Disk Management

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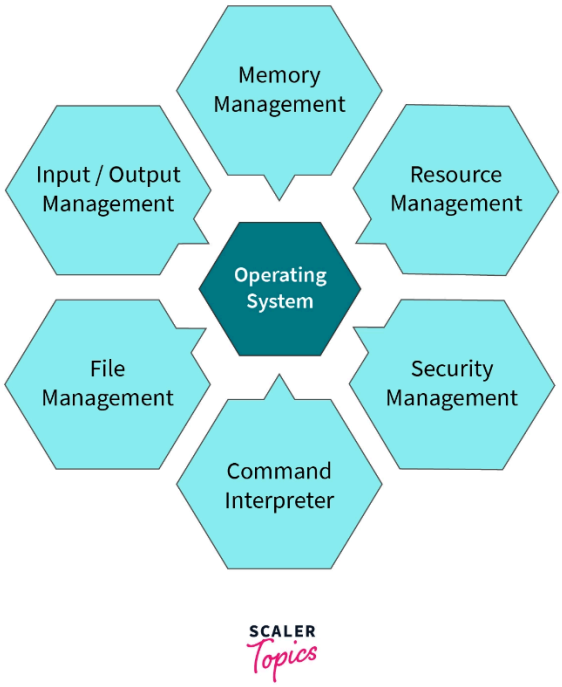
Disk Management is an essential computer component where vital data is stored within the disk. Disk management was developed and introduced by a company called Microsoft. Disk management is able to help a user perform many advanced tasks, such as managing the drive size itself. Therefore, it is important to learn more about disk management and the purpose of its creation. It is essential to be aware of disk management tools and their functions. Not to mention that users should be aware of the disk scheduling algorithms, where a few different varieties of algorithms are essential for disk management. Also, the set of examples of commands that can be used for Linux to check and manage storage.

Microsoft developed a utility called Disk Management, which was introduced in Windows XP. This utility assists users in managing their disk drives, portable drives, and portable backup drives. This utility is available on every version of Windows, such as Windows XP, Vista, 7, 8, 9, 10, and 11. There are six different ways to launch disk management: One is that you can rely on the search feature introduced on Windows to search and launch Disk management. Two, there is also a different method to launch the disk management by launching the utility from the quick access menu where the user right-clicks the Windows logo at the bottom-left corner of the user screen. After that, a small window should appear on the screen; the user can choose and click Disk Management to launch the utility. Third, the user can use another feature of Windows called *Run:* it enables users to run applications, folders, documents, or any other things on the computer. To run the Run command window, the user must press the keyboard keys: the Windows key + R keys to launch the feature. Then, the user can type *diskmgmt.msc* to open the disk management utility. The fourth alternative method is that disk management can be opened through the control panel on Windows. The user can open the control panel through

the start menu search bar, where they press the *System and Security* option and choose to run a utility called *Administrative Tools*. After that, the user is able to click *Create and Format Hard Disk Partitions* to open the disk management. Fifth, there is a different and simple way to run the disk management: the user can click the Windows logo at the bottom left corner of the screen and search for the folder called *Windows Administration tools*. The person can click the utility called *Computer Management.* Once the computer management is opened, the person can click the storage tab to use disk management. The sixth and last method is that they can run the disk management through the command prompt, where they type this input *diskmgmt* to run the disk management utility. Therefore, Windows has tried to include different methods to launch this utility for users, which can be simplified and easy to run for some users relying on a different method to run the disk management. This picture explains more about disk

management in operating systems:



Disk management has a few specifics that can assist the user in performing multiple functions. The first tool is called *Disk Partitioning.* Disk partitioning is a tool where the tool is able to create partitions in the disk. The tool divides and manages the disk by dividing the disk into multiple partitions. Each of the divided partitions will be included in the operating system as a logical disk where users can read and write data on the disk. The benefit of disk partitioning is that it is helpful if the user upgrades their hard disk into a new hard disk. It is better for organizations to store files into different sections of partitions such as school, games, music, and other data. It is easier to back up than to back up the whole drive. It is more efficient to recover data that is deleted by mistake on the computer. The second tool is called *Disk Formatting.* Disk formatting functions to configure any of the data storage devices to be used for the first time.

The process of data formatting that the function will erase any existing data within the disk itself. Therefore, the process involves erasing all the data stored on storage devices such as hard drives and flash drives. There are two levels of formatting: The first one is called low-level formatting, which involves the process to include marking out cylinders and tracks for an empty hard disk. The process divides the tracks into multiple parts by using markers. The process involves erasing all data that is stored on disk completely where it is impossible to recover. On the other hand, the second one is called high-level formatting, which involves writing the file system, cluster size, and partition label on the drive. The high-level formatting is preferable for users to erase the drive data and make it ready for a clean install for the computer. The third tool is called the cleanup tool. The disk cleanup tools function to delete unwanted files such as temporary files, web caches, and outdated backups on the computer. The fourth tool is disk compression tools. The disk compression functions automatically to compress or decompress the files stored on the disk drive. It is similar to programs called WinRAR and WinZip with similar functions. Although the difference is that the disk compresses, it compresses the disk, and the user cannot choose a specific file to compress. This tool used to be more popular in the past. Although, when they introduced programs such as WinRAR for more efficiency, this tool stopped being used by many users because that tool also compresses corrupted files, and those files remain corrupted, which may lead to data loss after the decompression process in the computer. The fifth tool is called the disk checker. Disk checkers are recommended to be used for maintenance and performance in order to keep the computer running. The purpose of this tool is to scan the hard drives for any bad storage blocks on the physical disk. The files that are stored on the bad blocks may be corrupted or unable to access those files. Therefore, the disk

checker tends to check for these files. To be precise, the disk checker monitors the hard drive in the computer for any errors or damage on the disk, which is helpful for maintenance. The sixth tool is called the disk cloning tool. Disk cloning is an essential tool for creating a copy of the hard disk drive or solid-state drive. The tool is primarily used for upgrading a disk to a new disk where the cloning disk replaces the original disk as a host for the computer. The process resembles backup, which is similar to disk imaging. The difference between disk cloning and disk imaging is that disk cloning, as stated, is the process of creating a copy of the hard disk where that includes all the data stored on the hard disk. On the other hand, disk imaging is about creating a compressed file containing all the data included in the hard drive where the files can be restored on that new disk. Disk imaging is highly used for creating backups for the computer. The benefits of cloning the hard drive: it is simple. The clone copies the exact copy of the drive. It is faster than disk imaging. Disk cloning does not compress the files, unlike disk imaging. The last tool is called Disk Space Analyzer. There is much software for disk space analyzers, such as the Disk Savvy application. The primary function of the disk space analyzer is that the software scans the computer, and the software generates the report in specific details about everything that uses the disk space.

Regarding disk scheduling algorithms, disk scheduling is about handling input and output requests. There are six types of disk scheduling algorithms:

1- FCFS algorithm is considered the most straightforward algorithm where the name FCFS suggests and stands for *First Come, First Serve.* Therefore, the first input or output request that appears first will be served first. The advantage of FCFS is that it is a fair

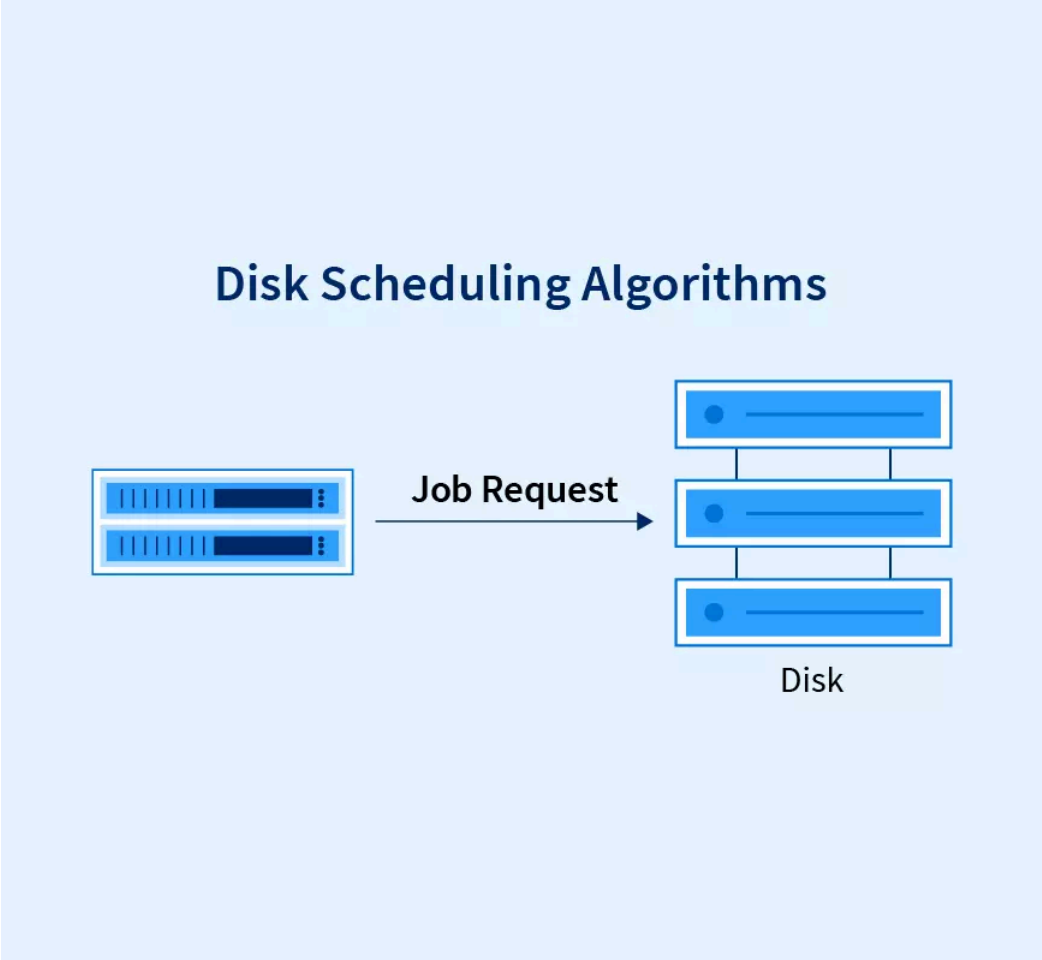
algorithm for managing requests. However, it is not an optimized algorithm. Therefore, it Is more disorganized and does not consider a specific request's priority.

2- The SSTF algorithm is also a simple algorithm. The name stands for *Shortest Seek Time First.* Specifically, the way that the SSTF function is explained in the name. The input or output requests with the least sought time will be served first. The advantage of SSTF is that the algorithm responds more efficiently than the algorithm FCFS. However, like FCFS, it is not an optimized algorithm, so that SSTF will behave like FCFS.

3- SCAN and C-SCAN algorithm. The SCAN algorithm process is that the disk arm is in an entirely specific location and direction where it serves the input and output requests coming in the path of the disk arm. The disk arm reverses the direction and serves the input or output requests to the present path. Therefore, the requests and disk arm are treated as an elevator. On the other hand, in C-SCAN, the disk arm cannot reverse requests to a direction, unlike SCAN. It serves requests at the other end of the disk direction. These two algorithms' advantages are their efficient response time and high throughput. However, the disadvantage is waiting for requests to be processed on the disk.

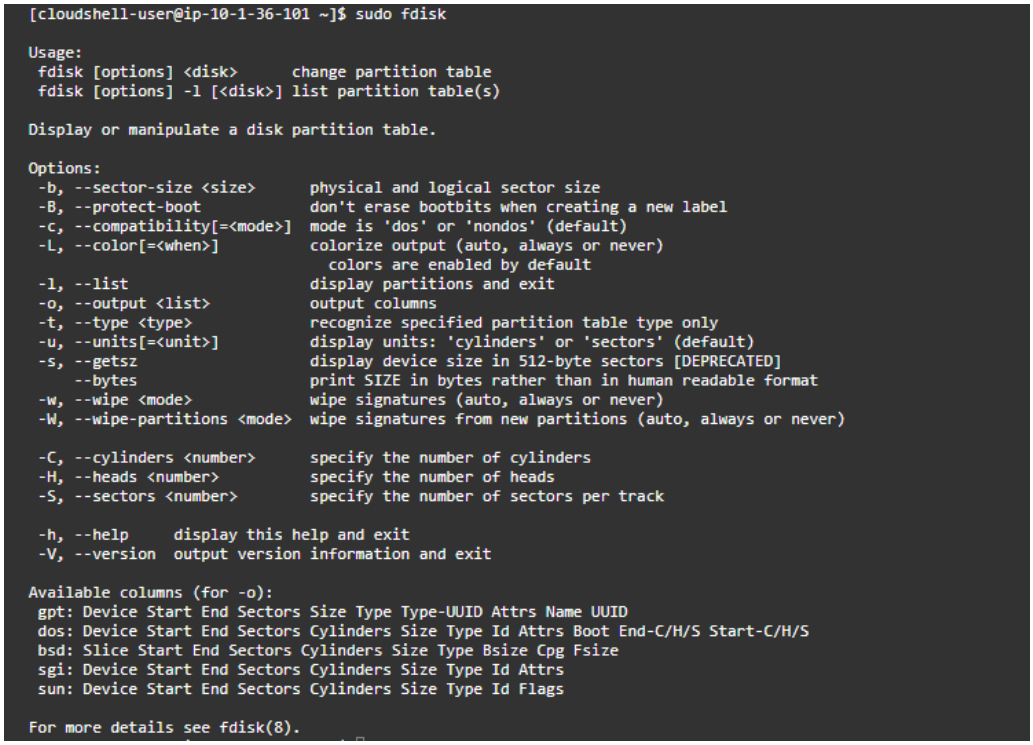
4- LOOK and C-LOOK algorithm. The LOOK algorithm for disk management functions similarly to the SCAN algorithm. LOOK algorithm's disk arm reverses the direction from the last served request. Therefore, the LOOK algorithm fixes and stops any delay in the movement of the disk. The advantage of the LOOK algorithm is that the response time for LOOK is far more excellent than the SCAN algorithm.

This picture will explain the way the scheduling process work to schedule input and output requests that arrive for the disk:

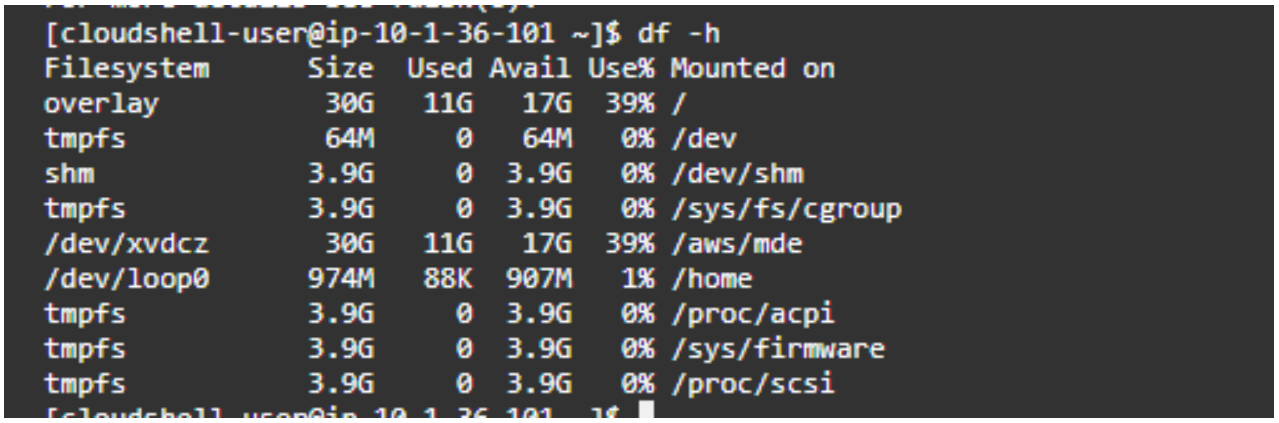


A few Linux commands can be used to manage, examine, or handle the disk. It is going to be included with pictures of the command that is inputted on the AWS cloud shell:

1- The command is called *sudo fdisk*. This command is about changing the partition of the table in the disk. The picture is inserted as an example:



2- The other command is called *df -h*. It is about examining the disk space and disk partitions:



3- The command is called *lsblk.* The command will show the relationship between disks and their partitions:

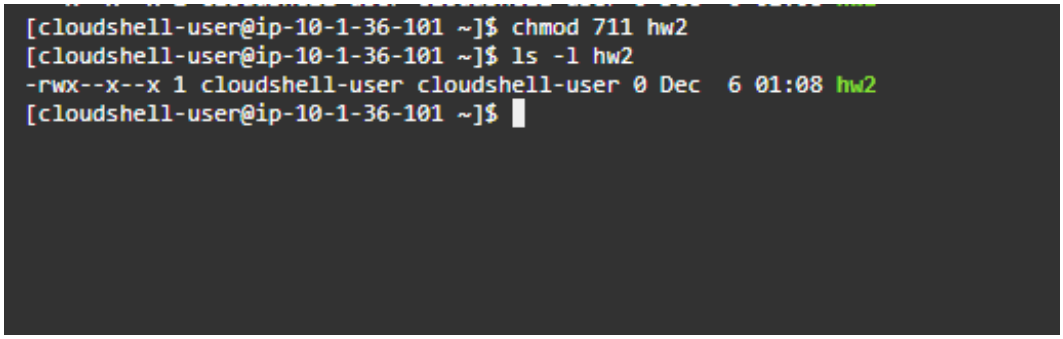
```
[cloudshell-user@ip-10-1-36-101 ~]$ lsblk
NAME    MAJ:MIN   RM SIZE RO TYPE MOUNTPOINT
loop0     7:0      0   1G  0 loop /home
xvda    202:0      0   5G  0 disk
└─xvda1 202:1      0   5G  0 part
xvdcz   202:26368  0  30G  0 disk /etc/hostname
```

4- The command is called *ulimit -a.* It shows how much space is on my computer:

```
[cloudshell-user@ip-10-1-36-101 ~]$ ulimit -a
core file size          (blocks, -c) unlimited
data seg size           (kbytes, -d) unlimited
scheduling priority             (-e) 0
file size               (blocks, -f) unlimited
pending signals                 (-i) 30446
max locked memory       (kbytes, -l) unlimited
max memory size         (kbytes, -m) unlimited
open files                      (-n) 4096
pipe size            (512 bytes, -p) 8
POSIX message queues     (bytes, -q) 819200
real-time priority              (-r) 0
stack size              (kbytes, -s) 10240
cpu time               (seconds, -t) unlimited
max user processes              (-u) unlimited
virtual memory          (kbytes, -v) unlimited
file locks                      (-x) unlimited
[cloudshell-user@ip-10-1-36-101 ~]$
```

5- The commands that are called chmod and ls -l. The command chmod changes the permission of the specific file contained in the disk. As for the command, ls -l reveals the

file permission, whether it is read, written, or execute for the user, groups, and others:



In conclusion, it the importance to learn more about disk management and the purpose of its creation. The vital part is to be knowledgeable about disk management tools and their functions. Also, people should learn about the importance of disk scheduling algorithms regarding disk management on the computer, where a few different varieties of algorithms are mentioned in this essay. The set of command examples that are shown in this essay can be useful for disk management. A user, a person should be familiar with the technique or ways to manage the data that exists within their own disk.

References

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