BSc (Hons) in Information Technology

Operating Systems and System Administration

Year 02 Semester 01

Assignment - Individual

Assignment Submission Guidelines

Assignment released date: **10/8/2024 at 8.00 p.m**

Assignment due date: **25/8/2024 at 12 mid- night**

Assignment submission method:

- **Prepare a report including answers to the (4) questions according to the template in appendix I.**
- **Save the report using the student's registration number.**
- **Submit the report to the link provided in the courseweb.**

Evaluation method: **Assignment report submission and viva**

Viva schedule: **Week starting on 26/ 8/2024 - During the practical time.**
(Attending the viva is compulsory to obtain the marks)

Total Marks allocated for the assignment: **100 marks.**
(25 marks for each question and the marks will be given during the viva session)

Question 1: Consider the following C program and answer the questions.

```
#include <stdio.h>
#include <unistd.h>

for(int i = 0; i < 10; i++)
{
      if (pid = fork() < 0)
      // error else if (pid == 0)
      {
            function_A();
            return 0;
      }
      printf("process ID: %d \n", pid); // Line A
}

for(int i = 0; i < 10; i++) //Line B
    wait();
```

(i) How many new processes are created in the program? Justify your answer?

(ii) Which process, the parent or the child, executes function_A()? Justify your answer?

(iii) Whose PID, the parent or the child, is printed in Line A? Justify your answer?

(iv) What is the purpose of the for loop with the wait() in Line B?

Question 2: Consider the following C program and answer the questions.

```
int main ()
{
      for(i =0; i < K; i++) {
            pid=fork ();
      }

}
```

Assume that the variables *i* and *pid*, and constant *K* have been properly defined, and initialized. There are no syntax errors in the above code.

(i) For *K*=5, How many processes are in the memory when the program is executed?

(ii) Modify the above program so that only the parent process creates 3 child processes, and each newly created process calls a function CPU( ). In addition, make the parent process wait for each child's termination.

Question 3: Consider the following program. Explain the meanings of every line in the code and mention the output in Line A?

```
int value = 40;
int main()
{
  pid_t pid;
  pid = fork();
  if (pid == 0) {
    value = value + 15;
    }
  else if (pid > 0)
  {
    value = value - 15;
    printf("PARENT: value= %d \n", value); //Line A
    wait (NULL);
    }
}
```

Question 4: Consider the following programs A and B and answer the questions given below.

(i) How many times will the fork () function be called in **Program A**? (*i.e.*, how many processes are created?) Justify your answer.

(ii) What is the output of **Line A** in **Program B**? Justify your answer.

```
// Program A
int main()
{
        pid_t pid;
        int i;
                for (i=0; i<4; i++)
                        pid = fork();
}
```

```
// Program B
int value = 30;
int main()
{
        pid_t pid;
        pid = fork();
                if (pid == 0)

                        value = value + 25;

                else if (pid > 0) {

                        value = value - 25;
                wait (NULL);

}
printf("Value= %d \n", value); //Line A
}
```

Appendix I

Prepare your report according to the below template.

1. Cover page
2. Table of content
3. Copy the assignment questions and provide the answers under the question text.
4. References

Prepare the cover page of your report according to the sample given below.

Sri Lanka Institute of Information Technology

IT2060 – Operating Systems and Systems Administration
Year 2, Semester 1- 2024

Assignment Report
<Student_id>