

16.317: Microprocessor Systems Design I

Spring 2012

Lecture 6: Key Questions February 3, 2012

1. What is the general process used to convert a high-level program to low-level machine code?
2. What are the different general types of instructions we'll use?
3. What is the general structure of an assembly language statement?

- | 80386DX
MPU | | Address | Memory
content | Instruction |
|----------------|------------|---------|-------------------|---------------------------------|
| | IP
0000 | 01000 | 80 | MOV AL, 15H
Next instruction |
| | CS
0100 | 01001 | 15 | |
| | DS | 01002 | XX | |
| | SS | 01003 | XX | |
| | ES | | | |
| | FS | | | |
| | GS | | | |
| EAX | | | XX | AX |
| EBX | | | | BX |
| ECX | | | | CX |
| EDX | | | | DX |
| ESP | | | | SP |
| EBP | | | | BP |
| ESI | | | | SI |
| EDI | | | | DI |

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- The diagram illustrates the 80386DX MPU architecture. It features a central MPU block with various registers and a stack. To the right, an instruction stream and memory content are shown.
- MPU Registers:**
- Instruction Pointer (IP):** Contains the value 0000.
 - Segment Registers:** CS (0100), DS (0200), SS, ES, FS, GS.
 - General Purpose Registers (GPRs):** EAX, EBX, ECX, EDX, ESP, EBP, ESI, EDI.
 - Accumulator (AX):** Contains the value XXXX.
 - Base Registers:** BX, CX, DX, SP, BP, SI, DI.
- Instruction Stream:**
- Address:** 01000, 01001, 01002, 01003, 01004.
 - Memory content:** 8B, 0E, 34, 12, XX.
 - Instruction:** MOV CX, [1234H].
 - Next instruction:** Indicated by an arrow pointing to the next instruction address.
- Source operand:**
- Address:** 02000, 02001, ..., 03234, 03235.
 - Memory content:** XX, XX, ..., ED, BE.
 - Source operand:** Indicated by an arrow pointing to the source operand address.

9. Explain register indirect addressing. Update the following figure to show the result of the instruction `MOV AX, [SI]`

