ECE 3120 Computer Systems Instruction Cycle

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Instruction Queue

- **The 68HCS12 executes one instruction at a time and many instructions take**
  several clock cycles to complete.

- **When the CPU is performing the operation, it does not need to access memory.**

- **The 68HCS12 prefetches instructions when the CPU is not accessing memory to**
  speed up the instruction execution process.

- **There are two 16-bit queue stages and one 16-bit buffer. Unless buffering is**
  required, program information is first queued in stage 1, and then advanced to
  stage 2 for execution.

Instruction Execution Cycle

Read cycle:the process of accessing a memory location.

Write cycle: the process of storing a value in a memory location.

Execution cycle: the process of executing an instruction.

When executing an instruction, the 68HCS12 performs:

- **One or more read cycles to fetch instruction opcode bytes and addressing information.**

- **One or more read cycles to fetch the memory operand (s) (optional).**

- **The operation specified by the opcode.**

- **One or more write cycles to write back the result to either a register or a memory location (optional).**

Chapter Summary

- Computer:
  - hardware (CPU,Memory,I/O)
  - software

- Microprocessor vs. microcontroller

- Memory Addressing Modes

- Instructions

What you should have learned…

- Define/explain: computer,processor,nicroprocessor,microcontroller,embedded systems,hardware,software,assembler,compiler, RAM (DRAM,SRAM),ROM(PROM,EPROM,EEPROM,Flash memory), byte,word,nibble,bus,KB,MB,mnemonic,opcode, operand.

- Explain different memory addressing modes

- Write a sequence of arithmetic and data transfer instructions to perform simple operations.

Next…

- 68HCS12 Assembly Programming
- Reading: Chapter 2.1-2.4