COS 335
DISPTIME - Assembler Program to Display the Time

; 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,cl
  mov secs,dh
  mov hund,dl
  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
  div si              ; we need to zero-extend AX into DX:AX
  div si              ; divide by 10; remainder in DX and quotient
  add dl, '0'         ; is in AX. Remainder is next least sig. digit
  add [bx], dx        ; convert binary to ASCII (same as add dl, 30h)
mov [bx], dl
  dec bx              ; store in output buffer
  loop L1             ; point to next char in output
ret
; DISPTIME.A86 -- Version 2
; Obtain system time from DOS and display it on the console

jmp start

  msg  DB 'The time is ', 0
  hstr DB 2 DUP ?,':', 0  ; string to store hours,
  DB 2 DUP ?,':', 0       ; minutes
  DB 2 DUP ?,',', 0       ; seconds
  DB 2 DUP ?,'$', 0      ; and hundredths of seconds
  time DB 4 dup ?, 0      ; 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, remander 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