**Matthew Austin**

**Assignment 1**

**CIS355** – Spring Term 2018

**Point Value**: 100 points

**Assignment Due Date**: **In class Thursday, Jan 25, 2018**

**Submission Instruction**

Please write your answers to those questions on a Microsoft Word document. The name of the file should be HW1\_YourLastname\_YourFirstnme.docx. Please 59pm submit a hard copy of the file to the instructor in class and submit the file on Schoology by 11:59.

**Short answers**

1. **What is Operating System (**5 points**) and its main purpose?** (5 points)
   1. It is a control program that manages the execution of user programs and manages the use of resources.
   2. The main purpose or goal of an OS is Efficiency, Fairness, and Protection by managing these resources:
      1. CPU time
      2. Memory space
      3. File-storage space
      4. I/O devices, etc.
2. **What is a program** (5 points)**? What is a process** (5 points)**? Please give a creative/funny analogy to distinguish between a process and a program**. (5 points)
   1. A program is similar to a recipe and a process is the instructions and going through them step by step. An analogy for this is like a chef with a recipe (program) a soup and the chef follows the instructions step by step to make the soup (process).
3. **What is the purpose of system calls (**5 points**)? Please give two examples of system call and describe their purposes.** (5 points)
   1. System calls provide an interface to the services made available by an operating system.
   2. open() is used to create a file and write() is used to write on a file.
4. **What is a monolithic system (**5 points**)? What is a layered system?** (5 points)
   1. **Monolithic Systems:** have the OS in a single address space providing efficient performance; everything in one layer.
   2. **A Layered System:** is an operating system is divided into many layers/levels and each layer uses functions/operations and services of only lower-level layers; everything is divided into separate layers.
5. **What are the advantages of a layered approach (**6 points**)? What are the disadvantages?** (4 points)
   1. **Advantages:** Layered approach simplifies implementation and easier debugging.
   2. **Disadvantages:** This approach requires careful planning and it is less efficient because a system call may go through the I/O layer, memory-management layer,CPU-scheduling layer, and then hardware at each layer. It is slower.
6. **In OS implementation, what are the advantages of using Assembly language (**5 points**)?** **What are the advantages of high level language such as C++**? (5 points)
   1. **Advantages of Assembly Language:**
      1. You directly specify which register you want to use to store you values.
      2. Faster/More Efficient.
      3. For most devices drivers assembly language can only be used
   2. **Advantages of High Level Language:**
      1. More understandable for users/easy to read.
      2. Easy to modify.
      3. Portability.
7. **What are the advantages of using Loadable Kernel Modules?** (10 points)
   1. The advantages of Loadable Kernel Modules are:
      1. The kernel has a set of core components (in a web formation)
      2. Links in additional services via modules at boot time or run time.
      3. Easier to extend the operating system. No need to change kernel.
      4. More reliable (less code is running in kernel mode)
8. **What are the design goals of Operating System from a user view (**5 points**)**? **What are the design goals of Operating System from a system view?** (5 points)
   1. **From a User View:**
      1. *Fast*
         1. Able to complete tasks in a quick and timely manner.
      2. *User-Friendly*
         1. Anyone is able to learn and easily use the operating system
   2. **From a System View:**
      1. *Efficiency*
         1. Multiprogramming
            1. Keep CPU always busy
   3. *Fairness*
      1. Which job get be in the CPU
   4. *Protection*
      1. Address space: all memories a process can touch
      2. Secure
      3. Dual-modes
         1. Kernel mode (supervisor mode)
         2. User mode (No access to direct hardware)
9. **What is the difference between 4 processors (each has one core) and 1 processor with 4 cores? (**10 points**)**
   1. Having 4 processors where each has a core cost more and will be slower due to having only one general CPU. Thus a program does nothing if it is not executed by CPU and does one job at a time
   2. 1 processor with 4 cores which will cost less and will be faster.
      1. Increased output
      2. Increased Reliability; if one processor fails another one will continue its work.
10. **Please describe the procedure of booting a system?** (5 points)
    1. Booting the system means loading the kernel into the memory.
       1. A Bootstrap program/loader is loaded at power-up or reboot.
          1. The CPU’s instruction register is loaded with a predefined memory location where the initial bootstrap program resides.
          2. The program is store in read-only memory (ROM). They are also known as firmware.
          3. Test hardware and initializes all aspects of system.
          4. Load OS kernel and starts execution.

**Hint:** starting with CPU fetch the memory location of a bootstrap program/loader.