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SERVICE ON THE GO (SERVEGO): Online Service Booking Application

Ho Kai Song, Hazalila Kamaludin*, Noor Zuraidin Mohd Safar, Norfaradilla Wahid

Faculty of Computer Science and Information Technology,
Universiti Tun Hussein Onn Malaysia, Parit Raja, 86400, MALAYSIA

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Abstract: Service On The Go is an online service booking application developed to provide users with access to multiple services in electrical repair, electrical wiring, plumbing repair services, and online home maintenance. Besides, this application also provides a platform for users who are experts in their services areas to promote and share their skills through the Internet. The purpose of ServeGo is to allow the user to find the contact of the person who provides the repair services. It also can solve the problem of the handyman who is facing the difficulty to promote and share their services. Hence, the application can save the time of users who need the services immediately. The app is developed by using Android Studio and Firebase. Android Studio is an official integrated development environment (IDE) for Android application development while Firebase is a service that enables helping the user to manage the centralized database via the cloud. The modules which are notification module, request module, booking status module, payment module, rating module, GPS module are added to implement the application.

Keywords: Online booking, Service, Handyman

1. Introduction

ServeGo is an application that provides a quick and reliable means of contacting artisan for jobs, which aids maximum satisfaction. It allows users to find multiple services including electrical repair, electrical wiring, plumbing repair services, and home maintenance, such as furniture repair service and paint service. The app is also a platform for users to promote or develop their services or skill over the Internet. At the same time, this app can also improve time savings of users in getting services.

The objectives of this application improvement project are to design the content of ServeGo application to enable further enhancement based on object-oriented approach, to develop the designed application on the mobile device, to do testing and evaluating on the functionality of the developed application.

There are six modules included in ServeGo. Notification module allows users to receive the notification as soon from the system when the workers confirm the booking of the users. Booking status

*Corresponding author: hazalila@uthm.edu.my

module allows users to know the booking status through the application. Payment module allows users to online pay the working fees to the workers when they want to book the service. Rating module allows users to give the rating to the workers so that the other user can know how well or bad the services of the worker are. Request module allows the workers to receive the request and then choose to reject or accept the request when the users are booking the service. GPS module allows the workers to know the address of the user in the google map when they receive the request.

The rest of the paper will be organized as follows. Section 2 will discuss the details of literature review of the application. Section 3 presents about the methodology of the application. For section 4, it talks about the system analysis and design. Next, section 5 describes the implementation and testing of the system. Lastly, section 6 will present the conclusion of the project.

2. Literature review

This section describes the research that has been done on existing systems to be developed.

2.1 Online payment system

An online payment system is a system based on the Internet. It becomes a method of processing economic transactions to people. The process describes the purchases of goods or services over the Internet which typically use a credit card [1]. It allows people to pay and accept payments from the people on the Internet. Therefore, the online payment systems have greatly expanded the reach of a business and its ability to form sales.

2.2 PayPal

PayPal is a popular online financial service used by businesses and consumers. Through the web, mobile apps, or in person, they are likely to conduct financial transactions around the world. By using PayPal, the client can pay their bills, send their bills and receive money, and accept payments with other people. PayPal is flexible, quick, and secure. PayPal will store the information in its servers, saving developers from having to worry about this [2].

2.3 Security protocol

Security protocols are a series of operations that ensure data security. It is used to protect the data and ensure the safe transfer of the data between the two parties. Typically, cryptography and encryption methods are used to protect data such that it can only be decrypted using a special code, a logical key, a mathematical formula and/or a combination of all of them. The examples of the security protocol are Secure Sockets Layer (SSL), Secure Electronic Transaction (SET) and so on.

2.3.1 Secure Sockets Layer (SSL)

Secure Sockets Layer is one of the standard security protocols for online transactions on the Internet. It is a security certificate to encrypt the website data sent from the browser to the server. Its purpose is used to provide a secure channel over the Internet so that it can protect the data transaction between the websites and the visitors. SSL provides the principle of encryption, authentication and data integrity for the site [3]. ServeGo application is using the PayPal sandbox for its online payment function. When the user clicks to pay the payment, the system will apply the SSL and go to the PayPal page for user login to make the payment.

2.3.2 Secure Electronic Transaction (SET)

Secure Electronic Transaction is a security protocol for the electronic credit card payment. It will ensure the integrity and security of electronic transactions when the user uses the credit card for payments [4]. It uses different encryption and hashing techniques to ensure the safety of online payment

through the Internet. SET will protect the personal information of the user. It will block out the details of the credit card information so that it can prevent the leakage of information to the merchants.

2.4 Data Encryption Standard

Data Encryption Standard (DES) is a symmetric-key algorithm of data encryption. DES is a block cipher, and it is an implementation of a Feistel Cipher [5]. It encrypts data in blocks of size 64 bit each. Although the key length of DES, which controls the transformation, is 64-bit, it has an only effective key length of 56 bits that can be chosen by the user and are key bits. The encryption algorithm does not use 8 of the 64 bits of the key. Finally, this cipher has been superseded by the Advanced Encryption Standard (AES).

2.5 Advanced Encryption Standard

Advanced Encryption Standard (AES) is a symmetric encryption algorithm. Nowadays, It is one of the most popular and widely used symmetric block cipher algorithms in the world. AES is a form of encryption of data that is fast and secure. AES is based on the three different key sizes, such as AES 128, 192, and 256 bits, each of which has a block size of 128 bits. AES is a replacement for DES. It is because the key size of DES is too small, and the people found that AES has at least six times faster than triple DES.

2.6 RSA Rivest–Shamir–Adleman

RSA (Rivest–Shamir–Adleman) RSA is currently the most powerful and widely-used crucial public cryptography algorithm in the world. It is resistant to most of the password attacks known so far and has been recommended as the public-key data encryption standard. By using the RSA encryption, it can encrypt the messages with a code that can call the public key, which can be shared openly [6]. RSA algorithm implements two essential ideas that can be used for both public-key encryption and digital signatures. The security of the RSA algorithm is based on the difficulty of factoring large integers.

2.7 Existing system

Four existing systems have been researched to learn more about the advantages and features that each application offers. The four systems studied are as follows:

2.7.1 KlikTukang [7]

KlikTukang is a mobile application that instantly connects the right service providers to users (client) with repair and maintenance needs at any time. In this application, it provides the details of the types of services and rates per workers (handyman). The app also allows clients to communicate to get the kind of service they need by following the client's budget. Workers are selected through a rigorous selection and verification process. However, the application has been only developed in Indonesia, so the user can only use it in Indonesia.

2.7.2 Get It Done-Hire a Handyman [8]

Get It Done-Hire a Handyman (GID) is a client-focused mobile application. It provides services to the user who requires immediate and quality repair services. This application offers registered handyman information so that the client can contact the handyman directly. The information provided is like a phone number and a score. Clients can choose to sign in or not but can still use the services provided. There are some of the features provided in this app which are login, reviews, scores, and descriptions of the services offered and articles.

2.7.3 Pak Tani Digital [9]

Pak Tani Digital is a marketplace platform or digital marketplace of mobile applications. It aims to help connect farmers with other agricultural stakeholders. It uses the method of digital to connect the farmers with end-buyers and all stakeholders. It provides a platform for farmers who do not have access to sell their agricultural commodities directly. With that, the farmers do not need to find the middleman to help them to sell their agricultural products. Besides, it is also a community of farmers sharing. The farmers can share their experience and information about the agricultural knowledge in this platform.

2.7.4 Maideasy [10]

Maideasy is a mobile application that can help the user to find and book a cleaner in Malaysia. It is an online platform that can enable individuals to find and hire home cleaners. If the user wants to look for a part-time maid or cleaner, they can use this application to hire a maid or cleaner. The user needs to view the live calendar of available dates and times. Then, the app will match them with a pre-vetted and experienced cleaner available in your area. However, Maideasy only provides cleaning services to the user. It does not contain other services such as electrical repair and plumbing service.

2.8 Systems Comparison

Table 1 shows the research about the comparison of the existing system and proposed system.

Table 1: The comparison of the existing system and proposed system

Characteristic	KlikTukang	Get It Done	Maideasy	Pak Tani Digital	Service On the Go (ServeGo)
User	Client and Handyman	Client and Handyman	Client and Handyman	Client and Farmers	Client and Handyman
Login and Registration	Client	Only can log in for client	Client	Client and Farmers	Admin, Client, and Handyman
Scope	Indonesia	United States	Malaysia	Indonesia	Malaysia
Client profile	Yes	No	Yes	Yes	Yes
Profile service provider	Yes	No	No	Yes	Yes
Client ratings and reviews	Yes	Yes	Yes	No	Yes
Service provided	Handyman service	Handyman service	Only for cleaning service	Agricultural service	Handyman service
Notification	Yes	No	Yes	Yes	Yes
Booking status	No	No	Yes	No	Yes
Online payment	Yes	No	Yes	No	Yes
Request GPS	No	No	Yes	No	Yes
	No	No	No	No	Yes

3. Methodology

This section explained the methodology that has been conducted for ServeGo application.

3.1 Object-oriented software development

The methodology of object-oriented software development is a system development approach encouraging and enables the re-use of software components. It facilitates the sharing of its other system components. The concept design was chosen as a methodology for the development of ServeGo as it is well adapted to short-lived projects. It makes the system easier to adjust and provides good foundations for reasoning, abstracting, and contributes to the modular design [11]. Figure 1 shows the life cycle of object-oriented, which includes six stages.

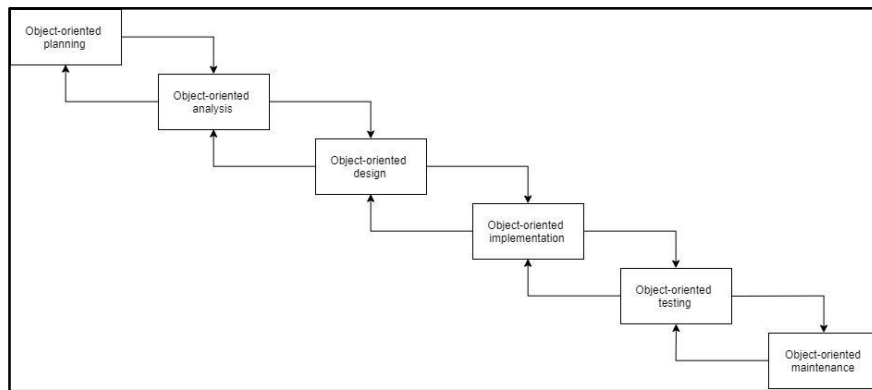


Figure 1: The object-oriented software development life cycle.

3.2 Hardware and software requirements

In every application development, including ServeGo, the process must require the software and hardware. These are the necessary specifications for mobile application development. Some of the equipment and software used in the ServeGo application are as follows.

Table 2: Hardware requirements of the proposed system

Hardware	Function
A laptop Acer Aspire E 14	Functional tools for developing applications.
Processor	Intel® Core™ i5-7200U CPU @ 2.50GHz 2.71Ghz
Random Access Memory	8 GB
Operating System	Window 10
Android Smartphone	Hardware used to test the mobile application development

Table 3: Software requirements of the proposed system

Software	Function
Android Studio	Software used to make the application work on smartphones which have the android specification operating system
Firebase	Works as a database to store the system-related data
Microsoft Word 2019	The software for writing reports
Microsoft Project 2019	The software for Gantt charting
Adobe Photoshop	The software used to edit the image and logo of the system.

4. Analysis and Design

Analysis and design are the most important phases of application development before going to the implementation phase. It provides a clear picture of how the application is being developed.

4.1 General system architecture

The general system architecture is a conceptual model that describes the design, actions, and views of the system. Figure 2 shows the system architecture diagram.

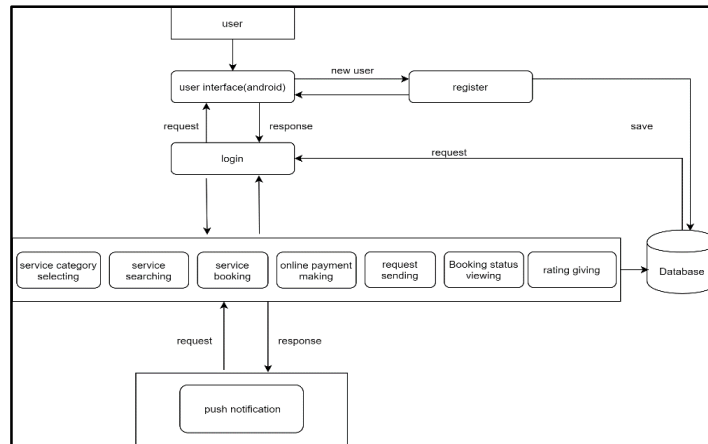


Figure 2: System architecture diagram

4.2 Unified Modelling Language (UML)

Unified Modelling Language, can also be called as UML is a standardized modelling language. UML has a direct relationship with object-oriented analysis and design. The UML of the ServeGo application is object-oriented based, which has use case diagram, sequence diagram, and classes diagram.

4.2.1 Use case diagram

The use case diagram is the primary form of system/process specifications for a new underdeveloped software program. Figure 3 shows the use case diagram for the whole diagram. There are three types of users which are client, handyman and admin in the diagram.

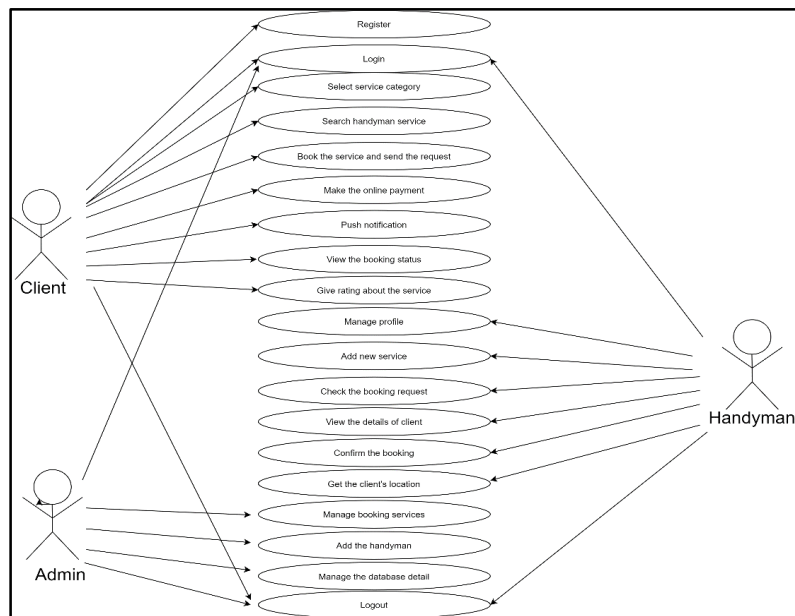


Figure 3: Use case diagram for whole diagram

4.2.2 Sequence diagram

A sequence diagram is interaction diagrams between objects in a sequential order that the order in which these interactions take place. It explains how and in what order the objects in the system work. It can help to predict how the system will act and to discover the responsibilities that a class may need in the process of modelling a new system.

4.2.3 Activity diagram

The use case diagram is the primary form of system/process specifications for a new underdeveloped software program. It explains or illustrates what triggers a particular event using an activity diagram. The activity diagram is essentially a flowchart that reflects the flow from one activity to another. It displays the control flow from the start point to the endpoint showing the different decision paths that occur while the operation is being carried out.

4.2.4 Class diagram

The class diagram is a type of static structure diagram in software engineering. It is not only used to illustrate, explain and record different aspects of the framework, but also to build the executable code of the software application. The class diagram describes the attributes and operations of the class, as well as the constraints imposed on the system. It provides a basic notation for other structure diagrams offered by UML.

4.3 Entity-Relationship Diagram

The Entity-Relationship Diagram (ERD) is a snapshot of the data structure. The Entity Relationship Diagram shows entities (tables) in the database and the relationship between tables in the database. The components of the ERD are entities, relationships, and attributes. The figure 4 shows the Entity Relationship Diagram of ServeGo.

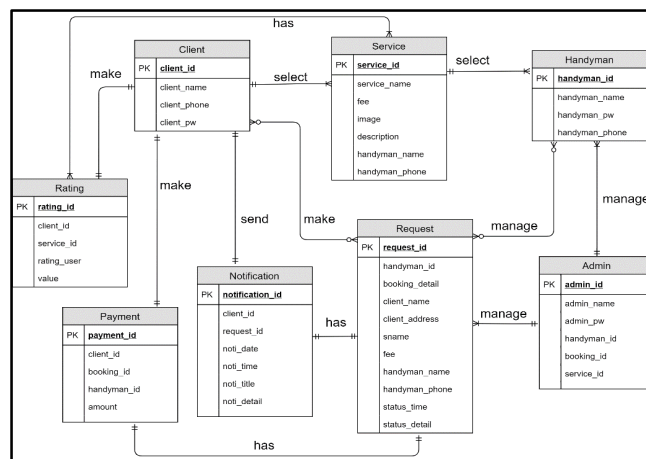


Figure 4: Entity-Relationship Diagram of ServeGo

5. Implementation and Testing

The implementation phase is very important to ensure that the application being developed meets the specified specifications. On the other hand, the testing phase is important to ensure that the application is free of any errors and provides quality applications.

5.1 Status and request activity

Figure 5 to Figure 7 shows about the code segment of the status and request activity. When the client books the service, the request will be sent to the handyman and its status will show in the status page of the application. Then, the handyman can also view the information of the request in the interface.

```
private void loadRequests(String phone) {

    FirebaseRecyclerOptions<Request> options =
        new FirebaseRecyclerOptions.Builder<Request>().setQuery(
            requests.orderByChild("phone").equalTo(phone),
            Request.class
        ).build();
```

Figure 5: Code segment to load the status in client interface

```
adapter = new FirebaseRecyclerAdapter<Request, RequestViewHolder>(options) {
    @Override
    protected void onBindViewHolder(@NonNull RequestViewHolder requestViewHolder, final int i, @NonNull final Request request) {
        Glide.with( activity: StatusActivity.this).load(request.getImage()).into(requestViewHolder.imageView);
        requestViewHolder.txtTime.setText(request.getDate() + " " + request.getTime());
        Common.setSpanString( welcome: "Handyman: ", request.getHandyman(), requestViewHolder.txtHandymanName, Color.parseColor( colorString: "#05668D"));
        Common.setSpanString( welcome: "Phone: ", request.getHandymanPhone(), requestViewHolder.txtHandymanPhone, Color.parseColor( colorString: "#05668D"));
```

Figure 6: Code segment to display the data in client interface

```
@Override
public boolean onContextItemSelected(MenuItem item) {
    if (item.getTitle().equals(Common.Update))
        showUpdateDialog(adapter.getRef(item.getOrder()).getKey(), adapter.getItem(item.getOrder()));
    else if (item.getTitle().equals(Common.Delete))
        deleteRequest(adapter.getRef(item.getOrder()).getKey());
    return super.onContextItemSelected(item);
}
```

Figure 7: Code segment of status update dialog

5.2 Online payment activity

Figure 8 and Figure 9 show about the code segment of online payment activity. When the client wants to book the service, the system will redirect the client to the PayPal page to ensure the client pays the fee.

```
static PayPalConfiguration config = new PayPalConfiguration()
    .environment(PayPalConfiguration.ENVIRONMENT_SANDBOX)
    .clientId(Config.PAYPAL_CLIENT_ID);

Intent intent = new Intent( packageContext: this, PayPalService.class);
intent.putExtra(PayPalService.EXTRA_PAYPAL_CONFIGURATION, config);
startService(intent);
```

Figure 8: Code segment to call the PayPal service

```
PayPalPayment paypalPayment = new PayPalPayment(new BigDecimal(formatAmount),
    S: "MYR",
    S1: "ServeGo Request",
    PayPalPayment.PAYMENT_INTENT_SALE);
Intent intent = new Intent(getApplicationContext(), PaymentActivity.class);
intent.putExtra(PayPalService.EXTRA_PAYPAL_CONFIGURATION, config);
intent.putExtra(PaymentActivity.EXTRA_PAYMENT, paypalPayment);
startActivityForResult(intent, PAYPAL_REQUEST_CODE);
```

Figure 9: Code segment to initiate PayPal interface

5.3 GPS activity

Figure 10 and Figure 11 show the code segment of GPS activity. The GPS module enables the system to locate the client's real-time location. In handyman interface, it will show the direction of location of handyman and the address of the client on the google map.

```
private void buildLocationCallback() {
    mLocationCallback = new LocationCallback() {
        @Override
        public void onLocationResult(LocationResult result) {
            super.onLocationResult(result);
            double latitude = result.getLastLocation().getLatitude();
            double longitude = result.getLastLocation().getLongitude();
            LatLng locationHandyman = new LatLng(latitude, longitude);

            if (handymanMarker == null)
            {
                int height, width;
                height = width = 80;
                BitmapDrawable bitmapDrawable = (BitmapDrawable) ContextCompat.getDrawable(context, R.drawable.shipper);
                Bitmap resized = Bitmap.createScaledBitmap(bitmapDrawable.getBitmap(), width, height, filter: false);

                handymanMarker = mMap.addMarker(new MarkerOptions()
                    .icon(BitmapDescriptorFactory.fromBitmap(resized)).position(locationHandyman).title("You"));
            }
        }
    };
}
```

Figure 10: Code segment of method onLocationResult()

```
mMap.addMarker(new MarkerOptions()
    .icon(BitmapDescriptorFactory.fromBitmap(resized))
    .title("destination")
    .position(new LatLng(Double.parseDouble(String.valueOf(lat)), Double.parseDouble(String.valueOf(lng)))));
```

Figure 11: Code segment of marker

6. Conclusion

In conclusion, the application Service On the Go has been developed successfully and achieved the objectives. The application showed that all the modules can be fully functional and the testing result can be seen in the test plan. The notification module, request module, booking status module, payment module, rating module and GPS module has been successfully developed.

Although the application ServeGo has been successfully developed, every application developed has its limitations. For example, the handyman needs to open the apps just to know whether they have a booking request or not. Besides, the system can add a module that can suggest the nearest handyman to the user. Moreover, if the user does not have the PayPal account, they cannot book the service.

To improve the usability and capability of application ServeGo, there are some plans that will be carried out in the future. The recommendation for improving the application is to have notification for the handyman view. It can help to improve the user experience of the application. Besides, there is also a plan of location tracker system which will suggest the nearest location of handyman to the client. It allows the client to book the service in the faster time from the handyman. Moreover, the payment after service function is planned to be implemented so that the client can choose to pay the fee at online payment or payment after service. With that, the admin can also charge the fee from the payment after service function.

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