



SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



23ECB204 – DIGITAL ELECTRONICS AND MICROPROCESSOR

Architecture of 8085 microprocessor

23ECB204/ DE & MP / Ms.V.Aishwarya, AP/ECE / Unit 3/8085 MICROPROCESSOR

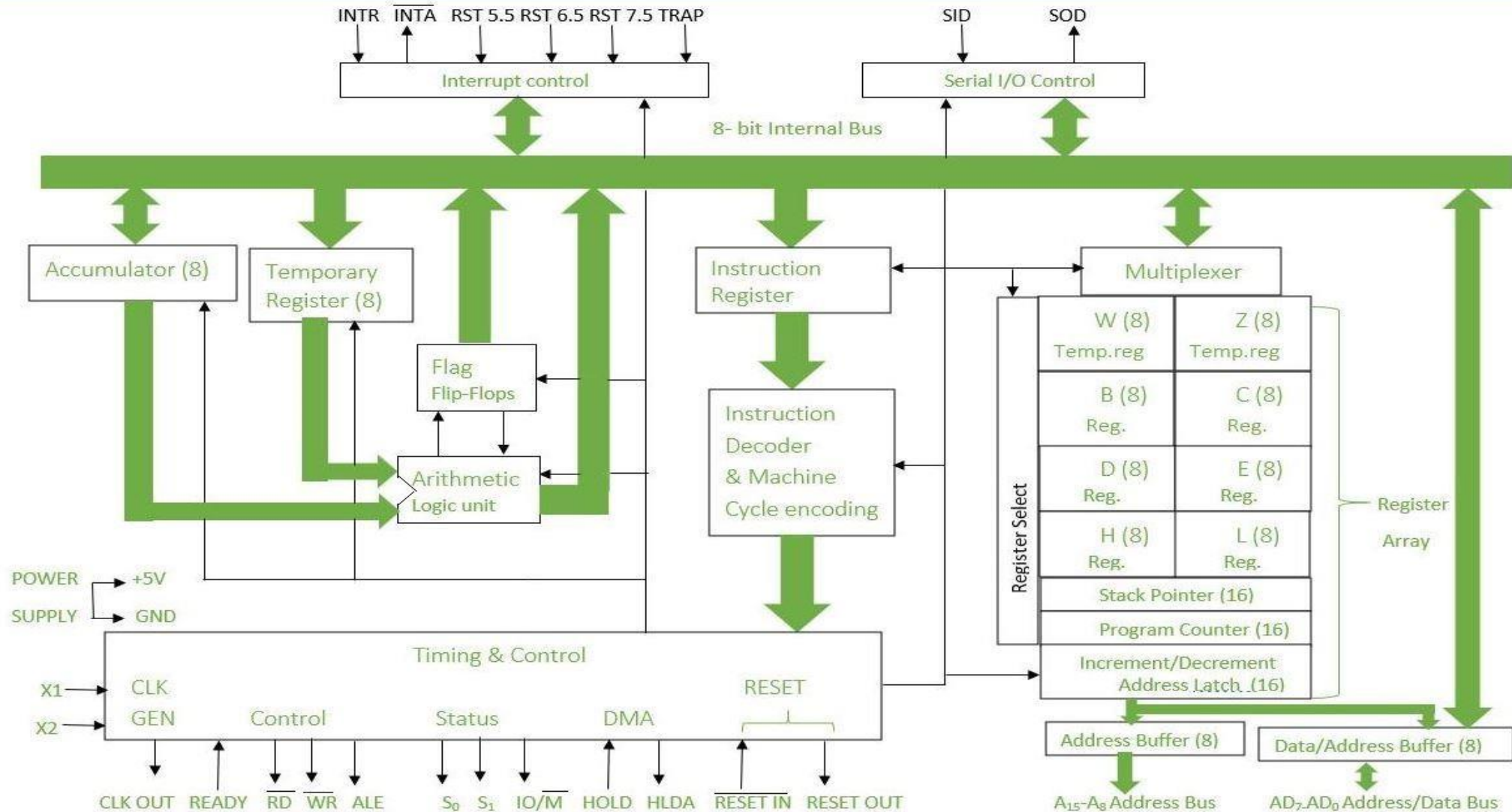




SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



Introduction :

- **The 8085 microprocessor is an 8-bit microprocessor that was developed by Intel in the mid-1970s.**
- It was widely used in the early days of personal computing and was a popular choice for hobbyists and enthusiasts due to its simplicity and ease of use.
- The architecture of the 8085 microprocessor consists of several key components, including the accumulator, registers, program counter, stack pointer, instruction register, flags register, data bus, address bus, and control bus.
- The accumulator is an 8-bit register that is used to store arithmetic and logical results.
- It is the most commonly used register in the 8085 microprocessor and is used to perform arithmetic and logical operations such as addition, subtraction, and bitwise operations.





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



1.
 - The 8085 microprocessor has six general-purpose registers, including B, C, D, E, H, and L, which can be combined to form 16-bit register pairs. The B and C registers can be combined to form the BC register pair, the D and E registers can be combined to form the DE register pair, and the H and L registers can be combined to form the HL register pair. These register pairs are commonly used to store memory addresses and other data.
 - The program counter is a 16-bit register that contains the memory address of the next instruction to be executed. The program counter is incremented after each instruction is executed, which allows the microprocessor to execute instructions in sequence.
 - The stack pointer is a 16-bit register that is used to manage the stack. The stack is a section of memory that is used to store data temporarily, such as subroutine addresses and other data. The stack pointer is used to keep track of the top of the stack.
 - The instruction register is an 8-bit register that contains the current instruction being executed. The instruction register is used by the microprocessor to decode and execute instructions.





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



2.

- The flags register is an 8-bit register that contains status flags that indicate the result of an arithmetic or logical operation.
- These flags include the carry flag, zero flag, sign flag, and parity flag.
- The carry flag is set when an arithmetic operation generates a carry, the zero flag is set when the result of an arithmetic or logical operation is zero, the sign flag is set when the result of an arithmetic or logical operation is negative, and the parity flag is set when the result of an arithmetic or logical operation has an even number of 1 bits.





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



3.

- The data bus is an 8-bit bus that is used to transfer data between the microprocessor and memory or other devices.
- The data bus is bidirectional, which means that it can be used to read data from memory or write data to memory.
- The address bus is a 16-bit bus that is used to address memory and other devices.
- The address bus is used to select the memory location or device that the microprocessor wants to access.





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



4.

- The control bus is a set of signals that controls the operations of the microprocessor, including the read and write operations.
- The control bus includes signals such as the read signal, write signal, interrupt signal, and reset signal.
- The read signal is used to read data from memory or other devices, the write signal is used to write data to memory or other devices, the interrupt signal is used to signal the microprocessor that an interrupt has occurred, and the reset signal is used to reset the microprocessor to its initial state.





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



8085 is an 8-bit, general-purpose microprocessor. It consists of the following functional units:

Arithmetic and Logic Unit (ALU) :

- It is used to perform mathematical operations like addition, multiplication, subtraction, division, decrement, increment, etc.
- Different operations are carried out in ALU: ***Logical operations, Bit-Shifting Operations, and Arithmetic Operations.***





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



Flag Register:

- It is an 8-bit register that stores either 0 or 1 depending upon which value is stored in the accumulator. Flag Register contains 8-bit out of which 5-bits are important and the rest of 3-bits are “don't Care conditions”.
- The flag register is a dynamic register because after each operation to check whether the result is zero, positive or negative, whether there is any overflow occurred or not, or for comparison of two 8-bit numbers carry flag is checked.
- So for numerous operations to check the contents of the accumulator and from that contents if we want to check the behavior of given result then we can use Flag register to verify and check.
- So we can say that the **flag register is a status register and it is used to check the status of the current operation which is being carried out by ALU.**

Different Fields of Flag Register:

1. Carry Flag
2. Parity Flag
3. Auxiliary Carry Flag
4. Zero Flag
5. Sign Flag

23ECB204/ DE & MP / Ms.V.Aishwarya, AP/ECE / Unit 3/8085 MICROPROCESSOR





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



Accumulator:

- Accumulator is used to perform I/O, arithmetic, and logical operations. It is connected to ALU and the internal data bus.
- The accumulator is the heart of the microprocessor because for all arithmetic operations Accumulator's 8-bit pin will always there connected with ALU and in most-off times all the operations carried by different instructions will be stored in the accumulator after operation performance.





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



General Purpose Registers:

- There are six general-purpose registers.
- These registers can hold 8-bit values.
- These 8-bit registers are B,C,D,E,H,L.
- These registers work as 16-bit registers when they work in pairs like B-C, D-E, and H-L. Here registers W and Z are reserved registers.
- We can't use these registers in arithmetic operations. It is reserved for microprocessors for internal operations like swapping two 16-bit numbers.
- We know that to swap two numbers we need a third variable hence here W-Z register pair works as temporary registers and we can swap two 16-bit numbers using this pair.





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



Program Counter :

Program Counter holds the address value of the memory to the next instruction that is to be executed. It is a 16-bit register.

For Example: Suppose current value of Program Counter : $[PC] = 4000H$
(It means that next executing instruction is at location 4000H.)

After fetching, program Counter(PC) always increments by +1 for fetching of next instruction.)





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



Stack Pointer :

- It works like a stack. In stack, the content of the register is stored that is later used in the program. It is a 16-bit special register.
- The stack pointer is part of memory but it is part of Stack operations, unlike random memory access.
- Stack pointer works in a continuous and contiguous part of the memory. whereas Program Counter(PC) works in random memory locations.
- This pointer is very useful in stack-related operations like ***PUSH, POP, and nested CALL requests*** initiated by Microprocessor. *It reserves the address of the most recent stack entry.*

Temporary Register:

It is an 8-bit register that holds data values during arithmetic and logical operations.

23ECB204/ DE & MP / Ms.V.Aishwarya, AP/ECE / Unit 3/8085 MICROPROCESSOR





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



Instruction register and decoder:

- It is an 8-bit register that holds the instruction code that is being decoded.
- The instruction is fetched from the memory.

Timing and control unit:

- The timing and control unit comes under the CPU section, and it controls the flow of data from the CPU to other devices.
- It is also used to control the operations performed by the microprocessor and the devices connected to it.
- There are certain timing and control signals like Control signals, DMA Signals, RESET signals and Status signals.





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



Interrupt control:

- Whenever a microprocessor is executing the main program and if suddenly an interrupt occurs, the microprocessor shifts the control from the main program to process the incoming request.
- After the request is completed, the control goes back to the main program.
- There are 5 interrupt signals in 8085 microprocessors: INTR, TRAP, RST 7.5, RST 6.5, and RST 5.5.

Priorities of Interrupts: TRAP > RST 7.5 > RST 6.5 > RST 5.5 > INTR





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



Address bus and data bus:

- The data bus is bidirectional and carries the data which is to be stored. The address bus is unidirectional and carries the location where data is to be stored.
- In the 8085 microprocessor, the address bus and data bus are two separate buses that are used for communication between the microprocessor and external devices.
- The Address bus is used to transfer the memory address of the data that needs to be read or written. The address bus is a 16-bit bus, allowing the 8085 to access up to 65,536 memory locations.
- The Data bus is used to transfer data between the microprocessor and external devices such as memory and I/O devices. The data bus is an 8-bit bus, allowing the 8085 to transfer 8-bit data at a time. The data bus can also be used for instruction fetch operations, where the microprocessor fetches the instruction code from memory and decodes it.
- The combination of the address bus and data bus allows the 8085 to communicate with and control external devices, allowing it to execute its program and perform various operations.





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



Serial Input/output control:

- It controls the serial data communication by using Serial input data and Serial output data.
- Serial Input/Output control in the 8085 microprocessor refers to the communication of data between the microprocessor and external devices in a serial manner, i.e., one bit at a time.
- The 8085 has a serial I/O port (SID/SOD) for serial communication. The SID pin is used for serial input and the SOD pin is used for serial output.
- The timing and control of serial communication is managed by the 8085's internal circuitry.
- The 8085 also has two special purpose registers, the Serial Control Register (SC) and the Serial Shift Register (SS), which are used to control and monitor the serial communication.





SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



Thank
you

