

Ai-WB2 series linux build environment tutorial

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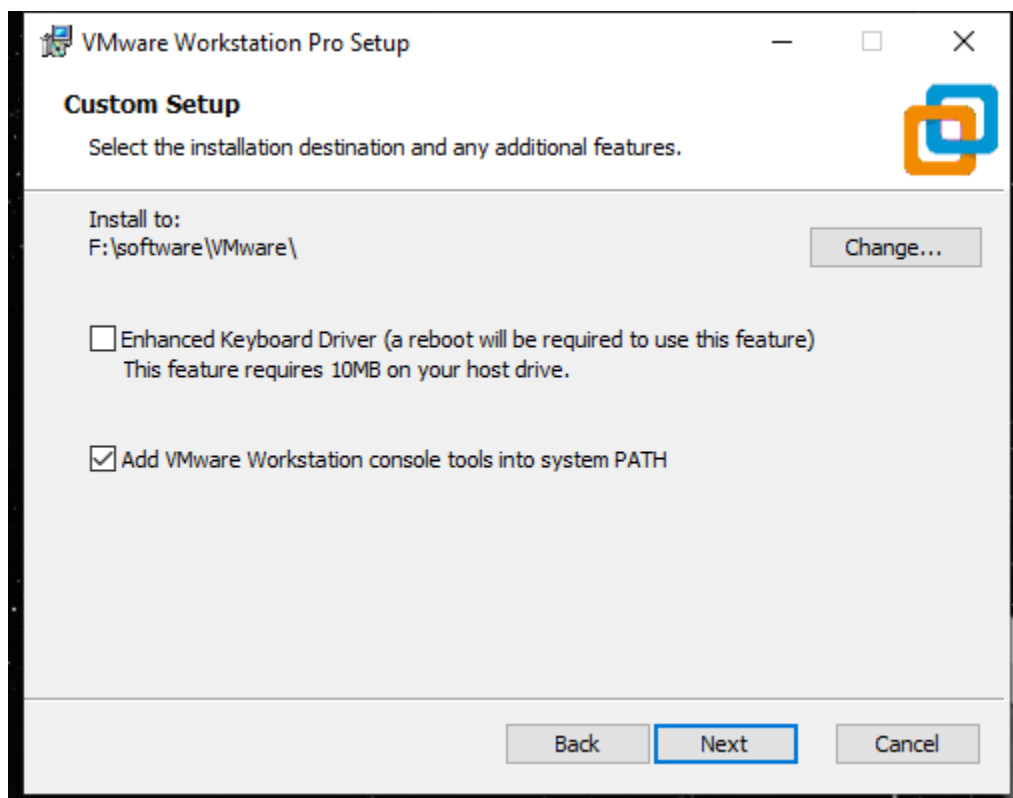
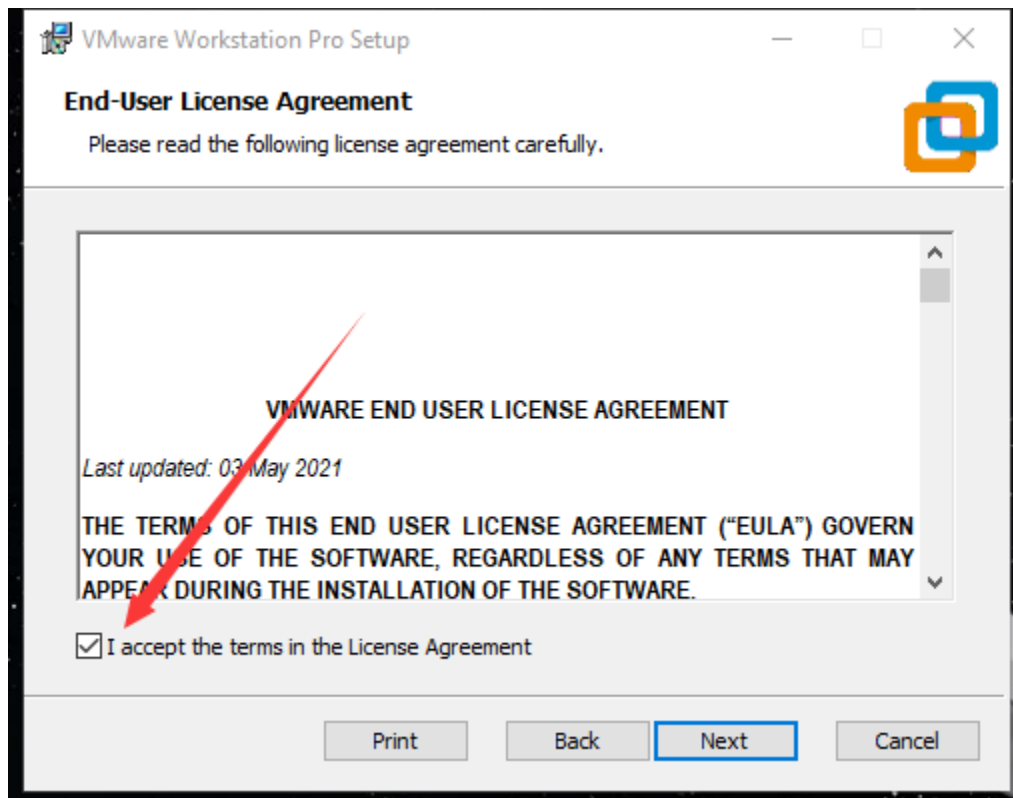
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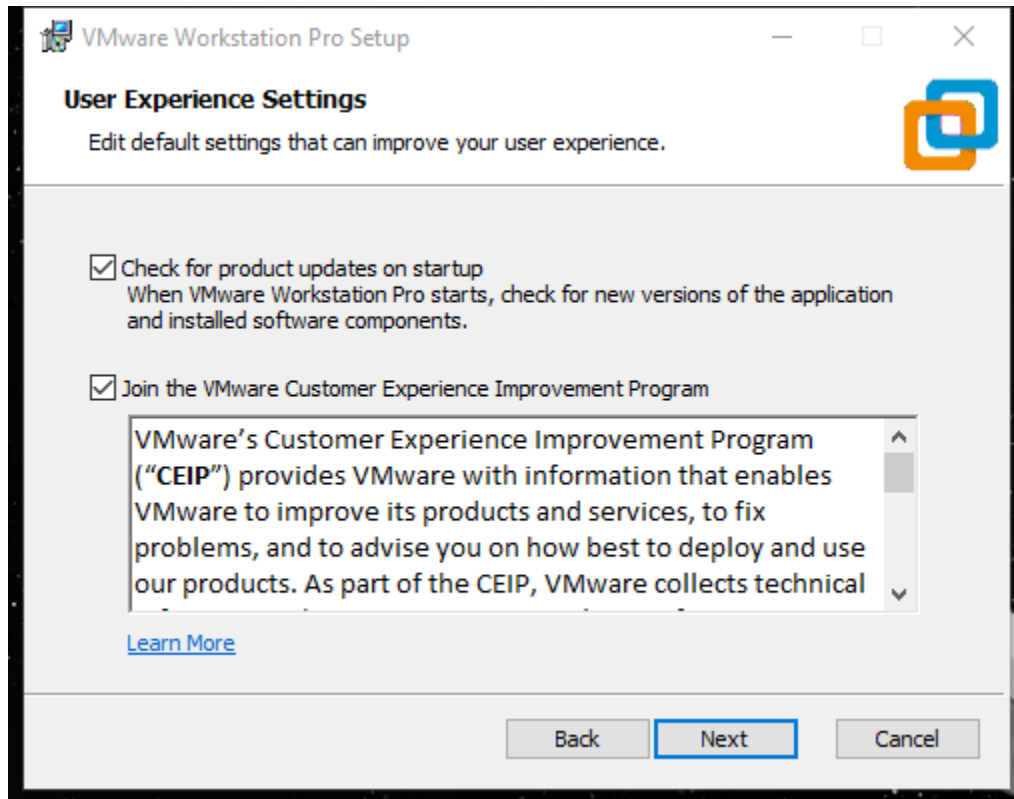
1. Ubuntu installation

The compilation speed in Linux is much faster than that in windows. We recommend that you use linux for development first. Ubuntu is a common Linux operating system. This topic describes how to quickly build an Ubuntu virtual machine.

1.1 Install VMware Workstation Pro

Download action [VMware Workstation Pro 16](#)
Installation





Click next until the installation is complete.

Activate:

open VMware Workstation Pro> Help> enter the license key.

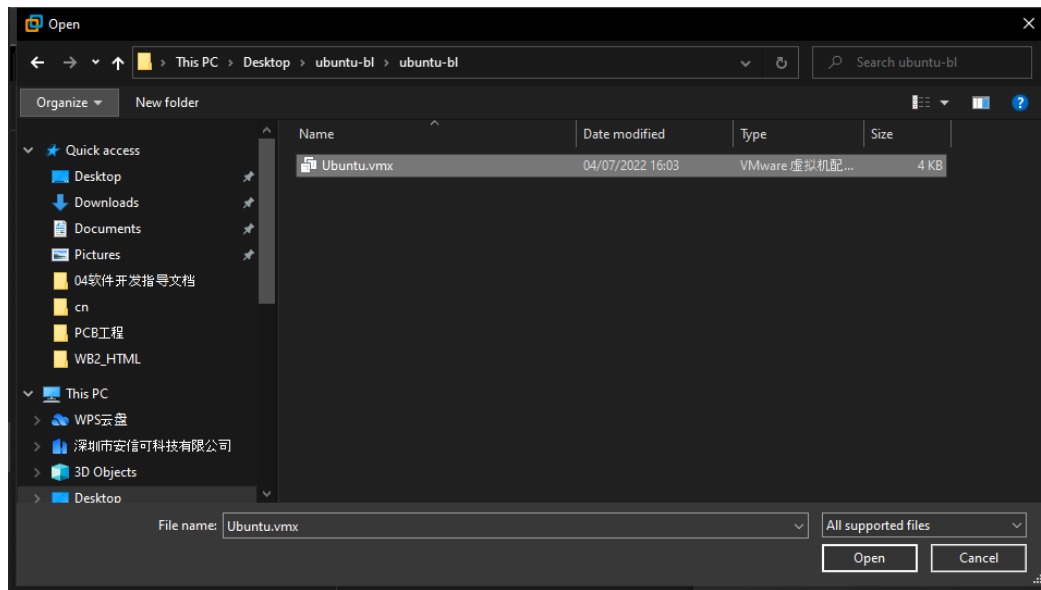
1.2 Install Ubuntu

Directly download the installed Ubuntu20.04 link:

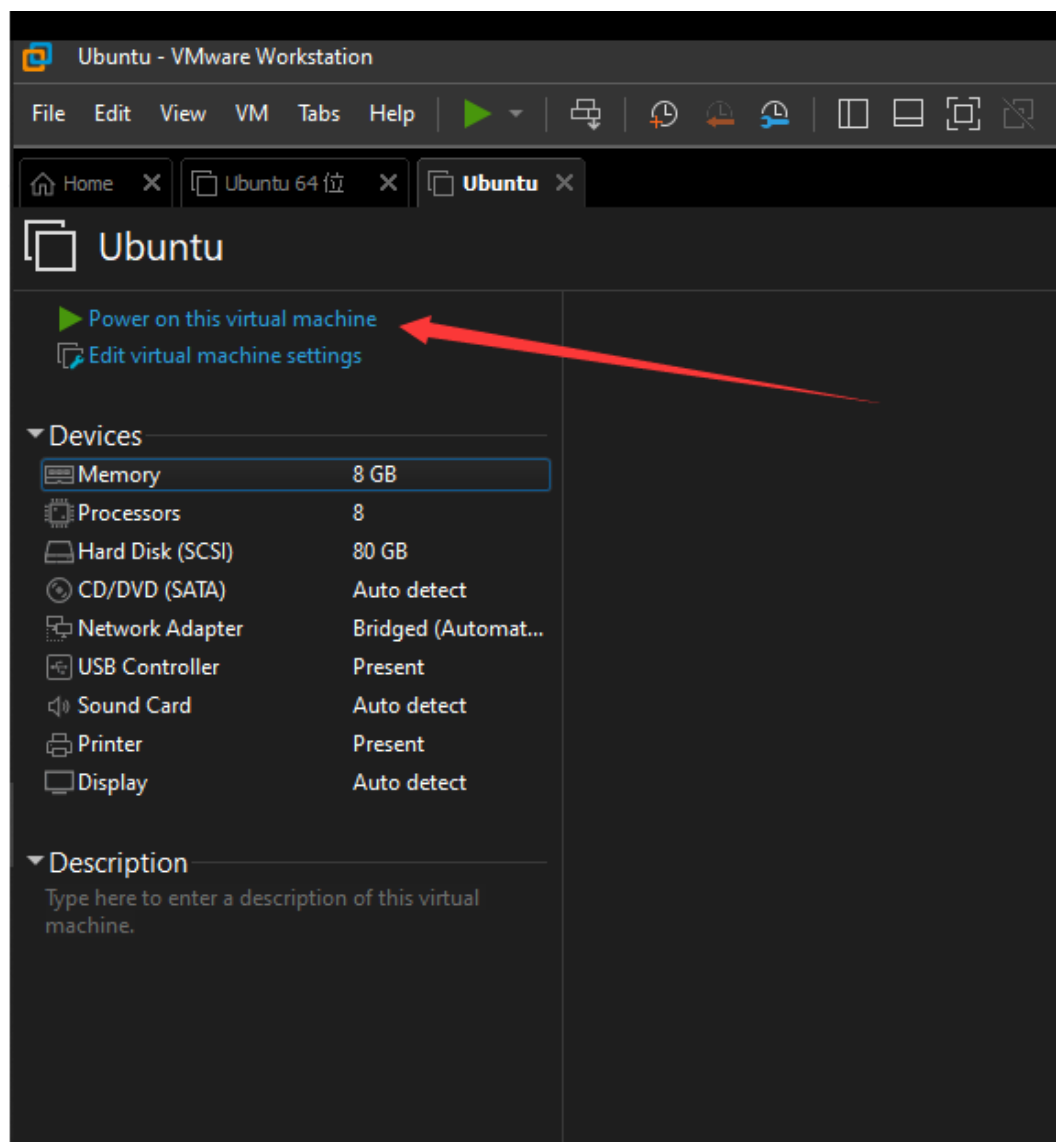
<https://drive.google.com/drive/folders/luP517y4QLhiECbYwFXdvGdFYzqp5AbbR?usp=sharing>

decompress the download.

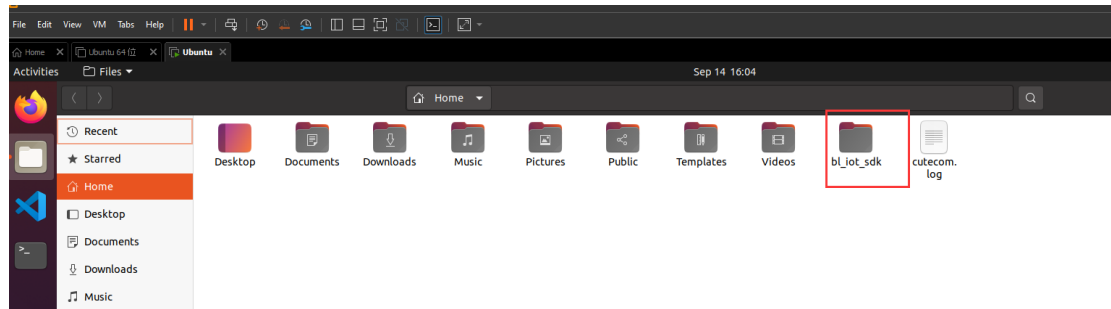
Open the VMware Workstation Pro -> File-> Open-> select the path of the downloaded and decompressed Ubuntu file



Boot directly, the user name and password are axk



the Ubuntu virtual machine has installed the development environment of Ai-WB2 series modules. The sdk is located in the home directory-> bl_iot_sdk.



The following brackets are for users who have installed Ubuntu before reading this blog post

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1. No need to reinstall Ubuntu
2. SDK: git clone https://github.com/bouffalolab/bl_iot_sdk.git
3. Open the terminal and install make. Run the sudo apt-get update and sudo apt-get install make commands.
4. install the serial port tool. Use cutecom here. Run the sudo apt-get install cutecom command.
5. Add a USER to dialout in Linux and run the sudo usermod -a -G dialout \$USER command.

}

2. Compilation

Enter the Directory of the project to be compiled. For example, to enter the hello world project, run the command: **cd customer_app/get-start/helloworld** to compile the project. Run the command **./genromap**

The following log indicates that the data has been compiled.

```
axk@axk-virtual-machine: ~/bl_iot_sdk/customer_app/get-start/hell
CC build_out/mbdrtls_lts/mbdrtls/library/platform_util.o
AR build_out/vfs/libvfs.a
CC build_out/mbdrtls_lts/mbdrtls/library/poly1305.o
CC build_out/mbdrtls_lts/mbdrtls/library/ripemd160.o
AR build_out/bl602/libbl602.a
CC build_out/mbdrtls_lts/mbdrtls/library/rsa.o
CC build_out/mbdrtls_lts/mbdrtls/library/rsa_internal.o
CC build_out/mbdrtls_lts/mbdrtls/library/sha1.o
CC build_out/mbdrtls_lts/mbdrtls/library/sha256.o
AR build_out/blfdt/libblfdt.a
CC build_out/mbdrtls_lts/mbdrtls/library/sha512.o
CC build_out/mbdrtls_lts/mbdrtls/library/ssl_cache.o
AR build_out/utills/libutills.a
CC build_out/mbdrtls_lts/mbdrtls/library/ssl_ciphersuites.o
CC build_out/mbdrtls_lts/mbdrtls/library/ssl_cli.o
AR build_out/bl602_std/libbl602_std.a
AR build_out/romfs/libromfs.a
CC build_out/mbdrtls_lts/mbdrtls/library/ssl_cookie.o
CC build_out/mbdrtls_lts/mbdrtls/library/ssl_msg.o
CC build_out/mbdrtls_lts/mbdrtls/library/ssl_srv.o
CC build_out/mbdrtls_lts/mbdrtls/library/ssl_ticket.o
CC build_out/mbdrtls_lts/mbdrtls/library/ssl_tls13_keys.o
CC build_out/mbdrtls_lts/mbdrtls/library/ssl_tls.o
AR build_out/cli/libcli.a
AR build_out/freertos_riscv_ram/libfreertos_riscv_ram.a
CC build_out/mbdrtls_lts/mbdrtls/library/threading.o
CC build_out/mbdrtls_lts/mbdrtls/library/timing.o
CC build_out/mbdrtls_lts/mbdrtls/library/version.o
CC build_out/mbdrtls_lts/mbdrtls/library/version_features.o
CC build_out/mbdrtls_lts/mbdrtls/library/x509.o
CC build_out/mbdrtls_lts/mbdrtls/library/x509_create.o
CC build_out/mbdrtls_lts/mbdrtls/library/x509_crl.o
CC build_out/mbdrtls_lts/mbdrtls/library/x509_crt.o
CC build_out/mbdrtls_lts/mbdrtls/library/x509_csr.o
CC build_out/mbdrtls_lts/mbdrtls/library/x509write_crt.o
CC build_out/mbdrtls_lts/mbdrtls/library/x509write_csr.o
CC build_out/mbdrtls_lts/port/pkparse.o
CC build_out/mbdrtls_lts/port/mbdrtls_port_mem.o
CC build_out/mbdrtls_lts/port/net_sockets.o
CC build_out/mbdrtls_lts/port/hw_entropy_poll.o
CC build_out/mbdrtls_lts/port/bignum_ext.o
CC build_out/mbdrtls_lts/mbdrtls/library/bignum.o
CC build_out/mbdrtls_lts/port/test_case.o
AR build_out/lwip/liblwip.a
AR build_out/mbdrtls_lts/libmbdrtls_lts.a
LD build_out/helloworld.elf
Generating BIN File to /home/axk/bl_iot_sdk/customer_app/get-start/helloworld/build_out/helloworld.bin
Building Finish. To flash build output.
axk@axk-virtual-machine:~/bl_iot_sdk/customer_app/get-start/helloworld$
```

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The compiled firmware is in the build_out folder: helloworld.bin

3. Install firmware to the device

3.1 Method 1: Use command line to burn

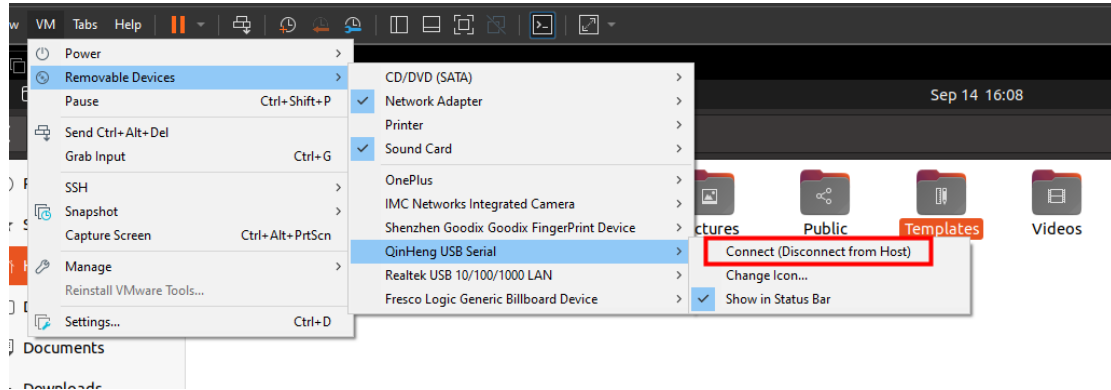
- Module wiring

Ai-WB2-XX	USB to TTL
TX	RX
RX	TX
IO8	DTR
EN	RTS
VDD	3.3V
GND	GND

Note that IO8 is on the dot on the back of the module.

- The development board enters the programming mode:
connect USB to the computer, press the BURN and EN buttons at the same time, release the EN button first and then release the BURN button

Connect a device to a virtual machine



set the baud rate of the serial port log:

open tools/flash_tool/chips/bl602/device_tree/... and set it in uart{ }. Here, set it to 115200

```

C main.c  M project.mk  M bl_factory_params_iotKitA_40M.dts  X
tools > flash_tool > chips > bl602 > device_tree > bl_factory_params_iotKitA_40M.dts
189  };
190  };
191  };
192  uart {
193      #address-cells = <1>;
194      #size-cells = <1>;
195      uart@4000A000 {
196          status = "okay";
197          id = <0>;
198          compatible = "bl602_uart";
199          path = "/dev/ttyS0";
200          baudrate = <115200>;
201          pin {
202              rx = <7>;
203              tx = <16>;
204          };
205          buf_size {
206              rx_size = <512>;
207              tx_size = <512>;
208          };
209          feature {
210              tx = "okay";
211              rx = "okay";
212              cts = "disable";
213              rts = "disable";
214          };
215      };
216      uart@4000A100 {
217          status = "okay";
218          id = <1>;
219          compatible = "bl602_uart";
220          path = "/dev/ttyS1";

```

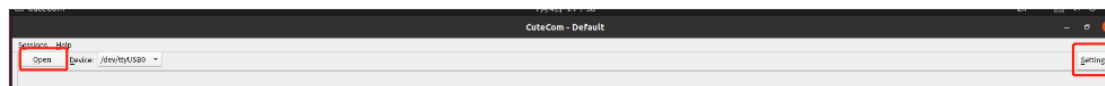
Run the following command:

make flash_only

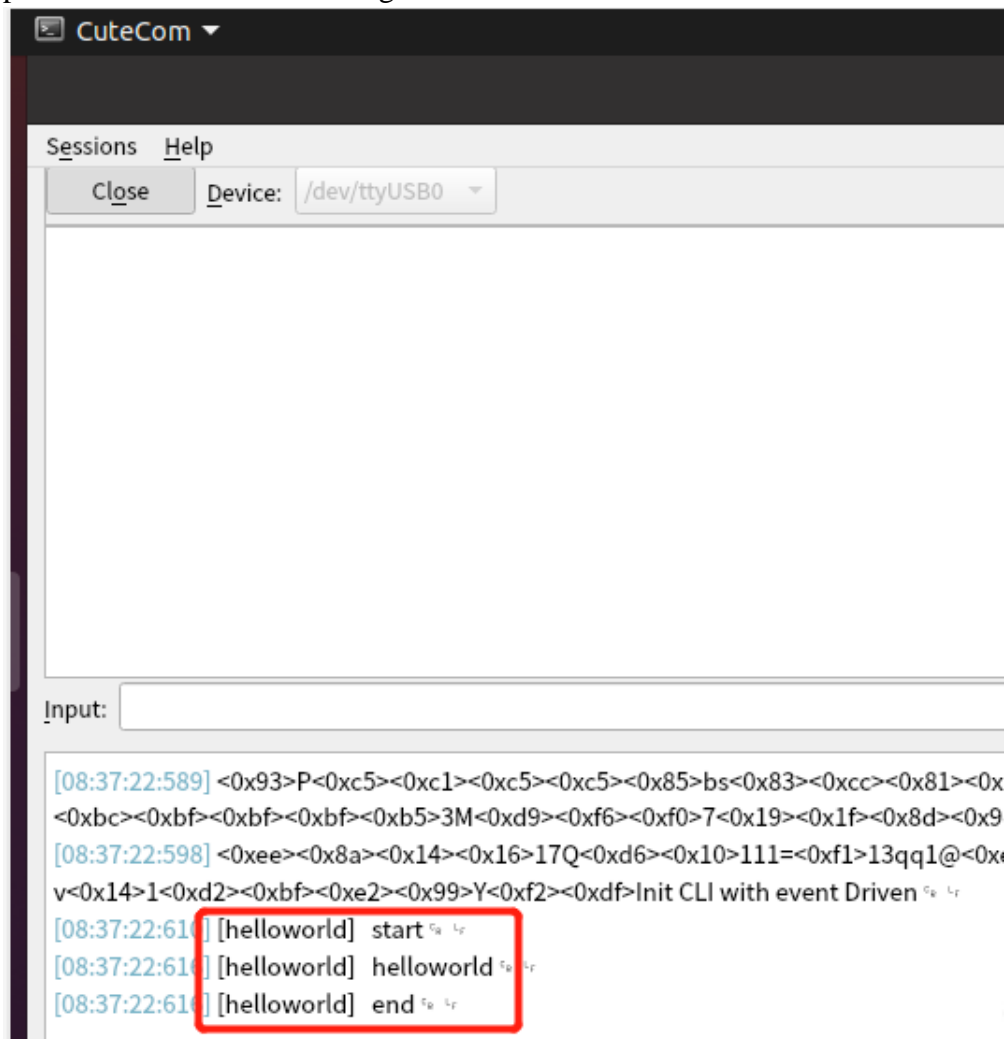
The following log indicates that the recording is successful.

```
[20:36:10.619] - Load 22528/46616 {"progress":48}
[20:36:10.636] - Load 24576/46616 {"progress":52}
[20:36:10.652] - Load 26624/46616 {"progress":57}
[20:36:10.668] - Load 28672/46616 {"progress":61}
[20:36:10.685] - Load 30720/46616 {"progress":65}
[20:36:10.702] - Load 32768/46616 {"progress":70}
[20:36:10.719] - Load 34816/46616 {"progress":74}
[20:36:10.735] - Load 36864/46616 {"progress":79}
[20:36:10.751] - Load 38912/46616 {"progress":83}
[20:36:10.769] - Load 40960/46616 {"progress":87}
[20:36:10.786] - Load 43008/46616 {"progress":92}
[20:36:10.804] - Load 45056/46616 {"progress":96}
[20:36:10.820] - Load 46616/46616 {"progress":100}
[20:36:10.820] - Load 46616/46616 {"progress":100}
[20:36:10.820] - Write check
[20:36:10.845] - Flash load time cost(ms): 427.244384765625
[20:36:10.845] - Finished
[20:36:10.846] - Sha caled by host: eddfb6c88ef11d97cfd1bd777e6623650741955a77176
[20:36:10.846] - xip mode Verify
[20:36:10.874] - Read Sha256/86048
[20:36:10.874] - Flash xip readsha time cost(ms): 26.012451171875
[20:36:10.874] - Finished
[20:36:10.877] - Sha caled by dev: eddfb6c88ef11d97cfd1bd777e6623650741955a77176b
[20:36:10.877] - Verify success
[20:36:10.877] - Dealing Index 4
[20:36:10.877] - ===== programming chips/bl602/device_tree/ro_params.dtb to 0x
[20:36:10.878] - ===== flash load =====
[20:36:10.879] - ===== flash erase =====
[20:36:10.879] - Erase flash from 0x1f8000 to 0x1f965d
[20:36:10.881] - erase pending
[20:36:10.909] - erase pending
[20:36:10.958] - Erase time cost(ms): 79.621337890625
[20:36:10.960] - decompress flash load 1508
[20:36:10.973] - Load 1508/1508 {"progress":100}
[20:36:10.973] - Load 1508/1508 {"progress":100}
[20:36:10.973] - Write check
[20:36:10.993] - Flash load time cost(ms): 34.4931640625
[20:36:10.993] - Finished
[20:36:10.993] - Sha caled by host: 465321030a14218284175e8fc4c6ed55a6486e784c5843
[20:36:10.993] - xip mode Verify
[20:36:11.000] - Read Sha256/5726
[20:36:11.000] - Flash xip readsha time cost(ms): 4.412109375
[20:36:11.000] - Finished
[20:36:11.003] - Sha caled by dev: 465321030a14218284175e8fc4c6ed55a6486e784c58433
[20:36:11.003] - Verify success
[20:36:11.003] - Program Finished
[20:36:11.003] - All time cost(ms): 4841.936767578125
[20:36:11.105] - [All Success]
axk@axk-virtual-machine:~/bl_tot_sdk/customer_app/get-start/helloworld$
```

Open the serial port assistant after burning: sudo cutecom
open the serial port after setting the baud rate in cutecom



print helloworld after resetting the module



3.2 Method 2: Use visual software to install (windows)

Download software: https://docs.ai-thinker.com/_media/ai-wb2/docs/v1.7.4-release.zip

- Module wiring:

Ai-WB2-XX	USB to TTL
TX	RX
RX	TX
EN	RTS
VDD	3.3V
GND	GND

The serial port chips that have been verified and supported are FT232 and CH340.

Development Board wiring:

connect the usb directly to the computer.

The Partition Table, Factory Params, and Boot2 bins to be burned are located in the following sections:

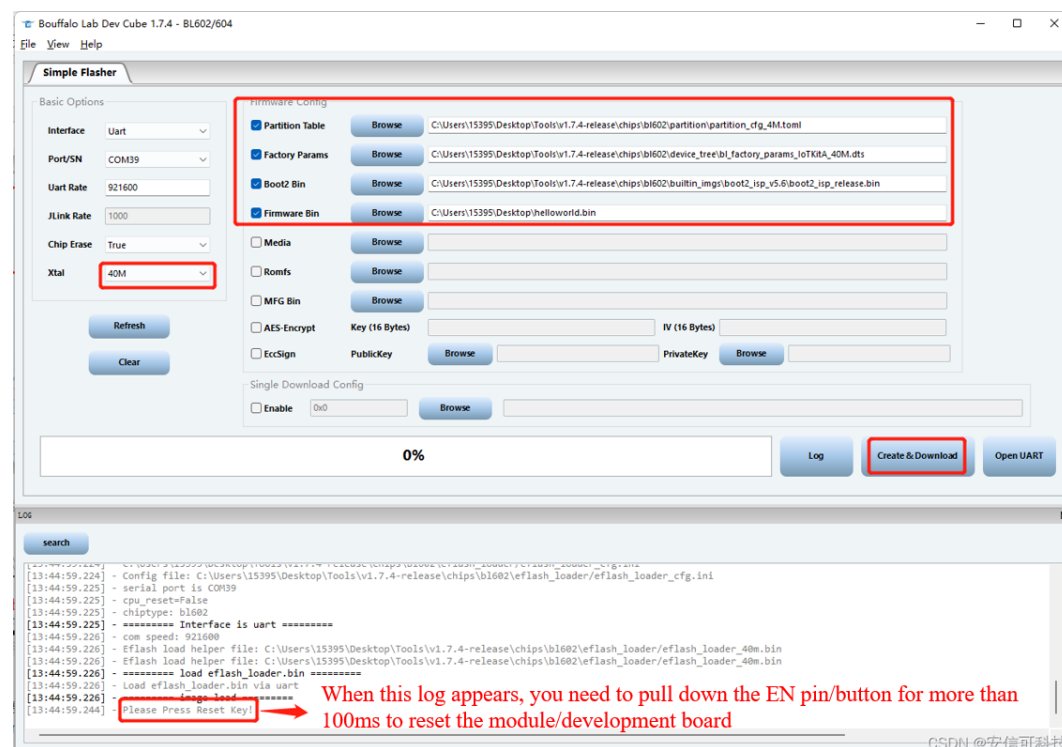
v1.7.4-release\chips\bl602\partition\partition_cfg_4M.toml

v1.7.4-release\chips\bl602\device_tree\bl_factory_params_IoTKitA_40M.dts

v1.7.4-release\chips\bl602\builtin_imgs\boot2_isp_v5.6\boot2_isp_release.bin

Compile the generated application-layer Firmware to Firmware Bin

Note: do not place the programming tools and firmware in the Chinese path.



The default baud rate of the log serial port is 2000000.

If you need to modify the baud rate of the log serial port, you can modify it in the file

v1.7.4-release\chips\bl602\device_tree\bl_factory_params_IoTKitA_40M.dts and

download it again after modification.

```
bl_factory_params_loTKitA_40M.dts X
C:\Users\15395\Desktop\Tools\v1.7.4-release\chips\bl602\device_tree> bl_factory_params_loTKitA_40M.dts
183     };
184     rx {
185         status = "okay";
186         pin = <12>; // only support 12 13
187         mode = "NEC"; // NEC, ExtendedNEC, RC5, SWM
188         active_mode = "Hi"; // Hi, Lo
189         data_check = <2>; // bit 0: check cmd, bit 1: check addr
190     };
191 };
192 uart {
193     #address-cells = <1>;
194     #size-cells = <1>;
195     uart@4000A000 {
196         status = "okay";
197         id = <0>;
198         compatible = "bl602_uart";
199         path = "/dev/ttyS0";
200         baudrate = <2000000>;
201         pin {
202             rx = <7>;
203             tx = <16>;
204         };
205         buf_size {
206             rx_size = <512>;
207             tx_size = <512>;
208         };
209         feature {
210             tx = "okay";
211             rx = "okay";
212             cts = "disable";
213             rts = "disable";
214         };
215     };
216     uart@4000A100 {
217         status = "okay";
218         id = <1>;
219         compatible = "bl602_uart";
```

3. How to modify the Makefile of a custom project

The routines in the sdk are relatively simple. It is OK to put all the source files in the same folder. However, when our project is relatively large, there will be many .c and .h files in the same folder, which will make it a little messy. At this time, it seems much more comfortable to put the code of different functional modules in different folders. How to implement it?

Take the simplest helloworld project as an example and modify it based on the official helloworld project.

Requirements:

1. Change the Project path from `bl_iot_sdk/customer_app/get-start/helloworld` to `bl_iot_sdk/Ai-WB2-Demo/helloworld`.

2. Add a folder component. Add hello.c and hello. H files to the component folder. Print helloworld into hello.c.

Implementation:

1. Configure the SDK path
modify the sdk path of the Makeflie in helloworld
BL60X_SDK_PATH_GUESS? = \$(shell pwd)
BL60X_SDK_PATH? = \$(BL60X_SDK_PATH_GUESS)/... /... /...
Change to
BL60X_SDK_PATH_GUESS? = \$(shell pwd)
BL60X_SDK_PATH? = \$(BL60X_SDK_PATH_GUESS)/... /...
2. Add components to Makeflie
INCLUDE_COMPONENTS += component
EXTRA_COMPONENT_DIRS += \$(PROJECT_PATH)/component
3. Add a Makeflie file named **bouffilo. mk** to the component folder to compile hello.c. Add code to bouffilo. mk:

COMPONENT_OBJS := \$(patsubst %.c,%.o, \$(COMPONENT_SRCS))

For the complete project, see https://gitee.com/chencong_cc/Ai-WB2-Demo.git.

4. Development Data

Official bouffalolab SDK: https://github.com/bouffalolab/bl_iot_sdk the official routine is located in the customer_app folder.

Programming Guide: https://bouffalolab.github.io/bl_iot_sdk