Assignment 1: Computers

Date Due: September 4, 2013   Instructor: Trani

Problem 1

One of the best web sites to learn about the development of computers is the History of Computers Museum (http://www.computerhistory.org/revolution/). Look at the Museum timeline and briefly answer the following questions.

   a) Name two hardware advances introduced by the IBM System /360 computer

   Magnetic Core Stack, IBM System/360 Model 91

   Magnetic Core Plane, IBM System/360 Model 65

   b) Large-scale projects like the Apollo Program required a good management program to integrate many suppliers and companies building the hardware and software elements of the program. Name the companies that created the Information Management System (IMS) for the Apollo Program.

   IBM and North American Rockwell

   c) In three sentences describe the SAGE computer system and state its purpose.

   The SAGE computer system, which is short for Semi-Automatic Ground Environment, was an operator environment for the automated air defense (AD) of North America and by extension. The network of computer systems provided the ground environment for the larger air defense system with buildings, radars, and defense aircraft. It was the Cold War network of computer sets and centrals that created the display and control environment for operation of the separate radars and to provide command guidance for ground-controlled interception by air defense aircraft in the "SAGE Defense System".

   d) In 1983 Apple introduced the Apple Lisa computer. Name two attributes of this personal computer system that we use today.

   Protected memory, Graphical User Interface (GUI), OS with Multi-tasking capability and Virtual Memory

   e) Atari became synonymous of gaming. Name two games introduced in the Atari platform.

   Pong, Space Invaders, Missile Command

   f) XEROX PARC is credited with the development of many computer technologies that we take for granted today including Ethernet. Name two other technologies developed by this famous computer science laboratory.

   Laser Printer, GUI operated with a mouse.

   g) Name the European laboratory and the key person who were behind the development of the World Wide Web?

   CERN, European Organization for Nuclear Research

Problem 2

For your own personal computer find the following:

(No standard answer)

   a) Number and model of CPU processor used

   b) CPU clock speed

   c) Computer memory size

   d) Graphics processing unit (GPU) and the amount of RAM

   e) Name the operating system used in your computer

Problem 3

a) An algorithm is a series of steps to solve a problem. Describe in a couple of paragraphs the purpose of an algorithm that you have developed using a programming language, Excel or an engineering tool like Matlab or Mathematica.

(No standard answer)

b) Back in 1984 Apple released the Lisa 2 at a price of $5,495. The computer had 1 Mb of RAM (very large for its time) and a 10 Mb hard drive. The Lisa 2 used a Motorola 68000 microprocessor running at 5 Mhz. What kind of personal computer can you buy for the same price today (get some quotes from sites like Apple or Dell)? Contrast the price of PCs vs their power. Comment.

	Lisa 2	Mac Pro
Processor	5 Mhz Motorola 68000 microprocessor	Two 2.66GHz 6-Core Intel Xeon processor (12 cores)
Memory	1 Mb	24GB (6X4GB)
Hard Drive	10 Mb	2TB 7200-rpm Serial ATA 3Gb/s hard drive
Graphics		ATI Radeon HD 5770 1GB
price	5495	5549

Comment: Today with the same price, which does not consider inflation from 1983, we can buy much more powerful personal computer. The performance of processor increases almost 1000 times. The storage of memory enlarge 24,000 times. And the storage of hard drive increases 200,000 times.

c) Search prices of typical hard drives in the Internet to help you figure out the cost per megabyte of storage today. Consider inflation in your answer. Use the Bureau of Labor Statistics calculator located at: http://www.bls.gov/data/inflation_calculator.htm.

Year	USD/MB	Considering Inflation (USD/MB)	Annual Decrease Rate
1960	3600	28410.32	
1970	259.7	1563.53	0.748278056
1985	31.39	68.15	0.811503959
1990	5.28	9.44	0.673443595
2000	0.01478723	0.2	0.680151719
2007	0.00028	0.00032	0.398647063
2008	0.0002	0.000217	0.678125
2009	0.0000933	0.0000933	0.429953917
2010	0.0000733	0.0000733	0.785637728
2011	0.00004	0.00004	0.545702592
2012	0.0000786	0.0000786	1.965
2013	0.000055	0.000055	0.699745547

Comment: The price of hard drive remained a steady decreasing rate during 1960 to 2000 about 70% annually. Then because of the introduction of new technology into the hard drive manufacturing, the price dropped suddenly from 2000 to 2007. After that the decrease rate went back to steady. In 2012, the price increased almost twice because the huge flood in Thailand, which is the main base of hard drive manufacture, destroyed the factory and disturbed the hard drive market. Recently, the hard drive market returned to its order.

Problem 4

Read the article "Numeric precision in Microsoft Excel" in Wikipedia and answer the following questions:

a) How many decimal places of precision can an 8-byte number hold?

15

b) How does the conversion of numbers in Excel to binary and back to decimal affects its accuracy?

When Excel do conversion of numbers to binary and back to decimal, round-off error will occur. It affects the accuracy of calculation.

Problem 5

An engineer doing seismic calculations wants to store two matrices (called A and B) of equal size containing floating point numbers. The size of each matrix is 4,100 x 4,100. In the algorithm to solve the problem, A and B are multiplied and produce a new matrix C (element by element multiplication). The engineer would like to keep each number of the two original matrices plus matrix C in memory using 8-byte representation for future calculations. Estimate the amount of RAM used in the computer.

Name	Size	Bytes	Class
A	4100x4100	134480000	double
B	4100x4100	134480000	double
C	4100x4100	134480000	double

403.44 Mb