

## Outline of the Lecture

- Brief History of 80x86 Family of Microprocessors
- Pipelining and Registers
- Introduction to Assembly Programming

## BRIEF HISTORY OF 80X86 FAMILY OF MICROPROCESSORS

### Evolution from 8080/8085 to 8086

- Intel introduced 8086 microprocessor in 1978. This 16-bit microprocessor was a major improvement over the previous generation of 8080/8085 series of microprocessors.

8086	8080/8085
1 megabyte (20-bit add. bus)	Memory of 64 kilobyte (16-bit add. bus)
16-bit Data bus	8-bit data bus
Pipelined processor (first single-chip $\mu$ pr.)	Non-pipelined $\mu$ pr

- In a system with pipelining, the data and the address bus are busy transferring data while the CPU is processing information.

### Evolution from 8086 to 8088

- 8086 was with 16-bit data bus internally and externally. All registers and the data bus carrying data in/out of the CPU were 16-bit.
  - That time all the peripherals were designed around 8-bit microprocessor.
  - It was expensive to built PCB with 16-bit data bus.
- So Intel introduced **8088** which was;
  - Identical to 8086 internally, but externally 8-bit data bus instead of 16-bit.
  - It had 1 megabyte of memory like 8086.
- IBMs decision to pick up 8088 as their choice of microprocessor in designing the IBM PC.
  - 8088-based IBM PC was enormous success, because IBM and Microsoft made it an open system.
  - This enabled the cloning of this system and resulted a huge growth in both hardware and software designs based on IBM PC.
  - In contrast IBMs main competitor Apple computer introduced a closed system and blocked all attempts of cloning.

### Other microprocessors: the 80286, 80386, and 80486

- **80286**: Intel introduced 80286 in 1982.
  - With 16-bit internal and external data bus.
  - 24-bit address bus ( $2^{24} = 16$  megabyte)
  - **virtual memory**: a way of fooling the microprocessor into thinking that it has access to unlimited memory by swapping data between disk storage and RAM.
  - **Real mode** (faster operation with maximum of 1 Mbytes of memory) vs. **Protected mode** protecting the operating system for accidental or deliberate destruction of the user. Protected mode is slower but can use 16 Mbytes of memory.