**Part 1: Backup Types Research**

**1. Full Backup**

* **Used When**: Regularly (e.g., weekly) to capture the entire database.
* **Includes**: All data, objects, and part of the transaction log for consistency.
* **Pros**:
  + Complete restore capability.
  + Simple to manage.
* **Cons**:
  + Time-consuming for large databases.
  + Requires more storage.
* **Real-World Scenario**: Banking systems performing weekly full backups every Sunday night.

**2. Differential Backup**

* **Used When**: Daily between full backups.
* **Includes**: Only data changed since the last full backup.
* **Pros**:
  + Faster and smaller than full backup.
  + Reduces backup time.
* **Cons**:
  + Restore requires latest full backup + latest differential.
* **Real-World Scenario**: E-learning platform backing up student progress daily.

**3. Transaction Log Backup**

* **Used When**: Hourly or more frequent; only in FULL recovery model.
* **Includes**: All transactions since the last log backup.
* **Pros**:
  + Supports point-in-time recovery.
  + Keeps database size manageable.
* **Cons**:
  + Complex restore chain (full + diff + all logs).
* **Real-World Scenario**: Ticketing system backing up logs every 15 minutes to avoid data loss.

**4. Copy-Only Backup**

* **Used When**: Ad-hoc backup without affecting backup chain.
* **Includes**: Full copy of database but doesn't reset differential base.
* **Pros**:
  + Safe for testing, reporting.
* **Cons**:
  + Cannot replace regular full backup.
* **Real-World Scenario**: Testing changes on a hospital’s DB snapshot without interrupting main backup plan.

**5. File/Filegroup Backup**

* **Used When**: Very large databases using multiple files or filegroups.
* **Includes**: Specific files/filegroups.
* **Pros**:
  + Targeted backup and restore.
* **Cons**:
  + Complex to manage.
* **Real-World Scenario**: Archival databases in insurance storing old and active data in different filegroups.

**Part 3: Real-World Backup Schedule (HospitalDB)**

**Backup Strategy**:

* **Sunday 2:00 AM** – Full backup
* **Monday–Saturday 2:00 AM** – Differential backup
* **Every hour (24x7)** – Transaction log backup

**Folder & Naming Convention**:

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