

# Development of API Middleware and Mobile Application for a Job marketplace by Using RESTful API and Mobile Development Framework

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## ABSTRACT

*The research is conducted based on the nationwide goals of Indonesia proposed in the Nawacita document, where one of the big goals is to improve the human resource greatly. Providing a good medium such as a job marketplace can be part of improving the human resource. Since most of Indonesian citizen nowadays has easy access to internet, which can ease their way of using a job marketplace application. Creating a job marketplace application may minimize a number of unemployment in Indonesia. Addition to that, through a focus group discussion, it has been discovered that respondents find job marketplace such as JobStreet and Indeed jobs does not satisfy respondents' UI and UX view towards the application. The objective of this research is to create a job marketplace mobile application that is useful and easy to use for users. The prototype mobile application is developed using react native, and a middleware that is developed using Express JS is made alongside to bridge data to the mobile application. To assess the prototype mobile application, two evaluation method is used which is User Experience Questionnaire (UEQ) and Questionnaire User Interface Satisfaction (QUIS). 6 respondents were allowed to examine prototype application, and answer the questionnaire. The result of the evaluation both shows positive results from both questionnaires.*

**Keywords:** Express JS, Job Advertisement, Job Marketplace, React Native, User Experience, User Interface

## 1. Introduction

Job marketplace, or also known as employment website, is a platform that specifies in employment and careers. Furthermore, there were also the job boards and job search engine. Job boards is a website that accommodates employer of a certain company to post vacant jobs, whereas job search engine helps user to navigate all through the internet to discover vacant jobs from employer website or any other job boards.

In Indonesia, the surge of internet users has multiplied over the year. According to APJII (Asosiasi Penyelenggara Jasa Internet Indonesia, 2017), Internet users in Indonesia has reach the number of 142 million since 2017, that number also indicates that about 54,69% of the population of Indonesia has access to internet since then. Internet users in Indonesia has increased over 600% in the last 10 years.

The Indonesian government, has made and classified the continuity of nationwide economic and social development. That way, the government decided to create drafts consisting of numerous ambitious objectives that should be reached and fulfilled by the year of 2025. One of the major aspects that must be fulfilled is to provide a quality and competitive human resource. Providing a good medium such as a job marketplace can be part of improving the human resource. Since most of Indonesian citizen nowadays has easy access to internet, which can ease their way of using a job marketplace application. Creating a job marketplace application may minimize a number of unemployment in Indonesia.

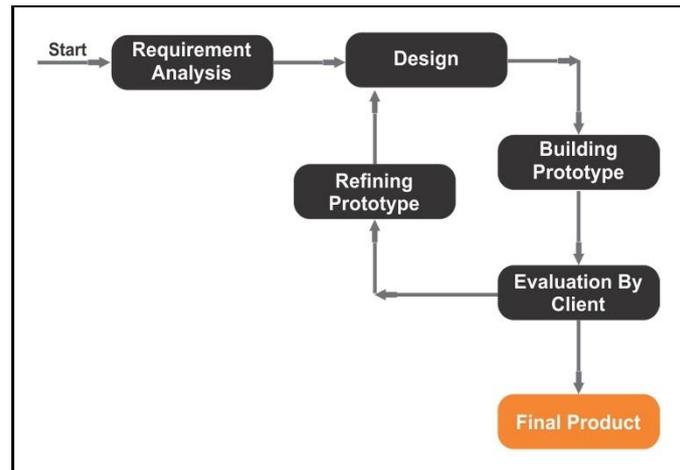
A focus group discussion is conducted at the early stage of the development about the respondents' perception towards 2 existing job marketplaces, which is Indeed Jobs and JobStreet. The focus group discussion resulted that the respondents' perception towards the 2 applications are not satisfied with some parts of the user interface and user experience.

## 2. Related Works

Reference (Böhm et al., 2014) shows a research about some job advertisement and career page that are not completely made and optimized for mobile access. The purpose of the research is to assess base on the usability of job ads, where deficits and best practices are identified. The evaluation method used is the heuristic usability evaluation. Reference (Fredrikson, 2018) shows a study that compares a native Android application to a cross-platform application. To compare in between them, 2 application is created to make a comparison and evaluation of respective frameworks. The study is the evaluated a quantitative analysis with User Experience Questionnaire (UEQ). Reference (Balagtas-Fernandez & Hussmann, 2009) is about a study of preparing a mobile system for usability analysis. It focuses on how easy and simple it is for a developer to prepare a system for evaluation. The UX evaluation is done using the Evahelper Framework. Reference (Ickin et al., 2012) shows a study of assessing the user acceptance of a mobile application by understanding the user's quality of experience through a combination of user application. The evaluation is done using Experience Sample Method (ESM). Reference (Naeini & Mostowfi, 2015) shows a study of assessing the user satisfaction and experience when using a computer system for a vending machine. The evaluation of the system is done by using questionnaire user interface satisfaction (QUIS).

## 3. Methodology

The The research methodology process will be explained in this section. The general overview of the research methodology is shown in figure 1.



**Figure 1.** SDLC Prototyping

### 3.1. Requirement Analysis

In this early stage of software development, various requirement and information will be gathered that is concerning with what is required in the project development. A predecessor website of job marketplace was made, and all the use case of the web, and design of the future mobile application should correlate and more or less the same with the website version of the job marketplace application.

A focus group discussion regarding the requirement gathering will be conducted at this stage. The purpose of this focus group discussion is to determine respondents' views of the current job marketplace application in the market. Through focus group discussion, respondent can express themselves freely, and to express their ideas on the given topic.

### 3.2. Software Design

The second stage is the software design. In this stage, planning out the structure of the Mobile application, how it will look, what the functions are, what are the required methods. At this stage is also where a discussion is conducted on which framework will be used on this project. Through this development stage, a programming framework has been chosen for the mobile application development, the framework is React Native. Express JS has become one of the decisions too, regarding which framework is chosen to develop the middleware.

### 3.3. Building Prototype

The third stage is building the prototype. In this stage, all the code and programming work is done to create a working prototype, and of course the working prototype should showcase all the basic requirement that has been gathered in the first stage which is the requirement gathering stage, which means including all the user requirement that has been gathered through the survey that is conducted at the early stage of this development. Some features may not have worked in the first prototype, but potential users may experience the user interface of the application.

### 3.4. Customer Evaluation and Refining Prototype

The fourth stage is to evaluate the prototype, which then presented to the potential users. The potential users that are mentioned are the 6 respondents from the requirement gathering stage. The prototype mobile application will be shown to the respondents, where they can review the software. The respondents should test out the prototype thoroughly, with some criteria in mind, such as the user interface, the user experience, and the feature that has been implemented according to the first stage which is the requirement gathering. After the respondent examine

the prototype, respondent will provide some feedback and comments to be collected and used for further development. They will also be prompted to fill in a questionnaire regarding the user experience and user interface of the prototype.

## 4. Results and discussions

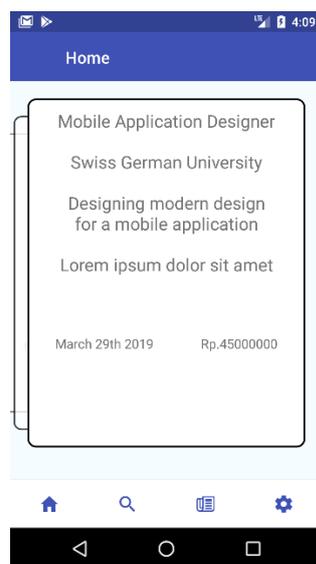
### 4.1. User Requirement Gathering Analysis

The development started with requirement gathering for the software. A focus group discussion was done to gather user requirement towards the application. The survey was done at the early stage of the development, 6 respondents is gathered with different backgrounds of individuals. 3 respondents were individuals who have entered the working age recently, meaning that they are aged between 22-26 years old. The other 3 respondents are undergraduate university students that are in their final years who are about to graduate and enter the job employment life. All 5 respondents are individuals that have used job marketplace application or websites to look for jobs and internship opportunities.

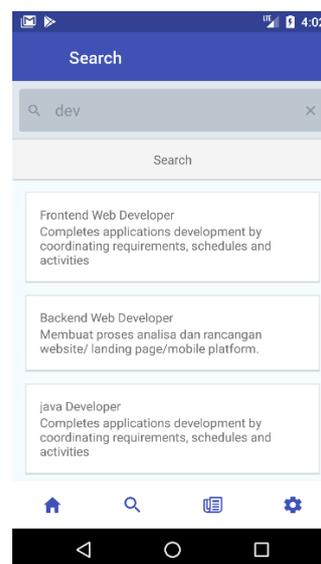
Through this discussion, the result shows some similarities and differences in opinions between respondents. In this discussion, all the similarities and differences among the 6 respondents are analyzed. Through this discussion of 4 questions, the respondents conclude that they are not satisfied with the user interface and user experience of both mobile applications. The last two questions are different than the first four questions, as the next two questions ask respondents what are their thoughts about some unique features that may be implemented by the prototype. The overall verdict of the respondents is positive. Respondents would happily use the feature and would like to see it on the prototype.

### 4.2. React Native Mobile Development

The mobile app development is started with creating a mockup design of the screens that would be in the mobile app. Each screen serves their own functionality. The main screen of the mobile application is the home screen, where it will share the navigation bar with other 3 different screens, the search screen, notification screen and the settings screen. The examples of the screen are shown in figure 2 and 3.



**Figure 2.** Home Screen



**Figure 3.** Search Screen

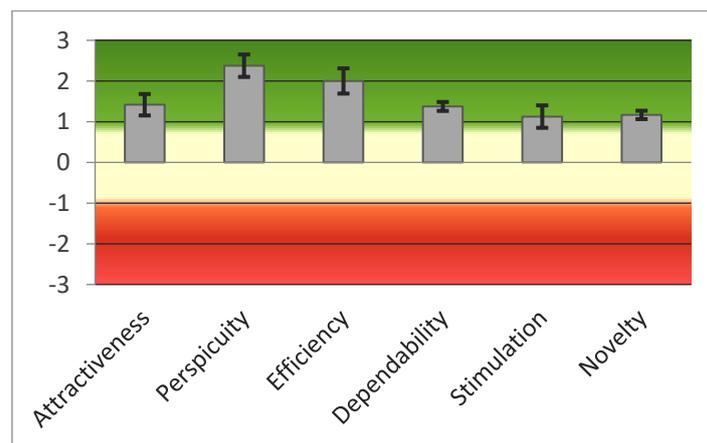
### 4.3. Express JS Middleware Development

The development of the middleware is done alongside the development of the react native mobile application. The purpose is to further shape up the structure of the middleware by looking at the mobile application required services such as fetching data and posting data.

### 4.4. Customer Evaluation Result

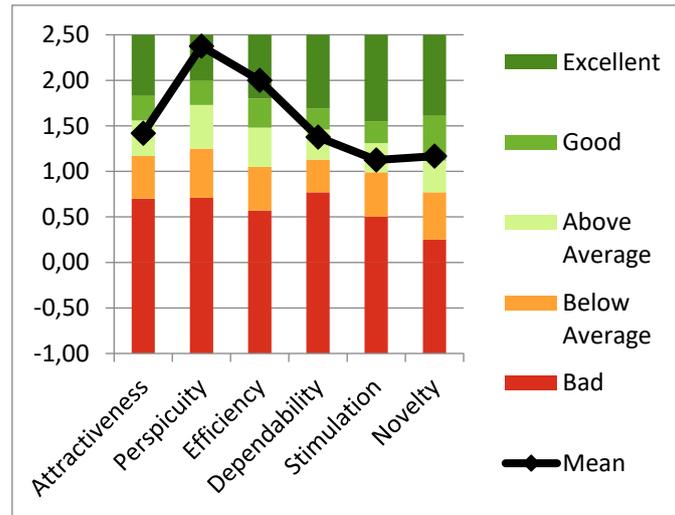
After the application prototype is done, previous respondents from the focus group discussion is called back to experience the prototype application. They were each invited separately, and interviewed separately. Respondents first are briefed about what they will be doing in the interview so that they know the goal of the interview. Respondents will be given time to examine the prototype application, then they were prompted to answer 2 questionnaires regarding user interface and user experience. After answering the questionnaires, respondent may comment and give any input about the prototype application.

A user experience questionnaires data analysis tool is used to evaluate and analyze the data procured from the questionnaires. The use of the data analysis tool is to make the analysis of the questionnaire as easy as possible. The tool helps to automatically calculate the numbers from the questionnaire and to interpret the results.



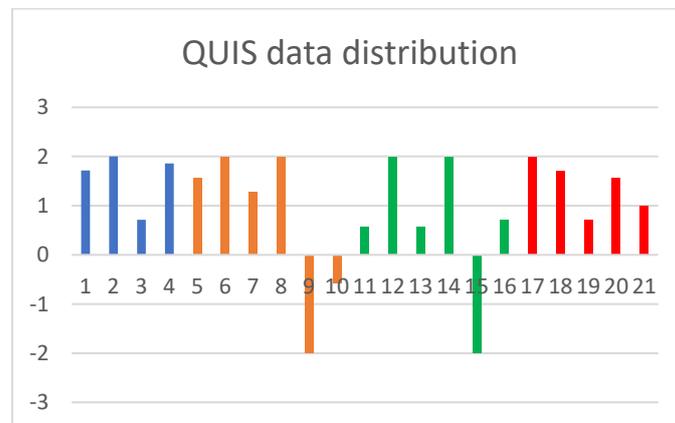
**Figure 4.** UEQ Scale

From the figure 4, all the scales show an extremely positive evaluation. Especially on the perspicuity scale, it appears that respondents find it very easy to use and understand the prototype application. To know whether the product fulfill the general expectations concerning the user experience, it is necessary to compare the result to other established products. UEQ data analysis tool provides benchmark which contains data of 246 product evaluations.



**Figure 5.** UEQ Benchmark Scale

From the figure 5, it is shown that when compared with the benchmark, the prototype application receives a positive evaluation. Although some of the scales are between good and above average, scales like perspicuity and efficiency achieve high range. The other 4 scales dipped in the 'above average' section, which means it those 4 are the areas that needs improvement in the future prototype refinement.



**Figure 6.** QUIS Data Distribution

Since there is no data analysis tool provided by QUIS, data is collected manually and displayed on the chart such as the figure above. The QUIS contains a total of 21 questions, with four area components of evaluation. The area of evaluation is shown by the different color, the blue color indicates screen component, the orange color indicates terminology and application information, the green color indicates learning component, and the red color indicates application capabilities.

## 5. Conclusion

The job marketplace mobile application has been developed with the purpose to support the 2024 government goal which is to improve the human resource of Indonesia. More than that, through a focus group discussion, it has been discovered that respondents find job marketplace such as JobStreet and Indeed jobs does not satisfy respondents' UI and UX view towards the application. This thesis work develops a job marketplace mobile application that is easy to use and useful for user. A middleware is also created to bridge data to the application.

The customer evaluation result concluded their view of user interface and user experience towards the prototype application. UEQ shows positive evaluation from all 6 scales, especially the perspicuity and efficiency scale. QUIS shows almost all positive evaluation from individual questions.

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