CMSC436: Programming Handheld Systems

Fall 2017

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 10.12 (Sierra)

GNOME or KDE desktop (tested on Ubuntu 14.04 LTS, Trusty Tahr)

Prerequisites

3 GB RAM min, 4 GB RAM rec

1 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/
index.html#downloads

Android Studio

Android platform

Android Studio IDE

Key development tools

System image for emulator

```java
package course.examples.helloworld;

…

public class MainActivity extends Activity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
    }
}
```

The Android Emulator

Runs virtual devices

MainActivity.java - HelloWorld - [~/git/CMSC436SampleCode/HelloWorld] - Android Studio 3.0 Beta 2

HelloWorld > app > src > main > java > course > examples > helloworld

app   styles.xml   activity_main.xml   strings.xml   MainActivity.java   AndroidManifest.xml

AVD Manager

app
- manifests
  - AndroidManifest.xml
- java
  - course.examples.helloworld
    - MainActivity
  - course.examples.helloworld (and...
- res
  - layout
    - activity_main.xml
  - mipmap
  - values
    - colors.xml
    - dimens.xml
    - strings.xml
    - styles.xml
- Gradle Scripts
  - build.gradle (Module: app)
  - gradle-wrapper.properties (Gradle
  - proguard-rules.pro (ProGuard Rules
  - gradle.properties (Project Properties
  - settings.gradle (Project Settings)
  - local.properties (SDK Location)

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...

Messages: Gradle Build   Code Analysis

/Users/aporter/git/CMSC43
- Warning:(5, 6) On SDK v...
  https://de...
- Warning:(5, 6) App is no...

which files to backup. More info:

4: Run   TODO   6: Logcat   Android Profiler   9: Version Control   Terminal   0: Messages

14:1   LF   UTF-8   Git: master   Context: <no context>

Event Log   Gradle Console
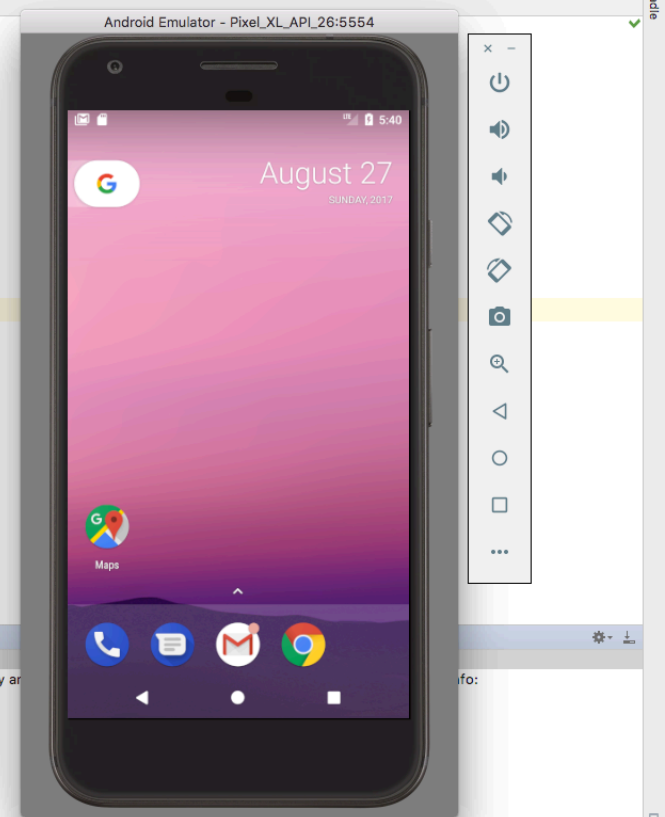
The Android Emulator

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 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

Change network speeds

Advanced Features

Emulate incoming phone calls & SMS messages

qemu-system-i386

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
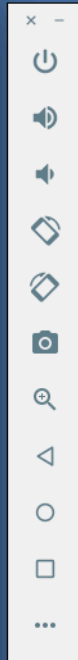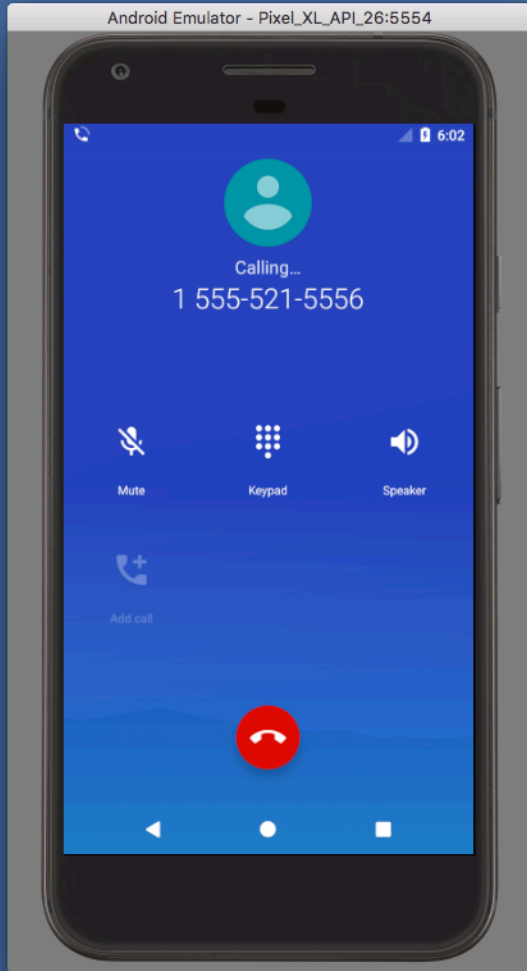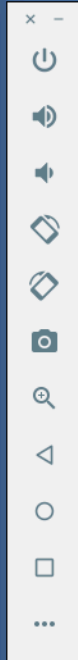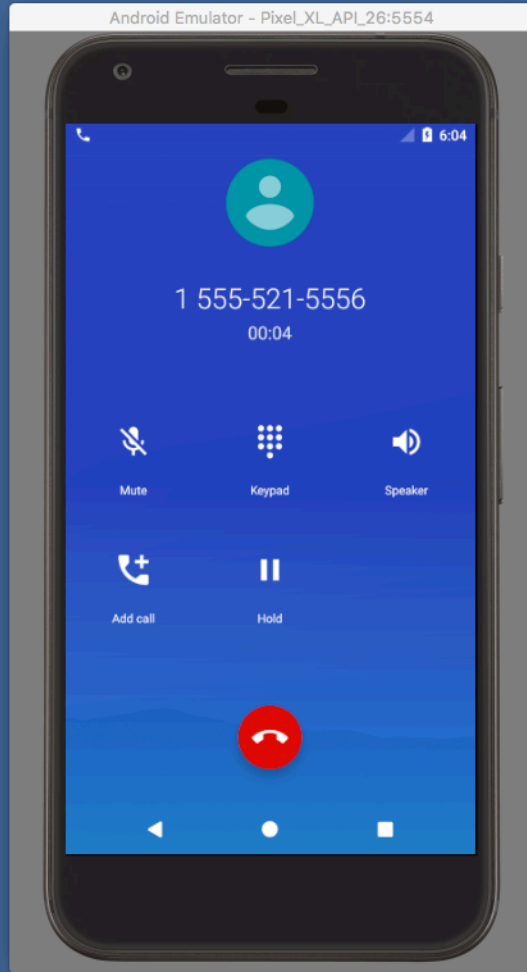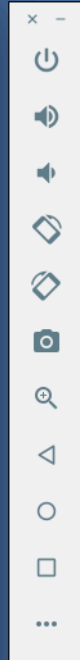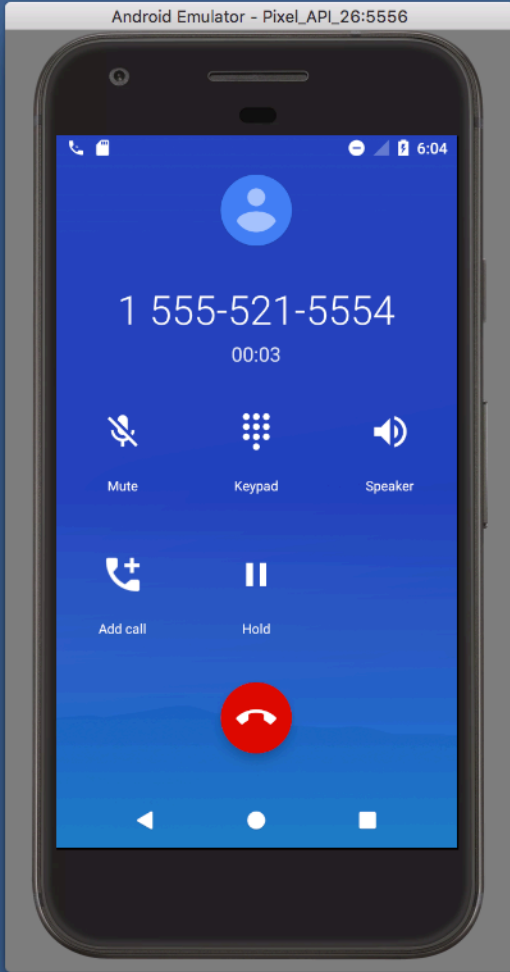
Advanced Features

Many more options

See:

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

Debugger

Tool for examining the internal state of a running application
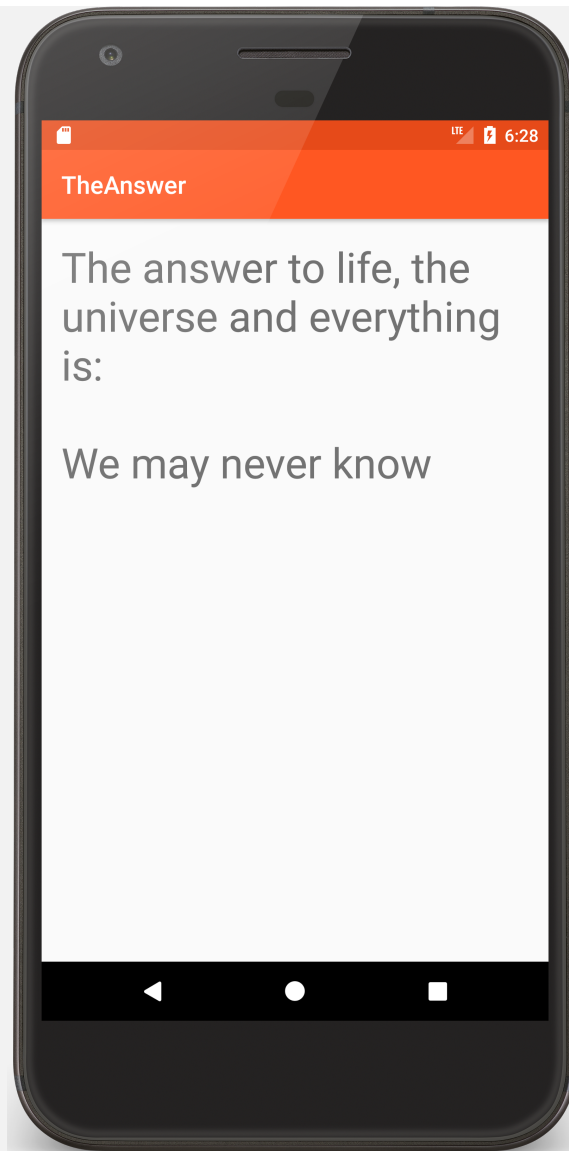
TheAnswer

The answer to life, the universe and everything is:

We may never know

```java
public class TheAnswer extends Activity {

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

    @Override
    protected void onCreate(Bundle savedInstanceState) {

        // Required call through to Activity.onCreate()
        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);
```

```java
    …
    int val = findAnswer();
    String output = (val == answer) ? "42" : "We may never know";

    // Set desired text in answerView TextView
    answerView.setText(String.format("The answer to life,
                    the universe and everything is:\n\n%s", output));
}

private int findAnswer() {
    for (int val : answers) {
        if (val != answer)
            return val;
    }
    return -1;
}
}
```

Development Tools

Android Studio provides numerous tools for monitoring application behaviors

Example Tools

Device File Explorer

Logcat

Traceview

Hierarchyview

Device File Explorer

View, copy, and delete files on your device

Often used to examine and verify file creation and transfer

Added in Android Studio 3.0

92% ⚡ Mon 10:12 AM Adam Porter

...wer - [~/git/CMSC436SampleCode/TheAnswer] - Android Studio 3.0 Beta 2

View menu:

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

Tool Windows submenu:

⊕ 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	

```
 3           ...ty {
 6
 7
 8                          s = { 42, -10, 0, 100, 1000 };
 9                              42;
10
11
12
13                          ...vedInstanceState) {
14
15                          ...ctivity.onCreate()
16                              ... state
17              super.onCre...          ...tate);
18
19              // Set up t...           ...er interface (content view)
20              setContentV...          ...r_layout);
21
22              // Get a reference to a TextView in the content view
23              TextView answerView = findViewById(R.id.answer_view);
24
25              int val = findAnswer();
26              String output = (val == answer) ? String.valueOf(answer) : "We may never know";
27
28              // Set desired text in answerView TextView
29              answerView
30                      .setText(output);
31          }
32
33 @     private int findAnswer() {
34          for (int val : answers) {
35              if (val == answer)
36                  return val;
37          }
38          return -1;
39      }
40  }
41
```

TheAnswer | onCreate()

```java
3    import ...

7    public class TheAnswer extends Activity {
8
9        private static final int[] answers = { 42, -10,
10       private static final int answer = 42;
11
12       @Override
13       protected void onCreate(Bundle savedInstanceStat
14
15           // Required call through to Activity.onCreat
16           // Restore any saved instance state
17           super.onCreate(savedInstanceState);
18
19           // Set up the application's user interface (
20           setContentView(R.layout.answer_layout);
21
22           // Get a reference to a TextView in the cont
23           TextView answerView = findViewById(R.id.answ
24
25           int val = findAnswer();
26           String output = (val == answer) ? String.val
27
28           // Set desired text in answerView TextView
29           answerView
30                   .setText(output);
31       }
32
33   @   private int findAnswer() {
34           for (int val : answers) {
35               if (val == answer)
36                   return val;
37           }
38           return -1;
39       }
40   }
41
```
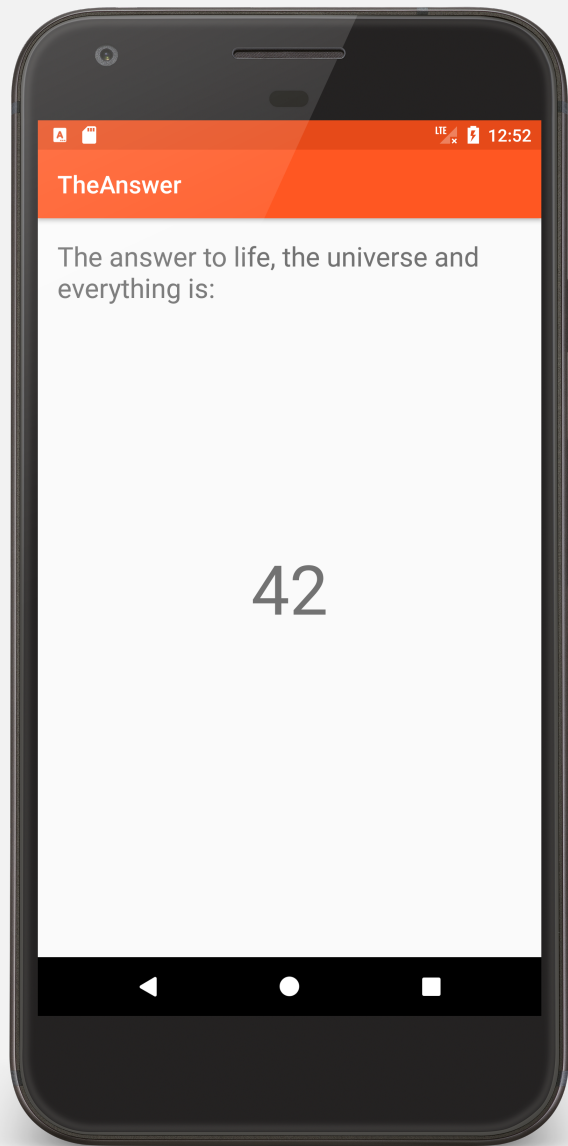
Device File Explorer

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 18:27	4 KB
▶ ▓ com.google.android.gms	drwx-	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 23:24	4 KB
▶ ▓ misc_ce	drwxr-	2017-08-26 23:23	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	drwxr-	2017-08-26 23:23	4 KB
▶ ▓ vendor	drwxr-	2017-08-26 23:23	4 KB

app
Gradle Scripts
build.gradle (Module:
gradle-wrapper.prop
settings.gradle (Proj
local.properties (SDK

Logcat

Write and review log messages

Apps use Log class to write messages to log

Developer can search and filter log messages

TheAnswer   findAnswer()

```java
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 ◇   Q⁃   ☑ 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)
```

```java
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 | 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>

Traceview

Logs execution sequences and timing taken from a running application

Graphically displays method traces and metrics

100% Mon 11:40 AM Adam Porter

TheAnswer.java - Th...   heAnswer] - Android Studio 3.0 Beta 2

Tools menu:
- Tasks & Contexts ▶
- Generate JavaDoc...
- IDE Scripting Console
- Create Command-line Launcher...
- 🔥 Firebase
- 🔗 App Links Assistant
- 🤖 Android ▶
- Ⓚ Kotlin ▶

Android submenu:
- Sync Project with Gradle Files
- Android Device Monitor
- AVD Manager
- SDK Manager
- Android Profiler
- ✓ Enable ADB Integration
- Layout Inspector
- Theme Editor

app ✕   Ⓒ TheAnswer.java ✕   strings.xml ✕   answer_layout.xml ✕

TheAnswer findAnswer()

```java
 8  public class TheAnswer extends Acti
 9
10      private static final int[] answ                , 1000 };
11      private static final int answer
12      private static String TAG = "Th
13
14      @Override
15      protected void onCreate(Bundle savedInstanceState) {
16
17          // Required call through to Activity.onCreate()
18          // Restore any saved instance state
19          super.onCreate(savedInstanceState);
20
21          // Set up the application's user interface (content view)
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";
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32                  .setText(output);
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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
```
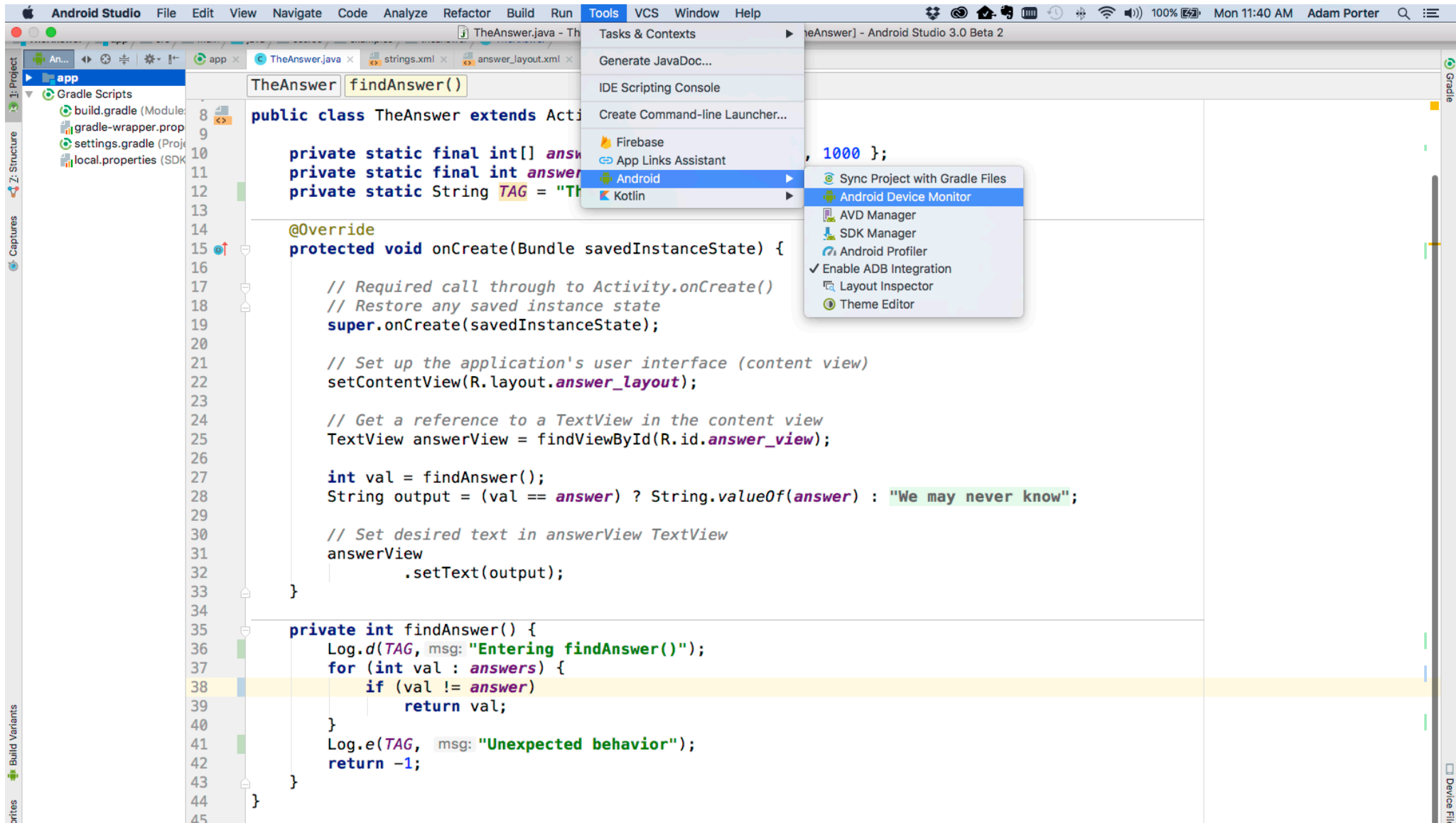
Project panel:
- app
- Gradle Scripts
  - build.gradle (Module:
  - gradle-wrapper.prop
  - settings.gradle (Proj
  - local.properties (SDK

Android Device Monitor

Quick Access | DDMS | Hierarchy View

dump_4700850547921896412.uix | ddms34461434319944414113.trace

msec: 10,050.85 | max msec: 10,051.236 (real time, dual clock)

10,050.74 10,050.76 10,050.78 10,050.8 10,050.82 10,050.84 10,050.86 10,050.88 10,050.9 10,050.92 10,050.94 10,050.96 10,050.98 10,051 10,051.02 10,051.04 10,051.06 10,051.08 10,051.1 10,051.12 10,051.14 10,051.16 10,051.18 10,051.2 10,051.22

[11537] main

[11551] Binder:11537_2

[11550] Binder:11537_1

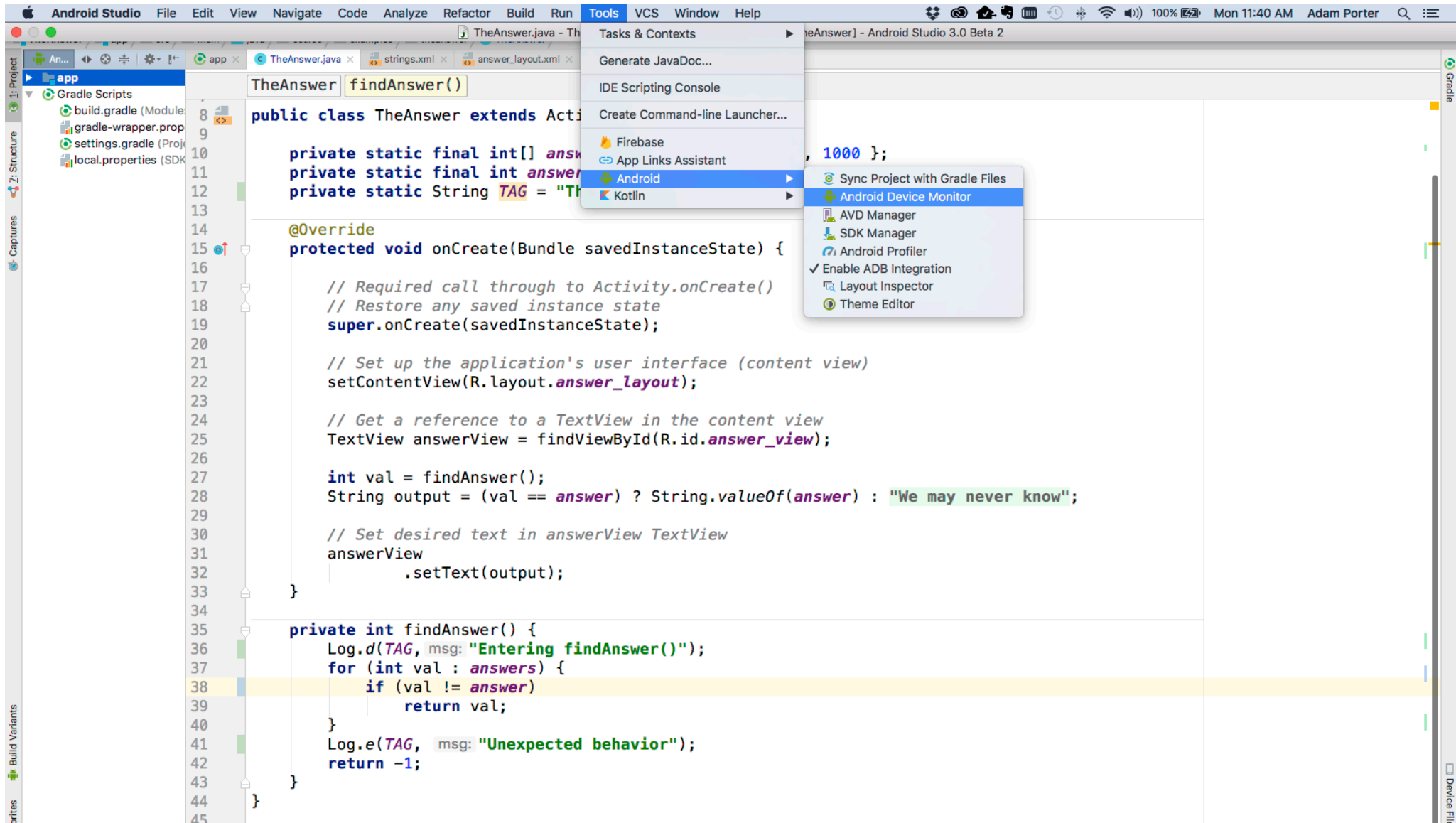[11570] Binder:11537_3

[11545] JDWP

Name	Incl Cpu Time %	Incl Cpu Time	Excl Cpu Time %	Excl Cpu Time	Incl Real Time %	Incl Real Time	Excl Real Time %	Excl Real Time	Calls+Recur Calls/Total	Cpu Time/Call	Real Time/Call
▼ 1692 course.examples.theanswer.TheAnswer.findAnswer ()I	0.0%	0.140	0.0%	0.036	0.0%	0.142	0.0%	0.021	1+0	0.140	0.142
▼ Parents											
16 course.examples.theanswer.TheAnswer.onCreate (La...	100.0%	0.140			100.0%	0.142			1/1		
▼ Children											
self	25.7%	0.036			14.8%	0.021					
1845 android.util.Log.d (Ljava/lang/String;Ljava/lang/Str...	74.3%	0.104			85.2%	0.121			1/1		
▶ 1693 android.text.TextUtils.isEmpty (Ljava/lang/CharSequence;)Z	0.0%	0.139	0.0%	0.106	0.0%	0.139	0.0%	0.109	15+0	0.009	0.009
▶ 1694 android.view.View.setOverScrollMode (I)V	0.0%	0.139	0.0%	0.139	0.0%	0.148	0.0%	0.148	28+0	0.005	0.005
▶ 1695 android.view.ViewRootImpl.loadSystemProperties ()V	0.0%	0.139	0.0%	0.016	0.0%	0.139	0.0%	0.016	1+0	0.139	0.139
▶ 1696 android.inputmethod.InputMethodManager.peekIns...	0.0%	0.139	0.0%	0.139	0.0%	0.136	0.0%	0.136	28+0	0.005	0.005
▶ 1697 android.widget.TextView.setTypeface (Landroid/graphics...	0.0%	0.139	0.0%	0.051	0.0%	0.141	0.0%	0.057	4+0	0.035	0.035
▶ 1698 android.graphics.Path.approximate (F)[F	0.0%	0.138	0.0%	0.036	0.0%	0.138	0.0%	0.033	2+0	0.069	0.069
▶ 1699 android.graphics.PorterDuffColorFilter.<init> (ILandroid/...	0.0%	0.138	0.0%	0.059	0.0%	0.136	0.0%	0.058	6+0	0.023	0.023
▶ 1700 android.view.RecordingCanvas.nDrawText (JLjava/lang/S...	0.0%	0.138	0.0%	0.138	0.0%	0.140	0.0%	0.140	5+0	0.028	0.028
▶ 1701 android.widget.RelativeLayout.centerHorizontal (Landroi...	0.0%	0.138	0.0%	0.077	0.0%	0.137	0.0%	0.079	4+0	0.035	0.034
▶ 1702 android.graphics.drawable.VectorDrawable.getAlpha ()I	0.0%	0.137	0.0%	0.026	0.0%	0.139	0.0%	0.028	3+0	0.046	0.046
▶ 1703 android.text.TextUtils.stringOrSpannedString (Ljava/lang...	0.0%	0.137	0.0%	0.096	0.0%	0.137	0.0%	0.094	9+0	0.015	0.015
▶ 1704 android.view.View.combineMeasuredStates (II)I	0.0%	0.137	0.0%	0.137	0.0%	0.103	0.0%	0.103	18+0	0.008	0.006
▶ 1705 android.util.Log.println_native (IILjava/lang/String;Ljava/l...	0.0%	0.136	0.0%	0.136	0.0%	0.153	0.0%	0.153	2+0	0.068	0.077
▶ 1706 android.widget.TextView.onLayout (ZIIII)V	0.0%	0.136	0.0%	0.049	0.0%	0.136	0.0%	0.051	3+0	0.045	0.045
▶ 1707 android.app.Activity.performRestart ()V	0.0%	0.135	0.0%	0.031	0.0%	0.133	0.0%	0.028	1+0	0.135	0.133
▶ 1708 android.text.Layout.getWidth ()I	0.0%	0.135	0.0%	0.135	0.0%	0.122	0.0%	0.122	23+0	0.006	0.005
▶ 1709 android.view.DisplayListCanvas.nResetDisplayListCanva...	0.0%	0.135	0.0%	0.135	0.0%	0.138	0.0%	0.138	16+0	0.008	0.009
▶ 1710 android.view.InputChannel.<init> ()V	0.0%	0.135	0.0%	0.097	0.0%	0.131	0.0%	0.062	2+0	0.068	0.066
▶ 1711 android.view.ViewRootImpl$SyntheticJoystickHandler.<i...	0.0%	0.135	0.0%	0.010	0.0%	0.135	0.0%	0.010	1+0	0.135	0.135
▶ 1712 android.view.ViewRootImpl.unscheduleConsumeBatched...	0.0%	0.135	0.0%	0.015	0.0%	0.134	0.0%	0.015	1+0	0.135	0.134
▶ 1713 sun.util.locale.LocaleUtils.isEmpty (Ljava/util/Map;)Z	0.0%	0.135	0.0%	0.135	0.0%	0.177	0.0%	0.177	24+0	0.006	0.007

Find:

UI Hierarchy Viewer

Shows the runtime organization of the user interface

Android Studio File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

Tasks & Contexts ▶

Generate JavaDoc...

IDE Scripting Console

Create Command-line Launcher...

🔥 Firebase
🔗 App Links Assistant
Android ▶
Kotlin ▶

TheAnswer.java - Th... heAnswer] - Android Studio 3.0 Beta 2

app   TheAnswer.java ×   strings.xml ×   answer_layout.xml ×

TheAnswer findAnswer()

Sync Project with Gradle Files
Android Device Monitor
AVD Manager
SDK Manager
Android Profiler
✓ Enable ADB Integration
Layout Inspector
Theme Editor

```java
8   public class TheAnswer extends Acti
9
10      private static final int[] answ                , 1000 };
11      private static final int answe
12      private static String TAG = "Th
13
14      @Override
15      protected void onCreate(Bundle savedInstanceState) {
16
17          // Required call through to Activity.onCreate()
18          // Restore any saved instance state
19          super.onCreate(savedInstanceState);
20
21          // Set up the application's user interface (content view)
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
```

Project
Gradle
Structure
Captures
Build Variants

app
Gradle Scripts
  build.gradle (Module:
  gradle-wrapper.prop
  settings.gradle (Proj
  local.properties (SDK

100% Mon 11:40 AM Adam Porter

Next

Application Fundamentals