UNIX SYSTEMS PROGRAMMING

By

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Previous Class

- chmod

- cmp

- diff

- top

Today's Agenda

- Basics of Files

- UNIX file system

- inode

Basics of Files

- A file is a sequence of bytes
- No structure is imposed on a file by the
- system and no meaning is attached to its
- contents
- 80% of data is either Semi structured or unstructured
- In Linux everything is stored in the form of File
- Standard Input (Keyboard) and standard output (monitor) are files

UNIX file system

- Every file / directory on a UNIX system has a unique id known as inode number

- Inode contains information necessary for a process to access a file

- File ownership, access rights, file size, and location of the file's data in the file system etc….

- We can display the inode number using –I option of ls **ls –li**

- [SysPgm@labserver ~] $ **ls -li** ↵

UNIX file system

- [SysPgm@labserver ~] $ **ls -li** ↵
- Displays the following fields
- Inode number [Column 1]
- Unix file types, File permissions [Column 2]
- Number of hard links [Column 3]
- Owner [Column 4]
- Group [Column 5]
- Size [Column 6]
- Date and Time [Column 7]
- File name [Column 8]

Inode

- Inode stores the meta data of the file
- Fields of Disk inode
- **File owner identifier**:
- Individual, group, super user [Column 4 and 5 of ls –li]
- **File type**: File, directory, special file or FIFO (pipes)
- [first character of column 2 in ls –li]
- Hyphen (-) represents Regular File
- d represents Directory
- b represents Block Device Driver
- c represents Character Device Driver
- l represents Symbolic Link
- p represents Named Pipe [used for inter process comm.]
- s represents Unix Domain Socket

Inode

- Fields of Disk inode continues
- **File access permissions**
- Column 2 in ls –li
- r represents read permission
- w represents write permission
- x represents execute permission
- represents the permission is not awarded
- 3 sets of permissions – Owner, Group and Others
- **File size**
- Column 6 in ls –li

Inode

- Fields of Disk inode continues
- **File access and modified times**
- Column 7 in **ls -li**
- Changing the content of a file automatically implies a change to the inode
- Changing the inode does not imply that the contents of the file change
- Changing the permissions affects only the inode change time
- See inode change time with **ls –lc** and data
- content change time by using **ls –lu**
- See **stat** command to display access time, modify time and change time

Inode

- Fields of Disk inode continues
- **Number of links to the file**
- Column 3 in ls -li
- Link count – The number of directories that contain an entry with this inode number
- When a new file is created, by default, the number of links will be 1
- When a new directory is created
- The link count of the parent directory will be incremented
- The link count of the newly created directory will be 2

THANK YOU