MaaXBoard

(AES-MC-SBC-IMX8M-G)

Debian Linux User Manual

V1.2

Copyright Statement:

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Regulatory Compliance:

- MaaXBoard single board computer has passed the CE & FCC certification.

Revision History

Rev.	Description	Author	Date
V1.0	Initial version	Sandy	20190301
V1.1	1. Add MIPI displayer, USB Device and Demo 2. Modify Wi-Fi and Camera operation	Sandy	20190705
V1.2	3. Add Bluetooth Audio 4. Add Debian Weston system	Sandy	20200119

Catalog

Chapter 1 Introduction

1.1 Feature List

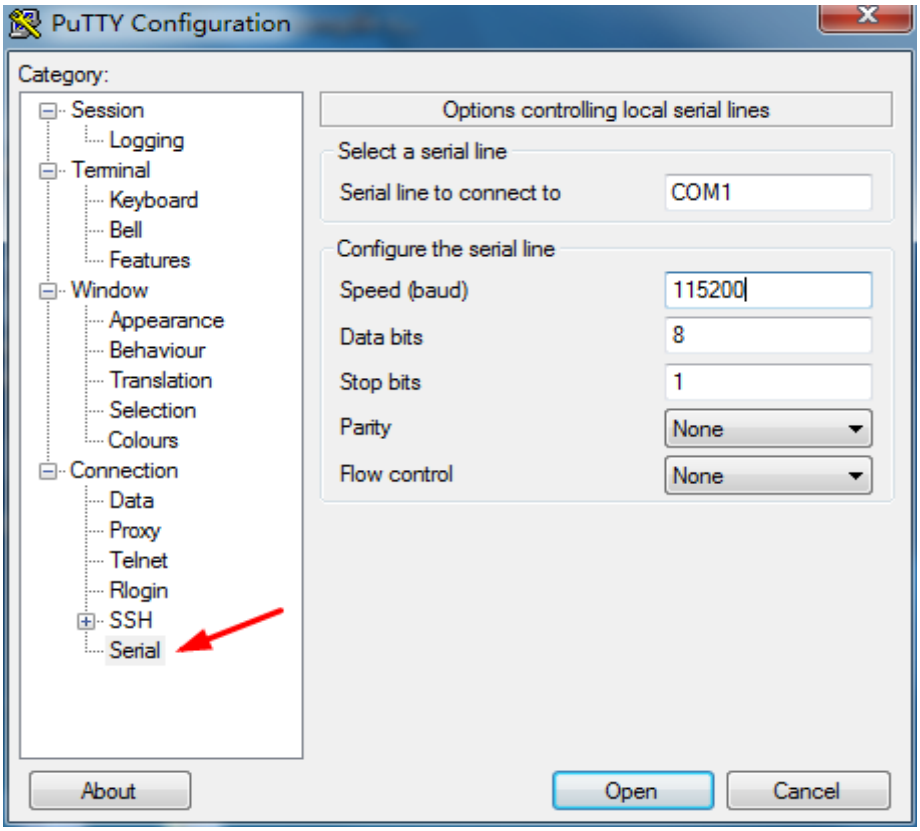
- U-Boot version: 2018.03
- Kernel version: 4.14.78
- Evaluation image: Debian 10
- Qt 5.10.1 library
- Desktop (Weston 5.0)
- Development based on NXP i.MX 8M
- Micro SD boot
- HDMI display
- HDMI audio output
- 1 Gigabit Ethernet (RJ45)
- 2 USB 3.0 can work in host & device mode
- 2 UART (TTL) include debug port
- External interfaces(I2C, UART,SPI ,SAI and GPIO)
- WIFI & BLE 4.2
- LVDS display
- MIPI-DSI display
- MIPI camera
- Dual display (TBD)

Chapter 2 Quick Start

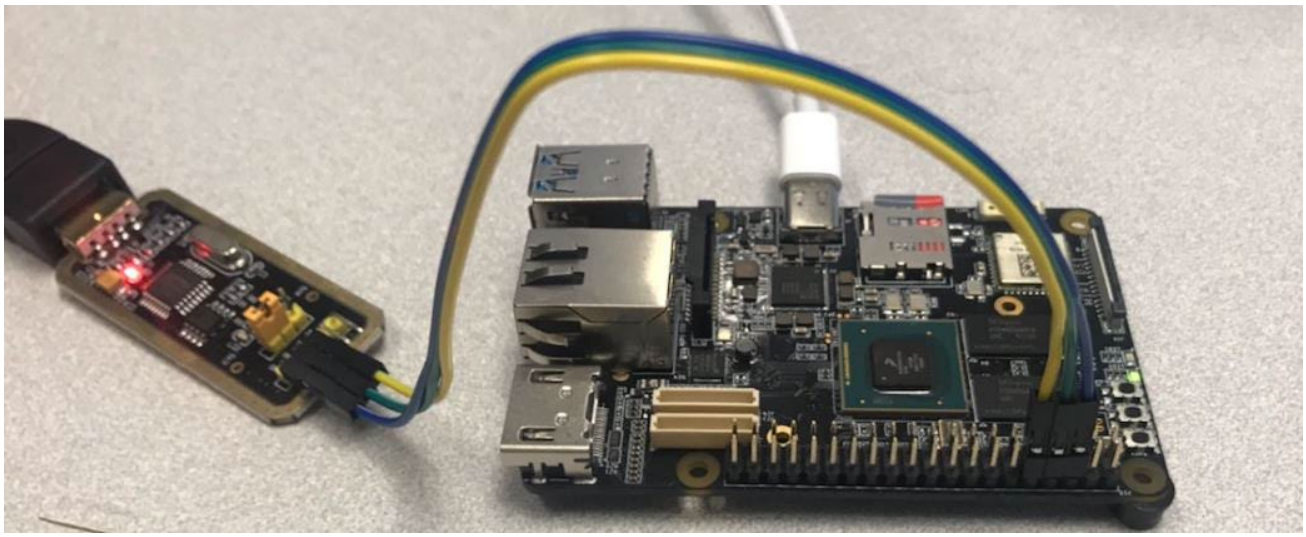
The default version of MaaXBoard support boot up from SD Card only. To burn the image to SD Card, refer to Chapter 4.For the hardware connection and accessories details, please check the QSG.

2.1 Boot from SDCard

- Install the Serial Communication software (e.g. PUTTY), select the corresponding port number, baudrate as 115200, data bits as 8, stop bits as 1, parity as none.

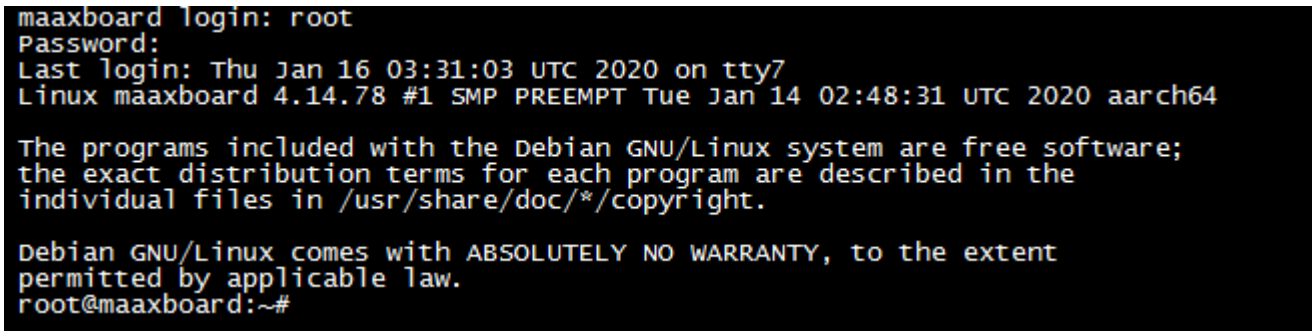


- Connect the debug interface to PC with USB to TTL converter. Pin 6, 8 and 10 of J10 to the GND, RXD and TXD pin of the USB to TTL converter.

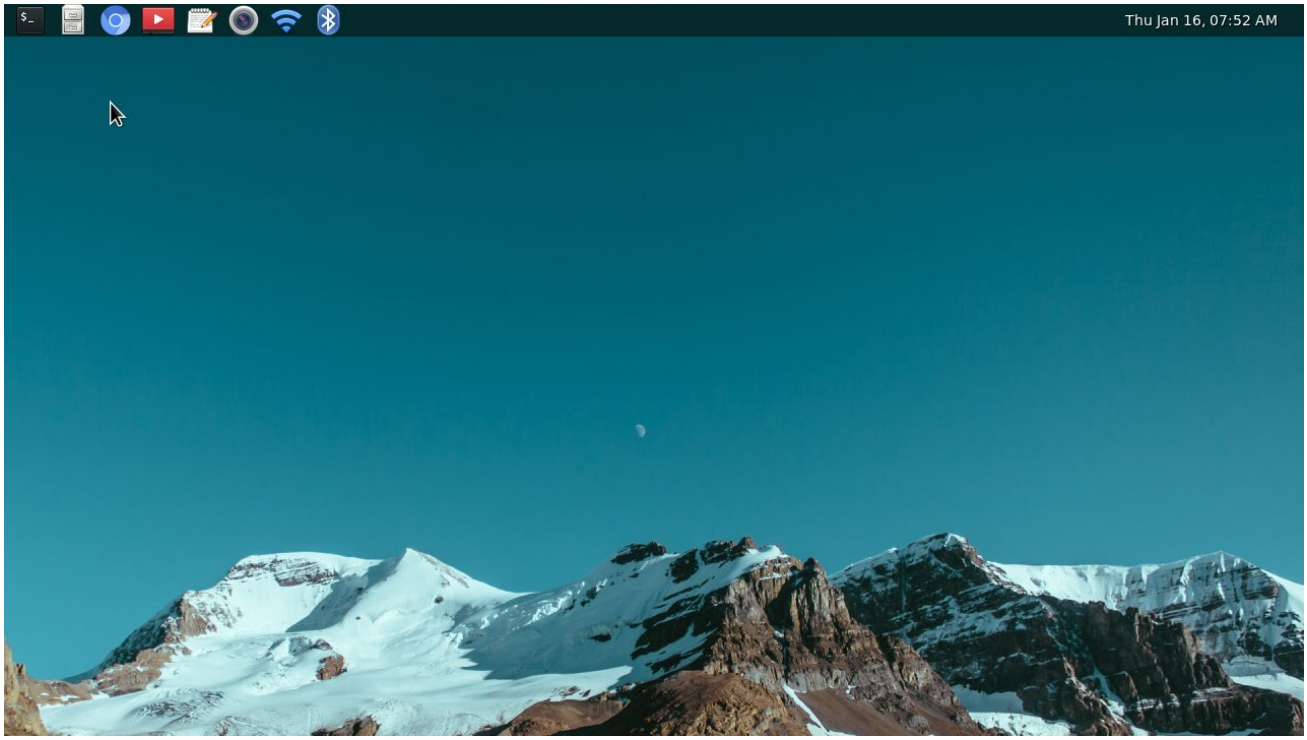


- Insert the SD card (with pre-burned image) into the card slot J19.
- Powered the board with a 5V, 2A, Type-C interface power (to J4).
- When the system boot up, the serial terminal will print the following information:

- Enter username as “root” to login.
- Enter password as “avnet” to login



- After the boot, screen will show the desktop environment. Connect a HDMI monitor up to your MaaXBoard. Users could connect keyboard and mouse to MaaXBoard, to use it. For detail, refer to Weston Desktop Environment.


Thu Jan 16, 07:52 AM

Chapter 3 Feature Configuration & Introduction

First of all, please refer to the previous chapter and boot up the system. Then configure or use the functions according to the following guidance.

3.1 Preparation

Connect to Internet via the Ethernet interface, execute the following commands in serial terminal to install related tools:

```
apt update
apt install evtest
```

3.2 USER LED

User can control the 2 single color LED indicators, LED0 and LED1 (corresponding to usr_led and sys_led) on MaaXBoard Board. Execute the following instructions in serial terminal to control them.
Light out LED:

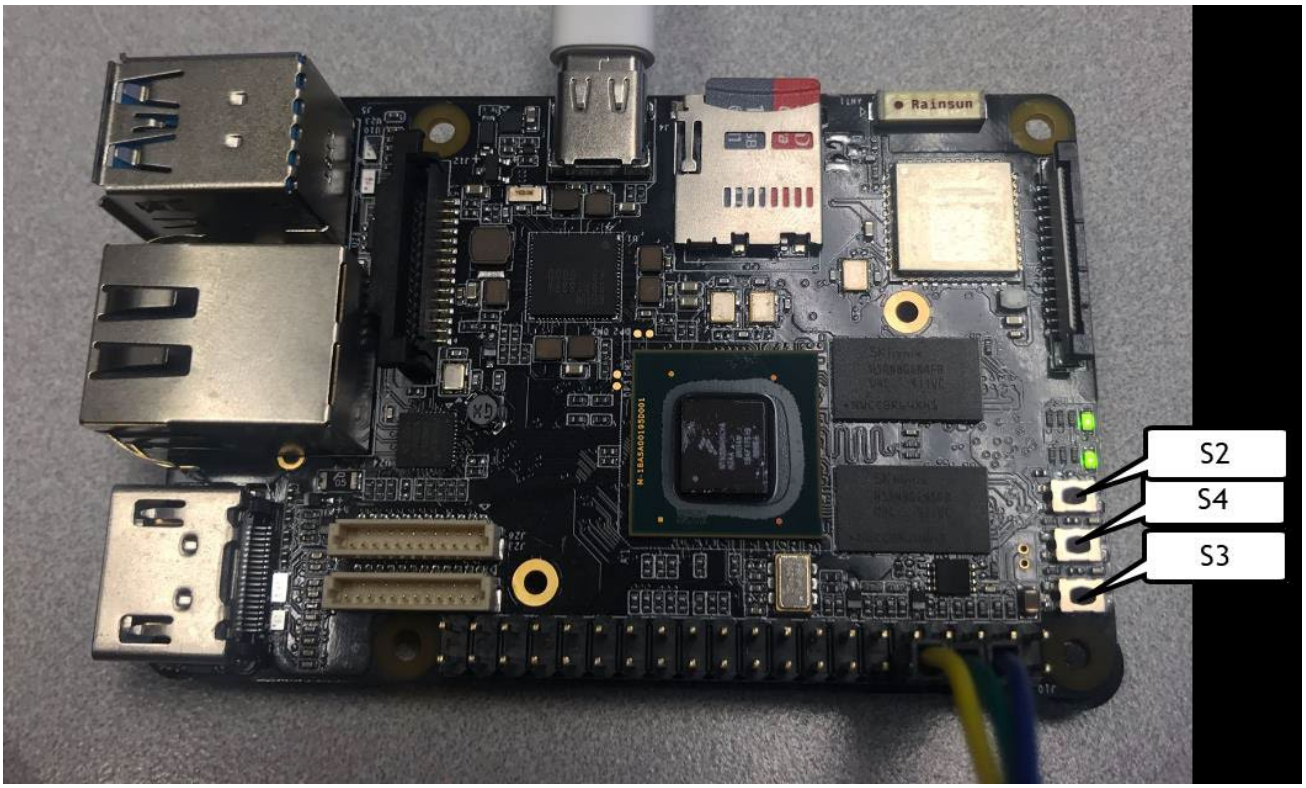
```
root@maaxboard:~# echo 0 | tee /sys/class/leds/usr_led/brightness
root@maaxboard:~# echo 0 | tee /sys/class/leds/sys_led/brightness
```

Light up LED:

```
root@maaxboard:~# echo 1 | tee /sys/class/leds/usr_led/brightness
root@maaxboard:~# echo 1 | tee /sys/class/leds/sys_led/brightness
```

3.3 Button

MaaXBoard supports 3 buttons: **S3-BACK**, **S4-HOME** and **S2-PWR**.



1. Test BACK and HOME button with following instructions:

Enter **evtest** command, then choose the event id for **gpio_keys**

```
root@maaxboard:~# evtest
No device specified, trying to scan all of /dev/input/event*
Available devices:
/dev/input/event0:          30370000.snvs:snvs-powerkey
/dev/input/event1:          gpio_keys
/dev/input/event2:          bd718xx-pwrkey
Select the device event number [0-2]: 1
Input driver version is 1.0.1
Input device ID: bus 0x19 vendor 0x1 product 0x1 version 0x100
Input device name: "gpio_keys"
Supported events:
  Event type 0 (EV_SYN)
  Event type 1 (EV_KEY)
    Event code 102 (KEY_HOME)
    Event code 412 (KEY_PREVIOUS)
Properties:
Testing ... (interrupt to exit)
Event: time 1571363047.449332, type 1 (EV_KEY), code 102 (KEY_HOME), value 1
Event: time 1571363047.449332, ---------- SYN_REPORT ------------
```

```
Event: time 1571363047.705857, type 1 (EV_KEY), code 102 (KEY_HOME), value 0
Event: time 1571363047.705857, ---------- SYN_REPORT ------------
Event: time 1571363048.645842, type 1 (EV_KEY), code 412 (KEY_PREVIOUS), value 1
Event: time 1571363048.645842, ---------- SYN_REPORT ------------
Event: time 1571363048.869859, type 1 (EV_KEY), code 412 (KEY_PREVIOUS), value 0
Event: time 1571363048.869859, ---------- SYN_REPORT ------------
```

2. Press PWR button, system will enter suspend mode, press PWR again for 1s, the system will reboot.

3.4 Displayer

MaaXBoard supports 3 kinds of displayer: HDMI, LVDS and MIPI-DSI screen. Users can connect the screen to the MaaXBoard before booting up the system according to the following table. When the system boots, the screen will print the related startup message and login UI. Users can connect keyboard to login the MaaXBoard file system. The default displayer is HDMI screen.

Screen Type	Interface
HDMI (Default screen)	J9 (Standard HDMI Interface)
MIPI-DSI	J16
LVDS	J16

Display device could be chosen by modify the fdt_file value in uEnv.txt.

Modification Method:

After the system start up, use **nano** or **vi** command to modify the uEnv.txt under path /boot, use **sync** command to synchronize, then reboot the system to make the modification effective.

3.4.1 HDMI

HDMI is the default displayer, the fdt_file value should be:

```
fdt_file=em-sbc-imx8m.dtb
```

The max HDMI screen resolution supported is 4K. (Need to use 4K HDMI displayer.)

3.4.2 MIPI-DSI Screen

Choose MIPI-DSI screen, the fdt_file value should be:

```
fdt_file=em-sbc-imx8m-dcss-dsi.dtb
```

MIPI-DSI supports backlight brightness adjustment. The backlight brightness has a range from 0 to 255, in which 10 means highest brightness, 0 means lowest.

Execute the following instructions on the serial terminal to implement the backlight test:

```
root@maaxboard:~# echo 7 > /sys/class/backlight/backlight/brightness
```

3.4.3 LVDS Screen

Choose LVDS screen, the fdt_file value should be:

```
fdt_file=em-sbc-imx8m-dcss-lvds.dtb
```

LVDS supports backlight brightness adjustment. The backlight brightness has a range from 0 to 10, in which 10 means highest brightness, 0 means lowest.

Execute the following instructions on the serial terminal to implement the backlight test:

```
root@maaxboard:~# echo 5 > /sys/class/backlight/lvds_backlight/brightness
```

3.5 Touchscreen

The MIPI-DSI and LVDS screen support touch screen, users could touch the screen to control the Debian Weston Desktop Environment.

3.6 Audio

3.6.1 HDMI Audio

Choose HDMI screen as displayer, connect HDMI displayer and the Audio devices, play the audio file:

```
root@maaxboard:~# aplay audio_sample.wav
root@maaxboard:~# gst-play-1.0 audio_sample.wav
```

Note: **aplay** command support audio file in wav format, **gst-play** command support wav, mp3 and aac format.

3.6.2 USB Audio Device

MaaXBoard could support USB audio device (which do not need specified driver) to play audio. When using MIPI-DSI or LVDS screens, you can play audio from USB audio device.

```
root@maaxboard:~# aplay audio_sample.wav
root@maaxboard:~# gst-play-1.0 audio_sample.wav
```

If other audio device, such as HDMI Audio, is connected, use **aplay** command to check the card id, then specify the device when play the audio file.

```
root@maaxboard:~# aplay -l
**** List of PLAYBACK Hardware Devices ****
card 0: imxaudiohdmi [imx-audio-hdmi], device 0: imx8 hdmi i2s-hifi-0 []
  Subdevices: 1/1
  Subdevice #0: subdevice #0
card 2: Device [USB Audio Device], device 0: USB Audio [USB Audio]
  Subdevices: 1/1
```

```
  Subdevice #0: subdevice #0
root@maaxboard:~# aplay -D plughw:2,0 audio_sample.wav
```

3.6.3 Bluetooth Audio

Debian system also support play audio files via the Bluetooth audio device such as Bluetooth headset. Users can connect the Bluetooth device through the desktop application: Blueman-manager. For detail, refer to Weston Desktop Environment.

3.7 UART

MaaXBoard supports 2 UART interface.

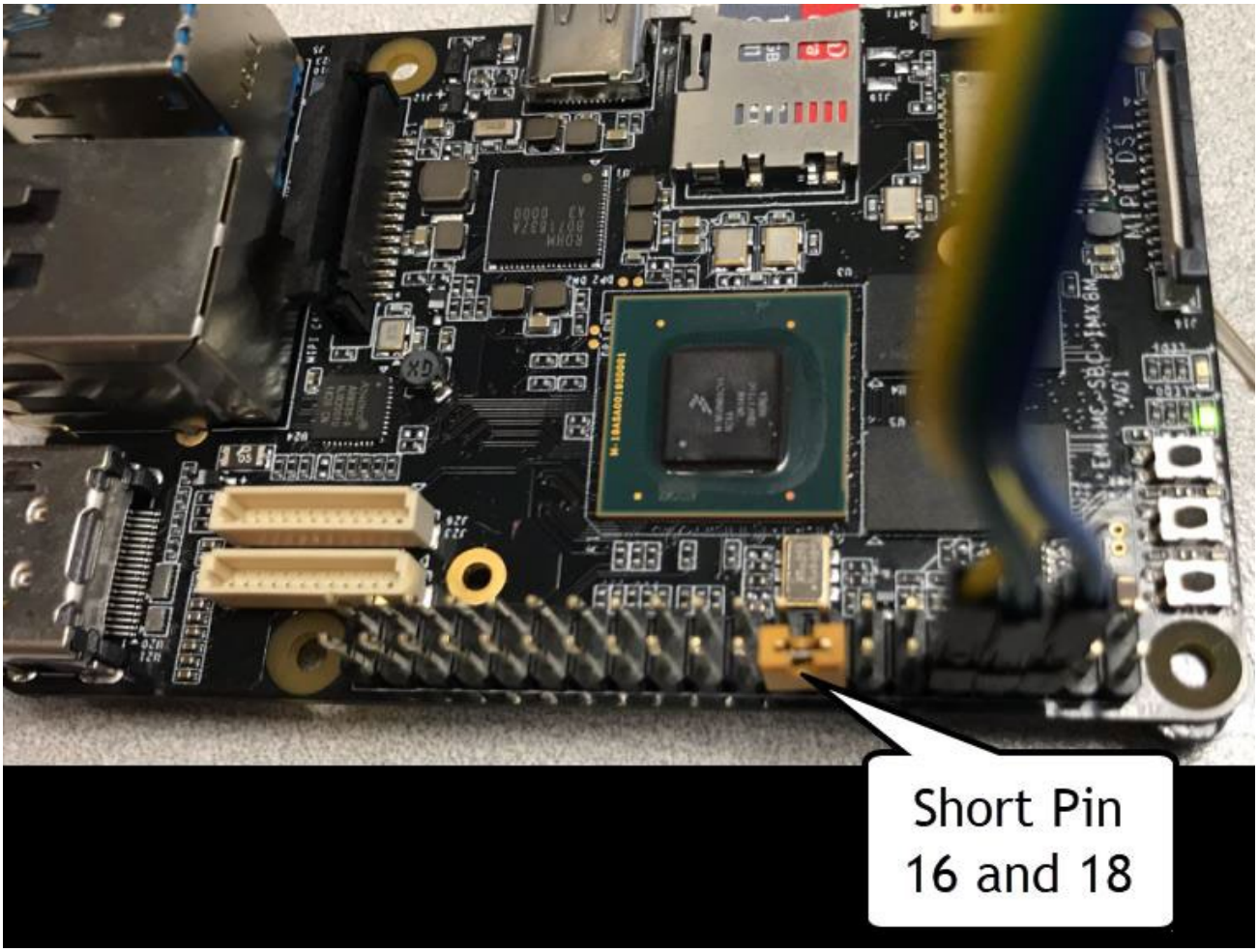
MaaXBoard (CPU)	Interface Type
UART1	UART TTL (Debug Interface)
UART2	UART TTL

3.7.1 UART 2

In the Yocto system, the node for UART2 is /dev/ttymxc1.

The system image provides a test application, uart_test, which could be used for a loop back test.

Short connect the pin 16 and 18 in J10, then enter the following instructions in serial terminal:




```
root@maaxboard:~# ./uart_test -d /dev/ttymxc1 -b 115200
/dev/ttymxc1 RECV 10 total
/dev/ttymxc1 RECV: 1234567890
```

The result of RECV as above, means test passed.

Note: Press “CTRL+C” to exit the test.

3.8 Gigabit Ethernet Interface

Connect the network cable to J13, enter the following instructions to set the IP address:
(The below IP address are example, replace it with your real network environment)

3.8.1 Network Test

After connecting the network cable, MaaXBoard will automatically obtain the IP by default. You can use the **ifconfig** command to view the IP information and use the following command to perform the network test:

```
root@maaxboard:~# ifconfig eth0
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.22.126  netmask 255.255.255.0  broadcast 192.168.22.255
        inet6 fe80::b093:522a:7bd4:5c15  prefixlen 64  scopeid 0x20<link>
        ether 4a:e0:a6:6f:e9:06  txqueuelen 1000  (Ethernet)
        RX packets 924  bytes 259139 (253.0 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 928  bytes 74715 (72.9 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
root@maaxboard:~# ping www.baidu.com
```

3.8.2 Configure IP Via Command Line

To Configure IP address, we can modify the parameter in command line or modify it from the desktop environment.

3.8.2.1 CONFIGURE STATIC IP

If you need to set a static IP, use **nano** command to modify **/etc/network/interfaces**, add following info in The primary network interface segment.

```
auto eth0
iface eth0 inet static
address 192.168.1.139
gateway 192.168.1.1
netmask 255.255.255.0
```

Execute **sync** after the modification, then reboot the system to make it effect.

3.8.2.2 AUTOMATIC GET IP ADDRESS

If you need to set automatic get IP Address, use **nano** command to modify **/etc/network/interfaces**, add following info in The primary network interface segment.

```
auto eth0
iface eth0 inet dhcp
```

Execute **sync** after the modification, then reboot the system to make it effect.

3.8.3 Configure IP Via GUI

Debian Weston system support nmcli GUI version, users can modify the IP address, server, etc. If you've already configure IP via command line, delete or comment the eth0 configurations you've made in /etc/network/interfaces. For detail, refer to Weston Desktop Environment.

3.9 USB 3.0 Interface

The USB 3.0 interface J5 on have 2 USB Host Interface, the upper one is USB1, the lower one is USB0. USB0 and USB1 both support USB HOST function, USB0 support USB Device function.

3.9.1 USB Host

Insert a U-disk to USB0 or USB1, serial terminal will display the disk information:

```
[   541.484723] usb 2-1: new SuperSpeed USB device number 2 using xhci-hcd
[   541.548910] usb-storage 2-1:1.0: USB Mass Storage device detected
[   541.558886] scsi host0: usb-storage 2-1:1.0
[   542.593679] scsi 0:0:0:0: Direct-Access     Kingston DataTraveler 3.0    PQ: 0 ANSI: 6
[   542.604306] sd 0:0:0:0: [sda] 30218842 512-byte logical blocks: (15.5 GB/14.4 GiB)
[   542.612602] sd 0:0:0:0: [sda] Write Protect is off
[   542.618045] sd 0:0:0:0: [sda] Write cache: disabled, read cache: enabled, doesn't support DPO or FUA
[   542.632439]  sda: sda1
[   542.636616] sd 0:0:0:0: [sda] Attached SCSI removable disk
[   542.817343] FAT-fs (sda1): Volume was not properly unmounted. Some data may be corrupt. Please run fsck.
```

Execute the following instructions on the serial terminal:

```
root@maaxboard:~# ls /dev/sd*
/dev/sda  /dev/sda1
root@maaxboard:~# ls /run/media/
sda1
```

The storage node for U disk is /dev/sda1, system will mount the storage device to /run/media path automatically.

MaaXBoard also supports other USB device such as key board, mouse, Camera, etc.

3.9.2 USB Device

USB0 support USB Device function could be used to burn the system image or use as USB Network adapter.

3.9.2.1 BURNING MODE

Connect USB0 and PC before power on the board. The system will not boot normally, it will enter burning mode. Then users could burn the system image to the development board using uuu tools. For the detail information, refer to MaaXBoard EMMC burning Guide.

3.9.2.2 USB NETWORK ADAPTER

To use USB0 as USB slave device: network adapter, users should modify the value of fdt_file in uEnv.txt and reboot the system.

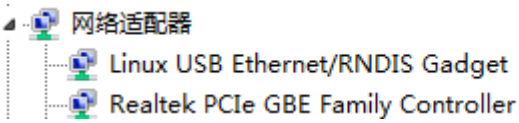
```
fdt_file=em-sbc-imx8m-usb0-device.dtb
```

When choose this value, the displayer is HDMI.

Connect USB0 to PC after the system start up, open the device manager, and check if the following device is recognized:

Please follow the steps listed below to finish USB Device test (Use Windows 7 as example).

1) Install Linux USB Ethernet driver (In release package: LinuxTools), then the device manager will list the Network Adapter: Linux USB Ethernet/RNDIS Gadget



2) Execute the following instructions to set and view the IP address of USB OTG port

The below IP address are example, you can select any other IP, but make sure it is NOT the same network segment as your PC's Ethernet port.

```
root@maaxboard:~# ifconfig usb0 up
root@maaxboard:~# ifconfig usb0 192.168.1.115
root@maaxboard:~# ifconfig usb0
```

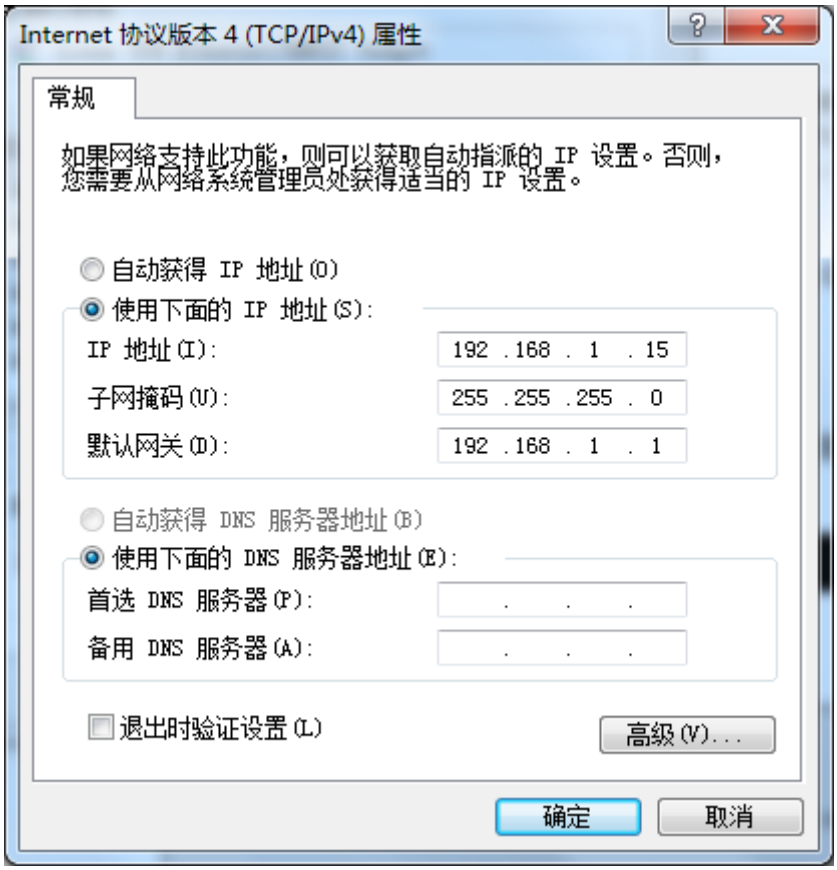
The terminal window will print information as shown below

```
usb0      Link encap:Ethernet  HWaddr 92:a9:b6:be:8b:3f
          inet addr:192.168.1.115  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::90a9:b6ff:febe:8b3f/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
```

```
          RX packets:167 errors:0 dropped:0 overruns:0 frame:0
          TX packets:28 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:12180 (11.8 KiB)  TX bytes:7075 (6.9 KiB)
```

3) Open Control Panel, in the search box, type adapter, and then, under Network and Sharing Center, select View network connections, you will find a new Local Area Connection as shown below

4) Right click the connection “Local Area Connection 5”, select “Properties”-> “Networking” -> “Internet Protocol Version 4 (TCP/IPv4)”, then select Properties to open the following window. Set an IP address that is in the same network segment as the USB OTG port, then click “OK”.



5) Execute the following instruction to verify the network connection;

```
root@maaxboard:~# ping 192.168.1.15
PING 192.168.1.15 (192.168.1.15) 56(84) bytes of data.
64 bytes from 192.168.1.15: icmp_seq=1 ttl=64 time=0.865 ms
64 bytes from 192.168.1.15: icmp_seq=2 ttl=64 time=0.464 ms
64 bytes from 192.168.1.15: icmp_seq=3 ttl=64 time=0.259 ms
```

The information shown above indicates the network connection is working properly.

3.10 Wi-Fi

The on-board Wi-Fi module support 2.4G/5G network and hotspot.

To connect WIFI, execute the following instructions on the serial terminal:

Open Wi-Fi device:

```
root@maaxboard:~# nmcli r wifi on
```

Search Wi-Fi network:

```
root@maaxboard:~# nmcli dev wifi
IN-USE  SSID            MODE   CHAN  RATE        SIGNAL  BARS  SECURITY
        Embest_WiFi     Infra  6     270 Mbit/s  67      ▂▄▆_  WPA1 WPA2
        e3000-5G        Infra  36    65 Mbit/s   60      ▂▄▆_  WPA1 WPA2
```

Connect Wi-Fi network:

Currently we support these kinds of encryption: None,WEP,wpa-psk,wpa-psk2, use the following instruction to connect Wi-Fi network:

In below instruction: “Embest-WiFi” is the SSID of the WIFI, “12345678” is the password.

```
root@maaxboard:~# nmcli dev wifi con "Embest-WiFi " password "12345678" ifname wlan0
```

If the connection succeeds, it will print the following info:

```
Device 'wlan0' successfully activated with '12551227-ee19-4054-9f43-0c9b83b75995'.
```

Enter **nmcli dev wifi** to check: Connected with Embest-WiFi:

```
root@maaxboard:~# nmcli dev wifi
IN-USE  SSID            MODE   CHAN  RATE        SIGNAL  BARS  SECURITY
*       Embest-WiFi     Infra  6     270 Mbit/s  67      ▂▄▆_  WPA1 WPA2
```

Test Wi-Fi network with **ping** command:

```
root@maaxboard:~# ping www.avnet.com -I wlan0
PING www.a.shifen.com (103.235.46.39) 56(84) bytes of data.
64 bytes from 103.235.46.39: icmp_seq=1 ttl=50 time=122 ms
```

3.10.1 Connect and Disconnect Wi-Fi Connection

Connect Wi-Fi connection:

```
root@maaxboard:~# nmcli device con wlan0
```

Disconnect Wi-Fi connection:

```
root@maaxboard:~# nmcli device dis wlan0
```

3.10.2 Delete Wi-Fi Connection

Delete the Wi-Fi Connection to “Embest-WiFi”.

```
root@maaxboard:~# nmcli con del Embest-WiFi
Connection ' Embest-WiFi ' (12551227-ee19-4054-9f43-0c9b83b75995) successfully deleted.
root@maaxboard:~# [ 2581.404408] IPv6: ADDRCONF(NETDEV_UP): wlan0: link is not ready
[ 2581.950671] IPv6: ADDRCONF(NETDEV_UP): wlan0: link is not ready
```

3.10.3 Wi-Fi Hotspot

To open a Wi-Fi hotspot, disconnect Wi-Fi connection, connect the network cable to J13, and execute the following instructions on the serial terminal:

```
root@maaxboard:~# nmcli dev wifi hotspot ifname wlan0 con-name MyHostspot ssid
MyHostspotSSID password 12345678
```

In above instruction: “MyHostspot” is connection name, “MyHostspotSSID” is the SSID, “12345678” is the password. Users could connect the hotspot with Wi-Fi device.

Close the Wi-Fi hotspot:

To temporary close the hotspot, see: Connect and Disconnect Wi-Fi Connection

Delete the Wi-Fi hotspot:

```
root@maaxboard:~# nmcli con del MyHostspot
```

3.10.4 Configure Via GUI

Debian Weston system support nmcli GUI version, users can configure Wi-Fi connection from GUI. For detail, refer to Weston Desktop Environment.

3.11 Bluetooth 4.2

3.11.1 Initialize the Bluetooth Module

Execute the following instructions on the serial terminal:

```
root@maaxboard:~# hciattach /dev/ttymxc3 bcm43xx 115200
bcm43xx_init
Cannot open directory '/etc/firmware': No such file or directory
Patch not found, continue anyway
Set Controller UART speed to 115200 bit/s
Device setup complete
root@maaxboard:~# hciconfig hci0 up
```

3.11.2 Scan the Bluetooth Device

Execute the following instructions on the serial terminal:

```
root@maaxboard:~# hcitool scan
Scanning ...
94:87:E0:DF:90:2D    小米手机
```

3.11.3 Connect the Bluetooth Device

Execute the following instructions on the serial terminal:

```
root@maaxboard:~# hcitool cc {address}
```

Users could also connect the Bluetooth device from Debian Weston Desktop Environment. Open blueman-manager application to connect device, transmit-receive files, play audio. For detail, refer to Weston Desktop Environment.

3.12 CAN

MaaXBoard support USB to CAN module, connect the module to USB Host, then use the following instructions to control it.

3.12.1 Check CAN Module

Use the following command to check if a CAN module connected.

```
root@maaxboard:~# ifconfig -a
can0: flags=128<NOARP>  mtu 16
        unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00  txqueuelen 10  (UNSPEC)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

3.12.2 Configure and Open CAN

Set the CAN0 bitrate to 50000:

```
root@maaxboard:~# ip link set can0 type can bitrate 50000
```

Open CAN0:

```
root@maaxboard:~# ip link set can0 up
```

Note: bitrate range is 2000~100000.

3.12.3 CAN Transmit and Receive

Connect the CAN module to another CAN device, set the same bitrate of 2 modules, then open CAN.

Set CAN0 as receiver:

```
root@maaxboard:~# candump can0 &
```

Set CAN0 as transmitter:

```
root@maaxboard:~# cansend can0 123#01020304050607
```

Use **show** command to check the summary of CAN transmit-receive data: In following example, TX added 3 packets, 14 bytes. RX added 16 packets, 128 bytes.

```
root@maaxboard:~#    ip -d -s link show can0
3: can0: <NOARP,UP,LOWER_UP,ECHO> mtu 16 qdisc pfifo_fast state UNKNOWN mode
DEFAULT group default qlen 10
      link/can    promiscuity 0
      can state ERROR-PASSIVE restart-ms 0
                bitrate 50000 sample-point 0.875
                tq 1250 prop-seg 6 phase-seg1 7 phase-seg2 2 sjw 1
                gs_usb: tseg1 1..16 tseg2 1..8 sjw 1..4 brp 1..1024 brp-inc 1
                clock 48000000
                re-started bus-errors arbit-lost error-warn error-pass bus-off

                0               0               0               4               1               0               numtxqueues 1
numrxqueues 1 gso_max_size 65536 gso_max_segs 65535
      RX: bytes    packets    errors    dropped overrun mcast
      128          16         0         0         0         0
      TX: bytes    packets    errors    dropped carrier collsns

14            3           0         0         0         0
```

3.12.4 Shut down CAN

```
root@maaxboard:~# ip link set can0 down
```

3.13 GPU

Debian file system integrates GPU application, use **gputop** command to check GPU driver and info.

```
root@maaxboard:~#gputop
Clients attached to GPU | 0 / 6    (sample_mode: TIME - 1.0 secs)
Galcore version:6.2.4.163672, gpuperfcnt:e3c7de622a66, 1.4
3D:GC7000,Rev:6214 Core: 800 MHz, Shader: 800 MHz
3D Cores:1,2D Cores:0,VG Cores:0
DDR0: r:97.21,w:0.07
DDR1:
```

PID	RES(kB)	CONT(kB)	VIRT(kB)	Non-PGD(kB)	Total(kB)	CMD
7116	12819	0	0	0	12819	weston-desktop-
7115	3208	0	0	0	3208	weston-keyboard
7112	21348	0	0	0	21348	weston
TOT:	37376	0	0	0	37376	
TOT_CON:	-	-	-	-	224767	

Note: Press “CTRL+C” to exit the test.

3.14 Desktop Environment

Connect displayer to MaaXBoard, the desktop environment will start automatically after system boot. Users can connect keyboard and mouse to the board to operate it. For detail, refer to Weston Desktop Environment.

3.15 Camera

MaaXBoard support USB Camera and MIPI-CSI Camera. System provide a Camera application based on QT Lib, could be used with desktop environment to preview, photograph and record video.
For detail, refer to Weston Desktop Environment

3.16 QT&GPU

File system integrated QT5.10 or higher version and GPU development Library, such as EGL, OpenCL and Open VG. It also provides several test programs.
GPU test program saved in path /opt/, users can execute them in serial terminal, e.g.:

```
root@maaxboard:~# /opt/qt_samples/gui/analogclock/analogclock
root@maaxboard:~# /opt/imx-gpu-sdk/GLES3/Skybox/Skybox_Wayland
root@maaxboard:~# /opt/imx-gpu-sdk/OpenVG/Example3/Example3_Wayland
root@maaxboard:~# /opt/viv_samples/tiger/tiger
```

Note: Press “CTRL+C” to exit the test.

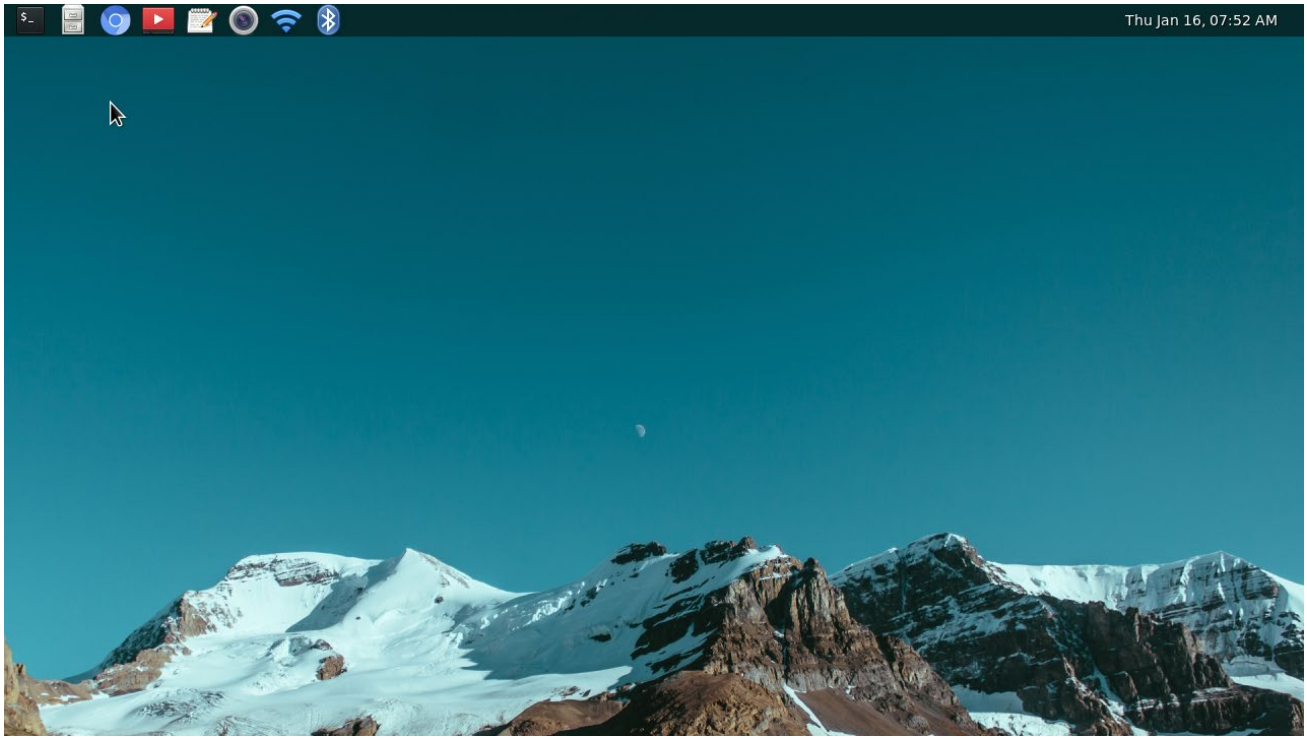
3.17 GPIO (40 Pin Sense Hat) (TBD)

TBD

Chapter 4 Weston Desktop Environment

Connect displayer to MaaXBoard, Weston Desktop Environment will run automatically after system boot. Users could connect keyboard and mouse to operate.

Here we use MIPI-DSI screen as example to introduce it.



4.1 Menu

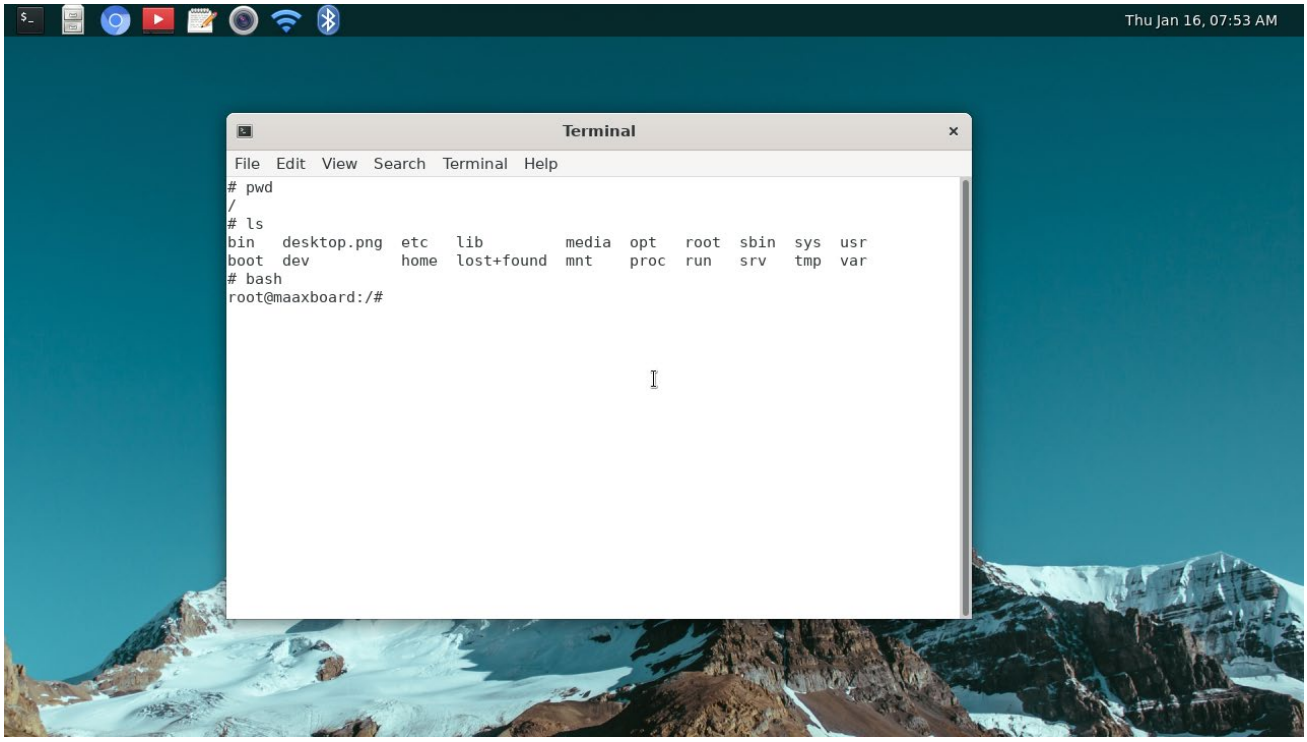
Weston Desktop Environment support these applications, which could be open from the menu in the up side of the screen, they are:

Icon	Application Usage	Application Name
	Terminal Tool	GNOME Terminal
	File Manager	Files Management
	Internet Explorer	Chromium
	Video Player	Totem Movie Player
	Text Editor	Gedit Text Editor
	Camera	Camera
	Network Manager	Network Connections
	Bluetooth Manager	Blueman-manager

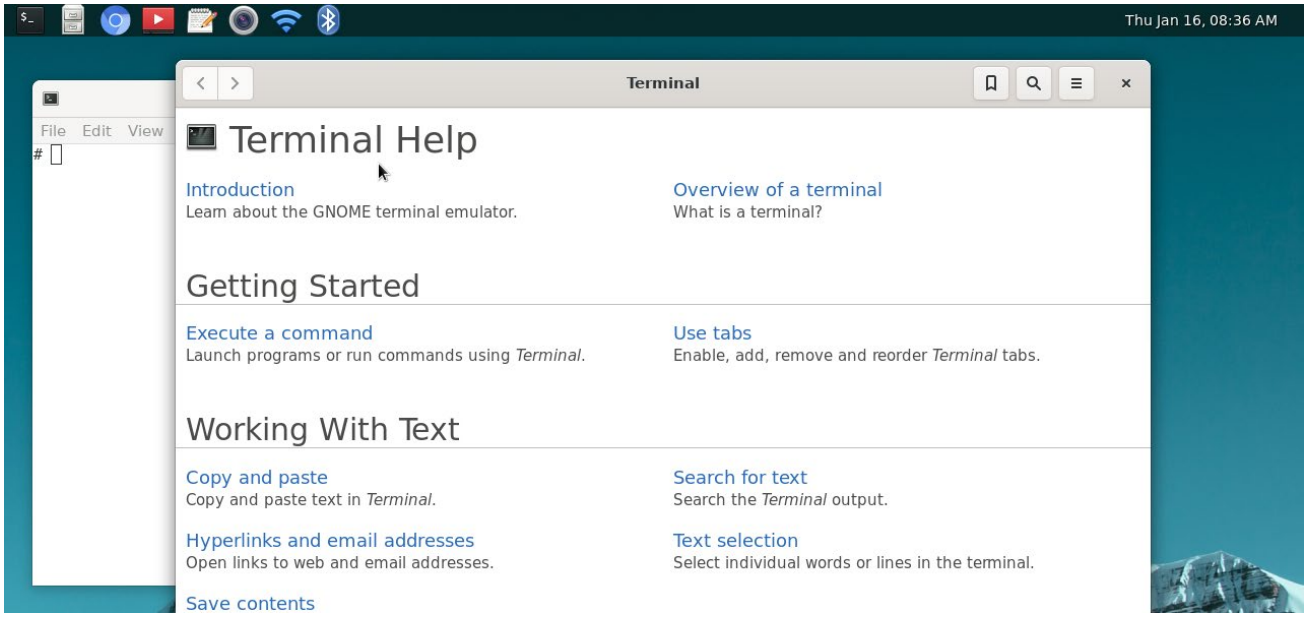
4.2 Terminal

Gnome Terminal is a Dash terminal application, connect keyboard and mouse to operate.

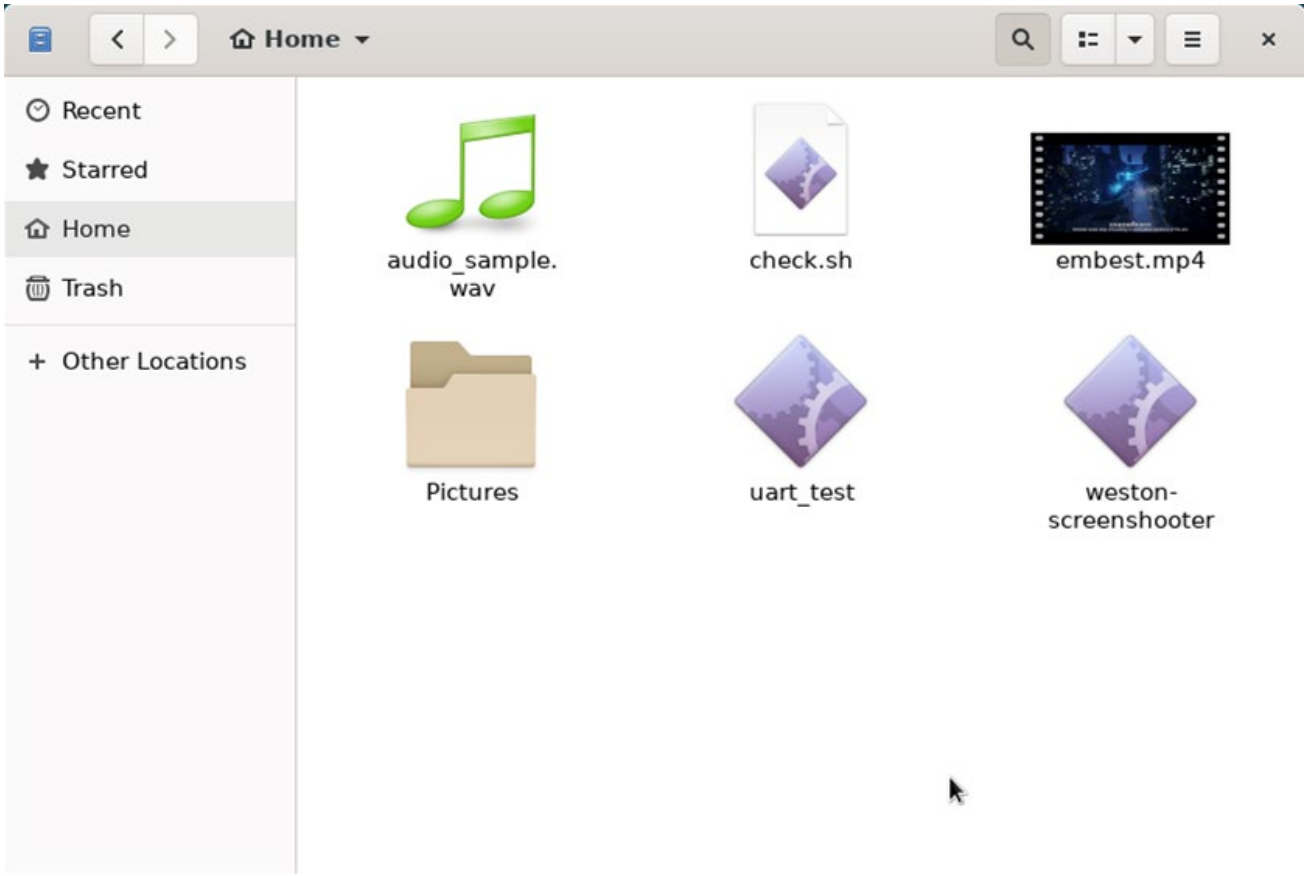
Open the terminal, then enter **bash** or **su** command to switch to bash terminal. Then you can get higher access to use more function.



Terminal application supports multiple windows, and adjusts the window size; click the x to close the application. To learn more about the usage of the Terminal, open a Help -> Content to view the Help documents.



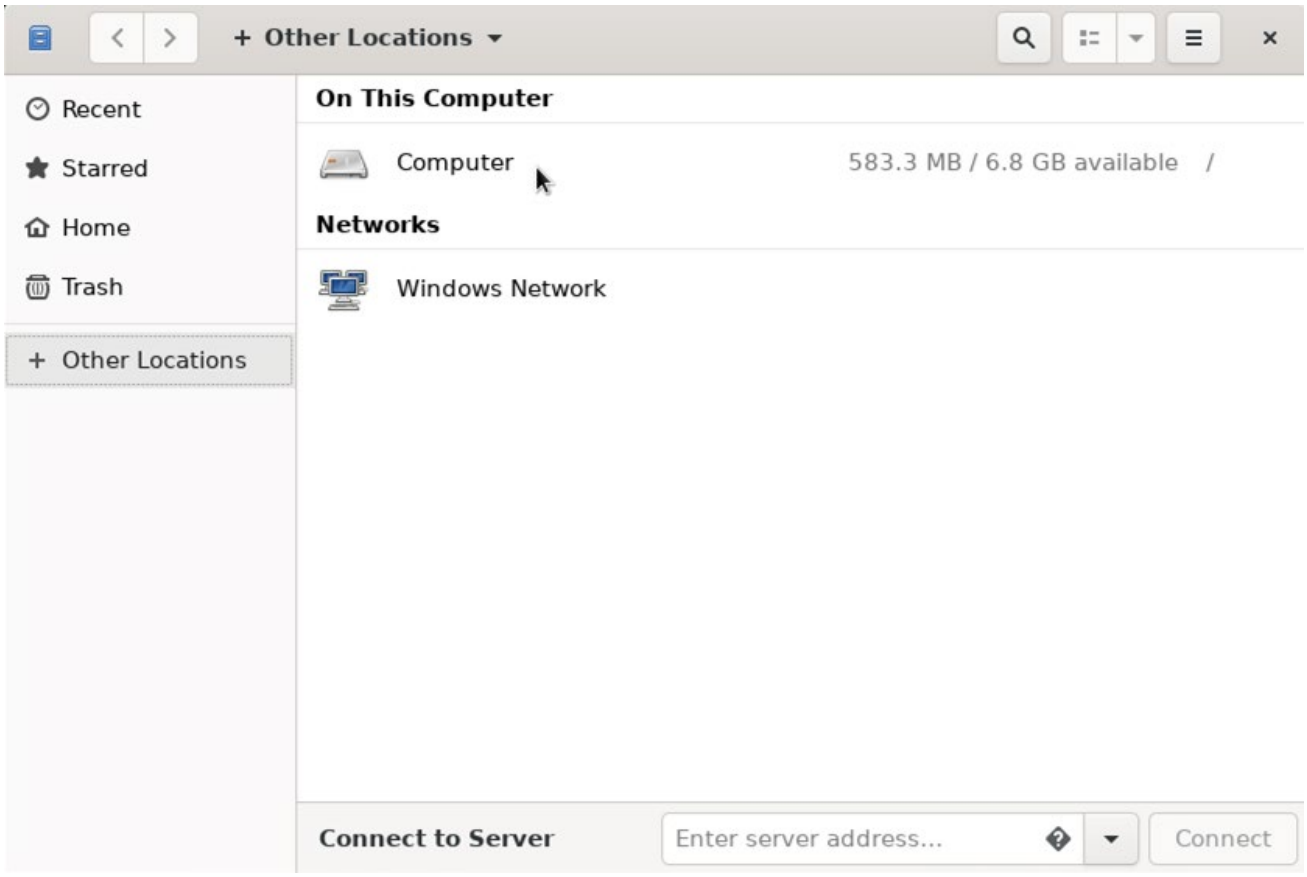
4.3 File Manager

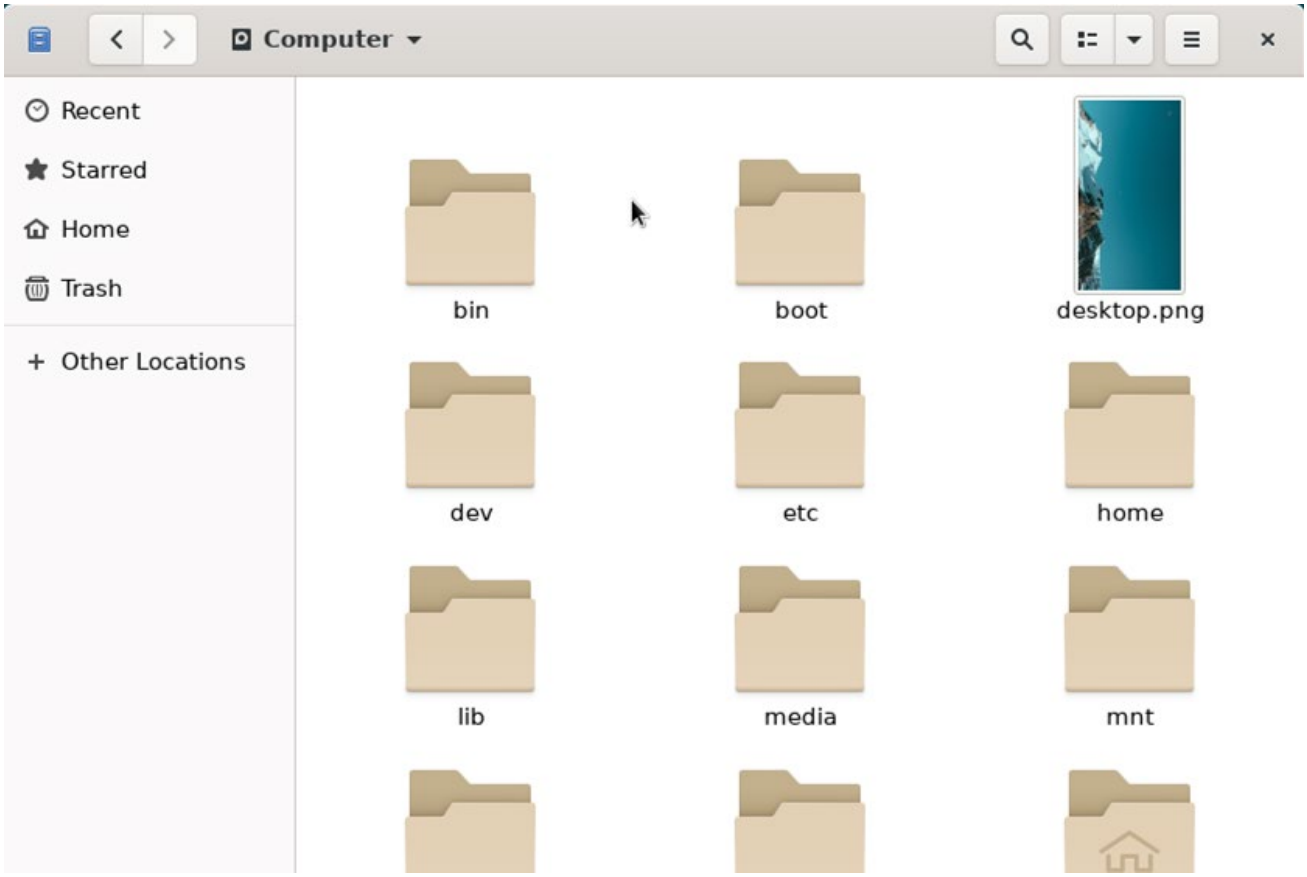


File manager could be used to view the files in the system. Double click to open files or folders. In the right click menu, users can choose operations such as: New Folder, Copy, Cut, Paste, Delete, Compress, and view their properties, etc.

The path to be open by default is /root, if you need to go to other directory, open root directory “/” first. Click Other Locations -> Computer, then open other path from here.

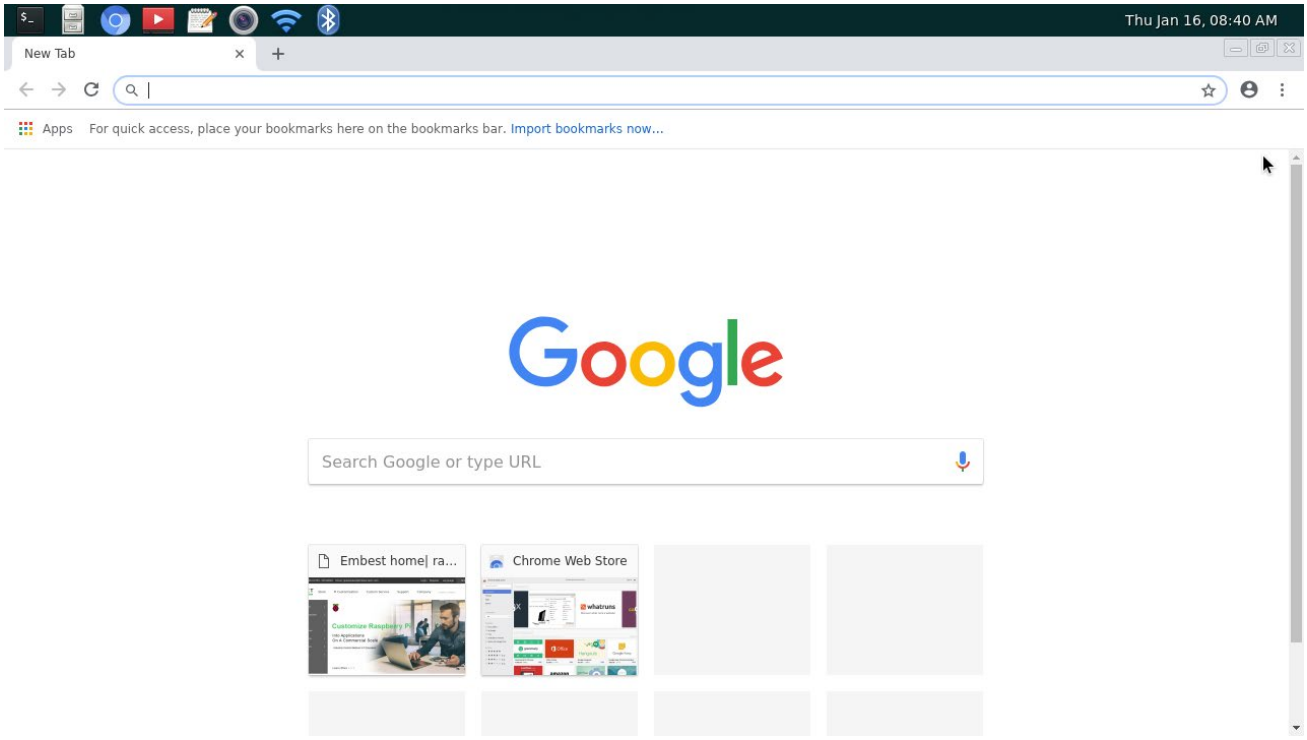
File manager supports multiple windows, and adjust the window size, click the x to close the application.


+ Other Locations
Recent
Starred
Home
Trash
+ Other Locations
On This Computer
Computer
583.3 MB / 6.8 GB available /
Networks
Windows Network
Connect to Server
Enter server address...
Connect

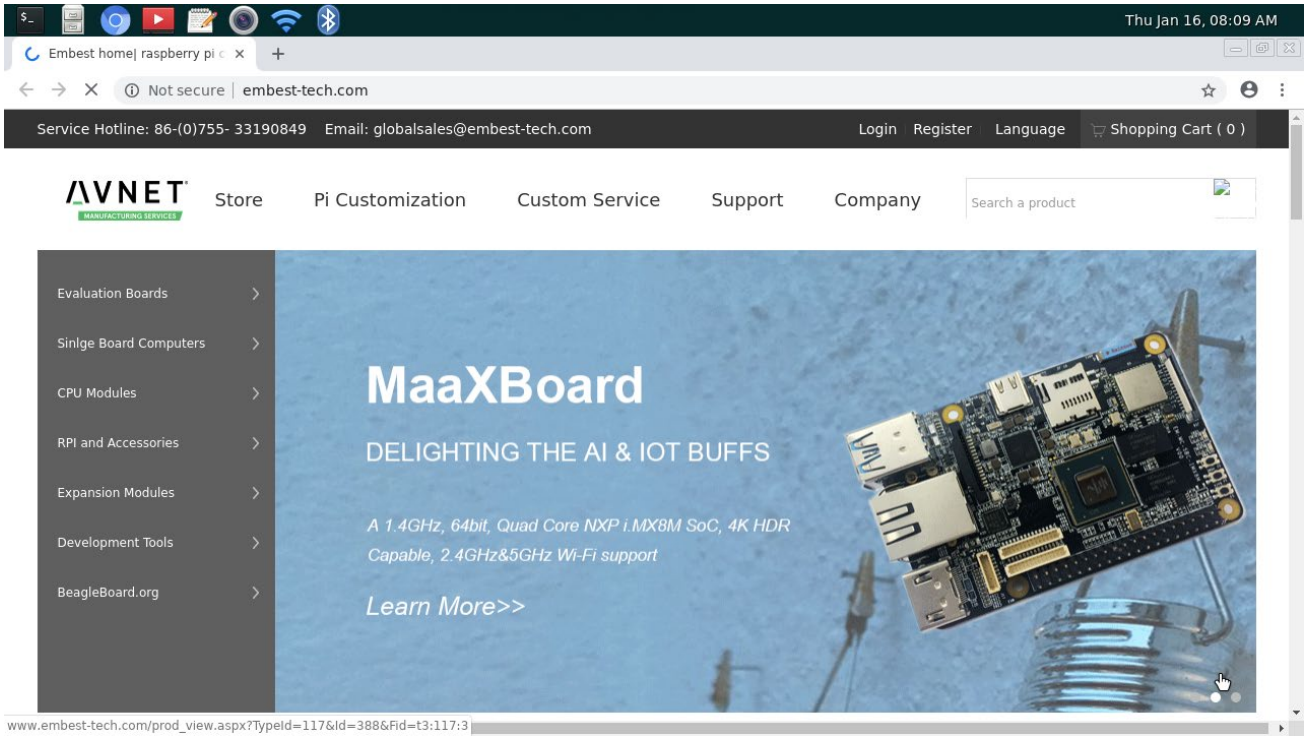

Computer
Recent
Starred
Home
Trash
+ Other Locations
bin
boot
desktop.png
dev
etc
home
lib
media
mnt

4.4 Chromium Explorer

Users could explore the internet with this application. Chromium support full screen, click the x to close the application.



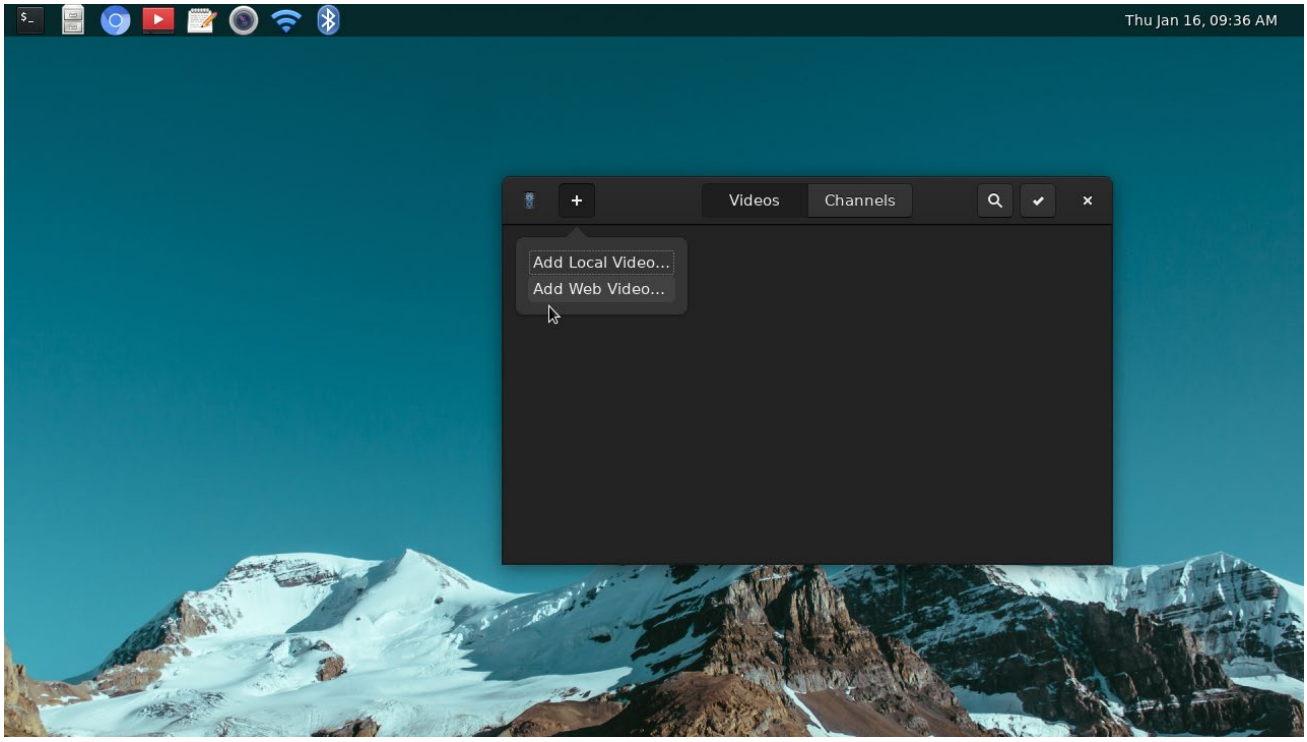
Open Chromium, enter website address in address bar to view the internet pages.

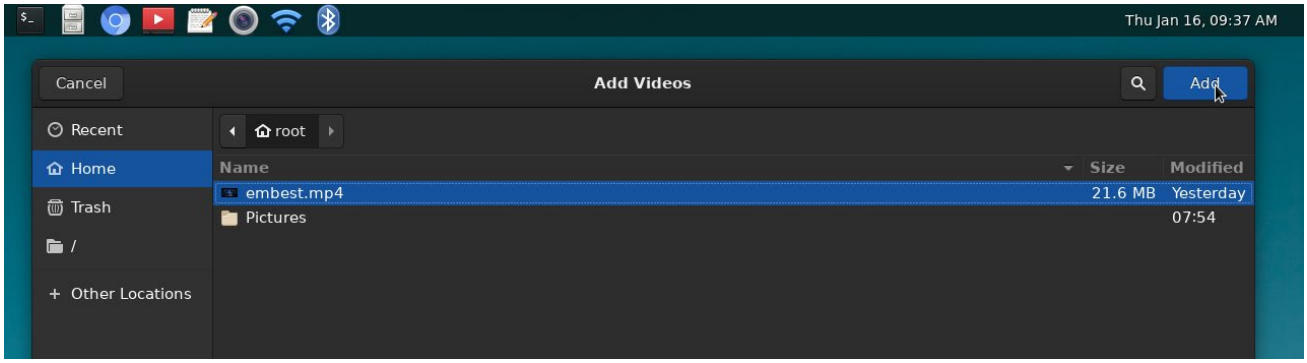


4.5 Movie Player

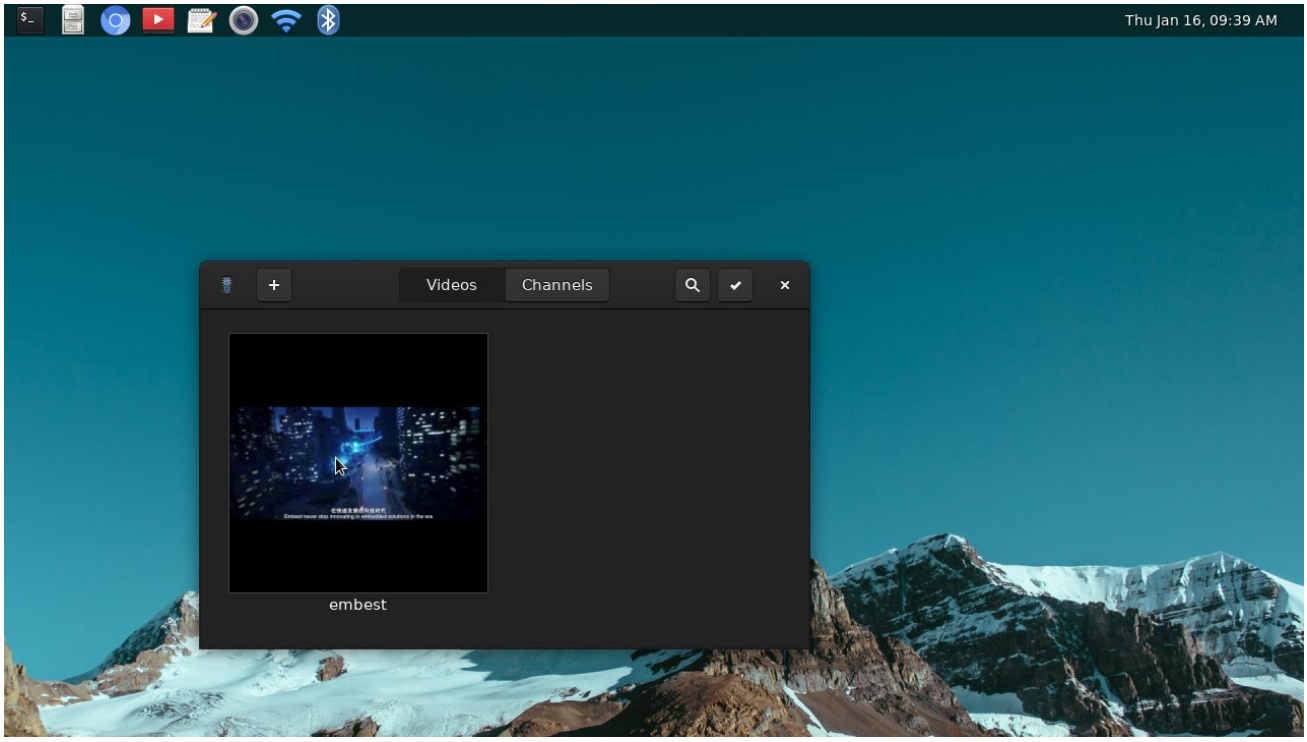
Totem Movie Player support play video file in several format, the largest support resolution is 4K (use with 4K HDMI Displayer).

1. Open Totem, click + button, choose “Add Local Video” to add files to playlist.

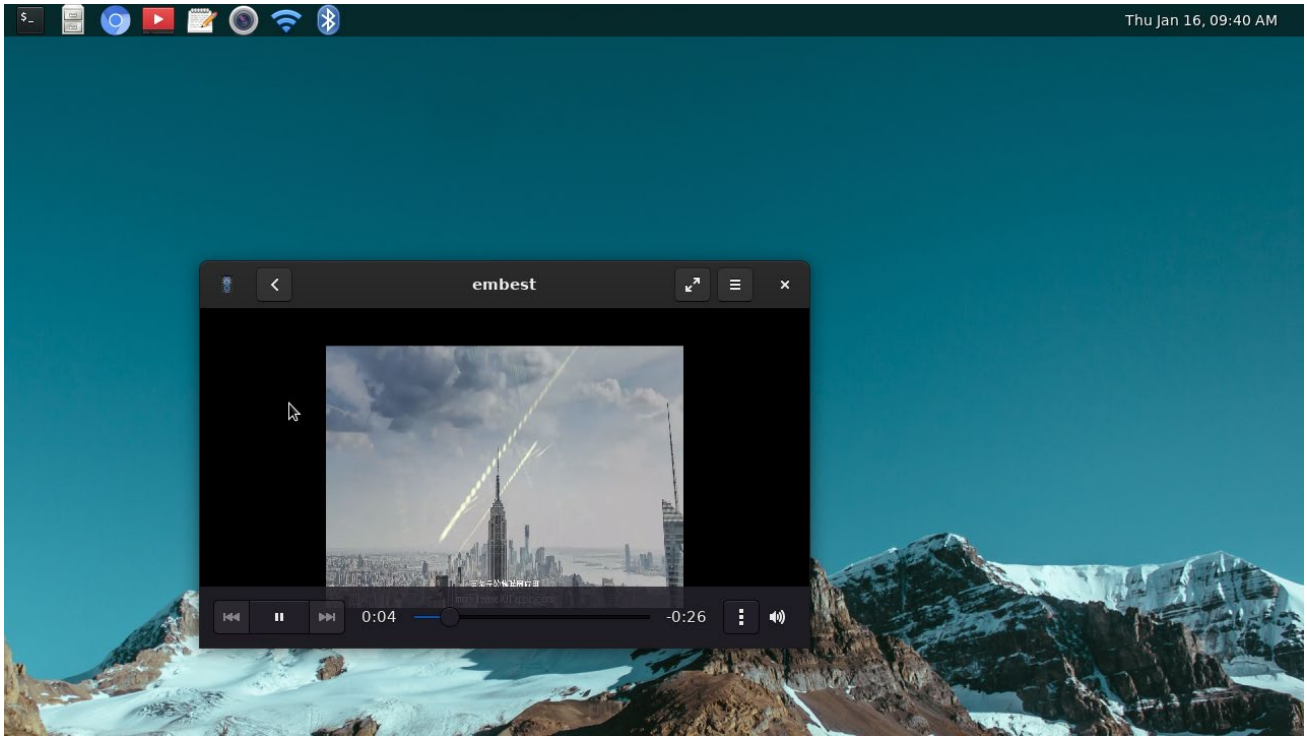




2. Click the file in the playlist to play video file.

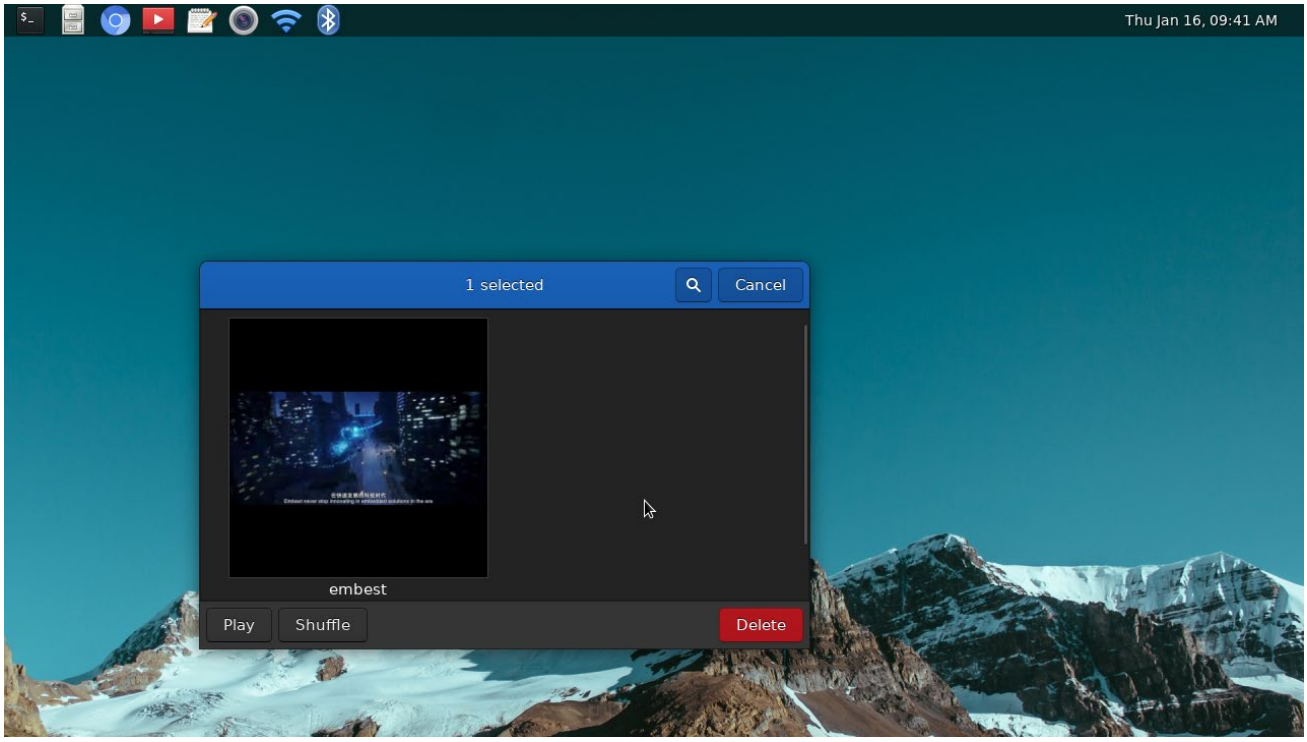


3. When playing the video files, users could full screen view, pause/resume a movie / song, change the audio volume, etc.

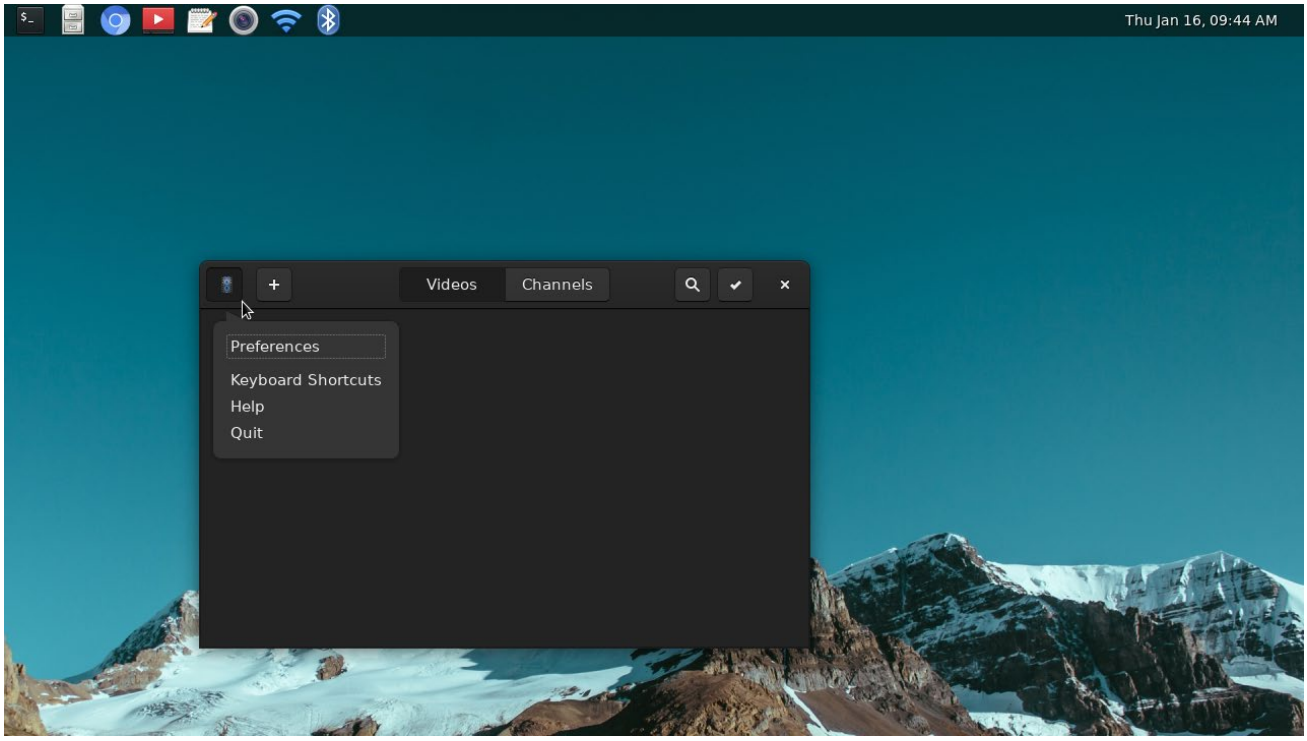


4. Click < button to back to playlist, click √ button or right click the file to select the file and delete form

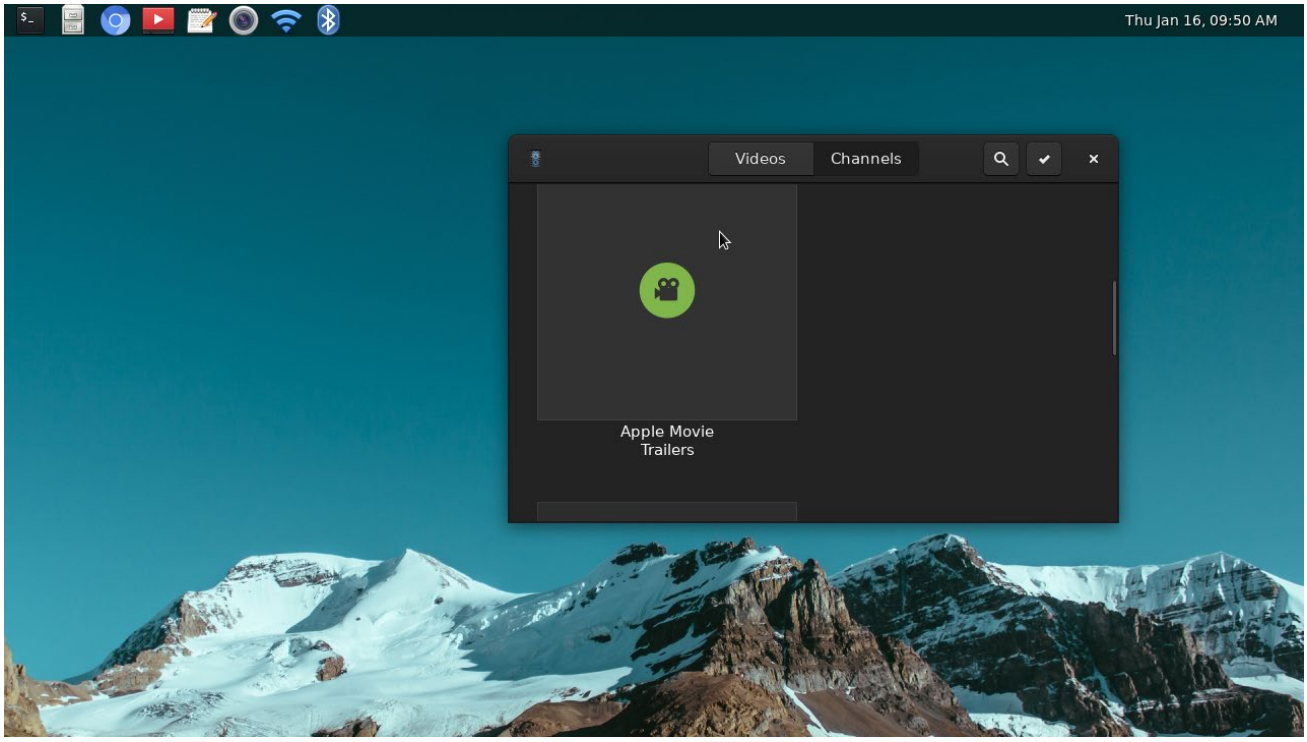
the playlist.



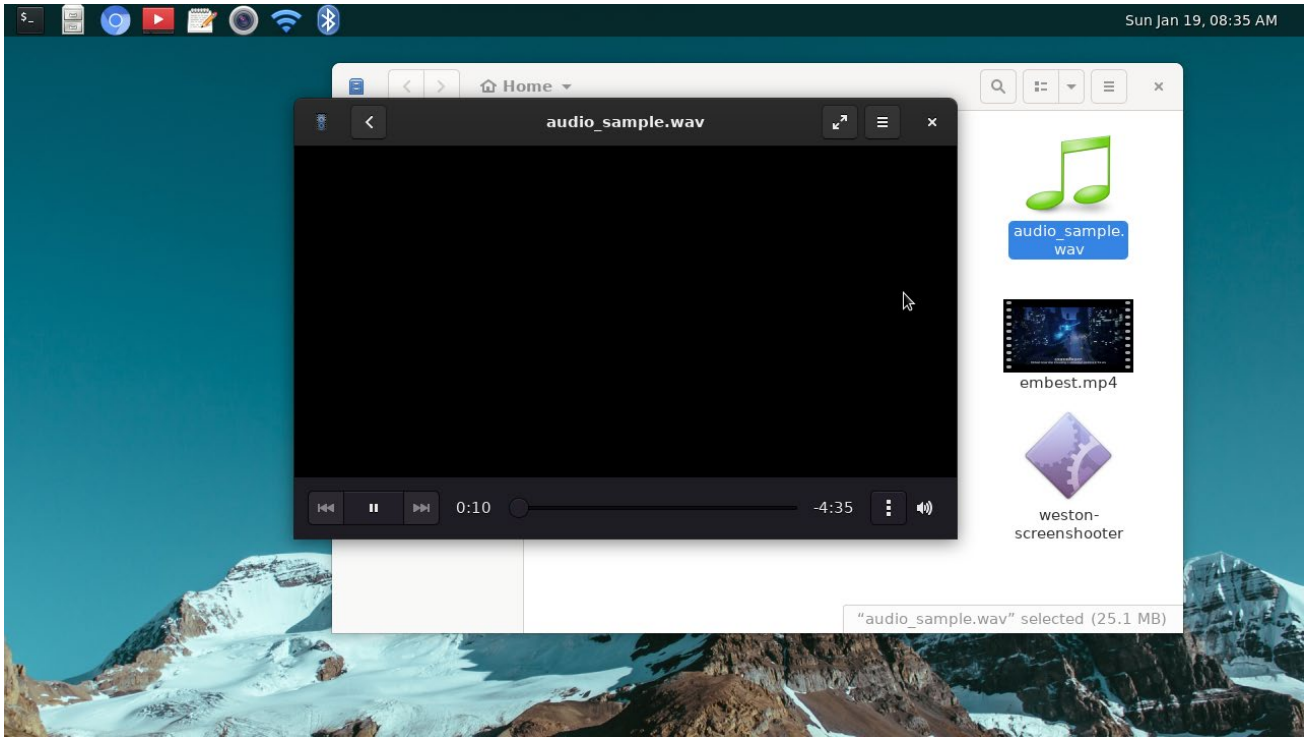
5. Click this button to open the menu, set Preferences, keyboard shortcuts, view help document or exit the application.



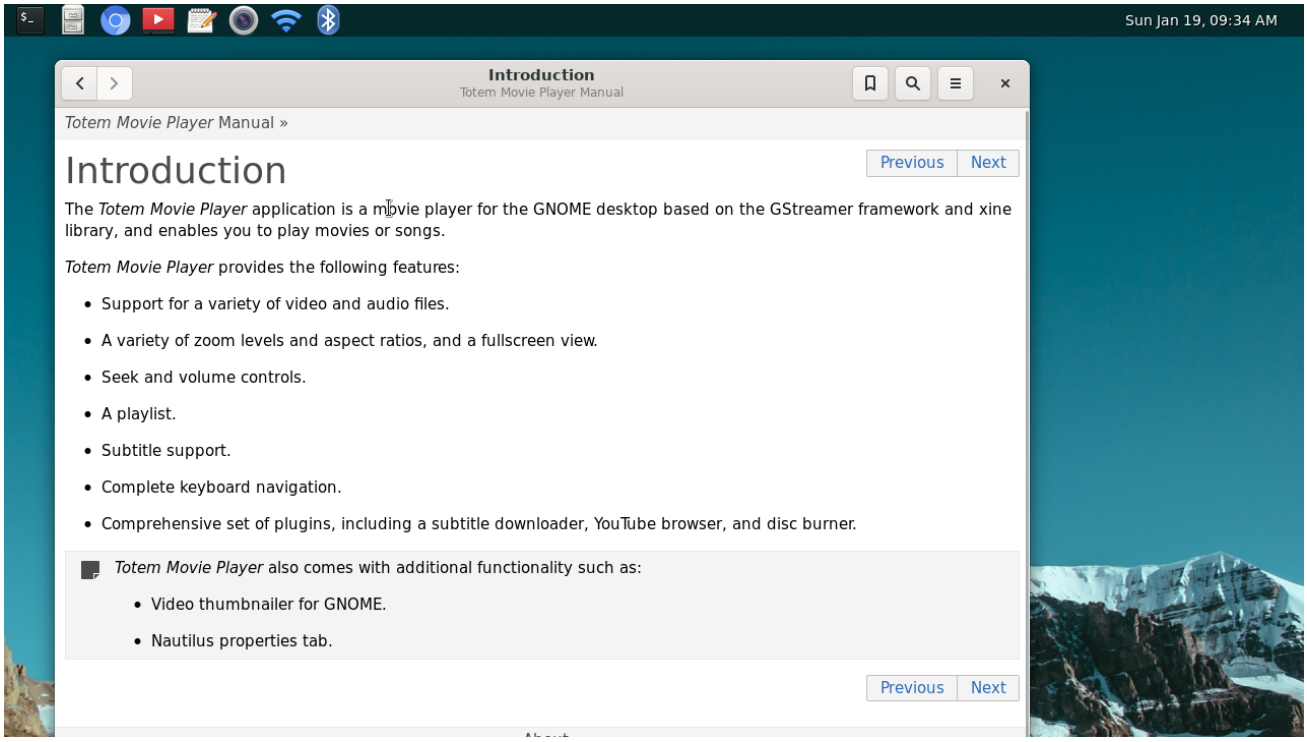
6. If connected to internet, users could open Channels and play online video.



7. In file manager, double click the video / audio file, system will use Totem to play it.



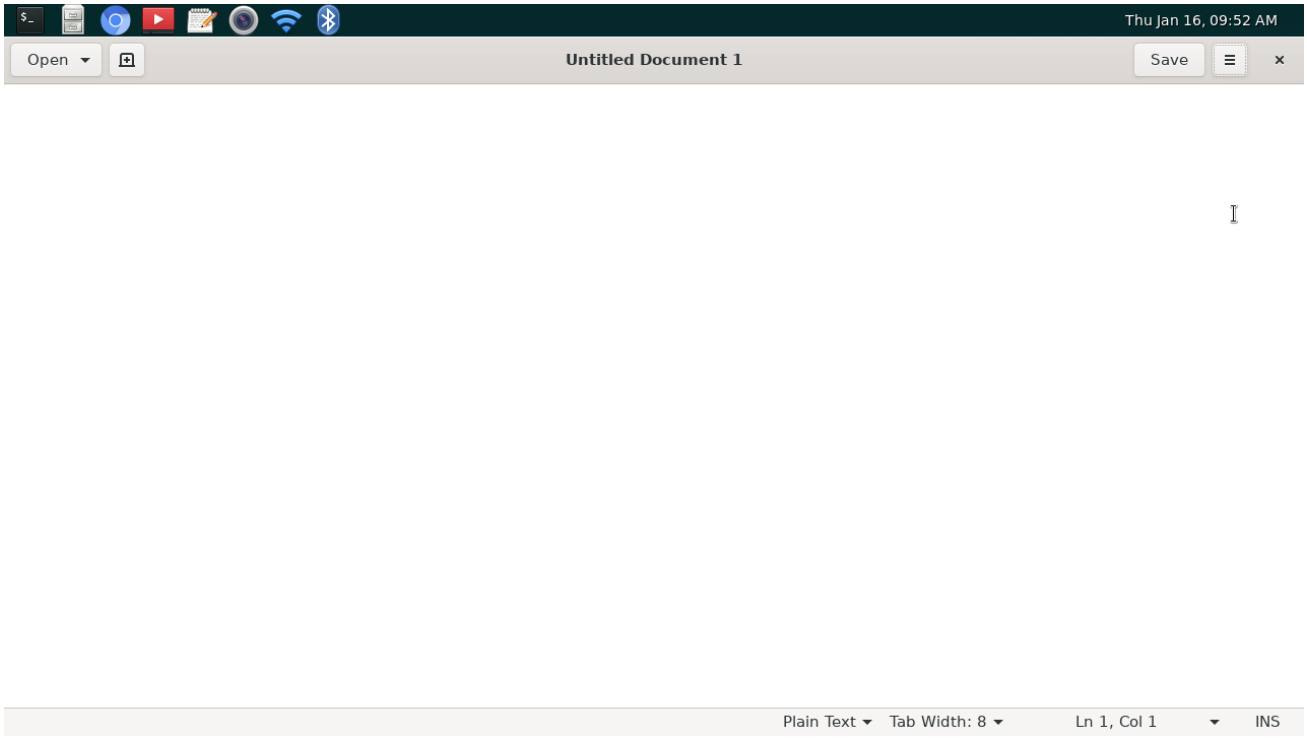
8. To learn more about Totem, open Totem Movie Player Manual.



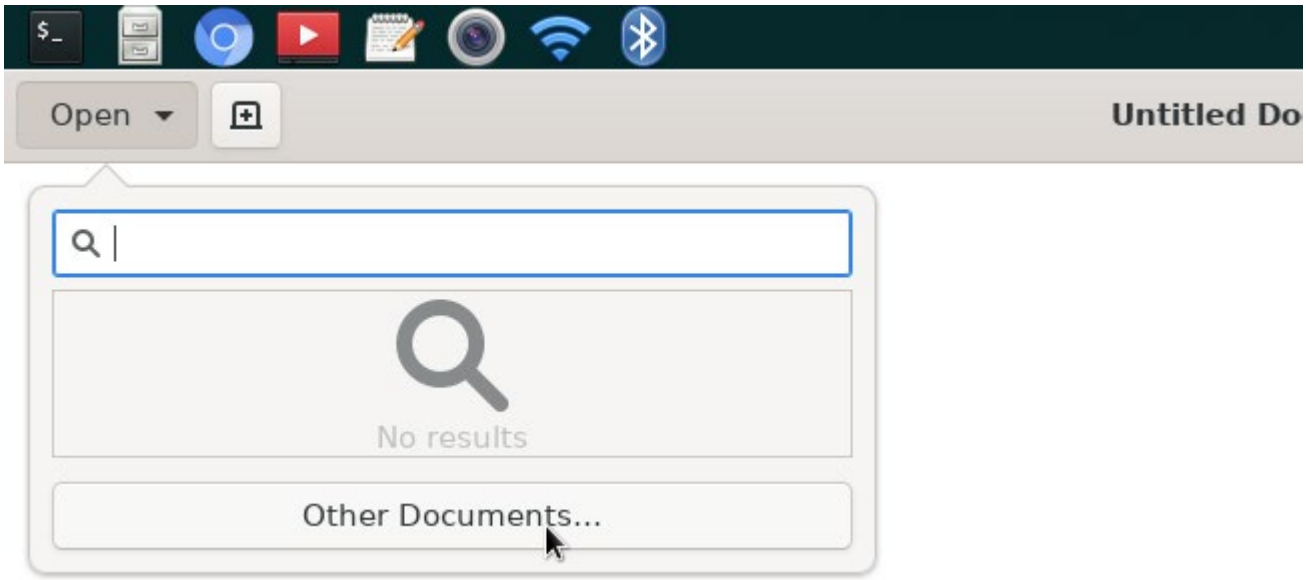
4.6 Text Editor

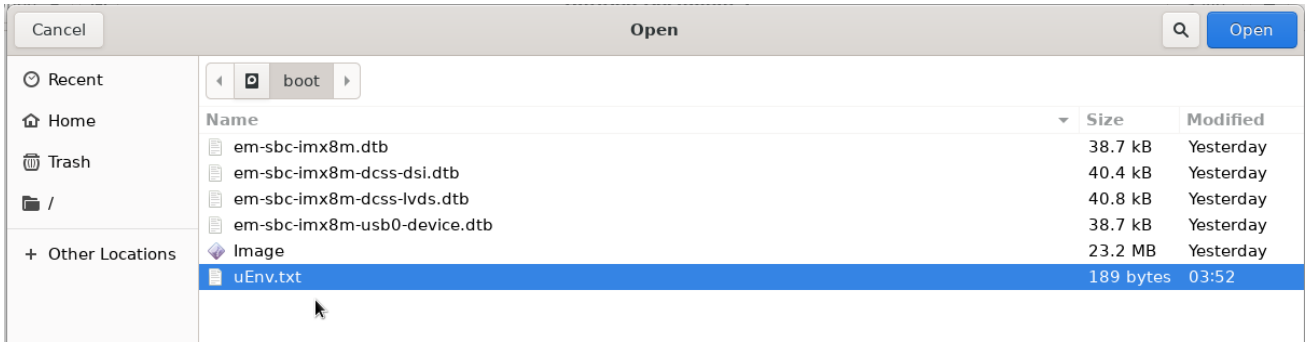
Gedit is a GUI text editor, support edit text file such as txt, shell script, etc.

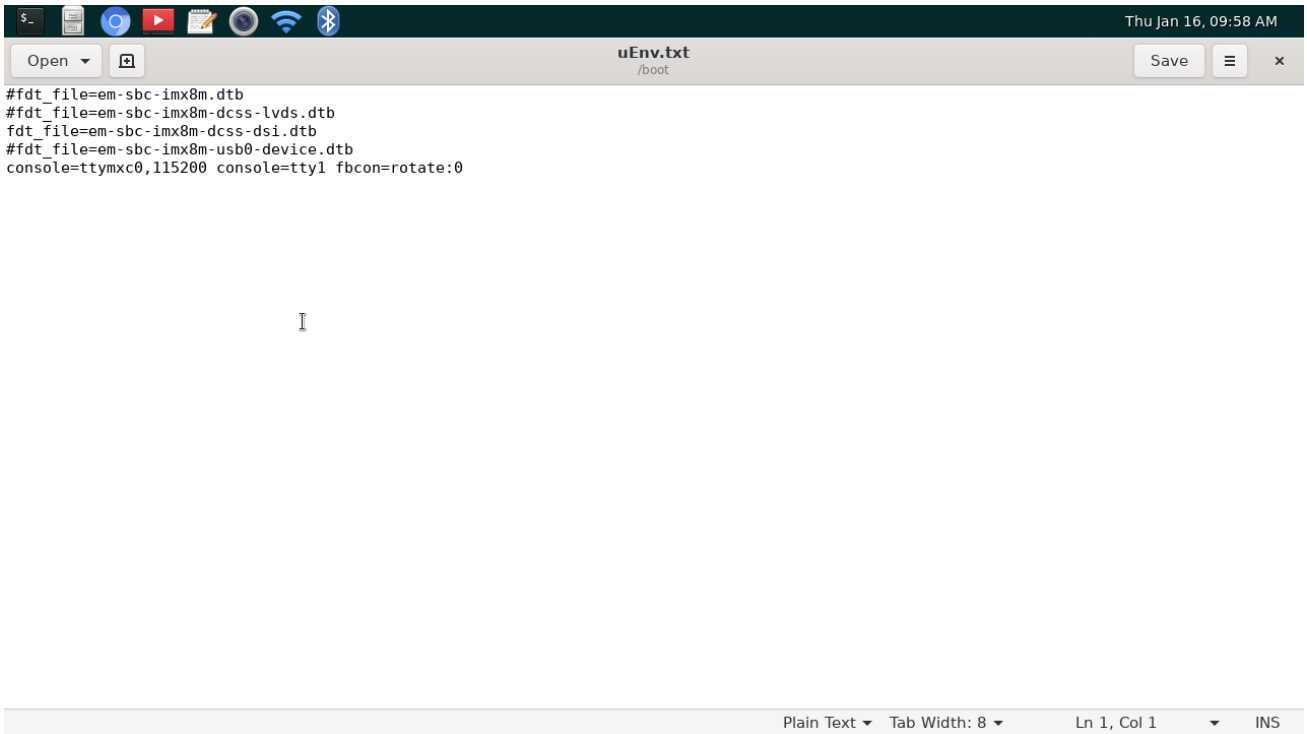
1. Open Gedit, it will new a Untitled Document.



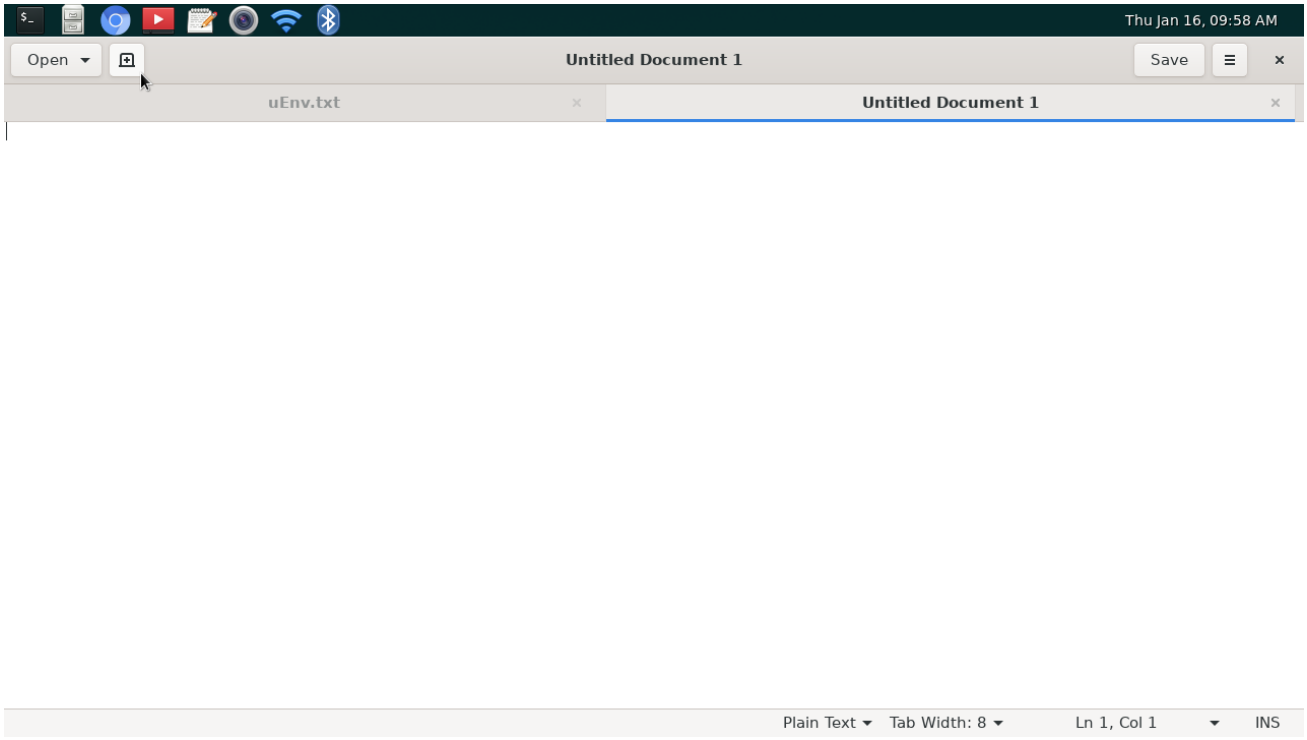
2. Click “Open -> Other Documents” to open exist text file to edit.



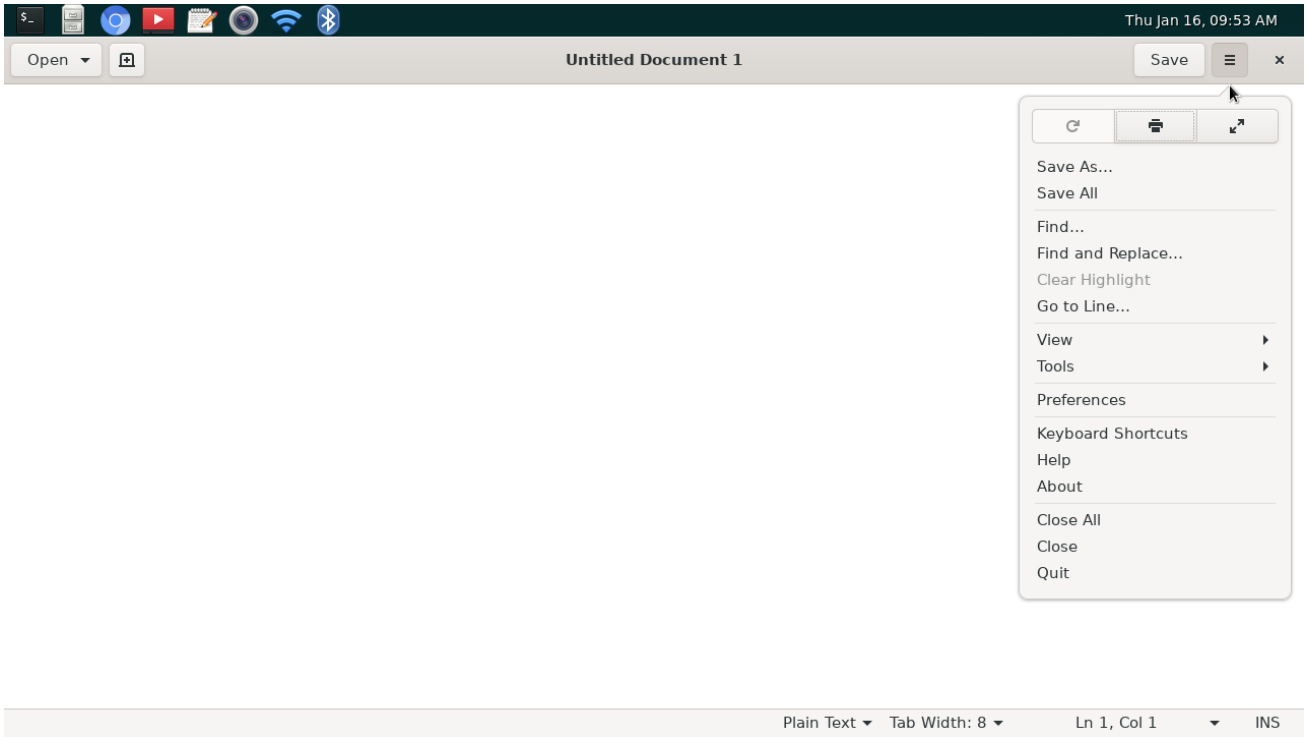




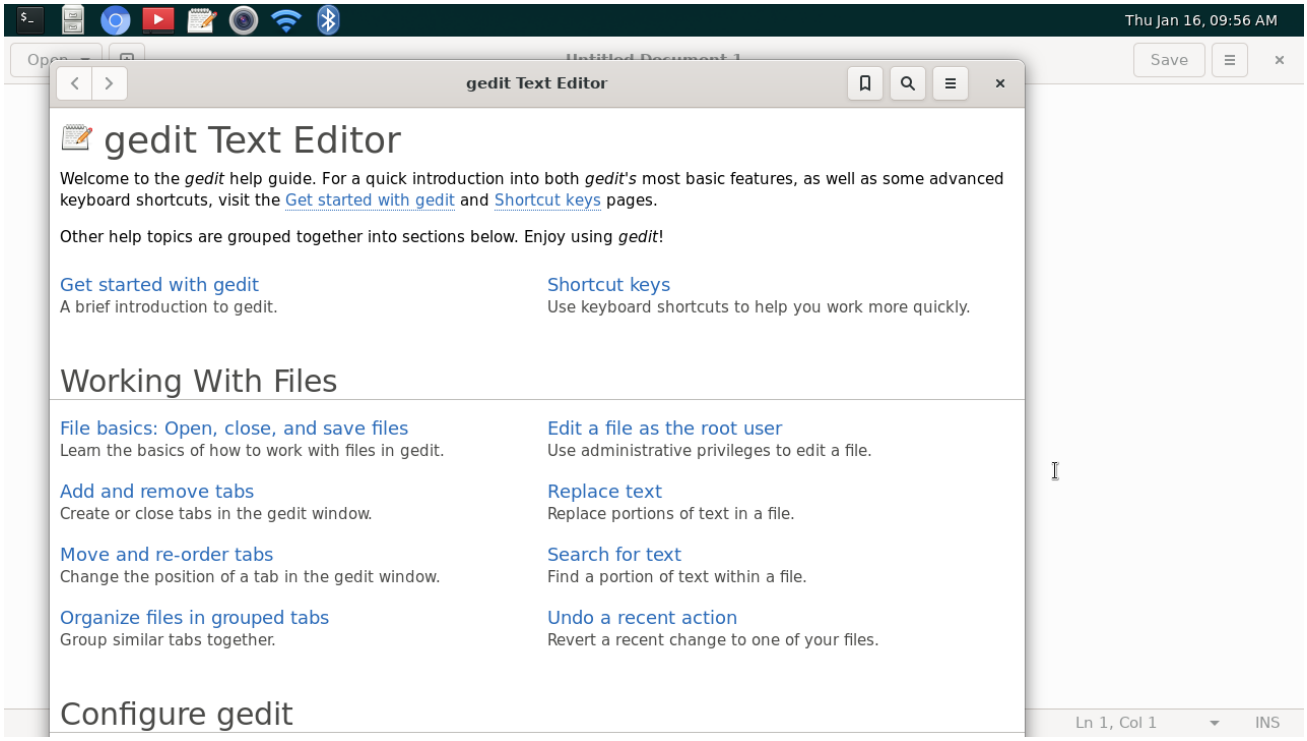
3. Click “+” to create new file.



4. Click this button to use more function.



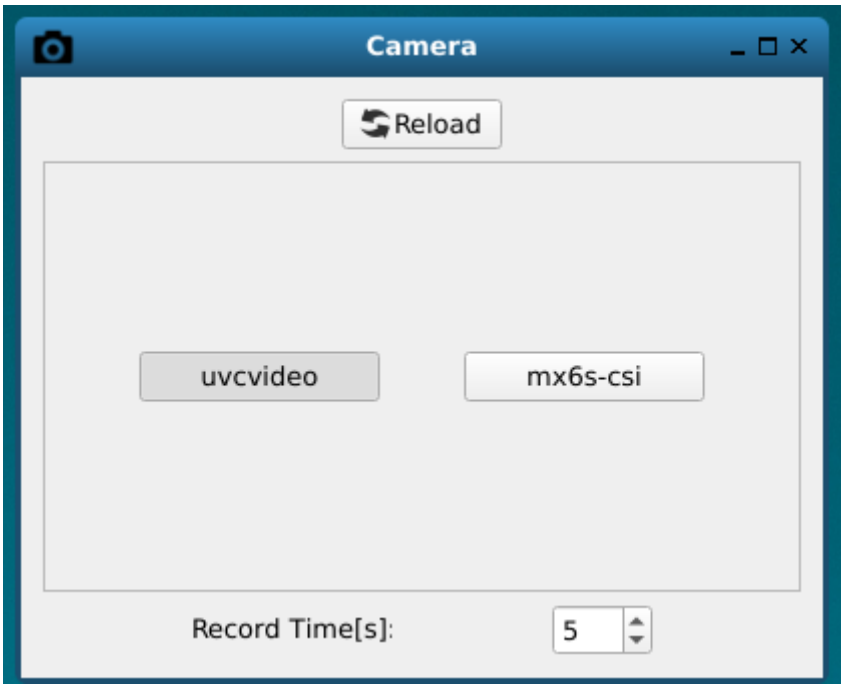
5. To learn more, click Help to view the gedit help guide.



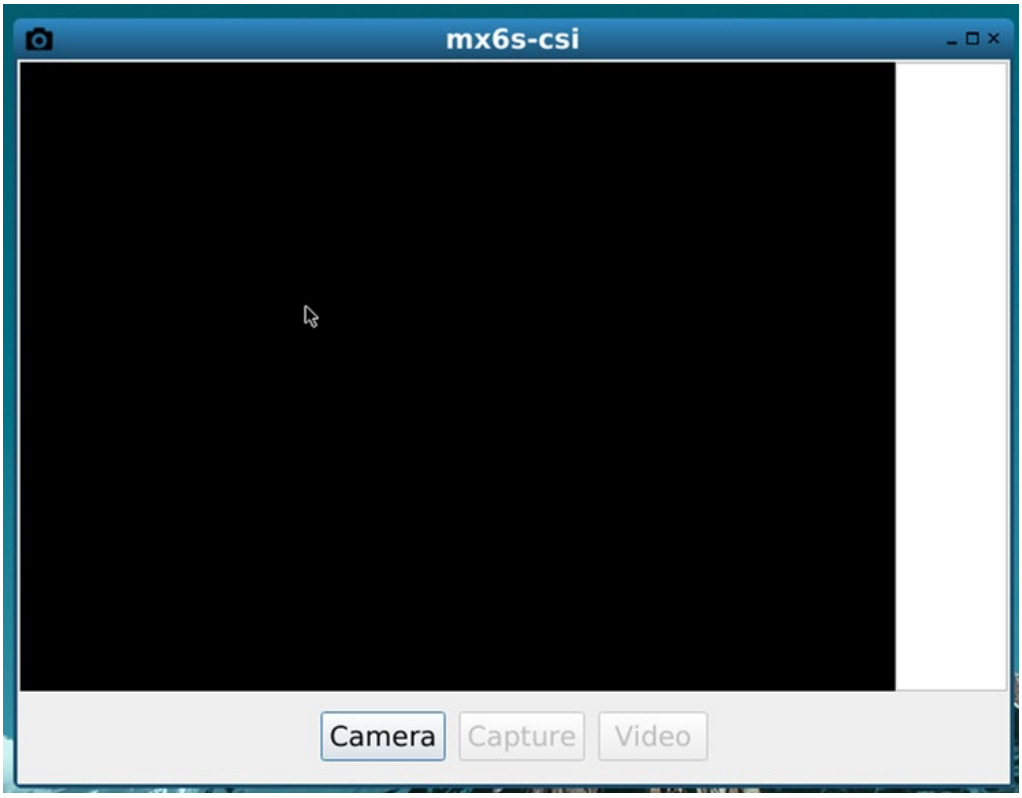
4.7 Camera

MaaXBoard support USB Camera and MIPI-CSI Camera. System provide a Camera application based on QT Lib, could be used with desktop environment to preview, photograph and record video. Connect a displayer, camera to MaaXBoard, make sure the desktop environment is start up.

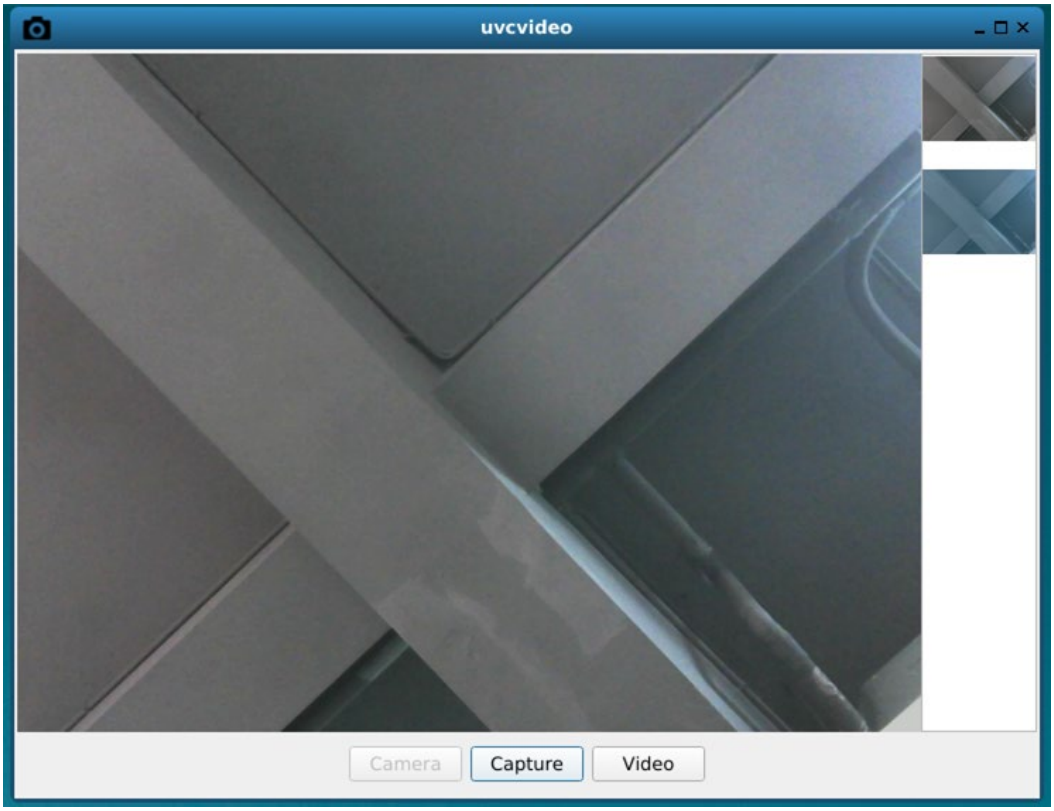
1. Open Camera application, system will detect the Camera connected or Camera interface. Choose uvcvideo when you use the USB camera, choose mx6s-csi when you use MIPI-CSI camera. Click Reload button to refresh.



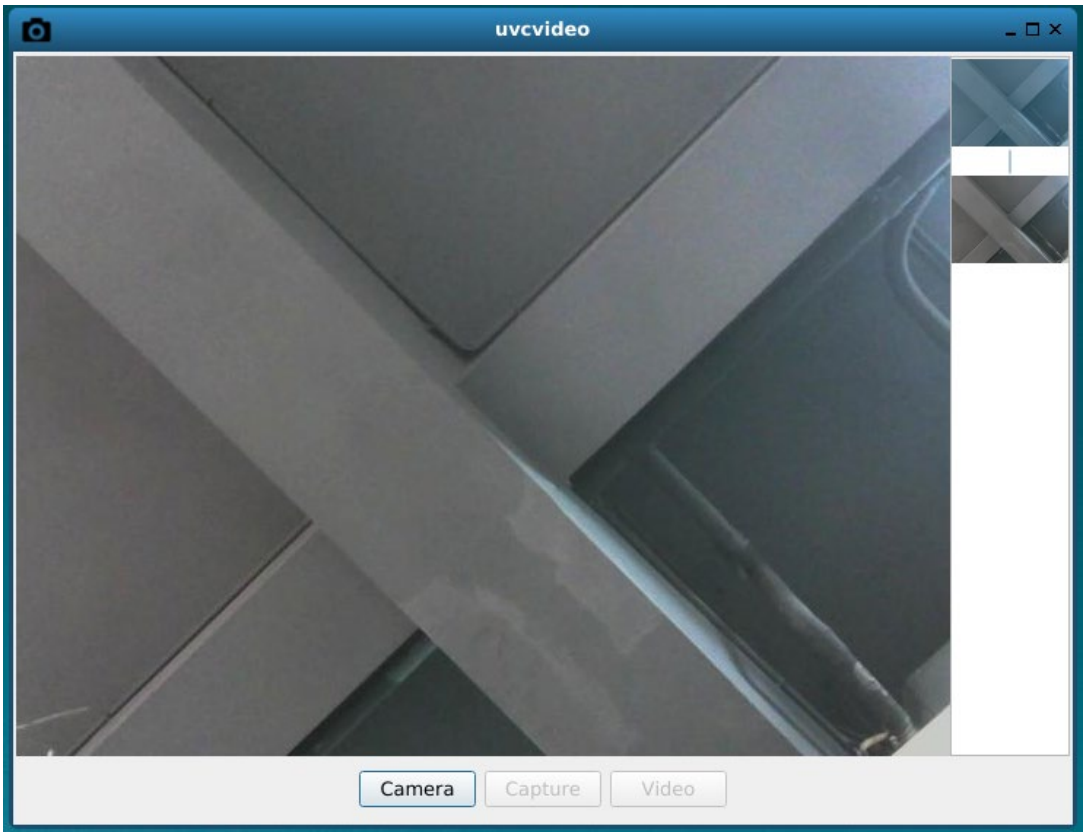
2. Click the Camera button on screen, to open Camera and preview the video.



3. Click Capture button to take a photo and show the thumbnail in the right side of the window. Click Video, it will record yuv video file in yuyv format, users could copy it to PC to check with YUVplayer. The photo and video files will be saved in /root/Pictures.



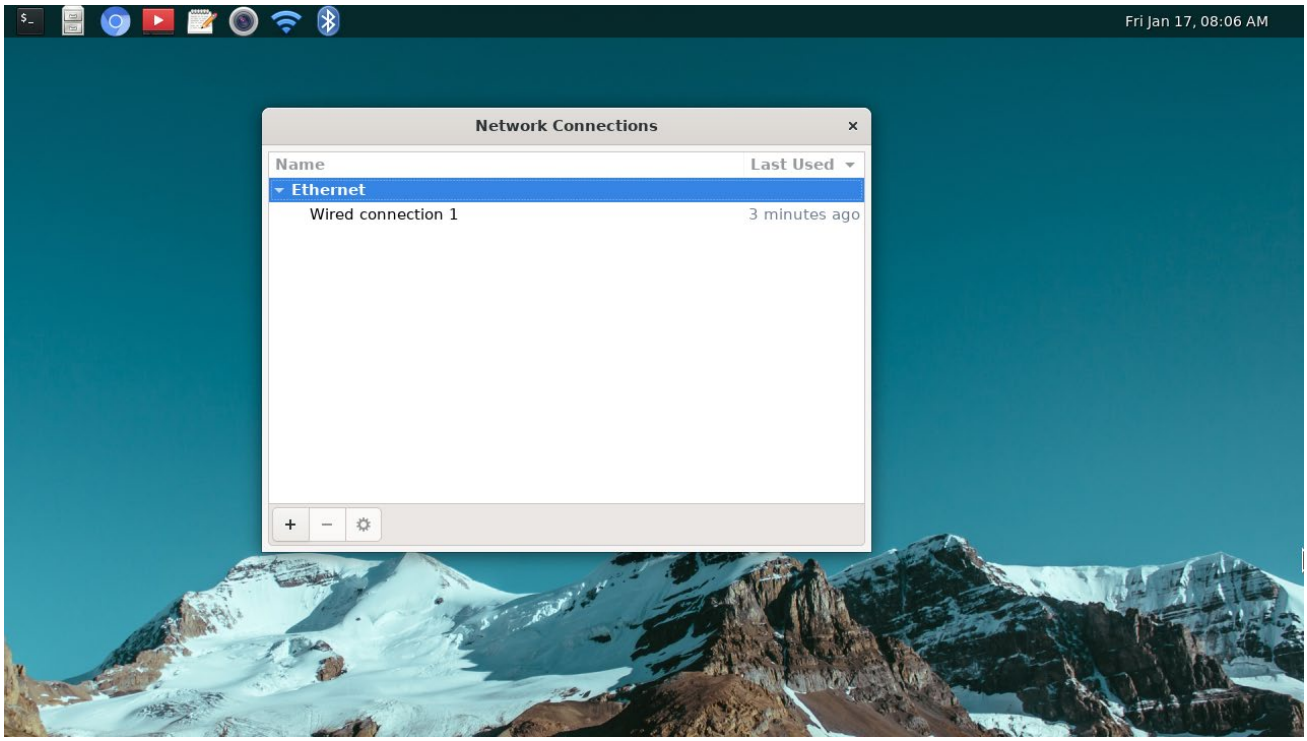
4. Click the thumbnail to close the camera preview and show the whole image in current window.



Camera application supports adjust the window size, click the x to close the application.

4.8 Network Manager

Network manager could be used to manage the Ethernet and Wi-Fi connection:

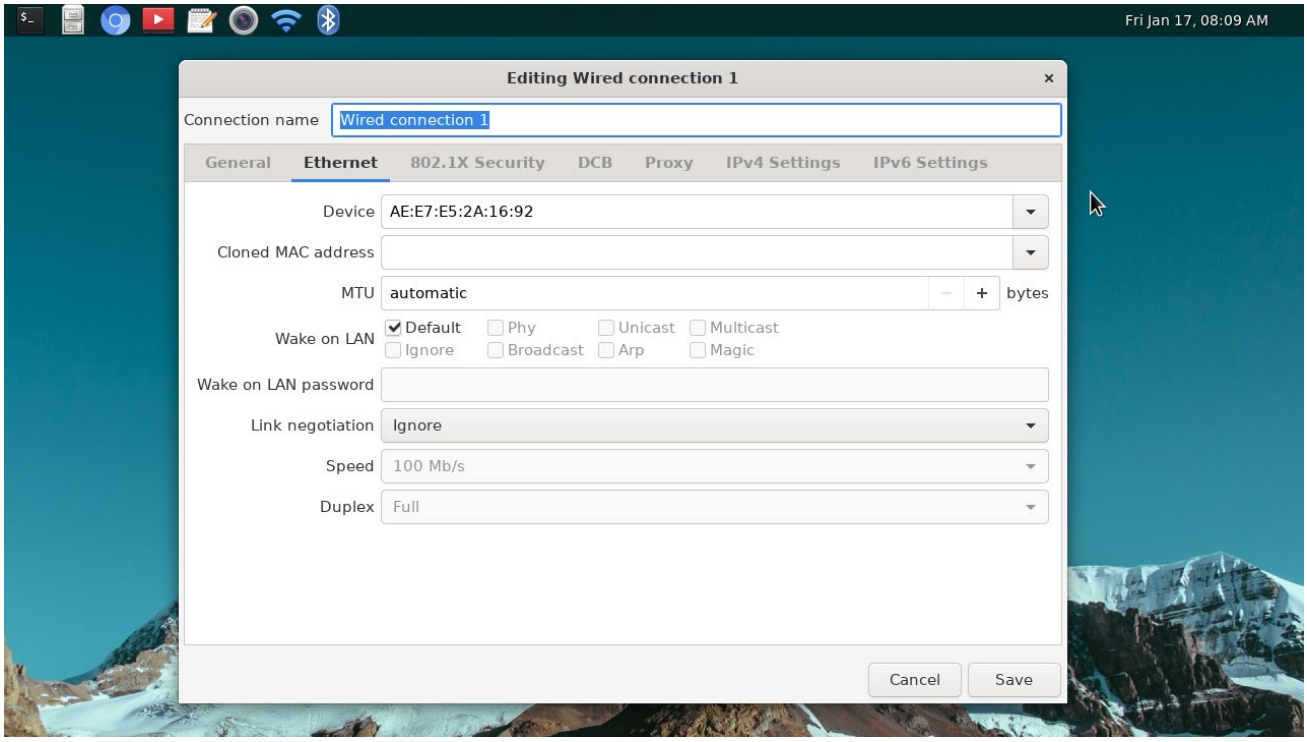


4.8.1 Manage Ethernet connection

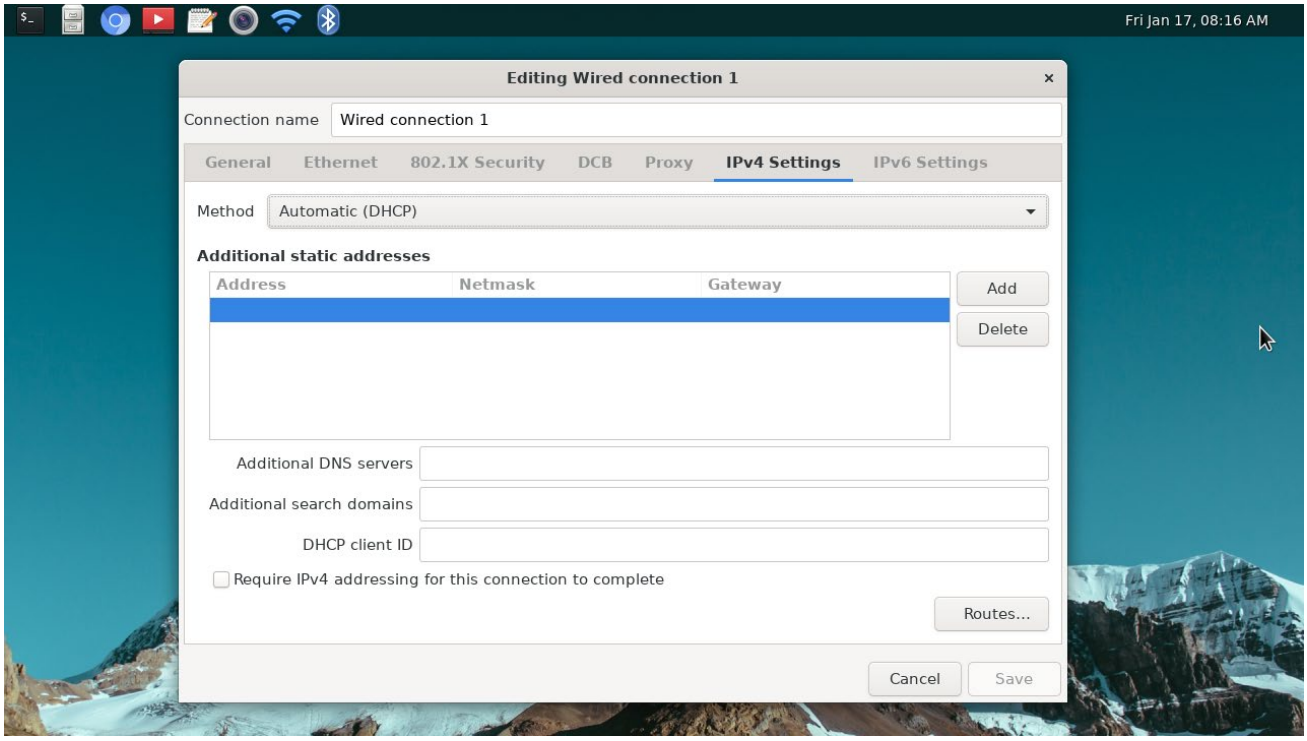
The default Ethernet connection is **Wired connection 1**, choose this connection, then click setting button to edit.

In Ethernet page, users could check MAC address, Speed, Duplex mode, etc. Click “Save” button to

save the modification.

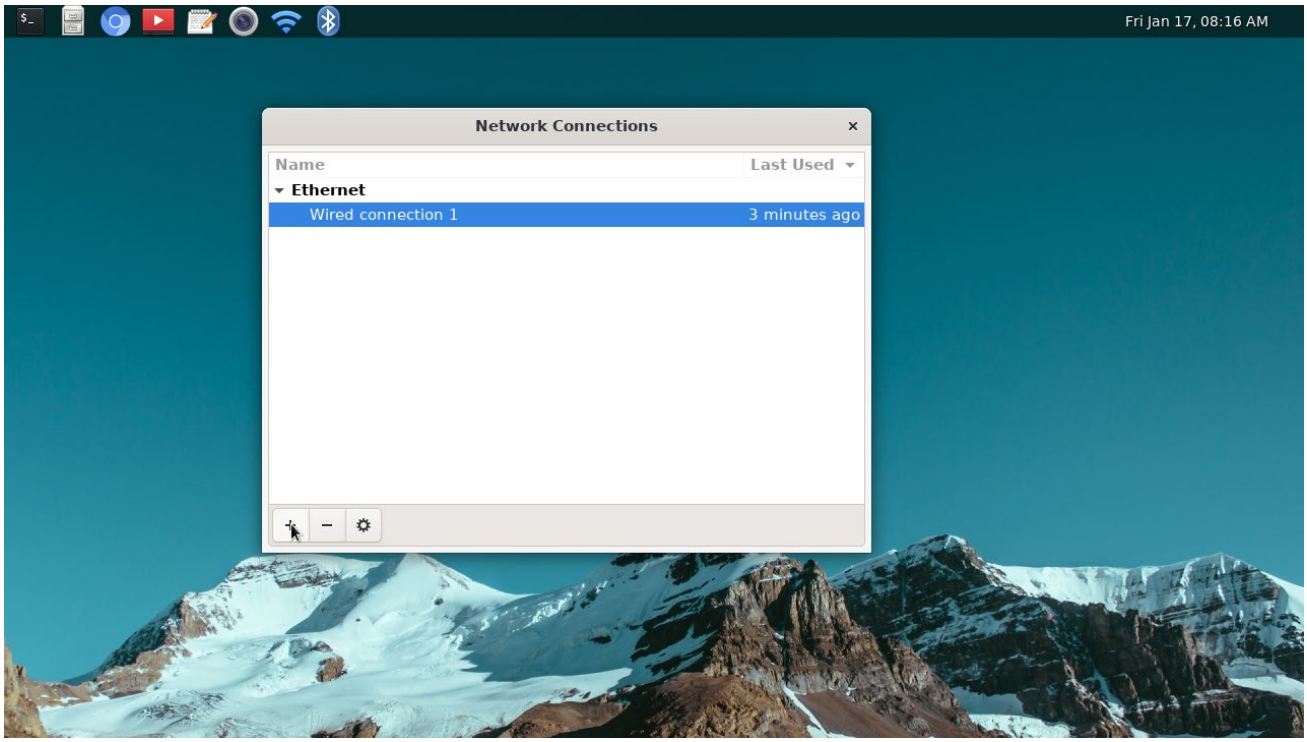


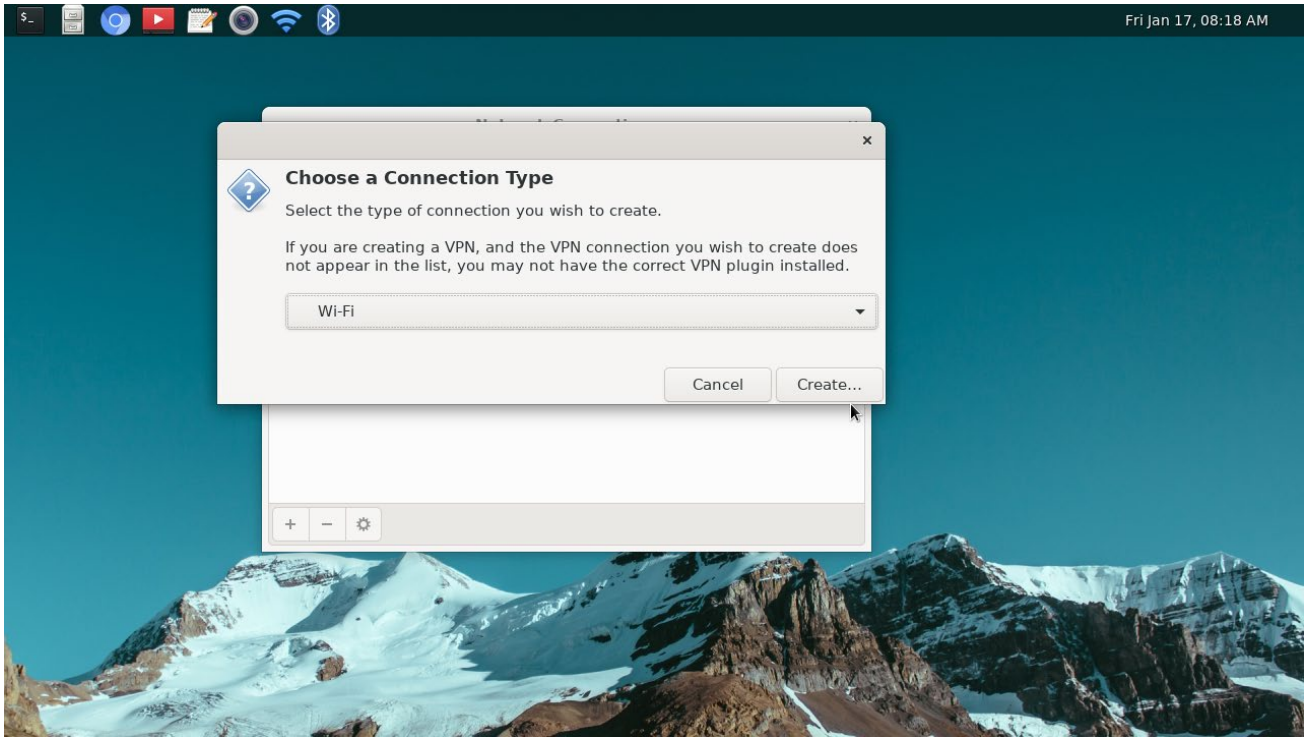
In IPv4/IPv6 Settings page, users could change IP address, DNS servers, etc. Click “Save” button to save the modification.



4.8.2 Manage Wi-Fi Connection

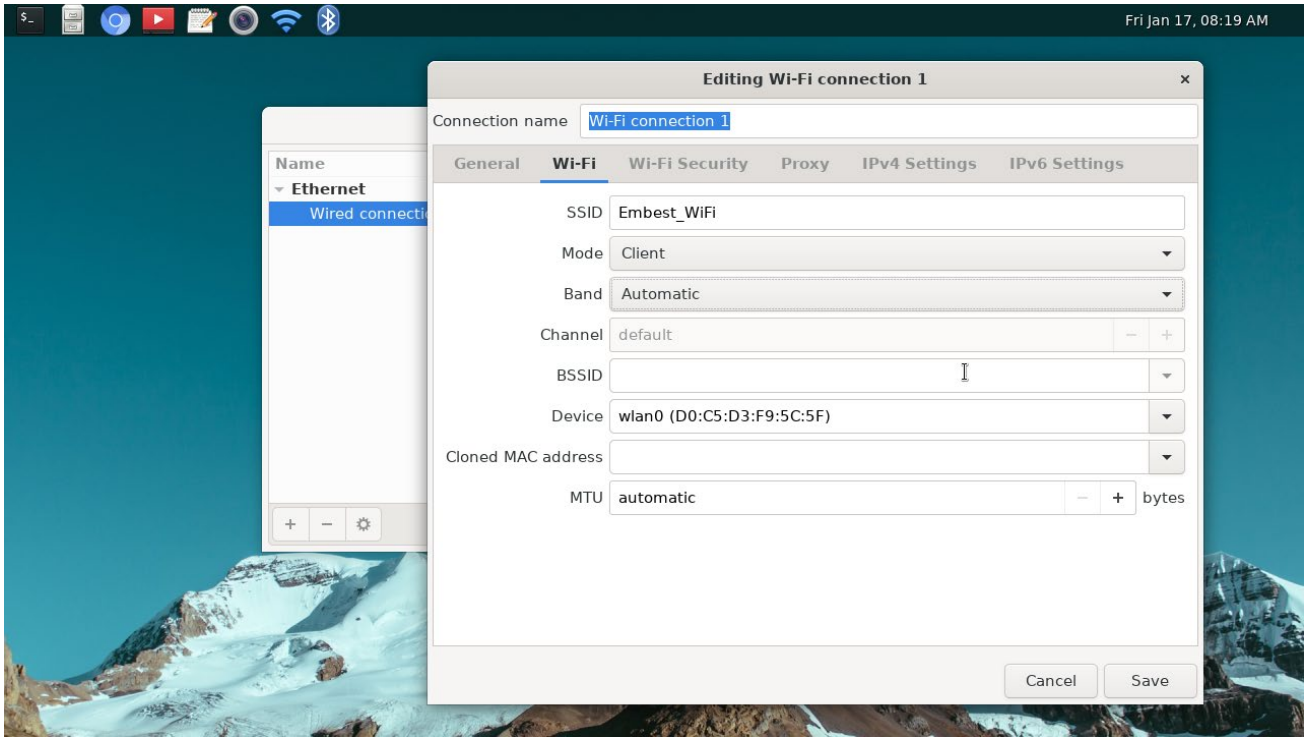
1. Wi-Fi connection need to be adding manually, click + button, then select Wi-Fi in the pop-up window.





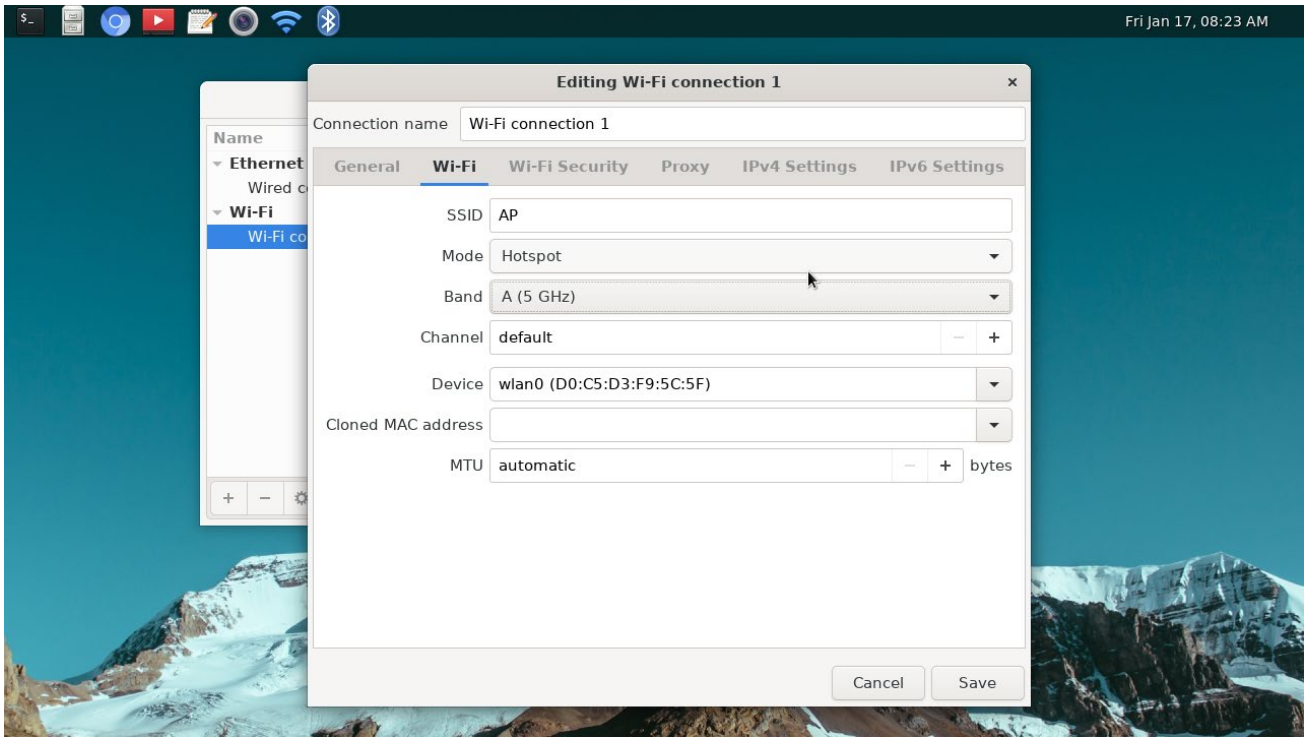
2. In Wi-Fi Page, enter the SSID for the Wi-Fi network, and choose work mode, band and device to

use.

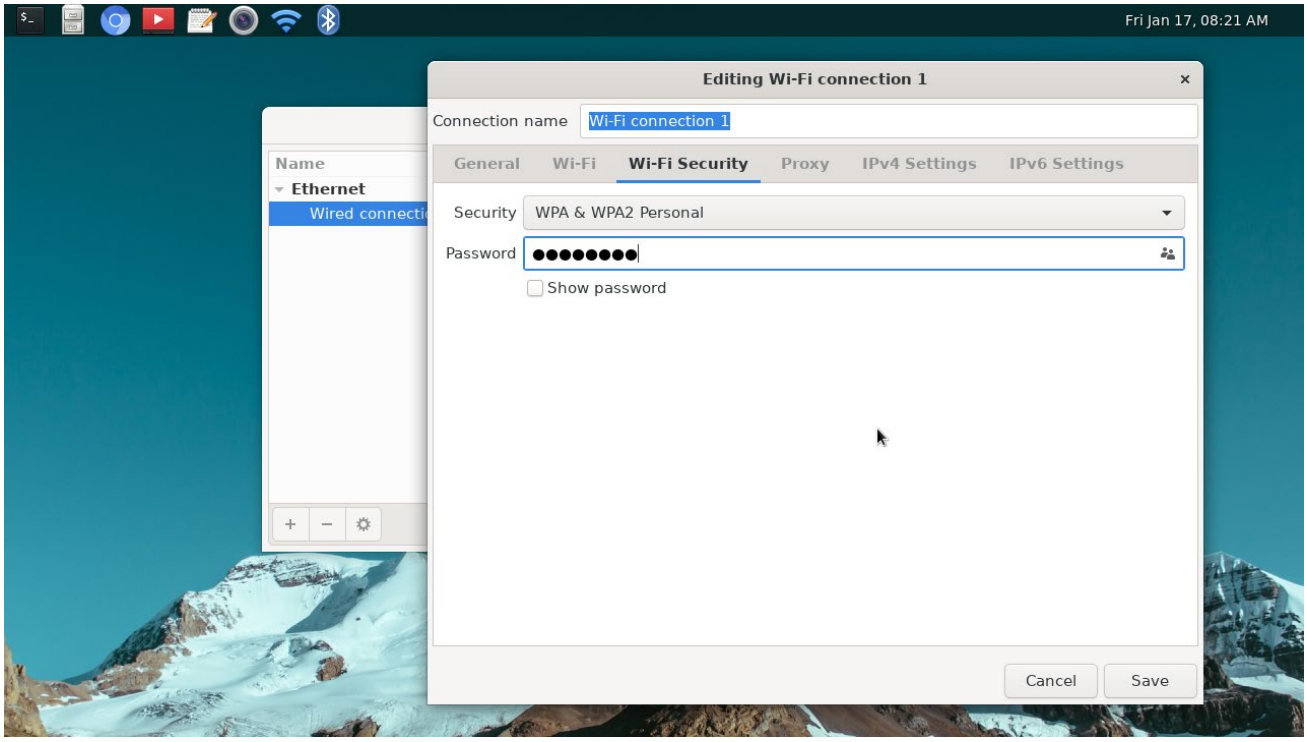


If we connect Wi-Fi with exist Wi-Fi connection, choose Client in Mode, Automatic in Band.

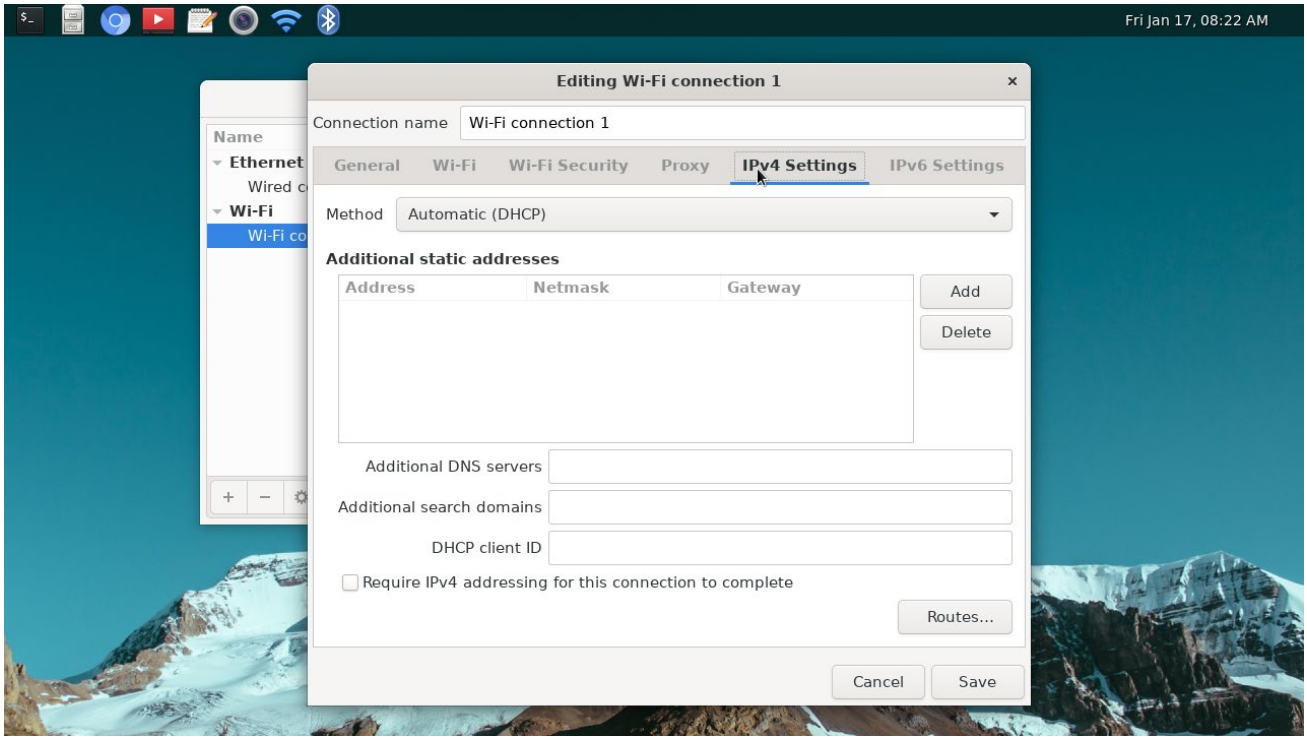
If we set a new Wi-Fi Hotspot, choose Hotspot in Mode, 2.4GHz or 5GHz in Band, and modify the channel parameter if necessary.



3. In Wi-Fi Security page, choose the Wi-Fi security method and enter password.



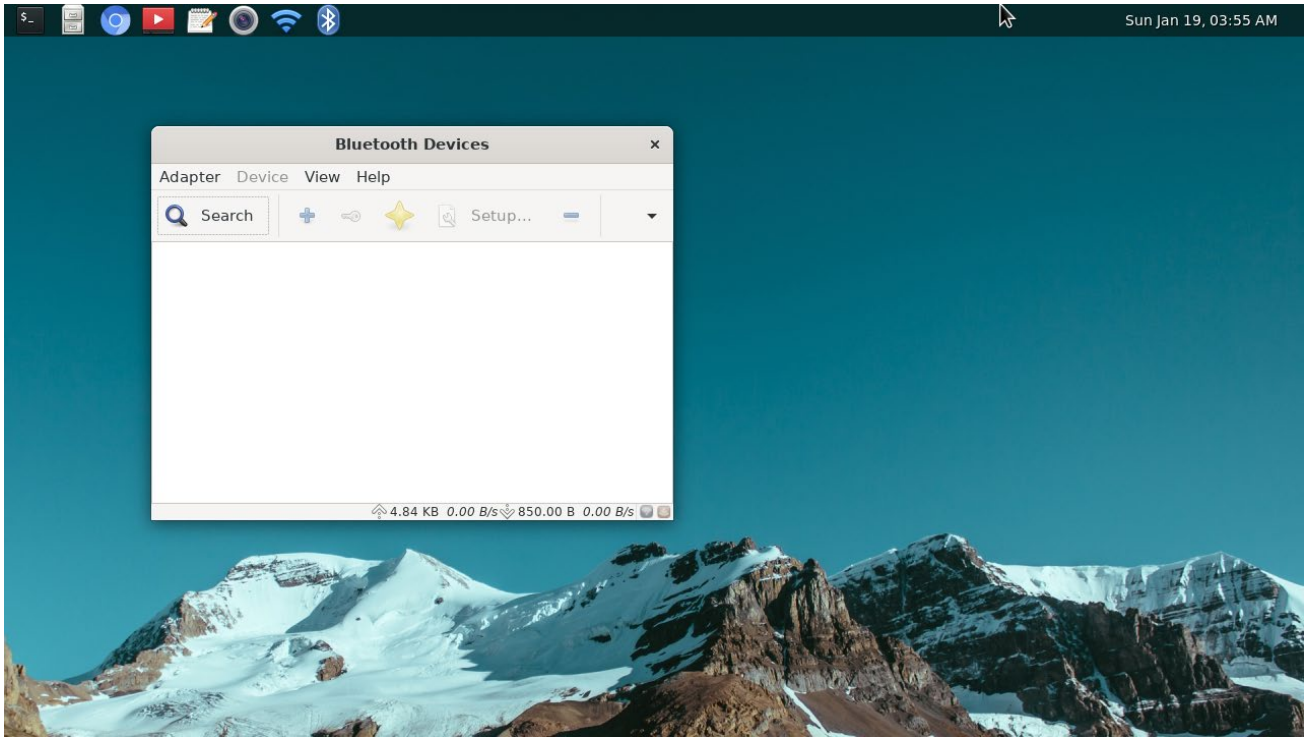
4. In IPv4/IPv6 Settings page, change IP address, DNS servers, etc. Click “Save” button to save the modification.



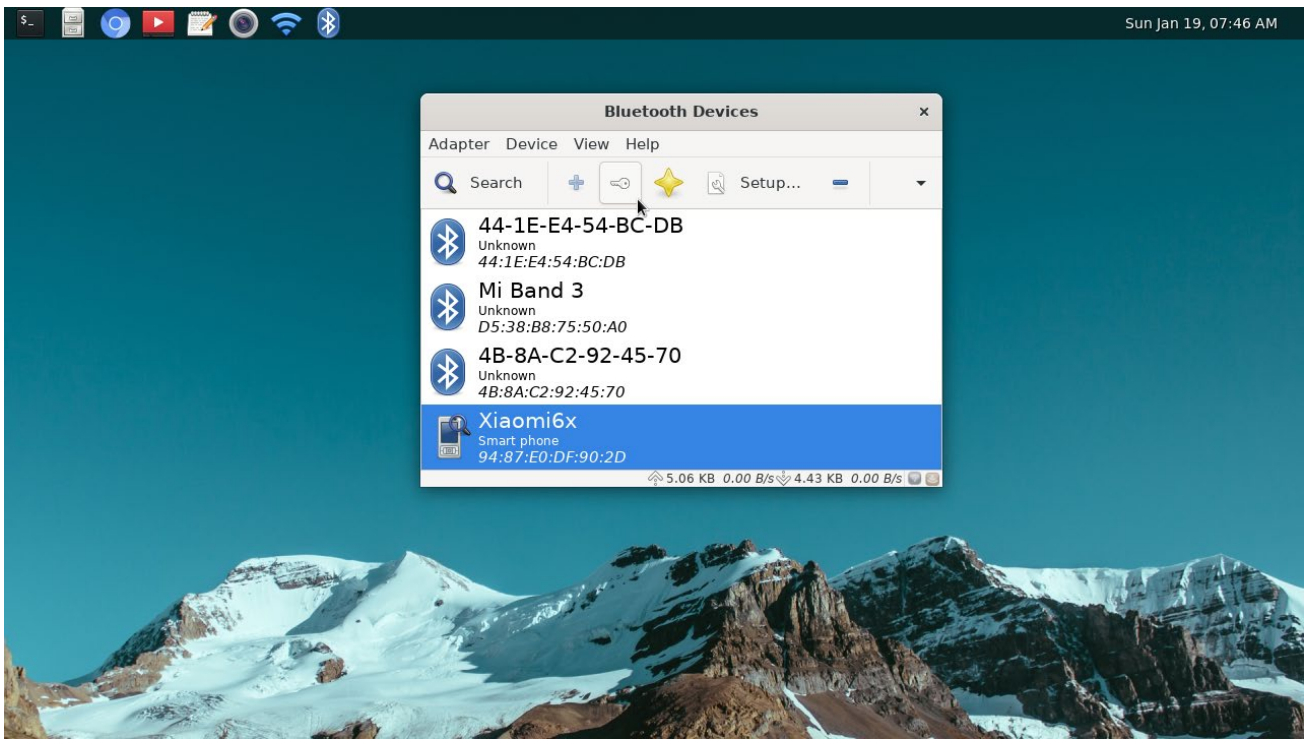
4.9 Bluetooth Manager

4.9.1 Search and Connect Device

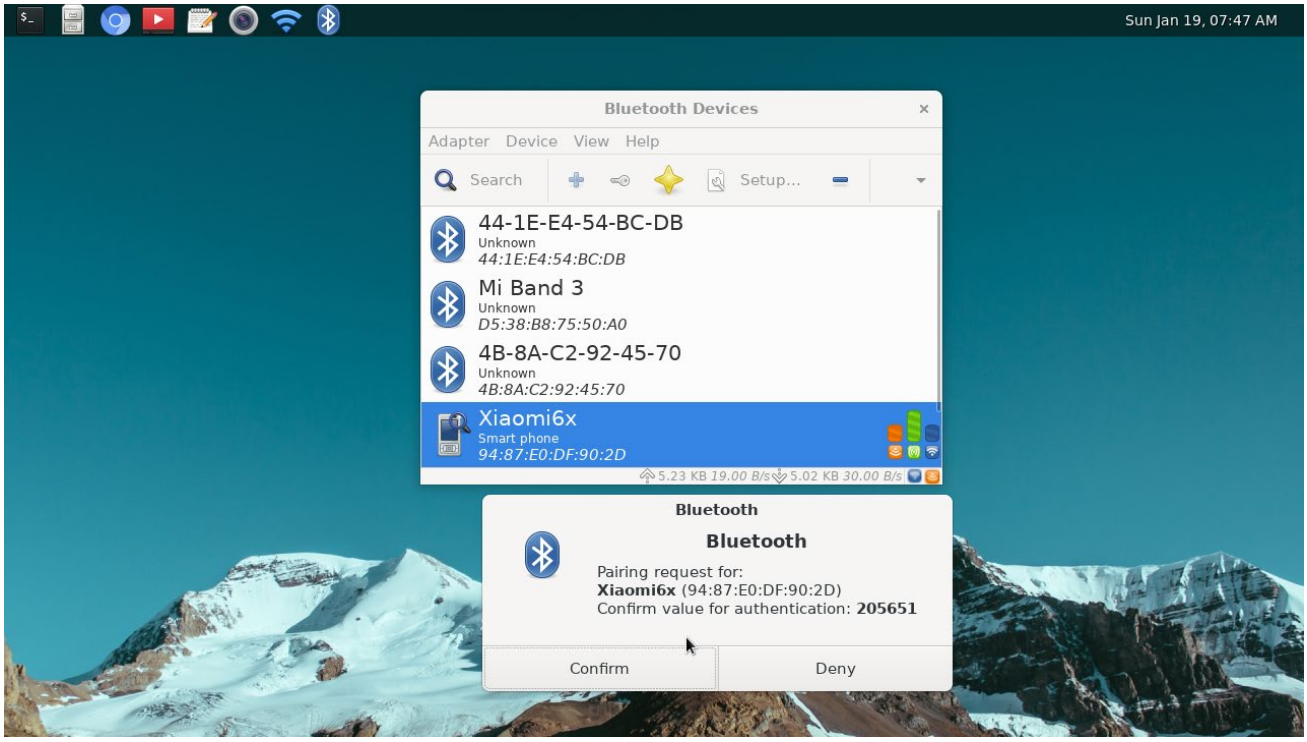
1. Click Search button to search for available Bluetooth device.



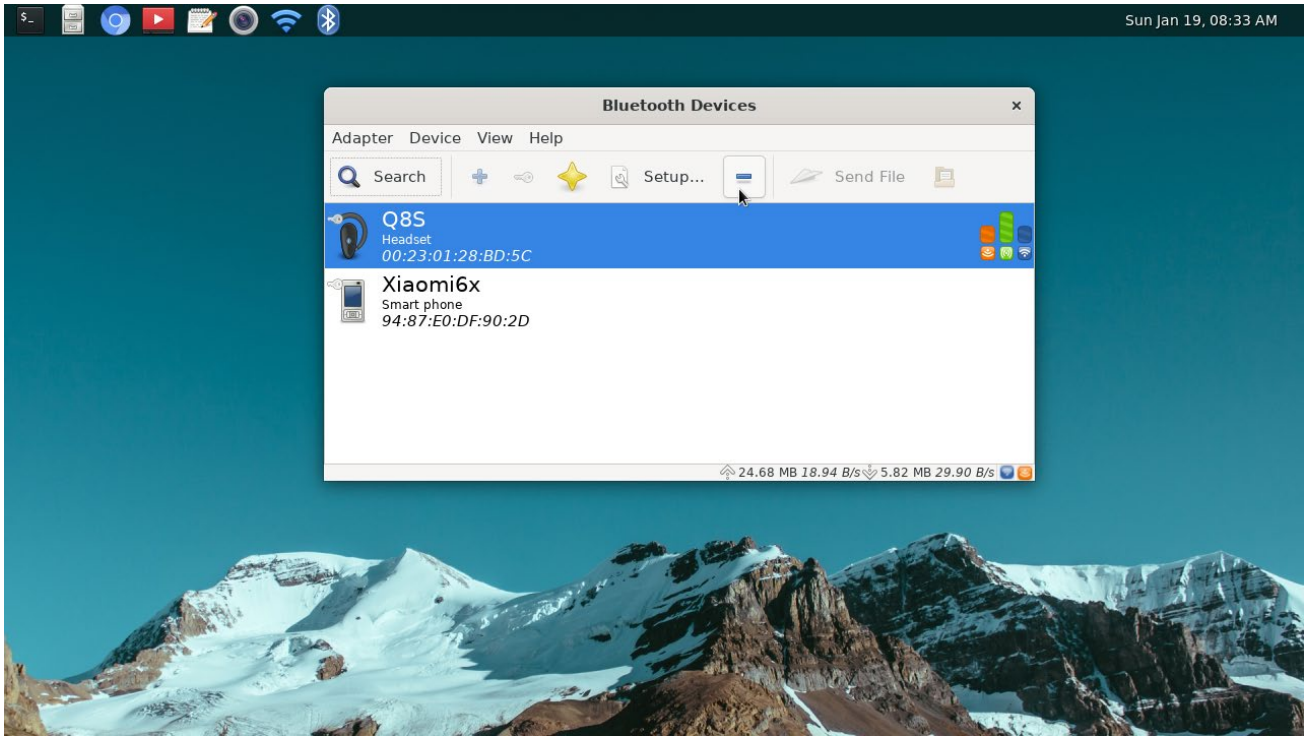
2. Select the device to connect, then click Pair button in Right click menu, Device menu or Quick menu bar to pair the device.



3. Sometimes the device will ask the system to confirm pairing request.

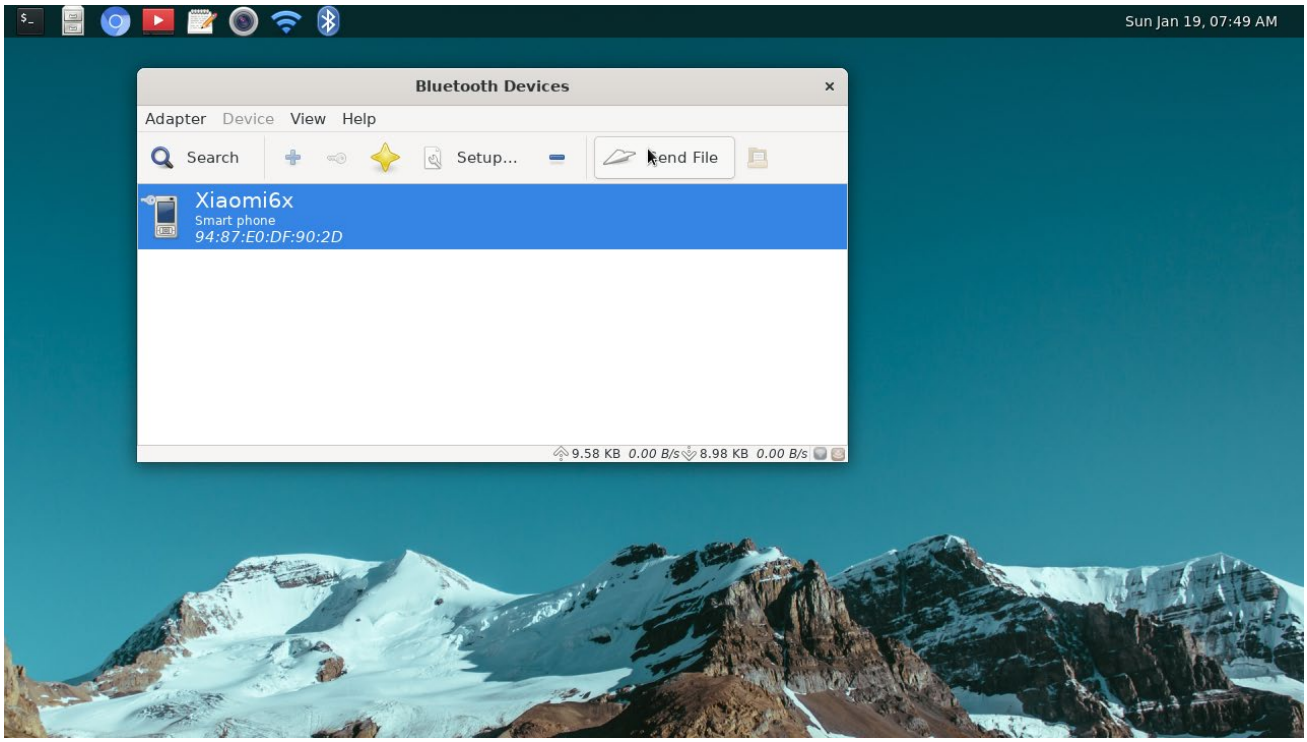


4. To cancel the pair, select the device, then click Remove button in Right click menu, Device menu or Quick menu bar to pair the device.

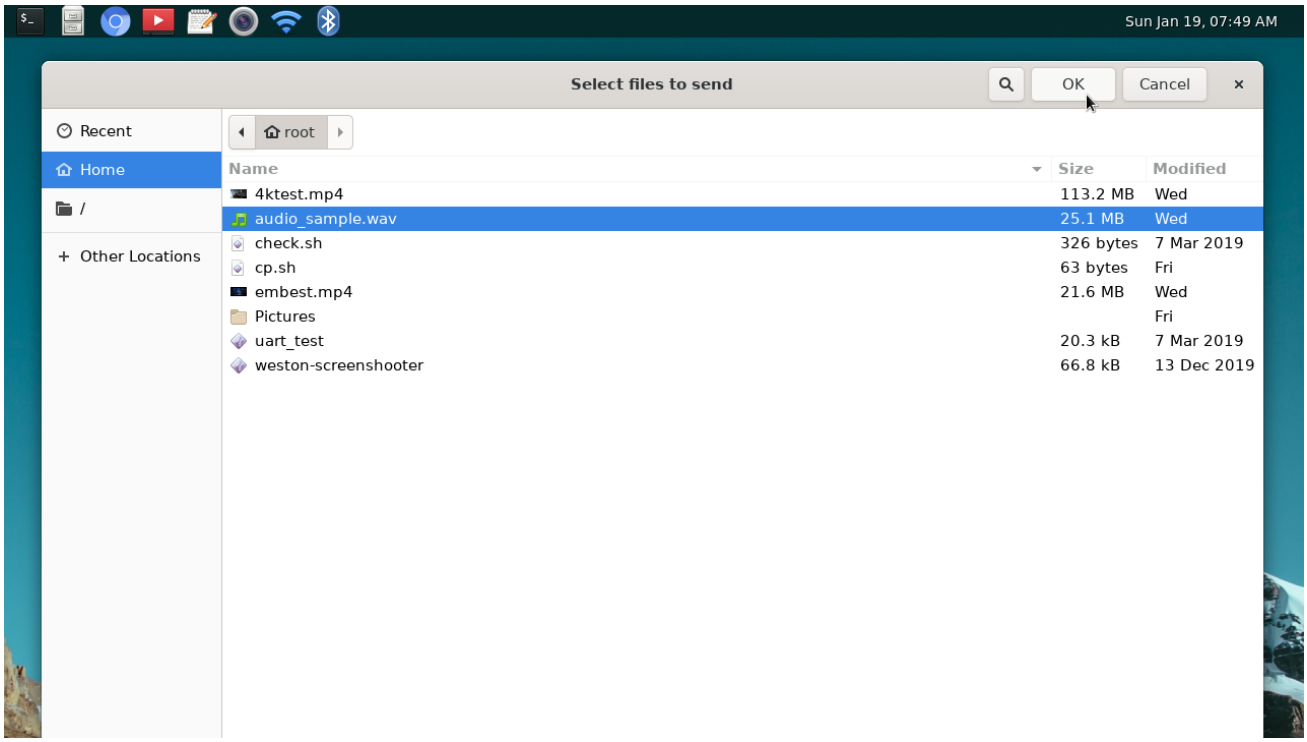


4.9.2 Transmit and Receive Files

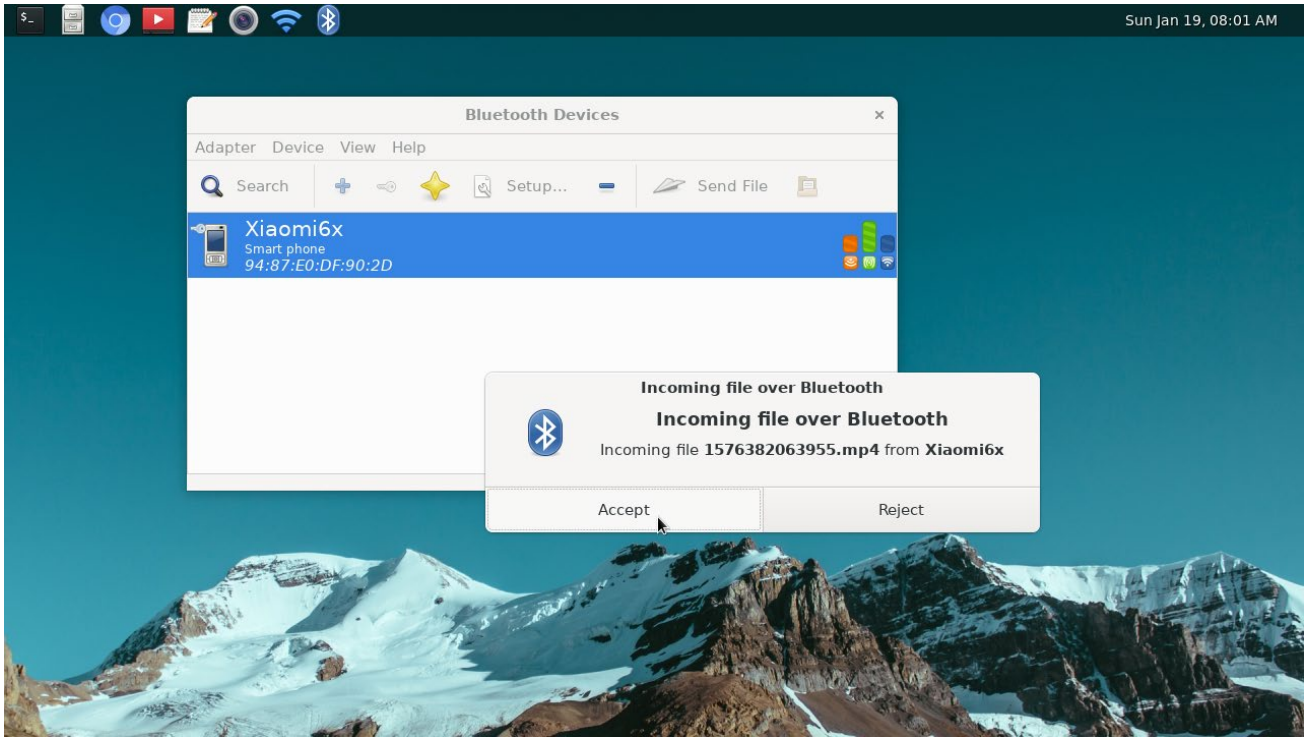
1. Pair with a Bluetooth device, such as smart phone, then click “Send File” button.



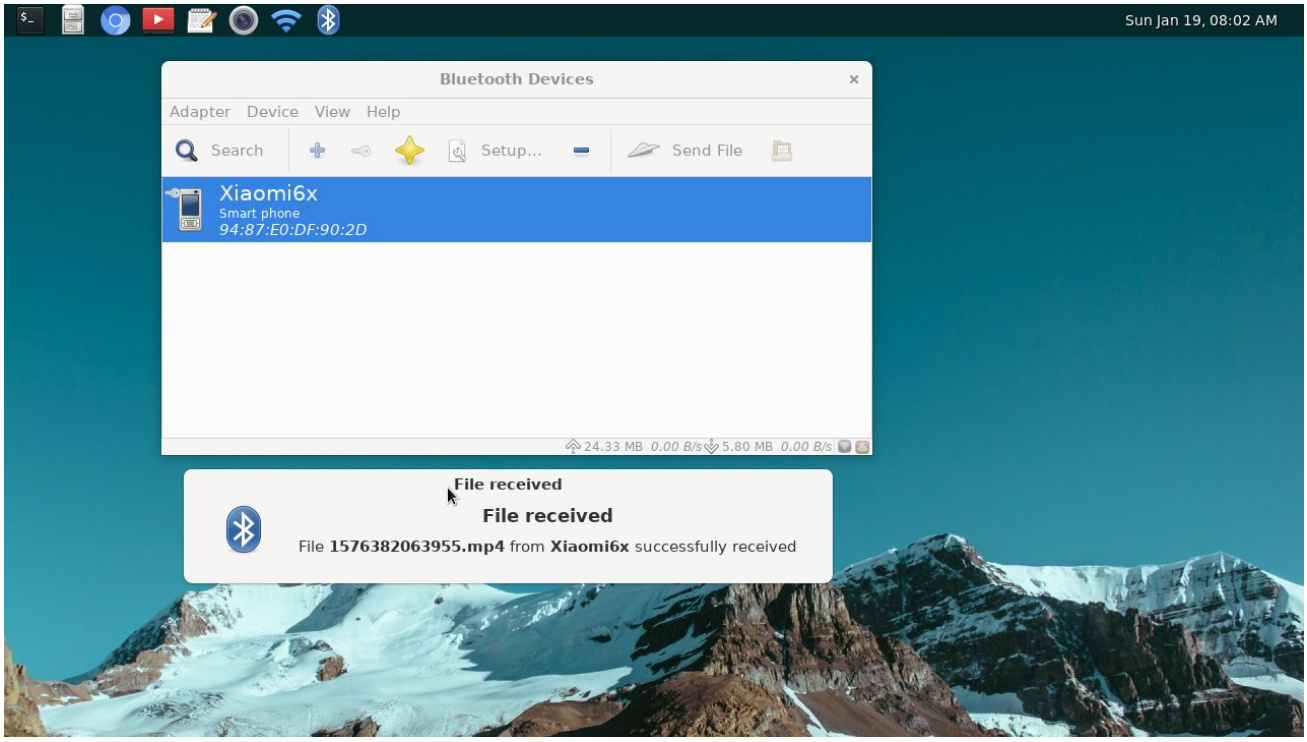
2. Choose the file in pop-up window.



3. Click “Accept” to receive the file send by the smart phone.



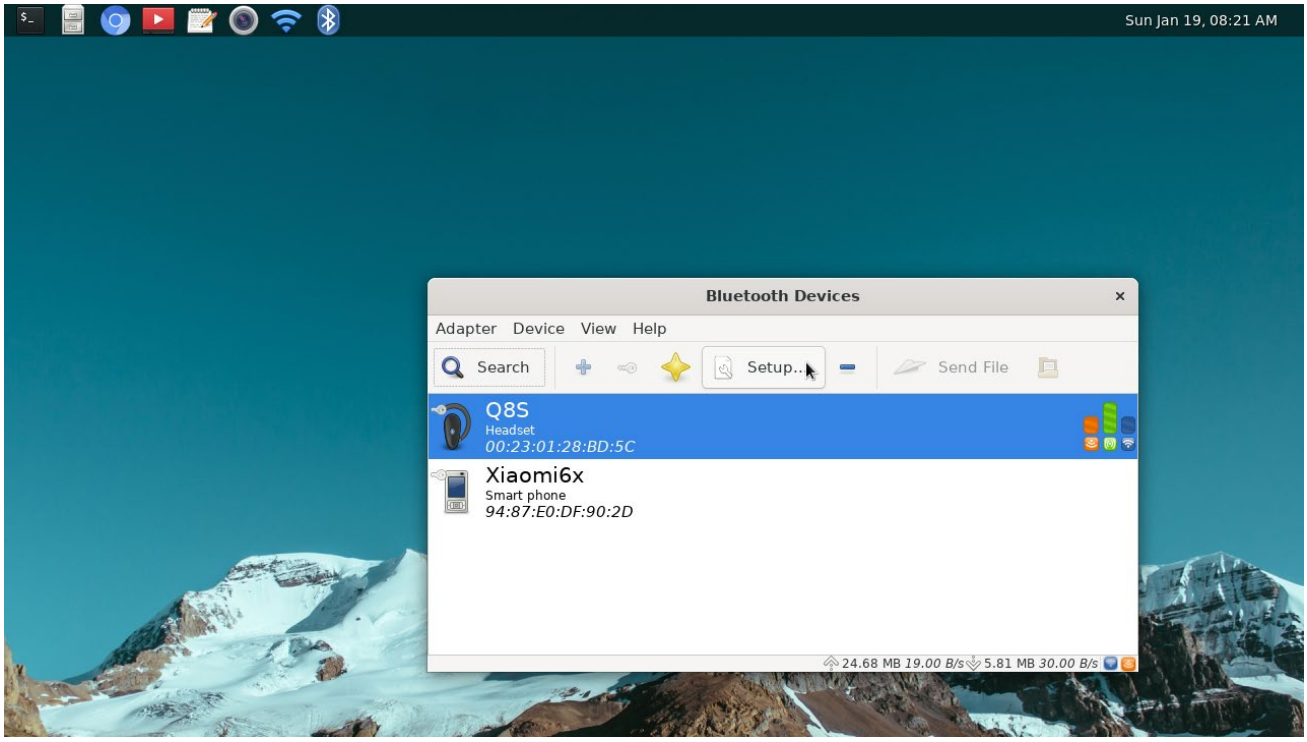
4. Select the inform window, press “Esc” button on keyboard to close it.

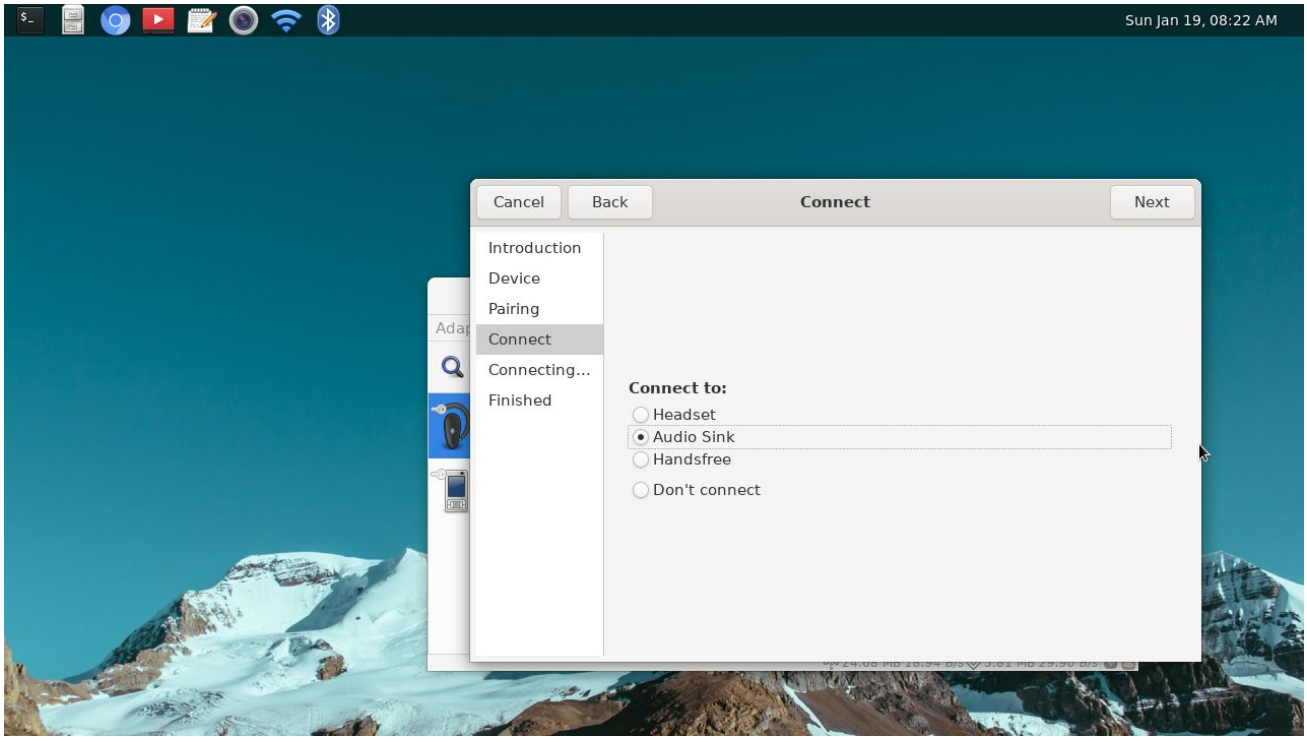


4.9.3 Connect Bluetooth Audio

MaaXBoard supports connect the Bluetooth audio device, such as Bluetooth headset, to play video or audio files. Pair the device at first, then choose “Connect to: Audio Sink” in Right click menu, or Device

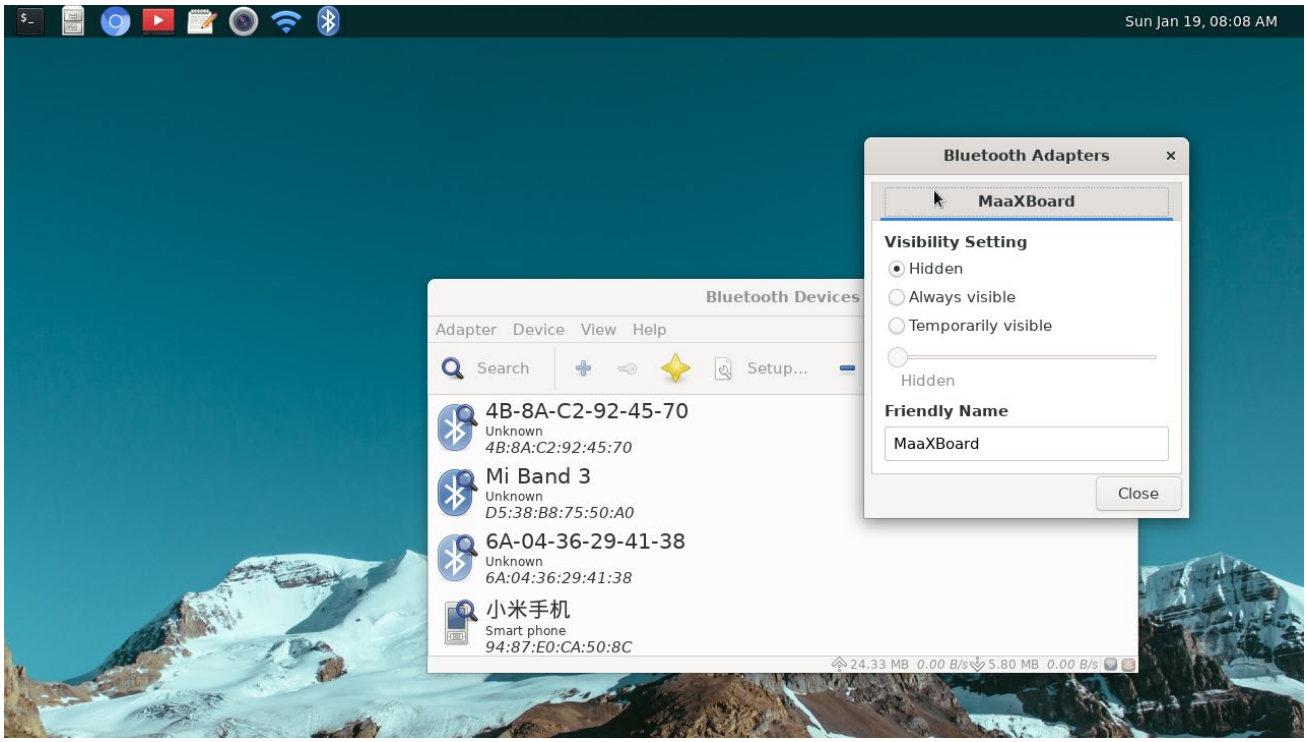
menu. Users could also click Setup button, follow the guide to configure the Bluetooth connection.



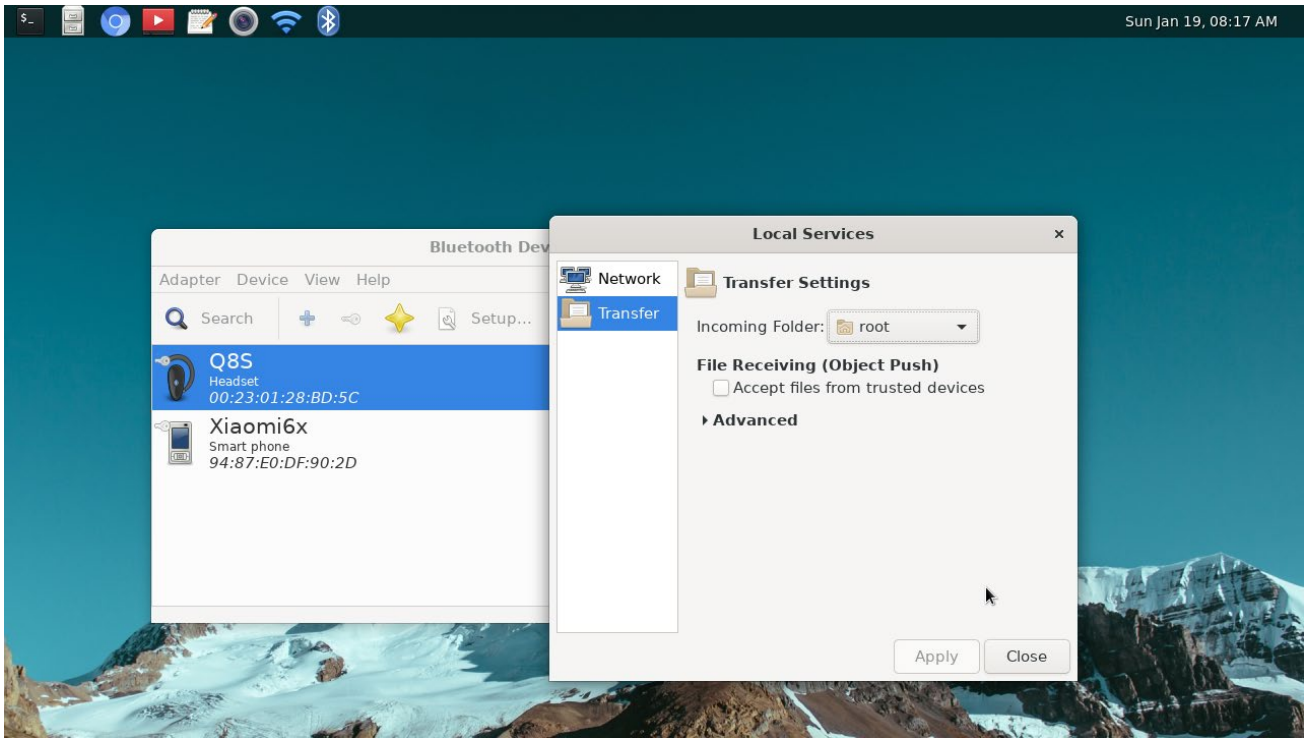


4.9.4 Other Configuration

1. In Adapter -> preferences, user can modify the device name of the Bluetooth adapter.

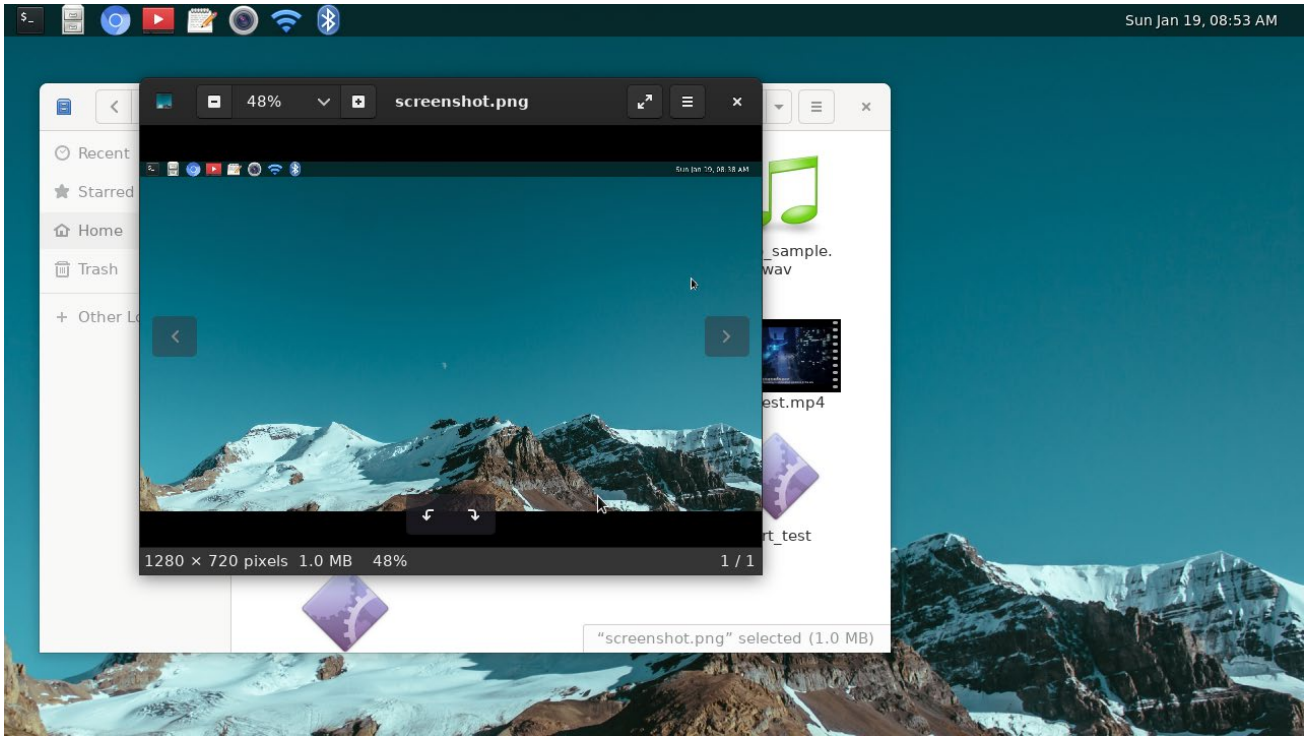


2. In View -> Local Services, user can change the incoming folder for received files, etc.

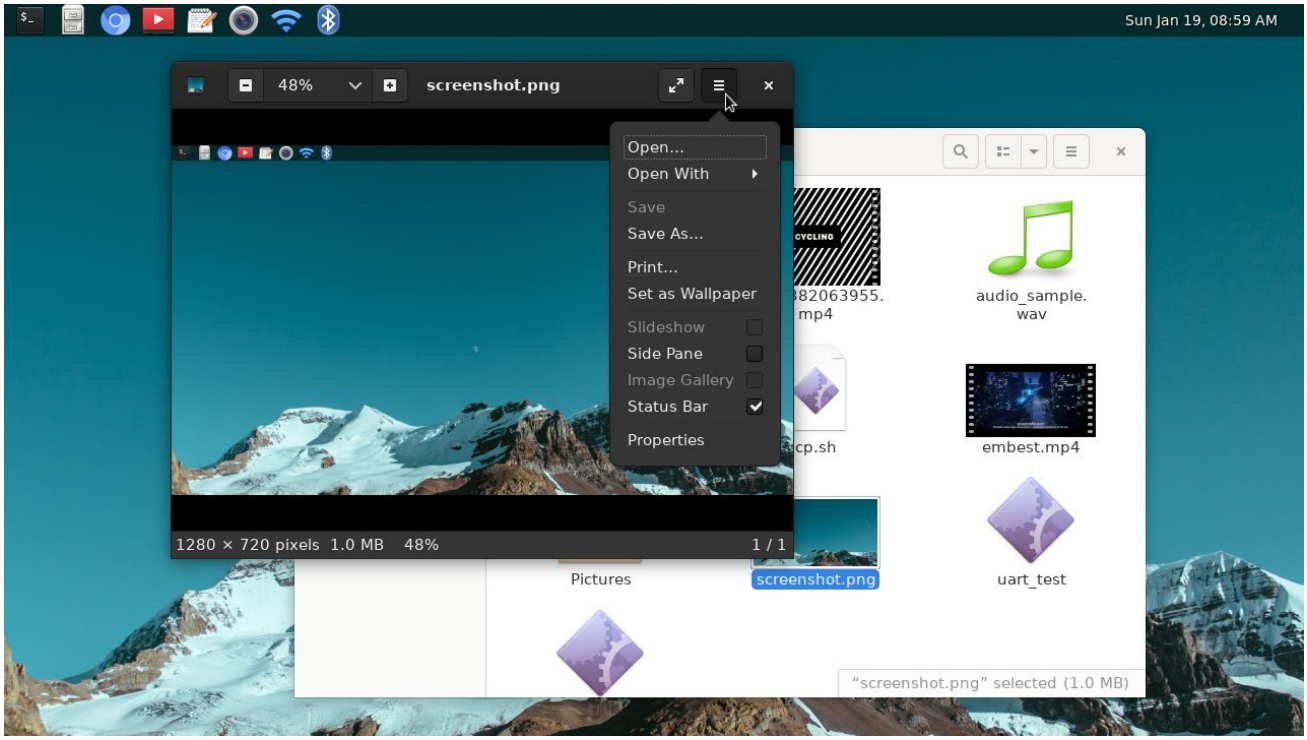


4.10 Image Viewer

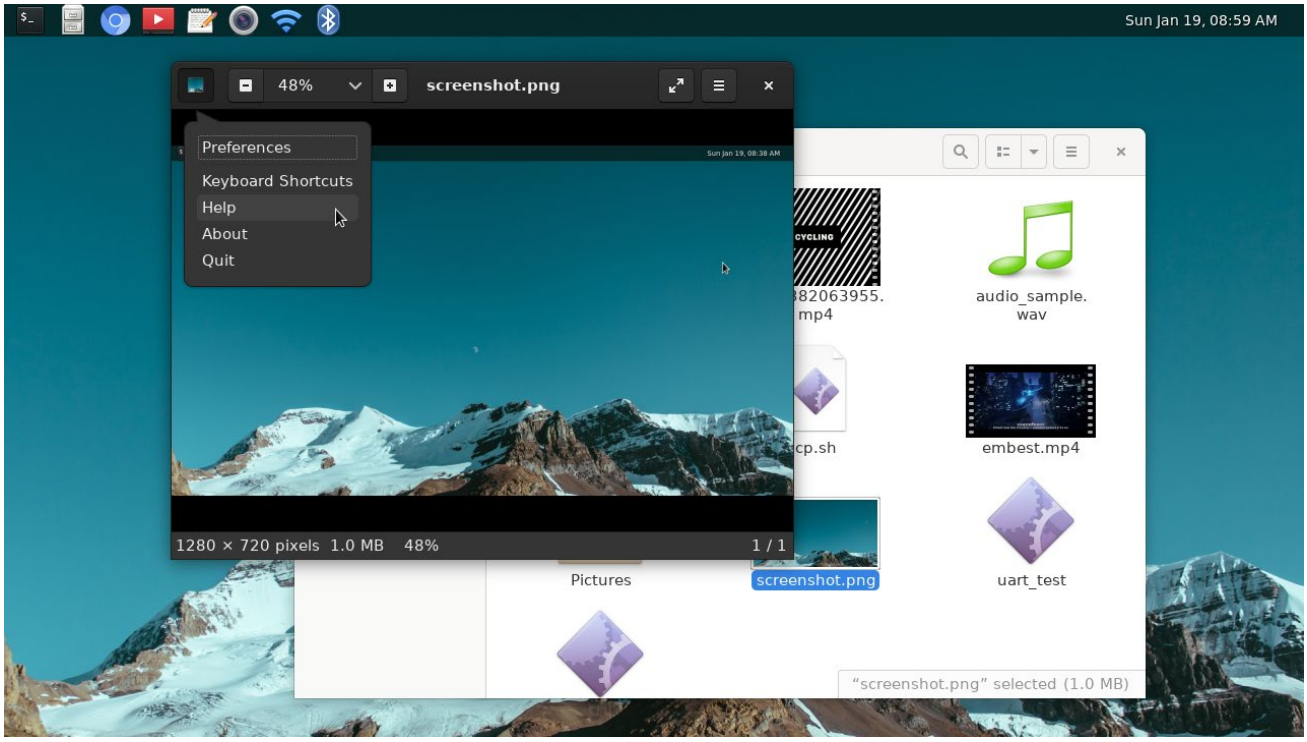
In file manager, double click the image file, system will use Image Viewer to show the picture on the screen.

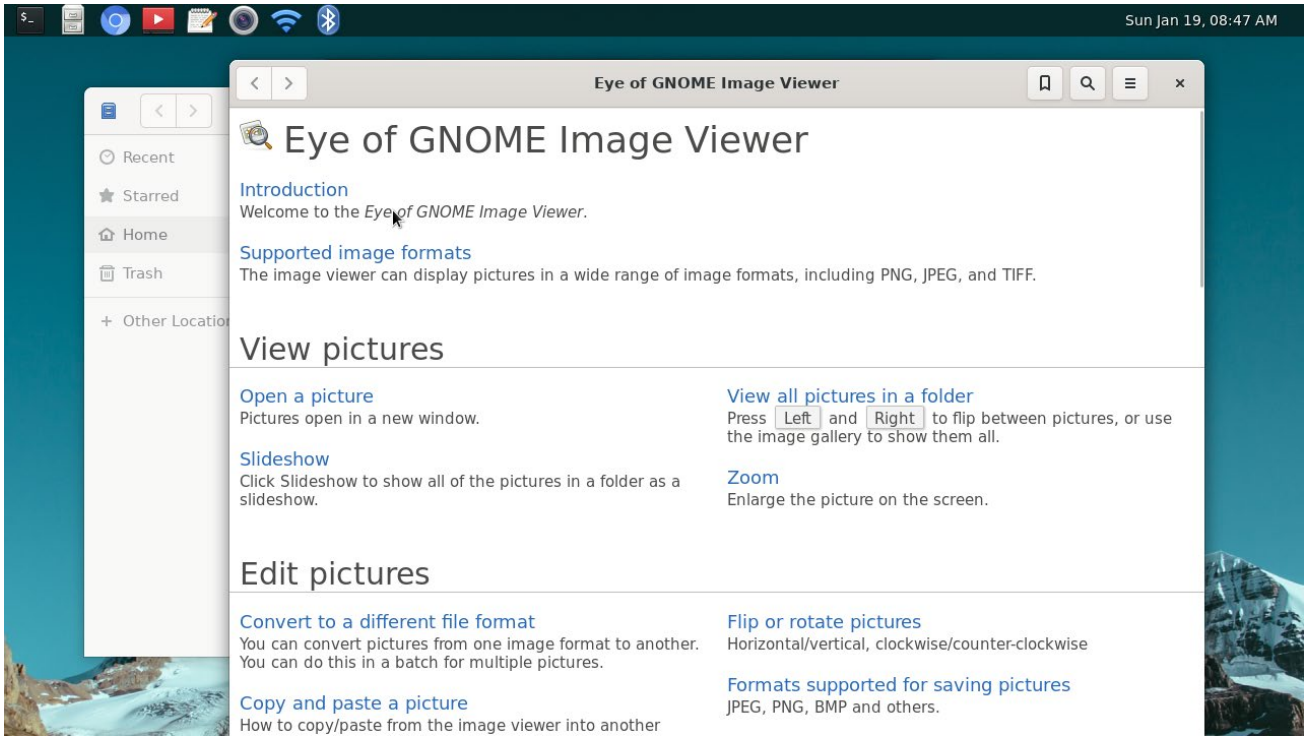


In Image Viewer, users could full screen to view the picture, zoom, rotate, check picture properties, etc.



To learn more, open the help content by click the thumbnail in the menu bar:

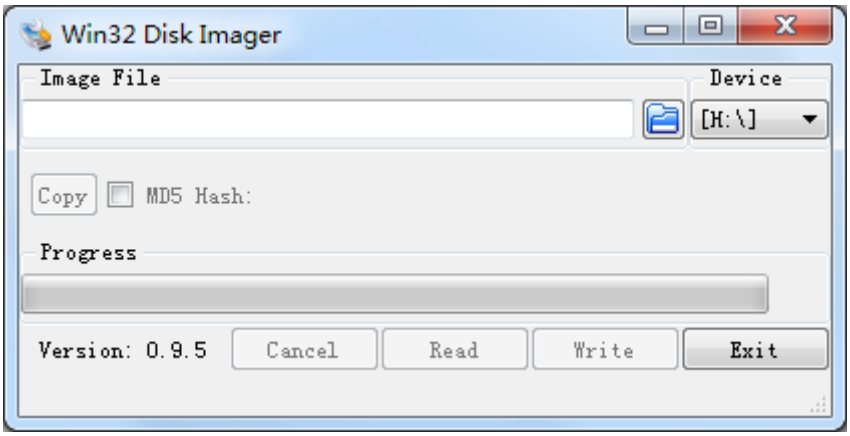




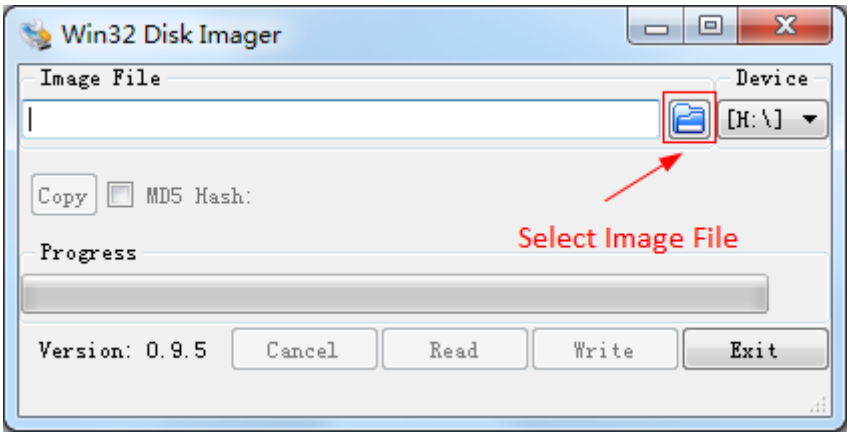
Chapter 5 Burn or update the system Image

5.1 Burn the System Image to SD Card under Windows OS

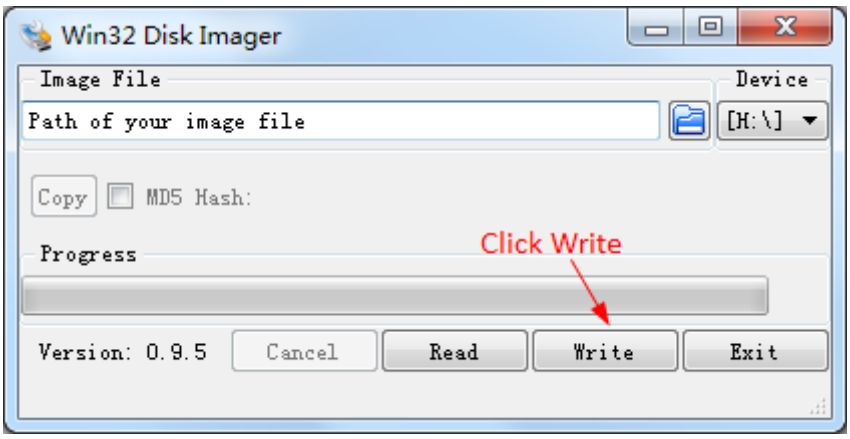
1. Firstly, you should prepare a SD card, which is no less than 8GB.
2. Then, download and install “Win32 Disk Imager” from: https://sourceforge.net/projects/win32diskimager/.



3. Select the system images file: eg:MaaXBoard-Debian-Image-SDcard-V1.1.1r10.img



4. Click “Write” button to burn the images:



5.2 Burn the System Image to SD Card under Linux OS

In Ubuntu or Debian OS, you can use bmap-tool to burn the image to SD Card. Here we use MaaXBoard-Debian-Image-SDcard-V1.1.1r10.img as an example:

1. Install bmap-tools

```
$ sudo apt install bmap-tools
```

2. Enter the following instructions in command line to check the SD Card ID, in this example is: sdc

```
$ ls /dev/sd*
/dev/sda    /dev/sda2  /dev/sdb    /dev/sdb2  /dev/sdc    /dev/sdc2
/dev/sda1   /dev/sda5  /dev/sdb1   /dev/sdb5  /dev/sdc1
```

3. If SD Card is mounted, umount it.

```
$ sudo umount /dev/sdc1
$ sudo umount /dev/sdc2
```

4. Burn the SD card with following instructions:

```
$ bmaptool create -o burn.map MaaXBoard-Debian-Image-SDcard-V1.1.1r10.img
$ sudo bmaptool copy --bmap burn.map MaaXBoard-Debian-Image-SDcard-V1.1.1r10.img
/dev/sdc
```

5.3 Update System Image in eMMC

USB0 (The lower one in USB interface HUB1) support burning mode. Connect USB0 and PC before power on the board. The system will enter burning mode. Then users could burn the system image to the development board using uuu tools. For the detail information, refer to MaaXBoard EMMC burning Guide.

Chapter 6 Appendix

6.1 Hardware

For the detail hardware introduction, please refer to MaaXBoard Hardware user manual.