Install Ubuntu Kylin on HiFive Unmatched

Prepare SD card

Even if planning to use an NVMe SSD long term, the SD card will be required as a first step. This way we can make use of the NVMe drive on the Unmatched to set up the SSD later. The Ubuntu Kylin 20.04 pro pre-installed Unmatched image can be downloaded and decompressed by running the following commands

```
wget https://www.ubuntukylin.com/downloads/download.php?id=90
unxz /ubuntukylin-20.04-pro-sp1-riscv64+unmatched.img.xz
```

Make SD card boot disk

To flash the image to the SD card via the command line, run：

```
dd if=</path/to/image.img> of=/dev/mmcblk0 bs=1M status=progress
```

This command assumes you have the SD card plugged into the SD card slot of the computer. If you are using a USB adapter it may appear as /dev/sdb or something similar instead of /dev/mmcblk0.

Note: be very careful about the “of” argument in the previous command. If the wrong disk is used, you may lose your data.

Booting for the First Time

After the first booting, there will be a default user in the system. After the desktop environment is started, you can use the default user to log in for the first time with Unmatched. Later, you can change the user or password according to your needs.

The default username/password is

```
username:ubuntukylin
password:ubuntukylin
```

At the same time, the following two login methods are also supported

Connecting to the Serial Console

The Getting Started Guide 14 from HiFive explains how to connect to the serial console from a variety of different operating systems. If using an 20.04 Pro RISC-V computer to monitor the serial output, connect that computer to the micro USB port next to the SD card slot on the Unmatched and run

```
sudo screen /dev/ttyUSB1 115200
```

Once the power button is pressed, boot output will start appearing in the screen session.

Connecting via ssh

If the Unmatched is connected to the internet, it is possible to use ssh to log in. Power it up and wait a while for it to boot fully. Identify the IP address of the Unmatched and run

```
ssh <IP of Unmatched>
```

to get a login prompt.

Installing 20.04 Pro RISC-V to an NVMe drive

Using an NVMe drive with the Unmatched makes a huge difference in performance and usability. It takes a little effort to get it working but trust me that it's worth it. SiFive recommends a Samsung 970 EVO Plus. I used a Samsung 970 EVO (not plus) and it works great. The easiest way to install 20.04 Pro RISC-V on the NVMe drive is to boot from the SD card and use the M.2 connector on the Unmatched itself.

Once booted, download the 20.04 Pro RISC-V image to the Unmatched and decompress it by running

```
wget https://www.ubuntukylin.com/downloads/download.php?id=90
unxz /ubuntukylin-20.04-pro-sp1-riscv64+unmatched.img.xz
```

Make sure the NVMe drive is present by running

```
ls -l /dev/nvme*
```

On my board the NVMe drive appears as /dev/nvme0n1. Now flash the image to the NVMe by running

```
sudo dd if=//ubuntukylin-20.04-pro-sp1-riscv64+unmatched.img \
of=/dev/nvme0n1 \
 bs=1M status=progress
```

Congratulations! You have now installed 20.04 Pro RISC-V on the HiFive Unmatched NVMe drive.However, there's still a catch. The Unmatched still needs an SD card present to boot, and there is a race condition that might cause it to mount the root filesystem on the SD card rather than the NVMe drive. To prevent this, mount the newly flashed NVMe drive and chroot into it by running

```
sudo mount /dev/nvme0n1p1 /mnt
sudo chroot /mnt
```

Note: the previous chroot command will only work if using a riscv64 computer to execute it. That is one reason why this tutorial suggests using the M.2 drive on the Unmatched to set up the NVMe drive

Use your favorite text editor to edit /etc/default/u-boot. Add the line

```
U_BOOT_ROOT="root=/dev/nvme0n1p1"
```

To apply these changes, run

```
u-boot-update
```

Exit the chroot environment by running exit, then reboot the system. It will now boot to your NVMe drive and you will have significant performance gains!