HPOM for Windows High Availability Utilizing Microsoft SQL Server Log Shipping

HPOM versions 8.10 and 8.16 with OMW_00090, 9.00
White Paper version 3.3

Change record

Version	Date	Changes
1.0	July 2003	First version for Operations for Windows 7.2
1.1	July 2003	Added comments about OVO backup job – see changes marked with |
1.2	August 2003	Added note about instrumentation replication
1.3	October 2003	Removed 'Preliminary'
1.4	July 2004	Added support for Reporter database replication. Replaced Switch management server tool by opcragt.
1.5	February 2005	Update location of Instrumentation folder. Changed 7.20 to 7.x in header/footer.
1.6	August 2007	Updated for HPOM 8.0
1.7	October 2007	Added uninstallation procedure
2.0	July 2008	Adapt to HPOM 8.1 (including HTTPS)
2.1	October 2008	Added information that two additional policies should be disabled on the backup server
2.2	November 2008	Added some more information about stopping the management server on the backup system
2.3	January 2009	Add some further improvements (additional registry key for OvStoreProv, additional tools,..)
2.4	April 2009	Extend the ship_ovdb.vbs by the optional parameter <DB path location>
2.5	July 2009	Add Mamta's feedback. Add 'system A' and ' system B' notations. Rearrange some execution orders
3.0	November 2009	Adapt to the new technology (SQL jobs are used instead of sqldmo)
3.1	March 2010	QXCR95893 HPOM HA using MSSQL Server Log Shipping missing info. Added tool "Change logshipping jobs owner"
3.2	October 2010	Add more information about required permissions
3.3	July 2011	Clarified prerequisites; document also applies to versions 8.10 or 8.16 with patch OMW_00090.

Architectural Overview

```
┌────────────────────────────────────────────────────────────────────────┐
│                                                                          │
│   ┌──────────────┐                                   ┌──────────────┐    │
│   │ HPOM         │  System A           System B      │ HPOM         │    │
│   │ Primary      │                                   │ Backup       │    │
│   │ Manager      │                                   │ Manager      │    │
│   └──────────────┘                                   └──────────────┘    │
│          │                                                  ▲            │
│          ▼                                                  │            │
│       SQL          (local or         (local or          SQL             │
│       Server        remote)           remote)           Server          │
│       DB                                                 DB              │
│                                                                          │
│          Backup                                                         │
│             ▼                                              ▲            │
│        Transaction   Copy         Restore         Transaction           │
│        Log         ──────────────────────────▶    Log                   │
│                                                                          │
└────────────────────────────────────────────────────────────────────────┘
```
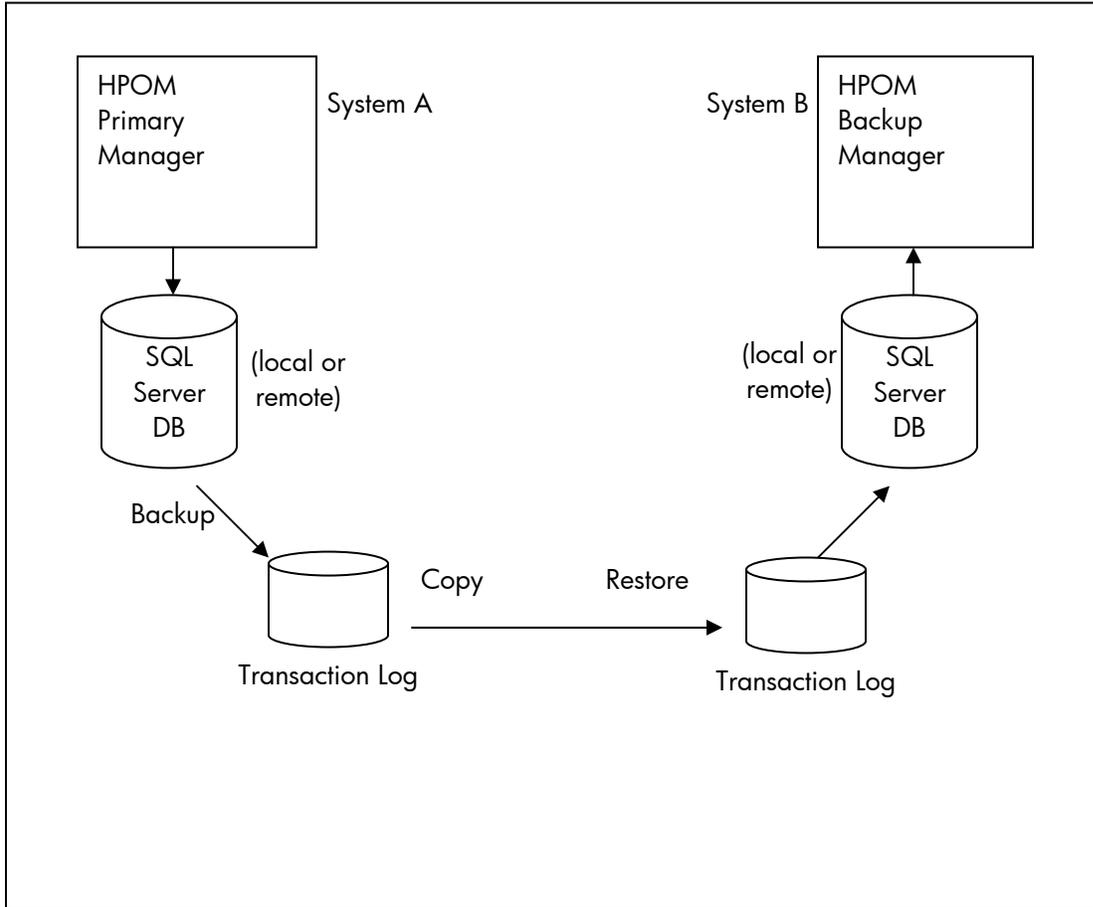
Conceptual Overview

The warm standby backup management server maintains a periodically updated copy of the SQL Server database of the active management server. The standby database on the backup management server is in "Restoring" (Read-Only) mode. SQL server jobs that you create on the primary and on the backup database server periodically back up the transaction log of the active database, copy it to the standby server, and restore it to the standby database. As a result, the two databases are kept synchronized.

If the primary management server fails, the database on the backup server switches from "Restoring" to "Online" mode, and the HPOM services start on the standby management server. Next, the Switch Management Server Tool is executed on every managed node. This switches the agents to report only to the standby management server. Then the operator merely has to restart the management server console to connect to the backup management server.

Note Configuration and other data that is not stored in the HPOM database (for example, registry settings, instrumentation, and graphs) is not replicated by this solution.

It is therefore recommended to combine this log shipping solution with a full backup and restore solution. See the HPOM online help for details about backup and restore.

Supported HPOM for Windows Versions

The SQL Server log shipping replication is currently supported with HPOM versions 8.10 and 8.16 with patch OMW_00090 (32-bit), and with HPOM version 9.00 (64-bit).

Note Starting with patch OMW_00090 and version 9.00, the log shipping solution is supported with SQL Server databases only. (The log shipping solution cannot be used with SQL Server Express databases.) This is because HPOM now uses SQL Server Agent Log Shipping jobs instead of sqldmo, which is used in previous versions.

Advantages and Disadvantages of SQL Server Log Shipping Replication

Advantages:

1. It is a cheaper and simpler solution than high-availability clusters such as Microsoft Cluster Server.

2. Log shipping does not require much processor overhead on the active management server. This is because performing a transaction log backup on the active management server requires only a fraction of the processing power needed to restore the transaction log backup on the standby management server.

Disadvantages:

1. There is no high-availability-software to perform a sanity check on the primary management server. Therefore, it requires human interaction to start the backup management server, and to execute the provided tool to reconfigure the agents to report to the backup management server.

2. Some data may be lost. How much data is lost depends on how often the transaction log is backed up and shipped to the standby management server. The default interval for database replication is 15 minutes.

3. Some data, like registry settings, instrumentation and graphs, is not replicated automatically.

Package Contents

This section describes the package contents that are installed. The package includes different tools, policies, and scripts that simplify the setup of the resilient HPOM server configuration. Note that you must perform certain configuration steps manually, as described later in this document.

"Failoverstart" Script

When the primary management server fails, the administrator starts the failoverstart.vbs script to bring the backup HPOM management server online.

The script performs the following actions:

– Recovers the database by applying all transaction log changes supplied through the log shipping process.
– Sets the database to multi-user, read-write access.
– Starts critical HPOM processes in preparation for consoles to connect.
– Sets the registry key value HKLM\SOFTWARE\Hewlett-Packard\OVEnterprise\Management Server\OvStoreProv\Disabled to 0 so that the OvStoreProv.exe can be started again (for backward compatibility).

The replication solution adds a new Tools folder named "Database Replication", which contains the following tools:

"Setup logshipping" Tool

This tool configures the database servers and starts the replication solution.

It adds the required information about the primary and backup database servers, initializes the backup database, and adds and starts the following SQL Server Agent jobs:

On the database server used by the primary HPOM management server:

backup_for_logshipping_openview

On the database server used by the backup HPOM management server:

copy_for_logshipping_openview

replace_for_logshipping_openview

To initialize the backup database, it performs a full backup of the primary database.

The account under which this tool is executed must meet the following conditions:

1) Must be a domain administrator of the domain where the management servers are installed into.

2) Administrative shares must be enabled on both database servers (C$, D$, E$, ADMIN$, etc), as they are used for the file copy operations between the database servers.

3) Remote SQL Server access must be enabled on the both database servers.

This tool configures the SQL Agent jobs to run every 15 minutes.

The job owner is `sa`. Use the "Change logshipping jobs owner" tool to change it.

The underlying operating system commands are executed under the SQL Agent Service Account. This account requires Windows directory access and SQL Server permissions. (Refer to the Microsoft SQL Server documentation if you need to use a different account.)

"Change logshipping jobs owner" Tool

This tool can be used to change the owner of the log shipping jobs (default is `sa`). The account used for the job owner must be a member of the `sysadmin` server role.

The account under which this tool is executed must have administrator rights on the two database instances.

Because the tool reads the name of the used database instance from the registry of the HPOM management server, it must have the corresponding permissions.

"Change logshipping interval" Tool

This tool can be used to change the time interval in which the log shipping jobs are executed (default is 15 minutes).

The account under which this tool is executed must have administrator rights on the two database instances. Because the tool reads the name of the used database instance from the registry of the HPOM management server, it must have the corresponding permissions.

"Disable HPOM Services" Tool

The "Disable HPOM Services" tool prepares the system for the backup role.
Important: This tool must be started from the primary management system and executed on the backup management system. If you start the tool on a non-management server system, it fails without having any effect on the system. The tool does the following:
  – Sets the startup type of the HPOM services on the backup server to Disabled.
  – Stops the HPOM services.

These settings prevent the HPOM services from being restarted by another process. This avoids that the database of the backup management server is accessed through these processes. While this management server is in backup mode his database should be changed only as a backup of the primary management server.

"Enable HPOM Services" Tool

The "Enable HPOM Services" tool performs the reverse steps of the Disable HPOM Services tool. It does the following:
  – Sets the startup type of the HPOM services on the backup server to Automatic.
  – Starts the HPOM services.
  – Sets the registry key value HKLM\SOFTWARE\Hewlett-Packard\OVEnterprise\Management
    Server\OvStoreProv\Disabled to 0 (for backward compatibility).

The actions carried out by this tool are usually executed by the failoverstart.vbs script.
Note: If you start the tool on a non-management server system, it fails without having any effect on the system.

"Disable logshipping backup job" Tool

The "Failoverstart" script stops the log shipping jobs on the (old) backup database. The log shipping jobs on the (old) primary database server are not handled (because this script is usually run when the primary server is unavailable).

When the primary HPOM management server is available again the administrator should run this tool to stop the job on the (old) primary database server from backing up the database that might be out-of-sync.

7

The account under which this tool is executed needs administrator rights on the database instance.

Because the tool reads the name of the used database instance from the registry of the HPOM management server, it must have the corresponding permissions.

"Replicate database" Tool

Use this tool when the failed primary HPOM management server has been repaired and should now take over the primary role again.

While the primary HPOM management server was down the corresponding database was not updated. The "Replicate database" tool will restore it to the state of the database used by the backup HPOM management server that was the active HPOM management server in the meantime.

The tool performs a full backup of the database used by the source HPOM management server specified in the parameters of the tool, and restores it to the database used by the specified target HPOM management server.

The account under which this tool is launched must meet the same requirements as the one used for the "Setup logshipping" tool described above.

"Remove logshipping jobs" Tool

If you do not want to use the log shipping feature any longer you can run this tool to remove the log shipping jobs, apply all open transaction log changes supplied through the log shipping process, and bring the backup database back online.

The account under which this tool is executed needs administrator rights on both database instances.

Because the tool reads the name of the used database instance from the registry of the HPOM management server, it must have the corresponding permissions.

"Get info about logshipping jobs" Tool

This tool provides more information about the current state of the configured log shipping jobs. When you run it, select your primary and backup HPOM server from the list.

Because the tool reads the name of the used database instance from the registry of the HPOM management server, it must have the corresponding permissions.

"Check_for_logshipping_events" Policy

The installer utility creates the policy group "HPOM-HA" on the two management servers. This group contains the Windows Event Log policy "Check_for_logshipping_events".

The log shipping jobs write events to the Windows Event Log.

This policy checks the Windows Event Log for such events and forwards Information events to the HPOM Acknowledged message browser and Warnings or Error events to the HPOM Active message browser.

This policy should be deployed to both database servers.

General Information about the Tools

When running one of the database replication tools you will be prompted to replace the default parameters:

– <PRIMARY_HPOM_SERVER> - the name of the HPOM management server configured to be the primary server
– <BACKUP_HPOM_SERVER> - the name of the HPOM management server configured to be the backup server
– <timeinterval(min)> - the time interval in which the log shipping jobs should be started.

Note: These tools always require the name of the HPOM management server – whether the server is configured to use a local or a remote database. The information about the used database instance is always retrieved from the HPOM management server.
You will also be prompted to provide the account under which this tool is executed. You can find this information in the descriptions of the respective tools.

Note: Always read the tool output thoroughly. Even if the status is 'Succeeded', the output might give you some important additional information about the status of your environment.

Prerequisites

1) Local or remote database servers running Microsoft SQL Server. (Microsoft SQL Server Express databases are not supported.)

2) Two HPOM management servers, configured identically, in a single Windows domain (NT4/ADS), and using the same domain accounts are required. It is assumed that the two servers have unique hostnames and share the same DNS domain. The machines do *not* need to be co-located. However, if replication traffic is large, you must make sure that adequate network bandwidth is available for the normal log ships and policy copies to succeed within the log-shipping interval. The default interval is 15 minutes. This may need to be adjusted in high-latency situations.

3) A domain administrator of the domain where the management servers are installed into – used for scheduled task policies and tools.

4) HPOM servers have the same patches applied. SQL Server servers at the same service pack level.

5) Administrative shares must be enabled on the backup management server for the file transfers to occur from the primary to the backup server.

6) Remote SQL Server access must be enabled on the Backup Server. Otherwise the database restore on the backup management server cannot be initiated from the primary management server by the scripts setup_logshipping.vbs and replicate_database.vbs. For details, see "Enable Remote Database Access for SQL Server on the Backup Server".

   Note: It is recommended that you enable remote SQL Server access on both management servers right from the start, because you might switch the roles of the management servers over time.

7) SQL Server Agents must run on both database servers. For details see "Start the SQL Server Agent on Your Database Servers"

Installation Process

Installation Checklist

To enable the replication process, perform the following tasks:
– Install the primary and backup HPOM management servers.
– Install the HPOM Database Replication package onto both servers.
– Configure trusted certificates for multiple management servers.

– Configure the MultipleActionManagers policy, and deploy it to managed nodes.
– Manage the backup management server from the primary management server.
– Deploy the log shipping instrumentation to the primary and backup management servers.
– Stop the HPOM for Windows services on the backup management server.
– Set cscript.exe as the default script host on both servers.
– Enable remote database access for SQL Server on the backup server.
– Start the SQL Server Agent on your database servers.
– Set up and initialize the replication to the backup management server.
– Deploy the Check_for_logshipping_events policy to the two database servers.

These tasks are described in detail in the following sections. Work through each procedure carefully, following all of the steps that are described.

Install the Primary and Backup HPOM Management Servers

For each HPOM host system:

– Install an HP Operations Manager management server (and the latest patches) on two separate computers.
– Install the same Smart Plug-ins on both management servers. This is important because some Smart Plug-ins extend the WMI namespace and service prototypes.

Each server must have a unique DNS name, and must be registered correctly in your DNS. Additionally, both management servers must be in the same Windows domain to aid with SQL Server authentication.
Both management servers must be installed as domain installations using the same HP-OVE-User domain account (or whatever account you configure when installing the management server).
The assumption of this setup is that only one management server is actively running, and the second management server is just a warm standby. When the primary management server fails, HPOM for Windows can be started on the backup management server, and the agents on the managed nodes are subsequently reconfigured to report to the backup management server.

Install the HPOM Database Replication Package onto Both Servers

To install the HPOM Database Replication Package onto both primary and backup management servers, follow these steps:
1) On both HPOM management servers, unzip all of the contents of the %OvInstallDir%\misc\OvOW\HPOM_HA_with_SQL_Log_Shipping.zip file into a temporary folder. The resulting folder should contain the following files.
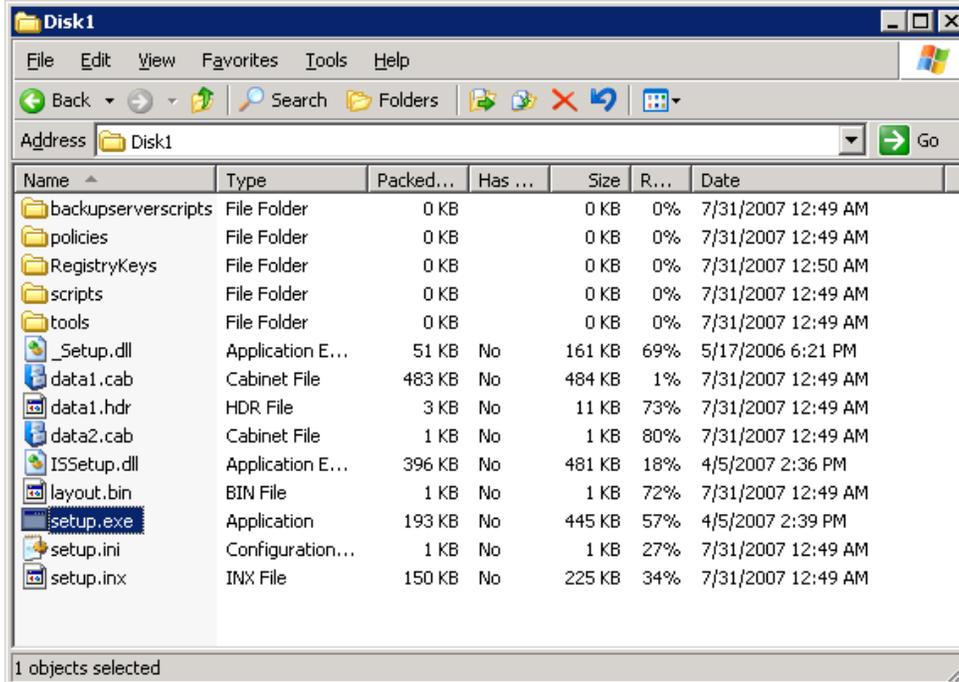
2) Run the Setup.exe installer utility on both HPOM management servers. Note that the HPOM server must be running for the installation to complete successfully, as Policies and Tools will be uploaded into the HPOM server's configuration.
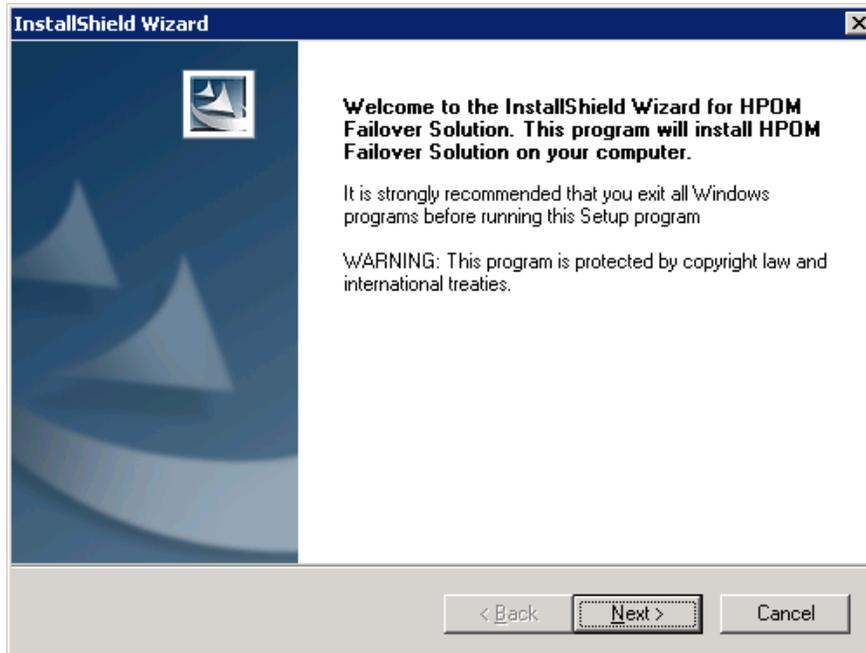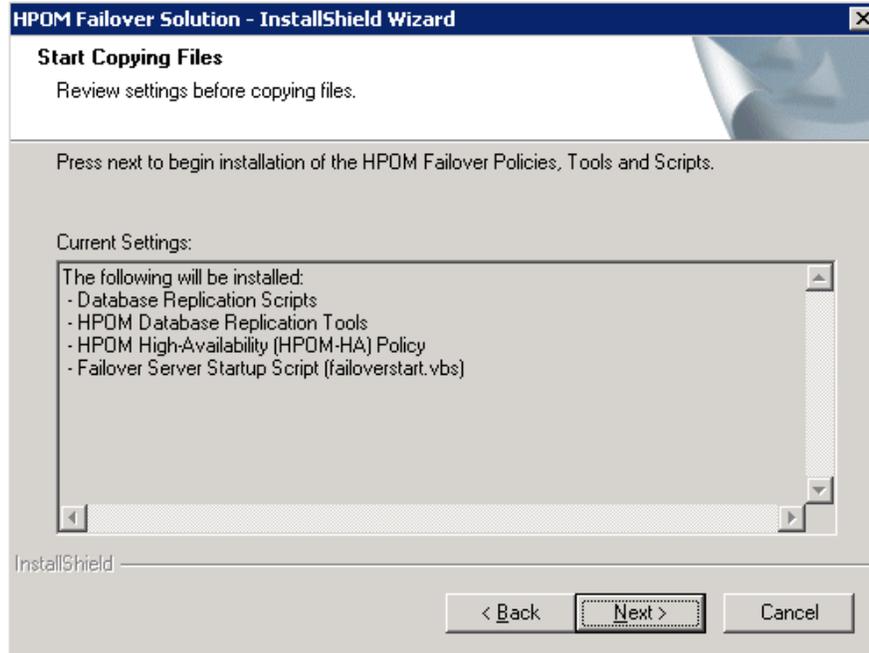
The installer performs the following steps on each system:
  – Copies the setup_logshipping.vbs, change_logshipping_interval.vbs, remove_logshipping_jobs.vbs, replicate_database.vbs, disable_backup_job.vbs, disable_HPOM_services.vbs, enables_HPOM_services.vbs, and get_logshipping_jobs_info scripts to the Logshipping Instrumentation folder.
  – Uploads a Windows Event Log policy to a policy group called "HPOM-HA". The policy is called "Check_for_logshipping_events".
  – Uploads a new tool folder called "Database Replication" that contains the tools: "Switch Management Server", "Setup logshipping jobs", "Change logshipping interval", "Remove logshipping jobs", "Disable logshipping backup job", "Replicate database", "Disable HPOM Services", "Enable HPOM Services", and "Get info about logshipping jobs".
  – Copies the script failoverstart.vbs to the folder %OvInstallDir%\support.
  – Creates a shortcut on the desktop for the failoverstart.vbs script. The shortcut is called "Recover Database and Start HPOM Processes".

Configure Trusted Certificates for Multiple Management Servers

In an environment with multiple management servers, you must configure each management server to trust certificates that the other management servers issued.

1) On every management server, export the trusted certificates to files using the following commands:
```
ovcert -exporttrusted  -file c:\temp\certificates.general.export
ovcert -exporttrusted -ovrg server -file c:\temp\certificates.server.export
```
(You can specify different filenames and locations. Note that the directory you specify must already exist.)

2) Copy these files to every other management server, and import each trusted certificate using the following commands:
```
ovcert -importtrusted -file c:\temp\certificates.general.export
ovcert -importtrusted -ovrg server -file c:\temp\certificates.server.export
```

3) For every management server, update the trusted certificates on existing nodes:

    a. In the console tree, click "Tools" > "HP Operations Manager Tools" > "Certificate Management".

b. In the details pane, double-click Update trusted certificates. A dialog listing nodes and services appears.

c. Select Nodes and click Launch…. The Tool Status dialog appears and shows progress.

For more information, see "Configure trusted certificates for multiple management servers" in the online help.

Configure the MultipleActionManagers Policy, and Distribute it to Managed Nodes

You need to run the Switch Manager tool (described later in this document) on the backup HPOM for Windows management server. Therefore, it is necessary to use the Flexible Management concepts of the HPOM agent to permit the HPOM for Windows backup management server to issue commands to the agent.

A Flexible Management policy defines the two HPOM for Windows management servers and specifies that both servers are permitted to perform actions on the HPOM agent. HPOM provides a policy template ("MultipleActionManagers") to simplify this configuration. You can find this policy template either in the "Samples" > "en" > "Agent-based Flexible Management" policy folder or the "Agent policies grouped by type" > "Flexible Management" policy folder that was installed with the base HPOM management server.

To configure the MultipleActionManagers policy, do the following:

1) On the primary management server, locate the "Agent policies grouped by type" > "Flexible Management" policy group and edit the "MultipleActionManagers" policy.
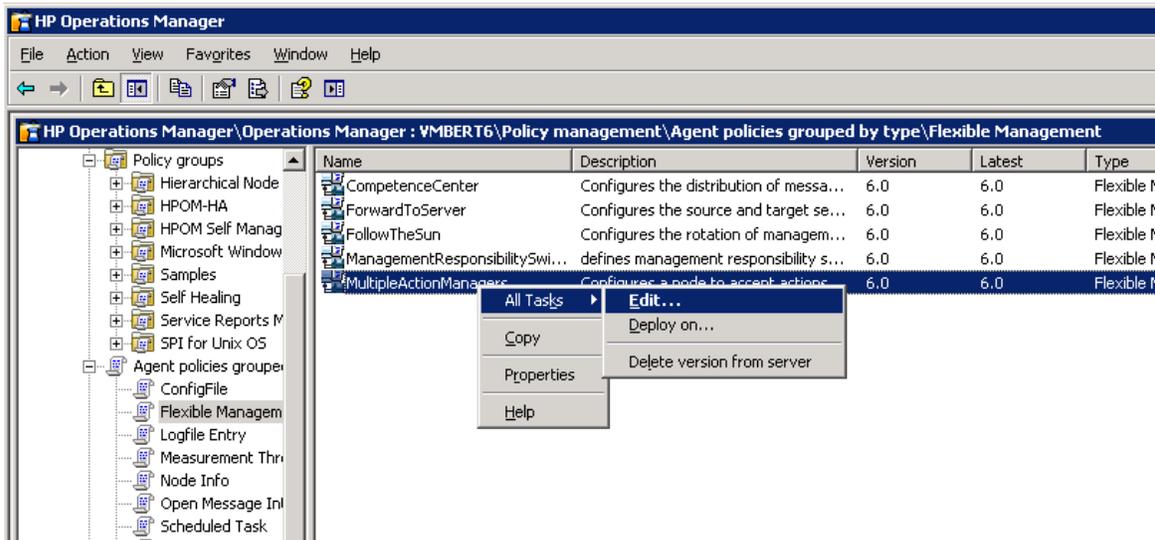
2) Modify the Flexible Management Syntax as described in the comments. Replace the hptest.bbn.hp.com strings with the primary management server name, and hpsystem.bbn.hp.com strings with the name of the backup management server. It is recommended to use fully qualified domain names here. You can leave the IP address at 0.0.0.0 so that DNS performs the name resolution.

After the names of the management servers, add the keyword ID followed by the respective management server's core ID. To get the management server's core ID, open a command prompt on the respective system, and then type the following command:

```
ovcoreid -ovrg server
```

Copy the core ID that the command returns.

For example, if your backup management server is called `hpom.example.com`, and its core ID is `89aea662-b9e6-7527-148d-8a612e083f23` replace both instances of the following line:
```
NODE IP 0.0.0.0 "hpsystem.bbn.hp.com"
```
with the following line:
```
NODE IP 0.0.0.0 "hpom.example.com" ID "89aea662-b9e6-7527-148d-8a612e083f23"
```

Also change the Description fields to indicate the Primary and Backup servers as appropriate.
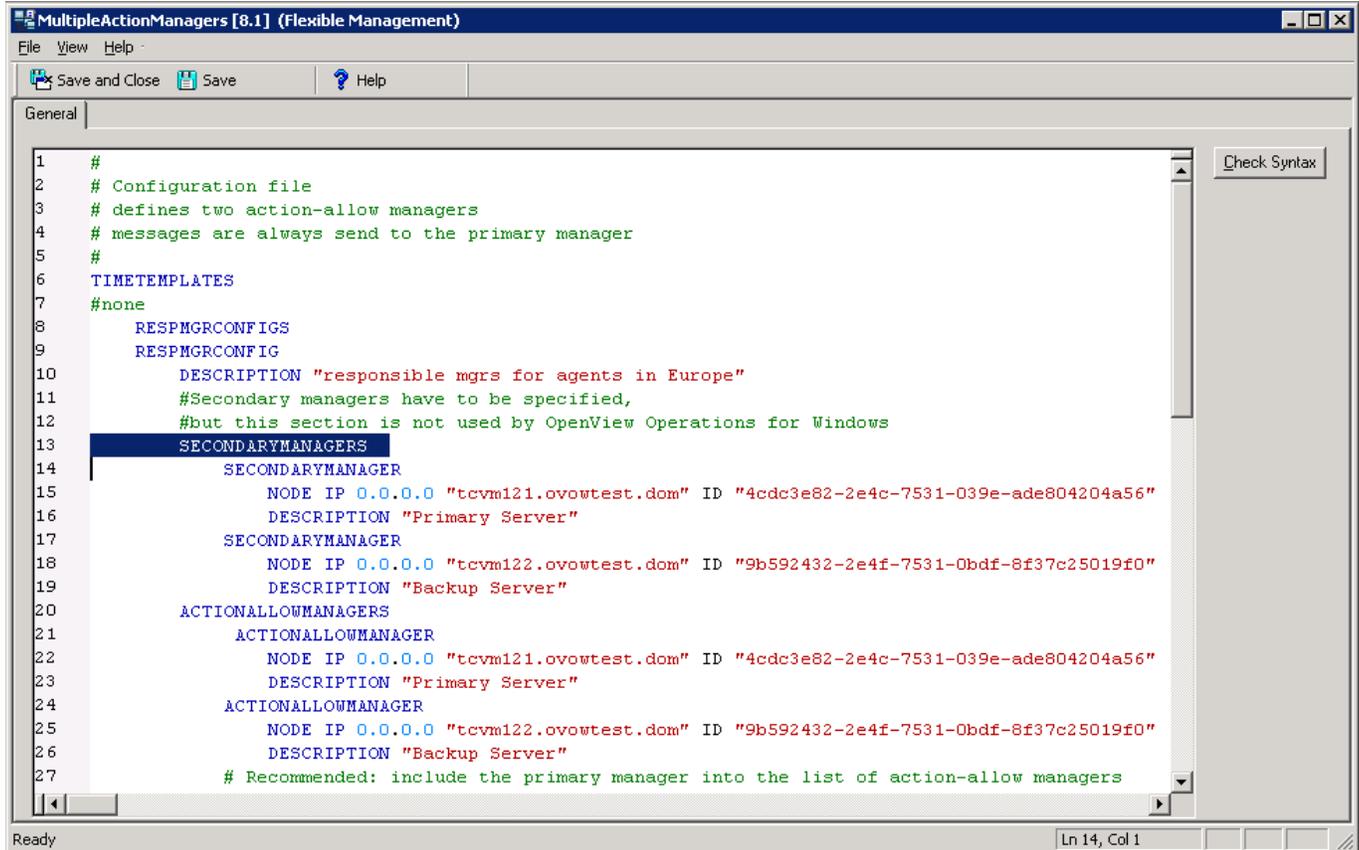
```
MultipleActionManagers [8.1] (Flexible Management)
File  View  Help
  Save and Close    Save          Help
General

1    #
2    # Configuration file
3    # defines two action-allow managers
4    # messages are always send to the primary manager
5    #
6    TIMETEMPLATES
7    #none
8        RESPMGRCONFIGS
9        RESPMGRCONFIG
10           DESCRIPTION "responsible mgrs for agents in Europe"
11           #Secondary managers have to be specified,
12           #but this section is not used by OpenView Operations for Windows
13           SECONDARYMANAGERS
14              SECONDARYMANAGER
15                 NODE IP 0.0.0.0 "tcvm121.ovowtest.dom" ID "4cdc3e82-2e4c-7531-039e-ade804204a56"
16                 DESCRIPTION "Primary Server"
17              SECONDARYMANAGER
18                 NODE IP 0.0.0.0 "tcvm122.ovowtest.dom" ID "9b592432-2e4f-7531-0bdf-8f37c25019f0"
19                 DESCRIPTION "Backup Server"
20           ACTIONALLOWMANAGERS
21              ACTIONALLOWMANAGER
22                 NODE IP 0.0.0.0 "tcvm121.ovowtest.dom" ID "4cdc3e82-2e4c-7531-039e-ade804204a56"
23                 DESCRIPTION "Primary Server"
24              ACTIONALLOWMANAGER
25                 NODE IP 0.0.0.0 "tcvm122.ovowtest.dom" ID "9b592432-2e4f-7531-0bdf-8f37c25019f0"
26                 DESCRIPTION "Backup Server"
27           # Recommended: include the primary manager into the list of action-allow managers

Check Syntax

Ready                                                          Ln 14, Col 1
```

3) Save the modified policy and deploy it to all HTTPS managed nodes.

Notes
- Deploy this policy to all nodes managed by the primary server (not only the management server).
- If you still have DCE managed nodes you need to create a copy of that policy, remove the ID parts and deploy it to all DCE nodes.
- Remember to deploy this policy to every new node that you add to the management server. If you forget to deploy this policy, the backup server will not be able to manage the node in case of a failure of the primary management server.

Manage the Backup Server from the Primary Server

To manage the backup management server from the primary management server, do the following:

1. Configure the MultipleActionManager policy on the backup management server, in a similar way to the one described above.

2. Deploy the policy to the backup management server and all its HTTPS managed nodes.

3. Export nodes from the backup management server.
   From a command line on the backup server execute the following command:
   `ovpmutil cfg nds dnl c:\temp\nodes.mof`
   (You can specify a different name and location for the mof-file.)

4. Copy the exported file containing the node information to the primary management server.

5. Import nodes on the primary management server.
   From a command line on the primary management server, execute:
   `ovpmutil cfg nds upl <mof-file copied from the backup server>`

6. Switch the management server for the backup server and the managed nodes imported from the backup server by launching the tool "Change the HPOM primary manager":
   a. Open a management console on the primary server.

   b. In the console tree, click **Tools** > **HP Operations Manager Tools** > **Agent Administration**.

   c. In the details pane, double-click **Change the HPOM primary manager**. A dialog listing nodes and services appears.

   d. Select the backup server and the managed nodes imported from the backup server and click Launch. The Tool Status dialog appears and shows progress.

7. Synchronize the inventory of the backup server and the managed nodes imported from the backup server.
   a. In the HPOM console of the primary management server, select the backup management server in the node pane.
   b. In the shortcut menu, select **All Tasks** > **Synchronize inventory** > **Policies and packages**.

   c. Execute the above steps for each imported managed node.

8. Switch certificate server for the backup management server and the managed nodes imported from the backup management server by launching the tool **Switch Agent's Certificate Server** (under **HPOM Operations Manager Tools** > **Certificate Management**) and selecting the respective nodes.

The backup server is now a managed node of the primary server and starts sending messages to the primary management server.

Deploy the Logshipping Instrumentation to the Primary and Backup Management Servers

The VBScripts that are used to perform the replication have been copied to the source Instrumentation folders of the primary HPOM management server. You need to deploy these scripts to the agents Instrumentation folders.

To deploy the Logshipping instrumentation, do the following:

1. Right-click on the primary HPOM server node, and select **All Tasks** > **Deploy Instrumentation**

2. Select the **LogShipping** instrumentation group and click **OK** to deploy it. Check that the instrumentation deployed successfully by reviewing the list of deployment jobs under Policy Management.

3. Repeat this step for the backup HPOM management server.

Stop HPOM for Windows on the Backup Server

Now you must stop HPOM for Windows services on the backup management server before you proceed with the following instructions.

1. Disable all the server policies from the backup management server to make sure that the services will not be restarted by a policy.

Execute this step from a HPOM console of the primary management server to make sure that the primary management server database stores the current state of these policies.

These policies are:
- VP_SM_OVOWServices
- VP_SM-Server_SynchAgentServices
- VP_SM-Server_EventLogEntries
- OvSvcDiscServerLog
- VP_SM-WMI-Restart
- VP_SM_CHK_OVODB
- VP_SM_DB_Backup
- ServiceLog_Maint_Job
- Update_HierarchicalNodes

Note: the policies VP_SM_CHK_OVODB and VP_SM_DB_Backup might not be installed automatically.
If you have added policies that use the HPOM management server services, you must also disable them.

To avoid possible concurrency issues on the primary management server database, disable the VP_SM_DB_Backup-policy also on the primary management server, or ensure that it does not run concurrently to the high-availability policies Backup-Ship-Restore HPOM Database and Backup-Ship-Restore HPOM Logs.
Note: the VP_SM_DB_Backup-policy might not be installed automatically.

2. Disable and stop the HPOM services of the backup management server
   From a HPOM console of the primary management server, start the "Disable HPOM Services" tool (under **Tools → Data Replication**) on the backup management server.
   The following services will be stopped:
   - OvAutoDiscovery Server
   - OvDnsDiscoveryService
   - OvEpMessageActionServer
   - OvServiceLogger
   - OvEpStatusEngine
   - OvOWReqCheckSrv
   - OvPmad
   - OvSecurityServer
   - OvMsmAccessManager
   - OvowWmiPlatProv
   - OvServerMonitor

   This tool will also set the registry key value HKLM\SOFTWARE\Hewlett-Packard\OVEnterprise\Management Server\OvStoreProv\Disabled to 1 to prevent OvStoreProv.exe from restarting on the backup management server.

Important
To clear all user connections on the backup SQL Server database, stop and restart the SQL Server (<*your database instance name*>) service, and make sure it is set to Automatic start.

Set cscript as the Default Script Host

On both the primary and backup management servers, make the default script host "cscript.exe". You need to do this to ensure that the provided scripts use console output rather than popup Message Box windows for progress indications. The scripts generate a number of status and progress messages, which you can view as Tool output or console message annotations.

From a command prompt, run cscript /h:cscript to make cscript.exe the default script host for the server. This will make the script host utilize console output, which is friendlier for batch jobs.
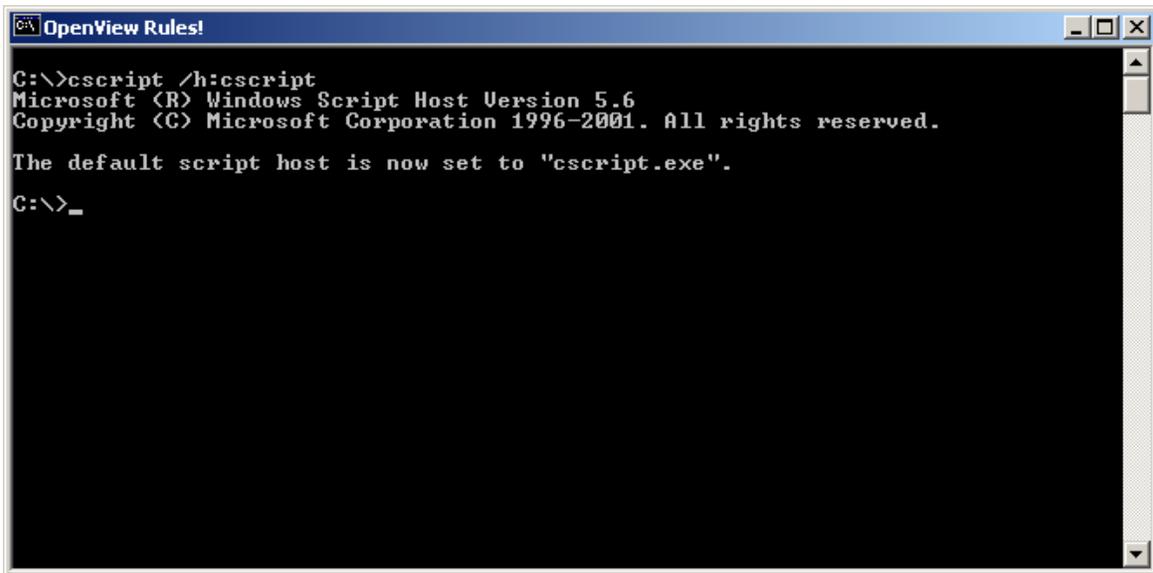
```
C:\>cscript /h:cscript
Microsoft (R) Windows Script Host Version 5.6
Copyright (C) Microsoft Corporation 1996-2001. All rights reserved.

The default script host is now set to "cscript.exe".

C:\>_
```

Enable Remote Database Access for SQL Server on the Backup Server

In SQL Server 2005, remote database access is disabled by default. However, some scripts used for log shipping require remote database access on the backup management server.
Note If your database runs SQL Server 2008, remote access is enabled by default, and you can skip the following steps.

To enable remote database access on SQL Server 2005 database, execute the following steps:

1) On the backup database server, launch the SQL Server Surface Area Configuration Manager

2) Click **Surface Area Configuration for Services and Connections**.

3) In the tree selector, click **Remote Connections** and make sure that the option **Local and remote connections** is selected.

4) Click **SQL Server Browser** and make sure that the SQL Server Browser service is started automatically.

5) Restart the SQL Server instance after SQL Server Browser service has been started.

Note: It is recommended that you enable remote database access on both management servers right from the start, because you might switch the roles of the management servers over time.

Start the SQL Server Agent on Your Database Servers

HPOM uses SQL Server Agent Log Shipping jobs. The SQL Server Agent must therefore run on both database servers.

To start the SQL Server Agent, open the Windows Services Manager on your database server.

1) In the details pane, right-click the service named "SQL Server Agent (<your database instance name>)" and then click **Properties**.

2) In the **General** tab, in **Startup type**, select **Automatic.**

3) In **Service status**, click **Start** to start the service.

Setup, initialize and start the logshipping solution

On the primary management server:

1) Run the"Setup logshipping" tool from the "Database Replication" tool group to set up, initialize, and start the replication.
2) In the **Parameters** dialog box, add the names of the primary and the backup HPOM management servers.
3) Click **Next**.
4) In the **Login** dialog box, add the name and the password of a domain administrator that meets the conditions described under "Setup logshipping" Tool.
5) It may take several minutes or more for the job to complete the backup of the primary database, copy the backup file, and restore the database to the backup management.

The default owner used for the backup, copy and restore jobs is 'sa'. If you want to change that, launch the tool "Change logshipping jobs owner". For details, see "Change logshipping jobs owner" Tool.

The default time interval in which the backup, copy and restore jobs are started is 15 minutes. If you want to change default time interval, launch the tool "Change logshipping interval". For details, see "Change logshipping interval" Tool.

Deploy the Check_for_logshipping_events Policy to the two Database Servers.

The installer utility creates the policy group "HPOM-HA" on the two management servers. It contains the policy "Check_for_logshipping_events". Deploy this policy to both SQL database servers so that it forwards the event logs generated by the log shipping jobs to the HPOM server. For details about this policy, see "Check_for_logshipping_events" policy.

Replicate the Instrumentation Folder after Modifications

The installation is now complete. This note is just to make you aware that the instrumentation folder is not replicated from the primary to the backup management server by the replication tools. Remember to copy modifications of this folder from the primary to the backup management server manually whenever you change or add anything there.

Location of the instrumentation folder:

    %OvShareDir%\Instrumentation

Uninstallation Process

1. Uninstall the HPOM high availability policies from the managed nodes:
    In the console tree, right-click the policy group **HPOM-HA** and select **All Tasks → Uninstall from**.

2. Delete the policy group HPOM-HA from the management server:
    In the console tree, right-click the policy group **HPOM-HA** and select **Delete**.

3. Delete the HPOM high availability policies from the database servers:
    a. In the console tree, under **Agent policies grouped by type**, right-click the Windows Event Log policy **Check_for_logshipping_events**.
    b. Select **All Tasks → Uninstall from...** and then select **Select all nodes on which any version of the policy is deployed.** Click **OK.**
    c. Right-click the policy again and select **All Tasks → Delete from server**. Note that this menu item will only be available if the policy is not deployed on any managed node.

4. Delete the tool group Database Replication:
    a. In the console tree, right-click **Tools** and select **Configure → Tools**.
    b. In the **Configure Tools** dialog box, right-click **Database Replication** and select **Delete**.

5. Delete the registry key [HKEY_LOCAL_MACHINE\SOFTWARE\Hewlett-Packard\OVEnterprise\Management Server\DBReplication].

6. Delete the folder %OvInstallDir%\Support\OVOW-HA\ including all subfolders.

7. Delete the file %OvInstallDir%\Support\failoverstart.vbs.

8. Delete the instrumentation directory %OvShareDir%\Instrumentation\Categories\Logshipping.

HP Operations Manager Fail-over to Backup Procedure

If the primary manager fails for any reason (hardware/network/disaster), a failover to the backup management server will need to be initiated. Because the SQL database on the failover system is standing by, initialization of the backup system takes only a few simple steps.

1) On the backup HPOM management server, call the "failoverstart.vbs" script to bring the backup database online, and start the critical HPOM services. This can be simply done by executing the shortcut called "Recover Databases and Start HPOM Processes" that has been added to the desktop of the backup management server by the installer.

2) Start an HPOM for Windows MMC console and connect to the backup management server.
3) Execute the Switch Primary Manager Tool (under "HPOM Operations Manager Tools") as described in the next section.
4) Switch the certificate server for all nodes.
   Launch the tool "Switch Agent's Certificate Server" (under "HPOM Operations Manager Tools" > "Certificate Management")
5) Enable the policies disabled in the step "Stop HPOM for Windows on the Backup Server".

At this point, the backup management server is at the state of the primary manager when the last transaction log backup was shipped.

Using the Switch Primary Manager Tool

The Switch Manager tool provides a mechanism to instruct managed systems that their agents should switch their primary manager to a different HPOM for Windows server. Typically this tool will be used when it is necessary to switch to using the backup HPOM for Windows management server (with the replicated database) as the primary management server.

The tool is located in the Tools folder called "HPOM Operations Manager Tools" and is called "Switch Management Server" tool.

Before you can use the "Switch Management Server" tool from the backup HPOM server you must configure and deploy the "MultipleActionManagers" policy correctly, as described earlier in this document.

The Switch Management Server tool uses the OvOWRAgtS tool that is part of the HPOM for Windows distribution. The Switch Management Server tool must be used from the backup management server to instruct HPOM for Windows agents that they should switch their primary manager from the current primary management server to the backup server.

The Switch Management Server tool iterates through all managed nodes and sends a command to each agent to switch to the new management server.
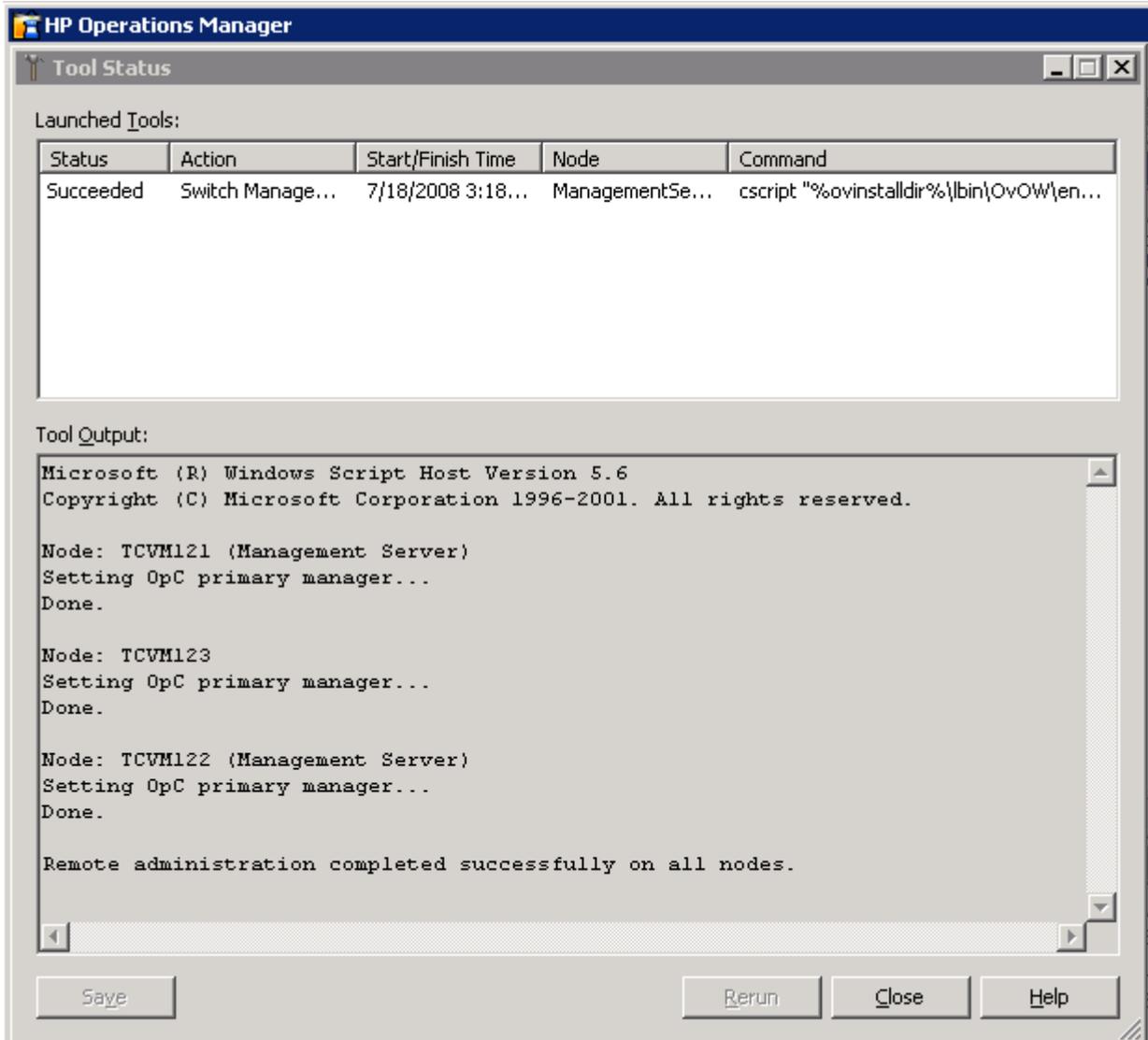
The old primary management server is also a managed node of the backup management server. If the old primary management server is unavailable when this tool is executed, the command will fail for this node. In this case the completion state of the Switch Management Server tool will be "failed" although it did its job successfully.

What to Do After Repairing the Old Primary Server

Note: For a better understanding we will use also the following notations in this chapter:

- System A – the original primary server
- System B – the original backup server

Once the original primary management server (system A) has been repaired, there are a number of possible options for continuing operations. The following options are described here:

- Continue using the original backup server (system B) as the new primary management server, and make the original primary server (system A) be the backup management server.

- Fail back to the original primary management server (system A) after it has been repaired.

Continue Using the Backup Server as the Primary Server.

If you plan to continue using the backup server (system B) as your primary HPOM management server (for example, because it has the same hardware resources as your original primary server (system A) and you wish to maintain continuous operations), then you will need to:

1) Configure the original primary HPOM management server (system A) as a standby backup server

2) Set up the new primary server (system B) as a permanent primary server.

Each of these steps is described below in more detail. In the context of these discussions, original primary server refers to the computer that was originally defined as the primary manager and failed (system A). The term new primary server refers to the computer that was originally designated as the backup and is now acting as the primary manager (system B).

Configure the Original Primary HPOM Server as a Standby Backup Server

Once the original primary server (system A) has been repaired, you need to prepare it as a backup server. From an MMC console connected to the new primary management server (system B), execute the following steps:

1) Use the "Change the HPOM primary manager" Tool from the "HP Operations Manager Tools" > "Agent Administration" tool group on the new primary management server (system B) to instruct the agent on the original primary management server (system A) to switch its primary manager.
   Note: you already instructed the agents on all the other nodes to switch to the new primary management server (system B) when you switched the primary manager configurations of the managed nodes.

2) You may also want to switch the certificate server used by the original primary server (system A). Launch the tool "Switch Agent's Certificate Server" (under "HPOM Operations Manager Tools" > "Certificate Management") and select the original primary server from the node list.

3) Disable the server policies and stop the HPOM services on the original primary management server (now the backup system, system A). See "Stop HPOM for Windows on the Backup Server" for more information.

4) Disable the backup job used for log shipping from the original primary manager (system A). Until this is done the original primary management server will continue to back up the database even though it is no longer synchronized with the new primary manager.
   Launch the tool "Disable logshipping backup job" from the "Database replication" tool group and specify the original primary HPOM management server as parameter.

The original primary server is now prepared as a backup server.

Set up the New Primary Server as a Permanent Primary

You finally need to configure and start the new replication of the database.

1) Clean up the old configuration used for log shipping before the original primary HPOM management server failed by launching the tool "Remove logshipping jobs". Specify the original primary HPOM management server (system A) and the original backup HPOM management servers (system B) as parameters. For more details, see "Remove logshipping jobs" Tool.

2) Reconfigure and start the replication by launching the tool "Setup logshipping". Specify the new primary HPOM management server (system B) and the new backup HPOM management servers (system A) as parameters. For more details, see "Setup logshipping" Tool.

3) Launch the "Setup logshipping" tool from the "Database Replication" tool group. Specify the new primary HPOM management server (system B) and the new backup HPOM management servers (system A) as parameters. For more details, see "Setup logshipping" Tool

The original backup server is now a permanent primary server.

Fail Back to the Original Primary After Repair.

If you need to fail over to the original primary management server (system A) from the existing new primary management server (system B), perform the following steps:

1) Because the database used by the original primary server does not contain the changes done while the original primary HPOM server was down, you need to update it. Using the HPOM MMC console on the new primary management server (the original backup server, system B), execute the following steps:

   a. Disable the server policies and stop the HPOM services on the original primary management server (now the backup system, system A). See "Stop HPOM for Windows on the Backup Server" for more information

   b. Run the "Replicate Database" Tool, specifying the new (system B) and the original (system A) primary HPOM management servers as parameters. This synchronizes the database state from the current primary server (system B) to the newly recovered original primary server (system A).

2) On the original primary server (system A), execute the shortcut called "Recover Databases and Start HPOM Processes" that has been added to the desktop of the backup management server by the installer.

3) Once this completes, start an HPOM MMC console and connect to this computer (system A), as it will, once again, be the primary server. Using this MMC console, execute the following steps:

   1) Disable the HPOM server policies and stop the HPOM services of the new primary management server (system B). See "Stop HPOM for Windows on the Backup Server" for more information.

   2) Enable the HPOM server policies of the original primary HPOM management server (system A) disabled earlier.

   3) Launch the "Switch Management Server" Tool to switch the primary manager of all managed nodes (including the current primary) to the newly recovered original primary server (system A).

   4) You may also want to switch the certificate server used by the managed nodes. To do this launch the tool "Switch Agent's Certificate Server" (under "HPOM Operations Manager Tools" > "Certificate Management").

Now you only need to reconfigure the replication of the database.

1)   Clean up the old configuration used for log shipping before the original primary HPOM management server failed by launching the tool "Remove logshipping jobs". Specify the original primary HPOM management server (system B) and the original backup HPOM management servers (system A) as parameters. For more details, see <u>"Remove logshipping jobs" tool</u>.

2)   Reconfigure and start the replication by launching the tool "Setup logshipping". Specify the new primary HPOM management server (system A) and the new backup HPOM management servers (system B) as parameters. For more details, see <u>"Setup logshipping" Tool</u>.

This completes the failover back to the original primary management sever.

Appendix A: Upgrade and Patch Installation

Use this procedure to upgrade an HPOM for Windows environment consisting of a primary and a backup server with a database replication in place, or to install a patch.

If your environment uses the old mechanism for the log shipping solution (implemented using the two Scheduled Task policies "Backup-Ship-Restore HPOM Database" and "Backup-Ship-Restore HPOM Logs"), follow these steps:

1) Disable the Scheduled Task policies "Backup-Ship-Restore HPOM Database" and "Backup-Ship-Restore HPOM Logs" on the primary management server.

2) Uninstall the high availability package as described in the "Uninstallation Process".

3) Upgrade HPOM for Windows or install the patch on the primary server, as described in the *HPOM for Windows Installation and Upgrade Guide*.

4) Run the script "failoverstart.vbs" on the backup server. This brings the database online and starts the HPOM for Windows services.

5) Upgrade HPOM for Windows or install the patch on the backup server.

6) Install the log shipping package as described in this document.

If your environment uses the new mechanism for the log shipping solution (implemented using the SQL Agent log shipping jobs), follow these steps:

1) Remove the old log shipping jobs by launching the tool "Remove logshipping jobs" Tool.

2) Upgrade HPOM for Windows or install the patch on the primary server, as described in the *HPOM for Windows Installation and Upgrade Guide*.

3) If the new version or patch also includes a new version of the log shipping package, re-install this package on the primary server. You then need to redeploy the instrumentation and the new versions of the policies.

4) Run the script "failoverstart.vbs" on the backup server. This brings the database online and starts the HPOM for Windows services.

5) Upgrade HPOM for Windows or install the patch on the backup server.

6) Re-install the log shipping package on the backup server. You then need to redeploy the instrumentation and the new versions of the policies.

7) Continue as if the primary server has failed and was repaired again. Decide which server should take over as primary server and continue with the corresponding steps, as described in What to Do After Repairing the Old Primary Server.

Appendix B: Troubleshooting the Log Shipping Solution

When setting up the log shipping environment, make sure to read the output of every tool carefully. Even if the tool succeeded, the output may contain some hints about possible issues in your environment.

In some cases you get an error message like:
Msg 3153, Level 16, State 2, Server TCVM167\TEST_PRIMARY, Line 1
The database is already fully recovered.
Msg 3013, Level 16, State 1, Server TCVM167\TEST_PRIMARY, Line 1
RESTORE DATABASE is terminating abnormally.
This message can be ignored.

In a running log shipping environment you can use the "Get info about logshipping jobs"-tool to obtain information about the configured log shipping jobs. In the output, you can find information, for example about the last execution of the jobs. If a job did not run although it should have, it might help to restart the SQL Agent of the respective database instance.

If you encounter any problems, you can also use the SQL Management Server Management Studio to obtain more detailed information about the log shipping jobs.

Appendix C: Customized Configurations

If you want to setup log-shipping replication combined with the HPOM for Windows remote database setup, do the following:

- Install an HP Operations Manager management server on two separate computers.

- Follow the steps of this document to set up the log-shipping replication. Remember to run the tools on both management servers and to deploy the "Check_for_logshipping_events" policy to the two database servers, which are on separate computers now.

For more information

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