

x86 Assembly Language I

CMSC 313
Sections 01, 02

1.5 Historical Development

- Moore's Law (1965)
 - Gordon Moore, Intel founder
 - “The density of transistors in an integrated circuit will double every year.”
- Contemporary version:
 - “The density of silicon chips doubles every 18 months.”

But this “law” cannot hold forever ...

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1.5 Historical Development

- Rock's Law
 - Arthur Rock, Intel financier
 - “The cost of capital equipment to build semiconductors will double every four years.”
 - In 1968, a new chip plant cost about \$12,000.

**At the time, \$12,000 would buy a nice home in the suburbs.
An executive earning \$12,000 per year was “making a very comfortable living.”**

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General-Purpose Registers			
31	16-15	8-7	0
	AX	AX	EAX
	BP	BP	EBP
	SI	SI	ESI
	DI	DI	EDI
	SP	SP	ESP
	IP	IP	EIP
	CS	CS	ECS
	DS	DS	EDS
	SS	SS	ESS

Figure 3-4. Alternate General-Purpose Register Names

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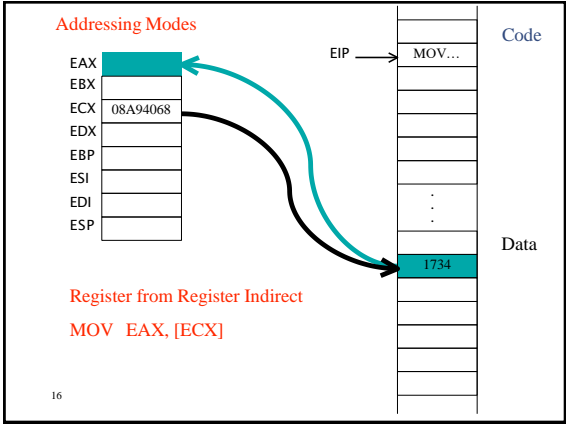
- EAX—Accumulator for operands and results data.
- EBX—Pointer to data in the DS segment.
- ECX—Counter for string and loop operations.
- EDI—I/O pointer.
- ESI—Pointer to data in the segment pointed to by the DS register; source pointer for string operations.⁹
- EDI—Pointer to data (or destination) in the segment pointed to by the ES register; destination pointer for string operations.
- ESP—Stack pointer (in the SS segment).
- EBP—Pointer to data on the stack (in the SS segment).

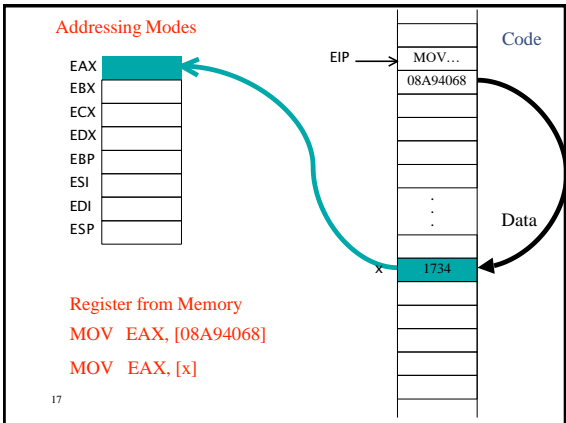
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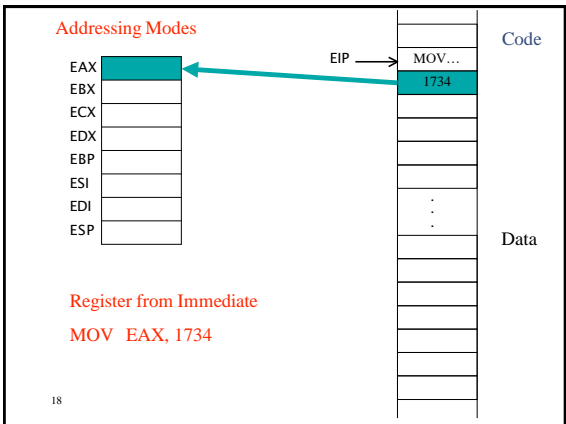
“Hello World” in Linux Assembly

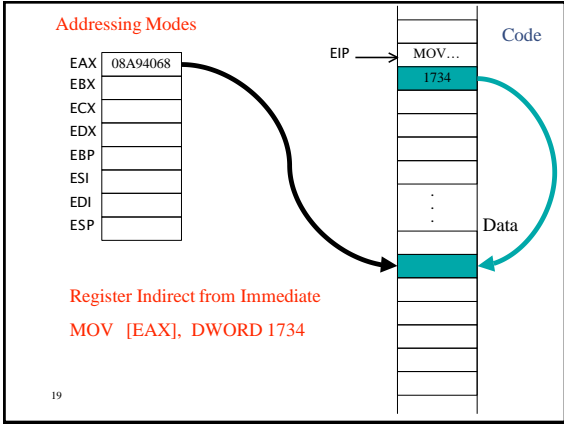
- Use your favorite UNIX editor (*vi, emacs, pico, ...*)
- Assemble using NASM on gl.umbc.edu `nasm -f elf hello.asm`
- NASM documentation is on-line.
- Need to “load” the object file `ld hello.o -melf_i386`
- Execute
 - `a.out`
- CMSC 121 Introduction to UNIX

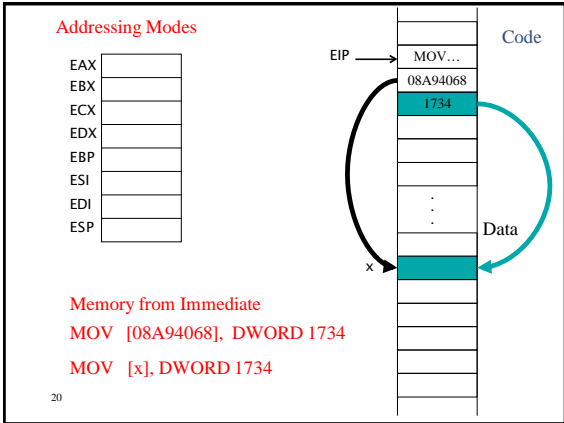
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Notes on Addressing Modes

- More complicated addressing modes later:
`MOV EAX, [ESI+4*ECX+12]`
- Figures not drawn to scale. Constants 1734h and 08A94068h take 4 bytes (little endian).
- Some addressing modes are not supported by some operations.
- Labels represent addresses not contents of memory.

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