**CS 4345: Operating Systems**

**Practice Questions 1 (Spring 2019)**

**Hardware:**

1. What are the three basic hardware component of any general system (computer)? How are they related (interconnected)?

CPU, memory, I/O devices.

1. Explain the instruction execution cycle of CPU by identifying different stages and their functionalities.
2. Discuss the memory hierarchy and explain its significance in functioning of a system.
3. What is caching? Explain what we mean by a cache hit.
4. A system has a cache, main memory, and a disk. If a referenced word is in cache, 5 nanoseconds are required to access it. The main memory access time is 20 nanoseconds, and 1 millisecond is required to access it from the disk if the word is not in main memory. The cache hit ration is 60% and the main memory hit ratio is 90%. What is the average time required to access a referenced word on his system?
5. What is DMA and how is it handled?
6. What is an interrupt? How is an interrupt handled? What are the main categories? How can interrupts help in functioning of an OS?
7. What is the role of a mode bit? How it provides a form of protection for the OS?

The mode bit whether the kernel or user mode is active. Kernal has access to important functions like hardware devices, control over interrupts, and certain instructions can only be executed while in kernel mode. While in user mode the CPU has limited capability giving a form of protection to critical resources.

**Operating System:**

1. OS can broadly be viewed in two categories – user’s and system’s. How user view OS differs from system view of OS?
2. A portable OS is one that can be ported from one system architecture to another without any modification. Explain why it is building an OS that is completely portable.
3. There are several design goals in building an OS, for example, resource utilization, timeliness, robustness, and so on. Suggest (and explain) an example of two deign goals that may conflict.
4. What is the difference between timesharing and multiprogramming systems?
5. What is a multiprocessing system? What are the advantages and disadvantages?
6. What are the main categories of multiprocessing? Explain the difference between them.

**OS Services and Structures:**

1. List at least three major services provided by OS. How OS services can be categorized?

Provides an environment for users to execute programs in a convenient and efficient manner. Fairly and efficiently allocates the separate resources needed to do a task. Supervises the execution of programs to prevent errors and improper use of the computer. Manages the operation and control of I/O devices.

1. What is CLI? What are the two broad ways of implementing CLIs? Discuss pros and cons f both methods.
2. What is a system call and how does it help in functioning of an operating system.
3. Discuss the trade-off involved in selecting programming language for implementing an OS.
4. What are the major types of design choices for structuring an OS?
5. Compare and contrast between ay two of the OS structures discussed.