FRONT-END CHOICES  
FOR WEB  
DEVELOPMENT

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# WHAT ARE FRONT END FRAMEWORKS?

The part of a web application that a user can view and interact with is called the frontend and its development represents the process of transforming data to a graphical interface that can be understood by the site visitors. Regarding the programming languages, it is in the majority of cases comprised of HTML that is responsible for webpage basic layout, CSS to manage the visual formatting, and JavaScript to maintain interactivity, allowing the users to perceive and network with the data.

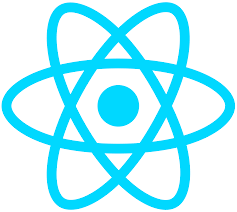
Frontend frameworks are required in order to help web developers in their process. There are many choices available. Nowadays, discussing the choice of a framework for a web development project is a topic which frequently generates a great deal of heated debate among experts, software developers. Given that every framework has its own advantages and disadvantages, there is always the need to brainstorm and research on which is the most suitable framework for the current project, in order to meet the requirements.

One of the most beneficial advantage is that by using frameworks, it allows the developer to create reusable components. Consequently, it keeps the code clean, organized and not repetitive.

In addition, web frameworks assist the software developers in achieving structure in the applications and provide them with additional features that they can understand and implement without a lot of effort. There is a greater focus on the quality and readability of the code, rather than quantity, so the developers need to know exactly where they can find the code for specific parts in order to utilize it. The frameworks also contain conventions for how code is supposed to be structured, organized and written, which help developers create code in a consistent manner. Frameworks offer a starting point, allowing them to concentrate on features rather than configuration issues.

# OVERVIEW OF THE MOST POPULAR FRAMEWORKS. REACT, ANGULAR, VUE AND EMBER

1. ***React***



React is an open-source framework, that was initially released in 2013 by Facebook. Nowadays, it is considered to be the best UI framework, as it is used by a majority of the frontend developers according to [Stack Overflow Developer’s survey 2021](https://insights.stackoverflow.com/survey/2021#section-most-popular-technologies-web-frameworks).

React is a front-end framework that is distinguished by its virtual Document Object Model (DOM), that presents its excellent functionality. Every time the data from a component change, React uses its [virtual DOM](https://reactjs.org/docs/faq-internals.html) to update that page rapidly. It's an ideal framework for people that expect a lot of traffic and need a reliable platform to handle it.

The learning curve for React is moderate. It promotes the usage of numerous functional programming paradigms (such as immutability and pure functions), therefore it is ideal that developers have a basic understanding of these principles before embarking on a significant project.

1. Angular



Angular is a TypeScript based JavaScript framework that is developed by Google and it was first released in 2010, being the first framework for use.

The architecture used in Angular projects is based on a few key concepts. The Angular framework's fundamental building pieces are Angular components, which are arranged into NgModules. An Angular application is defined by a set of NgModules.  NgModules are functional groupings of linked code. An application must include at least one root module to facilitate bootstrapping.

1. Vue



Vue was released in 2014, making it the newest from the three frameworks. It was created by Evan You, an independent software developer. Over the last years, it had a substantial increase in popularity.

The core library focuses solely on the view layer. For a developer, it is simple to use and combine with other libraries or projects. Nevertheless, Vue can also be a perfectly choice in order to create a sophisticated Single-Page Applications when used in combination with modern tooling and supporting libraries.

The history and key information about React, Angular and Vue

|  |  |  |  |
| --- | --- | --- | --- |
|  | React | Angular | Vue |
| Initial release | 2013 | 2010 | 2014 |
| Official site | [**reactjs.org**](https://reactjs.org/) | [**angular.io**](https://angular.io/) | [**vuejs.org**](https://vuejs.org/) |
| Current version | 17.x | 11 | 3.0.x |
| Used by | Airbnb, Netflix, Facebook, Uber | Google, PayPal, IBM, Wix | GitLab, WizzAir, Alibaba |

# ADVANTAGES AND DISADVANTAGES FOr EACH FRAMEWORK

### React

Advantages of using React:

* **Community Support** – Nowadays, React has the largest community of UX designers and developers, that continuously improve the framework and share useful information for the new developers. React is also an open-source framework, meaning that anybody may download React code, alter it, improve it, and share it with others to help the library grow. Moreover, more experienced developers can brainstorm, ask or respond to questions within the community, willing to help with any encountered problems, issues.
* **Cost effective -** React is an exceptional choice for reducing development expenses from a business and financial standpoint. In this way, companies can employ fewer developers and use fewer resources while keeping the same efficiency and bringing good or even better results.
* **Freedom** - React offers a great deal of freedom, leaving big decisions regarding a certain project to the developer. This aspect can easily be categorized as a disadvantage. While some developers appreciate the openness, the freedom that React offers, others, particularly new developers, may be overwhelmed by the unstructured approach.
* **Faster Iteration –** An important aspect when developing a product is the speed of iteration, thus there is the need for the web applications to be able to run fast and smooth. In order for this general state to be achieved, every part of the code that contains iterations needs to happen at a high-speed. This is ideal from a business point of view, because it makes the application appealing, easy to use, attracting more customers, site visitors.
* **Maintainability** – From a business perspective, having an application that is easily maintained is a huge advantage, because it saves costs and valuable time. When comparing React to other frontend frameworks, it shows how the code is flexible, easy to maintain in a long term, due to its modular structure.

Disadvantages of using React:

* **Misleading structure** – If we compare React to a monolithic framework like AngularJS, there is no predefined structure for your app (such as services, controllers & views in Angular). Consequently, the developer must devise his or her own methods for properly managing several components of the application in the absence of a predetermined architecture. In the event of a designed structure which is bad or ineffective, this might result in high overhead and protracted development durations.
* **React Documentation** – Many developers dislike the documentation for JSX React. the guides are tough to comprehend for the new developers in the field.
* **Debugging** - Because of the programming languages it employs, debugging is not the simplest part of the framework. Even some of the best React JS websites have such issues, which is unexpected.
* **Memory usage** - Although this could be attributed to JavaScript, React occasionally fails to execute memory-intensive (web) applications successfully. Nevertheless, while the framework is great for running lightweight projects, it can be challenging to run a website that uses a lot of memory efficiently.

### Angular

Advantages of using Angular:

* **Use of TypeScript** – TypeScript is used to build Angular. The key benefit of this tightly typed language is that it aids developers in maintaining clean and intelligible code. With the ability to view typical errors as you type, problems and common syntactical errors are easier to discover and eliminate.
* **Maintained by Google** – The fact that Angular is developed and managed by Google is one of its key aspects. Because it is supported by a reputable corporation, the community has a high level of trust in it. Developers have faith in the framework and trust that it will be maintained and that problems will be fixed, aided by the developers and community contributions.
* **Dependency Injection** – Angular uses dependency injection, which is one of the most fundamental application design patterns. Angular includes its own dependency injection framework.

Dependencies are services or objects that a class need in order to complete its task. Rather than generating services, the class requests them from an external resource, in this case another module or class. This allows us to assign each module a specific task.

The dependency injection design pattern has the benefit of dividing the task into many services. The object will not be produced by the class; instead, it will be constructed and injected by an Angular injector. It provides better testability and maintainability of the end product.

* **Powerful Router** – The Angular Router handles routing and in-app navigation in Angular. It's a module part of the '@angular/router package'. Angular router is a navigational service that is both strong and adaptable. It makes use of the router-outlet component to load multiple components into the view based on the URL in the browser.
* **Large community** – “Angular is actively maintained and has a large community and ecosystem. You can find lots of material on this framework as well as many useful third-party tools. Currently, Angular has around over 63K stars on GitHub, a clear indication of the popularity of the framework.”

Disadvantages of using Angular:

* **Steeper learning curve** – One significant disadvantage of choosing the Angular framework is that it is tough to understand. “With such a complex web of modules, coding languages, integrations and customizing capabilities, understanding Angular definitely takes some time. Fortunately, Angular provides phenomenal support and there are a number of online tutorials and courses you can take to catch up and start taking full advantage of all the program has to offer.”
* **Decline in popularity** - With the introduction of newer frameworks such as React and VueJS, Angular's popularity has decreased. Developers were mostly debating whether to use Angular or React for their projects just a few years ago. However, nowadays, there has been a third party introduced to the area of interest, VueJS.
* **Limited SEO Capabilities** – “Angular is just great for building powerful single-page web applications. However, as with all single-page web applications, there is a disadvantage when it comes to search engine optimization.

Usually single-page applications are rendered on the client side and therefore web crawlers of search engines like Google and Bing are not able to see the complete structure and content of the individual pages of the websites. With this limitation in place, it is not possible to list your website correctly in search engine results.

However, there are techniques and packages to make this work, but it is an extra effort in terms of development. Angular universal is a way to render the Angular application of the server itself. The technology enables server-side rendering for Angular applications. Angular Universal generates static application pages on the server through a process called server-side rendering.

While Angular universal takes care of most aspects, it still requires a lot of set-up. If you prefer to do it all manually, there are documents available to help you do that but there are gotchas that you need to watch out for.”

### VUE

Advantages of using Vue:

* **Easy to understand and use** – The main benefit of using VueJS programming is that the developer can get a high-quality result with little work. From a structure point of view, one-file components can contain all of the required codes (HTML, CSS, and JavaScript) in a single file. This structure offers the developer flexibility while creating the project.

**“**Unlike other frameworks, VueJS facilitates the development process. As an application grows, the codebase does not become heavier. The main reason for complication of the development process is that all JSX templates and methods (including life cycle methods) can exist in the same object. This makes it difficult to comply with the logic flow.**”**

* **Easy learning curve** – For a new developer, VueJS is easy to understand, learn and apply, especially if he/she has a thorough knowledge of JavaScript. Vue uses similar programming templates and styles as other JavaScript frameworks. Vue.js documentation is also comprehensive, guiding developers throughout the project, offering a complete description of all aspects of the work.
* **Reusable** – Vue can have reusable components, if they are created properly. “If programmers are experienced and tech-savvy enough to get many components and views that can be easily integrated into a ready-made infrastructure or application. The framework helps developers write their own code so that they can divide an app into many different functions that can interact with each other if necessary.”
* **Segregation** – “Using the Vue.js framework, it is possible to make a separation between the compiler and the template-to-virtual DOM. Another useful feature of Vue.js worth paying attention to is virtual DOM. It is utilized to update page elements without re-rendering the whole DOM.

After the changes are done, a new virtual DOM object is built and changes between the old and new DOM objects are discovered (then they are applied to the real DOM).”

Disadvantages of using Vue:

* **Lack of community and resources** - Compared to the other popular frameworks, React and Angular, there is a significant difference between the communities and the amount of support that a developer can get while completing a project.

Taking into consideration the fact that Vue is a somewhat new framework and it does not have a powerful company behind to actively maintain it, there are not that many senior software developers in this field.

* **Excessive code flexibility –** “On the one hand, code flexibility provides great opportunities for programmers. On the other hand, flexibility can lead to more irregularity and errors in code. Most of the delays in code are caused by excessive flexibility, when several different programming approaches can be applied simultaneously within the same team.”

# Statistics

# conclusion

# references

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