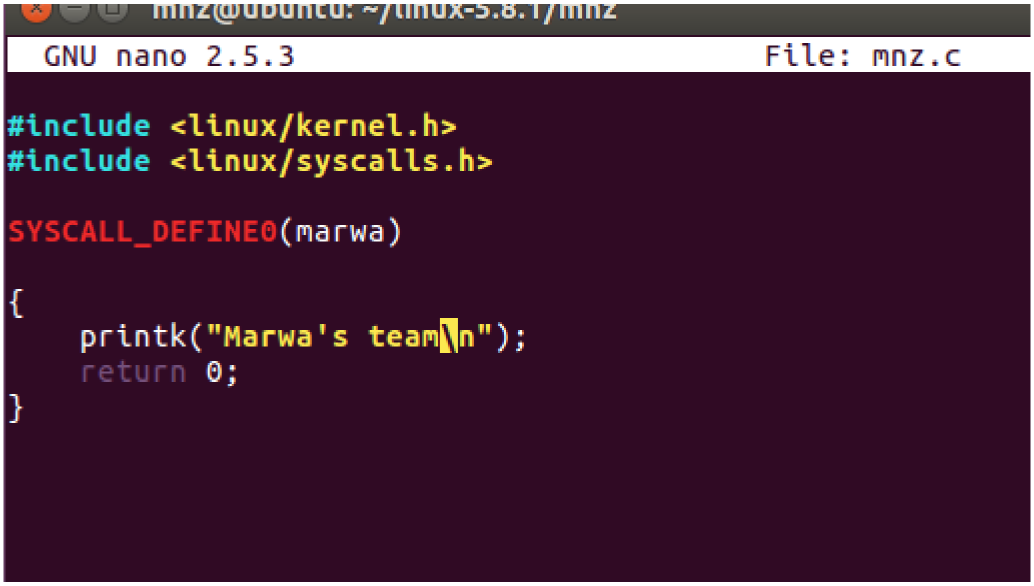
1.Create a C file for your system call.

Create the C file with the following command.

nano marwa/marwa.c

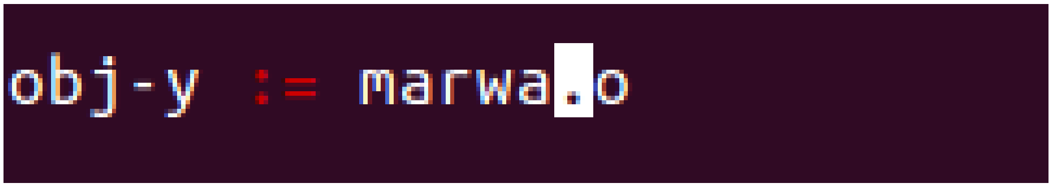


```
mnz@ubuntu: ~/linux-5.8.1/mnz
 GNU nano 2.5.3                              File: mnz.c

#include <linux/kernel.h>
#include <linux/syscalls.h>

SYSCALL_DEFINE0(marwa)

{
    printk("Marwa's team\n");
    return 0;
}
```

2.Create a Makefile for your system call.

Create the Makefile with the following command.

nano marwa/Makefile

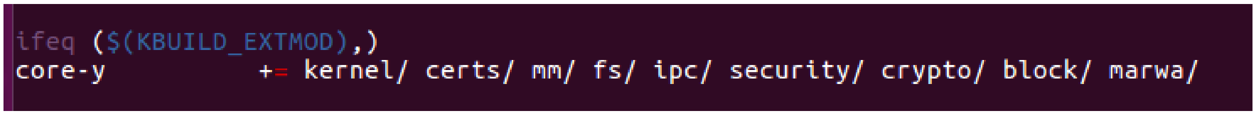


```
obj-y := marwa.o
```

3. Add the home directory of your system call to the main Makefile of the kernel.

Open the Makefile with the following command.

nano Makefile

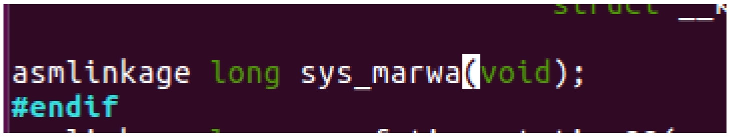


```
ifeq ($(KBUILD_EXTMOD),)
core-y          += kernel/ certs/ mm/ fs/ ipc/ security/ crypto/ block/ marwa/
```

4. Add a corresponding function prototype for your system call to the header file of system calls.

Open the header file with the following command.

nano include/linux/syscalls.h

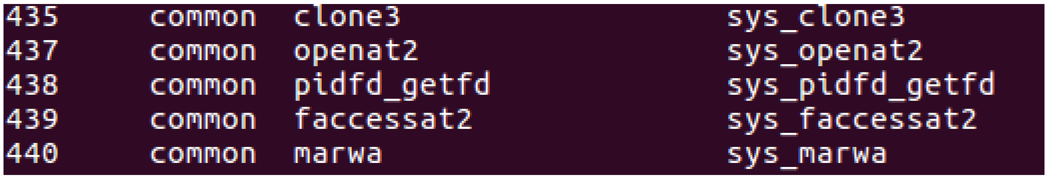


```
asmlinkage long sys_marwa(void);
#endif
```

5.Add your system call to the kernel's system call table.

Open the table with the following command.

nano arch/x86/entry/syscalls/syscall_64.tbl



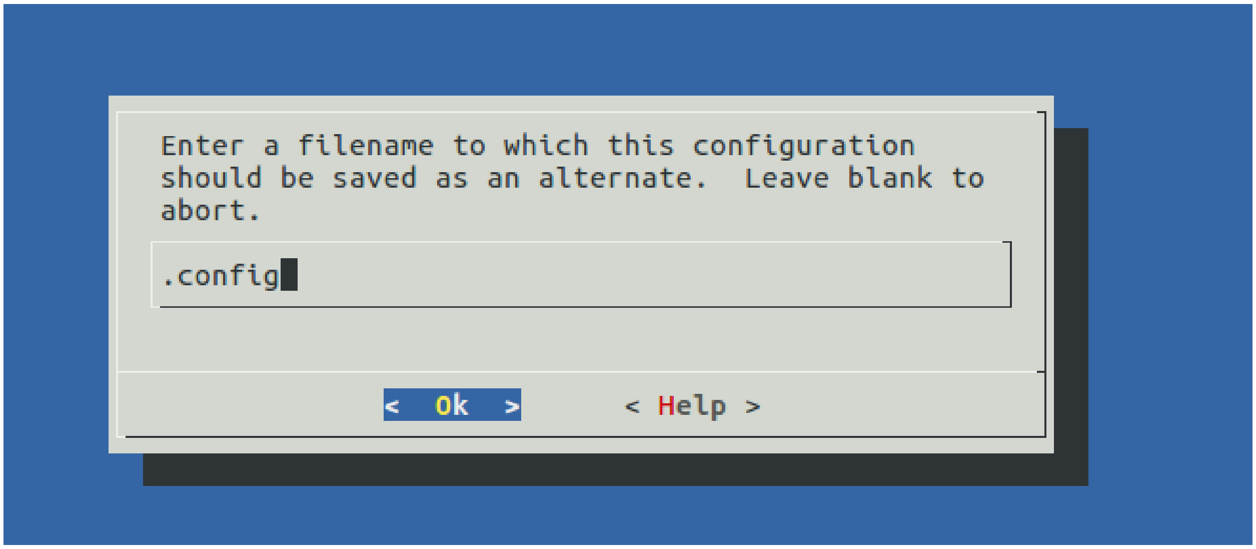
```
435     common  clone3                  sys_clone3
437     common  openat2                 sys_openat2
438     common  pidfd_getfd             sys_pidfd_getfd
439     common  faccessat2              sys_faccessat2
440     common  marwa                   sys_marwa
```

6.Configure the kernel.

Make sure the window of your terminal is maximized.

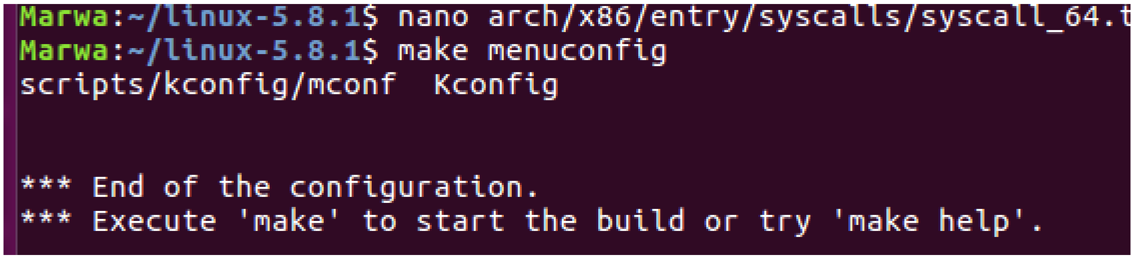
Open the configuration window with the following command.

make menuconfig

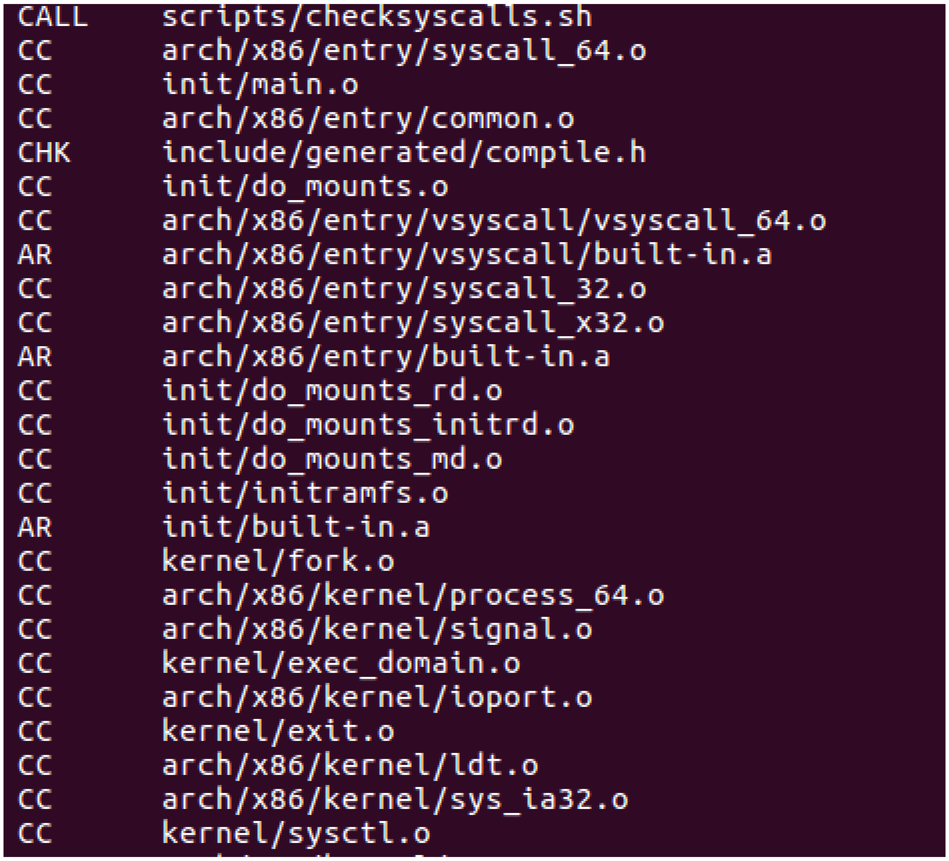


Enter a filename to which this configuration should be saved as an alternate. Leave blank to abort.

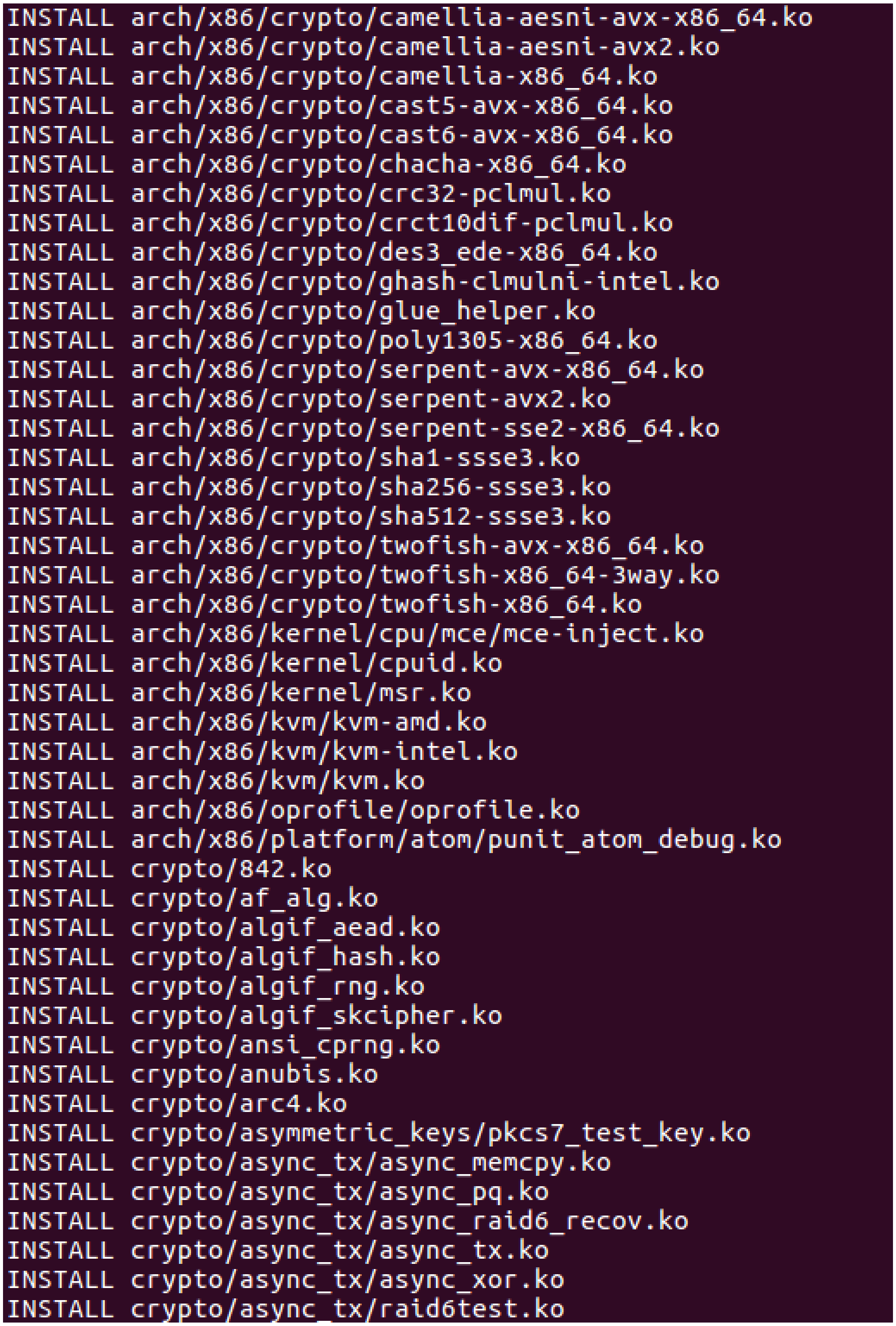
```
.config
```



```
Marwa:~/linux-5.8.1$ nano arch/x86/entry/syscalls/syscall_64.t
Marwa:~/linux-5.8.1$ make menuconfig
scripts/kconfig/mconf  Kconfig


*** End of the configuration.
*** Execute 'make' to start the build or try 'make help'.
```



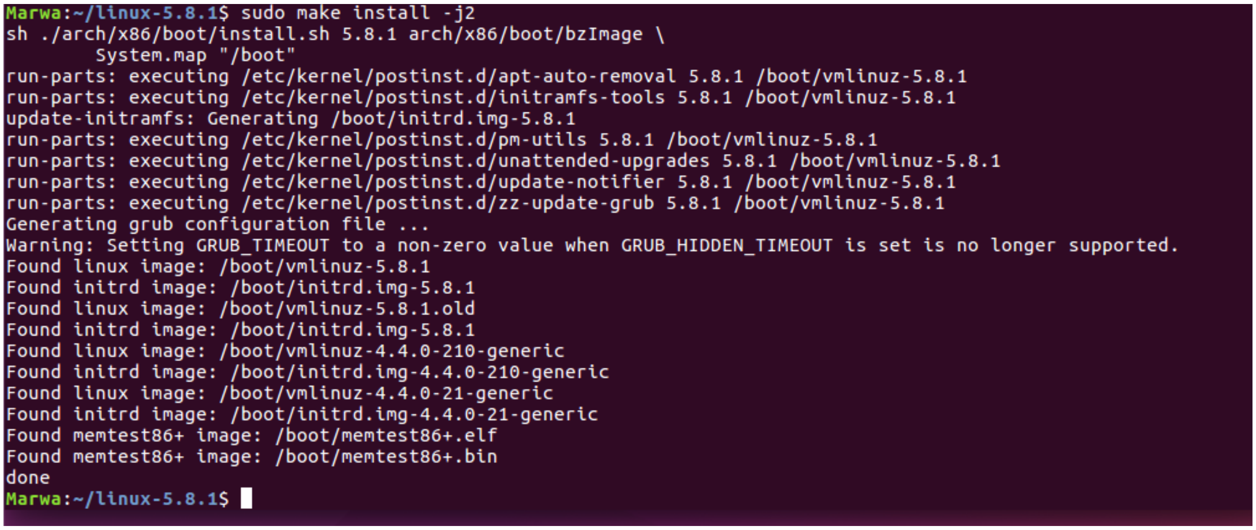
```
CALL    scripts/checksyscalls.sh
CC      arch/x86/entry/syscall_64.o
CC      init/main.o
CC      arch/x86/entry/common.o
CHK     include/generated/compile.h
CC      init/do_mounts.o
CC      arch/x86/entry/vsyscall/vsyscall_64.o
AR      arch/x86/entry/vsyscall/built-in.a
CC      arch/x86/entry/syscall_32.o
CC      arch/x86/entry/syscall_x32.o
AR      arch/x86/entry/built-in.a
CC      init/do_mounts_rd.o
CC      init/do_mounts_initrd.o
CC      init/do_mounts_md.o
CC      init/initramfs.o
AR      init/built-in.a
CC      kernel/fork.o
CC      arch/x86/kernel/process_64.o
CC      arch/x86/kernel/signal.o
CC      kernel/exec_domain.o
CC      arch/x86/kernel/ioport.o
CC      kernel/exit.o
CC      arch/x86/kernel/ldt.o
CC      arch/x86/kernel/sys_ia32.o
CC      kernel/sysctl.o
```



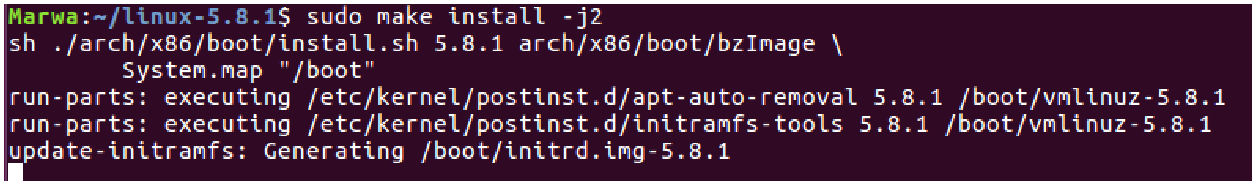
```
INSTALL arch/x86/crypto/camellia-aesni-avx-x86_64.ko
INSTALL arch/x86/crypto/camellia-aesni-avx2.ko
INSTALL arch/x86/crypto/camellia-x86_64.ko
INSTALL arch/x86/crypto/cast5-avx-x86_64.ko
INSTALL arch/x86/crypto/cast6-avx-x86_64.ko
INSTALL arch/x86/crypto/chacha-x86_64.ko
INSTALL arch/x86/crypto/crc32-pclmul.ko
INSTALL arch/x86/crypto/crct10dif-pclmul.ko
INSTALL arch/x86/crypto/des3_ede-x86_64.ko
INSTALL arch/x86/crypto/ghash-clmulni-intel.ko
INSTALL arch/x86/crypto/glue_helper.ko
INSTALL arch/x86/crypto/poly1305-x86_64.ko
INSTALL arch/x86/crypto/serpent-avx-x86_64.ko
INSTALL arch/x86/crypto/serpent-avx2.ko
INSTALL arch/x86/crypto/serpent-sse2-x86_64.ko
INSTALL arch/x86/crypto/sha1-ssse3.ko
INSTALL arch/x86/crypto/sha256-ssse3.ko
INSTALL arch/x86/crypto/sha512-ssse3.ko
INSTALL arch/x86/crypto/twofish-avx-x86_64.ko
INSTALL arch/x86/crypto/twofish-x86_64-3way.ko
INSTALL arch/x86/crypto/twofish-x86_64.ko
INSTALL arch/x86/kernel/cpu/mce/mce-inject.ko
INSTALL arch/x86/kernel/cpuid.ko
INSTALL arch/x86/kernel/msr.ko
INSTALL arch/x86/kvm/kvm-amd.ko
INSTALL arch/x86/kvm/kvm-intel.ko
INSTALL arch/x86/kvm/kvm.ko
INSTALL arch/x86/oprofile/oprofile.ko
INSTALL arch/x86/platform/atom/punit_atom_debug.ko
INSTALL crypto/842.ko
INSTALL crypto/af_alg.ko
INSTALL crypto/algif_aead.ko
INSTALL crypto/algif_hash.ko
INSTALL crypto/algif_rng.ko
INSTALL crypto/algif_skcipher.ko
INSTALL crypto/ansi_cprng.ko
INSTALL crypto/anubis.ko
INSTALL crypto/arc4.ko
INSTALL crypto/asymmetric_keys/pkcs7_test_key.ko
INSTALL crypto/async_tx/async_memcpy.ko
INSTALL crypto/async_tx/async_pq.ko
INSTALL crypto/async_tx/async_raid6_recov.ko
INSTALL crypto/async_tx/async_tx.ko
INSTALL crypto/async_tx/async_xor.ko
INSTALL crypto/async_tx/raid6test.ko
```

7.Install the kernel.

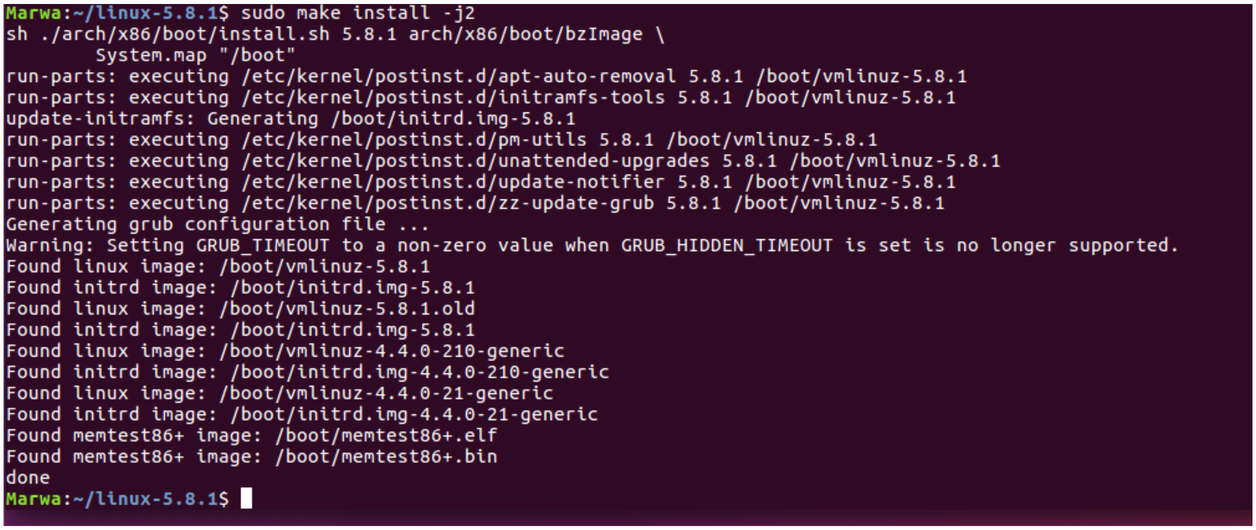
sudo make install -j12



```
Marwa:~/linux-5.8.1$ sudo make install -j2
sh ./arch/x86/boot/install.sh 5.8.1 arch/x86/boot/bzImage \
        System.map "/boot"
run-parts: executing /etc/kernel/postinst.d/apt-auto-removal 5.8.1 /boot/vmlinuz-5.8.1
run-parts: executing /etc/kernel/postinst.d/initramfs-tools 5.8.1 /boot/vmlinuz-5.8.1
update-initramfs: Generating /boot/initrd.img-5.8.1
run-parts: executing /etc/kernel/postinst.d/pm-utils 5.8.1 /boot/vmlinuz-5.8.1
run-parts: executing /etc/kernel/postinst.d/unattended-upgrades 5.8.1 /boot/vmlinuz-5.8.1
run-parts: executing /etc/kernel/postinst.d/update-notifier 5.8.1 /boot/vmlinuz-5.8.1
run-parts: executing /etc/kernel/postinst.d/zz-update-grub 5.8.1 /boot/vmlinuz-5.8.1
Generating grub configuration file ...
Warning: Setting GRUB_TIMEOUT to a non-zero value when GRUB_HIDDEN_TIMEOUT is set is no longer supported.
Found linux image: /boot/vmlinuz-5.8.1
Found initrd image: /boot/initrd.img-5.8.1
Found linux image: /boot/vmlinuz-5.8.1.old
Found initrd image: /boot/initrd.img-5.8.1
Found linux image: /boot/vmlinuz-4.4.0-210-generic
Found initrd image: /boot/initrd.img-4.4.0-210-generic
Found linux image: /boot/vmlinuz-4.4.0-21-generic
Found initrd image: /boot/initrd.img-4.4.0-21-generic
Found memtest86+ image: /boot/memtest86+.elf
Found memtest86+ image: /boot/memtest86+.bin
done
Marwa:~/linux-5.8.1$ 
```



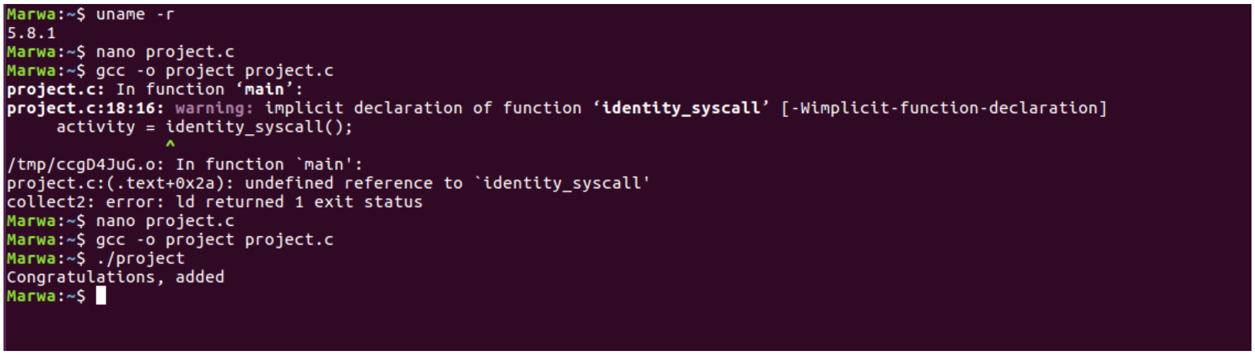
```
Marwa:~/linux-5.8.1$ sudo make install -j2
sh ./arch/x86/boot/install.sh 5.8.1 arch/x86/boot/bzImage \
        System.map "/boot"
run-parts: executing /etc/kernel/postinst.d/apt-auto-removal 5.8.1 /boot/vmlinuz-5.8.1
run-parts: executing /etc/kernel/postinst.d/initramfs-tools 5.8.1 /boot/vmlinuz-5.8.1
update-initramfs: Generating /boot/initrd.img-5.8.1
```



```
Marwa:~/linux-5.8.1$ sudo make install -j2
sh ./arch/x86/boot/install.sh 5.8.1 arch/x86/boot/bzImage \
        System.map "/boot"
run-parts: executing /etc/kernel/postinst.d/apt-auto-removal 5.8.1 /boot/vmlinuz-5.8.1
run-parts: executing /etc/kernel/postinst.d/initramfs-tools 5.8.1 /boot/vmlinuz-5.8.1
update-initramfs: Generating /boot/initrd.img-5.8.1
run-parts: executing /etc/kernel/postinst.d/pm-utils 5.8.1 /boot/vmlinuz-5.8.1
run-parts: executing /etc/kernel/postinst.d/unattended-upgrades 5.8.1 /boot/vmlinuz-5.8.1
run-parts: executing /etc/kernel/postinst.d/update-notifier 5.8.1 /boot/vmlinuz-5.8.1
run-parts: executing /etc/kernel/postinst.d/zz-update-grub 5.8.1 /boot/vmlinuz-5.8.1
Generating grub configuration file ...
Warning: Setting GRUB_TIMEOUT to a non-zero value when GRUB_HIDDEN_TIMEOUT is set is no longer supported.
Found linux image: /boot/vmlinuz-5.8.1
Found initrd image: /boot/initrd.img-5.8.1
Found linux image: /boot/vmlinuz-5.8.1.old
Found initrd image: /boot/initrd.img-5.8.1
Found linux image: /boot/vmlinuz-4.4.0-210-generic
Found initrd image: /boot/initrd.img-4.4.0-210-generic
Found linux image: /boot/vmlinuz-4.4.0-21-generic
Found initrd image: /boot/initrd.img-4.4.0-21-generic
Found memtest86+ image: /boot/memtest86+.elf
Found memtest86+ image: /boot/memtest86+.bin
done
Marwa:~/linux-5.8.1$ 
```

8.Check the version of your current kernel.

uname -r

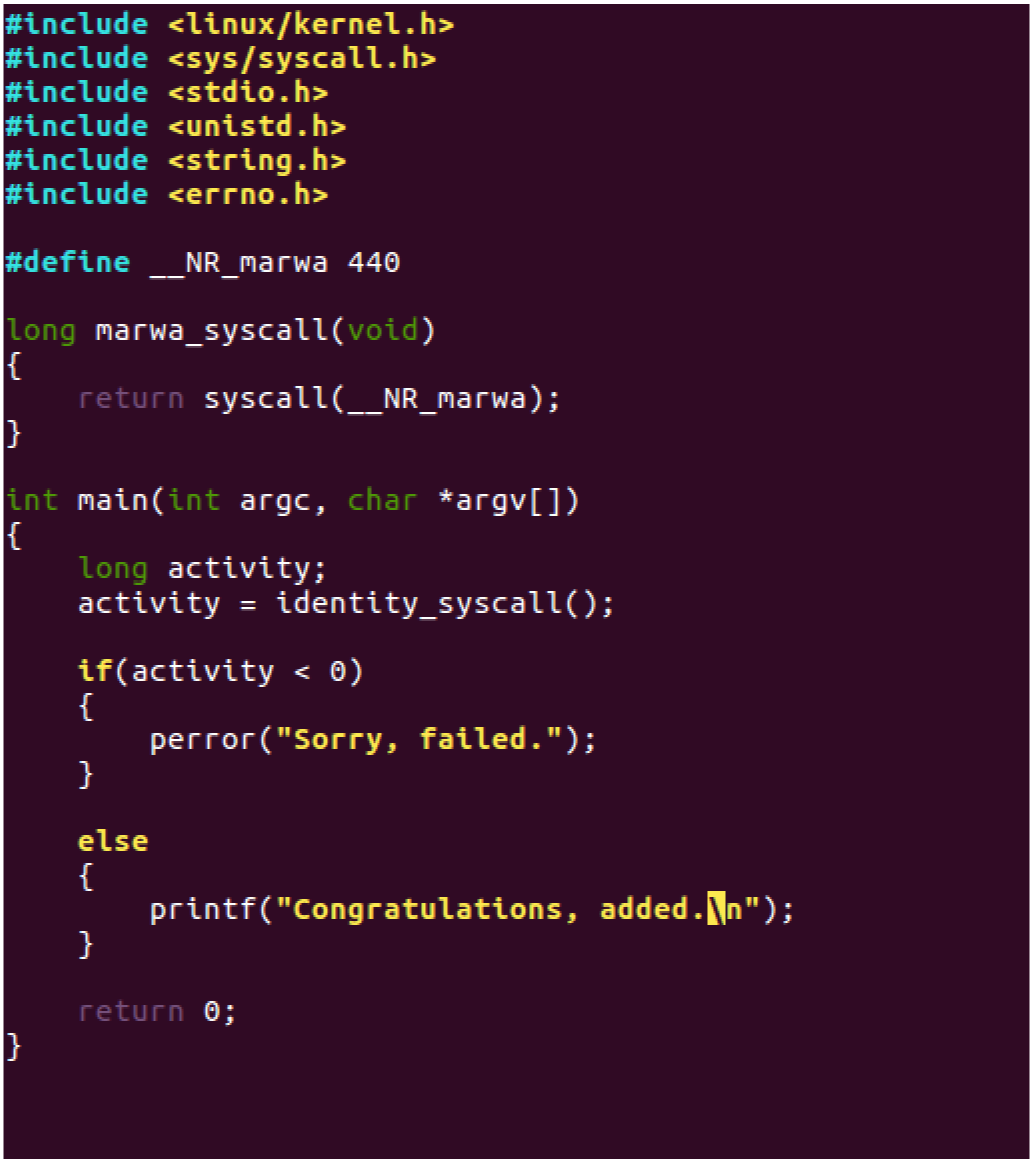


```
Marwa:~$ uname -r
5.8.1
Marwa:~$ nano project.c
Marwa:~$ gcc -o project project.c
project.c: In function ‘main’:
project.c:18:16: warning: implicit declaration of function ‘identity_syscall’ [-Wimplicit-function-declaration]
     activity = identity_syscall();
                ^
/tmp/ccgD4JuG.o: In function `main':
project.c:(.text+0x2a): undefined reference to `identity_syscall'
collect2: error: ld returned 1 exit status
Marwa:~$ nano project.c
Marwa:~$ gcc -o project project.c
Marwa:~$ ./project
Congratulations, added
Marwa:~$ 
```

9.Create a C file to generate a report of the success or failure of your system call.

Create the C file with the following command.

nano report.c



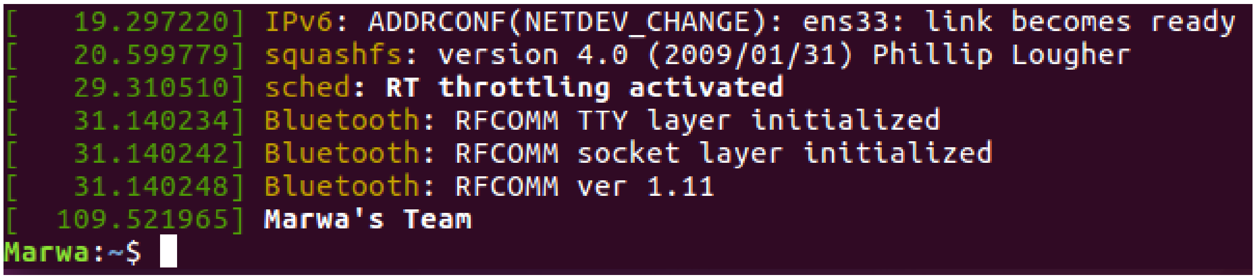
```
#include <linux/kernel.h>
#include <sys/syscall.h>
#include <stdio.h>
#include <unistd.h>
#include <string.h>
#include <errno.h>

#define __NR_marwa 440

long marwa_syscall(void)
{
    return syscall(__NR_marwa);
}

int main(int argc, char *argv[])
{
    long activity;
    activity = identity_syscall();

    if(activity < 0)
    {
        perror("Sorry, failed.");
    }

    else
    {
        printf("Congratulations, added.\n");
    }

    return 0;
}
```

Compile the C file you just created.

```
gcc -o report report.c
```

4.5 - Run the C file you just compiled.

```
./report
```



```
[   19.297220] IPv6: ADDRCONF(NETDEV_CHANGE): ens33: link becomes ready
[   20.599779] squashfs: version 4.0 (2009/01/31) Phillip Lougher
[   29.310510] sched: RT throttling activated
[   31.140234] Bluetooth: RFCOMM TTY layer initialized
[   31.140242] Bluetooth: RFCOMM socket layer initialized
[   31.140248] Bluetooth: RFCOMM ver 1.11
[  109.521965] Marwa's Team
Marwa:~$ 
```

KERNEL VERSION

9.8.1

RAMS:

2 GB

NUMBER OF CORES:

2

Here are some screenshots of the work we done

We tried more then 6 times in different computers and finally we got the result you see

(https://drive.google.com/drive/folders/11udY1M59CUXbcmUCwHLVyQ_lLvFcnSH8?usp=sharing)