

Romain Chiappinelli

THE ANDROID DEVELOPMENT ENVIRONMENT

THE ANDROID PLATFORM

A MULTI-LAYERED SOFTWARE STACK
FOR BUILDING AND RUNNING MOBILE
APPLICATIONS

THE ANDROID DEVELOPMENT
ENVIRONMENT

YOUR WORKBENCH FOR WRITING
ANDROID APPLICATIONS

TODAY'S TOPICS

DOWNLOADING ANDROID SDK

USING THE ANDROID STUDIO IDE

USING THE ANDROID EMULATOR

DEBUGGING ANDROID APPLICATIONS

OTHER TOOLS

PREREQUISITES

SUPPORTED OPERATING SYSTEMS:

MICROSOFT WINDOWS 7/8/VISTA/2003

MAC OS X 10.8.5 TO 10.9

LINUX (TESTED ON UBUNTU 14.04)

SEE: <http://developer.android.com/sdk>

PREREQUISITES

JAVA DEVELOPMENT KIT (JDK 7)

SEE:

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

PREREQUISITES

2 GB RAM MIN, 4 GB RAM REC

1 GB+ FOR ANDROID SDK, EMULATOR SYSTEM
IMAGES, AND CACHES

400 MB HARD DISK SPACE

1280 x 800 MIN SCREEN RESOLUTION

GETTING STARTED

DOWNLOAD & INSTALL ANDROID SDK
BUNDLE

SEE:

<http://developer.android.com/sdk>
<https://youtu.be/jpFl15aw5rA>

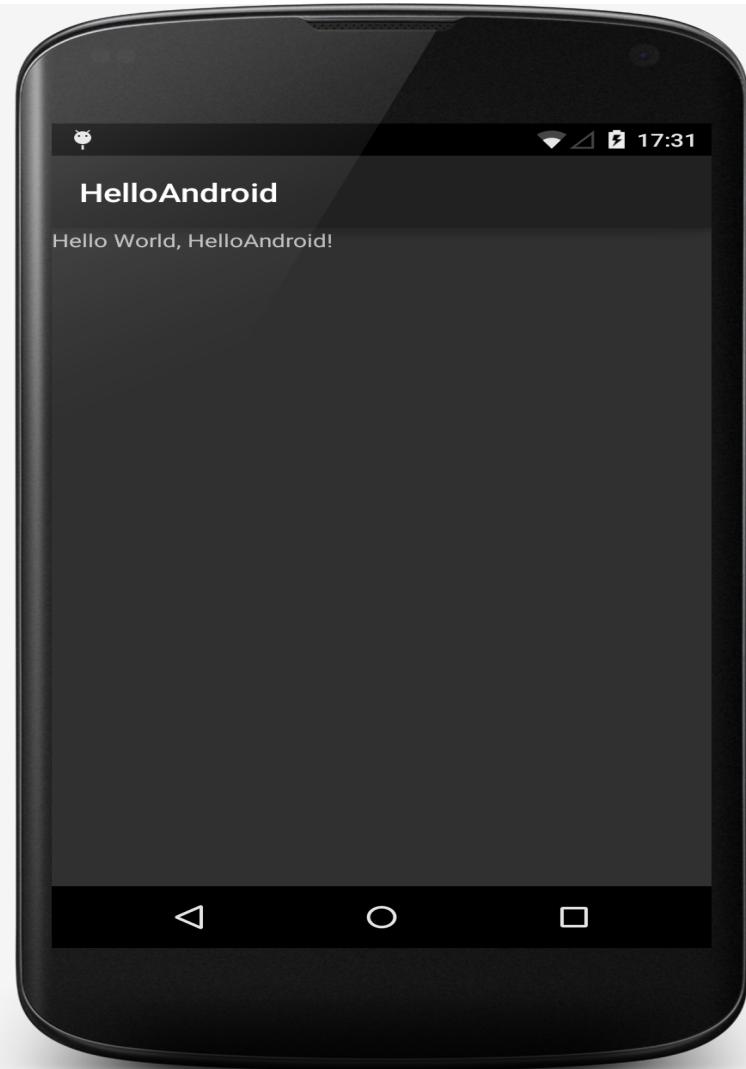
ANDROID SDK BUNDLE

ANDROID PLATFORM

ANDROID STUDIO IDE

KEY DEVELOPMENT TOOLS

SYSTEM IMAGE FOR EMULATOR



The screenshot shows the Android Studio interface with the following details:

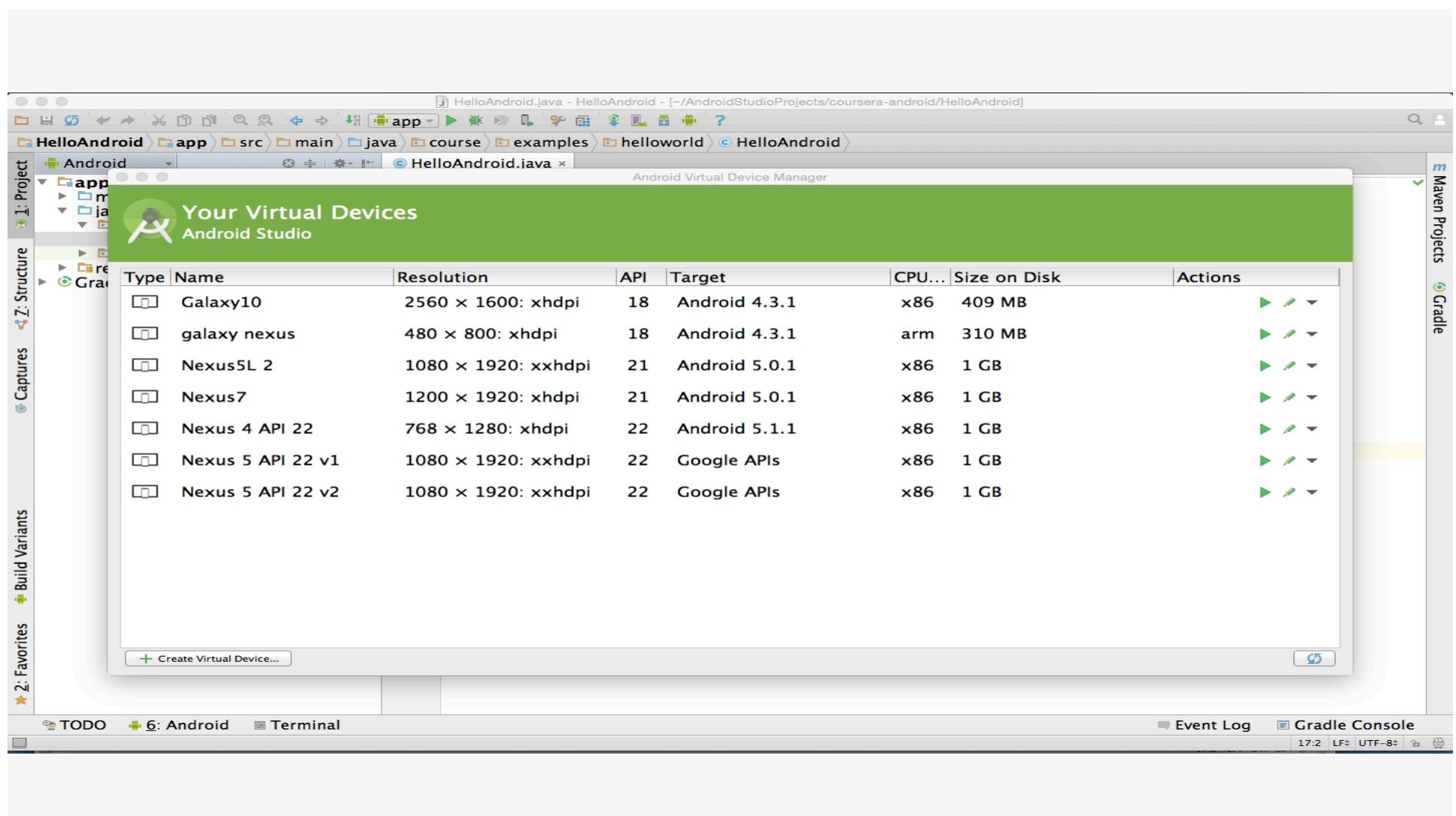
- Title Bar:** HelloAndroid.java - HelloAndroid - [~/AndroidStudioProjects/coursera-android/HelloAndroid]
- Project Navigators:** Project, Z. Structure, Captures, 2. Favorites.
- Code Editor:** The main editor window displays the `HelloAndroid.java` file under the package `course.examples.helloworld`. The code implements a basic Activity:

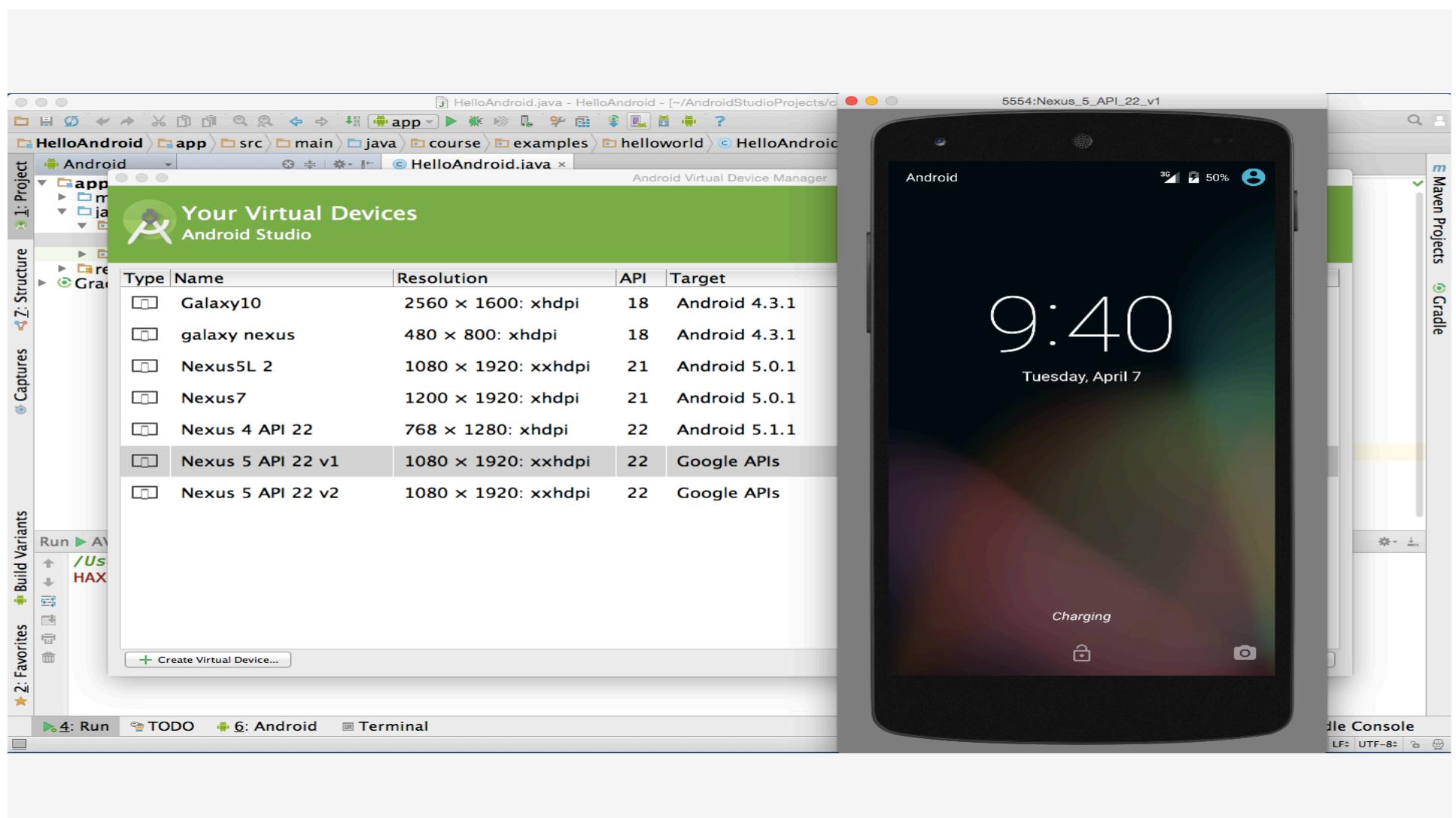
```
1 package course.examples.helloworld;
2
3 import android.app.Activity;
4 import android.os.Bundle;
5
6 public class HelloAndroid extends Activity {
7     @Override
8     protected void onCreate(Bundle savedInstanceState) {
9         // Required call through to Activity.onCreate()
10        // Restore any saved instance state
11        super.onCreate(savedInstanceState);
12
13        // Set up the application's user interface (content view)
14        setContentView(R.layout.main);
15    }
16}
17
```

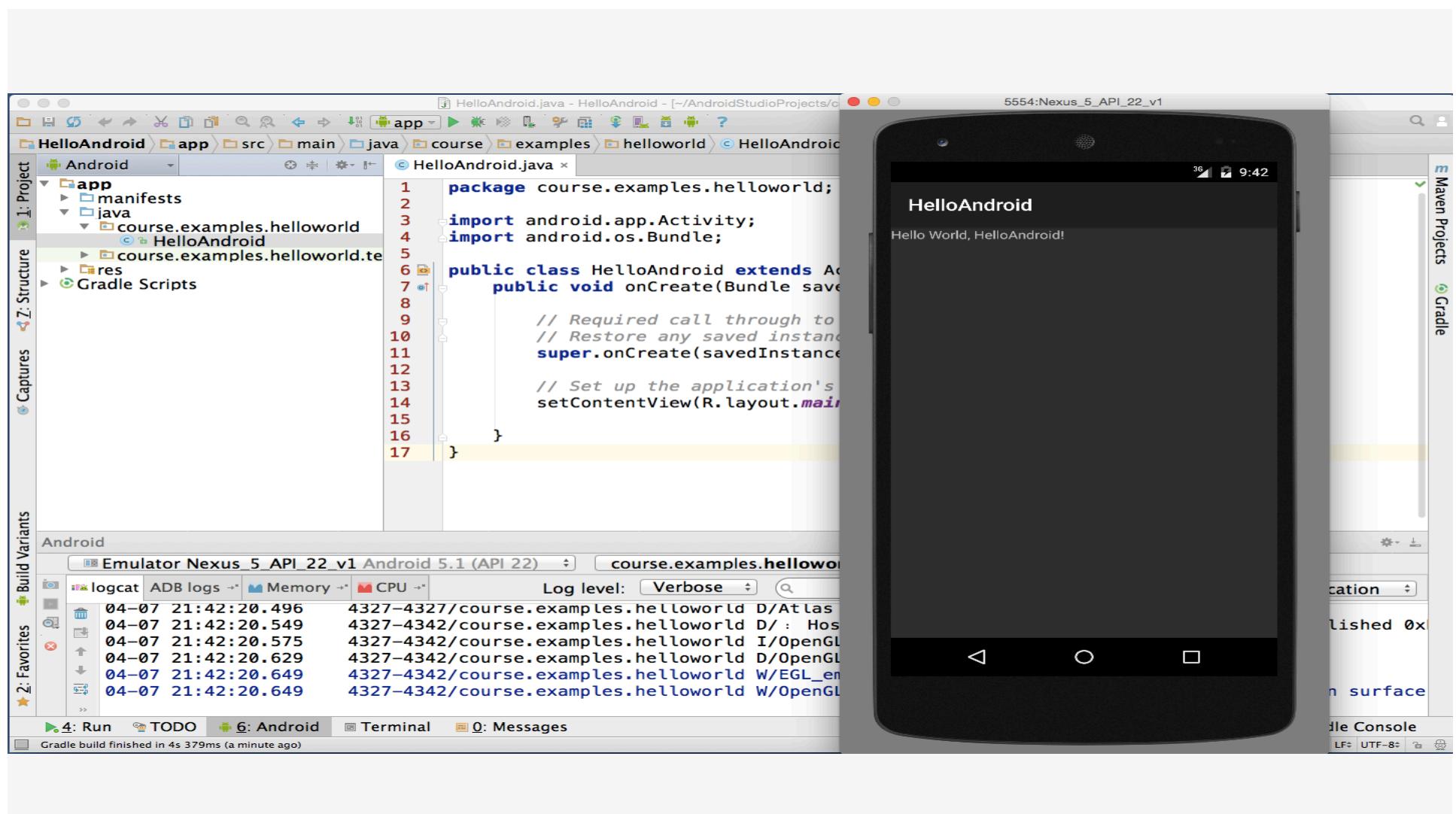
- Toolbars and Status Bar:** Standard Android Studio toolbars and a status bar at the bottom showing tabs like TODO, Android, Terminal, Event Log, and Gradle Console, along with system information like battery level and network status.

THE ANDROID EMULATOR

RUNS VIRTUAL DEVICES







THE ANDROID EMULATOR

PROS

DOESN'T REQUIRE AN ACTUAL PHONE

HARDWARE IS RECONFIGURABLE

CHANGES ARE NON-DESTRUCTIVE

THE ANDROID EMULATOR

CONS

CAN BE VERY SLOW

SOME FEATURES UNAVAILABLE

E.G., NO SUPPORT FOR BLUETOOTH OR USB
CONNECTIONS

PERFORMANCE / USER EXPERIENCE CAN BE
MISLEADING

ADVANCED FEATURES

CAN EMULATE MANY DIFFERENT DEVICE/
USER CHARACTERISTICS, SUCH AS:

NETWORK SPEED/LATENCIES

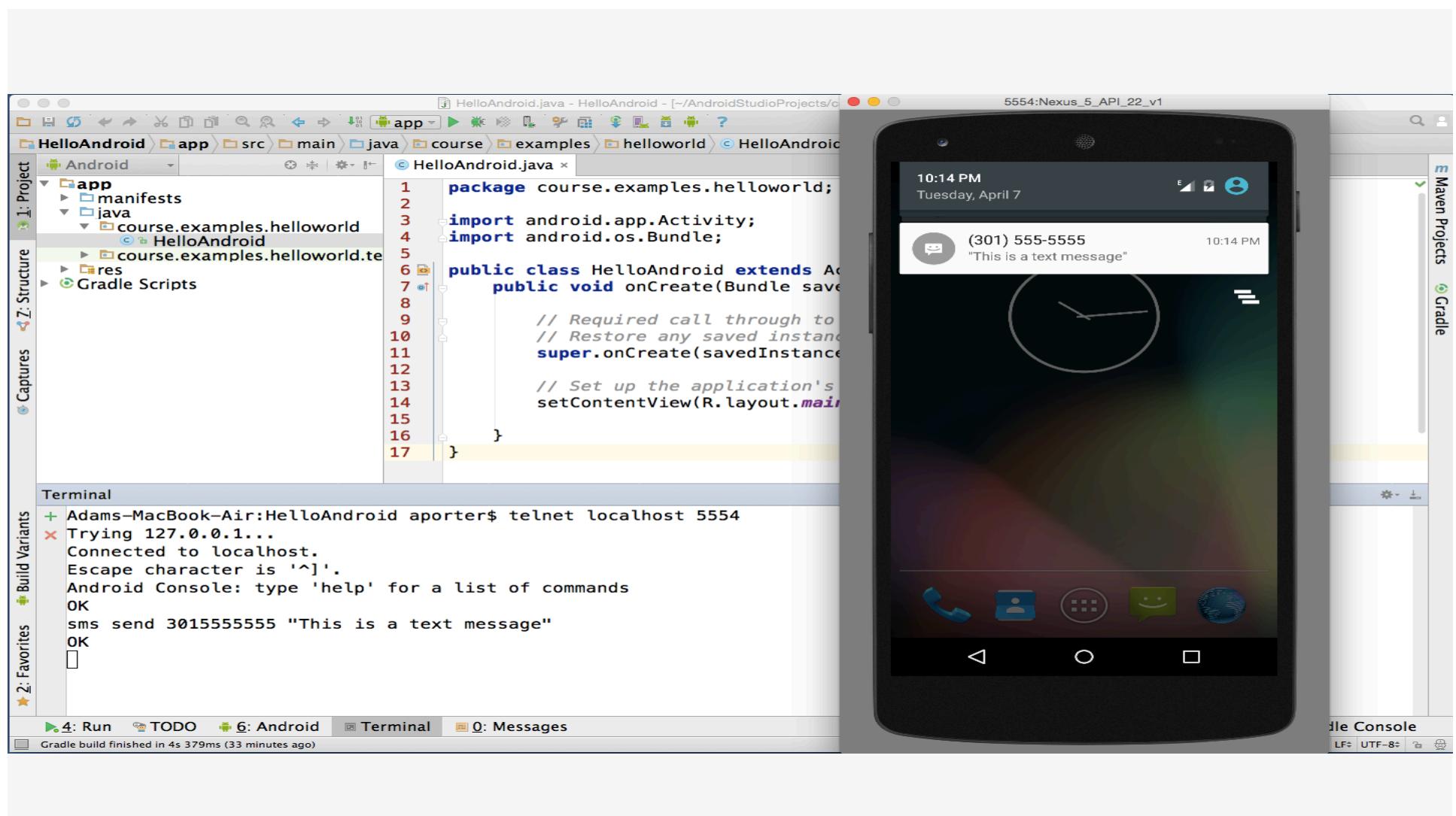
BATTERY POWER

LOCATION COORDINATES



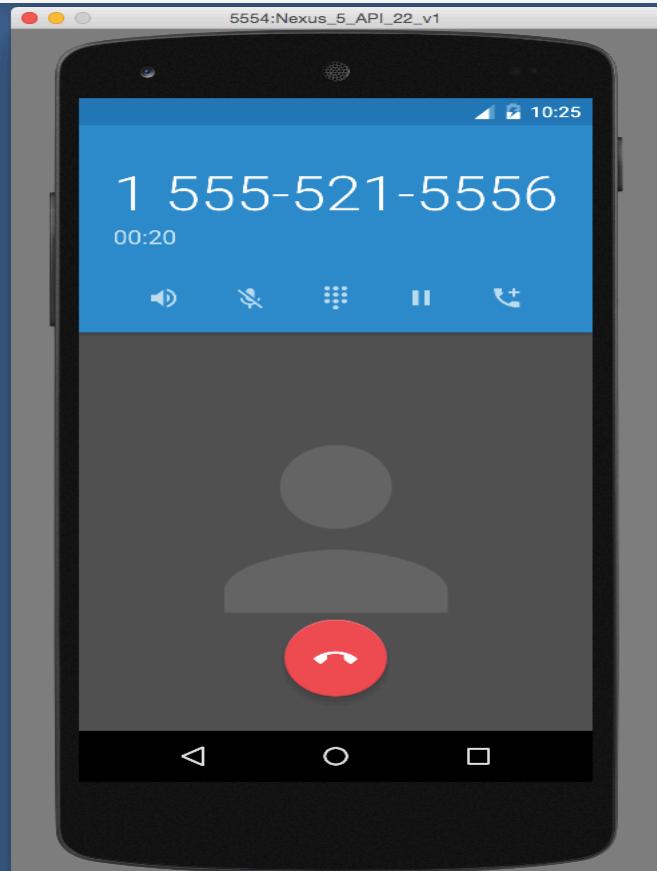
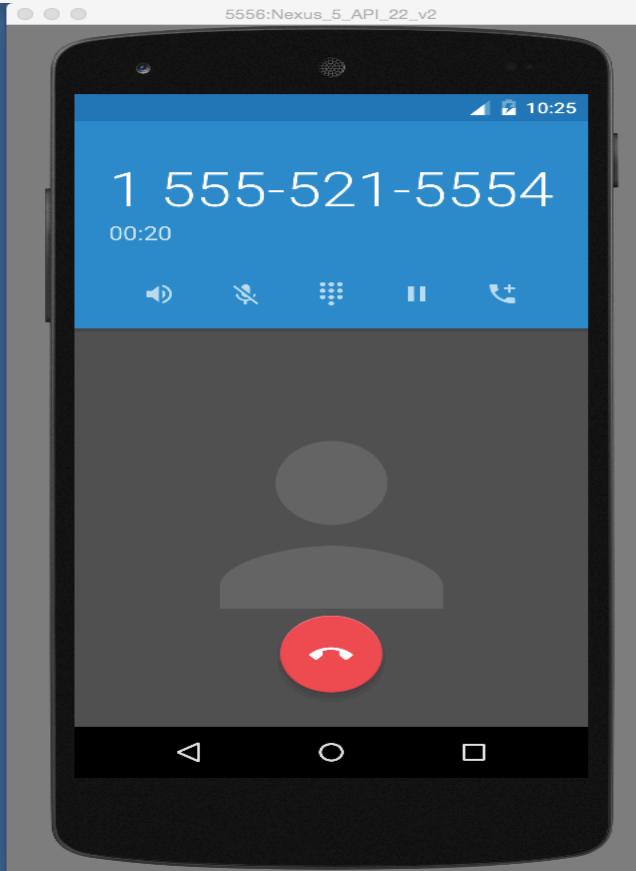
ADVANCED FEATURES

EMULATE INCOMING PHONE CALLS &
SMS MESSAGES



THE ANDROID EMULATOR

CAN INTERCONNECT MULTIPLE
EMULATORS



ADVANCED FEATURES

MANY MORE OPTIONS

SEE:

<http://developer.android.com/guide/developing/devices/emulator.html>

DEBUGGER

TOOL FOR EXAMINING THE INTERNAL
STATE OF A RUNNING APPLICATION



```
1 package course.examples.theanswer;
2
3 import ...
4
5
6
7 public class TheAnswer extends Activity {
8
9     public static final int[] answers = { 42, -10, 0, 100, 1000 };
10    public static final int answer = 42;
11
12    @Override
13    protected void onCreate(Bundle savedInstanceState) {
14
15        // Required call through to Activity.onCreate()
16        // Restore any saved instance state
17        super.onCreate(savedInstanceState);
18
19        // Set up the application's user interface (content view)
20        setContentView(R.layout.answer_layout);
21
22        // Get a reference to a TextView in the content view
23        TextView answerView = (TextView) findViewById(R.id.answer_view);
24
25        int val = findAnswer();
26        String output = (val == answer) ? "42" : "We may never know";
27
28        // Set desired text in answerView TextView
29        answerView
30            .setText("The answer to life, the universe and everything is:\n\n"
31                    + output);
32
33 }
```

```
34 @    private int findAnswer() {
35        for (int val : answers) {
36            if (val != answer)
37                return val;
38        }
39        return -1;
40    }
41 }
42 }
```



DALVIK DEBUG MONITOR SERVICE (DDMS)

GENERAL TOOLS FOR MONITORING
APPLICATION BEHAVIORS

DALVIK DEBUG MONITOR SERVICE (DDMS)

DDMS TOOLS INCLUDE

FILE EXPLORER

LOGCAT

TRACEVIEW

HIERARCHYVIEW

Android Device Monitor

Devices

Name	Status	Net
emulator-5554	Online	N/A
system_process	1229	860
com.android.systemui	1395	860
com.android.inputmethod.latin	1424	860
com.google.android.gms	1456	860
com.android.phone	1475	860
com.android.launcher	1508	860
com.google.process.location	1878	860
com.google.process.gapps	1912	860
com.google.android.gms.ui	1984	861
com.google.android.gms.wearable	2008	861
com.google.android.apps.maps	2047	861
android.process.media	2102	861
com.android.externalstorage	2124	861
com.android.deskclock	2139	861
com.android.music	2158	861
com.android.calendar	2181	861
com.android.providers.calendar	2205	861
com.android.mms	2222	861
com.android.dialer	2269	862
com.android.keychain	2287	862
com.android.managedprovisioning	2319	862
com.android.settings	2371	862
com.android.email	2407	862
com.android.exchange	2423	862

Threads | Heap | Allocation Tracker | Network Statistics | File Explorer | Emulator Control | System Information

File Explorer

Name	Size	Date	Time	Permissions	Info
etc	2015-04-07	22:38		drwxr-xr-x	Irwxrwxrwx -> /system/etc...
file_contexts	11166	1969-12-31	19:00	-rw-r--r--	
fstab.goldfish	922	1969-12-31	19:00	-rw-r-----	
init	645296	1969-12-31	19:00	rwxr-x---	
init.environ.rc	944	1969-12-31	19:00	-rwxr-x---	
init.goldfish.rc	2836	1969-12-31	19:00	-rwxr-x---	
init.rc	21728	1969-12-31	19:00	-rwxr-x---	
init.trace.rc	1927	1969-12-31	19:00	-rwxr-x---	
init.usb.rc	3885	1969-12-31	19:00	-rwxr-x---	
init.zygote32.rc	301	1969-12-31	19:00	-rwxr-x---	
mnt	2015-04-07	22:38		drwxrwxr-x	
proc	2015-04-07	22:38		dr-xr-xr-	
property_contexts	2771	1969-12-31	19:00	-rw-r--r--	
root	2014-09-16	13:33		drwx-----	
sbin	1969-12-31	19:00		drwxr-x---	
sdcard	2015-04-07	22:38		Irwxrwxrwx -> /storage/sdcard...	
seapp_contexts	471	1969-12-31	19:00	-rw-r--r--	
selinux_version	76	1969-12-31	19:00	-rw-r--r--	
sepolicy	118305	1969-12-31	19:00	-rw-r--r--	
service_contexts	9438	1969-12-31	19:00	-rw-r--r--	
storage	2015-04-07	22:38		drwxr-x--x	
sdcard	1969-12-31	19:00		drwxrwxr-x	
Alarms	2015-04-06	12:50		drwxrwx---	
Android	2015-04-06	12:50		drwxrwxr-x	
DCIM	2015-04-06	12:50		drwxrwx---	
Download	2015-04-06	12:50		drwxrwx---	
LOST.DIR	2015-04-06	16:50		drwxrwx---	
Movies	2015-04-06	12:50		drwxrwx---	
Music	2015-04-06	12:50		drwxrwx---	
Notifications	2015-04-06	12:50		drwxrwx---	
Pictures	2015-04-06	12:50		drwxrwx---	
Podcasts	2015-04-06	12:50		drwxrwx---	

LogCat

Console

Saved Filters

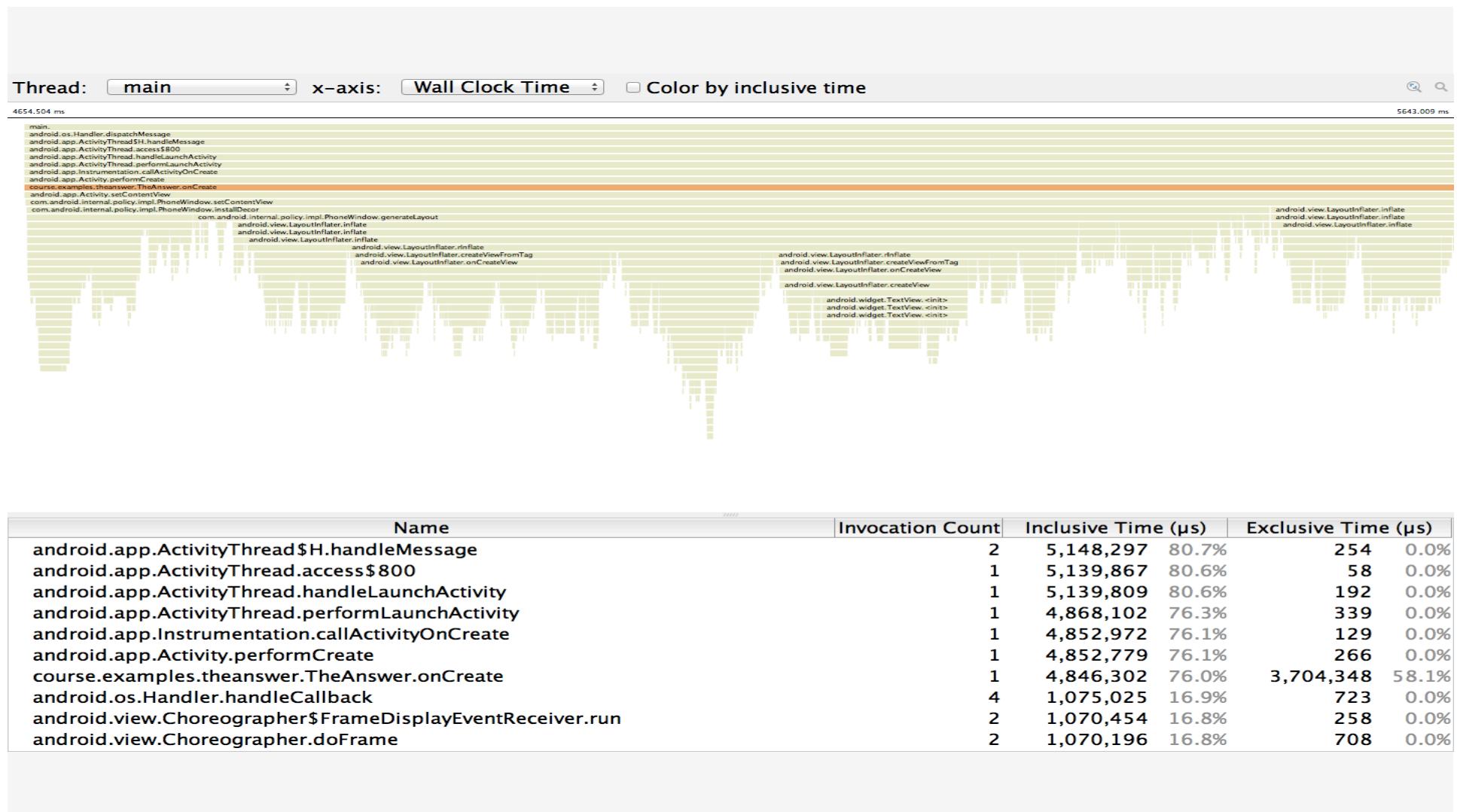
All messages (no filters)

Level	Time	PID	TID	Application	Tag	Text
I	04-07 22:39:39.363	1229	1247	system_process	ActivityManager	Waited long enough for: ServiceRecord{bda8349 u0 com.android.calend...
						ar/.alerts.InitAlarmsService}
I	04-07 22:39:39.673	1456	2176	com.google.android...	CheckinService	Done disabling old GoogleServicesFramework version
D	04-07 22:39:54.423	2181	2406	com.android.calen...	InitAlarmsSe...	Clearing and rescheduling alarms.
I	04-07 22:39:54.441	1229	1684	system_process	ActivityManager	Killing 1533:com.android.printspooler/u0a42 (adj 15): empty #17

120M of 492M

TRACEVIEW

GRAPHICALLY DISPLAY METHOD TRACES
TAKEN FROM RUNNING APPLICATION



UI HIERARCHY VIEWER

SHOWS THE RUNTIME ORGANIZATION OF
THE USER INTERFACE

