

Background History:

Since its release by **Google in 2009**, **Angular** has undergone quite a few transformations. At first, **it was called Angular.JS**, and later it was renamed to Angular with numbered versions. The framework **(version 2 and above) has been completely rewritten from scratch using TypeScript language**. Now it offers high flexibility, simplifies the entire development process, and supports the latest standards of **JavaScript (ES6)**.

Released in **2013 by Facebook**, **React** is a front-end JavaScript library that has become a fierce competitor to Angular and quickly gained popularity among developers. The ecosystem also includes **React Native** for building natively-rendered mobile apps for Android and iOS using the same codebase.

Vue.js is a **one-person project by Evan You** – an ex-Google employee determined to create something as good as React and Angular but flexible and lightweight. Vue was released in 2014 and now provides more features than was promising initially. It can undoubtedly be considered a framework that supports the end-to-end building of complex web applications.

JavaScript frameworks comparison

- ⇒ The starting point is the same for all three frameworks: Angular, React, and Vue **based on JavaScript**, as it is the basic language **requirement for front-end development**.

Theoretically, you can write your front end in any language, but browsers accept only JavaScript.

⇒ **Learning curve**

- ⊗ **Angular** is complex and has a steep learning curve.
 - ✓ Must learn TypeScript, MVC, and RxJS and understand patterns, pipelines, and dependency injection.
- ⊗ **React**, in turn, is much easier to grasp than Angular frameworks.
 - ✓ Being JavaScript-based, it uses its syntax extension – JSX, which is not as steep to learn as TypeScript.
- ⊗ The smoothest has **Vue**. It **uses pure JavaScript**, and its templates are written in HTML.
 - ✓ Vue developers **do not have to learn another programming language except JavaScript**.

⇔ Framework size

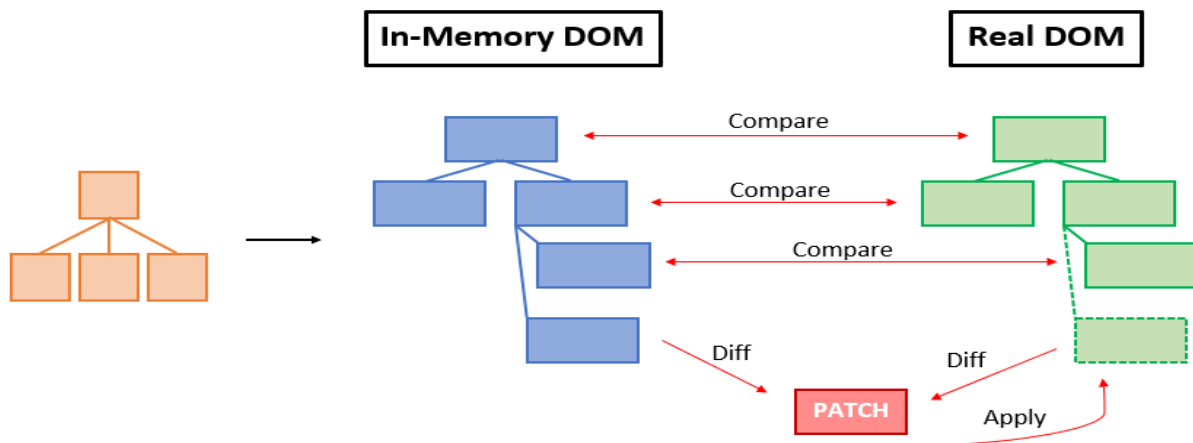
In the **context of development, the framework's size matters as it is directly related to the application performance**. The framework and the app need to be downloaded before the application becomes functional.

- ⊗ **Angular** is the heaviest – **143K**.
- ⊗ **React** follows it with **97.5K**
- ⊗ **Vue.js** is the most lightweight size, only **58.8K**.

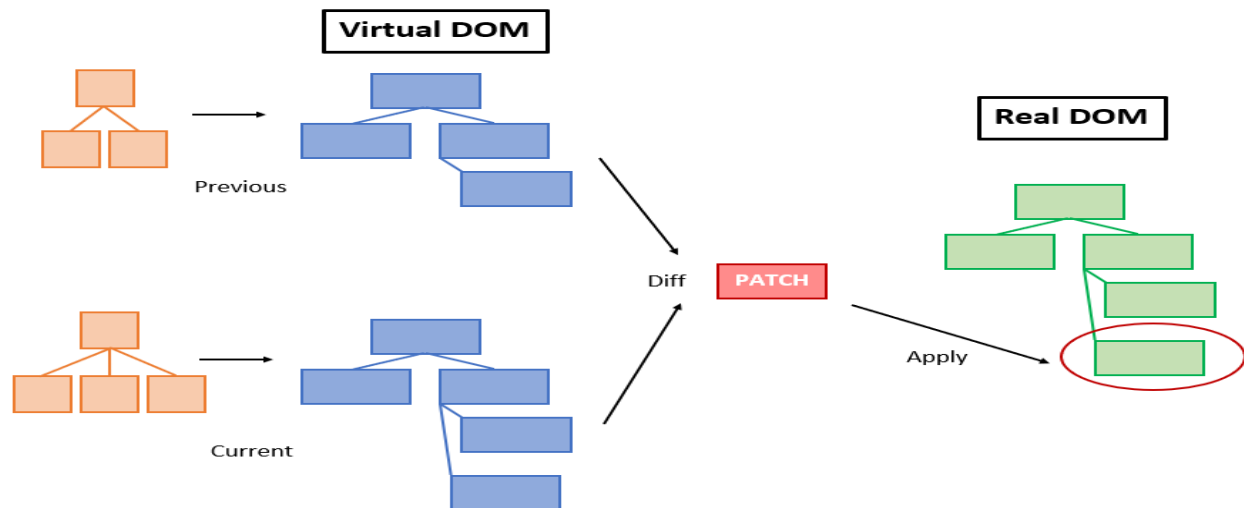
⇔ Performance

In web applications, performance is **directly related to the Document Object Model, or DOM**, representing the web page both in the browser and in the code. Through DOM, web pages can be manipulated in case of any updates.

- ⊗ **Angular** is a framework that uses an **incremental DOM**.
 - ✓ The difference from the virtual DOM is that **no intermediate tree is created** (the existing tree is mutated in place).
 - ✓ This approach **reduces memory allocation and garbage collection overhead for incremental updates to the DOM tree**.
- ⊗ **Vue.js and React** frameworks use **virtual DOM**.
 - ✓ It is a copy of the actual DOM where changes are made without properly affecting it.
 - ✓ The updated virtual DOM is compared to a snapshot of the real DOM, and then only the modified components are re-rendered.
 - ✓ It is worth noting that **Virtual DOM has a big memory footprint** because it needs headroom for changes that "might" happen.



Incremental DOM – doesn't need such a big footprint as memory is only allocated for changes, **so in theory, it should be better from a performance perspective**. **Tests prove this, BUT if we are talking about the big three, in most cases, Incremental DOM is not as fastest as Virtual DOM** because **Incremental DOM brings a solution to reduce memory usage; that solution impacts Incremental DOMs speed since difference calculation takes more time than the Virtual DOM approach**.



⇔ **Scalability**

Concerning front-end development, scalability mostly refers to consistently maintaining an expanding functionality.

Applications are supposed to grow in size and complexity, and the development platform should be able to support such growth.













- ⊗ The **developers' community almost unanimously states that both Angular and React are suitable for building scalable applications.**
- ⊗ **React lies heavily on third-party tools needed to scale the app.** However, this framework can easily develop a maintainable architecture with server-side rendering.
- ⊗ **Angular JavaScript framework comes with all the core features required for scaling an app by adding new functionality.**
- ⊗ **In terms of scalability, Vue.js is losing noticeably,** as it uses template-based syntax. In a large application, templates become increasingly more difficult to reuse than JavaScript components.

⇔ **Migrations**

Though you won't encounter issues from one version to another in most cases, keep your eyes on the ball because some updates can be more significant and may require tweaks to keep things compatible.

- ⊗ Angular changes its version every six months, providing a gradual but confident and continuous framework evolution. There are still 12 months before any major APIs become deprecated. So you have three release cycles (18 months) to make the necessary changes. It can be updated only from the previous version (you can't skip from Angular 2.0 to 7.0).
- ⊗ Regarding React, stability is paramount for Facebook, as big companies like Twitter and Airbnb rely on this framework. Upgrades through versions are the **easiest in React, through scripts such as a react-code mod that help you to migrate.**
- ⊗ In the Vue 3 Migration section, Vue mentions that 90% of the API is similar when you migrate from 1. x to 2.

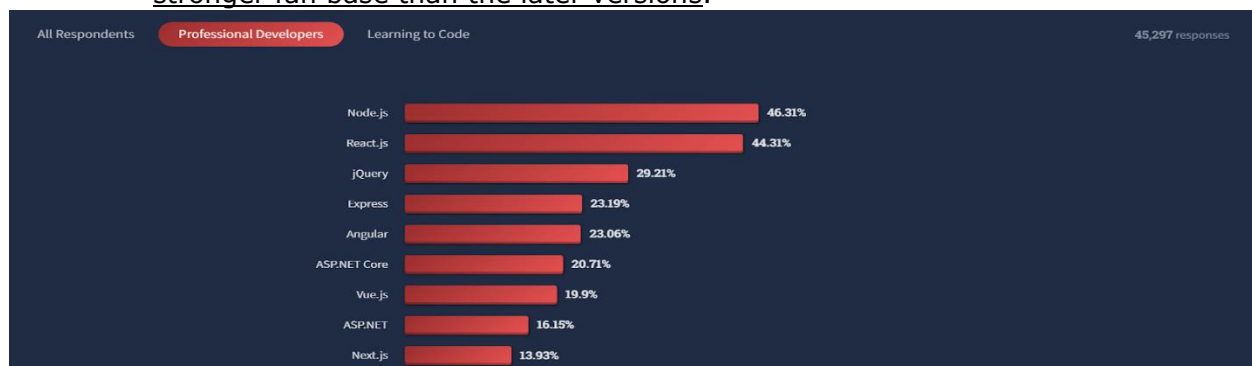
Stats

			Stars	Issues	Version	Updated	Created	Size
	angular	  	59 372	468	1.8.3	6 months ago	11 years ago	minzipped size 62.3 KB
	react	  	196 380	1 128	18.2.0	4 months ago	11 years ago	minzipped size 2.5 KB
	vue	  	33 215	793	3.2.41	6 days ago	9 years ago	minzipped size 34.2 KB

⇔ Developers' community

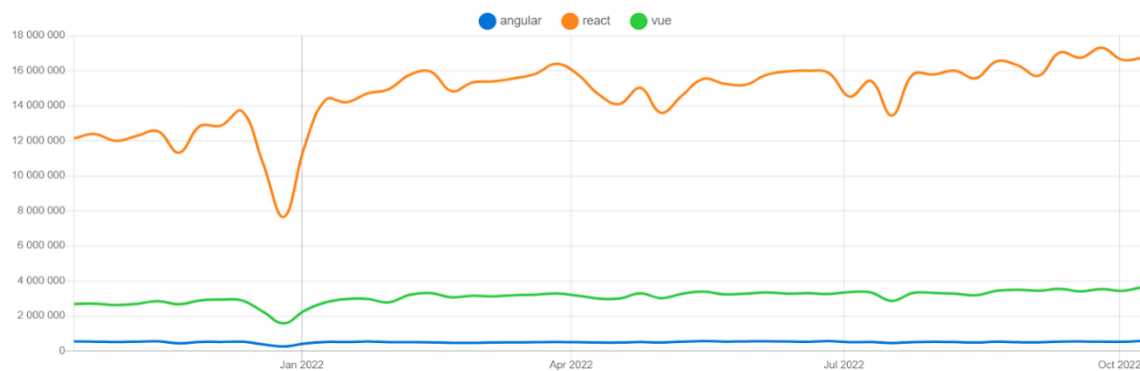
The community size is not about prestige – its effect is much more practical. The more people cooperate on the framework functionality, the better it gets, and, what's even more important, the greater its library collection becomes.

- **Vue** is maintained by a team of full-time and volunteer members worldwide, with Evan You as the project lead, and boasts its structured documentation. Despite its small community, Vue.js is on the rise with **19.9%**.
- According to the **2022 Stack Overflow Survey results**, **React is now one of the most used web frameworks (44.31%)**. React developers' community exceeds thirty thousand members but remains far behind Vue's regarding documentation accessibility and structure.
- **Angular** has been named **the less loved of the three**, but it is used by **23.06%** of developers. **This negative feedback is probably influenced by AngularJS, which has more problems than Angular 2+.** However, **Angular's initial versions built a stronger fan base than the later versions.**



React js library is the most downloaded of the three, showing users' confidence in React. Vue comes second by a long distance, surpassing Angular.

Downloads in past 1 Year



⇔ **Acceptance and adoption by global brands**

No matter how good a framework is, its reputation and popularity still play a key role in its acceptance. Besides, further maintenance and support will be much easier when you build an application on a popular and widely-used platform. Look at the global brands that have adopted these frameworks for their front end.

Angular	React	Vue
Behance Hdfcbank Freelancer Forbes IBM Microsoft Office PayPal Apple Adobe Nike	Facebook Zendesk Uber PayPal Asana GitHub Tesla Reddit New York Times Salesforce	Google Apple Behance Grammarly Zoom Trivago Alibaba Baidu GitLab WizzAir

❖ **Summary table**

Angular, React, and Vue are actively developing, and their future has glorious prospects. They regularly release new and maintain the existing versions. As the current level of support is high in each case, you can safely use any of these frameworks.

	Angular	React	Vue.js
Size	143k	43k	23k
Performance	medium	high	high
Scalability	high	high	low
Learning curve	steep	medium	easy
Developers' availability	high	high	low
Developers' community	large	very large	small
Acceptance and trust	high	high	cautious

We summarized Vue vs. React vs. Angular characteristics to give you a general idea:

	Angular	React	Vue
Size	143K	97.5K	58.8K
Performance	High	High	High
Ui component	In-built Material Design Components	Material-UI Library & Dependencies	Component libraries
Migrations	API upgrade	React code mod script	Migration helper tool
Scalability	High	High	Low
Architecture	Component-based	Component-based	Component-based
Data binding	Bi-directional; data is mutable	Uni-directional, data is immutable	Bi-directional

Rendering	Client/server side	Client/server side	Client/server side
Code reusability	Reusable components	Reusable components	Component templates
DOM	Incremental	Virtual	Virtual
Learning curve	Difficult (learn TypeScript and RxJS)	Moderate	Easy
Community	Large	Large	Small but active
Developers' availability	High	High	Low
Global brands preferences	Apple, Adobe, Nike, Microsoft, Google	Facebook, Twitter, PayPal, Uber	Alibaba, Baidu, GitLab, WizzAir

How to choose the right JavaScript framework for your project?

Choose Angular if you need	Native apps, mashups, or web apps that are substantial and long-term investments (like building enterprise applications with Angular)
	Real-time solutions, like chat or messaging applications
	Reliable and scalable framework
	Programming in TypeScript

Choose React if you want to develop	Lightweight modern enterprise-grade applications
	Cross-platform or single-page applications
	Expanding the functionality of an existing app
	Strong community support and solutions

Choose Vue.js if you plan	Build fast and scalable single-page applications
	Integrate with the current MPAs and SPAs rendered by the server
	Deliver MVPs or realize startup ideas quickly
	Support native apps
	Create alluring animations with built-in modules founded on CSS