

;ASSIGNMENT NO: 12
;ROLL NO.: SECOA115
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;Write a TSR program in 8086 ALP to implement Real Time Clock (RTC).

CODE SEGMENT ;DECLARE ALL SEGMENT IN CS
ASSUME CS:CODE,DS:CODE,ES:CODE,SS:CODE

ORG 100H ;PSP ADDRESS IN MEMORY
BEGIN:
JMP INIT

OFF1 DW ?
SEG1 DW ?

HR DB ?
MIN DB ?
SEC DB ?

TEST1:

PUSH AX
PUSH BX
PUSH CX
PUSH DX
PUSH SI
PUSH DI
PUSH ES
PUSH SS

MOV AH,02 ;TAKING CURRENT TIME IN THE FORM OF
;[CH=HOURS, CL=MINUTES, DH=SECONDS]

INT 1AH

MOV HR,CH
MOV MIN,CL
MOV SEC,DH

MOV AX,0B800H ;VIDEO RAM ADDRESS(SCREEN ADDRESS)
;[ES=SEGMENT ADDRESS BX=OFFSET ADDRESS]

MOV ES,AX
MOV BX,1992 ;[POSITION ON SCREEN TO DISPLAY CURRENT TIME
;ATTRIBUTE]

;DISPLAY [HR:MIN:SEC]

MOV AL,HR

```
CALL DISP8                ;;DISPLAY HOURS
CALL COLON
```

```
MOV AL,MIN
CALL DISP8                ;;DISPLAY MIN
CALL COLON
```

```
MOV AL,SEC                ;;DISPLAY SEC
CALL DISP8
```

```
POP SS
POP ES
POP DI
POP SI
POP DX
POP CX
POP BX
POP AX
```

```
JMP DWORD PTR CS:OFF1
```

```
;-----
```

```
DISP8 PROC
```

```
MOV CH,02H
MOV CL,04H
```

```
BACK:
```

```
ROL AL,CL
MOV DL,AL
AND DL,0FH
ADD DL,30H
MOV BYTE PTR ES:[BX],DL
```

```
INC BX
MOV BYTE PTR ES:[BX],11
INC BX
```

```
DEC CH
JNZ BACK
```

```
RET
```

```
DISP8 ENDP
```

```
;-----
```

```
COLON PROC
```

```
MOV BYTE PTR ES:[BX],':'
INC BX
MOV BYTE PTR ES:[BX],13
INC BX
RET
```

```
COLON ENDP
```

```
;-----
```

INIT:

PUSH CS
POP DS

MOV AX,0002 ;CLEAR WHOLE SCREEN
INT 10H

CLI

MOV AH,35H ;RETURN ADDRESS OF 08 INTRUPT FROM IVT
MOV AL,08H
INT 21H

MOV WORD PTR OFF1,BX
MOV WORD PTR SEG1,ES

MOV AH,25H
MOV AL,08H
LEA DX,TEST1
INT 21H

STI

MOV AH,31H ;MEMORY REQUIRE FOR PROGRAM

MOV AL,00 ;(16 BYTE PER PARAGRAPH)

LEA DX,INIT ;;LOAD EFFECTIVE ADDRESS OF INIT PROCEDURE
;INTO DX

INT 21H

MOV AH,4CH ;EXIT
MOV AL,00H
INT 21H
CODE ENDS
END BEGIN

OUTPUT:

PROCEDURE FOR EXECUTION:

```
Z:\>mount c c:\
Mounting c:\ is NOT recommended. Please mount a (sub)directory next time.
Drive C is mounted as local directory c:\
```

```
Z:\>c:
```

```
C:\>cd masm
```

```
C:\MASM>edit time1.asm
```

```
C:\MASM>masm time1.asm
```

```
Microsoft (R) Macro Assembler Version 5.00
```

```
Copyright (C) Microsoft Corp 1981-1985, 1987. All rights reserved.
```

```
Object filename [time1.OBJ]:
```

```
Source listing [NUL.LST]:
```

```
Cross-reference [NUL.CRF]:
```

```
51566 + 464978 Bytes symbol space free
```

```
0 Warning Errors
```

```
0 Severe Errors
```

```
C:\MASM>_
```

```
C:\MASM>masm time1.asm
```

```
Microsoft (R) Macro Assembler Version 5.00
```

```
Copyright (C) Microsoft Corp 1981-1985, 1987. All rights reserved.
```

```
Object filename [time1.OBJ]:
```

```
Source listing [NUL.LST]:
```

```
Cross-reference [NUL.CRF]:
```

```
51566 + 464978 Bytes symbol space free
```

```
0 Warning Errors
```

```
0 Severe Errors
```

```
C:\MASM>link time1.obj
```

```
Microsoft (R) Overlay Linker Version 3.60
```

```
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.
```

```
Run File [TIME1.EXE]:
```

```
List File [NUL.MAP]:
```

```
Libraries [.LIB]:
```

```
LINK : warning L4021: no stack segment
```

```
C:\MASM>_
```

```
C:\MASM>masm time1.asm
Microsoft (R) Macro Assembler Version 5.00
Copyright (C) Microsoft Corp 1981-1985, 1987. All rights reserved.
```

```
Object filename [time1.OBJ]:
Source listing [NUL.LST]:
Cross-reference [NUL.CRF]:
```

```
51566 + 464978 Bytes symbol space free
```

```
0 Warning Errors
0 Severe Errors
```

```
C:\MASM>link time1.obj
```

```
Microsoft (R) Overlay Linker Version 3.60
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.
```

```
Run File [TIME1.EXE]:
List File [NUL.MAP]:
Libraries [LIB]:
LINK : warning L4021: no stack segment
```

```
C:\MASM>time1.exe
```

```
C:\MASM>_
```

```
09:51:27
```

STEPS FOR DEBUGGING:

```
0 Warning Errors
0 Severe Errors

C:\MASM>debug time1.exe
-t
AX=FFFF BX=0000 CX=01A7 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=0769 CS=076A IP=0176  NU UP EI PL NZ NA PO NC
076A:0176 0E          PUSH    CS
-t
AX=FFFF BX=0000 CX=01A7 DX=0000 SP=FFFE BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=0769 CS=076A IP=0177  NU UP EI PL NZ NA PO NC
076A:0177 1F          POP     DS
-t
AX=FFFF BX=0000 CX=01A7 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=076A ES=075A SS=0769 CS=076A IP=0178  NU UP EI PL NZ NA PO NC
076A:0178 B80200      MOV     AX,0002
-t
AX=0002 BX=0000 CX=01A7 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=076A ES=075A SS=0769 CS=076A IP=017B  NU UP EI PL NZ NA PO NC
076A:017B CD10      INT     10
-
```