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# An Android Application for Cloud and Web Based Smart Vehicle Toll Payment System

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**ABSTRACT:** The use of Cloud and WEB applications in the business environment has become the standard. Main reasons are ease of maintenance as well as version release as it's made only on the central server without the need for access to a user's computer. The design and implementation of a cloud-based web application supporting vehicle toll payment system uses NFC (near field communication technology) to exchange the information between the two devices (toll payment). NFC cards holding payment and vehicle details are used for payment at different tolls where the cards have just to be tapped on the NFC enabled devices. This reduces the manual filling of the details and provides faster payment mode thus leading to less vehicle queuing and reducing waiting time of the passengers.

**KEYWORDS** Cloud Based Systems, Web Application Design, Internet of Things Concept, Vehicle Toll Payment.

## I. INTRODUCTION

The use of WEB applications in the business environment has become the standard. Main reasons are ease of maintenance as well as version release as it's made only on the central server without the need for access to a user's computer. In addition, WEB oriented applications are available over the Internet for use in any location and on any kind of small or resource constrained device. Such web applications can be integrated with different other applications, control and management services, and other applications as well, to realize management, monitoring reporting, etc. Usage of WEB based applications is operation system independent which means that usage of a cloud system has the advantage of hosting a specific web application. The cloud systems themselves can be divided into private, public or hybrid. Public cloud systems are provided by other organizations in a manner of renting distinct volumes of system resources, services and storage. A private cloud is considered as an internal data center in an enterprise or a company. From the web application and IoT world perspective, all three types of cloud can be considered for web application development and hosting, depending on the security requirements of the web application and the IoT application domain. In case of a web application, security is on a high level because of the access to a single central server, rather than using large amounts of workstations. Furthermore, the cloud system, either public or private, provides both the applications delivered as services over the Internet as well as the hardware and systems software in the data centers which provide those services. Therefore, moving web applications and corresponding services to the cloud gives more reliability and scalability to the whole system, while simultaneously allowing management and administration from one location.

## II. LITERATURE SURVEY

[1] Drazen Pasalic et. al. Proposed a work "Vehicle toll payment system based on Internet of Things" describes it is completely works only with the use of internet. To enable different physical environment, IOT is used. And also IOT has ability to bring other devices together to form a big network.

[2] Branimir Cvijic et.al., proposed a paper "Web application supporting vehicle toll payment system" presents Main advantages of web application development are becoming popular by its development features which consists of integration of different technologies.

[3] Processing, monitoring, and control in cloud based web application of payment process are explained using IOT devices. Satyasrikanth Pet.al, worked on "Automated Toll Collection System Using RFID" comprises Electronic toll payment system is mainly implemented for eliminating a need for motorists and toll admins to manually perform toll payment process. ETC significantly improves an efficiency of tolls and traffic needs of the toll road.



Limitations of related work is Cost of collecting cash from hundreds of toll locations in a city is huge. Toll payment system requires more security and manpower in collecting amount, counting cash. Time consumption is more for collecting tax. There are many chances of escaping without doing payment. Then all vehicles which are behind will be queued up.

### III. PROBLEM STATEMENT

#### EXISTING SYSTEM

In the existing system, according to the manual toll collection methodology, a driver has to stop at a charging booth and pay the required fee directly to a collector. The amount to be paid by each vehicle is determined by its characteristics or classification. In the manual toll payment system time consuming and many mischievous things may happen by manpower.

#### DEMERITS

- The cost of collecting cash from hundreds of fare-collection locations around a city is huge
- It requires security, and a lot of manpower is expended counting coins and reconciling trips with the amount collected

#### PROBLEM STATEMENT

In the current toll payment methodology, the use of man power is immense. The manual payment leads to various issues like queuing of vehicles, traffic jams, more time consumption etc. A driver has to stop at a charging booth and pay the required fee to a collector. Collecting the money, calculating the change, writing the required information of the vehicles and billing leads to a large waiting time and sometimes create issues for the travellers by reducing the manual intervention in the payment system, the time constraint can be overcome to provide a more efficient way of toll payment

#### OBJECTIVE

- To develop a efficient Toll Payment system using NFC (Near Field Communication) Technique.

#### PROPOSED SYSTEM

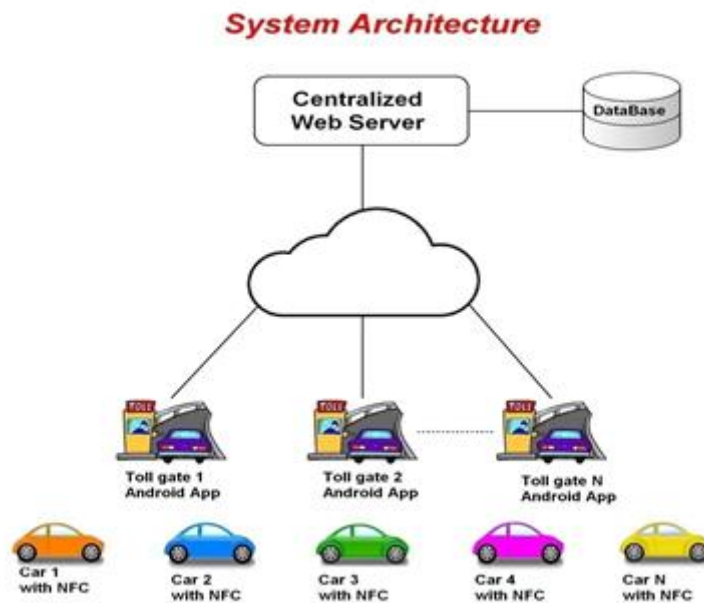
We propose a concept, design and implementation of a cloud-based web application used for vehicle toll payment. The design and implementation model implies usage of an NFC device which initiates vehicle toll payments request calling web application's web service functions. Further, the web Application realizes the user (driver) desired toll payment over an electronic payment system. The web application itself is developed to be hosted on a server directly or on a virtual machine using virtualization technology on the physical server.

#### ADVANTAGES

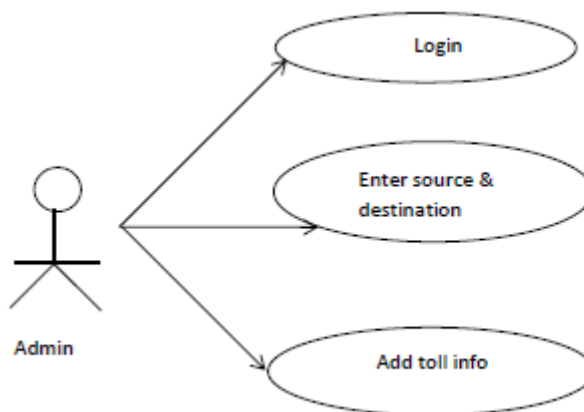
- More efficient way of payment than existing method.
- Admin can track of the payment made by the different user along with vehicle owner details.
- Secure way of payment as it uses peer to peer connection.

#### IV. SYSTEM DESIGN

System design can be explained by using any or all of the following methods:



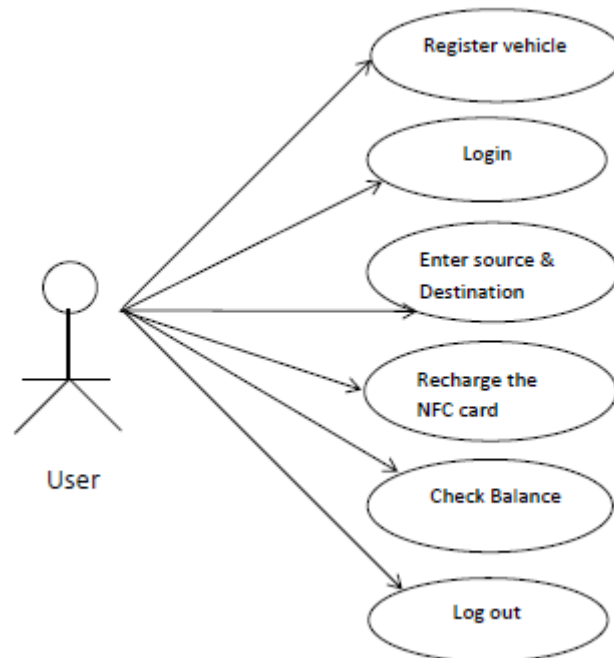
#### USE CASE FOR ADMIN



USE CASE	DESCRIPTION
<b>Login</b>	The admin logs in to start his/her work.
<b>Enter source &amp; destination</b>	The admin specifies the source and destination.
<b>Add toll info</b>	The admin enters the toll information like no of tolls, toll names, toll tax for different vehicle types etc.

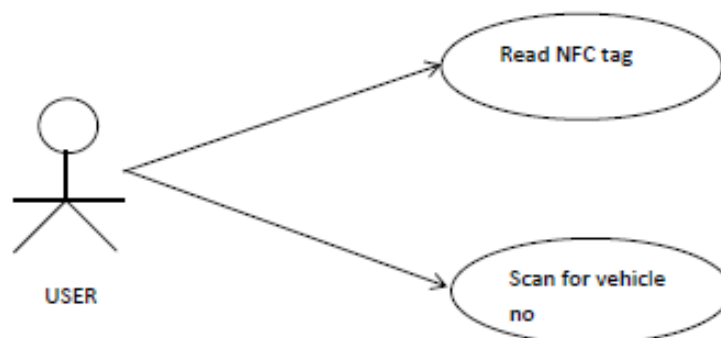


**USE CASE DIAGRAM FOR USER/DRIVER**



USE CASES	DESCRIPTION
<b>Register Vehicle</b>	User registers by adding vehicle details.
<b>Login</b>	User logs in to the application using the user name and password.
<b>Enter source &amp; Destination</b>	User enters source & destination, gets no of tolls and the amount to be recharged in the NFC tag.
<b>Recharge the NFC</b>	User recharges the NFC tag.
<b>Check the balance</b>	User can check the balance.
<b>Log Out</b>	User logs out of the application.

**USE CASE DIAGRAM FOR TOLL COLLECTOR**





USE CASE	DESCRIPTION
Read NFC tag	The toll user reads the data of the NFC tag using a NFC device and deducts the amount.
Scan for the vehicle no	OCR scanners are used to scan the vehicle no and deduct the amount.

#### IV. IMPLEMENTATION

There are three modules. Each of them has specific privileges.

##### Toll Collector:

- o Can login to the portal using valid credentials.
- o Can verify the traveller.
- o Can manually recharge the user toll account.
- o Can deduct the Toll fee.

##### Toll Payer (Traveller):

- o Can register by filling the details in the online form.
- o Can login by entering the valid credentials.
- o Can select type of vehicle and journey points to compute the total toll fee and pay it too.

##### Admin

- o Can login to the portal using valid credentials.
- o Can verify the traveller and vehicle Information.
- o Can Approve / Discard the Users.
- o Can issue Smart Cards.

When the vehicle owner taps the card to android toll application, first encrypted data is converted into original data with key .All card details will be displayed .card number ,vehicle detail and tollgate details will be send to web server ,web server Web Server Receives the Card No and fetch the Vehicle Record and its Balance (Y), if Card no is miss match then stop Fetch the Fare details from Toll Gate table Based on Vehicle type fetch the amount (X) from toll fare details If insufficient balance and stop the process to be continued. After successful payment update B in vehicle record. Send Transaction Success Message to Android App. Display Success Message in Android Model, View and Controller (MVC) Architecture. The Application is implemented in form of MVC architecture.MVC stands for Model View and Controller. It is a design pattern that separates the business logic, presentation logic and data.

- 1.Controller acts as an interface between View and Model. Controller intercepts all the incoming requests.
2. Model represents the state of the application i.e. data. It can also have business logic.
3. View represents the presentation i.e. UI (User Interface).

#### V.CONCLUSION

The web application is developed to support integration into the cloud or an enterprise system. As in the vehicle toll payment application the number of devices can be enormous, the scalability of the application is supported and represents a vital role. Besides the fact that this system is easy to use for travellers as well as for companies engaged in the highway management, advantages of such system could be multiple in other segments of service as well. The information contained in the database can be used to easily create reports about the number of vehicles and the category of vehicles that pass through the system of payment per day. In addition, it can be easy at any time to retrieve the data on the amount of money that is on daily or any other period paid at the cash register. This approach opens multiple possibilities because additional benefits in systems with toll can be introduced. New possibilities can exist in the form



of loyalty program for travellers who frequently use certain segments of the road, in order to attract as many passengers to use precisely this route. These programs may provide discounts on tolls, free refreshments at rest stops along the road, integrate with other products (e.g. vacations, traveling agencies) in order to use specific routes with such kind of payment, etc. Apart from paying tolls system, such a system could be applicable to many other systems, such as systems for parking payment, parking garage payment, or any transaction involving some of IoT devices that can communicate with the central system.

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