

SSC. 151
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Name: _____	ID No. _____
Date : _____	Section : _____

Solution Key to Problem Set 2

1. MULTIPLE CHOICES (MCOs)

1)

The binary number 11001010 is equivalent to the decimal number _____ and the hexadecimal number _____. (Hint: You may use your own calculations, as we learned in the class. You may also use Microsoft Windows Calculator or any physical scientific calculator.)

- 92, 5C
- 202, CA
- 161, A1
- 178, B2

2)

The Hexadecimal Number 1AA1 is equivalent to _____. (Hint: You may use your own calculations, as we learned in the class. You may also use Microsoft Windows Calculator or any physical scientific calculator.)

- 6682
- 2721
- 426
- 6817

3)

The sum of the two binary numbers 1000 and 1100 is _____ (Hint: You may use your own calculations, as we learned in the class. You may also use Microsoft Windows Calculator or any physical scientific calculator.)

- 10011
- 10101
- 10100
- 10110

4)

A _____ is connector on the exterior of a PC's system unit to which a device may be attached.

- Register
- Port
- Expansion slot
- Bus

5)

The _____ is the part of the CPU that attempts to retrieve data and instructions before they are needed for processing, in order to avoid delays.

- Bus Interface unit
- Prefetch unit
- ALU
- Registers

6)

A _____ fits into a slot located on the exterior of a notebook or tablet computer to provide new functionality or to attach a peripheral device.

- PC Card
- USB
- CPU
- Bus

7)

Another way to say “approximately” one trillion bytes is:

- one gigabyte
- one megabyte
- one terabyte
- one Petabyte

8)

Which type of the following memory is volatile-i.e. erased when the power goes out?

- Registers
- RAM
- Internal cache
- all of the above

9)

A(n) electronic path within a computer over which data travels is called a(n) _____.

- prefetch unit
- bus
- RAM
- motherboad

10)

The parts of the CPU that are used to store instructions or to store data before, during, and after processing are called _____.

- Registers
- ALU
- Prefetch Unit
- Decode Unit

11)

Your strategies of speeding up your system include all of the following except:

- Add more memory.
- Perform system maintenance.
- Moving circuits closer together.
- Upgrade your CPU.

12)

Typical CPU components include all of the following except:

- Bus interface unit
- USB
- Internal cache
- Decode unit

2. TRUE OR FALSE (T / F)

1)

Cache memory is a group of fast memory chips located on or near the CPU to help speed up processing.

True

False

2)

Pipelining is a CPU feature designed to begin processing a new instruction as soon as the previous instruction completes the first stage of the machine cycle.

True

False

3) Nanotechnology will provide computer chips thousands of times smaller than today's components because they are built at the atomic and molecular levels.

True

False

4) Common ports include FireWire, MIDI, IrDA.

True

False

5) Terascale computing uses multi-core in conjunction with multithreading hardware and software.

True

False

6) The decode unit takes instructions from the prefetch unit and translate them into a form that the control unit can understand.

True

False

3. TEXT DATA

During the 2008 Republican National Convention (RNC) in the USA, a popular election campaign slogan floated by the RNC chairman Michael Steele

Drill, Baby, Drill

1. If the slogan was first written and saved in Unicode encoded message, how big is the file size?

The slogan has 18 letters and so in Unicode must be ≥ 36 bytes.

2. If a clever sniffing program could intercept any communication message to Presidency (Bush/Cheney) or Republican Candidates (McCain/Palin) if the text file size is 15 bytes or more, Would it be possible not have been intercepted if it was saved in ANSI's ACSII text-encoding?

Yes. The slogan has 18 letters, i.e. 18 bytes in ANSI's ACSII text-encoding.

4. GRAPHICS DATA

- Download the file Mobile_Internet.bmp from the course webpage at
- http://academics.nawar.us/Mobile_Internet.bmp
- Open the file in Microsoft Windows **Paint**.

Hint (Do you know you that if you are online, you can open directly this file from **Paint** without having to first download it? Just type http://academics.nawar.us/Mobile_Internet.bmp)

Answer the following

(a) **What is the original file size and color information?**

The file size is 472 KB and color information is 24-bit bitmap.

(b) **Save the file as 256 colors bitmap. What is the file size? What happens on the picture?**

The file size is 159 KB in this 256-color bitmap. Saving the file this format causes some loss of color information.

(c) **Save the file as 16 colors bitmap. What is the file size? What happens on the picture?**

The file size is 79.5 KB in this 16-color bitmap. Saving the file this format causes some loss of color information.

(d) **Save the file as monochrome bitmap. What is the file size? What happens on the picture?**

The file size is 20.4 KB in this monochrome bitmap. Saving the file this format causes loss of all color information, except black and white.

5. QUESTIONS

(a) **Identify and briefly explain the main elements of the machine cycle.**

The machine cycle consists of a series of operations involved in the execution of a single machine-level instruction. There are four stages in each machine cycle, namely:

- **Fetch:** instructions are fetched from RAM or cache.
- **Decode:** Instructions are decoded, i.e. translated into a form that can be processed, and sent to the control unit.
- **Execute:** the ALU unit executes the instructions if there exist computations or logical comparisons.
- **Store:** data or results of computations are stored in the registers or the RAM for later use.

(b) What are individual persons' strategies of making the system unit faster today?

Individuals' strategies for making faster computers are diverse and include:

- **Add more memory:** with more memory, the system unit can run large, complex programs, and analyze large volumes of data.
- **Perform system maintenance:** many system maintenance activities exist, including defragmentation of the hard disk drive and disk cleanup by deleting unnecessary or temporary files on hard disk so as to increase the amount of available storage space, etc.
- **Buy a larger or second hard drive:** Hard drives become less efficient as they become fuller.
- **Upgrade Internet connection:** e.g. from dial-up to ISDN or to DSL.
- **Upgrade the video graphics card:** makes much of a difference in gaming and 3-D applications.
- **Upgrade CPU:** this option is getting less popular because the motherboard may not support faster CPU chip.

(c) What are the manufacturers' strategies of making the computer faster today and in the future?

Manufacturers' strategies for making faster computers are diverse and include:

- **Improved architecture:** including moving circuits closer together, improved instruction set design, and faster and wider buses; faster memory.
- **Improved materials:** including copper, SOI, new materials etc.
- **Pipelining :** a CPU feature designed to begin processing a new instruction as soon as the previous instruction completes the first stage of the machine cycle.
- **Multiprocessing:** the capability of an operating system to use multiple processors in a single computer, usually to process multiple jobs at one time faster than could be performed with a single processor.
- **Parallel processing:** processing technique that uses multiple processors simultaneously in a single computer, usually to process a single job fast.
 - **Hyperthreading :** a technique used in some Intel CPUs to enable software to treat the CPU as two processors to complete processing more quickly.
- **Nanotechnology chips:** creating tiny computer chips and other components at the atomic and molecular levels
- **Quantum chip:** creating chips based on the quantum theory of physics and mechanics. States in quantum computing do not need to be binary—instead there can be more than two states, thus allowing for **qubits** with faster processing than conventional chips.

- **Optical chips** : creating optical chips that use the light beam takes advantage of the fact that electronic signals move much more quickly through light than through solid materials.
- **3-D chips** : using multiple layers of circuitry or the circuitry stands vertically.

(d) **Compare between the RAM, Cache memory and Registers.**

The **Random access memory (RAM)** memory) is the computer's main memory and consists of chips located on the motherboard that provide a temporary location for the computer to hold data and program instructions while they are needed. RAM capacity is measured in bytes. A variety of RAM types, speeds, and size exists, including, DDR, PRAM and NRAM.

Cache memory is a group of fast memory chips located on or near the CPU to help speed up processing by storing data and instructions needed for processing in handy locations. Cache memory is usually organized in various levels such as **L1** for level 1, **L2** for level 2, and **L3** for level 3, with level 1 having the smallest storage capacity but the fastest memory speed.

Registers are high-speed memory built into the CPU that temporarily stores data during processing.

All the abovementioned types of memory are volatile, i.e. their content of data can be erased when the computer is powered off.