Operating Systems Exercises Week beginning 10th February 2014

Which of the following operations should be allowed only in kernel mode?

(a) write the program counter

(b) clear memory

(c) turn off interrupts

(d) access I/O device

(e) write the instruction register

2. A workstation has a clock rate of 25MHz which means that the machine is capable of performing 25 million basic operations per second. e.g. a register test instruction might just take one clock cycle but an arithmetic instruction might require 10 clock cycles while an I/O instruction might require hundreds.

What is the time duration of one basic operation (or one clock cycle)?

Assuming the average instruction takes 2.5 clock cycles, how many average instructions can be executed in 100 microseconds. A microsecond (µs) is a unit of time equal to one millionth (10-6) of a second

3. Some hardware devices follow:

* processor
* bus
* main memory
* hard disk
* register
* cache

Indicate which of these devices is best defined by the following: (Some items may have more than one answer)

executes program instructions

volatile storage medium

fastest memory in a computer system

transmits data between hardwire devices

fast memory that improves application performance

4. Use the hypothetical machine given to you in fetch-execute-cyle slides. The following is an extra opcode:

0110 – subtract memory from AC, storing result in AC.

The following are the contents of memory:

Memory Address Memory contents

1. 1510
2. 6511
3. 2512

…

1. 0005
2. 0001
3. 0000

The PC (program counter) contains 200, the address of the first instruction.

Show the fetch and execute cycle for this partial program