FLEET MANAGEMENT SYSTEM

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Abstract

Fleet Management System (FMS) is a system which helps institutions to manage vehicle fleet efficiently and effectively through smart allocation of resources. The fleet management application functionalities such as tracking, routing, dispatching, on-board information and security are to be performed by FMS. Once vehicle location is determined from the GPS components, additional tracking capabilities transmit this information to a fleet management web application. The main purpose of the proposed Fleet Management Application is essentially to automate entire operations and information of vehicles at a particular given point of time. So that the admin can get the information about their vehicles and drivers at any point of time. Web services have become quite essential in web application development. RESTful web services are one way of providing interoperability between computer systems on the internet. REST-compliant web services allow requesting systems to access and manipulate textual representations of web resources using a uniform and predefined set of stateless operations. These services, which are online APIs, can be accessed from various applications and the results can be used to offer specific functionality to users. This project consists of an Android app, a Server application and a Client application. The Server application exposes a REST API (Web Services developed using Representational State Transfer (REST) protocol) using, which the consuming client applications can make use of various functionalities as services across the network. The Android application will be installed in the smart phone present with each driver, this app would send live location data to the database using the REST API. The manager/admin uses the client application to track the vehicles in real time, the manager can also choose to track a particular vehicle.

Index Terms --- Fleet Management System (FMS), Representational State Transfer (REST), Application Programming Interface (API), Intelligent Transportation System (ITS), Java Script Object Notation (JSON), Extensible Markup Language (XML), Create Read Update Delete (CRUD), Hypertext Transfer Protocol (HTTP), Windows Communication Foundation (WCF), Microsoft Structured Query Language (MS SQL), Global Positioning System (GPS), Cascading Style Sheets (CSS).

1. INTRODUCTION

Fleet management is the management of Commercial motor vehicles such cars, trucks, bikes, busses, private vehicles used for work purposes. Fleet Management Application enables people to accomplish a series of specific tasks in the management of any or all aspects relating to a company's fleet of vehicles.

These specific tasks includes all operations from vehicle acquisition to disposal. Application, depending on its capabilities, allows functions such as recording driver and vehicle details, the tracking of procurement costs, scheduling of maintenance and servicing tasks, import of fuel transactions. It is to create an application/ API which can be used in multiple ways[7].

It is a common scenario where a business manager would like to track the location of all the vehicles owned by the firm. This application could be used by many businesses like delivery trucks, taxi services and public transport. Also this API can be consumed by developers who want to develop their own applications, such as an application to track all the vehicles belonging to a group of friends who are on a trip. Fleet managers play a vital role in maintaining

a healthy bottom line because they are responsible for one of the business's most important cost centres.

Vehicle acquisition, maintenance costs, fuel costs, insurance, driver training and ensuring vehicles are compliant with government regulations are seemingly small tasks but can add up quickly, compounding other day-to-day operating costs. From dispatching technicians more effectively and calculating more efficient routes to promoting

positive customer interactions, fleet managers must be able to juggle varying roles and responsibilities and stay cool under pressure.

While it's not necessarily critical for fleet managers to know exactly how to overhaul hydraulic brakes or fix a leaky oil pan, understanding what those fixes require (i.e., cost and downtime,) helps minimize negative impacts on the business and the bottom line. A skilled fleet manager can quickly adapt when vehicles or workers are unavailable, assess the potential downtime and quickly rearrange or reassign jobs while also minimizing disruption to vehicle operations[4].

2. LITERATURE REVIEW

Fleet Management Systems and GPS. Intelligent transportation systems (ITS) were defined in as using information technologies, computers, and communications in transportation systems to solve transportation problems. These systems increase transportation efficiency, promote driving safety, and raise industrial productivity. Fleet management systems has been available in the industrial domain, such as the transport business, for many years[11].

Currently, these systems have evolved into complete enterprise management tools linking together all parts of the business. The new trend clearly dictates increased management sophistication in terms of turning these tools into planning tools. They now include real-time asset management focusing on current fleet locations and prediction of planned tasks. These systems today offer a broad range of functionalities, including tight integration with internal enterprise resource planning (ERP) systems and systems located at customer sites. Specifically, extensive use of real time data and wireless communications serve together with increased intelligence for real-time planning, where industry developers identify these parameters as the primary drivers for current developments[11].

In an industrial context, a complete logistics system involves transporting raw materials from a number of suppliers, delivering them to the factory for processing, transporting the products to different depots, and finally distributing them to customers. These procedures form part of the overall supply-chain management of the company. The American Heritage Dictionary defines a global positioning system as "A system for determining a position on the Earth's surface by comparing radio signals from several satellites. Depending on your geographic location, the GPS receiver samples data from up to six satellites; it then calculates the time taken for each satellite signal to reach the GPS receiver, and from the difference in time of reception, determines your location." A number of literatures have been published which provide information to engineers about GPS technology applications to transportation systems, especially to intelligent transportation systems. GPS became very important because not only did the military rely on them to provide navigation, but the public sector did as well. These devices were used by pilots, miners, mountain climbers, and many others working in dangerous occupations. Several industries such as the logistics realized this and started to focus

on research and quality control. As part of logistics management, fleet management can be a practical tool for managing a vehicle fleet to improve scheduling, operating efficiency, and effectiveness[7].

These industries also realized the benefit of combining GPS technology with telecommunications. This enabled GPS receivers to transmit data to a base station for analysis. Another advance was a GPS architecture that enabled integration of the technology into computers and other devices. This opened up a huge spectrum of uses for GPS. Companies can reduce costs and create greater customer satisfaction by implementing GPS systems as part of already established processes.

GPS became a "tool of the trade" in trucking companies for logistics management. In addition, fleet management involves supervising the use and maintenance of vehicles and associated administrative functions, including coordination and dissemination of tasks and related information to solve heterogeneous scheduling and vehicle routing problems[7].

2.1 EXISTING SYSTEM

Current system is a manual one in which employees has to submit their applications for transport facility as well as for cab facility. Employees has to follow up regularly with transport personnel to know the status of their requests which is time consuming and hectic.

Disadvantages:

a) It is difficult to track the occupancy.

b) More manual hours need to generate required reports.

c) It is tedious to track the details of cabs provided by third party.

d) There is no possibility to track the approvals of requests.

e) No co-ordination between various departments.

2.2 PROPOSED SYSTEM

Proposed system is a software application which avoids more manual hours that need to spend in record keeping and generating reports. This application keeps the data in a centralized way

which is available to all the users simultaneously. It is very easy to manage historical data in database. No specific training is required for the employees to use this application. They can easily use the tool that decreases manual hours spending for normal things and hence increases the performance.

Advantages:

a) Easy to process requests.

b) Can generate required reports easily

c) Easy to manage historical data in a secure manner

d) Centralized database helps in avoiding conflicts

e) Easy to use GUI that does not requires specific training.

f) Implementation of approval process is very easy.

g) Occupancy tracking helps in decision making.

3. ORGANIZATION OF PROJECT

For the any project to be implemented planning is very much important as the has to go smooth with all the specific requirements and implementations. So while implementing any project if you already have a basic plan for it, the implementation becomes easy. The same logic we have used in this project and organized this project into 3 phases:

Planning

Execution

Evaluation

3.1.1 PLANNING

a. The very first thing that was planned, is what features our project will be having, and how they will be performed. It includes two platforms first is web application (for admin) and second is android application (for user).

b. The very next that had to be implemented was architecture. We have connected the android application with internet and then have given the access to web application using REST API and then the database is connected.

c. So this happens in way that user will request and the request will go through internet and then the web application and then the database. Now this database will response back to the REST and REST will send this response to the user. So, this is how the system will work.

d. The required resource for these is some of the software like MS SQL, REST API, Android Studio, Java, ASP.NET,Visual Studio, (WCF) web service.

e. And finally, there comes the cost required for this project, if we use above software the cost will be zero and if it has to be made higher tech or for professional industry it will have to be upgraded and may be that new

features will lead to cost funding.

3.1.2   EXECUTION

a.   The android application will be created using Android Studio and the language that will be used is Java.

b.   Web application will be created using HTML/PHP and CSS. And the web service that will be used is WCF.

c.   Database that has been used is MS SQL (Microsoft SQL Server).

d.   To connect android application with Web application REST API is used.

3.1.3   EVALUATION

a.   To give a approximate idea of the evaluation, the process will start this way, first the admin will add vehicles details to the database including insurance details and also admin will store the user (driver) details to the database.

b.   Then the user will register himself into the android application, after logging in to the system user will be assigned some deliveries or tasks by admin, he will then take allotted vehicle and go for the task assigned.

c.   In the meantime admin will track the driver using GPS and keep record of the same, also will see to the issue, the vehicle is not working properly while went to the delivery, other vehicle will be

sent to that location and further process is as above that is location tracking.

d.   Also if any expenses are done by driver for vehicle, driver will upload the receipt for that and claim for compensation.

e.   The main feature in this project is it will notify both driver and admin when the insurance is going to expire.

f.   That's it these are the main processes we have focused on.

4.   METHODOLOGY

According to this Waterfall model we have these 6 phases:
  a.   *Software Concept*
  b.   *Requirement Analysis*
  c.   *Architectural Design*
  d.   *Coding debugging*
  e.   *Testing*
  f.   *Maintenance*

4.1   SOFTWARE CONCEPT

The identification of new system will include determining whether a business problem or opportunity exists, conducting a feasibility study to determine if the proposed solution is cost effective, and developing a project plan. This process may involve end users who come up with an idea for improving their work. The process occurs with a review of the organization's strategic plan to ensure that IT is being used to help the organization achieve its strategic objectives. Mgt may need to approve concept ideas before any money is budgeted for its development[5].

4.2   REQUIREMENTS ANALYSIS

Analysis plays one of the most important part in any project implementation as you need to analyze different things and operations needed for implementing the project. It helps us to understand what all new features we can add in the

previous or existing system. From the previous papers or the existing system, we analyzed hat rather than manual approach we can use a software to run this kind of system. We can create 2 panels of admin and user;

one accesses the database as well as web application and the other accesses android application. Then the problems of tracking the current location is implemented so that its easy to locate driver as well as the vehicle. Second important thing we analyzed is many of the cars either do not have insurance or their insurance is expired, for this problem to overcome we are using the notification system which will inform the driver and the admin that their vehicle insurance will be expiring in 3-4 days. Additional notification system will be used which will be notifying the servicing of the vehicle after every 6 months. There are many more operations that have been analyzed and we have found eithers ways for implementing those operations[4].

4.3 ARCHITECTURE DIAGRAM

The figure 3.4 shows architecture diagram for fleet management system. Android application will send the request via internet the request will be go through the REST web server which receives and sends the Json format and then it will request database to give response. Database will send the response to REST and then REST will send it to Android application in Json format and the user has the output.
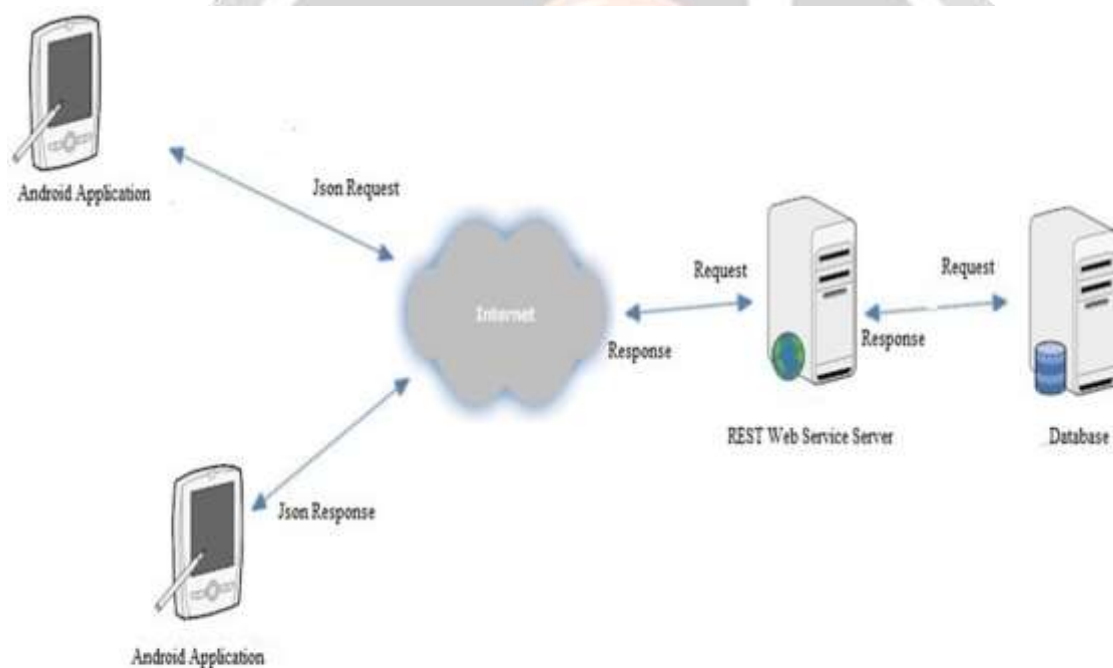

Figure 3.4 Architecture Diagram

4.4 IMPLEMENTATION

a. The web application will be made in Visual Studio by using C Sharp and ASP.NET.
b. And for the Web Application Programming Interface or Service we have used MS WCF that is Windows Communication Foundation.
c. The android application is made using Android Studio Java and XML.
d. The android application cannot directly communicate with the server where the data resides, hence we make use of an API (Application Programming Interface).
e. Since the android application makes use of an API for data exchange purpose, we make use of library that helps us to send request over network to the API. The library used is http client.

Advantages of the Iterative Model:-

a. Testing is inherent to every phase of the Iterative model.
b. It is an enforced disciplined approach.
c. It is documentation driven, that is, documentation is produced at every stage.

Disadvantages of the Iterative Model:-

The waterfall model is the oldest and the most widely used paradigm. However, many projects rarely follow its sequential flow. This is due to the inherent problems associated with its rigid format. Namely:

a. It only incorporates iteration indirectly, thus changes may cause considerable confusion as the project progresses.
b. As The client usually only has a vague idea of exactly what is required from the software product, this IM has difficulty accommodating the natural uncertainty that exists at the beginning of the project.
c. The customer only sees a working version of the product after it has been coded. This may result in disaster any undetected problems are precipitated to this stage.

In the implementation and testing phase stage the designs are translated into the software domain.Detailed documentation from the design phase can significantly reduce the coding effort. Testing at this stage focuses on making sure that any errors are identified and that the software meets its required specification. In the integration and system testing phase all the program units are integrated and tested to ensure that the complete system meets the software requirements. After this stage the software is delivered to the

customer [Deliverable – The software product is delivered to the client for acceptance testing.].

The maintenance phase the usually the longest stage of the software. In this phase the software is updated to:

a. Meet the changing customer needs
b. Adapted to accommodate changes in the external environment
c. Correct errors and oversights previously undetected in the testing phases
d. Enhancing the efficiency of the software

Observe that feed back loops allow for corrections to be incorporated into the model. For example a problem/update in the design phase requires a 'revisit' to the specifications phase. When changes are made at any phase, the relevant documentation should be updated to reflect that change.

5. RESULTS

Below attached are some of the screenshots from our developed project:

Android Application
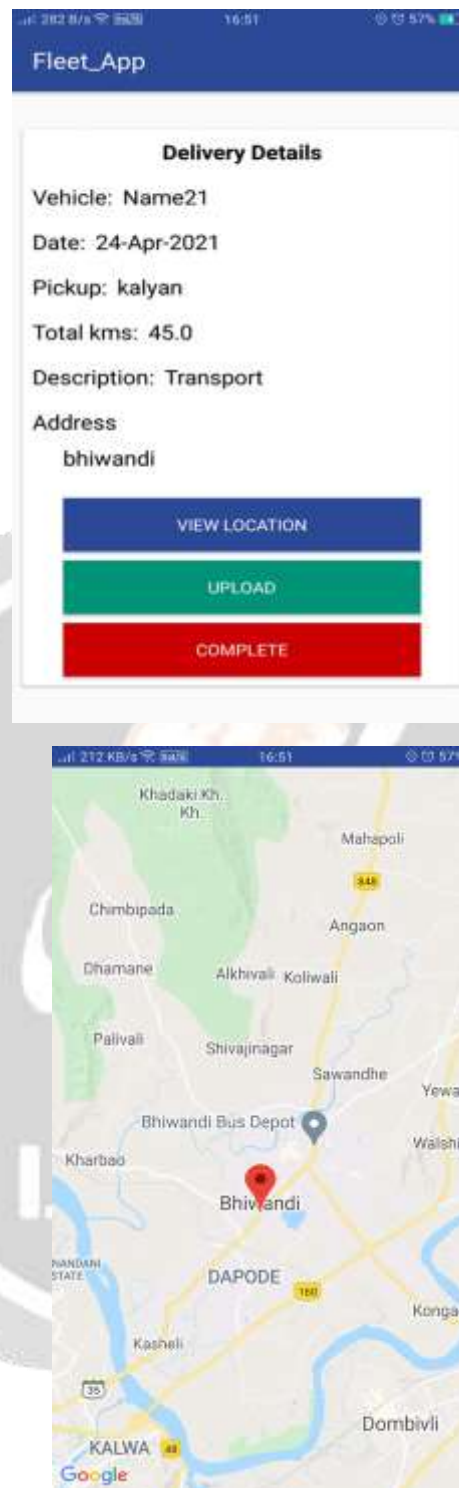
6. CONCLUSION

"Fleet Management System" that is designed for managing the delivery process with the aid of recent improvements in mobile and web technology. This system helps the admin to manage the drivers, vehicles and deliveries with the help of a website that contain of admin panel, and for the driver we have an android app from where he can see the deliveries assigned to them and can updated the status of delivery. This system can be used to increase the overall productivity of management system because lesser amount of human interaction is involved which in turn reduces the chances of errors. s said in the theory we have implemented the same using different codes, logics. Also

currently this project is made using the mentioned software and hardware and other components only, so this has been a zero cost project with good features. We have learned so many concepts like setting up API, then connecting everything to the server, etc.And the curiosity always made us work more and hard.

Finally this project has been carried out with cooperation of all our teammates.

And we hope that, whatever valuable knowledge we have gained during this Fleet Management System project implementation, will be useful for the future.

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