

**8051**

**Addressing**

**Modes**

# 8051 Addressing Modes

- The CPU can access data in various ways, which are called addressing modes

- 1. Immediate**

- 2. Register**

- 3. Direct**

- 4. Indirect**

- 5. Relative**

- 6. Absolute**

- 7. Long**

- 8. Indexed**

# 1. Immediate Addressing Mode

- The immediate data sign, “#”
- Data is provided as a part of instruction.

```
MOV A, #25H      ;load 25H into A
MOV R4, #62      ;load 62 into R4
MOV B, #40H      ;load 40H into B
MOV DPTR, #4521H ;DPTR=4512H
MOV DPL, #21H    ;This is the same
MOV DPH, #45H    ;as above

;illegal!! Value > 65535 (FFFFH)
MOV DPTR, #68975
```

## 2. Register Addressing Mode

- In the Register Addressing mode, the instruction involves transfer of information between

registers

```
MOV A,R0      ;copy contents of R0 into A
MOV R2,A      ;copy contents of A into R2
ADD A,R5      ;add contents of R5 to A
ADD A,R7      ;add contents of R7 to A
MOV R6,A      ;save accumulator in R6
```

# 3. Direct Addressing Mode

- This mode allows you to specify the operand by giving its actual memory address

```
MOV R0,40H ;save content of 40H in R0
```

```
MOV 56H,A ;save content of A in 56H
```

# 4. Indirect Addressing Mode

- A **register** is used as a pointer to the data.
- Only register **R0** and **R1** are used for this purpose.
- **R2 – R7** cannot be used to hold the address of an operand located in RAM.
- When **R0** and **R1** hold the addresses of RAM locations, they must be preceded by the “@”

```
MOV A,@R0    ;move contents of RAM whose  
              ;address is held by R0 into A  
MOV @R1,B    ;move contents of B into RAM  
              ;whose address is held by R1
```

```
MOVX A,@DPTR
```

# 5. Relative Addressing

- This mode of addressing is used with some type of jump instructions, like **SJMP** (short jump) and conditional jumps like **JNZ**

```
Loop      : DEC   A           ;Decrement A
           JNZ   Loop        ;If A is not zero, Loop
```

## 6. Absolute Addressing

- In Absolute Addressing mode, the absolute address, to which the control is transferred, is specified by a label.
- Two instructions associated with this mode of addressing are **ACALL** and **AJMP** instructions.
- These are 2-byte instructions



# 7. Long Addressing

- This mode of addressing is used with the **LCALL** and **LJMP** instructions.
- It is a **3-byte** instruction
- It allows use of the full **64K** code space.

# 8. Indexed Addressing

- The Indexed addressing is useful when there is a need to retrieve data from a

10010000000000000000000000000000 (01F00H)

```
MOV    A,#08H           ;Offset from table start
MOV    DPTR,#01F00H     ;Table start address
MOVC   A,@A+DPTR        ;Gets target value from the table
                        ;start address + offset and puts it
                        ;in A.
```