Using ArcSDE® With Microsoft® SQL Server™ Log Shipping and Standby Servers

An ESRI® Technical Paper • May 2004

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The use of a standby server that can be brought online if the primary production server is being maintained or fails can avert the loss of data and allow users to continue working with the database. A standby server contains a copy of the database(s) on the primary server; typically it is read-only. Microsoft® SQL Server™ log shipping can be used to automatically send transaction logs from one database to another on a scheduled basis. This allows synchronization of the source and destination database. Standby servers and log shipping can be configured in Enterprise Manager. Complete instructions for standby server and log shipping are covered in *SQL Server Books Online*. The instructions that follow are those that have been tested and confirmed to work at ESRI.

Implementing a Standby Server With Log Shipping

To set up a standby server with log shipping, the basic steps are as follows:

1. Create full database backups on the primary server. Create a transaction log backup of each database that is duplicated. The frequency of these transaction log backups will depend on the amount of transaction changes that users make.

2. Restore the database backups onto the standby server that is in standby mode. Specify one undo file per database. Periodically apply the transaction logs from the primary server to the databases on the standby server (e.g., use backed up logs or log shipping). Specify the same undo file used previously.

   Note: While the standby database is in read-only mode, it is not possible to use it via ESRI® ArcSDE® or Direct Connect.

3. If the primary server should become unavailable, apply any transaction logs that have not yet been applied to the standby server. Recover the databases on the standby server.

4. The standby server is now available for users to make changes to the database. Configuration of the standby server can be done in either Enterprise Manager or Query Analyzer.

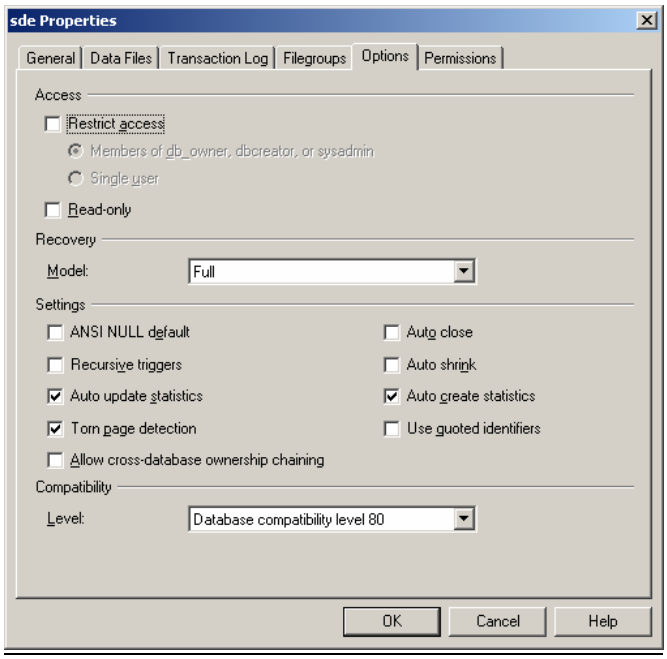
If the use of a standby server is necessary, all users will have to log on to the standby server. User processes are not transferred automatically to the standby server. In

addition, transactions are not maintained. It will be necessary to run sp_change_users_login once the switch to the standby server is made.

For more information, see the instructions in *SQL Server Books Online.*

Creating a Standby Server

Before proceeding, it is important to confirm the primary database is using the Full Recovery Model. To implement transaction log backups, the database must be in Full Recovery Model. This is the default setting for a new database created with the Standard and Enterprise Editions of SQL Server 2000. To change the Recovery Model from Enterprise Manager, right-click on a database and choose Properties. Click the Options tab and change the Recovery Model to Full. Click OK to continue.



The following detailed steps illustrate the creation of a standby server in Enterprise Manager.

Step 1: Backing Up Databases

In Enterprise Manager, right-click on the database to backup, choose all tasks, Backup Database.

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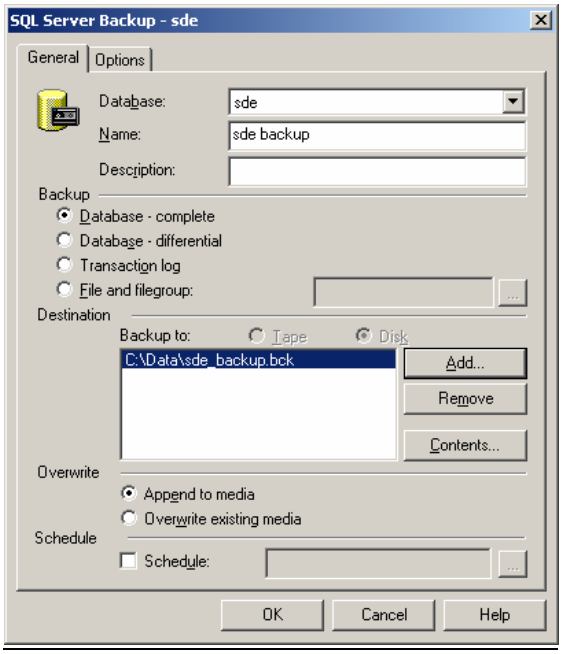
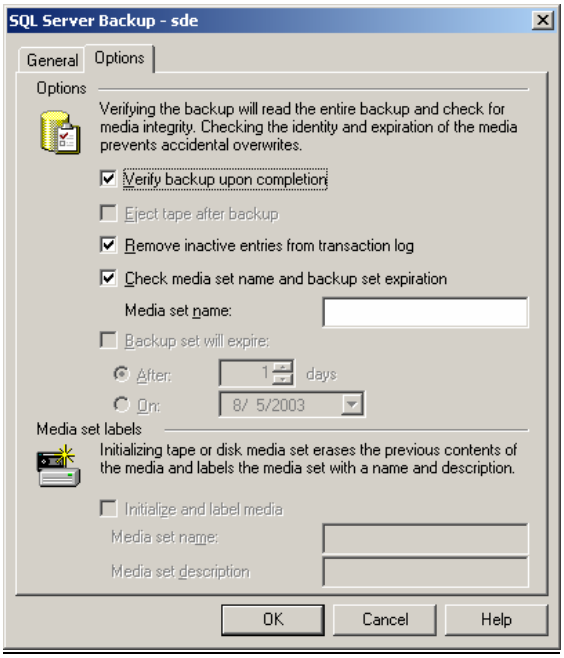
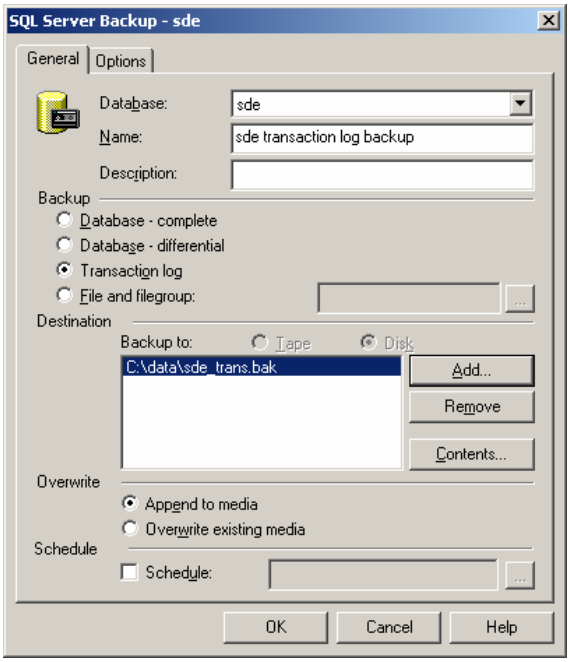


Click Backup Database-complete and select a Destination in which to store the backup. Click the Options tab.



Click Verify backup upon completion. Click OK to continue.

To back up the transaction log, in Enterprise Manager right-click the database, choose all tasks, Backup Database.



Click on Backup Transaction log. Select a new Destination for the log backup file. Click the Options tab then click Verify backup upon completion. Click OK to continue.

Step 2: Restoring Database on Standby Server

To restore the database on the standby server, in Enterprise Manager, right-click on the database to restore, choose all tasks, restore database.

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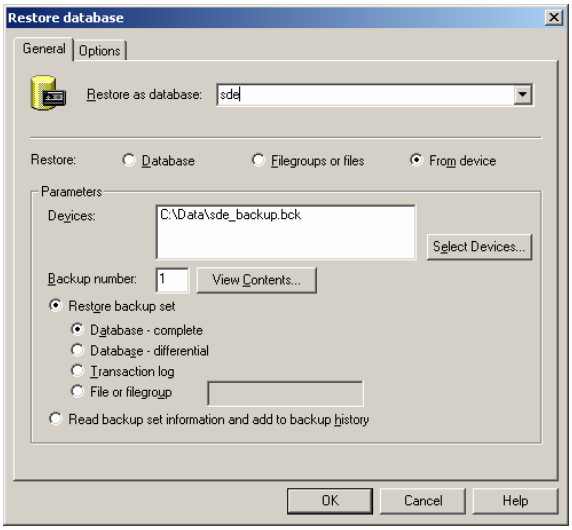
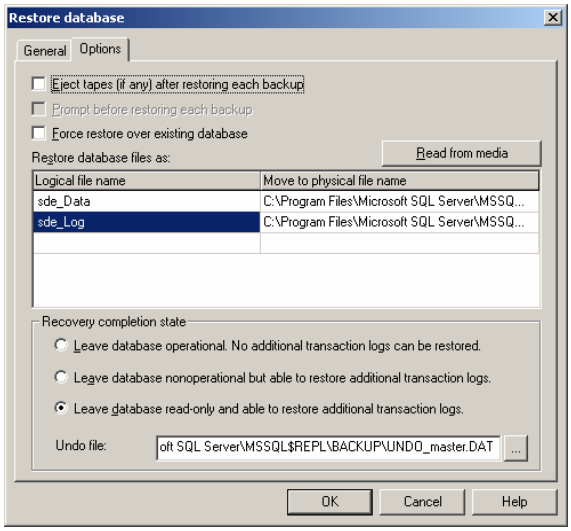


Click Restore backup set Database-complete. Click Restore From device, then select the file to restore. Click the Options tab.



Ensure the physical file name has a correct path on the standby server as it will default to the path from the primary server. In the Recovery completion state, click Leave database read-only and able to restore additional transaction logs. Select the location and file name in the Undo file. Click OK to continue. The database will be restored and will be in read-only mode. Continue this process for each transaction log to be restored on the standby server.

Bringing the Standby Server Online

If the production server should become unavailable, apply all remaining transaction logs to the standby server. Use the dialog as described earlier to finish applying any

remaining logs and alter the standby database to be operational. Or from Query Analyzer recover the standby server database without restoring. Execute the following statement with the name of the database to be recovered.

```
-- Restore database using WITH RECOVERY
RESTORE DATABASE sde WITH RECOVERY
```

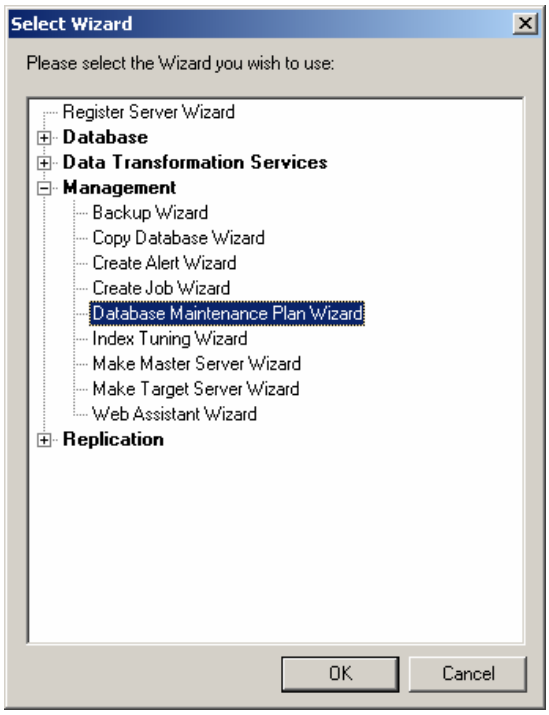
The standby server will now be in the same state as the production server from the last transaction log. All changes after the last backup of the transaction log will be lost. User security may need to be resolved through the use of sp_change_users_login. Having a script ready, if needed, would be one way of ensuring faster recovery on the standby server.

Implementing Log Shipping

Log shipping is a way of automating the transfer and restore of transaction logs from the primary server to the standby server. This example will use SQL Server 2000 Enterprise Edition to automatically log ship transactions between two servers.

The initial procedure is the same as configuring a standby server. There should be a primary and standby server. The standby server should have the backups restored from the primary server and should be in read-only mode.

From the primary server, choose Tools, Wizards, Management, then Database Maintenance Plan Wizard.



Click OK to start the wizard.

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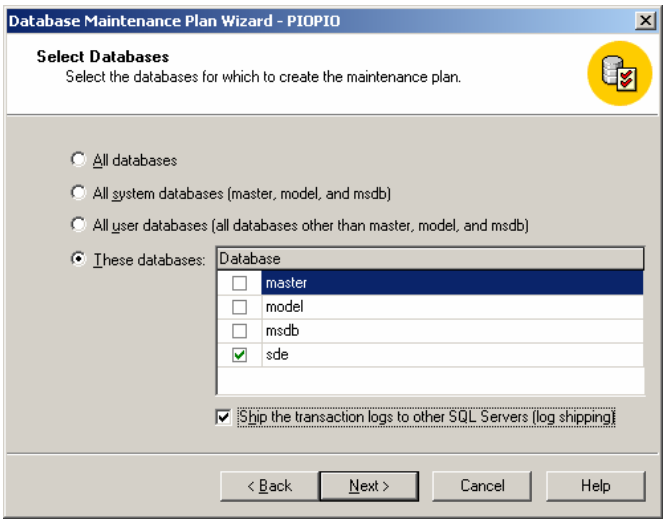
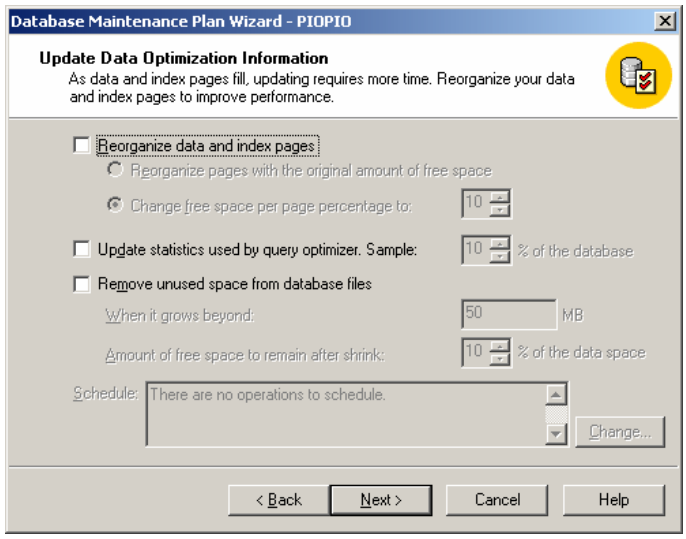
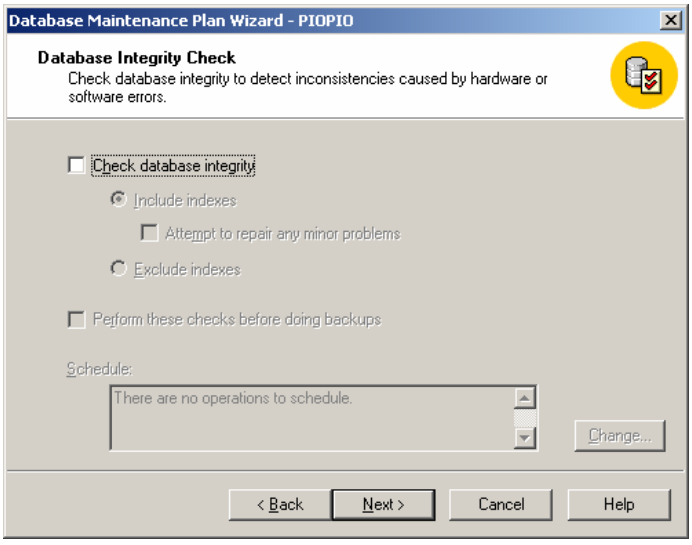
Click Next.



Select the database from which the transaction logs are to be shipped. Click the Ship the transaction logs to other SQL Servers check box. Click Next.



As part of the update wizard, tasks other than log shipping are performed. All defaults for these tasks will be accepted. Appropriate changes should be made for your installation. Click Next.



Default selections are shown. Choosing Attempt to repair any minor problems will put the database in single-user mode so that availability will be restricted. Click Next.

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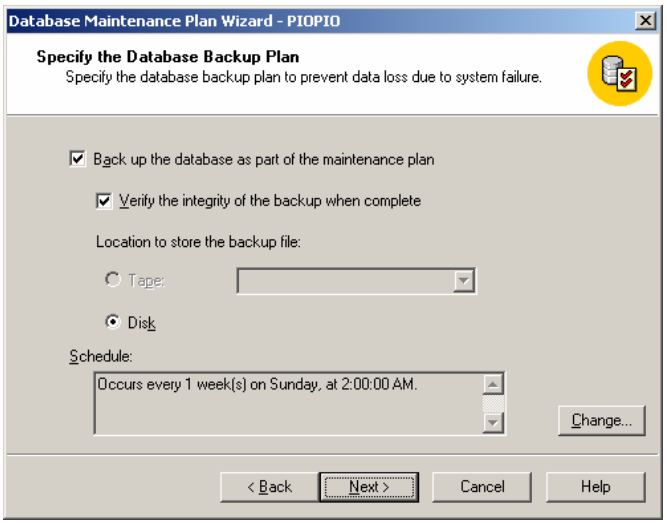
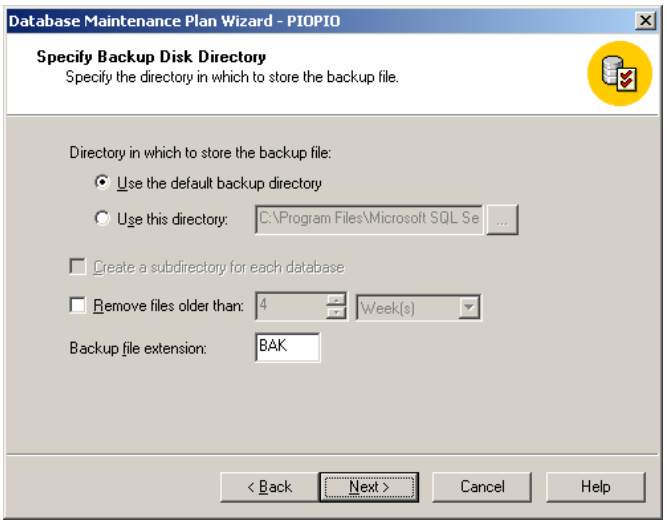


Select the database backup options and click Next.



Specify the location to store the backup file. Click Next.

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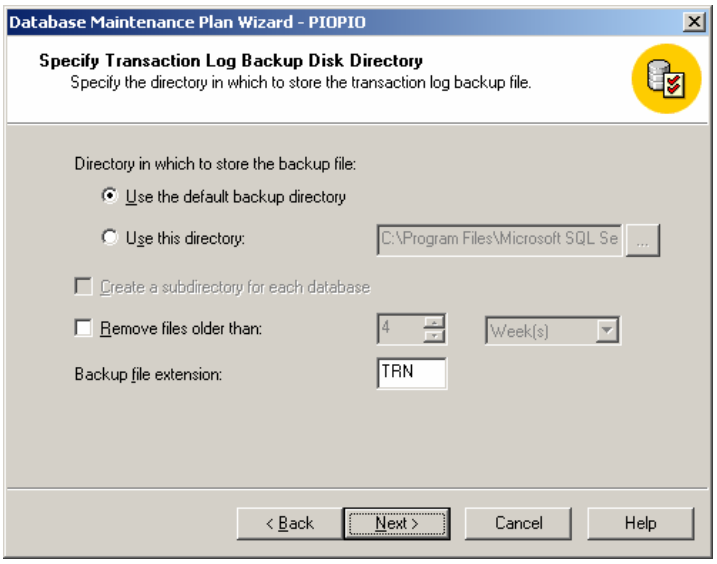
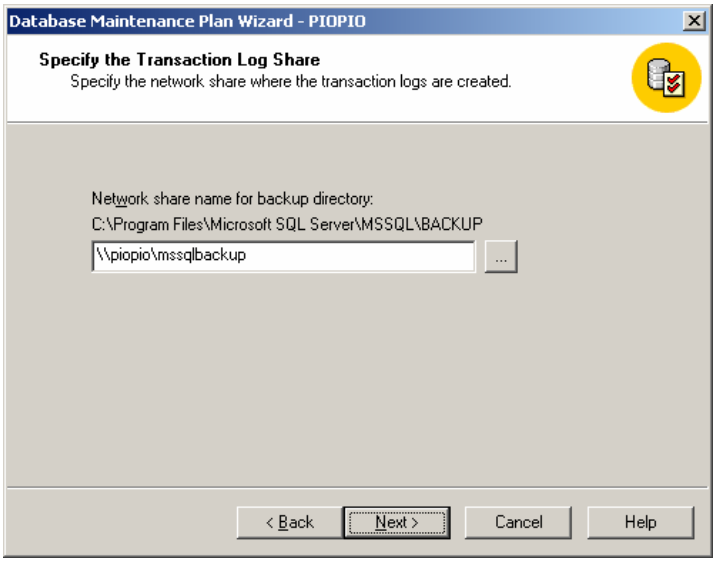


Specify the location to store the transaction backup file. Click Next.



To run log shipping, a share on the primary server drive that stores the transaction log must be created. Enter the location of this drive and click Next.

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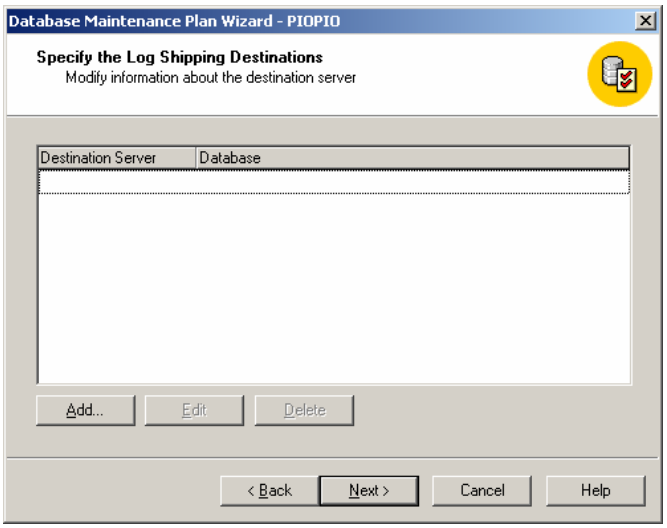
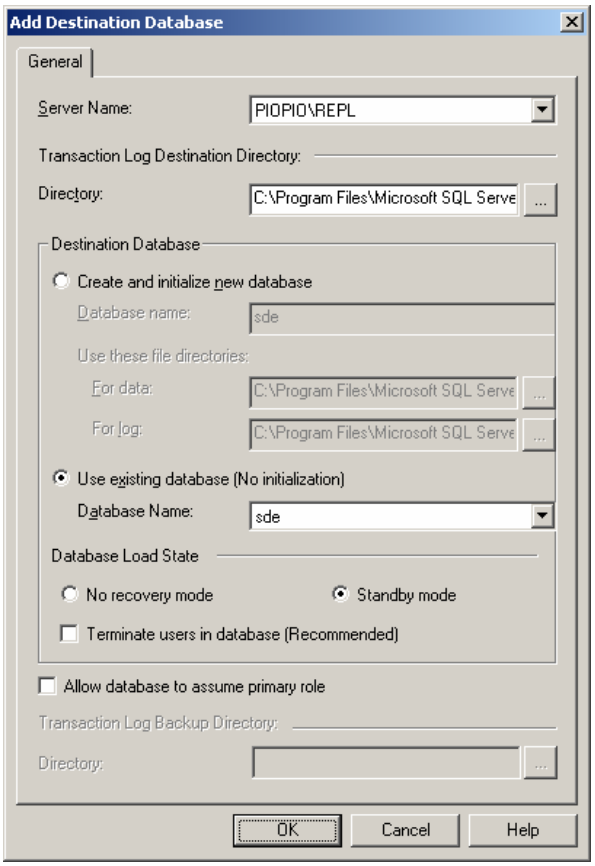
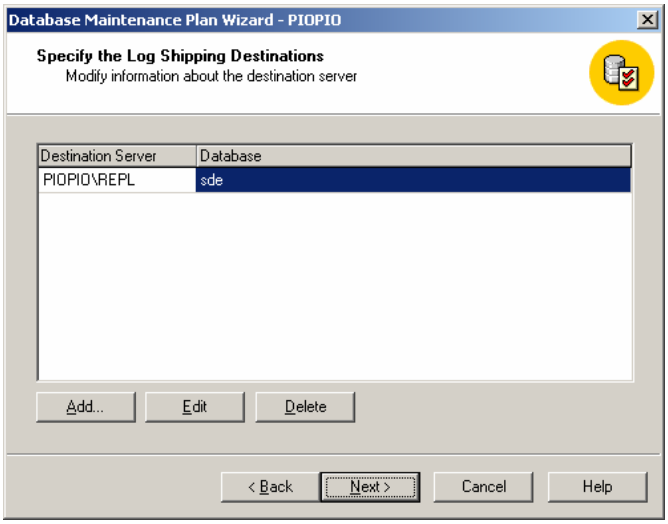


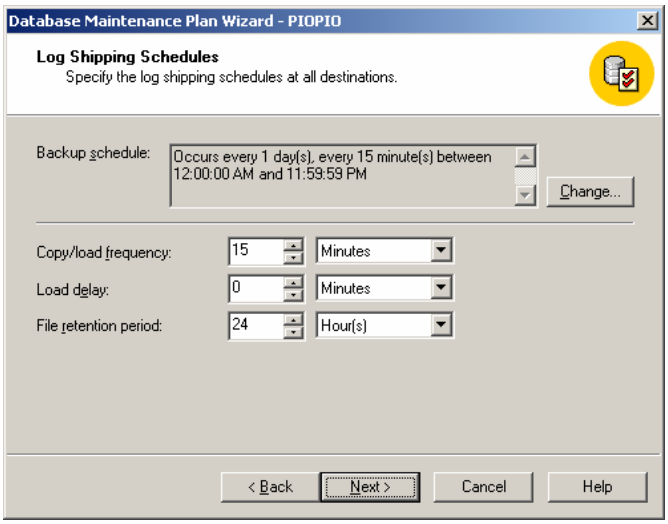
Click Add to specify the log shipping destination server.



Enter the Server Name for the destination of the transaction logs. In this example an existing database was used to receive the transaction logs. Click OK.



Confirm that the destination server and database are correct then click Next.



Enter the backup schedule for the log shipping then click Next.

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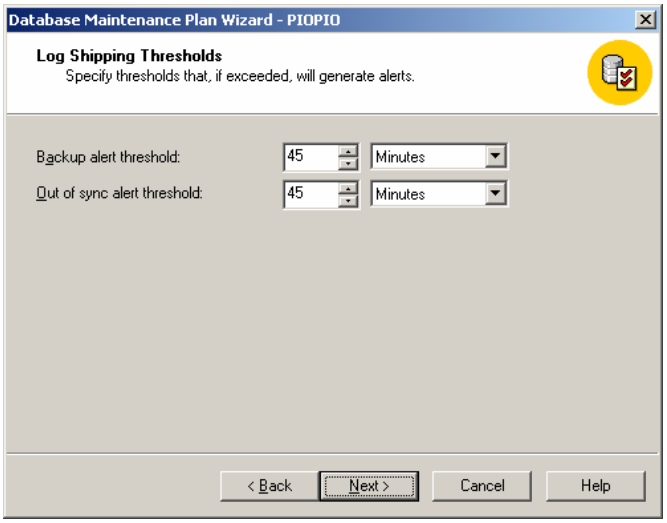
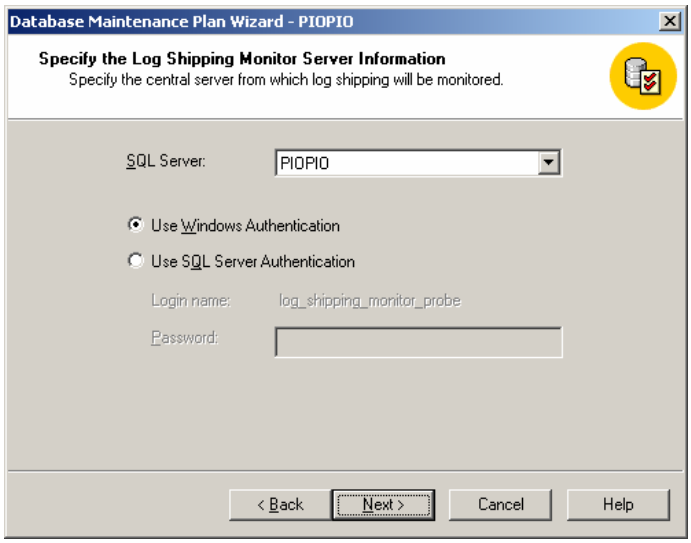
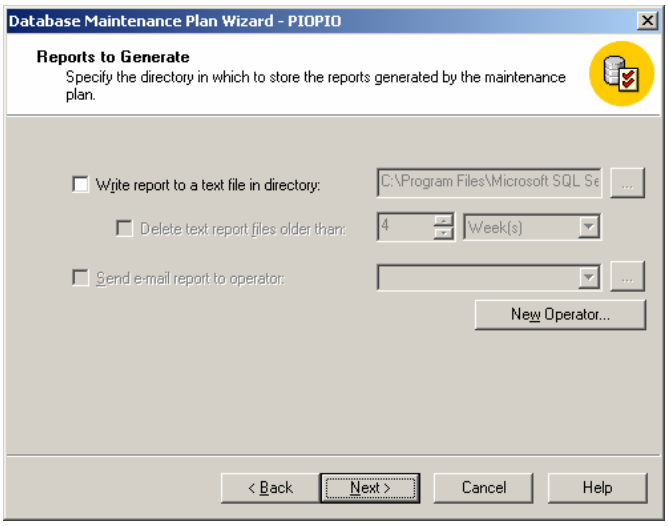


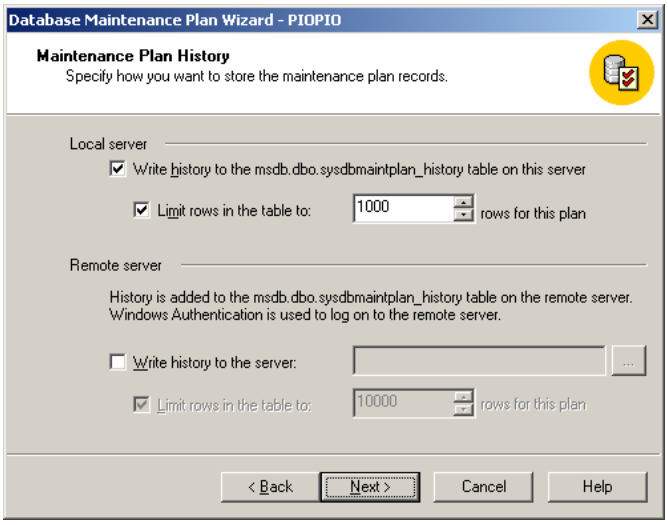
Specify the log shipping thresholds then click Next.



Specify the server to monitor the log shipping then click Next.



Specify any reports to generate then click Next.



Specify how to store the maintenance plan records then click Next.

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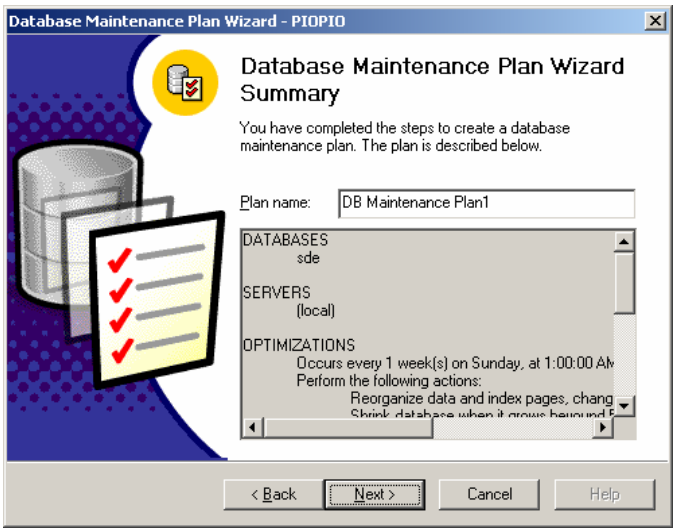
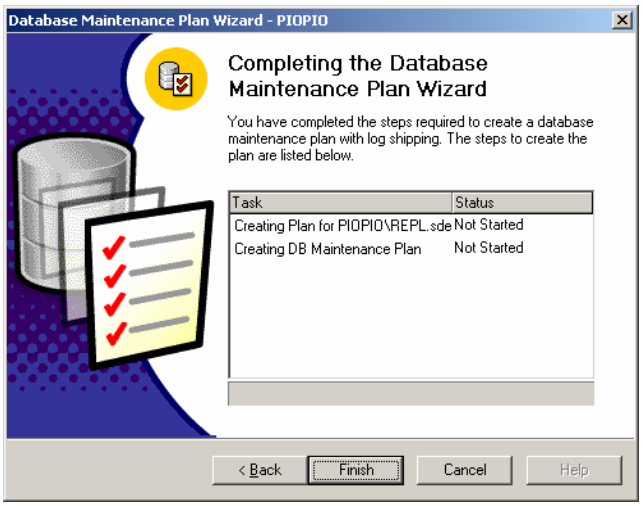


Name the database maintenance plan. In the example, the default DB Maintenance Plan1 was accepted. Confirm the options selected and click Next.



Click Finish to create a database maintenance plan.

It will be necessary to start the SQL Server Agent. In Enterprise Manager, open Management and right-click SQL Server Agent to start. The log shipping will be performed at the times specified in the log shipping schedules.

See the section on standby servers for information on bringing the standby server online.

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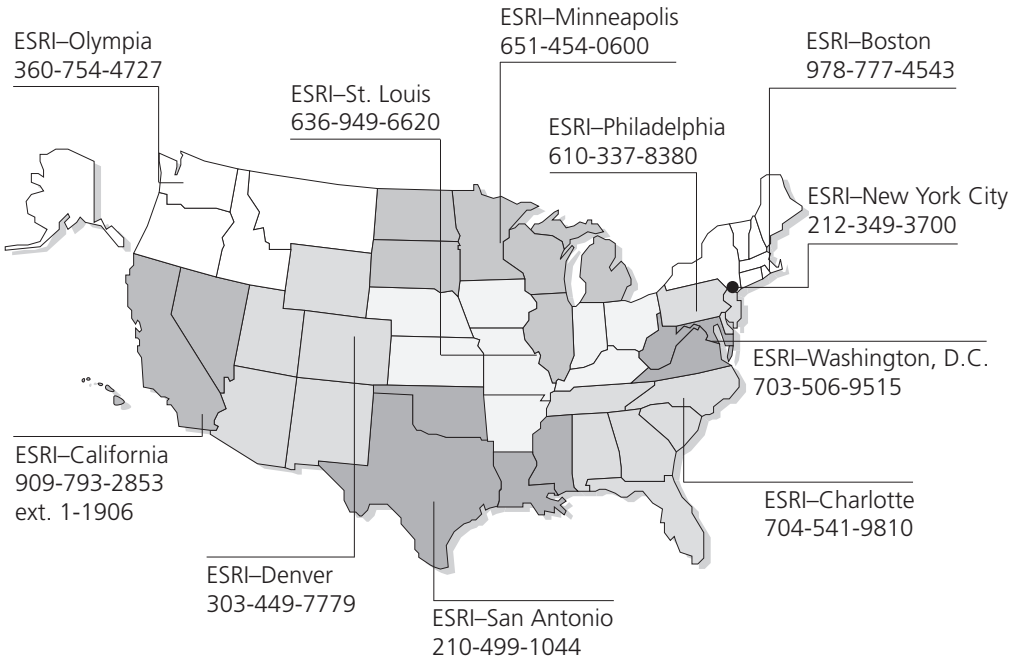

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