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Case conversion

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Aim: To write assembly program to do Case conversion.

Procedure:

1. Install all the required file for executing MASM programs.(Masm, edit, link, debug etc..).
2. Write the assembly program in any editor before mounting the folder to the MASM.
3. Mount the folder that contains the assembly program with any name such as "d".
 - mount d e:\masm
4. Create the object file of the assembly program using masm.
 - masm 16BITADD.asm
5. Use the link to create the executable file of the object file created from the above step.
 - Link 16BITADD.obj
6. Run the executable file using debug.
 - debug 16BITADD.exe
7. By un-assembling the program you can check the code segment of the program
 - u 076b:0100
8. To check the data memory segment, you can use the memory option to view the data stored.
 - d 076a:0000
9. To enter your own values, you can use the enter option which will prompt for new values.
 - e 076a:0000
10. To execute the program, you can use go option
 - G
11. After successful execution and termination of the program, you can check the result by checking the data memory segment
 - d 076a:0000
12. The result can be viewed in the respective address mentioned in the program.

8) Case conversion

Algorithm:

- a) Assign data to ax register
- b) Load contents of memory location ax in register ds
- c) Load contents of memory location count in register cx
- d) Loop L1 starts here
- e) Load contents of 01 in register ah (01h reads keyboard with echo)
- f) Stores the input character in al register
- g) Compare the character in al register with 60
- h) Jump to upper or else continue (it detects lower case character which are greater than 60 and sends to get converted into upper case)
- i) Add 20 to al (converts upper character to lower character)
- j) Jumps to skip
- k) L1 loop ends here
- l) Upper loop starts here
- m) Subtract 20 from al (converts lower to upper characters)
- n) End of upper loop
- o) Skip loop starts here
- p) Load contents of 02 in register ah (02h Write to Standard Output Device)
- q) Load contents of memory location al in register dl
- r) Display the character
- s) Repeat L1 loop until it satisfies the count.
- t) Load content 4ch termination code to ah register
- u) Stops execution of the program

Program:

Program	Comments
ASSUME CS:CODE,DS:data	Initializing the code, data and extra segments to assembler
data SEGMENT	Data segment
COUNT equ 10h	COUNT is declared and initialized to 10h
data ends	
CODE SEGMENT	Code segment
START:MOV AX,data	Transferring the data from memory location data to ax
MOV DS,AX	Transferring the data from memory location ax to ds
MOV CX,COUNT	Transferring the data from memory location count to cx
MOV AH,1	Transferring the data 01 in register ah (01h reads keyboard with echo)
INT 21H	Stores the input character in al register

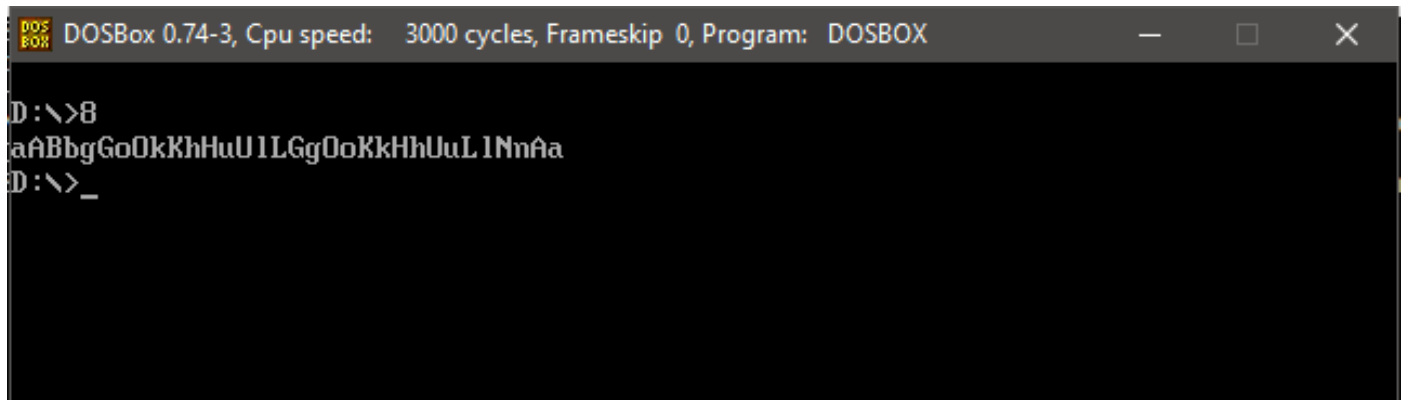
CMP AL,60H	Compare the character in al register with 60
JNC UPPER	Jump to upper or else continue (it detects lower case character which are greater than 60 and sends to get converted into upper case)
ADD AL,20H	Al=>al+20
JMP SKIP	Jump to skip
UPPER: SUB AL,20H	Al=>al-20
SKIP: MOV AH,2	Transferring the data 02 in register ah (02h Write to Standard Output Device)
MOV DL,AL	Transferring the data from memory location al to dl
INT 21H	Outputs the character
LOOP L1	Jump again to l1
MOV Ah,4CH	Transferring the termination code 4ch to ah
INT 21H	Termination
CODE ENDS	Code ends
end start	

Unassembled code:

```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
D:\>debug 8.EXE
-u
076A:0000 B86A07      MOV     AX,076A
076A:0003 8ED8          MOV     DS,AX
076A:0005 B91000      MOV     CX,0010
076A:0008 B401          MOV     AH,01
076A:000A CD21      INT     21
076A:000C 3C60          CMP     AL,60
076A:000E 7304          JNB     0014
076A:0010 0420          ADD     AL,20
076A:0012 EB02          JMP     0016
076A:0014 2C20          SUB     AL,20
076A:0016 B402          MOV     AH,02
076A:0018 BAD0          MOV     DL,AL
076A:001A CD21      INT     21
076A:001C E2EA          LOOP   0008
076A:001E B44C          MOV     AH,4C
  
```

Sample Input and output:

A screenshot of a DOSBox window. The title bar reads "DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX". The command prompt shows the command "D:\>B" followed by the output "aABbgGoOkKhHuU1LGgOoKkHhUuL1NnAa". The prompt then shows "D:\>_" indicating the program has finished execution.

```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX
D:\>B
aABbgGoOkKhHuU1LGgOoKkHhUuL1NnAa
D:\>_
```

Result:

Thus, the assembly program for case conversion is written and executed.