Linux & Scripting for Researchers

Getting Started to Supercomputing Facility at Tribhuvan University

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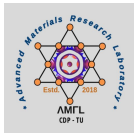

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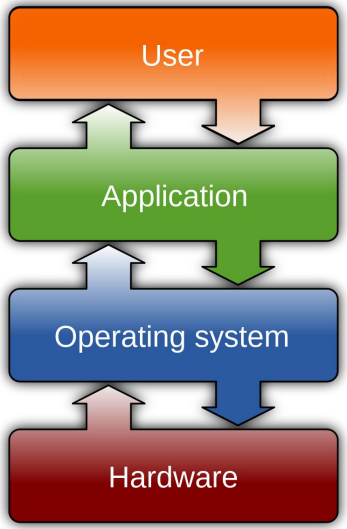
What is Operating System?

- An operating system (OS) is system software that **manages computer hardware and software resources,** and provides common services for computer programs.
- Operating system **32-bit and 64-bit**
- 32-bit operating system can only accept a maximum of 4 GB of RAM, while the 64-bit operating system is able to use more than 128 GB of RAM.

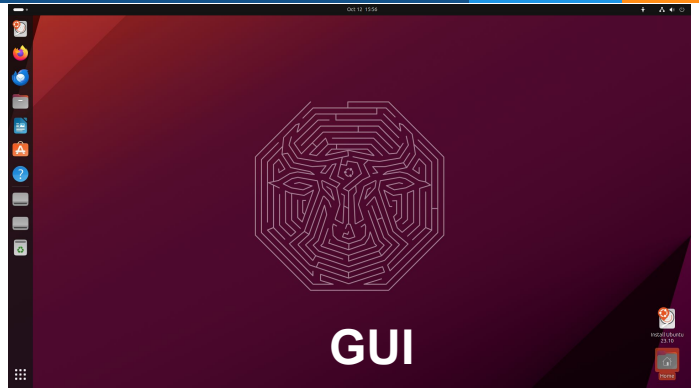


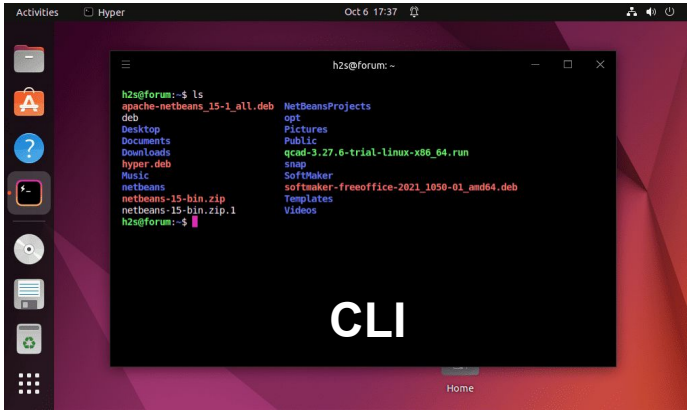
Why Choose Linux as Operating System?

- Free and Open source
  - The largest open-source project in the world !
  - Free of Cost
- Powerful, yet Compact
  - Linux runs all the Top 500 supercomputer
  - Unix was the first OS to include TCP/IP; today, Linux basically runs the internet.
  - Yet, it’s small (fast!) enough to embed in refrigerators, televisions, mobile phones,...

User Interface in Linux

- Very (very) similar to the Microsoft Windows
- User Interface –
  - Graphical (GUI)
    - (a window + mouse)
    - Linux desktop
  - Text based (CLI)
  - (command line + type)
    - [terminal]



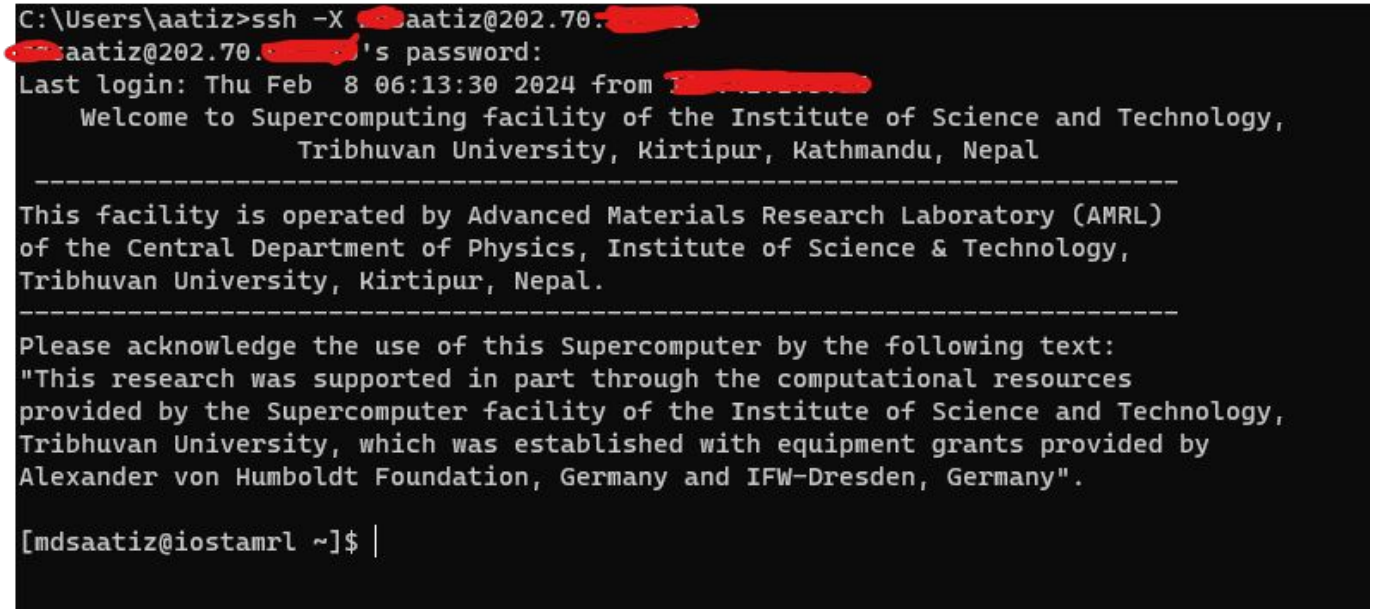


Login into Supercomputer (Tribhuvan University)

- From Windows:
  - Goto “Command Prompt” on Search.
  - Type: “ssh”
- Form Linux:
  - Goto “Terminal”
  - Type “ssh”

Login Command: **ssh -X username@ip-address:port**

Login into Supercomputer (Tribhuvan University)



Login Command: **ssh -X username@ip-address:port**

File, Directories, and Processes

- A **file** is a collection of data held in non-volatile storage such as a hard disk. It has a location in *file system* called *a path*. Paths typically be a series of words (directory names) Separated by forward slashes, /.
- A **directory** is a special type of file holding information about other files. It is the equivalent of folder in windows. Think of directory as a container for other files or directories.
- A **process** is an executing program that requires volatile storage such as RAM, as well as CPU resources. Process may be short in duration, such as a process that prints a file to the screen, or they may run indefinitely.

Directories and Paths

- The entire collection of directories in linux forms a tree structure
- A full path identifies the exact branch that locates a file or directory in the tree, starting from the trunk.
- The leading slash in the path, /, signifies the trunk or “root” directory
- The main branches from root have traditional names in Linux and Unix:
  - /bin, /sys for executable files that are considered part of the OS.
  - /lib, /lib64 for libraries needed by executables of all types
  - /etc for input and output files related to OS process
  - /tmp for temporary files
  - /home for home directories

Commands to Work with Directories

- **pwd**
  - print working directory, specially, the full path to the current working directory
- **ls**
  - list directory contents (files and subdirectories)
- **cd**
  - change directory
  - examples: **cd ~** takes you home directory, **cd . .** takes you up a level
- **mkdir <name>**
  - Make a directory with specified name (or path)

Keyboard Shortcuts in terminal

- **Up/down** arrows go up and down the list of previous commands
- **Tab key** auto completes a file or directory name
- **! !** repeats the previous command
- **history <N>**
  - display a list of the last N commands that have been executed in the terminal

Working with files and directories

- **cp file1 file2**
  - Copy file1 to file2
- **mv file1 file2**
  - move(rename) file1 to file2
- **mv dir1 dir2**
  - Move (rename) dir1 to dir2
- **rm file1**
  - Remove (immediately delete) file1
- **cp file1 dir1**
  - Copy file1 into directory dir1
- **mv file1 dir1**
  - Move file1 into directory dir1
- **mv dir2 dir1**
  - Move dir2 into existing directory dir1
- **rmdir dir1**
  - Remove empty directory dir1

Wildcard matching: **mv *.mp4 ../CodeDir**

- move all files ending with ".mp4" into existing directory Codedir, one levelup

Create, viewing and edit files

- touch <file-name>
  - create new, empty files
- nano <file-name>
  - A text editor used in linux terminals.
- cat <file-name>
  - preview files

File Permission

- By default Linux applies permissions to files (and folders)
- There are 3 types of permissions, read, write and execute
- Numerically values can be represented as:
- 0 = No Permission, 1 = Execute, 2 = Write, 4 = Read
- We can use chmod to change mode (permissions)

chmod 400 file - Read by user
chmod 040 file - Read by group
chmod 004 file - Read by other (World)

File Permission

- **For example : chmod 700**

  Sum the value (by collective; owner, group, world)

  So; 400 + 200 + 100 = 700

  Thus; 700 means Read/Write/Execute by USER only

- **[chmod 777 = give full access to everyone]**

System management

- df — Displays disk free space on your system
- free — Displays RAM (used and free)
- ip — Displays network details, can also be used to configure network-related settings
- ps — Displays currently running processes
- whoami — Displays the current user name
- mount/umount — Attaches and detaches a separate filesystem (e.g. hard drives or USB)
- logout - logout of the user

Break !