

15-213

“The course that gives CMU its Zip!”

Machine-Level Programming I: Introduction Jan. 23, 2003

Topics

- Assembly Programmer's Execution Model
- Accessing Information
 - Registers
 - Memory
- Arithmetic operations

IA32 Processors

Totally Dominate Computer Market

Evolutionary Design

- Starting in 1978 with 8086
- Added more features as time goes on
- Still support old features, although obsolete

Complex Instruction Set Computer (CISC)

- Many different instructions with many different formats
 - But, only small subset encountered with Linux programs
- Hard to match performance of Reduced Instruction Set Computers (RISC)
- But, Intel has done just that!

X86 Evolution: Programmer's View

Name	Date	Transistors
8086	1978	29K
<ul style="list-style-type: none">■ 16-bit processor. Basis for IBM PC & DOS■ Limited to 1MB address space. DOS only gives you 640K		
80286	1982	134K
<ul style="list-style-type: none">■ Added elaborate, but not very useful, addressing scheme■ Basis for IBM PC-AT and Windows		
386	1985	275K
<ul style="list-style-type: none">■ Extended to 32 bits. Added “flat addressing”■ Capable of running Unix■ Linux/gcc uses no instructions introduced in later models		