**CS 4345: Operating Systems**

**Assignment 1 (Spring 2023)**

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**[Submission instructions:** write your name at the top and include answers in this document after each question. Please do not write your answers on a separate document or file. Submit this file after renaming it as ***a1\_lastname.docx*** (where ***lastname*** is your last name) through BlazeVIEW assignment submission box.**]**

**Answer the following:**

1. A portable OS is one that can be ported from one system architecture to another without any modification. Explain why it is infeasible to build an OS that is completely portable. [5 points]

***Answer:*** Operating systems can be widely different from device to device. There are a lot of factors that you would have to consider in designing an operating system that’s portable. To name a few factors: The type of CPU that the device is using, the bus architecture, and the word size of the CPU usually 32bit or 64bit. With the large number of devices and the number of factors you would have to consider, it would not be feasible to develop a portable operating system, because each device has the possibility of having a different type of operating system architecture.

1. What is the difference between timesharing and multiprogramming systems? [5 points]

***Answer:*** A timesharing system allows multiple people the ability to perform computations on a computing system with their own terminals simultaneously. A multiprogramming system allows a user to run multiple programs at the same time. In time sharing processing time is given to each user by a particular time slot of when their processes can take place, but in multiprogramming it is able to run all processes at the same time by monitoring their process states and switching in between processes.

1. 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 design goals that may contradict each other. [5 points]

***Answer:*** Timeliness and resource utilization contract each other. Resource utilization is the measure of how much of your available resources you are currently using. Timeliness is referred to as the speed of dissemination of the data. When a system, manages its resources effectively without interruption can result in processes having longer wait times.

1. Direct memory access is used for high-speed I/O devices in order to avoid increasing the CPU’s execution load. The CPU is allowed to execute other programs while the DMA controller is transferring the data. Explain whether this process interfere with the execution of the user programs? [5 points]

***Answer:*** The CPU and the device will compete for cycles on the memory bus.  The memory bus controller will fairly allocate bus cycles between the CPU and the device. If a program ran by the CPU uses all the memory bus cycles, then the program will be forced to slow down while the DMA is active.