CMSC436: Programming Handheld Systems

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

See:

https://developer.android.com/studio/intro/

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 7/8/10 (32- or 64-bit)
- Mac OS X 10.10 (Yosemite) up to 10.14 (Mojave)
- GNOME or KDE desktop (tested on Ubuntu 14.04 LTS, Trusty Tahr)
- Chrome OS

General Prerequisites

4 GB RAM min, 8 GB RAM rec

2-4 GB+ for Android SDK, emulator system images, and caches

1280 x 800 min screen resolution

Getting Started

Download & install Android Studio

See: https://developer.android.com/studio/

Android Studio

Android platform

Android Studio IDE

Key development tools

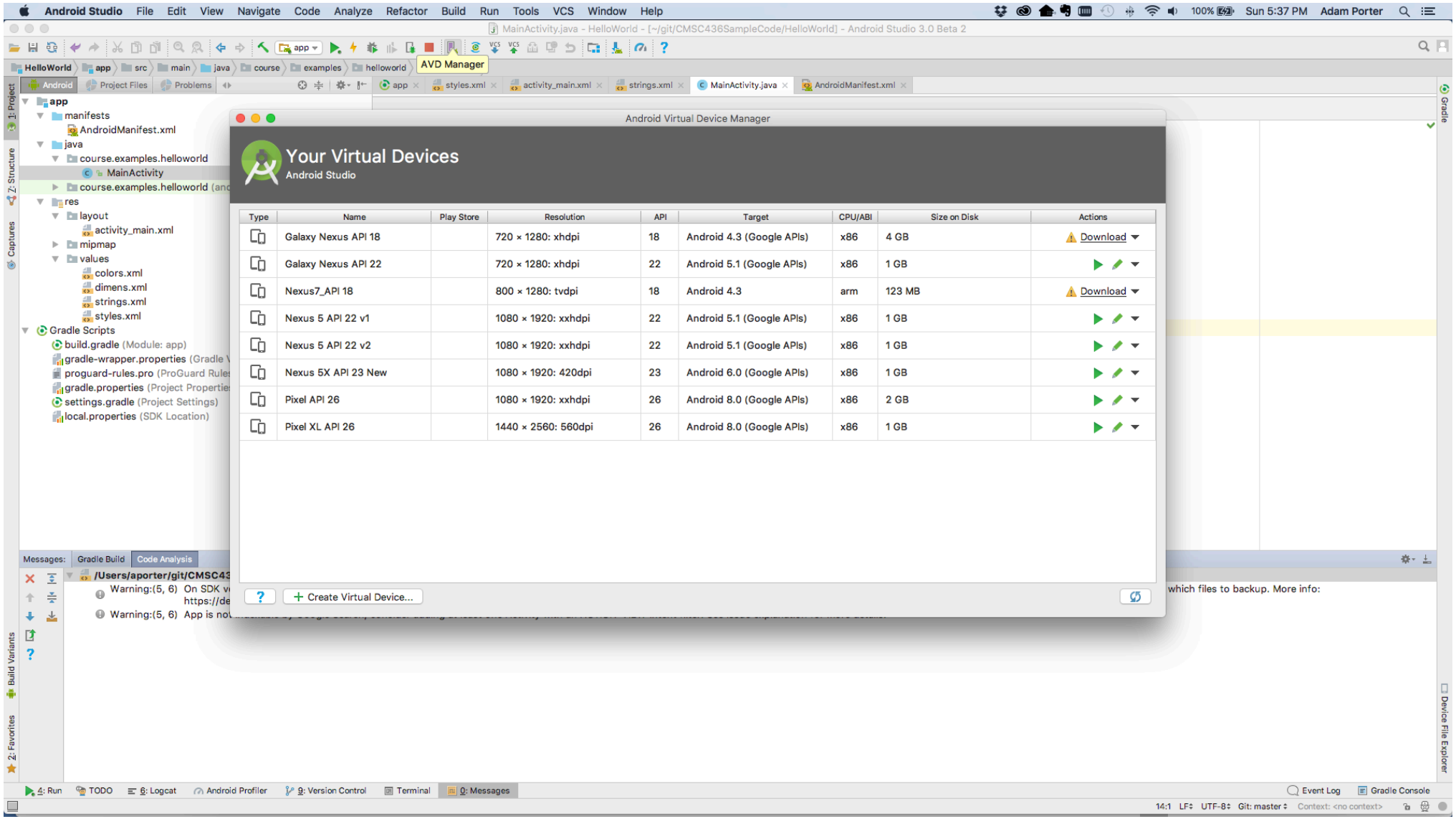
System image for emulator

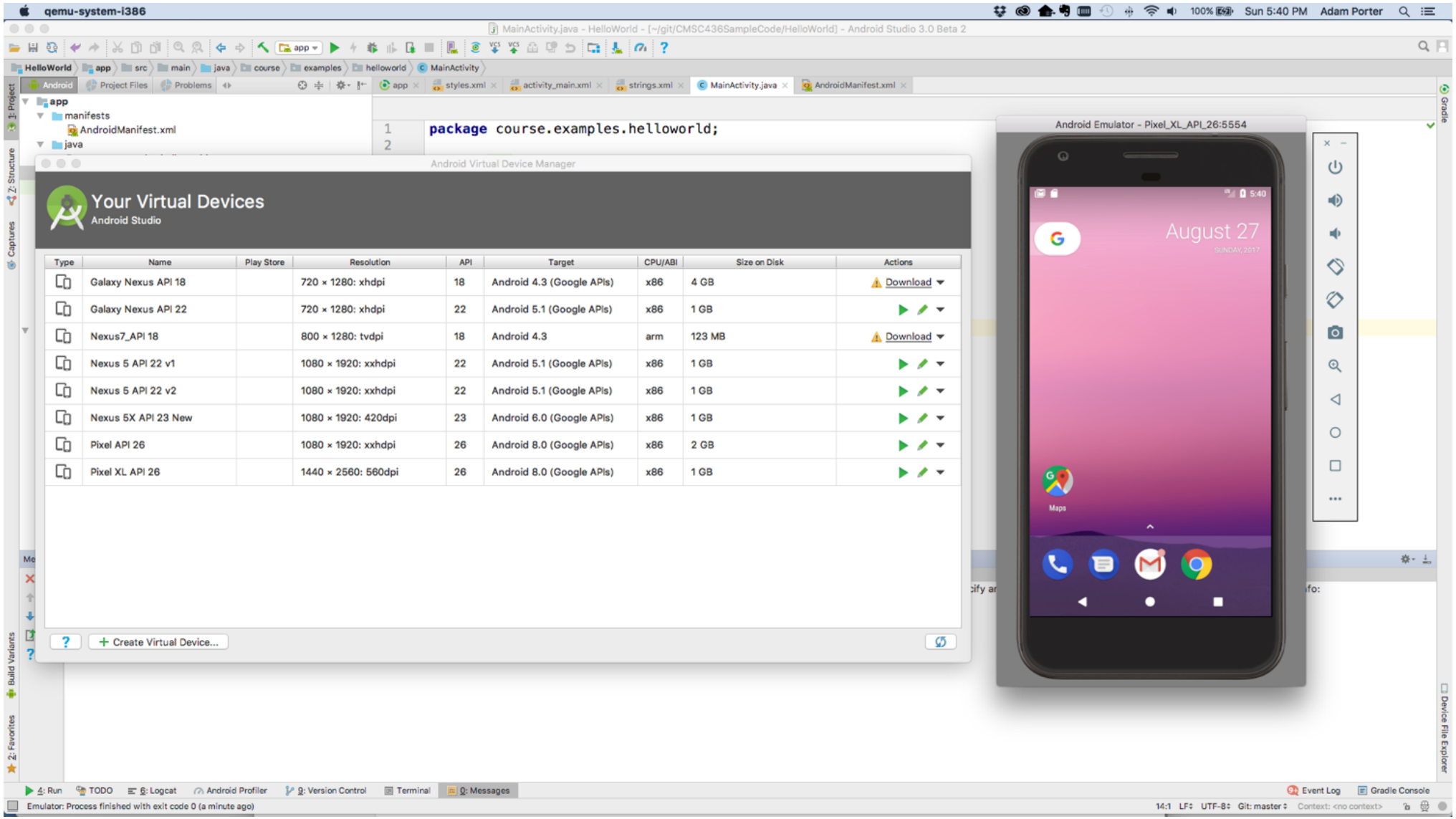
HelloWorld

```
package course.examples.helloworld

import android.app.Activity
import android.os.Bundle

class MainActivity : Activity() {

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        setContentView(R.layout.activity_main)
    }
}
```

The Android Emulator

Runs virtual devices


Android Studio File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
Sun 5:37 PM Adam Porter
MainActivity.java - HelloWorld - [~/git/CMSC436SampleCode/HelloWorld] - Android Studio 3.0 Beta 2
AVD Manager
Android Virtual Device Manager
Your Virtual Devices
Android Studio
Type Name Play Store Resolution API Target CPU/ABI Size on Disk Actions
Galaxy Nexus API 18 720 × 1280: xhdpi 18 Android 4.3 (Google APIs) x86 4 GB Download
Galaxy Nexus API 22 720 × 1280: xhdpi 22 Android 5.1 (Google APIs) x86 1 GB
Nexus7_API 18 800 × 1280: tvdpi 18 Android 4.3 arm 123 MB Download
Nexus 5 API 22 v1 1080 × 1920: xxhdpi 22 Android 5.1 (Google APIs) x86 1 GB
Nexus 5 API 22 v2 1080 × 1920: xxhdpi 22 Android 5.1 (Google APIs) x86 1 GB
Nexus 5X API 23 New 1080 × 1920: 420dpi 23 Android 6.0 (Google APIs) x86 1 GB
Pixel API 26 1080 × 1920: xxhdpi 26 Android 8.0 (Google APIs) x86 2 GB
Pixel XL API 26 1440 × 2560: 560dpi 26 Android 8.0 (Google APIs) x86 1 GB
Create Virtual Device...


qemu-system-i386
100% Sun 5:40 PM Adam Porter
MainActivity.java - HelloWorld - [~/git/CMSC436SampleCode/HelloWorld] - Android Studio 3.0 Beta 2
app
HelloWorld app src main java course examples helloworld MainActivity
Android Project Files Problems
app styles.xml activity_main.xml strings.xml MainActivity.java AndroidManifest.xml
app
manifests
AndroidManifest.xml
java
1 package course.examples.helloworld;
2
Android Virtual Device Manager
Your Virtual Devices
Android Studio
Type Name Play Store Resolution API Target CPU/ABI Size on Disk Actions
Galaxy Nexus API 18 720 × 1280: xhdpi 18 Android 4.3 (Google APIs) x86 4 GB Download
Galaxy Nexus API 22 720 × 1280: xhdpi 22 Android 5.1 (Google APIs) x86 1 GB
Nexus7_API 18 800 × 1280: tvdpi 18 Android 4.3 arm 123 MB Download
Nexus 5 API 22 v1 1080 × 1920: xxhdpi 22 Android 5.1 (Google APIs) x86 1 GB
Nexus 5 API 22 v2 1080 × 1920: xxhdpi 22 Android 5.1 (Google APIs) x86 1 GB
Nexus 5X API 23 New 1080 × 1920: 420dpi 23 Android 6.0 (Google APIs) x86 1 GB
Pixel API 26 1080 × 1920: xxhdpi 26 Android 8.0 (Google APIs) x86 2 GB
Pixel XL API 26 1440 × 2560: 560dpi 26 Android 8.0 (Google APIs) x86 1 GB
+ Create Virtual Device...
Android Emulator - Pixel_XL_API_26:5554
5:40
August 27
SUNDAY, 2017
Maps
4: Run TODO 6: Logcat Android Profiler 9: Version Control Terminal 0: Messages
Event Log Gradle Console
Emulator: Process finished with exit code 0 (a minute ago)
14:1 LF UTF-8 Git: master Context: <no context>

The Android Emulator

Pros

- Doesn’t require an actual phone
- Hardware is reconfigurable
- Changes are non-destructive

The Android Emulator

- Cons
  - Slower than an actual device
  - Some features unavailable
    - e.g., no support for Bluetooth, USB connections, NFC, etc.
  - Performance / user experience can be misleading

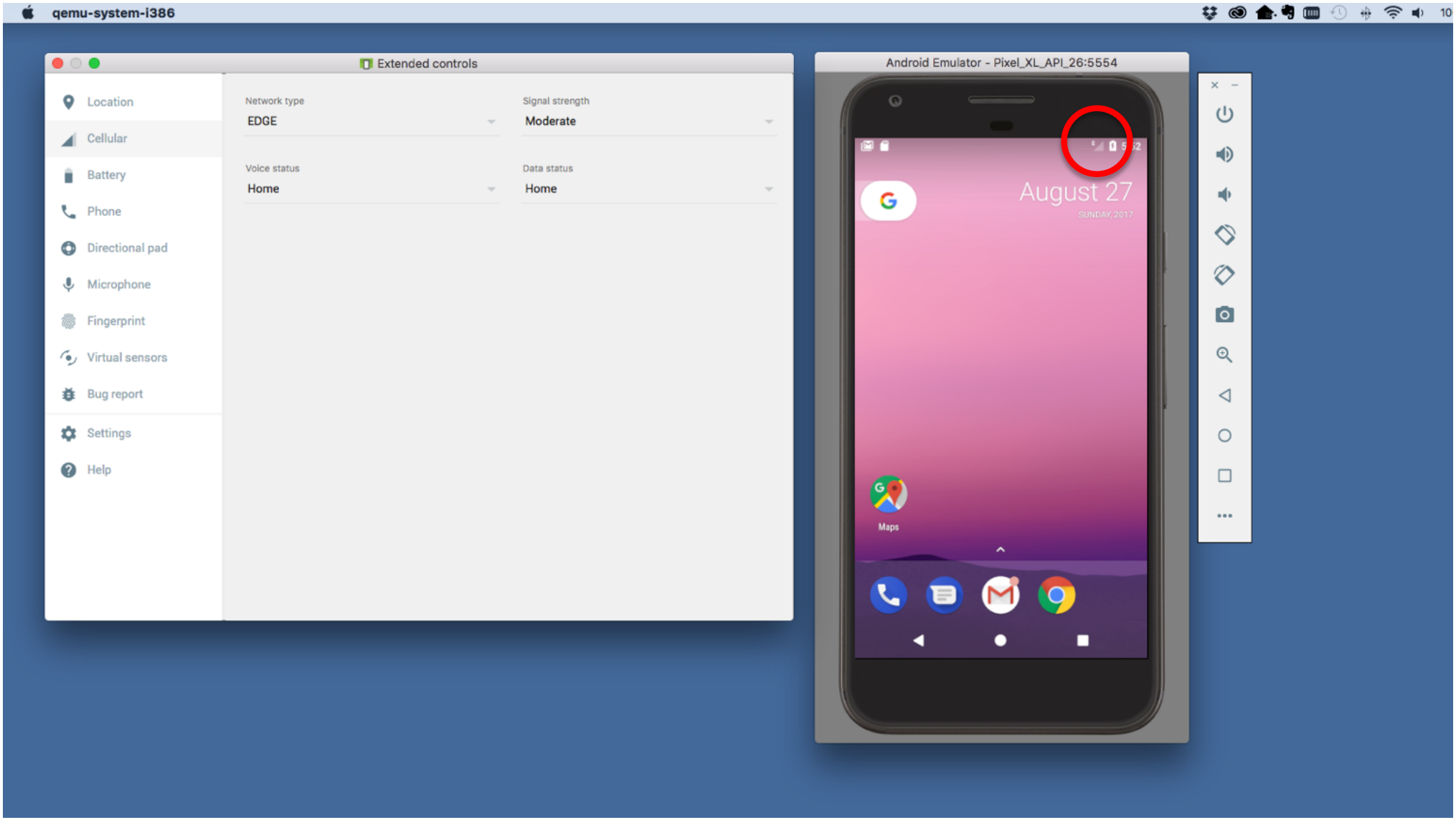
Advanced Features

Can emulate many different device/user characteristics, such as:

- Network speed/latencies
- Battery power
- Location coordinates

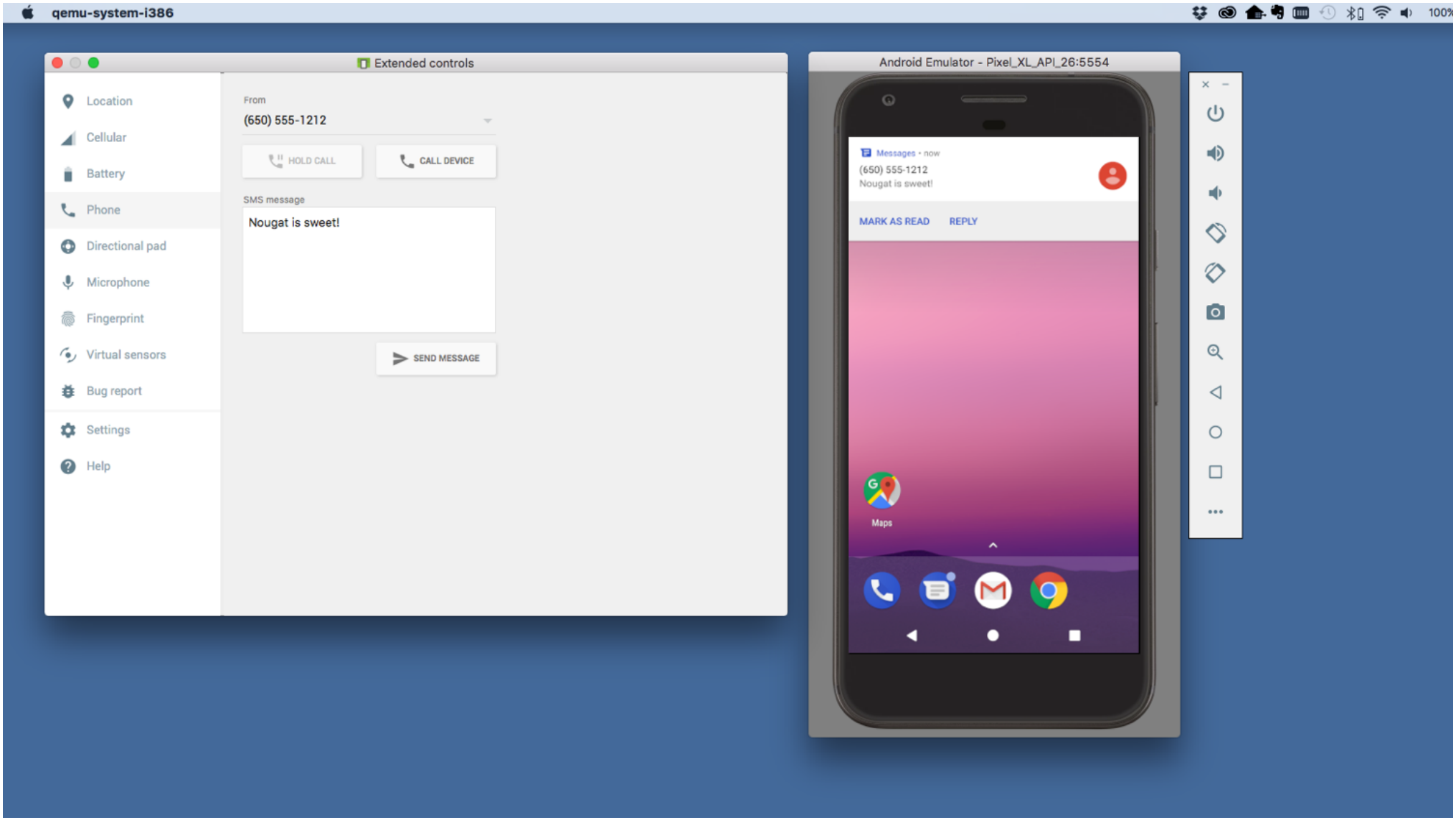
Advanced Features

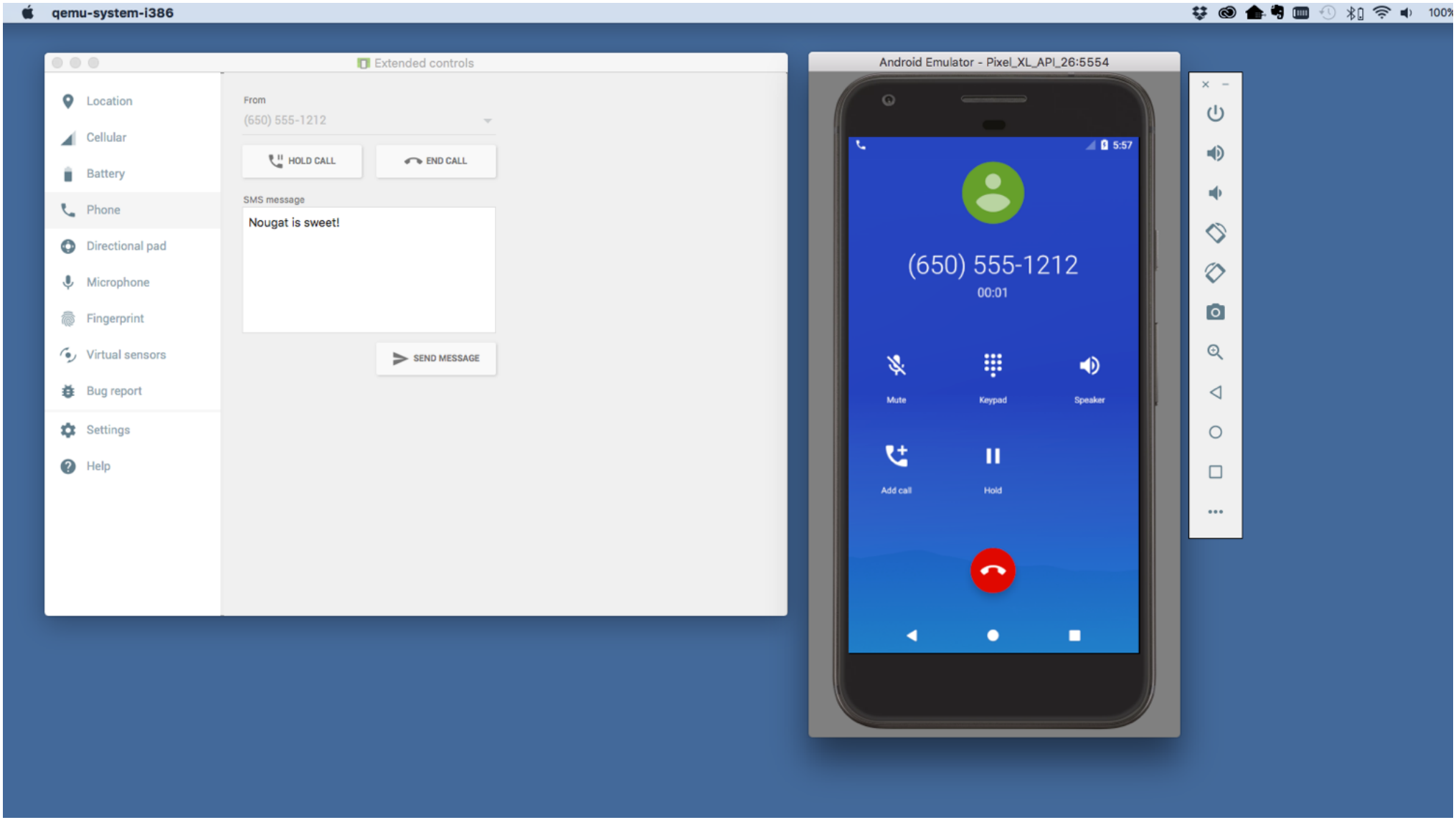
Change network speeds


qemu-system-i386
Extended controls
Location
Cellular
Battery
Phone
Directional pad
Microphone
Fingerprint
Virtual sensors
Bug report
Settings
Help
Network type
EDGE
Signal strength
Moderate
Voice status
Home
Data status
Home
Android Emulator - Pixel_XL_API_26:5554
August 27
SUNDAY, 2017
Maps

Advanced Features

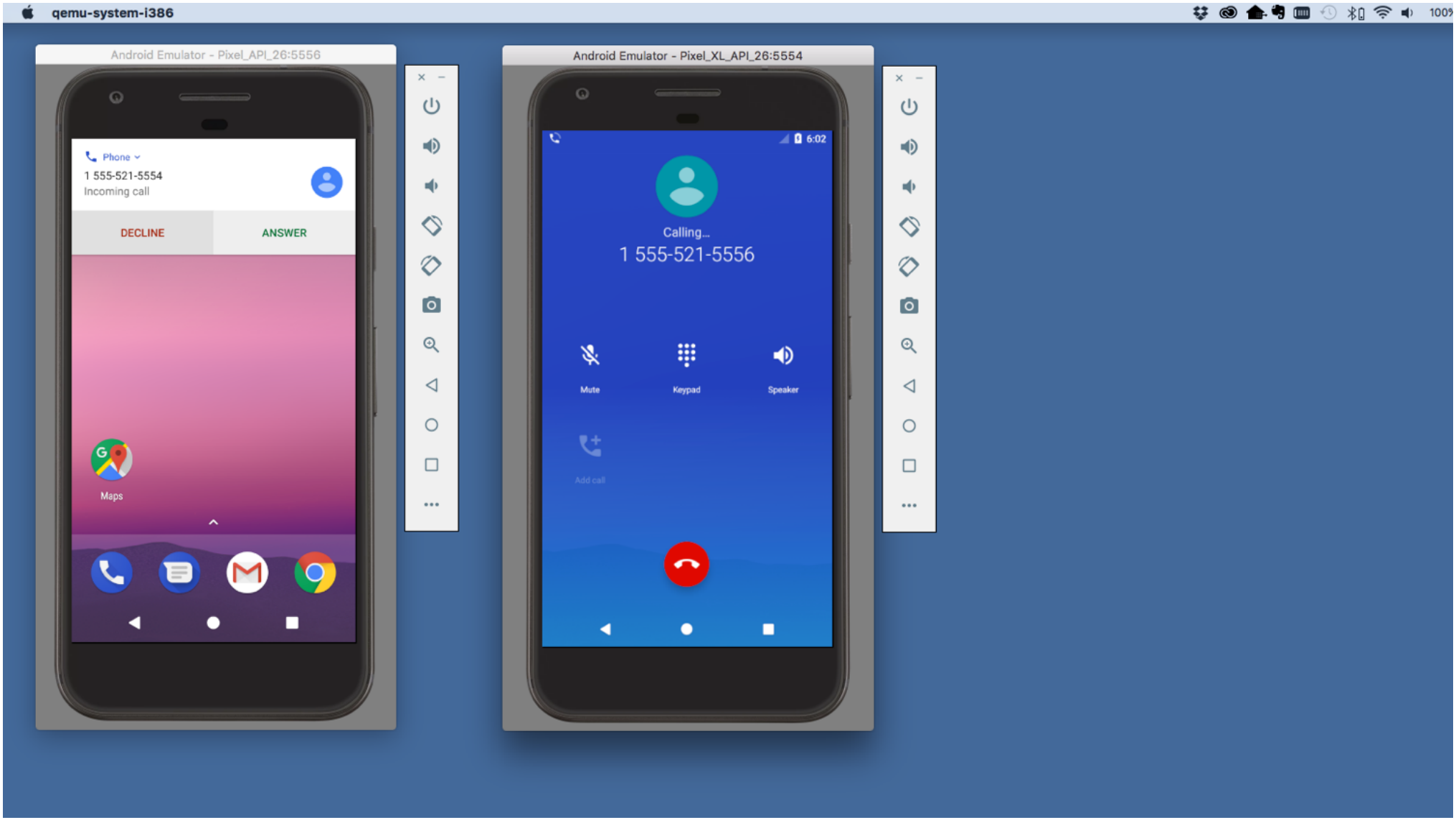
Emulate incoming phone calls & SMS messages

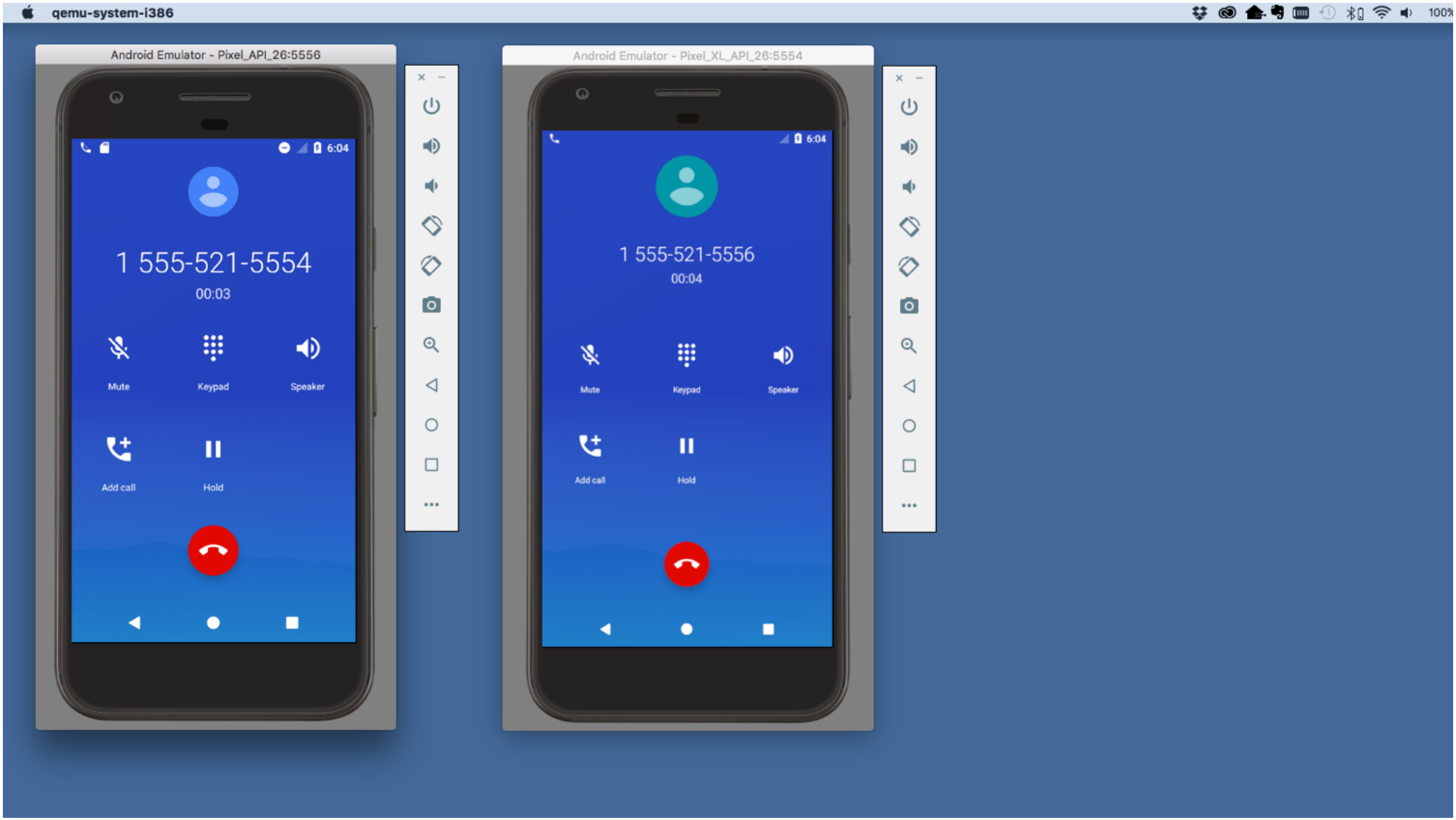

qemu-system-i386
100%
Extended controls
Location
Cellular
Battery
Phone
Directional pad
Microphone
Fingerprint
Virtual sensors
Bug report
Settings
Help
From
(650) 555-1212
HOLD CALL
CALL DEVICE
SMS message
Nougat is sweet!
SEND MESSAGE
Android Emulator - Pixel_XL_API_26:5554
Messages • now
(650) 555-1212
Nougat is sweet!
MARK AS READ
REPLY
Maps


qemu-system-i386
100%
Extended controls
Location
Cellular
Battery
Phone
Directional pad
Microphone
Fingerprint
Virtual sensors
Bug report
Settings
Help
From
(650) 555-1212
HOLD CALL
END CALL
SMS message
Nougat is sweet!
SEND MESSAGE
Android Emulator - Pixel_XL_API_26:5554
5:57
(650) 555-1212
00:01
Mute
Keypad
Speaker
Add call
Hold

The Android Emulator

Can interconnect multiple emulators


qemu-system-i386
Android Emulator - Pixel_API_26:5556
Phone
1 555-521-5554
Incoming call
DECLINE
ANSWER
Maps
Android Emulator - Pixel_XL_API_26:5554
6:02
Calling...
1 555-521-5556
Mute
Keypad
Speaker
Add call


qemu-system-i386
100%
Android Emulator - Pixel_API_26:5556
6:04
1 555-521-5554
00:03
Mute
Keypad
Speaker
Add call
Hold
Android Emulator - Pixel_XL_API_26:5554
6:04
1 555-521-5556
00:04
Mute
Keypad
Speaker
Add call
Hold

Advanced Features

Many more options

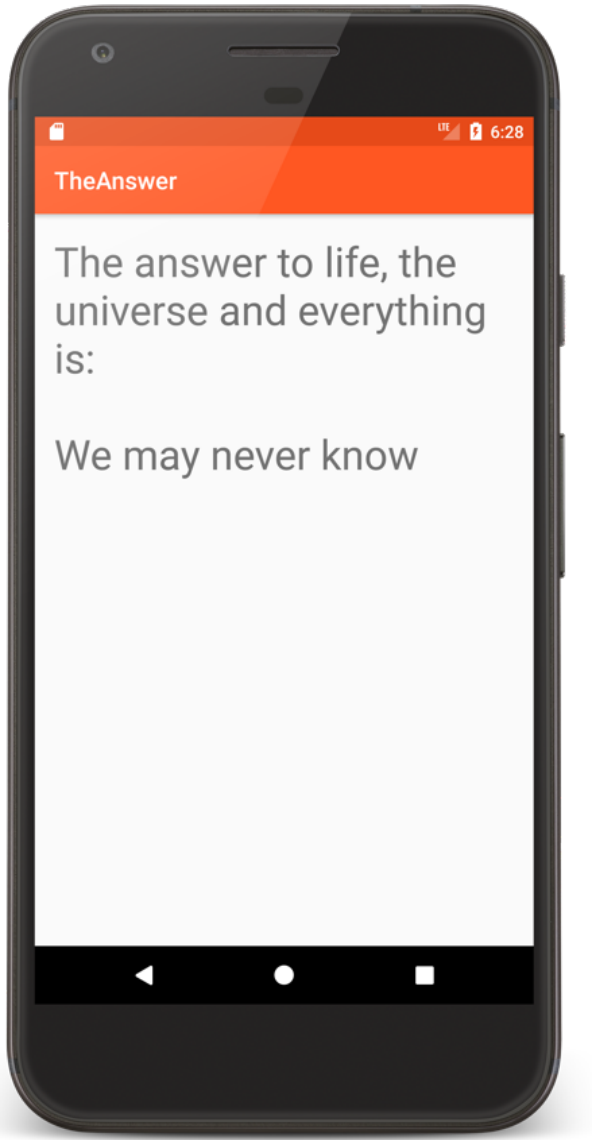
See:

https://developer.android.com/studio/run/emulator.html

Debugger

Tool for examining the internal state of a running application

TheAnswer


6:28
TheAnswer
The answer to life, the universe and everything is:
We may never know

```
class TheAnswer : Activity() {
    companion object {
        private val answers = intArrayOf(42, -10, 0, 100, 1000)
        private const val answer = 42
        private const val TAG = "TheAnswer"
    }


    override fun onCreate(savedInstanceState: Bundle?) {
        // Required call through to Activity.onCreate()
        // Restore any saved instance state
        super.onCreate(savedInstanceState)

        // Set up the application's user interface (content view)
         setContentView(R.layout.answer_layout)
         val value = findAnswer()
```

```
        val output = if (value != null) answer.toString()
                         else getString(R.string.never_know_string)

        // Get a reference to a TextView in the content view
        val answerView = findViewById<TextView>(R.id.answer_view)
        // Set desired text in answerView TextView
        answerView.text = output
    }
    private fun findAnswer(): Int? {
        Log.d(TAG, "Entering findAnswer()")
        // Incorrect behavior
         return answers.firstOrNull { it == -answer }
         // Correct behavior
         //  return answers.firstOrNull { it == answer }
    }
}
```


12:52
TheAnswer
The answer to life, the universe and everything is:
42

Development Tools

Android Studio provides numerous tools for monitoring application behaviors

Example Tools

Device File Explorer

Logcat

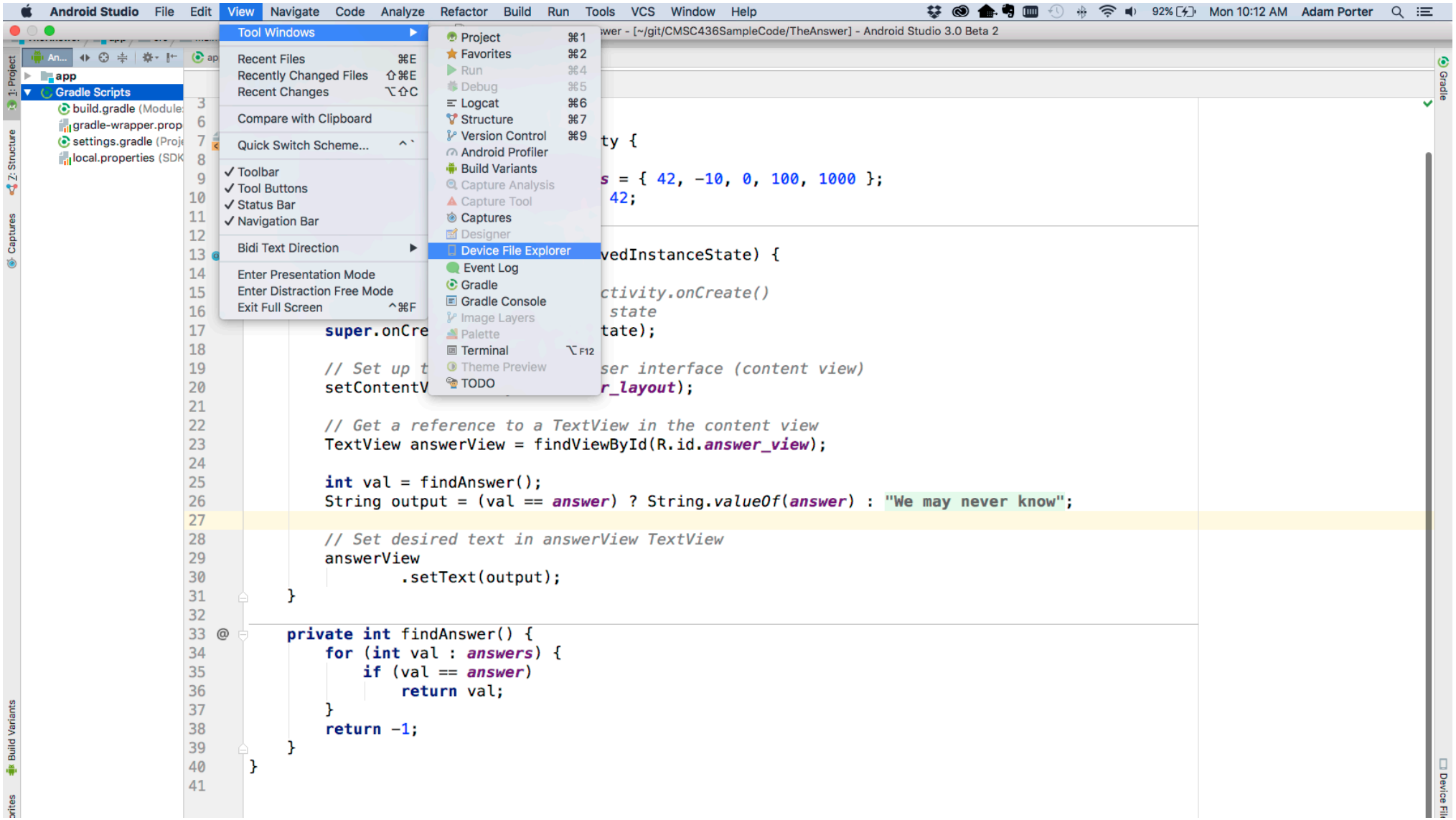
CPU Profiler

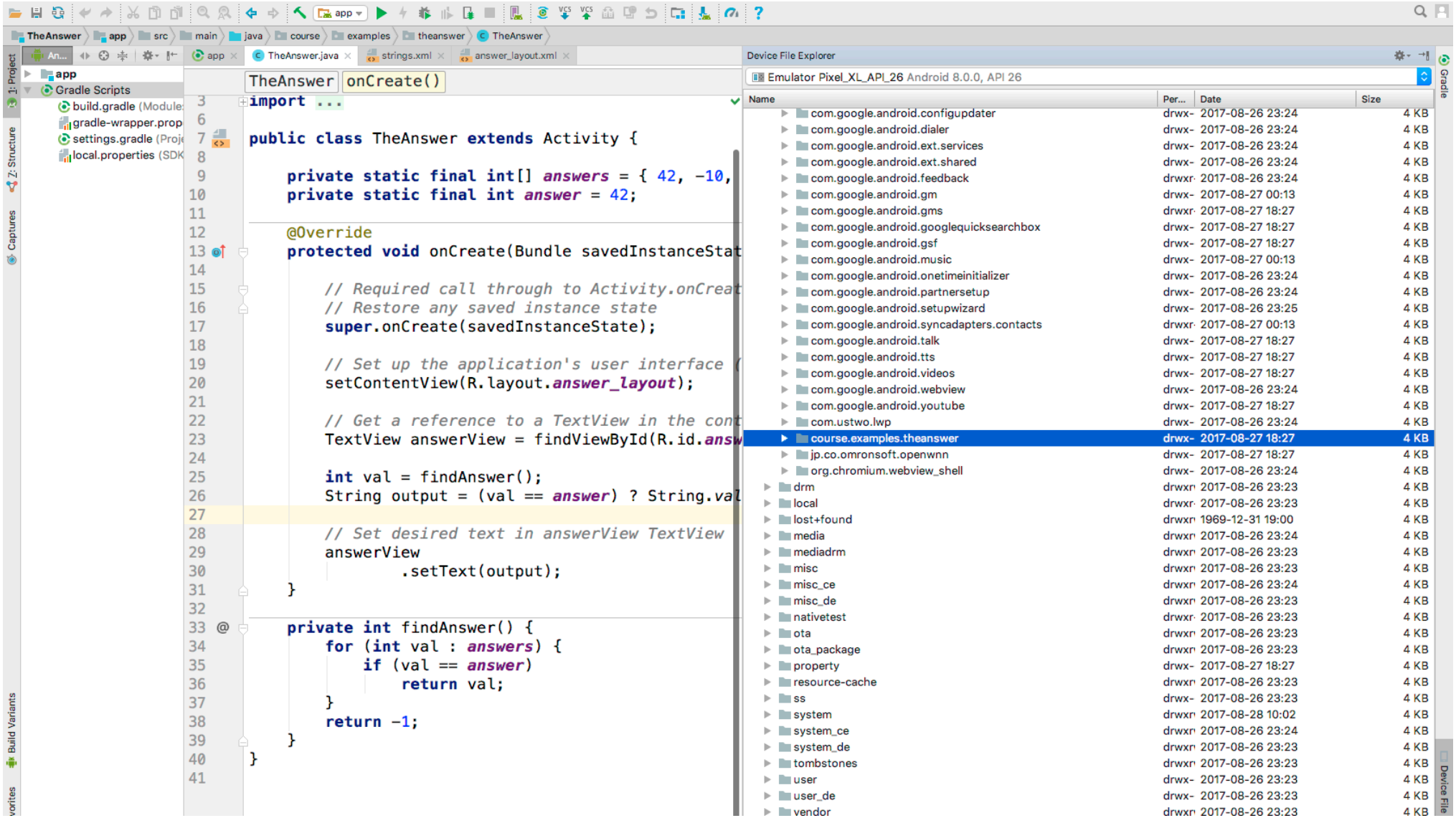
Layout Inspector

Device File Explorer

View, copy, and delete files on your device

Often used to examine and verify file creation and transfer


Android Studio File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
92% Mon 10:12 AM Adam Porter
Tool Windows
Recent Files ⌘E
Recently Changed Files ⇧⌘E
Recent Changes ⌥⇧C
Compare with Clipboard
Quick Switch Scheme... ^`
✓ Toolbar
✓ Tool Buttons
✓ Status Bar
✓ Navigation Bar
Bidi Text Direction
Enter Presentation Mode
Enter Distraction Free Mode
Exit Full Screen ^⌘F
Project ⌘1
Favorites ⌘2
Run ⌘4
Debug ⌘5
Logcat ⌘6
Structure ⌘7
Version Control ⌘9
Android Profiler
Build Variants
Capture Analysis
Capture Tool
Captures
Designer
Device File Explorer
Event Log
Gradle
Gradle Console
Image Layers
Palette
Terminal ⌥F12
Theme Preview
TODO
app
Gradle Scripts
build.gradle (Module:
gradle-wrapper.prop
settings.gradle (Proj
local.properties (SDK
1: Project
2: Structure
Captures
Build Variants
Gradle
Device File
// Set up t
ser interface (content view)
r_layout);
// Get a reference to a TextView in the content view
TextView answerView = findViewById(R.id.answer_view);
int val = findAnswer();
String output = (val == answer) ? String.valueOf(answer) : "We may never know";
// Set desired text in answerView TextView
answerView
.setText(output);
}
private int findAnswer() {
for (int val : answers) {
if (val == answer)
return val;
}
return -1;
}
}

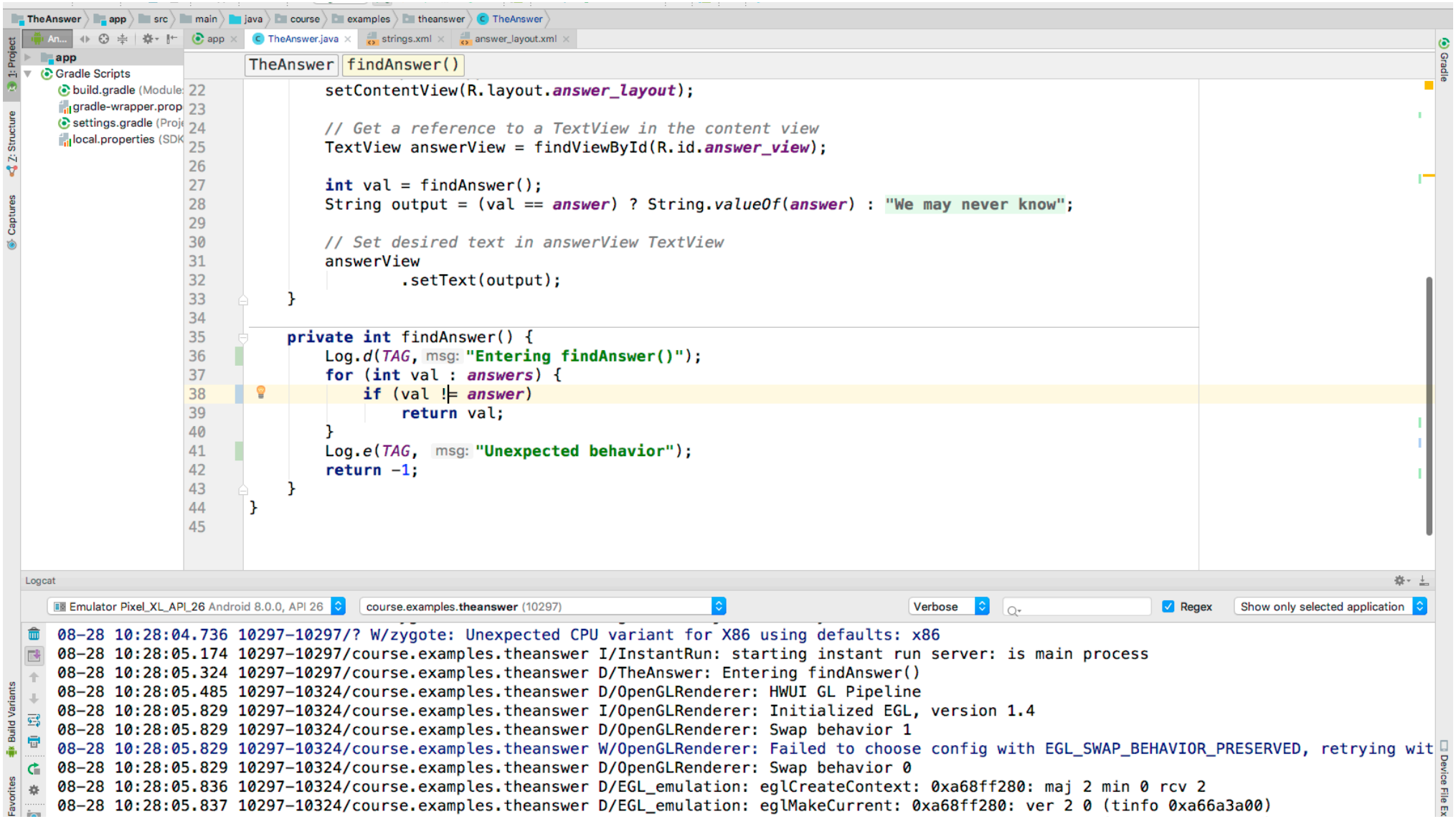

TheAnswer
app
src
main
java
course
examples
theanswer
TheAnswer
app
TheAnswer.java
strings.xml
answer_layout.xml
TheAnswer
onCreate()
Gradle Scripts
build.gradle
gradle-wrapper.prop
settings.gradle
local.properties
import ...
public class TheAnswer extends Activity {
private static final int[] answers = { 42, -10,
private static final int answer = 42;
@Override
protected void onCreate(Bundle savedInstanceStat
// Required call through to Activity.onCreat
// Restore any saved instance state
super.onCreate(savedInstanceState);
// Set up the application's user interface (
setContentView(R.layout.answer_layout);
// Get a reference to a TextView in the cont
TextView answerView = findViewById(R.id.answ
int val = findAnswer();
String output = (val == answer) ? String.val
// Set desired text in answerView TextView
answerView
.setText(output);
}
private int findAnswer() {
for (int val : answers) {
if (val == answer)
return val;
}
return -1;
}
}
Device File Explorer
Emulator Pixel_XL_API_26 Android 8.0.0, API 26
Name
Per...
Date
Size
com.google.android.configupdater drwx- 2017-08-26 23:24 4 KB
com.google.android.dialer drwx- 2017-08-26 23:24 4 KB
com.google.android.ext.services drwx- 2017-08-26 23:24 4 KB
com.google.android.ext.shared drwx- 2017-08-26 23:24 4 KB
com.google.android.feedback drwxr- 2017-08-26 23:24 4 KB
com.google.android.gm drwx- 2017-08-27 00:13 4 KB
com.google.android.gms drwxr- 2017-08-27 18:27 4 KB
com.google.android.googlequicksearchbox drwx- 2017-08-27 18:27 4 KB
com.google.android.gsf drwx- 2017-08-27 18:27 4 KB
com.google.android.music drwx- 2017-08-27 00:13 4 KB
com.google.android.onetimeinitializer drwx- 2017-08-26 23:24 4 KB
com.google.android.partnersetup drwx- 2017-08-26 23:24 4 KB
com.google.android.setupwizard drwx- 2017-08-26 23:25 4 KB
com.google.android.syncadapters.contacts drwxr- 2017-08-27 00:13 4 KB
com.google.android.talk drwx- 2017-08-27 18:27 4 KB
com.google.android.tts drwx- 2017-08-27 18:27 4 KB
com.google.android.videos drwx- 2017-08-27 18:27 4 KB
com.google.android.webview drwx- 2017-08-26 23:24 4 KB
com.google.android.youtube drwx- 2017-08-27 18:27 4 KB
com.ustwo.lwp drwx- 2017-08-26 23:24 4 KB
course.examples.theanswer drwx- 2017-08-27 18:27 4 KB
jp.co.omronsoft.openwnn drwx- 2017-08-27 18:27 4 KB
org.chromium.webview_shell drwx- 2017-08-26 23:24 4 KB
drm drwxr 2017-08-26 23:23 4 KB
local drwxr- 2017-08-26 23:23 4 KB
lost+found drwxr 1969-12-31 19:00 4 KB
media drwxr 2017-08-26 23:24 4 KB
mediadrm drwxr 2017-08-26 23:23 4 KB
misc drwxr 2017-08-26 23:23 4 KB
misc_ce drwxr 2017-08-26 23:24 4 KB
misc_de drwxr 2017-08-26 23:23 4 KB
nativetest drwxr- 2017-08-26 23:23 4 KB
ota drwxr 2017-08-26 23:23 4 KB
ota_package drwxr 2017-08-26 23:23 4 KB
property drwx- 2017-08-27 18:27 4 KB
resource-cache drwxr 2017-08-26 23:23 4 KB
ss drwx- 2017-08-26 23:23 4 KB
system drwxr 2017-08-28 10:02 4 KB
system_ce drwxr 2017-08-26 23:24 4 KB
system_de drwxr 2017-08-26 23:23 4 KB
tombstones drwxr 2017-08-26 23:23 4 KB
user drwx- 2017-08-26 23:23 4 KB
user_de drwx- 2017-08-26 23:23 4 KB
vendor drwxr 2017-08-26 23:23 4 KB

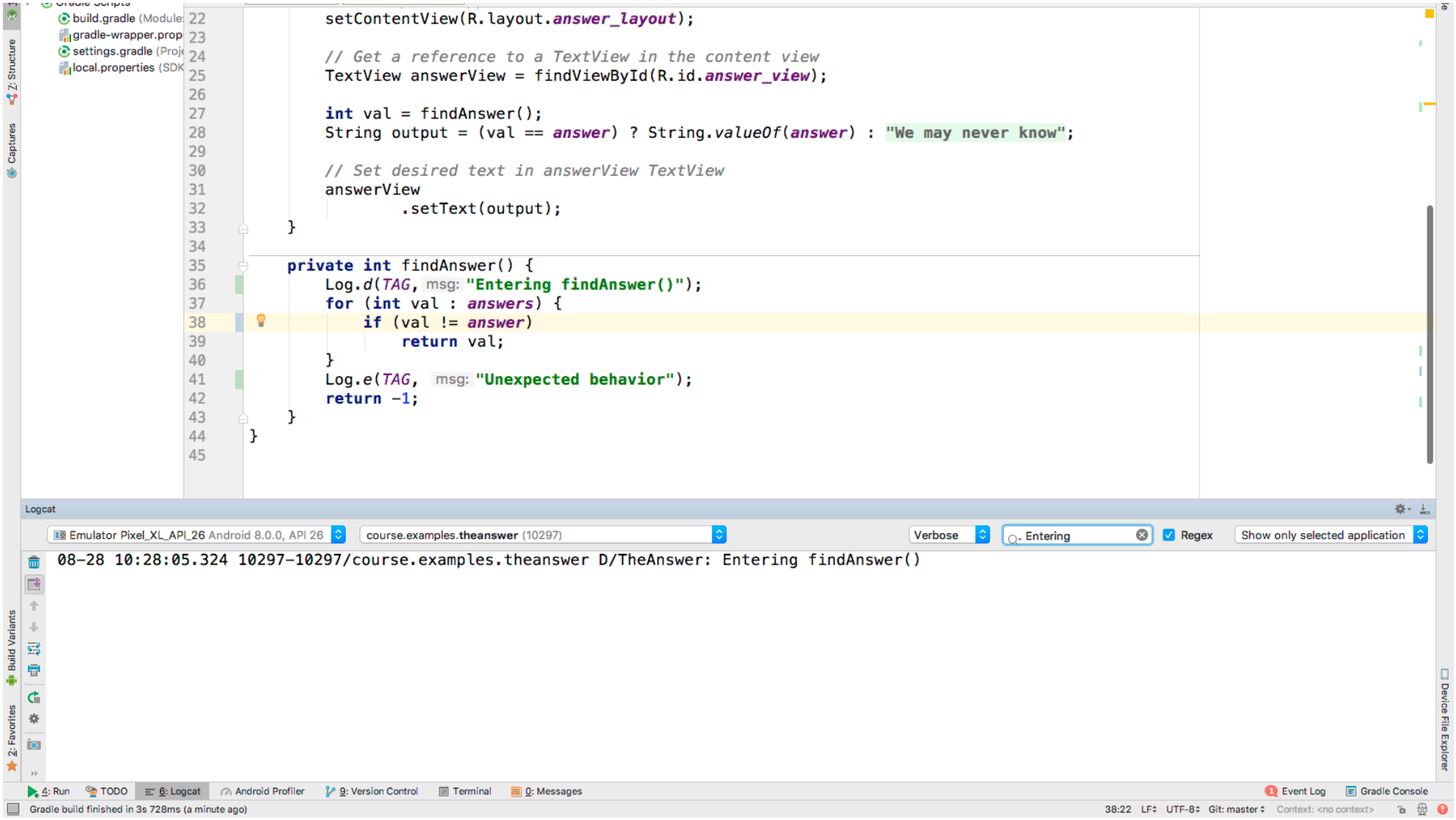
Logcat

Write and review log messages

Apps use Log class to write messages to log

Developer can search and filter log messages

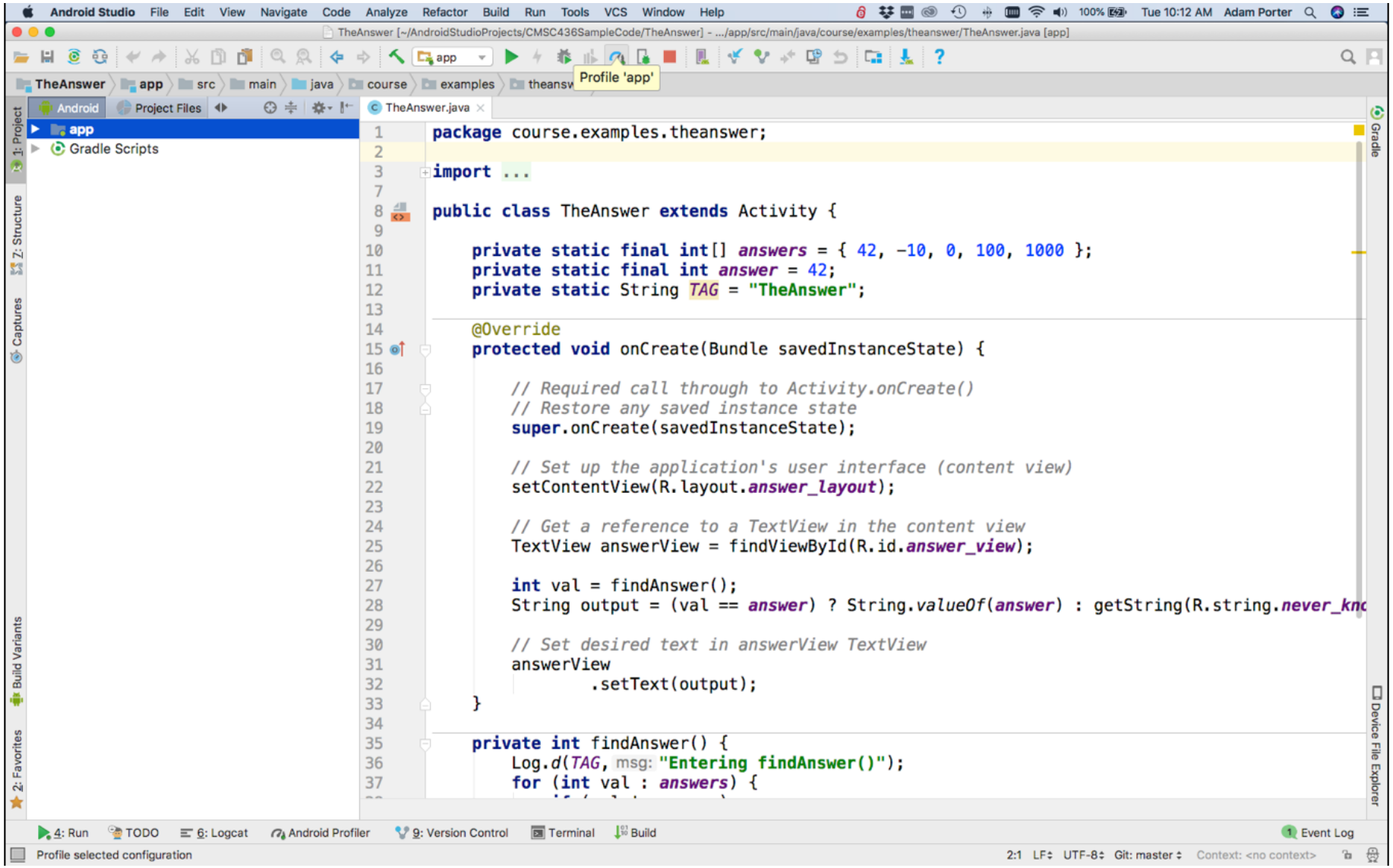

TheAnswer
app
src
main
java
course
examples
theanswer
TheAnswer
app
TheAnswer.java
strings.xml
answer_layout.xml
TheAnswer
findAnswer()
app
Gradle Scripts
build.gradle (Module:
gradle-wrapper.prop
settings.gradle (Proj
local.properties (SDK
22 setContentView(R.layout.answer_layout);
23
24 // Get a reference to a TextView in the content view
25 TextView answerView = findViewById(R.id.answer_view);
26
27 int val = findAnswer();
28 String output = (val == answer) ? String.valueOf(answer) : "We may never know";
29
30 // Set desired text in answerView TextView
31 answerView
32 .setText(output);
33 }
34
35 private int findAnswer() {
36 Log.d(TAG, msg: "Entering findAnswer()");
37 for (int val : answers) {
38 if (val != answer)
39 return val;
40 }
41 Log.e(TAG, msg: "Unexpected behavior");
42 return -1;
43 }
44 }
45
Logcat
Emulator Pixel_XL_API_26 Android 8.0.0, API 26
course.examples.theanswer (10297)
Verbose
Regex
Show only selected application
08-28 10:28:04.736 10297-10297/? W/zygote: Unexpected CPU variant for X86 using defaults: x86
08-28 10:28:05.174 10297-10297/course.examples.theanswer I/InstantRun: starting instant run server: is main process
08-28 10:28:05.324 10297-10297/course.examples.theanswer D/TheAnswer: Entering findAnswer()
08-28 10:28:05.485 10297-10324/course.examples.theanswer D/OpenGLRenderer: HWUI GL Pipeline
08-28 10:28:05.829 10297-10324/course.examples.theanswer I/OpenGLRenderer: Initialized EGL, version 1.4
08-28 10:28:05.829 10297-10324/course.examples.theanswer D/OpenGLRenderer: Swap behavior 1
08-28 10:28:05.829 10297-10324/course.examples.theanswer W/OpenGLRenderer: Failed to choose config with EGL_SWAP_BEHAVIOR_PRESERVED, retrying wit
08-28 10:28:05.829 10297-10324/course.examples.theanswer D/OpenGLRenderer: Swap behavior 0
08-28 10:28:05.836 10297-10324/course.examples.theanswer D/EGL_emulation: eglCreateContext: 0xa68ff280: maj 2 min 0 rcv 2
08-28 10:28:05.837 10297-10324/course.examples.theanswer D/EGL_emulation: eglMakeCurrent: 0xa68ff280: ver 2 0 (tinfo 0xa66a3a00)


build.gradle (Module:
gradle-wrapper.prop
settings.gradle (Proje
local.properties (SDK
setContentView(R.layout.answer_layout);
// Get a reference to a TextView in the content view
TextView answerView = findViewById(R.id.answer_view);
int val = findAnswer();
String output = (val == answer) ? String.valueOf(answer) : "We may never know";
// Set desired text in answerView TextView
answerView
.setText(output);
}
private int findAnswer() {
Log.d(TAG, msg: "Entering findAnswer()");
for (int val : answers) {
if (val != answer)
return val;
}
Log.e(TAG, msg: "Unexpected behavior");
return -1;
}
}
Logcat
Emulator Pixel_XL_API_26 Android 8.0.0, API 26
course.examples.theanswer (10297)
Verbose
Entering
Regex
Show only selected application
08-28 10:28:05.324 10297-10297/course.examples.theanswer D/TheAnswer: Entering findAnswer()
4: Run
TODO
6: Logcat
Android Profiler
9: Version Control
Terminal
0: Messages
Event Log
Gradle Console
Gradle build finished in 3s 728ms (a minute ago)
38:22
LF
UTF-8
Git: master
Context: <no context>

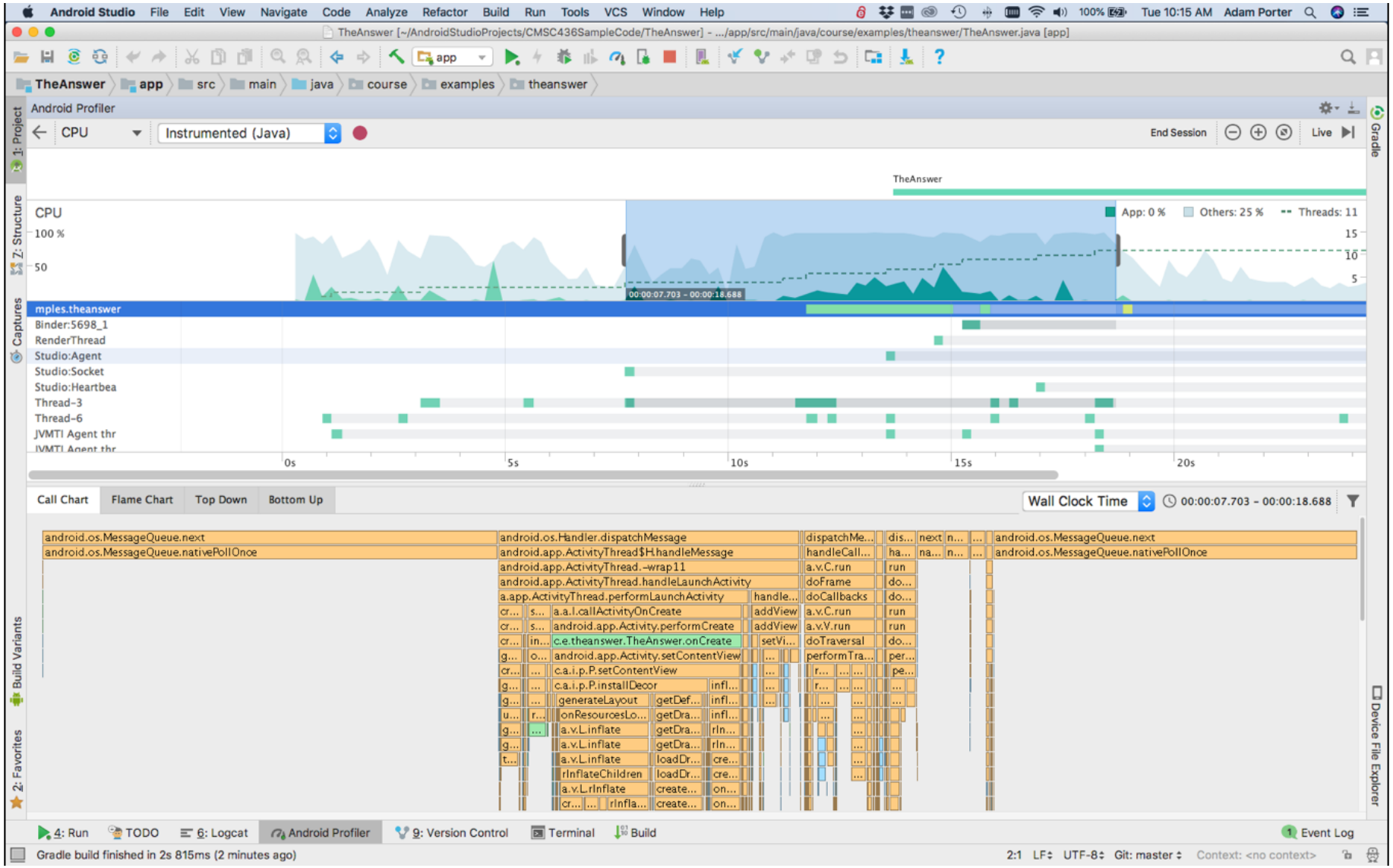
CPU Profiler

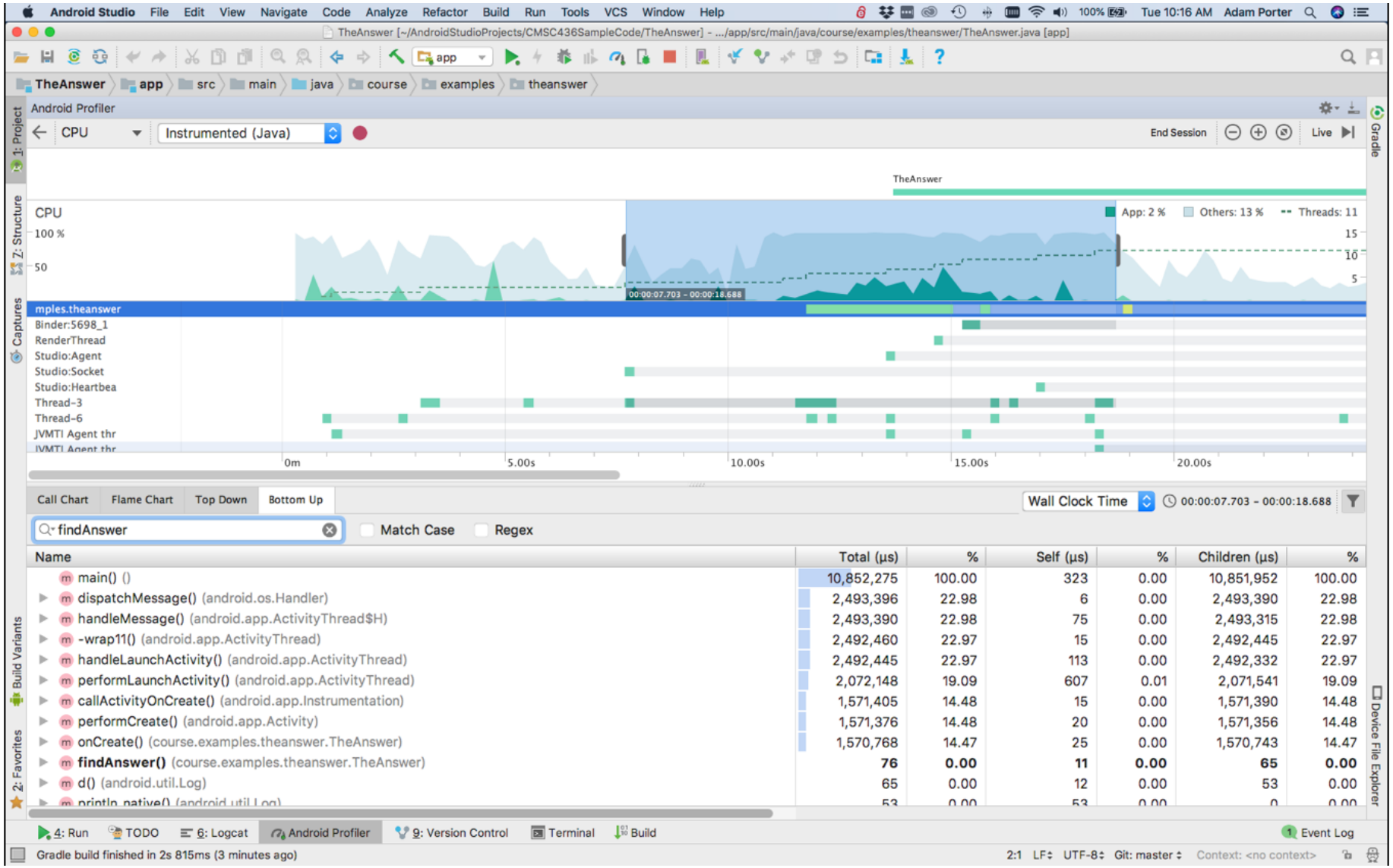
Logs execution sequences and timing taken from a running application

Graphically displays method traces and metrics



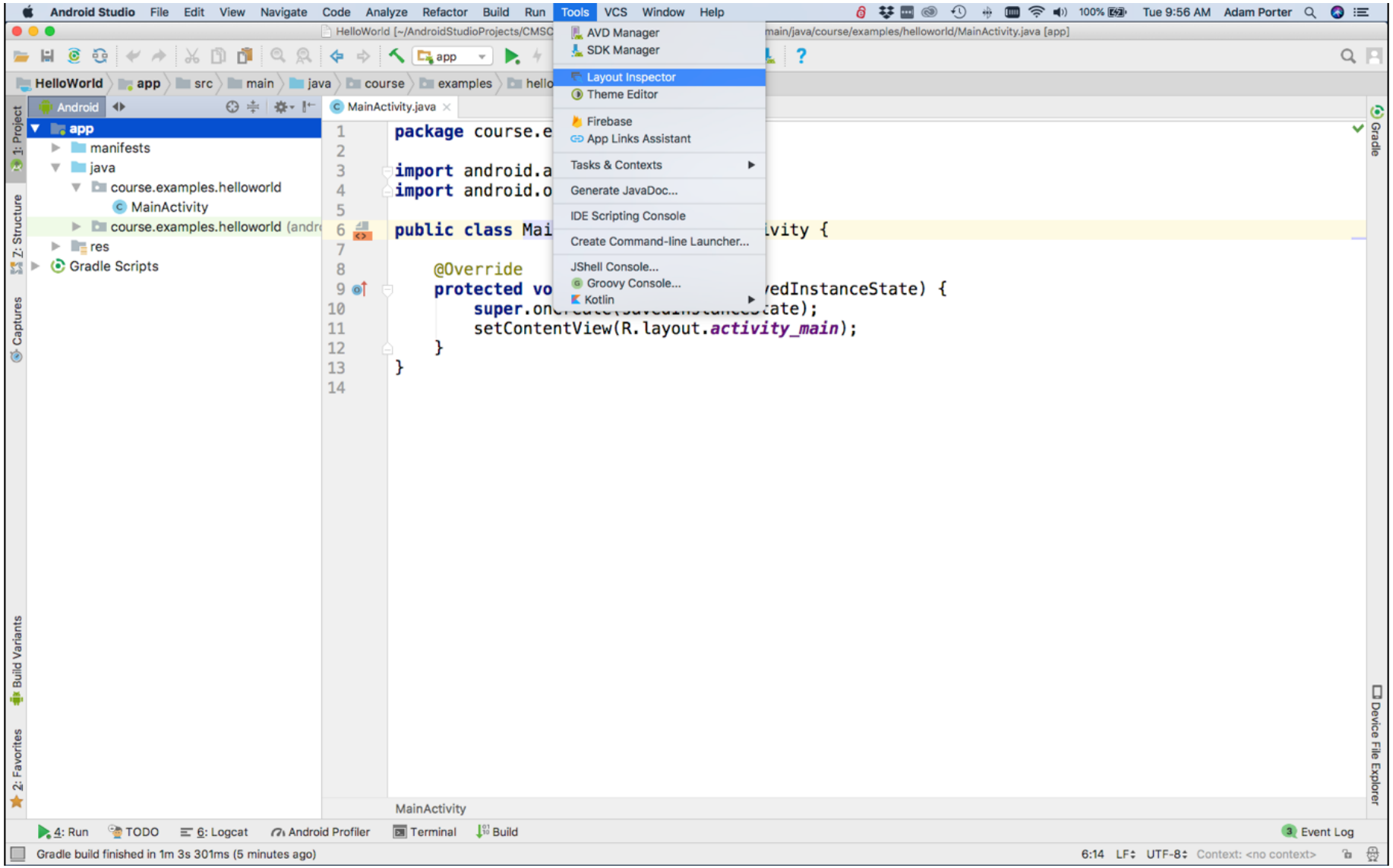

```
package course.examples.theanswer;

import ...

public class TheAnswer extends Activity {

    private static final int[] answers = { 42, -10, 0, 100, 1000 };
    private static final int answer = 42;
    private static String TAG = "TheAnswer";

    @Override
    protected void onCreate(Bundle savedInstanceState) {

        // Required call through to Activity.onCreate()
        // Restore any saved instance state
        super.onCreate(savedInstanceState);

        // Set up the application's user interface (content view)
        setContentView(R.layout.answer_layout);

        // Get a reference to a TextView in the content view
        TextView answerView = findViewById(R.id.answer_view);

        int val = findAnswer();
        String output = (val == answer) ? String.valueOf(answer) : getString(R.string.never_kno

        // Set desired text in answerView TextView
        answerView
                .setText(output);
    }

    private int findAnswer() {
        Log.d(TAG, msg: "Entering findAnswer()");
        for (int val : answers) {
```

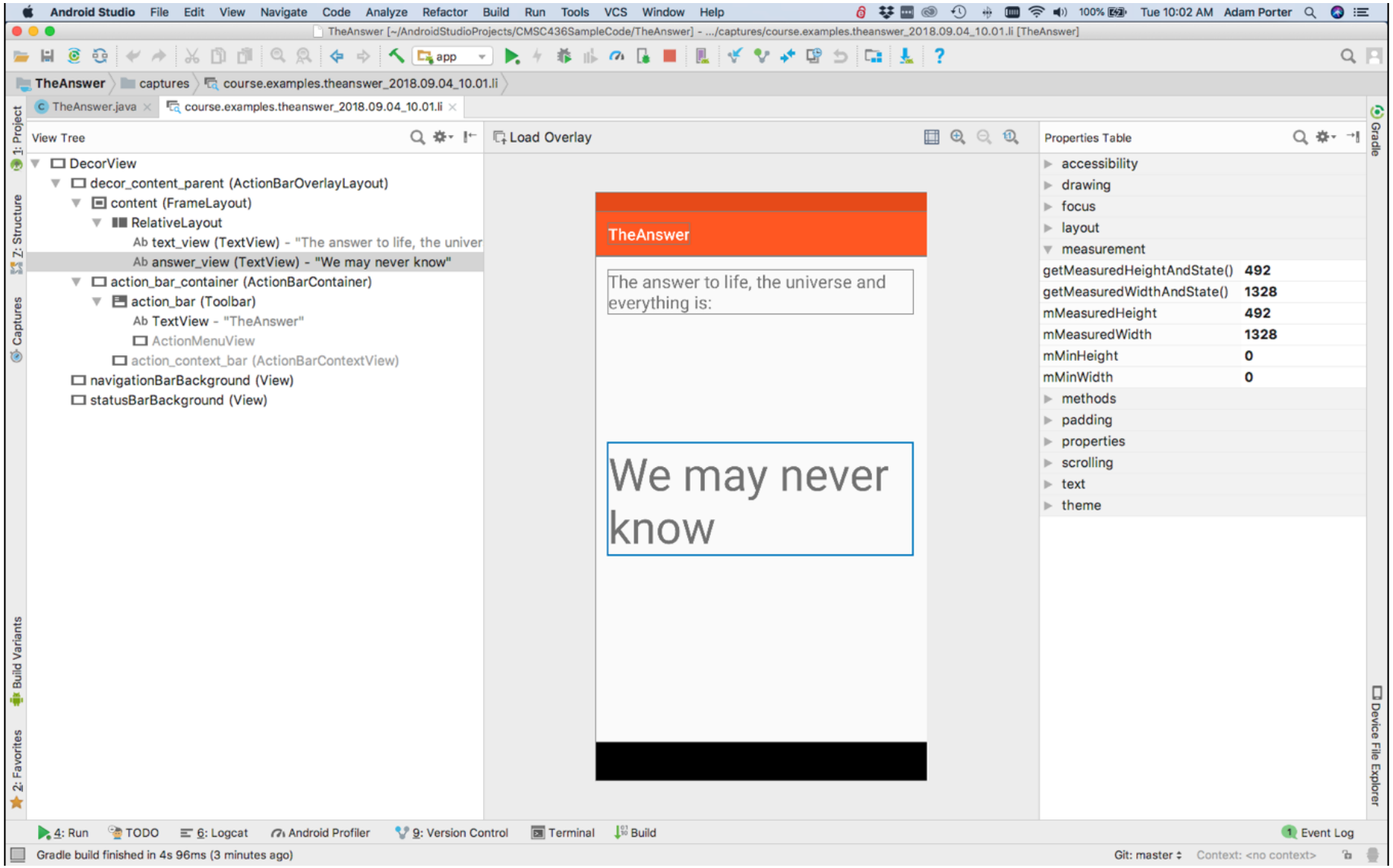

Android Studio File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
Tue 10:15 AM Adam Porter
TheAnswer [~/AndroidStudioProjects/CMSC436SampleCode/TheAnswer] - .../app/src/main/java/course/examples/theanswer/TheAnswer.java [app]
TheAnswer app src main java course examples theanswer
Android Profiler
CPU
Instrumented (Java)
End Session
Live
TheAnswer
CPU
100 %
50
App: 0 %
Others: 25 %
Threads: 11
15
10
5
00:00:07.703 - 00:00:18.688
mples.theanswer
Binder:5698_1
RenderThread
Studio:Agent
Studio:Socket
Studio:Heartbea
Thread-3
Thread-6
JVMTI Agent thr
JVMTI Agent thr
0s
5s
10s
15s
20s
Call Chart
Flame Chart
Top Down
Bottom Up
Wall Clock Time
00:00:07.703 - 00:00:18.688
android.os.MessageQueue.next
android.os.MessageQueue.nativePollOnce
android.os.Handler.dispatchMessage
android.app.ActivityThread$H.handleMessage
android.app.ActivityThread.-wrap11
android.app.ActivityThread.handleLaunchActivity
a.app.ActivityThread.performLaunchActivity
a.a.l.callActivityOnCreate
android.app.Activity.performCreate
c.e.theanswer.TheAnswer.onCreate
android.app.Activity.setContentView
c.a.i.p.P.setContentView
c.a.i.p.P.installDecor
generateLayout
onResourcesLo...
a.v.L.inflate
a.v.L.inflate
a.v.L.inflate
rInflateChildren
a.v.L.rInflate
rInfla...
dispatchMe...
handleCall...
doFrame
doCallbacks
a.v.C.run
a.v.C.run
a.v.V.run
doTraversal
performTra...
addView
setVi...
getDef...
getDra...
loadDr...
create...
infl...
rIn...
cre...
on...
dis...
ha...
next
na...
n...
do...
run
per...
pe...
Build Variants
2: Favorites
Gradle
Device File Explorer
4: Run
TODO
6: Logcat
Android Profiler
9: Version Control
Terminal
Build
Event Log
Gradle build finished in 2s 815ms (2 minutes ago)
2:1 LF UTF-8 Git: master Context: <no context>


Android Studio File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
Tue 10:16 AM Adam Porter
TheAnswer [~/AndroidStudioProjects/CMSC436SampleCode/TheAnswer] - .../app/src/main/java/course/examples/theanswer/TheAnswer.java [app]
TheAnswer app src main java course examples theanswer
Android Profiler
CPU
Instrumented (Java)
End Session
Live
TheAnswer
CPU
100 %
50
App: 2 %
Others: 13 %
Threads: 11
15
10
5
00:00:07.703 - 00:00:18.688
mples.theanswer
Binder:5698_1
RenderThread
Studio:Agent
Studio:Socket
Studio:Heartbea
Thread-3
Thread-6
JVMTI Agent thr
0m
5.00s
10.00s
15.00s
20.00s
Call Chart
Flame Chart
Top Down
Bottom Up
Wall Clock Time
00:00:07.703 - 00:00:18.688
findAnswer
Match Case
Regex
Name
Total (µs)
%
Self (µs)
%
Children (µs)
%
main() ()
10,852,275
100.00
323
0.00
10,851,952
100.00
dispatchMessage() (android.os.Handler)
2,493,396
22.98
6
0.00
2,493,390
22.98
handleMessage() (android.app.ActivityThread$H)
2,493,390
22.98
75
0.00
2,493,315
22.98
-wrap11() (android.app.ActivityThread)
2,492,460
22.97
15
0.00
2,492,445
22.97
handleLaunchActivity() (android.app.ActivityThread)
2,492,445
22.97
113
0.00
2,492,332
22.97
performLaunchActivity() (android.app.ActivityThread)
2,072,148
19.09
607
0.01
2,071,541
19.09
callActivityOnCreate() (android.app.Instrumentation)
1,571,405
14.48
15
0.00
1,571,390
14.48
performCreate() (android.app.Activity)
1,571,376
14.48
20
0.00
1,571,356
14.48
onCreate() (course.examples.theanswer.TheAnswer)
1,570,768
14.47
25
0.00
1,570,743
14.47
findAnswer() (course.examples.theanswer.TheAnswer)
76
0.00
11
0.00
65
0.00
d() (android.util.Log)
65
0.00
12
0.00
53
0.00
println_native() (android.util.Log)
53
0.00
53
0.00
0
0.00
4: Run
TODO
6: Logcat
Android Profiler
9: Version Control
Terminal
Build
Event Log
Gradle build finished in 2s 815ms (3 minutes ago)
2:1 LF UTF-8 Git: master Context: <no context>
1: Project
7: Structure
Captures
Build Variants
2: Favorites
Gradle
Device File Explorer

Layout Inspector

Shows the runtime organization of the user interface


Android Studio File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
Tue 9:56 AM Adam Porter
AVD Manager
SDK Manager
Layout Inspector
Theme Editor
Firebase
App Links Assistant
Tasks & Contexts
Generate JavaDoc...
IDE Scripting Console
Create Command-line Launcher...
JShell Console...
Groovy Console...
Kotlin
HelloWorld
app
src
main
java
course
examples
Android
MainActivity.java
app
manifests
java
course.examples.helloworld
MainActivity
course.examples.helloworld (andr
res
Gradle Scripts
package course.e
import android.a
import android.o
public class Mai
ivity {
@Override
protected vo
vedInstanceState) {
super.on
tate);
setContentView(R.layout.activity_main);
}
}
MainActivity
1: Project
2: Favorites
Build Variants
Captures
Z: Structure
Gradle
Device File Explorer
4: Run
TODO
6: Logcat
Android Profiler
Terminal
Build
Event Log
Gradle build finished in 1m 3s 301ms (5 minutes ago)
6:14 LF UTF-8 Context: <no context>


Android Studio File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
TheAnswer [~/AndroidStudioProjects/CMSC436SampleCode/TheAnswer] - .../captures/course.examples.theanswer_2018.09.04_10.01.li [TheAnswer]
TheAnswer captures course.examples.theanswer_2018.09.04_10.01.li
TheAnswer.java
course.examples.theanswer_2018.09.04_10.01.li
View Tree
DecorView
decor_content_parent (ActionBarOverlayLayout)
content (FrameLayout)
RelativeLayout
text_view (TextView) - "The answer to life, the univer
answer_view (TextView) - "We may never know"
action_bar_container (ActionBarContainer)
action_bar (Toolbar)
TextView - "TheAnswer"
ActionMenuView
action_context_bar (ActionBarContextView)
navigationBarBackground (View)
statusBarBackground (View)
Load Overlay
TheAnswer
The answer to life, the universe and everything is:
We may never know
Properties Table
accessibility
drawing
focus
layout
measurement
getMeasuredHeightAndState() 492
getMeasuredWidthAndState() 1328
mMeasuredHeight 492
mMeasuredWidth 1328
mMinHeight 0
mMinWidth 0
methods
padding
properties
scrolling
text
theme
1: Project
Z: Structure
Captures
Build Variants
2: Favorites
Gradle
Device File Explorer
4: Run
TODO
6: Logcat
Android Profiler
9: Version Control
Terminal
Build
Event Log
Gradle build finished in 4s 96ms (3 minutes ago)
Git: master
Context: <no context>

Next

Application Fundamentals

Example Applications

HelloWorld

TheAnswer