

LOG SHIPPING

What is Log shipping?

SQL Server log shipping is a technique which involves two or more SQL Server instances and copying of a transaction log file from one SQL Server instance to another. The process of transferring the transaction log files and restoring is automated across the SQL Servers. As the process result there are two copies of the data on two separate locations

What are Log shipping Modes available?

- No recovery
- Stand By

What are the most common reasons that causes log shipping failures?

- Space issue
- Blocking at secondary
- Service account password changed/Expired – not updated
- LSN mismatch
- Networking issues
- False alerts due to disconnect between primary and secondary
- New file creation at primary
- SQL agent does not have proper rights
- Restore will fail if there is a snapshot or an active DBCC replica on secondary DB
- Orphaned users
- SQL agent restart may cause LSN mismatch
- Wrong values given for “Out of Sync alert” and “Backup alert”
- Huge log backup

What are TUF and WRK files?

Transaction Undo File. This file gets created only if the Secondary server is in STANDBY mode. This file holds all uncommitted transactions and SQL Server will use this file to check which earlier uncommitted transactions are committed/rolled back. Accordingly, it will write the data to disk.

Transaction Log backups file extensions will be changed to ‘. WRK’ extension while getting copied from Primary server to the Secondary server. Once the backup file gets copied to the secondary server fully then the log backup file extension will be changed back to ‘. trn’. This helps in blocking restores to happen when the file is getting copied.

What happens if TUF file will corrupt?

Log shipping will fail if TUF file gets corrupted. We need to set up log shipping again to fix the issue.

Can we add new data file to primary database? What happens after we try to add?

Yes, file can be added to the primary database. After adding the file to the primary database, if the same path exists in the secondary server then the file gets added to the secondary database as well. If the same file path doesn't exist in the secondary server then log shipping fails.

Can we add new data file to secondary database? What happens after we try to add?

No, we can't add a new file to the secondary database directly as it will be either in restoring or standby (read only) mode.

Does log shipping support all recovery models?

No. Only FULL and Bulk-Logged recovery models are supported.

How to failover database from primary to secondary?

- Disable all jobs (backup, copy and restore) on primary and secondary servers.
- Apply all pending log backups to the secondary server by first copying and then restoring them to the secondary database.
- Take tail log backup of the primary database with NORECOVERY option. Primary database will go into restoring state after this.
- Restore all the pending log backups to secondary and finally restore the tail log backup as well with RECOVERY option.
- This will bring the secondary database ONLINE, now configure log shipping in secondary (to make this as primary).
- Now secondary (current primary) will start acting as a primary database for log shipping.
- Now run all the new backup, copy and restore jobs that got created. This will make the old primary as a secondary database for log shipping.

How to apply Service Pack / Hot Fixes when Log Shipping is enabled?

How to install service packs and hotfixes on an instance of SQL Server that is configured to use log shipping?

- First apply Service Pack on Monitor Server (if you have a Monitor Server).
- Next apply the same update on Secondary Server (if more than one secondary apply on all secondary's) of Log shipping.
- Finally apply the same update on Primary Server.

Can we have different versions of primary and secondary servers in log shipping?

Can we configure log shipping between different SQL Server versions? Like Primary on SQL Server 2012 and Secondary on SQL Server 2014?

Yes, we can configure log shipping from lower version of SQL Server to higher version. But in case of failover you will have issues like we cannot configure log shipping from higher to lower version.

We can configure log shipping from SQL 2012 to SQL 2014. We will receive error similar to below when we try to configure log shipping from higher version to lower version of SQL Server:

Restore failed for Server 'SQL2012'. (SqlManagerUI)

For help, click:

[http://go.microsoft.com/fwlink?ProdName=Microsoft+SQL+Server&ProdVer=11.0.3000.0+\(SQL11_PCU_Main\).121019-1322+\)&EvtSrc=Microsoft.SqlServer.Management.Smo.ExceptionTemplates.FailedOperationExceptionText&EvtID=Restore+Server&LinkId=20476](http://go.microsoft.com/fwlink?ProdName=Microsoft+SQL+Server&ProdVer=11.0.3000.0+(SQL11_PCU_Main).121019-1322+)&EvtSrc=Microsoft.SqlServer.Management.Smo.ExceptionTemplates.FailedOperationExceptionText&EvtID=Restore+Server&LinkId=20476)

System.Data.SqlClient.SqlError: The database was backed up on a server running version 12.00.2269. That version is incompatible with this server, which is running version 11.00.2100. Either restore the database on a server that supports the backup, or use a backup that is compatible with this server. (Microsoft.SqlServer.Smo)

What are 14420 and 14221 errors

-- out of sync and backup threshold

Log shipping uses Sqlmaint.exe to back up and to restore databases. When SQL Server creates a transaction log backup as part of a log shipping setup, Sqlmaint.exe connects to the monitor server and updates the log_shipping primaries table with the last_backup_filename information. Similarly, when you run a Copy or a Restore job on a secondary server, Sqlmaint.exe connects to the monitor server and updates the log_shipping secondaries table.

As part of log shipping, alert messages 14220 and 14221 are generated to track backup and restoration activity. The alert messages are generated depending on the value of Backup Alert threshold and Out of Sync Alert threshold respectively.

The alert message 14220 indicates that the difference between current time and the time indicated by the last_backup_filename value in the log_shipping primaries table on the monitor server is greater than value that is set for the Backup Alert threshold.

The alert message 14221 indicates that the difference between the time indicated by the last_backup_filename in the log_shipping_primaries table and the last_loaded_filename in the log_shipping_secondaries table is greater than the value set for the Out of Sync Alert threshold

Executed as user: NT SERVICE\SQLAgent\$ANILSECONDARY. The log shipping primary database DESKTOP-QCAHT98\ANILMANIKYAM.

Publisher has backup threshold of 60 minutes and has not performed a backup log operation for 54745 minutes.

Check agent log and logshipping monitor information. [SQLSTATE 42000] (Error 14420) The log shipping secondary database DESKTOP-QCAHT98\ANILSECONDARY.

Publisher has restore threshold of 45 minutes and is out of sync. No restore was performed for 54745 minutes.

Restored latency is 0 minutes. Check agent log and logshipping monitor information. [SQLSTATE 42000] (Error 14421).

The step failed.

Common Errors in Log shipping:

SQL Server Error During Restore Database: "Exclusive access could not be obtained because the database is in use"

A: 2 solutions:

- In log shipping configuration → secondary database settings → select the checkbox "disconnect users in the database while restoring the backup"
- Temporary Solution: Remove all connections from the database

Msg 4305, Level 16, State 1, Line 1 The log in this backup set begins at LSN 42000000037600001, which is too recent to apply to the database. An earlier log backup that includes LSN 42000000034400001 can be restored. Msg 3013, Level 16, State 1, Line 1 RESTORE LOG is terminating abnormally.

A: Identify the missing backups and apply manually on secondary database

Msg 5133, Level 16, State 1, Line 14

Directory lookup for the file "E:\AnilMankyam\Anil.mdf" failed with the operating system error 2(The system cannot find the file specified.).

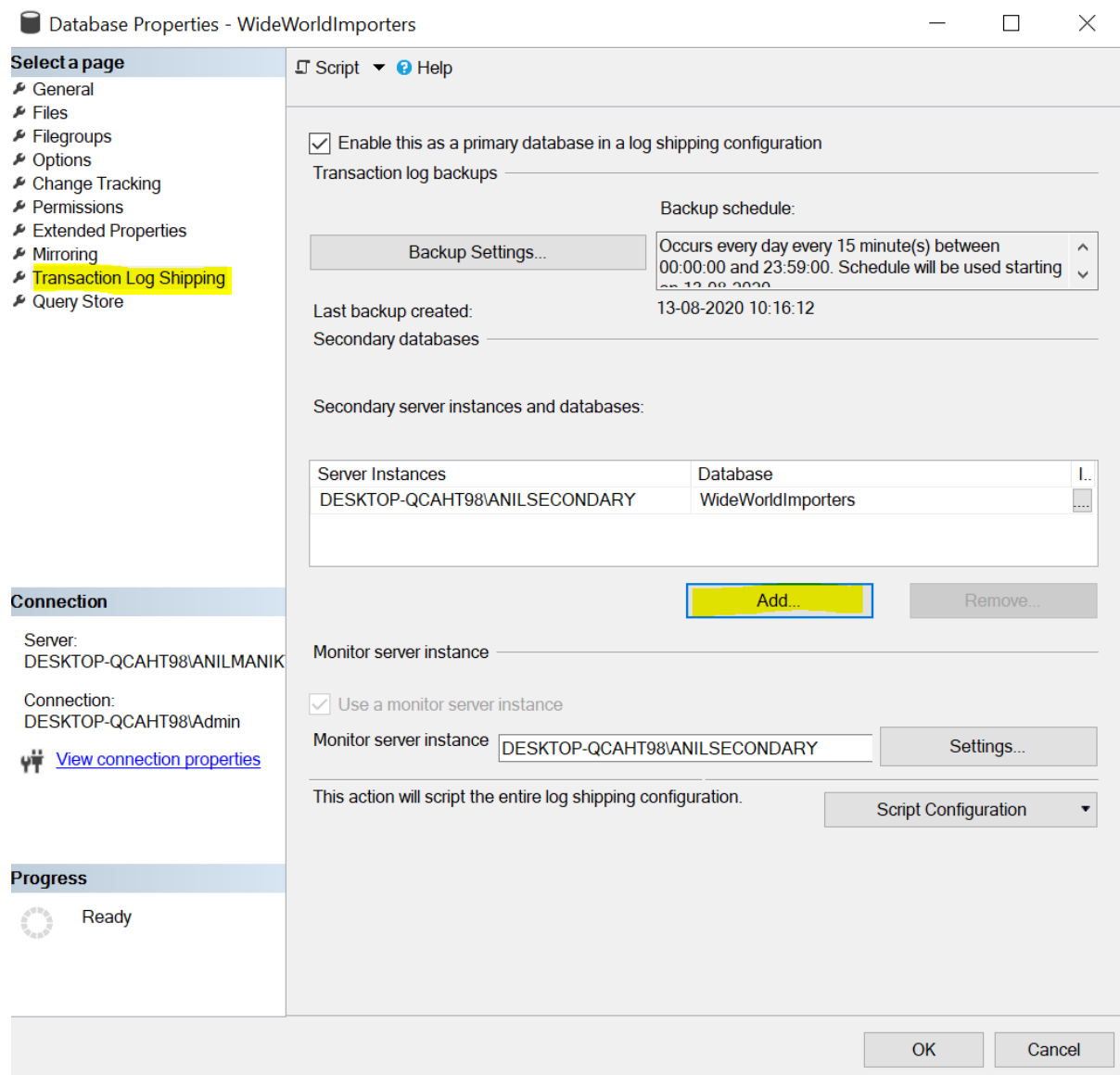
Msg 1802, Level 16, State 1, Line 14

A:

- Create same path on secondary like primary
- If is not possible then restore the backup "WITH MOVE" option

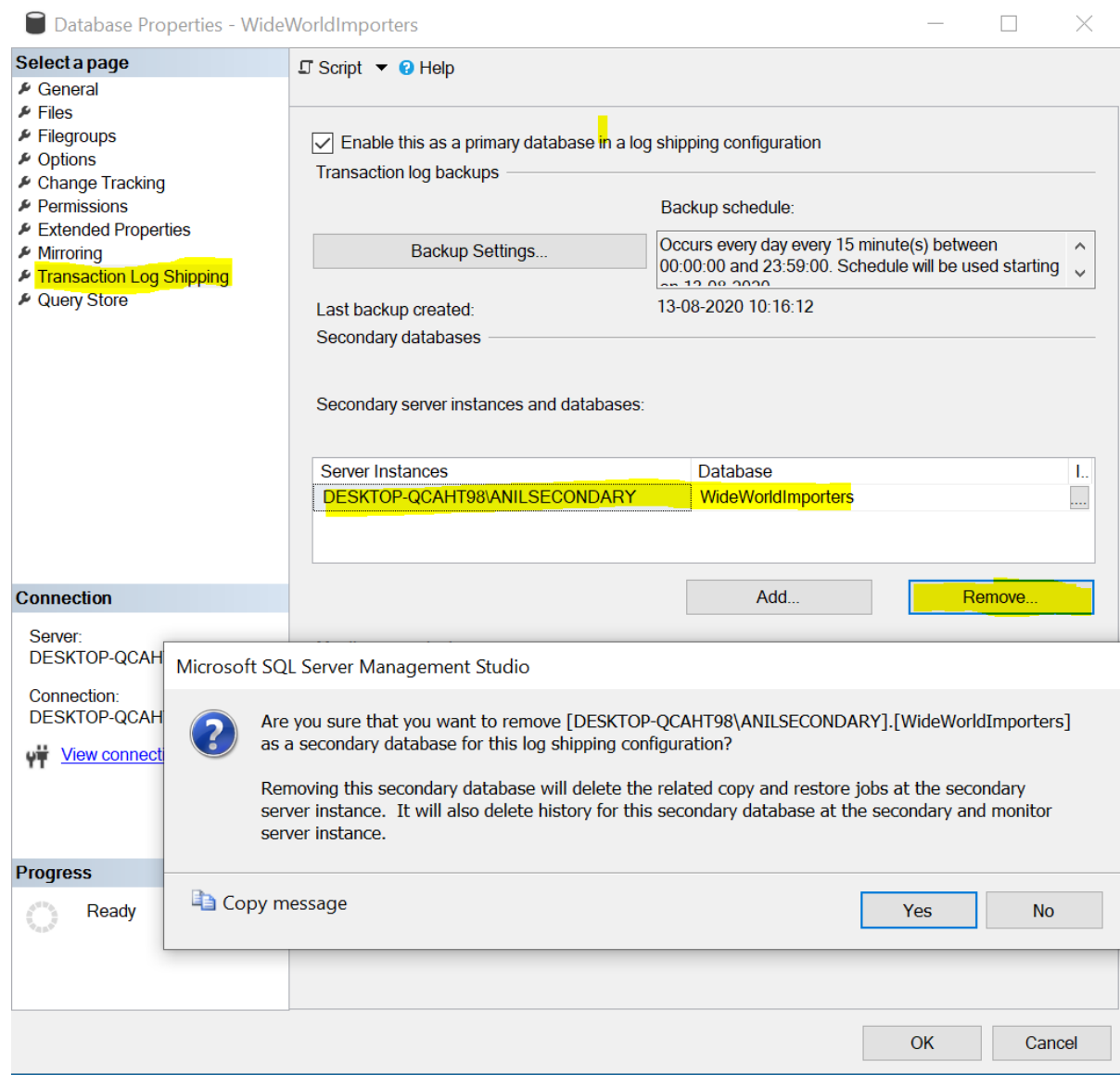
Adding a New Secondary Instance to an Existing Log Shipping configuration:

- Connect to primary database and right click and go to properties and select Transaction Log Shipping
- Under secondary databases section, click Add to add new secondary instance



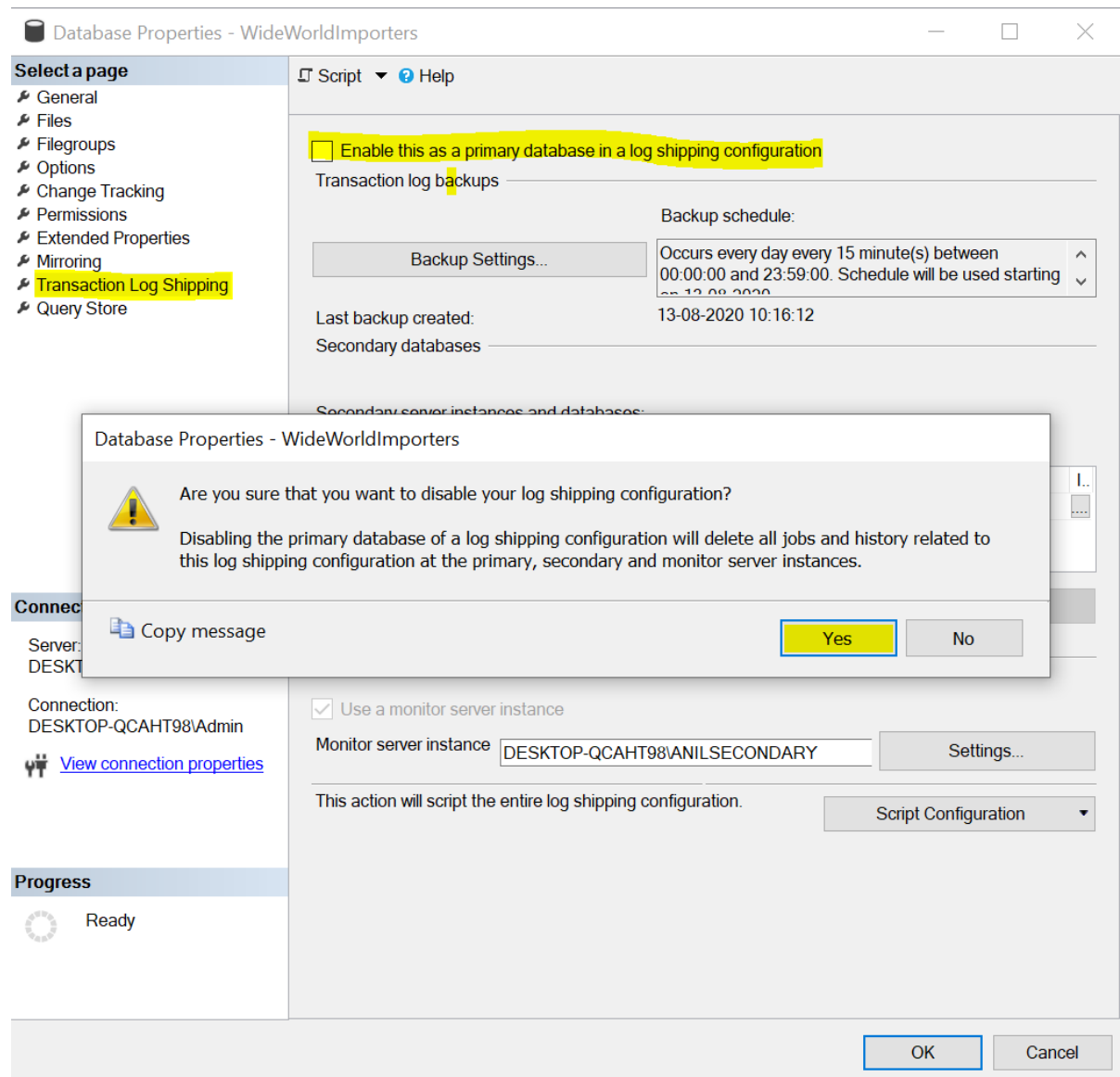
Remove a Secondary Instance from an Existing Log shipping Configuration:

- Connect to primary database and right click and go to properties and select Transaction Log Shipping
- Under secondary databases section, select the instance name which we need to remove and click Remove button to remove secondary instance



Disable or remove log shipping configuration

- Connect to primary database and right click and go to properties and select Transaction Log Shipping
- Uncheck the **Enable this as a primary database in log shipping configuration** option



Log shipping can be monitor through Queries and Reports

- Check the reports
- Check the Log shipping jobs
- Check the log shipping through queries

Log Shipping reports:

The screenshot shows the 'Transaction Log Shipping Status' report for the primary server instance 'DESKTOP-QCAHT98\ANILSECONDARY'. The report displays the status of log shipping configurations for which this server instance is a primary, secondary, or monitor.

Status	Primary Database -- Secondary Database	Time Since Last	Backup Threshold	Alert Enabled	Copy Time Since Last	Restore Time Since Last	Latency of Last File	Threshd
Alert	[DESKTOP-QCAHT98\ANILMANIKYAM][Publisher] -- [DESKTOP-QCAHT98\ANILSECONDARY] [Publisher]	61938 min	60 min	True		61938 min		45 min
Alert	[DESKTOP-QCAHT98\ANILMANIKYAM] [WideWorldImporters]	5829 min	60 min	True				
Alert	-- [DESKTOP-QCAHT98\ANILSECONDARY] [WideWorldImporters]					5829 min		45 min

- data in this column is not available or not applicable for this server instance.

Log Shipping monitoring Queries:

Primary Server :

```
--stores alert Job ID (on primary server if there is no monitor server)
select * from msdb..log_shipping_monitor_alert
--Stores error details for log shipping jobs
select * from msdb..log_shipping_monitor_error_detail
--Stores history details of log shipping jobs
select * from msdb..log_shipping_monitor_history_detail
-- Stores one monitor record for this primary database
select * from msdb..log_shipping_monitor_primary
--Stores configuration information for primary databases
select * from msdb..log_shipping_primary_databases
-- Stores primary and secondary database server and database (Map priamry and
secondary Databases)
select * from msdb..log_shipping_primary_secondaries
```

--Secondary queries:

```
select * from msdb..log_shipping_monitor_alert
--Stores error details for log shipping jobs
select * from msdb..log_shipping_monitor_error_detail
--Stores history details of log shipping jobs
select * from msdb..log_shipping_monitor_history_detail
-- Stores one monitor record for this secondary database
select * from msdb..log_shipping_monitor_secondary
--Stores configuration information
select * from msdb..log_shipping_secondary
--Stores configuration information for primary databases
select * from msdb..log_shipping_secondary_databases
```


--check backup log chain

```
SELECT
    s.database_name,s.backup_finish_date,y.physical_device_name
FROM
    msdb..backupset AS s INNER JOIN
    msdb..backupfile AS f ON f.backup_set_id = s.backup_set_id INNER JOIN
    msdb..backupmediaset AS m ON s.media_set_id = m.media_set_id INNER JOIN
    msdb..backupmediafamily AS y ON m.media_set_id = y.media_set_id
WHERE
    (s.database_name = 'WideWorldImporters')
ORDER BY
    s.backup_finish_date DESC;
```

-- Check LSN for Differential backup :

```
SELECT
    database_name
    ,type = ( CASE type
                when 'D' then 'FULL DB BACKUP'
                when 'I' then 'DIFFERENTIAL Backup'
                when 'L' then 'Log Backup'
            END)
    ,checkpoint_lsn
    ,database_backup_lsn
    ,differential_base_lsn
    ,backup_start_date
FROM msdb.dbo.backupset
WHERE backup_start_date>'2020-02-02 11:12:00.000' -- Optional, you can give a suitable
time
```

Log Shipping monitor:

sp_help_log_shipping_monitor – This is the how SQL Server generates the Log Shipping Status report by executing

sp_help_log_shipping_monitor_primary – returns all columns from the log_shipping_monitor_primary table for the specified primary log shipping database. It returns server name, database name, time of last backup, backup threshold, threshold alert and history retention period.

```
sp_help_log_shipping_monitor_primary @primary_server = 'DESKTOP-
QCAHT98\ANILMANIKYAM',@primary_database = 'WideWorldImporters'
```

sp_help_log_shipping_monitor_secondary – returns all columns from log_shipping_monitor_secondary table for the specified secondary log shipping database. It will return database name, server name, restore threshold, last copied file, time of last copy / restore and history retention period.

```
select lsd.secondary_database,lss.last_copied_file,lsd.last_restored_file from
msdb..log_shipping_secondary_databases lsd,msdb..log_shipping_secondary lss where
primary_server = 'DESKTOP-QCAHT98\ANILMANIKYAM' and
primary_database='WideWorldImporters' and lss.secondary_id=lsd.secondary_id
```