1 chapter10

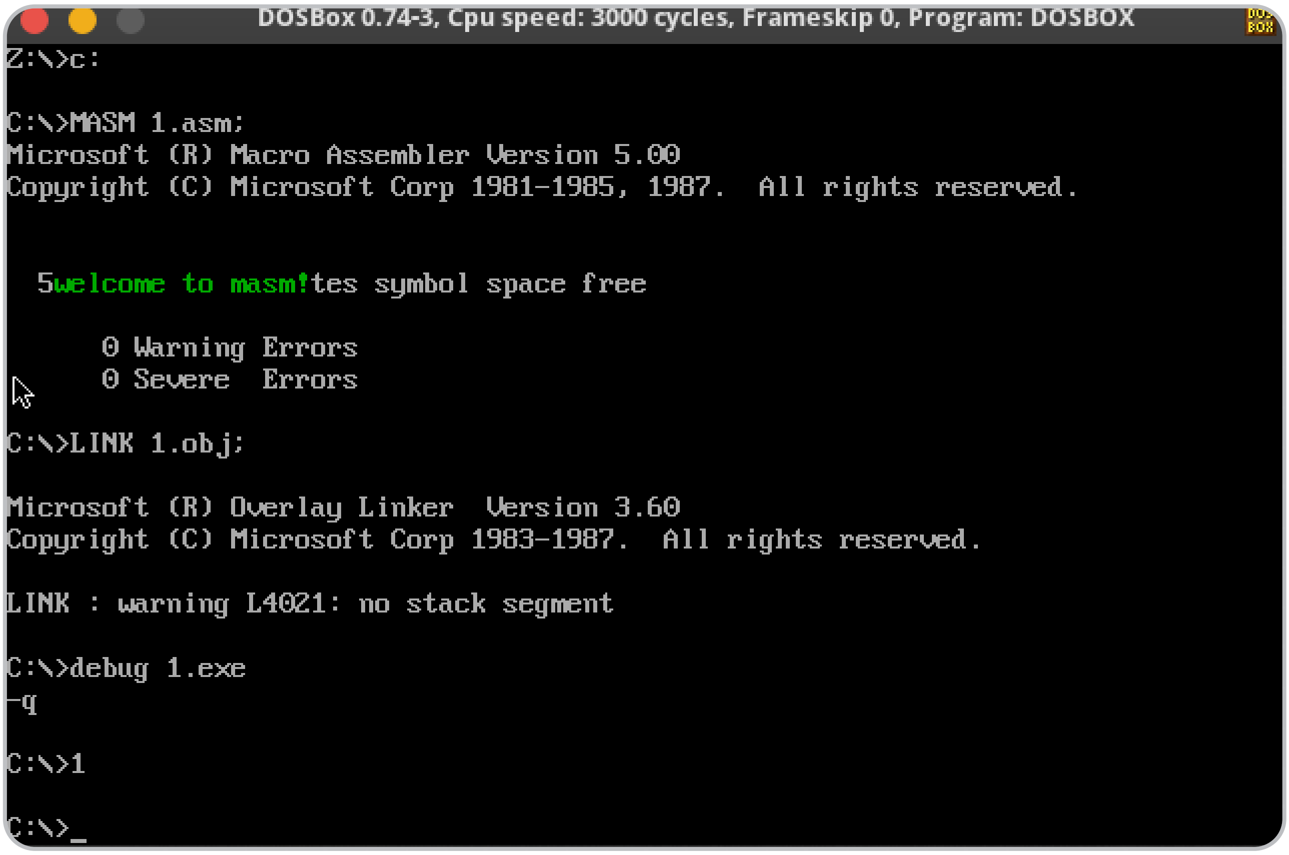
1.1 1. 显示字符串

1.1.1 代码

```
assume cs:code,ds:data,ss:stack

data segment
    db 'welcome to masm!',0
data ends

stack segment
    db 128 dup(0)
stack ends

code segment


    start:

    mov ax,stack
    mov ss,ax
    mov sp,128

    mov ax,data
    mov ds,ax
    mov si,0

    mov dh,8;row
    mov dl,3;cul
    mov cl,2;color
    call show_str

    mov ax,4c00h
    int 21h

    show_str:
        push ax
        push dx
        push cx
        push es
        push si
        push di

        mov ax,0b800h
        mov es,ax
        mov di,0

        call get_row
        add di,ax
        call get_cul
        add di,ax

        call show

        pop di
        pop si
        pop es
        pop cx
        pop dx
        pop ax
        ret

    get_row:
        mov al,160
        mul dh
        ret
    get_cul:
        mov al,2
        mul dl
        ret

    show:
        push ax
        push bx
        push cx
        push di
        push si

        sub ax,ax
        sub bx,bx


        mov bl,cl
        show_1:
            mov cl,ds:[si]
            mov al,ds:[si]
            mov ch,0
            jcxz ok
            mov ah,bl
            mov es:[di],ax
            add di,2
```

```
                inc si
                jmp show_1


            ok:
            pop si
            pop di
            pop cx
            pop bx
            pop ax
            ret

            ret
    code ends
    end start
```

1.1.2 截屏


DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX

```
Z:\>c:

C:\>MASM 1.asm;
Microsoft (R) Macro Assembler Version 5.00
Copyright (C) Microsoft Corp 1981-1985, 1987.  All rights reserved.


  5welcome to masm!tes symbol space free

      0 Warning Errors
      0 Severe  Errors

C:\>LINK 1.obj;

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

LINK : warning L4021: no stack segment

C:\>debug 1.exe
-q

C:\>1

C:\>_
```

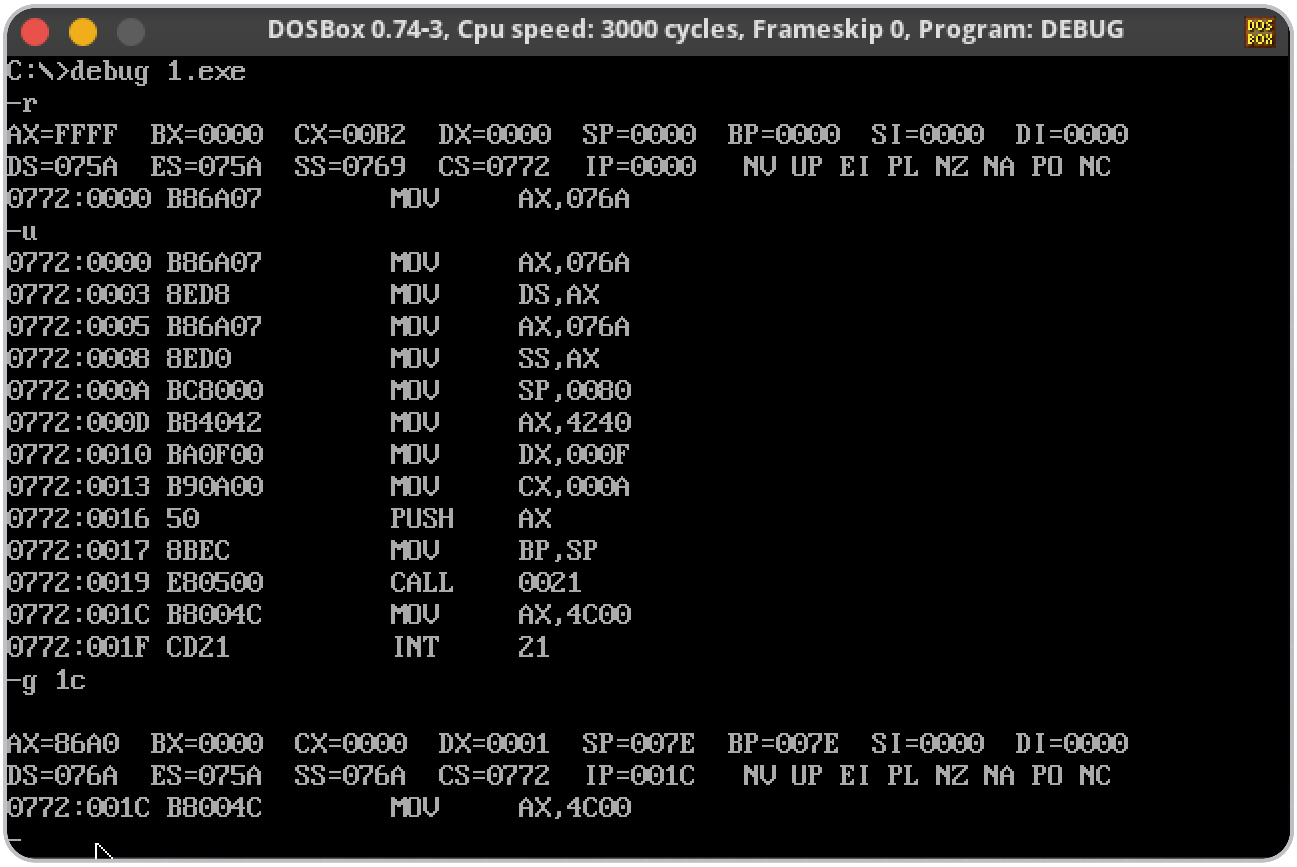
1.2 2. 解决除法溢出问题

1.2.1 代码

```
assume cs:code,ds:data,ss:stack
```

```

data segment
data ends

stack segment
    db 128 dup(0)
stack ends

code segment
    start:
        mov ax,data
        mov ds,ax
        mov ax,stack
        mov ss,ax
        mov sp,128

        mov ax,4240h;L
        mov dx,000fh;H
        mov cx,0ah;N

        push ax;暂时存储ax
        mov bp,sp;记录ax中数据的位置
        call divdw

        mov ax,4c00h
        int 21h

        divdw:

            mov ax,dx
            mov dx,0
            div cx
            push ax

            mov ax,ss:[bp+0];
            div cx
            mov cx,dx

            pop dx

            ret
code ends
end start
```

1.2.2 截图



DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG

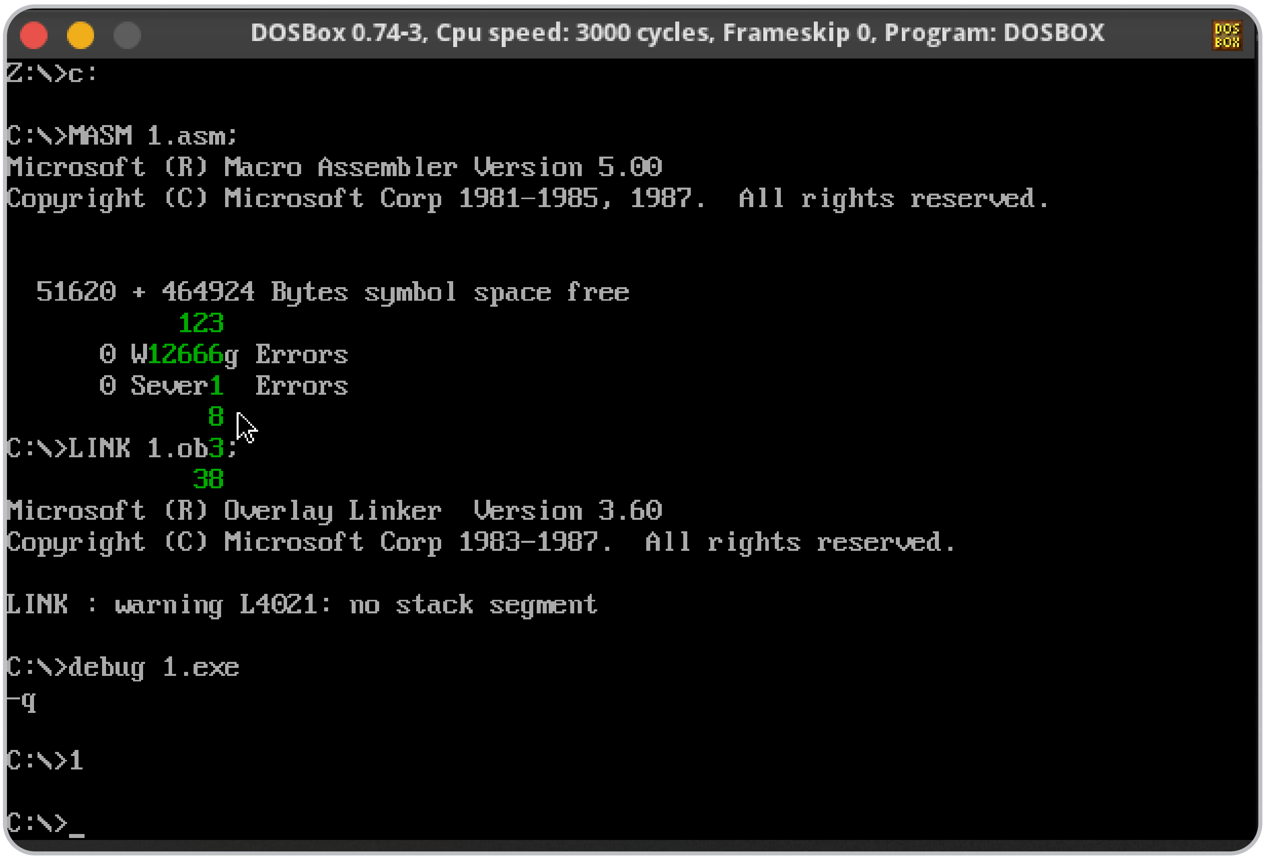
```
C:\>debug 1.exe
-r
AX=FFFF  BX=0000  CX=00B2  DX=0000  SP=0000  BP=0000  SI=0000  DI=0000
DS=075A  ES=075A  SS=0769  CS=0772  IP=0000   NV UP EI PL NZ NA PO NC
0772:0000 B86A07        MOV     AX,076A
-u
0772:0000 B86A07        MOV     AX,076A
0772:0003 8ED8          MOV     DS,AX
0772:0005 B86A07        MOV     AX,076A
0772:0008 8ED0          MOV     SS,AX
0772:000A BC8000        MOV     SP,0080
0772:000D B84042        MOV     AX,4240
0772:0010 BA0F00        MOV     DX,000F
0772:0013 B90A00        MOV     CX,000A
0772:0016 50            PUSH    AX
0772:0017 8BEC          MOV     BP,SP
0772:0019 E80500        CALL    0021
0772:001C B8004C        MOV     AX,4C00
0772:001F CD21          INT     21
-g 1c

AX=86A0  BX=0000  CX=0000  DX=0001  SP=007E  BP=007E  SI=0000  DI=0000
DS=076A  ES=075A  SS=076A  CS=0772  IP=001C   NV UP EI PL NZ NA PO NC
0772:001C B8004C        MOV     AX,4C00
-
```

1.3 3. 数值显示

1.3.1 代码

```
assume cs:code,ds:data,ss:stack

data segment
    dw 123,12666,1,8,3,38,0
data ends

string segment
    db 10  dup (0),0
string ends

stack segment
    db 128 dup(0)
stack ends

code segment



    start:
;初始化
    mov ax,stack
    mov ss,ax
    mov sp,128

    call init_reg

    mov dh,8;row
    mov dl,3;cul
    mov cl,2;color
;显示
    a:
    mov ax,ds:[si]
    mov cx,ax
    jcxz Pro_end
    call dtoc

    inc dh
    mov dl,3;cul
    mov cl,2;color
    call show_str

    call zero

    add si,2
    jmp a

    Pro_end:
    mov ax,4c00h
    int 21h

;把string全部清零
    zero:
                push ax
                push bx
                push cx
                push dx
                push ds
                push es
                push si
                push di

        mov cx,10
        mov ax,string
        mov es,ax
        mov di,0

        lp:
        mov al,0
        mov es:[di],al
        inc di
        loop lp

    zero_ret:
                pop di
                pop si
                pop es
                pop ds
                pop dx
                pop cx
                pop bx
                pop ax
        ret
;==========
    dtoc:
                push ax
                push bx
                push cx
                push dx
                push ds
                push es
                push si
                push di

        mov si,0
        mov dx,0
    dtoc_bg:
        mov cx,10
        div cx
        add dl,30h
        mov es:[si],dl
        mov cx,ax
        jcxz dtoc_end
        inc si
        mov dx,0
        jmp dtoc_bg


    dtoc_end:
                pop di
                pop si
                pop es
                pop ds
                pop dx
                pop cx
                pop bx
                pop ax
        ret
;========
    init_reg:
        mov ax,data
        mov ds,ax
        mov ax,string
        mov es,ax

        mov si,0

        ret

;=======
    show_str:
                push ax
                push bx
                push cx
                push dx
                push ds
                push es
                push si
                push di

        mov ax,string
        mov ds,ax
        mov si,0

        mov ax,0b800h
        mov es,ax
        mov di,0

        call get_row
        add di,ax
        add dl,10
        call get_cul
        add di,ax

        call show

                pop di
                pop si
                pop es
                pop ds
                pop dx
                pop cx
                pop bx
                pop ax
        ret

    get_row:
        mov al,160
        mul dh
        ret
    get_cul:
        mov al,2
        mul dl
        ret

    show:
                push ax
                push bx
                push cx
                push dx
                push ds
                push es
                push si
                push di

        sub ax,ax
        sub bx,bx


        mov bl,cl
        show_1:
            mov cl,ds:[si]
            mov al,ds:[si]
            mov ch,0
            jcxz ok
            mov ah,bl
            mov es:[di],ax
            sub di,2
            inc si
            jmp show_1


        ok:
                pop di
                pop si
                pop es
                pop ds
                pop dx
                pop cx
                pop bx
                pop ax
        ret

code ends
end start
```

1.3.2 截图


DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX

```
Z:\>c:

C:\>MASM 1.asm;
Microsoft (R) Macro Assembler Version 5.00
Copyright (C) Microsoft Corp 1981-1985, 1987.  All rights reserved.


  51620 + 464924 Bytes symbol space free
           123
      0 W12666g Errors
      0 Sever1  Errors
             8
C:\>LINK 1.ob3;
            38
Microsoft (R) Overlay Linker  Version 3.60
Copyright (C) Microsoft Corp 1983-1987.  All rights reserved.

LINK : warning L4021: no stack segment

C:\>debug 1.exe
-q

C:\>1

C:\>_
```

2 课程设计1

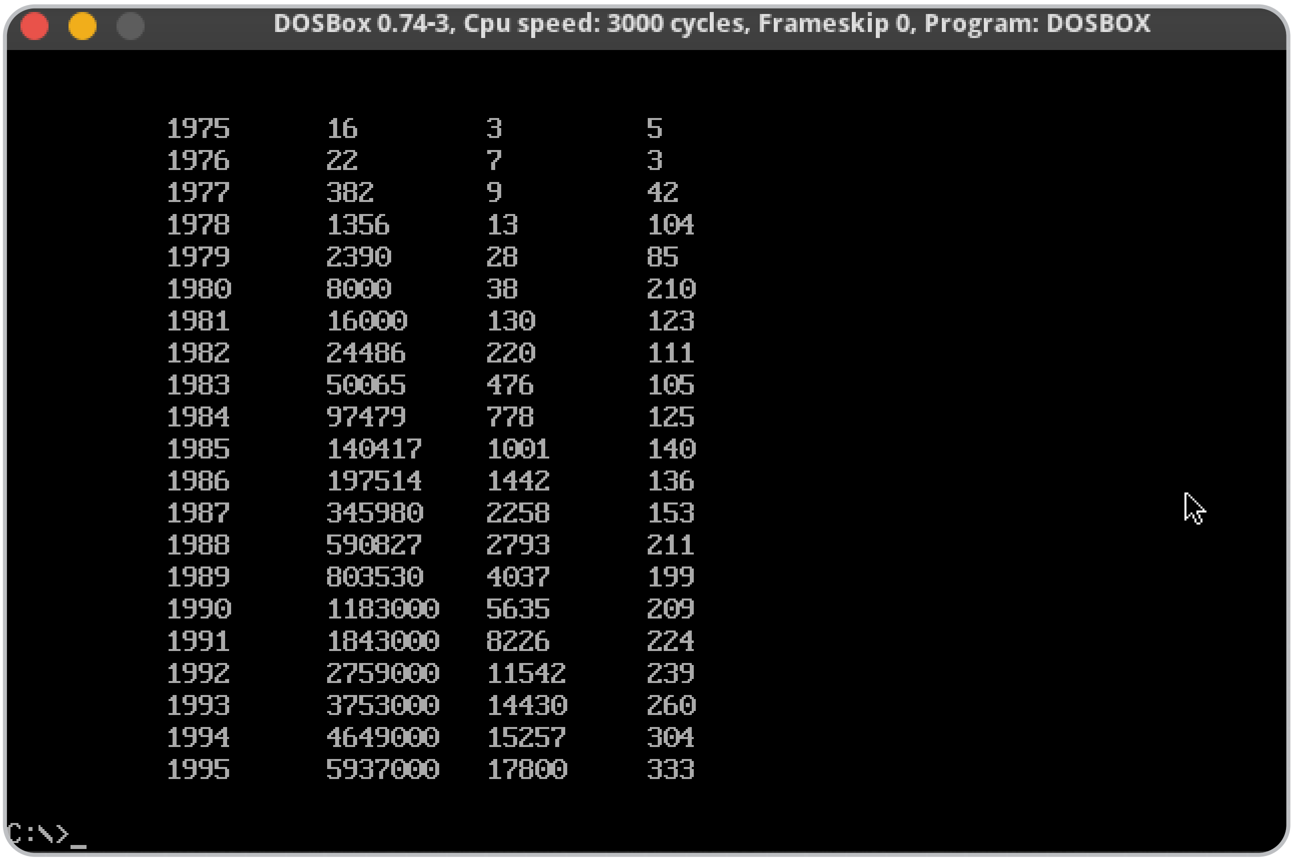
2.0.3 代码

```
assume cs:code,ds:data,ss:stack

data segment
        ;0,0
        db  '1975','1976','1977','1978','1979','1980','1981','1982','1983'
        db  '1984','1985','1986','1987','1988','1989','1990','1991','1992'
        db  '1993','1994','1995'
        ;以上是表示21年的21个字符串 year

        ;84,54h
        dd  16,22,382,1356,2390,8000,16000,24486,50065,97479,140417,197514
        dd  345980,590827,803530,1183000,1843000,2759000,3753000,4649000,5937000
        ;以上是表示21年公司总收入的21个dword数据   sum

        ;168,a8
        dw  3,7,9,13,28,38,130,220,476,778,1001,1442,2258,2793,4037,5635,8226
        dw  11542,14430,15257,17800
data ends



stack segment
    db 128 dup(0)
stack ends


table segment   ;0123456789ABCDEF
    db  21 dup ('year summ ne ?? ')
table ends

string segment ;0123456789ABCDEF
    db  21 dup (0000000000000000)
string ends


code segment
start:
            mov ax,stack;stack
            mov ss,ax
            mov sp,128

            call clear_screen;清空屏幕

            call init_reg;初始化寄存器组，把数据导入

            call input_table;把数据格式化存储

            call output_table;输出格式化数据

            mov ax,4C00H
            int 21H

;================================;output_table
output_table:
            push ax
            push bx
            push cx
            push dx
            push es
            push ds
            push di
            push si

    output_table_bg:
            ;分别调用显示子程序
            call print_year;年
            call print_income;总收入
            call print_employee;员工数量
            call print_avg;人均收入

    output_table_end:
            pop si
            pop di
            pop ds
            pop es
            pop dx
            pop cx
            pop bx
            pop ax
            ret
    ;=============================================
    print_avg:
            push ax
            push bx
            push cx
            push dx
            push es
            push ds
            push di
            push si

            mov ax,table
            mov ds,ax
            mov ax,string
            mov es,ax

            mov si,0

        print_avg_bg:

            mov cx,21
            mov di,160*3+2*40;在屏幕中的显示位置
        pa_lp1:
            push cx

            mov ax,ds:[si+13]
            mov dx,0
            mov cx,10

            call transfer;改进后的子程序3

            add si,16
            add di,160
            pop cx
            loop pa_lp1

            pop si
            pop di
            pop ds
            pop es
            pop dx
            pop cx
            pop bx
            pop ax
            ret

    ;=============================================
    print_employee:
            push ax
            push bx
            push cx
            push dx
            push es
            push ds
            push di
            push si

            mov ax,table
            mov ds,ax
            mov ax,string
            mov es,ax

            mov si,0

        print_employee_bg:
            mov cx,21
            mov di,160*3+2*30

        peb_lp1:
            push cx

            mov ax,ds:[si+10]
            mov dx,0
            mov cx,10

            call transfer

            add si,16
            add di,160
            pop cx
            loop peb_lp1

        print_employee_end:
            pop si
            pop di
            pop ds
            pop es
            pop dx
            pop cx
            pop bx
            pop ax
            ret

    ;==============================================
    print_income:
            push ax
            push bx
            push cx
            push dx
            push es
            push ds
            push di
            push si

            mov ax,table
            mov ds,ax
            mov ax,string
            mov es,ax

            mov si,0


        print_income_bg:

            mov cx,21
            mov di,160*3+2*20
        pib_lp1:
            push cx

            mov ax,ds:[si+5]
            mov dx,ds:[si+7]
            mov cx,10


            call transfer

            add si,16
            ;add di,16
            add di,160
            pop cx
            loop pib_lp1


        print_income_end:
            pop si
            pop di
            pop ds
            pop es
            pop dx
            pop cx
            pop bx
            pop ax
            ret

        ;==============================
        transfer:
            push ax
            push bx
            push cx
            push dx
            push es
            push ds
            push di
            push si

            mov bx,15

        transfer_bg:    ;判断是否大于一个字节
            mov cx,dx
            jcxz short_div;不大于一个字节

            mov cx,10
            push ax
            mov bp,sp
            call divdw
            add sp,2

            add cl,30h
            mov es:[bx],cl

            dec bx
            jmp transfer_bg
        sn:
            call show_number;输出结果

        transfer_end:
            pop si
            pop di
            pop ds
            pop es
            pop dx
            pop cx
            pop bx
            pop ax
            ret
        ;===================
        show_number:
            push ax
            push bx
            push cx
            push dx
            push es
            push ds
```

```
            push di
            push si

            mov ax,string
            mov ds,ax
            mov ax,0b800h
            mov es,ax


        sn_lp1:
            mov cx,0
            mov cl,ds:[bx]
            jcxz show_number_end
            mov ch,00000111b
            mov es:[di],cx

            inc bx
            add di,2

            jmp sn_lp1

        show_number_end:
            pop si
            pop di
            pop ds
            pop es
            pop dx
            pop cx
            pop bx
            pop ax
            ret

        ;===================
        divdw:

        mov ax,dx
        mov dx,0

        div cx
        push ax
        mov ax,ss:[bp+0]
        div cx

        mov cx,dx
        pop dx

        ret

        ;===================
        short_div:
        mov cx,10
        div cx
```

```
    add dl,30h
    mov es:[bx],dl
    mov cx,ax
    jcxz sn
    dec bx
    mov dx,0
    jmp short_div

;==============================================
print_year:
        push ax
        push bx
        push cx
        push dx
        push es
        push ds
        push di
        push si

        ;0123456789ABCDEF
        ;year summ ne ??

    print_year_bg:
        mov ax,table
        mov ds,ax
        mov ax,0b800h
        mov es,ax
        mov si,0
        mov di,160*3+2*10

        mov cx,21
    pyb_lp1:
        push cx
        mov cx,4
        mov bx,0
    pyb_lp2:
        mov al,ds:[si+bx]
        ;mov ah,00000111b
        mov ah,00000111b
        push bx
        add bx,bx
        mov es:[di+bx],ax
        pop bx

        inc bx
        loop pyb_lp2

        add si,16
        add di,160
        pop cx
        loop pyb_lp1

        print_year_end:
            pop si
            pop di
            pop ds
            pop es
            pop dx
            pop cx
            pop bx
            pop ax
            ret

;================================;input_table
input_table:
            push ax
            push bx
            push cx
            push dx
            push es
            push ds
            push di
            push si

            mov si,0
            mov di,0
            mov bx,21*4*2

            mov cx,21


                ;0123456789ABCDEF
                ;year summ ne ??
    input_table_bg:
            ;year
            push ds:[si+0]
            pop es:[di+0]
            push ds:[si+2]
            pop es:[di+2]
            ;income
            mov ax,ds:[si+21*4+0]
            mov dx,ds:[si+21*4+2]
            mov es:[di+5],ax
            mov es:[di+7],dx
            ;employee
            push ds:[bx]
            pop es:[di+10]
            ;avg
            div word ptr ds:[bx]
            mov es:[di+13],ax

            add si,4
            add di,16
            add bx,2

            loop input_table_bg
    input_table_end:
            pop si
            pop di
            pop ds
            pop es
            pop dx
            pop cx
            pop bx
            pop ax
            ret



;==============================初始化寄存器组，把数据导入
init_reg:
            mov bx,data;data in
            mov ds,bx
            mov bx,table;data out
            mov es,bx
            ret

;===================================清空屏幕
clear_screen:
            mov bx,0b800h
            mov es,bx

            mov bx,0
            mov dx,0000h
            mov cx,2000

    clearScreen:
                    mov es:[bx],dx
                    add bx,2

                    loop clearScreen

                    ret
code ends

end start
```

2.0.4 截图


DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX

```
          1975      16        3         5
          1976      22        7         3
          1977      382       9         42
          1978      1356      13        104
          1979      2390      28        85
          1980      8000      38        210
          1981      16000     130       123
          1982      24486     220       111
          1983      50065     476       105
          1984      97479     778       125
          1985      140417    1001      140
          1986      197514    1442      136
          1987      345980    2258      153
          1988      590827    2793      211
          1989      803530    4037      199
          1990      1183000   5635      209
          1991      1843000   8226      224
          1992      2759000   11542     239
          1993      3753000   14430     260
          1994      4649000   15257     304
          1995      5937000   17800     333

C:\>_
```