CS194A

Android Programming Workshop

Lecture 2: Sep 23, 2020

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Outline

- Logistics
- Bigger Number app
- Kotlin overview

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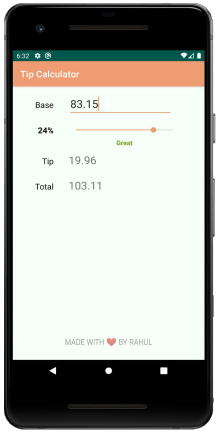
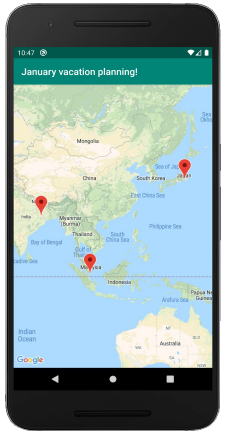
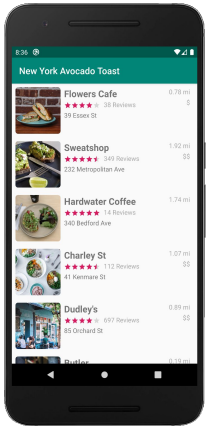
- **Logistics**
- Bigger Number app
- Kotlin overview







Assn 1: Tip Calculator

Assn 2: Google Maps

Assn 3: Yelp Clone

Industry panel discussion

1 2 3 4 5 6 7 8 9 10

Week #

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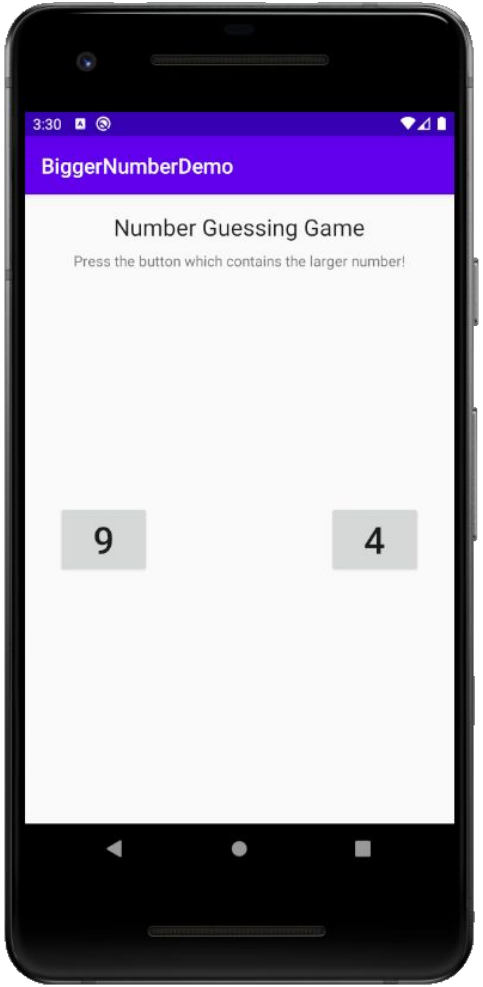
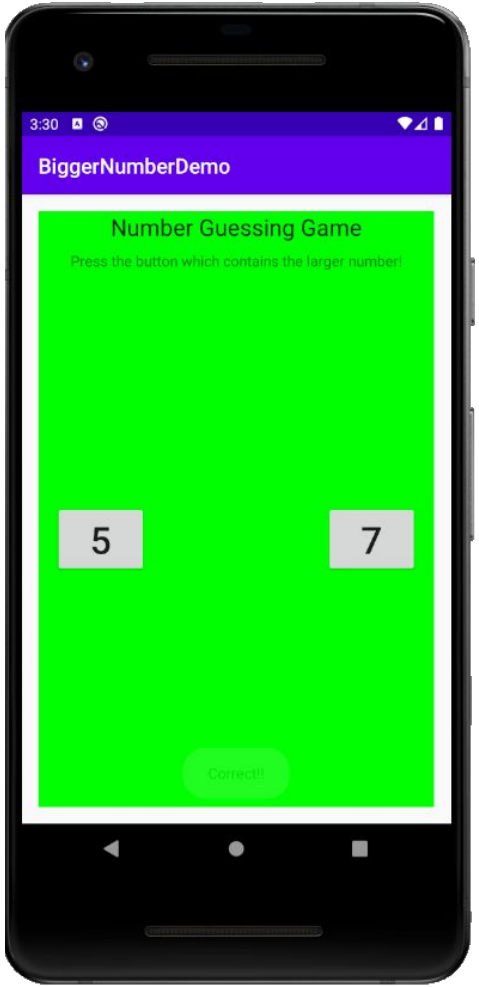
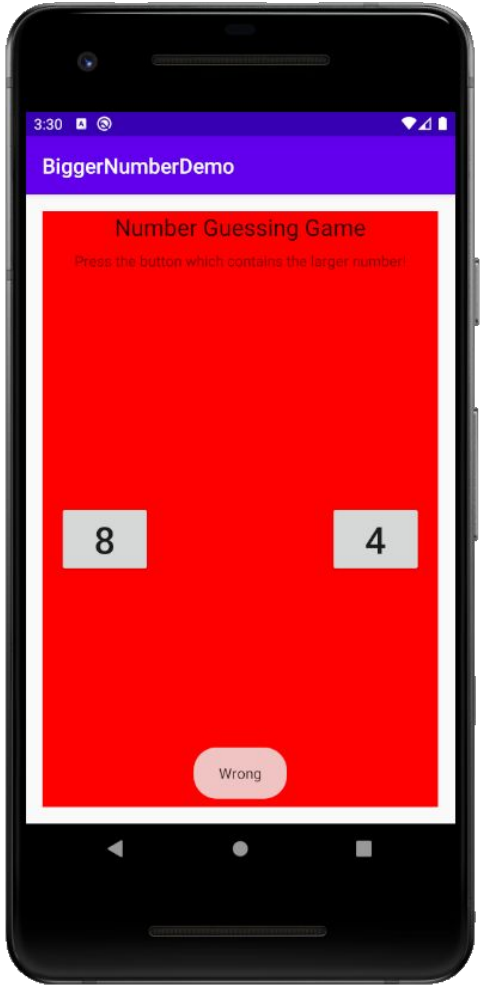
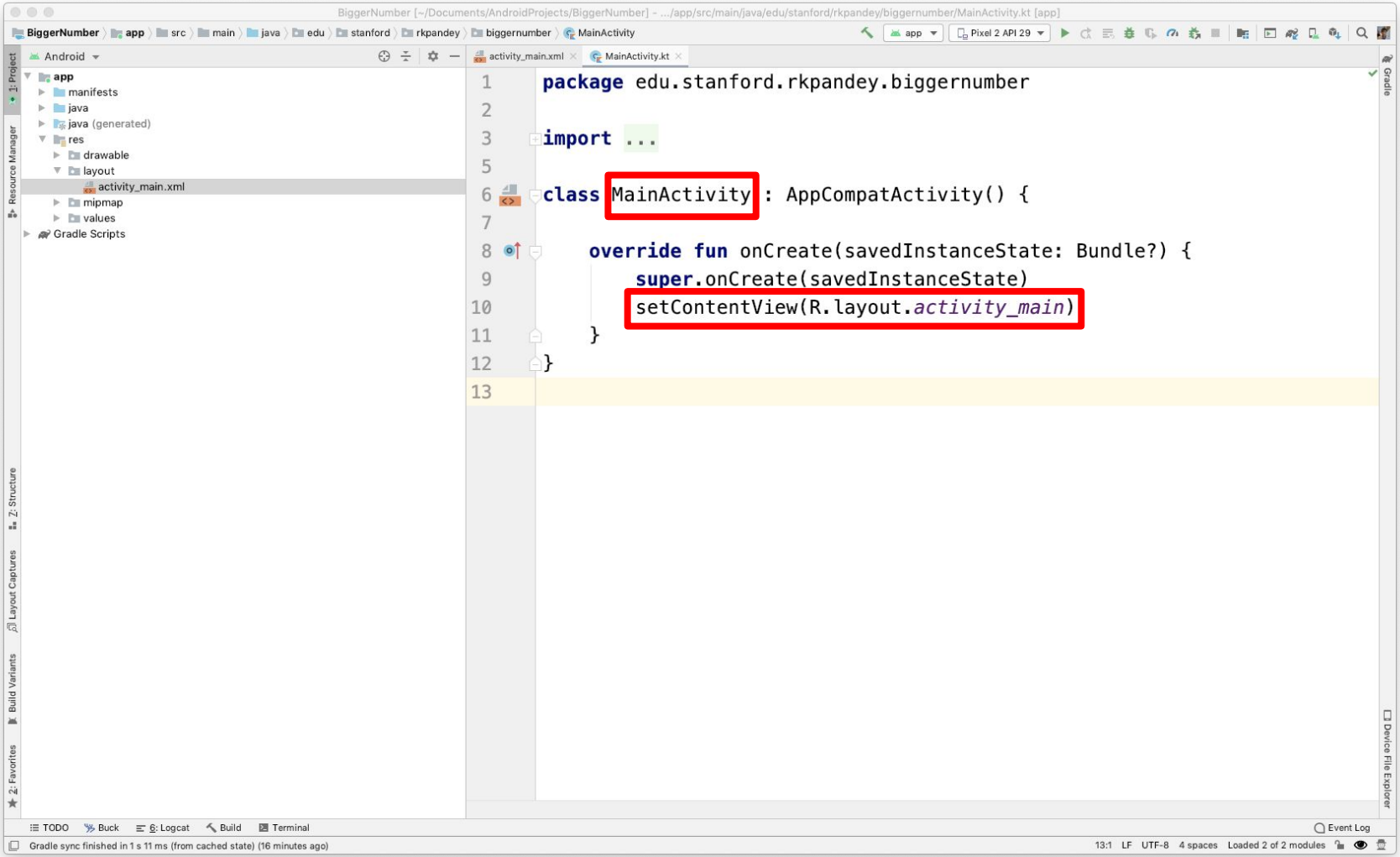
- **Bigger Number app**
- Kotlin overview


3:30
BiggerNumberDemo
Number Guessing Game
Press the button which contains the larger number!
9
4


3:30
BiggerNumberDemo
Number Guessing Game
Press the button which contains the larger number!
5
7
Correct!!


3:30
BiggerNumberDemo
Number Guessing Game
Press the button which contains the larger number!
8
4
Wrong


BiggerNumber [~/Documents/AndroidProjects/BiggerNumber] - .../app/src/main/java/edu/stanford/rkpandey/biggernumber/MainActivity.kt [app]
BiggerNumber app src main java edu stanford rkpandey biggernumber MainActivity
app
Pixel 2 API 29
Android
app
manifests
java
java (generated)
res
drawable
layout
activity_main.xml
mipmap
values
Gradle Scripts
activity_main.xml
MainActivity.kt
1 package edu.stanford.rkpandey.biggernumber
2
3 import ...
5
6 class MainActivity : AppCompatActivity() {
7
8 override fun onCreate(savedInstanceState: Bundle?) {
9 super.onCreate(savedInstanceState)
10 setContentView(R.layout.activity_main)
11 }
12 }
13
1: Project
Resource Manager
Z: Structure
Layout Captures
Build Variants
2: Favorites
Gradle
Device File Explorer
TODO
Buck
6: Logcat
Build
Terminal
Event Log
Gradle sync finished in 1 s 11 ms (from cached state) (16 minutes ago)
13:1 LF UTF-8 4 spaces Loaded 2 of 2 modules

Activity ⟷ Layout Communication

MainActivity.kt

```
1  package edu.stanford.rkpandey.dummyproject
2
3  import ...
6
7  class MainActivity : AppCompatActivity() {
8
9      override fun onCreate(savedInstanceState: Bundle?) {
10         super.onCreate(savedInstanceState)
11         setContentView(R.layout.activity_main)
12
13         tvHelloWorld.text = "Updated text!"
14     }
15 }
16
```

activity_main.xml

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <LinearLayout
3      xmlns:android="http://schemas.android.com/apk/res/android"
4      android:layout_width="match_parent"
5      android:layout_height="match_parent"
6      android:orientation="vertical">
7
8      <TextView
9          android:id="@+id/tvHelloWorld"
10         android:layout_width="wrap_content"
11         android:layout_height="wrap_content"
12         android:text="Hello World!" />
13
14 </LinearLayout>
```

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- **Kotlin overview**

What is Kotlin?

- Programming language developed by JetBrains, 1.0 released in 2016
  - In contrast, Java was released in 1995 by Sun Microsystems
- Statically typed, object oriented
- Incorporated lessons from the widespread use of Java
- Top priority for Kotlin is **pragmatism**
  - Inter-operates with Java by running on the JVM

Why Kotlin- “follow the community”

- Google I/O 2017: Kotlin support for Android
  - Google I/O 2019: Android will be “Kotlin-first”
- More and more companies are adopting Kotlin
- Potential growth outside the world of Android as well
- Kotlin will make you a better Java developer

Why Kotlin- “follow the tech”

- Concise
- Safe
- Interoperable
- Tool-friendly
- (Android) Kotlin extensions

Get last element of a list

```
val myList = listOf(42, 91, 51)

myList.get(myList.size - 1)

myList[myList.size - 1]

myList[myList.lastIndex]

myList.last()
```

Why Kotlin [repo]

- Type inference
- Immutability
- Null safety

Type inference

Java

```
String first = "Jane";
String last = "Smith";
int age = 35;

List<String> friends =
Arrays.asList("April",
"John");
```

Kotlin

```
val first: String = "Jane"
val last = "Smith"
val age = 35

val friends = listOf("April", "John")
```

Immutability

Java

```
int age = 35;
age += 1;
```

Kotlin

```
var age = 35
age += 1
```

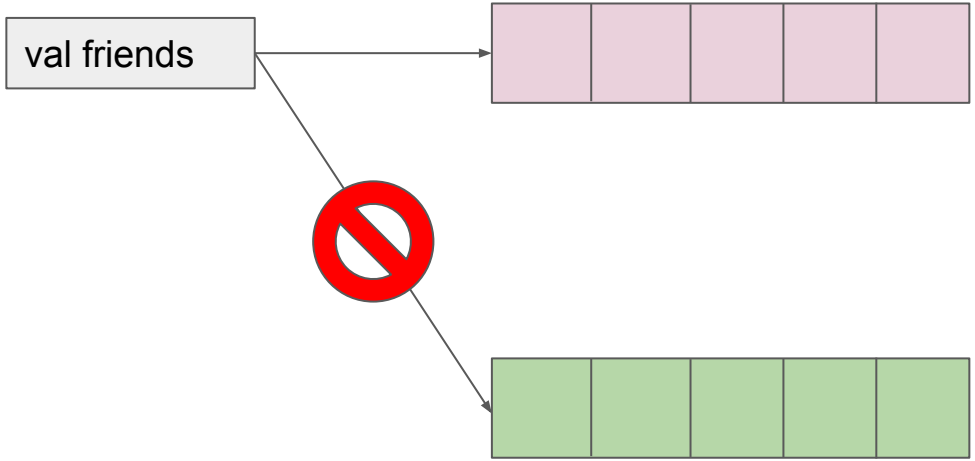
Java

```
List<String> friends =
Arrays.asList("April",
"John");

friends = Arrays.asList("May",
"Mark");

friends[0] = "June"
```

Kotlin

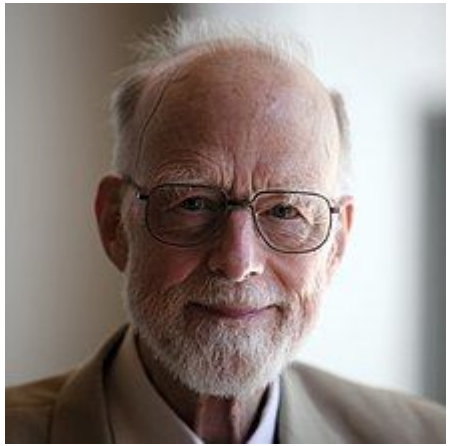
```
val friends = mutableListOf("April",
"John")

friends[0] = "May"
```

val vs var



Nullability

- “I call it my billion-dollar mistake”
  - Tony Hoare
- Kotlin adds null checks at compile-time rather than run-time



Nullability in Kotlin

Java

```
String name = null;
int length = name.length();     //  runtime crash
if (name != null) {
  int length = name.length();  // ok
}
```

Kotlin

```
val bad: String = null          //  compiler error!
val name: String? = null        // ok
val lengthBad = name.length()   //  compiler error!
val length1 = name?.length() ?: 0
if (name != null) {
  val length2 = name.length()
}
```

Practice: gist

```
data class ExamResult(val name: String, val score: Int)
```

Extension functions

Extend a class with new functionality without having to inherit from the class

```
fun <T> List<T>.secondToLast(): T? {
    if (this.size < 2) {
        return null
    }
    return this[this.size - 2]
}
```

Other nice features

- Data classes
- Single expression functions
- Automatic setters and getters
- Wrapping Java primitives into objects:
  - Byte, Short, Int, Long, Float, Double, Char, Boolean
  - Still uses primitive under the hood for performance

Prep for next week

- Code LeetCode problems with Kotlin
  - Two Sum
  - Water container

- Android Studio shortcuts video