

# 微机原理大作业

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## 一、题目选择

### 1.无符号二进制数运算

已知有 20 个 8 位无符号二进制数，编一个程序完成对这些数的求和。

### 2. BCD 算术运算

已知两个 6 位 BCD 码，完成减法运算，设被减数为 123456，减数为 789123。

### 3. 代码转换

(1) 编程将组合 BCD 码 9649 转换成二进制数。考虑采用  $((A*10)+B)*10+C)*10+D$  的算法。

(2) 编程将 10H 个两位未组合的 BCD 码转换成 ASCII 码。

### 4.排序

将 80H 个无符号的 8 位二进制数按递增方式排列。同时考虑有符号数、递减等方式。

## 二、程序代码及显示

### 1.代码如下：

```
STACK SEGMENT STACK
    DW 128(?)
STACK ENDS

DATA SEGMENT PARA @DATA@
STR1 DB "ADDING RESULT IS : $"
TRE DB "H", 0DH, 0AH, "$"
NUM DB 17 DUP(56H), 9FH, 23H, 09H
RES DW ?
DATA ENDS

CODE SEGMENT PARA @CODE@
ASSUME SS:STACK, CS:CODE, DS:DATA

MAIN PROC FAR
    MOV AX, DATA
    MOV DS, AX
    LEA DI, NUM
    LEA SI, RES;
    XOR AX, AX
    XOR BX, BX

    ADN: MOV AL, [DI]
```

```

        ADD BX,AX
        INC DI
        CMP DI,SI
        JNZ ADN
        MOV [SI],BX
        LEA DX,STR1
CALL    PRINT

```

```

        MOV AH,4CH
        INT 21H
MAIN ENDP

```

;现在输出为 ASCII 码形式，为使其输出为 16 位形式，在下方编写  
输出为 16 位的程序  
PRINT PROC NEAR

```

        MOV AH,09H
        INT 21H
        MOV CX,4

```

```

LOO:  PUSH CX
        MOV CL,4
        MOV DX,000FH
        ROL BX,CL;
        AND DX,BX
        CALL EXCH
        POP CX
        LOOP LOO

```

```

        LEA DX,TRE
        MOV AH,09H
        INT 21H
        RET
PRINT ENDP

```

```

EXCH  PROC
        CMP DL,10H
        JS NEXT
        MOV DL,030H
        JMP DISP

```

```

NEXT:  CMP DL,0AH
        JS DISP
        ADD DL,7

```

```

DISP:  ADD DL,30H
        MOV AH,02H
        INT 21H
        RET

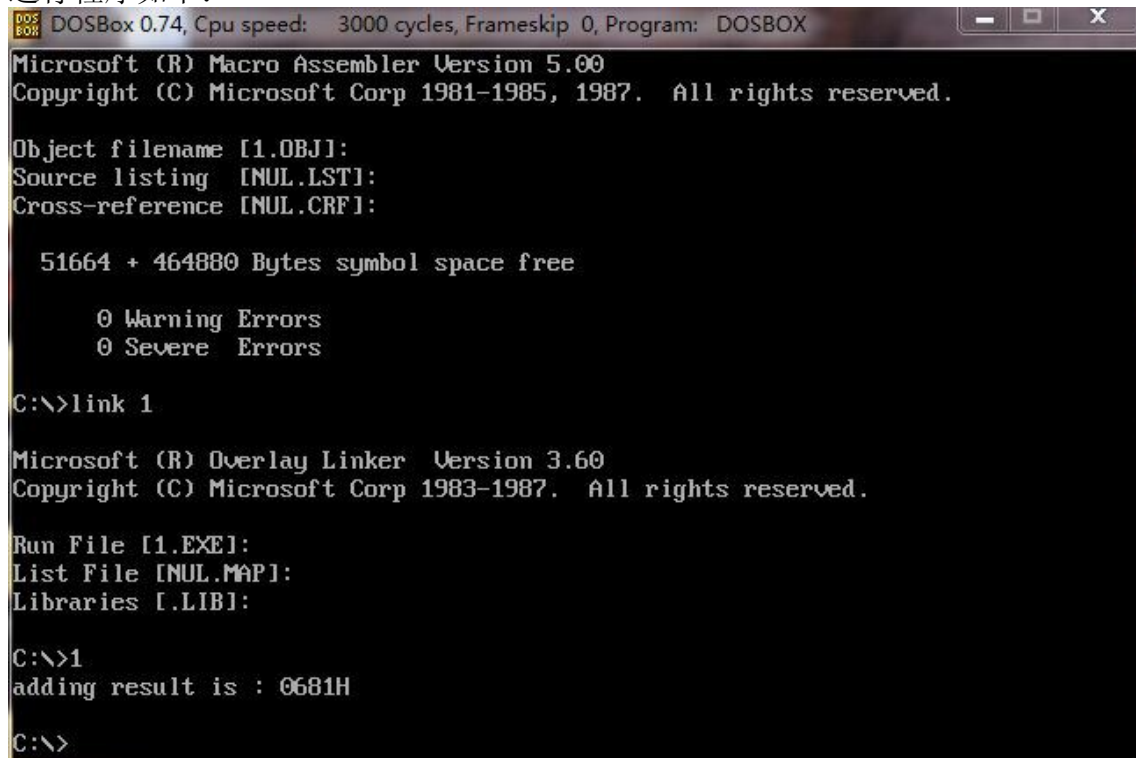
```

EXCH ENDP

CODE ENDS

END MAIN

运行程序如下：



```
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX
Microsoft (R) Macro Assembler Version 5.00
Copyright (C) Microsoft Corp 1981-1985, 1987. All rights reserved.

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

51664 + 464880 Bytes symbol space free

0 Warning Errors
0 Severe Errors

C:\>link 1

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

Run File [I.EXE]:
List File [NUL.MAP]:
Libraries [LIB]:

C:\>1
adding result is : 0681H

C:\>
```

2.代码如下：

```
STACK SEGMENT STACK
    DW 128 DUP(?)
STACK ENDS
DATA SEGMENT PARA ©DATA©
    A DT 123456,789123
    B DT ?
DATA ENDS
CODE SEGMENT PARA ©CODE©
```

```

ASSUME CS:CODE,DS:DATA,SS:STACK
MAIN    PROC FAR
        MOV AX,DATA
        MOV DS,AX
        LEA SI,A
        CLC

SUB1:    MOV CX,3
        MOV AL,[SI]
        MOV BL,[SI+10]
        SBB AL,BL
        DAS
        MOV [SI+20],AL
        INC SI
        LOOP SUB1

        JNC NC
        MOV AH,2
        MOV DL,@@
        INT 21H
        CLC
        MOV CX,3
        LEA SI,A

SUB2:    MOV AL,[SI+10]
        MOV BL,[SI]
        SBB AL,BL
        DAS
        MOV [SI+20],AL
        INC SI
        LOOP SUB2

NC:      MOV CX,3

DISP:    DEC SI
        MOV BL,[SI+20]
        PUSH CX
        CALL PRINT1
        POP CX
        LOOP DISP
        MOV AH,4CH
        INT 21H

MAIN    ENDP

PRINT1   PROC NEAR
        MOV CX,2
        PUSH CX
        LOO:

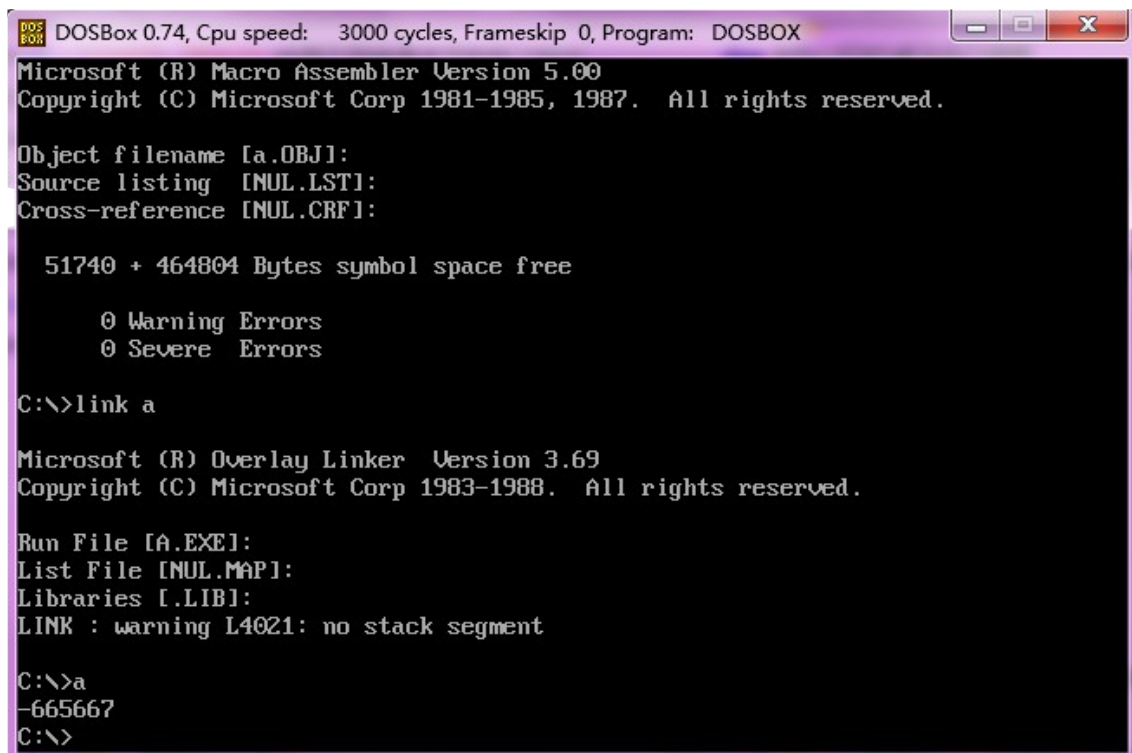
```

```

MOV CL,4
MOV DL,0FH
ROL BL,CL
AND DL,BL
ADD DL,30H
MOV AH,02H
INT 21H
POP CX
LOOP LOO
RET
PRINT1 ENDP
CODE ENDS
END MAIN

```

运行程序如下：



```

DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX
Microsoft (R) Macro Assembler Version 5.00
Copyright (C) Microsoft Corp 1981-1985, 1987. All rights reserved.

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

51740 + 464804 Bytes symbol space free

0 Warning Errors
0 Severe Errors

C:\>link a

Microsoft (R) Overlay Linker Version 3.69
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Run File [A.EXE]:
List File [NUL.MAP]:
Libraries [.LIB]:
LINK : warning L4021: no stack segment

C:\>a
-665667
C:\>

```

3(1).代码如下：

```

STACK SEGMENT STACK
    DW 128 DUP(?)
STACK ENDS

DATA SEGMENT PARA @DATA@
    NUM    DW 9649H
DATA ENDS

CODE SEGMENT PARA @CODE@
    ASSUME CS:CODE, DS:DATA, SS:STACK
MAIN PROC FAR
    PUSH DS

```

```

        XOR AX,AX
        PUSH AX
        MOV  AX,DATA
        MOV  DS,AX
        LEA SI,NUM
        MOV  AX,[SI]
        MOV CL,12
        SHR AX,CL
        AND AX,000FH
        MOV DX,AX
        CALL X_B
    MOV BX,[SI]
    MOV CL,8
    SHR BX,CL
    AND BX,000FH
    ADD AX,BX
    MOV DX,AX
    CALL X_B
    MOV BX,[SI]
    MOV CL,4
    SHR BX,CL
    AND BX,000FH
    ADD AX,BX
        MOV BX,AX
        MOV  CX,16
AGAIN:
        ROL BX,1
        PUSH BX
        AND BX,0001H
        ADD BX,0030H
    MOV DL,BL
    MOV  AH,2
    INT 21H
    POP BX
    LOOP AGAIN
        MOV  DL,ⓐ©
        INT 21H
    MOV AH,4CH
    INT 21H
MAIN  ENDP
X_B:  MOV  AX,10
      MUL  DX
      RET
CODE  ENDS
      END  MAIN

```

运行程序如下：

```
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX
C:\>masm 4a
Microsoft (R) Macro Assembler Version 5.00
Copyright (C) Microsoft Corp 1981-1985, 1987. All rights reserved.

Object filename [4a.OBJ]:
Source listing [NUL.LST]:
Cross-reference [NUL.CRF]:

51688 + 464856 Bytes symbol space free

0 Warning Errors
0 Severe Errors

C:\>link 4a

Microsoft (R) Overlay Linker Version 3.69
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Run File [4A.EXE]:
List File [NUL.MAP]:
Libraries [.LIB]:

C:\>4a
0000001111000100B
C:\>_
```

3(2).代码如下:

```
DATA SEGMENT
A DB
14H,05H,87H,24H,30H,01H,17H,56H,71H,66H,00H,55H,44H,55H,44H,
55H
N EQU 16
DATA ENDS
STACK SEGMENT STACK
DB 256 DUP(?)
STACK ENDS
CODE SEGMENT
ASSUME CS:CODE,DS:DATA,SS:STACK
START:MOV AX,DATA
MOV DS,AX
LEA SI,A
MOV CH,N
LP: MOV DL,[SI]
```

```

        MOV BL,DL
        MOV CL,4
        SHR DL,CL
        OR DL,30H
        CMP DL,30H
        JNE NEXT
        MOV DL,00
NEXT:    MOV AH,2
        INT 21H
        MOV DL,BL
        AND DL,0FH
        OR DL,30H
        MOV AH,2
        INT 21H
        CMP CH,1
        JE EXIT
        MOV DL,00
        MOV AH,2
        INT 21H
        INC SI
        DEC CH
        JNZ LP
EXIT:    MOV AH,4CH
        INT 21H
CODE    ENDS
        END START

```

运行程序如下：

```

DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX
C:\>masm 5a
Microsoft (R) Macro Assembler Version 5.00
Copyright (C) Microsoft Corp 1981-1985, 1987. All rights reserved.

Object filename [5a.OBJ]:
Source listing [NUL.LST]:
Cross-reference [NUL.CRF]:

51688 + 464856 Bytes symbol space free

0 Warning Errors
0 Severe Errors

C:\>link 5a

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Run File [5A.EXE]:
List File [NUL.MAP]:
Libraries [.LIB]:

C:\>5a
14, 5,87,24,30, 1,17,56,71,66, 0,55,44,55,44,55
C:\>

```



#### 4.程序如下:

```
STACK SEGMENT STACK
      DW 100 DUP(0)
      STACK ENDS
DATA   SEGMENT
IARRAY DB 100 DUP(0)
OARRAY DB 100 DUP(0)
DISPLAY DB 100 DUP(0)
TEN     DB 10
LCONT   DW 0
DATA    ENDS
CODE    SEGMENT
      ASSUME CS:CODE,DS:DATA,SS:STACK
MAIN    PROC FAR
      PUSH DS
      XOR AX,AX
      PUSH AX
      MOV AX,DATA
      MOV DS,AX
      LEA BX,IARRAY
      LEA DI,OARRAY
      XOR CX,CX
      JMP J3
J1:     MOV DL,AL
      MOV AH,2
      INT 21H
      MOV SI,1
      JMP J3
J2:     MOV DL,AL
      MOV AH,2
      INT 21H
      CALL CONVERT
J3:     MOV AH,7
      INT 21H
      CMP AL,0DH
      JE NEXT
      CMP AL,@@
      JE J2
      CMP AL,@@
      JE J2
      CMP AL,@@
      JE J1
      CMP AL,@@
      JL J3
      CMP AL,9@
      JG J3
      CALL INPUT
      JMP J3
```

```

NEXT: CALL CONVERT
      LEA BX,OARRAY
      MOV DX,[LCONT]
      DEC DX
      MOV CX,DX
      MOV DI,BX
      CMP CX,0
      JE M3
M1:   INC DI
      MOV AL,[BX]
      MOV AH,[DI]
      CMP AL,AH
      JB M2      ; 若要改为有符号递增，只需将此处 JB 改
                  为 JL，若要改为递减排序，只需将此处 JB 改为 JNB 即可，
                  有符号递减改为 JNL
      MOV [BX],AH
      MOV [DI],AL
M2:   LOOP M1
      INC BX
      MOV DI,BX
      DEC DX
      MOV CX,DX
      JNZ M1
M3:   LEA BX,OARRAY
      MOV CX,[LCONT]
      MOV DL,0AH
      MOV AH,2
      INT 21H
      JMP OS2
      OS1: MOV DL,@@
      MOV AH,2
      INT 21H
OS2:  MOV AL,[BX]
      SUB AL,0
      JNS OS3
      MOV DL,@@
      MOV AH,2
      INT 21H
      MOV AL,[BX]
      NOT AL
      INC AL
OS3:  CALL SHOW
      INC BX
      DEC CX
      JNZ OS1
      RET
MAIN ENDP

```

```

INPUT PROC NEAR
    MOV [BX],AL
    INC BX
    INC CX
    MOV AH,2
    MOV DL,AL
    INT 21H
OUT1: RET
INPUT ENDP
CONVERT PROC NEAR
    SUB BX,CX
    DEC CX
    XOR AX,AX
    MOV AX,[BX]
    SUB AX,30H
    CMP CX,0
    JE OUT2
    LOOP1:MUL TEN
    INC BX
    ADD AX,[BX]
    SUB AX,30H
    LOOP LOOP1
    OUT2:INC BX
    CMP SI,1
    JNE OUT3
    NOT AX
    INC AX
    SUB SI,1
OUT3: MOV [DI],AL
    INC DI
    MOV AX,[LCONT]
    INC AX
    MOV [LCONT],AX
    RET
CONVERT ENDP
SHOW PROC NEAR
    LEA DI,DISPLAY
    MOV CH,0
S1:     MOV AH,0
        DIV TEN
        MOV [DI],AH
        INC DI
        INC CH
        CMP AL,0
        JNZ S1
S2:     DEC DI
        MOV DL,[DI]
        ADD DL,30H

```

```

MOV AH,2
INT 21H
DEC CH
JNZ S2
RET
SHOW ENDP
CODE ENDS
END MAIN

```

运行程序如下:

递增(无符号):

```

DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX
Microsoft (R) Macro Assembler Version 5.00
Copyright (C) Microsoft Corp 1981-1985, 1987. All rights reserved.

Object filename [3c.OBJ]:
Source listing [NUL.LST]:
Cross-reference [NUL.CRF]:

51688 + 464856 Bytes symbol space free

0 Warning Errors
0 Severe Errors

C:\>link 3c

Microsoft (R) Overlay Linker Version 3.69
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Run File [3C.EXE]:
List File [NUL.MAP]:
Libraries [.LIB]:

C:\>3c
12 -34 78 -90 56 -19 28 -37 45
-90,-37,-34,-19,12,28,45,56,78
C:\>

```

递增（有符号）：

递减：

```
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: 3C
Object filename [3c.OBJ]:
Source listing [NUL.LST]:
Cross-reference [NUL.CRF]:

51688 + 464856 Bytes symbol space free

0 Warning Errors
0 Severe Errors

C:\>link 3c

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Run File [3C.EXE]:
List File [NUL.MAP]:
Libraries [.LIB]:

C:\>3c
12 34 78 90 56 19
90,78,56,34,19,12
C:\>

C:\>3c
```