**Mirroring Concepts**

**What is Database Mirroring Technology in SQL Server?**

* It is used as HA DR Technology for SQL Server protecting Database by maintaining Mirror Copy of the database
* IT is also used for Reporting Purpose
* IT can be used for Migration/Upgrade

**What are the components in Database Mirroring?**

* Principal Instance
* Secondary / Mirror Instance
* Witness Server
* Principal Database
* Secondary\Mirror Database

**What are the advantages of Database Mirroring?**

* IT is easy to implement
* IT can be used for reporting purpose
* Automatic Failover can be configured with few changes in Connection Strings
* Can be used cross Domains and without any domains with use of Server Certificate

**What are the operations involved in Database Mirroring?**

* IT uses Dedicated TCP Endpoints to send log records from principal to mirror which includes DDL/DML part
* Sends queue transactions from Principal to Mirror Instance which in return maintains redo queue

**Types of Database Mirroring available in SQL Server?**

* High Availability: Synchronous State with Mirror Server using Witness for Auto Failover
* High Protection: Synchronous State with Mirror Server but no witness Server
* High Performance: Mirroring is configured in asynchronous state

**Explain High Availability Mode?**

* Provides the most data protection, with automatic failover
* Transactions cannot commit in principal database until log has been
* written to the mirror database’s log
* Failover is automatic, long as database is in a synchronized state
* Database mirroring monitor can be used to monitor mirroring status

**Explain High Availability Mode?**

* Provides the most data protection, but no automatic failover
* Transactions cannot commit in principal database until log has been
* written to the mirror database’s log
* Failover is manual, if the database is in a synchronized state
* Database mirroring monitor can be used to monitor mirroring status

**Explain High Performance Mode?**

* Provides less data protection, but maybe better performance
* Transactions commit on the principal before sending to the mirror server
* Mirror database continuously applies all outstanding log records
* Mirror database tries to stay synchronized with the principal
* Only available in Enterprise Edition

**Advantages of Database Mirroring and usage?**

* Can be used with other HA/DR Technologies
* Faster Failover compared to Failover Cluster Instances
* Automatic Page Repair
* Easier and less costly compared to Failover Cluster

**Limitations of Database Mirroring and usage?**

* Only one copy can be maintained
* Server Level Settings are not mirrored and not used for System Databases
* Limited features in Standard Edition

**Reporting Features in Mirror Database?**

* Mirror Database only supports no-recovery
* Snapshot can be used to run select queries
* It is only available in Enterprise Editions

**What are the Database Mirroring Requirements?**

* Must have SQL Server 2005 or newer
* Principal database must be in FULL recovery model
* TCP ports for mirroring endpoints must be open in firewalls
* Logins must have connection permission to endpoints
* All instances in partnership need network connectivity to each other

**Limitation for DB Mirroring?**

* Only user databases can be mirrored
* FILESTREAM is not supported
* Database mirroring does not support crossdatabase transactions or distributed transactions

**Best Practices compared with DB Mirroring?**

* Use Identical Setup like OS , Drive Letters etc..
* Edition and Version Number for SQL Server
* Firewall Ports to be Opened for Endpoints
* Instance-level objects such as logins, linked servers, and Agent jobs

**Preparing the Principles Server for Database Mirroring?**

* Database Recovery model should be FULL
* Backup Compression to be enabled
* Reduce VLF Count of users
* Check Connectivity with Mirror/Witness

**Preparing the Mirror Server for Database Mirroring?**

* Make sure instance-level settings are identical to principal instance
* Use identical drive letters and directory paths for database
* Make sure instant file initialization is enabled to reduce restore times
* Create file share for remote backup directory and grant permissions

**Database Mirroring Tips and Tricks?**

* Try to mirror an empty test database first
* Manually prepare mirror database
* Start running in high performance mode

**Configuration Using the Database Mirroring Security Wizard?**

* Mirror database must be prepared
* Use fully-qualified TCP addresses
* Setup without a witness server at first
* Use high performance mode at first

**Types of Database Mirroring Failovers?**

* Automatic failovers
* Manual failovers
* 1.SET PARTNER FAILOVER
* 2.SET PARTNER FORCE\_SERVICE\_ALLOW\_DATA\_LOSS

**Issues Faced for Database Mirroring Problems?**

* Failures caused by hard errors
* Failures caused by soft errors
* Failover delay based on error type
* Large send queue
* Large redo queue
* Mirroring session is suspended

**Migrating/Upgrading with Database Mirroring?**

* Production migration to newer version of SQL Server
* Used for final production migration
* One-time, one-way failover
* Very short outage during production failover

**Post-migration Tasks?**

* Perform full backups on all databases
* Update statistics on all user databases
* Change compatibility level on user databases
* Run DBCC CHECKDB on all databases
* Monitor instance health and performance

**Details for DB Mirroring Concepts**

* Mirroring Send transaction Logs from Principal Database to Mirror Database
* DB Mirroring send committed logs to Mirror Database
* Log Records which are send to Mirror Database and are durable in nature

**How does Database Mirroring works?**

The Principal/Mirror servers communicate with each other through dedicated TCP End Points

which sends the records to Mirror DB continously

**What are the different Mirroring Components?**

* Principal Database -- The state of the database is Read-write
* Mirror Database -- The state of the database is in norecovery
* Witness Server --Used to Monitor status of principal and Mirror Server
* Quorum -- In case of Serer down Principal contacts Witness to check if it is able to connect

**Do Witness Server trigger failover?**

No the witness Server do not trigger the failover just helps to monitor Principal and Mirrir

and maintain Quorum

**Explain Syncronous Mode?**

* Transactions cannot commit on prinicpal until the log has been written to Mirror log
* Failover Type can be automatic or Manual

**Explain Asynchoronous Mode?**

* IT allows the transactions to be completed on Mirror and then send it to Mirror
* The user do not have to wait for the logs to be applied at Mirror DB
* This mode is available only in Enterprise Edition

**Types of Database Mirroring Configurations?**

* High Availability-- Needs Witness Server for Automatic Failover. There is no dataloss
* High Protection -- NO Witness Server. No Data Loss Failover Type is Manual
* High Performance -- Manual Failover and some dataloss is possible which cannot be measured

**Pre-Requisites for Database Mirroring?**

* Principal and Mirror Server should have SQL Server 2005 and above
* Disk Space should be identical
* For Automatic Failover Witness Server is needed
* Witness Server can be any edition
* Database Recovery Model should be always Full
* Mirror Database must be rstored using Principal Server Backup and one log applied
* While doing Mirroring Setup ensure Log backup are disabled until Mirror is enabled
* FileGroup or Partial Database is not supported
* Service Account or SysAdmin Account (Windows Authentication Mode)

**What are the types of Failover?**

Partner Timeout - SQL Server will ping every second internally if 10 pings are missed then failover or failure happens

**Factors for Mirroring Failure or Failover?**

* OS Errors
* Network Errors
* IO Errors
* Process Errors

**What will be the time for Failover?**

* Depends on Type of Failure
* Redo Queue on the mirror to be applied

**IN which case Failover are not triggered automatically?**

CheckSum Failures -823 and 824 do not trigger failover

**What happens when Mirror is lost?**

* User connections will continue on Principal DB
* Principal has quorum with witness
* Mirror will be set in suspended state
* when the mirror comes back are online the DB State changes to Synchronizing
* and once syncrhonised in HA State

**What happens when the Principal is lost?**

* Mirror has quorum with Witness
* If Witness and Mirror argree with each other. Mirror will become the new Principal
* When the Principal DB is online again it will synchronize but the failover wont be automatic
* and needsto be initiated manually

**What happens when the Witness is lost?**

The Principal and Mirror stays in synchronize state. Only Automatic Failover is not possible

**How many Mirror copy can we have for Database?**

1

**Can you restore Mirror in standby Mode?**

NO. It requires norecovery mode

**Can Mirror Database can be used for reporting?**

Mirror database is in norecovery. However Snapshot can be generated to run select queries

**How many database can be mirror per instance?**

10 is number.

However it also depends on the log data send to Mirror Server and NW requirement

**Standard Edition vs Enterprise Edition?**

One thread is used by Standard Edition and Enterprise wil use 1 thread per 4 cores