Applied Research Document

Housing App

Semester 3

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Version Table

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Problem statement

Which front-end library or framework should a student with no prior experience with front-end frameworks or libraries pick up, so he gets more experience and learns the foundations of creating a front-end application.

Main question

Which framework/library should be chosen for creating a front-end web application – React, Vue or Angular?

Sub questions

What is the difference between a framework and a library?

In what cases is each framework used?

What are the key differences between the 3 frameworks?

What are the constraints of each framework?

What one is the most popular nowadays?

Plan

- What is the difference between a framework and a library?

Community research – Library

Platforms like Stack Over Flow have a great community of software developers who provide information from their own experience and discuss different debate over different topics.

Document analysis – Field

In the documentation of a software product always can be found a definition and explanation of what the project provides.

- In what cases is each framework used?

Available product analysis – Library

Checking the available product and comparing in which case what their choice for a front-end framework is, can provide solid proof.

Document analysis – Field

Analyzing the documentation can show what the framework/library provides and what not, from which conclusions could be made for the use cases.

- What are the key differences between the 3 frameworks?

Literature study – Library

There are a lot of online resources which analyze and compare features of technologies.

Task analysis - Field

By how the frameworks are performing the same tasks the differences can be distinguished.

- What are the constraints of each framework?

Competitive research – Library

Document analysis – Field

- Which one is the most popular nowadays?

Community research – Library

On the popular platforms for software developers there are a lot of surveys and research performed which could be analyzed.

Data analytics – Lab

Analyzing the data can give useful insights

Results

What is the difference between a framework and a library?

Parameters	Library	Framework
Definition	Libraries provide developers with predefined functions and classes to make their work easier and boost the development process.	Framework, on the other hand, is like the foundation upon which developers build applications for specific platforms.

Inversion of Control	By using a library, you can control the flow of the application and call the library.	In contrast, when you use a framework, the control is inverted, i.e., the framework controls the flow and calls your code.
Collection	Generally, libraries are a collection of helper modules, objects, classes, functions, message templates, pre-written code, etc.	Frameworks consist of a lot of APIs, compilers, toolsets, support programs, libraries, etc.
Code Modification	Codes in libraries are geared toward a particular program or to solve a specific development problem. Therefore, developers must modify library code to meet their needs.	Despite the fact that frameworks generate new codes for developers. These codes cannot be altered or modified later. Unlike libraries, frameworks do not allow users to modify their pre-written codes, so you don't have to worry about deleting or changing them.
Scope	It is possible to call a library out of context. You may use the library wherever you see fit in your code.	On the other hand, you can only call and use what belongs to a Framework within the same Framework.
Function	In the program linking and binding process, they play an important role.	Using them, you can build and deploy applications in a standard way as the framework already provides code to perform common tasks and uses code provided by a developer for custom functionality.
Complexity	Having a library means understanding the functionality of each method, and it isn't easy to	Frameworks, on the other hand, embody the basic flow, and since plugins need to be added to code,

	create complex interactions since you need to call many methods to get the desired results.	it is easier to do the right modification.
Extensibility	Generally, libraries aren't designed for extensibility; they are designed to accomplish a specific purpose.	Frameworks provide general functionality. Because of this, they are built to be extensible, which allows developers to incorporate app-specific features without modifying the framework's source code.
Replaceable	It is easy to replace a library with another library. For instance, if you do not like the jQuery date picker library, you can use another date picker like a bootstrap date picker or pick date.	Frameworks are difficult to replace. If, for instance, you were using AngularJS to build your product, you cannot simply swap it out for another framework. It requires rewriting the entire codebase.
Performance	Less code is required to build libraries, which leads to faster loading times and better performance.	Developing a framework requires a lot of coding, which increases loading times and decreases performance.
Usage	The purpose of libraries is to perform a defined and specific task. Eg: Image manipulation, network protocols, math operations, etc.	Frameworks can be used for performing a wide range of tasks. Among these are Web application systems, plug-in managers, GUI systems, and so on.
Existing Projects	You can integrate libraries seamlessly into existing projects to add functionality.	Incorporating frameworks seamlessly into an existing project is impossible. Instead, frameworks should be used when starting a new project.
Benefits	Good code quality, reusability, and control,	Faster programming, support from the

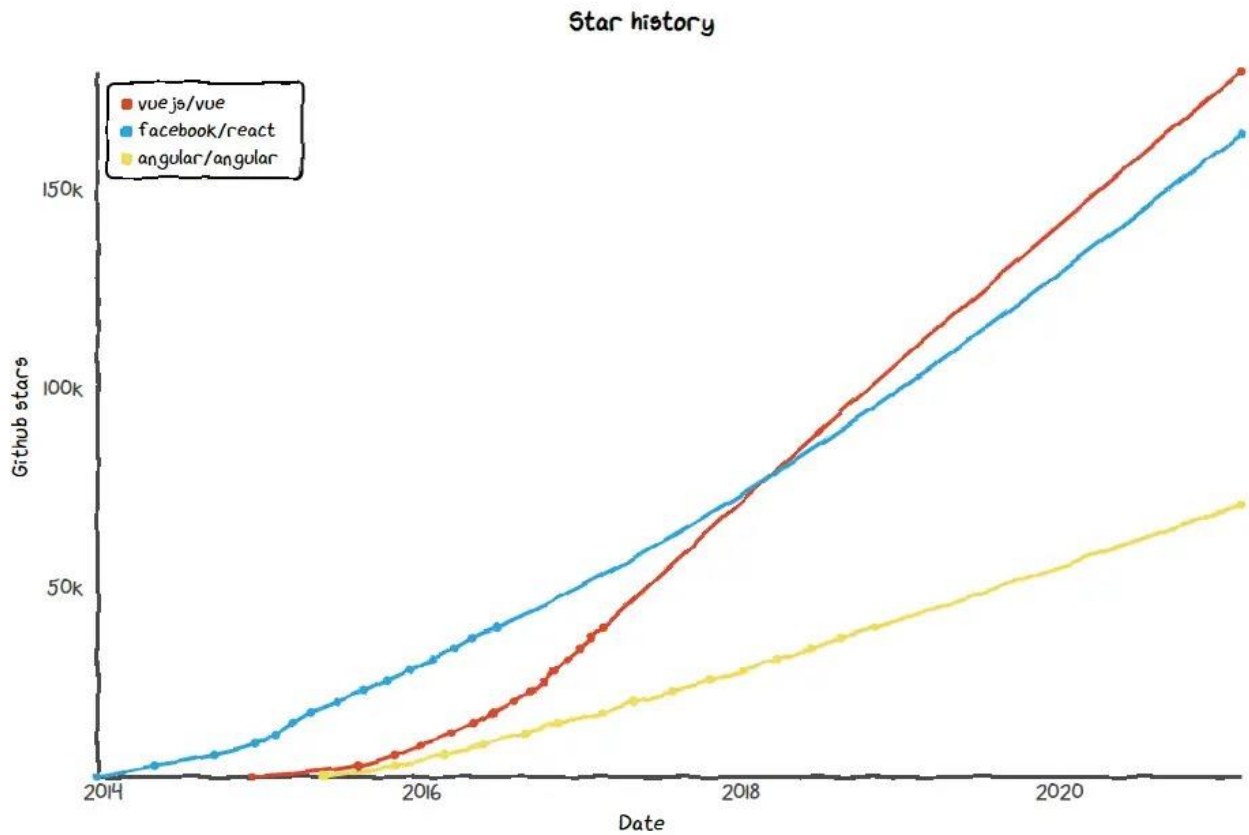|	enhanced speed and performance of the program	community, great support for MVC (Model View Controller) pattern
Examples	JQuery, React JS	Spring, NodeJS, AngularJS, Vue JS

Which one is the most popular nowadays?

According to a survey by Stack Overflow **40.14%** of the developers believe that React is the most commonly used JavaScript Framework. Angular and Vue follow it with 22.96% and 18.97%, respectively.

On the other hand, **Vue** has 200k **stars** on GitHub, the leading code hosting platform, surpassing both React (197k) and Angular (84,6k).

The number of currently live websites based on each JS framework also gives us a different arrangement between the three. Per BuildWith, **11 million websites** are using **React** as of 2022. While a solid 2 million websites use Vue, only 109k live sites today were created with Angular.

Number of stars on GitHub projects for Angular, React, and Vue

Star history

Github stars

150k · · · · · 100k · · · · · 50k

2014 · · · 2016 · · · 2018 · · · 2020

Date

Legend:
- vue js/vue
- facebook/react
- angular/angular

Stack Overflow Developer Survey 2021. (n.d.). Stack Overflow. Retrieved November 4, 2022,

from https://insights.stackoverflow.com/survey/2021

In what cases is each framework used?

Angular:

- For developing a large, multifunctional application.
- Enterprise applications

- Real-time apps, chats, or messengers.

React:

- Lightweight modern apps in a short time
- E-commerce projects
- Social media projects
- Secure mobile solutions for web development.
- To develop cross-platform or single-page mobile applications.
- To add new features to an existing program.

Vue.js:

- Single-page applications.
- Dynamic, high-performance applications enable because of the virtual DOM.
- Easy-to-use framework, for facilitated application development.
- Animated websites
- UI-centered websites

Stoyko, T. (2022, February 4). *Angular vs React vs Vue: The Main Differences and Use Cases*.

Incora - European Software Development Company.

https://incora.software/insights/react-vs-angular-vs-vue-the-main-differences-and-use-cases/55

- ## What are the constraints of each framework?

Angular:

Reloads the complete HTML tags tree structure

Because of the given framework, Angular is relatively stiff and inflexible

Steep learning curve

Less community support

It also has limited SEO options and poor accessibility for search engine crawlers

Difficulty in building cross-platform apps

Strong JSX knowledge required

React:

It is just a JavaScript library, not a framework.

Frequently insufficient for developing a web app and necessitating the use of other libraries.

Documentation is not always up to date due to the pace of development

Strong JSX knowledge required

Frequent updates cause many tools to become obsolete

Vue.js

Limitations in terms of scalability and plugins

Limited community comparing to Angular and React

Lack of large-scale projects to learn from

Overcomplications with flexibility

Stoyko, T. (2022, February 4). *Angular vs React vs Vue: The Main Differences and Use Cases*.

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What are the key differences between the 3 frameworks?

	Angular	Vue.js	React.js
Performance	Performant but may have some issues in the case of overloading	Depending on the use case	Highly performant
Ease of mastering	Difficult	Relatively easy	Easy
Ease of usage	Depending on the use case	Relatively easy	Easy
Popularity	The third-ranked tool	The second-ranked tool	The most popular web app development tool
Complete web apps	Can be used on standalone basis	Requires third parties tools	Needs to be integrated with many other tools
Model	MVC	Virtual DOM	Virtual DOM
Data binding	Bi-directional	Bi-directional	Uni-directional
Development speed*	Netflix, Upwork, PayPal	Meta, Adobe, Alibaba, Gitlab	Meta, Netflix, Yahoo, Atlassian

Conclusion

Choosing a front-end framework very much depends on the use-case, the purpose of the product and the priorities that the developer has. However, after the research performed and evaluating the results - React.js is the best choice.

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