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CS 352
HW 1
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1.14
Under what circumstances would a user be better off using a timesharing system rather than a PC or a single-user workstation?
Answer: Timesharing system would be better when there are a lot of users and the task is large enough with a faster hardware. The full power problem can be solved faster than on a personal computer. One more example of the same would be when a lot of users are in need of the same resources at the same time. Personal computers are useful when they job is small and it's executed reasonably.

1.20
a. How does the CPU interface with the device to coordinate the transfer?
Answer: There are special kinds of hardware in every single device; all those devices have drivers, which are called kernel programs that help communicate with the controllers. In order to store the arguments and results all those device drivers have registers, counters and buffers, but they always sit in the tight loop to see the I/O through. But these would tie up the CPU during the I/O. Using DMA, the CPU loads it first and then device controller takes care of the rest.
b. How does the CPU know when the memory operations are complete?
Answer: The device 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.
Answer: There is no interference with user programs, provided you discount interrupts. When it's done, DMA controller sends an interrupt, which causes a user process to be suspended.

1.25

Describe a mechanism for enforcing memory protection in order to prevent a program from modifying the memory associated with other programs.
Answer: Use 2 registers, base and limit, to specify the beginning address and the size of the memory allocation of a process. Each process can be tracked by the processor that are associated. The information can be maintained by using base and limits registers and by preforming a check for every memory access.

2.18
What are the two models of inter-process communication? What are the strengths and weaknesses of the two approaches?
Answer: The two models of IPC are shared memory model and message passing model:
Shared memory model:
Strengths:
1. It is faster than the message-passing model when the processes are on the same machine.

Weaknesses:
1. Different locations have to make sure that they are not writing on the same location when they are writing.
2. Processes using the shared memory need to address problems of memory protection and sync.

Message-passing mode:
Strengths:
1. Much easier to implement as compared to shared memory model.

Weaknesses:
1. Communication using message passing is slower than shared memory model due to the time involved in the connection setup.

2.23
How are iOS and Android similar? How are they different?
Answer: They are similar in the both are based on existing kernels (Linux and Mac OS X), they also have architecture that uses software stacks and provides the framework for developers.
The difference is that iOS is closed source whereas android is open, also iOS applications are developed in Objective-C and android is in java. Android uses a virtual machine, iOS executes code natively.

6.

I. Variable a → Data segment since its global
II. Variable b → Stack since its local
III. The space pointed by b → Heap because dynamic
IV. Variable c → Stack since its local
V. The space pointed by c → Heap because dynamic
VI. Variable d stored, respectively? After function foo finishes its execution, which of the above variable/space are/is reclaimed by the OS?
Answer: Stack since its local

7. Number 2 and 5 are the system calls whereas number 6 and 7 are execution with 6 also being termination.