

Assignment 1 CS-370 (Operating Systems)

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Part I (simple.c):

[screenshot of dmesg command after adding and removing simple.ko. Should show the golden ratio, gcd values, jiffies, and HZ value]

The screenshot shows a Linux desktop with a teal background. A terminal window titled "oscreader@OSC: ~/Desktop/final-src-osc10e/ch2" is open, displaying the output of the `make`, `insmod`, `dmesg`, `rmmod`, and `dmesg` commands. The `dmesg` output shows kernel messages including "Loading Module", "Golden Ratio Prime: 2654404609", "Jiffies: 6465841", "HZ: 250", "Removing Module", and "The greatest common divisor of 3300 and 24 is: 12". A C source file named `simple.c` is also visible, showing kernel module registration and logging code. The desktop includes icons for "home", "osc9e-src", "Trash", and "final-src-osc1". The system clock shows "Sat 21:49".

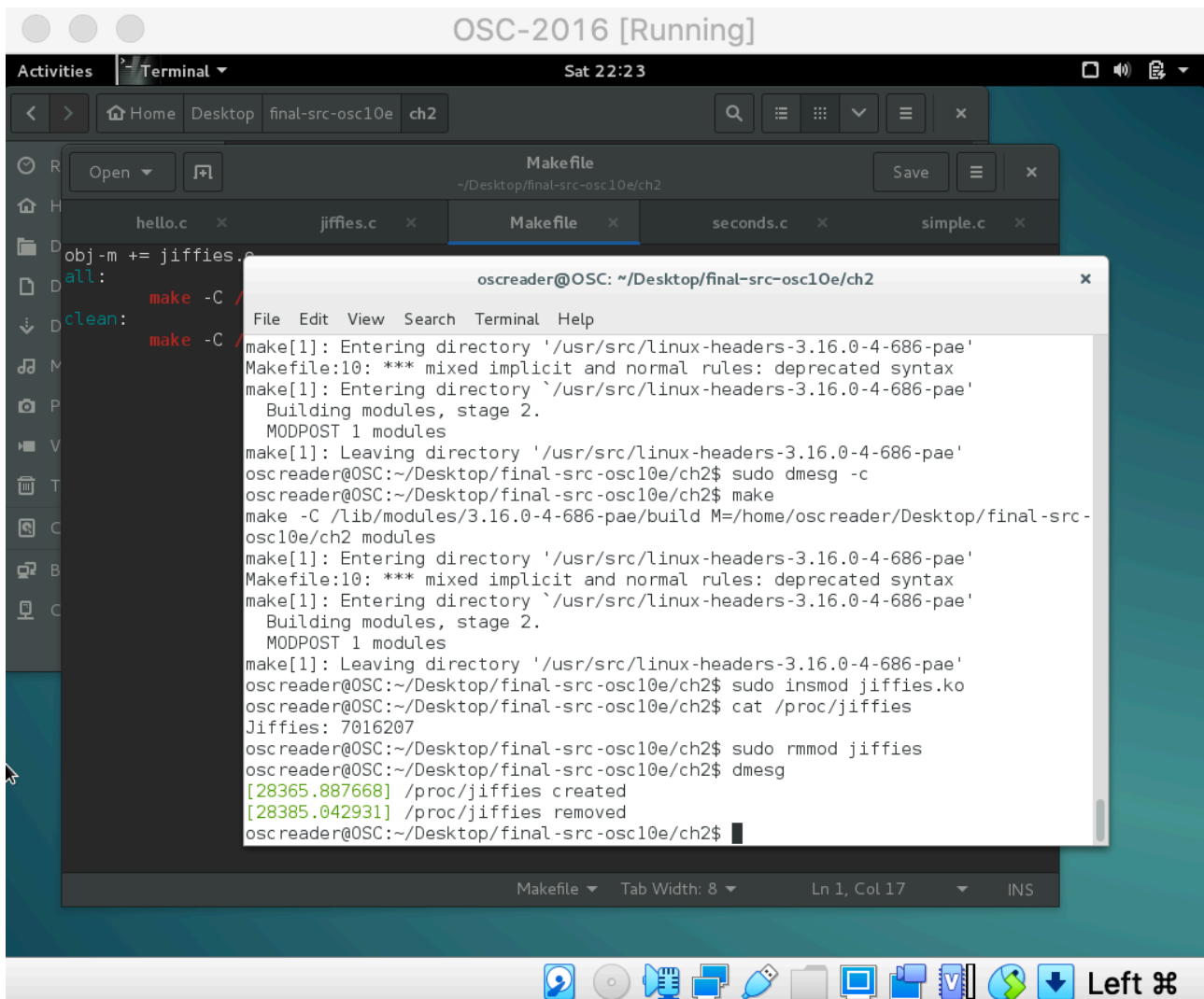
```
oscreader@OSC: ~/Desktop/final-src-osc10e/ch2
File Edit View Search Terminal Help
make -C /lib/modules/3.16.0-4-686-pae/build M=/home/oscreader/Desktop/final-src-osc10e/ch2 modules
make[1]: Entering directory '/usr/src/linux-headers-3.16.0-4-686-pae'
Makefile:10: *** mixed implicit and normal rules: deprecated syntax
make[1]: Entering directory '/usr/src/linux-headers-3.16.0-4-686-pae'
Building modules, stage 2.
MODPOST 1 modules
make[1]: Leaving directory '/usr/src/linux-headers-3.16.0-4-686-pae'
oscreader@OSC:~/Desktop/final-src-osc10e/ch2$ sudo insmod simple.ko
oscreader@OSC:~/Desktop/final-src-osc10e/ch2$ dmesg
[26172.823680] Loading Module
[26172.823683] Golden Ratio Prime: 2654404609
[26172.823684] Jiffies: 6465841
[26172.823685] HZ: 250
oscreader@OSC:~/Desktop/final-src-osc10e/ch2$ sudo rmmod simple
oscreader@OSC:~/Desktop/final-src-osc10e/ch2$ dmesg
[26172.823680] Loading Module
[26172.823683] Golden Ratio Prime: 2654404609
[26172.823684] Jiffies: 6465841
[26172.823685] HZ: 250
[26181.947729] Removing Module
[26181.947732] The greatest common divisor of 3300 and 24 is: 12
[26181.947733] Jiffies: 6468123
oscreader@OSC:~/Desktop/final-src-osc10e/ch2$

/* This function is called when the module is removed. */
void simple_exit(void) {
    printk(KERN_INFO "Removing Module\n");
    printk(KERN_INFO "The greatest common divisor of 3300 and 24 is: %lu\n",gcd
(3300,24));
    printk(KERN_INFO "Jiffies: %lu\n", jiffies);
}

/* Macros for registering module entry and exit points. */
module_init( simple_init );
return 0;
}
```

Part II (jiffies.c):

[screenshot of `cat /proc/jiffies` command (after loading jiffies module in the kernel) followed by `dmesg` command after removing jiffies.ko]



Part III (seconds.c):

[screenshot of at least 3 calls to `cat /proc/seconds` command (after loading seconds module in the kernel) followed by `dmesg` command after removing seconds.ko]

The screenshot shows a Linux desktop environment. In the background, a terminal window displays the source code of a C program named `seconds.c`. The program uses `module_init` and `module_exit` to register entry and exit points, and includes macros for license, description, and author. The code is as follows:

```

/* Macros for registering module entry and exit points. */
module_init( proc_init );
module_exit( proc_exit );

MODULE_LICENSE("GPL");
MODULE_DESCRIPTION("Seconds Module");
MODULE_AUTHOR("SGG");

```

In the foreground, a smaller terminal window titled `oscreader@OSC: ~/Desktop/final-src-osc10e/ch2` shows the execution of the program. The user runs `make`, which compiles the program into `seconds.ko`. Then, the user runs `sudo insmod seconds.ko`, which loads the kernel module. Subsequent `cat /proc/seconds` commands show the number of seconds elapsed since the module was first loaded, increasing from 10 to 23. Finally, the user runs `sudo rmmod seconds`, which removes the module, as indicated by the output `[28098.787693] /proc/seconds removed`.

```
/* Macros for registering module entry and exit points. */
module_init( proc_init );
module_exit( proc_exit );

MODULE_LICENSE("GPL");
MODULE_DESCRIPTION("seconds Module");
MODULE_AUTHOR("SGG");
```