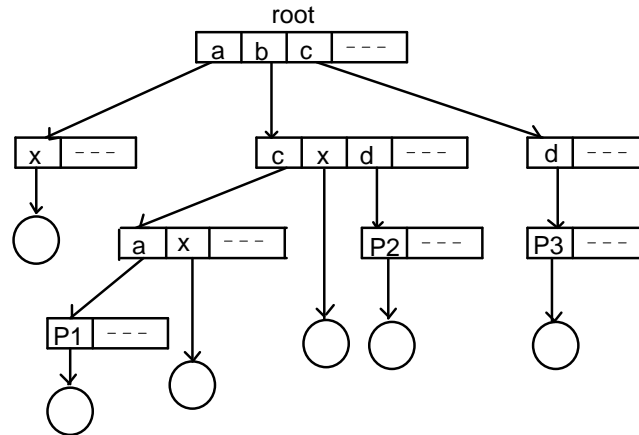


TUTORIAL TEN

File-Systems

1. The following figure shows part of a tree-structured directory of a file system. Assume that the components within a path name are separated by a slash (/).



- a) Give the path names of each non-directory file.
 - b) The file system maintains an Accessed File Table (AFT) which contains every file accessed by the user during a given log-in session.

When a file is referenced, the following rules apply:
 - Search AFT. If file not found, try rule II.
 - Search caller's parent directory. If file not found try rule III.
 - Search current working directory. If file not found, try rule IV.
 - Search library directory. If file not found, report error.
 - File P1, P2 and P3 are programs which contain references to a file x. Give the path name of the particular file x referenced when P1, P2 and P3 are executed separately. Assume that the current working directory is where the program is, the AFT is empty and the library directory is /a.
 - Is it possible to execute P1 and have file /b/x referenced without changing the search rules or modifying directory entries? Explain your answer.
- 2.
- a) Consider a file system where a file can be deleted and its disk space reclaimed while links to that file still exist. What problems may occur if a new file is created in the same storage area or with the same absolute path name? How can these problems be avoided?
 - b) Some systems provide file sharing by maintaining a single copy of a file; other systems maintain several copies, one for each of the users sharing the file. Discuss the relative merits of each approach.

3. Assume that a file system uses Unix-like inodes with six direct pointers and one single-indirect pointer. The file system is block-oriented with both logical and physical block sizes of 1000 bytes. A user executes a program that contains the following code:
- ```
fd = open("/usr/ast/mbox"); // open a file
seek(fd, 5900); // move the file pointer
read(fd, buf, 200); // read 200 bytes of data from the file
```
- a) How many disk read operations are required for the first system call (i.e., open) in the above program fragment? Assume that initially, the root directory is in memory, inodes are in disk, and that a directory can fit into a single block.
- b) How many disk read operations are required for the last two system calls (i.e., seek and read) in the above program fragment?
- c) What is the maximum file size the file system can support? Assume that each entry in the indirect block takes 2 bytes.
4. Some file systems use two block sizes for disk storage allocation, for example, 4-Kbyte and 512-byte blocks. Thus, a 6 Kbytes file can be allocated with a single 4-Kbyte block and four 512-byte blocks. Discuss the advantage of this scheme compared to the file systems that use one block size for disk storage allocation.