

- 1) In a file system (system V type) the file **bujuan** corresponds to the mailbox of the user **juan**, who is its owner, and the absolute file path is: **/var/spool/mail/students/bujuan**. Answer the following questions:

1.1 What is the minimum number of disks accesses necessary when running the following open system call?:

**`open("/var/spool/mail/students/bujuan",O_RDONLY)`**

to obtain the inode of **bujuan**? Directory entries for the different subdirectories are always located in the first block of their parent directories, except **students**, whose entry is in the fourth block and the file **bujuan**, whose entry is in the second block. It is supposed that the Buffer Cache and the Inode Cache are initially empty.

**Minimum number of disk accesses: 10**

**In the Data Area: 9**

**In the Inode List: 1**

1.2 In such a file system, the block size is 2Kbytes and the inodes have 12 block direct addresses, one single indirect address, one double indirect address and one triple indirect address. Moreover, the block addresses are represented with 4 bytes. How many disk blocks are necessary for storing the file **bujuan** if its size is 6MBytes? The answer must detail how many blocks are for data and how many for indexes.

**Number of data blocks: 3072**

**Number of index blocks: 7**

1.3 Following 1.1, once the file is open, the process runs the system call:

**`lseek(fd, 4194304, SEEK_SET)`**

How many blocks would have to read the operating system to fulfill the sentence:

**`c=fgetc(fd)` ?**

if it is supposed that the Buffer Cache is empty. (Note:  $4194304 = 4 * 2^{20}$ )

**Number of blocks that the OS has to read: 3**

1.4 What is the logical block number in the file system which corresponds to the root directory inode? (the logical blocks are numbered starting with logical block 0) and what is the logical block number corresponding to the **bujuan** file inode?, if the following is supposed:

- i. The inode number of "/" is 2, and to the file **bujuan** is assigned inode number 35 (the inodes are numbered starting with inode 1).
- ii. The inode size is 128 bytes.
- iii. The boot occupies 1 block and the superblock requires 8 blocks.

**Number of logical block of inode of "/": 9**

**Number of logical block of inode of "bujuan": 11**