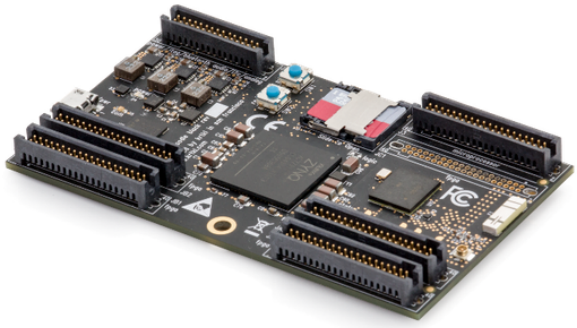
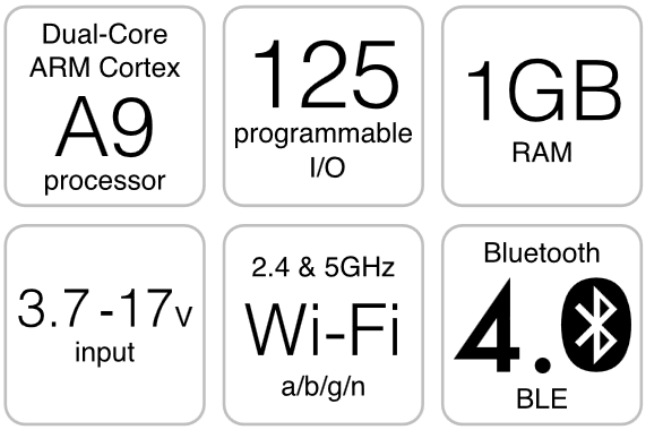
RIT RAVVEN LAB (/)

CREATE SNICKERDOODLE SD CARD (//WWW.RITRAVVENLAB.COM/ZYNQBLOG/ISSUE-2-CREATE-SNICKERDOODLE-SD-CARD)

4/19/2018 0 Comments (//www.ritravvenlab.com/zynqblog/issue-2-create-snickerdoodle-sd-card#comments)

You may be wondering what the Snickerdoodle development board is. Check out krtkl.com (http://krtkl.com/) to find out all about it. I have included some of its specs below. Essentially it is a super small and portable supercomputer containing an FPGA SoC as well as WiFi and Bluetooth. This tutorial will guide you through creating your very own SD card image based on the Ubuntu 16 file system.

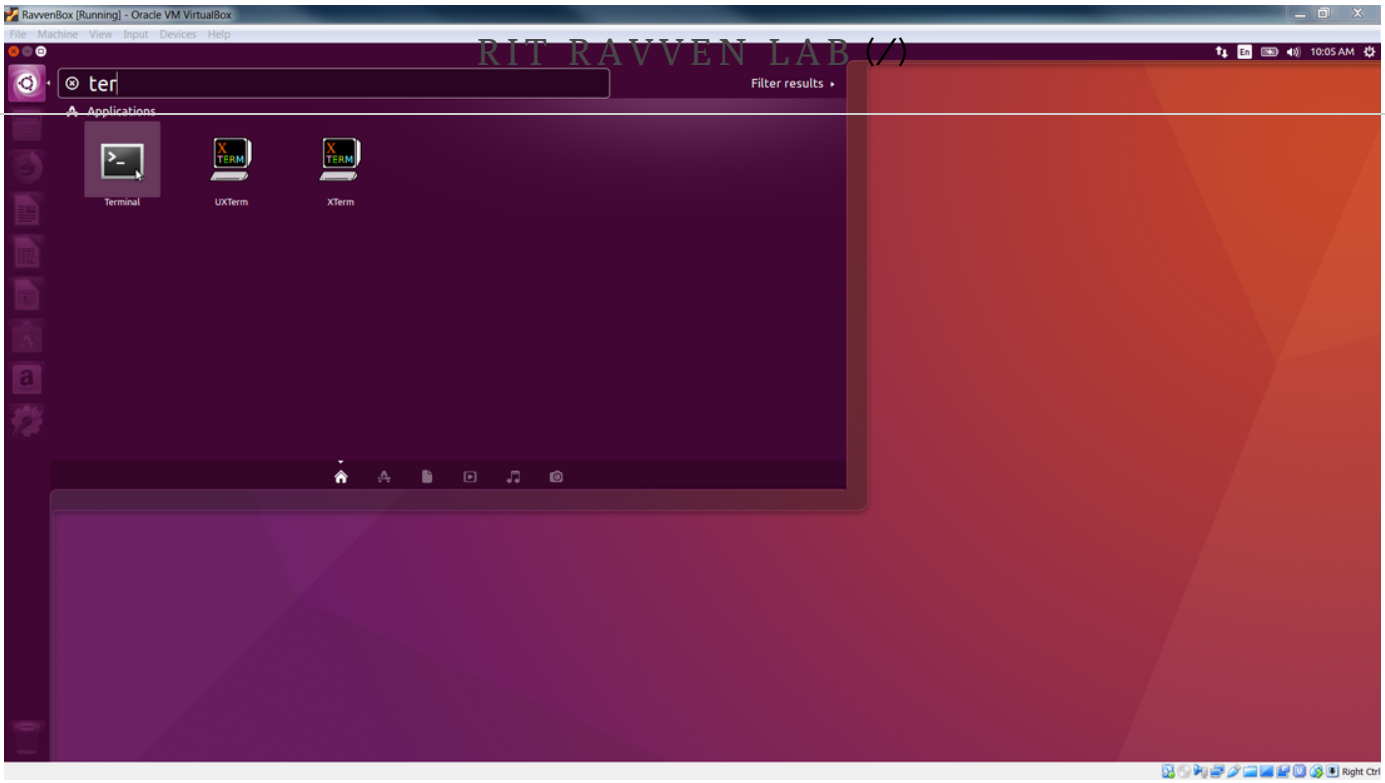


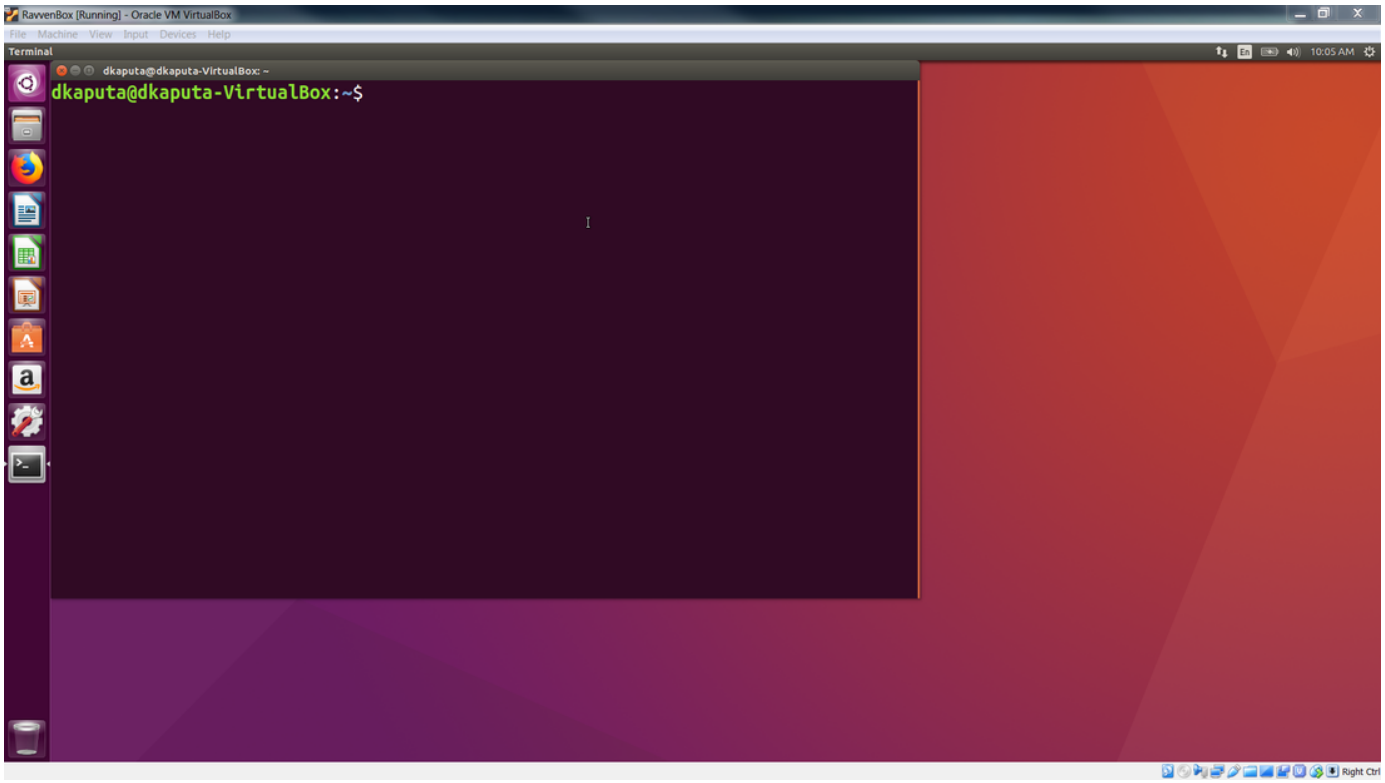


SNICKERDOODLE SPECS

- **Processor:** 2x 667MHz ARM Cortex-A9 (or 866MHz)
- **FPGA:** 430K gates/17.6K LUTs (or 1.3M/53.2K)
- **RAM:** 1GB
- **Flash:** 16MB NOR + microSD
- **Wi-Fi:** 2.4GHz 802.11n SISO (or 5GHz 2x2 MIMO)
- **Bluetooth:** Classic & BLE
- **I/O:** (see BASEBOARD SPECS for more)
  - **Reconfigurable:** 100 (or 125)
  - **Processor:** 54x GPIO
- **microUSB:** console, 5V power
- **Comms:** SPI, I2C, CAN, UART, JTAG, Gigabit Ethernet
- **Power input:** 3.7V to 17V
- **Dimensions:** 2in x 3.5in (50.8mm x 88.9mm)

The first thing you will have to do is start up your linux virtual box which we covered here (/zynqblog/issue-1-setup-linux-virtualbox). Then open up a terminal window by first clicking on the Ubuntu symbol in the upper left, typing *ter*, and then clicking on the terminal icon. Then you should see the terminal open up as shown below.





Once you are at the terminal you need to become the root user by typing sudo -i and then type in your password. Once you are the root user you will need to run the below commands to install the necessary software for the SD card compilation.

- apt-get install vim
- apt-get install git
- apt-get install qemu-user-static

- apt-get install debootstrap
- apt-get install isc-dhcp-server
- apt-get install libssl-dev
- apt-get install kpartx
- apt-get install bison
- apt-get install flex

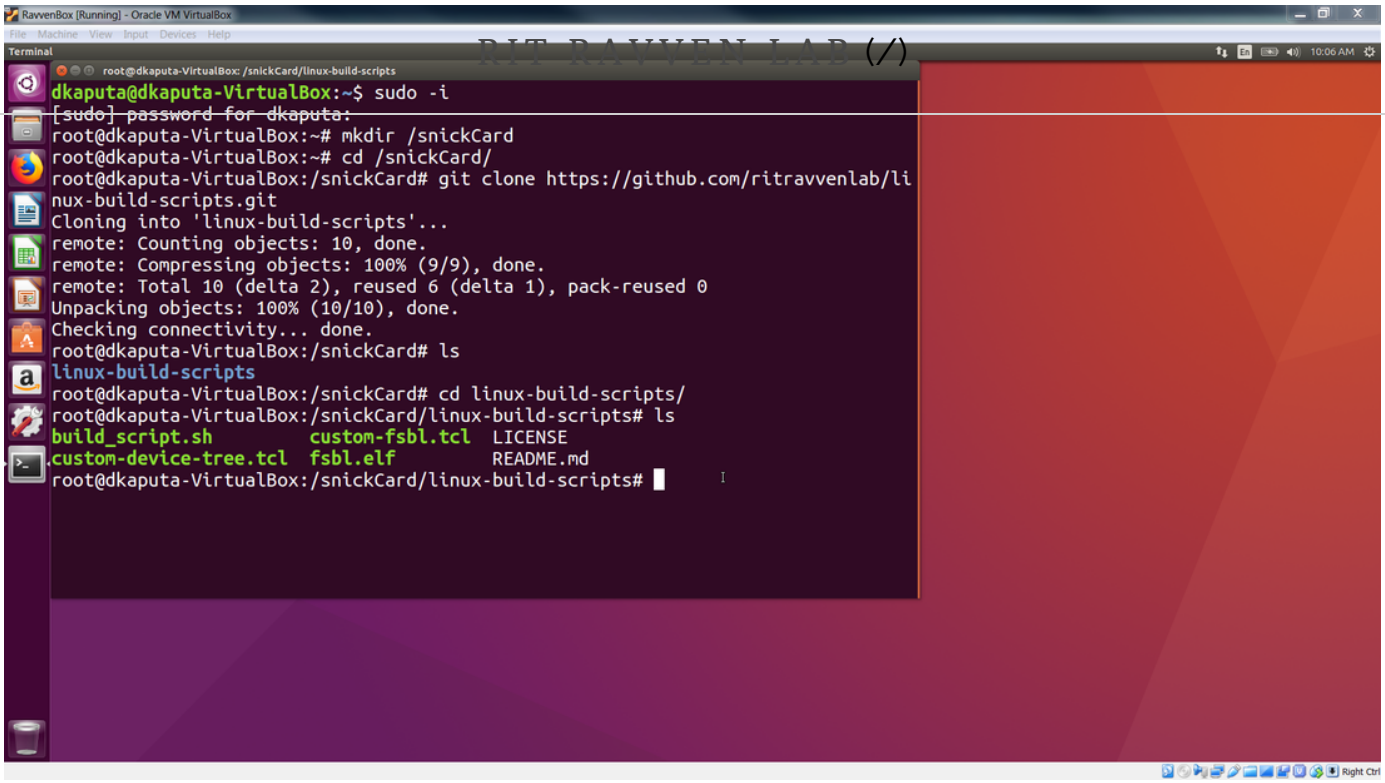
Once you have installed all of the necessary packages, create a directory where you will use as your sandbox to create the SD card. In the example I will create a directory called *snickCard* by typing mkdir /snickCard. The / will instruct the directory to be created at the base directory layer. You can then navigate to the directory by typing cd /snickCard. See the terminal image below. Note that I didn't pull down all the packages in the image as I already had them installed.

Once you are in your development directory you will want to clone the ritravvenlab linux build scripts repository by typing

- git clone https://github.com/ritravvenlab/linux-build-scripts.git

This will pull down the main build_script.sh file that you can use to create the SD card image. I recommend taking a look at the file to see exactly how it works. This file was developed by Russell Bush from Krtkl [and modified by ravvenlabs] and it is truly a masterpiece. It effectively pulls down all the required sources, bootstraps the Ubuntu 16 file system, sets up wireless connectivity [presently setup for RIT], pulls down packages for the file system, compiles the necessary programs like linux and u-boot, and creates an SD card image! You can get a flavor the various command line options that can be run by scrolling all the way to the bottom of the file. A couple things to be aware of however:

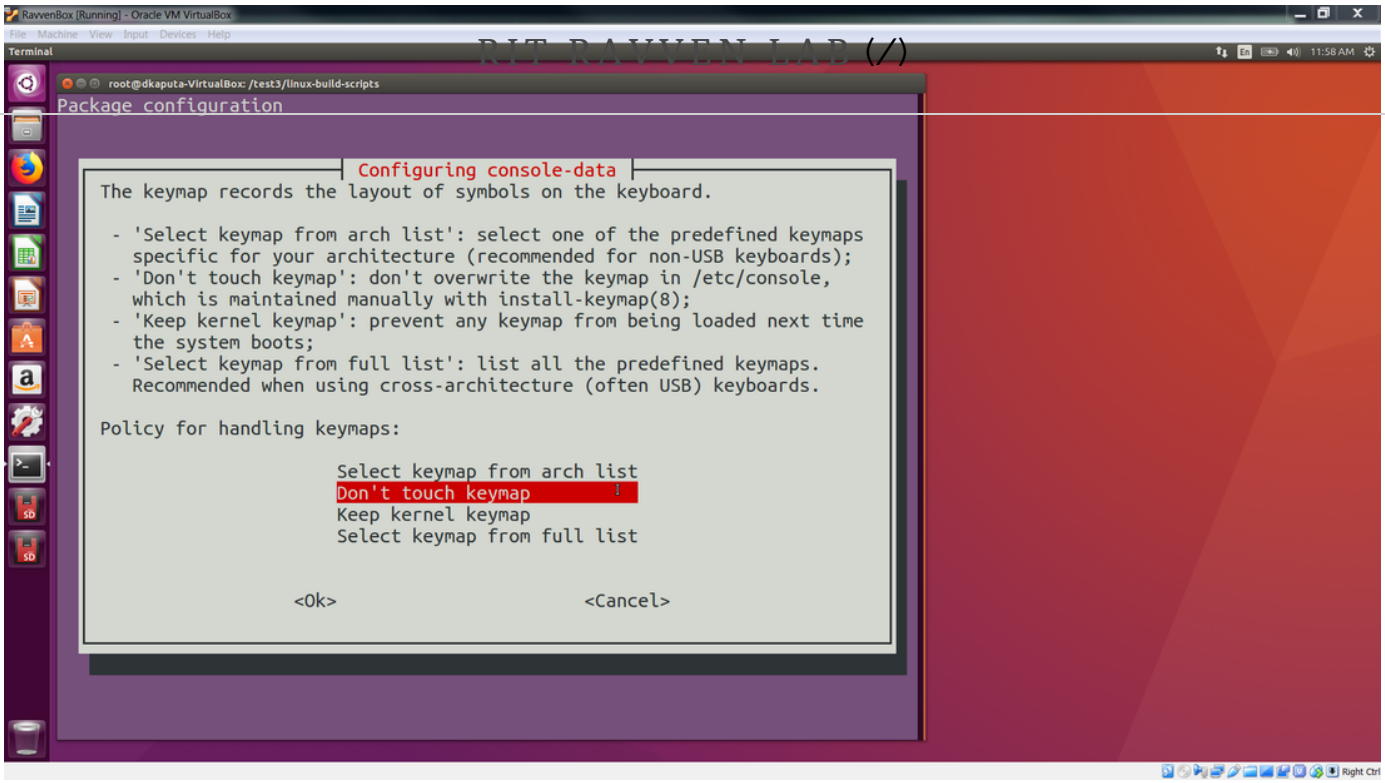
- You might have to modify the path of your Vivado toolchains at the top of the file
- This script uses a default first stage boot loader [FSBL] and device tree that are provided via the repositories If you want to build your own FSBL and device tree there is a special command line argument for that. You will need to modify the custom-device-tree.tcl and custom-fsbl.tcl files however to point to your Vivado project.
- Presently this script file is only for the Snickerdoodle plain. If you want to make an image for a different Snickerdoodle variant you will need to modify the defconfigs for linux and u-boot and use the correct device tree version.

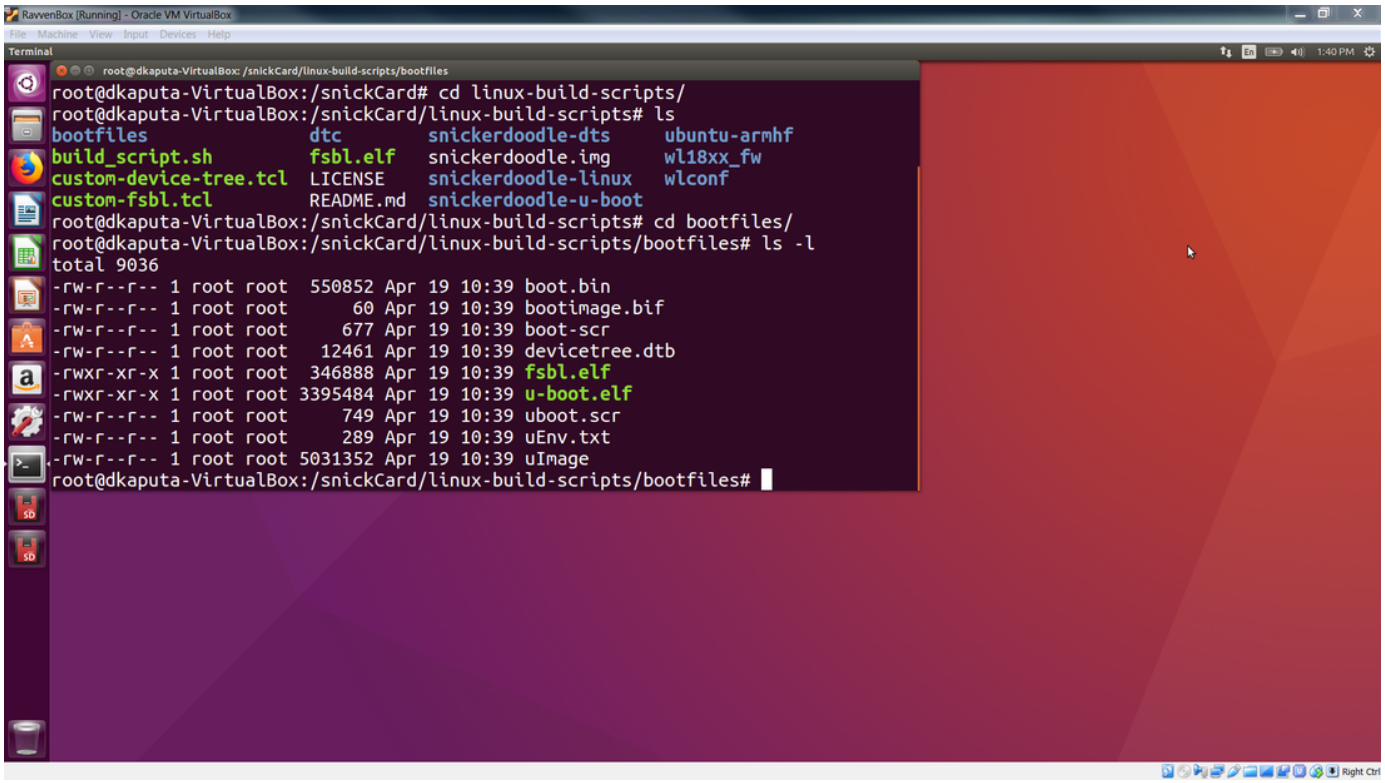


If you are feeling brave you can type ./build_script.sh all however I prefer to split things up a bit. Try the below command sequences: [also you may get prompted about keyboard configurations as shown below during the setup and I just use the defaults]

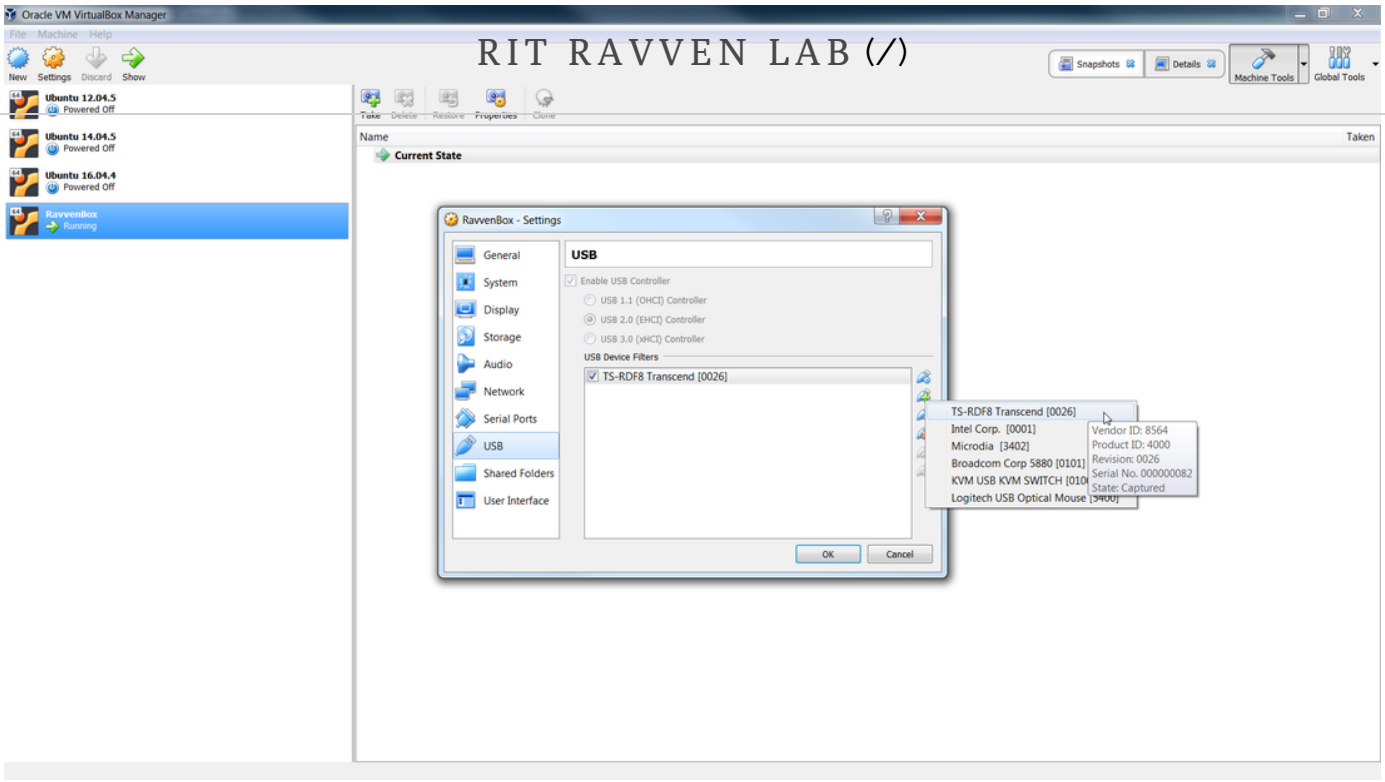
- ./build_script.sh get_sources
- ./build_script.sh rootfs
- ./build_script.sh boot
- ./build_script.sh create_card

If everything goes smoothly you should have a snickerdoodle.img file located in your /snickCard directory.

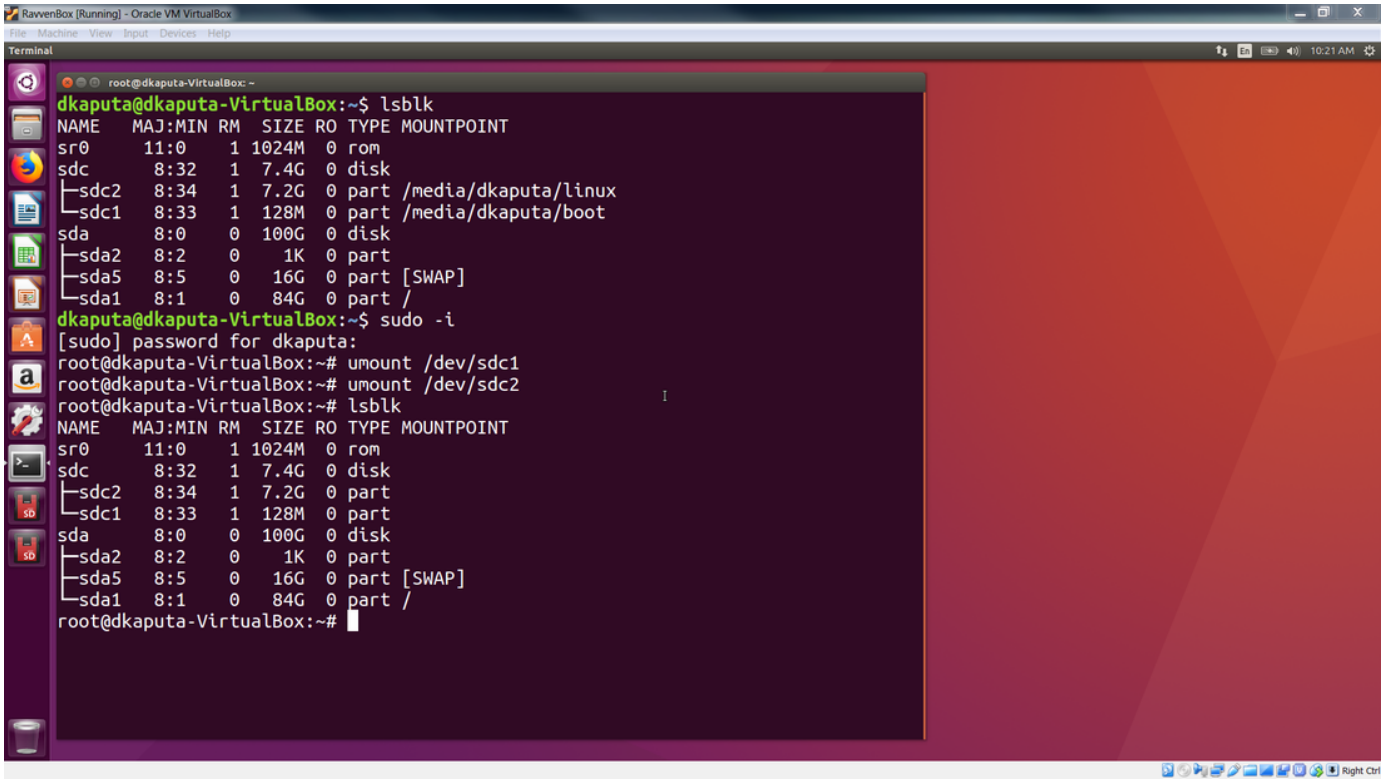




The last step is to copy that image onto your SD card. In order to do that you need to be able to see your SD card from your virtual box. This is sometimes much more difficult than it should be. I use a USB to SD converter module and plug it into my USB2 port. This is important as I have found that USB3 VM drivers are somewhat flaky. After the USB to SD card module is plugged into my USB2 port I then go to the USB tab under my VM settings and add the device as shown below. Once you do this your SD card should be able to be seen in your VM.

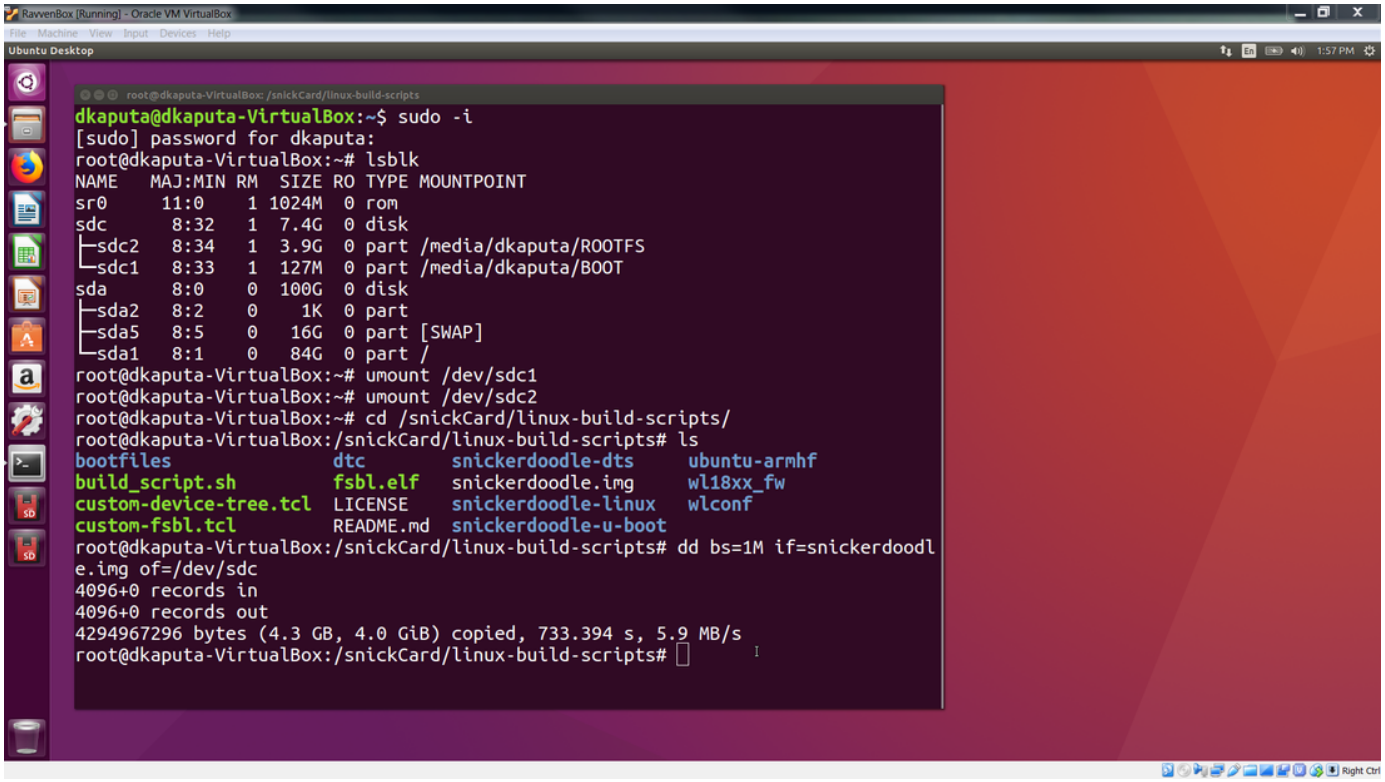


Now you can insert an SD card that will be flashed with the Snickerdoodle image. Be careful not to go crazy and use a 64 GB SD card as when you want to backup its image you will have a bunch of 64 GB backups taking up all of your disk space. I have found that 8 GB is a nice size which allows for roughly 4 GB of programs and gives you 4 GB for data. The first step is to unmount the SD card, and then you can *dd* the image over to it.



WARNING: Make sure to *dd* to the correct */dev/sdx* location. For me it was /dev/sdc but it could be different for you.

- dd bs=1M if=snickerdoodle.img of=/dev/sdc



Once this completes you should have a brand new Snickerdoodle SD card!

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