How to Compile Hardware for Ox64 on Ubuntu 22.04.2 LTS

This guide provides step-by-step instructions for compiling hardware for Ox64 using Buildroot Bouffalo on Ubuntu 22.04.2 LTS.

Prerequisites:

- A system running Ubuntu 22.04.2 LTS.
- Terminal or command-line access.
- Essential tools and packages installed.

Compilation Steps:

1. **Setting up the Build Directory**:

   Open the terminal and create a new directory for the build:

   ```
   mkdir buildroot_bouffalo && cd buildroot_bouffalo
   ```

2. **Cloning Necessary Repositories**:

   Clone the primary Buildroot repository and the specific Buildroot Bouffalo repository:

   ```
   git clone https://github.com/buildroot/buildroot
   git clone https://github.com/openbouffalo/buildroot_bouffalo
   ```

3. **Setting Up Overlay Path**:

   Define an environment variable for the Buildroot Bouffalo overlay path:

   ```
   export BR_BOUFFALO_OVERLAY_PATH=$(pwd)/buildroot_bouffalo
   ```

4. **Navigating to Buildroot Directory**:

   Change directory into the cloned Buildroot folder:

   ```
   cd buildroot
   ```

5. **Initial Configuration**:

   Apply the default configuration for Pine64 Ox64:

   ```
   make BR2_EXTERNAL=$BR_BOUFFALO_OVERLAY_PATH pine64_ox64_defconfig
   ```

6. **Configure Build Settings**:

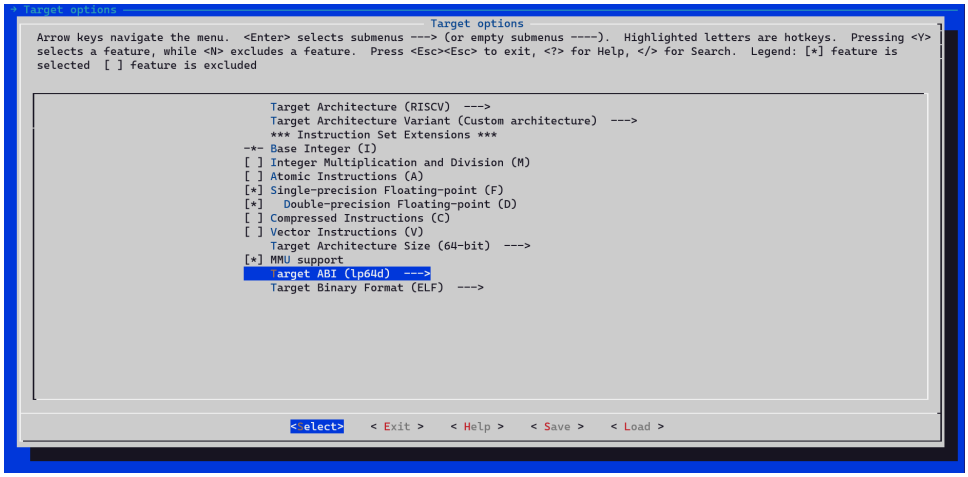
   Use the `menuconfig` tool to adjust build settings:

   ```
   make menuconfig
   ```

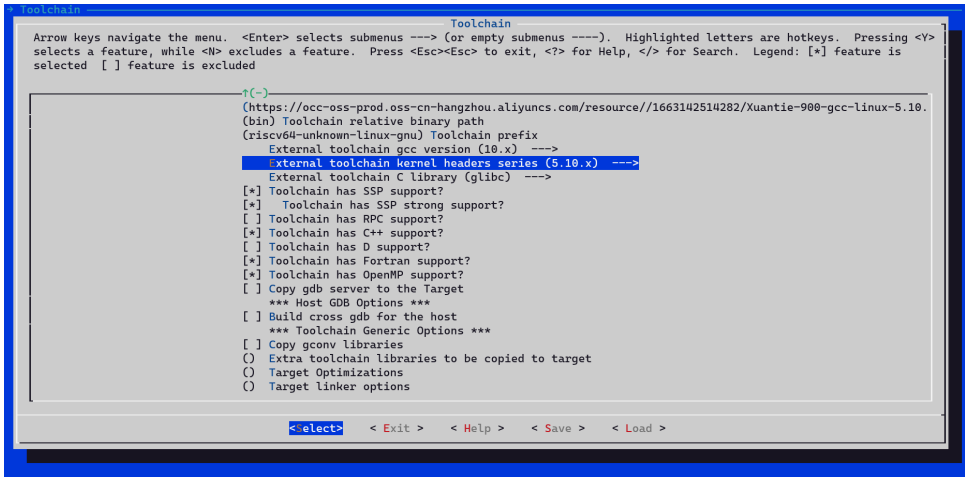
   Note: Within `menuconfig`:

   - Navigate to `Target Architecture`.

- Enable `Single-precision Floating-point` and `Double-precision Floating-point`.
- Set `Target ABI` to `lp64d`.



- Under `Toolchain`, enable `Fortran support` and `OpenMP support`.



7. **Compiling**:

   Initiate the build process:

   ```
   make
   ```

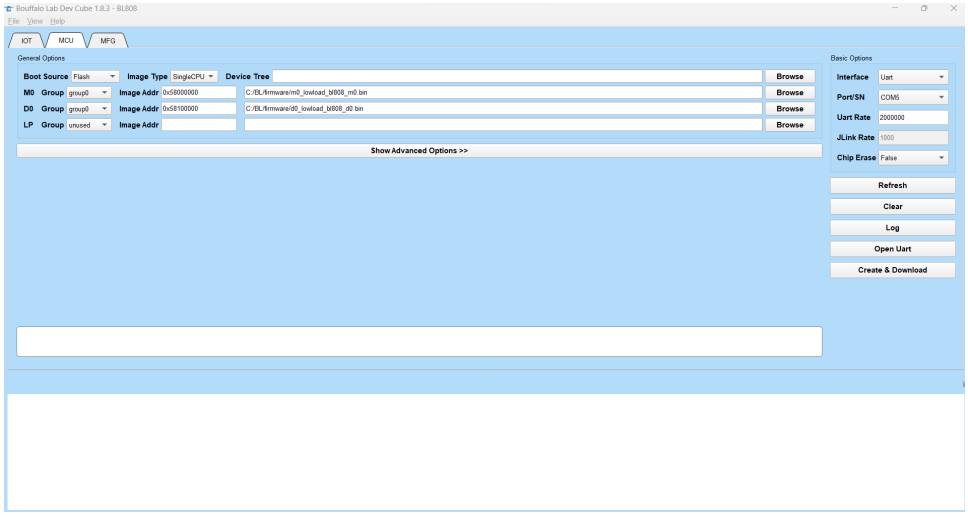
   Note: Before executing the `make` command, ensure your `PATH` variable doesn't have spaces.

Output:

Upon successful completion, all the required files will be located in the `buildroot/output/images` directory.

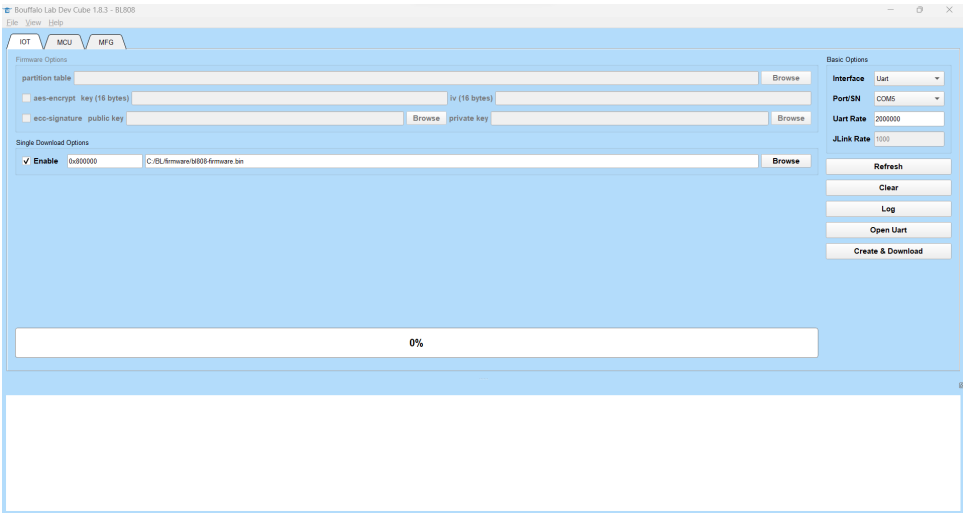
Flashing Steps:

1. **Download and Extract the Image**:
    - Download your preferred image or get the compiled image from compilation steps.
2. **Obtaining DevCube**:
    - Download DevCube 1.8.3 from [BouffaloLab DevCube v1.8.3].
3. **Connect BL808 Board**:
    - Using a serial port, connect the BL808 board to your PC.
4. **Setting BL808 to Programming Mode**:
    - Set the BL808 board to programming mode.
    - Press the `BOOT` button while resetting or applying power.
    - Release the `BOOT` button once done.
5. **Configure DevCube**:
    - Launch DevCube and select the `[BL808]` option.
    - Switch to the `[MCU]` page.
    - Set the following configurations:
        - Select the UART port and set the baud rate to `2000000`.
        - UART TX: GPIO 14.
        - UART RX: GPIO 15.
        - M0 Group[Group0] Image Addr: `[0x58000000]` followed by the path to `m0_lowload_bl808_m0.bin`.
        - D0 Group[Group0] Image Addr: `[0x58100000]` followed by the path to `d0_lowload_bl808_d0.bin`.
    - Click 'Create & Download' and patiently wait for completion.



6. **IOT Page Configurations**:
    - Switch to the `[IOT]` page.
    - Enable 'Single Download', set the Address to `0x800000`, and choose `[bl808-firmware.bin]`.

- Click 'Create & Download' once more and await completion.



7. **Flash to SD Card**:
    - Flash the extracted `sdcard-pine64-*.img.xz` image or sdcard.img compiled above to your SD card with Balena Etcher.

Post-Flashing Steps:

Setting up Ox64 with the Flashed SD Card:

1. **Insert the SD Card**:
    - Carefully insert the flashed SD card into the Ox64's card slot.
2. **Connecting to the Serial Console**:
    - For accessing the Linux console, use the serial console connection.
    - Connect your interface to the Ox64's GPIO pins:
        - UART TX: GPIO 16.
        - UART RX: GPIO 17.
    - Ensure your serial interface tool or software is set to the correct baud rate of `2000000`.
3. **Accessing the Linux Console**:
    - Once connected, power on the Ox64.
    - Use your serial interface tool to access the Linux console. You should now see the boot logs and be presented with a command-line interface or shell prompt.
4. **Logging In**:
    - To log in to the system, when prompted for the password, enter `root`.

Enjoy your Linux!