山东大学 计算机科学与技术 学院

汇编语言 课程实验报告

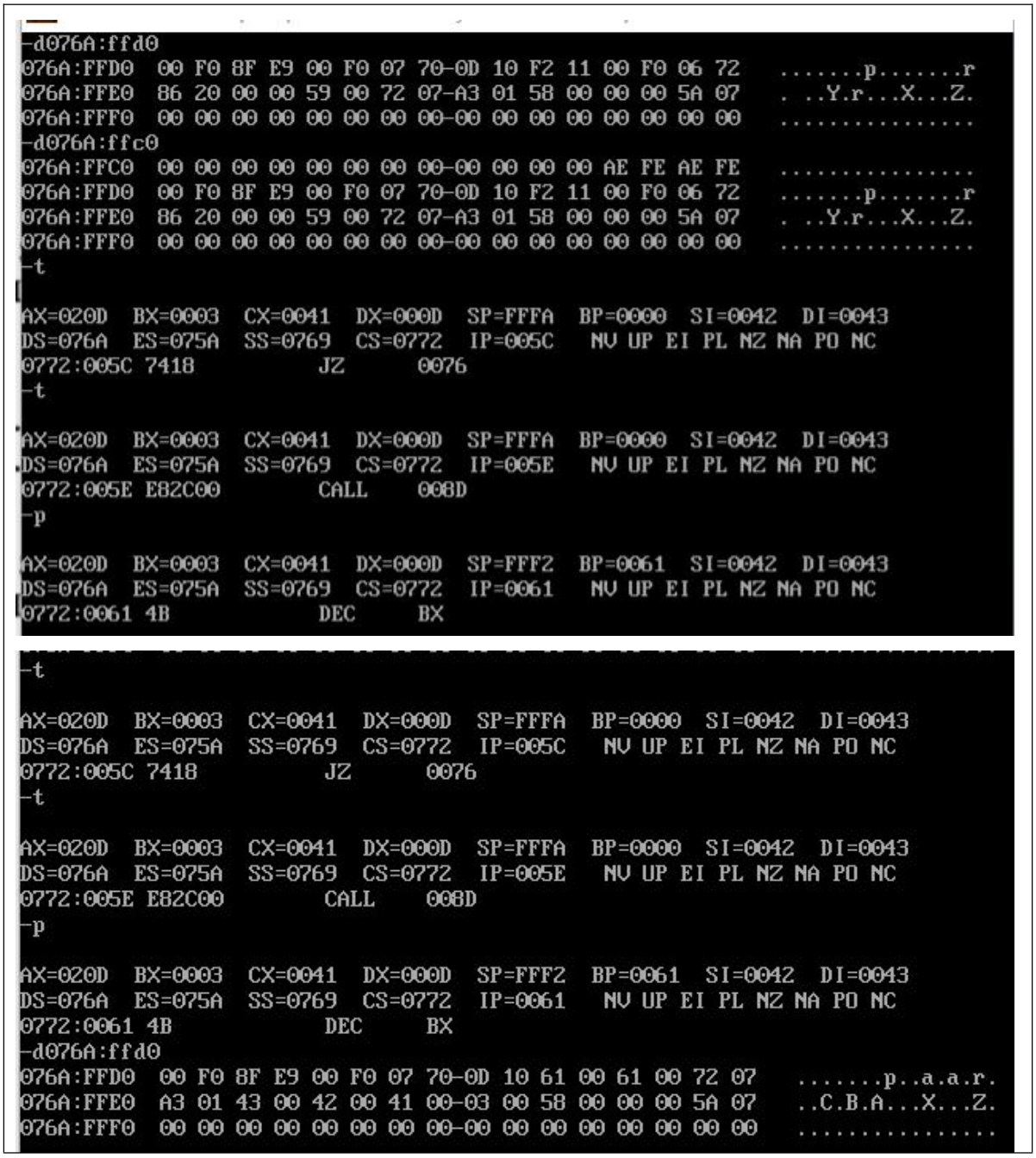
学号：202200130048	姓名：陈静雯	班级：6 班
实验题目：实验 7：示例 2.8		
实验学时：2	实验日期：20241125	
实验目的： 掌握综合性汇编语言程序设计的方法。掌握递归算法的设计与汇编表示。全面回顾前述一切实验的内容。		
实验环境：Windows10、DOSBox-0.74、Masm64		
源程序清单： 1. hanoi.asm		
编译及运行结果： 1.运行结果		

```
C:\>hanoi
N=?
3

What is the name of spindle X ?
A
What is the name of spindle Y ?
B
What is the name of spindle Z ?
C
A1C
A2B
C1B
A3C
B1A
B2C
A1C
```

```
4

What is the name of spindle X ?
A
What is the name of spindle Y ?
B
What is the name of spindle Z ?
C
A1B
A2C
B1C
A3B
C1A
C2B
A1B
A4C
B1C
B2A
C1A
B3C
A1B
A2C
B1C
```

2. debug 过程

```
C:\>debug hanoi.exe
-g59
N=?
3

What is the name of spindle X ?
A
What is the name of spindle Y ?
B
What is the name of spindle Z ?
C

AX=020D  BX=0003  CX=0041  DX=000D  SP=FFFA  BP=0000  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0059   NV UP EI PL NZ NA PE NC
0772:0059 83FB01        CMP     BX,+01
```


-d076A:ffd0
076A:FFD0 00 F0 8F E9 00 F0 07 70-0D 10 F2 11 00 F0 06 72 ....p.......r
076A:FFE0 86 20 00 00 59 00 72 07-A3 01 58 00 00 00 5A 07 . ..Y.r...X...Z.
076A:FFF0 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 ....
-d076A:ffc0
076A:FFC0 00 00 00 00 00 00 00 00-00 00 00 00 AE FE AE FE ....
076A:FFD0 00 F0 8F E9 00 F0 07 70-0D 10 F2 11 00 F0 06 72 ....p.......r
076A:FFE0 86 20 00 00 59 00 72 07-A3 01 58 00 00 00 5A 07 . ..Y.r...X...Z.
076A:FFF0 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 ....
-t
AX=020D BX=0003 CX=0041 DX=000D SP=FFFA BP=0000 SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=005C NV UP EI PL NZ NA PO NC
0772:005C 7418 JZ 0076
-t
AX=020D BX=0003 CX=0041 DX=000D SP=FFFA BP=0000 SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=005E NV UP EI PL NZ NA PO NC
0772:005E E82C00 CALL 008D
-p
AX=020D BX=0003 CX=0041 DX=000D SP=FFF2 BP=0061 SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=0061 NV UP EI PL NZ NA PO NC
0772:0061 4B DEC BX
-t
AX=020D BX=0003 CX=0041 DX=000D SP=FFFA BP=0000 SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=005C NV UP EI PL NZ NA PO NC
0772:005C 7418 JZ 0076
-t
AX=020D BX=0003 CX=0041 DX=000D SP=FFFA BP=0000 SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=005E NV UP EI PL NZ NA PO NC
0772:005E E82C00 CALL 008D
-p
AX=020D BX=0003 CX=0041 DX=000D SP=FFF2 BP=0061 SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=0061 NV UP EI PL NZ NA PO NC
0772:0061 4B DEC BX
-d076A:ffd0
076A:FFD0 00 F0 8F E9 00 F0 07 70-0D 10 61 00 61 00 72 07 ....p..a.a.r.
076A:FFE0 A3 01 43 00 42 00 41 00-03 00 58 00 00 00 5A 07 ..C.B.A...X...Z.
076A:FFF0 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 ....

```
-t

AX=020D  BX=0002  CX=0041  DX=000D  SP=FFF2  BP=0061  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0062   NV UP EI PL NZ NA PO NC
0772:0062 87F7          XCHG    SI,DI
-t

AX=020D  BX=0002  CX=0041  DX=000D  SP=FFF2  BP=0061  SI=0043  DI=0042
DS=076A  ES=075A  SS=0769  CS=0772  IP=0064   NV UP EI PL NZ NA PO NC
0772:0064 E8F2FF        CALL    0059
-t

AX=020D  BX=0002  CX=0041  DX=000D  SP=FFF0  BP=0061  SI=0043  DI=0042
DS=076A  ES=075A  SS=0769  CS=0772  IP=0059   NV UP EI PL NZ NA PO NC
0772:0059 83FB01        CMP     BX,+01
-d076A:ffd0
076A:FFD0  00 F0 8F E9 00 F0 0D 02-61 00 59 00 72 07 A3 01   ........a.Y.r...
076A:FFE0  67 00 43 00 42 00 41 00-03 00 58 00 00 00 5A 07   g.C.B.A...X...Z.
076A:FFF0  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
-
```

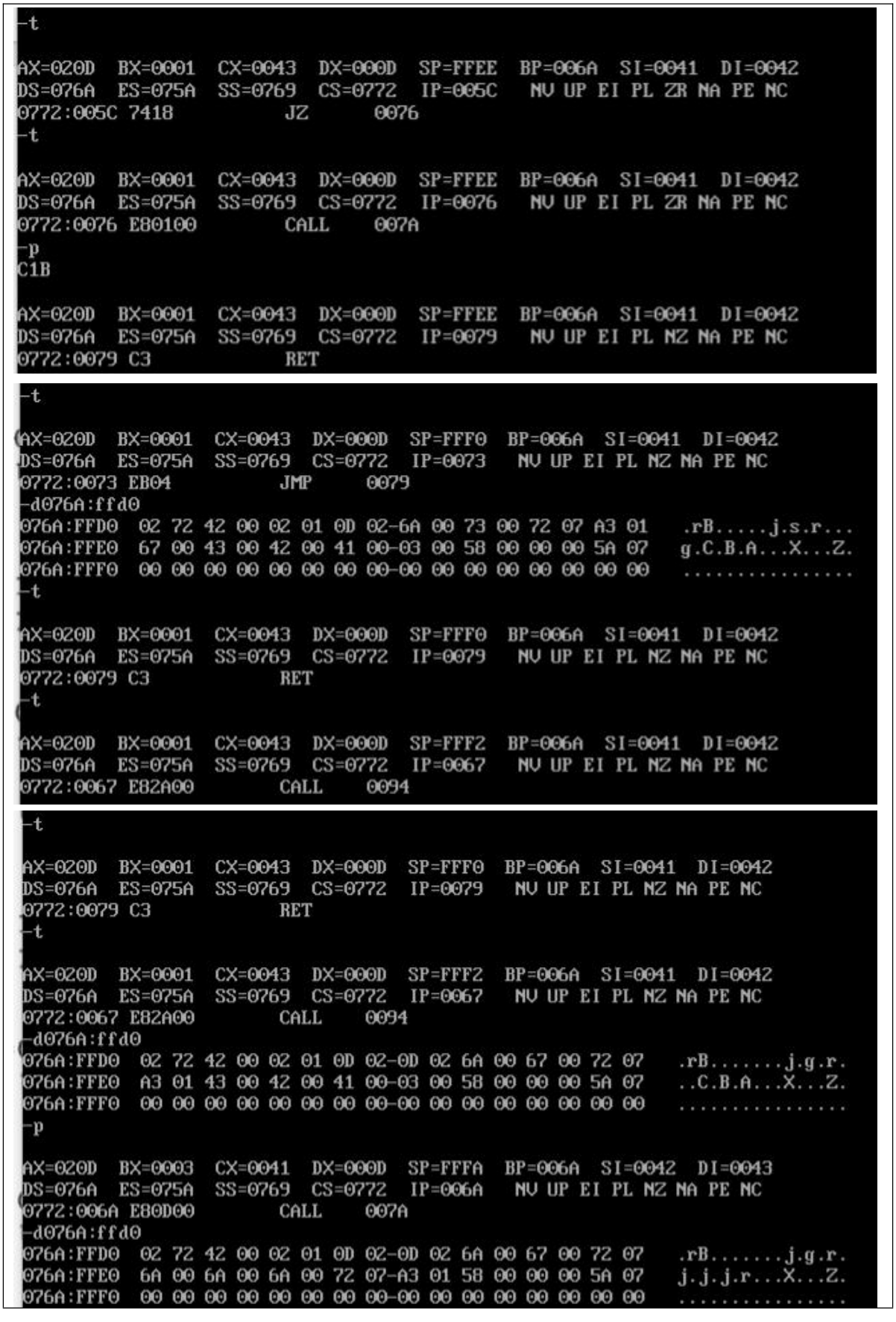
```
-t

AX=020D  BX=0002  CX=0041  DX=000D  SP=FFF0  BP=0061  SI=0043  DI=0042
DS=076A  ES=075A  SS=0769  CS=0772  IP=005C   NV UP EI PL NZ NA PO NC
0772:005C 7418          JZ      0076
-t

AX=020D  BX=0002  CX=0041  DX=000D  SP=FFF0  BP=0061  SI=0043  DI=0042
DS=076A  ES=075A  SS=0769  CS=0772  IP=005E   NV UP EI PL NZ NA PO NC
0772:005E E82C00        CALL    008D
-p

AX=020D  BX=0002  CX=0041  DX=000D  SP=FFE8  BP=0061  SI=0043  DI=0042
DS=076A  ES=075A  SS=0769  CS=0772  IP=0061   NV UP EI PL NZ NA PO NC
0772:0061 4B            DEC     BX
-d076A:ffd0
076A:FFD0  61 00 61 00 72 07 A3 01-42 00 43 00 41 00 02 00   a.a.r...B.C.A...
076A:FFE0  67 00 43 00 42 00 41 00-03 00 58 00 00 00 5A 07   g.C.B.A...X...Z.
076A:FFF0  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
```

```
-t

AX=020D  BX=0001  CX=0041  DX=000D  SP=FFE8  BP=0061  SI=0043  DI=0042
DS=076A  ES=075A  SS=0769  CS=0772  IP=0062   NV UP EI PL NZ NA PO NC
0772:0062 87F7          XCHG    SI,DI
-t

AX=020D  BX=0001  CX=0041  DX=000D  SP=FFE8  BP=0061  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0064   NV UP EI PL NZ NA PO NC
0772:0064 E8F2FF        CALL    0059
-t

AX=020D  BX=0001  CX=0041  DX=000D  SP=FFE6  BP=0061  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0059   NV UP EI PL NZ NA PO NC
0772:0059 83FB01        CMP     BX,+01
-d076A:ffd0
076A:FFD0  59 00 72 07 A3 01 67 00-42 00 43 00 41 00 02 00   Y.r...g.B.C.A...
076A:FFE0  67 00 43 00 42 00 41 00-03 00 58 00 00 00 5A 07   g.C.B.A...X...Z.
076A:FFF0  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
```

```
-t

AX=020D  BX=0001  CX=0041  DX=000D  SP=FFE6  BP=0061  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=005C   NV UP EI PL ZR NA PE NC
0772:005C 7418          JZ      0076
-t

AX=020D  BX=0001  CX=0041  DX=000D  SP=FFE6  BP=0061  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0076   NV UP EI PL ZR NA PE NC
0772:0076 E80100        CALL    007A
-p
A1C

AX=020D  BX=0001  CX=0041  DX=000D  SP=FFE6  BP=0061  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0079   NV UP EI PL NZ NA PE NC
0772:0079 C3            RET
```

```
-t

AX=020D  BX=0001  CX=0041  DX=000D  SP=FFE8  BP=0061  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0067   NV UP EI PL NZ NA PE NC
0772:0067 E82A00        CALL    0094
-d076A:ffd0
076A:FFD0  61 00 67 00 72 07 A3 01-42 00 43 00 41 00 02 00   a.g.r...B.C.A...
076A:FFE0  67 00 43 00 42 00 41 00-03 00 58 00 00 00 5A 07   g.C.B.A...X...Z.
076A:FFF0  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
-p

AX=020D  BX=0002  CX=0041  DX=000D  SP=FFF0  BP=006A  SI=0043  DI=0042
DS=076A  ES=075A  SS=0769  CS=0772  IP=006A   NV UP EI PL NZ NA PE NC
0772:006A E80D00        CALL    007A
-d076A:ffd0
076A:FFD0  61 00 67 00 72 07 6A 00-6A 00 6A 00 72 07 A3 01   a.g.r.j.j.j.r...
076A:FFE0  67 00 43 00 42 00 41 00-03 00 58 00 00 00 5A 07   g.C.B.A...X...Z.
076A:FFF0  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
-p
A2B

AX=020D  BX=0002  CX=0041  DX=000D  SP=FFF0  BP=006A  SI=0043  DI=0042
DS=076A  ES=075A  SS=0769  CS=0772  IP=006D   NV UP EI PL NZ NA PE NC
0772:006D 4B            DEC     BX
```

```
-t

AX=020D  BX=0001  CX=0041  DX=000D  SP=FFF0  BP=006A  SI=0043  DI=0042
DS=076A  ES=075A  SS=0769  CS=0772  IP=006E   NV UP EI PL NZ NA PO NC
0772:006E 87CE          XCHG    CX,SI
-t

AX=020D  BX=0001  CX=0043  DX=000D  SP=FFF0  BP=006A  SI=0041  DI=0042
DS=076A  ES=075A  SS=0769  CS=0772  IP=0070   NV UP EI PL NZ NA PO NC
0772:0070 E8E6FF        CALL    0059
-t

AX=020D  BX=0001  CX=0043  DX=000D  SP=FFEE  BP=006A  SI=0041  DI=0042
DS=076A  ES=075A  SS=0769  CS=0772  IP=0059   NV UP EI PL NZ NA PO NC
0772:0059 83FB01        CMP     BX,+01
-d076A:ffd0
076A:FFD0  72 07 02 72 0D 02 6A 00-59 00 72 07 A3 01 73 00   r..r..j.Y.r...s.
076A:FFE0  67 00 43 00 42 00 41 00-03 00 58 00 00 00 5A 07   g.C.B.A...X...Z.
076A:FFF0  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
```


-t
AX=020D BX=0001 CX=0043 DX=000D SP=FFEE BP=006A SI=0041 DI=0042
DS=076A ES=075A SS=0769 CS=0772 IP=005C NV UP EI PL ZR NA PE NC
0772:005C 7418 JZ 0076
-t
AX=020D BX=0001 CX=0043 DX=000D SP=FFEE BP=006A SI=0041 DI=0042
DS=076A ES=075A SS=0769 CS=0772 IP=0076 NV UP EI PL ZR NA PE NC
0772:0076 E80100 CALL 007A
-p
C1B
AX=020D BX=0001 CX=0043 DX=000D SP=FFEE BP=006A SI=0041 DI=0042
DS=076A ES=075A SS=0769 CS=0772 IP=0079 NV UP EI PL NZ NA PE NC
0772:0079 C3 RET
-t
AX=020D BX=0001 CX=0043 DX=000D SP=FFF0 BP=006A SI=0041 DI=0042
DS=076A ES=075A SS=0769 CS=0772 IP=0073 NV UP EI PL NZ NA PE NC
0772:0073 EB04 JMP 0079
-d076A:ffd0
076A:FFD0 02 72 42 00 02 01 0D 02-6A 00 73 00 72 07 A3 01 .rB.....j.s.r...
076A:FFE0 67 00 43 00 42 00 41 00-03 00 58 00 00 00 5A 07 g.C.B.A...X...Z.
076A:FFF0 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 ....
-t
AX=020D BX=0001 CX=0043 DX=000D SP=FFF0 BP=006A SI=0041 DI=0042
DS=076A ES=075A SS=0769 CS=0772 IP=0079 NV UP EI PL NZ NA PE NC
0772:0079 C3 RET
-t
AX=020D BX=0001 CX=0043 DX=000D SP=FFF2 BP=006A SI=0041 DI=0042
DS=076A ES=075A SS=0769 CS=0772 IP=0067 NV UP EI PL NZ NA PE NC
0772:0067 E82A00 CALL 0094
-t
AX=020D BX=0001 CX=0043 DX=000D SP=FFF0 BP=006A SI=0041 DI=0042
DS=076A ES=075A SS=0769 CS=0772 IP=0079 NV UP EI PL NZ NA PE NC
0772:0079 C3 RET
-t
AX=020D BX=0001 CX=0043 DX=000D SP=FFF2 BP=006A SI=0041 DI=0042
DS=076A ES=075A SS=0769 CS=0772 IP=0067 NV UP EI PL NZ NA PE NC
0772:0067 E82A00 CALL 0094
-d076A:ffd0
076A:FFD0 02 72 42 00 02 01 0D 02-0D 02 6A 00 67 00 72 07 .rB.....j.g.r.
076A:FFE0 A3 01 43 00 42 00 41 00-03 00 58 00 00 00 5A 07 ..C.B.A...X...Z.
076A:FFF0 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 ....
-p
AX=020D BX=0003 CX=0041 DX=000D SP=FFFA BP=006A SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=006A NV UP EI PL NZ NA PE NC
0772:006A E80D00 CALL 007A
-d076A:ffd0
076A:FFD0 02 72 42 00 02 01 0D 02-0D 02 6A 00 67 00 72 07 .rB.....j.g.r.
076A:FFE0 6A 00 6A 00 6A 00 72 07-A3 01 58 00 00 00 5A 07 j.j.j.r...X...Z.
076A:FFF0 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 ....

```
-p
A3C

AX=020D  BX=0003  CX=0041  DX=000D  SP=FFFA  BP=006A  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=006D   NV UP EI PL NZ NA PE NC
0772:006D 4B            DEC     BX
-t

AX=020D  BX=0002  CX=0041  DX=000D  SP=FFFA  BP=006A  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=006E   NV UP EI PL NZ NA PO NC
0772:006E 87CE          XCHG    CX,SI
-t

AX=020D  BX=0002  CX=0042  DX=000D  SP=FFFA  BP=006A  SI=0041  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0070   NV UP EI PL NZ NA PO NC
0772:0070 E8E6FF        CALL    0059
-t

AX=020D  BX=0002  CX=0042  DX=000D  SP=FFF8  BP=006A  SI=0041  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0059   NV UP EI PL NZ NA PO NC
0772:0059 83FB01        CMP     BX,+01
```

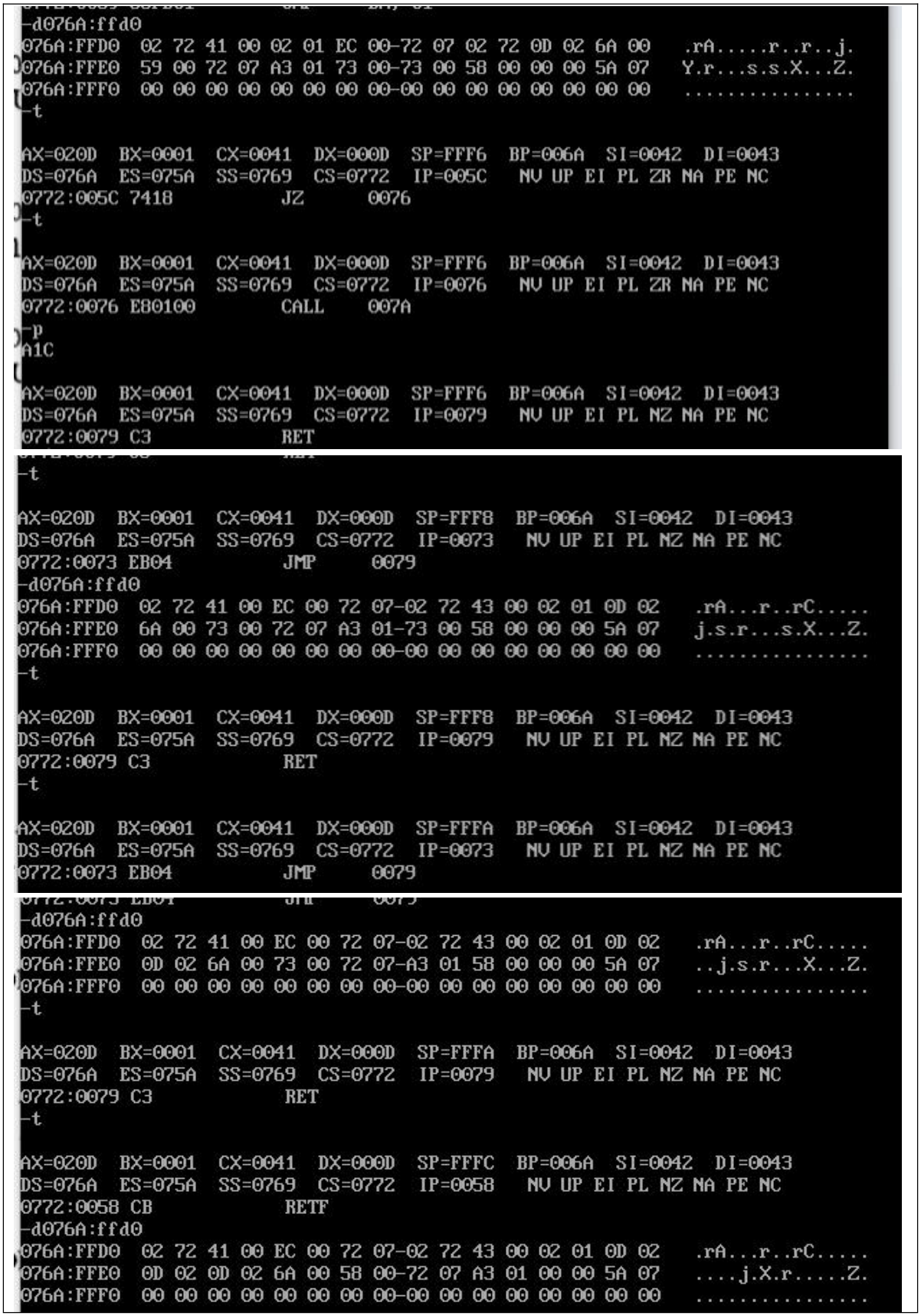
```
-d076A:ffd0
076A:FFD0  02 72 42 00 02 01 0D 02-EC 00 72 07 06 72 0D 02   .rB.......r..r..
076A:FFE0  6A 00 59 00 72 07 A3 01-73 00 58 00 00 00 5A 07   j.Y.r...s.X...Z.
076A:FFF0  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
-t

AX=020D  BX=0002  CX=0042  DX=000D  SP=FFF8  BP=006A  SI=0041  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=005C   NV UP EI PL NZ NA PO NC
0772:005C 7418          JZ      0076
-t

AX=020D  BX=0002  CX=0042  DX=000D  SP=FFF8  BP=006A  SI=0041  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=005E   NV UP EI PL NZ NA PO NC
0772:005E E82C00        CALL    008D
-p

AX=020D  BX=0002  CX=0042  DX=000D  SP=FFF0  BP=0061  SI=0041  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0061   NV UP EI PL NZ NA PO NC
0772:0061 4B            DEC     BX
```

```
-d076A:ffd0
076A:FFD0  02 72 42 00 02 01 0D 02-61 00 61 00 72 07 A3 01   .rB.....a.a.r...
076A:FFE0  43 00 41 00 42 00 02 00-73 00 58 00 00 00 5A 07   C.A.B...s.X...Z.
076A:FFF0  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
-t

AX=020D  BX=0001  CX=0042  DX=000D  SP=FFF0  BP=0061  SI=0041  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0062   NV UP EI PL NZ NA PO NC
0772:0062 87F7          XCHG    SI,DI
-t

AX=020D  BX=0001  CX=0042  DX=000D  SP=FFF0  BP=0061  SI=0043  DI=0041
DS=076A  ES=075A  SS=0769  CS=0772  IP=0064   NV UP EI PL NZ NA PO NC
0772:0064 E8F2FF        CALL    0059
-t

AX=020D  BX=0001  CX=0042  DX=000D  SP=FFEE  BP=0061  SI=0043  DI=0041
DS=076A  ES=075A  SS=0769  CS=0772  IP=0059   NV UP EI PL NZ NA PO NC
0772:0059 83FB01        CMP     BX,+01
```

```
-d076A:ffd0
076A:FFD0  02 72 42 00 0D 02 61 00-59 00 72 07 A3 01 67 00   .rB...a.Y.r...g.
076A:FFE0  43 00 41 00 42 00 02 00-73 00 58 00 00 00 5A 07   C.A.B...s.X...Z.
076A:FFF0  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
-t

AX=020D  BX=0001  CX=0042  DX=000D  SP=FFEE  BP=0061  SI=0043  DI=0041
DS=076A  ES=075A  SS=0769  CS=0772  IP=005C   NV UP EI PL ZR NA PE NC
0772:005C 7418          JZ      0076
-t

AX=020D  BX=0001  CX=0042  DX=000D  SP=FFEE  BP=0061  SI=0043  DI=0041
DS=076A  ES=075A  SS=0769  CS=0772  IP=0076   NV UP EI PL ZR NA PE NC
0772:0076 E80100        CALL    007A
-p
B1A

AX=020D  BX=0001  CX=0042  DX=000D  SP=FFEE  BP=0061  SI=0043  DI=0041
DS=076A  ES=075A  SS=0769  CS=0772  IP=0079   NV UP EI PL NZ NA PE NC
0772:0079 C3            RET
```

```
-t

AX=020D  BX=0001  CX=0042  DX=000D  SP=FFF0  BP=0061  SI=0043  DI=0041
DS=076A  ES=075A  SS=0769  CS=0772  IP=0067   NV UP EI PL NZ NA PE NC
0772:0067 E82A00        CALL    0094
-d076A:ffd0
076A:FFD0  02 72 41 00 02 01 0D 02-61 00 67 00 72 07 A3 01   .rA.....a.g.r...
076A:FFE0  43 00 41 00 42 00 02 00-73 00 58 00 00 00 5A 07   C.A.B...s.X...Z.
076A:FFF0  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
-p

AX=020D  BX=0002  CX=0042  DX=000D  SP=FFF8  BP=006A  SI=0041  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=006A   NV UP EI PL NZ NA PE NC
0772:006A E80D00        CALL    007A
-d076A:ffd0
076A:FFD0  02 72 41 00 02 01 0D 02-61 00 67 00 72 07 6A 00   .rA.....a.g.r.j.
076A:FFE0  6A 00 6A 00 72 07 A3 01-73 00 58 00 00 00 5A 07   j.j.r...s.X...Z.
076A:FFF0  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
```

```
-p
B2C

AX=020D  BX=0002  CX=0042  DX=000D  SP=FFF8  BP=006A  SI=0041  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=006D   NV UP EI PL NZ NA PE NC
0772:006D 4B            DEC     BX
-t

AX=020D  BX=0001  CX=0042  DX=000D  SP=FFF8  BP=006A  SI=0041  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=006E   NV UP EI PL NZ NA PO NC
0772:006E 87CE          XCHG    CX,SI
-t

AX=020D  BX=0001  CX=0041  DX=000D  SP=FFF8  BP=006A  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0070   NV UP EI PL NZ NA PO NC
0772:0070 E8E6FF        CALL    0059
-t

AX=020D  BX=0001  CX=0041  DX=000D  SP=FFF6  BP=006A  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=0772  IP=0059   NV UP EI PL NZ NA PO NC
0772:0059 83FB01        CMP     BX,+01
```


-d076A:ffd0
076A:FFD0 02 72 41 00 02 01 EC 00-72 07 02 72 0D 02 6A 00 .rA.....r..r..j.
076A:FFE0 59 00 72 07 A3 01 73 00-73 00 58 00 00 00 5A 07 Y.r...s.s.X...Z.
076A:FFF0 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 ....
-t
AX=020D BX=0001 CX=0041 DX=000D SP=FFF6 BP=006A SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=005C NV UP EI PL ZR NA PE NC
0772:005C 7418 JZ 0076
-t
AX=020D BX=0001 CX=0041 DX=000D SP=FFF6 BP=006A SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=0076 NV UP EI PL ZR NA PE NC
0772:0076 E80100 CALL 007A
-p
A1C
AX=020D BX=0001 CX=0041 DX=000D SP=FFF6 BP=006A SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=0079 NV UP EI PL NZ NA PE NC
0772:0079 C3 RET
-t
AX=020D BX=0001 CX=0041 DX=000D SP=FFF8 BP=006A SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=0073 NV UP EI PL NZ NA PE NC
0772:0073 EB04 JMP 0079
-d076A:ffd0
076A:FFD0 02 72 41 00 EC 00 72 07-02 72 43 00 02 01 0D 02 .rA...r..rC.....
076A:FFE0 6A 00 73 00 72 07 A3 01-73 00 58 00 00 00 5A 07 j.s.r...s.X...Z.
076A:FFF0 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 ....
-t
AX=020D BX=0001 CX=0041 DX=000D SP=FFF8 BP=006A SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=0079 NV UP EI PL NZ NA PE NC
0772:0079 C3 RET
-t
AX=020D BX=0001 CX=0041 DX=000D SP=FFFA BP=006A SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=0073 NV UP EI PL NZ NA PE NC
0772:0073 EB04 JMP 0079
-d076A:ffd0
076A:FFD0 02 72 41 00 EC 00 72 07-02 72 43 00 02 01 0D 02 .rA...r..rC.....
076A:FFE0 0D 02 6A 00 73 00 72 07-A3 01 58 00 00 00 5A 07 ..j.s.r...X...Z.
076A:FFF0 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 ....
-t
AX=020D BX=0001 CX=0041 DX=000D SP=FFFA BP=006A SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=0079 NV UP EI PL NZ NA PE NC
0772:0079 C3 RET
-t
AX=020D BX=0001 CX=0041 DX=000D SP=FFFC BP=006A SI=0042 DI=0043
DS=076A ES=075A SS=0769 CS=0772 IP=0058 NV UP EI PL NZ NA PE NC
0772:0058 CB RETF
-d076A:ffd0
076A:FFD0 02 72 41 00 EC 00 72 07-02 72 43 00 02 01 0D 02 .rA...r..rC.....
076A:FFE0 0D 02 0D 02 6A 00 58 00-72 07 A3 01 00 00 5A 07 ....j.X.r.....Z.
076A:FFF0 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00 ....

```
-t

AX=020D  BX=0001  CX=0041  DX=000D  SP=0000  BP=006A  SI=0042  DI=0043
DS=076A  ES=075A  SS=0769  CS=075A  IP=0000   NV UP EI PL NZ NA PE NC
075A:0000 CD20          INT     20
-p

Program terminated normally
-q
```

程序开始运行时用 g59 启动运行程序,0059 为 hanoi 子程序的入口地址，因此程序在接收 N 值及三个轴名后停于断点 0059。此时显示的指令 CMP BX,+01 尚未执行，用 t 命令执行该指令并显示下一条将要执行的指令为 JZ007C,再用 t 命令执行该指令并显示下一条将要执行的指令为 CALL008D.008D 为子程序 save 的入口地址，此时，为直接看到子程序执行完后的结果（而不是子程序中的每条指令的执行结果）用 P 命令执行该子程序，程序停于该子程序返回后的第一条指令 DEC BX 处，此时用 d 命令显示的堆栈内容为 save 子程序运行后的堆栈状态。

2.文件输入输出

```
C:\>hanoi

          PLEASE INPUT FILENAME : input.txt
```

OUTPUT - 记事本
文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)
A1C
A2B
C1B
A3C
B1A
B2C
A1C

问题及收获：

1. 方法优劣对比

（1）寄存器法

优点：

速度快：寄存器访问速度比内存访问快得多。

简洁：使用寄存器传递参数可以使代码更加简洁。

缺点：

资源有限：寄存器数量有限，不适合传递大量数据。

易冲突：多个子程序之间容易产生寄存器冲突，需要额外的保存和恢复机制。

（2）约定内存法

优点：

灵活性高：可以传递任意大小的数据。

易于调试：内存中的数据更容易查看和调试。

缺点：

速度慢：内存访问速度较慢，影响程序性能。

占用内存：需要额外的内存空间来存储数据。

（3）栈传递法

优点：

通用性好：适用于传递任意大小和数量的参数。

自动管理：调用者和被调用者之间的参数传递由栈自动管理。

缺点：

性能较低：栈操作涉及内存访问，速度较慢。

复杂度高：需要手动管理栈指针和栈帧。

2. 修改 52 页例 2.8，使其能从 INPUT.TXT 中读取输入数据（盘子数 始轴 中间轴 最终轴），并将所有输出结果重定向到 OUTPUT.TXT。提示：使用子程序负责输入和输出，如果命令行上有输入文件名和输出文件名参数，则输入输出都针对文件进行

```
main    proc far
        assume cs:prognam,ds:datarea
start:
;set up stack for return
        push    ds
        sub     ax,ax
        push    ax
;set DS register to current data segment
        mov     ax,datarea
        mov     ds,ax
        mov     cur,10
        call    getline
        call    openf
        or      ax,ax
        jnz     display
        mov     dx,offset mess_err2
        mov     ah,09h
        int     21h
        jmp     FILE_END
display:
        call    read_block
        or      ax,ax
        jnz     next2
        mov     dx,offset mess_err3
        mov     ah,09h
        int     21h
        jmp     FILE_END
next2:
        mov     dx,offset FILE
```

```
next2:
        mov     dx,offset FILE
        mov     cx,0
        mov     ah,3ch
        int     21h
        jc      error4
        mov     handle,ax
        mov     bx,buf[4]
        mov     bh,0h
        mov     si,bx
        mov     bx,buf[6]
        mov     bh,0h
        mov     di,bx
        mov     bx,buf[0]
        sub     bx,3030h
        mov     bh,0h
        mov     cx,buf[2]
        mov     ch,0h
        call    hanoi
        jmp     FILE_END
error4:
        mov     dx,offset mess_err4
        mov     ah,09
        int     21h
FILE_END:
        mov     bx,handle
```