Update or flash the Dev Board

Periodically, we'll release updates for our Coral software or a new version of **Mendel Linux** for the Dev Board. This page describes how to install these updates on your board.

Update your board with apt-get

To update the software packages in your current Mendel version—such as when we release a new Edge TPU Runtime and other API libraries—connect to the board (**with MDT** or the **serial console**) and run the following commands (first, **make sure your board is online**).

> **Note:** To upgrade the Mendel version, you must **flash a new system image**.

```
sudo apt-get update

sudo apt-get dist-upgrade

sudo reboot now
```

Rebooting isn't always required, but recommended in case there are any kernel updates.

> **Notice:** Due to a known issue in Mendel, if your Dev Board is currently running Mendel 2.0 or lower, some packages do not properly upgrade when using `apt-get`. Check your version by running `cat /etc/mendel_version`; if it's 2.0 or lower, we recommend that you **flash the system image**.

Flash a new system image

Flashing your board is necessary if you want to upgrade to the latest Mendel version or if your board is in a failed state and you want to start clean. If you just want to update your existing system with new packages, instead update with apt-get.

You can see your Mendel version if you connect to the board and run `cat /etc/mendel_version`. Then see what Mendel versions are available on the Software page.

If it's your first time flashing the board (or you're okay with deleting all user data), instead follow the guide to Get started with the Dev Board, which flashes the board using a microSD card.

> **Note:** The flashing procedure below works with Linux and Mac only.

First-time setup

If it's your first time flashing a Dev Board from the command line, start with the following one-time setup:

1. Install the fastboot tool.

   On Linux, you can install as follows:

   ```
   sudo apt-get install fastboot
   ```

   For Mac, it's available from the Android SDK platform tools. This package has many tools, but you only need fastboot. So move that to a location in your `PATH` environment variable, such as `/Users/yourname/bin`.

2. If you're on Linux, add the udev rules required for fastboot:

   ```
   sudo sh -c "echo 'SUBSYSTEM==\"usb\", ATTR{idVendor}==\"0525\", MODE=\"0664\", \
   GROUP=\"plugdev\", TAG+=\"uaccess\"' >> /etc/udev/rules.d/65-edgetpu-board.rules"


   sudo udevadm control --reload-rules && sudo udevadm trigger
   ```

   Also make sure your Linux user account is in the `plugdev` and `dialout` system groups by running this command:

   ```
   sudo usermod -aG plugdev,dialout <username>
   ```

   Then reboot your computer for the new groups to take effect.

Flash the board

Now you can flash the Dev Board as follows.

Caution: This deletes all system and local data. That is, unless your board is already running Mendel 5.0 or higher, which provides a separate partition for the `/home` directory. So if your board is running Mendel 4.0 or lower, back up any personal data before you proceed. For example, you can create a TAR of your `/home` directory and use `mdt pull` to copy the TAR from the board. Then use `mdt push` to move it back.

1. Verify the boot mode.

   First, make sure the boot mode switches are set to eMMC mode as follows. If they're not set this way, power off the board before you change them.

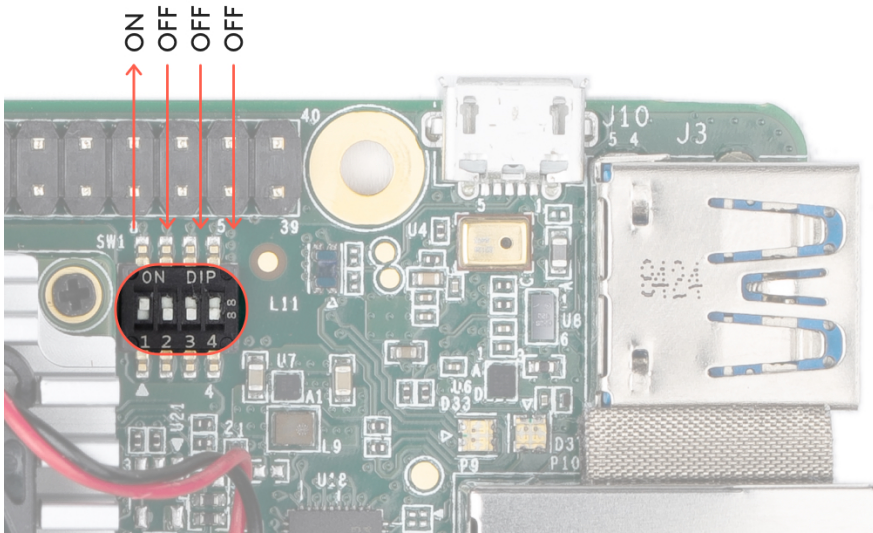 | Boot mode | Switch 1 | Switch 2 | Switch 3 | Switch 4 |
   | --- | --- | --- | --- | --- |
   | eMMC | ON | OFF | OFF | OFF |

   Figure 1. Boot switches set to eMMC mode

2. Connect to the USB data port.

   Attach a USB cable from your host computer to the USB port on the Dev Board labeled "OTG" (see figure 2).

   Figure 2. A USB-C data cable connected to the board (in addition to the power cable)

3. Power on the board.

   If it's not already booted, plug in the board and wait for it to power on.

   Verify the board is connected to your computer by running this command from your computer (**requires MDT**):

   ```
   mdt devices
   ```

   You should see output such as this:

```
orange-horse           (192.168.100.2)
```

4. Reboot the board into fastboot mode.

   | **Caution:** **You might be about to delete personal data on the board.** Now is the time to back it up.

   Run the following command from your computer:

   ```
   mdt reboot-bootloader
   ```

   After a moment, you can verify the board started in fastboot mode with this command (**requires** `fastboot`):

   ```
   fastboot devices
   ```

   You should see a line printed like this:

   ```
   1b0741d6f0609912         fastboot
   ```

   | **Help!** If `fastboot devices` prints nothing, wait a few more seconds for the device to reboot into fastboot, then try again.
   |
   | If it still prints nothing, verify the Dev Board is connected to your computer via USB as shown in figure 2 and you rebooted the board with the command `sudo reboot-bootloader`. If so, try installing a more recent version of `fastboot` from **Android SDK Platform-tools** and try again. (Be sure to add the new fastboot to your `PATH` environment variable.)

5. Download the system image.

   Run the following commands **on your host computer**:

   ```
   cd $HOME/Downloads

   curl -O https://dl.google.com/coral/mendel/enterprise/enterprise-eagle-20211117215217.zip

   unzip enterprise-eagle-20211117215217.zip \
   && cd enterprise-eagle-20211117215217
   ```

6. Flash the board.

   If your board is currently running Mendel 4.0 or lower, this step wipes all the board data, including the `/home` directory. If it's running Mendel 5.0 or higher, then the `/home` directory is preserved by default (you can intentionally wipe it by adding the `-H` flag to the following command).

   ```
   bash flash.sh
   ```

This starts the flashing process and you'll see various output.

It takes about 5 minutes to complete. When flashing is complete, your board reboots.

7. **Log in.**

   You can log in to the board's shell using MDT:

   ```
   mdt shell
   ```

   Mac users: If you're on macOS 10.15 (Catalina) or higher, this won't work (even if you preserved the board's `/home` directory and previously installed an SSH key, because flashing the board reset its known networks—you might simply need to get the board back your Wi-Fi using the serial console). See the steps to **connect MDT on macOS**.

   If MDT is unable to find your device, it's probably because the system is still setting up Mendel. This initial setup takes 2-3 minutes after you flash it (subsequent boot times are much faster). Instead of manually retrying, you can run `mdt wait-for-device && mdt shell` and it will connect when the device is ready.

   Then restore any data you backed up and **reconnect to the internet**, if necessary.

   Note: Your board's hostname is randomly generated the first time it boots from a new flashing. We do this to ensure that each device within a local fleet is likely to have a unique name. Of course, you can change this name using standard Linux hostname tooling (such as `hostname`).

   If you attempt to **connect with the serial console**, the login and password are reset to the defaults: login is **mendel**; password is **mendel**.

Flash from U-Boot on an SD card

If you can't even boot your board into U-Boot, then you can recover the system by accessing the U-Boot prompt from an image on the SD card, and then enable fastboot mode to flash the board. This also gives you general access to U-Boot for other troubleshooting.

Tip: To just delete everything and re-install Mendel, follow the new flash procedure in the **Dev Board get started guide**, which automatically flashes the board using an SD card (no command line needed).

1. **Enable boot from SD card.**

   Unplug the Dev Board and change the boot mode switches to boot from SD card:

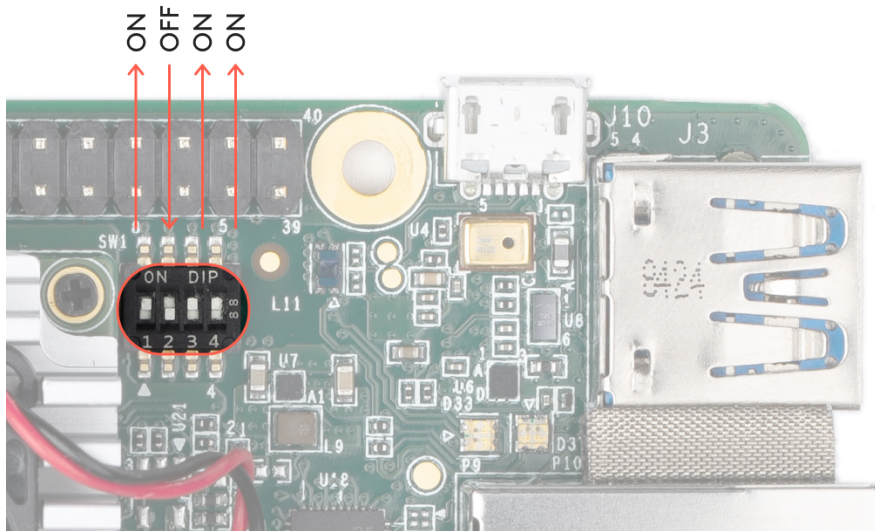 | Boot mode | Switch 1 | Switch 2 | Switch 3 | Switch 4 |
   |-----------|----------|----------|----------|----------|
   | SD Card | ON | OFF | ON | ON |

Figure 3. Boot switches set to SD card mode

2. **Flash an SD card with the recovery image.**

   On your host computer, download and unpack the latest system image:

   ```
   curl -O https://dl.google.com/coral/mendel/enterprise/enterprise-eagle-20211117215217.zip

   unzip enterprise-eagle-20211117215217.zip
   ```

   Inside the package, find the `recovery.img` file.

   Then use a program such as **balenaEtcher** to flash the `recovery.img` file to your microSD card.

   > **Help!** If the flash program displays a warning such as, "The image does not appear to contain a partition table," that's okay—it's true that there is no partition table in this image, but this is working as intended so you can continue.

3. **Connect to the serial console.**

   > **Note:** The board should not be powered on yet.

   Use a USB-micro-B cable to connect your host computer to the serial console port on the board (see figure 4). The orange and green LEDs on the board will illuminate.

   Follow **these instructions to open the serial console** (complete all steps, but **do not** plug the board into power). When you complete those steps, the prompt should disappear and your terminal should become completely blank (because the board is not powered on yet).
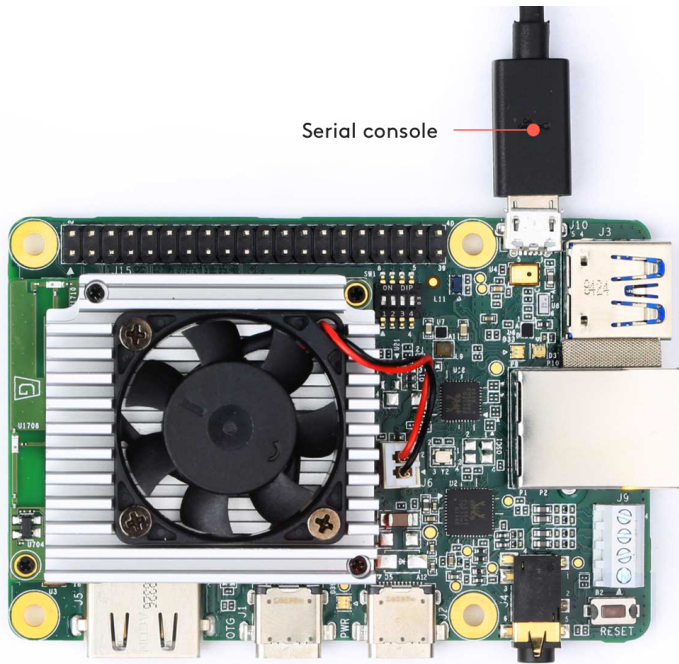
Figure 4. A USB-micro-B cable connected to the serial console port

4. **Insert the SD card and then power on the board.**

   The SD card slot is on the bottom of the Dev Board.

   Plug in your 2 - 3A power cable to the USB-C port labeled "PWR" (see figure 5).

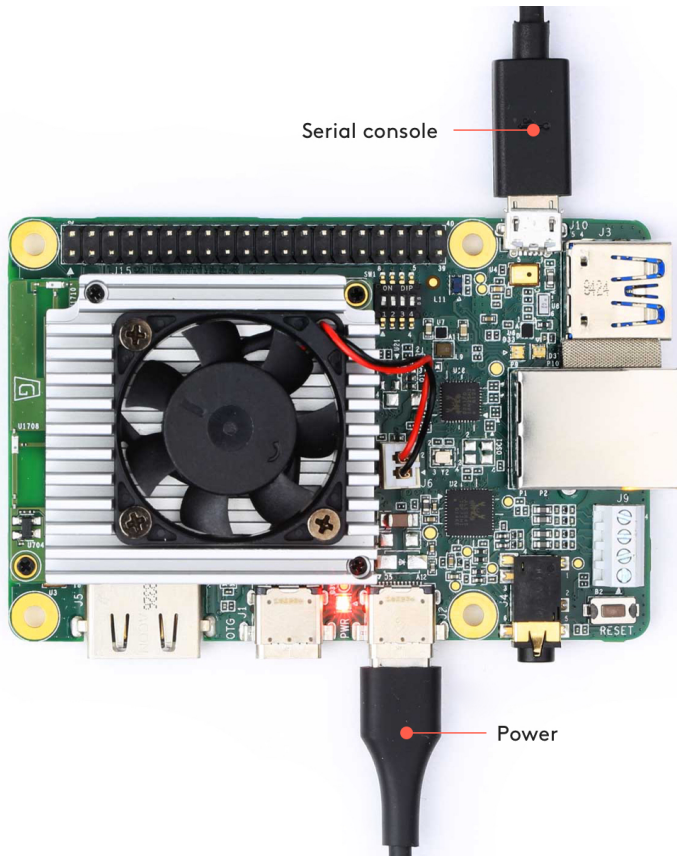   > **Caution:** Do not attempt to power the board by connecting it to your computer.

Figure 5. A USB-C power cable connected to the board (in addition to the serial cable)

5. **Start fastboot.**

   At the **u-boot** prompt that appears in your **screen** session (from step 3), start fastboot mode:

   ```
   fastboot 0
   ```

   The cursor moves to the next line but there is no output. That's as expected.

6. **Connect to the USB data port.**

   Use a USB-C cable to connect your host computer (Linux or Mac) to the USB-C data port on the Dev Board labeled "OTG" (see figure 6). (This is the connection used by fastboot.)
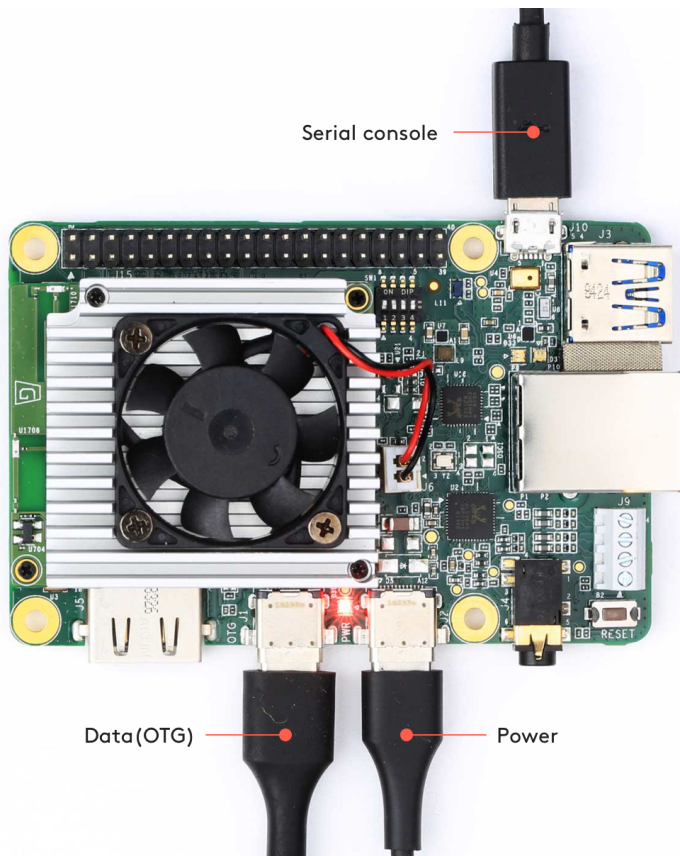
Figure 6. A USB-C data cable connected to the board (in addition to the serial and power cables)

After a moment, you can verify that the board started in fastboot mode by running the following command **from your connected host computer** (requires `fastboot`):

```
fastboot devices
```

You should see a line printed like this:

```
1b0741d6f0609912        fastboot
```

7. Flash the image.

   On your host computer, navigate into the unpacked system image directory (from step 2) and execute the flash script:

   ```
   cd enterprise-eagle-20211117215217

   bash flash.sh
   ```

When flashing is complete, your board will reboot. However, because you set the boot mode to SD card, that's what it will do so you'll again see the **u-boot** prompt. So unplug the power and reset the boot switches to eMMC mode:

Boot mode	Switch 1	Switch 2	Switch 3	Switch 4
eMMC	ON	OFF	OFF	OFF

Then boot the board again. When it's done booting, the console prompts you to login.

Login is `mendel`
Password is `mendel`

Tip: You can instead open a shell using MDT.

Once logged in, be sure to download other software updates with the following commands (**be sure your board is online first**):

```
sudo apt-get update

sudo apt-get dist-upgrade
```

Flash a new board

If you just unboxed your Dev Board, we recommend that you follow the **get started guide**, which shows how to flash the board using a microSD card. However, if you don't have a suitable microSD card, then you can instead manually flash a new board as follows.

Caution: This flashing procedure is significantly more complicated than using a microSD card, so you might be happier if you instead take the time to find a microSD card and **follow the get started guide**.

1. Gather the requirements

Before you begin, collect the following hardware:

- A host computer running Linux or Mac
    - Python 3 installed
- One USB-C power supply (2 A / 5 V), such as a phone charger
- One USB-C to USB-A cable
- One USB-micro-B to USB-A cable—be sure this cable supports data transfer (not just power)

You also need the following software tools on your host computer:

A serial console program such as `screen`, `picocom`, or PuTTY (among many others).

Our instructions use `screen` and it's available on Mac computers by default.

If you're on Linux and don't already prefer another program, we suggest you install `screen` as follows:

```
sudo apt-get install screen
```

The latest `fastboot` tool.

On Linux, you can install as follows:

```
sudo apt-get install fastboot
```

For Mac, it's available **from the Android SDK platform tools**. This package has many tools, but you only need fastboot. So move that to a location in your `PATH` environment variable, such as `/Users/yourname/bin`.

Now verify it works:

```
fastboot --version
```

For Mac compatibility, the version must be 28.0.2 or higher.

Also configure your system to communicate with the board:

- On Linux:

  Run the following commands to add the udev rule required for fastboot:

  ```
  sudo sh -c "echo 'SUBSYSTEM==\"usb\", ATTR{idVendor}==\"0525\", MODE=\"0664\", \
  GROUP=\"plugdev\", TAG+=\"uaccess\"' >> /etc/udev/rules.d/65-edgetpu-board.rules"

  sudo udevadm control --reload-rules && sudo udevadm trigger
  ```

  Also make sure your Linux user account is in the `plugdev` and `dialout` system groups by running this command:

  ```
  sudo usermod -aG plugdev,dialout <username>
  ```

  Then reboot your computer for the new groups to take effect.

- On Mac:

  Caution: Before installing the following package, be sure you've applied all available macOS software updates. Otherwise, you might be blocked from installing due to system security that disables the **Allow** button in System Preferences.

2. Enable the correct boot mode

Before you begin the flashing procedure, verify the following:

1. The board is completely unplugged (not powered and not connected to your computer).

2. The boot mode switches are set to eMMC mode (see figure 7):

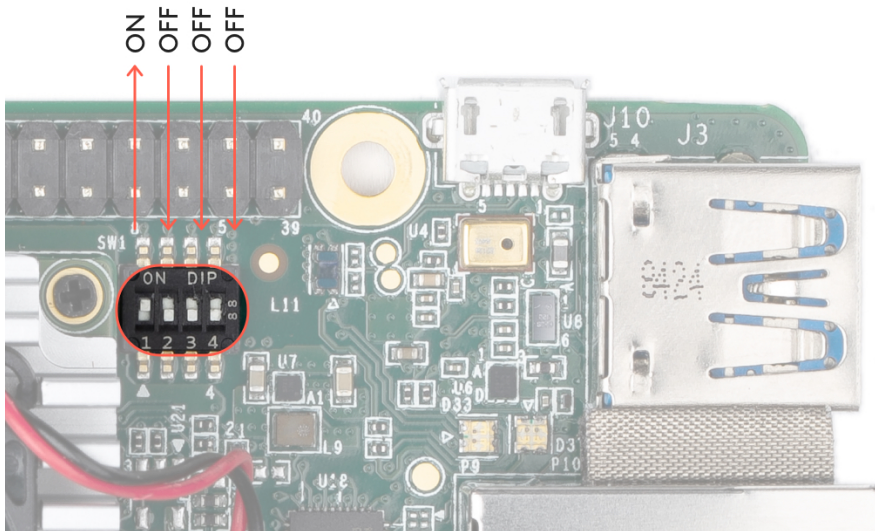| Boot mode	Switch 1	Switch 2	Switch 3	Switch 4
eMMC	ON	OFF	OFF	OFF

Figure 7. Boot switches set to eMMC mode

> **Note:** Do not power the board or connect any cables until instructed to do so.

3: Initiate fastboot mode

If your Dev Board was manufactured before April 10, 2019, then you need to initiate fastboot on the board.

You can determine the manufactured date from the serial number etched onto the heat sink, as shown in figure 8.
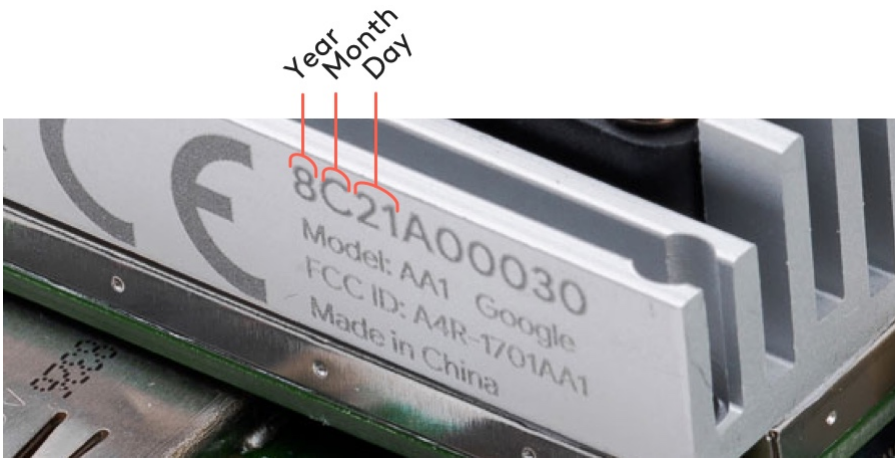
Figure 8. The manufactured date in the serial number

Field	Description
Year	Last digit of the year of manufacture: 0 - 9
Month	Month of manufacture: 1 to 9 (Jan to Sep), A (Oct), B (Nov), C (Dec)
Day	Day of manufacture: 01 to 31 (1st to 31st)

If your serial number starts with "9410" or higher, then it was manufactured on April 10th, 2019, or later, so you can skip to **execute the flash script** (because your board automatically boots into fastboot mode).

But if the date reads "9409" or lower, then you need to perform the following steps to enable fastboot mode:

1. **Connect the serial console cable.**

   Use your micro-B USB cable to connect your host computer to the serial console port on the board (see figure 9). The orange and green LEDs on the board should illuminate.

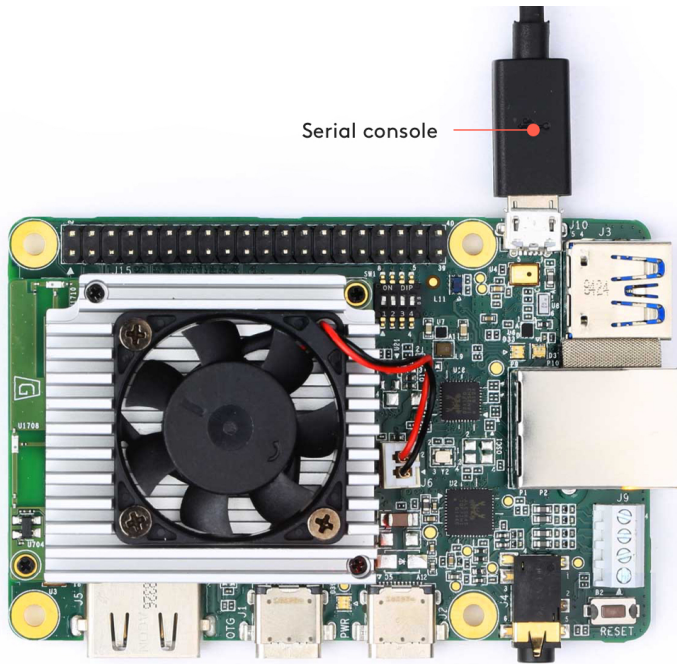   **Note:** The board should not be powered on yet.

Figure 9. A micro-B USB cable connected to the serial console port

2. **Initiate the serial console.**

   Open a terminal on your host computer and start the serial console as follows:

   - **On Linux:**

     Determine the device filename for the serial connection by running this command on your Linux computer:

     ```
     dmesg | grep ttyUSB
     ```

     You should see two results such as this:

     ```
     [ 6437.706335] usb 2-13.1: cp210x converter now attached to ttyUSB0
     [ 6437.708049] usb 2-13.1: cp210x converter now attached to ttyUSB1
     ```

     If you don't see results like this, double-check your USB cable.

     Then use the name of the *first* filename listed as a `cp210x converter` to open the serial console connection (this example uses `ttyUSB0` as shown from above):

     ```
     screen /dev/ttyUSB0 115200
     ```

     > **Help!**
     >
     > If you see [`screen is terminating`], it might also be due to the above missing groups, or there's something else wrong with `screen`—ensure all `screen` sessions are closed (type `screen -ls` to see open sessions), unplug the USB cable from the Dev Board, and then try again.

   - **On Mac:**

First, verify the board is visible by running this command:

```
ls /dev/cu*
```

You should see **/dev/cu.SLAB_USBtoUART** listed. If not, either there's a problem with your USB cable or the driver is not loaded. You can load the driver with `sudo kextload /Library/Extensions/SiLabsUSBDriver.kext` and then go to the system *Security & Privacy* preferences and click *Allow*. You also might need reboot your computer.

Then connect with this command:

```
screen /dev/cu.SLAB_USBtoUART 115200
```

If this does not connect, check the `ls /dev/cu*` output again—you might need to instead use the device name with a number at the end.

The prompt should disappear and your terminal should become completely blank. That's expected, because you've established a connection but the board is not turned on yet.

3. **Power the board.**

   Plug in your 2 - 3 A power cable to the USB-C port labeled "PWR" (see figure 10).

   Caution: Do not attempt to power the board by connecting it to your computer.
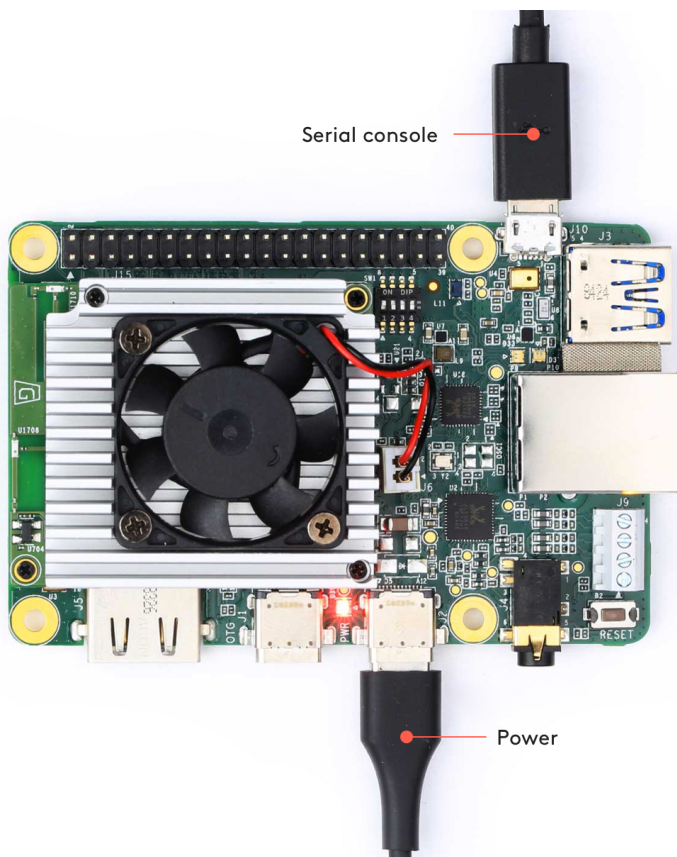

Serial console

Power

Figure 10. A USB-C power cable connected to the board (in addition to the serial cable)

The board's red LED will illuminate and the fan might turn on.

> **Help!** If you still don't see anything in the serial console screen, press Enter.

Your serial console (the `screen` terminal) should arrive at the **u-boot** prompt. You should see a "Welcome" message that tells you to visit g.co/coral/setup, which brings you to this page. So you're all good; you can continue.

> **Note:** If you instead see a long stream of messages, followed by a login prompt, then your board is already flashed with a system image. You can either disconnect the serial console and **connect to the shell with MDT** or if you still want to reflash the board, then instead read **flash a new system image**.

4. Start fastboot.

   In your serial console's **u-boot** prompt, execute the following:

   ```
   fastboot 0
   ```

   The cursor should simply move to the next line. Fastboot is now waiting for the host to begin flashing a system image.

5. Disconnect the serial console.

   You won't need the serial console connection anymore, so you can close the terminal and remove the micro-B USB cable.

4: Execute the flash script

Now you're ready to flash the board.

1. Connect the USB-C cable.

   Use your USB-C cable to connect your host computer to the USB-C data port labeled "OTG" on the Dev Board. (If you skipped the above procedure to **initiate fastboot**, then you also need to plug in your 2 - 3A power cable to the USB-C port labeled "PWR" and wait a few moments for the board to power on.)

   Figure 11. A USB-C data cable and power cable connected to the board

2. Verify fastboot sees your device.

   Open a new terminal on your host computer and execute the following command:

   ```
   fastboot devices
   ```

   You should see a line printed like this (your numbers will be different):

   ```
   1b0741d6f0609912        fastboot
   ```

If you don't see anything printed, be sure you have the latest version of `fastboot` (as per the **requirements above**). If you recently updated fastboot but it's still blank, then repeat the steps to **initiate fastboot mode**.

3. **Download and flash the system image.**

   From the same terminal, execute the following:

   ```
   cd ~/Downloads

   curl -O https://dl.google.com/coral/mendel/enterprise/enterprise-eagle-20211117215217.zip

   unzip enterprise-eagle-20211117215217.zip \
   && cd enterprise-eagle-20211117215217

   bash flash.sh
   ```

   This starts the flashing process and you'll see various output.

It takes about 5 minutes for flashing to complete. When it's done, the board reboots and your terminal prompt returns to you.

Now you can continue with the **Dev Board get started guide**.