

### 3.2.7 String and String-Handling Instructions

The 8086 microprocessor is equipped with special instructions to handle string operations. String means a series of data words (or bytes) that reside in consecutive memory locations. There are many string instructions in the instruction set of 8086, four of these instructions are discussed here.

#### 1. MOVSB, MOVSW:

An element specified by the (SI) reg. in the current data segment (DS) reg. is moved to the locations specified by the (DI) reg. in the current (ES) reg. . The move can be performed on a byte or a word of data.

##### **MOVSB (8-bit) (1 byte)**

This instruction will move a byte of data from the M.L. in *data segment* specified with **SI** as the *source* of data to a M.L. in *extra segment* specified with **DI** as the **destination** for data.

**MOVSB** ; move byte from (DS:SI) to (ES:DI) .

For DF = 0,

$SI = SI + 1$  ,  $DI = DI + 1$

For DF = 1,

$SI = SI - 1$  ,  $DI = DI - 1$

##### **MOVSW (16-bit) (2 byte)**

This instruction will move a word of data from the M.L. in *data segment* specified with **SI** as the *source* of data to a M.L. in *extra segment* specified with **DI** as the **destination** for data.

**MOVSW** ; move word from (DS:SI) to (ES:DI) & (DS: SI + 1) to (ES:DI + 1).

For DF = 0,

$$SI = SI + 2 \quad , \quad DI = DI + 2$$

For  $DF = 1$ ,

$$SI = SI - 2 \quad , \quad DI = DI - 2$$

## 2. CMPSB, CMPSW:

These instructions can be used to compare two elements in the same or different strings. It subtracts the content of  $(ES : DI)$  from the content of  $(DS : SI)$  and adjusts flags (CF, PF, AF, ZE, SF, & OF). The result of subtraction is not saved but it affects on the flag reg. (FX) only.

**CMPSB** ; compare the string content byte in  $(DS:SI)$  with the content of  $(ES:DI)$  .

For  $DF = 0$ ,

$$SI = SI + 1 \quad , \quad DI = DI + 1$$

For  $DF = 1$ ,

$$SI = SI - 1 \quad , \quad DI = DI - 1$$

**CMPSW** ; compare the string content word in  $(DS:SI)$  with the content of  $(ES:DI)$  and  $(DS:SI+1)$  with the content of  $(ES:DI+1)$ .

For  $DF = 0$ ,

$$SI = SI + 2 \quad , \quad DI = DI + 2$$

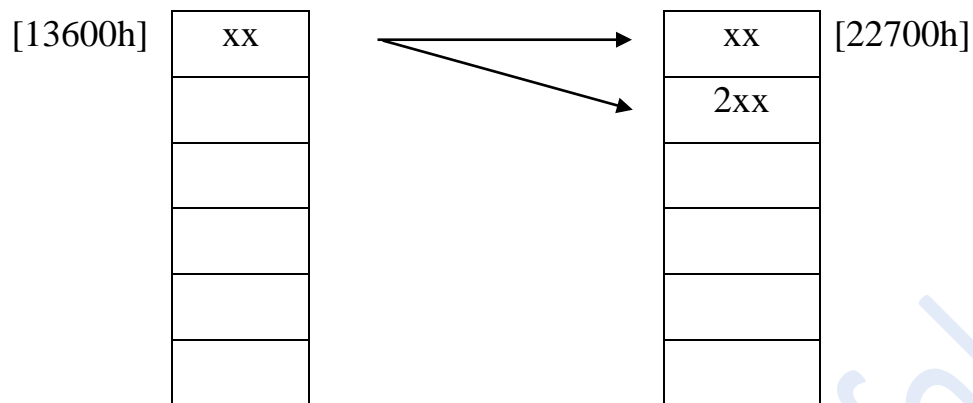
For  $DF = 1$ ,

$$SI = SI - 2 \quad , \quad DI = DI - 2$$

3. **STD**: make  $DF = 1$  .

4. **CLD**: make  $DF = 0$  .

**Ex.1:** Write an A.L.P. to perform the following operation:



i.e. move byte from the 1<sup>st</sup> memory to the 2<sup>nd</sup> memory and move the double of the same byte to the 2<sup>nd</sup> memory location of the 2<sup>nd</sup> vector. The 1<sup>st</sup> vector of the memory is about 8 elements.

**Ex.2:** Write an A.L.P. to find the number of students that had the same marks in two exams. The marks of the first exam is stored in data segment starting at offset 1000. While the marks of the second exam is stored in extra segment starting at offset 2000. NOTE DS = 2500 and ES = 3000. Total number of students is 50 (decimal).