# National University of Computer and Emerging Sciences, Lahore Campus

| Course: | Operating Systems | Course Code: | CS 2006 |
|---|---|---|---|
| Program: | BS(CS) | Semester: | Spring 2024 |
| Section: | F,G,H | Total Marks: | 50 |
| Assignment: | 1 | Pages | (3) |
| Due Date: | **3 March,2024** | | |

**Important Instructions:**

**1. Submit each question file named as your roll number along with the question number., i.e., 22L-1111_Q1.c. DO NOT ZIP YOUR FILES.**
**2. You are not allowed to copy solutions from other students. We will check your code for plagiarism using plagiarism checkers. If any sort of cheating is found, heavy penalties will be given to all students involved.**
**3. Late submission of your solution is not allowed.**

## Question 1: Custom Shell [5*3 marks]

In this question, you will develop your own version of shell. Your shell should execute the following commands when given by the user:

- cp
- mkdir
- ls

The steps involved will be as follows:

1. User types a command, such as "cp ./OS ../newOS". The command will be stored in a character array or a string object.
2. Shell will perform tokenization and separate the command and its arguments.
3. Shell will create a child process and use **execvp** system call to execute the command.
4. Shell will wait for the command to finish execution.
5. After the command has been executed, the shell will ask the user to enter the command again.

6. Shell will exit when the command given by the user is "exit".

**Question 2: [35 marks]**

Write a program that places the student record in their respective section files. For this purpose, you will receive at least 2 filenames from the command line. First filename will be students.txt and second filename – the section file - will be sec1.txt. There can be an arbitrary number of section's filenames, N, named as sec1.txt, sec2.txt, sec3.txt, sec4.txt and so on. Assume every file exists. Some possible list of commands for running your program can be:

./q2 students.txt sec1.txt

./q2 students.txt sec1.txt sec2.txt

./q2 students.txt sec1.txt sec2.txt sec3.txt sec4.txt sec5.txt

In students.txt you have students count in the first line and in next lines you have student roll numbers, his/her cgpa and associated section separated by space. Section files are initially empty. Consider the example below:

students.txt

```
5
22L-1234 3.23 Sec1
22L-2345 2.11 Sec3
21L-3456 2.56 Sec1
23L-4567 3.96 Sec2
22L-5678 3.47 Sec1
```

Now your task is to write a program in which for every section you need to create a child process. Your parent process will read students.txt and each child process will:

- print its own and its parent id on terminal
- write student roll number along with cgpa in the respective section file.

Communication between parent process and child processes is to be done through **pipes**. If there are N section files, Nth child should write in secN.txt

Sample Output:

sec1.txt

```
22L-1234 3.23
21L-3456 2.56
22L-5678 3.47
```

sec2.txt

```
23L-4567 3.96
```

sec3.txt

```
22L-2345 2.11
```

**Please note the file manipulation is to be done through system calls only(open,read,write etc). There will be no credit if any other file manipulation method is used such as ofstream/ ifstream/ fscanf/ fgets/ fprintf/fputs etc.**