Cross platform development

Should I use it? What should I use? When should I use what?

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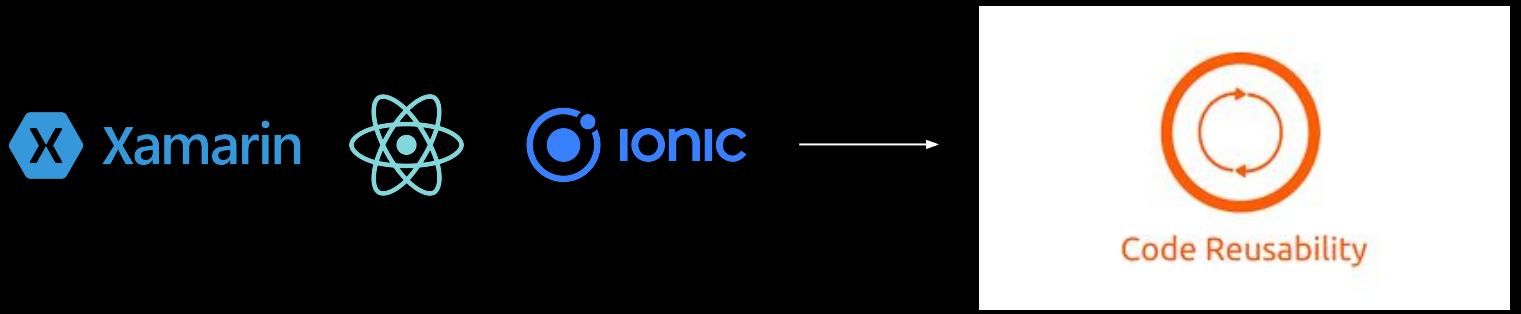
Native applications

- iOS: Swift or Objective-C
- Android: Kotlin or Java
- UWP: C#

- Pros
  - As native as it gets, latest updates
  - Best performance, smallest size
- Cons
  - Code redundancy per platform
  - Possible multiple deployment environments

Cross platform development

- Multiple tools exists; Xamarin, React Native, Ionic
- Reuse code, tests and logic between platforms
- When it can/should be considered?



Overview

- Xamarin: .NET based framework. Two ways, Native vs. Forms
- React Native: JavaScript based (React)
- Ionic: JavaScript/HTML based (Angular with TypeScript)

Performance comparison

- JIT and AOT compilation
- 64-bit requirement
- Xamarin: AOT for iOS, JIT for Android (can be AOT). 64-bit is no issue. Rendering used native components and pipeline.
- React: Interpreted, 64-bit issues on Android. Fast custom DOM for rendering, not cascading stylesheets (by default) for speed
- Ionic: WKWebView used by default. UIWebView can be used. 64-bit support for iOS, unclear for Android. Rendering via HTML and CSS

Performance comparison

		Xamarin	React	Ionic
Running code	iOS	AOT	Interpreter	Interpreter JIT via plugin
	Android	JIT/AOT	JIT	JIT
64-bit	iOS	Yes	Yes	Yes
	Android	Yes	No	?
GUI	iOS/Android	Native	“Native”, rendered	HTML

Development convenience

- Reloading scenarios
- Instant updates (React, Ionic)

Development convenience

		Official tools	Xamarin	React	Ionic
Manual restarting		Yes	Yes	Yes	Yes
Automatic restarting		No	No	Live/hot rel.	Yes
Hot swap	iOS	No	No	Hot rel.	No
	Android	Instant run	No	Hot rel.	No
Cold swap	iOS	No	No	Live rel.	Yes
	Android	Instant run	Fast depl.	Live rel.	Yes
Browser dev.		No	No	Partially	Looks different
Instant updates	iOS	No	No	Yes	Yes

OS integration and existing code

- Standard libraries
- Consuming libraries
- Native integration (Xamarin, React)
- GUI
- Background execution

OS integration and existing code

		Xamarin	React	Ionic
Code binding	Use Java, objc and @objc Swift	Any binary lib.	Adaptor required	Adaptor required
	Use cross-platform code in native app	Partially	Yes	No
Standard lib. binding	Supported feature set	Full	Partial	Partial
	Binding type	1-1	Abstraction layer	Abstraction layer
GUI	All widgets	Yes	No	No
	Native look & feel	Yes	Partial	Partial
Background exec.	iOS	Yes	No support	Very limited
	Android	Yes	Headless JS	Limited

Conclusion

- Xamarin is the fullest cross platform framework...
- ...comes with a cost
- Choose framework depending on project, cost and competence

Appendix - Xamarin

Code distribution Xamarin Native vs. Xamarin Forms

Xamarin Native	Xamarin Forms
UI (per platform)	UI (per platform)
	Forms (abstraction)
View models and models	View models and models

Questions & contact

- Questions?
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