Operating Systems I

CS 474

Homework #1

Due date: 09/25/2022 at 11:59 pm
Instructions:
HW must be submitted on typed pdf or word document.
All questions need to be worked on and answered individually. No collaboration of any form is permitted and will amount to plagiarism if performed.

Questions from Chapter 1

1. What are the three main purposes of an operating system? (10 pts)
2. Describe the differences between symmetric and asymmetric multiprocessing. What are three advantages and one disadvantage of multiprocessor systems? (10 pts)
3. What is the purpose of interrupts? What are the differences between a trap and an interrupt? Can traps be generated intentionally by a user program? If so, for what purpose? (10 pts)

Questions from Chapter 2

4. What is the purpose of system calls? (10 pts)
5. Describe three general methods for passing parameters to the operating system. (10 pts)
6. What is the main advantage of the microkernel approach to system design? How do user programs and system services interact in a microkernel architecture? What are the disadvantages of using the microkernel approach? (10 pts)

Questions from Chapter 3

7. Describe the differences among short-term, medium-term, and long-term scheduling. (10 pts)
8. Describe the actions taken by a kernel to context-switch between processes. (10 pts)

9. Including the initial parent process, how many processes are created by the program as shown. (10 pts)

```
#include<stdio.h>
#include<unistd.h>
int main()
{
      int i;
      for (i=0; i<4; i++)
         fork();

      return 0;
  }
```

10. Assume that the following program contains no syntax errors. As it executes it will create one or more processes. Simulate the execution of this program and show how processes are created (10 pts)

```
#include<stdio.h>
main()
{
int m=10, n=5,count=1, mult=1;
while(count <3)
{
    if(m != 0)
    {
         m = fork(); n = n+25;
     }
     else
     {
          m = fork(); n = n+20; mult = mult*n;
      }
      printf(" n = %d       mult  = %d", n, mult);
      count =count + 1;
   }
}
```

1) What is total number of processes? Show your work.
2) What will this program print on the screen when it executes?