16.317: Microprocessor Systems Design I

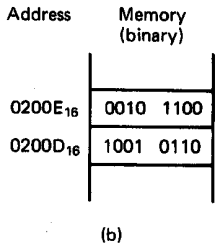
Fall 2013

Lecture 3: Key Questions
September 9, 2013

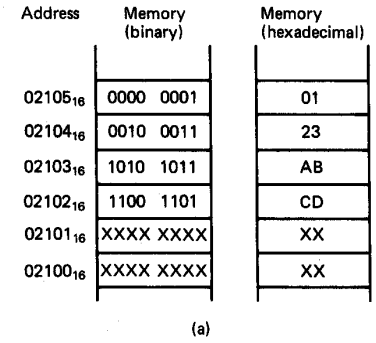
1. What does it mean for data to be aligned? What is the impact of mis-aligned data?

2. What is “little endian” data?

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



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



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

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

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

8. Describe the general characteristics of the x86 architecture.

9. Briefly describe the x86 registers.

10. Describe the different memory spaces in the x86 architecture.

11. Explain the basic concept of memory segmentation.

12. Describe the specifics of x86 memory segmentation.

13. Describe how x86 real mode addresses are generated, including the components of the address and the actual calculations performed.

14. **Example:** Given the following register values:

- CS = 0x1000
- SS = 0x2000
- DS = 0x3000
- ES = 0x4000
- IP = 0x0100
- ESP = 0x0002FF00
- EBP = 0x0000F000
- ESI = 0x0001000E
- EBX = 0xABCD1234

What linear addresses correspond to the following logical addresses?

- CS:IP

- SS:SP

- SS:BP

- DS:SI

- ES:BX