**SQL Server Backup Types**

**🔹 1. Full Backup**

* **When it is used:**  
  Typically done on a regular schedule (e.g., weekly). It serves as the base for other types of backups.
* **What it includes:**  
  A full backup captures the entire database—data files, system tables, and part of the transaction log to ensure consistency.
* **Pros:**  
   Simple to restore  
  Self-contained
* **Cons:**  
  Time-consuming for large databases  
  Requires more storage
* **Real-world scenario:**  
  In a **banking system**, a full backup is taken every Sunday to ensure complete recovery of all customer account information.

**🔹 2. Differential Backup**

* **When it is used:**  
  Taken frequently (e.g., nightly) between full backups to capture changes made since the last full backup.
* **What it includes:**  
  All changes since the last full backup (not since the last differential).
* **Pros:**  
  Faster than full backups  
  Requires less storage
* **Cons:**  
  Requires the most recent full backup for recovery  
  Size grows over time if full backup is not refreshed
* **Real-world scenario:**  
  In an **e-learning platform**, differential backups are taken nightly to store updates like course materials and student progress.

**🔹 3. Transaction Log Backup**

* **When it is used:**  
  Taken frequently (e.g., hourly or every few minutes) in databases with the FULL recovery model to support point-in-time recovery.
* **What it includes:**  
  All transactions that have occurred since the last transaction log backup.
* **Pros:**  
  Enables point-in-time recovery  
  Small in size and fast
* **Cons:**  
  Requires full and log backup chain  
  Restoration process can be complex
* **Real-world scenario:**  
  In a **stock trading system**, log backups every 15 minutes minimize the risk of losing transaction history.

**🔹 4. Copy-Only Backup**

* **When it is used:**  
  Taken manually when a backup is needed without affecting the backup strategy (e.g., for testing or migration).
* **What it includes:**  
  A full backup or log backup that does *not* interfere with differential or log backup sequences.
* **Pros:**  
  Safe for ad-hoc use  
  Does not break backup chain
* **Cons:**  
  Cannot be used as a base for differential backups  
  Not part of the normal backup strategy
* **Real-world scenario:**  
  In a **ticketing system**, a copy-only backup is taken before applying a system patch to avoid disrupting regular backup jobs.

**🔹 5. File/Filegroup Backup**

* **When it is used:**  
  Used for very large databases split into multiple filegroups. Allows partial backups of only the changed portions.
* **What it includes:**  
  Specific database files or filegroups rather than the whole database.
* **Pros:**  
  Reduces backup/restore time for large DBs  
  Flexible
* **Cons:**  
  Complex backup and recovery strategy  
  Requires careful planning
* **Real-world scenario:**  
  A **hospital management system** uses filegroup backups to back up patient records separately from imaging or billing data

**Real-World Backup Strategy for HospitalDB**

**Backup Schedule Strategy**

* **Sunday 2:00 AM:** Full backup
* **Monday–Saturday 2:00 AM:** Differential backup
* **Every day, every hour:** Transaction log backup

**Naming Conventions**

* Full: C:\HospitalBackups\Full\HospitalDB\_Full\_YYYYMMDD.bak
* Differential: C:\HospitalBackups\Diff\HospitalDB\_Diff\_YYYYMMDD.bak
* Log: C:\HospitalBackups\Logs\HospitalDB\_Log\_YYYYMMDD\_HHMM.trn

-- FULL BACKUP (Sunday)

BACKUP DATABASE HospitalDB

TO DISK = 'C:\HospitalBackups\Full\HospitalDB\_Full\_20250601.bak';

-- DIFFERENTIAL BACKUP (Monday–Saturday)

BACKUP DATABASE HospitalDB

TO DISK = 'C:\HospitalBackups\Diff\HospitalDB\_Diff\_20250602.bak'

WITH DIFFERENTIAL;

-- TRANSACTION LOG BACKUP (Hourly)

BACKUP LOG HospitalDB

TO DISK = 'C:\HospitalBackups\Logs\HospitalDB\_Log\_20250602\_1300.trn';