

# Module 5(Honor's)

SIM

## Availability

The availability of a system or component is commonly calculated as a percentage (of the time the system or component is available when compared to the whole), and it is often measured in terms of number of 9s, for example, 99.99%.

A formula to capture the availability of a simple system or component is calculated as follows, by tracking the uptime and downtime of the system itself:

$$\text{Availability} = \text{Uptime} / (\text{Uptime} + \text{Downtime})$$

The overall availability of a more complex system is calculated as follows, by multiplying the availability in percentage of each component present in the system:

$$\text{Overall Availability} = \text{Element\#1(availability\%)} * \text{Element\#2(\%)} * \dots * \text{Element\#n(\%)}$$

## Availability

A computer server running in a data center represents a complex system when approached as a set of separate devices, each with its own availability (calculated or most likely provided by the manufacturer). To the extent that the rack containing the server and additional devices represents a more evolved complex system to measure in terms of overall availability, the following items must be considered:

- Rack power supplies, cabling, and so on
- Top-of-the-rack network switches
- Server's local storage / hard disks
- Server's power supply (supplies, if redundant)
- Server's internal components (CPUs, memory, controller, and so on)

**Table 2. System Availability and Downtime per Year**

<b>Number of 9s</b>	<b>Availability %</b>	<b>Downtime/Year</b>	<b>System or Component Inaccessible</b>
1	90%	36.5 days	Over 5 weeks per year
2	99%	3.65 days	Less than 4 days per year
3	99.9%	8.76 hours	Approximately 9 hours per year
4	99.99%	52.56 minutes	Approximately 1 hour per year
5	99.999%	5.26 minutes	Approximately 5 minutes per year
6	99.9999%	31.5 seconds	Approximately half a minute per year

## What Is Redundancy?

The practice of storing data in more than one location within a database or storage system is known as data redundancy. This practice ensures that operations or services can continue during data corruption or loss.

An organization can have redundant data intentionally or unintentionally. They make a purposeful effort to secure and maintain the integrity of the data in several locations. Companies frequently use this information for backups or recovery plans.

Duplicate data can result in inconsistent data if done accidentally. Although data redundancy can reduce the likelihood of data loss, redundancy problems can still impact more extensive data collections.

## What Are Backups?

A backup gives protection against a broader range of problems such as failed drives, fraud, fire, or even an accidental file deletion and does not offer real-time protection.

There are two types of backups:

### Cold Backup

Cold backup, also called static or offline backup, is a type of backup service that necessitates the complete shutdown of the data system. During a cold backup, employees cannot do any work. Hence, it is typically done at the start or end of the day to ensure maximum company continuity.

During a cold backup, the system makes one copy of the backup. You can only complete the backups once because no new real-time data is added to this version.

A cold backup can be kept on another disk on the same server as the database.

## Hot Backup

This data type is known as “hot storage,” which refers to information users need to access quickly. Mission-critical data must be available right away, making it a good candidate for this method of data storage.

Information that requires the most storage space may benefit from solid-state drives, designed to reduce latency and increase transactional rates compared to traditional hard drives. On the other hand, high read/write cycles of hard disk drives make them better suited to situations where the drive is heavily used.

# What Are The Pros And Cons Of Data Backup?

- You only require one file copy for a quick and easy backup
- Archiving is a breeze
- Copying files back makes it simple to restore to a specific time
- Users can achieve the finest database recovery by combining it with archive functionality
- Maintain a high level of database security at a cheap cost

**Cold backup, on the other hand, has the following drawbacks.**

- When a company uses cold backup alone, recovery can only be made using a single time point
- Cold backup processing limits what the database can perform. So, users must turn off the database for a while before using it again
- A lack of disk space means you can only transfer data to external storage devices like tapes at a prolonged rate
- Databases and users cannot recover deleted data

**Here are several benefits of backing up control files via hot backup.**

- A quicker backup speed enables the backup of table space or database files
- During the backup process, the database can be accessed and used
- It enables second-level healing to a predetermined point in time
- Users can restore nearly every database entity
- In most circumstances, the database still functions, allowing for a quick recovery