Operating System, Spring 2018

Project 1

DUE DATE: April 14, 2018

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Implementation details or faced difficulties

To implement this project, we simply followed the specs in the pdf. The first difficult we faced is that when typing

```
$ sudo make menuconfig
```

it came up with the following error messages:

```
Your display is too small to run Menuconfig!
It must be at least 19 lines by 80 columns.
make[1]: *** [menuconfig] Error 1
make: *** [menuconfig] Error 2
team16@team16-VirtualBox:/usr/src/linux-2.6.32.60$
```

Figure 1: Menuconfig Error

We solved it by typing:

```
sudo apt-get install virtualbox-guest-dkms virtualbox-guest-utils virtualbox-guest-x11
```

in the **Terminal**.

In **"/usr/src/linux-2.6.32.60/arch/x86/kernel/syscall_table_32.S"**, we added

```
.long sys_rt_tgsigqueueinfo     /* 335 */
.long sys_perf_event_open
.long sys_hello
```

Figure 2: syscall_table_32.S

In **"/usr/src/linux-2.6.32.60/arch/x86/include/asm/unistd_32.h"**, we added

```
#define __NR_pwritev            334
#define __NR_rt_tgsigqueueinfo  335
#define __NR_perf_event_open    336
#define __NR_hello              337
#define __NR_multiply           338
#define __NR_min                339

#ifdef __KERNEL__

#define NR_syscalls 340
```

Figure 3: unistd_32.h

In **"/usr/src/linux-2.6.32.60/arch/x86/include/asm/syscalls.h"**, we added

```
/* kernel/sys_x86_64.c */
struct new_utsname;

asmlinkage long sys_mmap(unsigned long, unsigned long, unsigned long,
                         unsigned long, unsigned long, unsigned long);
asmlinkage long sys_uname(struct new_utsname __user *);

asmlinkage int sys_hello(void);

asmlinkage int sys_multiply(long, long);

asmlinkage int sys_min(long, long);
```

Figure 4: syscalls.h

Our results

Our test program:

```
team16@team16-VirtualBox: ~/Desktop
team16@team16-VirtualBox:~$ cd ~/Desktop/
team16@team16-VirtualBox:~/Desktop$ cat test.c
#include <sys/syscall.h>
#include <unistd.h>
#include <stdio.h>

int main() {
        syscall(337);
        printf("multiply = %ld\n", syscall(338, 8, 7));
        printf("min = %ld\n", syscall(339, 8, 7));
        return 0;
}
team16@team16-VirtualBox:~/Desktop$ ./a.out
multiply = 56
min = 7
team16@team16-VirtualBox:~/Desktop$
```

Figure 5: test.c

After typing **"dmesg"**,

```
[   14.689748] eth0: no IPv6 routers present
[   42.471657] HELLO SYSTEM CALL B03902129 B03505053
team16@team16-VirtualBox:~/Desktop$
```

Figure 6: dmesg

it correctly showed up our student IDs.