

# SQL Server Backup Types

## Part1

### 1. Full Backup

- **When Used:** Regularly (e.g., weekly) or before major changes.
- **What It Includes:** Entire database – data, objects, and part of the transaction log.
- **Pros:**
  - Simple and complete.
  - Restores everything to the backup point.
- **Cons:**
  - Time-consuming.
  - Large in size.
- **Real-World Scenario:** A hospital's patient record system takes a full backup every Sunday to ensure baseline recovery in case of failure.

### 2. Differential Backup

- **When Used:** Between full backups (e.g., nightly).
- **What It Includes:** Changes made since the last full backup.
- **Pros:**
  - Smaller and faster than full backups.
  - Reduces storage requirements.
- **Cons:**
  - Depends on the last full backup.
  - Slower to restore than a full backup alone.
- **Real-World Scenario:** An e-learning platform takes nightly differential backups to capture daily progress and content changes.

### 3. Transaction Log Backup

- **When Used:** Frequently (e.g., hourly) in Full recovery model.
- **What It Includes:** All changes since the last log backup.
- **Pros:**

- Supports point-in-time recovery.
- Enables fine-grained restoration.
- **Cons:**
  - Requires full and all prior log backups.
  - Fails if log chain breaks.
- **Real-World Scenario:** A banking system performs transaction log backups every 15 minutes to minimize data loss and maintain regulatory compliance.

#### 4. Copy-Only Backup

- **When Used:** Ad hoc backups without disturbing backup strategy.
- **What It Includes:** Full backup (or log backup) that doesn't affect backup sequence.
- **Pros:**
  - Safe for temporary needs.
  - Doesn't interfere with differential backups.
- **Cons:**
  - Not part of the regular restore chain.
- **Real-World Scenario:** A developer working on a ticketing system takes a copy-only backup before applying a risky patch.

#### 5. File/Filegroup Backup

- **When Used:** Large databases where full backup is time/resource intensive.
- **What It Includes:** Specific files or filegroups.
- **Pros:**
  - Backup/restore smaller portions.
  - Efficient for large-scale systems.
- **Cons:**
  - Complex to manage and restore.
- **Real-World Scenario:** A university's research database with separate filegroups for different departments uses filegroup backups for parallel recovery.

```

SQLQuery1.sql - CO...NE2025\code1 (66) - X
CREATE DATABASE TrainingDB;
GO
USE TrainingDB;
GO
CREATE TABLE Students (
    StudentID INT PRIMARY KEY,
    FullName NVARCHAR(100),
    EnrollmentDate DATE
)
INSERT INTO Students VALUES
(1, 'Sara Ali', '2023-09-01'),
(2, 'Mohammed Nasser', '2023-10-15');

BACKUP DATABASE TrainingDB TO DISK = 'C:\Program Files\Microsoft SQL Server\MSSQL16.MSSQLSERVER\MSSQL\Backup\TrainingDB_Full.bak';

-- Insert New Record
INSERT INTO Students VALUES (3, 'Fatma Said', '2024-01-10');

-- Differential Backup
BACKUP DATABASE TrainingDB TO DISK = 'C:\Program Files\Microsoft SQL Server\MSSQL16.MSSQLSERVER\MSSQL\Backup\TrainingDB_Diff.bak' WITH DIFFERENTIAL;

-- Set Recovery Model to FULL
ALTER DATABASE TrainingDB SET RECOVERY FULL;

-- Transaction Log Backup
BACKUP LOG TrainingDB TO DISK = 'C:\Program Files\Microsoft SQL Server\MSSQL16.MSSQLSERVER\MSSQL\Backup\TrainingDB_Log.trn';

-- Copy-Only Backup
BACKUP DATABASE TrainingDB TO DISK = 'C:\Program Files\Microsoft SQL Server\MSSQL16.MSSQLSERVER\MSSQL\Backup\TrainingDB_CopyOnly.bak' WITH COPY_ONLY;

```

## Part 3

### Backup Strategy Summary

- **Full Backup:** Every Sunday at 2:00 AM
- **Differential Backup:** Every night at 2:00 AM (Mon–Sat)
- **Transaction Log Backup:** Every hour

### File/Folder Naming Convention

- Folder: C:\HospitalBackups\
- Files:
  - Full: HospitalDB\_Full\_YYYYMMDD.bak
  - Diff: HospitalDB\_Diff\_YYYYMMDD.bak
  - Log: HospitalDB\_Log\_YYYYMMDD\_HHMM.trn

create database HospitalDB

use HospitalDB

-- FULL BACKUP (Sunday)

BACKUP DATABASE HospitalDB TO DISK = 'C:\Program Files\Microsoft SQL  
Server\MSSQL16.MSSQLSERVER\MSSQL\Backup\HospitalDB\_Full\_20250525.bak' WITH  
INIT, NAME = 'Full Backup - Sunday';

-- DIFFERENTIAL BACKUP (Mon–Sat)

BACKUP DATABASE HospitalDB TO DISK = 'C:\Program Files\Microsoft SQL  
Server\MSSQL16.MSSQLSERVER\MSSQL\Backup\HospitalDB\_Diff\_20250526.bak' WITH  
DIFFERENTIAL, NAME = 'Differential Backup - Weekday';

-- TRANSACTION LOG BACKUP (Hourly)

BACKUP LOG HospitalDB TO DISK = 'C:\Program Files\Microsoft SQL  
Server\MSSQL16.MSSQLSERVER\MSSQL\Backup\HospitalDB\_Log\_20250526\_1500.trn'  
WITH INIT, NAME = 'Log Backup - Hourly';