

Dev Environment:

Android

Mobile and Ubiquitous Games

ICS 163

Donald J. Patterson



Out of the box experience



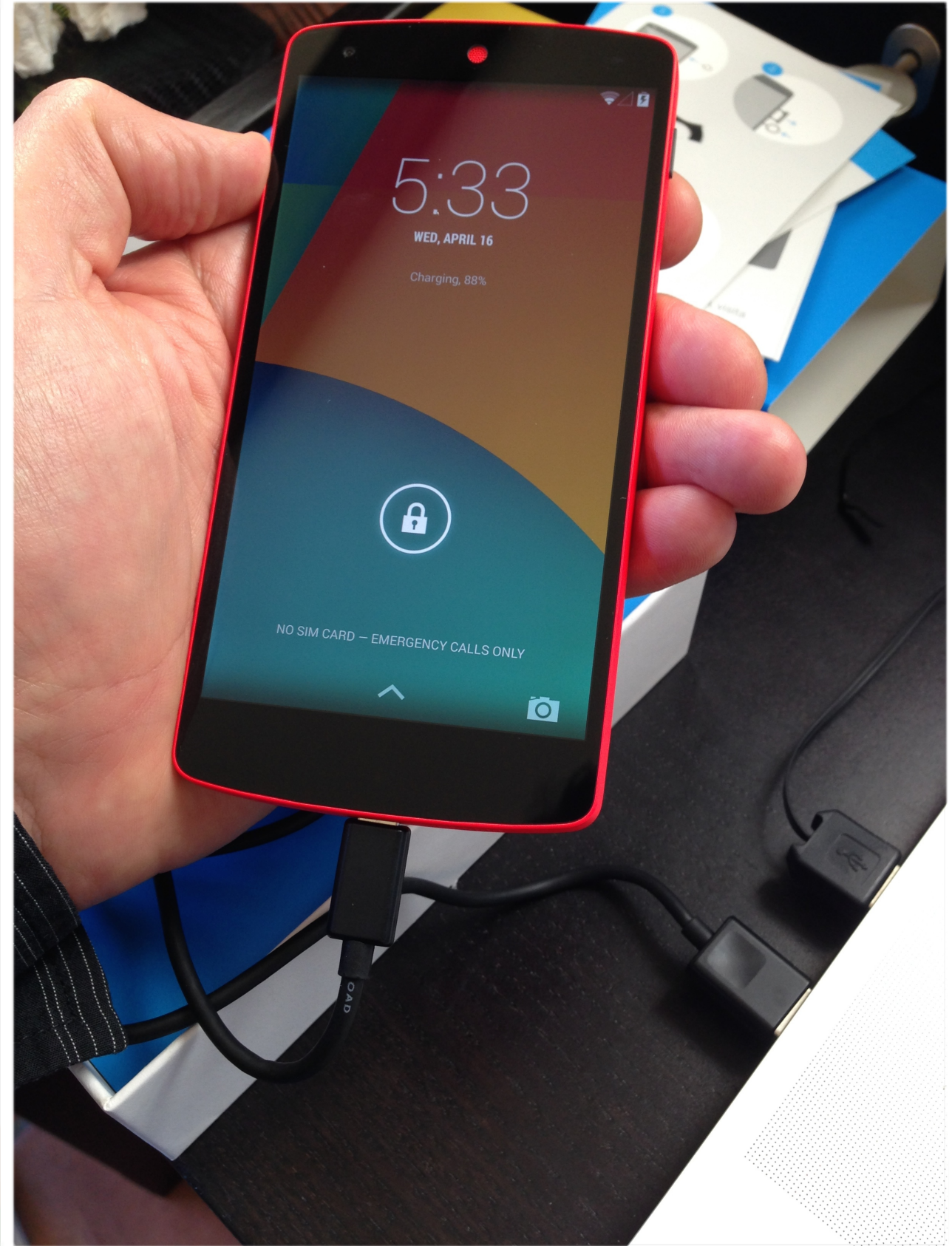
Out of the box experience



Out of the box experience



Out of the box experience



Out of the box experience

- Connect USB on phone to computer/wall to charge it
 - Required to complete set up
- **Factory Reset**
 - Why? Clear weird software and personal accounts
 - Settings -> Backup & Reset -> Factory Data Reset -> Reset Phone -> Erase Everything
 - 10 minutes later
- **Welcome**
 - Language Selection
 - Skip SIM card (WiFi only)



Out of the box experience

- **Welcome**
 - Select WiFi (**You must be in a wifi location to launch**)
 - If you are on campus this could be a problem.
 - Tap & Go
 - NFC based backup and restore
 - Skip it
 - Sign in to a Google Account
 - Required by Google to use location services
 - Does this freak you out? It should.



Out of the box experience

- **Services**
 - Turn off backup
 - Turn on location services
 - Turn on Help improve location services
 - Turn on/off Help improve Android experiences
- **Google Now**
 - Turn off
- **Update all the software**
 - Dial `*##*#checkin#*##*` to update phone until
 - "checkin succeeded"




Getting a development environment setup



Setting up your environment

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



The screenshot shows the Android Studio IDE running on a laptop. The interface includes a project explorer on the left, a central code editor with Java code, and a preview window on the right showing a mobile application interface with a login form. The text 'The official Android IDE' is displayed above the laptop screen.

Android Studio

- Android Studio IDE
- Android SDK tools
- Android 5.0 (Lollipop) Platform
- Android 5.0 emulator system image with Google APIs

[Download Android Studio for Mac](#)



Setting up your environment

System Requirements

Windows

- Microsoft® Windows® 8/7/Vista/2003 (32 or 64-bit)
- 2 GB RAM minimum, 4 GB RAM recommended
- 400 MB hard disk space
- At least 1 GB for Android SDK, emulator system images, and caches
- 1280 x 800 minimum screen resolution
- Java Development Kit (JDK) 7
- Optional for accelerated emulator: Intel® processor with support for Intel® VT-x, Intel® EM64T (Intel® 64), and Execute Disable (XD) Bit functionality

Mac OS X

- Mac® OS X® 10.8.5 or higher, up to 10.9 (Mavericks)
- 2 GB RAM minimum, 4 GB RAM recommended
- 400 MB hard disk space
- At least 1 GB for Android SDK, emulator system images, and caches
- 1280 x 800 minimum screen resolution
- Java Runtime Environment (JRE) 6
- Java Development Kit (JDK) 7
- Optional for accelerated emulator: Intel® processor with support for Intel® VT-x, Intel® EM64T (Intel® 64), and Execute Disable (XD) Bit functionality

On Mac OS, run Android Studio with Java Runtime Environment (JRE) 6 for optimized font rendering. You can then configure your project to use Java Development Kit (JDK) 6 or JDK 7.

Linux

- GNOME or KDE desktop
- GNU C Library (glibc) 2.15 or later

- Microsoft® Windows® 8/7/Vista/2003 (32 or 64-bit)
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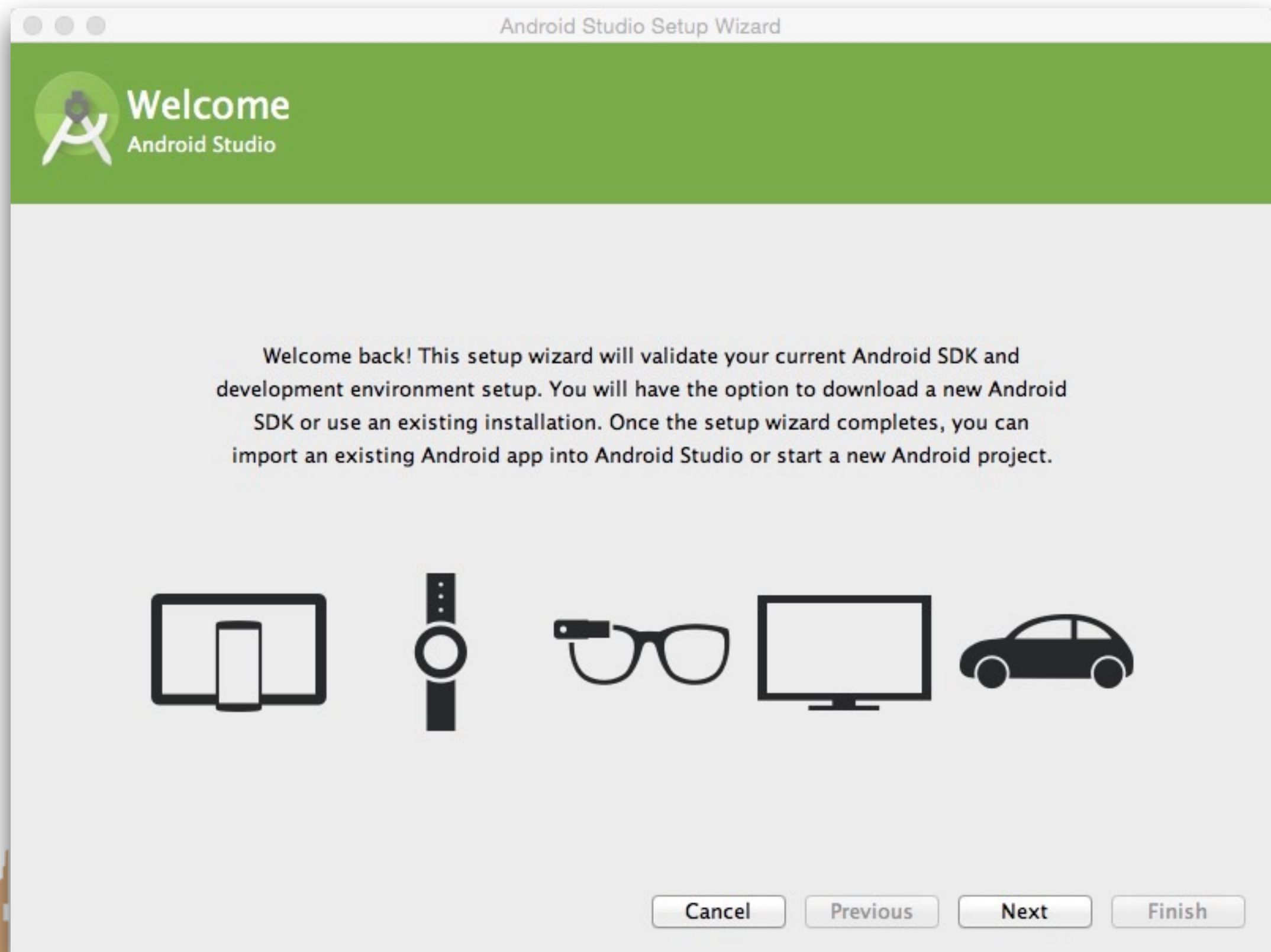
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- 400 MB hard disk space
- At least 1 GB for Android SDK, emulator system images, and caches
- 1280 x 800 minimum screen resolution
- Oracle® Java Development Kit (JDK) 7

Tested on Ubuntu® 14.04, Trusty Tahr (64-bit distribution capable of running 32-bit applications).

Setting up your environment



Setting up your environment

Android Studio Setup Wizard

Java Settings

Android Studio requires Java Development Kit (JDK) 7.0 or newer.

Java Development Kit (JDK) version 7.0.
Up to date JDK was not detected. Please select JDK location:

 ...

or download and install JDK for your operating system and architecture: [Mac OS X x64](#) and press

Detect

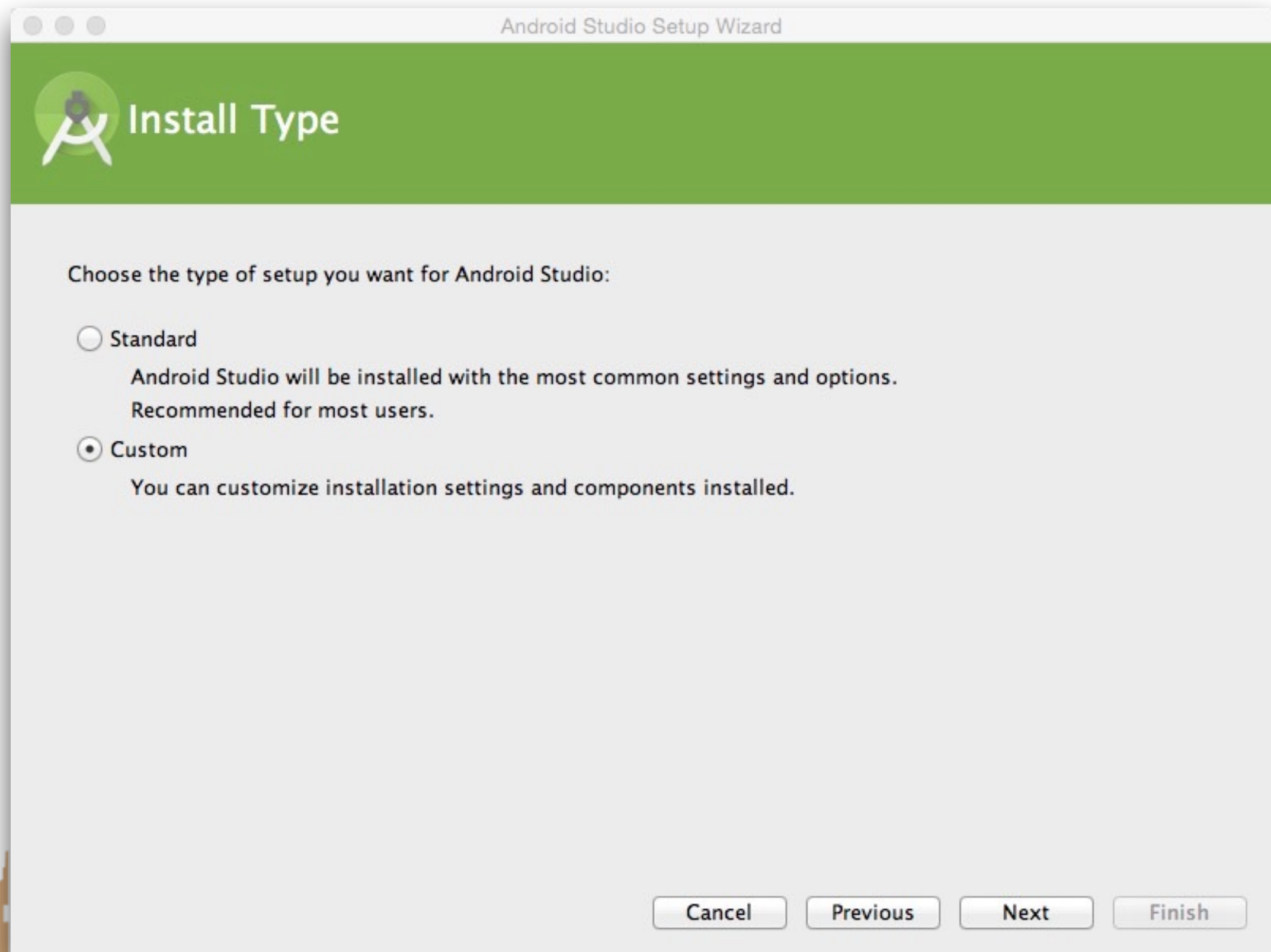
Cancel

Previous

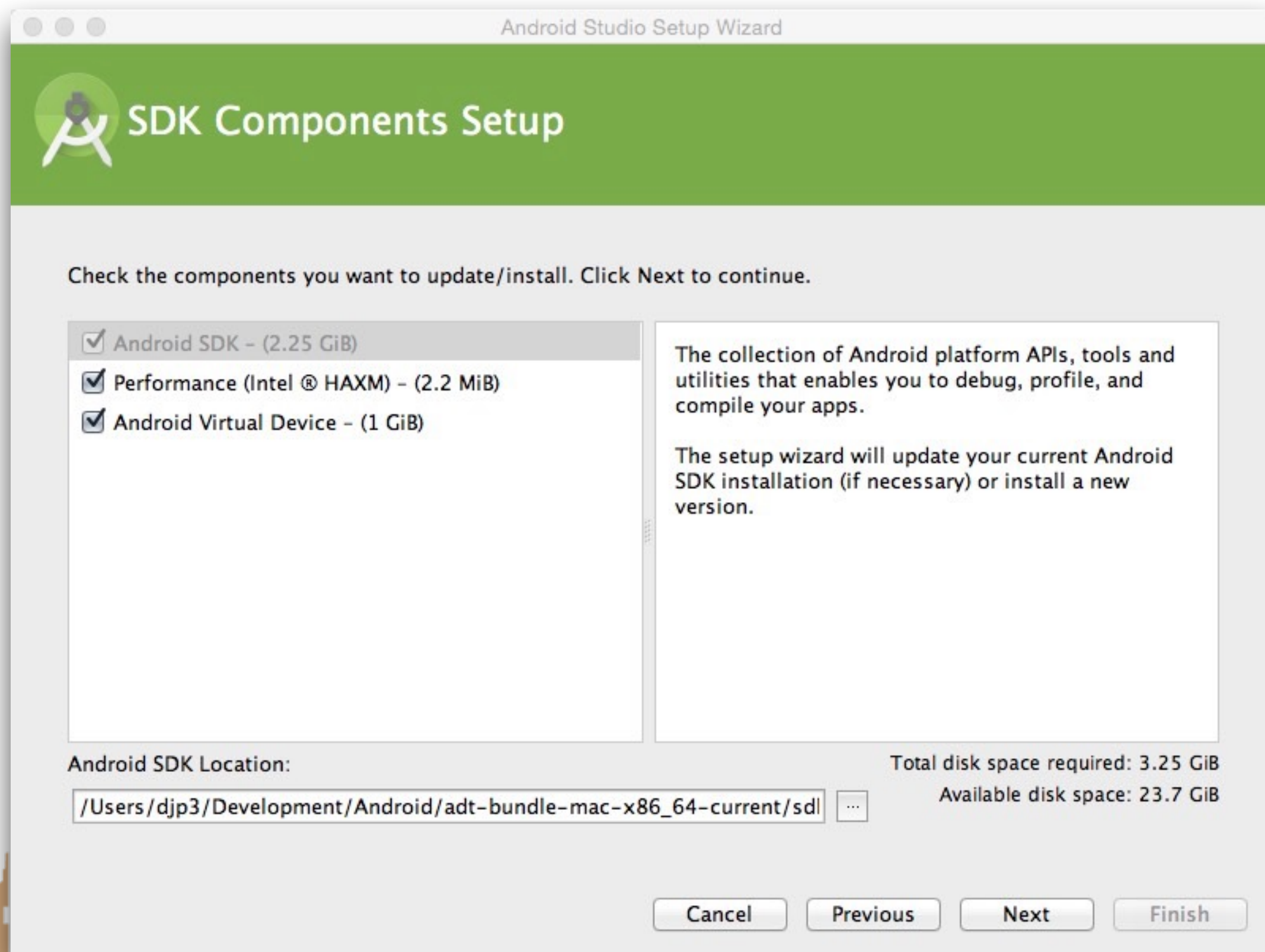
Next

Finish

Setting up your environment



Setting up your environment



Setting up your environment

Android Studio Setup Wizard

Emulator Settings

We have detected that your system can run the Android emulator in an accelerated performance mode.

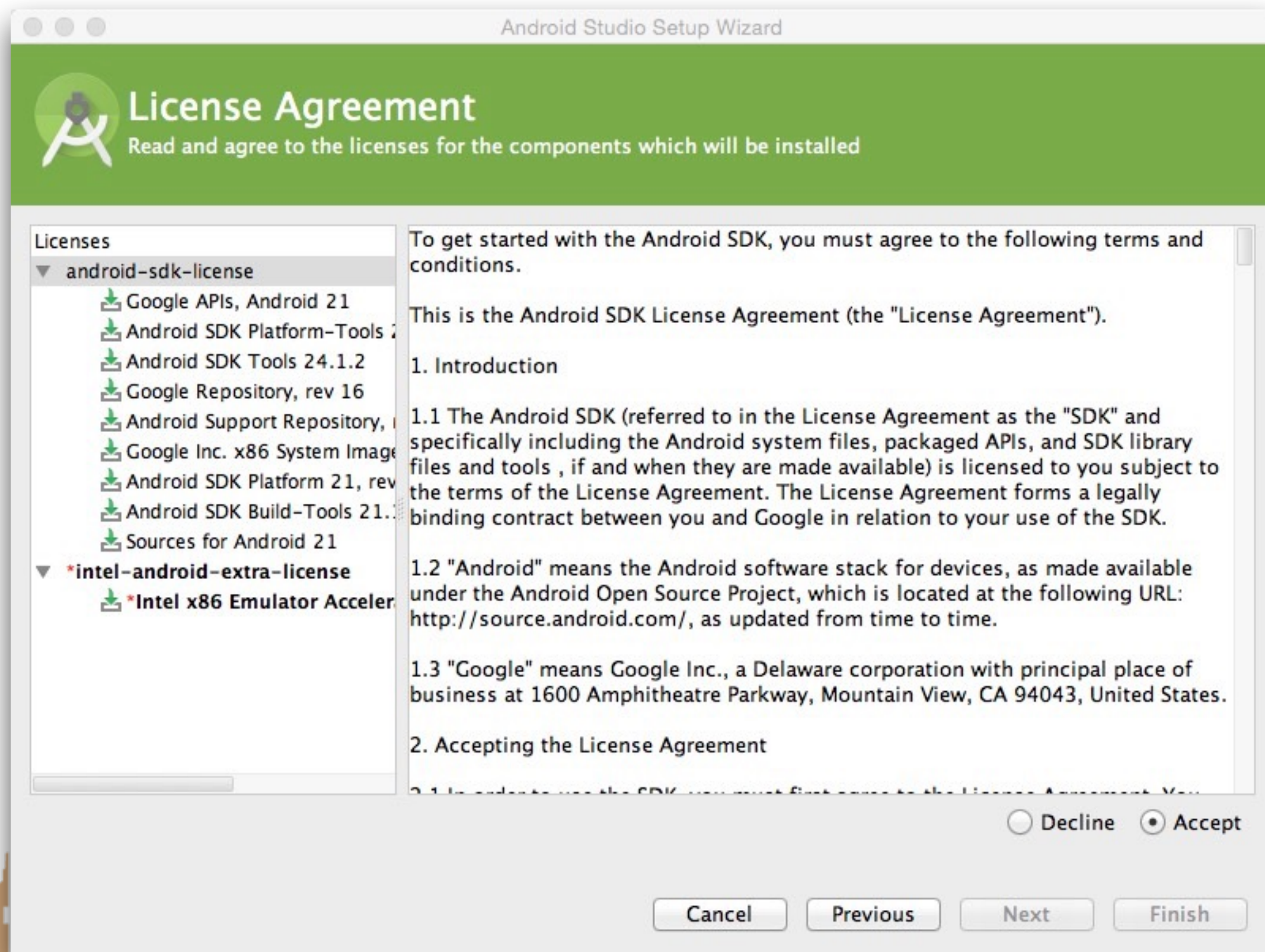
Please set the maximum amount of RAM available for the Intel® Hardware Accelerated Execution Manager (HAXM) to use for all x86 emulator instances. You can change these settings at any time by running the Intel® HAXM installer.

Please refer to the [Intel® HAXM Documentation](#) for more information.

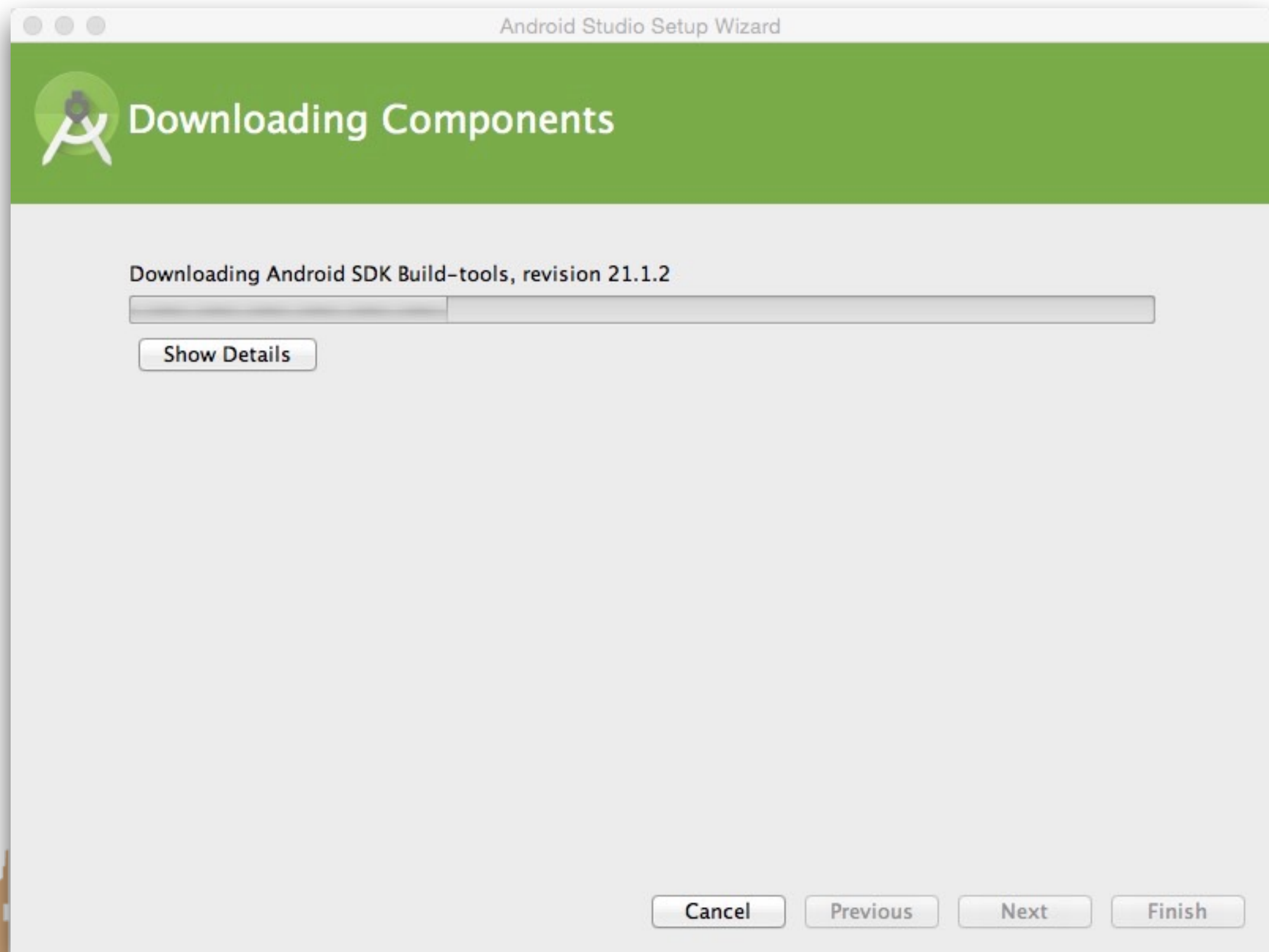
512 MiB 2 GiB (Recommended) 4 GiB 6 GiB

RAM allocation: MiB

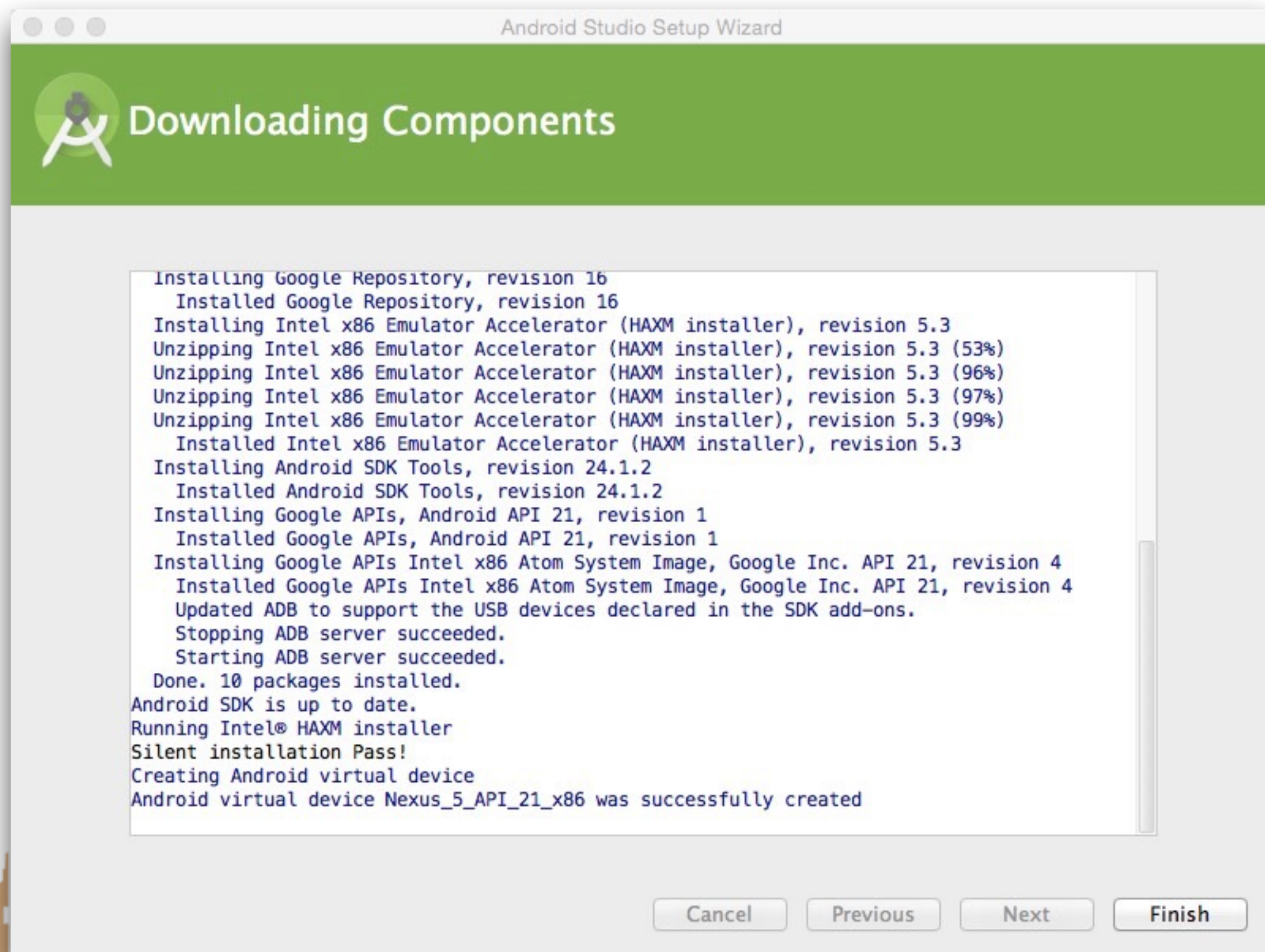
Setting up your environment



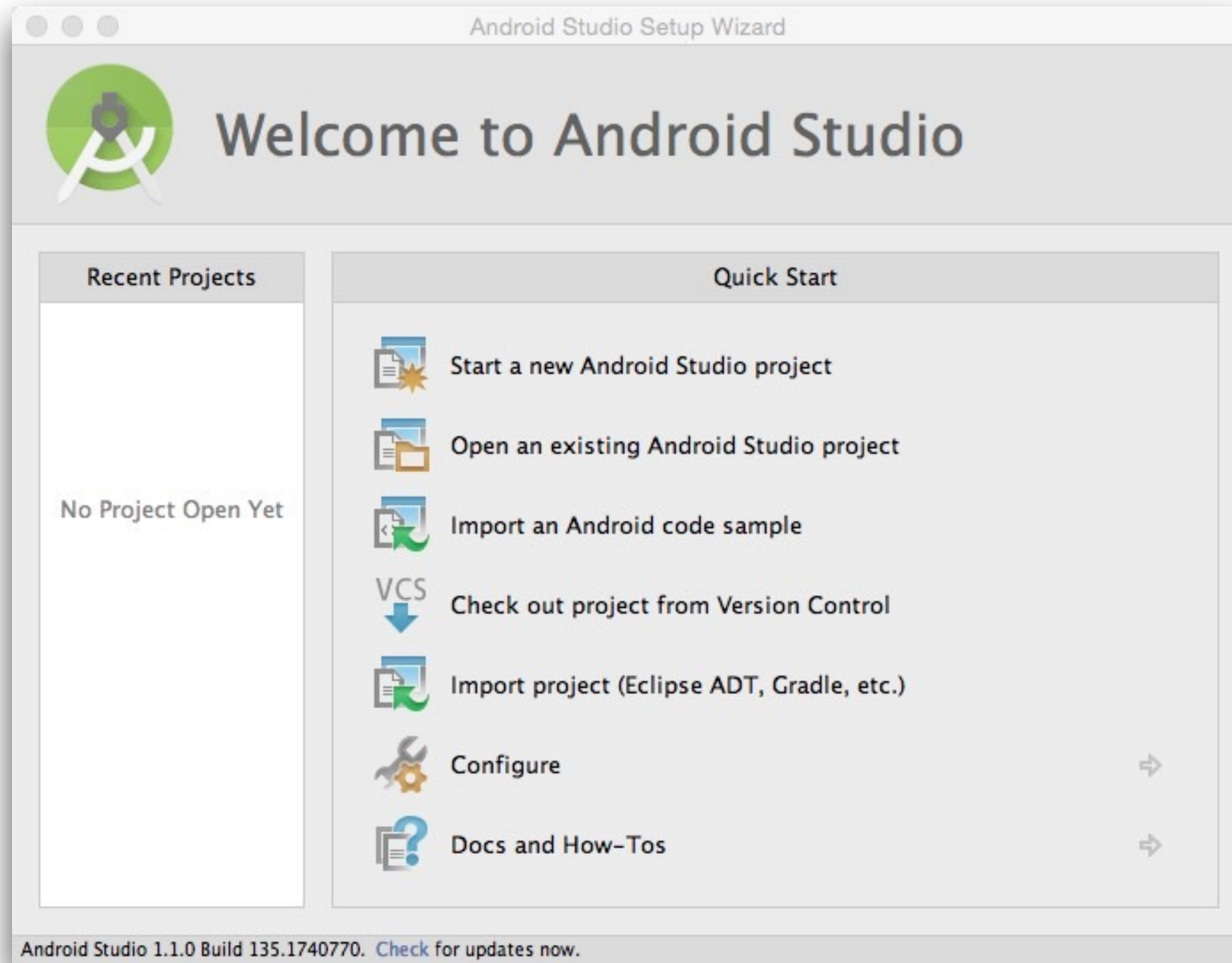
Setting up your environment



Setting up your environment




Setting up your environment



Setting up your environment

Create New Project

 **New Project**
Android Studio

Configure your new project

Application name:


Company Domain:

Package name: [Edit](#)

Project location:

Setting up your environment

Create New Project



Target Android Devices

Select the form factors your app will run on

Different platforms require separate SDKs

Phone and Tablet

Minimum SDK: API 21: Android 5.0 (Lollipop)

Lower API levels target more devices, but have fewer features available. By targeting API 21 and later, your app will run on < 1% of the devices that are active on the Google Play Store. [Help me choose.](#)

TV

Minimum SDK: API 21: Android 5.0 (Lollipop)

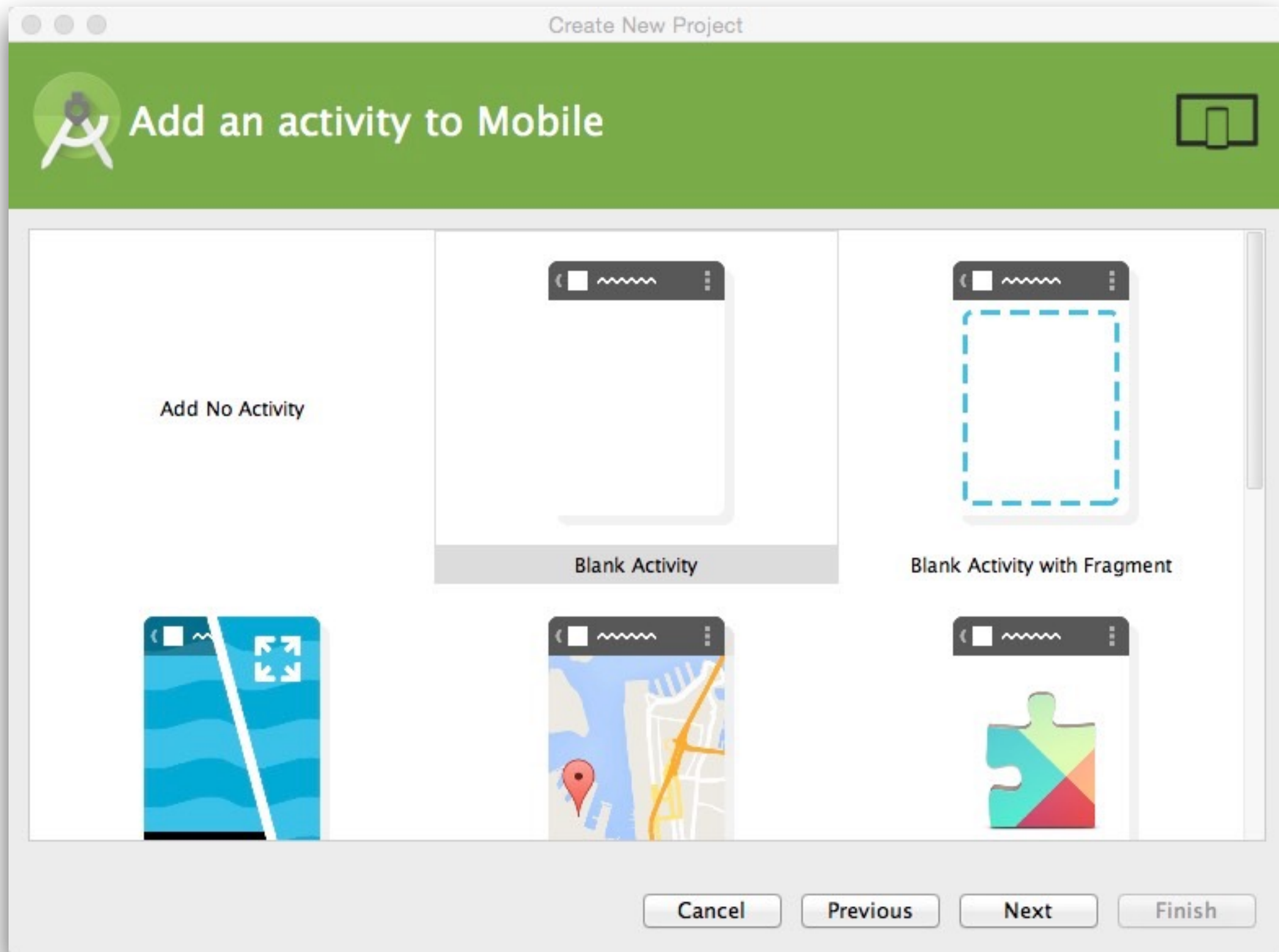
Wear

Minimum SDK: API 21: Android 5.0 (Lollipop)

Glass (Not Installed)

Cancel Previous Next Finish

Setting up your environment




Setting up your environment

Create New Project

Customize the Activity

Creates a new blank activity with an action bar.



Blank Activity

Activity Name:

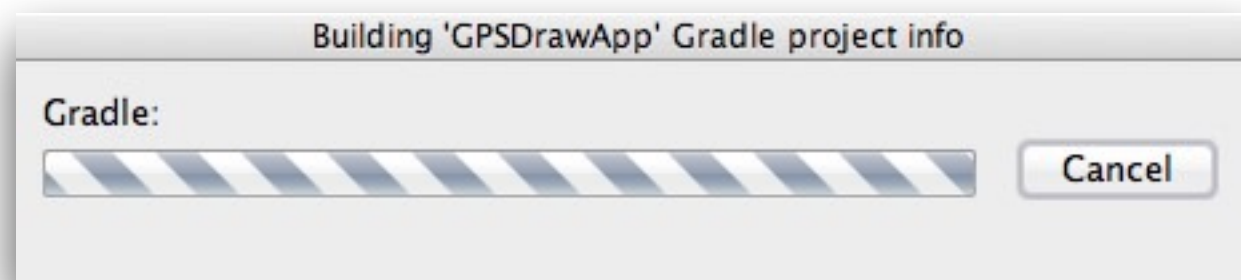
Layout Name:

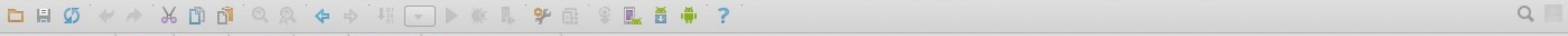
Title:

Menu Resource Name:

The name of the activity class to create

Setting up your environment





GPSDrawApp > app > src > main > res > layout > activity_main.xml

Project Structure

- Android
 - app
 - manifests
 - java
 - res
 - drawable
 - layout
 - activity_main.xml
 - menu
 - mipmap
 - values
 - Gradle Scripts

Palette

- Layouts
 - FrameLayout
 - LinearLayout (Horizontal)
 - LinearLayout (Vertical)
 - TableLayout
 - TableRow
 - GridLayout
 - RelativeLayout
- Widgets
 - Plain TextView
 - Large Text
 - Medium Text
 - Small Text
 - Button
 - Small Button
 - RadioButton
 - CheckBox
 - Switch
 - ToggleButton
 - ImageButton
 - ImageView
 - ProgressBar (Large)
 - ProgressBar (Normal)
 - ProgressBar (Small)
 - ProgressBar (Horizontal)
 - SeekBar
 - RatingBar
 - Spinner
 - WebView
- Text Fields
 - Plain Text
 - Person Name
 - Password
 - Password (Numeric)
 - E-mail
 - Phone
 - Postal Address
 - Multiline Text
 - Time
 - Date
 - Number
 - Number (Signed)



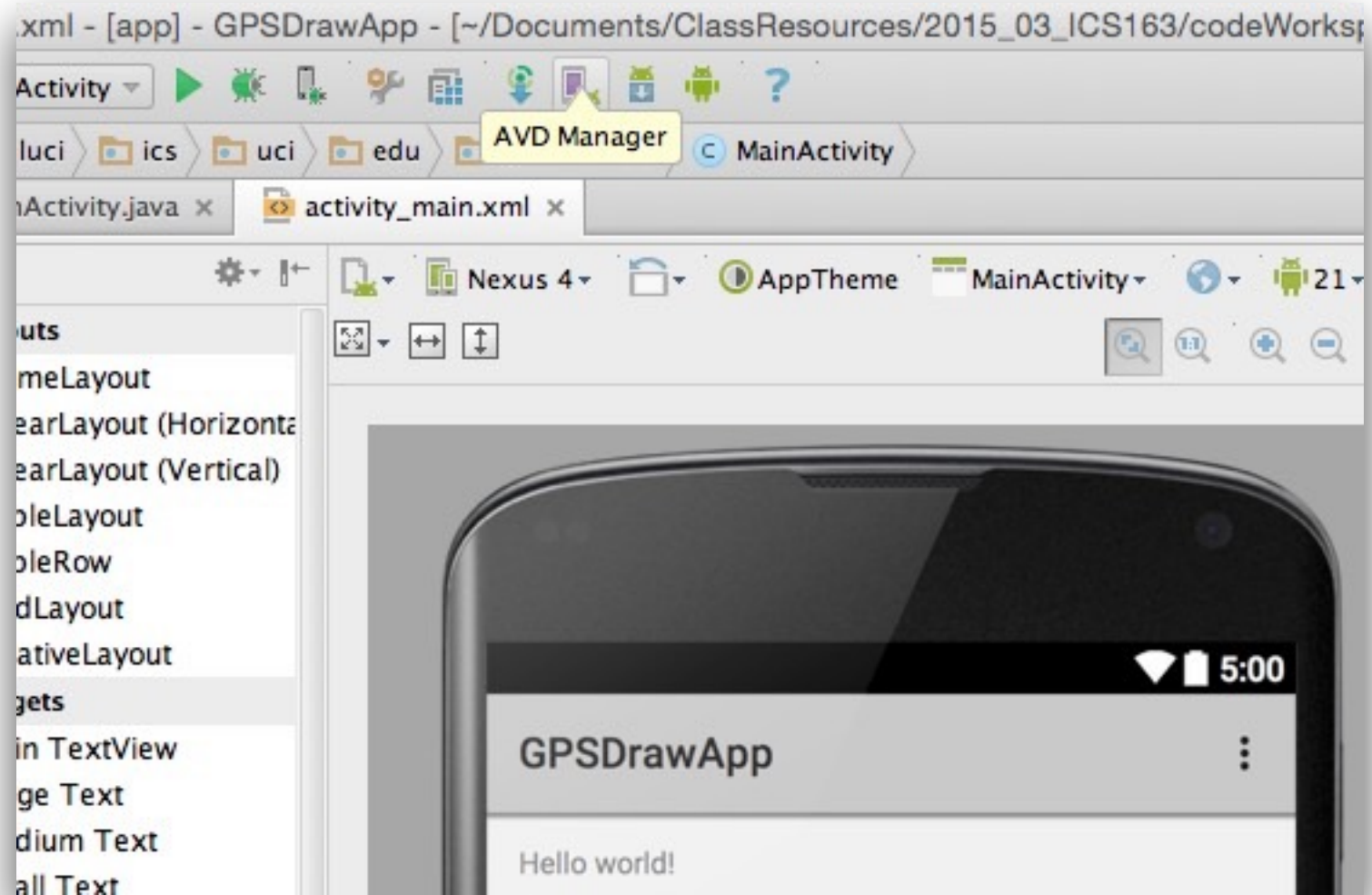
Component Tree

- Device Screen
 - RelativeLayout
 - TextView - @string/hello_world

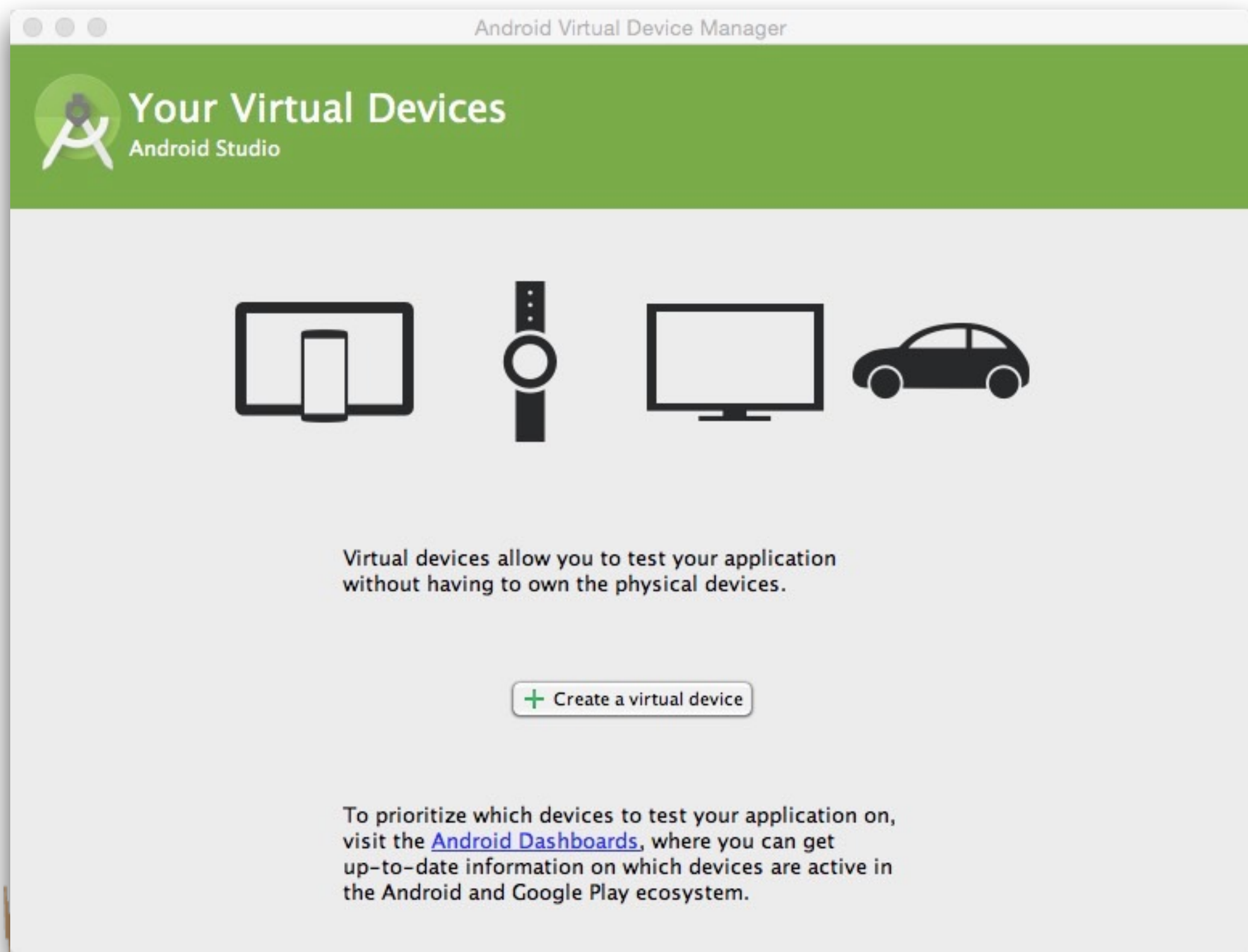
Properties

layout:width	match_parent
layout:height	match_parent
style	
accessibilityLiveRegion	
alpha	
background	
backgroundTint	
backgroundTintMode	
clickable	<input type="checkbox"/>
contentDescription	
elevation	
focusable	<input type="checkbox"/>
focusableInTouchMode	<input type="checkbox"/>
gravity	[]
id	
ignoreGravity	
importantForAccessibility	
labelFor	
layoutMode	
longClickable	<input type="checkbox"/>

Setting up your environment



Setting up your environment



Setting up your environment

Virtual Device Configuration



Select Hardware

Choose a device definition

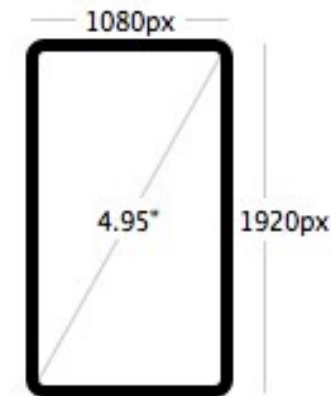
Category	Name	Size	Resolution	Density
Phone	Nexus S	4.0"	480x800	hdpi
Tablet	Nexus One	3.7"	480x800	hdpi
Wear	Nexus 6	5.96"	1440x2560	560dpi
TV	Nexus 5	4.95"	1080x1920	xxhdpi
	Nexus 4	4.7"	768x1280	xhdpi
	Galaxy Nexus	4.65"	720x1280	xhdpi
	5.4" FWVGA	5.4"	480x854	mdpi
	5.1" WVGA	5.1"	480x800	mdpi
	4.7" WXGA	4.7"	720x1280	xhdpi
	4.65" 720p (Gala...	4.65"	720x1280	xhdpi

New Hardware Profile

Import Hardware Profiles



Nexus 5



Size: normal
Ratio: notlong
Density: xxhdpi

Clone Device...

Cancel

Previous

Next

Finish

Setting up your environment

Virtual Device Configuration



Release Name	API Level	ABI	Target
Unknown Download	22	armeabi-v7a	Android SDK Platform 5.1
Unknown Download	22	x86_64	Android SDK Platform 5.1
Unknown Download	22	x86	Android SDK Platform 5.1
Unknown Download	22	armeabi-v7a	System Image armeabi-v7a with Google APIs
Unknown Download	22	x86_64	System Image x86_64 with Google APIs
Unknown Download	22	x86	System Image x86 with Google APIs
Lollipop	21	x86	Google APIs (Google Inc.) - google_apis
Lollipop Download	21	armeabi-v7a	Android SDK Platform 5.0.2
Lollipop Download	21	x86_64	Android SDK Platform 5.0.2
Lollipop Download	21	x86	Android SDK Platform 5.0.2
Lollipop Download	21	armeabi-v7a	System Image armeabi-v7a with Google APIs
Lollipop Download	21	x86_64	System Image x86_64 with Google APIs
KitKat Download	19	armeabi-v7a	Android SDK Platform 4.4.2
KitKat Download	19	x86	Android SDK Platform 4.4.2
Jelly Bean Download	18	armeabi-v7a	Android SDK Platform 4.3

Show downloadable system images

Lollipop



API Level

21

Android

5.0.1

Google Inc.

System Image

x86

[? - See documentation for Android 5 APIs](#)

Cancel

Previous

Next

Finish

Setting up your environment

SDK Quickfix Installation

Installing Requested Components

SDK Path: /Users/djp3/Development/Android/adt-bundle-mac-x86_64-current/sdk

Loading SDK information...

Refresh Sources:

Fetched Add-ons List successfully

Refresh Sources

Installing Archives:

Preparing to install archives

Installing SDK Platform Android 5.1.1, API 22, revision 2

Installed SDK Platform Android 5.1.1, API 22, revision 2

Installing Google APIs, Android API 22, revision 1

Installed Google APIs, Android API 22, revision 1

Installing Google APIs Intel x86 Atom_64 System Image, Google Inc. API 22, revision 1

98%, 11423 KiB/s, 0 seconds left

Cancel

Previous

Next

Finish

Setting up your environment

Virtual Device Configuration



Release Name	API Level	ABI	Target
Unknown	22	x86_64	Google APIs (Google Inc.) - google_a
<i>Unknown Download</i>	22	armeabi-v7a	Android SDK Platform 5.1
<i>Unknown Download</i>	22	x86_64	Android SDK Platform 5.1
<i>Unknown Download</i>	22	x86	Android SDK Platform 5.1
<i>Unknown Download</i>	22	armeabi-v7a	System Image armeabi-v7a with Goo
<i>Unknown Download</i>	22	x86	System Image x86 with Google APIs.
Lollipop	21	x86	Google APIs (Google Inc.) - google_a
<i>Lollipop Download</i>	21	armeabi-v7a	Android SDK Platform 5.0.2
<i>Lollipop Download</i>	21	x86_64	Android SDK Platform 5.0.2
<i>Lollipop Download</i>	21	x86	Android SDK Platform 5.0.2
<i>Lollipop Download</i>	21	armeabi-v7a	System Image armeabi-v7a with Goo
<i>Lollipop Download</i>	21	x86_64	System Image x86_64 with Google A
<i>KitKat Download</i>	19	armeabi-v7a	Android SDK Platform 4.4.2
<i>KitKat Download</i>	19	x86	Android SDK Platform 4.4.2
<i>Jelly Bean Download</i>	18	armeabi-v7a	Android SDK Platform 4.3

Show downloadable system images

Lollipop



API Level

22

Android

5.1.1

Google Inc.

System Image

x86_64

[? - See documentation for Android 5 APIs](#)

Cancel

Previous

Next

Finish

Setting up your environment

Virtual Device Configuration



Android Virtual Device (AVD)

Verify Configuration

AVD Name

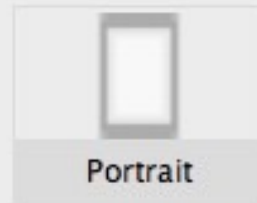
 Nexus 5 4.95" 1080x1920 xxhdpi

Google APIs (Google Inc.) x86_64

Startup size and orientation

Scale:

Orientation:



Portrait



Landscape

Emulated Performance

Use Host GPU

Store a snapshot for faster startup

You can either use Host GPU or Snapshots

Enable Snapshot

Helps improve emulator re-start performance. Start the AVD from the AVD manager and check Launch from snapshot and Save to snapshot. This way, when you close the emulator, a snapshot of the AVD state is saved and used to quickly re-launch the AVD next time. Note this will make the emulator slow to close.

Setting up your environment

Virtual Device Configuration



Android Virtual Device (AVD)

Verify Configuration

Camera	Front:	Webcam0 ▾	
	Back:	Emulated ▾	
Network	Speed:	Full ▾	
	Latency:	None ▾	
Emulated Performance	<input checked="" type="checkbox"/>	Use Host GPU	
	<input type="checkbox"/>	Store a snapshot for faster startup	
<i>You can either use Host GPU or Snapshots</i>			
Memory and Storage	RAM:	1536	MB ▾
	VM heap:	64	MB ▾
	Internal Storage:	200	MB ▾
	SD card:	<input checked="" type="radio"/> Studio-managed	100

Hide Advanced Settings

Network Latency

Sets the initial state of the simulated network transfer latency used by AVD. Latency is the delay in processing data across the network. The latency speed can also be adjusted in the emulator.

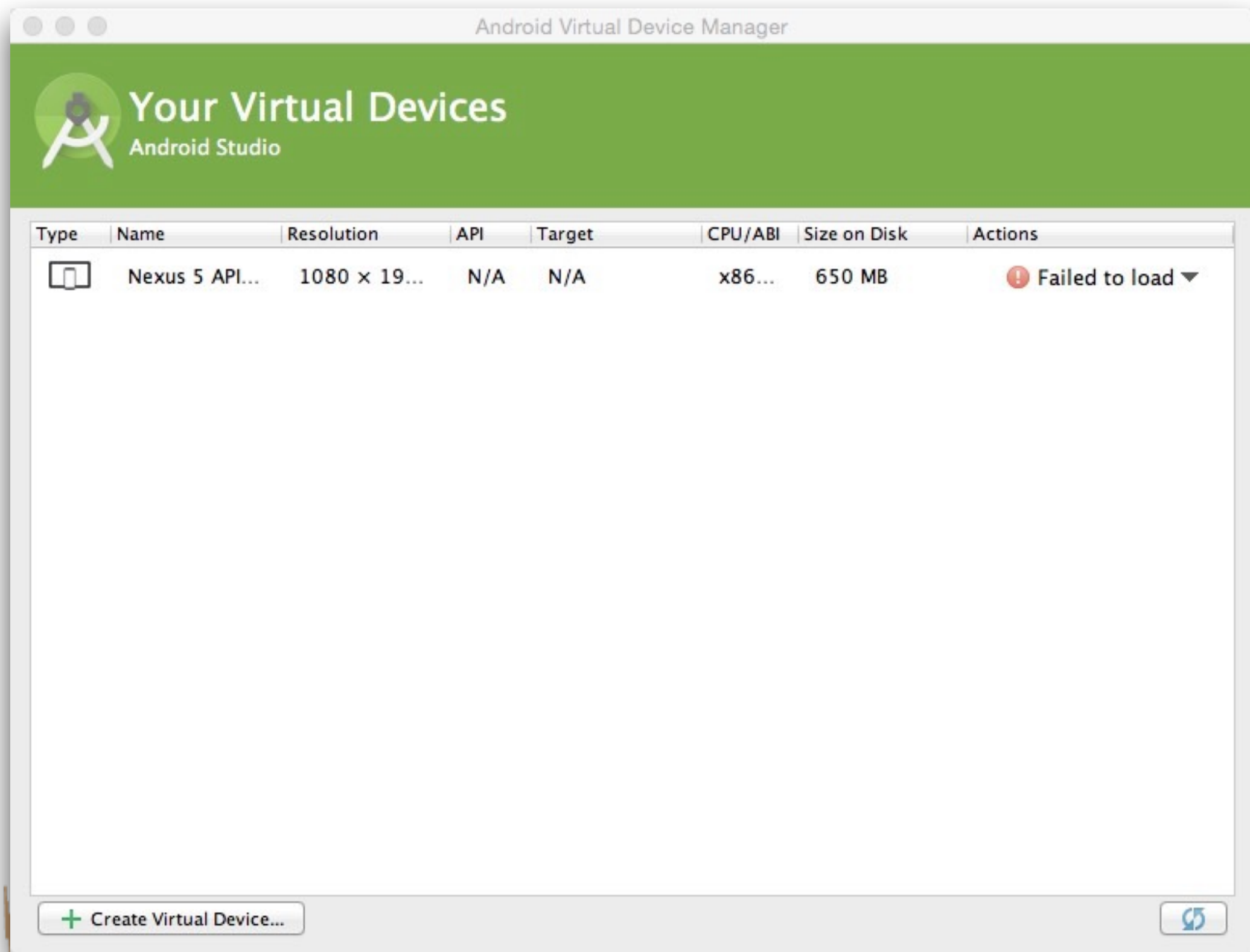
Cancel

Previous

Next

Finish

Setting up your environment



Setting up your environment

Android Virtual Device Manager

Your Virtual Devices
Android Studio

Type	Name	Resolution	API	Target	CPU/ABI	Size on Disk	Actions
	Nexus 5 API...	1080 x 19...	N/A	N/A	x86...	650 MB	Failed to load ▼

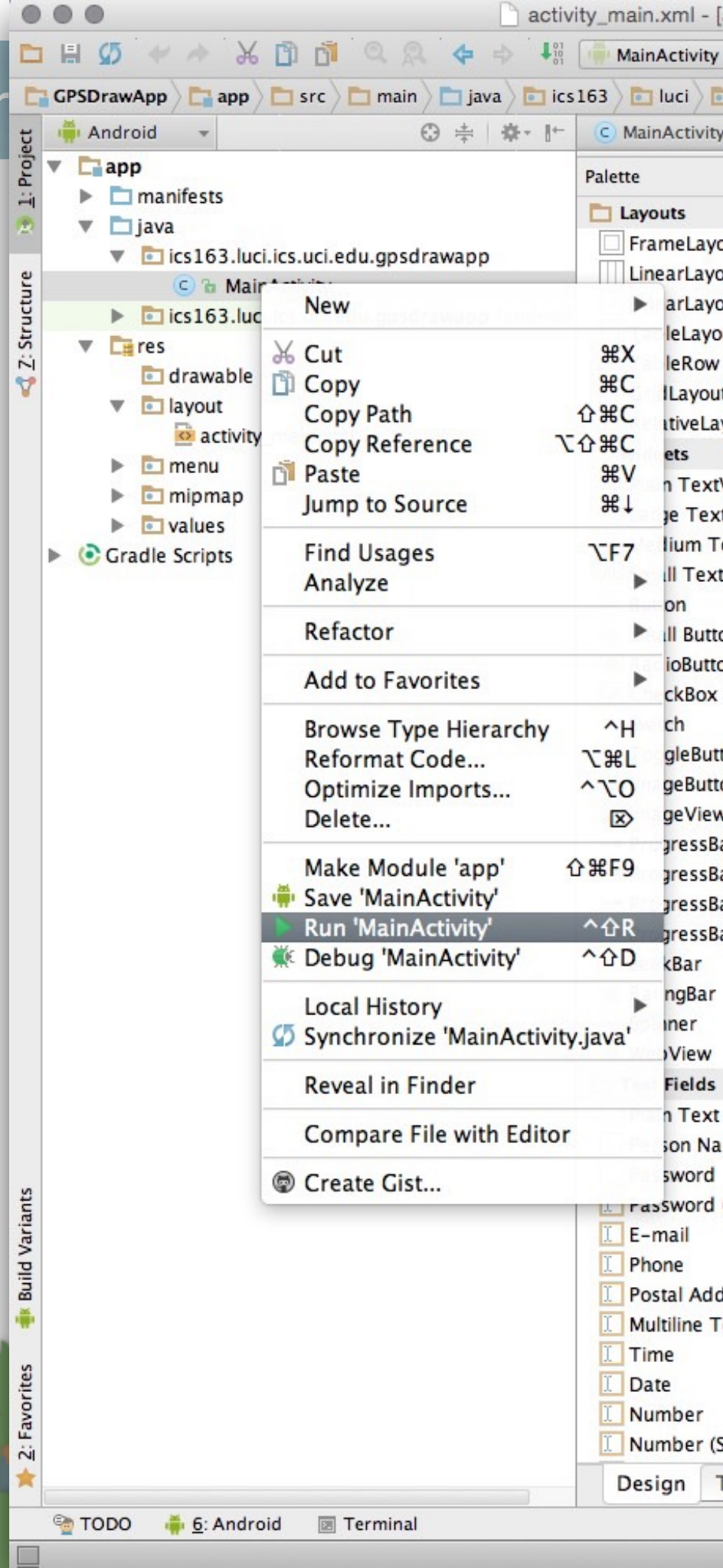
+ Create Virtual Device...

Restart Everything

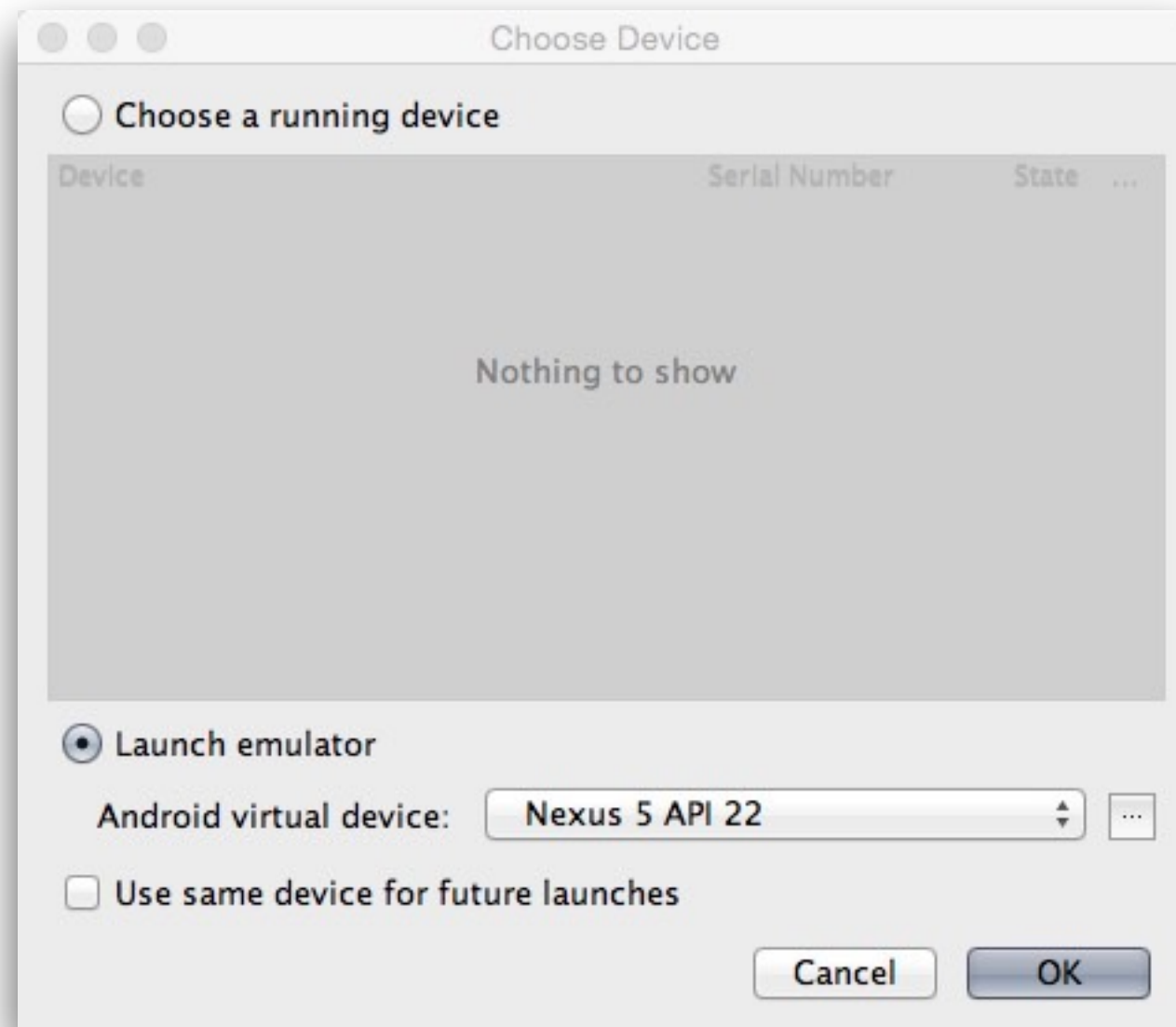
Setting up your environment



Setting up your environment



Setting up your environment



Setting up your environment



Se

Android

3G 50%



2:10

Thursday, April 16



Backup

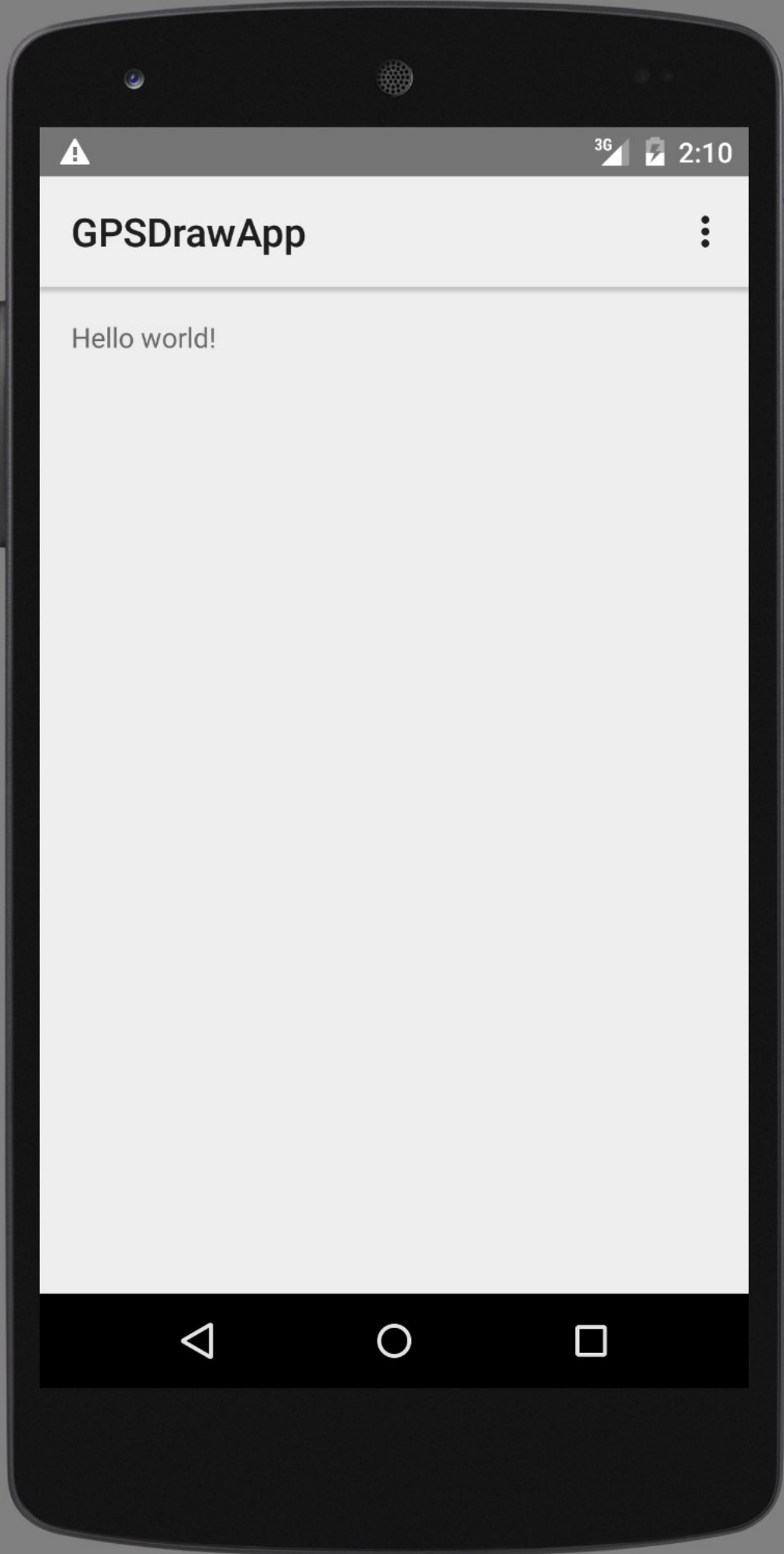
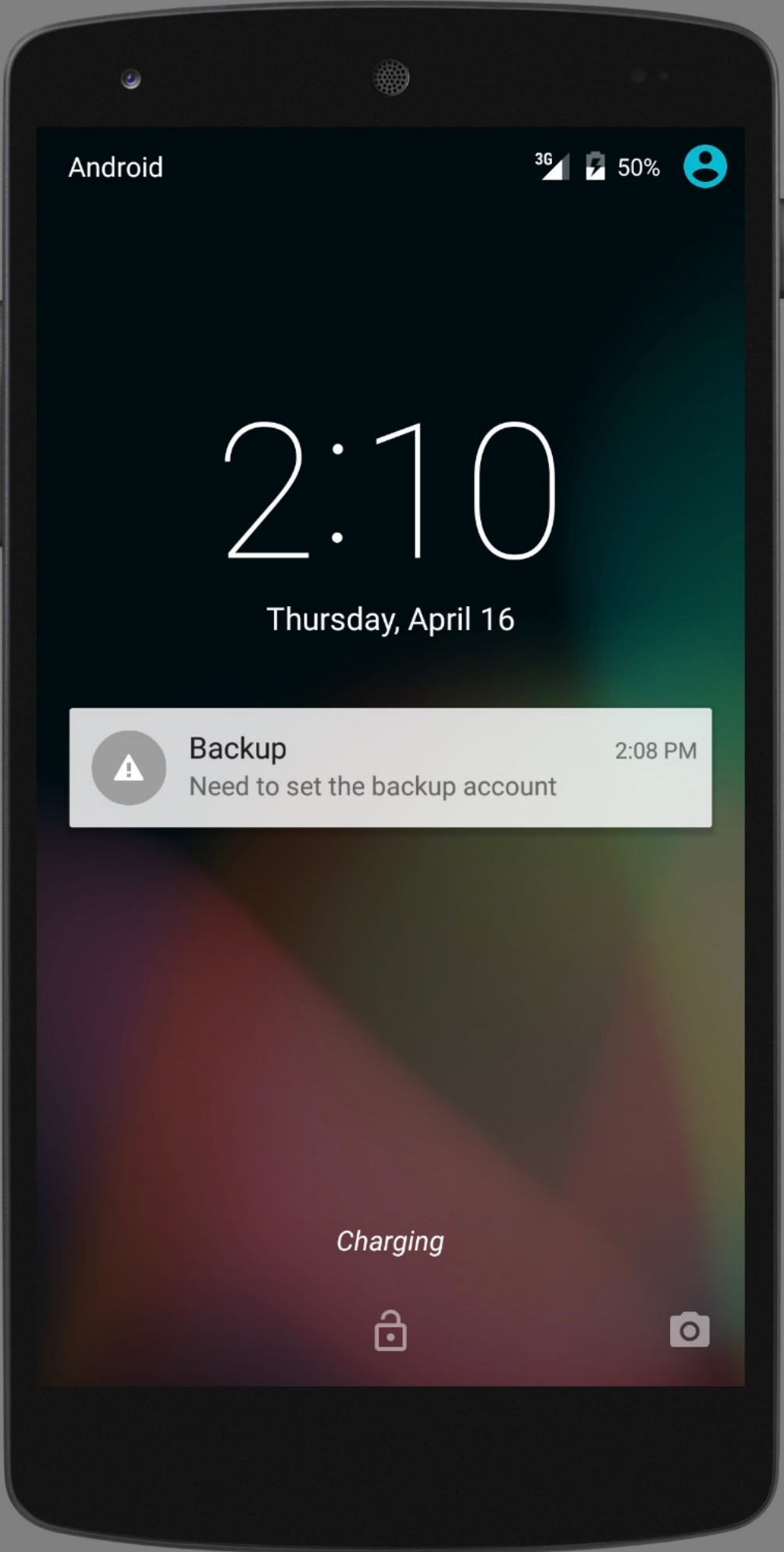
2:08 PM

Need to set the backup account

Charging



Se



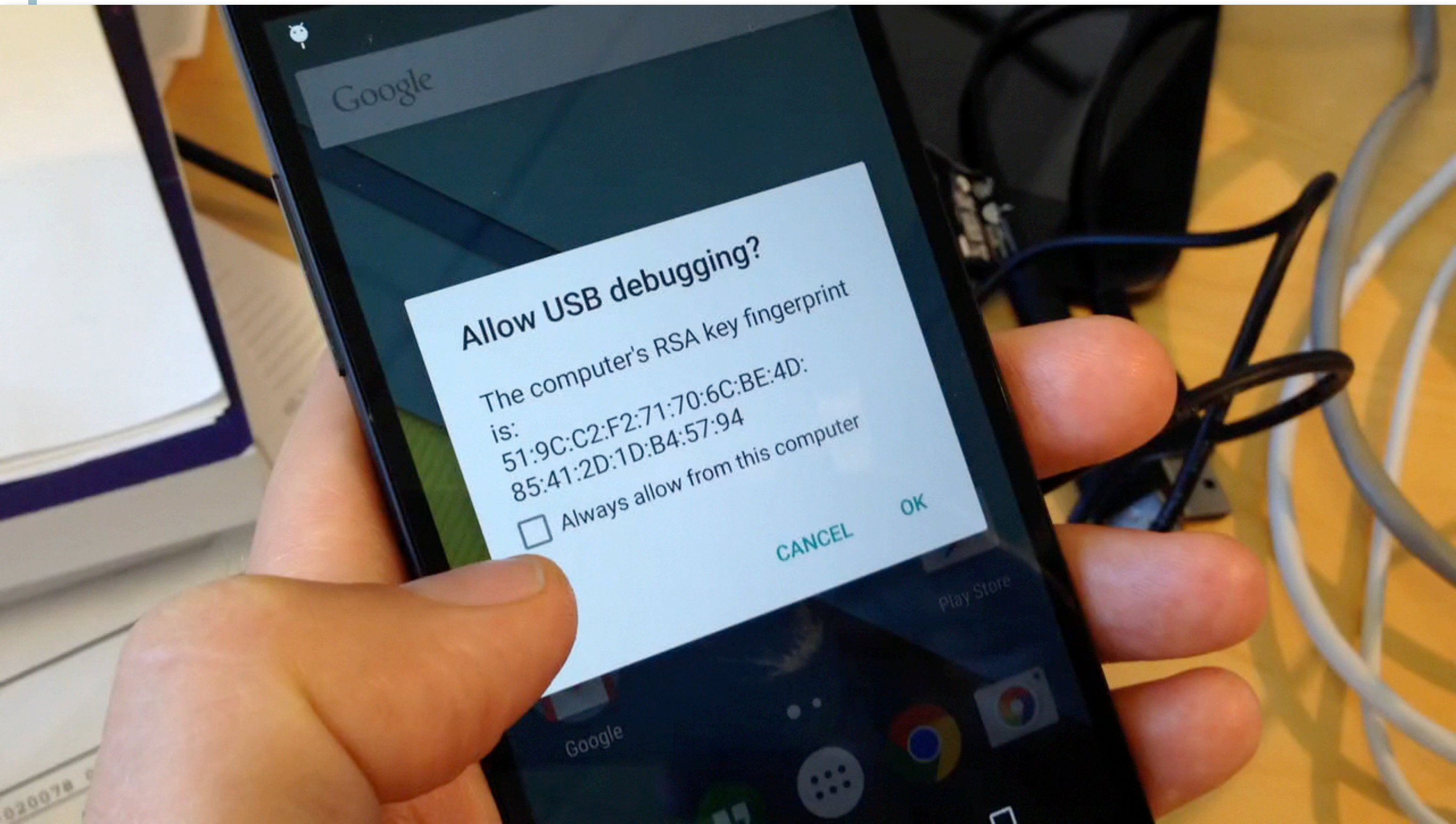
Setting up your environment



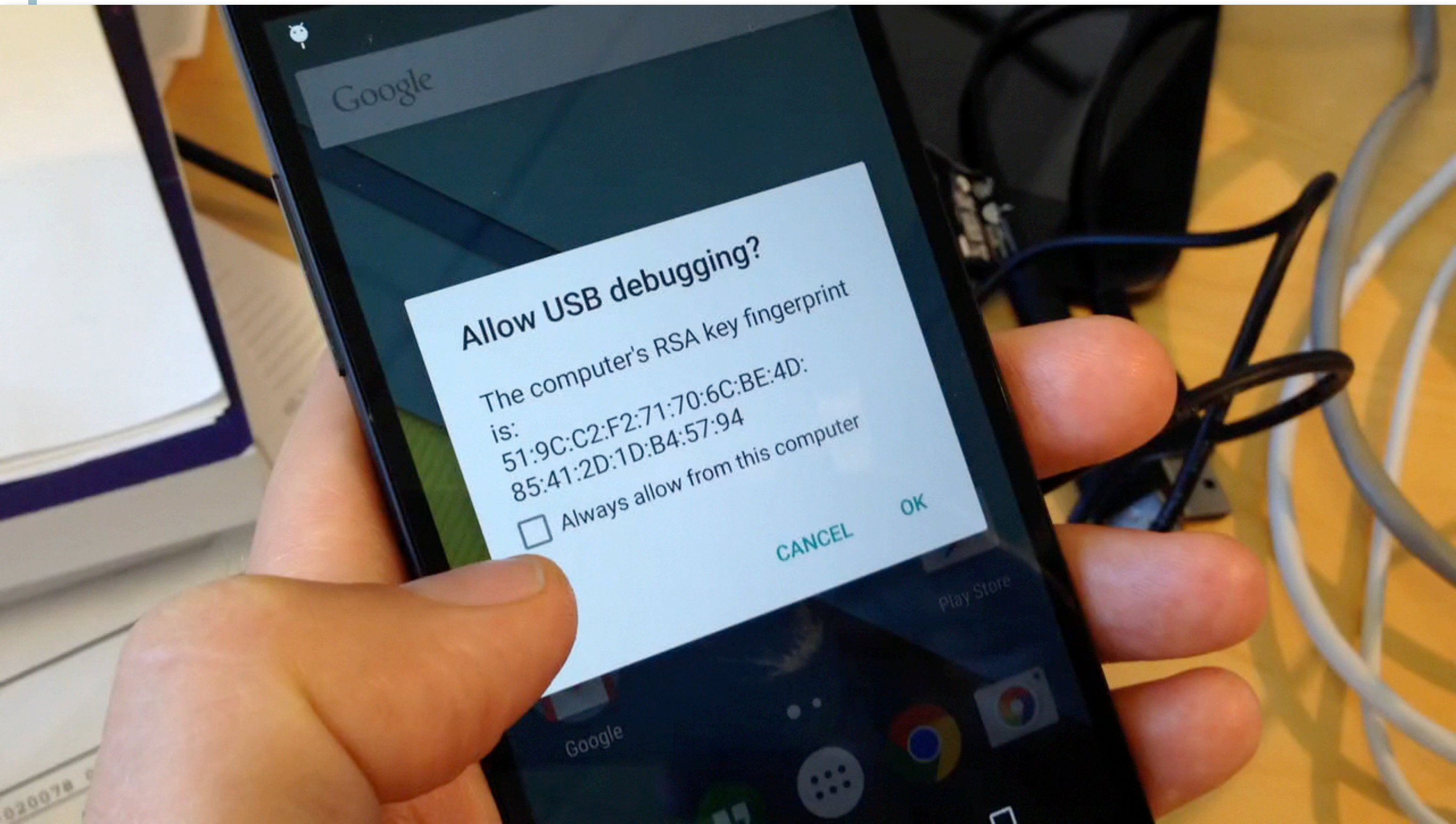
Setting up your environment



Setting up your environment



Setting up your environment



Setting up your environment

- Now the real phone and emulator are both options



MainActivity

GPSDrawApp app src main res layout activity_main.xml

MainActivity.java x activity_main.xml x strings.xml x

Android

Project Structure

- app
 - manifests
 - AndroidManifest.xml
 - java
 - ics163.luci.ics.uci.edu.gpsdrawapp
 - MainActivity
 - ics163.luci.ics.uci.edu.gpsdrawapp (android)
 - res
 - drawable
 - layout
 - activity_main.xml
 - menu
 - mipmap
 - values
 - dimens.xml (2)
 - strings.xml
 - styles.xml (2)
 - Gradle Scripts

Palette

- Layouts
 - FrameLayout
 - LinearLayout (Horizontal)
 - LinearLayout (Vertical)
 - TableLayout
 - TableRow
 - GridLayout
 - RelativeLayout
- Widgets
 - Plain TextView
 - Large Text
 - Medium Text
 - Small Text
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 - Small Button
 - RadioButton
 - CheckBox
 - Switch
 - ToggleButton
 - ImageButton
 - ImageView
 - ProgressBar (Large)
 - ProgressBar (Normal)
 - ProgressBar (Small)
 - ProgressBar (Horizontal)
 - SeekBar
 - RatingBar
 - Spinner
 - WebView
- Text Fields
 - Plain Text
 - Person Name
 - Password
 - Password (Numeric)
 - E-mail
 - Phone
 - Postal Address
 - Multiline Text
 - Time
 - Date
 - Number
 - Number (Signed)

Design Text

Device Screen

RelativeLayout

Ab hello_world (TextView) - @string/hello_world

GPSDrawApp

Hello world

Properties

Property	Value
layout:width	wrap_content
layout:height	wrap_content
layout:margin	[]
layout:alignEnd	
layout:alignParentEnd	<input type="checkbox"/>
layout:alignParentStart	<input type="checkbox"/>
layout:alignStart	
layout:toEndOf	
layout:toStartOf	
layout:alignComponent	[]
layout:alignParent	[]
layout:centerInParent	
style	
accessibilityLiveRegion	
accessibilityTraversalAfter	
accessibilityTraversalBefore	
alpha	
autoLink	[]
autoText	<input type="checkbox"/>
background	

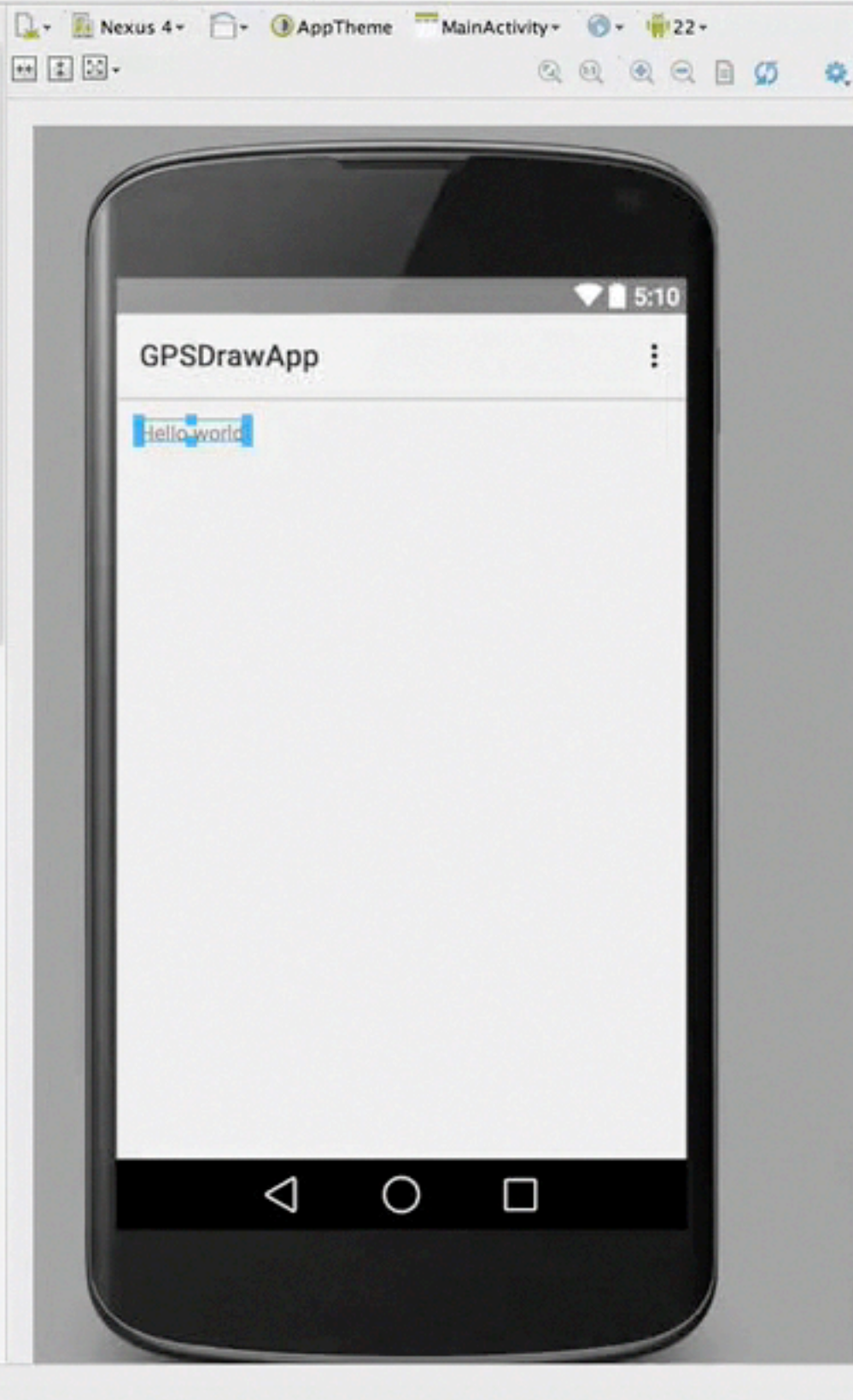
Project Structure

- app
 - manifests
 - AndroidManifest.xml
 - java
 - ics163.luci.ics.uci.edu.gpsdrawapp
 - MainActivity
 - ics163.luci.ics.uci.edu.gpsdrawapp (android)
 - res
 - drawable
 - layout
 - activity_main.xml
 - menu
 - mipmap
 - values
 - dimens.xml (2)
 - strings.xml
 - styles.xml (2)
 - Gradle Scripts

Palette

- Layouts
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 - ImageButton
 - ImageView
 - ProgressBar (Large)
 - ProgressBar (Normal)
 - ProgressBar (Small)
 - ProgressBar (Horizontal)
 - SeekBar
 - RatingBar
 - Spinner
 - WebView
- Text Fields
 - Plain Text
 - Person Name
 - Password
 - Password (Numeric)
 - E-mail
 - Phone
 - Postal Address
 - Multiline Text
 - Time
 - Date
 - Number
 - Number (Signed)

Design Text



Component Tree

- Device Screen
 - RelativeLayout
 - Ab hello_world (TextView) - @string/hello_world

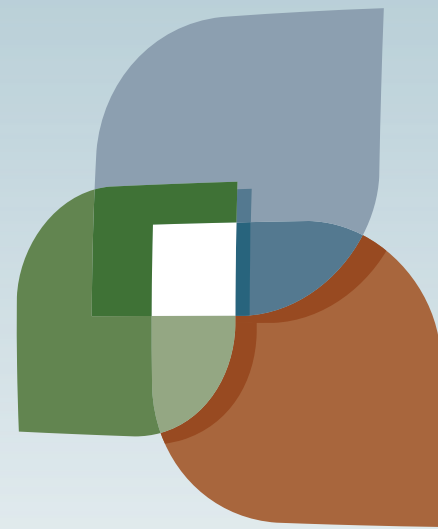
Properties

layout:width	wrap_content
layout:height	wrap_content
layout:margin	[]
layout:alignEnd	
layout:alignParentEnd	<input type="checkbox"/>
layout:alignParentStart	<input type="checkbox"/>
layout:alignStart	
layout:toEndOf	
layout:toStartOf	
layout:alignComponent	[]
layout:alignParent	[]
layout:centerInParent	
style	
accessibilityLiveRegion	
accessibilityTraversalAfter	
accessibilityTraversalBefore	
alpha	
autoLink	[]
autoText	<input type="checkbox"/>
background	



GPSDrawApp

Hello world! This has changed



L U C I

