**Chapter 14 - Exercises**

**14.1. What general roles are performed by processor registers?**

● User-visible registers: Enable the machine language programmer to minimize main-memory references

● Control and status registers: Control the operation of the CPU and by privileged, operating system programs to control the execution of programs.

**14.2. What categories of data are commonly supported by user-visible registers?**

● General Purpose

● Data

● Address

● Conditional Codes

**14.3. What is the function of condition codes?**

Condition codes are bits set by the CPU hardware as the result of operations

**14.4. What is a program status word?**

A register contains condition codes and status information.

**14.5. Why is a two-stage instruction pipeline unlikely to cut the instruction cycle time in half, compared with the use of no pipeline?**

Either way there may be wait time for things to be fetched

**14.6. List and briefly explain various ways in which an instruction pipeline can deal with conditional branch instructions.**

● Multiple streams: A brute-force approach

● Prefetch branch target: When taking a branch it will also prefetched the instruction following the branch.

● Loop buffer: Recently fetched instructions are put in a buffer, will cheek buffer for the target befor anything else

● Branch prediction: Predicts if the branch will be taken and then gets subsequent instructions

● Delayed branch: Making instructions occur later on.

**14.7. How are history bits used for branch prediction?**

Indicators that direct the processor to make a particular decision.

**14.8. What would be the value of the following flags: Carry, Zero, Overflow, Sign, Even Parity , Half-Carry ?**

(a) If the last operation performed on a computer with an 8-bit word was an addition in which the two operands were 00000010 and 00000011.

(b) Repeat for the addition of -1 (twos complement) and +1.

(c) A - B, where A contains 11110000 and B contains 0010100.

**Answers to Questions**