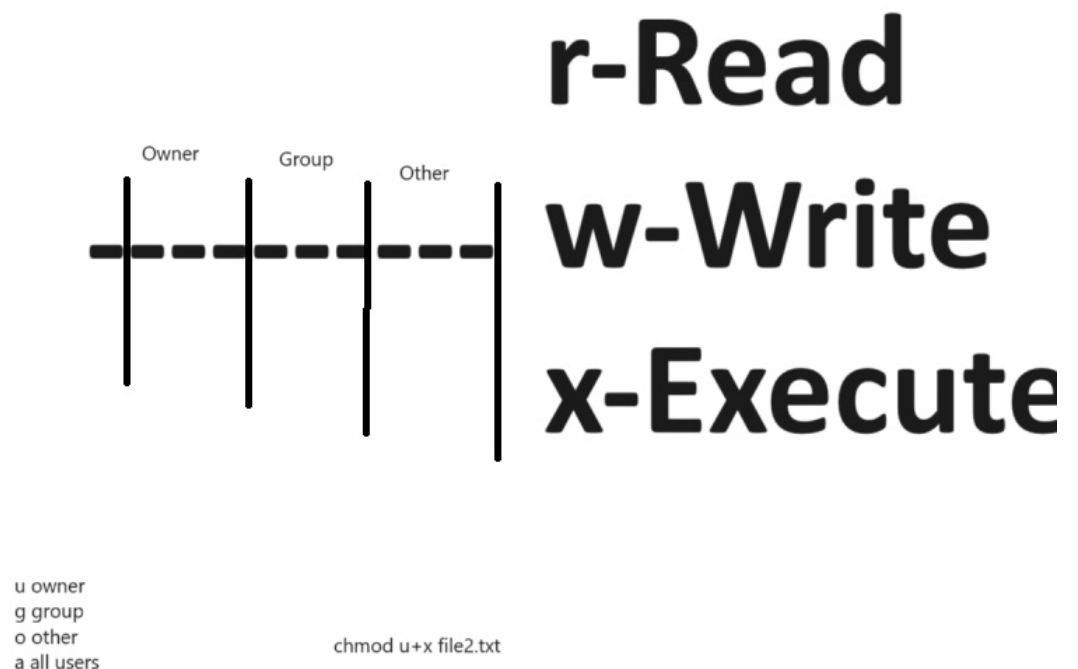


Session-3: Introduction to Linux continue...

- It is an Open Source operating system. It is available free to use and user can modify it according to their need.
- The founder of Linux is Linus Torvalds. It is available since 1991.
- An Open Source Community is working behind the updation and upgradation of the Linux code.
- Feature
 1. No Cost / Low Cost
 2. Multi-Tasking
 3. Security
 4. Multi-User
 5. Stable and Scalable
 6. Networking
 7. CLI as well as GUI
 8. Better File System
- Working with basic file system of Linux
- / is root directory
 1. /bin: User Binaries
 2. /sbin: System Binaries
 3. /etc: Configuration Files
 4. /dev: Device Files
 5. /proc: Process Information
 6. /var: Variables Files
 7. /tmp: Temporary Files
 8. /usr: User Programs
 9. /home: Parent directory of user friendly directory
 10. /boot: Boot Loader Files
 11. /opt: Apps
 12. /lib: System Libraries
- Commands associated with files/directories
 1. pwd: Present Working Directory
 2. ls: it lists out all the files and directory of current working directory
 3. nano: it actually runs the nano editor and opens the specified file.
 4. touch: It is used to create a new file
 5. mkdir: To create a new directory.
 6. chmod: to give and revoke the file or directory permissions
 7. rm: to remove file and recursive directory
 8. rmdir: to remove a particular directory
 9. cd: to change directory
- Ref: <https://ubuntu.com/tutorials/command-line-for-beginners#1-overview>

- What are file permissions and how to set them?



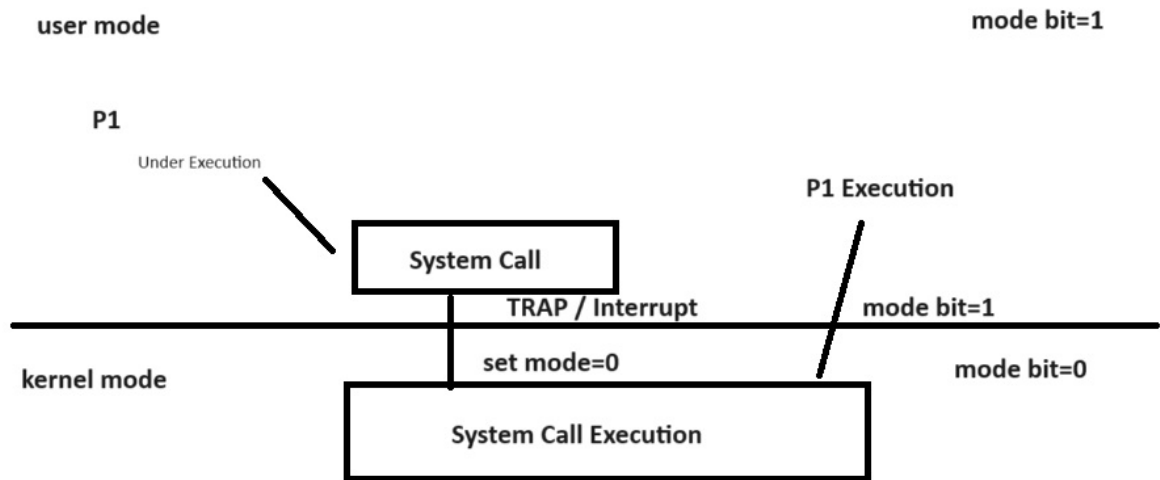
- Permissions (chmod, chown, etc)
- Ref: <https://help.ubuntu.com/community/FilePermissions>
- chown: to change owner of the file
- su: to switch the user from current to any specified user
- cat: to display content of the file on console
- head: to display top n lines of the file on console. By default it will print first 10 lines
- tail: to display bottom n lines of the file on console. By default it will print last 10 lines
- adduser: to add new user into the system
- sudo: to give some specific privileges to the user's other than root.
- Operators like Redirection (>)
- Other basics command

1. ls	11. cat	21. diff	31. kill and killall	41. apt, pacman, yum, rpm
2. pwd	12. echo	22. cmp	32. df	42. sudo
3. cd	13. less	23. comm	33. mount	43. cal
4. mkdir	14. man	24. sort	34. chmod	44. alias
5. mv	15. uname	25. export	35. chown	45. dd
6. cp	16. whoami	26. zip	36. ifconfig	46. whereis
7. rm	17. tar	27. unzip	37. traceroute	47. whatis
8. touch	18. grep	28. ssh	38. wget	48. top
9. ln	19. head	29. service	39. ufw	49. useradd
10. clear	20. tail	20. ps	40. iptables	50. passwd

Process Management

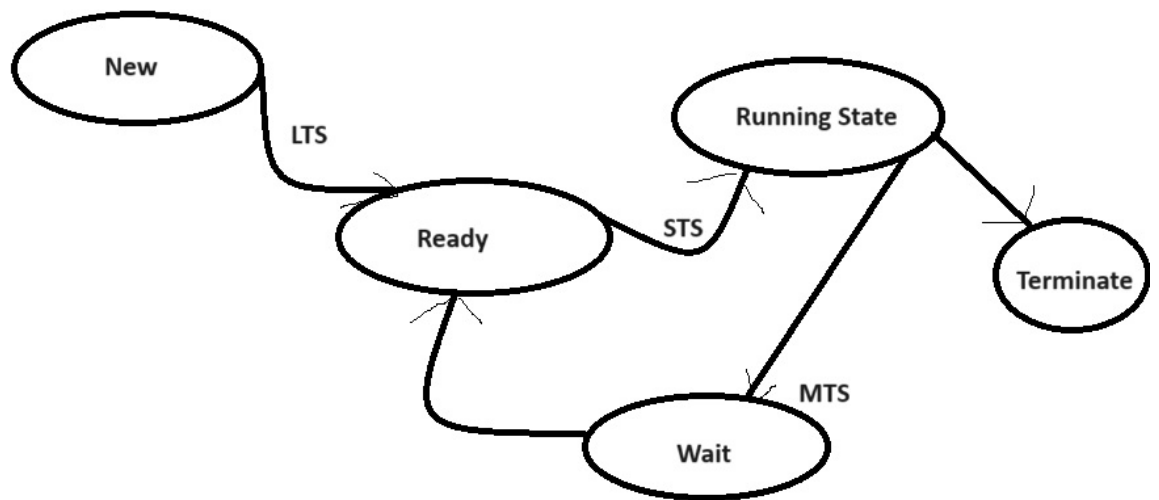
- User Mode and Kernel Mode (System calls)
- System Calls types

1. File related calls: Read(), Write(), Delete(), Open(), Close(), Create()
2. Process related calls: New(), Fork(), Exit(), Wait(), Running(), etc.
3. Device related calls: Read(), ioctl etc.
4. Information related: getpid, gettime, sysdata, etc.
5. Communication related: wait(), signal(), status, etc.



- Process: It is information or code or data which help the processor to execute or complete the user task.
 1. Code Segment: It consist of compiled code or instructions to be executed
 2. Data Segment: It consist of data required for the execution.
 3. Information Segment: It have metadata about the system variables or system which help in the process execution.
 4. Memory Segment: Heap and Stack
- Process Life Cycle
 1. New State
 2. Ready State (Ready Queue)
 3. Running State- Processor is executing the process
 4. Terminated State

5. Wait State



- Process Schedulers
 1. Long Term Schedulers (LTS)
 2. Short Term Schedulers
 3. Medium Term Schedulers
- Process Control Block (PCB) (Kindly read all attributes of PCB)

PID	1001
Pointer	0xffff0
State	Ready
Allocated Registers	A, C, D
PC	0xdff0
Allocated Hardware	KB, MS, PR
Accounting Information	file.txt, abc.txt
Priority	10
	...

PCB P1

- Scheduling Algorithms
 1. Pre-Emptive Scheduling
 2. Non Pre-Emptive Scheduling
 1. FCFS (First Cum First Serve)

- | PID | Arrival Time | Burst Time | Wait | TAT |
|-----|--------------|------------|------|-----|
| P1 | 0 | 4 | 0 | 4 |
| P2 | 1 | 6 | 3 | 9 |
| P3 | 2 | 8 | 8 | 16 |
| P4 | 3 | 2 | 15 | 17 |
-
- | Gantt Chart | | | | |
|-------------|----|----|----|----|
| | P1 | P2 | P3 | P4 |
| | 0 | 4 | 10 | 18 |
| | | | | 20 |
-
- | | | | | |
|---------------------------------------|--|--|--|--|
| Avg. WT= Sum WT of ALL/No. of Process | | | | |
|---------------------------------------|--|--|--|--|

PID	Arrival Time	Burst Time	CT	Wait	TAT
P1	0	4	4	0	4
P2	1	6	12	5	11
P3	2	8	20	10	18
P4	3	2	6	1	3

Gantt Chart				
P1	P4	P2	P3	
0	4	6	12	20

- In round robin algo a fixed slice of time is given to each and every process. That slice of time is known as quantum.

PID	Arrival Time	Burst Time	CT	Wait	TAT
P1	0	4	10	6	10
P2	1	2	4	1	3
P3	2	6	16	8	14
P4	3	8	20	9	17

Time	0	2	4	6	8	10	12	14	16	20
Process	P1	P2	P3	P4	P1	P3	P4	P3	P4	

- | PID | Arrival Time | Burst Time | CT | Wait | TAT |
|-----|--------------|------------|----|------|-----|
| P1 | 0 | 2 | 2 | 0 | 2 |
| P2 | 0 | 4 | 10 | 6 | 10 |
| P3 | 0 | 6 | 14 | 8 | 14 |
| P4 | 0 | 2 | 8 | 6 | 8 |
-
- | | | | | | | | | | |
|---|----|---|----|----|----|----|----|----|--|
| | P1 | | P2 | P3 | P4 | P2 | P3 | P3 | |
| 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | | |

4. Priority

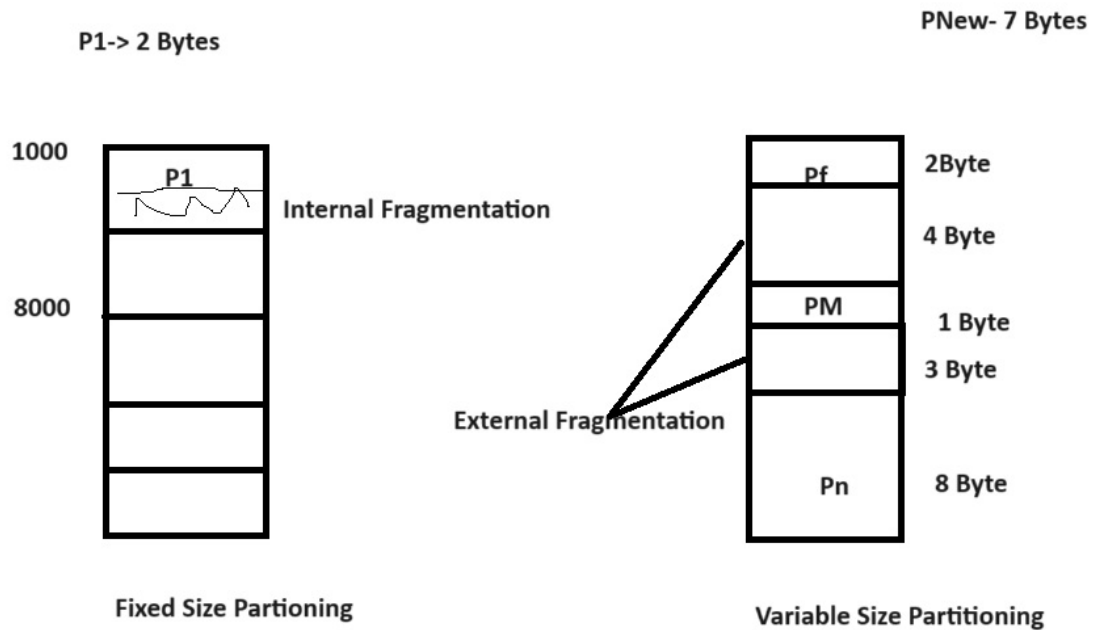
PID	Arrival Time	Burst Time	Priority	CT	Wait	TAT	
P1	0	2	7	12	10	12	
P2	0	4	5	10	6	10	
P3	0	6	1	6	0	6	
P4	0	2	9	14	12	14	
					Avg WT= 7 Avg TAT=10.5		
	P3	P2	P1	P4			
0		6	10	12	14		

- PR with some AT

PID	Arrival Time	Burst Time	Priority	CT	Wait	TAT	
P1	0	2	7	12	10	12	
P2	1	4	5	11	6	10	
P3	2	6	1	8	0	6	
P4	2	2	9	14	10	12	
					Avg WT= 6.5	Avg TAT=10	
	P1	P2	P3	P2	P1	P4	
0		1	2	8	11	12	14

Memory Management (RAM)

- The memory of computer systems can be divided into block of fixed size or variable size.
- This process is known as Fixed Size Partitioning and Variable Size Partitioning respectively.
- Fixed Size Partitioning: Here the memory is divided into fixed size blocks where all the blocks are of size like either 2 Bytes, 4 Bytes, etc.
 - The Process which will get the memory may be small or equal to the partitioning block size.
 - As the process size may be smaller than block, it gives rise to Internal Fragmentation
- Variable Size Partitioning: Here the memory is divided into variable size blocks in which blocks may have size 2 Bytes, 3 Bytes or any size.
 - In variable size partitioning during contiguous memory allocation some time total memory available can not be given to the new process which leads to External Fragmentation.



- Compaction

Linux Commands to be discussed

- Pipe (|)
- Access Control List
- Network Commands (telenet, ftp, ssh, sftp, finger)
- System variables like – PS1, PS2 etc. How to set them?

Shell Programming (to be discussed)

- What is shell?
- What are different shells in Linux?
- Shell variables
- Wildcard symbols
- Shell meta characters
- Command line arguments
- Read
- Echo
- Decision loops (if else, test, nested if else, case controls, while...until, for)
- Regular expressions; Arithmetic expressions
- More examples in Shell Programming