

# CECS 326 Assignment 1 - Introduction to Operating Systems

20 points

**Assignment Description.** Answer the following questions from the Chapter 1 reading from your textbook. Be thorough and complete with your answers. You *may* work on these questions with a partner (no more than two working together), but **both** students must submit the document individually on Beachboard Dropbox along with both students' names on each submission.

1. What are the two main functions of an operating system?
2. What is the difference between timesharing and multiprogramming systems?
3. The family-of-computers idea was introduced in the 1960s with the IBM System/360 mainframes. Is this idea now dead as a doornail or does it live on?
4. What is the difference between kernel and user mode? Explain how having two distinct modes aids in designing an operating system.
5. On early computers, every byte of data read or written was handled by the CPU (i.e., there was no DMA). What implications does this have for multiprogramming?
6. There are several design goals in building an operating system, for example, resource utilization, timeliness, robustness, and so on. Give an example of two design goals that may contradict one another.
7. Which of the following instructions should be allowed only in kernel mode?
  - (a) Disable all interrupts.
  - (b) Read the time-of-day clock.
  - (c) Set the time-of-day clock.
  - (d) Change the memory map.
8. Consider a system that has two CPUs, each CPU having two threads (hyperthreading). Suppose three programs,  $P0$ ,  $P1$ , and  $P2$ , are started with run times of 5, 10 and 20 msec, respectively. How long will it take to complete the execution of these programs? Assume that all three programs are 100% CPU bound, do not block during execution, and do not change CPUs once assigned.
9. What is a trap instruction? Explain its use in operating systems.
10. Modern operating systems decouple a process address space from the machine's physical memory. List two advantages of this design.

**Deliverables.** Submit the answers to the questions on **Beachboard Dropbox** by the indicated due date and time. Acceptable file submission formats are: .txt, .rtf, .odt, .doc, .docx, or .pdf.