Exp No: 8 **Date:** 19/10/2020

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CASE CONVERSION

Aim:

To program and execute case conversions using 8086 microprocessor using DOSBOX.

Algorithm:

- Count carries the value od number of characters.
- In a loop input characters. Compare input value with 60h.
- If AL>60h, move to upper.
- Else add 20h.then move to skip.
- In Upper subtract 20h from AL.
- In skip output character using mov functions.
- End the program.

PROGRAM	COMMENT		
; Program to convert case			
ASSUME CS: CODE, DS: data			
data SEGMENT	DEFINE DATA SEGMENT		
COUNT equ 10h			

data ends

CODE SEGMENT

START: MOV AX, data

MOV DS, AX

MOV CX, COUNT

L1:MOV AH,1,

INT 21H

LI 1

INPUT CHARACTER

IF AL IS greater THAN 60

LOOP COUNTER

CMP AL,60H

JNC UPPER

ADD AL,20H

JMP SKIP CONVERT TO UPPER CASE

UPPER: SUB AL,20H CHARACTER OUTPUT FUNCTION

SKIP: MOV AH, 2 CHARACTER MUST BE IN DL

MOV DL, AL DISPLAY THE CHARACTER

INT 21H REPEAT LOOP

LOOP L1

MOV AH,4CH TERMINATE THE PROGRAM

INT 21H

CODE ENDS

end start

Unassembled Code:

-u 976A:0000 B86A07 MDU AX,076A 976A:0003 8ED8 MDU DS,AX 976A:0005 B91000 MDU CX,0010 976A:0008 B401 MDU AH,01 976A:000A CD21 INT 21 976A:000C 3C60 CMP AL,60 976A:000E 7304 JNB 0014 976A:0010 0420 ADD AL,20 976A:0012 EB02 JMP 0016 976A:0014 2C20 SUB AL,20 976A:0016 B402 MDU AH,02 976A:0018 BAD0 MDU DL,AL 976A:001A CD21 INT 21 976A:001C EZEA LOOP 0008 976A:001E B44C MDU AH,4C				
976A:0003 8ED8 MOV DS,AX 976A:0005 B91000 MOV CX,0010 976A:0008 B401 MOV AH,01 976A:000A CD21 INT 21 976A:000C 3C60 CMP AL,60 976A:000E 7304 JNB 0014 976A:0010 0420 ADD AL,20 976A:0012 EB02 JMP 0016 976A:0014 2C20 SUB AL,20 976A:0016 B402 MOV AH,02 976A:0018 8AD0 MOV DL,AL 976A:001A CD21 INT 21 976A:001C E2EA LOOP 0008	–u			
976A:0005 B91000 MOU CX,0010 976A:0008 B401 MOU AH,01 976A:000A CD21 INT Z1 976A:000C 3C60 CMP AL,60 976A:000E 7304 JNB 0014 976A:0010 0420 ADD AL,20 976A:0012 EB02 JMP 0016 976A:0014 2C20 SUB AL,20 976A:0016 B402 MOU AH,02 976A:0018 8AD0 MOU DL,AL 976A:001A CD21 INT Z1 976A:001C E2EA LOOP 0008	076A:0000	B86A07	MOV	AX,076A
976A:0008 B401 MOU AH,01 976A:000A CD21 INT 21 976A:000C 3C60 CMP AL,60 976A:000E 7304 JNB 0014 976A:0010 0420 ADD AL,20 976A:0012 EB02 JMP 0016 976A:0014 2C20 SUB AL,20 976A:0016 B402 MOU AH,02 976A:0018 BAD0 MOU DL,AL 976A:001A CD21 INT 21 976A:001C E2EA LOOP 0008	076A:0003	8ED8	MOV	DS,AX
976A:000A CD21 INT 21 976A:000C 3C60 CMP AL,60 976A:000E 7304 JNB 0014 976A:0010 0420 ADD AL,20 976A:0012 EB02 JMP 0016 976A:0014 2C20 SUB AL,20 976A:0016 B402 MOU AH,02 976A:0018 BAD0 MOU DL,AL 976A:001A CD21 INT 21 976A:001C EZEA LOOP 0008	076A:0005	B91000	MOV	CX,0010
976A:000C 3C60 CMP AL,60 976A:000E 7304 JNB 0014 976A:0010 0420 ADD AL,20 976A:0012 EB02 JMP 0016 976A:0014 2C20 SUB AL,20 976A:0016 B402 MOU AH,02 976A:0018 BAD0 MOU DL,AL 976A:001A CD21 INT 21 976A:001C EZEA LOOP 0008	076A:0008	B401	MOV	AH,01
976A:000E 7304 JNB 0014 976A:0010 0420 ADD AL,20 976A:0012 EB02 JMP 0016 976A:0014 2C20 SUB AL,20 976A:0016 B402 MOV AH,02 976A:0018 BAD0 MOV DL,AL 976A:001A CD21 INT 21 976A:001C E2EA LOOP 0008	076A:000A	CD21	INT	21
076A:0010 0420 ADD AL,20 076A:0012 EB02 JMP 0016 076A:0014 2C20 SUB AL,20 076A:0016 B402 MDV AH,02 076A:0018 8AD0 MDV DL,AL 076A:001A CD21 INT 21 076A:001C E2EA LOOP 0008	076A:000C	3060	CMP	AL,60
076A:0012 EB02 JMP 0016 076A:0014 2C20 SUB AL,20 076A:0016 B402 MDV AH,02 076A:0018 8AD0 MDV DL,AL 076A:001A CD21 INT 21 076A:001C E2EA LOOP 0008	076A:000E	7304	JNB	0014
076A:0014 2C20 SUB AL,20 076A:0016 B402 MOV AH,02 076A:0018 8AD0 MOV DL,AL 076A:001A CD21 INT 21 076A:001C E2EA LOOP 0008	076A:0010	0420	ADD	AL,20
976A:0016 B402 MOV AH,02 976A:0018 BAD0 MOV DL,AL 976A:001A CD21 INT 21 976A:001C E2EA LOOP 0008	076A:0012	EB02	JMP	0016
976A:0018 8ADO MOV DL,AL 976A:001A CD21 INT 21 976A:001C E2EA LOOP 0008	076A:0014	2020	SUB	AL,20
976A:001A CD21 INT 21 976A:001C EZEA LOOP 0008	076A:0016	B402	MOV	AH,02
976A:001C EZEA LOOP 0008	076A:0018	8ADO	MOV	DL,AL
	076A:001A	CD21	INT	21
976A:001E B44C MOV AH,4C 	076A:001C	EZEA	LOOP	0008
	076A:001E	B44C	MOV	AH,4C

Snapshot of sample input and output:

INPUT:

```
-d 076a:0000
0000 :076A
          B8 6A 07 8E D8 B9 10 00-B4 01 CD 21 3C 60 73 04
          04 20 EB 02 2C 20 B4 02-8A D0 CD 21 E2
076A:0010
                                                   EA B4 4C
976A:0020
          CD 21 80 BF B8 2C 00 75-05 88 46 F8 EB 1E 8A 5E
976A:0030
          F9 B7 00 D1 E3 8B 87 AE-16 3B 46 FE 77
          FE 8A 46 F9 88 46 F8 FE-46 F9 EB C9 8A 5E F8 B7
976A:0040
976A:0050
          00 8A 87 48 2F DO D8 73-17 E8 B6 00 8A 5E F8 B7
                                                               ...H∕..s.S..P.s.
..,:F.t~.F....F.
76A:0060
          00 8A 87 48 2F D0 D8 73-07 53 B0 01 50 E8 73 01
          AO B6 2C 3A 46 F8 74 7E-C7 46 FA 00 00 8A 46 F8
76A:0070
```

OUTPUT:

```
aAAabBBbcCCcdDDdeEEefFFfgGGghHHh
Program terminated normally
-d 076a:0000
976A:0000 B8 6A 07 8E D8 B9 10 00-B4 01 CD 21 3C 60 73 04
          04 20 EB 02 2C 20 B4 02-8A D0 CD 21 E2
076A:0010
                                                  EA B4 4C
          CD 21 80 BF B8 2C 00 75-05 88 46 F8 EB 1E 8A 5E
076A:0020
          F9 B7 00 D1 E3 8B 87 AE-16 3B 46 FE 77 09 89 46
076A:0030
076A:0040  FE 8A 46 F9 88 46 F8 FE-46 F9 EB C9 8A 5E F8 B7
976a:0050   00 8a 87 48 2f do d8 73-17 E8 B6 00 8a 5E f8 B7
076A:0060 00 8A 87 48 2F DO D8 73-07 53 BO 01 50 E8 73 01
                                                                .H∕..s.S..P
076A:0070 A0 B6 2C 3A 46 F8 74 7E-C7 46 FA 00 00 8A 46 F8
```

Result:

The assembly level programs were written to perform the above specified system operations and the output was verified.