Install Linux Kernel

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1 Compile the Linux Kernel

1.1 Preparation

We can download and install the VMWare Workstation Pro 15.5.0. Then we can download the image file of the Ubuntu operating system ubuntu-20.04.1-desktop-amd64.iso from mirrors.tuna, and install it as a virtual machine in VMWare Workstation.

After installation, open the terminal of the virtual machine and input the following instruction, and we can see the current Linux Kernel version of the Ubuntu system.

```
1       uname -a
```

The current Linux Kernel version of my ubuntu is 5.8.0-43-generic (Fig. 1).

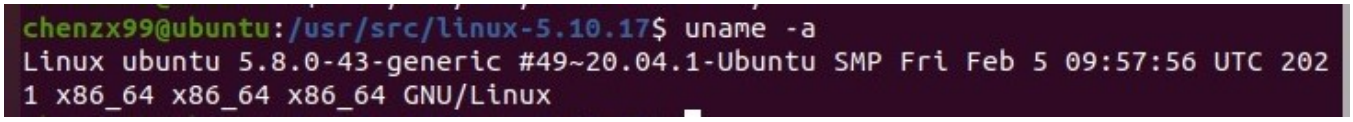

图 1: The current Linux Kernel version

Then we can visit the Kernel.org to download the latest version kernel source. I choose the latest mainline version (5.11) to download (Fig. 2).

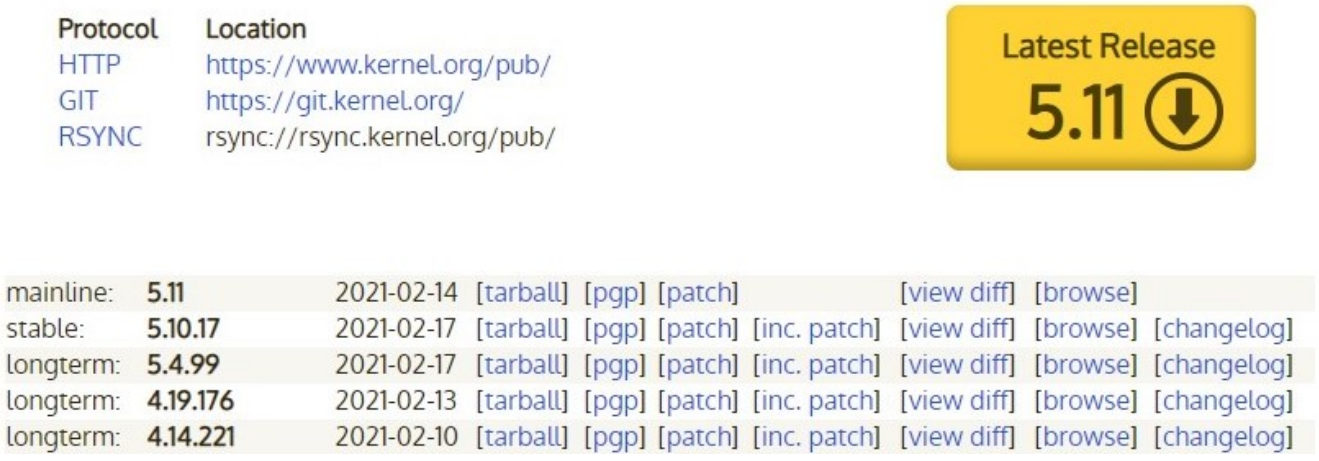

图 2: The latest stable kernel version

Then we can use the following instruction to unzip the Linux Kernel source file to the directory `/usr/src`.

```
tar xvJf linux-5.5.8.tar.xz -C /usr/src
```

Before compiling, remember to install or upgrade these tools which is necessary for compilation. Otherwise, sonething would go wrong during compilation.

```
sudo apt update
sudo apt upgrade
sudo apt-get install build-essential ncurses-dev libssl-dev flex bison
```

Then, we can use the following instruction to set some configuration of kernel.

```
sudo make menuconfig
```

The configuration menu is displayed as follows (Fig. 3).

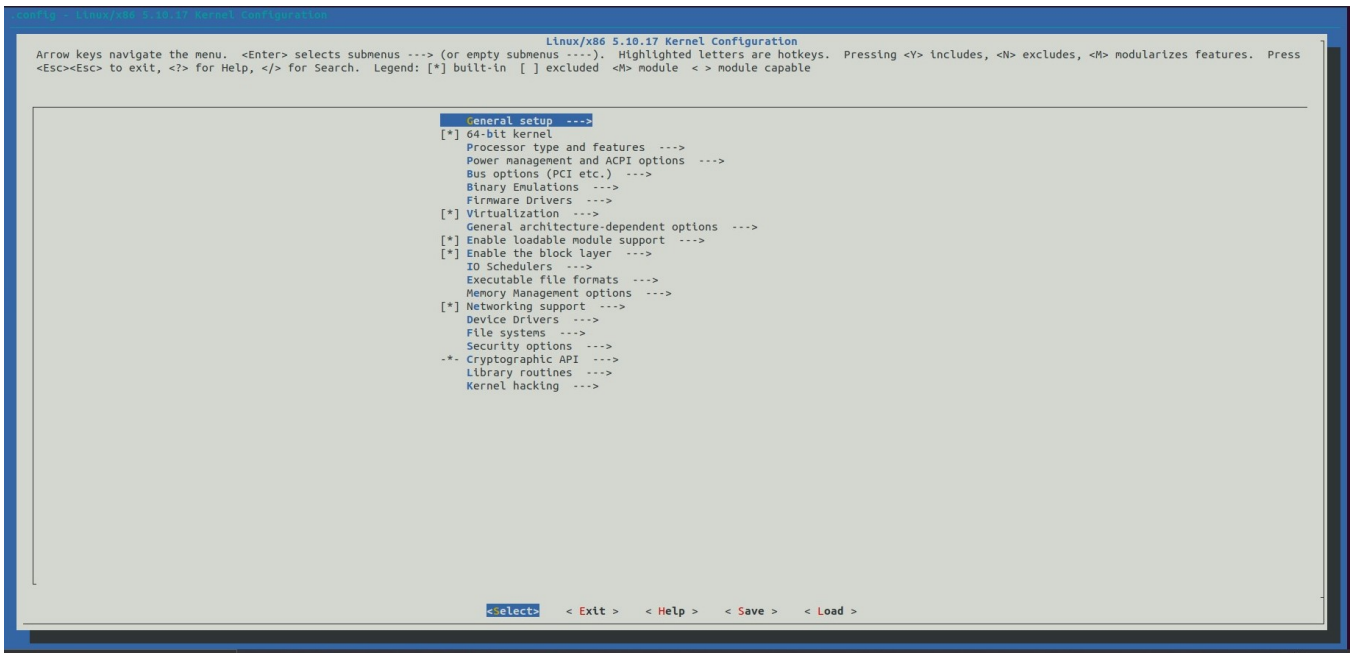

图 3: The configuration menu

If there is nothing to be configured, then we can exit directly and the configuration will be saved automatically.

1.2 Compilation

As prompted, we use the following instruction to compile the kernel.

```
sudo make
```

This will take a long time to make, try use the following instruction to make more threads to speed up.

```
sudo make -j 2
```

This period takes about three hours, which is finally displayed as follows (Fig. 4).

1.3 Installation

After compilation, we can use the following instruciton to install modules.

```
  LD [M]  sound/usb/bcd2000/snd-bcd2000.ko
  LD [M]  sound/usb/caiaq/snd-usb-caiaq.ko
  LD [M]  sound/usb/hiface/snd-usb-hiface.ko
  LD [M]  sound/usb/line6/snd-usb-line6.ko
  LD [M]  sound/usb/line6/snd-usb-pod.ko
  LD [M]  sound/usb/line6/snd-usb-podhd.ko
  LD [M]  sound/usb/line6/snd-usb-toneport.ko
  LD [M]  sound/usb/line6/snd-usb-variax.ko
  LD [M]  sound/usb/misc/snd-ua101.ko
  LD [M]  sound/usb/snd-usb-audio.ko
  LD [M]  sound/usb/snd-usbmidi-lib.ko
  LD [M]  sound/usb/usx2y/snd-usb-us122l.ko
  LD [M]  sound/usb/usx2y/snd-usb-usx2y.ko
  LD [M]  sound/x86/snd-hdmi-lpe-audio.ko
  LD [M]  sound/xen/snd_xen_front.ko
chenzx99@ubuntu:/usr/src/linux-5.11.1$
```

图 4: Final result for make command

```
1       sudo make modules_install
```

Then, we can use the following instruction to install the new Kernel.

```
1       sudo make install
```

The result for installation is displayed as follows (Fig. 5).

```
chenzx99@ubuntu:/usr/src/linux-5.11.1$ sudo make install
sh ./arch/x86/boot/install.sh 5.11.1 arch/x86/boot/bzImage \
        System.map "/boot"
run-parts: executing /etc/kernel/postinst.d/apt-auto-removal 5.11.1 /boot/vmlinuz-5.11.1
run-parts: executing /etc/kernel/postinst.d/initramfs-tools 5.11.1 /boot/vmlinuz-5.11.1
update-initramfs: Generating /boot/initrd.img-5.11.1
run-parts: executing /etc/kernel/postinst.d/unattended-upgrades 5.11.1 /boot/vmlinuz-5.11.1
run-parts: executing /etc/kernel/postinst.d/update-notifier 5.11.1 /boot/vmlinuz-5.11.1
run-parts: executing /etc/kernel/postinst.d/zz-update-grub 5.11.1 /boot/vmlinuz-5.11.1
Sourcing file `/etc/default/grub'
Sourcing file `/etc/default/grub.d/init-select.cfg'
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-5.11.1
Found initrd image: /boot/initrd.img-5.11.1
Found linux image: /boot/vmlinuz-5.8.0-43-generic
Found initrd image: /boot/initrd.img-5.8.0-43-generic
Found linux image: /boot/vmlinuz-5.4.0-42-generic
Found initrd image: /boot/initrd.img-5.4.0-42-generic
Found memtest86+ image: /boot/memtest86+.elf
Found memtest86+ image: /boot/memtest86+.bin
done
chenzx99@ubuntu:/usr/src/linux-5.11.1$
```

图 5: Final result for installation

1.4 Reboot

Finally, we can use the following to restart and reboot the kernel.

```
1       reboot
```

Moreover, we can use the following instruction again to view the version of kernel (Fig. 1.4).

```
1       uname -a
```

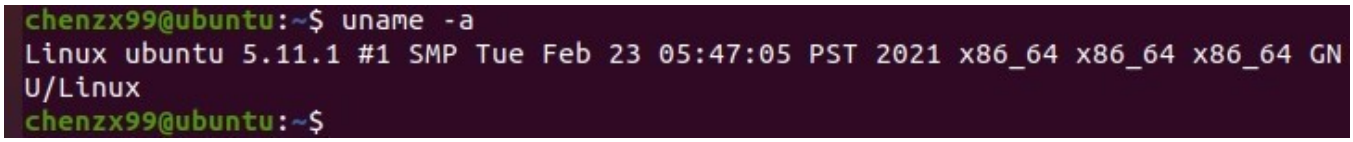

图 6: The new Linux Kernel version