

Operating Systems

Homework 1. (Due Date 08/03/2019)

1- Suppose our hypothetical machine (discussed in the class) also has two I/O instructions:

0111 = Load AC from I/O

0110 = Store AC to I/O

In these cases, the 12-bit address identifies a particular external device. Show the program execution (using format of Figure 1.4 in slide # 18) for the following program:

1. Load AC from IO device 9.
2. Add contents of memory location 800 to AC.
3. Store AC to device 2.

Assume that the next value retrieved from device 9 is 1 and that location 940 contains a value of 10.

2- A computer has a cache, main memory, and a disk. If a referenced word is in the cache, 2 ns are required to access it. If it is in main memory but not in the cache, 100 ns are needed to load it into the cache (this includes the time to originally check the cache), and then the reference is started again. If the word is not in main memory, 20 ms are required to fetch the word from disk to memory, followed by 100 ns to copy it to the cache, and then the reference is started again. Let the cache hit ratio (probability of finding referenced data in cache) is 0.9 and the main-memory hit ratio is 0.7. What is the average time in ns required to access a referenced word on this system?