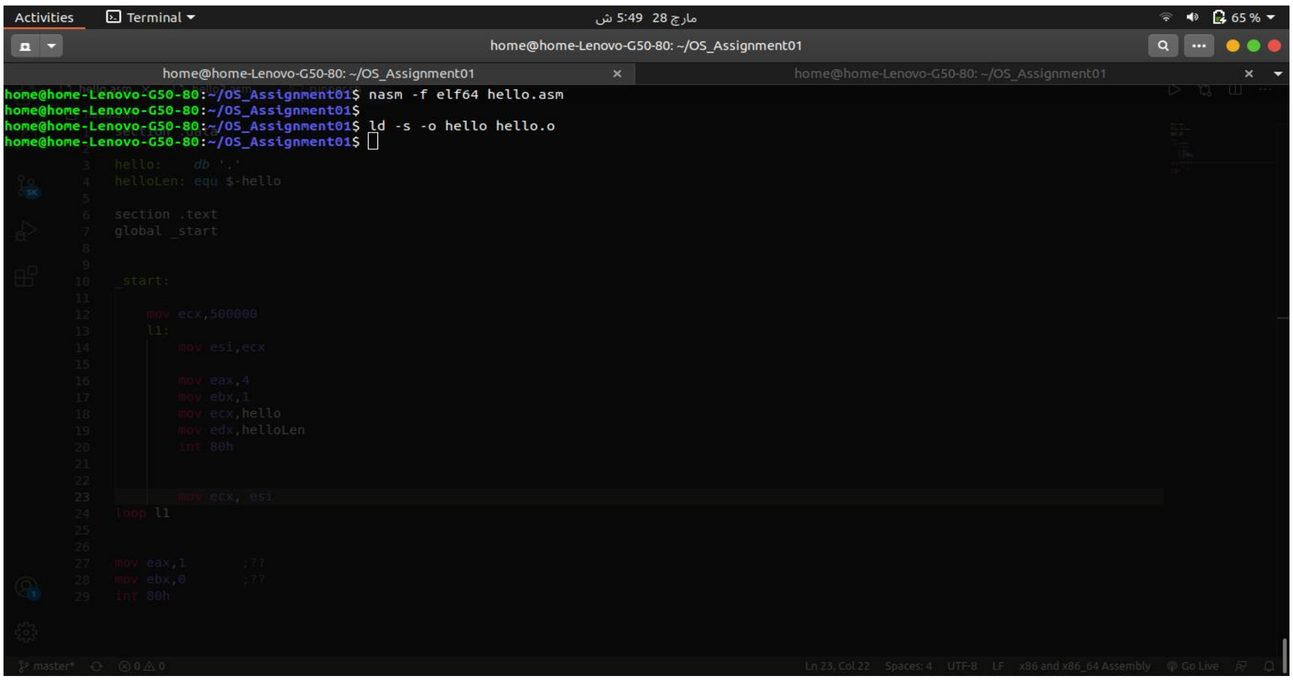
CS220 Operating Systems
Assignment 01

Muhammad Hassan
p176157 (6B)

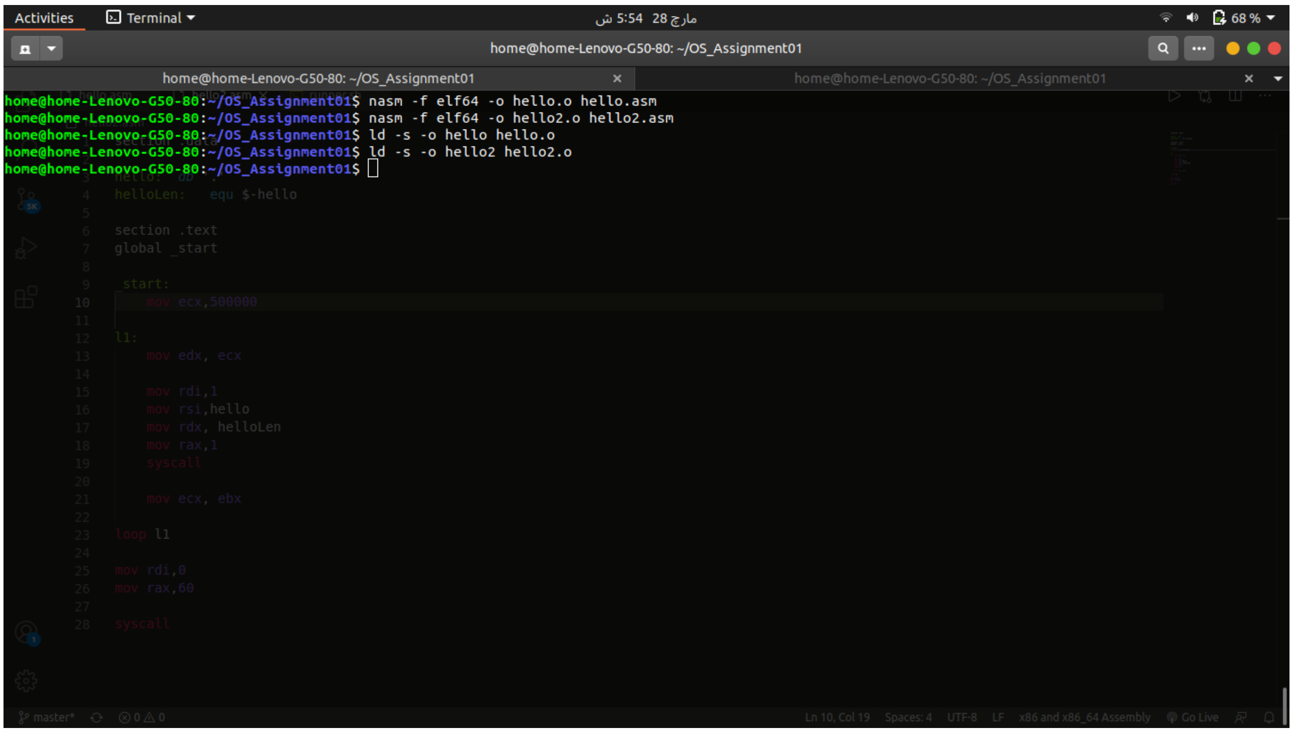
Number of experiments run:	N = 50 times
Average 'user time' for hello (*int-based calls*):	I = 0.108 seconds
Average 'user time' for hello2 (*syscall-based calls*):	S = 0.058 seconds
Percentage speedup: (I-S)*100/I	=46%

screenshots

Commands for Compiling and linking



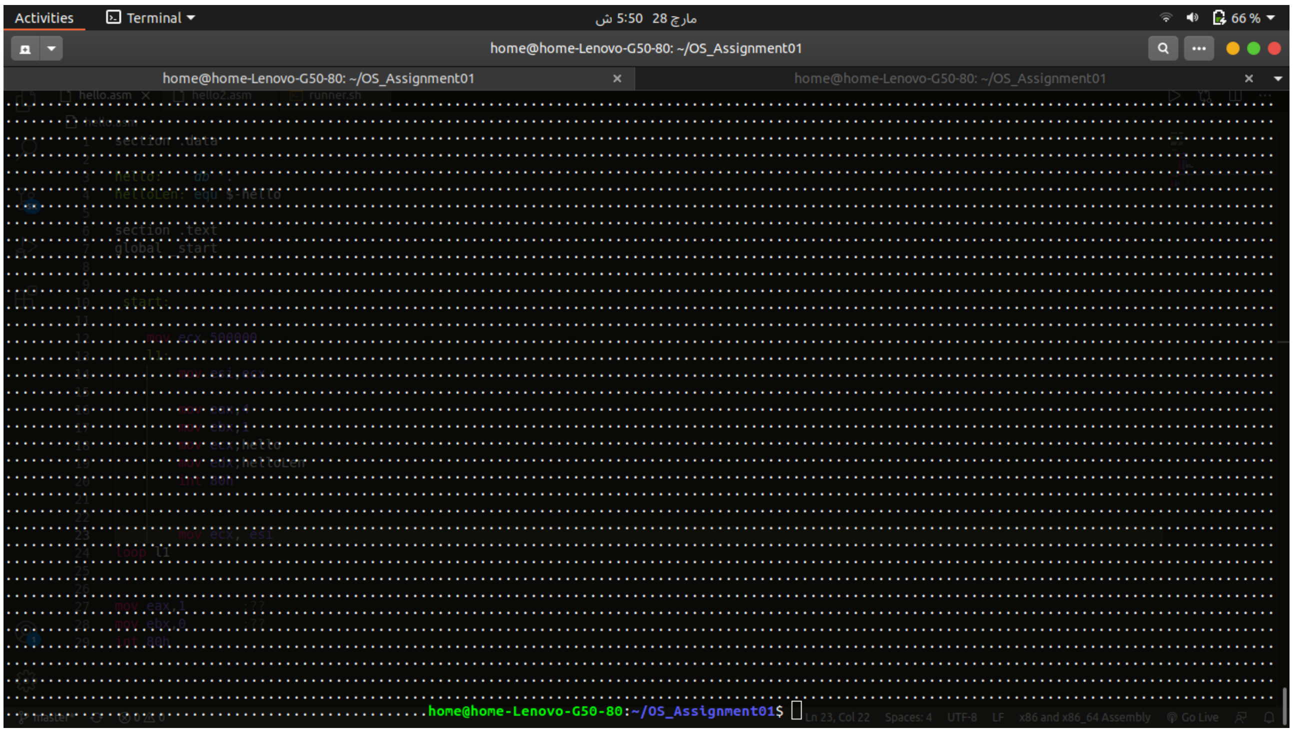
```
home@home-Lenovo-G50-80:~/OS_Assignment01$ nasm -f elf64 hello.asm
home@home-Lenovo-G50-80:~/OS_Assignment01$
home@home-Lenovo-G50-80:~/OS_Assignment01$ ld -s -o hello hello.o
home@home-Lenovo-G50-80:~/OS_Assignment01$ 
```



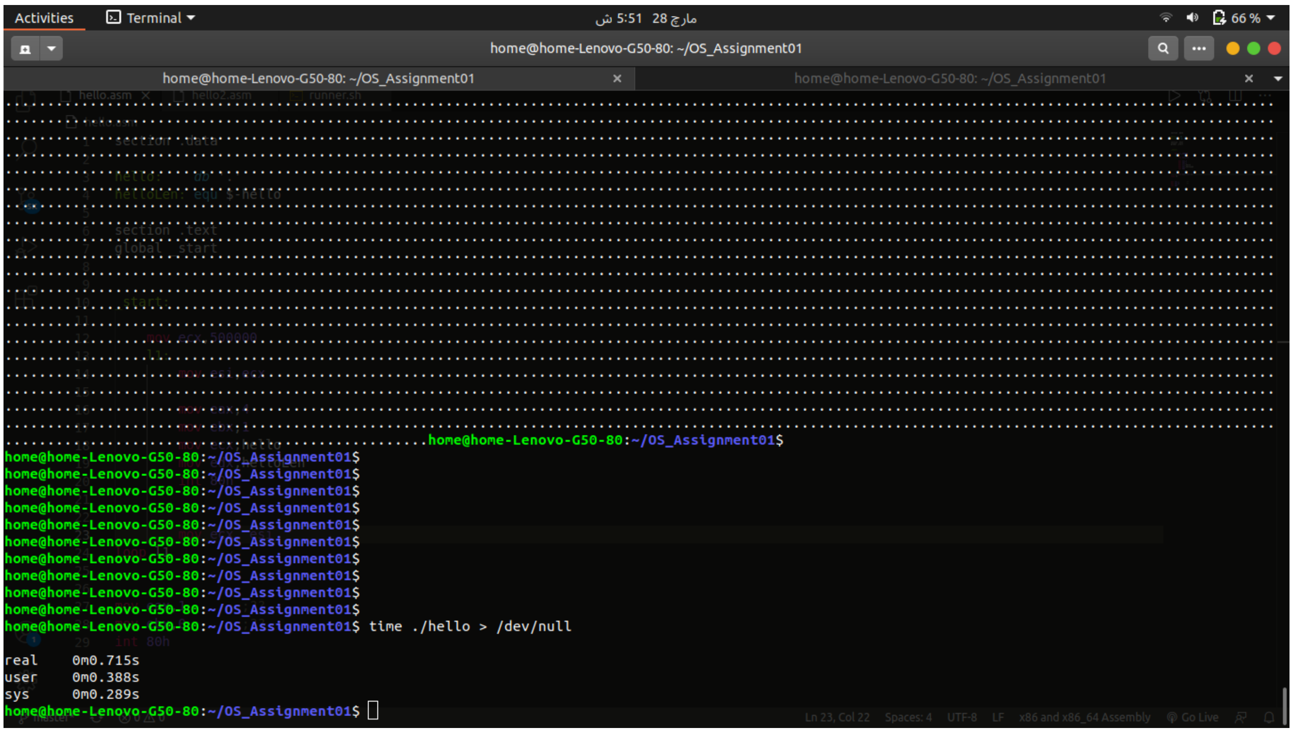
```
home@home-Lenovo-G50-80:~/OS_Assignment01$ nasm -f elf64 -o hello.o hello.asm
home@home-Lenovo-G50-80:~/OS_Assignment01$ nasm -f elf64 -o hello2.o hello2.asm
home@home-Lenovo-G50-80:~/OS_Assignment01$ ld -s -o hello hello.o
home@home-Lenovo-G50-80:~/OS_Assignment01$ ld -s -o hello2 hello2.o
home@home-Lenovo-G50-80:~/OS_Assignment01$ 
```

```
helloLen:   equ $-hello

section .text
global _start

 _start:
    mov ecx,500000

l1:
    mov edx, ecx

    mov rdi,1
    mov rsi,hello
    mov rdx, helloLen
    mov rax,1
    syscall

    mov ecx, ebx

loop l1

mov rdi,0
mov rax,60

syscall
```

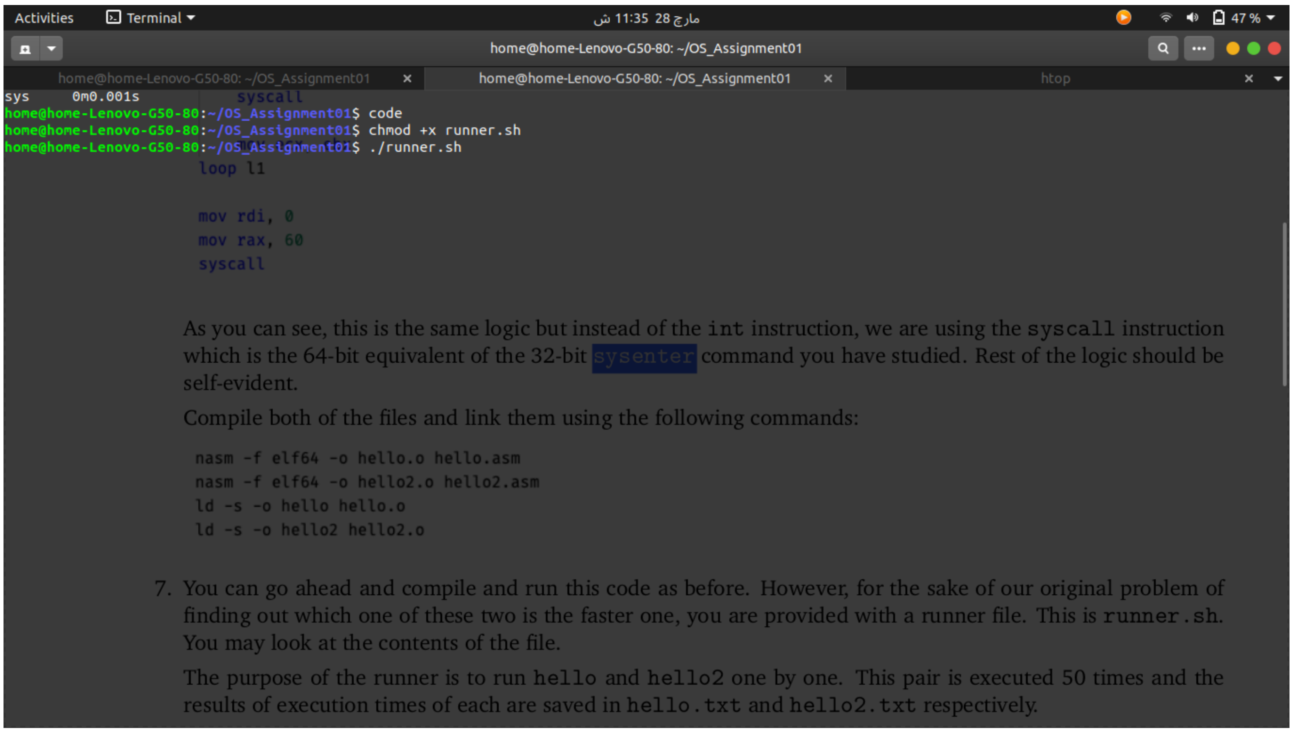
After running ./hello printing 50000 dots



```
...............................................home@home-Lenovo-G50-80:~/OS_Assignment01$ 
```



```
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
..................................................................................................................................
...........................................home@home-Lenovo-G50-80:~/OS_Assignment01$
home@home-Lenovo-G50-80:~/OS_Assignment01$
home@home-Lenovo-G50-80:~/OS_Assignment01$
home@home-Lenovo-G50-80:~/OS_Assignment01$
home@home-Lenovo-G50-80:~/OS_Assignment01$
home@home-Lenovo-G50-80:~/OS_Assignment01$
home@home-Lenovo-G50-80:~/OS_Assignment01$
home@home-Lenovo-G50-80:~/OS_Assignment01$
home@home-Lenovo-G50-80:~/OS_Assignment01$
home@home-Lenovo-G50-80:~/OS_Assignment01$
home@home-Lenovo-G50-80:~/OS_Assignment01$
home@home-Lenovo-G50-80:~/OS_Assignment01$ time ./hello > /dev/null

real    0m0.715s
user    0m0.388s
sys     0m0.289s
home@home-Lenovo-G50-80:~/OS_Assignment01$
```



```
sys     0m0.001s
home@home-Lenovo-G50-80:~/OS_Assignment01$ code
home@home-Lenovo-G50-80:~/OS_Assignment01$ chmod +x runner.sh
home@home-Lenovo-G50-80:~/OS_Assignment01$ ./runner.sh
```

```
    loop l1

    mov rdi, 0
    mov rax, 60
    syscall
```

As you can see, this is the same logic but instead of the `int` instruction, we are using the `syscall` instruction which is the 64-bit equivalent of the 32-bit `sysenter` command you have studied. Rest of the logic should be self-evident.

Compile both of the files and link them using the following commands:

```
nasm -f elf64 -o hello.o hello.asm
nasm -f elf64 -o hello2.o hello2.asm
ld -s -o hello hello.o
ld -s -o hello2 hello2.o
```

7. You can go ahead and compile and run this code as before. However, for the sake of our original problem of finding out which one of these two is the faster one, you are provided with a runner file. This is `runner.sh`. You may look at the contents of the file.

   The purpose of the runner is to run `hello` and `hello2` one by one. This pair is executed 50 times and the results of execution times of each are saved in `hello.txt` and `hello2.txt` respectively.