



Shri Vile Parle Kelavani Mandal's

DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING

(Autonomous College Affiliated to the University of Mumbai)

NAAC Accredited with "A" Grade (CGPA : 3.18)



A.Y. 2022-2023

PROCESSOR ORGANIZATION AND **ARCHITECTURE**

AYUSH JAIN

COMPUTER ENGINEERING | TE – B2 | 60004200132

EXPERIMENT – 6

Aim: a) Assembly program to sort numbers in ascending order.

Code:

DATA SEGMENT

STRING1 DB 99H, 12H, 56H, 45H, 36H

DATA ENDS

CODE SEGMENT

ASSUME CS:CODE,DS:DATA

START: MOV AX,DATA

MOV DS,AX

MOV CH,04H

UP2: MOV CL,04H

LEA SI,STRING1

UP1:MOV AL,[SI]

MOV BL,[SI+1]

CMP AL,BL

JC DOWN

MOV DL,[SI+1]

XCHG [SI],DL

MOV [SI+1],DL

DOWN: INC SI

DEC CL

JNZ UP1

DEC CH

JNZ UP2

CODE ENDS

END START



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Output:

The screenshot shows the emul086 emulator interface. The main window displays assembly code with the following content:

```
001 DATA SEGMENT
002 STRING1 DB 99h, 12h, 56h, 45h, 36h
003 DATA ENDS
004
005 CODE SEGMENT
006 ASSUME CS:CODE, DS:DATA
007 START: MOV AX, DATA
008 MOV DS, AX
009
010 MOV CH, 04h
011
012 UP2: MOV CL, 04h
013 LEA SI, STRING1
014
015 UP1: MOV AL, [SI]
016 MOV BL, [SI+1]
017 CMP AL, BL
018 JNC DOWN
019 MOV DL, [SI+1]
020 XCHG [SI], DL
021 MOV [SI+1], DL
022
023 DOWN: INC SI
024 DEC CL
025 JNZ UP1
026 DEC CH
027 JNZ UP2
028
029 CODE ENDS
030 END START
```

The registers window shows the following values:

Register	Value
AX	0000
BC	0000
CD	0000
DE	0000
HI	0000
IP	0000
SP	0000
SI	0000
DI	0000
DS	0700
ES	0700

The flags window shows the following values:

Flag	Value
CF	0
ZF	0
SF	0
OF	0
PF	0
AF	0
IF	1
DF	0

The variables window shows the following values:

Variable	Value
STRING1	99h, 12h, 56h, 45h, 36h

The screenshot shows the emul086 emulator interface. The main window displays assembly code with the following content:

```
001 DATA SEGMENT
002 STRING1 DB 99h, 12h, 56h, 45h, 36h
003 DATA ENDS
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005 CODE SEGMENT
006 ASSUME CS:CODE, DS:DATA
007 START: MOV AX, DATA
008 MOV DS, AX
009
010 MOV CH, 04h
011
012 UP2: MOV CL, 04h
013 LEA SI, STRING1
014
015 UP1: MOV AL, [SI]
016 MOV BL, [SI+1]
017 CMP AL, BL
018 JNC DOWN
019 MOV DL, [SI+1]
020 XCHG [SI], DL
021 MOV [SI+1], DL
022
023 DOWN: INC SI
024 DEC CL
025 JNZ UP1
026 DEC CH
027 JNZ UP2
028
029 CODE ENDS
030 END START
```

The registers window shows the following values:

Register	Value
AX	0756
BC	0099
CD	0000
DE	0045
HI	0711
IP	0830
SP	0710
SI	0000
DI	0000
DS	0710
ES	0700

The flags window shows the following values:

Flag	Value
CF	1
ZF	1
SF	0
OF	0
PF	1
AF	0
IF	1
DF	0

The variables window shows the following values:

Variable	Value
STRING1	12h, 36h, 45h, 56h, 99h



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b) Assembly program to sort numbers in descending order

Code:

DATA SEGMENT

STRING1 DB 99H, 12H, 56H, 45H, 36H

DATA ENDS

CODE SEGMENT

ASSUME CS:CODE,DS:DATA

START: MOV AX,DATA

MOV DS,AX

MOV CH,04H

UP2: MOV CL,04H

LEA SI,STRING1

UP1:MOV AL,[SI]

MOV BL,[SI+1]

CMP AL,BL

JNC DOWN

MOV DL,[SI+1]

XCHG [SI],DL

MOV [SI+1],DL

DOWN: INC SI

DEC CL

JNZ UP1

DEC CH

JNZ UP2

CODE ENDS

END START



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Output:

emu0086 - assembler and microprocessor emulator 4.00

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Load reload step back single step run step delay ms: 0

registers

name	value
AX	00 00
CX	00 00
DX	00 00
BP	0000
IP	0000
SP	0000
SI	0000
DI	0000
DS	0000
ES	0000

flags

flag	value
CF	0
ZF	0
SF	0
OF	0
PF	0
AF	0
IF	1
DF	0

variables

name	value
STRING1	99h, 12h, 56h, 45h, 36h

emu0086 - assembler and microprocessor emulator 4.00

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Load reload step back single step run step delay ms: 0

registers

name	value
AX	07 36
CX	00 00
DX	00 00
BP	0000
IP	0000
SP	0000
SI	0000
DI	0000
DS	0000
ES	0000

flags

flag	value
CF	0
ZF	1
SF	0
OF	0
PF	1
AF	0
IF	1
DF	0

variables

name	value
STRING1	99h, 56h, 45h, 36h, 12h

Conclusion: To write and emulate assembly program to sort numbers in ascending/ descending order.