

Installing and configuring an Android device emulator

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EntwicklerCamp 2012

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Lab objectives

The purpose of this lab is to install and configure an Android emulator to be able to access server-side mobile applications and for the purpose of installing client-side mobile applications

Time estimate

You should be able to complete the lab in around 45 minutes.

Prerequisites

Appropriate Skill Level:

- No prerequisite skills required

Computer Specification:

- Linux or Windows O/S
- 500Mb free disk space
- At least 3Gb of memory (the emulator may work with less but they will be extremely slow)
- (optional) Lotus Greenhouse ID
- Internet connectivity

Getting started

This lab includes the following:

- Installing and configuring the Android device emulator
- Accessing server-side mobile applications
- Installing client-side mobile applications

Setting up the device emulator

The latest version of the Android SDK tools can be downloaded from the following URL

<http://developer.android.com/sdk/index.html>

However, your moderator will provide you with the install files required for SDK R16.

Note that even though a Java Runtime Environment (JRE) should be enough to

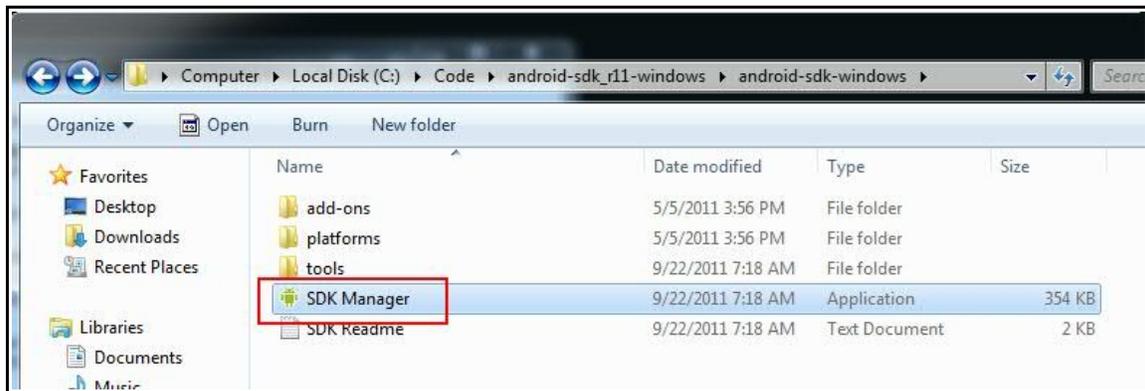
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run the Android emulator, you will not be able to start the SDK Manager if you don't have a Java Development Kit (JDK).

You are recommended to install one from here, but your moderator will also provide a local copy:

<http://www.oracle.com/technetwork/java/javase/downloads/index.html>

1. Unzip the toolkit file and run the **SDK Manager** application



2. The program will search for updated packages to install. To save on disk space, it is advisable to just install the platforms that you really need. For example, this lab has been tested by installing the following additions

- GALAXY Tab Addon
- SDK Platform Android 2.2, API8, revision 3 (required version for using the GALAXY Tab Addon)
- Android SDK Platform-tools, (revision 7) required for some of the device manipulation we will explore later in the lab)

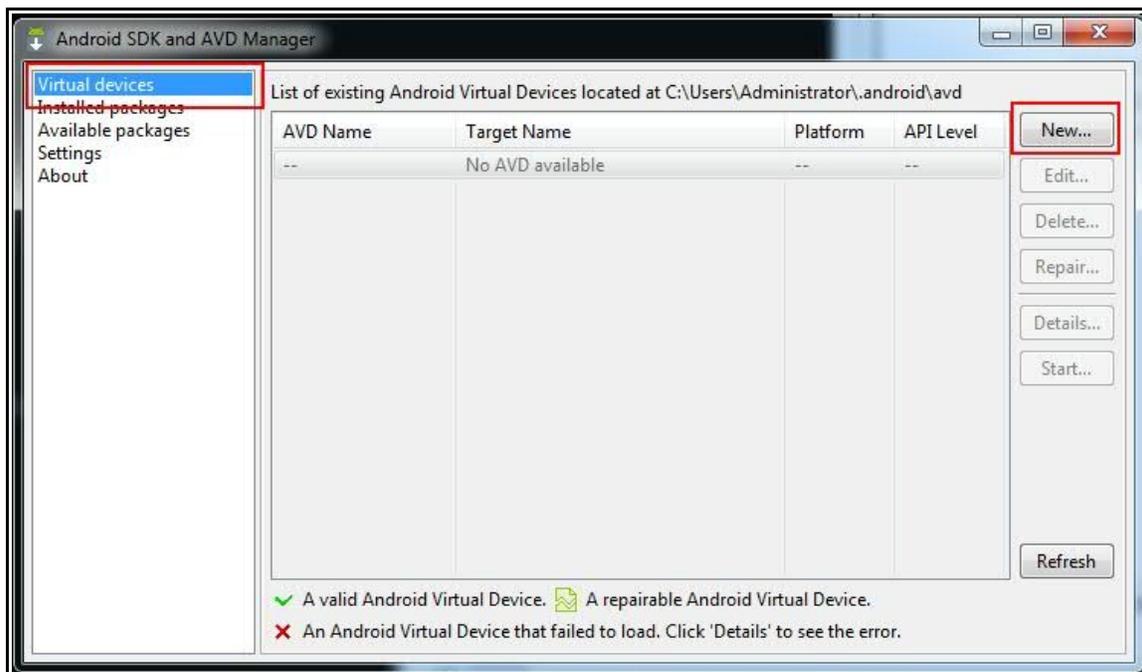


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Note that you do not need to use the GALAXY Tab UI, or any other – but it does have the look and feel of a real phone rather than the default UI for the Android emulator as seen from the pictures below.

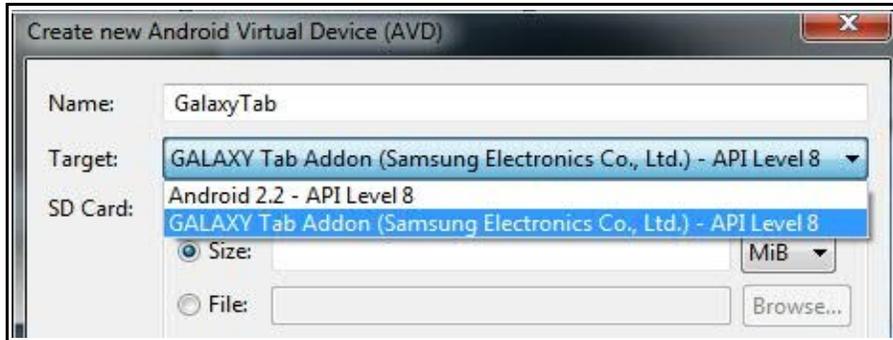


3. In the SDK Manager, select **Virtual devices** from the navigator and then click **New**



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4. Enter a name for your virtual device and select the target.

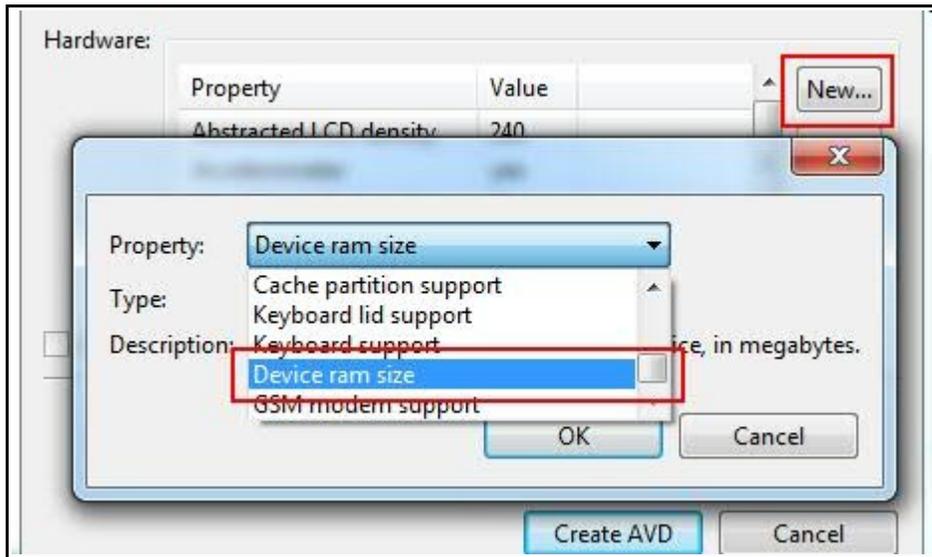


5. If you want to install any applications locally you will probably need to add an SDcard – but, when selecting the size of the card, be aware that the full disk space is pre-allocated in the virtual image file. To complete this lab, please select a **20Mb** SD card.
6. Snapshots can be useful to allow you to pre-configure the virtual device with applications or settings and have the image immediately start with these available. This considerably speeds up the time to launch the emulator which can take several minutes, the first time it is loaded.

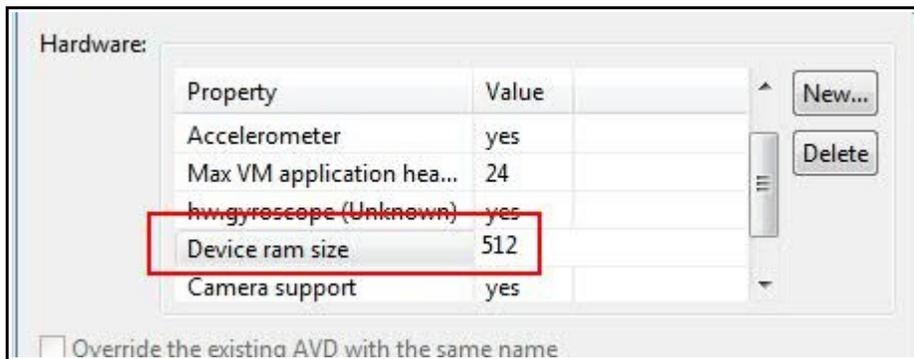


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7. The hardware section shows the main default settings for the device you have selected and you can change these values if you need to. One value that is available but not shown by default is the device RAM size and it is advisable to add this.

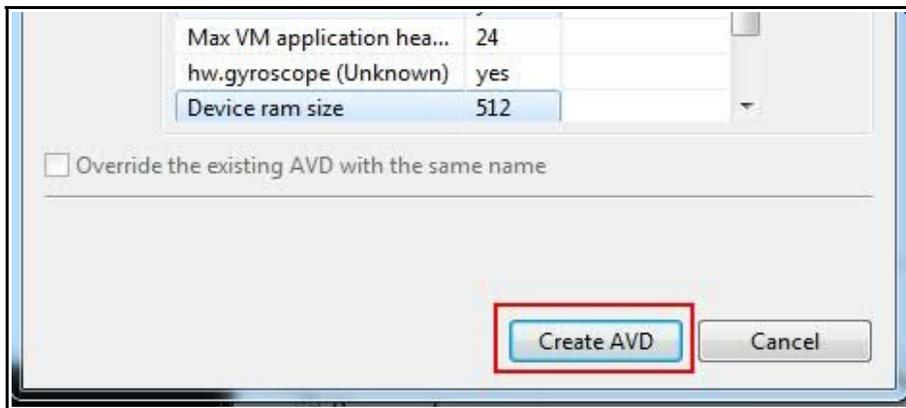


8. Note that when added the value is set to 0 so you will want to change this to something more appropriate!

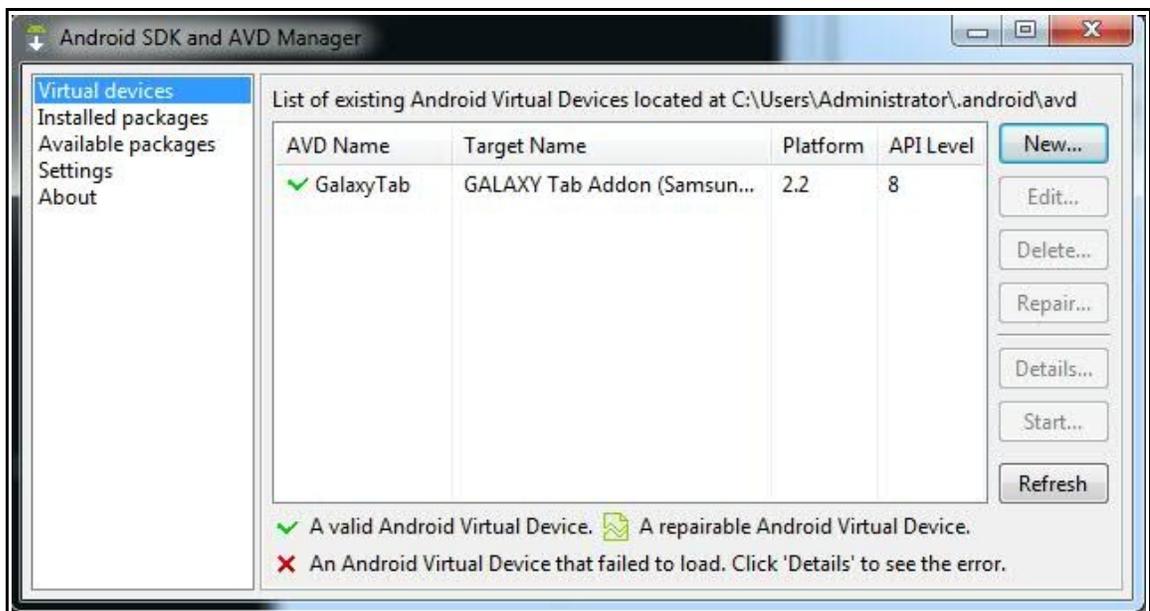


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9. When you have finished configuring the device, click **Create AVD**



10. You should then see your device in the list.



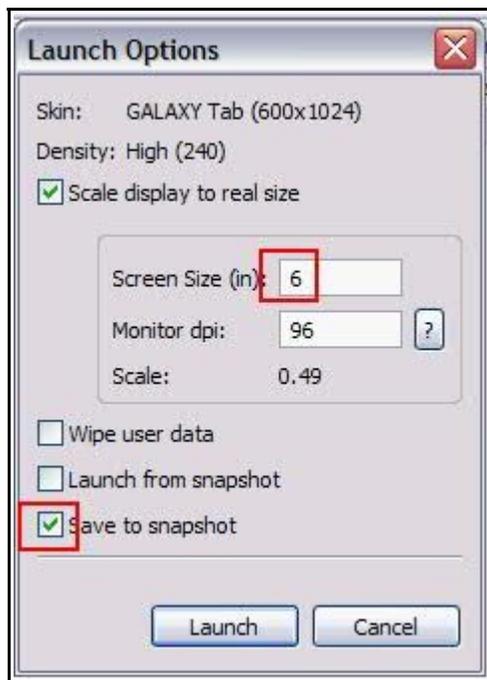
Note that, by default, the physical file that represents your virtual device is stored in the user's directory on the local machine eg: on Windows 7

```
c:\Users\Administrator\.android\avd\GalaxyTab.avd
```

and not in the SDK directory.

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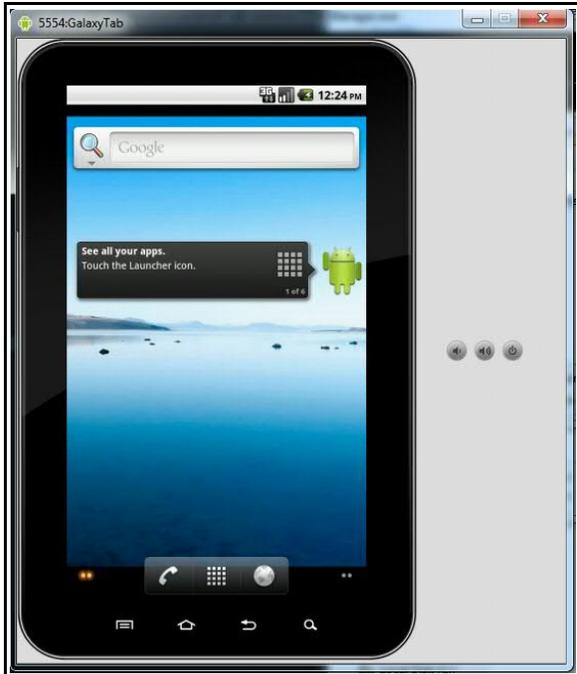
11. Select your device in the list and click **Start**.
12. When prompted you can select to scale the screen size. The default (3 inches) is rather small so you will probably want to increase this.
13. You can also choose whether to launch from a snapshot (if you already have one) and/or save to a snapshot when you finish using the device.



14. Check the box to **Save to snapshot**. Note that you can override your choice to save / not to save a snapshot later, using some of the command-line tools.

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The device emulator can take more than a minute to start up but eventually you should get a screen like this.



15. As you are able to type into the Android device from your computer keyboard, it can be helpful (and improve performance) if you disable the Android soft keyboard. To do this select the App launcher

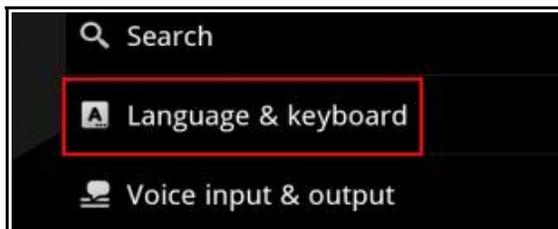


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16. Then select **Settings** from the applications screen.



17. Scroll down the list (click and drag with the mouse) until you find the **Language & keyboard** option.



18. Deselect **Android keyboard**



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19. Scroll further down the list and click on **Device keyboard**



20. Disable all three options here



21. Click the **Return** button (at the bottom of the screen) three times to return to the Applications screen.



22. Click on the browser icon and type in the URL for IBM.com
`http://www.ibm.com`

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Notice that the site recognizes that it is being accessed by a mobile device and switches to the mobile interface.



23. When you have finished exploring the basic functionality of the device emulator, click on the **X** in the top right corner to close it.

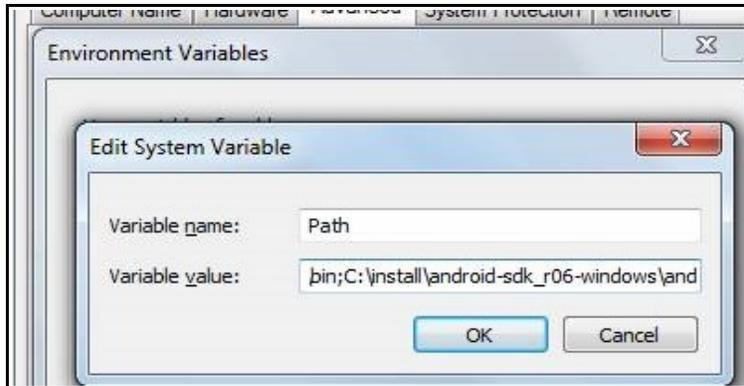


Note that, because you selected to save as a snapshot, the device will take a while to close down. However, the next time you start the device (and choose to start from the snapshot) it will retain all of the settings you configured.

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Important for further integration with Eclipse:

Add the android-sdk-<os>/tools directory to your PATH variable:



Greenhouse applications

The following Android mobile applications can be accessed on and/or installed from the Greenhouse servers from these URLs.

	Web (server-side) app – access from	Native (client-side) / Hybrid app – download from
iNotes	http://greenhouse.lotus.com/mymail	
Traveler		http://traveler.lotus.com
Connections	http://greenhouse.lotus.com/mobile	Download apk file from http://9.180.24.234/com.ibm.lotus.connections.mobile_v3.0.1.apk then configure for http://greenhouse.lotus.com/mobile
Sametime IM		Download apk file from http://9.180.24.234/AndroidSametime.apk then configure for ?? <awaiting information from greenhouse>

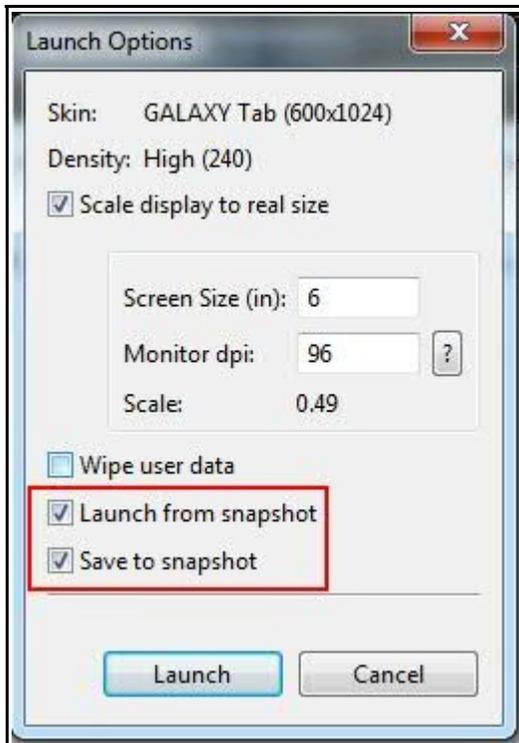
For more information on the specific steps on installing an application see the next section.

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Installing native/hybrid (client-side) applications

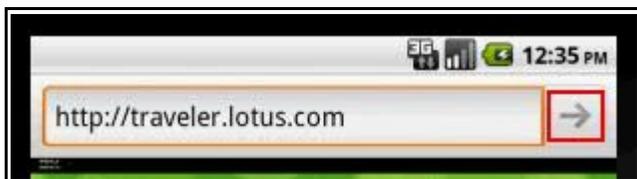
For an example of how to install a native/hybrid application on the Android emulator follow these steps to use the Greenhouse site to install Traveler for Android.

1. Start your virtual device from the SDK Manager and select to **Launch from snapshot** as well as **Save to snapshot**.



Note that the device starts more quickly than the first time and takes you wherever you were on the device at the time you closed it down.

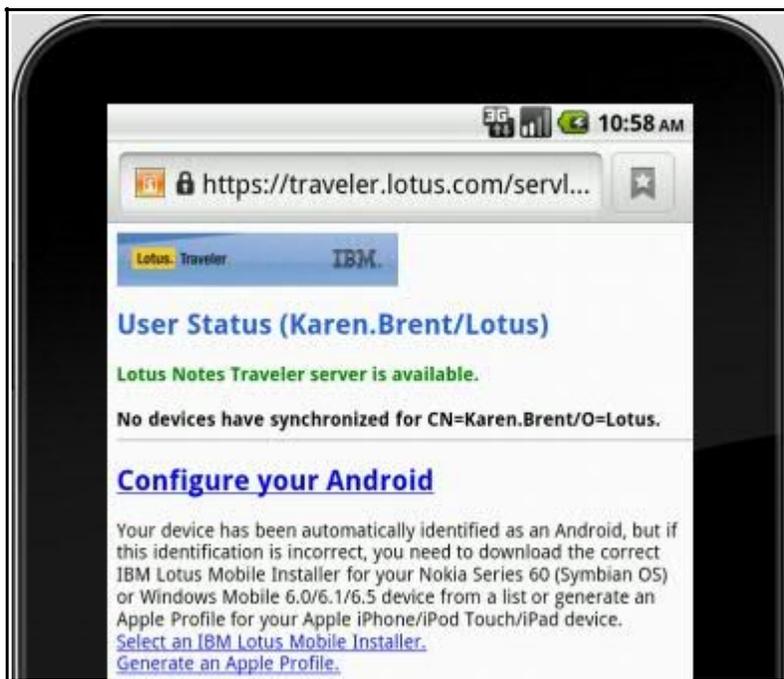
2. In the Android's browser, type in the URL **http://traveler.lotus.com** and click the arrow.



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If the device can connect to the server, a Login screen should be displayed.

3. Enter your Greenhouse credentials and click **Sign In** and the Traveler Home Page will be displayed showing that your device has been correctly identified as an Android device.



Note that if for some reason the automatic identification was wrong, you could select your correct device type from other links on this page.

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4. Click on the **“Configure your Android”** link
5. The message “Starting download” will appear briefly and then an icon will appear at the top of the device.



6. Click on the icon and drag to the bottom of the screen and the Notifications window should stay open.



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7. A page will display prompting you to install the application. Before installing the application check the warning messages explaining the effects this application will have.



8. Click **Install**.

9. When the installation is complete, click **Open** and you will be prompted to enter your credentials.



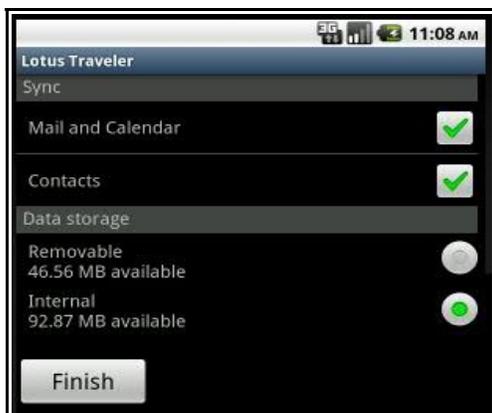
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10. Enter these and then click Next again and you will be prompted to activate the device administrator.



11. Click **Activate**

12. The next screen allows you to configure which items you want to synchronise and where you want Traveler to store its data.



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13. Leave the defaults and click **Finish**

14. Click **OK** on the Status message.

15. Click on the Home button at the bottom of the screen.



16. Click the **Applications Launcher** icon at the bottom of the screen to see the Traveler applications.



17. Close the emulator.

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Configuring hosts file

Unfortunately the Android device emulator does not make use of the computer's hosts file for resolving hostnames, so if you are trying to access a site that is not in DNS, the simplest option is to use the IP address of the site rather than the hostname. Note that if you want to access applications on your local machine, the Android device does not use the usual loopback address (127.0.0.1) but uses a reserved IP address (10.0.2.2)

Unfortunately there are situations where the IP address is not appropriate for accessing an application. For example, although you can login to a Connections server using the IP address, links to subsequent Connections components will typically generate fully qualified hostnames which will fail to resolve unless the hostnames are in DNS.

The Android emulator does have an internal hosts file which can be edited, but this appears to be quite a complicated process. This section of the lab explains how you can edit this file. (This information was gleaned from several different posts on Android forums and may not be the only, or the simplest, way to achieve this – but it worked for me!)

1. Use the SDK Manager to create a new virtual device with the desired settings. Make sure that snapshots are enabled and that you have allocated an appropriate value to device RAM size and added an SD card if you wish but do not start the emulator from the SDK Manager.
2. From a command prompt, change to the **tools** subdirectory of the main SDK directory and type the following command

```
emulator -avd <avd name> -scale <scale> -partition-size 128
```

where:

- <avd name> is the name you gave to the virtual device you created
- <scale> is the size of the virtual device (on the screen) compared with the size of the real device (for the Galaxy Tab, a scale of **0.5** works well, for other devices you may need to experiment)
- setting the partition size to 128, increases the size of the system partition on the device which is where the hosts file is stored. By default there is no spare space on this partition so you need to increase the size in order to be able to add entries to the hosts file. (Unfortunately this isn't currently one of the settings you can select from the SDK Manager)

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The emulator should then start up

3. When the emulator has started, open another command window and change to the **platform-tools** subdirectory of the main SDK directory. Note: this is only available after you have installed the Android SDK Platform-tools, revision 6 package.

4. Type the following command

```
adb shell
```

This command opens communication with the virtual device

5. At the # prompt type

```
df
```

This command shows the free disk on the virtual device partitions. You can see that the system partition has free space.

```
# df
df
/dev: 258224K total, 0K used, 258224K available (block size 4096)
/mnt/asec: 258224K total, 0K used, 258224K available (block size 4096)
/system: 127104K total, 80044K used, 47060K available (block size 4096)
/data: 127104K total, 26084K used, 101020K available (block size 4096)
/cache: 65536K total, 1156K used, 64380K available (block size 4096)
/mnt/sdcard: 20146K total, 1K used, 20144K available (block size 512)
/mnt/secure/asec: 20146K total, 1K used, 20144K available (block size 512)
#
```

6. At the # prompt type

```
mount
```

```
# mount
mount
rootfs / rootfs ro 0 0
tmpfs /dev tmpfs rw,mode=755 0 0
devpts /dev/pts devpts rw,mode=600 0 0
proc /proc proc rw 0 0
sysfs /sys sysfs rw 0 0
none /acct cgroup rw,cpuacct 0 0
tmpfs /mnt/asec tmpfs rw,mode=755,gid=1000 0 0
none /dev/cpuctl cgroup rw,cpu 0 0
/dev/block/mtdblock0 /system yaffs2 ro 0 0
/dev/block/mtdblock1 /data yaffs2 rw,nosuid,nodev 0 0
/dev/block/mtdblock2 /cache yaffs2 rw,nosuid,nodev 0 0
/dev/block/vold/179:0 /mnt/sdcard vfat rw,dirsync,nosuid,nodev,noexec,uid=1000,gid=1015,fsmask=0702,dmask=0702,allow_utime=0020,codepage=cp437,ioccharset=iso8859-1,shortname=mixed,utf8,errors=remount-ro 0 0
/dev/block/vold/179:0 /mnt/secure/asec vfat rw,dirsync,nosuid,nodev,noexec,uid=1000,gid=1015,fsmask=0702,dmask=0702,allow_utime=0020,codepage=cp437,ioccharset=iso8859-1,shortname=mixed,utf8,errors=remount-ro 0 0
tmpfs /mnt/sdcard/.android_secure tmpfs ro,size=0k,mode=000 0 0
#
```

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This command shows which partitions are read-only and which are read-write. Note that the system partition is read-only. By default you are not able to edit files on the system partition.

7. At the # prompt type

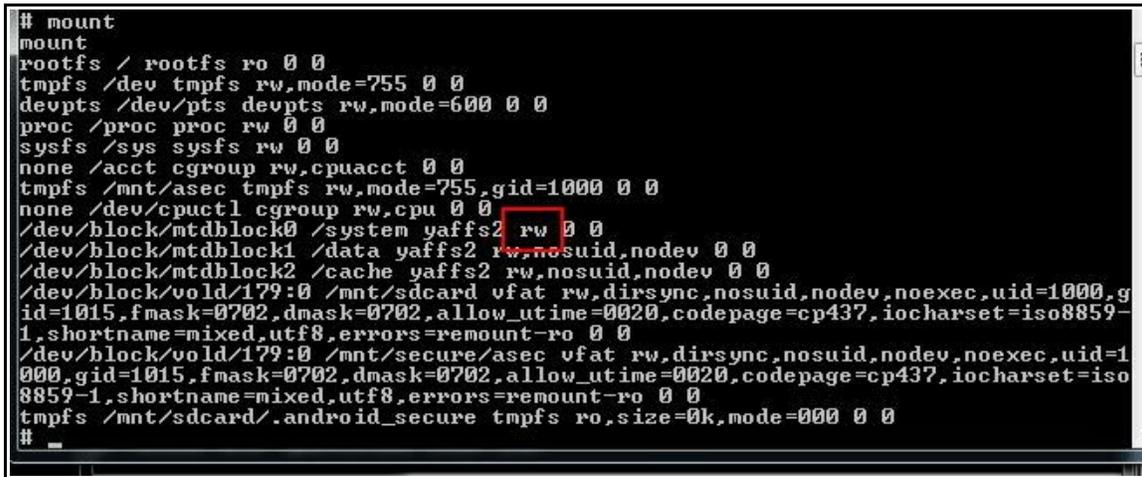
```
mount -o remount rw /system
```

This command will remount the system partition as a read-write partition so that we can edit the hosts file.

8. At the # prompt type

```
mount
```

9. Check that the system partition is now read-write



```
# mount
mount
rootfs / rootfs ro 0 0
tmpfs /dev tmpfs rw,mode=755 0 0
devpts /dev/pts devpts rw,mode=600 0 0
proc /proc proc rw 0 0
sysfs /sys sysfs rw 0 0
none /acct cgroup rw,cpuacct 0 0
tmpfs /mnt/asec tmpfs rw,mode=755,gid=1000 0 0
none /dev/cpuctl cgroup rw,cpu 0 0
/dev/block/mtdblock0 /system yaffs2 rw 0 0
/dev/block/mtdblock1 /data yaffs2 rw,nosuid,nodev 0 0
/dev/block/mtdblock2 /cache yaffs2 rw,nosuid,nodev 0 0
/dev/block/vold/179:0 /mnt/sdcard vfat rw,dirsync,nosuid,nodev,noexec,uid=1000,gid=1015,
fmask=0702,dmask=0702,allow_utime=0020,codepage=cp437,ioccharset=iso8859-1,shortname=mixed,utf8,errors=remount-ro 0 0
/dev/block/vold/179:0 /mnt/secure/asec vfat rw,dirsync,nosuid,nodev,noexec,uid=1000,gid=1015,
fmask=0702,dmask=0702,allow_utime=0020,codepage=cp437,ioccharset=iso8859-1,shortname=mixed,utf8,errors=remount-ro 0 0
tmpfs /mnt/sdcard/.android_secure tmpfs ro,size=0k,mode=000 0 0
#
```

10. At the # prompt type

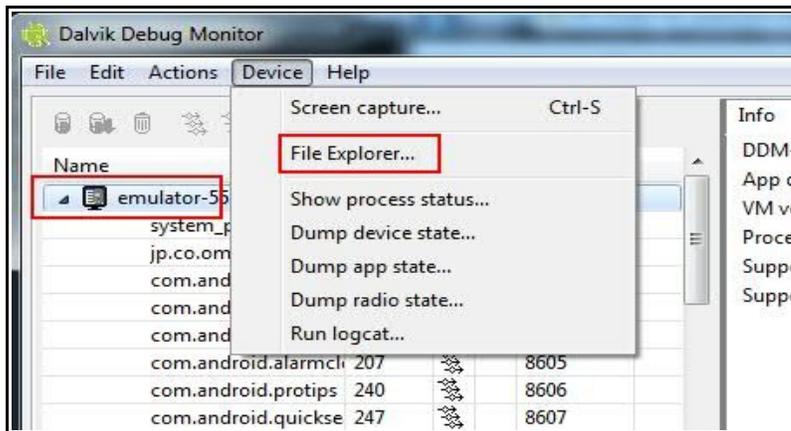
```
exit
```

11. In the same command window, change to the **tools** directory within the Android SDK and launch the **ddms** application (Dalvik Debug monitor)

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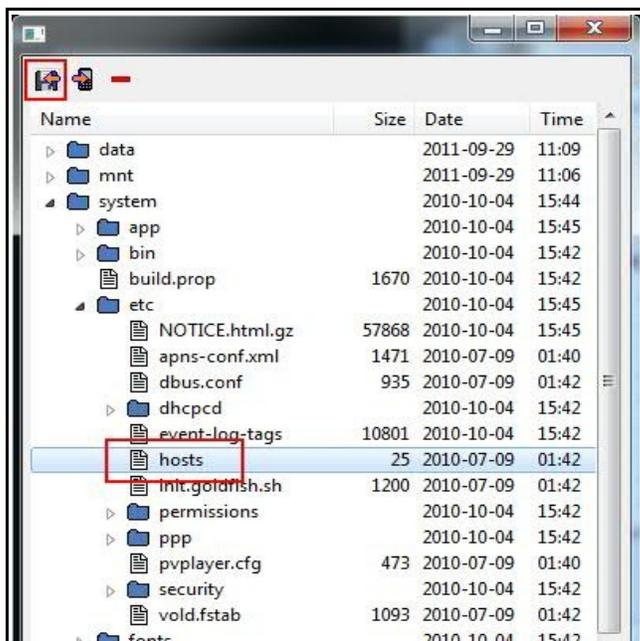
This application contains a File Explorer which allows you to navigate to files held on the virtual device.

12. Select the emulator and then select **Device > File Explorer** from the menu.



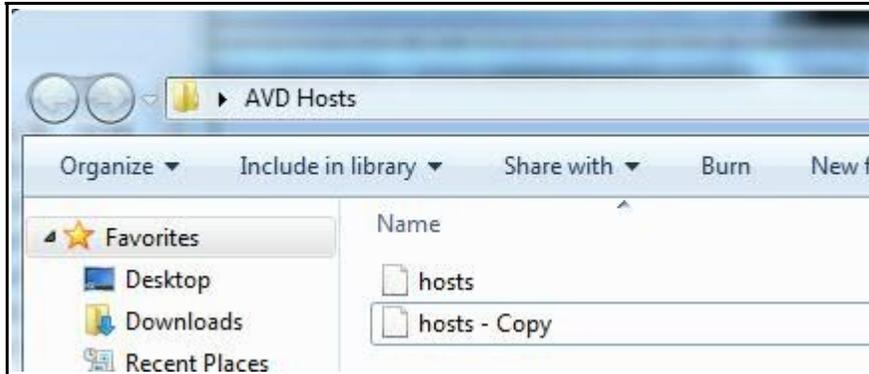
13. Navigate to the **system > etc** directory and note the size of the **hosts** file.

14. Select the **hosts** file and click the icon to pull the file from the device onto your computer.



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15. Save the folder into an empty directory and then make a copy of the file.



It is very easy to corrupt the hosts file, particularly when using Windows editors, so it is advisable to make a copy of this file before editing it. You can only tell that the file is corrupted when you attempt to use the hostname on the device and it does not resolve.

Use the following hints to help prevent corrupting the file.

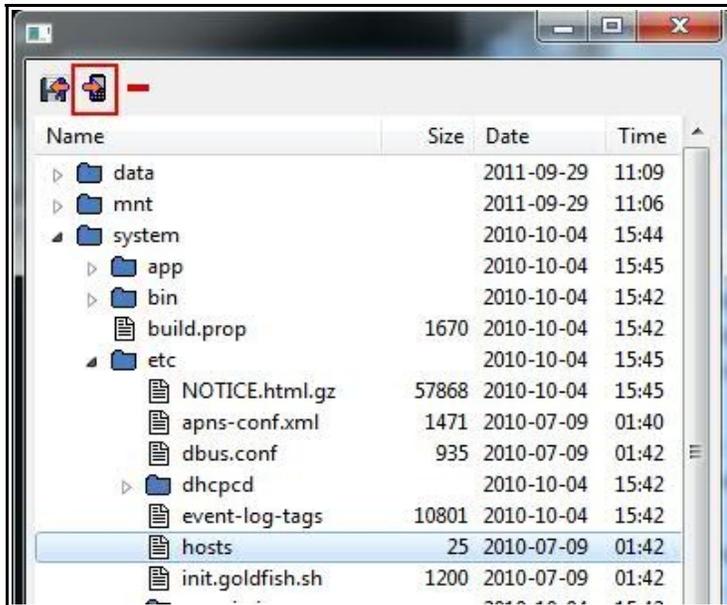
- Copy and paste the original host entry (complete with invisible new line character) and edit the characters and numbers only - leaving the valid formatting (tab characters etc).
- Don't use backspace or the Enter/Return key - just use delete to remove the characters you don't need.
- If you want a host entry for the local computer, use the IP address 10.0.2.2
- At the bottom of the file make sure that the cursor ends on an empty line below the last host entry (which it should if you copied the new line character as well as the original hosts entry).
- Try to avoid multiple edits and saves of the file – it often introduces corruption.

16. Edit the original file to add in the required hosts entries.

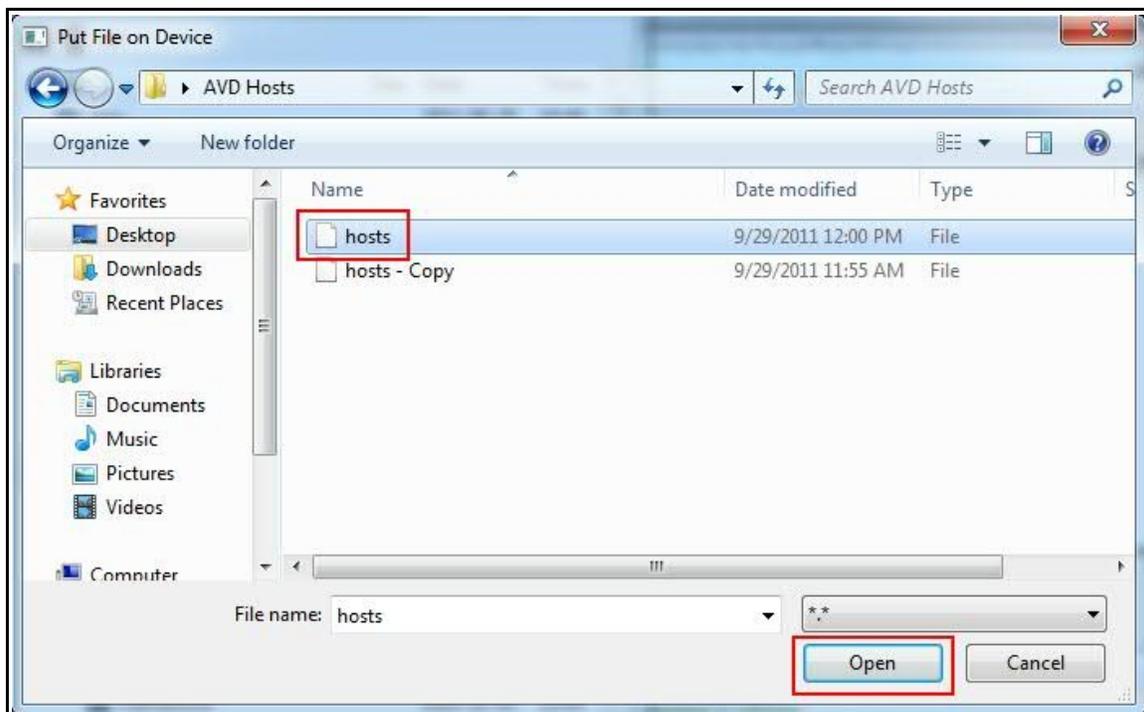
17. When you have saved the local copy of the hosts file, return the DDMS File Explorer.

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18. Ensure that you still have the hosts file selected and click the icon to push a file onto the device.



19. Select the local copy of the hosts file that you edited and click **Open**.



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20. Ensure that the size and date of the hosts file have changed



event-log-tags	10801	2010-10-04	15:42
hosts	54	2011-09-29	16:51
init.goldfish.sh	1200	2010-07-09	01:42
permissions		2010-10-04	15:42

21. Close the File Explorer and the DDMS program.

22. (Optional – not required for the purposes of this exercise). Make any other changes you want to save in your virtual device (like disabling the keyboard features and installing any applications you need).

23. To save the snapshot, open a command window and type

```
telnet localhost 5554
```

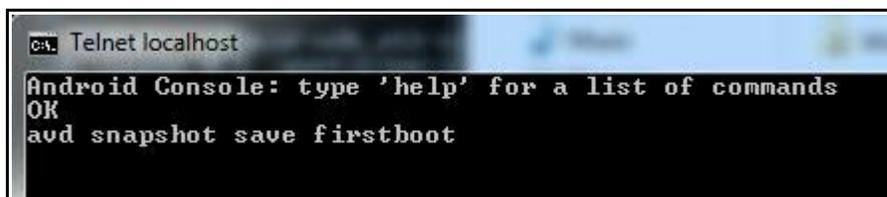
This connects you to the device.

Note: if you do not appear to have the telnet application, you may need to enable it in the Windows features via the Control Panel.



24. Type in the command

```
avd snapshot save <snapshotname>
```



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This will create a named snapshot (in this case “firstboot”) which you can call when loading the virtual device from a command line. This process may take a few minutes but the disk activity should reassure you that it is still working! When the snapshot save has completed the window will display “OK”



```
CA: Telnet localhost
Android Console: type 'help' for a list of commands
OK
avd snapshot save firstboot
OK
```

25. In the same command window type

```
kill
```

This will close the device emulator and the telnet session without trying to overwrite your snapshot with another one.



```
CA: Administrator: C:\Windows\system32\cmd.exe
Android Console: type 'help' for a list of commands
OK
avd snapshot save firstboot
OK
kill
OK: killing emulator, bye bye

Connection to host lost.
```

26. In order to start the emulator with the configuration you have saved you can launch the emulator with the following command.

```
emulator -avd <avd name> -scale <scale> -snapshot
<snapshotname>
```

The above command line can be entered in a batch file so that you don't have to start the SDK manager in order to start the emulator. Note that snapshots can take up a lot of disk space. If you don't want a further snapshot to be taken when you exit the device you can append

```
-no-snapshot-save
```

to the above command line.

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27. Open the browser on the Android device and type in

```
http://<alias you set in hostfile>
```

28. If the alias can resolve correctly you should see the home page of the Domino server.



Installing apps from the Android Market

There is no Android Market app on the emulator and you are not able to download apps directly from the Android Marketplace (<http://market.android.com>) to the Android emulator unless you have first downloaded something to the device from the Android Market app!

An article here suggest that it is possible to get the Android Market app onto the emulator but the steps are rather complicated.

<http://www.tech-recipes.com/rx/10004/accessing-android-market-from-android-sdk/>

Summary

In this lab, you installed and configured the Android emulator supplied with the Android SDK and familiarised yourself with how to install applications and connect to both production and non-production application servers.

End of exercise