Part 1: Research Task:
SQL Server Backup Types:

SQL Server Backup Types

In SQL Server, backups are essential to protect data and ensure recovery in case of data loss or system failure. There are several types of backups, each designed for different scenarios. Below is a summary of the main types, along with when to use them, what they include, pros and cons, and real-life examples.

1. Full Backup

When to Use:

- On a regular schedule (like daily or weekly).
- Before making major changes to the database.

What It Includes:

The entire database – all tables, data, system objects, and enough transaction logs to restore everything to the backup point.

Pros:

- Easy to restore from.
- Complete copy of the database.

Cons:

- Can be large and take time.
- Requires a lot of storage.

Example:

- A **banking system** takes a full backup every night to protect all financial records.

2. Differential Backup

When to Use:

- Frequently between full backups (e.g., every few hours).
- When you want quicker and smaller backups than full.

What It Includes:

- Only data that has changed since the last full backup.

Pros:

- Faster and smaller than a full backup.
- Useful for reducing backup time.

Cons:

- Still relies on the most recent full backup.
- Grows in size the longer you wait.

Example:

- An **e-learning platform** does full backups at night and differential backups every 2 hours to capture student activity.

3. Transaction Log Backup

When to Use:

- When using the full recovery model.
- To allow point-in-time recovery and reduce data loss.

What It Includes:

- All changes made to the database since the last transaction log backup.

Pros:

- Enables point-in-time recovery.
- Keeps data loss minimal.

Cons:

- Needs to be done regularly.
- Can be complex to restore.

Example:

- A **ticketing system** backs up its transaction log every 15 minutes to prevent losing any customer orders.

4. Copy-Only Backup

When to Use:

- For temporary or one-time backups.
- Before testing or performing risky tasks.

What It Includes:

- Same as a full or log backup, but doesn't affect the backup chain.

Pros:

- Doesn't interfere with regular backup schedules.
- Safe for testing and migrations.

Cons:

- Not part of normal restore sequence.
- Must be tracked manually.

Example:

- A developer takes a **copy-only backup** before testing a new feature on the production database.

5. File/Filegroup Backup

When to Use:

- When working with large databases divided into filegroups.
- To back up or restore specific parts instead of the whole database.

What It Includes:

- Only selected files or filegroups from the database.

Pros:

- Saves time and storage.
- Useful for partial restore.

Cons:

- More complex to manage.
- Needs careful planning.

Example:

- An **ERP system** backs up only the “Finance” filegroup separately to allow quick recovery if needed.

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