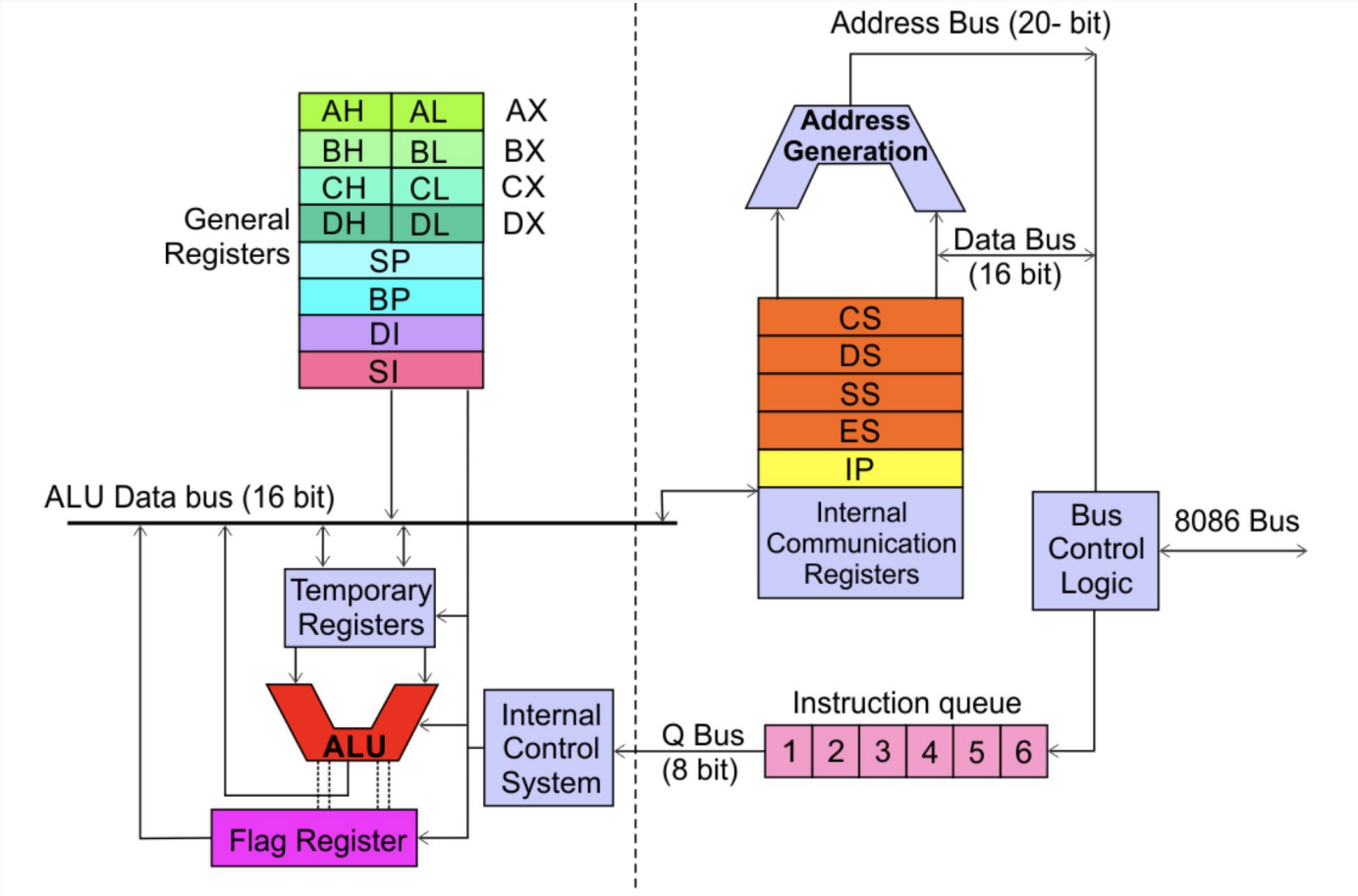
Assembly

Instruction Set - Hello World


Address Bus (20- bit)
AH
AL
AX
BH
BL
BX
CH
CL
CX
DH
DL
DX
General Registers
SP
BP
DI
SI
Address Generation
Data Bus (16 bit)
CS
DS
SS
ES
IP
Internal Communication Registers
Bus Control Logic
8086 Bus
ALU Data bus (16 bit)
Temporary Registers
ALU
Internal Control System
Q Bus (8 bit)
Instruction queue
1
2
3
4
5
6
Flag Register

Instruction Set

- Data Transfer Instructions
- Arithmetic Instructions
- Logical Instructions
- String manipulation Instructions
- Process Control Instructions
- Control Transfer Instructions

Directives

- Called pseudo instructions
- Control the generation of machine codes and organization of the program
  - no machine codes are generated for assembler directives
- Used to
  - specify the start and end of a program
  - attach value to variables
  - allocate storage locations to input/output data
  - define start and end of segments and procedures

Instruction Set

Data Transfer

- Transfer data/ address in to registers, memory locations and I/O ports
- Size is either word or byte

IMPORTANT RULE

8-bit data can only be moved to 8-bit register/ memory

16-bit data can be moved to 16-bit register/ memory.

MOV

MOV reg2/ mem, reg1/ mem	
MOV reg2, reg1	**(reg2) ← (reg1)**
MOV mem, reg1	**(mem) ← (reg1)**
MOV reg2, mem	**(reg2) ← (mem)**
MOV reg/ mem, data	
MOV reg, data	**(reg) ← data**
MOV mem, data	**(mem) ← data**

MOV AX, BX
MOV DL, CL

MOV byte[20H], AH
MOV CX, word[30H]

MOV AL, 50H
MOV CX, 05FAH

MOV byte[40H], 05FAH

Arithmetic

Addition: ADD / ADC

Subtraction: SUB / SBB

INC / DEC

CMP

CMP

CMP reg2/mem, reg1/ mem	
CMP reg2, reg1	**Modify flags ← (reg2) – (reg1)** **If (reg2) > (reg1) then CF=0, ZF=0, SF=0** **If (reg2) < (reg1) then CF=1, ZF=0, SF=1** **If (reg2) = (reg1) then CF=0, ZF=1, SF=0**
CMP reg2, mem	**Modify flags ← (reg2) – (mem)** **If (reg2) > (mem) then CF=0, ZF=0, SF=0** **If (reg2) < (mem) then CF=1, ZF=0, SF=1** **If (reg2) = (mem) then CF=0, ZF=1, SF=0**
CMP mem, reg1	**Modify flags ← (mem) – (reg1)** **If (mem) > (reg1) then CF=0, ZF=0, SF=0** **If (mem) < (reg1) then CF=1, ZF=0, SF=1** **If (mem) = (reg1) then CF=0, ZF=1, SF=0**

CMP reg/mem, data	
CMP reg, data	**Modify flags ← (reg) – (data)** **If (reg) > data then CF=0, ZF=0, SF=0** **If (reg) < data then CF=1, ZF=0, SF=1** **If (reg) = data then CF=0, ZF=1, SF=0**
CMP mem, data	**Modify flags ← (mem) –** (data) **If (mem) > data then CF=0, ZF=0, SF=0** **If (mem) < data then CF=1, ZF=0, SF=1** **If (mem) = data then CF=0, ZF=1, SF=0**

Directives

Directives

- DB
- DW
- ORG
- END