

Part 1: hello.c

Script:

```
#include <linux/module.h>

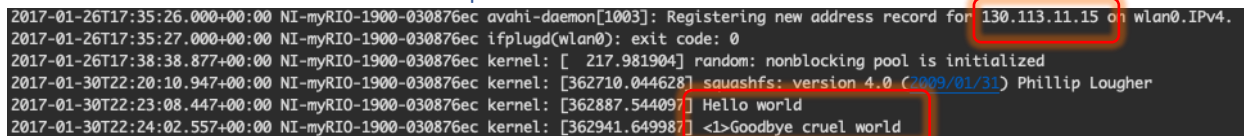
#include <linux/kernel.h>

int init_module(void)
{
    printk (KERN_INFO "Hello world\n");

    return 0;
}

void cleanup_module(void)
{
    printk (KERN_INFO "<1>Goodbye cruel world\n");
}
```

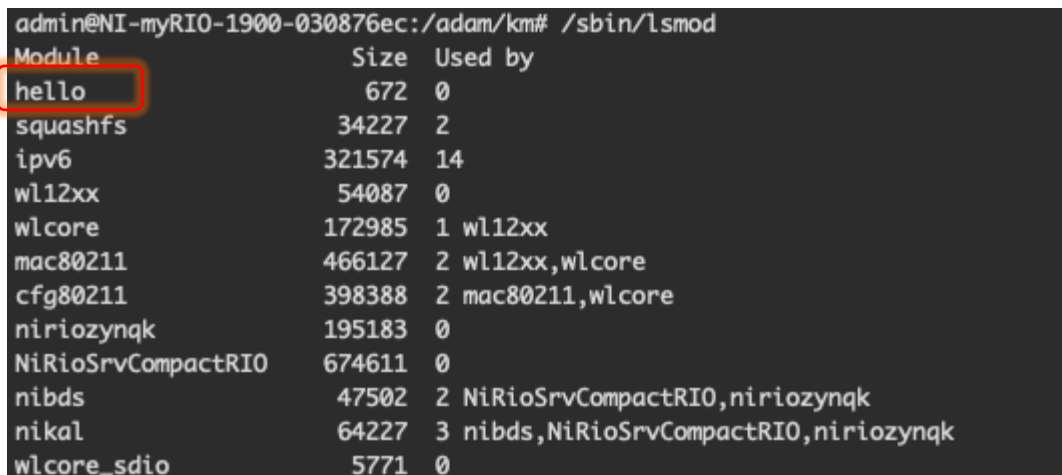
Screenshot of IP address and Output:



A terminal screenshot showing system logs. The IP address 130.113.11.15 is highlighted in a red box. The output of the 'hello' module is also highlighted in a red box, showing 'Hello world' and '<1>Goodbye cruel world'.

```
2017-01-26T17:35:26.000+00:00 NI-myRIO-1900-030876ec avahi-daemon[1003]: Registering new address record for 130.113.11.15 on wlan0.IPv4.
2017-01-26T17:35:27.000+00:00 NI-myRIO-1900-030876ec ifplugd(wlan0): exit code: 0
2017-01-26T17:38:38.877+00:00 NI-myRIO-1900-030876ec kernel: [ 217.981904] random: nonblocking pool is initialized
2017-01-30T22:20:10.947+00:00 NI-myRIO-1900-030876ec kernel: [362710.044628] squashfs: version 4.0 (2009/01/31) Phillip Lougher
2017-01-30T22:23:08.447+00:00 NI-myRIO-1900-030876ec kernel: [362887.544097] Hello world
2017-01-30T22:24:02.557+00:00 NI-myRIO-1900-030876ec kernel: [362941.649987] <1>Goodbye cruel world
```

Screenshot of loaded module:



A terminal screenshot showing the output of the 'lsmod' command. The 'hello' module is highlighted in a red box. The output shows the module name, size, and used by.

```
admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/lsmod
Module              Size  Used by
hello                672    0
squashfs            34227    2
ipv6                 321574   14
wl12xx               54087    0
wlcore               172985    1 wl12xx
mac80211             466127    2 wl12xx,wlcore
cfg80211             398388    2 mac80211,wlcore
niriozynqk           195183    0
NiRioSrvCompactRIO  674611    0
nibds                47502    2 NiRioSrvCompactRIO,niriozynqk
nikal                64227    3 nibds,NiRioSrvCompactRIO,niriozynqk
wlcore_sdio          5771     0
```

Screenshot of unloaded module:

```
admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/insmod hello.ko
admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/lsmod
Module                Size  Used by
hello                 672   0
squashfs             34227  2
ipv6                 321574 14
wl12xx                54087  0
wlcore               172985  1 wl12xx
mac80211             466127  2 wl12xx,wlcore
cfg80211             398388  2 mac80211,wlcore
niriozynqk           195183  0
NiRioSrvCompactRIO   674611  0
nibds                 47502  2 NiRioSrvCompactRIO,niriozynqk
nikal                 64227  3 nibds,NiRioSrvCompactRIO,niriozynqk
wlcore_sdio           5771   0
admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/rmmod hello
admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/lsmod
Module                Size  Used by
squashfs             34227  2
ipv6                 321574 14
wl12xx                54087  0
wlcore               172985  1 wl12xx
mac80211             466127  2 wl12xx,wlcore
cfg80211             398388  2 mac80211,wlcore
niriozynqk           195183  0
NiRioSrvCompactRIO   674611  0
nibds                 47502  2 NiRioSrvCompactRIO,niriozynqk
nikal                 64227  3 nibds,NiRioSrvCompactRIO,niriozynqk
wlcore_sdio           5771   0
```

Part 2: hello2.c

Script:

```
#include <linux/module.h>

#include <linux/kernel.h>

#include <linux/init.h>

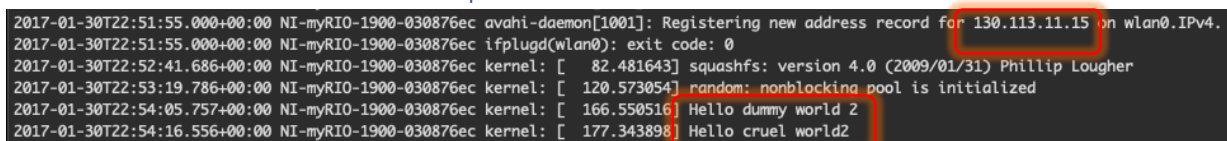
static int foo __initdata = 2;

static int __init init_custom_module(void)
{
    printk (KERN_INFO "Hello dummy world %d\n", foo);
    return 0;
}

static void __exit cleanup_custom_module(void)
{
    printk (KERN_INFO "<1>Hello cruel world2\n");
}

module_init(init_custom_module);
module_exit(cleanup_custom_module);
```

Screenshot of IP address and Output:



The screenshot shows a terminal window with the following output:

```
2017-01-30T22:51:55.000+00:00 NI-myRIO-1900-030876ec avahi-daemon[1001]: Registering new address record for 130.113.11.15 on wlan0.IPv4.
2017-01-30T22:51:55.000+00:00 NI-myRIO-1900-030876ec ifplugd(wlan0): exit code: 0
2017-01-30T22:52:41.686+00:00 NI-myRIO-1900-030876ec kernel: [ 82.481643] squashfs: version 4.0 (2009/01/31) Phillip Lougher
2017-01-30T22:53:19.786+00:00 NI-myRIO-1900-030876ec kernel: [ 120.573054] random: nonblocking pool is initialized
2017-01-30T22:54:05.757+00:00 NI-myRIO-1900-030876ec kernel: [ 166.550516] Hello dummy world 2
2017-01-30T22:54:16.556+00:00 NI-myRIO-1900-030876ec kernel: [ 177.343898] Hello cruel world2
```

In the screenshot, the IP address 130.113.11.15 is highlighted with a red box, and the output lines "Hello dummy world 2" and "Hello cruel world2" are also highlighted with red boxes.

Screenshot of loaded module:

```
admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/insmod hello2.ko
admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/lsmod
Module                Size  Used by
hello2                 592   0
squashfs              34227  2
ipv6                  321574 14
wl12xx                 54087   0
wlcore                172985  1 wl12xx
mac80211              466127  2 wl12xx,wlcore
cfg80211              398388  2 mac80211,wlcore
niriozynq             195183   0
NiRioSrvCompactRIO    674611   0
nibds                  47502   2 NiRioSrvCompactRIO,niriozynq
nikal                  64227   3 nibds,NiRioSrvCompactRIO,niriozynq
wlcore_sdio            5771    0
admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/rmmod hello2
```

Part 3: hello3.c

Script:

```
#include <linux/module.h>

#include <linux/kernel.h>

#include <linux/init.h>


#define DRIVER_AUTHOR "Adam+Harneet"

#define DRIVER_DESC "4AA4 Lab2 Part3"


static int foo __initdata = 2;


static int __init init_custom_module(void)
{
    printk (KERN_INFO "Hello dummy world %d\n", foo);
    return 0;
}

static void __exit cleanup_custom_module(void)
{
    printk (KERN_INFO "<1>Hello cruel world2\n");
}


module_init(init_custom_module);
module_exit(cleanup_custom_module);


MODULE_LICENSE("GPL");
MODULE_AUTHOR(DRIVER_AUTHOR);
MODULE_DESCRIPTION(DRIVER_DESC);
```

Screenshot of IP address and Output:

```
admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/modinfo hello3.ko
filename:       /adam/km/hello3.ko
description:    4AA4 Lab2 Part3
author:         Adam+Harneet
license:        GPL
depends:
vermagic:       4.1.15-rt17-ni-4.0.0f1 SMP preempt mod_unload modversions ARMv7 p2v8
```

Screenshot of loaded module:

```
admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/lsmmod
Module          Size Used by
hello3           596  0
squashfs        34227  2
ipv6            321574 14
wl12xx          54087  0
wlcore          172985  1 wl12xx
mac80211        466127  2 wl12xx,wlcore
cfg80211        398388  2 mac80211,wlcore
niriozynq       195183  0
NiRioSrvCompactRIO 674611  0
nibds           47502  2 NiRioSrvCompactRIO,niriozynq
nikal           64227  3 nibds,NiRioSrvCompactRIO,niriozynq
wlcore_sdio     5771  0
```

Part 4: hello4.c

Script:

```
#include <linux/module.h>

#include <linux/kernel.h>

#include <linux/init.h>


#define DRIVER_AUTHOR "Adam+Harneet"

#define DRIVER_DESC "4AA4 Lab2 Part3"


static char *my_name = "harneet";


static int __init init_custom_module(void)
{
    printk (KERN_INFO "Hello dummy world %s\n", my_name);
    return 0;
}

static void __exit cleanup_custom_module(void)
{
    printk (KERN_INFO "Goodbye, %s\n", my_name);
}

module_init(init_custom_module);
module_exit(cleanup_custom_module);


module_param(my_name, charp, 0000);
MODULE_PARM_DESC(my_name, "Your name string");


MODULE_LICENSE("GPL");
MODULE_AUTHOR(DRIVER_AUTHOR);
MODULE_DESCRIPTION(DRIVER_DESC);
```

Screenshot of IP address and Output:

```

2017-01-31T01:18:30.000+00:00 NI-myRIO-1900-030876ec avahi-daemon[999]: New relevant interface wlan0.IPv4 for mDNS.
2017-01-31T01:18:30.000+00:00 NI-myRIO-1900-030876ec avahi-daemon[999]: Registering new address record for 130.113.11.1
5 on wlan0.IPv4.
2017-01-31T01:18:31.000+00:00 NI-myRIO-1900-030876ec ifplugd(wlan0): exit code: 0
2017-01-31T01:23:31.711+00:00 NI-myRIO-1900-030876ec kernel: [ 326.711004] random: nonblocking pool is initialized
2017-01-31T01:31:12.831+00:00 NI-myRIO-1900-030876ec kernel: [ 787.824887] squashfs: version 4.0 (2009/01/31) Phillip
Lougher
2017-01-31T01:32:22.931+00:00 NI-myRIO-1900-030876ec kernel: [ 857.922788] Hello dummy world harneet
2017-01-31T01:32:40.651+00:00 NI-myRIO-1900-030876ec kernel: [ 875.650515] Goodbye, harneet
2017-01-31T01:32:49.651+00:00 NI-myRIO-1900-030876ec kernel: [ 884.645108] Hello dummy world adam
2017-01-31T01:33:04.881+00:00 NI-myRIO-1900-030876ec kernel: [ 899.880806] Goodbye, adam

```

Screenshot of loaded module:

```

admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/insmod hello4.ko my_name="adam"
admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/lsmmod
Module          Size Used by
hello4          632  0
squashfs        34227  2
ipv6            321574 14
wl12xx          54087  0
wlcore          172985  1 wl12xx
mac80211        466127  2 wl12xx,wlcore
cfg80211        398388  2 mac80211,wlcore
niriozynqk      195183  0
NiRioSrvCompactRIO 674611  0
nibds           47502  2 NiRioSrvCompactRIO,niriozynqk
nikal           64227  3 nibds,NiRioSrvCompactRIO,niriozynqk
wlcore_sdio     5771  0
admin@NI-myRIO-1900-030876ec:/adam/km# /sbin/rmmod hello4
admin@NI-myRIO-1900-030876ec:/adam/km# cat /var/log/messages

```