An Effective Garage Management System Web Application for Customer Service

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ABSTRACT

In this paper, the Garage Management System allows the user to keep track of all garage operations. It is a web-based tool that allows the user to manage the garage's stock, check for repair estimates, and schedule deliveries, among other things. It keeps track of the vehicle's service history as well as the time spent in the mechanic's shop. It also keeps track of the car components inventory. It will keep track of all cars that have been maintained and will be able to send service reminders to clients depending on the service dates. Admin access to the Garage Management System is restricted. The administrator will be able to keep track of various users such as supervisors, receptionists, and principals, among others. It's a smart online Web App that can help garage owners keep track of events that occurs in garage. Customers are served by garage management system based on their servicing requirements. The major goal of this initiative is to eliminate manual labor. This application is capable of assigning engineers for their respected work.

Keywords

Garage Management, Appointment Book, Frontend, Backend, Database, Automobile Industry, UI/UX, Administration

1. INTRODUCTION

This Garage Management System will assist the user in keeping track of all garage operations. It is a web-based platform with administrators, principals, receptionists, and supervisors as users. The admin will provide other users access to particular modules. The users must log in and control the system's activity. The supervisor should be able to examine the garage's inventory of vehicle spares. Users can be able to see which cars are presently being maintained and which ones need to be alerted for servicing. The user will also be able to record the hours spent at the mechanic shop. Payment for the repair or service will also be possible through the system. The system can also check for car spare parts offered by the garage. HTML and PHP were used to create the user interface. It offers an easy-to-use web interface.

The main objective of this paper is to show the project Garage Management System's needs. The finest application for organizingthe garage work estimate, sell and buy components, and automobile is "Garage Management System." It will allow to have complete control over garage at a look. By automating operations, recording client car history, and keeping a database of other dealers and customers, garage management software aids in the achievement of auto shop goals. Garage software allows auto repair companies to manage their whole garage infrastructure. The document contains a detailed description of the client's functional and non-functional needs. Using DFD, ER diagrams, and UML diagrams, this project outlines the hardware and software interface requirements.

2. LITERATURE SURVEY

In this paper [1], built an application to give a platform for users who want to take services at its location as well as in an emergency, therefore increasing its commercial value. In this study [2], many video feeds from interior parking garages were used to test and operate a suggested concept for a smart parking system based on image processing. This paper [3] used MVC architecture to create an MVC-based e-sourcing system architecture, which was then used to create an innovative e-sourcing system to address the difficulties described above those consumers and salespeople encounter in the present car sourcing system. The authors [4] created a web application for Online Management System for Automobile Services, which is a website that can run on any browser in a mobile, tablet, or computer, with the goal of discovering the various factors that affect the servicing and maintenance process of a car and looking for opportunities to reduce the time required for it. In this paper [5], an effective vehicle service management system is proposed, which can automatically manage the entire service process while monitoring changes and operations performed on the vehicle. It also looks at predictive vehicle maintenance - that is, predicting when vehicle components (such as brakes) need to be repaired. The authors [6] have computerized the showroom in this paper, as well as scheduled and divided the one organization into parts and managed it effectively with features such as one of the most essential aspects of the project is the interaction between the client and the organization's salesperson. The authors of this study [7] have completed the scheduling process at an automotive repair business using an Artificial Neural Network in MATLab. The proposed paper [8] depicts the flow, structure, and operation of the Automobile Service Center Management (ASCM) system. ASCM is user-friendly, i.e. simple to use, and available for free on the Android Store, making it a time-saving and cost-effective application.

3. TOOLS AND TECHNOLOGY

3.1 Software configuration:
- Operating system: Windows XP Professional
- Environment: Visual studio NET 2005 4.6
- Frontend: CSS, HTML, Javascript, JSON, jQuery
- Backend: MySQL, PHP

3.2 Tools Used
- Xampp
- My SQL Workbench
- VS Code

3.3 Technology
- ### Database:

Any collection of data or information specially organized for quick computer search and retrieval is called a database, generally referred to as an electronic database. The database is designed to make data storage, retrieval, modification, deletion and other data processing procedures as simple as possible. To obtain information from the database, records and documents must be organized. Users access the information in the database mainly through queries. The advantage of a database management system (DBMS) is that new relationships can be created based on the basic relationships provided by tables and use them to answer queries.

- ### Backend -

PHP: PHP is a server-side, open-source, object-oriented scripting language. PHP is a popular web development language. The current development paradigm PHP organizes without a structure, combining data access code, business logic processing code, and web display layer code.

MySQL: In today's modern big data world, MySQL is one of the most well-known technologies. MySQL is a structured query language-based relational database management system (RDBMS) created by Oracle (SQL). A database is a collection of data that has been organized into a logical structure. A relational database, in particular, is a digital repository for data that is organized using the relational paradigm. Tables in this model are made up of rows and columns, and data element relationships are all organized logically.

- ### Frontend - HTML, CSS, Javascript, JSON andjQuery:

HTML: HTML stands for HyperText Markup Language in its entire form. HTML programming allows people to share their ideas with the rest of the world via the internet. Pages have a clearer, more straightforward element structure, making them easier to design, change, and debug—as well as to create automated services that aid in the discovery of key web resources. HTML is one of the 3 most significant tools for building a website: HTML defines the structure of a website, including how text, images, and other content will appear. Websites and web-based content use HTML as their primary language. It aids a browser's comprehension of the structure and style of a document or files for internet reading.

CSS: Cascading style sheets (CSS) is used to optimize pages for responsive web design and to generate more advanced graphics such as hover effects, in addition to adjusting simple things like colors, fonts, and spacing. A style sheet instructs the web browser on how to display the content in question.

A style sheet instructs the web browser on how to display the content in question. All style sheets in CSS are cascading, which is a crucial idea to grasp. Even if the designer hasn't applied any styles, every web page is touched by at least one style sheet. The User Agent stylesheet contains the default styles added by the browser.

Javascript: JavaScript is a web programming language that adds motion to websites to make them look more alive. To be more specific, it's a programming language that allows to create complicated and beautiful web pages. It's an interpreted high-level programming language.

JSON: JavaScript Object Notation (JSON) is a text-based, schema less structured data representation that uses key-value pairs and organized lists. Although JSON was developed from JavaScript, it is compatible with most major programming languages either directly or through libraries. It is widely used, but not specifically for sending and receiving data between Web clients and servers.

4. DESIGN
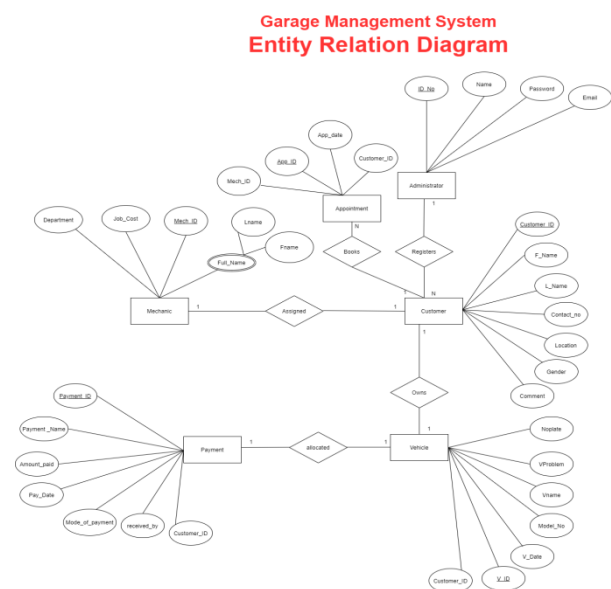## 4.1 Database Design (ER Diagram):

Fig 1:Database Design (ER Diagram)

4.2 Database Schema

Customer (Customer_ID, F_Name, L_Name, Contact_no, Location, Gender, Comment)

Vehicle (V_ID, V_Date, Model_No, Vname, VProblem, Noplate, Customer_ID)

Payment (Payment_ID, Payment_Name, Amount_paid, Pay_Date, Mode_of_payment, Received_by, Customer_ID)

Mechanic (Mech_ID, Department, Job_Cost, Lname, Fname)

Appointment (App_ID, Customer_ID, Mech_ID, App_date)

Administrator (ID_No, Name, Password, Email)

4.3 Relational Database Design using Schema Diagram

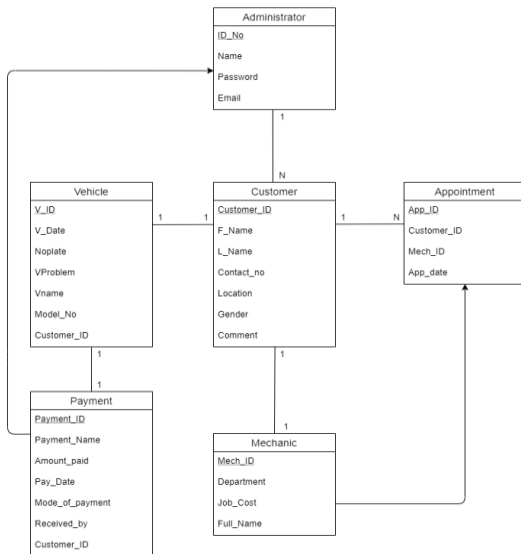## Relational Database Design using Schema Diagram

Fig 2: Relational Database Design using Schema Diagram

4.4 Database Normalization till 3 NF

Customer (Customer_ID, F_Name, L_Name, Contact_no, Location, Gender, Comment)

Its in 1 NF since the atomicity is one. Its also in second NF since there is no partial dependency and also in 3 NF since there is no transitive dependency.

Hence, its in 3 NF.

Vehicle (V_ID, V_Date, Model_No, Vname, VProblem, Noplate, Customer_ID)

Composite key: V_ID+ Customer_ID

Table is in 3NF since all attribute depend on primary key V_ID and foreign key Customer_ID.

Payment (Payment_ID, Payment_Name, Amount_paid, Pay_Date, Mode_of_payment, Received_by, Customer_ID)

Composite key: Payment_ID+ Customer_ID

Table is in 3NF since all attribute depend on primary key Payment_ID and foreign key Customer_ID.

Mechanic (Mech_ID, Department, Job_Cost, Lname, Fname)

Its in 3 NF since all attributes only depend on Mech_ID which is primary key.

Appointment (App_ID, Customer_ID, Mech_ID, App_date)

Composite key: App_ID+ Customer_ID+Mech_ID

Table is in 3 NF since all attribute depend on primary key App_ID, Customer_ID, Mech_ID

Administrator (ID_No, Name, Password, Email)

Its in 3 NF since all attributes only depend on ID_No which is primary key.

5. EXPERIMENTAL WORK

5.1 Frontend& UI/UX

HTML, CSS, JSS, and Bootstrap are used to create the UI/UX. Admin, Mechanic, and Customer all have login access at the navigation bar on the homepage.
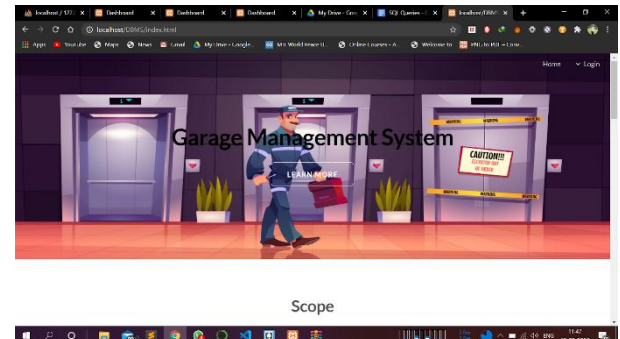

Fig 3: Garage Management System Homepage

5.2 PHP and MySQL

PHP is used for the backend, and MySQL is used for the database. Three different tables for Admin, Mechanic, and Customer are constructed for login. HTML performs password validation on the password field.
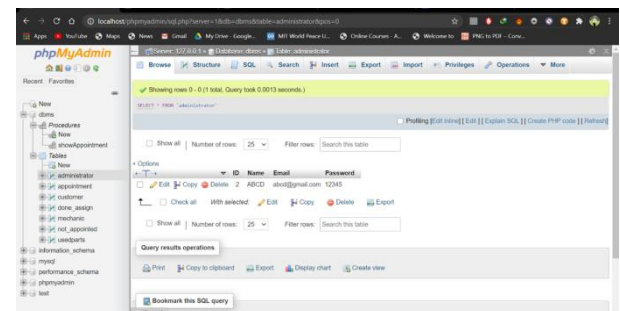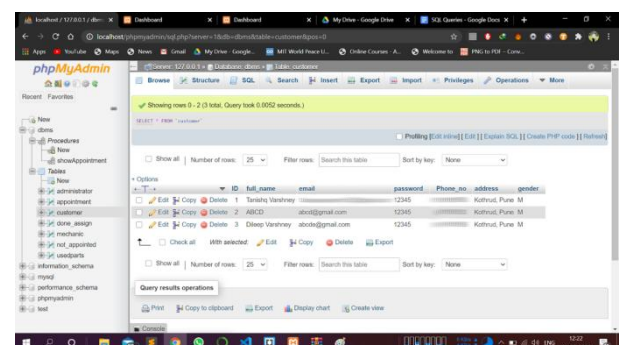

Fig 4: MySQL table for Administrator
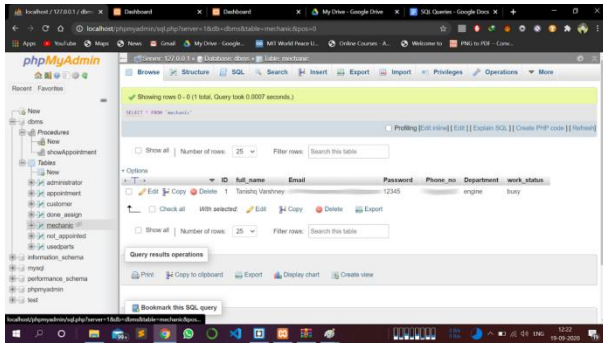

Fig 5: MySQL table for Customer

Fig 6: MySQL table for Mechanic

Query used for creating these tables are:

a) create table administrator(ID int(30) primary key auto_increment, Name char(30), Email varchar(30), Password varchar(30));

b) create table customer(ID int(10) primary key auto_increment ,full_name char(30), email varchar(30), password varchar(30), Phone_no bigint(30) check(Phone_no>0), address varchar(50), gender char(10));

c) create table mechanic(ID int(10) primary key auto_increment, full_name char(30), Email varchar(30), Password varchar(30), Phone_no bigint(30) check(Phone_no>0), Department char(30), work_status char(10));

ID is set to auto increment and is set as the primary key to prevent its duplication. The status of mechanic will be free initially because the admin has not allocated any impending appointments to him. After logging in, a customer can schedule an appointment for his vehicle, which will appear on the admin's dashboard along with the names of available mechanics which is done by creating routines.
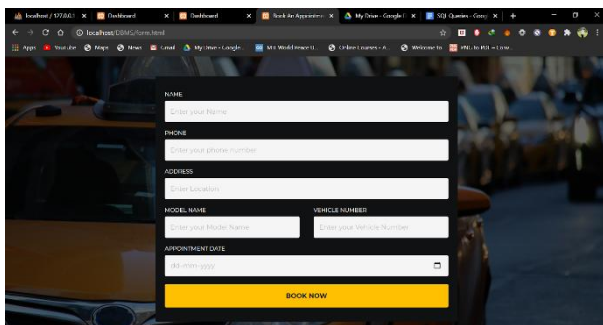

Fig 7: Booking an Appointment

The appointment booking form is written in HTML with a POST method. All of the information will be saved in the database table Appointment. A 14-digit booking id is generated using PHP's Random string function and later allocated to a specific appointment. Admin can easily assign the available mechanic to an upcoming appointment and both the customer and mechanic will be notified on their respective dashboards.
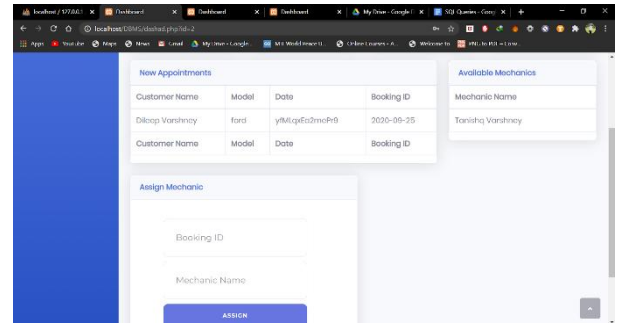

Fig 8: Admin's Dashboard

The value of Mechanic assigned at the customer's dashboard is changed to Y, and the value of status at the mechanic's dashboard is set to busy once the mechanic is assigned. Create triggers on the customer and mechanic tables to complete this operation. Mechanics can enter a list of components that were used in the vehicle's servicing, which will be saved in the Used Parts table and displayed to the client. The components will be recorded as JSON data, which will consist of a collective array of Name and Quantity. At the end of the process, the mechanic can complete the task on his end, and the customer will receive a thorough copy of the bill that contains all of the parts and their amounts.
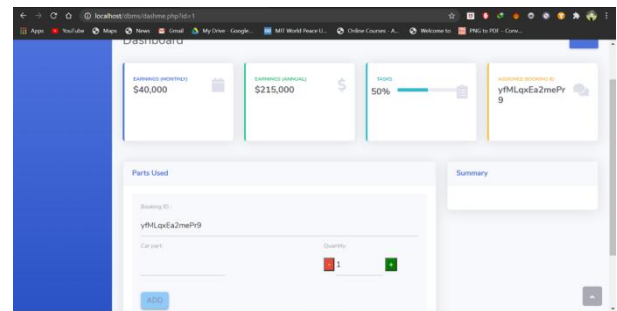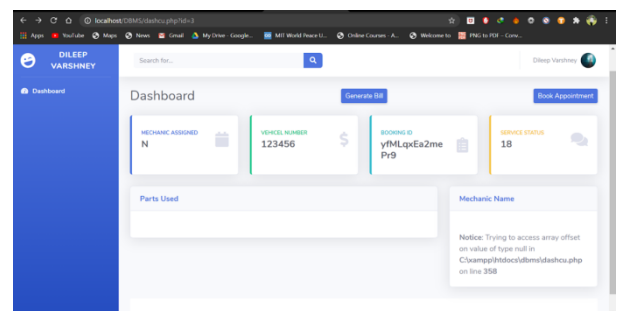

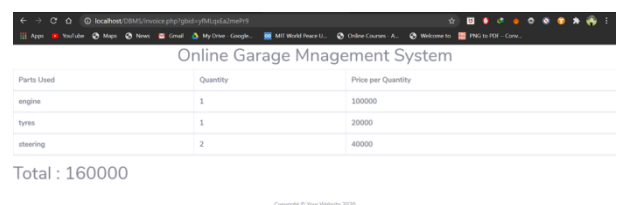**Fig 8: Mechanic's Dashboard**

Fig 9: Customer's Dashboard

Fig 10: Final Bill

Routine used in the database is :

BEGIN
  DECLARE cname, m_name char(30);

```
DECLARE bookid varchar(30);
DECLARE bdate date;
DECLARE exit_loop BOOLEAN DEFAULT FALSE;
DECLARE c1 CURSOR FOR SELECT full_name,
model_name, date, gbid FROM appointment WHERE
mech_assign = 'N';
DECLARE CONTINUE HANDLER FOR not found SET
exit_loop = TRUE;
TRUNCATE TABLE not_appointed;
OPEN c1;
book_loop:LOOP
        FETCH FROM c1 INTO cname, m_name, bdate,
bookid;
        IF exit_loop THEN
            LEAVE book_loop;
        END IF;
    SELECT cname, m_name, bdate, bookid;
    INSERT INTO not_appointed VALUES (cname, bookid,
m_name, bdate);
    END LOOP book_loop;
CLOSE c1;
END
```

6. FUTURE SCOPE

In the future, it can be hosted in cloud services to deploy it and make it more effective. It may also have some guiding relevance in order to make it a more intellectualized application by incorporating other embedded technology.

7. CONCLUSION

In this paper, "Garage Management System" benefits the automobile industry as it makes Garage Bookings more convenient for users, provides a better interface, and saves time by booking an appointment in advance. To address all of the shortcomings of the current garage servicing system, this system is necessary, in which the complexities of the management process for automobile services are minimized for the convenience of automobile owners. This technology allows owners of automobiles to receive regular updates on their vehicles' services. This website makes automobile maintenance simple. In the event of a car breakdown in an unfamiliar place, automobile owners can use this technology to discover all neighboring garages. As a result, the system attempts to improve the current system and provide a more effective approach to manage automotive maintenance.

8. REFERENCES

[1] Er. Swati Ganar, Gulhasan Siddiquee, Attaullah Khan, Soyab Anwar, "E-Garage Management System", 10th International Conference on Intelligent Systems and Communication Networks (IC-ISCN 2019)

[2] Chyn Ira C. Crisostomo, Royce Val C. Malalis, Romel S. Saysay, and Renann G. Baldovino, "A Multi-storey Garage Smart Parking System based on Image Processing", 7th International Conference on Robot Intelligence Technology and Applications (RiTA), 2019

[3] Bokolo Anthony Jnr., Mazlina Abdul Majid , Awanis Romli, "An Analytical Study Evaluating the Applicability of a Developed Innovative E-Sourcing System for Automobile Based Firm", International Conference on Innovation and Intelligence for Informatics, Computing, and Technologies (3ICT), 2018

[4] Hanamant B. Sale , Dharmendra Bari, TanayDalvi, Yash Pandey, "Online Management System for Automobile Services", International Journal of Engineering Science and Computing, February 2018

[5] Shivang Shah, Parimal Abhishek, Deep Shrivastava, Abraham Sudharson Ponraj, "Vehicle Service Management and Live Monitoring With Predictive Maintenance System", International Conference on Vision Towards Emerging Trends in Communication and Networking (ViTECoN), 2019

[6] Neha Selokar, Vijay Masne, Roshani Pimpalkar, Srushti Puranik, Nidhi Bhoyar, "24*7 Vehicle Management Systems for Automobile Industry", International Research Journal of Engineering and Technology (IRJET), 2016

[7] N. SHIVASANKARAN, P. SENTHILKUMAR , "SCHEDULING OF MECHANICS IN AUTOMOBILE REPAIR SHOPS USING ANN", Indian Journal of Computer Science and Engineering (IJCSE) , 2014

[8] Prof. Shilpa Chavan, Saket Adhav, Rushikesh Gujar, Mayur Jadhav, Tushar Limbore, "Automobile Service Center Management System", International Journal of Scientific and Research Publications, Volume 4, Issue 3, March 2014 1 ISSN 2250-3153.