# Angular, React and Vue

**Angular** was developed in 2009 by Google. The first version was angular.JS and was later developed into angular, angular.JS and angular are widely different in that angular.JS is MVC architecture and is written in JavaScript, while angular is component-based architecture, written in TypeScript, is larger and more complex, faster and more performant, and has a wider set of tools and a larger community.

### Architecture:

- Components: Components are the building blocks of angular, they are responsible for defining the UI and logic of a part of the application like a navbar for example, each component consists of three files, an HTML file, a CSS file and a TypeScript file.
- Services: Services are responsible for handling logic that is not specific to a particular component like communication with APIs
- Modules: Modules are used to organize the artifacts of an Angular application into logical units and manage dependencies
- Other features: in addition to these main building blocks, Angular also provides a number of other features, such as directives, pipes, dependency injection, and routing.

**DOM:**

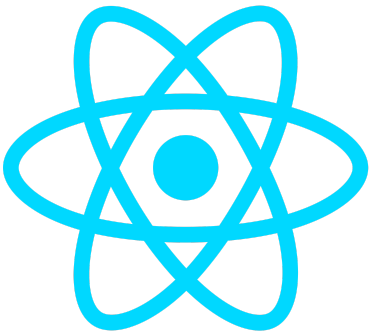
In Angular, the DOM is updated through change detection, where data flows from the component class to the template and changes made in the template are sent back to the component class typically using built-in directives.

**Pros:**

- Modularity: Angular's component-based architecture promotes modularity and code reuse.
- Performance: Angular's detection mechanism makes it fast and efficient for large and complex applications.
- Angular CLI: Angular CLI makes it easier to set up and develop Angular applications.
- TypeScript: Angular is written in TypeScript which improves code organization due to its static typing nature.

**Cons:**

- Steep Learning Curve: due to its complex architecture Angular can be hard to pick up.
- Size and Performance : Angular is a large framework, so even though it's generally fast and efficient, in smaller and simpler applications it can be slower than other frameworks.



**React** was developed by Facebook in March 2013,
React is a component-based library that allows breaking down the UI into smaller, reusable components.
React uses a virtual DOM to render user interfaces and update the DOM only when necessary.
React is known for its simplicity and flexibility.

## Architecture:

- Components: React uses a component-based architecture, where components are the building blocks of the UI.
- Virtual DOM: React uses a virtual DOM to render user interfaces and only update the DOM when necessary
- State and Props: the state and props of a component determine how it's rendered and when changed react will automatically re-render the component
- Additional libraries: React provides additional libraries such as React Router for handling routing.

## DOM:

React uses a virtual DOM, Traditionally when an application's state changes, these changes need to be reflected in the UI by directly manipulating the DOM, which is slow and resource-intensive, React, however solves this problem by using a virtual DOM which is a lightweight representation of the actual DOM, so when the application state changes React updated the virtual DOM and compares it to the actual DOM and only changes the actual DOM when necessary.

## Pros:

- Reusable components: React's component-based architecture promotes code reuse and makes it easy to build and maintain complex UIs.
- Performance: React's use of a virtual DOM and efficient rendering pipeline make it fast and efficient, even for large and complex applications.
- Flexibility: React's architecture is flexible and allows developers to choose the tools and libraries that best fit their needs.
- Large community: React has a large and active community, which means that there are plenty of resources, libraries, and support available for developers.
- Easy to learn: React is known for its simplicity and ease of use, making it a popular choice for beginners.

## Cons:

- Lack of structure: Unlike frameworks, React doesn't provide guidance on how to structure an application, which can lead to lack of organization.
- JSX as a barrier: React's use of JSX syntax can be confusing for developers who are not familiar with it.

**Vue** was developed by Evan You in 2014 as a progressive JavaScript library for building user interfaces. Like React, Vue is a component-based library that allows breaking down the UI into smaller, reusable components.

**Architecture:**

- Components: Vue uses a component-based architecture, where components are the building blocks of the UI.
- Reactivity: Vue's reactivity system allows changes to the application state to be automatically reflected in the UI.
- Templates: Vue provides a template syntax that allows developers to declaratively render components and data.
- Additional libraries: Vue provides additional libraries such as Vue Router for handling routing and Vuex for state management.

**DOM:**

Similar to React, Vue uses a virtual DOM and a template compiler to efficiently render user interfaces and update the DOM only when necessary. When the application state changes, Vue updates the virtual DOM and compares it to the actual DOM, and only updates the actual DOM where necessary.

**Pros:**

- Versatility: Vue's architecture is versatile and can be used for both small and large-scale applications.
- Performance: Vue's use of a virtual DOM and efficient rendering pipeline make it fast and efficient, even for large and complex applications.
- Simplicity: Vue is known for its simplicity and ease of use, making it a popular choice for beginners.

**Cons:**

- Limited tooling: Compared to React, Vue has limited tooling and fewer third-party libraries available.
- Less mature: As a newer framework, Vue is less mature than React or Angular, which means that it may have more bugs and issues that need to be addressed.