Using SQL Server 2008 /R2
Database Mirroring Troubleshooting

Nutan Marasini
MCT, MCITP(DBA), MCPD, MCTS, MCP, Trainer, Speaker, DJ
Certified Since 2003

Sr. IT Executive
(SQL Server, BI, SharePoint Consultant)
SARANG InfoTech Pvt. Ltd.
College Of Real Time Technologies Pvt. Ltd.
Agendas

- High Availability
- Factors Affecting High Availability
- High Availability Technique
- Database Mirroring
- Database Mirroring Server Roles
- Database Mirroring Option
- Handling Failover
- Transparent Client Redirection
- Demo
What Is High Availability?

High Availability: describes method to achieve guarantees availability at various levels

- Network
- System
- Application
Factors Affecting Availability

- Software failures
- Hardware component failures
- Network failure
- Power failure and natural disaster
High Availability Techniques

- Log Shipping
- DataBase Mirroring
- Implementing Server Clustering
- Replication
Database Mirroring

- Cost-effective failover solution
- Maintains two copies of a database on different instances
- Per-database
- Requires Full Recovery Model
- Provides hot or warm standby
Database Mirroring Server Roles

**Principal Server**
Serves the database to clients

**Witness Server**
Monitors the primary and mirror database servers
Performs automatic failover

**Mirror Server**
Provides hot or warm standby for failover
Options for Database Mirroring Configuration

<table>
<thead>
<tr>
<th>Mode</th>
<th>Automatic Failover</th>
<th>Full Protection from Data Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Availability</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>High Protection</td>
<td>×</td>
<td>✔</td>
</tr>
<tr>
<td>High Performance</td>
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<td>×</td>
</tr>
</tbody>
</table>
Database Mirroring
High Safety with Witness Server

1. Write the data to the transaction log

2. Send transaction to mirror

3. Write the data to the transaction log and commit the data

4. Send acknowledgement to principal

5. Commit the data
High-Performance Mode

1. Write the data to the transaction log and commit the data
2. Send transaction to mirror
3. Write the data to the transaction log and commit the data
4. Send acknowledgement to principal
Handling Failover

• Automatic failover
  - Mirror and witness form quorum
  - Role changes automatically

• Manual failover

  ```sql
  ALTER DATABASE DbName
  SET PARTNER FAILOVER
  ```

• Forced service

  ```sql
  ALTER DATABASE DbName
  SET PARTNER FORCE_SERVICE_ALLOW_DATA_LOSS
  ```
Transparent Client Redirection

Application code

Cache
Initial partner name: **Partner_A**
Failover partner name: **Partner_B**

SQL Native Client
or
.NET Framework Data Provider for SQL Server

Mirroring session for AdventureWorks database

Partner_A as principal server for Db_1
Data flow

Partner_B as principal server for Db_1
DEMO
Troubleshooting Setup Issue

Error: 1416
Database <DbName> is not configured for Mirroring

- Restore database on the **Mirror server** using the **NORECOVERY** option
Troubleshooting Setup Issue

Error: 1412
Remote copy of database <DbName> has not been role forward to a point in time that is encompassed in the local copy of database log.

Error: 1478
The mirror database, <DbName>, has insufficient transaction log data to preserve the log backup chain in the principal database. This may happen if a log backup from the principal database has not been taken or has not been restored on the mirror database.

- Apply one or more transaction log back up to the mirror server.
Troubleshooting Setup Issue

Error: 1418
The server network address <Network Address> cannot be reached or does not exist. Check the network address name and that the ports for the local and remote end points are operations.

Error: 1486
Database Mirroring transport is disabled in the endpoint configuration.

Error: 1456
The ALTER DATABASE command could not be sent to the remote server instance <Network Address>. The database mirroring configuration was not changed. Verify that the server is connected, and try again.
Detecting Errors

- Soft Error
- Hard Error
Soft Error

- Unresposive OS
- Unresposive SQL server instance
- Unresposive database
- Network timeouts
- Over allocated OS Resources
Hard Errors

- OS Failure
- Firewall Issue
- Router Issue
- EndPoint issue
- Fault NIC
- Faulty Network Cable
- Faulty Disk Drives
Failure Scenarios

- Scenario 1: Principal Server Unavailable
Failure Scenarios

• Scenario 2: Witness Server Unavailable
Failure Scenarios

- Scenario 3: Mirror Server Unavailable
Failure Scenarios

- Scenario 4: Mirror and Witness Server Unavailable
Failure Scenarios

- Scenario 5: Principal and Witness Server Unavailable
SQL Alert to Database Mirroring

<table>
<thead>
<tr>
<th>State Id Number</th>
<th>State Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Synchronized Principal With Witness</td>
</tr>
<tr>
<td>2</td>
<td>Synchronized Principal Without Witness</td>
</tr>
<tr>
<td>3</td>
<td>Synchronized Mirror with Witness</td>
</tr>
<tr>
<td>4</td>
<td>Synchronized Mirror without Witness</td>
</tr>
<tr>
<td>5</td>
<td>Connection With Principal Lost</td>
</tr>
<tr>
<td>6</td>
<td>Connection With Mirror List</td>
</tr>
<tr>
<td>7</td>
<td>Manual Failover</td>
</tr>
<tr>
<td>8</td>
<td>Automatic Failover</td>
</tr>
<tr>
<td>9</td>
<td>Mirroring Suspended</td>
</tr>
<tr>
<td>10</td>
<td>No Quorum</td>
</tr>
<tr>
<td>11</td>
<td>Synchronizing Mirror</td>
</tr>
<tr>
<td>12</td>
<td>Principal Running Exposed</td>
</tr>
<tr>
<td>13</td>
<td>Synchronizing Principal</td>
</tr>
</tbody>
</table>

Select * from Database_Mirroring_State_Change Where State=8 And DatabaseName='DBMirror'
Q&A

Nutan Marasini
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Since 2003

nutan@saranginfotech.com
9851049374

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