Ben Holmes
COMS 352
1/19/18

1.12 In a multiprogramming and time-sharing environment, several users share the system simultaneously. This situation can result in various security problems.
a. What are two such problems?

1. Viruses and Worms
2. Denial of Service attacks

b. Can we ensure the same degree of security in a time-shared machine as in a dedicated machine? Explain your answer.

Because time-shared machines are responsible for managing multiple users, they must cycle through all the computer processes very quickly in order to prevent the CPU from being overwhelmed. Due to the extra work an operating system must do in order to manage all these user processes, it leaves the machine more open to a denial of service attack. A time-shared machine would also theoretically be easier to hack into, because there are more user's, thus more user/password options to exploit, where as a dedicated machine only has one user, and thus only one possible user/password combination.

1.14 Under what circumstances would a user be better off using a timesharing system than a PC or a single-user workstation?

A timesharing environment is good when you have many different people attempting to use the same computer system. In this instance the CPU cycles through many processes very quickly, allowing many different programs to run at the same time. This allows multiple people to access the same software, thus preventing software duplication.

1.15 Describe the differences between symmetric and asymmetric multiprocessing. What are three advantages and one disadvantage
of multiprocessor systems?

In symmetric multiprocessing, processors share the same memory, whereas in asymmetric multiprocessing there is one master processor controlling the structure of memory.

Advantages
1. Because there are more processors, more work can be done simultaneously.
2. Multiple processors can prevent the duplication of data. Instead of saving data on multiple processors to be used by specific programs, all the data can be saved in one place, and shared by the programs which need it.

3. More reliable, because even if one processor fails, there are still other processors which can ensure the system runs smoothly.

Disadvantage
1. They are more expensive, and also require a more complex operating system.

1.19 What is the purpose of interrupts? How does an interrupt differ from a trap? Can traps be generated intentionally by a user program? If so, for what purpose?

Interrupts are calls to the CPU that inform the OS about system programs. They come from the hardware. A trap is a software generated interrupt. It can be caused by an error, or by request from a user program. A trap can be caused by dividing by 0, or invalid memory access.

1.20 Direct memory access is used for high-speed I/O devices in order to avoid increasing the CPU's execution load.
a. How does the CPU interface with the device to coordinate the transfer?

The CPU sets up buffers, pointers, and counters for the I/O device. Then the device controller transfers a block of data to or from its own buffer storage to memory.

b. How does the CPU know when the memory operations are complete?

The direct memory access controller sends an interrupt to the CPU.

c. The CPU is allowed to execute other programs while the DMA controller is transferring data. Does this process interfere with the execution of the user programs? If so, describe what forms of interference are caused.

This process can interfere with execution of user programs if both the CPU and direct memory access controllers attempt to access and modify the same memory at the same time.

2.13 Describe three general methods for passing parameters to the operating system.

1) Pass the parameters in registers
2) Store parameters in a block in memory, and pass address of block as a parameter in a register
3) Push the parameters onto the stack with a program, and let the OS pop them off.

2.15 What are the five major activities of an operating system with regard to file management?

1. Creation and deletion of files
2. Creation and deletion of directories
3. The support of primitives
4. The mapping of files onto secondary storage
5. The backup of files on stable storage media

2.16 What are the advantages and disadvantages of using the same systemcall interface for manipulating both files and devices?

Advantages
- Devices can be accessed as if they were files on the system.
- A user could write code to access devices and files in the same manner.
- Could create a nice API for accessing device driver code.

Disadvantages
- Could cause loss of functionality or performance with the way device software is accessed in the filesystem api.

2.18 What are the two models of interprocess communication? What are the strengths and weaknesses of the two approaches?

Shared-memory model.
Strength:
1. Shared memory communication is faster when the processes are on the same machine.
Weaknesses:
1. Processes need to keep track of where memory is being altered so that no two processes modify the same memory.
2. Processes that use shared memory need to communicate in order to protect and synchronize their work loads.
Message-passing model.
Strength:
1. Easy to implement
Weakness:
1. A longer connection setup time causes communication to be slower