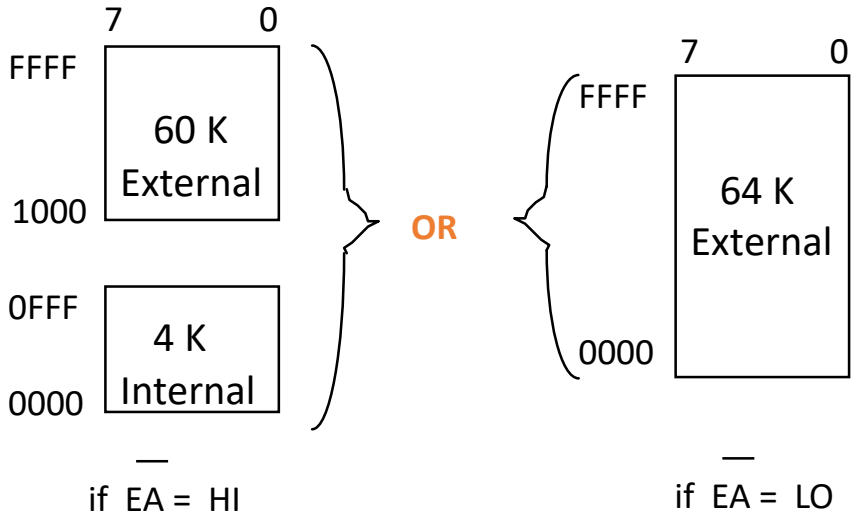
Data movement instructions

Of 8051

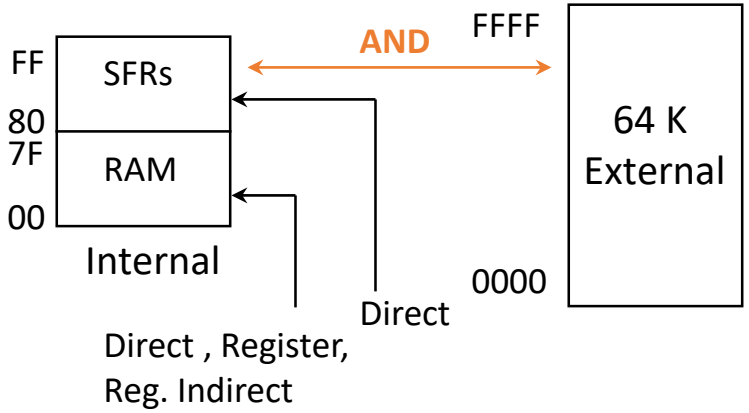
Memory organization of 8051

Program Memory



- All instructions
- Constant Data
  - Look up tables
  - Jump tables
- **Using MOVC**

Data Memory



- Any data
- Using MOV (internal memory)
- Using MOVX (external memory)

Data Transfer Instructions

- MOV
  - 8-bit data transfer for internal RAM and the SFR.

MOV A, Rn
MOV A, direct
MOV A, @Ri
MOV A, #data

MOV Rn, A
MOV Rn, direct
MOV Rn, #data

MOV @Ri, A
MOV @Ri, direct
MOV @Ri, #data

MOV direct, #data
MOV direct, A
MOV direct, Rn
MOV direct, direct
MOV direct, @Ri

Data Transfer Instructions

- MOVC
- Move Code Byte to the accumulator
  - Load the accumulator with a byte from program memory.
  - Only one way data transfer possible
  - Must use indexed addressing
  - Only two instructions of 8051 can read from code memory
    - MOVC A, @A+DPTR
    - MOVC A, @A+PC

Data Transfer Instructions

- MOVX
  - Data transfer between the accumulator and a byte from external data memory.
  - Only register indirect addressing mode is supported.
  - Move data from external data memory to accumulator
    - MOVX A, @Ri
    - MOVX A, @DPTR
  - Move data from accumulator to external data memory
    - MOVX @Ri, A
    - MOVX @DPTR, A

Data Transfer Instructions

- PUSH / POP
  - Push; write a data byte on the stack.
  - Pop; read a data byte from the stack.
  - The data byte is identified by a direct address from the internal RAM locations.

  - Examples:

    - PUSH DPL
    - PUSH 56H
    - POP 40H

Data Transfer Instructions

- XCH
  - Exchange accumulator and a byte variable
  - XCH A, Rn
  - XCH A, direct
  - XCH A, @Ri

- XCHD
  - Exchange lower digit of accumulator with the lower digit of the memory location specified.
  - XCHD A, @Ri
  - The lower 4-bits of the accumulator are exchanged with the lower 4-bits of the internal memory location identified indirectly by the index register.
  - The upper 4-bits of each are not modified.

8051 Data Movement - summary

MOV	A,	#
		D
		R
		@R

MOV	R,	#
		D
		A

MOV	D,	#
		D
		R
		@R
		A

MOV	@R,	#
		D
		A

8051 Data Movement - summary

Move From Program Memory

MOVC	A, @A+DPTR	Acc ← Rom(A+DPTR)
	A, @A+PC	Acc ← Rom(A+PC)

Move between External Data RAM and accumulator

MOVX	A, @R	
	A, @DPTR	
MOVX	@R, A	
	@DPTR, A	

Others

PUSH	D	
POP	D	
XCH	A, R	
	D	
	@R	
SWAP	Rn	Acc ↔ Rn
XCHD	A , @R	