Analysis of Alternatives

Group 3

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1. Terms of reference

1.1 Skills/experience of team members

The skills and experiences of the team members are naturally taken into account when choosing the framework/language for this project. At least one member must be experienced in the chosen framework/language so that they can guide the rest of the members.

1.2 Hardware

The platform and language chosen must be supported by the hardware owned by all team members. For example, it will make no sense to develop an IOS app if no team member owns an IOS device.

1.3 Cost

Services such as hosting a web server have financial costs. The team should consider these costs when choosing the infrastructure/architecture.

1.4 Client and user requirements

Client requirements are taken into consideration when choosing the language and platform. End users are considered when making architectural decisions.

1.5 Availability of tools

Frameworks and languages with tools that facilitate quick and sustainable development with minimal overhead are preferred over those with lacking package ecosystems.

2. Team's Skills

The following table is to be used as a reference for programming languages known by each member of the team. This is taken into consideration for the analysis of alternatives.

Name	Languages Known
Er Tian Ru	Java, Python, JavaScript, HTML, C, CSS, Matlab
Bryan Lim	Java, Python, JavaScript, HTML, C, Typescript, PHP, C#, R
Sami Hussein	Java, Python, JavaScript, HTML, C, Matlab
Jason The	Java, Python, JavaScript, HTML, Typescript, R
Shuta Gunraku	Python, JavaScript, Java, PHP, R, Matlab, CSS, HTML
Pan Wei Hung	Java, Python, JavaScript, HTML, CSS, VB, Matlab, Markdown

3. Evaluation of Alternatives

3.1 Platform

There are three primary types of application when it comes to selecting the platform of our application. The three primary types of application are listed below along with their advantages and disadvantages:

Mobile applications

- Advantages
  - Fast execution speed
  - Easily accessible to end-users from the app store
  - Have full access to the device
- Disadvantages
  - Lengthy development period
  - Costly to develop different apps for multiple Operating Systems (doesn't support cross-platform functionality)
  - Not everyone on the team is familiar with building native mobile applications

Desktop applications

- Advantages
  - It can support powerful programs
  - Can be accessed offline
- Disadvantages
  - It requires installation
  - Not portable
  - Not flexible enough for the purpose of this application

Web applications

- Advantages
  - No installation is needed for the user
  - Highly portable
  - Fewer hardware and software compatibility issues
  - Can be accessed from any device with a browser and an internet connection
  - Does not need to consider different OS
- Disadvantages
  - Internet dependence
  - Functionality limitations

3.2 Programming languages

As our team has come to an agreement on developing a web application (refer to recommendation for justification). In order to achieve our target, we have considered a few programming languages and frameworks. All programming languages and frameworks are listed below:

- AngularJS with Node JS and Express(JavaScript) - A JavaScript open-source web framework for developing single-page applications.
  - Advantages
    - All of the members are familiar with JavaScript.
    - JavaScript is most suitable for web development.
  - Disadvantages
    - Applications written only in JavaScript are not secured enough.

- Vue.js with Node JS and Express (JavaScript) - An open-source MVC front-end JavaScript framework for building user interfaces and single-page applications.
  - Advantages
    - All of the members are familiar with JavaScript.
    - Simplicity
    - Fewer restrictions
  - Disadvantages
    - Excessive flexibility

- ASP.NET (C#) - An open-source, server-side web application framework designed for web development to produce dynamic web pages.
  - Advantages
    - Easier maintenance
    - Lesser code
  - Disadvantages
    - Resource intensive
    - Only one member of the team is familiar with this programming language

- Spring MVC (Java) - A Java framework that is used to build web applications. It follows the MVC model and implements all the basic features of a core spring framework like Inversion of Control, Dependency Injection.
  - Advantages
    - All team members are familiar with Java
    - Facilitates fast and parallel development
  - Disadvantages
    - Has a lot of complexity and variables
    - The parallel mechanism can cause confusions
    - Requires understanding of Java, which is relatively harder than other languages.

- Django (Python) - A Python-based free and open-source web framework that follows the MVC model.
  - Advantages
    - All team members are familiar with Python
    - The fact that it is written in Python
    - Python is one of the most suitable languages for data analytics.
  - Disadvantages
    - Uses routing pattern to specify its URL
    - Everything is based on Django ORM
    - Components get deployed together

- Laravel (PHP) - A free, open-source PHP web framework with expressive and elegant syntax. It is one of the most popular PHP frameworks in the market.
  - Advantages
    - One of the most powerful frameworks for web development.
    - In PHP file, it can contain JavaScript and HTML files altogether, which can lessen the workload and simplify the code.
  - Disadvantages
    - The composer is not strong enough.
    - Most of the team members are not familiar with PHP.

4. Recommendations

After considering the advantages and disadvantages of each platform, we have decided to develop a web application as it can be accessed by multiple devices with a browser. There is a wide variety of existing frameworks that support MVC architecture for web applications. It is also very lightweight, without needing an installation on user machines.

Taking into account the criteria listed we have decided on Javascript as the main programming language due to all the team members having experience in JavaScript. Vue.js was then chosen as the frontend framework because of its simplicity and easier learning curve compared to the rest like AngularJS. Lastly, Express with Node JS was chosen due to its simplicity and its ability to seamlessly handle requests between Vue.js and a database.

All team members also possess hardware that supports Javascript, Vue.js, Express, and Node JS. Furthermore, there is no cost to using these frameworks as they are all available for free.

A web application made using JavaScript as the programming language with the Vue.js framework for the frontend, and Express with Node JS as the framework for the backend.