Assignment 1

1. What is the difference between 8086 architecture, IA32 and Intel 64 architectures?

2. What is the difference between CISC and RISC processors? Give an example of each.

3. Why did Intel® use microarchitectures in newer processors rather than keeping the original 8086 architecture?

4. Define the following:
    a. Superscalar processor
    b. Hyperthreading
    c. SIMD
    d. Cache coherence

5. A 32-bit PC has 4G main memory and 4M cache (only one level). If the line size is 64 bytes answer the following:
    a. What is the number of lines in the main memory
    b. What is the number of lines in the cache
    c. Where does the address 0x7583E281 fall in the main memory (which line!!)
    d. Where does the address 0x7583E281 fall in the cache if the cache was 8-way set associative.
    e. Where does the address 0x7583E281 fall in the cache if the cache used direct mapping.

6. A system has two levels of cache memory (L1 and L2) and the hit ratios are (90% and 92% respectively).
    a. If the access times were 1ns for L1 cache, 10 ns for L2 cache and 100 ns for the main memory, what is the effective access time of the system?
    b. If you can either increase the hit ratio of the L1 cache to 92% or the hit ratio of the L2 cache to 95% at the same cost, which one will you choose?

7. What is the difference between segmented and flat memory models? Why did 8086 processors use segmented memory model? In your opinion, what is the main advantage (if any) of flat memory model over segmented memory model?

8. What is the difference between compatibility and 64-bit sub-modes of IA32e?

9. What is the difference between protected and real address modes of IA32?

10. What is the purpose of having the system management mode?

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