16.317: Microprocessor Systems Design I

Spring 2013

Lecture 4: Key Questions
January 30, 2013

1. Describe the different memory spaces in the 80386DX.

2. Explain the basic concept of memory segmentation.

3. Describe the specifics of segmentation on the 80386DX.

4. Describe how real mode addresses are generated on the 80386DX, including the components of the address, the difference between logical and physical addresses, and the actual calculations performed.

5. **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 physical addresses correspond to the following logical addresses?

- CS:IP

- SS:SP

- SS:BP

- DS:SI

- ES:BX

6. Describe the different addressing modes specific to the 80386DX.

7. **Example:** Compute the physical address for the specified operand in each of the following instructions. The register contents and variables are as follows:
   - (CS) = $0A00_{16}$
   - (DS) = $0B00_{16}$
   - (ESI) = 00000100_{16}
   - (EDI) = 00000200_{16}
   - (EBX) = 00000300_{16}

a. Destination operand in: MOV [DI], AX

b. Source operand in: MOV DI, [SI]

c. Destination operand in: MOV [BX+0400H], CX

d. Destination operand in: MOV [DI+0400H], AH

e. Destination operand in MOV [BX+DI+0400H], AL

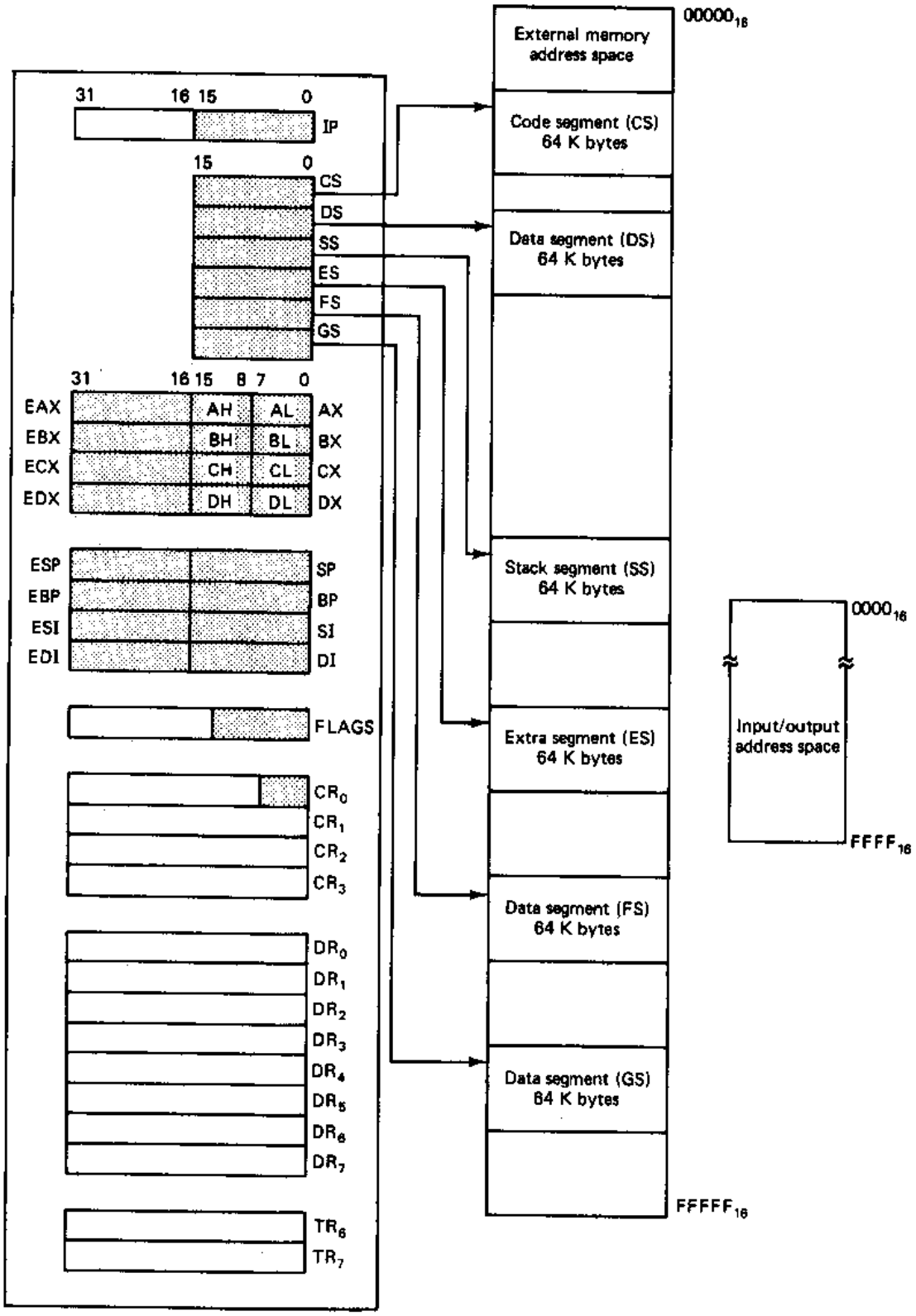

Fig. 2.2: Real-mode software model of the 80386DX microprocessor