Data Transfer and Manipulation

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Most computer instructions can be classified into three categories:

1) Data transfer,

2) Data manipulation,

3) Program control instructions

Data Transfer Instruction

❖ Data transfer instructions move data from one place in the computer to another without changing the data content

❖ The most common transfers are between memory and processor registers,between processor registers and input or output,and between the processor registers themselves.

NAME	Mnemonic
Load	LD
Store	ST
Move	MOV
Exchange	XCH
Input	IN
Output	OUT
Push	PUSH
pop	POP

Typical Data Transfer Instruction :

» **Load : transfer from memory to a processor register, usually an AC** (*memory read*)

» **Store : transfer from a processor register into memory (***memory write***)**

» **Move : transfer from one register to another register**

» **Exchange : swap information between two registers or a register and a memory word**

» **Input/Output : transfer data among processor registers and input/output device**

» **Push/Pop : transfer data between processor registers and a memory stack**

Data Manipulation Instruction

❑ Data Manipulation Instructions perform operations on data and provide the computational capabilities for the computer.

❑ It is divided into three basic types:

1) Arithmetic,

2) Logical and bit manipulation,

3) Shift Instruction

Arithmetic Insructions

- The four basic arithmetic operations are addition,subtraction, multiplication,and division.

- Other add instr. are ADDI,ADDF,ADDD

NAME	Mnemonic
Increment	INC
Decrement	DEC
Add	ADD
Subtract	SUB
Multiply	MUL
Divide	DIV
Add with carry	ADDC
Subtract with borrow	SUBB
Negate (2's complement)	NEG

Logical and bit manipulation Instructions

- Logical instructions perform binary operations on strings of bits stored in registers.

- They are useful for manipulating individual bits or a group of bits that represent binary-coded information.

NAME	Mnemonic
Clear	CLR
Complement	COM
AND	AND
OR	OR
Exclusive-or	XOR
Clear carry	CLRC
Set carry	SETC
complement carry	COMC
Enable interrupt	EI
Disable interrupt	DI

Shift Instructions

- Instructions to shift the content of an operand
- Shifts are operations in which the bits of a word are moved to the left or right.

NAME	Mnemonic
Logical shift right	SHR
Logical shift left	SHL
Arithmetic shift right	SHRA
Arithmetic shift left	SHLA
Rotate right	ROR
Rotate left	ROL
Rotate right through carry	RORC
Rotate left through carry	ROLC