Driving License Management System

Management Information Systems

CO3252

(Mini – Project)

Department of Computer Engineering

Group 01

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Abstract

For the project we decided to implement a working solution for one of the major issues in our country. That is the ill-treatment that take place in our motor traffic department. One has to wait endlessly in order to get his/her driver's licensing or renew his/her driver license and so on it is no secret that the existing manual system is time consuming and arduous. It is prone to many man-made errors both intentionally and unintentionally, which could be unnecessary delays in attending to customers due to the manual processing of information and delays in going through helps of files in their achievement to get necessary information that will aid in present information processing. It's not customer friendly in any aspect and is vulnerable to many man-made errors both intentionally and unintentionally, which could lead to unnecessary delays in attending to customers due to the manual processing of information and delays in going through heaps of personal files to get necessary information. Hence, the need of an automated Driver's License Management System (DLMS) existed.

Therefore, our main goal was to automate the process of issuing a driver's license and to facilitate the flow of information within the department of motor traffic. Our main objective was to implement DLMS in a way that it can ease functions such as New License Registration, License Renewal, Payments, Document Analysis, Document Validation, etc. and to act as a platform where customers could connect with Driving schools.

Agile methodology was used to develop this project. Therefore, regular feedback sessions were held to discuss the status of each members assigned task. This helped us to maintain a continuous collaboration with each member even though we weren't physically present in the same location. Also, maintaining a good rapport helped us to make more effective changes to our initial plan to make our project more beneficial for its users.

By following these principles, the entire team became accountable for the project development and its status.

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Chapter 1 - Introduction

DLMS is an online **D**riving **L**icense **M**anagement **S**ystem designed for the use of Department of Motor Traffic, Sri Lanka. The preliminary intend of **DLMS** is to automate the process of issuing drivers' license and to facilitate the flow of information within the department.

This system can make the basic operations of issuing driving license more efficient, provide fast response to users and store and retrieve information accurately. Some of the objectives of the system are:

- Ensure data integrity and security
- Less manpower
- Generate accurate reports
- Accurate handling in multiple and multitype data
- Ease basic functions relates to the process of issuing driver's license

DLMS will reduce the difficulties faced on the manual existing system, with minimum error. The user-friendly aspect of the system will guide its users to complete their tasks.

There are three user levels in DLMS.

1. **Admins** – the staff works under the department of motor traffic will have administrator level access to the system.
2. **Clients** – the customers who comes to the department of motor traffic to get/renew their license.
3. **Driving schools** – the driving schools registered at the department of motor traffic.

Having stated that DLMS facilitate the flow of information within the department, admins can use this system to manage all user records regarding the new license issuing and renewing process.

The general challenges faced by the staff such as inaccuracies in data processed, ineffective, inefficiency in identifying and improper keeping of records, unnecessary delays in attending to customers due to the manual processing of information and delays in going through heap of file in their archive to get necessary information that will aid in present information processing is eliminated by DLMS.

They are able to validate user applications (this involves validating user photo, copy of the birth certificate, copy of the NIC, users' medical certificates and copy of current driver's license – if any) and inform the user about the current progress of the application. They can also, schedule and inform user about written and practical exams.

DLMS also provides a paying portal so the user can easily make any required payments such as exam registration fee, exam re-sit fee, etc.

During the process of issuing a driver's license there are certain documents generated by the department employees. DLMS is capable of easing the step by generating written and practical exam slips and learners permits (temporarily driver's license). Finally, they can also inform the user when their license is ready.

It is no secret that Motor Traffic Department forms a big part of corruption in our country. Scrapping RDA would be a move against corruption as well. The officers issue licenses without having a thorough check once they are bribed.

DLMS minimizes the chances of customers meeting department officers. Therefore, DLMS act as an initiative towards reducing corruption in state departments.

Having stated that DLMS act as a platform where customers could connect with driving schools, admins can register driving schools and add them to the data base. Once the account has been created driving schools can inform the customers about their training programs and packages, make schedules for registered customers and inform them.

Admins can also manipulate user accounts of driving schools – edit and delete.

DLMS also provides a paying portal for the driving schools so the users can make any required payments to register for any of the available packages of any driving school per their choice.

Each time when the users (clients) make payments he/she will receive a confirmation email to their provided email accounts.

Having this platform benefits the driving schools immensely to increase their customer base. Users (customers) can also complete many tasks with the aid of DLMS without physically visiting those locations wasting an unnecessary amount of time.

This means that the user will only have to visit the state office is to sit for the written exam, practical exam and to collect his/her driver's license.

Although the scope of the project is limited to the work process of department of motor traffic and its related agencies, DLMS maintains a database that contains details about majority of the citizens.

Hence, this can be used in such scenarios where government need to retrieve information about citizens.

Followings are the technologies used to implement DLMS:

DLMS is developed using PHP Hypertext Preprocessor (PHP), Structure Query Language (SQL), Bootstrap, JavaScript, JQuery, Stripe API is used to handle payments and MySQL database drive is used to ensure data integrity and security of the system instead of using MySQL database drive as MySQL has a prevention mechanism for SQL Injection attacks.

Chapter 2 – Problem Specification

2.1 Problem Definition

The existing manual system is time consuming and arduous. It is not customer friendly in any aspect. Obtaining a single document from RMV will take more than 2-3 hours. Customers have to move from one counter to another after standing in ques for hours. This process is so tedious and tiresome for customers. Sometimes customers will be victims of unhelpful shrug offs.

Current licensing process is disadvantageous for employees as well as for customers.

Manual document filing takes up lot of space and the documents are prone to misplaced or get damaged. Losing a single document in the licensing process will cause a severe damage to the Department of motor traffic.

Due to large number of files, Employees take a huge amount of time to hunt down information as well as to organize and store. This can cause annoyance for customers as well as for employees. Their productivity is lowered by the manual licensing process since they have to spend excessive time with dealing paper works.

Lack of security for user documents is another problem in the manual licensing process. Customers expect their information to be secured once they submit the documents to RMV. A cabinet filled with files is way easier to access than a system which requires a password and credentials to get into.

Cost of Office supplies is another difficulty. Even though this looks like an insignificant problem, overtime it cost a lot of money. It is no secret that Motor Traffic Department forms a big part of corruption in our country. The officers issue licenses without having a thorough check once they are bribed.

Currently there are no user interacting online Driving License Management System in Sri Lanka that facilitate each function in the process.

The aim is to implement the DLMS in such way that it can ease functions such as New License Registration, License Renewal, Payments, Document Analysis, Document Validation, etc. It will reduce considerably the difficulties faced on existing system, with minimum error and difficulties.

Following features of the system will address above mentioned problems,

2.2 Solutions From DLMS

2.2.1 New License Application Portal

- DLMS allow users to register for new license and submit their documents to Department of Motor Traffic and it will not take more than few minutes. Users can eliminate the difficulty of waiting in queues for hours and moving from one counter to another.
- DLMS prevent users from being victims of unhelpful shrug offs. System gives a clear insight about the required documents; thus, the process is much simpler and easy to follow.
- Users can check the status of the application and get their exams scheduled through the system without physically vising to RMV. This reduce the time wastage and the users are not required to be a part of the tedious process which takes places place in the manual system.
- Users will be notified through the system once the license is ready.
- The user has to visit to RMV only to attend the exams and to collect the license.
- DLMS can improve the user satisfaction.

2.2.2 License Renewal Portal

- All documents relevant for license renewal can also be submitted through the system without wasting hours in RMV.
- Users can check the status of the application and they will be notified once the license is renewed.
- So, the user has to visit to RMV only to the collect the renewed license.
- The tiresome process involved in license renewal can eliminated through DLMS.

2.2.3 Driving School (Learners) Management

- DLMS allow new license applicants to easily register with a driving school.
- Applicant can check out the packages of each driving school and select the one that he/she prefer.

- User does not have to visit each driving school to get information he/she can easily fulfill this need through the system.
- Driving school employees can also use this system to their benefit.
- This reduces document filing need of driving schools.
- Driving school employees can register users and schedule training sessions without much involving paperwork.

2.2.4 Report Generation

- Reports can be generated in both PDF and Excel formats.
- Employees have the opportunity of generating reports based on the desired time frame.
- This eliminates the need of document filing.

In addition to above methods, the system addresses the problems that employee faces as follows,

- Employees can provide faster response to customers through the system without going through the tedious paperwork. Manual document filing is not required at all because all the records are stored in the system and the employees can generate reports based on the desired time frame.
- This system can improve the productivity of employees and reduce the corruption. Since all records are stored in the system, the higher authorities can detect corruption by examining the records and the employees are not given the opportunity to alter user submitted documents or entered data in the system.
- DLMS address the problem of security too. Only the users with credentials can access the system. Thus, it reduces the risk of data falling into wrong hands. Cost of office supplies is also reduced through DLMS.

The preliminary intend of DLMS is to automate the process of issuing driving license and to facilitate the flow of information within the department. This system can make the basic operations of issuing/renewing driving license more efficient, provide fast response to users and store and retrieve information accurately.

Chapter 3 – Design Methodology

3.1 Requirements

One of our aim was to ease the functions such as New License Registration, License Renewal, Payments, Document Analysis, Document Validation, etc. as it will reduce considerably the difficulties faced on existing system, with minimum error and difficulties. As this system is a replacement for manual system, it must contain all the functions that exists in the manual system. In addition to that more features were added according to the requirements. Therefore, as the first step user levels that required for the system were identified as User, Administrator and Learners (Driving School). Then the requirements for each user level was configured as mentioned in the below table.

Table 3.1: List of Requirements

Level	Requirements
User	Registration, Login, Password Recovery, Register for New License process, Register for Renew License process, Medical and Other required documents upload, Payments required, Refer online study materials (model papers), Date Scheduling for Written Exam, Date Re-scheduling for Written Exam (if 1st attempt was failed), Obtaining temporary license as a pdf, Date Scheduling for the trial, Date Re-scheduling for the practical exam, Date Re-scheduling for the practical exam, Register for learners, Notify when license is ready, Logout
Administrator	Login, Upload model papers, Manage payments, Manipulate user account (delete and edit), Document analysis and validation, Schedule written exam dates and practical exam dates, Re-schedule written exam dates and practical exam dates, Enter the results of written and practical exams, Notify users (about the current state of the license), Manage dashboard, Mange learners accounts (Add, Delete), Report generation, Issuing temporary license, Logout
Learner	Login, Registration, Retrieve registered users list, Schedule timetable for registered users

3.2 Methodology

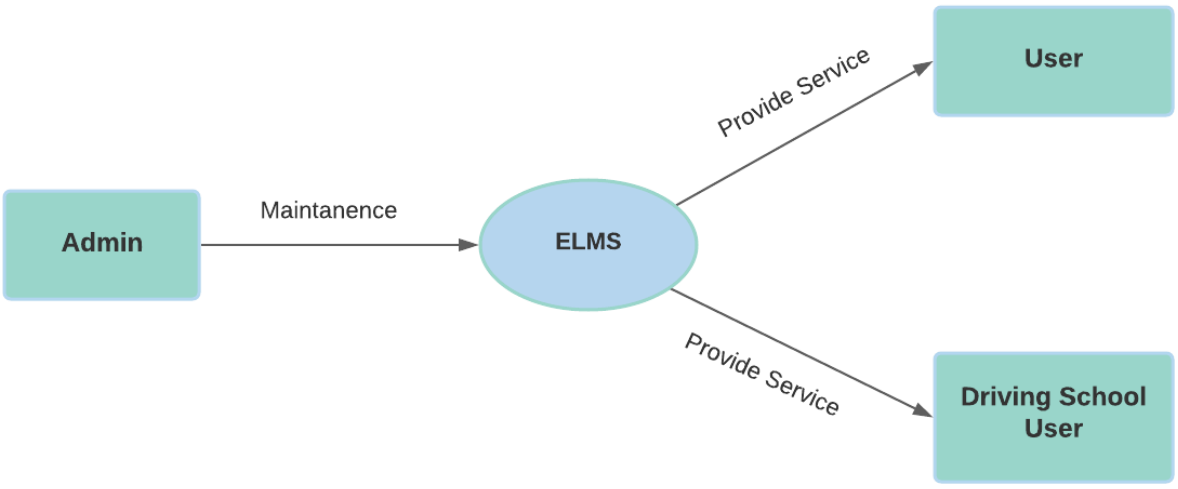

Figure 3.2.1: Main user levels

As mentioned above there are 3 main user levels in the system and for those 3 levels all the requirements that mentioned above can be done using a connection with a database as all the information must be stored securely. Thus, a web application was designed for that purpose named as DLMS to handle all the requirements by connecting with a database which, mainly depend on main database operations such as insert, update, delete and view. When designing the web application for the 3 user levels it was essential to recognize the relations between each level.

3.2.1 User Level

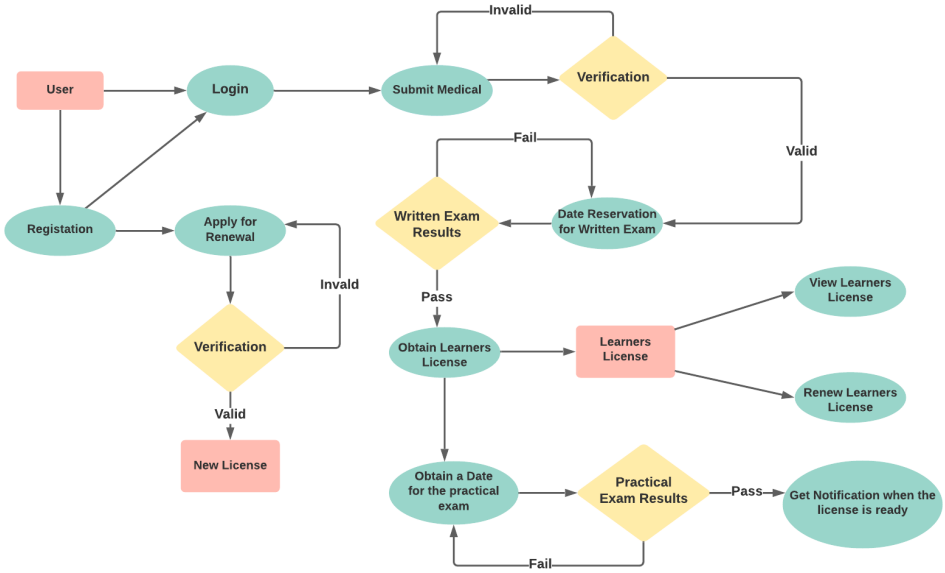

Figure 3.2.2: Flow diagram of User level

To use this system, as the first step a user should create an account in the main registration page. Then he/she will be asked to select whether the account is for New license or Renew license. If user selects Renew License option then the user is asked to submit a medical as a pdf, a copy of previous license as a pdf and a clear photo of a user for validation and an administrator will check those and inform the user through the account (in the user dashboard) whether they are valid or not and notify the user a date to collect the renewed license from their main office if all the documents are verified by the admin. If one of the documents is not valid then user is asked to send only the rejected document through the system. This will save the transportation cost as well as time of the user when compared to manual existing system.

If user selects New license option, then he/she will be directed to the dashboard which created for new license user. Then to apply new license he/she will be asked to upload several documents (stated as medical in Figure 3.2) which are the medical certified from the nearby hospital (which take medicals for license appliers) as a pdf, NIC copy as a pdf, birth certificate as a pdf and a clear photo of the user for validation as well as a form containing user details and applying vehicle types and an administrator will check and inform the user through his/her account whether the all documents are valid or not as above mentioned process. If one of it or more than one of them are rejected, then user can upload the documents which were rejected by the admin. In addition to that admin will mention for the rejection of a document if any of them are not valid so that user can easily understand the issue. Once all are valid, user is asked to do the payment required for new license and it can be paid through online system. After that, an administrator will be given a date for the user for written exam and user will be informed through his/her account. In addition to that administrators will upload some model papers with answers in main 3 languages (Sinhala, Tamil and English) to the user account which will help users to pass the exam easily. A pdf containing all the details of the written exam will be generated which can download from the user account and they can print it and take it to the physical exam. Once user finished the written exam, they don’t need to stay in there for their results as an administrator will upload their results to the user dashboard where each user can see their result. If the result is Fail an administrator will re-schedule the exam for that user within few days once the required payment for re-sitting for the exam is done and if the result is Pass then, the user can download the generated permit/temporary license as pdf from his/her account which can be printed for the usage. Then the user will be scheduled for the trial/practical exam for the vehicle classes they applied. All the details of the practical exam will be uploaded to the user account as well as a pdf which can be downloaded. They are asked to bring

that to the practical exam which is similar to admission card. In addition to that user can register a for a learners service through his/her account and get a timetable to practice for the practical exam because the system already registered some learners (driving schools) accounts. It will be beneficial for both users as well as learners' services to manage their service. Once user faced to the practical exam their results will be given in there as well as they will be uploaded to the system. If the result is Fail, then an admin will reschedule the user for another date within few days and if the result is Pass then the user will be notified by the admin through his/her account when the license is ready. Then he/she can collect it from the main office. In addition to that user can always contact admin help for any issue raised during the system. As mentioned, the system is user friendly as DLMS will help the user to pass the exam without much difficulty because of the model papers which will be uploaded and it will save user's time and cost which are the main issues exists in the manual system. User doesn't need to go and waste his/her whole day time in main office for license process.

3.2.2 Admin Level

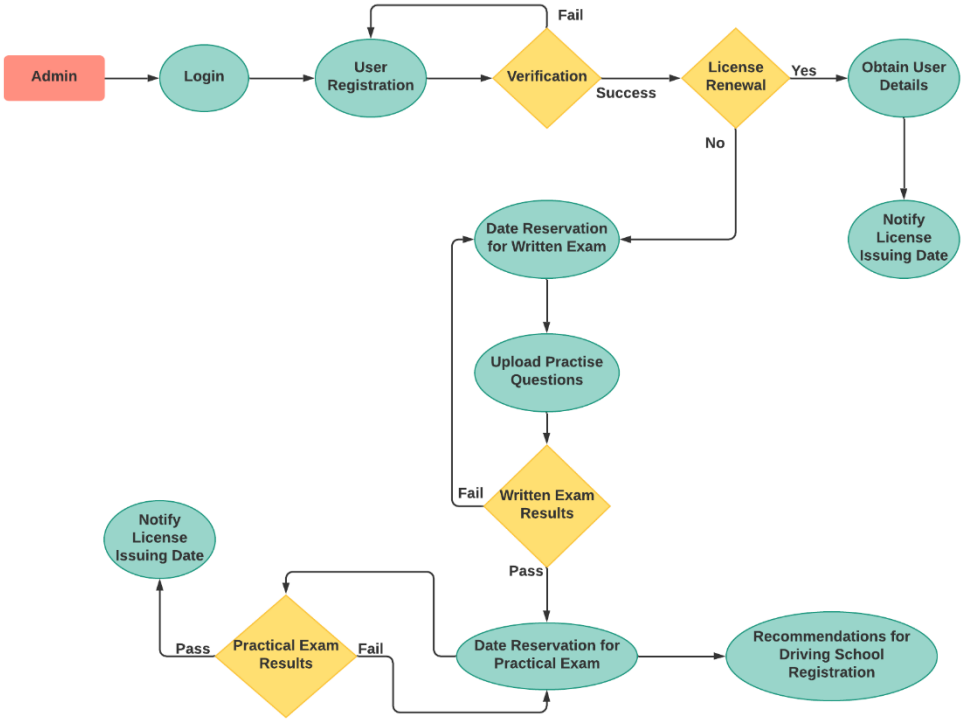

Figure 3.2.3: Flow diagram for Admin Level

Administrators are the main user level which maintain the users and learners of the system. They can simply log in to their account once an account was created and they will be directed to an admin

dashboard page which contains all the essential details such as pending user applications, pending schedules, pending results, etc as shown in Figure 3.4. They can view each and every person in the system and also they will be responsible for registering leaners services to the system. The main job of them are the validating user documents for New or Renew license, uploading model papers for new license users, scheduling exams (written/trial), entering results, generating temporary license, rescheduling exams for the users who failed and notifying the dates to the users to collect their license. The above simply illustrates the flow diagram an admin when a new user registered for the system. They will also handle all payments required for a particular service and can generate reports such as user details who registered for the system, driving schools' details, scheduled details, etc. Thus, administrators can maintain users and learners accounts without any difficulty and still can manage their work even at home in a situation such as covid pandemic.

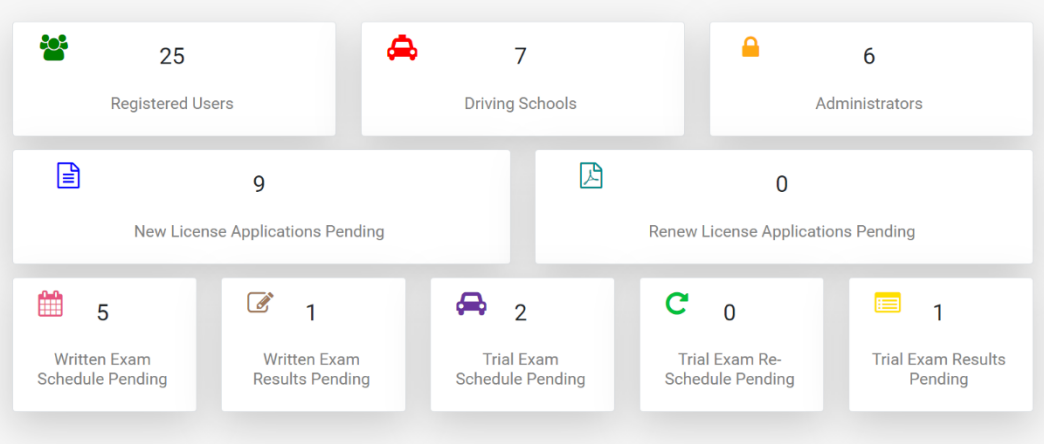

Figure 3.2.4: Admin Dashboard with essential details

3.2.3 Learners Level

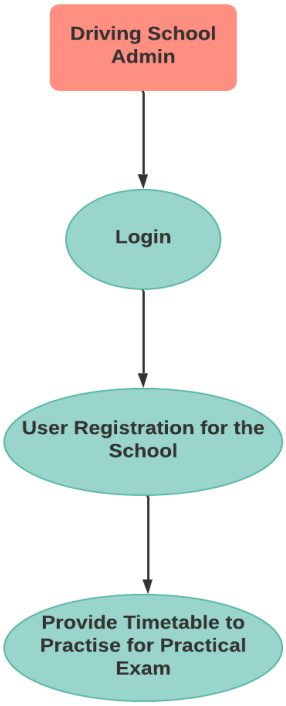

Figure 3.2.5: Flow diagram of Leaners Level

Learners (driving schools) can be registered to the system through administrators as they can add learners. Once an account was created by administrators (including their details, vehicle types, etc.) learners can update their prices for each vehicle type for the course. As mentioned above once the user passed the written text, they can register for a driving school which registered in the system if they are willing. Learners can view the registered users and can give the schedules for the driving course. All the payments can be done through online and the required documents also can be uploaded through the system.

Thus, as mentioned above DLSM offer many benefits for users and it will help to continue some kind of work in a pandemic era such as present in today.

Chapter 4 - Implementation

It is common that many mistakes can be happened during this kind of a project. As DLMS is a web application the main issue raised during the project was some web pages were not responsive after the implementation. It is essential that in a web application all the web pages should be responsive and user friendly. Therefore, after implementing each and every web page, all were checked again and made them responsive.

At the beginning of our application, an online quiz as the written exam which exists in the manual system was decided to add but rejected after some discussions because it cannot be 100% accurate as anyone can face for the online quiz. The intention was to continue that function from DLMS for any situation such as covid pandemic and due to transport issues as user needs to present in the hall for the physical exam.

Since users from around the country can access to this system, many of them won't be fluent in English language as main language used in the system was English. Thus, it can be a major issue for the users to understand how the system work. As a solution to that Sinhala and Tamil translations were added to the main web page as well as the user interfaces so that users can clearly understand and use the system without much difficulty. Google translation was used for that as a javascript code as follows,

```
<script type="text/javascript" src="//translate.google.com/translate_a/element.js
?cb=googleTranslateElementInit"></script>

      <script type="text/javascript">
        function googleTranslateElementInit() {
          new google.translate.TranslateElement({
            includedLanguages: 'en,si,ta',
            layout: google.translate.TranslateElement.InlineLayout.SIMPLE
          }, 'google_translate_element');
        }
      </script>

      <div id="google_translate_element">Language</div>
```

Figure 4.1: Code for translation

As illustrates in the above figure, googletranslaeElementInit() function was used to translate the whole web application included with English, Sinhala and Tamil by creating an object of google.translate.TranslateElement class by importing link as shown in the top script tag. However, some of the translations were not gave the correct meaning as expected and sometimes it gave translations to some words which was not required. Therefore, to avoid that kind of results translate=”no” was placed in the corresponding tag as figured below.

```
<title translate="no">DLMS-Driving License Management System</title>
```

Figure 4.2: Avoiding some translations

Thus, user documents such as NIC copy as a pdf, birth certificate as a pdf, medical obtained as a pdf and an image couldn’t uploaded to the database using a single form. One reason for that was our system was designed as user friendly such that to re-upload any form (not all 4 documents) which was rejected by admin. Therefore, to archive that those 4 documents were not inserted to the database using single form and four forms were used such that at first user was asked to insert the NIC as a pdf then after uploading it user was directed to next page to upload the birth certificate as a pdf and like wise all four were inserted. Then if an admin rejects one of them, code was generated such that after user was notified that one of the documents were rejected, then he/she will be directed to the form/page which asked to re-upload the rejected document only with properly.

In addition to that during the implementation was, how to store the user documents such as images and pdfs in the database. As a solution for that a code was designed to store those files in the database but it also saved in the server’s local storage which was next problem raised during the implementation as it is not suitable to fill up the server’s local storage while using the database. After some research, the designed code was replaced with another one which can store those files in the database by not filling server’s local storage. To accomplish that in the database relations, file attribute type was defined as ‘longblob’ rather than a string value which results to fill the server’s local storage. The code for inserting file types for the database is as follows,

```
$filename = $_FILES['file']['name'];
 if($filename==null){
   $success=2;
   header("Location: birthCertificate.php?error=none");
 }

 else{

 $tmpname = $_FILES['file']['tmp_name'];
 $file_size = $_FILES['file']['size'];
 $file_type = $_FILES['file']['type'];

 $ext = pathinfo($filename, PATHINFO_EXTENSION);


 $fp      = fopen($tmpname, 'r');
 $content = fread($fp, filesize($tmpname));
 $content = addslashes($content);
 fclose($fp);


 if ($ext == "png" || $ext == "PNG" || $ext == "JPG" || $ext == "jpg" || $ext ==
"jpeg" || $ext == "JPEG"
   || $ext == "pdf" || $ext == "PDF" || $ext == "doc" || $ext == "DOC" || $ext =
= "docx" || $ext == "DOCX") {
   $photo_status='Pending';
   $sql = "UPDATE user_details SET birth_certificate = '$content', bc_status = '
$photo_status' WHERE user_id = '$id';";
   $i = mysqli_query($link, $sql);
```

Figure 4.3: Inserting file types to the database

As illustrates above once user inserts a document to the system, the file name, size and type parameters are configured using ‘pathinfo()’ and ‘fileaize()’ functions and then the code checks whether the user entered file type is valid and if so it will update the user_details relation and place it in the database as a longblob type. The code for retrieve data is as follows,

```
   $query = "SELECT birth_certificate FROM user_details WHERE user_id = $uid";
   $result = mysqli_query($con, $query) or die('Error, query failed');

   list($content) = mysqli_fetch_array($result);
   header("Content-Disposition: inline; filename=$name");
   header("Content-type: $type");
```

Figure 4.4: Retrieving files from database

When displaying the table data in the database, for instance when displaying all users in table form from the user table, it is not suitable to display all of them in one page as the page may gets longer when more users are inserted to that table. Thus, it is tedious for the viewer to view all the names one by one to search one name without searching it. Therefore, to avoid that a javascript library was imported named as ‘datatables’ as shown below code.

```
<script type="text/javascript" src="https://cdn.datatables.net/v/bs4/dt-
1.10.24/r-2.2.7/sc-2.0.3/sp-1.2.2/datatables.min.js"></script>
<script>
    $(document).ready(function() {
        $('#userTable').DataTable();
    });
</script>
```

Figure 4.5: Code for datatables

As shown in above figure, ‘userTable’ was the id given to the table. It contains a framework where the table values can be displayed at once 10/25/50, total data in the table, a pagination including a search bar as shown below.

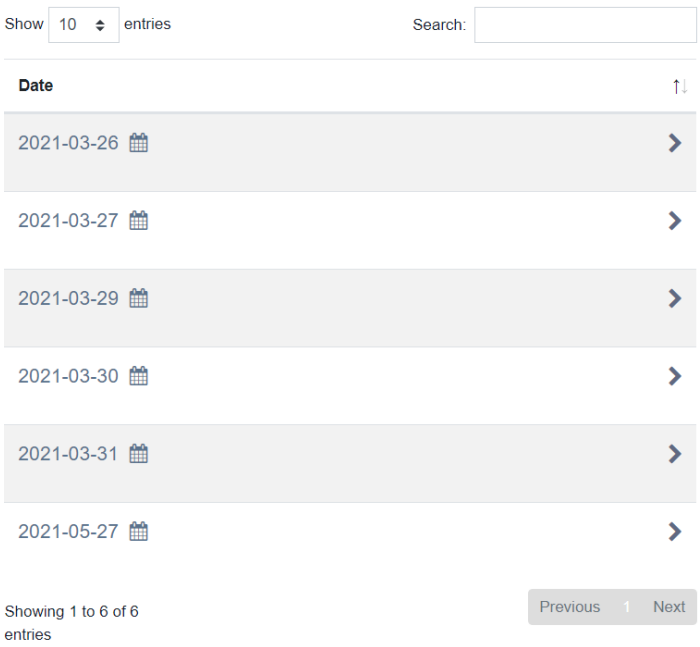

Figure 4.6: Final results after using datatables

Chapter 5 – Results and Evaluation

When the project planning process begins the main intention was to create something useful and unique. Therefore, it was planned to make an web application for license management where the system is not limited to one operation. It was planned to create a system that can ease functions such as New License Registration, License Renewal, Payments, Document Analysis, Document Validation.

The implementation was perfectly done as planned and all the features were implemented without neglecting any part. Therefore, it can be considered as achieving the goals at full extent which means completely, since a web application was developed including not only all the planned features but also some additional features such as Driving school management etc.

Most importantly all these features were added with the compatibility for both mobile and desktop web browsing platforms.

It doesn't matter how good the implementation was done; testing is an essential factor while doing projects. A wide range of testing methodologies or techniques can be used when it comes to test the web applications for their quality and function.

5.1 Functionality Testing

The main goal of functional testing is to make sure that all the functions within a web app are working smoothly without any technical glitches. In a web application, functional testing could cover different things like whether all the links are working properly or not, testing forms in all the pages, validating HTML or CSS. The application was tested several times to ensure all the functions work properly.

In this testing it was checked the database connection and ensured all links in the web pages work properly. Also, the forms used for submitting and/or getting info from the users were also checked and verified they work properly.

This was done multiple times with different data input. The level of accuracy was checked if it was the same every time. Then the application could be considered functionally correct.

5.2 Web UI Testing

When it comes to make the application user-friendly and effective, its user interface should comply with the standards. All colors and images/animations were chosen in a way such that they are matched with the theme. Simple layouts and templates were used throughout the project. These things were considered and tested well.

It was checked whether or not all interaction between the app server and the web server run smoothly. Not only the communication process was tested, but the displaying of error messages as well. Also, in this test it was ensured whether the interruptions by the server and/or by the user are handled properly.

5.3 Compatibility Testing

Compatibility of the web application is one of the most crucial things that should be considered while testing the application. Since the main reason of making a web application is also to be more compatible with all the users. So that it's really important to do a compatibility testing. It will check the web application for browser compatibility, operating system compatibility and mobile browsing.

Browser compatibility was checked by running the application in different browsers such as Chrome, Internet Explorer and Firefox.

In mobile browser compatibility testing it was confirmed that this application displayed correctly across mobile browsers.

In this case the testing was done several times to make sure that the application is compatible with mobile platforms.

Different operating systems display certain app elements differently. This is why it is important to run the compatibility tests with as many operating systems as possible, especially the most popular ones such as Windows, Mac Linux. [2]

5.4 Security Testing

Once the web application is developed, it has to be tested for security. This type of testing includes all kinds of processes to determine the system's weak points and improve them as much as possible.In this phase of testing the expected security goals were identified and planned the test by considering the security needs of each of them.

It was essential to identify and list all potential threats and vulnerabilities. Only the users with login credentials can access the system. All the passwords are stored in the database in the encrypted form.

After all these testing and evaluations, the web application was working properly in a way that provides all the expected outcomes in the planning process. Therefore, it can be considered as a well-executed implementation with a high confidence level of success.

Chapter 6 - Discussion

Driving License Management System (DLMS) was designed for the use of Department of Motor Traffic, Sri Lanka which has strengths as well as weaknesses. The primary propose of it is to automate the process of issuing driving license and to facilitate the flow of information within the department. This system can make the basic operations of issuing driving license more efficient, provide fast response to users and store and retrieve information accurately. Thus, even this system is valuable in situations kind of Covid-19. Another objective of DLMS is it Prioritize customer satisfaction. Thus, web application is completely free and user can easily create an account without any charges and can access to the system without physically visiting to the corresponding office and also can recover the account if the user forgot his/her password. Furthermore, DLMS offer an online payment portal where user can easily pay their required payments which saves users' time as well as costs for transportation where those were the main problems in the manual process. Even user can get the temporary license form without visiting to the office physically. In addition to that, this system gives many advantages to the officers where they can simply access to the web application and continue the work without any disturbance, generate reports based on several sections and can continue their work without meeting users physically. Another strength is that the user can simply register for any learners' service (driving schools) through the system as system allows to create learners accounts through administrator. Thus, system can be used with 3 main languages which are Sinhala, Tamil and English so that user won't face any difficulties because the lack of English knowledge. Apart from those, an online exam was planned to add to the system but due to many reasons that feature was rejected as anyone can face to an online exam and employees cannot verify the user. As a solution for that model papers and answers were supplied to the user (can download through his/her account) when they register for New license process.

In additions to the strengths there are also some weaknesses in DLMS. One of the main weakness is that system can only handle license renewal and new license registration where there are other functions that handles in department of motor traffic. Another major weakness is if the data are mistakenly added to database by an employee then there isn't any method to recover that. In addition to that there are no backup databases to store data in case of a cyber-attack. Thus, user must have a proper and strong internet connection n to access the system. Translation was added to the system to ease the user access to the web application but sometimes some words may give incorrect results when translated.

DLMS can be modified for many future improvements where the main one is to expand this web application for the services of Extension of driving license, conversion of foreign license and Duplicating driving license and charge of particulars in addition to renew license and new license processes [1]. Furthermore, without asking user to upload a photo, using the system a user photo can be captured using some machine learning techniques so that users will be free of difficulties when uploading an image. Thus, keeping a backup database will secure the user data in case of an attack.

Chapter 7 - Conclusion

DLMS is an online Driving License Management System (DLMS) designed for the use of Department of Motor Traffic, Sri Lanka. The preliminary intend of E-license is to automate the process of issuing driving license and to facilitate the flow of information within the department. This system is capable of simplifying the basic operations related to issuing driving license more efficient and in a more user friendly manner. Further provides quick responses to its users and handle data and information accurately. Objectives of this system includes with,

- Ensuring data integrity and security
- Less consumption of manpower
- Well organized data management and generating accurate reports
- Handling multiple details of the users quite accurately.

DLMS will reduce the difficulties faced on the manual conventional system up to a great extent. The user-friendly aspect of the system will guide its users to complete their tasks without any trouble.

It is no secret that Motor Traffic Department forms a big part of corruption in our country. The officers issue licenses out of the expected procedure once they are bribed.

Since DLMS minimizes the chances of customers meeting department officers, bribery and any other means of corruption are at a least level.

There are three user levels in DLMS.

4. **Admins** – the staff works under the department of motor traffic will have administrator level access to the system.
5. **Clients** – the customers who come to the department of motor traffic to get/renew their license.
6. **Driving schools** – the driving schools registered at the department of motor traffic.

Admins can use this system to manage all user records regarding the new license issuing and renewing process. The duties of the admins are greatly simplified through this system and it also overcomes the hardships which they have to come across in handling information systems manually.

Employees can provide faster response to customers through the system without going through the tedious paperwork. Manual document filing is not required at all because all the records are stored in the system and the employees can generate reports based on the desired time frame.

DLMS maintains a database that contains details about majority of the citizens.

Hence, this can be used by the admins in such scenarios where government needs to retrieve information about citizens.

It also provides an online paying portal so the user can easily make any required payments such as charges for new license and for renewals, exam registration fee, exam re-sit fee, etc.

So the customers only have to visit the state office is to sit for the written exam, practical exam and to collect his/her driver's license.

This system benefits the driving schools immensely to increase their customer base. Users (customers) can also complete many tasks with the aid of DLMS without physically visiting those locations wasting an unnecessary amount of time.

So with all the facilities compiled in this system users of this system are surely rewarded with several benefits as mentioned in above points.

Although every user of this system won't be fluent in English language and main language used in the system was English, Sinhala and Tamil translations were added to the main web page as well as in user interfaces so that users can clearly understand and use the system without much difficulty.

When talking about the technologies used in the developing phase DLMS was developed using following tools and technologies.

- Hypertext Preprocessor (PHP)
- Structure Query Language (SQL)
- Cascading Style Sheet (CSS)
- Bootstrap
- JavaScript
- Stripe API (used to handle payments)
- MySQL

The implementation of this system was perfectly done as initially planned and all the features were implemented without neglecting any part.
Most importantly the system was designed with the compatibility for both mobile and desktop web browsing platforms.
Several testing phases such as functionality testing, web UI testing, compatibility testing and security testing were done and ensured all the functions work properly.

Eventually, it can be considered that DLMS achieves all of its goals at full extent providing a quite user friendly system overcoming the unforeseen challenges.

References

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Appendices

Appendix A: Glossary

Definitions, Acronyms and Abbreviations

Term	Definition
DLMS	Driving License Management System
RMV	Registration of Motor Vehicles
Admin/Administrator	Party who ensures that the application operates efficiently.
User	General public
Learners/Driving Schools	Party who guides user to learn driving.
Learners Permit/Temporary License	A restricted license that is given to a person who is learning to drive but has not yet satisfied the perquisite to obtain a driver's license.
PHP	PHP is a general-purpose scripting language especially suited to web development.
HTML	Hypertext Markup Language (HTML) is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript.
CSS	Cascading Style Sheets is the language for describing the presentation of Web pages, including colors, layout, and fonts. It allows one to adapt the presentation to different types of devices, such as large screens, small screens, or printers.
Bootstrap	A free and open source CSS framework for web development.
Stripe API	It is a application program interface which is a service that allows users to accept payments online.

JQuery	A JavaScript library designed to simplify HTML document traversal and manipulation, event handling, animation, Ajax, etc.
MySQL	An open source relational database management system
SQL	Structured Query Language which lets access and manipulate databases.