Assignment 03 - Advanced Operating Systems
Fall 2020

Total Marks: 100

Submission Instructions:

- Students need to answer the questions (hand written) on A-4 sheets by mentioning their names and roll numbers on each paper
- After attempting the assignment, students need to convert the solved answer sheets to a single pdf file using cam scanner or any other tool
- Finally, Upload the single pdf file containing solutions to all the questions on University Learning Management System till **midnight Wednesday, February 10, 2021**.
- No Assignment will be graded after the deadline.

Question # 1

a. Describe by drawing and labeling a diagram, how an application program makes a system call. Do mention all the steps by labeling the diagram properly and also mention the registers involved.
b. Mention the two main tasks of a linker.
c. Explain the C program compilation process, draw the diagram and write down and discuss the commands to create the intermediate files.
d. Differentiate between strong and weak symbols by giving example.
e. Draw and label a diagram that describes how a C program starts and terminates. Do mention the details of exit handlers.
f. Mention two limitations of registering an exit handler using atexit() system call.
g. Given the code below, draw the FSF for the main as well as the display function. The program is executed using the following command.

```
$ ./a.out "Welcome to Learning AOS with Arif Butt"
void display (char* str) {
char buff[10];
strcpy(buff, str);
printf("The command line received is: %s \n", buff);
}
int main(int argc, char * argv[]){
if(argc > 1)
display(argv[1]);
else
printf("No command line received.\n");
exit(0);
}
```

h. Mention the steps that Linux Kernel performs when a file is deleted.
i. Draw and label the PPFDT for the following commands:
   1. **$ cat file1.txt 2> errors.txt**
   2. **$ cat 1> f1.txt 2>&1 0< f1.txt**
j. Suppose two or more processes have a directory already open and another process deletes that directory and the link count of that directory reaches zero. What will happen?
k. Write down C code snippet that will redirect the output of that program to ***/home/user1/f1.txt***
l. The **readdir()** call returns NULL in case of error as well as in case of reaching the end of the directory. Write a code snippet that will handle this situation.

m. If the value of static priority of a process is 134. Determine the process will be interactive or not?
n. What are the main similarities and differences between a thread and a process?
o. Briefly explain the five signal dispositions.
p. Draw and label the PPFDT for the following command:
    1. cat 0< /etc/passwd | wc 1> f1.txt
q. Describe the working of named pipes (FIFO) with the help of diagram
r. Consider the following code snippet. What will be the resulting permissions on the file
    umask(0311);
    int fd = open("f1.txt",O_CREAT|O_RDWR, 0333)