

# **Module 12: Backup and Recovery**

# Overview

- **Backup and recovery methods available in Oracle and SQL Server 2012**
- **Types of failure**
- **Types of recovery**
- **Formulating backup and recovery strategies**

# Database Errors

The most common database errors include:

- **Statement failure**—when a program encounters a failure in the handling of a statement
- **Process failure**—when a background process, user process, or server process encounters an abnormal disconnection or process termination
- **Instance failure**—when an instance ceases to run due to a hardware or software failure
- **User or application error**—when objects are dropped or data is deleted accidentally
- **Media failure**—when reading from or writing to a database file fails
- **Network failure**—when a network segment fails or a connection aborts

# Backup Methods

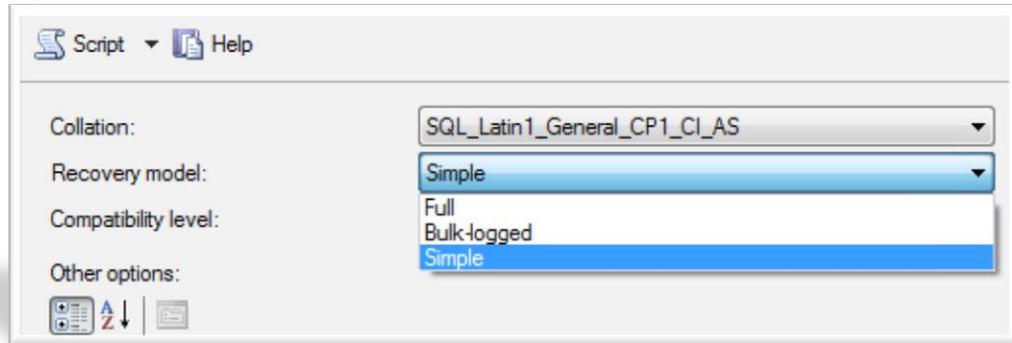
## Two Types: Logical and Physical Backups

- **Logical backups facilitate recovery at the individual schema object level**
  - In SQL Server, you can use SSIS, bcp, and other data transport tools
- **Physical backups are copies of physical database files. These include:**
  - Online (or inconsistent) backups
  - Offline (or consistent) backups
  - Incremental backups
  - Archive log backups

# SQL Server Recovery Models

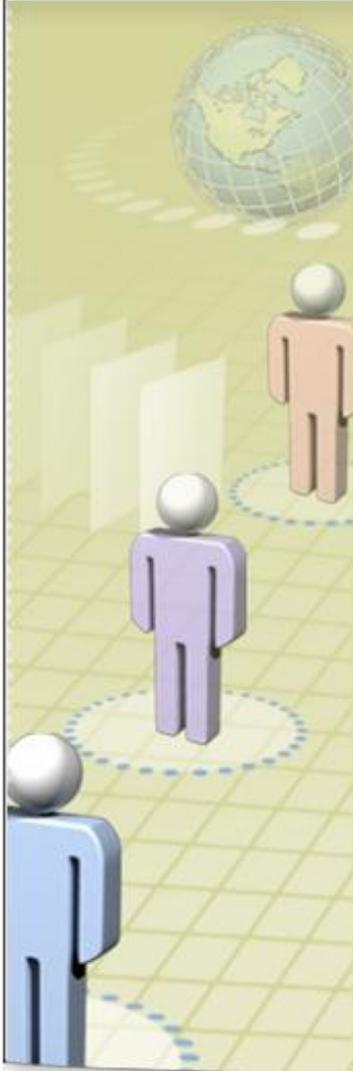
- Available recovery models include:

- Full
- Bulk Logged
- Simple



- Recovery models determine the amount of logging at the database or command level
- Recovery models provide much needed control over logging and speed up bulk operations while providing recoverability to transaction-heavy systems

# Demonstration 1: Recovery Model



**In this demonstration you will learn to:**

- **Locate the Recovery Model Option for a database**
- **Make the changes through the SSMS GUI or with scripts**

# Factors Affecting Backup Strategy Decisions

- **Transaction rate and rate of data change**
- **Availability requirements of databases**
- **Value and degree of mission critical nature of data**
- **Nature of data access**
- **File system storage space available for backups**
- **Backup media space available**
- **Cost of other hardware and software resources**
- **Performance load requirements**

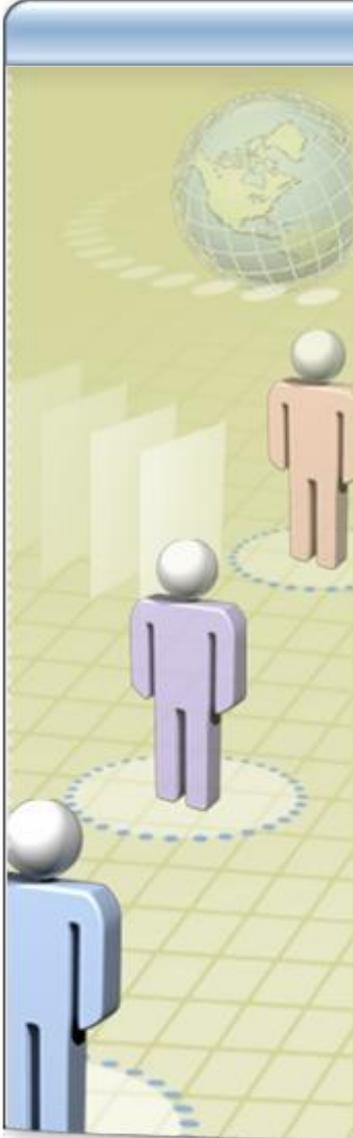
# Recovering From Database Errors

- **Statement failure**—Oracle and SQL Server automatically recover and return control
- **Process failure**—PMON in Oracle and SQLOS in SQL Server automatically roll back the current transaction and release held resources
- **Instance failure**—Oracle and SQL Server recover on instance startup
- **User or application error**—Oracle and SQL Server offer point in time recovery options
- **Media failure**—Oracle and SQL Server offer file-level recovery
- **Network failure**
  - PMON in Oracle and SQLOS in SQL Server recover aborted transactions
  - RECO in Oracle and MSDTC in SQL Server recover from failures during two-phase commit of distributed transactions

# Backup and Recovery Tools

- **Oracle Recovery Manager (RMAN)**—part of Oracle, used to back up and recover database files.
- **SQL Server backup and restore components**—in conjunction with SQL Server Agent, you can set up, schedule, automate backups and perform recovery.
- **BACKUP and RESTORE commands** can be used in applications, T-SQL scripts, stored procedures, and triggers.
- **Backup history** is maintained in the RMAN recovery catalog. The equivalent system catalog tables are in the msdb database in SQL Server.
- **Consider Encryption/Compression**

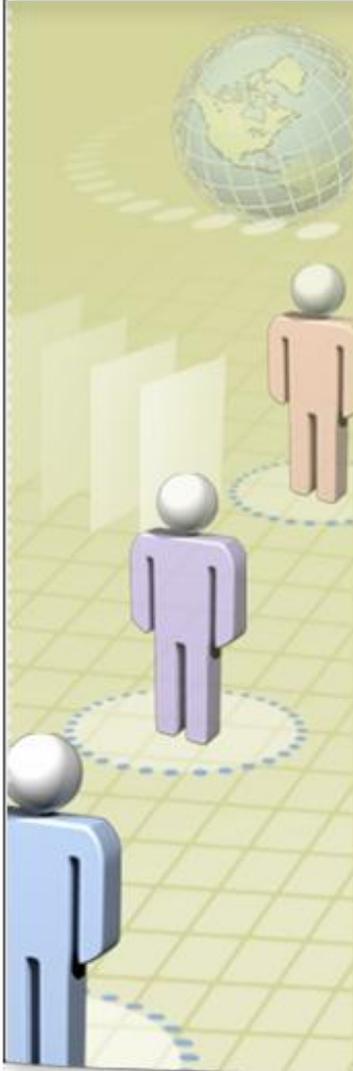
# Demonstration 2: Maintenance Plan Backup



In this demonstration you will learn to:

- **Create a Maintenance Plan using SSMS**
- **Schedule the plan for future execution**
- **Use SQL Server Agent – Job Activity Monitor to monitor the execution status**

# Demonstration 3: Differential and Log Backups and Restore



**In this demonstration you will learn to:**

- **Create a Tail Log backup**
- **Restore a database to every committed transaction**

# Third-Party Backup and Recovery Solutions

- **System Center Data Protection Manager (DPM) provides centralized backup solution for SQL Server**
- **Third-party backup and recover tools interface RDBMS native backup and restore components with media management. Some examples include:**
  - BMC's Recovery Manager
  - EMC's Datamanager
  - Symantec's NetBackup
  - HP's Data Protector
  - Red Gate's SQL Backup
  - Quest's LightSpeed
  - Idera's SQLsafe

# Review

- **Identified the types of database errors**
- **Discussed backup methods available for online, offline and incremental backups**
- **Learned about available recovery models**
- **Discussed how to recover from the different types of failure**
- **Introduced to third-party solutions for aiding in recovery and backup**