Court Commission Management System

Final Report

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ABSTRACT

The Court Commission Management System (CCMS) is proposed as a solution to manage the heap of work which has to be faced by Licensed Surveyors & Court Officials in Sri Lanka. The CCMS is designed according to the Model-View-Controller Architecture Pattern & Client-Server Architecture Style. It is designed as a web application using Symfony Framework which is best suited for MVC pattern. Doctrine Library is used as the Object Relational Mapper to integrate with MySQL database and triggers. As the final output, CCMS acts as a tool or an assistant to manage court commissions' daily tasks and reports. Therefore this can be viewed as a great work reliever for hundreds of Licensed Surveyors all over the country.

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1. INTRODUCTION

1.1 BACKGROUND OF THE APPLICATION DOMAIN / PROBLEM

In Sri Lanka, there is a mechanism in the Law to resolve a dispute between two parties regarding their lands which involves a court case and specially the participation of Licensed Surveyors to survey the relevant land. So that a Court Commission is sent from a regionally relevant Court to inform the surveyors about the requirement to survey and prepare a plan for the troubled land via postal mail.

The duty of a licensed surveyor is to study and examine the details of the troubled land and prepare the plan by surveying. It is a process taking a time ranging from several weeks to several months. So it needs to be managed for every event happening in the Court Commission until the required plans and documentation are prepared.

Due to this tedious process, many licensed surveyors experience considerable confusions and stress which leads delays in delivering the survey plans for troubled lands. Therefore this project is about assisting the management of court commissions for licensed surveyors.

1.2 MOTIVATION FOR THE SELECTED SYSTEM DEVELOPMENT

Not only the surveyors and clerks but also the people also have to face for several court days because the surveyors sometimes cannot complete the surveys on time due to number of commissions per a surveyor is high. Therefore, having identified these circumstances, a sophisticated system to manage court commissions is obviously needed.

By developing such a huge system for this type of situation, one can learn many technologies and methodologies about software engineering and project management. Therefore all these things can be viewed as the motivation for the selected system development.

1.3 IMPORTANCE AND MAIN PURPOSE OF THE SYSTEM

CCMS is targeted for two type of users. They are Licensed Surveyors and Court Clerks. Main purpose of the system is to act as an efficient assistant for managing court commission work.

1.4 OVERVIEW

This document provides a well-defined introduction of the Court Commission Management System with its requirements, elaboration, development, testing and deployment.

2. LITERATURE REVIEW

The CCMS is a web application based on MVC architecture pattern. Model is the he lowest level of the pattern which is responsible for maintaining data. View is responsible for displaying all or a portion of the data to the user. Controller is the software code that controls the interactions between the Model and View.

Client-Server architecture style is used for CCMS. Browsers like Firefox, Google Chrome and Internet Explorer (after version 7) can be viewed as clients and they are used by both types of users. Server is where the functionality and database schema & data are stored.

Symfony Framework is used to develop the system using NetBeans IDE. It can be viewed as the leading PHP framework to create websites and web applications. Built on top of the A set of decoupled and reusable components. Symfony conforms to the MVC pattern completely.

MySQL is used as the technology to implement the relational database of the system. The audit system of CCMS is completely based on MySQL TRIGGERS which are automatically triggered when a predefined event occurs in the system.

Doctrine Library is used as the Object-Relational Mapper by integrating in Symfony Framework. It allows the developer to consider the database relations as objects. The whole database schema is created and maintained using Doctrine Annotations and symfony commands.

For security, Biba model in which the lower level objects and users cannot alter the information of higher level objects and users, is used. In the system, Licensed Surveyors are high level users whereas Court Clerks are low level users. Password Hashing is used as a non-cryptographic technique where the real password is never saved in the database. A hash value derived from SHA1() – Secure Hash Algorithm 1 – is saved and when a user tries to login, the system will check if the given username/email exist in the database and if it exists, then the system will compare the hash value of the given password with the stored

hash value. If they are equal, then only the user will be granted access. MySQL Injection is assisted by the doctrine symfony itself by using prepared statements with the help of setParameter(variableName, variableValue) function.

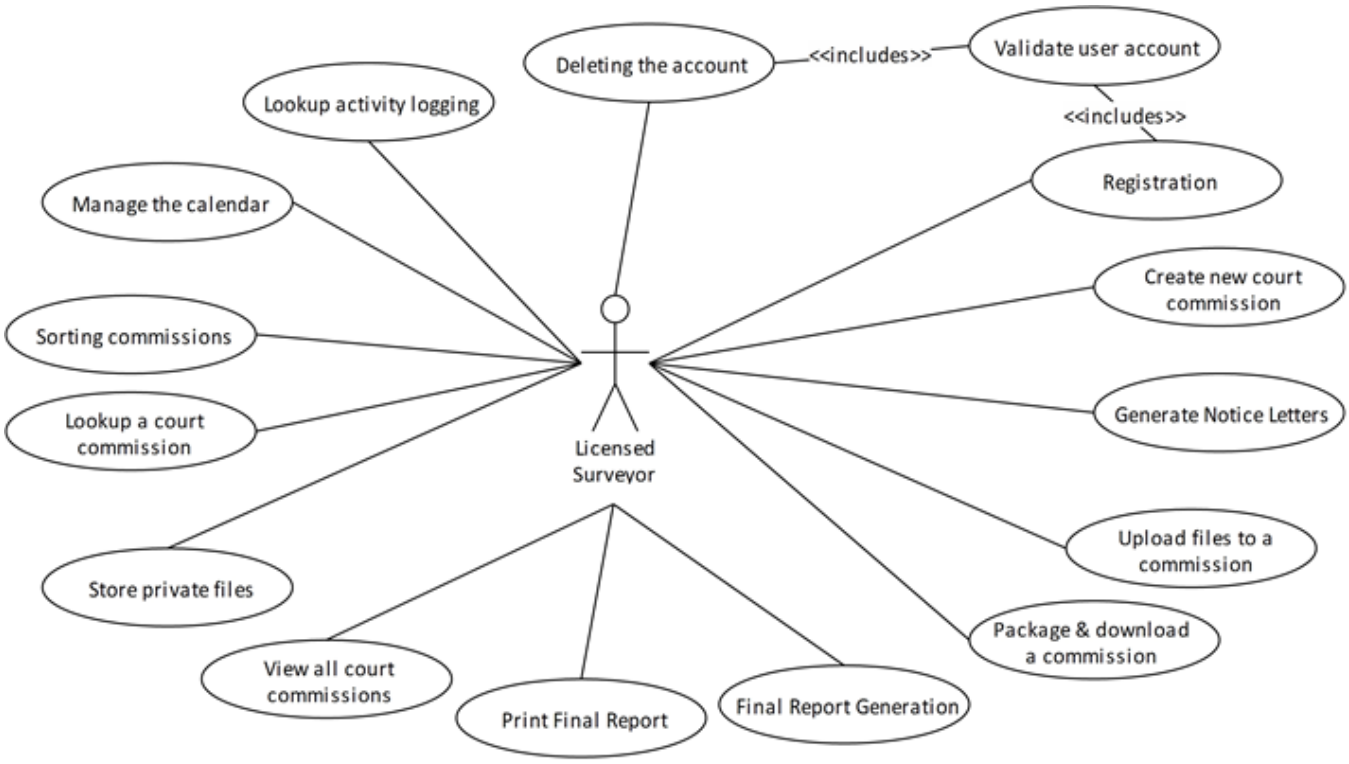
Parsley Validation Library is used for client side validation of user text fields and inputs. Singleton design pattern is used when storing the current user and his/her required details. For that, session object is used to store the current session.

3. SYSTEM MODELS

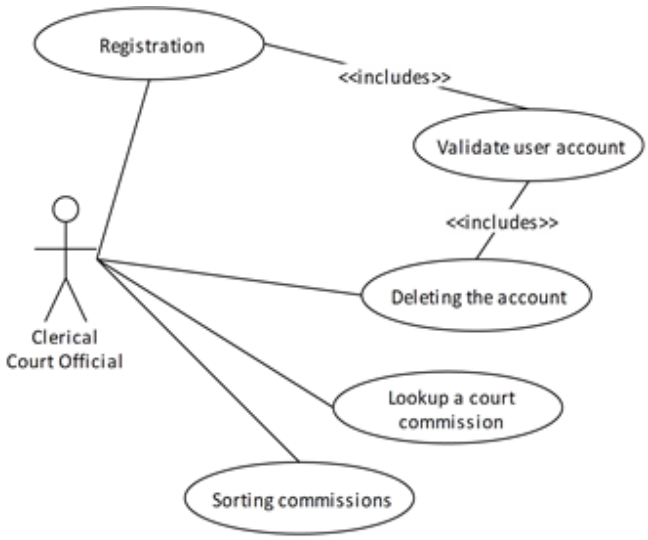
3.1 SYSTEM REQUIREMENTS

Functional Requirements of the system are creating detailed accounts for users, user settings functionality, creating court commissions, editing them, making a report and a complete audit of the system to view what the user has done.
Non-functional requirements of the system are usability, reliability, performance, and supportability and security.

Following use case diagrams show the use cases involved with each user.



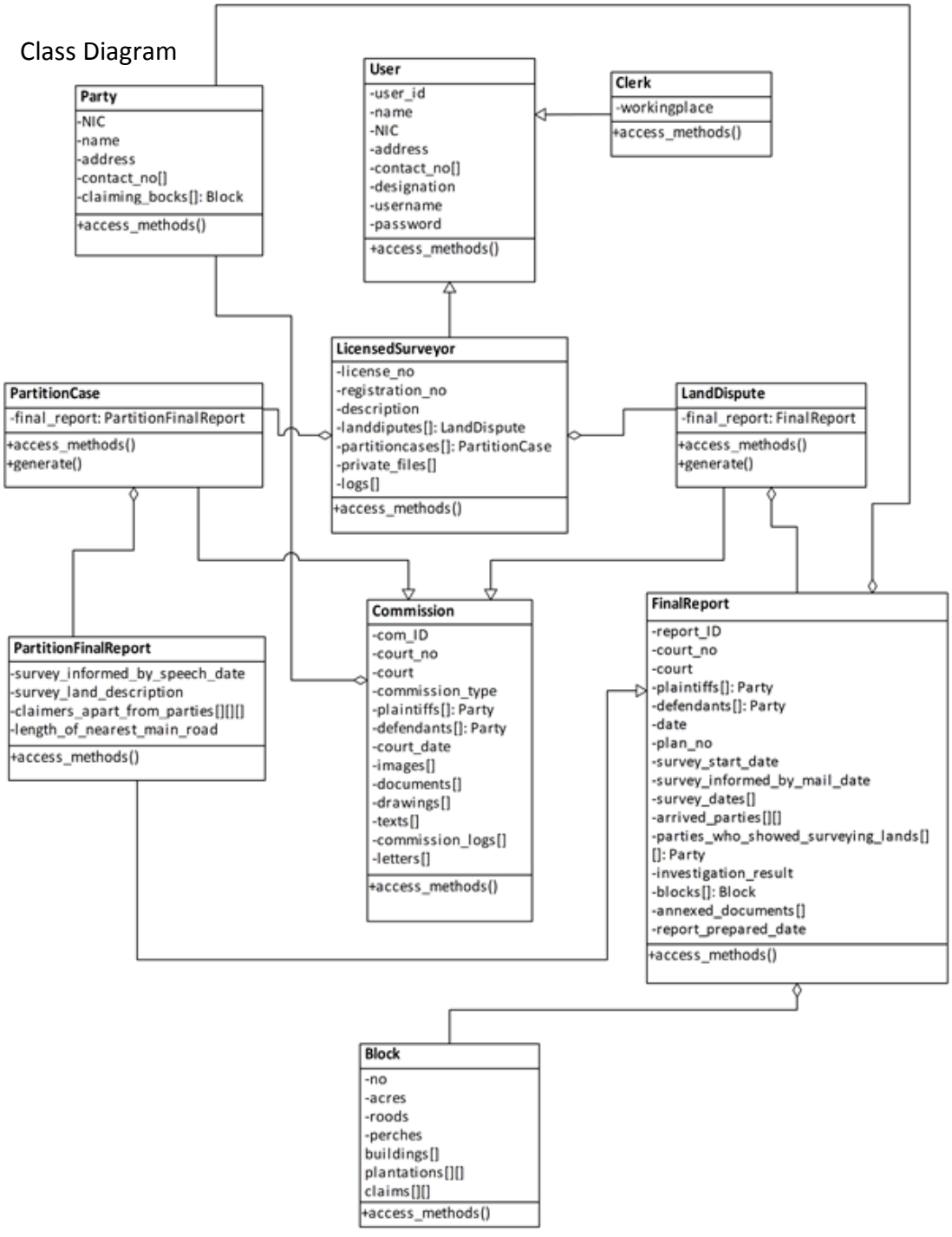
Use case diagram for Licensed Surveyor



Use case diagram for Clerical Court Official

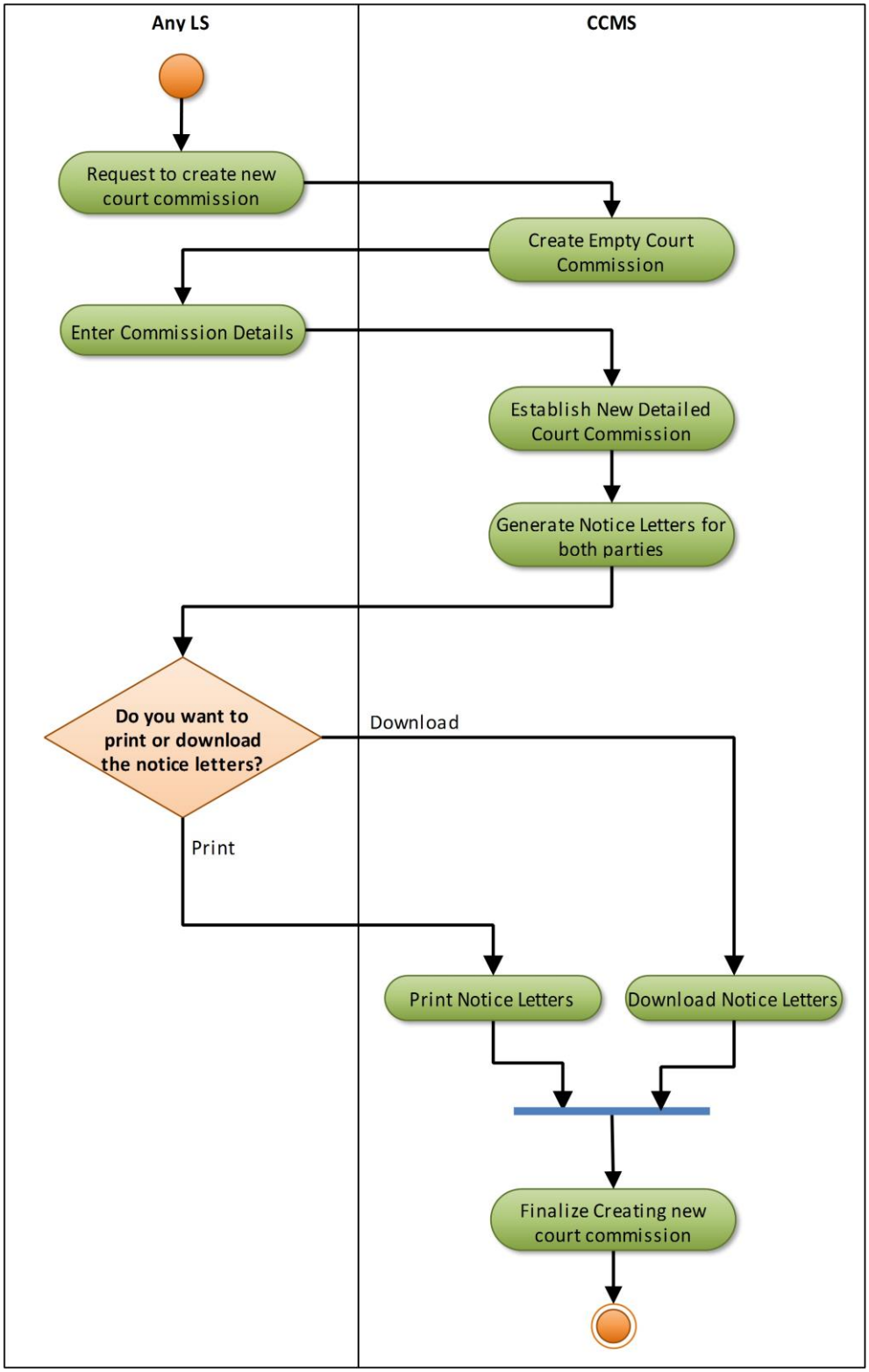
3.2 SYSTEM DESIGN

3.2.1 Class Diagram

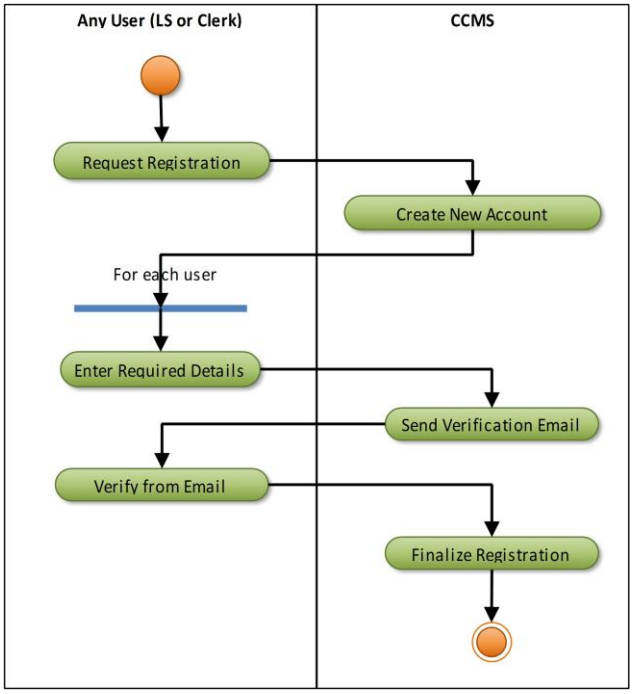


3.2.2 Activity Diagrams

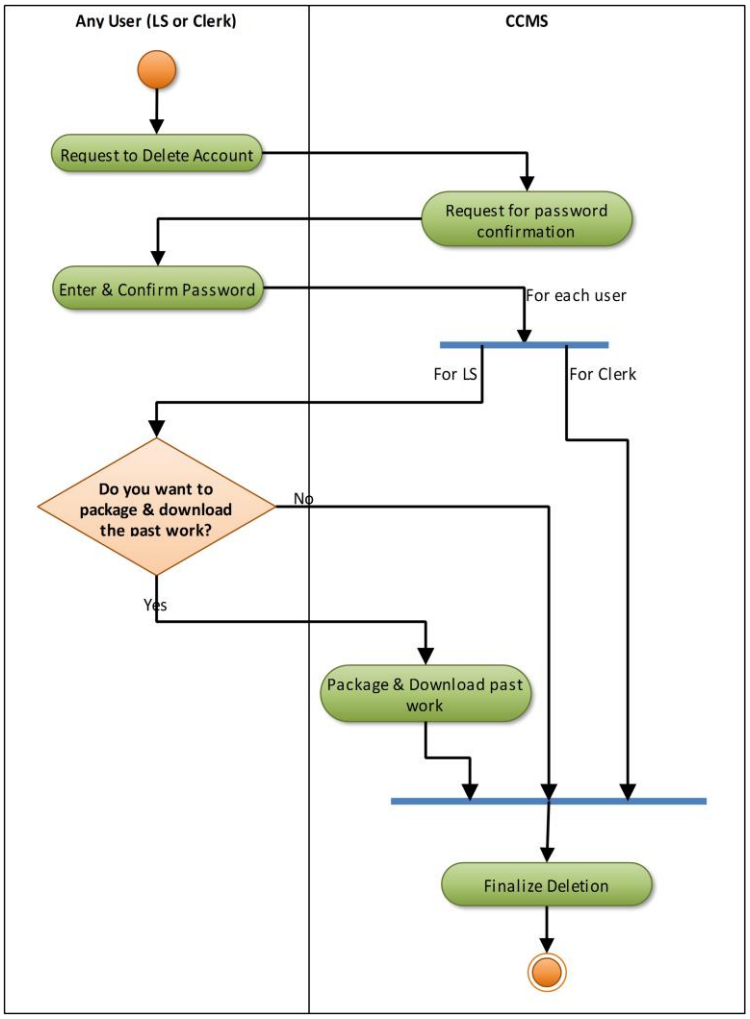
a) Creating Court Commission



b) User Registration

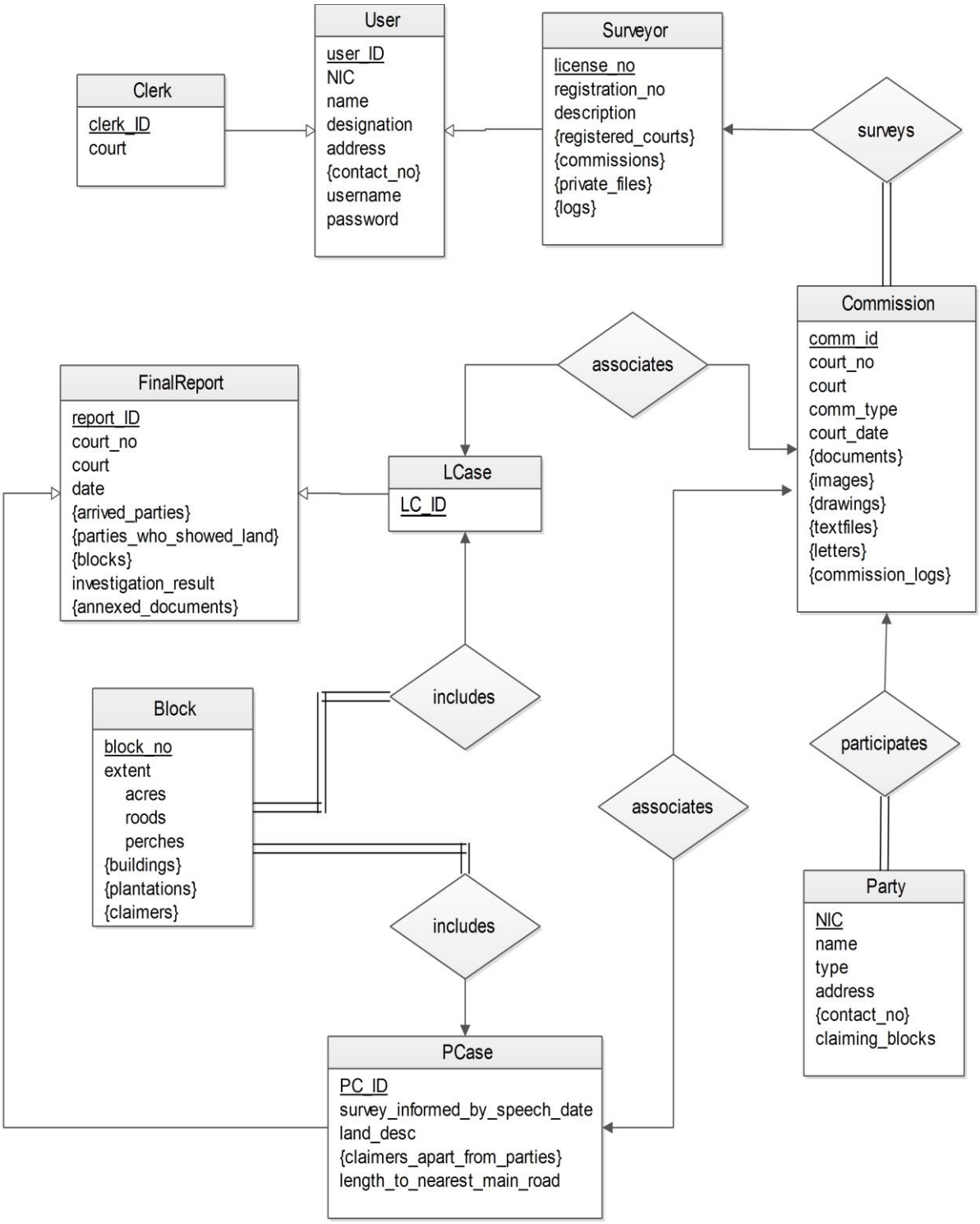


c) Account Deletion



3.3 DATABASE DESIGN

The database is designed according to the above ER diagram and normalized to 3rd Normal Form.



4. SYSTEM IMPLEMENTATION

4.1 IMPLEMENTATION PROCEDURE

The CCMS is a web application based on MVC architecture pattern and Client-Server architecture style. Browsers like Firefox, Google Chrome and Internet Explorer (after version 7) can be used to access the application from anywhere.

Symfony Framework is used to develop the system using NetBeans IDE and it conforms to the MVC pattern completely. MySQL is used to implement the relational database of the system. The audit system of CCMS is completely based on MySQL TRIGGERS which are automatically triggered when a predefined event occurs in the system. The database relations are created using doctrine annotations and symfony commands. Doctrine Library is used as the Object-Relational Mapper. It allows the developer to consider the database relations as objects.

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Parsley Validation Library is used for client side validation of user text fields and inputs. Singleton design pattern is used when storing the current user and his/her required details. For that, session object is used to store the current session. Bootstrap libraries are used for user interface creation and to gain the responsiveness. JavaScript coding is done to have client side functionalities like adding multiple contact numbers, licenses, plaintiffs and defendants.

4.2 MATERIALS

Several actual court commissions are used to fill up the database tables so that the system can be iteratively implemented during the development and testing. These court commissions contain huge sentences and paragraphs so, a few tables had to be designed to store string values from 500 to 1000 characters. For storing files, the system use BLOB data type where the file is stored in database as .bin file.

4.3 THE ALGORITHM

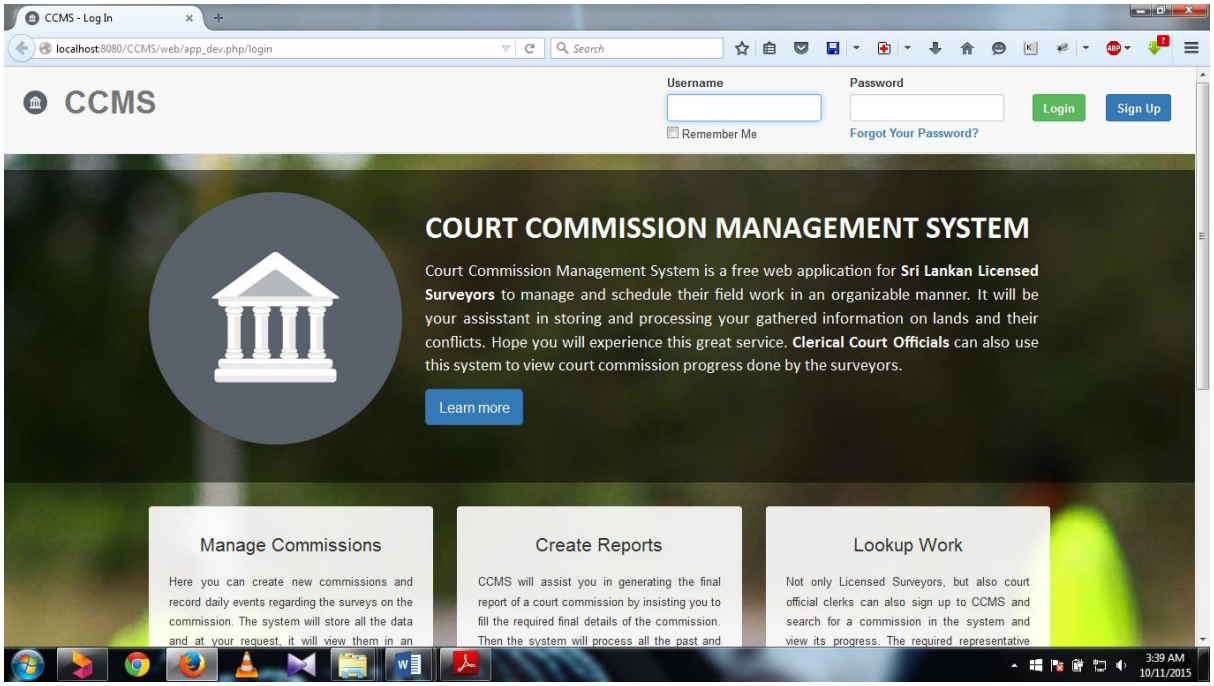
User Login

```
If (user login request is POST) {
        If (given username exists in the system) {
                storedHashValue ← getPassword(username)
                givenHashValue ← sha1(given password)
                if (storedHashValue == givenHashValue) {
                        allow access
                } else {
                        message "Password is incorrect"
                }
        } else {
                message "Username is invalid"
        }
} else {
        message "System error"
}
```

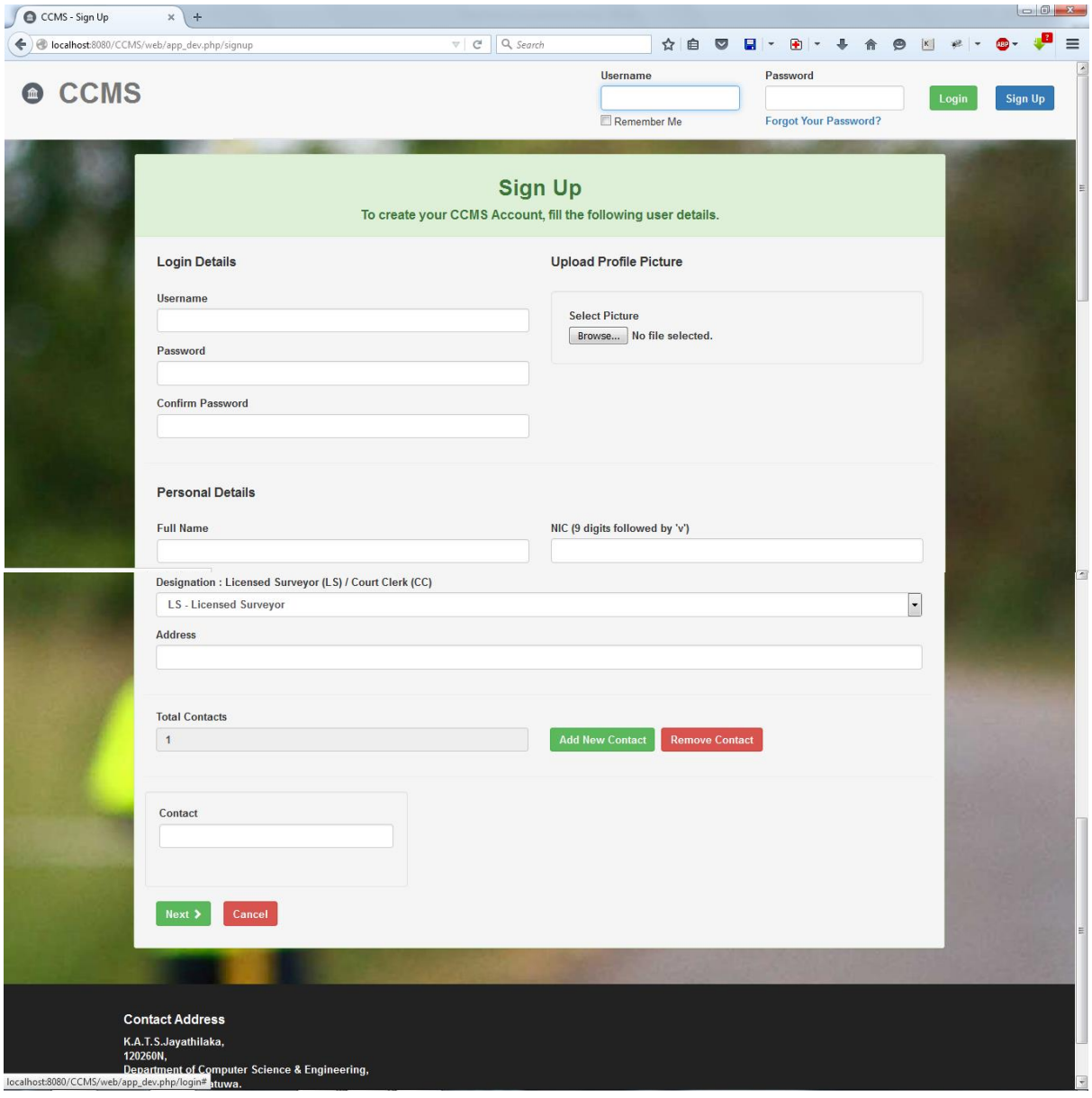
File Upload

```
If (filetype is in allowedTypes[] ) {
        If (filesize <= allowed size) {
                Store file in database
        } else {
                Message "File is large"
        }
} else {
        Message "invalid file type."
}
```

4.4 MAIN INTERFACES

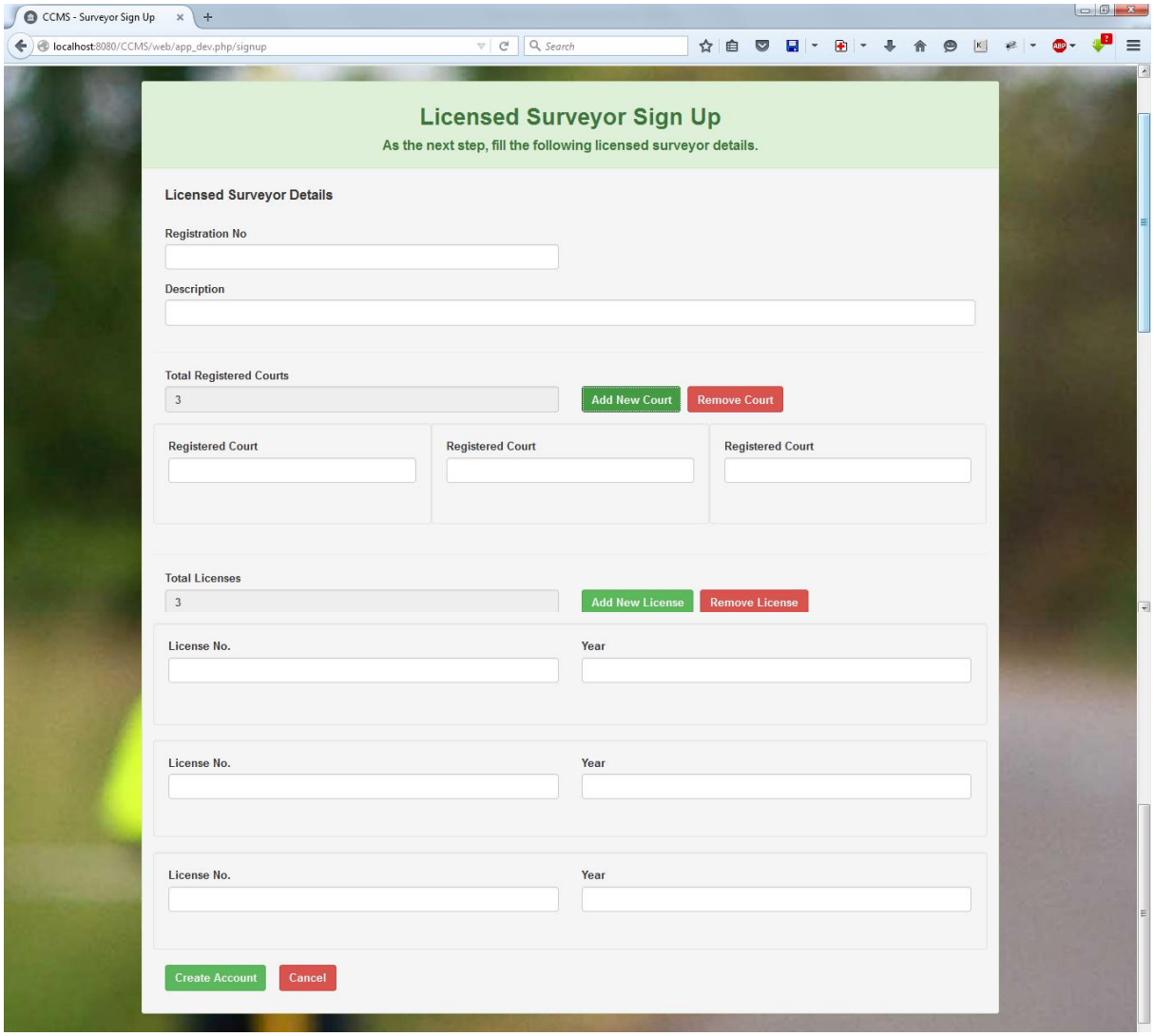


This is the login interface and homepage



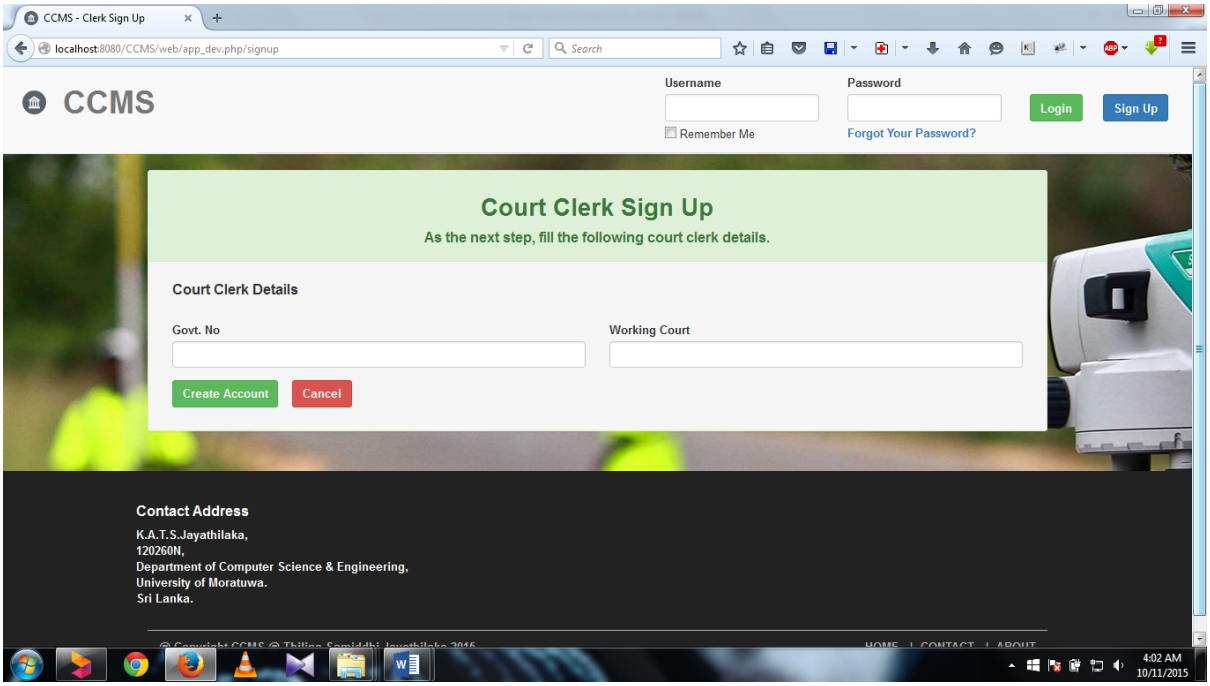
This is signup form for user details.

By clicking 'Add New Contact' button, user can add many contacts he wants.

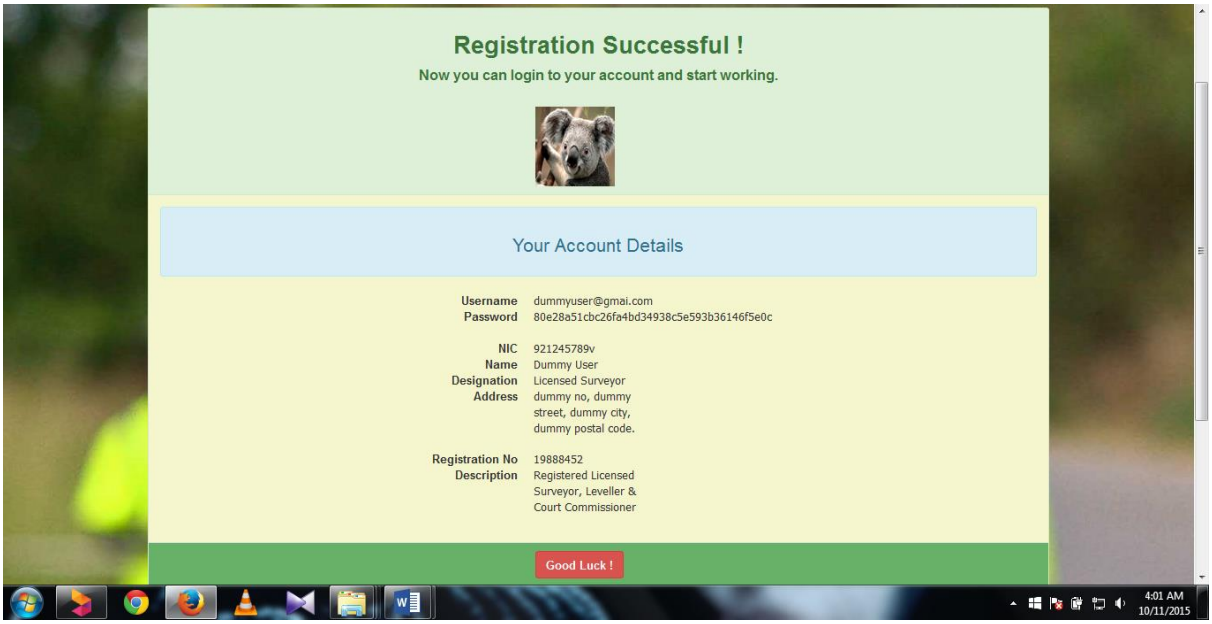


This is signup form for LS details. It appears after entering User details

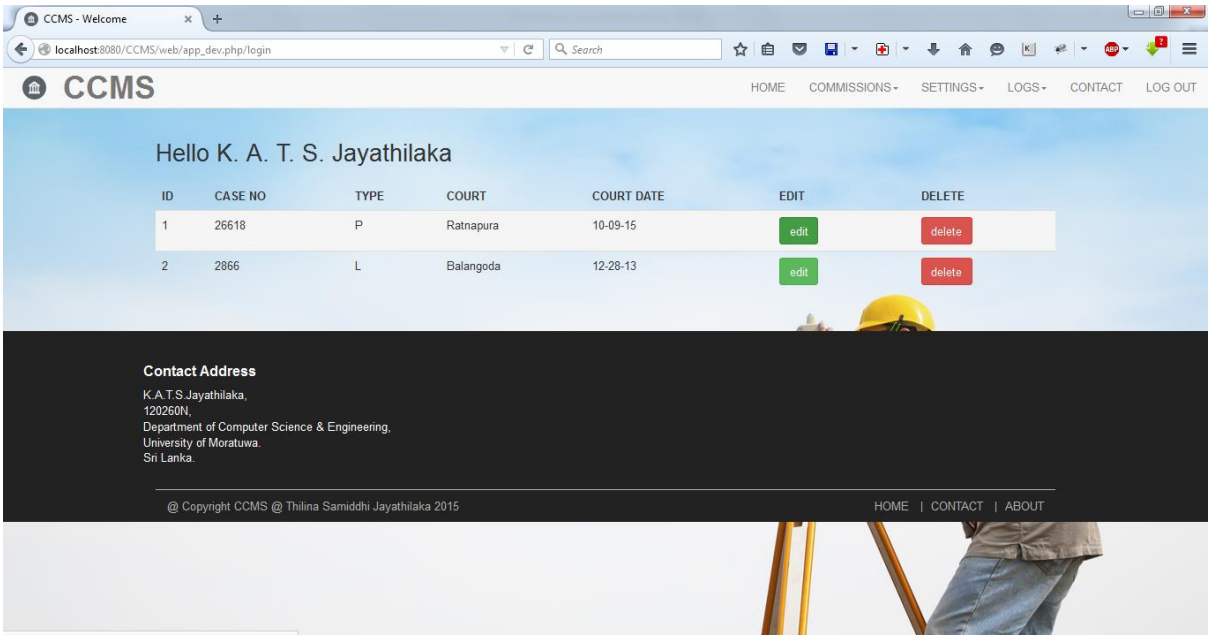
By clicking 'Add New Court' and 'Add New License' buttons, LS can add many courts and licenses he wants.



This is signup form for CC details. It appears after entering User details

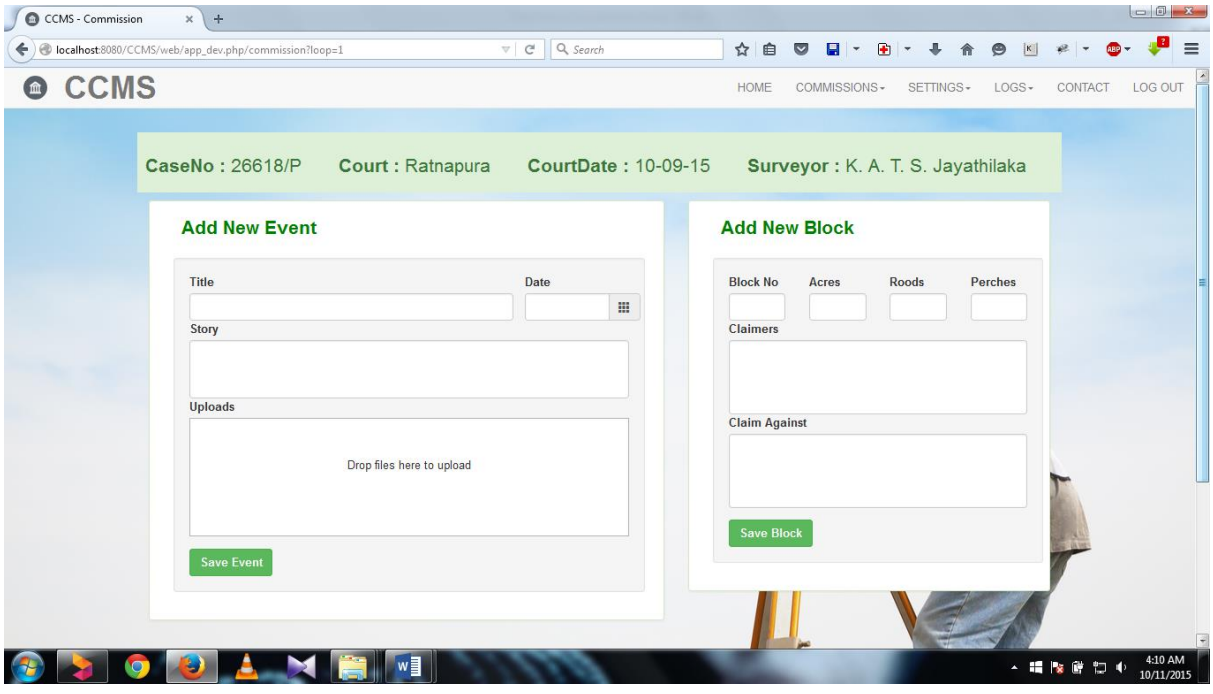


Acknowledge ment Page for successful user registration



Account Homepage for a Licensed Surveyor.

Currently working commissions are in the given table. LS can edit or delete them.

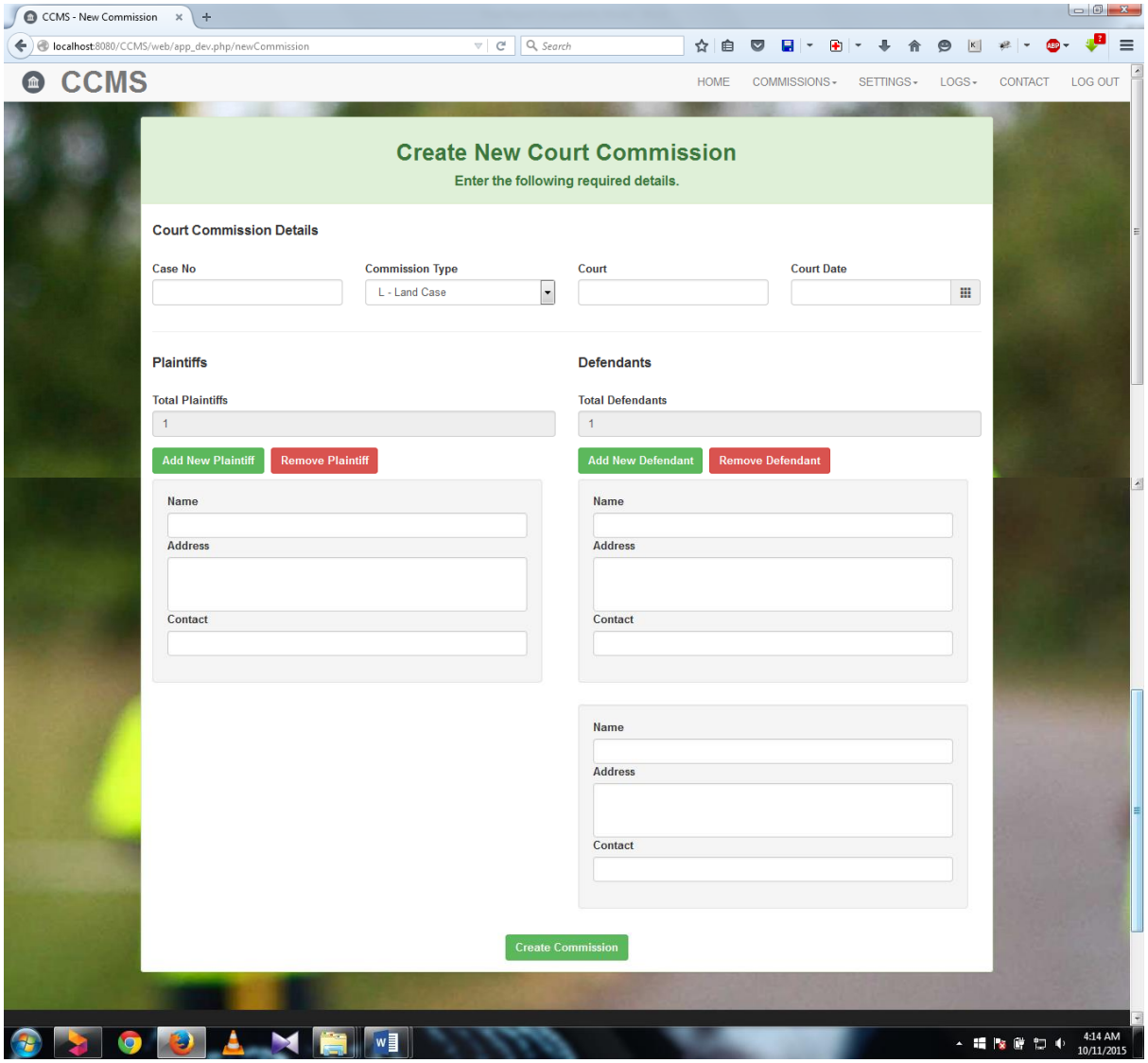


Editing a court commission is done here.

LS can add a new event to the Commission.

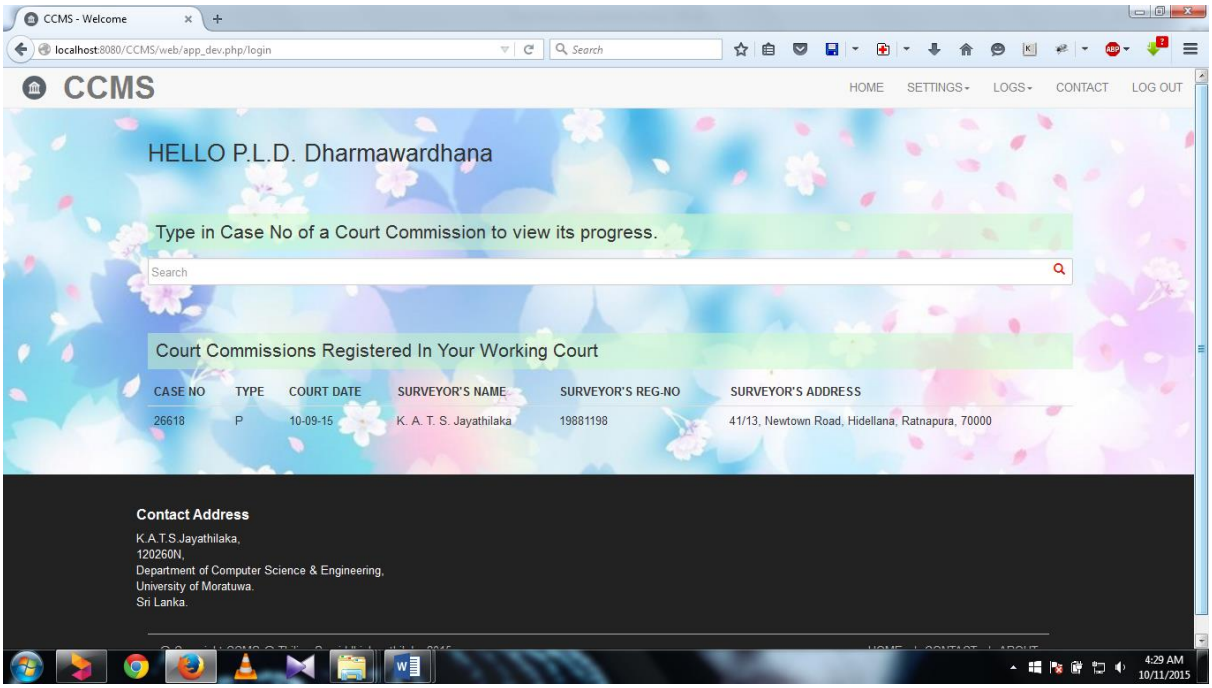
Or when he finished surveying one block of the land, he can enter a new block.

Required files (maps, text files) can also be uploaded.



Creating a new court commission.

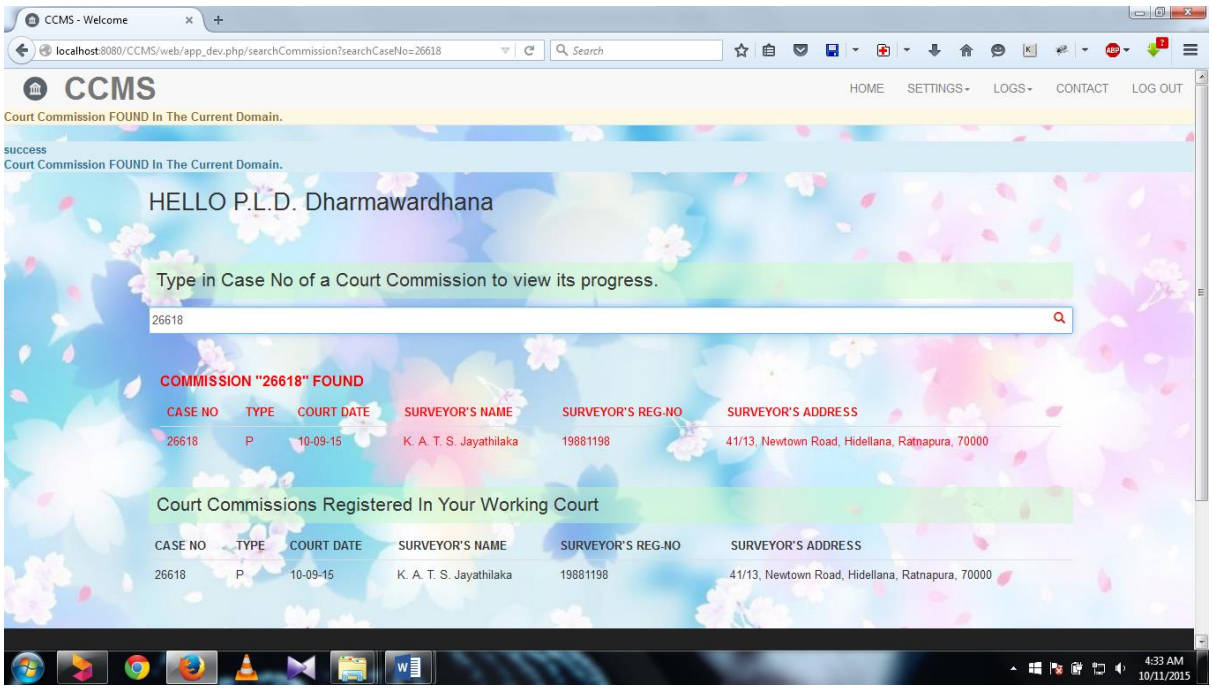
Any number of Plaintiffs and Defendants can be added as needed per each court commission.



Account Homepage for a Court Clerk.

Court commissions handled by court clerk's working court is displayed in the lower table.

Search bar is used to find a numbered court commission from the table.

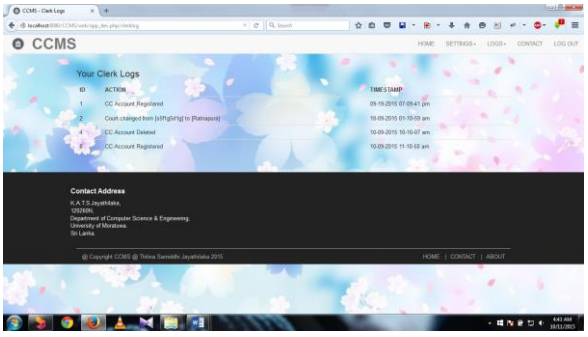


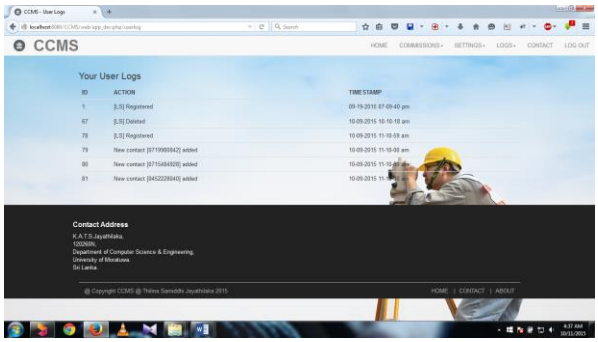
If the entered court case numbered commission is present, it will be emphasized below in red.

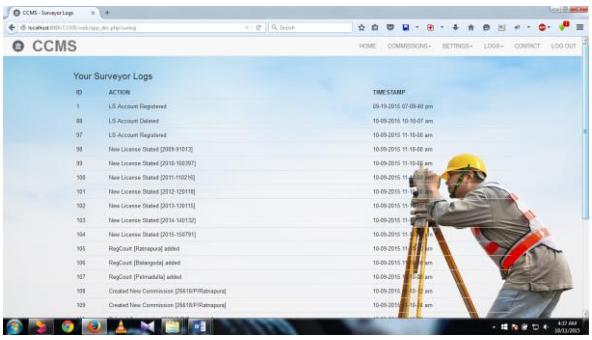
System audit for CCMS administration.

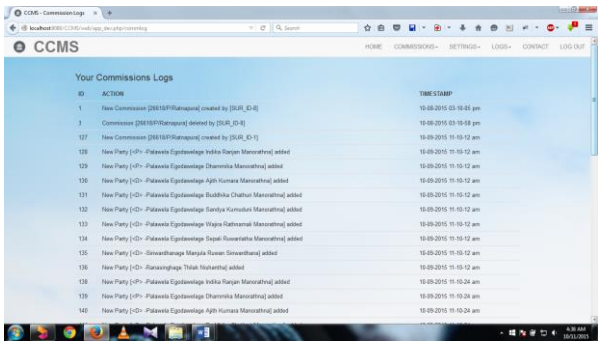
IMPORTANT:

MySQL Triggers are used to build the audit system.









User logs, Clerk logs, Surveyor logs, Commission Logs are viewed according to the users.

5. SYSTEM TESTING AND ANALYSIS

5.1 TESTING APPROACH

a) User Registration

Technique Objectives :	Execute the use case scenario and test whether the user interfaces render the information correctly and whether the user details and designation details are stored in the database.
Techniques :	• Enter user details including the designation in the text fields appearing after clicking the signup button • When the next button is clicked it will forward to relevant designation form and notifies the user to add data • When create account button is clicked, the system will check for empty fields and notifies the user to fill them • If there exist no data and the finish button is clicked a message notifies the user to add data. • If requested data type is not entered, user will be notified to enter required type • If all the fields are appropriately filled and create account button is clicked, details will be recorded to database and a summary of the created account will be shown.
Oracles :	• Set the expected values for correct data and check if the output matches and gives a success on the test. • Set the expected values for incorrect data and check if the output matches and gives a failure on the test.
Required Tools :	NetBeans IDE, WAMP Server, Parsley Data Validation Libraries, Symfony Doctrine
Success Criteria :	The technique supports the testing of: • correct data entry • incorrect data entry
Special Considerations :	Once an error message is displayed it is assumed that the user will correct his error before repressing the button.

b) Audit System

Technique Objectives :	Execute the use case scenario and test whether the user interfaces render the information correctly and whether the all the required important events are recorded automatically in the database.
Techniques :	• Perform events such as user registration, user account details editing, court commission creation, court commission editing and report generation to test whether those events are

	recorded in the right audit table
Oracles :	• Perform expected events for correct data and check if the output matches and gives a success on the test. • Perform expected events for incorrect data and check if the output matches and gives a failure on the test.
Required Tools :	NetBeans IDE, WAMP Server, MySQL Triggers, Symfony Doctrine
Success Criteria :	The technique supports the testing of: • Correct event performing with data entry • Incorrect event performing data entry
Special Considerations :	The audit system should behave in a manner to record all the important events in the system

c) User Interface Testing

Technique Objectives :	Navigation through the target-of-test reflecting business functions and requirements, including page-to-page, field-to- field, and use of access methods (tab keys, mouse movements, accelerator keys). Window objects and characteristics can be exercised–such as menus, size, position, state, and focus.
Techniques :	• To test the navigation from page to page: • Go to a page • Select the button to proceed to the next page • Test whether the browser approaches to the expected page using symfony dashboard
Oracles :	The results of this test can be observed in the symfony dashboard.
Required Tools :	NetBeans IDE, WAMP Server, Symfony Doctrine
Success Criteria :	The technique should handle page to page transitions as expected by the software
Special Considerations :	N/A

5.2 ASPECTS RELATED TO PERFORMANCE, SECURITY, FAILURES

This web application is designed by Symfony framework. So that the application inherits great functional performance mixed with developers coding behaviour. Database is accessed and manipulated in a secure manner using transaction. SQL Injection is prevented using prepared statements in doctrine. Therefore the consistency of the database is assured. Application is running on a server so that it is crucial for the server to keep up its activity. If the server is down, the system will go down. Therefore a suitable RAID architecture must be proposed and used.

6. CONCLUSION AND FUTURE WORK

According to the above descriptions, we can conclude that this system is really an assistant for a licensed surveyor and a court clerk. But, there are lots of additional features that we can add.

The managing of a court commission can be slightly altered to give a user friendly feature which contains more editing features in a single page. Viewing of a court commission can be enhanced to a separate page too. The report generation is at the basic form in this system. It can be developed to give a full detailed report too.

This system insist that the users will add correct data types and values as data inputs. But there can be many instances where users enter wrong information. So that, the Robust Nature of the application (behaving while coping with errors) should be increased.

If the system can be upgraded to above specifics, CCMS can be deployed in to the Sri Lankan Community so that many users can get the most of it and manage their work. Surveyors Institute of Sri Lanka (SISL) and Survey Department of Sri Lanka (SDSL) can be notified about this system, so that they also will be interested in sponsoring these types of applications.