Additional data transfer and 16 bit arithmetic instruction (Cont.)

Lecture 2

Dronacharya Group of Institutions

Logic Operations : ROTATE and COMPARE

ROTATE

Rotate accumulator left

- RLC none Each binary bit of the accumulator is rotated left by one position. Bit D7 is placed in the position of D0 as well as in the Carry flag. CY is modified according to bit D7. S, Z, P, AC are not affected.
- Example: RLC

Logic Operations : ROTATE and COMPARE

Rotate accumulator right

- RRC none Each binary bit of the accumulator is rotated right by one position. Bit D0 is placed in the position of D7 as well as in the Carry flag. CY is modified according to bit D0. S, Z, P, AC are not affected.
- Example: RRC

Logic Operations : ROTATE (Cont.)

Rotate accumulator left through carry

- RAL none Each binary bit of the accumulator is rotated left by one position through the Carry flag. Bit D7 is placed in the Carry flag, and the Carry flag is placed in the least significant position D0. CY is modified according to bit D7. S, Z, P, AC are not affected.
- Example: RAL

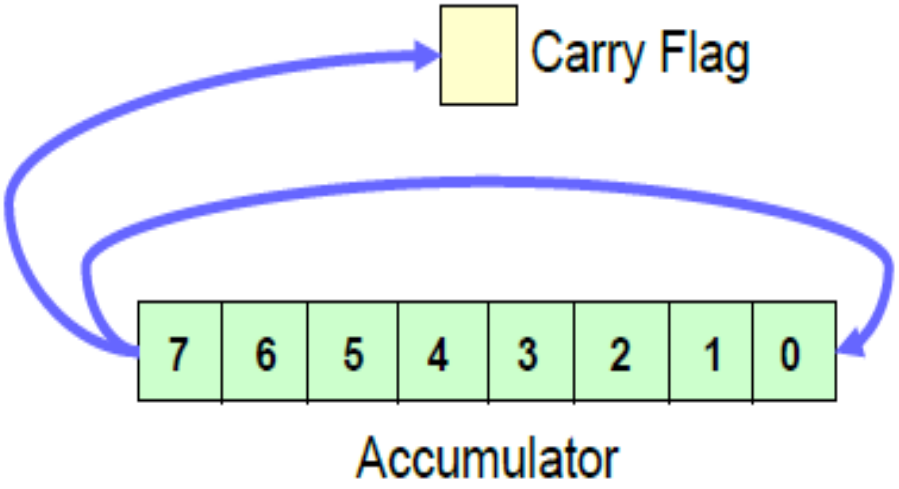
Logic Operations : ROTATE (Cont.)

Rotate accumulator right through carry

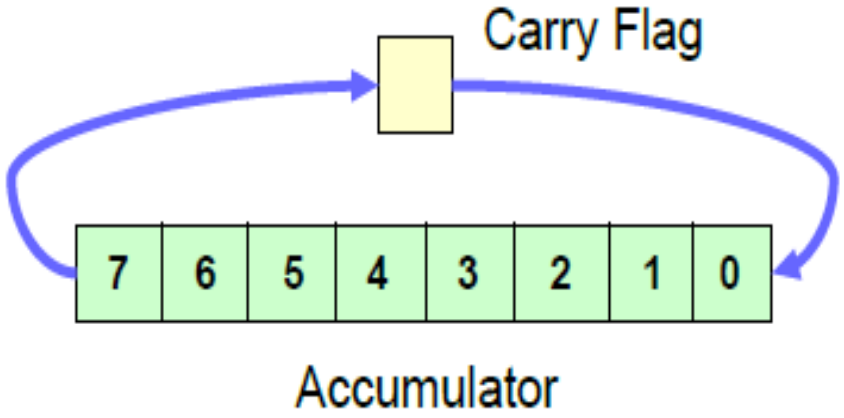
- RAR none Each binary bit of the accumulator is rotated right by one position through the Carry flag. Bit D0 is placed in the Carry flag, and the Carry flag is placed in the most significant position D7. CY is modified according to bit D0. S, Z, P, AC are not affected.
- Example: RAR

RLC vs. RLA

- RLC



- RAL



LOGICAL OPERATIONS

- Compare
- Compare the contents of a register or memory location with the contents of the accumulator.
- CMP R/M :Compare the contents of the register or memory location to the contents of the accumulator.
- CPI # : Compare the 8-bit number to the contents of the accumulator.

- The compare instruction sets the flags (Z, Cy, and S).
- The compare is done using an internal subtraction that does not change the contents of the accumulator.

- A –(R / M / #)

BRANCH OPERATIONS

Two types:
Unconditional branch: Go to a new location no matter what.

Conditional branch : Go to a new location if the condition is true.

Unconditional Branch

JMP Address : Jump to the address specified (Go to).

CALL Address: Jump to the address specified but treat it as a subroutine.

RET : Return from a subroutine.

The addresses supplied to all branch operations must be 16-bits.

CONDITIONAL BRANCH

- Go to new location if a specified condition is met.
- JZ Address(Jump on Zero)Go to address specified if the **Zero flag is set.**
- JNZ Address(Jump on NOT Zero)Go to address specified if the **Zero flag is not set.**
- JC Address(Jump on Carry)Go to the address specified if the **Carry flag is set.**
- JNC Address(Jump on No Carry)Go to the address specified if the **Carry flag is not set.**
- JP Address(Jump on Plus)Go to the address specified if the **Sign flag is not set**
- JM Address(Jump on Minus)Go to the address specified if the **Sign flag is set.**

DATA FORMATS

- In an 8-bit microprocessor, data can be represented in one of four formats:
- ASCII
- BCD
- Signed Integer
- Unsigned Integer.
- It is important to recognize that the microprocessor deals with 0's and 1's.It deals with values as strings of bits.
- It is the job of the user to add a meaning to these strings.

DATA FORMATS

- Assume the accumulator contains the following value: 0100 0001.There are four ways of reading this value: It is an unsigned integer expressed in binary, the equivalent decimal number would be 65.
- It is a number expressed in BCD (Binary Coded Decimal) format. That would make it, 41.
- It is an ASCII representation of a letter. That would make it the letter A.
- It is a string of 0's and 1's where the 0th and the 6th bits are set to 1 while all other bits are set to 0.