Linux Operating System and Programming

TOPIC#1
Getting Started

Computer
A computer is an electronic device that takes input, computes or performs arithmetic/logical operations and gives output.
It consists of hardware that includes input devices (keyboard, mouse, scanner, etc.), processing unit (ALU) and output devices (monitor, printer, etc). Also, there are softwares installed for operating a computer.

Software and Hardware
In computer world, every physical objects, which we can touch, is hardware.
Software is set of computer programs, which when run on computer hardware, produces results the software is developed for.

Operating System (OS)
An operating system (OS) is the software that manages the computer's hardware and provides a convenient and safe environment for running programs. It acts as an interface between programs and the hardware resources that these programs access (like memory, hard disk and printer).

It is loaded into memory when a computer is booted and remains active as long as the machine is up.

Operating Systems' functionality
1. The OS allocates memory for the program and loads the program to the allocated memory.
2. It loads the CPU registers. These registers maintain the memory locations where each segment of the program is stored.
3. OS keeps track of the instruction that was executed last by the CPU.
4. OS also allows the program to access the hardware when needed.
5. OS cleans up the memory and registers, after the program has completed execution, and makes them available for next program.
6. Apart from this, OS does…
    a. File Management
    b. Handles User(s)
    c. Command Interpreter & Execution
    d. Provides Security
    e. Device Management

Example of Operation Systems available in the market
- UNIX/LINUX (fedora, Ubuntu, red hat, Cent OS , open SuSE, Debian)
- MAC OS
- Windows(95, 98, XP, NT, 7, 8)
- Sun Solaris

- others

Why study UNIX?

It has practically everything an OS should have and it runs on every hardware (known as portability) and also provides inspiration to the Open Source movement (Free software). It is multiuser ,multitasking operating system. As per UNIX philosophy, it is consisting of small but powerful applications and it has capability to link multiple simple/small applications to achieve big task. The power of UNIX is also derived from its commands and their multiple options. (i.e. find utility). The incorporation of TCP/IP (a network protocol) into UNIX and its use which led rapid growth of internet and also UNIX.

According to Forbes, “A group that keeps track of the top 500 supercomputers in the world estimates that Linux powers 60% of those machines.”

UNIX and Linux

UNIX was developed at AT&T Bell Laboratories by Ken Thompson and Dennis Ritchie.
UNIX is finally written in C. (Dennis Ritchie is also known as father of “C Programming Language”.)

In 1983, Ritchie and Thompson received the Turing Award *for their development of generic operating systems theory and specifically for the implementation of the UNIX operating system. The Turing Award is recognized as the "highest distinction in Computer science" and "*Nobel Prize of computing*".*

Linux is a UNIX implementation that is constantly growing with contributions from the Free Software Foundation (formerly GNU). UNIX is propriety system while Linux is an Open Source system.

Simple Commands

Most UNIX commands are represented as *files* in the system.

date
This command is used to display current system date and time.
System administrator can change the date and time using the same command.

Example:
[user1@centos ~]$ date
Wed Aug 21 00:01:01 IST 2013
[user1@centos ~]$ date +%j

233

[user1@centos ~]$ date +%d_%m_%y

21_08_13

[user1@centos ~]$ date +%d_%m_%y -d "2 days ago"

19_08_13

[user1@centos~]$ date +%Y%m%d -s "20081128"

20081128

tput clear
This command is used to clear the screen.

Example:
clears the screen
[user1@centos ~]$ tput clear

Shows number of columns of terminal screen
[user1@centos ~]$ tput cols

cal
This command is used to display calendar.

Example:
[user1@centos ~]$ cal

July 2013

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

who
This command shows the list of users that are currently logged-in. UNIX is system that can be concurrently used by multiple users.

Example:
user1@centos ~]$ who
user1 :0 2013-07-15 13:12

user1 pts/1 2013-07-15 13:14 (:0.0)

user1@centos ~]$ who am i
user1 pts/1 2013-07-15 13:14 (:0.0)

```
user1@centos ~]$ whoami
user1
```

ps
This command is used to view the currently running processes of our system.

Example:
```
user1@centos ~]$ ps
  PID TTY          TIME CMD
 5484 pts/1    00:00:00 bash
 5549 pts/1    00:00:00 ps
```

ls
This command is used to display the list of files in the current working directory.

Example:
```
user1@centos ~]$ ls
ankk            fuffyyd             list                    prolog          weka.log
cs47            headfirstmysql.pdf  mpi                     software        wireless.tcl
Desktop         lab1                mysqlaccess.log         tasm            workspace
fff             lab2                OfflineToolVersion2.1   TC
```

Directing output to a file
Any output can be directed to a file using the syntax: > *filename*

Example:
```
user1@centos ~]$ ls > file1
```

Here, the list of files generated by ls command will be stored in the file1 file.
The content of file1 can be viewed by **cat** command

Example:
```
user1@centos ~]$ cat file1
ankk
cs47
Desktop
fff
file1
```

wc
This command is used to count the number of lines, words and characters in a file.
Example:
```
user1@centos ~]$ wc file1
 20  20 168 file1
```

echo
This command is used to echo a string or a variable on the terminal.
Example:
user1@centos ~]$ echo ‘Hello’
Hello
Example:
user1@centos ~]$ echo “$SHELL”
/bin/bash
Example:
user1@centos ~]$ x=25
user1@centos ~]$ echo $x
25

exit
This command is used to exit or logout from the current session.

Example
user1@centos ~]$ exit

Linux Rules Supercomputers!!

Forbes.com write “
A group that keeps track of the top 500 supercomputers in the world estimates that Linux powers 60% of those machines.”

http://www.forbes.com/2005/03/15/cz_dl_0315linux.html

Interested in Supercomputers?

Statistics on high-performance computers are of major interest to manufacturers, users, and potential users. These people wish to know not only the number of systems installed, but also the location of the various supercomputers within the high-performance computing community and the applications for which a computer system is being used. Such statistics can facilitate the establishment of collaborations, the exchange of data and software, and provide a better understanding of the high-performance computer market.

http://www.top500.org/

Growing with Linux

Redhat is a firm providing linux distribution (Licensed version with support) to enterprises world wide. It has fedora project to support free software.

Redhat Certifications:

http://www.redhat.com/training/certifications/

Fedora - A Red Hat-Sponsored Community Project

http://fedoraproject.org/

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