**CSE 3302: Programming Languages**

**Spring 2018**

**Homework 05**

**Due on October 26, 2018 [ before 11:59 pm]**

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**Date: 10/26/2018**

**INSTRUCTIONS**

1. **Do NOT plagiarize.**
2. **No group-work. All work should be your own.**
3. **Do not discuss your work with other students in the class.**
4. **Cite sources where necessary.**
5. **Turn in your word document using Blackboard. Do not email your documents.**
6. **Name your document as netid.docx where *netid* is your UTA NetID. If you do not know your NetID, check what it is using NetID Self Service. Your 1000 number is NOT your NetID.**
7. **Try to answer each question within 5-7 lines.**

**Questions:**

**1.** What made IBM 7090 six times faster and half cost than IBM 709? **[7 points]   
All discrete vacuum tubes were replaced with discrete transistors.**

**2.** What is virtual memory? Who manipulates the physical memory when program runs?**[8points]   
Memory management technique that provides an abstraction of the storage resources. The operating system.**

**3.** Difference between flat file system and hierarchical file system. **[7 points]  
Flat file system has all its files stored at one level. Hierarchical has the ability to put files in to folders and folders in to folders.**

**4.** Why the memory protection is important for operating system?**[8 points]**

**It is important so that programs don’t overwrite the memory of other programs. It is especially important to memory that is occupied by the OS. You don’t want programs overwriting the OS that will result in loss of functionality of the system.**

**5.** What is Moore’s Law? Is it out-of-date now?**[5 points]**

**Approximately every two years, thanks to advances in materials and manufacturing, you could fit TWICE the number of transistors into the same amount of space. Yes, there are limits to the photomask and it’s wafer due to wavelengths of light and we are reaching the limit on how small a transistor can be while still being effective. When a transistor gets too small it leaks current and is not as effective.**

**6.** Give a summary of the storage technology history from 1940s to nowadays. **[10 points]**

**Punch cards, delay line memory, magnetic core memory, magnetic tape, magnetic drum memory, hard disk drives, floppy disks, optical disks, solid state drives.**

**7.** What are the fragmentation and defragmentation in file system? **[5 points]**

**Fragmentation is files getting broken up across storage. When files are created, deleted, and modified, it will leave chunks of unused memory in between used chunks of memory. Defragmentation relocates files in memory so that all files are contiguous in memory and all unused memory is contiguous position after used memory.**

**8.** How can a computer run several programs in one single CPU at the same time? **[8 points]**

**The operating system contains a scheduler that can make programs run and wait, making the completion of all the programs more efficient. This is called multitasking.**

**9.** What is the metadata?**[5 points]**

**It is data about data.**

**10.** Give a brief description on the directory file. **[7 points]**

**A special file that records where other files are located.**

**11.** What is a file system? What’s the relation to OS? **[7 points]**

**Part of the operating system that manages and keeps track of stored files.**

**12.** List some softwares that are used for designing the ICs.**[7 points]**

**Cadence, Synopsis, Mentor Graphics, Calibre, Xilinx.**

**13.** What is multitasking in the Operating System? Why is it necessary? [**10 points]**

**The ability to run multiple programs on a single CPU. It is necessary because it makes the completion of several tasks much faster and efficient.**

**14.** What is a time-sharing operating system?**[6 points]   
Time-sharing operating system allows users only a fraction of the resources available on the system when there are multiple users on the same operating system. This ensures that one individual user won’t use all available resources.**

**Extra credit (bonus question):**

**15.** What is the printed circuit board? What are the effects to the industry?. **[10 points]**