Computer Architecture

Assignment 2

Due: Next weak section. (*one day before if you submit by email***)**

Notes: This assignment is individual assignment, every student should complete by himself.

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1. **(10 points) Draw the Data Flow diagram for the following problems, then indicate which ISA model (Von Neumann or Data Flow) could be better to solve it and why?**

   a. Binary Search.

   b. Fibonacci Sequence**.**

2. **(10 points) In this part you will figure out a simple Assembly language environment, common registers, and memory organization. First, apply the environment configuration to install an assembly utility called "Debug". Then perform the exercise after.**

   Environment configuration:

   a. For 32bit "x86" Windows (mostly winxp)
      i. Start the command prompt [run utility>cmd]
      ii. Run the following command "debug".
   b. For 64 bit windows
      iii. Download DosBox (download)
      iv. Download debug.rar (download)
      v. Extract debug.rar to specific drive for example D:\
      vi. Install and start DosBox and mount drive D as following [mount d d:\ ↵] *hint: note that C drive is mounted by default*
      vii. Change directory to drive D as following [d: ↵]
      viii. Run the command "debug"

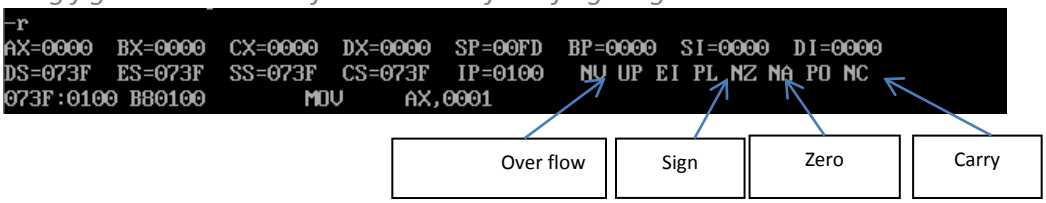
Exercise: Write a report with snapshots for the following procedure

1. Run the command [? ↵] to list all the available commands with "debug" program
2. Run the command [r ↵] to list all the available registers
3. Record the contents of the following registers (CS, DS, IP, Flags: over flow, zero, carry) *Check hint 1*
4. Run the command [a 100 ↵] then write the following assembly instructions:

```
mov ax, 0001 ↲
sub ax, 0001 ↲
add ax, 0002 ↲
sub ax, 0003 ↲
add ax, 7fff ↲
add ax, 7fff ↲
```

5. Press Enter again after the last instruction to end the " a " command
6. Record the address in front of each instruction in the previous program
7. Run the command [p =100 ↲] to execute the first instruction at address 100
8. Record the contents of the following registers (AX, CS, DS, IP, and Flag: over flow- sign-zero-carry).
9. Run the command [p ↲] 5 times to execute all the program instructions. In each time, record the contents of the following registers (AX, CS, DS, IP, and Flag: over flow – sign- zero- carry).
10. Run the command [d 100 ↲] to dump (display) part of the memory contains the previous program.
11. From the first line in the dump, what is the machine code of the instruction (sub ax, 0003) ?

Hint 1: The following figure show the default values of the flags register



Hint 2: for further help use the following tutorial
http://kipirvine.com/asm/debug/Debug_Tutorial.pdf