11

Monitoring Health and Performance

IN THIS CHAPTER, YOU WILL LEARN TO:

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  - Ensure That Mail Flows Freely (Page 443)
  - Verify Exchange Server Health (Page 455)
  - Use the Exchange Best Practices Analyzer (Page 464)
- **TRACK EXCHANGE PERFORMANCE (Pages 465 – 477)**
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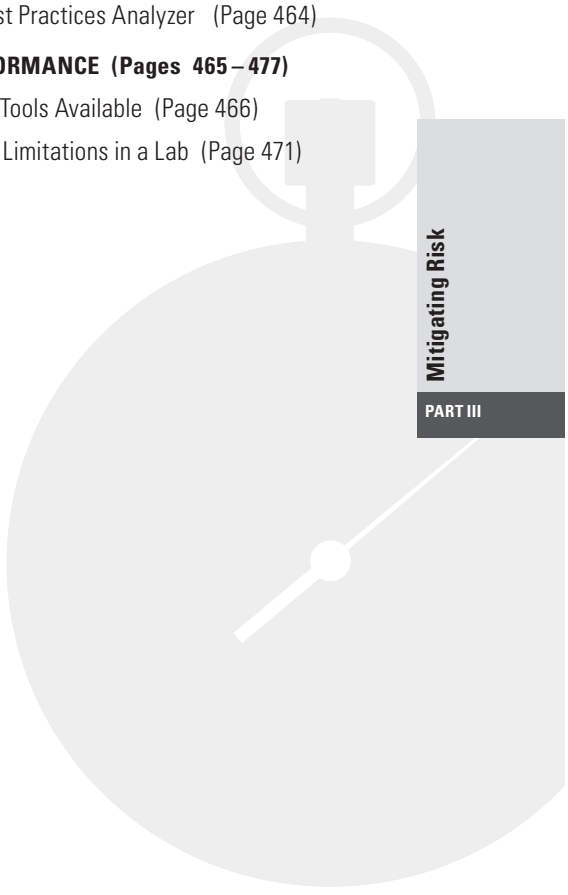
  - Test the Performance Limitations in a Lab (Page 471)



When your Exchange servers are healthy and performing well, there is a much smaller chance of problems surfacing that you didn't anticipate. This chapter is about being proactive. That is, actively seeking out potential issues before they happen. In order to be proactive, we'll look primarily in two areas. The first area is ensuring that your Exchange servers are healthy. I'll show you how to make sure that mail is flowing freely throughout your transport servers. I'll also show you how to proactively verify your health by monitoring your logs and other factors. We'll also take a look at the Exchange Best Practices Analyzer, and use that helpful tool to make sure that your Exchange implementation is in line with best practices.

The second area that we'll look at is the performance of Exchange. There are many methods and tools that can be used to evaluate the performance of your Exchange servers. I'll show you how to use the most common tools and methods that you'll want to use in your environment as a minimum.

Keep Exchange Healthy

The Exchange administrator has no bigger task than to ensure that the system stays up and running. Unfortunately, many administrators are forced to live in reactive mode, constantly putting out the biggest fire. Instead, administrators should strive to be consistently in proactive mode. When you are in a state of proactivity, you don't need to "react" to events, but instead you "respond" to them. In other words, living in proactive mode means that you'll smell the smoke before the fire starts. You'll detect little issues and quirks ahead of time so you can correct them before they become big problems.

There are a few key areas that you need to become proactive in if you want to be effective in keeping your Exchange implementation healthy:

- Keeping messages moving in and out of the Exchange organization
- Ensuring that your Exchange servers aren't standing on their last leg
- Using best practices in your implementation

This section shows you what you can do to proactively monitor the health of Exchange in these areas.

Ensure That Mail Flows Freely

Ensuring that mail can be routed successfully throughout your environment is an important area to look at when you are monitoring Exchange health. A routing problem may not be easy to detect until it has compounded for a while. This is one of those areas where you can't depend on your users to notify you if there's a problem. If mail delivery is delayed, users may not even call the help desk because they may just blame it on the "slow network." And when messages are routed outside the organization, there are so many factors outside your control that you may not even realize the problem is with your servers.

Now more than ever, it's important to pay careful attention to your routing topology because Exchange relies heavily on an external dependency—Active Directory. Exchange administrators may not be aware of site topology changes in Active Directory (AD), and this can greatly affect how mail is routed.

Check Message Queues

When messages can't be routed to the next hop toward their destination, they will be held in one of the queues on the transport server that can't route the message. If users are sending mail and the messages are taking a long time to reach their recipients, there may be an excessive amount of messages in a queue. Therefore, it's important to monitor your queues and ensure that no issues exist that might prevent message delivery.

The two primary tools for checking message queues in Exchange Server 2010 are the Queue Viewer and the Exchange Management Shell (EMS). The Queue Viewer is accessible through the Toolbox portion of the Exchange Management Console (EMC). To open the Queue Viewer, follow these steps:

1. Open the EMC and browse to the Toolbox node in the Console tree.

   The Work area will list several tools that are included in Exchange Server 2010.

2. In the Mail Flow Tools section, double-click the Queue Viewer tool, as shown in Figure 11.1.

When the Queue Viewer is opened, the Submission queue is shown by default. Other queues that currently have messages in them will also appear. You can double-click on the queue to open it and view the details of the messages that are inside. Figure 11.2 shows a message stuck in

the Unreachable queue because it couldn't find a Simple Mail Transfer Protocol (SMTP) connector to route the message over.

Figure 11.1: Opening the Queue Viewer tool from the EMC

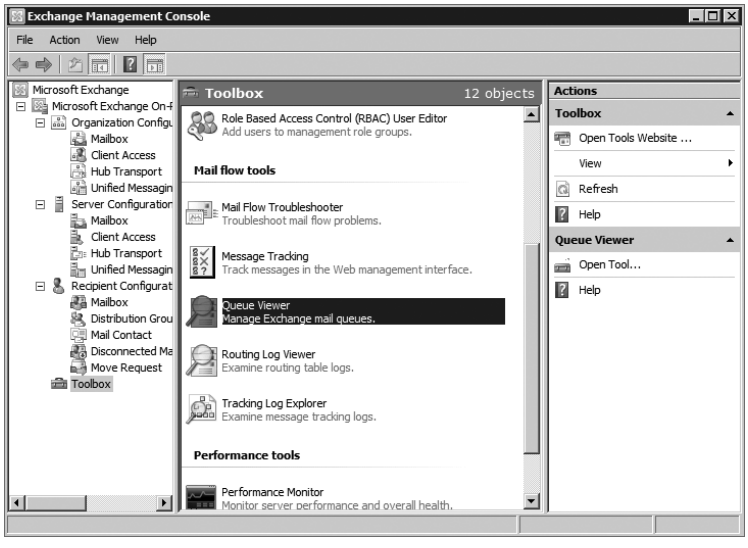
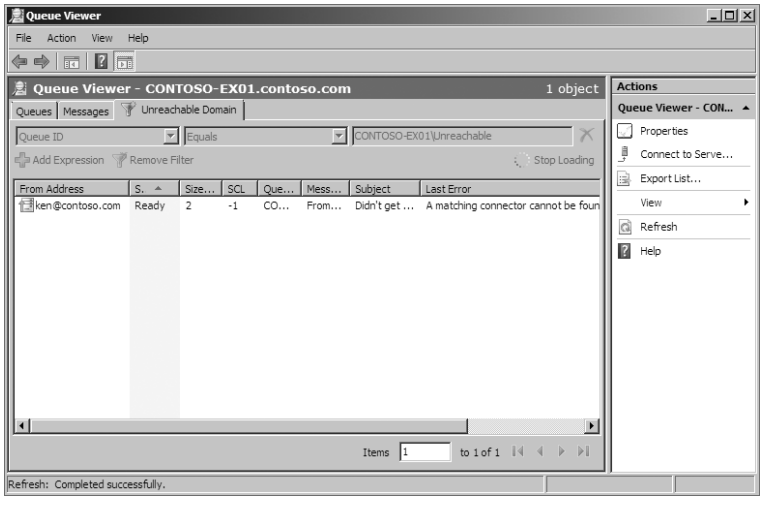


Figure 11.2: A message trapped in the Unreachable queue



There are a few different things you can do to messages that are stuck in a queue. Table 11.1 lists your options.

Table 11.1: Actions You Can Take on Queued Messages

Action	Description	Usage Notes
Suspend the message	Stops the message from being delivered and moved out of the queue	Does not apply to the Submission queue or the Poison Message queue.
Remove the message	Removes the message from the queue	You have the option of sending a nondelivery report to the sender or just silently dropping the message from the queue. This does not apply to the Submission queue.
Export the message	Makes a copy of the queued message without removing the message from the queue	Cannot be done in the Queue Viewer. Exporting messages can only be performed with the EMS.
Resubmit the message	Moves the message out of the queue and resubmits it to the Submission queue	Causes the message to go through categorization again.

Suspend and Remove Messages from Queues

You can suspend and remove messages using the Queue Viewer. Use the following steps:

1. In the Queue Viewer, select the Messages tab in the main pane.

   The messages that are currently in the queue are listed.

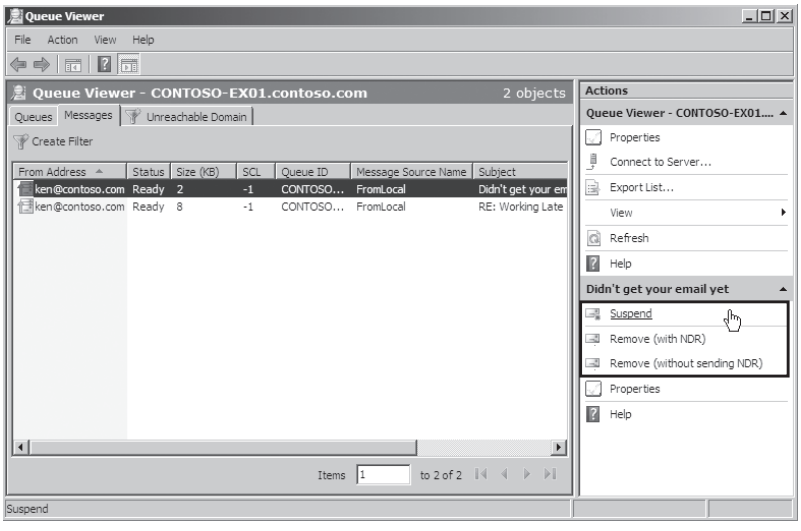
2. Click on the message that you want to suspend or remove.

   The Actions pane on the right will present the options that you have (Figure 11.3). Remember that you cannot perform these options on messages that are in the Submission queue.

3. Click Suspend to suspend the message. Click Remove (With NDR) to remove the message and send a nondelivery report to the sender. Click Remove (Without Sending NDR) to drop the message from the queue without notifying the sender. The sender may assume that the message was delivered.

4. If you choose to remove a message, you are prompted for confirmation. Click the Yes button in the confirmation dialog box to continue.

Figure 11.3: Suspending or removing a message from a queue



Export a Message from the Queue Using the Exchange Management Shell

If you want to export a message from a queue, you must use the Exchange Management Shell. Run the `Export-Message` cmdlet to export the message. You will need to specify the message identity and the file path to where you want to export the message. To get the message identity, you can view the properties of the queued message in the Queue Viewer or you can run the `Get-Message` cmdlet. The following example retrieves the message identity for the messages that are in the Unreachable queue:

```
Get-Message -Queue CONTOSO-EX01\Unreachable | ft Identity, ↩
FromAddress, Status
```

For further instructions on using the `Export-Message` cmdlet, refer to Chapter 6, "Managing Message Routing."

Resubmit a Queued Message Using the Exchange Management Shell

When you resubmit a message, you must resubmit all the messages in the queue. To resubmit messages, you use the `Retry-Queue` cmdlet in the EMS and specify the `Resubmit` parameter. The following example resubmits all of the messages in the Unreachable queue:

```
Retry-Queue CONTOSO-EX01\Unreachable -Resubmit $True
```

Use Protocol Logging to Diagnose Transport Problems

Protocol logging provides a method for you to determine what's happening behind the scenes in an SMTP exchange between servers. By turning on protocol logging, you can determine what the servers are saying to each other. Protocol logging can be enabled for send connectors or receive connectors. Send connectors and receive connectors maintain separate protocol logs.

To use protocol logging, follow these steps:

1. Turn protocol logging on at the connector that you want to log.
2. Determine or change the location of the protocol logs.
3. Examine the logs and understand what they are saying.

Enable Protocol Logging on Receive Connectors

To use the EMC to turn on protocol logging for receive connectors on a Hub Transport server, follow these steps:

1. Open the EMC and browse to the Server Configuration ➢ Hub Transport node in the Console tree.
2. Select the Hub Transport server that contains the receive connector from the list in the Results pane.
3. In the list of receive connectors, select the connector that you want to enable protocol logging on and click the Properties action in the Actions pane.
4. In the properties dialog box for the connector, select the General tab.
5. Next to the Protocol Logging Level option, select Verbose from the drop-down list, as shown in Figure 11.4.
6. Click OK to make the changes and close the properties dialog box.

You can also enable protocol logging on a receive connector through the EMS. Use the following command to enable protocol logging:

```
Set-ReceiveConnector ReceiveConnectorName ↩
-ProtocolLoggingLevel Verbose
```

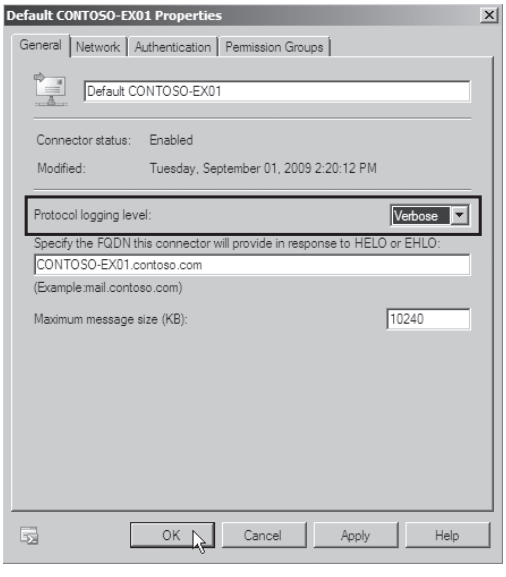
Enable Protocol Logging on Send Connectors

To enable protocol logging on send connectors in the EMC, follow these steps:

1. Open the EMC and browse to the Organization Configuration ➢ Hub Transport node in the Console tree.

2. Select the Send Connectors tab in the Work area.
3. In the list of send connectors, select the connector that you want to enable protocol logging on.
4. In the Actions pane on the right, click the Properties action to open the properties dialog box for the connector.
5. In the properties dialog box, select the General tab.
6. To the right of the Protocol Logging Level field, select Verbose from the drop-down list.
7. Click OK to make the change and close the properties dialog box.

Figure 11.4: Enabling protocol logging on a receive connector



You can also enable the protocol logs for send connectors using the following EMS command:

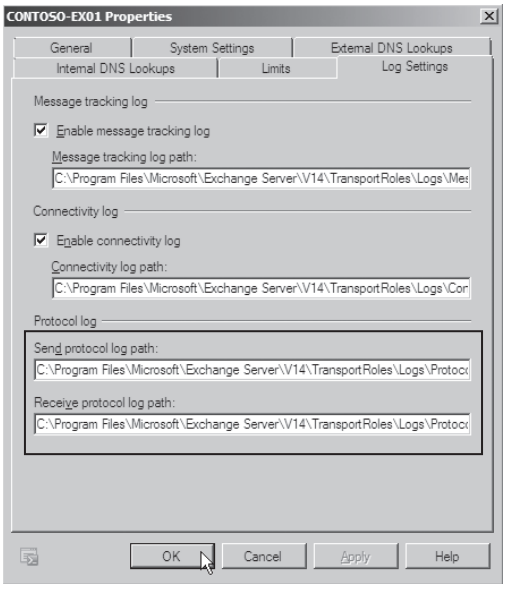
```
Set-SendConnector SendConnectorName -ProtocolLoggingLevel ↵
Verbose
```

Configure the Location of the Protocol Logs

When you enable protocol logging, information is written to the protocol logs. On each server there is one instance of these logs for send connectors and one instance for receive connectors. To determine where those logs are or to change the location of those logs, you can use the following steps in the EMC:

1. Open the EMC and browse to the Server Configuration ➢ Hub Transport node in the Console tree.
2. In the list of Hub Transport servers in the Results pane, select the server that you want to modify the location of the protocol logs on.
3. In the Actions pane on the right, select the Properties task to display the properties dialog box for the server you have selected.
4. In the properties dialog box, click the Log Settings tab.
5. View or modify the folder path in the Send Protocol Log Path field or the Receive Protocol Log Path field (Figure 11.5).
6. If you changed any of the protocol log paths, click OK to make the changes and close the properties dialog box.

Figure 11.5: Viewing or modifying the folder path of the protocol logs



Read the Protocol Logs

After the protocol logs are configured, you can open the logs and start reading through them. Browse to the folder that the logs are stored in using the path that you discovered previously. You can simply double-click on the log to open it using `Notepad.exe`.

The protocol log records several parameters that you can use to determine why a message isn't being sent from or received by a particular server. The notable fields used by the protocol logs are detailed in Table 11.2.

Table 11.2: Fields Used by the Protocol Logs

Field Name	Description
`date-time`	The date and time that the event occurred.
`connector-id`	The name of the connector that the event occurred on.
`session-id`	The unique ID associated with the SMTP session. You can use this to distinguish SMTP sessions from one another.
`sequence-number`	A number that is associated with each event in the current SMTP session. This is used to determine which order things happened in.
`local-endpoint`	The IP address and port used on your Exchange server.
`remote-endpoint`	The IP address and port used by the external Mail server.
`Event`	Indicates what was happening in the exchange. The session can be connected (+) or disconnected (-). After a session is connected, commands can be sent (>) or received (<). The log also indicates informational (*) messages.

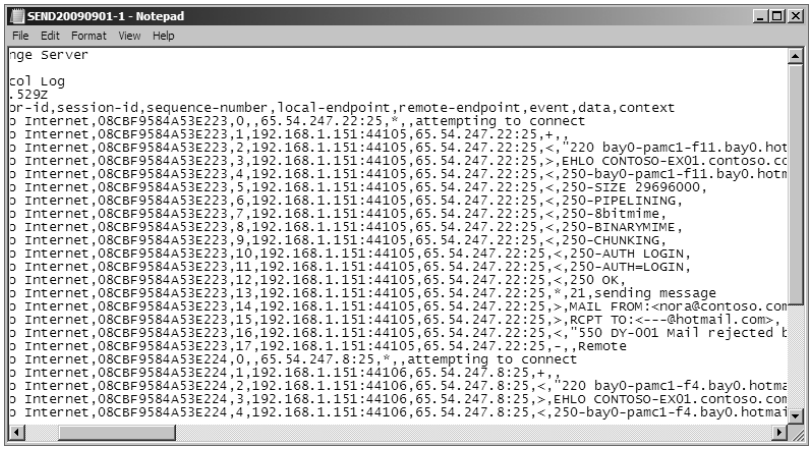
Using the information in the protocol logs, you can determine what exactly is happening during the SMTP session and take action accordingly. Figure 11.6 shows the send connector protocol logs from a message that was rejected by a server.

Track Message Flow

The ability to track message flow inside an Exchange organization is useful when you want to determine what has happened to a message after the user sent it. You can track message flow throughout an Exchange

organization using the message tracking logs. The message tracking logs keep track of messages that are sent between transport servers and to and from mailbox servers. These logs can be enabled on Mailbox, Hub Transport, and Edge Transport servers. Message tracking logs are enabled by default, so unless you explicitly turned them off, you can just start analyzing them.

Figure 11.6: A sample protocol log from a send connector



You have a few options for viewing message logs:

- Viewing the log files directly
- Using the Tracking Log Explorer
- Using the Exchange Management Shell

View the Log Files Directly

Directly viewing the log files with a tool such as `Notepad.exe` might not be the most efficient method of viewing the logs, but it's available to you as an option. Determine where the logs are kept on the Transport server by running the following EMS command:

```
Get-TransportServer ServerName | fl MessageTrackingLogPath
```

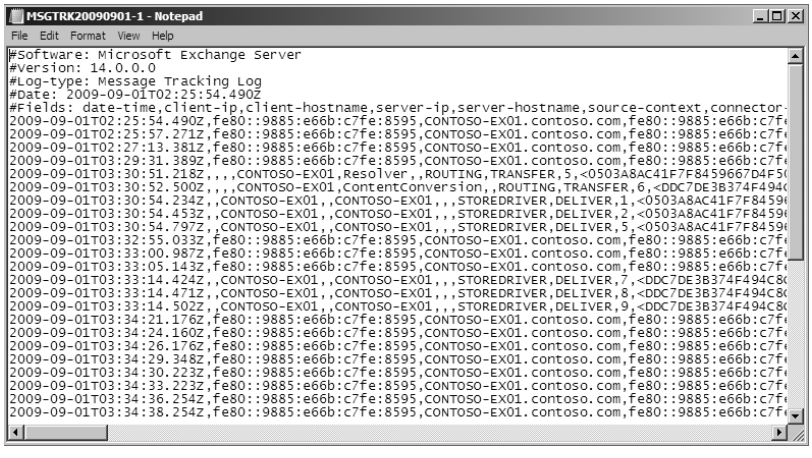
To determine where the logs are on a Mailbox server, use this EMS command:

```
Get-MailboxServer ServerName | fl MessageTrackingLogPath
```

After you get the path of the logs, you can browse to the folder on your server. Log files on transport servers are given the name `MSGTRK`*`yyyymmdd`*`-#.log` and mailbox server message tracking log files are named `MSGTRKM`*`yyyymmdd`*`-#.log`. The identifier *yyyymmdd* corresponds to the year, month, and day that the log file was created. Each log file is given a number that increments for each log file created on that day. By default, after log files reach 10 MB, a new log file is created with an incremented number. If your server has the Hub Transport role and Mailbox role combined, you will see both the MSGTRK log and the MSGTRKM log in the folder. However, the tracking log files for the Transport server and Mailbox server are kept separate even
if it's the same server.

If you open one of the message tracking log files in `Notepad.exe`, you will see a comma-separated file similar to the one shown in Figure 11.7.

Figure 11.7: Message tracking log file



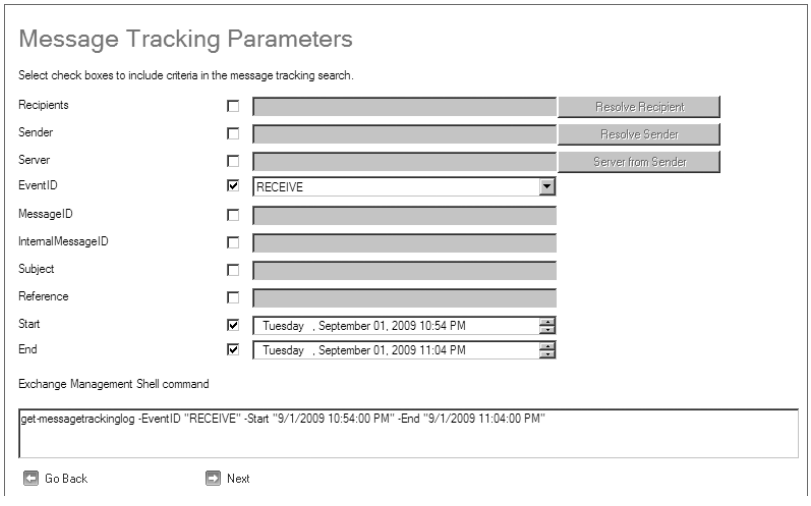
There are multiple fields in this file that indicate useful information such as the time that the message was sent or received, the servers that were involved in transporting the message, and the sender, recipient, and subject of the message. Although this information is available in the raw log files, using the Tracking Log Explorer to analyze the information may be a better choice.

Use the Tracking Log Explorer

The Tracking Log Explorer is part of the Exchange Troubleshooting Assistant, which is used in diagnosing multiple issues with Exchange.

You can use the Tracking Log Explorer to search through the message tracking logs and determine what exactly has happened to a message. As shown in Figure 11.8, there are multiple parameters you can perform the search with. If you don't specify the sender or the server, the search is performed against the Exchange server that you are currently logged in at.

Figure 11.8: Available search parameters in the Tracking Log Explorer



A field at the bottom of the parameters dialog box specifies the EMS parameter that is used in the search. You can copy and paste this command into the Exchange Management Shell to duplicate the results that the Tracking Log Explorer got.

The following steps demonstrate how to use the Tracking Log Explorer to track a message:

1. Open the EMC and browse to the Toolbox node in the Console tree.
2. In the Work area, double-click on the Tracking Log Explorer tool from the list of tools in the Mail Flow Tools section of the EMC.

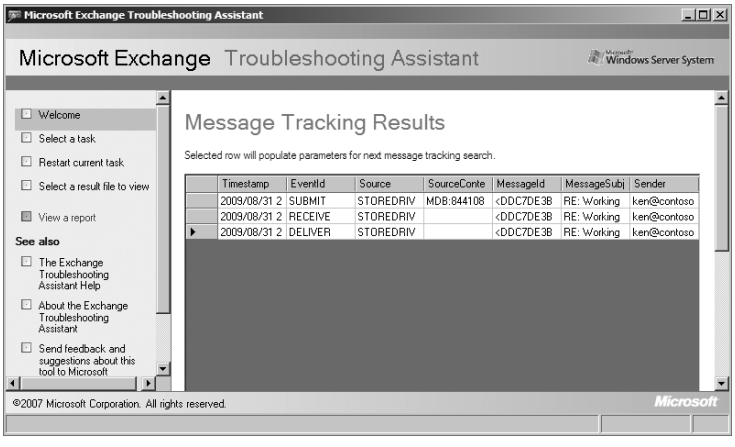
   The Exchange Troubleshooting Assistant launches and goes straight to the Tracking Log Explorer. If this is your first time using the Tracking Log Explorer, you may see a welcome screen that you can safely bypass.
3. In the Message Tracking Parameters dialog box, select the parameters that you want to use to perform the search. You can use the

Sender, Recipients, or Subject fields to find the message that you want to track.

4. Click Next to search for the message in the message tracking logs.

   The Message Tracking Results dialog box will display all the events that were found matching your search criteria. If you look at the results shown in Figure 11.9, you can see that the particular message that was searched on was submitted by the Mailbox server, received by the Transport server, and delivered to the recipient's mailbox.

Figure 11.9: Viewing the results of a tracked message



Track Messages in the EMS

You can use the `Get-MessageTrackingLog` cmdlet to perform various message tracking searches in the EMS. The easiest way to use the EMS for searching through message tracking logs is to build the search using the Tracking Log Explorer and then copy and modify the EMS command that the tool creates for you.

For example, the EMS command that was used by the Tracking Log Explorer in the previous example can be run directly in the EMS:

```
Get-MessageTrackingLog -Server CONTOSO-EX01 ↵
-MessageSubject "RE: Working Late"
```

Verify Exchange Server Health

A large part of being proactive in managing your Exchange environment is knowing where your servers stand in terms of health. This section discusses various things that you need to keep an eye on to help ensure that your servers are healthy.

Monitor the Event Logs

Event logs in Windows are used by several components and applications as a place to record critical alerts and notifications that may be of interest to system administrators. Exchange Server 2010 also uses the Windows event logs to record important events. Exchange records most of its events to the Application log, but you may also see some events recorded elsewhere. However, the majority of the events that you need to be concerned about for Exchange will appear in the Application log.

As a part of your responsibilities as an Exchange Server 2010 administrator, it's vital to check the event logs on each Exchange server and make sure that you don't see any undetected problems or other events that could become big issues in the future. You will primarily want to keep an eye out for any Warning or Error events, as they indicate problems that the server is currently having or could have.

View Relevant Events

To view the Application event log, follow these steps:

1. Click Start ➢ Administrative Tools ➢ Event Viewer.

   This launches the Event Viewer application that is built into Windows.

2. In the Event Viewer Console tree, browse to the Windows Logs ➢ Application node.

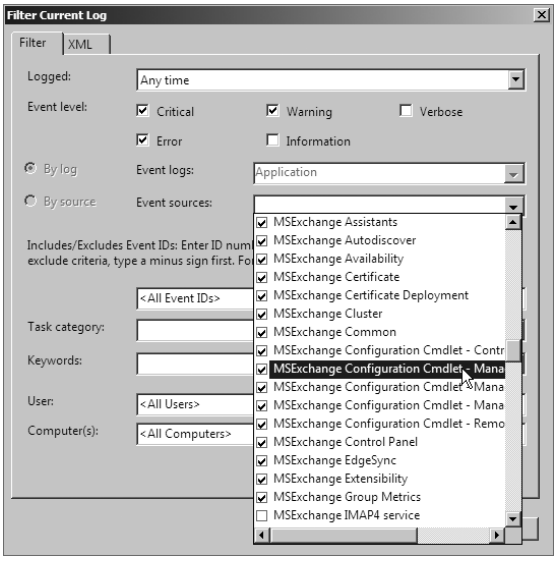
   The event logs for Exchange (and other processes) are displayed in the Results pane. You can search through the log line by line or you can create a filter.

3. If you want to filter out everything except for the Exchange logs, click the Filter Current Log task in the Actions pane on the right.

4. In the Filter Current Log dialog box, select the Critical, Error, and Warning check boxes. These events will indicate that something is wrong with Exchange or that something may soon break.

5. While still in the Filter Current Log dialog box, click on the drop-down list for the Event Sources field and select the relevant events that begin with MSExchange from the list, as shown in Figure 11.10. Click OK when finished.

Figure 11.10: Filtering out everything except for the Exchange logs in Event Viewer



6. Back in the Event Viewer dialog box, you can now view only the events relevant to Exchange.

Specify the Level of Logging Detail

If you find that you need more detail than what is provided in the Application logs, you can turn the dial up on what Exchange logs in the Application log. To increase logging, use the `Set-EventLogLevel` cmdlet in the EMS. You will need to specify the category of logs that you want to increase and how much you want to increase it.

In the following example, we will check and change the log level for the MSExchangeRPC log:

1. To determine what component to enable higher logging on and to determine the current logging level, run the following command:

```
Get-EventLogLevel
```

2. The `Get-EventLogLevel` command displays information about each component. Use the built-in PowerShell filtering capabilities to narrow down this list to display only event log categories that have the characters `rpc` in the identity:

```
Get-EventLogLevel *rpc*
```

3. To specify a logging level of High for the MSExchangeRPC log, use the following command:

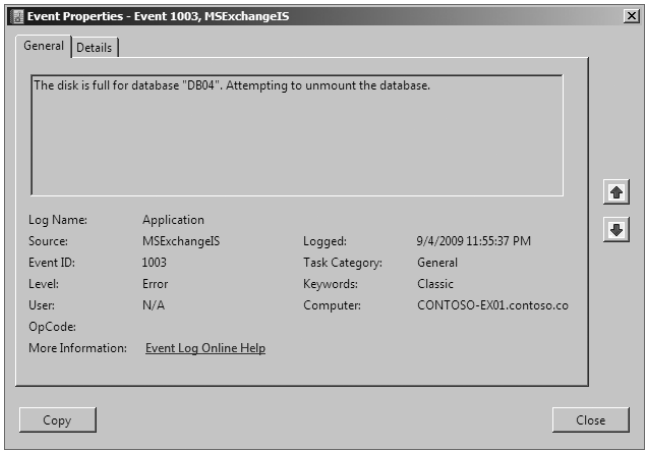
```
Set-EventLogLevel "MSExchangeSA\RPC Calls" -Level High
```

Monitor Disk Space on Database and Log Drives

The amount of free disk space is an important thing to monitor, particularly on your volumes that contain the database files or the transaction log files. On Mailbox servers, when the volume that contains the database gets full the database will be dismounted, which prevents users from accessing their mailboxes on that database. Dismounting the database is how Exchange protects the integrity of the data, as it cannot write additional data to the database if there is no space to do so. The database is dismounted when there is 2 MB of disk space left on the volume.

When the database is dismounted due to the disk being full, Exchange will log an event in the Application log with event ID 1003, as shown in Figure 11.11.

Figure 11.11: Event ID 1003 is logged when the database volume is out of free space.



Before the database can be mounted again, you must free up some space on the volume. There are multiple ways to reclaim space:

- Back up the server and allow the transaction logs to truncate.
- Back up the server and permanently delete any mailboxes that may be stored in deleted mailbox retention.
- Perform an offline defragmentation of the database using the `ESEUTIL /D` command. This may take some time to complete.
- If you're using a SAN-based volume, you can grow the size of the LUN that is presented to the Exchange server.
- Back up any extraneous data or personal files and delete them or move them to a more appropriate server.
- Move any transaction logs that have already been committed to another volume.

On Transport servers, when the disk that contains the message queue database and logs nears capacity, Exchange applies back pressure, which instructs Exchange to stop accepting new connections and potentially stops all message flow. By default, the Transport servers require at least 500 MB of disk space free on the volumes that contain the queue database and logs, so you should monitor the free disk space on those locations.

If you get into the situation of being low on disk space on your Transport server and back pressure is being applied, alleviate the problem using one of the following methods:

- Free up disk space on the Transport server by removing extraneous data.
- Move the queue database and logs to a separate volume with more space available.
- Modify the threshold numbers used to determine when to apply back pressure.

When back pressure is applied or relinquished, the Transport servers will log events in the Application log with event IDs of 15004 and 15005. You can monitor the Application log for these events on your Transport servers to indicate that back pressure is being applied.

Ensure That Services Are Running

The various components of Exchange run as services in Windows. Not all of the services need to be running in order for Exchange to be functional,

however. Certain services may only need to be started if Exchange is using a feature that relies on services, such as POP or IMAP. In fact, one of the best practices in hardening servers is to disable services that you are not required to run.

There are core services that need to be running in Exchange in order for an Exchange server in a particular role to function correctly. You should monitor these services to ensure that they are running. Many problems are attributable to a service that has stopped running for one reason or another. If you know when a critical service stops, you can respond rapidly to get the problem resolved.

Table 11.3 lists the services that Exchange Server 2010 uses and identifies which services are critical for each role.

Table 11.3: Critical Services That Need to Remain Running for Each Role

Service	Mailbox	Client Access	Hub Transport	Edge Transport
IIS Admin Service	Yes	Yes	Yes	No
Microsoft Exchange Active Directory Topology	Yes	Yes	Yes	No
Microsoft Exchange ADAM	No	No	No	Yes
Microsoft Exchange Credential Service	No	No	No	Yes
Microsoft Exchange EdgeSync	No	No	Yes	No
Microsoft Exchange Information Store	Yes	No	No	No
Microsoft Exchange Mailbox Assistants	Yes	No	No	No
Microsoft Exchange Address Book	No	Yes	No	No
Microsoft Exchange Forms-Based Authentication Service	No	Yes	No	No
Microsoft Exchange File Distribution	No	Yes	No	No
Microsoft Exchange Mail Submission	Yes	No	No	No

Table 11.3: Critical Services That Need to Remain Running for Each Role *(continued)*

Service	Mailbox	Client Access	Hub Transport	Edge Transport
Microsoft Exchange Mailbox Replication	Yes	Yes	No	No
Microsoft Exchange Protected Service Host	No	Yes	No	No
Microsoft Exchange RPC Client Access	Yes	Yes	No	No
Microsoft Exchange System Attendant	Yes	No	No	No
Microsoft Exchange Search Indexer	Yes	No	No	No
Microsoft Exchange Service Host	Yes	Yes	Yes	Yes
Microsoft Exchange Throttling	Yes	No	No	No
Microsoft Exchange Transport	No	No	Yes	Yes
Microsoft Exchange Transport Log Search	Yes	No	Yes	No
World Wide Web Publishing Service	Yes	Yes	Yes	No
Windows Remote Management	Yes	Yes	Yes	No

To determine if the required services for each role are running, you can execute the `Test-ServiceHealth` cmdlet in the EMS. You do not need to include any parameters.

The `Test-ServiceHealth` cmdlet will return the list of roles that are running on the Exchange server along with a list of the services for those roles. The cmdlet identifies the services that are running as well as the services that are not running but should be.

The following output demonstrates what is returned by the command when the Mail Submission service is stopped on a Mailbox server:

```
Role                    : Mailbox Server Role
RequiredServicesRunning : False
ServicesRunning         : {IISAdmin, MSExchangeADTopology,
                          MSExchangeIS, MSExchangeMailbox
```

```
                                Assistants, MSExchangeRepl, MSEx
                                changeRPC, MSExchangeSA, MSExchange
                                Search, MSExchangeServiceHost, MS
                                ExchangeThrottling, MSExchange
                                TransportLogSearch, W3Svc, WinRM}
    ServicesNotRunning      : {MSExchangeMailSubmission}
```

Use the Test Cmdlets in the Exchange Management Shell

Exchange Server 2010 provides several cmdlets in the Exchange Management Shell that are focused on testing the functionality and configuration of Exchange. The list of test cmdlets has grown in comparison to those available with Exchange Server 2007, and there are several useful ones that can make your job as an Exchange administrator a lot easier. Table 11.4 describes the available test cmdlets. You may have seen some of these cmdlets used throughout this book when working with certain aspects of Exchange.

Table 11.4: The `Test-*` Cmdlets in Exchange Server 2010

Cmdlet	Description
`Test-ActiveSyncConnectivity`	Tests mobile device connectivity through ActiveSync. The cmdlet attempts to synchronize the mobile device that you specify in the command.
`Test-EcpConnectivity`	Tests access to the Exchange Control Panel on a Client Access server that you specify.
`Test-EdgeSynchronization`	Tests the synchronization of Edge Transport servers.
`Test-FederationTrust`	Tests the configuration of the federation trust with the Microsoft Federation Gateway.
`Test-FederationTrustCertificate`	Tests the certificate used for your federation trust.
`Test-ImapConnectivity`	Tests the connectivity of one or more IMAP clients.
`Test-IPAllowListProvider`	Tests that the configured IP allow list provider is available and checks an IP address against it.

Table 11.4: The Test-* Cmdlets in Exchange Server 2010 *(continued)*

Cmdlet	Description
Test-IPBlockListProvider	Tests that the configured IP block list provider is available and checks an IP address against it.
Test-IRMConfiguration	Tests the configuration of Rights Management in Exchange.
Test-Mailflow	Tests whether mail can be sent to and from mailbox servers in the Exchange organization.
Test-MapiConnectivity	Tests that a mailbox can be logged into. If run against a database, it tests that the system mailbox for the database can be logged into.
Test-Message	Submits a test message to the specified recipients. This can be used to test transport rules and have a report generated about the tests.
Test-MRSHealth	Tests to ensure that the Mailbox Replication Service is running properly.
Test-OutlookConnectivity	Thoroughly tests the connectivity of Outlook by testing profile creation, AutoDiscover, and mailbox access.
Test-OutlookWebServices	Tests that AutoDiscover is returning the correct configuration information for a user and tests each of the service endpoints returned by AutoDiscover.
Test-OwaConnectivity	Tests that Outlook Web App can be contacted and successfully logged into.
Test-PopConnectivity	Tests the connectivity of one or more POP clients.
Test-PowerShellConnectivity	Tests that PowerShell can be used remotely and can successfully issue commands.
Test-ReplicationHealth	Tests multiple aspects of replication for a server in a DAG.

Table 11.4: The Test-* Cmdlets in Exchange Server 2010 *(continued)*

Cmdlet	Description
`Test-SenderId`	Tests sender ID checking against an IP address and domain that you specify.
`Test-ServiceHealth`	Tests that the services for each Exchange role installed are running.
`Test-SystemHealth`	Tests the overall health of the Exchange server through multiple tests.
`Test-WebServicesConnectivity`	Tests the functionality of Exchange Web Services through the use of Outlook Anywhere.

TIP The test cmdlets don't need to always be run on demand. You can choose a few of them that you want to run on a regular basis and create scheduled tasks out of them. For information on creating scheduled tasks from PowerShell scripts, refer to Chapter 2, "Using the Exchange Management Console and the Exchange Management Shell."

When running some of these test cmdlets, you may be required to have a specific test account created beforehand. To create this account, use the following steps:

1. Open the EMS and browse to the Scripts folder in the location where Exchange is installed. By default, this location is `C:\Program Files\Microsoft\Exchange Server\v14\Scripts`.
2. Run the PS1 script called `New-TestCasConnectivityUser.ps1`.
3. When prompted for a password, type a temporary password and press Enter. This password is just used for the creation of the test account and you will therefore not need to remember this password.
4. When prompted to continue creating the test user, press Enter.

   The test user is automatically created. When the test account is finished, the script will end and you will be returned to the EMS command prompt.

Use the Exchange Best Practices Analyzer

The Exchange Best Practices Analyzer (ExBPA) is a powerful tool in the Exchange administrator's toolbox that should be run on a regular basis. The ExBPA can perform a variety of tests that help ensure the health of your Exchange organization. In this section, I will show you how to run a health check.

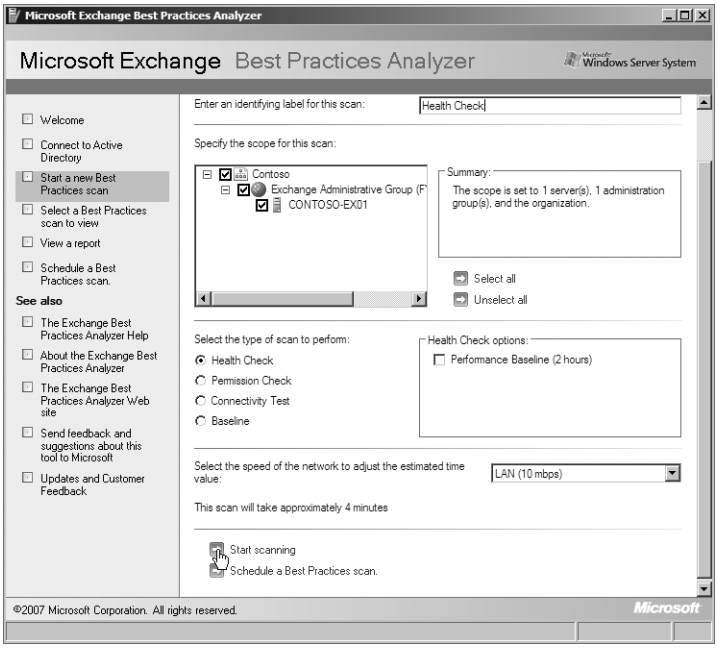
The ExBPA health check component performs a variety of tests against your Exchange servers and presents the results in an easy-to-read report. When reviewing the report, you will be presented with the critical issues encountered and given the opportunity to read more about why the issue was detected and how to correct it.

To perform a health check with the ExBPA, use the following steps:

1. Open the Exchange Best Practices Analyzer. You can do this by opening the EMC and browsing to the Toolbox node in the Console tree. Under the Configuration Management Tools portion of the Toolbox, double-click on Best Practices Analyzer.
2. If this is the first time you are running the BPA, you will be presented with a welcome screen. Decide whether you want to join the Microsoft Customer Experience Improvement Program and then click Go To The Welcome Screen.
3. At the Welcome screen, select the option Select Options For A New Scan.
4. On the Connect To Active Directory screen, type the name of the domain controller you want to connect to and click Connect To The Active Directory Server.
5. If you want to use different credentials than what you are currently logged in as for communication with Active Directory, click Show Advanced Login Options and enter the credentials that you want to use.

   Your connectivity and access permissions are verified before continuing.
6. On the Start A New Best Practices Scan screen, enter a name for the scan and select Health Check from the list of scans to perform.
7. If you only want to scan specific Exchange servers, you can select those servers from the Specify The Scope For This Scan list.
8. After you configured your options, click Start Scanning, as shown in Figure 11.12.

Figure 11.12: Configuring the BPA to perform a health check



On the Scanning In Progress screen, the scan is performed. The amount of time that the scan takes to complete will vary depending on how many servers you are scanning and the speed of your network.

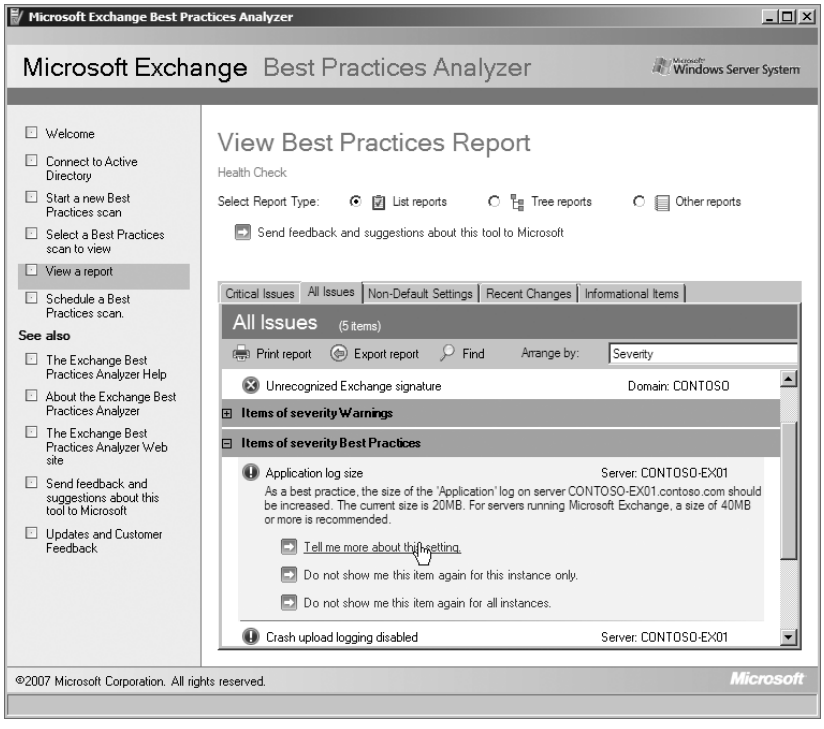
9. After the scan completes, you will be taken to the Scanning Complete screen. Select the option View A Report Of This Best Practices Scan.
10. View the results of the scan and take any necessary action on reported issues by selecting the option Tell Me More About This Setting, as you can see in Figure 11.13.

Track Exchange Performance

Ensuring that Exchange servers are highly performing machines is a vital area to focus on. This was more apparent in previous versions of Exchange where performance bottlenecks were more obvious. With the

many improvements in the architecture of Exchange and with the move to a 64 bit–only operating system, the performance demands of the system are becoming easier to meet. But before you can meet your performance requirements, you need to have an idea of how your Exchange servers are performing. This section will show you how to gather this information and gauge the level of performance that you need for Exchange.

Figure 11.13: Viewing the results of your health check



In this section, we'll first look at the tools that you can use for checking the performance of Exchange. Then I'll show you how to stress-test your servers and test the performance limitations of your configuration.

Use the Performance Tools Available

When analyzing the performance of Exchange, some of the best tools that you have at your disposal are the free ones that come with Exchange and Windows. The two tools that we'll look at in particular are the Performance Troubleshooter and the Performance Monitor tool.

Run the Performance Troubleshooter

The Performance Troubleshooter is a part of the Exchange Troubleshooting Assistant tool. With the Performance Troubleshooter, you can analyze and troubleshoot performance problems in Exchange as they are happening.

To use the Performance Troubleshooter, perform the following steps:

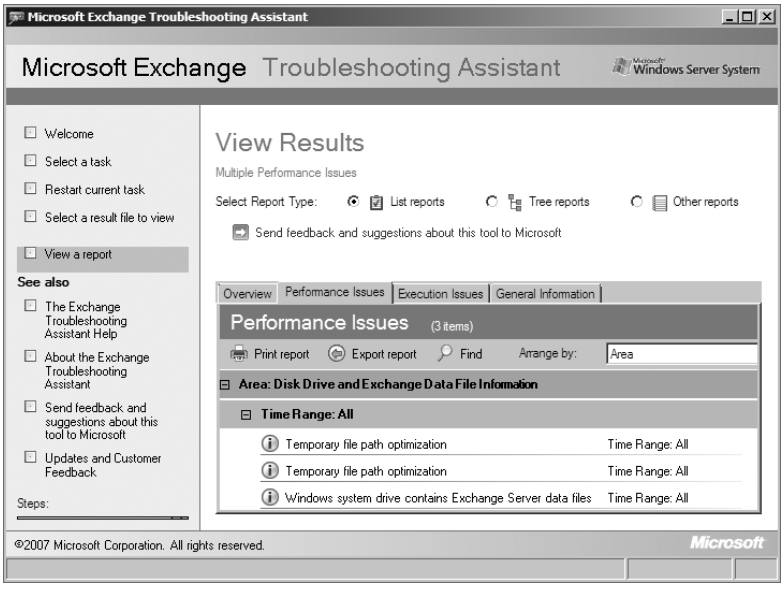
1. Open the EMC and browse to the Toolbox node in the Console tree.
2. Double-click on the Performance Troubleshooter tool in the list of tools in the Work area.

   The Microsoft Exchange Troubleshooting Assistant launches and takes you directly to the Performance Troubleshooter.
3. At the Welcome screen of the Performance Troubleshooter, type a name for the performance analysis that you are running. Select the option Troubleshoot New Performance Issue and then click Next.
4. On the Exchange Performance Troubleshooter screen you'll see the What Symptoms Are You Seeing? field. Select the appropriate symptom that you are troubleshooting from the drop-down list. Click Next to continue.
5. At the next screen, type the name of the Exchange server in the Server Name field and ensure that the domain controller in the Global Catalog Server Name field is the one that you want to use. Then click Next.
6. On the Configure Data Collection screen, determine whether you want to start the collection now or adjust it to run at a later time. If performing the data collection now, select Start Collection Now and click Next.

   You can also change the location where performance data is stored by changing the directory in the Root Data Directory field.

   The Performance Troubleshooter performs the data collection and compiles the performance report. These tasks may take some time to finish.
7. After the analysis is complete, you will be presented with the performance report in the View Results screen. You can view the results of the report and make the appropriate changes. If you click the Performance Issues tab (as shown in Figure 11.14), you can go through what the tool identified as potential performance problems and correct or ignore them.

Figure 11.14: Viewing the results of the performance report



Analyze Performance with the Performance Monitor

The Performance Monitor tool allows you to specify one or more performance counters to collect data on and track. The tool is used for collection and reporting of the real-time or precollected performance statistics. You can add and remove counters from the monitor and generate and save reports based on those counters.

View Real-Time Performance Statistics

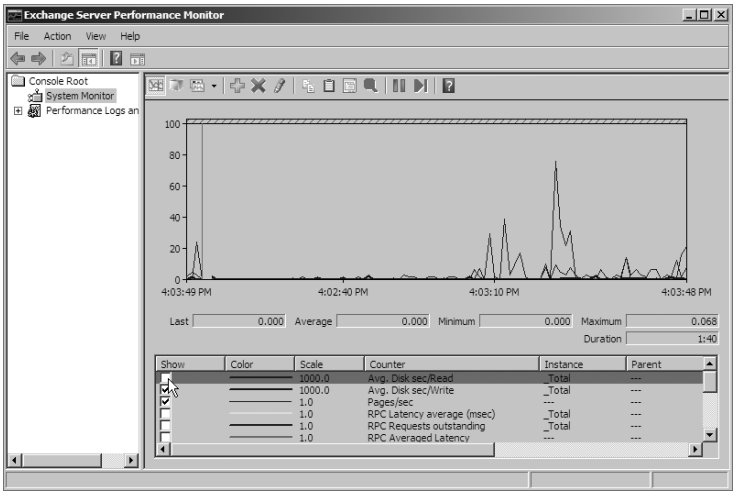
You can view performance statistics in real time by using the following steps:

1. Open the EMC and browse to the Toolbox node in the Console tree.
2. In the Work area, select Performance Monitor from the list of tools and double-click on it to launch it.
3. In the Exchange Server Performance Monitor tool, select the System Monitor node from the tree in the left pane.

   The System Monitor is used for viewing real-time statistics based on the performance counters that are currently loaded. The list near the bottom of the graph contains the currently loaded counters.

4. Check and uncheck counters to display them or remove them from the graph (see Figure 11.15).

Figure 11.15: Reviewing the performance counters in real time



5. To add counters to the list, click the plus sign above the graph or press Ctrl+I.

   The Add Counters dialog box will be displayed.

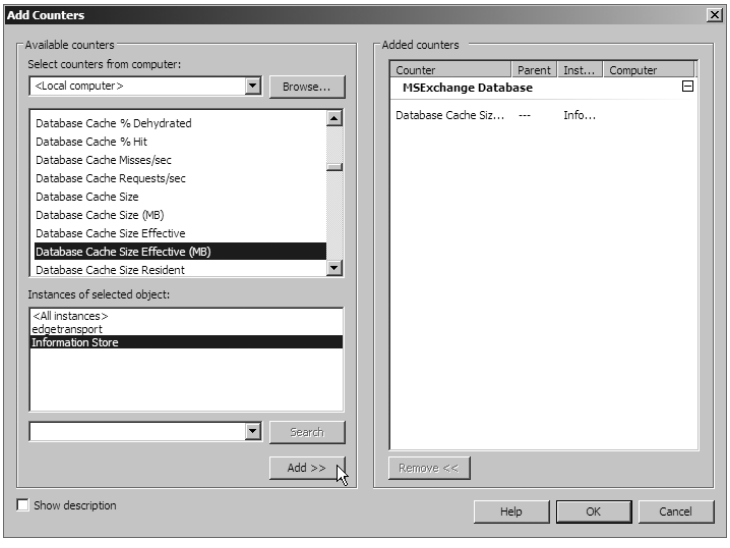
6. In the Available Counters section, scroll through the list of counters that are available and click the Add button to add counters to the tool. This is shown in Figure 11.16.
7. Click OK to close the Add Counters dialog box and go back to the System Monitor.

Capture and Save Performance Statistics for Analysis

You can create data collections that allow you to monitor the system for a period of time and save the results. These results can then be used later for analysis of the performance statistics. Use the following steps to collect the performance statistics:

1. Open the EMC and browse to the Toolbox node in the Console tree.
2. In the Work area, select Performance Monitor from the list of tools and double-click on it to launch it.

Figure 11.16: Adding performance counters to the tool



3. In the Exchange Server Performance Monitor tool, browse to the Performance Logs And Alerts ➢ Data Collector Sets ➢ User Defined node in the tree in the left pane.
4. Right-click on the User Defined node in the tree and select New ➢ Data Collector Set from the drop-down menu.

   This launches the Create New Data Collector Set wizard.
5. On the first screen of the wizard, type a name for the data collector set. This is an arbitrary name that you will use to uniquely identify this set of data from other sets that you create.
6. Choose the Create Manually option to create an advanced data set composed of the metrics that you want to capture. Click Next to continue.
7. In the screen What Type Of Data Do You Want To Include?, select the Performance Counter check box and click Next.
8. At the next screen, Which Performance Counters Would You Like To Log?, click the Add button to add your counters to the list.

   This launches the Add Counters dialog box.

9. In the Available Counters section, scroll through the list of counters that are available and click the Add button to add counters to the collection. Click OK when you've added all the counters that you are going to use.
10. When back in the wizard, adjust the interval that you want to collect the data in. Click Next to continue.

    The default interval is set to collect data every 15 seconds.
11. On the screen Where Would You Like The Data To Be Saved?, specify the folder that the data will be saved in, and then click Next.
12. At the Create The Data Collector Set screen, you can specify a custom account that the data will be collected under.
13. Select the option Save And Close and then click the Finish button to complete the creation of the data collector set.

    Back in the Exchange Server Performance Monitor tool, the new data collector set that you just created will be shown under the User Defined node.
14. Right-click on the data collector set and choose Start from the drop-down menu to start collecting the data.
15. When you are finished collecting the data, you can right-click on the data collector set and choose Stop.

Test the Performance Limitations in a Lab

When sizing your Exchange servers, most of the effort you are putting into the calculations for server hardware and user load are theoretical until you apply some real load to the system. It's always a good idea to stress-test your server configuration before placing it in your production environment. This section shows you how to stress-test the Mailbox servers and the client workload in your environment.

Stress-Test the Databases

When sizing Mailbox servers, one of the most important things is ensuring that your databases and storage can handle your anticipated user load. You will want to perform this testing before you deploy your servers in production to ensure that they are adequately sized.

The Exchange Jetstress tool is designed to perform this type of testing on Exchange databases. Jetstress is not installed with Exchange. You will need to download the tool from the Exchange Server 2010 TechCenter and install it separately. This section will walk you through installing and using Jetstress before deploying your servers in production.

Install Jetstress

You can install Jetstress on your existing Exchange servers, but the preferred method is to install it and test your system before you install Exchange. Therefore, part of the installation procedures includes copying database files from your Exchange installation media. Use the following steps to install Jetstress:

1. Download Jetstress from the Exchange Server 2010 TechCenter at the following URL:

   `http://technet.microsoft.com/en-us/exchange/2010`

2. Double-click on the `Jetstress.msi` file that you downloaded. This will launch the Jetstress installation wizard.
3. In the Welcome screen of the installation wizard, click Next.
4. At the End-User License Agreement screen, click the option I Accept The Terms In The License Agreement and click Next.
5. On the Select Installation Folder screen, ensure that you are satisfied with the default location of the Jetstress files. If you anticipate that another person will be logging into the server with a different account and using Jetstress, then click the Everyone option and click Next.
6. At the Confirm Installation screen, click Next to start the installation.
7. After Jetstress is installed, you will see the Installation Complete screen. Click Close to close the wizard.
8. Copy the following files from your Exchange installation media or folder to the location where Jetstress was installed:
   - `ESE.DLL`
   - `ESEPERF.DLL`
   - `ESEPERF.INI`
   - `ESEPERF.HXX`

You can do this by opening a command prompt and running the following commands, assuming that you kept the default location of Jetstress and assuming that your Exchange media is in drive D:

```
copy d:\Setup\ServerRoles\Common\perf\amd64\eseperf.dll ↩
"c:\Program Files\Exchange JetStress"

copy d:\Setup\ServerRoles\Common\perf\amd64\eseperf.hxx ↩
"c:\Program Files\Exchange JetStress"

copy d:\Setup\ServerRoles\Common\perf\amd64\eseperf.ini ↩
"c:\Program Files\Exchange JetStress"

copy d:\Setup\ServerRoles\Common\ese.dll ↩
"c:\Program Files\Exchange JetStress"
```

Run Jetstress

You can use the following steps to perform a basic disk throughput test using the storage configuration on your Mailbox server. In this example, we're going to test the performance of disk subsystem throughput:

1. Launch Jetstress by clicking Start ➢ All Programs ➢ Microsoft Exchange ➢ Exchange Jetstress.
2. At the Jetstress Welcome screen, click Start New Test.
3. Jetstress will run some checks to make sure that it is installed properly. After the Jetstress checks run, on the Checking Test System screen, click the Next button.
4. On the Open Configuration screen, select Create A New Test Configuration and enter the location of the XML file that you want to store your test configuration in. Click Next to continue.
5. On the Define Test Scenario screen, you can choose to either test the disk subsystem in terms of the performance of the database, or you can test a specific planned mailbox I/O profile.

   The latter option will simulate I/O in the pattern that you anticipate from your users and tell you if your server can handle it.
6. Select the Test Disk Subsystem Throughput option and click Next.
7. At the Select Capacity And Throughput screen, enter the capacity of the storage that you want to simulate.

For example, if you anticipate that your database will grow to 500 GB and if you test 50% capacity, Jetstress will test the database at 250 GB.

You can also adjust the percentage of the Input/Output Per Second (IOPS) throughput. It is recommended that you leave these values at the default setting of 100 and click Next.

8. On the Select Test Type screen, select the type of test you want to perform and click Next.

   In this example, we're going to perform a performance test.

9. On the Define Test Run screen, type the location that you want to store the test results in. Also adjust the length of time that you want to run the test for. When you set this to a number higher than 6 hours, a stress test is run. Click Next.
10. At the Define Database Configuration screen, enter the number of databases that you want to test with. Also select the number of copies of each database.
11. In the table that lists the databases, you will need to enter the location of the database file and transaction log files for each database. After you enter this information, click Next.
12. On the Select Database Source screen, select whether you want to create new databases or attach the test to existing databases. Click Next to continue.
13. On the Review & Execute Test screen, review the options that you've picked for the Jetstress test and click Execute Test.

Simulate Client Workload

You can simulate client workload using the Exchange Load Generator (LoadGen) application. The Load Generator is not installed by default, so you will need to download it from the Exchange Server 2010 TechCenter and install it separately from Exchange.

With the Load Generator, you can benchmark and validate your Exchange configuration before it is deployed in production and users start using it. A variety of client simulation options give you a good idea of how your servers will perform against your anticipated load.

Install LoadGen

You can use the following steps to install the Load Generator tool on your Exchange servers before putting them into production:

1. Download LoadGen from the Exchange Server 2010 TechCenter at the following URL:

   `http://technet.microsoft.com/en-us/exchange/2010`

2. Double-click on the downloaded file `LoadGen.msi` to start the installation wizard.
3. On the Welcome screen of the installation wizard, click Next.
4. On the End-User License Agreement screen, click the option I Accept The Terms In The License Agreement and click Next.
5. At the Select Installation Folder screen, enter the location of where you want to install LoadGen and click the Next button.
6. On the Confirm Installation screen, click Next to begin the installation.
7. After LoadGen installs, you will see the Installation Complete screen. Click Close to close the installation wizard.
8. When prompted to reboot, click Yes and allow the Exchange server to reboot.

Use LoadGen

Use the following steps to launch the Load Generator and perform some basic user simulation testing:

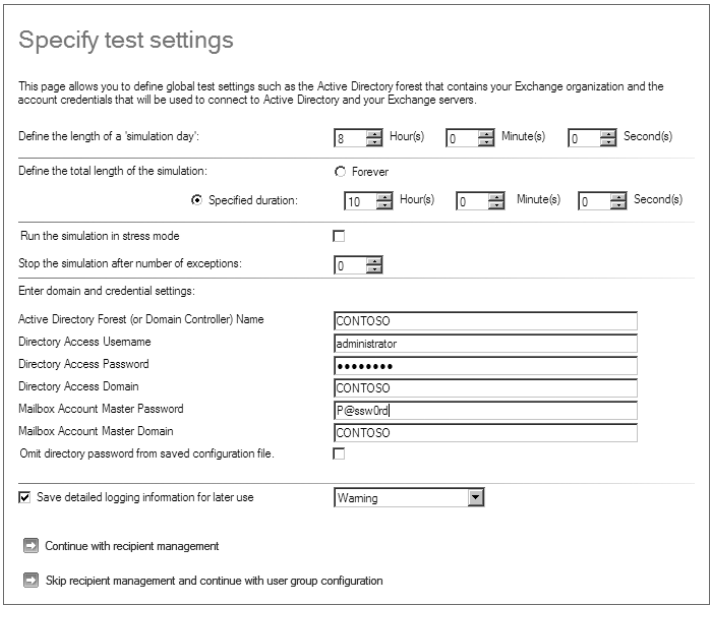
1. Launch the LoadGen tool by clicking Start ➢ All Programs ➢ Microsoft Exchange ➢ Exchange Load Generator 2010.
2. At the Welcome screen of the Load Generator tool, click Start A New Test.
3. On the Start A New Test screen, click the option Create A New Test Configuration and click Continue.

   If you have an existing test configuration that you want to use, you can choose the Use The Following Saved Configuration File option and browse for the existing configuration that you want to use instead.

4. On the Specify Test Settings screen, you can adjust the settings that you want the test to simulate the load with. You can accept the default settings for the simulation time period or you can adjust them as necessary.
5. In the section Enter The Domain And Credential Settings, enter the name and password that you want to use for connecting to Active Directory (Directory Access Password) and the password you want to use for logging into the test accounts (Master Account Master Password). Then click Continue With Recipient Management.

   An example of the configuration of the test settings is shown in Figure 11.17.

Figure 11.17: Configuration of the test parameters in the Load Generator tool



6. On the User Settings screen, enter the number of users that you want to test with each database and click Continue.
7. On the Advanced Recipient Settings screen, define the distribution list settings, contact settings, and external recipient settings that you want to use in the test. Click Continue after you are finished.

On the next screen, the test recipients will be created on the databases that you specified. This may take a few minutes to complete depending on how many recipients you decided to test with.

8. On the Specify Test User Groups screen, specify the load parameters that you want to simulate in the test. Click the plus sign to add a user group to the list. When you add a user group, you will need to configure the method they will be using to access mail (Client Type), the profile of the user (how heavily they use email), and the size of their mailboxes. Add as many different test groups as you would like and click Continue when you are finished.
9. The Remote Configurations screen gives you the option of adding remote load generators. If you don't want to use remote load generators, then leave this screen at the default values and click Continue.
10. On the Configuration Summary screen, verify the settings that you want to use and click Start Initialization Followed By Simulation.

    The test will be initialized and the simulation will run for the time you specified.