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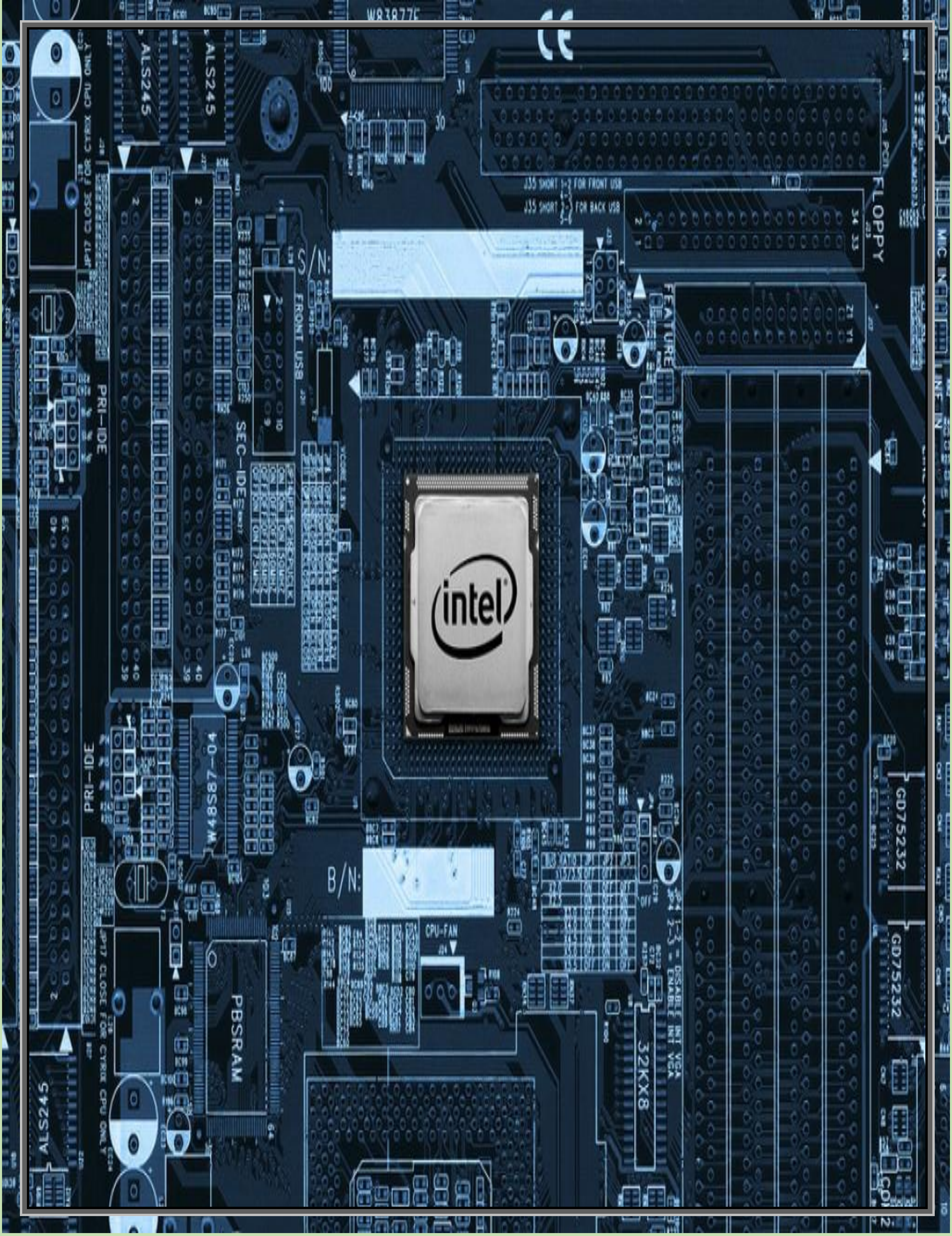
W83877F
ALS245
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J35 SHORT 1-2 FOR FRONT USB
J35 SHORT 2-3 FOR BACK USB
FLOPPY
S/N:
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SEC-IDE
PRI-IDE
intel
PRI-IDE
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B/N:
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PBSRAM
32KX8
GD75232
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Chapter # 2

INTRODUCTION TO INTEL 8088/86 MICROPROCESSOR AND ARCHITECTURE

Short questions

What are the flags in 8086?
In 8086 Carry flag, Parity flag, Auxiliary carry flag, Zero flag, Overflow flag, Trace flag, Interrupt flag, Direction flag, and Sign flag.

Which Stack is used in 8085?
LIFO (Last In First Out) stack is used in 8085.In this type of Stack the last stored information can be retrieved first

What are the various registers in 8085?
Accumulator register, Temporary register, Instruction register, Stack Pointer, Program Counter are the various registers in 8085

What is meant by Maskable interrupts?
An interrupt that can be turned off by the programmer is known as Maskable interrupt.

What is Non-Maskable interrupts?
An interrupt which can be never be turned off (ie. disabled) is known as Non-Maskable interrupt

What are the various segment registers in 8086?
Code, Data, Stack, Extra Segment registers in 8086.

What is a flag?
Flag is a register made up of flip-flops, used to store the information about the status of a processor and the status of the instruction executed most recently

Course outline questions

Define and describe the basic terms:

Register Array:

It is a vital component of a computer which serves as the storage location that is inside the processor. This is the area of the microprocessor which consists of various registers. These registers are primarily used to store data temporarily during the execution of a program. It accepts, stores and transfers the data and instructions that are used immediately.

General Purpose Register:

Microprocessor consists 6 general purpose registers of 8-bit each named **as AX, BX, CX, DX, EX,**. Generally theses registers are not used for storing the data permanently. It carries the 8-bits data. These are used only during the execution of the instructions. These registers can also be used to store 16 bit data by using them in pairs i.e. BC, DE and HL.

Temporary Register:

It is an 8-bit register which is used to hold the data on which the accumulator is computing operation. It is also called as operand register because it provides operands to ALU.

Internal Data Bus:

Internal data bus connects all the internal components of a computer, such as CPU and memory, to the motherboard. An internal bus can carry data, memory addresses, control information and any other internal communications or processes. It enables faster data transfer than an external bus.

External Data Bus:

External data bus is a computer bus for interfacing small peripheral devices like flash memory with the processor. It is used to expand the internal bus of the processor to enable connection with external memories or other peripherals.

Instruction Decoder:

The instruction decoder of a processor is a combinatorial circuit. Its purpose is to decode an opcode.

Accumulator:

It is an 8-bit register which is used to perform arithmetical and logical operation. It stores the output of any operation. It also works as registers for I/O accesses.

Condition Flags:

Conditional Flag indicate the result of last executed arithmetic or logical operation. There are six conditional flag.

The Parity Flag (PF)

The Zero Flag (ZF)

The Sign Flag (SF)

The Auxiliary Flag (AF)

The Carry Flag (CF)

The Overflow Flag (OF)

Addressing Registers:

Addressing register are used to store addresses of (are pointers to) locations in memory. Below is a listing of different address registers.

MAR is short for Memory Address Register.

DMAR is the destination memory address register.

SMAR is the source memory address register.

Programming Counters:

A program counter is a register in a computer processor that contains the address (location) of the instruction being executed at the current time. As each instruction gets fetched, the program counter increases its stored value by 1.

Sketch and Label Block Diagram of Intel 8088/86 Microprocessor

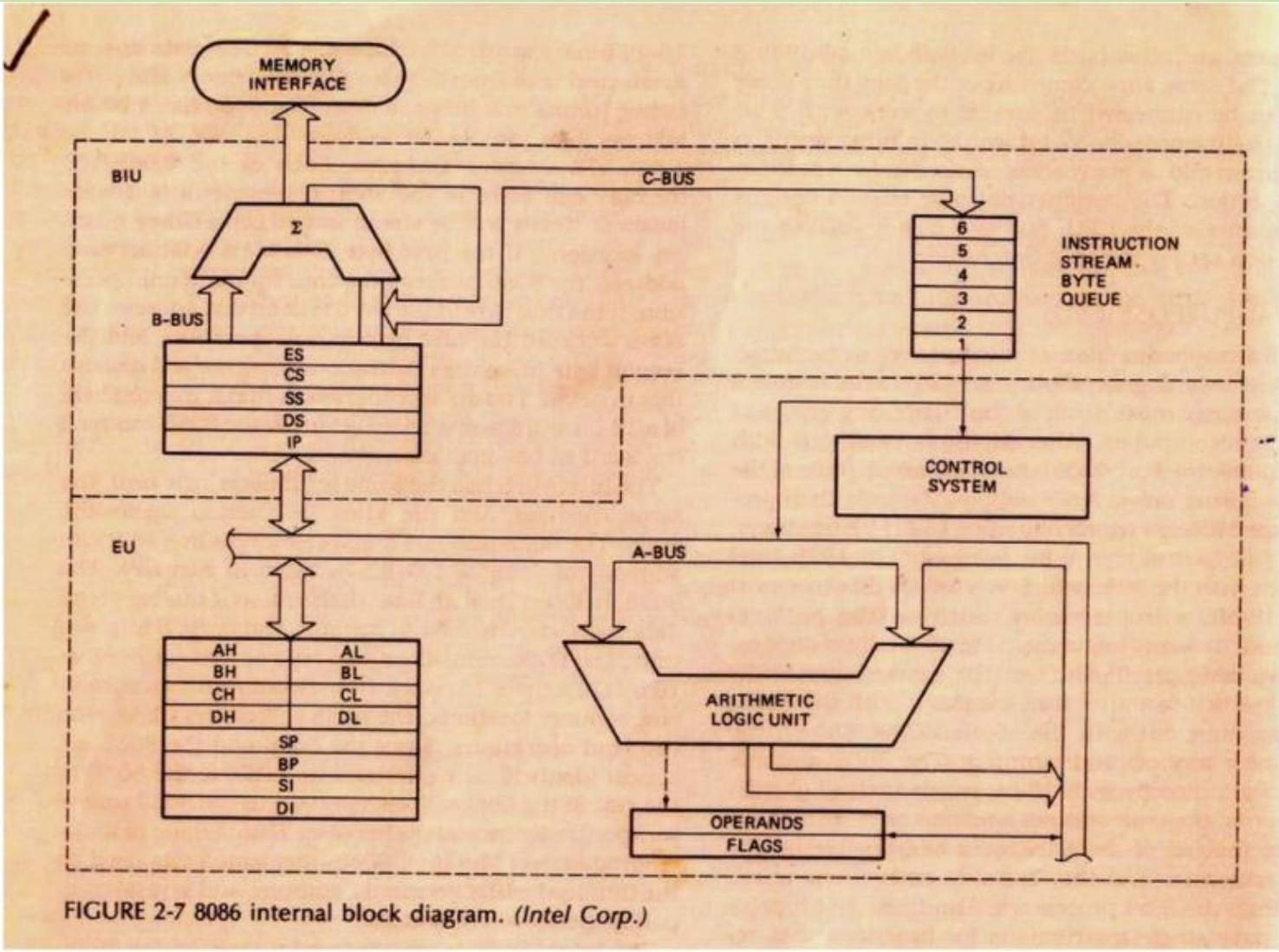

FIGURE 2-7 8086 internal block diagram. *(Intel Corp.)*

Explain Functions of each block of 8086/88 Microprocessor

Intel 8086 was launched in 1978.

It was the first 16-bit microprocessor.

It consists of 29,000 transistors.

The 8086 CPU is divided into two independent functional parts, the bus interface unit or BIU, and the execution unit or EU.

Bus Interface Unit

The function of BIU is to:

- Fetch the instruction or data from memory.
- Write the data to memory.
- Write the data to the port.
- Read data from the port.

Instruction Queue

- To increase the execution speed, BIU fetches as many as six instruction bytes ahead to time from memory.
- All six bytes are then held in first in first out 6 byte register called instruction queue.
- Then all bytes have to be given to EU one by one.

Execution Unit (EU)

The functions of execution unit are:

- To tell BIU where to fetch the instructions or data from.
- To decode the instructions.
- To execute the instructions.

Parts of E.U

- Control Circuit
- Instruction Decoder
- ALU
- General Purpose Register
- Special Purpose Register

Control Circuit:

The control circuit control all the operations and flow of data inside the microprocessor.

Instruction Decoder:

The instruction decoder works to translate or decode the instructions which are fetched from the memory. After translation it places the instructions in a series to perform the required task

ALU:

This is a 16 bit unit which performs AND, OR, Exclusive, addition, subtraction, increment, decrement, complement and shift functions.

General Purpose Registers:

The EU has 8 general purpose registers. Which are named as AL, AH, BL, BH, CL, CH, DL, and DH these are all 8 bit register but these can also be used as 16 bit registers, when we take the different pairs of these registers, the possible pairs are

AL, AH = AX

BL, BH = BX

CL, CH = CX

DL, DH = DX

AL register is also called accumulator because it has some characteristics different from other general purpose register.

Special Purpose Register:

Additional registers called segment registers or Special Purpose Register generate memory address when combined with other in the microprocessor. In 8086 microprocessor, memory is divided into 4 segments as follow:

Code Segment (CS): The CS register is used for addressing a memory location in the Code Segment of the memory, where the executable program is stored.

Data Segment (DS): The DS contains most data used by program. Data are accessed in the Data Segment by an offset address or the content of other register that holds the offset address.

Stack Segment (SS): SS defined the area of memory used for the stack.

Extra Segment (ES): ES is additional data segment that is used by some of the string to hold the destination data.

Flag Register of 8086

It is a 16-bit register. 9-bit are used as different flags, remaining bits unused

Out of 9-flags, 6 are conditional (status) flags and three are control flags

Conditional Flags

Conditional flags represent result of last arithmetic or logical instructions

- OF (Overflow flag): is set if there is an arithmetic overflow, i.e. the size of the result exceeds the capacity of the destination location.
- SF (Sign flag): is set if the MSB of the result is 1
- ZF (Zero flag): is set if the result is zero
- AF (Auxiliary carry flag): is set if there is carry from lower nibble to upper nibble or from lower byte to upper byte
- PF (Parity flag): is set if the result has even parity
- CF (Carry flag): is set if there is carry from addition or borrow from subtraction

Control flags:

They are set using certain instructions. They are used to control certain operations of the processor.

- TF (Trap flag): for single stepping through the program
- IF (Interrupt flag): to allow or prohibit the interruption of a program
- DF (Direction flag): Used with string instructions

Explain Real mode memory addressing

Real mode operation allows the microprocessor to address only first 1M byte of memory space. A combination of a segment address and an offset address access a memory location in the real mode. Segments in the real mode always have a length of 64K bytes. Real mode provides no support for memory protection, multitasking, or code privilege levels.

Explain Protected mode memory addressing

Protected mode memory addressing allows access to data and programs located above the first 1M byte of memory In protected addressing mode segments can be of variable size(below or above 64 KB).

Explain Memory Paging

Memory paging is a memory management technique for controlling how a computer or virtual machine's (VM's) memory resources are shared. A computer can address memory beyond the amount physically installed on the system. This nonphysical memory, which is called virtual memory, is actually a section of a hard disk that's set up to emulate the computer's RAM.