Scientific and Techincal Computing

Introduction to Linux shell environment.

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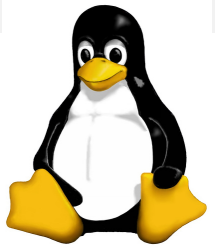
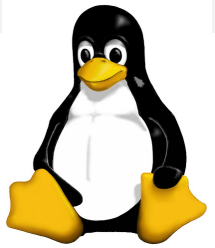
Linux Command Line



What's Scientific Computing and Why Linux?

- Using computers to analyze and solve problems
  - Eg. Automating daunting and repetitive task such as huge-size matrix vector operations.
- It allows the study of mathematical models of physical phenomena.
- It is used to find optimal system parameters.
- Experimentalists use computers to control experiments and to gather relevant data.

Linux Command Line



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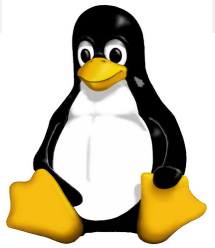

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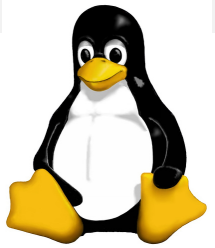

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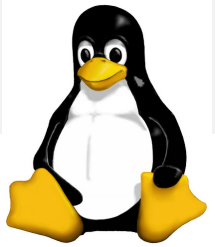
Linux Command Line - Outline

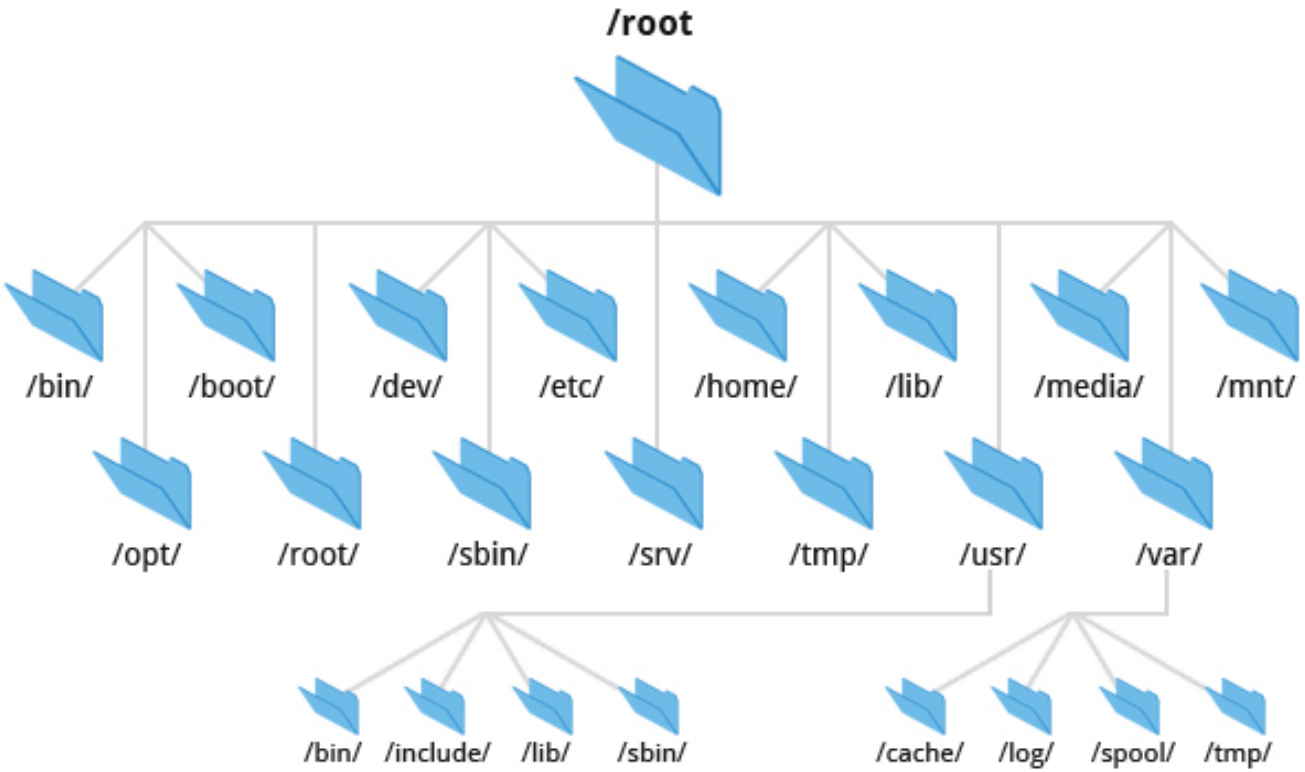


- File system
  - Linux File system
- Basic Operations
  - Basic Commands
  - File operations
  - User Environment
  - Access Control
  - Process Management
  - Network Management
- Text Editor
  - Vim
- Shell Tools & Programs
  - Shell Program
- Shell Programming
  - Bash Scripting
  - Variables
  - Statements
  - Conditionals
  - Control Sequence / Loops
  - Functions
- Regular Expressions
  - Regular Expression

Linux Command Line - File system

- Filesystem Types: ext2, ext3, ext4, reiserfs, vfat, xfs, nfs
- Devices: Block devices, Loop devices
- Block Devices:
- inodes
- FHS: Filesystem Hierarchy Standard
- NFS: Network File System

Linux Command Line - Linux Directory Structure



Linux Command Line - Basic Operations

- Basic Operations
  - Basic Commands
  - File operations
  - User Environment
  - Access Control
  - Process Management
  - Network Management

Linux Command Line - Basic Commands

ls: list files

pwd: present working directory

cd: change directory

cat: list file content

alias: remap a command

date: check or set date/time

uname: OS info. version and architecture

Linux Command Line - Basic Commands

- **pwd:** present working directory
- **ls:** list files/directories

ls: list files

```
~ $ ls
```

pwd: present working directory

```
~ $ pwd
```

cd: change directory
cd <directory-name>

```
~ $ cd Desktop
```

Navigate one step(directory) back cd ..

```
~ $ cd ..
```

- **cd:** change directory

ls

```
Desktop Pictures
Documents Downloads
```

pwd

```
/home/elliott
```

pwd

```
/home/elliott/Desktop
```

pwd

```
/home/elliott
```

More info on commands: https://maker.pro/linux/tutorial/basic-linux-commands-for-beginners

Linux Command Line - Basic Commands

touch: create new files

mkdir: create new directory

cp: cp files & directories

mv: relocate/move file & directories

rm: delete files & directories

Linux Command Line - Basic Commands ...

- **touch:** create a new file
- **mkdir:** create a new directory
- **cp:** copy files & directories

Create a new file
touch <filename>
Eg.

```
~ $ touch file1
~ $ touch file2
```

Create a new directory
mkdir <directoryname>
Eg. To create two directories called **dir1** and **dir2**

```
~ $ mkdir dir1
~ $ mkdir dir2 dir4 dir5
```

Copy a file from a particular location to another
cp <file-to-be-copied> <new-destination>
Eg. Copy *file1* to directory called **dir1**

```
~ $ cp file1 dir1
```

Copy a directory from a particular location to another
Copying is done **recursively**. [-r]
cp -r <directory-to-be-copied> <new-destination>
Eg. Copy *file1* to directory called **dir1**

Linux Command Line - Basic Commands ...

- **mv:** move/relocate/rename or a file/directory

Move/Relocate a file/directory to a new location

mv <file-to-be-moved> <new-destination>

Eg. To place *file2* into **dir2**

```
~ $ mv file2 dir2
```

<file-to-be-moved> and <new-destination> are actually **paths**.

Linux allows relative paths

Technically, the syntax below shows how it absolute paths works with mv

```
~ $ mv /home/elliott/file2 /home/elliott/dir2
```

Rename a **file**

mv <file-to-be-renamed> <new-name>

Eg. To rename *file1* into **file3**

```
~ $ mv file1 file3
```

Rename a **directory**

mv <directory-to-be-renamed> <new-name>

Eg. To rename *dir1* into **dir3**

```
~ $ mv dir1 dir3
```

Linux Command Line - Process Management

ps:: list processes

kill: kill processes

top: monitor processes

fuser: find process owner

Linux Command Line - User Environment

env: command to view user environment

export: command to add to user environment

bashrc: file to store user environment settings

profile: file for global user environment settings. /etc/profile

tilde: reference to current user

Linux Command Line - Basic Commands ...

End of Basic Commands, thank you ...

End of talk

Thank you ...