



Waterford Institute *of* Technology
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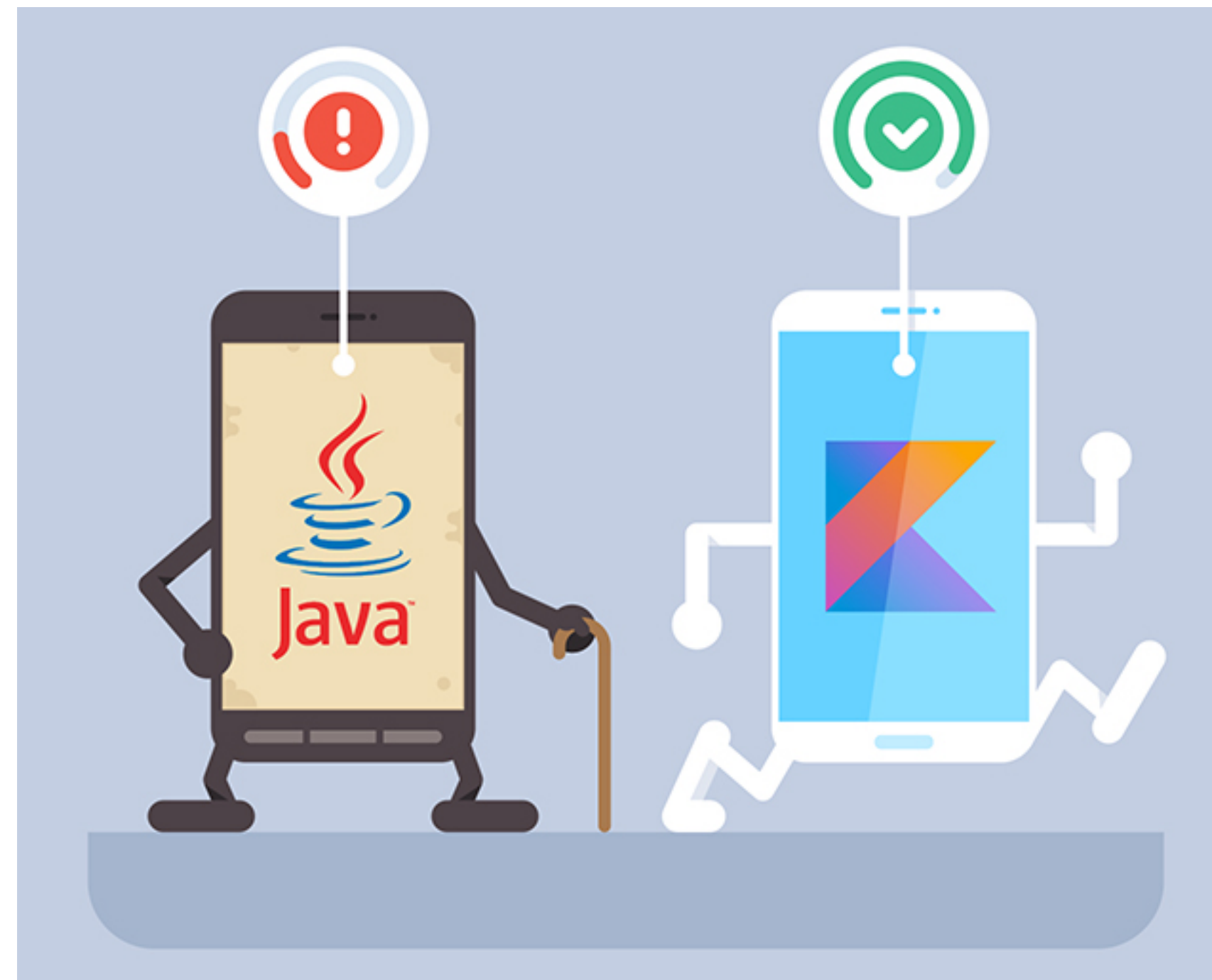


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2018

Android Programming with Kotlin

Course Mission: *Accelerate into Android App development leveraging the power & expressiveness of Kotlin*



- 00: Overview
 - Module Overview
- 01: Activities
 - Kotlin Context
 - Evolution
 - Convergence
 - Android Activities
 - Android: Foundation
 - Lab-01 Activities
- Adapters
 - Kotlin Fundamentals
 - Kotlin Structure
 - Basic Syntax
 - Kotlin Deep Dive
 - Android Adapters
 - Android Application Object
 - RecyclerView + Adapters
 - Lab-02 Adapters
- 03: Models
 - Kotlin Idioms
 - Idioms
 - J2K Variables & Expressions
 - Android Models
 - Toolbar
 - Memory Store
 - Adapter + Listener
 - Parcelable
 - Lab-03 Models
- 04: Images
 - Kotlin Deep Dive
 - Types
 - J2K Collections
 - Images
 - Resources
 - Model Updates
 - Images
 - Lab-04 Images
- 05: Maps

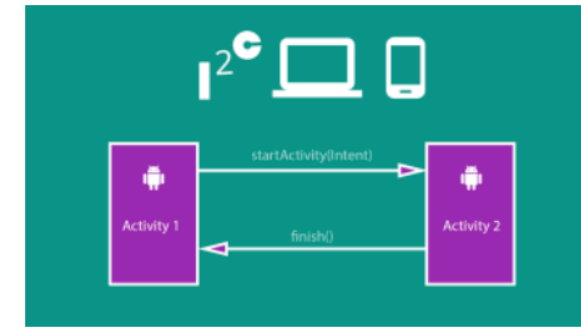
Android Programming with Kotlin

Eamonn de Leastar, WIT



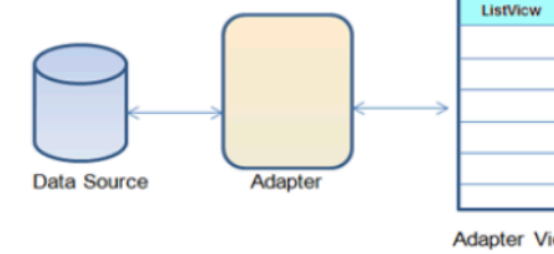
Look at the
in Kotlin.
pages in
selecting
is from the
y.

01: Activities



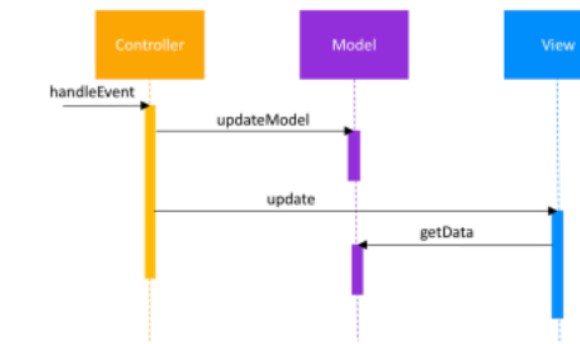
Trace the influences on the Kotlin Programming language. Create and explore a starter Kotlin Android application in detail.

Adapters



Look at Kotlin in more depth. Deep dive into some of its features. Extend the app to manage lists of placemarks using the adapter pattern.

03: Models



Examine key Kotlin Idioms. Start comparing simple Java & Kotlin statements. Introduce a more complete model into Placemark.

05: Maps



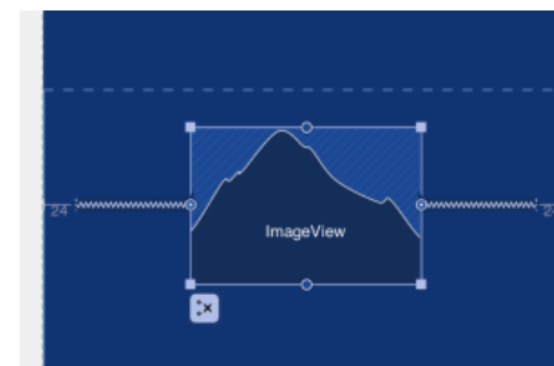
Review Kotlin Packages + Control flow. Introducing Google Maps into and android app.

06: Persistence



Kotlin Classes, inheritance, interfaces. Properties & fields. New Placemark Store class to save placemarks to the file system.

07: Layouts



Kotlin Data classes, sealed classes & extensions. Objects & Delegation. Include a Map widget onto an activity. Manage the map markers.

“Building Android applications is both exciting and challenging. The diversity of the applications one can build is fascinating, however their complexity can be overwhelming. Kotlin, a new language fully supported by google, dramatically enhances the power and simplicity of the programmers task.”



Kotlin is:

Modern

Secure

Typesafe

Expressive

Concise

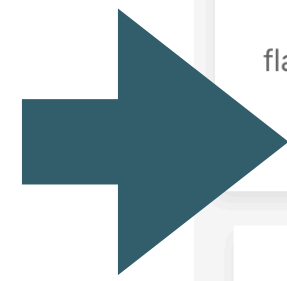





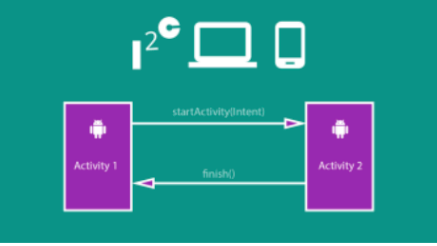

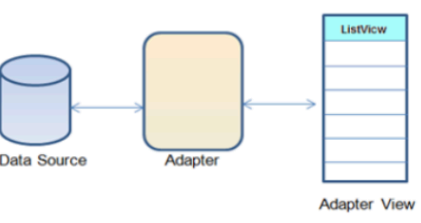

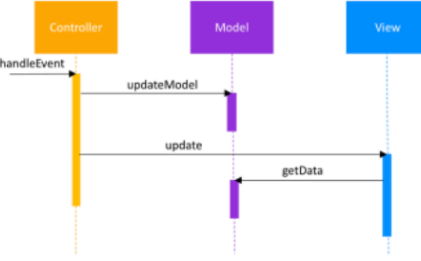







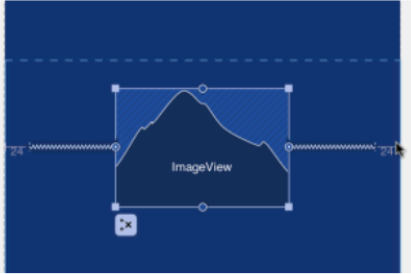










Assumptions:

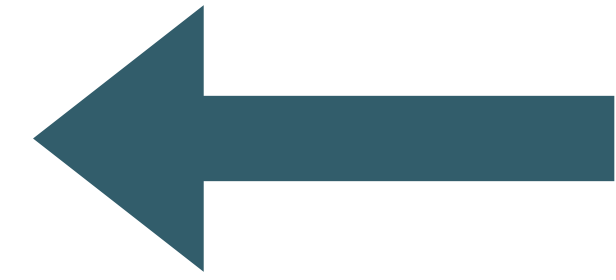
Intermediate level Java or
closely related language
skills

Accelerate into the
fundamentals of Kotlin we
need

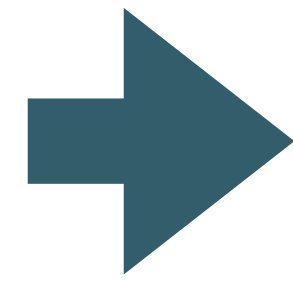
Every topic explores
specific Kotlin features *in
parallel* to android code




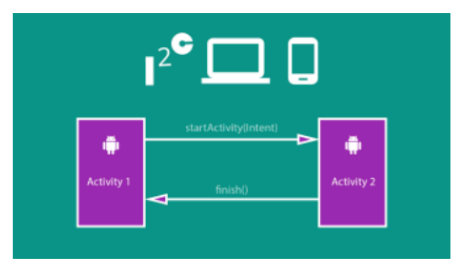

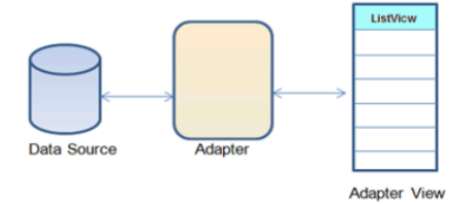

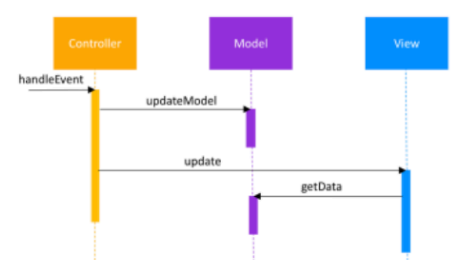
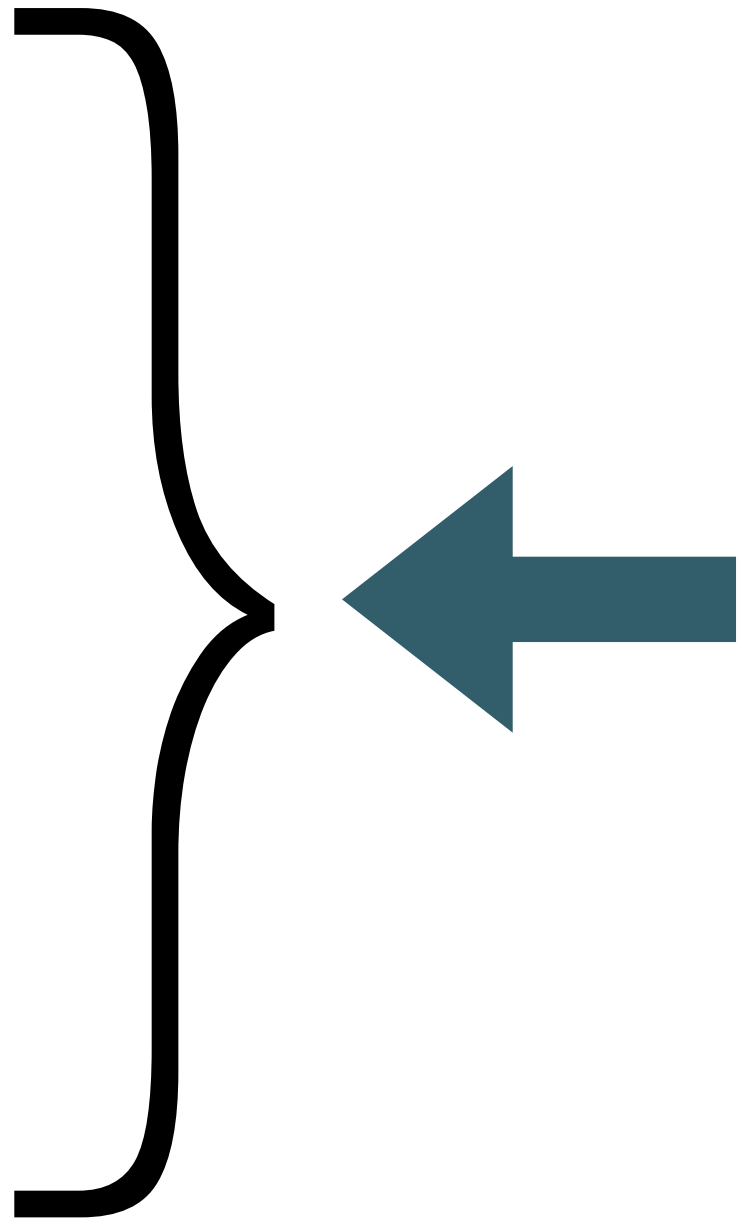







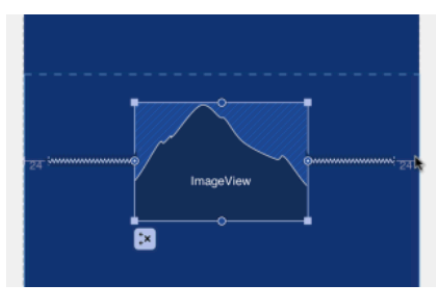








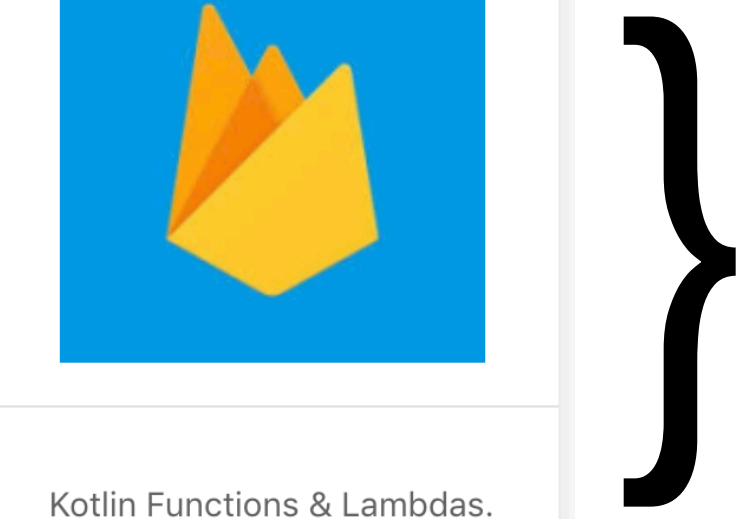


<p>00: Overview </p>  <p>Preview the module, get a flavour of Kotlin. Introduce the Android platform</p>	<p>01: Activities </p>  <p>Take the first steps with a Kotlin Android. Explore the source in detail.</p>	<p>02: Adapters </p>  <p>Look at Kotlin in more depth. Deep dive into some of its features. Extend the app to manage lists of placemarks using the adapter pattern.</p>	<p>03: Models </p>  <p>Examine key Kotlin Idioms. Start comparing simple Java & Kotlin statements. Introduce a more complete model into Placemark.</p>	
<p>04: Images </p>  <p>A more detailed look at the fundamental types in Kotlin. How to manage images in android, including selecting and displaying images from the phone gallery.</p>	<p>05: Maps </p>  <p>Review Kotlin Packages + Control flow. Introducing Google Maps into an android app.</p>	<p>06: Persistence </p>  <p>Kotlin Classes in detail. New Placemark Store class to save placemarks to the file system.</p>	<p>07: Layouts </p>  <p>Kotlin properties, fields, & interfaces. Constraint Layout. Introduce activity to display all placemark locations + details.</p>	
<p>08: Location </p>  <p>Kotlin visibility & extensions. Determine the device's current location & resolve in a map.</p>	<p>09: Rooms </p>  <p>Kotlin Data & Sealed classes, Generics. Android Architecture Components. The Room framework. PlacemarkStoreRoom implementation</p>	<p>10: Tracking </p>  <p>Kotlin Nested Classes, Enums and Objects. Tracking a user's current location. Supporting Landscape perspective.</p>	<p>11: Authentication </p>  <p>Kotlin Delegation. Support Authentication via the Firebase cloud service.</p>	<p>12: Cloud </p>  <p>Kotlin Functions & Lambdas. Moving the Placemark store to Firebase.</p>



Module Topics



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Delivered On Site

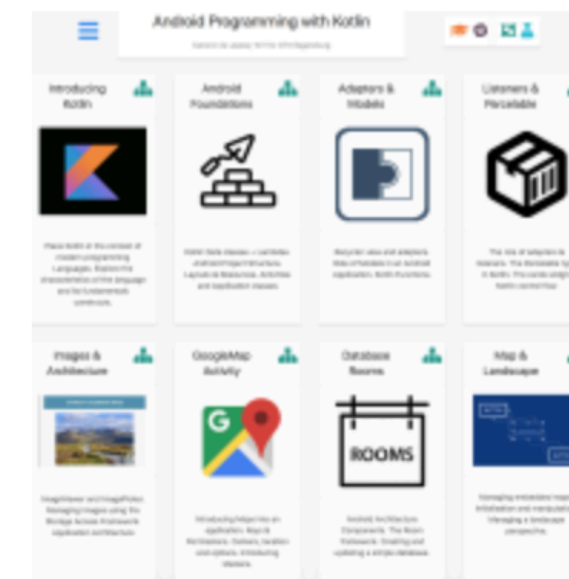
Delivered Online later

00: Overview



Preview the module, get a flavour of Kotlin. Introduce the Android platform

Module Overview



Outline of the structure and content of the module

Convergence



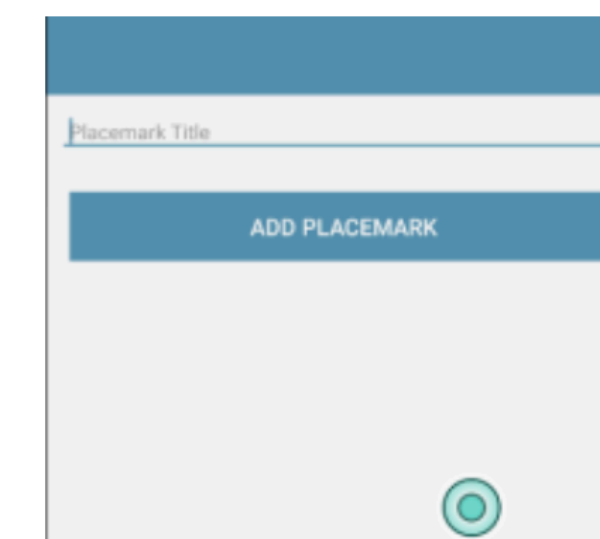
A simple algorithm expressed in Java, Groovy, Swift and Kotlin

Android Overview



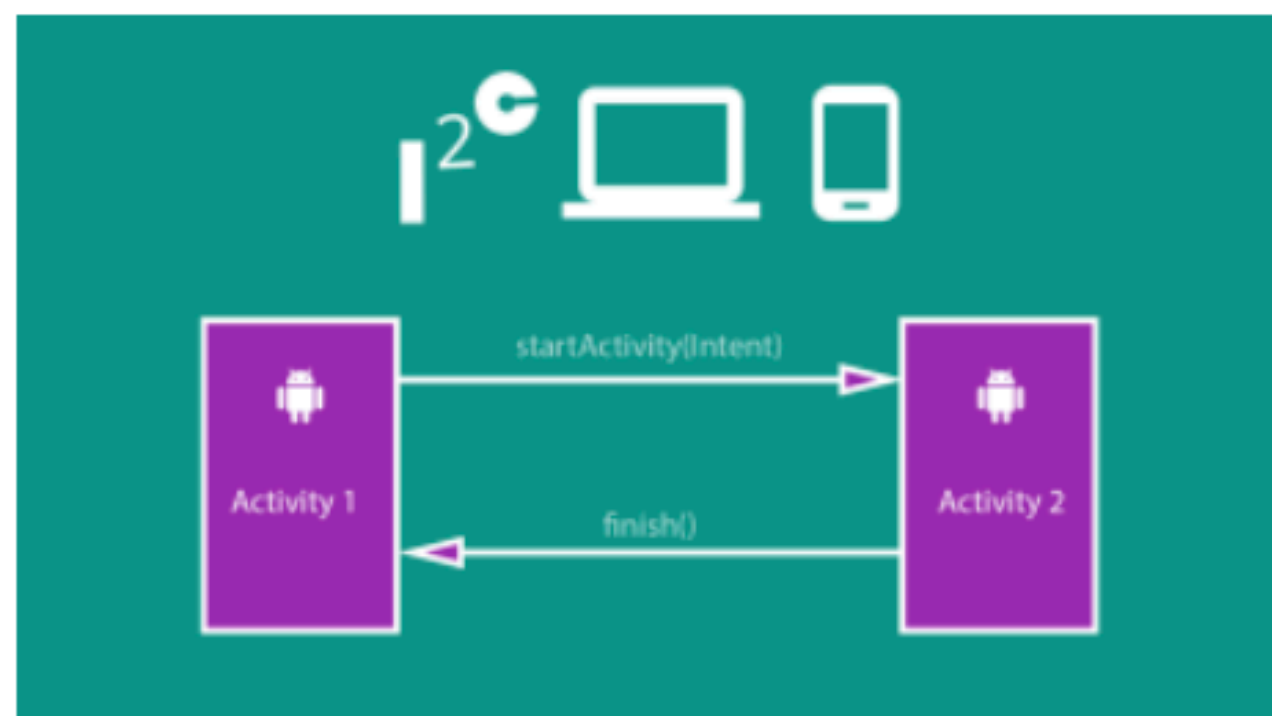
Introduction to the Android platform - its goals and major components

Lab-00 Studio



Download and configure Android Studio. Generate and run a sample application.

01: Activities



Take the first steps with a Kotlin Android. Explore the source in detail.

Anatomy

Explore the major features in an android application

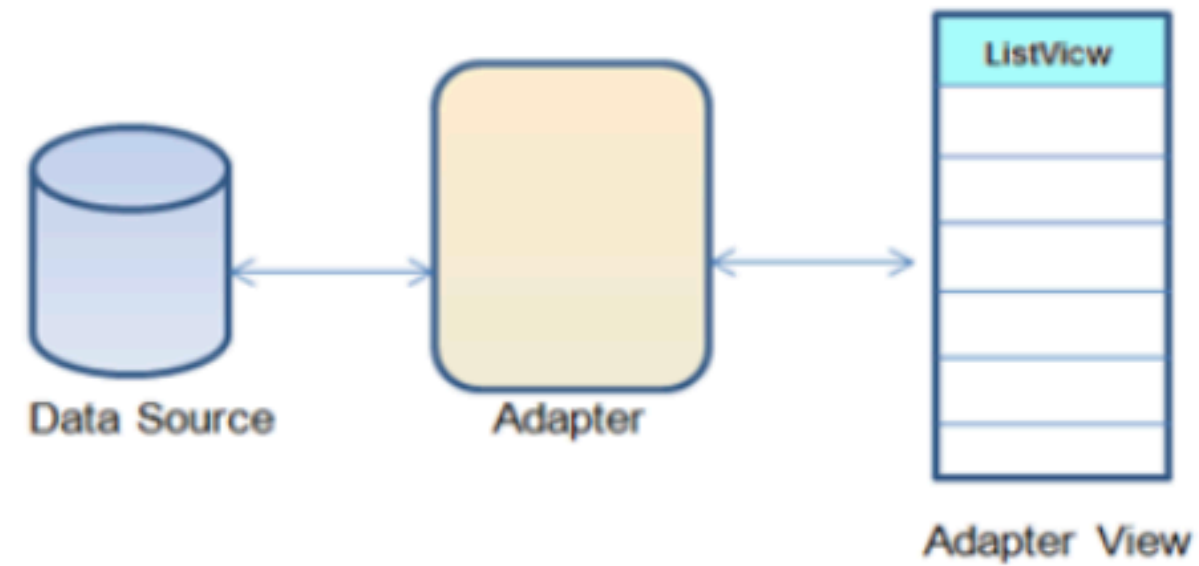
Foundation

A first look at the structure of a simple Kotlin Android application

Lab-01 Activities

Layout the PlacemarkActivity - supporting create/edit of placemarks

02: Adapters



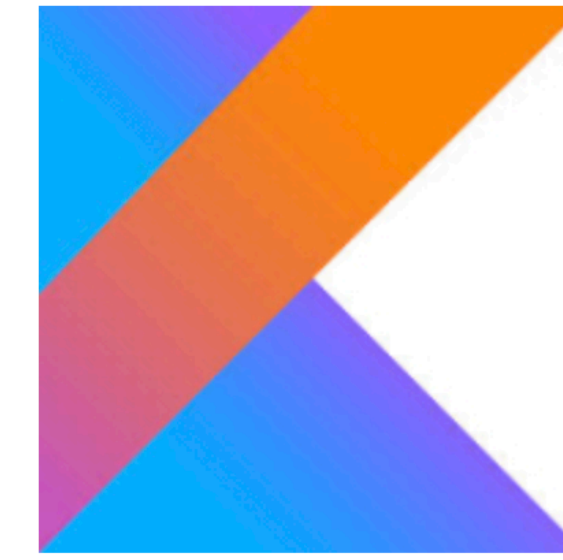
Look at Kotlin in more depth. Deep dive into some of its features. Extend the app to manage lists of placemarks using the adapter pattern.

Kotlin Structure



The fundamental characteristics of the language

Basic Syntax



Rapid tour of the basic syntax of Kotlin

Kotlin Deep Dive



A deep dive into some key Kotlin features: Data Classes & Lambdas

Android Application Object



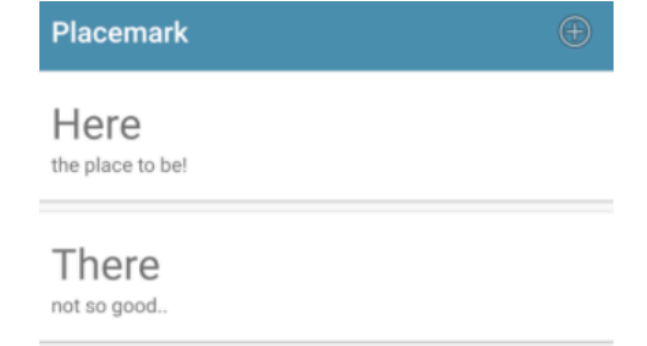
This class enables a global application object to be defined, accessible from all activities

RecyclerView + Adapters



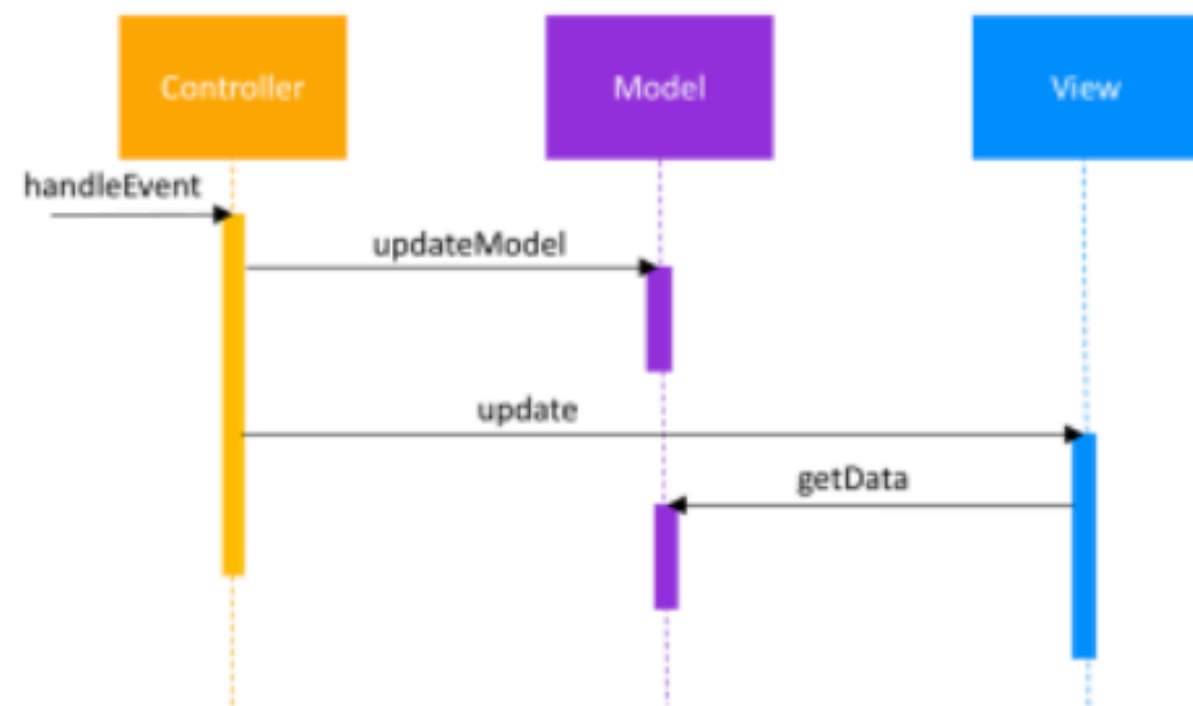
Managing lists is facilitated by the RecyclerView + Adapters - 2 key patterns in Android development

Lab-02 Adapters



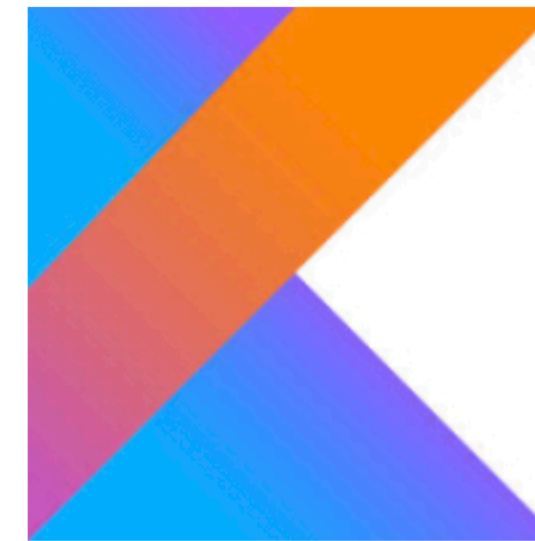
Introduce new activity to display a list of placemarks. Support adding to this list.

03: Models



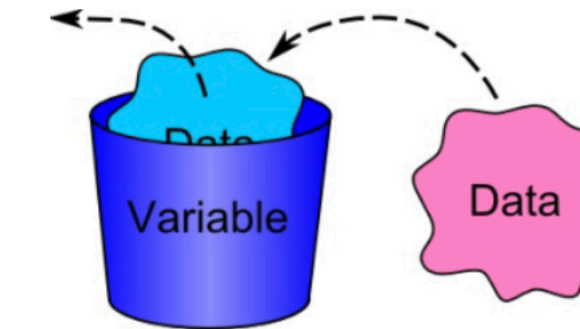
Examine key Kotlin Idioms. Start comparing simple Java & Kotlin statements. Introduce a more complete model into Placemark.

Idioms



A tour of the common idioms in Kotlin

J2K Variables & Expressions



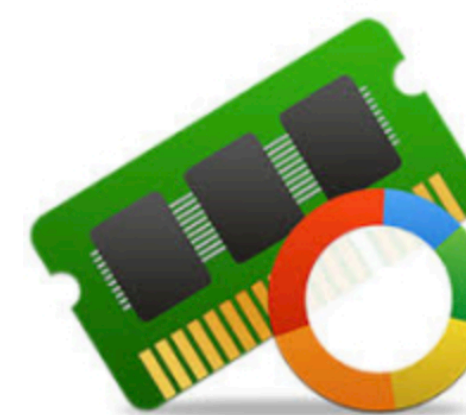
Snippets of the same code in Java & Kotlin

Toolbar



The Android Support Library implements AppCompatActivity + a range of general purpose components, including a Toolbar

Memory Store



Abstract the Placemarks data structure into PlacemarkStore interface + in-memory implementation.

Adapter + Listener



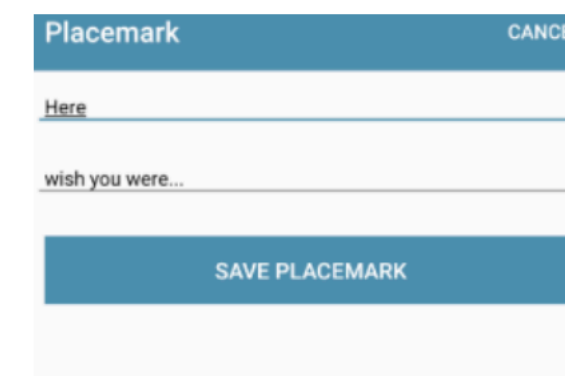
Equip the Adapter with a Listener interface. Use this interface to communicate from the adapter to the host Activity

Parcelable



Encapsulate model data for transmission between Activities

Lab-03 Models



Application object + Model classes to manage placemarks.

04: Images



A more detailed look at the fundamental types in Kotlin. How to manage images in android, including selecting and displaying images from the phone gallery.

Types



Summary of the basic types in the Kotlin programming language

J2K Collections



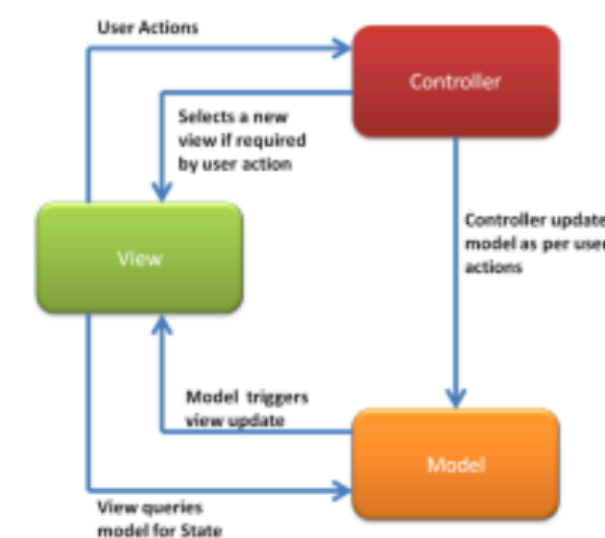
Collection examples: Java & Kotlin equivalents

Resources



A general term for all layout, strings, bitmaps and other XML artefacts in an Android Project

Model Updates



Creating and updating a Placemark. Updating the placemark list.

Images



Support selecting image from phone gallery, and then displaying them in an activity.

Lab-04 Images



Allow an image to be selected from the phones photos, and stored with the placemark

05: Maps



Review Kotlin Packages + Control flow. Introducing Google Maps into and android app.

Kotlin Packages



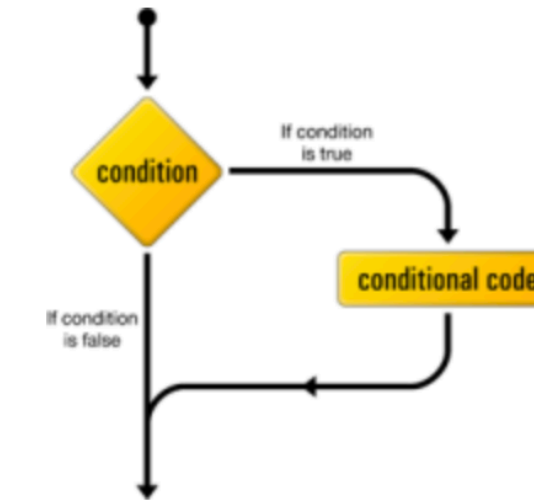
Source files start with a package declaration. This can be used to access (import) features from the source file.

Kotlin Control Flow



if, when, for and while statements

J2K Control Flow



Control flow examples in Java and Kotlin

App Structure



Key classes and relationships in the application.

Map Activity



Google Map Activity can be inserted into an app via a Wizard from Studio. API Keys must be acquired from google directly.

Cameras & Markers



These abstractions enable the map view to be manipulated programatically, and facilitate direct manipulation by the user.

Lab-05 MapActivity



Include a MapActivity, enabling the user to select the location of the placemark

06: Persistence



Kotlin Classes in detail. New Placemark Store class to save placemarks to the file system.

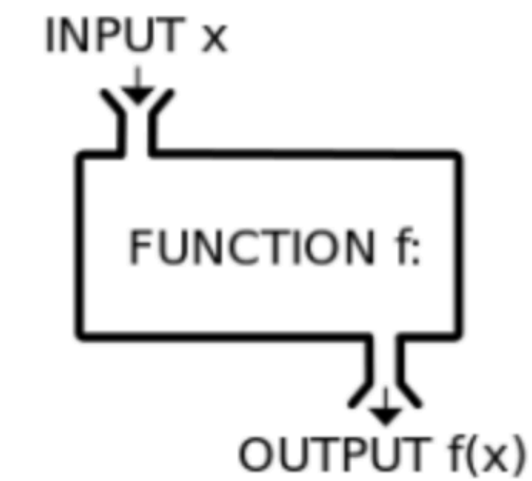
Classes & Inheritance



```
class class_name class_header {  
    class variables  
    secondary constructors  
    functions (methods)  
}
```

In kotlin, classes are more concise, explicit and fine-grained than Java

J2K: Functions



Functions in Java & Kotlin

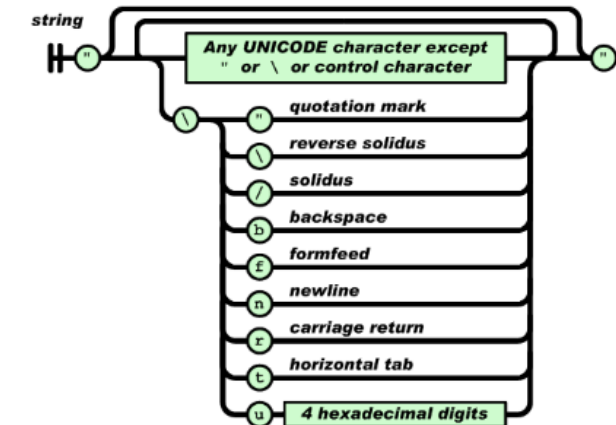
File Formats



```
<?xml version="1.0"  
encoding="UTF-8"?>  
  
<coffee objname="c1">  
  <name> mocha </name>  
  <shop> costa </shop>  
  <price> 2.0 </price>  
  <rating> 3.5</rating>  
  <favourite> 0 </favourite>  
</coffee>
```

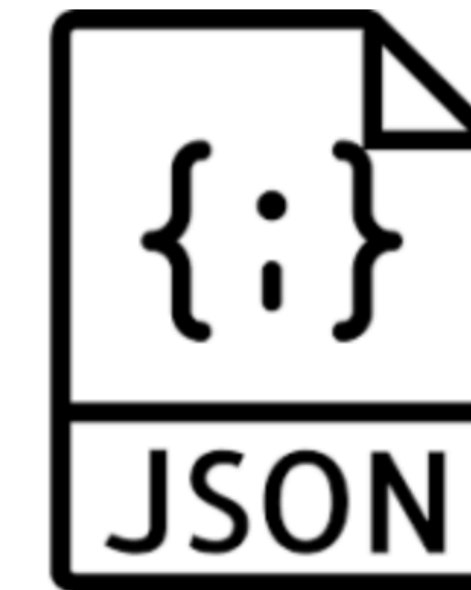
When a simple file persistence strategy, CSV, Name/Value, YAML, XML & JSON are all potential candidate formats for file-based storage.

JSON



A detailed look at the syntax of JSON

JSON Store



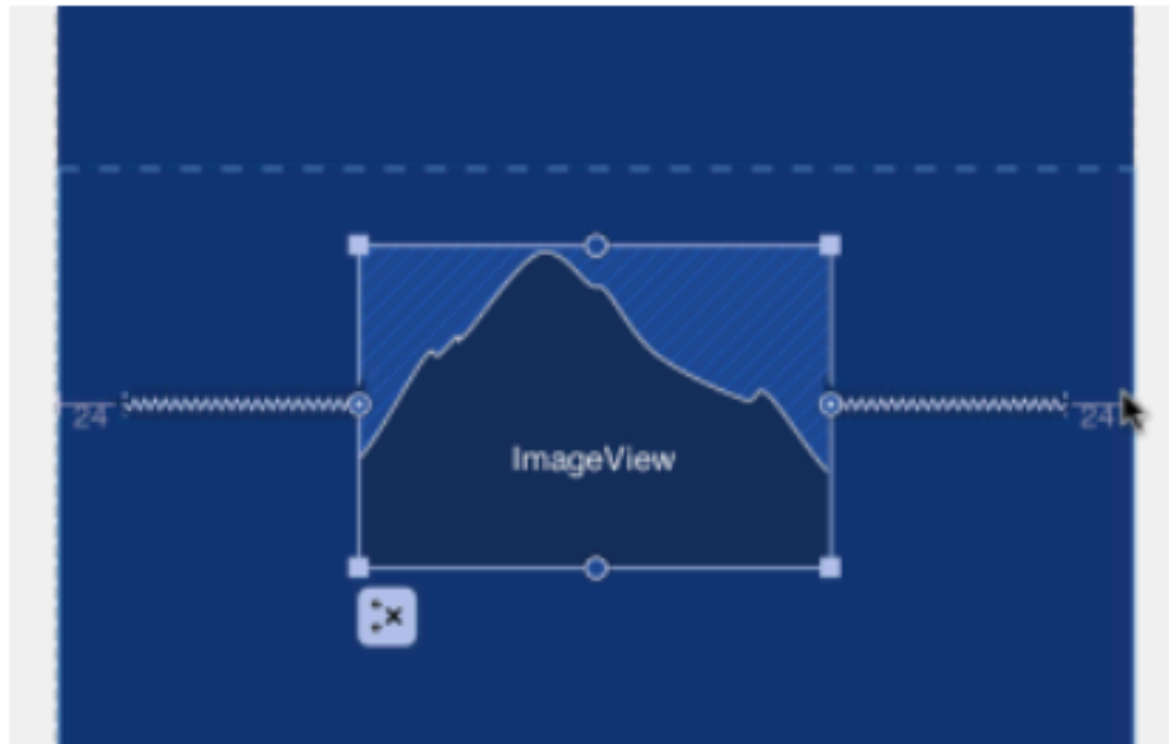
A new PlacemarkStore implementation - PlacemarkJSONStore - to persist placemarks to a JSON file.

Lab-06 JSON



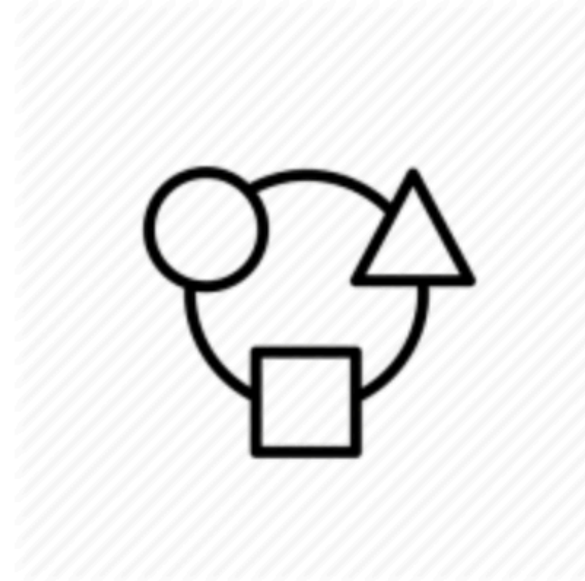
Save and restore placemarks from a JSON formatted file

07: Layouts



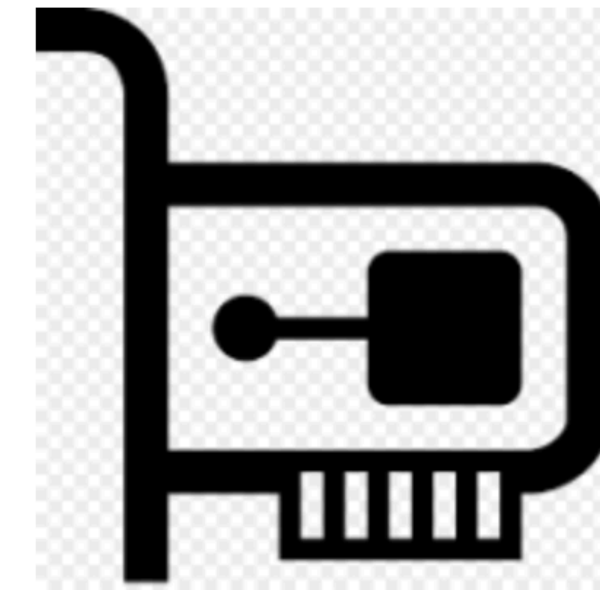
Kotlin properties, fields, & interfaces. Constraint Layout. Introduce activity to display all placemark locations + details.

Properties & Fields



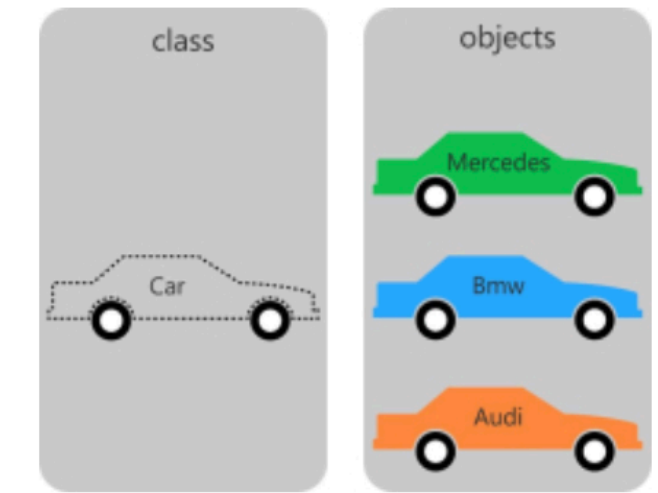
Kotlin properties and fields offer a richer set of features and variants over Java

Interfaces



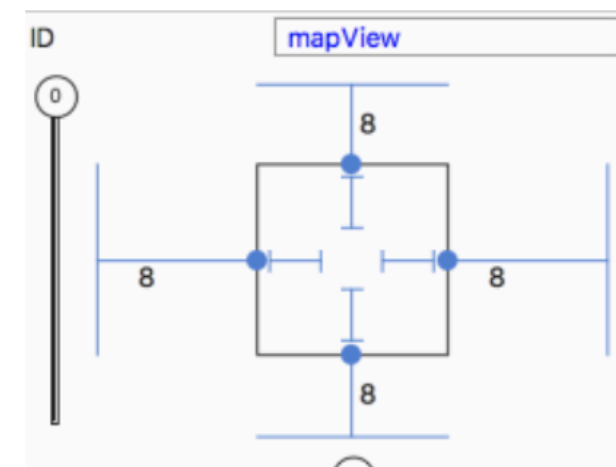
Kotlin interfaces largely follow Java 8 conventions

J2K : Classes



Classes in Java & Kotlin

Constraint Layout



ConstraintLayout allows you to create large and complex layouts with a flat view

Map Widget



The map widget can be placed directly onto an existing layout

Lab-07a MapView



Display all placemarks on a map in a new activity

08: Location



Kotlin visibility & extensions.
Determine the devices current
location & resolve in a map.

09: Rooms



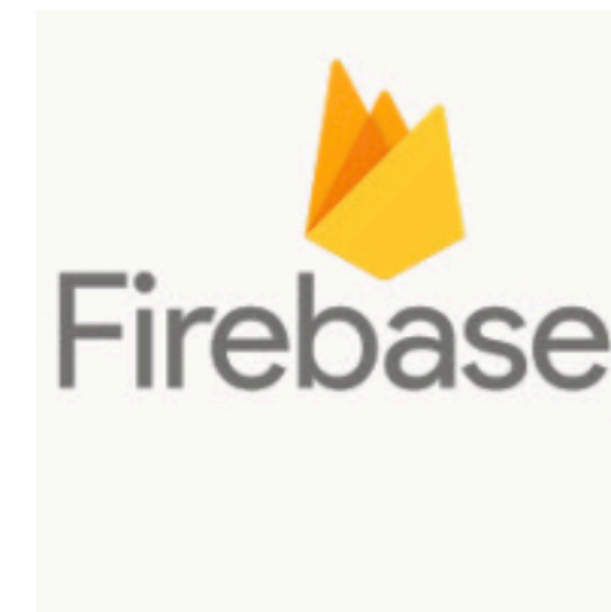
Kotlin Data & Sealed classes,
Generics. Android Architecture
Components. The Room
framework.
PlacemarkStoreRoom
implementation

10: Tracking



Kotlin Nested Classes, Enums
and Objects. Tracking a users
current location. Supporting
Landscape perspective.

11: Authentication



Kotlin Delegation. Support
Authentication via the Firebase
cloud service.

12: Cloud



Kotlin Functions & Lambdas.
Moving the Placemark store to
Firebase.

Placemark Application



email password

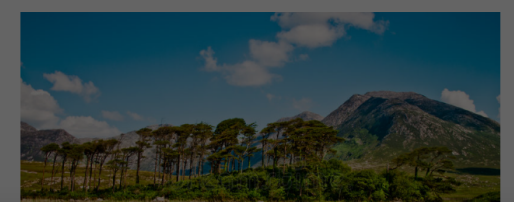
SIGN IN SIGN UP

Placemark SAVE CANCEL

Here

good!

CHANGE IMAGE



Allow Placemark to access this device's location?

DENY ALLOW

Google

Downloads

- lago-connemara... May 9
- pin_1-512.png Apr 21

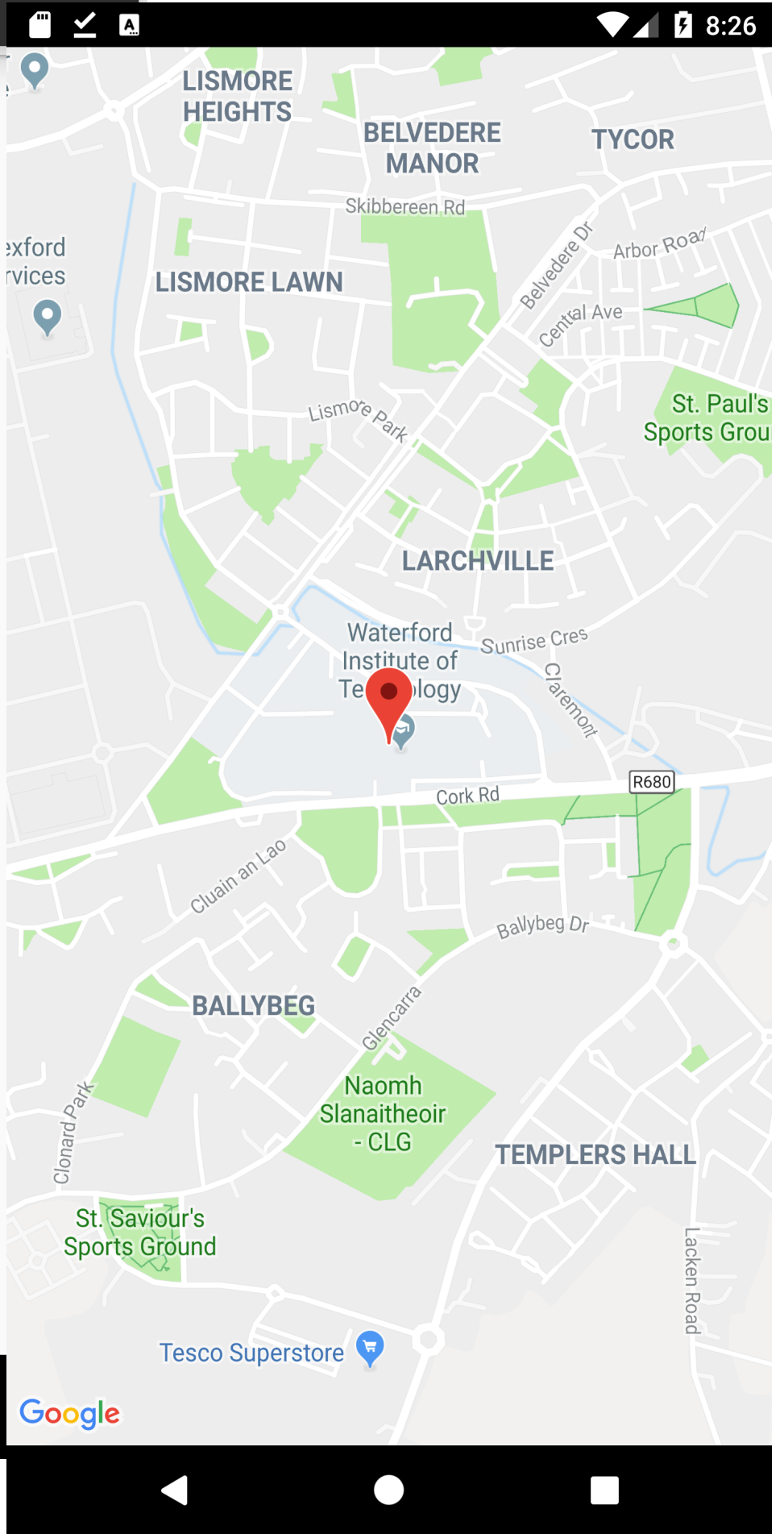
Placemark: test@test

Here good!

Add Placemark

Show Map

Logout



	Thursday 25/10/2018	Friday 26/10/2018	Saturday 27/10/2018	Monday 29/10/2018	Tuesday 30/10/2018	Wednesday 31/10/2018
10:00 11:30			Lecture 04: Images Kotlin Types Images & Architecture			
11:45 13:15		Lecture 02: Adapters Basic Syntax Deep Dive AppObject, Recycler + Adapters	Lab 04: Images			
13:30 15:00		Lab 02: Adapters	Lecture 05: Maps Kotlin Packages + Control Flow Google Map Setup & Models			
15:15 16:45		Lecture 03: Models Kotlin Idioms Toolbars, MemoryStore, Adapter + Listener, Parcelable	Lab 05: Maps			
17:00 18:30	Lecture 01: Activities Activities	Lab 03: Models			Lab 06: Persistence	
18:45 20:15	Lab 01: Activities			Lecture 06: Persistence Classes & Objects I JSON, JSONStore,	Lecture 07: Layouts Classes & Objects II Map Widget & Markers	Lecture 08: Assignment Specification Lab 07: Layouts

Schedule

All classes in K40