

## TUTORIAL ELEVEN

### File-Systems

1. Indicate whether the following statements are true or false. Justify your answers.
  - a) Assuming the protection bits of a file are “r - x r - x - - x”, only the owner of this file is able to read the file.
  - b) Open file table is used to temporarily cache data blocks of a file to improve efficiency.
  - c) Linked file allocation method may result in external fragmentation.
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.