

COS 335
DISPTIME - Assembler Program to Display the Time

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; DISPTIME.A86 -- Version 1
; Obtain system time from DOS and display it on the console

JMP START
    hstr DB 2 DUP ?,': ' ; string to store hours,
    mstr DB 2 DUP ?,': ' ; minutes
    sstr DB 2 DUP ?,'. ' ; seconds
    dstr DB 2 DUP ?, '$' ; and hundredths of seconds

    hrs DB ? ; binary storage for results
    mins DB ? ; of DOS Get Time function
    secs DB ?
    hund DB ?

start:
mov ah,2ch ; get system time
int 21h
mov hrs,ch ; store the results
mov mins,c1
mov secs,dh
mov hund,d1

call timestr ; convert time to a string
mov dx,offset hstr ; display on the console
mov ah,09h
int 21h
mov ax,4c00h ; DOS Terminate program
int 21h

timestr:
    sub ah,ah ; zero out ah for future calls
    mov bx, OFFSET hstr+1 ; setup for bin2dec, bx points to end of buffer
    mov cx,2 ; number of digits
    mov al, hrs ; number to convert
    call bin2dec ; convert it

    mov bx, OFFSET mstr+1 ; convert minutes
    mov cx,2
    mov al,mins
    call bin2dec

    mov bx, OFFSET sstr+1 ; convert seconds
    mov cx,2
    mov al,secs
    call bin2dec

    mov bx, OFFSET dstr+1 ; convert hundredths
    mov cx,2
    mov al,hund
    call bin2dec
    ret
;-----
; bin2dec converts a 16-bit unsigned integer into ASCII decimal
; Input Parameters:
;     AX: number to convert
;     BX: pointer to least significant digit of output buffer
;     CX: number of bytes desired in output buffer (1-5)
; Returns:
;     Buffer filled with digits
; Destroys contents of AX, BX, CX, DX and SI
    Bin2dec:
        mov si, 10 ; divisor for DIV instruction
L1:
    sub dx, dx ; since a 16 bit divides DX:AX by the divisor
                ; we need to zero-extend AX into DX:AX
    div si ; divide by 10; remainder in DX and quotient
            ; is in AX. Remainder is next least sig. digit
    add dl, '0' ; convert binary to ASCII (same as add dl, 30h)
    mov [bx], dl ; store in output buffer
    dec bx ; point to next char in output
    loop L1 ; repeat for CX chars
    ret

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; DISPTIME.A86 -- Version 2
; Obtain system time from DOS and display it on the console

jmp start

    msg DB 'The time is '
    hstr DB 2 DUP ?,': ' ; string to store hours,
        DB 2 DUP ?,': ' ; minutes
        DB 2 DUP ?,'. ' ; seconds
        DB 2 DUP ?, '$' ; and hundredths of seconds

    time DB 4 dup ? ; binary storage for results
        ; of DOS Get Time function

start:
mov ah,2CH ; DOS Get System Time function code
int 21H
mov bx, offset time
mov [bx],ch ; store the results
mov [bx+1],cl
mov [bx+2],dh
mov [bx+3],dl

call timestr ; convert time to a string
mov dx,OFFSET msg ; display on the console
mov ah,09H ; function code for Display String
int 21H

mov ax,4C00H ; DOS terminate program
int 21H

timestr:
    mov cx,4 ; we want to convert 4 numbers
    mov dl,10 ; used to divide by 10
    mov bx, OFFSET hstr ; bx points to string buffer for ASCII chars
    mov si, OFFSET time ; and si points to number to convert
L1:
    mov al,[si] ; load number to convert
    sub ah,ah ; zero out AH because we're dividing a 2 digit number
    div dl ; divide AX by 10. Quotient in AL, remainder in AH
    or ax,3030H ; convert AX to ASCII digits
    mov [bx],ax ; store result. Bytes are swapped to correct order
    add bx,3 ; point to next string
    inc si ; and next number
    loop L1 ; and do it
    ret

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