I BUILT THE EXACT SAME APP IN **KOTLIN**, **NATIVESCRIPT** AND **FLUTTER**

WHAT DID I LEARN?

SO WHAT APP IS THIS ?

- “realworld.io" - a project by thinkster (github.com/gothinkster)
- A simplified clone of Medium
- Standardised API
- We can make backend or frontend using any technology as per the API

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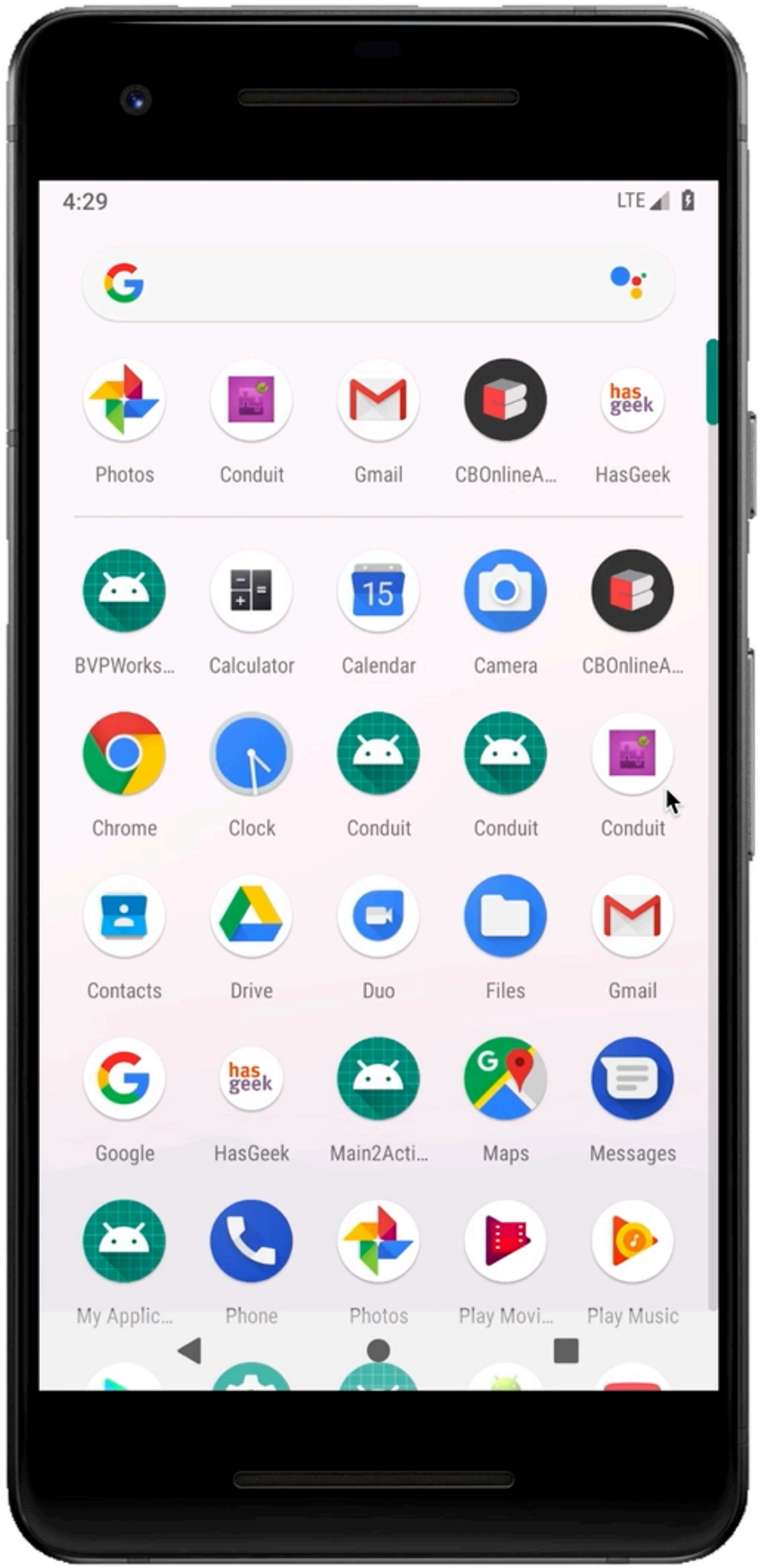
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DEVELOPER EXPERIENCE

I WILL TRADE A FEW CPU CYCLES FOR DEVELOPER CYCLES ANY DAY

DHH

(Basecamp & Ruby on Rails founder)

Available IDEs

Available IDEs

Available IDEs

Android Studio

IntelliJ IDEA

Flutter

WebStorm

VS Code

THIS **SHOULD** BE EXTREMELY EASY

GETTING STARTED

- Android Studio installation takes care of all required dependencies
- Create new project in GUI
- Created project works out of the box
- Most problems in starting a project have multiple StackOverflow answers

- Installing Flutter SDK has command-line steps
- **flutter doctor** command to check installation success (not 100% reliable)
- GUI-based steps to create project in Android Studio
- Created project works out of the box

- Installing nativescript-cli has command-line steps
- **tns doctor** command to check installation success (not 100% reliable)
- CLI-based step to init starter template. Multiple starter templates - can be confusing
- Created project may not work out of the box. Circuitous dependency resolution in starter template too

LANGUAGES

MORE SIMILAR THAN YOU THINK

- Differences in implementations, practices, common patterns, internal mechanisms
- On the surface, modern multi-platform languages have very similar syntax and features

Swift

```
print("Hello, world!")
```

Kotlin

```
println("Hello, world!")
```

Dart

```
print('Hello, world!');
```

TypeScript

```
console.log("Hello, world!");
```

VARIABLES

Swift

```swift
var myVariable = 42
myVariable = 50
let myConstant = 42
```

Kotlin

```kotlin
var myVariable = 42
myVariable = 50
val myConstant = 42
```

Dart

```dart
var myVariable = 42;
myVariable = 50;
final myConstant = 42;
```

TypeScript

```typescript
let myVariable = 42;
myVariable = 50;
const myConstant = 42;
```

ARRAYS

Swift

```swift
var shoppingList = ["catfish", "water",
    "tulips", "blue paint"]
shoppingList[1] = "bottle of water"
```

Dart

```dart
final shoppingList = ["catfish", "water",
    "tulips", "blue paint"];
shoppingList[1] = "bottle of water";
```

Kotlin

```kotlin
val shoppingList = arrayOf("catfish", "water",
    "tulips", "blue paint")
shoppingList[1] = "bottle of water"
```

TypeScript

```typescript
let shoppingList = ["catfish", "water",
    "tulips", "blue paint"];
shoppingList[1] = "bottle of water";
```

MAPS

Swift

```swift
var occupations = [
    "Malcolm": "Captain",
    "Kaylee": "Mechanic",
]
occupations["Jayne"] = "Public Relations"
```

Dart

```dart
var occupations = {
    "Malcolm": "Captain",
    "Kaylee": "Mechanic",
};
occupations["Jayne"] = "Public Relations";
```

Kotlin

```kotlin
val occupations = mutableMapOf(
    "Malcolm" to "Captain",
    "Kaylee" to "Mechanic"
)
occupations["Jayne"] = "Public Relations"
```

TypeScript

```typescript
let occupations = {
    "Malcolm": "Captain",
    "Kaylee": "Mechanic",
};
occupations["Jayne"] = "Public Relations";
```

ARRAY - MAP - STREAM

Swift

```swift
let numbers = [20, 19, 7, 12]
numbers.map { 3 * $0 }
```

Kotlin

```kotlin
val numbers = listOf(20, 19, 7, 12)
numbers.map { 3 * it }
```

Dart

```dart
final numbers = [20, 19, 7, 12];
numbers.map((number) => 3 * number);
```

TypeScript

```typescript
let numbers = [20, 19, 7, 12];
numbers.map((it) => 3 * it);
```

CLASSES

Swift

```
class Shape {
    var numberOfSides = 0
    func simpleDescription() -> String {
        return "A shape with \(numberOfSides) sides."
    }
}
```

Kotlin

```
class Shape {
    var numberOfSides = 0
    fun simpleDescription() =
        "A shape with $numberOfSides sides."
}
```

TypeScript

```
class Shape {
    numberOfSides = 0;
    simpleDescription(){
        return `A shape with ${this.numberOfSides} sides.`;
    }
}
```

Dart

```
class Shape {
    var numberOfSides = 0;
    simpleDescription() =>
        "A shape with $numberOfSides sides.";
}
```

INTERFACES

Swift

```
protocol Nameable {
    func name() -> String
}

func f<T: Nameable>(x: T) {
    print("Name is " + x.name())
}
```

Dart

```
abstract class Nameable {
    String name();
}

f(Nameable x) {
    println("Name is " + x.name())
}
```

Kotlin

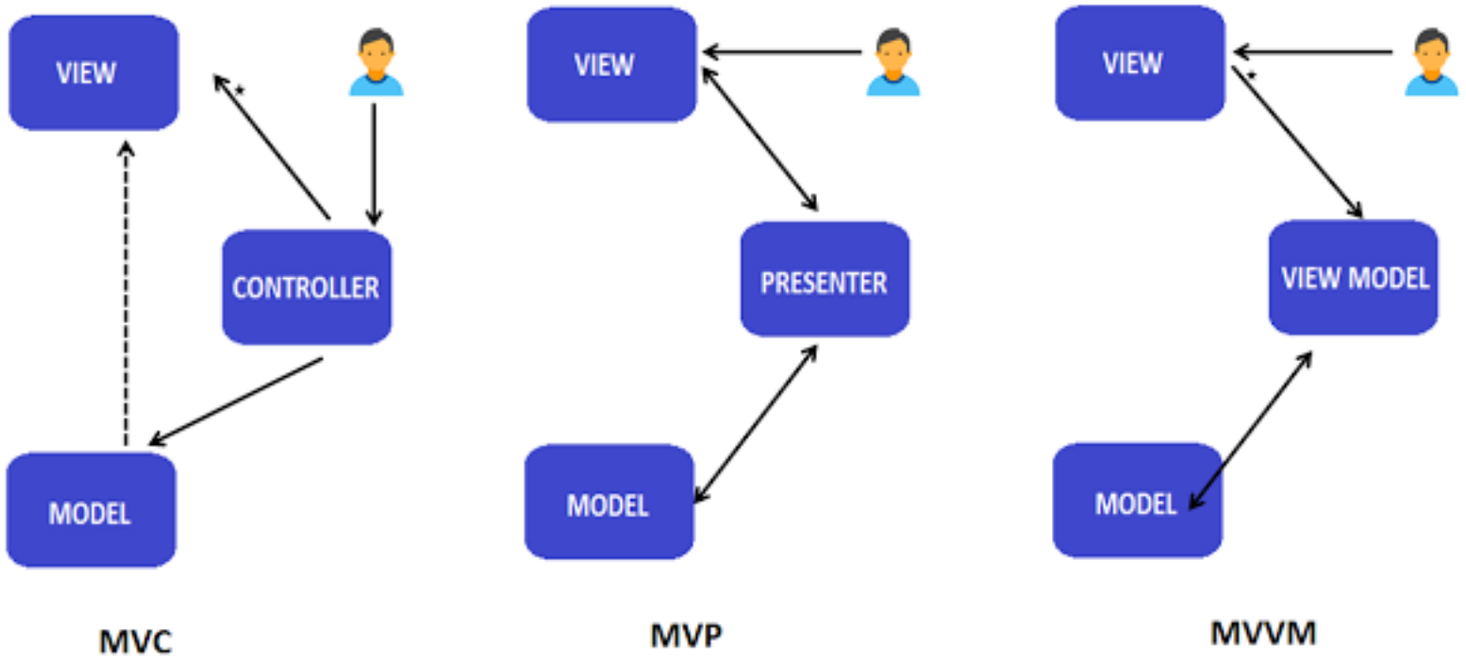
```
interface Nameable {
    fun name(): String
}

fun f<T: Nameable>(x: T) {
    println("Name is " + x.name())
}
```

TypeScript

```
interface Nameable {
    name():string;
};

function f(x: Nameable) {
    console.log("Name is " + x.name());
}
```



IT HELPS TO HAVE WELL-ESTABLISHED

DESIGN PATTERNS

KOTLIN (NATIVE ANDROID)

- All 3 - **MVP, MVC** and **MVVM** well defined and documented
- **MVC**: Conventional (and easy to get started)
- Modern *Android Architecture Components* - focus on **MVVM**
- **ReactiveX** available via *RxJava, RxAndroid* and *RxKotlin*

NATIVESCRIPT (WITH ANGULAR OR VUE)

- Angular - Component based (sort of MVC) but can by **Reactive** is using *RxJS*
- Vue - **MVVM**, can be **Reactive** if using *vuex-rxjs*
- **Flux**-like state management via *vuex* available in Vue

FLUTTER

- No officially documented/endorsed design pattern
- Unofficial MVC and MVVM-like examples available
- **B**usiness **Lo**gic **C**omponent (BLoC) pattern getting popular

GOOD TO HAVE

COMMON TOOLS

DRAG/DROP GUI EDITOR

android	**Yes** - fully featured
NativeScript	**No**
Flutter	**No** - partial support via 3rd party tools

BREAKPOINT DEBUGGING

Yes - fully integrated with Android Studio

No - very limited support, socket connection breaks

Yes - via Android studio but not 100% reliable

HOT RELOAD

Partial - currently opened activity refreshes. Also slow

Yes - Recently released, Webpack HMR based. Very buggy right now

Yes - rock solid

TESTING FRAMEWORKS

Well Supported - JUnit for unit test and Espresso for UI test

??? - Can use Vue/ Angular usual mechanisms, but not well documented

Well Supported - Separate unit and UI test methods not needed

DATA (DE)SERIALIZATION AT RUNTIME

Yes - Gson, Jackson, FasterXML. Also data class generators available

NativeScript

Yes - Not needed for JSON 😄, XML libraries exist

No - Not possible without reflection. Need data classes pre-generated.

2-WAY DATA BINDING

Kind of - Using LiveData and DataBinding

Yes - Vue supports proper 2-way binds with v-model

No - Not in usual sense. There is widget-binding

FULLY FEATURED ORM

Yes - multiple solutions for SQLite and also Realm for object-storage

Yes - TypeORM for SQLite

No - sqflite is *kind of* ORM but lot of hand-written SQL needed.

Not possible because no runtime reflection

INTEGRATING WITH NATIVE WIDGETS

Needed to embed Google Maps or WebViews

android

Ofcourse

NativeScript

Yes - Might need Kotlin/ Swift knowledge to glue together

Flutter

No - Preliminary support recently dropped, doesn't work reliably yet

LET US TAKE A

WALK THROUGH THE CODEBASE

cb.lk/rwappkt

KOTLIN CODEBASE WALKTHROUGH

cb.lk/rwappns

NATIVESCRIPT CODEBASE WALKTHROUGH

cb.lk/rwappfl

FLUTTER CODEBASE WALKTHROUGH

BENCHMARKS

Raw Numbers

App Size (debug)

3.6MB

42MB

App Size (prod)

3.1 MB

5.8 MB

Peak CPU Usage

36%

26%

Peak Memory Usage

127 MB

160 MB

Average Memory Usage

50 MB

85 MB

Lines of Code (excluding autogenerated files)

950

440

Build Time (cold/clean)

32s

50s

Build Time (warm/dirty)

Kandroid

8s

NativeScript

Flutter

8s

Time taken to develop (via wakatime.com stats)

5 hrs

3.5 hrs