

《汇编语言》实验

第二次实验作业

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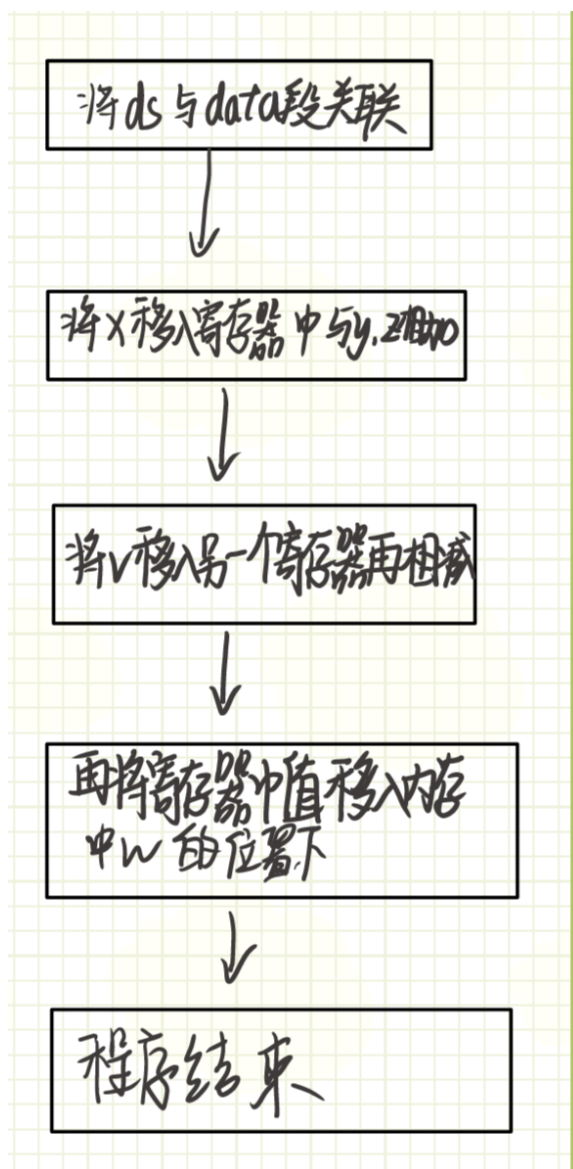
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一、实验目的

编写一程序计算表达式 $w = v - (x + y + z - 51)$ 的值。

- 1、变量 x, y, z, v , 的值是存储器的数字;
- 2、会用 debug 在调试中, 修改变量 x, y, z, v 的值;
- 3、计算的结果保存在变量 w 中, 初始值为 0。

二、简单的程序流程图



三、实验过程中内存状况的变化截图（至少包括程序运行前、运行中、运行后三张内存截图）。

首先查看内存中的程序：

```
-r
AX=FFFF BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0760 ES=0760 SS=076F CS=0771 IP=0000  NU UP EI PL NZ NA PO NC
0771:0000 B87007      MOV     AX,0770
-u
0771:0000 B87007      MOV     AX,0770
0771:0003 8ED8      MOV     DS,AX
0771:0005 A10200      MOV     AX,[0002]
0771:0008 03060000    ADD     AX,[0000]
0771:000C 03060400    ADD     AX,[0004]
0771:0010 83E833      SUB     AX,+33
0771:0013 8B1E0600    MOV     BX,[0006]
0771:0017 2BD8      SUB     BX,AX
0771:0019 891E0800    MOV     [0008],BX
0771:001D B8004C      MOV     AX,4C00
-r
```

1、没有修改变量的值时，执行程序的过程（ $x=y=z=v=0$ ）

开始前的内存：

```
-d 0770:0000
0770:0000 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 .....
0770:0010 B8 70 07 8E D8 A1 02 00-03 06 00 00 03 06 04 00 .p.....
0770:0020 83 E8 33 8B 1E 06 00 2B-D8 89 1E 08 00 B8 00 4C ..3....+.....L
0770:0030 CD 21 00 00 00 00 00 00-00 00 00 00 00 00 00 .f.....
0770:0040 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 .....
0770:0050 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 .....
0770:0060 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 .....
0770:0070 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 .....
-t
```

执行过程：（使用 t 命令逐条执行）

```

AX=0770 BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0760 ES=0760 SS=076F CS=0771 IP=0003 NU UP EI PL NZ NA PO NC
0771:0003 BEDB          MOU     DS,AX
-t

AX=0770 BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=0005 NU UP EI PL NZ NA PO NC
0771:0005 A10200       MOU     AX,[0002]          DS:0002=0000
-t

AX=0000 BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=0008 NU UP EI PL NZ NA PO NC
0771:0008 03060000     ADD     AX,[0000]          DS:0000=0000
-t

AX=0000 BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=000C NU UP EI PL ZR NA PE NC
0771:000C 03060400     ADD     AX,[0004]          DS:0004=0000
-t

AX=0000 BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=0010 NU UP EI PL ZR NA PE NC
0771:0010 83E833          SUB     AX,+33
-

```

```

AX=FFCD BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=0013 NU UP EI NG NZ AC PO CY
0771:0013 8B1E0600       MOU     BX,[0006]          DS:0006=0000
-t

AX=FFCD BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=0017 NU UP EI NG NZ AC PO CY
0771:0017 2BD8          SUB     BX,AX
-t

AX=FFCD BX=0033 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=0019 NU UP EI PL NZ AC PE CY
0771:0019 891E0800       MOU     [0008],BX          DS:0008=0000
-t

AX=FFCD BX=0033 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=001D NU UP EI PL NZ AC PE CY
0771:001D B8004C          MOU     AX,4C00
-t

AX=4C00 BX=0033 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=0020 NU UP EI PL NZ AC PE CY
0771:0020 CD21          INT     21
-

```

执行过程中的内存：（因为只有最后一条才会改变内存的值，其余时候内存中的值没有发生改变）

```

-d 0770:0000
0770:0000 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 .....
0770:0010 B8 70 07 8E D8 A1 02 00-03 06 00 00 03 06 04 00 .p.....
0770:0020 83 E8 33 8B 1E 06 00 2B-D8 89 1E 08 00 B8 00 4C ..3.....L
0770:0030 CD 21 00 00 00 00 00 00-00 00 00 00 00 00 00 00 .!.....
0770:0040 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 .....
0770:0050 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 .....
0770:0060 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 .....
0770:0070 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 .....
-

```

执行后内存的结果：（33 也就是 16 进制的 51 是正确的实验结果）

```

0771:0020 CD21          INT      21
-d 0770:0000
0770:0000  00 00 00 00 00 00 00 00-33 00 00 00 00 00 00 00 .....3.....
0770:0010  B8 70 07 8E D8 A1 02 00-03 06 00 00 03 06 04 00  .p.....
0770:0020  83 E8 33 8B 1E 06 00 2B-D8 89 1E 08 00 B8 00 4C  ..3....+.....L
0770:0030  CD 21 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .!.....
0770:0040  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0050  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0060  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0070  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
-

```

2、修改变量的值时执行程序的过程

首先修改变量（x 为 1010H）：

```

-e 0770:0000 10 10
-d 0770:0000
0770:0000  10 10 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0010  B8 70 07 8E D8 A1 02 00-03 06 00 00 03 06 04 00  .p.....
0770:0020  83 E8 33 8B 1E 06 00 2B-D8 89 1E 08 00 B8 00 4C  ..3....+.....L
0770:0030  CD 21 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .!.....
0770:0040  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0050  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0060  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0070  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
-

```

然后开始执行：

```

AX=0770 BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0760 ES=0760 SS=076F CS=0771 IP=0003  NU UP EI PL NZ NA PO NC
0771:0003 8ED8          MOV     DS,AX
-t
AX=0770 BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=0005  NU UP EI PL NZ NA PO NC
0771:0005 A10200        MOV     AX,[0002]          DS:0002=0000
-t
AX=0000 BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=0008  NU UP EI PL NZ NA PO NC
0771:0008 03060000      ADD     AX,[0000]          DS:0000=0000
-t
AX=0000 BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=000C  NU UP EI PL ZR NA PE NC
0771:000C 03060400      ADD     AX,[0004]          DS:0004=0000
-t
AX=0000 BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=0010  NU UP EI PL ZR NA PE NC
0771:0010 83E833      SUB     AX,+33
-

```

执行过程中的内存：（因为只有最后一条才会改变内存的值，其余时候内存中的值没有发生改变）

```

0771:0000 83E833          SUB     AX,+33
-t
AX=1010 BX=0000 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=0010  NU UP EI PL NZ NA PO NC
0771:0010 83E833          SUB     AX,+33
-d 0770:0000
0770:0000  10 10 00 00 00 00 00 00-00 00 00 00 00 00 00 00 .....
0770:0010  B8 70 07 BE D8 A1 02 00-03 06 00 00 03 06 04 00  .p.....
0770:0020  83 E8 33 8B 1E 06 00 2B-D8 89 1E 08 00 B8 00 4C  ..3....+.L
0770:0030  CD 21 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .?.....
0770:0040  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0050  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0060  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0070  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....

```

修改数值后执行的结果：

```

0771:001D B8004C          MOV     AX,4C00
-t
AX=4C00 BX=F023 CX=0032 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=0770 ES=0760 SS=076F CS=0771 IP=0020  NU UP EI NG NZ AC PO CY
0771:0020 CD21          INT     21
-d 0770:0000
0770:0000  10 10 00 00 00 00 00 00-23 F0 00 00 00 00 00 00 .....#.....
0770:0010  B8 70 07 BE D8 A1 02 00-03 06 00 00 03 06 04 00  .p.....
0770:0020  83 E8 33 8B 1E 06 00 2B-D8 89 1E 08 00 B8 00 4C  ..3....+.L
0770:0030  CD 21 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .?.....
0770:0040  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0050  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0060  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
0770:0070  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....

```

四、完整的代码（包括必要的注释）。

```
01 assume cs:codesg,ds:data
02 data segment
03     x dw 0
04     y dw 0
05     z dw 0
06     v dw 0
07     w dw 0
08 data ends
09 codesg segment
10     start:
11     mov ax,data;将ds与data段关联
12     mov ds,ax;将ds与data段关联
13     mov ax,y;将y变量移入ax中,暂存
14     add ax,x;加x
15     add ax,z;加z
16     sub ax,51;减51
17     mov bx,v;将v变量移入bx中暂存
18     sub bx,ax;实现相减
19     mov w,bx;移入w中
20     mov ax,4c00H;结束程序
21     int 21h;
22 codesg ends
23 end start
```