Introduction to Operating Systems

COP 4600

Name and ID Kevin Hicks U13696231

Homework #1

Due date: 09/03/2017 at 11:59 pm
Instructions:
1) To complete assignment one, you need to read Chapters 1, 2, and 3 of the textbook.
2) HW must be submitted on typed pdf or word document.
You must do your work on your own. Late work will be not accepted.

Q1. What are the three main purposes of an operating system? (1 point)

Answer:

1) Make user programs and make solving user problems easier

2) Make the computer system convenient to use

3) Use the computer hardware in an efficient manner

Q2. What is the main advantage for an operating-system designer of using virtual-machine architecture? What is the main advantage for a user? (1 point)

Answer:
For an operating-system developer, the system is easy to debug, and security problems are easy to solve. Virtual machines also provide a good platform for operating system research since many different operating systems may run on one physical system.

Q3. Describe the actions taken by a kernel to context-switching between processes. (1 point)

Answer:
During a context switch, the kernel saves the context of the old process in its PCB and loads the saved context of the new process scheduled to run.

Q4. What are the benefits and the disadvantages of each of the following? (3 points)

a. Synchronous and asynchronous buffering

Answer:

The advantage of synchronous buffering is that it allows for a rendezvous between the sending process and the receiving process, thereby synchronizing the two processes. A disadvantage with synchronous buffering is that there is only one communication at a time and if a rendezvous isn't required, the processes are blocked until the communication is complete and they are unable to perform any other operations

The advantage of asynchronous buffering is that process flow isn't restricted or blocked while waiting for a response. A disadvantage of asynchronous buffering is that processes need to handle multiple communications.

b. Automatic and explicit buffering

Answer:

An advantage of automatic buffering is that it provides a queue with indefinite length which ensures that the sender will never have to block while waiting to copy a message, while a disadvantage of automatic buffering is that there are no specifications on how the automatic buffering will be provided. This means that lots of memory can be wasted, if a scheme that reserves large amounts of memory is used.

A disadvantage of explicit buffering is that the send may be blocked while waiting for available space in the queue. That's because an advantage of explicit buffering since its specifies the size of the buffer, meaning that there is a lower chance of wasting memory.

c. Fixed-sized and variable-sized messages

Answer:

An advantage of fixed sized messages is that its known how many messages a buffer with a known size can hold, while the disadvantage of fixed sized messages is that if the messages do not use the full size that can be held, the buffer space will be wasted.

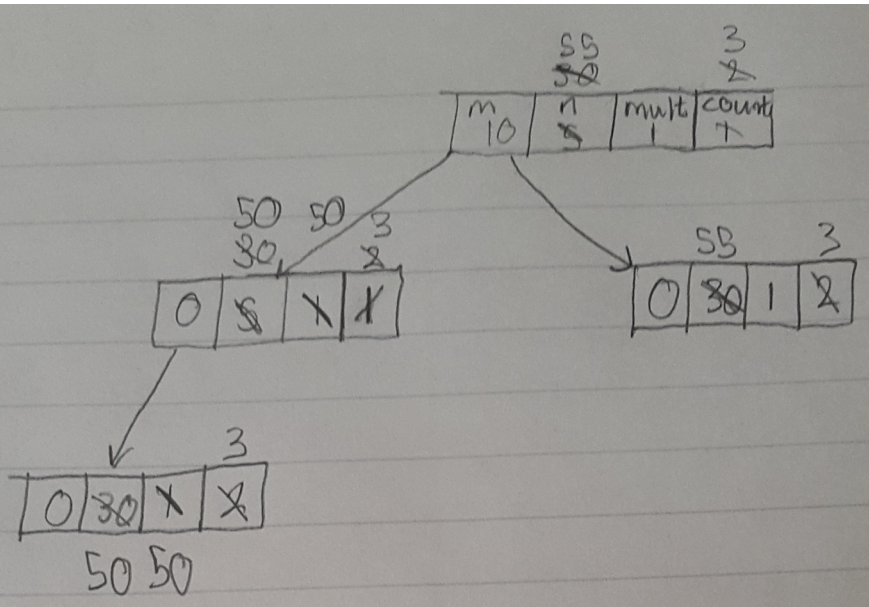
The advantage of variable-sized messages is that there is a possibility that more messages can be held in a buffer than fixed-sized messages, which can increase speed. A disadvantage is that there isn't a known amount of variable-sized messages that can held in a buffer with a known size. This can mean that messages larger than the buffer will use something else, like shared memory in Windows 2000.

Q5. Assume that the following program contains no syntax errors. As it executes it will create one or more processes. (4 points)
Simulate the execution of this program and show how processes are created

```
#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;
   }
}
```

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

Answer:
4 total processes
Program will print:
n = 30 mult = 1
n = 30 mult = 1
n = 55 mult = 1
n = 55 mult = 1
n = 50 mult = 50
n = 50 mult = 50



n = 30 mult = 1
n = 30 mult = 1
n = 55 mult = 1
n = 55 mult = 1
n = 50 mult = 50
n = 50 mult = 50