ADDRESSING MODES

OPERAND TYPES

The 8051 supports datatypes like:

- Bytes
- Short Integers
- Bits

ADDRESSING MODES

The 8051 instruction set supports 5 addressing modes:

- Register Addressing
- Direct Addressing
- Indirect Addressing
- Immediate Addressing
- Based Indexed Indirect Addressing

ADDRESSING MODES

REGISTER ADDRESSING:

- 8051 has access to eight working registers (R0 to R7)
- Other registers used are A,B and DPTR

Example:

- ADD A,R7
- MOV A,R5
- INC DPTR
- MUL A,B
- MOV DPL,R6

ADDRESSING MODES

DIRECT ADDRESSING:

- Direct addressing can access any on-chip memory location.
- Only internal data RAM and SFR can be directly addressed.
- Example:
  - ADD A,55H
  - MOV A, 4EH
  - MOV P1.0, A
    - {Transfers the content of accumulator to Port 1.0 (address 90H)}

ADDRESSING MODES

INDIRECT ADDRESSING:

- R0 or R1 may operate as pointer registers (an 8-bit address in internal RAM where data are written or read)
- In 8051 assembly language, indirect addressing is represented by an @ before R0 or R1.

Example:

- MOV A, @R0
- If R0 contains 5FH and address location 5FH has 01H, then after this instruction 01H will be stored in accumulator.
- MOVX A, @DPTR

ADDRESSING MODES

IMMEDIATE ADDRESSING:

- An immediate data i.e., constant is specified in the instruction, after the opcode byte

Example:

- MOV A,#05H
- MOV R6,#05H
- MOV @DPTR,#4500H
- MOV P1,#65H

ADDRESSING MODES

BASED INDEXED INDIRECT ADDRESSING:

- Only program memory can be accessed using this addressing mode. The DPTR or PC register act as base register and register A acts as index register.
- The summation of contents of base register and index register determines the operand address.

Example:

- MOVC A, A+DPTR
- If A=02H and DPTR=4500H and 4502H=03H, then in this instruction 03H will be stored in accumulator.