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Hot backup and **Cold backup** in SQL Server are more about **when** and **how** the backup is taken with respect to database availability.

1. Hot Backup (Online Backup)

Definition

A **hot backup** is taken **while the SQL Server database is online and accessible to users**.

- Transactions can continue to run during the backup.
- SQL Server's backup mechanism ensures data consistency using **transaction logs**.
- No downtime for users.

How it Works in SQL Server

- SQL Server uses a **write-ahead logging** mechanism.
- While the backup runs, SQL Server records changes in the **transaction log** and includes them in the backup so the backup represents a consistent state.

Example – Hot Backup in SQL Server


```
-- Full Backup while database is online

BACKUP DATABASE SalesDB TO DISK = 'D:\Backups\SalesDB_Full.bak' WITH INIT, COMPRESSION;
```

✅ This backup can be taken **anytime**, even during business hours.
✅ Ideal for **24x7** systems.

2. Cold Backup (Offline Backup)

Definition

A **cold backup** is taken **when the SQL Server instance or database is offline** (or at least in a state where no transactions can occur).

- Requires downtime.
- Usually done by physically copying the database files (.mdf, .ndf, .ldf) from the file system.

When Used

- Rare in SQL Server because downtime is costly.
- Useful when:
    - The system is under maintenance.
    - There's no active transaction logging needed.
    - You need a guaranteed static copy of database files.

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Example – Cold Backup in SQL Server

```
-- Step 1: Stop SQL Server service

-- Step 2: Copy MDF, NDF, and LDF files from data folder to backup location

-- Step 3: Restart SQL Server service
```

Or using **Detach/Attach**:

```
-- Detach database

EXEC sp_detach_db 'SalesDB';

-- Copy physical files manually

-- Reattach database

CREATE DATABASE SalesDB

ON (FILENAME = 'D:\Data\SalesDB.mdf'),

  (FILENAME = 'D:\Data\SalesDB_log.ldf')

FOR ATTACH;
```

⚠ Requires application downtime.
⚠ Any changes after stopping the service will not be included unless you restart and take another hot backup.

Hot vs Cold Backup – Quick Comparison

Feature	Hot Backup	Cold Backup
DB Availability	Online during backup	Offline during backup
Downtime	None (minimal)	Required
Method	BACKUP command	Stop service / copy files
Recovery Point	Up to the backup time (can combine with log backups)	Exact state when DB was stopped
Use Case	Production 24x7 environments	Rare, maintenance window only
Speed	Slightly slower due to active transactions	Faster file copy (but requires downtime)

💡 **In SQL Server, almost all modern backups are "hot"** because the built-in BACKUP command handles active transactions.

Cold backups are mostly used in legacy systems or very special maintenance scenarios.

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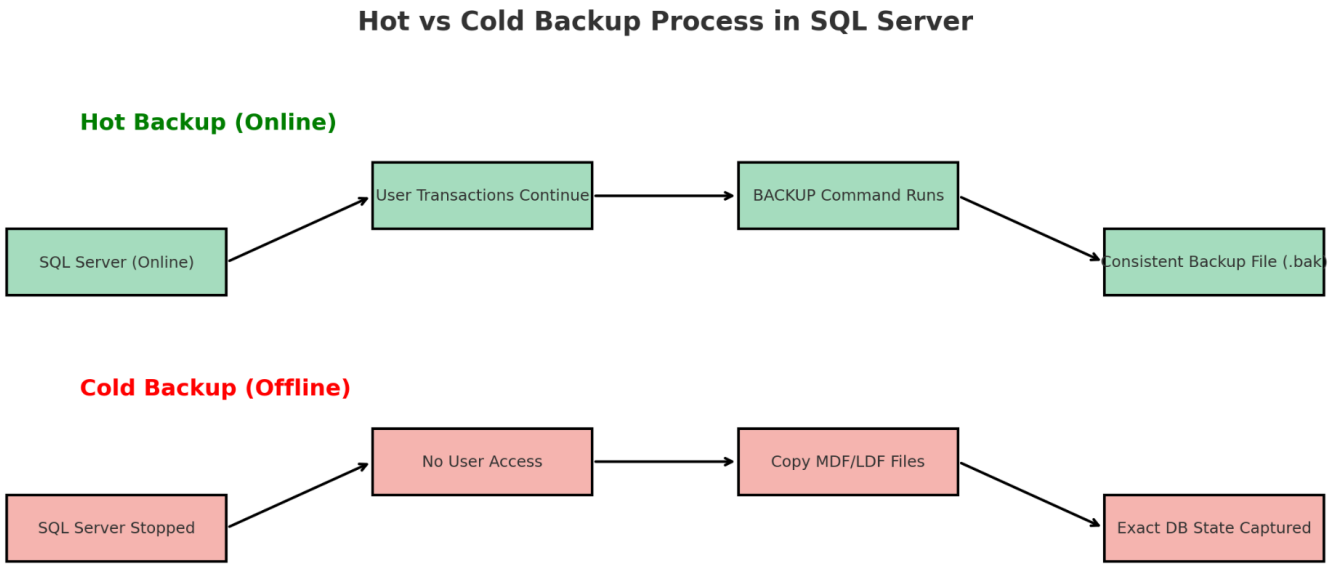

Here's the **visual comparison** showing how:

- **Hot Backup** runs while SQL Server is online, allowing transactions to continue.
- **Cold Backup** requires the server to be stopped, with no user access, and physical file copies taken.