CS194A

Android Programming Workshop

Lecture 3: April 22, 2020
Rahul Pandey

Outline

- Logistics
- Layouts review
- ImageView
- RecyclerView

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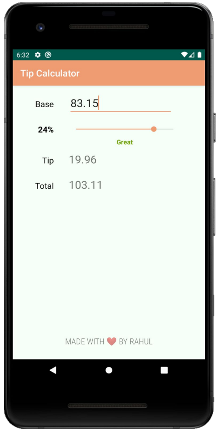
- **Logistics**
- Layouts review
- ImageView
- RecyclerView



6:32

Tip Calculator

Base 83.15

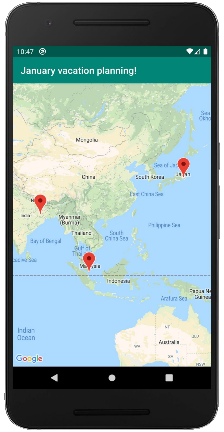
24%

Great

Tip 19.96

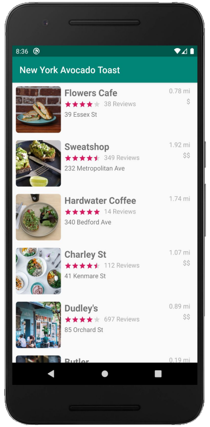
Total 103.11

MADE WITH ❤ BY RAHUL



10:47

January vacation planning!



8:36

New York Avocado Toast

Flowers Cafe ★★★★☆ 38 Reviews 39 Essex St 0.78 mi $

Sweatshop ★★★★½ 349 Reviews 232 Metropolitan Ave 1.92 mi $$

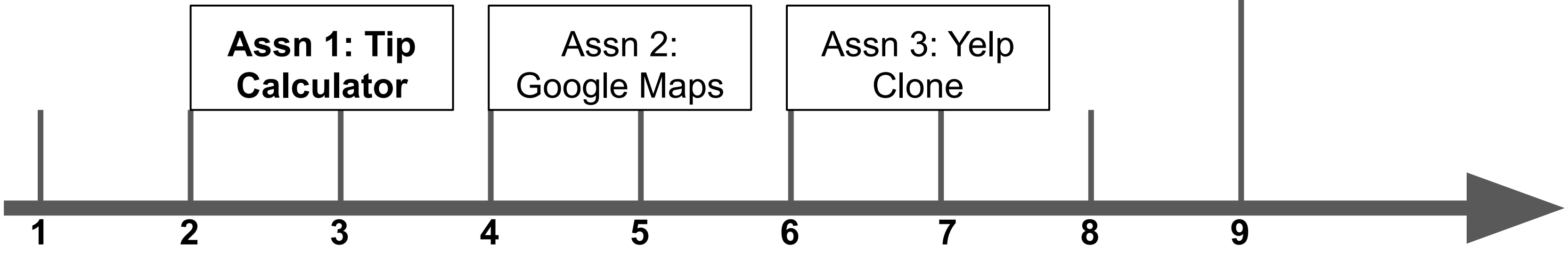
Hardwater Coffee ★★★★★ 14 Reviews 340 Bedford Ave 1.74 mi

Charley St ★★★★½ 112 Reviews 41 Kenmare St 1.07 mi $$

Dudley's ★★★★☆ 697 Reviews 85 Orchard St 0.89 mi $$

Butler 0.19 mi

Industry panel discussion



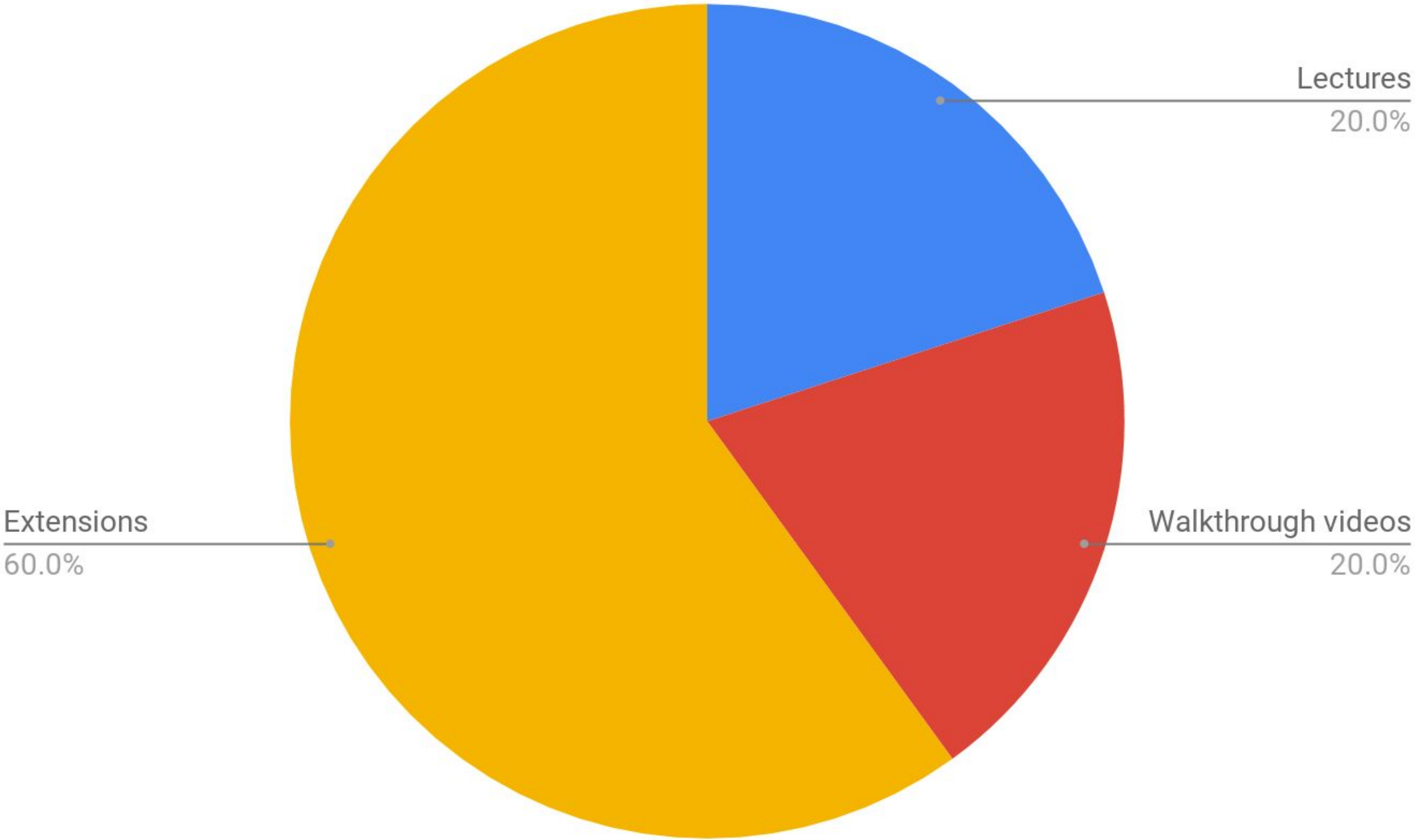
Assn 1: Tip Calculator

Assn 2: Google Maps

Assn 3: Yelp Clone

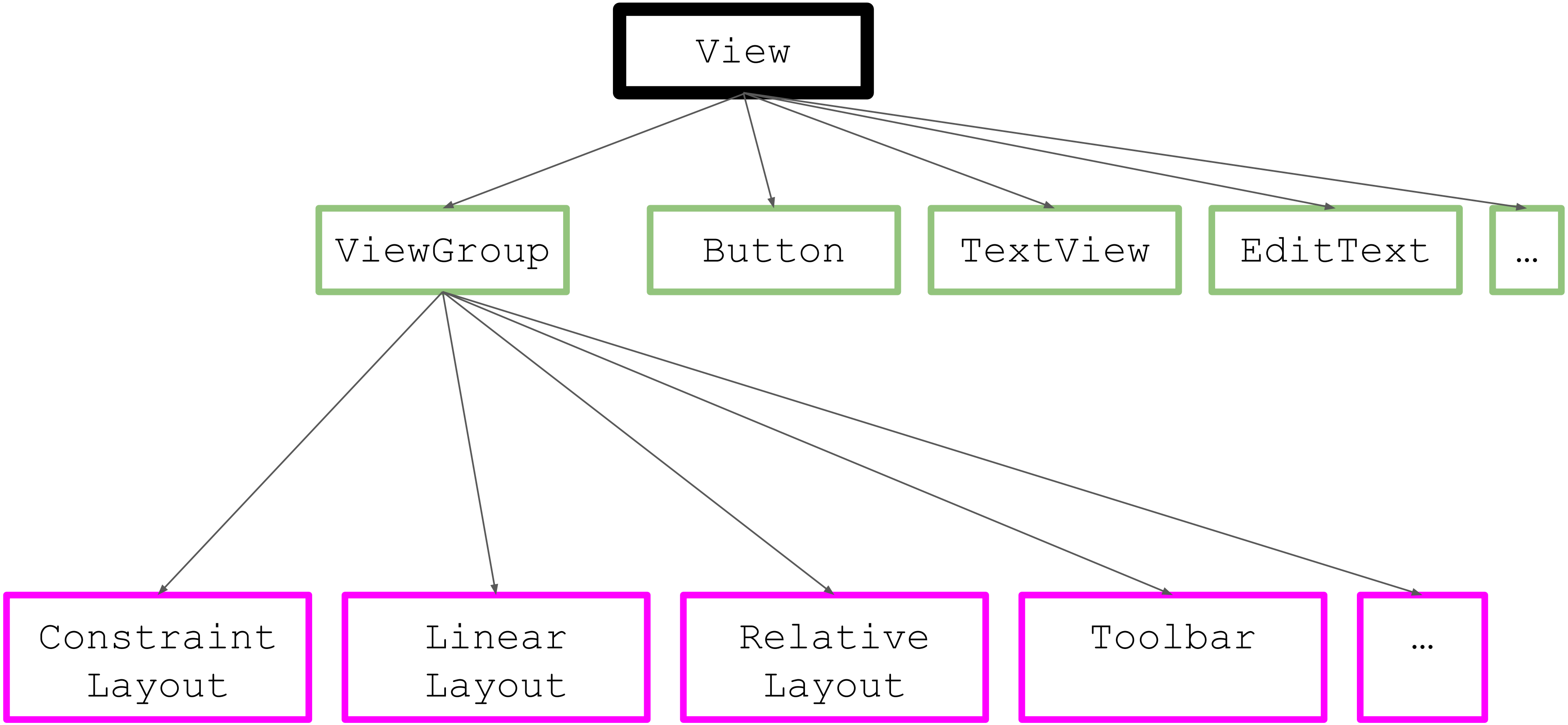
1 2 3 4 5 6 7 8 9

Week #


Lectures
20.0%
Walkthrough videos
20.0%
Extensions
60.0%

Outline

- Logistics
- **Layouts review**
- ImageView
- RecyclerView



View

ViewGroup

Button

TextView

EditText

…

Constraint Layout

Linear Layout

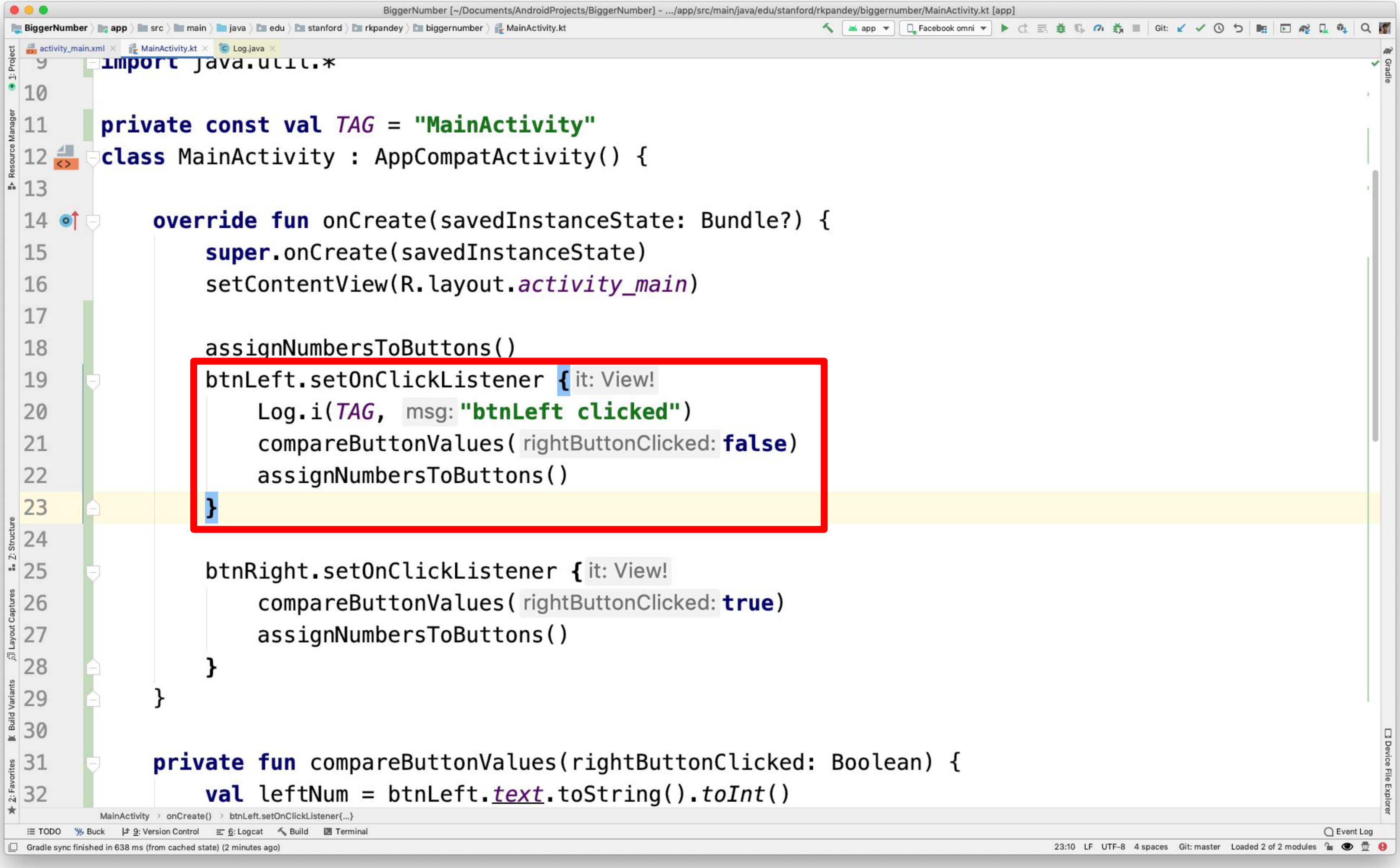
Relative Layout

Toolbar

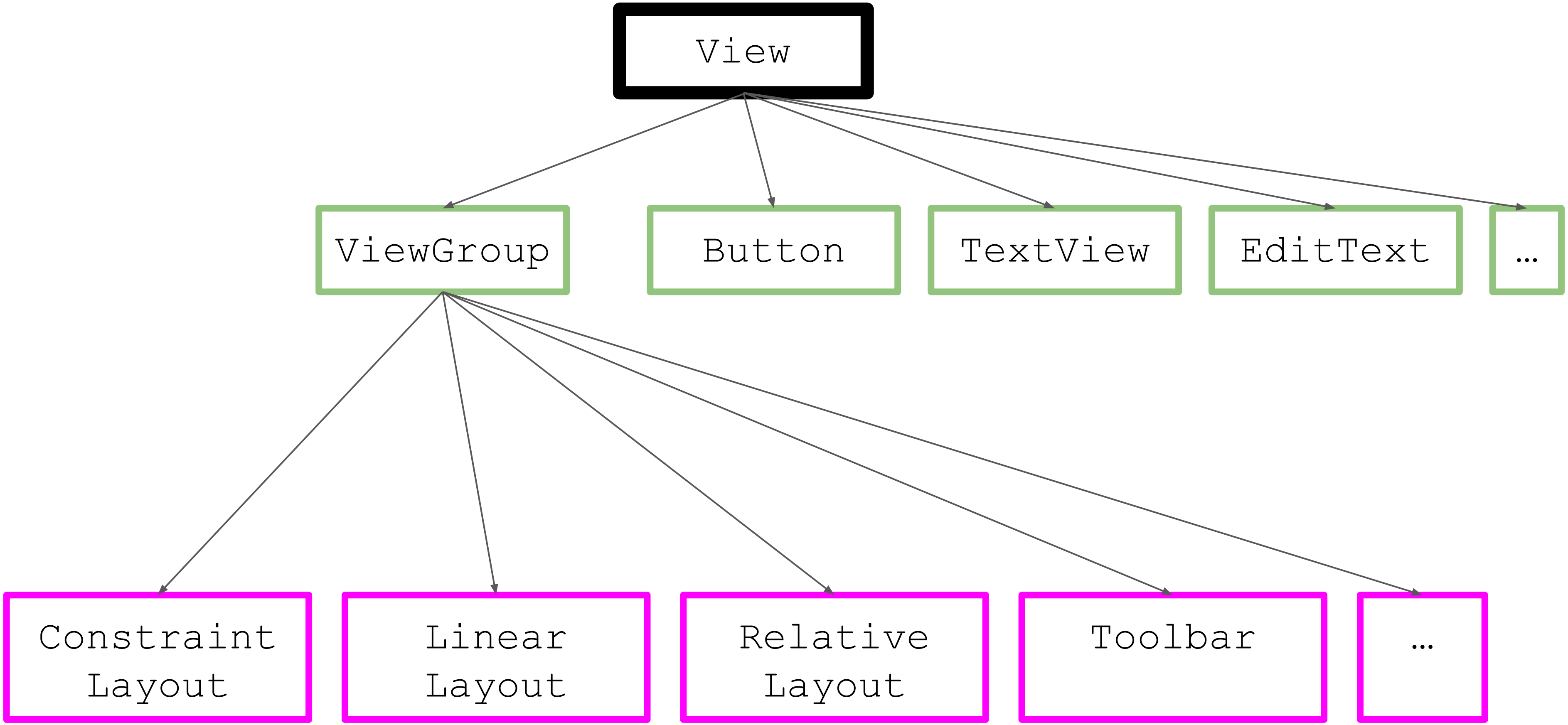
…

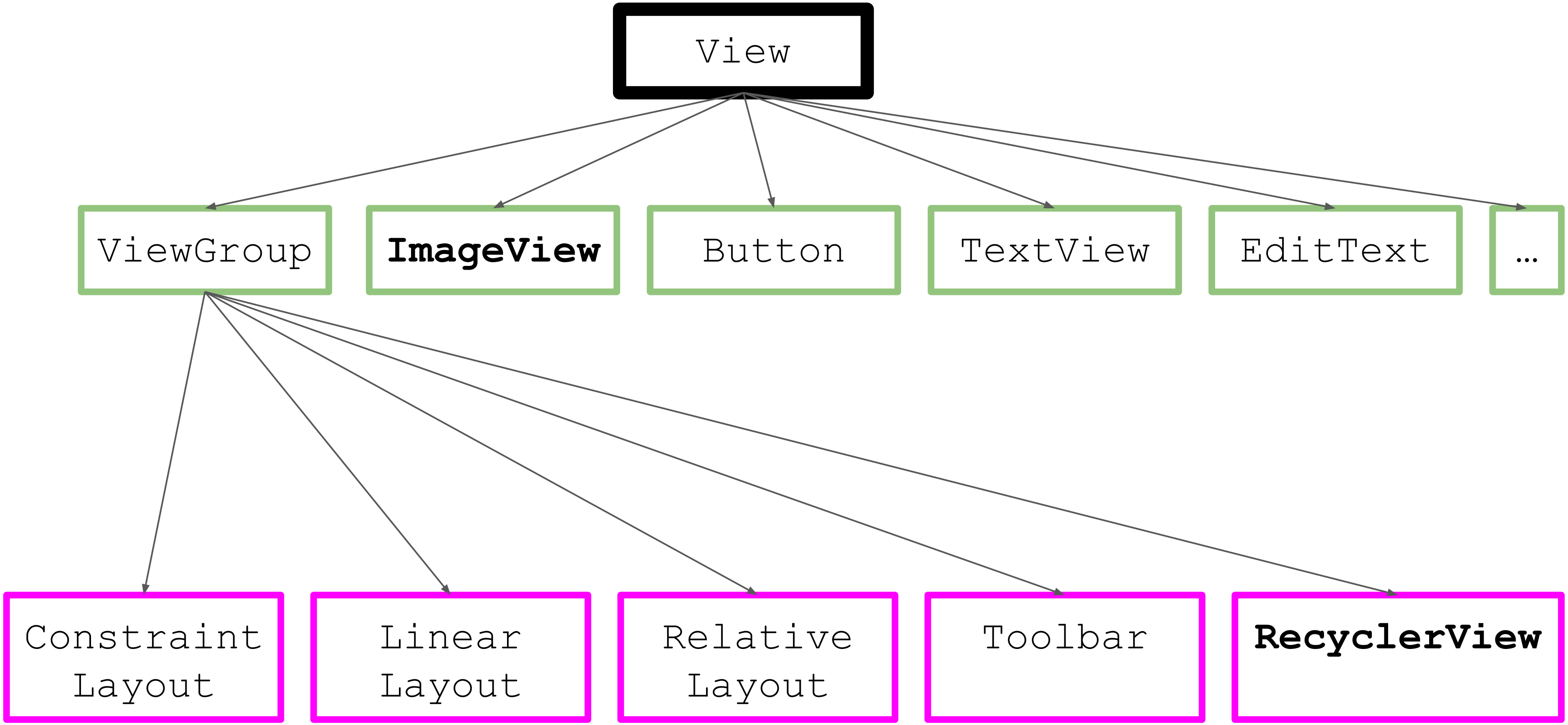
Views and ViewGroups

- Can be declared in layout XML file
- Don’t waste time memorizing attribute names
- Added programmatically in Kotlin


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.kt
app
Facebook omni
Git:
activity_main.xml
MainActivity.kt
Log.java
1: Project
Resource Manager
Z: Structure
Layout Captures
Build Variants
2: Favorites
Gradle
Device File Explorer
MainActivity › onCreate() › btnLeft.setOnClickListener{...}
TODO
Buck
9: Version Control
6: Logcat
Build
Terminal
Event Log
Gradle sync finished in 638 ms (from cached state) (2 minutes ago)
23:10 LF UTF-8 4 spaces Git: master Loaded 2 of 2 modules

```kotlin
import java.util.*

private const val TAG = "MainActivity"
class MainActivity : AppCompatActivity() {

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

        assignNumbersToButtons()
        btnLeft.setOnClickListener { it: View!
            Log.i(TAG, msg: "btnLeft clicked")
            compareButtonValues( rightButtonClicked: false)
            assignNumbersToButtons()
        }

        btnRight.setOnClickListener { it: View!
            compareButtonValues( rightButtonClicked: true)
            assignNumbersToButtons()
        }
    }

    private fun compareButtonValues(rightButtonClicked: Boolean) {
        val leftNum = btnLeft.text.toString().toInt()
```


View
ViewGroup
Button
TextView
EditText
...
Constraint Layout
Linear Layout
Relative Layout
Toolbar
...


View
ViewGroup
ImageView
Button
TextView
EditText
...
Constraint Layout
Linear Layout
Relative Layout
Toolbar
RecyclerView

Outline

- Logistics
- Layouts review
- **ImageView**
- RecyclerView

ImageView

- Displays image resources
- Why does it require special handling?
  - Memory usage
  - Scale type
  - Fetching remote images

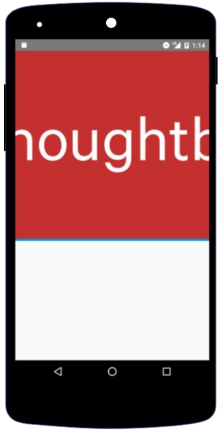
ImageView - memory usage

- Be mindful of memory usage
  - Pixel phone: 12 MP camera
  - 4048 * 3036 pixels, 4 bytes per pixel = 48 MB memory
  - This can crash your app on older devices!
- Libraries such as **Glide** will handle this for you

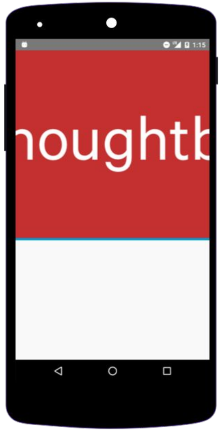
ImageView - scale type

CENTER	center the image in the view, no scaling
CENTER_CROP	Scale the image uniformly so both width/height are **greater than or equal** to the view width/height
CENTER_INSIDE	Scale image uniformly so both width/height are **less than or equal** to the view width/height
FIT_CENTER	(**Default**) Ensure the image fits entirely inside the view, similar to CENTER_INSIDE
FIT_XY	Scale X and Y dimensions of the image independently to exactly match the view dimensions (may **change the aspect ratio**)

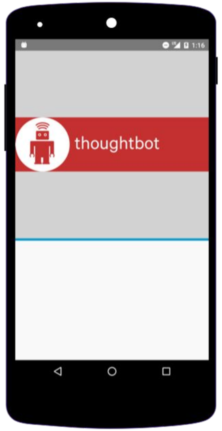
center



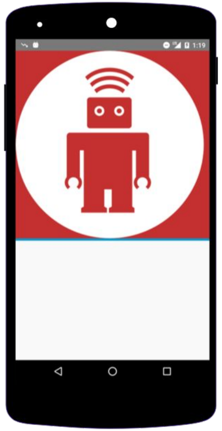
center crop



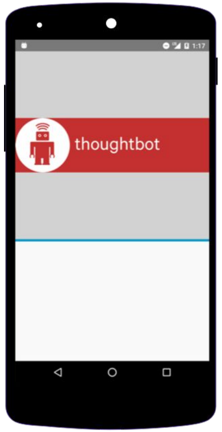
center inside



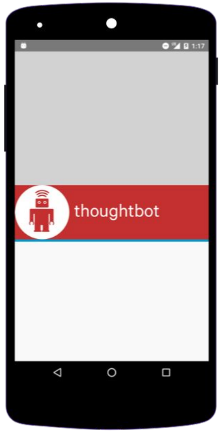
matrix



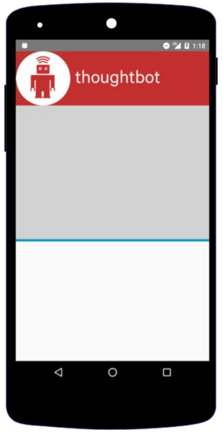
fit center



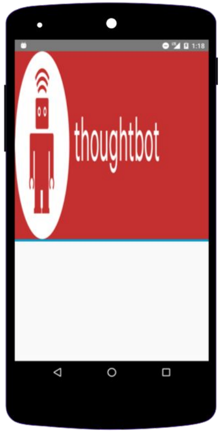
fit end



fit start



fitxy



Source:
ThoughtBot

ImageView - remote images

- We’ll often want to render an image based on a URL
- Network requests are an example of an asynchronous operation
  - Downloading the image must be down on a background thread
  - Translate the image into a bitmap
- Stanford image url

Image loading libraries

- Can fetch, decode, and display bitmaps in your app
- Can also do image transformations, e.g. rounded corners
- Popular libraries
    - **Glide** - from Google
    - **Picasso** - from Square
    - **Fresco** - from Facebook

Outline

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- ImageView
- **RecyclerView**

RecyclerView

- The recommended way to display a list of items in Android
- Released with Android Lollipop in 2014
- Supercedes the ListView component

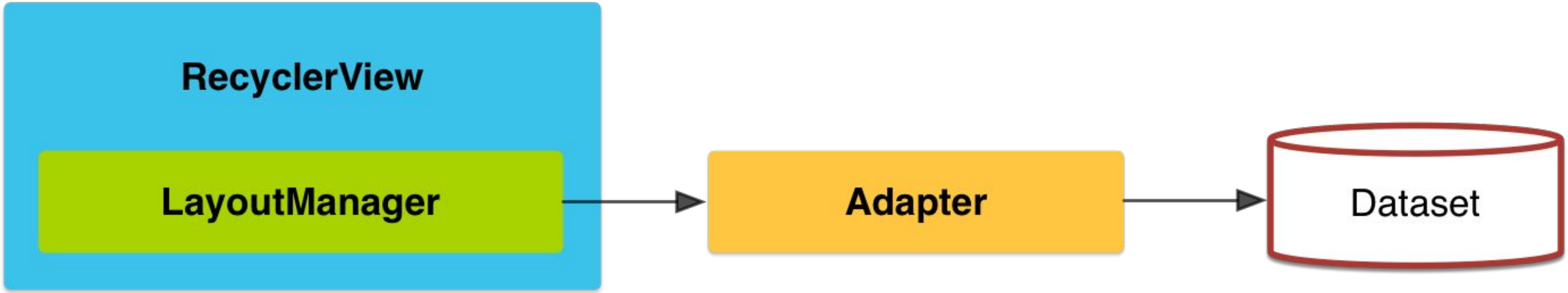
RecyclerView- why so complex?

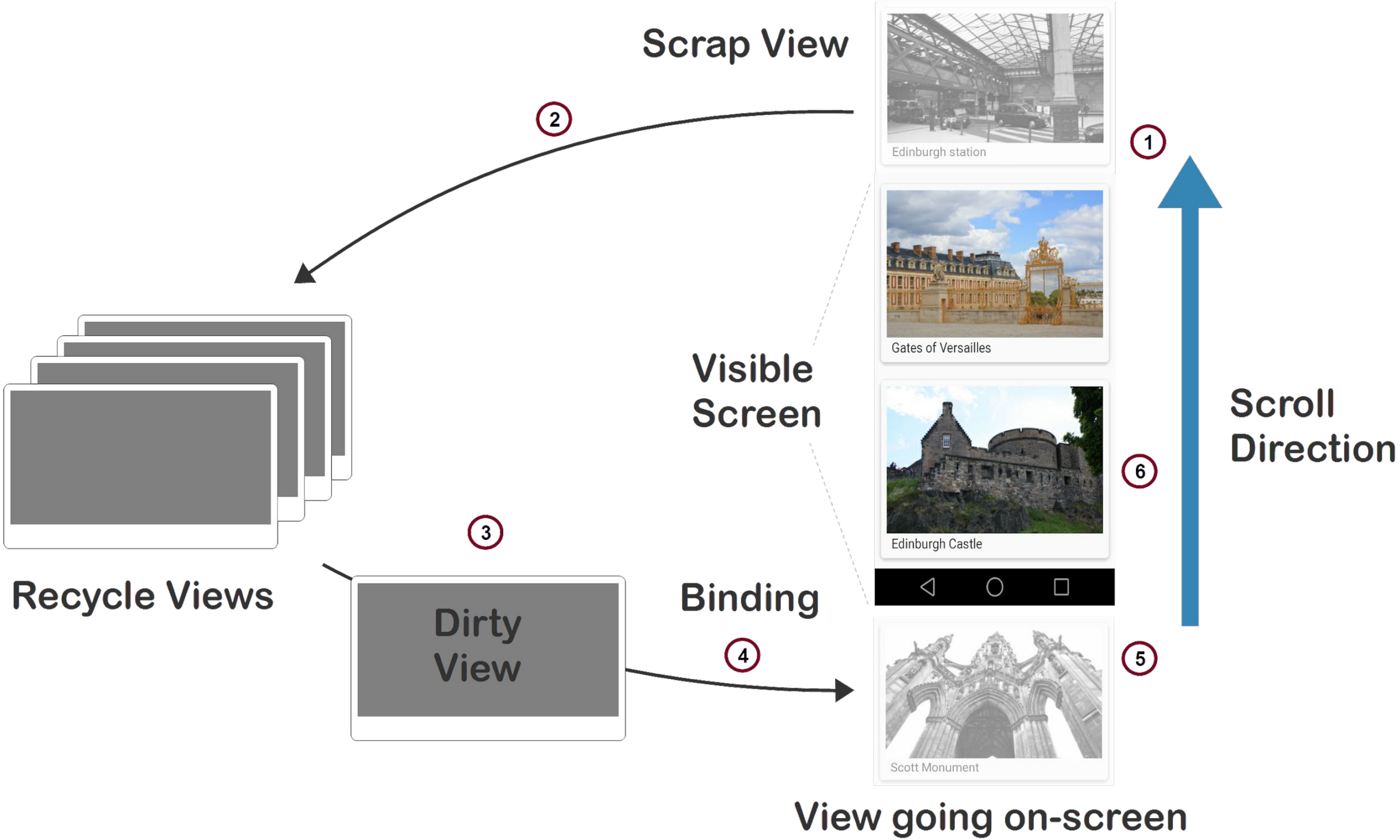
- Memory usage concerns
- Variety of ways to display and animate
- Need fine-grained control over individual list elements and click listeners

RecyclerView vs ListView

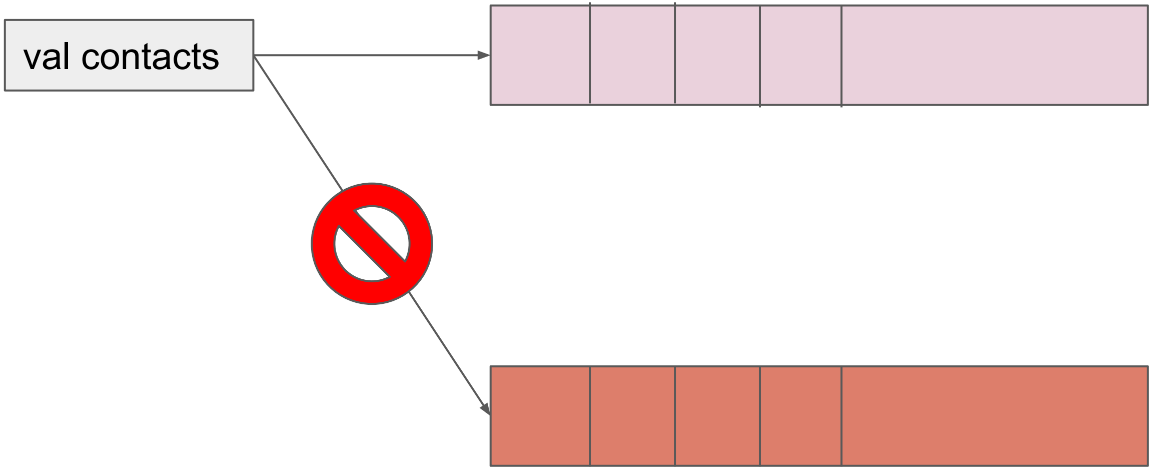
- (+) More efficient by default (use the ViewHolder pattern)
- (+) More flexible for styling + animations
- (+) Separation of concerns
- (-) More complicated

RecyclerView Components




Scrap View
Edinburgh station
1
2
Gates of Versailles
Visible
Screen
Scroll
Direction
Edinburgh Castle
6
3
Recycle Views
Dirty
View
Binding
4
5
Scott Monument
View going on-screen

val vs var



Further reading

- RecyclerView in <50 lines of code: videos
- Codepath guide: link
- Android developer guide: link

Prep for next week

- Complete extensions for the Tip Calculator by Sunday and reply to the email with your partner

- Submit feedback for your partner before next lecture