

Homework #1

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25th March, 2017

Implementaion Details

1. Open the file [linux-2.6.32.60/arch/x86/kernel/syscall_table_32.S](#)
Add `".long sys_show", ".long sys_multiply", ".long sys_returnzero",
".long sys_min", ".long sys_cpu_util"`
2. Open the file [linux-2.6.32.60/arch/x86/include/asm/unistd_32.h](#)
Add `"#define __NR_show 338", "#define __NR_multiply 339", "#define __NR_returnzero 340", "#define __NR_min 341", "#define __NR_cpu_util 342"`
Update `"#define NR_syscalls 343"`
3. Open the file [linux-2.6.32.60/arch/x86/include/asm/syscalls.h](#)
Add the prototype of the system call `"asmlinkage long sys_show(void);", "asmlinkage long sys_multiply(long, long)", "asmlinkage long sys_returnzero(void)", "asmlinkage long sys_min(long, long)", "asmlinkage long sys_cpu_util(void)"`
4. Create files `"show.c", "multiply.c", "returnzero.c", "min.c" and "cpu_util.c"` in [linux-2.6.32.60/kernel/](#)

(a) `show(void)`

```
#include <linux/kernel.h>
#include <linux/linkage.h>
asmlinkage long sys_show(void){
    printk("B04611015 Chen Chia-You\n");
    printk("B04902009 Hsiao Chien-Huei\n");
    return 0;
}
```

(b) `mulitply(long, long)`

```
#include <linux/kernel.h>
#include <linux/linkage.h>
asmlinkage long sys_multiply(long a, long b){
    return a*b;
}
```

(c) `min(long, long)`

```
#include <linux/kernel.h>
#include <linux/linkage.h>
asmlinkage long sys_min(long a, long b){
    return (a < b ? a : b);
}
```

(d) `cpu_util(void)`

Since the code too long, we don't show it here.

5. Modify the Makefile in [linux-2.6.32.60/kernel/](#)

Add `"show.o"`, `"multiply.o"`, `"returnzero.o"`, `"min.o"`, `"cpu_util.o"` to "obj-y"

6. Rebuild the whole kernel and reboot the ubuntu.

Faced Difficulties

1. It's hard to find the definition of CPU utilization.
2. It's a waste of time to repeat rebuilding the kernel when debugging.

Results

- `show (void)`
- `cpu_util (void)`

```
[ 14.564328] eth0: no IPv6 routers present
[ 24.826479] B04611015 Chen Chia-You
[ 24.826481] B04902009 Hsiao Chien-Huei
[ 26.826950] usage 75.30%
eiffel@eiffel-VirtualBox:~/OS$ dmesg
```

- `multiply (long, long)`
- `min (long, long)`

```
eiffel@eiffel-VirtualBox:~/OS$ ./test
multiply(12,25)=300
min(35,12)=12
```