

AdvLinuxTU

User Manual

V1.1.2

The Advantech logo consists of the word "ADVANTECH" in white, uppercase, sans-serif font, centered within a solid blue rectangular background.

ADVANTECH

Enabling an Intelligent Planet

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1. About This Manual

Thank you for choosing Advantech. This manual is for AdvLinuxTU and can be copied and distributed in any medium.

AdvLinuxTU is based on Xbuntu 18.04.x, its kernel is 4.15.

2. AdvLinuxTU Overview

AdvLinuxTU is an embedded Linux system designed for Advantech embedded devices, and it is especially optimized for TPC/UNO/PPC/ITA series.

2.1. Hardware Support List

AdvLinuxTU can be installed on all Advantech devices theoretically, but only the following device is tested.

➤ TPC Series

TPC-B200-J12AE

TPC-B500-633AE

TPC-5152T-633AE

TPC-5212W-633AE

TPC-2181WP-533AE

TPC-2211W-J12AE

TPC-2151T-J12AE

TPC-312-R83xA

TPC-312-R85xA

TPC-312-R87xA

TPC-315-R83xA

TPC-315-R85xA

TPC-315-R87xA

TPC-317-R83xA

TPC-317-R85xA

TPC-317-R87xA

TPC-324W-P83xA

TPC-324W-P85xA

TPC-324W-P87xA

➤ UNO Series

UNO-247

UNO-420
UNO-1372G-J0x1AE
UNO-2271G-E(0)xxxE
UNO-2272G-JxAE
UNO-2372G-E0xxAE
UNO-2372G-J0xxAE
UNO-2372G-J1xxAE
UNO-2473G-ExAE
UNO-2473G-JxAE
UNO-2484G-6xxxAE
UNO-2484G-7xxxAE
UNO-2483G-4xxAE
UNO-137-E1
UNO-410-E1
UNO-430-E1
WISE-5580

2.2. Kernel Version

Kernel version: 4.15

2.3. Software version:

Xorg: 1.19.6
Qt: 5.9.5
glibc: 2.27
gcc: 7.3.0

2.4. User and Password

There are three users in AdvLinuxTU by default. The user and default password is as follows:

root:111111
advantech:111111
sysuser: 1111111

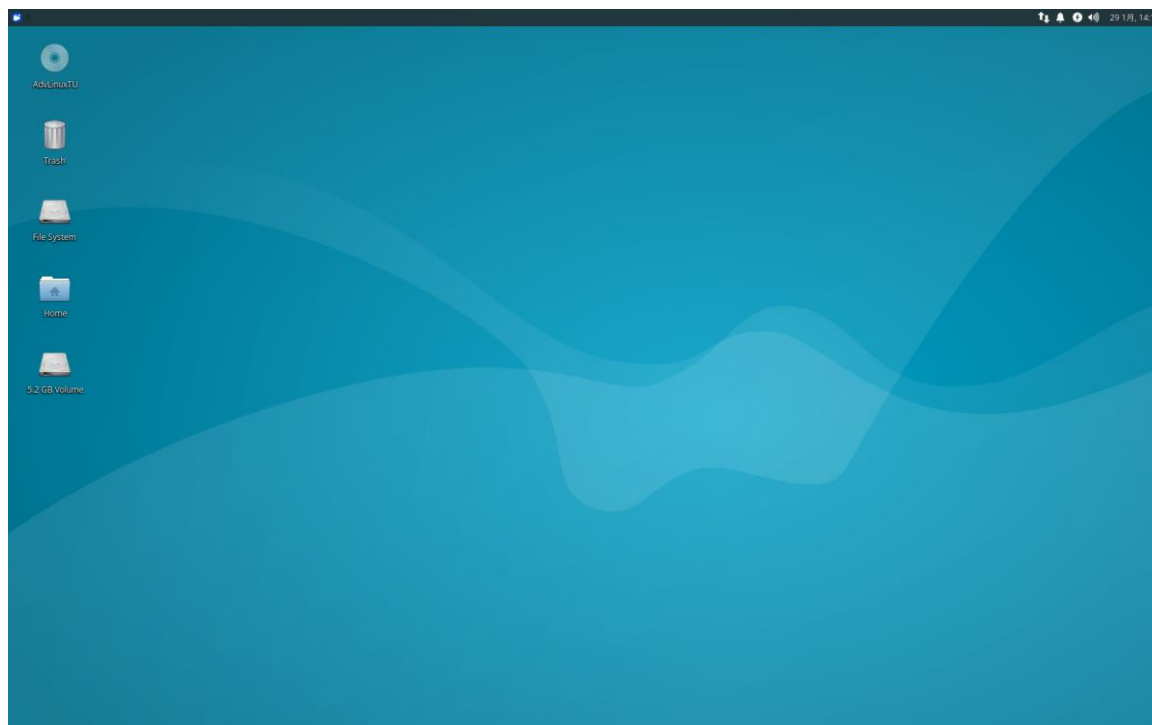
2.5. Main Features

AdvLinuxTU has many important features coming for industrial customers. Here we list some of them and give a brief introduction. We will explain them in detail in later

sections.

- **Provide Embedded QT runtime environment**
The user can run embedded QT application.
- **Auto login**
The installation offers an auto login option; if the user chooses it, the user will be able to auto login to AdvLinuxTU after the installation.
- **USB installation support**
The user can burn the AdvLinuxTU ISO to a USB disk, and then the user can install AdvLinuxTU to Advantech device from the USB disk.
- **Hardware auto detection**
When installing AdvLinuxTU, the installation will detect the hardware automatically and install all drivers it needs. Therefore, once the installation is completed, no more drivers will be needed unless the user adds some other devices such as Advantech data collecting card to the embedded device.
- **Online Installation and Update**
You can use apt-get command to install and update software, extending AdvLinuxTU functions.

2.6. AdvLinuxTU Screenshot



Picture 2-6-1 Default Desktop

3. Installation Guide

In this chapter, we will introduce the installation step by step.

3.1. System Requirements

Recommended requirements:

Storage size:

32 G or more

Memory size:

2 G or more

3.2. Prepare for Installation

We suggest that the user makes a copy of data in storage medium in order to prevent data lost in case of improper operation during installation.

AdvLinuxTU supports installing from USB disk.

Prepare:

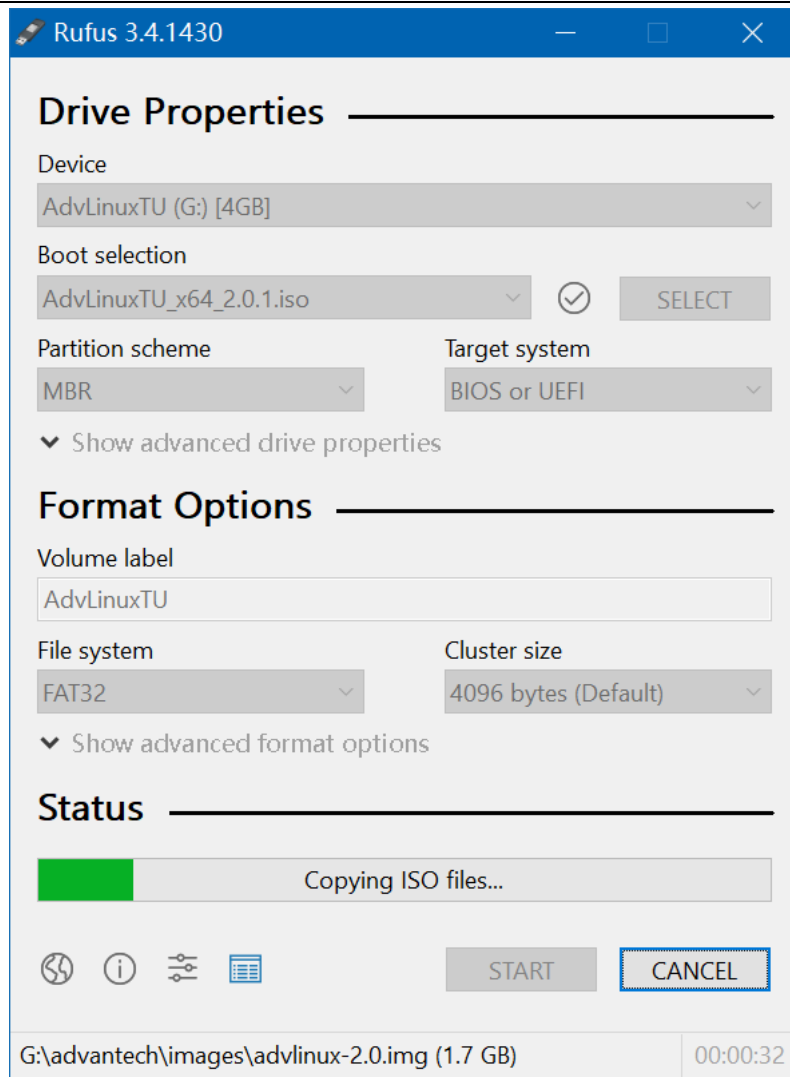
- ✓ AdvLinuxTU ISO
- ✓ USB Disk (storage size is more than 2G)
- ✓ Rufus utility

3.3. Install from USB disk

We use Rufus tool to Burn AdvLinuxTU ISO file to USB disk, Rufus is a utility that helps format and create bootable USB flash drives, Rufus is open source and is 100% Free Software (GPL v3), You can download from <https://rufus.ie/>

System Requirements for Rufus:

Windows 7 or later, 32 or 64 bit doesn't matter. Once downloaded, the application is ready to use.



Picture 3-3-1 Select the AdvLinuxTU ISO File and start to burn

Burn the ISO as follows:

- Insert USB disk to windows PC
- Start Rufus tool
- Select AdvLinuxTU ISO
- Click START to start burn

3.4. Raid mode & Installation Steps

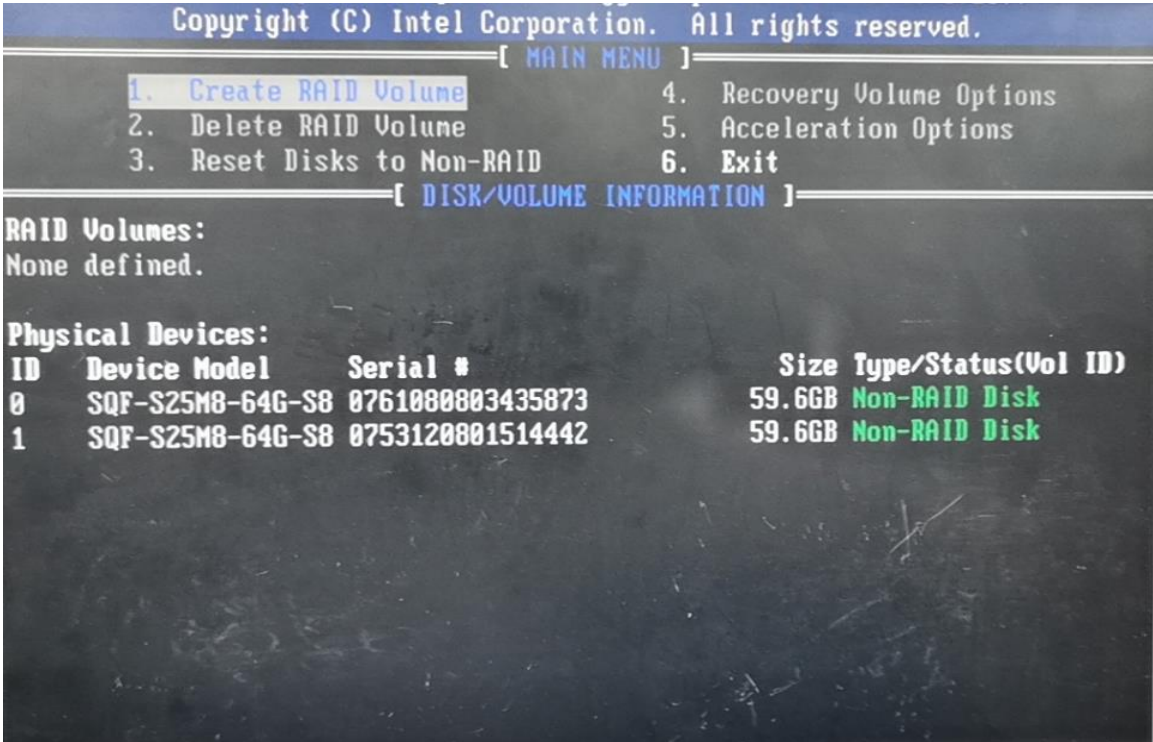
UNO-2483G, UNO-2484G, UNO-3283G, TPC-B500 support raid mode.

3.4.1. Setting RAID Mode

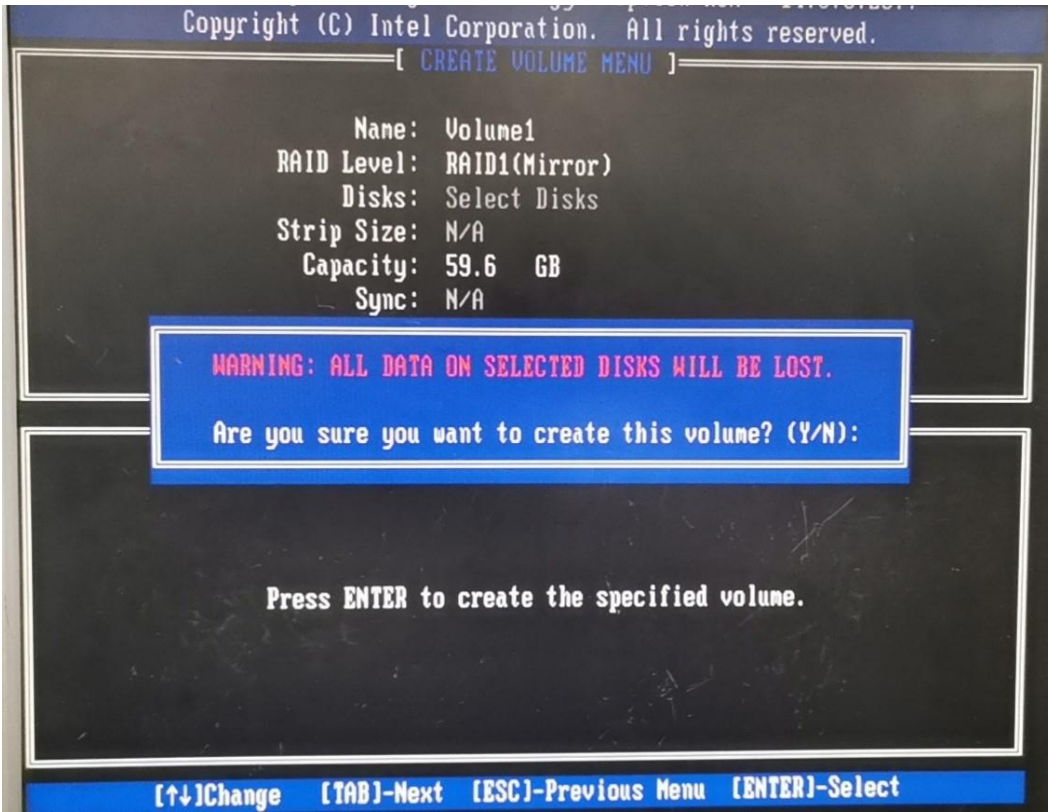
Enter the BIOS interface, set the hard disk mode to RAID mode.

3.4.2. Create RAID Volume

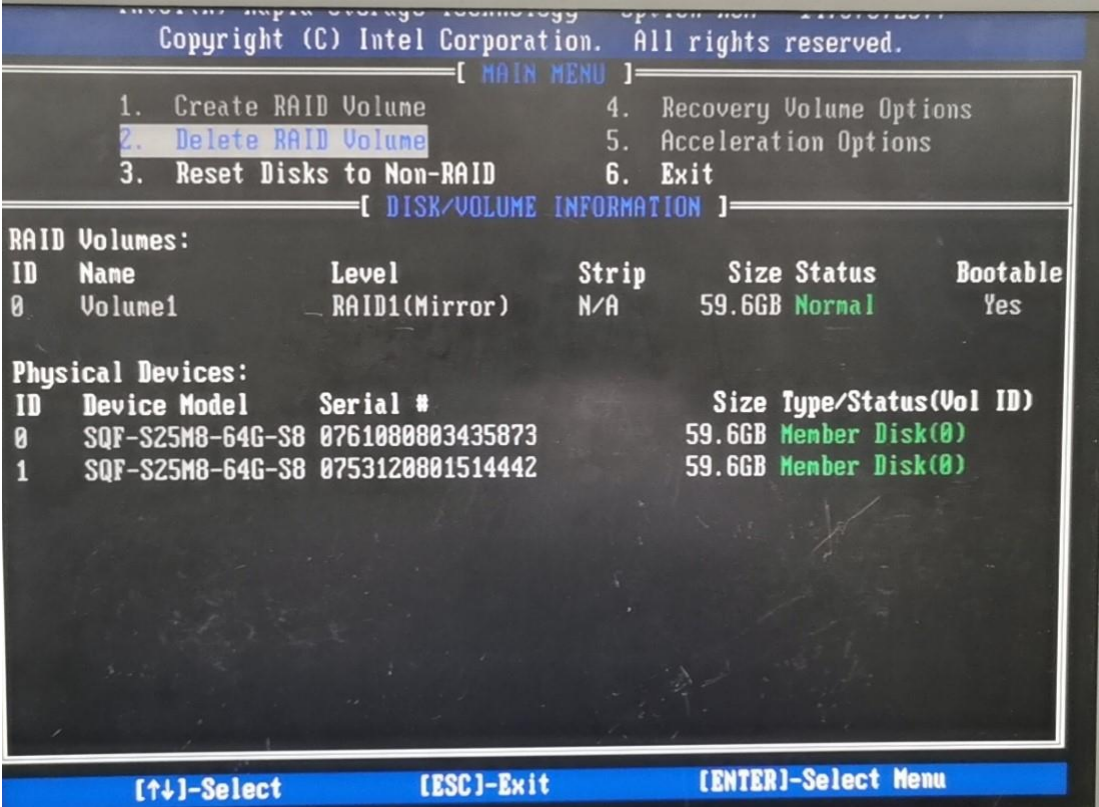
Enter “ctr + i” will show the RAID interface, choose “Create RAID Volume” and press enter.



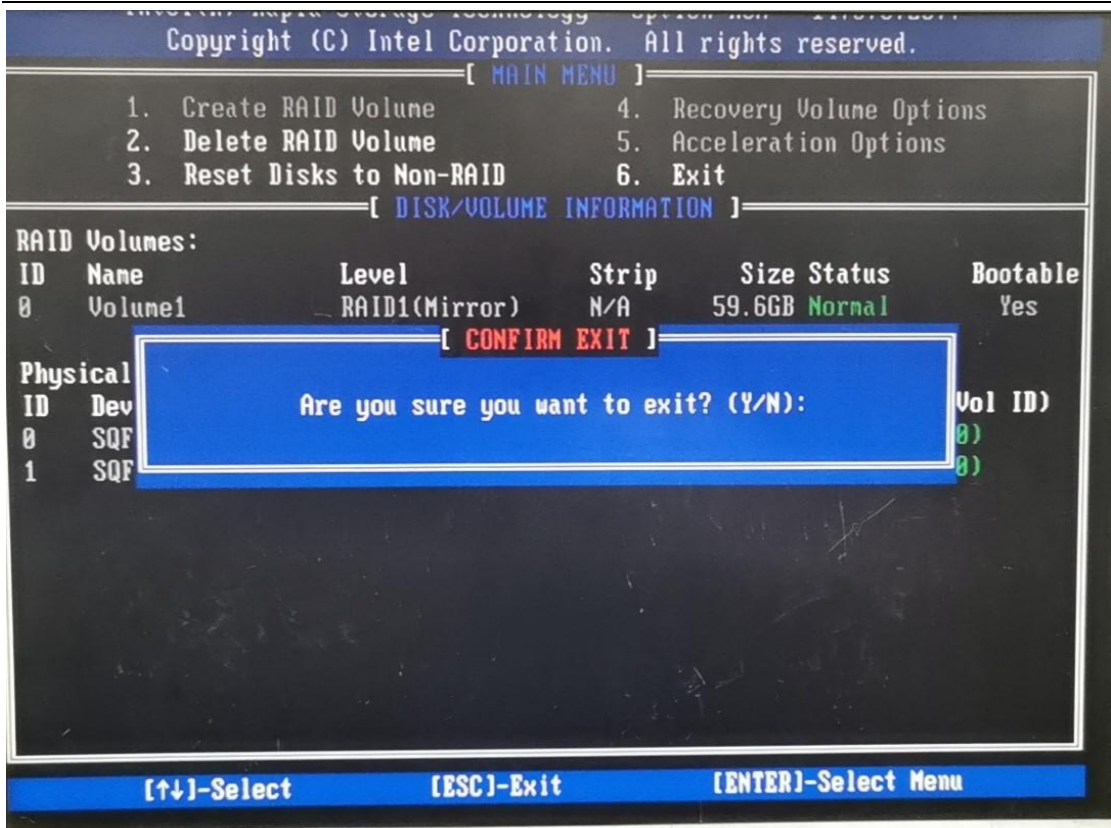
Enter “Shift + y” to Create Raid Volume. At present, RAID1 is mainly supported. The specific steps are as follows



Don't modify the default "Volume1", otherwise AdvlinuxTU will install failed.
You can see Volume1 show up.



Enter "Shift + y" to exit.



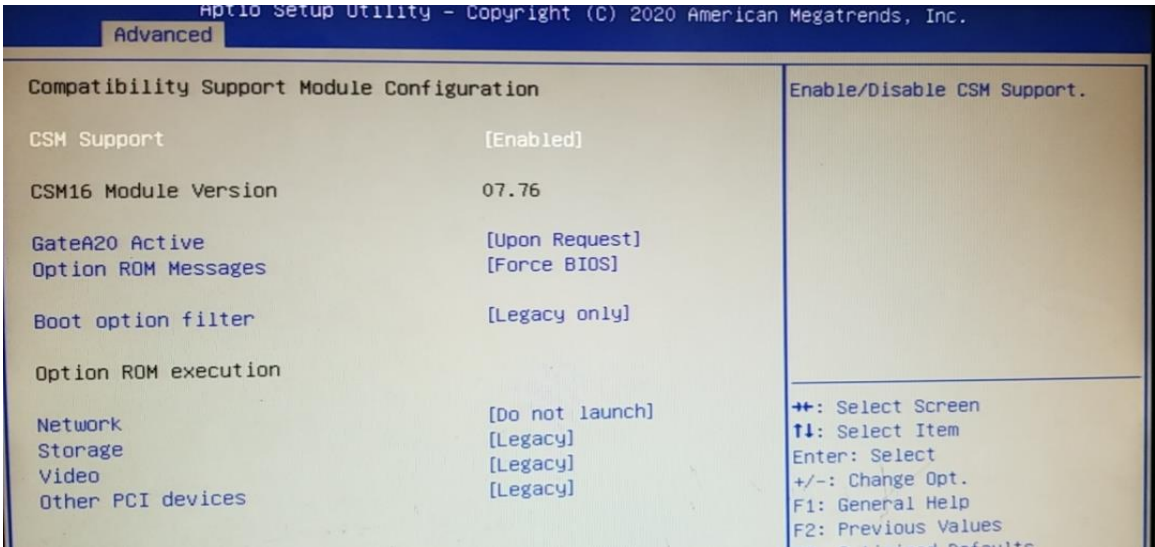
3.5. Boot Mode & Installation Steps

AdvLinuxTU supports two boot modes: Legacy and UEFI.

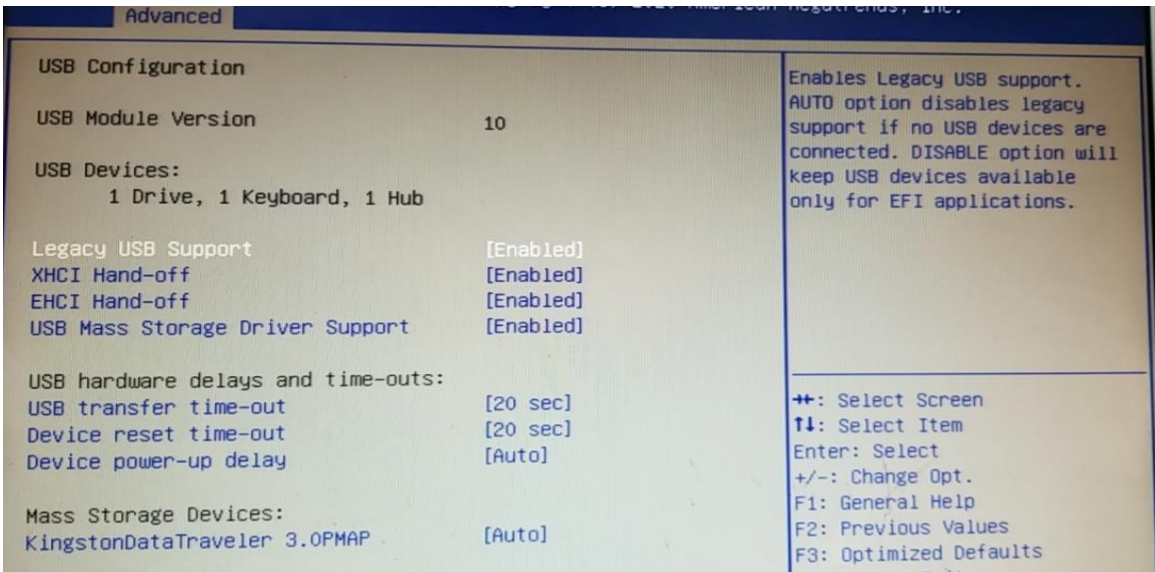
3.5.1. Legacy Boot Mode Installation Steps

3.5.1.1. BIOS Configuration

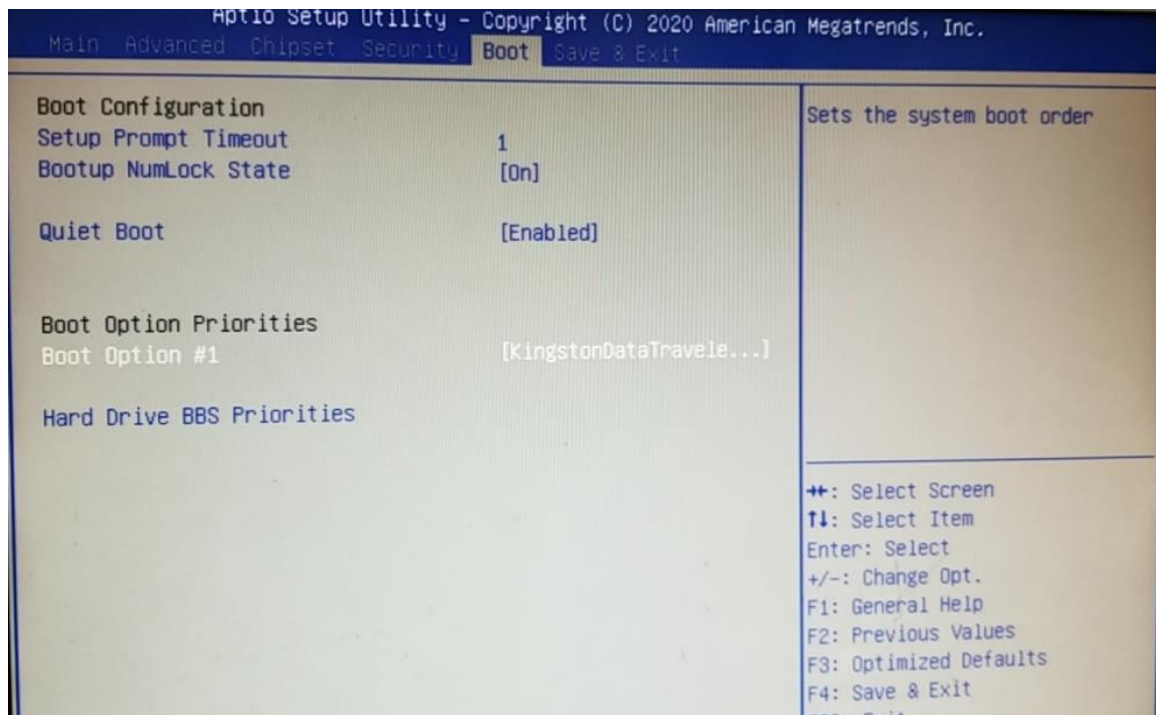
Step1: CSM configuration



Step2: USB configuration

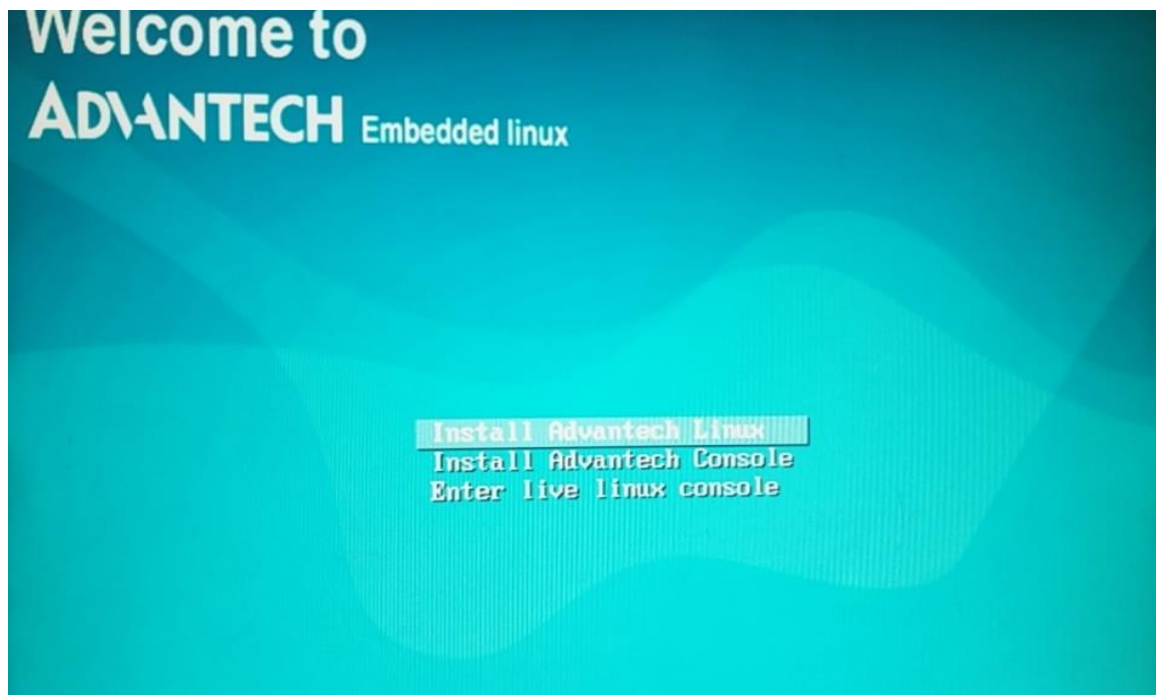


Step3: Boot Option #1 selection

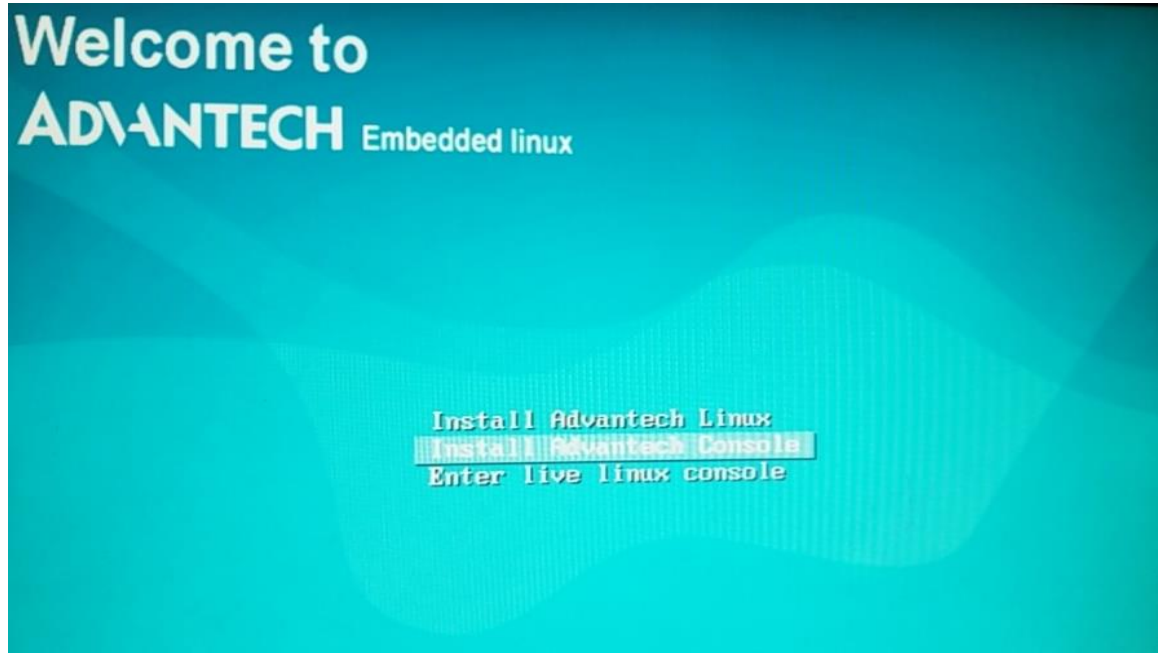


3.5.1.2. System Mode Selection (Gui/Console)

If you want to boot into the graphical interface, select the first one.



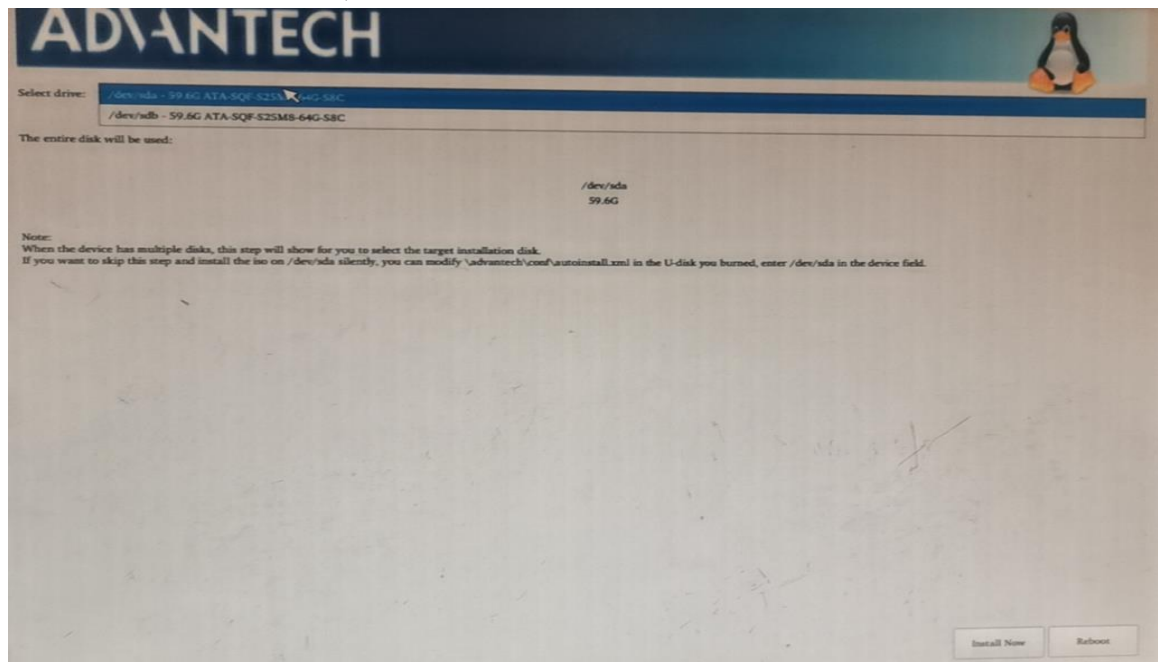
If you want to boot into the character interface, select the second one.



3.5.1.3. OS Installation

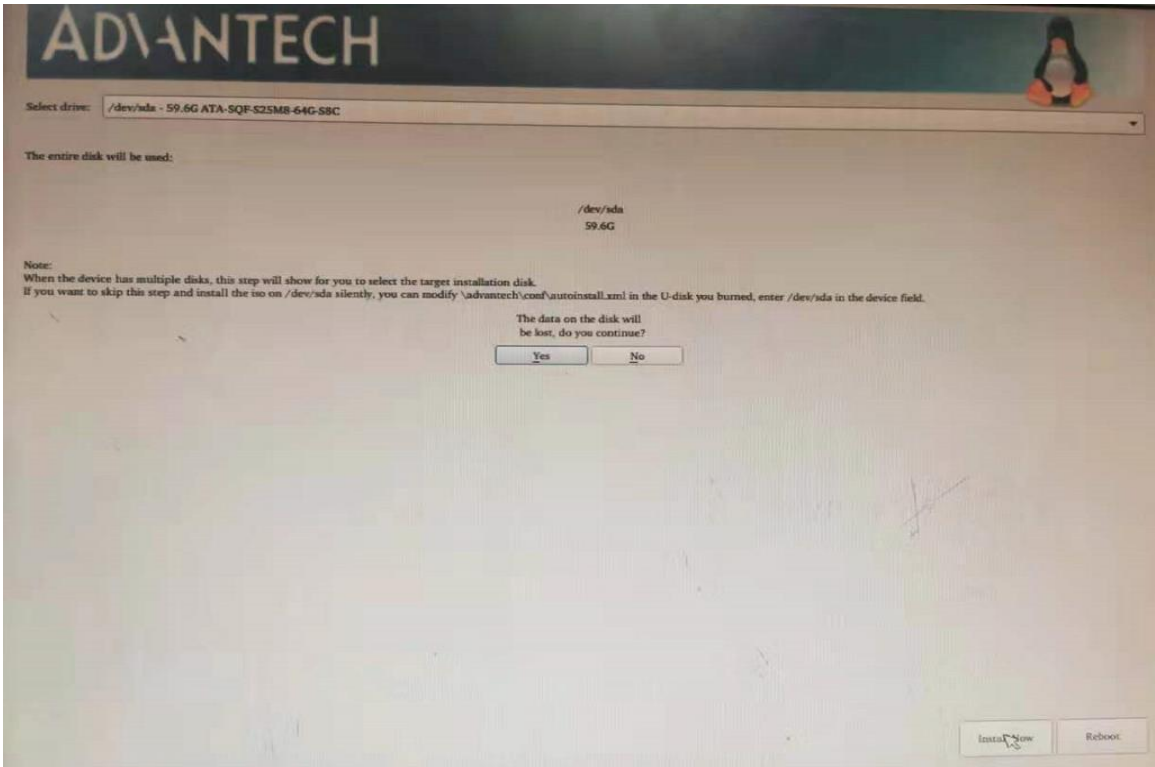
If the device has multiple disks (two disks have been tested at most), picture a and picture b will be show to select disk for installation. But it will auto install except in this case.

Select disk for installation, enter “Install Now”.

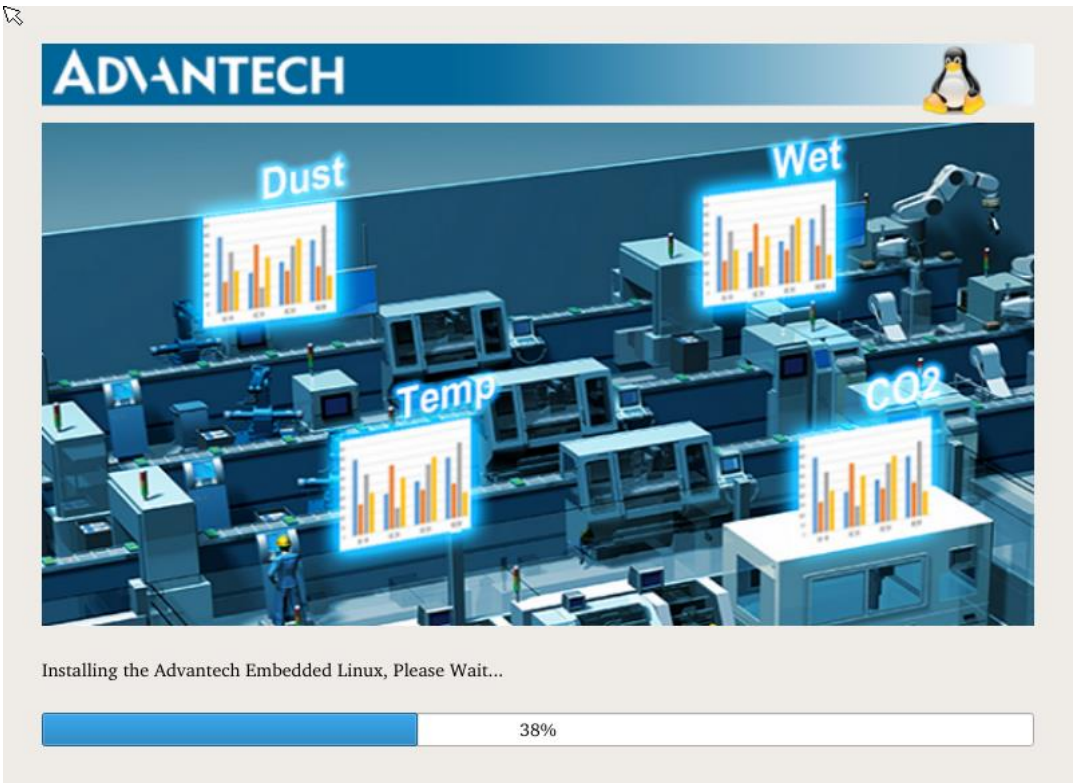


Picture a

Enter “Yes”, it will start the installation.



Picture b



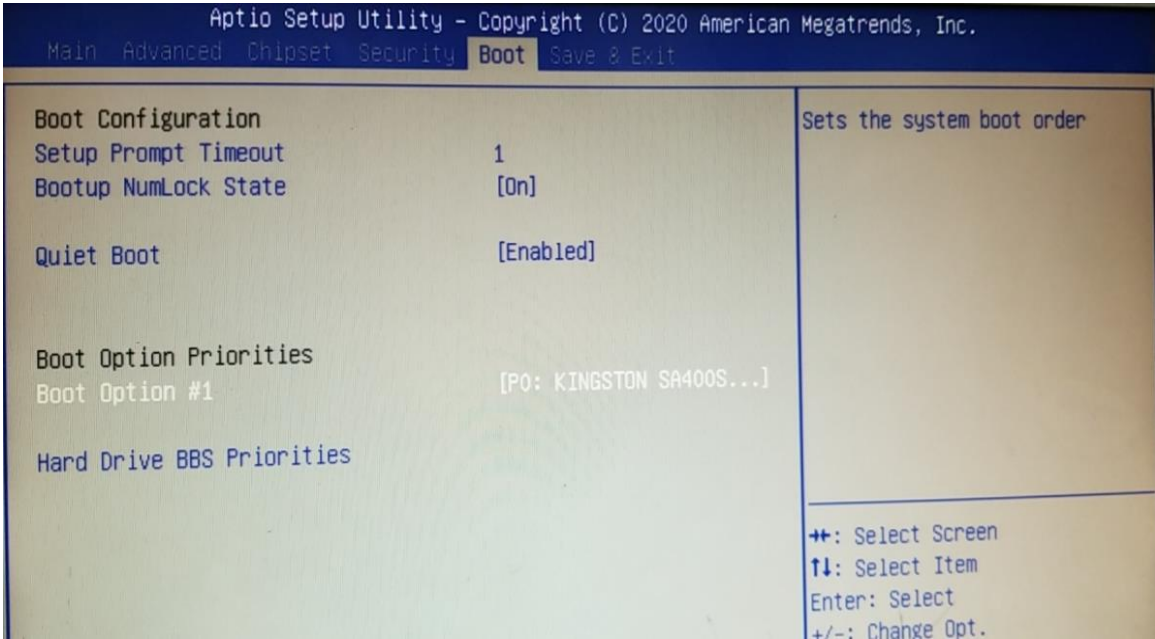
Picture c



Picture d

3.5.1.4. Change Boot Option #1

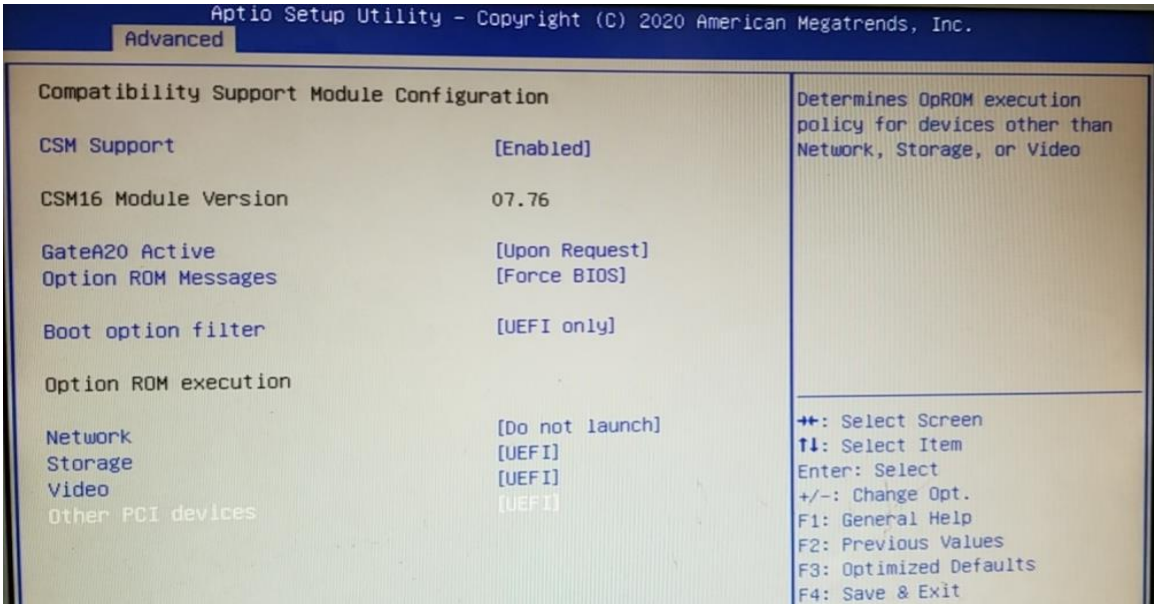
Enter Reboot and go into BIOS, change device hard disk as Boot Option #1.



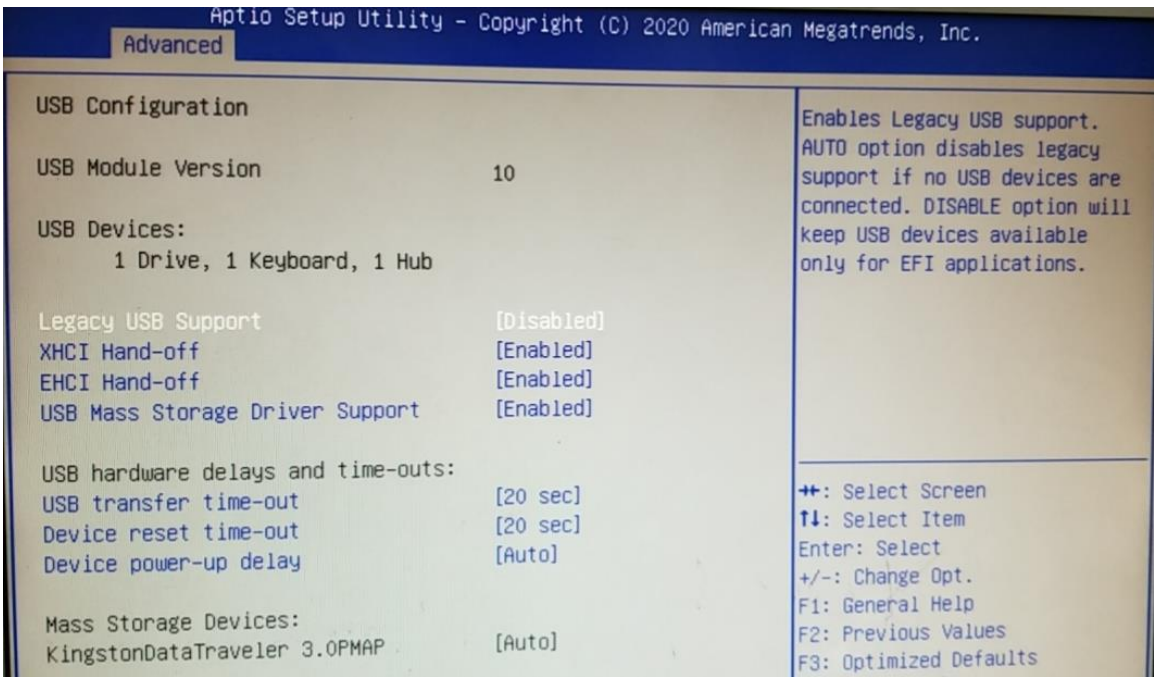
3.5.2. UEFI Boot Mode Installation Steps

3.5.2.1. BIOS Configuration

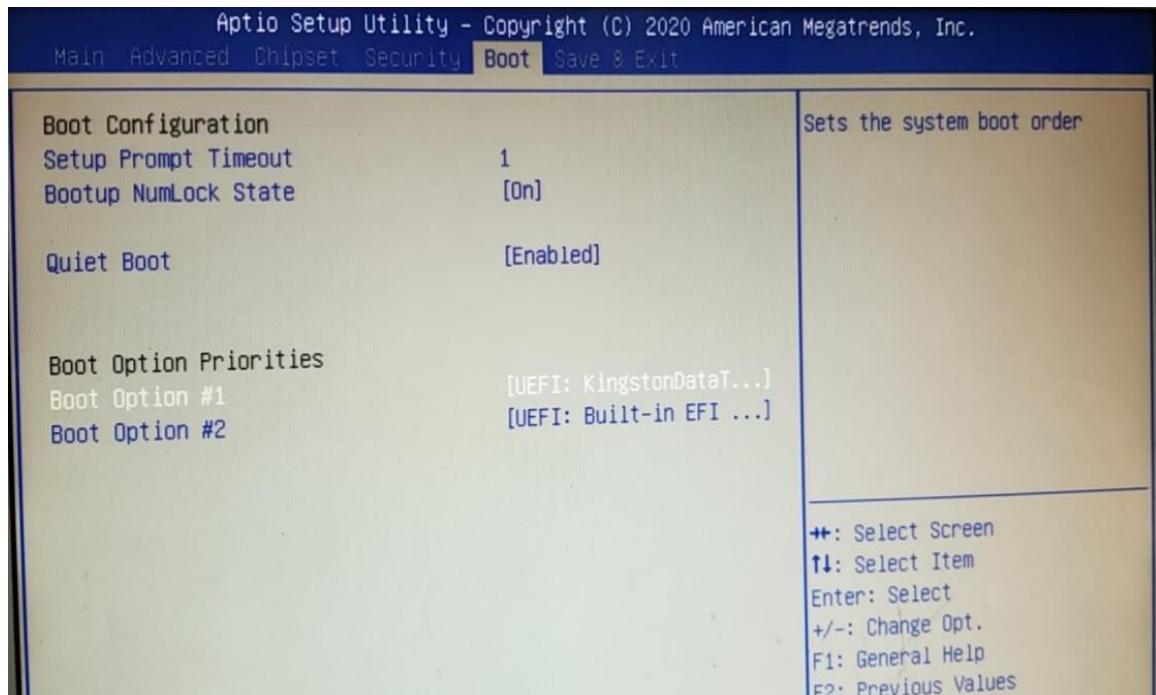
Step1: CSM configuration



Step2: USB configuration

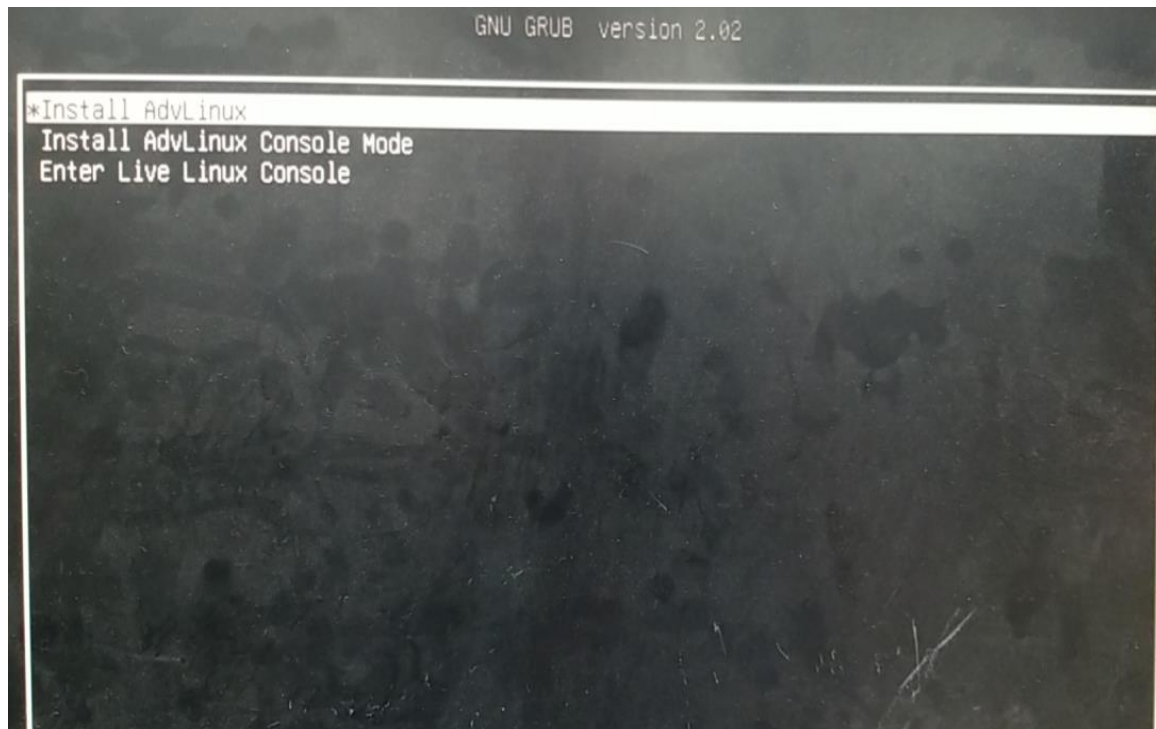


Step3: Boot Option #1 selection

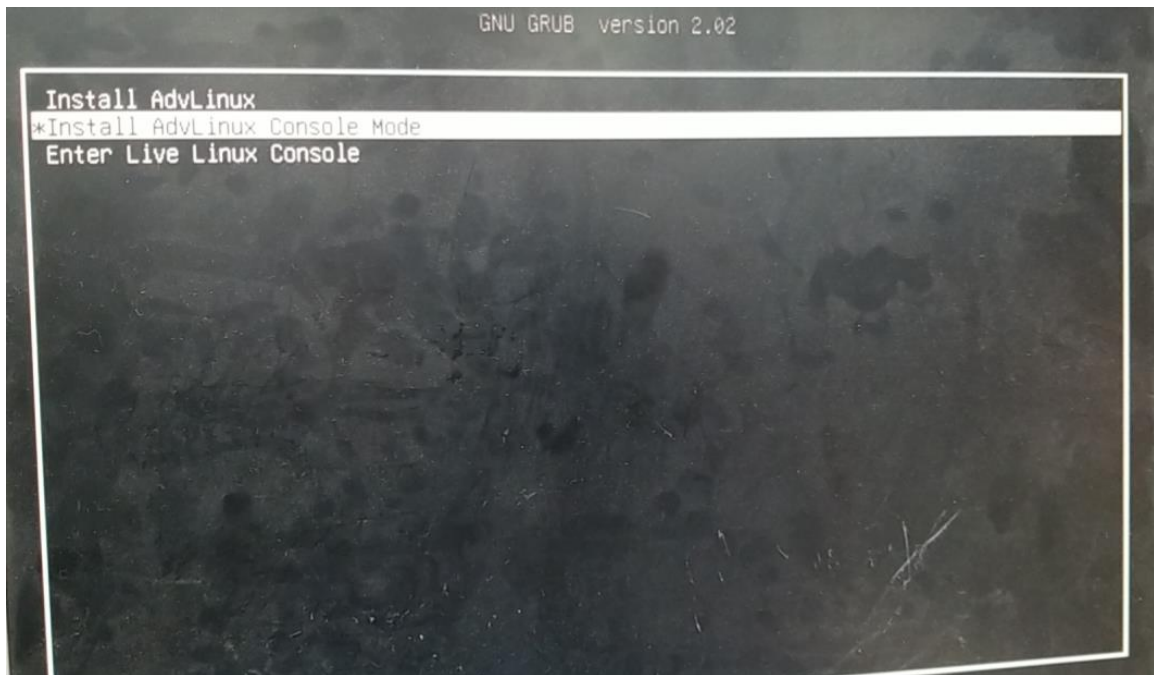


3.5.2.2. System Mode Selection (Gui/Console)

If you want to boot into the graphical interface, select the first one.



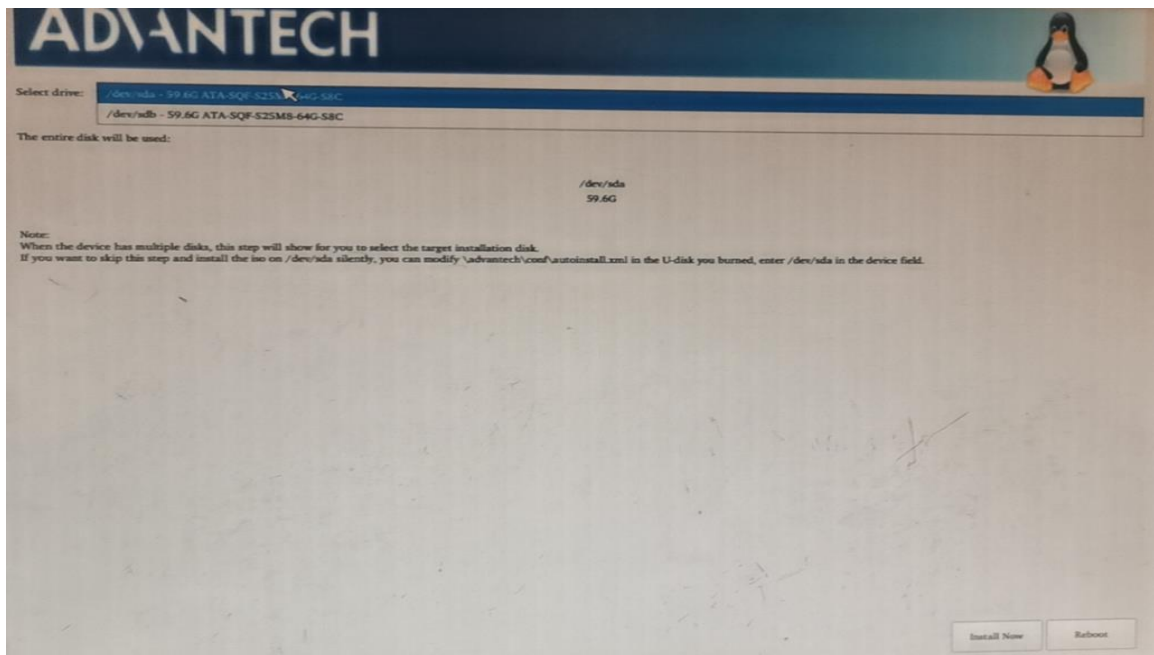
If you want to boot into the character interface, select the second one.



3.5.2.3. OS Installation

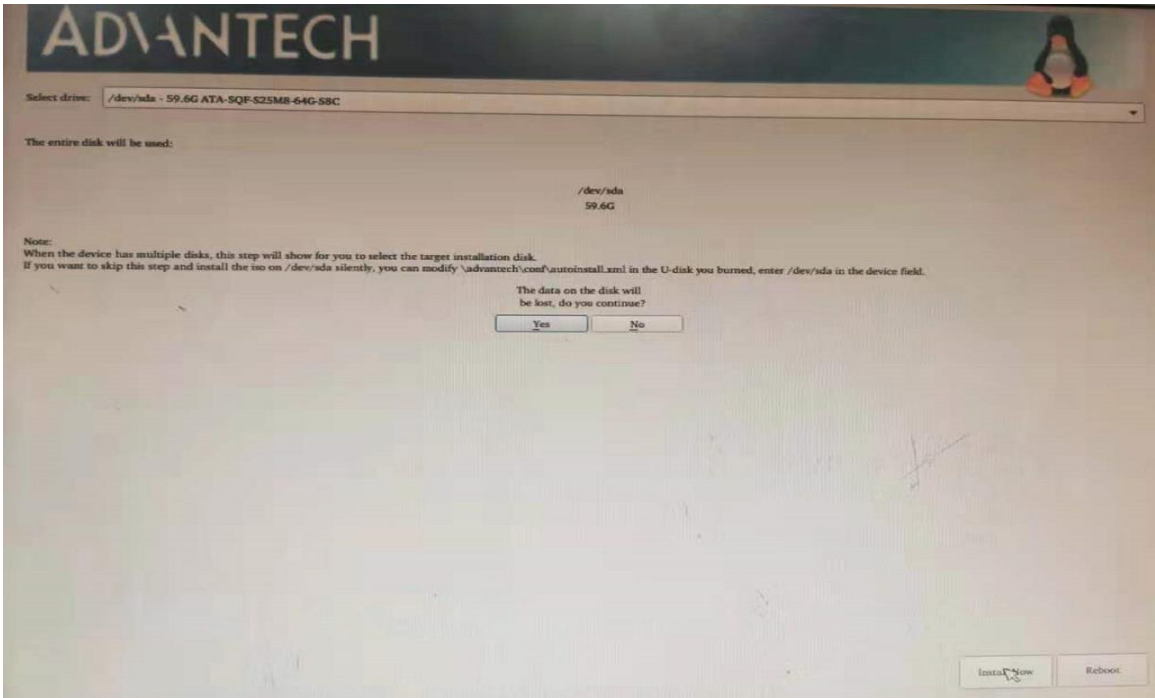
If the device has multiple disks (two disks have been tested at most), picture a and picture b will be show to select disk for installation. But it will auto install except in this case.

Select disk for installation, enter “Install Now”.

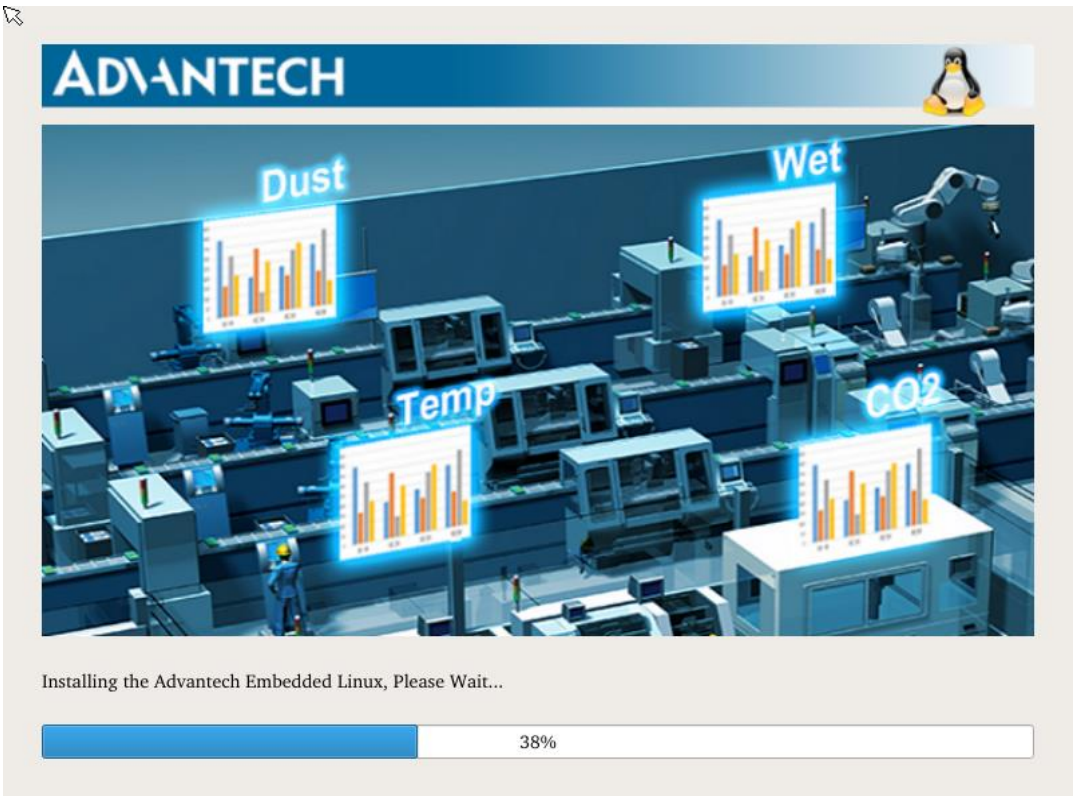


Picture a

Enter “Yes”, it will start the installation.



Picture b



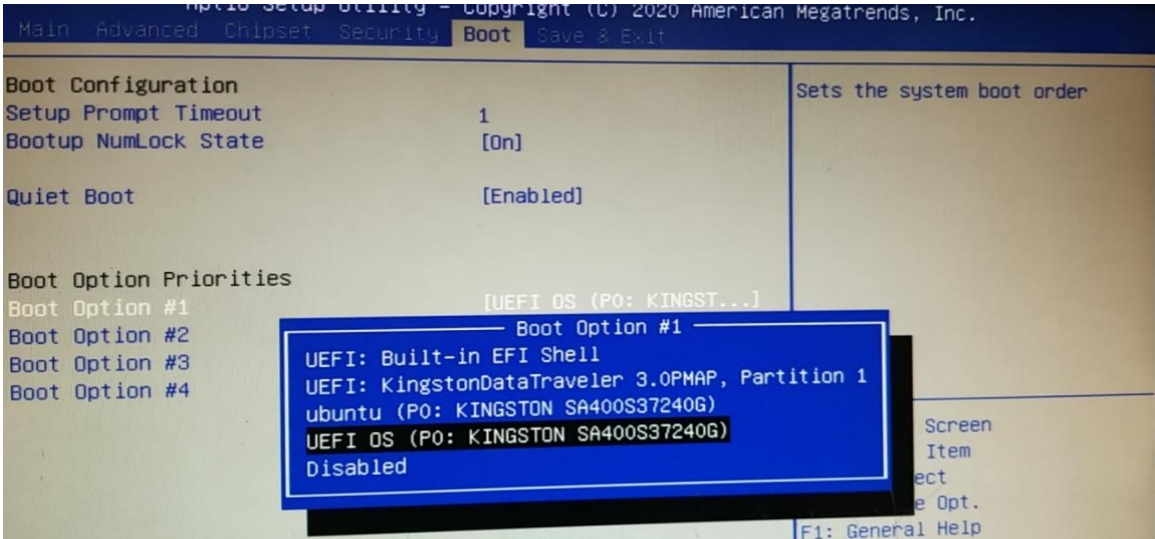
Picture c



Picture d

3.5.2.4. Change Boot Option #1

Enter Reboot and go into BIOS, You can see there are two UEFI Boot hard disk.
Ubuntu (P0: KINGSTON SA400S37240G) and UEFI OS (P0: KINGSTON SA400S37240G).
You can choose both of them.

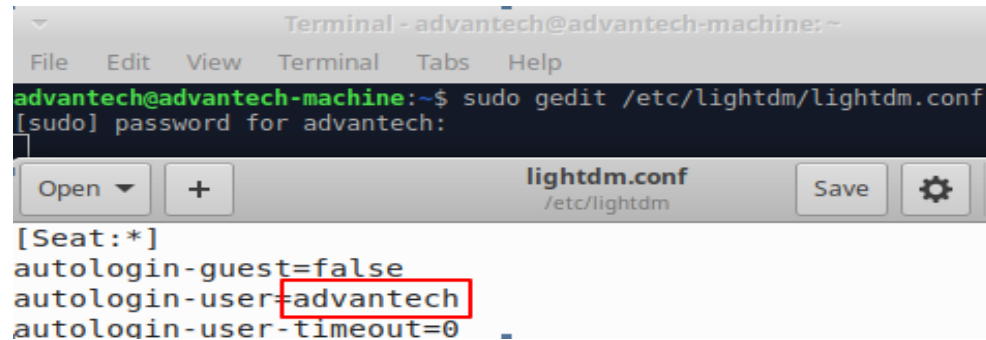


4. How to disable auto login

4.1. Desktop mode

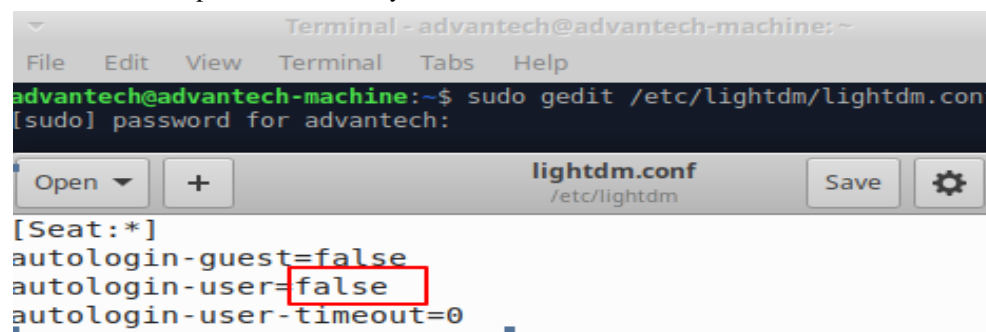
Change autologin-user to false in the /etc/lightdm/lightdm.conf field.

The default autologin-user field is advantech.



```
Terminal - advantech@advantech-machine: ~  
File Edit View Terminal Tabs Help  
advantech@advantech-machine:~$ sudo gedit /etc/lightdm/lightdm.conf  
[sudo] password for advantech:  
lightdm.conf /etc/lightdm  
[Seat:*]  
autologin-guest=false  
autologin-user=advantech  
autologin-user-timeout=0
```

Change it to autologin-user=false and save it. After rebooting, it will not automatically log in, You need to enter the password manually.



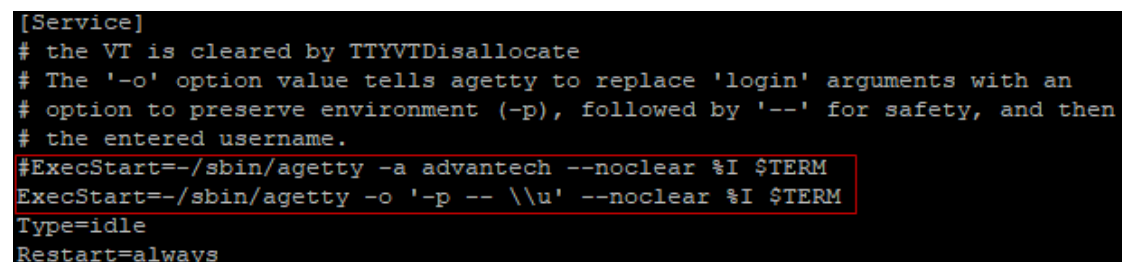
```
Terminal - advantech@advantech-machine: ~  
File Edit View Terminal Tabs Help  
advantech@advantech-machine:~$ sudo gedit /etc/lightdm/lightdm.conf  
[sudo] password for advantech:  
lightdm.conf /etc/lightdm  
[Seat:*]  
autologin-guest=false  
autologin-user=false  
autologin-user-timeout=0
```

4.2. Console mode

Need to modify `/lib/systemd/system/getty@.service`

Comment the line `[ExecStart=-/sbin/agetty -a advantech --noclear %I $TERM]`

Then add `[ExecStart=-/sbin/agetty -o '-p -- \\u' --noclear %I $TERM]`



```
[Service]  
# the VT is cleared by TTYVTDisallocate  
# The '-o' option value tells agetty to replace 'login' arguments with an  
# option to preserve environment (-p), followed by '--' for safety, and then  
# the entered username.  
#ExecStart=-/sbin/agetty -a advantech --noclear %I $TERM  
ExecStart=-/sbin/agetty -o '-p -- \\u' --noclear %I $TERM  
Type=idle  
Restart=always
```

After rebooting, it will not automatically log in, You need to enter the password manually.

5. Advantech device driver

AdvLinuxTU supports Advantech products, and the related drivers, the related drivers will be installed in /usr/src/advantech and auto loaded during the booting process. Here are some examples or demos in /usr/src/advantech/driver name/example/.

6. EAPI(Embedded API) Solution

AdvLinuxTU supports EAPI solution. if you want to know the detail, please read *Embedded API (EAPI) Developer Guide V1.4*.

7. AdvLinuxTU X-Windows Introduction

7.1. X-Windows overview

The Advantech Linux's Desktop-system is based on Xorg and XFCE.

➤ Xorg

It is a cost-free standard X server software with high configurability. All graphic cards on the market have certain configuration for Xorg.

For further details, please refer to <http://www.x.org/>

➤ Xfce4

Xfce is a lightweight desktop environment.

Official website: <http://www.xfce.org/>

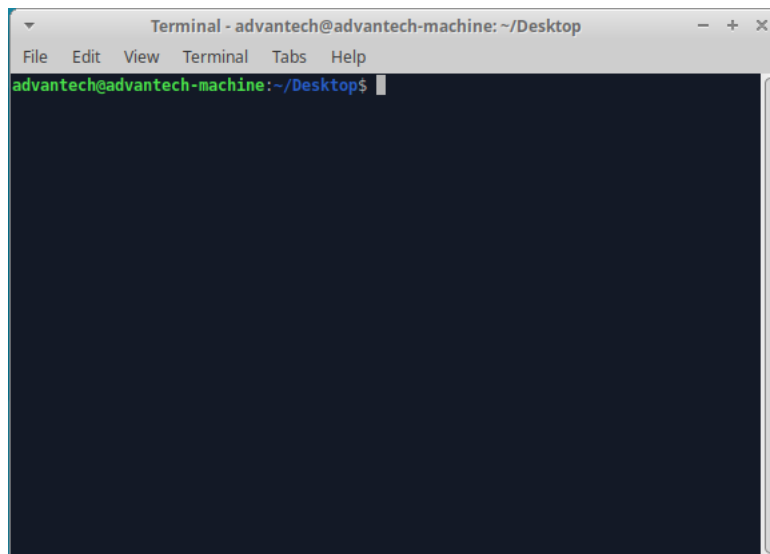
For further details, please refer to <http://docs.xfce.org/>

7.2. X-windows tools

AdvLinuxTU provides many tools based on X-Windows. Here we mainly introduce some important tools that the user may use frequently.

7.2.1. X Terminal

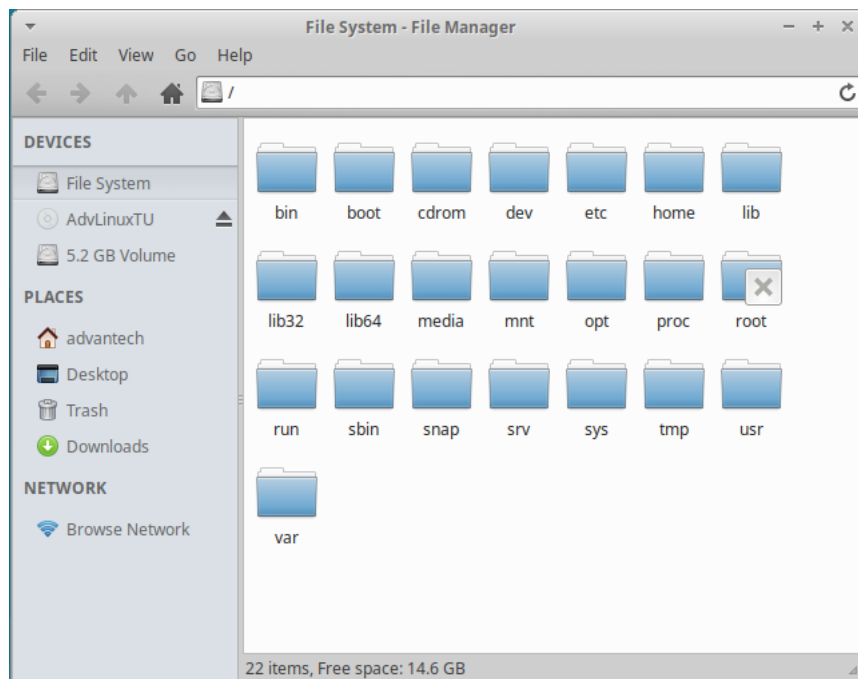
It is a terminal tool for X environment.



Picture 6-2-1 X Terminal

7.2.2. Thunar

It provides folder management functions similar to windows.

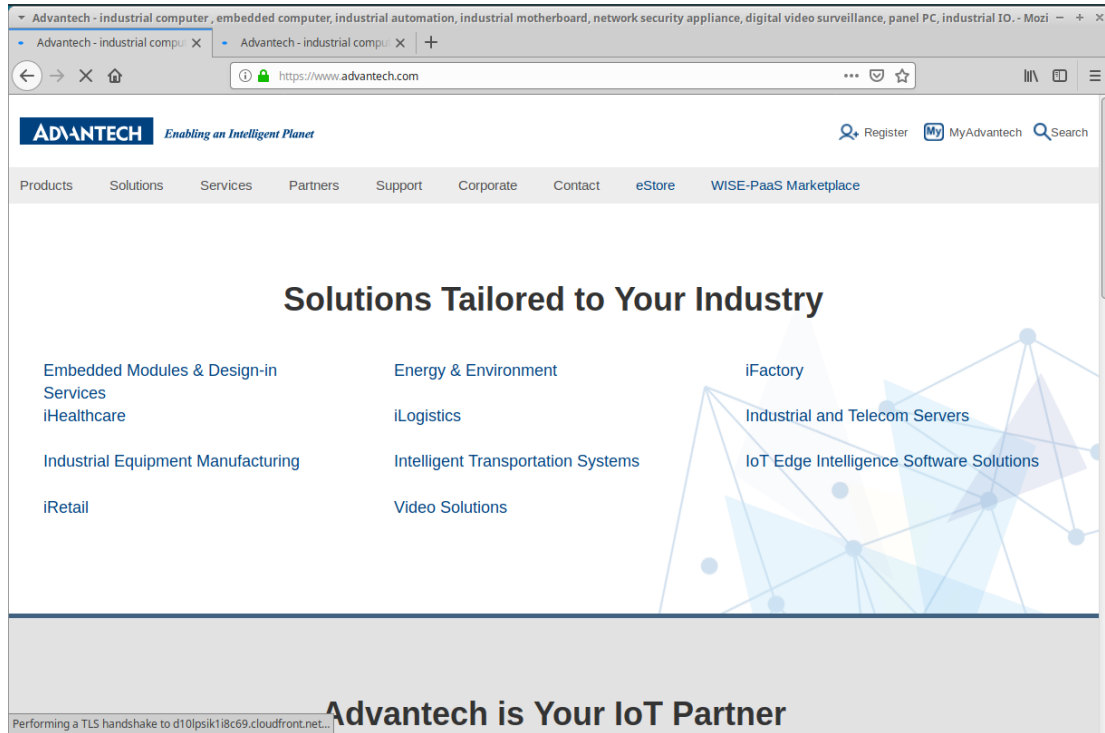


Picture 6-2-2 Thunar

Thunar is a fast and easy-to-use file manager for XFCE desktop environment.
Official site: <http://thunar.xfce.org/>

7.2.3. Browser

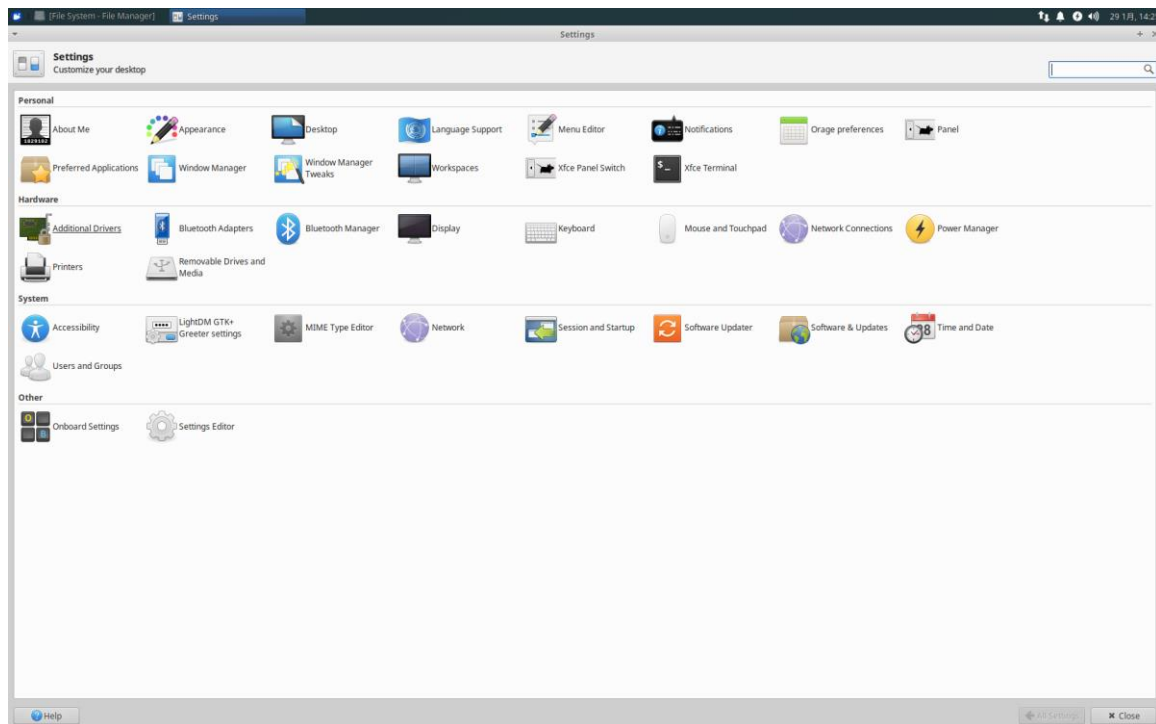
Firefox browser:



Picture 6-2-3 Lightweight picture-viewer Ristretto

7.3. X-Windows Configuration

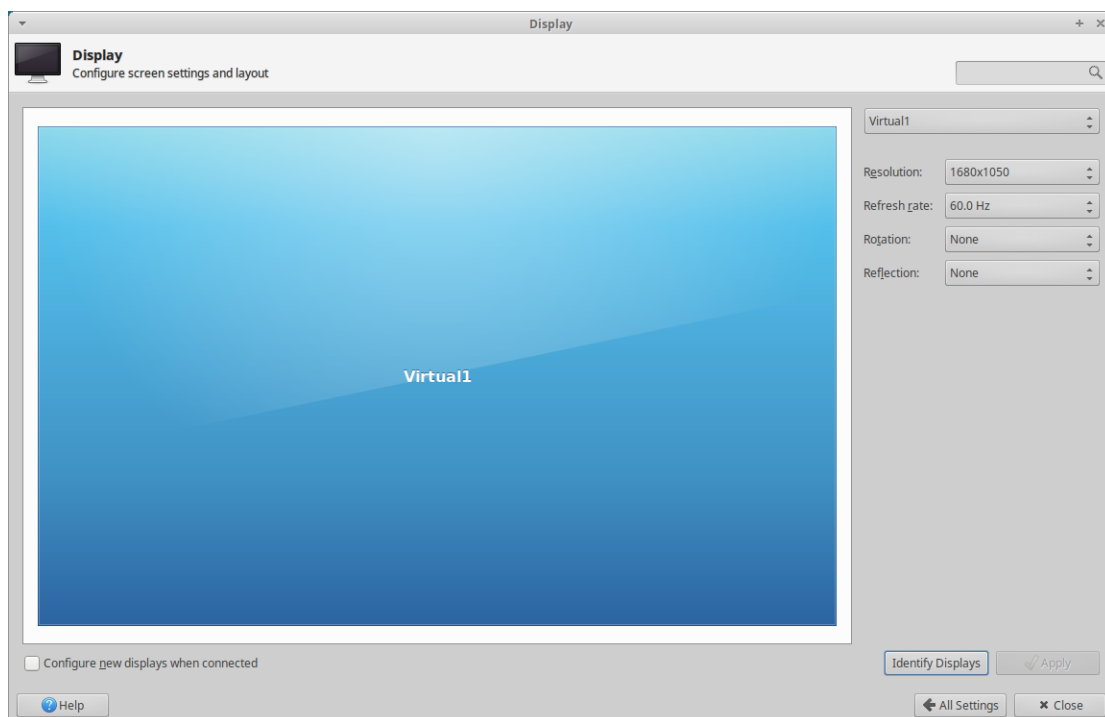
AdvLinuxTU provides many helpful tools, most of which can be opened from the XFCE setting manager, for user configuration. In the following sections, we will introduce some of them which are helpful for the user to configure the system.



Picture 6-3-1 XFCE setting manager

7.3.1. Resolution configuration

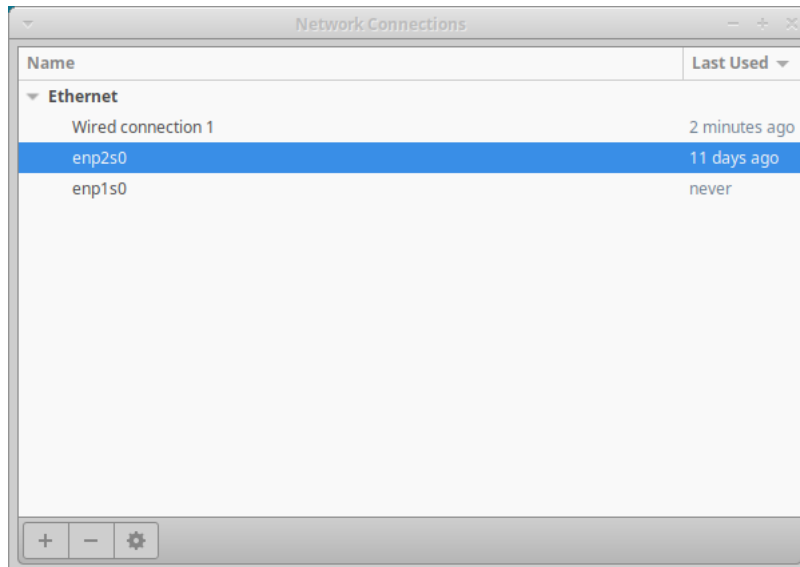
Select the Display item from list to change the Xorg resolution. For multiple displays, device resolution is based on minimum screen resolution.



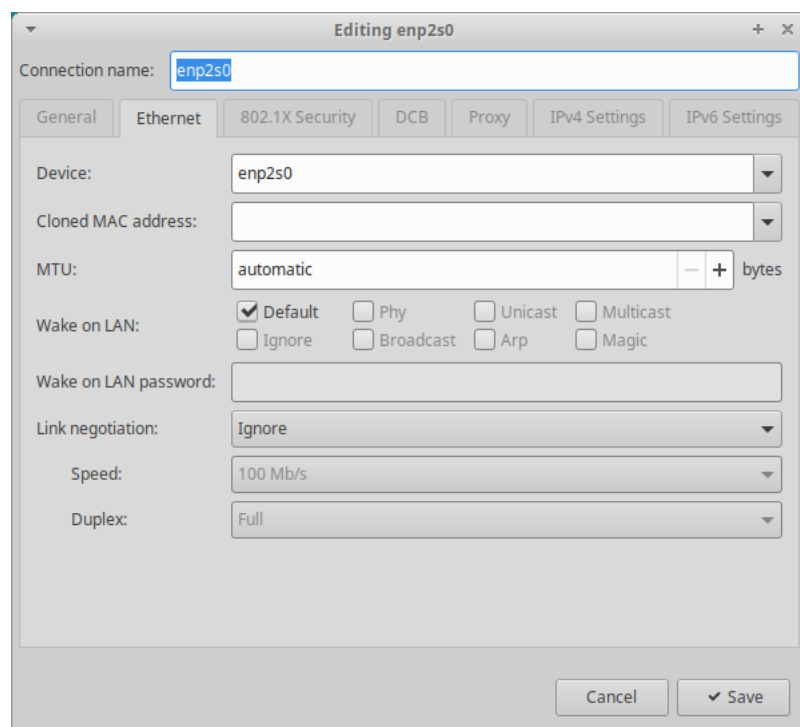
Picture 6-3-2 Resolution Setting

7.3.2. IP configuration

AdvLinuxTU gets IP according to DHCP default. If you want to get IP by static, you can use “Network Connections”. To set static IP, you must restart the service of NetworkManager. Please reboot the machine.

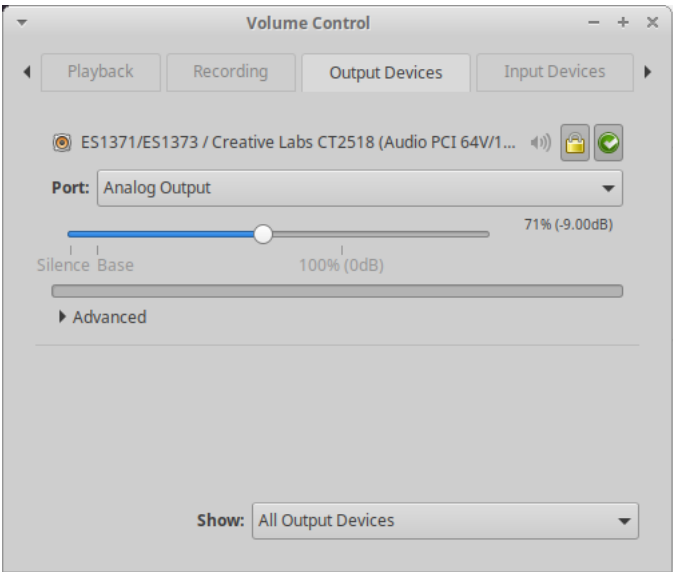


Picture 6-3-3 Network Connections



Picture 6-3-4 Network IP Setting

7.3.3. Sound card configuration

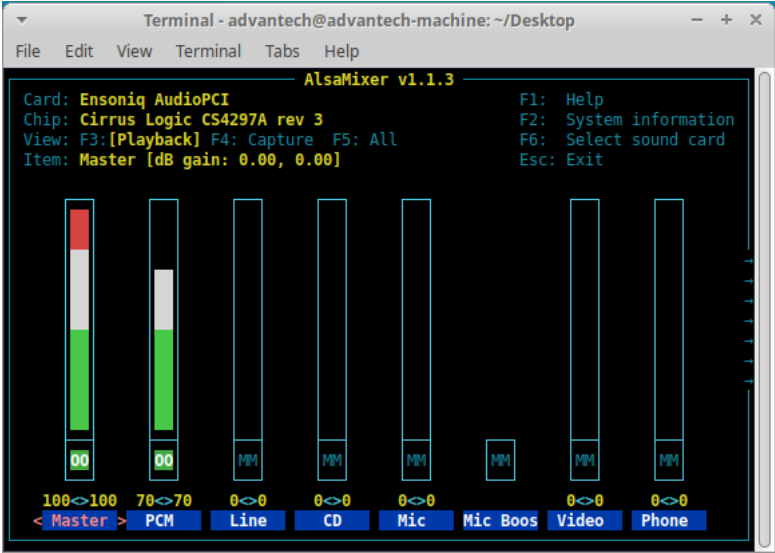


Picture 6-3-5 Sound Settings

To install the text mode, please run

#alsamixer

The Sound configuration tools will be shown as below:



Picture 6-9 Audio Setting

8. Introduction of console mode tools

8.1. Date and time configuration

Use the date command to modify the date

Usage:

```
#date [OPTION]... [+FORMAT]
```

```
#date [-u|--utc|--universal] [MMDDhhmm[[CC]YY][.ss]]
```

For example:

```
Fri Oct 18 09:11:05 CST 2013
```

```
#date 101809112013.05
```

8.2. Ftp service

The File Transfer Protocol (FTP) is a standard network protocol used to transfer computer files between a client and a server on a computer network.

Note: You may stop firewall to allow the user to login to your machine.

8.3. SSH service

OpenSSH is the premier connectivity tool for remote login with the SSH protocol. It encrypts all traffic to eliminate eavesdropping, connection hijacking, and other attacks. In addition, OpenSSH provides a large suite of secure tunneling capabilities, several authentication methods, and sophisticated configuration options.

8.4. Qt Runtime and Development Environment

8.4.1. Qt runtime environment

AdvLinuxTU provide QT-5.9.5 library/

8.4.2. Qt Development environment

Suggest using Qt Creator to develop Qt application.

User can install the Qt Creator online.

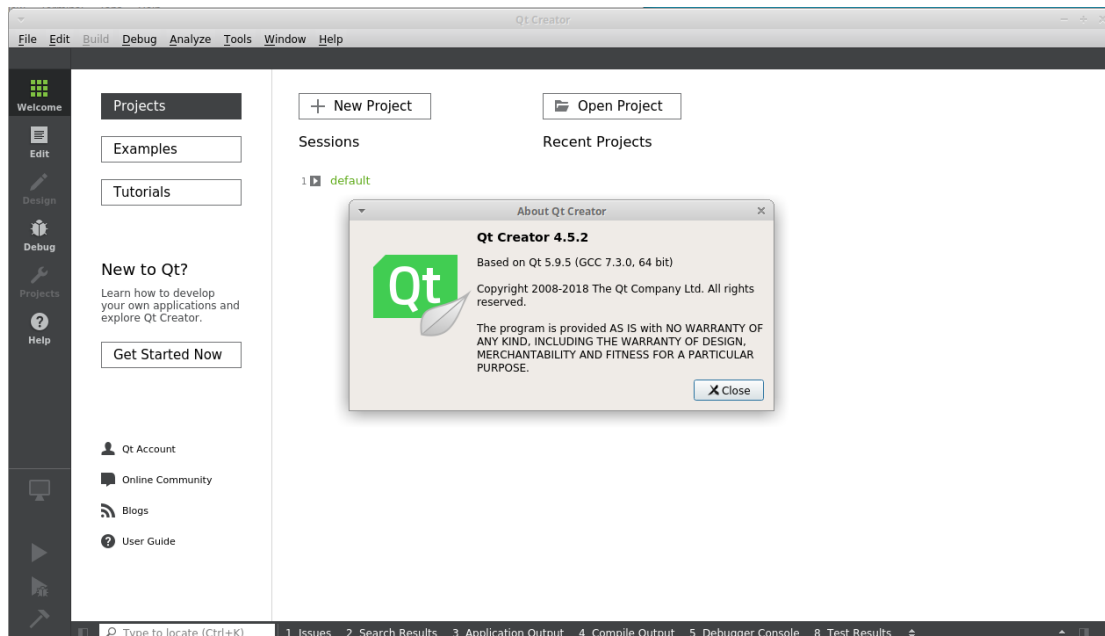
```

Terminal - advantech@advantech-machine: ~/Desktop
File Edit View Terminal Tabs Help

advantech@advantech-machine:~/Desktop$ sudo apt-get install qtcreator
[sudo] password for advantech:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  binfmt-support clang clang-6.0 geoclue-2.0 iio-sensor-proxy lib32gcc1 lib32stdc++6 libbotan-2-4 libclang-common-
6.0-dev libclang1-6.0 libffi-dev libgcl2 libgeoclue-2-0 libjsoncpp1 libobjc-7-dev libobjc4 libomp-dev libomp5
  libqbsscore1.10 libqbssqtprofilesupport1.10 libqt5designer5 libqt5designercomponents5 libqt5help5 libqt5positioning5
  libqt5script5 libqt5sensors5 libqt5webchannel5 libqt5webkit5 libqt5xmlpatterns5 libtspi1 llvm-6.0 llvm-6.0-dev
  llvm-6.0-runtime qbs-common qml-module-qtgraphicaleffects qml-module-qtqml-models2 qml-module-qtquick-controls q
ml-module-qtquick-layouts qmlscene qt3d5-doc qt5-assistant qt5-doc qtbase5-doc qtcharts5-doc qtconnectivity5-doc
  qtcreator-data qtcreator-doc qtdeclarative5-dev-tools qtdeclarative5-doc qtgraphicaleffects5-doc qtlocation5-doc
  qtmultimedia5-doc qtquickcontrols2-5-doc qtquickcontrols5-doc qtscript5-doc qtsensors5-doc qtserialport5-doc qtsv
g5-doc
  qttools5-dev-tools qttools5-doc qtwayland5-doc qtwebchannel5-doc qtwebengine5-doc qtwebkit5-doc qtwebkit5-exampl
es-doc qtwebsockets5-doc qtwebview5-doc qtx11extras5-doc qtxmlpatterns5-dev-tools qtxmlpatterns5-doc
Suggested packages:
  gnustep gnustep-devel clang-6.0-doc libomp-doc llvm-6.0-doc cmake git kate-data subversion
The following NEW packages will be installed:
  binfmt-support clang clang-6.0 geoclue-2.0 iio-sensor-proxy lib32gcc1 lib32stdc++6 libbotan-2-4 libclang-common-
6.0-dev libclang1-6.0 libffi-dev libgcl2 libgeoclue-2-0 libjsoncpp1 libobjc-7-dev libobjc4 libomp-dev libomp5
  libqbsscore1.10 libqbssqtprofilesupport1.10 libqt5designer5 libqt5designercomponents5 libqt5help5 libqt5positioning5
  libqt5script5 libqt5sensors5 libqt5webchannel5 libqt5webkit5 libqt5xmlpatterns5 libtspi1 llvm-6.0 llvm-6.0-dev
  llvm-6.0-runtime qbs-common qml-module-qtgraphicaleffects qml-module-qtqml-models2 qml-module-qtquick-controls q
ml-module-qtquick-layouts qmlscene qt3d5-doc qt5-assistant qt5-doc qtbase5-doc qtcharts5-doc qtconnectivity5-doc
  qtcreator qtcreator-data qtcreator-doc qtdeclarative5-dev-tools qtdeclarative5-doc qtgraphicaleffects5-doc qtloc
ation5-doc qtmultimedia5-doc qtquickcontrols2-5-doc qtquickcontrols5-doc qtscript5-doc qtsensors5-doc qtserialport
5-doc
  qtsvg5-doc qttools5-dev-tools qttools5-doc qtwayland5-doc qtwebchannel5-doc qtwebengine5-doc qtwebkit5-doc qtweb
kit5-examples-doc qtwebsockets5-doc qtwebview5-doc qtx11extras5-doc qtxmlpatterns5-dev-tools qtxmlpatterns5-doc
0 upgraded, 71 newly installed, 0 to remove and 85 not upgraded.
Need to get 219 MB of archives.
After this operation, 631 MB of additional disk space will be used.
Do you want to continue? [Y/n]

```

Picture 6-3-1 Install Qt Creator



Picture 5-3-2 Qt Creator

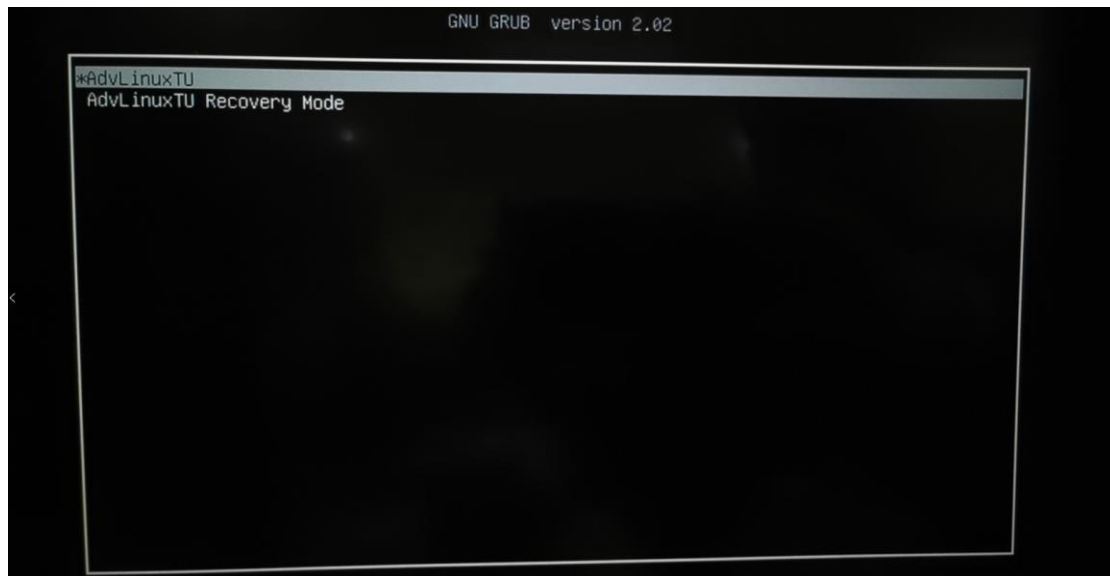
9. System backup and restore

9.1. How to backup

- **Step1:** Boot, when the GRUB menu appears, choose “AdvLinuxTU Recovery Mode”.

AdvLinuxTU: main system

AdvLinuxTU Recovery Mode: mini system



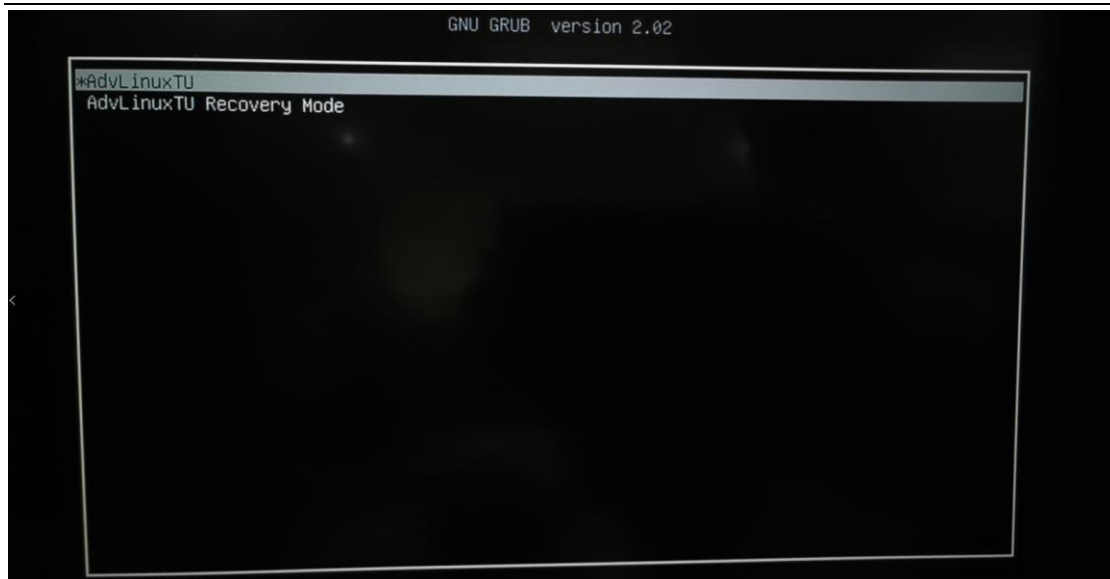
- **Step2:** Open the terminal, enter `advbackup.sh` and run it.
There is no need to do anything during running the script. After it finishes running, the system will automatically restart and `advlinux-2.0.img` will be copied to the `/media/recovery/` directory on the main system.

9.2. How to restore

- **Step1:** Boot, when the GRUB menu appears, Choose “AdvLinuxTU”.

AdvLinuxTU: main system

AdvLinuxTU Recovery Mode: mini system



➤ **Step2:** Open the terminal, enter into /media/recovery

Since you have backuped the system, you'll notice that advlinux-2.0.img is available in this directory.

Enter “mv advupdate.txt.example advupdate.txt”,reboot, it will restore automatically.

10. WISE-PaaS/AppHub

10.1. What is WISE-PaaS/AppHub

AppHub is a web browser-based, easy-to-use and powerful enterprise-level remote management software. It can effectively accelerate the application deployment on industrial edge device and the operation and maintenance efficiency of system. In addition, it can monitor the operating status of device software and hardware in real time, and timely troubleshoot and resolve various software and hardware abnormalities, greatly reducing operation and maintenance costs. Here, we only briefly introduce it, if you have any questions, feel free to contact us!

The agent of AppHub has been built in AdvLinuxTU already. But it does not start automatically.

If you want to use it, refer 9.3, it is easy.

10.2. Features

Function	Description
Device status overview	<ul style="list-style-type: none"> • Overview dashboard • Device group dashboard • Real-time monitor (CPU, memory, storage, battery, App, peripheral, etc.) • Mobile applications are provided for real-time notifications
Device management	<ul style="list-style-type: none"> • Device online status • Rename devices • Group management • Device real-time status, reboot, power off
Update the application	<ul style="list-style-type: none"> • Support inno setup/Wix Toolset installation and zip for Windows • Support deb, tar.gz and zip packages for Linux • Support docker container application for Windows the Linux • Support Android apk for Android • Single and batch update
File deployment	<ul style="list-style-type: none"> • Remote push and deployment of any file

OS update	<ul style="list-style-type: none"> • OS update for single device • OS update in batch for multi devices • History record
Docker monitoring management	<ul style="list-style-type: none"> • docker image management • docker container management • docker container monitoring • Support docker-compose and docker swarm
Remote control	<ul style="list-style-type: none"> • Remote power off • Remote restart • Volume setting • Brightness setting
Remote Desktop	<ul style="list-style-type: none"> • Based on browser • Network penetration to access intranet devices
Application security (Android only now)	<ul style="list-style-type: none"> • Application whitelist
Kiosk application setting (Android only now)	<ul style="list-style-type: none"> • Set the application to start automatically when boot • Set the application to run in full screen • Hide status bar and navigation bar
Work order	<ul style="list-style-type: none"> • Multi tasks in one-click deployment • Support multi task batch deployment • The task can be edited and saved as a work order
Private software repo	<ul style="list-style-type: none"> • Application upload and version management • System update package upload and management • Other file upload and management
Server UI customization by self service	<ul style="list-style-type: none"> • Adjust menu functions as required • Hide unwanted menu functions • Change Logo picture

10.3. How to use

To use AppHub, there are only three steps to do:

- 1) Server runtime environment setup
- 2) Device environment setup
- 3) Device enroll to server

You can download the relevant software and document of AppHub from:

- Google drive

https://drive.google.com/drive/folders/1ijrMNZEtbWx1auGMGfCRlcl2I9r0etTV?usp=s_haring

- Baidu cloud disk(百度云盘)

<https://pan.baidu.com/s/1kuqIMkCbecQVlyGYrXUtyg> Access code(提取码): xian

10.3.1. Server runtime environment setup

From the use scenarios described above, we can see that the AppHub server supports multiple platforms. At present, the verified platforms are as follows:

- 1) On-premise server
- 2) Advantech WISE-PaaS cloud platform (including public cloud and private cloud)
- 3) Alibaba cloud ECS VM
- 4) Microsoft Azure cloud VM

For on-premise server, we provide an ISO installation image, which can be burned to the U disk, and then install to the server through the U disk.

For other platform you want to setup AppHub server, we also provide the corresponding methods and steps, please refer to section 2.1 of AppHub manual.

10.3.2. Device environment setup

We have built AppHub agent in AdvLinuxTU already, you can use it just do as follows:

Step1: start the agent service, run “systemctl start EI-Device.service” in terminal.

Step2: Brower open “http://deviceIP:9010” to config server information, Device IP is the IP address of the device. If you can see a web page similar to the following, it means that the agent has been started successfully.



10.3.3. Device Enroll to server

We provide 2 ways for Linux to enroll, just one of them can enroll to server success.

- **Way 1:**

Click “ Input Server Information ” , and paste the connection information

- **Way 2:**

Enroll by scanning the QR code. Android application EI-LINK that needs to be installed on the Android phone for scanning QR code. For specific usage, please refer to section 2.3 of AppHub manual.

Finish the up 2 steps, now you can control this device by AppHub. The more information please refer the manual of AppHub:

https://docs.wise-paas.advantech.com/en/Guides_and_API_References/ApplicationServices/1611826936336928113