how to add your system call the Linux OS kernel.

Osama mohammed ahmed G2
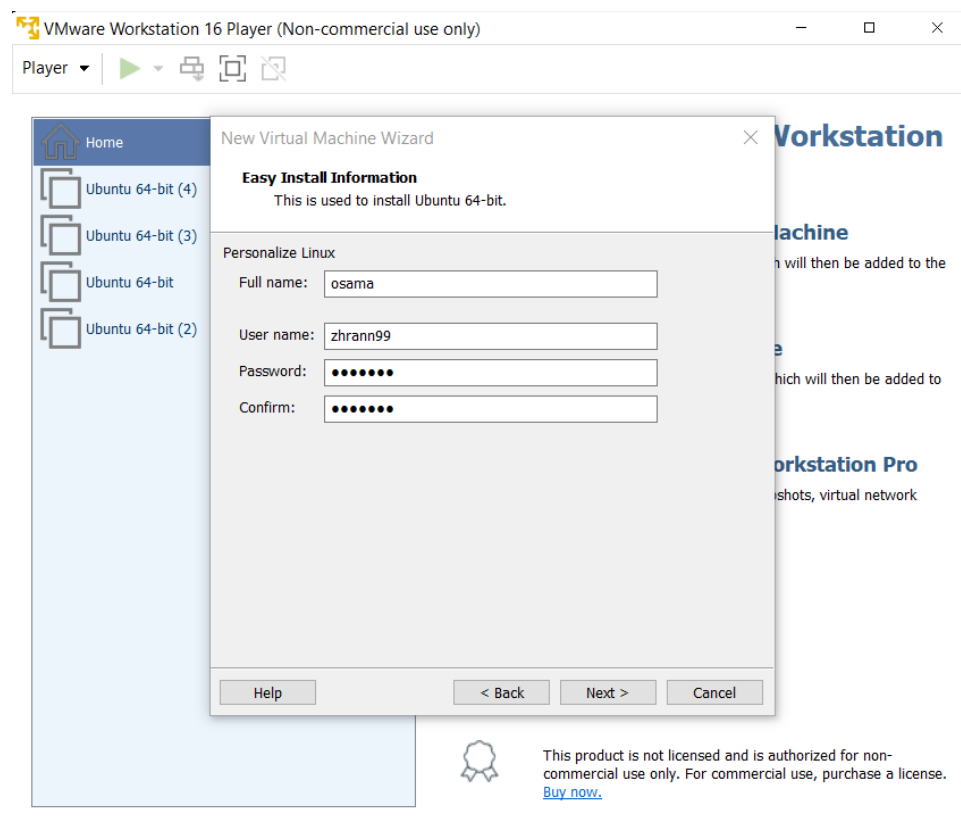
Abdelrhman amged   mohammed   G1

Mohamed el hosseny mohamed   G2

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To

Dr Samer Shaban AbdelFatah
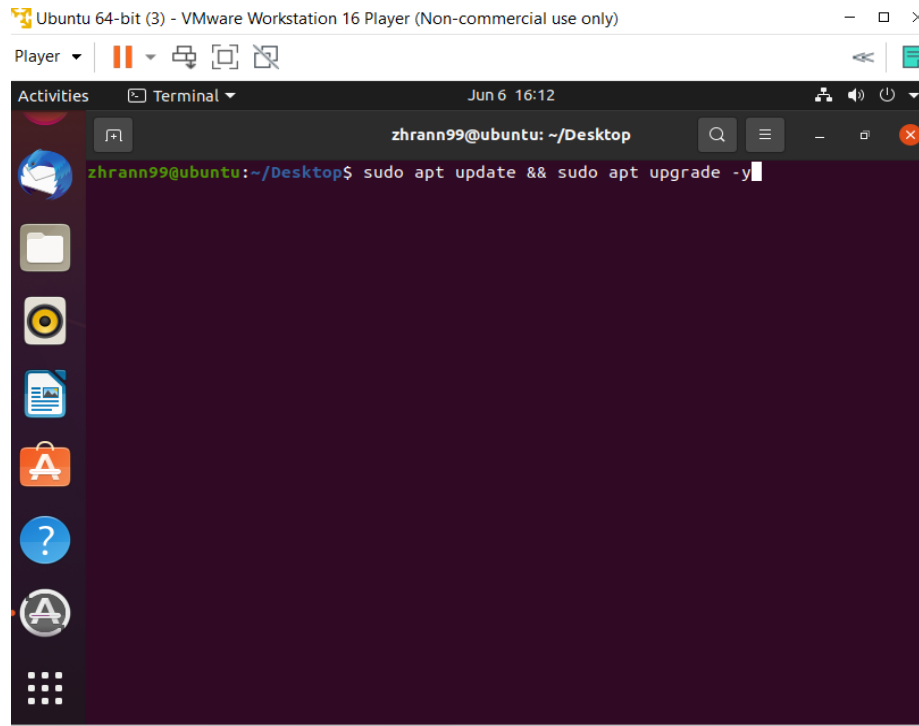
#install and setup program

1 - and 2

In this part , will download all necessary tools to add a basic system call to the Linux kernel and run it. This is the only part of the entire process where network connectivity is necessary.

1.a - Fully update your operating system.

1.b - Download and install the essential packages to compile kernels.

1.c - Download and install the essential packages to compile kernels.

1.e - Download the source code of the latest stable version and Clean up installed packages..

```
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
zhrann99@ubuntu:~/Desktop$ sudo apt install build-essential libncurses-dev libssl
-dev libelf-dev bison flex -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
bison is already the newest version (2:3.5.1+dfsg-1).
flex is already the newest version (2.6.4-6.2).
libelf-dev is already the newest version (0.176-1.1build1).
libncurses-dev is already the newest version (6.2-0ubuntu2).
build-essential is already the newest version (12.8ubuntu1.1).
libssl-dev is already the newest version (1.1.1f-1ubuntu2.4).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
zhrann99@ubuntu:~/Desktop$ sudo apt install vim -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
v   Software Updater  he newest version (2:8.1.2269-1ubuntu5).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
zhrann99@ubuntu:~/Desktop$ sudo apt clean && sudo apt autoremove -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
zhrann99@ubuntu:~/Desktop$
```

Ubuntu 64-bit (3) - VMware Workstation 16 Player (Non-commercial use only)

Player ▾

Activities   Terminal ▾   Jun 6 16:16

zhrann99@ubuntu: ~/Desktop

```
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
zhrann99@ubuntu:~/Desktop$ sudo apt install build-essential libncurses-dev libssl
-dev libelf-dev bison flex -y
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zhrann99@ubuntu:~/Desktop$ sudo apt install vim -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
vim is already the newest version (2:8.1.2269-1ubuntu5).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
zhrann99@ubuntu:~/Desktop$ sudo apt clean && sudo apt autoremove -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
zhrann99@ubuntu:~/Desktop$ wget -P ~/ https://cdn.kernel.org/pub/linux/kernel/v5.
x/linux-5.8.1.tar.xz
```

-part2- Check the version of your current kernel. And Change your working directory to the root directory of the recently unpacked source code.

We will Create the home directory of your system call and Create a C file for your system call.

Player

zhrann99@ubuntu: ~/linux-5.8.1

```
linux-5.8.1/usr/Makefile
linux-5.8.1/usr/default_cpio_list
linux-5.8.1/usr/gen_init_cpio.c
linux-5.8.1/usr/gen_initramfs.sh
linux-5.8.1/usr/include/
linux-5.8.1/usr/include/.gitignore
linux-5.8.1/usr/include/Makefile
linux-5.8.1/usr/initramfs_data.S
linux-5.8.1/virt/
linux-5.8.1/virt/Makefile
linux-5.8.1/virt/kvm/
linux-5.8.1/virt/kvm/Kconfig
linux-5.8.1/virt/kvm/async_pf.c
linux-5.8.1/virt/kvm/async_pf.h
linux-5.8.1/virt/kvm/coalesced_mmio.c
linux-5.8.1/virt/kvm/coalesced_mmio.h
linux-5.8.1/virt/kvm/eventfd.c
linux-5.8.1/virt/kvm/irqchip.c
linux-5.8.1/virt/kvm/kvm_main.c
linux-5.8.1/virt/kvm/vfio.c
linux-5.8.1/virt/kvm/vfio.h
linux-5.8.1/virt/lib/
linux-5.8.1/virt/lib/Kconfig
linux-5.8.1/virt/lib/Makefile
linux-5.8.1/virt/lib/irqbypass.c
zhrann99@ubuntu:~/Desktop$ uname -r
5.8.0-53-generic
zhrann99@ubuntu:~/Desktop$ cd ~/linux-5.8.1/
zhrann99@ubuntu:~/linux-5.8.1$ mkdir identity
```

Player
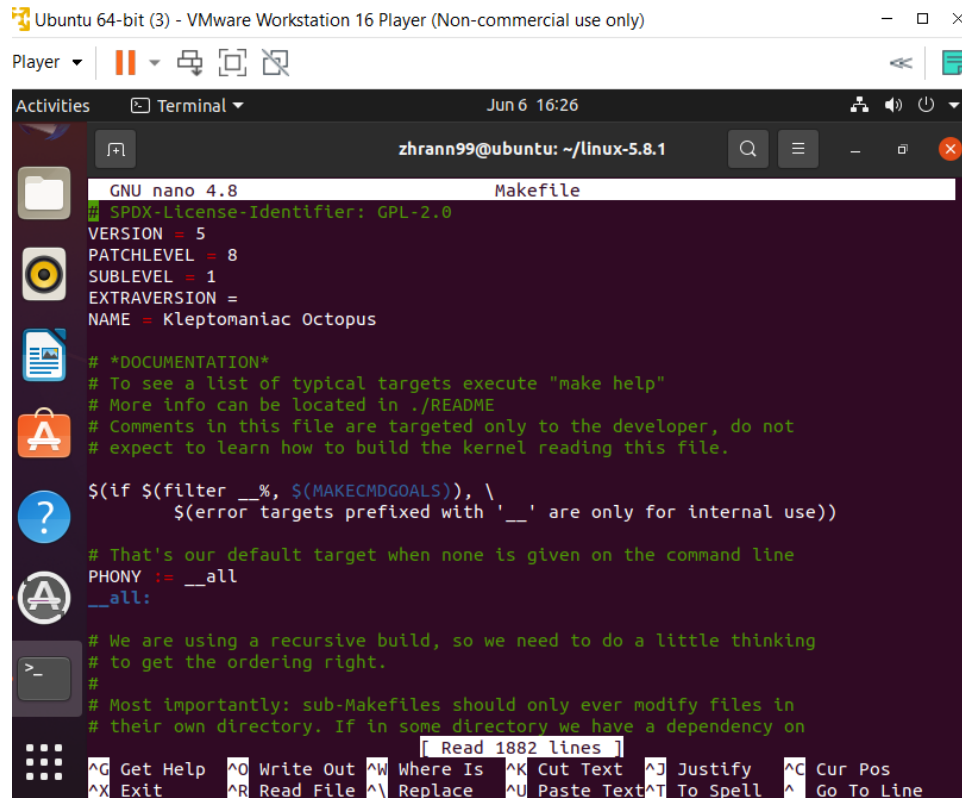
zhrann99@ubuntu: ~/linux-5.8.1

```
  GNU nano 4.8                    identity/identity.c                    Modified
#include <linux/kernel.h>
#include <linux/syscalls.h>

SYSCALL_DEFINE0(identity)

{
    printk("I am osama and abdo amged and hosseny.\n");
    return 0;
}
```

```
^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
```

We will Create a Makefile for your system call. And Add the home directory of system call to the main Makefile of the kernel.

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

After this Add your system call to the kernel's system call table.

Configure the kernel.

We skip some screenshots ....for some commend like

Find out how many logical cores you have

Compile the kernel's source code.

Prepare the Install the kernel.

Install the kernel.

 Update the bootloader of the operating system with the new kernel.
Change working directory to home directory.

After this comend we will Create the C file with the following command

In final - Run the C file you just compiled.
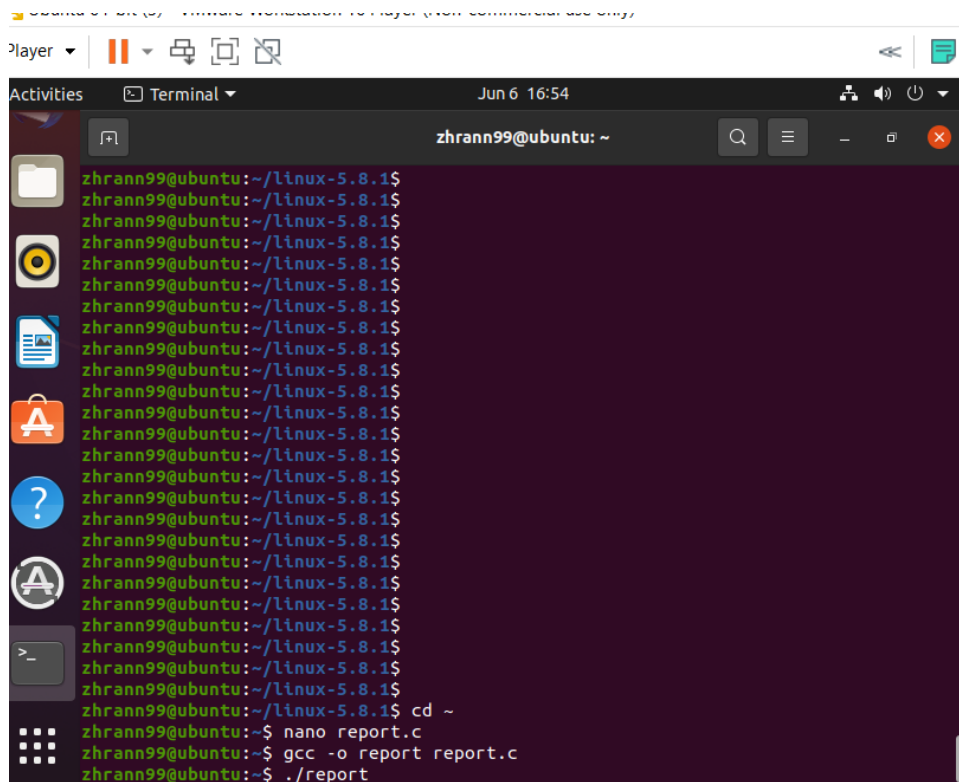
It show to me `Congratulations, osama Your system call is functional.`but I forget to photo screen

References

https://dev.to/jasper/adding-a-system-call-to-the-linux-kernel-5-8-1-in-ubuntu-20-04-lts-2ga8

Thanks.