Workshop: Building end-to-end ML workflows with Arm

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Hands-on session pre-requisites

Step 1: Install VNC (Virtual Network Computing) viewer

In order to control the Raspberry desktop interface through your laptop, it is necessary to install VNC viewer (https://www.realvnc.com). This will allow to control the Raspberry Pi UI using the screen, keyboard and mouse of your laptop.

Note: VNC server is already included with Raspbian OS and it requires to be launched before establishing the connection from your laptop.

VNC viewer is supported on various platforms including Windows, Linux, MacOS, Chrome OS, Android and many more. For this workshop, we recommend installing VNC viewer on Chrome browser through the Chrome Web Store.

https://www.realvnc.com/en/connect/download/viewer/

Chrome browser

1. Install VNC® Viewer for Google Chrome™ from Chrome web store
2. Open Chrome browser
3. In the navigation bar, type:

- chrome://extensions/

4. In the search extensions field, look for VNC viewer and run it

Default login for Raspbian OS

- **User**: pi
- **Password**: raspberry

Step 2: Connecting to Raspberry Pi from Host

Approach 1: Direct Ethernet Connection (Recommended)

Connect to the pi from the host through an ethernet cable alone.

Each pi is already configured to have a static IP address at: 10.0.0.1 for the ethernet port

You need to configure the host machine's ethernet to the following or similar:

- **IP address**: 10.0.0.2 (host's static address)
- **Subnet mask**: 255.255.255.0
- **Gateway/Router address**: 10.0.0.1 (pi's static address)

Windows

1. Connect pi to the host with the ethernet cable and turn on pi.
2. Open Settings. And go to Network & Internet.
3. Go to Ethernet tab and open Change adapter options window.
4. Right click on the **Ethernet** connection (enable it if not already) and open **Properties**
5. In the **Networking** tab, locate **Internet Protocol Version 4 (TCP/IPv4)** in the list and double click on it.
6. Select **Use the following IP address**. And type in the connection addresses as detailed above.
7. Click **OK.**

MacOS

1. Connect pi to the host with the ethernet cable and turn on pi.
2. Open System Preferences. And go to Network.
3. Select your ethernet connection (if you're using a USB to ethernet port, this may display as the driver name like "AX88x72A").
4. In the Configure IPv4 dropdown, select Manually. And type in the connection addresses as detailed above.

5. Click Apply.

Linux (From Ubuntu GUI)

1. Connect pi to the host with the ethernet cable and turn on pi.
2. Open **Settings**. And go to **Network.**
3. Select a **Wired** connection, turn it on, and open **Options**.
4. In the **IPv4 Settings** tab, type in the addresses as detailed above.
5. Click **Save**.

Linux (From Terminal)

1. Connect pi to the host with the ethernet cable and turn on pi.
2. Open terminal (ctrl + alt + t)
3. Find out the ethernet interface name with

```
ifconfig -a
```

   It usually starts with “en” for ethernet.
4. Set up the addresses with:

```
sudo ifconfig <interface name> 10.0.0.1 netmask 255.255.255.0 up
```

Approach 2: Serial Connection

Windows

1. Download and install the PuTTY terminal
   - https://www.putty.org
2. Execute (as administrator) putty.exe
3. Under Connection type, select:
   - Serial
4. In the Serial line field, enter the COM# for your USB serial port. You can find the COM# number from the Device Manager under the section “Ports (COM & LPT)”
5. In the Speed field, type:
   - 115200
6. Click Open.

7. If you cannot see the login screen, press Enter multiple times

MacOS

1. Launch the Terminal app from **Spotlight** (**cmd + space**).
2. In the **Terminal**, enter the command:
    - **$ ls /dev/cu.usbserial-***
3. From the list of devices, copy the name of the device that contains **cu.usbserial**.
4. In the **Terminal**, enter the command:
    - **$ screen /dev/cu.usbserial-*<name> 115200**

    This command will start the serial communication with the Raspberry Pi
5. If you cannot see the login screen, press Enter multiple times

Linux

1. Open the terminal (**ctrl +alt + t**)
2. In the Terminal, enter the command:
    - **$ sudo apt-get install screen**

    Note: Skip if already installed
3. In the **Terminal**, enter the command:
    - **$ ls /dev/ttyUSB***
4. From the list of the devices, copy the name of the device that contains **ttyUSB** (I.e. ttyUSB0)
5. In the **Terminal**, enter the command:
    - **$ sudo screen /dev/ttyUSB<number> 115200**
6. If you cannot see the login screen, press Enter multiple times

Step 3: Use VNC viewer

At this point you should have already connected your pi with your host. Although you can proceed with ssh or serial connection, you may find it easier to control your pi graphically with VNC.

1. If you connected your pi with ethernet, from your host, log into your pi with ssh:

```
ssh pi@10.0.0.1
```

And proceed with your raspbian login credentials

If you connected your pi with serial cable, you should've already logged into your pi.

2. Start the vnc server with:

```
vncserver
```

You should see output like:

```
VNC® Server 6.5.0 (r41824) ARMv6 (Aug 16 2019 00:24:44)

…

New desktop is raspberrypi:1 (10.0.0.1:1)
```

Make a note of the desktop address, which should be **10.0.0.1:1**

3. From your browser, run the vnc viewer, and type in the desktop address.