

MICROPROCESSOR AND INTERFACING TECHNIQUES

CODE: CSI2006

SLOT: L53 + L54

LAB ASSIGNMENT – 4

TEAM MEMBERS:

- Saksham Verma (19MID0023)
- Tharun S (19MID0031)
- Sabarinathan R V (19MID0057)
- Mothishwaran C (19MID0017)
- Prashanth S (19MID0020)

AIM: To write an assembly language program for

- Reversing a string
- Block Transfer

ALGORITHM:

- Reversing a string

Input:

-> "das" as input

Process:

- Using a stack to store the string via using push()
- Then popping out the string and as the stack stores the in LIFO manner hence our string is reversed

Conclusion for reversing the string: String in the reverse manner as output

CODE:



```
1  .model small
2  .stack 100h
3  .data
4  string db 'das'
5  .code
6  main proc
7      mov ax, @data
8      mov ds, ax
9      mov si, offset string
10     mov cx, 03h
11     l1: mov bx, [si]
12         push bx
13         inc si
14         loop l1
15     mov cx, 03h
16     l2: pop dx
17         mov ah, 02
18         int 21h
19         loop l2
20     mov ah, 4ch
21     int 21h
22 main endp
23 end main
24
```

.model small

.stack 100h

.data

string db 'das'

.code

main proc

mov ax, @data

mov ds, ax

mov si, offset string

mov cx, 03h

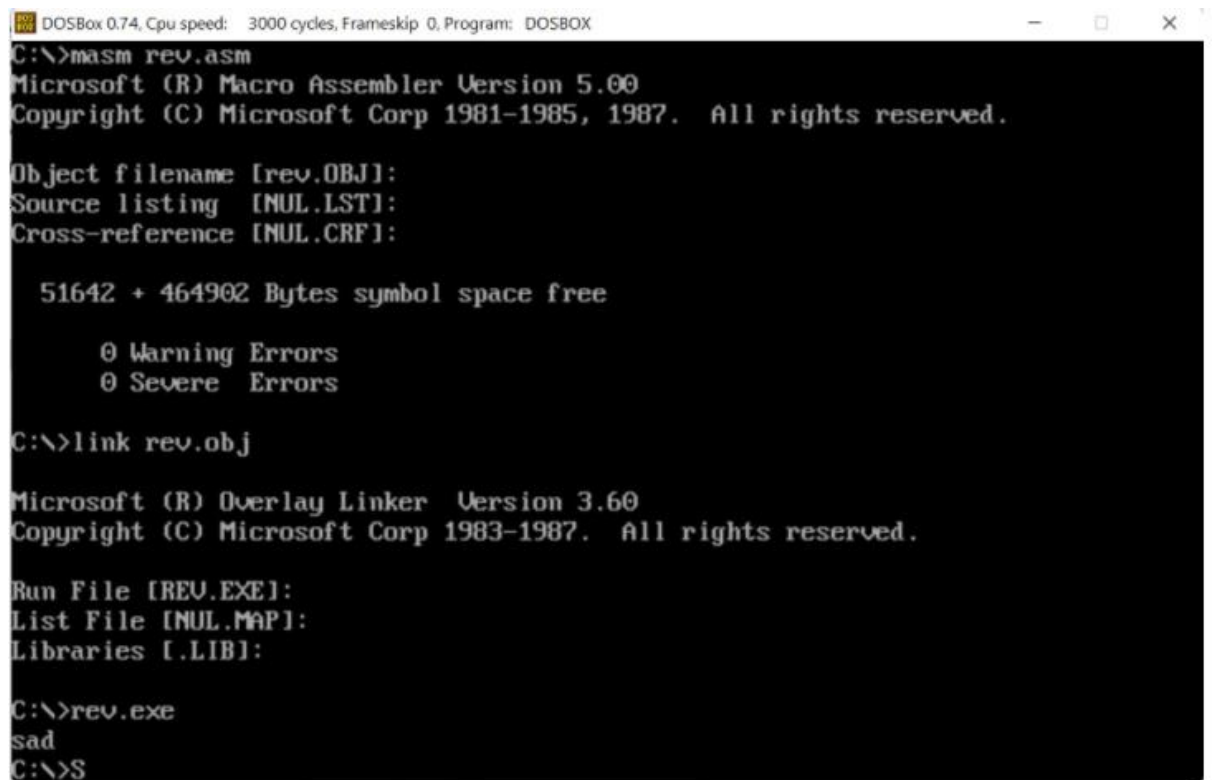
l1: mov bx, [si]

push bx

inc si

```
loop l1  
mov cx,03h  
l2:pop dx  
mov ah,02  
int 21h  
loop l2  
mov ah,4ch  
int 21h  
main endp  
end main
```

OUTPUT:



```
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX  
C:\>masm rev.asm  
Microsoft (R) Macro Assembler Version 5.00  
Copyright (C) Microsoft Corp 1981-1985, 1987. All rights reserved.  
  
Object filename [rev.OBJ]:  
Source listing [NUL.LST]:  
Cross-reference [NUL.CRF]:  
  
51642 + 464902 Bytes symbol space free  
  
0 Warning Errors  
0 Severe Errors  
  
C:\>link rev.obj  
  
Microsoft (R) Overlay Linker Version 3.60  
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.  
  
Run File [REV.EXE]:  
List File [NUL.MAP]:  
Libraries [LIB]:  
  
C:\>rev.exe  
sad  
C:\>S
```

ALGORITHM:

Block Transfer

Input:

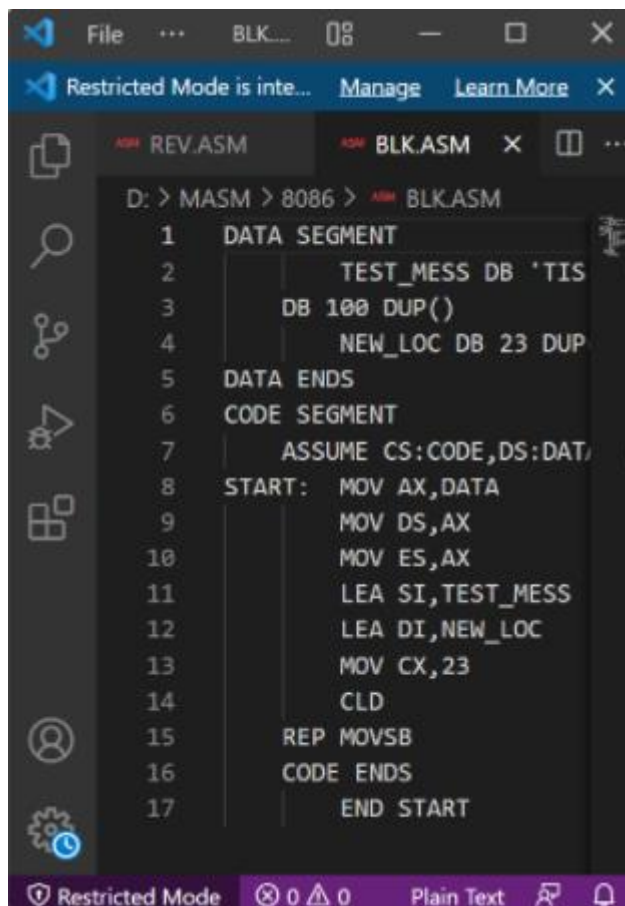
-> "TIS TIME FOR A NEW HOME" as input

Process:

- SI and DI points a character of source and Destination
- CLD and REP MOVSB commands takes care of automatic incrementation of SI, DI and CX registers after copying bytes from source Index address to Destination Index address.

Conclusion for reversing the string: String in the reverse manner as output

CODE:



```
D: > MASM > 8086 > ASM BLK.ASM
1  DATA SEGMENT
2      TEST_MESS DB 'TIS
3      DB 100 DUP()
4      NEW_LOC DB 23 DUP
5  DATA ENDS
6  CODE SEGMENT
7      ASSUME CS:CODE,DS:DAT
8  START:  MOV AX,DATA
9          MOV DS,AX
10         MOV ES,AX
11         LEA SI,TEST_MESS
12         LEA DI,NEW_LOC
13         MOV CX,23
14         CLD
15         REP MOVSB
16     CODE ENDS
17     END START
```

DATA SEGMENT

TEST_MESS DB 'TIS TIME FOR A NEW HOME'

DB 100 DUP()

```

        NEW_LOC DB 23 DUP(0)

DATA ENDS

CODE SEGMENT

        ASSUME CS:CODE,DS:DATA,ES:DATA

START:  MOV AX,DATA

        MOV DS,AX

        MOV ES,AX

        LEA SI,TEST_MESS

        LEA DI,NEW_LOC

        MOV CX,23

        CLD

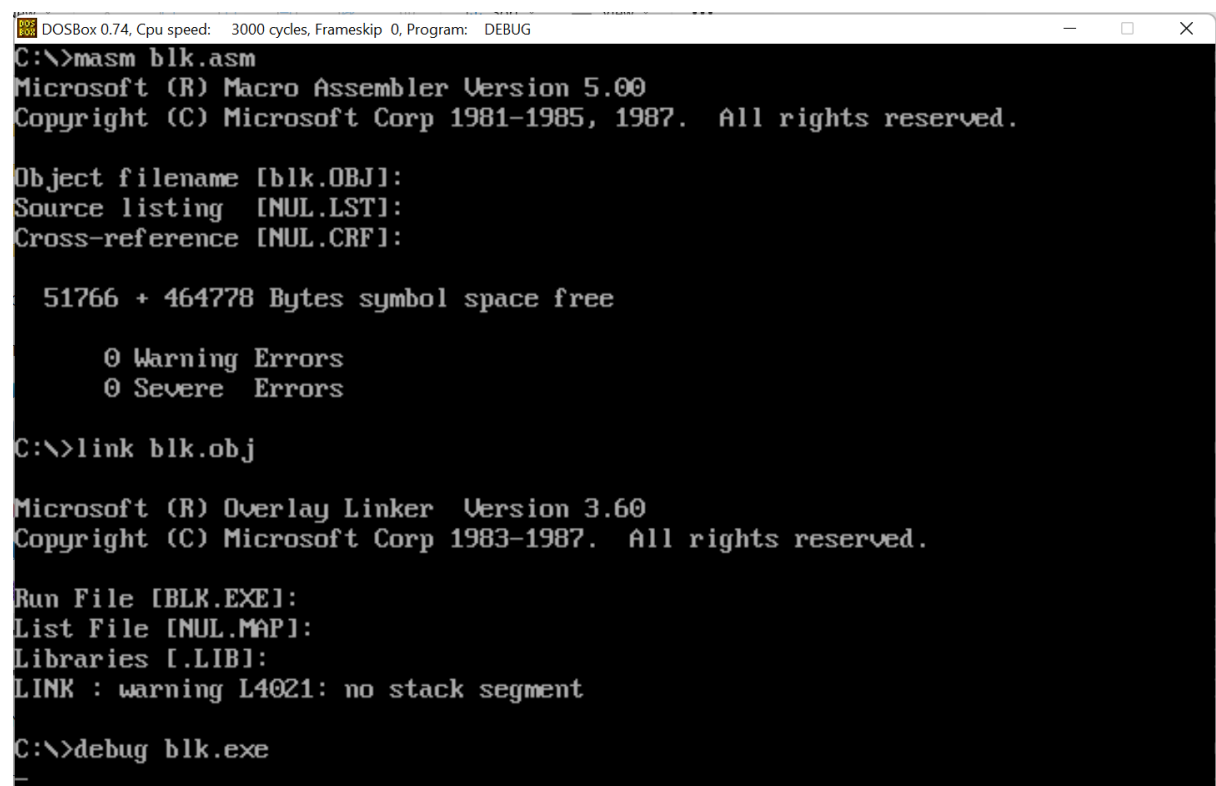
        REP MOVSB

CODE ENDS

        END START

```

OUTPUT:



```

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

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

51766 + 464778 Bytes symbol space free

0 Warning Errors
0 Severe Errors

C:\>link blk.obj

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

Run File [BLK.EXE]:
List File [NUL.MAP]:
Libraries [.LIB]:
LINK : warning L4021: no stack segment

C:\>debug blk.exe

```

```
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip: 0, Program: DEBUG
-t
AX=076A BX=0000 CX=00B5 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=0769 CS=0774 IP=0003  NU UP EI PL NZ NA PO NC
0774:0003 8ED8          MOV     DS,AX
-t
AX=076A BX=0000 CX=00B5 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=076A ES=075A SS=0769 CS=0774 IP=0005  NU UP EI PL NZ NA PO NC
0774:0005 8EC0          MOV     ES,AX
-t
AX=076A BX=0000 CX=00B5 DX=0000 SP=0000 BP=0000 SI=0000 DI=0000
DS=076A ES=076A SS=0769 CS=0774 IP=0007  NU UP EI PL NZ NA PO NC
0774:0007 8D360000      LEA     SI,[0000]          DS:0000=4954
-d ds:0000
076A:0000 54 49 53 20 54 49 4D 45-20 46 4F 52 20 41 20 4E  TIS TIME FOR A N
076A:0010 45 57 20 48 4F 4D 45 00-00 00 00 00 00 00 00 00  EW HOME.....
076A:0020 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
076A:0030 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
076A:0040 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
076A:0050 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
076A:0060 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
076A:0070 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00  .....
```

```
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip: 0, Program: DEBUG
0774:000F B91700      MOV     CX,0017
-t
AX=076A BX=0000 CX=0017 DX=0000 SP=0000 BP=0000 SI=0000 DI=007B
DS=076A ES=076A SS=0769 CS=0774 IP=0012  NU UP EI PL NZ NA PO NC
0774:0012 FC          CLD
-t
AX=076A BX=0000 CX=0017 DX=0000 SP=0000 BP=0000 SI=0000 DI=007B
DS=076A ES=076A SS=0769 CS=0774 IP=0013  NU UP EI PL NZ NA PO NC
0774:0013 F3          REPZ
0774:0014 A4          MOUSB
-t
AX=076A BX=0000 CX=0016 DX=0000 SP=0000 BP=0000 SI=0001 DI=007C
DS=076A ES=076A SS=0769 CS=0774 IP=0013  NU UP EI PL NZ NA PO NC
0774:0013 F3          REPZ
0774:0014 A4          MOUSB
-t
AX=076A BX=0000 CX=0015 DX=0000 SP=0000 BP=0000 SI=0002 DI=007D
DS=076A ES=076A SS=0769 CS=0774 IP=0013  NU UP EI PL NZ NA PO NC
0774:0013 F3          REPZ
0774:0014 A4          MOUSB
-
```

```
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
-t
AX=076A BX=0000 CX=0014 DX=0000 SP=0000 BP=0000 SI=0003 DI=007E
DS=076A ES=076A SS=0769 CS=0774 IP=0013 NU UP EI PL NZ NA PO NC
0774:0013 F3 REPZ
0774:0014 A4 MOUSB
-t
AX=076A BX=0000 CX=0013 DX=0000 SP=0000 BP=0000 SI=0004 DI=007F
DS=076A ES=076A SS=0769 CS=0774 IP=0013 NU UP EI PL NZ NA PO NC
0774:0013 F3 REPZ
0774:0014 A4 MOUSB
-t
AX=076A BX=0000 CX=0012 DX=0000 SP=0000 BP=0000 SI=0005 DI=0080
DS=076A ES=076A SS=0769 CS=0774 IP=0013 NU UP EI PL NZ NA PO NC
0774:0013 F3 REPZ
0774:0014 A4 MOUSB
-t
AX=076A BX=0000 CX=0011 DX=0000 SP=0000 BP=0000 SI=0006 DI=0081
DS=076A ES=076A SS=0769 CS=0774 IP=0013 NU UP EI PL NZ NA PO NC
0774:0013 F3 REPZ
0774:0014 A4 MOUSB
-
```

```
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
-t
AX=076A BX=0000 CX=000E DX=0000 SP=0000 BP=0000 SI=0009 DI=0084
DS=076A ES=076A SS=0769 CS=0774 IP=0013 NU UP EI PL NZ NA PO NC
0774:0013 F3 REPZ
0774:0014 A4 MOUSB
-t
AX=076A BX=0000 CX=000D DX=0000 SP=0000 BP=0000 SI=000A DI=0085
DS=076A ES=076A SS=0769 CS=0774 IP=0013 NU UP EI PL NZ NA PO NC
0774:0013 F3 REPZ
0774:0014 A4 MOUSB
-t
AX=076A BX=0000 CX=000C DX=0000 SP=0000 BP=0000 SI=000B DI=0086
DS=076A ES=076A SS=0769 CS=0774 IP=0013 NU UP EI PL NZ NA PO NC
0774:0013 F3 REPZ
0774:0014 A4 MOUSB
-t
AX=076A BX=0000 CX=000B DX=0000 SP=0000 BP=0000 SI=000C DI=0087
DS=076A ES=076A SS=0769 CS=0774 IP=0013 NU UP EI PL NZ NA PO NC
0774:0013 F3 REPZ
0774:0014 A4 MOUSB
-
```

```
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
-t
AX=076A BX=0000 CX=0008 DX=0000 SP=0000 BP=0000 SI=000F DI=008A
DS=076A ES=076A SS=0769 CS=0774 IP=0013  NU UP EI PL NZ NA PO NC
0774:0013 F3          REPZ
0774:0014 A4          MOUSB
-t
AX=076A BX=0000 CX=0007 DX=0000 SP=0000 BP=0000 SI=0010 DI=008B
DS=076A ES=076A SS=0769 CS=0774 IP=0013  NU UP EI PL NZ NA PO NC
0774:0013 F3          REPZ
0774:0014 A4          MOUSB
-t
AX=076A BX=0000 CX=0006 DX=0000 SP=0000 BP=0000 SI=0011 DI=008C
DS=076A ES=076A SS=0769 CS=0774 IP=0013  NU UP EI PL NZ NA PO NC
0774:0013 F3          REPZ
0774:0014 A4          MOUSB
-t
AX=076A BX=0000 CX=0005 DX=0000 SP=0000 BP=0000 SI=0012 DI=008D
DS=076A ES=076A SS=0769 CS=0774 IP=0013  NU UP EI PL NZ NA PO NC
0774:0013 F3          REPZ
0774:0014 A4          MOUSB
-
```

```
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
DS=076A ES=076A SS=0769 CS=0774 IP=0013  NU UP EI PL NZ NA PO NC
0774:0013 F3          REPZ
0774:0014 A4          MOUSB
-t
AX=076A BX=0000 CX=0001 DX=0000 SP=0000 BP=0000 SI=0016 DI=0091
DS=076A ES=076A SS=0769 CS=0774 IP=0013  NU UP EI PL NZ NA PO NC
0774:0013 F3          REPZ
0774:0014 A4          MOUSB
-t
AX=076A BX=0000 CX=0000 DX=0000 SP=0000 BP=0000 SI=0017 DI=0092
DS=076A ES=076A SS=0769 CS=0774 IP=0015  NU UP EI PL NZ NA PO NC
0774:0015 E9BD00      JMP     00A5
-t
AX=076A BX=0000 CX=0000 DX=0000 SP=0000 BP=0000 SI=0017 DI=0092
DS=076A ES=076A SS=0769 CS=0774 IP=00A5  NU UP EI PL NZ NA PO NC
0774:00A5 5E          POP     SI
-t
AX=076A BX=0000 CX=0000 DX=0000 SP=0002 BP=0000 SI=0000 DI=0092
DS=076A ES=076A SS=0769 CS=0774 IP=00A6  NU UP EI PL NZ NA PO NC
0774:00A6 8BE5        MOV     SP,BP
-
```



```
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
AX=076A BX=0000 CX=0000 DX=0000 SP=0000 BP=0000 SI=0000 DI=0092
DS=076A ES=076A SS=0769 CS=0774 IP=00A8 NU UP EI PL NZ NA PO NC
0774:00A8 5D POP BP
-t

AX=076A BX=0000 CX=0000 DX=0000 SP=0002 BP=7302 SI=0000 DI=0092
DS=076A ES=076A SS=0769 CS=0774 IP=00A9 NU UP EI PL NZ NA PO NC
0774:00A9 C3 RET
-t

AX=076A BX=0000 CX=0000 DX=0000 SP=0004 BP=7302 SI=0000 DI=0092
DS=076A ES=076A SS=0769 CS=0774 IP=0000 NU UP EI PL NZ NA PO NC
0774:0000 B86A07 MOV AX,076A
-d ds:007b
076A:0070 54 49 53 20 54 TIS T
076A:0080 49 4D 45 20 46 4F 52 20-41 20 4E 45 57 20 48 4F IME FOR A NEW HO
076A:0090 4D 45 00 00 00 00 00 00-00 00 00 00 00 00 00 ME.....
076A:00A0 B8 6A 07 8E D8 8E C0 8D-36 00 00 8D 3E 7B 00 B9 .j.....6...>f..
076A:00B0 17 00 FC F3 A4 E9 8D 00-8A 86 FA FE 2A E4 40 50 .....*.@P
076A:00C0 8D 86 FA FE 50 8D 86 7C-FF 50 E8 C5 72 83 C4 06 ....P..i.P..r...
076A:00D0 8B 9E 7A FF D1 E3 D1 E3-8B 87 CC 17 8B 97 CE 17 ..z.....
076A:00E0 89 46 FC 89 56 FE 05 0C-00 52 50 E8 42 48 83 C4 .F..U....RP.BH..
076A:00F0 04 50 8D 86 7C FF 50 E8-02 0F 83 .P..i.P....
-

```

```
DOSBox 0.74, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
DS=076A ES=076A SS=0769 CS=0774 IP=0015 NU UP EI PL NZ NA PO NC
0774:0015 E98D00 JMP 00A5
-t

AX=076A BX=0000 CX=0000 DX=0000 SP=0004 BP=7302 SI=0017 DI=0092
DS=076A ES=076A SS=0769 CS=0774 IP=00A5 NU UP EI PL NZ NA PO NC
0774:00A5 5E POP SI
-t

AX=076A BX=0000 CX=0000 DX=0000 SP=0006 BP=7302 SI=0000 DI=0092
DS=076A ES=076A SS=0769 CS=0774 IP=00A6 NU UP EI PL NZ NA PO NC
0774:00A6 8BE5 MOV SP,BP
-d ds:007b
^ Error
-d ds:007b
076A:0070 54 49 53 20 54 TIS T
076A:0080 49 4D 45 20 46 4F 52 20-41 20 4E 45 57 20 48 4F IME FOR A NEW HO
076A:0090 4D 45 00 00 00 00 00 00-00 00 00 00 00 00 00 ME.....
076A:00A0 B8 6A 07 8E D8 8E C0 8D-36 00 00 8D 3E 7B 00 B9 .j.....6...>f..
076A:00B0 17 00 FC F3 A4 E9 8D 00-8A 86 FA FE 2A E4 40 50 .....*.@P
076A:00C0 8D 86 FA FE 50 8D 86 7C-FF 50 E8 C5 72 83 C4 06 ....P..i.P..r...
076A:00D0 8B 9E 7A FF D1 E3 D1 E3-8B 87 CC 17 8B 97 CE 17 ..z.....
076A:00E0 89 46 FC 89 56 FE 05 0C-00 52 50 E8 42 48 83 C4 .F..U....RP.BH..
076A:00F0 04 50 8D 86 7C FF 50 E8-02 0F 83 .P..i.P....
-

```