Notes: From Class Presentations
in
COSC 362: Unix Systems

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October 26, 2023

Preface

These notes will serve as catalog of the work presented in COSC 362 in the Fall of 2023. The goal of the course is to introduce students to the Unix operating system, and different types of computing that can be done on this operating system.

On behalf of the class our apologies in advance for any typographical errors or mistakes that are present in this document. That said, we will do our best to update and correct errors in the document as we are made aware of them.

The due date for the write up for all groups will be 12/1/2023 at 12:00 PM EST (note that this is at noon).

-John Chrispell and the COSC 362 class

Contents

Chapter 1

Installing Linux onto a Tablet

"This chapter contains work done by: "

−Ian Bowser and Kamir Walton

It is commonly known that tablets are like bigger versions of android phones. And an android phone is just like a small computer. So, following that string of logic, a tablet would then just be a bigger computer than an android. With that being the case, is it then possible to put a computer operating system onto a tablet? Well, the short answer is yes, but it is certainly no easy feat. This chapter will cover the steps to loading a different operating system onto a tablet, the barriers of such a task, and also the shortcomings and advantages to doing such a thing.

1.1 Rooting the Tablet

In order to override the existing operating system on an Android tablet, it is first necessary to root the device. But what is rooting exactly? Rooting is a process in which administrative control is gained over an Android device. This then allows the user to do things such as replacing the firmware of the device; something that is incredibly useful when it comes to completely changing the operating system of the tablet. The process to doing such a thing is a little lengthy, however. In addition, tablets have become increasingly hard to root in the recent years as technology has improved its security measures.
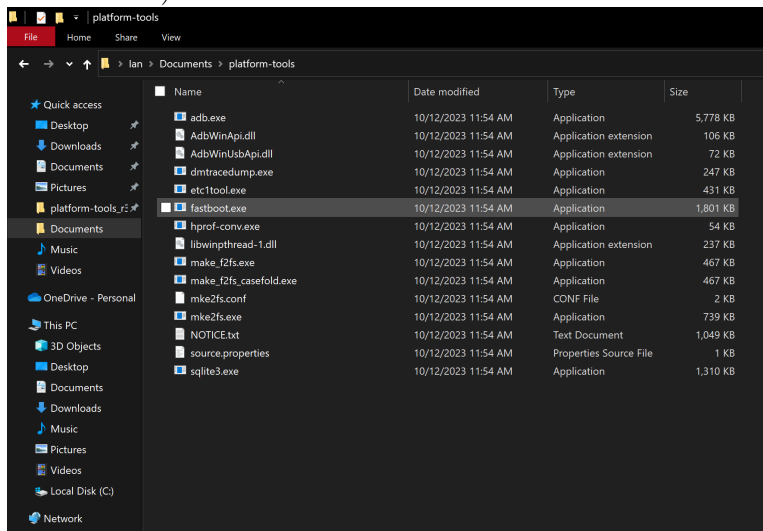
1.2 Unlocking the Bootloader

Unlocking the bootloader is a necessary to be able to load the device with a system recovery and the operating system. There are a several steps involved in rooting a device:

- Install Android SDK

- Enable USB Debugging and OEM Unlocking

- Boot Device to Fastboot Mode

- Unlock Bootloader via Fastboot Command

3

1.2.1 Install Android SDK

Installing the Android SDK Platform Tools is the first step to unlocking the bootloader. These are a set of tools that allow a developer to interact with the Android device. There are two main tools that are included in the SDK Platform Tools that will be useful in rooting the device: adb and fastboot. Adb stands for Android Debug Bridge and is a command line tool that allows developers to communicate with the device. It actually allows access to a Unix shell in order to perform such an action. Fastboot is a tool that interfaces with the Android platform. It can be used for things like accessing all of a device's partitions or loading the device independently of the operating system (which will be useful in this particular case).


1.2.2 Enable USB Debugging and OEM Unlocking

The second step to unlocking the bootloader is enabling USB debugging. This is a setting that can be enabled on an Android device in order to move files between the device and a computer. More specifically, enabling it allows the device to be recognized by the computer in adb mode. This makes it possible to boot the device in Fastboot mode. Additionally, there is another setting that must be enabled in order to further progress in rooting the device. This setting is known as OEM Unlocking. It is responsible for allowing the bootloader to be unlocked. In other words, it allows rooting to be possible on the device. Enabling this setting in particular is an integral part of being able to root the device. Usually, the user would need to go into "developer options" in their settings in order to find this setting. Since this process doesn't change between devices, the steps to finding this setting are as follows:

1. Go to settings

2. Tap About Device

3. Locate the Build Number and tap it 7 times

4. Return to the main Settings screen

5. Go to System

6. Tap Developer Options

It is within "Developer Options" that the aforementioned settings can be found.
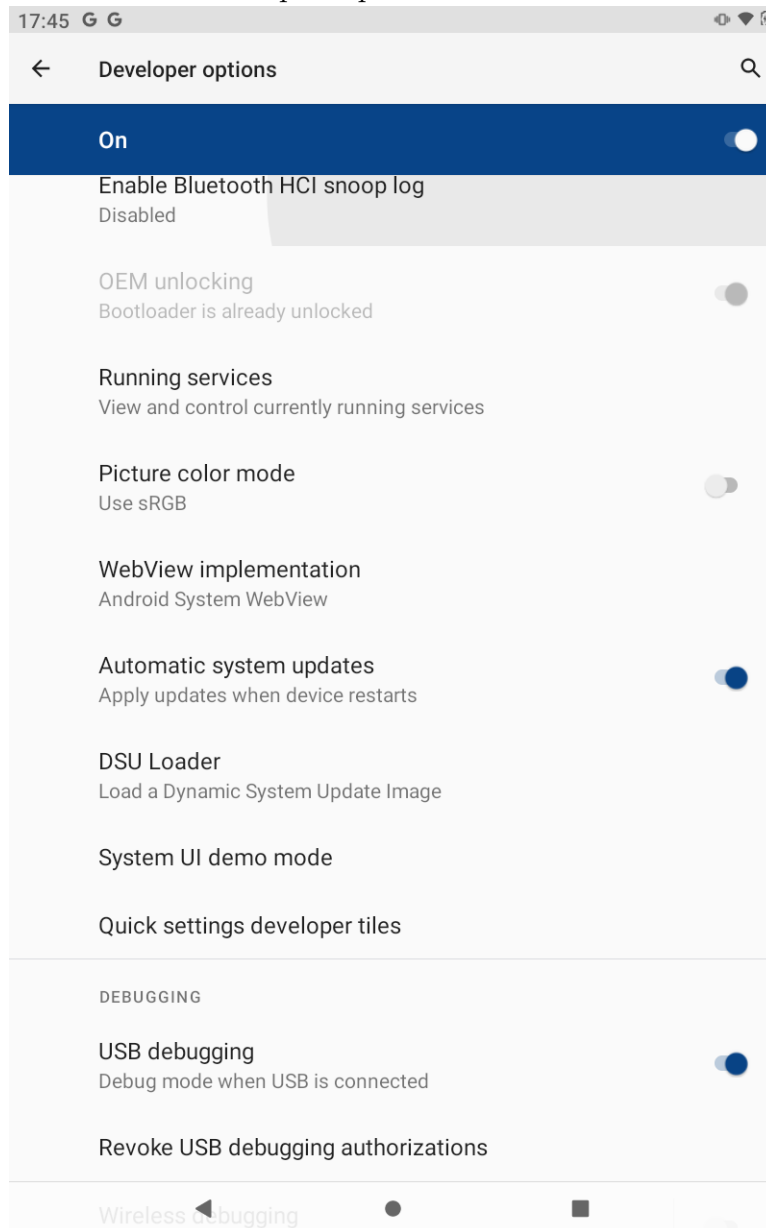
1.2.3   Boot Device to Fastboot Mode

The third step to unlocking the bootloader is booting into Fastboot Mode. In this step, the device will have to be connected to a computer. It is necessary to open folder where the Android SDK Platform Tools were downloaded through the command line. Then, in order to boot the device into Fastboot Mode, type the command "adb reboot bootloader". At this point, the device should be in Fastboot Mode. This can be verified by typing the command "fastboot devices" in the command line. Again, Fastboot Mode allows to a Unix shell that gives the developer the ability to communicate with the device on a very low level.

```
C:\Program Files (x86)\Minimal ADB and Fastboot>adb devices
List of devices attached
bc649b55        device

C:\Program Files (x86)\Minimal ADB and Fastboot>_
```

1.2.4   Unlock Bootloader via Fastboot Command

This is pretty much the final step to unlocking the bootloader. In this step, only one command needs to be run in order to unlock the bootloader and root the device. Type the command "fastboot flashing unlock" into the command line. This command should prompt a confirmation screen to appear on the Android device. Once the operation is confirmed, the device should reboot automatically. If not, then type "fastboot reboot".

```
C:\Program Files (x86)\Android\android-sdk\platform-tools>fastboot devices
HT69D020        fastboot

C:\Program Files (x86)\Android\android-sdk\platform-tools>fastboot flashing unlock
...
(bootloader) Please select 'YES' on screen if you want to continue...
```

1.3   Flash the TWRP Custom Recovery

In order to load the device with a new operating system is to get a custom recovery. This can be done fairly simply by going to the XDA Developers forum. Once there, search for the tablet device in question. XDA is a great resource for everything related to rooting, modding, and custom ROMs. It is here that the instructions for how to get a custom recovery for the specified device will be found. Once found, download it and boot it into TWRP application. Again, this process is done in order to have a copy of the firmware on the device with root access. Once the custom recovery is flashed onto the device, the device should then be rooted. The device should be rebooted after this process.

TeamWin - TWRP

Devices

Search for TWRP for your device here

Search..

OEMs

Alcatel

Allview

Amazon

Amlogic

Archos

Asus

Barnes & Noble

BQ

Cat

Dell

1.4 Installing Linux

Once the device is rooted, installing Linux is a very straightforward process actually. The steps are as follows:

1. Connect to wifi

2. Install BusyBox

3. Install Linux Deploy

4. Open BusyBox and tap Start (this ensures that root permissions are enabled)

5. Tap Settings

6. Choose a Linux Distribution

7. Check the Enable box under GUI to view a Linux desktop

8. Open Graphics and select VNC

9. Choose the Desktop environment you want under GUI settings

10. Find the User name and User password fields and edit them

11. Exit the menu and tap the three dots in the upper-right corner

12. Select Install, then OK

Once those steps are completed, Linux should be installed onto the device. The desktop environment can be viewed by installing VNC Viewer which can be found on the Play Store. Press the start button in Linux Deploy to run Linux and then open VNC Viewer. Connect to localhost:5900 to view the Linux desktop.

And just like that, Linux is installed onto the tablet. That was a very simple process wasn't it? Or perhaps...maybe not...

1.5   Pitfalls to trying to load another operating system

The process of installing linux onto a tablet as described above may seem straightfoward and fairly feasible, however there are many places where this process fails. Many of the failures come with actually trying to root the device. One such example is finding the appropriate firmware for the tablet in use. Some brands of tablets aren't popular enough for their firmware to be posted for people to download. That being the case, it would be impossible to root the device in this scenario. This issue was the very one encountered when researching this topic. As such, the team was indeed not able to successfully root the tablet in order to install a Linux environment onto the device. Small encounters with issues like this are not uncommon when dealing with trying to root an Android device. It should be said that one should first do major research on rooting compatability before purchasing a device that they wish to root.