# x86 Architecture

| | Real Mode | Protect Mode | Virtual 8086 Mode | Address Bus | Data Bus | PSE | PAE |
|---|---|---|---|---|---|---|---|
| 8086 | ☆ | | | 20-bit | 16-bit | | |
| 80286 | ☆ | ☆ | | 24-bit | 16-bit | | |
| i386 | ☆ | ☆ | ☆ | 32-bit | 32-bit | | |
| Pentium | ☆ | ☆ | ☆ | 32-bit | 32-bit | ☆ | |
| P6 family | ☆ | ☆ | ☆ | 32-bit | 32-bit | ☆ | ☆ |
| AMD64 | ☆ | ☆ | ☆ | 64-bit | 64-bit | ☆ | |

## Control register

**CR0**
- PE (bit 0) Protection Enable
- TS (bit 3) Task Switched
- WP (bit 16) Write-Protection
- AM (bit 18) Alignment Mask
- NW (bit 29) Not Write-Through
- CD (bit 30) Cache Disable
- PG (bit 31) Paging

**CR2** last linear address caused a page fault

**CR3** physical address of Page Directory Base

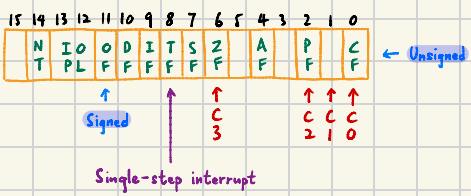
**CR4**
- PSE (bit 4) Page Size Extension
- PAE (bit 5) Physical Address Extension

## Memory Management

Logical Address → Linear Address → Physical Address

Segmentation ↑ ↑ Paging

## flags register




- **CF** Carry Flag — A carry or borrow into the most significant bit.
- **OF** Overflow Flag — The sum of two numbers with the same sign yields a number with opposite sign.
- **AF** Auxiliary Flag — A carry or borrow with the least significant nibble.
- **PF** Parity Flag — Whether the least significant byte contains even number of bits set.