



## BlueHire: a Blue-Collar Job Hiring Platform for on-Call Jobs in Olongapo City Using Content-Based Filtering and Vue.JS Framework

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# BlueHire: A Blue-Collar Job Hiring Platform for On-Call Jobs in Olongapo City using Content-based Filtering and Vue.JS Framework

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BlueHire aims to be a platform for on-call blue-collar workers in Olongapo City to easily find a job that fits their knowledge and skill sets. Before the pandemic, we can see various blue-collar job postings are typically located on walls, the streetside, the gate of a house, and the like. Finding jobs at the time was already difficult and implementing lockdowns at the height of the pandemic certainly made the situation even worse. Such is the main reason why the team proposed BlueHire: A Blue-Collar Job Hiring Platform for On-Call Jobs using Content-based Filtering and Vue.JS Framework. It is a mobile application that is designed for easier job hunting for on-call blue workers in Olongapo City. By providing a platform for them, we can hopefully solve the problem of difficulties in finding blue-collar workers by being able to view and select the right people for the task.

The methodology used in developing the application is Agile Methodology. This approach involves delivering frequent and small updates that are useful. Hence it is easy to make improvements to the application in a timely and consistent manner. The ISO 25010 Software Evaluation got an average of 4.17, interpreted as Very Good. In conclusion, BlueHire can ease the process of job hiring for on-call jobs in Olongapo City.

General Terms: Web Application, Mobile Application, Job Hiring Platform, Recommender Systems

## 1. INTRODUCTION

It is often said that manual workers are the backbone of our society. They provide us with the food we eat, the water we drink, the roads we travel on, and the homes we live in. Blue-collar workers refer to individuals who engage in manual labor. [10] The results from the Philippine Statistics Authority regarding the annual estimates of the labor force survey stated that pre-pandemic, the unemployment rate was at 5%, while in 2020, it reached as high as 10%. [12]

During this time of the pandemic, around 7.2 million Filipino workers lost their jobs. [8] Most of them are carpenters, drivers, plumbers, and construction workers. As blue-collared jobs are conducted on-site, lockdowns effectively cost them their livelihoods.

However, finding a job is difficult not for the lack of abilities, but rather for the lack of job postings. This is one of the chronic problems faced by blue-collar workers. Especially for on-call blue-collar jobs such as plumbers, and carpenters, among others. Job postings are frequently seen on walls, streetside, and the like. Even though there are competent individuals who are good at their jobs, the lack of visibility of job postings makes it difficult for employers. This is the reason why the researchers are proposing

a solution, BlueHire: A Blue-Collar Job Hiring Platform for On-Call Jobs in Olongapo City using Content-based Filtering and VueJS Framework. It is a mobile application designed for easier access to on-call blue-collared jobs. The main goal is to ease the employment process by matching individuals with potential opportunities that meet their skills and knowledge. Additionally, employers may check worker profiles, employment histories, and reviews from prior employers through the application itself.

## 2. REVIEW OF RELATED LITERATURE

Blue-collar workers refer to individuals who engage in hard manual labor. They typically work in agriculture, manufacturing construction, mining, or the maintenance sectors. They may work outdoors and/or work with heavy machinery or animals. [10] Recommendation systems usually involve exploiting the relations among known features and content that describe items (content-based filtering) or the overlap of similar users who interacted with or rated the target item (collaborative filtering). Our experimental results demonstrate the efficiency of our proposed approach as well as its improved performance on recommendation precision. [19]

Job recommender systems (JRS) are a subclass of information filtering systems that aims to help job seekers identify what might match their skills and experiences and prevent them from being lost in the vast amount of information available on job boards that aggregates postings from many sources such as LinkedIn or Indeed. The proposed system recommends the top-n jobs to the job seekers by analyzing and measuring the similarity between the job seeker's skills and explicit features of job listing using content-based filtering. [1]

Recommender systems are systems that are designed to recommend things to the user based on several different factors. Companies like Netflix, Amazon, and others use recommender systems to help identify the correct product or movies for their users. [4]

The recommendation process has different phases, namely: the information collection phase, the learning phase, and the prediction/recommendation phase. In addition, there are three main subtypes of recommendation systems: content-based filtering, collaborative filtering, and hybrid filtering. [6]

Collaborative filtering is a recommendation system that creates a prediction based on a user's previous behaviors according to

iterators. [7] Content-based filtering, on the other hand, uses what the user likes in order to recommend things that you may like. [9]

### 3. CONCEPTUAL AND THEORETICAL FRAMEWORK

#### 3.1 Web Application Development

Web development refers to the general tasks that are associated with developing websites for hosting either view intranet or the internet. Front-end development, otherwise known as client-side development, is the practice of producing HTML, CSS, and JavaScript for a website or web application so that the user can see and interact with it directly. Back-end development, also known as server-side development, refers to the part of the website that the user cannot see. It focuses more on how the data is retrieved, sent, and stored in the database. [3]

#### 3.2 Mobile Application Development

Mobile development is simply doing any kind of development for any kind of mobile device. It does not limit itself to just smartphones, but it also covers tablets, smartwatches as well as other wearable devices that run a mobile operating system. [15]

#### 3.3 Database Management System

Database management system is a software package that is designed to define, manipulate, retrieve, and manage data in a database. Aside from manipulating the data, it also defines the rules to validate and manipulate this data. [3]

MySQL is a relational database management system developed by Oracle that is based on Structured Query Language. It is one of the most recognizable technologies in the modern big data ecosystem. It is integral to many of the most popular software stacks for building and maintaining applications. [17]

#### 3.4 Computerized System Development

The tools used in this system development are:

Kotlin is a modern but already mature programming language aimed at making developers happier. It is concise, safe, interoperable with Java and other languages, and provides many ways to reuse code between multiple platforms for productive programming. It is a cross-platform, statically typed, general-purpose programming language with type inference. [5]

Ktor is a framework that is also developed by JetBrains that is used to develop applications from microservices to multiplatform HTTP client apps. It uses coroutines for high scalability and offers an easy-to-use idiomatic API. [13]

Vue.js is a library for building interactive web interfaces. The goal of Vue.js is to provide the benefits of reactive data binding and composable view components with an API that is as simple as possible. [11]

#### 3.5 Progressive Web App (PWA)

A progressive web app (PWA) is a website that looks and behaves as if it is a mobile app. PWAs are built to take advantage of native mobile device features, without requiring the end user to visit an app store, make a purchase, and download software locally. [18]

#### 3.6 Conceptual Model of the Study

ISO 25010, titled “Systems and software engineering – Systems and software Quality Requirements and Evaluation (SQuaRE) – System and software quality models”, is a software quality standard. It describes the models, consisting of characteristics and sub-characteristics, for both software product quality, and software quality in use together with practical guidance on the use of the quality models. [2]

### 4. METHODOLOGY

In this chapter, different steps needed to achieve the goal are outlined. These steps comprise the research design, location of the research, tools used, confirmation of the tools’ effectiveness, managing and gathering data, and the statistical analysis of the data.

#### 4.1 Research Design

Descriptive research involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data collection. It often uses visual aids such as graphs and charts to aid the reader in understanding the data distribution. [16]

#### 4.2 Respondents / Locale of the Study

This study focuses on blue-collar workers in Olongapo City. The respondents of this study include carpenters, plumbers, construction workers, and others who are currently living in Olongapo City. These workers and employers were selected as they represent a significant portion of the blue-collar workforce in the city and their experiences and perspectives are valuable for understanding the challenges and opportunities facing this population

#### 4.3 Flowchart and Process Modeling

The focus of this section is on the use of flowcharts and diagrams to represent the logical design of the web and mobile application. This section will be the basis for the actual development of the study using the technologies cited in the conceptual model of the study.

##### 4.3.1 System Flowchart

A system flowchart is a diagram type that shows the flow of data and how decisions can affect events surrounding it. It is used in software development to show how an algorithm works.

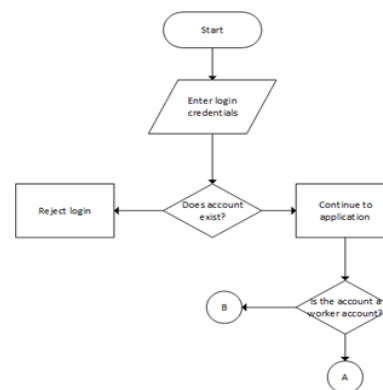


Fig. 1. Authentication System Flowchart

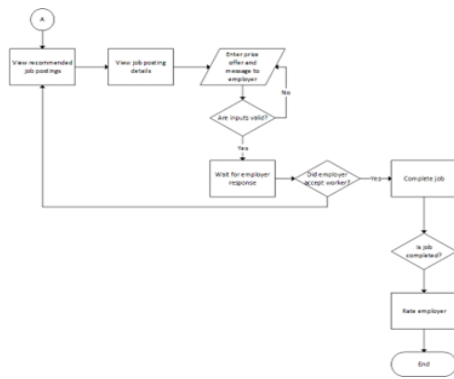


Fig. 2. BlueHire System Flowchart (Worker)

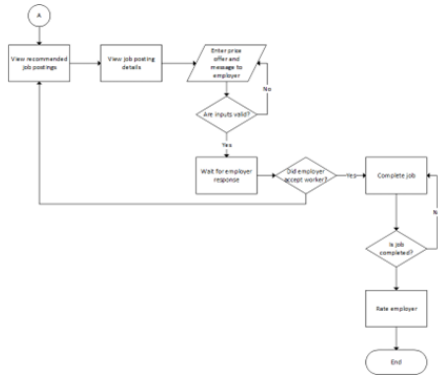


Fig. 3. BlueHire System Flowchart (Employer)

#### 4.3.2 Conceptual Framework

Based upon the concepts, theories, and findings from related literature, studies reviewed and insights taken from them, a conceptual model of the study is shown below:

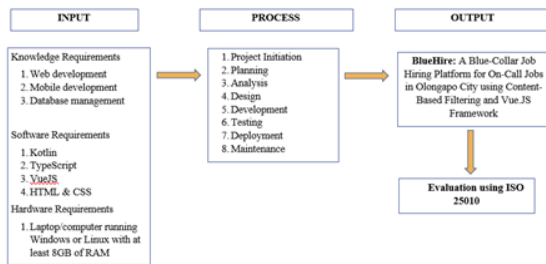


Fig. 4. Conceptual Framework of BlueHire

#### 4.3.3 Features of the System

BlueHire is designed to simplify the job hunting process for on-call blue-collar workers. One of the features of BlueHire is its ability to connect workers with trusted employers quickly and easily. The system allows users to view ratings and reviews of both workers and employers, ensuring that they can work with people they trust. The platform allows users to personalize their profiles and establish their credibility, making it easier for them to stand out to potential employers.

- Worker

The system offers features that enable workers to present their skill sets in a good and effective manner. By creating detailed profiles that highlight their skills and experience, workers can position themselves as top candidates for the jobs they are seeking. With the ability to view job listings that are specifically relevant to their unique skill set, workers can streamline their job search and identify opportunities that match their expertise. The system enables workers to review their employers after completing a job, providing valuable feedback that can help both workers and employers make informed hiring decisions.

- Employee

As for the employer, the feature of being able to create a job posting and allow workers to search for it. It makes the hiring process more streamlined and efficient. Once it has hired a worker, the system allows it to review its performance and provide feedback.

#### 4.3.4 Data Flow Diagram

A Data Flow Diagram (DFD) is a graphical representation of the "flow" of data through an information system, modeling its process aspects. A DFD is often used as a preliminary step to create an overview of the system, which can later be elaborated.

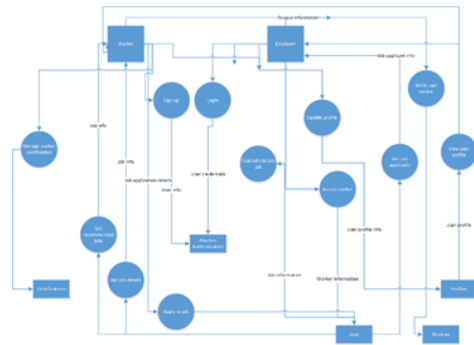


Fig. 5. Data Flow Diagram of the Study

#### 4.4 The Instrument

The study will use a survey tool that follows the ISO 25010 Software Evaluation Instrument. The ISO 25010 software quality model, shown in figure 6, identifies seven main characteristics-functionality, reliability, usability, efficiency, maintainability, portability, and security. The questions are also modified based on the necessary processes the system needed.

System/Software Product Quality							
Functional Suitability	Performance Efficiency	Compatibility	Usability	Reliability	Security	Maintainability	Portability
Functional completeness	Time-behavior	Co-existence	Appropriateness recognizability	Maturity	Confidentiality	Modularity	Adaptability
Functional correctness	Resource utilization	Interoperability	Learnability	Availability	Integrity	Reusability	Instability
Functional appropriateness	Capacity		Operability	Fault tolerance	Non-repudiation	Analyzability	Replaceability
			User error protection	Recoverability	Accountability	Modifiability	
			User interface aesthetics	Authenticity	Tastability		
			Accessibility				

Fig. 6. The modified ISO standard for mobile application development [adapted from Haouses et al., 2017]

#### 4.5 Agile Methodology

The study utilizes Agile Methodology. It approaches product development that is aligned with the values and principles described in the Agile Manifesto for software development. It aims to deliver the right product, with incremental and frequent delivery of small chunks of functionality, through small cross-functional self-organizing teams, enabling frequent customer feedback and course correction as needed. [14]



Fig. 7. Agile System Development Life Cycle of the Study

#### 4.6 Design

This section will present the interface of the study.

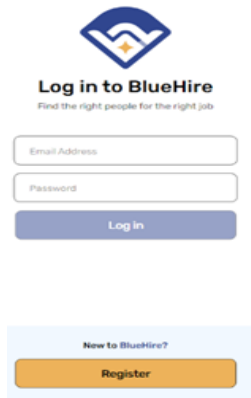


Fig. 8. Mobile Application: Login Page

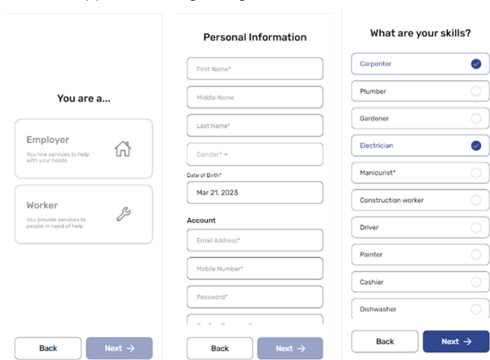


Fig. 9. Mobile Application: Sign Up Page (Worker / Employer)

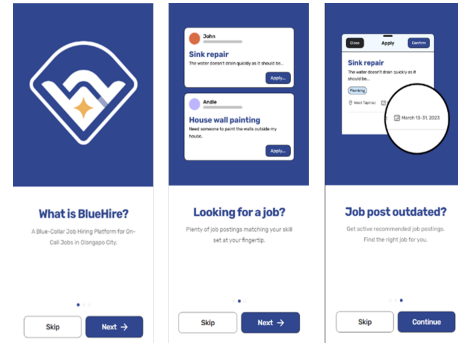


Fig. 10. Mobile Application: On-Board Page (Woker)

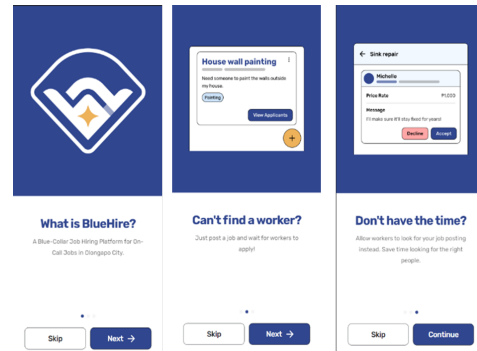


Fig. 11. Mobile Application: On-Board Page (Employer)

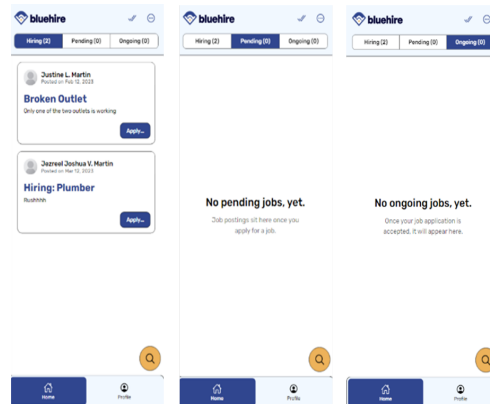


Fig. 12. Mobile Application: Home Page (Employer)

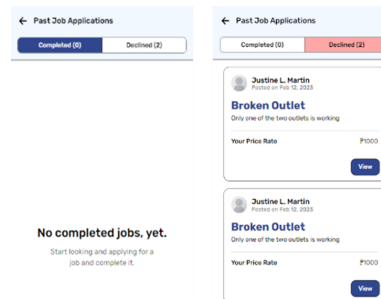


Fig. 13. Mobile Application: Past Job Applications (Worker)

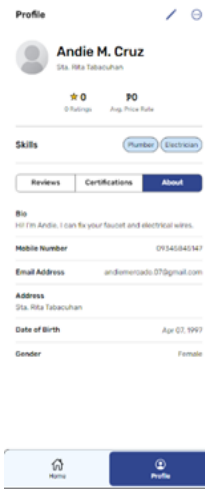


Fig. 14. Mobile Application: Profile Page (Worker)

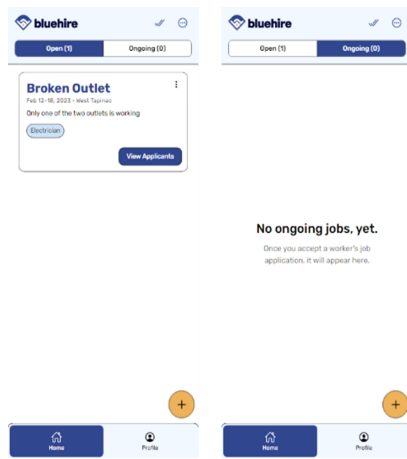


Fig. 15. Mobile Application: Home Page (Employer)

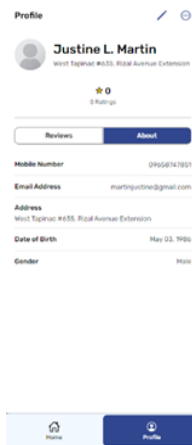


Fig. 16. Mobile Application: Profile Page (Employer)

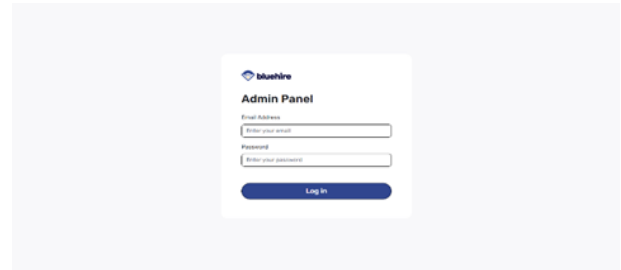


Fig. 17. Web Application: Login Page (Admin)



Fig. 18. Web Application: Dashboard Page (Admin)

#### 4.7 Data Collection

The residents and blue-collar workers in Olongapo City rated (see Figure 6) the respective questions based on how they experienced the application using a 5-point scale (see Table 1).

Table 1. Likert Scale Method

Range	Descriptive Rating
4.50 - 5.00	Excellent
3.50 - 4.49	Very Good
2.50 - 3.49	Good
1.49 - 2.49	Fair
1.00 - 1.49	Poor

Table 2. Blue-Collar Job Workers and Residents ISO 25010 Software Evaluation Result

ISO 25010 Software Evaluation Result	
	Average Rating
A. Functional Stability	4.18
B. Performance	4.19
C. Compatibility	4.28
D. Usability	4.16
E. Reliability	4.04
F. Security	4.15
G. Maintainability	4.14
H. Portability	4.25

The ISO 25010 evaluation shows that the software is generally suitable for use by blue-collar job workers and residents, with high ratings in functionality, performance, compatibility, usability, maintainability, and portability. Overall, the average evaluation result is 4.17, interpreted as Very Good.

## 5. CONCLUSION

In conclusion, the lack of visibility and reliability of job postings for on-call blue-collar jobs is a major problem that the researchers are attempting to address. The current practice of posting job ads on posts, walls, and streetside makes it difficult for job seekers to find relevant opportunities, and there is no way to verify the validity of these postings.

Based on the summary of the findings:

- Based on the results gathered from the evaluation through a survey questionnaire based on ISO 25010, it can be concluded that BlueHire can ease the hiring process for on-call jobs in Olongapo City.
- BlueHire can be a step in the right direction for helping and providing more opportunities for people, especially blue-collar workers.

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