Chapter #7 Exercises

Due on June 30th, 2019
Computer Organization & Programming
CS555WS—Summer I
Ed Banduk

Daniel Kadyrov

Problem 1. What are there two different registers (MAR and MDR) associated with memory?

Solution

The control unit contains two registers associated with memory, the memory address register (MAR) and the memory data register (MDR). The memory address register stores the memory address from which the data will be fetched or sent. The memory data register, also known as the memory buffer register, holds the actual data value that is being accessed from the memory location addressed by the MAR.

Englander, I. (2014). *The architecture of computer hardware, systems software, & networking: An information technology approach* (Fifth ed.). Hoboken, NJ: John Wiley & Sons.

Problem 2. Suppose that the instruction format for a modified Little Man Computer requires two consecutive locations for each instruction. The high-order digits of the instruction are located in the first mail slot, followed by the low order digits. The IR is large enough to hold the entire instruction and can be addressed as IR [high] and IR [low] to load it. You may assume that the op code part of the instruction uses IR [high] and that the address is found in IR [low]. Write the fetch-execute cycle for an ADD instruction on this machine.

Solution

```
1    PC → MAR
2    MDR → IR [high]
3    PC + 1 → PC
4    PC → MAR
5    MDR → IR [low]
6    IR [low] → MAR
7    MDR → A
8    PC + 1 → PC
```

Englander, I. (2014). *The architecture of computer hardware, systems software, & networking: An information technology approach* (Fifth ed.). Hoboken, NJ: John Wiley & Sons.