Batch: C2   Roll No.:   16010121110
Experiment No. 01
Grade: AA / AB / BB / BC / CC / CD /DD
Signature of the Staff In-charge with date

TITLE: Exploring basic Commands of UNIX: Shell, Processes, Files

AIM: To Explore basic commands for handling File system under Unix/Linux using shell scripts.(Creating groups, chown , chmod , directory name, tty , diff, umask).

Expected Outcome of Experiment:

CO 1. To introduce basic concepts and functions of operating systems.

Books/ Journals/ Websites referred:

1. **Silberschatz A., Galvin P., Gagne G. "Operating Systems Principles", Willey Eight edition.**
2. **Achyut S. Godbole , Atul Kahate "Operating Systems", McGraw Hill Third Edition.**
3. **Sumitabha Das " UNIX Concepts & Applications", McGraw Hill Second Edition.**

Pre Lab/ Prior Concepts:

An operating system (OS) is a resource manager. It takes the form of a set of software routines that allow users and application programs to access system resources (e.g. the CPU, memory, disks, modems, printers network cards etc.) in safe efficient and abstract way.

- The operating system kernel is in direct control of the underlying hardware. The kernel provides low-level device, memory and processor management functions (e.g. dealing with interrupts from hardware devices, sharing the processor among multiple programs, allocating memory for programs etc.)
- Basic hardware-independent kernel services are exposed to higher-level programs through a library of system calls (e.g. services to create a file, begin execution of a program, or open a logical network connection to another computer).
- Application programs (e.g. word processors, spreadsheets) and system utility programs (simple but useful application programs that come with the operating system, e.g. programs which find text inside a group of files) make use of system calls. Applications and system utilities are launched using a shell (a textual command line interface) or a graphical user interface that provides direct user interaction.

Operating systems can be distinguished from one another by the system calls, system utilities and user interface they provide, as well as by the resource scheduling policies implemented by the kernel.

UNIX has been a popular OS for more than two decades because of its multi-user, multi-tasking environment, stability, portability and powerful networking capabilities.

Linux is a free open source UNIX OS for PCs.

Linux has all of the components of a typical OS :

- **Kernel**

  The Linux kernel includes device driver support for a large number of PC hardware devices (graphics cards, network cards, hard disks etc.), advanced processor and memory management features, and support for many different types of file systems. In terms of the services that it provides to application programs and system utilities, the kernel implements most BSD and SYSV system calls, as well as the system calls described in the POSIX.1 specification.

  The kernel (in raw binary form that is loaded directly into memory at system startup time) is typically found in the file /boot/vmlinuz, while the source files can usually be found in /usr/src/linux.

- **Shells and GUIs**

  Linux supports two forms of command input: through textual command line shells similar to those found on most UNIX systems (e.g. sh - the Bourne shell,

bash - the Bourne again shell and csh - the C shell) and through graphical interfaces (GUIs) such as the KDE and GNOME window managers.

- **System Utilities**

  Virtually every system utility that you would expect to find on standard implementations of UNIX has been ported to Linux. This includes commands such as ls, cp, grep, awk, sed, bc, wc, more, and so on. These system utilities are designed to be powerful tools that do a single task extremely well (e.g. grep finds text inside files while wc counts the number of words, lines and bytes inside a file). Users can often solve problems by interconnecting these tools instead of writing a large monolithic application program.

- **Application programs**

  Linux distributions typically come with several useful application programs as standard. Examples include the emacseditor, xv (an image viewer), gcc (a C compiler), g++ (a C++ compiler), xfig (a drawing package), latex (a powerful typesetting language) and soffice (StarOffice, which is an MS-Office style clone that can read and write Word, Excel and PowerPoint files).

Description of Commands and options:

DOS commands: Attrib, dir, at, chkdsk, shutdown, tree, create a batch file, output and input redirection

Windows utilities: msconfig, defragmenter, performance monitor, task manager, registry editor, event viewer, process explorer

Unix Commands:

Unix file operations: ls, cp, rm , mv, chmod, chown ,chgrp
Text file operations in Unix :   cat , more , less , head, tail , grep
Unix directory management commands :   cd, pwd , ln, mkdir, rmdir
Unix system status commands: hostname, w, uname
Process management: ps, top, kill
Unix users commands: whoami , id, groups, passwd , who, last

Implementation details:

Unix file operations: ls, cd, mkdir, md, cd, pwd, cat

```
kjsce@ubuntu:~$ ls
Desktop  Documents  Downloads  Music  n  Pictures  Public  Templates  Videos
kjsce@ubuntu:~$ cd Music
kjsce@ubuntu:~/Music$ cd ..
kjsce@ubuntu:~$ cd Public
kjsce@ubuntu:~/Public$ mkdir exp1
kjsce@ubuntu:~/Public$ ls
exp1
kjsce@ubuntu:~/Public$ cd exp1
kjsce@ubuntu:~/Public/exp1$ cd ..
kjsce@ubuntu:~/Public$ rmdir exp1
kjsce@ubuntu:~/Public$ ls
kjsce@ubuntu:~/Public$ mkdir exp1
kjsce@ubuntu:~/Public$ md exp1
md: command not found
kjsce@ubuntu:~/Public$ cd exp1
kjsce@ubuntu:~/Public/exp1$ pwd
/home/kjsce/Public/exp1
kjsce@ubuntu:~/Public/exp1$ cd ..
kjsce@ubuntu:~/Public$ cd ..
kjsce@ubuntu:~$ cd Desktop

kjsce@ubuntu:~/Desktop/folder$ cat > xyz
a
b
v
kjsce@ubuntu:~/Desktop/folder$ cat > abc
w
e
r
t
kjsce@ubuntu:~/Desktop/folder$ cat xyz abc
a
b
v
w
e
r
t


kjsce@ubuntu:~/Desktop$ cat > exp1
this is experiment 1 of Operating Systems

Ending the file
EOF
bye
kjsce@ubuntu:~/Desktop$ cp exp1 Desktop
```

Moving and removing a file

```
kjsce@ubuntu:~/Desktop$ ls
Desktop  exp1
kjsce@ubuntu:~/Desktop$ ls
Desktop  Pictures
kjsce@ubuntu:~/Desktop$ mkdir folder
kjsce@ubuntu:~/Desktop$ ls
Desktop  exp1  folder
kjsce@ubuntu:~/Desktop$ mv exp1 folder
kjsce@ubuntu:~/Desktop$ ls
Desktop  folder
kjsce@ubuntu:~/Desktop$ cd folder
kjsce@ubuntu:~/Desktop/folder$ ls
exp1
kjsce@ubuntu:~/Desktop/folder$ rm exp1
kjsce@ubuntu:~/Desktop/folder$ ls
```

Viewing a file using Less command

```
kjsce@ubuntu:~/Desktop/folder$ less exp1

a
b
c
d
e
f
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
```

Viewing file using more and head commands. Also using the tail command to check the last contents of the file

```
kjsce@ubuntu:~/Desktop/folder$ more exp1
a
b
c
d
e
f

kjsce@ubuntu:~/Desktop/folder$ head -n 2 exp1
a
b
kjsce@ubuntu:~/Desktop/folder$ tail -n 3 exp1
d
e
f
```

Grep for finding contents in file and chmod commands for the access mode control. Checking user of the current login and adding groups using addgroup, changing the groups

```
kjsce@ubuntu:~/Desktop/folder$ tail -n 3 exp1
d
e
f

kjsce@ubuntu:~/Desktop/folder$ grep 'a' exp1
a

kjsce@ubuntu:~/Desktop/folder$ chmod u+r exp1

kjsce@ubuntu:~/Desktop/folder$ who
kjsce     :0           2023-07-17 22:01 (:0)
kjsce@ubuntu:~/Desktop/folder$ chown kjsce exp1

kjsce@ubuntu:~/Desktop/folder$ sudo addgroup try
[sudo] password for kjsce:
Adding group `try' (GID 1001) ...
Done.
kjsce@ubuntu:~/Desktop/folder$ sudo chgrp try exp1

kjsce@ubuntu:~/Desktop$ who
kjsce     :0           2023-07-31 16:04 (:0)
```

Using finger command

```
kjsce@ubuntu:~/Desktop$ sudo apt install finger
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libfwupdplugin1 libxmlb1 ubuntu-advantage-desktop-daemon
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  finger
0 upgraded, 1 newly installed, 0 to remove and 10 not upgraded.
Need to get 16.9 kB of archives.
After this operation, 51.2 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 finger amd64 0.17-17 [16.9 kB]
Fetched 16.9 kB in 5s (3,562 B/s)
Selecting previously unselected package finger.
(Reading database ... 202378 files and directories currently installed.)
Preparing to unpack .../finger_0.17-17_amd64.deb ...
Unpacking finger (0.17-17) ...
Setting up finger (0.17-17) ...
Processing triggers for man-db (2.9.1-1) ...
kjsce@ubuntu:~/Desktop$ finger
Login     Name      Tty      Idle  Login Time  Office     Office Phone
kjsce     KJSCE     *:0            Jul 31 16:04 (:0)
```

Conclusion: Thus we have understood the basics of commands in the OS. We tried out different commands. We were able to explore the different commands and their functionalities, and even troubleshoot some issues using the commands. We trued out commands related to internet connectivity, making directory and giving permissions to a file.

Post Lab Descriptive Questions

1. Explain how do you read and interpret syntax of any OS command.
Put command `–help` or `command ?`

2. Explain different functions of the operating systems.
   - File management
   - Memory management
   - Process management
   - Device management

3. What are the default permissions assigned by Unix for Directory.
What is Umask and How to Use It {Update Default Linux File ...
The system default permission values are 777 (rwxrwxrwx) for folders and 666 (rw-rw-rw-) for files.

4. Give the difference between DOS and WINDOWS.
The most significant difference between DOS and Windows is that DOS is a single-user character-based (Command Line Interface) operating system, while Windows is a multiuser, graphical user-interface based operating system. In general, Windows is a more modern and user-friendly operating system than DOS. Windows Evolved from MS-DOS

5. Explain Booting Process.
Booting is the process of starting the computer. When the CPU is first switched on it has nothing inside the Memory. In order to start the Computer, load the Operating System into the Main Memory and then Computer is ready to take commands from the User.

Date: 5 Aug 23   **Signature of faculty in-charge**