Lab: 07

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3.7 Lab Work: Symbolic Constants and the EQU and = Directives

Symbolic Constants Defined in the Program:

```
TITLE Symbolic Constants (File: Constants.asm)
; Demonstration of EQU and = directives

.686
.MODEL flat, stdcall
.STACK

INCLUDE Irvine32.inc

.data
Rows        EQU   3
Cols        EQU   3
Elements    EQU   Rows * Cols
CR          EQU   10
LF          EQU   13
PromptText EQU   <"Press any key to continue ...", CR, LF, 0>

matrix      WORD  Elements DUP(0)
prompt      BYTE  PromptText

COUNT = 10h
COUNT = 100h
COUNT = 1000h
COUNT = SIZEOF matrix

.code
main PROC
    exit
main ENDP
END main
```

Symbolic Constants and Their Values:

Symbolic Constant	Value (hexadecimal)
Rows	3
Cols	3
Elements	9
CR	0A
LF	0D

Symbolic Constant	Value (hexadecimal)
PromptText	<"Press any key to continue ...", CR, LF, 0>
COUNT	10h
COUNT	100h
COUNT	1000h
COUNT	12 (Size of matrix, which is 9 elements * 2 bytes each)

Total Number of Bytes Allocated for Data:

- `matrix`: 9 WORDs * 2 bytes/WORD = 18 bytes
- `prompt`: "Press any key to continue ..." + CR (1 byte) + LF (1 byte) + null terminator (1 byte) = 30 bytes

Total = 18 bytes (matrix) + 30 bytes (prompt) = 48 bytes

3.8 Lab Work: Viewing Symbolic Constants in the Listing (.lst) File

Command to Generate .lst File:

```
sh
ml –c –Zi –Fl –coff Constants.asm
```

Open `Constants.lst` to verify the values of the symbolic constants.

Review Questions

1. **Data Declaration for an 8-bit Unsigned Integer Variable:**

- `BYTE myByte`

- **Data Declaration for a 32-bit Signed Integer Variable:**

- `SDWORD mySignedDword`

- **Declare a 16-bit Signed Integer and Initialize It with the Smallest Negative 16-bit Number:**

- `SWORD mySignedWord = -32768`

- **Declare an Unsigned 16-bit Integer Variable `wArray` That Uses Three Initializers:**

- `WORD wArray[3] = {1, 2, 3}`

- **Declare an Uninitialized Array of 50 Unsigned 32-bit Integers Named `dArray`:**

- `DWORD dArray[50]`

- **Declare a String Variable Containing the Word "TEST" Repeated 100 Times:**

- **`BYTE myString[401] =`**
`"TESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTT`
`ESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTES`
`TTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTT`
`ESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTES`
`TTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTTESTT`
`ESTTESTTESTTESTTESTTESTTESTTESTTEST"``, 0`

- **Order of Individual Bytes in Memory for `dvar DWORD 5012AB6Fh`:**

  - `dvar` DWORD 5012AB6Fh in little-endian format: 6F AB 12 50

- **Array Declaration and Symbolic Constants:**

```
assembly
myArray DWORD 30 DUP(5 DUP(0))
```

  - **Define a Symbolic Constant `Elements` That Calculates the Number of Elements in `myArray`:**

    ```
    assembly
- Elements EQU 30 * 5
    ```

- **Define a Symbolic Constant `Size` That Calculates the Number of Bytes in `myArray`:**

8. `Size EQU Elements * 4`