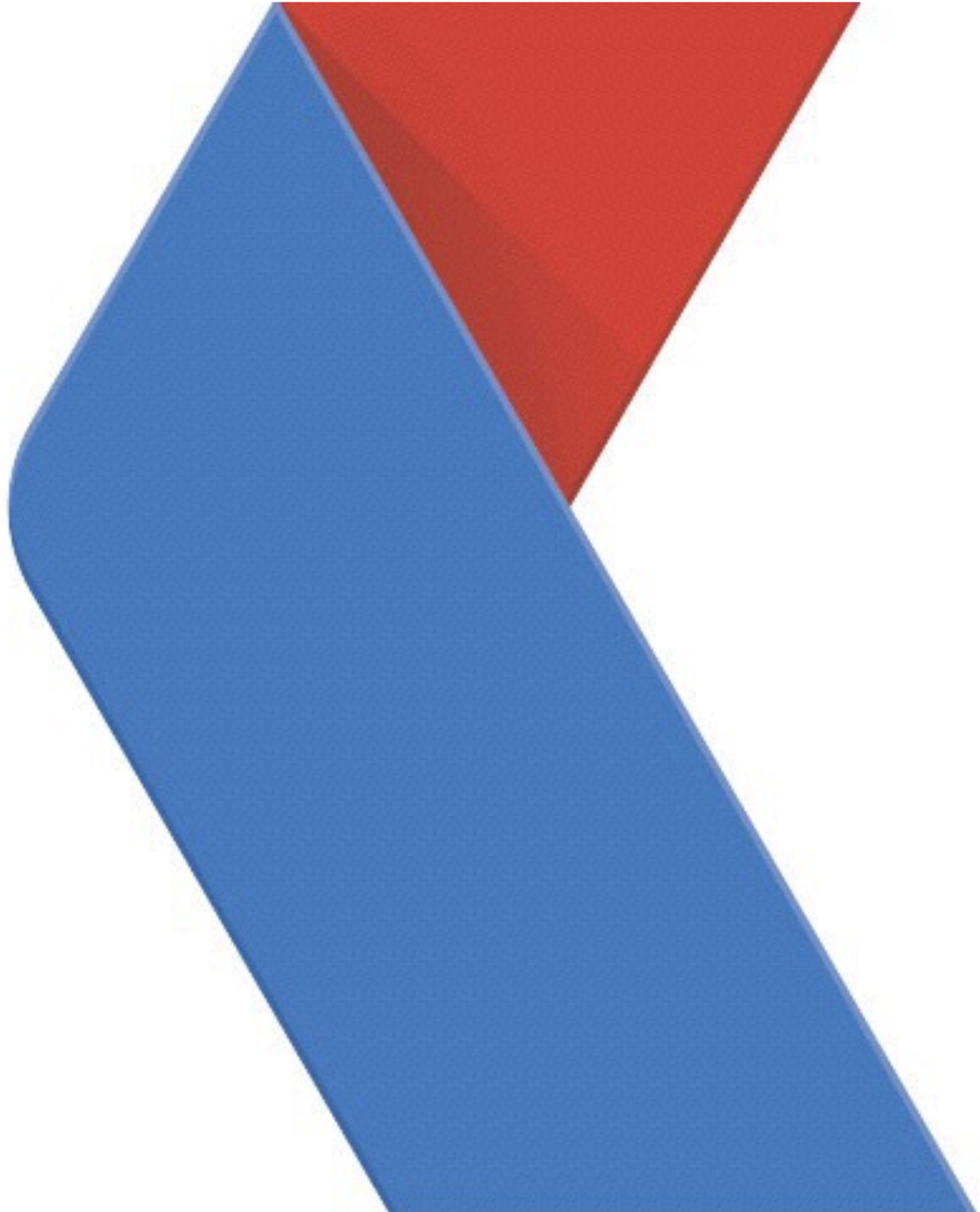
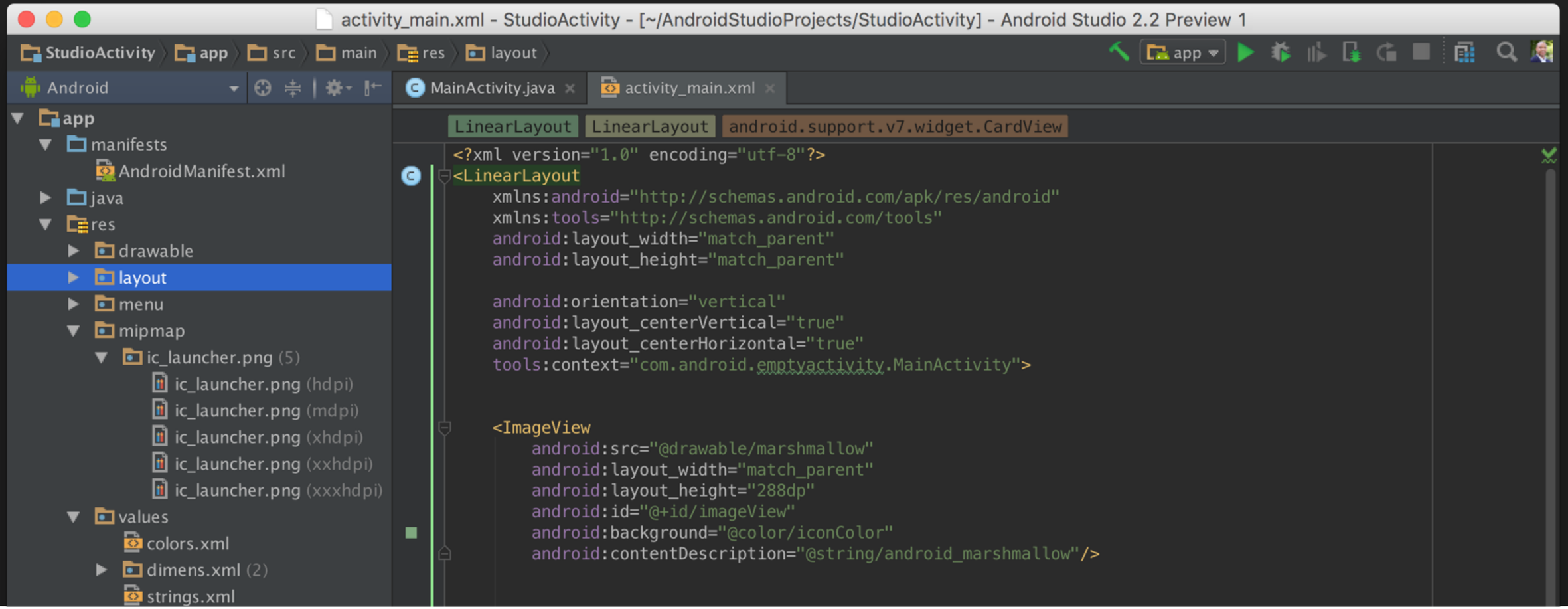
Android Studio and Tools

December 2016





Android Studio

Google Developer Day

92%

of top 125 apps use Android Studio

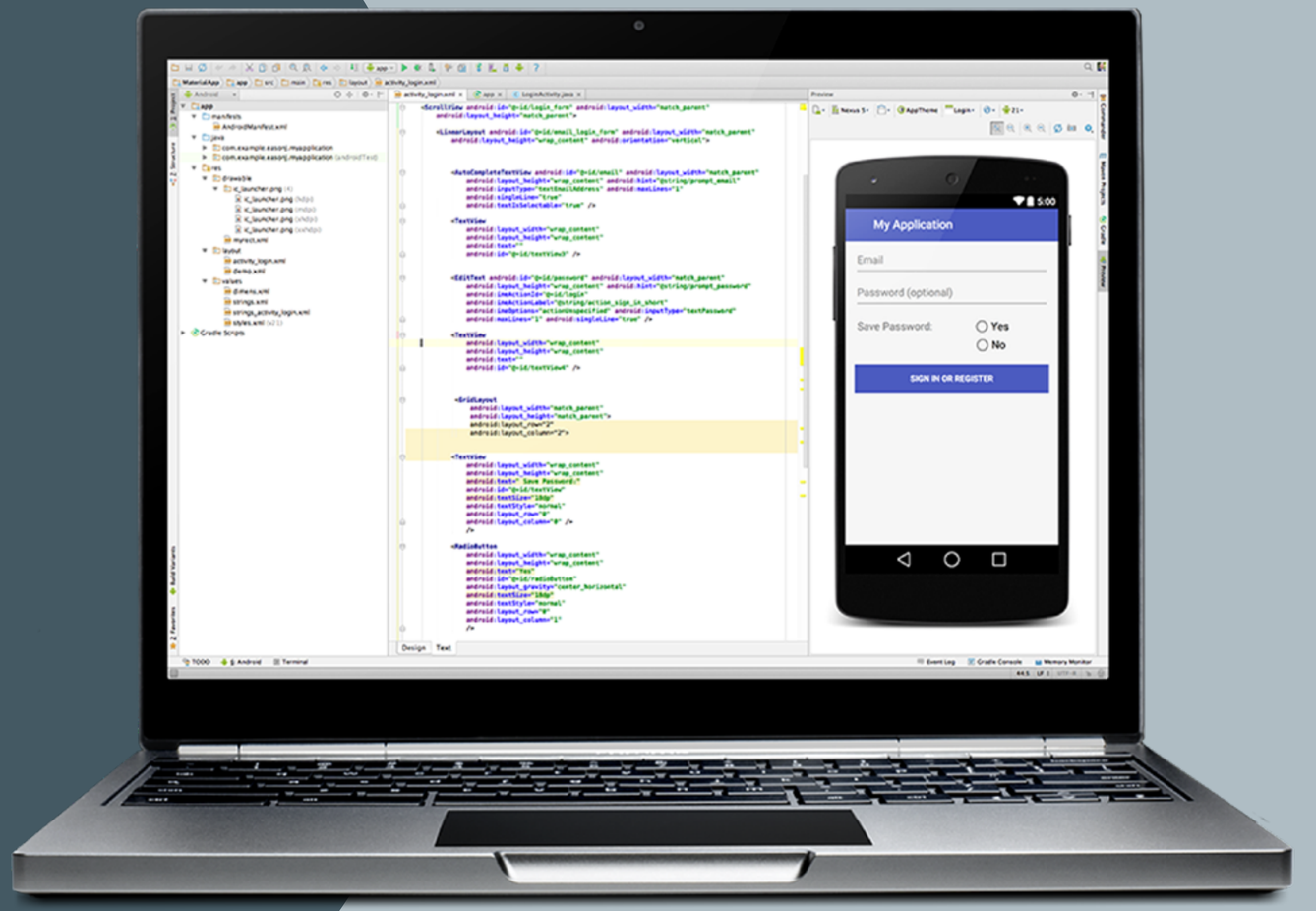
143

Releases across
Preview, Beta, and Stable
Channels

Google Developer Day

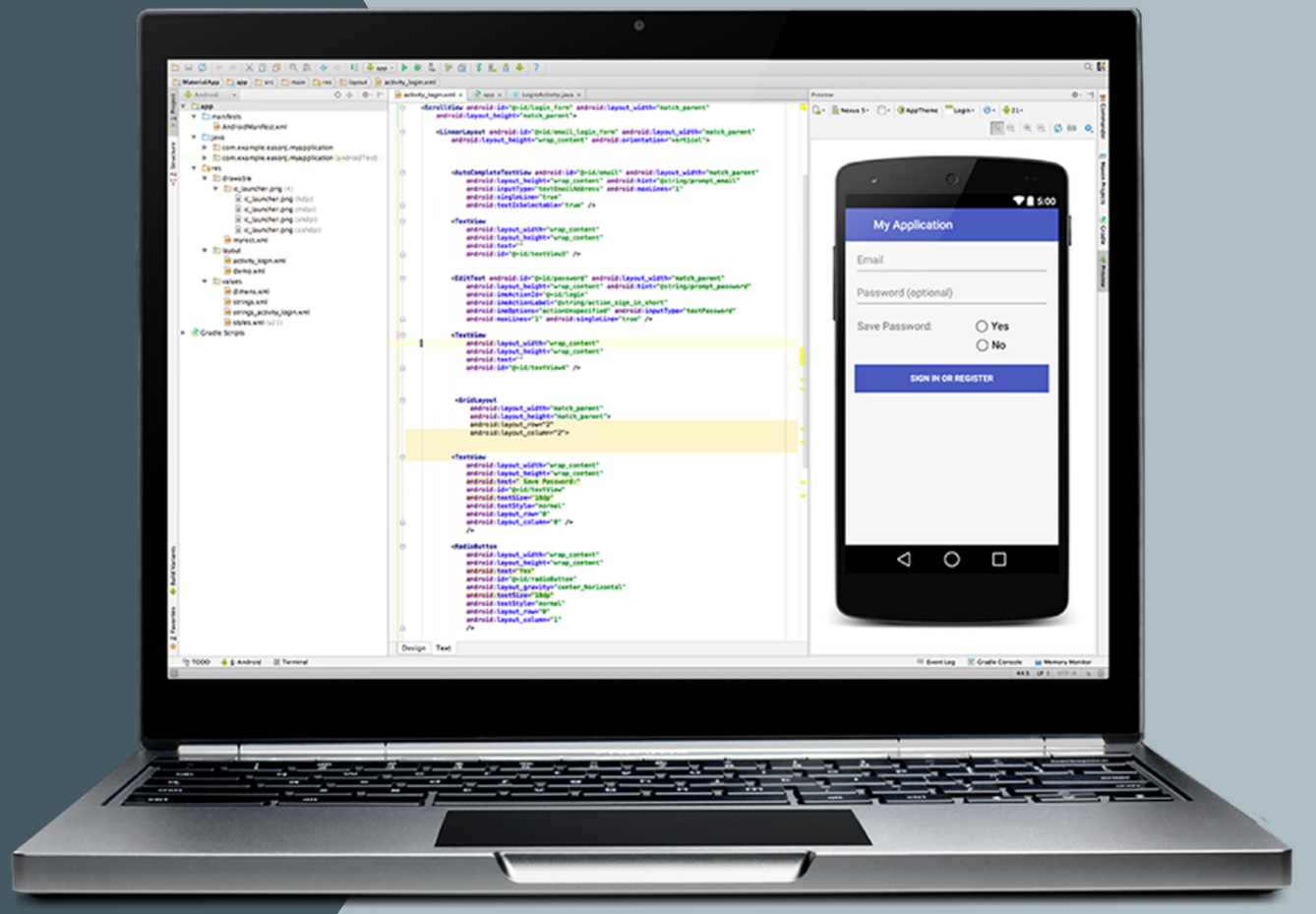
Android Studio 2.0

- Instant Run
- Accelerated build and deployment speeds
- Next-generation Emulator
- New GPU profiler
- IntelliJ 15
- Enhanced testing support
- Support for Google Search deep linking



Android Studio 2.1

- Nougat Developer Preview Features & APIs
- Jack compiler & Java8 language feature support
- Nougat Developer Preview Android Virtual Devices (AVDs)
- Instant Run - incremental java compilation + dex in process



Android Studio 2.2

Android Studio 2.2

Design

Develop

Build

Test

Design

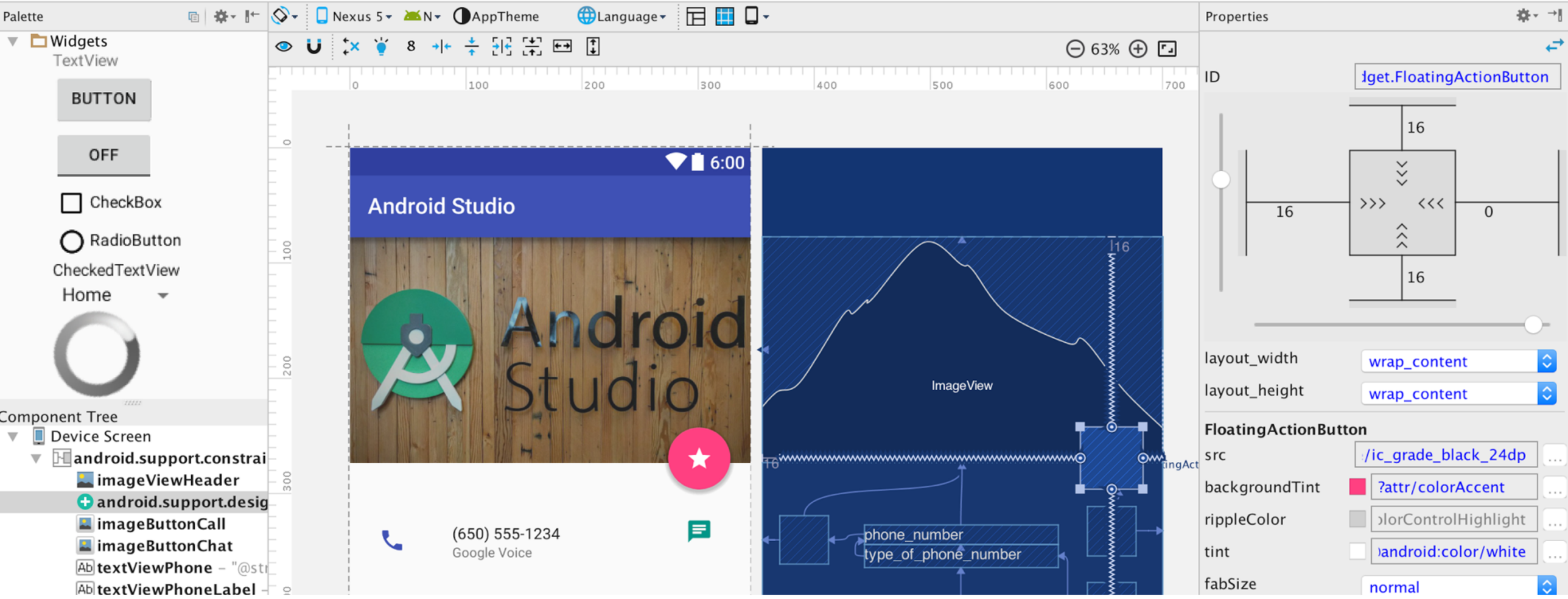
Develop

Build

Test

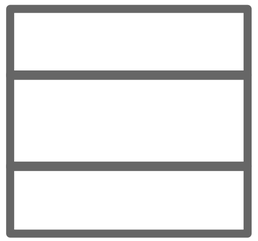
No XML Editing Required

Google Developer Day

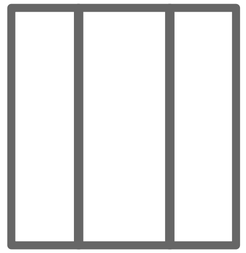


Layout Editor

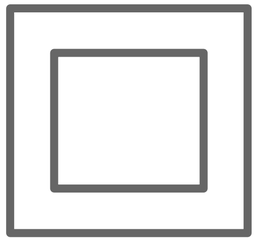
Google Developer Day



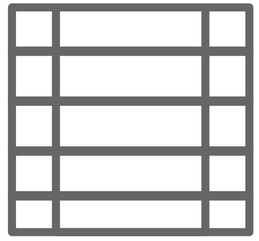
LinearLayout
(horizontal)



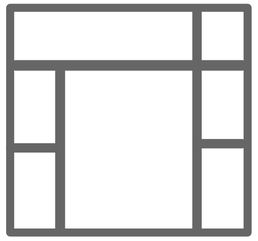
LinearLayout
(vertical)



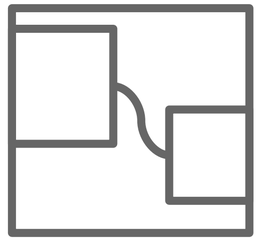
FrameLayout



TableLayout



GridLayout



RelativeLayout

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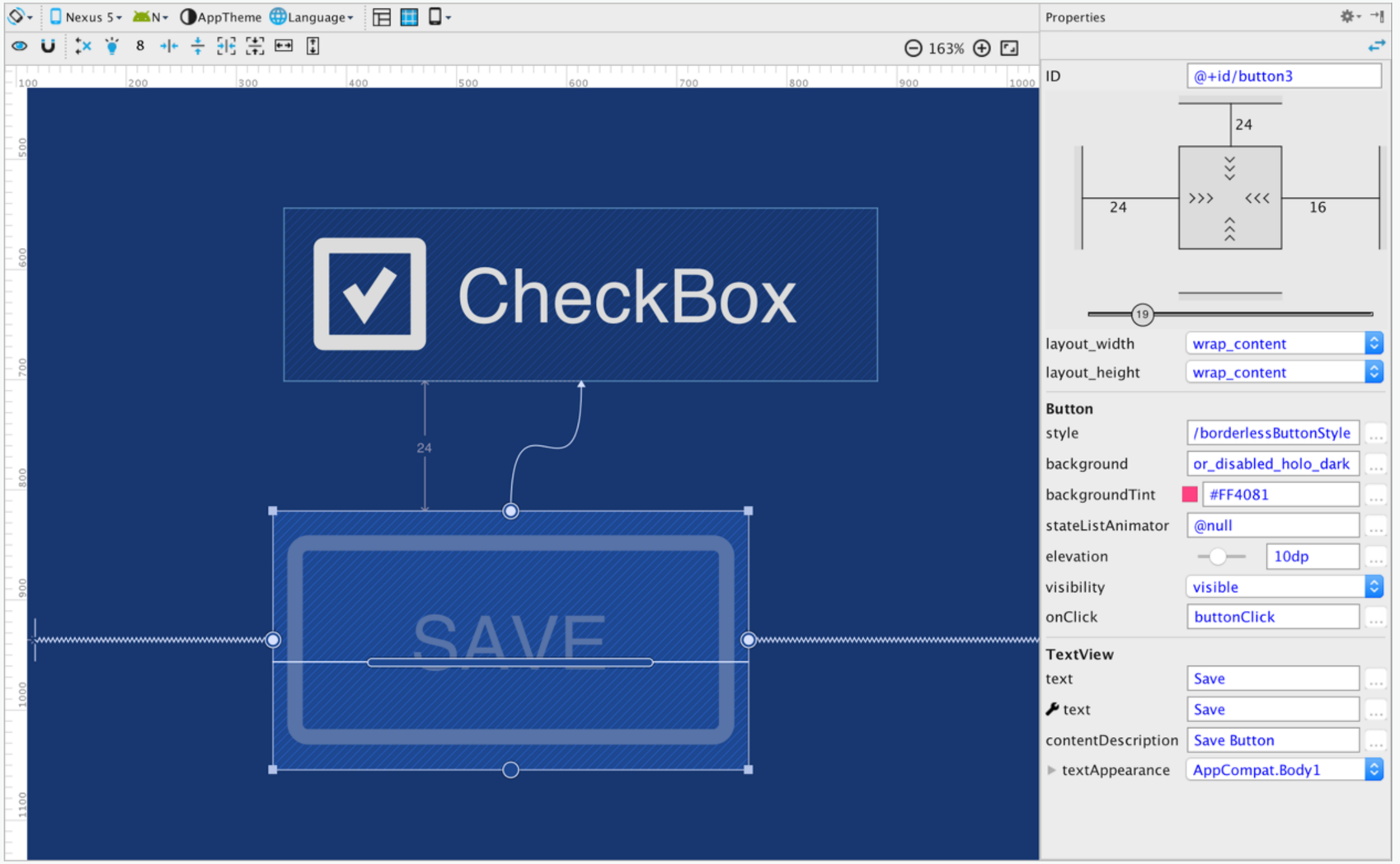
Constrai
nt Layout



Google Developer Day

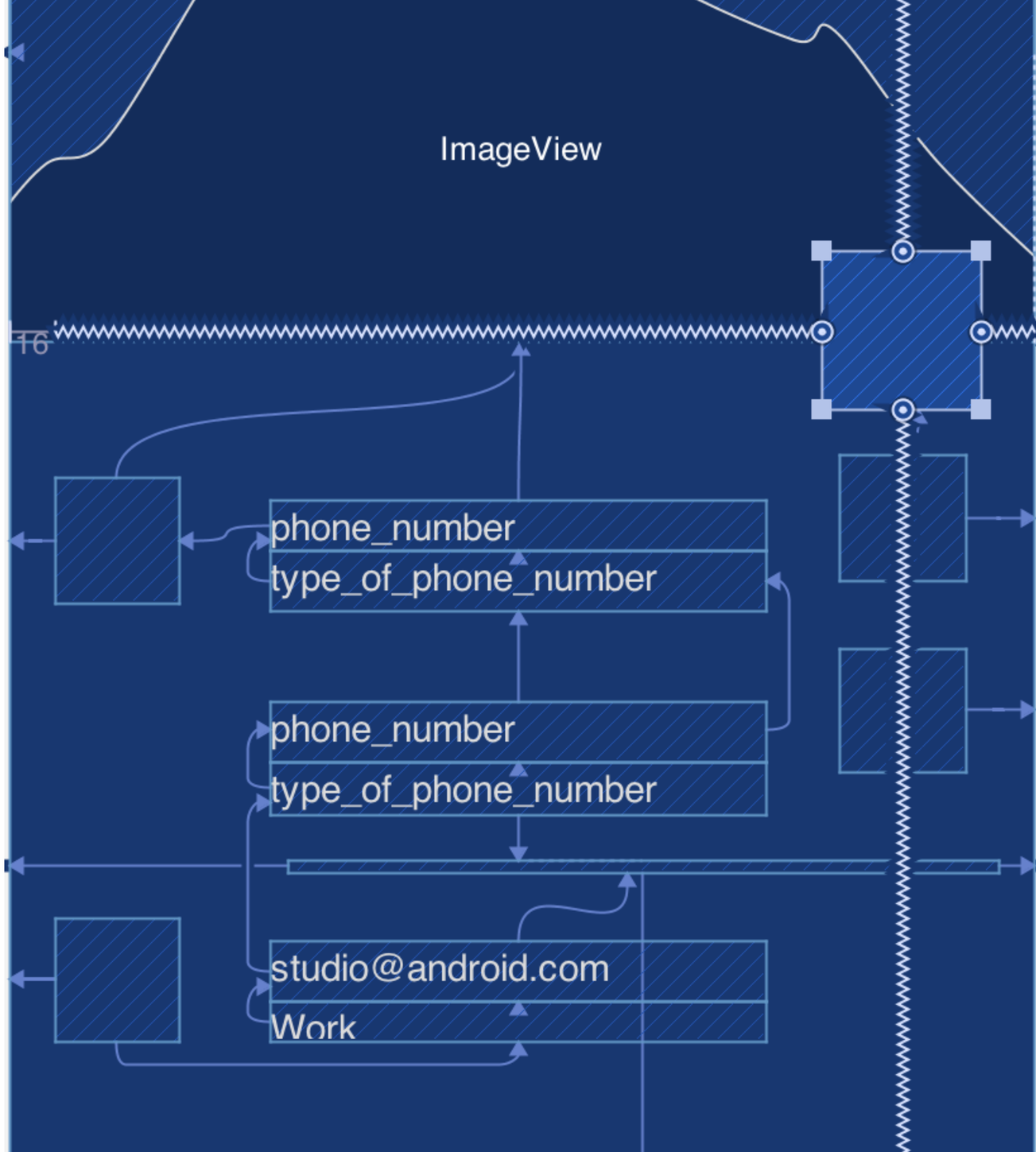
Constraint Layout

Fast UI Development

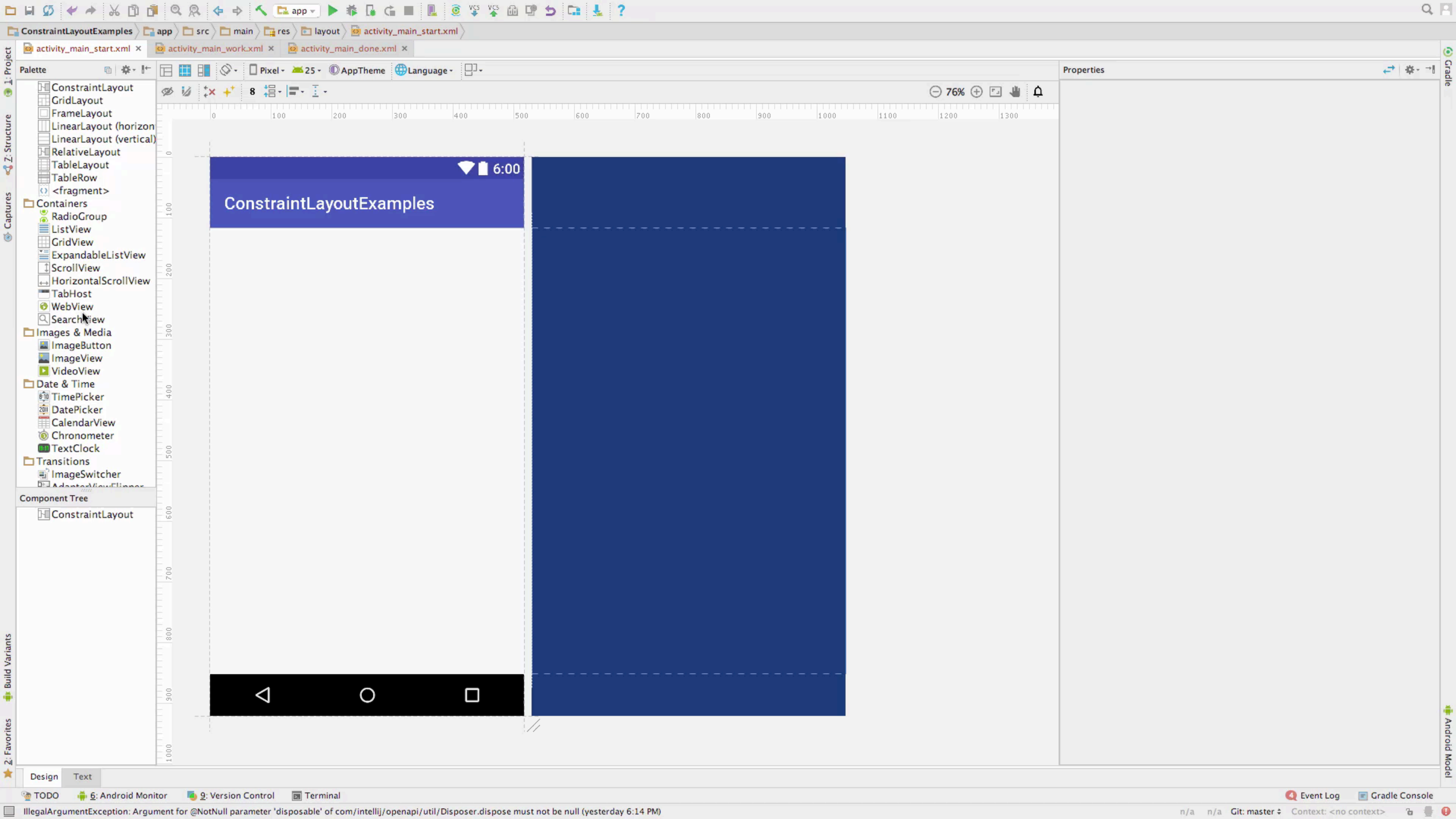
Responsive Design

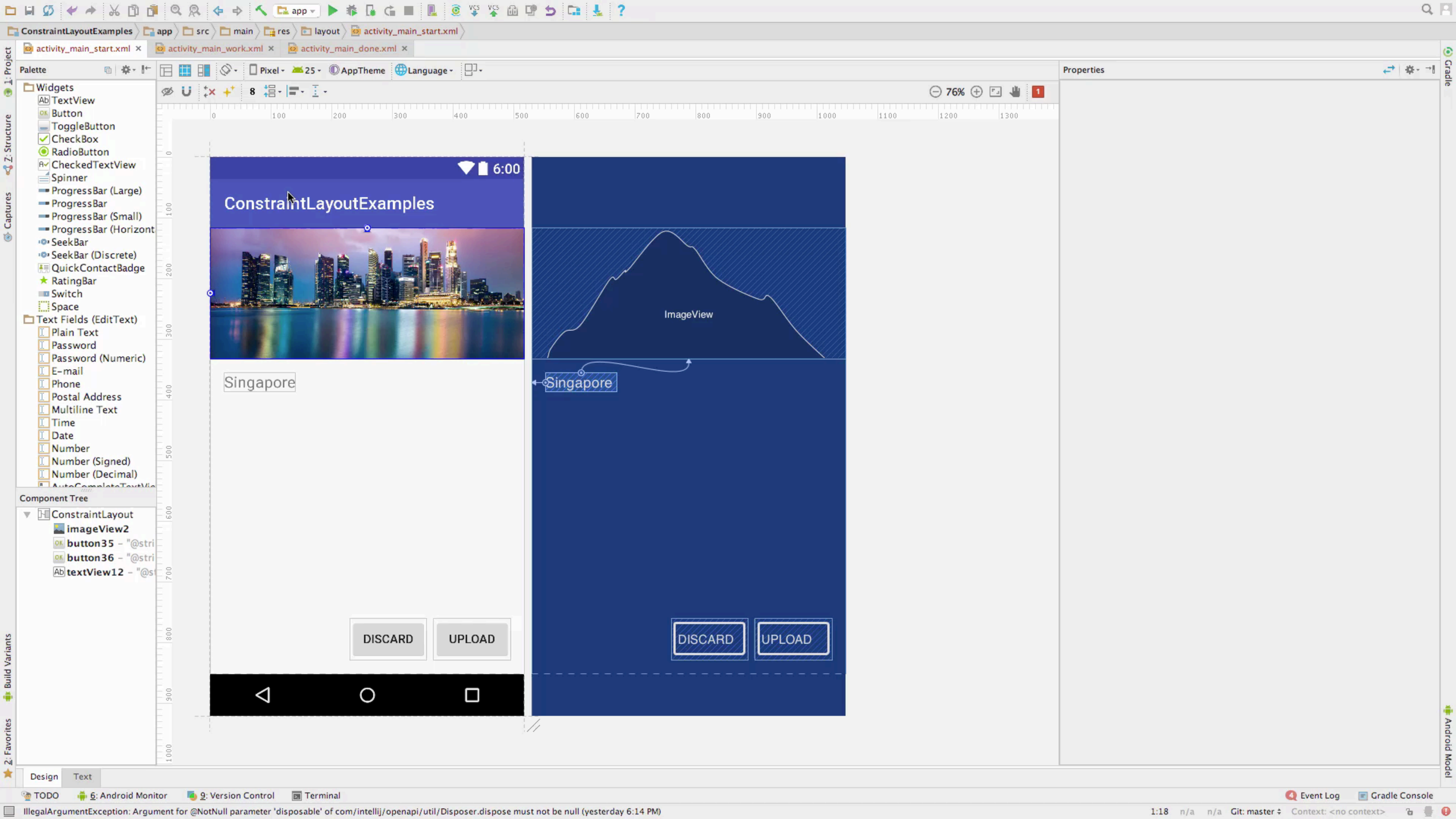
Performant UI

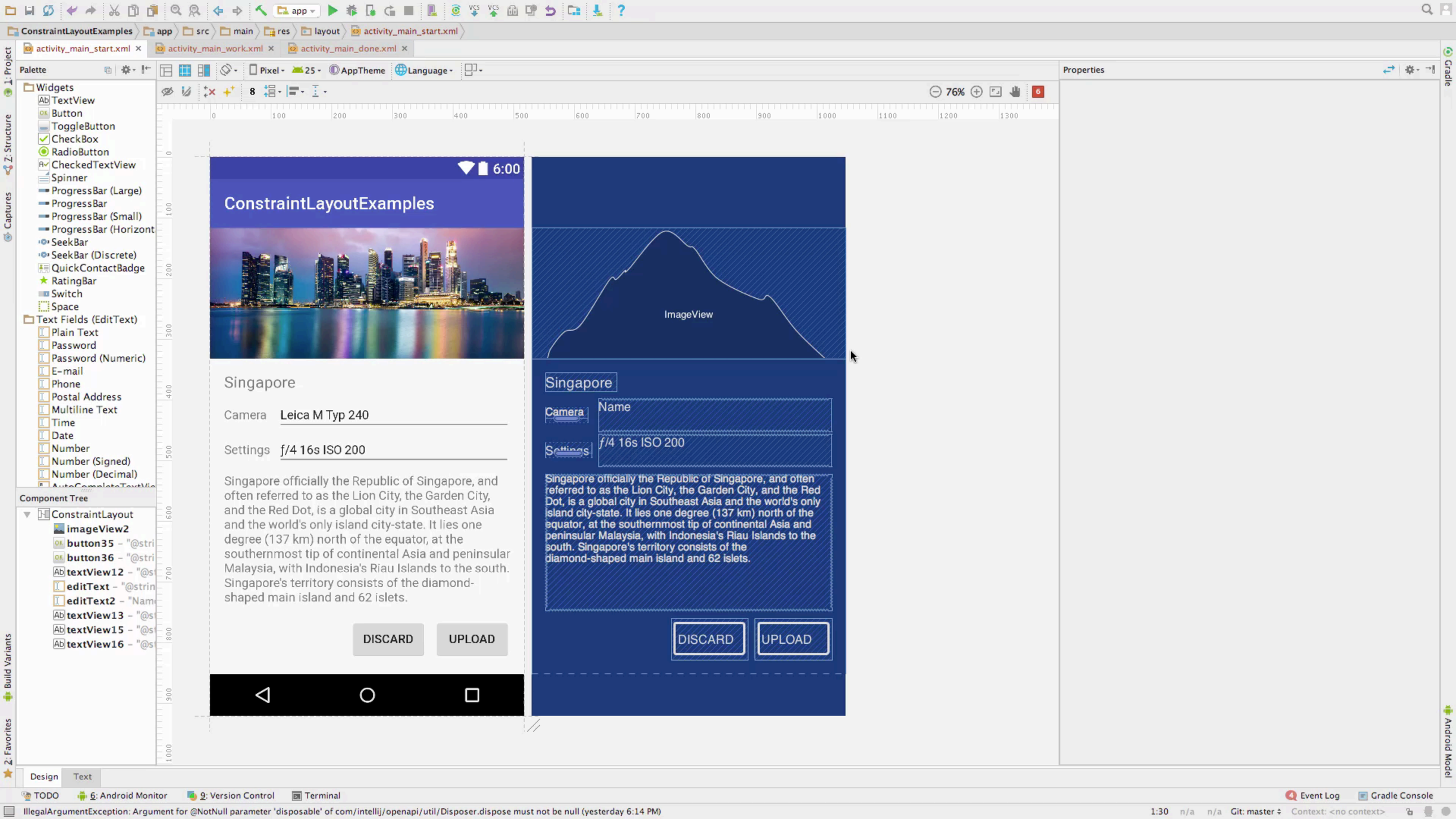
Gingerbread Compatible



Google Developer Day


ConstraintLayoutExamples
app
src
main
res
layout
activity_main_start.xml
activity_main_start.xml
activity_main_work.xml
activity_main_done.xml
Palette
ConstraintLayout
GridLayout
FrameLayout
LinearLayout (horizon
LinearLayout (vertical)
RelativeLayout
TableLayout
TableRow
<fragment>
Containers
RadioGroup
ListView
GridView
ExpandableListView
ScrollView
HorizontalScrollView
TabHost
WebView
SearchView
Images & Media
ImageButton
ImageView
VideoView
Date & Time
TimePicker
DatePicker
CalendarView
Chronometer
TextClock
Transitions
ImageSwitcher
Component Tree
ConstraintLayout
Pixel
25
AppTheme
Language
76%
6:00
ConstraintLayoutExamples
Properties
Design
Text
TODO
6: Android Monitor
9: Version Control
Terminal
Event Log
Gradle Console
IllegalArgumentException: Argument for @NotNull parameter 'disposable' of com/intellij/openapi/util/Disposer.dispose must not be null (yesterday 6:14 PM)
Git: master
Context: <no context>


ConstraintLayoutExamples
app
src
main
res
layout
activity_main_start.xml
activity_main_start.xml
activity_main_work.xml
activity_main_done.xml
Palette
Widgets
TextView
Button
ToggleButton
CheckBox
RadioButton
CheckedTextView
Spinner
ProgressBar (Large)
ProgressBar
ProgressBar (Small)
ProgressBar (Horizont
SeekBar
SeekBar (Discrete)
QuickContactBadge
RatingBar
Switch
Space
Text Fields (EditText)
Plain Text
Password
Password (Numeric)
E-mail
Phone
Postal Address
Multiline Text
Time
Date
Number
Number (Signed)
Number (Decimal)
Component Tree
ConstraintLayout
imageView2
button35
button36
textView12
Pixel
25
AppTheme
Language
76%
Properties
6:00
ConstraintLayoutExamples
Singapore
DISCARD
UPLOAD
ImageView
Singapore
DISCARD
UPLOAD
Design
Text
TODO
6: Android Monitor
9: Version Control
Terminal
Event Log
Gradle Console
IllegalArgumentException: Argument for @NotNull parameter 'disposable' of com/intellij/openapi/util/Disposer.dispose must not be null (yesterday 6:14 PM)
1:18
Git: master
Context: <no context>


ConstraintLayoutExamples
app
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main
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activity_main_work.xml
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Palette
Widgets
TextView
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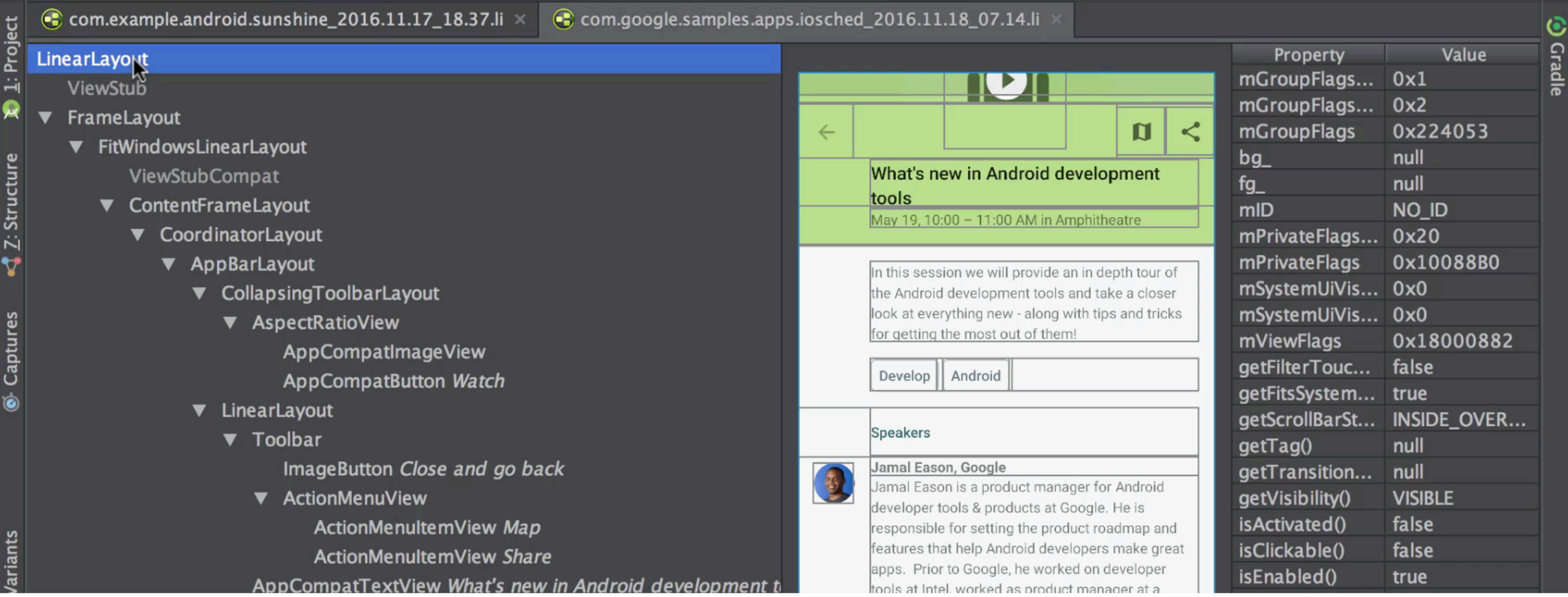
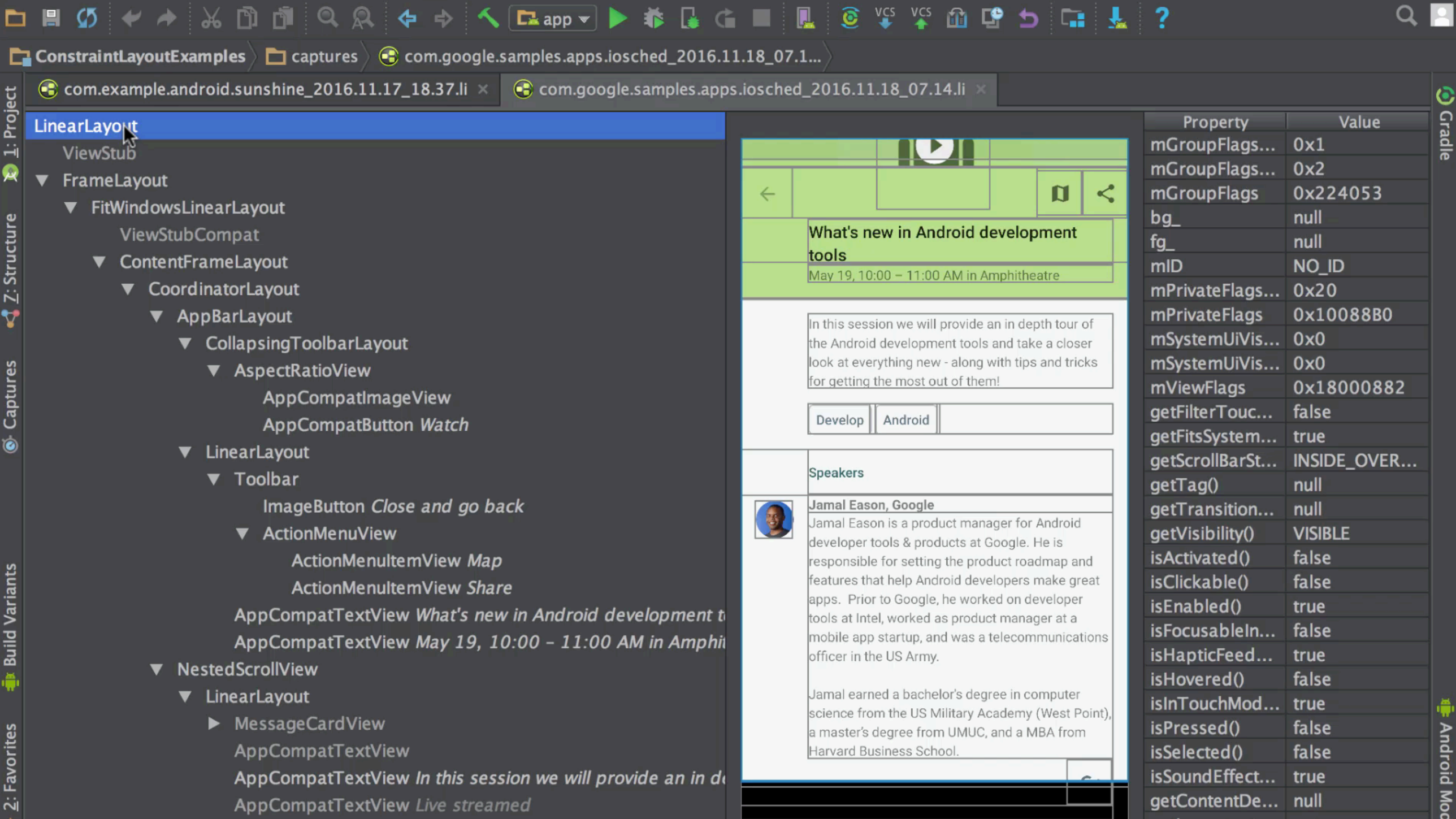
ProgressBar (Large)
ProgressBar
ProgressBar (Small)
ProgressBar (Horizont
SeekBar
SeekBar (Discrete)
QuickContactBadge
RatingBar
Switch
Space
Text Fields (EditText)
Plain Text
Password
Password (Numeric)
E-mail
Phone
Postal Address
Multiline Text
Time
Date
Number
Number (Signed)
Number (Decimal)
Component Tree
ConstraintLayout
imageView2
button35
button36
textView12
editText
editText2
textView13
textView15
textView16
Pixel
25
AppTheme
Language
76%
Properties
6:00
ConstraintLayoutExamples
Singapore
Camera
Leica M Typ 240
Settings
ƒ/4 16s ISO 200
Singapore officially the Republic of Singapore, and often referred to as the Lion City, the Garden City, and the Red Dot, is a global city in Southeast Asia and the world's only island city-state. It lies one degree (137 km) north of the equator, at the southernmost tip of continental Asia and peninsular Malaysia, with Indonesia's Riau Islands to the south. Singapore's territory consists of the diamond-shaped main island and 62 islets.
DISCARD
UPLOAD
ImageView
Singapore
Camera
Name
Settings
ƒ/4 16s ISO 200
Singapore officially the Republic of Singapore, and often referred to as the Lion City, the Garden City, and the Red Dot, is a global city in Southeast Asia and the world's only island city-state. It lies one degree (137 km) north of the equator, at the southernmost tip of continental Asia and peninsular Malaysia, with Indonesia's Riau Islands to the south. Singapore's territory consists of the diamond-shaped main island and 62 islets.
DISCARD
UPLOAD
Design
Text
TODO
6: Android Monitor
9: Version Control
Terminal
Event Log
Gradle Console
IllegalArgumentException: Argument for @NotNull parameter 'disposable' of com/intellij/openapi/util/Disposer.dispose must not be null (yesterday 6:14 PM)
1:30
Git: master
Context: <no context>



Layout Inspector


ConstraintLayoutExamples
captures
com.google.samples.apps.iosched_2016.11.18_07.1...
com.example.android.sunshine_2016.11.17_18.37.li
com.google.samples.apps.iosched_2016.11.18_07.14.li
LinearLayout
ViewStub
FrameLayout
FitWindowsLinearLayout
ViewStubCompat
ContentFrameLayout
CoordinatorLayout
AppBarLayout
CollapsingToolbarLayout
AspectRatioView
AppCompatImageView
AppCompatButton Watch
LinearLayout
Toolbar
ImageButton Close and go back
ActionMenuView
ActionMenuItemView Map
ActionMenuItemView Share
AppCompatTextView What's new in Android development t
AppCompatTextView May 19, 10:00 – 11:00 AM in Amphi
NestedScrollView
LinearLayout
MessageCardView
AppCompatTextView
AppCompatTextView In this session we will provide an in d
AppCompatTextView Live streamed
What's new in Android development tools
May 19, 10:00 – 11:00 AM in Amphitheatre
In this session we will provide an in depth tour of the Android development tools and take a closer look at everything new - along with tips and tricks for getting the most out of them!
Develop
Android
Speakers
Jamal Eason, Google
Jamal Eason is a product manager for Android developer tools & products at Google. He is responsible for setting the product roadmap and features that help Android developers make great apps. Prior to Google, he worked on developer tools at Intel, worked as product manager at a mobile app startup, and was a telecommunications officer in the US Army.
Jamal earned a bachelor's degree in computer science from the US Military Academy (West Point), a master's degree from UMUC, and a MBA from Harvard Business School.
Property
Value
mGroupFlags...
0x1
mGroupFlags...
0x2
mGroupFlags
0x224053
bg_
null
fg_
null
mID
NO_ID
mPrivateFlags...
0x20
mPrivateFlags
0x10088B0
mSystemUiVis...
0x0
mSystemUiVis...
0x0
mViewFlags
0x18000882
getFilterTouc...
false
getFitsSystem...
true
getScrollBarSt...
INSIDE_OVER...
getTag()
null
getTransition...
null
getVisibility()
VISIBLE
isActivated()
false
isClickable()
false
isEnabled()
true
isFocusableIn...
false
isHapticFeed...
true
isHovered()
false
isInTouchMod...
true
isPressed()
false
isSelected()
false
isSoundEffect...
true
getContentDe...
null

Design

Develop

Build

Test

Firebase

Easy Access to Firebase Resources

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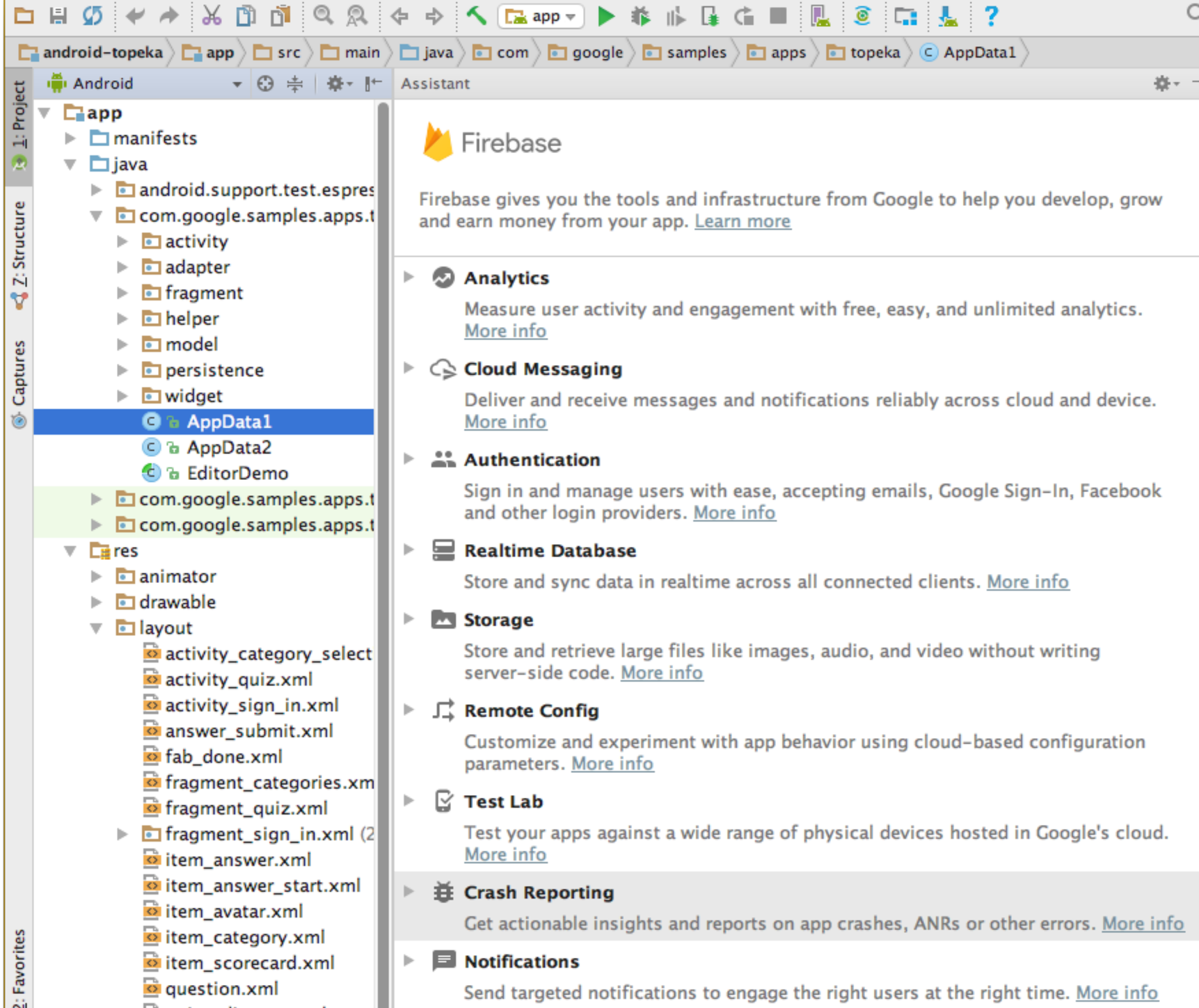
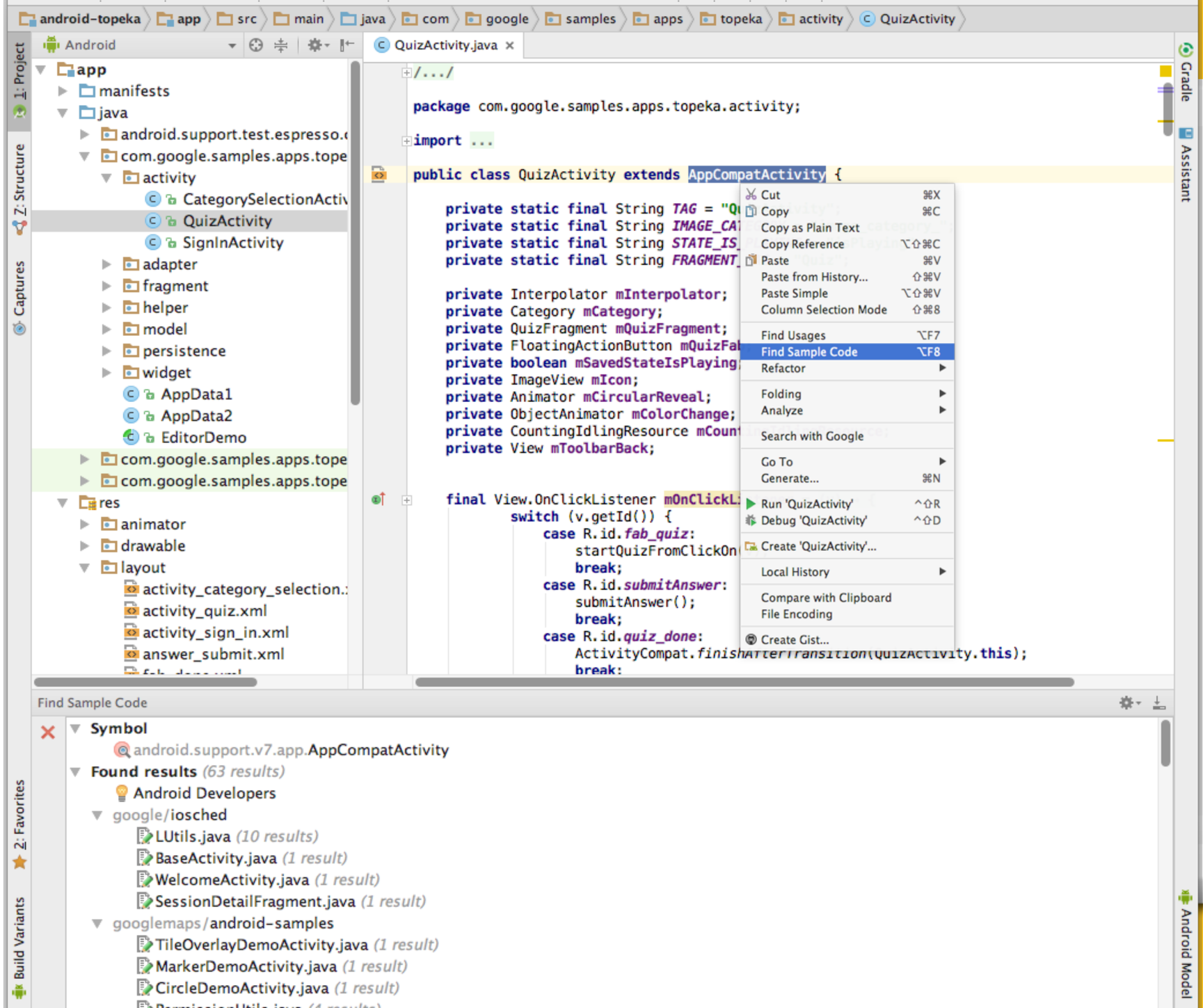


Sample Browser

Quick search for
relevant sample code



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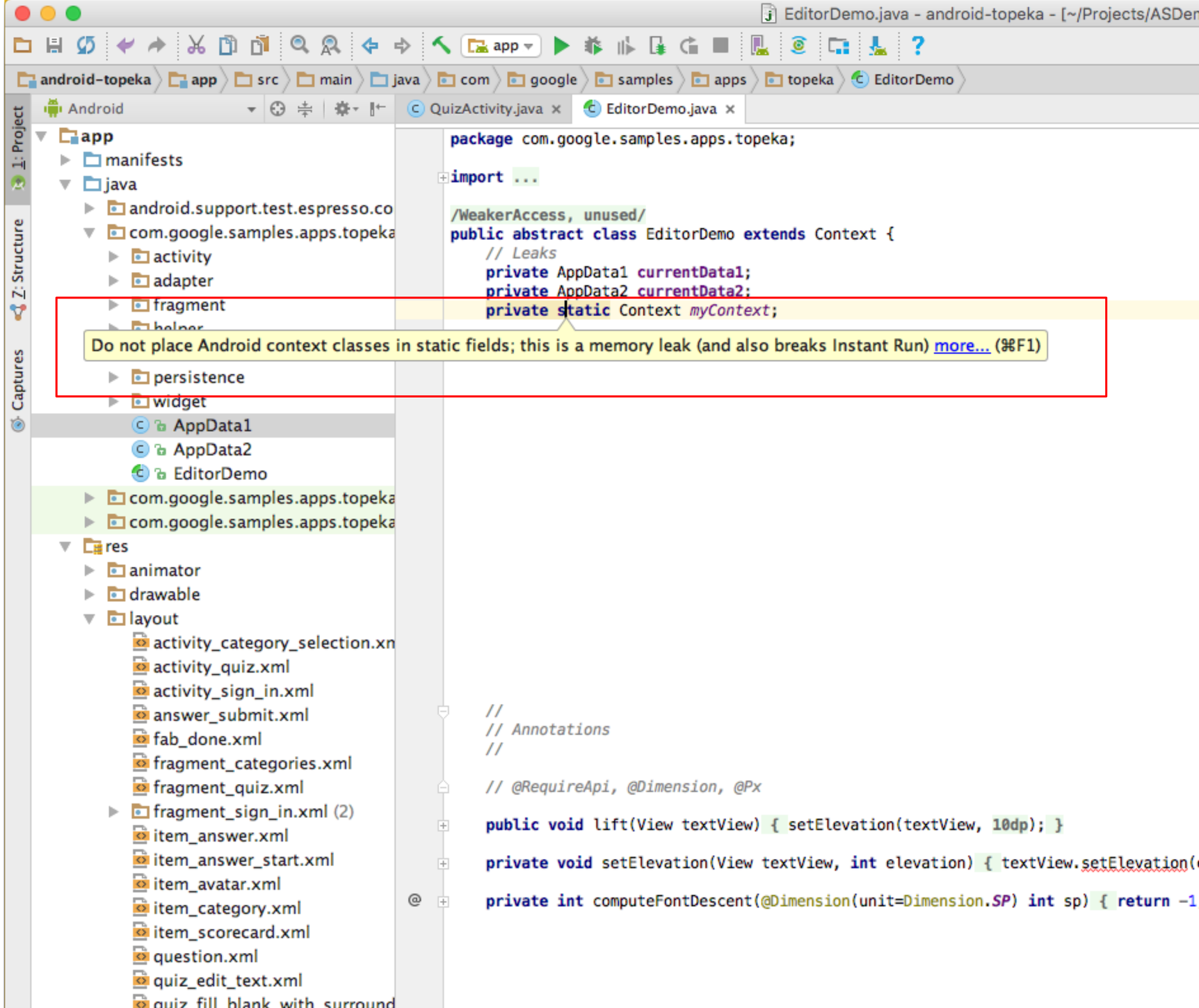
Enhanced Code Analysis

New code quality checks



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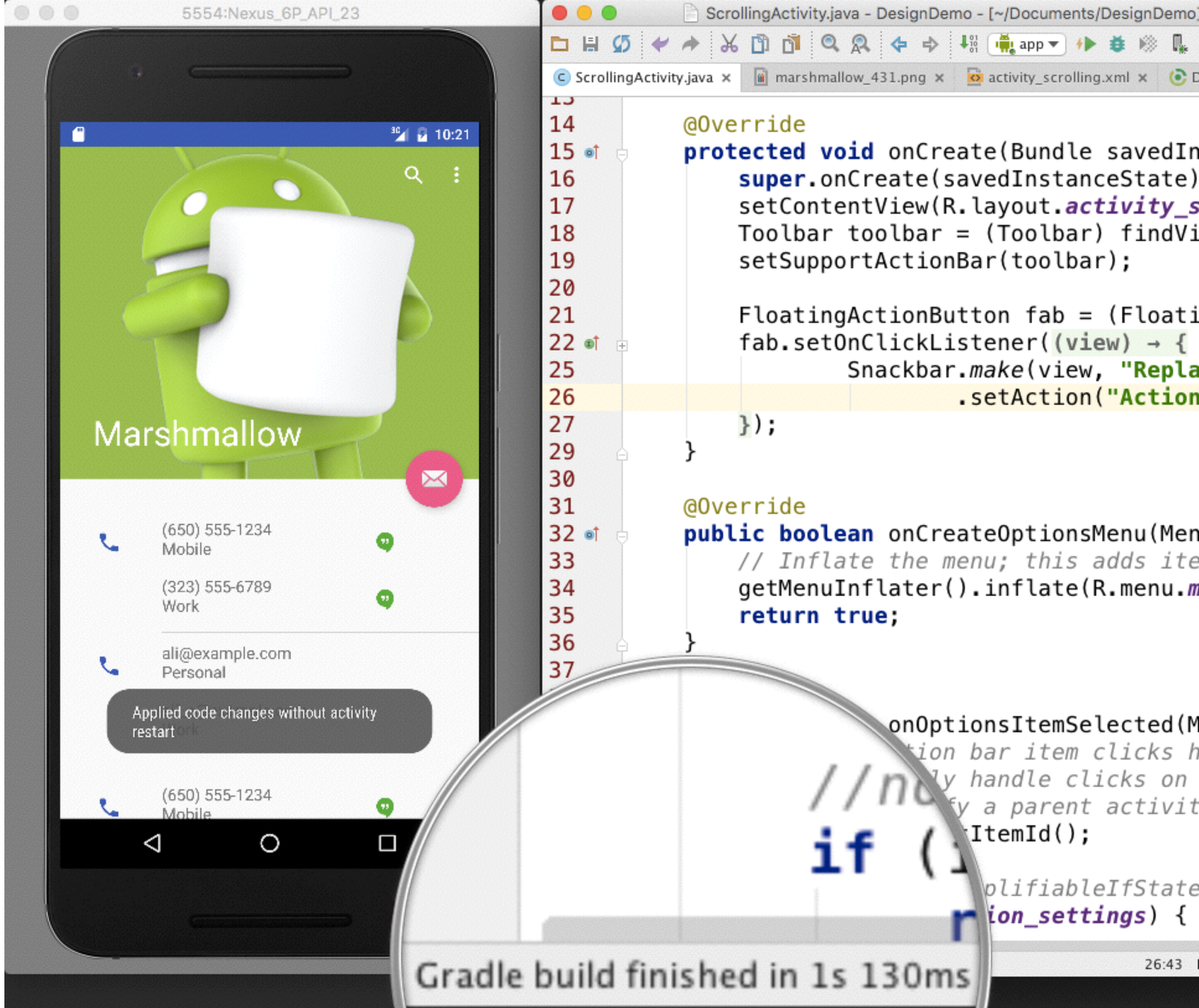
Design Develop **Build** Test

Instant Run



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Hot Swap

Warm Swap

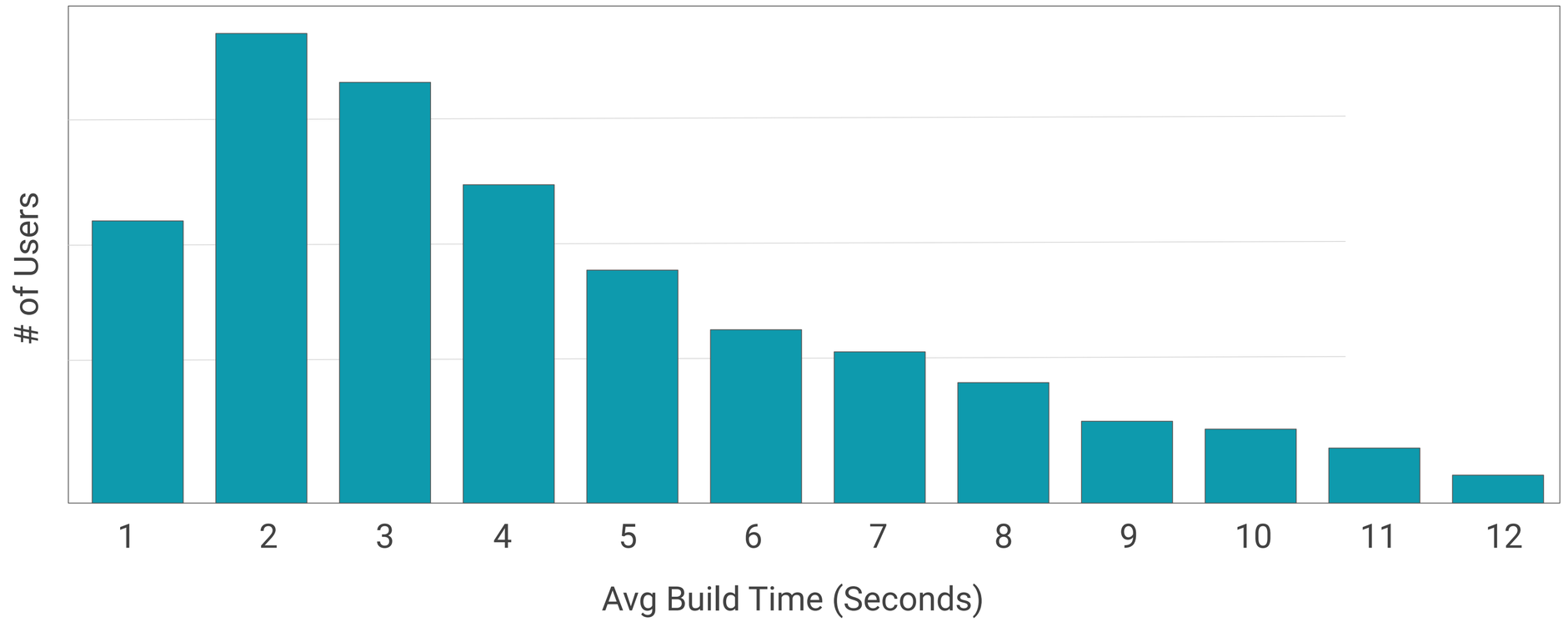
Cold Swap

Instant Run: Benchmark

Version Build Type	Mean (seconds)	StdDev	Delta
2.0 Instant Run Disabled	45.02	0.78	n/a
2.1 Cold Swap	9.46	0.56	**4.7X** faster
2.1 Hot Swap	4.20	0.70	**10.7X** faster

@Github: wikimedia/apps-android-wikipedia

Instant Run: Average Build Time per User



Android Studio opted-in user IDE instrumentation, May 2016

Instant Run

Build

Speed

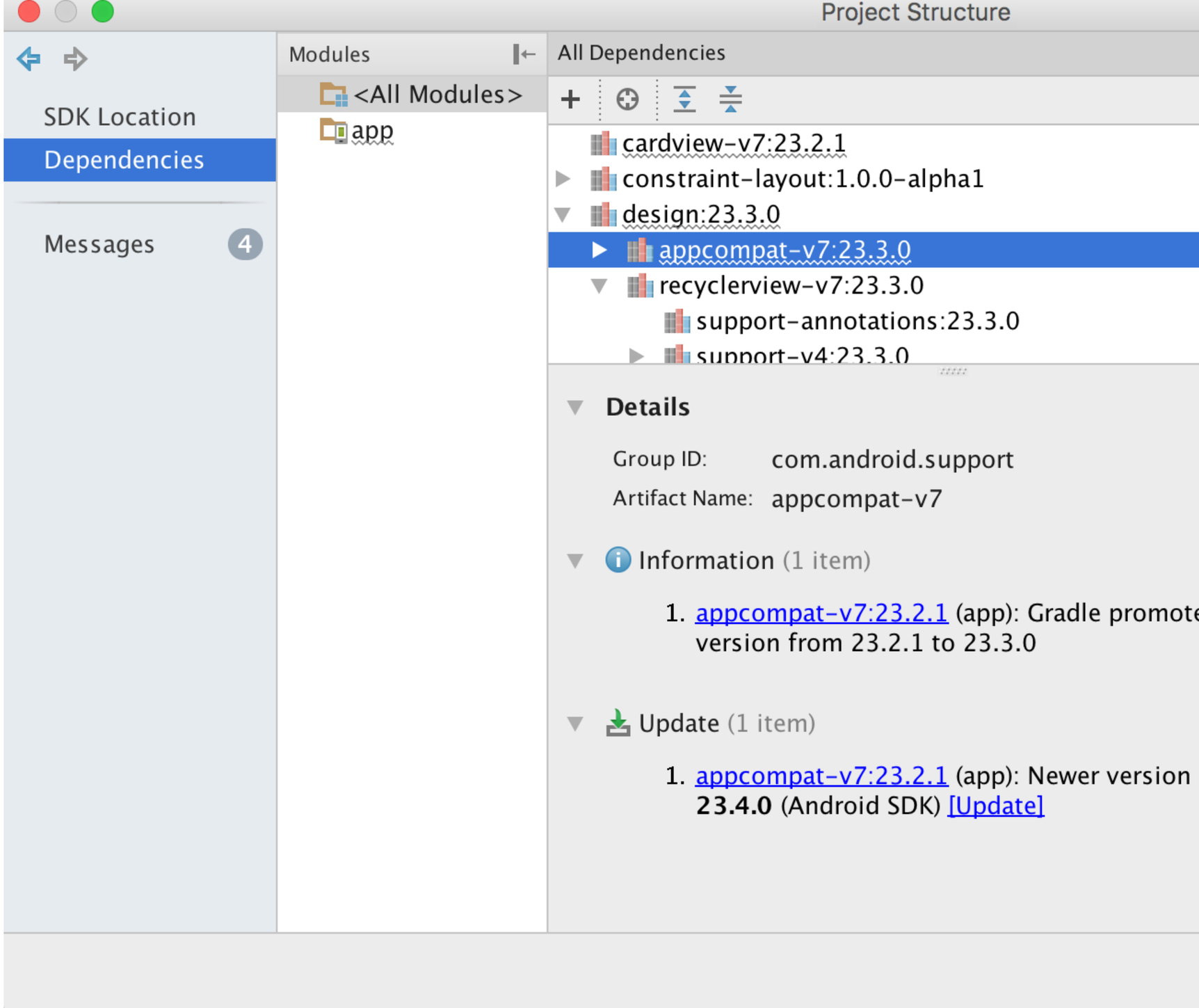
Enhancements

New AAPT

Split APK

Google Developer Day

Project Structure Dialog



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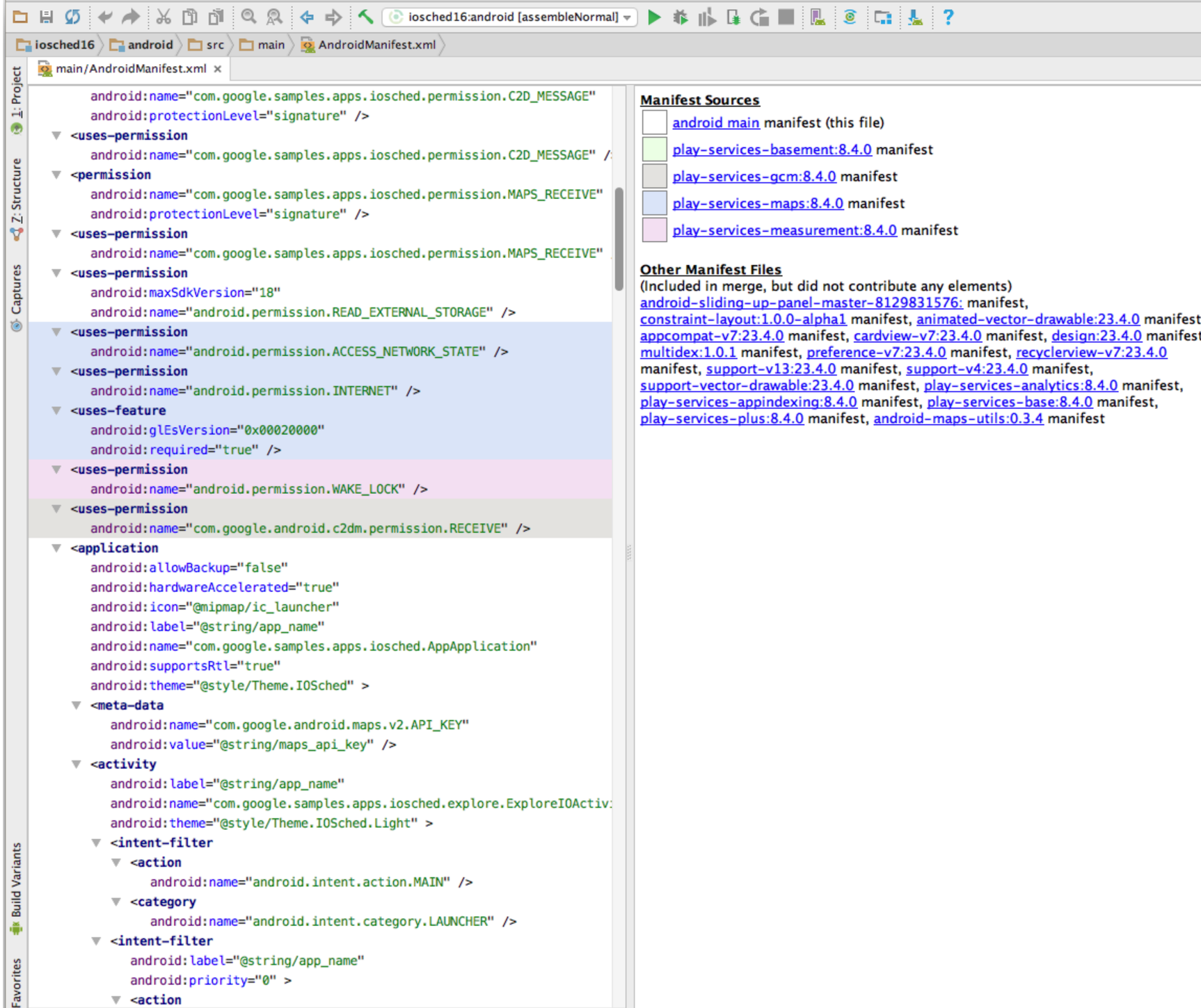
Merged Manifest Viewer



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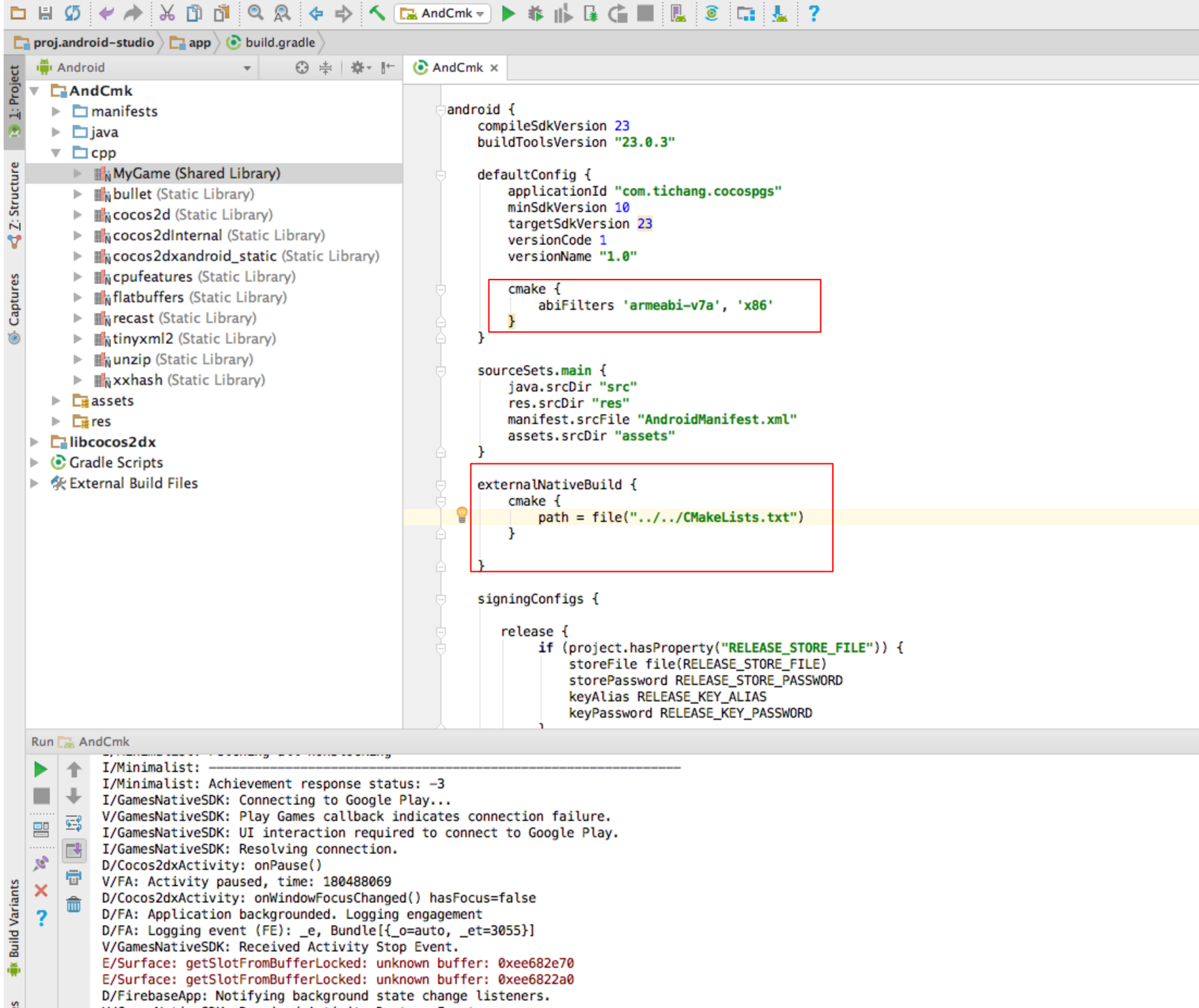
C++ Support

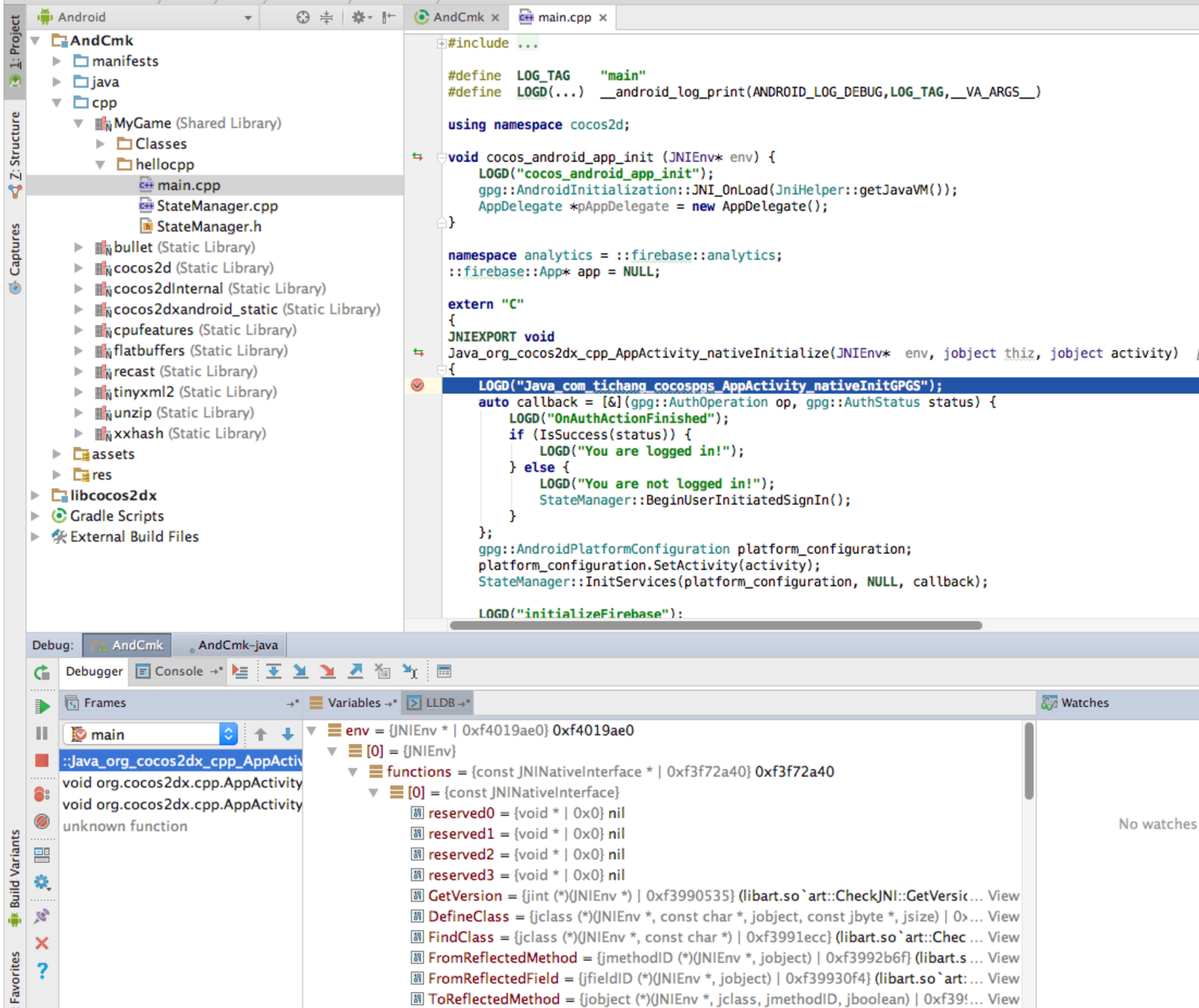
ndk-build

CMake



C++ Support

Native Debugging



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Design Develop Build Test

Android Emulator

Faster than Device

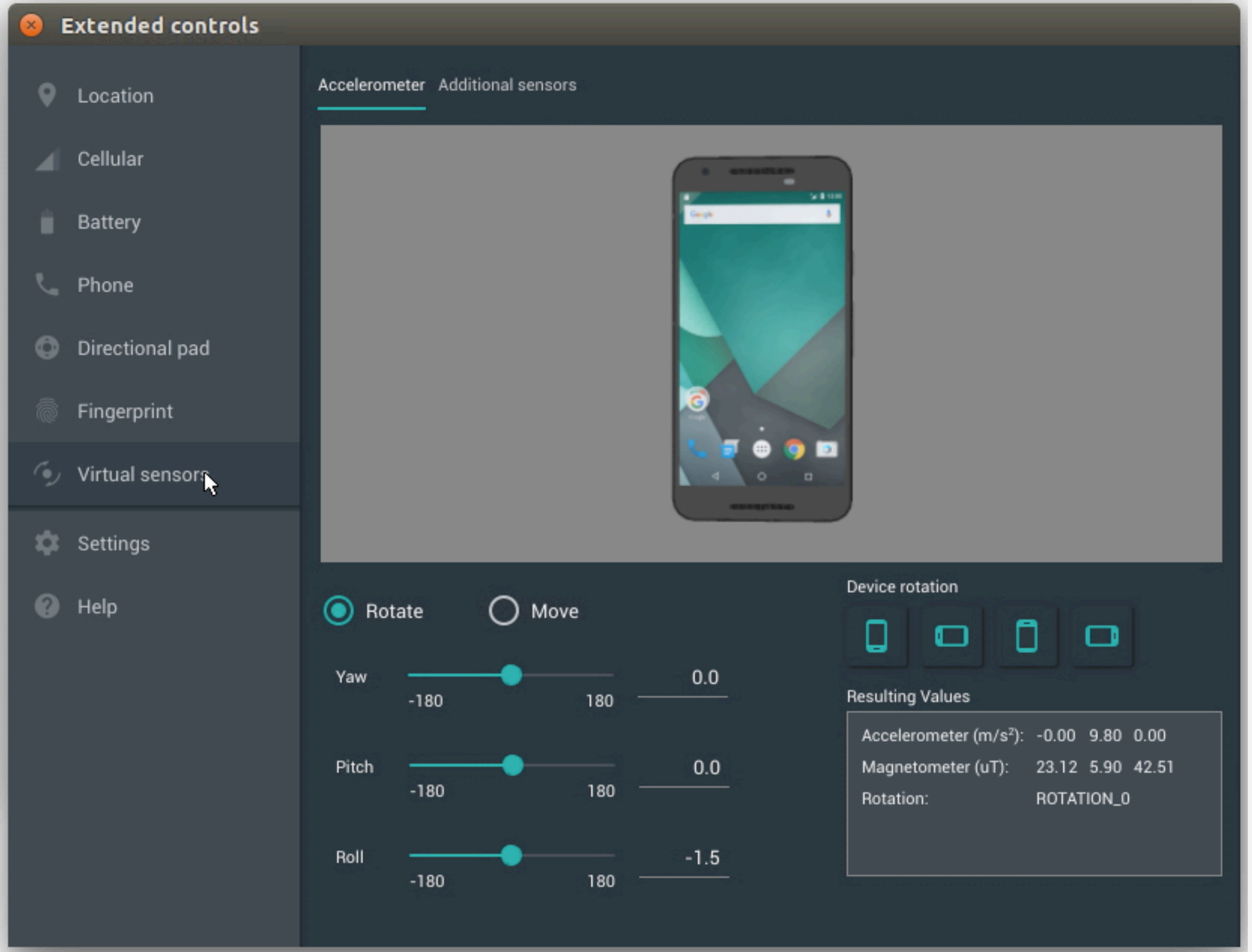
10x fast ADB

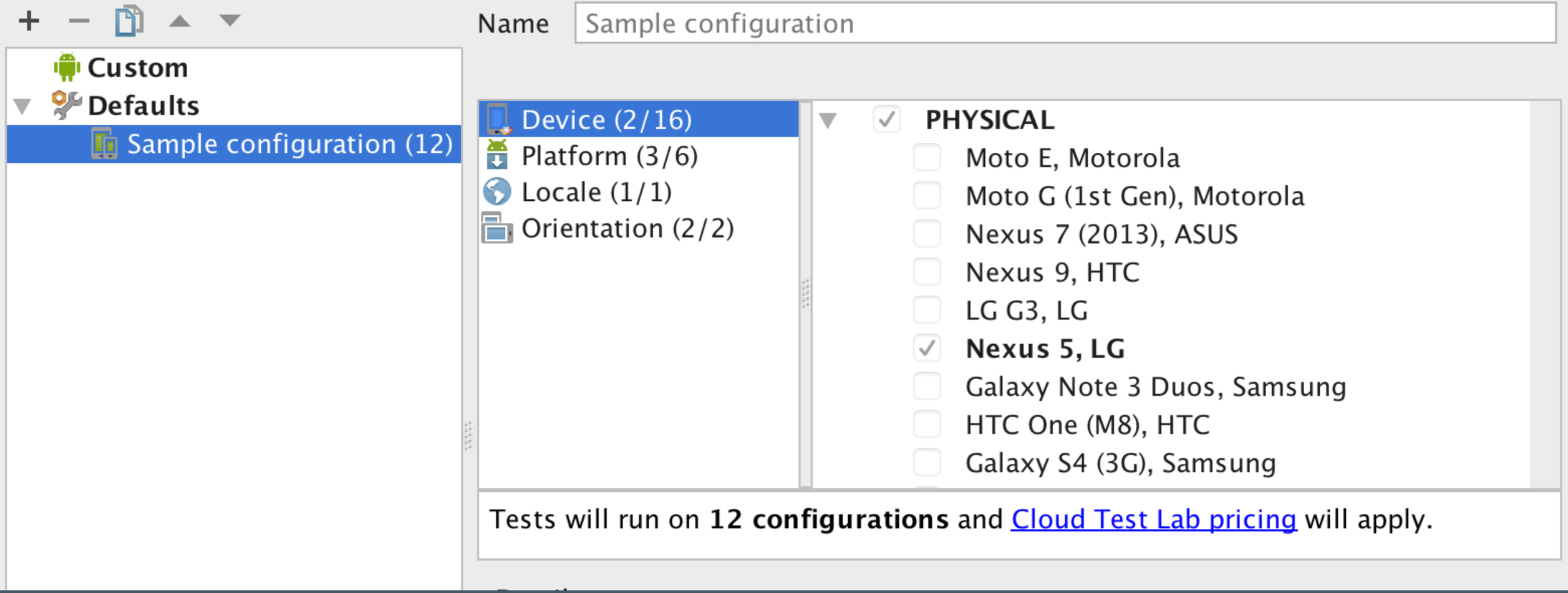
Sensor Control

New UI

Google Developer Day

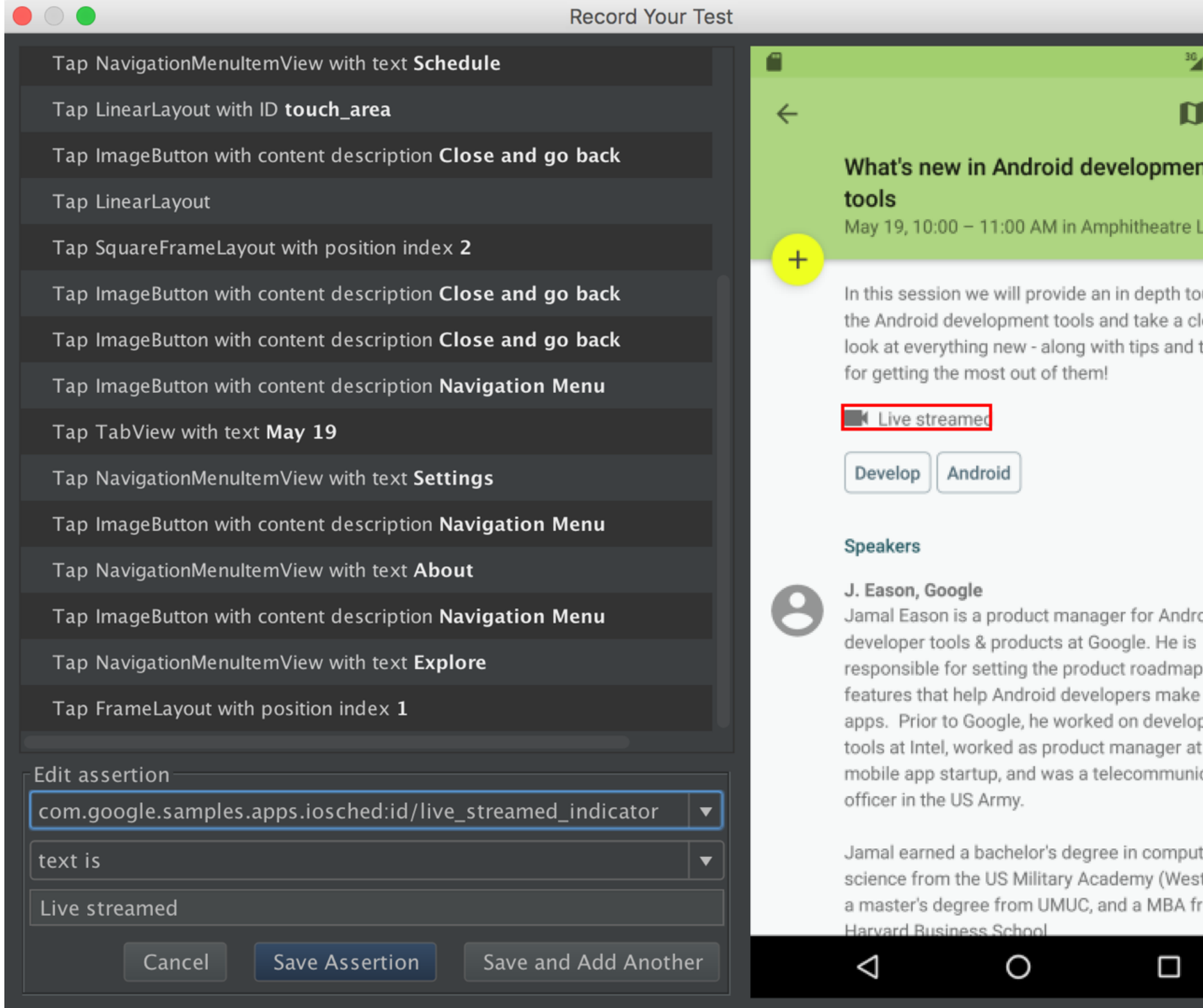
Android Emulator - Nexus_4_API_24_2:5554


Extended controls
Location
Cellular
Battery
Phone
Directional pad
Fingerprint
Virtual sensors
Settings
Help
Accelerometer
Additional sensors
Rotate
Move
Yaw
-180
180
0.0
Pitch
-180
180
0.0
Roll
-180
180
-1.5
Device rotation
Resulting Values
Accelerometer (m/s²): -0.00 9.80 0.00
Magnetometer (uT): 23.12 5.90 42.51
Rotation: ROTATION_0



Firebase Test Lab

Espresso Test Recorder



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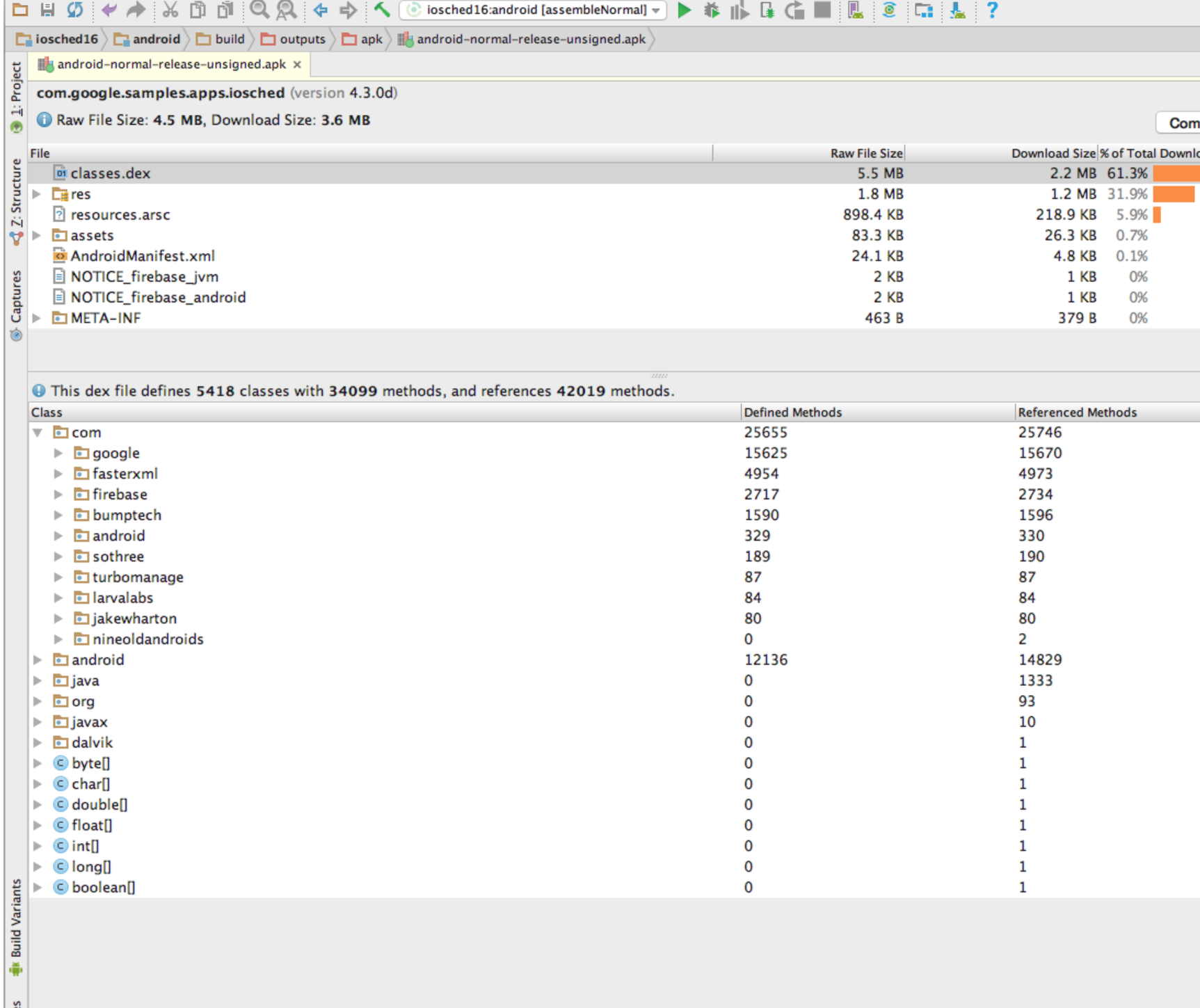
APK Analyzer

Method counts

Ref. counts



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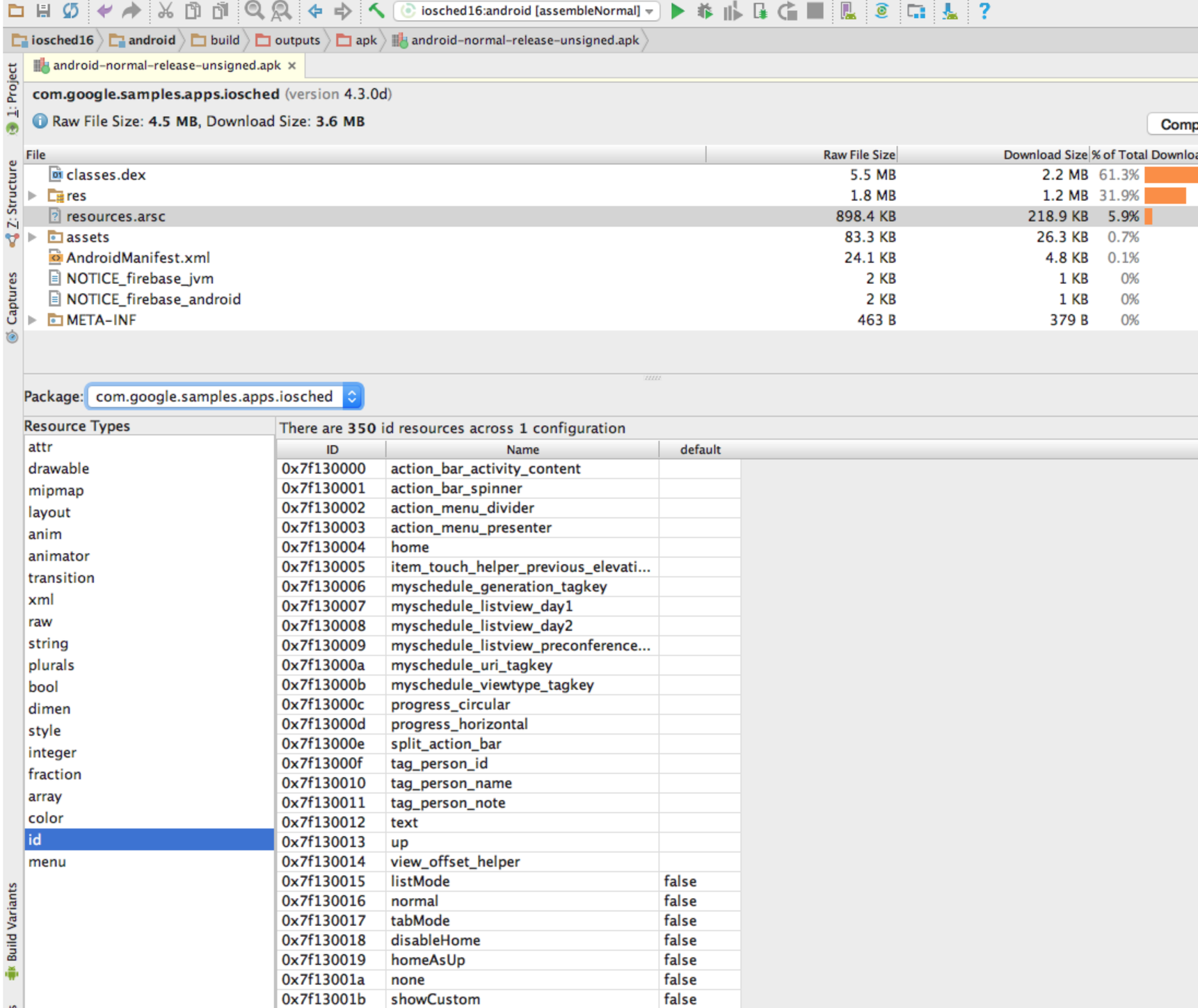
APK Analyzer

Resource Lookup



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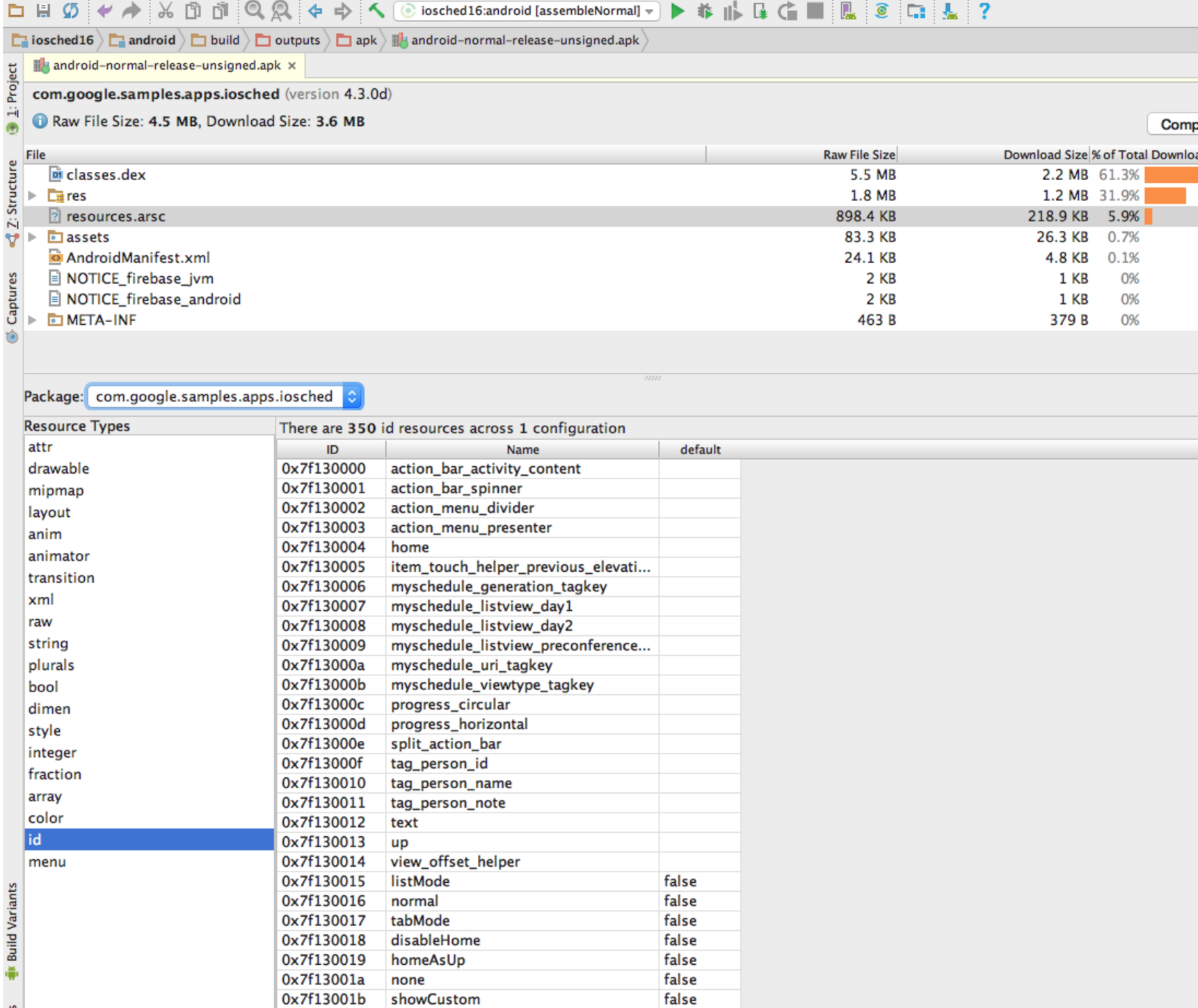
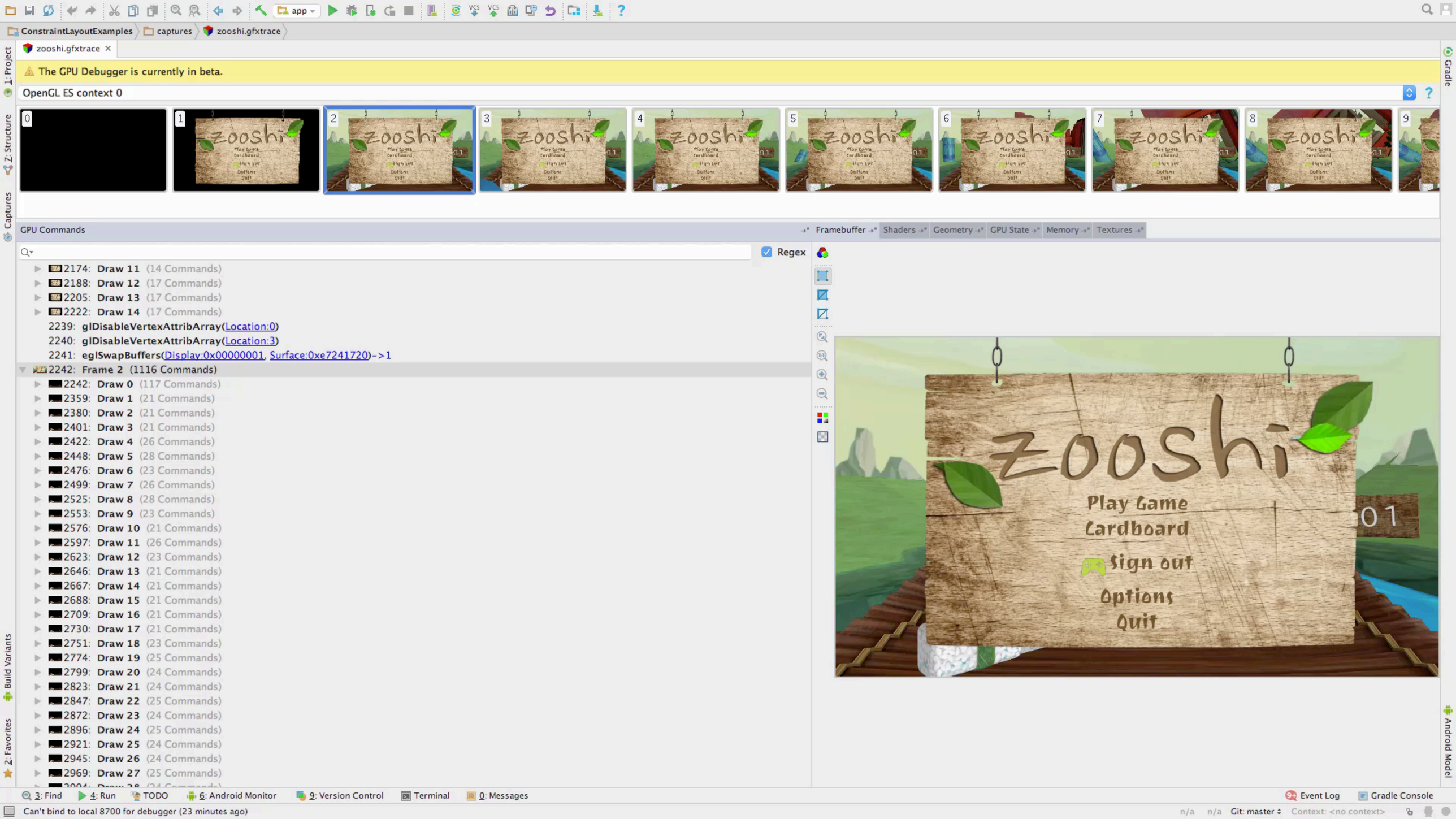
GPU Debugger

Troubleshooting 3D Graphics



Google Developer Day


ConstraintLayoutExamples
captures
zooshi.gfxtrace
zooshi.gfxtrace
The GPU Debugger is currently in beta.
OpenGL ES context 0
GPU Commands
Framebuffer
Shaders
Geometry
GPU State
Memory
Textures
Regex
2174: Draw 11 (14 Commands)
2188: Draw 12 (17 Commands)
2205: Draw 13 (17 Commands)
2222: Draw 14 (17 Commands)
2239: glDisableVertexAttribArray(Location:0)
2240: glDisableVertexAttribArray(Location:3)
2241: eglSwapBuffers(Display:0x00000001, Surface:0xe7241720)->1
2242: Frame 2 (1116 Commands)
2242: Draw 0 (117 Commands)
2359: Draw 1 (21 Commands)
2380: Draw 2 (21 Commands)
2401: Draw 3 (21 Commands)
2422: Draw 4 (26 Commands)
2448: Draw 5 (28 Commands)
2476: Draw 6 (23 Commands)
2499: Draw 7 (26 Commands)
2525: Draw 8 (28 Commands)
2553: Draw 9 (23 Commands)
2576: Draw 10 (21 Commands)
2597: Draw 11 (26 Commands)
2623: Draw 12 (23 Commands)
2646: Draw 13 (21 Commands)
2667: Draw 14 (21 Commands)
2688: Draw 15 (21 Commands)
2709: Draw 16 (21 Commands)
2730: Draw 17 (21 Commands)
2751: Draw 18 (23 Commands)
2774: Draw 19 (25 Commands)
2799: Draw 20 (24 Commands)
2823: Draw 21 (24 Commands)
2847: Draw 22 (25 Commands)
2872: Draw 23 (24 Commands)
2896: Draw 24 (25 Commands)
2921: Draw 25 (24 Commands)
2945: Draw 26 (24 Commands)
2969: Draw 27 (25 Commands)
Play Game
Cardboard
Sign out
Options
Quit
3: Find
4: Run
TODO
6: Android Monitor
9: Version Control
Terminal
0: Messages
Event Log
Gradle Console
Can't bind to local 8700 for debugger (23 minutes ago)
Git: master

Design

Layout Editor
Constraint Layout
Layout Inspector

Develop

Firebase
Sample Search
Enhanced Lint Analysis
IntelliJ 2016.1
Accessibility

Build

Instant Run
Project Structure
Jack Compiler
C++: NDK & CMake Build

Test

Android Emulator
Firebase Test Lab
Espresso Test Recorder
APK Analyzer

Android Studio 2.2

Android Studio 2.3

Android Studio 2.3

IntelliJ Idea 2016.2

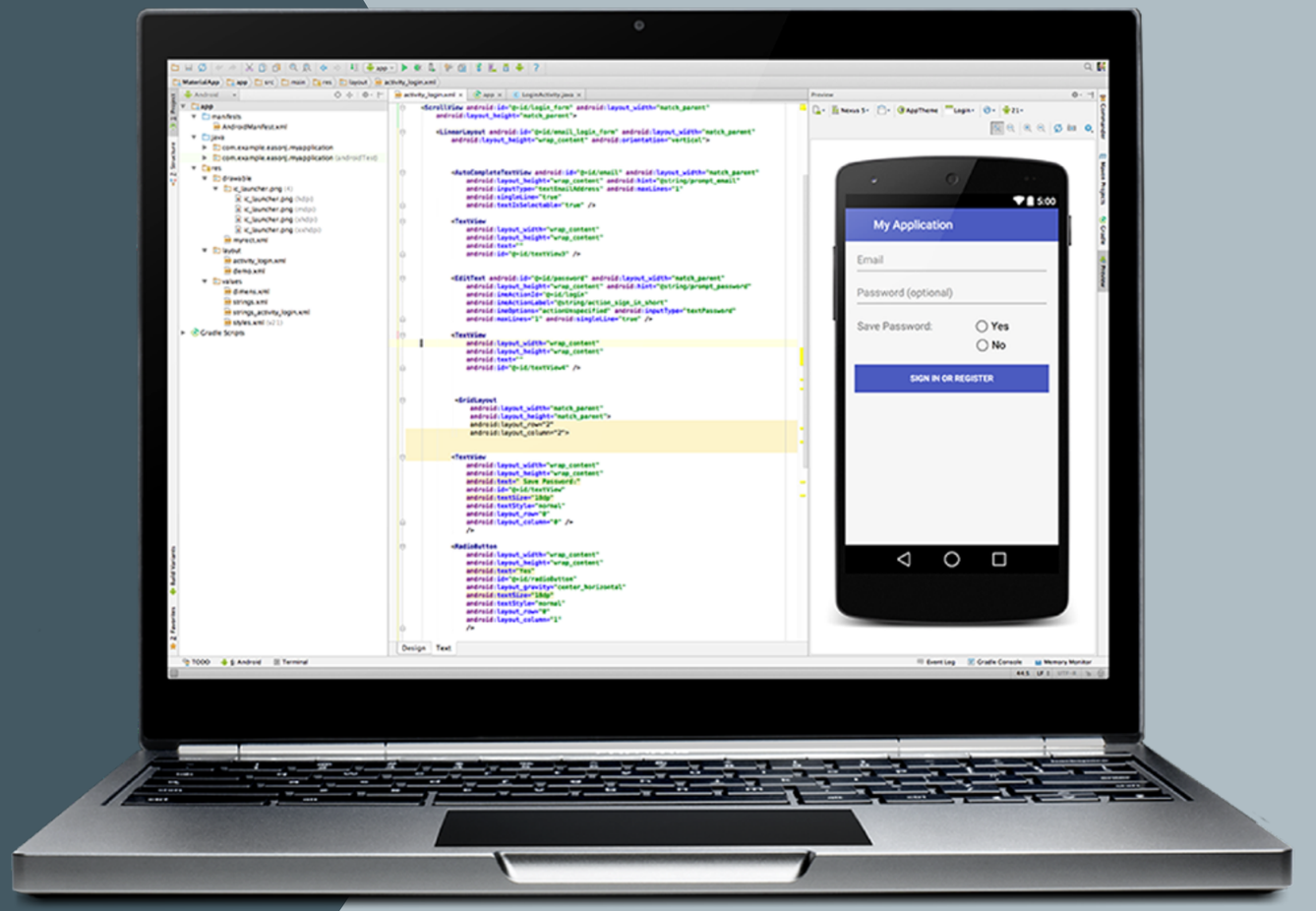
Constraint Layout: Chains and Ratios support

New Lint checks + baseline support

PNG to WebP converter

Data Binding generated code debugging

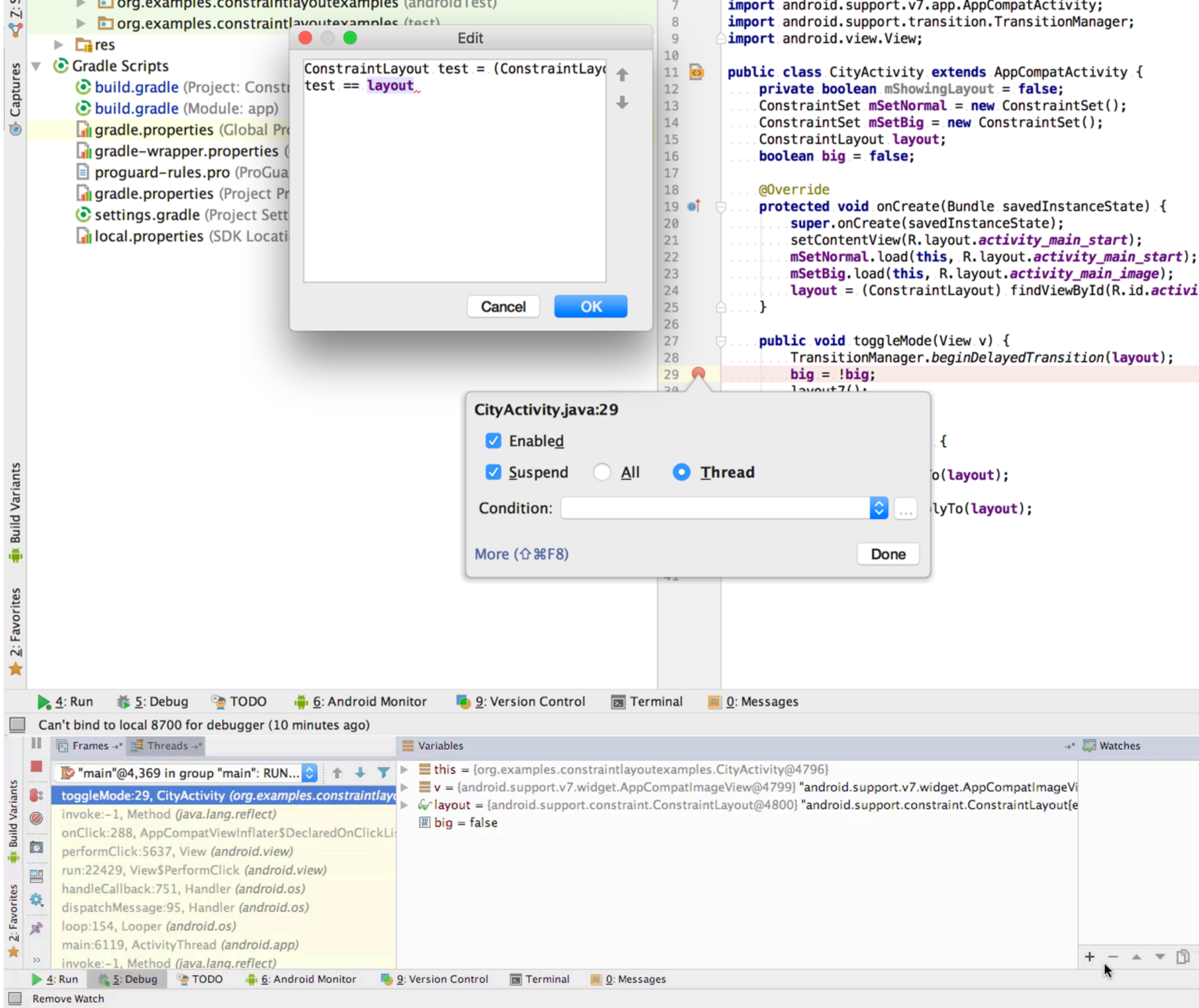
Incremental SDK Updates

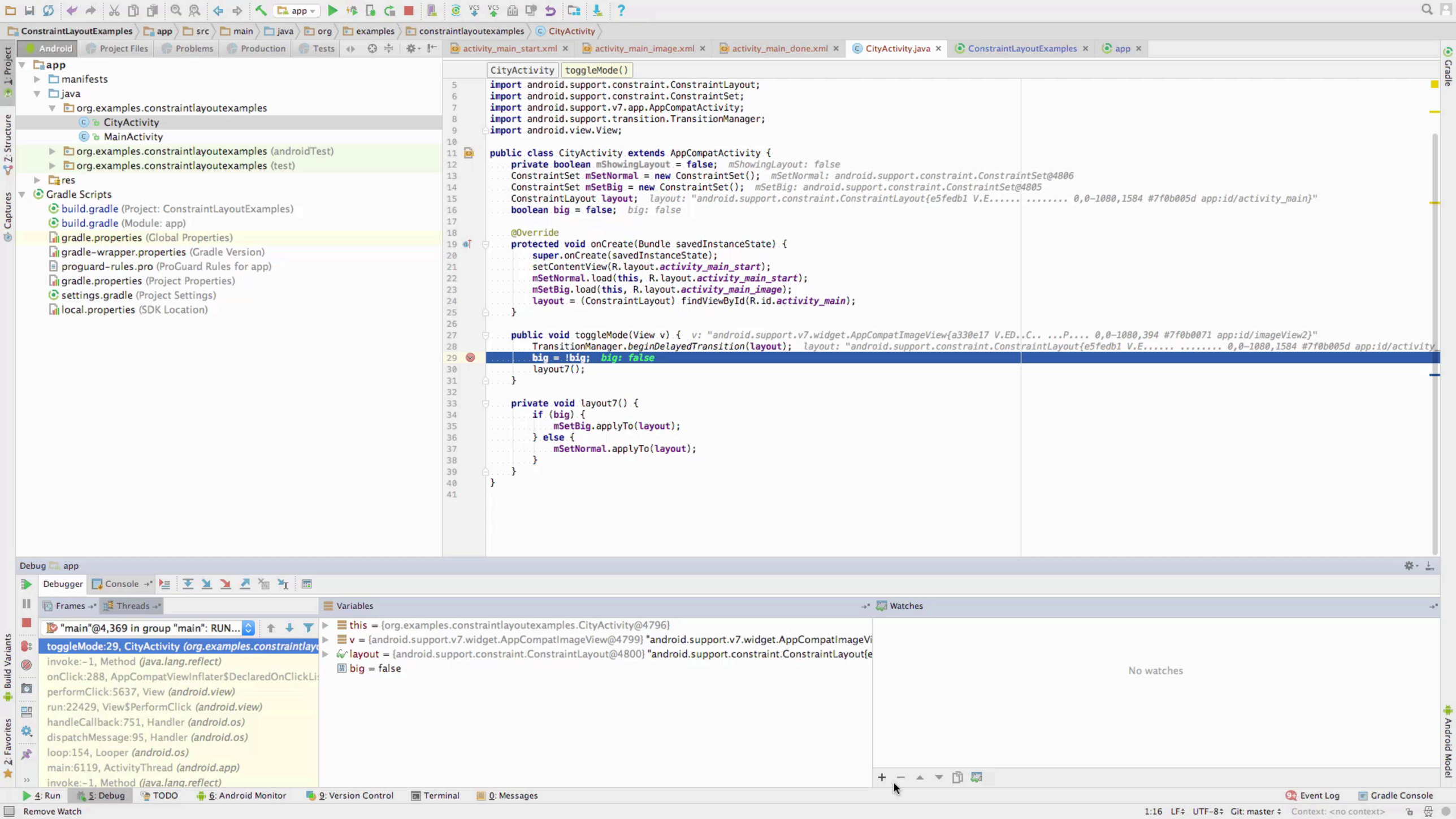


IntelliJ Idea 2016.2

- Background Images
- Font Ligatures
- Improved Version Control Log View
- Multiline Breakpoint Expressions
- Merged Watch/Variables
- And more!

Google Developer Day

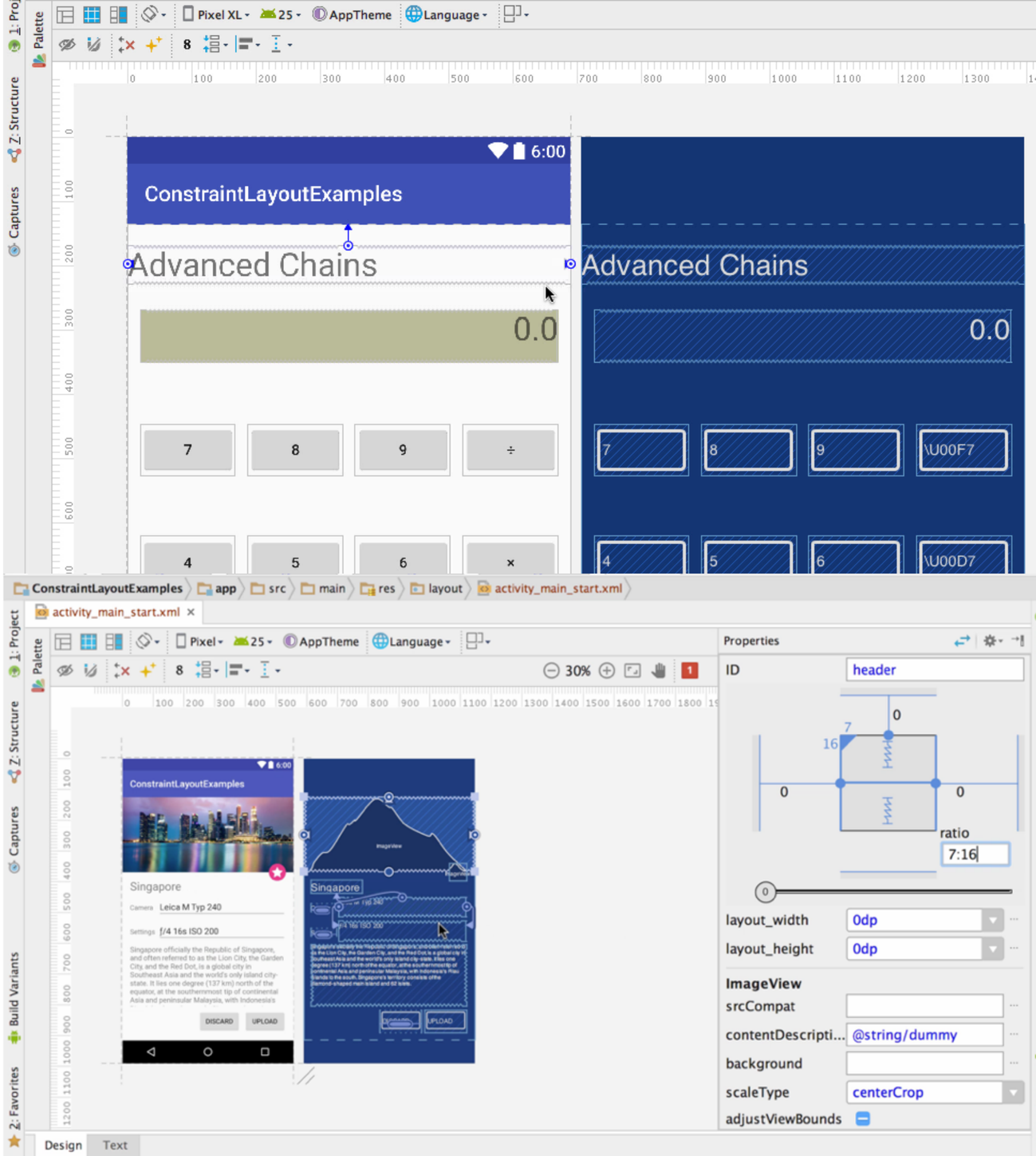


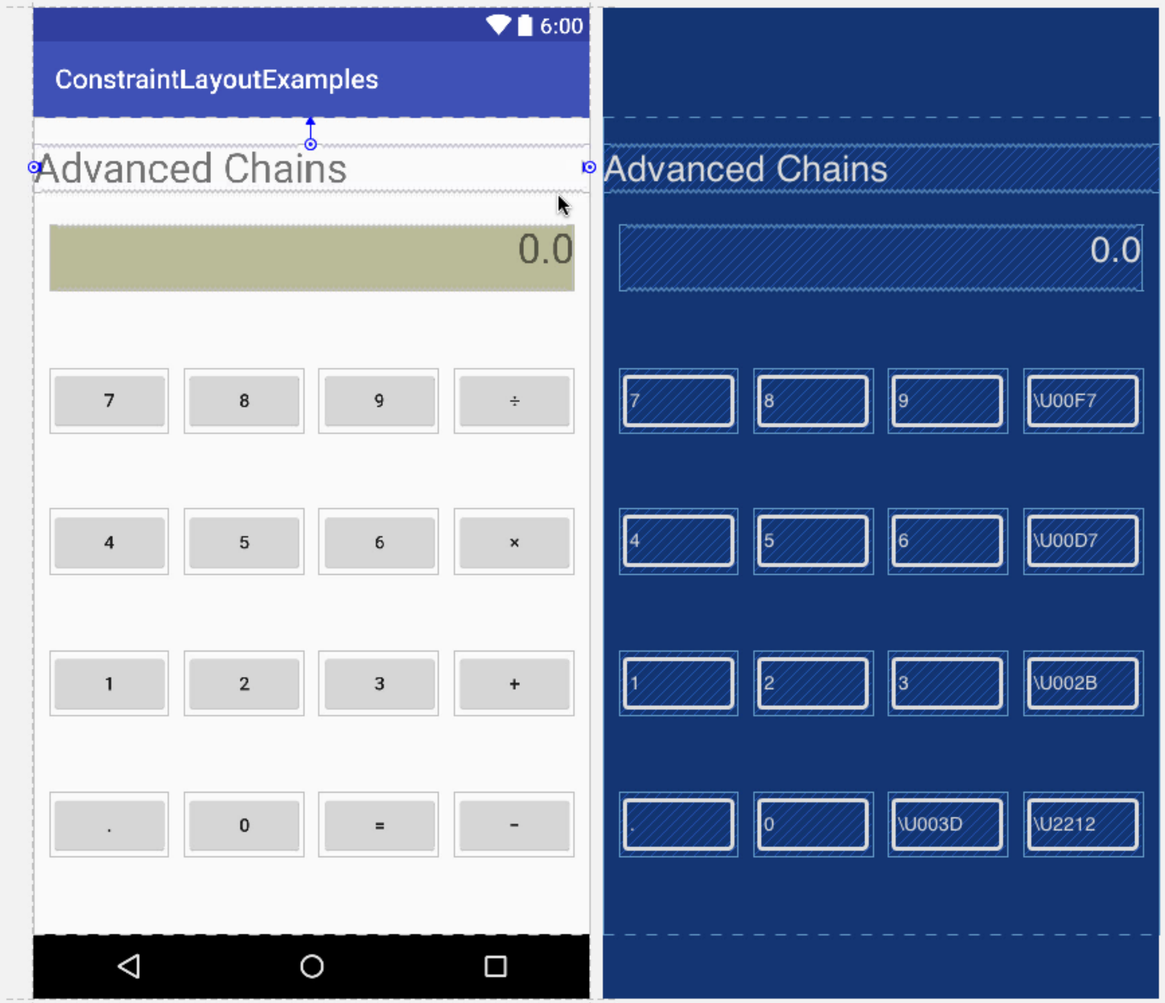

ConstraintLayoutExamples
app
src
main
java
org
examples
constraintlayoutexamples
CityActivity
Android
Project Files
Problems
Production
Tests
activity_main_start.xml
activity_main_image.xml
activity_main_done.xml
CityActivity.java
ConstraintLayoutExamples
app
CityActivity
toggleMode()
app
manifests
java
org.examples.constraintlayoutexamples
CityActivity
MainActivity
org.examples.constraintlayoutexamples (androidTest)
org.examples.constraintlayoutexamples (test)
res
Gradle Scripts
build.gradle (Project: ConstraintLayoutExamples)
build.gradle (Module: app)
gradle.properties (Global Properties)
gradle-wrapper.properties (Gradle Version)
proguard-rules.pro (ProGuard Rules for app)
gradle.properties (Project Properties)
settings.gradle (Project Settings)
local.properties (SDK Location)
import android.support.constraint.ConstraintLayout;
import android.support.constraint.ConstraintSet;
import android.support.v7.app.AppCompatActivity;
import android.support.transition.TransitionManager;
import android.view.View;
public class CityActivity extends AppCompatActivity {
private boolean mShowingLayout = false; mShowingLayout: false
ConstraintSet mSetNormal = new ConstraintSet(); mSetNormal: android.support.constraint.ConstraintSet@4806
ConstraintSet mSetBig = new ConstraintSet(); mSetBig: android.support.constraint.ConstraintSet@4805
ConstraintLayout layout; layout: "android.support.constraint.ConstraintLayout{e5fedb1 V.E..... ..... 0,0-1080,1584 #7f0b005d app:id/activity_main}"
boolean big = false; big: false
@Override
protected void onCreate(Bundle savedInstanceState) {
super.onCreate(savedInstanceState);
setContentView(R.layout.activity_main_start);
mSetNormal.load(this, R.layout.activity_main_start);
mSetBig.load(this, R.layout.activity_main_image);
layout = (ConstraintLayout) findViewById(R.id.activity_main);
}
public void toggleMode(View v) { v: "android.support.v7.widget.AppCompatImageView{a330e17 V.ED..C.. ...P.... 0,0-1080,394 #7f0b0071 app:id/imageView2}"
TransitionManager.beginDelayedTransition(layout); layout: "android.support.constraint.ConstraintLayout{e5fedb1 V.E..... ..... 0,0-1080,1584 #7f0b005d app:id/activity
big = !big; big: false
layout7();
}
private void layout7() {
if (big) {
mSetBig.applyTo(layout);
} else {
mSetNormal.applyTo(layout);
}
}
}
Debug app
Debugger
Console
Frames
Threads
Variables
Watches
"main"@4,369 in group "main": RUN...
toggleMode:29, CityActivity (org.examples.constraintlay
invoke:-1, Method (java.lang.reflect)
onClick:288, AppCompatViewInflater$DeclaredOnClickLi
performClick:5637, View (android.view)
run:22429, View$PerformClick (android.view)
handleCallback:751, Handler (android.os)
dispatchMessage:95, Handler (android.os)
loop:154, Looper (android.os)
main:6119, ActivityThread (android.app)
invoke:-1, Method (java.lang.reflect)
this = {org.examples.constraintlayoutexamples.CityActivity@4796}
v = {android.support.v7.widget.AppCompatImageView@4799} "android.support.v7.widget.AppCompatImageVi
layout = {android.support.constraint.ConstraintLayout@4800} "android.support.constraint.ConstraintLayout{e
big = false
No watches
4: Run
5: Debug
TODO
6: Android Monitor
9: Version Control
Terminal
0: Messages
Event Log
Gradle Console
Remove Watch
1:16
LF
UTF-8
Git: master
Context: <no context>

Constraint Layout

Chains and Ratios Support

Google Developer Day




6:00
ConstraintLayoutExamples
Advanced Chains
0.0
7
8
9
÷
4
5
6
×
1
2
3
+
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0
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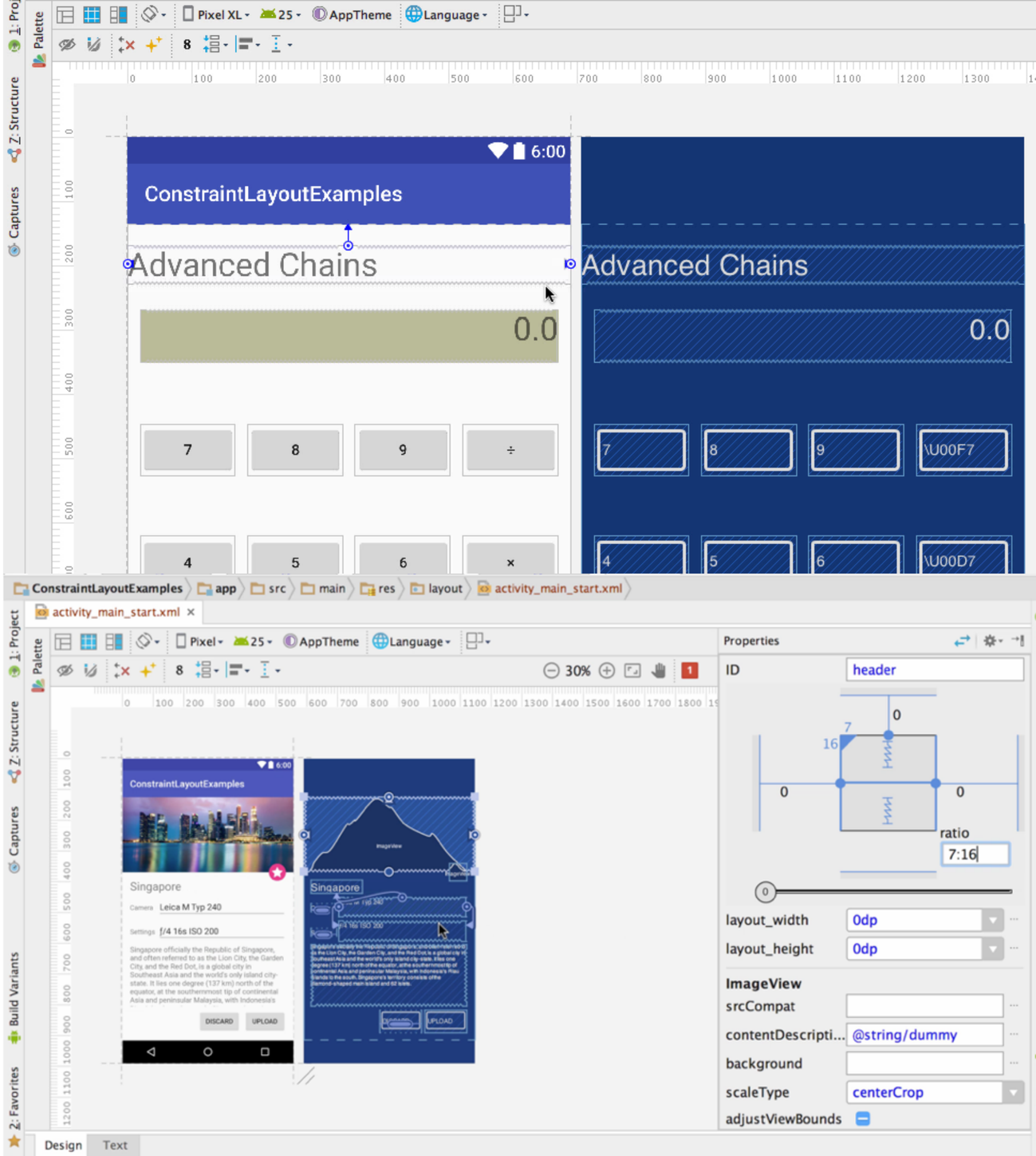
-
Advanced Chains
0.0
7
8
9
\U00F7
4
5
6
\U00D7
1
2
3
\U002B
.
0
\U003D
\U2212

Constraint Layout

Chains and Ratios Support

Google Developer Day



ConstraintLayoutExamples > app > src > main > res > layout > activity_main_start.xml

activity_main_start.xml

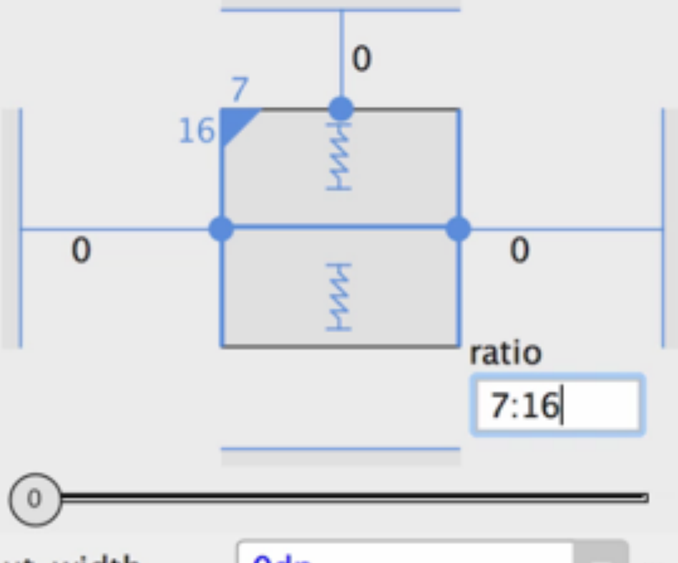
Palette

Pixel 25 AppTheme Language

30%

Properties

ID header



layout_width 0dp

layout_height 0dp

ImageView

srcCompat

contentDescripti... @string/dummy

background

scaleType centerCrop

adjustViewBounds

Design Text

1: Project 7: Structure Captures Build Variants 2: Favorites

Lint

Baseline Support

```
android {
    lintOptions {
        baseline file("lint-baseline.xml")
    }
}
```

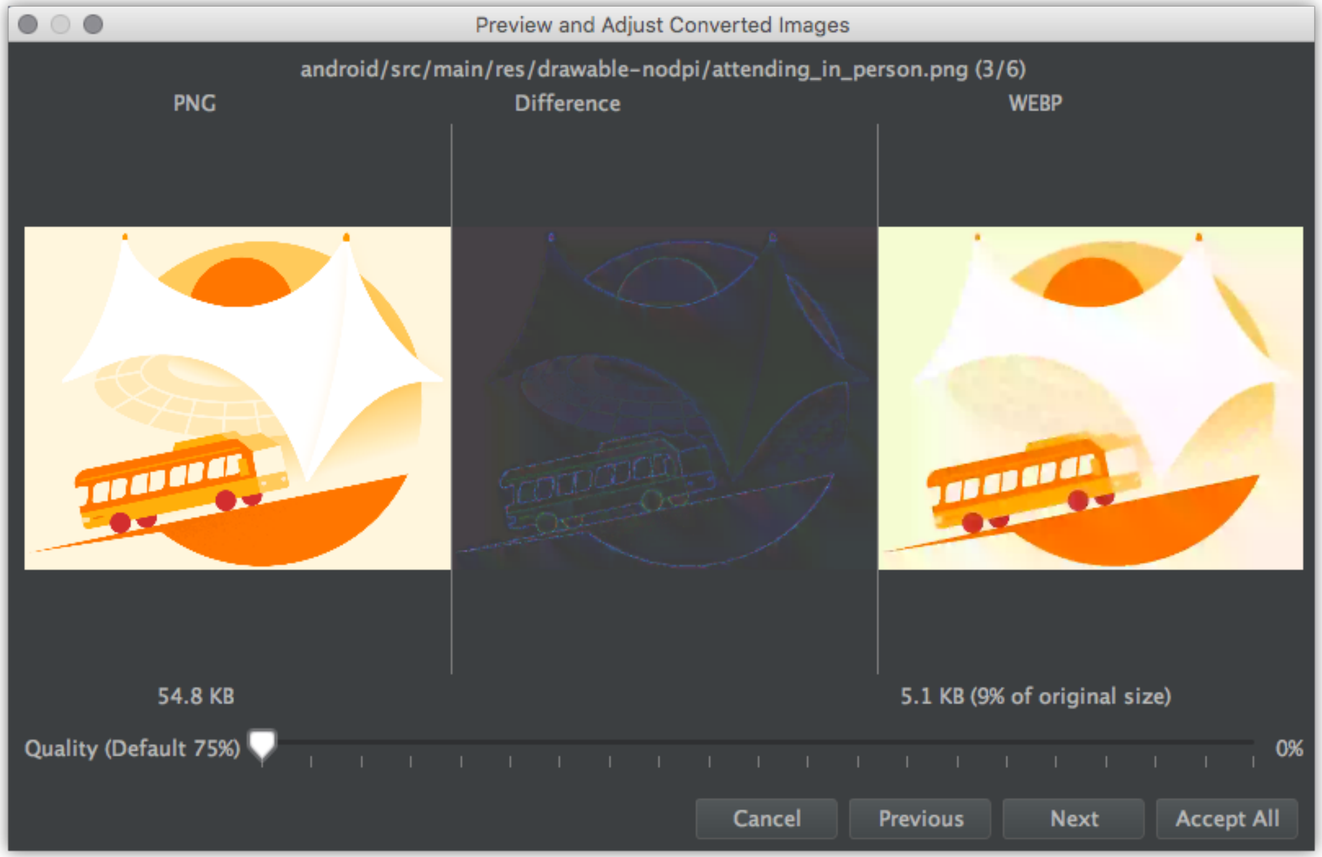
New Lint Checks

Obsolete SDK_INT
Object Animator Validation
Unnecessary Item Decorator Copy
WifiManager Leak

and many more!

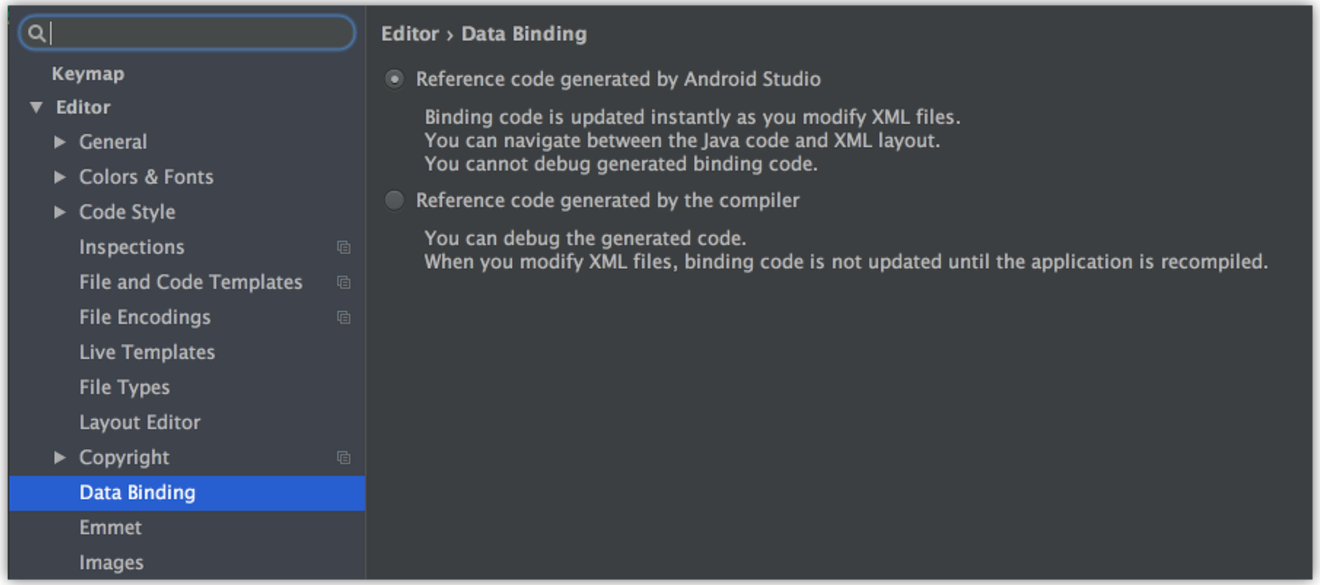
PNG to WebP

#APKSizeMatters



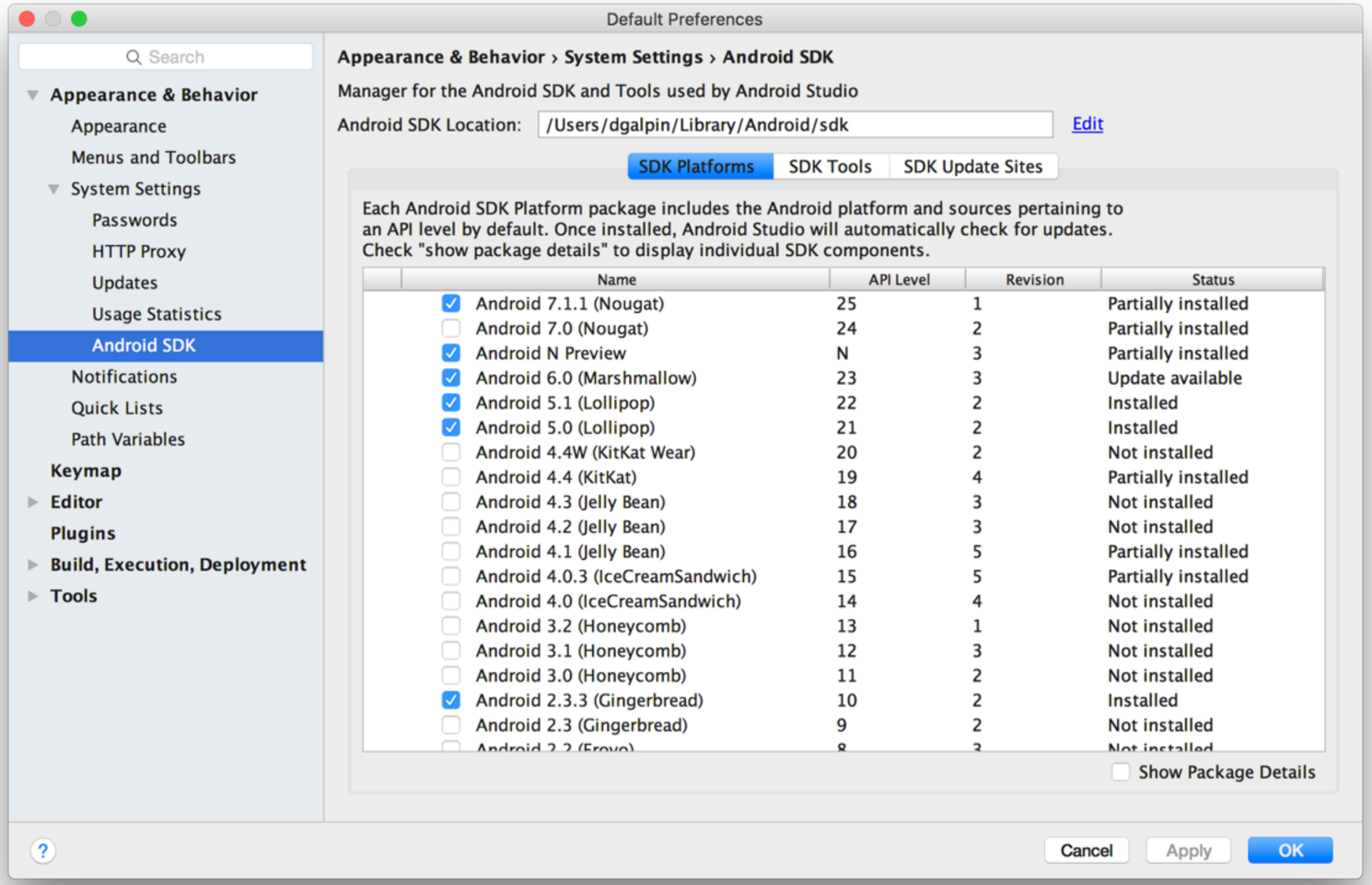
Data Binding

Now Debuggable!



Incremental SDK Updates

Less waiting!



Support Library

Support Library

Night Mode

Bottom Navigation

Transitions Framework

Constraint Layout

Custom Tabs

DiffUtil

Commit Content

Google Developer Day

ConstraintLayoutExamples › app › src › main › res › layout › activity_main_start.xml

Android | Project Files | Problems | Production | Tests

- app
  - manifests
  - java
    - org.examples.constraintlayoutexamples
      - CityActivity
      - MainActivity
    - org.examples.constraintlayoutexamples (androidTest)
    - org.examples.constraintlayoutexamples (test)
  - res
    - drawable
    - layout
      - activity_main.xml
      - activity_main_done.xml
      - activity_main_image_final.xml
      - activity_main_start.xml
      - activity_main_work.xml
      - constraint_example_1.xml
      - constraint_example_2.xml
      - constraint_example_3.xml
      - constraint_example_4.xml
      - constraint_example_5.xml
      - constraint_example_6.xml
      - constraint_example_7.xml
      - constraint_example_7a.xml
      - constraint_example_7b.xml
      - constraint_example_x1.xml
      - timer_nested.xml
    - mipmap
    - values
  - Gradle Scripts

activity_main_start.xml | activity_main_done.xml

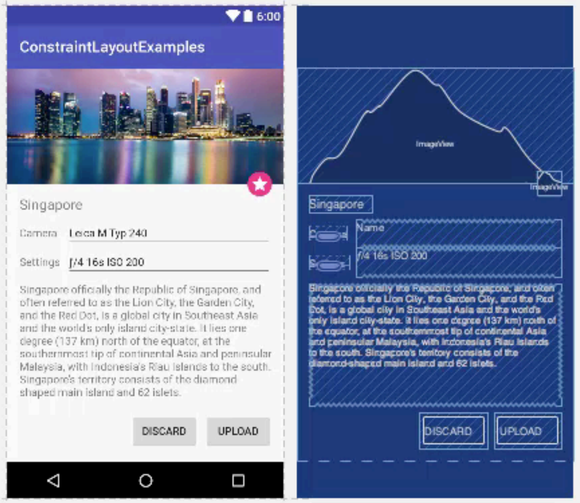
Palette

- Widgets
  - TextView
  - Button
  - ToggleButton
  - CheckBox
  - RadioButton
  - CheckedTextView
  - Spinner
  - ProgressBar (Large)
  - ProgressBar
  - ProgressBar (Small)
  - ProgressBar (Horizont
  - SeekBar
  - SeekBar (Discrete)
  - QuickContactBadge
  - RatingBar
  - Switch
  - Space
- Text Fields (EditText)
  - Plain Text
  - Password
  - Password (Numeric)
  - E-mail
  - Phone
  - Postal Address
  - Multiline Text
  - Time
  - Date
  - Number
  - Number (Signed)
  - Number (Decimal)

Component Tree

- activity_main (Const
  - imageView2
  - button35 – "@stri
  - button36 – "@stri
  - textView12 – "@s
  - editText – "@strin
  - editText2 – "Nam
  - textView13 – "@s
  - textView15 – "@s
  - textView16 – "@s
  - imageView3

Pixel | 25 | AppTheme | Language | 38%



Properties

Design | Text

4: Run | 5: Debug | TODO | 6: Android Monitor | 9: Version Control | Terminal | 0: Messages | Event Log | Gradle Console

Instant Run applied code changes and restarted the app. // (Dont show again) (3 minutes ago)

n/a n/a Git: master Context: <no context>

Helpful Links

Android Studio: d.android.com/studio

Support Library: d.android.com/topic/libraries/support-library

Constraint Layout: d.android.com/training/constraint-layout