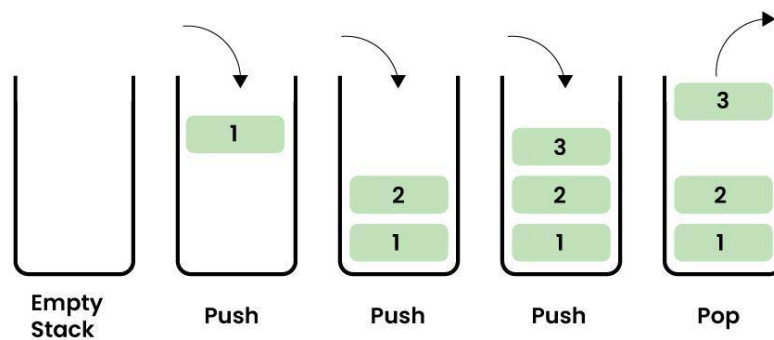


Understanding Stack Operations in Assembly

The stack is a Last-In-First-Out (LIFO) data structure used in Assembly for temporary storage in RAM, passing function parameters, and saving return addresses during function calls. The main instructions used for stack operations are:

- PUSH → Stores (pushes) a value onto the stack
- POP → Retrieves (pops) a value from the stack



Example 1: Basic PUSH and POP

org 100h

MOV AX, 2 ; Load AX with 2

PUSH AX ; Store AX on the stack

MOV AX, 3 ; Load AX with 3

PUSH AX ; Store AX on the stack

POP BX ; Retrieve last pushed value (3) into BX

POP CX ; Retrieve first pushed value (2) into CX

RET

Example 2: Swapping Two Values Using the Stack

```
org 100h
MOV AX, 10    ; AX = 10
MOV BX, 20    ; BX = 20

PUSH AX      ; Store AX (10) on the stack
PUSH BX      ; Store BX (20) on the stack

POP AX       ; AX now gets the last value pushed (20)
POP BX       ; BX now gets the first value pushed (10)
RET
```

Example 3: PUSH and POP for three numbers

```
org 100h
MOV AX, 5      ; Load AX with 5
PUSH AX        ; Store AX on the stack
MOV AX, 2      ; Load AX with 2
PUSH AX        ; Store AX on the stack
MOV AX, 7      ; Load AX with 7
PUSH AX        ; Store AX on the stack
POP BX         ; Retrieve last pushed value (3) into BX
POP CX         ; Retrieve first pushed value (2) into CX

RET
```

Write Assignments in 5 pages for one from the following topics:

1- Memory Hierarchy in Computer Systems

(Discuss different levels of memory (registers, cache, RAM, secondary storage) and their impact on system performance.)

2- Types of Adders in Digital Circuits

Compare Half Adder, Full Adder, and Parallel Binary Adder, discussing their applications.

3- Evolution of CPU Architecture

Discuss the historical development of CPUs, from early designs to modern multi-core processors.

4- Comparison Between RAM and ROM

Explain the differences, types, and roles of RAM and ROM in a computer system.

5- Role of the Control Unit in a CPU

Describe the functions and importance of the control unit in executing instructions.

6- Binary Arithmetic in ALU Operations

Analyze how the ALU performs addition, subtraction, multiplication, and logic operations.