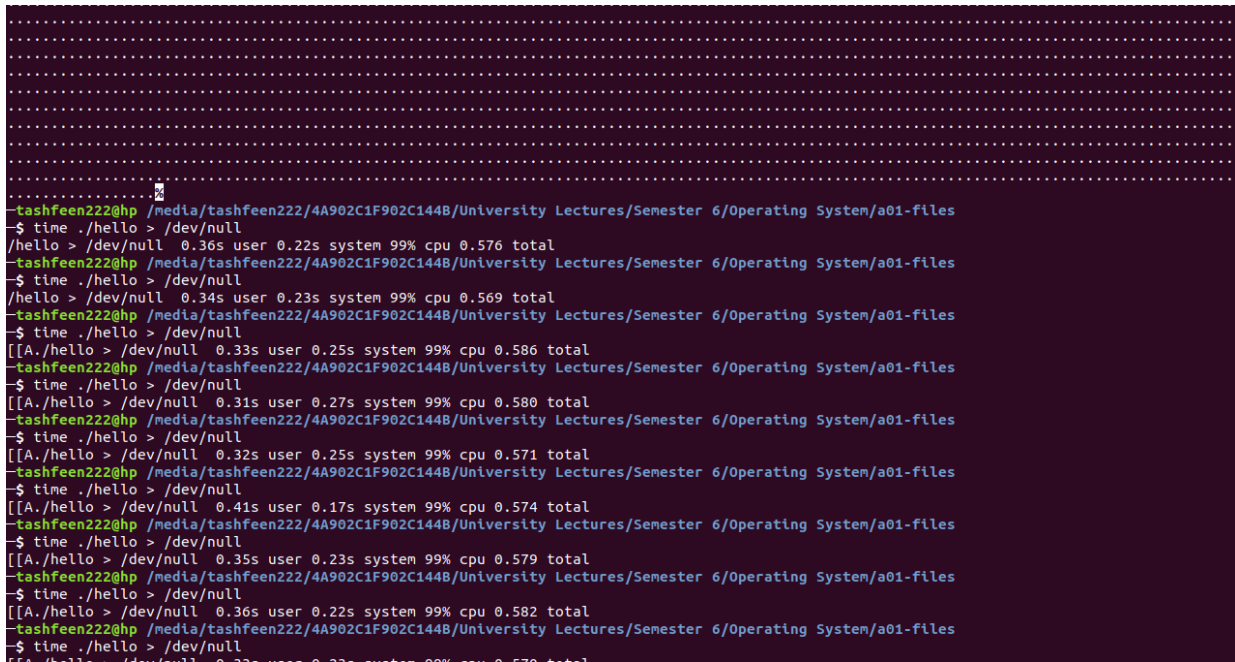|	
Name	Tashfeen Latif
Roll No	17P-6035
Section	CS-A
Course	Operating System
Professor	Dr.Muhammad Nauman

Assignment # 01

ScreenShot#1

```
─tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
└$ nasm -f elf64 hello.asm
─tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
└$ ld -s -o hello hello.o
─tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
└$ ./hello
```

ScreenShot#2

ScreenShot#3


```
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.36s user 0.22s system 99% cpu 0.576 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.34s user 0.23s system 99% cpu 0.569 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[[A./hello > /dev/null  0.33s user 0.25s system 99% cpu 0.586 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[[A./hello > /dev/null  0.31s user 0.27s system 99% cpu 0.580 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[[A./hello > /dev/null  0.32s user 0.25s system 99% cpu 0.571 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[[A./hello > /dev/null  0.41s user 0.17s system 99% cpu 0.574 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[[A./hello > /dev/null  0.35s user 0.23s system 99% cpu 0.579 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[[A./hello > /dev/null  0.36s user 0.22s system 99% cpu 0.582 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[[A./hello > /dev/null  0.32s user 0.23s system 99% cpu 0.570 total
```

ScreenShot#4

```
/hello > /dev/null  0.34s user 0.23s system 99% cpu 0.569 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[A./hello > /dev/null  0.33s user 0.25s system 99% cpu 0.586 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[A./hello > /dev/null  0.31s user 0.27s system 99% cpu 0.580 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[A./hello > /dev/null  0.32s user 0.25s system 99% cpu 0.571 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[A./hello > /dev/null  0.41s user 0.17s system 99% cpu 0.574 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[A./hello > /dev/null  0.35s user 0.23s system 99% cpu 0.579 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[A./hello > /dev/null  0.36s user 0.22s system 99% cpu 0.582 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[A./hello > /dev/null  0.33s user 0.23s system 99% cpu 0.570 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[A./hello > /dev/null  0.33s user 0.25s system 99% cpu 0.574 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[A./hello > /dev/null  0.34s user 0.24s system 99% cpu 0.576 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[A./hello > /dev/null  0.36s user 0.22s system 99% cpu 0.580 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[A./hello > /dev/null  0.36s user 0.21s system 99% cpu 0.574 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
[A./hello > /dev/null  0.38s user 0.20s system 99% cpu 0.582 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
```

ScreenShot#5

```
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.34s user 0.24s system 99% cpu 0.574 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.35s user 0.23s system 99% cpu 0.580 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.34s user 0.24s system 99% cpu 0.583 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.34s user 0.24s system 99% cpu 0.580 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.32s user 0.25s system 99% cpu 0.570 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.38s user 0.19s system 99% cpu 0.573 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.38s user 0.20s system 99% cpu 0.581 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.35s user 0.22s system 99% cpu 0.572 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.31s user 0.28s system 99% cpu 0.584 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.31s user 0.27s system 99% cpu 0.582 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.34s user 0.24s system 99% cpu 0.571 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello > /dev/null
/hello > /dev/null  0.32s user 0.24s system 99% cpu 0.567 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$
```

ScreenShot#6

```
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ nasm -f elf64 hello2.asm
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ ld -s -o hello2 hello2.o
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ ./hello2
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ScreenShot#7

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tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
/hello2 > /dev/null  0.27s user 0.14s system 99% cpu 0.408 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
/hello2 > /dev/null  0.25s user 0.16s system 99% cpu 0.403 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
/hello2 > /dev/null  0.27s user 0.13s system 99% cpu 0.404 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
/hello2 > /dev/null  0.22s user 0.19s system 99% cpu 0.407 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
/hello2 > /dev/null  0.23s user 0.17s system 99% cpu 0.405 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
```

ScreenShot#8

```
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
[[A./hello2 > /dev/null  0.26s user 0.15s system 99% cpu 0.406 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
[[A./hello2 > /dev/null  0.24s user 0.16s system 99% cpu 0.408 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
[[A./hello2 > /dev/null  0.27s user 0.14s system 99% cpu 0.406 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
/hello2 > /dev/null  0.25s user 0.16s system 99% cpu 0.408 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
[[B./hello2 > /dev/null  0.29s user 0.11s system 99% cpu 0.403 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
[[A./hello2 > /dev/null  0.24s user 0.17s system 99% cpu 0.410 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
/hello2 > /dev/null  0.24s user 0.16s system 99% cpu 0.408 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
/hello2 > /dev/null  0.26s user 0.15s system 99% cpu 0.404 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
/hello2 > /dev/null  0.28s user 0.13s system 99% cpu 0.406 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
/hello2 > /dev/null  0.24s user 0.16s system 99% cpu 0.405 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ time ./hello2 > /dev/null
./hello2 > /dev/null  0.23s user 0.17s system 99% cpu 0.405 total
tashfeen222@hp /media/tashfeen222/4A902C1F902C144B/University Lectures/Semester 6/Operating System/a01-files
$ \
```

Number of experiments run: N = 50

Average 'user time' for hello (int-based calls): I = 0.3874

Average 'user time' for hello2 (syscall-based calls): S = 0.2306

Percentage speedup: (I-S)*100/I = 40.48 = 41% approximately