Custom ROM's in Android

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Abstract—In this paper various things about a custom ROM have been discussed. It focusses on things like what is a custom ROM, how can it be installed, what are the pros and cons of installing the custom ROM, features of a custom ROM have also been discussed. A method of installing a custom ROM is provided in this research paper that will help users to easily install a custom ROM.

Index Terms: Rooting, Custom ROM, Superuser, Stock ROM

I. INTRODUCTION

"A ROM is the operating system software that runs the Android. It is stored in the Read Only Memory portion of the hardware on the Android smartphone and/or tablet. All Android devices come with a stock ROM installed by the manufacturer. But, if you root your device, you gain the ability to install custom ROMsthat will completely change the look and feel of the software. This is one of the major reasons that people choose to root their Android devices".
[1]
There are two types of ROM's available for the android device, they are described below:

Stock ROM: The ROM or the operating system provided by default by the device manufacturer. It is the official ROM for the device.

Custom ROM: It is not the default ROM, it is developed mostly by the third party developers. It can either be a modified version of the stock ROM or it can be completely different from the stock ROM.
Both custom ROM's and Stock ROM's for Android have their own advantages as well as limitations that are discussed further in this paper.
Generally, it is difficult to remove the bloatware from the android device but, the custom ROM can do so.
Though rooting is an illegal process, still most of the users root their devices to get a modified version of the operating system or the version that the manufacturer has decided not to release for their devices.
Rooting may increase the performance of the device,it may also improve the battery life, add tweaks & additional features like themes etc.

Related terms:-
ART: ART stands for Android Runtime It was first introduced in Android 4.4 i.e. kitkat. With the art support the battery life and performance of the device increases.

Bootloader: The Bootloader runs beforeoperating system starts (like a PC's BIOS). When a user buys a new device, the bootloader is locked but a user can unlock it by rooting the device.
For some of the devices, the permission has to be taken from the manufacturer to unlock the bootloader e.g. HTC Smartphones.
Busy Box: The soul of the android is Linux/UNIX i.e. android is linux based. But very limited number of commands are offered by UNIX so a busy box needs to be installed.
Dalvik: A virtual machine that is used to process the code of android. It translates the application code into actions in android devices.
Fastboot: An engineering tool that offers several features such as launching in recovery mode or flashing image files.
Kernel: The kernel is the brain of the device. The kernel acts as an interface between the user software and the applications.
Recovery Mode: It offers the system level functions that can be performed with a device. For example defragmentation, formatting, creating a copy of the stock ROM, etc.
Rooting: In order to gain the administrator control of the device, an android device can be rooted. The warranty of the device can be voided if the device is rooted.
Also rooting is an illegal process as stated in this paper above. This process can be reversed by simply flashing a stock-ROM (the original ROM installed by the manufacturer). Doing this might restore the warranty of the device.
Superuser: The user with full administrative privileges for accessing the device is known as a super user. Super user is unlocked when the device is rooted.
Flashing the ROM: Flashing a ROM means installing the system image into the device's internal flash memory. Flash memory holds the Android's firmware, the same as most other devices with an embedded OS.[2]
Steps for rooting an Android device:
(Here the device considered for rooting is Samsung Galaxy Note 10.1 but for different devices, this procedure may vary).

The things that are needed to root the device are:
A Galaxy Note 10.1 device installed with the Kies software and USB debugging must be enabled on the device.
The USB drivers for the device.
PC with windows operating system.
ClockWordMod recovery software along with its root files.

A complete backup of the original data.

Installing ClockWorkMod Recovery on Samsung Galaxy Note 10.1:
1. Download the ClockworkMod Recovery software and install or flash the it.
2. Download the RootGalaxyNote10.1.zip and extract its contents in a folder. Files included in this folder are; odin3
   v1.85.exe, odin3.ini, highonandroidcwmrecoverygtn8000.tar and cwm-supersu-v0.94.zip.
3. Run the Odin3 v1.85.exe
4. After Odin has successfully launched, click the PDA button and locate and selectHighOnAndroidCWMRecoveryGTN8000.tar [3]
5. Do not change any options found in Odin [3]
6. Turn off your Galaxy Note 10.1 device that is being rooted.
7. After the device has turned off, turn it on again by pressing the Volume Down &Power Button together. Press Volume Up and go to Download Mode after a "Warning" message appears
8. Connect the device (Galaxy Note 10.1) to windows PC through USB and then Odin will show a message saying "Added" at its bottom left corner.
9. If the message "Added" did not appear there is something wrong with your drivers or your PC could not detect your tablet. Try doing it again or reinstalling the drivers. [3]
   10. Click start button on Odin to start flashing. A message saying that it is safe to disconnect your tablet from your PC should appear.[3]
   11. You are done. You can now use the ClockWordMod Recovery to fully back up and make a ROM of your Galaxy Note.[3]

Rooting Samsung Galaxy Note 10.1
   It is important to install ClockWorkMod Recovery before trying to root Samsung Galaxy Note 10.1 device:
1. Connect Galaxy Note 10.1 to windows PC and copy the CWM-SuperSU-v0.94.zip to the SD card of your Galaxy Note 10.1 device. Do not extract, just copy.
2. Turn off the Galaxy Note 10.1 device.
3. Turn it on again by pressing Volume Up + Volume Down + Power Button together, this will enter your tablet to ClockWorkMod Recovery menu. [3]
4. Select Install ZIP from SD card on the CWM Recovery menu by using the Volume + /Volume – button to navigate.[3]
5. After selecting Install ZIP from SD card, select CWM-SuperSU-v0.94.zip it and confirm.
6. Select the Reboot System now from the CWM Recovery menu after you have successfully rooted the device.
7. Turn on the device and find the SuperSU from application menu. Connect to internet and launch this application.
8. Just hit Continue and Ok and you're done Close the app and your Galaxy Note 10.1 is now rooted.[3]

Benefits of rooting (installing custom ROM) an Android Device
1. Latest version of android can easily be installed if the manufacturer does not release the update for the device.
2. Latest version of android can be installed before the manufacturer releases the official update.
3. There are additional software installed in the custom ROM that can help in enhancing the speed of the device.
4. User can easily take backup of all applications or games in a rooted device onto the memory card which is not possible in non- rooted devices.
5. The applications that are by default provided by the manufacturer consumes a lot of internal storage space. These applications cannot be removed in non-rooted devices, but for rooted devices removing the default applications is possible thereby, freeing a lot of internal memory that can be used for many other purposes.

Disadvantages of rooting (installing a custom ROM)
1. Applications can be downloaded from various sources other than the play store (the default market space for downloading the android applications) in a rooted device, which can raise the security issues.
2. The applications might not work correctly if the device is not rooted properly, it may even damage the kernel and may result in a lot of bugs in the device.
3. The manufacturer's warranty for the device gets void if the device is rooted.

II. CONCLUSIONS

To gain the full control (administrative control) over the device, an android device can easily be rooted. Rooting is installation of the custom ROMS in the device.
Android is open source thus, it is easy to access its code. Making the changes in the android's official ROM code may result in new ROM's. There are various pros and cons of rooting a device as discussed above. The user with full administrator control is known as a super user. And to be a super user a user has to root his/her device.

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