Improvement of Vehicle Management System (IVMS)

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***Abstract*—This research paper for the software application development of Vehicle Management System (VMS) for Unihomes. Development of this membership management system was proposed due to conventional manual vehicle management practices by the Unihomes, which caused various complexities in managing the vehicles, renting and operation details. Primarily, the recognized problems are vehicle and renting details are not in a database, long processing time to produce reports, wrong vehicles are being booked. Thus, the core objectives of this development project were to resolve most of these challenges and complexities encountered due to conventional manual vehicle management practices. On the whole, this development project is an implementation of a computerized membership management system that adopts inter-related (relational) database concept for storing, managing and organizing data in a systematic and efficient manner. Microsoft Visual Studio 2016, Crystal Reports and MYsql have been used as key development tools for this development project. In addition, Agile Unified Process methodology that has established beneficial by various organizations has been adopted and applied for this whole development project. This implementation will ensure that usability to use the application will be easy since the user had difficulties to analyze the data when the record manually done and it was hard for the record quickly and efficiently.**

Keywords— Database System, Agile Unified Process, Vehicle Management, Rental, Crystal Reports, MySQL.

I. INTRODUCTION

Unihomes is one of the main house agents for the students who are studying in Management and Science University (MSU). They rent rooms for students from the condominiums around Section 13, Shah Alam which is Menara U1 and Menara U2. Other than giving rentals in rooms for the students, they just started to provide car rentals for the students and public who wish to rent a car for a day or two. [1]

Since the car rental services is just started by Unihomes, the management practices are still conservative and very much traditional. In businesses, the faster you can actually make your transactions the better it will be, and by managing the business in a manual way, it causes the management to make slow transactions and they do tend to make easy mistakes when it comes to booking and even maintaining the vehicle itself. [2] This had caused certain customers to be very not satisfied with the booking process. In the context of vehicle management system, the whole vehicle management process is done in a very traditional method, where involves a lot of manual work. Due to these traditional recording practices, Unihomes management is encountering problems in managing their vehicle and operations. There are three problems that can be identified, and the first problem is, there is no database system to manage the rental and vehicle management details. The second problem is reports takes a longer time to generate in the manual way. The third problem is wrong vehicles are being booked. For example, managing their rental forms, customer details and car details in forms which leads to them to have a lot of paperwork. Moreover, this also costs them time when they are finding back the details related to that particular detail regarding the car and customer. Plus, there is no back up in the method which they are doing since the forms which they have can go missing and maybe damaged. To design a Database System to manage their vehicle management, which user able to keep the record or data using the application.

i. To create a database system to manage their vehicle information and car rental details.

ii. To create new feature such as reports to aid the management.

iii. To improve the vehicle management and car rental process by using the database system.

There are 2 extent of task, which is client degree and application scope. In, client scopes the client ready to deal with the information in the Vehicle Management System. For the system scope consists the feature in the Vehicle Management System, such as record keeping on the vehicle and rental details, and reports. Moreover, VMS is a single user stand-alone system, which does not require a network or a high-end database system. The assumptions are the vehicle management process and the car rental process will be done quickly and efficiently, and there will be no more mistakes in giving out the wrong car to customers. The management will not lose track of any important schedules regarding the car since all the details regarding any service is in the system. The limitations of the project is, the system only runs on Windows OS. It can be only accessed at that particular computer which it was installed, since it is not a web-based database system.

II. RELATED WORK

This section will explain the present manual practices of the management for vehicle management. [1] Manual work refers to practices such as keeping many papers works

regarding the vehicles, which they own, and having to write all the renting records into a book.
The registration and the booking process will be through a registration form. Then the details will be transferred into a membership record book. A confirmation receipt will be prepared through word processing software manually. For the Payment, a manual receipt will be issued. The details of these transactions will be registered into cash receipts and payment details record book. For the vehicle management system, all the records and information regarding the vehicle, for an example, the vehicle details, service dues and any maintenance done to the vehicle will be recorded in the vehicle logbook.

Reports are generated for the management and members, which takes a lot of effort and time. Basically, the information details are extracted manually for the record books and the extracted information will be then transferred manually into the computer software application such as standard word processing and spreadsheet. Finally, the reports are generated and printed using these standard applications

The following are the five of the most downloaded membership management software available in the market as of April 2018, which bears the similar functions and objectives with the database system developed in this project.

2.1 A FleetVIP

This software is a fleet management system, for small businesses and works to manage their vehicles. In the software, they have provided GPS tracking alerts, vehicle mileage, vehicle cost management, and preventive maintenance due dates. The disadvantages of using this software is for their free version you will only get to manage two vehicles. [11] Figure 1 shows the interface for A FleetVIP.

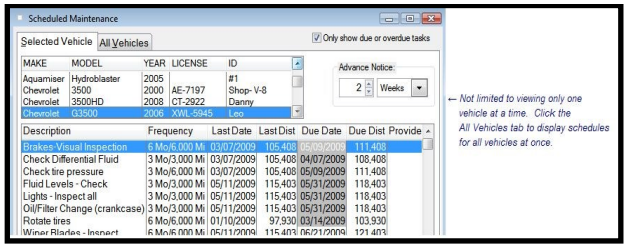

Figure 1: A FleetVIP [11]

2.2 Odoo Fleet Management

Odoo makes a range of business applications and fleet management is one of them. Odoo Fleet Management includes core functionalities such as vehicle fuel usage, costs and insurance management. [12] Odoo also offers the opportunity to better manage your fleet through customizable report functionality. Figure 12 shows the interface for ODOO Fleet Management.

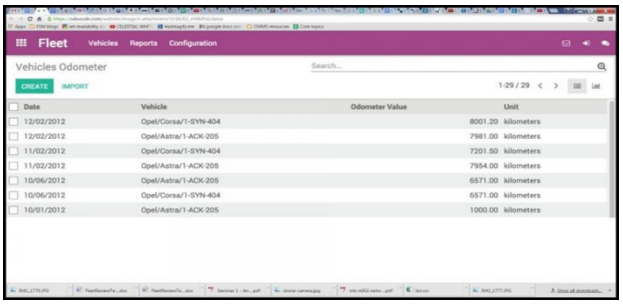

Figure 2: ODOO Fleet Management [12]

2.3 Traccar

Traccar offers a server-based version, as well as a native mobile app. The software works with a dizzying number of tracking devices, and even integrates with Open GTS. Traccar is a free GPS tracking system that will tell you where your vehicles are, but cannot manage other business-side concerns such as using proactive maintenance scheduling to save money. If all you need is the telematics part (vehicle tracking) of fleet management software, Traccar is a great option. [13] If you need a single platform for all business-related aspects, though, it might not be the best fit. Figure 3 shows the interface for Traccar.

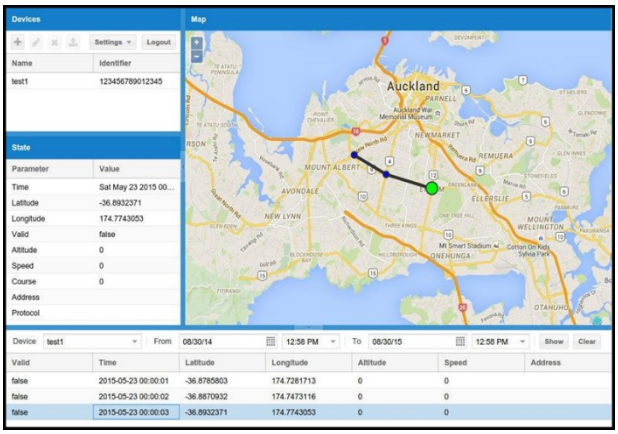

Figure 3: Traccar [13]

2.4 Open GTS Project

This isn't a full fleet service program; it tracks fleet vehicle location but isn't designed to track things like fuel use, maintenance, costs, or warranty expiration. That said, you could adapt Open GTS to meet other needs. You can customize reports using XML, integrate the system with various mapping software programs, and use adaptable web page decorations to make your business stand out. Infrequent updates are another reason to be wary; OpenGTS only updated the software twice in 2017. [13] Figure 4 shows the interface for Open GTS project.

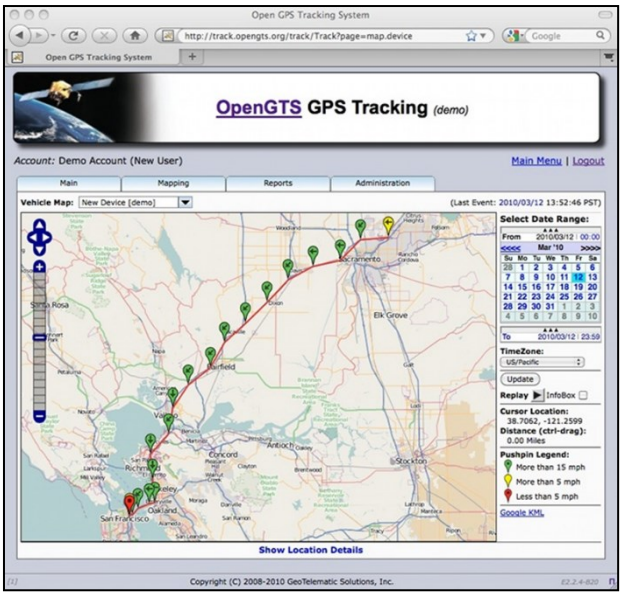

Figure 4: Open GTS Project [13]

2.5 O Fleet Rental

O-Fleet is a cloud-based vehicle rental programming gathering in excess of 100 highlights. By picking O-Fleet you will inspire an across the board answer for screen your movement and a 360 view to address every one of your difficulties: Manage and track your armada progressively, Visualize and examine all the KPIs and measurements of your action, Plan and enhance your armada use, Increase your perceivability to a worldwide customer base. [12] Figure 5 shows the interface for O Fleet Rental.

Figure 5: O Fleet Rental [12]

III. PROPOSED METHOD

This project was alluded to the Agile Unified Process (AUP) where AUP has four primary stages (initiation, elaboration, development, change). [4] The essential application is in an improved perspective of fundamental exercises thus the three controls, business demonstrating, process applications, and examination and configuration are supplanted with just a single order displaying.

3.1 Creation of Database

To achieve the objective of having to create a database for Unihomes, a background study is done to understand the management process which is done by the Unihomes in detail. Once the study is done, the database tables and the main primary keys would be easily identified and created.

3.2 Reports Generation

For the reporting section, a study and research was done to identify on the type of information the management needs to view and manage.

3.3 Improvement of Vehicle Management and Car Rental

A database system has to be designed to help improve the management process which is done by Unihomes. From a database management system, all the information regarding the vehicle management and rentals would be easily stored and accessed.

3.4 Agile Unified Process (AUP) Phases

To conduct this development and to ensure a smoothly flow to the process, all the steps of the methodology has to been followed. This will ensure, all the necessary data and information will be sufficient enough to conduct the development.

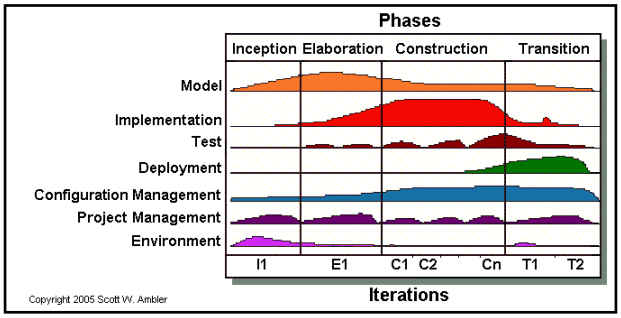

Figure 6: Developing process

The objective is to distinguish the underlying extent of the task, a potential design for framework, and to acquire starting venture financing and partner acknowledgment. The clients will be met to discover on what they require and from the data which has been accumulated, the subsequent stage will be taken. Next is, to demonstrate the engineering of the framework. Hence, for this task the UML outlines will be made so as to demonstrate the entire engineering of the undertaking. The objective is to manufacture working software on a standard, gradual premise which meets the most astounding need needs of task partners. Thusly, the code for the program will be coded utilizing Visual Studio and will be tried. What's more, finally, the objective is to approve and convey the framework into generation condition. [4] For each of the stages in the technique, there are explicit objectives which are should have been satisfied.

I. **Inception**. The objective is to recognize the underlying extent of the venture, a potential engineering for framework, and to get beginning task subsidizing and partner acknowledgment. The clients will be met to discover on what they require and from the data which has been assembled, the following stage will be taken.

II. **Elaboration**. The objective is to demonstrate the design of the framework. Thusly, for this undertaking the UML outlines will be made so as to demonstrate the entire design of the task.

III. **Construction**. The objective is to manufacture working programming on a standard, steady premise which meets the most elevated need needs of undertaking partners. In this

manner, the code for the program will be coded utilizing Visual Studio and will be tried.

IV. **Transition.** The objective is to approve and send the framework into generation condition. The software will run a full testing by the method of Acceptance Testing by the user to identify the error and the part that need modifications and once everything is completed then the software will be passed to the user.

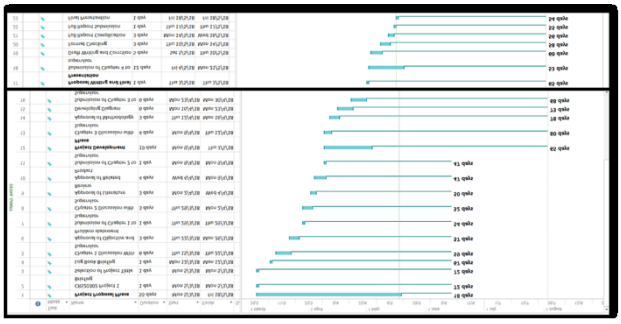

Figure 7. Project Schedule

Based on "Fig. 7", The project has been keeping up to the deadlines well, and each of the phases has been accomplished well.

The software which was used to develop the system is Microsoft Visual Studio 2017. Since this is a database application, bringing the visual studio to design and code the interface was the best choice. Due to the reason where Visual Studio is very versatile and there are a lot of key functions which can be implemented into the system. Other than that, Microsoft Access has been used as a database for the application. Visual studio and Microsoft Access have a build in connection which helps the developer to implement the usage of the database in an easier manner.

Hardware that is use to developing the application is by using laptop/PC, that have at least 8GB RAM to ensure that the process of developing will run smoothly and efficiently. The "Table.1" below shows the minimum requirement of the laptop/pc required for development.

Table 1: MININUM REQUIREMENT OF PC

Feature / Component	**Description**
Platform	Windows
Processor	Intel Core i5-5200U
Processor speed	2.20GHz
Memory	8 GB 1600 MHz DDR3
Graphics	AMD Radeon (TM) R5 M330

The plan for the framework is comprises a couple of structures, for example, use case configuration, class outline, grouping graph, correspondence chart, action outline, and state graph. The succession chart and correspondence graph must be same to guarantee that the stream of the framework the equivalent, where it must pursue the class outline stream. Other than that, the framework interface is to demonstrate the capacity and the component that is comprises in every interface.

IV. Findings and Discussions

There are few kinds of testing that been raced to test the ease of use of the Vehicle Management System (VMS) application, for example, unit test, framework test, beta testing, and acknowledgment test. The unit test is to test the database association, where once the database is made there will keep an eye on the addition of the database, regardless of whether the inclusion is achievement or not. The making of the database is achievement and the addition or the information is achievement.

Next is the framework test, where the Vehicle Management System application is test overall, which comprises the testing for every one of the elements in the application. The test plan is having been directed to satisfy the prerequisite of building up the Vehicle Management System application.

Based on the "Fig. 8", presents a small code from the Login button, where the SQL command is used to select the "User" and "Password" from the Database.

```
"command.CommandText = " select * from Loginn where Username = '" + Usernametext.Text + "' and Password = '" + passwordtext.Text + "'";"
```

Figure 8: Code for Login Button

Based on "Fig.9", it shows the login interface for the system as it is one of the security features which was designed for the proposed project and it was successfully accomplished.

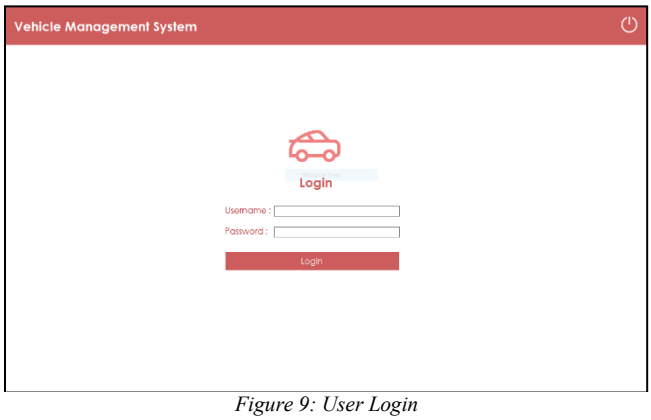

Figure 9: User Login

The next feature is the payment interface, in which all the payment records will be taken in the database. New payment records can be added and all the older records can be viewed back as well. Moreover, since all of the data is in the database, the records can be printed as a report for the management uses.

"Fig. 10", shows the code for the "Load" button, in this part of the code is where the database is displayed at the "Data grid" section at the interface.

```
“connection.Open();
OleDbCommand commandds = new OleDbCommand();
commandds.Connection = connection;
string query = "select* from Paymentt";
command.CommandText = query;
OleDbDataAdapter dadap = new
OleDbDataAdapter(commandds);
DataTable dtt = new DataTable();
dadap.Fill(dtt);
dataGridView1.DataSource = dtt;
connection.Close();”
```

Figure 10: Code for Load Button

The “Fig. 11” shows the payment interface. This is where all the payments details will be stored in the database. The payment details can be edited if needed and the receipt will be produced from the data which is provided in this section.

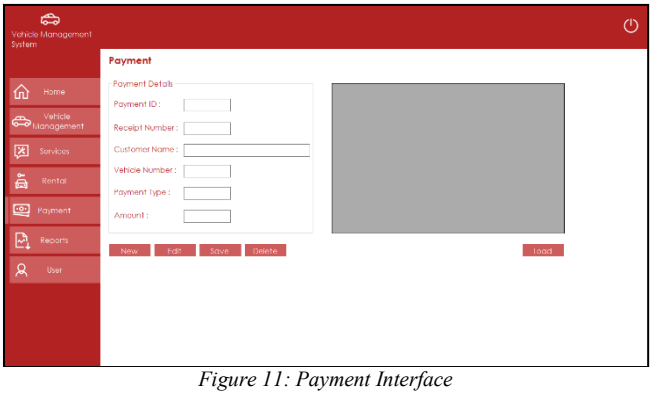

Figure 11: Payment Interface

“Fig. 12”, shows the code block from the “Delete Button” where the code shows the opening of the database, and the SQL query to search for the data to be delete from the database using the Vehicle ID as reference.

```
“connection.Open();
OleDbCommand commandds = new OleDbCommand();
command.Connection = connection;
string query = "delete from Loginn where Vehicle_ID = " +
VehicleID.Text + "";
commandds.CommandText = query;
commandds.ExecuteNonQuery();
MessageBox.Show("Data is Deleted");
connection.Close();”
```

Figure 12: Code Block from Delete Button

“Fig. 13”, shows the Vehicle Management Interface, where all the data regarding the vehicles which is under the owned by the management. From here, all the details regarding the vehicle can be viewed, from the service date, the services which has been done for the vehicles and etc.

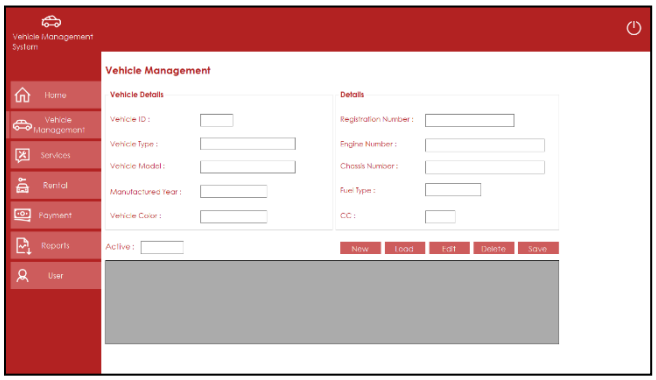

Figure 13: Vehicle Management Interface

“Fig. 14”, shows the code from User Control Vehicle, where the connection to the database is made. This code allows the system to search for the database file “. accbd”, where the URL for the file is written in the code itself, to access the database.

```
“public partial class UC_Vehicle : UserControl
{
private OleDbConnection connectionns = new
OleDbConnection();
public UC_Vehicle()
{
InitializeComponent();
connectionns.ConnectionString =
@"Provider=Microsoft.ACE.OLEDB.12.0;Data
Source=C:\Users\Muthu\Documents\VMS.accdb;Persist
Security Info=False;";
}”
```

Figure 14: Code Block for Accessing the Database

“Fig. 15”, shows the interface for the Service section. In this interface is where all the details regarding the service has been done can be added, edited and viewed.

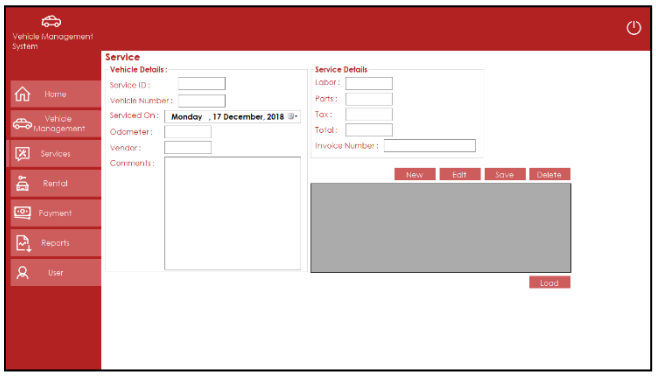

Figure 15: Service Interface

For beta testing is to test is to test the application in reality and the last test should be hurried to test the ease of use of the Vehicle Management System (VMS) application. There were ten inquiries that is disseminate. Then for the

acknowledgment testing is to test the client acknowledgment towards the Vehicle Management System (VMS). This test is to assess the framework consistence with the client prerequisite and evaluate whether it is satisfactory to be conveyance.

V. Conclusion

The development of the Vehicle Management System is to help Unihomes by providing features such as to help them store data regarding the vehicles, payment features for rental, customer details when they are renting the vehicles and report feature to help aid the management. Thus, the core objectives of this development project are to resolve most of these challenges and complexities encountered due to conventional manual vehicle management practices. On the whole, this development project is an implementation of a computerized membership management system that adopts inter-related (relational) database concept for storing, managing and organizing data in a systematic and efficient manner. Microsoft Visual Studio 2016, Crystal Reports and MYsql have been used as key development tools for this development project. This implementation will ensure that usability to use the application will be easy since the user had difficulties to analyze the data when the record manually done and it was hard for the record quickly and efficiently.

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