

**GEBZE TECHNICAL UNIVERSITY**  
**Computer Engineering Department**



**CSE 312 / CSE 504**

**Homework #01**

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- Ödevde ilk önce gtuos.cpp ve gtuos.h dosyalarına 6 tane system call yazılmıştır.
- Bu system call'lar A register'inin içindeki değere göre çağrılır.
- Daha sonra bu system call'ları içinde kullanan 5 tane asm dosyası yazıldı.
- Bunlar; **PrintNumbers.asm**, **PrintNumbersRev.asm**, **Sort.asm**, **Search.asm** ve **test.asm** ' dir.
- **PrintNumbers.asm:** 0' dan 50'ye kadar olan integer degerleri aralarında new line olacak şekilde yazdırır.

```
System Call : PRINT_B
B: 40
System Call : PRINT_B
B: 41
System Call : PRINT_B
B: 42
System Call : PRINT_B
B: 43
System Call : PRINT_B
B: 44
System Call : PRINT_B
B: 45
System Call : PRINT_B
B: 46
System Call : PRINT_B
B: 47
System Call : PRINT_B
B: 48
System Call : PRINT_B
B: 49
System Call : PRINT_B
B: 50
Total Number of Cycle : 8048
cse312@ubuntu:~/Desktop/a$
```

0 dan 50 ye kadar yukardaki gibi print eder.

```
System Call : PRINT_B
B: 100
System Call : PRINT_B
B: 99
System Call : PRINT_B
B: 98
System Call : PRINT_B
B: 97
System Call : PRINT_B
B: 96
System Call : PRINT_B
B: 95
System Call : PRINT_B
B: 94
```

- **PrintNumbersRev:** 100'den 50'ye kadar olan integer degerleri aralarında new line olacak şekilde yazdırır.

.....

```
System Call : PRINT_B
B: 57
System Call : PRINT_B
B: 56
System Call : PRINT_B
B: 55
System Call : PRINT_B
B: 54
System Call : PRINT_B
B: 53
System Call : PRINT_B
B: 52
System Call : PRINT_B
B: 51
System Call : PRINT_B
B: 50
Total Number of Cycle : 8048
cse312@ubuntu:~/Desktop/a$
```

- **Sort.asm:** Ödevin pdf inde verilen arrayi DW kullanarak memory yazılır ve bunların sıralamasını yapar. Sıralama için bubble sort algoritması kullanılmıştır. Eğer arrayde bulursa bulunan elemanın indexini, bulamazsa 'error' u print eder.

array dw 12H, 34H, 23H, 2AH, 5BH, 6FH, 33H, 21H, 7CH, \$FFH, \$BAH, \$CBH, \$A1H, 1AH, 3BH, \$C3H, 4AH, 5DH, 62H, \$A3H, \$B1H, 5CH, 7FH, \$CCH, \$AAH, 34H

- Array yukardaki gibi oluşturulmuştur. Array sıralandıktan sonra PRINT\_B ile decimal olarak sıralanmış hali bastırılır.

```
cse312@ubuntu:~/Desktop/a$ ./a.out part3.com 0
System Call : PRINT_B
B: 18
System Call : PRINT_B
B: 26
System Call : PRINT_B
B: 33
System Call : PRINT_B
B: 35
System Call : PRINT_B
B: 42
System Call : PRINT_B
B: 51
System Call : PRINT_B
B: 52
System Call : PRINT_B
B: 52
System Call : PRINT_B
B: 59
System Call : PRINT_B
B: 74
System Call : PRINT_B
B: 91
System Call : PRINT_B
B: 92
System Call : PRINT_B
B: 93
System Call : PRINT_B
B: 98
System Call : PRINT_B
B: 111
```

```
System Call : PRINT_B
B: 124
System Call : PRINT_B
B: 127
System Call : PRINT_B
B: 161
System Call : PRINT_B
B: 163
System Call : PRINT_B
B: 170
System Call : PRINT_B
B: 177
System Call : PRINT_B
B: 186
System Call : PRINT_B
B: 195
System Call : PRINT_B
B: 203
System Call : PRINT_B
B: 204
System Call : PRINT_B
B: 255
Total Number of Cycle : 44093
cse312@ubuntu:~/Desktop/a$
```

- **Search.asm:** Ödevin pdf'inde verilen array üzerinden konsoldan değer alarak arama yapar. Eğer arrayde, aranan değeri bulursa bulunduğu index PRINT\_B ile gösterilir, bulamazsa PRINT\_STR ile 'error' yazdırılır.
- Memory'e yazılan değerler hexadecimal olduğu için keyboard'dan aranan değer decimal karşılığı girilmelidir.Örneğin 12 değerini aratmak istiyorsak decimal karşılığı olan 18 girilmelidir.

```
cse312@ubuntu:~/Desktop/a$ ./a.out part4.com 0
System Call : READ_B
21
System Call : PRINT_STR
ERROR
Total Number of Cycle : 1619
cse312@ubuntu:~/Desktop/a$
```

```
cse312@ubuntu:~/Desktop/a$ ./a.out part4.com 0
System Call : READ_B
170
System Call : PRINT_B
B: 24
Total Number of Cycle : 1454
cse312@ubuntu:~/Desktop/a$
```

- **test.asm**: ilk basta yazılan system call'lar tek tek denenir.

```
cse312@ubuntu:~/Desktop/a$ ./a.out part5.com 0

System Call : READ_B
12

System Call : PRINT_B
B: 12
System Call : READ_MEM
41

System Call : PRINT_MEM
BC: 41
System Call : READ_STR
onursezer

System Call : PRINT_STR
onursezer
Total Number of Cycle : 1024
cse312@ubuntu:~/Desktop/a$
```

- Her program çalıştırıldığında toplam cycle sayısı gösterilir.
- gtuos.cpp de memoy nin içeriğini konsolda gösteren bi method yazılmıştır. Bu method mainden program bitmeden önce çağrılarak memory'nin son hali 'exe.mem' dosyasına yazdırılır.
- DEBUG modları yazılmıştır.

```
cse312@ubuntu: ~/Desktop/a
001c JNZ $0014 ..... A $01 B $31 C $01 D $32 E $00 H $00 L $00 SP f000
0014 MOV B,D ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP f000
0015 MVI A,$01 ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP f000
0017 CALL $0003 ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP effe
0003 PUSH D ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP effc
0004 PUSH D ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP effa
0005 PUSH H ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP eff8
0006 PUSH PSW ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP eff6

System Call : PRINT_B
B: 500007 NOP ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP eff6
SP eff6
0008 POP PSW ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP eff8
0009 POP H ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP effa
000a POP D ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP effc
000b POP D ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP effe
000c RET ..... A $01 B $32 C $01 D $32 E $00 H $00 L $00 SP f000
001a INR D ..... A $01 B $32 C $01 D $33 E $00 H $00 L $00 SP f000
001b DCR C ..... A $01 B $32 C $00 D $33 E $00 H $00 L $00 SP f000
001c JNZ $0014 ..... A $01 B $32 C $00 D $33 E $00 H $00 L $00 SP f000
001f HLT ..... A $01 B $32 C $00 D $33 E $00 H $00 L $00 SP f000

Total Number of Cycle : 8048
cse312@ubuntu:~/Desktop/a$
```



DEBUG mode 1

```
cse312@ubuntu:~/Desktop/a$ ./a.out part1.com 2
0000 JMP $000d ..... A $00 B $00 C $00 D $00 E $00 H $00 L $00 SP 0000
000d LXI SP,$f000 ..... A $00 B $00 C $00 D $00 E $00 H $00 L $00 SP f000
0010 MVI C,$33 ..... A $00 B $00 C $33 D $00 E $00 H $00 L $00 SP f000
0012 MVI D,$00 ..... A $00 B $00 C $33 D $00 E $00 H $00 L $00 SP f000
0014 MOV B,D ..... A $00 B $00 C $33 D $00 E $00 H $00 L $00 SP f000
0015 MVI A,$01 ..... A $01 B $00 C $33 D $00 E $00 H $00 L $00 SP f000
0017 CALL $0003 ..... A $01 B $00 C $33 D $00 E $00 H $00 L $00 SP effe
0003 PUSH D ..... A $01 B $00 C $33 D $00 E $00 H $00 L $00 SP effc
0004 PUSH D ..... A $01 B $00 C $33 D $00 E $00 H $00 L $00 SP effa
0005 PUSH H ..... A $01 B $00 C $33 D $00 E $00 H $00 L $00 SP eff8
```



DEBUG mode 2