

Microprocessor

Just Note

Program to sum 5 bytes of data stored in Data1 as 01 02 03 04 05 using debug

```
141A:0100 B90500      MOV    CX,0005
141A:0103 B000        MOV    AL,00
141A:0105 BB0002      MOV    BX,0200
141A:0108 0207       ADD    AL,[BX]
141A:010A 43         INC    BX
141A:010B E2FB       LOOP   0108
141A:010D B44C       MOV    AH,4C
141A:010F CD21       INT     21
-e 0200 01 02 03 04 05
-d 0200 0204
141A:0200 01 02 03 04 05      ....
-t
AX=0000 BX=FFFF CX=0005 DX=0000 SP=FFFE BP=0000 SI=0000 DI=0000
DS=141A ES=141A SS=141A CS=141A IP=0103  NV UP EI PL NZ NA PO NC
141A:0103 B000      MOV    AL,00
-t
AX=0000 BX=FFFF CX=0005 DX=0000 SP=FFFE BP=0000 SI=0000 DI=0000
DS=141A ES=141A SS=141A CS=141A IP=0105  NV UP EI PL NZ NA PO NC
141A:0105 BB0002    MOV    BX,0200
-t
AX=0000 BX=0200 CX=0005 DX=0000 SP=FFFE BP=0000 SI=0000 DI=0000
DS=141A ES=141A SS=141A CS=141A IP=0108  NV UP EI PL NZ NA PO NC
141A:0108 0207     ADD    AL,[BX]          DS:0200=01
-t
AX=0001 BX=0200 CX=0005 DX=0000 SP=FFFE BP=0000 SI=0000 DI=0000
DS=141A ES=141A SS=141A CS=141A IP=010A  NV UP EI PL NZ NA PO NC
141A:010A 43      INC    BX
-t
AX=0001 BX=0201 CX=0005 DX=0000 SP=FFFE BP=0000 SI=0000 DI=0000
DS=141A ES=141A SS=141A CS=141A IP=010B  NV UP EI PL NZ NA PO NC
141A:010B E2FB    LOOP   0108
-t
AX=0001 BX=0201 CX=0004 DX=0000 SP=FFFE BP=0000 SI=0000 DI=0000
DS=141A ES=141A SS=141A CS=141A IP=0108  NV UP EI PL NZ NA PO NC
141A:0108 0207     ADD    AL,[BX]          DS:0201=02
```

```
-t
AX=0003 BX=0201 CX=0004 DX=0000 SP=FFFE BP=0000 SI=0000 DI=0000
DS=141A ES=141A SS=141A CS=141A IP=010A NV UP EI PL NZ NA PE NC
141A:010A 43      INC  BX
```

```
-t
AX=0003 BX=0202 CX=0004 DX=0000 SP=FFFE BP=0000 SI=0000 DI=0000
DS=141A ES=141A SS=141A CS=141A IP=010B NV UP EI PL NZ NA PO NC
141A:010B E2FB    LOOP 0108
```

```
-t
AX=0003 BX=0202 CX=0003 DX=0000 SP=FFFE BP=0000 SI=0000 DI=0000
DS=141A ES=141A SS=141A CS=141A IP=0108 NV UP EI PL NZ NA PO NC
141A:0108 0207    ADD  AL,[BX]      DS:0202=03
```

Continue tracing to get

```
-t
AX=000F BX=0205 CX=0000 DX=0000 SP=FFFE BP=0000 SI=0000 DI=0000
DS=141A ES=141A SS=141A CS=141A IP=010D NV UP EI PL NZ NA PE NC
141A:010D B44C    MOV  AH,4C
```

Program to sum 5 bytes of data stored in Data1 as 01 02 03 04 05 using tasm

```
.model small
.stack 64
.data
data1 db 1H,2H,3H,4H,5H
.code
main proc far
    mov ax,@data
    mov ds,ax
    mov cx,05H
    mov al,0H
    mov bx,offset data1
again: add al,[bx]
    inc bx
    dec cx
    jnz again
    mov ah,4cH
    int 21H
main endp
end main
```

D:\>**cd tasmeditor\tasm**

D:\tasmeditor\TASM>**tasm d:\summe.asm**

Turbo Assembler Version 3.2 Copyright (c) 1988, 1992 Borland International

Assembling file: d:\summe.asm to summe.OBJ

Error messages: None

Warning messages: None

Passes: 1

Remaining memory: 421k

D:\TASMED~1\TASM>**tlink summe.obj**

Turbo Link Version 5.1 Copyright (c) 1992 Borland International

Open the exe file "summe.exe" in debug

D:\>**debug summe.exe**

-l

-r

AX=0000 BX=0000 CX=0025 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000

DS=141A ES=141A SS=142D CS=142A IP=0000 NV UP EI PL NZ NA PO NC

142A:0000 B82C14 MOV AX,142C

-u cs:0000 0025

142A:0000 B82C14 MOV AX,142C

142A:0003 8ED8 MOV DS,AX

142A:0005 B90500 MOV CX,0005

142A:0008 B000 MOV AL,00

142A:000A BB0000 MOV BX,0000

142A:000D 0207 ADD AL,[BX]

142A:000F 43 INC BX

142A:0010 49 DEC CX

142A:0011 75FA JNZ 000D

142A:0013 B44C MOV AH,4C

142A:0015 CD21 INT 21

142A:0017 0000 ADD [BX+SI],AL

142A:0019 0000 ADD [BX+SI],AL

142A:001B 0000 ADD [BX+SI],AL

142A:001D 0000 ADD [BX+SI],AL

142A:001F 0001 ADD [BX+DI],AL

142A:0021 0203 **ADD AL,[BP+DI]**
142A:0023 0405 **ADD AL,05**
142A:0025 0105 **ADD [DI],AX**

-t

AX=142C BX=0000 CX=0025 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=141A ES=141A SS=142D CS=142A IP=0003 NV UP EI PL NZ NA PO NC
142A:0003 8ED8 **MOV DS,AX**

-t

AX=142C BX=0000 CX=0025 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0005 NV UP EI PL NZ NA PO NC
142A:0005 B90500 **MOV CX,0005**

-t

AX=142C BX=0000 CX=0005 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0008 NV UP EI PL NZ NA PO NC
142A:0008 B000 **MOV AL,00**

-t

AX=1400 BX=0000 CX=0005 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=000A NV UP EI PL NZ NA PO NC
142A:000A BB0000 **MOV BX,0000**

-t

AX=1400 BX=0000 CX=0005 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=000D NV UP EI PL NZ NA PO NC
142A:000D 0207 **ADD AL,[BX]** **DS:0000=01**

-t

AX=1401 BX=0000 CX=0005 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=000F NV UP EI PL NZ NA PO NC
142A:000F 43 **INC BX**

-t

AX=1401 BX=0001 CX=0005 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0010 NV UP EI PL NZ NA PO NC
142A:0010 49 **DEC CX**

-t

AX=1401 BX=0001 CX=0004 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0011 NV UP EI PL NZ NA PO NC
142A:0011 75FA **JNZ 000D**

-t

AX=1401 BX=0001 CX=0004 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=000D NV UP EI PL NZ NA PO NC
142A:000D 0207 **ADD AL,[BX]** **DS:0001=02**

-t

AX=1403 BX=0001 CX=0004 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=000F NV UP EI PL NZ NA PE NC
142A:000F 43 **INC BX**

-t

AX=1403 BX=0002 CX=0004 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0010 NV UP EI PL NZ NA PO NC
142A:0010 49 **DEC CX**

-t

AX=1403 BX=0002 CX=0003 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0011 NV UP EI PL NZ NA PE NC
142A:0011 75FA **JNZ 000D**

-t

AX=1403 BX=0002 CX=0003 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=000D NV UP EI PL NZ NA PE NC
142A:000D 0207 **ADD AL,[BX]** **DS:0002=03**

-t

AX=1406 BX=0002 CX=0003 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=000F NV UP EI PL NZ NA PE NC
142A:000F 43 **INC BX**

-t

AX=1406 BX=0003 CX=0003 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0010 NV UP EI PL NZ NA PE NC
142A:0010 49 **DEC CX**

-t

AX=1406 BX=0003 CX=0002 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0011 NV UP EI PL NZ NA PO NC
142A:0011 75FA **JNZ 000D**

-t

AX=1406 BX=0003 CX=0002 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=000D NV UP EI PL NZ NA PO NC
142A:000D 0207 **ADD AL,[BX]** **DS:0003=04**

-t

AX=140A BX=0003 CX=0002 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=000F NV UP EI PL NZ NA PE NC
142A:000F 43 **INC BX**

-t

AX=140A BX=0004 CX=0002 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0010 NV UP EI PL NZ NA PO NC
142A:0010 49 **DEC CX**

-t

AX=140A BX=0004 CX=0001 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0011 NV UP EI PL NZ NA PO NC
142A:0011 75FA **JNZ 000D**

-t

AX=140A BX=0004 CX=0001 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=000D NV UP EI PL NZ NA PO NC
142A:000D 0207 **ADD AL,[BX]** **DS:0004=05**

-t

AX=140F BX=0004 CX=0001 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=000F NV UP EI PL NZ NA PE NC
142A:000F 43 **INC BX**

-t

AX=140F BX=0005 CX=0001 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0010 NV UP EI PL NZ NA PE NC
142A:0010 49 **DEC CX**

-t

AX=140F BX=0005 CX=0000 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0011 NV UP EI PL ZR NA PE NC
142A:0011 75FA **JNZ 000D**

-t

AX=140F BX=0005 CX=0000 DX=0000 SP=0040 BP=0000 SI=0000 DI=0000
DS=142C ES=141A SS=142D CS=142A IP=0013 NV UP EI PL ZR NA PE NC
142A:0013 B44C **MOV AH,4C**