Microprocessor 8085
Data transfer instructions

Data transfer instructions

- These instructions copy the content between registers, between memory and registers
- Copy data from source to destination (without changing original data in source)

Instruction set- Data transfer instructions

1.

sno	instruction	description	example

1	MOV Rd, Rs
	MOV M, Rs
	MOV Rs, M
		Copies the content of source to destination. If one of the operand is a memory location, its location is specified in HL registers	MOV B, C
			MOV B, M
			MOV M,B

2	MVI Rd, data MVI M, data	The 8-bit data is stored in the destination register or memory	MVI B, 57H MVI M, 57H
3	LDA 16-bit address	The accumulator is loaded with data in the specified memory location	LDA 2034H
4	LDAX B/D reg.pair	The contents of the designated register pair point to a memory location. This instruction copies the contents of that memory location into the accumulator	LDAX B

Instruction set- Data transfer instructions

sno	instruction	description	example
1. 9	SHLD 16-bit address	The content of register HL is stored into the memory location specified in 16-bit address.	SHLD 2034H
10	XCHG	The content of register H are exchanged with the contents of register D, and content of L is exchanged with content of E register.	XCHG
11	SPHL	Loads the content of HL into stack pointer register	SPHL
12	XTHL	Contents of L register are exchanged with stack location pointed out by the contents of the stack pointer register. The contents of the H register are exchanged with the next stack location (SP+1)	XTHL

Instruction set- Data transfer instructions

sno	instruction	description	example
1. 13	PUSH reg pair	The content of register pair designated in the operand are copied onto the stack	PUSh B PUSH A
14	POP Reg.pair	The content of the memory location pointed out by the stack pointer register are copied to the low-order register of the operand.	POP H POP A
15	OUT 8-bit port address	The content of accumulator are copied into the output port specified	OUT F8
16	IN 8-bit port address	The content of input port specified is read and loaded into the accumulator	IN 8C

MOV - copy from source to destination

Opcode	operand
MOV	Rd, Rs
	M, Rs
	Rd, M

- Mov copies the contents of the source register into th destination register.
- If one of the operands is a memory location, its location is specified by the contents of the HL registers.

Example MOV B,C

MOV B,M

Instruction set- data transfer instruction

Before execution

A	20	F	
B		C	
D		E	
H		L	

MOV B,A

After execution

A	20	F	
B	20	C	
D		E	
H		L	

memory

2050	
2051	40H
2052	
2053	
2054	32H

A	20H	F	
B	40H	C	
D		E	
H	20	L	51

MOV M,B

A	20H	F	
B	40H	C	
D		E	
H		L	

A	20H	F	
B	40H	C	
D		E	
H	20	L	54

MOV C,M

A	20H	F	
B	40H	C	32H
D		E	
H	20	L	51

MVI - Move immediate

Opcode	operand
MVI	Rd, Data
	M, Data

- The 8-bit data is stored in the destination register or memory
- If the operand is a memory location, its location is specified by the contents of the HL registers.

Example MVI B,70H

MVI M, 50H

MVI - Move immediate

Before execution

A	20H	F	
B	25	C	
D		E	
H		L	

MVI B,70H

After execution

A	20	F	
B	70H	C	
D		E	
H		L	

A	20H	F	
B	40H	C	
D		E	
H	20	L	51

MVI M,43H

Memory

2050	
2051	43H
2052	
2053	
2054	32H

LDA - Load accumulator

Opcode	operand
LDA	16-bit address

- The contents of a memory location, specified by a 16-bit address in the operand, are copied into the accumulator

Example LDA 2000H

LDA - Load Accumulator

Before execution

A	20H	F	
B	40H	C	
D		E	
H	20	L	51

LDA 2054H

After execution

A	32H	F	
B	40H	C	
D		E	
H		L	

Memory

2050	
2051	43H
2052	
2053	
2054	32H

LDAX - Load accumulator indirect

Opcode	operand
LDAX	B / D- Register Pair

- The contents of a designated register pair point to a memory location.
- This instruction copies the contents of that memory location into the accumulator
- The contents of either the register pair or the memory location are not altered.

Example LDAX D

LDAX E

LDAX - Load Accumulator indirct

Before execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	51

LDAX D

After execution

A	43H	F	
B		C	
D		E	
H		L	

Memory

2050	43H
2051	
2052	
2053	
2054	32H

LXI - Load register pair indirect

Opcode	operand
LXI	Register Pair, 16-bit data

- This instruction loads 16-bit data in the register pair designated in the operand

Example LXI H, 2030

LXI - Load Accumulator indirect

Before execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	51

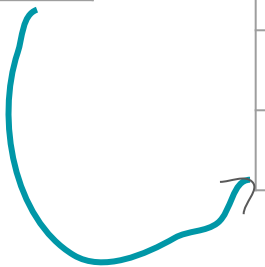
LXI H,2054

After execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	54

Memory

2050	43H
2051	
2052	
2053	
2054	32H



LHLD - Load H and L register direct

Opcode	operand
LHLD	16-bit address

- This instruction copies the contents of memory location pointed out by 16-bit address into register L
- It copies the contents of next memory location into register H

Example LHLD 2030

LHLD - Load H and L register direct

Before execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	51

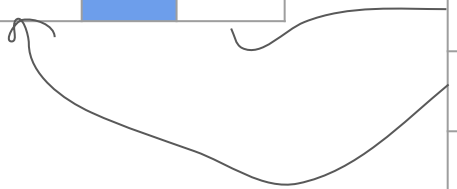
LHLD 2052

After execution

A	20H	F	
B		C	
D	20	E	50
H	22	L	80

Memory

2050	43H
2051	
2052	80
2053	22
2054	32H



Instruction set- data transfer instruction

Before execution

A	20H	F	
B	20	C	54
D		E	
H		L	

LDAX B

After execution

A	32H	F	
B	70H	C	
D		E	
H		L	

2050	
2051	43H
2052	
2053	
2054	32H
2055	20

A	20H	F	
B	40H	C	
D		E	
H	20	L	45

LXI H,2051H

A	20H	F	
B	40H	C	
D		E	
H	20	L	51

A	20H	F	
B	40H	C	
D		E	
H	20	L	51

LHLD 2054H

A	32H	F	
B	40H	C	
D		E	
H	20	L	32

STA - Store accumulator direct

Opcode	operand
STA	16-bit address

- The content of accumulator are copied into the memory location specified by the operand.
-

Example STA 2030

STA - Store accumulator direct

Before execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	51

STA 2052

Memory before execution

2050	43H
2051	
2052	60
2053	22
2054	32H

Memory after execution

2050	43H
2051	
2052	20
2053	22
2054	32H

STAX - Store accumulator indirect

Opcode	operand
STAX	Register pair

- The content of accumulator are copied into the memory location specified by the contents of the register pair.
-

Example STAX B

STAX - Store accumulator indirect

Before execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	51

STAX D

Memory before execution

2050	43
2051	
2052	60
2053	22
2054	32H

Memory after execution

2050	20
2051	
2052	20
2053	22
2054	32H

SHLD - Store H and L registers direct

Opcode	operand
SHLD	16 - bit address

- The content of register L are stored into memory location specified by the 16-bit address
- The contents of register H are stored into the next memory location

Example SHLD 2050

SHLD - Store H and L registers direct

Before execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	51

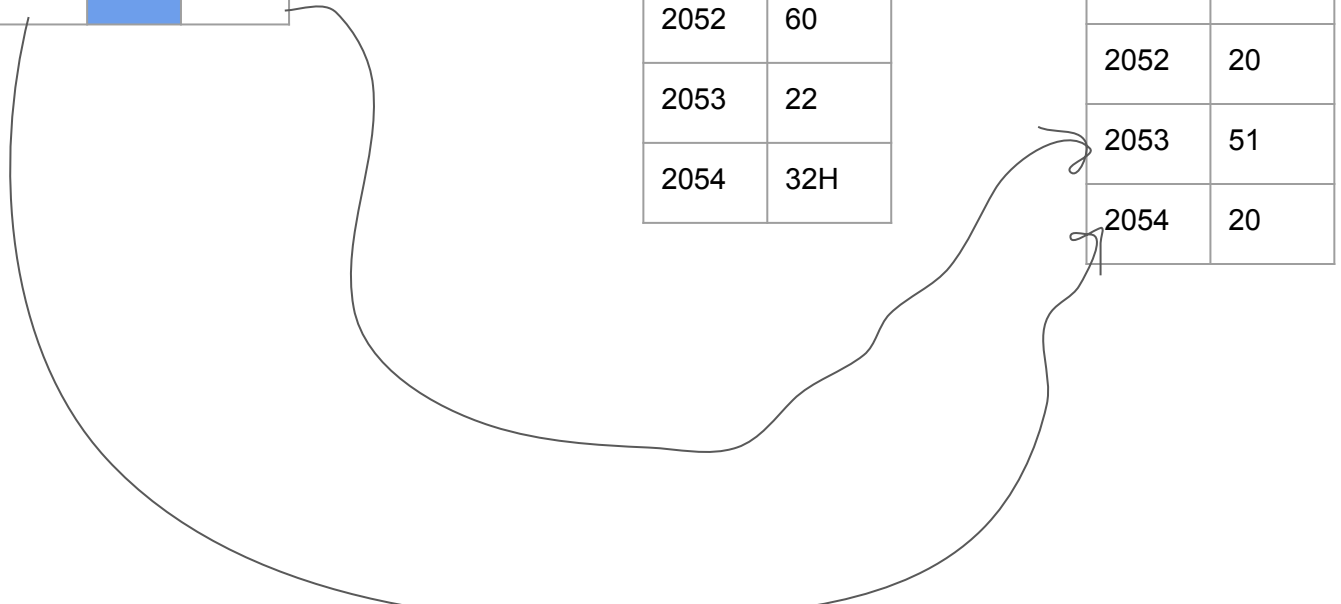
SHLD 2053

Memory before execution

2050	43
2051	
2052	60
2053	22
2054	32H

Memory after execution

2050	20
2051	
2052	20
2053	51
2054	20



Instruction set- data transfer instruction

Before execution

A	20H	F	
B	20	C	54
D		E	
H		L	

STA 2054

After execution

A	20H	F	
B	70H	C	
D		E	
H		L	

2050	
2051	43H
2052	
2053	
2054	20H
2055	20

A	7EH	F	
B	20H	C	53
D		E	
H	20	L	45

STAX B

2050	
2051	43H
2052	
2053	7E
2054	20H
2055	20

A	20H	F	
B	40H	C	
D		E	
H	20	L	51

SHLD 2054H

2050	
2051	43H
2052	
2053	7E
2054	51
2055	20

XCHG - Exchange H and L registers with D and E registers

Opcode	operand
XCHG	None

- The content of register H are exchanged with the contents of register D
-
- The contents of register L are exchanged with the content of register E

Example : XCHG

XCHG - Exchange H and L registers with D and E registers

Before execution

A	20H	F	
B		C	
D	20	E	50
H	40	L	56

XCHG

After execution

A	20H	F	
B		C	
D	40	E	56
H	20	L	51

SPHL - Copy H and L registers to the stack pointer

Opcode	operand
SPHL	None

- This instruction loads the contents of H-L pair into SP

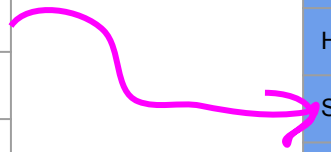
Example : SPHL

SPHL - Copy H and L registers to the stack pointer

Before execution

A	20H	F	
B		C	
D	20	E	50
H	40	L	56
S	20	P	60
P		C	

SPHL



After execution

A	20H	F	
B		C	
D	20	E	50
H	40	L	56
S	40	P	56
P		C	

XTHL - Exchange H and L with top of stack

Opcode	operand
XTHL	None

- The content of L register are exchanged with the location pointed out by the contents of SP
- The contents of H register are exchanged with the next location (SP + 1)

Example : XTHL

XTHL - Exchange H and L with top of stack

Before execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	56
S	20	P	50
P		C	

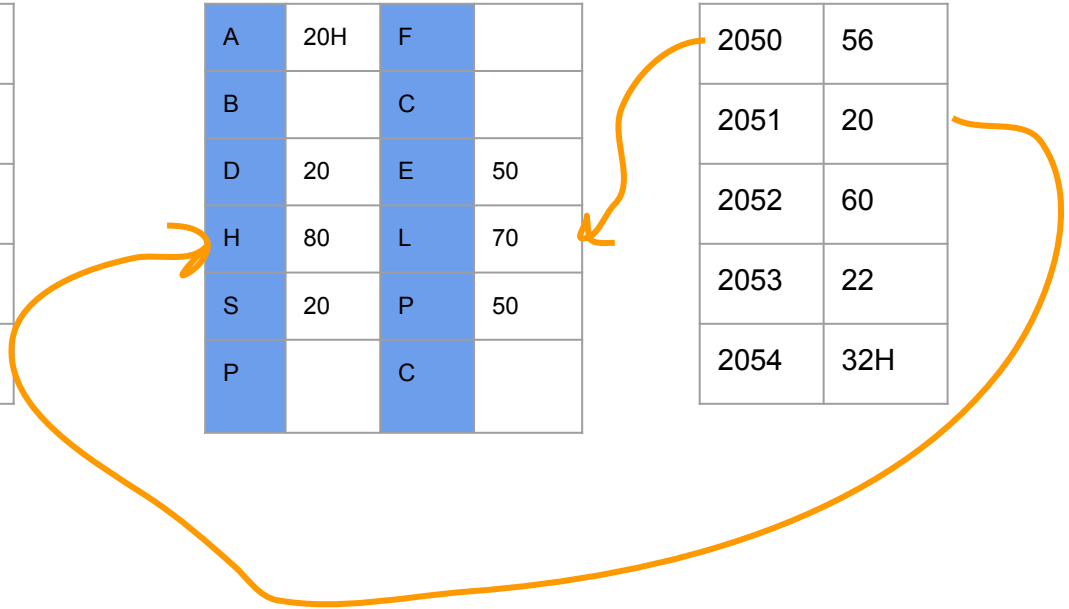
XTHL

2050	70
2051	80
2052	60
2053	22
2054	32H

After execution

A	20H	F	
B		C	
D	20	E	50
H	80	L	70
S	20	P	50
P		C	

2050	56
2051	20
2052	60
2053	22
2054	32H



PCHL - Load Program counter with H-L contents

Opcode	operand
PCHL	None

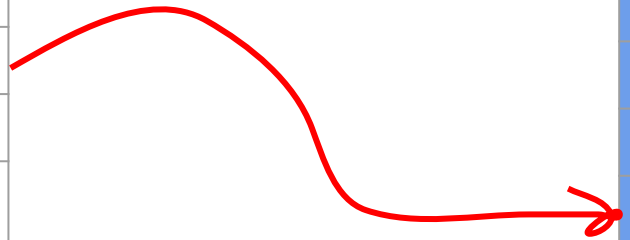
- The content of registers H and L are copied into the Program Counter (PC)
- The contents of H register are replaced as the high-order byte and the contents of L as low-order byte

Example : PCHL

PCHL - Load Program counter with H-L contents

Before execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	56
S	20	P	50
P	25	C	43



After execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	56
S	20	P	50
P	20	C	56

PUSH - Push register pair onto stack

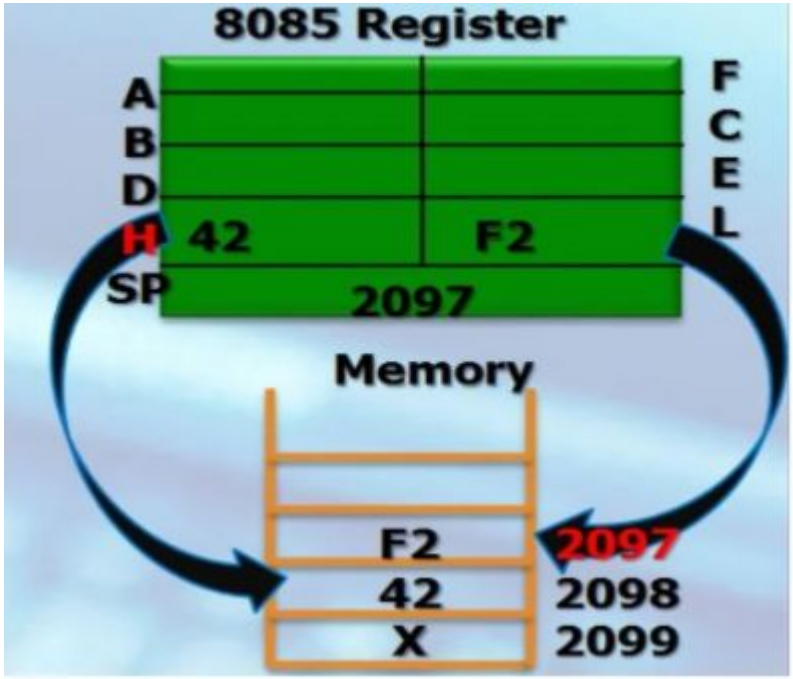
Opcode	operand
PUSH	Register pair

- The content of registers pairs are copied onto stack
- SP is decremented and the contents of high-order registers (B, D, H, A) are copied into stack
- SP is again decremented and the contents of low-order registers (C, E, L, Flags) are copied into stack.

Example : PUSH B

PUSH - Push register pair onto stack

PUSH H



POP - Pop stack to register pair

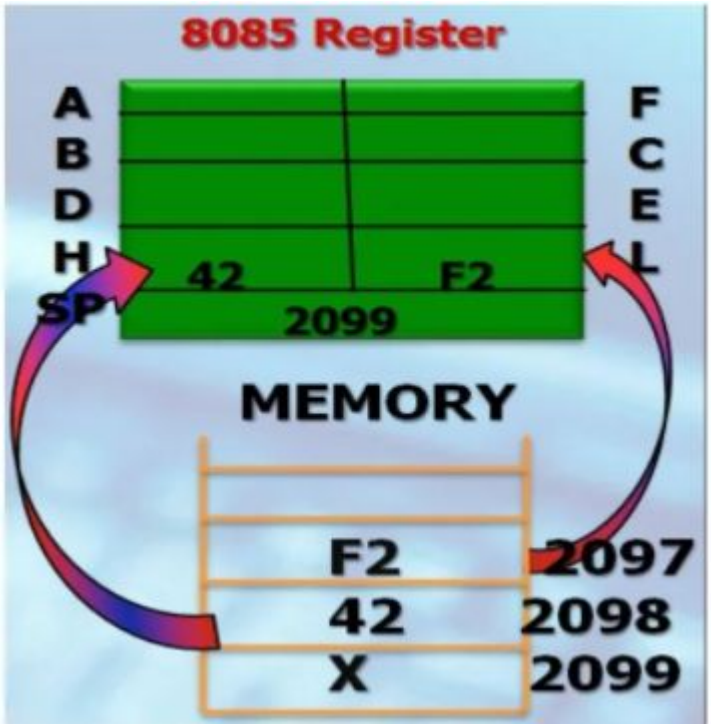
Opcode	operand
POP	Register pair

- The content of top of stack are copied into registers pair
- The contents of location pointed out by SP are copied to the low-order register (C, E, L, Flags)
- SP is incremented and the contents of location are copied to the high-order registers (B, D, H, A) .

Example : POP B

POP - Pop stack to register pair

POP H



IN - Copy data to accumulator from a port with 8-bit address

Opcode	operand
IN	8-bit port address

- The content of I/O port are copied into accumulator

Example : IN 01

IN - Copy data to accumulator from a port with 8-bit address

Before execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	56
S	20	P	50
P	25	C	43

$IN\ 01_H$

After execution

A	10H	F	
B		C	
D	20	E	50
H	20	L	56
S	20	P	50
P	20	C	56

Port 01	10

OUT - Copy data from accumulator to the port with 8-bit address

Opcode	operand
OUT	8-bit port address

- The content of accumulator are copied into the I/O port with the specified address

Example : OUT 02

OUT - Copy data from accumulator to the port with 8-bit address

Before execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	56
S	20	P	50
P	25	C	43

OUT 02_H

After execution

A	20H	F	
B		C	
D	20	E	50
H	20	L	56
S	20	P	50
P	20	C	56

Port 02	20

https://www.slideshare.net/gokulvlsi/8085-instruction-set

Instruction set- data transfer instruction

Before execution

A	20H	F	
B	20	C	54
D	20	E	40
H	70	L	80

XCHG

After execution

A	20H	F	
B	70H	C	
D	70	E	80
H	20	L	40

A	7EH	F	
B	20H	C	53
D		E	
H	20	L	45

STAX B

2050	
2051	43H
2052	
2053	7E
2054	20H
2055	20

A	20H	F	
B	40H	C	
D		E	
H	20	L	51

LHLD 2054H

A	32H	F	
B	40H	C	
D		E	
H	20	L	32