with the organization certifier ID or organizational unit certifier ID.
- ► Adds the administrator's name and the server's name as managers in the access control list of the Domino Directory.
- Adds the server name to the LocalDomainServers group in the Domino Directory.
- Creates the log file for the Domino server in the same directory you choose for Domino data files and gives it the default name LOG.NSF.
- Creates a mail directory in the Domino data directory and a mail file in that directory for the Domino administrator.

## 4.1.3 Using domwzd.exe to configure a new Domino server

The Domino Server Setup wizard (domwzd.exe) is available after expanding the downloaded self extracting executable file from Passport Advantage as well as from the physical media. To configure a Domino server on i5/OS using the Domino Server Setup wizard (domwzd.exe) configuration method, perform the following steps:

- 1. Locate domwzd.exe file on your PC workstation and double click on it to launch.
- 2. On the Signon to the Server window (Figure 4-2), enter your System i name or IP address and your i5/OS user ID and password to authenticate.

**Note:** An i5/OS user ID with the special authorities of \*SECADM (Security Administration), \*ALLOBJ (All Object), \*IOSYSCFG (System Configuration) and \*JOBCTL (Job Control) is required to configure a Domino 7 server.



Figure 4-2 Signing on to the System i machine

3. On the Welcome to Domino Server Setup window (Figure 4-3), click on Next.



Figure 4-3 Welcome to Domino Server Setup wizard

4. If you have multiple versions of Domino installed on your System i machine then you are prompted to choose which version you want to configure the new Domino server to use. Once you have selected the version, click **Next**. See Figure 4-4.

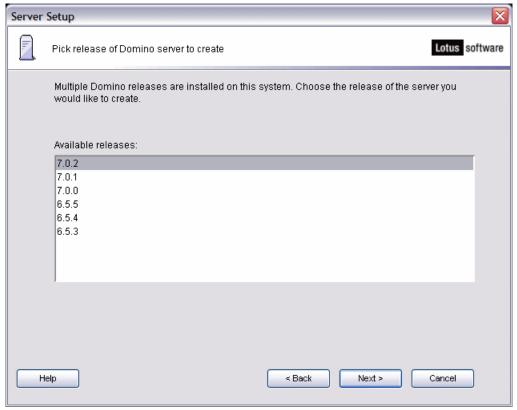


Figure 4-4 Selecting the release of Domino to configure

5. You now need to decide whether this configuration is for a first Domino server or an additional Domino server (Figure 4-5). For this example we are selecting the option to setup the first server which is the default. Click **Next**.

**Note:** If you are configuring an additional Domino server into an existing Domino domain, see 4.2, "Configuring an additional Domino server" on page 123.

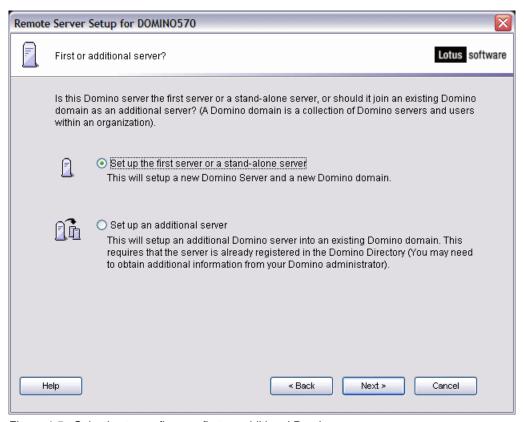


Figure 4-5 Selecting to configure a first or additional Domino server

6. Enter the Domino server name and title (Figure 4-6) and click **Next**. Remember, the Domino server name must be unique within the Domino domain.

Tip: You can click the Help button for additional information.

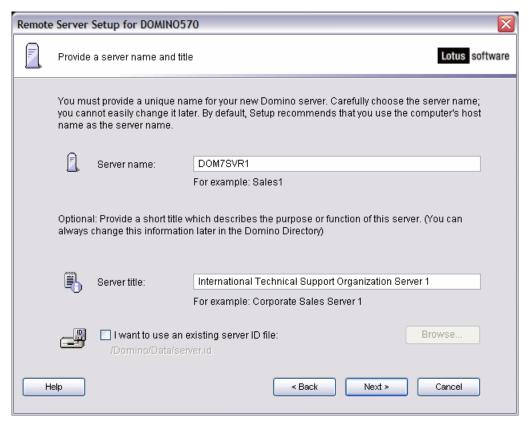


Figure 4-6 Entering the Domino server name and title

7. Enter the folder name and path or click **Browse** to specify the i5/OS integrated file system path to be used for the Domino server data directory (Figure 4-7). Click **Next**.

**Note:** It is a good idea to give the Domino server data directory the same name as the Domino server, particularly if you plan to have multiple Domino servers on the same system. This makes it easy to identify which data directory belongs to which Domino server. Grouping these Domino server data directories as subdirectories under the one directory (/Domino/ in this example) makes it easy to locate the Domino server data directories and collectively back up or restore these directories.

The default naming convention for the data directory in the Domino Server Setup wizard is /Domino/servername/Data. If you want to shorten the directory path, you can specify the path as /Domino/servername. The /data directory is really not necessary. In this example we kept the full default path to be consistent with the configuration defaults of the Domino Server Setup wizard.

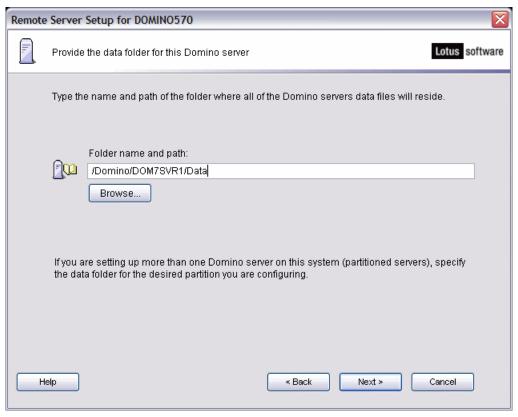


Figure 4-7 Specifying the Domino server data directory

- 8. Specify any advanced settings that are needed by clicking the **Customize** button shown in Figure 4-8. In our example, we accept the defaults and click **Next** to continue.
  - Start server after setup: Starts the Domino server after the Domino Server Setup wizard is completed.
  - Start server with TCP/IP: Starts the Domino server when the STRTCP command, the STRTCPSVR SERVER(\*AUTOSTART), or the STRTCPSVR SERVER(\*DOMINO) CL command is run. Also means that this Domino server will shut down when the ENDTCP command or the ENDTCPSVR SERVER(\*DOMINO) command is run.
  - Start Java server controller with TCP/IP: Starts the Java server controller when starting Domino servers when TCP/IP is started.

**Note:** Start server with TCP/IP and Start Java server controller with TCP/IP are ignored if your current level of the system does not support those fuctions for Domino.

- Enable server partitioning: Sets this Domino server up as a partitioned server. You can run up to 99 Domino servers on the same i5/OS partition. The actual number of Domino servers you can run on a system depends on system size and system load.
- Enable BRMS incremental save: Includes the BRMS incremental save task
   (QINNINBRM) for incremental backup of Domino databases. This task is not required if you are planning to only implement BRMS full online backups.
- Copy Administrator ID File: Specifies where the Administrator ID file for this Domino server will be saved.

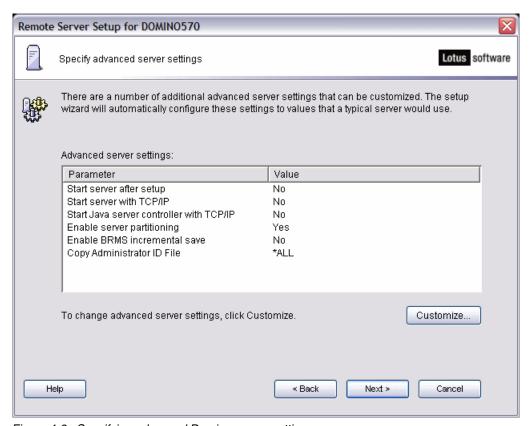


Figure 4-8 Specifying advanced Domino server settings

9. Enter the Organization name and the Organization Certifier password to be associated with the certifier ID (Figure 4-9). Take careful note of the information you enter here because it is critical to your Domino configuration.

Attention: Passwords are case sensitive.

You may want to add additional organizational details. For example, you want to create an organizational unit name. In this case, click **Customize**.

Otherwise, click **Next** to continue.

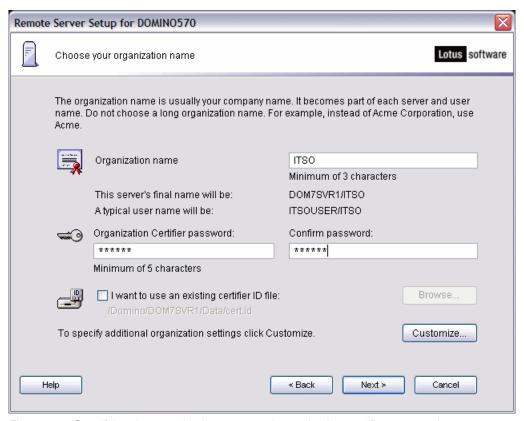


Figure 4-9 Specifying the organization name and organization certifier password

10. Enter the Domino domain name (Figure 4-10) and click Next.

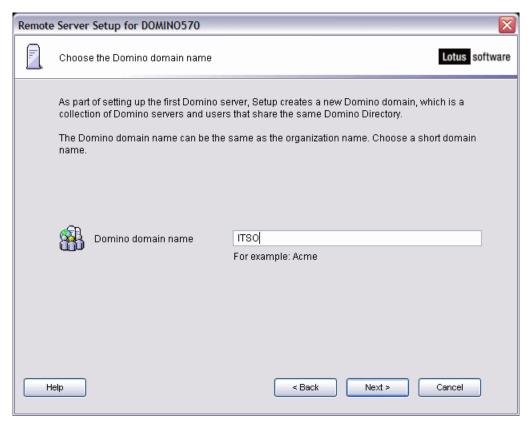


Figure 4-10 Specifying the Domino domain name

11. Specify the Administrator name and password (Figure 4-11) and click **Next**. Carefully note the information you enter here because it is critical to your Domino server configuration.

Attention: Passwords are case sensitive.



Figure 4-11 Specifying the Administrator name and password

12.On the What Internet services should this Domino Server provide? window (Figure 4-12), select the Internet services that this Domino server will provide. Click **Customize** to select other Domino services.

You can change these options later on if your company requirements change using either iSeries Navigator or the Change Domino Server (CHGDOMSVR) CL command. Click **Next** to continue.

**Note:** By default, the Domino HTTP server listens on port 80 and the LDAP server on port 389. If you are running multiple i5/OS or Domino HTTP or LDAP servers, you must consider the IP addresses and ports you are using so there is no port conflicts.

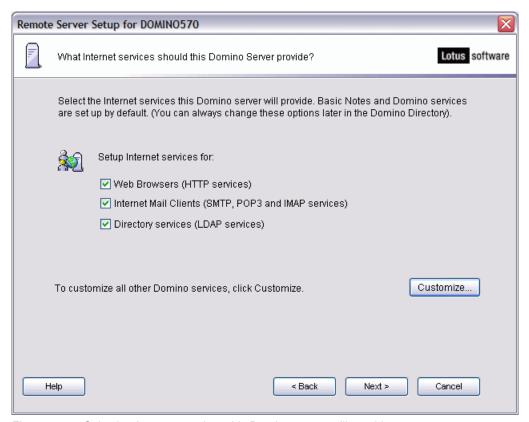


Figure 4-12 Selecting Internet services this Domino server will provide

13. Specify the TCP/IP address and define the fully qualified host name for this Domino server by clicking the **Customize** button on the Domino network settings window(Figure 4-13). When finished, click **Next** to continue.

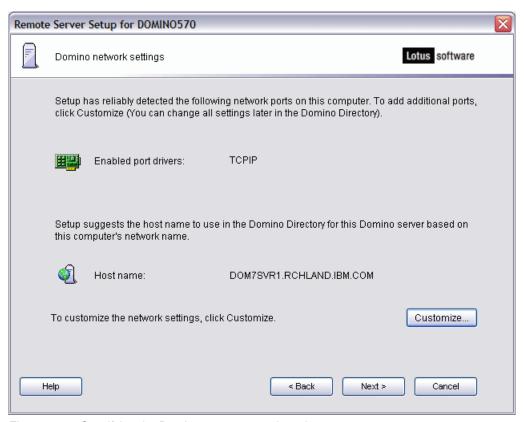


Figure 4-13 Specifying the Domino server network settings

14. Specify the time zone for this Domino server and if daylight savings time will be observed (Figure 4-14). Click **Next**.

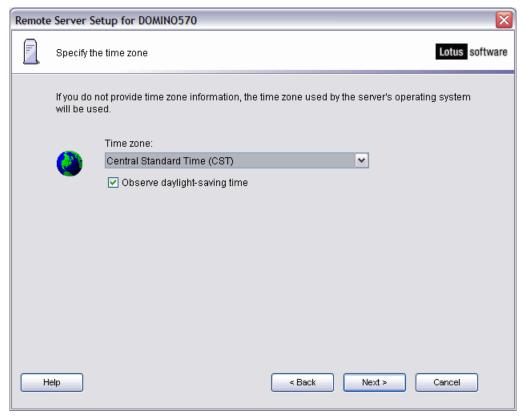


Figure 4-14 Specify the time zone and daylight savings time

15.On the Secure your Domino Server window (Figure 4-15), confirm that you want to secure your Domino server and prevent unauthenticated access to the Domino databases. We recommend that you keep the default settings. Click **Next**.

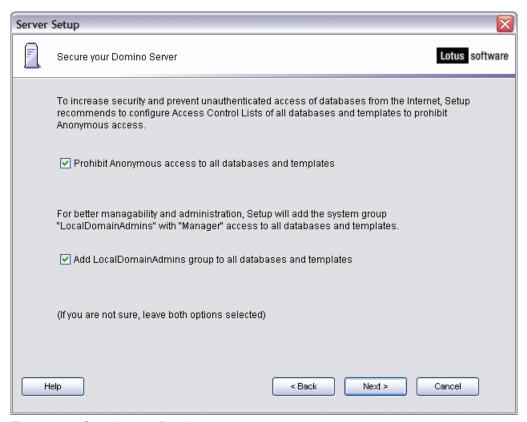


Figure 4-15 Securing your Domino server

16.On the Make optional copies of ID files window (Figure 4-16), you can optionally specify to create additional copies of your soon to be created ID files. Click **Next** to continue.

During the configuration of the Domino server, the ID files are all stored in the data directory of the Domino server. By selecting the I want to make additional copies of the ID files option, you can store a copy of the ID files locally on your PC workstation.

We recommend that you make the additional ID file copies. You should move these backup copies to a safe place or at least protect the ID directory against unauthorized access. A lost 'root' certifier file may require a global recertification of your entire Domino environment. You should backup at least all your organization unit (OU) certifier files.

Select the I want to make additional copies of the ID files check box and click Browse to specify the ID file copy path.



Figure 4-16 Option to make additional copies of ID files

17. You are now prompted to confirm your configuration settings for the new Domino server (Figure 4-17). You also have the option to click the **View command** button (see Figure 4-18) to view what the Configure Domino Server (CFGDOMSVR) CL command looks like that the wizard is running in the background. If all the settings are correct, click **Setup** to configure the Domino server.

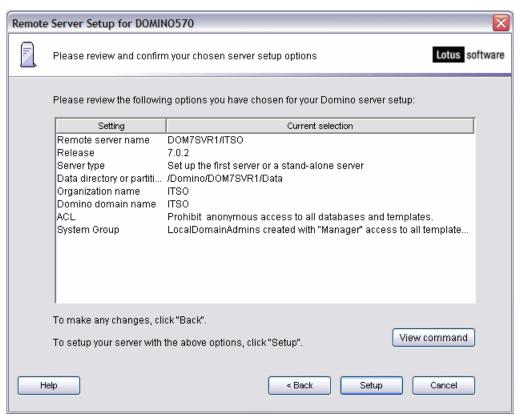


Figure 4-17 Reviewing the Domino server setup options



Figure 4-18 Example of CFGDOMSVR CL command used by the wizard

18. You are able to monitor the status of your Domino server configuration via a provided progress bar. Eventually you see the Setup summary completion window (Figure 4-19). Click **Finish** to complete the configuration process.

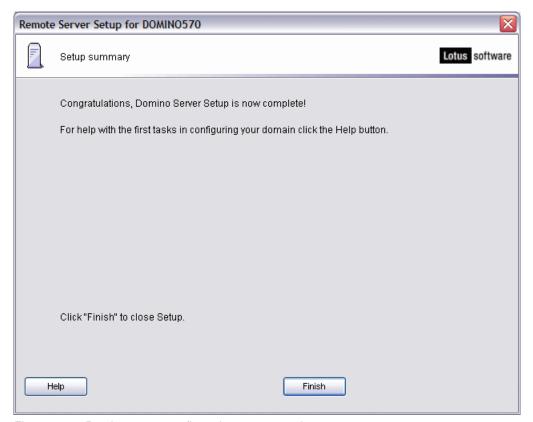


Figure 4-19 Domino server configuration setup complete message

Your new Domino server starts automatically if you specified Start server after setup = Yes in the advanced server settings (see Figure 4-8 on page 98). Our example does not have this automatic start value set. You can learn more about starting a Domino server in Chapter 5, "Administering Domino 7 on i5/OS" on page 153.

## 4.1.4 Using CFGDOMSVR to configure a new Domino server

Configure Domino Server (CFGDOMSVR) is an i5/OS CL command to used to configure a new Domino server. If multiple versions of Domino are installed on the system, by default the command will correspond to the latest version of Domino installed. Thus if both Domino 7.0.1 and 7.0.2 are installed and the command is issued from an i5/OS command line, it will configure new 7.0.2 server.

If you want to create a Domino server at older release than the most current, you must qualify the CFGDOMSVR CL command by specifying the desired library first. Thus if the goal is configure a new 7.0.1 server the command would be QDOMINO701/CFGDOMSVR.

To configure a Domino server on i5/OS using the CFGDOMSVR command, perform the following steps:

1. Start a 5250 emulation session to the System i machine and sign-on with appropriate authority.

**Note:** An i5/OS user ID with the special authorities of \*SECADM (Security Administration), \*ALLOBJ (All Object), \*IOSYSCFG (System Configuration) and \*JOBCTL (Job Control) is required to configure a Domino 7 server.

2. From an i5/OS command line, enter the CFGDOMSVR command and press F4 to prompt the command. On the Configure Domino Server (CFGDOMSVR) display (Figure 4-20), enter the Domino Server name and \*FIRST for the Option parameter and press Enter.

See Table 4-1 for a description of the parameters on this display.

Figure 4-20 CFGDOMSVR command for a first Domino server (Display 1 of 7)

Table 4-1 CFGDOMSVR parameters (Display 1 of 7)

Parameter	Description
Server name	Specifies the name of the Domino server. The first 15 characters of this name must be unique across the organization. The Domino server name can be a text string having 1 to 246 characters. The maximum server name length decreases by 1 for every character after the 3rd character in the Organization name. For example, if the Organization name is 4 characters long, the server name length can not exceed 245 characters. Server names can contain a maximum of 246 characters and consist of any characters except: parentheses, at (@), slash and backslash (/ and \), underscore (_), equal (=), and plus (+), and space ( ).
	If you are setting up an additional Domino server (you specify *ADD for the Option parameter), you must provide the full hierarchical name of the server. For example, if the name of the additional server is Server1, the organization name is Acme, and the country or region code is US, you must specify Server1/Acme/US as the Server name.
Option	Specifies whether you are setting up the first Domino server, adding an additional Domino server, or removing a Domino server. The possible values are:  *FIRST - Specify this option only when you are setting up Domino for the first time in your company or when you are creating a new Domino domain.  *ADD - Specify this option to add a pre-registered Domino server to an existing Domino domain. Before you can add an additional Domino server to an existing domain you must:  - Use the Domino Administrator or Web Administrator to register the new server with an administration server in the Domino domain. Registering a server adds the server to the Domino domain. The server registration process creates a Server document for the server in the Domino Directory and creates a server ID.  - Have access to the server ID file that was created during server registration.  - Have access to the Domino Directory on the administration server.  *DB2ACCESS - This value is not currently supported.  *REMOVE - Specify this option if you want to remove a Domino server.

3. You now see parameters for Data directory and Organization (Figure 4-21). For our example, we specify /Domino/DOM7SVR1/Data for the data directory and ITSO for the organization. Enter your information for these values and press Page Down.

See Table 4-2 for a description of the parameters on this display.

**Note:** It is a good idea to give the Domino server data directory the same name as the Domino server, particularly if you plan to have multiple Domino servers on the same system. This makes it easy to identify which data directory belongs to which Domino server. Grouping these Domino server data directories as subdirectories under the one directory (/Domino/ in this example) makes it easy to locate the Domino server data directories and collectively back up or restore these directories.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Server name . . . . . . . > DOM7SVR1
Option . . . . . . . . . > *FIRST
                                              *FIRST, *ADD, *REMOVE...
Data directory . . . . . . . . .
                                 /Domino/DOM7SVR1/Data
                                 ITS0
Organization . . . . . . . . . .
                                                                    More...
F3=Exit
         F4=Prompt
                     F5=Refresh
                                 F10=Additional parameters
                                                            F12=Cancel
F13=How to use this display
                                 F24=More keys
```

Figure 4-21 CFGDOMSVR command for a first Domino server (Display 2 of 7)

Table 4-2 CFGDOMSVR parameters (Display 2 of 7)

Parameter	Description
Data directory	Specifies the path of the i5/OS integrated file system directory where you want the Domino server data files to reside. If the specified directory does not exist, it is automatically created with public authority of *EXCLUDE. If the specified directory already exists, we recommend that you specify a public authority of *EXCLUDE for this directory.  If you are setting up more than one Domino server on the same system (partitioned Domino servers), specify a different data directory for each Domino server.
Organization	Specifies the organization name for the Domino server. The organization name could be the name of your company or a group within your company. You should have a good understanding of your organization's hierarchical name scheme before you select the name for your Domino organization. The organization name is appended to all user and server names and is the name of the organization certifier. The organization name is usually the same as the Domino domain name, can have a maximum of 63 characters, and may include alpha characters (A-Z), numbers (0-9), and the ampersand (&), dash (-), period (.), space (), and underscore (_).  You must specify an organization name when you specify an option of *FIRST.

4. On the next display shown in Figure 4-22, you need to specify the Administrator's name and password as well as other customized settings, many of which can be changed later using the Change Domino Server (CHGDOMSVR) CL command. Once you have entered the values, press the Page Down key.

See Table 4-3 for a description of the parameters on this display.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Administrator:
                                 Admin
 Last name . . . . . . . . .
                                 Domino
 First name . . . . . . . . .
 Password . . . . . . . . . . .
                                 password
                                               0 - 31
 Minimum password length . . .
 Internet password . . . . .
                                 password
Time zone . . . . . . . . . . . . .
                                 CST
                                               GMT,EST,CST,MST,PST,CET ...
Daylight savings time . . . . .
                                 *YES
                                               *YES, *NO
Web browsers . . . . . . . . .
                                 *HTTP
                                               *NONE, *ALL, *HTTP, *IIOP
Internet mail packages . . . . .
                                 *SMTP
                                               *NONE, *ALL, *IMAP, *POP3 ...
              + for more values
Directory services . . . . . .
                                 *NONE
                                               Character value, *NONE...
                                                                    More...
F3=Exit
         F4=Prompt
                    F5=Refresh
                                 F10=Additional parameters
                                                            F12=Cancel
                                 F24=More keys
F13=How to use this display
```

Figure 4-22 CFGDOMSVR command for a first Domino server (Display 3 of 7)

Table 4-3 CFGDOMSVR parameters (Display 3 of 7)

Parameter	Description
Administrator	Specifies the name and password of the person who is the administrator for this Domino server. This name will appear in the Server document and in the access control list (ACL) of the Domino Directory (Public Address Book).
	You must specify at least a last name when you specify an Option of *FIRST. The first name and middle name are optional, but recommended to help prevent duplicate names. A password is required unless the minimum password length is specified to be zero.
	By default, Domino saves the administrator ID file in the Domino data directory.
	If you plan to administer the Domino server from a Web browser, use the Internet password value to specify a password for accessing the Domino server from the Internet. The possible values are:

Parameter	Description
Time zone	Specifies the time zone to be used by the Domino server. You can press the F4 key to display a list of valid values for the time zone. You must specify a time zone if you specify an Option of either *FIRST or *ADD.
	<ul> <li>Be sure the time zone and daylight savings time are set correctly for the server's operating system.</li> <li>Do not change the operating system time zone or daylight savings time settings between the time you configure the Domino server and the first time you start the Domino server.</li> <li>If you change the time zone or daylight savings time for the operating system while the Domino server is running, the new settings do not take effect until you restart the Domino server.</li> <li>The Domino server time zone and daylight savings time settings should match those of servers with which a server replicates. If the settings do not match, you may experience unexpected behavior from agents that run at a scheduled time.</li> <li>You can change the Domino server's time zone and daylight savings time settings later in the Server Location section of the Server document in the Domino Directory.</li> </ul>
Daylight savings time	Specifies whether the Domino server time stamp should be adjusted for daylight savings time. This value does not affect the actual system time. The possible values are:  *YES - Adjust the time stamp for daylight savings time.  *NO - Do not adjust the time stamp for daylight savings time.
Web browsers	Specifies which, if any, Web features should be included in the Domino server configuration. These features enable Web browsers to access your Domino server. The possible values are:  ➤ *NONE - Do not include any Web features.  ➤ *ALL - Include all Web features. This option will not include any operating system HTTP Web Servers.  ➤ *HTTP - Include the Domino HTTP Web server if you want Web browsers to access data on the Domino server or if you plan on using iNotes or DOLS (Domino Off-Line Services).  ➤ *IIOP - Include the Internet Inter-ORB Protocol (IIOP) feature. IIOP lets Web browsers and servers exchange complex objects, unlike HTTP, which only supports transmission of text. The IIOP supports both Notes objects and Object Request Broker (ORB) objects.  Note: Operating system HTTP Web server names are not allowed for this parameter.
Internet mail packages	Specifies which, if any, Internet mail packages should be included in the Domino server configuration. These packages enable the Domino server to send mail to and receive mail from the Internet.  You can enter multiple values. If you need additional entry fields to enter these multiple values, type
	a plus sign (+) in the entry field opposite the phrase "+ for more values" and press the Enter key.  The possible values are:
Directory services	Specifies which, if any, directory services should be included in the configuration.  The possible values are:  *NONE - Do not include any directory services in the configuration.  *ALL - Include all directory services in the configuration.  *LDAP - Include the Lightweight Directory Access Protocol (LDAP) in the configuration.

5. On the display shown in Figure 4-23 you must press the F10 key to see further additional parameters. Choose the settings that are relevant for your new Domino server and then press Page Down.

See Table 4-4 for a description of the parameters on this display.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Connection services . . . . . > *NONE
                                                *DECS, *NONE
Advanced services . . . . . .
                                  *PARTITION
                                                *NONE, *ALL, *PARTITION...
              + for more values
Default ACL settings . . . . .
                                  *ADMGRP
                                                *NONE, *ANONYMOUS, *ADMGRP
Text 'description' . . . . . > 'Domino R7 server for ITSO'
                          Additional Parameters
SMTP services (obsolete) . . . .
                                                Character value
                                  *DOMINO
News readers (obsolete) . . . .
                                  *NONE
                                                Character value
Replace configuration . . . . .
                                  *YES
                                                *YES, *NO
Domain name . . . . . . . . . . . .
                                  *ORG
Network name . . . . . . . . . . . .
                                  NETWORK1
Country or region code . . . . .
                                  *BLANK
                                                                     More...
F3=Exit F4=Prompt F5=Refresh F12=Cancel
                                               F13=How to use this display
F24=More keys
```

Figure 4-23 CFGDOMSVR command for a first Domino server (Display 4 of 7)

Table 4-4 CFGDOMSVR parameters (Display 4 of 7)

Parameter	Description
Connection services	Specifies whether the Domino Enterprise Connection Services (DECS) feature should be included in the Domino server configuration. DECS provides the capability to build live links from Domino pages and forms to data from relational databases.
Advanced services	Specifies which, if any, features of the Domino Advanced Services should be included in the Domino server configuration. You can enter multiple values. If you need additional entry fields to enter these multiple values, type a plus sign (+) in the entry field opposite the phrase '+ for more values' and press the Enter key. The possible values are:  *NONE - Do not set up any Advanced Services features on this server.  *ALL - Set up all Advanced Services features on this server.  *PARTITION - Set up this Domino server as a partitioned server. The partitioned servers feature enables you to run up to 99 Domino servers on the same i5/OS partition. The actual number of Domino servers that you can run depends on system size and load.  *BILLING - Set up this Domino server with the billing feature. The billing feature allows a Domino server to track and record specific Domino activities for billing purposes.  *CLUSTER - Set up this Domino server as a cluster server. The server clusters feature enables you to group Domino servers in the same domain connected by a local area network. Clusters provide failover protection for high availability of data and services.

Parameter	Description
Default ACL settings	Specifies the configuration of the Access Control List (ACL) to be applied for all databases and templates. The possible values are:  *ADMGRP - This option adds the group called LocalDomainAdmins in the Domino Directory and gives this group Manager access to all Domino databases and templates on the Domino server. To give individual administrators Manager access to all databases and templates, you need only add their names to this group in the Domino Directory.
	Manager access in an ACL allows an administrator to modify the database ACL, encrypt the database, modify replication settings, delete the database, and perform all tasks allowed by lower access levels.
	➤ *ANONYMOUS - Allow anonymous access. This decreases security and does not prevent unauthenticated access of databases from the Internet.
	Any user or server that accesses a Domino server without first authenticating is known by the name of Anonymous on that server. Anonymous database access can be given to Internet users and to Notes users who have not authenticated with the server.
	Anonymous access is generally used in databases that reside on Domino servers available to the general public. You can control the level of database access granted to an anonymous user or server by entering the name Anonymous in the access control list, and assigning an appropriate level of access. Typically you assign Anonymous users Reader access to a database.
	*NONE - Prohibit anonymous access and do not add the system group of LocalDomainAdmins.
Text 'description'	Specifies the text that briefly describes the purpose or function of the Domino server. The possible values are:  *BLANK - Text is not specified.  *description' - Specify no more than 60 characters of text, enclosed in apostrophes.
SMTP services (obsolete)	SMTP services is an obsolete parameter and is only allowed syntactically for upwards compatibility of CL programs that use the CFGDOMSVR command and specify the parameter. Any value specified for this parameter will be ignored.
News readers (obsolete)	News readers is an obsolete parameter and is only allowed syntactically for upwards compatibility of CL programs that use the CFGDOMSVR command and specify the parameter. Any value specified for this parameter will be ignored.
Replace configuration	Specifies whether the existing Domino server configuration files in the data directory that is specified in the Data directory (DTADIR) parameter should be erased and replaced with the new ones. The possible values are:  *YES - Replace existing configuration files in the directory that is specified in DTADIR parameter.  *NO - Do not replace existing configuration files in the directory that is specified in DTADIR parameter.
Domain name	Specifies the domain name for the Domino server. Each Domino domain has a common Domino Directory that is shared by all Domino servers in the domain. If you are using TCP/IP, you should consider using your TCP/IP domain name. Otherwise, you should choose a name which identifies your organization. The possible values are:  *ORG - Specifies that the domain name of the Domino server is the same as the organization name.  domain-name - Specify the domain name to be used. The first 15 characters of the name must be unique across the organization. You can use letters, numbers, and the special characters &, - and _ in the name. The name can be mixed case. The maximum length of the domain name is 31 characters.

Parameter	Description
Network name	<ul> <li>Specifies the name of the Notes named network to which this Domino server belongs. A Notes named network identifies a group of servers that share a common protocol so they can communicate directly. The possible values are:         <ul> <li>NETWORK1 - The network name is NETWORK1. Use this default name unless you are sure that another name is used for other Domino servers in the Notes network.</li> <li>network-name - Specify the name of the network. You can simplify administration by naming your networks with easily identifiable names. For example, you can use a name that reflects a location (such as Chicago), a network type or protocol (such as TCP), or a combination of location and network type or protocol.</li> </ul> </li> </ul>
Country or region code	Specifies a two-character country or region code that is added to the certifier ID for the Domino server. If you are planning to use your Domino server to communicate with other companies, you can use a country or region code to minimize the chance that another company has the same Domino server ID.
	The country or region code should be entered only if you have registered your organization name with a national or international standards body.
	The possible values are:  ► *BLANK - A country or region code is not used.  ► country or region-code - Specify the two-character country or region code for the server. For example, the country or region code for the United States is US and the country or region code for Canada is CA. While the cursor is on this field, you can press the F4 key to display a list of valid country or region codes.

6. The display shown in Figure 4-24 lists options for the ID's to be used. As this is a first Domino server configuration, accept the defaults and press the Page Down key.

See Table 4-5 for a description of the parameters on this display.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Organizational unit:
                                  *BLANK
  Name . . . . . . . . . . . . . . . .
  ID file . . . . . . . . . . . . . .
                                  *GEN
  ID file's password . . . . .
                                  *ADM
Certifier ID:
                                  *GEN
  ID file's password . . . . .
                                  *ADM
Administrator ID:
  ID file . . . . . . . . . . . . . . .
                                  *GEN
  ID file's password . . . . .
                                  *ADM
                                                                     More...
F3=Exit
         F4=Prompt
                     F5=Refresh
                                  F12=Cancel
                                              F13=How to use this display
F24=More keys
```

Figure 4-24 CFGDOMSVR command for a first Domino server (Display 5 of 7)

Table 4-5 CFGDOMSVR parameters (Display 5 of 7)

Parameter	Description
Organizational unit	Specifies an organizational unit for the first Domino server being configured. Use the Name parameter to specify an organizational unit name. The possible values are:  ➤ *BLANK - An organizational unit name is not used.  ➤ OU-name - Specify an organizational unit name. It could be the name of a department within your company or the name of a specific location (for example: North). The name must be no more than 32 characters, it can be mixed case and letters, numbers, spaces, and the special characters &, - and _ can be used as part of the name.
	Use the ID file parameter to specify an organizational unit certifier ID. This option is ignored if an organizational unit name is not specified. The possible values are:  ➤ *GEN - Specifies that a new organizational unit certifier ID file should be created.  ➤ OU-certifier-ID-file-path-name - Specify the path to an existing Domino organizational unit certifier ID file that should be copied. The path is ignored if an organizational unit name is not specified.
	For the ID file's password, specify the password that is associated with the new or existing organizational unit certifier ID file. The administrator's password will be used if *ADM is specified. The password is ignored if an organizational unit name is not specified.
Certifier ID	Specifies the certifier ID file to be used for the first Domino server being configured. Each grouping of Domino servers, which is known as a domain, has an organization certifier ID that is stored in a file called CERT.ID. During configuration of the first Domino server, Domino automatically creates the organization certifier ID and saves it in the directory that is specified in the Data directory (DTADIR) parameter. This certifier ID automatically certifies the first server's ID and the administrator's user ID. When you register new users or servers, you use the certifier ID to give access to the domain. You also use the organization certifier ID when you create organizational unit certifiers for organizational units (lower level units) within an organization. The possible values are:  * *GEN - Specifies that a new organization certifier ID file should be created. If the file CERT.ID already exists in the Domino data directory and the Replace configuration (RPLCFG) parameter is set to *NO, a new certifier ID file is not created.  * certifier-ID-file-path-name - Specify the path to an existing Domino certifier ID file that should be copied. If the certifier ID file does not exist in the Domino data directory, it is copied from the specified file. If the certifier ID file already exists in the Domino data directory and the RPLCFG parameter is set to *YES, the certifier ID file is replaced by the specified ID file. If the certifier ID file already exists in the Domino data directory and the RPLCFG parameter is set to *NO, no action is taken.
	For the ID file's password, specify the password that is associated with the new or existing organization certifier ID file. The administrator's password will be used if *ADM is specified.
Administrator ID	Specifies the user ID file to be used for the Domino administrator. During configuration of the first Domino server, Domino automatically creates a user ID for the Domino administrator and attaches it as a file named USER.ID to the administrator's Person document in the Domino Directory. The possible values are:  *GEN - Specifies that a new administrator ID file should be created. If a USER.ID file already exists in the Domino data directory and the Replace configuration (RPLCFG) parameter is set to *NO, an administrator ID file is not created.  *administrator-ID-file-path-name - Specify the path to an existing Domino administrator ID file that should be copied. If the administrator ID file does not exist in the Domino data directory, it is copied from the specified file. If the administrator ID file already exists in the Domino data directory and the RPLCFG parameter is set to *YES, the existing administrator ID file is replaced by the specified ID file. If the administrator ID file already exists in the Domino data directory and the RPLCFG parameter is set to *NO, no action is taken.
	For the ID file's password, specify the password that is associated with the new or existing administrator ID file. The administrator's password will be used if *ADM is specified.

7. The display shown in Figure 4-25 lists additional configuration options to choose from. Often the default settings are just fine and for this example, we accept the defaults with exception of entering our fully qualified host name of the Domino server in the Internet address field. Using an IP address is also okay. Once you have entered the parameters as desired, press Page Down to go to the last configuration screen.

See Table 4-6 for a description of the parameters on this display.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Server ID:
 ID file
                                   *GEN
 ID file's password . . . . .
                                   *NOPWD
                                   *N0
Start server . . . . . . . . . .
                                                 *YES, *NO
Start when TCP/IP started . . .
                                   *N0
                                                 *YES, *NO, *JSC, *ALL
Log replication events . . . .
                                   *YES
                                                 *YES, *NO
                                                 *YES, *NO
Log client session events . . .
                                   *YES
TCP/IP port options:
 Encrypt network data . . . . .
                                   *NOENCRYPT
                                                 *ENCRYPT, *NOENCRYPT
 Internet address . . . . . .
                                   DOM7SVR1.RCHLAND.IBM.COM
 Bind HTTP . . . . . . . . . . .
                                                 *YES, *NO
                                   *YES
                                                 *YES, *NO
 Compress network data . . . .
                                   *N0
                                                                       More...
F3=Exit
         F4=Prompt
                      F5=Refresh
                                   F12=Cancel
                                                F13=How to use this display
F24=More keys
```

Figure 4-25 CFGDOMSVR command for a first Domino server (Display 6 of 7)

Table 4-6 CFGDOMSVR parameters (Display 6 of 7)

Parameter	Description
Server ID	Specifies the server ID file to be used for the first Domino server being configured. During setup of the first Domino server, Domino automatically creates a server ID for the new server. The new server ID file is saved in the directory that is specified in the Data directory (DTADIR) parameter and has the default name of SERVER.ID. The possible values are:  **GEN - Specifies that a new server ID file should be created. If a SERVER.ID file already exists in the Domino data directory and the Replace configuration (RPLCFG) parameter is set to *NO, a server ID file is not created.  **server-ID-file-path-name - Specify the path to an existing Domino server ID file that should be copied. If the server ID file does not exist in the Domino data directory, it is copied from the specified file. If the server ID file already exists in the Domino data directory and the RPLCFG parameter is set to *YES, the existing server ID file is replaced by the specified ID file. If the server ID file already exists in the Domino data directory and the RPLCFG parameter is set to *NO, no action is taken.  For the ID file's password parameter, specify the password that is associated with the existing server ID file. No password is used if *NOPWD is specified. The password is ignored if *GEN is specified for the server ID file.

Parameter	Description
Start server	Specifies whether the Domino server should be started when the CFGDOMSVR CL command completes the setup. The possible values are:  *NO - Do not start the server when the setup is complete.  *YES - Start the server when the setup is complete.
Start when TCP/IP started	Specifies whether this Domino server should be started when the STRTCP command, the STRTCPSVR SERVER(*AUTOSTART), or the STRTCPSVR SERVER(*DOMINO) command is run. It also means that this Domino server will be ended when the ENDTCP command or the ENDTCPSVR SERVER(*DOMINO) command is run. The possible values are:  *NO - Do not start this server when the STRTCP or STRTCPSVR command is run, and do not end this server when the ENDTCP or ENDTCPSVR command is run.  *YES - Start this server when the STRTCP or STRTCPSVR command is run, and end this server when the ENDTCP or ENDTCPSVR command is run.  *JSC - Start just the Java server controller (JSC) of this Domino server when the ENDTCP or STRTCPSVR command is run, and end the JSC and this Domino server when the ENDTCP or ENDTCPSVR command is run.  *ALL- Start this server and its Java server controller (JSC) when the STRTCP or STRTCPSVR command is run, and end this server and its JSC when the ENDTCP or ENDTCPSVR command is run, and end this server and its JSC when the ENDTCP or ENDTCPSVR command is run.
Log replication events	Specifies whether the replication events should be logged in the Notes log (LOG.NSF) for this Domino server. The possible values are:  *YES - Log all replication events.  *NO - Do not log replication events.
Log client session events	Specifies whether the client session events should be logged in the Notes log (LOG.NSF) for this Domino server. The possible values are:  *YES - Log all client session events.  *NO - Do not log client session events.

Parameter	Description
TCP/IP port options	Specifies options for the TCP/IP port.
	Use the Encrypt network data option to specify whether the system should encrypt the data that is sent through the port. Encrypting the data can make the transmission more secure, but the transmission speed may decrease slightly. The possible values are:  *NOENCRYPT - Do not encrypt the data.  *ENCRYPT - Encrypt the data.
	Use the Internet address option to specify a separate Internet (IP) address for the Domino server's port. You might use this option, for example, to specify a separate port address for each partitioned server. The possible values are:  ➤ *SYSTEM - This port should listen to all IP interfaces configured on the system.  ► IP-address - Specify the IP address or host name of the port. If an IPv4 address is specified, it must be in the form nnn.nnn.nnn, where nnn is a decimal number between 0 and 255; for example, 199.4.191.76. An IPv4 address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address. A port number can be specified at the end of the IP address.  ► If a host name is specified, it must be no more than 255 characters of text. The host name can be either the short form or the full domain version of the name and consist of one or more labels separated by periods. Each label can contain up to 63 characters. The specified host name must be listed either in the system's TCP/IP host table or in the Domain Name Server (DNS) of your network.
	Use the Bind HTTP option to bind the HTTP port of the Domino server to the specified Internet address. This option is ignored if the value of the Internet Address option is *SYSTEM. The possible values are:  ➤ *YES - Bind the HTTP port to the specified Internet address. The Internet address must be associated to an existing host name through an entry either in the system's TCP/IP host table or in the Domain Name Server (DNS) of your network.  ➤ *NO - Do not bind the HTTP port.
	<b>Caution</b> : In a production environment, do not use IP addresses in Network Address fields. Doing so results in serious administrative complications if an IP address changes or if network address translation (NAT) connections are used, as the values returned by the Notes Name Service will not be correct.
	Use the Compress network data option to reduce the amount of data transmitted between a Notes workstation and Domino server, or between two Domino servers. You can turn on network compression for each enabled network port.
	Whether you should enable network compression on Domino ports depends on the type of network connection and the type of data being transmitted. You need to enable compression on both sides of a network connection in order for it to work. To enable compression on a port or ports on all Notes clients (or a subset of them), use Desktop or Setup policy settings. For information on policy settings, see Lotus Domino Administrator Help. You benefit from using network compression only if the data being transmitted is not already compressed. The same is true of tasks involving data that was compressed using the Lempel-Ziv algorithm (LZ1 compression), such as replicating a mail file with a large number of compressed attachments.
	For LAN or private WAN connections, compression decreases bandwidth utilization on the network, but this gain must be weighed against increased memory and processor utilization, since network compression works by buffering data before compressing it. The cost of compression might be worth it only for a heavily loaded network or network pathway.
	The possible values are:  ► *NO - Do not compress the data.  ► *YES - Compress the data.

8. On the final configuration display (Figure 4-26), you are again presented with a number configuration choices. In our example we have elected to enter the fully qualified host name for the Server host name parameter as well as enter the Domino server name for the subsystem name and object names parameter.

See Table 4-7 for a description of the parameters on this display.

After pressing Enter, you are informed the command is in progress and periodically given percentages of the configuration status until eventually the command will come back with a message that it ended successfully.

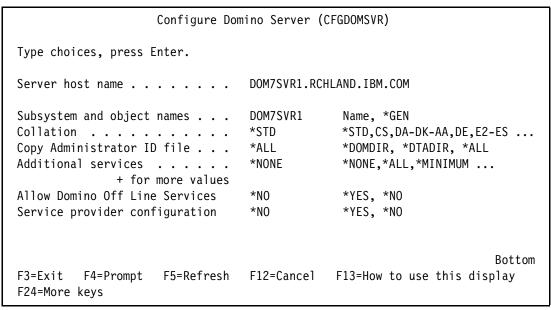


Figure 4-26 CFGDOMSVR command for a first Domino server (Display 7 of 7)

Table 4-7 CFGDOMSVR parameters (Display 7 of 7)

Parameter	Description
Server host name	<ul> <li>Specifies the host name related to the Domino server being configured. The host name is used by some services and applications running within the Domino server such as SMTP. The possible values are:         <ul> <li>*NONE - A server host name is not specified. If SMTP is configured in the Domino server then the system's host name is used.</li> <li>'host-name' - Specify no more than 255 characters of text. The host name can be either the short form or the full domain version of the name and consist of one or more labels separated by periods. Each label can contain up to 63 characters. The specified host name must be listed either in the system's TCP/IP host table or in the Domain Name Server (DNS) of your network.</li> </ul> </li> </ul>
Subsystem and object names	Specifies the name to be used for the subsystem in which the Domino server runs. This name is also used for other system objects that are used for the Domino server. These objects include a job description (*JOBD), a job queue (*JOBQ), a class (*CLS), and possibly BRMS lists. The possible values are:  *GEN - The system should generate the name. The name will be 'DOMINO' followed by a two-character sequence number. For example, DOMINO01 or DOMINO02.  *Name - Specify the name to be used for the subsystem and associated objects. The name can be 10 characters or less.

Parameter	Description
Collation	<ul> <li>Specifies the way in which the Domino server should sort characters. The possible values are:</li> <li>*STD - The standard collation sequence should be used. Using this collation sequence, Domino sorts numbers and accented characters before letters.</li> <li>collation-code - Specify a collation code that defines the way in which the Domino server should sort characters. While the cursor is on this field, you can press the F4 key to display a list of valid collation codes.</li> </ul>
Copy Administrator ID file	Specifies where the system should copy the Administrator ID file for the Domino server. This parameter is intended for the case where a new USER.ID file is created (*GEN specified in the parameter ADMID). If an existing ID is being used, then this parameter does not take effect. The possible values are:  *ALL - Copy the ID file to both the Domino Directory and the data directory for the server.  *DOMDIR - Copy the ID file only to the Domino Directory.  *DTADIR - Copy the ID file only to the Domino server's data directory.
Additional services	Specifies which, if any, additional services should be included in the Domino server configuration. The possible values are:  *NONE - Include the default additional services (Update, AMgr, AdminP, CalConn, Replica, RnRMgr, Router, Sched and Stats).  *ALL - Include all the additional services.  *MINIMUM - Include the minimum possible number of additional services.  *AMGR - Runs agents on one or more databases (Agent Manager task).  *ADMINP - Automates a variety of administrative tasks (Administration Process task).  *BRMS - Include the BRMS incremental save task for backup of Domino databases.  *CALCONN - Processes requests for free-time information from another server (Calendar Connector task).  **CERTAUTH - Include the Certificate Authority task.  **CHGMGR - Automates large-scale changes to enterprise systems. It provides reliable and simple 'fire-and-forget' operation with workflow approval and tracking facilities. When combined with the Tivoli Analyzer for Domino, it leverages the Administration Process to provide a robust, distributed, high-performance solution for balancing resources across Domino servers (Change Manager task).  **DMNIDX - Include the Domain Indexer.  **ICM - Include the Internet Cluster Manager.  **ISPY - Sends server and mail probes and stores the statistics (ISpy task).  **RRMTDBG - Replicates databases with other servers (Replicator task).  **RNTBGG - Performs both auto-processing of requests as well as - busy-time updates for Rooms and Resources databases (Rooms and Resources task).  **RNBMGR - Performs beth auto-processing of requests as well as - busy-time updates for Rooms and Resources databases (Rooms and Resources task).  **SCHED - Returns meeting times and dates and available invitees (Schedule Manager task).  **SCHED - Returns meeting times and dates and available invitees (Schedule Manager task).  **STATCOL - Collects statistics for multiple servers (Statistics Collector task).  **STATCO - Records database activity in the log file (Statistics task).
Allow Domino Off Line Services	Specifies whether this Domino server will support Domino Off-Line Services (DOLS). DOLS technology enables Web browser users to access and interact with Web applications while disconnected from the network. The possible values are:  *NO - The server does not support DOLS.  *YES - The server will support DOLS.
Service provider configuration	This value is no longer supported and is ignored if specified.

Your new Domino server starts automatically if you specified Start server after setup = Yes in the advanced server settings (see Figure 4-25 on page 117). Our example does not have this automatic start value set. You can learn more about starting a Domino server in Chapter 5, "Administering Domino 7 on i5/OS" on page 153.

## 4.1.5 Using iSeries Navigator to configure a new Domino server

In order to use iSeries Navigator to configure a new Domino server you must first installed the Domino plug-in. This plug-in becomes available as soon as the Domino licensed program is installed on your System i machine. See 3.6, "Installing the iSeries Navigator Lotus Domino plug-in" on page 82 for details.

Once the iSeries Navigator Domino plug-in is installed, you have many options available to you with regard to administering Domino on i5/OS, including the function of configuring a new Domino server.

Perform the following steps to configure a new Domino server with iSeries Navigator:

- 1. Start iSeries Navigator
- Under My Connections click on the plus (+) sign next to the System i machine to configure Domino on and click Network → Servers and right click on Domino.
- 3. On the pop-up window, click New  $\rightarrow$  New Domino Server as shown in Figure 4-27.

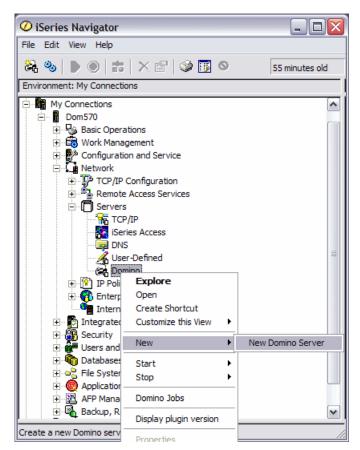


Figure 4-27 Configuring a Domino server with iSeries Navigator

4. On the Signon to the Server window (Figure 4-28), enter your System i machine's host name or IP address and a valid user ID and password. Click **O**K.

**Note:** An i5/OS user ID with the special authorities of \*SECADM (Security Administration), \*ALLOBJ (All Object), \*IOSYSCFG (System Configuration) and \*JOBCTL (Job Control) is required to configure a Domino 7 server.



Figure 4-28 Signing on to the System i machine

The steps to configure a Domino server are the same as detailed in 4.1.3, "Using domwzd.exe to configure a new Domino server" on page 92 starting with step 3 on page 93.

## 4.2 Configuring an additional Domino server

As noted earlier in the chapter (4.1.1, "Methods to configure a Domino server" on page 90), there are several methods available to configure a Domino server. When the new Domino server is not the first server in an existing Domino Domain, the configuration steps change slightly.

Use this procedure outlined in this section if you want to add a new Domino server to an existing Domino domain. When you add a Domino server to a Domino domain, the additional server uses the same Domino Directory as other servers in the Domain.

**Note:** Although the steps to configure the additional Domino server vary slightly between using the domwzd.exe, CFGDOMSVR command, or iSeries Navigator method, the fundamental concept remains the same as does the terminology.

In this example we add a second Domino server to the ITSO domain and configured it on the same System i machine as the prior Domino server (DOM7SVR1) that we configured earlier in this chapter.

To configure an additional Domino server, you must complete the following tasks:

1. Prepare the i5/OS environment for the Domino server. If you previously configured your first Domino server on the same i5/OS, you have already set up the i5/OS environment.

If the additional Domino server is configured on the same i5/OS, you may have to create an additional TCP/IP interface (an IP address) for the new Domino server. Refer to 2.4, "TCP/IP considerations for Domino" on page 22, to create a new TCP/IP interface.

- 2. Use a Domino Administrator client workstation and an existing Domino server in the Domino domain to register the additional Domino server. When an additional server is configured, the server ID file is created when you register the new server to the existing Domino Directory, before you actually configure the new server.
  - See 4.2.1, "Registering an additional Domino server" on page 124, for details on how to perform this step.
- 3. Copy the server ID file for the additional server to your i5/OS, if you saved the new server ID in a file when you registered the server. See 4.2.2, "Handling the ID file for an additional server" on page 130, for details on how to perform this step.
- 4. If the registration Domino server is on a separate system, verify the TCP/IP connection from the System i machine where the new additional Domino server will be configured to the registration Domino server.
  - See 4.2.3, "Verifying the connection to the Domino registration server" on page 131, for details on how to perform this step.
- 5. Configure the additional Domino server on your System i machine. See 4.2.4, "Using DOMWZD.EXE to configure an additional Domino server" on page 132 or 4.2.5, "Using CFGDOMSVR to configure an additional Domino server" on page 145 for details on how to perform this step.

## 4.2.1 Registering an additional Domino server

**Note:** This procedure for registering an additional server is not specific to i5/OS. This procedure applies across all platforms when registering an additional server.

The procedure to register a new Domino server is similar to the procedure used when registering a new Lotus Notes user. Before adding a Domino server to an existing Domino domain, you must register the server in the Domino Directory on a registration server. The registration server (the Domino server on which you register other servers) must be up and running on your network. To register a new server from your workstation, you must have access to the registration server. You must also have at least Author access to the Domino Directory with the appropriate role in the access control list of the Domino Directory.

From the Domino Administrator workstation, perform the following steps:

1. From the Domino Administrator client, connect to the Domino server (in our example this is DOM7SVR1) you are going to register the additional server on.

Click the Configuration tab and from the right hand side of the display, expand Tools →
 Registration → Server (Figure 4-29). Optionally, you may select the pull down menu
 options for Configuration → Registration → Server to get to the same place.

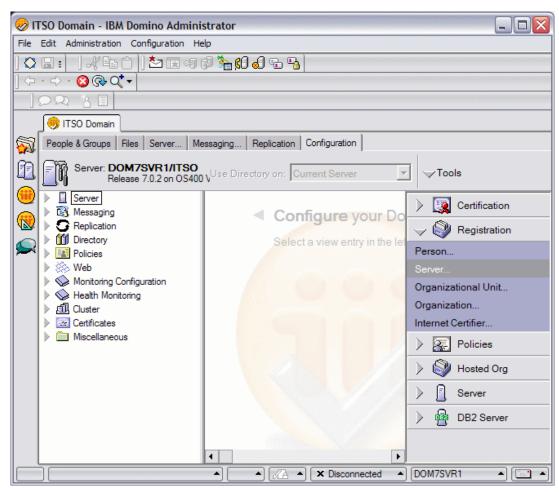


Figure 4-29 Domino Administrator client

3. You are then prompted to choose a certifier (Figure 4-30). Click the **Server** button to select the existing Domino server and then click the **Certifier ID** button to navigate to the correct cert.id file. Click **OK**.



Figure 4-30 Choosing a certifier ID

4. You are prompted (Figure 4-31) to enter the certifier password. Click **OK**.



Figure 4-31 Entering the certifier password

5. Click **OK** to the Certifier Recovery Information Warning window (Figure 4-32). This is a normal screen and is not a cause for concern.



Figure 4-32 Certifier Recovery Information Warning

On the Register Servers window (Figure 4-33) confirm the Registration Server and Certifier settings. Click Continue.

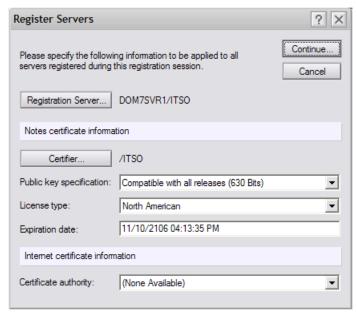


Figure 4-33 Register Servers

- 7. On the Register New Server(s) window (Figure 4-34), enter the required information:
  - **Server name:** Enter the name of the new Domino server.
  - Server title: This long title is visible in the Domino Directory to identify the server.
  - Domino domain name: Enter the name of the existing Domino domain.
  - Server administrator name: The name of the Domino Administrator or an existing Administration group.
  - ID file password: You can enter a password to protect the new Domino server's ID file. The password is mandatory if you want the ID file to be attached to the Server document in the Domino Directory. Attaching the file to the Server document seems to make the Domino server configuration easier. However, after you successfully configure the Domino server, you either must enter the password manually every time you start the server in the future, or you must clear the password.

The entire process is shorter if you do not specify a password (and consequently cannot attach the ID file to the Server document). To do so, you also must specify a minimum password quality of zero on the password quality scale which located by clicking the **Password Options** button.

- Password Options: Clicking this button displays the window shown in Figure 4-35.
   Use the scroll bar to select the required minimum password quality. Specify 0 (zero) or weak so you can clear the password later. This also allows you to leave the password field empty. However, this is only if the ID file will not be attached to the Server document in the Domino Directory.
- Location for storing server ID: You have the choice of storing the new server ID as an attachment in the Server document in the Domino Directory, in a file on the disk drive of your PC workstation, or both.

If the ID file is stored in the Domino Directory, the setup process (when you configure the Domino server later) accesses the Domino Directory database to detach the ID file

from the Server document. In this case, it is mandatory to specify a password, even if you selected a minimum password length of 0 or weak.

If you choose to store the ID in a file, it is saved to the selected drive on your PC workstation. It must be copied to the i5/OS integrated file system before you configure the additional Domino server. The advantage of this method is that you do not have to clear the password after you set up the additional Domino server. If you do not want to specify a password, deselect the In Domino Directory option.

See 4.2.2, "Handling the ID file for an additional server" on page 130 for further details on storing the server ID file.

In our example we are not saving the new server ID file to the Domino Directory as this would require a password be set for it. Instead we clicked on the **Password Options** button and reduced the password level to weak. We then elected to save the server ID file to a local directory on the PC by clicking the **Set ID File** button to specify where to save the ID file.

After confirming all the settings, click on the green check mark to add the new server to the Registration queue.



Figure 4-34 Registering a new Domino server, Basics tab



Figure 4-35 Password options

8. With the Domino server having now been added to the registration queue. The final step to complete the registration process is to either select the server entry in the queue and then click the **Register** button or to just click the **Register All** button (Figure 4-36).

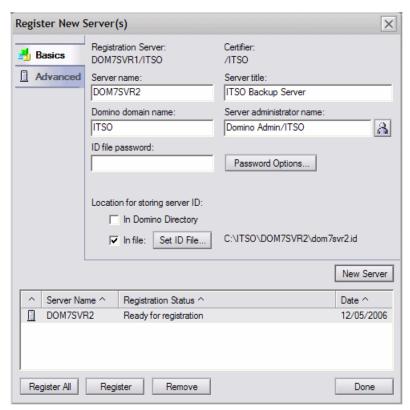


Figure 4-36 Registering a new Domino server, ready for registration

- 9. You should see a message that the Domino server was successfully registered. The new Domino server is now known to the existing Domino domain and organization. However, you must still configure the Domino server. Before configuring the Domino server, we discuss two different ways to handle the new server ID file in the following section.
- 10. After the registration process is complete, click **Done** to close the registration window.

### 4.2.2 Handling the ID file for an additional server

As mentioned earlier, you can place the new Domino server ID file in the following two places when you register it:

- ► Store the ID file on disk.
- Attach the ID file to the Server document in the Domino Directory.

Each method has advantages and disadvantages. We describe the characteristics of each method in the following sections.

#### Storing the server ID file on disk

If you do not attach the ID file to the Server document in the Domino Directory, you have the advantage that no password needs to be specified when configuring the additional server. However, this does not mean that the ID has to be created without a password. The ID file can still have a password. The minimum password length should be set to zero because you may want to remove it later.

The disadvantage with this method is that you must copy the ID file from your PC workstation to a directory in the i5/OS integrated file system before configuring the additional Domino server. You must perform the following steps to copy the server ID file to the i5/OS integrated file system. This can be done using a graphical user interface or a 5250 emulation session. For the following example, we use a 5250 emulation session.

 Determine the i5/OS integrated file system directory you want to place the server ID. If the directory does not exist, then you can create it using the Create Directory (MKDIR) CL command. In our example, we use the following MKDIR command to create a directory called ITSO in the i5/OS integrated file system.

MKDIR DIR('/ITSO')

- 2. From the PC workstation, perform the following steps to open a DOS prompt window and switch to the directory with server ID file. For example during our registration of the additional server we placed the ID file in C:\ITSO\DOM7SVR2.
  - a. Click Start and then Run. Type cmd and click OK to open a DOS prompt window.
  - b. On the DOS prompt window, switch to the root of the C drive using the cd \ command.
  - c. Change to the directory (for example, cd ITS0\D0M7SVR2) containing the server ID file.
  - d. Verify the server ID file exists using the dir \*.id command.
- 3. Perform the following steps to FTP the server ID file to the to the i5/OS integrated file system:
  - a. On the DOS prompt window, type the ftp hostname command, where hostname is the name of your System i machine.
  - b. When prompted enter your i5/OS user ID and password to authenticate with the System i machine.
  - c. Switch to i5/OS integrated file system format using the cd / command.
  - d. Switch to i5/OS integrated file system directory created in step 1 using the cd directoryname command. For our example, this would be cd ITS0.
  - e. Switch to binary format using the bin command.
  - f. Place the server ID file on the i5/OS integrated file system directory using the put serverid command. For our example this would be put DOM7SVR2.ID.

4. From an i5/OS command line change the ownership of the server ID file to QNOTES using the following Change Owner (CHGOWN) CL command. In our example the command would be:

CHGOWN OBJ('/ITSO/DOM7SVR2.ID') NEWOWN(QNOTES)

**Attention:** If you do not change ownership of the ID file and attempt to start the Domino server, it shows the following message on the Domino server console and then ends:

Server exiting the ID file is write protected.

The server ID file is now available for configuring the additional server on the System i machine. See 4.2.4, "Using DOMWZD.EXE to configure an additional Domino server" on page 132 or 4.2.5, "Using CFGDOMSVR to configure an additional Domino server" on page 145 for details on how to perform this step.

#### Attaching the ID file to the Server document in the Domino Directory

The advantage of this method is that during the configuration process on i5/OS, the ID file is automatically retrieved from the registration Domino server. The disadvantage is that a password must be specified for the ID file everytime you start the Domino server.

This is not a problem during the configuration process because you can specify the ID file password with the additional Domino server ID (ADDSVRID) parameter of the CFGDOMSVR command. However, when you start the Domino server after you configure it, it does not completely start unless you access the Domino server console on i5/OS with the Work with Domino Console (WRKDOMCSL) CL command and enter the correct password. This must be done *every* time you start the Domino server. Provided you specified a minimum password length of zero, you can clear the password.

Perform the following steps to clear a Domino server ID's password:

- 1. Start the Domino Administrator client.
- Click the Configuration tab and from the right hand side of the display, expand Tools → Certification → ID Properties (see Figure 4-29 on page 125).
- 3. Open the server ID file.
- 4. Click the Change Password button.
- 5. Click the No Password button and then the Yes button to confirm the choice.
- 6. Click **OK** or **Close**.

**Note:** If this fails, it likely suggests that when the server ID was created that the minimum password strength was not set to allow for zero or no password. If this is the case you must recertify the server ID and change the password strength to require no password before the above steps will work.

# 4.2.3 Verifying the connection to the Domino registration server

During the configuration process for an additional Domino server, an existing Domino server (usually the registration Domino server) is contacted to request a replica of the Domino Directory. Therefore, the Domino registration server must be reachable by the System i machine using TCP/IP.

It is a good idea to verify the connection by performing a ping from an i5/OS command line before configuring the Domino server. A a successful ping from your PC workstation to the Domino registration server does not guarantee that the System i machine can also access the

registration server. You must use the Verify TCP/IP Connection (PING) CL command from an i5/OS command line (rather than from a DOS command line). For example, to verify the connection to the Domino server called DOM7SVR1, on any i5/OS command line, type:

ping dom7svr1

Press Enter.

You must be able to ping by the Domino server name. If you cannot reach the registration server by specifying its name, but you receive a positive response by using the numerical IP address, you must add the name, along with the correct IP address, to a DNS if any exists or to the i5/OS host table (using the Configure TCP/IP (CFGTCP) menu, option 10 or the Add TCP/IP Host Table Entry (ADDTCPHTE) command).

### 4.2.4 Using DOMWZD.EXE to configure an additional Domino server

In this example, during registration of the additional server, we elected to save the newly created server ID to disk and then FTPed the server ID file to the i5/OS integrated file system.

The steps used to configure an additional server using the Domino Server Setup wizard (domwzd.exe) are very similar to the steps noted in 4.1.3, "Using domwzd.exe to configure a new Domino server" on page 92. As all of the parameters were discussed in detail in that section we will not be elaborating on them in this section. Perform the following steps to configure the additional server using the domwzd.exe method:

- 1. Follow steps 1 thru 4 from 4.1.3, "Using domwzd.exe to configure a new Domino server" on page 92.
- 2. On window shown in Figure 4-37, select Set up an additional server and click Next.

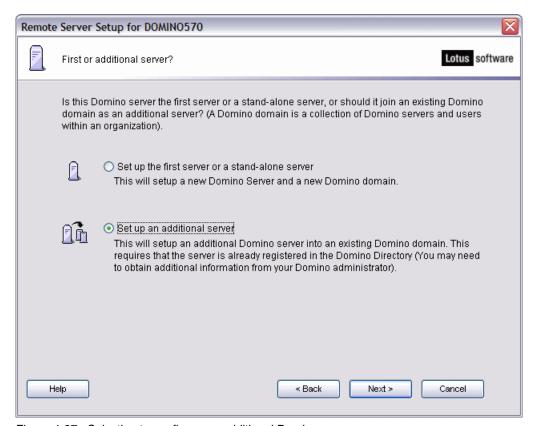


Figure 4-37 Selecting to configure an additional Domino server

3. On the Where is the ID file for this additional Domino server window (Figure 4-38), click **The server ID file is stored on server in a directory** if your Domino server ID file is stored in the i5/OS integrated file system. You can click the **Browse** button to find the server ID file. Click **Next** to continue.



Figure 4-38 Specifying the location of the additional server ID

4. The Domino Server Setup wizard reads the Domino server name from the server ID file. Confirm the Server name (Figure 4-39) and click **Next**.

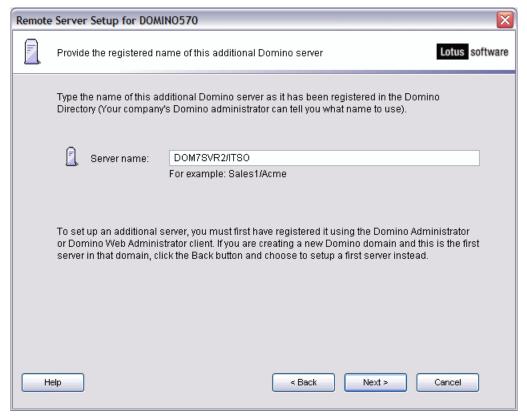


Figure 4-39 Additional Domino server name

5. On the Provide the data folder for this Domino server window (Figure 4-40), enter the folder name and path of the Domino server data directory. You can also use the **Browse** button to select an existing i5/OS integrated file system directory. Each partitioned Domino server must have its own data directory. Click **Next**.



Figure 4-40 Additional Domino server data directory

6. Confirm the advanced server settings (Figure 4-41) or click on the **Customize** button to change the settings. When finished click **Next**.

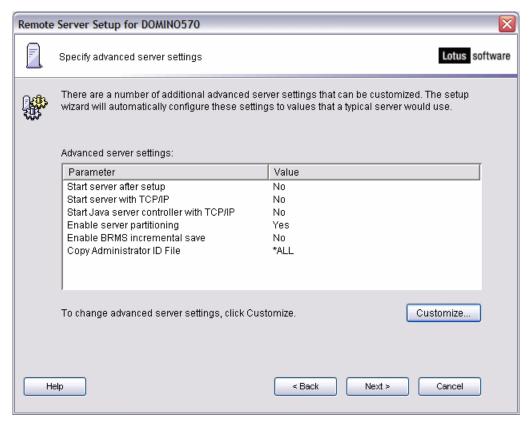


Figure 4-41 Additional Domino server advanced settings

 Confirm the desired Internet services (Figure 4-42) for this Domino server or click on the Customize button to customize other Domino Internet services settings. When finished, click Next.



Figure 4-42 Additional Domino server Internet services

8. Confirm the network settings (Figure 4-43) or click **Customize** to customize the network settings. When finished click **Next**.

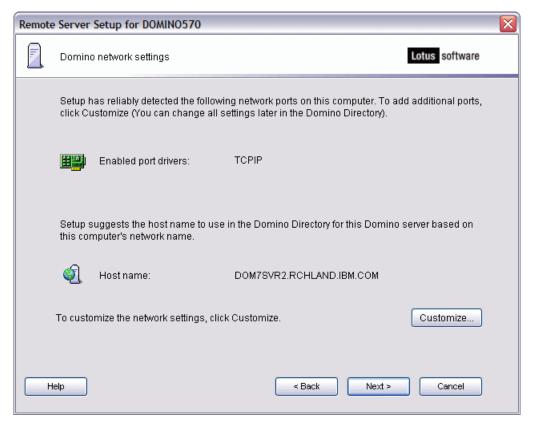


Figure 4-43 Additional Domino server network settings

9. Specify the time zone and whether daylight savings times is observed (Figure 4-44) and click **Next**.

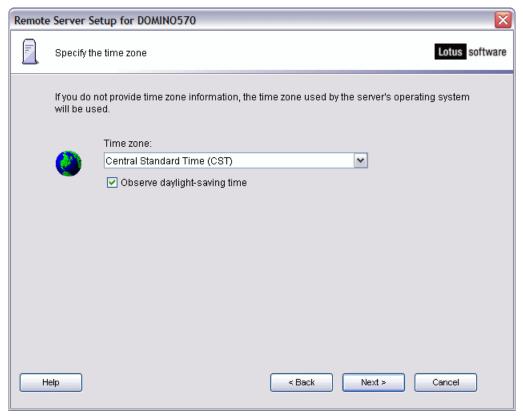


Figure 4-44 Additional Domino server time zone

10.On the Provide the system databases for this Domino server window (Figure 4-45), specify an existing Domino server in the Domino domain and optionally (if your DNS does not resolve the server name) a network address and click **Next**.

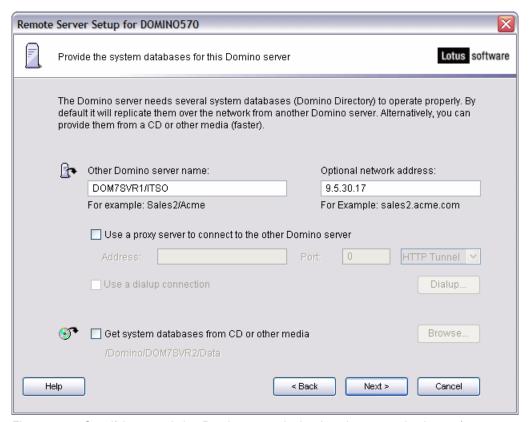


Figure 4-45 Specifying an existing Domino server in the domain to copy databases from

11. Decide if the additional Domino server will be setup as a primary Domino directory or as setup as a Configuration Directory (Figure 4-46) and then click **Next**.

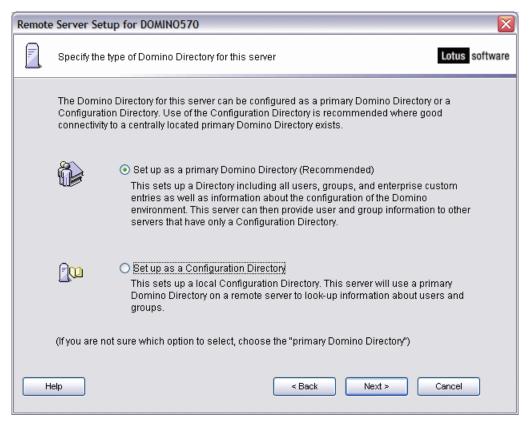


Figure 4-46 Additional Domino server Domino Directory type

12.On the Secure your Domino Server window (Figure 4-47), confirm the Domino server security settings and click **Next**.

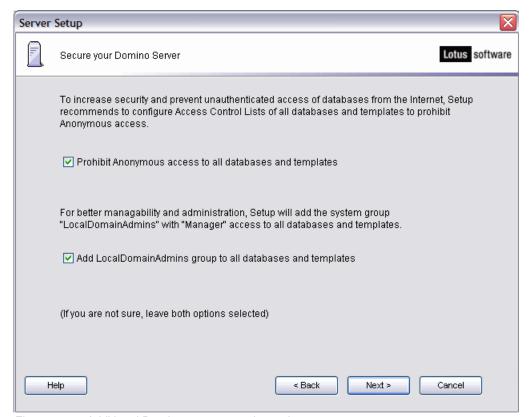


Figure 4-47 Additional Domino server security settings

13. You are now presented with an option (Figure 4-48) to make optional copies of ID files in the new Domino server's data directory. Click **Next**.



Figure 4-48 Additional Domino server option to copy ID files

14. Confirm the additional Domino server settings (Figure 4-49) and click **Setup**.

**Note:** The **View command** button shows you what the Configure Domino Server (CFGDOMSVR) CL command looks like that the wizard is running in the background to configure the additional server.

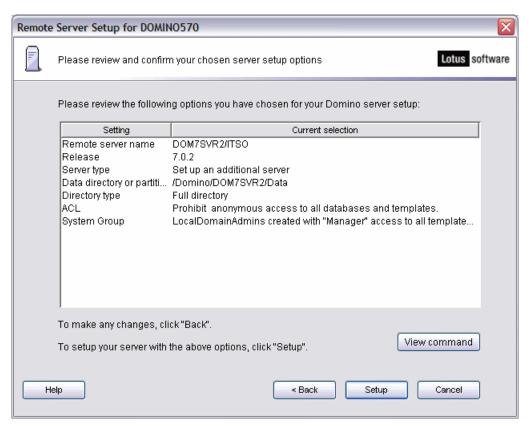


Figure 4-49 Additional Domino server settings confirmation

15. You should now see a congratulations window as shown in Figure 4-50 stating the Domino Server Setup is complete. Click **Finish**.



Figure 4-50 Additional Domino server setup complete

Your new Domino server starts automatically if you specified Start server after setup = Yes in the advanced server settings (see Figure 4-41 on page 136). Our example does not have this automatic start value set. You can learn more about starting a Domino server in Chapter 5, "Administering Domino 7 on i5/OS" on page 153.

# 4.2.5 Using CFGDOMSVR to configure an additional Domino server

In this example during registration of the additional server we elected to save the newly created server ID to disk and then FTP the server ID file to the i5/OS integrated file system. Perform the following steps to configure the additional server using the CFGDOMSVR command.

The steps used to configure an additional server using the CFGDOMSVR CL command are very similar to the steps noted in 4.1.4, "Using CFGDOMSVR to configure a new Domino server" on page 108. As all of the parameters were discussed in detail in that section we will not be elaborating on them in this section.

1. From an i5/OS command line, enter the CFGDOMSVR command and press F4 to prompt the command.

2. On the Configure Domino Server (CFGDOMSVR) display (Figure 4-51), you must provide the full hierarchical name of the Domino server. In this example, the Domino server name is DOMSVR2/ITSO.

Also, since you are configuring an additional Domino server, specify \*ADD for the Option parameter. Press Enter.

```
Configure Domino Server (CFGDOMSVR)

Type choices, press Enter.

Server name . . . . . > DOM7SVR2/ITSO

Option . . . . . . > *ADD *FIRST, *ADD, *REMOVE...

Bottom
F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys
```

Figure 4-51 CFGDOMSVR command for additional Domino server (Display 1 of 9)

3. The display expands as shown in Figure 4-52, type the Domino server's data directory and time zone. Press Page Down.

Figure 4-52 CFGDOMSVR command for additional Domino server (Display 2 of 9)

- 4. On the display shown in Figure 4-53, the Get Domino Directory from parameter specifies the source from where to get the Domino Directory to be used for this additional server.
  - Use the *Domino server name* option to specify the name of an existing Domino server that has the Domino Directory. The Domino Directory is copied from the specified Domino server to this new server. Because the Domino Directory has a large amount of information, the copy time can be extensive.

You must specify a Domino server name when you specify the \*ADD option.

- Use the Optional network address option to specify the Internet address of the Domino server that has the Domino Directory. This is an optional parameter. The possible values are:
  - \*NONE: Do not specify an Internet address.
  - IP-address: Specifies the IP address or host name of the Domino server that has the Domino Directory. If an IP address is specified, it must be in the form nnn.nnn.nnn, where nnn is a decimal number between 0 and 255.

If a host name is specified, it must be no more than 255 characters of text. The host name can be either the short form or the full domain version of the name and consist of one or more labels separated by periods. Each label can contain up to 63 characters. The specified host name must be listed either in the i5/OS TCP/IP host table or in the Domain Name Server of your network.

In case the Domino server that has the Domino Directory requires a proxy server, then you must specify the following proxy settings:

- Use the Proxy server address option to specify the Internet address of the proxy server. The possible values are:
  - \*NONE: Internet address is not specified. It means that a proxy server is not necessary to reach the Domino server. All the proxy settings are ignored.
  - IP-address: Specifies the IP address of the proxy server. A valid proxy port must also be specified.
- Use the Proxy server port option to specify the port number, between 1 and 65535, here the proxy server is listening to requests.

Press Page Down to continue.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Get Domino Directory from:
 Domino server name . . . . > 'DOM7SVR1/ITSO'
 Optional network address . . . > '9.5.30.17'
 Proxy server address . . . . *NONE
 Proxy server port . . . . .
                                              1-65535
                                                                   More...
F3=Exit F4=Prompt F5=Refresh F10=Additional parameters
                                                           F12=Cancel
F13=How to use this display F24=More keys
```

Figure 4-53 CFGDOMSVR command for additional Domino server (Display 3 of 9)

- 5. On the display shown in Figure 4-54, you finish entering parameters for the Get Domino Directory from parameter, type the Additional server ID location as well as other parameter settings.
  - Use the Proxy server type option to specify the type of the proxy server being used. The possible values are:
    - \*HTTPTUN: An HTTP tunnel proxy server is used.
    - \*SOCKS: A SOCKS proxy server is used.

- Use the Local file option to access the Domino Directory from a file in an i5/OS integrated file system directory. The possible values are:
  - \*NONE: Do not use a local file. Use the Domino Directory from the specified Domino server.
  - file-path-name: Specifies the local directory path where to access the Domino Directory, for example /domino/server1/data.
- The Domino directory type option specifies the type of Domino Directory to be used for the additional server. The possible values are:
  - \*CENTRAL: The Domino Directory contains user and group entries in addition to all the documents required by the server for proper operation.
  - \*CONFIG: The Domino Directory does not contain any user or group entries, but only
    the server (or configuration) related documents required by the additional Domino
    server for proper operation. Users and groups are looked up on the domain's
    central directory using directory services assistance (DIRSRV parameter value).
- The Additional server ID option specifies the name and associated password for the server ID file of the additional Domino server. This server ID file was created for the new Domino server when it was registered by an existing Domino server. The possible values for the ID file are:
  - \*NAB: The server ID file is retrieved from the Domino Directory for the Domino domain in which the new server was registered.
  - server-ID-file-name: Specify the path name that identifies the server ID file to be used for the new server.

For the ID file's password, specify the password that is associated with the new server when it is created. A password is required only if the new server ID file is password-protected. That is, only if a password was specified when the new server was registered.

Type the other parameters you want to change and press Page Down to continue.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
                                 *HTTPTUN
                                               *HTTPTUN, *SOCKS
 Proxy server type . . . . .
 Local file . . . . . . . . .
                                 *NONE
                                              *CENTRAL, *CONFIG
Domino directory type . . . . *CENTRAL
Additional server ID:
 ID file . . . . . . . . > '/ITSO/dom7svr2.id'
 ID file's password . . . . .
Web browsers . . . . . . . > *HTTP
                                              *NONE, *ALL, *HTTP, *IIOP
Internet mail packages . . . . > *SMTP
                                              *NONE, *ALL, *IMAP, *POP3 ...
              + for more values
                                 *NONE
                                              Character value, *NONE...
Directory services . . . . . .
                                                                   More...
F3=Exit
         F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display
                                 F24=More keys
```

Figure 4-54 CFGDOMSVR command for additional Domino server (Display 4 of 9)

7. On the display shown in Figure 4-55, press F10 to display the additional server parameters.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Connection services . . . . > *NONE
                                               *DECS, *NONE
Advanced services . . . . . .
                                 *PARTITION
                                               *NONE, *ALL, *PARTITION...
              + for more values
Default ACL settings . . . . .
                                 *ADMGRP
                                               *NONE, *ANONYMOUS, *ADMGRP
Text 'description' . . . . . .
                                 *BLANK
                                                                    Bottom
F3=Exit
         F4=Prompt F5=Refresh
                                 F12=Cancel
                                              F13=How to use this display
F24=More keys
```

Figure 4-55 CFGDOMSVR command for additional Domino server (Display 5 of 9)

6. On the display shown in Figure 4-56, type the parameters you want to change. Press Page Down.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Connection services . . . . > *NONE
                                               *DECS, *NONE
                                               *NONE, *ALL, *PARTITION...
Advanced services . . . . . .
                                 *PARTITION
              + for more values
                                               *NONE, *ANONYMOUS, *ADMGRP
Default ACL settings . . . . *ADMGRP
Text 'description' . . . . . *BLANK
                          Additional Parameters
                                               Character value
SMTP services (obsolete) . . . .
                                 *DOMINO
News readers (obsolete) . . . .
                                               Character value
                                  *NONE
Replace configuration . . . . .
                                  *YES
                                               *YES, *NO
Domain name . . . . . . . . . . . .
                                  *ORG
Network name . . . . . . . . . .
                                 NETWORK1
Country or region code . . . . .
                                 *BLANK
                                                                    More...
F3=Exit
         F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys
```

Figure 4-56 CFGDOMSVR command for additional Domino server (Display 6 of 9)

7. On the display shown in Figure 4-57, type the parameters you want to change. Press Page Down.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Organizational unit:
  Name . . . . . . . . . . . . . . . .
                                    *BLANK
  ID file . . . . . . . . . . . .
                                    *GEN
  ID file's password . . . . .
                                    *ADM
Certifier ID:
  ID file . . . . . . . . .
                                    *GEN
  ID file's password . . . . .
                                   *ADM
Administrator ID:
  ID file . . . . . . . . . . . . . . .
                                    *GEN
  ID file's password . . . . .
                                    *ADM
                                                                         More...
F3=Exit
          F4=Prompt
                      F5=Refresh
                                   F12=Cancel
                                                 F13=How to use this display
F24=More keys
```

Figure 4-57 CFGDOMSVR command for additional Domino server (Display 7 of 9)

8. On the display shown in Figure 4-58, type the parameters you want to change. Press Page Down.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Server ID:
 ID file
                                  *GEN
                                  *NOPWD
 ID file's password . . . . .
Start server . . . . . . . . . . . .
                                  *N0
                                                *YES, *NO
Start when TCP/IP started . . .
                                  *N0
                                                *YES, *NO, *JSC, *ALL
Log replication events . . . .
                                  *YES
                                                *YES, *NO
Log client session events . . .
                                  *YES
                                                *YES, *NO
TCP/IP port options:
 Encrypt network data . . . . > *NOENCRYPT
                                                *ENCRYPT, *NOENCRYPT
 Internet address . . . . . > '9.5.30.18'
                                                *YES, *NO
 Bind HTTP . . . . . . . . .
                                  *YES
 Compress network data . . . .
                                  *N0
                                                *YES, *NO
                                                                      More...
         F4=Prompt
                     F5=Refresh
                                  F12=Cancel
                                               F13=How to use this display
F3=Exit
F24=More keys
```

Figure 4-58 CFGDOMSVR command for additional Domino server (Display 8 of 9)

9. On the display shown in Figure 4-59, type the parameters you want to change and then press Enter to configure the Domino server.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Server host name . . . . . . > DOM7SVR2.RCHLAND.IBM.COM
Subsystem and object names . . . > DOM7SVR2
                                                 Name, *GEN
                                                 *STD,CS,DA-DK-AA,DE,E2-ES ...
Collation . . . . . . . . . . . .
                                   *STD
                                                 *DOMDIR, *DTADIR, *ALL
Copy Administrator ID file . . .
                                   *ALL
                                                 *NONE, *ALL, *MINIMUM ...
Additional services . . . . .
                                   *NONE
               + for more values
Allow Domino Off Line Services
                                   *N0
                                                 *YES, *NO
                                                 *YES, *NO
Service provider configuration
                                   *N0
                                                                        Bottom
F3=Exit
         F4=Prompt
                     F5=Refresh
                                   F12=Cancel
                                                F13=How to use this display
F24=More keys
```

Figure 4-59 CFGDOMSVR command for additional Domino server (Display 9 of 9)

Your new Domino server starts automatically if you specified Start server after setup = Yes in the advanced server settings (see Figure 4-58 on page 150). Our example does not have this automatic start value set. You can learn more about starting a Domino server in Chapter 5, "Administering Domino 7 on i5/OS" on page 153.



# 5

# **Administering Domino 7 on i5/OS**

To help you manage Domino servers on the System i platform, Domino for i5/OS allows you to use the following methods to perform common administration tasks:

- ▶ iSeries Navigator: This graphical interface is part of the workstation support provided by IBM iSeries Access. For details on administering Domino for i5/OS servers using iSeries Navigator, see 5.1, "Using iSeries Navigator" on page 154.
- ▶ i5/OS commands: These commands allow you to interact directly with the i5/OS operating system through its native command interface. i5/OS commands allow you to initiate system functions using a terminal directly connected with your system, or a workstation communicating with your system using a session such as a 5250 emulator window. For details on administering Domino for i5/OS servers using i5OS commands, see 5.2, "Using i5/OS commands" on page 169.
- ▶ Java Server Console: This Java-based application allows you to manage your Domino servers from a workstation, even when your Domino servers are not currently running. For details on administering Domino for i5/OS servers using the Java server console, see 5.3, "Using the Java Server Console" on page 180.
- ▶ Web Administrator client: You can use the Web Administrator to perform most of the tasks that are available through the Domino Administrator client. For details on administering Domino for i5/OS servers using a Web Administrator client, see 5.4, "Using the Web Administrator client" on page 181.
- ▶ Lotus Domino Administrator Client: The Domino Administrator is the administration client for Notes and Domino. You can use the Domino Administrator to perform most administration tasks. For details on administering Domino for i5/OS servers using the Domino Administrator client, see 5.5, "Using the Domino Administrator client" on page 182.

**Important:** You must use iSeries Navigator, i5/OS commands, or the Java Server Console to do some of the Domino server tasks, such as starting or stopping a Domino server.

Whether you use iSeries Navigator, i5/OS commands, or the Java Server Console to manage a Domino server, you must have an i5/OS user profile that has the necessary authority to perform each administrative operation.

# 5.1 Using iSeries Navigator

iSeries Navigator enables you to use your Domino administrator workstation to manage both your system and the Domino servers on the system. Through the Domino for i5/OS support in iSeries Navigator, you can:

- ▶ Determine the status of all Domino servers on a system
- Perform administrative tasks on the Domino servers, such as starting and stopping
- View and change Domino server properties, including Domino server's notes.inin files

iSeries Navigator works through the iSeries Access support. Therefore, you must install iSeries Access on the system and the administrator's workstation. You must also install the Domino plug-in for iSeries Navigator on the administrator's workstation. The Domino plug-in for iSeries Navigator must be installed if you want to manage your Domino environment using iSeries Navigator. It will add the necessary code to administer Domino from iSeries Navigator. For details on installing the Domino plug-in for iSeries Navigator, see 3.6, "Installing the iSeries Navigator Lotus Domino plug-in" on page 82.

If you are familiar with a graphical user interface, such as Microsoft Windows, you may prefer to use iSeries Navigator (Figure 5-1).

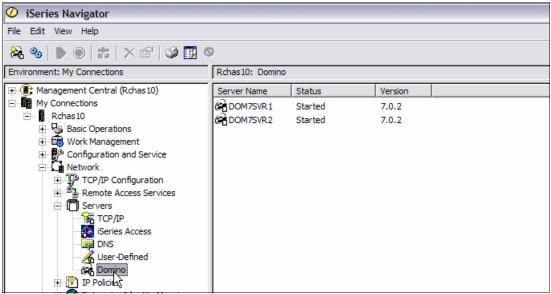


Figure 5-1 Using iSeries Navigator to administer Domino for i5/OS servers

# 5.1.1 Starting Domino services

You can use iSeries Navigator to start Domino servers, controllers, or the Domino Console. Perform the following steps to start all the Domino services on your system:

- Start iSeries Navigator, open the system where you installed Domino and click Network → Servers.
- 2. Right click on **Domino** and select **Start**. You have the option to start the following Domino services as shown in Figure 5-2:
  - All Servers: All stopped Domino servers will start.
  - All Controllers: All stopped Controllers will start.
  - All Servers and Controllers: Both Domino servers and Controllers will start.
  - Domino Console: Starts the Domino Console.

Note: You must have \*JOBCTL special authority to start the Domino Console.

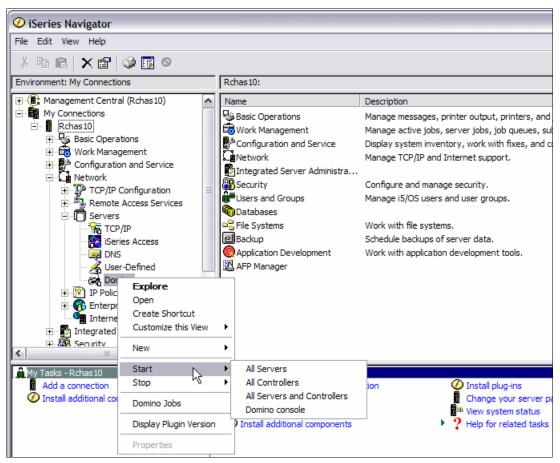


Figure 5-2 Starting all Domino services on the system

Perform the following steps to work with a particular Domino server:

- 1. Start iSeries Navigator, open the system where you installed Domino and click Network → Servers → Domino.
- 2. Right-click on the Domino server you want to work with and select **Start**. You have the option to start the following Domino services as shown in Figure 5-3:
  - Server: The selected Domino server will start.
  - Controller: The Domino server's Controller will start.
  - Server and Controller: Both Domino server and Controller will start.

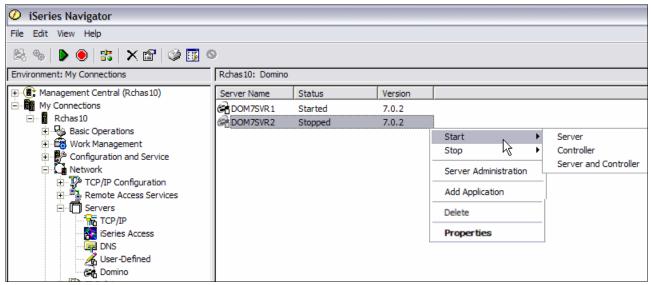


Figure 5-3 Starting services for a Domino server

# 5.1.2 Stopping Domino services

You can use iSeries Navigator to stop Domino servers, controllers, or the Domino Console. Perform the following steps to stop all the Domino services on your system:

- Start iSeries Navigator, open the system where you installed Domino and click Network → Servers.
- 2. Right click on **Domino** and select **Stop**. You have the option to stop the following Domino services as shown in Figure 5-4:
  - All Servers: All Domino servers will be stopped.
  - All Servers and Controllers: All Domino servers and Controllers will stopped.
  - All Servers Immediately: All Domino servers will be stopped immediately.
  - All Servers and Controllers Immediately: All Domino servers and Controllers will be stopped immediately.

**Note:** You must have \*JOBCTL special authority to stop all servers or all servers and controllers immediately.

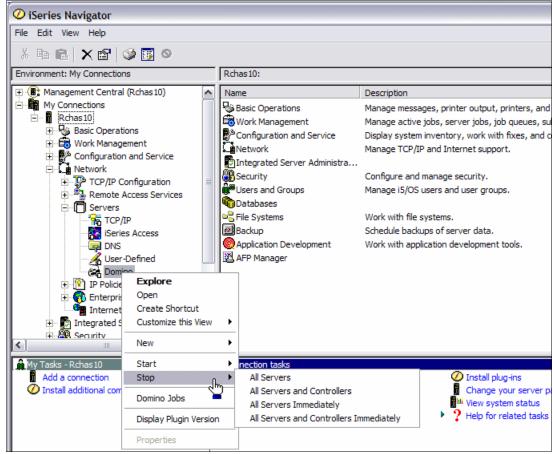


Figure 5-4 Stopping all Domino services

Perform the following steps to work with a particular Domino server:

- Start iSeries Navigator, open the system where you installed Domino and click Network → Servers → Domino.
- 2. Right-click on the Domino server you want to work with and select **Stop**. You have the option to stop the following Domino services as shown in Figure 5-5:
  - Server: The selected Domino server will be stopped.
  - Server and Controller: The Domino server's Controller will be stopped.
  - Server Immediately: The selected Domino server will stop immediately.
  - Server and Controller Immediately: Both the Domino server and Controller will be stopped immediately.

**Note:** You must have \*JOBCTL special authority to stop a server or a server and controller immediately.

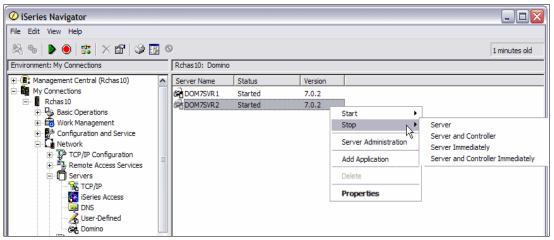


Figure 5-5 Stopping services for a Domino server

# 5.1.3 Displaying Domino jobs

To view the active jobs related to Domino servers on a system, perform the following steps:

- Start iSeries Navigator, open the system where you installed Domino and click Network → Servers.
- Right-click on **Domino** and select **Domino Jobs** as shown in Figure 5-6.

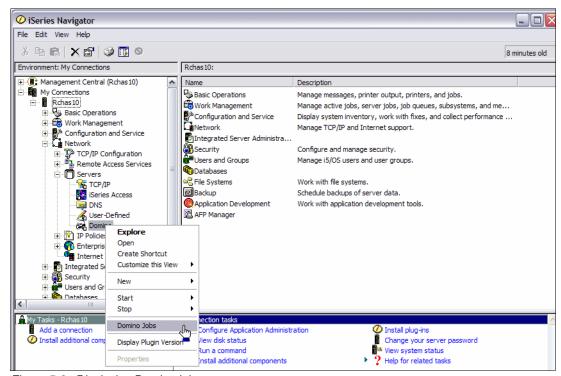


Figure 5-6 Displaying Domino jobs

3. The Domino jobs are displayed in a new window as shown Figure 5-7, sorted by subsystem.

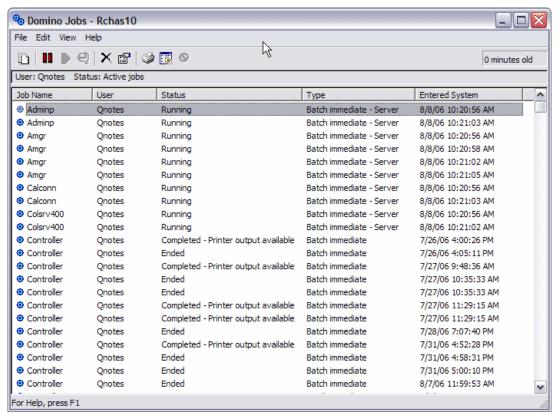


Figure 5-7 Domino jobs

# 5.1.4 Domino server properties

To change the Domino server's properties using iSeries Navigator, perform the following steps:

**Note:** If the Domino server is active, some of the options displayed are grayed out and you cannot change them. Also, if the Domino server is not active, some of the information may be displayed as *Not available*.

- Start iSeries Navigator, open the system where you installed Domino and click Network → Servers → Domino.
- 2. Right-click on the Domino server you want to work with and select **Properties** as shown in Figure 5-8.

**Note:** If you are unable to see all of the Domino server properties when using iSeries Navigator, the issue is most likely with your i5/OS user ID authorities. When using iSeries Navigator to manage your Domino server, the i5/OS user profile is authenticated. Make sure you are using a user profile with the correct authorities.

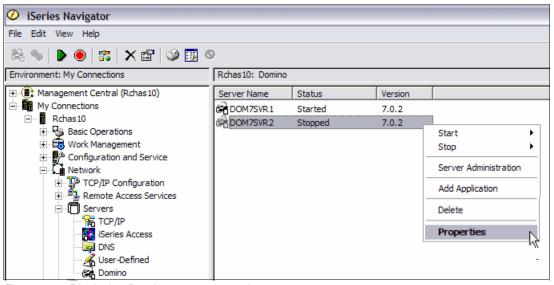


Figure 5-8 Displaying Domino server properties

#### **Basics tab**

On the Domino server Properties window, the Basics tab shown in Figure 5-9 provides the basic information of the Domino server. Also, when the Domino server is stopped, you are able to change some of the settings on this tab.

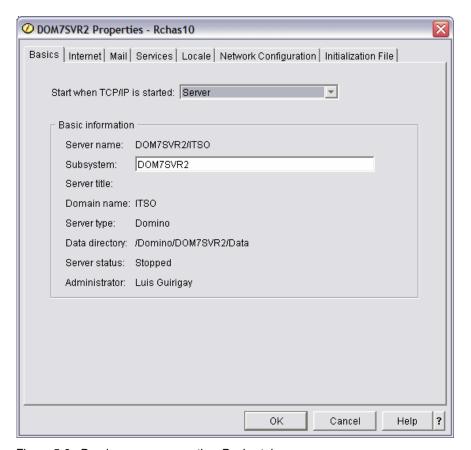


Figure 5-9 Domino server properties, Basics tab

#### Internet tab

As shown in Figure 5-10, the Internet tab provides the option to activate the Domino HTTP task, the IIOP task, or the Internet Cluster Manager.

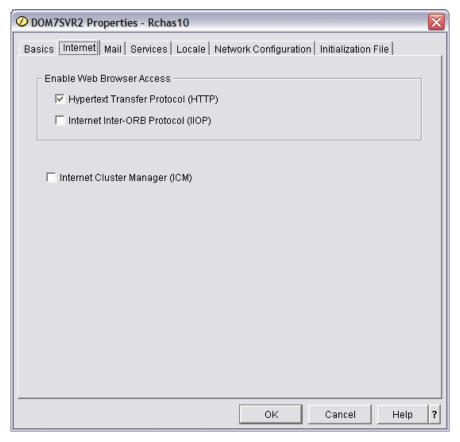


Figure 5-10 Domino server properties, Internet tab

#### Mail tab

The Mail tab shown in Figure 5-11 allows to you enable or disable the POP3, IMAP, or SMTP tasks for messaging purposes and the LDAP task for directory purposes. It also provides information about the type of Domino directory used by this server.

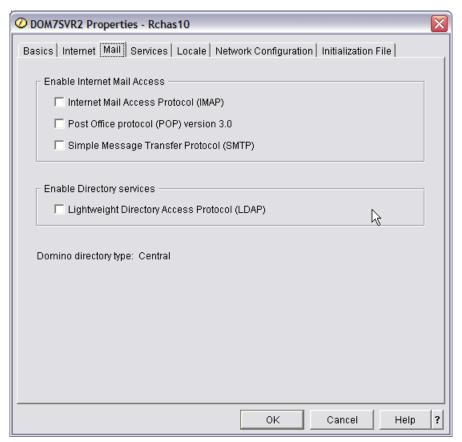


Figure 5-11 Domino server properties, Mail tab

#### Services tab

The Services tab shown in Figure 5-12 shows the Domino server's tasks. You can disable or enable them from this window. You can also use this page to log replication and client session events.

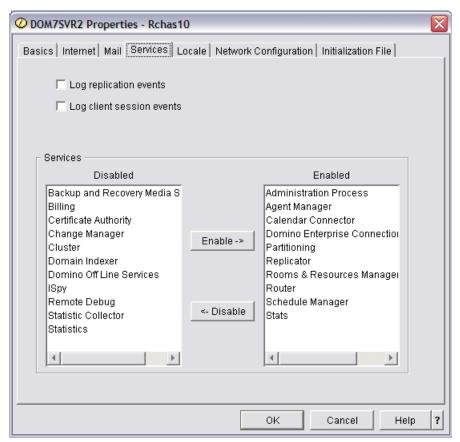


Figure 5-12 Domino server properties, Services tab

#### Locale tab

Use the Locale tab shown in Figure 5-13 to specify the local time zone, whether to observe daylight savings time, and how the Domino server should sort characters.

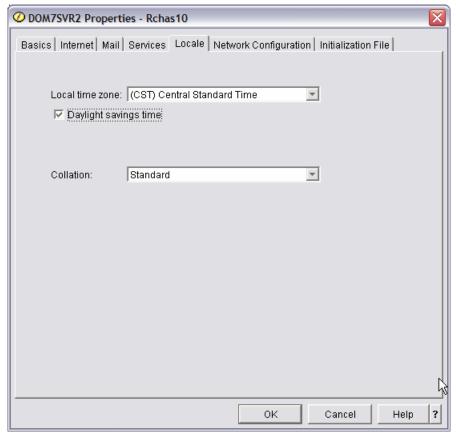


Figure 5-13 Domino server properties, Locale tab

#### **Network Configuration tab**

The Network Configuration tab shown in Figure 5-14 shows network information for the Domino server. The values that appear on this page are set in the Domino Directory.

**Important:** You must stop the Domino server to change the network configuration.

You can perform the following actions on this tab:

- Click Add to add new network configuration information to the list.
- ► Click **Delete** to delete a specific network configuration from the list.
- Click Modify to change the network configuration information for a specific port.

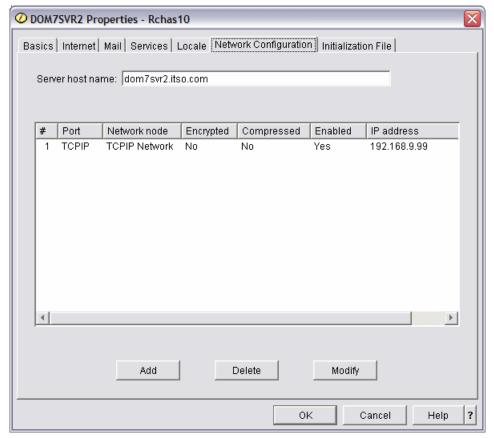


Figure 5-14 Domino server properties, Network Configuration tab

When adding or modifying an IP address you will see the window shown in Figure 5-15.

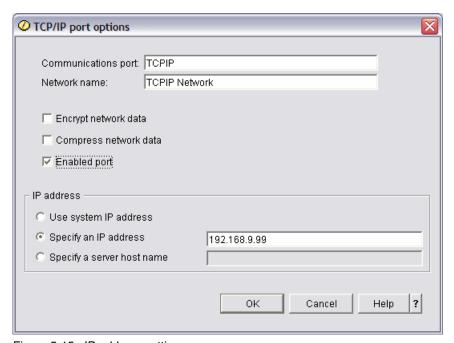


Figure 5-15 IP address settings

#### Initialization tab

The Initialization tab shown in Figure 5-16, shows a copy of the Domino server's NOTES.INI file.

**Important:** Making changes to the NOTES.INI file is only recommended for experienced Domino administrators. Even minor changes to the NOTES.INI file can introduce errors into the file and impair the operation of a Domino server.

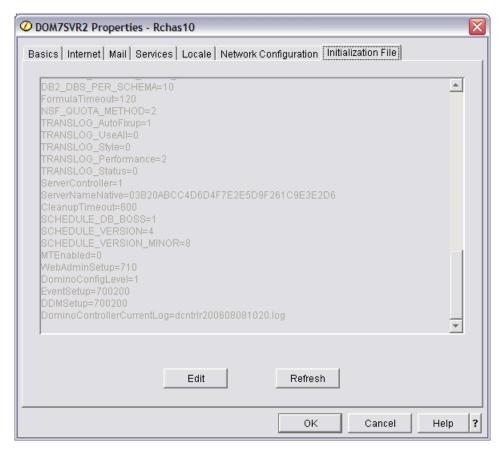


Figure 5-16 Domino server properties, Initialization File tab

If you want to edit the NOTES.INI file, click **Edit**. Click **OK** in the warning prompt show in Figure 5-17.

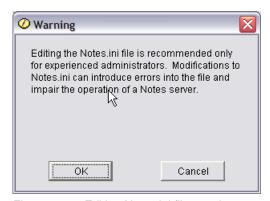


Figure 5-17 Editing Notes.ini file warning

When finished editing, click Save (Figure 5-18).

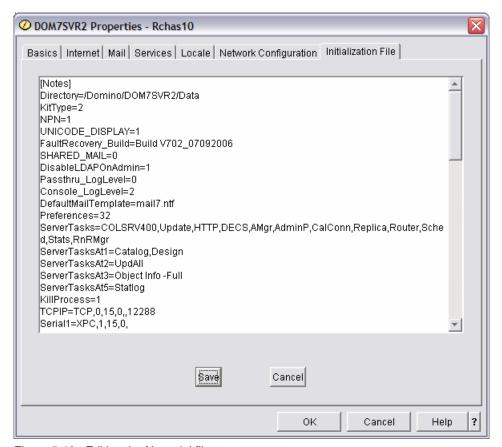


Figure 5-18 Editing the Notes.ini file

# 5.1.5 Deleting a Domino server

To delete a Domino server from a system using iSeries Navigator, perform the following steps:

**Note:** You must have \*ALLOBJ, \*JOBCTL, \*SECADM, and \*IOSYSCFG special authorities to perform this task.

 Start iSeries Navigator, open the system where you installed Domino and click Network → Servers → Domino. 2. Right-click on the Domino server you want to work with and select **Delete** as shown in Figure 5-19.

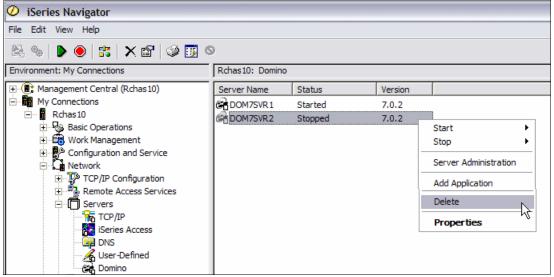


Figure 5-19 Deleting a Domino server

## 5.1.6 Launching the Lotus Domino Administrator client

If you want to manage your Domino server using the Lotus Domino Administrator client, you can open the client interface either from the Lotus Notes client or from iSeries Navigator.

To launch the Domino Administrator client using iSeries Navigator, perform the following steps:

- Start iSeries Navigator, open the system where you installed Domino and click Network → Servers → Domino.
- Right-click on the Domino server you want to work with and select Server Administration
  as shown in Figure 5-20. The Lotus Domino Administrator client will launch and connects
  to the Domino server specified in your administration preferences.

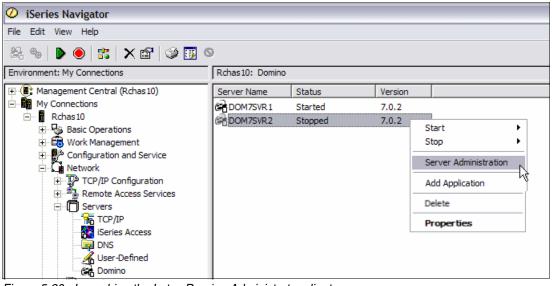


Figure 5-20 Launching the Lotus Domino Administrator client

# 5.2 Using i5/OS commands

If you are familiar with i5/OS, the Domino i5/OS CL commands provide a direct and convenient way of managing both i5/OS and Domino servers running on i5/OS. You can run the commands from any display or workstation that is communicating with the i5/OS operating system. No additional setup is required.

## 5.2.1 Working with Domino servers

The primary i5/OS CL command used to manage Domino servers is the Work with Domino Servers (WRKDOMSVR) command. This command is the starting point to reach all i5/OS commands necessary to manage your Domino for i5/OS servers without typing the commands on a command line. Figure 5-21 shows the Work with Domino Servers display.

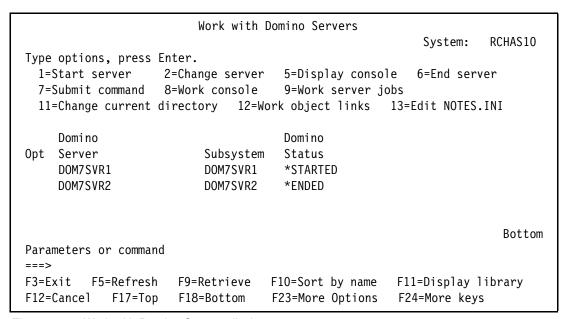


Figure 5-21 Work with Domino Servers display

The display shows you the following important information at a glance:

- Domino servers and related subsystems. The name of the subsystem is the one used by the Domino server. The Domino server jobs run in these subsystems.
- Current status of each Domino server. The possible values are:
  - \*STARTING: The Domino server is being started or only the Server Controller is active.
     The Domino server is not yet available for use by Lotus Notes clients or Web browsers.
     If the Server Controller only is active, you must start your Domino server before the Notes clients or Web browsers can contact the Domino server.
  - \*STARTED: The Domino server is active. Generally, the server is available for use by Notes clients or Web browsers.

**Note:** In the rare instance of a failure that requires restarting the system, the \*STARTED status may still appear when the system is restarted, even though the Domino server is not active. Under this condition, you can update the status by issuing the Start Domino Server (STRDOMSVR) CL command to start the server or the End Domino Server (ENDDOMSVR) CL command to end the Domino server.

- \*ENDING: The Domino server is in the process of ending.
- \*ENDED: The Domino server is not active.
- \*STANDBY: The Domino server is configured as part of a Domino application Cluster Resource Group (CRG) supported with i5/OS Cluster Management functions. When a server is in a \*STANDBY state, its application CRG is not started, or if it is started, the Domino server is active on another system in the cluster as defined by the server's application CRG.
- \*UNKNOWN: The system cannot determine the status of the Domino server or the user is not authorized to view the status.

#### Library and release information

Press F11 to see the information about the library and release of each Domino server as shown in Figure 5-22.

Important: This information is useful when working with multi-version capable releases.

```
Work with Domino Servers
                                                                   RCHAS10
                                                         System:
Type options, press Enter.
                                     5=Display console
 1=Start server 2=Change server
                                                        6=End server
 7=Submit command 8=Work console
                                     9=Work server jobs
 11=Change current directory 12=Work object links 13=Edit NOTES.INI
    Domino
                                                 Domino
Opt Server
                         Subsystem
                                                 Release
                                     Library
    DOM7SVR1
                         DOM7SVR1
                                     QDOMIN0702 7.0.2
    DOM7SVR2
                         DOM7SVR2
                                     QDOMIN0702 7.0.2
                                                                     Bottom
Parameters or command
===>
            F5=Refresh
                         F9=Retrieve
                                                        F11=Display path
F3=Exit
                                      F10=Sort by name
F12=Cancel
            F17=Top
                         F18=Bottom
                                      F23=More Options
                                                         F24=More keys
```

Figure 5-22 Work with Domino Servers display: library and release information

## Domino server data directory path

Press F11 again to show the path to the data directory for the Domino server as shown in Figure 5-23. The data directory contains the files that are used by the Domino server.

**Note:** If the path is too long to fit in the space provided, a greater than symbol (>) appears at the end of the truncated path.

Work with Domino Servers RCHAS10 System: Type options, press Enter. 1=Start server 2=Change server 5=Display console 6=End server 7=Submit command 8=Work console 9=Work server jobs 11=Change current directory 12=Work object links 13=Edit NOTES.INI Domino Opt Server Subsystem Path DOM7SVR1 DOM7SVR1 /Domino/DOM7SVR1/Data DOM7SVR2 DOM7SVR2 /Domino/DOM7SVR2/Data Bottom Parameters or command ===> F3=Exit F5=Refresh F9=Retrieve F10=Sort by name F11=Display status F12=Cancel F17=Top F18=Bottom F23=More Options F24=More keys

Figure 5-23 Work with Domino Servers display: Domino server data directory path

#### Actions to be performed on a selected Domino server

The WRKDOMSVR command is not only valuable to display information about Domino servers, but you can also use it to perform certain actions upon a specific Domino server. These actions include:

**Note:** Options 14, 15, and 16 are only available if 7.0.2 or a later release is installed on your System i machine. Press F23 (Shift + F11) to display options 14, 15 and 16. See Figure 5-24.

- ➤ Option 1 (Start server): Use this option to start a Domino server. This option runs the Start Domino Server (STRDOMSVR) CL command. To use this option, you must have \*JOBCTL special authority. The option is not displayed if your user profile does not have the required authority. See 5.2.2, "Start Domino Server (STRDOMSVR)" on page 173 for details.
- ▶ Option 2 (Change server): Use this option to change the configuration of a Domino server. This option runs the Change Domino Server (CHGDOMSVR) CL command. To use this option, you must have \*ALLOBJ, \*JOBCTL, \*IOSYSCFG, and \*SECADM special authorities. The option is not displayed if your user profile does not have the required authority.
- ▶ Option 5 (Display console): Use this option to start a Domino server console session to view Domino server messages. This option runs the Display Domino Console (DSPDOMCSL) CL command. You cannot enter Domino server commands on the Display Domino Console display. To use this option, you must have \*ALLOBJ special authorities or have Execute (\*X) authority to the Domino server data directory and each directory in the path.
- Option 6 (End server): Use this option to end a Domino server. This option runs the End Domino Server (ENDDOMSVR) CL command. To use this option, you must have \*JOBCTL special authority. The option is not displayed if your user profile does not have the required authority. See 5.2.3, "End Domino Server (ENDDOMSVR)" on page 174 for details.

- ▶ Option 7 (Submit command): Use this option to submit a Domino server command. This option runs the Submit Domino Command (SBMDOMCMD) CL command. To use this option, you must have \*USE authority to the SBMDOMCMD command in the QSYS library and \*USE authority to the QNNINSDC program in the QNOTES library.
- ▶ Option 8 (Work console): Use this option to start a Domino server console session that shows Domino server activities and allows you to interact with the Domino server by entering server commands. This option runs the Work with Domino Console (WRKDOMCSL) CL command. To use this option, you must have \*ALLOBJ special authority or \*USE authority to the WRKDOMCSL command in the QSYS library and \*USE authority to the QNNINCSS program in the QNOTES library.
- Option 9 (Work server jobs): Use this option to work with i5/OS jobs that support Domino server operations. This option runs the Work with Active Jobs (WRKACTJOB) CL command for the subsystem under which the Domino server runs.
- ► Option 11 (Change current directory): Use this option to change the working directory of your current i5/OS job to the data directory that is used by the Domino server. This option runs the Change Current Directory (CHGCURDIR) CL command. To use this option, you must have Execute (\*X) authority to the Domino server data directory and each directory in the path.
- ► Option 12 (Work object links): Use this option to work with the objects in the data directory that is used by the Domino server. This option runs the Work with Object Links (WRKLNK) CL command. To perform operations using the WRKLNK command, you must have the following authorities:
  - \*USE authority to the command used by the operation and the appropriate authority to the objects on which the operation is to be performed.
  - Read (\*R) authority to the directory containing the object links and Execute (\*X)
    authority to the other directories in the path. Object authority is not required when
    displaying the object name only.
- ▶ Option 13 (Edit Notes.ini): Use this option to edit the NOTES.INI file that controls the operation of the Domino server. This option runs the Edit File (EDTF) CL command. To use this option, you must have the authority to change the NOTES.INI file. The option is not displayed if the EDTF command does not exist on your system. For some operating system versions, the EDTF command is provided by a PTF.
- ▶ Option 14 (Work with support files): Use this option to work with support files in the following i5/OS integrated file system directory that is used by the Domino server:

<Domino server data directory>/IBM TECHNICAL SUPPORT/

This option runs the Work with Object Links (WRKLNK) CL command. To perform operations using the WRKLNK command, you must have the following authorities:

- \*USE authority to the command used by the operation and the appropriate authority to the objects on which the operation is to be performed.
- Read (\*R) authority to the directory containing the object links and Execute (\*X)
  authority to the other directories in the path. Object authority is not required when
  displaying the object name only.
- ▶ Option 15 (Work with NSDs): Use this option to work with NSD files in the following i5/OS integrated file system directory that is used by the Domino server:

<Domino server data directory>/IBM\_TECHNICAL\_SUPPORT/nsd\*

- This option runs the Work with Object Links (WRKLNK) CL command. To perform operations using the WRKLNK command, you must have the following authorities:
- \*USE authority to the command used by the operation and the appropriate authority to the objects on which the operation is to be performed.

- Read (\*R) authority to the directory containing the object links and Execute (\*X)
  authority to the other directories in the path. Object authority is not required when
  displaying the object name only.
- ▶ Option 16 (Dump server call stacks): Use this option to dump call stacks of all the threads of jobs from the selected Domino server. This option runs the Dump Domino Server Call Stacks (DMPDOMSVRC) CL command.

```
Work with Domino Servers
                                                           System:
                                                                     RCHAS10
Type options, press Enter.
 14=Work with support files
                             15=Work with NSDs 16=Dump server call stacks
    Domino
                                      Domino
Opt Server
                          Subsystem
                                      Status
                                      *STARTED
    DOM7SVR1
                          DOM7SVR1
    DOM7SVR2
                          DOM7SVR2
                                      *ENDED
                                                                       Bottom
Parameters or command
===>
                      F9=Retrieve F10=Sort by date
                                                       F11=Display library
F3=Fxit
       F5=Refresh
F12=Cancel
             F17=Top
                      F18=Bottom
                                    F23=More Options
                                                       F24=More keys
```

Figure 5-24 Work with Domino Servers display: displaying more options

## 5.2.2 Start Domino Server (STRDOMSVR)

The Start Domino Server (STRDOMSVR) CL command starts a Domino server that runs on the local system. The Start Domino Server (STRDOMSVR) CL command prompt is shown Figure 5-25. The parameters to run this command are:

Server name (SERVER): Specifies the name of the Domino server that you want to start. The possible values are:

**Tip:** While the cursor is on this field, you can press the F4 key to display a list of Domino servers on this system.

- server-name: Specifies the name of the Domino server that you want to start.
- \*ALL: Specifies that you want to start all of the Domino servers on the system.
- ▶ Java Server Controller (JSC): Specifies whether the Java server controller related to the Domino server should be started. The possible values are:
  - \*NO: Do not start the Java server controller when the Domino server starts.
  - \*YES: Start the Java server controller when the Domino server starts.
  - \*ONLY: Start just the Java server controller.

**Important:** You must have \*JOBCTL special authority to run this command.

```
Start Domino Server (STRDOMSVR)

Type choices, press Enter.

Server name . . . . . . . DOM7SVR2

Java Server Controller . . . . *YES *YES, *NO, *ONLY

Bottom
F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys
```

Figure 5-25 Start Domino Server (STRDOMSVR) command

## **5.2.3 End Domino Server (ENDDOMSVR)**

The End Domino Server (ENDDOMSVR) CL command stops a Domino server that runs on the local system. The End Domino Server (ENDDOMSVR) CL command prompt is shown Figure 5-26. The parameters to run this command are:

► **Server name (SERVER)**: Specifies the name of the Domino server that you want to stop. The possible values are:

**Tip:** While the cursor is on this field, you can press the F4 key to display a list of Domino servers on this system.

- server-name: Specifies the name of the Domino server that you want to stop.
- \*ALL: Specifies that you want to stop all of the Domino servers.
- ► How to end: Specifies whether the Domino server is ended in a controlled manner or immediately. The possible values are:
  - \*CNTRLD: The Domino server command QUIT is sent to the Domino server to shut down the server. All operating system jobs used by the Domino server are ended, but the subsystem used by the Domino server remains active. This option is the equivalent of entering the QUIT command from the Domino server console.
  - \*IMMED: The subsystem that this Domino server is running under is ended by issuing the End Subsystem (ENDSBS) CL command with an option of \*IMMED. As a result, all processing by the Domino server is stopped immediately.

**Attention:** Use this option only if the Domino server fails to shut down when you enter this command with the \*CNTRLD option or enter the QUIT command at the Domino server console. Data could be lost if the Domino server processing is stopped abruptly.

- ▶ Java Server Controller (JSC): Specifies whether the Java server controller related to the Domino server should be stopped. The possible values are:
  - \*NO: Do not stop the Java server controller when the Domino server ends.
  - YES: Stop the Java server controller when the Domino server ends.

**Important:** You must have \*JOBCTL special authority to run this command.

Figure 5-26 End Domino Server (ENDDOMSVR) command

## 5.2.4 Update Domino Server (UPDDOMSVR)

The Update Domino Server (UPDDOMSVR) CL command updates a configured Domino server to any installed Domino release specified. If a list of servers or \*ALL is specified, UPDDOMSVR attempts to update every Domino server specified and sends a summary message upon completion that lists the number of Domino servers that were updated and the number that failed to update for any reason.

**Attention:** Each Domino server to be updated must be stopped.

The Update Domino Server (UPDDOMSVR) CL command prompt is shown Figure 5-27. The parameters to run this command are:

- ► Server name (SERVER): Specifies the name of the Domino server to be updated. The name must be that of an existing Domino server configured on the system. The parameter will prompt with a list of configured Domino servers and allows any or all of the configured Domino servers to be specified. The possible values are:
  - \*ALL: Processes all the configured Domino servers on the system, attempting to upgrade all of the servers to the specified release.
  - server-name: The name of a configured Domino server on the system.
- ► To release level (TORLS): Specifies the specific release to which the Domino server or servers specified will be updated. The parameter will prompt with a list of installed Domino releases. The possible values are:
  - \*LATEST: This is the default value for this parameter and will always represent the latest installed release.
  - target-release-number: The target release number specifies the release level that the Domino server(s) will be updated to. The target release number is specified in an n.n.n format (for example, 7.0.2). Only the release number of a currently installed Domino release can be specified. When the cursor is located in this field and you press F4, you will get a display with all the available releases.

Figure 5-27 Update Domino Server (UPDDOMSVR) command

If you select a release earlier to the release the Domino server is currently running, you will receive an error message as shown in Figure 5-28.

```
Additional Message Information
Message ID . . . . :
                         LNT8888
                                       Severity . . . . . :
Message type . . . . :
                         Diagnostic
Date sent . . . . :
                         08/17/06
                                       Time sent . . . . :
                                                                15:32:29
Message . . . : Server DOMSVR was not updated to release 6.5.5. Error
                  An error occurred attempting to update a Domino server to
Cause . . . . :
 the specified release. The error code is 4:
   -- 2 = Update of server failure.
   -- 3 = Server DOMSVR not found. Or could not retrieve server
    -- 4 = Server DOMSVR is already at a higher Domino release than release
           6.5.5.
   -- 5 = Server is in a *STANDBY state.
Recovery . . . :
   -- 2 See previous messages in the job log to determine server update
                                                                   More...
Press Enter to continue.
F3=Exit F6=Print F9=Display message details
                                            F21=Select assistance level
F10=Display messages in job log
                               F12=Cancel
```

Figure 5-28 Error message using UPDDOMSVR command

# 5.2.5 Set Domino Environment (SETDOMENV)

The Set Domino Environment (SETDOMENV) CL command sets the operating system job environment to the context of a particular Domino server This includes setting the PATH environment variable, the active directory to the data directory of the Domino server, and optionally switching to the user profile associated with the Domino server. The server's product library is added to this job's library list.

To use this command, you must have either of the following:

- \*ALLOBJ special authority
- \*USE authority to the SETDOMENV object (object type \*CMD) in the QSYS library and \*USE authority to the QNNINRUN object (object type \*PGM) in the Domino product library

The Set Domino Environment (SETDOMENV) CL command prompt is shown Figure 5-29. The parameters to run this command are:

► Server name (SERVER): Specifies the name of the Domino server to use for the context to set the environment for this current job.

**Tip:** While the cursor is on this field, you can press F4 to display a list of Domino servers.

- ► Set user (USER): Specifies if the command should switch this job to run under the user profile associated with the specified Domino server. This is normally the QNOTES user profile. The QNOTES user profile has limited capabilities. When switching to QNOTES in an interactive job, the command line can no longer be used. The possible values are:
  - \*CURRENT: The user profile will remain as it is for this job. Note that using this default when the Domino server specified by the SERVER parameter is not started could mean that system objects that are created as a result of using a Domino API are owned by this current user profile. As a result, the Domino server specified by the SERVER parameter might not be able to start.
  - \*SERVER: This job will be switched to run under the user profile associated with the specified Domino server.
- ► Set path (PATH): Specifies how the PATH environment variable will be set for this job. The possible values are:
  - \*REPLACE: The current setting of the PATH environment variable will be reset with a
    path that specifies the Domino server's configured execution, data, and user
    directories.
  - \*APPEND: The current setting of the PATH environment variable will be reset to a path setting that has the Domino server's configured execution, data, and user directories appended to it.
  - \*PREPEND: The current setting of the PATH environment variable will be reset and appended to a path setting that first specifies the Domino server's configured execution, data, and user directories.

Figure 5-29 Set Domino Environment (SETDOMENV) command

## 5.2.6 Run Domino Command (RUNDOMCMD)

The Run Domino Command (RUNDOMCMD) CL command runs an operating system CL command in the context of a particular Domino server. It sets up the environment which allows the command to be run whether the Domino server is active or not. The setup includes setting the PATH environment variable for the Domino server, setting the directory for the job to the data directory of the Domino server and running the resulting job under the QNOTES user profile.

To use this command, you must have either of the following:

- \*ALLOBJ special authority
- \*USE authority to the RUNDOMCMD object (object type \*CMD) in the Domino product library and \*USE authority to the QNNINRUN object (object type \*PGM) in the Domino product library

The Run Domino Command (RUNDOMCMD) CL command prompt is shown Figure 5-30. The parameters to run this command are:

- ➤ Server name (SERVER): Specifies the name of the Domino server in which context you want to run the CL command. While the cursor is on this field, you can press F4 to display a list of Domino servers.
- Command (CMD): Specifies the CL command string to be run in the context of the specified Domino server.
- ► Run in batch (BATCH): Specifies if the command will be submitted in batch or not. The possible values are:
  - \*YES: The command will be submitted in a batch job.
  - \*NO: The command will be run interactively.
- ▶ Allow multiple threads (ALWMLTTHD): Specifies whether or not the batch job is allowed to run with multiple user threads. This attribute does not prevent the operating system from creating system threads in the job. This parameter is ignored if the Run in batch (BATCH) parameter is set to \*NO. The possible values are:
  - \*JOBD: The value specified in the job description of the QNOTES user profile determines whether or not the job is allowed to run with multiple user threads.
  - \*YES: The job is allowed to run with multiple user threads.
  - \*NO: The job is not allowed to run with multiple user threads.

**Note:** If the CL command string is to be run in batch (BATCH (\*YES) is specified). The RUNDOMCMD command setup does not set the current working directory for the job to the Domino server data directory. Instead, the home directory of the QNOTES user profile is used. A batch job does not inherit the current working directory of the job which submits it. It uses the home directory of the user profile it runs under.

For example of using the RUNDOMCMD, see "Run Domino Command (RUNDOMCMD)" on page 298.

```
Run Domino Command (RUNDOMCMD)
Type choices, press Enter.
Server name . . . . . . . . . . . . . . . . DOM7SVR2
Command . . . . . . . . . . . call PGM(QDOMINO702/compact) parm(names.nsf)
                                    *YES
Run in batch . . . . . . . . . . . .
                                                   *YES, *NO
Allow multiple threads . . . . .
                                     *JOBD
                                                    *JOBD, *YES, *NO
                                                                            Bottom
F3=Exit
                                     F12=Cancel
           F4=Prompt
                        F5=Refresh
                                                   F13=How to use this display
F24=More keys
```

Figure 5-30 Run Domino Command (RUNDOMCMD) command

## 5.2.7 Work with Subsystems (WRKSBS)

The Work with Subsystems (WRKSBS) display shows the status of, and information about, each subsystem in the system as shown in Figure 5-31. You can use this list to determine whether a specific amount of main storage has been assigned to a subsystem and if so, which pool IDs within the subsystem were assigned that main storage. You can also see how many jobs are active in each subsystem.

```
Work with Subsystems
                                                          System:
                                                                    RCHAS10
Type options, press Enter.
                   5=Display subsystem description
 4=End subsystem
 8=Work with subsystem jobs
                     Total
                               -----Subsystem Pools-----
Opt Subsystem
                  Storage (M)
                               1
                                    2
                                      3 4
                                              5
                                                   6
                                                      7
                                                           8
                                                               9 10
                                2
    DOM7SVR1
                          .00
    DOM7SVR2
                                2
                          .00
    QBATCH
                          .00
                                2
    QCMN
                                2
                          .00
    QCTL
                          .00
                                2
                          .00
                                2
     QHTTPSVR
                          .00
                                2
                                    3
    QINTER
                                2
     QSERVER
                          .00
                                2
     QSPL
                          .00
     QSYSWRK
                          .00
                                2
                                                                     More...
Parameters or command
===>
F3=Exit
         F5=Refresh
                      F11=Display system data
                                                F12=Cancel
F14=Work with system status
```

Figure 5-31 Work with Subsystems display

## 5.2.8 Work with Active Jobs (WRKACTJOB)

The Work with Active Jobs (WRKACTJOB) display shows the performance and status information for jobs that are currently active on the system as shown in Figure 5-32. All information is gathered on a job basis. The jobs are ordered on the basis of the subsystem in which they are running. Jobs that run in a subsystem (autostart jobs, interactive jobs, batch jobs, readers, and writers) are alphabetized by job name and indented under the subsystem monitor job field they are associated with.

		V	lork with	Active	Jobs	08/15/06	RCHAS10 16:30:24
CPU %:	.0	Elapsed ti	me: 00	:00:00	Active ,		10.30.24
2=Chan	ions, press ge 3=Holo with spool	l 4=End ed files	5=Work 13=Disc		6=Release	7=Display mes	sage
DOM A Al	system/Job 7SVR1 DMINP MGR	Current User QSYS QNOTES QNOTES	Type SBS BCI BCI	.0 .0	Function PGM-ADMINP PGM-AMGR	SELW	
C. C E H	MGR ALCONN OLSRV400 VENT TTP NNINSTS	QNOTES QNOTES QNOTES QNOTES QNOTES QNOTES	BCI BCI BCI BCI BCI BCH	.0	PGM-AMGR PGM-CALCON PGM-COLSRV PGM-EVENT PGM-HTTP PGM-QNNINS	400 SELW SELW SELW	
===> F3=Exit	rs or comma F5=Refres lay elapsed	sh F7	7=Find 12=Cancel	-	Restart sta More option	tistics s F24=More k	More

Figure 5-32 Work with Active Jobs display

# 5.3 Using the Java Server Console

The Java Server Console allows you to manage your Domino servers through any workstation that supports Java applications. To use the Java Server Console, you must first start the Java Server Controller (JSC) on the system. You can start the JSC when starting a Domino server from iSeries Navigator or the STRDOMSVR CL command.

The JSC can also be started when running the STRTCP, STRTCPSVR SERVER(\*AUTOSTART), or STRTCPSVR SERVER(\*DOMINO) commands if \*JSC or \*ALL was selected in the AUTOSTART parameter during server configuration.

The Java Server Controller is a stand-alone Java program that listens for requests from the remote Java Server Console.

**Important:** When starting a Domino server and the Java Server Controller, you will now see a QJVAEXEC job instead of a SERVER job in the i5/OS job log.

## 5.3.1 Starting the Java Server Console

This section shows you two methods to start the Java Server Console or Domino Console on your Windows PC workstation.

- Starting the Domino Console with iSeries Navigator You can start the Domino Console by using iSeries Navigator. For details, see 5.1.1, "Starting Domino services" on page 154.
- Starting the Domino Console directly

You can start the Domino Console on a Windows workstation by starting the jconsole.exe file. This executable file is installed on your workstation when you install the Domino Administrator or Lotus Notes client. The file is located in the Notes program directory.

**Note:** Java Server Console uses the HTTP user and password information

Figure 5-33 shows an example of the Java Server Console or Domino Console.

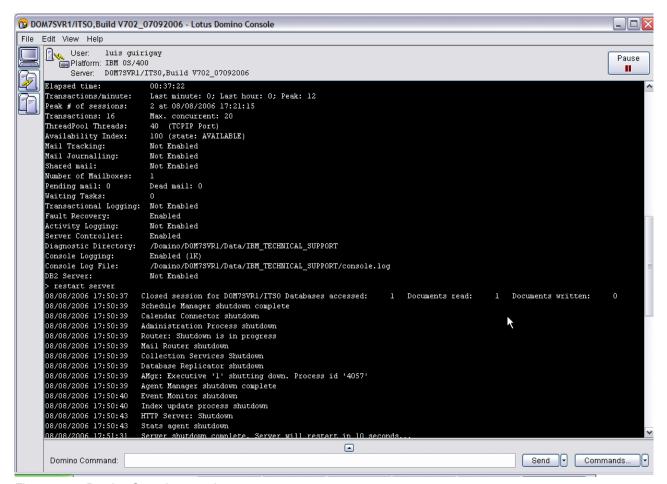


Figure 5-33 Domino Console example

# 5.4 Using the Web Administrator client

The Web Administrator (Figure 5-34) is almost identical to the Domino Administrator client with a few exceptions. The user interface looks the same and most menu options, dialog and

information boxes are identical. The administrator is authenticated by the user ID and password used to log onto the Domino server. The interface changes depending on the roles assigned to the user ID. The Web Administrator includes most of the Domino Administrator functionality.

To start the Domino Web Administrator, point your Web browser to the following URL:

http://Dominoserver.yourdomain.com/webadmin.nsf

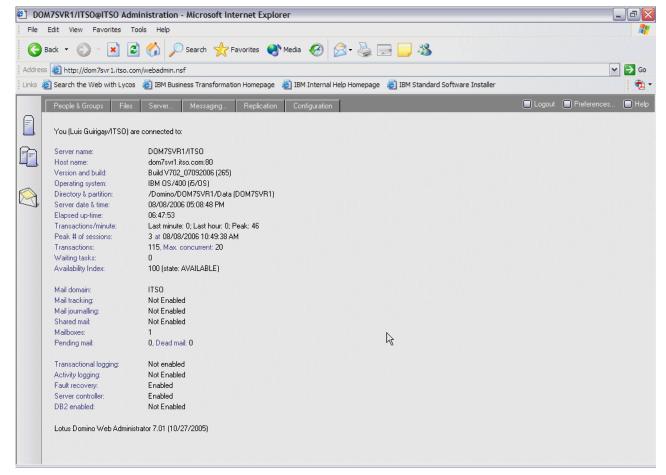


Figure 5-34 Web Administrator

# 5.5 Using the Domino Administrator client

Typically you manage a Domino server from the Lotus Domino Administrator client. This client interface provides the full set of Domino administration functions. The Lotus Domino Administrator is used on a remote workstation since a Domino server on i5/OS does not have a local Notes client.

For more information on the Domino Administrator client, reference the Domino 7 Administrator available at the following Web page:

http://doc.notes.net/domino\_notes/7.0/help7\_admin.nsf



# 6

# Domino 7 performance tuning on i5/OS

The Domino server on i5/OS is an application that runs within its own subsystem but also competes for overall i5/OS system resources as well. Domino 7 allows application developers to create complex workflow or other GUI-based client/server applications. They can route information automatically and exchange information with enterprise software such as relational databases and transaction processing systems. Under varying circumstances, these factors both alone and in concert can result in slow user response times and resource bottlenecking if your environment is not taking advantage of the tools available to track performance so that the environment can be adjusted properly as the need arises. Performance analysis can be a very long and tedious process. For any performance-oriented work environments, always consider general performance management guidelines.

To help with these guidelines, you need to:

- ► Develop objectives such as user expectations
- ► Establish performance baselines to ensure that expectations are realistic
- Implement a good strategy for deployment of your objectives
- Set evaluation benchmarks for your level of progress

A well-defined strategy can make the difference in the degree of overall performance preservation and improvement. Performance management generally consists of performance measurements and a trend analysis.

# 6.1 Defining Domino 7 performance on the i5/OS

Designing a performance management solution for Domino 7 on i5/OS is slightly more complex than traditional i5/OS performance tuning. First and foremost, you need an understanding of Lotus Domino to best leverage the relationships between the processes that are taking place in Domino and how these processes affect the performance of your System i machine.

**Performance:** Often associated with response time, it is the measure of time spent on an individual operation or job. From a capacity planning (throughput) standpoint, it can be measured in terms of data transfer rates or resource utilizations that occur within a given system.

Because varying combinations of tools are available to provide the analysis of Domino 7 performance on i5/OS, you may be required to utilize these tools to gather necessary information in making your performance determinations. This chapter has been structured to assist you with that process.

The best practice for understanding Domino 7 performance on the i5/OS is to have a good understanding of the information found in the following references:

- ▶ Domino 6 for iSeries Best Practices Guide, SG24-6937
- Domino 7 Performance Tuning Best Practices to Get the Most Out of Your Domino Infrastructure, REDP-4182
- Domino 7 Administration Help (help7\_admin.nsf) database
- ► Domino for i5/OS Help (i400hlp.nsf), included with Domino 7 for the i5/OS

If you require a better understanding of the components of performance management for i5/OS, we recommend that you read the following:

- ► AS/400 Performance Management, SG24-4735
- ▶ Performance Tools for iSeries Version 5, SC41-5340

Seasoned Domino administrators also have the ability to stay abreast of the latest performance management strategies available for Domino 7 across all platforms by regularly consulting the performance articles which are kept and updated on the Lotus knowledge domain of the IBM developerWorks Web site:

http://www-128.ibm.com/developerworks/lotus/performance/

For those new to Domino administration, many basic performance tuning practices for Domino are found in detail in a variety or IBM Redbooks and Lotus product documentation books, and are also taught in the following Domino 7 System Administration classes:

- ▶ N7D750: IBM Lotus Domino 7 System Administration Operating Fundamentals
- N7D760: Building the IBM Lotus Domino 7 Infrastructure
- N7D770: Managing IBM Lotus Domino 7 Servers and Users

Classes such as the ones listed above provide hands-on exposure to concepts such as Domino server clustering, setting up server monitoring, and analyzing Domino server activity data. More information on these and other Lotus-related course offerings can be found on the IBM Training and Certification Web site:

http://www-306.ibm.com/software/sw-training/

When gathering performance information on Domino 7 for the i5/OS, i5/OS techniques in conjunction with Domino administration strategies provide a good foundation for making performance management decisions that prove truly effective.

## 6.1.1 Prioritized strategies

It is important that the administrator clearly understand their performance objectives before the development of the performance management strategy.

Following are three levels of strategic focus that can be applied to performance management, which can be used independently or sequentially in phases by an administrator:

**Preservation** When the system is running at acceptable levels of response and

throughput efficiency, this focus involves taking action to keep the system in resistance against negative factors able to degrade the current efficiency standards over short and long-term durations.

**Prediction** Assuming an understanding of the level of efficiency within a given

system, this focus involves searching the parameters and conditions on the system to identify scenarios where the full potential of response

time and/or throughput may have not yet been realized.

**Possibility** After identifying the potential for greater efficiency within a system, this

focus involves taking actions intended to improve response time and throughput efficiency in efforts to develop new and lasting standards of

performance on the system.

#### Prioritizing Domino 7 performance on the i5/OS

Often, administrators wait until there is a problem on a system to concern themselves with performance. They find themselves wishing that they had taken the time to gauge the efficiency of their systems prior to experiencing performance bottlenecking. When steps are taken to measure initial performance baselines for a system prior to users experiencing poor performance, it becomes easier to take action when circumstances force administrators to search for adjustments to make on their systems. Make measuring performance a priority in your Domino 7 environment, and you will find it easier to identify issues and make needed efficiency improvements.

Baseline A benchmark measurement of system response and data throughput

within your Domino 7 and i5/OS environments. Collected as a basis for comparison and reference over time as changes are introduced to those environments and updated measurements are made available.

**Bottleneck** A degradation of system response and data throughput within your

Domino 7 and i5/OS environments. Often highlighting opportunities to improve the management of the CPU, memory, disk, and network resource configurations currently in place within those environments.

Table 6-1 illustrates how a focus on performance and associated priorities can change for administrators when comparing proactive performance measurement in a stable environment with reactive administrative intervention once poor performance has already had an impact on a system's user population. Given the vast suite of performance tools available for Domino 7 on i5/OS, the opportunity to be prepared for performance bottlenecking and requested optimization directives when either arise is literally already at your command.

Table 6-1 Driving forces influencing Domino 7 performance strategies on the i5/OS

Driving force	Strategic focus	Proactive strategy	Reactive strategy	
Performance (baseline verses bottleneck)	Defining the parameters of performance quality	Capture Baseline: Understand the initial or current caliber of Domino and i5/OS system performance	Pinpoint Bottleneck: Target identified decreases in quality of Domino and i5/OS system performance	

Driving force	Strategic focus	Proactive strategy	Reactive strategy		
Preservation	Protecting the caliber of performance quality	Maintain the initial or current caliber of Domino and i5/OS system performance	Stabilize the current caliber of Domino and i5/OS system performance		
Prediction	Questioning the caliber of performance quality	Identify abnormalities in contrast with the prospect of a higher caliber of Domino and i5/OS system performance	Troubleshoot abnormalities in contrast with a previously attained caliber of Domino and i5/OS system performance		
Possibility	Enhancing the caliber of performance quality	Raise the current caliber of Domino and i5/OS system performance	Remove identified abnormalities to restore previously attained caliber of Domino and i5/OS system performance		

## 6.1.2 Categorizing performance bottlenecks on the i5/OS

Table 6-2 lists the factors which are most often associated with i5/OS performance. Also listed are the available tools that can be used to assist with handling bottlenecks for specific performance categories.

Table 6-2 Typical performance categories and degradation influences on i5/OS

Performance category	Factors affecting performance	Available tools for monitoring and intervention			
Processor load	Job CPU usage	Work with Active Jobs (WRKACTJOB) Work with System Activity (WRKSYSACT) 1			
Main storage	Faulting statistics, Wait-to-ineligible	Work with System Status (WRKSYSSTS)			
Disk Low arm number, low arm speed		Work with Disk Status (WRKDSKSTS)			
Communications	Slow lines, line errors, line user excess	Work with TCP/IP Connection Status (NETSTAT) Performance Tools Advisor for the i5/OS <sup>1</sup> Performance Tools Component Report for i5/OS <sup>1</sup> Communications Trace			
IOPs	Processor imbalance, IOP deficiency	Performance Tools Advisor for the i5/OS <sup>1</sup> Performance Tools Component Report for i5/OS <sup>1</sup>			
Applications	Object locks	Performance Tools for iSeries (5722-PT1) Work with Object Locks (WRKOBJLCK)			
<sup>1</sup> Requires Perform	nance Tools for iSeries (5722-	PT1)			

# 6.2 Domino 7 performance management options for i5/OS

Upgrading to Domino 7 on i5/OS can provide your system improvement in CPU conservation in comparison with typical CPU usage as measured under Domino 6. This is dependent though on any deployment of advanced or process-intensive Domino 7 functionalities as they may affect the ultimate extent of this conservation improvement. In any event, there are many resources available to help you maintain a standard of expected service quality when managing Domino 7 on i5/OS.

This section briefly introduces you to the tools available to measure, preserve, troubleshoot and improve performance when using Domino 7 for i5/OS. More specific information on using these tools for a variety of performance-related purposes will be discussed later in this chapter.

#### 6.2.1 Performance and i5/OS commands

Performance involves many levels of system awareness and can be managed in many different ways. Use Table 6-3 as a general reference of the commands available using a 5250 emulation session to view performance related data.

Table 6-3 i5/OS CL commands for performance management

CL command	Command request	Performance benefits
Collecting hardwa	re information	
DSPSYSVAL	Display System Values	DSPSYSVAL SYSVAL(QMODEL) Provides model number for your i5/OS machine.
WRKHDWRSC	Work with Hardware Resources	WRKHDWRSC TYPE(*PRC) Processor capacity card information and interactive card information.
Collecting and tur	ning performance dynamics	
WRKACTJOB	Work with Active Jobs	Provides information on CPU usage of the system and individual Domino jobs. Also provides the run priority of Domino jobs.
WRKSYSACT	Work with System Activity	Shows recent jobs using the CPU. Requires Performance Tools for the i5/OS (5722-PT1)
WRKSYSSTS	Work with System Status	<ul> <li>Review faulting and the Wait-to-Ineligible transitions.</li> <li>Displays non-database fault rates for the machine pool and all of the other pools.</li> <li>Displays page rates for all pools.</li> <li>Displays transition rates for all pools.</li> <li>View or increase pool sizes.</li> <li>Increase maximum number of active jobs in a pool.</li> </ul>
WRKSYSVAL	Work with System Values	Display and change i5/OS system values.
WRKDSKSTS	Work with Disk Status	<ul> <li>Can help find i5/OS disk constraints.</li> <li>Shows disk units in the ASP where Domino is running.</li> <li>Shows % busy data for each unit (arm).</li> <li>Shows disk actuator changes.</li> <li>Shows how full each disk unit is.</li> </ul>
WRKOBJLCK	Work with Object Locks	Investigate object usage on the system.
NETSTAT *CNN	Work with TCP/IP Connection Status	Retransmission checking on port 1352.
CFGTCP	Configure TCP/IP	<ul> <li>Configure IP interfaces and routes.</li> <li>Set i5/OS host table and domain information.</li> </ul>
WRKLIND	Work with Line Description	Used to check the MTU on the line description.

CL command	Command request	Performance benefits
CHGTCPA	Change TCP/IP Attributes	CHGTCPA UDPCKS(*NO) Resolves Checksum issues when retransmissions have been identified. Disables UDP checksum for Windows clients to avoid network re-transmissions.
STRPFRCOL	Start Performance Collection	Starts i5/OS Performance Collection Services. Equivalent to option 2 on GO PERFORM menu.
STRPFRTRC	Start Performance Trace	Collects performance trace data.
CHGJOBTYP	Change Job Type	Change to batch or interactive type.
ADDPEXDFN	Add PEX Definition	Performance Explorer (PEX) command
STRPEX	Start Performance Explorer	Starts the Performance Explorer Tool.
ENDPEX	End Performance Explorer	Ends the Performance Explorer Tool.
Reviewing and re	porting performance dynamics	
DSPLOG	Display System Log	Shows QHST system history log and recent changes in system values.
PRTSYSRPT	Print System Report	Performance Tools Command Creates and prints Collection Services system operation overview report.
PRTCPTRPT	Print Component Report	Performance Tools Command Creates and prints Collection Services system operation overview report by component.
PRTTNSRPT	Print Transaction Report	Performance Tools Command (Requires that STRPFRTRC be run) Generates reports on transactions taking place when performance data was being collected.
PRTACTRPT	Print Activity Report	Performance Tools Command Creates WRKSYSACT data reports.
CVTPFRTHD	Convert Performance Thread Data	Performance Tools Command Converts Collection Services performance data.
PRTPEXRPT	Print PEX report	Performance Explorer Command Prints formatted listing of PEX data saved across a physical fileset within a library.

# **6.2.2 Performance Management for System i5**

Performance Management for System i5 allows for automatic collection of performance data. The data collected can then be sent to IBM for analysis, saving you the trouble of worrying about having to store an excess of performance information on your system.

Included on the system when your machine is shipped, Performance Management for System i5 needs to be activated and customized to allow your environment to benefit from its functionality.

Performance Management for System i5 works in collaboration with a variety of the other available performance resources on i5/OS, including Management Central (see 6.2.3, "Management Central" on page 189) and Collection Services (see 6.2.5, "Collection

Services" on page 190), to save you the time of having to manually collect and tediously process your system's performance data.

For more information, refer to the Performance Management for System i5 Web page:

http://www.ibm.com/systems/i/pmsystemi5/

#### 6.2.3 Management Central

Management Central (Figure 6-1) is a suite of systems management functions that allows you to manage multiple systems through a single central system. Simply select a System i machine to use as your central system, then add endpoint systems to your Management Central network. You can create groups of similar or related endpoint systems to make managing and monitoring your systems even easier. Your central system will handle the communications for you. You no longer have to worry about configuring communications connections or juggling multiple login sessions. Management Central is scalable, flexible, and easily manipulated to fit the needs of your environment.

Management Central provides the ability to monitor system-wide metrics, and can focus on specific jobs running on the system. System monitors track various performance statistics, provide real-time tracking, and have the ability to view historical data on such areas as disk arm utilization and interactive feature utilization. The job monitors can monitor the activity of a single job or numerous jobs by job name, user, subsystem, or server type.

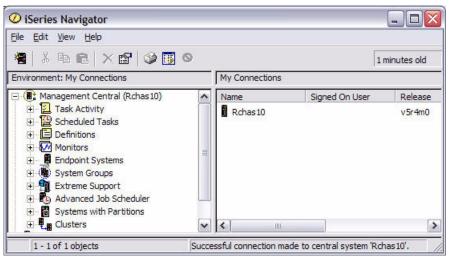


Figure 6-1 Management Central

# 6.2.4 Performance Tools for iSeries (5722-PT1)

Performance Tools for iSeries manages and analyzes performance data, providing real-time and long-term views, as well as detailed analyses. You can order this product with one of two features, the Manager feature or the Agent feature. The Agent feature contains a subset of the functions in the Manager feature. The performance capabilities in both the Manager and Agent features allow you to:

- Manage performance data
- Monitor performance in real-time interactively
- ► Display performance data
- Analyze performance data

Performance Tools for iSeries has the capability to report, analyze, and model system performance. The Advisor function (option 10 on the Perform menu shown in Figure 6-2) can analyze the system and give recommendations to improve performance.

```
PERFORM
                      IBM Performance Tools for iSeries
                                                            System:
                                                                       RCHAS10
Select one of the following:
    1. Select type of status
     2. Collect performance data
     3. Print performance report
     5. Performance utilities
     6. Configure and manage tools
    7. Display performance data
    8. System activity
    9. Performance graphics
    10. Advisor
    70. Related commands
Selection or command
===>
         F4=Prompt
                      F9=Retrieve
                                    F12=Cancel
                                                 F13=Information Assistant
F3=Exit
F16=System main menu
(C) COPYRIGHT IBM CORP. 1981, 2005.
```

Figure 6-2 IBM Performance Tools for iSeries menu

#### 6.2.5 Collection Services

Collection Services (Figure 6-3), formerly known as Performance Monitor, is a data collection tool that is native to i5/OS. It can provide significant help in troubleshooting performance problems. Data analysis can be performed against this data collection online or offline. To analyze the data acquired by Collection Services, utilize Management Central or the Performance Tools for iSeries (5722-PT1).

**Note:** If you are upgrading to Domino 7 from a release prior to Domino 6 for i5/OS, you will notice a new ServerTask called COLSRV400 added to the ServerTasks line of the NOTES.INI file of each Domino server that is upgraded. This is the add-in task used to gather Domino server statistics required by Collection Services for data collection and analysis. Whether you use Collection Services or not, Lotus recommends that the add-in task be left in the ServerTasks line for each server. COLSRV400 has been available since Domino 6 for i5/OS running V5R2 and higher.

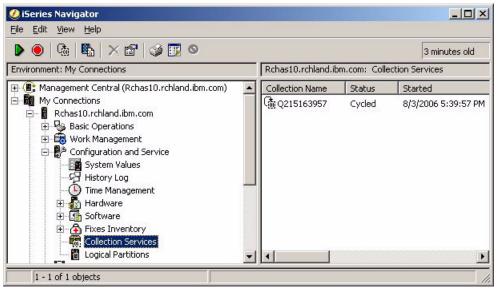


Figure 6-3 Collection Services access from iSeries Navigator

## **6.2.6 Performance Explorer (PEX)**

Performance Explorer (PEX) is a set of performance collection functions and reporting commands. Part of the total i5/OS performance management methodology, the PEX commands should be one of the last lines of defense engaged when analyzing a performance problem. The Performance Explorer and Collection Services are separate from one another and produce two completely different sets of database files that contain grouped sets of collected data, but both collections of data can run at the same time. This practice should be kept to a minimum, however, as the impact to the system is significant with both collections active.

As with Collection Services, the capability to collect Performance Explorer data is shipped with i5/OS. Your ability to analyze this data after it has been obtained is significantly enhanced by the purchase of Performance Tools for iSeries (5722-PT1).

#### 6.2.7 iDoctor

iDoctor for i5/OS is a plug-in that provides your system with a suite of tools that aid with the management of i5/OS performance. The suite of tools includes:

- Performance Trace Data Visualizer, a free tool to analyze PEX trace data
- ► PEX Analyzer, to analyze 5722PT1 data tied to analyzing CPU utilization, physical disk operations, logical disk input/output, data areas, and data queues
- Consulting Services, which allows expert consultants to view your performance data
- Job Watcher, a job activity viewing and reporting tool

The iDoctor functionalities provide a number of strategies to measure the overall health of your system. The analysis of a vast amount of data is evaluated quickly and in ways that can be easily understood. For more information regarding iDoctor usage, visit the iDoctor for iSeries Web site at:

https://www-912.ibm.com/i\_dir/iDoctor.nsf

## 6.2.8 Domino 7 cross platform performance tools

In Domino 7, performing traditional performance troubleshooting involves:

- ► Using information from the Domino server log (log.nsf), the Monitoring Results database (statrep.nsf), and the Administration Requests database (admin4.nsf) to perform historical data-analysis.
- ▶ Using Monitoring Configuration (events4.nsf) event generators and notifications with standard Domino server monitoring to perform real-time data-analysis.
- Using Domino Directory documents and notes.ini settings to customize the Domino server configuration.

In the sections below we will discuss advanced tools native to the Domino 7 server which can be used to manage performance when using Domino 7 on i5/OS.

## **Domino Domain Monitoring (DDM)**

Domino Domain Monitoring (DDM) is Domino's next generation system event management suite. Packaged with the Domino 7 product for use on all platforms, DDM works in conjunction with the Domino Monitoring Configuration database (events4.nsf) to gather and report activity data for multiple Domino 7 servers through the use of configurable probes which collect data and report pre-determined threshold flags and resource usage ranking to the Domino Domain Monitor database (ddm.nsf).

From a performance perspective, a major benefit of DDM is its state-of-the-art offering of Domino 7 database application performance monitoring functionalities. These functionalities allow for memory, CPU, and slow response time to be flagged and reported to the Domino Domino Monitor database associated with the processing of agents running within databases on your Domino 7 server. Additionally, Domino processes such as the building of temporary full-text indexes by agents can be tracked and identified so that administrative intervention can occur to limit performance cost. For more information on limiting the performance impact of building temporary full-text indexes, see "'Preventing agents from creating temporary full text indexes" on page 223".

Application probes allow monitoring of agents running both via the Agent Manager task and the HTTP Web Services task. Application probe classifications include:

- Agents behind schedule
- Agents ranked by CPU usage
- Agents ranked by memory usage
- Agents with unusually extended runtimes

If you require a better understanding of the components of Domino Domain Monitoring or ddm.nsf database creation, we recommend that you read the IBM Redpaper *Lotus Domino Domain Monitoring*, REDP-4089.

For information on configuring DDM application probes to monitor agents being processed by the AMGR or HTTP jobs on your Domino 7 server, refer to the following article *Troubleshooting application performance: New tools for data collection*:

http://www-128.ibm.com/developerworks/lotus/library/app-troubleshooting2/

#### **Activity Trends and the Domino Change Manager**

Activity Trends allows you to collect and explore stored activity statistics as current observations and historical trends. The collected activity statistics relate to:

- ► The Domino server
- Domino databases

- User load
- Connections of users to databases

Activity Trends recommends a resource-balancing plan using this data. Then, in collaboration with the Domino server's Domino Change Manager, Activity Trends provides workflow that facilitates implementing the recommended changes. For more information on Activity Trends and the Domino Change Manager, see the Lotus Domino 7 Administration Help database.

#### Server.Load

With Domino Server.Load, you can evaluate the capacity of your Domino servers and evaluate the requirements for additional CPU, memory, or disk storage upgrades. The tool can also be used to determine the effect of changes to the machine, such as upgrading a device drive, an OS service pack, or a Domino maintenance release. Domino Server.Load is included as part of the Domino 7 Administrator client, and is best for small and mid-sized evaluations.

If you configure multiple clients, you can set up and run the test from each client system. Each client workstation running Server.Load generates a simulated user load of Notes transactions, which reports server statistics back to the client. You can also monitor real-time server metrics. While the script is running, the Metrics window displays an immediate characterization of server performance by updating metrics on a per-minute basis.

New to Domino 7 is the Enterprise Mail workload. The Enterprise Mail workload attempts to simulate variations of user activity on Domino servers. These activities include:

- Messaging
- Calendaring
- ► Database searches
- Database replication between servers
- ► Local database replication on the client, and cluster replication

For additional explanation of the Enterprise Mail workload, refer to the following Web site:

http://www-128.ibm.com/developerworks/lotus/library/domino7-enterprise-performance/

For more information on Server.Load, see the Lotus Domino 7 Administration Help.

# 6.3 Installing performance management tools for the i5/OS

You have many options regarding your choice of performance management tools on i5/OS. Adding Domino 7 to an i5/OS partition provides for a more complex, collaborative environment which requires performance specialists to consider processes that span comprehensions beyond standard performance techniques. Domino acts as its own entity on i5/OS, running Domino transactions to meet both the Domino server requirements and the requirements of the users. Transactions are also run for any external system requirements such as requests from the i5/OS operating system. Because Domino is so diverse, Domino 7 on i5/OS can be optimized, with proper planning, to take advantage of i5/OS assets such as scalability.

# 6.3.1 i5/OS Performance Explorer pre-installed for i5/OS

The collection functions and related commands of the i5/OS Performance Explorer are part of the i5/OS licensed program. The reporting function and various associated commands are part of the base option in the Performance Tools for iSeries licensed program (5722-PT1) and

are available with either the Manager feature or the Agent feature described in 6.3.3, "Installing Performance Tools for the i5/OS" on page 197.

## 6.3.2 Setting up Management Central

Management Central is an optionally installable component of iSeries Navigator. To be able to start the Management Central server on i5/OS, users will need to have \*USE authority to the Start TCP/IP Server (STRTCPSVR) command. Perform the following steps to set up Management Central:

 From a Windows workstation, Management Central is installed as long as the installer selects the **Typical** option when installing iSeries Access for Windows. See Figure 6-4.

The typical option ensures the following components are installed to provide users with basic Management Central functionality:

- Tasks (inventory only)
- Endpoint systems
- System groups

To utilize additional Management Central functionality, you can use the pull down menu options of **File**  $\rightarrow$  **Install Options**  $\rightarrow$  **Selective Setup** function in iSeries Navigator to install additional functionality at a later time. The additional install components required for full Management Central functionality are:

- Configuration and Service
- Users and Groups
- Commands
- Packages and Products, and
- Monitors



Figure 6-4 Installation options for iSeries Access for Windows

2. From iSeries Navigator, choose your central system when you first start Management Central. By default, the first System i machine to which you create a connection to in iSeries Navigator is designated as your central system. You can also change your central system at any time, by right clicking on Management Central and selecting Change Central System as is shown in Figure 6-5.

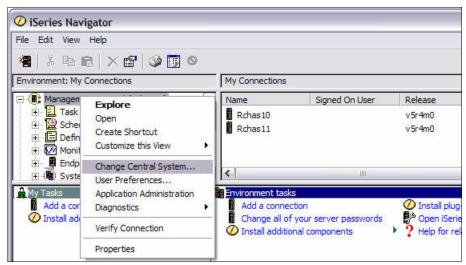


Figure 6-5 Changing the Central System for Management Central

3. From iSeries Navigator, add endpoint systems by expanding **Management Central**, right click on **Endpoint Systems** and select **New Endpoint System** as is shown in Figure 6-6.

**Note:** Endpoint systems are the *other* systems in your network that you manage with your single central system. Your central system is automatically added to the list of endpoint systems. If you have more than one System i machine, you can add your other systems manually or use the Discover Systems function.

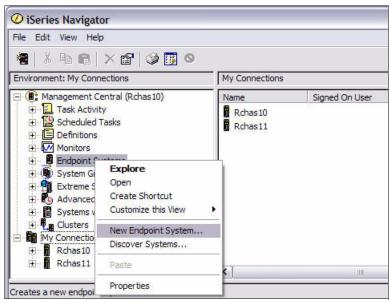


Figure 6-6 Adding endpoint systems within Management Central

4. From iSeries Navigator, create system groups by expanding **Management Central**, right click on **System Groups** and select **New System Group** as shown in Figure 6-7.

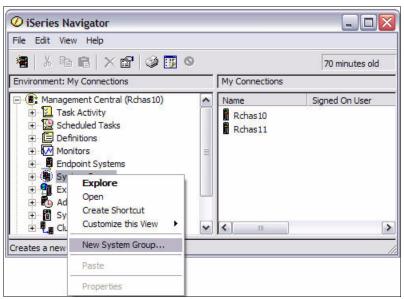


Figure 6-7 Creating a new system group in Management Central

5. On the New System Group window (Figure 6-8), name your system group and select the systems that will be members of the system group. Click **OK**.

**Tip:** Make the most of Management Central's ability to manage groups of systems. Create groups of systems, for example based on system functions (all Domino servers, all WebSphere servers, etc.) or geography, to make managing them easier and more efficient.

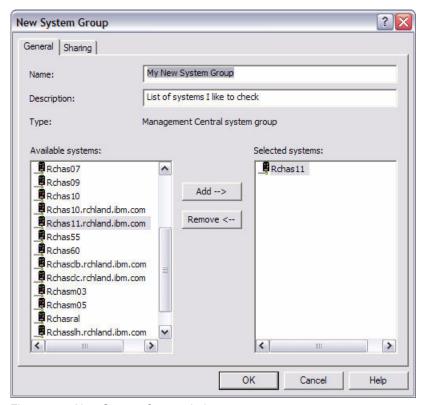


Figure 6-8 New System Group window

Once you have finished this preliminary work with Management Central, you're ready to begin managing your systems. For more details about installing and configuring Management Central, refer to the Getting Started with Management Central Web page at:

http://publib.boulder.ibm.com/infocenter/iseries/v5r4/topic/rzaih/rzaksinstlmc.htm

# 6.3.3 Installing Performance Tools for the i5/OS

**Attention:** To install the Performance Tools, you must use an i5/OS user ID with \*SAVSYS special authority.

Performance Tools for the i5/OS runs out of a library called QPFR. You will need to rename any pre-existing libraries called QPFR on your system using the Rename Object (RNMOBJ) CL command before installing the Performance Tools. Use the following Restore License Program (RSTLICPGM) CL command to install the Performance Tools into the QPFR library:

RSTLICPGM LICPGM(5722PT1) DEV(NAME) OPTION(\*BASE)

You must then install one or both of the following options to complete the installation.

► The Manager feature

RSTLICPGM LICPGM(5722PT1) DEV(device-name) OPTION(1)

The Agent feature

RSTLICPGM LICPGM(5722PT1) DEV(device-name) OPTION(2)

**Note:** If you have several CD-ROMs to install, you may receive a message saying that the 5722PT1 licensed program is restored but no language objects were restored after you have installed the first CD. If this occurs, insert the next CD-ROM and enter the following RSTLICPGM command:

RSTLICPGM LICPGM(5722PT1) DEV(NAME) RSTOBJ(\*LNG) OPTION(\*BASE)

# 6.4 Measuring Domino 7 performance standards on the i5/OS

You can check your system's performance at anytime. In this section is a brief synopsis of some of the tools and metrics available to assist with collecting performance data related to both Domino and i5/OS.

## 6.4.1 Work with System Status (WRKSYSSTS)

The Work with System Status (WRKSYSSTS) display shown in Figure 6-9, allows you to view and alter several aspects of i5/OS. You will see this tool referenced throughout this chapter during discussions on main memory (6.5.2, "Managing resources on the i5/OS" on page 214) and disk space (6.7.3, "Disk input/output (I/O) performance tuning" on page 245).

**Tip:** The best way to view the information discussed in this section is to use the Intermediate assistance level. Once you are on the Work with System Status display, press F21 to access the different assistance levels. Select option 2 for Intermediate and press Enter.

Work with System Status 08/16/06							RCHAS10 10:37:45		
% CPII II	sed.	1.4 Auxiliary storage:							
					n ASP :			622 0 0	
		:							
		:							
Jobs in	system .	:	44	134	Total			. :	632.9 G
% perm	addresses	:	.0	07	Currer	nt unpro	tect us	sed :	9953 M
		:		16		ım unpro			
<b>P</b>			•	-					
Type ch	anges (if	allowed),	press Er	iter.					
System	Poo1	Reserved	Max	[	OB	Non	-DB		
Poo1	Size (M)	Size (M)	Active	Fault	Pages	Fault	Pages		
1	865.21	476.57	+++++	.0	.0	.0	.0		
2	17565.03	5.57	6585	.0	.0	1.8	1.8		
3	5000.00	.02	67	.0	.0	.9	.9		
4	.25					.0			
•	• 23	.00		••	••	• •	• • •		
									Bottom
Command									
===>									
F3=Exit	F3=Exit F4=Prompt F5=Refresh F9=Retrieve F10=Restart F12=Cancel							ncel	
F19=Extended system status F24=More keys									

Figure 6-9 Work with System Status (WRKSYSSTS) display

## 6.4.2 Work with Disk Status (WRKDSKSTS)

The Work with Disk Status (WRKDSKSTS) display shown in Figure 6-10, allows you to view a few aspects of your i5/OS direct access storage devices (DASD). Some of the things you can see on this display are:

- How many disk units you have configured in an ASP
- ► How busy the disk arms are
- How full each disk unit is

The two aspects that affect Domino performance the most are how busy the disk arms are and if any disk arms are significantly busier than the other disk arms in the ASP.

				Work	with Disk	Status		08/1		CHAS10 0:40:41
Elaps	ed time:	00:0	0:05							
		Size	%	I/0	Request	Read	Write	Read	Write	%
Unit	Type	(M)	Used	Rqs	Size (K)	Rqs	Rqs	(K)	(K)	Busy
1	4326	30769	12.5	.0	.0	.0	.0	.0	.0	0
2	4326	30769	12.5	.1	4.0	.0	.1	.0	4.0	0
3	4326	30769	12.5	.0	.0	.0	.0	.0	.0	0
4	4326	30769	12.5	.0	.0	.0	.0	.0	.0	0
5	4326	30769	12.5	.1	4.0	.0	.1	.0	4.0	0
6	4326	30769	12.5	.3	6.0	.0	.3	.0	6.0	0
7	4326	30769	12.5	.0	.0	.0	.0	.0	.0	0
8	4326	30769	12.5	.3	22.0	.0	.3	.0	22.0	0
9	4326	30769	12.5	.1	4.0	.1	.0	4.0	.0	0
10	4326	30769	12.5	.1	4.0	.1	.0	4.0	.0	0
11	4326	35165	12.5	.3	4.0	.1	.1	4.0	4.0	0
12	4326	30769	12.5	.3	4.0	.1	.1	4.0	4.0	0
13	4326	35165	12.5	.1	4.0	.1	.0	4.0	.0	0
										More
Comma	nd									
===>										
F3=Ex	it F5=	Refresh	F12:	=Cancel	F24=Mor	e keys				

Figure 6-10 Work with Disk Status (WRKDSKSTS) display

## 6.4.3 Work with System Activity (WRKSYSACT)

The Work with System Activity (WRKSYSACT) display (Figure 6-11), allows you to interactively work with the jobs and tasks currently running in the system. At a first glance, the information shown by this command looks very similar to the Work with Active Jobs (WRKACTJOB) display. However, WRKSYSACT has several advantages over WRKACTJOB:

- It uses less system resources.
- Besides user jobs, it also shows system tasks.
- ► The resource utilization shown is not cumulative and shows as a snapshot of each measurement interval. When used with the Automatic Refresh (F19) function, it shows live information for the very second, you are watching it.

**Note:** The WRKSYSACT command is only available when the Performance Tools for the i5/OS (5722-PT1) product is installed on your system.

Besides having the ability to view this data on the display, you can also direct the data to be stored in a database file for future use. To direct the data to a database file, specify either \*FILE or \*BOTH for the OUTPUT parameter of the WRKSYSACT command. This allows you to produce a report using the Print Activity Report (PRTACTRPT) CL command.

Α										
	Work with System Activity								RCH	AS10
									06 10:	46:31
	Auto	Automatic refresh in seconds								
		sed time		00:00:02	Averag	e CPU	util .		:	2.5
	Numb	er of CPUs .	:	2	Maximu	m CPU	util .		. :	3.5
	0ver	all DB CPU ut	til:	.0	Minimu	m CPU	util .		. :	1.5
					Curren	t prod	cessing	capaci	ty:	2.00
	Auth	orization Typ	oe .:							
	Type	options, pre	ess Enter.							
	1=	Monitor job	5=Work wit	h job						
								Total	Total	DB
		Job or					CPU	Sync	Async	CPU
	0pt	Task	User	Number	Thread	Pty	Util	-, -	I/0	Util
		SERVER	QNOTES	040258	00000244	20	1.3	1	3	.0
		SERVER	QNOTES	040258	0000020D	20	.3		0	.0
		CHRONOS	QNOTES	040937	00000015	20	.3		0	.0
		QPADEV0007	BBPAGE	040912	000000D	1	.1	7	0	.0
		HTTP	QNOTES	040263	000000F0	20	.0	2	0	.0
	F2 F	510 !!		E11 \/:		,	E10 A		_	ottom
	F3=E		date list	FII=View	2 F12=Ca	nceı	F19=A	utomati	c refre	sn
		More keys	4 CODD 1001	2005						
L	(L)	COPYRIGHT IBN	1 CURP. 1981	, 2005.						

Figure 6-11 Work with System Activity (WRKSYSACT) display

## 6.4.4 Performance analysis using Management Central

Using Management Central, you can manage and monitor your Domino server performance in an easy and understandable way. System and job monitors gather and present real-time performance data for your Domino servers. You can use monitors to see your server's performance as it happens at a single system or across multiple systems and groups of systems.

In contrast, you can use Collection Services to collect performance data for later analysis. Collection Services allows you to analyze multiple sets of true performance data for a longer period of your system performance history. Using the Graph History window, you can see a graphical view of the metrics that you collected for an extended period of time. You can use the Graph History function as long as you collect data with Collection Services, you do not need to have a system monitor running.

For information about Collection Services, see 6.6, "Domino 7 performance bottlenecking on the i5/OS" on page 224.

This section does not cover all the functions on Management Central performance monitors. For more detailed and complete information, we recommend that you read *Managing OS/400* with Operations Navigator V5R1, SG24-6226.

The system monitor graphs present real-time system performance data in a graphical interface that you can directly manipulate to gather different or more detailed data. Monitors allow you to collect performance data simultaneously for a wide variety of system metrics, for any system or system group, and for any length of time.

To monitor real-time system performance, you start with creating a system monitor.

## Creating a new system monitor

You can define a new system monitor by using one of the following methods:

► From iSeries Navigator, expand Management Central → Monitors, right-click on System and select New Monitor. See Figure 6-12.



Figure 6-12 Creating a new system monitor with Management Central

► Right-click on a System i machine under My Connections in iSeries Navigator and select Monitors → System. See Figure 6-13.

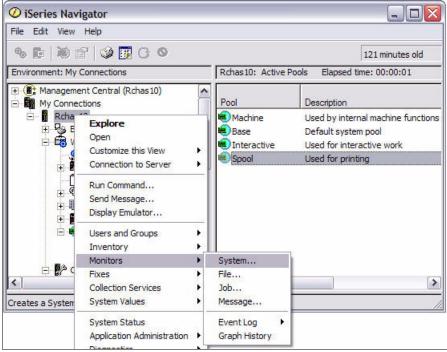


Figure 6-13 Using My Connections method to create a new system monitor

- ► Expand Endpoint Systems under Management Central, right click on a system and select Monitors → System.
- ► Expand System Groups under Management Central, right click on a system group and select Monitors → System.

Each of these methods activates the New Monitor window shown in Figure 6-14.



Figure 6-14 Creating a new system monitor, General tab

### General tab

On the General tab of the New Monitor window, you enter the name of the monitor and a brief description of the monitor.

### Metrics tab

The Metrics tab (Figure 6-15) allows you to select the metrics that you want to monitor. You can view and change information about the collection interval, the maximum graphing value, and the display time for each metric. You can define one or two thresholds for each metric. The thresholds are independent of each other and provide a way to monitor for different conditions in one monitor.

For example, you may monitor for a less severe condition and send a command to page the system operator. Or, you may monitor for a more severe condition and send a command page to start ending certain jobs. A threshold consists of a trigger value and, optionally, a reset value. You can specify an i5/OS command to be run when the threshold is triggered.

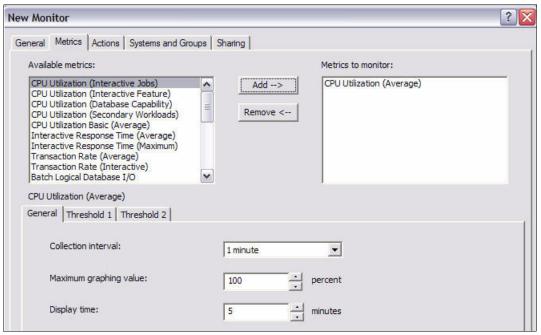


Figure 6-15 Metrics tab for Management Central system monitor

Following is a description of the available metrics shown in Figure 6-15:

- ► CPU Utilization (Average): This metric shows you the percentage of available processing unit time that is being consumed by all jobs on your system. This metric includes all work being done, including both interactive and non-interactive.
- ► CPU Utilization (Interactive Jobs): Formerly known as CPU Utilization (Interactive), this metric shows you the percentage of available processing unit time that is being consumed on the system for all jobs of the type I (interactive). It also helps you manage your interactive users' work compared to total CPU utilization capacity. The resulting data is relative to achieving good interactive response time and the amount of CPU left for non-interactive jobs. Type I jobs include:
  - Twinaxial data link control (TDLC)
  - 5250 remote workstation
  - 3270 remote workstation
  - SNA pass-through
  - 5250 telnet
- ► CPU Utilization (Interactive Feature): This metric is designed to help you monitor and manage your system's interactive use. It determines whether a particular job is doing interactive work and measures the system's overall interactive workload. This metric complements the existing Management Central metrics such as CPU Utilization (Interactive Jobs) and CPU Utilization (Average). This metric shows you when your system is approaching its interactive limits:
  - Signed-on 5250 workstation jobs
  - Autostart jobs, prestart jobs, or jobs submitted to a batch job queue that run I/O operations on a 5250 workstation
- ► CPU Utilization (Database Capability): This metric is intended to help you monitor your system's database use. Using this metric, you can see how much of your system CPU is consumed by database activities and which jobs contribute the most to this use. In addition, you can find detailed data for each job, including the number of milliseconds of

- CPU used by that job in database processing during the particular sample interval being graphed.
- ▶ CPU Utilization (Secondary Workloads): This metric is designed for use on System i dedicated systems. It measures how much CPU is being used on the system for work other than the primary workload for which the system is designed, which can include database activity. For example, this metric can be used on the Dedicated Server for Domino to see how much non-Domino work is being done on the system. The amount of CPU used by secondary workloads is currently reported only on Dedicated Servers for Domino systems running V4R5 or later and is a portion of the total CPU utilization capacity. On other systems and servers, the value is ignored and appears as 0%. This metric does not track detailed data.reset.
- ► CPU Utilization Basic (Average): This metric shows the percentage of available processing unit time that is being consumed by all jobs on the system. Unlike the CPU Utilization (Average) metric mentioned above, this metric does not track detailed data.
- ▶ Interactive Response Time (Average): This includes the average response time for interactive (5250) jobs on the system. Second level information shows the jobs having the highest average response time.
- ► Interactive Response Time (Maximum): This includes the highest response time for interactive (5250) jobs on the system while the monitor is active. Second level information shows the jobs having the highest response time.
- ► Transaction Rate (Average): This includes the average number of transactions per second completed by all jobs active on the system. Second level information shows the jobs having the highest rate.
- ► Transaction Rate (Interactive): This includes the average number of transactions per second completed by 5250 jobs active on the system. Second level information shows the jobs having the highest rate.
- ▶ Batch Logical Database I/O: The average number of logical database input/output (I/O) operations currently performed by all non-5250 (batch) jobs on the system. Second level information shows the jobs performing the highest I/Os.
- Disk Arm Utilization (Average): The average percentage of disk arm busy doing I/O operations for all disks on the system. Second level information shows information for each disk arm.
- Disk Arm Utilization (Maximum): The maximum percentage of disk arm busy doing I/O operations for all disks on the system. Second level information shows information for each disk arm.
- ▶ **Disk Storage (Average):** The average percentage of disk arm storage that is full on your system during the time you collect the data. Second level information shows information for each disk arm.
- ▶ **Disk Storage (Maximum):** The highest percentage of disk arm storage that is full on your system during the time you collect the data. Second level information shows information for each disk arm.
- ▶ **Disk IOP Utilization (Average):** The average percent busy the disk input/output processors (IOPs) are on your system during the time you collect the data. Second level information shows information for each IOP.
- ▶ **Disk IOP Utilization (Maximum):** The maximum percent busy the disk input/output processors (IOPs) are on your system during the time you collect the data. Second level information shows information for each IOP.

- ► Communication IOP Utilization (Average): The average percent busy the communication (LAN, WAN, ...) IOPs are on your system during the time you collect the data. Second level information shows information for each IOP.
- Communication IOP Utilization (Maximum): The maximum percent busy the communication (LAN, WAN, ...) IOPs are on your system during the time you collect the data. Second level information shows information for each IOP.
- Machine Pool Faults (Average): The average number of faults per second occurring in the machine pool of the system during the time you collect the data. Only Licensed Internal Code runs in the Machine pool.
- ▶ User Pool Faults (Average): The average number of faults per second occurring in all of the user pools on the system during the time you collect the data. Second level information shows information for each pool.
- ▶ User Pool Faults (Maximum): The maximum number of faults per second occurring in all of the user pools on the system during the time you collect the data. Second level information shows information for each pool.
- ► Communication Line Utilization (Average): The average percentage of line utilization for all non-LAN lines active during the time you collect the data. Line utilization is an approximation of the actual amount of data transmitted compared to the theoretical maximum line speed configured on the line description object. Second level information shows information for each non-LAN line. A non-LAN line is supports binary synchronous, asynchronous, IDLC, X.25, LAPD, or SDLC protocols.
- ► Communication Line Utilization (Maximum): The maximum percentage of line utilization for all non-LAN lines active during the time you collect the data. Second level information shows information for each non-LAN line.
- ► LAN Utilization (Average): The average percentage of line utilization for all LAN (Token-Ring and Ethernet) lines active during the time you collect the data. Line utilization is an approximation of the actual amount of data transmitted compared to the theoretical maximum line speed configured on the line description object. Second level information shows information for each LAN line.
- ► LAN Utilization (Maximum): The maximum percentage of line utilization for all LAN lines active during the time you collect the data. Second level information shows information for each LAN line.

## Actions tab

The Actions tab (Figure 6-16) allows you to specify the actions to occur when a threshold is triggered and when a threshold is reset.

- ▶ Log event: Adds an entry to the event log on the central system when the threshold is triggered or reset. The entry includes the date and time the event occurred, the endpoint system being monitored, the metric being collected, and the monitor that logged the event.
- ▶ **Open event log:** Displays the event log when a trigger or reset event occurs. This automatically brings up the Event Log window if it is not currently displayed on your PC.
- ▶ Open monitor: Displays a list of systems that are being monitored for the specified metrics and a list of the values for the specified metrics as they are collected for each system when a trigger or reset event occurs. This automatically brings up the Monitor window if it is not currently displayed on the PC.
- ▶ Sound alarm: Sounds an alarm on the PC when the threshold for the monitor is triggered.

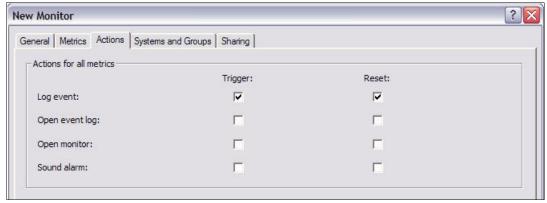


Figure 6-16 Actions tab for Management Central system monitor

## Systems and Groups tab

The Systems and Groups tab shows you a list of endpoint systems or system groups. The list can include systems from which the monitor is currently collecting data. The list can also include systems on which the monitor is not currently running. You can also add or remove endpoint systems or system groups from this page.

## 6.4.5 Memory resource performance analysis

Periodically checking the amount of memory your memory pools use is important. By monitoring these levels, you can tune your memory pools to run at maximum efficiency.

In iSeries Navigator, you can easily monitor the amount of memory your pools are using by performing the following steps:

- Open iSeries Navigator, expand My Connections and then expand the connection for your System i machine.
- Expand Work Management → Memory Pools and click on either Active Pools or Shared Pools.
- Right-click on the specific pool of your choice and select Properties. See Figure 6-17.

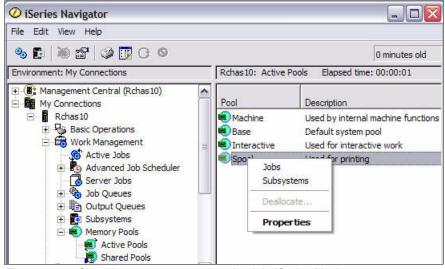


Figure 6-17 Choosing a memory pool to check in iSeries Navigator

4. On the Properties window (Figure 6-18), click on the **Configuration** tab. View the memory usage amount in the Current field under the Size section.

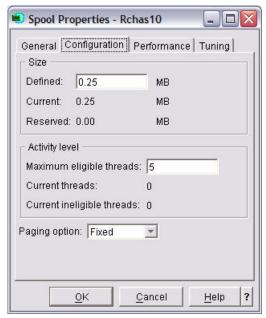


Figure 6-18 Configuration tab of spool memory pool properties

# 6.5 Preserving performance on your Domino 7 server

The information in this section shows you how to preserve the performance of your Domino 7 server.

# 6.5.1 Collecting Domino 7 performance data on the i5/OS

The information in this section shows you how to collect Domino 7 for i5/OS performance data.

## **Collection Services**

Collection Services analysis requires that the Performance Tools for the i5/OS has been installed on your system. See 6.3.3, "Installing Performance Tools for the i5/OS" on page 197 for details.

### Starting performance collections from a 5250 emulation session

To start a Collection Services analysis from a 5250 emulation session, perform the following steps:

1. On the i5/OS command line, type GO PERFORM and press Enter.

2. On the IBM Performance Tools for iSeries menu, type an option 2 (Collect Performance Data) and press Enter. See Figure 6-19.

```
PERFORM
                      IBM Performance Tools for iSeries
                                                            System:
                                                                      RCHAS10
Select one of the following:
    1. Select type of status
    2. Collect performance data
    3. Print performance report
    5. Performance utilities
    6. Configure and manage tools
    7. Display performance data
    8. System activity
    9. Performance graphics
   10. Advisor
   70. Related commands
Selection or command
===> 2
F3=Exit
         F4=Prompt
                     F9=Retrieve F12=Cancel
                                                F13=Information Assistant
F16=System main menu
(C) COPYRIGHT IBM CORP. 1981, 2005.
```

Figure 6-19 IBM Performance Tools for iSeries menu

3. On the Collect Performance Data display (Figure 6-20), you will see the status of Collection Services running on your system.

```
Collect Performance Data
                                                               RCHAS10
                                                       07/31/06 19:47:29
Collection Services status:
  Status . . . . . . . . . . . . :
                                   Started
                                   0212194713
  Collection object . . . . . :
    OMPGDATA
                                   07/31/06 19:47:13
  Started . . . . . . . . . . . :
  Default collection interval . . :
                                   00:15:00
  Retention period . . . . . :
                                   01 day 00 hours
                                   00:00:00
  Cycle time . . . . . . . :
  Cycle interval . . . . . . :
                                   24
  Collection profile . . . . . :
                                   *STANDARDP
Select one of the following:
     1. Start Performance Collection
     2. Configure Performance Collection
     3. End Performance Collection
Selection or command
===>
F3=Exit
        F4=Prompt
                   F5=Refresh
                               F9=Retrieve
                                            F12=Cancel
```

Figure 6-20 Status shown when Collection Services has been started

4. If the status shown is Started, then Collection Services is already running. If the status shown is Stopped, type an option 1 (Start Performance Collection) and press Enter twice to start Collection Services on your system. Press F5 to refresh the display and confirm that the status of Collection Services has changed to Started.

### Starting performance collections from the iSeries Navigator

Collection Services can also be started from iSeries Navigator. Perform the following steps:

1. Open iSeries Navigator, expand **My Connections** and then expand the connection for your i5/OS machine.

2. Expand Configuration and Service, right click on Collection Services and select Start Performance Collection. See Figure 6-21.

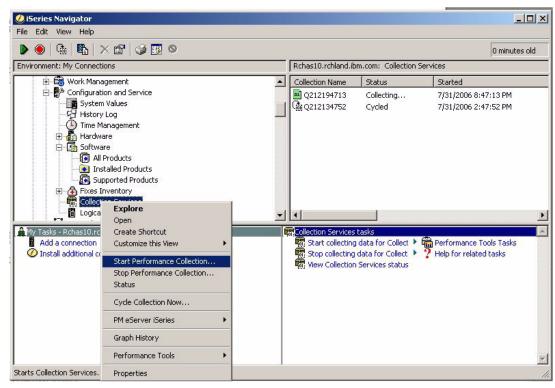


Figure 6-21 Starting a Collection Services Performance Collection from iSeries Navigator

## Performance Explorer (PEX)

Performance Explorer is probably the last tool that you should consider using to analyze a performance problem, as it requires having advanced understandings in order for the information generated to be put to good use. It is not the tool with which to start your analysis.

PEX commands can be run by i5/OS users with \*SERVICE special authority.

The following list shows the process (or the cycle) for using the PEX tool:

- Enable PEX trace point debugging on your Domino 7 server
- 2. Add the PEX Definition (ADDPEXDFN)
- 3. Add the PEX Filter (ADDPEXFTR)
- 4. Start Performance Explorer (STRPEX)
- 5. End Performance Explorer (ENDPEX)
- Print the PEX Report (PRTPEXRPT)
- Analyze the PEX data

## Step 1: Enabling PEX trace point debugging

Four levels of trace point debugging exist to allow more Domino-specific collection of data by PEX. The desired level of trace point analysis that you would like performed can be specified by the addition of the parameter DEBUG\_OS400\_PEX to the notes.ini of each Domino 7 server for which data will be collected.

## Step 2: Adding the PEX Definition (ADDPEXDFN)

A Performance Explorer (PEX) definition identifies the performance data that is collected during a Performance Explorer session. You can add PEX Definitions using the Add PEX

Definition (ADDPEXDFN) command. See Figure 6-22. The ADDPEXDFN commands adds a new Performance Explorer definition to the system and stores the definition as a member of QAPEXDFN in library QUSRSYS.

```
Add PEX Definition (ADDPEXDFN)
Type choices, press Enter.
Definition . . . . . . . > TESTDEF
                                              Name
                                              *STATS, *TRACE, *PROFILE
Type . . . . . . . . . . . > *TRACE
Jobs:
                                              Name, generic*, *, *NONE, *ALL
 Job name . . . . . . . . . . . .
   User . . . . . . . . . . . . . .
                                              Name, generic*, *ALL
                                              000001-999999, *ALL
   Number . . . . . . . . . . . . .
 Thread identifier . . . . .
                                              0000001-FFFFFFF, *ALL...
              + for more values
              + for more values
*NONE
              + for more values
Maximum storage to use . . . .
                                  10000
                                              1024-4000000 K
                                  *STOPTRC
                                              *STOPTRC, *WRAP
Trace full . . . . . . . . . . .
                                              *ALL, *NEW, *CURRENT
Add threads/tasks option . . . .
                                  *ALL
                                  *N0
                                              *NO, *YES
List all jobs/tasks . . . . . .
                                                                    More...
F3=Exit
         F4=Prompt
                     F5=Refresh
                                 F12=Cancel
                                              F13=How to use this display
F24=More keys
```

Figure 6-22 Add PEX Definition (ADDPEXDFN) command

## Step 3: Adding the PEX Filter (ADDPEXFTR)

Add a Performance Explorer filter to limit the amount of data collected by specifying a compare value for specific events. See Figure 6-23.

```
Add PEX Filter (ADDPEXFTR)
Type choices, press Enter.
               . . . . . . > TESTFILTER
Filter . . . . .
                                           Name
Program trigger:
 Program . . . . . . . . . . . . .
                                           Name
   Library . . . . . . . .
                                           Name
                                           Name, *ALL
 Procedure . . . . . . . . . . .
                               *PEP
                               *PGM
                                           *PGM, *SRVPGM
 Trigger option . . . . . . .
                               *ENTRYEXIT
                                                              More...
F3=Exit
        F4=Prompt
                   F5=Refresh
                               F12=Cancel
                                          F13=How to use this display
F24=More keys
```

Figure 6-23 Add PEX Filter (ADDPEXFTR) command, Filter field

## Step 4: Starting Performance Explorer (STRPEX)

You are now ready to start the Performance Explorer with the Start Performance Explorer (STRPEX) command. See Figure 6-24. You will use the definition you created in "Step 2: Adding the PEX Definition (ADDPEXDFN)" on page 211 and the filter you created in "Step 3: Adding the PEX Filter (ADDPEXFTR)" on page 212.

**Note:** When troubleshooting a performance issue using PEX, steps 1 through 4 will need to occur prior to your expectation that a problem will resurface. After it appears that the performance issue has returned, the PEX data collection can be stopped (step 5) so that you can analyze (step 6) the performance snapshot for the system that corresponds with the time of your performance issue.

```
Start Performance Explorer (STRPEX)
Type choices, press Enter.
Session ID . . . . . . . . > ITSO
                                       Name
*NEW
                                       *NEW, *INZONLY, *RESUME
Definition . . . . . . . . . . . . .
                           TESTDEF
                                       Name, *SELECT
                                       Name, *NONE, *SELECT
TESTFILTER
                                                         Bottom
F3=Exit
       F4=Prompt
                 F5=Refresh F12=Cancel
                                      F13=How to use this display
F24=More keys
```

Figure 6-24 Start Performance Explorer (STRPEX) command

### Phase 5: Ending Performance Explorer (ENDPEX)

While experiencing the performance issue you need to end the PEX trace using the End Performance Explorer (ENDPEX) command. See Figure 6-25.

```
End Performance Explorer (ENDPEX)
Type choices, press Enter.
Session ID . . . . . . . . > ITSO
                                              Name, *SELECT
                                 *END
                                              *END, *SUSPEND, *STOP
*LIB
                                              *LIB, *MGTCOL, *DLT
Data option . . . . . . . . . . .
Data library . . . . . . . . . . . .
                                 QPEXDATA
                                              Name
Data member . . . . . . . . . . . .
                                *SSNID
                                              Name, *SSNID
Replace data . . . . . . . . . . . .
                                              *NO, *YES
                                *N0
Number of threads . . . . . .
                                *CALC
                                              1-256, *CALC
Text 'description' . . . . . . .
                                Pex data for performance issue
                                                                   Bottom
F3=Exit
         F4=Prompt
                    F5=Refresh
                                F12=Cancel F13=How to use this display
F24=More keys
```

Figure 6-25 End Performance Explorer (ENDPEX) command

## Phase 6: Printing the PEX Report (PRTPEXRPT)

Once the trace has ended, you will want to print out the results for review using the Print PEX Report (PRTPEXRPT) command. See Figure 6-26.

```
Print PEX Report (PRTPEXRPT)
Type choices, press Enter.
Member . . . . . . . . . > ITSO
                                           Name
                              QPEXDATA
Name
Type . . . . . . . . . . . > *PROFILE
                                           *STATS, *TRACE, *PROFILE...
Profile options:
 Sort by . . . . . . . > *SAMPLECOUNT
                                           *SAMPLECOUNT, *ADDRESS
 Summarize by . . . . . . > *PROCEDURE
                                           *BLANK, *STATEMENT...
 Filter percentage . . . . . .
                                           0 - 99
                              *DESCENDING
                                           *ASCENDING, *DESCENDING
     . . . . . . . . . . . . .
                                                               Bottom
F3=Exit
        F4=Prompt F5=Refresh
                              F12=Cancel
                                          F13=How to use this display
F24=More keys
```

Figure 6-26 Print PEX Report (PRTPEXRPT) command

## Phase 7: Analyzing the PEX data

At this point you are now ready to review results which are contained in a spool file and accessible using the Work with Job (WRKJOB) command and typing option 4 (Work with spooled files).

## 6.5.2 Managing resources on the i5/OS

This section shows you how to manage i5/OS resources.

### Main memory

A storage pool is a logical division of main memory that is reserved for processing a group of jobs. In the i5/OS, all main storage is divided into logical allocations called storage pools. If you enable the performance adjuster, then the system manages most aspects of the storage pools.

**Note:** When the performance adjuster is enabled (QPFRADJ system value is set to 2 or 3), it monitors the jobs running in the different storage pools. If a storage pool needs more memory for the jobs running in it, then the performance adjuster can increase the size of that storage pool. When the performance adjuster increases the size of a storage pool, it takes the required memory from the \*BASE pool. So, if the performance adjuster wants to increase the size of the \*INTERACT storage pool by 10 MB, then it decreases the \*BASE storage pool by 10 MB. However, if decreasing the \*BASE storage pool by 10 MB would make it smaller than the QBASPOOL, then the performance adjuster cannot increase the size of the \*INTERACT storage pool.

By default, all Domino servers run in the base (\*BASE) storage pool. This is pool number 2 on the Work with System Status (WRKSYSSTS) display. You can manually change a Domino server to run in a different storage pool. The purpose of separate storage pools is to

guarantee a certain amount of memory to a group of jobs which will not be paged out by other jobs that need memory.

There are two storage pools that you need to focus on when managing Domino 7 for the i5/OS. See for additional d:

- ► The machine (\*MACHINE) storage pool (viewed as pool number 1 in WRKSYSSTS)
  - Processes Licensed Internal Code (LIC) work
  - Processes communications data work (TCP/IP, etc.)
  - Does not process work from user jobs
  - Size is specified by QMCHPOOL
- The storage pool the Domino server is running in (\*BASE by default).
  - Contains all of the memory not allocated by other (private or shared) storage pools
  - Contains storage that can be shared by many subsystems
  - Size can be altered by the system value of QBASPOOL
  - Activity level can be altered by the system value of QBASACTLVL

**Note:** You can configure a Domino server to run in another shared pool or private pool. For suggestions on deciding which storage pool to run a Domino partition in and how to change the Domino configuration so it runs in another storage pool, see the IBM Redbook *Domino for iSeries Sizing and Performance Tuning*, SG24-5162.

Domino performance will be negatively impacted if the paging and faulting for the storage pool Domino is running in or for the \*MACHINE storage pool gets *too high*. Domino is concerned with the values in the Non-DB Paging and Faulting columns.

## Adjusting i5/OS system values

Table 6-4 contains a listing of i5/OS system values that can be changed to help improve performance for a Domino 7 server running on i5/OS. These changes can be made using the Work with System Values (WRKSYSVAL) command.

Table 6-4 System values influencing performance on i5/OS

System value	Definition	Default value	Recommended value	Need IPL to update?
QTOTJOB	Total number of jobs for which the auxiliary storage is allocated during IPL.	30	Varies	Yes
	<b>Note:</b> If set too high, can significantly lengthen total time to IPL.			
QADLTOTJ	Additional number of jobs that need storage allocated when QTOTJOB is reached.	10	Varies	No
QACTJOB	Initial number of active jobs for which auxiliary storage is allocated during an IPL.	20	Varies	Yes
QADLACTJ	Additional number of active jobs that need storage allocated when QACTJOB is reached.	10	Varies	No
QMAXACTLVL	Maximum activity level of the system	*NOMAX	Varies	No

System value	Definition	Default value	Recommended value	Need IPL to update?
QMCHPOOL	Size of the *MACHINE storage pool. (Pool 1 in WRKSYSSTS)	20	Varies	No
QBASPOOL	Minimum size of the *BASE storage pool (Pool 2 in WRKSYSSTS)	5% of the main storage with a minimum value of 2000KB	Varies	No
QBASACTLVL	Activity level for the *BASE storage pool.	6	120 times the number of Domino servers (if i5/OS Performance Adjuster is not active)	No
QPFRADJ	Performance adjustment values that specifies whether the system should adjust values during initial program load (IPL), at regular intervals for system pool sizes and activity levels, or not make any automatic adjustments. This functionality is commonly referred to as the i5/OS performance adjuster.	3 (Automatic adjustment)	2 (Adjustment at IPL and automatic adjustment) or 3 (Automatic adjustment), to allow for auto-adjust of memory pool activity levels.	Yes
QDYNPTYADJ	Priority of interactive jobs is dynamically adjusted to maintain high performance of batch job processing.	1 (On)	Varies	Yes
QDYNPTYSCD	The dynamic priority scheduler.	1 (On)	Varies	Yes
QPRCMLTTSK	Processor multi-tasking capability.	2 (System-controlled)	1 (On)	Yes

## **PercentAvailSysResources**

On Domino 7 for i5/OS, you can control the amount of memory allocated to each Domino server (subsystem) by percentage using the PercentAvailSysResources variable. Before the introduction of this variable on earlier releases of Domino, each Domino server assumed it had 100 percent of system physical memory available to it. Unless you set an actual value in NSF\_Buffer\_Pool\_Size\_MB, Domino would take three eighths (3/8) of total physical memory. Other Domino memory allocation sizing parameters would take a percentage of the remaining five eighths (5/8) of all memory.

With the PercentAvailSysResources variable, you can assign a portion of total system physical memory to each Domino server by specifying a value from 2% to 100%, which represents an absolute percentage of the system's total physical memory. On the i5/OS, memory calculations are based on the main storage size multiplied by PercentAvailSysResources if the Domino subsystem is running in \*BASE pool or on the actual pool if running in a shared or private pool. The NSFBuffer pool then defaults to approximately three eighths (3/8) of that calculated base for each Domino server. Note also that if QPFRADJ is not set to zero, and you are using shared pools, your shared pool sizes will be adjusted on the fly. That may affect how PercentAvailSysResources works in cases where the Domino server is started or restarted when the subsystem is already active for a longer time and the pool size has been adjusted meanwhile. In that case, using NSF\_Buffer\_Pool\_Size\_MB will be more predictable.

If the NSF\_Buffer\_Pool\_Size\_MB is omitted, the allocated three eighths (3/8) of the total amount of memory allocated to Domino by PercentAvailSysResources. If you need more memory in the NSF\_Buffer\_Pool\_Size\_MB, you must adjust any one (or more) of the following areas:

- Physical memory (so that the amount from the same percentage increases)
- Proportion of memory that this Domino server acquires by increasing PercentAvailSysResources
- ► Deliberately set NSF\_Buffer\_Pool\_Size\_MB to a higher value than three eighths (3/8) of available memory

In the first two cases, the remaining memory buffer allocation parameters (the 3/8 versus 5/8) will keep their correct relative values and balance. With the third case, you should carefully make certain that the NSF\_Buffer\_Pool\_Size\_MB fits in with your actual requirements for this particular configuration by calculation if you set it to greater than 3/8 deliberately.

Setting both variables will protect the overall system from Domino's stealing habits, if, at some future point more physical memory is added with no (Domino NOTES.INI) parameter adjustments. For example, if you want to dedicate 25 percent of total system memory to a Domino server, add the following line to the Domino server's notes.ini file:

PercentAvailSysResources=25

This effectively leaves 75 percent of memory for other Domino servers. For example, a Domino server on a system with 10 Gb of memory and a Domino server with its notes.ini setting of PercentAvailSysResources=25 would reserve 2.5 Gb for itself.

The PercentAvailSysResources parameter has significant advantages over the old method of 'hard coding' the memory using NSF\_Buffer\_Pool\_Size\_MB parameters:

- ► If you add additional memory, it is immediately proportionally shared between the Domino servers without any need to change or edit the notes.ini parameters.
- ► In high availability clustering and failover scenarios, when a Domino server's workload is failed-over to another partition, the percent of physical memory required by the receiving partition to cope with the increased workload is quite simply the sum of the two separate PercentAvailSysResources parameters from the failed and the newly joined partition.

### Domino database indexing: controlling the UPDATE task

One of the most common, preventable causes of poor response time and performance of Domino servers is excessive and unnecessary activity of the Domino UPDATE task. This task is responsible for updating and rebuilding the indexes of Domino database views. It is designed to run in the background and is intended to improve response time and performance by ensuring that when a user opens a database view, the user does not have to wait for it to be indexed. Ironically, it often turns out to have the opposite effect. This section explains how the UPDATE task is supposed to work. It looks at how Domino administrators and designers can monitor and control it to improve Domino server performance. It also explains the potential impact to performance when the UPDATE task is running excessively. It provides a hint of the kind of improvements you might see by correcting the problem.

### Components of the Domino database indexer

Lotus Technote #167013 provides a great deal of information regarding the Domino Indexer and the UPDATE task. This section includes a few excerpts that are relevant to the topics in this redbook. However, you should read the entire Technote if you want to understand what happens under the covers. You can find the Technote by searching for 167013 on the Lotus Support Web site at:

http://www.support.lotus.com

The Indexer is composed of three components:

- ► The UPDATE task
- ► The UPDALL task
- ► The Notes Indexing Facility (NIF) Subsystem

The Indexer, as a whole, is responsible for keeping the active views and the full text indexes current, within the databases. It processes any requests for changes to documents within a database, so that the active view collections and the full text indexes display the most recent modifications and current information.

### The UPDATE task

UPDATE is a Domino server task that should run at all times (under normal conditions; this is explained later). You can load the UPDATE task in one of two ways:

Automatically, by specifying it in the "ServerTasks=" line in the Domino server's notes.ini file. This is the default when you configure a Domino server. Following is an example of the "ServerTasks=" line:

ServerTasks=Replica, Router, Update, Stats, AMgr, AdminP, Sched,....

Manually, from the Domino server console, using the command load update.

The UPDATE task works continuously from a queue called \$UpdateQueue. When a change occurs in a database (such as deletions, additions, or edits), a corresponding request is entered into the UPDATE queue. UPDATE checks the queue every 5 seconds for any new requests that have been deposited and takes the requests from the queue on a first-come, first-served basis.

\$UpdateQueue is a hard-coded queue that has a maximum capacity of 500 requests. These requests include updates to view indexes as well as full text indexes. When a request is placed into the queue, the actual names of the databases and paths to the databases are stored in the queue, not the view names themselves. No published method is available to display the actual contents of the \$Update queue.

To see if UPDATE is running and what it is doing, you can use the show tasks Domino server console command.

#### The UPDALL task

The UPDALL task is a single instance of the UPDATE task. It does not operate off a queue like UPDATE, but accomplishes the same purpose in a different way. When the UPDALL task runs, it processes every Domino database, refreshing the views or updating the full text indexes for each database. The UPDALL task starts in one of two ways:

- Automatically, at a scheduled time each day. By default, the UPDALL task is run at 2:00 AM. It is defined in the ServerTasksAt2 line in the Domino server's notes.ini file as follows: ServerTasksAt2=Upda11
- ▶ Manually, from the Domino server console. When you run the UPDALL task from the console command line, you can use various switches to control it. For example, you can invoke UPDALL to rebuild only the full text index on a single database.

The UPDALL task performs additional functions beyond what the UPDATE task does. In the design of a view, you can specify, in View Properties, the frequency with which a view index is discarded:

- ► Never
- After each use
- ► If inactive for a specified number of days

It is the responsibility of the UPDALL task to remove the view index if a discard option is specified. In other words, if the Discard Index option is selected for a view, the index is not actually discarded immediately. Rather, the index is removed the next time the UPDALL tasks runs. For example, a view has a Discard View option of 'After each use'. If you exit from a view at 1:00 p.m., the view will not be removed until UPDALL is run (usually done at 2:00 a.m.).

## Notes Indexing Facility

The Notes Indexing Facility (NIF) is made up of a multitude of functions within Domino that allow a server to keep data ordered and current within a view. Specifically, the NIF performs these tasks:

- Updates indexes
- Opens and closes view collections/view indexes
- ► Locates index entries

The majority of these requests are made by the Domino server when users open and close databases. For example, the NIF subsystem, not the UPDATE task, forces the update of a view collection when a user switches between views. If a user makes a modification to a document within a view, and then switches quickly to another view and then back again to the original view, the new changes should be seen almost immediately by the user.

### The UPDATE task and CPU utilization in a normal environment

On a typical Domino server (one that is not experiencing performance problems due to the UPDATE task), UPDATE may run quite often, but usually for very short periods of time.

Unless a database has just had several hundred or thousand documents added or changed, UPDATE does its work quickly, updates each view in the database it is indexing, and finishes in a few seconds.

With small databases, even on older, slower hardware, doing an incremental update of a view, in which only a few or no documents have changed, takes less than a second. If you observe CPU utilization when this is taking place, you may see the utilization rise to 90% or more (on a single CPU), but only for a few seconds while UPDATE traverses all the views in a database.

With very large databases (as long as the number of new or changed documents is small), the time to do an incremental update of a view still remains short, usually only a second or maybe a few seconds.

In any case, with small or large databases, or fast or slow servers, the time it takes to do an incremental update of the views in a given database will be similar for all views in that database as long as the number of new or changed documents is small.

This activity (incremental updates of view indexes) does not usually cause much of a performance problem for servers. Although the utilization is high, it is brief. Its effect is hardly noticeable. Also, although views are also "locked" and, therefore, inaccessible when they are being updated. No one usually notices because it normally takes, at most, a few seconds.

You should also be aware that the time to do an incremental update of a view, in which few or no documents have changed, depends more on the number of documents in the database than the number of documents in the view. This may sound contrary to what you have read, but it is not. When the number of documents to be indexed is low or zero, the time to update is really mostly just overhead and depends on the database size. However, if you consider the time it takes to completely build a view, then it is the number of documents in the view that matters more than the actual number in the database.

## The UPDATE task and CPU utilization in a problem environment

Now, if you consider a Domino server in which the UPDATE task is observed to be running almost all the time and in which the CPU utilization is consistently at or near 100%, usually something else is going on. This does not necessarily mean, the UPDATE task permanently consumes over 90% of all processor resources. There can also be cases where the overall utilization approaches 100% and the UPDATE task accounts for the major part of it.

A high total CPU utilization does not necessarily cause problems on i5/OS. However, if high priority jobs, such as Domino tasks or interactive (5250) jobs consume a major part of resources (including disk utilization), you can see the following results:

- ► All jobs with same priority may see longer response times.
- ▶ Jobs with lower priority, for example traditional batch jobs with lower priority (that is, the priority value is higher than 20), will drastically slow down or even stop working.

Several reasons may cause the UPDATE task to use up too many processing cycles or even monopolize the CPU. The total number of views in databases with many documents, to be maintained by the UPDATE task, is extremely high.

- Full text indexes are created frequently.
- ▶ Many views (for big databases) have to be completely rebuilt from scratch.
- Many views contain time-dependent selection formulas.

Since views and the capability of full text search represent the full power of many Domino applications, it is in most cases not an option to reduce any of them. If these two reasons turn out to be the cause of excessive resource consumption, probably the only choice is to invest in more and faster hardware.

When the UPDATE task is called upon to completely rebuild a view from scratch, it is also very CPU-intensive. So far, this is the bad news. The good news is that this should normally not happen. UPDATE should almost never need to completely rebuild a view. Most of the time, this is redundant and a waste of CPU resources.

The only circumstances in which UPDATE should rebuild views from scratch are:

- All the documents in the view or database have changed or are new. This might occur because:
  - An agent or external program has updated them.
  - A Lotus Enterprise Integrator (LEI) Direct Transfer Activity deletes and refreshes all the documents in a database. This should be avoided whenever possible. Sometimes other techniques or tools can be used, such as using LEI Replication Activities, which have a smaller impact.
- ► The database is new. If a new replica is created on a Domino server, and some of the views have the proper settings, UPDATE builds the indexes for those views.
- ► The design of the view has changed. If the view has the proper settings and previously existed, changing the design causes the whole view index to be rebuilt.

As you might surmise, the circumstances in the second and third bullets should not be common occurrences.

**Note:** If the examples above are not the cause of views having to be rebuilt, then the likely cause is the existence of one or more views with time-dependent selection formulas in which the View Refresh Index options specify that the views should be automatically updated. The UPDATE task has no business rebuilding these kinds of views. Why? Because they are always out of date.

## 6.5.3 Special performance considerations for Domino databases

The main function of the Domino server is to service its users by providing database access, mail routing, and often data processing through the use of Domino database agents. Frequently, these tasks require interaction with the i5/OS operating system, such as when Domino users access DB2 Universal Database for i5/OS databases directly through Domino. Although these and other interfaces to the i5/OS operating system use system resources, the Domino server tasks themselves should be the primary focus of performance considerations. If you understand some of the components of Domino, you should understand the advantages that Domino can provide under i5/OS, as well as the performance implications.

When you consider the affects of application responsiveness in a Domino environment, there are several factors that can impact performance:

- ► The number and frequency of users accessing the application
- Access to a back end relational database by the application
- Client type (simple Web browser, Lotus Notes client)
- Client and server operations
- ▶ Domino server architecture
- Server deployment topology

When designing an application, always start at the high level, where you can make performance considerations from the architectural perspective. Although all of the factors mentioned above are important, the factor that has the most impact is the actual design of the applications. By building a complex application, you increase the processing and calculations required by the Domino server, which can compromise performance.

Developers must balance the need for clean, simple functionality with the need for performance. There is no single means of maximizing the performance of a Domino application. The desire for application performance does not always leave room for design elegance or maintainability. The following list contains some application design factors that affect performance. You should carefully consider the following when developing an application with performance in mind:

- ► Requirements for agent execution
- Actions within forms
- Field validation
- Using formulas in views
- Dynamic data versus static data
- Indexing requirements (Frequency of indexing, Full text indexing)

Further information on application development performance for Domino can be found in the following references:

- Domino 7 for i5/OS Application Development Guide http://www-12.lotus.com/ldd/doc/uafiles.nsf/docs/i5osdom7/\$File/apdev400.pdf
- Performance Considerations for Domino Applications, SG24-5602 http://www.redbooks.ibm.com/redbooks/SG245602.html

## **Enabling teraspace**

*Teraspace* is the term for process-local storage on the i5/OS model. Teraspace support, required for Single Level Store (SLS) data, allows larger storage spaces to be allocated on your i5/OS machine. In addition to allowing for the use of 8-byte pointers instead of 16-byte pointers, Domino 7 for the i5/OS model makes use of teraspace in certain areas where it needs more than 16MB of contiguous storage.

Domino 7 for the i5/OS is fully enabled for teraspace. You can pass teraspace memory to Domino and it can access the larger memory allocations. For maximum performance, be sure to enable all Domino applications, modules, and service program extensions for teraspace.

To ensure that your Domino C or C++ application is properly enabled for use with future versions of Domino, there are two important considerations:

#### ► Bind to QNOTES/LIBNOTES

Some applications incorrectly specify a library of \*LIBL when binding to the LIBNOTES service program. This can result in incorrect operation in a multi-versioned Domino environment. Applications must specify library QNOTES when binding to the LIBNOTES service program in order to function correctly in a multi-versioned environment.

#### Enable for teraspace

When 64-bit support for Domino becomes available, Domino for i5/OS will also change to use the i5/OS 64-bit pointer and teraspace support. To ensure proper operation, applications using the Domino C or C++ API must be enabled for teraspace. This can be accomplished by recompiling the application with the teraspace compiler options specified. No source changes are required. This is expected to provide significant improvement in Domino i5/OS performance when 64-bit support is introduced.

▶ Use the \*INHERIT storage model

For service programs that implement extensions to Domino, you should use the \*INHERIT storage model. Although teraspace-enablement is a requirement but while teraspace-storage is optional, the result will be much better performance. Be aware that this may not be compatible with older versions of Domino.

## Determining if recompilation is required

Use the following procedures to determine if your C and C++ application programs and service programs are bound to QNOTES/LIBNOTES or enabled for teraspace usage.

For any service programs used by the application, issue the Display Service Program (DSPSRVPGM) CL command. The \*BASIC detail should show the following settings.

- ▶ Teraspace storage enabled modules =\*ALL
- Storage model = \*INHERIT
- ► The \*SRVPGM detail should show the LIBNOTES program from library QNOTES. Use of a QDOMINOxxx library is not correct.

If any of these settings are not as shown above, you will need to recompile using the techniques explained below.

For any programs used by the application, issue the Display Program (DSPPGM) CL command. The \*BASIC detail should show the following settings:

- Teraspace storage enabled PEP = \*YES
- Teraspace storage enabled modules =\*ALL
- Storage model = \*TERASPACE
- ► The \*SRVPGM detail should show the LIBNOTES program from library QNOTES. Use of a QDOMINOxxx library is not correct.

If any of these settings are not as shown above, you will need to recompile using the techniques explained below.

## Recompilation examples

As an example, if you have a C application that uses the Domino C API and it consists of a program, MYPGM, which uses one module, MYMOD. You should recreate the module

making sure to specify the TERASPACE and STGMDL parameters as shown in the following example (along with any other parameters that are important for the creation of your module):

CRTCMOD MODULE(MYMODLIB/MYMOD) SRCFILE(MYSRCLIB/QCSRC) TERASPACE(\*YES \*TSIFC) STGMDL(\*TERASPACE)

If your application program consists of more than one module, make sure that you recreate each module using these parameters.

You should then recreate the program making sure to specify the BNDSRVPGM and STGMDL parameters as shown in the following example (along with any other parameters that are important for the creation of your program):

CRTPGM PGM(MYPGMLIB/MYPGM) MODULE(MYMODLIB/MYMOD) BNDSRVPGM(QNOTES/LIBNOTES) STGMDL(\*TERASPACE)

If your application consists of more than one program, make sure that you recreate each one using these parameters.

As another example, if your C application should happen to consist of a service program, MYSRVPGM, which uses one module, MYMOD, you should specify the same teraspace parameters for the module creation as shown in the CRTCMOD example above. You should then recreate the service program making sure to specify the BNDSRVPGM, STGMDL and ACTGRP parameters as shown in the following example (along with any other parameters that are important for the creation of your service program):

```
CRTSRVPGM SRVPGM(MYSRVLIB/MYSRVPGM) MODULE(MYMODLIB/MYMOD)
BNDSRVPGM(QNOTES/LIBNOTES) STGMDL(*INHERIT) ACTGRP(*CALLER)
```

If your application consists of more than one service program, make sure that you recreate each one using these parameters.

If your application happens to be C++ and use the Domino C++ API, you would use the CRTCPPMOD command and specify the same teraspace parameters as shown in the CRTCMOD example above.

For more details, see the following documents:

- ► Considerations when developing Domino C and C++ API applications for i5/OS: http://www.ibm.com/support/docview.wss?rs=203&uid=swg21238494
- ► Domino 7 for i5/OS Application Development Guide (Chapter 2, Application Development Considerations)

```
http://www-12.lotus.com/ldd/doc/uafiles.nsf/docs/i5osdom7/$File/apdev400.pdf
```

► Support for IBM Lotus Domino on 64-bit Operating Systems:

```
http://www.ibm.com/support/docview.wss?rs=463&context=SSKTMJ&dc=DB520&uid=swg21233872&loc=enUS&cs=UTF-8&lang=en&rss=ct463lotus
```

#### Large mail file best practices

Refer to the following for Best practices for large Lotus Notes mail files:

http://www-128.ibm.com/developerworks/lotus/library/notes-mail-files/

## Preventing agents from creating temporary full text indexes

On the Domino server console, you may at times see the following message reported to log for various Domino databases:

Warning: Agent is performing full text operations on database 'mail/dominoapp.nsf' which is not full text indexed. This is extremely inefficient.

This occurs because an agent has been coded to perform a full text search for information within a Domino database, but no full text index exists for the database in question. Unless actions are taken by an administrator to prevent agents from conducting these searches, temporary full-text indexes are built on the Domino server to allow the agents to perform their searches. This building of temporary full text indexes can significantly impact performance on your Domino server.

To prevent the building of temporary indexes, include the line FT\_FLY\_INDEX\_0FF=1 within the NOTES.INI files of your Domino 7 servers.

If you have databases that require that agents perform full text indexes successfully on your servers, the best way to prevent a performance impact is to create the full text indexes manually on the server. By creating a full text index manually (and thus permanently, until it is manually deleted), you eliminate the need for an agent to have to create temporary indexes for the same database to perform the necessary searches associated with the agent's processing.

## **Loopback and Domino clustering**

i5/OS can also be optimized to take advantage of Domino assets such as database clustering. Using the loopback option to cluster Domino databases on a single i5/OS partition provides an example of efficiency and high availability that is unmatched on other platforms.

# 6.6 Domino 7 performance bottlenecking on the i5/OS

Following are a few questions to get you started on the road to determining the root causes of Domino 7 performance issues on the i5/OS:

- What appears to be the problem?
- ▶ What users are affected by the problem?
- What sites are affected by the problem?
- What servers are affected by the problem?
- ▶ How does the problem seem to be manifesting itself?
- ► How is the problem causing the system to deviate from your expected performance standard? (Analysis of collected historical performance data will be required to answer this question. See 6.5.1, "Collecting Domino 7 performance data on the i5/OS" on page 208 for guidance on collecting performance data.)
- What noticeable changes are there within the environment?

If you find yourself unable to answer these questions right away, use the techniques listed within this chapter to help bring you closer to the answers and the determination of any necessary resolution.

# 6.6.1 Analyzing the system for performance bottlenecks

When working Domino 7 issues on i5/OS, you must begin by knowing where to look to identify the types of bottlenecks that your environment may be experiencing. Performance problems for Domino 7 on the i5/OS can be related to CPU, memory, disk, or network. Use the information in this section to collect the necessary data required to provide you with a quality assessment of possible performance bottlenecks on your system.

Perform the following steps to perform a bottleneck analysis:

 From an i5/OS command line, issue the command dspsysval qmodel and press Enter. On the Display System Value display (Figure 6-27), verify the model number of the System i machine being analyzed.

```
Display System Value

System value . . . . : QMODEL
Description . . . . : System model number

Model number . . . . : 520

Press Enter to continue.

F3=Exit F12=Cancel
```

Figure 6-27 Verifying the System i machine model number

2. From an i5/OS command line, issue the command dspsysval qprcfeat and press Enter to verify the processor feature for the System i machine. See Figure 6-28.

**Note:** The QPRCFEAT system value specifies the processor feature code level for your System i machine. The number identifies the processor being used to operate on data. Regardless of the number of partitions on your system, the processor feature system value will be the same for every partition. Record this value as additional information to provide for support in the case that you choose to engage them.

```
Display System Value

System value . . . . : QPRCFEAT
Description . . . . : Processor feature

Processor feature . . : 7456

Press Enter to continue.

F3=Exit F12=Cancel
```

Figure 6-28 Verifying the System i machine processor feature

3. From an i5/OS command line, issue the command dspsysval qprcmlttsk and press Enter to verify the Processor multitasking configuration in use on your System i machine. See Figure 6-29.

**Note:** The QPRCMLTTSK (Processor multi-tasking) system value allows your System i machine to have two sets of task data ready to run for each physical processor. When one task has a cache miss, the processor can switch to the second task while the cache miss for the first task is serviced. It is recommended to always set QPRCMLTTSK to 1 for POWER5 models running Domino to improve CPU utilization.

Figure 6-29 Verifying the System i processor multitasking feature

4. With the information collected in the previous steps, check the performance capabilities for the release of Domino 7 that you are running. Ensure that your total number of mail users has not exceeded the maximum recommendation by referencing the Performance Capabilities Reference associated with the release of the i5/OS that you are running. You can find the latest performance management data for your System i machine in the i5/OS version-correspondent document at the Performance Management for IBM System i Resource Library:

http://www.ibm.com/servers/eserver/iseries/perfmgmt/resource.html

To expedite the identification of the processor CPW (Commercial Processing Workload) and the MCU (Mail and Calendar User) numbers associated with your platform, in the reference document associated with your level of i5/OS, search the document by the processor feature value obtained in step 2. This should greatly assist in pointing you to the values that you should be concerned with when dealing with performance on your i5/OS machine. Table 6-5 shows the information for our example.

Table 6-5 Performance capabilities reference data

Model	Processor CPW	MCU
520-0905 (7456)	6000	13300

5. From an i5/OS command line, issue the command dspsysval qpfradj and press Enter to verify the configuration on the Performance Adjuster. The recommended setting is to have QPFRADJ assigned a value of 2. See Figure 6-30.

Figure 6-30 Verifying the performance adjuster setting

- 6. From an i5/OS command line, issue the Work with System Status (WRKSYSSTS) CL command. In intervals of approximately 30 seconds, press the F5 key to refresh the values shown. See Figure 6-31. Try to identify noticeable changes associated with the following values:
  - % CPU Used
  - Non-DB (Page) Faults in system pools 1 (\*Machine) and 2 (\*Base)
  - Any Wait->Inel values (viewable by pressing the F11 key)
  - Any Act->Inel values (viewable by pressing the F11 key)
  - % system ASP used in excess of 90%
  - Any Pool 1 (\*Machine) faults in excess of 5.0 (5 faults per second)

```
Work with System Status
                                                                  RCHAS10
                                                         08/07/06 13:22:38
% CPU used . . . . . :
                               66.1
                                       Auxiliary storage:
% DB capability . . . . :
                               .0
                                        System ASP . . . . :
                                                                   632.9 G
                           00:15:39
                                        % system ASP used . .:
Elapsed time . . . . :
                                                                   10.9919
Jobs in system . . . . :
                               4238
                                        Total . . . . . . :
                                                                   632.9 G
                               .007
                                        Current unprotect used :
                                                                   5983 M
% perm addresses . . . . :
% temp addresses . . . . :
                               .016
                                                                   10458 M
                                        Maximum unprotect . . :
Type changes (if allowed), press Enter.
                                  ----DB---- ---Non-DB---
System
         Pool
                 Reserved
                            Max
 Poo1
       Size (M) Size (M) Active Fault Pages Fault Pages
         865.21
                  474.45
                          +++++
                                           .0
  1
                                    .0
                                                  .0
                                                         .0
  2
                                           .0
       17565.03
                    3.42
                            6585
                                     .0
                                                  .0
                                                         .0
                     .05
                                   .0
  3
        5000.00
                              67
                                           .0
                                                  .0
                                                         .0
   4
            .25
                     .00
                                     .0
                                           .0
                                                  .0
                                                         .0
                                                                   Bottom
Command
===>
F3=Exit
         F4=Prompt
                    F5=Refresh
                                 F9=Retrieve
                                              F10=Restart
                                                            F12=Cancel
F19=Extended system status
                                 F24=More keys
```

Figure 6-31 Work with System Status display

- 7. From an i5/OS command line, issue the command dspsysval qmaxactlvl. This command shows you the number of threads allowed to simultaneously compete for memory and processor resources. The suggested setting for this system value is No Maximum (\*NOMAX). If you notice that this value has been assigned a set number and certain of the fields on the WRKSYSSTS screen referenced in step 6 seem to return values that may be of concern to you, discuss the possibility of raising this value with your i5/OS administrator.
- 8. From an i5/OS command line, issue the command WRKDSKSTS to Work with Disk Status. See Figure 6-32. In intervals of approximately 60 seconds, press the F5 key to refresh the values shown. Ensure that the % busy for each value shown remains less than 30%. If you notice values in excess of 30%, you will want to analyze your i5/OS environment to identify and eliminate disk imbalances (See 6.6.3, "Bottleneck analysis for Disk Input/Output (I/O)" on page 238 for details).

				Work v	with Disk S	tatus		08/0		CHAS10 4:04:22
08/07/06 14:04:2 Elapsed time: 00:08:58										
		Size	%	I/0	Request	Read	Write	Read	Write	%
Unit	Type	(M)	Used	Rqs	Size (K)	Rqs	Rqs	(K)	(K)	Busy
1	4326	30769	10.2	.0	4.0	.0	.0	.0	4.0	0
2	4326	30769	10.2	.0	.0	.0	.0	.0	.0	0
3	4326	30769	10.2	.0	4.0	.0	.0	4.0	.0	0
4	4326	30769	10.2	.0	4.0	.0	.0	4.0	4.0	0
5	4326	30769	10.2	.0	4.6	.0	.0	5.0	4.0	0
6	4326	30769	10.2	.0	4.0	.0	.0	4.0	4.0	0
7	4326	30769	10.2	.0	4.6	.0	.0	5.3	4.0	0
8	4326	30769	10.2	.0	4.0	.0	.0	4.0	4.0	0
9	4326	30769	10.2	.0	4.0	.0	.0	4.0	4.0	0
10	4326	30769	10.2	.0	4.0	.0	.0	4.0	4.0	0
11	4326	35165	10.2	.0	4.0	.0	.0	4.0	4.0	0
12	4326	30769	10.2	.0	6.4	.0	.0	5.3	8.0	0
13	4326	35165	10.2	.0	4.0	.0	.0	4.0	4.0	0
										More
Comma	nd									
===>										
F3=Ex	it F5=	Refresh	F12	=Cancel	F24=More	e keys				

Figure 6-32 Work with Disk Status (WRKDSKSTS)

- 9. From an i5/OS command line, issue the command WRKACTJOB to Work with Active Jobs. Verify the following details associated with each of your Domino servers:
  - In which pool is each Domino server running? (Viewable by pressing F11.)
  - How many threads are running per Domino server? (Viewable by pressing F11 twice.)
  - How many threads are associated with HTTP jobs?
  - Which jobs are using the highest amount of CPU?
  - Is there a job other than SERVER or HTTP using a high amount of CPU?

Attention: If you notice a job related to a Domino server task that is using a high amount of CPU, do not attempt to end the job from WRKACTJOB, as this could cause your entire Domino server to crash. However, shutting down that task from the Domino server console may assist with recovery of CPU utilization in an emergency situation. Before stopping any task, you want to ensure that the shutdown of that task will not cause your environment any critical loss of functionality while the task is shutdown. You will want to monitor how CPU usage changes both after that task has been stopped from the Domino server console and once the task is again reloaded at the Domino server console.

- 10. From an i5/OS command line, issue the command WRKD0MSVR to Work with Domino Servers. A list of Domino servers will appear. On the line corresponding to the Domino server being analyzed, type an option 8 (Work console) to work with the Domino server console and press Enter.
- 11. The command line that appears at the bottom of the Work with Domino Console screen is not the standard i5/OS command line. This command line is used to issue Domino server commands to the respective Domino server. Table 6-6 lists the some of the Domino server commands that you can issue on this display and the caveats to watch for when the Domino server reports the requested data to the console. Type the command onto the console command line, press Enter, and then press the F5 key over approximately five second intervals to view the data returned within the Domino server console.

Table 6-6 Domino server commands to assist with performance standards

Domino server console command	Key data provided
show server	<ul> <li>Compare peak users to MCU rating from step 4 on page 226</li> <li>For mail servers, verify that more than one mail.box is being used by the Domino server</li> </ul>
show stat database	<ul> <li>Total size of all buffer_pools</li> <li>Database.Database.BufferPool.Maximum.Megabytes</li> <li>Database.Database.BufferPool.Peak.Megabytes</li> <li>Database.Database.BufferPool.PerCentReadsInBuffer should be less than 95%</li> </ul>
show stat domino (only if HTTP task is running)	Domino.Config.ActiveThreads.Max should be greater than DominoThreads.Active.Peak by a small amount
sh stat sem	<ul> <li>'SEM not found in server statistics table' in best case</li> <li>If an alphanumeric semaphore code is returned, report the code to your Lotus Support person for additional guidance or analysis</li> </ul>
show config NSF_buffer_pool_size_MB	NSF Buffer Pool size limit in Domino 7. Unless otherwise advised by Lotus, this variable should be assigned a value of 300.
show config Server_Pool_Tasks	Controls the number of physical threads in the IOCP thread pool, per port, running on the Domino server.
show config Server_Max_Concurrent_trans	Controls the number of physical threads that are allowed to concurrently execute transactions.
show config NSF_DBcache_maxentries	Sets the number of databases that a Domino server can hold in its database cache at one time.
show config NSF_DBUCache_Max_Entries	Allows the Domino server to cache a specified number of database users.

Domino server console command	Key data provided
show config server_show_performance	Will echo back if NOTES.INI parameter is enabled and will report command is not recognized if parameter is not enabled.
show config platform_statistics_enabled	Will echo back if NOTES.INI parameter is enabled and will report command is not recognized if parameter is not enabled.

- 12. From the Work with Domino Servers (WRKDOMSVR) display, for a given Domino server, type an option 12 (Work object links) and press Enter. This will display a listing of all of the files and directories located in the data directory of the Domino server.
- 13.Use the Page Up and Page Down keys to look through the listing of files in the Domino server data directory, Search for files that have an extension of .tmp or .TMP. If you find files of either of these types within your data directory, contact the Lotus Support Center to confirm whether or not these files can be removed.
- 14. For any given database in the Domino server data directory or in a lower directory (type an option 5 (Display) and press Enter to display lower directory content), select a random Domino database in the listing and type an option 8 (Display attributes) to view file attributes. In the Display Attributes display (Figure 6-33), verify the File format shown on the second page of the display lists the Domino database as being \*TYPE2.

If the file format displays as \*TYPE1, consider converting your directories to TYPE2. For more information on the performance and DASD reclamation benefits of the TYPE2 format for your i5/OS model, search for '\*TYPE2 Directories" on the i5 Information Center:

http://publib.boulder.ibm.com/iseries/

For additional understanding regarding leveraging TYPE2 in an environment currently using TYPE1 format and running V5R3 or above, read Section 4.1.7 of the IBM Redbook Domino 6 for iSeries Best Practices Guide, SG24-6937.

```
Display Attributes
                     /Domino/DOM7SVR1/Data/mail/admin.nsf
Object . . . . . :
Creation date/time . . . . . . . . . . . . . . . .
                                        07/21/06 20:38:33
Last access date/time . . . . . . :
                                        08/07/06 05:01:00
Data change date/time . . . . . . :
                                        08/07/06 05:01:00
Attribute change date/time . . . . . :
                                        08/07/06 05:01:00
Size of object data in bytes . . . . :
                                        17563648
Allocated size of object . . . . . :
                                        17825792
                                        *TYPE2
Size of extended attributes . . . . . :
Storage freed . . . . . . . . . :
                                        Nο
Disk storage option . . . . . . . :
                                        *NORMAL
Main storage option . . . . . . :
                                        *NORMAL
Auditing value . . . . . . . . . . . . . . . . .
                                        *NONE
                                                                 More...
Press Enter to continue.
F3=Exit F12=Cancel
                     F22=Display entire field
```

Figure 6-33 Verifying the file format of \*TYPE2

15. From an i5/OS command line, issue the command NETSTAT \*CNN to Work with the TCP/IP Connection Status. See Figure 6-34. In the Local Port column, use the Page Down key to find port 1352 (Notes Port) and ensure that all references to 1352 have *Listen* indicated in the corresponding State column.

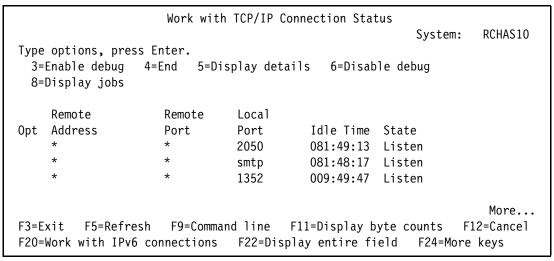


Figure 6-34 Verifying port 1352 (Notes Port) in Listen state

- 16. From an i5/OS command line, issue the command CHGTCPA to display the Change TCP/IP Attributes screen. From this display, take note of the following values that are currently set on your system:
  - TCP keep alive
  - TCP receive buffer size
  - TCP send buffer size
  - UDP checksum
  - IP reassembly time-out

These procedures should help you isolate the category or categories of performance bottlenecking being experienced on your system. If you follow this process and do not identify any circumstances that appear to be out of the ordinary, record the data that you have collected and keep it available to provide to the Lotus or System i Support Centers in the case that either of them are engaged.

# 6.6.2 Bottleneck analysis for memory resources

In this section, we provide a procedure for you to follow in analyzing your system for potential performance bottleneck with memory resources by identifying jobs causing excessive page faults.

Using the Work with System Status (WRKSYSSTS) CL command, an administrator can see if paging/faulting is very high on the system. If Performance Tools (5722PT1) and Query Tools (5722QU1) is installed, then data from Collection Services can be used to identify the job(s) causing the high paging/faulting.

**Note:** This procedure requires that Performance Tools for the i5/OS (product 5722PT1) be installed on your system (see 6.3.3, "Installing Performance Tools for the i5/OS" on page 197), and that Collection Services is already gathering data (see 6.5.1, "Collecting Domino 7 performance data on the i5/OS" on page 208).

Perform the following steps:

- 1. From the i5/OS command line, issue GO PERFORM and press Enter.
- 2. On the IBM Performance Tools for iSeries menu, type an option 2 (Collect Performance Data) and press Enter.
- 3. On the Collect Performance Data display, make sure the Collection Services status shows Started as shown in Figure 6-35. Also, record the name of the Collection object library in our example this is QMPGDATA.

```
Collect Performance Data
                                                                  RCHAS10
                                                         08/03/06 16:40:00
Collection Services status:
 Status . . . . . . . . . . . :
                                    Started
 Collection object . . . . . :
                                    Q215163957
   Library . . . . . . . . . . . :
                                    QMPGDATA
 Started . . . . . . . . . . . . :
                                    08/03/06 16:39:57
 Default collection interval . . :
                                    00:15:00
 Retention period . . . . . :
                                    01 day 00 hours
                                    00:00:00
 Cycle time . . . . . . . . :
 Cycle interval . . . . . . :
                                    24
 Collection profile . . . . . :
                                    *STANDARDP
Select one of the following:
    1. Start Performance Collection
    2. Configure Performance Collection
    3. End Performance Collection
Selection or command
===>
                                 F9=Retrieve
                                               F12=Cancel
F3=Exit
         F4=Prompt
                     F5=Refresh
```

Figure 6-35 Collect Performance Data display

4. Type the Work with Queries (WRKQRY) command on the i5/OS command line and press Enter to access the i5/OS query tools. Create a new query by typing an option 1 (Create) and naming the query being created. See Figure 6-36.

```
Work with Queries
Type choices, press Enter.
 Option . . . . . . 1
                                     1=Create, 2=Change, 3=Copy, 4=Delete
                                     5=Display, 6=Print definition
                                     8=Run in batch, 9=Run
                                     Name, F4 for list
 Query . . . . . . .
                      MYKWERY
   Library . . . .
                                     Name, *LIBL, F4 for list
                        QMPGDATA
                             F5=Refresh
                                             F12=Cancel
F3=Exit
             F4=Prompt
```

Figure 6-36 Work with Queries display, creating a new query

5. Specify the file that you want to query by typing an option 1 (Select) in front of the Specify File selections option and pressing Enter. See Figure 6-37.

```
Define the Query
                     MYKWERY
                                                             CREATE
Query . . . . . :
                                       Option . . . . :
                       QMPGDATA
                                       CCSID . . . . . :
                                                             65535
 Library . . . :
Type options, press Enter. Press F21 to select all.
 1=Select
0pt
      Query Definition Option
      Specify file selections
      Define result fields
      Select and sequence fields
      Select records
      Select sort fields
      Select collating sequence
      Specify report column formatting
      Select report summary functions
      Define report breaks
      Select output type and output form
      Specify processing options
F3=Exit
                  F5=Report
                                     F12=Cancel
F13=Layout
                  F18=Files
                                      F21=Select all
```

Figure 6-37 Define the Query display

6. On the Specify File Selections display (Figure 6-38), query the file QAPMJOBL by specifying the file and referencing the library name recorded in step 3 on page 232.

```
Specify File Selections
Type choices, press Enter. Press F9 to specify an additional
 file selection.
  File . . . . . . . . .
                          QAPMJOBL
                                         Name, F4 for list
   Library . . . . .
                           QMPGDATA
                                         Name, *LIBL, F4 for list
                          *FIRST
                                         Name, *FIRST, F4 for list
 Member . . . . . . . .
                                         Name, *FIRST, F4 for list
 Format . . . . . . . . .
                          *FIRST
                                                         F9=Add file
F3=Exit
                 F4=Prompt
                                    F5=Report
F12=Cancel
                                    F24=More keys
                 F13=Layout
```

Figure 6-38 Specify File Selections display

7. On the same Specify File Selections display, place the cursor in the Member field and press F4. On the Select Member display (Figure 6-39), select the member to query by typing an option1 (Select) next to the member of your choice.

Note: The naming convention for members is Qjjjhhmmss where:

- ▶ jjj is the Julian date
- ▶ hh is the hour the data started to be gathered
- mm is the minute the data started to be gathered
- ss is the second where data started to be gathered

Therefore, Q212194713 would mean the data started to be gathered on the 212th day (which in 2006 was July 31) at 19 hours, 47 minutes and 13 seconds after midnight.

```
Select Member
File ID . . . . :
                      T01
                      QAPMJOBL
File . . . . . :
  Library . . . :
                        QMPGDATA
Type option (and Member), press Enter.
  1=Select
Opt Member
                    Text
  Q088111319
   Q089000002
   Q212134752
1 Q212194713
                                                                     Bottom
F11=Display names only
                            F12=Cancel
```

Figure 6-39 Select Member display

- 8. From the Select Member display, once the member has been selected, press Enter three times to return to the Define the Query display.
- 9. On the Define the Query display, type an option 1 (Select) in front of Select and sequence fields and press Enter. See Figure 6-40.

```
Define the Query
                     MYKWERY
                                                            CREATE
Query . . . . :
                                       Option . . . . :
 Library . . . :
                      QMPGDATA
                                      CCSID . . . . . :
                                                            65535
Type options, press Enter. Press F21 to select all.
 1=Select
0pt
      Query Definition Option
    > Specify file selections
      Define result fields
      Select and sequence fields
      Select records
      Select sort fields
      Select collating sequence
      Specify report column formatting
      Select report summary functions
      Define report breaks
      Select output type and output form
      Specify processing options
F3=Exit
                  F5=Report
F13=Layout
                  F18=Files
                                    F21=Select all
Select options, or press F3 to save or run the query.
```

Figure 6-40 Define the Query display

10. From the Select and Sequence Fields display (Table 6-41), assign each the values noted in Table 6-7 to the respective fields specified. Use the Page Up and Page Down keys to scroll through the list of field values on the display. Once the fields have been completed, press Enter twice.

Table 6-7	Select and	Sequence	Field	display	values

Assign value of	to Field	Field Description
10	INTNUM	Interval Number
20	DTETIM	Interval Date and Time
30	JBNAME	Job Name
40	JBTFLT	Total Page Faults
50	JBXRFR	Stream File Reads
60	JBXRFW	Stream File writes

	Select and Sequence Fields									
٠.	Type sequence number (0-9999) for the names of up to 500 fields to appear in the report, press Enter.									
Seg	Field	Text		Len	Dec					
10	INTNUM	Interval	number	5	0					
20	DTETIM	Interval	date and time	12						
	INTSEC	Elapsed i	nterval seconds	7	0					
	JBSSYS	Subsystem	n name	10						
	JBSLIB	Subsystem	ı library name	10						
30	JBNAME	Job nam	ne	16						
	JBUSER	Job user		10						
	JBNBR	Job numbe	r	6						
	JBACC0	Job accou	nting code	15						
	JBTYPE	Job type		1						
	JBSTYP	Job subty	/pe	1						
	JBTTYP	Task type	!	2						
	More									
	F3=Exit F5=Reports F13=Layout F20=Reports		F11=Display names only F21=Select all	F12=Cancel F24=More keys	;					

Figure 6-41 Select and Sequence Fields display

11. Back on the Define the Query display (Table 6-42), type an option 1 (Select) next to Select sort fields and press Enter.

```
Define the Query
Query . . . . . : MYKWERY
                                       Option . . . . :
                                                            CREATE
  Library . . . :
                       QMPGDATA
                                      CCSID . . . . . :
                                                            65535
Type options, press Enter. Press F21 to select all.
  1=Select
0pt
      Query Definition Option
    > Specify file selections
      Define result fields
    > Select and sequence fields
      Select records
 1
      Select sort fields
      Select collating sequence
      Specify report column formatting
      Select report summary functions
      Define report breaks
      Select output type and output form
      Specify processing options
F3=Exit
                  F5=Report
F13=Layout
                  F18=Files
                                    F21=Select all
Select options, or press F3 to save or run the query.
```

Figure 6-42 Define the Query display

12.On the Select Sort Fields display (Table 6-43), find the field JBTFLT, and type a sort priority of 10 in the Sort Prty column and a D in the A/D column for the field. Press Enter twice to confirm.

	Select Sort Fields							
			(0-999) and A to 32 fields, p	(Ascending) or D (Descend ress Enter.	ling) for			
Sort								
Prty	A/D	Field	Text		Len	Dec		
		INTNUM	Interva	l number	5	0		
		DTETIM	Interva	l date and time	12			
		JBNAME	Job n	ame	16			
10	D	JBTFLT	Total p	age faults	11	0		
		JBXRFR	Stream	file reads	11	0		
		JBXRFW	Stream	file writes	11	0		
					Bot	tom		
F3=E>	kit		F5=Report	F11=Display names only	F12=Cancel	F12=Cancel		
F13=l	_ayou	t	F18=Files	F20=Renumber	F24=More keys			

Figure 6-43 Select Sort Fields display

13. Back on the Define the Query display, press F5 to run the query report. An example of query output generated using this process is shown in Table 6-44.

			Displa	y Report					
				Report width		:	91		
Positio	on to line								
Line									
+1+2+3+4+5+6+7									
		Interval			Total	Strea			
	Interval	date	Job		page	file			
	number	time	name		faults	reads			
000001	6	060731211500	SERVER		211	4			
000002	2	060731201500	SERVER		210	4			
000003	2	060731201500	SERVER		210	3			
000004	3	060731203000	SERVER		210	4			
000005	4	060731204500	SERVER		210	4			
000006	4	060731204500	SERVER		210	4			
000007	5	060731210000	SERVER		210	4			
800000	5	060731210000	SERVER		210	4			
000009	6	060731211500	SERVER		210	4			
000010	7	060731213000	SERVER		210	4			
000011	7	060731213000	SERVER		210	4			
000012	8	060731214500	SERVER		210	4			
000013	8	060731214500	SERVER		210	4			
000014	9	060731220000	SERVER		210	4			
						More.			
F3=Exit	t F12	=Cancel F	19=Left	F20=Right	F21=Sp	lit			

Figure 6-44 Example of query output

Using the INTNUM field, the data can be further queried so that only data during the business day is viewed, or only data during a certain time frame is viewed. Notice the Interval date time column. The normal format for that column is yymmddhhnnss where yy is the year, mm is the month, dd is the day, hh is the hour, nn is the minute, and ss is the second for that interval. Therefore, if the high page faulting started at 8:00 am, the query can be refined to only show data from 8:00 am on. Find the Interval date time that identifies 8:00 am and make note of the Interval Number. Press F12 to exit the report. Back on the Define the Query display, use the Select records option to refine the query. The FIELD would be INTNUM. The TEST would be GE (for greater than or equal to). The VALUE would be the Interval Number found in the report.

## 6.6.3 Bottleneck analysis for Disk Input/Output (I/O)

As stated previously, there is a finite number of resources on any system. This limit changes from system to system, but it is finite. There is a limited amount of disk space (DASD) on the system and if you hit the limit, the System i machine will IPL itself. This is bad! You do not want an unplanned IPL. Therefore, you need to keep an eye on the DASD. If you are getting close to the limit (100% used), then you have to remove of some of the objects taking up disk space. The Work with System Status (WRKSYSSTS) CL command allows you to monitor the amount of DASD used on your system. The fields on the upper right-hand side of the display provide information on DASD.

The System ASP field shows the amount of DASD configured in the system auxiliary storage pool (ASP). The % system ASP used field shows how much of the DASD in the system ASP has been used to this point. So, if the system ASP has 87 GB and 51% has been used, that means there is about 42.6 GB of DASD left to be used in the system ASP before it is full. The Total field shows how much DASD is available to the entire system. This includes the system ASP, any configured user ASPs, and any configured independent ASPs. If the Total field and the System ASP field are the same, then there are no user or independent ASPs configured on this system.

The Current unprotect used field shows how much temporary storage is currently in use on the system. Temporary storage is included in the % system ASP used field. Temporary storage is released when the job using that storage ends. The Maximum unprotect field shows the maximum amount of temporary storage in use on the system at one point in time. The Maximum unprotect field is the maximum since the last IPL. If the storage on your system is quickly approaching 100%, you need to figure out where that storage is being used.

The first thing you need to do is decide if the storage being used is temporary storage. Is the Current unprotect used field increasing rapidly? Or is the storage being used permanent storage. Is Current unprotect used field not increasing as fast as the % system ASP used field? Permanent storage is not released when the job that used it ends.

If most of the storage driving the system to 100% DASD utilization is temporary storage, then you need to figure out which job is using the temporary storage and why. If most of the storage driving the system to 100% DASD utilization is permanent storage, then you need to figure out what new objects are taking up space on your system.

#### Finding the root cause behind rapidly increasing temporary storage

The first step to finding the root cause behind rapidly increasing temporary storage is to identify the job using all the temporary storage. There are two parts to this process. The first part is to identify a list of likely jobs. To generate that list, use the TASKINFO advanced analysis macro in the System Service Tools.

**Important:** Be careful when you access the System Service Tools. The tools that are pointed to in this section are not dangerous and will not break anything on your system as long as you follow the instructions carefully. However, there are other tools in the System Service Tools that can alter or damage your operating system if you do not use them correctly.

#### Perform the following steps:

- 1. Start the System Service Tools using the command STRSST.
- 2. Enter your SST user ID and password.
- 3. Type an option 1 to Start a service tool.
- 4. Type an option 4 for Display/Alter/Dump.
- 5. Type an option 1 for Display/Alter storage.
- 6. Type an option 2 for Licensed Internal Code (LIC) data.
- 7. Type an option 14 for Advanced analysis.
- 8. Page down to the TASKINFO macro and type an option 1(Select) in front of it. Press Enter.
- 9. Enter the following string of characters in the Options field and press the Enter key:
  -ALL -F 5 -TF 2 -SORT 7

#### Where:

- ALL means output all active jobs and tasks on the system
- F 5 means output the first five frames of the call stack for each job or task
- TF 2 means timestamps will be output in a date/time format rather than an 8 byte timestamp
- SORT 7 means that all the jobs or tasks will be sorted in descending order by the delta temporary auxiliary storage used. (This is the total temporary storage allocated minus the temporary storage deallocated.)

To get the correct output, it is important to get the spaces in this string in the correct places. The Options string is:

```
-ALL <space> -F <space> 5 <space> -TF <space> 2 <space> -SORT <space> 7
```

**Tip:** If you need help on this macro or if you want to see other options, place **-H** in the Options field and press Enter.

Make sure you have the latest i5/OS PTFs related to temporary storage applied to your system. To find the list of i5/OS PTFs relating to temporary storage, go to the Software Knowledge Base Web site and search for a document called Temporary Storage PTFs:

http://www-912.ibm.com/s dir/slkbase.nsf/slkbase

## 6.6.4 Bottleneck analysis for network resources

There are several aspects relating to TCP/IP and network configuration that can affect Domino performance on a i5/OS machine. We discuss the most common issues in this section.

### Work with TCP/IP Connection Status (NETSTAT \*CNN)

The Work with TCP/IP Connection Status (NETSTAT \*CNN) screen displays a lot of information about connections to the system. There are several things to look at, but we only mention two items as they relate directly to Domino and performance:

- ► Ports in a LISTEN state
- Retransmissions

#### Ports in a LISTEN state

A port is a 16-bit number used to communicate between the Transmission Control Protocol (TCP) or higher level protocol and an application process. A TCP port identifies the ultimate destination within a system. Each process that wants to communicate with another process identifies itself to the TCP/IP protocol by one or more ports.

Ports are analogous to network and system addresses. Just as an Internet address identifies a system on a network, a port identifies a destination on a system. An application (such as a Domino server) may wait for incoming service requests on a port. A client application (such as a Lotus Notes client) sends requests to a specific system and port. Ports numbered less than or equal to 1023 are generally reserved for use by standard TCP and User Datagram Protocol (UDP) application programs such as Simple Mail Transfer Protocol (SMTP) on port 25, TELNET on port 23, and Post Office Protocol (POP3) on port 110. Table 6-8 provides a listing of commonly used ports and their associated protocols.

Port number	Associated Protocol
23	Telnet communication
25	Simple Mail Transfer Protocol (SMTP) inbound transfer
80	Domino HTTP connectivity
110	Domino Post Office Protocol (POP3) connectivity
389	Lightweight Directory Access Protocol (LDAP)
1352	Lotus Notes Client Connectivity

Table 6-8 TCP ports commonly used within Domino server infrastructures

For a Domino server to work properly, the correct ports must be in a LISTEN state on the System i machine. When a port is in LISTEN status, it is listening for new connection requests from a client. If a Lotus Notes client attempts to connect to a Domino server on port 1352 and there is no port 1352 in a LISTEN state, then the Lotus Notes client gets an error that the server is not responding.

To check your ports, use the NETSTAT \*CNN CL command. All the ports in LISTEN status are listed at the beginning. See Figure 6-34 on page 231 for an example of the NETSTAT \*CNN command. Notice the local port 1352 in a LISTEN state. This is a Domino server listening for new connection requests.

#### Retransmissions

A *retransmission* occurs when a data packet (like a TCP packet) must be resent. A retransmission can occur if the local system does not receive an acknowledgement for a packet it sent. A retransmission can also occur if the data in the checksum does not equal the number of bits in the TCP packet. The most common cause is if the line speed and/or duplex of the System i's line description does not match the hardware it is cabled to. A good general rule of thumb is that if your System i machine is cabled to a switch that is set to auto negotiate then the line description's line speed and duplex should also be set to auto negotiate. If the switch is hard coded to a speed such as 1GB and full duplex then the System i line description should match those settings.

Retransmissions are not supposed to be common. If you see a lot of retransmissions (even one if you are on the local subnet), then you are having a problem and it can affect performance. To identify if Domino is having a problem with retransmissions, you can use the information on the NETSTAT \*CNN screen by performing the following steps:

- 1. From the i5/OS command line type the **NETSTAT** \*CNN command and press Enter.
- Press the F15 key (Subset) to display a subset of the data on the Work with TCP/IP Connection Status screen.
- 3. On the Subset Connection List display, type 1352 on the Local port range: Lower value field and press Enter twice.
- 4. Type an option 5 (Display details) in front of a connection and press Enter. Pick any connection other than the ones in a LISTEN state.
- 5. Page down and look for the retransmission information. Make note of how many retransmissions this conversation has had.
- 6. Press the F12 key to return to the Subset of TCP/IP Connections screen and display another connection.

If most of the connections have several retransmissions, then you are having a problem and you should check your network to resolve it.

#### Communications trace and resets

Sometimes you suspect a network problem, but you cannot find it. An i5/OS communications trace can help you identify problems within your network. There are many types of information that a communications trace can show you. We are only discussing one of them in this section.

For information on how to read an i5/OS communications trace:

- Search for the command STRCMNTRC in the i5/OS Information Center at: http://publib.boulder.ibm.com/iseries/
- ► Refer to the IBM reference called iSeries TCP/IP Troubleshooting at: http://publib.boulder.ibm.com/iseries/v5r2/ic2924/info/rzaku/rzakumst.pdf

We are discussing communication resets in this section. There is a known problem that can affect Domino server performance that is identified by resets (RST) in a communications trace.

There are many reasons why a reset can occur during a TCP/IP conversation and none of the reasons are good. A reset is always a bad thing and if you are seeing lots of resets in an i5/OS communications trace, you should try to find the underlying problem causing them.

One of the possible underlying problems relates to a concept called a *linger value*. Linger refers to how long a socket/session waits to close. The Domino server has a linger value of 20. The i5/OS will reset (RST) any TCP conversation in a TIMEWAIT state which has not closed. The default close time for TCP on the i5/OS is 120 seconds. Due to this configuration, when the Domino linger pops after 20 seconds, a RST is sent because TCP has not closed the session. This results in a lot of resets and can affect performance.

To see if you might be experiencing this linger problem, perform the following steps:

- 1. Identify the active lines on your system that Domino could be using the CFGTCP, option 1.
- Start a communications trace against one of the lines. You may have to trace all lines.
   STRCMNTRC CFGOBJ(ETHLINE) CFGTYPE(\*LIN) MAXSTG(16M) USRDTA(\*CALC)
   The CFGOBJ parameter is the name of one of the active lines you found in step 1.
- Let the trace run for a few minutes and then end it using the following command: ENDCMNTRC CFGOBJ(ETHLINE) CFGTYPE(\*LIN)

4. Print the communications trace with the PRTCMNTRC command:

PRTCMNTRC CFGOBJ(ETHLINE) CFGTYPE(\*LIN) CODE(\*ASCII) SLTCTLD(\*ALL) FMTTCP(\*YES) FMTBCD(\*YES)

This creates a spooled file called QPCSMPRT.

- 5. Review the communications trace and search for RST. You can use the WRKJ0B 0PTI0N(\*SPLF) command and option 5 to display the QPCSMPRT file that contains the trace data.
- 6. Use the Find field and the F16 key to search the spooled file for RST. Count the number of times a RST occurs against a Domino conversation. A Domino conversation can be identified by its ports. A Domino conversation will occur on ports like:
  - Port 1352 for Lotus Notes clients and the SERVER job
  - Port 80 if running the Domino HTTP job
  - Port 25 if running the Domino SMTP job

You must use your own judgement to determine if you are seeing too many RST packets. As an example, if you ran a 5 minute trace and count 10 RST packets, then you should consider investigating your network configuration to fix this problem.

# 6.7 Improving Domino 7 performance expectations on i5/OS

Improving or tuning performance on a system can really make the difference in situations when your company is unwilling or unable to upgrade or replace existing hardware or application components. In other cases where a performance has been assessed on a system as being less than expected or gradually worsening, the potentially corrective adjustment strategies are developed through analysis of the environment to stabilize or raise the standard of response normalcy and capacity on that system.

When you aim to improve performance within an environment, you always run the risk of discovering that the changes made to improve performance can make the situation worse if the root cause of the situation has been misdiagnosed. Because of this, it is critical to track the changes that are made on a system to ensure that you can back out a particular adjustment as needed in efforts to restore a system to a higher performance standard.

## 6.7.1 CPU resource performance tuning - choosing processor priority

The term interactive has a very specific meaning in i5/OS. It refers to 5250 green-screen based processing with some strong performance implications. Each processor has an Interactive Commercial Processing Workload (Interactive CPW) rating that provides an indication of how much interactive work can be accommodated.

Although we as Domino users would consider much of Domino's mail and applications to be 'interactive', in i5/OS terms, the tasks that support this Domino work are actually implemented as batch immediate jobs.

When looking at changing or setting priorities, Domino has tasks with different behavior patterns. Some, such as the SERVER task, behave more like interactive jobs. They become active for a relative short period of time, typically for some seconds or less and then they wait for the user's next request, usually longer than a minute.

The ADMINP, AMGR, and UPDATE tasks perform in a more batch like manner, similar to traditional batch jobs in that they run constantly for a long time (minutes or even hours). They only pause when they have to wait for disk I/O or at time-slice end if another job/thread with

higher priority is ready to run. The number of jobs/threads with higher priority (and not in long wait) is higher than the activity level for the pool.

The run priority of jobs on i5/OS is normally set based on the type of work that is being performed:

- ► Interactive jobs started on a 5250 emulation session run at priority 20 by default.
- Traditional batch jobs that are submitted to run in the background run at priority 50 by default.

The higher priority of interactive jobs ensures that requests from a user are honored immediately by possibly interrupting a batch job running with lower priority (50). Since interactive usually only spend a short time actively processing, control will be soon returned to the batch job or jobs.

All Domino jobs on i5/OS run as batch immediate jobs and all have a run priority of 20. That is, even Domino tasks with a batch like behavior compete directly with other tasks or interactive jobs, which need to respond quickly. In most cases, this does *not* pose any kind of problem.

However, there have been situations where a huge portion of the total CPU utilization was consumed by background tasks like UPDATE or AMGR. The fact that overall CPU utilization raises very high does not necessarily mean it causes problems, but when the majority of CPU resources is consumed by high priority jobs, the response times may increase.

So, if the response times for the Notes clients (and traditional interactive applications, if any) raises exceptionally high during times when you observe high CPU utilization caused by jobs like UPDATE or AMGR, it *may* help if you reduce the priority of those tasks.

## 6.7.2 Memory resource performance tuning - choosing a memory pool to use

A memory pool is a logical division of main memory or storage that is reserved for processing a job or group of jobs. In i5/OS, all main storage can be divided into logical allocations called *memory pools*. By default, the system manages memory pools. The system manages the transfer of data and programs into memory pools if necessary. You can control how much work can be done in a subsystem by controlling the number and size of the memory pools. The greater the size of the memory pools in a subsystem, the more work can be done in the subsystem.

By default, all Domino servers will run in the \*BASE memory pool. This is quite adequate in most scenarios, but there are times when you may want to place a Domino server in its own storage pool to allow you to specify specific priorities, amounts of memory, and so on. The scenario where this becomes most important is when Domino is running on the same system that is also hosting interactive, 5250-based applications written in RPG or other languages. Both the Domino tasks and the 5250 jobs will run at run priority 20. They will compete for the same CPU cycles. Since Domino tends to require much more processing power than traditional i5/OS applications, a heavy Domino application may severely impact the response times of other applications.

If Domino and traditional interactive applications were left to run at the same priority level and in the same memory pool, neither set of applications would run well. In this scenario, it is much better to separate the memory pools for the Domino server and interactive jobs. The reason for doing so, as described above, is the interactive jobs typically stay active for a very short time. If Domino tasks stay active for much longer time periods, the pages needed by the interactive jobs will be moved out of memory over time. Once the jobs become active again, those pages need to be moved back into memory. This costs valuable time and increases the response times.

The purpose of separate memory pools is to guarantee a certain amount of memory to a group of jobs, which will not be paged out, because other jobs (not part of the same group) need memory. Typically this group of jobs belongs to the same application or run in the same subsystem, but that is not necessarily so. For example, you may use the predefined shared pool \*INTERACT for all your interactive 5250 applications.

The following describe the different types of memory pools and how to assign one to Domino servers.

#### ► Machine pool (\*MACHINE)

This is the pool in which highly shared i5/OS jobs and microcode tasks (License Internal Code) run. The machine pool provides storage for jobs the system must run that do not require your attention. The size for this memory pool is specified in the system value QMCHPOOL. No user jobs run in this pool.

While iSeries Navigator refers to the pools by name, the machine pool appears as system pool identifier 1 on the Work with System Status (WRKSYSSTS) display. Normally, this pool should have the rate of non-DB faults less than one per second.

#### Base pool (\*BASE)

This is the memory pool where all Domino jobs run by default. It contains all memory that is not allocated by other (private or shared) memory pools.

The base pool contains storage that can be shared by many subsystems. The system value QBASPOOL specifies the minimum size of the base pool. Its activity level is specified in the system value QBASACTLVL.

The base pool is used for batch work and miscellaneous system functions. While iSeries Navigator refers to the pools by name, the base pool appears as system pool identifier 2 on the Work with System Status (WRKSYSSTS) display. We recommend that you keep all Domino jobs in the \*BASE pool, unless you decide to isolate the storage for one or more Domino servers in one of the shared pools (\*SHRPOOL1 to \*SHRPOOL60).

There can be up to 62 shared memory pools in i5/OS. As the name implies, they can be shared by two or more subsystems. However, to enable automatic performance adjustment for a pool used by a Domino server, it may make sense to assign one of the shared pools to a single Domino subsystem.

The size and activity level of a shared pool, as well as the *expert cache* behavior (*paging option*), can be changed with the Change Shared Pool (CHGSHRPOOL) or Work with Shared Storage Pools (WRKSHRPOOL) CL commands.

After you define the size and activity level for one of the shared pools, you use the Change Subsystem Description (CHGSBSD) command to assign the pool to the subsystem. For example, to assign \*SHRPOOL3 to the subsystem DOMINO02, enter:

CHGSBSD SBSD(QUSRNOTES/DOMINOO2) POOLS((1 \*SHRPOOL3))

To assign the \*BASE pool to the subsystem again, you would use the following command: CHGSBSD\_SBSD(QUSRNOTES/D0MIN002)\_P00LS((1 \*BASE))

#### Tuning the NSF\_Buffer\_Pool\_Size\_MB parameter

There are four things to check when fine tuning the NSF\_Buffer\_Pool\_Size\_MB parameter:

1. Monitor how much NSF buffer pool your Domino server uses by running the SHOW STAT DATABASE command on the Domino server console. If BufferPoolPeak is routinely more than 95% of the maximum, then the NSF\_Buffer\_Pool\_Size\_MB may need to be increased. If you have sufficient main memory, some memory may be freed from some other over-allocated task or job. Otherwise, you may have to consider buying additional memory or upgrading the system.

Here are the statistics you will want to obtain:

- Buffer pool maximum (Database.BufferPool.Maximum)
- Buffer pool used (Database.BufferPool.Used)
- Buffer pool peak (Database.BufferPool.Peak)
- 2. Monitor Database.BufferPool.PerCentReadsInBuffer. When tested under a heavy workload, BufferPoolPeak was seen at 100%, while PerCentReadsInBuffer was under 95%. Under a light load, BufferPoolPeak was under 10%, while PerCentReadsInBuffer was over 97%.
- 3. Monitor non-database page faulting by using the WRKSYSSTS CL command or a performance monitor. High faulting rates indicate memory contention, and you may be able to actually improve performance by decreasing NSF\_Buffer\_Pool\_Size\_MB.
- 4. Monitor the Domino server's mail router database cache size (which defaults to NSF\_Buffer\_Pool\_Size\_MB times a factor of 3). Monitor Mail.DBCacheEntries to see if your system is reaching the maximum available cache size. Then you can compare Mail.DBCacheHits to Mail.DBCacheReads to see how effectively your cache is being used.

## 6.7.3 Disk input/output (I/O) performance tuning

Typically on the System i machine, all disk (DASD) is shared by all jobs, using (system ASP 0). It is possible to limit disk space by dividing out some of the main DASD storage at a physical disk level into 1 to 32 auxiliary storage pools (ASP) composed of one or more disks in each user ASP. In V5R1, the independent ASP (IASP) allows the definition of up to 67 IASPs. The IASP allows a set of disks to be moved to a different i5/OS system in the case of a planned or unplanned outage of one system.

Using ASPs is less commonly done these days with the advent of RAID, mirrored disks, and storage area network (SAN) systems. But historically separating out some ASPs for journal files was essential, so that both the journal and data were not sharing the same physical unit for performance reasons and could be recovered in the event of a disk crash.

This technique with using ASPs is particularly important to separate out the transaction logging files from the Domino data files and directories for performance reasons to minimize the movement of the disk access arm.

#### Creating and changing size of auxiliary storage pools

After you install new disks, you can create a new ASP with the Dedicated System Tools (DST) menu or iSeries Navigator. If you want to move an existing disk drive from one pool to another, you need to use DST.

To change the size of an ASP, perform the following steps:

- 1. From the IPL or Install the System display, select option 3 (Use Dedicated Service Tools). Sign on using the QSECOFR profile.
- 2. From the DST menu, select option 4 (Work with disk units).
- 3. Select option 1 (Work with disk configuration).
- 4. Select option 3 (Work with ASP configuration).
- 5. From the Work with ASP Configuration menu, select the option that matches your task and follow the screen prompts to complete.

## 6.7.4 Network resource performance tuning

There are a number of tools and parameters that can be leveraged to improve network performance on your system. How you configure TCP on your system can affect the performance of the Domino server. In this section, we discuss two types of configuration settings that can greatly impact the performance of your Domino server:

- ► Interfaces and routes (which is found under menu options 1 and 2 on the Configure TCP/IP (CFGTCP) display)
- ► Host table and domain information (which is found under menu options 10 and 12 on the CFGTCP display).

#### Interfaces and routes

By default, the System i machine load balances network traffic across any configured network interface that shares a common route. As a result, if you have multiple adapters, a different adapter may be used to send data from the machine than the adapter that was used when data came into the machine. This is normal and can help performance.

Unfortunately, some network switches cannot handle this configuration. Some switches generate a route table that include the IP address of the host and the MAC address of the adapter that owns the IP address. When the adapter used for incoming traffic is different from the adapter used for outgoing traffic, this can confuse the switch and cause it to send out ARP broadcasts to build a new route table. If this happens often, then you can experience performance problems related to this.

By looking at the CFGTCP menu option 1, you can identify if your system has multiple adapters. Menu option 1 is the Work with TCP/IP Interfaces screen. Count the number of active line descriptions on that screen. To see if a line description/interface is active, press the F11 key to display the Interface status column. Do *not* count the \*LOOPBACK line.

By looking at CFGTCP menu option 2, you can identify how many routes your system has defined and if they are bound to specific interfaces. If each route is bound to a specific interface, then this problem cannot occur. If the routes are not bound, then you could experience a performance problem.

#### Host table and domain information

A Domino server frequently has to resolve its own name. (When we talk about name resolution, we are talking about the process of identifying the IP address that corresponds to a particular Domino server name.) There are two ways a Domino server can resolve its name on i5/OS. The first way is by looking up the information in the local i5/OS host table. The second way is by going to the Domain Name Server (DNS) defined in the machine's TCP/IP configuration.

If the Domino server has to go to an external DNS to resolve its name, then it is sending a packet out on the network and it has to wait for a response to come back on the network. This takes time and increases the traffic on the network. Thus it is quicker to allow the Domino server to resolve its name in the local host table. Use menu options 10 and 12 on the CFGTCP menu to configure this.

Menu option number 10 on the CFGTCP menu is the i5/OS local host table. Just like a host table on a PC, this local host table contains a list of names and their corresponding IP addresses. It is recommended that you list the Domino server name in this table. List both the common name and the fully qualified TCP/IP name.

Menu option number 12 on the CFGTCP menu contains information on your domain and Domain Name Server (DNS). In general, you will get better performance with a Domino server by making i5/OS check its local host table before doing a DNS query.

To make i5/OS check its local host table before querying the DNS, set the Host name search priority field to \*LOCAL. However, do *not* set this field to local if you have a DNS configured on the local i5/OS machine. It will not function correctly.

### Work with Line Descriptions (WRKLIND)

Communication on System i machines occur over lines. When you configure a new line on a System i machine, you have to set several options. Some of the options you have to configure are the physical resource that the line will use on the system, the controller for the line, the line speed, the maximum frame size, and duplex information. We discuss the maximum frame size (also known as maximum transmission unit or MTU) in this section.

The MTU is usually configured at the line description level. To confirm that is true for your system, perform the following steps:

- 1. Access the Configure TCP/IP menu by typing the CFGTCP CL command and pressing Enter.
- 2. Type a menu option 2 (Work with TCP/IP routes) and press Enter.
- 3. On the Work with TCP/IP Routes display, use option 5 to display the routes.
- 4. On the Display TCP/IP Route display, check the Maximum transmission unit field. If the value in that field is \*IFC, then you must check the TCP/IP interfaces.
- Press F12 to get back to the Configure TCP/IP menu.
- 6. Type a menu option 1 (Work with TCP/IP interfaces) and make note of the active line descriptions on this display.
- 7. On the Work with TCP/IP Interfaces display, use option 5 to display the interfaces. Check the Maximum transmission unit field. If the value in that field is \*LIND, then the MTU size is set at the line description level.
- 8. To check the MTU on the line description, enter the Work with Line Descriptions (WRKLIND) CL command and press Enter.
- 9. On the Work with Line Descriptions display, type an option 5 (Display) in front of the line description and press Enter to display its configuration.
- 10.On the Display Line Description display, look at the Maximum frame size field. This field shows the MTU size for the line.

A lot of customers configure the MTU size large when using fiber or copper. Since the System i machine and the communication lines can handle 8 KB, it is believed that a setting of 8 KB will make conversations faster. The problem is that most switches will not transfer an 8 KB frame/packet. Most switches will break the frame up into smaller frames. This takes time. The more frames that need to be broken up into smaller frames, the more time it takes. This can severely impact your network performance and thus your Domino server performance.

We have found that an MTU of 1496 bytes is a good size for most Domino servers. Consult your network administrator for more information on MTUs and your switch's ability to handle large frames.

Since all users are connected to either a local area network (LAN) or wide area network (WAN) to your Domino servers, the performance of the network is also crucial to provide decent response times to your users.

The main items that are of concern here are the maximum transmission unit (MTU) size for the line description, send and receive buffer size, port filtering, and duplex settings. For the recommendation for each of these areas, refer to the following sections.

#### Maximum Transmission Unit (MTU) Size

The Maximum Transmission Unit (MTU) Size parameter affects the actual size of the line flows. By increasing the value of this parameter, you can reduce the overall number of transmissions, and therefore, increase the potential capacity of the CPU and the IOP (input/output processor).

Similar parameters also exist on the client. The negotiated value is the minimum of the server and client (and perhaps any bridges/routers), so increase them all. The recommended setting varies depending on the communications protocol that is being used:

- ► 4 MB Token Ring = 4060
- ► 16 MB Token Ring = 16388
- ► Ethernet 802.3 = 1492
- ► Ethernet version 2 = 1500

To change the MTU size, perform the following steps:

- 1. Type CFGTCP on any i5/OS command line. You see the Configure TCP/IP display.
- 2. From the Configure TCP/IP display, type option 2 (Work with TCP/IP routes) and press Enter. You see the Work with TCP/IP Routes display.
- 3. From the Work with TCP/IP Routes display, type a 2 in the Opt column next to the IP address used by your Domino server. You see the Change TCP/IP Route display.
- 4. On the Change TCP/IP Route display, type in the recommendation from above in the Maximum transmission unit (MTU) parameter.

#### TCP/IP buffer size

Web serving performance can be increased by tuning the buffer size that is used by TCP/IP, especially when sending large amounts of data. If your network is very reliable, try increasing the buffer size from the default (8000) to 64000. If your network experiences a significant amount of collisions or congestion, you may be able to improve performance by decreasing the TCP/IP send and receive buffers. This is because it will take less time to detect a bad packet, and less data will need to be retransmitted. To change the buffer size, perform the following steps:

- 1. From the Configure TCP/IP display, type option 3 (Change TCP/IP attributes).
- 2. On the Change TCP/IP Attributes display, locate the TCP receive buffer size (TCPRCVBUF) and type a new value.
- 3. Locate the send buffer size (TCPSNDBUF) and type a new value.
- 4. Press Enter.

#### Port filtering

Filtering happens on every communications line, so you want to make sure that you have the proper hardware configuration to enable this support. It has happened in the past that filtering has not been setup correctly on a system and the result was a communications performance problem.

The primary concern has been with the 2838 Ethernet card. If you have this card, check the part number and ensure that filtering is optimally configured.

If the part number is 21H9067 on the 2838 Ethernet card, then an external filter is required. The external filter cable with part number 97H7385 is recommended. If the part number on

the 2838 Ethernet card is 21H5458, or anything else, it has built in filtering, so you should not have an external filter since this double filtering can cause problems.

#### TCPONLY for Ethernet

TCP/IP performance can be even further improved by setting the TCPONLY parameter to \*YES on an Ethernet line description. This decreases the TCP/IP code path length by limiting the code that is loaded in the IOP for the line description.

Ethernet supports both half and full duplex. The best performance will be with FULL duplex. However, the duplex setting on the line description must match the setting on the port on the switch if the line is hooked up to a switch. Be especially careful if you set your Ethernet switch or your line description to \*AUTO. In many cases, we have found where performance is severely degraded because the duplex setting did not auto-negotiate correctly. It is probably best to configure switches and line descriptions to either \*FULL or \*HALF explicitly. If the line is connected directly to a 8271 Ethernet switch, the switch's port is FULL duplex. Therefore, the duplex setting on the Ethernet line description should be set to FULL. If the line is connected to a "stackable" hub, then the duplex setting on the line should be set to HALF to match the hub setting.

**Note:** It is advised that you not set duplex speed settings on switches and routers to \*AUTO, as this setting can change other settings that could result in dropped network packets.

#### i5/OS parameter, TCPKEEPALV

TCPKEEPALV specifies the amount of time, in minutes, that TCP/IP waits before sending out a probe to the other side of a network connection. This probe is sent when the connection is otherwise idle, even when there is no data to be sent. The default value for this parameter is 120 minutes. Setting this value to a smaller number will cause sessions to get cleaned up sooner. To modify the TCPKEEPALV parameter, enter the CFGTCP command and select option 3 (Change TCP/IP attributes). A value of fifteen minutes is appropriate.

#### Line speed and duplex

The configuration of the line description being used on the System i machine can greatly affect overall network performance. As mentioned earlier, the settings of the line description should match the hardware it is cabled to. Thus if the System i machine is cabled to a 1GB switch and that switch is set to auto negotiate the fastest line speed and duplex possible, the System i line description should be configured to match the settings. To realize the best possible performance it would then be expected that the i5/OS line description if displayed (DSPLIND) would report it was negotiating at 1GB and full duplex. If it was negotiating at a speed other than that is something that should be looked into as a potential network bottleneck.



# 7

# Moving your Domino server to the System i platform

This chapter provides guidelines for moving a Domino server running on another platform to the System i platform. We show the process for moving a Domino server first through a graphical interface, for those who prefer a Windows look and feel, and then through a 5250 emulation session for those with a strong i5/OS background.

Some of the reasons for moving Domino to the System i platform include:

- Higher reliability and availability as compared to PC servers
- ► Consolidation of smaller capacity servers to a single highly scalable environment
- Enhanced integration with i5/OS services and DB2 Universal Database for i5/OS data
- Lower total cost of ownership

# 7.1 Migration considerations

The migration (moving the Domino environment from different server platforms) processes outlined in this chapter assume that the Domino release of Domino for i5/OS is broadly compatible with the Domino release of the server being migrated. In other words, the processes in this chapter do not address Domino release upgrade issues.

Should there be a need to upgrade releases in conjunction with moving a Domino environment, then the processes must either be modified for release difference issues, or an additional process can be added (before or after the migration) to upgrade the release.

For example, to move a Domino server running Domino R6 (or previous release) to a Domino for i5/OS server running Domino R7, you can use either of the following two fully documented methods:

- ▶ Upgrade the source server to Domino 7, using the normal upgrade process for the source platform (described in that platform's documentation). Then, use the moving process described in this chapter to move the source server, now running Domino 7, to a Domino for i5/OS server running Domino 7.
- ▶ Use the moving process described in this chapter to transplant the source server running Domino R6, to a Domino for i5/OS running Domino R6. Then, upgrade the Domino for i5/OS server from Domino R6 to Domino 7. This process is described in 5.2.4, "Update Domino Server (UPDDOMSVR)" on page 175.

**Note:** It is advisable not to run the migration and upgrade processes back-to-back, but to allow a few days of normal operation in between to ensure that the first process has successfully completed.

The migration process outlined in the following sections are applicable to any supported Domino platform moving to Domino for i5/OS. First we show the process for moving a Domino server through a graphical interface, for those who prefer a Windows look and feel. See 7.2, "Moving your Domino server using a graphical interface" on page 253 for details.

We then show the process for moving a Domino server through a 5250 emulation session for those with a strong i5/OS background. See 7.3, "Moving your Domino server using a 5250 emulation session" on page 278 for details.

# 7.1.1 Transaction logging

Special consideration has to be made regarding transaction logging since the disk structure is different in each platform. Our approach is to disable transaction logging immediately before shutting and down moving the Domino server. We then enable it once the Domino server is fully migrated and up and running on i5/OS.

On i5/OS, by default, the transaction logs are placed in the logdir subdirectory of the Domino server data directory. The Domino Administrator client help text suggests placing the transaction logs on their own separate drive. The equivalent on the System i platform is to place them in a separate ASP. However, usually the benefit is not significant enough to justify the additional complexity. The basis for this is that the System i platform I/O architecture makes multiple drives appear as one single unit, so performance is improved as drives are added.

# 7.2 Moving your Domino server using a graphical interface

In this section we show you how to move your Domino server from a Microsoft Windows environment to an i5/OS environment using a graphical user interface. The general steps are:

- ▶ 7.2.1, "Copying ID files to the i5/OS integrated file system" on page 253
- 7.2.2, "Configuring a Domino for i5/OS server using domwzd.exe" on page 257
- 7.2.3, "Replacing the configuration databases" on page 273
- ► 7.2.4, "Moving the data" on page 275
- ▶ 7.2.5, "Starting the Domino server" on page 278

## 7.2.1 Copying ID files to the i5/OS integrated file system

Consider that when you configure the Domino server on i5/OS, you are moving your Domino environment. Therefore, you need to keep your current Domino certifiers. Perform the following steps to create a directory path in the i5/OS integrated file system where the Domino certifier data is to be moved.

**Note:** In our example, the directory path for the copied ID files from the existing Window Domino server is /Lotus/DOM7SVR1/Data. We are using an i5/OS profile of itsouser which has QSECOFR equivalent authority.

 Start iSeries Navigator and expand File Systems → Integrated File System. Right click on Root and select New Folder. See Figure 7-1.

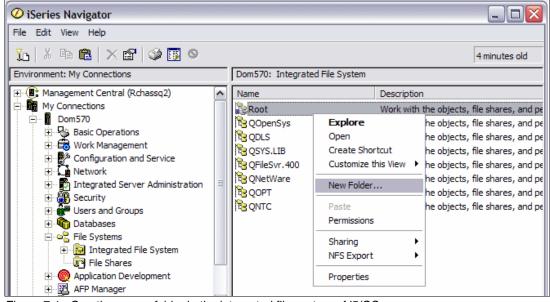


Figure 7-1 Creating a new folder in the integrated file system of i5/OS

2. Type in the New folder name (Figure 7-2). In our example we type Lotus and click OK.

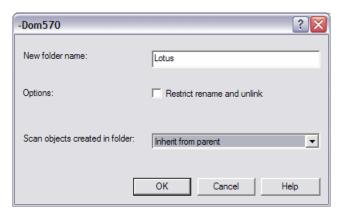


Figure 7-2 New folder name

3. The i5/OS user profile which was used to signon to iSeries Navigator is by default the directory owner of the newly created integrate file system directory. Since any files or directories used by a Domino for i5/OS server must be owned by the QNOTES user profile, you will need correct this. Click on the **Root** directory and locate the directory you just created. Right click on the new folder (in our example this was Lotus) and select **Permissions** as shown Figure 7-3.

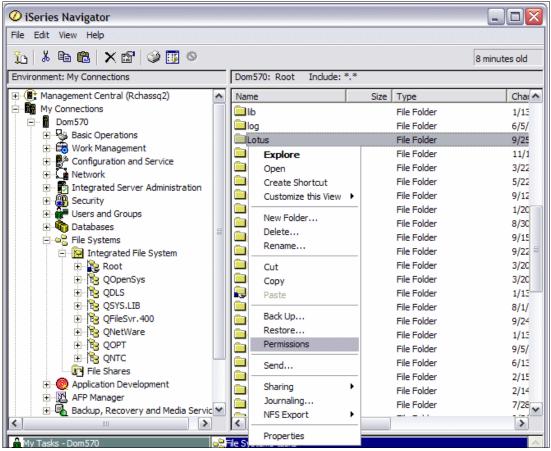


Figure 7-3 iSeries Navigator, setting permissions on a folder

4. The Permissions window shows the ownership and authorities to the directory (Figure 7-4). Click on the **Owner** button to change the owner of the /Lotus directory to the QNOTES user profile.

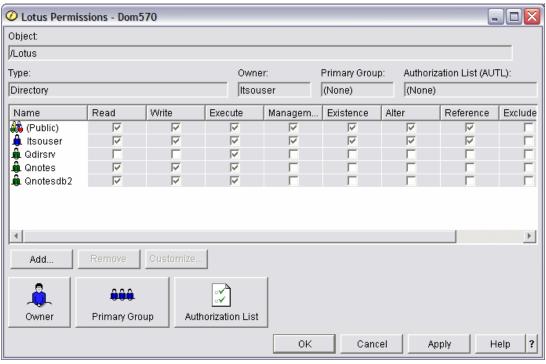


Figure 7-4 Default permissions of the /Lotus folder

5. On the Owner window, click on the plus sign next to **All Users** to expand. Scroll down and select **Qnotes** (Figure 7-5). By default, the check box to remove all permissions from current owner is selected and should be accepted. Click **OK** to change the ownership.

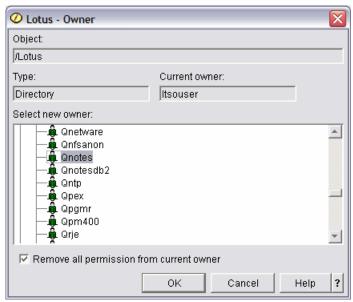


Figure 7-5 Assigning a new owner to the /Lotus directory

- 6. Back on the Permissions window, click the **Apply** button to finish the ownership change and have the prior owning profile removed from the Permissions window.
- 7. Perform the following steps to set the correct permissions:
  - a. The (Public) profile has more authority than desired. Correct this by clicking on the Exclude checkbox.
  - b. Make sure all the check boxes (except for Exclude) are selected for Qnotes.
  - c. You should now see a window like what is shown in Figure 7-6. Click OK.

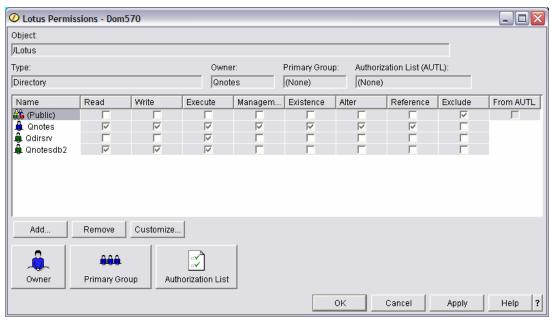


Figure 7-6 Corrected directory permissions

- 8. Repeat steps 1 to 7 to create any desired subdirectories. In our example we created a subdirectory of /Lotus/DOM7SVR1 and a further subdirectory of /Lotus/DOM7SVR1/Data.
- 9. FTP your existing ID files (cert.id, ou.id if applicable, server.id and admin.id or whatever name used for the Domino Administrator ID) from your workstation to the directory path you just created. In our example we are transferring three ID files (cert.id, server.id and admin.id) to the /Lotus/DOM7SVR1/Data directory in the i5/OS integrate file system by performing the following steps:
  - a. On your workstation or server where the ID files exist, open a DOS command prompt.
  - b. Switch to the directory where the ID files are stored.
  - c. Start an FTP session with the System i machine via the following steps:
    - Type ftp hostname (where hostname is the System i machine, an IP address can also be used)
    - ii. Type your **i5/OS username**
    - iii. Type your i5/OS password
    - iv. Type **cd** / to switch to the i5/OS integrated file system
    - v. Type cd /Lotus/DOM7SVR1/Data
    - vi. Type **bin** to switch to binary format
    - vii. Type put admin.id

- viii. Type put server.id
- ix. Type put cert.id
- x. Type bye and then exit to leave the DOS command prompt.
- 10. Verify the ID's file are placed into the i5/OS integrated file system as shown in Figure 7-7.

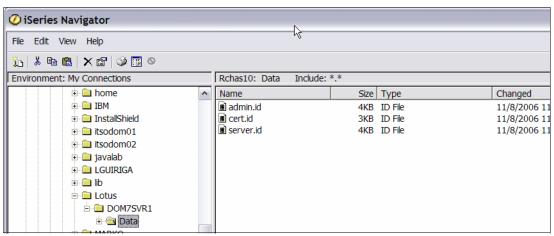


Figure 7-7 Viewing FTP results via iSeries Navigator

- 11. Change the ownership and authority of the IDs files as was done in steps 3 thru 7.
- 12. You are now ready to configure the Domino server on i5/OS.

## 7.2.2 Configuring a Domino for i5/OS server using domwzd.exe

In this section you configure the Domino for i5/OS server. In our example, we configure a Domino server called *dom7svr1* as a first server. We use the id files transferred from the Microsoft Windows Domino server as discussed in 7.2.1, "Copying ID files to the i5/OS integrated file system" on page 253.

The following steps differ from the configuration process shown in Chapter 4, "Configuring a Domino 7 server on i5/OS" on page 89, in this section we show how to use existing certifiers. Also, in this example we assume that the Domino for i5/OS licensed program is installed. For information on installing the Domino for i5/OS licensed program, see Chapter 3, "Installing Domino 7 on i5/OS" on page 41.

**Note:** In our example, the data directory path for the Domino for i5/OS server is /Domino/DOM7SVR1/Data.

Perform the following steps to configure a Domino for i5/OS server using domwzd.exe:

 From the downloaded image from Passport Advantage or from CD 2 of the Domino for i5/OS physical media, double click on domwzd.exe. 2. You are prompted to signon to your System i machine. Enter a valid i5/OS user ID and password with QSECOFR equivalent authority (Figure 7-8). Click **OK**.

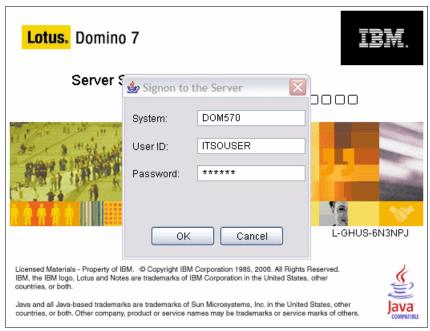


Figure 7-8 Signing on to the System i machine

3. On the Welcome to Domino Server Setup window (Figure 7-9), click Next.



Figure 7-9 Welcome screen from DOMWZD.EXE installation

4. On the First or additional server window (Figure 7-10), select **Set up the first server or stand-alone server** and click **Next**.

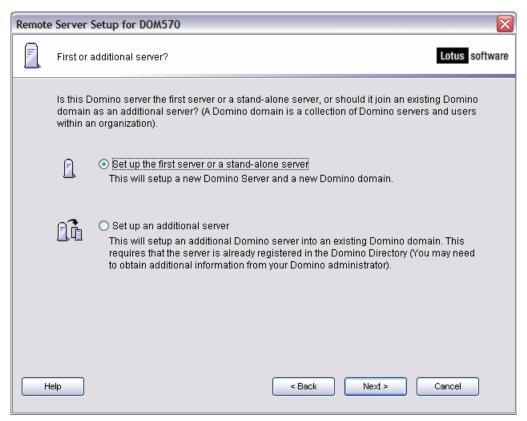


Figure 7-10 Setup the first server or stand-alone server

5. On the Provide server name and title window (Figure 7-11), enter the existing Domino server name to be moved. In our example this is DOM7SVR1. Select the checkbox for I want to use an existing server ID file and click Browse.



Figure 7-11 Entering a Domino server name and title

6. On the Select server ID File window (Figure 7-12), locate the server.id file that you FTPed to the i5/OS integrate file system and click **Select**.

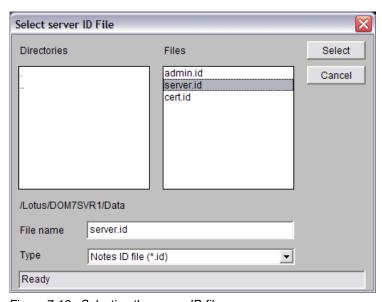


Figure 7-12 Selecting the server ID file

- 7. Back on the Provide server name and title window, click **Next**.
- 8. On the Provide the data folder for this Domino server window (Figure 7-13), confirm that the Folder name and path are correct and click on **Next**.

**Note:** If the server.id has a password, you are prompt to type it in.

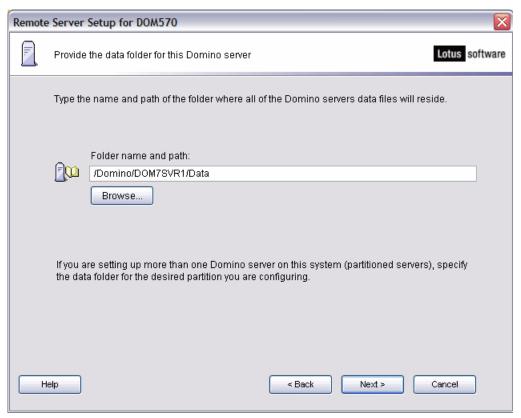


Figure 7-13 Domino server data directory path

9. On the Specify advanced server settings window (Figure 7-14), customize as needed (see Chapter 4, "Configuring a Domino 7 server on i5/OS" on page 89 for details). Click **Next**.

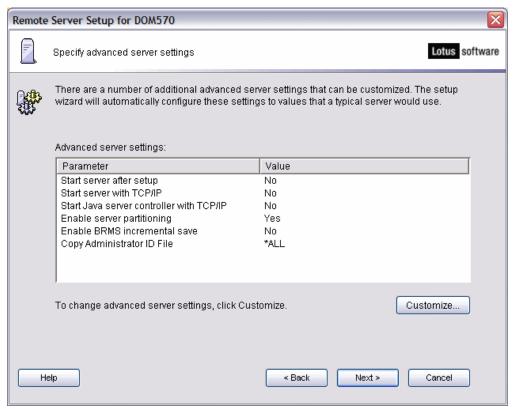


Figure 7-14 Specifying advanced Domino server settings

10.On the Choose your organization name window (Figure 7-15), since there is an existing hierarchical structure, select I want to use and existing certifier ID file and click Browse.



Figure 7-15 Choosing the organization name

11.On the Select the organization ID file window (Figure 7-16), locate the existing cert.id file you FTPed to the i5/OS integrate file system and click **Select**.

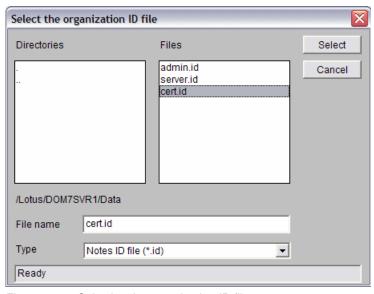


Figure 7-16 Selecting the organization ID file

- 12. Back on the Choose your organization name window, click Next.
- 13. Enter the certifier ID's password (Figure 7-17) and click OK.



Figure 7-17 Entering the certifier ID password

14.On the Choose the Domino domain name window (Figure 7-18), type in the Domino domain name used for the existing Domino server in the Microsoft Windows environment and click **Next**.

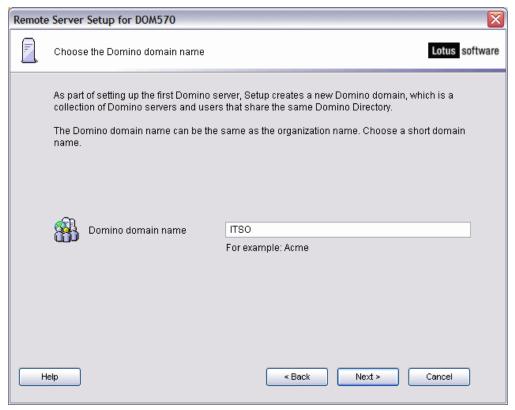


Figure 7-18 Specifying the Domino domain name

15.On the Specify an Administrator name and password window (Figure 7-19), select the checkbox I want to use an existing Administrator ID file and click Browse.



Figure 7-19 Specifying an Administrator name and password

16.On the Select the administrator ID file window (Figure 7-20), locate the administrator ID file that you FTPed to the i5/OS integrate file system and click **Select**.

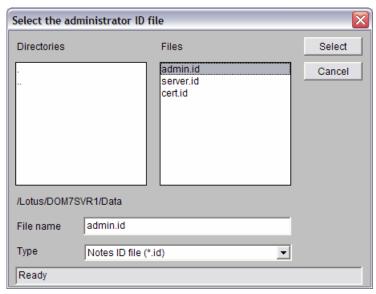


Figure 7-20 Selecting the administrator ID file

17. Back on the Specify an Administrator name and password window (Figure 7-21), verify the administrator information extracted from the ID file is correct and click **Next**.



Figure 7-21 Extracted information from existing Administrator ID file

18. Type in the Administrator's password (Figure 7-22) and click **OK**.



Figure 7-22 Entering the Administrator's password

19.On the What Internet services should this Domino Server provide window (Figure 7-23), select any Internet services that were used prior to moving to the System i platform and click on the Customize button to make any further relevant changes before clicking on Next to continue.

**Tip:** It is recommended that you have a printed copy of the NOTES.INI file of the Domino server being moved. This should be to used as a reference for customizing options.

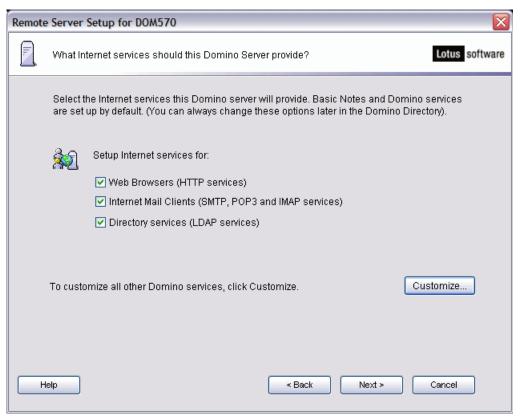


Figure 7-23 Selecting Internet services for the Domino server

20.On the Domino network settings window (Figure 7-24), click on **Customize** to make any desired changes and then click **Next** to continue.

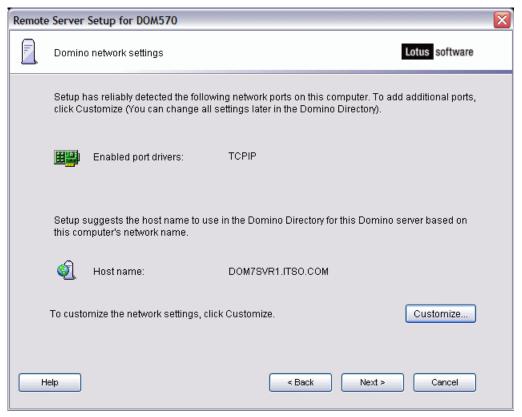


Figure 7-24 Domino server network settings

21.On the Specify the time zone window (Figure 7-25), select the time zone and click Next.

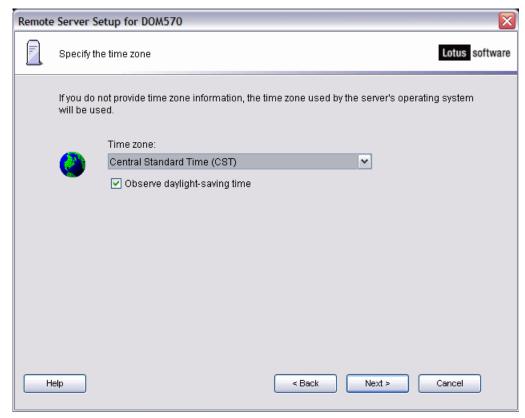


Figure 7-25 Specifying the time zone

22.On the Secure your Domino Server window (Figure 7-26), take the defaults unless you have a specific reason to uncheck the boxes. Click **Next**.

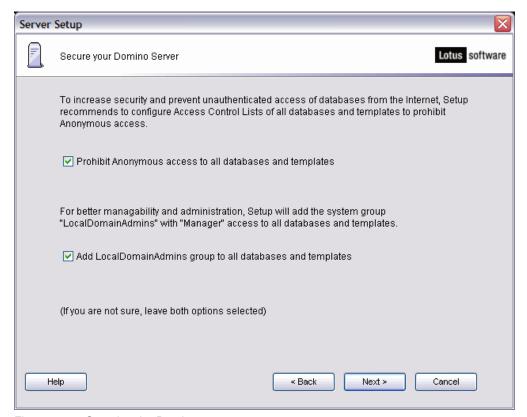


Figure 7-26 Securing the Domino server

23.On the Make optional copies of ID files window (Figure 7-27), select the checkbox I want to make additional copies of the ID files if desired. In our case we did not and instead just clicked Next.

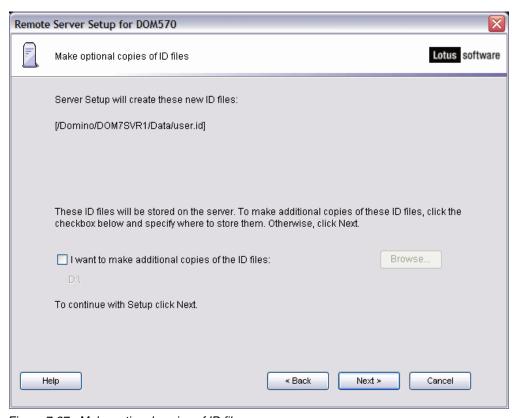


Figure 7-27 Make optional copies of ID files

24. On the summary window (Figure 7-28) detailing the chosen Domino server setup options, review the server setup options and click **Setup**.

**Tip:** If you want to see what the i5/OS CFGDOMSVR CL command would look like to configure this Domino server, click **View Command**.

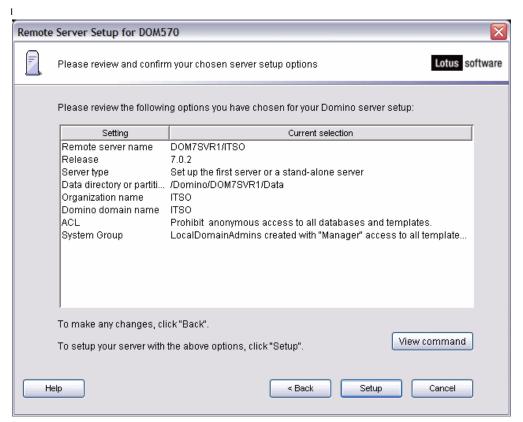


Figure 7-28 Confirming the Domino server setup options

25. The Server Setup window (Figure 7-29) shows the progress of the configuration.

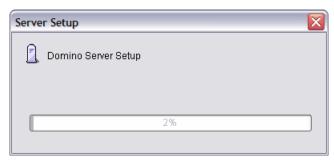


Figure 7-29 Domino server configuration progress

26.On the Setup summary window (Figure 7-30), you should see a congratulations message stating the Domino server was successfully configured. Click **Finish** to complete the setup.

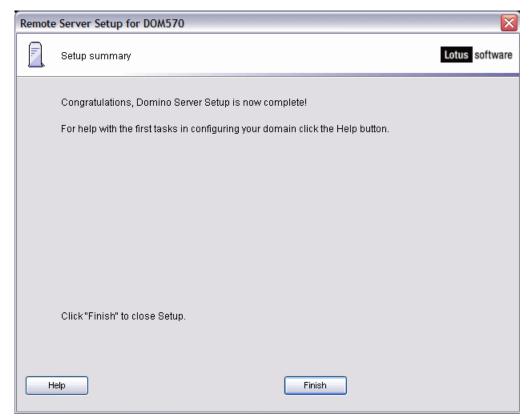


Figure 7-30 Congratulations window showing Domino server setup is complete

**Attention: Do not start the Domino server at this time.** We need to replace the configuration databases created by default during the setup process and move all other configuration and data databases from the prior Domino for Windows server first.

# 7.2.3 Replacing the configuration databases

By default, the Domino for i5/OS server configuration creates the databases listed in Table 7-1. These databases need to be replaced by the ones that were used in the existing Windows Domino server environment. See 7.2.4, "Moving the data" on page 275 for details on how to do this.

Table 7-1 Default databases created during Domino server configuration

Database	Function
AgentRunner.nsf	This database provides Notes agent context to a Java IDE. Once the context is set up, you can build, run, and debug without leaving the IDE. The code executes as it would in the Notes agent.
certlog.nsf <sup>1</sup>	The certification log is a database that keeps a record of the certified users of a Domino server. If a system certifier chooses to create the log, each time he or she certifies a new user, a record of that person's certification is added to the database.

Database	Function
certsrv.nsf	The Server Certificate Administration application lets you request server certificates from either an internal or external Certification Authority (CA) and manage your server certificates in a key ring file. Use this database if you are a server administrator and you want to secure your Domino servers with SSL 3.0.
cppfbws.nsf	The Free Time Web Service database allows a Domino server to provide free time information about the users in its Domino Directory through a Web service.
homepage.nsf	Default welcoming page database.
Indfr.nsf	The Lotus Notes/Domino Fault Reports is a database that stores information about faults that occur on Domino servers and Lotus Notes workstations in the domain. Administrators should look at the Lotus Notes/Domino Fault Reports often to see if:  ► Domino servers or Lotus Notes workstations are experiencing problems  ► There are similar repeated faults across the same or different Domino servers or Lotus Notes workstations
Indsutr.nsf	The Lotus Notes/Domino Smart Upgrade Tracking Reports is a database that stores information about smart upgrade attempts that occur from Lotus Notes workstations or Domino servers in the domain. Domino Administrators can then via Desktop Settings Policies enable the collection of smart upgrade reports as well as distribute the collections points for the reports if so desired.  Administrators should look at the Lotus Notes/Domino Smart UpgradeTracking Reports often to see if:  Lotus Notes workstations or Domino servers are smart upgrading successfully  Lotus Notes workstations or Domino servers are experiencing smart upgrade problems  There are similar repeated smart upgrade failures across the same or different Lotus Notes workstations or Domino servers
names.nsf <sup>1</sup>	The Domino Directory is the central repository for addressing and server configuration information for users, groups, and servers within a Domino domain. The Domino server accesses the Domino Directory whenever it needs to contact a server or user. For example when sending mail or replicating. All users and servers within a Domino domain share the same Domino Directory.
reports.nsf	The Reports database allows you to analyze mail usage on the Domino server directly from your Lotus Notes workstation. With this database, you can create reports on such information as top mail users, message volume over time, and routing patterns. These reports can be executed immediately or on a scheduled basis. The results can be saved in this database or mailed to one or more mailboxes. You can also view the results of previously executed reports, from one of several views.

<sup>&</sup>lt;sup>1</sup> These databases **must** be brought over from your existing Windows Domino server environment. All the other databases listed in this table only needed if you have previously configured and used them in your prior environment.

# 7.2.4 Moving the data

With the initial Domino server configuration having been completed in 7.2.2, "Configuring a Domino for i5/OS server using domwzd.exe" on page 257, you now need to transfer your Domino mail and application databases to the i5/OS integrated file system. To accomplish this, use an FTP program of your choice. We provide an example in "Moving data via FTP using DOS prompt" on page 276.

**Note:** There is no need to move the .ft extension directories and their content. These are indexes that are created by the Indexer task in the new Domino for i5/OS server. Also, allow automatically created database such as mail.box, busytime.nsf or catalog.nsf to be generated by the Domino server at startup time.

Make sure not to only move your mail and application databases, but also special configuration databases and modified templates such as those listed in Table 7-2.

Table 7-2 Databases to be considered for moving

DATABASE	FUNCTION
admin4.nsf	The Administration Request database is the database for observing the activity of the Administration Process. It contains the Administration Request documents automatically created when certain administrative activities are performed in the Domino Directory. It also contains the Administration Log documents, composed by a Domino server's Administration Process, detailing the modifications made to databases when Administration Requests are processed. The audience of this database is system administrators who automatically create Administration Request documents during their work activities.
da.nsf	The Directory Assistance database is used to configure the Directory Assistance feature. If your organization includes multiple domains, you can set up directory assistance to enable users to browse and select names from Public Directories outside of their domain. For example when they address mail, define database access control lists (ACL), or complete a NAMES field in documents. When users send mail to recipients in another domain, directory assistance also allows Domino to resolve the names before sending the memo.
dc.nsf	A directory catalog is an optional directory database that aggregates information from multiple Domino Directories. There are two types of directory catalogs: Extended Directory Catalogs and condensed Directory Catalogs.
resource.nsf	Domino 7 has centralized the processing of room and resource reservations into a new Rooms and Resources Manager (RnRMgr) task. The Rooms and Resources Manager is designed to prevent overbooking of rooms or resources and is responsible for both the processing of all workflow that is related to reserving a room or resource as well as accurately updating the Busytime database. Rooms and Resources Manager handles functionality previously handled in multiple places such as router, the Rooms and Resources Template and the Schedule Manager. Regardless of where the reservation request is created, that is, either in the Resource Reservations database, a user's calendar, or using the Internet, the reservation request will not have any conflicts with other reservations.

DATABASE	FUNCTION
ddm.nsf <sup>1</sup>	The Domino Domain Monitor (DDM) database contains event information that is reported by DDM probes as well as event information reported by other checks that are built into Domino 7 for DDM. Those checks include event generators; new checks that run as part of specific server tasks, such as the router or replicator; and checks that generate events in previous Domino releases and that have now been modified to report into DDM with additional information.
decsadm.nsf	This database is used to configure real-time back-end connectivity between Domino and external systems when using the DECS (Domino Enterprise Connection Services) add-in task.
events4.nsf	The Monitoring Configuration database includes a new configuration user interface for use with Domino Domain Monitoring (DDM). Use this new interface to set up DDM probes and a collection hierarchy of Domino servers that collect information from other Domino servers. A collection server collects two classes of event information, enhanced events and simple events. Enhanced events include events generated by the DDM probes, events generated by instrumentation that is new in Domino 7.0, events generated by the Event Generator, and any other event that is associated with a specific target. A simple event is any event that is not associated with or that does not contain specific target information. For example, most of the events that are reported to the event console are simple events.
log.nsf <sup>2</sup>	The Notes Log is a database that records and stores information about all types of Domino server and Notes workstation activities.
mtstore.nsf	The Message Tracking Store is the repository for summary information about mail flowing through this server. The summary information includes such items as the originators, recipients, arrival times, and status for all messages processed by this server. This database is created and written to by the mtc add-in task when message tracking is enabled for this Domino server. The database is read by the message tracking tool in the server administration facility to track messages sent to or from this server. This database is also used to generate reports on such information as top mail users, message volume over time, and routing patterns by agents in the Reports database. The mtstore.nsf is located in the mtdata subdirectory.

<sup>&</sup>lt;sup>1</sup>Any configured DDM monitored events should be changed from Windows to OS400 (i5/OS).

# Moving data via FTP using DOS prompt

As we detailed earlier in this chapter, with moving existing ID files to the i5/OS integrated file system, the FTP method is recommended. Using an FTP graphical user interface utility is okay, but using Windows Explorer to move files between an existing Domino server running on Windows to the i5/OS integrated file system is not recommended. This is due to the inherent problem that Windows Explorer does not check for file locks and also transfers the databases and templates into the wrong code page.

Perform the following steps to transfer your existing Domino databases and templates from the Windows Domino server to the Domino for i5/OS server:

<sup>&</sup>lt;sup>2</sup> The log.nsf database only needs to be moved if you want to keep the Windows environment log until the log documents have expired.

**Attention:** When the databases are transferred using FTP, they are set with the correct coded character set ID of 819.

- 1. Stop the Domino server running on Windows after having made sure all the Domino administration requests within admin4.nsf have been processed as well all the mail messages within the Domino mail boxes have been delivered.
- 2. FTP the desired databases. If you are unfamiliar with FTP then you might consider contacting IBM/Lotus support for assistance in moving the data. A generic example where we are moving all existing mail files from a Domino 7 server running on Windows to the System i machine (running the same release) is listed below:
  - a. On your Windows Domino server, open a DOS command prompt.
  - b. Switch to the Window Domino server data directory.
  - c. Type **ftp hostname** (where hostname is the System i machine, an IP address can also be used)
  - d. Type your i5/OS username
  - e. Type your i5/OS password
  - f. Type **cd** / to switch to the i5/OS integrated file system
  - g. Type cd /Domino/DOM7SVR1/Data (this is the Domino for i5/OS server data directory)
  - h. Type **bin** to switch to binary format
  - Type put databasename.nsf (where you are transferring all desired databases, you
    might also consider using mput command and disabling the prompts via "prompt"
    command)
  - j. Type put templatename.ntf (where you are transferring all desired templates, you might also consider using mput command and disabling the prompts via "prompt command")
  - k. Create a mail subdirectory and correct ownership (in our case this is /Domino/DOM7SVR1/Data/mail) using same steps as documented in 7.2.1, "Copying ID files to the i5/OS integrated file system" on page 253.
  - I. Type **cd mail** to switch to newly created mail subdirectory
  - m. Type prompt to disable prompting
  - n. Type **mput \*.nsf** to transfer all mail files
  - o. Type quit to exit your FTP session
  - p. Type exit to close the DOS prompt window
- 3. Correct ownership of all transferred files. This can be done via a graphical user interface as shown in 7.2.1, "Copying ID files to the i5/OS integrated file system" on page 253. For purposes of ease and speed we are now switching to a 5250 emulation method. Start a 5250 emulation session to the System i machine and sign on.
  - a. From the i5/OS command line, type CHGOWN OBJ('/Domino/DOM7SVR1/Data/\*') NEWOWN(QNOTES) to correct ownership of any transferred databases and templates in the data directory.
  - b. From the i5/OS command line, type CHGOWN OBJ('/Domino/DOM7SVR1/Data/mail/\*') NEWOWN(QNOTES) to correct the ownership of the transferred mail files.

**Tip:** If this Domino server is also a Web server and thus many more subdirectories are involved in being FTPed and ownership corrected, you should contact Lotus support and inquire about the CHGOWNALL i5/OS integrated file system tool.

- 4. Update the Domino server's NOTES.INI with desired settings from the prior Windows Domino server environment if needed.
- 5. Add the IP address that was used in the prior Windows Domino server environment to i5/OS using the CFGTCP CL command, option 1. With the prior Windows Domino server shutdown you should then start the IP interface and verify that it is reachable via a PING command and thus available for your newly configured Domino for i5/OS server.

# 7.2.5 Starting the Domino server

Once you have replaced the configuration databases and have moved all the data from Windows Domino server to the Domino for i5/OS server (and set their file owner and permissions on i5/OS), you are ready to start your Domino for i5/OS server. Perform the following steps:

- 1. Start iSeries Navigator and expand **Network** → **Servers** → **Domino**.
- 2. Right click on your Domino for i5/OS server and select **Start** → **Server**. See Figure 7-31.

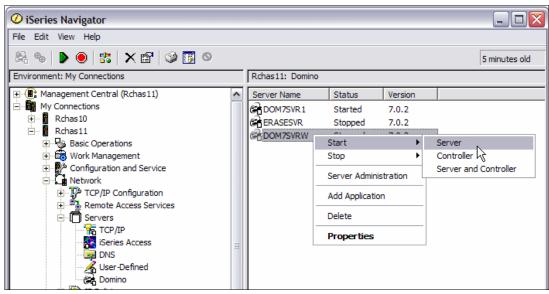


Figure 7-31 Starting the Domino server using iSeries Navigator

# 7.3 Moving your Domino server using a 5250 emulation session

In this section we show you how to move your Domino server from a Microsoft Windows environment to an i5/OS environment using a 5250 emulation session. The general steps are:

- 7.3.1, "Copying ID files to the i5/OS integrated file system" on page 279
- 7.3.2, "Configuring a Domino for i5/OS server using CFGDOMSVR" on page 282
- ► 7.3.3, "Replacing the configuration databases" on page 287
- ► 7.3.4, "Starting the Domino server" on page 288

# 7.3.1 Copying ID files to the i5/OS integrated file system

Consider that when you configure the Domino server on i5/OS, you are moving your Domino environment. Therefore, you need to keep your current Domino certifiers. Perform the following steps to create a directory path in the i5/OS integrated file system where the Domino certifier data is to be moved.

**Note:** In our example, the directory path for the copied ID files from the existing Window Domino server is /Lotus/DOM7SVR1/Data. We are using an i5/OS profile of itsouser which has QSECOFR equivalent authority.

- 1. Create the directory and subdirectories in the i5/OS integrated file system where the Domino data is to be moved:
  - a. Start a 5250 emulation session and sign on.
  - Enter the Create Directory (CRTDIR) CL command and press F4 to prompt the command.
  - c. On the Create Directory screen, type in the directory name and set the public authority as shown in Figure 7-32.

```
Tip: You can also type the following command:

CRTDIR DIR('/Lotus') DTAAUT(*EXCLUDE) OBJAUT(*NONE)
```

```
Create Directory (CRTDIR)
Type choices, press Enter.
Directory . . . . . . . . > '/Lotus'
Public authority for data . . . > *EXCLUDE
                                               Name, *INDIR, *RWX, *RW...
Public authority for object . . > *NONE
                                               *INDIR, *NONE, *ALL...
              + for more values
Auditing value for objects . . . *SYSVAL
                                               *SYSVAL, *NONE, *USRPRF...
Scanning option for objects . . *PARENT
                                               *PARENT, *YES, *NO, *CHGONLY
Restricted rename and unlink . . *NO
                                               *NO, *YES
                                                                     Bottom
F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys
```

Figure 7-32 Creating a directory in the integrated file system of i5/OS

Repeat this step to create any desired subdirectory or subdirectories as well. In our example we also create "/Lotus/DOM7SVR1" and "/Lotus/DOM7SVR1/Data.' Thus the CRTDIR CL commands would be:

```
CRTDIR DIR('/Lotus/DOM7SVR1'') DTAAUT(*EXCLUDE) OBJAUT(*NONE)
CRTDIR DIR('/Lotus/DOM7SVR1/Data'') DTAAUT(*EXCLUDE) OBJAUT(*NONE)
```

- 2. The i5/OS user profile which was used to sign on to the 5250 emulation session is by default the directory owner of the newly created integrate file system directories. Since any files or directories used by a Domino for i5/OS server must be owned by the QNOTES user profile, you will need correct this. Perform the following steps:
  - Enter the Work with Object Links (WRKLNK) CL command and press F4 to prompt the command.
  - b. Locate the directory created in the previous step (Figure 7-32), type option 9 next to it and press Enter. See Figure 7-33.

```
Work with Object Links
Directory . . . . : /
Type options, press Enter.
 9=Work with authority 10=Move
                                   13=Change attribute ...
0pt
     Object link
                            Туре
                                     Attribute Text
                            DIR
     usr
     var
                            DIR
                            DIR
     WWW
     Domino
                            DIR
9
     Lotus
                            DIR
     QDLS
                            DIR
     QFileSvr.400
                            DIR
     QIBM
                            DIR
     QNetWare
                            DIR
                                                                     More...
Parameters or command
F3=Exit F4=Prompt
                     F5=Refresh
                                  F9=Retrieve F12=Cancel
                                                            F17=Position to
F22=Display entire field
                                  F23=More options
```

Figure 7-33 Working with Object Links

3. On the Work with Authority screen (Figure 7-34), press the F19 (Change owner) function key to change the ownership of the directory.

```
Work with Authority
                                  /LOTUS
                                  ITSOUSER
Owner . . . . . . . . . . . . :
Primary group . . . . . . :
                                  *NONE
Authorization list . . . . . :
                                  *NONE
Type options, press Enter.
 1=Add user 2=Change user authority 4=Remove user
                  Data
                           --Object Authorities--
Opt User
                Authority Exist Mgt Alter Ref
    *PUBLIC
                *EXCLUDE
    ITSOUSER
                *RWX
                             Χ
                                  Χ
                                        Χ
                                              Χ
    QDIRSRV
                *χ
    QNOTESDB2
                *RWX
                                                                      Bottom
Parameters or command
                                        F18=Bottom F19=Change owner
F15=Change authorization list F17=Top
F20=Change primary group
                               F24=More keys
```

Figure 7-34 Work with Authority screen

4. On the Change Owner screen (Figure 7-35), enter QNOTES for the New owner field and press Enter.

```
Change Owner (CHGOWN)
Type choices, press Enter.
Object . . . . . . . . . . . . . /LOTUS'
                                           Path name
QNOTES
                                           Name
                               *YES
                                           *NO, *YES
Revoke current authority . . . .
                                           *NO, *YES
Symbolic link . . . . . . . . . .
                               *N0
                                                                Bottom
                   F5=Refresh
                              F12=Cancel
F3=Exit F4=Prompt
                                          F13=How to use this display
F24=More keys
```

Figure 7-35 Changing the owner for the /Lotus directory

- 5. Refresh the screen with F5 and you will now see that the ownership has indeed been corrected.
- 6. Repeat steps 2 to 5 for the subdirectories that were created.
- 7. FTP your existing ID files (cert.id, ou.id if applicable, server.id and admin.id or whatever name used for the Domino Administrator ID) from your workstation to the directory path

you just created. In our example we are transferring three ID files (cert.id, server.id and admin.id) to the /Lotus/DOM7SVR1/Data directory in the i5/OS integrate file system by performing the following steps:

- a. On your workstation or server where the ID files exist, open a DOS command prompt.
- b. Switch to the directory where the ID files are stored.
- c. Start an FTP session with the System i machine via the following steps:
  - Type ftp hostname (where hostname is the System i machine, an IP address can also be used)
  - ii. Type your i5/OS username
  - iii. Type your i5/OS password
  - iv. Type cd / to switch to the i5/OS integrated file system
  - v. Type cd /Lotus/DOM7SVR1/Data
  - vi. Type bin to switch to binary format
  - vii. Type put admin.id
  - viii.Type put server.id
  - ix. Type put cert.id
  - x. Type **bye** and then **exit** to leave the DOS command prompt.
- Correct the ownership of the ID files by using the following Change Owner (CHGOWN) CL command:
  - CHGOWN OBJ('/Lotus/DOM7SVR1/Data/\*') NEWOWN(QNOTES)
- 9. You are now ready to configure the Domino server on the System i machine.

# 7.3.2 Configuring a Domino for i5/OS server using CFGDOMSVR

In this section you configure the Domino for i5/OS server. In our example, we configure a Domino server called *dom7svr1* as a first server. We use the id files transferred from the Microsoft Windows Domino server as discussed in 7.3.1, "Copying ID files to the i5/OS integrated file system" on page 279.

The following steps differ from the configuration process shown in Chapter 4, "Configuring a Domino 7 server on i5/OS" on page 89, in this section we show how to use existing certifiers. Also, in this example we assume that the Domino for i5/OS licensed program is installed. For information on installing the Domino for i5/OS licensed program, see Chapter 3, "Installing Domino 7 on i5/OS" on page 41.

**Note:** In our example, the data directory path for the Domino for i5/OS server is /Lotus/DOM7SVR1/Data.

Perform the following steps to configure a Domino for i5/OS server:

1. From an i5/OS command line, type the Configure Domino Server (CFGDOMSVR) CL command and press F4 to prompt the command.

2. On the Configure Domino Server screen, enter the name of the Domino server being moved. For the option field, type \*FIRST and press F10 for more options. Enter Data directory and Organization fields (see Figure 7-36) and press Page Down.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Server name . . . . . . > DOM7SVR1
                                               *FIRST, *ADD, *REMOVE...
Option . . . . . . . . . > *FIRST
Data directory . . . . . . . . .
                                 /Lotus/DOM7SVR1/Data
Organization . . . . . . . . . .
                                 ITS0
                                                                    More...
                     F5=Refresh
F3=Exit
         F4=Prompt
                                 F12=Cancel
                                              F13=How to use this display
F24=More keys
```

Figure 7-36 Configuring the Domino Server with the CFGDOMSVR CL command

 Enter the Domino Administrator name and password (Figure 7-37). Take special care with the password length. Also, you will need to specify your time zone and if you wish to observe daylight savings time. Press Page Down

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Administrator:
 Last name . . . . . . . . .
                                 Administrator
 First name . . . . . . . . .
                                  Domino
 Middle name . . . . . . . . . . . .
 Password . . . . . . . . . .
                                  dom1no
 Minimum password length . . .
                                               0 - 31
                                  6
 Internet password . . . . .
                                  *ADMIN
                                               GMT,EST,CST,MST,PST,CET ...
CST
Daylight savings time . . . . .
                                  *YES
                                               *YES, *NO
Web browsers . . . . . . . . .
                                 *http
                                               *NONE, *ALL, *HTTP, *IIOP
Internet mail packages . . . . .
                                  *SMTP
                                               *NONE, *ALL, *IMAP, *POP3 ...
              + for more values
Directory services . . . . . .
                                  *NONE
                                               Character value, *NONE...
                                                                    More...
F3=Exit
         F4=Prompt
                     F5=Refresh
                                 F12=Cancel
                                              F13=How to use this display
F24=More keys
```

Figure 7-37 CFGDOMSVR command, additional parameters

4. Since we eventually plan to have another Domino server running on the System i machine, we specified \*PARTITION in the Advanced services field (Figure 7-38). Do so if you want have more than one Domino server running on the same i5/OS partition. Also you will want to specify \*NO for the Replace Configuration parameter to make sure new ID files are not created. Press Page Down to see further settings.

**Note:** Make sure to enter the correct Network Name where the default is *NETWORK1*. In our example we were using *TCPIP Network* on the Windows Domino server and so we needed to change this.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
                                  *DECS
                                                *DECS, *NONE
Connection services . . . . .
Advanced services . . . . . .
                                  *PARTITION
                                                *NONE, *ALL, *PARTITION...
              + for more values
Default ACL settings . . . . .
                                  *ADMGRP
                                                *NONE, *ANONYMOUS, *ADMGRP
Text 'description' . . . . . .
                                  *BLANK
                          Additional Parameters
SMTP services (obsolete) . . . .
                                  *DOMINO
                                                Character value
News readers (obsolete) . . . .
                                  *NONE
                                                Character value
Replace configuration . . . . .
                                  *N0
                                                *YES, *NO
Domain name . . . . . . . . . . . .
                                  *ORG
Network name . . . . . . . . . .
                                  TCPIP Network
                                  *BLANK
Country or region code . . . . .
                                                                      More...
F3=Exit
         F4=Prompt
                     F5=Refresh
                                  F12=Cancel F13=How to use this display
F24=More keys
```

Figure 7-38 CFGDOMSVR command, additional parameters

- 5. In the Figure 7-39, we indicate that we are using existing IDs, otherwise the configuration process will create new certifiers. You need to indicate the ID path (in the i5/OS integrated file system) and ID password for each of the following:
  - Organizational unit (if the Domino server was registered under one)
  - Certifier
  - Administrator

Press Page down.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Organizational unit:
 *BLANK
 *GEN
 ID file's password . . . . .
                               *ADM
Certifier ID:
                               /Lotus/DOM7SVR1/Data/cert.id
 ID file . . . . . . . . . . . .
 ID file's password . . . . .
                               dom1no
Administrator ID:
 ID file . . . . . . . . . . . . . . .
                               /Lotus/DOM7SVR1/Data/admin.id
 ID file's password . . . . .
                               dom1no
                                                                More...
F3=Exit
        F4=Prompt
                   F5=Refresh
                               F12=Cancel
                                           F13=How to use this display
F24=More keys
```

Figure 7-39 CFGDOMSVR command, specifying existing ID files and passwords

6. Specify the directory path to the existing Server ID file (Figure 7-40) and enter a password if associated with it (in most cases this will not be true as it requires manual entry of the password every the Domino server is started). Set other parameters as desired. For the Internet address field, enter the host name or IP address to be used. Press Page Down.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Server ID:
                                   /Lotus/DOM7SVR1/Data/server.id
 ID file . . . . . . . . . . . .
                                   *NOPWD
 ID file's password . . . . .
Start server . . . . . . . . . . . .
                                   *N0
                                                 *YES, *NO
Start when TCP/IP started . . .
                                                 *YES, *NO, *JSC, *ALL
                                   *N0
                                                 *YES, *NO
Log replication events . . . . .
                                   *YES
Log client session events . . .
                                   *YES
                                                 *YES, *NO
TCP/IP port options:
 Encrypt network data . . . . .
                                   *NOENCRYPT
                                                 *ENCRYPT, *NOENCRYPT
 Internet address . . . . . .
                                   DOM7SVR1.ITSO.COM
 Bind HTTP . . . . . . . . . .
                                   *YES
                                                 *YES, *NO
 Compress network data . . . .
                                   *N0
                                                 *YES, *NO
                                                                        More...
          F4=Prompt
                                   F12=Cancel
F3=Exit
                      F5=Refresh
                                                F13=How to use this display
F24=More keys
```

Figure 7-40 CFGDOMSVR command, specifying the Server ID file and Internet address

7. On the next screen (Figure 7-41), type in the fully qualified Domino Server host name. Often administrators will specify the subsystem and object names field the same as the Domino sever name. Press Enter to finish the configuration.

```
Configure Domino Server (CFGDOMSVR)
Type choices, press Enter.
Server host name . . . . . . . .
                               DOM7SVR1.ITSO.COM
Subsystem and object names . . .
                               DOM7SVR1
                                             Name, *GEN
                                            *STD,CS,DA-DK-AA,DE,E2-ES ...
*STD
Copy Administrator ID file . . .
                               *ALL
                                            *DOMDIR, *DTADIR, *ALL
                               *NONE
Additional services . . . . .
                                            *NONE, *ALL, *MINIMUM ...
             + for more values
Allow Domino Off Line Services
                               *N0
                                            *YES, *NO
Service provider configuration
                                *N0
                                            *YES, *NO
                                                                 Bottom
F3=Exit F4=Prompt
                  F5=Refresh F12=Cancel
                                           F13=How to use this display
F24=More keys
```

Figure 7-41 CFGDOMSVR command, final additional parameters

- 8. The following message is shown to indicate that the CFGDOMSVR command is in process and how far along it is complete:
  - 27: Percent of files copied to the server data directory.
- 9. Once the setup is done, you receive the following message:

Command CFGDOMSVR ended successfully.

**Attention: Do not start the Domino server at this time.** We need to replace the configuration databases created by default during the setup process and move all other configuration and data databases from the prior Domino for Windows server first.

# 7.3.3 Replacing the configuration databases

By default, the Domino for i5/OS server configuration creates the databases listed in Table 7-1 on page 273. These databases need to be replaced by the ones that were used in the existing Windows.

You also need to transfer your Domino mail and application databases to the i5/OS integrated file system. Make sure not to only move your mail and application databases, but also special configuration databases and modified templates such as those listed in Table 7-2 on page 275.

**Note:** There is no need to move the .ft extension directories and their content. These are indexes that are created by the Indexer task in the new Domino for i5/OS server. Also, allow automatically created database such as mail.box, busytime.nsf or catalog.nsf to be generated by the Domino server at startup time.

Perform the following steps to transfer your existing Domino databases and templates from the Windows Domino server to the Domino for i5/OS server:

- Stop the Domino server running on Windows after having made sure all the Domino administration requests within admin4.nsf have been processed as well all the mail messages within the Domino mail boxes have been delivered.
- 2. FTP the desired databases. See 7.2.4, "Moving the data" on page 275 for detailed steps.

# 7.3.4 Starting the Domino server

Once you have replaced the configuration databases and have moved all the data from Windows Domino server to the Domino for i5/OS server (and set their file owner and permissions on i5/OS), you are ready to start your Domino for i5/OS server. Perform the following steps:

- 1. Enter the Start Domino Server (STRDOMSVR) and press F4 to prompt the command.
- 2. On the Start Domino Server screen (Figure 7-42), specify the Domino server name (in our example this is DOM7SVR1) and press Enter.

Figure 7-42 Starting the Domino server



# 8

# **Problem determination**

As this topic could fill a book of it's own, we are only covering a few of the more imperative issues you may face while administering a Domino server on the System i platform. This chapter is designed to give you some insight into basic troubleshooting and problem determination practices.

Generally the areas for cause and concern in troubleshooting and problem determination of a Domino server are:

- Server crash
- Server hang
- ► Performance

This chapter steps you through what data is normally required to assist in root cause determination as well as how to collect it. It also provides additional debug parameters you might leverage in your day to day operation to help troubleshoot common items that might arise in your production environment.

# 8.1 Server crash

A Domino server crash is the moment when one of the Domino tasks ends in error and as a result, all of the other Domino tasks are ended. This unfortunately results in the Domino server no longer responding to any user requests. During the crash or abnormal end, the Notes Server Diagnostic tool (NSD) is invoked to collect relevant data to diagnosing the cause of the crash.

The following events are known to crash a Domino server:

#### ► ENDJOB

Domino jobs do not correctly process the signal from an End Job (ENDJOB) command. If you issue an ENDJOB command against a single Domino job, it can crash the entire Domino server. To correctly end a single Domino job, you must use the Domino server console command TELL JOBNAME QUIT. For example: TELL ROUTER QUIT.

#### ► ENDSBS

The End Subsystem (ENDSBS) command issues an ENDJOB command against all the jobs running in the subsystem specified by the SBS parameter. As stated previously, Domino jobs do not handle the END Job command gracefully. You can safely issue the ENDSBS command against a Domino subsystem if all the Domino jobs running in that subsystem are already ended.

#### ► ENDDOMSVR with OPTION(\*IMMED)

The \*IMMED option should not be used unless the End Domino Server (ENDDOMSVR SERVER(servername) OPTION(\*CNTRLD)) command failed to end the Domino server. The reason for this is that the \*IMMED option in the ENDDOMSVR command issues an ENDSBS \*IMMED. If the Domino jobs are still running, this ENDSBS \*IMMED will crash the Domino server.

#### ► PWRDWNSYS

You must end the Domino server in a controlled manner before issuing the Power Down System (PWRDWNSYS) command. One of the commands that a PWRDWNSYS runs is the ENDSBS command. As stated previously, if the Domino server is not already ended, this ENDSBS will crash the Domino server.

#### ► GO SAVE option 21

To run a complete system save, you go to the SAVE menu and take option 21. This can be referred to as a GO SAVE option 21. This option issues an ENDSBS SBS(\*ALL) OPTION(\*IMMED). As mentioned earlier, an ENDSBS will crash the Domino server if the Domino jobs are not already ended. Therefore, you should end the Domino server in a controlled manner before issuing the GO SAVE option 21.

#### Canceling a BRMS backup of an active Domino server

The reason this can occur is that when BRMS is backing up an active Domino server it is essentially like an active job on the Domino server. Just as performing an ENDJOB against a Domino job can cause a crash, a cancel of a save has that possibility as well. Ongoing enhancements continue to greatly reduce the possibility of a crash. Thus although the chance still exists, far more often than not the Domino server should remain running if a save is cancelled.

#### Prior crashes

When a Domino server is cleanly shutdown, all references to shared memory and semaphores are removed cleanly. If the Domino server crashes this is not always the case and orphaned shared memory and/or semaphores can be the result. If the restarted

Domino server tries to access the previously orphaned shared memory and/or semaphores it may take exception and crash again. For information on cleaning up orphaned shared memory or semaphores, see 8.1.8, "Cleaning up orphaned shared memory or semaphores" on page 303.

#### Database corruption

Every time a Domino server crashes is has the unfortunate potential to corrupt data. If data does become corrupt and the Domino server tries to allocate that object at a later date the server may take exception and crash. The chance of this occurring can be lessened if the Domino server has transaction logging (TL) enabled.

# 8.1.1 More about the Notes Server Diagnostic tool (NSD)

The Notes Server Diagnostic tool (NSD) on the System i platform is different than it's counter part on other platforms in terms of layout and content. In Domino 7, modifications have been made to NSD and so cosmetically it looks different and is easier to read was well as includes more detail.

In Domino 7, NSD also collects the call stacks for all of the processes or jobs associated with the Domino server at the time of the crash. This is a very useful modification to have especially if you have thread id debug enabled. For information on enabling thread i debug, see 8.4, "Additional troubleshooting parameters" on page 326.

NSD will display the information shown in Table 8-1.

Table 8-1 NSD information on the System i platform

Number	Part	Function
1	NSD filename, system name, Domino release information	Indicates the date and time of the NSD, name of the system and the Domino release.
2	Call stack for falling process	Tells what thread reported the failure and what it was doing at time of crash.
3	Dump job call stacks	Reports what each individual thread running on the Domino server was doing at time of crash.
4	User environment	Shows environment variables set on the system.
5	Job log of current job	Message ids, the job that was dumped at the time of the failure.
6	Notes.ini	Shows the contents of the Domino server's Notes.ini file.
7	Pid.nbf	Shows the contents of the pid.nbf file at time of failure.
8	List of active jobs	Reports the results of WRKACTJOB.
9	Display job of current job	Job status, definition and run attributes, spooled output files, job call stack, job locks, job record locks, library lists, open files, and overrides
10	Domino console entries	Shows console entries leading up to time of crash.

What the NSD will not tell you:

- Cumulative PTF's, Group PTF's, or if an IPL is necessary for a PTF to apply.
- ► The model or feature code (hardware) or whether LPAR is used.

 Based on the NSD alone, any hot fixes or interim fixes that may be applied to the Domino code.

An important thing to bare in mind about the NSD file is that on the System i platform, it will appear legible if you open it from a 5250 emulation session. However, if you drag and drop it from the IBM\_TECHNICAL\_SUPPORT directory to a client PC workstation, it will retain the EBCDIC format and look similar to Figure 8-1.

Figure 8-1 NSD in EBCDIC format

The NSD file shows you the invocation stack trace of the failing thread and the call stacks of all other Domino jobs in the partition. What this provides is basically a snapshot of the functions and arguments in the sequence that they were called. The snippet of the Domino server console that is also provided, indicates what happened immediately before and during the time of the error. Figure 8-2 is an example of a thread details that is included in an NSD file.

	############# 000000000000000000000000	07B (2/120)	PID: 8710	job: 027876/QNOTES/SERVER
Lib Name	Pgm Name	Mod Name	Statement	Procedure Name
QSYS	QLESPI	QLECRTTH	0000000017	LE Create Thread2 FP12cr
QSYS	QPOWPINT	QP0WSPTHR	000000019	pthread create part2
QDOMINO702	LIBNOTES	THREAD	000000018	ThreadWrapper
QDOMINO702	LIBNOTES	NLTHREAD	0000000023	NAMELookupThread
QDOMINO702	LIBNOTES	OSSEM	0000000002	OSWaitEvent
QDOMINO702	LIBNOTES	OSSEM	0000000025	WaitOnNativeSemaphore
QDOMINO702	LIBNOTES	OSSEM	000000017	WaitForThreadSem
QSYS	QPOWPTHR	QPOWCOND	000000049	pthread_cond_wait
QSYS	QPOWPINT	QPOWSCOND	0000000086	wait20QpOwPthreadCondit

Figure 8-2 Thread call stack details

You can also run call stack information independently of a crash by issuing the command load NSD from the Domino server console. Call stack information is particularly useful in a Domino server hang if debug or memcheck is enabled.

#### Fault recovery operation

The fault recovery system in Domino 7 is configured the same as on UNIX platforms, with the exception that the fault recovery system is enabled by default on i5/OS. The fault recovery settings are located in the Domino server document and accessible via the Configuration tab from the Domino Administrator or a Lotus Notes client.

**Note:** The AS400\_DOMSVR\_RESTART environment variable is no longer supported and has been replaced by the Maximum Fault Limits settings in the Domino server's configuration document.

When upgrading from Domino 6 to Domino 7, the current Domino server settings for fault recovery are retained and the Domino server's configuration document is updated accordingly.

See the Fault Recovery section in the Lotus Domino Administrator 7 Help database for more information.

#### Specifying a diagnostic program for fault recovery

There is no longer a Cleanup Script Name field in the Domino server configuration document in which you must place CALL QNOTES/NSD. This has been replaced by the Run This Script After Server Fault/Crash field in which you may configure a call to your own recovery diagnostic program, such as CALL MYLIB/MYDIAG. If you do not have one, this field should be blank. Any user diagnostic will be run before the Domino NSD program.

The Domino NSD program can be turned on and off by the Run NSD To Collect Diagnostic Information field. This should normally be enabled so that critical diagnostic information will be generated. This information is useful to the Lotus and IBM support team for solving server problems.

#### 8.1.2 How to troubleshoot Domino server crashes

As explained at the beginning of this chapter, a Notes Server Diagnostic (NSD) is generated whenever a Domino server crashes or is ended improperly. In order to troubleshoot the crash you must first locate the NSD. In older versions of Domino, the NSD was generated in the Domino server data directory but starting with more recent versions of Domino 6 and also with all releases of Domino 7, the NSD is created in a subdirectory of the Domino server data directory. This subdirectory is called IBM\_TECHNICAL\_SUPPORT. Each NSD file has a date/time stamp indicating when the recycle occurred. For example:

nsd 08 13 06@01 45 06.nsd

**Note:** Domino 7.0.2 provides the following additional new functionality on the Work with Domino Servers (WRKDOMSVR) display:

- Option 14 = Work with support files
- Option 15 = Work with NSDs
- ► Option 16 = Dump server call stacks

If you are running Domino 7.0.2 or later, to view an NSD from the Work with Domino Servers (WRKDOMSVR) display, press F23 (More Options). You can then type option 15 (Work with NSDs) next to a specific Domino server. This will take you directly into the

IBM\_TECHNICAL\_SUPPORT subdirectory. You'll then need to locate the desired NSD and type an option 5 to display the contents.

If you aren't yet running 7.0.2, you can instead use the WRKDOMSVR command then select option 12 (Work object links) to go into the data directory. From here you'll need to page down until you see the IBM\_TECHNICAL\_SUPPORT subdirectory and then enter option 5 to go into the subdirectory and page down until you find the desired NSD file.

The layout of the NSD header has changed and is easier to read. Figure 8-3 is an example of the NSD header.

/Domino/DOM7SVR1/Data/IBM TECHNICAL SUPPORT/nsd 08 13 06@01 45 06.nsd Server: DOM7SVR1 Date: Sun August 13 01:45:06 2006 System: ITS0 0S400 0S: Release: V5R4M0 Notes Version: Release 7.0.2 September 26, 2006 <99 Section: Notes Process Info 

Figure 8-3 NSD header information

Figure 8-4 is an example of a crash stack. Look for entries in the crash stack such as *exception*, *kill*, *fatal*, *panic*, *child died*, or *fault*. At the first entry (immediately preceding the error) you will see the last valid function being executed. You then work vertically up (backwards) and note the processes just prior to the exception to find clues (though not definitive answers) as to what the Domino server was doing just prior to the recycle. These clues must be reviewed and evaluated in the context of other information.

For instance, in the example shown in Figure 8-4, take the entry ConsolidateBIBs and search the Lotus customer support knowledge base for this entry. You will find there is a technote published and a matching SPR by going to the following URL and selecting the option to search the knowledge base under the Self help section:

http://www.ibm.com/software/support/

In this instance our search found technote 1239923 which was entitled *Domino server crashes during BRMS backup on ConsolidateBIBs*. This was reported as a known crash and references that the issue was reported to Quality Engineering as SPR# DROO6MYQRW and has been addressed in 7.0.1 FP1 and the base of 7.0.2 and you have likely determined your source of failure.

If the Domino server crash you are investigating reports an entry for Child\_Died and/or console line Child Stopped by Signal -1, it may indicate that something outside of Domino caused the server to crash. Often QHST will indicate a Domino task took exception immediately prior to the Domino server reporting the NSD. If this is the case, investigate as to why the task took exception and thus led to the NSD.

Lastly, it is important to note that the crash stack and the failing process is not always the cause of the crash but more indicative of a symptom (as illustrated above).

JOB: 081167/QUSER/QZRCSRVS THREAD: 0x281			
	297		QCMDEXC
CL PEP	0	Q1AC0BK	Q1AC0BK
Q1ACOBK	311		
_CL_PEP	0	Q1ACBK	Q1ACBK
Q1ACBK	308		
_QRNP_PEP_Q1ARBK	0	Q1ARBK	Q1ARBK
Q1ARBK	5128		
_C_pep	0	Q1AXCMD	Q1AXCMD
main	109		
	356		QCAPCMD
_CXX_PEP	13	QNNINSDB	QNNINSDB
main	85		
QnninsdbSave_Main	89	QNNINSDBP	QNNINSDBP
do_fullFP9Vary_listc	66		
Save_Brm_FilesFP10file_entryi	229		
Write_chgs_to_fileFUiT1PcT3Pi	3		
NSFBackupGetChangeInfoSize	5	NSFSEM7	LIBNOTES
iNSFBackupGetChangeInfoSize	11	BACKUP	
ConsolidateBIBs	80		
OSMemoryLock	1	MEMORY	
LockMemHandle	2		
Panic	29	OSPANIC	
fatal_error	33	BREAK	
OSFaultCleanup	1	CLEANUP	
OSFaultCleanupExt	86		
OSRunExternalScript	39		
system_a	2	STDLIB_A	
system	6	QC2SYS	
	297		QCMDEXC
_C_pep	0	NSD	NSD
main	89		

Figure 8-4 Crash call stack example

# 8.1.3 My Domino server keeps crashing or won't start

The first question posed to an administrator is what to do. The following list of items are some things to check during your initial investigation:

- ▶ Review the NSD's, first checking to see if the invocation stack trace or last entries in the console snippet are the same as in the previous crashes. If they are, then it may be due to corruption or a potentially already known condition. You should check the Lotus support Web site for any known issues related to the crashes. If it is corruption related, you may need to issue the FIXUP command against the Domino server while it is ended. See 8.1.5, "Consistency checks and FIXUP" on page 297 for more information.
  - Also, if the problem is related to a specific task other than the SERVER task, you might have the option to remove the offending task from the ServerTasks= line of the Domino server's NOTES.INI file temporarily to at least get your Domino server up and running until root cause can be determined and a permanent resolution provided.
- ▶ Is the Domino server shutdown for backup at night? If so, find out if the last server shutdown was successful by looking for an NSD at the time of the shutdown. If one exists then this indicates your Domino server did not shutdown properly. If one does not exist,

- you might check the backup log joblog to see if there was any noted errors concerning Domino databases. Lastly, check to see if the backup is still active. If it is, is this expected?
- ▶ If it is the ROUTER task which keeps failing, you may try renaming the MAIL.BOX (or boxes if multiple ones are used) to try and bring relief. If the Domino server then remains stable, this suggests a mail message in the renamed mail.box was at fault and support should be contacted to fully diagnose. If the Domino server continues to crash on the ROUTER task even after this action, it is likely you will have to invoke some router debug. Contact Support for which router debug parameters might be appropriate.
- ▶ If the crash is on the HTTP task, you may be asked to enable HTTP thread logging so that specifically what database are being accessed via a Web browser at the time of the crash can be pinpointed. Information on enabling this additional logging is provided in 8.4, "Additional troubleshooting parameters" on page 326.
- ► Are you receiving insufficient memory upon startup or shortly thereafter? If so, have you checked for any orphaned shared memory or semaphores? If you have only one Domino server on your system, then with the Domino server ended you should verify that no shared memory or semaphores are still actively referenced. If so they should be cleared and the server restarted to see if a positive impact. For further information on how this is done see 8.1.8, "Cleaning up orphaned shared memory or semaphores" on page 303.
- ► Have there been any recent code changes to your environment? Have you recently upgraded the i5/OS? If so have you verified you have the necessary i5/OS PTF levels? Have you updated your anti-virus software to a newer version that is not compatible with your current version of Domino? Perhaps patches need to be applied.
- ► Have there been any hardware changes since the Domino server was last stable? If so, evaluate if any of them might be a factor in the Domino server stability.
- ► Look for relevant messages in the QSYSOPR or QHST that might be related to your Domino server. This can be done via DSPMSG MSGQ(QSYSOPR) command to display the QSYSOPR message queue or via DSPLOG to display the history log (QHST). As QHST can be quite lengthy, use the F4 key to prompt on the DSPLOG command to pick a specific time or time frame for review.
- ► Check the spooled files for user QNOTES. Especially for the QNNINSTS and SERVER job logs. If the logging level displayed in the job logs is not sufficient, then increase the logging level and restart the Domino server and wait for the next failure. The login level can be increased by issuing the following command. If you are not sure of your Domino server subsystem name, use the WRKDOMSVR command to verify.
  - CHGJOBD JOBD(QUSRNOTES/Dominosubsystemname) LOG(4 0 \*SECLVL)
- Are there authorities issues? Are there any authority error messages in the job logs or spooled files? Are there QNOTES ownership issues? Do all Domino server data directory objects have QNOTES ownership? As a general rule of thumb, any object that exists in the Domino server data directory and subdirectories should be owned by QNOTES. The i5/OS Edit File (EDTF) CL command can be used to easily check.
- ▶ Is a Domino job still listed under the Domino server's subsystem? If a job is listed in END status and the Domino server is ended this may be the culprit. If the job remains in the END status for some time, you may need to issue the End Job Abnormal (ENDJOBABN) command to clear the job before attempting to restart the Domino server.

If you feel you have exhausted all of these possibilities and the Domino server keeps crashing or will not start, you should then you should contact Lotus support.

# 8.1.4 Crash data to collect if engaging Lotus support

If you find that you need to contact Lotus support to determine why your Domino server is crashing or won't start, the following data may be requested from you to determine the root cause of the problem:

- Any recent NSD's from the last few days
- ▶ If console logging is enabled on your server, then the console log from the data directory
- ► A list of current Lotus hotfixes on your system (DSPPTF OUTPUT(\*PRINT))
- ► The history log (DSPLOG OUTPUT(\*PRINT))
- ► The QSYSOPR message queue (DSPMSG MSGQ(QSYSOPR) OUTPUT(\*PRINT))

# 8.1.5 Consistency checks and FIXUP

The consequences of a Domino server crash means down time. Obviously the time spent in down mode will depend on what steps are necessary to take to recover the server. However, if you have the Domino Directory set to automatic recovery in the event of a crash, Domino will restart and begin it's own recovery. A consistency check will be invoked by the server on the recovery startup.

A consistency check is similar to the FIXUP server task. Consistency checks are done when a database is found to be in an unknown state, corrupt state, or the integrity is questionable:

- ► An unknown state occurs when the database is not closed properly which can occur if the database was open at the time of the crash.
- ► A corrupt state can occur in several places. These all relate to bad tables, notes, folders, bitmaps, etc.
- Questionable integrity occurs when a database header or index has entries that appear to be invalid.

When you restart a Domino server, the server quickly searches for any unlogged databases that were modified but improperly closed because of a server failure, power failure, hardware failure, and so on. A few minutes after server startup, the server task then runs consistency checks on these databases in an attempt to fix any inconsistencies that resulted from partially written operations caused by a failure. When users attempt to access one of these databases and a consistency check has not yet run on the database, the users see the message *This database cannot be opened because a consistency check of it is in progress*.

**Important:** You should never cancel the consistency check of a file.

If corruption is found to be affecting your Domino server, you may need to run Domino utilities to remedy the situation. The following methods are available to try and fix corruption that wasn't addressed by the consistency check during startup:

- ► Run FIXUP using the FIXUP tool in the Files tab. Use this method to run FIXUP on one or a few databases. You can easily select the databases and you don't have to use command line options, but you cannot use the Domino Administrator until Fixup finishes.
- ► Run Fixup using the Task Start tool. Use this method to run FIXUP on all databases. You can continue to use the Domino Administrator while FIXUP runs and you don't have to use command line options.
- Run Fixup using live console. Use this method if you prefer to use command line options.
- Run Fixup using a Program document. Use this method to schedule FIXUP to run at particular times.

Keep in mind that after you set up transaction logging, FIXUP is usually no longer needed or used to bring databases back to a consistent state during startup.

**Note:** The above concepts also applies to the UPDALL and COMPACT utilities.

For more information on these Domino utilities, refer to the Administrator help which details FIXUP, UPDALL, and COMPACT.

#### **Run Domino Command (RUNDOMCMD)**

A method specific to the System i platform is the i5/OS CL command called Run Domino Command (RUNDOMCMD). This command is used to issue Domino console commands while the server is ended. This is sometimes required when trying to address integrity issues with databases that are constantly in use such as the Domino directory (names.nsf) and would otherwise have little to no effect if the server was left running.

The Run Domino Command (RUNDOMCMD) command sets up the environment that allows the command to be run regardless of whether the Domino server is active or not. When the Domino server is not active, you can run such batch processing type commands as FIXUP, COMPACT, and UPDALL.

To use the RUNDOMCMD command, you must have one of the following authorities:

- \*ALLOBJ special authority
- ➤ \*USE authority to the RUNDOMCMD object (object type \*CMD) in the QSYS library and
  \*USE authority to the QNNINRUN object (object type \*PGM) in the QNOTES library

Figure 8-5 shows an example of how to use the RUNDOMCMD command to run the FIXUP task against the names.nsf database on a Domino server called DOM7SVR1. On any i5/OS command line, type RUNDOMCMD and press F4 to prompt the command and enter desired parameters.

```
Run Domino Command (RUNDOMCMD)
Type choices, press Enter.
Server name
                               DOM7SVR1
                               CALL PGM(QDOMINO702/FIXUP) PARM('names.nsf')
*YES
                                             *YES, *NO
Run in batch . . . . . . . .
Allow multiple threads . . . . .
                                *JOBD
                                            *JOBD, *YES, *NO
                                                                  Bottom
                    F5=Refresh
F3=Exit
         F4=Prompt
                                F12=Cancel
                                            F13=How to use this display
F24=More keys
```

Figure 8-5 Example of RUNDOMCMD command running FIXUP against names.nsf

If you wand to run the FIXUP utility against every object on the Domino server, you wouldn't specify any parameters as shown in Figure 8-6.

```
Run Domino Command (RUNDOMCMD)

Type choices, press Enter.

Server name . . . . . > DOM7SVR1

Command . . . . . . . > CALL PGM(QDOMINO702/FIXUP)

Run in batch . . . . . . . *YES *YES, *NO *JOBD, *YES, *NO *JOBD, *YES, *NO *Bottom
```

Figure 8-6 Example of RUNDOMCMD running FIXUP against all objects on a Domino server

You also have the capability to utilize utility switches as well within the RUNDOMCMD command. Figure 8-7 shows an example of the FIXUP command being issued with the '-j' switch if you happen to have transaction logging enabled on your Domino server and thus the switch is desired.

Figure 8-7 Example of RUNDOMCMD running FIXUP against names.nsf using the -j switch

Although these examples reference the FIXUP utility, the same logic applies to the other Domino commands such as UPDALL or COMPACT.

For additional information on the RUNDOMCMD, see 5.2.6, "Run Domino Command (RUNDOMCMD)" on page 178.

# 8.1.6 Transaction logging

If transactional logging is not a feature of your Domino server at the time of a crash then it should be something you should consider enabling on your Domino server. The major benefits of enabling transaction logging are a reduced chance of data corruption from server crashes and a quicker recovery when the Domino server starts back up after a crash.

The basis for this is that transactional logging captures all the changes made to a database and writes them to a transaction log. The logged transactions are then written to disk in a batch, either when resources are available or when scheduled.

A transaction is a related series of changes made to a database on a server. For example, opening a new document, adding text, and saving the document is one transaction. The advantages of using transaction logging is that in situations where you have large indexes or data files, the rebuild process time can be significantly less rather than having to rebuild the file from scratch.

For more information on transactional logging refer to the Domino Administrator help database. Also note that although the help text suggests you place the transaction logs on a separate drive for performance considerations, on the System i platform this doesn't really result in a gain and just adds complexity to the environment. Thus the suggestion is to take the defaults and place the transaction logs on the same drive which for the System i platform is the system ASP.

# 8.1.7 Automatic Diagnostic Collection Tool

The Domino 7 administrator can automate some data collection by setting up the automatic diagnostic collection tool to collect diagnostic data after server or client crashes. This data is then sent to a mail-in database after the server or client restarts. Although this feature is available for the client as well, we will only be discussing the server configuration in this section.

To setup automatic data collection on your Domino server, you use the Domino server Configuration Settings document. You can also enable or disable Fault Analyses from this same tab on the Server Configuration Settings document. Perform the following steps:

- 1. From the Domino Administrator client, click the **Configuration** tab.
- 2. Click Server → Configurations.
- 3. Select the Server Configuration document you want to edit and click Edit Configuration.
- 4. On the Configuration Settings document, click the **Diagnostics** tab and complete the fields as shown in Figure 8-8 and detailed in Table 8-2.

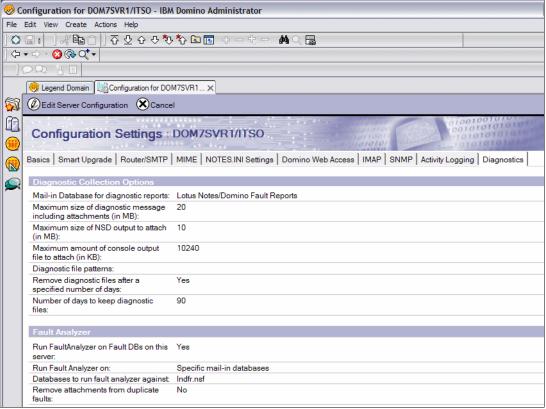


Figure 8-8 Configuration Settings document, Diagnostics tab

Table 8-2 Configurations Settings document, Diagnostics tab, field definitions

Field	Action
Mail-in Database for diagnostic reports	Select the mail-in database to which you want the diagnostic report for server crashes mailed.
Maximum size of diagnostic message including attachments (in MB)	Enter the maximum size of the entire message that automatic diagnostic data collection will create, including all attachments (NSD, console output, user defined files, etc).
Maximum size of NSD output to attach (in MB)	Enter the maximum size of the NSD log that can be attached to the document created by automatic diagnostic data collection. (Automatic diagnostic data collection collects data and then creates documents in a mail-in database.)
Maximum amount of console output file to attach in (KB)	Use the default value of 10240, or enter another value between 10MB and 1KB. 10240 is the upper limit. This value represents the portion of the CONSOLE.LOG file to be sent, beginning with the end of the file and moving toward the beginning.
Diagnostic file patterns	Enter a file name pattern that Domino will search for. If the pattern is located and it is listed in the file, DIAGINDEX.NBF, the file will be attached to the message that is sent to the mail-in database. DIAGINDEX.NBF contains all of the files associated with the crashing instance of the client or server. For example, the following is a file pattern: addin_log*.txt. These files would be located based on that pattern:addin_log1.txt, addin_log_2004_11_23@16_21_20.txt, etc

Field	Action
Remove diagnostic files after a specified number of days	Choose one of these:  No: (Default) Choose No to accept the default of never automatically deleting the diagnostic files created on the server.  Yes: Choose Yes to enter the number of days after which the diagnostic files on the server are to be deleted.
Number of days to keep diagnostic files	Accept the default value of 365 days, or enter another value representing the number of days after which the diagnostic files are to be deleted from the server. (This field displays only if you chose Yes for the Remove diagnostic files after a specified number of days.)
Run FaultAnalyzer on Fault DBs on this server	Determines if the Fault Analyzer will run on this Domino server and process any automatic diagnostic collection databases on the server. If none are found the task will exit.
Run Fault Analyzer on	Choose whether you would like the Fault Analyzer to find all mail-in databases on the server or if you would like to manually specify which databases will be processed.
Databases to run fault analyzer against	Enter the list of the databases that the Fault Analyzer will process.
Remove attachments from duplicate faults	If faults are found to be an exact or partial match for an existing fault then if this field is set to Yes, any attachments on the new occurrence of the fault will be removed to save space.

The main benefit of the automatic diagnostic collection tool is the ability to know what diagnostic files were created that correspond to a server crash, and where they reside so they can be collected. One of the features is the idea of the *diagnostic directory*, which is a common place where all diagnostic files reside. The default location is <data directory>/IBM\_TECHNICAL\_SUPPORT.

Putting all the files in the same directory is not enough to allow you to know definitively which ones are associated with a given server crash. So a new file is created in the data directory of the client or server to track diagnostic files that have been created on the machine since startup. This file is called diagindex.nbf and is created at startup when the console.log file is created.

If you are restarting after a crash, the previous diagindex.nbf file is renamed prior to creating the new one. Any Notes/Domino programs that use the underlying log creation functions will register the file name of the diagnostic file being created into this index file. Any non-Notes/Domino processes can also append their titles to this file since it is an ASCII text file.

When a Domino server restarts after a crash, a new executable called SENDDIAG loads. This program is responsible for processing the diagindex.nbf file that corresponds to the crash that just occurred. It searches through the index and extracts each of the diagnostic files that were generated. It also parses out (from the NSD) the Notes name, Notes/Domino version, OS version, start time, crash time, error message and the call stack of the thread that crashed. It then creates a mail message with all this information and sends it to the mail-in database that has been configured to receive this information.

One of the results of this is that the diagnostic data is created, but it is up to the user as to when the data is deleted. This data has the potential to use a lot of space. Administrators configure how long to keep these diagnostic files within the Domino server Configuration Settings document. Every time a Domino server starts, a new executable called FILERET is invoked. This executable scans the diagnostic directory for files with the pattern < machine

*name*>\_ that exceed the configured number of days to keep diagnostic files (default of 365 days), and removes them.

The database will have attached to it the necessary diagnostics data files. If you place a call into Lotus support these will likely be the files requested by them to help determine root cause of the problem. The administrative section is editable so that should you find a matching SPR during your own investigation or should you open a PMR with Lotus support, you have the option to record the details to remain organized.

For further information on the setup and usage of automatic diagnostic collection tool, see the Domino 7 Administrator help database.

# 8.1.8 Cleaning up orphaned shared memory or semaphores

After a Domino server crash or abnormal end it may be necessary to address orphaned shared memory or semaphores. This should only be required if you have just experienced rampant crashing and your Domino server won't come up or if upon startup or shortly thereafter you receive errors reporting *insufficient memory*.

If this is the case, then there are a couple of options available to you. The most desired option is only available from support. A tool which contains Delete Domino Shared Memory (DLTDOMSMEM) and Delete Domino Semaphores (DLTDOMSEM) commands is available that will clean up all shared memory and semaphores specific to any given Domino server provided it has been ended first.

If you have only one Domino server running on your system, then the following two options are also available to you:

- Using iSeries Navigator to manually delete shared memory or semaphores
- Using the i5/OS command line to manually delete shared memory or semaphores

**Attention:** Any of the above options should only be used under the guidance of Lotus Support as deleting or clearing shared memory or semaphores incorrectly can lead to further problems.

Although not mentioned above for either System i machines with multiple Domino servers or just one single Domino server, an option to IPL the system will also clean up any issues that relate to shared memory or semaphores. This should obviously be a last option and one only used when you are certain the problem lies with orphaned or damaged shared memory or semaphores.

#### **DLTDOMSMEM and DLTDOMSEM**

If you have contacted Lotus support and been provided the save file which contains the DLTDOMSMEM and DLTDOMSEM CL commands then after following the installation instructions, you will have these two i5/OS commands available.

The DLTDOMSMEM command will delete Domino shared memory specific to a given Domino server that has been ended. See Figure 8-9. Fill in the following fields:

- ▶ Server name Domino server name or \*ALL is allowed as well
- ► Force if not owned by QNOTES default is \*NO
- ▶ **Delete shared memory** default is \*YES. If you want to see what shared memory is being referenced by the Domino server while it is active you can choose \*NO and run the command and review the resulting report.

```
Delete Domino Shared Memory (DLTDOMSMEM)

Type choices, press Enter.

Server name . . . . . . > DOM7SVR1

Additional Parameters

Force if not owned by QNOTES . . *NO *NO, *YES
Delete shared memory . . . . . *YES *NO, *YES

Bottom
F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys
```

Figure 8-9 DLTDOMSMEM command

The DLTDOMMEM command will delete Domino shared semaphores specific to a given Domino server that has been ended. See Figure 8-10. Fill in the following fields:

- ▶ Server name Domino server name or \*ALL is allowed as well
- ► Force if not owned by QNOTES default is \*NO
- ▶ Delete semaphore default is \*YES. If you want to see what semaphores are being referenced by the Domino server while it is active you can choose \*NO and run the command and review the resulting report.

```
Delete Domino Semaphores (DLTDOMSEM)

Type choices, press Enter.

Server name . . . . . . > DOM7SVR1

Additional Parameters

Force if not owned by QNOTES . . *NO  *NO, *YES
Delete semaphore . . . . . . *YES  *NO, *YES

Bottom

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display F24=More keys
```

Figure 8-10 DLTDOMSEM command

# Using iSeries Navigator to delete shared memory or semaphores

The ability to view and delete or clear shared memory and semaphores through a graphical user interface is done using iSeries Navigator. This option should only be used if you have only one Domino server on your system and it has been ended or if you have multiple Domino servers but have ended them all as well. Perform the following steps:

1. Start iSeries Navigator and sign on to your System i machine as QSECOFR or a profile with equivalent authority.

- 2. Click on the plus next to your System i machine.
- 3. Click **Application Development** → **Interprocess Communication**. You should see views for Semaphore Sets and for Shared Memory as shown in Figure 8-11.

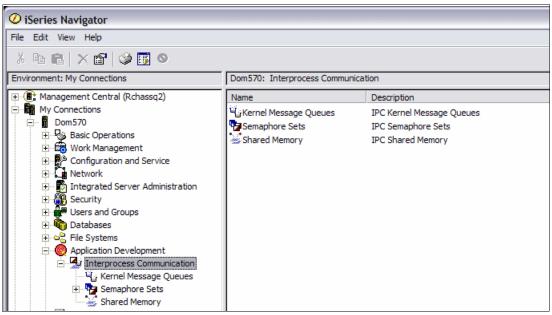


Figure 8-11 Using iSeries Navigator to see semaphores and shared memory

4. Click on **Semaphores**. In the right panel, note the entries where the owner is QNOTES. These are the entries you will be highlighting and deleting if your Domino server or servers are ended. See Figure 8-12.

To delete a semaphore, left click on it and then either press the delete button or then right click on it and select **Delete**.

**Tip:** If you want to delete multiple entries at once, you can either hold down the CTRL key while left clicking on the desired entries or if all the entries are consecutive you can click on the first desired entry and then while holding down the SHIFT key, left click on the last desired entry.

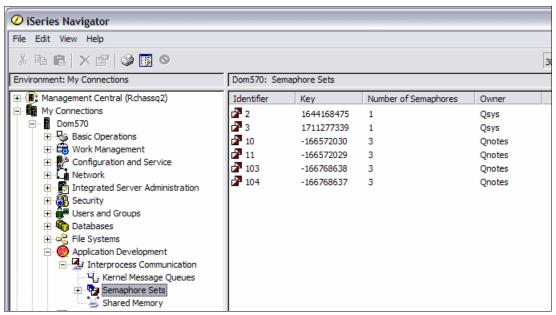


Figure 8-12 Using iSeries Navigator to work with semaphores

5. Click on **Shared Memory**. In the right panel, note the entries where the owner is QNOTES. These are the entries you will be highlighting and deleting if your Domino server or servers are ended. See Figure 8-13. The same logic mentioned in the previous step for deleting semaphores holds true for deleting multiple shared memory entries.

**Note:** If you don't see the owner field populated when looking at shared memory, this is likely due to running version V5R4 of the client. To resolve this, you need to update the client to SP4 for iSeries Navigator which is due out at the end of 2006.

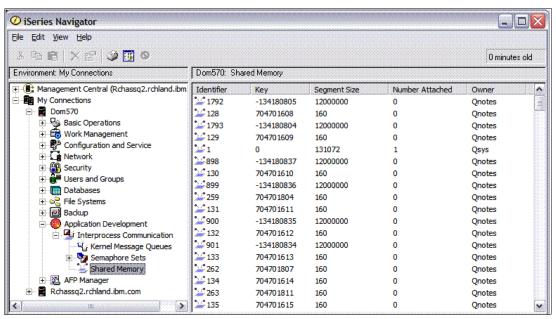


Figure 8-13 Using iSeries Navigator to work with shared memory

- 6. If you are wondering what the shared memory segment is attached to before you delete it, you can determine this by left clicking on the *Indentifier* field and then right clicking and selecting **Properties**.
- 7. On the Shared Memory Properties window (Figure 8-14), Jobs Attached tab, you see if any active job is currently using the shared memory segment.
  - Last attachment: Shows the date and time that the last job attached to the shared memory segment.
  - Last detachment: Shows the date and time that the last job detached from the shared memory segment.
  - Last action performed: Shows information about the last job that attached to or detached from the shared memory segment. This information includes the following:
    - Job name The name of the last job that attached to or detached from the shared memory segment. This information is not available if the job has ended or if the job is not initialized for asynchronous signals. A signal is a mechanism by which a job may be notified of an event or may be affected by an event occurring in the system.
    - User The name of the user who owns the job. This information is not available if the job has ended or if the job is not initialized for asynchronous signals.
    - Number The number of the job. This information is not available if the job has ended or if the job is not initialized for asynchronous signals.

- Process identifier The process identifier for the last job that attached to or detached from the shared memory segment.
- Type Identifies whether the last job attached to or detached from the shared memory segment. If the program cannot determine whether the last action was an attach or a detach, the value shown is Not available.
- Jobs currently attached: The list of jobs that are currently attached to the shared memory segment includes the following:
  - Job name The name of the job currently attached to the shared memory segment.
  - User The name of the user who owns the job.
  - Number The number of the job.
  - Times attached The number of times the job has attached to the segment.

**Note:** If after you have deleted the all the shared memory you may see that some of the shared memory is still listed in the column. This fine as long as the *key* value is all zeros.

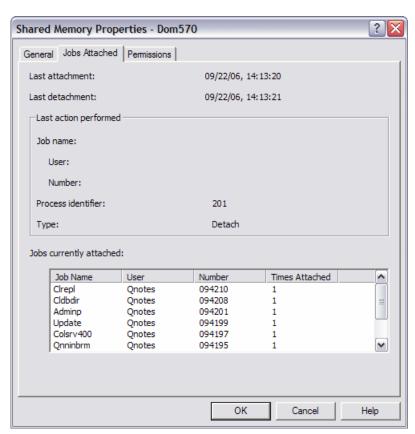


Figure 8-14 Shared memory properties

#### Using a 5250 session to view shared memory or semaphores

You may prefer to use the i5/OS command line to view shared memory or semaphores. Listed below is how this can be accomplished. Ways also exist to clear or delete the shared memory or semaphores but are not covered in this book as the margin for error outweighs the need for showing how this is done. Instead the DLTDOMSMEM and DLTDOMSEM CL commands first mentioned in this section should be used. Perform the following steps:

- 1. Using a 5250 emulation session, sign on to your System i machine.
- 2. With the Domino server(s) ended, on an i5/OS command line type the following command:

```
CALL PGM(QPOZIPCS) PARM('-Emsa')
```

- 3. This command will create a spooled file with the file name of IPCS which you can access using the Work with Spool Files (WRKSPLF) command or the Work with Jobs (WRKJOB) and option 4.
- 4. You will want to note entries were QNOTES is the owner. Sample output from the command will look like what is shown in Figure 8-15.

IPC STATUS AS OF Thu Nov 16 16:35:32 2006 SHARED MEMORY:						
T	ID KEY	MODE	OWNER	GROUP	CREATOR	CGROUP
M	1792 0XF800903E	3RW-RW		*NONE	QNOTES	*NONE
М	128 0X2A00E4A8	3RWRW-	QNOTES	*NONE	QNOTES	*NONE
М	1793 0XF8009030	:RW-RW	QNOTES	*NONE	QNOTES	*NONE
М	129 0X2A00E4A9	RWRW-	QNOTES	*NONE	QNOTES	*NONE
М	1 0X00000000	T-RW-RW	QSYS	*NONE	QSYS	*NONE
ATT	ACH LIST:					
NUM	ATT APID					
	1 58					
M	898 0XF800901E	3RW-RW	QNOTES	*NONE	QNOTES	*NONE
М	130 0X2A00E4AA	RWRW-	QNOTES	*NONE	QNOTES	*NONE
М	899 0XF8009010	:RW-RW	QNOTES	*NONE	QNOTES	*NONE
М	259 0X2A00E560	:RWRW-	QNOTES	*NONE	QNOTES	*NONE
М	131 0X2A00E4AE	3RWRW-	QNOTES	*NONE	QNOTES	*NONE
М	900 0XF8009010	RW-RW	QNOTES	*NONE	QNOTES	*NONE
М	132 0X2A00E4A0	:RWRW-	QNOTES	*NONE	QNOTES	*NONE
М	901 0XF800901E	RW-RW	QNOTES	*NONE	QNOTES	*NONE
	510.0	<b>510 1 6</b> 1	500 B. I.	504.44		
F3=Exit	F12=Cancel	F19=Left	F20=Right	F24=More keys		

Figure 8-15 Sample output from CALL QP0ZIPCS command

# 8.2 Domino server hangs and slowdowns

Describing your Domino server as being in a hung state generally means that the server is unresponsive. By this we mean you cannot enter commands on the Domino server console or if you can enter commands no data is returned from them. In this frozen state, no new connections are allowed and the existing connections are unresponsive or dropping off and not reconnecting again. This is occurring even though it appears all of the tasks in the Domino subsystem are active and working but unfortunately the uptime of the server is not serving any real purpose. A slowdown is quite similar but varies in that the Domino server console is still responsive and some work is getting down but client response time is poor and the Domino server appears sluggish.

What is important to note here is the Domino server could be hung or slowing down for a number of reasons and so it's best to check some things before rushing in to end the current life cycle of the active server.

- There could be a system resource issue. A runaway task may be causing CPU spikes (use WRKACTJOB or WRKSYSACT if the command is available).
- ▶ There could an unbalanced or even failing disk unit (use WRKDSKSTS).

- ► There could be a BRMS backup or some other process holding a lock on a critical object which might eventually clear or perhaps some bad coding in a Java servlet hungry on memory (use WRKACTJOB).
- Memory in the \*BASE pool may have been exasperated due to some irregular functionality or all active threads in the pool used up (use WRKSYSSTS).
- It could be a network issue or a faulty Ethernet card in the System i machine (use NETSTAT).

## 8.2.1 What data to collect to provide to Lotus Support

Ideally, the following debug will have been set on the Domino server prior to the reported hang or slowdown. If this is the first time the issue has occurred then likely the settings won't have been enabled and determining root cause will likely not be possible. In order to properly debug a slowdown or hang the following NOTES.INI parameters need to be set and the Domino server restarted:

- ► DEBUG\_SHOW\_TIMEOUT=1
- ► DEBUG CAPTURE TIMEOUT=10
- ► DEBUG\_THREADID=1
- ▶ CONSOLE LOG ENABLED=1

When the above parameters are enabled, semaphore related activity will be populated to the console log as well to a file called SEMDEBUG.TXT which exists in the IBM\_TECHNICAL\_SUPPORT subdirectory of the Domino server in question. If the hang or slowdown is related to semaphore activity, this populated file will be instrumental in determining root cause of the problem.

If semaphore time outs are encountered on your Domino server, you will see entries like those shown in Figure 8-16 posted to the Domino server console log as well as within the SEMDEBUG.TXT file.

```
THREAD [02AB:0123] WAITING FOR FRWSEM 0x030B Collection semaphore (@0BE65A20) (R=0,W=1,WRITER=0080:015E,1STREADER=0000:0000) FOR 30000 ms

THREAD [01FE:0220] WAITING FOR FRWSEM 0x0244 open database semaphore (@00ECBDD2)

(R=0,W=1,WRITER=0080:015E,1STREADER=0000:0000) FOR 30000 ms
```

Figure 8-16 Semaphore timeout example

In addition to the above debug, when a hang or slowdown condition occurs you will want to perform the following actions:

 Issue the Dump Domino Server Call Stack (DMPDOMSVRC) command and specify the affected Domino server. This will dump the thread activity for all Domino jobs to i5/OS spool files.

**Note:** As mentioned earlier, starting with Domino 7.0.2, the ease of collecting or working with data is greater. You can optionally dump the Domino server call stacks using option 16 (Dump server call stacks) from WRKDOMSVR display.

If the Domino server console is still responsive to commands try issuing the show task
debug command and pressing F5 to see if the results are displayed. Optionally if you
chose not to have enabled console logging then you can instead press F6 to print out the
results to a spool file which can later be reviewed.

3. If the hang or slowdown is possibly related to the HTTP task then you should issue the tell http show thread state to report what the threads are processing. Depending on what is found you may also be asked to enable HTTP thread logging.

**Note:** Prior to Domino 7, the functionality to dump Domino server thread activity or Domino job activity was only available after downloading a tool from the Domino for i5/OS Web site. Although you can still use this tool which provides the CL commands of DMPSVRSTKS and DMPDOMCLL when running Domino 7, the provided commands which reside in the QDOMINO7xx library (where xx is the release you are running, for 7.0.2 it would be QDOMINO702) should be used.

4. Once the above debug has been set and needed actions taken you will need to contact Lotus support and provide them the resulting data. The easiest way is most often to bring up iSeries Navigator and navigate to **Basic Operations** and then **Printer Output** (Figure 8-17).

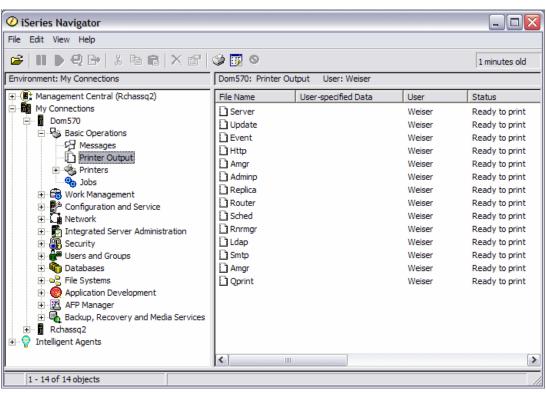


Figure 8-17 Viewing DMPDOMSVRC output via iSeries Navigator

5. From here you can simply right click on each spool file and drag to your PC's desktop to copy it locally and thus be able to provide as an email attachment to support. To retrieve the other needed files such as the console.log and semdebug.txt, navigate to File Systems → Integrated File System → Root to then delve down to your Domino server's IBM\_TECHNICAL\_SUPPORT subdirectory where the files reside. See Figure 8-18. Right click and drag them to your PC's desktop. You can then zip all the file together and send them to support.

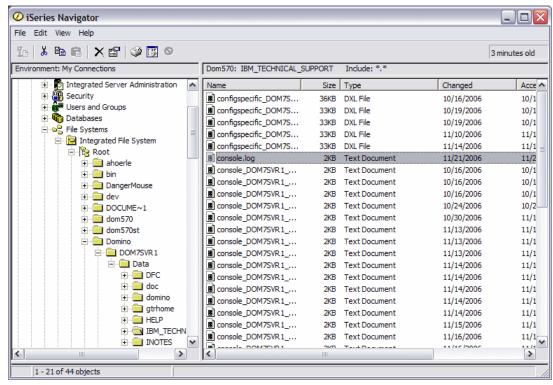


Figure 8-18 Locating console.log file using iSeries Navigator

# 8.2.2 A further explanation of semaphore debug

Domino thread id and semaphore debug is used in the following way. In a multitasking environment there is often a requirement to synchronize the execution of various tasks or ensure one process has been completed before another begins. This requirement is facilitated by the use of a software switch known as a semaphore or a flag. The function of this is to work in much the same way a railway signal would, only allowing one train on the track at a time. A semaphore timeout is where the railway signal has been set in one state too long, maybe because the train has broken down.

#### Example of a semaphore timeout

An example of a semaphore timeout in Domino is when the INDEXER task needs to completely rebuild an index, it locks a semaphore so that other tasks cannot use the index until it is rebuilt. If a user task now tries to open that index while it is being rebuilt, it will have to wait for the indexer to finish the rebuild and then unlock the semaphore. As a result, the user task is stuck until that semaphore is unlocked. While it is stuck waiting for the semaphore, it keeps track of how long it has been waiting. If it is stuck for more than 30 seconds, this is considered a semaphore timeout and in debug mode a message will be logged to the Domino server console.

Domino administrators often become alarmed at the presence of numerous semaphore appendages to the console log. This can be with good reason if the site is experiencing a performance hit and or Domino server hangs are common.

The task will continue to wait for the semaphore, timing out every 30 seconds, until the semaphore is unlocked or the task is ended. For most operations, a task might only wait a few microseconds and hence not time-out. With a complicated view on a large database, the task may have to wait several minutes for the index semaphore.

If an important semaphore is locked by a task and is never unlocked, all tasks can be stopped waiting for that semaphore. This can happen in several different ways. The most common is where a task locks the semaphore and then crashes. This can also happen if a task locks the semaphore and then goes into an endless loop or it gets an error and forgets to unlock it.

Semaphore deadlock can occur when two tasks try to lock two different semaphores in a different order. For example, Task A locks Semaphore 1 and then tries to lock Semaphore 2. In the meantime, Task B has already locked Semaphore 2 and is now trying to lock Semaphore 1. Task A is stuck waiting for Semaphore 2 and Task B is waiting for Semaphore 1. This is a deadlock situation.

### Determining if a semaphore timeout has occurred

If an issue is a semaphore timeout, at the Domino server console, you will see the sem.timeouts statistic. To view this statistic, type the following Domino server console command:

sh stat sem.timeouts

If the problem has occurred, you will see something similar to the following, depending upon the nature of the semaphore timeout:

Sem.Timeouts = 430D:58 OA13:42 O30B:28 O116:26 OA12:21

**Note:** The statistic sem.timeouts will not appear in the Statrep database if you are not experiencing semaphore timeouts.

The first number is the semaphore ID. The ID tells us what the semaphore is used for. For example, 0x030B is the collection semaphore used by Notes Index Facility (NIF). The second number is a decimal number which shows the number of times the semaphore timeout occurred. See Table 8-3 for a listing of semaphore IDs. It is not unusual in a heavily used server to get semaphore timeouts.

Table 8-3 Semaphore IDs

Semaphore	Function
0x0244	NSF per database semaphore
0x410F	OS File system semaphore
0x0266	NSF per-database full-text semaphore
0x4245	NSF database opening semaphore
0x030B	NIF collection semaphore
0x430D	NAMELookup semaphore
0x0A13	Log commit semaphore
0x0116	console semaphore

Semaphore	Function
0x0A12	Buffered log package semaphore
0x030B	Collection semaphore
0x4117	Handle table free chain consistency semaphore
0x0A0B	session table semaphore
0x4113	Handle table movement semaphore
0x33D5	AdminP's semaphore for ACL modification
0x5708	BSAFE semaphore (RSA encryption stuff)
0x0255	NSF B-Tree semaphore
0x0294	Directory Manager Queue semaphore
0x1120	Transfer queue lock semaphore
0x4253	internal control semaphore

## 8.3 Performance

To properly investigate a performance problem, a Domino administrator needs to be familiar with their environment. This means they need to know what is considered normal CPU usage for their Domino servers. They need to know what is normal memory faulting for their Domino servers and they also need to know what is normal disk I/O for their Domino servers. This is what is considered a baseline. To better become familiar with the Domino environment on your System i machine, use the following performance checklist.

The performance checklist can be run through with just a few System i and Domino commands. These commands allow you to check most of the major i5/OS aspects that could affect you Domino server's performance.

You'll want to run the following i5/OS commands and write down the output/results. If you are unfamiliar with any of the commands or steps, contact Lotus support for assistance. Also, see Chapter 6, "Domino 7 performance tuning on i5/OS" on page 183 for details on how to perform the following steps.

- DSPSYSVAL SYSVAL(QMODEL)
  - Write down the model number of your System i machine.
- 2. WRKHDWRSC TYPE(\*PRC)
  - Write down the Processor Capacity Card and the Interactive Card information.
- DSPSYSVAL SYSVAL(QMAXACTLVL)
  - Make sure that this system value is set to \*NOMAX
- 4. WRKACTJOB
  - Write down the system CPU
  - Write down the CPU of individual Domino jobs
  - Write down the run priority of the Domino jobs
  - Write down the storage pool the Domino jobs are running in
- 5. WRKSYSSTS
  - Write down the paging/faulting in the \*MACHINE pool

- Write down the paging/faulting in the storage pool where Domino is running
- Write down any ineligible jobs in the storage pool where Domino is running
- Write down the % System ASP used and Current unprotected used values

#### 6. WRKDSKSTS

- Write down the % busy for the disk units in the ASP where Domino is running
- Write down any disk units that have a % Busy significantly higher than other units

#### 7. NETSTAT \*CNN

- Check port 1352 connections for any retransmissions
- 8. WRKDOMCSL SERVER(<ServerName>)
  - Run the Domino command: SHOW STAT SEM
  - Run the Domino command: SHOW SERVER
    - Check Peak # of sessions as too many sessions may indicate network issues
    - Check Transactions: No transactions might mean a Domino server hang.

## 8.3.1 High server workload

You notice that the CPU usage on your system is high and end user response times are poor. The following questions will help you qualify what is happening to the CPU:

- ▶ Is the CPU higher than you expect? Or is the CPU higher than it used to be?
- ▶ What was the CPU like yesterday? Last week?
- ► Have you seen CPU spikes in Domino job(s) previously? If so, which job and was there any pattern? Same time of day? Same day of the week?
- ▶ The high CPU usage could be caused by a loop or by a large spike in the amount of work that a job needs to process. For instance, if the ROUTER job starts taking a lot of CPU, the job could be looping on a single piece of e-mail (which is a problem) or someone might have just sent a mass mailing to 1000 users (which is normal because a mass mailing can cause the CPU to spike while it is delivering the messages).

# 8.3.2 Steps to take to find the root cause of high CPU

Start by determining the job(s) generating the extra CPU. If you have the iSeries Performance Tools (5722-PT1) loaded on the system, you can use the WRKSYSACT command.

**Note:** For more information on 5722PT1 tools reference 6.2.4, "Performance Tools for iSeries (5722-PT1)" on page 189.

This command will list all job threads and tasks on the system in order of CPU percentage with the threads taking the largest amount listed first.

Press the F10 key to refresh the statistics on the screen.

If the threads taking the most CPU are always the same, then these are the ones that should be noted. Write down the thread number, job name, job user, and job number.

If you do not have the iSeries Performance Tools (5722-PT1) loaded on the system, you can use the WRKACTJOB command to determine which jobs are taking large amounts of CPU. The difference between WRKSYSACT and WRKACTJOB is that WRKSYSACT will show both jobs and tasks. The WRKACTJOB command only shows jobs.

**Tip:** For more information on i5/OS command line performance commands see 6.2.1, "Performance and i5/OS commands" on page 187

Once you are on the Work with Active Jobs (WRKACTJOB) display, sort the jobs by CPU so the jobs taking the most CPU are at the top of the list. To do so:

- 1. Place the cursor on the CPU% column.
- 2. Press the F16 key to sort the jobs by CPU (shift and F4).
- Press F10 to watch the CPU changing and check if the same job(s) are always at the top of the list. If the process taking the most CPU is always the same, then this could be the job generating the excessive CPU. See Figure 8-19.

Write down the job name, job user, and job number which may be obtained by pressing the F11 key twice.

Work with Active Jobs 08/12/06					RCHAS10 16:23:10	
CPU %: 50	Elapsed tim	ne: 00	:45:43	Active job		10.23.10
Type options, press 9=Exclude 10=D <sup>-</sup> 12=Work with thre	splay call					
Opt Subsystem/Job SERVER HTTP STATS UPDATE SCHED ROUTER RNRMGR REPLICA QNNINSTS	User QNOTES	BCI	35.3 20.1 7.4 6.2 .1 .1	Function PGM-SERVER PGM-HTTP PGM-STATS PGM-UPDATE PGM-SCHED PGM-ROUTER PGM-RNRMGR PGM-REPLICA PGM-QNNINSTS		
More  Parameters or command  ===>  F3=Exit F5=Refresh F7=Find F10=Restart statistics  F11=Display elapsed data F12=Cancel F23=More options F24=More keys						

Figure 8-19 WRKACTJOB display, sorted by CPU %

Now that you have narrowed down the problem to a job(s), you must identify which thread(s) in that job is generating the extra CPU:

- 1. Run the WRKACTJOB command and find the job you identified earlier.
- 2. Type an option 5 (Work with) in front of that job and press Enter to work with the job information. On the Work with Job display, take note of the job number.
- 3. Type menu option 20 (Work with threads, if active) to display the threads in that job. If there are multiple threads running in this job, you must continue to check each individual

thread to identify which thread(s) is generating the extra CPU utilization. Under normal conditions a thread can periodically be seen entering and exiting a RUN status.

4. The Total CPU column indicates how much time (in seconds) that a particular thread has been in the processor.

**Note:** The value in the Total CPU column does not directly relate to the CPU percentage of the job.

If a thread is generating most of the extra CPU utilization, then you may notice it has a larger value in the Total CPU column than other threads. Or, you may notice that the thread is constantly in a RUN status. Remember, more than one thread may be responsible for the excess CPU.

Write down the thread identifier for the thread(s) you believe may be responsible for generating the extra CPU utilization.

Now that you have identified the job and the thread that may be generating the extra CPU, you should look at the thread's call stack and see if you can recognize what that thread is doing. This can be done a variety of ways:

- ▶ Using the Domino 7 Dump Job Call Stacks (DMPJOBCLLS) command
- ▶ Using the Dump Domino Server Call Stacks (DMPDOMSVRC) command
- ► The traditional method of option 20 (Work with threads, if active) from the Work with Job menu and then option 10 (Display call stack) from the Work with Threads display.

For example, when displaying what you believe is the offending server thread taking high CPU you see what is shown Figure 8-20.

Display Call Stack					
Job: SERVER User: QNOTES Num	nber: 081142		System: AS09		
Thread: 00000084					
		ILE	ILE		
Procedure	Statement	Module	program		
NSFNoteUpdateExtended2	0000000043	NTUPWRAP	LIBNOTES		
DbMonitorEvalNote	0000000596	MONITORS	LIBNOTES		
MonitorEvalNoteFP16DBCONTEXT_STRUCTUiU	19 000000730	MONITORS	LIBNOTES		
NSFComputeMainFormula2	0000001431	CNSFWRAP	LIBNOTES		
<pre>Eval7ComputeFv</pre>	0000001764	COMPUTE	LIBNOTES		
ComputeVariants8RootNodeFv	0000001397	COMPNODE	LIBNOTES		
ComputeVariants14AtFunctionNodeFv	0000001171	COMPNODE	LIBNOTES		
Execute10AtAbstractFv	0000001813	ATABSTRACT	LIBNOTES		
Abstract	000000001	ABSTRACT	LIBNOTES		
AbstractInternal	8000000008	ABSTRACT	LIBNOTES		
DoChunks	0000000005	ABSTRACT	LIBNOTES		
FindChunksInText	0000000021	CHUNK	LIBNOTES		
FindEndOfTextChunk	000000034	CHUNK	LIBNOTES		
NextLine		CHUNK	LIBNOTES		
Cstrpbrk	000000004	CSTR	LIBNOTES		
			Bottom		
F3=Exit F10=Update stack F11=Display instruction F12=Cancel					

Figure 8-20 Display Call Stack display

In the example call stack shown in Figure 8-19, notice the *DbMonitorEvalNote* procedure and the *FindChunksInText* procedure. Monitors are used for both kinds of mail rules that are set in an individual's mail file and mail rules that can be set for the entire Domino server in the Domino 7 code.

The procedure *FindChunksInText* sounds like the thread is searching for something in the text of a document. This call stack is telling you to look at mail rules (specifically, look for mail rules that may be searching the body or subject of an e-mail for certain words or phrases).

**Tip:** Usually, some procedure in the call stack will tell you what a particular thread is doing.

If you cannot identify the issue causing the excessive CPU at this point, then you need to gather some information/traces while the problem is occurring and contact Lotus Support.

Information and traces is explained in the following section.

## 8.3.3 Data to gather while the CPU is running high on your system

Perform the following steps to gather data while the CPU is running high on your system:

1. Collect the joblog for the job(s) you identified earlier in this section:

DSPJOBLOG JOB(xxxxxx/user/jobname) OUTPUT(\*PRINT)

Where xxxxxx is the six digit job number you noted prior. This command generates a spooled file called QPJOBLOG.

**Tip:** If the current logging level is insufficient you may be requested by Support to bump the logging level. This can be done using the following command:

chgjobd jobd(qusrnotes/subsystemname) log(4 00 \*seclvl)

- 2. Provide the following system value information from the following i5/OS commands:
  - DSPSYSVAL QMODEL System model number
  - DSPSYSVAL QPRCFEAT Processor feature
  - DSPSYSVAL QPRCMLTTSK Processor multitasking
  - DSPSYSVAL QPRFADJ Performance adjustment
- 3. Enter the following Domino server console commands so that the output gets written to the LOG.NSF and console log respectively:
  - SH SERVER DEBUG
  - SH USER
  - SH DIRECTORY
  - SH TRANSACTIONS
  - SH TASKS DEBUG
  - SH SCHED
  - SH STATS
  - SH MEMORY DUMP
  - TELL ROUTER SHOW QUEUE
  - TELL ROUTER LIST
  - TELL AMGR STATUS
  - TELL HTTP SHOW THREAD STATE

4. Make a copy of LOG.NSF from the Domino server whose job is taking the extra CPU. If you have console logging enabled, then you can send in the console log rather than the log.nsf.

Use a Lotus Notes client and open the LOG.NSF database of the Domino server generating the high CPU utilization. Select **File**  $\rightarrow$  **Database**  $\rightarrow$  **New Copy**. Make sure you change the new file name to something other than LOG.NSF.

5. Collect the system history log (QHST):

```
DSPLOG OUTPUT (*PRINT)
```

This command generates a spooled file called QPDSPLOG.

6. Gather the system operator message queue:

```
DSPMSG MSGQ(QSYSOPR) OUTPUT(*PRINT)
```

This command generates a spooled file called QPDSPMSG.

7. Generate a list of the program temporary fixes (PTF's) installed on the system:

```
DSPPTF OUTPUT (*PRINT)
```

This command generates a spooled file called QSYSPRT.

- 8. Dump the call stacks for the Domino server using the DMPDOMSVRC command. This creates spool files for each of the Domino server's jobs as well for the pid.nbf database.
- 9. Gather information about TCP/IP connections to the system:

```
NETSTAT *CNN
```

Press F6 to print the information on the Work with TCP/IP Connection Status display. This command generates a spooled file called NETSTAT.

10. Collect a TPROFS Performance Explorer Trace (PEX Trace) as long as you have more than 0.5 processing power on the LPAR:

**Tip:** For more information on TPROFS (PEX trace) refer to the Collecting and Analyzing PEX Trace Profile Data document:

http://www.ibm.com/servers/eserver/iseries/perfmgmt/pdf/tprof.pdf

a. Create a library to store the data in:

```
CRTLIB LIB(MYLIB)
```

- b. Add a PEX definition that describes the data you want to collect:
- CALL QCMD and press Enter.
- ADDPEXDFN DFN(JOB1) TYPE(\*TRACE) JOB((xxxxxx/user/jobname)) TASK(\*NONE)
   MAXSTG(100000) INTERVAL(1) TRCTYPE(\*SLTEVT) SLTEVT(\*YES) BASEVT(\*PMCO)

Where xxxxxx is the six digit job number you noted earlier in step 1.

The screen may report nothing but if you look at the lower level messages using DSPJOBLOG you will see your PEX definition is added. See Figure 8-21.

ADDPEXDFN DFN(JOB1) TYPE(\*TRACE) JOB((040153/USER/JOBNAME)) TASK(\*NONE) MA XSTG(100000) INTERVAL(1) TRCTYPE(\*SLTEVT) SLTEVT(\*YES) BASEVT((\*PMCO)) Member JOB1 added to file QAPEXDFN in QUSRSYS.

Member JOB1 file QAPEXDFN in QUSRSYS changed.

Definition JOB1 added.

Figure 8-21 Using DSPJOBLOG for your current session for lower level information

**Note:** This PEX definition is only good while the job you specified in the JOB parameter is running on the system. Once that job ends, this definition is useless. You can delete the definition using the following Remove PEX Definition (RMVPEXDFN) command:

RMVPEXDFN DFN(JOB1)

c. Start the PEX trace:

STRPEX SSNID(TRACE1) DFN(JOB1)

Let the trace run for 2-3 minutes while the CPU is high.

d. End the PEX trace:

SBMJOB CMD(ENDPEX SSNID(TRACE1) DTALIB(MYLIB)) JOB(ENDPEX)

e. Wait for the batch job to end before proceeding with the next step. Verify the status of the job using the following command:

**WRKSBMJOB** 

Wait for the job called ENDPEX to have a status of OUTQ.

f. If you have the Performance Tools for iSeries (5722-PT1) loaded on your system, then you can print out the PEX report:

```
SBMJOB CMD(PRTPEXRPT MBR(TRACE1) LIB(MYLIB) TYPE(*PROFILE) PROFILEOPT(*SAMPLECOUNT *PROCEDURE)) JOB(PRTPEX)
```

This command generates a spooled file called QPVPERPT in the batch job you submitted. In this example, the batch job you submitted is called PRTPEX. Use the command WRKJOB JOB(PRTPEX) to find the spool file.

If you do not have the Performance Tools for iSeries (5722-PT1) loaded on your system, then send the library containing the PEX data to Lotus Support.

# 8.3.4 Using iSeries Navigator to investigate a performance issue

Domino and System i administrators should be pro-active in monitoring performance over an allotted period of time. See 6.1, "Defining Domino 7 performance on the i5/OS" on page 184, where the methods and strategy are well documented.

However, in this instance we are using iSeries Navigator in much the same way to view statistical information such that was used to gather information in 8.3.3, "Data to gather while the CPU is running high on your system" on page 318 to toubleshoot a HTTP performance issue.

For example, the system CPU is running at 98 percent and the Domino server console is accepting but not responding to commands. Trying to open an HTTP session is taking a long time and eventually times out with no page to display. If you have iSeries Access for Windows installed on a client PC workstation and have configured Management Central (See 6.2.3, "Management Central" on page 189), then you may be amazed at what details you have to access using this interface. Perform the following steps to walk through some of these details:

- 1. Start the iSeries Navigator client on your workstation to see a list of System i machines available to you.
- 2. Click on the plus next to the system experiencing the performance issue.
- Right click on Work Management and select System Status.

4. On the System Status window (Figure 8-22) General tab, you can see the CPU usage, the total number of jobs in the system and those of which are active as well as the total of the disk space capacity and the percentage used.

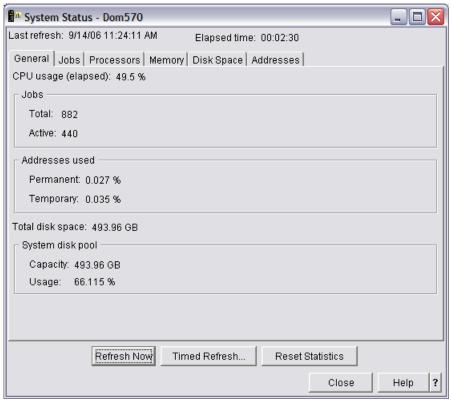


Figure 8-22 System status from iSeries Navigator

5. Under the Jobs tab, click the **Active Jobs** button. As shown in Figure 8-23, you see the Active Jobs window. If you click on a field (for example CPU %) it will list the processes lowest in CPU percentage to highest in CPU percentage from top to bottom. Double click on the column again to change the sort order from highest to lowest.

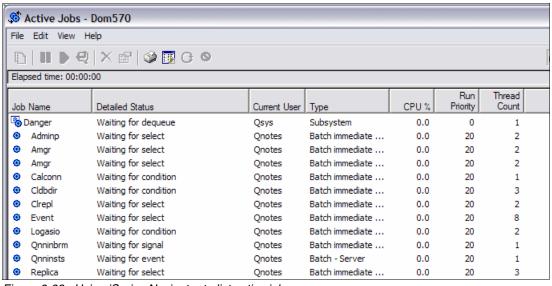


Figure 8-23 Using iSeries Navigator to list active jobs

6. To see further performance details of a job, right click on a job and select **Properties**. See Figure 8-24.

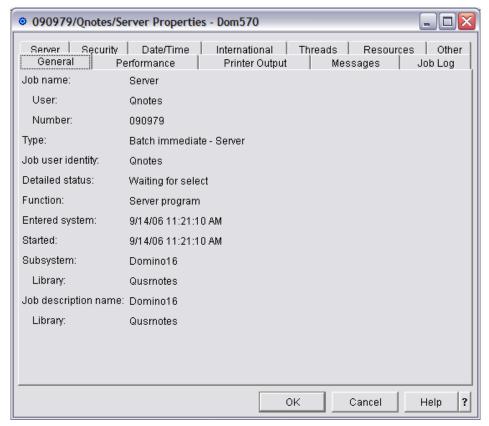


Figure 8-24 Job properties using iSeries Navigator

7. On the Properties window, click on the **Performance** tab and then click the **Elapsed Performance Statistics button**. You will now see a window like the one shown in Figure 8-25 showing detailed information about the job.

Table 8-4 details each of the statistics listed for the performance statistics calculated over elapsed time.

**Note:** The Average response time field and the Interactive transactions field will not display when the elapsed performance statistics are shown for a thread.

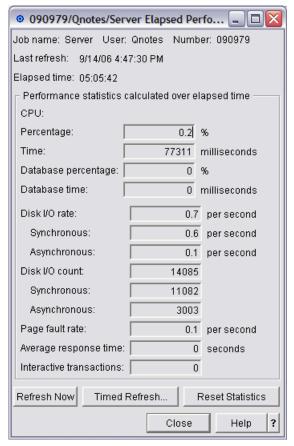


Figure 8-25 Elapsed performance statistics of a job

Table 8-4 Elapsed performance statistics

CPU statistic	Description
Percentage	The percentage of available processing unit time that is used by the job or thread during the elapsed time. For multiprocessor systems, this value is the average across all processors.
Time	The amount of processing unit time that is used by the job or thread during the elapsed time, in milliseconds.
Database percentage	The percentage of total processing unit that is used for database processing during the elapsed time. For multi-processor systems, this value is the average across all processors.
Database time	The amount of processing unit time that is used for database processing during the elapsed time, in milliseconds.
Disk I/O rate	The average number of disk input/output operations performed by the job or thread during the elapsed time, per second. This value is the sum of the asynchronous and synchronous disk input/output operations.
Disk I/O rate, Synchronous	The average number, per second, of synchronous (physical) disk I/O operations performed by a job or thread during the elapsed time. This value is the sum of the synchronous database and nonadjustable reads and writes.
Disk I/O rate, Asynchronous	The average number of asynchronous disk input/output operations performed by the job or thread during the elapsed time, per second. This value is the sum of the asynchronous database and non-database reads and writes.

CPU statistic	Description
Disk I/O count	The number of disk input/output operations performed by the job or thread during the elapsed time. This value is the sum of the asynchronous and synchronous disk input/output operations.
Disk I/O count, Synchronous	The number of synchronous (physical) disk I/O operations performed by the job or thread during the elapsed time. This value is the sum of the synchronous database and nondatabase reads and writes.
Disk I/O count, Asynchronous	The number of asynchronous (physical) disk I/O operations performed by the job or thread during the elapsed time. This value is the sum of the asynchronous database and nondatabase reads and writes.
Page fault rate	The average number of times, per second, that an active program references an address that is not in main storage during the elapsed time.
Average response time	The average interactive transaction response time for the job during the elapsed time, in seconds.
Interactive transactions	The number of user interactions for the job during the elapsed time. For example, the number of times a person pressed a function key.

- 8. Back on the Active Jobs window, other useful details about a job are available. If you right click on a job and select **Details**, you see a list of options as shown in Figure 8-26.
  - Call Stack displays the procedures being invoked by the initial thread of the job.
  - Library List displays the libraries in use by the selected job.
  - Locked Objects displays the initial locks and from this screen you will get the lock holders which is similar to the WRKOBJLCK command on the i5/OS command line.
  - Open Files allows you to view open library objects and open file system objects by the selected job.
  - Threads displays a list of all the threads after the initial thread of the job along with their status and the other invaluable properties pertaining to the job.
  - Transactions displays a list the transactions of the selected job.
  - Elapsed Performance Statistics displays detailed performance information for a job or thread as noted in the previous step.

Although each of these has it's own uses (and should be explored when time permits) in our example the one we'll be looking at further is the option for threads. Click **Threads**.

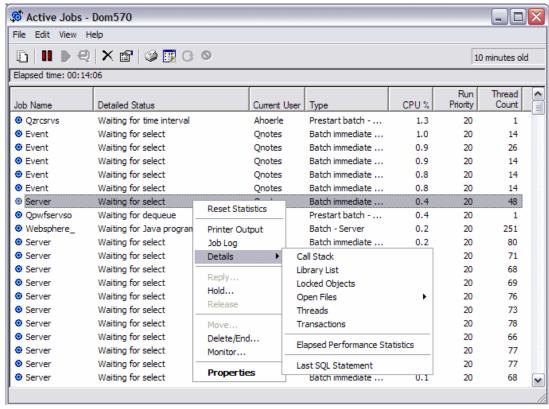


Figure 8-26 Job detail options from iSeries Navigator

9. On the Threads window that is displayed, locate the thread(s) taking the highest CPU, right click on it and select **Properties**. Again the CPU column can be sorted by double clicking on it. Take note of the details shown in the Thread Properties window (Figure 8-27), this may be important in indentifying the problem.

If a problem exists, often many of the threads will report waiting for lock while some appear to be running. If the thread remains waiting for an extended period of time, you can select the locked objects from the Details menu to view the object on which the thread is waiting to get a lock. You can then view the other jobs and threads that hold a lock on the object and are preventing this thread from getting its lock. For example, if a thread is trying to update an object in a database, and another thread tries to update that same object, a lock is put on the object, allowing only one thread to update at a time. The other thread has to wait until the first thread is done with the updates to be able to access that object. This is used to preserve the integrity of the data within the object.

Other possible thread status values are:

- Job Held
- Held (n)
- Stopped by a signal
- Waiting for save while active checkpoint
- Waiting for condition
- Waiting for dequeue
- Waiting for event
- Waiting for activity level
- Waiting for Java program
- Waiting for lock
- Waiting for lock space
- Waiting for mutex

- Waiting for select
- Waiting for semaphore
- Waiting for signal
- Waiting for thread
- Waiting for time interval
- Unknown

**Note:** When Waiting for lock is shown on a Thread Properties window, additional information that identifies the object being locked is displayed. When the object being locked is an i5/OS object, you will see a ten character object name, its library and the object type. When the object being locked is an internal object you will see a 30 character object name, its library, and its object type. Remember, for internal objects you need, Job Control special authority (\*JOBCTL) in order to see the 30 character name.



Figure 8-27 Thread properties using iSeries Navigator

# 8.4 Additional troubleshooting parameters

There is unfortunately no hard or fast rule concerning how to troubleshoot a Domino issue. So many variables exist that the best approach is to continually narrow the scope of the problem until you are confident you have determined root cause. Often this process involves turning on additional logging for the function you are investigating. If you encounter a situation and the problem is not self evident from the initial diagnostic data at hand, then Lotus support may present you with a set of debug parameters to further help in troubleshooting the situation.

Many NOTES.INI debug parameters exist. Listed below are only a small subset of the ones you may be asked to use to try and determine root cause of a problem. These debug parameters can be enabled by editing the Domino server's NOTES.INI file or via the set config Domino server console command.

**Attention:** The following debug parameters should only be used if you are already familiar with them or if advised to do so by Lotus support. Also note that some additional levels of setting might be available for any given parameter.

#### General debug parameters:

- ► Console\_Log\_Enabled=1 This is Domino's dynamic debug outfile for trapping error messages to a log file (other than the LOG.NSF). The console logging can be switched on and off with the commands start consolelog and stop consolelog.
- Console\_Log\_Max\_kbytes=100000 This parameter sets a size limit to the CONSOLE.LOG file. Setting it as shown would result in the CONSOLE.LOG file being limited to 100 MB in size. Upon hitting that limit it would then wrap.
- ▶ **Debug\_Threadid=1** Enabling this debug parameter provides further information about each entry posted to the Domino server console to include job number, process id (PID), and thread number. This can be extremely useful when combined with other utilities to determine the last activity by a thread prior to a crash or what a particular thread was doing during a hang or slowdown situation.
- ► Log\_View\_Events=1 This records to the console whenever views are rebuilt.

#### Hang debug parameters:

- ▶ **Debug\_Show\_Timeout=1** This parameter, combined with the following parameter, allows for the population of a file called SEMDEBUG.TXT which exists in the IBM\_TECHNICAL\_SUPPORT subdirectory and is vital to determining root cause for server slowdowns or hangs.
- ► Debug\_Capture\_Timeout=10 This parameter, combined with the above parameter, allows for the population of a file called SEMDEBUG.TXT which exists in the IBM\_TECHNICAL\_SUPPORT subdirectory and is vital to determining root cause for server slowdowns or hangs.

#### SMTP debug parameters:

- SMTPDebug=4 Enabling this debug parameter logs all inbound SMTP protocol conversations to include commands and responses as well as some of the text but not the body of messages.
- SMTPDebugIO=3 This debug parameter is used to log all data received by the SMTP listener task.
- ► SMTPClientDebug=1 This debug parameter is used to log all outgoing SMTP protocol conversations for all external messages transferred by the Router task.
- ► SMTPDebugControls=3 Assists in determining a variety of issues involving SMTP to include reverse DNS queries and Blacklists.
- ► SMTPDebugDNSBL=1 Assists in determining issues when utilizing Blacklists function.
- SMTPSaveImportErrors=3 Provides the SMTP listener task to save all inbound messages during import and then delete all the messages which have been successfully received and written to the mail.box. This will leave only the messages that fail to be imported in the mail.box and they will be saved to a temp file for review.
- ► MIME\_Save\_Convert\_Failures=1 Enabling this setting results in the copying of any messages that failed conversion to a separate database called CFDB.NSF.

#### Mail routing debug parameters:

► Log\_MailRouting=40 This posts to the Domino console all transfer messages, message queues, and full document information involving mail.box.

- DebugRouter=3 This debug parameter also increases the logging level for Router activity.
- ▶ **Debug\_TCP\_Resolver=1** This debug parameter bumps the logging of the TCPIP name lookup function and assists in determining DNS issues.
- Debug\_Directory\_Assistance=1 Provides for high level logging of directory assistance activities.
- ▶ **Debug\_NameLookup=1** Enhances the logging of the namelookup function.
- ▶ **DebugRouterLookUp=3** Displays how the Router task resolves a name lookup.

#### Agent manager debug parameters:

- ▶ **Debug\_AMGR=\*** Increases all aspects of logging for the Agent Manager task
- Log\_AgentManager=1 Specifies that the execution of partially and completely successful events are logged.

#### Update debug parameters:

- ► Log\_Update=2 Setting this debug parameter will post to the Domino console when the Indexer starts and stops as well when the Indexer updates views and full text indexes for specific databases. It also records the names of views being updated.
- ▶ **Debug\_NIF\_Update=1** Enabling this debug parameter provides for a report when an the Update task is started and stopped. This report includes the database name, the view name, as well as the user name of the update. Most importantly, if an error is encountered it will print out the error message during the rebuild/creation of the view involved.
- ▶ **Debug\_NIF=1** This parameter prints out information concerning the opening, closing, and updating of significant indexing events and should rarely be used due to the excessive output.

#### POP3 debug parameters:

- ► POP3Debug=4 Serves the same purpose as the SMTPDebug parameter except that it does so for the POP3 task.
- ► POP3DebugIO=3 Serves the same purpose as the SMTPDebugIO parameter except that it does so for the POP3 task.
- ► POP3ClientDebug=1 Serves the same purpose as the SMTPClientDebug parameter except that it logs the entire conversation for the POP3 task instead.

#### LDAP debug parameters:

► LDAPDebug=7 Bumps what is reported by the LDAP task to assist in lookups but also will have a potential performance impact on the LDAP server depending on usage.

#### ADMINP debug parameters:

▶ **Debug\_ADMINP=1** This debug parameter provides for the administration process to dump out its schedule information each time the schedule is updated.

#### Network and connectivity debug parameters:

- ▶ **Debug\_TCP\_All=1** Provides low level TCP/IP session information and should rarely be used to due to the amount of logging and possible impact to Domino server performance.
- ▶ **Debug\_TCP\_Errors=1** Similar to above parameter in that it provides low level information on TCP related errors that are encountered.
- ▶ Log\_Connections=1 When this debug parameter is set, the Domino server console will display the notes network port, the network address of the requesting system, and the network address of the destination server.

- ► Log\_Sessions=1 Enabling this parameter posts each individual session to the Domino server console and includes user and version of Notes client being used.
- ▶ **Debug\_TCP\_Session=1** This enables debug information about when sessions are opened and closed to the Domino server console.

Full text index debug parameters:

- Debug\_FTV\_Search=1 Displays information about full text searches and statistics.
- Debug\_FT\_Stream=1 Records every document that is full text indexed by the Domino server.
- ► **Debug\_FTV\_Index=1** Displays debug information about the indexer when updating full text indexes.

Replication debug parameters:

- ► Log\_Replication=4 This debug parameters specifies if the start and end of replication sessions are posted to the Domino server console. If using the value of 4, it will report replication all the way down to field level replication. Otherwise if setting to 3, it records down to note level and if set to 2 it will report activity at the database level.
- ▶ **Debug\_REPL\_Time=1** This parameter posts to the Domino server console the time the a replication action took.
- ▶ **Debug\_REPL\_All=2** This parameter gives additional information about each document that is not replicating.

HTTP debug parameters:

- HTTPAgentDebug=4 Used to help debug Java agents within HTTP.
- ► AgentThreadDebug=1 Assists in determining what HTTP agent is being processed at time of a server failure.
- ► HTTPEnableThreadDebug=1 Generates htthr files detailing all HTTP thread activity.
- ► HTTPLogFormatAscii=1Allows the HTTP log files to be written in ASCII instead of EBCDIC.
- ▶ **DebugShowJavaAgentTID=1** Allows for determination which worker/control thread spawns which Java thread when executing a Java agent as well as prints out the agent name.

Transaction logging debug parameters:

► **Debug\_RM\_Debug=1** This debug parameter reports high level information about the actions that the recovery manager is taking against each database.

Memory overwrite debug parameters:

 Debug\_Checkmarkers=1 This debug parameter is used to help diagnose memory overwrites.

Compact debug parameters:

► **Debug\_DBCompact=1** This debug parameter provides additional high level detail of the compact task activity.

Reports debug parameters:

Debug\_Reports=1 Allows for additional logging of reports run from the reports.nsf.

Memory related debug parameters:

- ▶ **Debug\_Showleaks=2** Enables memory usage tracking in conjunction with memory dumps to help determine if a leak exists.
- Debug\_TrapLeaks\_ShowStack=1 Assists in debugging potential memory leaks.
- NSD\_RUN\_MemCheck=1 Provides for memory related debug and is described in the next section.

#### 8.4.1 MEMCHECK

In a situation where it is not so easy to determine the boundaries of a hang, including MEMCHECK in the debug data may assist in determining the root cause of a problem. MEMCHECK provides indepth information about memory, memory pools and blocks and other system variables that could prove invaluable in such instances as a performance issue or a potential memory leak irrespective of the information included in an NSD.

MEMCHECK was added to the Domino for iSeries code at 6.0.5/6.5.4. Before those releases, MEMCHECK did not run on the iSeries platform.

There are two ways to trigger MEMCHECK on the System i platform:

- ► From the Domino server console type: load memcheck -k curr -d err -v 2
- ► Insert the notes.ini variable: NSD RUN MEMCHECK=1

The first method is a Domino server console command. The last parameter in the string (-v 2) is the verbose level of the output. This can be 1, 2, 3, or 4. Running this Domino server console command creates a text file in the IBM\_TECHNICAL\_SUPPORT subdirectory called: memcheck\_mm\_dd\_yy@hh\_nn\_ss.log (where mm is month, dd is day, yy is year, hh is hour, nn is minute, and ss is second).

The second method is a Domino server NOTES.INI parameter. If a Domino server crash occurs when this parameter is set, then the MEMCHECK output is incorporated into the NSD file that is created.

You can invoke the Domino server console command to run MEMCHECK only or you can type LOAD NSD from the Domino server console. With the debug parameter active, MEMCHECK data is produced as part of an NSD also located in the IBM\_TECHNICAL\_SUPOPORT directory.

```
Browse : _20.log
Record: 1 of 7683 by 14
                                     Column: 1
                                                   96 by 79
Control:
....+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....
********Beginning of data******
Section: Notes Memory Analyzer (memcheck) (Time 17:07:20)
Arguments: QDOMINO702/MEMCHECK -k curr -d err -v 2
Copyright (c) IBM Corporation 1987, 2006. All Rights Reserved.
<@@ ----- Notes Memory Analyzer (memcheck) -> Shared Memory Analysis (Time
17:0
Open shared memory DPOOL key=0xf8000800
** Analyzing shared memory DPOOL 'key=0xf8000800' size=9460336
Number of Shared Pools = 13
Number of Small Shared Pools = 9
F3=Exit F10=Display Hex F12=Exit F15=Services F16=Repeat find
F19=Left F20=Right
```

Figure 8-28 Example of memcheck output



# 9

# Domino 7 backup and recovery using BRMS

The successful backup of data is vital for any production software solution. Without this capability, the cost of missing or lost data can be potentially a great hardship for any company. This chapter covers the System i solution of backing up Domino data using Backup, Recovery, and Media Services (BRMS) to provide for a 24x7 online solution.

BRMS is a separate, chargeable i5/OS product (5722-BR1) that can be purchased for use on any System i machine. It allows for both full and incremental backups and restores to tape devices, automated tape libraries, save files and TSM servers.

The objective of this chapter is to cover at a fairly high level, the backup and recovery process. We show both methods of using the graphical user interface of iSeries Navigator and by using a 5250 emulation session. This provides administrators the option of using either option to leverage the BRMS software to best save Domino for i5/OS data.

**Note:** For traditional built-in i5/OS save and restore features, which does not include the ability to save Domino servers while they are running, refer to the IBM Redbooks of *Lotus Domino for AS/400 R5: Implementation*, SG24-5592 or *Domino 6 for iSeries Best Practices Guide*, SG24-6937. Although both these publications reference older releases of Domino, they are still relevant for backing up your Domino 7 data.

BRMS supports the online backup of Domino servers while they are active. This online backup implies that the Domino server databases on i5/OS can be saved while they are in use and thus requires no save while active synchronization points. This is what is considered true online backup support.

The ability to first use Domino and BRMS together existed when Domino R5.0.2c was released. This provided for full online backups of Domino servers. Subsequently starting with R5.0.8.01, the ability to also perform incremental saves was added. The marriage between these two products has continued to build with the releases of Domino 6 and 6.5 and now with Domino 7.

Information in this chapter uses documentation provided from the BRMS Web page, the IBM Redbook *Domino 6 for iSeries Best Practices Guide*, SG24-6937 and Lotus technical documents. These resources are available at the following Web sites:

- ► IBM Systems iSeries Backup Recovery and Media Services for iSeries

  http://publib.boulder.ibm.com/infocenter/iseries/v5r4/topic/books/sc415345.pdf
- ► BRMS iSeries Navigator Client Student Guide V5R4

  http://www.ibm.com/servers/eserver/iseries/service/brms/pdf/StudentGuide54.pdf
- ► Domino 6 for iSeries Best Practices Guide, SG24-6937

http://www.redbooks.ibm.com/abstracts/sg246937.html?Open

► Lotus Software Knowledge base

http://www.ibm.com/software/lotus/support

**Note:** The BRMS software is a chargeable licensed program (5722BR1) and is shipped with every System i machine. It can be used and evaluated free of charge for seventy days. If you want to continue using the product, you should contact IBM Direct or your IBM Business partner to purchase the software.

## 9.1 BRMS and how it works with Domino

This section explains BRMS concepts and terminology. It then details how the BRMS product provides for the backing up of Domino data while the Domino server is active.

# 9.1.1 BRMS concepts

BRMS concepts are the fundamentals for understanding the terminology used and what they mean. This section briefly describes what some of the common terms are and how sometimes the same word mentioned in iSeries Navigator is slightly different from a 5250 emulation session.

**Media** A tape cartridge which will hold the saved data.

Media identifier A name given to a physical piece of media.

Media class A logical grouping of media with similar physical and/or logical

characteristics (for example, density).

Control group A group of items (for example, libraries or stream files) to back up as well as

the attributes associated with how to back them up. iSeries Navigator

references these control groups as *policies*.

Policies A set of defaults that are commonly used (for example device or media

class). Generally used defaults are in the BRMS system policy. Backup

related defaults are in the BRMS backup policy.

## 9.1.2 How Domino online backups work

Full online backups of a Domino server consist of database files and changes files. The changes files contain all updates to a database while it is being backed up. These two objects are bound together during the backup in order to provide for restoration of databases in the event of a recovery. Incremental online backups build on this by also including saves of the transaction logs.

BRMS uses a concept called a *package* to bind the backup of the databases to the changes files and associated transaction logs. When a full online backup is run, the Domino server uses the Package identifier (PKGID) parameter on the Save Object using BRM (SAVBRM) CL command to specify the package association between the databases and the changes files. During the backup, the Domino server also references the Recovery exit program (RCYEXITPGM) parameter to specify a Domino server exit program which BRMS then calls after the package is recovered.

Online backups of Domino servers are stored in the BRMS history information as packages. The number of elements in the package is determined by the type and number of online backups performed. In the case of full online backups, the package number is 2. For every subsequent incremental online backup, 1 is added to the full package number. The maximum package number is 99 which allows for a full online backup and 97 incremental online backups for each Domino server.

When you request BRMS to recover a Domino server database that was saved as a package, BRMS restores the entire package consisting of the database files, changes files and transaction logs. After these are all restored, BRMS calls the Domino server exit program which in turn applies the transaction log changes to the restored databases.

## 9.1.3 Configuring BRMS to work with Domino

This section explains the setup process of configuring BRMS to work with Domino on your System i machine and how to customize it for your environment. The initial requirement is to have the BRMS (5722BR1) licensed program installed along with a recent group PTF. For i5/OS V5R3 the BRMS group PTF identifier is SI23620 and for V5R4 it is SI23622.

For administrator or graphical user interface based restores, you need to have iSeries Navigator installed on a PC workstation and the BRMS plug-in installed to be able to save or restore data outside the traditional 5250 emulation session options.

### **Initializing BRMS**

When BRMS (5722BR1) is first installed on i5/OS, there will be nothing defined for it to run with Domino. The process for setup though is quite simple. If the Domino licensed program (5733LD7) is installed and a Domino server is already configured, you just need to issue either the Start Maintenance for BRM (STRMNTBRM) or Initialize BRMS (INZBRM) for \*DATA CL command to create the new Domino control groups that can be used or copied to backup your Domino server.

If you subsequently add additional Domino servers, you just need to rerun either of the above CL commands to have new corresponding control groups created for the new Domino servers.

For example, if you have one Domino server configured when you issue the Initialize BRMS (INZBRM) command, you will see the following two control groups created:

- QLTSDOM00 (which saves just the one Domino server)
- QLTSSVR (which saves all Domino servers)

If more Domino servers are configured and the initialize BRMS CL command rerun, you will see additional QLTSDOMxx BRMS control groups for each Domino server configured. An administrator then has the choice to save Domino servers individually or to save them all via the QLTSSVR control group. If neither of these are desired, a third option exists to create a new customized control group to save any combination of Domino servers within the control group.

**Note:** Any customization done to the automatically created BRMS control groups (that is the ones that start with the letter Q) will be overridden each time the Start Maintenance for BRM (STRMNTBRM) or Initialize BRMS (INZBRM) for \*DATA CL command is run. If you want to customize the control groups, they should be copied to another naming convention. Many administrators choose to create controls with the same name as the Domino server being saved or if saving multiple Domino servers the name of the control group will give an indication of its function.

By default, the types of objects that are backed up are files with extensions of \*.ns?, \*.nt?, and \*.box as they are the objects that are core to the function of your Domino server.

Although many customers find that the default BRMS control groups for their Domino servers are sufficient in saving the vital Domino data needed for disaster recovery, BRMS also provides the ability to fully customize the backup to include other integrated file system objects (for example notes.ini, jpeg files, or gif files) not saved by the initial Domino server control groups which saves only the databases, templates, and mail boxes.

**Attention:** When saving these other integrated file system objects, the Domino server should be ended.

Further details on how to customize the integration of BRMS with Domino is available at the following Web site:

http://www.ibm.com/servers/eserver/iseries/service/brms/dominitbrm.html

## 9.1.4 Save and restore scenarios of Domino data using BRMS

This section lists some common scenarios used to save Domino data and to recover Domino data via BRMS. Each scenario can be done using the iSeries Navigator client or a 5250 emulation session, depending on your choice being graphical or command line based.

Save scenarios include:

- Domino full online backup
- Domino incremental online backup

Restore scenarios from either full or incremental online backup include:

- Recovery to same Domino server with same name
- ► Recovery to same Domino server but with different name
- ► Recovery to different Domino server with same name
- ► Recovery to different Domino server with different name

As you can see, there are many options available for data recovery. For purposes of showing examples, we will only detail a few of the above scenarios. Although, being familiar with the process in general should hopefully allow you to logically perform any of them after reading this chapter.

In all examples shown in this chapter, the following software levels were used. Thus the screen captures in this chapter will reflect these software levels. If using different software levels your screens may vary.

- ▶ iSeries Navigator V5R4 with BRMS plug-in installed
- ► Domino server 7.0.2
- ▶ i5/OS V5R4

# 9.2 Performing a full online backup of a Domino server

This section shows you how to do a full online backup of a Domino server using BRMS through iSeries Navigator (see 9.2.1, "Using iSeries Navigator to perform the full online backup") as well as through a traditional 5250 emulation session (see 9.2.2, "Using a 5250 emulation session to perform the full backup" on page 341).

It should be understood, that periodic full offline backups of the System i machine itself either via traditional save methods or via BRMS is a must. Although the online backup of the Domino server via BRMS saves the Domino data, it will not provide for complete disaster recovery.

The information in this section also assumes that the setup of your BRMS environment is already complete and that your are familiar with BRMS in general. If not, refer to the following Backup Recovery and Media Services Web page for additional information:

http://www.ibm.com/servers/eserver/iseries/service/brms

**Note:** The setup required to provide for Domino full online backup is minimal. There is no need to enable transaction logging unless desired and there are no additional services required. As long as the Domino R7 (5733LD7) licensed program is installed on the system along with BRMS (5722BR1), the capability exists out of the box to run full online backups.

## 9.2.1 Using iSeries Navigator to perform the full online backup

In order to save your Domino server using iSeries Navigator, perform the following steps. These steps assume the initial setup with regard to media is already complete and BRMS has been configured to work with Domino on your system. See 9.1.3, "Configuring BRMS to work with Domino" on page 335for details.

1. From the iSeries Navigator client, expand **Backup**, **Recovery and Media Services** and select **Backup Policies** as shown in Figure 9-1.

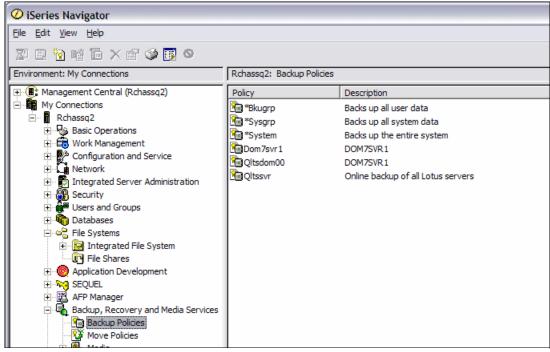


Figure 9-1 BRMS backup policies available via iSeries Navigator

2. As shown in Figure 9-2, right click on the Domino server policy in the right hand window and select **Run Now**.

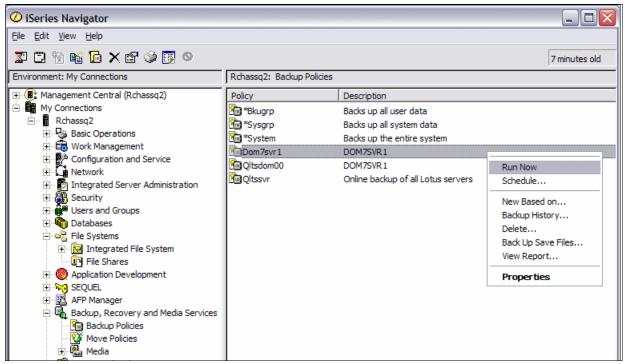


Figure 9-2 Starting the full online save of a Domino server

3. Immediately upon starting the full online save, unless you have changed the policy to not allow for overrides, the Run Backup Policy window (Figure 9-3) is shown. You are prompted to accept the default settings or change them. The default for a new backup policy is a full online backup and thus you only need to click **OK** to begin the save.

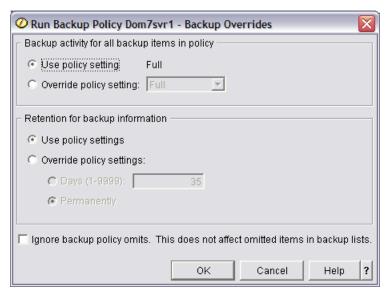


Figure 9-3 Option to override backup settings

4. You now see an initial screen stating that the status is starting and will then eventually change to the status of Completed (Figure 9-4).

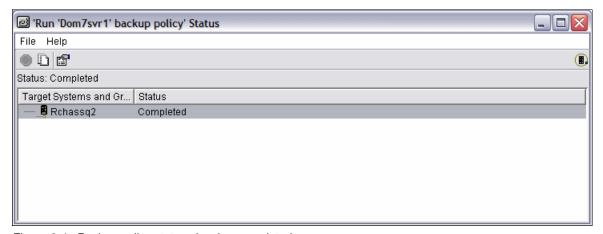


Figure 9-4 Backup policy status showing completed

5. To see what was saved, you can go back to your backup policies view (Figure 9-2 on page 338), right click on your policy and select the option for **Backup History**.

6. In the Backup History window (Figure 9-5) you can define what days you want to include or you can accept the default for all. Click **OK**.

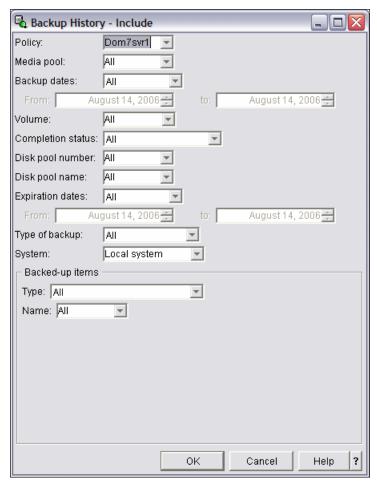


Figure 9-5 Backup history include options

7. The Backup History window (Figure 9-6) shows the results of prior saves.

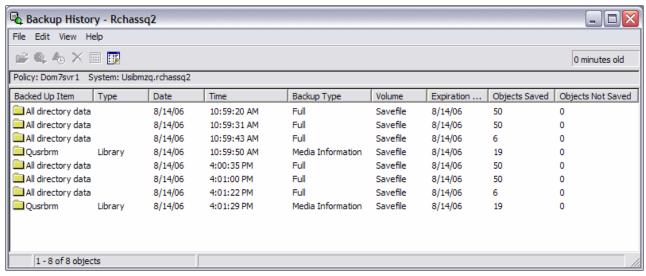


Figure 9-6 Backup history results

You have now performed a full online save of a Domino server using iSeries Navigator. If you want to see what was saved you can double click on the individual entries to verify which objects were backed up.

We will now cover the same function using a 5250 emulation session. If you need additional information on what functionality is available and how to better use iSeries Navigator with BRMS refer to the BRMS iSeries Navigator Client Student Guide V5R4 which is available on the following Web site:

http://www.ibm.com/servers/eserver/iseries/service/brms/pdf/StudentGuide54.pdf

## 9.2.2 Using a 5250 emulation session to perform the full backup

**Important:** The Save Domino Server using BRMS (SAVDOMBRM) CL command should never be used outside of a backup control group or policy. The command should only be used with \*EXIT entries within a BRMS backup control group or policy.

In order to save your Domino server using a 5250 emulation session, perform the following steps. These steps assume the initial setup with regard to media is already complete and BRMS has been configured to work with Domino on your system. See 9.1.3, "Configuring BRMS to work with Domino" on page 335for details.

- Start a 5250 session to your System i machine. On an i5/OS command line, enter the Start Backup using BRM (STRBKUBRM) CL command and press F4 to prompt the command.
- 2. On the Start Backup using BRM (STRBKUBRM) display (Figure 9-7), type the Domino server control group name in the Control group field and press Enter. In this example we are accepting the defaults and submitting the backup to batch.

```
Start Backup using BRM (STRBKUBRM)
Type choices, press Enter.
                                                *BKUGRP, *SYSGRP, *SYSTEM...
Control group . . . . . . > DOM7SVR1
Schedule time . . . . . . . . .
                                  *IMMED
                                                hhmm, *IMMED
Submit to batch . . . . . . . .
                                  *YES
                                                *YES, *CONSOLE, *CTLSBS, *NO
Starting sequence:
                                  *FIRST
 1-9999, *FIRST
 Library . . . . . . . . . . . . .
                                  *FIRST
                                               Name, *FIRST
Append to media . . . . . . .
                                  *CTLGRPATR
                                               *CTLGRPATR, *BKUPCY, *NO...
Job description . . . . . . . .
                                  *USRPRF
                                                Name, *USRPRF
                                                Name, *LIBL, *CURLIB
 Library . . . . . . . . . . . .
Job queue . . . . . . . . . . . . . .
                                  *J0BD
                                               Name, *JOBD
                                                Name, *LIBL, *CURLIB
 Library . . . . . . . . . . . .
Activity . . . . . . . . . . . .
                                  *CTLGRPATR
                                                *CTLGRPATR, *FULL, *INCR
Retention:
                                  *CTLGRPATR
                                               *CTLGRPATR, *DAYS, *PERM
 Retention type . . . . . . . .
 Retain media . . . . . . . . .
                                                1-9999
                                  *PROCESS
                                               *PROCESS, *IGNORE
Omits . . . . . . . . . . . . . . . .
                                                                      Bottom
         F4=Prompt F5=Refresh
F3=Exit
                                  F12=Cancel
                                               F13=How to use this display
F24=More keys
```

Figure 9-7 Start Backup using BRM (STRBKUBRM) CL command

 Check the status of the save by issuing the Work with Submitted Jobs (WRKSBMJOB) CL command to monitor status until it completes and goes to OUTQ status as shown in Figure 9-8.

```
Work with Submitted Jobs
                                                                   RCHASSQ2
                                                          08/14/06 16:55:55
Submitted from . . . . . . :
                                  *JOB
Type options, press Enter.
           3=Hold 4=End
                                          6=Release
 2=Change
                             5=Work with
                                                      7=Display message
 8=Work with spooled files
Opt Job
                User
                            Type
                                     ----Status---- Function
                WEISER
    DOM7SVR1
                            BATCH
                                    OUTQ
                                                                      Bottom
Parameters or command
===>
F3=Exit
            F4=Prompt
                        F5=Refresh
                                                  F11=Display schedule data
                                    F9=Retrieve
F12=Cancel
            F17=Top
                        F18=Bottom
```

Figure 9-8 Work with Submitted Jobs (WRKSBMJOB) results

4. To view the results of your save, issue the Work with Media Information (WRKMEDIBRM) CL command. As you can see from Figure 9-9, the Saved Item column on the Work with Media Information display reflects the name of the Domino subsystem and the Save Type reflects \*LTSONL which indicates a full online backup of a Domino server.

**Note:** In releases of i5/OS prior to V5R4 the saved item would indicate a type of \*LINK followed by the number 2 indicating the online backup was a full save.

```
Work with Media Information
                                                                  RCHASSQ2
 Position to Date . . . .
Type options, press Enter.
  2=Change 4=Remove 5=Display
                                   6=Work with media
                                                       7=Restore
  9=Work with saved objects
                         Save Save
   Saved
                                      Parallel Volume
                                                         File
                                                                    Expire
                Save
Opt Item
                Date
                        Time Type
                                      Devices Serial
                                                         Sequence
                                                                    Date
               8/15/06 14:30:32 *LTSONL
                                               *SAVF
                                                                    *NONE
   DOM7SVR1
                                                                0
   DOM7SVR1
               8/15/06 14:30:59 *LTSONL
                                               *SAVF
                                                                0
                                                                    *NONE
   DOM7SVR1
               8/15/06 14:31:23 *LTSONL
                                                                 0
                                                                    *NONE
                                               *SAVF
                                                                 0
                                                                    *NONE
   QUSRBRM
               8/15/06 14:31:30 *QBRM
                                               *SAVF
                                                                      Bottom
F3=Exit
          F5=Refresh
                       F11=Object detail
                                               F12=Cancel
F23=More options
```

Figure 9-9 Work with Media Information (WRKMEDIBRM) results

For further information on performing BRMS backups using a 5250 emulation session refer to Backup Recovery and Media Services for iSeries document:

http://publib.boulder.ibm.com/infocenter/iseries/v5r4/topic/books/sc415345.pdf

# 9.3 Performing a Domino incremental online backup

This section explains how a Domino incremental backup is performed using BRMS through iSeries Navigator (see 9.3.2, "Using iSeries Navigator to perform an incremental backup" on page 351) as well as through a 5250 emulation session (see 9.3.3, "Using a 5250 emulation session to perform an incremental backup" on page 352).

It should be understood that periodic full offline backups of the System i machine itself using either traditional save methods or using BRMS is a must. Although the online backup of the Domino server via BRMS saves the Domino data it will not provide for complete disaster recovery.

**Important:** If you are doing one full online save weekly of your Domino servers and then daily incremental online backups. You need to consider that an incremental save needs to be done immediately prior to the full online save in order to provide point-in-time (PIT) recovery. Otherwise, there will be window that PIT can not be accomplished.

The main reasons that administrators implement incremental saves include:

- Ability to recover a database to a specific point-in-time
- ► To speed up the duration of the save as incremental backups only save objects that have changed
- ▶ To reduce the number of tapes required for the save, which can reduce retention costs

The information in this section also assumes that the setup of your BRMS environment is already complete and that your are familiar with BRMS in general. If not, refer to the following Backup Recovery and Media Services Web page for additional information:

http://www.ibm.com/servers/eserver/iseries/service/brms

# 9.3.1 Changes required to provide for Domino incremental backups

The following configuration changes are required regardless of whether you plan to perform the incremental backups and recoveries using iSeries Navigator or a 5250 emulation session:

- Archival transaction logging must be enabled
- ▶ The BRMS additional service must be added to the Domino server
- The control group or policy configured to perform incremental backups must be updated

**Note:** For further information on transaction logging refer to the help database (help7\_admin.nsf) within the Domino Administrator client.

## **Enabling archival style transaction logging**

Perform the following steps to enable archival style transaction logging:

 From the Domino Administrator client, edit the Domino server document and click on the Transactional Logging tab (Figure 9-10).



Figure 9-10 Domino server document, Transactional Logging tab

If the Transactional logging field is set to Disabled, you will need change to Enabled. You are then prompted to change the settings. Change the Logging style field to Archived (Figure 9-11).

**Note:** If you currently have transaction logging enabled for a style other than archival, you will need to change and restart the Domino server when time permits.

When enabling for transaction logging, you will be suggested to place your logs on a separate drive. Due to the System i machine architecture for single level storage this has been found not to lead to any additional performance gains and thus due to simplifying the environment, it is suggested you take the defaults to create the logs on the same auxiliary storage pool (ASP).



Figure 9-11 Transactional logging set to archived style

3. The Domino server will now need to be ended and restarted for the transaction logging change to take effect. When the Domino server is ended you should take this opportunity to then add \*BRMS as additional service to your Domino server. See the next section.

## Adding the BRMS additional service to the Domino server

Adding the BRMS additional service to the Domino server can be done using either iSeries Navigator or a 5250 emulation session.

## Using iSeries Navigator

To make the change using Series Navigator, perform the following steps:

- Start iSeries Navigator to your System i machine and click Network → Servers → Domino.
- 2. Make sure your Domino server is ended and then right click on your Domino server and select **Properties**.
- 3. On the Domino server Properties window (Figure 9-12), click on the **Services** tab.

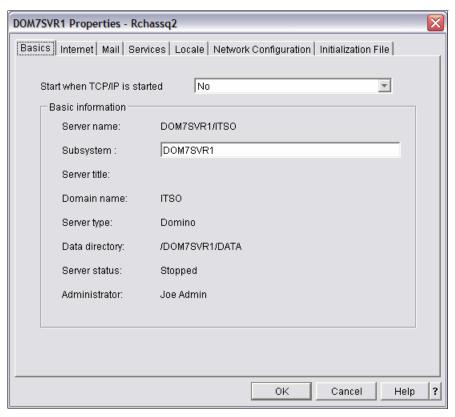


Figure 9-12 Domino server properties using iSeries Navigator

4. Select Backup, Recovery and Media Services in the Disabled column, click on the **Enable** button and then click **OK**.

#### Using a 5250 emulation session

To add the BRMS additional service to the Domino server using a 5250 emulation session, perform the following steps:

1. Sign on to the 5250 emulation session and end the Domino server by using the following End Domino Server (ENDDOMSVR) CL command:

ENDDOMSVR SERVER (servername)

- 2. Type CHGDOMSVR SERVER(servername) and press F4 to prompt the command.
- 3. On the Change Domino Server (CHGDOMSVR) display (Figure 9-13), page down to the Additional services field and enter \*BRMS. Press Enter to save your changes.

**Note:** The \*BRMS additional service is only required for incremental saves. This will be reflected by the adding of QNNINBRM to the ServerTasks line of the Domino server's notes.ini file. If this service is enabled and transaction logging is not enabled or is not set to archival style, you will receive a message indicating Error 11 occurred in QNNINBRM upon startup of your Domino server.

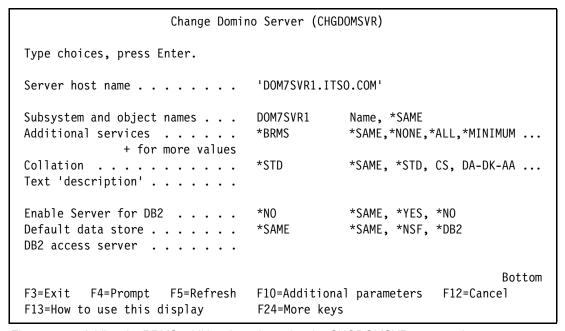


Figure 9-13 Adding the BRMS additional service using the CHGDOMSVR command

## Updating a BRMS backup policy

The control group or policy configured to perform incremental backups must be updated. In this section we show you how to do this first using iSeries Navigator and then from a 5250 emulation session.

#### Using iSeries Navigator

Perform the following steps using iSeries Navigator to update your BRMS backup policy:

1. Start iSeries Navigator and expand the **Backup**, **Recovery and Media Services** section. Select **Backup Policies**.

2. As shown in Figure 9-14, right click on the Domino server policy in the right hand window and select **Properties**.

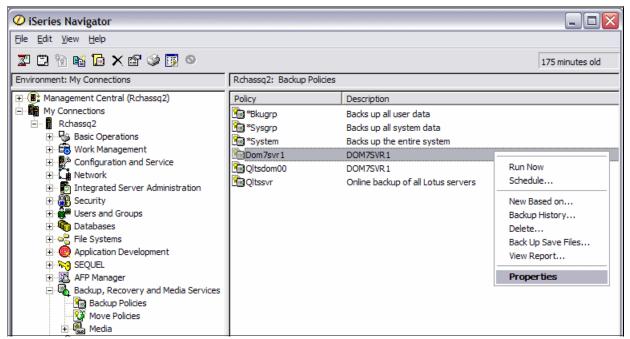


Figure 9-14 Selecting the backup policy Properties option from iSeries Navigator

3. On the Domino Policy Properties window (Figure 9-15), click the **During** button to proceed.

**Note:** If receiving a BRMS warning regarding the formatting of the policy, click **OK** as this is normal the first time the policy is viewed or used via iSeries Navigator.

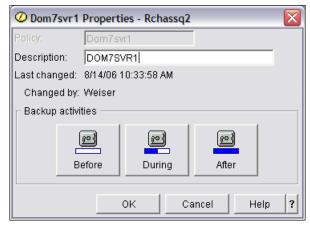


Figure 9-15 Domino Policy Properties window

4. On the During Backup window (Figure 9-16), click on the **Activity** tab and select the radio button for **Customized**. Then click the **Customize** button.

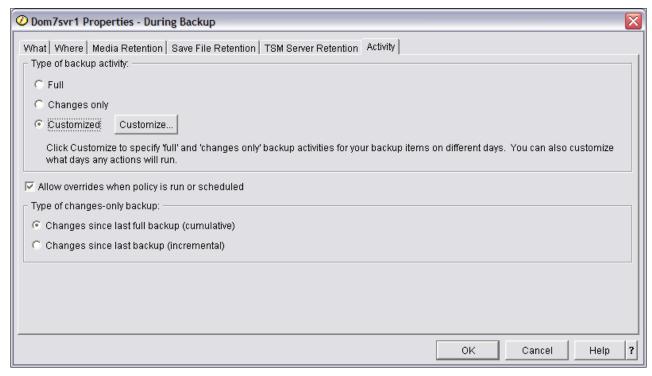


Figure 9-16 Domino Policy Properties - During Backup window - Activity tab

5. The Activity - Customize window (Figure 9-17) is shown. Our example shows that each day is currently set to perform a full online backup which are the default settings.

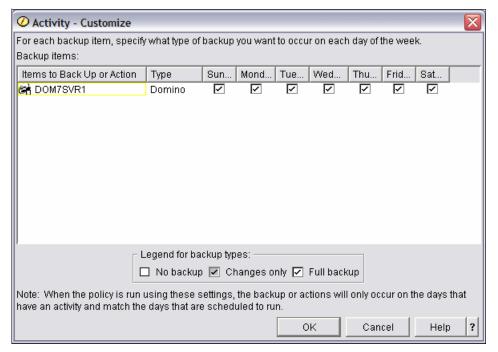


Figure 9-17 Activity - Customize window

6. For our example, we chose to leave Sunday for a full online backup but changed the remaining days of the week to perform incremental online backups instead. To change each day you must click on the associated box twice. See Figure 9-18. Click **OK** three times to save your changes.

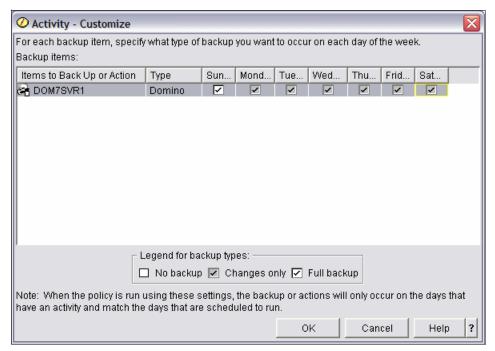


Figure 9-18 Customizing backup activity for incrementals

You have now configured your backup policy using iSeries Navigator to implement incremental backups.

## Using a 5250 emulation session

Perform the following steps using a 5250 emulation session to update your BRMS backup control group (otherwise referred to in the graphical user interface terms as a backup policy).

 Start a 5250 session to your System i machine and issue the Work with Backup Control Groups (WRKCTLGBRM) CL command to modify your backup control group to provide for incremental saves (Figure 9-19).

```
Work with Backup Control Groups
                                                              RCHASSQ2
Position to . . . . .
                                   Starting characters
Type options, press Enter
                                         4=Delete
 1=Create
           2=Edit entries
                             3=Copy
                                                   5=Display
 6=Add to schedule 8=Change attributes
                                        9=Subsystems to process ...
              Full
                        Incr
                                    Weekly
   Control
              Media
                       Media
                                    Activity
Opt Group
              Policy Policy
                                    SMTWTFS Text
   *BKUGRP
              *BKUPCY
                        *BKUPCY
                                    *BKUPCY Backs up all user data
   *SYSGRP
              SAVSYS
                         SAVSYS
                                    *BKUPCY Backs up all system data
                        SYSTEM
   *SYSTEM
              SYSTEM
                                    *BKUPCY Backs up the entire system
2 DOM7SVR1
              SAVF
                        Z060814002 *BKUPCY D0M7SVR1
   QLTSD0M00
              Z060814000 Z060814001 *BKUPCY D0M7SVR1
   QLTSSVR
              QLTSSVR
                      QLTSSVR
                                    *BKUPCY Online backup of all Lotus ser
                                                                   Bottom
F3=Exit
            F5=Refresh
                        F7=Work with BRM scheduled jobs
F9=Change backup policy
                        F23=More options
                                          F24=More keys
```

Figure 9-19 Work with Backup Control Groups display

2. Enter an option 2 (Edit entries) to edit your control group and press Enter.

3. On the Edit Backup Control Group Entries display, under the Weekly Activity column, the letter F's indicate that on those respective days you are currently scheduled to perform full online backups. Since we intending to perform incrementals backups, change the Monday through Saturday entries to the letter I (see Figure 9-20) to indicate an incremental save should now be taken. You will then need to press Enter and then F3 and then enter an option 1 to save the change.

**Note:** The entry under the Weekly Activity column may instead show \*DFTACT which corresponds to default activity. This will still need to be changed to the letter I for days you want to run incremental saves unless you instead choose to modify the system default activity itself.

```
Edit Backup Control Group Entries
                                                                RCHASSQ2
Group . . . . . . . . . . . . DOM7SVR1
Default activity . . . . *BKUPCY
Text . . . . . . . . DOM7SVR1
Type information, press Enter.
                       Auxiliary
                                  Weekly
                                            Retain Save
                                                             SWA
     Backup
                 List Storage
                                  Activity Object While
                                                             Message
                 Type Pool Device SMTWTFS
                                            Detail Active
Seq
     Items
                                                             Queue
 10 *EXIT
                                  FFFFFF
 20 *EXIT
                                  FIIIIII
 30 *EXIT
                                  FFFFFF
                                                                     Bottom
F3=Exit
          F5=Refresh
                        F10=Change item
                                          F11=Display exits
F12=Cancel
             F14=Display client omit status
                                              F24=More keys
```

Figure 9-20 Edit Backup Control Group Entries display

You have now configured your backup policy to implement incremental backups.

# 9.3.2 Using iSeries Navigator to perform an incremental backup

Perform the following steps to use iSeries Navigator to perform an incremental backup of a Domino server. This section assumes that the required setup was done as explained in 9.3.1, "Changes required to provide for Domino incremental backups" on page 343.

 Start iSeries Navigator and expand Backup, Recovery and Media Services. Then click on Backup Policies to see a list of available backup policies on the system. Right click on the desired policy and select Run Now as shown in Figure 9-2 on page 338. 2. You now see a Backup Overrides window indicating that your backup policy has been customized (Figure 9-21). Click **OK** to continue.

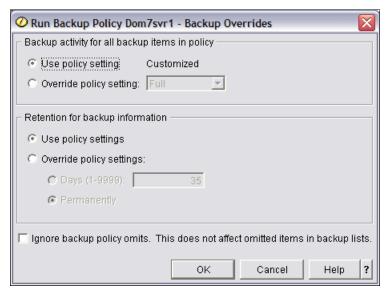


Figure 9-21 Backup Overrides reflecting Customized

3. This will take you to a window indicating the status of backup and it will eventually change to a status of Completed. See Figure 9-4 on page 339.

## 9.3.3 Using a 5250 emulation session to perform an incremental backup

This section assumes that the required setup has been done as explained in 9.3.1, "Changes required to provide for Domino incremental backups" on page 343 before using a 5250 emulation session to perform an incremental backup of a Domino server.

Once the setup of the BRMS control group has been completed, the steps to perform the incremental backup are the same as for a full online backup. From an i5/OS command line, the backup can be started using the Start Backup using BRM (STRBKUBRM) CL command. See 9.2.2, "Using a 5250 emulation session to perform the full backup" on page 341 for details.

# 9.4 Recovering data from a Domino full online backup

The first decision in any restore is what objects are needed to be recovered and where is the best place to restore the objects. When restoring Domino data, the first requirement is that the data needs to be restored to the data directory or subdirectory of a Domino server. Whether that Domino server is active or never started (for example a dummy server) is up to the administrator performing the restore.

There are advantages and disadvantages to both options. With a restore to the data directory or subdirectory of the original active Domino server, it can be assumed that the end user or users needing the data already have access to the server. Therefore access is not an issue. The problem lies in that restoring over an existing databases is not desired due to the potential for inconsistent results as it must first delete the database before the restore process can begin. Thus if restoring an object to the same location as it originally was located, the

existing database should first be deleted or renamed. In most cases, unless the database is totally corrupt it is better to rename it in case you have problems with the restore.

Another consideration when restoring to the same Domino server, is the fact that duplicate replica ID's now exist and replication between the two databases may occur and wipe out what was just recovered. If restored to a subdirectory of the original active server, the administrator does not need to worry about deleting or renaming the database but still needs to worry about the two replicas potentially replicating between themselves and possibly losing the recovered data. The obvious advantage being that the end user already knows the location of the database and will not have to browse for it.

Restoring Domino databases to a dummy server (one that is never started and solely used for data recovery purposes) has the advantage of not having to worry about replication issues and also due to the fact that if a restore should somehow fail to an active Domino server there could be problems as a result of that. If problems occur while restoring to a dummy server there is no potential impact to active users. Further, since the server is not active and can not be accessed from a Lotus Notes client, restoring to a dummy server allows the administrator to provide end users access to the data via the System i machine Net Server functionality. This is due to the fact that since the dummy server is never started, there is no issue with end users mapping drives to the data directory and any subdirectories. The end user with a mapped drive can then open the database as if it were local and retrieve the desired data. This requires administrator intervention to inform the end user of the location on the System i machine and also means that they must have a corresponding i5/OS user profile to access.

If the data is restored to another active Domino server that is in the same domain, the advantage is that the end user will already have access to the server and there should be little concern for the replica ID. One exception to this is if scheduled replication is done between the servers and the connection document includes replication for all databases. When putting the database on a different server, the end user will need to be informed of the new location of the database as well as have access to the Domino server.

In summary some of the advantages and disadvantages of each of the recovery methods discussed above are listed in Table 9-1.

Table 9-1	Comparison of Domino data recovery methods

Recovery method	Advantage	Disadvantage
Recovering Domino data to existing location of data	End user already knows location of the data.	Potential for deletion of existing file and restore process failing and all data is purged.
	Best used when existing database is corrupt and not usable.	Only provides for specific window in time. If only one document is needed, restoring over existing database is not very helpful.
Recovering Domino data to subdirectory of original active Domino server	No issue with deletion of the original database replica during recover.	Duplicate replica ID's on the same Domino server could lead to replication of non-desired data.
	End user already has access to Domino server via Lotus Notes client.	If problems occur during restore process it could affect the active Domino server.

Recovery method	Advantage	Disadvantage
Recovering Domino data to a dummy Domino server	No issue if problems occur during restore since the Domino server is never started.	End user needs to be made aware of the location of the data.
	End users can map network drive to access databases as if they were local on the PC workstation.	End user needs to have an i5/OS user profile and access to restore the database.
Recovering Domino data to another Domino server in the domain	No issue with duplicate replica IDs as long as connection documents are correctly setup.	If problems occur during the restore process, it could affect the active Domino server.
	End user already has access to Domino server via Lotus Notes client.	End users need to be told where data is located and require access to the other Domino server.

**Important:** If performing an incremental restore to a dummy Domino server or to another Domino server in the domain, extensive setup is required due to transactional logging. See the following Web page for details:

http://www.ibm.com/servers/eserver/iseries/service/brms/domRecoveryIncremental.html

## 9.4.1 Using iSeries Navigator to restore data from full online backup

In this example we are restoring a Domino database from a full online backup using the same name but to a different location than it existed originally. To do this using iSeries Navigator, perform the following steps:

1. Start iSeries Navigator and right click on **Backup**, **Recovery and Media Services**. Select the option for **Restore** as shown in Figure 9-22.

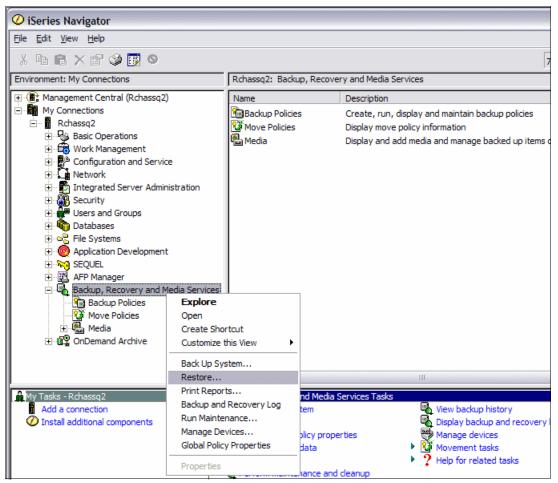


Figure 9-22 Starting the restore process from iSeries Navigator

- 2. Click **OK** on the Restore help screen.
- 3. On the Backup History Include window (Figure 9-23), since all Domino data resides in the i5/OS integrated file system, if looking to restore specific files you need to change the Backed-up items Type field to **Directories or files**. If you know the specific integrated file system directory, you can then specify that as well or just list the object name. Click **OK** to continue with the restore process.

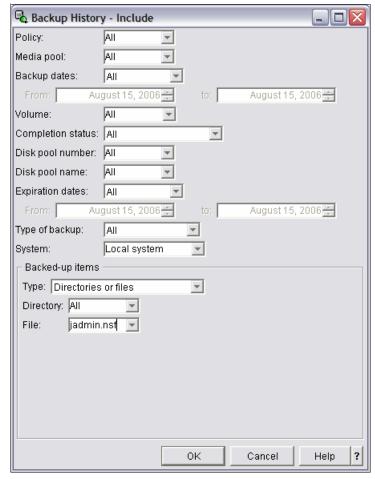


Figure 9-23 Backup history using Directories or files option

4. On the Backup History window (Figure 9-24), right click on the object to restore and select **Restore**. In our example, we right click on the jadmin.nsf database and select **Restore**.

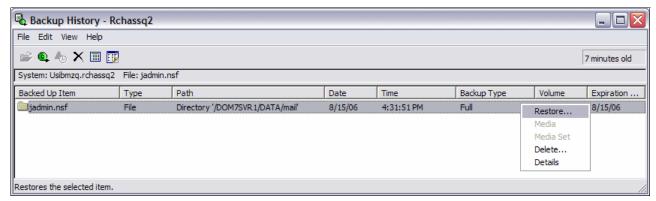


Figure 9-24 Recovering a specific file from the backup history

5. The Restore - Welcome window (Figure 9-25) of the Restore Wizard is shown. The Restore Wizard assists you in restoring the data. Click **Next**.

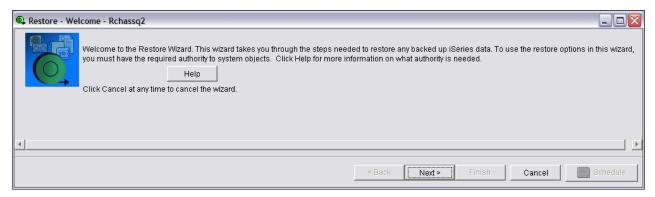


Figure 9-25 Restore Wizard

6. On the Restore - Restore Using Same Name window (Figure 9-26), you are prompted to decide if you want to restore to the same name or a new name. In this example we select Yes, use same name as we are recovering with the same file name but to a different location. Click Next.

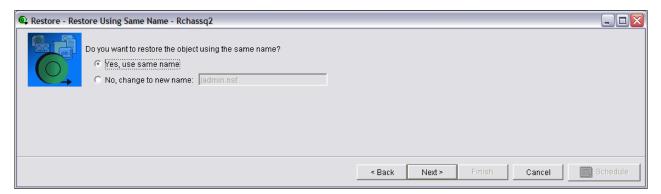


Figure 9-26 Restore using same name

 On the Restore - Restore to Same Location window (Figure 9-27) we select the No, restore to a different location option and then click Browse to the specify the new location to restore the data. Click Next.

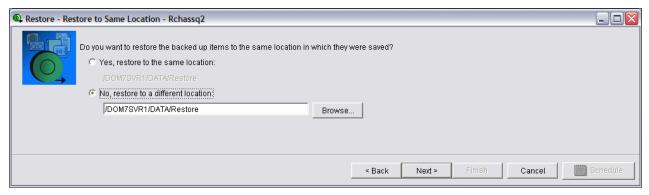


Figure 9-27 Restoring to a different location

8. On the Restore - Summary window (Figure 9-28), information is available in the Details button and further options exist via the Advanced Options and the Schedule buttons. In our example we are accepting the defaults and click **Finish**.

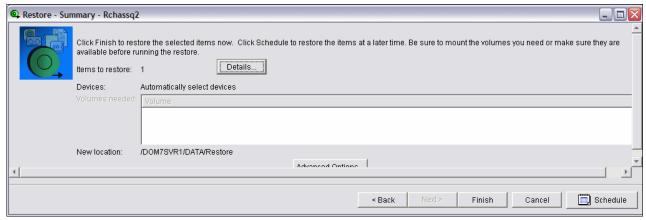


Figure 9-28 Restore summary window

9. On the Restore Items Status window (Figure 9-29), you will receive notification that the restore request is being processed and eventually a screen which states it was completed.

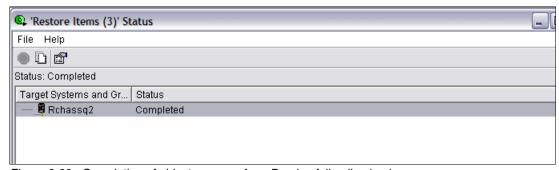


Figure 9-29 Completion of object recovery from Domino full online backup

## 9.4.2 Using a 5250 emulation session to restore data from a full online backup

In this example we are restoring a Domino database from a full online backup using the same name but to a different location than it existed originally. To do this using a 5250 emulation session, perform the following steps:

- Start a 5250 emulation session and from an i5/OS command line enter the Work with Link Information (WRKLNKBRM) CL command to specify the i5/OS integrated file system directory where the object resides or you can use the Work with Media Information (WRKMEDIBRM) CL command to browse through the save history. Since we know the location of the object to be restored, in this example we use the WRKLNKBRM command.
  - From an i5/OS command line issue the command WRKLNKBRM and press F4 to prompted the command.
- 2. On the Work with Link Information display, in the Directory field, specify the i5/OS integrated file system directory where the object you want to restore is located. Press Enter. See Figure 9-30.

**Note:** The WRKLNKBRM command, Directory field is case sensitive with regard to the i5/OS integrated file system directory.

```
Work with Link Information (WRKLNKBRM)
Type choices, press Enter.
Directory
                 . . . . . . . > '/DOM7SVR1/DATA/mail'
                                               *ALL, *FULL, *CUML, *INCR,
                                  *ALL
Save type
. . .
               + for more values
Select dates:
                                               Date, *BEGIN, *CURRENT, nnnnn
  From date . . . . . . . .
                                  *BEGIN
                                  *END
                                               Date, *END, *CURRENT, nnnnn
  To date . . . . . . . . . . . .
From system . . . . . . . . . . .
                                  *LCL
*, *PRINT
                                                                     Bottom
                     F5=Refresh
                                  F12=Cancel
F3=Exit
          F4=Prompt
                                              F13=How to use this display
F24=More keys
```

Figure 9-30 Work with Link Information (WRKLNKBRM) command display

3. On the Work with Link Information display, you see results as shown in Figure 9-31. Type an option 9 (Work with directory information) next to the desired link location and press Enter.

```
Work with Link Information
                                                                      RCHASSQ2
                                                            08/14/06 18:02:18
Type options, press Enter.
 4=Remove
           9=Work with directory information
0pt
        Directory
9
        /DOM7SVR1/DATA/mail
                                                                         Bottom
Command
===>
F3=Exit
         F4=Prompt
                      F5=Refresh
                                   F9=Retrieve
                                                 F12=Cancel
                                                              F17=Position to
F22=Display entire field
(C) COPYRIGHT IBM CORP. 1998, 2006. ALL RIGHTS RESERVED.
```

Figure 9-31 Results of WRKLNKBRM command

4. On the Work with Directory Information display, you need to continue to enter an option 9 to get down to the desired object to restore (Figure 9-32).

```
Work with Directory Information
                                                                     RCHASSQ2
                                                           08/14/06 18:05:54
Directory . . . :
                      /DOM7SVR1/DATA/mail
Type options, press Enter.
                                    9=Work with objects
 4=Remove
           5=Display
                        7=Restore
      Date
                 Time
                            Save
                                    Volume
                                               Expiration
                                                            Objects
                                                                        Not
0pt
      Saved
                 Saved
                            Type
                                    Serial
                                                  Date
                                                             Saved
                                                                       Saved
      08/14/06
                17:51:20
                           *FULL
                                    *SAVF
                                                08/14/06
                                                                  1
                                                                           0
                                                                        Bottom
Command
===>
F3=Exit
         F4=Prompt
                      F5=Refresh
                                 F9=Retrieve
                                                F12=Cancel
                                                              F17=Position to
F22=Display entire field
```

Figure 9-32 Work with Directory Information display

5. On the Work with Objects display, type an option 7 (Restore) next to the object to be restored and press Enter. In our example this the database jadmin.nsf. See Figure 9-33.

```
Work with Objects
                                                                    RCHASSQ2
                                                           08/14/06 18:09:13
                      /DOM7SVR1/DATA/mail
Directory . . . :
                      08/14/06 17:51:20
Saved date/time . :
Type options, press Enter.
 4=Remove
           5=Display 7=Restore
                                                Volume
                                                Serial
                                                                         Size
0pt
     0b.ject
     jadmin.nsf
                                                *SAVF
                                                                     18874368
                                                                       Bottom
Command
===>
F3=Exit
         F4=Prompt
                     F5=Refresh F9=Retrieve
                                                F12=Cancel
                                                             F17=Position to
F22=Display entire field
```

Figure 9-33 Work with Objects display

6. On the Select Recovery Items display (Figure 9-34), type an option 7 (Specify object) next to the saved item and press Enter.

```
Select Recovery Items
                                                                   RCHASSQ2
                                           Select action . . . . : *ALL
                                           Select volume
Type options, press Enter.
  1=Select
            4=Remove
                        5=Display 7=Specify object
                                                          File
   Saved
                                       Parallel Volume
                                                                      Expire
                Save
                         Save
                                Save
Opt Item
                Date
                         Time
                                Type
                                       Devices Serial
                                                          Sequence
                                                                      Date
7 DOM7SVR1 8/14/06 17:51:20 *LTSONL
                                             *SAVF
                                                                    8/14/06
                                                                        Bottom
                       F9=Recovery defaults
F3=Exit
          F5=Refresh
                                              F11=Object View
F12=Cancel
             F14=Submit to batch
                                   F16=Select
```

Figure 9-34 Recovering an object from a Domino full online backup

7. On the Restore Object display (Figure 9-35), you can specify a different name or location in which to restore the object. In our example we are restoring the jadmin.nsf database using the same name but to a different location. Press Enter.

```
Restore Object (RST)
Type choices, press Enter.
Objects:
           . . . . . . . . > /DOM7SVR1/DATA/mail/jadmin.nsf
                                             *INCLUDE, *OMIT
 Include or omit . . . . > *INCLUDE
 New object name . . . . . /DOM7SVR1/DATA/Restore/jadmin.nsf
 Name . . . . . . . . . . . . > '/QSYS.LIB'
 Include or omit . . . . . > *OMIT
                                             *INCLUDE, *OMIT
 New object name . . . . . .
                                *SAME
                                                                 More...
F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display
                                F24=More keys
```

Figure 9-35 Restoring Domino database using same name but different directory

8. A status screen will flash by like the one shown in Figure 9-36. Eventually you will be back to an i5/OS command line. To check the status of your restore you can issue the Display Job Log (DSPJOBLOG) CL command and press F10, then page up to verify the restore completed without error. Or you can check the i5/OS integrated file system directory that you restored the file to.

```
Select Recovery Items
                                                   RCHASSQ2
:
                   Display Recovery Items
                                                   RCHASSQ2:
                                                   18:19:24
   Remaining items . . . :
:
                                 1
                                 50
   Remaining objects . . . :
   Remaining size . . . :
                             .4096 M 100.0 %
: Saved
                         Save Volume
                                              Exp
                                                    Objects:
         Date Time
                         Type Serial File Seq
: Item
                                              Date
                                                     Saved
: *LINK
         8/14/06 17:51:38 *FULL *SAVF
                                              8/14/06
                                                       50
:
                                                           :
:
 Press ATTN key to cancel recovery after current item completes.
1......
```

Figure 9-36 Display Recovery Items display

# 9.5 Recovering data from a Domino incremental online backup

As mentioned in 9.4, "Recovering data from a Domino full online backup" on page 352, many options exist when restoring data. The major difference between full online restores and incremental online restores is the complexity. Tape management during incremental restores is crucial as the tapes from the full save are required as well as all the tapes from the incremental saves up until the time of the desired restore.

If recovering data to the current Domino server, the recovery process is quicker and easier but as also noted earlier in this chapter, there are certain disadvantages associated with it. Recovering to a different Domino server has certain advantages that might appeal to you but also requires additional setup. For the steps required to recovery incremental Domino data to a different Domino server refer to the following Web site:

http://www.ibm.com/servers/eserver/iseries/service/brms/domRecoveryIncremental.html

## 9.5.1 Using iSeries Navigator to restore from incremental online backup

When restoring Domino data, if the data is from after the last incremental backup then another incremental backup must be issued prior to the recovery request. Otherwise if the desired data is from prior to the last save, there is no need for an immediate incremental save and the following steps can be performed:

- 1. Start iSeries Navigator, right click on **Backup, Recovery and Media Services** and select **Restore** (see Figure 9-22 on page 355).
- 2. After clicking **OK** on a general information window you see the Backup History Include window (see Figure 9-23 on page 356). You can accept the defaults if you are not sure of data location or can be as specific as you want. In our example we are looking to restore a specific database and are specifying **Directories or files** for type and **jadmin.nsf** for the file (see Figure 9-24 on page 357). Click **OK**.
- 3. On the Backup History window (Figure 9-37), right click on the object to restore and select **Restore**. In our example, we right click on the jadmin.nsf database and select **Restore**.

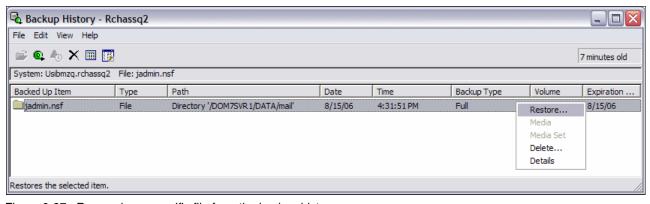


Figure 9-37 Recovering a specific file from the backup history

- 4. The Restore Wizard is started. Click **Next** on the Restore Welcome window. See Figure 9-25 on page 357.
- On the Restore Specify Date and Time window (Figure 9-38), select the Restore backup to specific date and time option. Specify the date and time criteria and click Next.

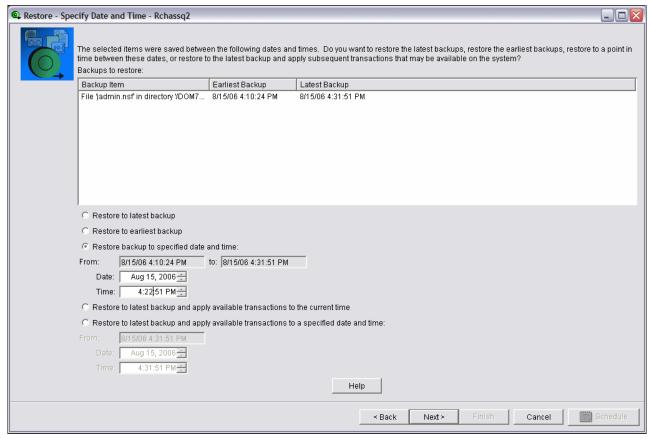


Figure 9-38 Restore - Specify Date and Time options

- 6. On the Restore Restore Using Same Name window (Figure 9-26 on page 357), you are prompted to decide if you want to restore to the same name or a new name. In this example we select **Yes, use same name** as we are recovering with the same file name but to a different location. Click **Next**.
- 7. On the Restore Restore to Same Location window (Figure 9-27 on page 358) we select the No, restore to a different location option and then click Browse to the specify the new location to restore the data. Click Next.
- 8. On the Restore Summary window (Figure 9-28 on page 358), information is available in the Details button and further options exist via the Advanced Options and the Schedule buttons. In our example we are accepting the defaults and click **Finish**.

**Attention:** In our example Figure 9-38 indicates that a full online backup was performed just after 4:10pm and that at least one incremental was attached and was run just after 4:31 pm. This provides recovery to any point-in-time (PIT) within this time period. We happen to be electing to recover to 4:22 pm as the end user received an email at 4:21 pm and accidently deleted it at 4:30 pm and now needs to recover it.

9. On the Restore Items Status window (Figure 9-29 on page 358), you will receive notification that the restore request is being processed and eventually a screen which states it was completed.

**Note:** As the help window that pops up during the restore suggests, you can confirm the restore using the Task Activity under Management Central or you may check the Domino server console for a message stating the media recovery was complete. You should be able to verify that the restored database did recover to the desired PIT.

## 9.5.2 Using a 5250 session to restore data from an incremental online backup

Perform the following steps to use a 5250 emulation session to restore Domino server data from an incremental backup:

- Start a 5250 emulation session and from an i5/OS command line enter the Work with Link Information (WRKLNKBRM) CL command to specify the i5/OS integrated file system directory where the object resides. See Figure 9-30 on page 359.
- 2. On the Work with Link Information display, you see results as shown in Figure 9-31 on page 360. Type an option 9 (Work with directory information) next to the desired link location and press Enter.
- 3. On the Work with Directory Information display, you need to continue to enter an option 9 to get down to the desired object to restore (Figure 9-39).

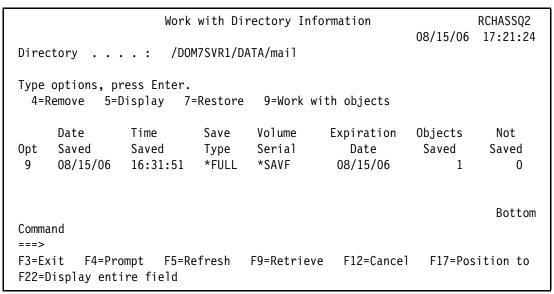


Figure 9-39 Work with Directory Information display

4. On the Work with Objects display, type an option 7 (Restore) next to the object to be restored and press Enter. In our example this the database jadmin.nsf. See Figure 9-40.

```
Work with Objects
                                                                    RCHASSQ2
                                                           08/15/06 17:24:18
Directory . . . :
                      /DOM7SVR1/DATA/mail
Saved date/time . :
                      08/15/06 16:31:51
Type options, press Enter.
 4=Remove
           5=Display 7=Restore
                                                Volume
                                                Serial
0pt
     0b.ject
                                                                         Size
                                                *SAVF
                                                                     18874368
     jadmin.nsf
                                                                       Bottom
Command
===>
F3=Exit
         F4=Prompt F5=Refresh F9=Retrieve
                                                F12=Cancel
                                                             F17=Position to
F22=Display entire field
```

Figure 9-40 Work with Objects display

5. On the Select Recovery Items display (Figure 9-41), press F9 (Recovery defaults). This provides for administrator's to specify the date and the time of the object to be recovered to. Select the saved item to be restored by entering on option 1 (Select) next to it and press Enter.

**Note:** The Save Type column will report \*LTSINC which indicates an incremental save exists to recover from. If this reports \*LTSONL only a full online recovery is possible.

```
RCHASSQ2
                         Select Recovery Items
                                         Select action . . . . : *ALL
                                         Select volume . . . . :
Type options, press Enter.
  1=Select 4=Remove 5=Display 7=Specify object
   Saved
               Save
                              Save
                                     Parallel Volume
                                                       File
                                                                   Expire
                        Save
Opt Item
               Date
                        Time
                              Type
                                     Devices Serial
                                                       Sequence
                                                                   Date
1 DOM7SVR1
              8/15/06 16:31:51 *LTSINC
                                              *SAVF
                                                                   8/15/06
                                                                    Bottom
F3=Exit
          F5=Refresh
                      F9=Recovery defaults
                                            F11=Object View
F12=Cancel
             F14=Submit to batch F16=Select
```

Figure 9-41 Selecting recovery items

6. On the Restore Commands Defaults display (Figure 9-42), page down to see the option for Lotus point-in-time and type in the desired date and time. Press Enter.

```
Restore Command Defaults
Type information, press Enter.
Restore to library . . . . . . *SAVLIB
                                               Name, *SAVLIB
Auxiliary storage pool . . . . . *SAVASP
                                               Name, *SAVASP, 1-32...
Document name generation . . . . *SAME
                                               *SAME, *NEW
System resource management . . . . *ALL
                                               *ALL, *NONE, *HDW, *TRA
Apply journaled changes:
                                               *YES, *NO
  Restore journal receivers . . . *YES
                                               *NONE, *APPLY, *REMOVE
  Apply option . . . . . . . . *NONE
                                               Date, *CURRENT
    Ending date . . . . . . . *CURRENT
                                               Time, *CURRENT
    Ending time . . . . . . . *CURRENT
Lotus point-in-time:
  Ending date . . . . . . . . . . 8/15/06
                                               Date, *CURRENT, *FULL
  Ending time . . . . . . . . . . . . 16:22:51
                                               Time, *CURRENT, *FULL
Create parent directories . . . . *NO
                                               *NO, *YES
  Parent directories owner . . . *PARENT
                                               Name, *PARENT
                                                                     Bottom
F12=Cancel
```

Figure 9-42 Restore Command Defaults display

7. You will now be back on the Select Recovery Items display, type an option 7 (Specify object) next to the saved item and press Enter. See Figure 9-43.

```
Select Recovery Items
                                                                   RCHASSQ2
                                           Select action . . . . : *ALL
                                           Select volume . . . . :
Type options, press Enter.
  1=Select
            4=Remove
                        5=Display
                                    7=Specify object
                                                          File
    Saved
                Save
                         Save
                                Save
                                       Parallel Volume
                                                                      Expire
Opt Item
                Date
                         Time
                                Type
                                       Devices Serial
                                                          Sequence
                                                                      Date
                                                *SAVF
7 DOM7SVR1
               8/15/06 16:31:51 *LTSINC
                                                                       8/15/06
                                                                        Bottom
F3=Exit
          F5=Refresh
                       F9=Recovery defaults
                                              F11=Object View
F12=Cancel
             F14=Submit to batch
                                   F16=Select
```

Figure 9-43 Recovering an object from a Domino incremental backup

8. On the Restore Object display (Figure 9-44), you can specify a different name or location in which to restore the object. In our example we are restoring the jadmin.nsf database using the same name but to a different location. Press Enter.

```
Restore Object (RST)
Type choices, press Enter.
Objects:
            . . . . . . . . > /DOM7SVR1/DATA/mail/jadmin.nsf
                                             *INCLUDE, *OMIT
 Include or omit . . . . . > *INCLUDE
 New object name . . . . . /DOM7SVR1/DATA/Restore/jadmin.nsf
 Name . . . . . . . . . . . . > '/QSYS.LIB'
 Include or omit . . . . . > *OMIT
                                             *INCLUDE, *OMIT
 New object name . . . . . .
                                *SAME
                                                                 More...
F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display
                                F24=More keys
```

Figure 9-44 Restoring Domino database using same name but different directory

9. A status screen will flash by like the one shown in Figure 9-45. Eventually you will be back to an i5/OS command line. To check the status of your restore you can issue the Display Job Log (DSPJOBLOG) CL command and press F10, then page up to verify the restore completed without error. Or you can check the i5/OS integrated file system directory that you restored the file to.

```
Select Recovery Items
                                                        RCHASSQ2
:
                      Display Recovery Items
                                                        RCHASSQ2:
                                                        12:01:58 :
    Remaining items . . . :
:
                                     3
                                    52
    Remaining objects . . . :
                             136.7245 M 100.0 %
    Remaining size . . . :
                                                   Exp
: Saved
                            Save Volume
                                                         Objects:
            Date Time
: Item
                            Type Serial File Seq
                                                   Date
                                                          Saved
: *LINK 8/15/06 16:10:46 *FULL *SAVF
: *LINK 8/15/06 16:22:24 *FULL *SAVF
                                                  8/15/06
                                                            50
                                                  8/15/06
                                                             1
                                                                :
: *LINK
           8/15/06 16:31:51 *FULL *SAVF
                                                  8/15/06
                                                             1
                                                                :
                                                                :
: Press ATTN key to cancel recovery after current item completes.
:.....
```

Figure 9-45 Display Recovery Items display

# 9.6 Integrated file system directories used by BRMS

This section explains the i5/OS integrated file system directories that are populated by Domino and BRMS when online backups are implemented.

## 9.6.1 Directories used when implementing full online backups

The following i5/OS integrated file system directories are used by BRMS when implementing full online backups of a Domino server:

#### ► /BRMSCHGS

This directory and the subdirectories under it reside within the Domino server data directory and contain the changes that occur to each Domino object during the full online backup.

#### ► /BRMSINFO

This directory and the subdirectories under it reside within the Domino server data directory and contain the database instance ID (DBIID) information about the state of the files at the time of the full online backup. This directory is also used by incremental online saves to determine if an incremental request needs to revert to a full request due to the DBIID having changed.

## 9.6.2 Directories used when implementing incremental online backups

The following i5/OS integrated file system directories are used by BRMS when implementing incremental online backups of a Domino server:

#### ► /BRMS

This subdirectory resides within the Domino server data directory and contains the copied full transaction logs from the QNNINBRM addin task. The files will build up here until an incremental online save is performed.

**Note:** The copied log files start with a period and end with a .LOG extension. To be able to see them in the i5/OS integrated file system from a 5250 emulation session, you need to change your display options for the Work with Objects Links (WRKLNK) CL command to \*ALL. This can be done using the following command:

WRKLNK DSPOPT (\*ALL)

#### /BRMS/COPIEDLOG

This subdirectory resides within the Domino server data directory and contains a copy of the partial transaction log at the time of the incremental online save.

#### /BRMS/INCRSAVE

This subdirectory resides within the Domino server data directory and is a temporary location for the full copied transaction logs. When the incremental online save request is made, the copied logs under the BRMS subdirectory are moved here first before then being saved and deleted from the directory.

#### ► /BRMS/LASTPARTIALLOG

This subdirectory resides within the Domino server data directory and contains a snapshot of the current partial log at the time the QNNINBRM addin task finds a full log to copy to the BRMS subdirectory.

# 9.7 Customization options available via the notes.ini file

During the course of using BRMS to backup Domino servers, administrators may want to change the default settings. Below are three of the most common settings used, what they are used for, and what variables can be used. These parameters are specified in the notes.ini file of the Domino server:

#### ► SAVDOMBRM FILES IN GROUP=xx

This parameter defines how many objects are saved in each group where xx equals a value from 1 to 120. The greater this value, the faster your online Domino backups will complete but the longer any database recovery will take. Also, if you set this value high then the time to save each group will take longer (overall save will still go quicker) and the potential for timeouts can occur. The default value for this parameter for Domino R7 is 50, even if the parameter does not exist in the notes.ini file.

#### ► BACKUP\_TIMEOUT=xx

This parameter defines the timeout value in minutes. If the backup of a group exceeds the value, a timeout will be posted to the backup and potentially none of the changes that occurred to those group of objects during the save will be merged back into the database itself. This does not mean the databases were not saved, just that during the save of the group any changes to these databases may not have been included in the backup. The default value for this parameter for Domino R7 is 15, even if the parameter does not exist in the notes.ini file.

## ► BACKUP\_NO\_TIMEOUT=xx

This parameter defines whether a timeout is observed or not. If set to 1, the backup will process as long as necessary to merge the changes that occurred to the objects during the backup to the objects state at the beginning of the backup. The value of 1 indicates no backup timeout is set. The default value for this parameter for Domino R7 is 0, indicating that the BACKUP\_TIMEOUT is observed.





# Configuring Domino for i5/OS to use System i SSL

This appendix explains the setup required in order to leverage System i SSL (otherwise known as system SSL) with Domino for i5/OS. At this time this can be done with only the Domino HTTP protocol.

By adding this capability, the System i machine is allowing administrators the ability to use hardware to speed up SSL traffic. Due to the normal overhead of enabling this feature the performance enhancement is a welcome addition to the system advantages of running Domino on i5/OS.

It is important to note that this capability exists whether or not you have an actual hardware cryptography card installed on the System i machine or not. This will be referenced as software-only encryption and should still result in better response times over SSL than using the traditional built-in Domino SSL capability. In this appendix we are only covering the software-only encryption feature.

For further information regarding this capability as well as using with hardware cryptography cards please refer to the following Web sites:

- ► Domino HTTP Hardware Cryptography using iSeries SSL whitepaper: ftp://ftp.software.ibm.com/as400/web/domino/pdf/crypto.pdf
- ► IBM System i Information Center (under Networking → Networking Security) http://publib.boulder.ibm.com/html/as400/infocenter.html
- ► IBM Redbook *iNotes Web Access on the IBM eServer iSeries Server*, SG24-6553 http://www.redbooks.ibm.com/redbooks/pdfs/sg246553.pdf

# **System requirements**

This section details the software requirements for configuring Domino on i5/OS to run with system SSL enabled.

Software requirements:

- ▶ 5722-SS1 Option 34, Digital Certificate Manager
- ▶ 5722-DG1, IBM HTTP Server for iSeries
- ► 5722-AC2, Crypto Access Provider 56-bit for AS/400 or 5722-AC3, Crypto Access Provider 128-bit for AS/400
- ► Domino 6.0.4/6.5.2 or later release

# Steps to setup Domino to use system SSL

Following is the list of steps required to configure Domino for i5/OS to use system SSL:

- 1. Enable the Digital Certificate Management (DCM) server.
- 2. Create a local Certificate Authority (CA).
- 3. Create a certificate store.
- Create a certificate for Domino using software encryption.
- 5. Assign a certificate to Domino.
- 6. Configure Domino to use System SSL.

## **Enabling the Digital Certificate Management (DCM) server**

DCM is configured using the \*ADMIN instance of the System i HTTP server. You will need to start the \*ADMIN instance of the HTTP if it is not already running. This can be done using the following Start TCP/IP Server (STRTCPSVR) CL command:

STRTCPSVR SERVER(\*HTTP) HTTPSVR(\*ADMIN)

The DCM server is accessed using your Web browser (Internet Explorer is suggested to avoid certain problems) using port 2001 where you are prompted to signon using your i5/OS user profile and password. After entering your credentials you will then see a window like the one shown in Figure A-1. Click on the link for **Digital Certification Manager**.

**Note:** The screen shots provided in the following example reflect Microsoft Windows XP and Internet Explorer. Your display may vary if using a different operating system and Web browser.

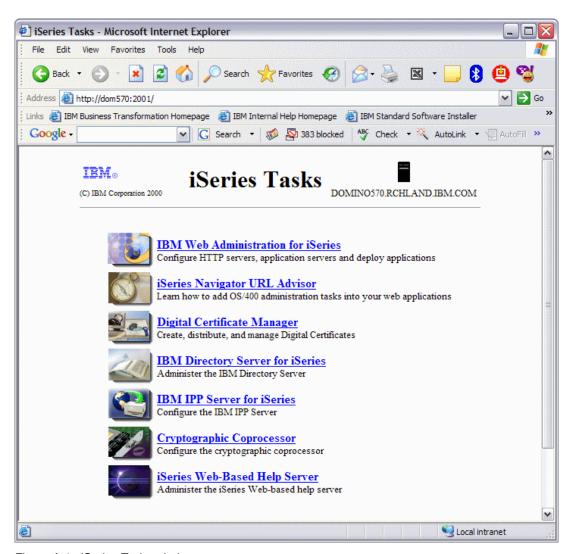


Figure A-1 iSeries Tasks window

## Creating a local Certificate Authority (CA)

Creating a local certificate authority is an excellent way to test the SSL setup before purchasing a certificate from a trusted Internet certificate authority. Perform the following steps:

1. From the Digital Certificate Manager window (Figure A-2) click **Create a Certificate**Authority (CA) link located in the left navigation bar.

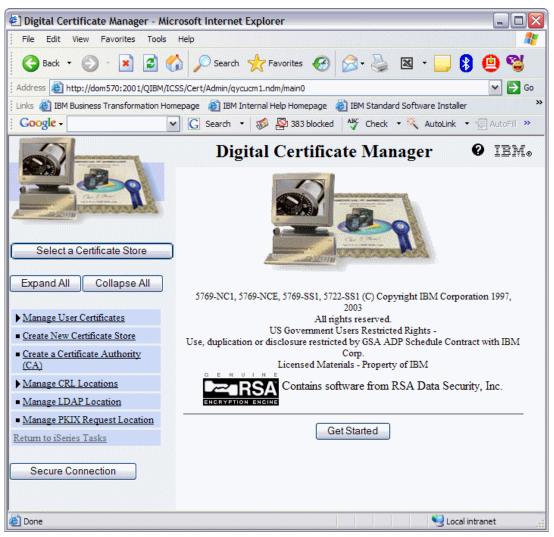


Figure A-2 Digital Certificate Manager

2. On the Create a Certificate Authority (CA) window (Figure A-3), fill in the requested information and click **Continue**.

**Note:** The certificate you are creating is the root certificate and will be used for issuing other certificates to include the Domino certificate. It is suggested that in the Certificate Authority (CA) name, you identify its relationship with the certificate authority.

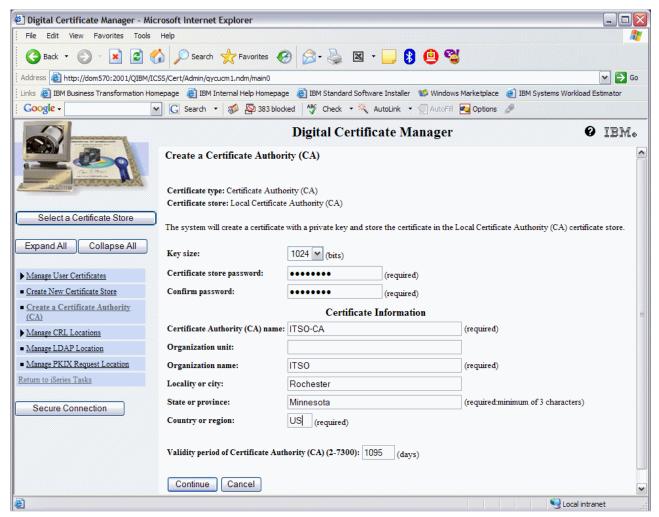


Figure A-3 Creating a Certificate Authority (CA)

3. On the Install Local CA Certificate window (Figure A-4), click Install Certificate.

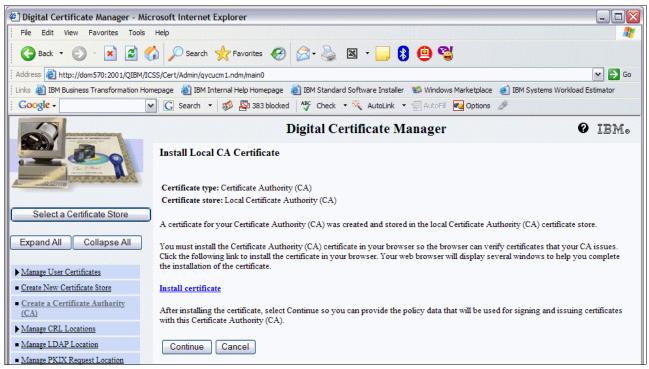


Figure A-4 Installing the local CA Certificate

4. You will be prompted for file download (Figure A-5). Click Open.



Figure A-5 Certificate file download

5. On the Certificate Information window (Figure A-6), click Install Certificate.

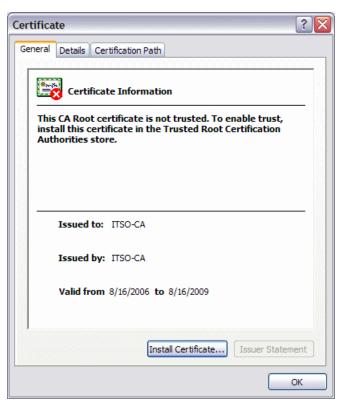


Figure A-6 Certificate information

6. On the Welcome to the Certificate Import Wizard, click Next (Figure A-7).



Figure A-7 Certificate Import Wizard - Welcome

7. On the Certificate Store window (Figure A-8), accept the default and click Next.



Figure A-8 Certificate Import Wizard - Certificate Store

8. On the Completing the Certificate Import Wizard window (Figure A-9), click Finish.



Figure A-9 Certificate Import Wizard - Completion

9. You will now receive a security warning (Figure A-10) and will need to click on Yes.



Figure A-10 Security Warning message

10. After clicking **Yes** to the security warning you will see a window stating the import was successful (Figure A-11) and will need to click **OK** twice.



Figure A-11 Certificate Import Wizard successful

11. You are now back on the Install Local CA Certificate window (Figure A-4 on page 376) where you will need to click **Continue**.

12.On the Certificate Authority (CA) Policy Data window (Figure A-12), accept the defaults and click **Continue**.

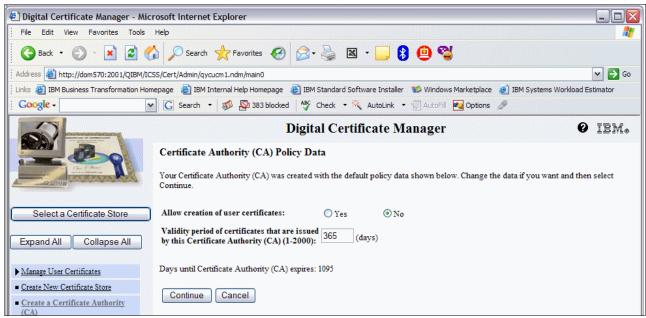


Figure A-12 Certificate Authority (CA) Policy Data

13. After receiving the message that the policy data for the Certificate Authority (CA) was accepted (Figure A-13), click **Cancel** as we have now completed this section.



Figure A-13 Policy data accepted for the Certificate Authority (CA)

# Creating a Certificate Store

Perform the following steps to create a certificate store:

 Starting again from the Digital Certificate Manager window (Figure A-2 on page 374, click Create New Certificate Store. On the Create New Certificate Store window (Figure A-14), select \*SYSTEM and click Continue.

**Note:** If the option for \*SYSTEM does not appear on the screen, this indicates it has already been configured and you can skip ahead to the section "Creating a certificate for Domino using software encryption" on page 382.

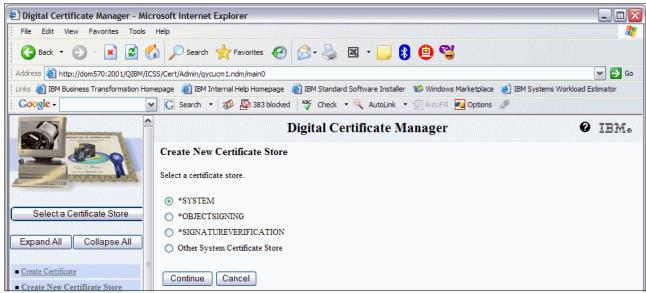


Figure A-14 Creating a new Certificate Store

3. On the Create a Certificate in New Certificate Store window (Figure A-15), select \*NO to not create a certificate in the certificate store and click **Continue**.

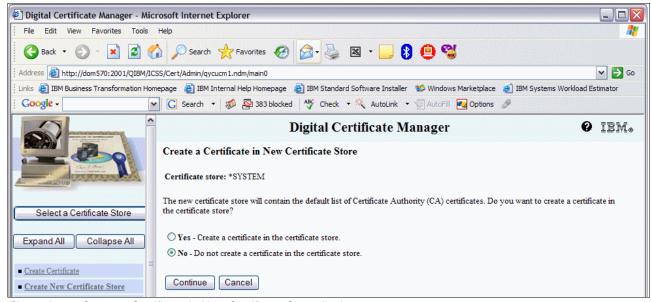


Figure A-15 Create a Certificate in New Certificate Store display

4. On the Certificate Store Name and Password window (Figure A-16), type a Certificate store password, confirm the password and click **Continue**.



Figure A-16 Entering the Certificate Store password

The Certificate Store Created window (Figure A-17), indicates that the Certificate Store was created. Click OK.

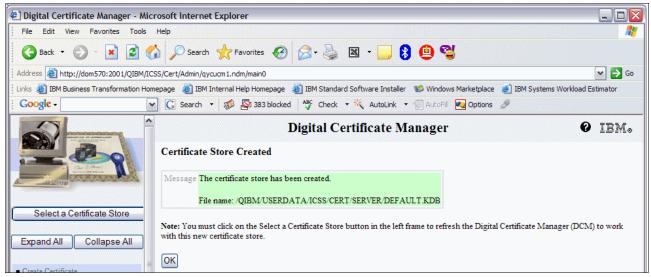


Figure A-17 Certificate Store Created

## Creating a certificate for Domino using software encryption

Perform the following steps to create a certificate for Domino using software encryption:

1. On the upper left hand side of the Digital Certificate Manage window (Figure A-2 on page 374), click on the **Select a Certificate Store** button.

On the Select a Certificate Store window (Figure A-18), select \*SYSTEM and click Continue.



Figure A-18 Selecting a Certificate Store

On the Certificate Store and Password window (Figure A-19), enter the password that you defined earlier and click Continue.



Figure A-19 Entering the Certificate Store password

4. On the Current Certificate Store window (Figure A-20), confirm your current certificate store and click the **Create Certificate** link located in the left navigation frame.

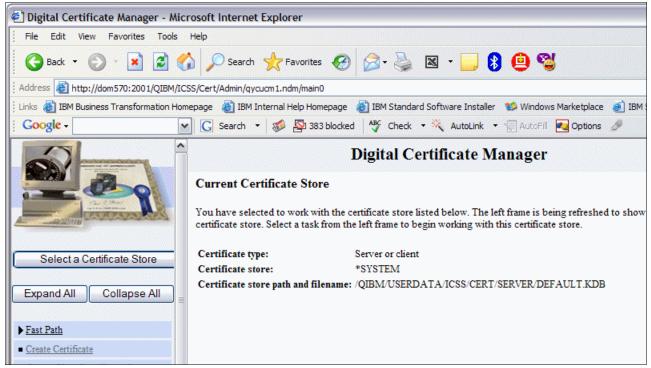


Figure A-20 Current Certificate Store information

5. On the Create Certificate window (Figure A-21), select **Server or client certificate** and click **Continue**.



Figure A-21 Create Certificate.

6. On the Select a Certificate Authority (CA) window (Figure A-22), select **Local Certificate Authority (CA)** and click **Continue**.

Note: If using an external certificate this is where you would select it.

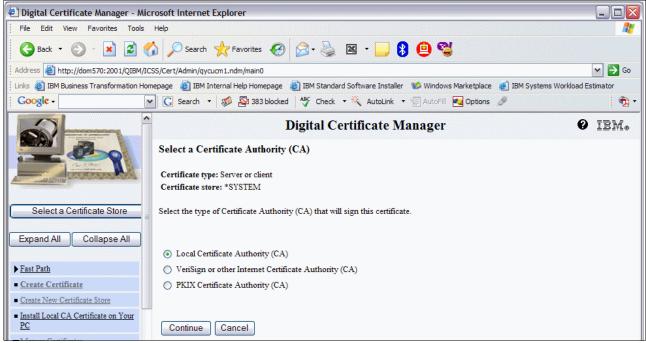


Figure A-22 Selecting a Certificate Authority

7. On the Create Certificate window (Figure A-23), fill out the required fields with information about your system and company and click **Continue**.

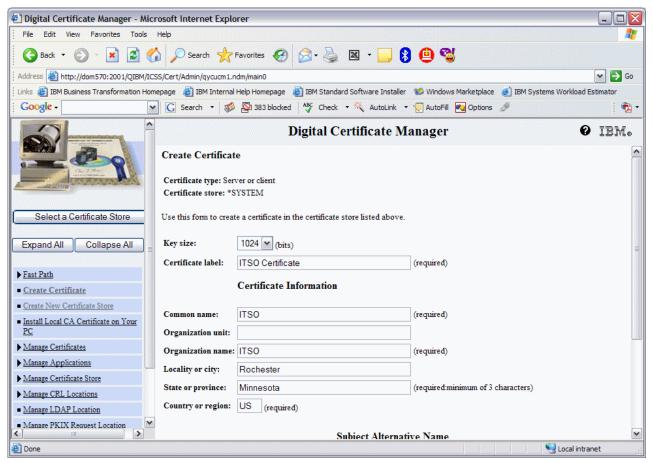


Figure A-23 Creating a certificate

8. On the Select Applications window (Figure A-24), you should see a message stating that your certificate was created as well as a list of applications to select from. As we don't yet have an application identifier for Domino we won't be checking any boxes at this time and just need to click **Continue**.

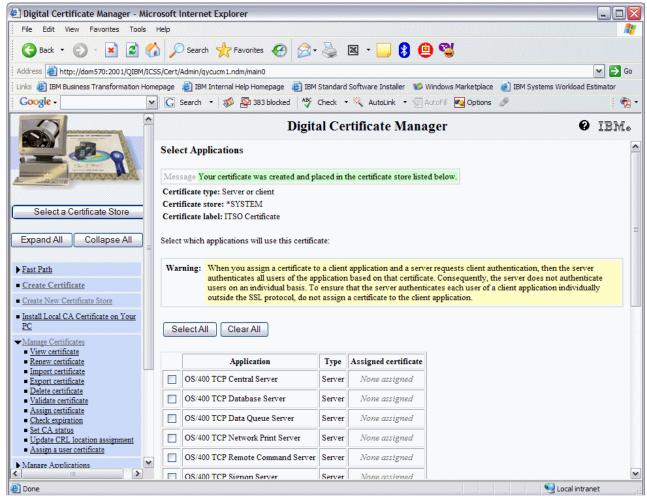


Figure A-24 Select Applications display

9. On the Application Status window (Figure A-25), click **OK**.

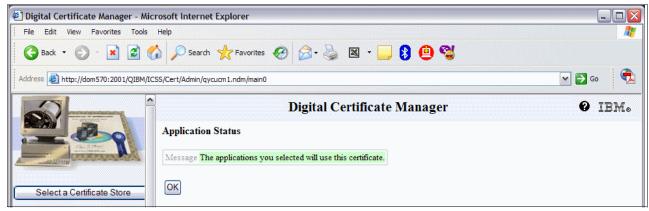


Figure A-25 Application Status

#### Assigning a certificate to Domino

The System i machine uses Application Identifiers (AppID) to associate certificates with applications. Perform the following steps to create a new AppID for Domino:

- 1. Continuing from where we left off in the prior section, from the left navigation frame, click **Manage Applications** and select **Add Application**.
- 2. On the Manage Applications window (Figure A-26), click **Continue**.

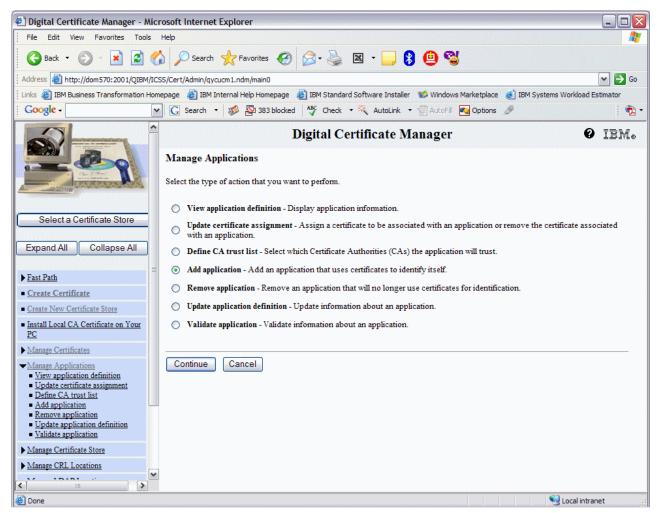


Figure A-26 Manage Applications display

3. On the Add Application window (Figure A-27), select **Server - Add a server application** and click **Continue**.

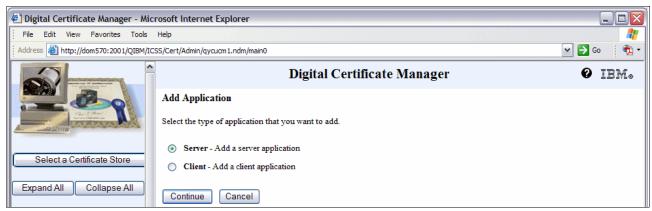


Figure A-27 Add Application

4. Fill in the fields shown in Figure A-28, where the Application User Profile has to be QNOTES and the radial button for Client authentication supported should be set to Yes. This process is what gives Domino access to the \*SYSTEM certificate store files. Then click Add.

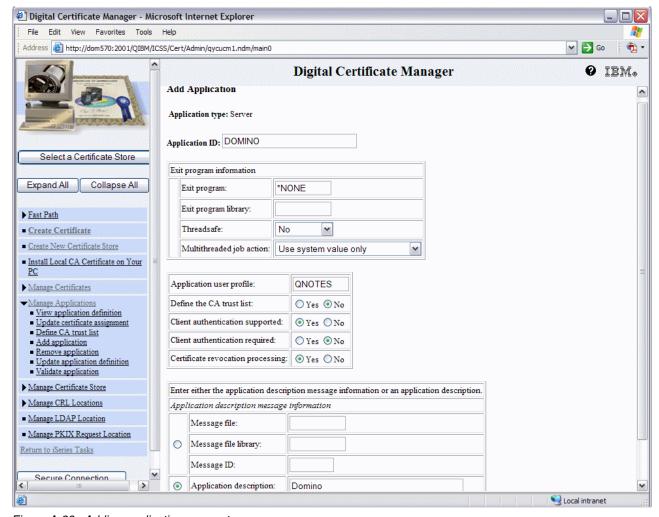


Figure A-28 Adding application parameters

5. After receiving a message that the application has been added as shown in Figure A-29, click **OK**.

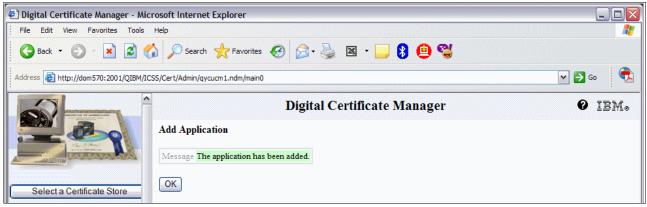


Figure A-29 Application added successfully

6. On the Manage Applications window (Figure A-30), select **Update certificate** assignment and click **Continue**.

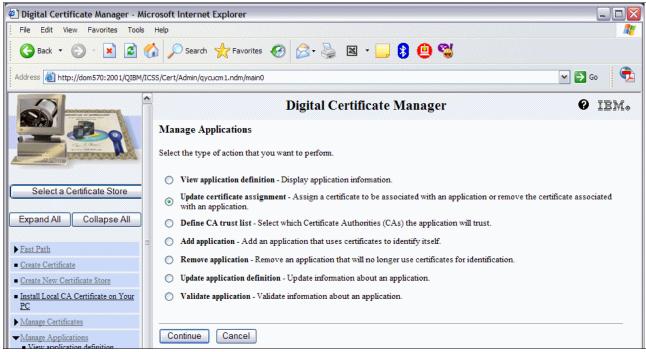


Figure A-30 Manage Applications, selecting Update certificate assignment option

 On the Update Certificate Assignment window (Figure A-31), select Server - Add, change, or remove certificate assignment for a server application and click Continue.

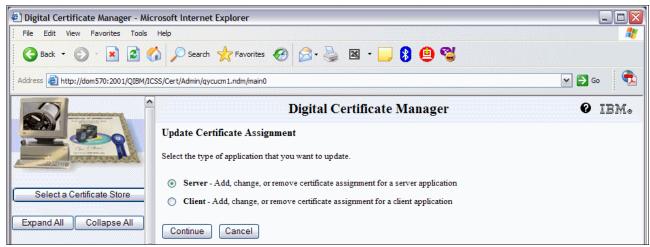


Figure A-31 Updating the Certificate Assignment for Server

8. This brings you to the Update Certificate Assignment window shown in Figure A-32, where the Application ID we added earlier is now listed. Highlight the radial button for it and click on the **Update Certificate Assignment** button.

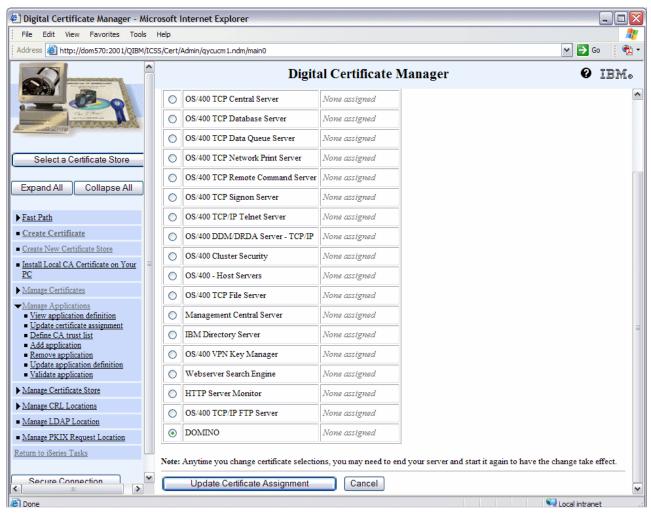


Figure A-32 Updating the Certificate assignment

9. Select the certificate to assign to Domino which is the one created earlier and click the **Assign New Certificate** button (Figure A-33).

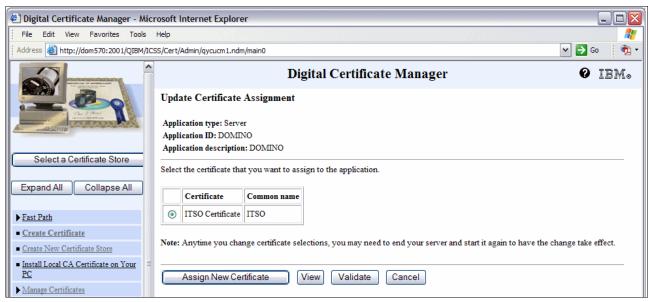


Figure A-33 Assigning a new certificate

10. You will now see a message as shown in Figure A-34 stating that the certificate was assigned to the application.



Figure A-34 Certificate Update complete

#### Configuring Domino to use System SSL

This is the final step to completing the setup of having your Domino server on i5/OS utilize the operating system's SSL which has been found to lead to faster client response times over port 443 traffic. This should be done for each Domino server you intend to use System SSL. Perform the following steps

1. Edit the NOTES.INI file of the Domino server and add the following parameters. Table A-1 provides an explanation of these parameters.

```
SYSTEM_SSL_HTTP=1
SYSTEM_SSL_APPLICATION_ID=DOMINO
```

Table A-1 Available NOTES.INI parameters related to using system SSL

NOTES.INI parameter	Required?	Description
SYSTEM_SSL_HTTP=1	Yes	Tells Domino to utilize the System i SSL API instead of Domino's SSLPlus for HTTP.
SYSTEM_SSL_APPLICATION_ID=	Yes	References the Application ID created in the DCM for this particular Domino server.
SYSTEM_SSL_TIMEOUT=	No	The number of seconds until SSL V3.0 session identifier expires. This number can range from 0 to 86400 and defaults to 30000 (8 hours).

2. Edit the Domino server document. Select the **Ports** tab and then **Internet Ports** subtab and from the Web subtab (Figure A-35) click on the twistie next to SSL port status and select **Enabled**. Then click **Save and Close**.

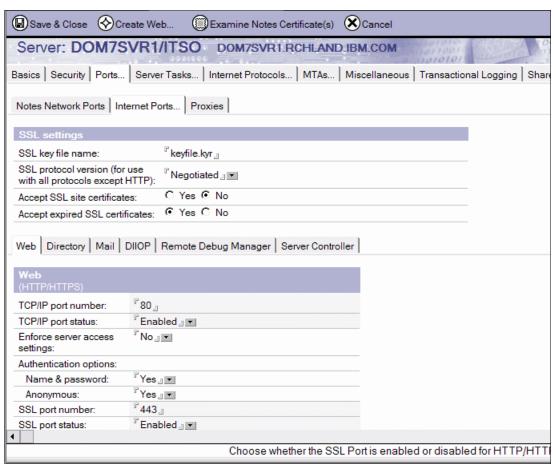


Figure A-35 Enabling SSL for the Domino server HTTP task

3. Your setup is now complete. You will need to end and restart your Domino HTTP server when time permits. You should then begin to see the benefits of running Domino on i5/OS and using System i SSL to speed up secure HTTP traffic.





# Adding presence awareness to your Domino 7 environment

This appendix describes the necessary steps to complete the IBM Lotus Sametime Limited Use integration with your Domino 7 environment on the System i platform.

The IBM Lotus Sametime Limited Use version of Sametime is a limited version of the full Sametime product. The full version of Sametime supports presence awareness, instant messaging, and Web conferencing functionality. The IBM Lotus Sametime Limited Use version of Sametime supports presence awareness and instant messaging capabilities, but does not support Web conferencing. The IBM Lotus Sametime Limited Use version of Sametime ships with all Domino 7.0 servers.

This chapter also explains how to install Sametime 7 Limited Use for i5/OS using the installer obtained from the Passport Advantage.

For more information about Lotus Sametime go to:

http://www-142.ibm.com/software/sw-lotus/products/product3.nsf/wdocs/homepage

For more information about IBM Lotus Sametime for i5/OS go to:

http://www.ibm.com/servers/eserver/iseries/sametime/

## Installing Sametime 7 Limited Use on i5/OS

In this section explains the necessary steps to install the Sametime Limited Use program on i5/OS.

**Important:** Customers who are entitled to the Instant Messaging Limited Use version of Lotus Sametime receive and install only the \*BASE product option of Lotus Sametime (5724J23).

Perform the following steps to install the Sametime 7 Limited Use program:

1. Uncompress the file obtained from Passport Advantage. Click **OK** on the window shown in Figure B-1 to continue.

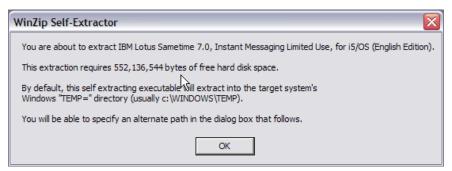


Figure B-1 WinZip Self-Extractor program Sametime Limited Use program

2. Specify a local folder to extract the files to (Figure B-2) and click Unzip.

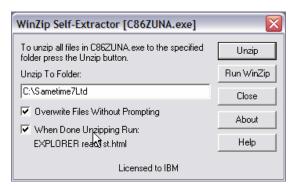


Figure B-2 WinZip Self-Extractor directory

3. The files will be created as shown in Figure B-3.

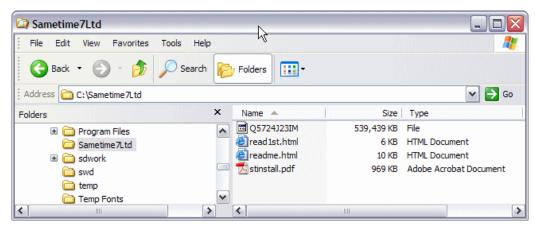


Figure B-3 Sametime Limited Use files

4. On any i5/OS command line, run the following commands to create a library and an empty save file for the Sametime software:

CRTLIB MYLIB
CRTSAVF MYLIB/Q5724J23IM

C:\Sametime7Ltd>

5. Open a DOS command window and transfer via FTP, the file Q5724J23IM to the System i machine as shown in Example B-1.

#### Example: B-1 Using FTP to transfer Sametime 7 file

```
C:\>cd Sametime7Ltd
C:\Sametime7Ltd>ftp sametime7.itso.com
Connected to SAMETIME7.ITSO.com.
220-QTCP at SAMETIME7.ITSO.COM.
220 Connection will close if idle more than 5 minutes.
User (SAMETIME7.ITSO.com:(none)): lguiriga
331 Enter password.
Password:
230 LGUIRIGA logged on.
ftp> bin
200 Representation type is binary IMAGE.
ftp> put Q5724J23IM MYLIB/Q5724J23IM
200 PORT subcommand request successful.
150 Sending file to member Q5724J23IM in file Q5724J23IM in library MYLIB.
226 File transfer completed successfully.
ftp: 552384624 bytes sent in 66.36Seconds 8323.43Kbytes/sec.
ftp> quit
221 QUIT subcommand received.
```

6. On any i5/OS command line, run the following Restore License Program (RSTLICPGM) command:

RSTLICPGM LICPGM(5724J23) DEV(\*SAVF) OPTION(\*BASE) LNG(2924) SAVF(MYLIB/Q5724J23IM)

7. To verify if Sametime was successfully installed, go to any i5/OS command line and execute the Display Software Resources (DSPSFWRSC) CL command. The result is shown is Figure B-4.

Display Software Resources					
Resource			System:	RCHAS10	
	0+.	F4	Description		
ID	•	Feature	•		
5722XW1	*BASE		iSeries Access Base		
5722XW1	1	5101	iSeries Access Option 1		
5724J23	*BASE	5050	Lotus Sametime Instant Messaging		
5724J23	*BASE	2924	Lotus Sametime Instant Messaging		
5733LD7	*BASE	5050	Lotus Domino 7 (5724E62)		
5733LD7	*BASE	2924	Lotus Domino 7 (5724E62)		
5733LD7	1	5050	Lotus Domino 7: C API		
5733LD7	12	5050	Lotus Domino 7: Release 7.0.2		
5733LD7	12	2924	Lotus Domino 7: Release 7.0.2		
5733SC1	*BASE	5050	IBM Portable Utilities for i5/0S		
5733SC1	*BASE	2924	IBM Portable Utilities for i5/0S		
5733SC1	1	5050	OpenSSH, OpenSSL, zlib		
5733W60	*BASE	5050	WebSphere Application Server for OS/400 V6		
5733W60	2	5102	WebSphere Application Server V6 ("Base")		
				More	
F3=Exit F11=Display libraries/releases F12=Cancel					
F19=Display trademarks					

Figure B-4 Display Software Resources display

## Adding Sametime 7 Limited Use to a Domino 7 server

In the example shown in this section, we registered and configured a new Domino 7 server called SAMETIME7. See Chapter 4, "Configuring a Domino 7 server on i5/OS" on page 89 for details on configuring Domino for i5/OS servers.

**Important:** A System i machine can run multiple Domino servers on the same system. While it is possible to add Sametime to an existing production Domino server, this configuration is not recommended. Instead, consider creating a new Domino server for running Sametime. The new Domino server can reside on the same system as your existing production Domino servers.

Perform the following steps to add Sametime to a Domino server using the Add Sametime to Domino (ADDLSTDOM) CL command:

- 1. Stop the Domino server that you want to add Sametime to.
- On the i5/OS command line, type the following command and press Enter: ADDLSTDOM SERVER(SAMETIME7)

**Note:** Sametime will use the Domino Directory as the Directory type by default and it will not allow HTTP tunneling. For more options when adding Sametime to a Domino server see the Lotus Sametime 7.0 for i5/OS documentation Web site:

http://www.lotus.com/ldd/notesua.nsf/a08df36b2299a8bc8525665d006dce40/58f02f65b21ea1728525706d004b4a7e?OpenDocument

3. Press Enter to end the terminal session shown in Figure B-5.

```
Switching to the server identity...

10% ...

Setting up authentication system...

30% ...

Setup of the authentication system completed.

55% ...

Sametime Server setup completed successfully.

100% ...

Press ENTER to end terminal session.

===>

F3=Exit F4=End of File F6=Print F9=Retrieve F17=Top
F18=Bottom F19=Left F20=Right F21=User Window
```

Figure B-5 Adding Sametime to a Domino for i5/OS server

4. To verify if Sametime was added correctly to the Domino server, go to the Domino server's notes.ini file and check if the lines shown in Example B-2were added.

Example: B-2 Sametime lines added to the Domino server's notes.ini file

```
ServertTasks=...., STAddin2
SametimeInstallType=COMPLETED
SametimeDirectoryType=DOMINO
SametimeServerConfig=OnDomino
LSTJava1=/QIBM/ProdData/Lotus/Sametime/java
LSTJava2=/QIBM/ProdData/Lotus/Sametime/stcore.jar
LSTJava3=/QIBM/ProdData/Lotus/Sametime/stmtgmanagement.jar
LSTJava4=/QIBM/ProdData/Lotus/Sametime/dsig.zip
LSTJava5=/QIBM/ProdData/Lotus/Sametime/stnotescalendar.jar
LSTJava6=/QIBM/ProdData/Lotus/Sametime/xml-apis.jar
LSTJava7=/QIBM/ProdData/Lotus/Sametime/mail.jar
LSTJava8=/QIBM/ProdData/Lotus/Sametime/activation.jar
JavaUserClassesExt=LSTJava1,LSTJava2,LSTJava3,LSTJava4,LSTJava5,LSTJava6,LSTJava7,
LSTJava8
SameTimeLog=STLog.nsf
SametimeConference=STConf.nsf
JavaOS400RegisterNatives=stnotespw,stauthmgr,stutility,stconfigur
STProgramDirectory=/Domino/SAMETIME7/Data
SametimeBootstrap=/Domino/SAMETIME7/Data/sametime.ini
SametimeVersion=7.0
```

## Verifying if Sametime is working correctly

After Sametime is installed and added to the Domino server, you can go to the Domino server console to see if Sametime starts successfully. Perform the following steps to verify if Sametime is running correctly:

1. On the i5/OS command line, run the following command to start the Domino server where you added Sametime:

```
STRDOMSVR SERVER(SAMETIME7)
```

2. On the i5/OS command line, run the following command to see the Domino server console:

```
WRKDOMCSL SERVER(SAMETIME7)
```

3. Using the Domino server console (Figure B-6) you will see when the Sametime server is running.

**Note:** Most of the Sametime services are disabled because this is a Limited Use edition.

```
Work with Domino Console
                                              Server: SAMETIME7
Previous subcommands and messages:
  08/01/2006 13:45:15 Sametime: Service [Material Manager] is disabled.
  08/01/2006 13:45:15 Sametime: Service [Capacity Monitor] is disabled.
  08/01/2006 13:45:15 Sametime: Service [Broadcast Gateway] is disabled.
  08/01/2006 13:45:15 Sametime: Service [Broadcast Controller] is disabled.
  08/01/2006 13:45:15 Sametime: Service [A/V MMP] is disabled.
  08/01/2006 13:45:15 Sametime: Service [Interactive Streamed Media Service]
  is disabled.
  08/01/2006 13:45:15 Sametime: Service [H.323 MCU] is disabled.
  08/01/2006 13:45:15 Sametime: Service [Activity Provider] is disabled.
  08/01/2006 13:45:15 Sametime: Starting service [Sametime Links].
  08/01/2006 13:45:45 Sametime: Service [Sametime Links] started
successfully.
  08/01/2006 13:45:45 Sametime: All services started successfully.
  08/01/2006 13:45:45 Sametime: Server startup successful.
  08/01/2006 13:47:08 Sametime Server: Running
Enter a Domino subcommand.
===>
F3=Exit F5=Refresh F6=Print F9=Retrieve
F17=Top F18=Bottom F21=Command line
```

Figure B-6 Domino server console showing Sametime starting

At this point, Sametime is ready to be used with the Lotus Notes client. However, if a Lotus Notes client was installed before Sametime was added to the Domino server, the presence awareness and instant messaging capabilities will not be enabled.

Perform the following steps to enable the Lotus Notes client with presence awareness and instant messaging capabilities:

1. Open the Lotus Notes client and click the **Office** tab located in the bottom left of the status bar (Figure B-7). Then click **Edit Current** from the list.

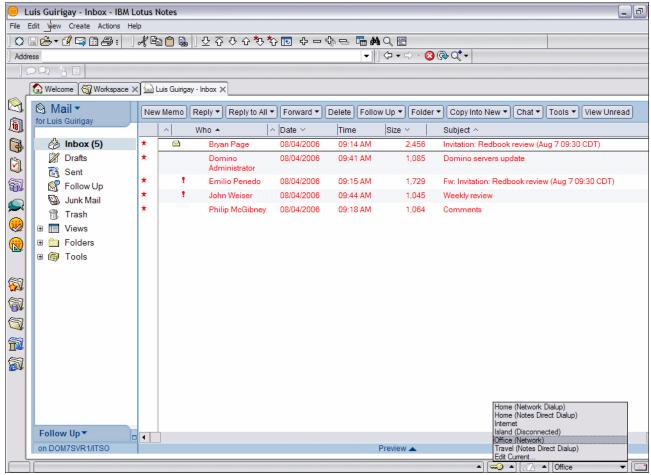


Figure B-7 Editing the current Location document

2. In the Location document, Servers tab, enter the Sametime server name in the IBM Lotus Sametime server field (Figure B-8). Click **Save & Close**.

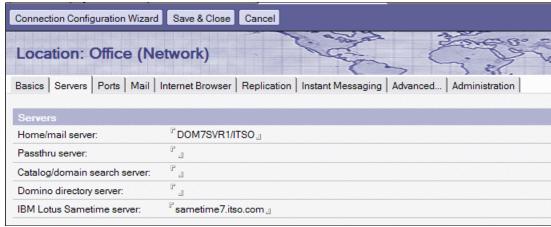


Figure B-8 Entering the Sametime server name in the Location document

3. On the Log on to instant messaging window (Figure B-9), enter your Lotus Notes user ID Internet password and click **Log on**.

**Note:** The requested password is the Internet password. This is located in the Person document as shown in Figure B-10.



Figure B-9 Logging on to Sametime server



Figure B-10 Person document

4. The Lotus Notes client is now using the presence awareness and instant messaging capabilities provided by Sametime as shown in Figure B-11.

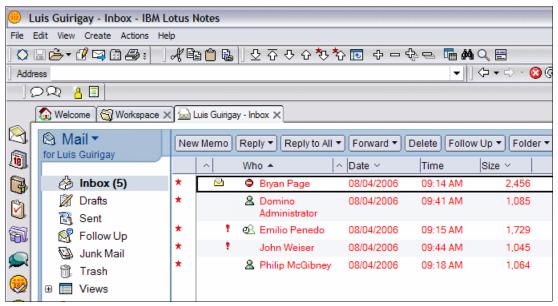


Figure B-11 Lotus Notes client using Sametime presence awareness and instant messaging functions

If single sign on (SSO) is already configured in your Domino environment, you can enable the Lotus Notes client to use it. Using this capability, the Lotus Notes client will not prompt for the Internet password to sign on to the Sametime server. To enable SSO on the Lotus Notes client, perform the following steps:

- On the Lotus Notes client, click the pull down menu options of File → Preferences → User Preferences.
- On the User Preferences window, click Instant Messaging → General as shown in Figure B-12 and enable the Log onto instant messaging using single sign-on (SSO) option. Click OK.

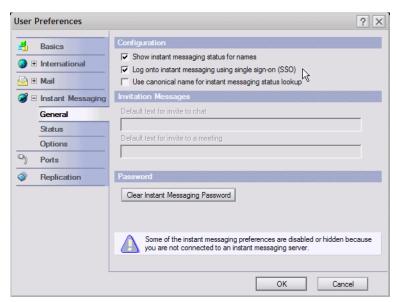


Figure B-12 Enabling SSO in the Lotus Notes client

## Adding presence awareness to Domino Web Access

Domino Web Access integrates an instant messaging capability so that users can chat with their co-workers online and maintain an instant messaging list that shows the online status of other users. The instant messaging awareness feature also displays online status next to the names of people in mail messages, views and folders.

There are some additional steps which need to be performed to complete the Sametime integration with Domino Web Access:

- 1. Create Connection documents.
- Set up Domino SSO authentication between the Domino Web Access server and the Sametime server.
- 3. Specify the Sametime server configuration for Domino Web Access users.
- 4. Replicate names.nsf and restart servers.

Attention: All these changes should be made in your Domino Web Access server.

For additional information on integrating Sametime with Domino Web Access, refer to the IBM Technote 1159197, Complete steps to configure Sametime integration with DWA 6.5.x available, at the following Web site:

http://www.ibm.com/support/docview.wss?uid=swg21159197

#### **Creating Connection documents**

You need Connection documents for the Domino Web Access and the Sametime servers if the Sametime server is not in the same domain as the Domino Web Access server. Also, if the Sametime server is in the same domain as the Domino Web Access server, but is not clustered with the registration server, you need a Connection document in order to replicate the Domino Directory. Perform the following steps:

- 1. On the Domino Web Access server (Figure B-13), create a Connection document:
  - a. Enter the Sametime server's name in the Destination server field.
  - b. Enter the Domino Web Access server's name in the Source server field.

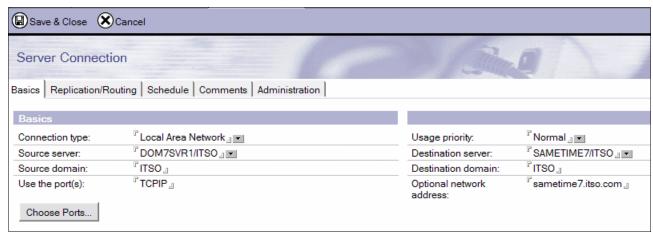


Figure B-13 Domino Web Access Server Connection document

- 2. On the Sametime server (Figure B-14), create a Connection document:
  - a. Enter the Domino Web Access server's name in the Destination server field.
  - b. Enter the Sametime server's name in the Source domain field.

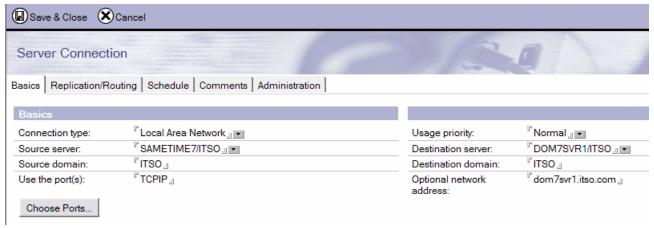


Figure B-14 Sametime Server Connection document

Note: For more information about Connection documents go to:

http://www-12.lotus.com/ldd/doc/domino\_notes/7.0/help7\_admin.nsf/f4b82fbb75e942a6852566ac0037f284/f4f7bc235c42319d8525706f0065b03c?OpenDocument

#### **Setting up Domino SSO authentication**

Domino single sign-on (SSO) authentication allows Web users to log in once to a Domino or WebSphere server, and then access any other Domino or WebSphere server in the same DNS domain that is enabled for single sign-on (SSO) without having to log in again. In a multiple server environment, it is possible that one or more servers in your Domino domain are already configured for Domino SSO, and the Domino Directory already contains a Domino Web SSO configuration document. When you install Sametime, it creates a Web SSO configuration document called LtpaToken unless one already exists in the Domino Directory. If an LtpaToken configuration document already exists, Sametime does not attempt to alter it.

Note: For more information about Domino SSO go to:

http://www-12.lotus.com/ldd/doc/domino\_notes/7.0/help7\_admin.nsf/f4b82fbb75e942a6852566ac0037f284/13d0f1088e35bc0c8525706f0065d9f0?OpenDocument

Perform the following steps to set up Domino SSO:

 From the Domino Administrator client, click the Configuration tab, expand the Server section and click All Server Documents. Click Web → Create Web SSO Configuration. See Figure B-15.

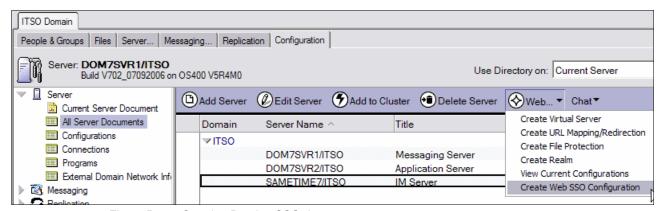


Figure B-15 Creating Domino SSO document

- 2. On the Web SSO Configuration document (Figure B-16), change the fields to the following values:
  - DNS Domain = your Domino domain
     For our example we use itso.com
  - Domino Server Names = your Domino servers
     For our example we use DOM7SVR1/ITSO,SAMETIME7/ITSO.



Figure B-16 Web SSO Configuration document

3. Click **Keys** → **Create Domino SSO Key** (Figure B-17).

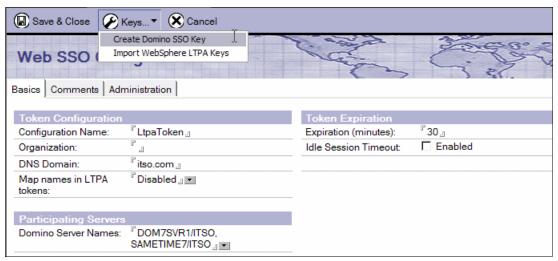


Figure B-17 Creating Domino SSO Key

4. Click **OK** to continue (Figure B-18).



Figure B-18 Successfully created Domino SSO key

- 5. Back on the Web SSO Configuration document, click Save & Close.
- 6. From the Domino Administrator client, click the **Configuration** tab, expand the **Server** section and click **All Server documents**.
- 7. In your Domino Web Access server document, under Internet Protocols → Domino Web Engine tab (Figure B-19), edit the following values in the HTTP Sessions section:
  - Session authentication = Multiple servers (SSO)
  - Web SSO Configuration = LtpaToken

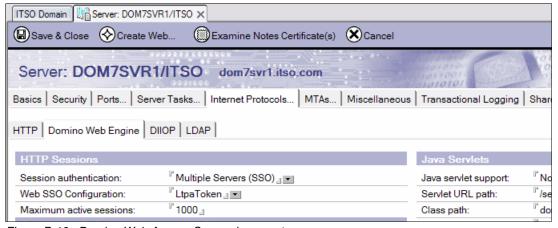


Figure B-19 Domino Web Access Server document

8. Repeat the previous step for the Sametime server (Figure B-20).

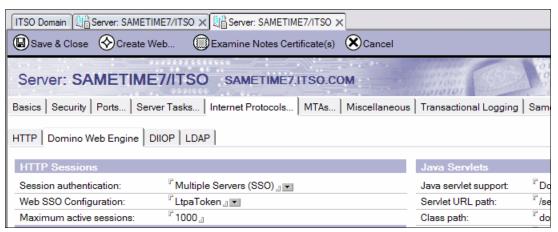


Figure B-20 Sametime Server document

#### Specifying the Sametime server configuration for Domino Web Access users

To enable instant messaging and set the Sametime server for all Domino Web Access users at one time, use the Instant Messaging settings in the Configuration Settings document, Domino Web Access tab. After you have done this, individual users can enable or disable instant messaging on their local Domino Web Access clients by setting a User Preference. Perform the following steps:

**Note:** For more information about creating Configuration Settings documents go to: http://www-12.lotus.com/ldd/doc/domino\_notes/7.0/help7\_admin.nsf/f4b82fbb75e942 a6852566ac0037f284/0646f18e7e0bb0428525706f0065c7ce?0penDocument

- 1. From the Domino Administrator client, click the **Configuration** tab, expand the **Server** section and click **Configurations**.
- 2. Select the Configuration Settings document for the Domino Web Access server and click **Edit Configuration**. See Figure B-21.

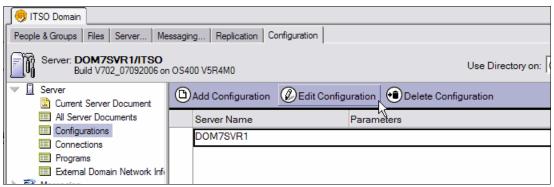


Figure B-21 Editing the Configuration Settings document for Domino Web Access server

3. On the Configuration Settings document, click the **Domino Web Access** tab and go to the Instant Messaging section (Figure B-22). Set the values according to Table B-1.

**Note:** For more information about the fields in a Configuration Settings document go to:

http://www-12.lotus.com/ldd/doc/domino\_notes/7.0/help7\_admin.nsf/f4b82fbb75e 942a6852566ac0037f284/5c963b000ee5eb0d8525706f0065cf3a?0penDocument

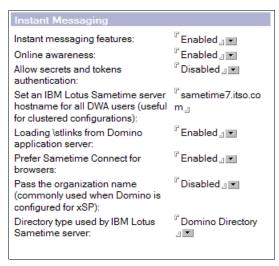


Figure B-22 Configuration Settings document, Instant Messaging section

Tahla R-1	Configuration	Settings document	. Instant Messaging values	
iavie p-i	Cominguration	Settinas accument.	. IIIStarit iviessauliiu values	5

Field	Value
Instant messaging feature	Enable
Online awareness	Enabled
Allow secrets and tokens authentication	Disabled
Set an IBM Lotus Sametime server hostname for all DWA users (useful for clustered configurations)	sametime7.itso.com
Loading \stlinks from Domino application server	Enabled
Prefer Sametime Connect for browsers	Enabled
Pass the organization name (commonly used when Domino is configured for xSP)	Disabled
Directory type used by IBM Lotus Server	Domino Directory

- 4. Replicate the changes to your Sametime server.
- 5. After all changes have been replicated to the Sametime server, restart the Domino Web Access server and the Sametime server.

6. Using Domino Web Access, sign in with any user account and click **Preferences** (Figure B-23).

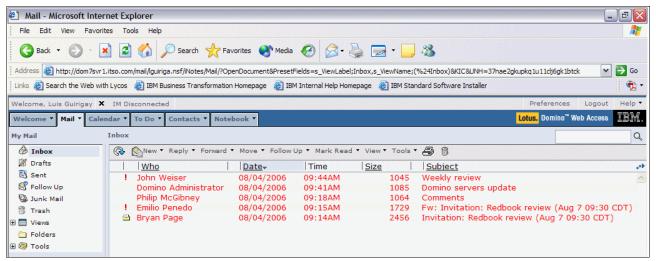


Figure B-23 Domino Web Access user with no presence awareness or instant messaging capabilities

7. On the Preference window (Figure B-24), enable Instant messaging and click **OK**.

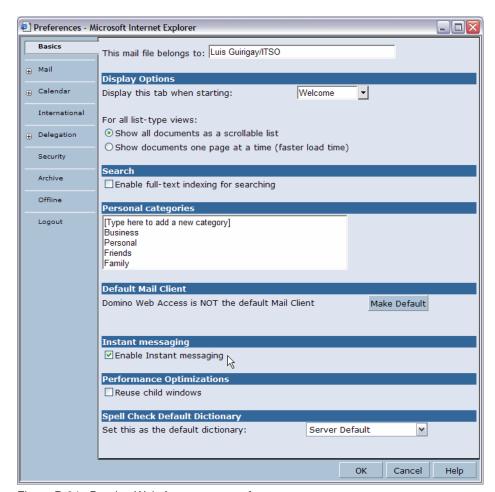


Figure B-24 Domino Web Access user preferences

8. Figure B-25 shows the integration between Domino Web Access and Sametime.

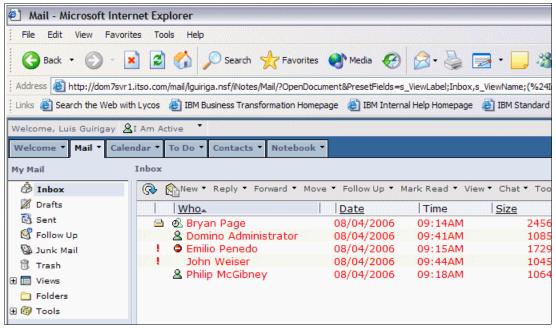


Figure B-25 Domino Web Access user with presence awareness and instant messaging enabled

#### Sametime not working with Domino Web Access

If Sametime is not working properly with Domino Web Access, we recommend to check the following areas:

- ► Test your SSO
- ▶ Use Fully Qualify Domain Names (FQDN)
- ► Check ports blocking
- Set Internet Explorer default settings
- Verify your network configuration

For more information see the IBM Technote 1158798, Troubleshooting problems with Chat and Awareness in DWA 6.5.x at the following Web site:

http://www.ibm.com/support/docview.wss?uid=swg21158798





## Domino Access for Microsoft Outlook

This appendix describes the steps to configure the Microsoft Outlook client to access a Domino for i5/OS server.

IBM Lotus Domino Access for Microsoft Outlook provides the following benefits:

- ► Keeps the Microsoft Outlook client on the user's desktop
- ► Low user retraining
- No costs associated with desktop change
- All the benefits of Domino are now available to the Microsoft Outlook user

Domino Access for Microsoft Outlook delivers the leading messaging, calendar and scheduling, and personal information management services of Lotus Domino to Microsoft Outlook users. Organizations currently using Microsoft Exchange for their messaging infrastructure can move to security-rich, scalable and reliable Domino server software, without changing from familiar client software on the desktop and without user retraining.

Domino Access for Microsoft Outlook can help improve user and organizational productivity. Lotus Domino Access for Microsoft Outlook allows Microsoft Outlook users to benefit from the advanced functionality of the Domino server:

- ► Gives you the opportunity to run your messaging infrastructure on any of a wide range of supported hardware and operating system platforms.
- ► Lets Microsoft Outlook users take advantage Domino-based collaboration capabilities such as discussion forums, teamrooms and reference databases from a Web browser on their workstation.
- ► Allows Microsoft Outlook users (including those using Microsoft Outlook 2000 and 2002 (XP)) to productively work with their e-mail, calendar and address books when offline.
- ► Leverages award-winning Domino replication and network compression, which can help improve performance for offline synchronization and help make online interactions more efficient.
- Extends to Microsoft Outlook users the benefits of advanced failover capabilities and server-level anti-spam features of Domino.

## Requirements

Domino Access for Microsoft Outlook allows Microsoft Outlook 2000, 2002 (XP), or 2003 users to connect to an Domino server.

#### Client requirements:

- Windows OS (Window 2000 Professional or Windows XP Professional)
- ▶ Microsoft Outlook 2000 or Outlook XP with SP3, and Outlook 2003 with SP1
- ▶ Domino server running 6.5.1 or higher
- Mail databases created using a Mail7.NTF, Mail7ex.NTF or DWA7.NTF template

### What's new in Domino R7

Domino Access for Microsoft Outlook offers the following new enhancements in Domino 7:

- ▶ Domino R7.0
  - Native support for Internet standards, including X.509 and Secure Multipurpose Internet Mail Extensions (S/MIME).
  - Client software performance enhancements, reducing the time to launch the application compared to 6.5.3.
  - Installation option for separate program and data directories, allows configuration of more than one user on the same machine using Windows operating system security.
  - New mail notification, user options include playing a sound, briefly changing the mouse cursor, showing an envelope icon in the notification area.
  - Option to use a local copy of your global address book, this can be a full copy of the directory or a condensed directory catalog to save space on your workstation.
- Domino R7.0.1
  - Mail rules, run automatically on all messages as they come into the in-box.
  - Native Microsoft Outlook new mail notification.
  - Use of Microsoft Outlook local archive settings for both manual and automatic archiving. Messages removed from the main PST in Lotus Domino Access for Microsoft Outlook software are removed from the server store. Conversely, messages moved from a local archive to the PST are added to the server store.
  - Microsoft Outlook 2003 PST format. The new file format is automatically used if running a Microsoft Outlook 2003 client. This capability enables local file sizes to increase to 20 gigabytes.
  - Support for alternate names.

## Installation and configuration

Perform the following steps to configure a Domino Access for Microsoft Outlook user:

1. Register a new Domino user using the Domino Administrator client interface.

- 2. On the end user workstation, verify that Microsoft Outlook is the default e-mail program:
  - a. Open Internet Explorer.
  - b. Go to **Tools** → **Internet Options**.
  - c. On the Internet Options window, click on the **Programs** tab and select **Microsoft Office Outlook** for E-mail as shown in Figure C-1.

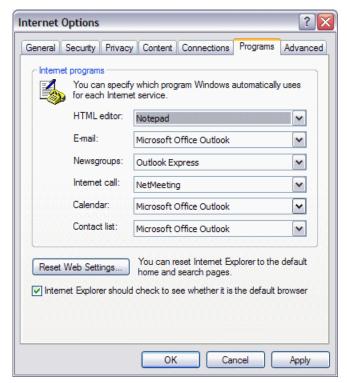


Figure C-1 Selecting the default E-mail program on the end user's workstation

- 3. On the user's workstation, open Internet Explorer and go to the following URL address (replace itso.com with your server's fully qualified Internet host name):
  - http://www.itso.com/DAO/setup.exe
- 4. On the File Download window (Figure C-2), accept the download file and click Save.



Figure C-2 Downloading the Domino Access for Microsoft Outlook setup file

5. A status bar indicates the download process as shown in Figure C-3, when complete click **Open**.

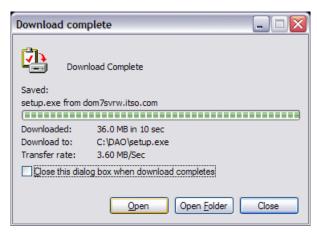


Figure C-3 Domino Access for Microsoft Outlook setup file download completed

The IBM Lotus Domino Access for Microsoft Outlook installation wizard starts (Figure C-4), click Next.



Figure C-4 Domino Access for Microsoft Outlook installation wizard

- 7. Accept the terms in the software license agreement and click **Next**.
- Register your user and organization license, select the installation type (Single user or Multi-user) and click Next.

**Installation type:** If you are a member of the Windows Administrator group, you can choose whether to do a single user or a multi-user installation on a workstation. If you are not a member of this group, the installation is a single user install by default.

- ► Single user install: Use this method if only one person uses Domino Access for Microsoft Outlook on the workstation. This type of install creates only one data directory.
- ▶ Multi-user install: Use this method if more than one person uses Domino Access for Microsoft Outlook on the workstation. This type of install allows the creation of data directories specific to each user. This means that each user can have their own local files, that can provide some measure of security.
- 9. On the Install Directory window (Figure C-5), select the installation folder. In our example, we used the default and click **Next**.



Figure C-5 Specifying the Domino Access for Microsoft Outlook installation directory

10.On the Custom Setup window (Figure C-6), select if you want the single logon feature to be installed and click **Next**.



Figure C-6 System Setup

11.,On the Ready to Install the Program window (Figure C-7), click Install.



Figure C-7 Starting the Domino Access for Microsoft Outlook installation

12.A status bar indicates the installation process. You will be prompted to type in your user name and the Domino server name as shown in Figure C-8. In our example we specify the fully qualified Internet hosts name of the Domino server. Click **Next**.



Figure C-8 Domino Access for Microsoft Outlook setup

13. Your user.id password is prompted as shown in (Figure C-9), type it in and click OK.



Figure C-9 Domino Access for Microsoft Outlook user password

14., A MAPI profile is created as shown in Figure C-10, click **Finish**.



Figure C-10 MAPI profile created

15. The IBM Lotus Domino Access for Microsoft Outlook installation wizard is completed (Figure C-11), click **Finish**.



Figure C-11 Domino Access for Microsoft Outlook installation wizard completed

16. Start the Microsoft Outlook client.

17. You are prompt to choose a profile as shown in Figure C-12. Select the profile with you Domino server name and click **OK**.



Figure C-12 Selecting a profile

18. Type in your Domino user ID password (Figure C-13) and click OK.

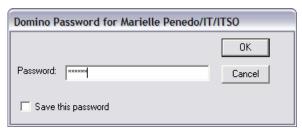


Figure C-13 Specifying the Domino user ID password

19. Wait for the Initial Setup process to complete. This is done just the first time you use Domino Access for Microsoft Outlook. See Figure C-14.

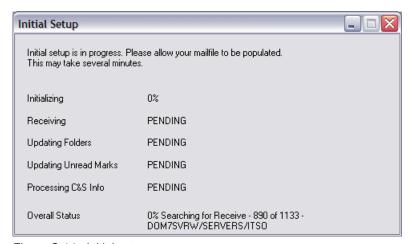


Figure C-14 Initial setup process

20. When the initial setup process is complete, your Microsoft Outlook interface is started and a Welcome to IBM Lotus Domino Access for Microsoft Outlook message is displayed. See Figure C-15.



Figure C-15 Microsoft Outlook client using Domino Access for Microsoft Outlook

## **Related publications**

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

#### **IBM Redbooks**

For information about ordering these publications, see "How to get IBM Redbooks" on page 428. Note that some of the documents referenced here may be available in softcopy only.

- ▶ Domino 6 for iSeries Best Practices Guide, SG24-6937
- ► Domino 7 Performance Tuning Best Practices to Get the Most Out of Your Domino Infrastructure, REDP-4182
- ► Lotus Domino Domain Monitoring, REDP-4089
- Domino for iSeries Sizing and Performance Tuning, SG24-5162
- Domino 7 Server Consolidation: Best Practices to Get the Most Out of Your Domino Infrastructure, REDP-4181
- Performance Considerations for Domino Applications, SG24-5602
- ► Lotus Domino for AS/400 R5: Implementation, SG24-5592
- Lotus Domino 6 Multi-Versioning Support on the IBM eServer iSeries Server, SG24-6940
- ▶ iNotes Web Access on the IBM eServer iSeries Server, SG24-6553

#### Other publications

These publications are also relevant as further information sources:

- ► Backup Recovery and Media Services for iSeries
  - http://publib.boulder.ibm.com/infocenter/iseries/v5r4/topic/books/sc415345.pdf
- ▶ BRMS iSeries Navigator Client Student Guide V5R4M0
  - http://www.ibm.com/servers/eserver/iseries/service/brms/pdf/StudentGuide54.pdf
- Lotus Integration Technologies for SAP
  - ftp://ftp.software.ibm.com/software/lotus/info/Domino/SAPandDomino042002.zip
- Domino 7 Upgrade Guide
  - http://doc.notes.net/uafiles.nsf/docs/domino7b2/\$File/v7 admin upgrade.pdf
- Domino 7 Administrator help
  - http://doc.notes.net/domino notes/7.0/help7 admin.nsf
- ► Domino 7 for i5/OS Application Development Guide
  - http://www-12.lotus.com/ldd/doc/uafiles.nsf/docs/i5osdom7/\$File/apdev400.pdf
- ► iSeries TCP/IP Troubleshooting
  - http://publib.boulder.ibm.com/iseries/v5r2/ic2924/info/rzaku/rzakumst.pdf

- Collecting and Analyzing PEX Trace Profile Data
  - http://www.ibm.com/servers/eserver/iseries/perfmgmt/pdf/tprof.pdf
- ▶ Domino HTTP Hardware Cryptography using iSeries SSL
  - ftp://ftp.software.ibm.com/as400/web/domino/pdf/crypto.pdf
- ► AS/400 Performance Management, SG24-4735
- Performance Tools for iSeries Version 5, SC41-5340
- ► Managing OS/400 with Operations Navigator V5R1, SG24-6226
- Domino for i5/OS Help (i400hlp.nsf), included with Domino 7 for the i5/OS

#### Online resources

These Web sites are also relevant as further information sources:

- Backup Recovery and Media Services
  - http://www.ibm.com/servers/eserver/iseries/service/brms
- ► Lotus Software Knowledge base
  - http://www.ibm.com/software/lotus/support
- ▶ IBM Passport Advantage
  - http://www-306.ibm.com/software/howtobuy/passportadvantage/
- ► Lotus Domino for i5/OS Extended product updates
  - http://www.ibm.com/servers/eserver/iseries/domino/support/extprod.html
- ► Lotus Domino for i5/OS Domino 7 updates
  - http://www.ibm.com/servers/eserver/iseries/domino/support/mr70.html
- ► Lotus Documentation, Release Notes
  - http://www.lotus.com/ldd/notesua.nsf/RN
- ► Domino for i5/OS Developer Resources
  - http://www.ibm.com/servers/eserver/iseries/domino/devresources.html
- Lotus product documentation repository
  - http://www-10.lotus.com/ldd/notesua.nsf
- System i logical partitioning
  - http://www.ibm.com/eserver/iseries/lpar
- ► IBM eServer Workload Estimator
  - http://www-912.ibm.com/estimator
- ► Lotus Performance knowledge domain of the IBM developerWorks
  - http://www-128.ibm.com/developerworks/lotus/performance/
- ► IBM Training and Certificatio
  - http://www-306.ibm.com/software/sw-training/
- ▶ Performance Management for System i5 Web page:
  - http://www.ibm.com/systems/i/pmsystemi5/
- iDoctor for iSeries Web site at:

https://www-912.ibm.com/i dir/iDoctor.nsf

► Troubleshooting application performance: New tools for data collection

http://www-128.ibm.com/developerworks/lotus/library/app-troubleshooting2/

The Enterprise Mail workload benchmark

http://www-128.ibm.com/developerworks/lotus/library/domino7-enterprise-performance/

► Getting Started with Management Central

http://publib.boulder.ibm.com/infocenter/iseries/v5r4/topic/rzaih/rzaksinstlmc.htm

► Lotus Support

http://www.support.lotus.com

► Considerations when developing Domino C and C++ API applications for i5/OS

http://www.ibm.com/support/docview.wss?rs=203&uid=swg21238494

Support for IBM Lotus Domino on 64-bit Operating Systems

http://www.ibm.com/support/docview.wss?rs=463&context=SSKTMJ&dc=DB520&uid=swg21 233872&loc=en US&cs=UTF-8&lang=en&rss=ct463lotus

Best practices for large Lotus Notes mail files:

http://www-128.ibm.com/developerworks/lotus/library/notes-mail-files/

► i5/OS Information Center

http://publib.boulder.ibm.com/iseries/

► Lotus Sametime

http://www-142.ibm.com/software/sw-lotus/products/product3.nsf/wdocs/homepage

► IBM Lotus Sametime for i5/OS

http://www.ibm.com/servers/eserver/iseries/sametime/

► Lotus Sametime 7.0 for i5/OS documentation

► IBM Technote 1158798, Troubleshooting problems with Chat and Awareness in DWA 6.5.x http://www.ibm.com/support/docview.wss?uid=swg21158798

► IBM Technote 1159197, Complete steps to configure Sametime integration with DWA 6.5.x

http://www.ibm.com/support/docview.wss?uid=swg21159197

Connection documents

http://www-12.lotus.com/ldd/doc/domino\_notes/7.0/help7\_admin.nsf/f4b82fbb75e942 a6852566ac0037f284/f4f7bc235c42319d8525706f0065b03c?OpenDocument

▶ Domino SSO

Creating Configuration Settings documents

http://www-12.lotus.com/ldd/doc/domino\_notes/7.0/help7\_admin.nsf/f4b82fbb75e942a6852566ac0037f284/0646f18e7e0bb0428525706f0065c7ce?OpenDocument

Configuration Settings document settings

http://www-12.lotus.com/ldd/doc/domino\_notes/7.0/help7\_admin.nsf/f4b82fbb75e942 a6852566ac0037f284/5c963b000ee5eb0d8525706f0065cf3a?OpenDocument

## **How to get IBM Redbooks**

You can search for, view, or download Redbooks, Redpapers, Hints and Tips, draft publications and Additional materials, as well as order hardcopy Redbooks or CD-ROMs, at this Web site:

ibm.com/redbooks

## **Help from IBM**

IBM Support and downloads

ibm.com/support

**IBM Global Services** 

ibm.com/services

To determine the spine width of a book, you divide the paper PPI into the number of pages in the book. An example is a 250 page book using Plainfield opaque 50# smooth which has a PPI of 526. Divided 250 by 526 which equals a spine width of .4752". In this case, you would use the .5" spine. Now select the Spine width for the book and hide the others: **Special>Conditional** Conditional Text Settings (ONLY!) to the book files. Text>Show/Hide>SpineSize(->Hide:)>Set. Move the changed Conditional text settings to all files in your book by opening the book file with the spine.fm still open and File>Import>Formats the

Draft Document for Review February 19, 2007 3:16 pm

7311spine.fm 4





(1.0" spine) 0.875"<->1.498" 460 <-> 788 pages

To determine the spine width of a book, you divide the paper PPI into the number of pages in the book. An example is a 250 page book using Plainfield opaque 50# smooth which has a PPI of 526. Divided 250 by 526 which equals a spine width of .4752". In this case, you would use the .5" spine. Now select the Spine width for the book and hide the others: **Special>Conditional** Conditional Text Settings (ONLY!) to the book files. Text>Show/Hide>SpineSize(->Hide:)>Set. Move the changed Conditional text settings to all files in your book by opening the book file with the spine.fm still open and File>Import>Formats the

Draft Document for Review February 19, 2007 3:16 pm

7311spine.fm 430

# Index

Symbols \$UpdateQueue 218 *BASE option 13, 42 *BASE pool 215, 243 *MACHINE pool 215, 244	incremental online backup of Domino server 343 Initialize BRMS (INZBRM) 335 notes.ini settings 370 package 335 recovery of Domino full online backup 352
A activity trends 3, 192 Add PEX Definition (ADDPEXDFN) 211 Add Sametime to Domino (ADDLSTDOM) 400 adding BRMS service to a Domino server 345 adding Sametime 7 Limited Use to a Domino 7 server 400	recovery of Domino incremental online backup 363 Save Domino Server using BRMS (SAVDOMBRM) 341 Save Object using BRM (SAVBRM) 335 Start Backup using BRM (STRBKUBRM) 341 Start Maintenance for BRM (STRMNTBRM) 335 Work with Backup Control Groups (WRKCTLGBRM) 350 Base pool (*BASE) 244
additional Domino server 123 configuring with CFGDOMSVR 145 configuring with domwzd.exe 132 handling the server ID 130	baseline 185 billing 113 bottleneck 185 Busytime database 4
registering the server 124 verifying connection to registration server 131 additional language support 63	C C API option 13, 42
installing using Language Pack Installer 63 installing using LODRUN 71 admin.id 256, 281 admin4.nsf 192, 275	capacity planning 15 cert.id 256, 281 Certificate Authority (CA) 374 Certificate Store 380
administering Domino 7 for i5/OS 153 administrator 111 Administrator client 168, 182 Administrator ID 98, 116	certifier ID 116 certlog.nsf 273 certsrv.nsf 274 Change Current Directory (CHGCURDIR) 172
ADMINP task 328 agent manager task 328 AgentRunner.nsf 273 analyzing	Change Domino Server (CHGDOMSVR) 102, 111, 171 Change Job Type (CHGJOBTYP) 188 Change Owner (CHGOWN) 131, 282 Change Shared Pool (CHGSHRPOOL) 244
disk I/O 238 memory resources 231 network resources 239 performance bottlenecks 224	Change Shared Foor (CHGSHIT COL) 244 Change TCP/IP Attributes (CHGTCPA) 188, 231 Change TCP/IP Domain (CHGTCPDMN) 23 changing the Domino server configuration 171
anti-spam 4 applications 2, 186 architecture 2 archival transaction logging 344	cleaning up orphaned shared memory or semaphores 303 cluster enabled Domino 7 clustering 113, 224
automatic diagnostic collection tool 300 auxiliary storage pools 245 availability 5	collaborative applications 2 collation 121 collecting Domino performance data 208 collecting information for Lotus Support 297
Backup, Recovery, and Media Services (BRMS) 98, 333 changes for Domino incremental backups 343 concepts 334 configuring to work with Domino 335 control groups 335 directories used 369 Domino online backups 334 full online backup of Domino server 337	Collection Services 190, 201 starting 208 commands ADDLSTDOM 400 ADDPEXDFN 211 CFGDOMSVR 90, 108, 282 CFGTCP 23 CHGCURDIR 172 CHGDOMSVR 102, 111, 171

CHGJOBTYP 188	WRKSYSACT 200		
CHGOWN 131, 282	WRKSYSSTS 198, 227		
CHGSBSD 244	WRKSYSVAL 215		
CHGSHRPOOL 244	common name (CN) 23		
CHGTCPA 188, 231	communication line descriptions 247		
CHGTCPDMN 23	communications 186		
DLTDOMSEM 303	communications trace 241		
DLTDOMSMEM 303	compact task 298, 329		
DMPDOMSVRC 7, 173, 310	Configure Domino Server (CFGDOMSVR) 90, 108, 282		
DSPDOMCSL 171	configuring an additional server 145		
DSPPTF 19, 33	Configure TCP/IP (CFGTCP) 23		
	, ,		
DSPSFWRSC 400	configuring		
DSPSYSVAL 15, 187, 225	additional Domino server 123, 132		
EDTF 172	handling the server ID 130		
ENDDOMSVR 174	registering the server 124		
ENDJOB 290	using CFGDOMSVR 145		
ENDJOBABN 296	using domwzd.exe 132		
ENDPEX 213	verifying connection to registration server 131		
ENDSBS 174, 290	Backup, Recovery, and Media Services (BRMS) for		
ENDTCP 98, 118	Domino 335		
ENDTCPSVR 98, 118	Domino Access for Microsoft Outlook 416		
INZBRM 335	Domino for i5/OS to use System i SSL 371		
LODRUN 43, 53	Domino server with existing id files 257, 282		
MKDIR 130	first Domino server 90		
NETSTAT *CNN 239	special authorities 92, 109, 123		
PING 30, 132	TCP/IP on i5/OS 27		
PRTACTRPT 200	consistency check 297		
PRTPEXRPT 214	console.log 302, 327		
PWRDWNSYS 290	control group 334		
RSTLICPGM 43, 55, 197	copying ID files 106		
RUNDOMCMD 178, 298	corrupt data 291		
SAVBRM 335	country (C) 23		
SAVDOMBRM 341	cppfbws.nsf 274		
SBMDOMCMD 172	CPU usage 315		
SETDOMENV 176	CPW (Commercial Processing Workload) 226		
STRBKUBRM 341	Create Directory (MKDIR) 130		
STRDOMSVR 173, 288	creating		
STRMNTBRM 335	certificate for Domino using software encryption 382		
STRPEX 213	Certificate Store 380		
STRPFRCOL 188	local Certificate Authority (CA) 374		
STRPFRTRC) 188	system monitor 202		
STRTCP 29, 98, 118	temporary full text indexes 223		
STRTCPSVR 98, 118	critical fix packs 12		
UPDDOMSVR 31, 175			
VFYTCPCNN 30	n		
WRKACTJOB 172, 180, 228	D		
WRKCTLGRM 350	da.nsf 275		
WRKDOMCSL 172	data directory 110, 170		
WRKDOMSVR 169, 229	data recovery 353		
WRKDSKSTS 199, 228	database corruption 291		
WRKHDWRSC 15, 187	database indexing 217		
WRKLIND 187, 247	Database.BufferPool.Maximum 245		
WRKLNK 172	Database.BufferPool.Peak 245		
	Database.BufferPool.PerCentReadsInBuffer 245		
WRKLNKBRM 359, 365	Database.BufferPool.Used 245		
WRKMEDIBRM 342	daylight savings time 104, 112, 164		
WRKPTFGRP 17	DB2 Universal Database for i5/OS 6		
WRKQRY 233	dc.nsf 275		
WRKSBMJOB 342	ddm.nsf 192, 276		
WRKSBS 179			
WRKSHRPOOL 244	debug parameters 326		
	decsadm.nsf 276		

Delete Domino Semaphores (DLTDOMSEM) 303	incremental online backup 343
Delete Domino Shared Memory (DLTDOMSMEM) 303	installation methods 43
deleting	installing 42
Domino server 167	measuring performance 198
orphaned shared memory or semaphores 303	memory requirements 15
diagindex.nbf 302	multiple language support 14
Digital Certificate Management (DCM) server 372	multi-version capable releases 34, 38, 59
disk 186	multi-versioning 8
disk I/O 238	network configuration 164
performance tuning 245	NOTES.INI 166, 172
disk space 15	obtaining software 14
Display Domino Console (DSPDOMCSL) 171	online backups 334
Display Program Temporary Fix (DSPPTF) 19, 33	performance tuning 183
Display Software Resources (DSPSFWRSC) 400	prepare for install 42
Display System Value (DSPSYSVAL) 15, 225	product options 13
Display System Values (DSPSYSVAL) 187	Program Temporary Fixes (PTFs) 12, 16, 32
displaying Domino jobs 158	recovery of full online backup 352
domain monitoring 3	recovery of incremental online backup 363
Domain Name System (DNS) 25	software requirements 15
Domino 2	TCP/IP considerations 22
administrator 111	updating the Domino server release 175
architecture 2	upgrading 21, 31
clustering 7, 224	verifying installed 56
configuration databases 273	versions 12
data directory 110	what happens at installation time 44
database indexing 217	Domino 7.0.2 293
debug parameters 326	Domino Access for Microsoft Outlook 415
domain monitoring 3	installation and configuration 416
domain name 24, 100, 114	requirements 416
fix packs 12, 32	what's new in Domino 7 416
language pack 14	Domino Administrator client 168, 182
large mail files 223	Domino Change Manager 192
licenses 47	Domino database performance considerations 221
Maintenance Releases (MRs) 12, 38	Domino Directory 24
naming conventions 22	upgrade considerations 35
network configuration 164	Domino directory type 162
NOTES.INI 166, 172	Domino Document Manager 9
performance tools 192	Domino Domain Monitoring (DDM) 192
release 38	Domino Enterprise Connection Services (DECS) 113
release notes 13	Domino Enterprise Server 48
server document 24	Domino extended products 8
server host name 120	Domino eXtensible Markup Language (DXL) 5
server name 109	Domino Fax for i5/OS 8
version 38	Domino HTTP server 102, 112
Domino 7 enhancements 3	Domino HTTP task 161
Domino 7 for i5/OS 5, 7, 13, 353	Domino LDAP server 102, 112
adding the BRMS service 345	Domino Messaging Server 47
additional language support 63	Domino Monitoring Configuration database 192
administering 153	Domino Off-Line Services (DOLS) 112, 121
capacity planning 15	Domino plug-in for iSeries Navigator 7, 82, 154
CL commands 169	Domino server
collecting performance data 208	command 172
configuring a first server 90	console 171
configuring an additional Domino server 123	crash 290, 293
configuring to use System i SSL 371	data directory path 170
disk requirements 15	hang 309, 327
display jobs 158	partitioning 98, 113
full online backup 337	properties 159
Group PTFs 16	slowdown 309
hardware requirements 14	Domino Server Installation wizard 43, 51

multi-version considerations 59 Domino Server Language Pack Installer 63 Domino Server Setup wizard (domwzd.exe) 90, 92, 132	HTTP Server Plug-in for Domino 21 HTTP task 296, 311, 329
Domino Utility Server 47	I
domwzd.exe 257	<b>I</b> i5/OS
Dump Domino Server Call Stack (DMPDOMSVRC) 310	
Dump Domino Server Call Stacks (DMPDOMSVRC) 7,	analyzing
173	disk I/O 238
	memory resources 231
E	network resources 239
Edit File (EDTF) 172	performance bottlenecks 224 architecture 5
editing NOTES.INI 166, 172	Backup, Recovery, and Media Services (BRMS) 333
enabling	cluster enabled Domino 7
archival style transaction logging 344	configuring Domino to system SSL 371
automatic diagnostic collection tool 300	disk requirements 15
Digital Certificate Management (DCM) server 372	Domino CL commands 169
teraspace 221	Domino server jobs 172
encryption 371	Group PTFs 16
End Domino Server (ENDDOMSVR) 174	hardware requirements 14
End Job (ENDJOB) 290	host table 246
End Job Abnormal (ENDJOBABN) 296	installing Domino 7 for i5/OS 42
End Performance Explorer (ENDPEX) 213	installing performance management tools 193
End Subsystem (ENDSBS) 174, 290	iSeries Navigator 7, 154
End TCP/IP (ENDTCP) 98, 118	logical partition (LPAR) 39
End TCP/IP Server (ENDTCPSVR) 98, 118	managing resources 214
ending	measuring performance 198
Domino job 290	memory 214
Domino server 98, 118, 174	memory requirements 15
Java Server Controller 174	performance bottlenecks 186
events4.nsf 192, 276	Performance Explorer 193
extended products 8	Performance Tools 197
EZ-Setup 90	Program Temporary Fixes (PTFs) 16
	software requirments 15
E	system values 215
F	TCP/IP considerations 22
fault analyses 300	IBM HTTP Server Plug-in for Domino 21
fault recovery 293	IBM Lotus Domino Document Manager 9
fax 8	IBM Lotus Enterprise Integrator (LEI) 9
fix packs 12, 32	precautions for upgrading 21
FIXUP 295, 297	upgrade considerations 37
full online backup 337	IBM Lotus QuickPlace 9
directories used 369	IBM Lotus Sametime 8, 397
recovery 352 full text index 329	upgrade considerations 36
Tull text lindex 329	IBM Lotus Sametime Limited Use 397
	adding to a Domino server 400
G	IBM Passport Advantage 14
Group PTFs 16	IBM Systems Workload Estimator 15, 42
verifying 17	IBM Tivoli Analyzer for Lotus Domino 3
	ID files, copying 106
П	iDoctor 191
H	IIOP task 161
hardware requirements 14	IMAP task 162
high convertigated 215	incremental online backup 343
high server workload 315	directories used 369
homepage.nsf 274	recovery 363
host name 23, 120	incremental saves 98
host table 246	independent ASP (IASP) 245
HOSTS file 25	indexer task 328
hotfixes 12, 33	Initialize BRMS (INZBRM) 335
HTTP server 102, 112	installation methods for Domino 7 for i5/OS 43

installing 197	starting 98, 118
Domino for i5/OS 42	jconsole.exe 181
additional languages 63	job monitors 201
using InstallShield 44	
using iSeries Navigator 51	K
using LODRUN 53	
using LORUN 53	knowledge management 2
using RSTLICPGM 55	
using setup.exe 44	L
verifying install 56	language pack 14, 63
Domino plug-in for iSeries Navigator 82	language support 14, 63
Performance Explorer 193	large mail files 223
performance management tools 193	LDAP server 102, 112
Performance Tools for the i5/OS 197	LDAP task 162, 328
preparing to install Domino 42	licensing 47
Sametime 7 Limited Use on i5/OS 398	line description 27, 247
InstallShield 43	line speed and duplex 249
insufficient memory 303	linger value 241
integrating Sametime and Domino Web Access 406	Linux 4
integration 6	Indx 4 Indfr.nsf 274
with SAP 4	
Interactive Commercial Processing Workload (Interactive	Indsutr.nsf 274
CPW) 242	Load and Run (LODRUN) 43, 53
Internet Cluster Manager 161	local Certificate Authority (CA) 374
Internet Inter-ORB Protocol (IIOP) 112	log.nsf 192, 276
Internet Mail Access Protocol (IMAP) 112	logical partition (LPAR) 39
Internet password 404	loopback 224
IOPs 186	Lotus access for SAP solutions 4
iSeries Access for Microsoft Windows 20	Lotus Domino Administrator client 168, 182
iSeries Access for the Web 20	Lotus Domino Document Manager 9
iSeries Navigator 7, 154	Lotus Domino Fix Packs 12
configuring a Domino server 90, 122	Lotus Domino Maintenance Releases (MRs) 12
creating a system monitor 202	Lotus Domino plug-in for iSeries Navigator 82
deleting a Domino server 167	Lotus Domino Program Temporary Fixes (PTFs) 12, 16,
deleting shared memory or semaphores 304	32
displaying Domino jobs 158	Lotus Enterprise Integrator (LEI) 9
Domino plug-in 7, 154	precautions for upgrading 21
Domino server properties 159	upgrade considerations 37
editing NOTES.INI 166	Lotus Notes for Linux 4
endpoint systems 195	Lotus Quickplace 9
full online backup of Domino server 337	Lotus Sametime 8, 397
incremental online backup of Domino server 351	upgrade considerations 36
installing Domino 51	Lotus Sametime Limited Use 397
installing the Domino plug-in 82	adding to a Domino server 400
investigating a performance issue 320	Lotus Support 297
lauching the Domino Administrator client 168	
memory resource performance analysis 207	M
restoring Domino data from full online backup 354	machine pool (*MACHINE) 244
•	mail file best practices 223
restoring Domino data from incremental online backup	mail policies 3
363	mail routing debug 327
setting up Management Central 194	mail.box 327
starting Collection Services 210	main memory 214
starting Domino services 154	
stopping Domino services 156	main storage 186
system groups 196	Maintenance Releases (MRs) 12, 38
verifying Domino installed 56	Maintenance Updates (MUs) 12
	Management Central 189
J	performance analysis 201
Java Server Console 21, 180	setting up 194
Java Server Controller 173, 180	managing resources on the i5/OS 214

maximum frame size (MTU) 247	recovery of incremental online backup 363
MCU (Mail and Calendar User) 226	organization 22, 99, 110
measuring performance 198	organizational units 22, 99, 116
media 334	ou.id 256, 281
media class 334	Outlook access to Domino 415
media identifier 334	installation and configuration 416
MEMCHECK 330	requirements 416
memory 15	what's new in Domino 7 416
memory leaks 330	
memory overwrite 329	Р
memory pool 243	package 335
memory resources 231	partitioning 98, 113
methods to configure a Domino server 90	Passport Advantage 7, 14, 43
Microsoft Outlook access to Domino 415	PercentAvailSysResources 216
installation and configuration 416	performance 184
requirements 416	baseline 185
what's new in Domino 7 416	bottleneck 185
migration considerations 252	Domino database considerations 221
monitors 201	monitors 201
moving the Domino environment 252	using iSeries Navigator to investigate 320
moving your Domino server	performance adjuster 214, 216, 227
using a 5250 emulation session 278 using a graphical interface 253	performance analysis
mtstore.nsf 276	memory resource 207
multi-homing 24	using Management Central 201
multi-hosting 24	performance bottlenecks
multi-lingual database support 14	analyzing 224
multiple language support 14	analyzing disk I/O 238
multi-version capable releases 34, 175	analyzing memory resources 231
displaying Domino server information 170	network resources 239
preparing for 39	performance checklist 314
primary release 38	Performance Explorer (PEX) 188, 191, 211
multi-versioning 8, 38	installing 193
configuring a Domino server 94, 108	Performance Management for System i5 188
considerations when installing Domino code 59	performance management tools
-	installing 193
NI .	Performance Monitor 190
N	performance statistics 322
name aliasing 24	performance tools for Domino 192
names.nsf 24, 274	Performance Tools for iSeries (5722-PT1) 186, 189, 197
upgrade considerations 35 naming Domino servers 22	performance tuning 183 disk I/O 245
national language considerations 63	network resource 246
network compression 119	person document 24
network configuration 164	ping 30, 132
network resource performance tuning 246	policies 334
network resources 239	policy lockdown 3
Notes Indexing Facility (NIF) 218	policy-based administration 3
Notes Server Diagnostic (NSD) 293	POP3 task 162, 328
Notes Server Diagnostic tool (NSD) 290	port filtering 248
NOTES.INI 166, 172, 326	ports 240
Notesbench results 6	Post Office Protocol Version 3 (POP3) 112
NSD files 172	Power Down System (PWRDWNSYS) 290
NSF_Buffer_Pool_Size_MB 216, 244	preparing for installation 42
·	preparing for multi-versioning 39
^	primary release 38
0	Print Activity Report (PRTACTRPT) 200
obtaining Domino 7 software for i5/OS 14	Print PEX Report (PRTPEXRPT) 214
online backup 334, 337, 343	private pool 215
directories used 369	problem determination 289
recovery of full online backup 352	Domino debug parameters 326

peformance 314	S
Sametime not work with Domino Web Access 413	Sametime 8, 397
server crash 290	upgrade considerations 36
server hang 309, 327	Sametime Limited Use 397
server slowdown 309	adding to a Domino server 400
using iSeries Navigator 320	SAP integration 4
processor load 186	Save Domino Server using BRMS (SAVDOMBRM) 34
processor priority 242	Save Object using BRM (SAVBRM) 335
product options 13	scalability 6
Program Temporary Fixes (PTFs) 12, 16, 32	Secure Sockets Layer (SSL) 371
verifying 19	security 4
	sem.timeouts 313
Q	semaphore 290
QACTJOB 215	debug 312
QADLACTJ 215	timeout 312
QADLTOTJ 215	semaphores 303
QBASACTLVL 216, 244	semdebug.txt 310, 327
QBASPOOL 216, 244	server crash 290, 293
QDYNPTYADJ 216	server document 24
QDYNPTYSCD 216	server hang 309, 327
QMAXACTLVL 215, 228	server ID file 117
QMCHPOOL 216	server ID file 117
QNNINBRM 346, 369	clearing the password 131 handling the file for additional server 130
QNOTES user profile 44, 296	server name 109
QPFRADJ 216, 227	server slowdown 309
QPRCFEAT 225	server.id 256, 281
QPRCMLTTSK 216, 226	Server.Load 193
QTOTJOB 215	Set Domino Environment (SETDOMENV) 176
Quarterly Maintenance Updates (QMUs) 12	setup.exe 44, 90
Quickplace 9	shared pool 215, 244
QUSRNOTES library 44	Simple Message Transfer Protocol (SMTP) 112
	Simple Object Access Protocol (SOAP) 4
R	single sign on (SSO) 405
recovery of full online backup 352	SMTP task 25, 162, 327
recovery of incremental online backup 363	software encryption 382
Redbooks Web site 428	software requirements 15
Contact us xiii	software-only encryption 371
registering a Domino server 124	sorting characters 164
release 38	spam 4
release notes 13	Start Backup using BRM (STRBKUBRM) 341
reliability 5	Start Domino Server (STRDOMSVR) 173, 288
replication 329	Start Maintenance for BRM (STRMNTBRM) 335 Start Performance Collection (STRPFRCOL) 188
reports task 329 reports.nsf 274	Start Performance Explorer (STRPEX) 213
requirements	Start Performance Explorer (STRPFTTRC) 188
disk 15	Start TCP/IP (STRTCP) 29, 98, 118
hardware 14	Start TCP/IP Server (STRTCPSVR) 98, 118
memory 15	starting 173
software 15	Collection Services 208
resource.nsf 275	Domino server 98, 118, 173, 278, 288
resrc7.ntf 35	Domino services 154
Restore License Program (RSTLICPGM) 43, 55, 197	Java Server Console 181
restoring Domino databases 353	Java Server Controller 173
retransmissions 240	statrep.nsf 192
RnRMgr 35	STLINKS directory 36
Rooms and Resources Manager (RnRMgr) task 4, 35	STLINKS.SAV directory 37
Rooms and Resources Reservation Database (RRD) 35	stopping
router task 296, 315, 327	Domino server 98, 118, 174
Run Domino Command (RUNDOMCMD) 178, 298	Domino services 156

storage pool 214 Submit Domino Command (SBMDOMCMD) 172 subsystem 169, 179 support 297 support files 172 dump server call stacks 173 NSD files 172 system ASP 245 System i hostname 23 system monitor 201 creating 202 system values 215	HTTP task 296, 329 indexer task 328 LDAP task 328 MEMCHECK 330 memory leaks 330 memory overwrite 329 network and connectivity 328 performance 314 POP3 task 328 reports task 329 router task 296, 327 Sametime not work with Domino Web Access 413 semaphore deag 312
Т	server crash 290
tasks	server hang 309, 327 server slowdown 309
ADMINP 328	SMTP task 327
agent manager 328	transaction logging 329
compact 298, 329	update task 328
HTTP 296, 311, 329 IIOP 161	using iSeries Navigator 320
IMAP 162	11
indexer 328	U
LDAP 162, 328 POP3 162, 328	UPDALL task 218 Update Domino Server (UPDDOMSVR) 31, 175
QNNINBRM 346, 369	UPDATE task 217, 328
reports 329	updating the Domino server 39, 175
router 296, 315, 327	upgrading 31, 39
SMTP 25, 162, 327	Domino Directory considerations 35
UPDALL 218	LEI considerations 37
UPDATE 217, 328	precautions for LEI 21
TCP/IP 22	Rooms and Resources Manager task considerations
activating 29	35
buffer size 248	Sametime considerations 36
configuring on i5/OS 27	using setup.exe 44
Domain Name System (DNS) 25 host files 25	
interface 27	V
multi-homing 24	Verify TCP/IP Connection (VFYTCPCNN) 30, 132
multi-hosting 24	verifying
name aliasing 24	Domino installed 56
verifying 29	Group PTFs 17
technical support files 172	individual PTFs 19 Sametime Limited Use installed 400
dump server call stacks 173	Sametime working correctly 402
NSD files 172	TCP/IP 29
teraspace 221	version 38
threads 325	versions of Domino 7 for i5/OS 12
time zone 104, 112, 164	
transaction logging 252, 291, 298, 343 debug parameter 329	14/
troubleshooting 289	W
ADMINP task 328	Web Administrator client 181 Web applications 2
agent manager task 328	Web services 4
automatic diagnostic collection tool 300	Web Services 4 Web Services Description Language (WSDL) 4
cleaning up orphaned shared memory or semaphores	Work with Active Jobs (WRKACTJOB) 172, 180, 228
303	Work with Backup Control Groups (WRKCTLGBRM) 350
collecting information 297	Work with Disk Status (WRKDSKSTS) 199, 228
Domino debug parameters 326	Work with Domino Console (WRKDOMCSL) 172
Domino server crashes 293	Work with Domino Servers (WRKDOMSVR) 7, 169, 229
Domino server won't start 295	Work with Hardware Resources (WRKHDWRSC) 15,
full text index 329	

187

Work with Line Description (WRKLIND) 187

Work with Line Descriptions (WRKLIND) 247

Work with Link Information (WRKLNKBRM) 359, 365

Work with Media Information (WRKMEDIBRM) 342

Work with Object Links (WRKLNK) 172

Work with PTF Groups (WRKPTFGRP) 17

Work with Queries (WRKQRY) 233

Work with Shared Storage Pools (WRKSHRPOOL) 244

Work with Submitted Jobs (WRKSBMJOB) 342

Work with Subsystems (WRKSBS) 179

Work with System Activity (WRKSYSACT) 200

Work with System Status (WRKSYSSTS) 198, 227

Work with System Values (WRKSYSVAL) 215

Work with TCP/IP Connection Status (NETSTAT \*CNN)

239

working with Domino servers 169

Workload Estimator 15, 42



# **Implementing Domino 7 for i5/0S**



Guidelines for deploying and administering Domino 7 on i5/OS

Latest information on Domino for i5/0S performance tuning

Tips for moving Domino servers to the IBM System i platform With the introduction of IBM Lotus Notes and Domino 7, IBM Lotus continues to set the standard for innovation in the messaging and collaboration market that Lotus defined two decades ago. With Lotus Notes and Domino 7, IBM has enhanced the scalability, security features, administration, interoperability, productivity, and performance, enabling companies to achieve the most from their infrastructure.

Upgrading to the latest version of Lotus Notes and Domino can help your organization to realize high return on investment, potentially lower your cost of ownership, and help improve user productivity and business responsiveness.

This IBM Redbook targets system administrators who plan to implement or upgrade to Domino 7 for i5/OS in their organization. It provides tips and techniques to help you successfully deploy and administer Domino 7 servers on i5/OS. The primary focus is to explain the installation, configuration, and performance tuning of Domino 7 in this environment. This redbook also provides information on moving Domino servers to the System i platform as well information on backup and recovery and troubleshooting Domino 7 servers running on i5/OS.

INTERNATIONAL TECHNICAL SUPPORT ORGANIZATION

BUILDING TECHNICAL INFORMATION BASED ON PRACTICAL EXPERIENCE

IBM Redbooks are developed by the IBM International Technical Support Organization. Experts from IBM, Customers and Partners from around the world create timely technical information based on realistic scenarios. Specific recommendations are provided to help you implement IT solutions more effectively in your environment.

For more information: ibm.com/redbooks

SG24-7311-00

**ISBN**