

Tutorial Link <https://course.testpad.chitkara.edu.in/tutorials/Disk Management in Linux 1/62d82a1ecde4603aa597bc92>**TUTORIAL**

# Disk Management in Linux 1

**Topics**

- 1.1 "df" for Disk Management
- 1.2 Commands to Manage Linux Disk Partitions

## "df" for Disk Management

The 'df' command stands for "**disk filesystem**", it is used to get a full summary of available and used disk space usage of the file system on the Linux system.

Using '-h' parameter with (**df -h**) will show the file system disk space statistics in "**human-readable**" format, means it gives the details in bytes, megabytes, and gigabyte.

**Check File System Disk Space Usage:** The "df" command displays the information of device name, total blocks, total disk space, used disk space, available disk space, and mount points on a file system.

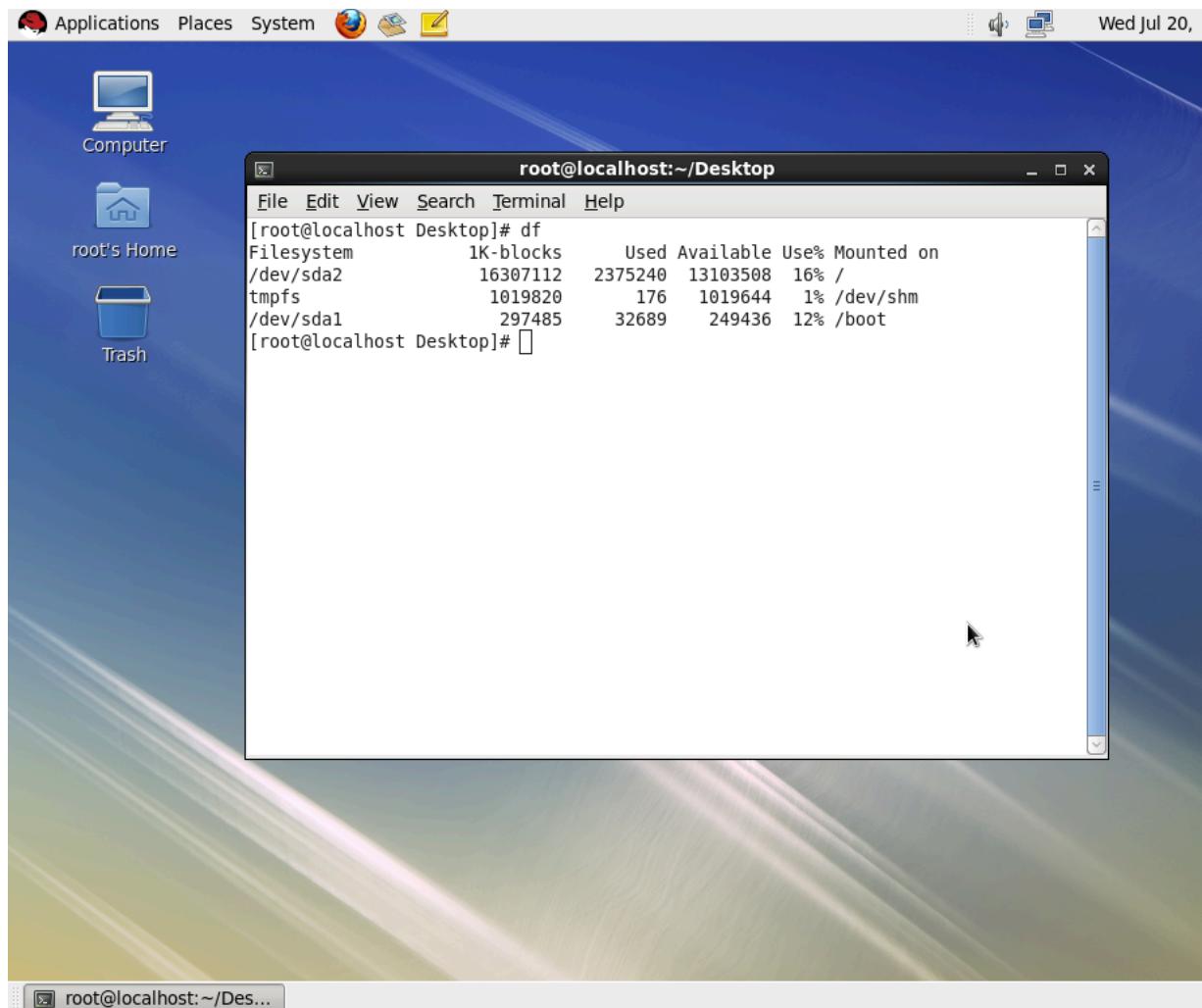


Fig 4.1 File System Disk Usage with df

## Display Information of all File System Disk Space Usage

The same as above, but it also displays information of dummy file systems along with all the file system disk usage and their memory utilization.

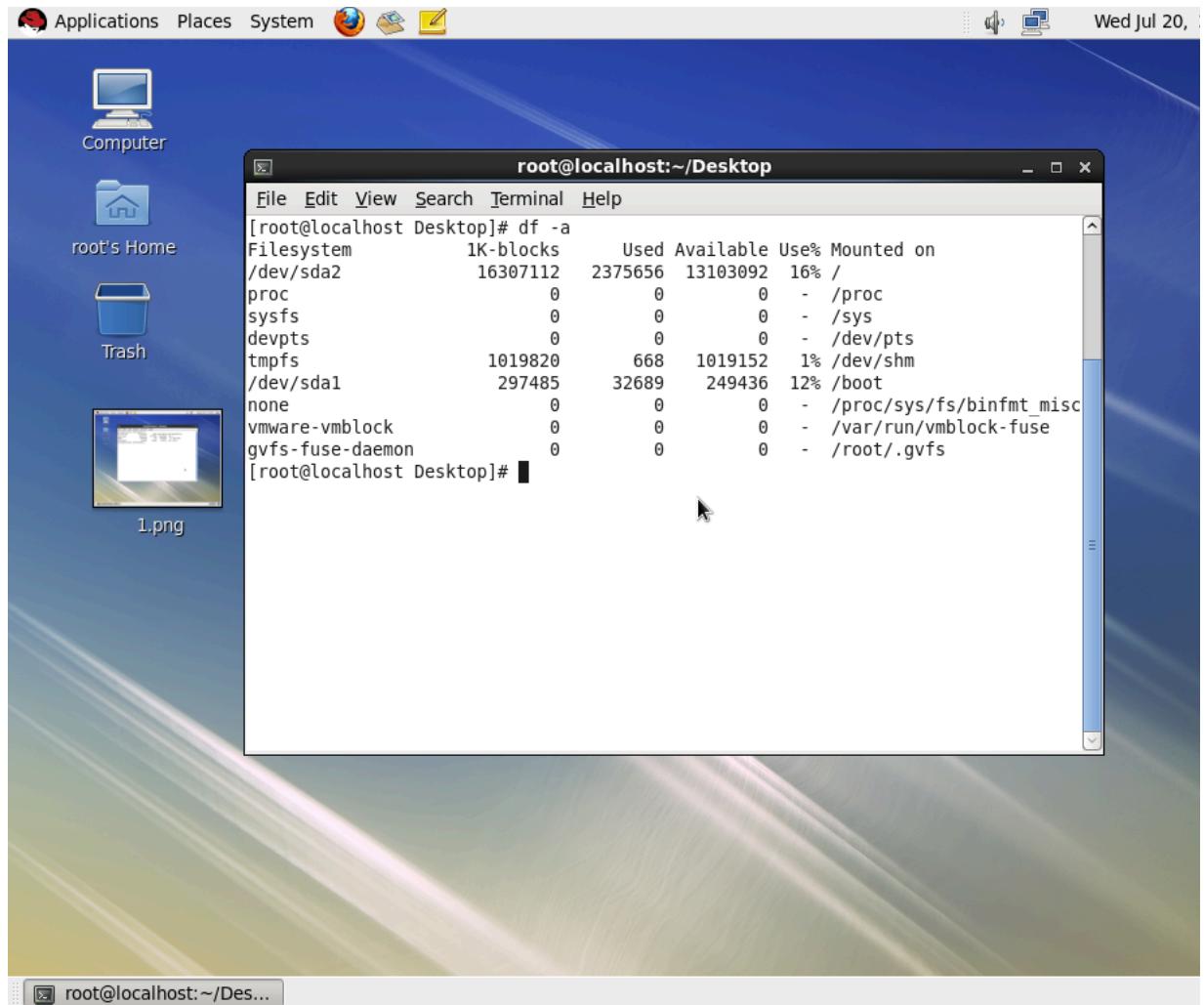


Fig 4.2 All File System Disk Usage with df

## Show Disk Space Usage in Human Readable Format

Have you noticed that the above commands display information in bytes, which is not readable at all because we are in a habit of reading the sizes in megabytes, gigabytes, etc. as it makes it very easy to understand and remember.

The **df** command provides an option to display sizes in **Human Readable** formats by using '**-h**' (prints the results in human-readable format (e.g., **1K 2M 3G**)).

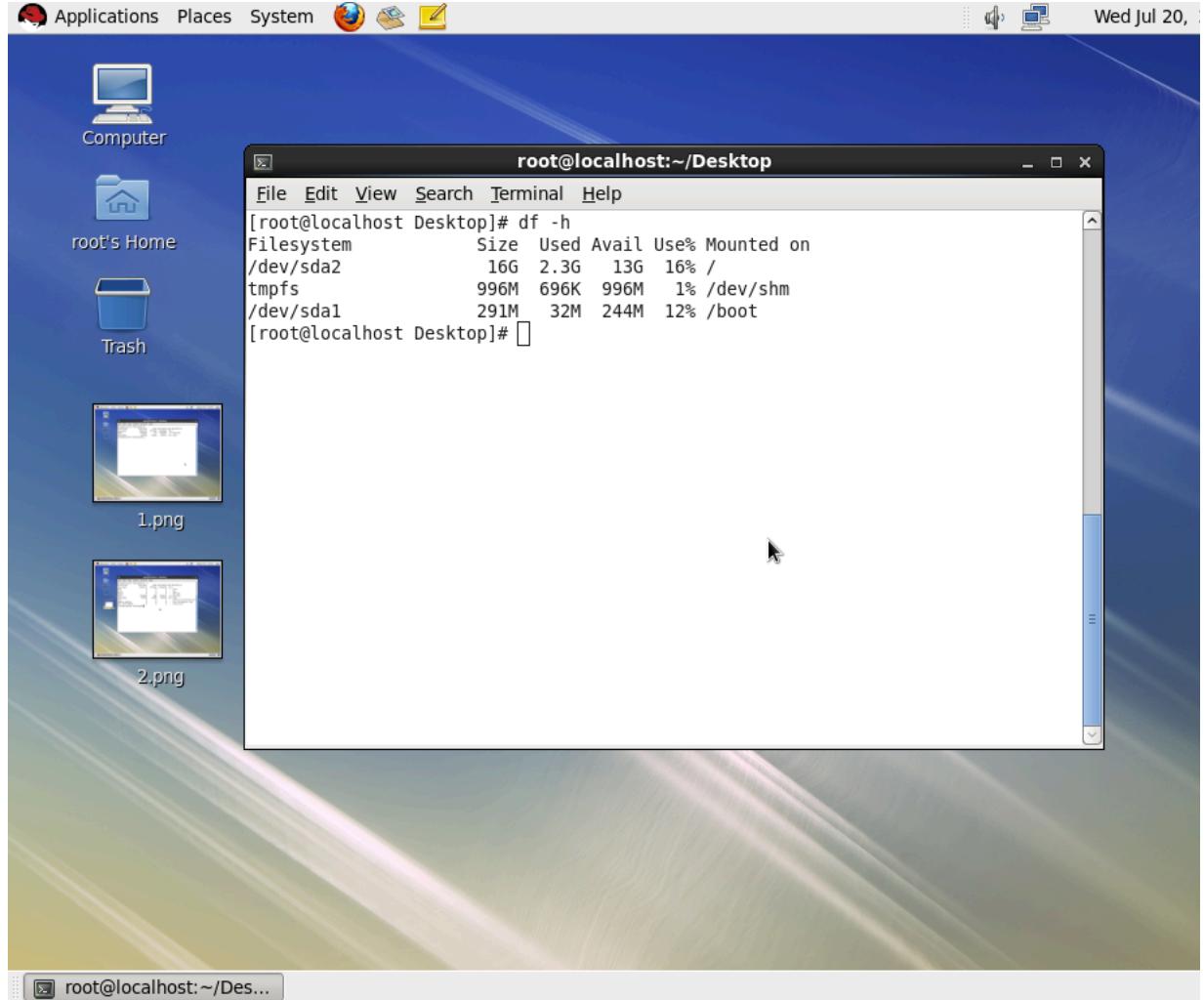


Fig 4.3 All File System Disk Usage in Human Readable format with df

#### Display Information of /home File System

To see the information of only device **/home** file systems in human-readable format use the following command.

The screenshot shows a terminal window titled "root@localhost:~/Desktop". The window contains the following text:

```
[root@localhost Desktop]# df -hT /home
Filesystem      Type     Size  Used Avail Use% Mounted on
/dev/sda2        ext4    16G   2.3G  13G  16% /
[root@localhost Desktop]#
```

Fig 4.4 Display info of /home with df

#### Display Information of File System in Bytes

To display all file system information and usage in **1024-byte** blocks, use the option '**-k**' (e.g. `--block-size=1K`) as follows.

The screenshot shows a terminal window titled "root@localhost:~/Desktop". The window contains the output of the "df -k" command, which displays disk usage information. The output is as follows:

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
/dev/sda2	16307112	2376552	13102196	16%	/
tmpfs	1019820	696	1019124	1%	/dev/shm
/dev/sda1	297485	32689	249436	12%	/boot

The terminal window has a standard Linux interface with a menu bar at the top and a scroll bar on the right side.

Fig 4.5 File System Disk Usage in Bytes with df

#### Display Information of File System in MB

To display information of all file system usage in **MB (MegaByte)** use the option '**-m**'.

The screenshot shows a terminal window titled "root@localhost:~/Desktop". The window contains the output of the command "df -m", which displays the following disk usage information:

Filesystem	1M-blocks	Used	Available	Use%	Mounted on
/dev/sda2	15925	2321	12796	16%	/
tmpfs	996	1	996	1%	/dev/shm
/dev/sda1	291	32	244	12%	/boot

The terminal window has a standard Linux interface with a menu bar (File, Edit, View, Search, Terminal, Help) and a toolbar with icons for Applications, Places, System, and others.

Fig 4.6 File System Disk Usage in MB with df

#### Display Information of File System in GB

To display information of all file system statistics in **GB (Gigabyte)** use the option as '**df -h**'.

The screenshot shows a terminal window titled "root@localhost:~/Desktop". The window contains the output of the command "df -h", which displays disk usage information. The output is as follows:

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/sda2	16G	2.3G	13G	16%	/
tmpfs	996M	704K	996M	1%	/dev/shm
/dev/sda1	291M	32M	244M	12%	/boot

The terminal window has a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The status bar at the bottom shows the path "root@localhost:~/Des...".

Fig 4.7 File System Disk Usage in GB with df

#### Display File System Inodes

The screenshot shows a terminal window titled "root@localhost:~/Desktop". The window contains the following text:

```
[root@localhost Desktop]# df -i
Filesystem      Inodes   IUsed   IFree  IUse% Mounted on
/dev/sda2        1036320  97091  939229   10% /
tmpfs           254955      6  254949    1% /dev/shm
/dev/sda1        76912     38   76874    1% /boot
[root@localhost Desktop]#
```

Fig 4.8 Display File System inode with df

#### Display File System Type

If you notice all the above commands output, you will see there is no Linux file system type mentioned in the results. To check the file system type of your system use the option '`T`'. It will display file system type along with other information.

The screenshot shows a terminal window titled "root@localhost:~/Desktop". The window contains the following text:

```
[root@localhost Desktop]# df -T
Filesystem  Type      1K-blocks   Used   Available  Use%  Mounted on
/dev/sda2    ext4     16307112  2378892  13099856  16%   /
tmpfs       tmpfs     1019820    696   1019124    1%   /dev/shm
/dev/sda1    ext4     297485    32689   249436   12%   /boot
[root@localhost Desktop]#
```

Fig 4.9 Display File System Type with df

#### Include Certain File System Type

If you want to display a certain file system type use the '**-t**' option. For example, the following command will only display the **ext4** file system.

The screenshot shows a terminal window titled "root@localhost:~/Desktop". The window contains the following text:

```
[root@localhost Desktop]# df -t ext4
Filesystem      1K-blocks    Used Available Use% Mounted on
/dev/sda2        16307112   2378948  13099800  16% /
/dev/sda1        297485     32689   249436  12% /boot
[root@localhost Desktop]#
```

Fig 4.10 Display certain File System type with df

#### Exclude Certain File System Type

If you want to display a file system type that doesn't belong to the **ext4** type use the option '**-x**'. For example, the following command will only display other file systems types other than **ext4**.

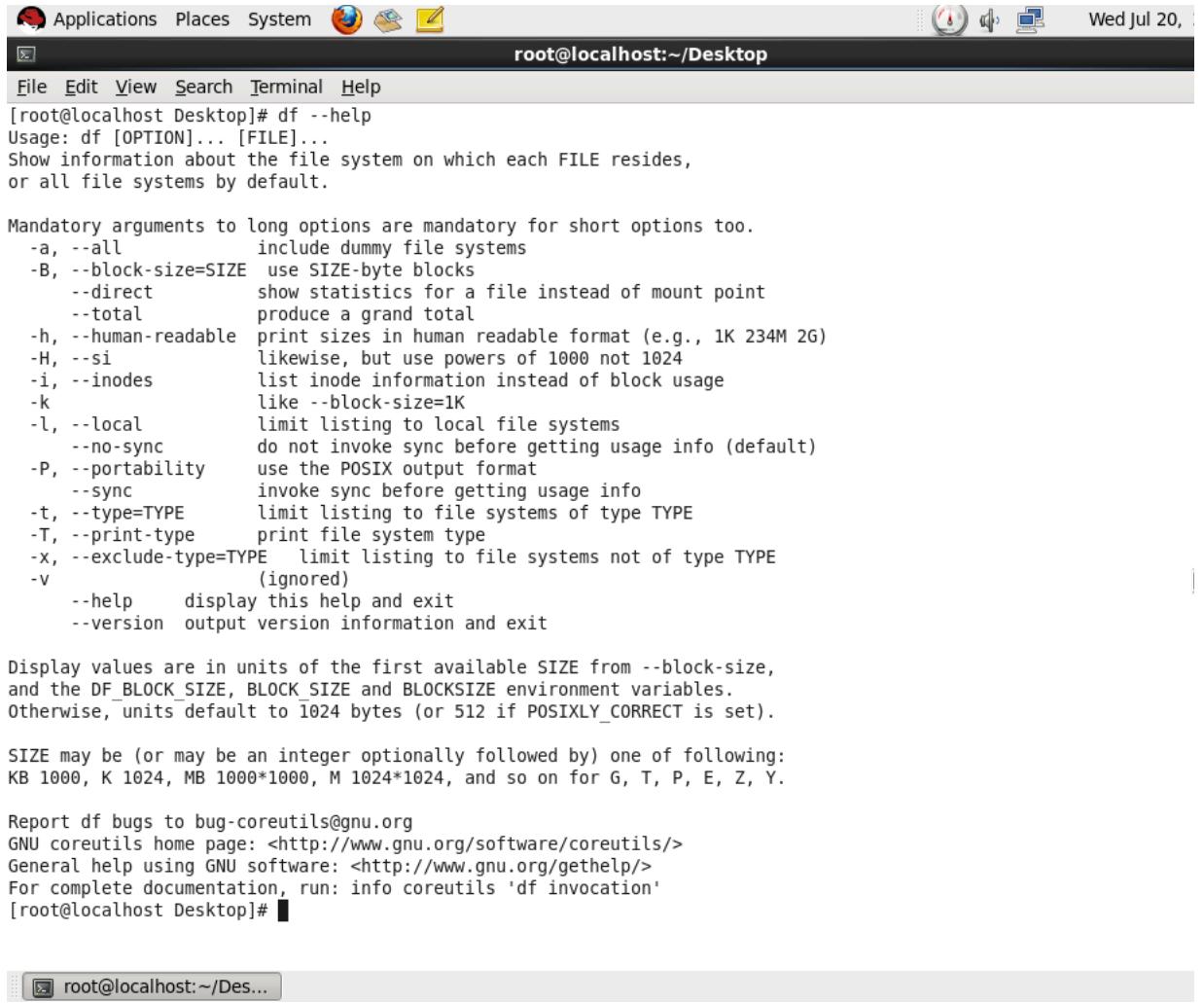
The screenshot shows a terminal window titled "root@localhost:~/Desktop". The window contains the following text:

```
[root@localhost Desktop]# df -x ext4
Filesystem      1K-blocks    Used   Available  Use%  Mounted on
tmpfs           1019820      696    1019124   1%  /dev/shm
[root@localhost Desktop]#
```

Fig 4.11 Exclude certain File System type with df

#### Display Information of df Command.

Using '`--help`' switch will display a list of available option that is used with `df` command.



The screenshot shows a terminal window titled "root@localhost:~/Desktop". The window displays the help output for the "df" command. The text includes usage information, mandatory arguments for long options, size units, reporting bugs, and general help links.

```
[root@localhost Desktop]# df --help
Usage: df [OPTION]... [FILE]...
Show information about the file system on which each FILE resides,
or all file systems by default.

Mandatory arguments to long options are mandatory for short options too.
-a, --all           include dummy file systems
-B, --block-size=SIZE use SIZE-byte blocks
--direct          show statistics for a file instead of mount point
--total           produce a grand total
-h, --human-readable print sizes in human readable format (e.g., 1K 234M 2G)
-H, --si            likewise, but use powers of 1000 not 1024
-i, --inodes        list inode information instead of block usage
-k                like --block-size=1K
-l, --local         limit listing to local file systems
--no-sync         do not invoke sync before getting usage info (default)
-P, --portability   use the POSIX output format
--sync            invoke sync before getting usage info
-t, --type=TYPE     limit listing to file systems of type TYPE
-T, --print-type    print file system type
-x, --exclude-type=TYPE limit listing to file systems not of type TYPE
-v                (ignored)
--help            display this help and exit
--version         output version information and exit

Display values are in units of the first available SIZE from --block-size,
and the DF_BLOCK_SIZE, BLOCK_SIZE and BLOCKSIZE environment variables.
Otherwise, units default to 1024 bytes (or 512 if POSIXLY_CORRECT is set).

SIZE may be (or may be an integer optionally followed by) one of following:
KB 1000, K 1024, MB 1000*1000, M 1024*1024, and so on for G, T, P, E, Z, Y.

Report df bugs to bug-coreutils@gnu.org
GNU coreutils home page: <http://www.gnu.org/software/coreutils/>
General help using GNU software: <http://www.gnu.org/gethelp/>
For complete documentation, run: info coreutils 'df invocation'
[root@localhost Desktop]#
```

Fig 4.12 Help for df

## Commands to Manage Linux Disk Partitions

**fdisk** stands (for “**fixed disk** or **format disk**”) is an most commonly used command-line based disk manipulation utility for a **Linux/Unix** systems. With the help of fdisk command you can view, create, resize, delete, change, copy and move partitions on a hard drive using its own user-friendly text based menu driven interface.

This tool is very useful in terms of creating space for new partitions, organising space for new drives, re-organising an old drive and copying or moving data to new disks. It allows you to create a maximum of four new **primary** partition and number of logical (**extended**) partitions, based on size of the hard disk you have in your system.

**To see list of all the available partitions use "fdisk -l"**

The screenshot shows a terminal window titled "Red Hat Enterprise Linux ...". The window has a standard Linux desktop interface at the top with icons for Applications, Places, System, and a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The title bar also shows the host name "root@localhost:~". The terminal content displays the output of the "fdisk -l" command, listing disk partitions and their details. The terminal window is part of a larger desktop environment.

```
[root@localhost ~]# fdisk -l

Disk /dev/sda: 21.5 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00009ece0

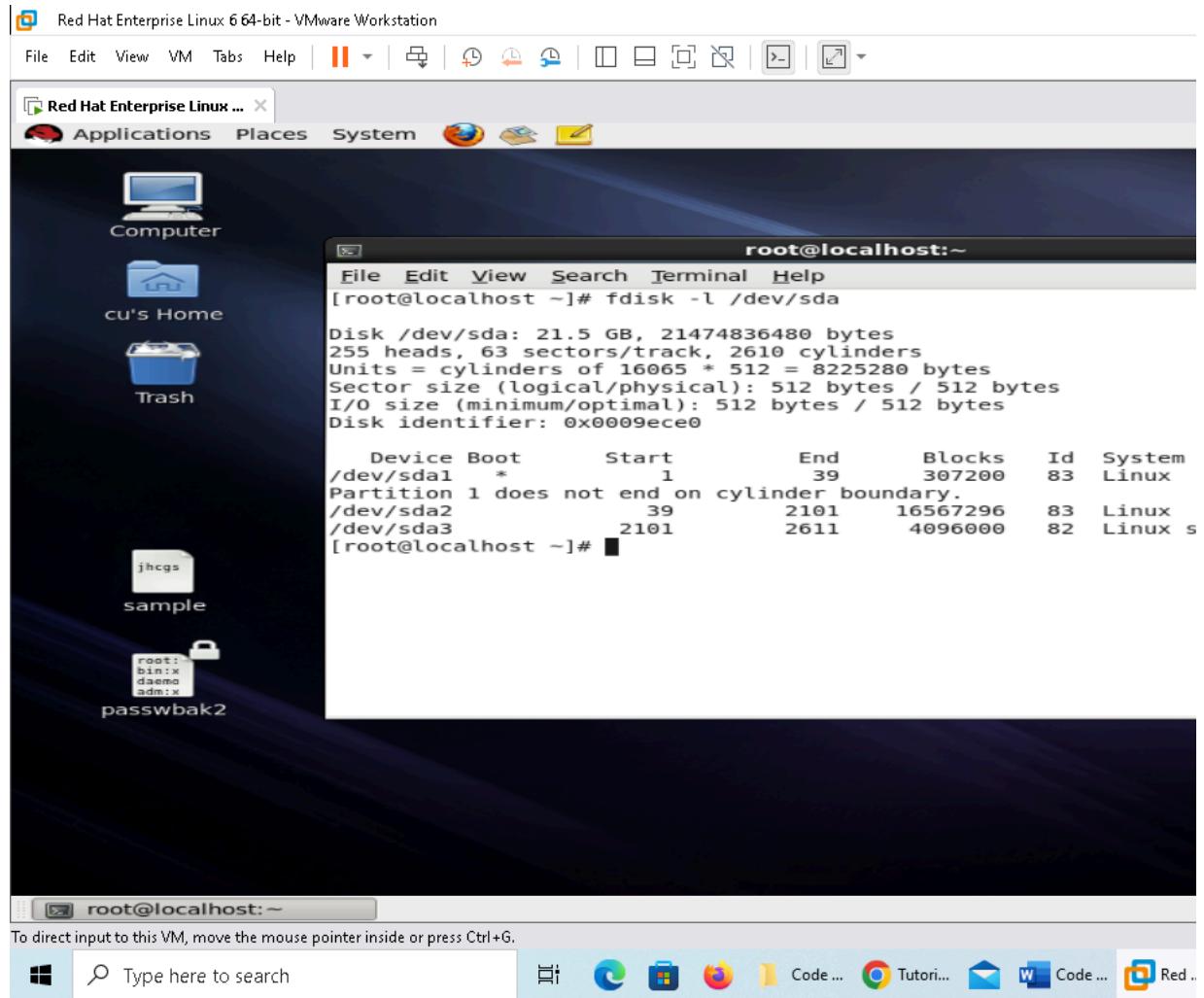
      Device Boot      Start        End    Blocks   Id  System
/dev/sdal    *          1         39     307200   83  Linux
Partition 1 does not end on cylinder boundary.
/dev/sda2      39       2101    16567296   83  Linux
/dev/sda3     2101      2611    4096000   82  Linux swap / Solaris

Disk /dev/sdb: 5368 MB, 5368709120 bytes
255 heads, 63 sectors/track, 652 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x000000000

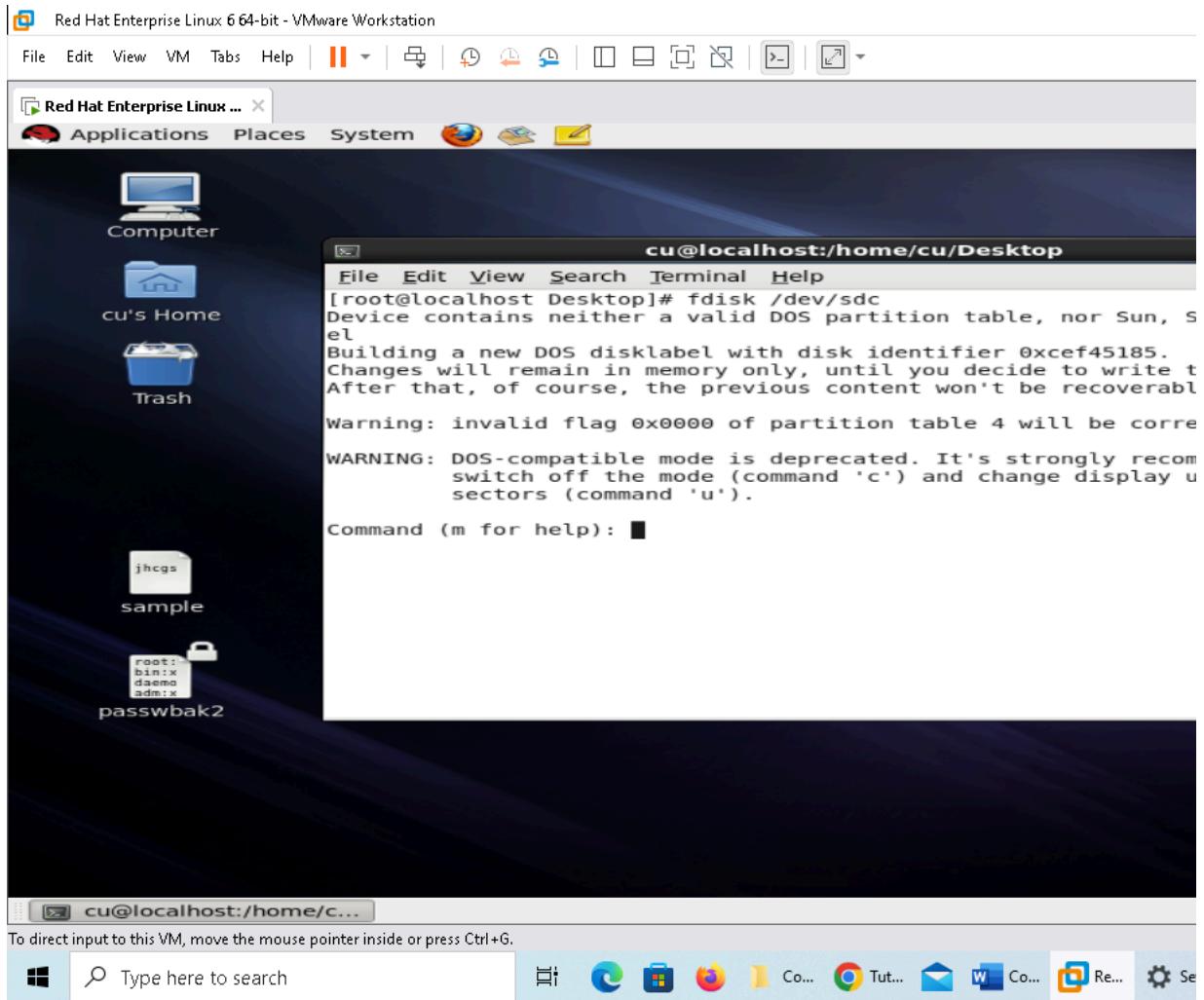
Disk /dev/sdc: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x000000000

Disk /dev/sdc doesn't contain a valid partition table
[root@localhost ~]#
```

To see specific disk partition just specify the partition



### Check all Available fdisk Commands



Now Press m for help and you will see below screen

```
[root@localhost Desktop]# fdisk /dev/sdc
Device contains neither a valid DOS partition table, nor Sun, SGI or OSF disklabel
Building a new DOS disklabel with disk identifier 0xcef45185.
Changes will remain in memory only, until you decide to write them.
After that, of course, the previous content won't be recoverable.

Warning: invalid flag 0x0000 of partition table 4 will be corrected by w(rite)

WARNING: DOS-compatible mode is deprecated. It's strongly recommended to
         switch off the mode (command 'c') and change display units to
         sectors (command 'u').

Command (m for help): m
Command action
  a  toggle a bootable flag
  b  edit bsd disklabel
  c  toggle the dos compatibility flag
  d  delete a partition
  l  list known partition types
  m  print this menu
  n  add a new partition
  o  create a new empty DOS partition table
  p  print the partition table
  q  quit without saving changes
  s  create a new empty Sun disklabel
  t  change a partition's system id
  u  change display/entry units
  v  verify the partition table
  w  write table to disk and exit
  x  extra functionality (experts only)

Command (m for help):
Command (m for help): ■
cu@localhost:~/home/c...
```

## How to Print a Partition in Linux

The screenshot shows a terminal window titled "Red Hat Enterprise Linux ...". The window has a standard Linux desktop interface at the top with icons for Applications, Places, System, and a menu bar with "File Edit View Search Terminal Help". The terminal session is running as root on the local host, with the command "fdisk /dev/sda" being executed. The output of the command is displayed, showing disk details and partition information. The terminal window is part of a larger desktop environment, with a taskbar at the bottom showing various application icons.

```
[root@localhost Desktop]# fdisk /dev/sda
WARNING: DOS-compatible mode is deprecated. It's strongly recommended to
switch off the mode (command 'c') and change display units to
sectors (command 'u').

Command (m for help): p
Disk /dev/sda: 21.5 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x0009ece0

Device Boot Start End Blocks Id System
/dev/sda1 * 1 39 307200 83 Linux
Partition 1 does not end on cylinder boundary.
/dev/sda2 39 2101 16567296 83 Linux
/dev/sda3 2101 2611 4096000 82 Linux swap / Solaris

Command (m for help):
```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

## How to Delete a Partition in Linux

**Warning :** Be careful, while performing this step, because using option ‘d’ will completely delete partition from system and may lost all data in partition

## How to Create a New Partition in Linux

While creating a new partition, it will ask you two options '**extended**' or '**primary**' partition creation. Press '**e**' for extended partition and '**p**' for primary partition. Then it will ask you to enter following two inputs.

- First cylinder number of the partition to be created.
  - Last cylinder number of the partition to be created (Last cylinder, +cylinders or +size).

You can enter the size of cylinder by adding “**+5000M**” in last cylinder. Here, ‘+’ means addition and **5000M** means size of new partition (i.e **5000MB**). Please keep in mind that after creating a new partition, you should run ‘w’ command to alter and save new changes to partition table and finally reboot your system to verify newly created partition.

Red Hat Enterprise Linux 6 64-bit - VMware Workstation

File Edit View VM Tabs Help | | | | | | | | | | |

Red Hat Enterprise Linux ...

Applications Places System

cu@localhost:/home/cu/Desktop

```
File Edit View Search Terminal Help
[root@localhost Desktop]# fdisk /dev/sdc

WARNING: DOS-compatible mode is deprecated. It's strongly recommended to
         switch off the mode (command 'c') and change display units to
         sectors (command 'u').

Command (m for help): n
Command action
      e   extended
      p   primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-1305, default 1):
Using default value 1
Last cylinder, +cylinders or +size{K,M,G} (1-1305, default 1305):
Using default value 1305

Command (m for help): p

Disk /dev/sdc: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x330da79e

   Device Boot      Start        End      Blocks   Id  System
/dev/sdcl            1       1305     10482381   83  Linux

Command (m for help): 
```

cu@localhost:/home/c...

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

Type here to search Co... Tu... Co... Re... Se...

## How to Check Size of a Partition in Linux

After formatting new partition, check the size of that partition using flag '**s**' (displays size in blocks) with fdisk command. This way you can check size of any specific device.

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