Android Virtual Machine (VM) Setup on Linux

by Ken F Yu

Approved for public release; distribution unlimited.
NOTICES

Disclaimers

The findings in this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

Citation of manufacturer’s or trade names does not constitute an official endorsement or approval of the use thereof.

Destroy this report when it is no longer needed. Do not return it to the originator.
Android Virtual Machine (VM) Setup on Linux

Ken F Yu
Computational and Information Sciences Directorate, ARL
The native Android Virtual Machine (VM) acts as an actual Android device and has improved speed performance over the Android Software Development Kit (SDK) emulator. The purpose of this document is to provide a detailed guide on how to effectively debug an Android application without the actual Android device and how to improve speed performance over the default Android emulator using an Android VM on an x86 host computer.
## Contents

List of Figures iv

1. Software Requirements 1

2. Android Setup on VirtualBox 1

3. Conclusions 14

4. References 15

List of Symbols, Abbreviations, and Acronyms 16

Distribution List 17
List of Figures

Fig. 1   Select operating system .......................................................................................................1
Fig. 2   Select memory size ..............................................................................................................2
Fig. 3   Select hard drive ..................................................................................................................2
Fig. 4   Select hard drive file type ....................................................................................................3
Fig. 5   Select hard drive type ..........................................................................................................3
Fig. 6   Select file location and size ................................................................................................4
Fig. 7   Select storage type ...............................................................................................................4
Fig. 8   Select installation option ....................................................................................................5
Fig. 9   Select partition option .........................................................................................................5
Fig. 10  Select drive type ..................................................................................................................6
Fig. 11  Set drive type .....................................................................................................................6
Fig. 12  Set drive size .......................................................................................................................7
Fig. 13  Select bootable drive ..........................................................................................................7
Fig. 14  Select write option .............................................................................................................8
Fig. 15  Answer <yes> to write partition option .............................................................................8
Fig. 16  Quit program .......................................................................................................................9
Fig. 17  Select installation partition ................................................................................................9
Fig. 18  Select <filesystem> type ..................................................................................................10
Fig. 19  Answer <yes> to format ....................................................................................................10
Fig. 20  Answer <yes> to install GRUB .......................................................................................11
Fig. 21  Answer <yes> to read-write option .................................................................................11
Fig. 22  Select <run> option .........................................................................................................12
Fig. 23  Disable Android ISO image from launch ........................................................................12
Fig. 24  Android welcome screen ..................................................................................................13
INTENTIONALLY LEFT BLANK.
1. Software Requirements

The following software packages are required:

1) VirtualBox\(^1\) can be used as a Virtual Machine (VM) to emulate Android natively.

2) Android-x86\(^2\) can be installed on any Intel-processor-based VM.

3) The Software Development Kit (SDK)\(^3\) can be used to interact with the Android VM, but it is not necessary to install it on an Android VM.

2. Android Setup on VirtualBox

Before the Android VM can be used, the VirtualBox from Oracle must be installed. After VirtualBox is installed, type the command `<virtualbox>` from the console to start the VirtualBox application. Then, create an Android VM on Linux using the following procedures:

1) Click the `<New>` button VirtualBox. It will bring up the VirtualBox setup screen. Type the name of the VM (i.e., Android). Select the Type: Linux. Select a Linux version, such as `<Linux 2.6>`. Click `<Next>` (Fig. 1).

![Fig. 1 Select operating system](image)
2) Pick the memory size, such as 1024 MB, click <Next> (Fig. 2).

Fig. 2  Select memory size

3) Create a virtual drive, click <Next> (Fig. 3).

Fig. 3  Select hard drive
4) Select <VDI (Virtualbox Disk Image)> disk image type (Fig. 4).

Fig. 4   Select hard drive file type

5) Select the storage type: “Dynamically allocated” is preferred (Fig. 5).

Fig. 5   Select hard drive type
6) Next, pick the VM size (Fig. 6).

Fig. 6  Select file location and size

7) Go to the VirtualBox setting, select the storage type, and select the Android ISO image that was downloaded (Fig. 7).

Fig. 7  Select storage type
8) Run the VM that was just created with the Android ISO attached. Select the installation option (Fig. 8).

![Fig. 8 Select installation option](image)

9) Select the <Create/Modify partitions> option. Click <OK> (Fig. 9).

![Fig. 9 Select partition option](image)
10) Click <New> for the Primary Drive (Fig. 10).

![Fig. 10 Select drive type](image)

11) Select the <Primary> option (Fig. 11).

![Fig. 11 Set drive type](image)
12) Set the size of the Primary Drive: <default> is sufficient (Fig. 12).

13) Select a <Bootable> drive (Fig. 13).
14) Select the <Write> option (Fig. 14).

Fig. 14 Select write option

15) Answer <yes> to the <write partition table to disk> question (Fig. 15).

Fig. 15 Answer <yes> to write partition option
16) After the <write> process is done, select <Quit> (Fig. 16).

![Fig. 16 Quit program](image)

17) Select the <sda1 Linux> option. Click <OK> (Fig. 17).

![Fig. 17 Select installation partition](image)
18) Select the <ext3> option. Click <OK> (Fig. 18).

![Fig. 18 Select filesystem type](image1)

19) Click <yes> in response to the formatting question (Fig. 19).

![Fig. 19 Answer yes to format](image2)
20) Install GNU GRand Unified Bootloader (GRUB) and click <Yes> (Fig. 20). GRUB provides more flexibility to boot different Linux installations during startup.

Fig. 20   Answer <yes> to install GRUB

21) Select <Yes> in response to the <install/system directory as read-write> question (Fig. 21).

Fig. 21   Answer <yes> to read-write option
22) Select the <Run Android-x86> option (Fig. 22).

![Fig. 22 Select <run> option](image1.png)

23) When Virtualbox is started, go to the <Devices->CD/DVD Devices->Remove the disk from virtual drive> option to remove the Android ISO (Fig. 23).

![Fig. 23 Disable Android ISO image from launch](image2.png)
24) After Android is booted, the Android Welcome screen appears (Fig. 24). This shows that the installation was successful on the VirtualBox. Next, go through the normal Android setup processes, and the Android device will now be activated for use.

![Android Welcome Screen](image.png)

Fig. 24 Android welcome screen

25) After the Android on VM is successfully started, it needs to connect to the Linux host computer.

26) Setup the virtual box as a “Host-only Network” using the VirtualBox Preference Menu. Go to <File->Preference->Network>, choose <Host-only Networks>, and click the <Add> icon. Use the default name <vboxnet0>.

27) Select the VM just created; click the <Settings> button, go to the <Network> setting. Under <Adaptor 1> selection, pick the <Attached to> option to <Host-only Adaptor> and make sure the <Name> is set to <vboxnet0>. Click the <OK> button.

28) Open a new terminal, and type the command <ifconfig> to list all possible connected network devices on the host computer.

29) Find the device with <vboxnet0>, and use the same subnet for the new Android VM. For example, if the Internet Protocol (IP) address for <vboxnet0> is 192.168.56.1, then use 192.168.56.101 as the IP address for the Android VM.
30) Assuming that the Android SDK is installed correctly, type <adb start-server> to start the Android-to-host-computer connection process.

31) Type <adb connect (ip of VM)> to connect the VM—for example, <adb connect 192.168.56.101>.

32) Type <adb devices> to determine whether the VM is actually connected.

33) If there is more than 1 device connected to the host computer, then type <adb –s device-ip shell> to connect the device you want to the host computer—for example, <adb –s 192.168.56.101:5555>. You must type the full name of the device including port (as shown in the <adb devices> command) to connect the device.

34) Type <adb devices> to verify the devices are connected.

---

3. Conclusions

This step-by-step guide provides details on how to setup the VM running Android on an x86-based processor.
4. References


2. Android-x86 – Porting Android to x86. [accessed 24 July 2014].
   http://www.android-x86.org/.

### List of Symbols, Abbreviations, and Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRUB</td>
<td>GNU GRand Unified Bootloader</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
</tr>
<tr>
<td>SDK</td>
<td>Software Development Kit</td>
</tr>
<tr>
<td>VDI</td>
<td>Virtualbox Disk Image</td>
</tr>
<tr>
<td>VM</td>
<td>Virtual Machine</td>
</tr>
</tbody>
</table>