2008.1 Final Exam : LINUX System

Student Id. : (   ) , Name : (   )

* Each of your answer should be no more than one line. Otherwise, you will get penalty.

1. (25points) Fill out following blanks.
(1) Demand Paging : As there is much less ([1]   ) than ([2]   ) the operating system must be careful that it does not use the ([1]   ) inefficiently.

(2) ... there is no entry in process *X's* page table for virtual page frame number 2 and so if process *X* attempts to read from an address within virtual page frame number 2 the processor cannot translate the address into a physical one.
At this point the processor notifies the operating system that ([3]   ) has occurred.

(3) The ([4]   ) contains all the information about the file: the file type, the file's access permission bits, the size of the file, pointers to the data blocks for the file, and so on.
Only two items are stored in the directory entry: the ([5]   ) and the ([6]   ).

(4) What concept does following sentence explain?
([7]   ) : If a process needs to bring a virtual page into physical memory and there are no free physical pages available, the operating system must make room for this page by discarding another page from physical memory.

2. (15points) Consider file locking. What is a shared lock (LOCK_SH)? What is an exclusive lock (LOCK_EX)? Explain.
(1) LOCK_SH : (   )

(2) LOCK_EX : (   )

3. (25points)
 In UNIX System V file system, i-node has ten direct pointers, one single indirect pointer, one double indirect pointer, and one triple indirect pointer.

(1) What is the direct pointer and the indirect pointer? Explain. Your answer should include the purpose of the direct and indirect pointers.

direct pointer : (   )

indirect pointer : (   )

(2) If i-node has only direct pointers, what problem may happen?
(   )

(3) If i-node has only indirect pointers, what problem may happen?
(   )

st_mode

type	special	permission
4 bits	3 bits	9 bits

4.(20points) Fill out following blanks (1) and (2). (1) should be an octal number
st_mode type variable of a stat structure has information on a file type as shown above.

```
#define      S_IFMT    (1)                          // (1) should be an octal number
#define      S_IFDIR  0040000 /* directory */
#define      S_IFCHR  0020000 /* character special */
#define      S_IFBLK  0060000 /* block special */
#define      S_IFREG  0100000 /* regular */
#define      S_IFLNK  0120000 /* symbolic link */
#define      S_IFSOCK 0140000 /* socket */
#define      S_IFIFO  0010000 /* fifo */
```

S_ISDIR macro function checks whether st_mode value has a bit of S_IFDIR constant or not.
Define the macro S_ISDIR by filling out the blanks below. **You must use the constant S_IFMT in your answer.**

```
#define S_ISDIR(mode)  (2)
```

5. (15points)
(1) Which signal is generated by the terminal driver when we press the key Ctrl-C in UNIX shell environment ?

 Answer : (SIG_____)

(2) Above signal is sent to all processes in the foreground process group including a shell process.
How can you deal with this signal when you implement the miniShell in your homework?
In other words, how should the miniShell in our homework deal with the case when the key Ctrl-C is pressed while the miniShell is waiting for user input command?
(   )