Database Backup & Restore

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What is database backup?

Database backup is the process of creating, managing, and storing copies of data in case it's lost, corrupted, or damaged. Database backups allow users to recover data before it becomes unusable. This can be done manually or autonomously using a database backup solution

What are the three types of backups?

- Full database backup
- Incremental database backup
- Differential database backup

Full database backup

A full database backup includes all of the data in a database and enough log to enable recovery. It serves as the foundation for both differential backup and transaction log backup.

Full or normal backups cover all of the data in a database. Full backups take a long time to complete due to the enormous volume of data they handle. However, they back up every bit of information they are entrusted with copying.

When a full backup is performed, it backs up all of the data on that drive. The information is subsequently transferred to the destination of choice, like backup tapes, a secondary drive, or the cloud, and all archive bits are reset.

Full backups are the quickest way to restore a database as all of the data is kept in one area. The disadvantage of full backups is that they take a very long time to complete, which can be detrimental for businesses in certain situations. Even if they run overnight, large-capacity drives may not be able to do a full backup. To save time in these circumstances, incremental and differential backups can be added to the backup schedule.

Incremental database backup

An incremental database backup saves the data that has changed since the last backup. Incremental backups run much faster than the other types of backups.

Running full backups only on weekends is a standard method to deal with the high operational duration they demand. Since incremental backups take significantly less time, many companies schedule them throughout the week. Only files that have been updated since the last full backup are included in an incremental backup. Once an incremental backup has been completed, admins won't back up the file again unless it is modified or the next full backup is completed.

Data recovery via incremental backups is slightly risky because it relies on the prior backups not being corrupted. If a typical backup runs on Saturday and a file is updated Monday morning, it's restored from the Monday night backup if something goes wrong with that file on Tuesday. However, if the entire drive is lost or corrupted, then admins would need to restore the full backup and every incremental backup done since the full backup.

Differential database backup

A differential database backup is an alternative to incremental backups and provides a more straightforward recovery process. Differential database backups only capture data that has been modified since the last full backup. Since they only backup what has been changed since the previous full backup, it can lower the time required to conduct a database backup.

However, differential backups don't clear the archive bit. As a result, files that have been modified after a full backup are archived every time a differential backup is conducted until the subsequent full backup runs and clears the archive bit.

Cost difference between incremental and differential backups?

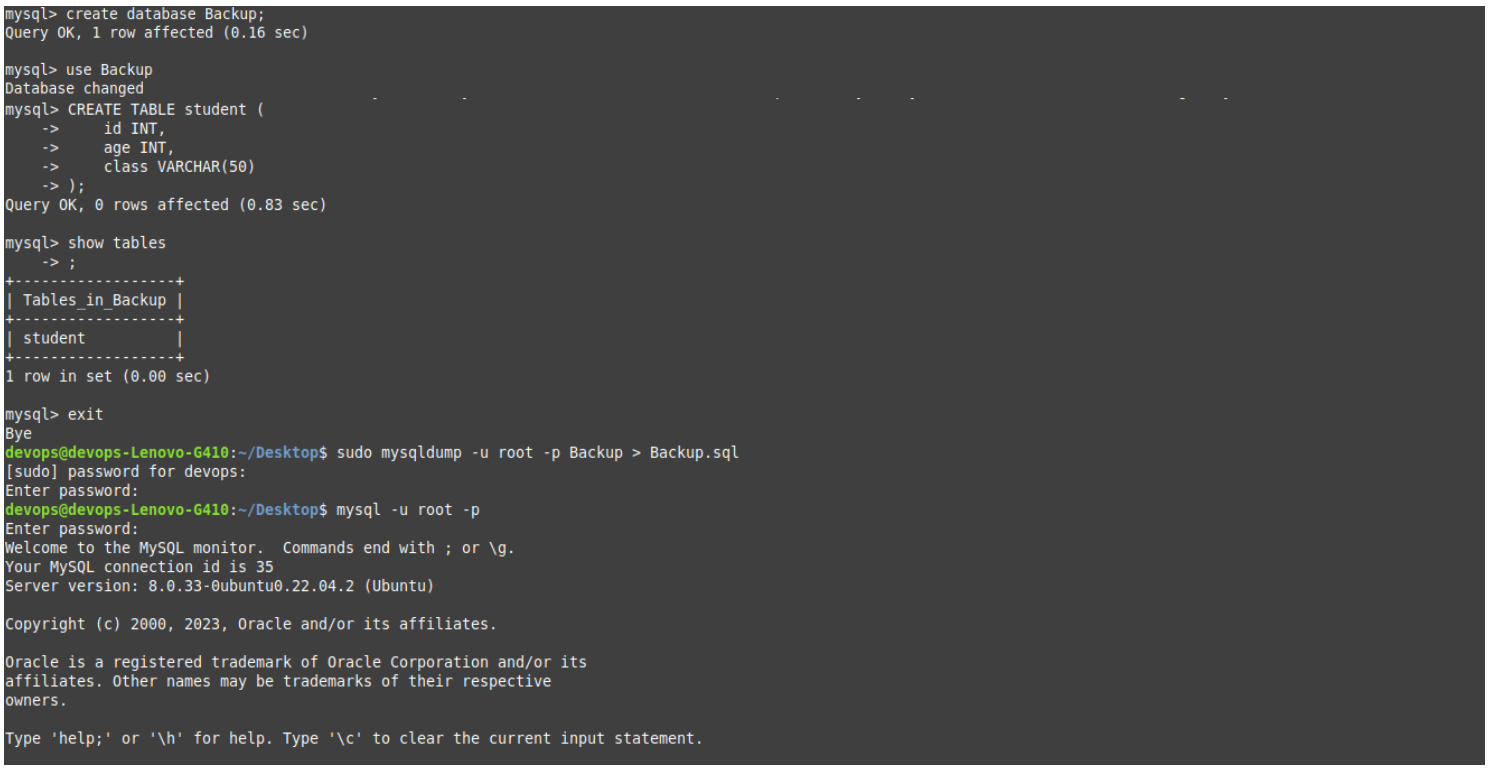
The cost comparison of backup strategies is measured primarily by the storage space taken for each backup type. As we've discussed, full backups would be the most costly, as they require the most storage space. Then come differential backups, with incremental backups being the most cost efficient.

All those backup methods need licence which is costly.

In the example below we are using built-in tool(mysqldump) of mysql for backup and restore for-

Creating a database name **Backup**, backing up as **Backup.sql**. Then restoring the **Backup** database again.

```
Database Backup: {mysqldump -u root -p Backup > Backup.sql}
Restoring : {mysql -u root -p Backup < Backup.sql}
```



```
mysql> drop database Backup;
Query OK, 1 row affected (0.57 sec)

mysql> create database Backup;
Query OK, 1 row affected (0.20 sec)

mysql> exit
Bye
devops@devops-Lenovo-G410:~/Desktop$ mysql -u root -p Backup < Backup.sql
Enter password:
devops@devops-Lenovo-G410:~/Desktop$ mysql -u root -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 37
Server version: 8.0.33-0ubuntu0.22.04.2 (Ubuntu)

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Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use Backup
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> show tables
    -> ;
+-----------------+
| Tables_in_Backup |
+-----------------+
| student          |
+-----------------+
1 row in set (0.00 sec)
```

We can also third party Tools like **phpMyAdmin:** A web-based tool for managing MySQL databases, including backup and restore features.