

BACKUP AND RECOVERY

SAP HANA supports the following backups

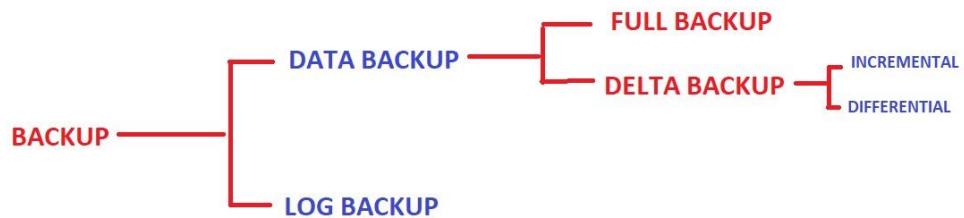
- 1.Data Backup
2. Delta Backup
- 3.Log Backup

BACKUP AND RECOVERY

The normal database backup and recovery principles apply to SAP HANA. The SYSTEMDB and all tenants are separate databases, which can be individually backed up and restored.

SAP HANA supports the following backups

- 1) Data Backup
- 2) Delta Backup (incremental , Differential Backup)
- 3) Log Backup



Data Backups:

A data backup includes all the data that is required to recover the database to a consistent state. A data backup is comprised of both business data and administrative data. Administrative data can be roles, models, information models, and topology information. With a data backup, only the actual data is backed up.

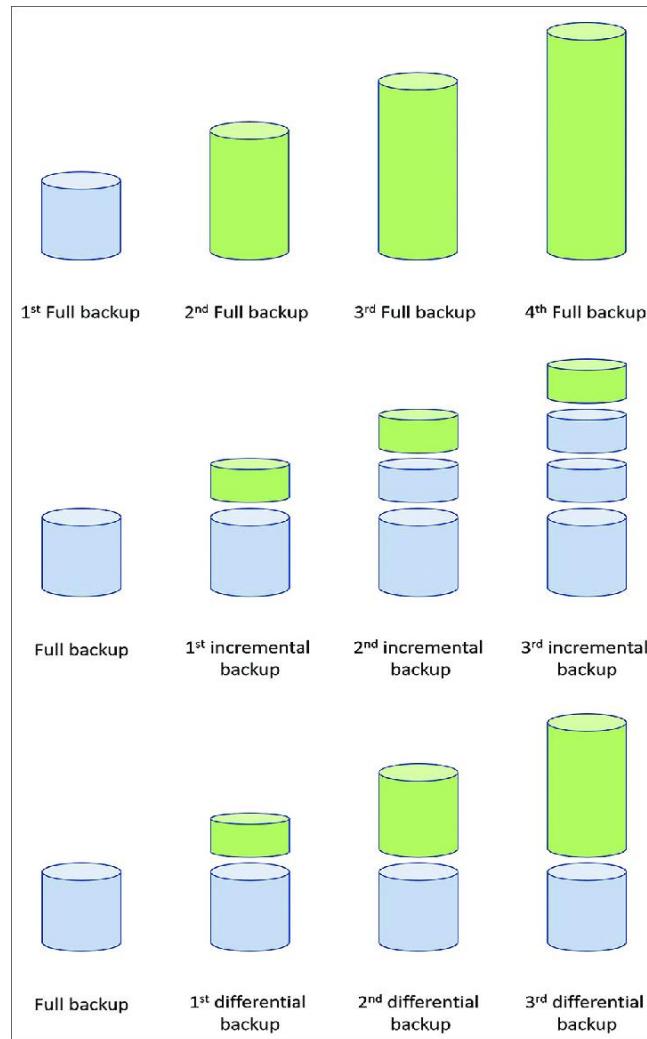
A data backup does not include: Unused space in the database, The log area

The data area is backed up in parallel for each of the SAP HANA services. If SAP HANA is running on multiple hosts, a data backup includes all the service-specific backup parts for all the hosts. To ensure the safety of your data, data backups should be stored on multiple different backup destinations outside the SAP HANA database.

Delta Backups:

Delta backups allow you to reduce the amount of data that is backed up, compared to full data backups. In turn, this means that delta backups are normally faster to create than full data backups. In addition, a database recovery using delta backups is normally faster than with log backups. With delta backups, only the changed data is recovered, whereas with log backups, each log entry needs to be processed separately before it is recovered. Processing multiple log backups is normally more processor-intensive than recovering a small number of delta backups.

Delta backups back up only data that has been changed since the last full data backup or the last delta backup



Incremental Backups: These backups only store data changes since the last data backup (either the last data backup or the last delta backup). Incremental backups are faster and require less storage space than full backups, but restoring data from incremental backups can be more time-consuming because each incremental backup since the last full backup needs to be processed.

Differential Backups: These backups store data changes since the last full backup, irrespective of other differential or incremental backups that have occurred since then. While differential

backups require more storage space than incremental backups, they offer faster data recovery times as they only need the last full backup and the last differential backup for a restore operations.

Differential Backup	Incremental Backup
Stores all the data changed since the last full data backup.	Stores the data changed since the last full data backup or the last delta backup (incremental or differential).
Backup The amount of data to be saved with each differential backup increases	Backup If data remains unchanged, it is not saved to more than one backup. For this reason, incremental backups are the smallest of the backup types.
Recovery If your backup strategy is based on only full data backups and differential backups, only two backups are needed for a recovery: a full data backup and one differential backup	Recovery If your backup strategy is based on only full data backups and incremental backups, to recover the database, SAP HANA needs the following backups: <ul style="list-style-type: none"> • The full data backup, on which the incremental backups are based • Each incremental backup made since the full data backup. In some situations, a large number of incremental backups may be needed for a recovery.

If you are using a third-party backup tool to create delta backups, you need to ensure that the backup agent executable (hdbbackint) is configured correctly. This hdbbackint call is sent internally by SAP HANA and is recorded in the backint.log file.

Log Backups: The Redo Log is a critical component in HANA system, capturing all changes made to the database. Regular backups of the Logs are crucial for database recovery to the most recent committed transaction in the event of a database failure. Log backups help in ensuring minimal data loss during a recovery scenario.

Log Mode:

SAP HANA can run in the following log modes: normal and overwrite. Note After installation, SAP HANA temporarily runs in log mode overwrite. This ensures that the log area does not grow excessively. After you create the first full data backup, SAP HANA runs in the default log mode Normal.

Normal: In log mode normal, log backups are created automatically if automatic log backups are enabled. Log mode normal is recommended to provide support for point-in-time recovery. Automatic log backups can prevent the log area from filling.

In log mode normal, log segments are backed up automatically in the following situations:

- The log segment is full.

- The log segment is closed after the configured time interval has been reached if at least one commit has been made.
- The database is started.

After a log segment has been backed up, SAP HANA can reuse the space that a log segment occupied in the log area to overwrite it with new log entries. A log segment in the log area is freed and its space can be reused only after:

1)The log segment is closed and a savepoint has been written.

2)The log segment has been backed up.

If the log area becomes full and no more log segments can be created in the file system, a log full situation arises and the database freezes. If the log area is full, no more log entries can be written until a log backup has been completed and the log segment is no longer needed to re start the database.

Do not delete log segments at operating system level, as this will make the log area unusable. As a consequence, the database may stop working immediately, and it will not be possible to restart the database

Overwrite:

No log backups are created. When savepoints are written, log segments are immediately freed to be overwritten by new log entries. When log mode overwrite is active, the Log Backup Settings in the Backup Console cannot be changed. Log mode overwrite can be useful for installations that do not need to be backed up or recovered. For example, for test installations.

Log mode overwrite is not recommended for production systems. With log mode overwrite, a point-in-time recovery is not possible. For recovery, only data backups are available; no log backups exist. Only the following recovery option can be selected: Recover the database to a specific data backup or storage snapshot.

You can switch between the SAP HANA log modes: normal and overwrite

Procedure

1. In SAP HANA studio, go to the Configuration tab.
2. Open global.ini, then open the persistence section.
3. Locate the parameter log_mode.
4. Double-click to open the change dialog.
5. Specify the new log mode. The new log mode can be either normal or overwrite. To reset SAP HANA to log mode normal, choose Restore Default.
6. Save. The change takes effect immediately.

Destination for the Log Backups:

By default, file-based log backups are written to: usr/sap/<SID>/HDB<NR>/backup/<SID>/log

You can change the default destination for file-based log backups FROM STUDIO.

Log Backup Interval : By default, the log backup interval is 15 minutes (900s). You can change the interval at which log backups are created. If the log segments become full before the log backup interval, the logs are backed up automatically.

The log backup interval takes effect only if automatic log backups are enabled. To enable automatic log backups, the log mode must be NORMAL.

You can specify the log backup interval using the Backup Console in SAP HANA studio. Alternatively, you can configure the parameter `log_backup_timeout_s` in the `global.ini` configuration file.

A log backup interval of 15 minutes (or less) is recommended for production systems.

If you specify a timeout of 0, log backups are created only when a log segment is full and when services are restarted.

RECOVERY:

To perform a recovery, an SAP HANA database needs to be shut down.

For this reason, during recovery, a database cannot be accessed by end users or applications.

An SAP HANA database cannot be recovered to an SAP HANA database with a lower software version. The SAP HANA software version used for the recovery must always be the same version or higher than the SAP HANA database used to create the data backup or storage snapshot.

Backup is online ,Recovery is off line. If your hana data base is encrypted, while backup data unencrypted and backedup.

You can cancel a recovery while it is running. However, be aware that canceling a recovery makes the database state inconsistent. SAP HANA prevents an inconsistent database from being started. To be able to work with the database again after cancelling a recovery, you would need to perform the recovery again.

To recover the database, you need at least one full backup (data backup or storage snapshot).

The data backup can be file-based or it can be created using a third-party backup tool

If a full backup is physically available, but not recorded in the backup catalog, that backup can still be used to recover the database. At the time of recovery, you need to specify its location.

At the beginning of a recovery, all the data and log backups to be used must be either accessible in the file system or available through a third-party backup tool.

Recovery of SAP HANA database is required in the following situations –

- 1)A disk in the data area is unusable or disk in the log area is unusable.
- 2)As a consequence of a logical error, the database needs to be reset to its state at a particular point in time.
- 3)You want to create a copy of the database.

RECOVERY TYPES IN HANA:

Most Recent State – Used for recovering the database to the time as close as possible to the current time. For this recovery, the data backup and log backup have to be available since last data backup and log area are required to perform the above type recovery.

Point in Time – Used for recovering the database to the specific point in time. For this recovery, the data backup and log backup have to be available since last data backup and log area are required to perform the above type recovery

Specific Data Backup – Used for recovering the database to a specified data backup. Specific data backup is required for the above type of recovery option.

IMPORTANT POINTS:

- 1)Data backup and Log back can happen at same time
- 2)two data backups we can't schedule on same time
- 3)incremental backup and differential backup we can,t take in same time
- 4)By default log mode= over write, once you take backup first time log mode will be NORMAL
Automatic backup enabled in log mode Normal.In log mode over write --point in time recovery not possible, log backup not possible.
- 5)It is not possible to backup and recover individual database objects . backup and recovery always apply to the whole database.