

ASSIGNMENT 3:

CREATING SYS-CALLS AND ADDING THEM TO THE KERNEL

PART 1: When no arguments are passed:

The sys-call that prints "Hello World" was successfully implemented with the following procedure:

1. Downloading the appropriate kernel source using:
`apt-get source linux-image-$(uname -r)`
2. Unzipping the Kernel image file into the `usr/src` directory:
`sudo tar -xvf linux-3.19.0.orig.tar.gz -C/usr/ src/`
3. Next go into the kernel source directory: `cd linux-3.19.0/`
4. Create a new directory: `mkdir hello`
5. Here we place our code in `hello.c`: `gedit hello.c`

```
#include <linux/kernel.h>
#include <linux/linkage.h>

asmlinkage long sys_hello(void)
{
    printk(KERN_EMERG "Hello World\n");
    return 0;
}
```
6. Create a Makefile in the `hello` directory to allow the build of `hello.c`: `gedit Makefile`
The code placed is:
`obj-y := hello.o`
7. We go back into the parent directory (Kernel source directory) and edit the Makefile to indicate where the new syscall is:
We replace the line:
`core-y += kernel/ mm/ fs/ ipc/ security/ crypto/ block/`
With -> `core-y += kernel/ mm/ fs/ ipc/ security/ crypto/ block/ hello/`
8. Then go into the directory: `arch/x86/syscalls`. In the file `syscall_32.tbl` add the following line to the end:
`359 i386 hello sys_hello`
9. Return to the kernel source directory and go into `include/linux`. Add your syscall definition at the end of `syscall.h`:

```
asmlinkage long sys_hello(void)
```
10. After returning to the main kernel source directory, compile your kernel. And install.
11. After installing your kernel image, reboot your system
12. create a test program to call your syscall and check the kernel with the following command:
`dmesg`

PART 2: With parameters integer (int) and a string (char []).

The syscall was modified as follows:

1. The hello.c program was changed to the following:

```
#include <linux/kernel.h>
#include <linux/linkage.h>

asmlinkage long sys_hello(int num, const char __user *str)
{
    printk(KERN_EMERG "num = %d and str = %s\n", num, str);
    return 0;
}
```

2. The last line in the syscall.h file (in include/linux/) was modified to:
`asmlinkage long sys_hello(int num, const char __user *str);`
3. It was compiled and reinstalled again. After rebooting the syscall was tested by the modified program