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| --- | --- | --- | --- | --- | --- |
|  | **Price** | **Learning Curve** | **Performance** | **Stability** | **Online resource and support** |
| **Xamarin –** App is developed in C#. [[1]](#endnote-1) | Offers a free and full-featured IDE for students and small teams. [[2]](#endnote-2) | No knowledge of C# so learning curve is steep. | Boasts of native performance. 1 | Xamarin has been around since 2011. It’s stable. [[3]](#endnote-3) | Lots of online tutorials |
| **RubyMotion –** App is developed in Ruby. [[4]](#endnote-4) | Free package has limited features. Cheapest license is $199 yearly. [[5]](#endnote-5) | RubyMotion uses a dialect of Ruby I’m not familiar with. Knowledge of native APIs is needed. Learning curve is fairly steep. [[6]](#endnote-6) | Performance equals performance of native applications. 6 | First release was in 2012. RubyMotion is stable. [[7]](#endnote-7) | There are more online tutorials for iOS than for Android. |
| **B4X (B4A and B4i) –** B4X is a variant of Visual Basic. [[8]](#endnote-8) | There’s a discount of 50% for students and teachers.  Standard price for Android and iOS is $59 yearly respectively. [[9]](#endnote-9) | Programming language is similar to Visual Basic but I have no knowledge of Visual Basic. Learning curve is steep. | Performance equals performance of native applications. 8 | First release of B4A (Basic4Android) was in 2010. B4A and B4i are stable. [[10]](#endnote-10) | There are online tutorials for B4A and B4i, though more of B4A exists. |
| **jQuery Mobile –** HTML5 framework. [[11]](#endnote-11) | Free. [[12]](#endnote-12) | I’m familiar with jQuery. Learning curve isn’t steep | Not as fast as a native application. Slower in Android devices. [[13]](#endnote-13) Doesn’t attempt to achieve native appearance. 11 | jQuery Mobile was first released in 2006 and is very stable. [[14]](#endnote-14) | There are lots of online resources and support |
| **Mobile Angular UI --** mobile UI framework, similar to jQuery Mobile or Sencha Touch. [[15]](#endnote-15) | Free. 15 | No knowledge of Angular.js. Learning curve fairly steep | Not as fast as a native application. Works well in older browsers. Difficult to customise to add customer functions. [[16]](#endnote-16) | Mobile Angular UI was released on 2014 and it’s fairly stable. | There are lots of resources and support online. |
| **React Native --** based on JavaScript and React.js. 17 | Free. [[17]](#endnote-17) | No knowledge of React.js. Learning curve is steep. Knowledge of native APIs is also required. [[18]](#endnote-18) | Near-native performance. [[19]](#endnote-19) | React Native was released in 2015 and is new. It isn’t stable. [[20]](#endnote-20) | There are more online resources for React Native for iOS than for Android |
| **Sencha Touch --** based on HTML5 and JavaScript. [[21]](#endnote-21) | Offers free trial for 30 days. Cheapest license is $4,475. [[22]](#endnote-22) | It uses a proprietary stack. Learning curve is fairly steep. [[23]](#endnote-23) | Quirky and sluggish performance sometimes. 16 | First stable version was released in November 2010. [[24]](#endnote-24) | Online tutorials are not abundant |
| **Ionic --** Free and open source. Offers a library of mobile-optimized HTML, CSS and JS components. Based on optimized Angular.js. [[25]](#endnote-25) | Free. 25 | Knowledge is Angular.js is helpful. Learning curve is fairly steep. | Good performance on iOS but slower performance on Android. Rendering of UI components especially animations is sluggish at times. 16 | Ionic 1.0 was released in May 2015. It is fairly stable. [[26]](#endnote-26) | There are more online tutorials for iOS development than those for Android. |
| **Appcelerator Titanium –** a JavaScript framework; runs native on any platform. [[27]](#endnote-27) | Cheapest subscription is $39 per month. [[28]](#endnote-28) | No knowledge of Titanium. Learning curve is fairly steep. | Struggles to handle animations – especially on Android devices, it has a better performance on iOS devices. [[29]](#endnote-29) | Supported Android and iOS applications in 2009. It’s stable. [[30]](#endnote-30) | There are lots of online tutorials and support |
| **Rhodes –** a Ruby framework. [[31]](#endnote-31) | Pricing is per developer. Offers a free trial for 30 days. Cheapest paid package is $299 per month. Free package has limited features. [[32]](#endnote-32) | Familiar with Ruby. Learning curve isn’t steep. | Average performance | First released in September 2008. [[33]](#endnote-33) It’s stable | There are online tutorials and support |

1. 1 *Deliver native Android, iOS, and Windows apps, using existing skills, teams, and code,* Retrieved April, 14, 2016, from <https://www.xamarin.com/> [↑](#endnote-ref-1)
2. 2 *Build C# apps on Android, iOS, Windows, and Mac with Xamarin,* Retrieved April, 14, 2016, from <https://www.xamarin.com/> [↑](#endnote-ref-2)
3. 3 *Founding of Xamarin,* Retrieved April, 14, 2016, from <https://en.wikipedia.org/wiki/Xamarin> [↑](#endnote-ref-3)
4. 4 *Write cross-platform native apps in Ruby,* Retrieved April, 14, 2016, from <http://www.rubymotion.com/> [↑](#endnote-ref-4)
5. 5 *Let’s Get Started!,* Retrieved April, 14, 2016, from <http://www.rubymotion.com/download/> [↑](#endnote-ref-5)
6. Morrice, G. (2015). *A Review of RubyMotion in 2015,* Retrieved April, 14, 2015, from <https://katanacode.com/blog/posts/12-a-review-of-rubymotion-in-2015> [↑](#endnote-ref-6)
7. *About RubyMotion,* Retrieved April, 14, 2016, from <http://www.rubymotion.com/about/> [↑](#endnote-ref-7)
8. *B4X – The Simple way to develop native Android, iOS & iOT apps ,* Retrieved April, 14, 2016, from <https://www.b4x.com/> [↑](#endnote-ref-8)
9. *Rapid Application Development Tools for Android, iOS and desktop applications,* Retrieved April, 14, 2016, from <https://www.b4x.com/store.html> [↑](#endnote-ref-9)
10. *B4X - Wikipedia, the free encyclopedia,* Retrieved April, 14, 2016, from <https://en.wikipedia.org/wiki/B4X> [↑](#endnote-ref-10)
11. *jQuery Mobile,* Retrieved April, 14, 2016, from <https://jquerymobile.com/> [↑](#endnote-ref-11)
12. *Download - jQuery Mobile,* Retrieved April, 14, 2016, from <http://jquerymobile.com/download/> [↑](#endnote-ref-12)
13. *JQuery Mobile & PhoneGap: Differences, Advantages & Disadvantages,* Retrieved April, 14, 2016, from <http://www.rapidprogramming.com/questions-answers/jquery-mobile-phonegap-differences-advantages-disadvantages-1574> [↑](#endnote-ref-13)
14. *jQuery 1.0 – The Official jQuery Blog,* Retrieved April, 14, 2016, from <https://blog.jquery.com/2006/08/26/jquery-10/> [↑](#endnote-ref-14)
15. *Mobile Angular UI – Angular JS Mobile UI framework with Bootstrap 3 CSS,* Retrieved April, 14, 2016, from <http://mobileangularui.com/> [↑](#endnote-ref-15)
16. Ashbrook, J. (2015). *Top 10 Mobile Frameworks for Performance,* Retrieved April, 14, 2016, from <https://cdnify.com/blog/top-10-mobile-frameworks-performance/> [↑](#endnote-ref-16)
17. *Getting Started – React Native – A framework for building native apps using React,* Retrieved April, 14, 2016, from <https://facebook.github.io/react-native/docs/getting-started.html#content> [↑](#endnote-ref-17)
18. *Native Modules – React Native – A framework for building native apps using React,* Retrieved April, 14, 2016, from <https://facebook.github.io/react-native/docs/native-modules-android.html#content> [↑](#endnote-ref-18)
19. *Performance – React Native – A framework for building native apps using React,* Retrieved April, 14, 2016, from <https://facebook.github.io/react-native/docs/performance.html#content> [↑](#endnote-ref-19)
20. *React Native for Android: How we built the first cross-platform React Native app,* Retrieved April, 14, 2016, from <https://code.facebook.com/posts/1189117404435352/react-native-for-android-how-we-built-the-first-cross-platform-react-native-app/> [↑](#endnote-ref-20)
21. *Create native-looking HTML5 apps using JavaScript,* Retrieved April, 14, 2016, from <https://www.sencha.com/products/touch/#overview> [↑](#endnote-ref-21)
22. *Products - Sencha,* Retrieved April, 14, 2016, from <https://www.sencha.com/store/> [↑](#endnote-ref-22)
23. *Sencha Guides,* Retrieved April, 14, 2016, from <http://docs.sencha.com/> [↑](#endnote-ref-23)
24. *Sencha Touch - Wikipedia, the free encyclopedia,* Retrieved April, 14, 2016, from <https://en.wikipedia.org/wiki/Sencha_Touch> [↑](#endnote-ref-24)
25. *Ionic: Advanced HTML5 Hybrid Mobile App Framework,* Retrieved April, 14, 2016, from <http://ionicframework.com/> [↑](#endnote-ref-25)
26. *Ionic (mobile app framework) - Wikipedia, the free encyclopedia,* Retrieved April, 14, 2016, from <https://en.wikipedia.org/wiki/Ionic_(mobile_app_framework>)

    [↑](#endnote-ref-26)
27. *The Appcelerator Platform,* Retrieved April, 14, 2016, from <http://www.appcelerator.com/> [↑](#endnote-ref-27)
28. *Platform Plans and Pricing,* Retrieved April, 14, 2016, from <http://www.appcelerator.com/pricing/> [↑](#endnote-ref-28)
29. Angelini, E. (2012). *5 Pros and Cons of Appcelerator’s Titanium*, Retrieved April, 14, 2016, from <http://enricoangelini.com/2012/5-pros-and-cons-of-appcelerators-titanium/> [↑](#endnote-ref-29)
30. *Appcelerator Titanium - Wikipedia, the free encyclopedia*, Retrieved April, 14, 2016, from <https://en.wikipedia.org/wiki/Appcelerator_Titanium> [↑](#endnote-ref-30)
31. *You’re in good company with RhoMobile*, Retrieved April, 14, 2016, from <http://rhomobile.com/> [↑](#endnote-ref-31)
32. *RhoMobile Suite Pricing,* Retrieved April, 14, 2016, from <http://rhomobile.com/pricing/> [↑](#endnote-ref-32)
33. *RhoMobile Suite - Wikipedia, the free encyclopedia,* Retrieved April, 14, 2016, from <https://en.wikipedia.org/wiki/RhoMobile_Suite> [↑](#endnote-ref-33)