Assembler directives

Assemble Directives

- **Instructions to the Assembler regarding the program being executed.**

- **Control the generation of machine codes and organization of the program; but no machine codes are generated for assembler directives.**

- **Also called 'pseudo instructions'**

- **Used to :**
  - **› specify the start and end of a program**
  - **› attach value to variables**
  - **› allocate storage locations to input/ output data**
  - **› define start and end of segments, procedures, macros etc..**

Assemble Directives

DB

DW

SEGMENT
ENDS

ASSUME

ORG
END
EVEN
EQU

PROC
FAR
NEAR
ENDP

SHORT

MACRO
ENDM

- **Define Byte**
- **Define a byte type (8-bit) variable**
- **Reserves specific amount of memory locations to each variable**
- **Range : 00_H – FF_H for unsigned value; 00_H – $7F_H$ for positive value and 80_H – FF_H for negative value**
- **General form : variable DB value/ values**

Example:

```
LIST DB 7FH, 42H, 35H
```

Three consecutive memory locations are reserved for the variable LIST and each data specified in the instruction are stored as initial value in the reserved memory location

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- Define Word
- Define a word type (16-bit) variable
- Reserves two consecutive memory locations to each variable
- Range : 0000_H – $FFFF_H$ for unsigned value; 0000_H – $7FFF_H$ for positive value and 8000_H – $FFFF_H$ for negative value
- General form : variable DW value/ values

Example:

```
ALIST DW 6512H, 0F251H, 0CDE2H
```

Six consecutive memory locations are reserved for the variable ALIST and each 16-bit data specified in the instruction is stored in two consecutive memory location.

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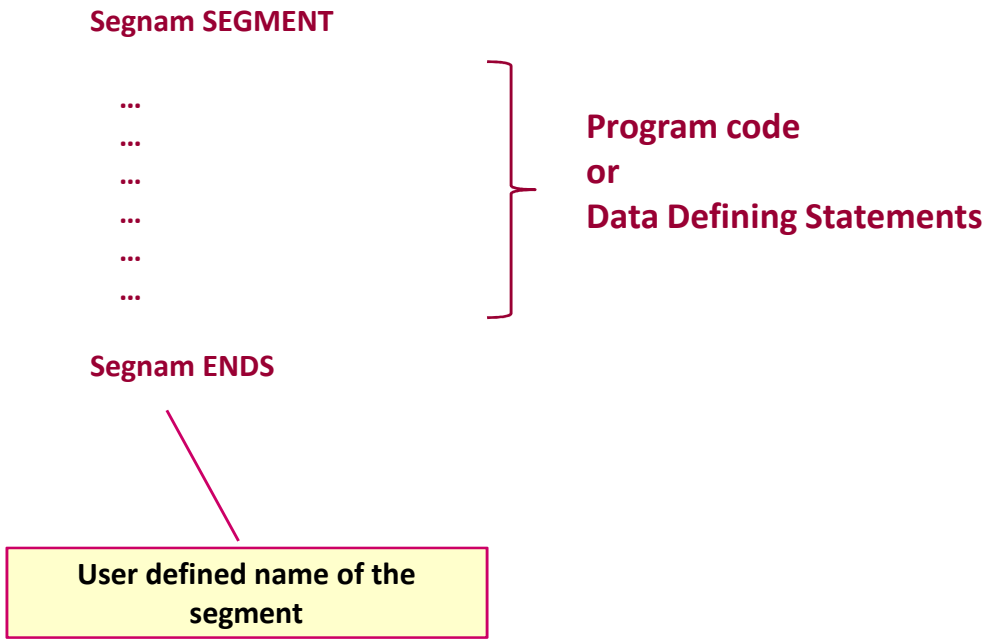
- **SEGMENT : Used to indicate the beginning of a code/ data/ stack segment**
- **ENDS : Used to indicate the end of a code/ data/ stack segment**
- **General form:**



Assemble Directives

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- **Informs the assembler the name of the program/ data segment that should be used for a specific segment.**
- **General form:**

ASSUME segreg : segnam, .. , segreg : segnam

Segment Register

User defined name of the segment

Example:

ASSUME CS: ACODE, DS:ADATA	Tells the compiler that the instructions of the program are stored in the segment ACODE and data are stored in the segment ADATA

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- **ORG** (Origin) is used to assign the starting address (Effective address) for a program/ data segment
- **END** is used to terminate a program; statements after END will be ignored
- **EVEN** : Informs the assembler to store program/ data segment starting from an even address
- **EQU** (Equate) is used to attach a value to a variable

Examples:

ORG 1000H	Informs the assembler that the statements following ORG 1000H should be stored in memory starting with effective address 1000_H
LOOP EQU 10FEH	Value of variable LOOP is $10FE_H$
_SDATA SEGMENT ORG 1200H A DB 4CH EVEN B DW 1052H _SDATA ENDS	In this data segment, effective address of memory location assigned to A will be 1200_H and that of B will be 1202_H and 1203_H.

Assemble Directives

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- **PROC** Indicates the beginning of a procedure
- **ENDP** End of procedure
- **FAR** Intersegment call
- **NEAR** Intrasegment call
- General form

```
procname PROC[NEAR/ FAR]

        ...
        ...
        ...

        RET

procname ENDP
```

Program statements of the procedure

Last statement of the procedure

User defined name of the procedure

Assemble Directives

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DW

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ORG
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NEAR

SHORT

MACRO
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Examples:

ADD64 PROC NEAR … … … RET ADD64 ENDP	The subroutine/ procedure named ADD64 is declared as NEAR and so the assembler will code the CALL and RET instructions involved in this procedure as near call and return
CONVERT PROC FAR … … … RET CONVERT ENDP	The subroutine/ procedure named CONVERT is declared as FAR and so the assembler will code the CALL and RET instructions involved in this procedure as far call and return

Assemble Directives

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SHORT

MACRO
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- **Reserves one memory location for 8-bit signed displacement in jump instructions**

Example:

JMP SHORT AHEAD	The directive will reserve one memory location for 8-bit displacement named AHEAD

Assemble Directives

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ASSUME

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EVEN
EQU

PROC
ENDP
FAR
NEAR

SHORT

MACRO
ENDM

- **MACRO** Indicate the beginning of a macro
- **ENDM** End of a macro
- General form:

```
macroname MACRO[Arg1, Arg2 ...]
        ...
        ...
        ...
macroname ENDM
```

Program statements in the macro

User defined name of the macro