

SYSTEM CALL

Operating system and System programming individual assignment

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Introduction

A system call is a function that allows a process to communicate with the Linux kernel. It's just a programmatic way for a computer program to order a facility from the operating system's kernel. System calls expose the operating system's resources to user programs through an API (Application Programming Interface).

There are 116 system calls in Linux. one of those is the `delete_module` system call.

System call name: delete_module()

1. What / Why / How, this system call?

What is this system call?

- The delete_module() system call attempts to remove the unused loadable module entry identified by name.
- If the module has an exit function, then that function is executed before unloading the module. The flags argument is used to modify the behavior of the system call, as described below. This system call requires privilege.

Why this system call?

- Module removal is attempted according to the following rules:
 1. If there are other loaded modules that depend on this module, then the call fails.
 2. Otherwise, if the reference count for the module (i.e., the number of processes currently using the module) is zero, then the module is immediately unloaded.
 3. If a module has a nonzero reference count, then the behavior depends on the bits set in *flags*.

How?

✓ *int syscall(SYS_delete_module, const char *name, unsigned int flags);*

On success, zero is returned. On error, -1 is returned and errno is set to indicate the error.

2. Parameters and flags

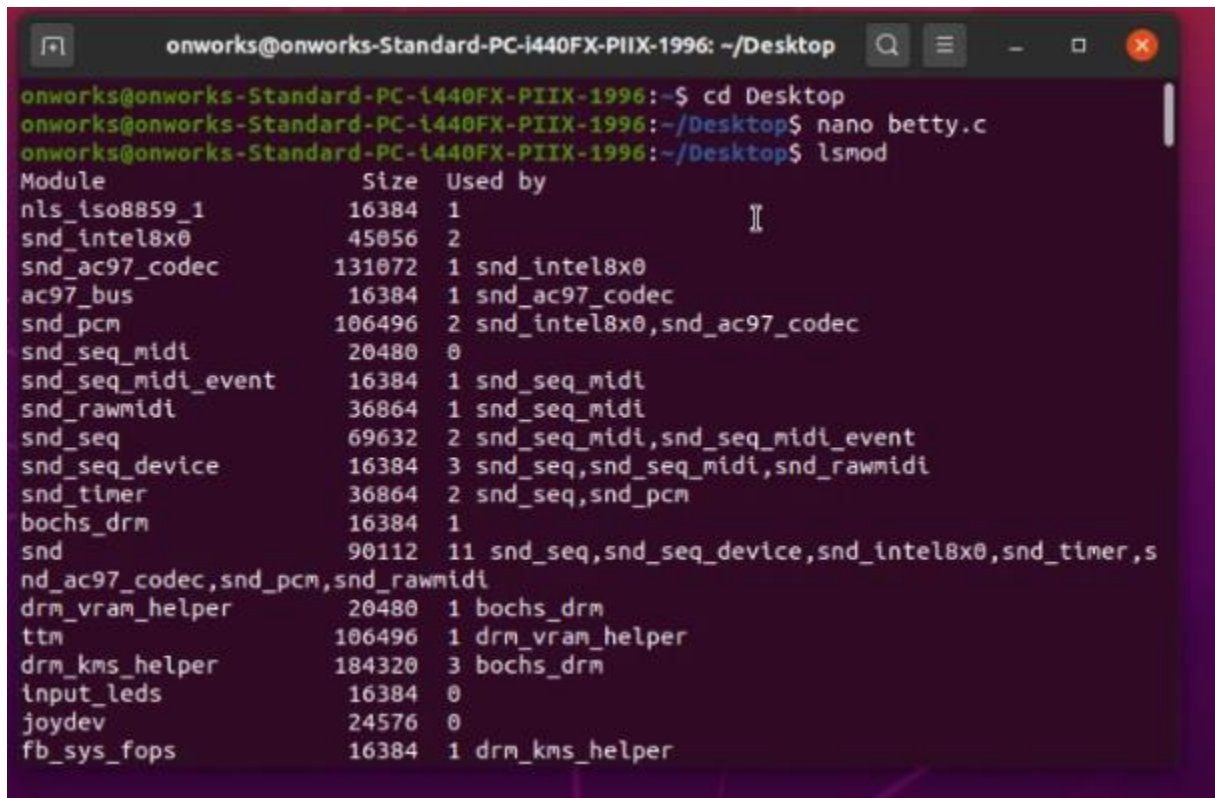
This system call has two parameters

- 1) name – it is a pointer to string with name of module
- 2) flags – this modify behavior of unload

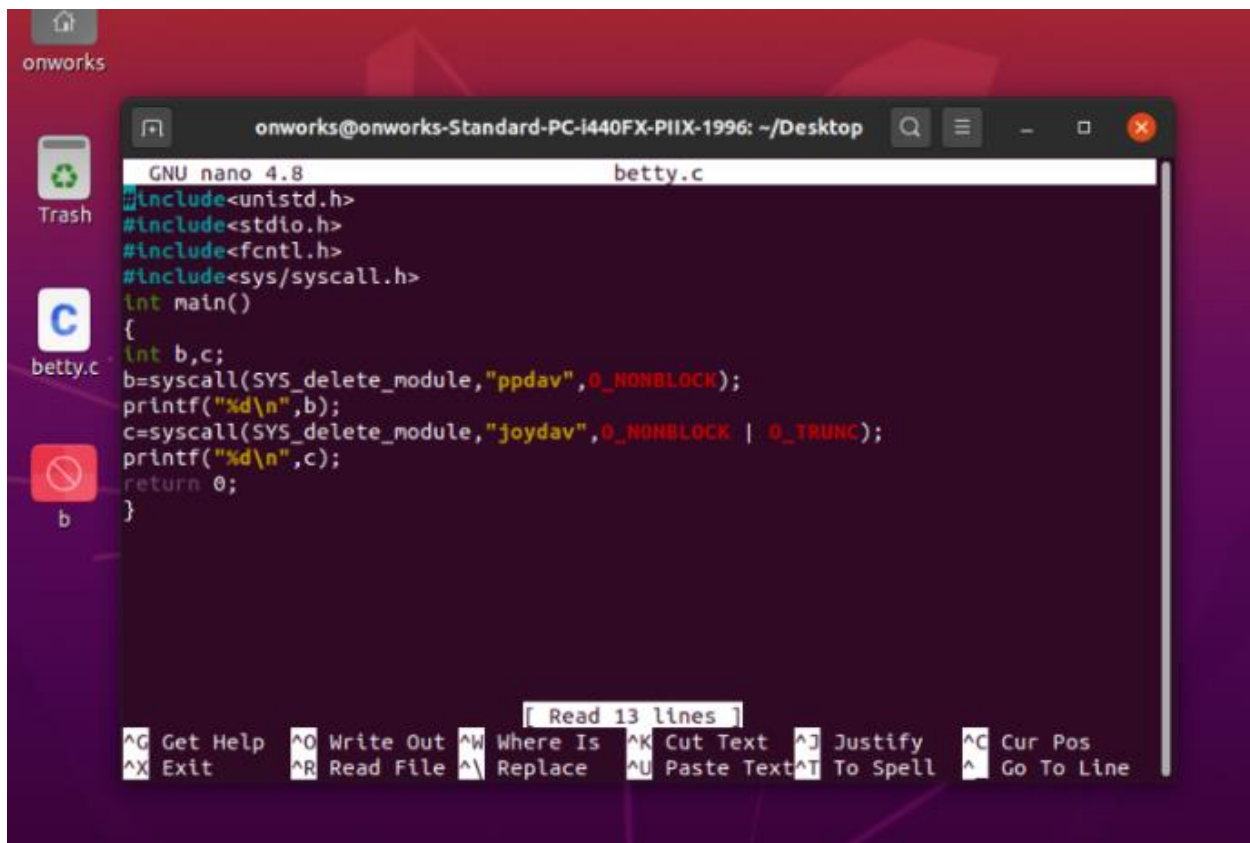
It has two flags

- ✓ O_NONBLOCK – immediately return from syscall
- ✓ O_NONBLOCK | O_TRUNC – unload module immediately even if reference count is not zero

3. List the flags, their purpose with code implementation (give Example source code with output)

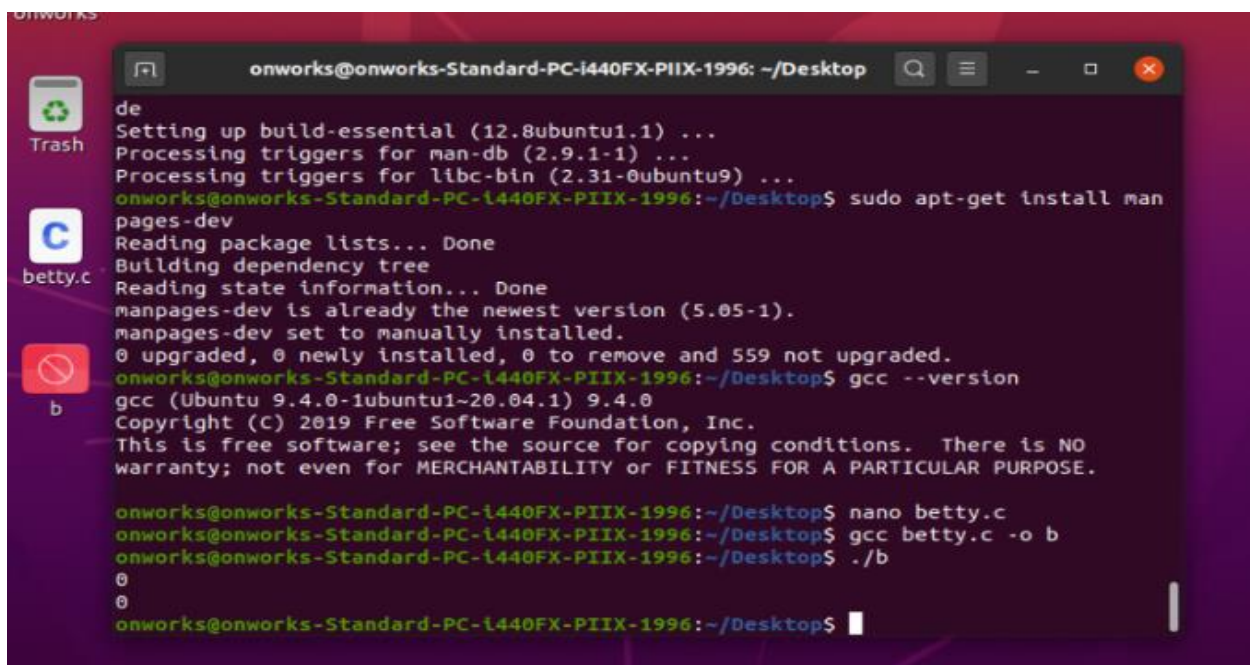


```
onworks@onworks-Standard-PC-i440FX-PIIX-1996: ~/Desktop
onworks@onworks-Standard-PC-i440FX-PIIX-1996:~/Desktop$ nano betty.c
onworks@onworks-Standard-PC-i440FX-PIIX-1996:~/Desktop$ lsmod
Module                  Size      Used by
nls_iso8859_1           16384      1
snd_intel8x0             45056      2
snd_ac97_codec          131072      1 snd_intel8x0
ac97_bus                 16384      1 snd_ac97_codec
snd_pcm                 106496      2 snd_intel8x0,snd_ac97_codec
snd_seq_midi            20480      0
snd_seq_midi_event      16384      1 snd_seq_midi
snd_rawmidi             36864      1 snd_seq_midi
snd_seq                 69632      2 snd_seq_midi,snd_seq_midi_event
snd_seq_device          16384      3 snd_seq,snd_seq_midi,snd_rawmidi
snd_timer               36864      2 snd_seq,snd_pcm
bochs_drm               16384      1
snd                     90112     11 snd_seq,snd_seq_device,snd_intel8x0,snd_timer,s
nd_ac97_codec,snd_pcm,snd_rawmidi
drm_vram_helper         20480      1 bochs_drm
ttm                    106496      1 drm_vram_helper
drm_kms_helper          184320      3 bochs_drm
input_leds              16384      0
joydev                  24576      0
fb_sys_fops             16384      1 drm_kms_helper
```



```
onworks@onworks-Standard-PC-i440FX-PIIX-1996: ~/Desktop
GNU nano 4.8      betty.c
#include<unistd.h>
#include<stdio.h>
#include<fcntl.h>
#include<sys/syscall.h>
int main()
{
    int b,c;
    b=syscall(SYS_delete_module,"ppdav",0_NONBLOCK);
    printf("%d\n",b);
    c=syscall(SYS_delete_module,"joydav",0_NONBLOCK | O_TRUNC);
    printf("%d\n",c);
    return 0;
}

[ Read 13 lines ]
^G Get Help  ^O Write Out ^W Where Is  ^K Cut Text  ^J Justify   ^C Cur Pos
^X Exit      ^R Read File ^\ Replace   ^U Paste Text ^T To Spell  ^_ Go To Line
```



```
onworks@onworks-Standard-PC-i440FX-PIIX-1996: ~/Desktop
de
Setting up build-essential (12.8ubuntu1.1) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9) ...
onworks@onworks-Standard-PC-i440FX-PIIX-1996:~/Desktop$ sudo apt-get install man
pages-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
manpages-dev is already the newest version (5.05-1).
manpages-dev set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 559 not upgraded.
onworks@onworks-Standard-PC-i440FX-PIIX-1996:~/Desktop$ gcc --version
gcc (Ubuntu 9.4.0-1ubuntu1~20.04.1) 9.4.0
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warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

onworks@onworks-Standard-PC-i440FX-PIIX-1996:~/Desktop$ nano betty.c
onworks@onworks-Standard-PC-i440FX-PIIX-1996:~/Desktop$ gcc betty.c -o b
onworks@onworks-Standard-PC-i440FX-PIIX-1996:~/Desktop$ ./b
0
0
onworks@onworks-Standard-PC-i440FX-PIIX-1996:~/Desktop$
```

- As we can see it displayed 0 which shows success.