



State of Cross Platform Development 2015

John Leung 2015

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Topics

1. Platforms Today
2. Native Platform Development
3. Cross Platform Native Development
4. Finding Unicorn

Platforms 2015

- **PC** - Windows, OS X, Linux, Chrome OS
- **Mobile** - iOS, Android, Windows Phone Mobile
- **Web** - Chrome, Firefox, IE, Safari, Edge
- *Others* - Game Systems, IoT, Wearables, SmartTV, Auto

Mythical Unicorn





Develop Once, Deploy Everywhere™

Dynamic Development with JavaScript



Tidekit

- The only app development platform that lets you develop HTML5, hybrid and native apps for iOS, Android, Blackberry, Windows, Mac OS X, Linux and the Web — all from a single source of code written in JavaScript.
- Bindings for different languages including Python, C, C++, Java, C#, Objective-C
- Beta Testing via paid waiting list of \$29 or priority seating for \$99 <http://betalist.com/startups/tidekit>

Vaporware

- After more than a year with nothing to show, it announced:

*We failed to bring the product quickly enough for you.
As a result, we came to the serious decision to
discontinue TideKit and dissolve our company.*

- lawsuits were filed for 1000+ paid supporters

Native Mobile Development Environments

iOS

- operating system for iphone, ipad, ipod touch, appleTV
- uses XNU kernel, the kernel for Darwin, a Unix OS which began in form of NeXT's OS and became the base for OS X
- iOS SDK stack (hierarchically):
 1. Cocoa Touch Platform
 2. Media / Application Services
 3. Core Services
 4. Core OS / iOS kernel

Cocoa Touch

- Multi-touch events and controls
- Accelerometer support
- View hierarchy
- Localization (i18n)
- Camera support

Cocoa Touch key frameworks

- Foundation Kit Framework
- UIKit Framework (based on Application Kit)
- GameKit Framework
- iAd Framework
- MapKit Framework
- Address Book UI Framework
- EventKit UI Framework
- Message UI Framework
- Notification Center Framework
- PushKit Framework
- Twitter Framework

Native iOS Languages

- c, c++, objective-C, swift
- most documentations are still for objective-C
- “Objective-C - a hacked language to incorporate smalltalk on top of c”

Swift:

- characterized as “Objective-C without the C”
- 2.0 announced and open sourced June’15
- usage is growing
- will probably replace Objective-C as the de facto language for iOS and MacOS apps

Android OS

- operating system for Android phones, tablets, and PC, Android TV, Android Wear, and Android Auto
- started life as OS for the Danger smartphone
- uses version 3.4 or 3.10 of Linux kernel

APPLICATIONS

Home

Contacts

Phone

Browser

...

APPLICATION FRAMEWORK

Activity
Manager

Window
Manager

Content
Providers

View
System

Notification
Manager

Package
Manager

Telephony
Manager

Resource
Manager

Location
Manager

XMPP
Service

LIBRARIES

Surface
Manager

Media
Framework

SQLite

OpenGL|ES

FreeType

WebKit

SGL

SSL

libc

ANDROID RUNTIME

Core
Libraries

Dalvik Virtual
Machine

LINUX KERNEL

Display
Driver

Camera
Driver

Bluetooth
Driver

Flash Memory
Driver

Binder (IPC)
Driver

USB
Driver

Keypad
Driver

WiFi
Driver

Audio
Drivers

Power
Management

Android Runtime Environment

Dalvik VM:

- on version 4.4 (Kitkat) and earlier.
- a JIT (Just In Time compilation) Java VM

ART (Android Runtime):

- on version 5.0 (Lollipop) and later
- uses of ahead-of-time (AOT) compilation by compiling entire applications into native machine code upon their installation.

Android SDK

SDK:

- debugger, libraries, and emulator

Native Languages support:

- Java (any JVM languages), Go
- other languages can be compiled to ARM and MIPS, and be installed via the Android NDK (Native Development Kit)

Official Tools

XCode(iOS):

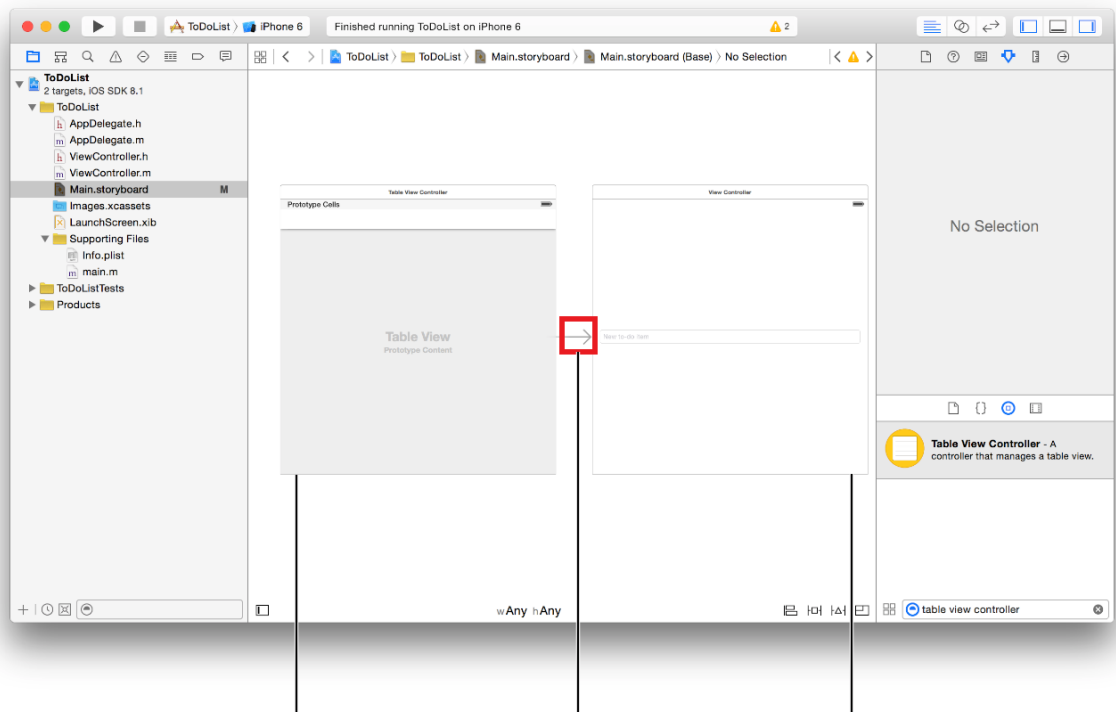
- IDE containing iOS SDK and OS X SDK targeting the Cocoa Touch and Cocoa Platform
- available on OS X only, but can run on Windows via a VM
- provides Different View Layouts, Storyboard Editor

Android Studio(Android):

- the Official Android IDE powered by IntelliJ
- available on Windows, Linux, OS X

Visual Studio (Windows, Windows Phone):

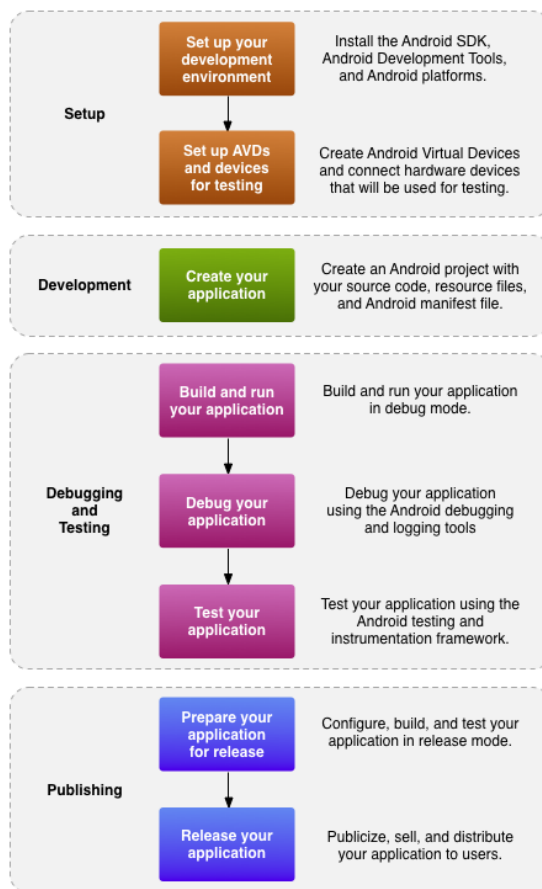
- available on Windows, Linux, OS X



To-do list scene

Storyboard entry point

Add to-do item scene



Cross Platform Native Development

Appcelerator (Javascript)

- Suite of tools: Dashboard, Titanium, ArrowDB, Arrow Push, Insights/Analytics
- Compiles to Native targeting iOS, Android, Windows
- One of the first Cross Mobile Native Platform Development Environment
- Still strong community
- \$39/mo. for solo

RubyMotion (Ruby)

- targets Native Android, iOS
- No IDE (use XCode, Android Studio, etc.)
- Terminal based workflow, deployment
- watchOS support
- Not much community and traction, not that great reviews

Corona SDK (Lua)

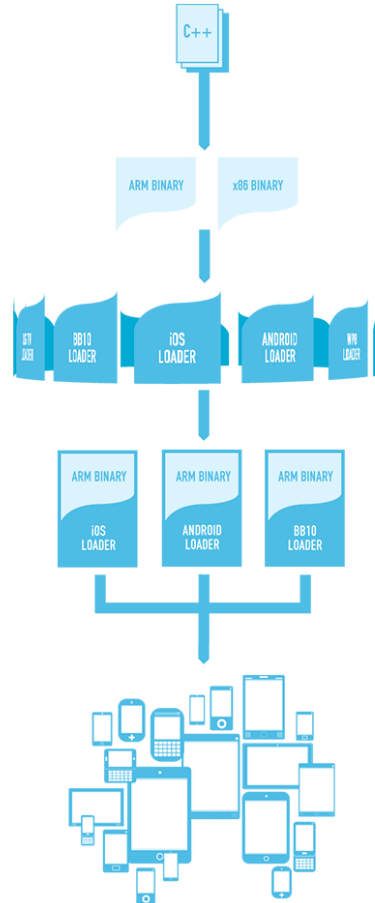
- targets Native Android, iOS, Windows Phone, Windows, OS X, kindle
- Designed for gaming, so very gaming centric
- Comes with Corona Editor IDE
- Very active community
- Free SDK limited to API provided
- \$79/mo. for Enterprise - ability to call C, C++, Objective-C, Java
- \$499/yr/platform for Corona Cards - even easier development

Golang Mobile

- Official support for Android
- Limited alpha/beta bindings for iOS
- <https://github.com/golang/go/wiki/Mobile>

Marmalade (C++)

- No IDE (use XCode, Android Studio, etc.)
- Single source for your app regardless of platform
- No virtual machines or language cross translation
- Can redeploy your app to another platform without recompiling



RoboVM (Java)

- Share code targeting iOS, Android, Windows, Linux, OS X and WebGL-enabled browsers
- Use any JVM languages
- translates Java bytecode into native ARM or x86 code for Native UX & Performance
- integrates with Eclipse, IntelliJ IDEA, Netbeans, and XCode's Interface Builder
- \$19/mo. or \$199/yr. for solo

Xamarin (C#)

- Suite of tools: Xamarin Platform, Test Cloud, Insights
- Custom IDE with forms builder
- Share code targeting Native iOS, Android, Windows, OS X
- Support for F#, but almost zero documentation/code samples
- \$25/mo. for solo

Kivy (Python)

- *"Open source Python library for rapid development of multi-touch applications"*
- targets Linux, Windows, OS X, Android and iOS
- runs the same code on all supported platforms
- can natively use most inputs, protocols and devices including mouse, trackpad, WM_Touch, WM_Pen
- 4 books published in past 18 months!
- <http://kivy.org/#gallery>
- very active community

Kivy Organization

- a non-profit (as per the French law of 1901) membership organization devoted to advancing open source technology related to the Kivy Framework, created in February 2014.
- Manages the funding, publicizing, protection of the core Kivy Framework, made available to the public free of charge.
- Publicizes, promotes the adoption of, and facilitates the ongoing development of Kivy-related technology and educational resources.


```

from kivy.app import App
from kivy.uix.button import Button

class TestApp(App):
    def build(self):
        return Button(text='Hello World')

TestApp().run()

class LoadDialog(FloatLayout):
    def load(self, filename): pass
    def cancel(self): pass

#:kivy 1.4.0
<LoadDialog>:
    BoxLayout:
        size: root.size
        pos: root.pos
        orientation: "vertical"
        FileChooserListView:
            id: filechooser

        BoxLayout:
            size_hint_y: None
            height: 30
            Button:
                text: "Cancel"
                on_release: root.cancel()

        Button:
            text: "Load"
            on_release: root.load(filechooser.path, filechooser.selection)

```

Silver

- Implementation of Swift with extensions for cross platform support
- from RemObjects LLC. <http://www.elementscompiler.com>
- supports Native iOS, OS X, watchOS, Android, JVM platforms, Windows Phone, Windows 8, 10, RT
- has ability to convert Java Android sources to Silver
- Swift 2.0 specification support in beta
- Very active community <http://talk.remobjects.com>
- [Building a calculator app in Swift with Silver](#)
- Free (non FOSS)

Silver Extensions

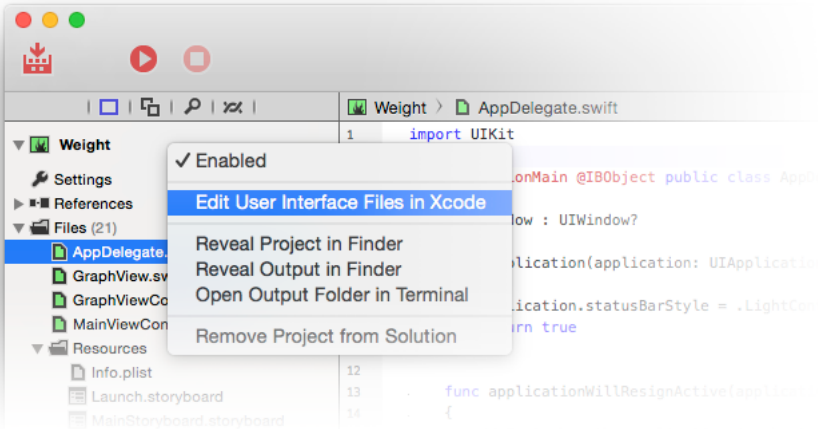
Extends Swift 2.0's error handling to handle exceptions from all 3 platforms

Additional keywords and symbols

- `__await` - C# style await
- `__event` - .NET style multi-cast Events
- `__inline` (inline functions)
- `__partial` - partial classes
- `__yield` - iterators
- `__mapped` - Mapped Types - used internally to create cross-platform wrappers with zero overhead
- `@` - Aspects
- `:` - attribute scope prefixes

Silver IDE

- uses Visual Studio for Windows
- “Fire” - their IDE for Mac
- both IDE can compile to all 3 platforms
- have contextual menu to open up Android Studio and Xcode to edit UI



React Native

- “Bringing modern web techniques to mobile“
- true native UI (only on iOS for now)
- based on componentkit, a native port of React to iOS also by facebook
- aims to primarily bring the power of the React programming model to mobile app development
- aims to be a learn-once write-anywhere tool
- not aim to be a write-once run-anywhere cross platform tool
- only environment with virtual DOM and reconciliation, bringing functional programming to the UI layer

React Native vs. React

- Instead of using block elements such as div or section, use the View component, which maps over to the native iOS component UIView
- All text must be wrapped inside the Text component
- No stylesheets - all your styling is written as JavaScript objects
- ES6 is supported out of the box as well as flexbox

sources:

- <http://www.raywenderlich.com/99473/introducing-react-native-building-apps-javascript>
- <http://ryanclark.me/going-native-with-react/>

Conclusion

- Unicorn exists?

Half Unicorns?

- Kivy, Silver, React Native