23VLS1401: Microcontroller and Computer architecture

Lecture 1 (U5)

Data Transfer instructions and programming for Microcontroller 8051

A presentation by

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Session objectives

- To overview instructions related to the process of data transfer in Microcontroller 8051
- To develop the programming technique in assembly language for given problem statement, store the source data, execute the program and observe the result in destination register or memory location.

Data Transfer instructions

- **MOV**
- **MOVX**

Data transfer instructions

Opcode	Operand	Operation	Addressing mode
MOV	A,#n	Copy immediate data ‘n’ to accumulator	Immediate
MOV	A,Rr	Copy data from register Rr to accumulator	Register
MOV	Rr,A	Copy data from accumulator to register Rr	Register
MOV	Rr,#n	Copy immediate data ‘n’ in register Rr	Immediate
MOV	DPTR,#nn	Copy 16 bit to DPTR	Immediate

Data transfer instructions

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MOV	A,#n	Copy immediate data ‘n’ to accumulator	Immediate
MOV	A,Rr	Copy data from register Rr to accumulator	Register
MOV	Rr,A	Copy data from accumulator to register Rr	Register
MOV	Rr,#n	Copy immediate data ‘n’ in register Rr	Immediate
MOV	DPTR,#nn	Copy 16 bit to DPTR	Immediate

Caution:

Immediate data can not be a destination

All numbers must start with decimal number 0-9. Otherwise assembler will treat it as a label

Register to register data transfer is not possible

Caution

- Immediate data can not be a destination
- All numbers must start with decimal number 0-9. Otherwise assembler will treat it as a label
- Register to register data transfer is not possible

Examples of MOV instruction:

MOV A,#56H

Before Execution of the instruction

A	XX

MOV A,#56H

After Execution of the instruction

A	56

Examples of MOV instruction:

MOV A,R2

Before Execution of the instruction

A	XX
R2	43

MOV A,R2

After Execution of the instruction

A	43
R2	43

Examples of MOV instruction:

MOV R2,A

Before Execution of the instruction

A	29
R2	XX

MOV R2,A

After Execution of the instruction

A	29
R2	29

Examples of MOV instruction:

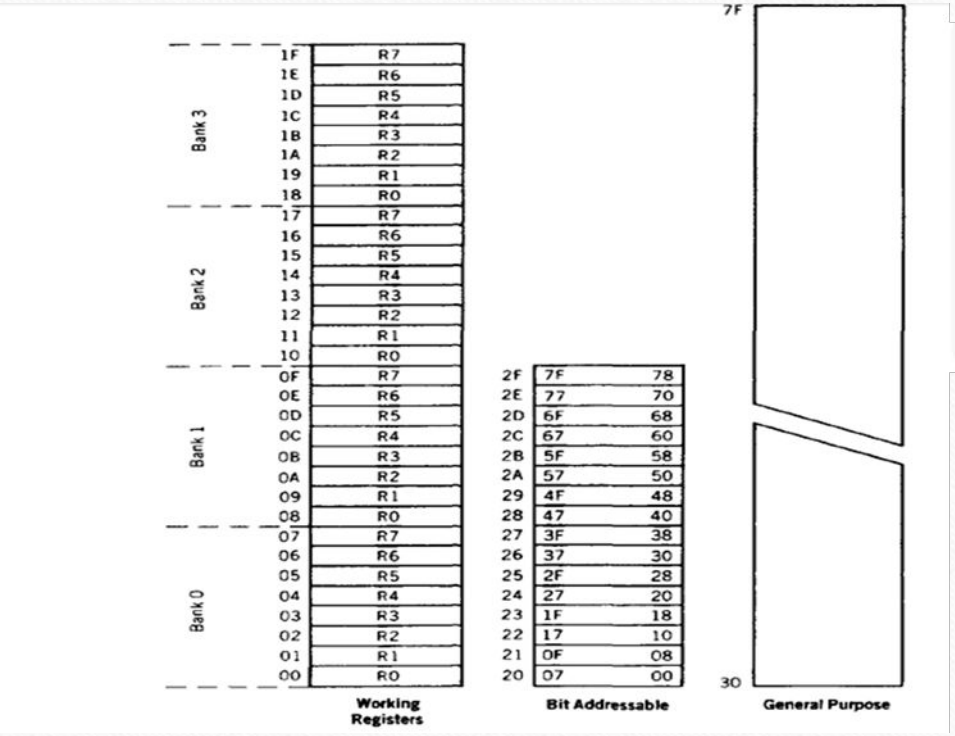
MOV R2,A

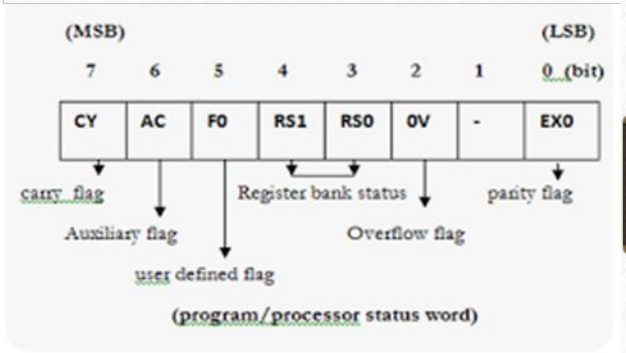
Before Execution of the instruction

A	29
R2	XX

After Execution of the instruction

A	29
R2	29





Examples of MOV instruction:

MOV R0,#23H

Before Execution of the instruction

R0	XX

MOV R0,#23H

After Execution of the instruction

R0	23

Examples of MOV instruction:

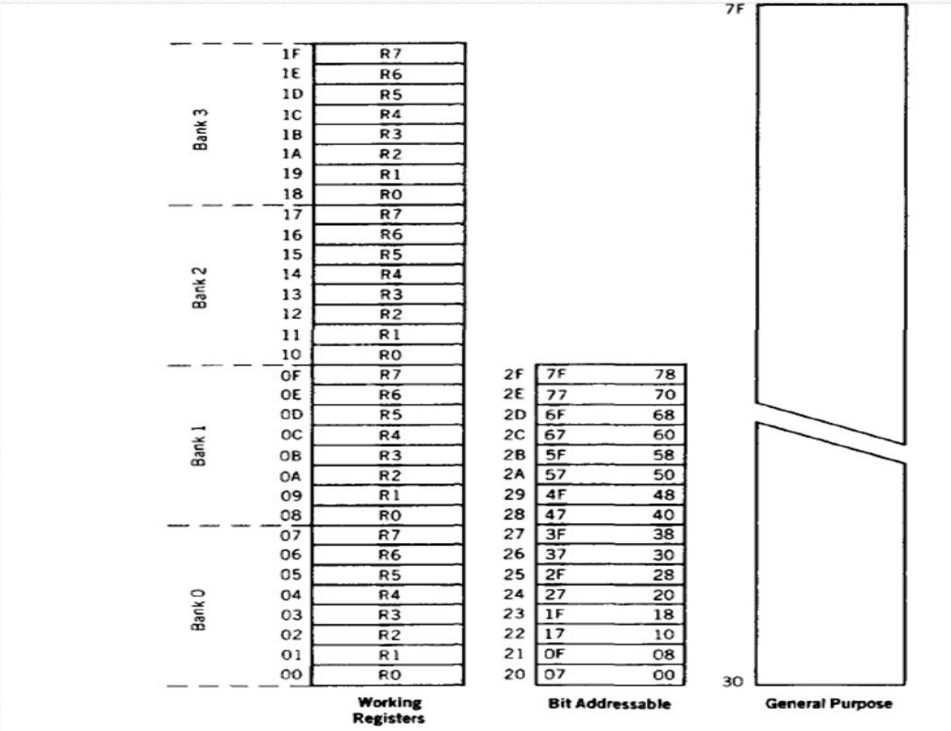
MOV R0,#23H

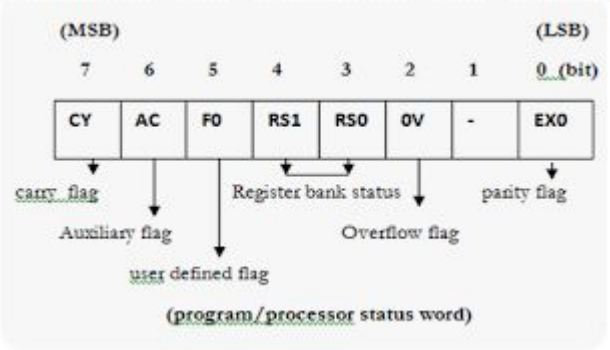
Before Execution of the instruction

R0	XX

After Execution of the instruction

R0	23





Examples of MOV instruction:

MOV DPTR,#2501H

Before Execution of the instruction

DPTR	XX

After Execution of the instruction

DPTR	2501H

MOV DPTR,#2501H

Data transfer instructions

Opcode	Operand	Operation	Addressing mode
MOV	A,add	Copy data from direct address ‘add’ to A	Direct
MOV	add,A	Copy data from A to direct address ‘add’	Direct
MOV	Rr,add	Copy data from direct address to register Rr	Direct
MOV	add,Rr	Copy data from register Rr to direct address add	Direct
MOV	add,#n	Copy data ‘n’ to direct address add	Direct
MOV	add1,add2	Copy data from direct address ‘add2’ to direct address ‘add1’	Direct

Data transfer instructions

Opcode	Operand		Addressing mode
MOV	A,add	Copy data from direct address ‘add’ to A	Direct
MOV	add,A	Copy data from A to direct address ‘add’	Direct
MOV	Rr,add	Copy data from direct address to register Rr	Direct
MOV	add,Rr	Copy data from register Rr to direct address add	Direct
MOV	add,#n	Copy data ‘n’ to direct address add	Direct
MOV	add1,add2	Copy data from direct address ‘add2’ to direct address ‘add1’	Direct

Caution:

Address above 7F do not exist

Moving data from a Direct address to itself is invalid

Caution

- Address above 7F do not exist
- Moving data from a Direct address to itself is invalid

Examples of MOV instruction:

MOV A,25H

Before Execution of the instruction

A	11
25	22

MOV A,25H

After Execution of the instruction

A	22
25	22

Examples of MOV instruction:

MOV 25,A

Before Execution of the instruction

A	11
25	22

MOV 25H,A

After Execution of the instruction

A	11
25	11

Examples of MOV instruction:

MOV R0,25H

Before Execution of the instruction

R0	11
25	22

MOV R0,25H

After Execution of the instruction

R0	22
25	22

Examples of MOV instruction:

MOV 25H,R0

Before Execution of the instruction

R0	11
25	22

MOV 25H,R0

After Execution of the instruction

R0	11
25	11

Examples of MOV instruction:

MOV 25H,#55H

Before Execution of the instruction

25	22

MOV 25H,#55H

After Execution of the instruction

25	55

Examples of MOV instruction:

MOV 25H,20H

Before Execution of the instruction

20	11
25	22

MOV 25H,R0

After Execution of the instruction

20	11
25	11

Data transfer instructions

Opcode	Operand	Operation	Addressing mode
MOV	@Rp,#n	Load immediate data ‘n’ to the address in Rp	Indirect
MOV	@Rp,add	Copy contents in address add to the address in Rp	Indirect
MOV	@Rp,A	Copy contents in accumulator to the address in Rp	Indirect
MOV	add, @Rp	Copy contents in address at Rp to address ‘add’	Indirect
MOV	A, @Rp	Copy contents in address at Rp to accumulator	Indirect

Caution:

1. A number in Rp must be a RAM address
2. Only R0 and R1 are used for indirect addressing

Data transfer instructions for external data moves

Opcode	Operand	Operation	Addressing mode
MOVX	A,@Rp	Copy the contents of external address in Rp to A	Indirect
MOVX	A,@DPTR	Copy the contents of external address in DPTR to A	Indirect
MOVX	@Rp,A	Copy the contents of A to external address in Rp	Indirect
MOVX	@DPTR,A	Copy the contents of A to external address in DPTR	Indirect


Thank
you