

# Programming Laboratory I

## Group-A

### Assignment No: 4

#### 1 Title

Write a program in Python/C++ to read display the i-node information for a given text file, image file.

#### 2 Aim

To read and display the i-node information for the given text file.

#### 3 Objective

To study the i-node information.

#### 4 Theory

1. i-node :

- (a) Definition: Inode contains the information necessary for a process to access a file and its exists in a static form on disk and the kernel reads them into an in-core inode to manipulate them.
- (b) Disk inodes consist of the following fields:
  - i. file owner identifier
  - ii. file Type
  - iii. File access Permissions
  - iv. Number of links to file
  - v. Table of Contents
  - vi. File size
- (c) File owner identifier:  
Ownership is divided between an individual owner and a "group"

owner and defines the set of users who have access rights to a file. The super user has access rights to all files in the system.

- (d) File type:  
Files may be of type regular, directory, character or block special, or FIFO (pipes).
- (e) File access permissions:  
The system protects files according to three classes: the owner and the group owner of the file, and other users; each class has access rights to read, write and execute the file, which can be set individually.
- (f) File access times:  
giving the time the file was last modified, when it was last accessed, and when the Number of links to the file: Representing the number of names the file has in the directory hierarchy.
- (g) Table of contents:  
for the disk addresses of data in a file. Although users treat the data in a file as a logical stream of bytes, the kernel saves the data in discontinuous disk blocks. The inode identifies the disk blocks that contain the file's data.
- (h) File size:  
Data in a file is addressable by the number of bytes from the beginning of the file, starting from byte offset 0, and the file size is 1 greater than the highest byte offset of data in the file. For example, if a user creates a file and writes only 1 byte of data at byte offset 1000 in the file, the size of the file is 1001 bytes.
- (i) System calls used in i-node:
  - i. Stat()  
Description:  
These functions return information about a file. No permissions are required on the file itself, but in the case of stat() execute (search) permission is required on all of the directories in path that lead to the file.

## 5 Mathematical Modelling

Let S be the solution perspective of the class such that

$S = \{s, e, i, o, f, DD, NDD, success, failure\}$

$s = \{\text{Initial state that is constructor of the class}\}$

$e = \{\text{End state or destructor of the class}\}$

$i = \{\text{Input of the system}\}$

$o = \{\text{Output of the system}\}$

$DD = \{\text{Deterministic data: it helps identifying the load store functions or assignment functions}\}$

$NDD = \{\text{Non deterministic data: data of the system S to be solved}\}$

$Success = \{\text{Desired outcome generated}\}$

$Failure = \{\text{Desired outcome not generated or forced exit due to system error}\}$

For class:  
s={initial state or constructor of the class weather()}  
JDBC()={sets the default values for all variables}  
Input i=(I1,I2)  
f={stat()}  
stat={system call used for returning ID of device containing file, inode number, protection, number of hard links, user ID of owner, group ID of owner, total size in bytes, blocksize for filesystem I/O and number of 512B blocks allocated}

## 6 Algorithm

1. Start
2. Declare all header file
3. define the stat and allocate buffer.
4. Take the input from the user i.e path name from user to display the information of file.
5. Define the structure of stat to display the information of inode.
6. if (file exist on the disk)  
display the inode information of file;  
else  
file is not available on disk;
7. Stop

## 7 State Transition Diagram

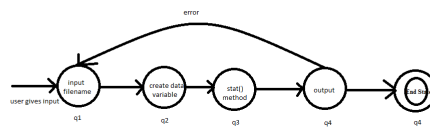


Figure 1: State Transition

## 8 Conclusion

From the above assignment we have learnt to read and display the i-node information for a given text file, image file.