Introduction to 8086 Microprocessor (part 2)

Microprocessors and microcomputer-based system design
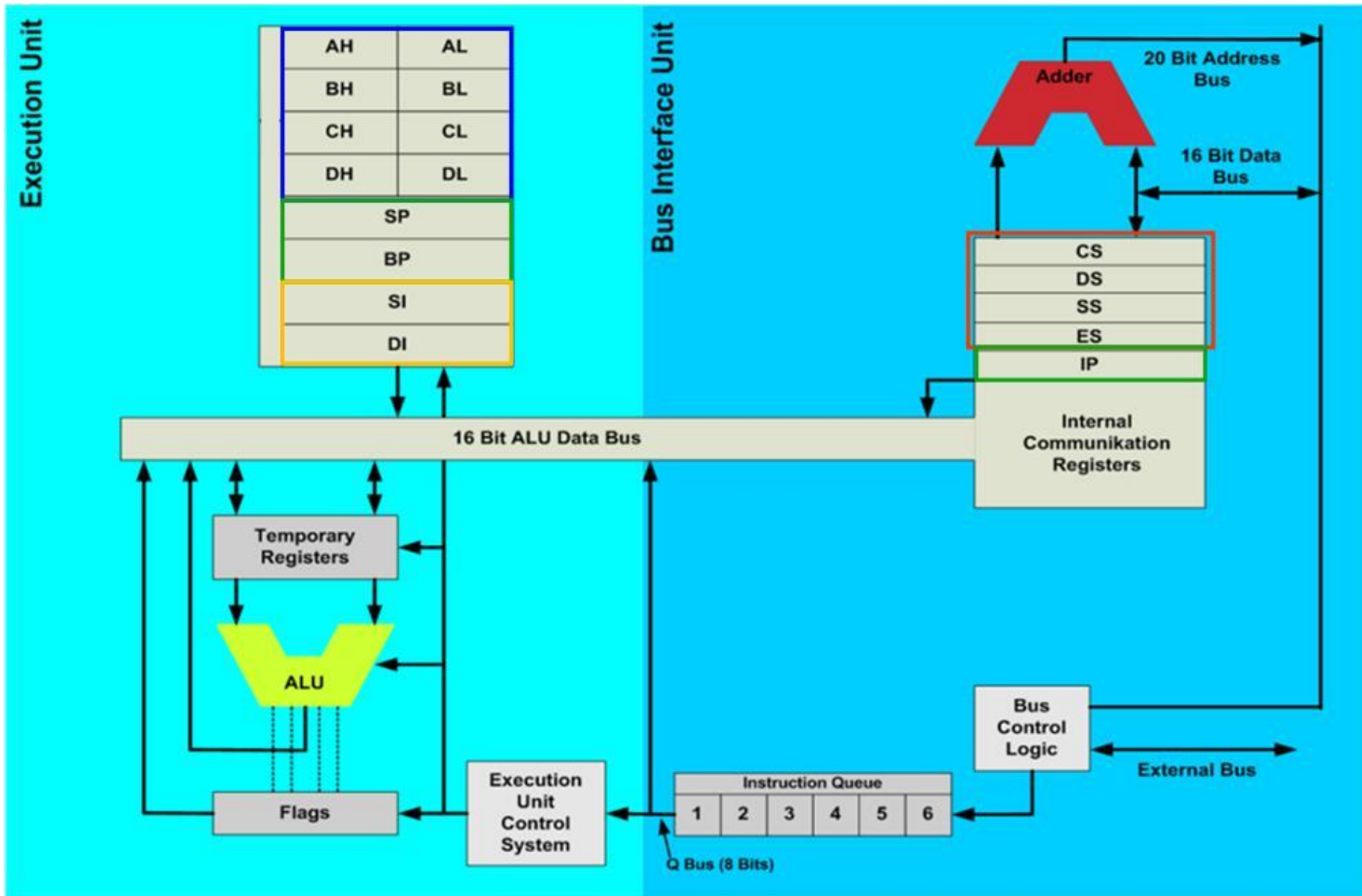Mohamad Rafiquzzaman
>Chapter 3 section 3.1, 3.2, 3.3

Assembly language programming Ytha Yu
> Chapter 3 section 3.2

8086 Internal Architecture

8086 Architecture Description

The 8086 has two units:

1) Bus Interface Unit (BIU)

2) Execution Unit (EU)

Function of BIU

- The BIU sends out addresses, fetches instruction from memory, reads data from ports and memory, and writes data to ports and memory.

- The BIU handles all transfer of data and addresses on the buses for the execution unit.

Function of Execution unit

- Execution unit is responsible for the coordination of all other units of the processor.

- The execution unit instructs the BIU where to fetch instruction or data from, then decoder in the EU translates instructions fetched from memory into a series of actions which the EU carries out.

- ALU of execution unit performs various arithmetic and logical operations over the data

Description of Execution Unit (EU) 1

- The EU has a 16-bit arithmetic logic unit which can add, subtract, AND, OR, increment, decrement, complement, Binary numbers.

- The execution unit which includes the ALU, four 16-bit general purpose register, a 16-bit flag register and a control unit.

- The EU contains eight 16-bit registers- AX, BX, CX, DX, SP, BP, SI and DI.

- The general purpose registers AX, BX, CX, DX can be further divided into two 8-bit registers AH&AL, BH&BL, CH&CL and DH&DL and can be used to store 8-bit or 16-bit data during program execution.

Description of Execution Unit (EU) 2

- A 16-bit flag register in the EU contains nine flags. Six of the nine flags are used to indicate some condition produced by an instruction.

- The three remaining flags in the flag registers are used to control certain operations of the processors.

Description of Bus Interface Unit (BIU) 1

- The BIU stores pre-fetched instruction byte in FIFO register called queue from memory.

- Fetching the next instruction while executing the current instruction is referred as the instruction pipeline.

- The BIU has a dedicated Adder. The main function of the adder is to produce 20 bit physical address.

- The bus control logic of the BIU generates all bus control signals such as read and writes for memory, I/O ports.

Description of Bus Interface Unit (BIU) 2

- Four segment registers in the BIU are used to hold the starting addresses of four memory segments that the 8086 is working with at particular time.

- The four segment registers are the Code segment (CS), Stack segment (SS), Extra Segment (ES) and Data Segment (DS).
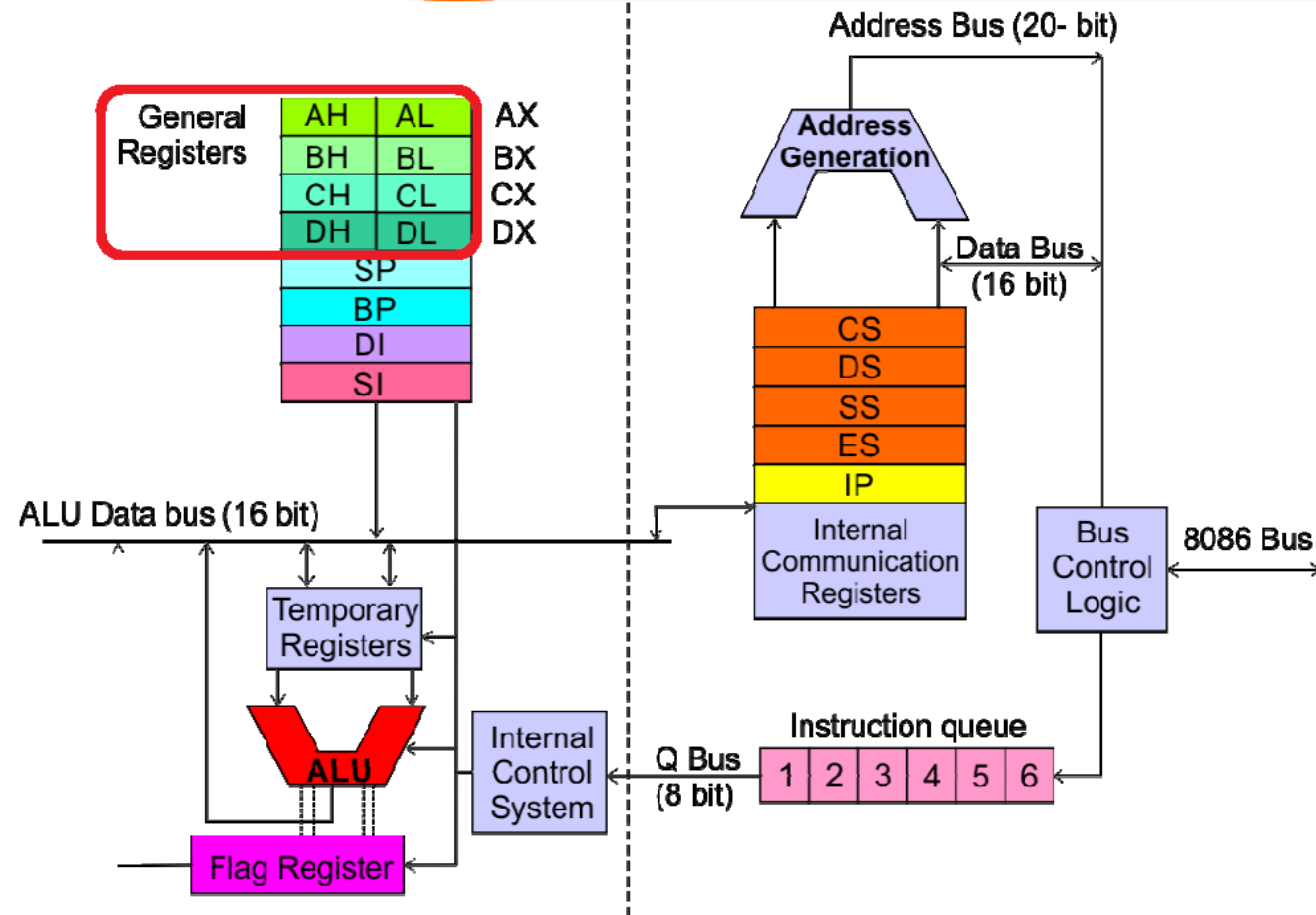
Execution Unit (EU)

EU executes instructions that have already been fetched by the BIU.

BIU and EU functions separately.

Bus Interface Unit (BIU)

BIU fetches instructions, reads data from memory and I/O ports, writes data to memory and I/ O ports.