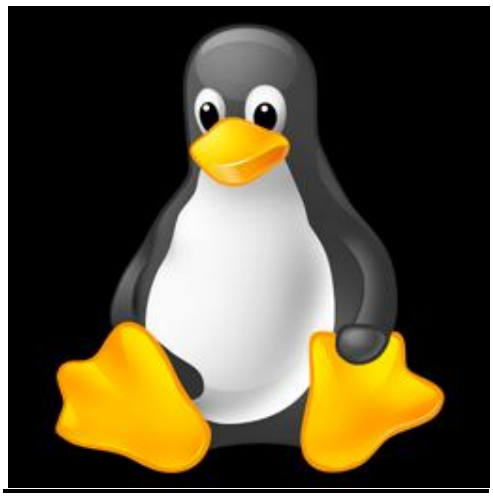


LINUX COMMAND LINE BASICS:

www.ihaveapc.com admin team

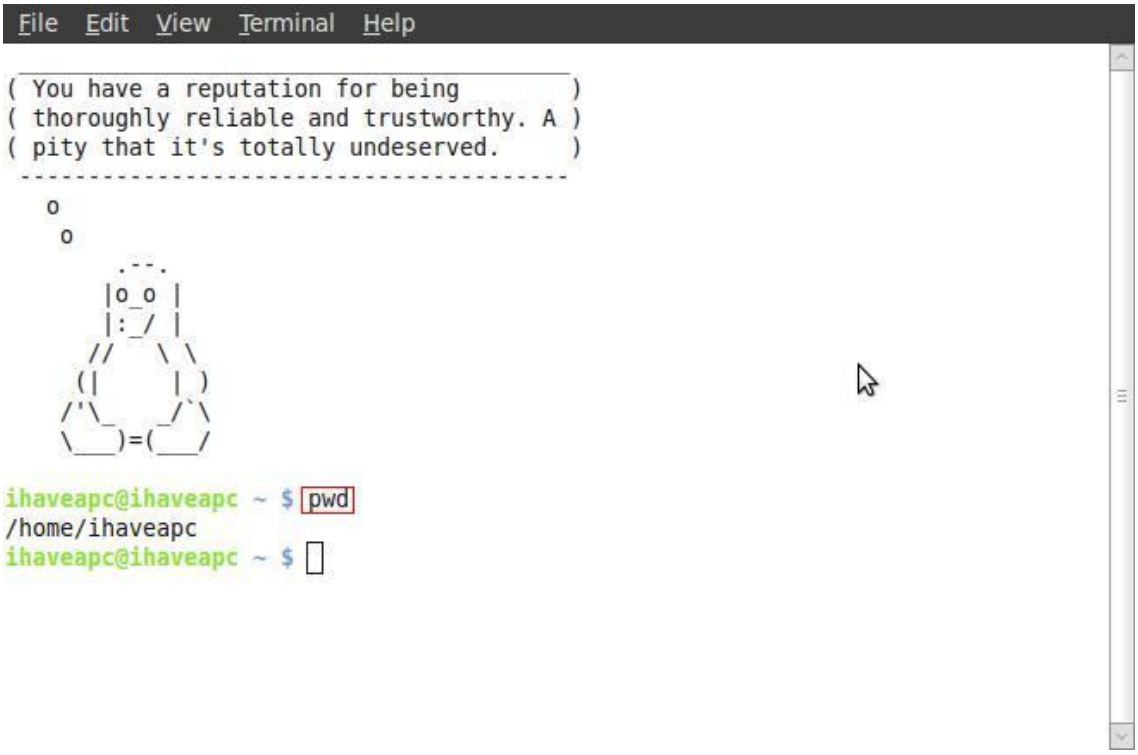
Contents:

PART 1: Navigation

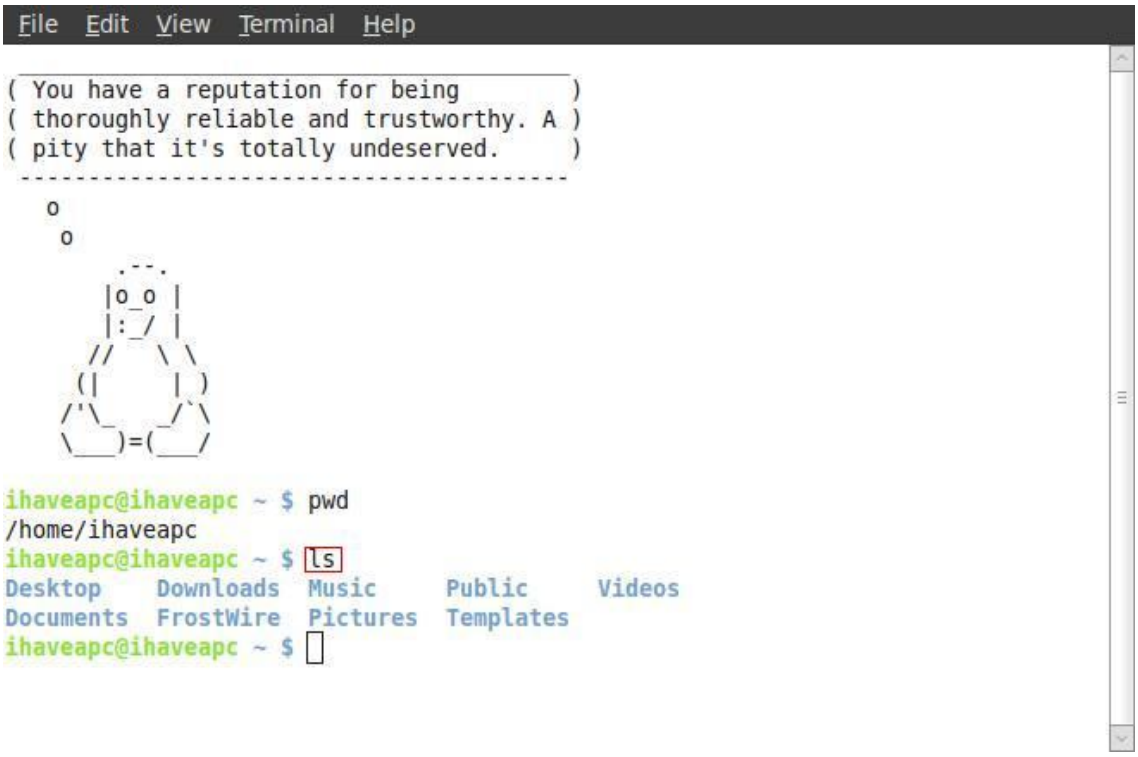
Linux has evolved as a great choice for desktop OS and most of the tasks can be accomplished from within the GUI. But still, we may need to use the command line interface in case of an emergency where GUI is not available or for remote administration (Telnet, SSH etc.) from a place with a very low bandwidth.

Now we'll learn how to navigate around using command line. The Linux version used here is Linux Mint 9.0, which is a variant of Debian Linux. To practice, start the 'Terminal' from the 'Accessories' section of the main menu. Please note that Linux commands are case sensitive.

1. pwd - Print Working Directory. This command outputs the current directory the user is in. For a Linux desktop user, it is typically '/home/<user-name>'. Everything in Linux is represented as a folder or a file. '/' is the root directory and all other directories fall under this directory (more about the Linux directory structure in the next part). So, if your user name is 'sam', your home directory will be '/home/sam'.

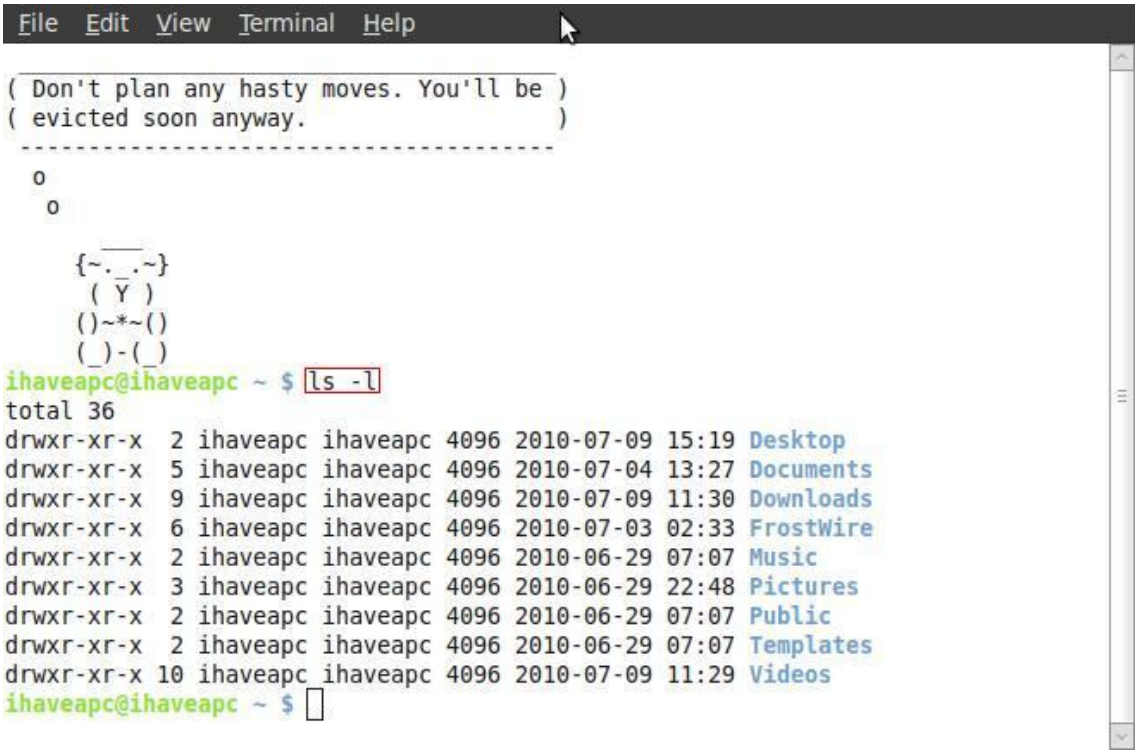


2. ls - List. This command lists the contents of a directory.



To view the directory contents in long format, issue the command:

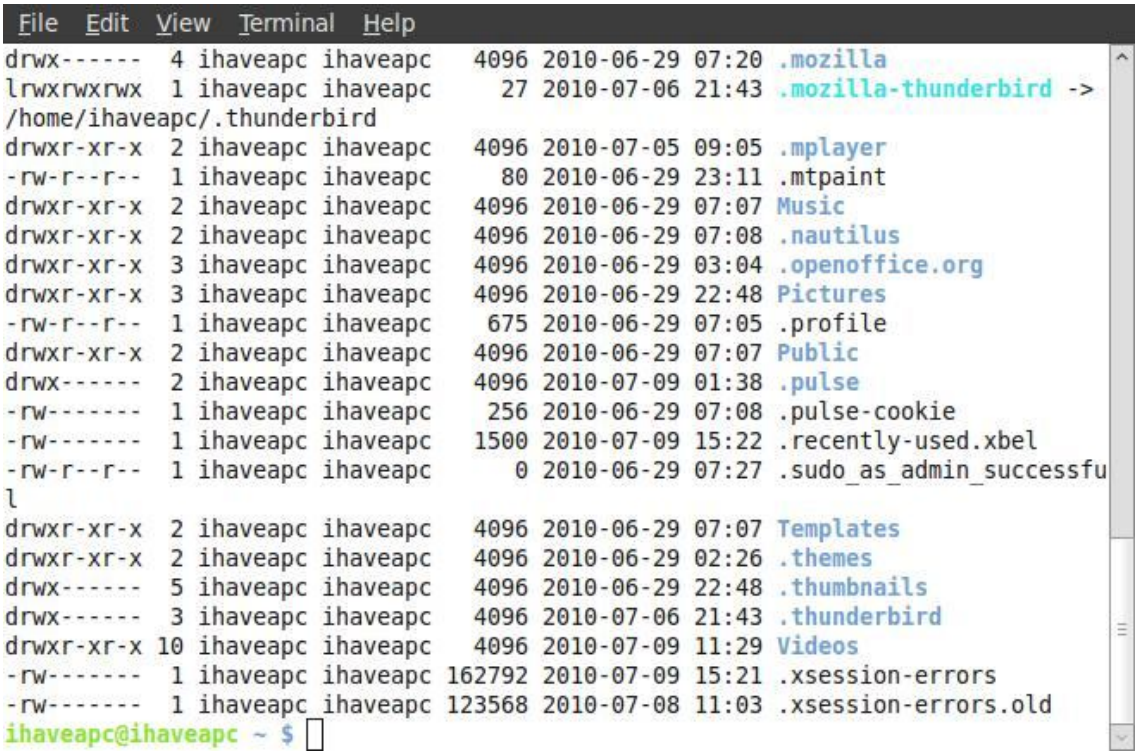
ls -l



In the above screenshot, you can see the output of list command in long format. The first column represents user permissions, which will learn about in the upcoming posts. Second column represents number of files/folders in that directory. Third column represents the owner. Fourth column represents the owner's group. Fifth column represents the size in bytes. Sixth and seventh columns represent the date and time modified respectively. Last column represents the file/folder name.

In Linux, a hidden file/directory name starts with a dot i.e. '.'. If you want to view the hidden files/directories then issue the following command:

ls -la



Also note that in the above screenshot, the colored entries are directories and black entries are files. Notice the second entry, which has '->' in it's name. It is a link, which is similar to shortcut file in windows. In above case, '.mozilla-thunderbird' is a link to actual directory '/home/ihaveapc/.thunderbird'.

Also, note that the output has scrolled too fast for the user to read. To make the output readable, we will use two things- a pipe (|) and 'more'. Pipe will cascade output of one command as a input of the second command. Command 'more' will instruct the system to display output screen full at a time until space key is pressed. Hence, if we issue command:

ls -la | more

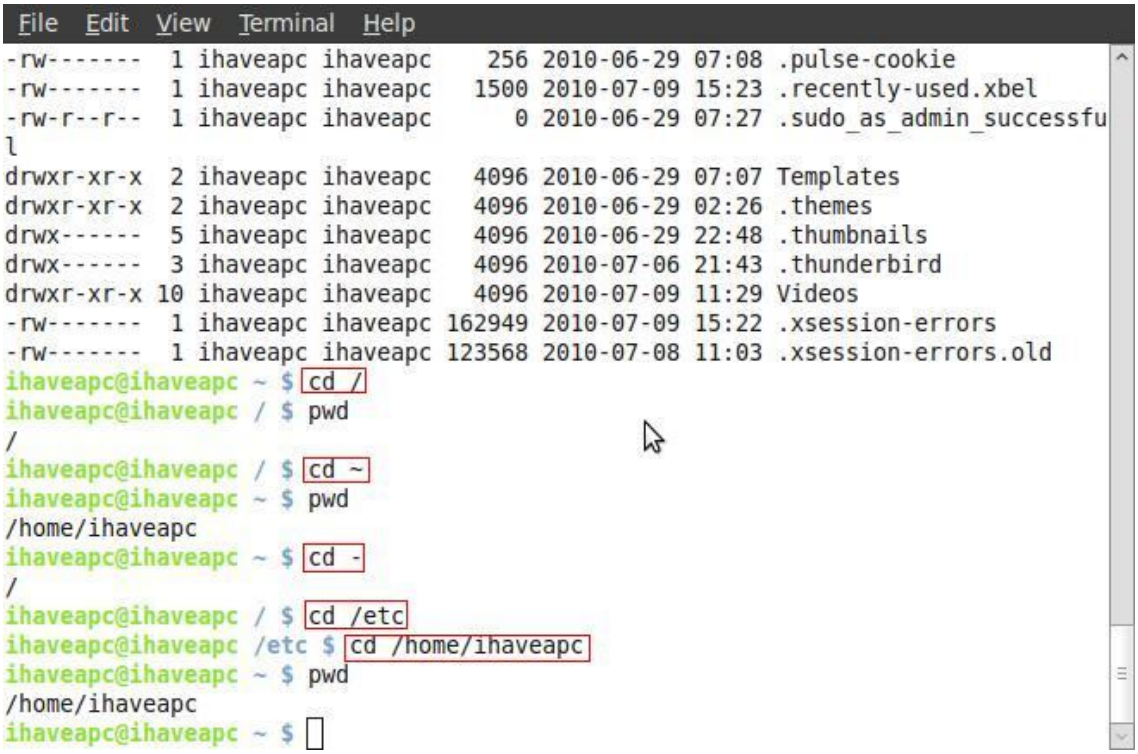
then, we will get the same output as above but screen full at time until user presses the space key to advance to the next screen.

```
File  Edit  View  Terminal  Help
total 496
drwxr-xr-x 41 ihaveapc ihaveapc   4096 2010-07-09 15:23 .
drwxr-xr-x  3 root     root       4096 2010-06-29 07:05 ..
drwx------  3 ihaveapc ihaveapc   4096 2010-06-29 02:05 .adobe
-rw-------  1 ihaveapc ihaveapc   2177 2010-07-09 15:21 .bash_history
-rw-r--r--  1 ihaveapc ihaveapc    220 2010-06-29 07:05 .bash_logout
drwx------  6 ihaveapc ihaveapc   4096 2010-07-09 01:38 .cache
drwx------  3 ihaveapc ihaveapc   4096 2010-06-29 07:10 .compiz
drwxr-xr-x 14 ihaveapc ihaveapc   4096 2010-07-09 04:29 .config
drwx------  3 ihaveapc ihaveapc   4096 2010-06-29 07:07 .dbus
drwxr-xr-x  2 ihaveapc ihaveapc   4096 2010-07-09 15:22 Desktop
-rw-r--r--  1 ihaveapc ihaveapc     36 2010-07-09 01:38 .dmrc
drwxr-xr-x  5 ihaveapc ihaveapc   4096 2010-07-04 13:27 Documents
drwxr-xr-x  9 ihaveapc ihaveapc   4096 2010-07-09 11:30 Downloads
-rw-------  1 ihaveapc ihaveapc     16 2010-06-29 07:08 .esd_auth
drwx------  2 ihaveapc ihaveapc   4096 2010-07-05 22:49 .filezilla
drwxr-xr-x  2 ihaveapc ihaveapc   4096 2010-07-05 22:16 .fontconfig
drwxr-xr-x  6 ihaveapc ihaveapc   4096 2010-07-03 02:33 FrostWire
drwxr-xr-x  7 ihaveapc ihaveapc   4096 2010-07-07 01:29 .frostwire4.18
drwx------  5 ihaveapc ihaveapc   4096 2010-07-09 01:38 .gconf
drwx------  2 ihaveapc ihaveapc   4096 2010-07-09 15:23 .gconfd
drwx------  4 ihaveapc ihaveapc   4096 2010-06-29 01:59 .gegl-0.0
drwxr-xr-x 22 ihaveapc ihaveapc   4096 2010-07-05 22:17 .gimp-2.4
--More--
```

```
File  Edit  View  Terminal  Help
drwxr-xr-x 22 ihaveapc ihaveapc   4096 2010-07-05 23:04 .gimp-2.6
-rw-r-----  1 ihaveapc ihaveapc      0 2010-07-09 01:41 .gksu.lock
drwx------ 10 ihaveapc ihaveapc   4096 2010-07-08 11:03 .gnome2
drwx------  2 ihaveapc ihaveapc   4096 2010-06-29 07:08 .gnome2_private
drwxr-xr-x  2 ihaveapc ihaveapc   4096 2010-07-09 11:29 .gstreamer-0.10
-rw-r--r--  1 ihaveapc ihaveapc    152 2010-07-09 01:38 .gtk-bookmarks
dr-x------  2 ihaveapc ihaveapc      0 2010-07-09 01:38 .gvfs
-rw-------  1 ihaveapc ihaveapc   4564 2010-07-09 01:38 .ICEauthority
drwxr-xr-x  2 ihaveapc ihaveapc   4096 2010-06-29 02:26 .icons
drwxr-xr-x 12 ihaveapc ihaveapc   4096 2010-07-08 00:42 .jdownloader
drwxr-xr-x  6 ihaveapc ihaveapc   4096 2010-06-29 12:43 .linuxmint
drwxr-xr-x  3 ihaveapc ihaveapc   4096 2010-06-29 07:05 .local
drwx------  3 ihaveapc ihaveapc   4096 2010-06-29 02:05 .macromedia
drwx------  4 ihaveapc ihaveapc   4096 2010-06-29 07:20 .mozilla
lrwxrwxrwx  1 ihaveapc ihaveapc     27 2010-07-06 21:43 .mozilla-thunderbird ->
/home/ihaveapc/.thunderbird
drwxr-xr-x  2 ihaveapc ihaveapc   4096 2010-07-05 09:05 .mplayer
-rw-r--r--  1 ihaveapc ihaveapc     80 2010-06-29 23:11 .mtpaint
drwxr-xr-x  2 ihaveapc ihaveapc   4096 2010-06-29 07:07 Music
drwxr-xr-x  2 ihaveapc ihaveapc   4096 2010-06-29 07:08 .nautilus
drwxr-xr-x  3 ihaveapc ihaveapc   4096 2010-06-29 03:04 .openoffice.org
drwxr-xr-x  3 ihaveapc ihaveapc   4096 2010-06-29 22:48 Pictures
-rw-r--r--  1 ihaveapc ihaveapc    675 2010-06-29 07:05 .profile
--More--
```

3. cd – Change Directory. This command allows you to change the current working directory. Syntax is simple: 'cd <directory path>'. To go to the root directory, issue the following command:

cd /



After changing the directory, you can use 'pwd' command to check your current directory. You can issue command:

cd ~

from any directory to go back to your home directory.

You can issue command:

cd -

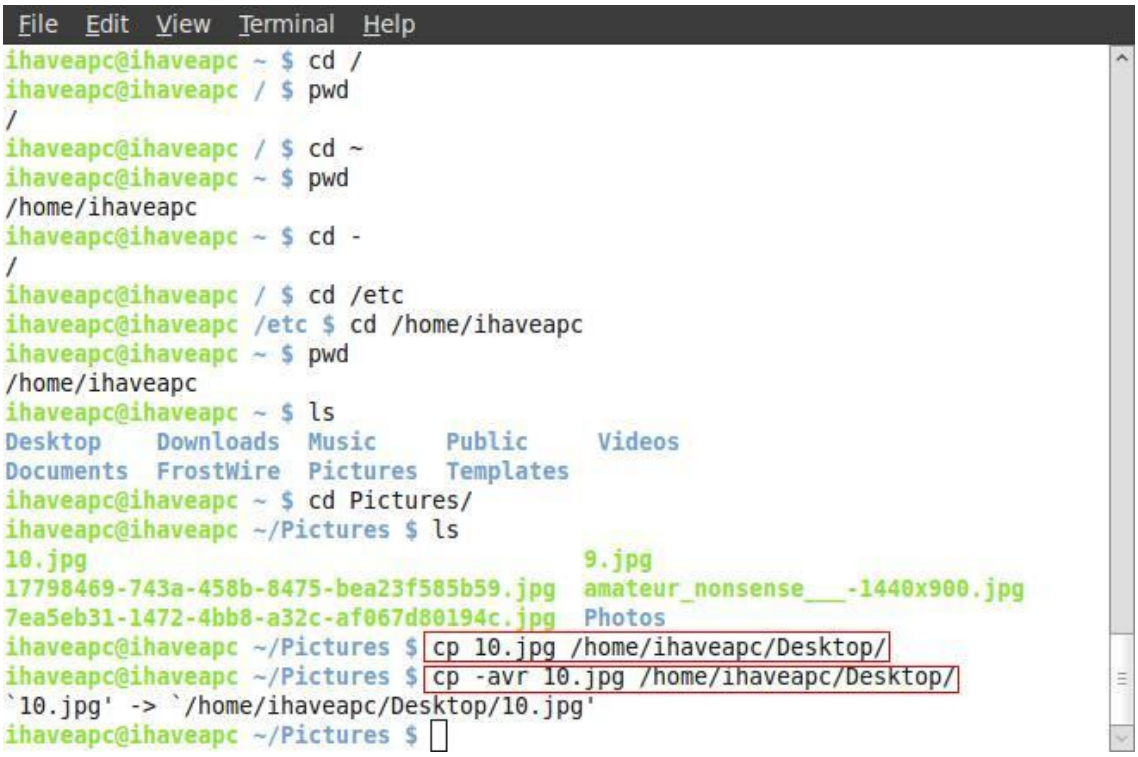
to switch back to previous directory in which you were working before issuing last 'cd' command.

Also, notice that when we changed to directory '/etc' by issuing command 'cd /etc', the directory path is displayed on the left side of the '$' sign. When we changed to home directory by issuing command 'cd /home/ihaveapc', '~' is displayed on the left side of the '$' sign. Recall that '~' represents home directory.

4. cp – Copy. The syntax is simple 'cp <path to the file/folder to be copied> <path where the file/folder is to be copied>'

In below screenshot, we have changed to directory '/home/ihaveapc/Pictures' and we want to copy the file '10.jpg' to '/home/ihaveapc/Desktop'. Hence, we issue the following command:

cp 10.jpg /home/ihaveapc/Desktop



However, notice that we did not get any message on screen as the file was copied. Hence, we can issue the '-avr' option. 'a' means archive(preserve link and permissions), 'v' means verbose(show what is being done), 'r' means recursive(copy recursively). Hence, we issue the following command:

cp -avr 10.jpg /home/ihaveapc/Desktop

Note that the previously copied '10.jpg' in 'Desktop' directory was overwritten without confirmation. To avoid this we will use the option '-i'. 'i' means interactive(confirm before overwriting). Hence, the above command will be modified to:

cp -iavr 10.jpg /home/ihaveapc/Desktop

5. mkdir – Make Directory. Syntax is simple 'mkdir <directory name to be created>'

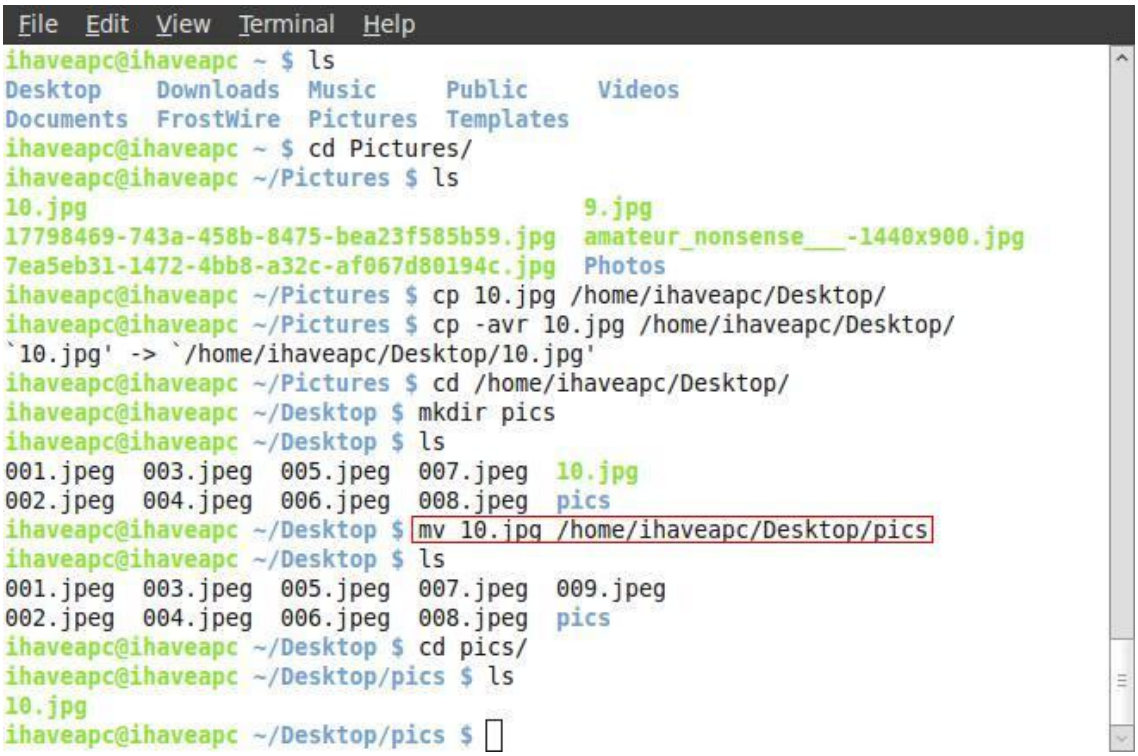
Now, we make a directory 'pics' in the 'Desktop' folder by issuing the following command:

mkdir pics

6. mv – Move. The syntax is simple 'mv <path to the file/folder to be moved> <path where the file/folder is to be moved>'

We need to move the file '10.jpg' from directory 'Desktop' to directory 'pics'. For this we will issue the following command:

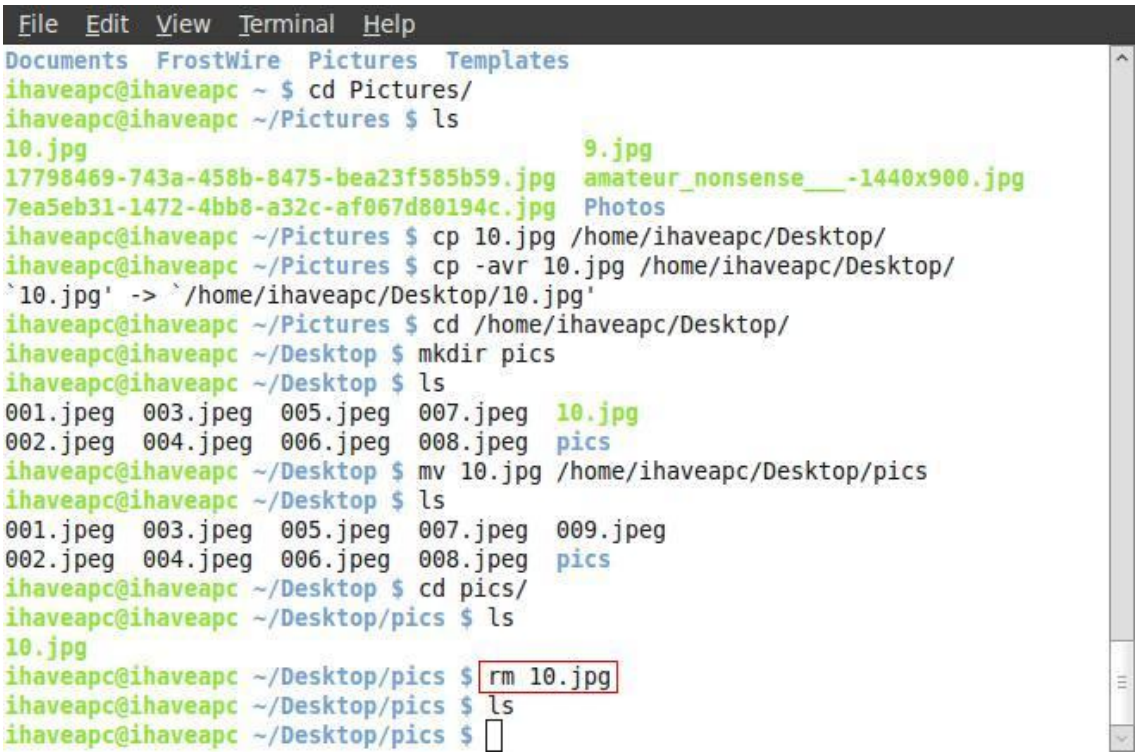
mv 10.jpg /home/ihaveapc/Desktop/pics



7. rm – Remove. This command deletes a file/directory. Syntax is 'rm <file/directory name to be deleted>'

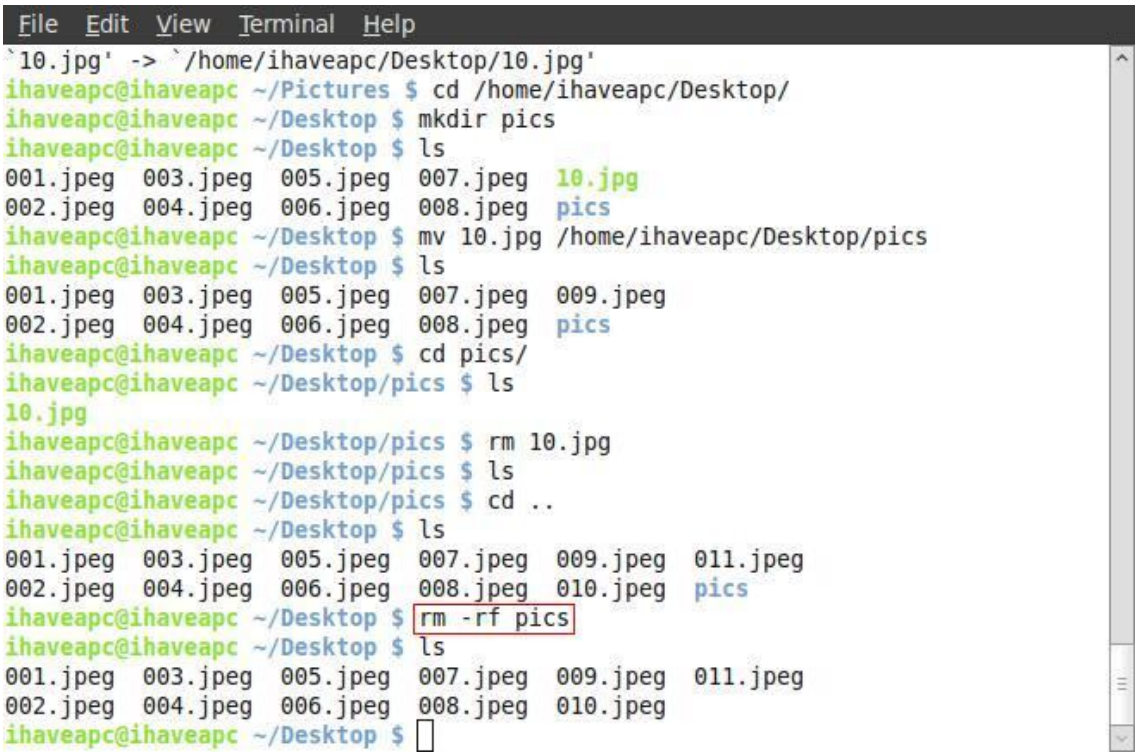
We need to delete file '10.jpg' in directory 'pics'. Hence, we issue the following command:

rm 10.jpg



However, if we try to delete a directory which has files/folders in it, system will not delete it and will tell you that the directory is not empty. Hence, we can use '-rf' option in such cases. 'r' means recursive(delete recursively), 'f' means force(do not prompt about non-existent files). Hence, we issue the following command to delete 'pics' directory:

rm -rf pics



[Be very careful while using the above command. Never run the above command on root directory as a root user.]

PART 2: Linux Directory Structure and Permissions

We will now continue with the Linux command line basics. We will go through the standard Linux directory structure before you explaining some concepts about Linux file permissions so that you will be in a better position to understand user/group management commands and the commands used to set file permissions in Linux.

Linux directory structure:

The Linux directory structure is like a tree. Standard Linux directory structure generally contains the following directories-

1. **/** – This is the highest level directory in the tree. It is called 'root' and all other folders and devices are its subdirectories. In Linux, everything is represented as a file or a folder (even hardware devices!). Since, you can set permissions on files and folders; you can secure access to these files and folders. This is the reason why Linux is secure by design.

2. **/bin** – This directory contains essential binary applications required by the system to operate.

3. **/usr/bin** – This directory contains the binary applications for the system's users.

4. **/sbin** – This directory contains the binary applications required for system administration by a super user. This folder contains critical binary applications that system must use even before other directories are mounted.

5. **/usr/sbin** – This directory contains the binary applications required for system administration by a super user but the applications are available only after booting is completed.

6. **/boot** – This is the directory where Linux kernel and boot loader files are kept.

7. **/dev** – This directory contains all the hardware devices available to the system represented as files. The system can read from and write to these files or both depending on the type of device.

8. **/etc** – This directory contains the configuration files for the OS, applications and the start up scripts.

9. **/home** – This is the directory which contains the user's home directories. In general, a normal user cannot write or make changes to the directories outside his home directory. This reduces the chances of user accidently messing up the system. Only root user (administrator) or super users can write or make changes anywhere in the Linux directory structure.

10. **/lib** – This directory contains the shared libraries required for proper functioning of the system.

11. **/lost+found** – This directory contains the lost and found files from the root directory.

12. **/mnt** – This directory is the mount point for the mounted file systems in your computer.

13. **/media** – This directory is the mount point for the file systems of the removable devices.

14. **/opt** – This directory is a place for the optional applications that can be installed.

15. **/proc** – This is a virtual directory that contains entries corresponding to the processes and threads running in the system.

16. **/srv** – This directory acts as a temporary location for the data to be used by the servers.

17. **/sys** – This directory contains system-specific information to be used as a reference for other applications.

18. **/tmp** – This directory is used for temporary storage of files.

19. **/usr** – This directory contains files/folders that support applications that are available to all the users.

20. **/var** – This directory contains files that change while the system is running.

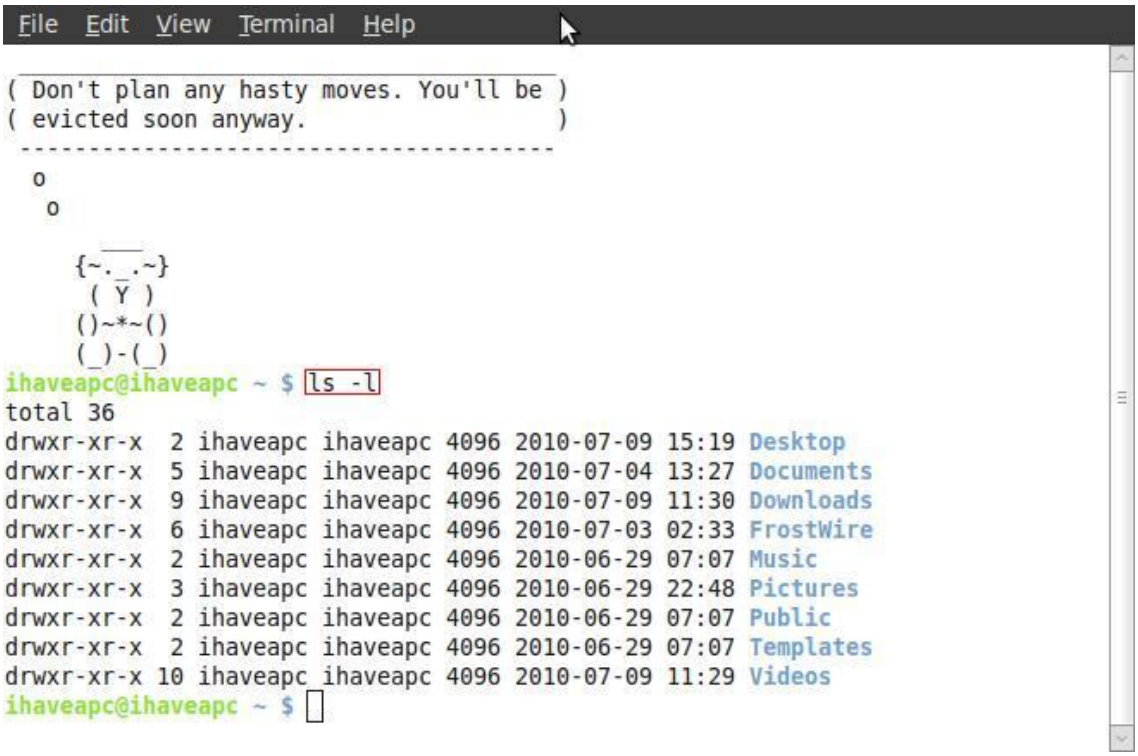
File / Folder permissions in Linux:

In Linux, there are 3 types of **file permissions**-

r (read) – Allows user to view the file – numerical value = 4

w (write) – Allows user to edit the file – numerical value = 2

x (execute) – Allows user to run the file as an executable – numerical value =1



While listing a directory in long format via ls -l command, you will notice the that the first column has the following format-

drwxrwxrwx

or

-rwxrwxrwx

This column represents the file / folder permissions. Let us see how-

- r w x r w x r w x

The first character from left represents the whether the listed entry is a file (represented by '-'), directory (represented by 'd') or a link (represented by 'l').

- r w x r w x r w x

The red characters represent the permissions provided to the owner of the file. Presence of a character(r, w or x) represents that the permission for that action (read, write or execute) is granted. Presence of a '-' instead of the character represents that the permission for that action (read, write or execute) is denied.

In above case the owner has permission to read, write and execute the file. Note that, r+w+x = 4+2+1 = 7.

- r w x r w x r w x

The green characters represent the permissions provided to the members of the owner's group for the file. In above case the group members have permission to read, write and execute the file. Note that, r+w+x = 4+2+1 = 7.

- r w x r w x r w x

The blue characters represent the permissions provided to all the other users for the file. In above case the other users have permission to read, write and execute the file. Note that, r+w+x = 4+2+1 = 7.

The numerical value of the above permission is represented as 777.

Here are few examples of the file permissions-

rwx------ : (4+2+1, 0+0+0, 0+0+0 = 700) Owner can read, write and execute the file. Group users and other users do not have any permission for the file.

rw-rw-rw- : (4+2+0, 4+2+0, 4+2+0 = 666) All users can read and write to the file.

rw-r--r-- : (4+2+0, 4+0+0, 4+0+0 = 644) Owner can read and write to the file. Group users and others can only read the file.

The **directory permissions** are calculated in similar manner with just the following differences-

r (read) – Allows user to list the files in the directory – numerical value = 4

w (write) – Allows user to create new files and delete the files in the directory – numerical value = 2

x (execute) – Allows user to change to the directory via cd command – numerical value =1

Here are few examples of directory permissions-

rwxrwxrwx : (4+2+1, 4+2+1, 4+2+1 = 777) Allows owner, group members and others to list files in directory, create files in directory, delete files from the directory and to change to the directory.

rwxr-xr-x : (4+2+1, 4+0+1, 4+0+1 = 755) Allows owner to list files in directory, create files in directory, delete files from the directory and to change to the directory. Group members and others can change to the directory and list the files only.

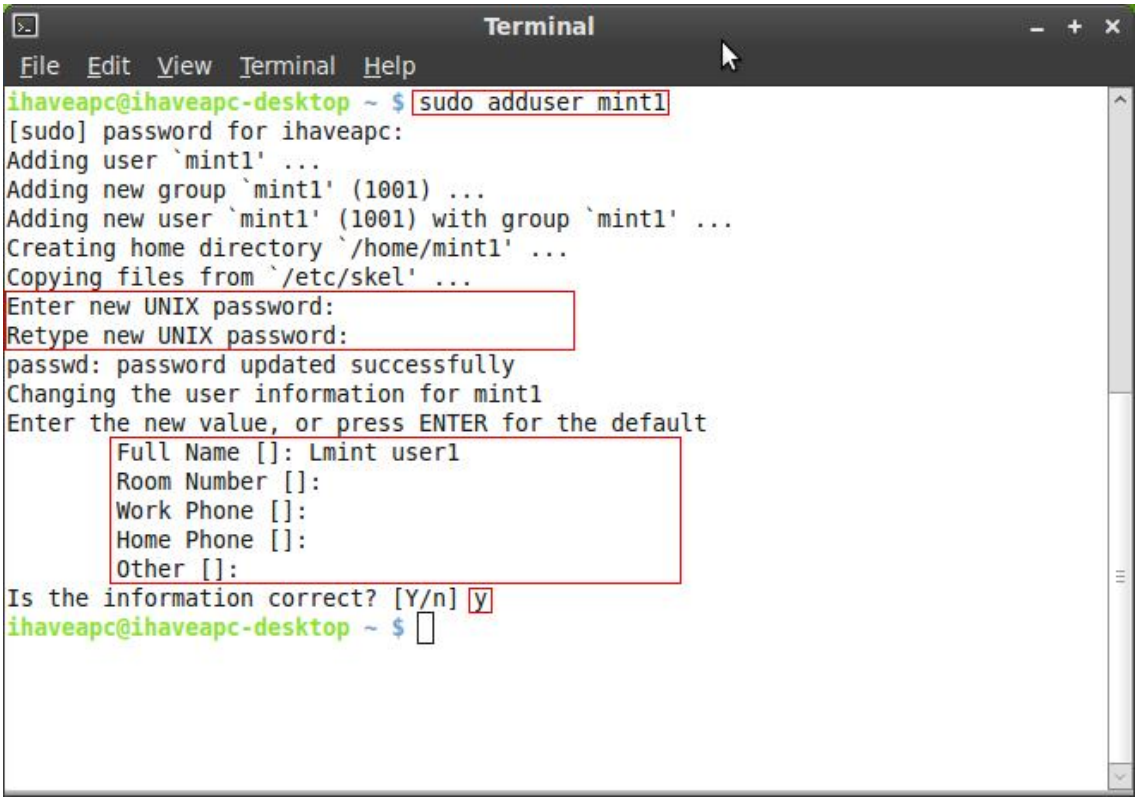
rwx------ : (4+2+1, 0+0+0, 0+0+0 = 700) Allows owner to list files in directory, create files in directory, delete files from the directory and to change to the directory. Group members and others do not have any permission on the directory. This makes the directory private to the owner.

PART 3: Managing Users And Groups

We will learn how to manage users and groups.

1. adduser – Add user. Syntax is 'sudo adduser <user name>'. We need to use 'sudo' as root privileges are required to run this command. A root user can run the command without 'sudo'. To add a new user named 'mint1', issue the following command in the terminal:

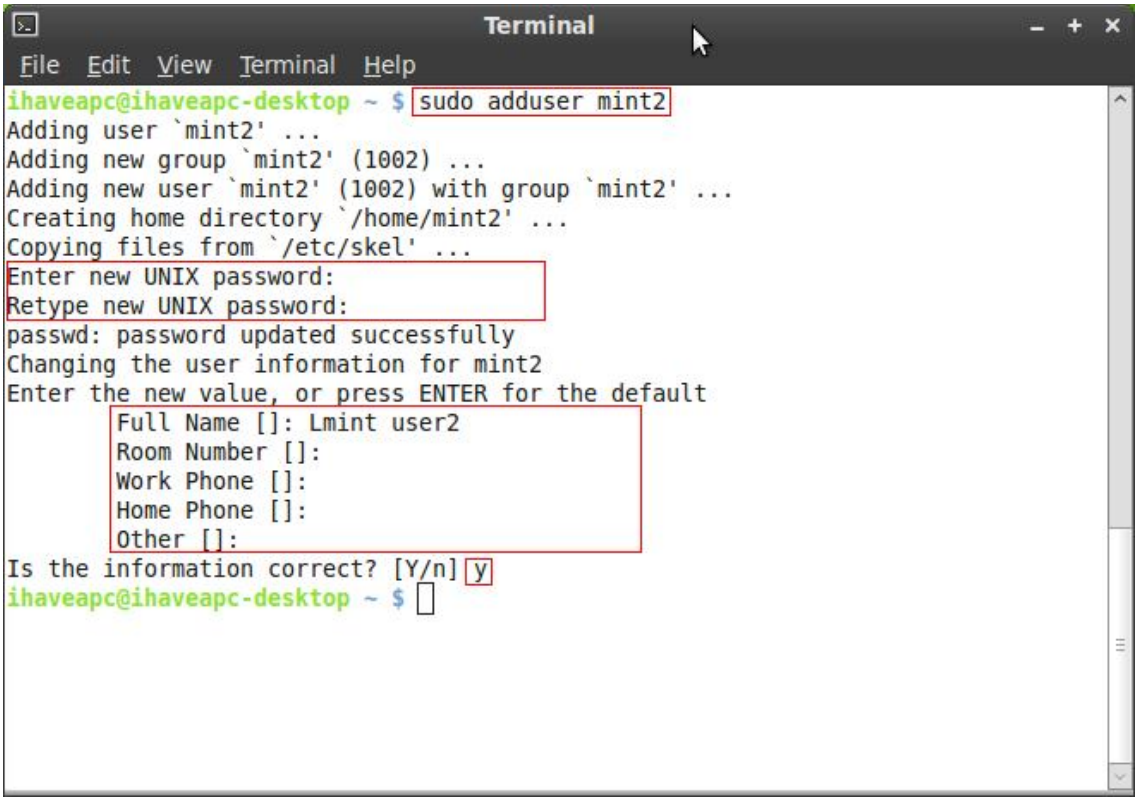
sudo adduser mint1



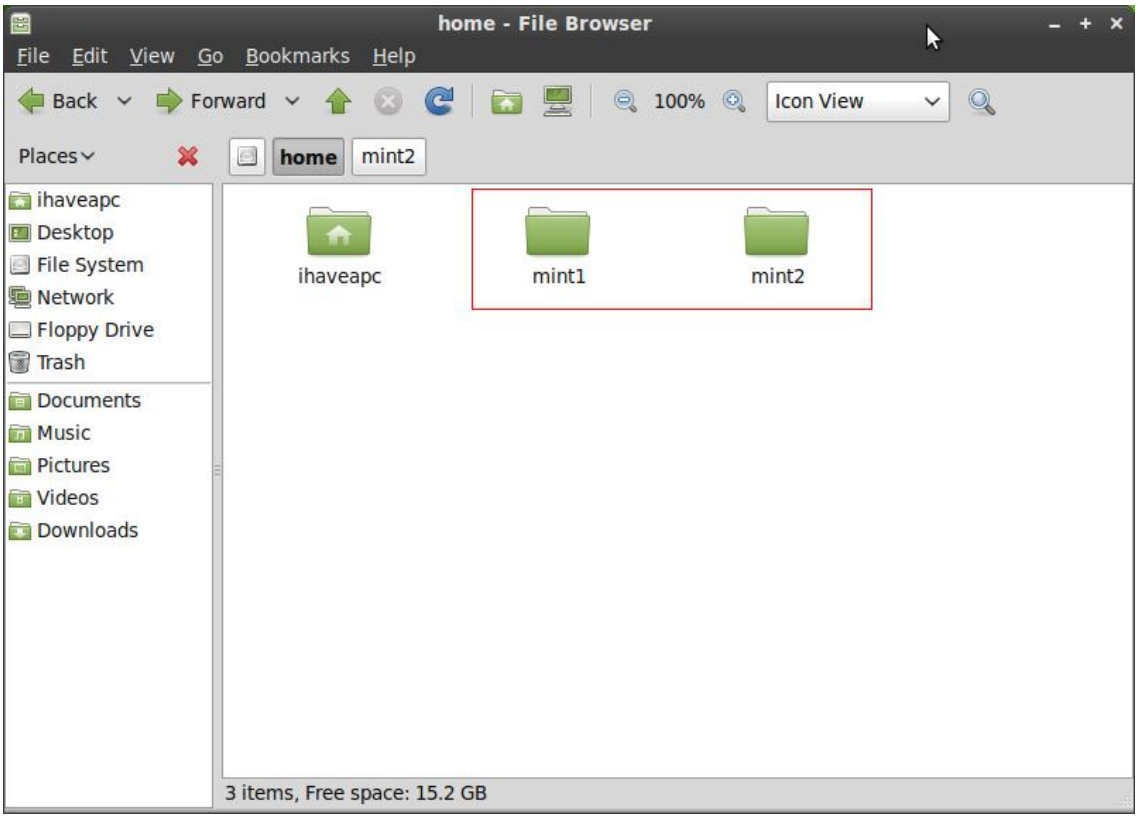
Enter the user password when prompted. A new user called 'mint1' will be created. A home directory will be created for the new user in '/home' location. The name of new user's home directory will be same as his user name. [Note that the default structure of the home directory is defined in '/etc/skel' (skel=skeleton). Every time a home directory is to be created for a new user, files are copied from '/etc/skel']. The system will now ask you to create a password for this new user. Type the password and re-type it when prompted. Ask the user to change this password to a desired one by using 'passwd' command when the user logs in for the first time. You can also enter the full name and contact details of the new user when prompted. Type 'y' to confirm the information and hit enter.

In similar manner, to add a new user named 'mint2', issue the following command in the terminal:

sudo adduser mint2

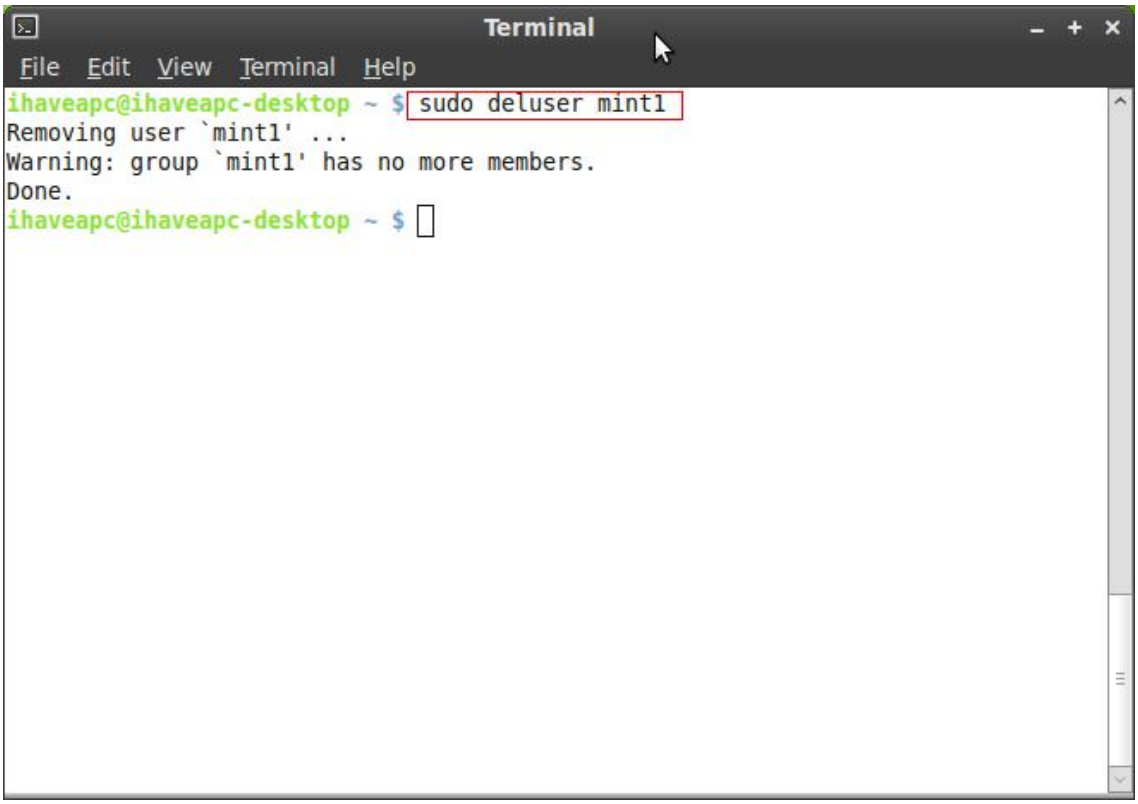


Note that two new home directories have been created for users 'mint1' and 'mint2' in '/home' location.

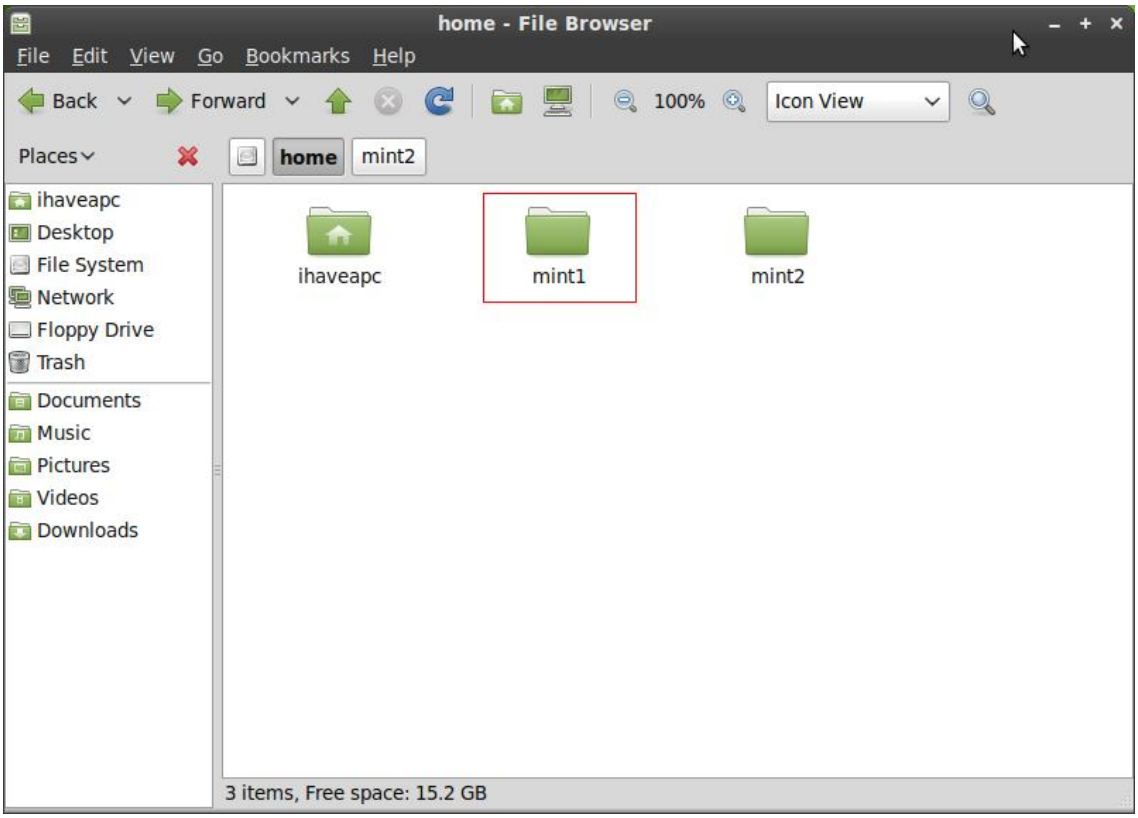


2. deluser – Delete user. Syntax is 'sudo deluser <user name>'. We need to use 'sudo' as root privileges are required to run this command. A root user can run the command without 'sudo'. To delete the user 'mint1' issue the following command at the terminal:

sudo deluser mint1

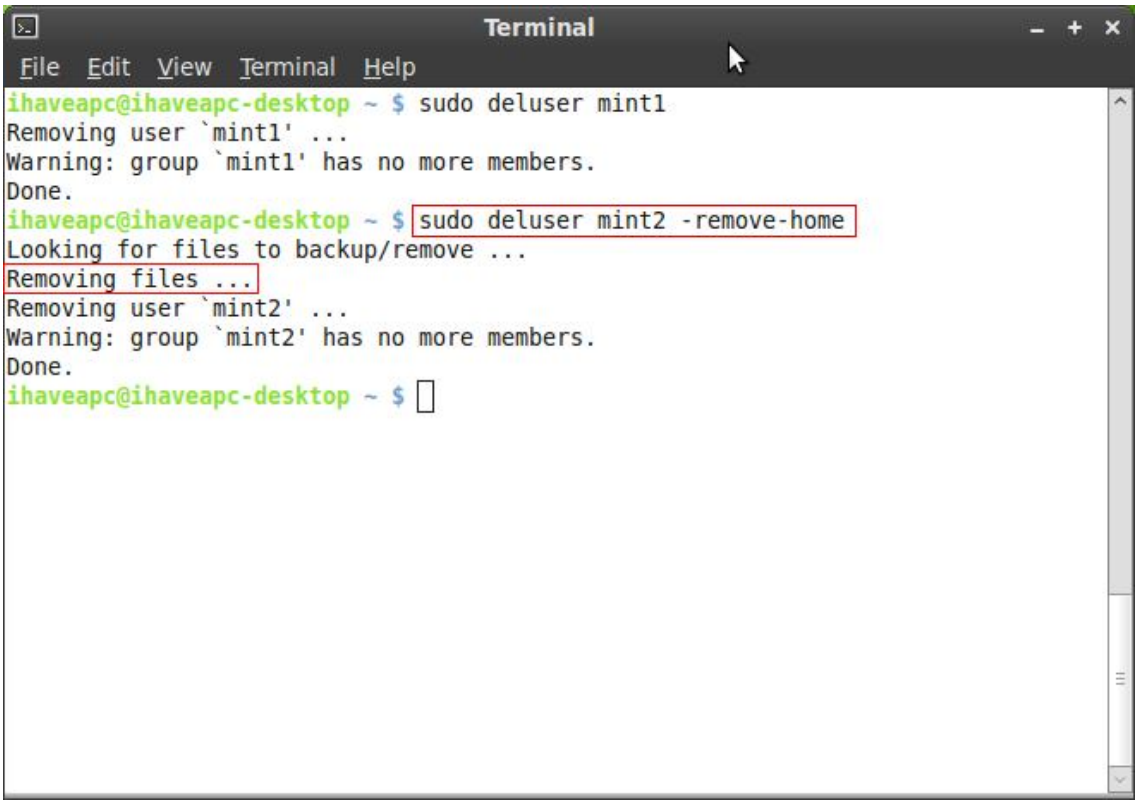


Note that the above command does not delete user's home directory. It is still present in '/home' location.

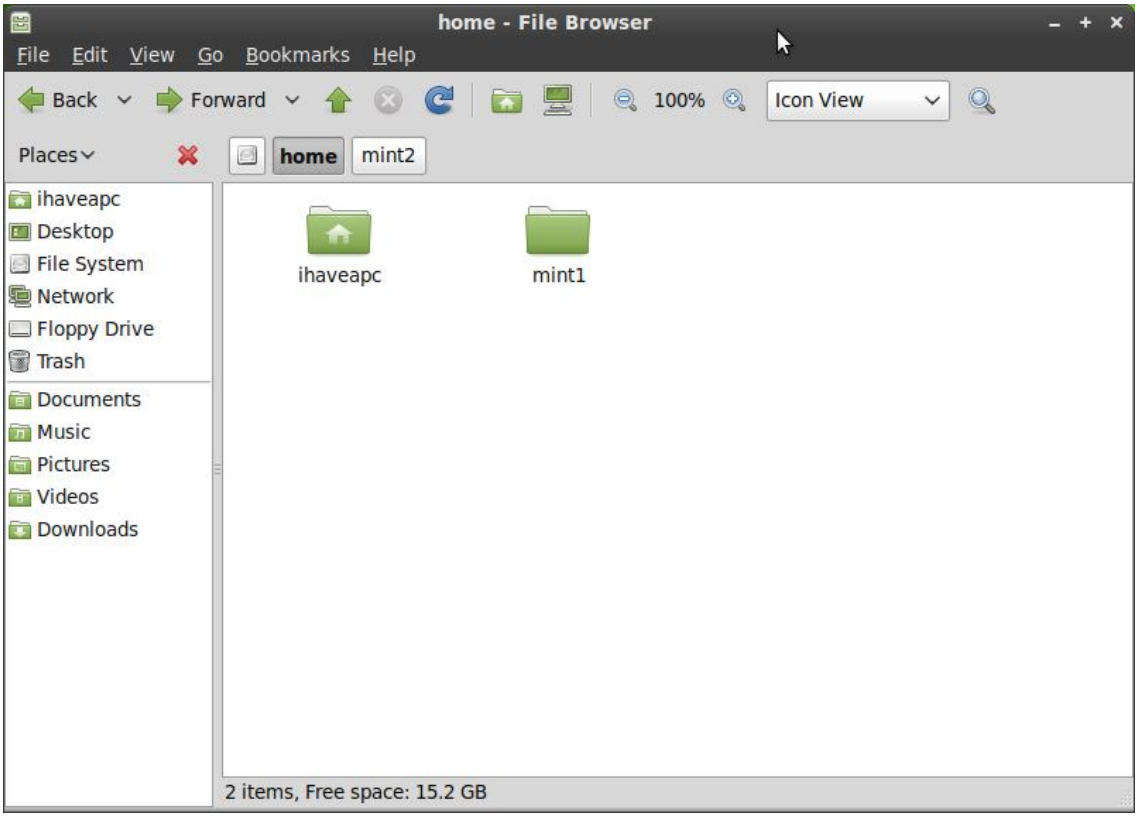


If you want to delete a user as well as his home directory, use the option '-remove-home'. In order to delete user 'mint2' as well as his home directory issue the following command at the terminal:

sudo deluser mint2 -remove-home

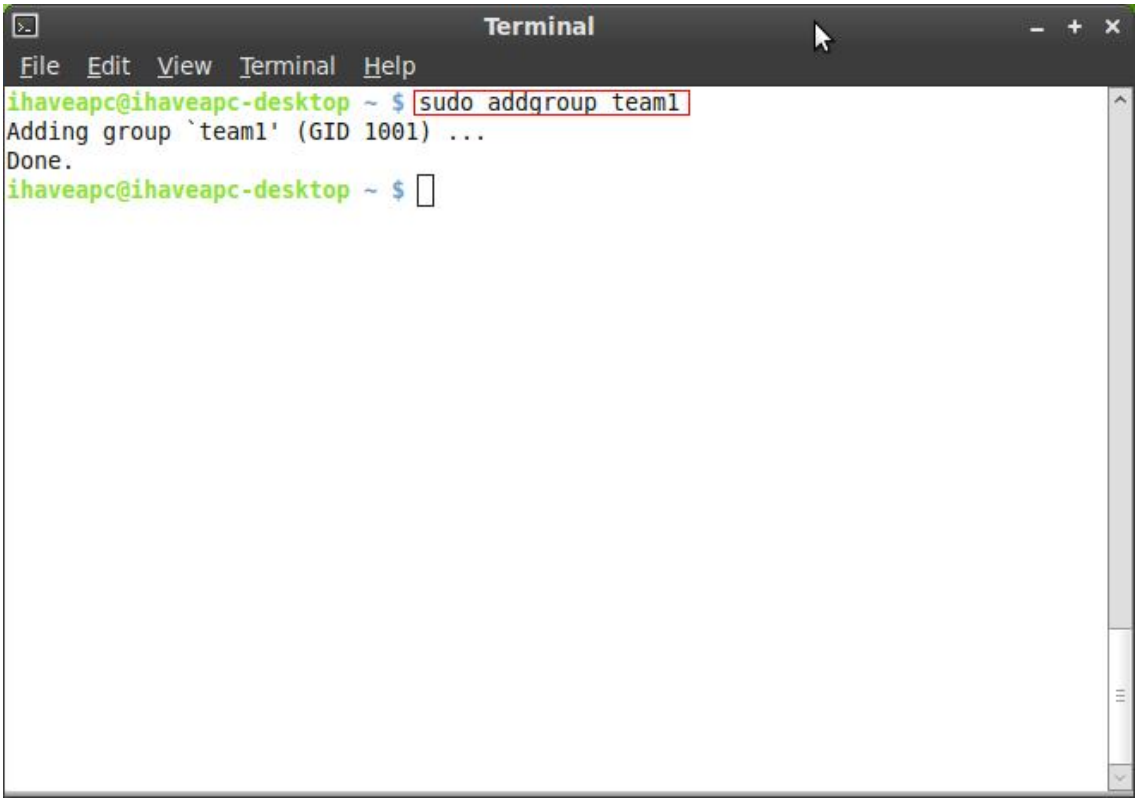


Note that the user's directory has been deleted from the '/home' location.



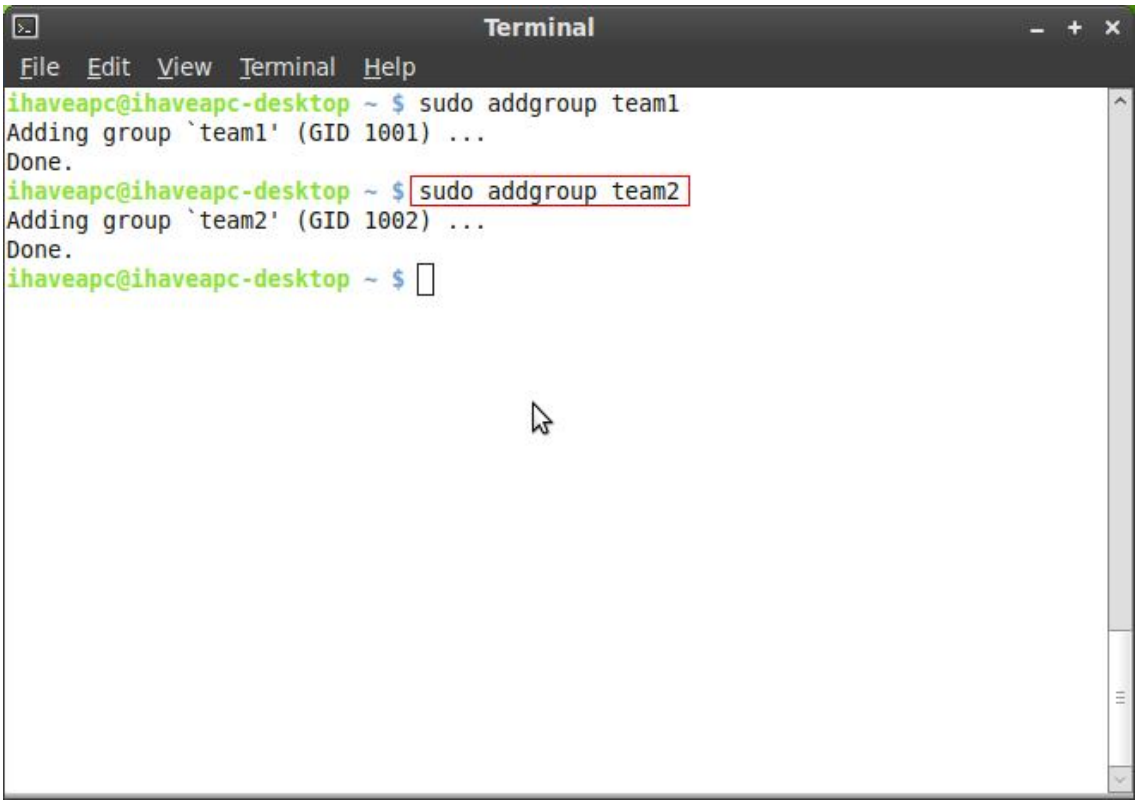
3. addgroup – Add group. Syntax is 'sudo addgroup <group name>'. We need to use 'sudo' as root privileges are required to run this command. A root user can run the command without 'sudo'. To add a group called 'team1', issue the following command at the terminal:

sudo addgroup team1



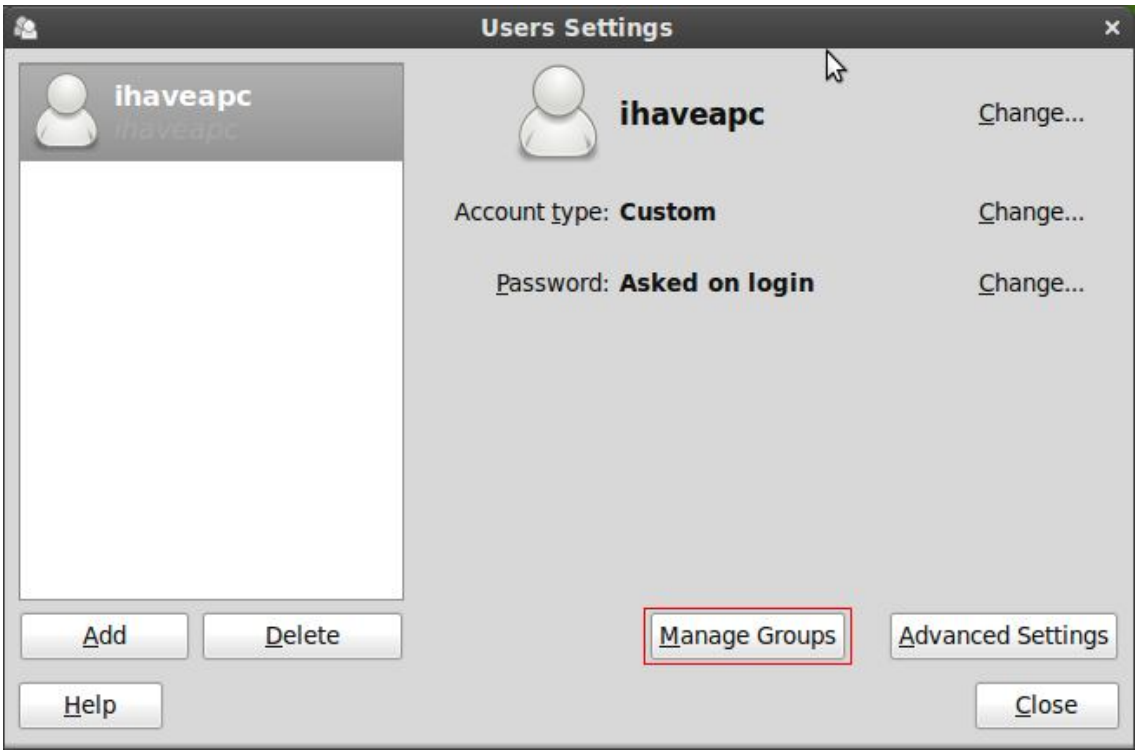
To add a group called 'team2', issue the following command at the terminal:

sudo addgroup team2

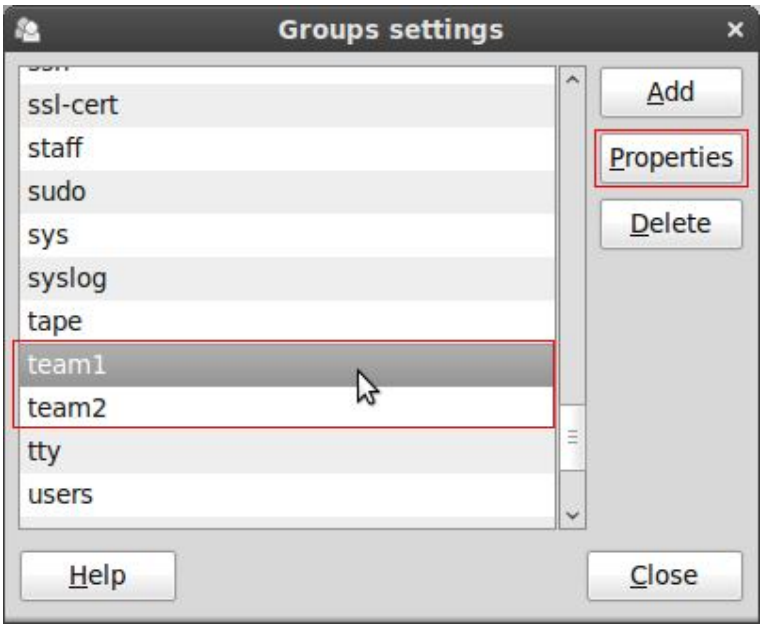


Now, click on 'Menu>Administration>Users and Groups'.

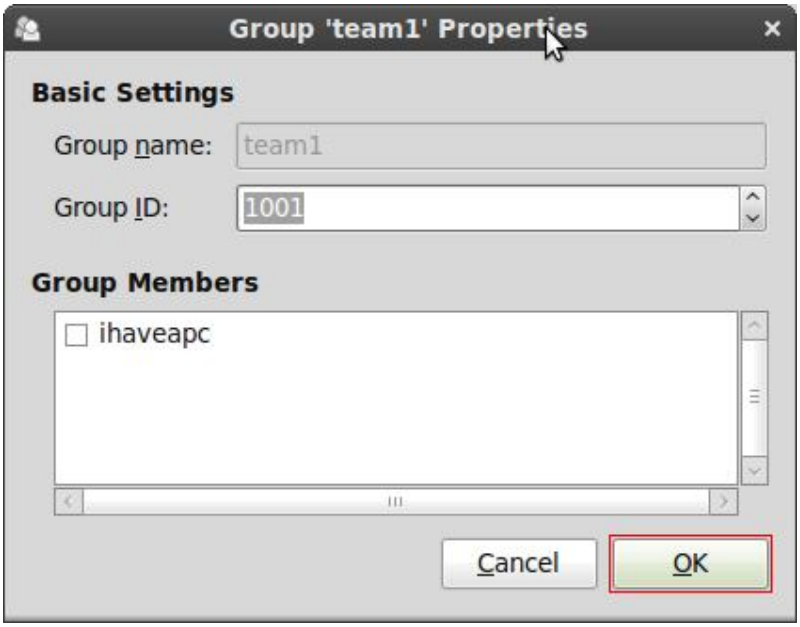
Click on 'Manage Groups'.



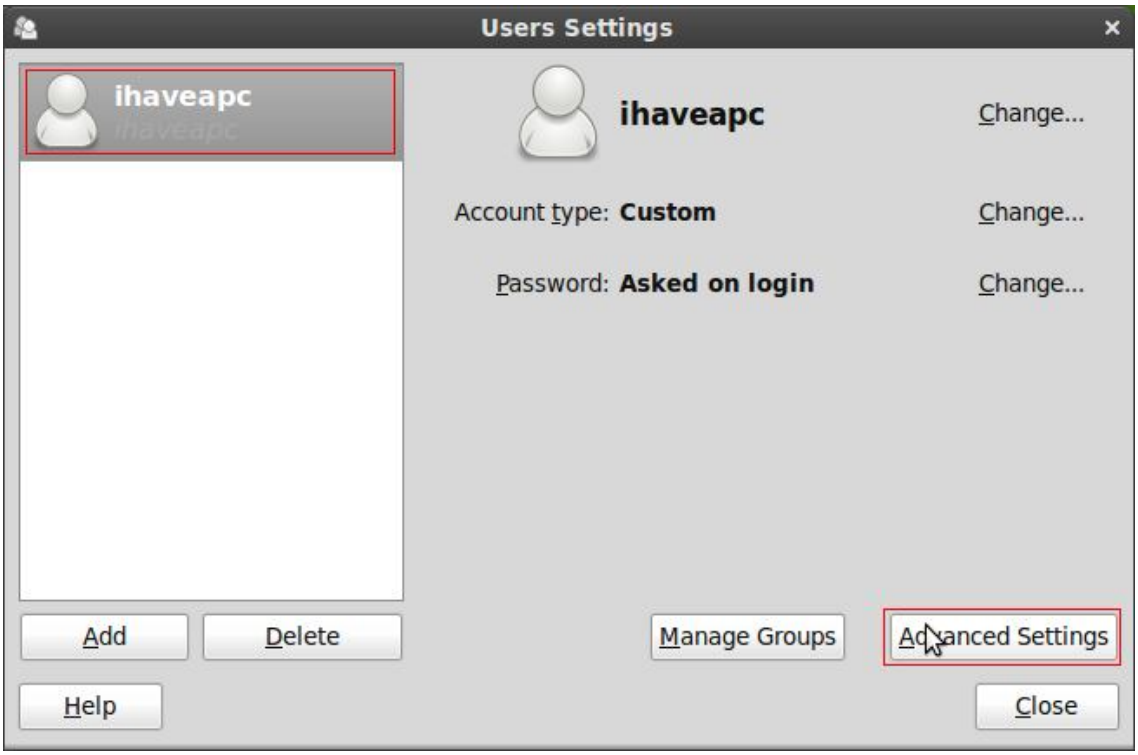
Notice that groups 'team1' and 'team2' have been added. Select 'team1' and click 'Properties'.



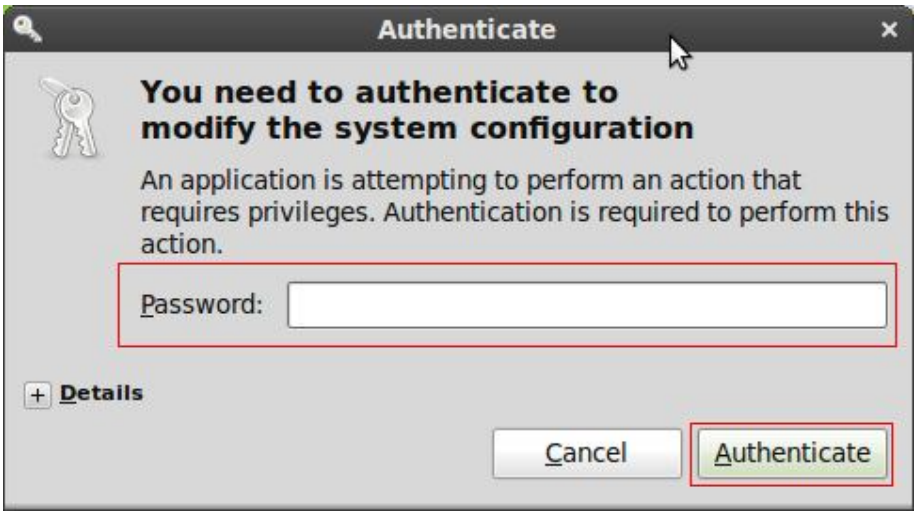
You can view the list of users who are members of this group. Click 'OK' to close the window.



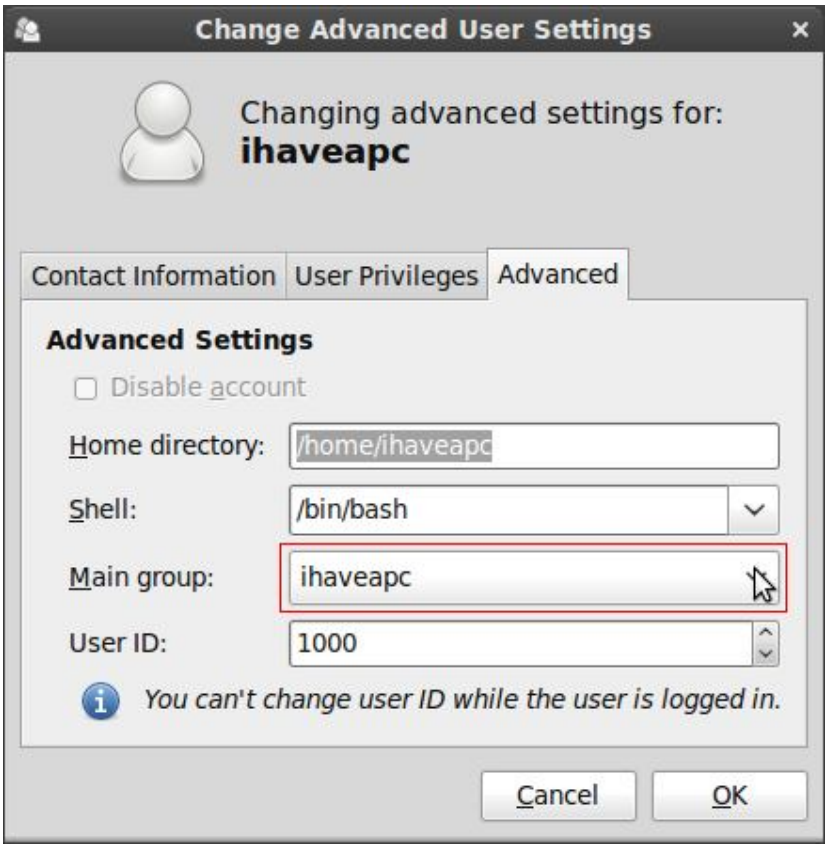
You can also select a user and click 'Advanced Settings'.



Enter user password when prompted and click 'Authenticate'.



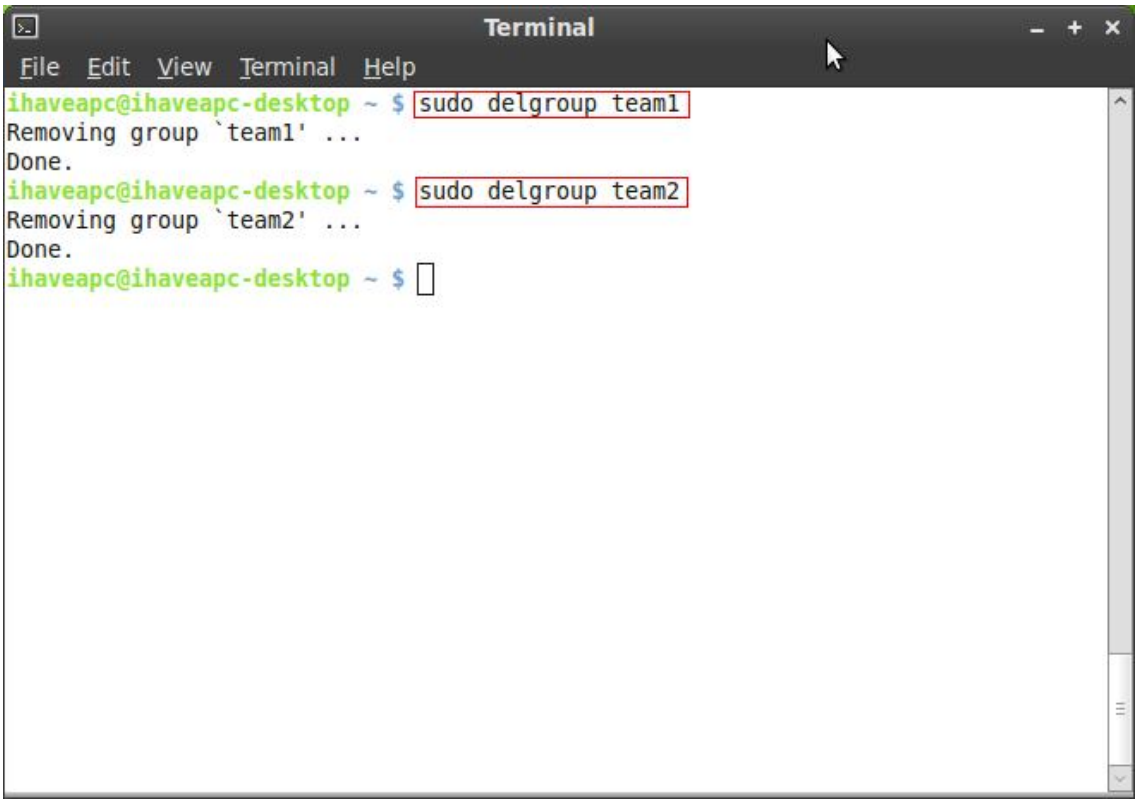
In the 'Change Advanced User Settings' window, you can modify user's main group, if required.



4. delgroup – Delete group. Syntax is 'sudo delgroup <group name>'. We need to use 'sudo' as root privileges are required to run this command. A root user can run the command without 'sudo'. In order to delete groups 'team1' and 'team2', issue the following commands at the terminal:

sudo delgroup team1

sudo delgroup team2

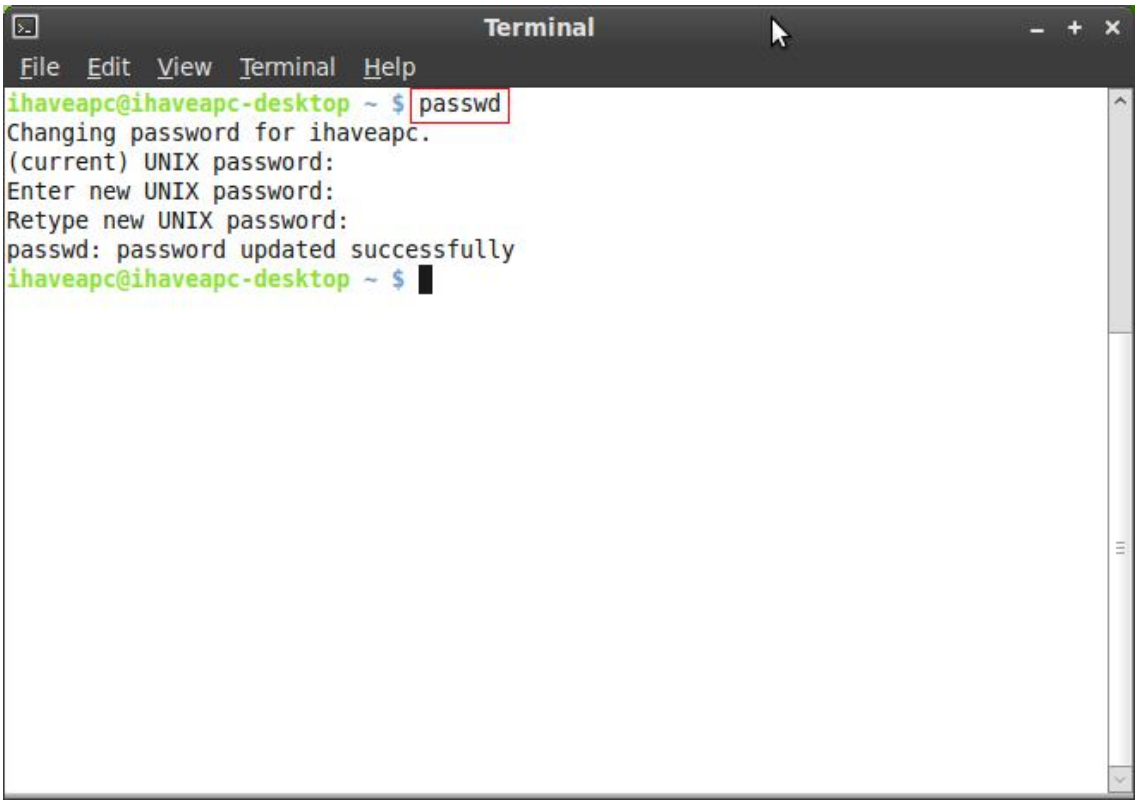


5. passwd – Change user password. Syntax is 'passwd <user name>'. You can change the password for the user whose name has been entered.

Simply issuing command 'passwd' enable you to change your own password. Issuing the command 'sudo passwd' will enable you to change root user's password.

To change your password, issue the following command at the terminal:

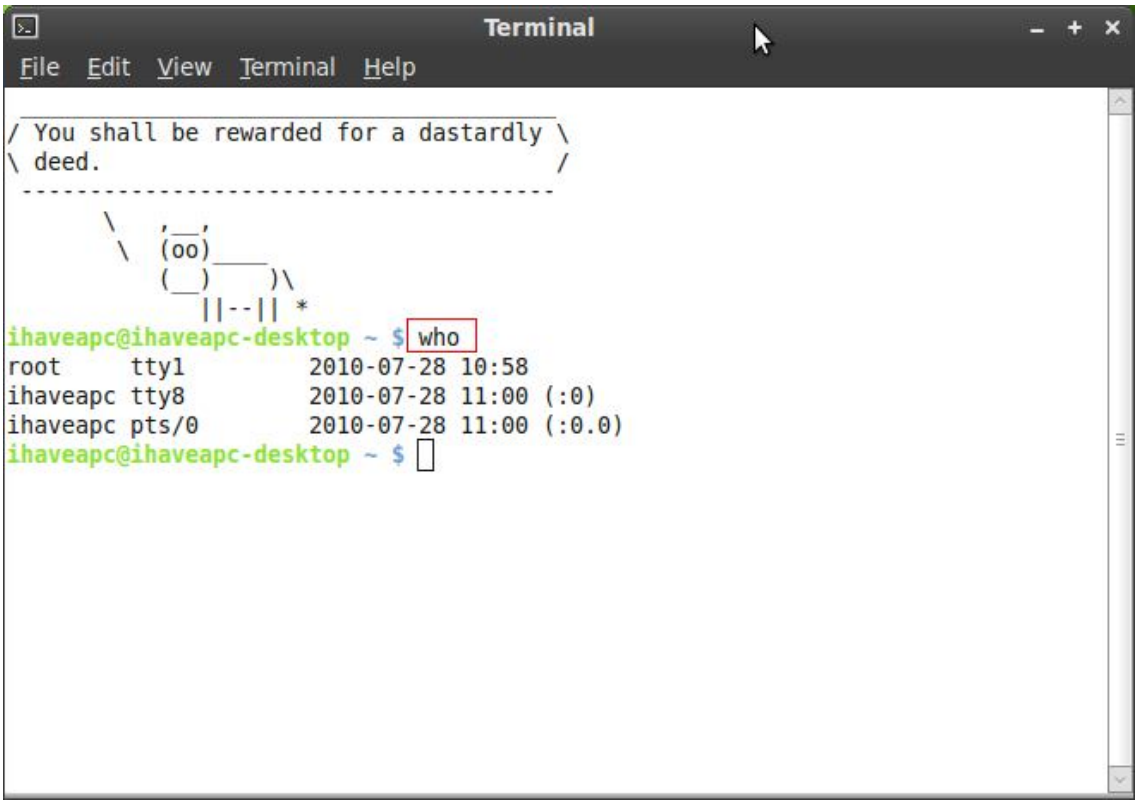
passwd



You need to enter your current password, new password and then re-type the new password.

6. who – Shows list of logged on users. To view the users which are logged on, issue the following command at the terminal:

who



Note that the users 'root' and 'ihaveapc' are logged in the system (entries 1 and 2). Entry 3 (pts/0) denotes the pseudo terminal slave session of user 'ihaveapc' (as we have opened a terminal in the GUI after logging in to the Gnome desktop, that session becomes the slave session of our current session in the GUI).

PART 4: Users, Groups And Permissions

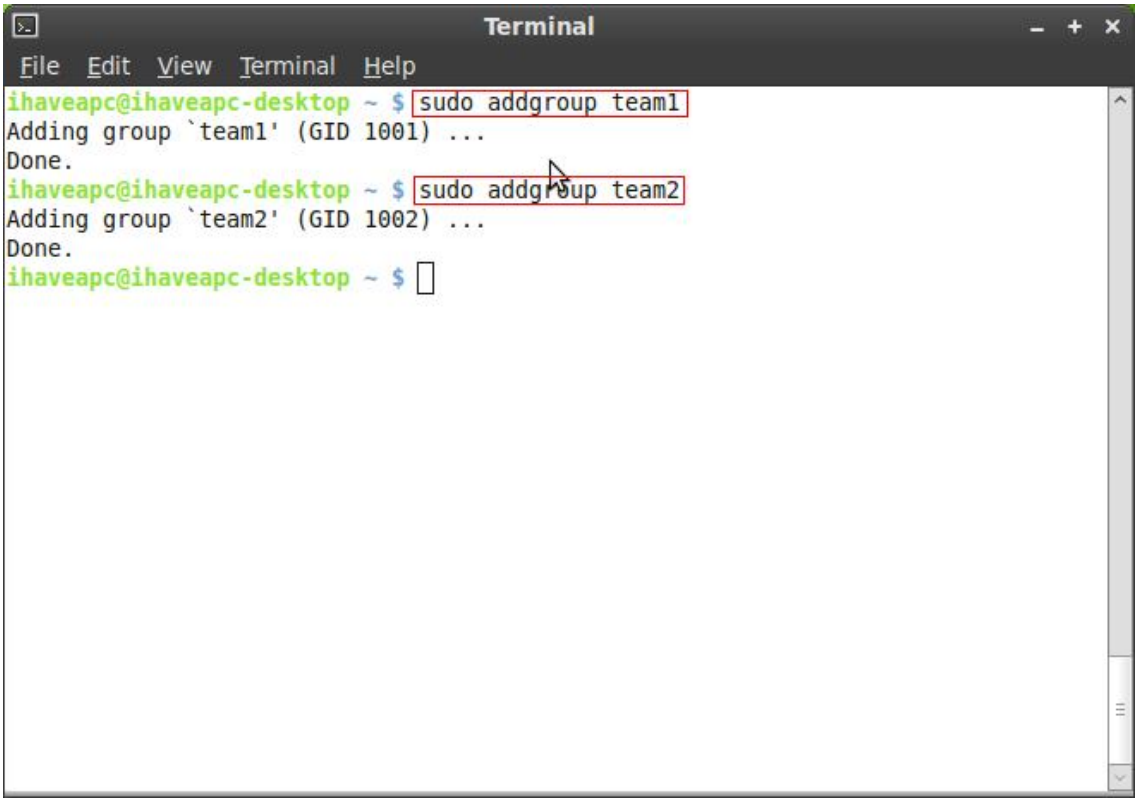
We'll now learn how to add users to groups via command line and how to modify file/folder permissions.

Let's create two groups in the system- 'team1' and 'team2'

Issue the following commands at the terminal:

sudo addgroup team1

sudo addgroup team2



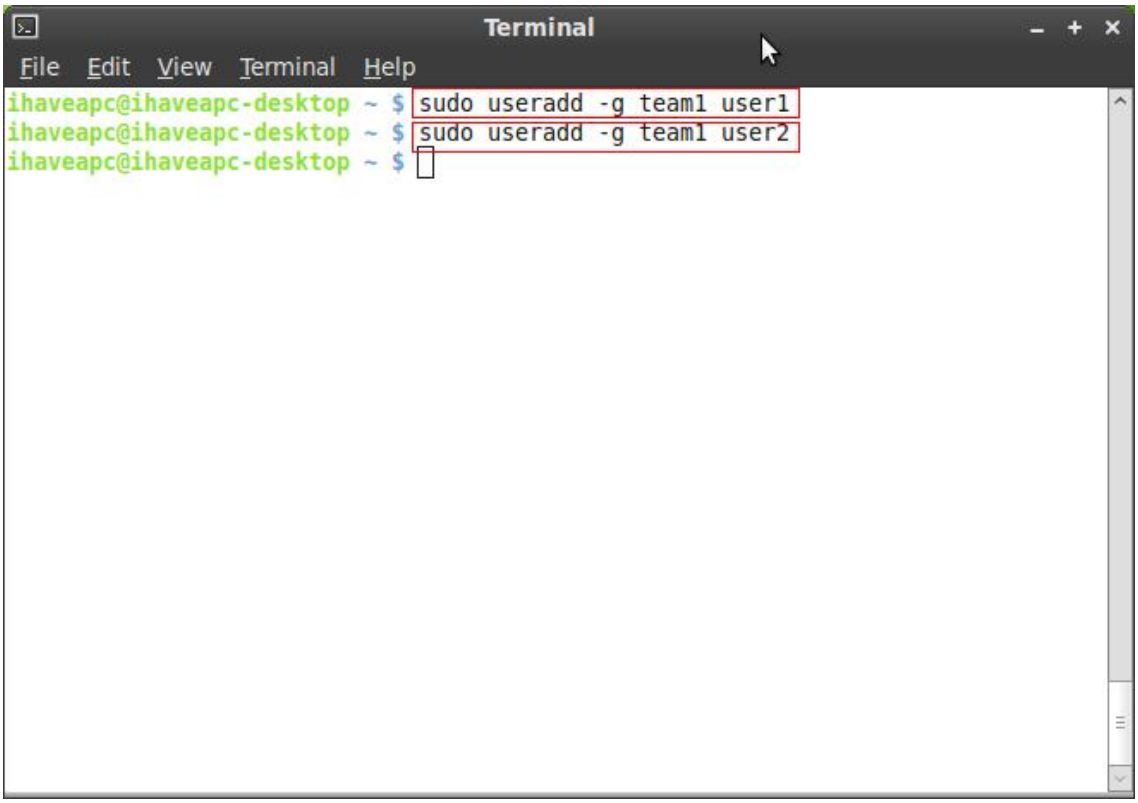
1. useradd – adds a new user to an existing group.

Syntax 1 – sudo useradd -g <group-name> <user-name>

The above command will add a new user to an existing group. The option '-g' will make the specified group new user's primary group. In order to add new users 'user1' and 'user2' with primary group 'team1', issue the following commands at the terminal:

sudo useradd -g team1 user1

sudo useradd -g team2 user2

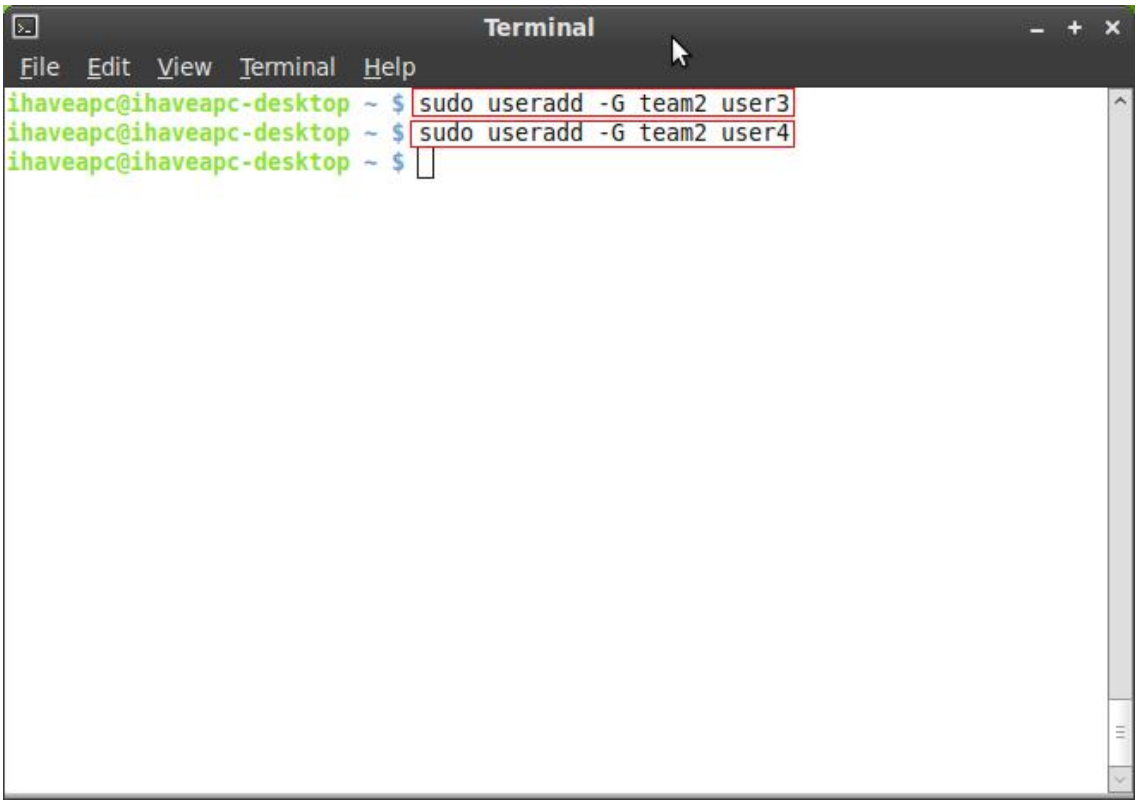


Syntax 2 – sudo useradd -G <group-name> <user-name>

The above command will add a new user to an existing group. The option '-G' will make the specified group new user's secondary group. In order to add new users 'user3' and 'user4' with secondary group 'team2', issue the following commands at the terminal:

sudo useradd -G team2 user3

sudo useradd -G team2 user4



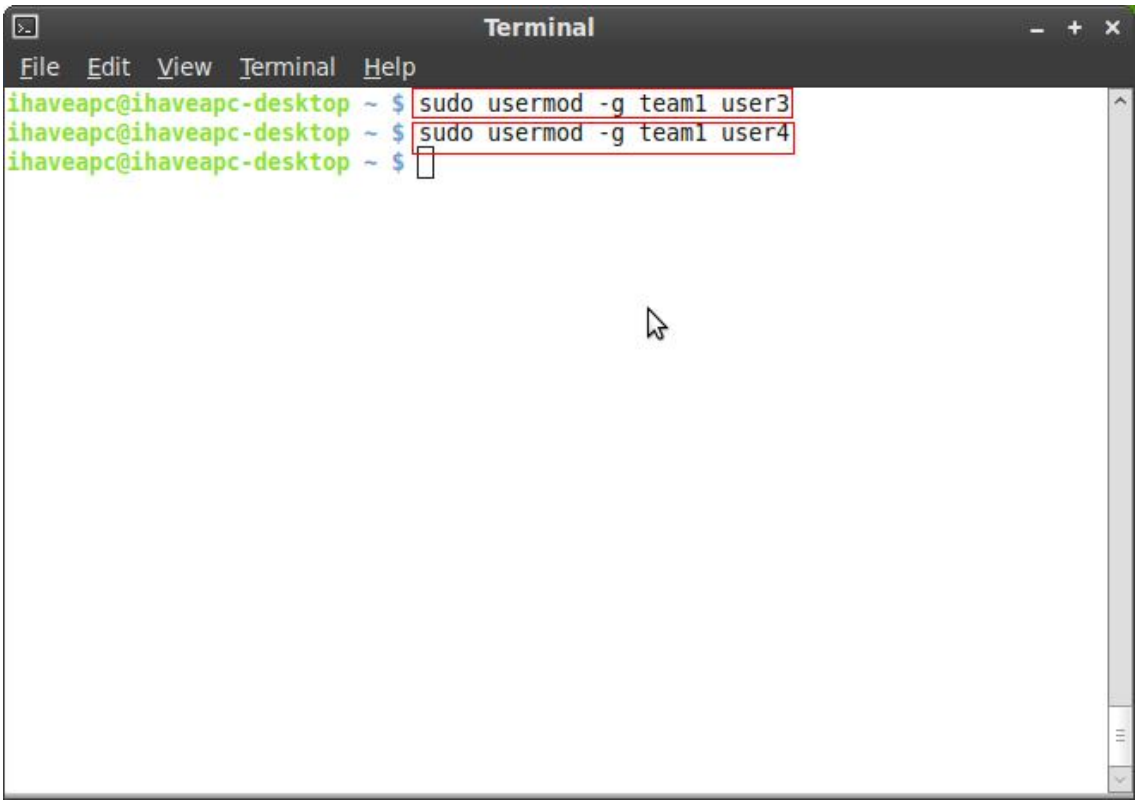
2. usermod – adds an existing user to an existing group.

Syntax 1 – sudo usermod -g <group-name> <user-name>

The above command will add an existing user to an existing group. The option '-g' will make the specified group existing user's primary group. In order to add existing users 'user3' and 'user4' with primary group 'team1', issue the following commands at the terminal:

sudo usermod -g team1 user3

sudo usermod -g team1 user4

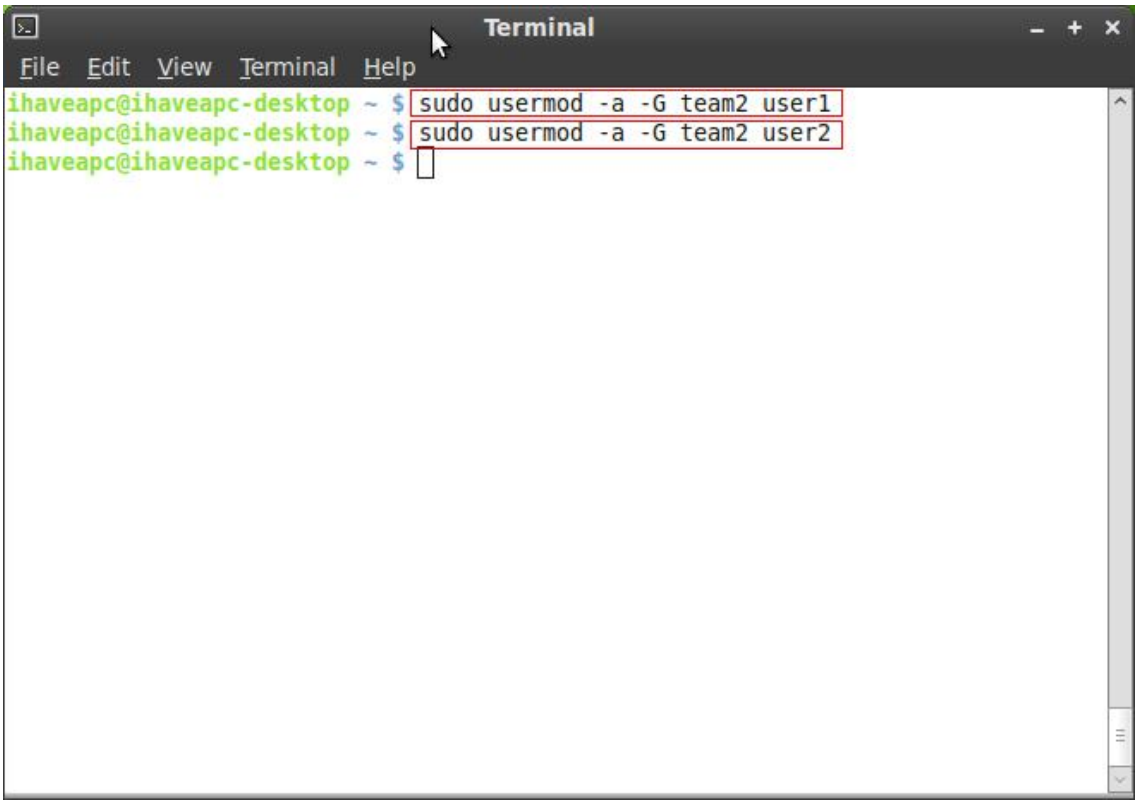


Syntax 2 – sudo usermod -a -G <group-name> <user-name>

The above command will add an existing user to an existing group. The options '-a' and '-G' will make the specified group existing user's secondary group. In order to add existing users 'user1' and 'user2' with secondary group 'team2', issue the following commands at the terminal:

sudo usermod -a -G team2 user1

sudo usermod -a -G team2 user2

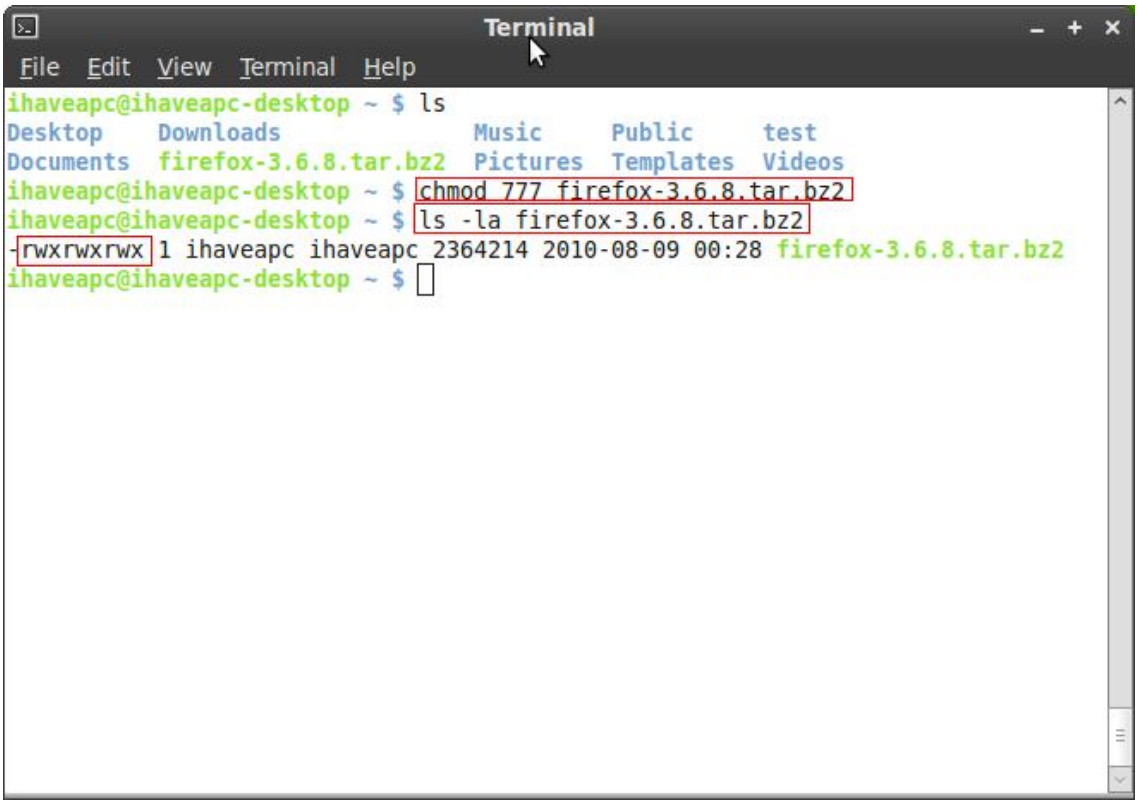


3. chmod – modifies file/folder permissions.

Syntax – chmod <permission value> <file/folder name>

Issue the following command at the terminal:

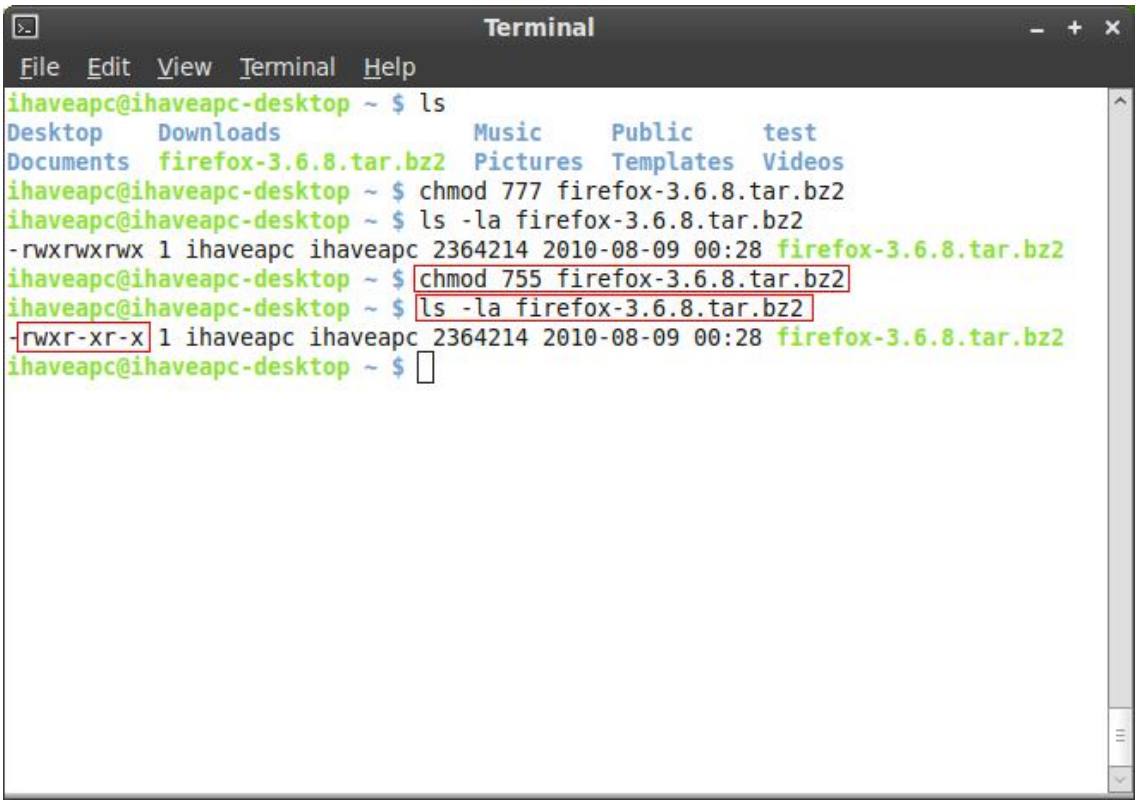
chmod 777 firefox-3.6.8.tar.bz2



The above command will allow everybody to read, write and execute the file.

Issue the following command at the terminal:

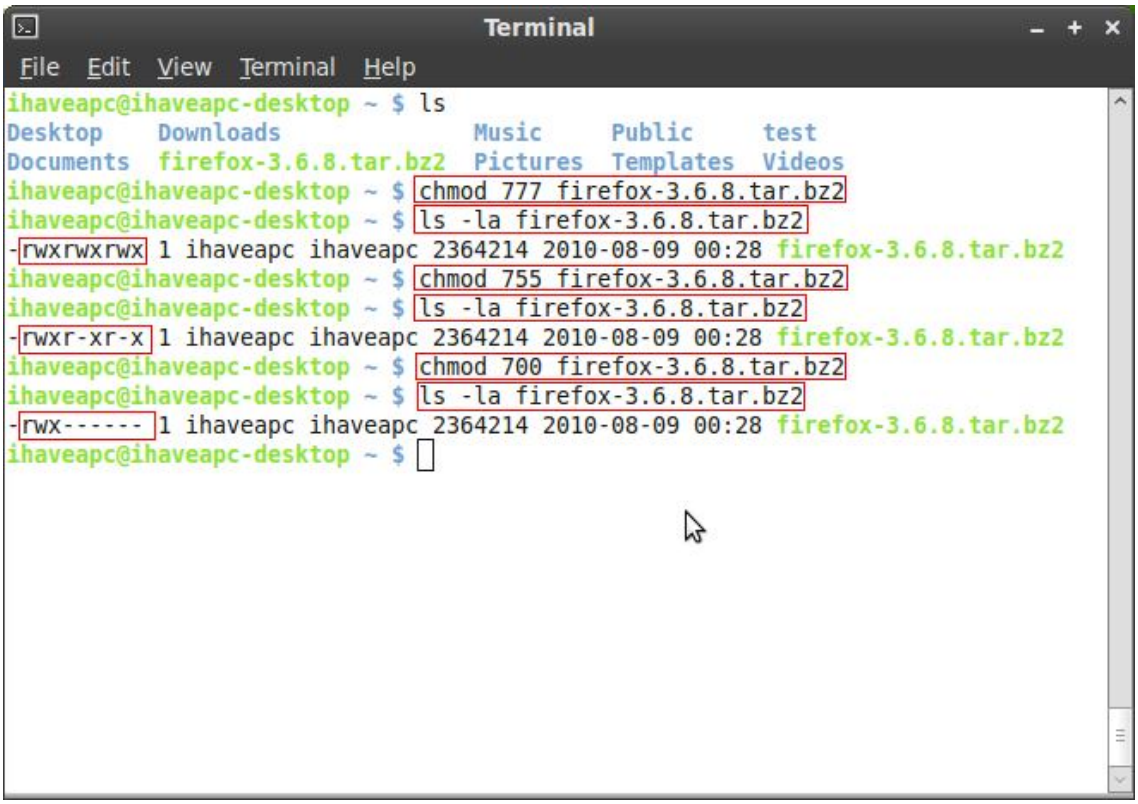
chmod 755 firefox-3.6.8.tar.bz2



The above command will allow the file owner to read, write and execute the file. Group users can read and execute the file. Others can only execute the file.

Issue the following command at the terminal:

chmod 700 firefox-3.6.8.tar.bz2

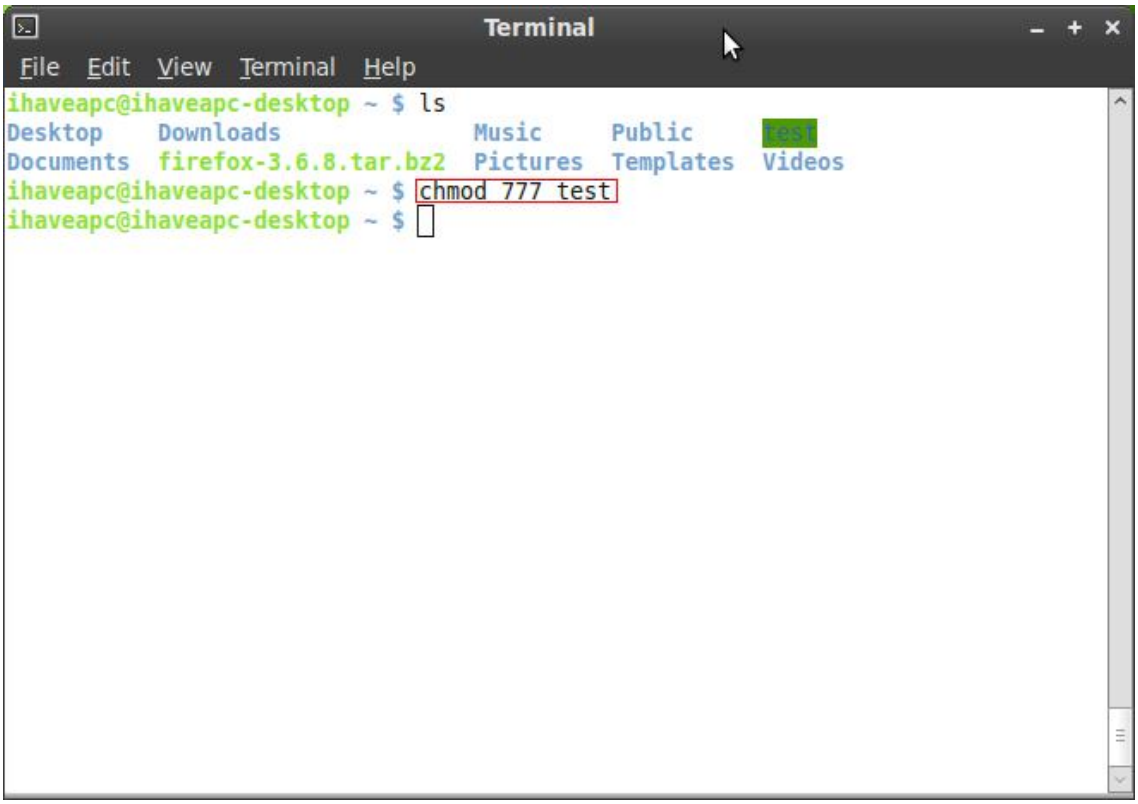


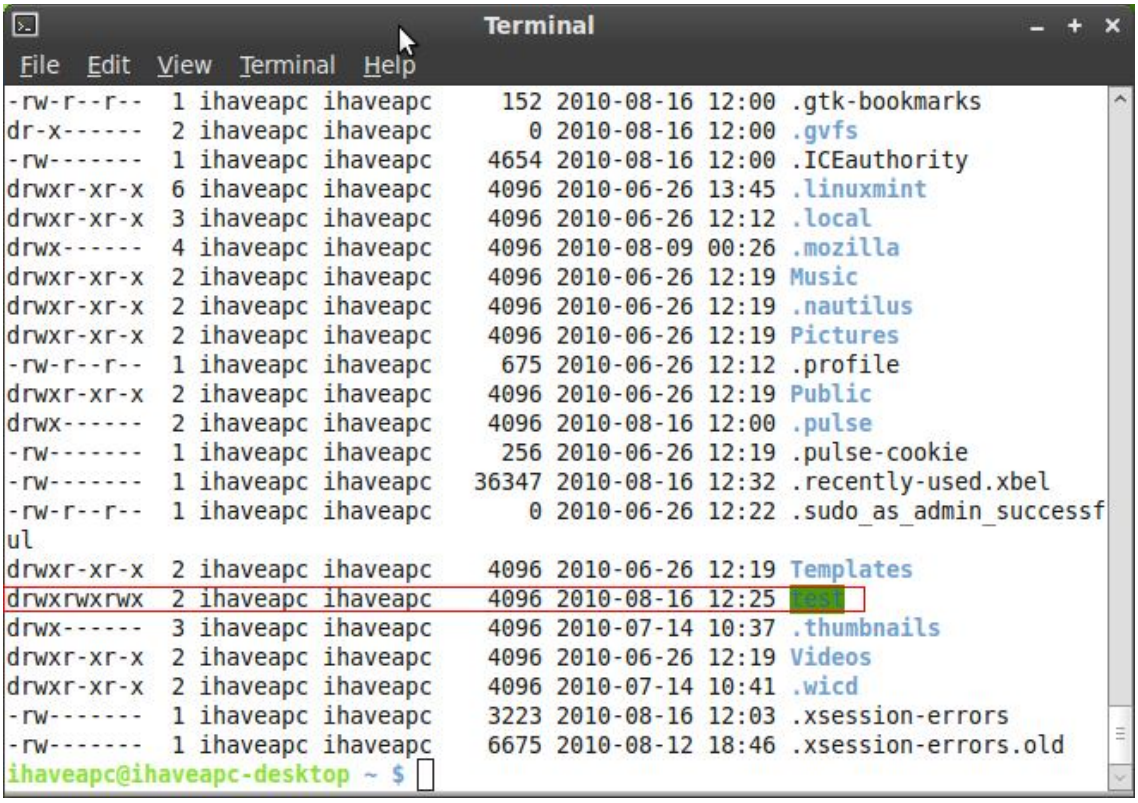
The above command will allow file owner to read, write and execute the file. Group users and others have no permissions on the file.

Now, let us look how 'chmod' is used to modify folder permissions.

Issue the following command at the terminal ('test' is folder in our home directory):

chmod 777 test

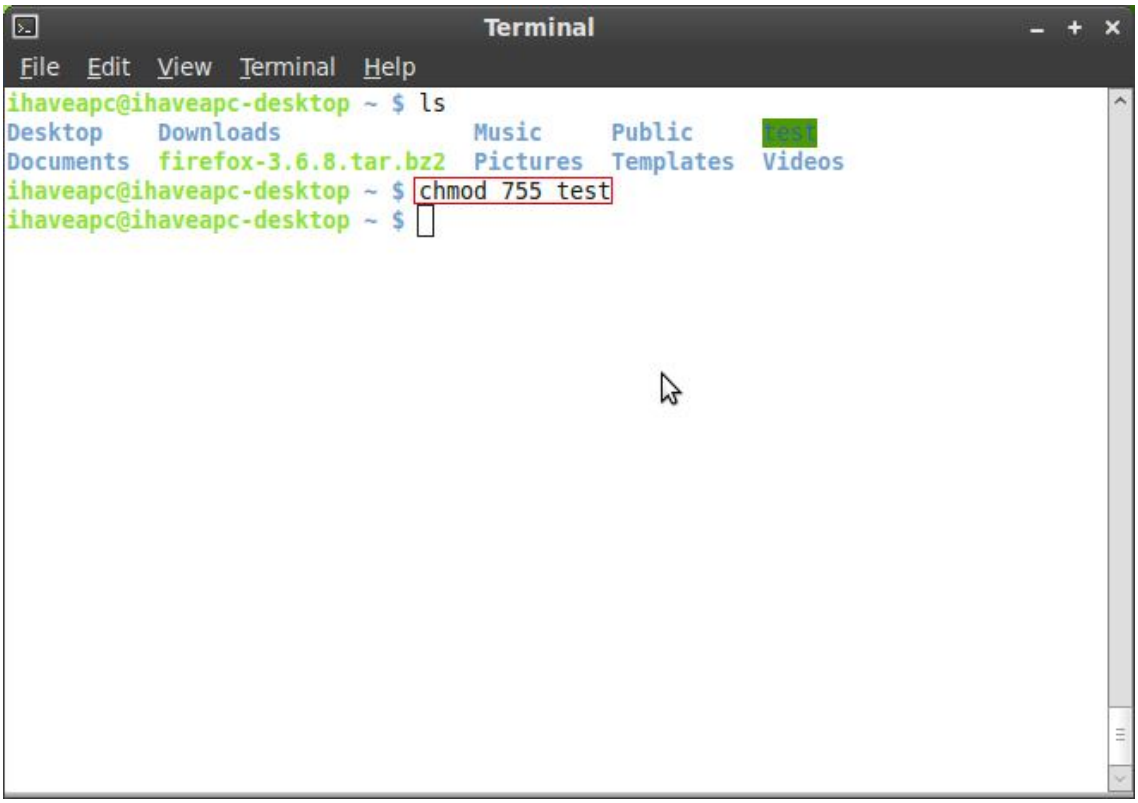

Terminal
File Edit View Terminal Help
ihaveapc@ihaveapc-desktop ~ $ ls
Desktop Downloads Music Public test
Documents firefox-3.6.8.tar.bz2 Pictures Templates Videos
ihaveapc@ihaveapc-desktop ~ $ chmod 777 test
ihaveapc@ihaveapc-desktop ~ $

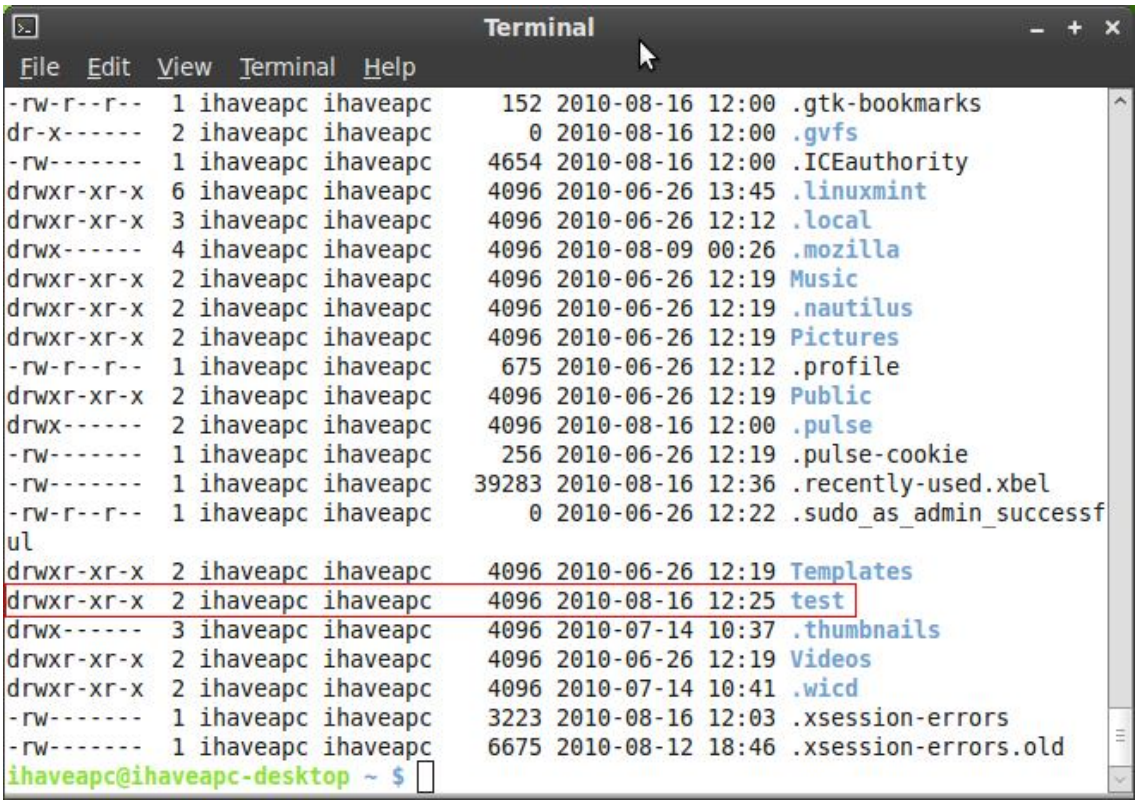

Terminal
File Edit View Terminal Help
-rw-r--r-- 1 ihaveapc ihaveapc 152 2010-08-16 12:00 .gtk-bookmarks
dr-x------ 2 ihaveapc ihaveapc 0 2010-08-16 12:00 .gvfs
-rw------- 1 ihaveapc ihaveapc 4654 2010-08-16 12:00 .ICEauthority
drwxr-xr-x 6 ihaveapc ihaveapc 4096 2010-06-26 13:45 .linuxmint
drwxr-xr-x 3 ihaveapc ihaveapc 4096 2010-06-26 12:12 .local
drwx------ 4 ihaveapc ihaveapc 4096 2010-08-09 00:26 .mozilla
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-06-26 12:19 Music
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-06-26 12:19 .nautilus
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-06-26 12:19 Pictures
-rw-r--r-- 1 ihaveapc ihaveapc 675 2010-06-26 12:12 .profile
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-06-26 12:19 Public
drwx------ 2 ihaveapc ihaveapc 4096 2010-08-16 12:00 .pulse
-rw------- 1 ihaveapc ihaveapc 256 2010-06-26 12:19 .pulse-cookie
-rw------- 1 ihaveapc ihaveapc 36347 2010-08-16 12:32 .recently-used.xbel
-rw-r--r-- 1 ihaveapc ihaveapc 0 2010-06-26 12:22 .sudo_as_admin_successful
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-06-26 12:19 Templates
drwxrwxrwx 2 ihaveapc ihaveapc 4096 2010-08-16 12:25 test
drwx------ 3 ihaveapc ihaveapc 4096 2010-07-14 10:37 .thumbnails
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-06-26 12:19 Videos
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-07-14 10:41 .wicd
-rw------- 1 ihaveapc ihaveapc 3223 2010-08-16 12:03 .xsession-errors
-rw------- 1 ihaveapc ihaveapc 6675 2010-08-12 18:46 .xsession-errors.old
ihaveapc@ihaveapc-desktop ~ $

The output of 'ls -la' command shows that the above command allows owner, group members and others to list files in directory 'test', create files in directory 'test', delete files from the directory 'test' and to change to the directory 'test'.

Issue the following command at the terminal:

chmod 755 test

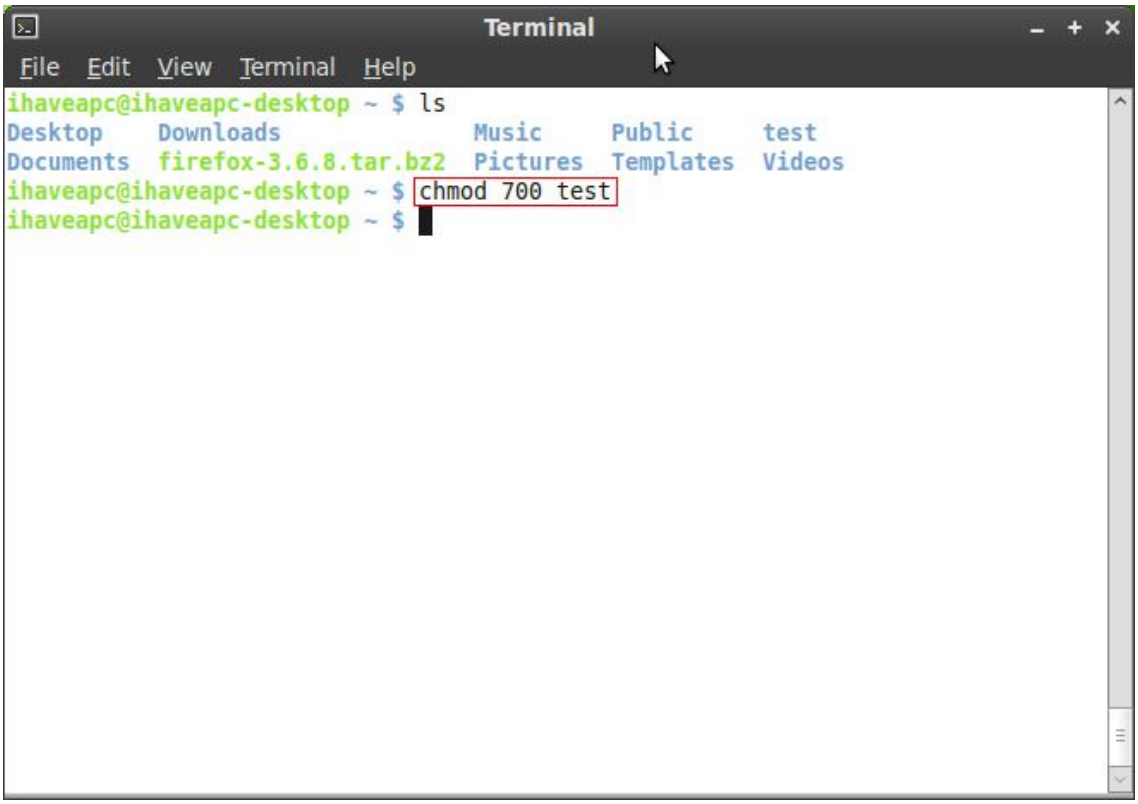


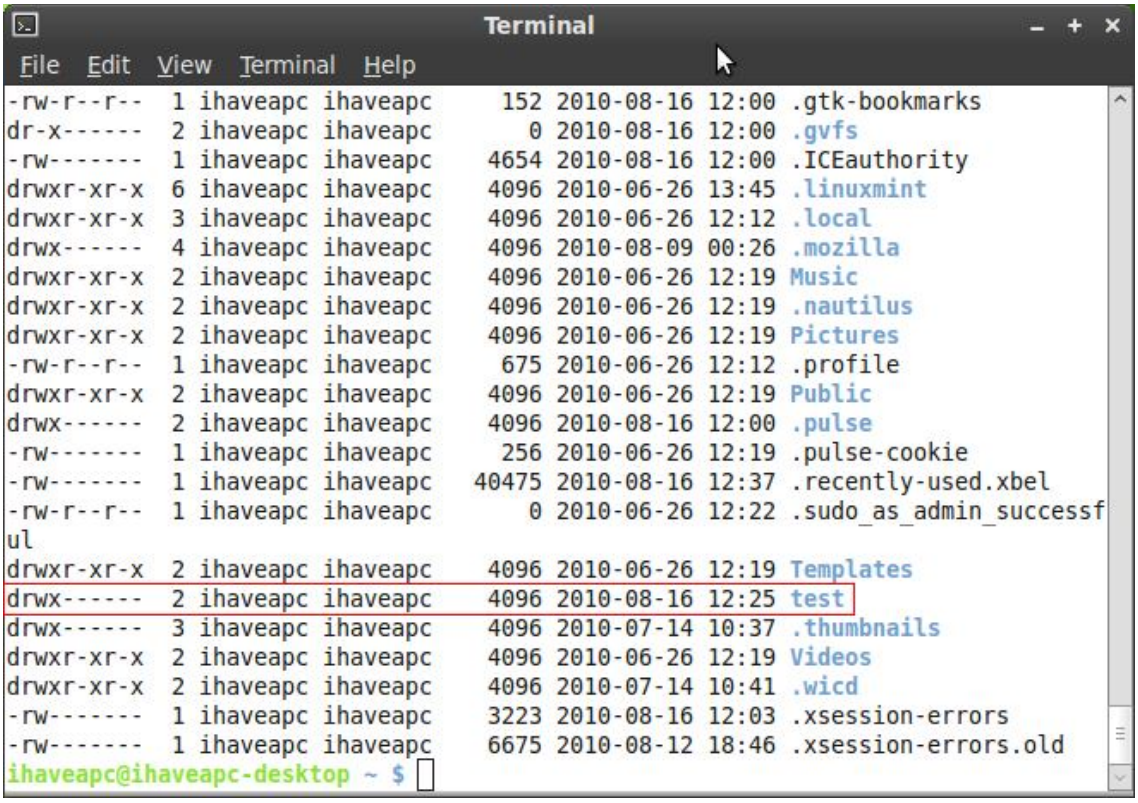


The output of 'ls -la' command shows that the above command allows owner to list files in directory 'test', create files in directory 'test', delete files from the directory 'test' and to change to the directory 'test'. Group members and others can change to the directory 'test' and list the files only.

Issue the following command at the terminal:

chmod 700 test


Terminal
File Edit View Terminal Help
ihaveapc@ihaveapc-desktop ~ $ ls
Desktop Downloads Music Public test
Documents firefox-3.6.8.tar.bz2 Pictures Templates Videos
ihaveapc@ihaveapc-desktop ~ $ chmod 700 test
ihaveapc@ihaveapc-desktop ~ $


Terminal
File Edit View Terminal Help
-rw-r--r-- 1 ihaveapc ihaveapc 152 2010-08-16 12:00 .gtk-bookmarks
dr-x------ 2 ihaveapc ihaveapc 0 2010-08-16 12:00 .gvfs
-rw------- 1 ihaveapc ihaveapc 4654 2010-08-16 12:00 .ICEauthority
drwxr-xr-x 6 ihaveapc ihaveapc 4096 2010-06-26 13:45 .linuxmint
drwxr-xr-x 3 ihaveapc ihaveapc 4096 2010-06-26 12:12 .local
drwx------ 4 ihaveapc ihaveapc 4096 2010-08-09 00:26 .mozilla
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-06-26 12:19 Music
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-06-26 12:19 .nautilus
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-06-26 12:19 Pictures
-rw-r--r-- 1 ihaveapc ihaveapc 675 2010-06-26 12:12 .profile
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-06-26 12:19 Public
drwx------ 2 ihaveapc ihaveapc 4096 2010-08-16 12:00 .pulse
-rw------- 1 ihaveapc ihaveapc 256 2010-06-26 12:19 .pulse-cookie
-rw------- 1 ihaveapc ihaveapc 40475 2010-08-16 12:37 .recently-used.xbel
-rw-r--r-- 1 ihaveapc ihaveapc 0 2010-06-26 12:22 .sudo_as_admin_successful
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-06-26 12:19 Templates
drwx------ 2 ihaveapc ihaveapc 4096 2010-08-16 12:25 test
drwx------ 3 ihaveapc ihaveapc 4096 2010-07-14 10:37 .thumbnails
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-06-26 12:19 Videos
drwxr-xr-x 2 ihaveapc ihaveapc 4096 2010-07-14 10:41 .wicd
-rw------- 1 ihaveapc ihaveapc 3223 2010-08-16 12:03 .xsession-errors
-rw------- 1 ihaveapc ihaveapc 6675 2010-08-12 18:46 .xsession-errors.old
ihaveapc@ihaveapc-desktop ~ $

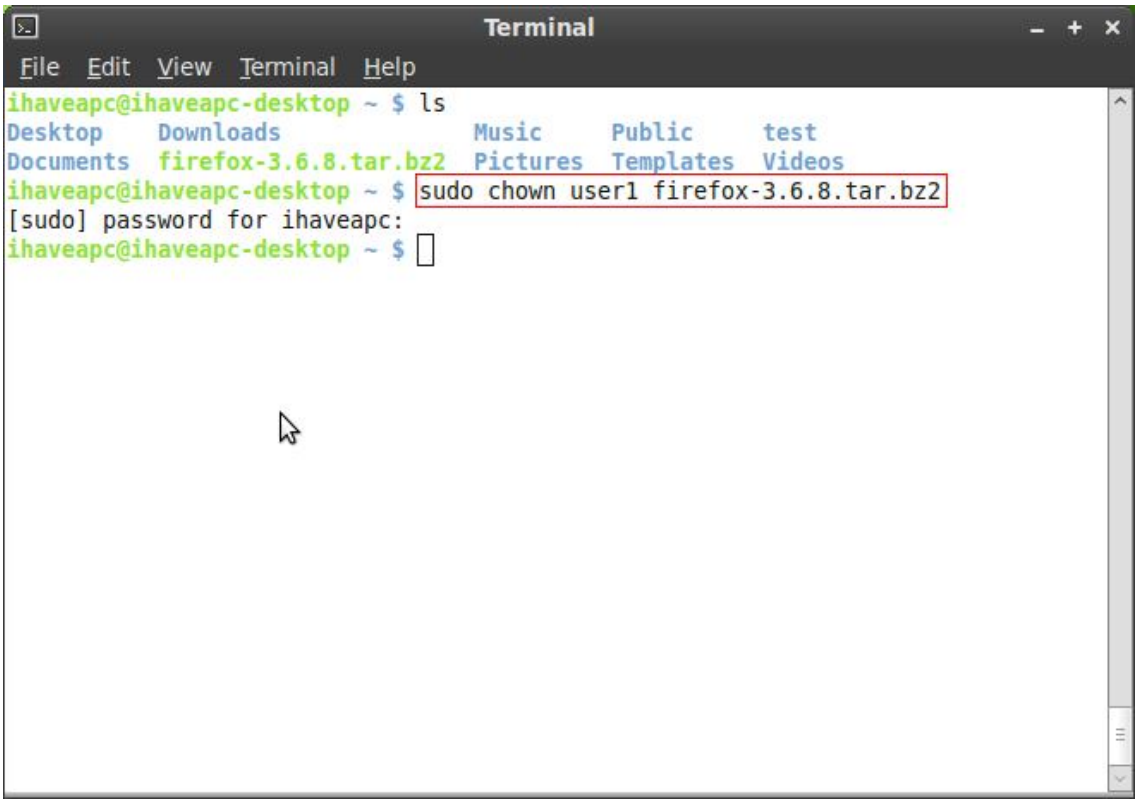
The output of 'ls -la' command shows that the above command allows owner to list files in directory 'test', create files in directory 'test', delete files from the directory 'test' and to change to the directory 'test'. Group members and others do not have any permission on the directory 'test'.

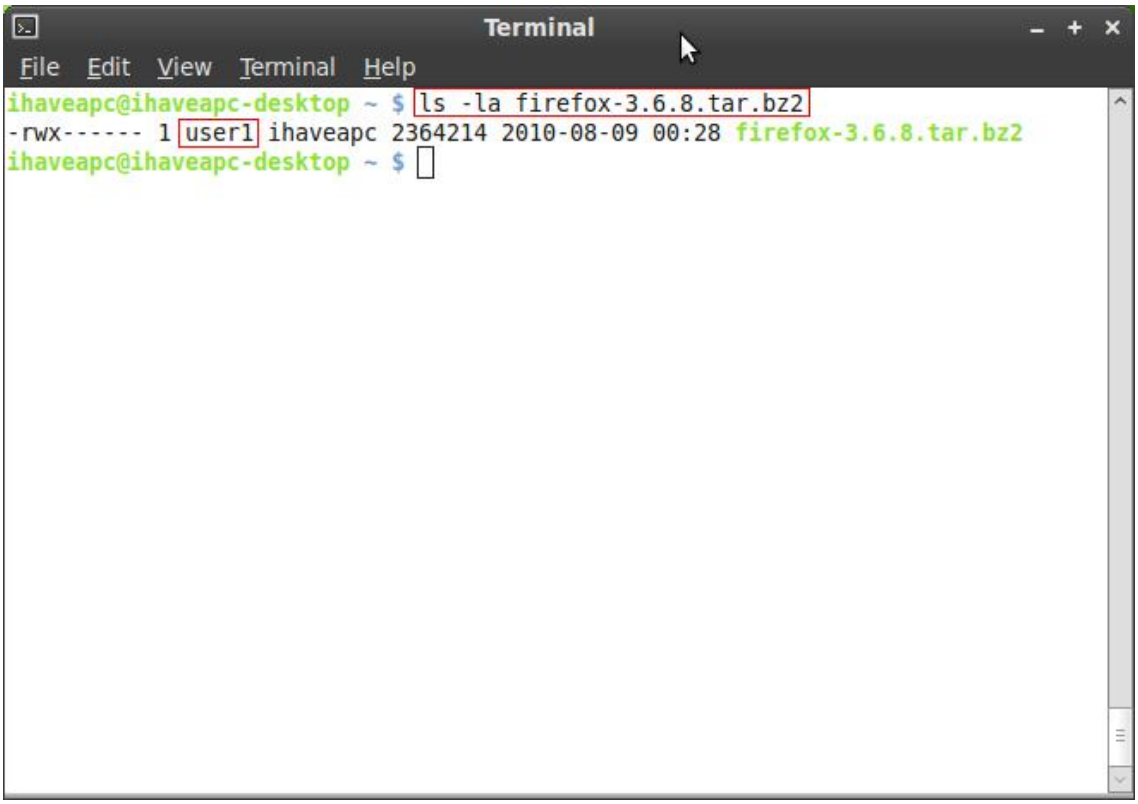
4. chown – changes file ownership.

Syntax – sudo chown <user-name(of new owner)> <file-name>

Issue the following command at the terminal:

sudo chown user1 firefox-3.6.8.tar.bz2





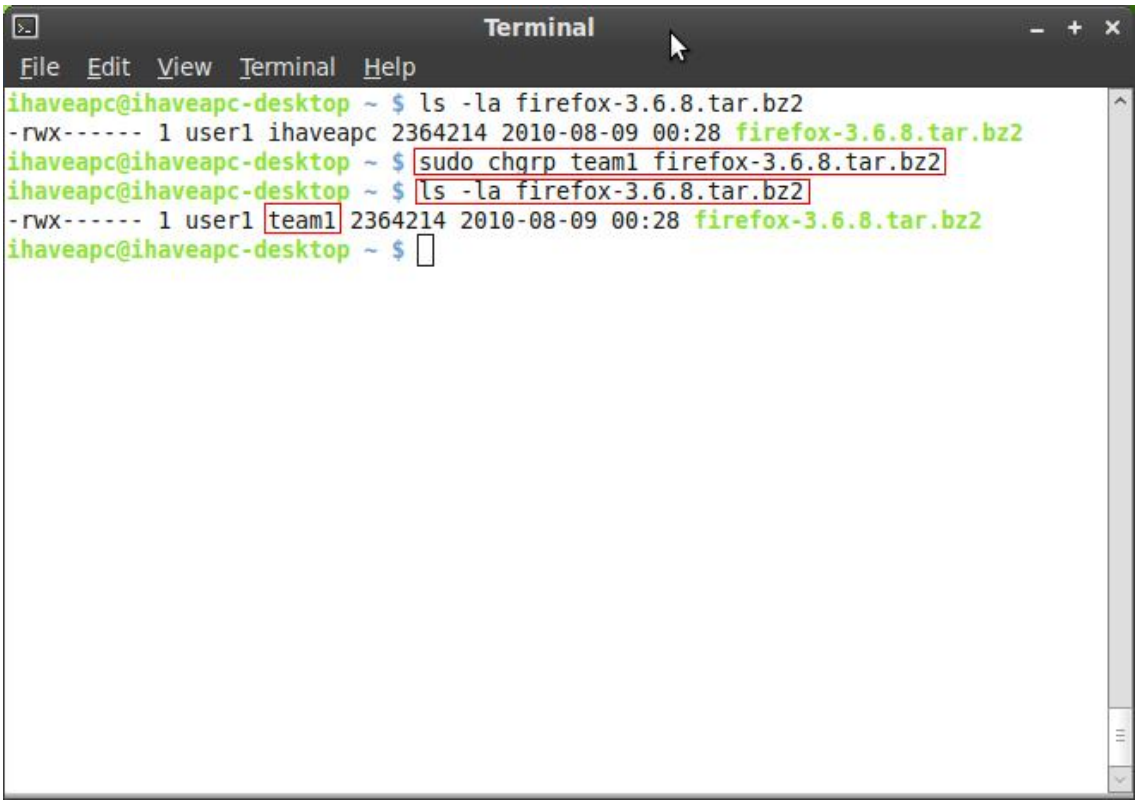
The output of command 'ls -la firefox-3.6.8.tar.bz2' shows that 'user1' is the new owner of the file.

5. chgrp – changes file's group ownership

Syntax – sudo chgrp <group-name(of new owner group)> <file-name>

Issue the following command at the terminal:

sudo chgrp team1 firefox-3.6.8.tar.bz2

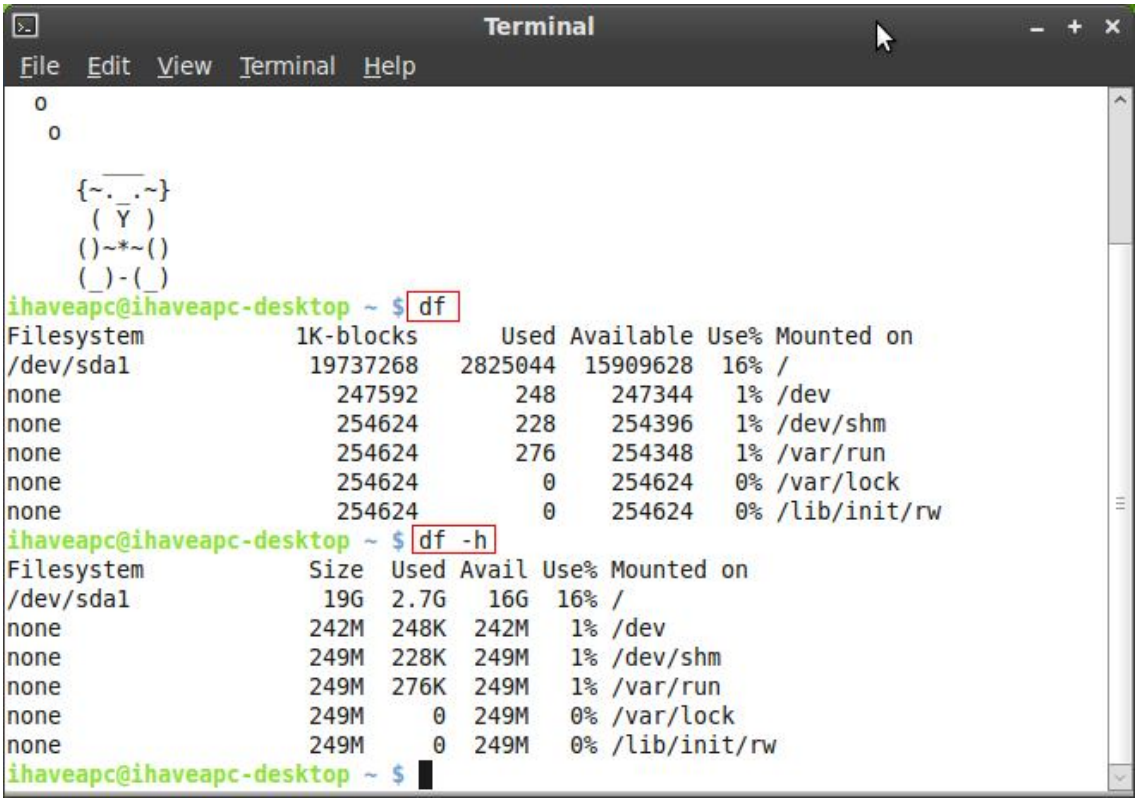


The output of the command 'ls -la firefox-3.6.8.tar.bz2' shows that the file's group ownership has changed to 'team1'.

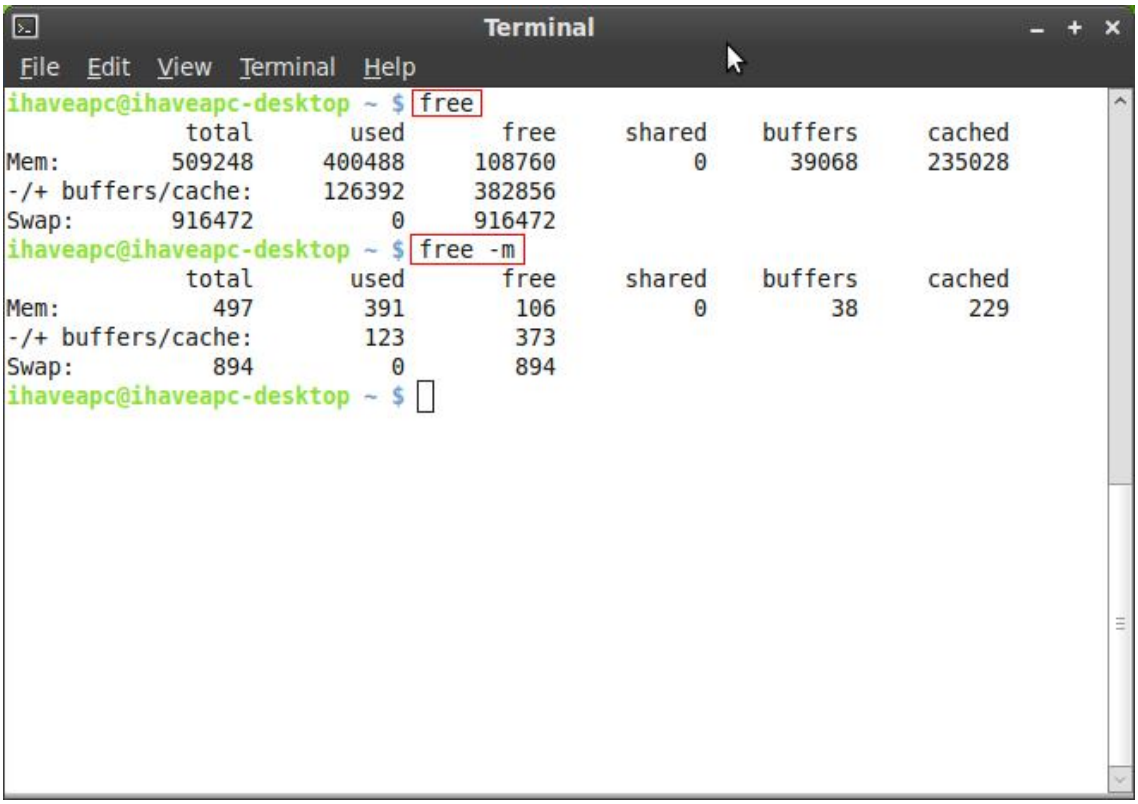
PART 5: System Information Commands

Now we'll learn a few Linux system information commands:

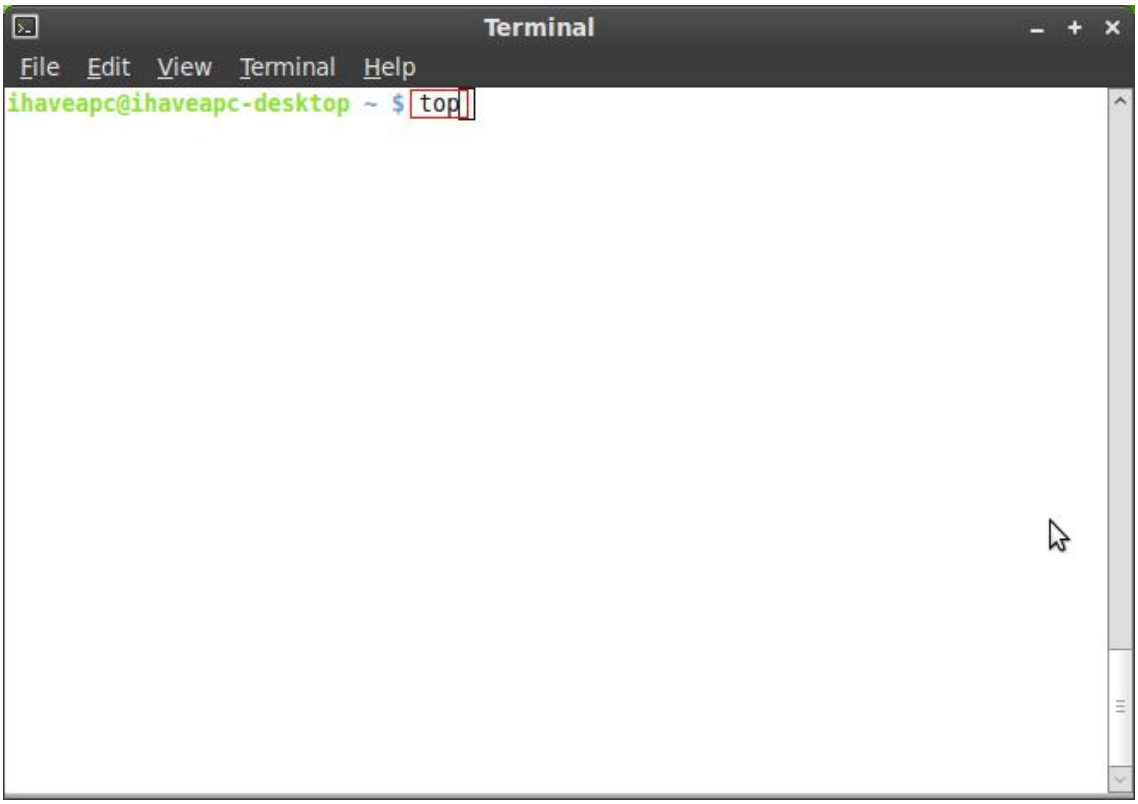
1. df – disk free. This commands displays file system and disk space usage for all partitions. If option '-h' (human-readable) is used with the command, it will generate the report using KB/MB/GB units instead of number of blocks which are displayed when the command is used without any options.

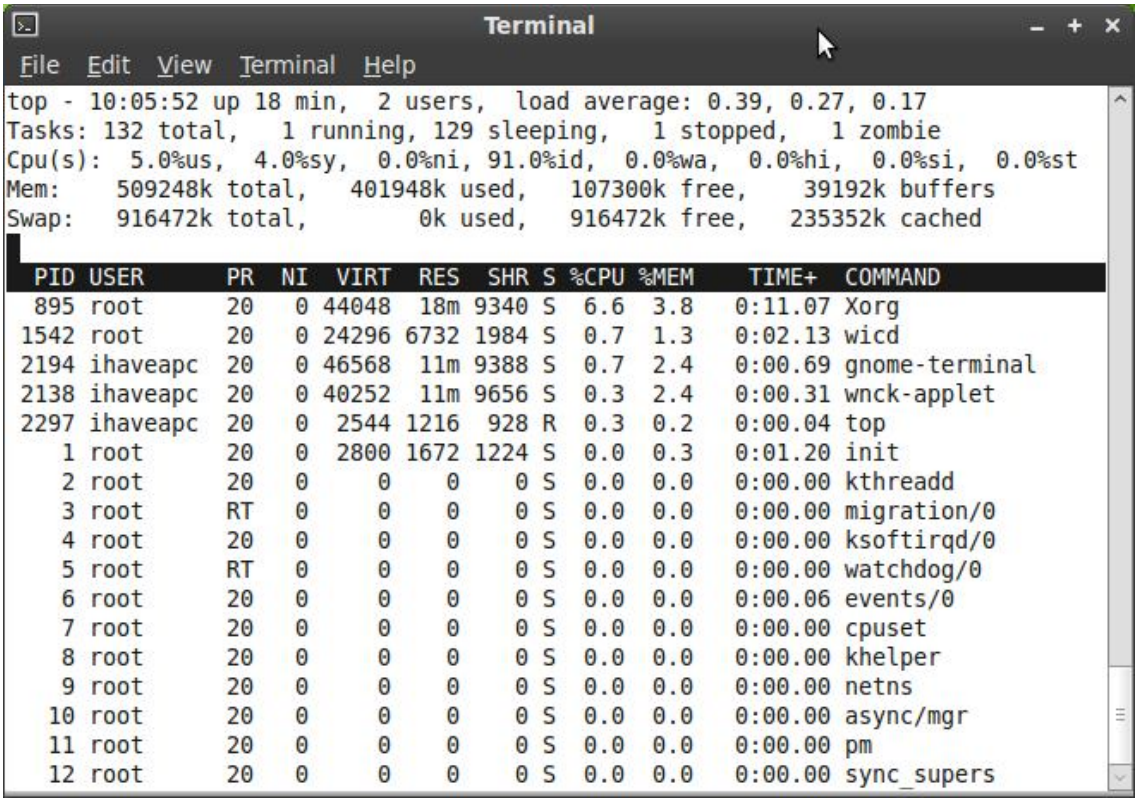


2. free – This command displays information about the amount of used and free system memory. If option '-m' is used with the command, report is generated using MB unit.

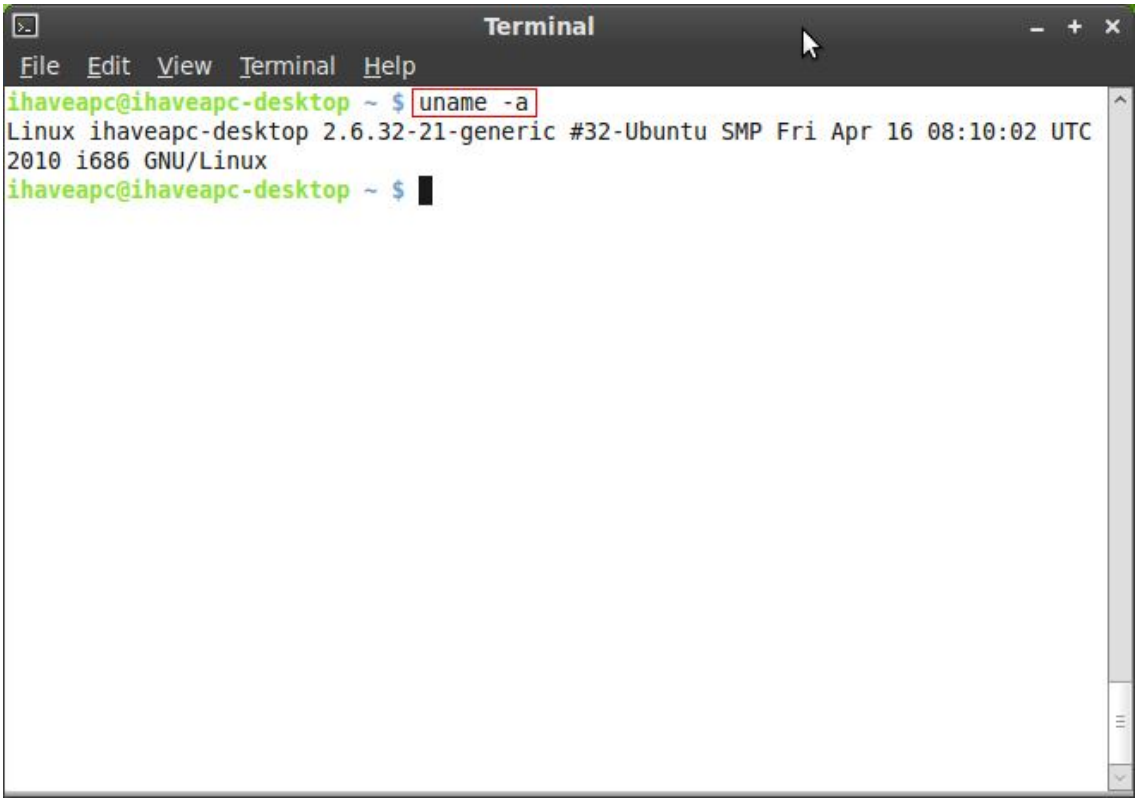


3. top – This command provides a real-time information about Linux system uptime, number of users, system load, number of tasks, and utilization of system resources such as cpu, memory and swap partition. You can press 'Ctrl' + 'Z' keys to quit the program at any time.

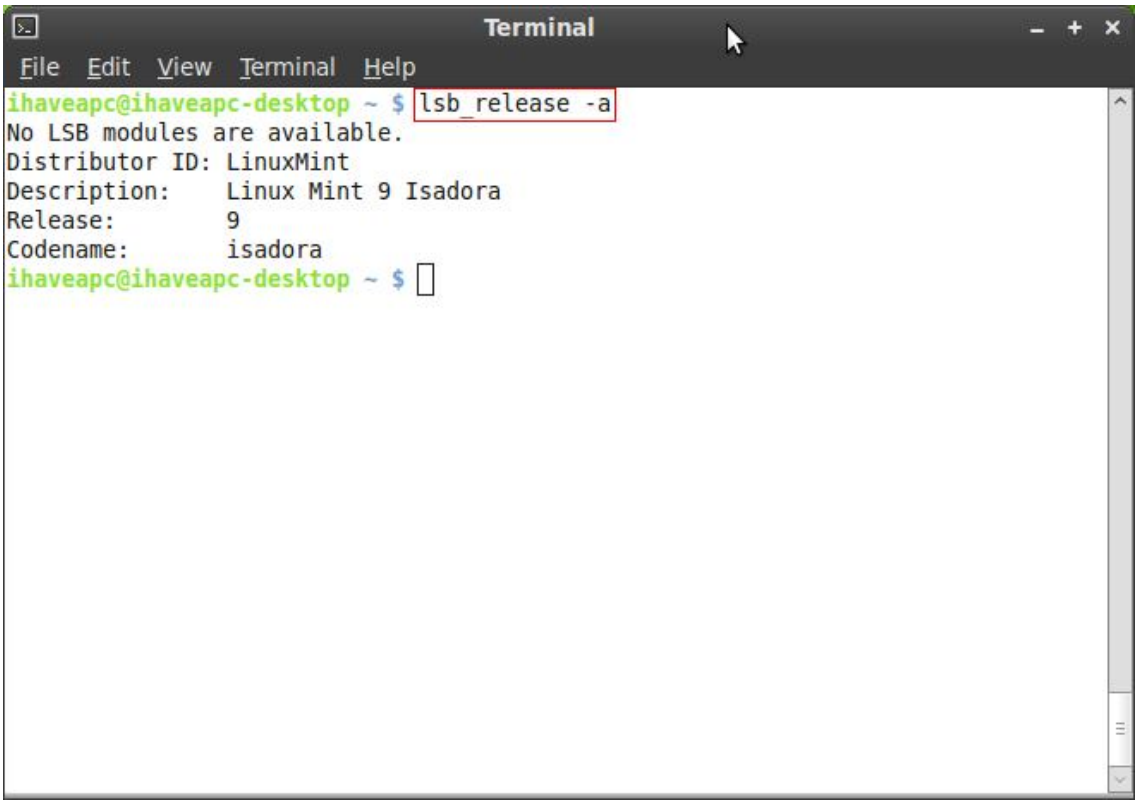

Terminal
File Edit View Terminal Help
ihaveapc@ihaveapc-desktop ~ $ top


Terminal
File Edit View Terminal Help
top - 10:05:52 up 18 min, 2 users, load average: 0.39, 0.27, 0.17
Tasks: 132 total, 1 running, 129 sleeping, 1 stopped, 1 zombie
Cpu(s): 5.0%us, 4.0%sy, 0.0%ni, 91.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Mem: 509248k total, 401948k used, 107300k free, 39192k buffers
Swap: 916472k total, 0k used, 916472k free, 235352k cached
PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
895 root 20 0 44048 18m 9340 S 6.6 3.8 0:11.07 Xorg
1542 root 20 0 24296 6732 1984 S 0.7 1.3 0:02.13 wicd
2194 ihaveapc 20 0 46568 11m 9388 S 0.7 2.4 0:00.69 gnome-terminal
2138 ihaveapc 20 0 40252 11m 9656 S 0.3 2.4 0:00.31 wnck-applet
2297 ihaveapc 20 0 2544 1216 928 R 0.3 0.2 0:00.04 top
1 root 20 0 2800 1672 1224 S 0.0 0.3 0:01.20 init
2 root 20 0 0 0 0 S 0.0 0.0 0:00.00 kthreadd
3 root RT 0 0 0 0 S 0.0 0.0 0:00.00 migration/0
4 root 20 0 0 0 0 S 0.0 0.0 0:00.00 ksoftirqd/0
5 root RT 0 0 0 0 S 0.0 0.0 0:00.00 watchdog/0
6 root 20 0 0 0 0 S 0.0 0.0 0:00.06 events/0
7 root 20 0 0 0 0 S 0.0 0.0 0:00.00 cpuset
8 root 20 0 0 0 0 S 0.0 0.0 0:00.00 khelper
9 root 20 0 0 0 0 S 0.0 0.0 0:00.00 netns
10 root 20 0 0 0 0 S 0.0 0.0 0:00.00 async/mgr
11 root 20 0 0 0 0 S 0.0 0.0 0:00.00 pm
12 root 20 0 0 0 0 S 0.0 0.0 0:00.00 sync_supers

4. uname – unix name. This command provides the name, kernel version and other system architecture details about the current system and the Linux OS running on it. If option '-a' is used with the command, it will print machine type, network node host name, processor type, OS release and OS version.



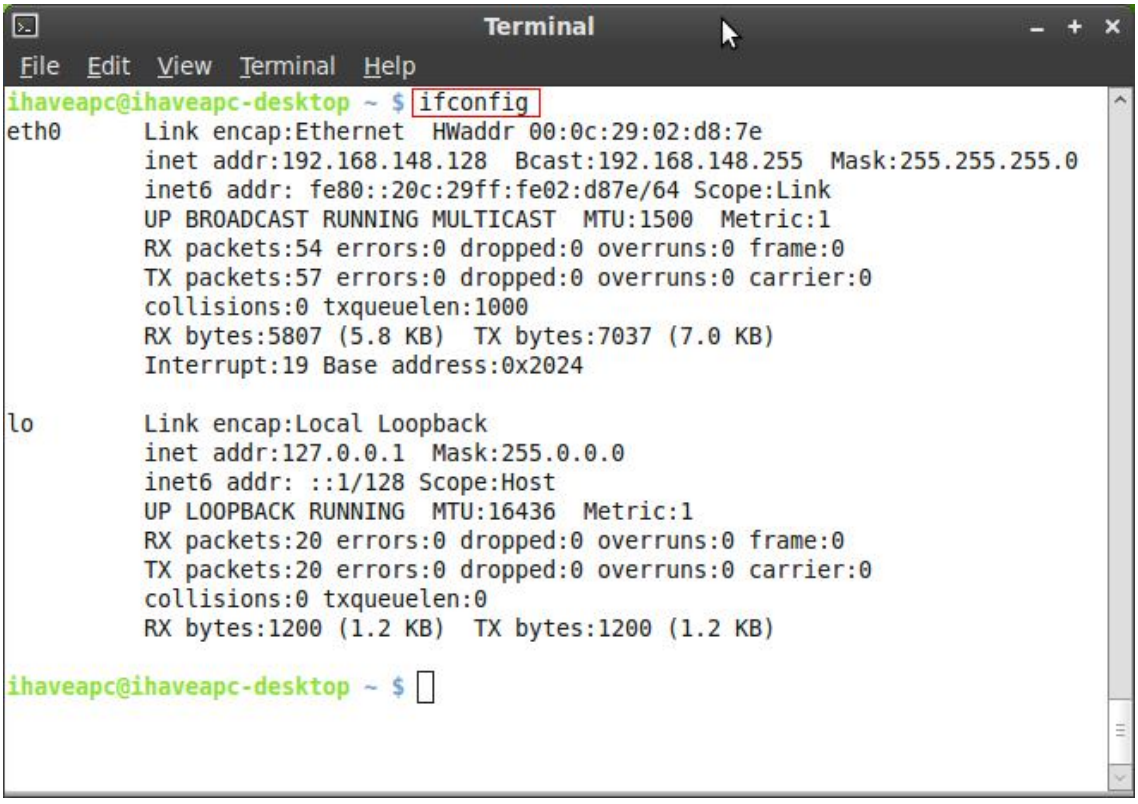
5. lsb_release – This command provides Linux Standard Base and the distribution information. When '-a' option is used with the command, it will print LSB version, distributor ID, description of distribution, release number and codename of the distribution.


Terminal
File Edit View Terminal Help
ihaveapc@ihaveapc-desktop ~ $ lsb_release -a
No LSB modules are available.
Distributor ID: LinuxMint
Description: Linux Mint 9 Isadora
Release: 9
Codename: isadora
ihaveapc@ihaveapc-desktop ~ $

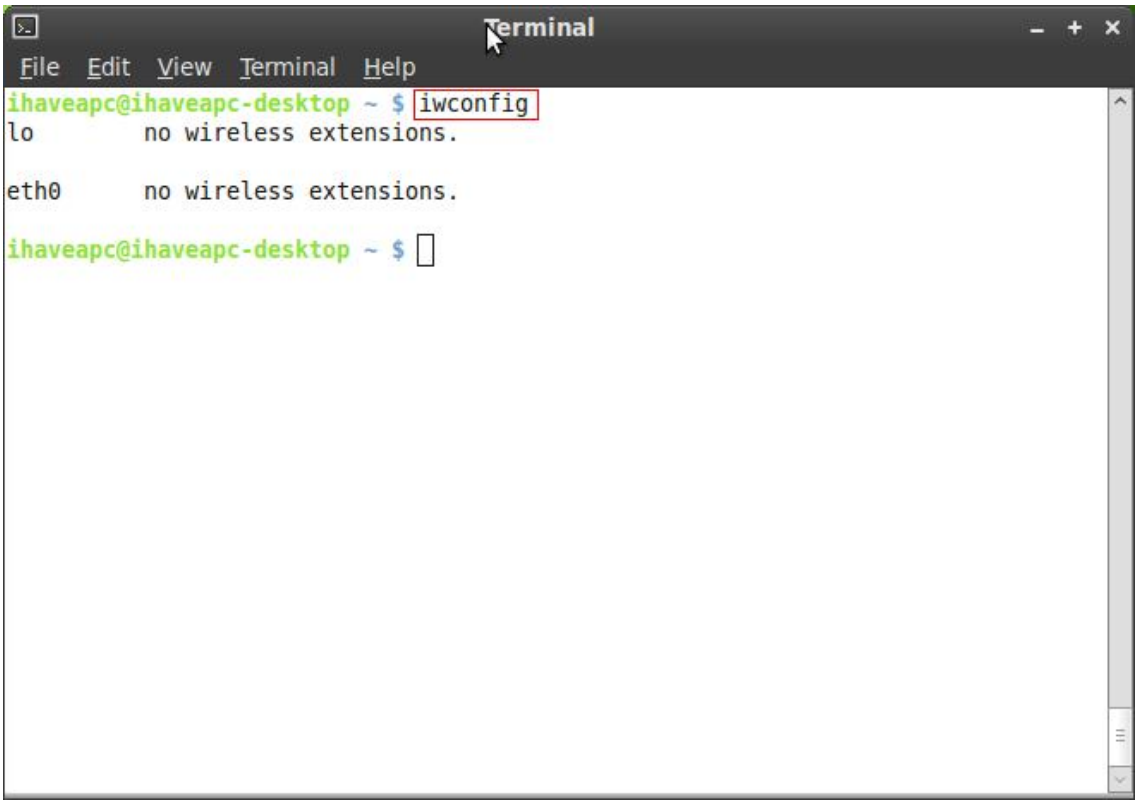
PART 6: More System Information Commands

Let us learn a few more Linux system information commands.

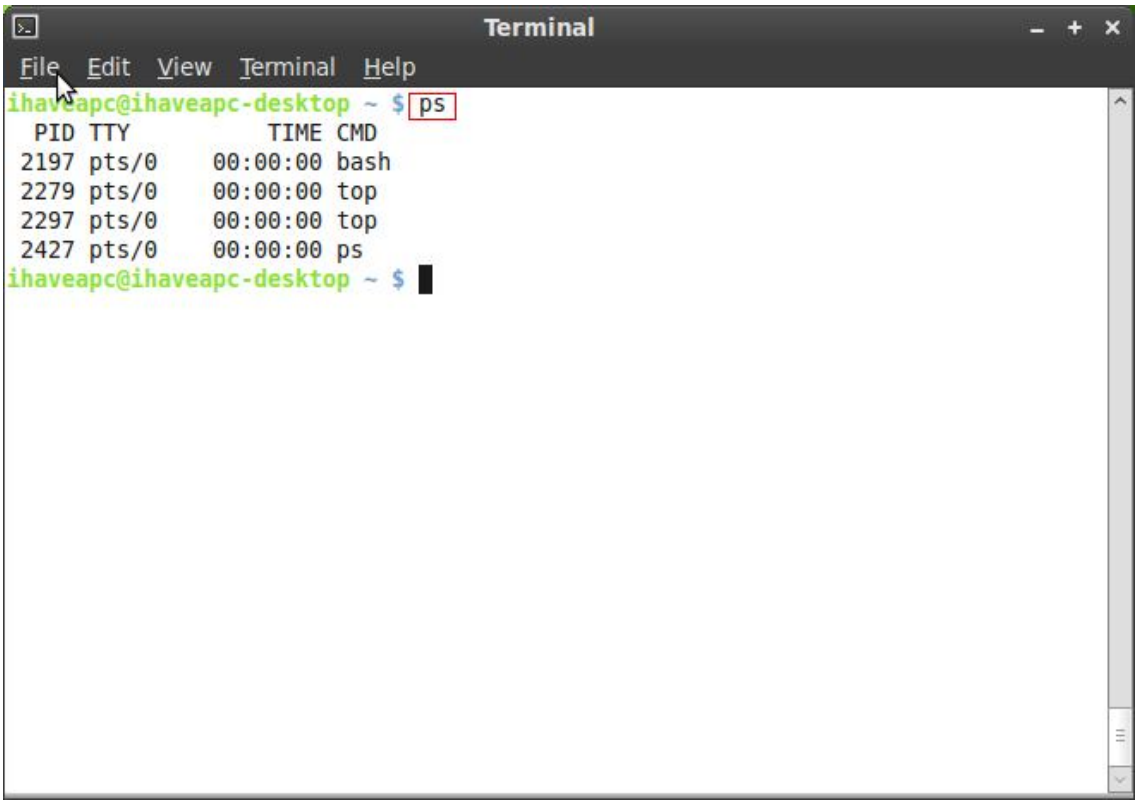
1. ifconfig – interface configuration. This command displays information about the network interfaces in a system.



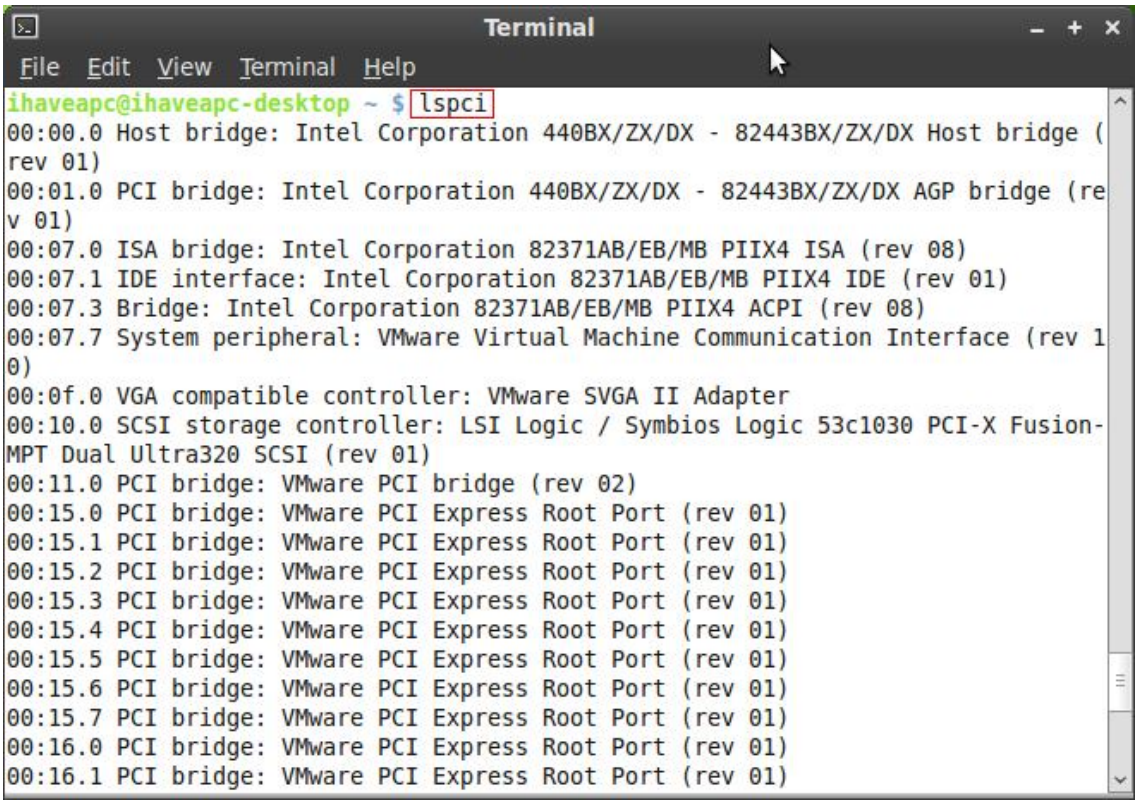
2. iwconfig – This command is similar to 'ifconfig' command but it only displays information about the wireless network interfaces. (You won't see any wireless network interface in the screenshot as it has been taken inside a virtual machine.)

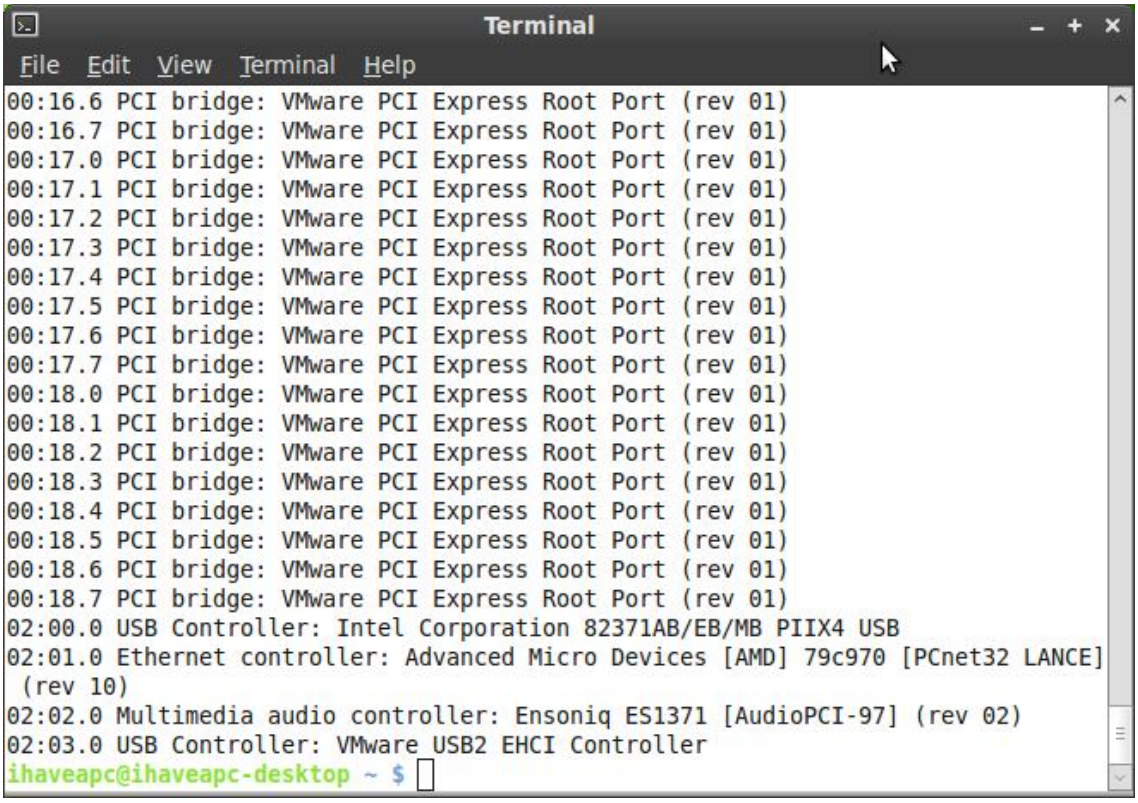


3. ps – process status. This command shows you all the processes running in the system.

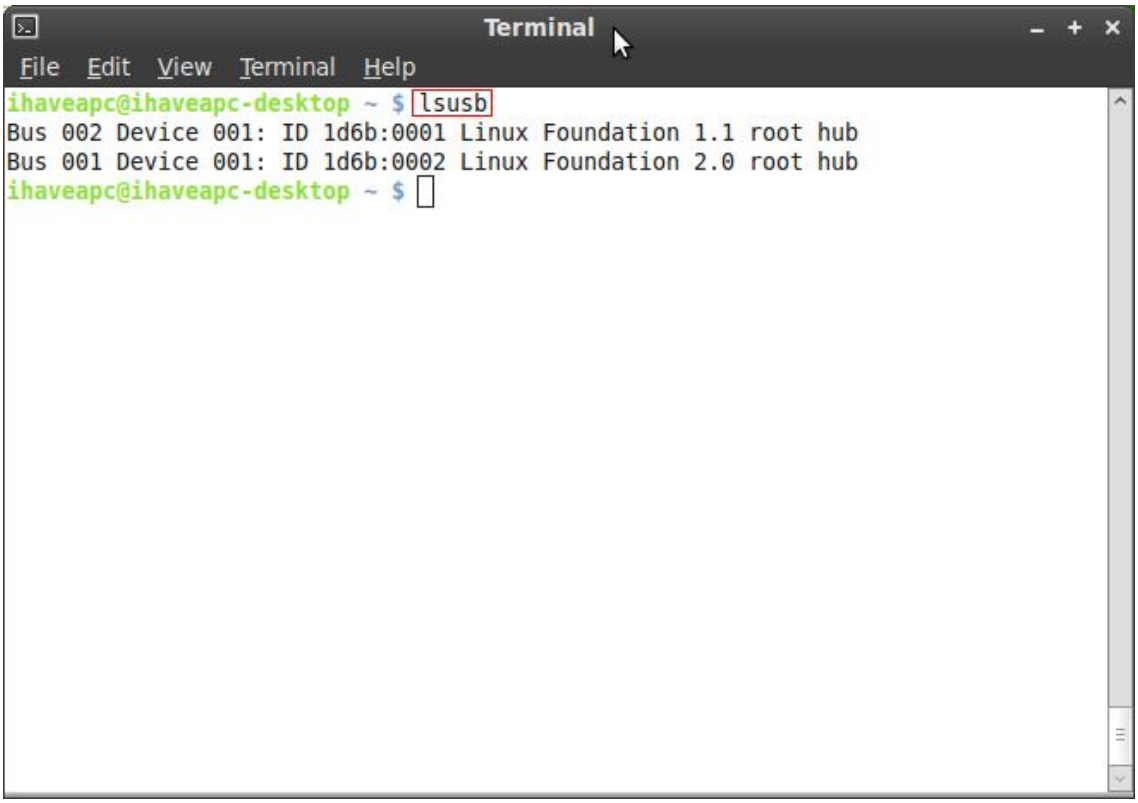


4. lspci – This command lists all PCI buses and devices connected to them.

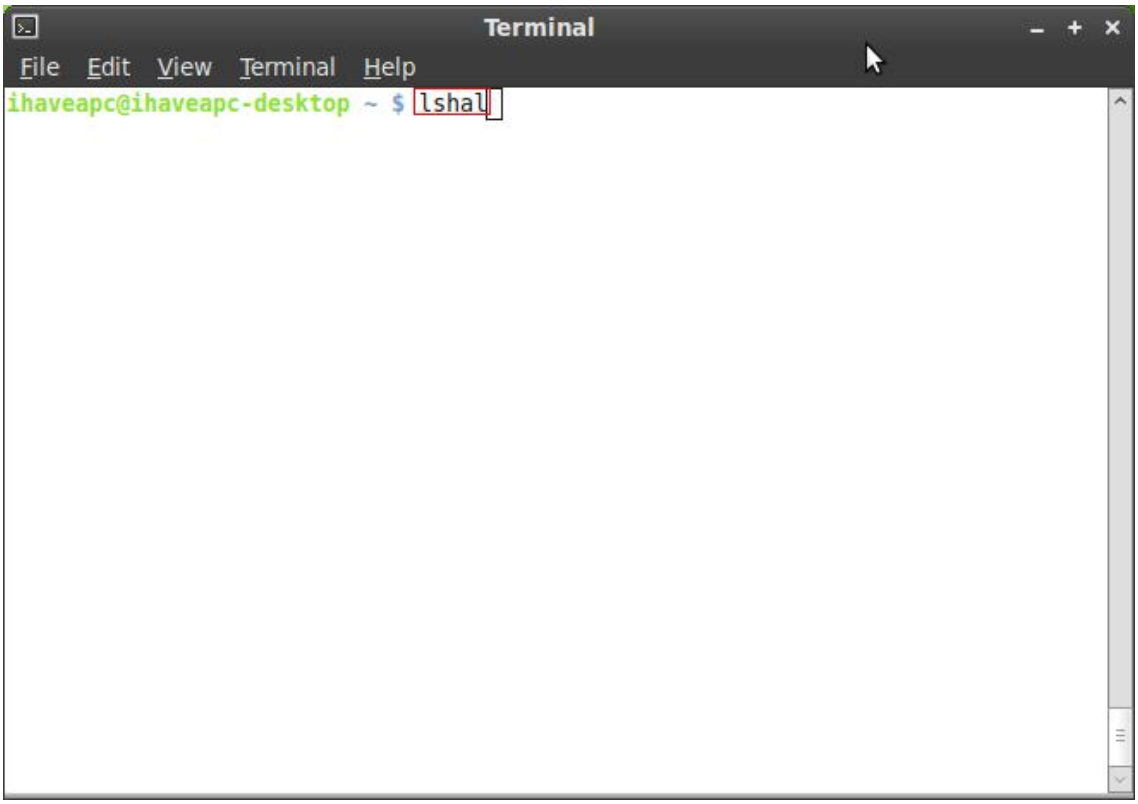

Terminal
File Edit View Terminal Help
ihaveapc@ihaveapc-desktop ~ $ lspci
00:00.0 Host bridge: Intel Corporation 440BX/ZX/DX - 82443BX/ZX/DX Host bridge (
rev 01)
00:01.0 PCI bridge: Intel Corporation 440BX/ZX/DX - 82443BX/ZX/DX AGP bridge (re
v 01)
00:07.0 ISA bridge: Intel Corporation 82371AB/EB/MB PIIX4 ISA (rev 08)
00:07.1 IDE interface: Intel Corporation 82371AB/EB/MB PIIX4 IDE (rev 01)
00:07.3 Bridge: Intel Corporation 82371AB/EB/MB PIIX4 ACPI (rev 08)
00:07.7 System peripheral: VMware Virtual Machine Communication Interface (rev 1
0)
00:0f.0 VGA compatible controller: VMware SVGA II Adapter
00:10.0 SCSI storage controller: LSI Logic / Symbios Logic 53c1030 PCI-X Fusion-
MPT Dual Ultra320 SCSI (rev 01)
00:11.0 PCI bridge: VMware PCI bridge (rev 02)
00:15.0 PCI bridge: VMware PCI Express Root Port (rev 01)
00:15.1 PCI bridge: VMware PCI Express Root Port (rev 01)
00:15.2 PCI bridge: VMware PCI Express Root Port (rev 01)
00:15.3 PCI bridge: VMware PCI Express Root Port (rev 01)
00:15.4 PCI bridge: VMware PCI Express Root Port (rev 01)
00:15.5 PCI bridge: VMware PCI Express Root Port (rev 01)
00:15.6 PCI bridge: VMware PCI Express Root Port (rev 01)
00:15.7 PCI bridge: VMware PCI Express Root Port (rev 01)
00:16.0 PCI bridge: VMware PCI Express Root Port (rev 01)
00:16.1 PCI bridge: VMware PCI Express Root Port (rev 01)

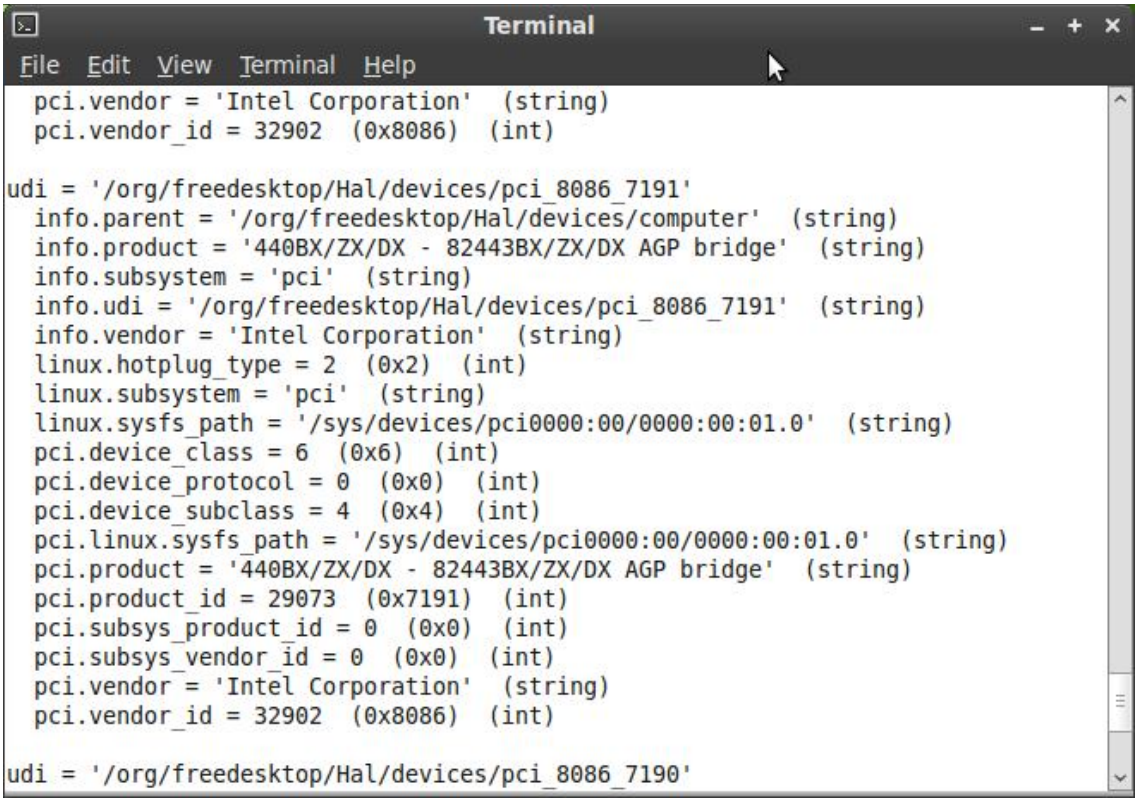

Terminal
File Edit View Terminal Help
00:16.6 PCI bridge: VMware PCI Express Root Port (rev 01)
00:16.7 PCI bridge: VMware PCI Express Root Port (rev 01)
00:17.0 PCI bridge: VMware PCI Express Root Port (rev 01)
00:17.1 PCI bridge: VMware PCI Express Root Port (rev 01)
00:17.2 PCI bridge: VMware PCI Express Root Port (rev 01)
00:17.3 PCI bridge: VMware PCI Express Root Port (rev 01)
00:17.4 PCI bridge: VMware PCI Express Root Port (rev 01)
00:17.5 PCI bridge: VMware PCI Express Root Port (rev 01)
00:17.6 PCI bridge: VMware PCI Express Root Port (rev 01)
00:17.7 PCI bridge: VMware PCI Express Root Port (rev 01)
00:18.0 PCI bridge: VMware PCI Express Root Port (rev 01)
00:18.1 PCI bridge: VMware PCI Express Root Port (rev 01)
00:18.2 PCI bridge: VMware PCI Express Root Port (rev 01)
00:18.3 PCI bridge: VMware PCI Express Root Port (rev 01)
00:18.4 PCI bridge: VMware PCI Express Root Port (rev 01)
00:18.5 PCI bridge: VMware PCI Express Root Port (rev 01)
00:18.6 PCI bridge: VMware PCI Express Root Port (rev 01)
00:18.7 PCI bridge: VMware PCI Express Root Port (rev 01)
02:00.0 USB Controller: Intel Corporation 82371AB/EB/MB PIIX4 USB
02:01.0 Ethernet controller: Advanced Micro Devices [AMD] 79c970 [PCnet32 LANCE]
(rev 10)
02:02.0 Multimedia audio controller: Ensoniq ES1371 [AudioPCI-97] (rev 02)
02:03.0 USB Controller: VMware USB2 EHCI Controller
ihaveapc@ihaveapc-desktop ~ $

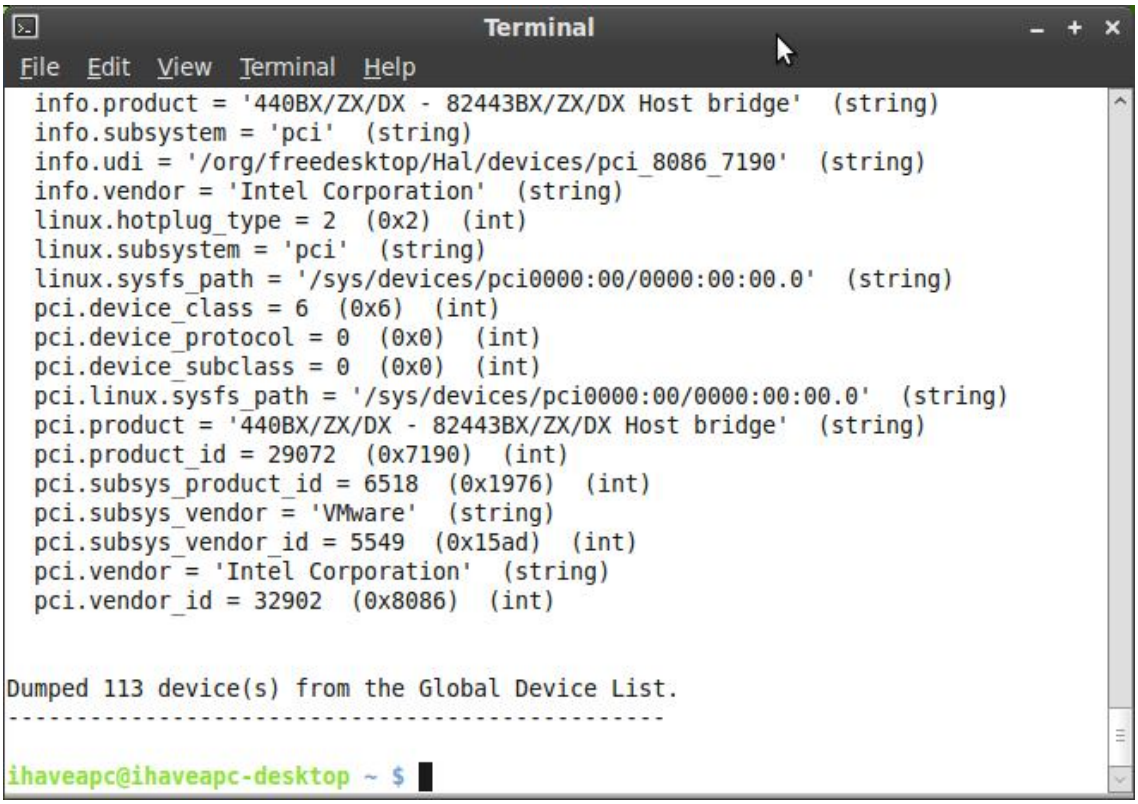
5. lsusb – This command lists all USB buses and devices connected to them.



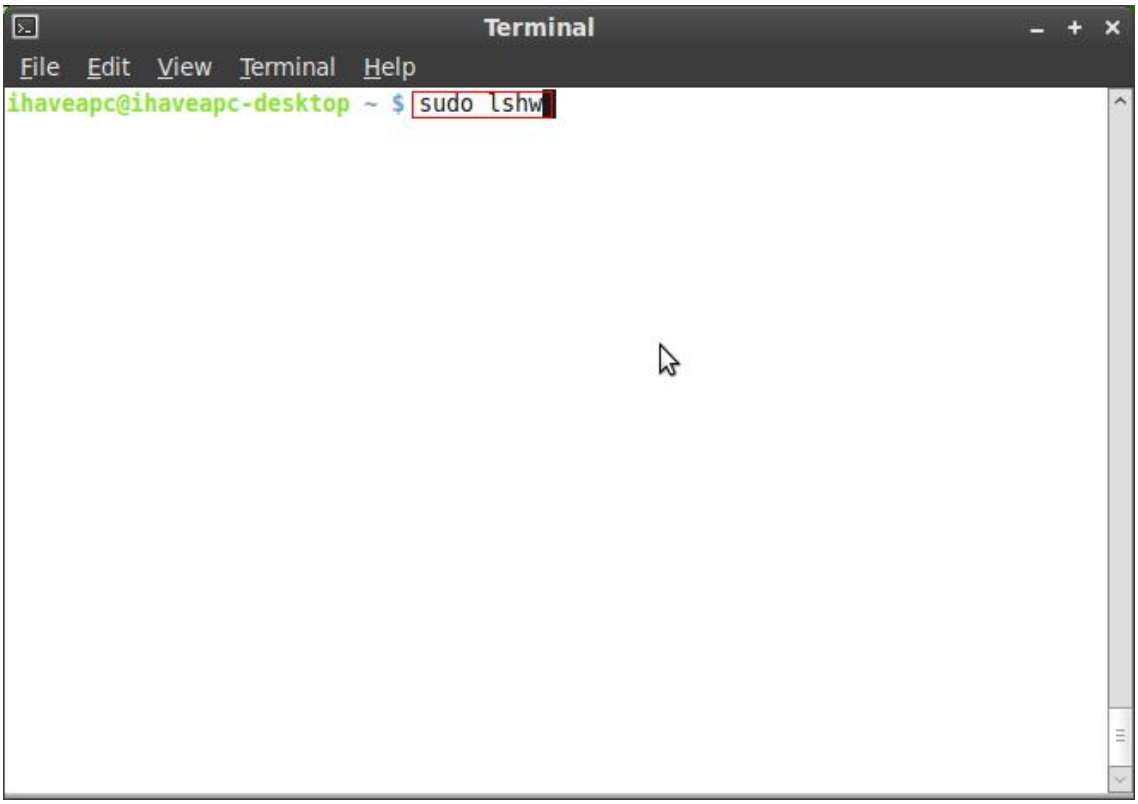
6. lshal – This command lists all the devices that HAL(Hardware Abstraction Layer) is aware about i.e. most of the hardware connected to your system.

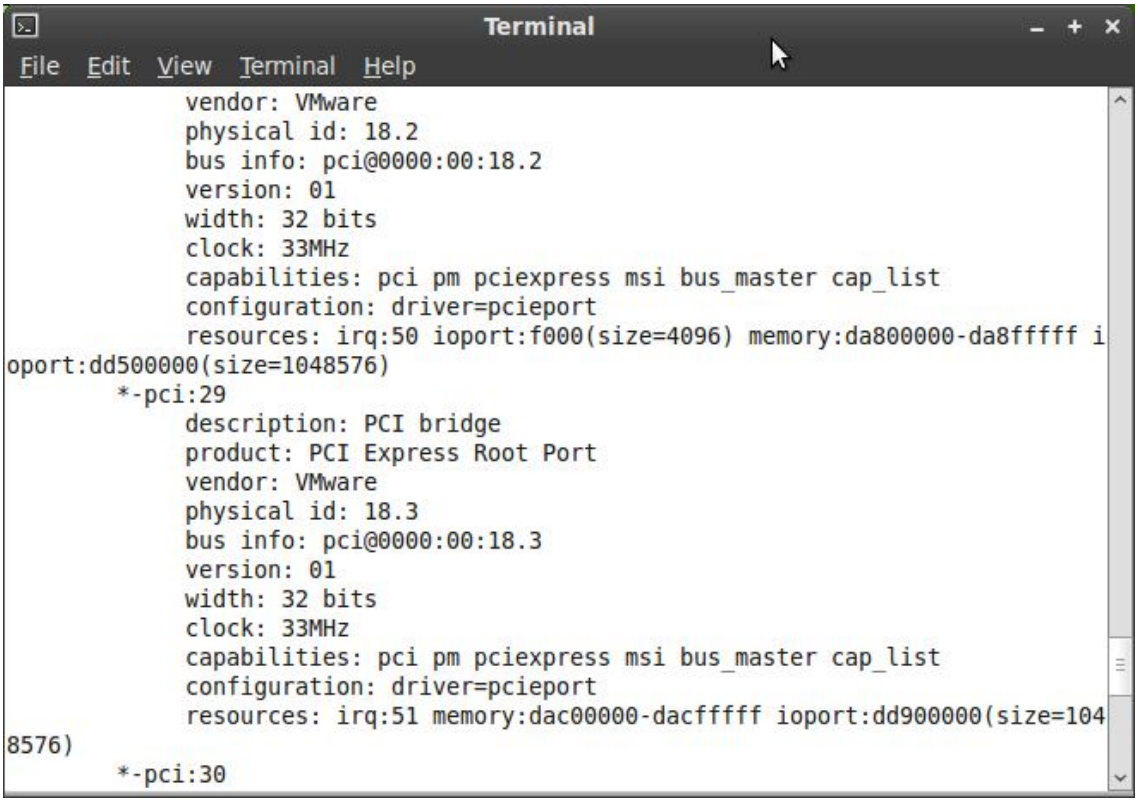

Terminal
File Edit View Terminal Help
ihaveapc@ihaveapc-desktop ~ $ lshal

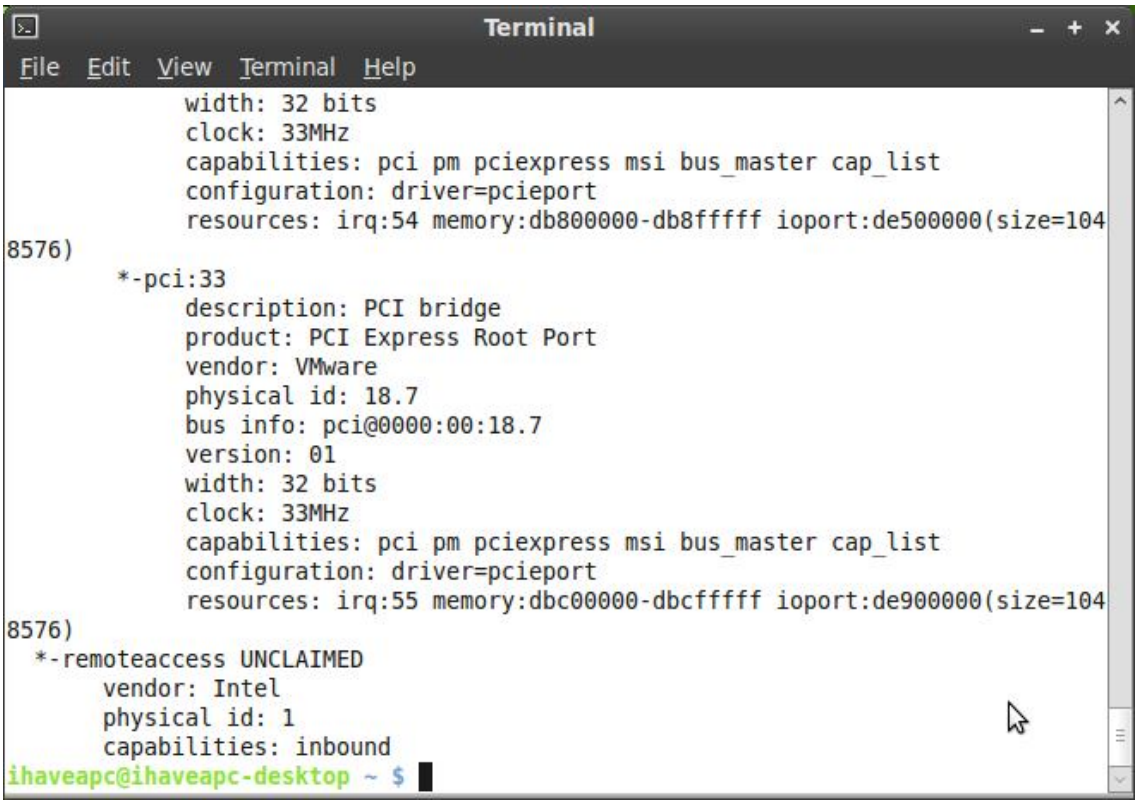

Terminal
File Edit View Terminal Help
pci.vendor = 'Intel Corporation' (string)
pci.vendor_id = 32902 (0x8086) (int)
udi = '/org/freedesktop/Hal/devices/pci_8086_7191'
info.parent = '/org/freedesktop/Hal/devices/computer' (string)
info.product = '440BX/ZX/DX - 82443BX/ZX/DX AGP bridge' (string)
info.subsystem = 'pci' (string)
info.udi = '/org/freedesktop/Hal/devices/pci_8086_7191' (string)
info.vendor = 'Intel Corporation' (string)
linux.hotplug_type = 2 (0x2) (int)
linux.subsystem = 'pci' (string)
linux.sysfs_path = '/sys/devices/pci0000:00/0000:00:01.0' (string)
pci.device_class = 6 (0x6) (int)
pci.device_protocol = 0 (0x0) (int)
pci.device_subclass = 4 (0x4) (int)
pci.linux.sysfs_path = '/sys/devices/pci0000:00/0000:00:01.0' (string)
pci.product = '440BX/ZX/DX - 82443BX/ZX/DX AGP bridge' (string)
pci.product_id = 29073 (0x7191) (int)
pci.subsys_product_id = 0 (0x0) (int)
pci.subsys_vendor_id = 0 (0x0) (int)
pci.vendor = 'Intel Corporation' (string)
pci.vendor_id = 32902 (0x8086) (int)
udi = '/org/freedesktop/Hal/devices/pci_8086_7190'



7. lshw – This command lists hardware present in the system including information about manufacturer, device type and where it is connected.


Terminal
File Edit View Terminal Help
ihaveapc@ihaveapc-desktop ~ $ sudo lshw


Terminal
File Edit View Terminal Help
vendor: VMware
physical id: 18.2
bus info: pci@0000:00:18.2
version: 01
width: 32 bits
clock: 33MHz
capabilities: pci pm pciexpress msi bus_master cap_list
configuration: driver=pcieport
resources: irq:50 ioport:f000(size=4096) memory:da800000-da8fffff i
oport:dd500000(size=1048576)
*-pci:29
description: PCI bridge
product: PCI Express Root Port
vendor: VMware
physical id: 18.3
bus info: pci@0000:00:18.3
version: 01
width: 32 bits
clock: 33MHz
capabilities: pci pm pciexpress msi bus_master cap_list
configuration: driver=pcieport
resources: irq:51 memory:dac00000-dacfffff ioport:dd900000(size=104
8576)
*-pci:30


Terminal
File Edit View Terminal Help
width: 32 bits
clock: 33MHz
capabilities: pci pm pciexpress msi bus_master cap_list
configuration: driver=pcieport
resources: irq:54 memory:db800000-db8fffff ioport:de500000(size=104
8576)
*-pci:33
description: PCI bridge
product: PCI Express Root Port
vendor: VMware
physical id: 18.7
bus info: pci@0000:00:18.7
version: 01
width: 32 bits
clock: 33MHz
capabilities: pci pm pciexpress msi bus_master cap_list
configuration: driver=pcieport
resources: irq:55 memory:dbc00000-dbcfffff ioport:de900000(size=104
8576)
*-remoteaccess UNCLAIMED
vendor: Intel
physical id: 1
capabilities: inbound
ihaveapc@ihaveapc-desktop ~ $

PART 7: vi Cheat Sheet