File Attributes (Cont’d)  
  
test.dat: inode 68013061; dev 50331652; links 2; size 18

regular; mode is rw-r—r--; uid 929 (smith); gid 45 (students)

st\_fstype: xfs  
  
 change time - …..  
 access time - ……  
 modify time - …..

Inodes:

-inode number: unique within a file system  
-file system ID: cdrom, hard drive, ….  
-directory file: file name mapping to inode  
-inode table: stored in disk used by Linux kernel  
  
Kernel Support for Files :

-Process 1 :  
 -FILE Table  
 -File Descriptor Table  
  
-Process 2 :

-FILE Table  
 -File descriptor Table

…..  
  
-FILE table points to same location in the file descriptor table  
-The corresponding entry in the file descriptor table points to the actual file (\*cfp)  
x

-In the inode table, all the permissions are listed, eg. r, rw, …..  
-In the inode table, the filename: foo1.txt, foo2,dat and the file contents are listed (on the hard drive, …)

FILE pointers and FILE descriptors:

-Converter:  
 int fileno (FILE\*stream\_pointer) //return file descriptor

FILE \*fdopen(int fd, char \*mode) //create an entry in FILE table

-Libraries < === > Linux system call

fopen < === > open  
 fclose < === > close

fread, fgetc, fscanf, fgets < === > read  
fwrite, fputc, fprintf, fputs < === > write

fseek, ftell, frewind < === > lseek

Directory Files:

-Contain file info residing in a directory

-Data structure: contains at least 2 essential fields: file name and inode number

-APIs

opendir

readdir

closedir

rewinddir

Hard Link and Symbolic Link:

-Hard link:

-Does not create a new inode  
 -Cannot link directories, unless root  
 -Cannot link files across file systems  
 -Increase the hard link count of the linked inode  
  
-Symbolic Link:

-Create a new inode  
 -Can link directories  
 -Can link files across file systems  
 -Does not change the hard link count of the linked inode

Bourne Shell Programming:

Writing Bourne Shell Scripts :

-The first line  
 #!/bin/sh for Bourne Shell Scripting

#!/bin/bash for Bash Shell Scripting

-Comments  
 # This is a comment

-Statements:

-Linux commands, Shell commands,   
 -Programming constructs and comments  
  
Writing Bourne Shell Scripts:

-Making the script executable  
 $ chmod +x test.bash