16.317: Microprocessor Systems Design I

Summer 2013

Lecture 1: Key Questions
July 9, 2013

1. Briefly describe the role of an ISA. What information specified in the ISA is required to translate a high-level statement such as `X[i]=i*2;` to assembly language?

2. What types of operations should a processor be able to perform?

3. What are the two major concerns when dealing with data on a microprocessor?

4. Briefly describe data types: what they specify, and what the different possibilities are for each aspect of a data type.

5. Explain the difference between how data can be interpreted as a signed or unsigned integer. Show the difference by interpreting the 8-bit value $1001\ 1111_2$ as both a signed and unsigned value.

6. What characteristics do we want storage media to have?

7. Describe the basic characteristics of processor registers.

8. Describe the basic characteristics of processor memory.

9. What does it mean for data to be aligned? What is the impact of mis-aligned data?

10. What is "little endian" data?

11. **Example:** Given the figure shown below (Fig. 2.5b), write the full data word in hexadecimal. Is this word aligned?

Address	Memory (binary)
$0200E_{16}$	0010 1100
$0200D_{16}$	1001 0110

(b)

12. **Example:** Given the double word in this figure (Figure 2.7a), write the full double-word in hexadecimal. Is this double word aligned?

Address	Memory (binary)	Memory (hexadecimal)
02105_{16}	0000 0001	01
02104_{16}	0010 0011	23
02103_{16}	1010 1011	AB
02102_{16}	1100 1101	CD
02101_{16}	XXXX XXXX	XX
02100_{16}	XXXX XXXX	XX

(a)

13. What are the three general types of locations where operands can be stored and the addressing modes associated with those locations?

14. Explain what an effective address is and how one is generally calculated.

15. Describe each of the general classes of memory addressing modes.