

# An Interactive Location Based App for Part Time Job

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**Abstract**—This paper presents the iOS mobile app for the use of both employers and part time job seekers, aiming to provide a user-friendly location based service (LBS) experiences. The proposed prototype captures user's current location, and returns the information to the nearest neighbourhood that offers a part time job instantly. Unlike the conventional job listing board, this app is able to sort the order of the listed job based on either the distance or the wages offered. These features are able to ease the process of part time job searching, and also simplify the hiring process for the employers. The development approach employed the evolutionary prototyping with a minimal functional working prototype is built initially, and additional requirements are implemented iteratively. Several screenshots of the graphical user interface are included to demonstrate the prototype.

**Index Terms**—Interactive; Location Based; Mobile App; Part Time Job.

## I. INTRODUCTION

Mobile app has grown at a phenomenal rate in the market. It has been designed to solve specific problems by providing data access anywhere and anytime [10]. Meanwhile, job searching portal for mobile app was not common in Malaysia until the creation of JobStreet.com [4] in the year of 1997. Since then, more portals and career communities for mobile platform has appeared in the local market, in order to simplify and fasten the recruitment process for both employer and job seekers.

Most of the job searching portals consists of filtering features which enable the job seekers to seek for their potential employer depending on their desired criteria such as job category, expected salary and etc. There is another important context parameter in the job searching portal, which is the location.

However, most of the established portals in Malaysia focused on full time job options. Thus, only fresh graduates or experienced job seekers with professional certification such as Bachelor Degree and above are eligible. Otherwise, housewives, retirees and especially students whom are hunting for short-term job (a few hours per day just to earn some allowances) have to be done manually such as visiting some shops to find out more details. The mobile app to serve this purpose is yet remained uncultivated niche market in Malaysia.

Although social networking websites are used as the media to post part time jobs, the consistency and reliability are yet left unsolved. Anyone is able to utilize the social networking websites despite of the initial intention (either positive or negative). Apart from that, there exist several local part time job portals for mobile platforms, but these portals require user to

type in the complete job queries. In order to solve these problems, our prototype enables the location based instant search by taking account of the user's current location, compare the distance value with the potential shop or company. Then, the nearest shop is shown on a map view using a popover marker. User is able to view the details for the shop such as address, photos, reviews and others.

Apart from the distance parameter, user is allowed to use the wages as parameter to search for the part time jobs. In order to achieve this mobile app with all the described features, three main processes are involved. Firstly, a backend web application which allows an employer to submit the job listings and communicate with the mobile app. Then, an external application programming interface (API) on top of the established backend web application is developed in order to allow the communication between the app and the backend. Finally, the front end mobile app that enables user to view nearby part time job vacancies depending on the user's current location.

## II. LITERATURE REVIEW

There are a large number of interactive applications which exploit the geographical position of a user, and provide user with rich well-structured data. Li et al. [7] presented a location-aware search system in both desktop and iOS platforms. This system is able to return the relevant answers instantly as user's type in the queries letters. Besides that, a location-based service, aimed for tourists to a site with various tourist attractions are developed in native technologies and HTML5 frameworks [6]. Christensen [2] described a geographical information system prototype for home healthcare workers who during a normal workday have to attend clients and patients that are physically distributed over a large geographical area. It delivers the ad-hoc exchange of work tasks, prompt alarm functionality and information tailored to the user and the location. Moreover, Shin et al. [11] has created a new type of web service architecture, which automatically recognizes geographically web resources and notifies to the user in a periodic manner. However, these existing location-based systems require user intervention such as typing in their queries. It is quite bothersome and slow for user to get what they are requesting. Furthermore, there are yet any applications which focus on looking for part time job based on location-based especially in Malaysia.

There are several established e-recruitment portals that

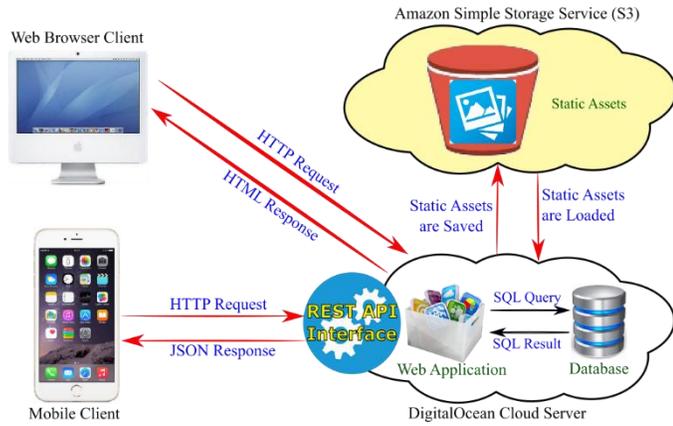


Figure 1: An Overview of our Three-tier System Architecture.

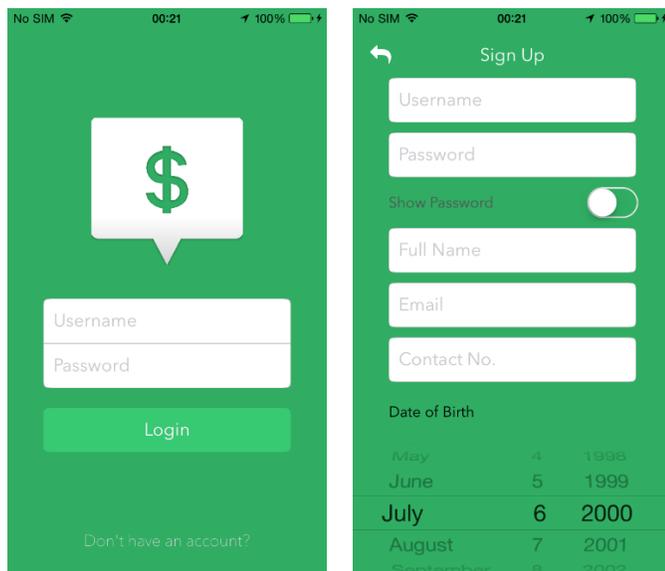


Figure 2: The Login Screen (existing user) and the Sign Up (new user) Screen of the App for mobile users (the part time job seekers).

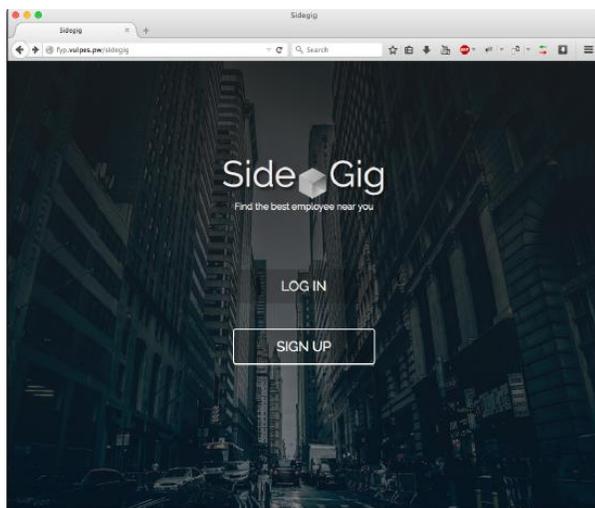


Figure 3: The Login Screen (existing user) and the Sign Up (new user) Screen for the Web Browser Clients (the employers).

allows people to post and look for jobs in both desktop and mobile platforms [3, 4]. Job seekers are able to upload their resume, and update their qualifications by taking an online assessment such as English Language [4]. This system [4] has employed the matching feature named LiNa, in order to search the job by comparing criteria specified by user. While [3] is designed to match the job seekers with prospective employers automatically by entering their current skills, qualifications and expected working environment. Both portals [3, 4] require user to register as member before start using the facilities. On the other hand, Jobless.com [8] is a web noticeboard that lets user to post job information and search for certain jobs. It featured a simple web interface which doesn't require registration in order to find or post job information.

Although [3, 4, 8] can be deployed in mobile platform; these portals are unable to filter part time jobs based on the user's current location. Moreover, there is yet any portal that offers any review system for both the employers and employees.

Location-based services (LBS) have become more and more important, especially with the expansion of the smartphone and tablets markets. It is always convenient and fast to obtain the requested information based on the geographical position of the mobile device. This paper is mainly described the development of our interactive location-based system that identify the nearest whereabouts for part time jobs together with the review system.

### III. SYSTEM ARCHITECTURE OVERVIEW

System architecture is the embodiment of concept, allocation of physical function to elements of form and the definition of interfaces among the elements and with the surrounding context [5]. It defines how pieces of the application interact with each other, and what functionality each piece is responsible for performing. Moreover, it helps to describe the framework for our proposed project in consistently and efficiently.

As shown in Figure 1, the employer uses web browser in iMac desktop to access the developed web application whereas job seeker uses the mobile application to communicate with the web application via Representation State Transfer (REST) Application Programming Interface (API) as shown in Figure 1. Meanwhile, web application query data from the database using Structured Query Language (SQL) and results are returned using the same format. Static assets such as user-uploaded images are stored in our subscribed Amazon Simple Storage Service (S3), a scalable cloud storage service provided by Amazon.

Thus, our mobile prototype has pursued the three-tier application model which consists of the presentation tier, logic tier and data tier. These tiers are described in the following sections.

### IV. PRESENTATION TIER

This tier is the top most level of our proposed prototype which uses Xcode as the integrated development environment (IDE) containing a set of software development tools developed by Apple Incorporated [12].

This tier communicates with the other tiers by sending requests to the servers and obtaining results through the browser. Hence, the graphical user interface is part of the key

element of the translation and communication between user and the services offered.

#### A. Mobile Client

Graphical User Interface (GUI) takes the advantage of the computer graphics, e.g., graphical icons and visual indicators to facilitate user's interaction. User is able to request and retrieve the appropriate information for the underlying logical design of our proposed location-based feature.

Figure 2 shows the login screen for our location based part time mobile application. The user is able either to register a new account and fill in the necessary details, or login with the existing one. After user has login successfully, the map view which shows the current location of the user is redirected. User is able to explore the map to seek for any part time job available or search for a specific job using the search bar. Red markers are displayed on the map to indicate there are part time jobs offered in that location while the popover presented the name of the shop. In order to read the details of the job offered, including the review and ratings from the former employees, user can simply tap on these markers and the direction to this location.

Apart from that, our user-friendly tab bar enables user to navigate and perform multiple functions in an efficient and simple manner. The functions consist of the map, notification, review and profile. Meanwhile, search view in the map tab allows user to select the criteria of the job based on the distance or the highest pay offered. The resulting queries are then sorted accordingly and once again, the details will be displayed when user taps on one of these resulting lists.

The notification tab is also included in our mobile application. This tab consists of the status of the applied part time job, whether it is accepted or rejected. The feature has simplified the process of job application compare with the existing job portals. On the other hand, a new feature is introduced in our application to enhance the reliability between the job seeker and the employer as well. The review tab allows both parties to write comments respectively. Moreover, the employee has the opportunity to rate the shop by marking the number of stars. There are 5 stars in this rating system. The higher the number of stars, the better the working environment for job seekers.

Finally, the profile tab enables user to view, update or change personal details including the previous job attempted. Besides that, the reviews from the former employer are visible to the user as their improvements reference. Positive reviews act as uplift messages that make user happy and gain more confidence about own self. While negative reviews can be used as guidance to be improved for the next job.

#### B. Web Browser Client

It is also necessary to design an interactive graphical user interface for the employer to manage the web application as depicted in Figure 3. Twitter Bootstrap is used as the front-end design framework for web application as it provides several present responsive features and designs of various Hypertext Markup Language (HTML) components. The user is allowed either to login using an existing account or sign up a new one if the user is the first timer.

Once the employer has logged in successfully, the control

panel page is displayed. This page consists of three tabs on the menu bar as shown in Table 1.

Table 1  
The descriptions for each mobile tabs.

Mobile Tab	Description
Profile	To view, edit or logout.
Jobs	To list the previous created job advertisement or create a new job vacancy.
Review	Employer is able to read the reviews for the former employee or write a new review. Apart from that, employer has the opportunity to read the reviews written by the former employee.

## V. LOGIC TIER

This layer coordinates with the presentation layer by performing detailed processing such as making logical decisions and evaluations, data validation and performing calculations. It also acts as a communicator between the presentation layer and the data layer which is described in the next section.

#### A. The Middle Communicator

Several existing software are used to implement the web application as the middle communicator. The communicator between this layer and the presentation layer is created by using the Ruby on rails, or in short, Rails. Rails is an open source web application framework which encourages rapid prototyping and code reuse. It utilizes a model-view-controller pattern to segregate data processing and information representation. Moreover, it encourages the use of Representational State Transfer (REST) for sending and handling client request as shown in Figure 1. There are two core philosophies of Rails that includes:

- Don't Repeat Yourself (DRY) and,
- Convention Over Configuration (COC)

DRY is an important principle in software development that states "Every piece of knowledge must have a single, unambiguous, authoritative representation within a system" [1]. By having only a single source of specific information, the system is easier to maintain and extend without affecting the stability of the whole system. On the other hand, COC is a software design principle which aims to increase the productivity of developer by reducing the number of decisions made during the software development lifecycle. The developer is able to skip most of the trivial configuration and dive into development of the feature quickly. The Ruby language is used to build Rails. Ruby is an interpreted language designed and created by Yukihiro Matsumoto, known as "Matz" in the Ruby developer community. It has a wide list of features including object-oriented, dynamic type checking, closures, garbage collection and support for Unicode character encoding.

Contradict with the design philosophy of most programming language that is made to run faster on the machine, the philosophy of the Ruby language is to increase the productivity of the programmer and make the process of the software development more enjoyable [13]. Hence, Ruby language is designed to be as intuitive and as similar to English as possible.

Representation State Transfer (REST) is an architecture style for applications that provide web services through public accessible Application Programming Interface (API). REST is most commonly used in presentation tier-data tier (or in other words, client-server) communication over Hypertext Transfer Protocol (HTTP). The objective of REST is to enable the creation of highly scalable and maintainable web services. It consists of several principles including stateless, cacheable and uniform interface [9].

It requires all components to communicate through a single interface. This results in high portability as interaction between different services uses the same interface. Changes in the service implementation do not affect how each service communicates with each other. HTTP adhered to this constraint provides a list of uniform method on web resource retrieval and modification. The lists include GET method for resource retrieval, while POST method for resource modification.

### B. Calculation

There are two main calculations in our prototype. The nearest shops which are located near the user, and the star rating system.

Firstly, the algorithm identifies the user's location by obtaining the geographic coordinate system: the latitude and longitude coordinates. The images within the Google map displayed on the mobile screen are two-dimensional and flat. The Earth however is three-dimensional and is often approximated as a sphere.

Hence, to represent the Earth on a two-dimensional flat surface, 2D-projection is applied. Within 2D projections, some distortions are expected. Thus, simple Euclidean geometry is not applicable. In order to find the shortest distance between the user's current location and the shop is not a straight line, but a great circle.

In other words, it is a type of geodesics, and the angles that make up a triangle on the surface of a sphere add up to more than 180 degrees. Meanwhile, the calculation of the star rating system is simple and direct as follows:

$$Stars\ Rating = \frac{1}{n} \sum_{i=1}^n i, i \in \{1,2,3,4,5\} \quad (1)$$

where: n = the number of people involved in the rating system.

i = weight for each star.

The displayed review that is visible to the job seeker is the resulting of this equation.

## VI. DATA TIER

This layer is mainly stores and retrieves the information onto a database server or file system. It is then accessed by the logic layer for processing, and then eventually back to the user from the presentation layer.

In this prototype, we have temporary subscribed the virtual private server (VPS) hosting to host our developed web application. DigitalOcean has chosen as the hosting provider as shown in Figure 1, as the pricing is affordable and its cloud

servers are easily scaled.

The subscribed cloud server has the following specifications:

- 512 MB RAM
- 20 GB SSD Storage
- Ubuntu version 12.04,
- Secure Shell (SSH) keys as encryption scheme to safely administer remote servers,
- Singapore is chosen as the server region to reduce latency and the communication between the development machines.

Ruby language, Rails framework and Nginx web server (as described in logic tier) are installed on the server through SSH. A database is also created to store the application data using MySQL create database command.

Additionally, the static assets such as images are stored in the Amazon Simple Storage Service (Amazon S3) cloud. This cloud storage is scalable and the fees are charged according to the storage space used. Container used to store objects in Amazon S3 is addressed as bucket. A bucket with the specified region, Singapore in our project is created to store our static images.

## VII. CONCLUSION AND DISCUSSION

This paper has presented an interactive location based app for part time job. We have introduced a convenient and simple app that is based on the location of the job seeker. Moreover, the review systems for both employee and employer are also available for the self-improvements purposes.

Part time job vacancies obtain a high demand especially from the students and housewives. Although there are several popular job portals and social networks to seek and publicize the part time jobs, they are usually scattered around. Furthermore, the resulting queries are not based on the location of job seeker and the credibility of the employer is not able to identify. Hence, this interactive app is created.

Since this mobile app is yet a preliminary stage, we did not obtain any collaboration from the employers. We have used the general information for some famous franchise shops in Malaysia, such as Ocho and McDonald as our testing purposes. However, we have hired several volunteers; most of them are students to test our mobile app and received positive comments from them.

There are several improvements have to be done in this project. Firstly, due to monetary constraint, Secure Sockets Layer (SSL) certificate was not purchased and installed on the cloud server, data passed during communication between mobile applications and web application may be susceptible to man-in-the-middle attack and eavesdropping. In the next phase, SSL certificate has to be purchased from Certificate Authority (CA), and installed on the web server to strengthen the overall security.

Furthermore, payment system was not integrated into our prototype for the employer to advertise their part time job vacancies in our proposed prototype. This feature will be included during commercialization phase. Moreover, this app will be built on Android platform.

Apart from the implementation issues, a proper evaluation of this application should be included to demonstrate the results so

that researchers and people from the industries can learn and benefit from this work. The speed of the application process and the way to help the job seekers to find better part time jobs or employers can be investigated.

Finally, the existing rating features can be enhanced for both parties (job seekers and employers). This feature has the strong privacy implications that are worthwhile to analyze in the future.

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This work was developed by a Bachelor Degree student named Kee Soon Ching who has graduated in March 2016 with distinction.

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