OPERATING SYSTEMS

Assignment-1

System Calls Through Assembly Language

SYED ASAD ZAMAN

p18-0034

Department of Computer Science

Number of experiments run :

N = 50

Average 'user time' for hello (int-based calls):

I = 1.028200

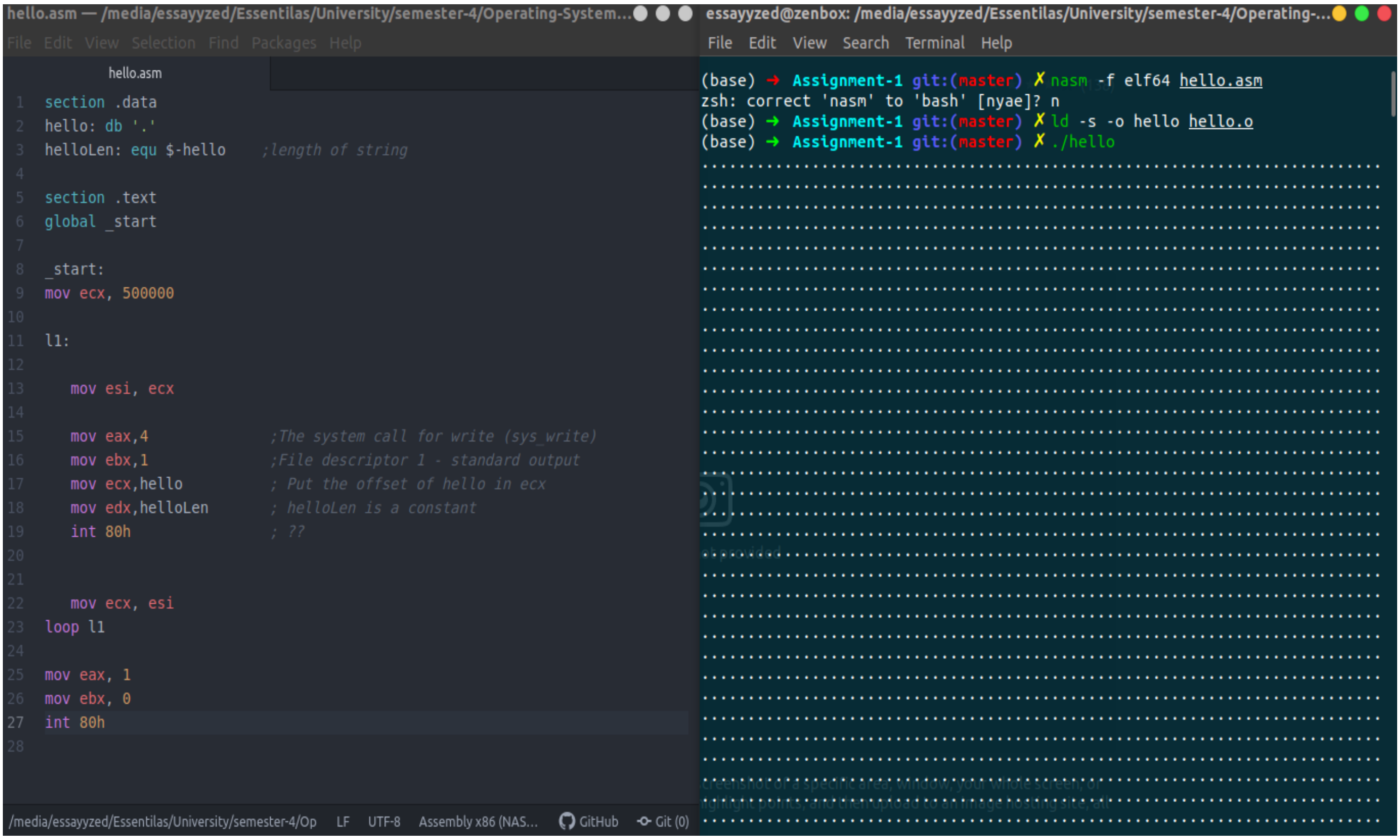
Average 'user time' for hello2 (syscall-based calls):

S = 0.224000

*Percentage speedup: (I-S)*100/I = ((1.028200 – 0.224000)) * 100 / 1.28200*

= 78.21%

Int Based Call:


hello.asm — /media/essayyzed/Essentilas/University/semester-4/Operating-System...
File Edit View Selection Find Packages Help
hello.asm
/media/essayyzed/Essentilas/University/semester-4/Op LF UTF-8 Assembly x86 (NAS... GitHub Git (0)
essayyzed@zenbox: /media/essayyzed/Essentilas/University/semester-4/Operating-...
File Edit View Search Terminal Help

```asm
section .data
hello: db '.'
helloLen: equ $-hello    ;length of string

section .text
global _start

_start:
mov ecx, 500000

l1:

   mov esi, ecx

   mov eax,4              ;The system call for write (sys_write)
   mov ebx,1              ;File descriptor 1 - standard output
   mov ecx,hello          ; Put the offset of hello in ecx
   mov edx,helloLen       ; helloLen is a constant
   int 80h                ; ??


   mov ecx, esi
loop l1

mov eax, 1
mov ebx, 0
int 80h
```

```
(base) ➜ Assignment-1 git:(master) ✗ nasm -f elf64 hello.asm
zsh: correct 'nasm' to 'bash' [nyae]? n
(base) ➜ Assignment-1 git:(master) ✗ ld -s -o hello hello.o
(base) ➜ Assignment-1 git:(master) ✗ ./hello
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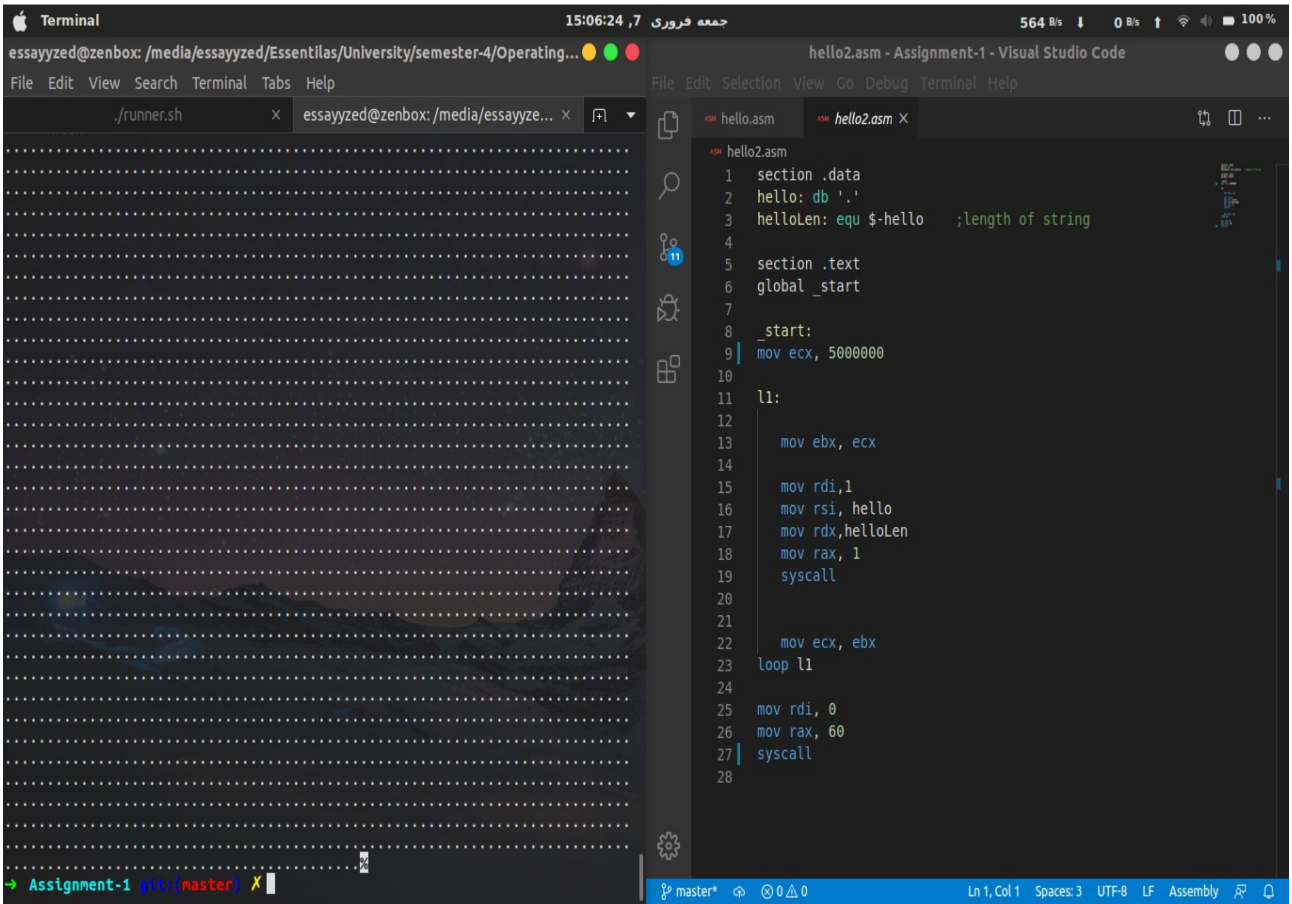
System Call Based


Terminal
15:06:24 ,7 جمعه فروری
564 B/s 0 B/s 100 %
essayyzed@zenbox: /media/essayyzed/Essentilas/University/semester-4/Operating...
File Edit View Search Terminal Tabs Help
./runner.sh
essayyzed@zenbox: /media/essayyze...
hello2.asm - Assignment-1 - Visual Studio Code
File Edit Selection View Go Debug Terminal Help
hello.asm
hello2.asm
master* ⓧ 0 ⚠ 0 Ln 1, Col 1 Spaces: 3 UTF-8 LF Assembly

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➜ Assignment-1 git:(master) ✗
```
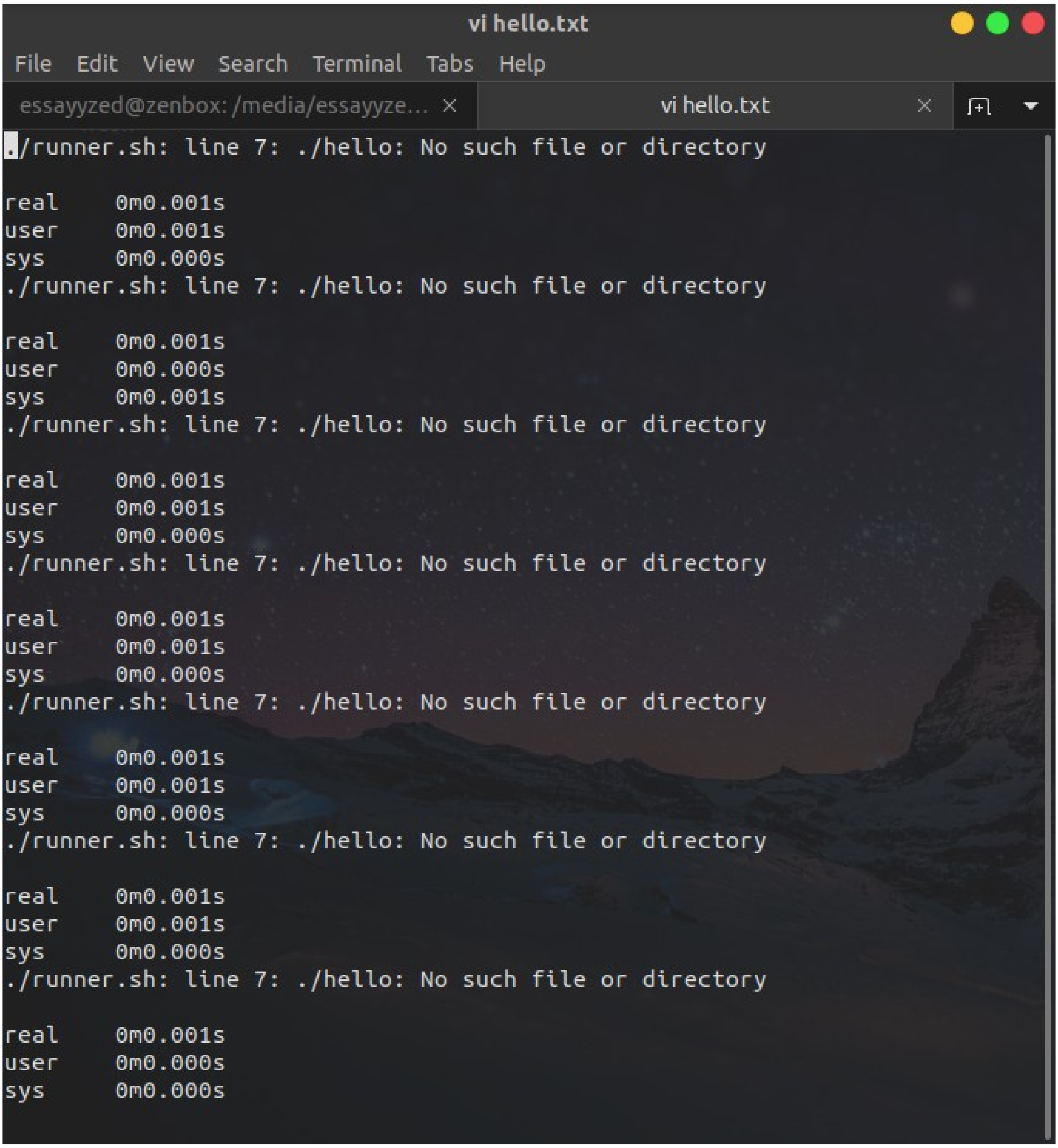

```asm
section .data
hello: db '.'
helloLen: equ $-hello    ;length of string

section .text
global _start

_start:
mov ecx, 5000000

l1:

   mov ebx, 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
```

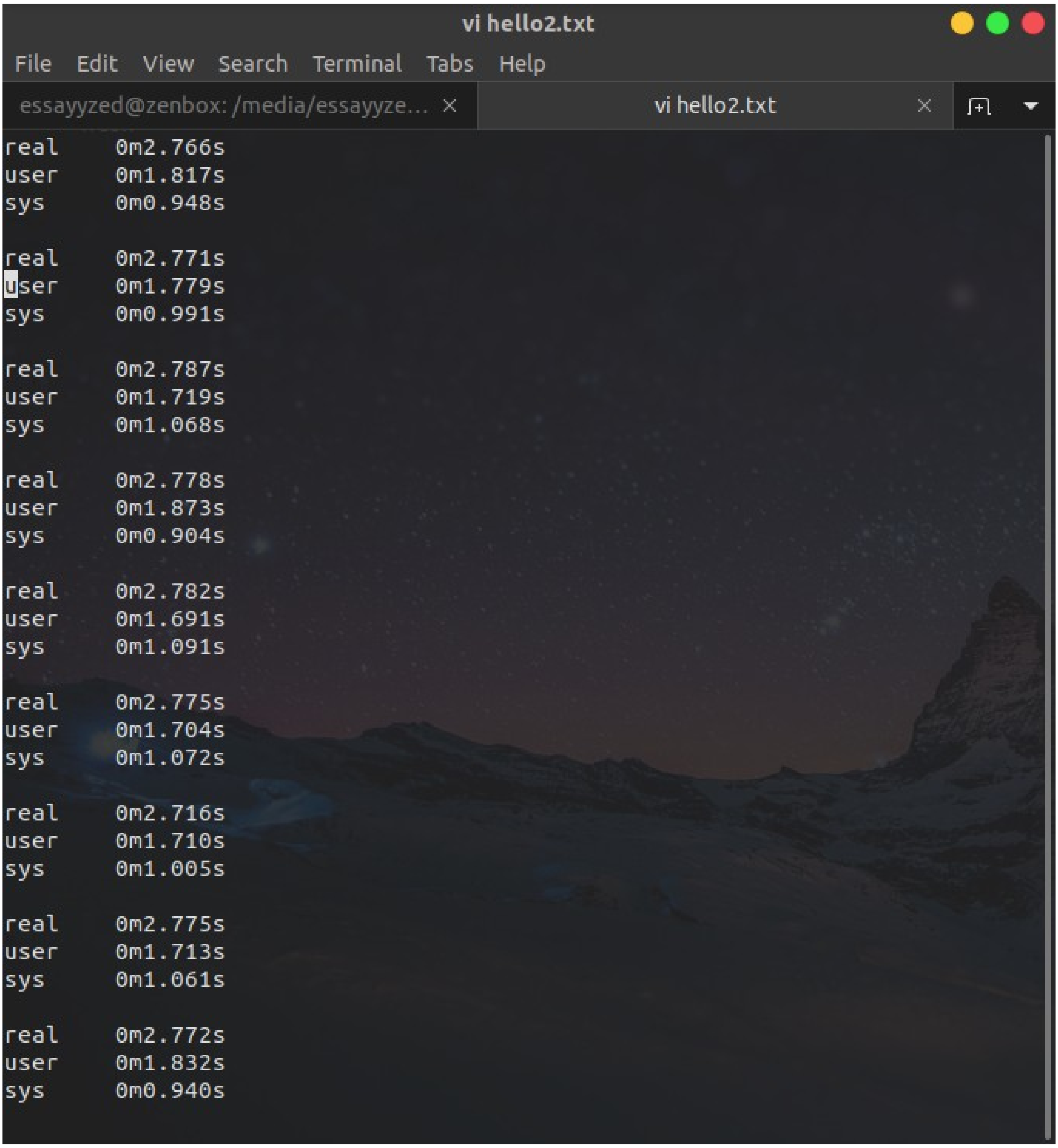
Execution Time of INT Based Call



vi hello.txt
File Edit View Search Terminal Tabs Help
essayyzed@zenbox: /media/essayyze...
vi hello.txt

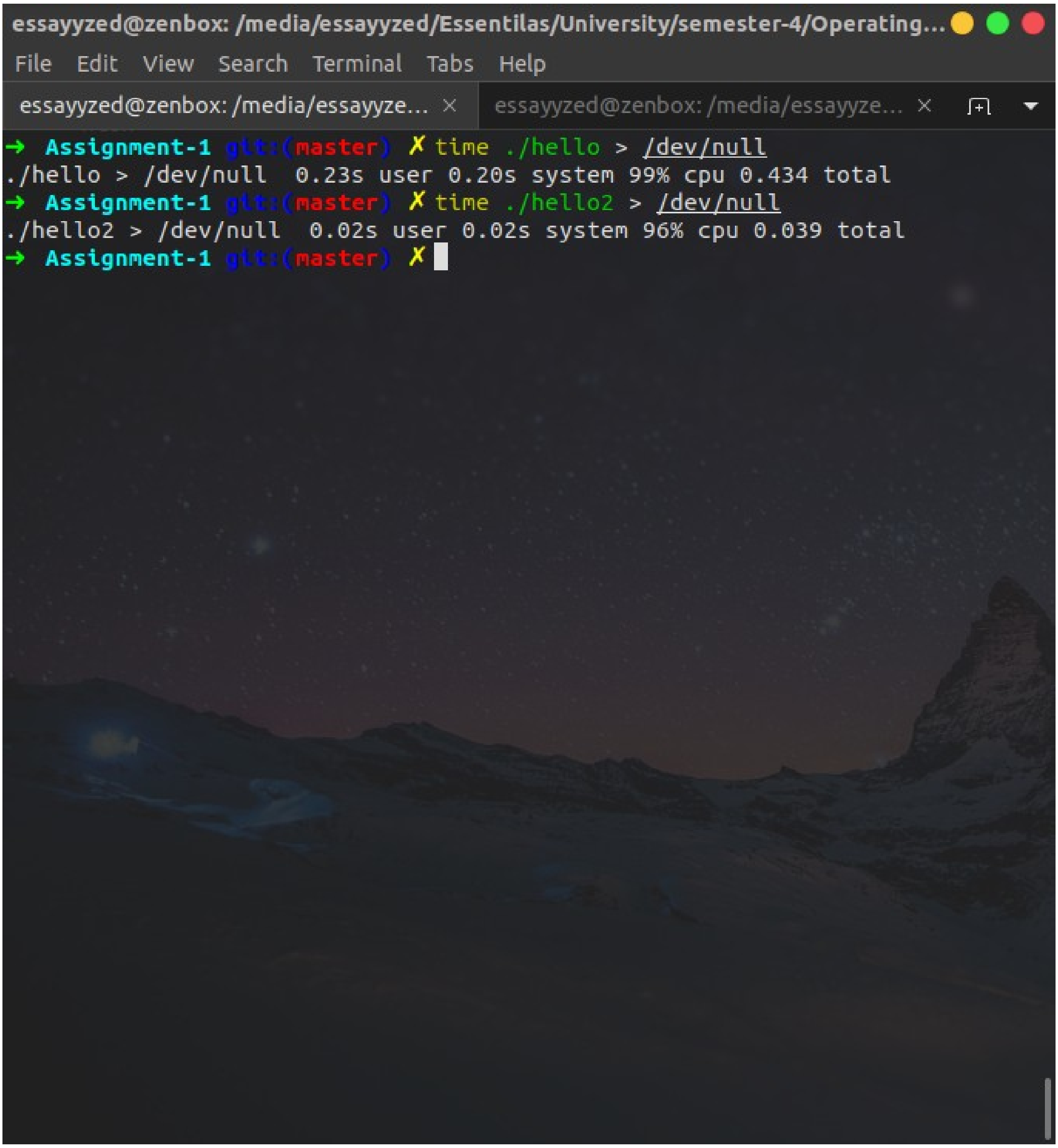
```
./runner.sh: line 7: ./hello: No such file or directory

real	0m0.001s
user	0m0.001s
sys	0m0.000s
./runner.sh: line 7: ./hello: No such file or directory

real	0m0.001s
user	0m0.000s
sys	0m0.001s
./runner.sh: line 7: ./hello: No such file or directory

real	0m0.001s
user	0m0.001s
sys	0m0.000s
./runner.sh: line 7: ./hello: No such file or directory

real	0m0.001s
user	0m0.001s
sys	0m0.000s
./runner.sh: line 7: ./hello: No such file or directory

real	0m0.001s
user	0m0.001s
sys	0m0.000s
./runner.sh: line 7: ./hello: No such file or directory

real	0m0.001s
user	0m0.001s
sys	0m0.000s
./runner.sh: line 7: ./hello: No such file or directory

real	0m0.001s
user	0m0.000s
sys	0m0.000s
```

Execution Time of Sys Based Call


vi hello2.txt
File Edit View Search Terminal Tabs Help
essayyzed@zenbox: /media/essayyze...
vi hello2.txt

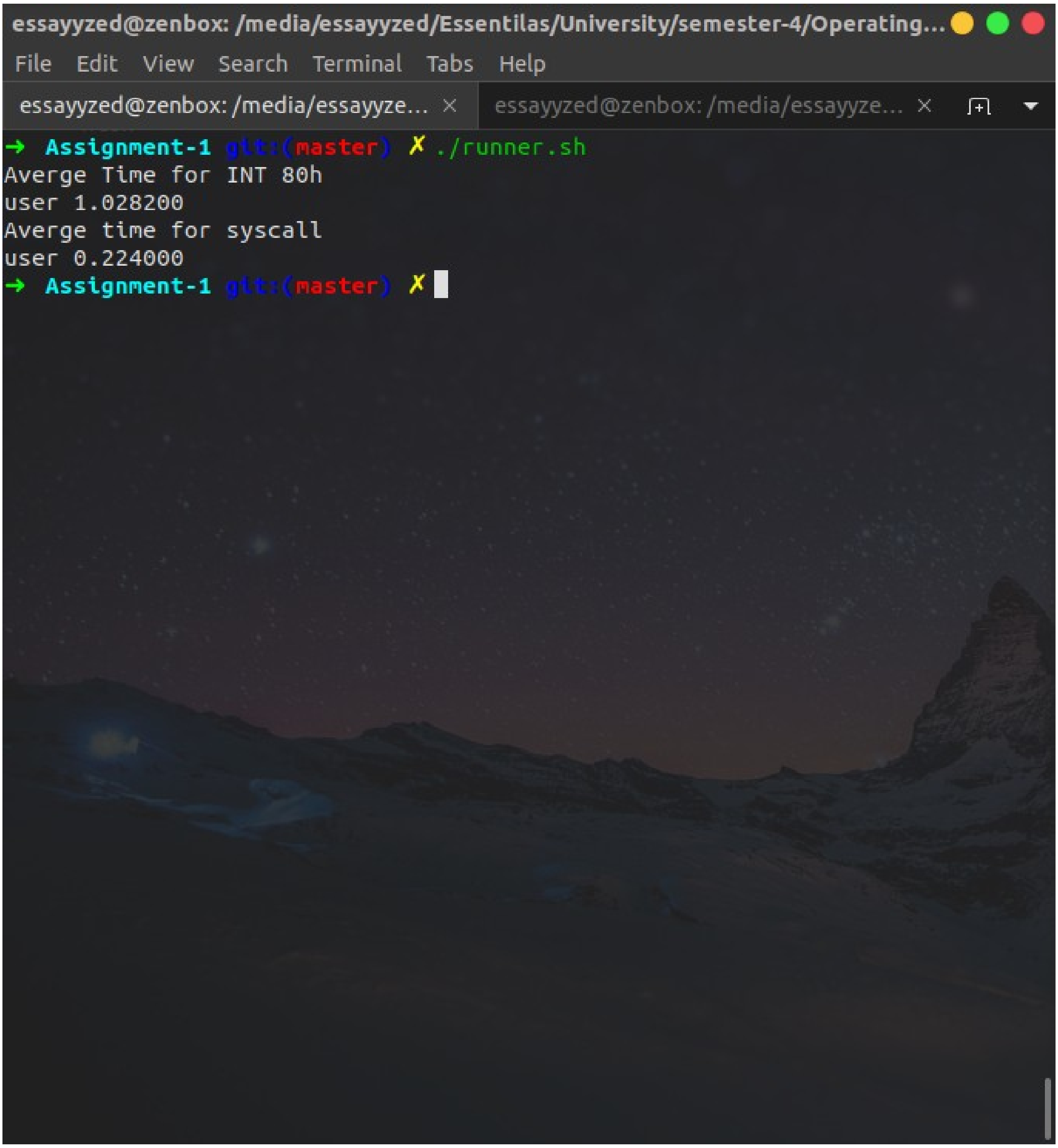
```
real    0m2.766s
user    0m1.817s
sys     0m0.948s

real    0m2.771s
user    0m1.779s
sys     0m0.991s

real    0m2.787s
user    0m1.719s
sys     0m1.068s

real    0m2.778s
user    0m1.873s
sys     0m0.904s

real    0m2.782s
user    0m1.691s
sys     0m1.091s

real    0m2.775s
user    0m1.704s
sys     0m1.072s

real    0m2.716s
user    0m1.710s
sys     0m1.005s

real    0m2.775s
user    0m1.713s
sys     0m1.061s

real    0m2.772s
user    0m1.832s
sys     0m0.940s
```

Memory & Time Usage Info.


essayyzed@zenbox: /media/essayyzed/Essentilas/University/semester-4/Operating...
File
Edit
View
Search
Terminal
Tabs
Help
essayyzed@zenbox: /media/essayyze...
essayyzed@zenbox: /media/essayyze...

```
➜  Assignment-1 git:(master) ✗ time ./hello > /dev/null
./hello > /dev/null  0.23s user 0.20s system 99% cpu 0.434 total
➜  Assignment-1 git:(master) ✗ time ./hello2 > /dev/null
./hello2 > /dev/null  0.02s user 0.02s system 96% cpu 0.039 total
➜  Assignment-1 git:(master) ✗
```

Average Time (Both Sys & INT based Calls)



essayyzed@zenbox: /media/essayyzed/Essentilas/University/semester-4/Operating...
File Edit View Search Terminal Tabs Help
essayyzed@zenbox: /media/essayyze...
essayyzed@zenbox: /media/essayyze...

```
→ Assignment-1 git:(master) ✗ ./runner.sh
Averge Time for INT 80h
user 1.028200
Averge time for syscall
user 0.224000
→ Assignment-1 git:(master) ✗ 
```

Note:

why did we issue 500k syscalls?

We issued 500k syscalls in order to find the time in microsecond in any other case we won’t be able to compute it because it won’t take to much time.

Why not less or more?

In case of less we won’t be able to find the time because it is so much less that it is approximately zero(0).

In case of More it will be unstoppable at certain level and will take too much time.

Why did we run the experiment 50 times?

In order to find Average time taken by both the calls.. in other case we won’t be able to compute the average time taken.