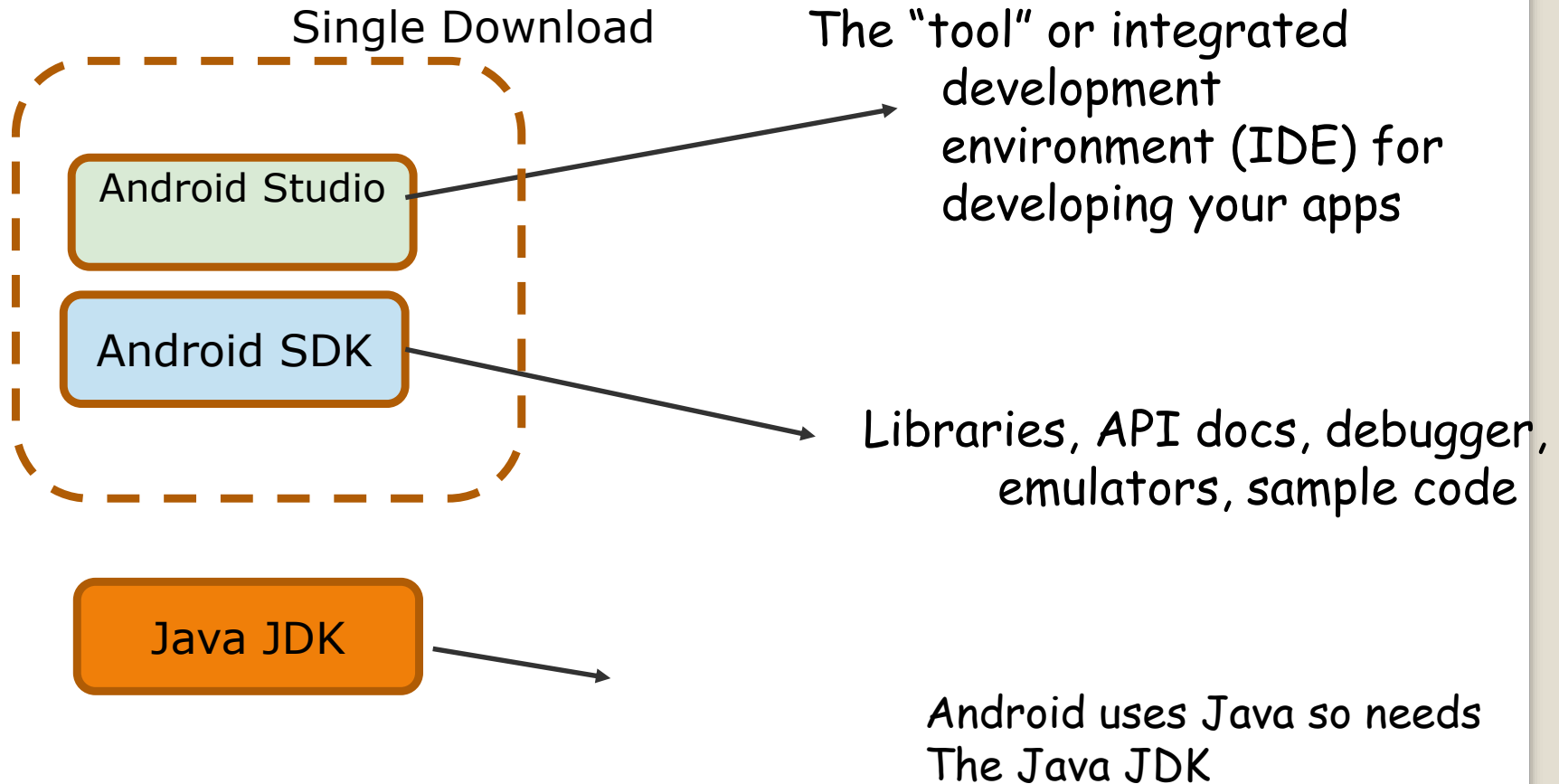


Mobile Software Development

DT228/3

Dr. Susan McKeever

Developing in Android



JDK = Java Development Kit
SDK = software development kit

To set up your own Android Dev environment:

- Android Studio (purpose built and **recommended**) is now the standard development tool for Android
- Note: Eclipse with Android (ADT) plug in still used a bit..
OR any other one you prefer
- **Android Studio** (with SDK as an option) at:

<https://developer.android.com/studio/install.html>

API levels and versions

A complicating factor!

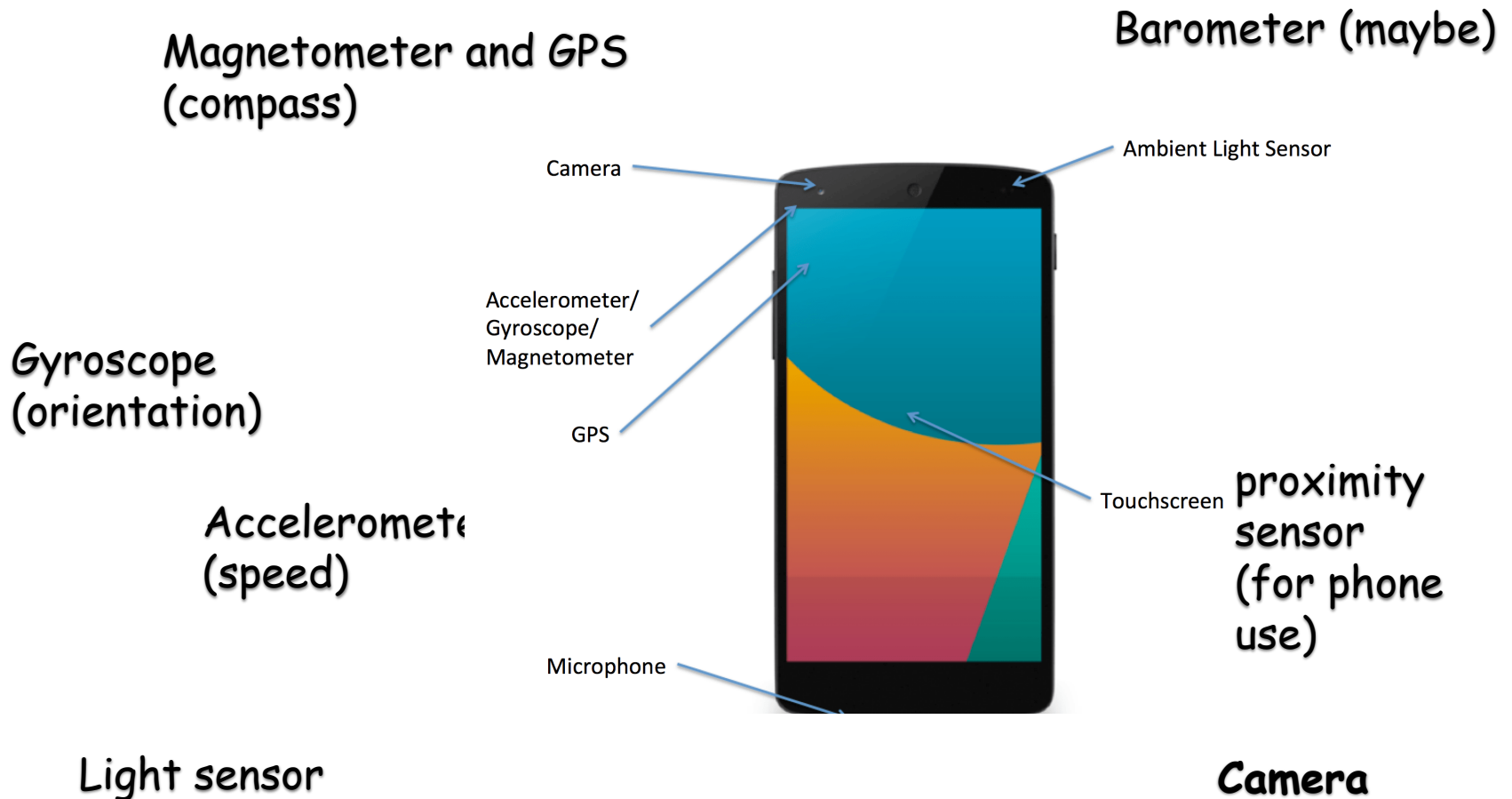
| Code name | Version number | Initial release date | API level |
|----------------------------|----------------|------------------------------------|-------------------|
| <u>Ice Cream Sandwich</u> | 4.0 – 4.0.4 | 18 October 2011 | 14–15 |
| <u>Jelly Bean</u> | 4.1 – 4.3.1 | 9 July 2012 | 16–18 |
| <u>KitKat</u> | 4.4 – 4.4.4 | 31 October 2013 | 19–20 |
| <u>Lollipop</u> | 5.0 – 5.1.1 | 12 November 2014 | 21–22 |
| <u>Marshmallow</u> | 6.0 – 6.0.1 | 5 October 2015 | 23 |
| <u>Nougat</u> | 7.0 – 7.1 | 22 August 2016 | 24 - 25 |
| <u>Oreo</u> | 8.0.0 | 2017 | 26 |
| <u>Pie</u> ^[16] | 9.0 | 4.4.107, 4.9.84, and 4.14.42 | August 6, 2018 |

Android smartphone - Hardware and sensors

Android versus Apple iOS

Different approaches to phone/ software

Android smartphone - hardware and sensors



Android API Documentation

<https://developer.android.com/reference/packages.html>

The screenshot shows a Mozilla Firefox browser window displaying the Android API Documentation for the `Button` class. The browser's address bar shows the URL `http://developer.android.com/reference/android/widget/Button.html`. The page features a navigation menu on the left with categories like `android.text`, `android.view`, and `android.widget`. The main content area displays the `Button` class, which extends `TextView`. It lists known direct subclasses (`CompoundButton`) and indirect subclasses (`CheckBox`, `RadioButton`, `ToggleButton`). A "Class Overview" section describes the `Button` as a push-button widget. A notification bubble in the bottom right corner indicates that `susan.mckeever@dit.ie` has 2 new messages, with one message titled "Death notice" from Melda Slattery.

Button | Android Developers - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://developer.android.com/reference/android/widget/Button.html

Most Visited Customize Links My Yahoo! Ben 10 : Savage Purs... Free Hotmail Windows Marketplace Windows Media iGoogle intensive english cour...

Br*thers*ft | ** The HelloWorldApp

Blackboard Learning System iGoogle Button | Android Devel... My Account RTE RTÉ Ireland's National Radi...

English Android.com

search developer docs Search

Home SDK Dev Guide **Reference** Resources Videos Blog

Filter by API Level: 9

android.text
android.text.format
android.text.method
android.text.style
android.text.util
android.util
android.view
android.view.accessibility
android.view.animation
android.view.inputmethod
android.webkit
android.widget
dalvik.bytecode
dalvik.system
java.awt.font
java.beans

AutoCompleteTextView
BaseAdapter
BaseExpandableListAdapter
Button
CheckBox
CheckedTextView
Chronometer
CompoundButton

Use Tree Navigation

Done

public class **Button**
Summary: [Inherited XML Attrs](#) | [Inherited Constants](#) | [Ctors](#) | [Inherited Methods](#) | [\[Expand All\]](#)
Since: API Level 1
extends [TextView](#)

[java.lang.Object](#)
↳ [android.view.View](#)
↳ [android.widget.TextView](#)
↳ [android.widget.Button](#)

► Known Direct Subclasses
[CompoundButton](#)

► Known Indirect Subclasses
[CheckBox](#), [RadioButton](#), [ToggleButton](#)

Class Overview

Represents a push-button widget. Pu...

A typical use of a push-button in an a...

public class MainActivity

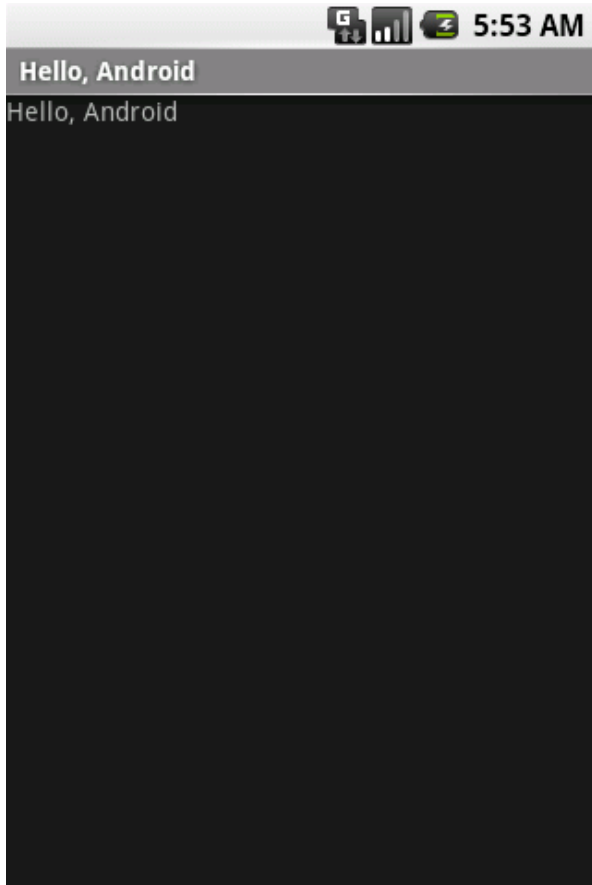
susan.mckeever@dit.ie has 2 new messages

Death notice Melda Slattery
Dear colleagues, It is with the greatest regret that we inform you of the sudden unexp...

Re: Interim reports Zach Davidson/ Chris Harrington Paul Doyle
Thanks! -----Original Message----- From: susan mckeever [mailto:susan.mckeever@dit.i...]

Start Inbox - Moz... 3 Firefox 2 Windows... L2 - Project... L1 - Introdu... 2 Microsof... TextPad - C... 12:27

Running your app



Need to use a real phone
(USB driver may be needed)

OR

an **Android Virtual Device**
- Built into Android Studio

OR

Alternative Android emulators are
available online e.g. **nox**
<https://downloadnox.com/>
Genymotion etc.

Android Virtual Devices

Emulation or Mock up of a real phone

Most of the AVDs require hardware acceleration - enable this OR
choose an AVD that runs using CPU ARM
Tip: SD Card > 9Mb (but not much)

Resource heavy: Keep to the physically smaller emulators

Notes:

In Studio: Tools/ Android/ AVD manager to access OR
just click "RUN" to initiate

"System Image" is the enabling underlying files for AVDs

Advantages of Android Virtual Devices?

Disadvantages of Android Virtual Devices?

Advantages of Android Virtual Devices?

Can test different API version

Phone skins

Layouts

"Free"

Can easily get at underlying database e.g. dB for the app

Full debugging environment

Disadvantages of Android Virtual Devices?

Slow

Can't easily test real world scenarios such as:

- mobile/ location based real world
- Sensors e.g. microphone, etc

Getting your first project going..

Install
(Android studio
(includes
Android sdk)
java etc

Android
Studio:
Create an
app/ project

Create an
emulator to
test the app

Run the app/
project
On emulator

Warning!

Android in-built
Emulators are
slow to run
especially the
FIRST time

Android Platform - layers

System Apps (and your apps)

- Contacts
- Phone Dialer
- E-mail
- Web Browser

Android Framework

- Activity Manager
- Content Provider
- Location Manager
- Notification Manager

Runtime + Dalvik VM

- Lightweight Java VM
- Efficient Bytecode

Native Libraries

- Surface Manager
- 2D+3D Graphics (OpenGL) + Media
- SQLite
- Browser (webkit)

Linux

Inside a project

Java

Res -- Layouts (design versus text views)

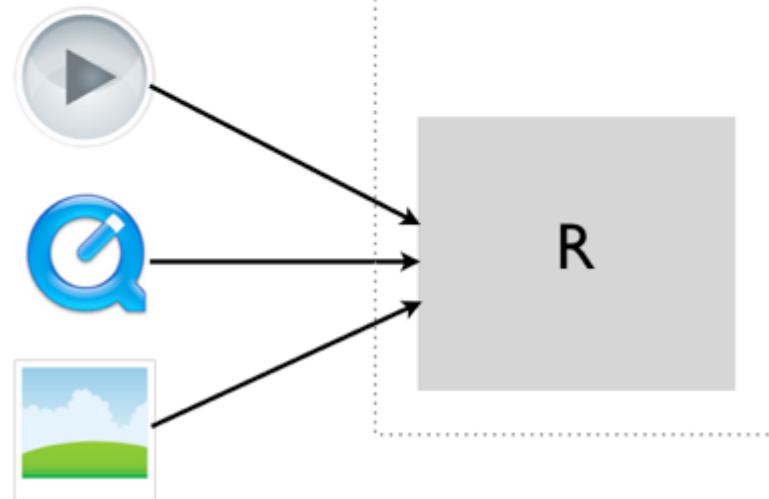
Manifest

Android - "vocabulary"

Resource:

R class

R.java is a critical file in each project



Android - "vocabulary"

Activity

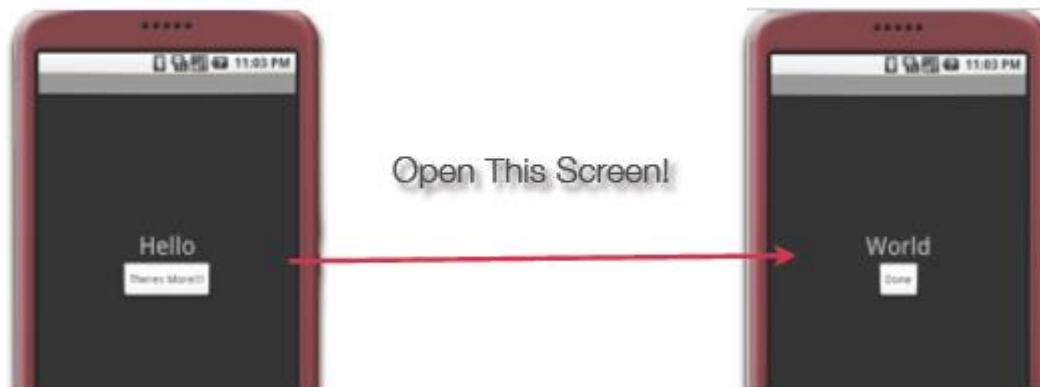
Layout file

XML files

Android - "vocabulary"

Intent:

Code to accomplish a verb, like "Call this number" or "Open the contacts list" .



Android - Project

- Every Android app created via an Android Project
- Project holds all source code, resources etc
- "Building" project turns it into an APK file
- Specific tree structure

Android application files

An **.apk** = Android Package (APK) file.

A variant of the Jar format

Used for the distribution and installation

An .apk file can be opened and inspected using common archive tools such as 7Zip, WinZip

Labs this week

Laptops <https://developer.android.com/studio/install.html>

Download

Cable (for your phone)