Multiplatform Mobile App Development

APACHE CORDOVA™

XML VM

CODENAME ONE

Migeran

J2ObjC
by
g

jQuery mobile

Xamarin

ionic

ROBOVM

Gergely Kis
CEO
MattaKis Consulting Kft.

MattaKis

Introduction

- Worked in Mobile for 10 years
  - Platform development (Siemens, Android)
  - App development
    - Android, iOS, BB 10, BB Classic, J2ME, Symbian
- Started MattaKis Consulting in 2007
  - Cross-platform Mobile Apps since 2008
  - Migeran spin-off created in 2013
- Other Technologies
  - Embedded Linux (C / C++ / ARM / MIPS)
  - Java EE (Spring, Play)

Full Disclosure

Migeran

MattaKis

The Multiplatform Challenge

I need an app for ...

iOS

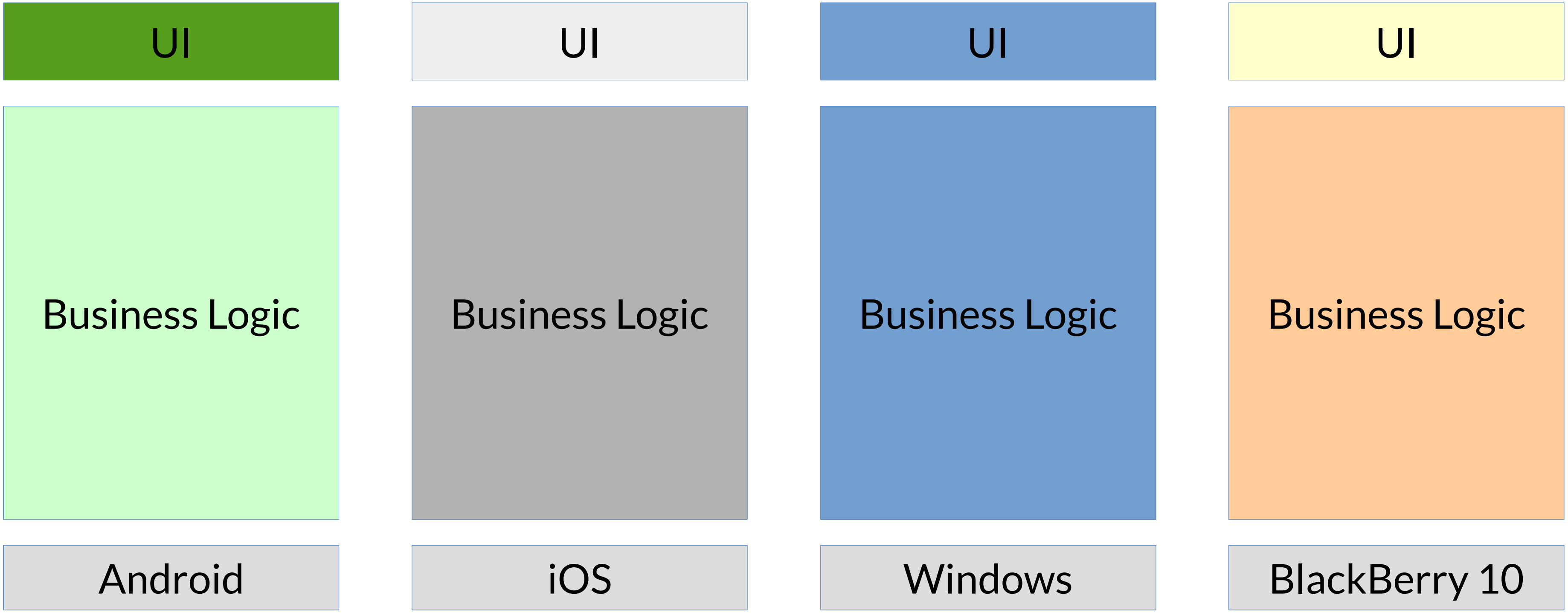
Windows phone

BlackBerry 10

Let's create the same app 4 times!

Or think Multiplatform?

Anatomy of a Mobile App



UI	UI	UI	UI
Business Logic	Business Logic	Business Logic	Business Logic
Android	iOS	Windows	BlackBerry 10

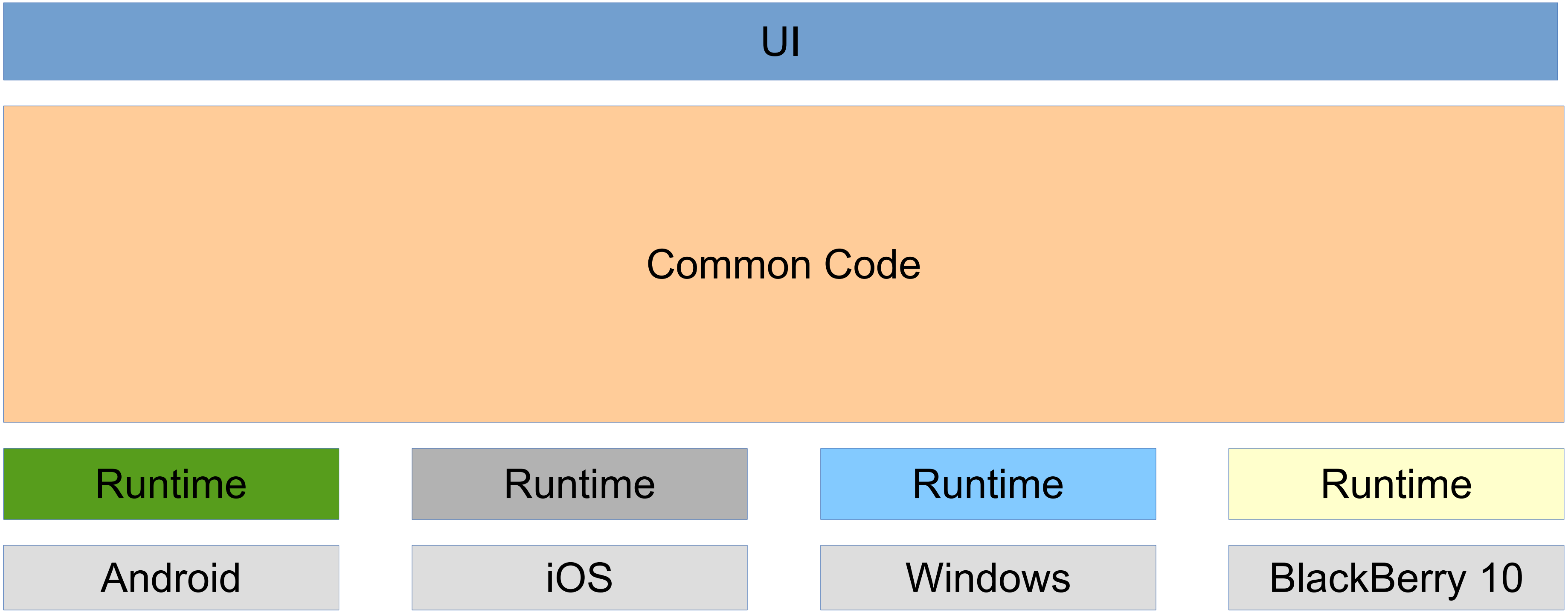
Seriously?!

Caveat: App Behavior

- Clients look for identical App behavior across platforms:
  - The same data should be displayed
  - Operations should do exactly the same thing
  - Lot of room for interpretation

Syncing app behaviors is extra effort

Anatomy of an ideal Multiplatform Mobile App



UI

Common Code

Runtime	Runtime	Runtime	Runtime
Android	iOS	Windows	BlackBerry 10

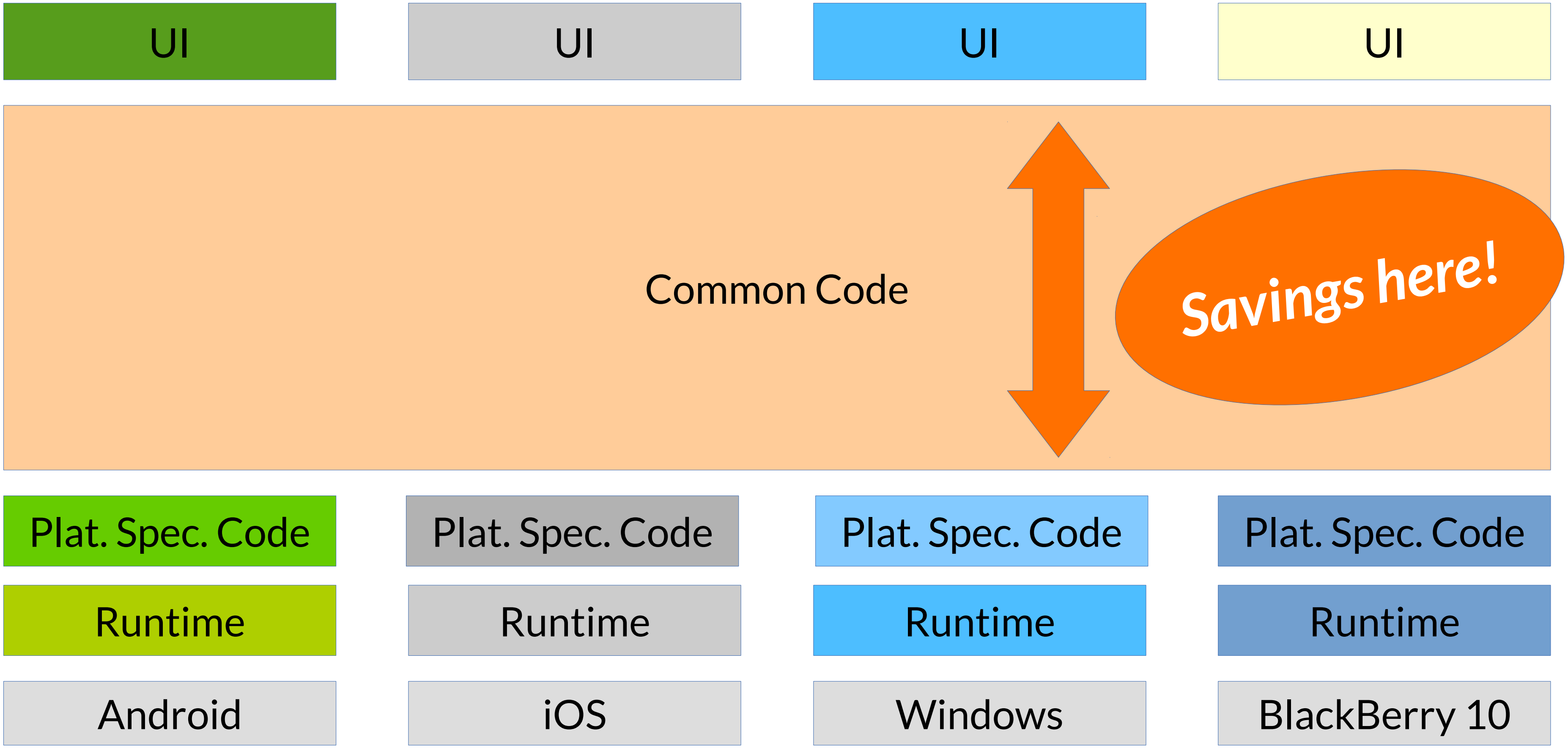
Promise:
Write Once Run Anywhere

Caveat: User Experience

- Users look for familiar UX
  - Apps are just extensions of the Platform's UX
- Quote from Index.hu:
  - *„The BKV Futár App on Android and iOS looks the same. And this is a mistake.”*

Separate UX Design for each platform

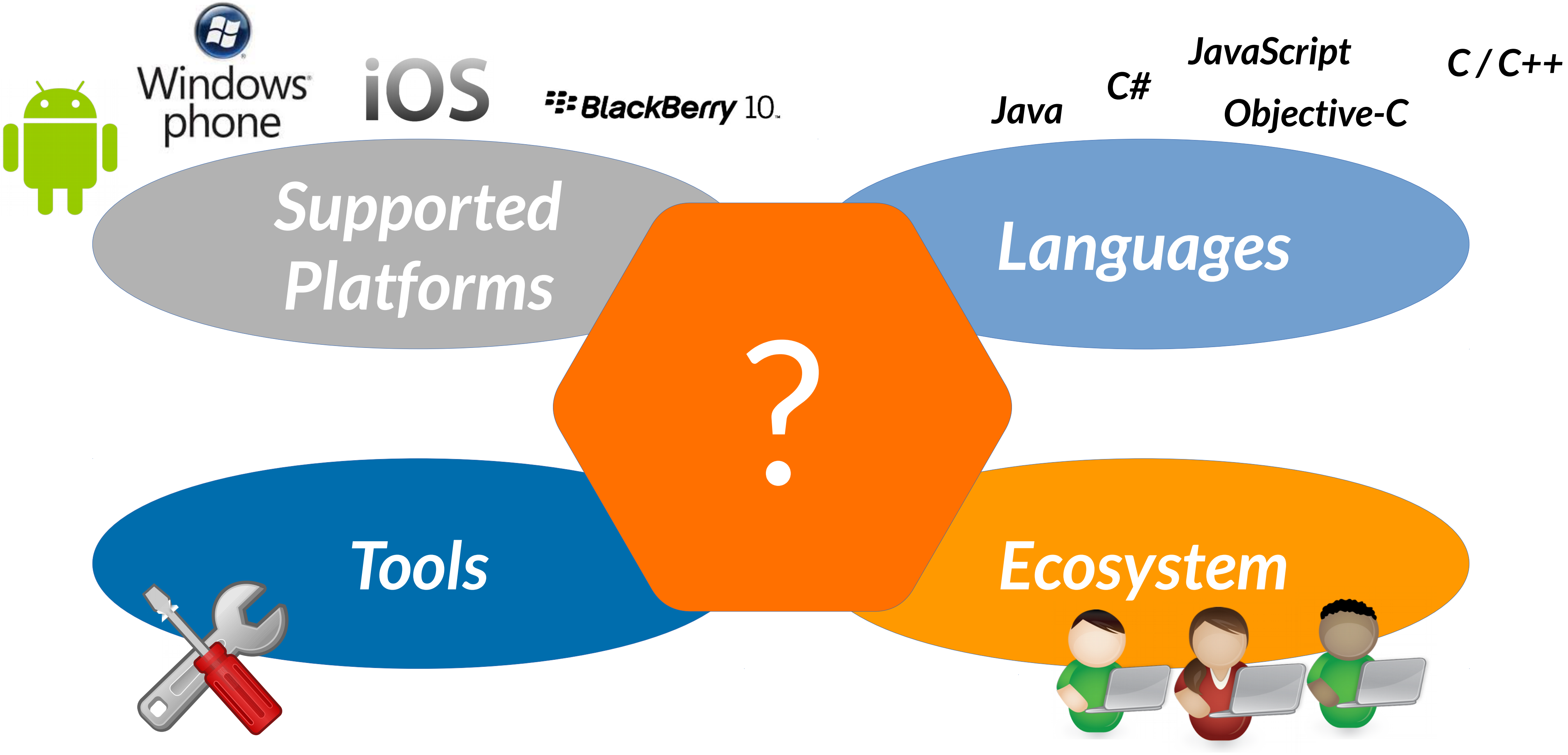
Anatomy of a real Multiplatform Mobile App



UI	UI	UI	UI
Common Code			
Plat. Spec. Code	Plat. Spec. Code	Plat. Spec. Code	Plat. Spec. Code
Runtime	Runtime	Runtime	Runtime
Android	iOS	Windows	BlackBerry 10

Savings here!

Comparing Approaches



Java C# JavaScript Objective-C C / C++

Supported Platforms

Languages

?

Tools

Ecosystem

App Types

Hybrid Apps

- Use the WebView of the underlying platform
- UI simulates native controls in HTML / CSS
- Application code developed in JavaScript
- Limited access to native platform features

Native Apps

- May use additional runtimes (e.g. VMs)
- Uses the native UI and APIs
- May use alternative languages
- May provide a platform-independent API

Hybrid Apps

Native Packaging for Hybrid Apps

- Apache Cordova / PhoneGap
  - The oldest, most mature solution
  - Supported by all frameworks
  - Loads of plugins
- Sencha Cmd
  - Specifically designed for Sencha Touch
- Trigger.io

Hybrid App Frameworks

- Sencha Touch
  - Mature OO framework
  - Device agnostic main theme + custom specific themes
  - Abstracts common UI and Device APIs
- JQuery Mobile
  - The mobile extension of JQuery
  - Works also on the desktop
  - Requires an external MV* Framework like Backbone
- Ionic
  - Built on AngularJS
    (with options open for other frameworks)
  - Widgets provided as custom HTML elements

Native Apps

Source Translators

J2ObjC
by
g

- Translate Java source code to Objective-C
- No VM (e.g. no garbage collection), translated code runs in the Objective-C runtime
- UI code is written in Objective-C
- iOS Development in Xcode with standard tools

XMLVM

- Translates DEX bytecode to Objective-C, C# … etc. source
- No VM (e.g. no garbage collection), translated code runs in the Objective-C runtime
- Hand written partial Java bindings for iOS API
- No debugging support
- No IDE support

Appcelerator Titanium

- JavaScript based API
  - Not WebView based
- Native UI components
  - Alloy MVC Framework
  - Common UI Controls
    - With platform specific enhancements
- Eclipse based IDE
- Supported platforms
  - iOS, Android, BlackBerry, Windows Phone

```
var myLabel = Ti.UI.createLabel({
    text : 'Hello World',
    top : 250
});
```

Codename One

- Write Once Run Anywhere Concept
  - Common, Swing-like API
  - Development on Java Simulator
  - Debugging only on host, not on target devices
- Multiple targets
  - Android: Implementation of the CodeOne API
  - IOS: XMLVM based translator, a new VM is in development
  - Windows: Java code translated to C#
- UI Designer for Codename One API
- Cloud based builds
- Some support for additional languages, e.g. Scala or Mirah
  - May support any statically compiled JVM language

Xamarin

- Develop apps in C# for multiple platforms
  - Android, iOS, Mac
- Uses the Mono Runtime
  - Ahead of time compilation
- UI developed separately for each platform
  - UI Designer available
- Cross platform libraries
  - Xamarin.Forms
  - Xamarin.Mobile
- IDE support: Xamarin Studio, Visual Studio

RoboVM

- Custom VM implementation
  - Java bytecode translated to native code ahead of time
- Partial iOS API bindings
  - Supports JNI and Bro (custom native binding framework)
- Basic IDE support (e.g. launch on device / iOS Simulator from Eclipse)
- No debugging support
- Supports Java
  - Any statically compiled JVM language is possible

Migeran

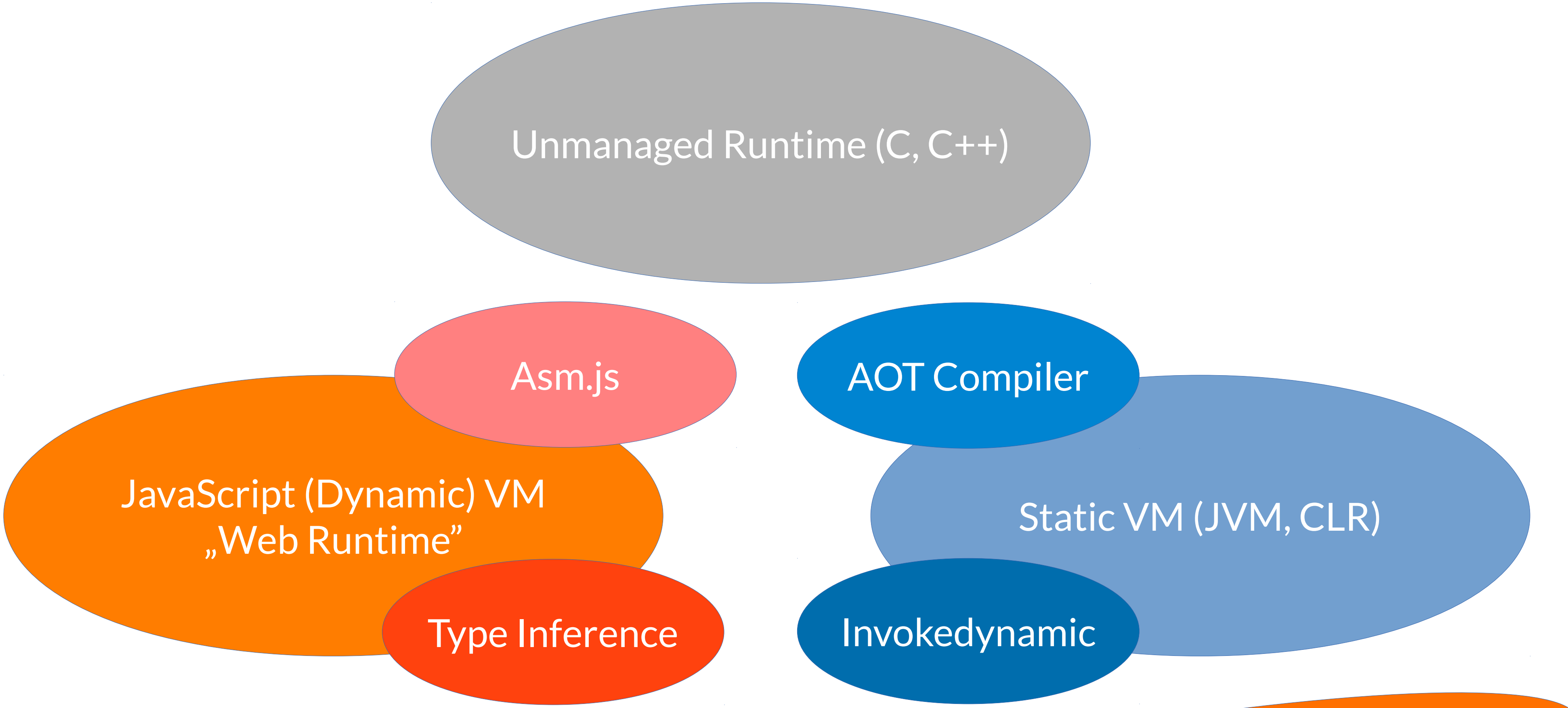
- Based on Android ART Runtime
- Full Eclipse IDE Support
  - Launching, Debugging, Migeran specific Code-Assist
- Eclipse & Xcode integrated
  - Storyboards, Interface Builder
  - Hybrid Classes
- Nat/J – Native Bindings with Automated Generator
  - The full iOS8 API is generated
  - Generator included in Eclipse – use in your own projects
- Supports Java and Scala
  - any language supported on ART is possible

Now Available

Migeran Demo

http://www.migeran.com

Convergence of Runtimes



Unmanaged Runtime (C, C++)

Asm.js

AOT Compiler

JavaScript (Dynamic) VM
„Web Runtime”

Static VM (JVM, CLR)

Type Inference

Invokedynamic

Where is Objective-C and Swift?

Questions & Answers

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CEO
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[gk@] mattakis.com

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