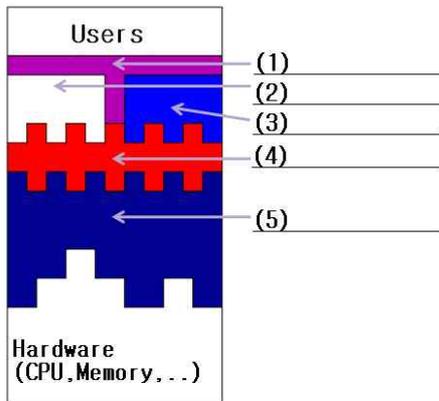


2008.1 Midterm Exam : LINUX System

Student Id. : (_____) , Name : (_____)

1. (20points)



Above figure shows the layered structure of a computer system. Fill the blanks (1)-(5) in the above figure.

(1) shell or GUI , (2) application programs, (3) system utilities, (4) system call, (5) OS Kernel

2. (20points)

(1) What is the meaning of "-r" in the shell command "cp -r ../src ."?

Answer to this question in just one English word. (recursive)

(2) What is the meaning of "x (execute)" permission for a directory in UNIX?

(permission for changing the directory)

3. (20points) Fill the blanks (1) and (2) in the following "Makefile" that can be used by a UNIX utility "make" for generating an executable file "prog1" from source files "file1.c", "file2.c", "file3.c", and "mydefs.h". After "make" is executed, all object files (file1.o, file2.o, and file3.o) should be deleted. Use the macro OBJS.

```
OBJS = file1.o file2.o file3.o
```

```
prog1 : ${OBJS}
        ${CC} -o prog1 ${OBJS}
```

```
file1.o : file1.c mydefs.h
```

```
        ${CC} -c file1.c
```

```
file2.o : file2.c mydefs.h
```

```
        ${CC} -c file2.c
```

```
file3.o : file3.c
```

4. (20points) Suppose we want to delete every file whose filename ends with ".txt" from current directory and its subdirectories. Answer to the following questions.

(1) Explain why the shell command below does not work correctly for that purpose.

```
% find . -name "*.txt" -print | rm
```

(using pipe for rm is wrong. rm does not take input from standard input but rm takes files as command line arguments)

(2) Write a correct shell command by modifying above shell command.

The answer should be just one line.

```
( find . -name "*.txt" -exec rm {} ";"        )
```

5. (20points) Fill the blank below by writing the output that is displayed in screen after the C code below is compiled and executed in UNIX environment. Note that printf is a standard library function in C that writes a formatted string through file descriptor# STDOUT_FILENO.

```
% gcc -o q q.c
```

```
% ./q
```

(What will be displayed here after the C code below "q.c" is compiled and executed?)

```
C1 : 10 500
```

```
P : 10 500
```

```
Z : 11 501
```

```
/* Suppose the file name of this C code is q.c */
#include <fcntl.h>
#include <unistd.h>
#include <stdio.h>
#include <errno.h>
#include <sys/wait.h>

int globalVar=500;

int main(int argc , char* argv[] ) {
    char *path = "/bin/ls";
    char *arg0 = "ls";
    pid_t pid;
    int fd, status;
    int localVar=10;

    pid = fork();
    if (pid == 0) {
        printf("C1 : %d %d\n",localVar++,globalVar++);
        fd = open("temp.txt", O_WRONLY|O_CREAT|O_TRUNC, S_IRWXU);
        dup2(fd, STDOUT_FILENO);
        close(fd);
        printf("C2 : %d %d\n",localVar++,globalVar++);
        execl(path, arg0, NULL);
        printf("C3 : %d %d\n",localVar++,globalVar++);
    } else {
        close(fd);
        wait(&status);
        printf("P : %d %d\n",localVar++,globalVar++);
    }
    printf("Z : %d %d\n",localVar++,globalVar++);
}
```