Andorid Programming

Week 1

Mina Jung

EECS, Syracuse University

Spring 2017

Part I

Course Overview

Outline

- Information
  - Lectures and Help Sessions
  - Teaching Staff
  - Textbook
  - Lab Environment
- Introduction
  - Topics
  - Course Schedule
  - Grading Policy
  - Lab Assignments
  - Filtering Test
- Final Project
  - Groups
  - Milestones
  - UI Design
  - Grading
- TAs' Presentation and Talk

Lectures and Help Sessions

- Lectures
  - Where: Newhouse 1 – 101
  - When: Friday 11:40 AM – 2:25 PM
- Help Sessions
  - Where: CST 3-212
  - When: Monday through Thursday 5:10 PM – 7 PM

Staff

- Instructor: Mina Jung, Ph.D.
  - Office: CST 4-129
  - Email: mijung@syr.edu
  - Office Hours: T/Th 1 PM to 3 PM, or by appointment
- Teaching Assistant: Ricky Laishram
  - Email: rlaishra@syr.edu
  - Office Hours: T/W/Th Help Sessions
- Teaching Assistant: Rakesh Nallapeta Eshwaraiah
  - Email: rnallape@syr.edu
  - Office Hours: M/Th Help Sessions

Textbook

- Most of the contents that we cover can be found online, so textbooks are not necessary.

App Development Enviroment

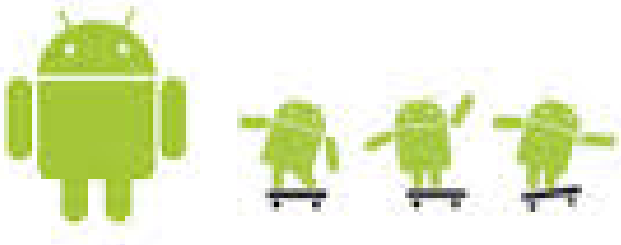
- Install Android Studio

Testing Enviroment I

- Use Intel Hardware Accelerated Execution Manager (Intel HAXM) from Android Studio

Testing Enviroment II

- Use a real Android device



Testing Enviroment III

- Use Genymotion and Virtual Box
  - First, Install Virtual Box

  - Second, Install Genymotion

Focused Topics

- User Interface Design
- Server-side Programming
- Future Learning

Course Schedule I

Week	Topics	Due
1/20	(1) Course Overview & Hello World!	
1/27	(2) Layout, Input Controls, Event handling, Colors and Styles	Assignment 1
2/3	(3) Fragment, Master/Detail Flow, and ViewPager	Assignment 2
2/10	(4) ListView and RecylerView	Assignment 3
2/17	(5) Action bar and Navigation Drawer	Assignment 4
2/24	(6) Server-Side Programming I	Assignment 5 **App Idea**
3/3	(7) Server-Side Programming II	Assignment 6

Course Schedule II

3/10	(8) AsyncTask and Thread	Assignment 7
3/17	**Spring Break**	
3/24	(9) Get data from cloud Firebase	Assignment 8
3/31	(10) Graphics and Animation	Assignment 9 **App Design**
4/7	(11) TBA	Assignment 10
4/14	(12) TBA	
4/21	(13) **Filtering Test**	
4/28	(14) **Final Project Demo, Final Report**	

Grading Policy

10 Lab Assignments	50
Final Project Idea	Pass/Fail
Final Project Design	5
Final Project Demo	45
Filtering Test	Pass/Fail
Total	100

Lab Assignments

- All Assignments are individual works and will be announced on a regular schedule.
- Each assignment will 5 points of your final grade.
- Students who are caught cheating will receive zero for that homework, and the final grade will only be B or lower.
- If students are caught cheating, they must immediately split from their current project group.
- Students who provide code for others to cheat will receive K grade deduction, with K being the number of people who copy their code.

Filtering Test

- No weight for the final grade, just filtering whether any student has cheated
- if students cannot pass, they will be asked to do a second-round oral exam in front of the instructor and the TAs
- Test Info
  - When and Where: April 28, Newhouse 1 101
  - Time for CIS400 students – 11:40 AM to 12:50 PM (70 min)
  - Time for CIS600 students – 1:00 PM to 2:10 PM (70 min)

Groups

- Group or Individual
  - up to 2 people in each group

Milestones

- App Idea (**2/24**): come up with an idea and find a teammate if you want
- UI design (**3/31**): submit a design document to describe how your apps will be designed, and follow the MVC (Model-View-Controller) model
- Final Presentation (**4/28**): will be given 10 minutes to present and demonstrate to the judging panel

UI Design (5 pts)– Wireframing Final Project App

- Sketch and Create Wireframes

Grading

- Grading Criteria for Final Presentation
  - Uniqueness/Usefulness: 10%
  - Artistic Score: 20%
  - Technical Score: 70%
    - Basic Features (up to 60%)
    - Advance Features (up to 40%)
- Scoring system with $3 + \alpha$ judges

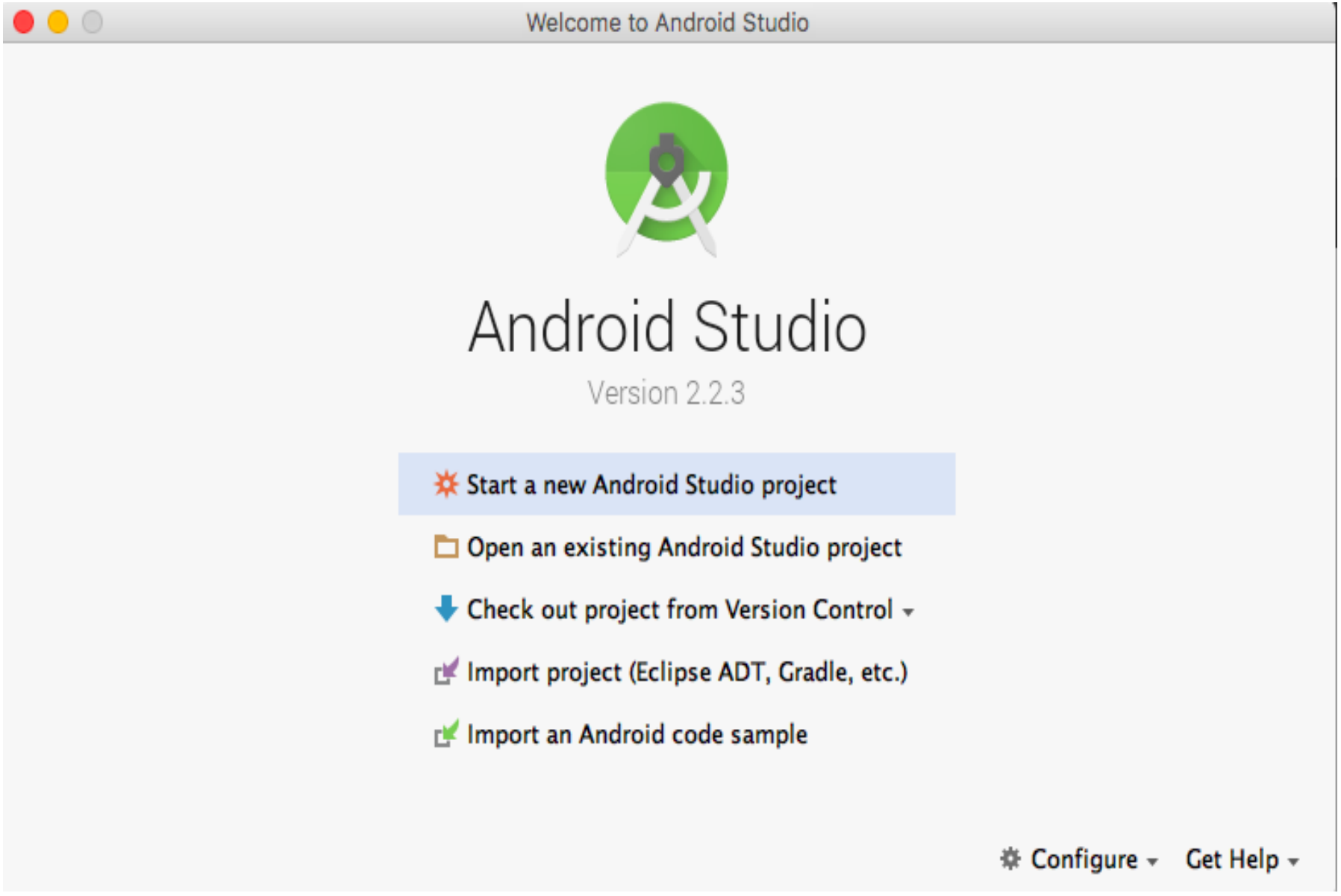
TA's Presentation and Talk

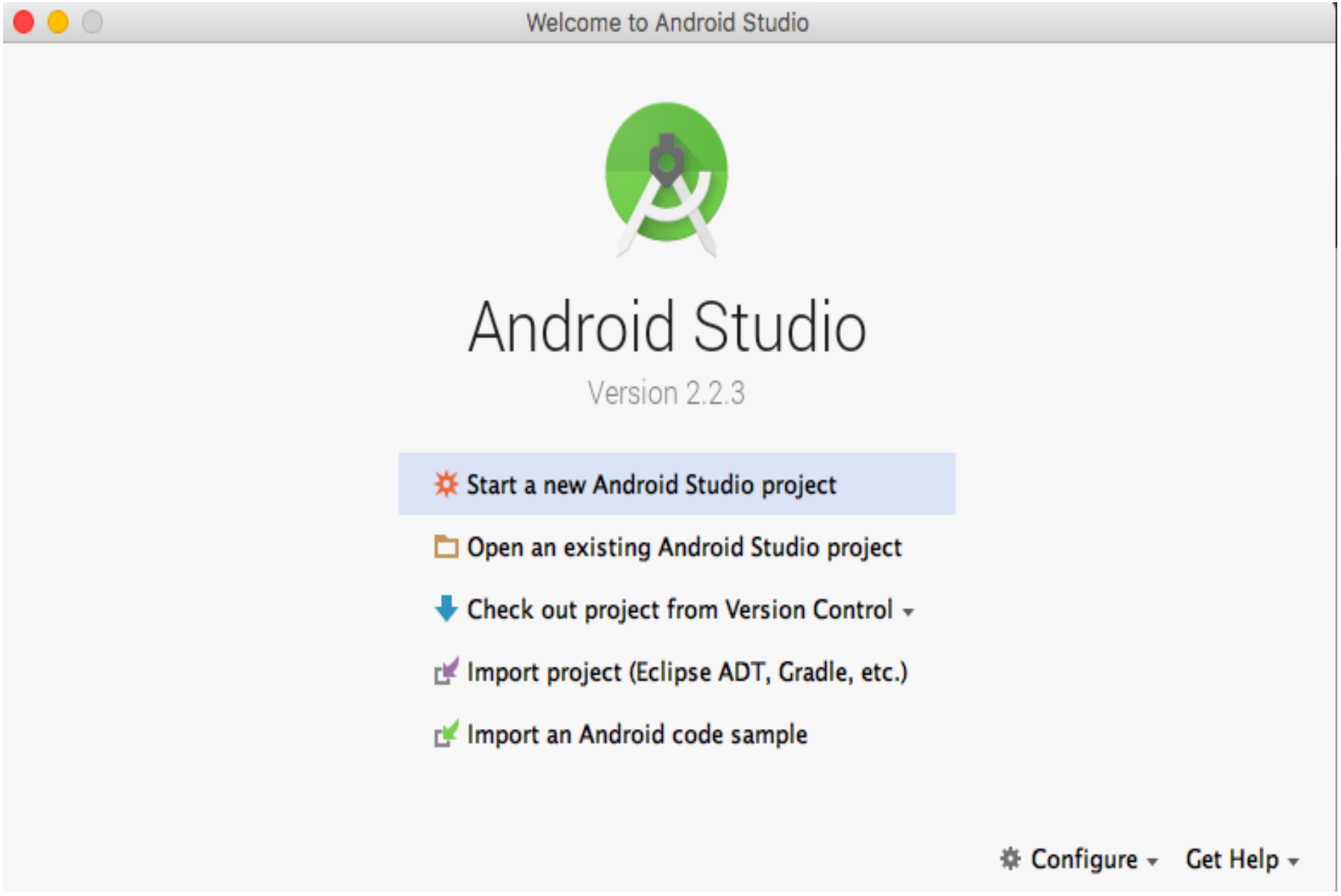
Part II

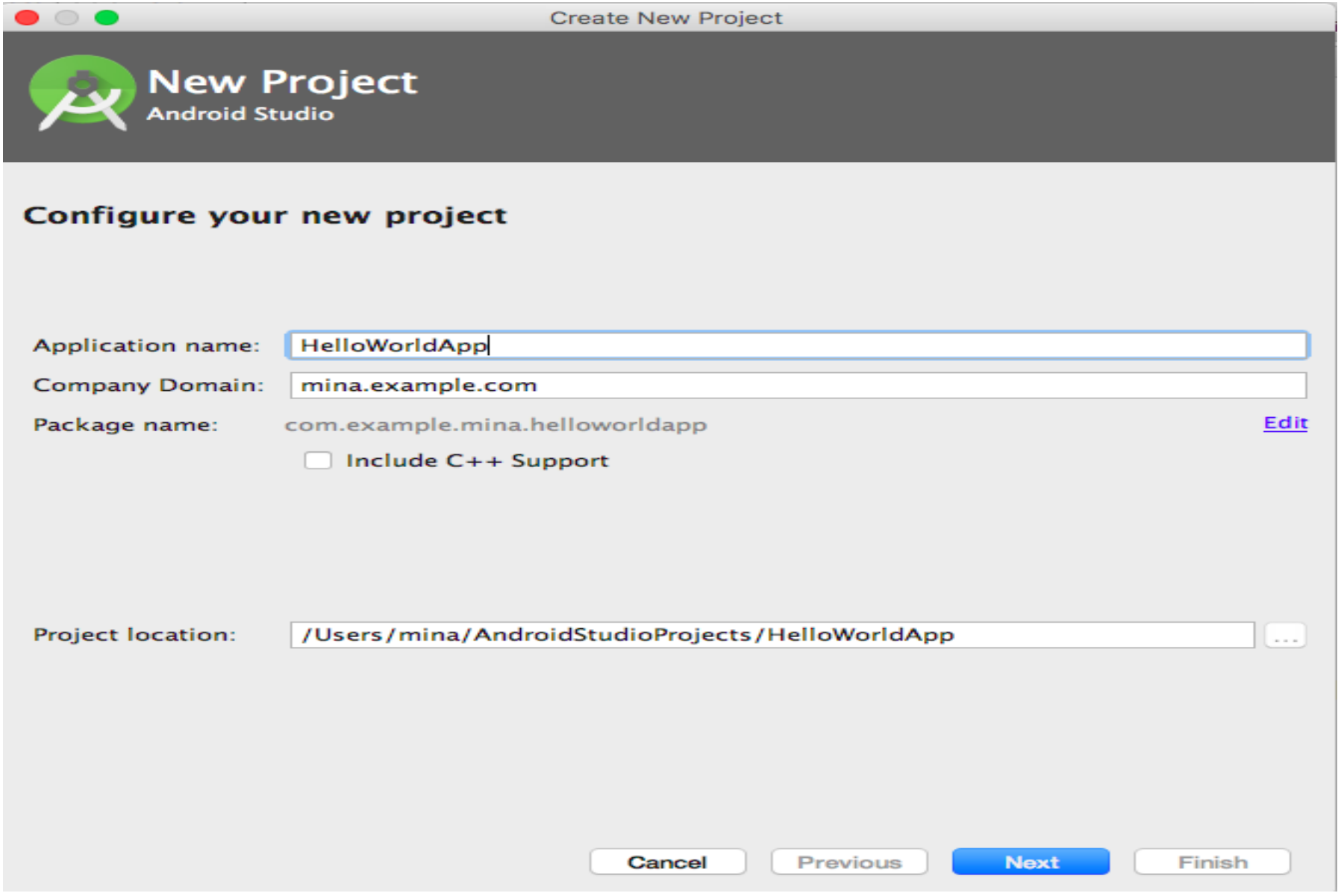
First App: Hello World!

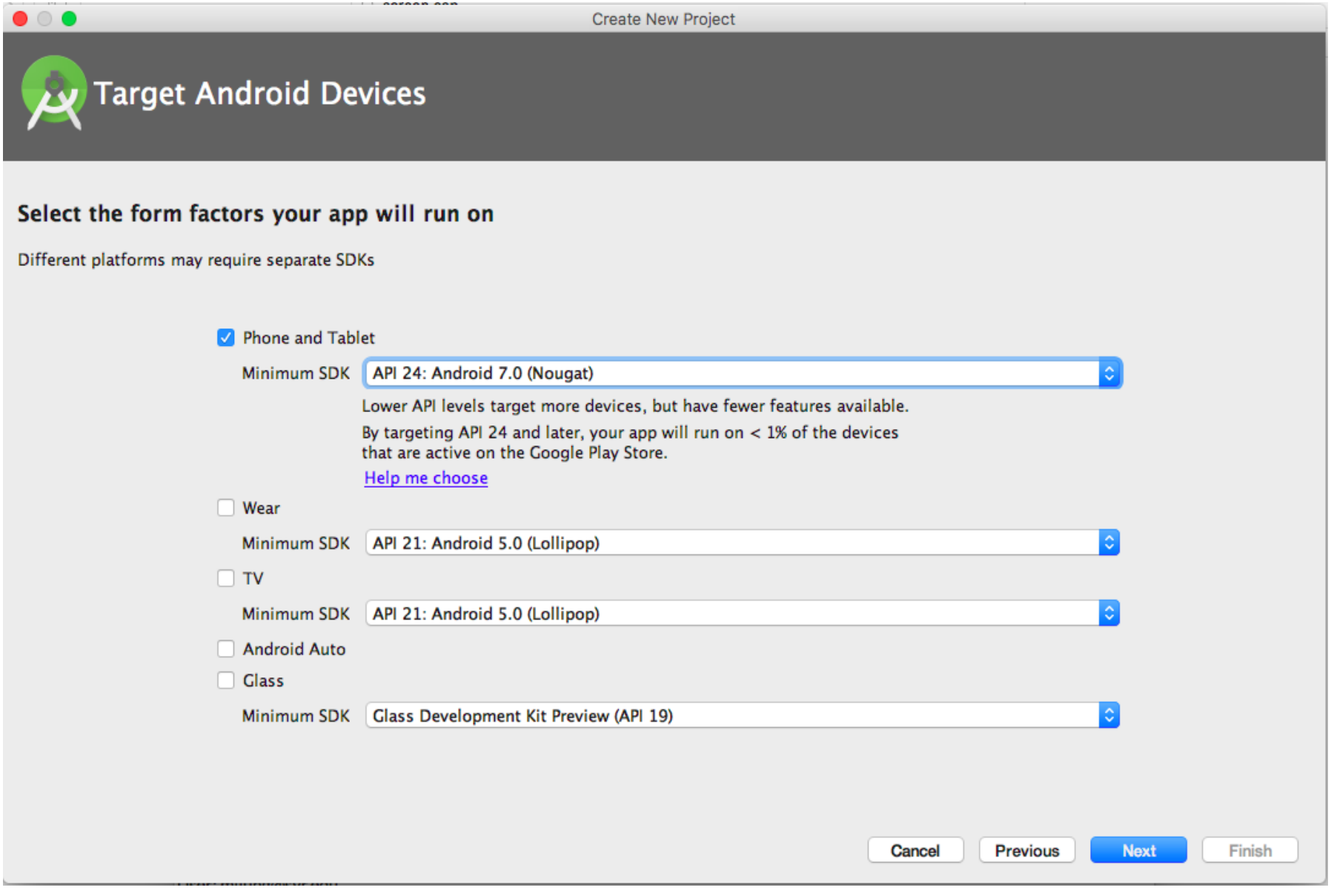
Outline

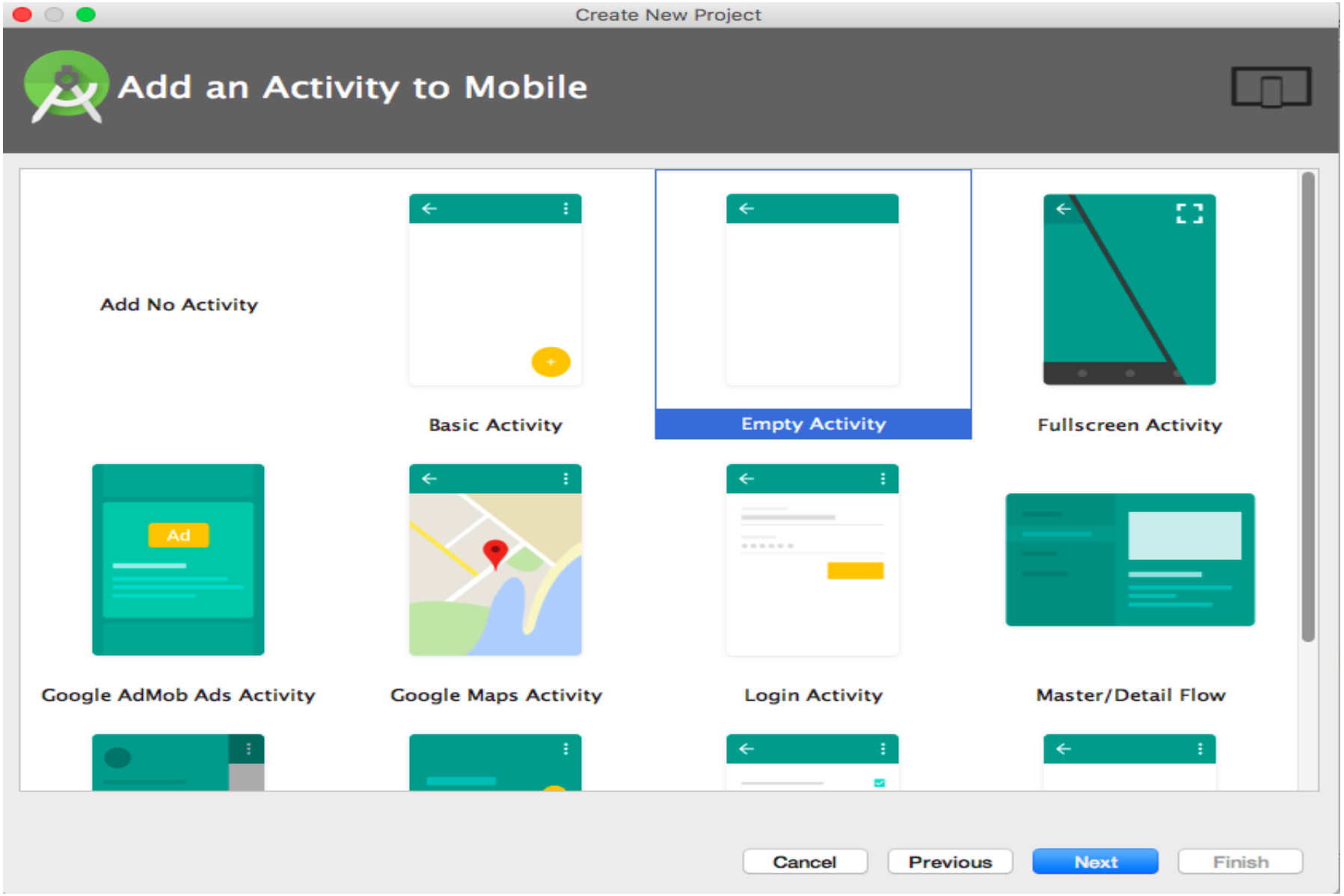
- Create a New Project - Hello World App
  - Create Hello World! App
  - Start Emulator (Genymotion) and Target VM Device
  - Run 'App'
- Review Important Files
  - File Structure
  - MainActivity.java
  - Life-cycle of Android App and Activity
  - activity_main.xml
  - AndroidManifest.xml
  - Other files and folders under resource folder

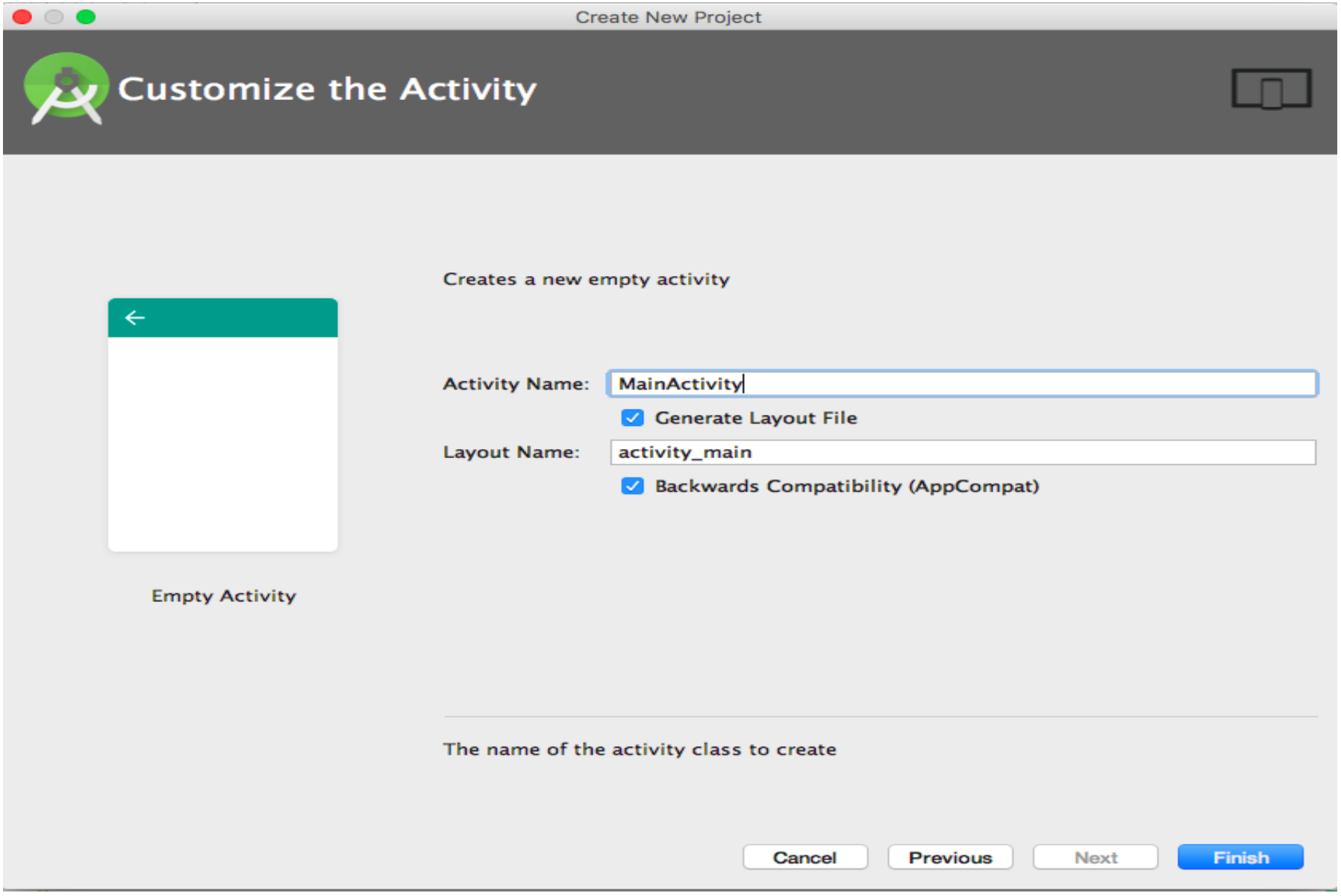

Welcome to Android Studio
Android Studio
Version 2.2.3
Start a new Android Studio project
Open an existing Android Studio project
Check out project from Version Control
Import project (Eclipse ADT, Gradle, etc.)
Import an Android code sample
Configure
Get Help

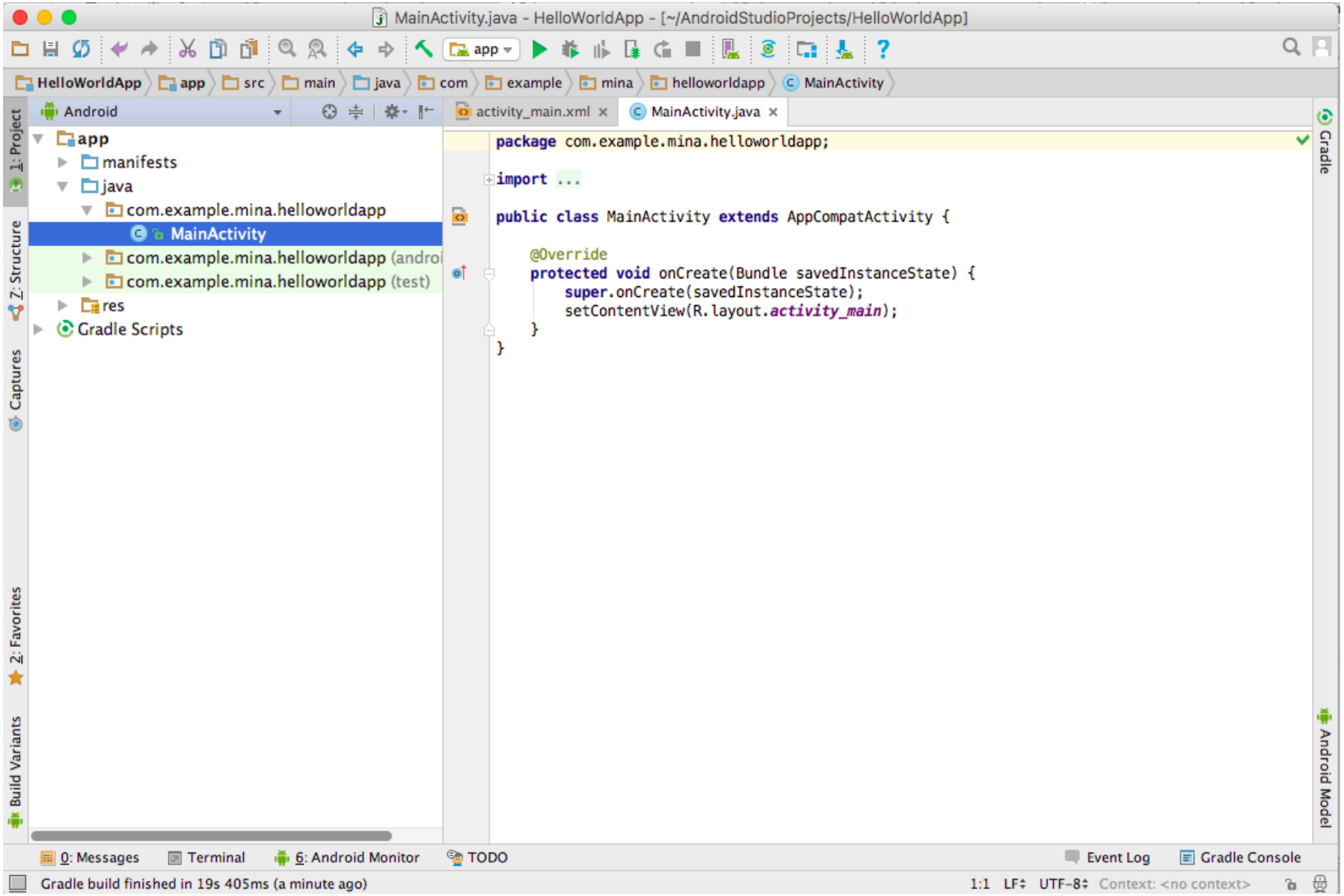

Welcome to Android Studio
Android Studio
Version 2.2.3
Start a new Android Studio project
Open an existing Android Studio project
Check out project from Version Control
Import project (Eclipse ADT, Gradle, etc.)
Import an Android code sample
Configure
Get Help

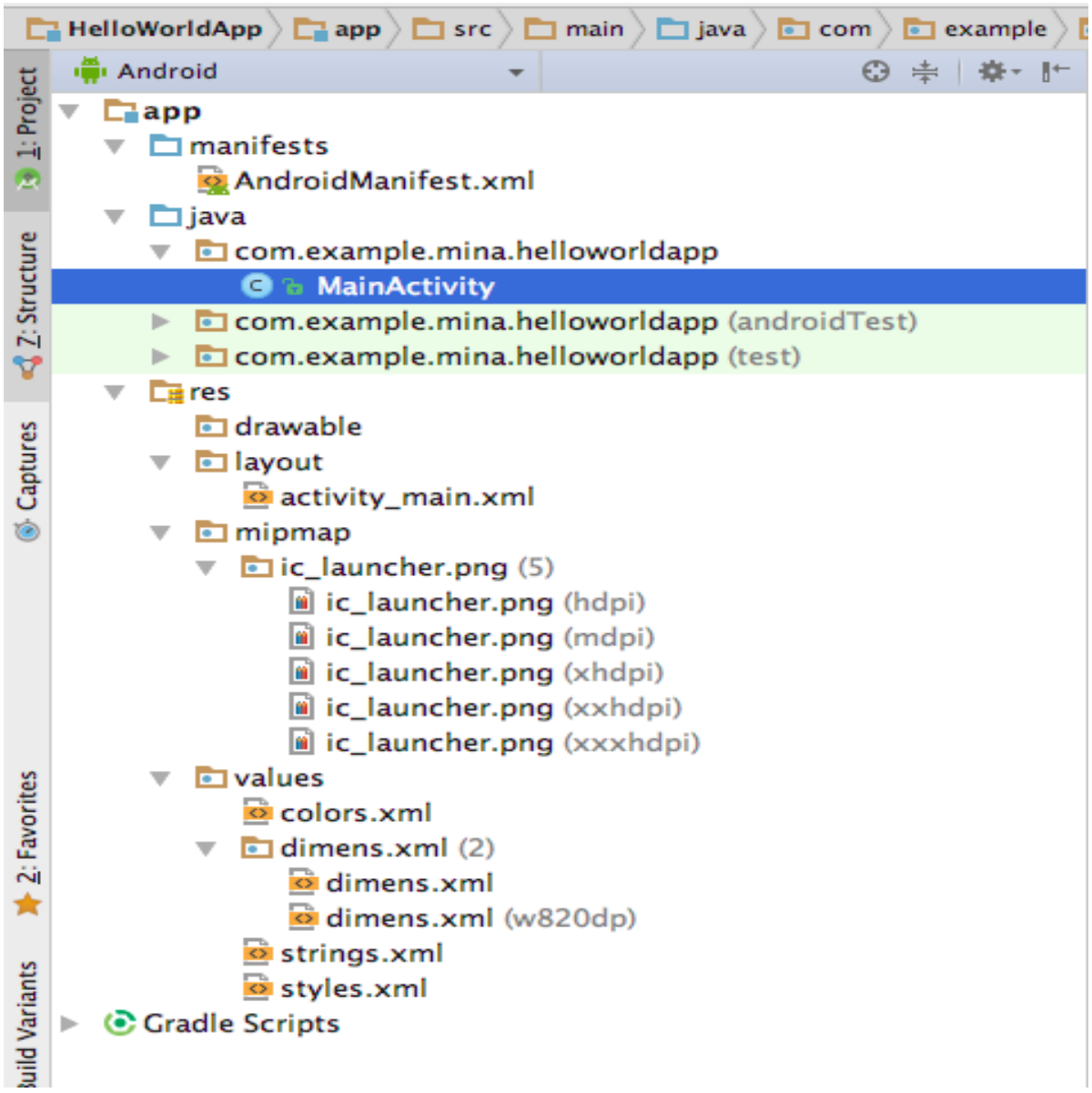

Create New Project
New Project
Android Studio
Configure your new project
Application name:
HelloWorldApp
Company Domain:
mina.example.com
Package name:
com.example.mina.helloworldapp
Edit
Include C++ Support
Project location:
/Users/mina/AndroidStudioProjects/HelloWorldApp
...
Cancel
Previous
Next
Finish

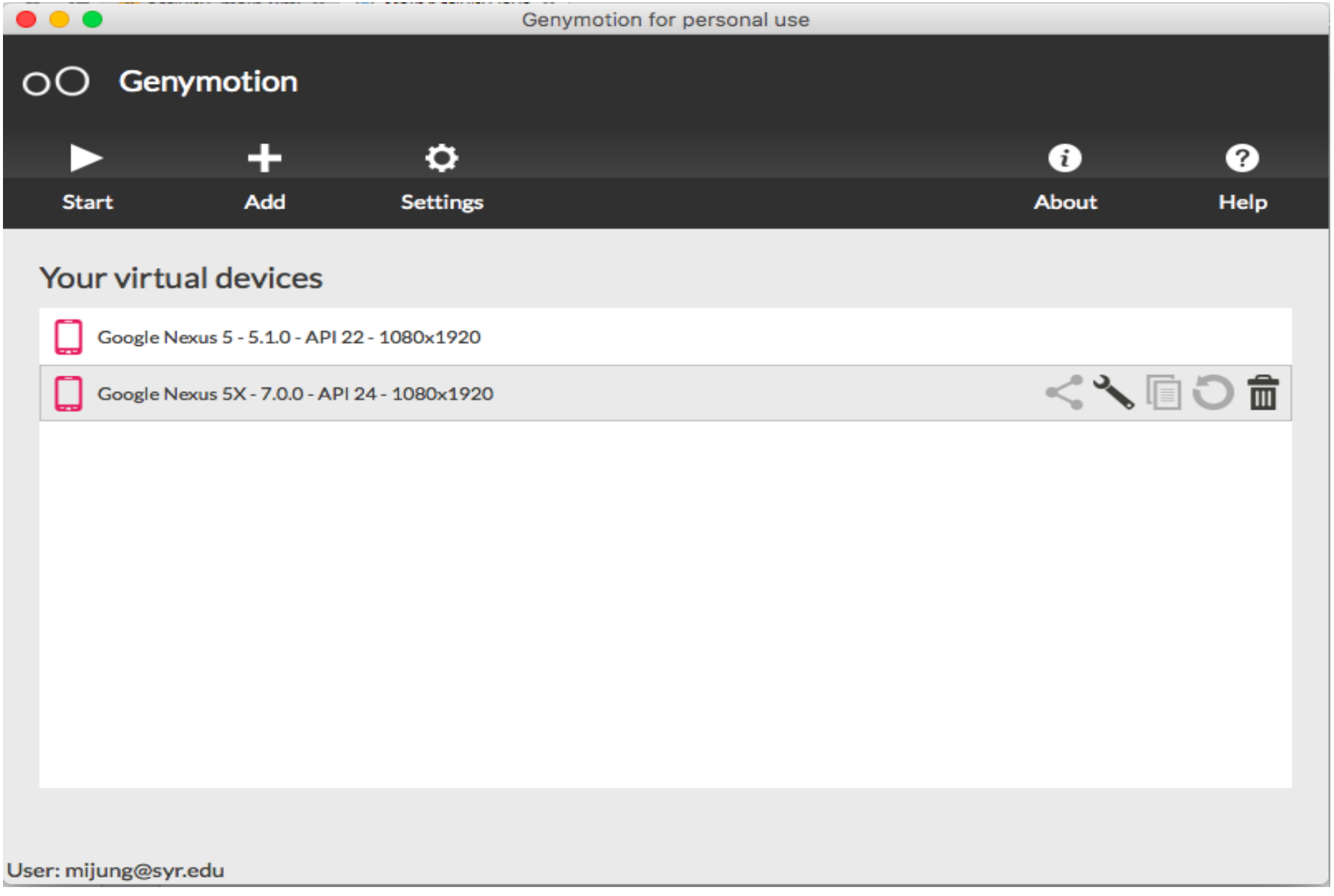

Create New Project
Target Android Devices
Select the form factors your app will run on
Different platforms may require separate SDKs
Phone and Tablet
Minimum SDK
API 24: Android 7.0 (Nougat)
Lower API levels target more devices, but have fewer features available.
By targeting API 24 and later, your app will run on < 1% of the devices that are active on the Google Play Store.
Help me choose
Wear
Minimum SDK
API 21: Android 5.0 (Lollipop)
TV
Minimum SDK
API 21: Android 5.0 (Lollipop)
Android Auto
Glass
Minimum SDK
Glass Development Kit Preview (API 19)
Cancel
Previous
Next
Finish

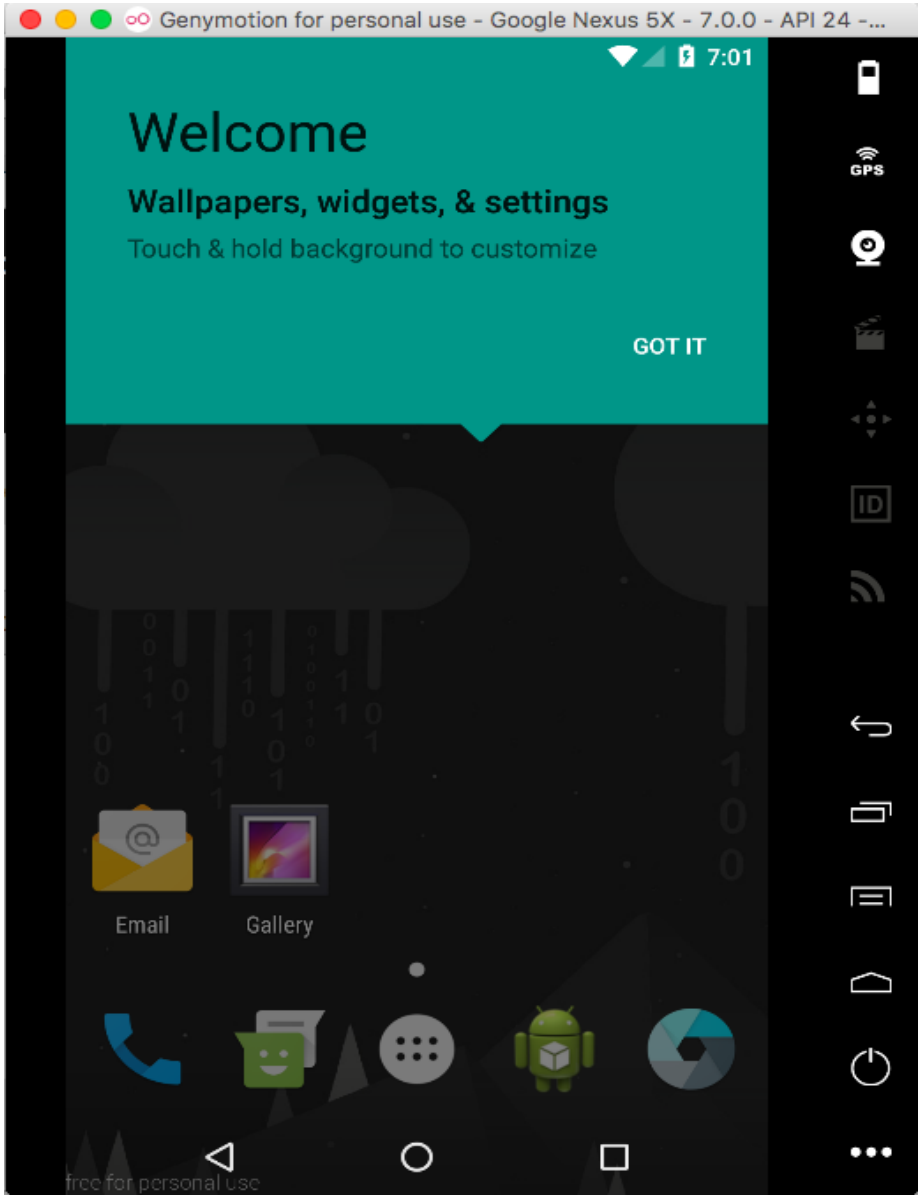

Create New Project
Add an Activity to Mobile
Add No Activity
Basic Activity
Empty Activity
Fullscreen Activity
Ad
Google AdMob Ads Activity
Google Maps Activity
Login Activity
Master/Detail Flow
Cancel
Previous
Next
Finish

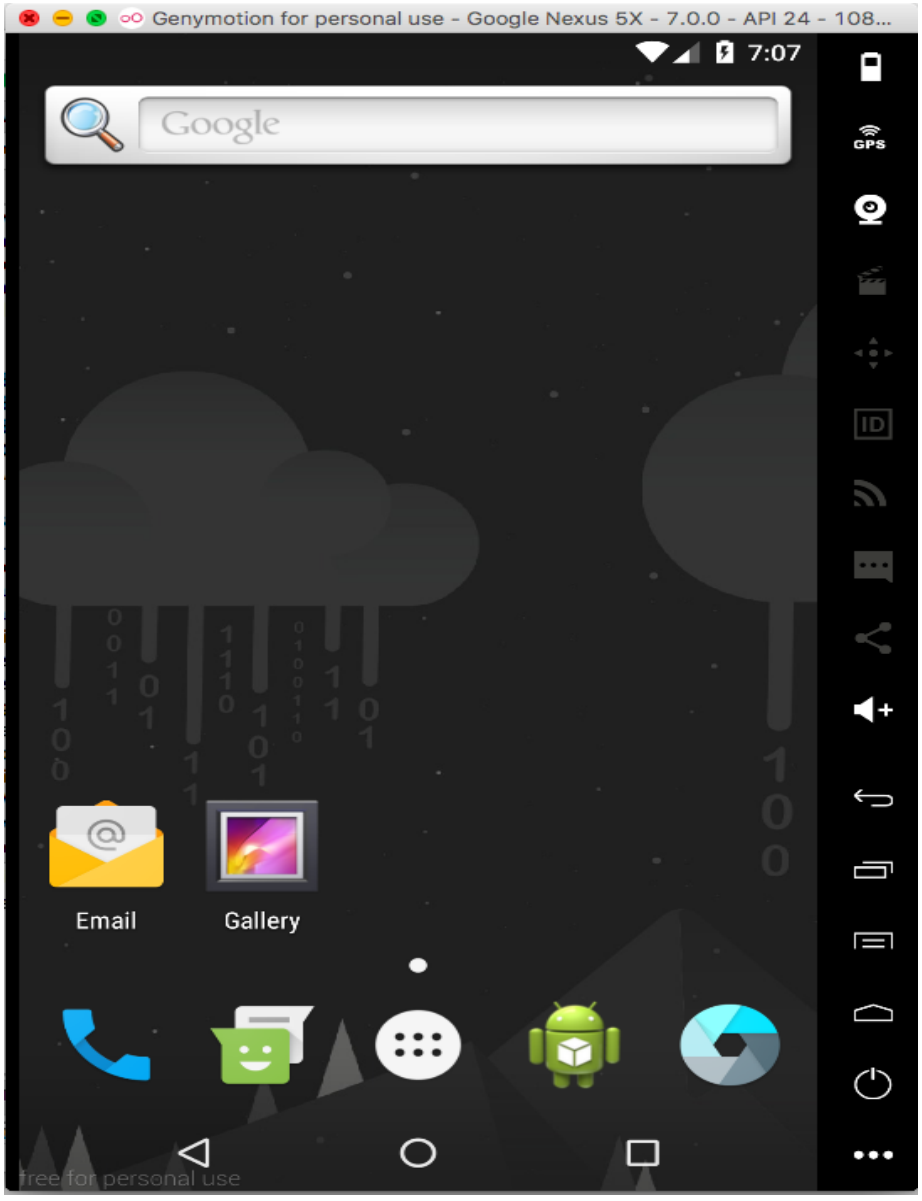

Create New Project
Customize the Activity
Creates a new empty activity
Activity Name:
MainActivity
Generate Layout File
Layout Name:
activity_main
Backwards Compatibility (AppCompat)
Empty Activity
The name of the activity class to create
Cancel
Previous
Next
Finish

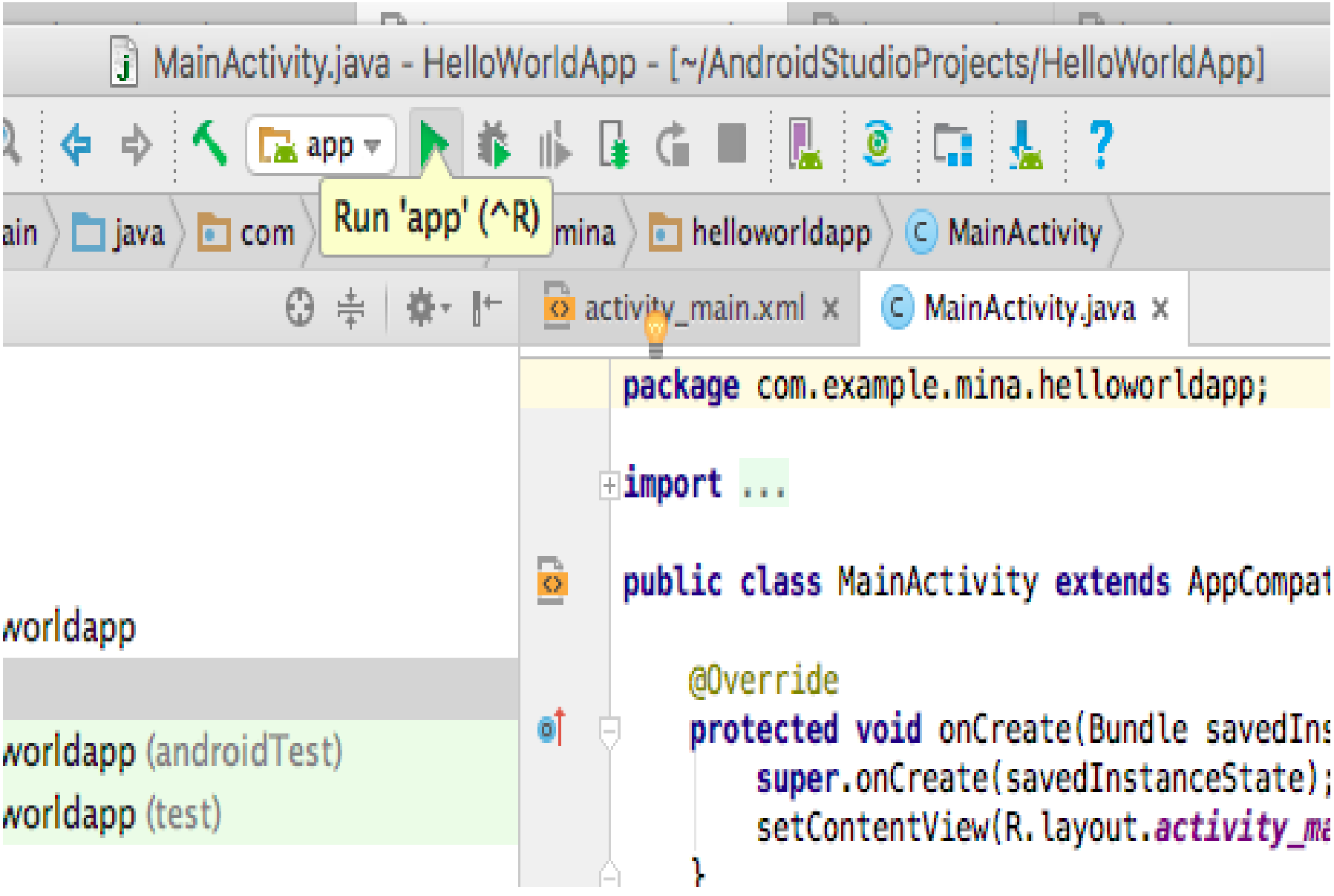

MainActivity.java - HelloWorldApp - [~/AndroidStudioProjects/HelloWorldApp]
HelloWorldApp
app
src
main
java
com
example
mina
helloworldapp
MainActivity
Android
activity_main.xml
MainActivity.java
app
manifests
java
com.example.mina.helloworldapp
MainActivity
com.example.mina.helloworldapp (andro
com.example.mina.helloworldapp (test)
res
Gradle Scripts
package com.example.mina.helloworldapp;
import ...
public class MainActivity extends AppCompatActivity {
@Override
protected void onCreate(Bundle savedInstanceState) {
super.onCreate(savedInstanceState);
setContentView(R.layout.activity_main);
}
}
1: Project
7: Structure
Captures
2: Favorites
Build Variants
Gradle
Android Model
0: Messages
Terminal
6: Android Monitor
TODO
Event Log
Gradle Console
Gradle build finished in 19s 405ms (a minute ago)
1:1
LF
UTF-8
Context: <no context>

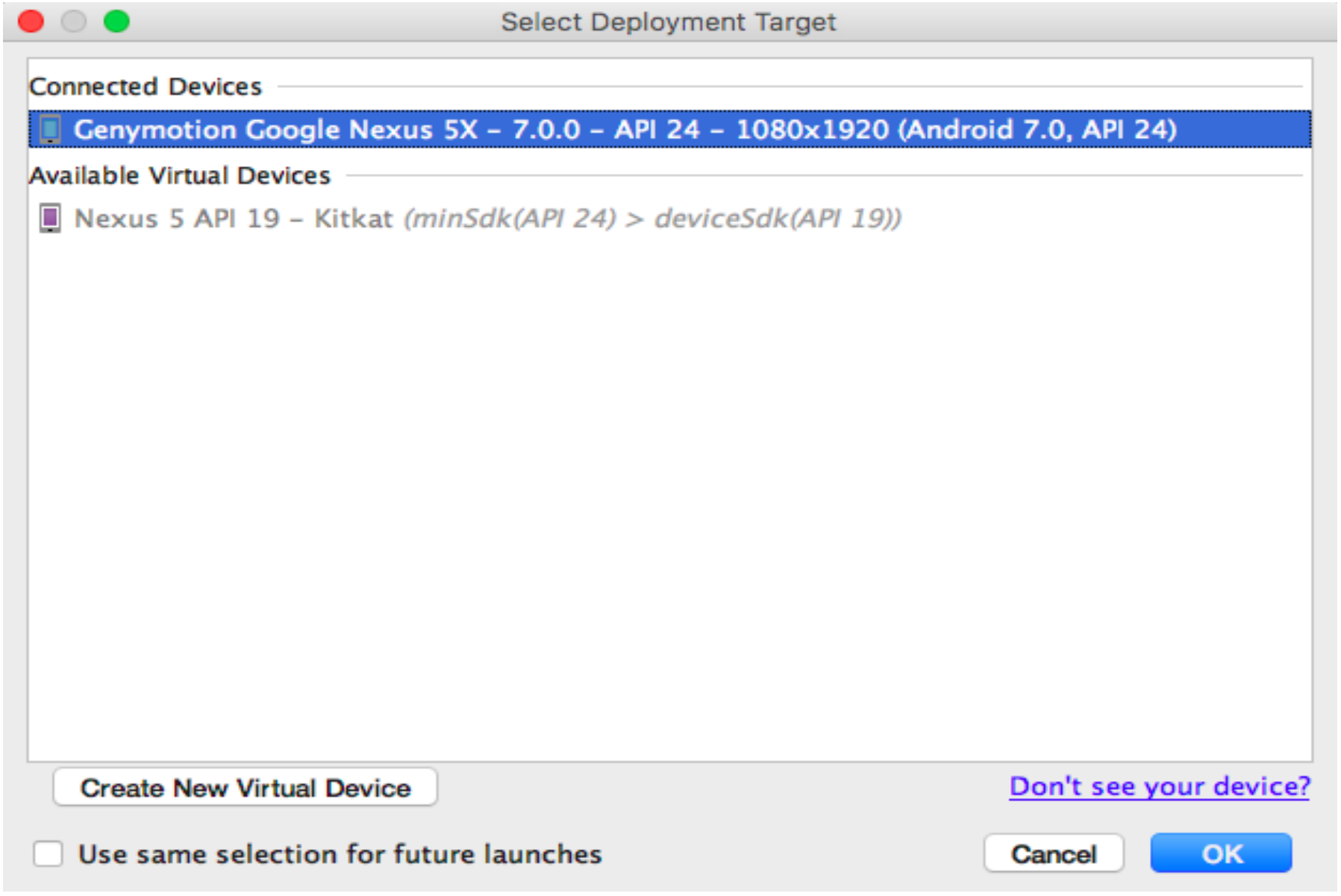

HelloWorldApp
app
src
main
java
com
example
Android
1: Project
7: Structure
Captures
2: Favorites
Build Variants
app
manifests
AndroidManifest.xml
java
com.example.mina.helloworldapp
MainActivity
com.example.mina.helloworldapp (androidTest)
com.example.mina.helloworldapp (test)
res
drawable
layout
activity_main.xml
mipmap
ic_launcher.png (5)
ic_launcher.png (hdpi)
ic_launcher.png (mdpi)
ic_launcher.png (xhdpi)
ic_launcher.png (xxhdpi)
ic_launcher.png (xxxhdpi)
values
colors.xml
dimens.xml (2)
dimens.xml
dimens.xml (w820dp)
strings.xml
styles.xml
Gradle Scripts

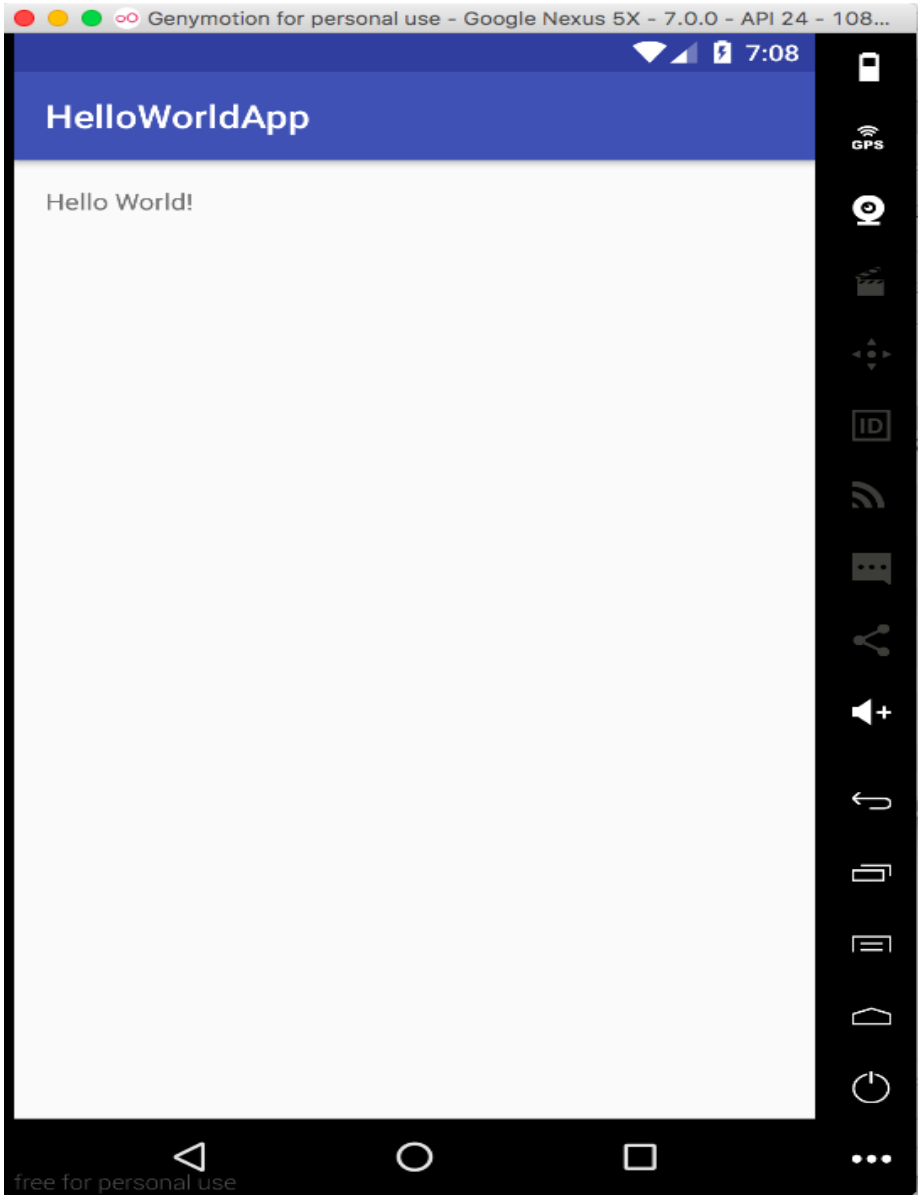

Genymotion for personal use
Genymotion
Start
Add
Settings
About
Help
Your virtual devices
Google Nexus 5 - 5.1.0 - API 22 - 1080x1920
Google Nexus 5X - 7.0.0 - API 24 - 1080x1920
User: mijung@syr.edu

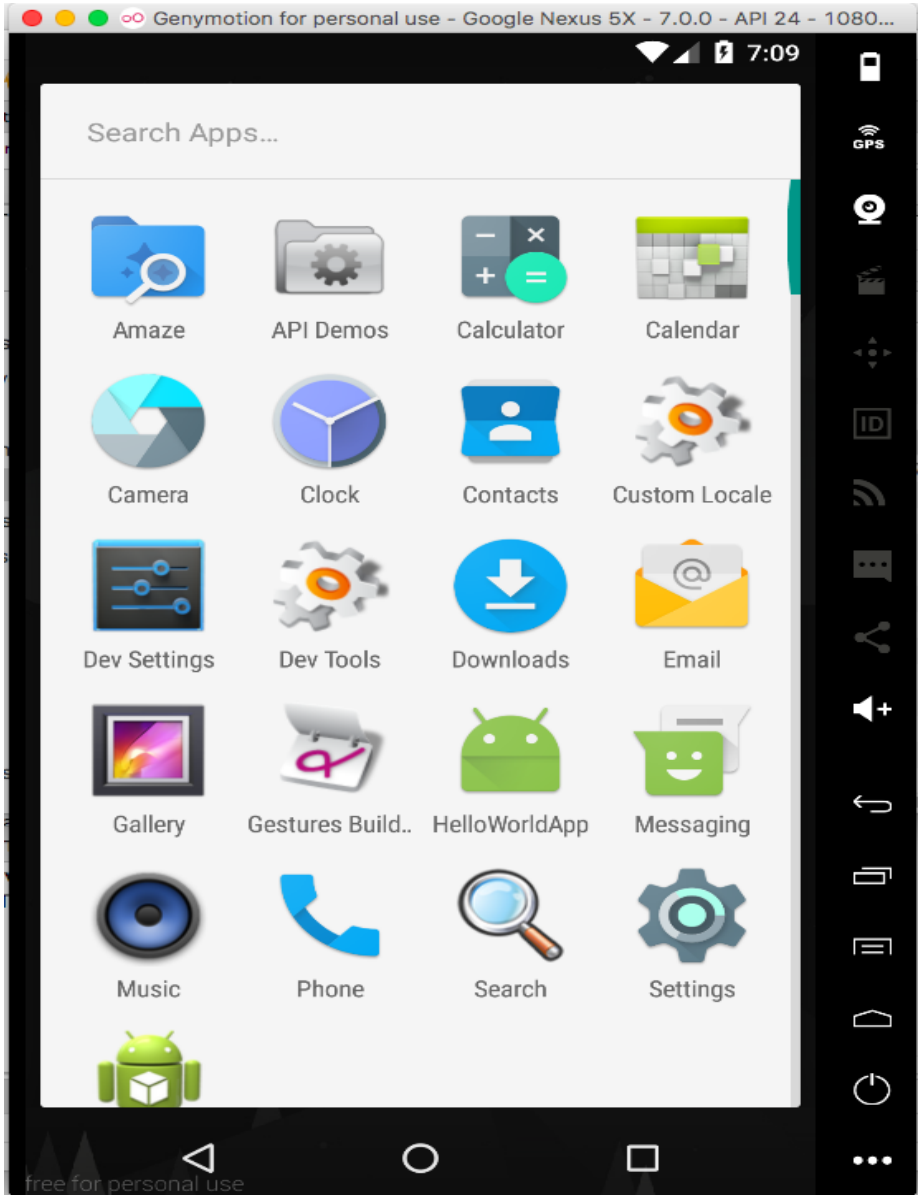

Genymotion for personal use - Google Nexus 5X - 7.0.0 - API 24 -...
7:01
Welcome
Wallpapers, widgets, & settings
Touch & hold background to customize
GOT IT
GPS
ID
Email
Gallery
free for personal use


Genymotion for personal use - Google Nexus 5X - 7.0.0 - API 24 - 108...
7:07
Google
GPS
Email
Gallery
free for personal use

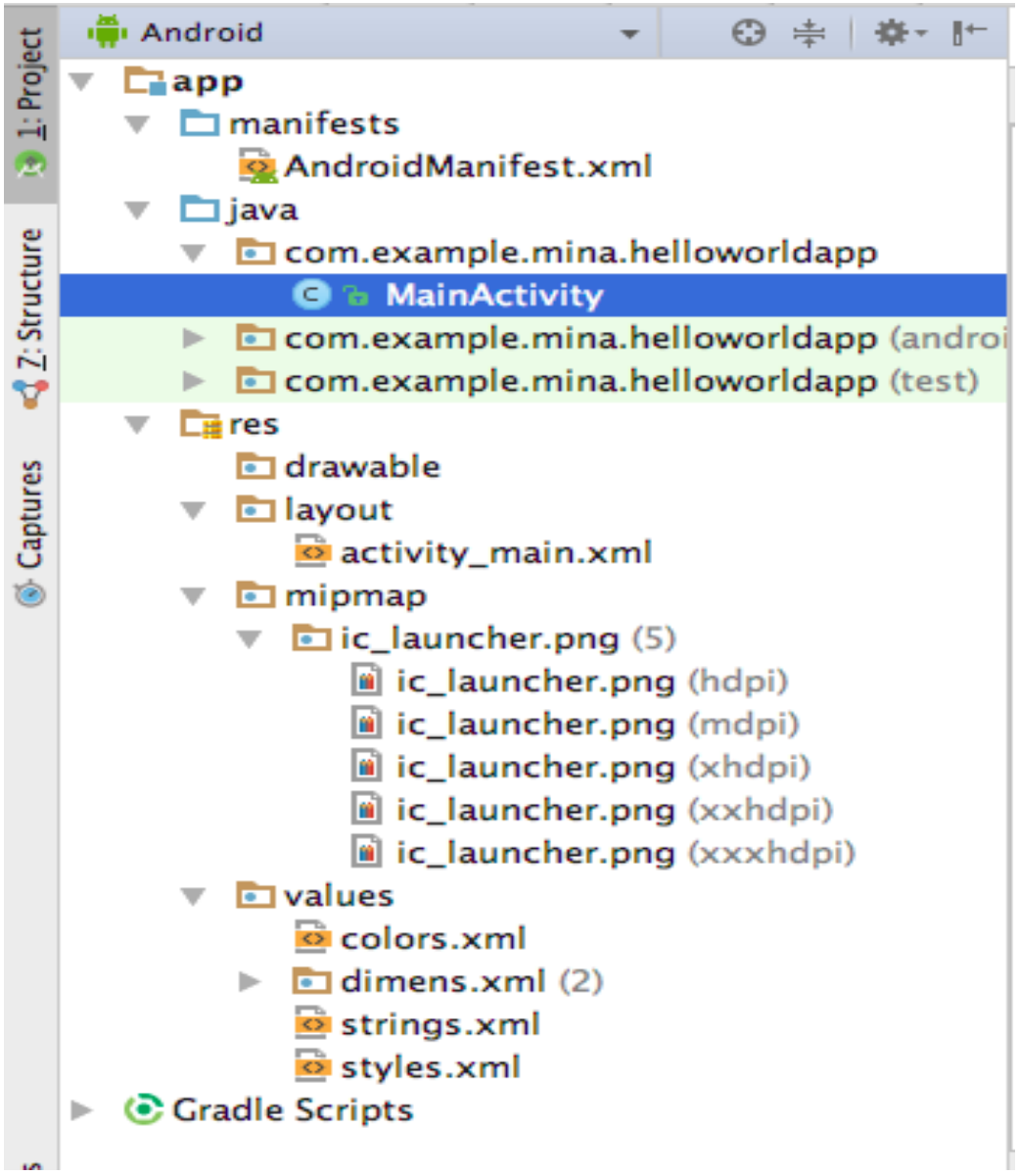

MainActivity.java - HelloWorldApp - [~/AndroidStudioProjects/HelloWorldApp]
app
Run 'app' (^R)
java
com
helloworldapp
MainActivity
activity_main.xml
MainActivity.java
package com.example.mina.helloworldapp;
import ...
public class MainActivity extends AppCompat
@Override
protected void onCreate(Bundle savedIns
super.onCreate(savedInstanceState);
setContentView(R.layout.activity_ma
}
worldapp
worldapp (androidTest)
worldapp (test)


Select Deployment Target
Connected Devices
Genymotion Google Nexus 5X – 7.0.0 – API 24 – 1080x1920 (Android 7.0, API 24)
Available Virtual Devices
Nexus 5 API 19 – Kitkat (minSdk(API 24) > deviceSdk(API 19))
Create New Virtual Device
Don't see your device?
Use same selection for future launches
Cancel
OK


Genymotion for personal use - Google Nexus 5X - 7.0.0 - API 24 - 108...
7:08
HelloWorldApp
Hello World!
GPS
free for personal use


Genymotion for personal use - Google Nexus 5X - 7.0.0 - API 24 - 1080...
7:09
Search Apps...
Amaze
API Demos
Calculator
Calendar
Camera
Clock
Contacts
Custom Locale
Dev Settings
Dev Tools
Downloads
Email
Gallery
Gestures Build..
HelloWorldApp
Messaging
Music
Phone
Search
Settings
GPS
ID
free for personal use

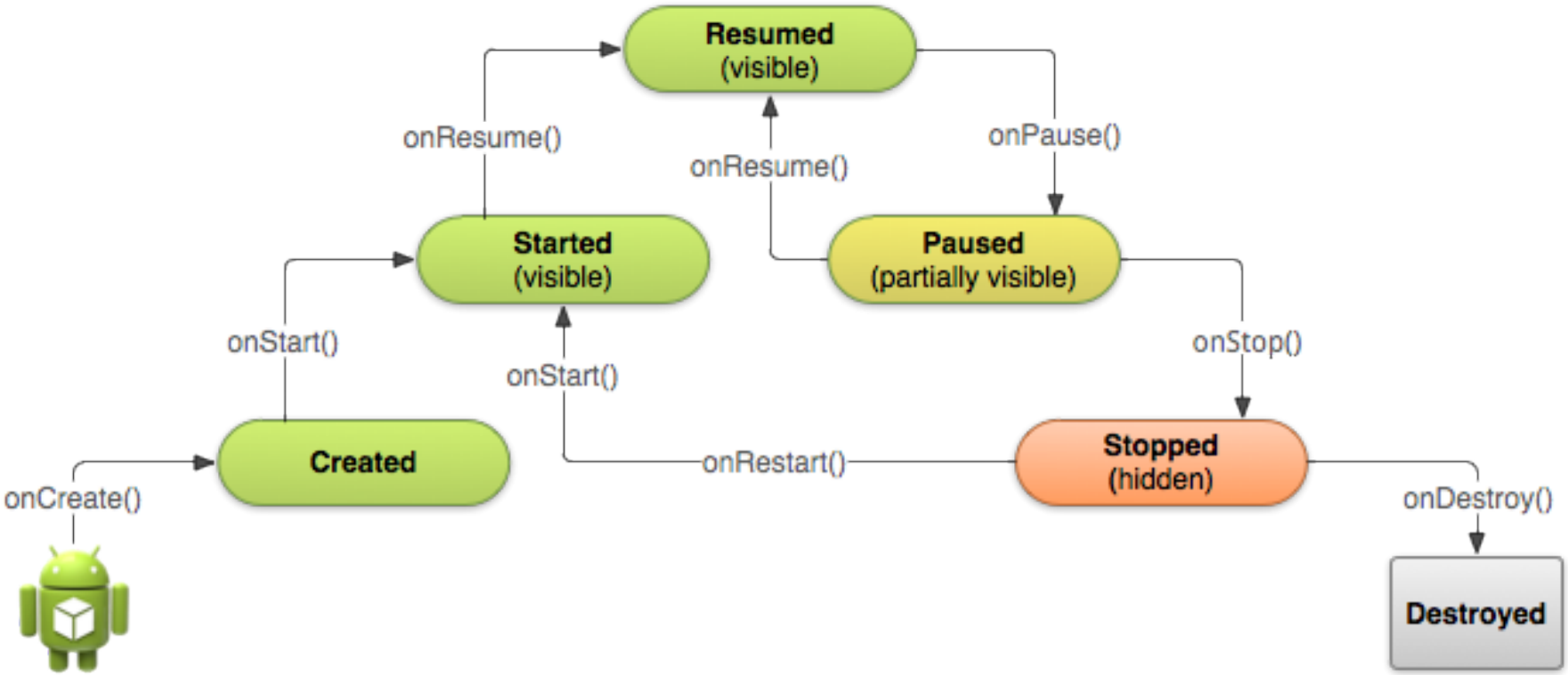
HelloWorldApp
app
app.iml
build
build.gradle
libs
proguard-rules.pro
src
androidTest
main
AndroidManifest.xml
java
res
drawable
layout
activity_main.xml
mipmap-hdpi
ic_launcher.png
mipmap-mdpi
ic_launcher.png
mipmap-xhdpi
ic_launcher.png
mipmap-xxhdpi
ic_launcher.png
mipmap-xxxhdpi
ic_launcher.png
values
colors.xml
dimens.xml
strings.xml
styles.xml
values-w820dp
dimens.xml
test
build
build.gradle
gradle
gradle.properties
gradlew
gradlew.bat
HelloWorldApp.iml
local.properties
settings.gradle

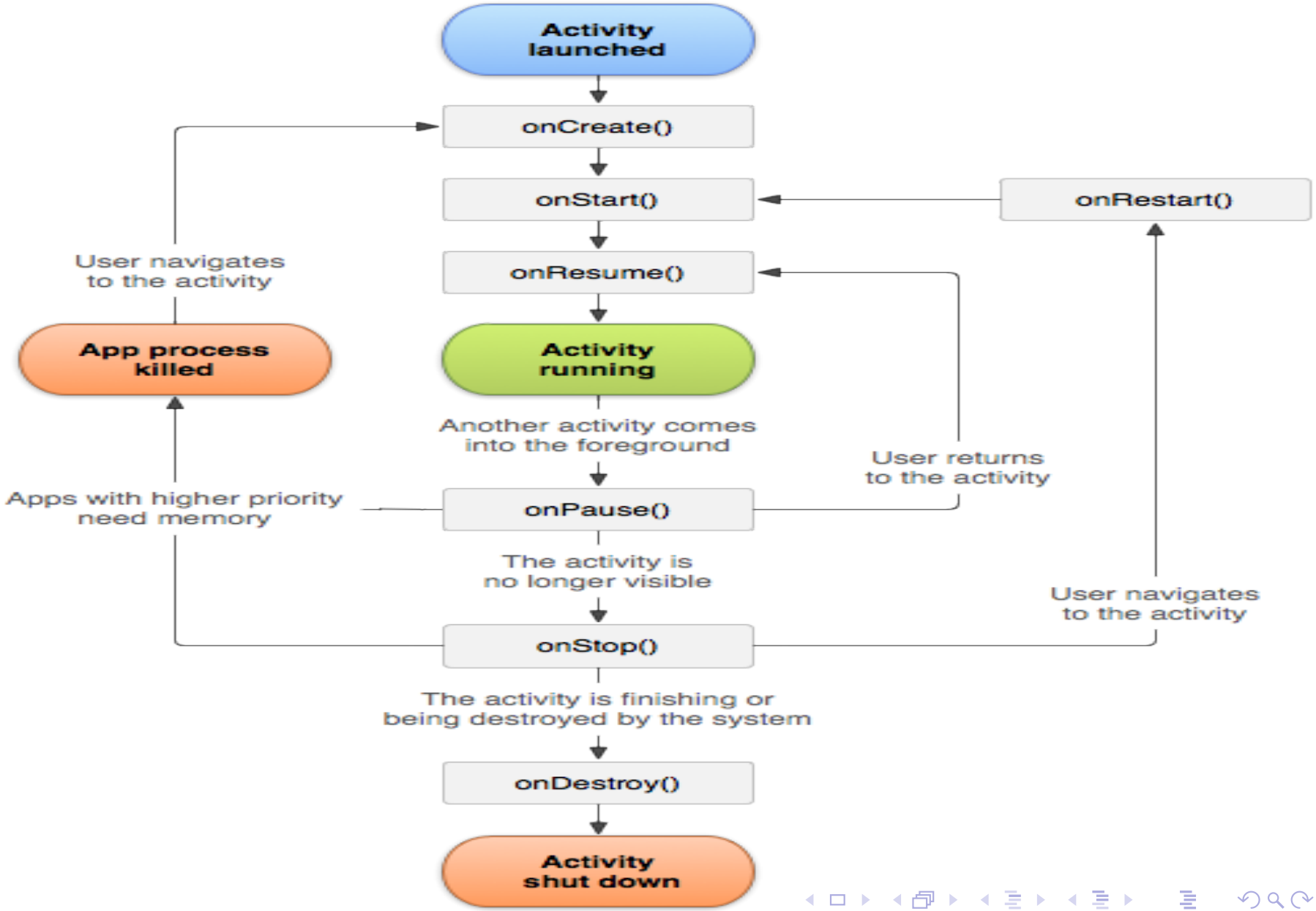

Android
app
manifests
AndroidManifest.xml
java
com.example.mina.helloworldapp
MainActivity
com.example.mina.helloworldapp (androi
com.example.mina.helloworldapp (test)
res
drawable
layout
activity_main.xml
mipmap
ic_launcher.png (5)
ic_launcher.png (hdpi)
ic_launcher.png (mdpi)
ic_launcher.png (xhdpi)
ic_launcher.png (xxhdpi)
ic_launcher.png (xxxhdpi)
values
colors.xml
dimens.xml (2)
strings.xml
styles.xml
Gradle Scripts
1: Project
7: Structure
Captures

```
1  package com.example.mina.helloworldapp;
2
3  import android.support.v7.app.AppCompatActivity;
4  import android.os.Bundle;
5
6  public class MainActivity extends AppCompatActivity {
7
8      @Override
9      protected void onCreate(Bundle savedInstanceState) {
10         super.onCreate(savedInstanceState);
11         setContentView(R.layout.activity_main);
12     }
13 }
```

MainActivity.java

- class definition for the activity
- Activity starts and loads the layout file (activity_main.xml)
- under Java folder


Resumed
(visible)
onResume()
onResume()
onPause()
Started
(visible)
Paused
(partially visible)
onStart()
onStart()
onStop()
Created
onRestart()
Stopped
(hidden)
onCreate()
onDestroy()
Destroyed

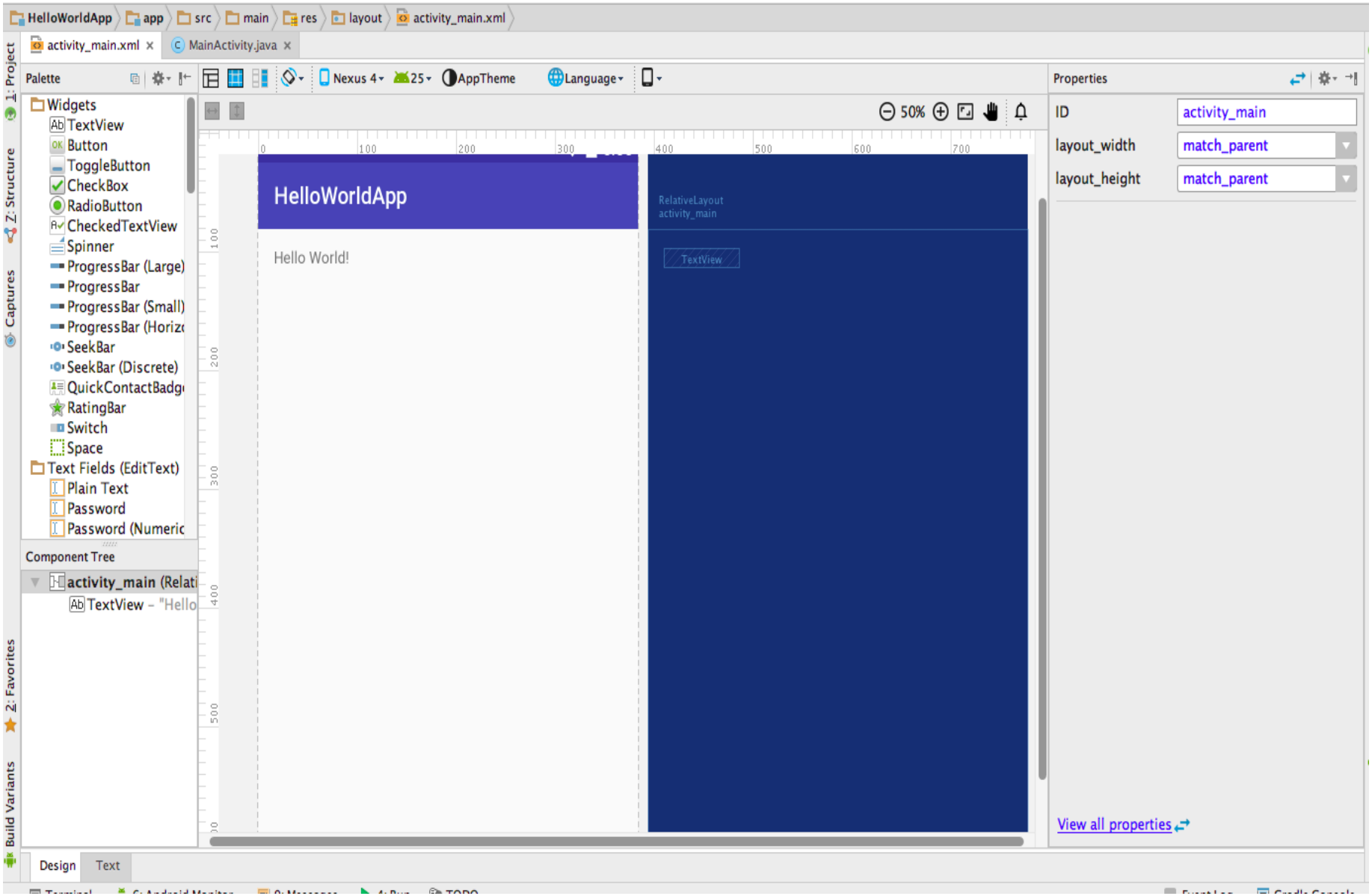

Activity launched
onCreate()
onStart()
onRestart()
onResume()
User navigates to the activity
App process killed
Activity running
Another activity comes into the foreground
User returns to the activity
Apps with higher priority need memory
onPause()
The activity is no longer visible
User navigates to the activity
onStop()
The activity is finishing or being destroyed by the system
onDestroy()
Activity shut down

```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/activity_main"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:paddingBottom="@dimen/activity_vertical_margin"
    android:paddingLeft="@dimen/activity_horizontal_margin"
    android:paddingRight="@dimen/activity_horizontal_margin"
    android:paddingTop="@dimen/activity_vertical_margin"
    tools:context="com.example.mina.helloworldapp.MainActivity">

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Hello World!" />
</RelativeLayout>
```

activity_main.xml

- layout (interface) definition for the activity
- contains a TextView element with the text “Hello World!”
- under /res/layout folder


HelloWorldApp
app
src
main
res
layout
activity_main.xml
activity_main.xml
MainActivity.java
Palette
Widgets
TextView
Button
ToggleButton
CheckBox
RadioButton
CheckedTextView
Spinner
ProgressBar (Large)
ProgressBar
ProgressBar (Small)
SeekBar
SeekBar (Discrete)
RatingBar
Switch
Space
Text Fields (EditText)
Plain Text
Password
Password (Numeric
Component Tree
activity_main (Relati
TextView – "Hello
Nexus 4
25
AppTheme
Language
50%
HelloWorldApp
Hello World!
RelativeLayout
activity_main
TextView
Properties
ID
activity_main
layout_width
match_parent
layout_height
match_parent
View all properties
Design
Text
1: Project
Z: Structure
Captures
2: Favorites
Build Variants

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3      package="com.example.mina.helloworldapp">
4
5      <application
6          android:allowBackup="true"
7          android:icon="@mipmap/ic_launcher"
8          android:label="@string/app_name"
9          android:supportsRtl="true"
10         android:theme="@style/AppTheme">
11         <activity android:name=".MainActivity">
12             <intent-filter>
13                 <action android:name="android.intent.action.MAIN" />
14
15                 <category android:name="android.intent.category.LAUNCHER" />
16             </intent-filter>
17         </activity>
18     </application>
19
20 </manifest>
```

AndroidManifest.xml

- describes the fundamental characteristics of app
- defines each of app components
- under /manifests folder

- strings.xml

```
1 <resources>
2     <string name="app_name">HelloWorldApp</string>
3 </resources>
```

strings.xml

  - under /res/values folder for various XML files
  - contains all the text definitions
  - @string refers to strings.xml file (@string/app_name = "HelloWorldApp")

- /res/drawable

- /res/mipmap