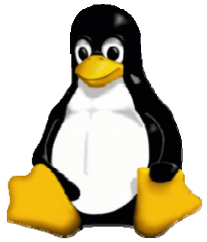
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

CSN-101 (Introduction to Computer Science and Engineering)

Lecture 11: Linux Operating System and Linux Administration



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Piazza Class Room: https://piazza.com/iitr.ac.in/fall2019/csn101

[Access Code: csn101@2019]

Moodle Submission Site: https://moodle.iitr.ac.in/course/view.php?id=45

[Enrollment Key: csn101@2019]

Plan for Lecture Classes in CSN-101 (Autumn, 2019-2020)

Week	Lecture 1 (Monday 4-5 PM)	Lecture 2 (Friday 5-6 PM)	
1	Evolution of Computer Hardware and Moore's Law, Software and Hardware in a Computer	Computer Structure and Components, Operating Systems	MTE
2	Computer Hardware: Block Diagrams, List of Components	Computer Hardware: List of Components, Working Principles in Brief, Organization of a Computer System	
3	Linux OS	Linux OS	
4	Writing Pseudo-codes for Algorithms to Solve Computational Problems	Writing Pseudo-codes for Algorithms to Solve Computational Problems	ETE
5	Sorting Algorithms – Bubble sort, selection sort, and Search Algorithms	Sorting Algorithms – Bubble sort, selection sort, and Search Algorithms	
6	C Programming	C Programming	
7	Number Systems: Binary, Octal, Hexadecimal, Conversions among them	Number Systems: Binary, Octal, Hexadecimal, Conversions among them	
8	Number Systems: Negative number representation, Fractional (Real) number representation	Boolean Logic: Boolean Logic Basics, De Morgan's Theorem, Logic Gates: AND, OR, NOT, NOR, NAND, XOR, XNOR, Truth-tables	
9	Computer Networking and Web Technologies: Basic concepts of networking, bandwidth, throughput	Computer Networking and Web Technologies: Basic concepts of networking, bandwidth, throughput	MTE
10	Different layers of networking, Network components, Type of networks	Network topologies, MAC, IP Addresses, DNS, URL	
11	Different fields of CSE: Computer Architecture and Chip Design	Different fields of CSE: Data Structures, Algorithms and Programming Languages	ETE
12	Different fields of CSE: Database management	Different fields of CSE: Operating systems and System softwares	
13	Different fields of CSE: Computer Networking, HPCs, Web technologies	Different Applications of CSE: Image Processing, CV, ML, DL	Term Project
14	Different Applications of CSE: Data mining, Computaional Geometry, Cryptography, Information Security	Different Applications of CSE: Cyber-physical systems and IoTs	

Linux Directory Commands

Directory Command	Description
pwd	The pwd command stands for (print working directory). It displays the current working location or directory of the user. It displays the whole working path starting with /. It is a built-in command.
ls	The ls command is used to show the list of a folder. It will list out all the files in the directed folder.
cd	The cd command stands for (change directory). It is used to change to the directory you want to work from the present directory.
mkdir	With mkdir command you can create your own directory.
rmdir	The rmdir command is used to remove a directory from your system.

Directory Commands

pwd (print working directory):

- Displays your location currently you are working on.
- It will give the whole path starting from the root ending to the directory.

Syntax:

pwd

ls (List)

It will show the full list or content of your directory.

Syntax:

ls

Directory Commands

Linux ls command options

ls option	Description
ls -a	The (ls -a) command will enlist the whole list of the current directory including the hidden files.
ls -l	It will show the list in a long list format.
ls -lh	This command will show you the file sizes in human readable format.
ls -li	This command prints the index number if file in the first column.
ls -p	It is used to identify the directory easily by marking the directories with a slash (/) line sign.
ls -r	It is used to print the list in reverse order.
ls -R	It will display the content of the sub-directories also.
ls -lX	It will group the files with same extensions together in the list.
ls -lt	It will sort the list by displaying recently modified filed at top.
ls ~	It gives the contents of home directory.
ls ../	It give the contents of parent directory.
ls --version	It checks the version of ls command.

Directory Commands

cd: change directory

- used to change the current directory i.e.; the directory in which the user is currently working.

Syntax:
cd <dirname>

1) Change from current directory to a new directory
2) Change directory using absolute path
3) Change directory using relative path

cd Options

option	Description
cd ~	Brings you to your home directory.
cd -	Brings you to your previous directory of the current directory.
cd ..	Brings you to the parent directory of current directory.
cd /	It takes you to the entire system's root directory.
cd ../ ../dir1/dir2	It will take you two directories up then move to dir1 and then finally to dir2.

Directory Commands

Mkdir: make directory

- you can create a new directory wherever you want in your system.

Syntax:

mkdir **<dirname>**

To make multiple directories

Syntax:

mkdir <dirname1> <dirname2> <dirname3> ...

Mkdir Options

Options	Description
mkdir -p, -parents	Add directory including its sub directory.
mkdir -v, -verbose	Print a message for each created directory.
mkdir -m -mode=MODE	Set access privilege.

Directory Commands

rmdir

- used to delete a directory. But will not be able to delete a directory including a sub-directory. It means, a directory has to be empty to be deleted.

Syntax:

rmdir <dirname>

rmdir- options

rmdir -p

- This command will delete a directory including its sub-directories all at once. In below picture, all sub-directories have been deleted with 'rmdir -p' command.

Locate Command

The locate command is often the simplest and quickest way to find the locations of files and directories on Linux and other Unix-like operating systems.

Syntax
locate [options] name(s)

For example, the following would list the absolute paths of all files named *file1* and all directories named *dir1* for which the user had access permission:
locate file1 dir1

It would also list any other absolute pathnames that contained these strings (i.e., sequences of characters), for example
/home/john/file123 or */usr/local/mydir1/index.html*

Internal commands & External commands

Internal commands

- **Internal commands** are those **commands** which are shell built-in **commands**.
- These are executed by the shell.
- No new process is created.
- These are built-ins in the shell. The execution of these commands happens through the execution of their corresponding files in /bin directory.
- **Some examples** are cd, pwd, etc.

External commands

- **External commands** are those **command** which are stored as a separate binaries.
- These are executed by the kernel.
- A separate process is spawned every time a new external command is executed.
- These are separate files in /bin directory. The execution of these commands happens through the execution of their corresponding files in /bin directory.
- **Some examples** are cp, mv, etc.

Basic File Handling commands in Linux

mkdir – make directories

Syntax: mkdir [OPTION] DIRECTORY...

e.g., mkdir prabhat

ls – list directory contents

Syntax: ls [OPTION]... [FILE]...

e.g., ls, ls l, ls prabhat

cd – changes directories

Syntax: cd [DIRECTORY]

e.g., cd prabhat

pwd print name of current working directory

Syntax: pwd

vim – Vi Improved, a programmers text editor

Syntax: vim [OPTION] [file]...

e.g., vim file1.txt

Basic File Handling commands in Linux

cp – copy files and directories

Syntax: cp [OPTION]... SOURCE DEST

e.g., cp sample.txt sample_copy.txt

cp sample_copy.txt target_dir

mv – move (rename) files

Syntax: mv [OPTION]... SOURCE DEST

e.g., mv source.txt target_dir

mv old.txt new.txt

rm - remove files or directories

Syntax: rm [OPTION]... FILE...

e.g., rm file1.txt , rm rf some_dir

find – search for files in a directory hierarchy

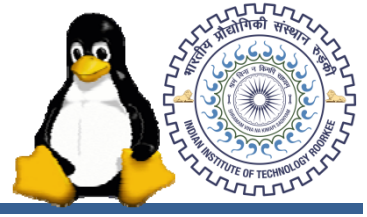
Syntax: find [OPTION] [path] [pattern]

e.g., find file1.txt, find name file1.txt

history – prints recently used commands

Syntax: history

Basic Text Processing commands in Linux



cat – concatenate files and print on the standard output

Syntax: cat [OPTION] [FILE]...

e.g., cat file1.txt file2.txt

cat n file1.txt

echo – display a line of text

Syntax: echo [OPTION] [string] ...

e.g., echo I love India

echo $HOME

grep - print lines matching a pattern

Syntax: grep [OPTION] PATTERN [FILE]...

e.g., grep i apple sample.txt

wc - print the number of newlines, words, and bytes in files

Syntax: wc [OPTION]... [FILE]...

e.g., wc file1.txt

wc L file1.txt

Basic Text Processing commands in Linux

sort – sort lines of text files

Syntax: sort [OPTION]... [FILE]...

e.g., sort file1.txt

sort r file1.txt

Continued to Next Class…