Final Year Project

CS6P05NP

Final Report

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Date: April 2021

ABSTRACT

The aim of this project is based on developing Web-based application named Mero Hisab to make civil estimates with ease. Mero Hisab Web Application will help people for finding the quantity of various materials. This application can generate calculations of bricks, sand, aggregate, steel, wood, plaster, concrete. It will also be helpful for finding the area and volume of various civil works. This application is also able to save to save data to database. Also, this application has a user registration system which only allows registered users to get log-in and take benefit of Mero Hisab web-app

As Nepal is a Developing country various civil works are being done day by day so choose to make an estimate app which is web-based that can be a cornerstone in the field of Information Technology.

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1 Introduction

1.1. Introduction to topic

We all know that Civil engineering is a vast Engineering field. Where various stages are needs to be done for the completion of the project. Designing, Estimation, Billing etc. comes under the Civil engineering parts. Where Estimation plays a vital role in any project. Being the student of IT. I have decided to combine the IT with Civil engineering field. Before starting any project, Estimation is done to calculate the total cost of the project based on which all the project plans are decided. Estimation is considered as a vital part of Civil Engineering Projects. There are various applications made for the estimation purpose, but they are not much accurate, and data cannot be obtained in the printable format using such app. Most of the applications that have been made for the estimation are paid version. And non- paid versions don't give desired results.

Problem statement and objective

1.2. Project as a solution

1.3. Aims and Objective of projects

Objectives of software are following:

1.4. Smart Objective

Relevant: To be specific to the use of Visual Studio, .net, C# and other tools, software and resources.

Measure: To keep the log book and submit to the supervisor

Attainable: To move along project plan

Time Bound: To complete and submit the project before the deadline.

2. Background

2.1. Elaboration of topic

“Mero Hisab” is the name of my purposed project for the Final Year Project. It is an Estimate related application. This application can be used by any age group having certain knowledge about estimation. This application has been made using C#, .net core, Xml and Visual studio. People can work and generate calculations in different sheets separately by just clicking the buttons and filling some data in it. The application includes different pages. Brick Calculation, Building Estimator, Carpeting, Concrete Calculate, Steel Calculator, Plaster Calculate will be the name of different pages of my application. User must first Register for the service and after login, user can have access to the remaining sheets.

2.2. Literature Review

Given the risks involved, estimating contract length precisely is a difficult task in the building industry. The road and bridge building industry in Nepal is in a transitional period, and working procedures vary depending on the specific capability of each contractor. As a result, a realistic approach is needed for developing a methodology for estimating length. The aim of this study is to provide an empirical formula for determining contract length based on historical data from roads and bridges built in the last five years. This study examined 83 bridges and 78 road projects to establish a relationship between cost and time span for construction.

The model was discovered to be an excellent match for the results. Aside from the project's cost, several other considerations such as vehicle accessibility, job difficulty, inflation and deflation rates, and the rate of inflation and deflation all have an impact on the project's duration. To satisfy these project-specific conditions, the time-cost model was modified by adding coefficients in the analytical relationship. Contract length is directly proportional to expense, according to the obtained equation. The rate of growth in contract length, on the other hand, reduces as expense increases. This is due to a greater degree of concurrent operations and efficient use of technology with contracts with

higher costs. This model can be useful for government departments, builders, and consultants engaged in road and bridge design and procurement procedures in Nepal. The empirical formula established as a result of this research is applicable to Nepalese road and bridge projects costing more than two crore rupees. (Prakriti Pokhrel, 2021)

2.3. Review of Journal

The preliminary cost estimate has a significant impact on the fate of a transportation project, but it may be an order of magnitude off the final bid number. Poor cost prediction in state transportation agencies will lead to less-than-optimal project selection at the outset and delays later where financing is insufficient to finance proposed projects. The ability to distinguish quantity uncertainty from price uncertainty is shown. If item amounts can be estimated in advance, readily available unit prices can be used to generate a semi-detailed approximate calculation.

In contrast to the common method of adding a gross cost per lane mile, the proposed solution provides a more precise foundation for measuring the results of improvements during project construction. The Texas Department of Transportation is testing this technique in preparation for deployment. (Jui-Sheng Chou, 2006)

An estimation for any construction work can be interpreted as the method of estimating the quantities and costs of the different things needed for the job. Before beginning some work for completion, the builder's owner should have a detailed understanding of the amount of work. The smallest information will help him determine if the work will be done within the time limit and budget specified. It also helps him to consider the likely costs of completing the planned work. As a result, based on the proposals and requirements, it is important to list the likely costs or create an estimate for the planned work.

There are various types of estimate described as follows:

1 Detailed Estimate:

A detailed estimation is generated using the entire collection of contract papers. The preparation of a thorough calculation can be divided into two stages, such as working out the quantities of various works and calculating the cost of each work.

1) Determine the amounts of various works – The entire building work process is categorized into categories such as excavation and earthwork, concrete work, formwork, reinforcement, masonry work, roof covering and roof plumbing, carpentry, painting and decorating, plumbing, electrical installation, and so on.

   The estimation takeoff process is carried out with the assistance of drawings/plans, which are then entered into measurement. A measurement sheet is a predefined shape that includes a series of columns for recording measurements and job details. Finally, the measurement columns are averaged to calculate the necessary quantity. (Editor, July 27, 2018)

2) Calculation of each work's cost – The previously obtained amounts are used to calculate the cost of each work. The calculated costs of each work object are summarized in sequence in a text known as an abstract layer.

   Documents such as a survey, descriptions, drawings/plans, construction maps, and a rate schedule should be included in a comprehensive calculation. Material size, transportation of goods, site position, labor costs, expense of machinery (commonly allowed: - 2% of the estimated cost), overhead charges (commonly allowed:- 2% of the estimated cost), contingencies & unforeseen (commonly allowed:- 4% of the estimated cost) are all important factors to remember when planning the comprehensive calculation. (Editor, July 27, 2018)

2 Preliminary or Approximate or Rough Estimate

That is also known as a budget or a tentative estimation. This form of calculation is created during the early stages of a project. To provide the owner (client) with a reasonable estimate of the project's expense and to obtain consent from the

appropriate sanctioning bodies (eg: from banks to get loan). To carry out the calculation, documents such as project drawing plans, land specifics like power and water supplies, and a full clear report are required. Typically, an estimated approximation is calculated using data from prior knowledge.

For example, when calculating a house estimation, a previously (and also recently) completed related house would be considered. In this case, the estimator already knows the rate for a 1m2 area and uses it to measure the cost estimate for the newly planted area (of similar house). (Editor, July 27, 2018)

Quantity Estimate or Quantity Survey

This is a comprehensive calculation or inventory of quantities for all work elements needed to complete the job. The quantity of each piece of work is calculated based on the measurements seen on the structure's drawing.

The object of a bill of quantities is to include a full list of quantities required for the execution of any engineering project, and when priced, it provides an estimation of the project's expense. (Editor, July 27, 2018)

2.4. Background research on potential end users:

Mero Hisab is a web-based application that makes user easier in the field of construction and estimation. User can calculate the no of bricks, quantity of cement, quantity of steel, quantity of plaster, Area, Volume, Quantity of Aggregate, Dry volume of Mixture as well as wet volume of mixture etc. by just few input and clicks. This app helps the people of all age group. This application is especially helpful for those who are in the field of civil engineering and for those who wants to find the quantity of materials needed for construction.

3. Comparison with similar application

3.1. Review of similar projects

There have been several apps that would provide the Mero Hisab with different features. As the idea collected from these applications for this project is focused on the combination of ideas. The below are the summaries of related applications:

- Construction Calculator Material Balding Estimate

Figure 1 Construction Calculator

In the world of construction, time and money are of the utmost importance. Nothing can negatively impact these two things more than purchasing the wrong amount of construction materials. Unfortunately, ending up with too much or too little supplies is a frequent occurrence because many people don't know how to properly calculate their needs. Construction Estimator-Building Material Estimate is such a superb app. Which easily solve the construction calculation through mobile app. In engineering field have difficult how to find the estimation of a construction. Now don't wary about it we are bring new idea to solve these problem. Construction estimator have allots of functionalities. Construction estimator are just develop for engineer but everyone can use it. The construction Estimator helps you calculate the cost to build your new

building. Cost to build will do the rest and provide you with a cost summary. Construction estimator can used to build a building, new start of construction to build a school are build a hospital, collage building university building etc. you can find easily the cast of these material through mobile it's give accurate result.

The construction estimator have some modules which is given bellow.

Super structure: super structure consist of the following some fundamental block which is given bellow.

Slab: A concrete slab is a common structural element of modern buildings. Which consist of a thick flat piece of a solid substance, such as stone, wood, metal, food etc. That is usually square or rectangular. In the slab portion they are consist of two block one is brick and another is rcc. You are just select one option like you are click on slab brick you are select some amount of cement sand and crush.to just insert the specific value of that cement sand ad crush. In the next button you are enter some value like enter length, enter width, enter height, enter brick area in feet inches and percent. Then for slab brick and quality ratio are showing.

Stairs: Simply stair is a construction designed to bridge a large vertical distance by dividing it into smaller vertical distances, called steps.. Stairs may be straight are be straight, round, or may consist of two or more straight pieces connected at angles.

In the stair button is also work like slab button they showing quantity of stock. Like cement sand and crush.it process just like slab you have to reach for result it the end.

Beam: A beam is a structural element that primarily resists loads applied laterally to the beam's axes. Its mode of deflection is primarily by bending. The load applied to the beam is result din reaction forces at beam support points. Total force on the beam.

You will find out the quality and quantity of the beam like cement, sand and crush, you are just enter the specific value of the entire process it will give complete result it the end.

Column: A column or pillar is also architecture and structure engineering is a structure element that transmits, through compression. In the column also you can find the quality and quantity to find how much enough to sand, cement and crush are enough for a column.

Walls & Floors: A wall is a structure that defines an area, carries a load, or provides shelter or security. Now in the construction you have need to bricks, cement, crush and sand, you are just enter the entire value this app will give a complete result. In Excavation, Foundation, Configuration Setting, Marble, Chips and Excavation you can click the button find a good result of your construction estimation how much sand, crush and brick is enough for a construction. (Estimate, n.d.)

- Business Estimates, Estimate, Estimation
  Estimation is pre order process. A proper estimate will make your products order successful. Estimation app will provide a delightful experience to prepare and share estimate to your customers.

Main Features

Estimates & Business Quotes

- Customer name and estimate date

- Product can be added from product catalogue

- GST(CGST/SGST,IGST) , VAT (Tax) calculation

- Search estimations

- Preview estimation before sending to customer.

- Share estimation in 3 different formats: simple text, CSV, PDF via email,whatsapp or any content sharing apps installed in your device.

Item Master

- Add product with tax percentage

- Product stock unit(used in estimation) like kg, ml,Pcs, Nos.

- Search product (saralhisab, n.d.)

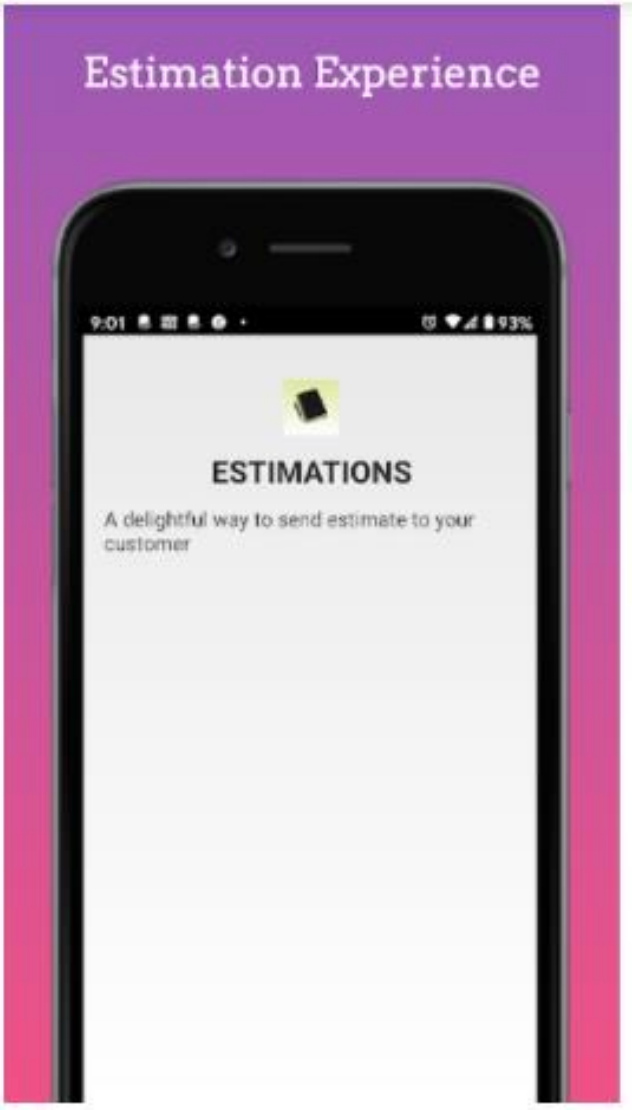

Figure 2 Business Estimate, estimates estimation

- Construction Material Estimate

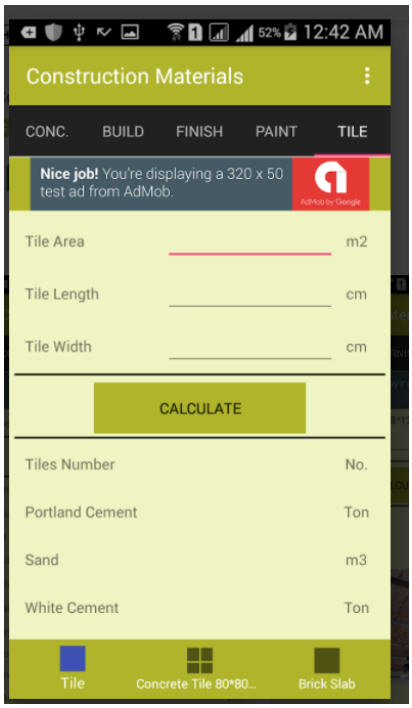

Figure 3 Construction Material Estimate

The Application is made for one thing in mind. Make your life simpler specifically when it comes to estimating/calculating construction materials like. Bricks, Blocks, Thermistor, Plaster, Cement, Sand, Gravel, Water-Base, Oil-Base, Concrete Tile, Tile.... etc. The App. is easy to use.

- All Construction Material Calculator 2021

Bricks estimate:

Do you want to calculate how much bricks you need to build? Bricks calculator is used to calculate area and volume and make walls easily. Bricks calculator that allows you to calculate the quantity of brick, sand and cement needed for the construction. Bricks calculator is used for Industrial area, housing, shopping malls and so on. You can use to calculate the exact amount of bricks to construct your project. You can calculate the number of bricks needed when building a wall.Brick estimator- Calculate the amount of bricks works on algorithm which is able to calculate Bricks estimate amount and bricks

calculation for building construction. Wall Bricks Calculator is the unique and Best bricks calculation app on play store.

Paint estimate

How much quantity of paint you need for painting a room to use Beautiful paint decorates? Paint calculator is easy to use and if you want to know how much gallons of paint you will need to paint your walls then use this feature of our application it will tell you the total estimate for the buckets of paint you have to use. Paint estimator is used for room walls, TV launch walls, drawing room walls, outdoor walls and so on. Quantity price calculator you can calculate the total cost of the paint including calculations for multiple coats by using Paint calculator.Wall paint estimate also provide Paint cost estimate and save your money by providing Total cost of paint including calculation

Beam estimate:

Beam estimate is the best feature that provide you to design a given shape, boundary and materials. Beam estimates the cost rate for house, building material. Beam estimate- properties to calculate the performance of beam.Beam estimate- Beam calculate for building material calculate exact estimate of Beautiful design of given shape material and also Calculate the performance of beam for future. You can calculate Quantity of beam material and also Calculate quantity of Steel beam design.

Lanter estimate:

Lanter estimate- lanter material cost to calculate the exact figure of Cement quantity and tell you that How much cement are required for lanter? Lanter is very important factor for building houses, Industries, shopping marts. Using home construction calculator You can calculate all construction material and can also calculate accurate cost.Calculate for building material or Lanter calculation is also a main feature of material construction and through which you can calculate the quantity of cement used in lanter. using Lanter estimate- you can calculate accurate amount of cement. You can use Lanter calculation for all constructing new houses and buildings.

Wall Plaster:

For the More beautiful and stylish ceiling, in plastering of wall you can use the Plaster ceiling feature which will ultimately give you the estimated amount of plaster to be used and the amount you need to do it. you are constructing new house or new building to calculate how much plaster are required in this wall. You can calculate quality of plaster material required for building constructing for various work.

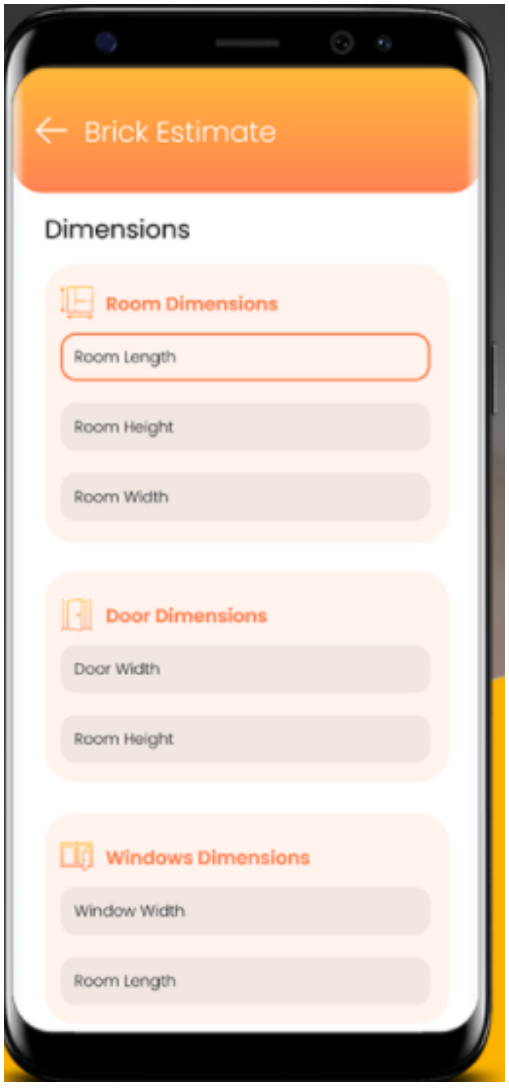

Figure 4 All Construction Material Calculator 2021

- Mero Hisab

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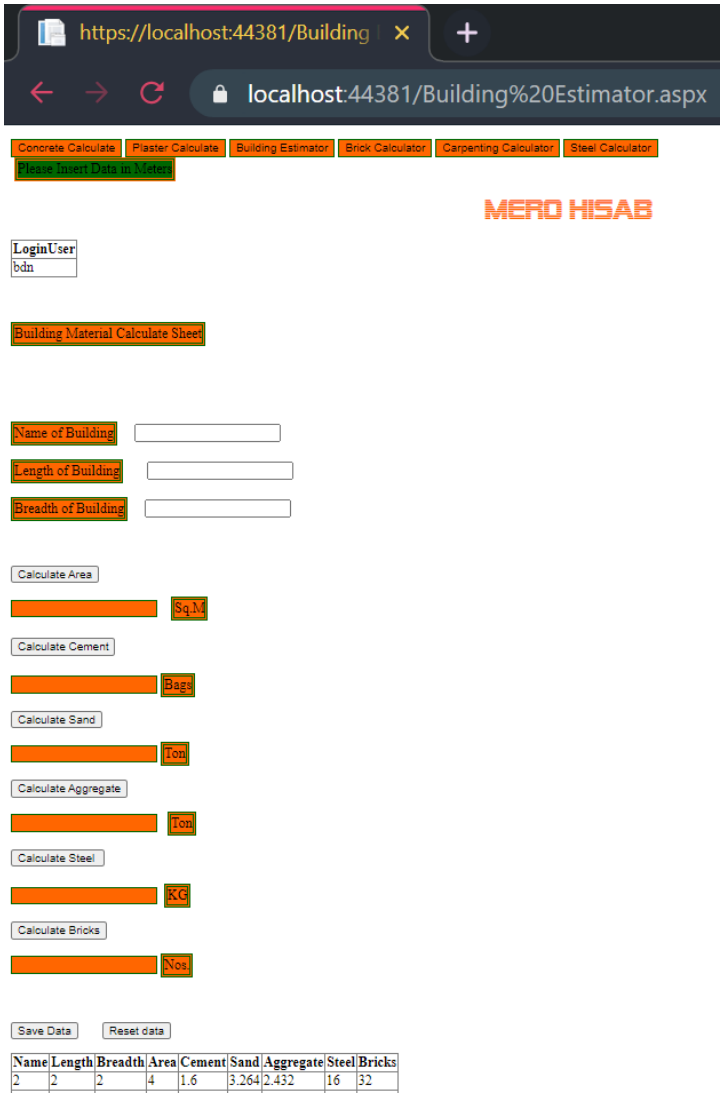

Figure 5 Mero Hisab

3.2. Comparison Table

System	User login/register	Save data to database	Calculate Amount	Calculate Quantity	Works on mobile	Works on laptop
Construction Calculator Material Balding Estimate	No	No	Yes	Yes	Yes	No

Business Estimates, Estimate, Estimation	No	No	Yes	Yes	Yes	No
Construction Material Estimate	No	No	Yes	Yes	Yes	No
All Construction Material Calculator 2021	No	No	Yes	Yes	Yes	No
Mero Hisab	Yes	Yes	No	Yes	Yes	Yes

3.3. Uniqueness of the developed system

A lot of prior study has discovered several things related to other software. Most of the application I have been researched were mainly focus in the Estimate detail and their information. Though most of the facilities that are provided by the software is same. The main difference is that Mero Hisab is a web-based app. Which means the application can be used in any type of device. Also other applications don't provide the facility to store data in the database file but Mero Hisab is the only app which facilities the user to save data for future use. Also, Mero Hisab web app is more secure in comparison to other apps as this app has user register and login system built which is not available in other software's.

4. Methodology

4.1. Studies on the System Methodology

A system development methodology refers to the context for the structure, strategy and management of the information system development process.

Over the years there has been a wide range of such structures, each with its own recognized strengths and limitations. One approach for device construction is not inherently acceptable for all programs. (Khan, 2016)

4.2. Software Development Life Cycle (SDLC)

The Software Development Life Cycle (SDLC) is a concept that defines different stages of the software development process. The SDLC strives to deliver high-quality applications at the lowest possible cost and in the shortest amount of time. The multiple stages in the software development cycle allow developers and managers to achieve complete transparency in all organizations across the entire development process. (Kost, 2020)

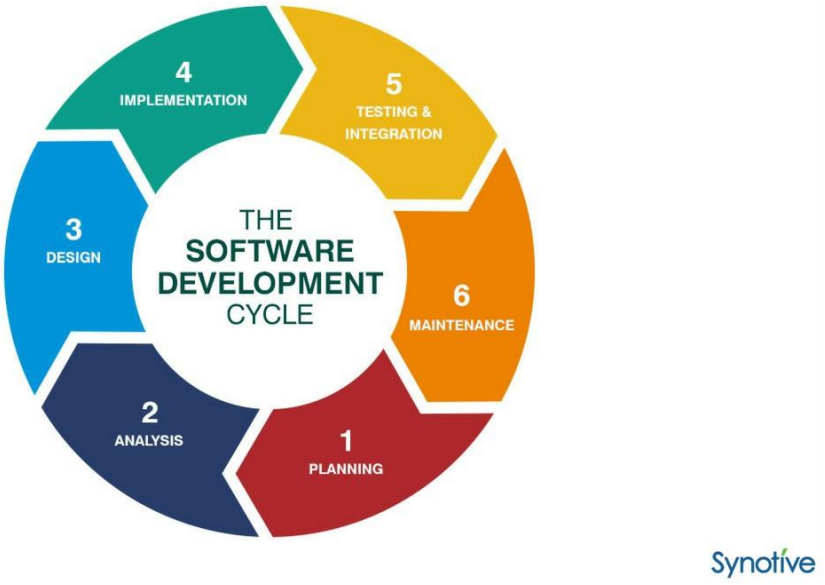

Figure 6 Stages of SDLC

Various SDLC models have been used in the creation of system development methodologies. Methodologies that may be used for this project are:

4.2.1. Waterfall Model

The waterfall model is a longitudinal project management methodology in which stakeholders' and clients' needs are gathered at the outset of the project and a

sequential project schedule is developed to follow certain parameters. The waterfall concept is so named because the next phase in the project falls like a waterfall. This is a technique that has been around for a long time, which means it has had a lot of choices for a long time. The waterfall paradigm has been used in many development projects since it extends from an original specification to a complete end product construction approach. Regardless of the debate, there are at least five to seven phases in which no other phase in the waterfall model can be initiated. (Project Manager, 2021)

Advantage of waterfall model are:

- The next phase of development must be fully done before moving on to the next phase.
- Project depends entirely on project teams with minimal consumer engagement.
- Documentation is performed at each development cycle phase of the application.
- Suitable for small projects that have well-defined specifications.
- During the development phase all system requirement is change.

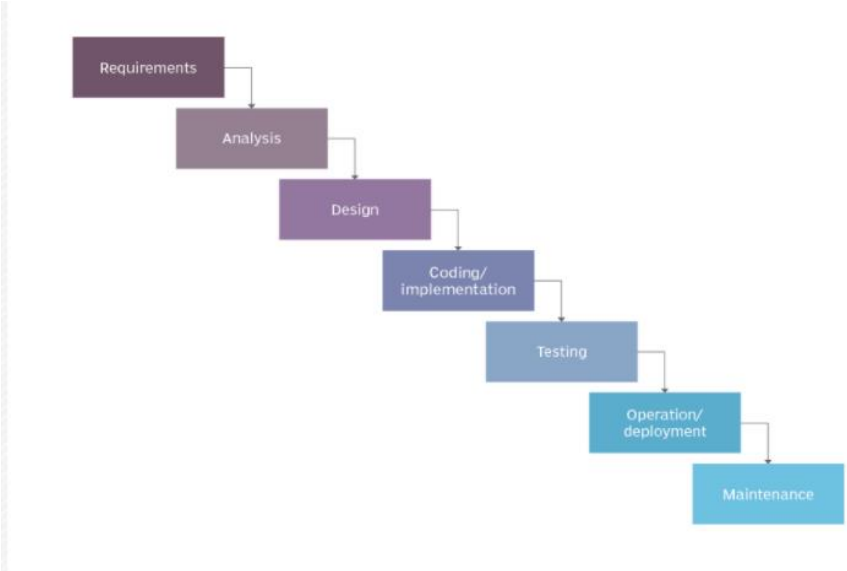

Figure 7 Waterfall Methodology

4.2.2. Prototyping Model

The Prototyping Process is a software development model that constructs, tests, and reworks a design until it is ready for a prototype. The foundation for the final structure or software is often created. It works well in cases where the project requirements are not well known. Instead of taking a chance on a completely functional concept, prototyping relies on making prototype structures and experimenting on them over time to refine them, revising and finally repeating this process before a suitable outcome is achieved When faced with project uncertainties, the model performs well when more than half of the parameters are unclear. When creating an app, users and developers collaborate for a lengthy cycle of trial and error before the app is right and usable.

Advantage of prototyping model are:

• The user can get idea of working model of application fast.
• Missing features can be quickly found

Working system model is given for this approach so the users get a clearer view of the development of the system.

• There is quick customer feedback to improve application.

• Errors can be detected earlier
(Lewis, 2020)

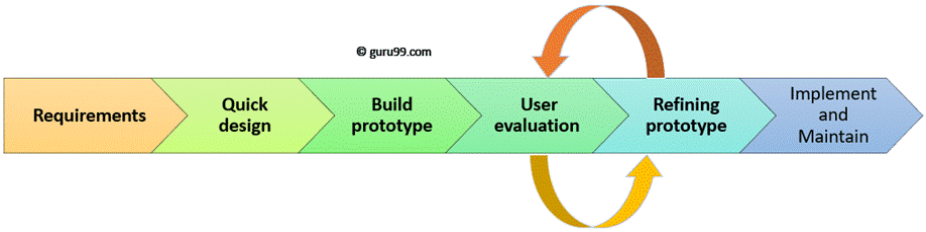

Figure 8 Prototype Methodology

4.2.3. Spiral Methodology

The Spiral Model is a risk-based software development process model that mixes the cascade and iterative models. The spiral model aids in the selection and application of different software project delivery processes focused on relevant risk patterns. The pyramid model of the software development lifecycle has significantly aided risk management. It is a step of the software

development cycle that is represented as a complete and final structure with a different perspective on a piece of work being merged into the larger whole. When a project manager is assigned, the amount of risk involved in the construction process should be understood to allow for variation in the process steps needed. The cost of a project is often determined by the distance from the centre with respect to the axis's projection, and the sum of construction is defined by the spiral's angle.

Advantage of spiral model are:

- Software is developed quickly and software is created in the early stages of the product life cycle.
- It contributes to customer satisfaction due to involvement at early stages of product development.
- It's good for projects that need high levels of creative effort and which are large and complex, but low levels of instability.
- This model is ideal for making specifications readily adaptable in later phases. Additional features may be applied to the software after launch, as well.
- This model is one of the better models to use due to the risk analysis being done in the process.

(Geeksforgeeks, 2021)

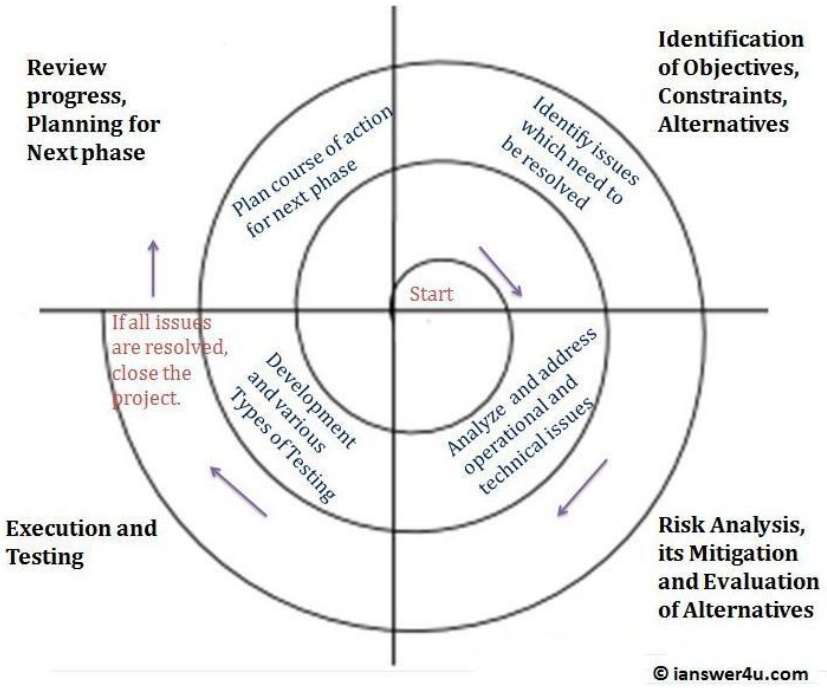

Figure 9 Spiral Model

4.2.4. Incremental Methodology

The gradual model is a method of software creation in which requirements are broken down into components. As in this model, each module adheres to the standards, specifications, implementation, and testing. Any subsequent version of the module has new features that expands on what was already present in the previous one. As long as the whole task is not completed, the process continues to extend. It has specified that the commodity has followed all of the requirements. The waterfall approach was also combined with the iterative process theory in this new paradigm. Once a product is built, each of its individual components. Each of a product's individual components is designed and created after it is built. Any part is usable when it is completed and distributed to the customer. To avoid the lengthy implementation process, a part of the product may be made usable while this is applied. It would save a large initial investment and a long approval process. The application of a new method would be less painful under this paradigm of deployment when it is implemented gradually. (Javatpoint, 2021)

Advantages of Incremental Methodology

- Changing requirements and scope are flexible and cheaper

- During the software life cycle the software is generated quick.
- Changes can be made during the development phases
- Incremental methodology is cheaper as compared to other methodology
- Errors can be identified easily

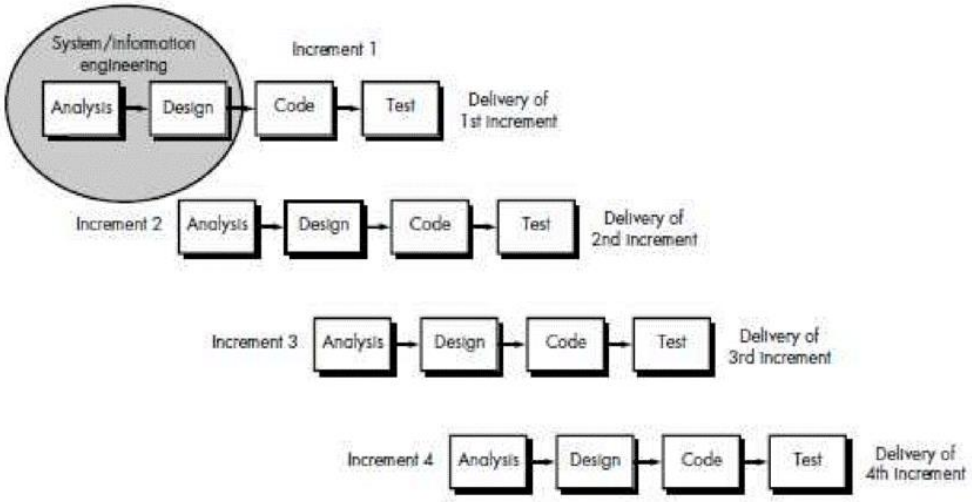

Figure 10 Incremental Model

4.2.5. Agile Methodology

The AGILE approach is a practice that promotes continuous improvement and experimentation during the software development phase of a project. Unlike the Waterfall model, production and research activities compete in the Agile model. The easiest way to create a market plan for Agile software development is to provide a simple basic target that can be turned into a vision. We use the terms constant planning, development, team involvement, and being iterative to describe effective software design. Getting something new to market as soon as possible while still creating changes is critical. It prepares people to cope with a rapidly changing environment.

Advantages of agile methodology

- Adaptation regularly to shifting circumstances and can be changed at last moment

- Customers, developers, and testers interactants often engage in discussion with each other for the project.
- The easiest way of communicating face-to-face is to speak and regular collaboration between companies and developers
- Make customer satisfy by conforming they get what they need quickly and continuously.
- More attention and careful attention to high precision of design and quality

  (360logica, 2021)

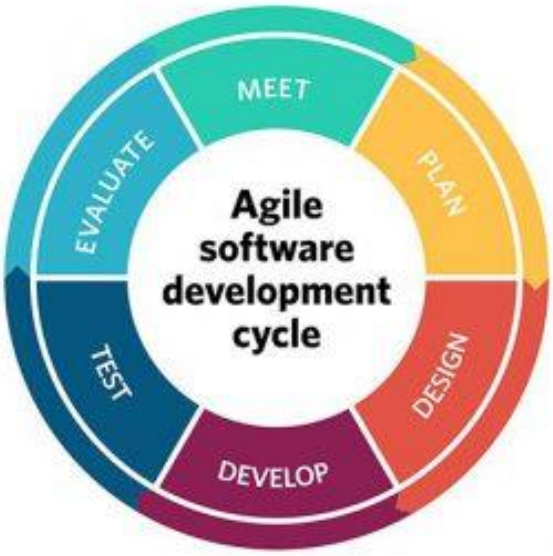

Figure 11 Agile Methodology

4.2.6 RAD Methodology

The publishing of a text by seems to have sparked interest in rapid application growth (RAD).

The same title is held by James Martin (Martin, 1992). The main goals of RAD, according to Martin, are high quality processes, rapid production and execution, and low costs.

RAD has received a lot of attention in specialist circles, but there seems to be relatively little scholarly material evaluating it. This is not surprising given Wynkoop and Russo's comprehensive review of the current literature on information system implementation methodologies (ISDMs) (Wynkoop &

Russo, 1997). Almost half of those constituted observational analysis, with the aim of evaluating ISDMs or portions of ISDMs. (Beynon-Davies, n.d.)

Rapid Application Development (RAD) model is a concurrent development of functions and subsequent integration, in which each component or function is built in parallel as if they were mini-projects. Part creation is time-bound, shipped, and then assembled into a working prototype. This approach or paradigm allows for accelerated improvement and improvement of the components or software, and it promotes active customer input by giving the customer early awareness of the product.

In this part, we will talk about and clarify the Rapid Application Development model, also known as the RAD model.

RAD, like every other software development model, has a few stages that it stresses. These stages are as follows:

Requirements.

Design.

Implementation.

Test.

Maintenance. (Pedamkar, n.d.)

The RAD model is usually an incremental model in which several tiny – small chunks are selected and built concurrently to attain the larger image. In addition, the gradual model is processed, in which large features to be created are broken down into smaller, more manageable chunks. These chunks are then formed one at a time.

A typical RAD model could be divided into five phases which are as follows:

Planning and Requirement Analysis.

Designing Project Architecture.

Development and Programming.

Testing.

Deployment and Maintenance.

Planning and Requirement Analysis

This is one of the most important stages. Initial parameters are collected and thoroughly reviewed here. Remember that a thorough comprehension of the requirements is essential in order for the finished product to meet demands.

Designing Project Architecture

Once requirements are gathered, the next focus is on project architecture development. A project architecture should be flexible enough to accommodate the new addition of files and folders easily.

Development and Programming.

The next big challenge is to build the building after the architecture has been planned. This move entails writing a ton of code in order to bring the software to a viable state.

Testing.

The testing process entails testing the produced product. A team of people is interested in the careful testing of the manufactured product.

Deployment and Maintenance.

After trial, the software could be applied to the cloud. A implemented project usually necessitates maintenance and perhaps the inclusion of a few new features.

There are some advantages and disadvantages of this methodology.

The advantages of this methodology are listed below.

The rapid development of the product.

Development of reusable small components.

Repetitive review during development.

Integration of reusable components at an initial level hence saves effort in spite of not adding bigger modules.

Constructive feedback.

The disadvantages of this methodology are listed below.

Requires lots of effort for gathering all requirements at the initial stage.

Modeling skills have lots of dependencies.

Not suitable for a low-budget project.

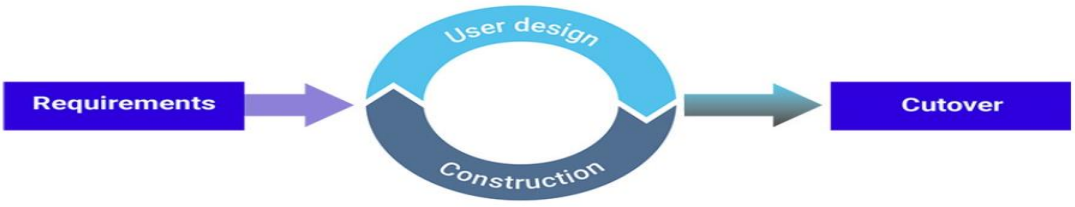

Figure 12:RAD Methodology

4.3. Selected Methodology

It is good to research and reflect the concept before adding the required methodology. Consequently, different methodologies were reviewed. Finally, RAD Methodology was selected for development of this project.

The software development model chosen for the project is RAD Methodology. In the method, the work is divided into various phases and each phase goes through requirement gathering, design, coding, testing and implementation. This methodology allows developer to quickly adjust to shifting requirements in a fast-paced and constantly changing market. In this methodology, the construction phase repeats until the user confirms that the product meets all the requirements. During the development of this purposed application, mockup app will be made and consulted to my supervisor and only then jump to the next part else modification will be done in that part.

4.3.1. Reason for selecting prototype methodology:

Fast Delivery: Because the whole project has been separated into parts, and each module is handled as a separate prototype, the time spent delivering has been significantly decreased. Each prototype goes through a different testing process before being wound together to form the final application. This means that the app is delivered quicker and with less glitches.

Faster market analysis: Since each prototype can be checked by the end customer, it is easier to poll prospects for feedback and enhancements. Any transition is simple to implement because it only affects one model of the application and not the whole development at once.

User Feedback: In conventional waterfall production, software development delays will result in the product arriving far later than expected. The concept can become outdated or be stolen by competitors. Using the MVP growth theory, the need and psychology of the consumer are evaluated, and further development is carried out only if the demand seems to be suitable.

Ease to incorporate changes:

Several application components are processed at the same time. Since there is no method type of administration, program modifications are simpler to implement. Unlike waterfall growth, developers do not need to take a step back if improvements to the product are proposed.

System Integration: All of the application's components are implemented from the start, resulting in fewer problems during the final integration process. This results in fewer glitches when all components are correctly synchronized from the start.

4.3.2. Reason for not selecting other methodology

- The spiral model is expensive to implement it inappropriate for small-scale projects. Since many tasks have unclear objectives and project objectives cannot be defined in a straightforward and accurate terms.
- Most of the methodology focuses on coding over one design rather than on one design. There is no indicator of code assurance included in this technique.
- Agile approach doesn't aim at designing and developing new products. Senior people are the only ones that are capable to make choices in the development phase of broadening one's knowledge.
- Incremental methodology is expensive to implement as well as good planning and well-defined module interface are required to use it.

- Waterfall methodology is not suitable for application which may have frequent change and waterfall methodology have no turning back since this project may change frequently.

4.4. Phases involved in prototyping methodology

The prototyping method is used by programmers and team to create a basic model, which provides a preview of the planned application. After gaining initial customer reviews, new features or enhancements are added to the next version of prototypes are created and used by the design team before the product results in the most ideal solution being found. The stages of prototype methodology are following:

5. Implementation

The Crucial Stages of a RAD Model

When creating a RAD model, multiple phases must be completed, including study, planning, construction, and final testing. These measures may be broken down to make them more understandable and realistic. The following mechanism is used in all RAD models:

The first stage is business modeling.

The RAD model's market modeling phase collects input from the organization obtained from a variety of business-related sources. This knowledge is then compiled into a useful explanation of how the data can be used after it has been analyzed, as well as what makes this particular information successful for the industry.

Data Modeling is the second stage.

All of the knowledge collected during the Business Modeling process is processed during the Data Modeling period. The knowledge is divided into various categories that may be helpful to the organization as a result of the research. Each data group's content is closely analyzed and accurately defined. During this process of the RAD model, a relationship between these groups

and their usefulness, as described in the Business Modeling step, is also created.

Application Development:

The Application Generation process involves coding all of the knowledge collected and building the framework that will be used to construct the prototype. In the following process, the data models are transformed into individual prototypes that can be evaluated.

Process modeling is the third stage.

The Process Modeling phase of the RAD model method is where all of the information groups obtained during the Data Modeling stage are transformed into the necessary functional information. Changes and optimizations can be made during the Process Modeling stage, and data sets can be further described. During this process, any explanations for inserting, deleting, or modifying data objects are also generated.

Turnover and testing

The Testing and Turnover stage allows for more efficient testing of the prototypes produced. Each model is evaluated independently in order to easily define and adjust the components in order to produce the most successful product. Since the majority of the elements have already been tested, your prototype should be free of significant flaws.

5.1. Wireframe Design

Balsamiq was used to build the wireframes. These are the early designs that I intended to use in my first edition. The wireframes for this project are listed in the following order:

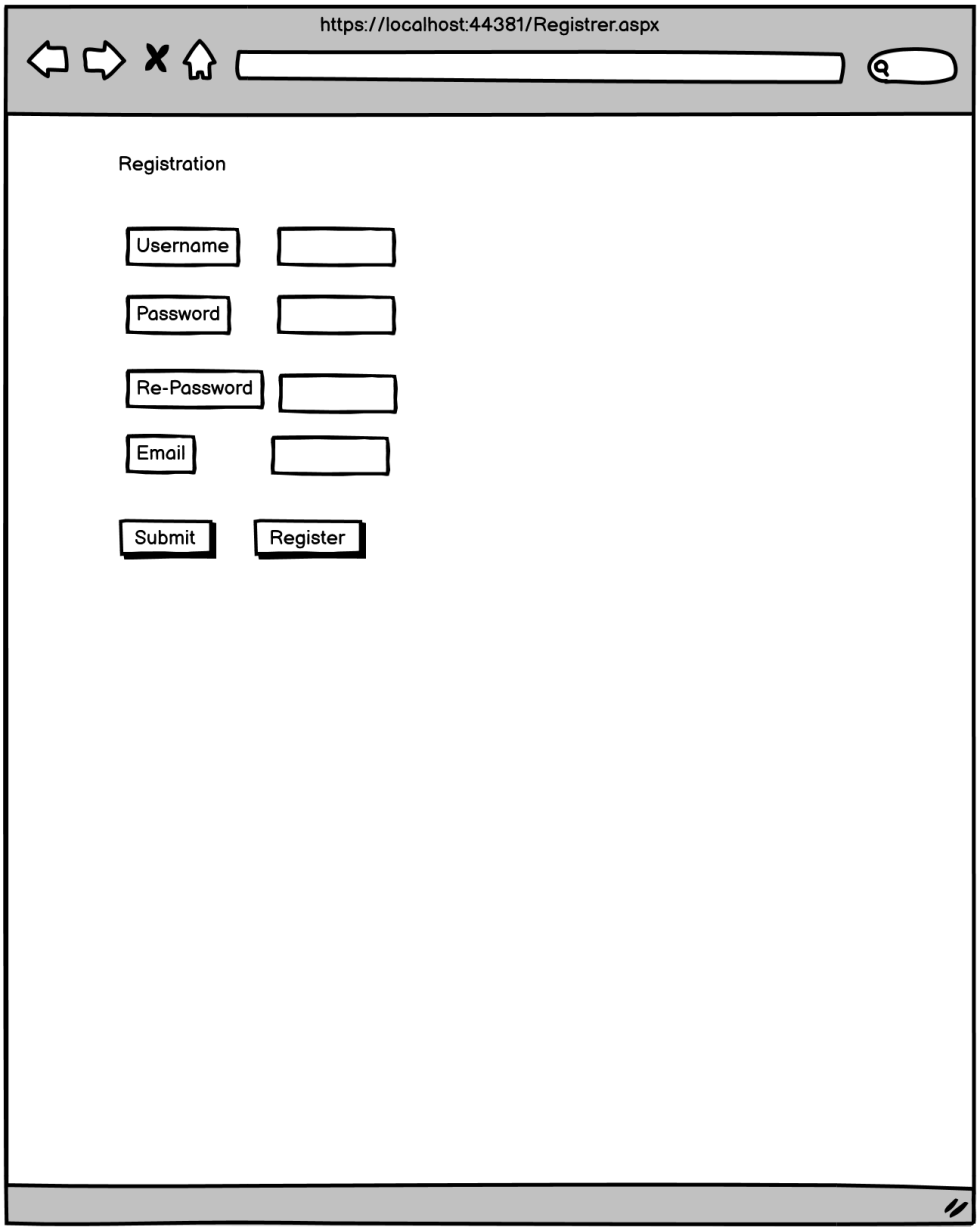

Figure 13 Register Screen

The above figure shows the Registration Screen where four textbox are available for the data entry and two buttons are available to register for new user and login button to go to the login page for pre-registered user.

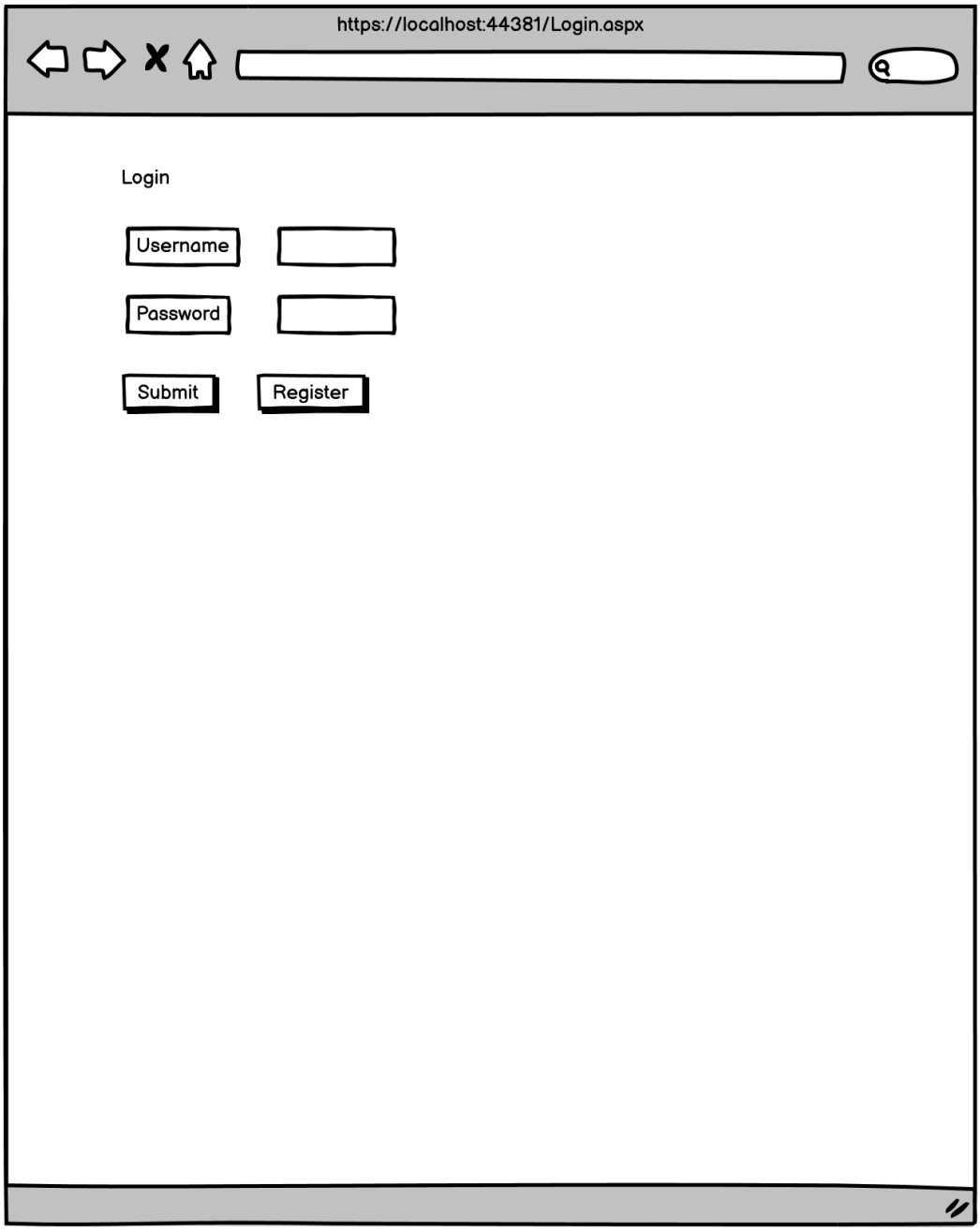

Figure 14 Log in Screen

The above figure shows the Login screen, there are two textbox available for the username and password. Also, there are two buttons for new user to get to the registration page for new registration and login button for the pre-registered user to get logged in in this app.

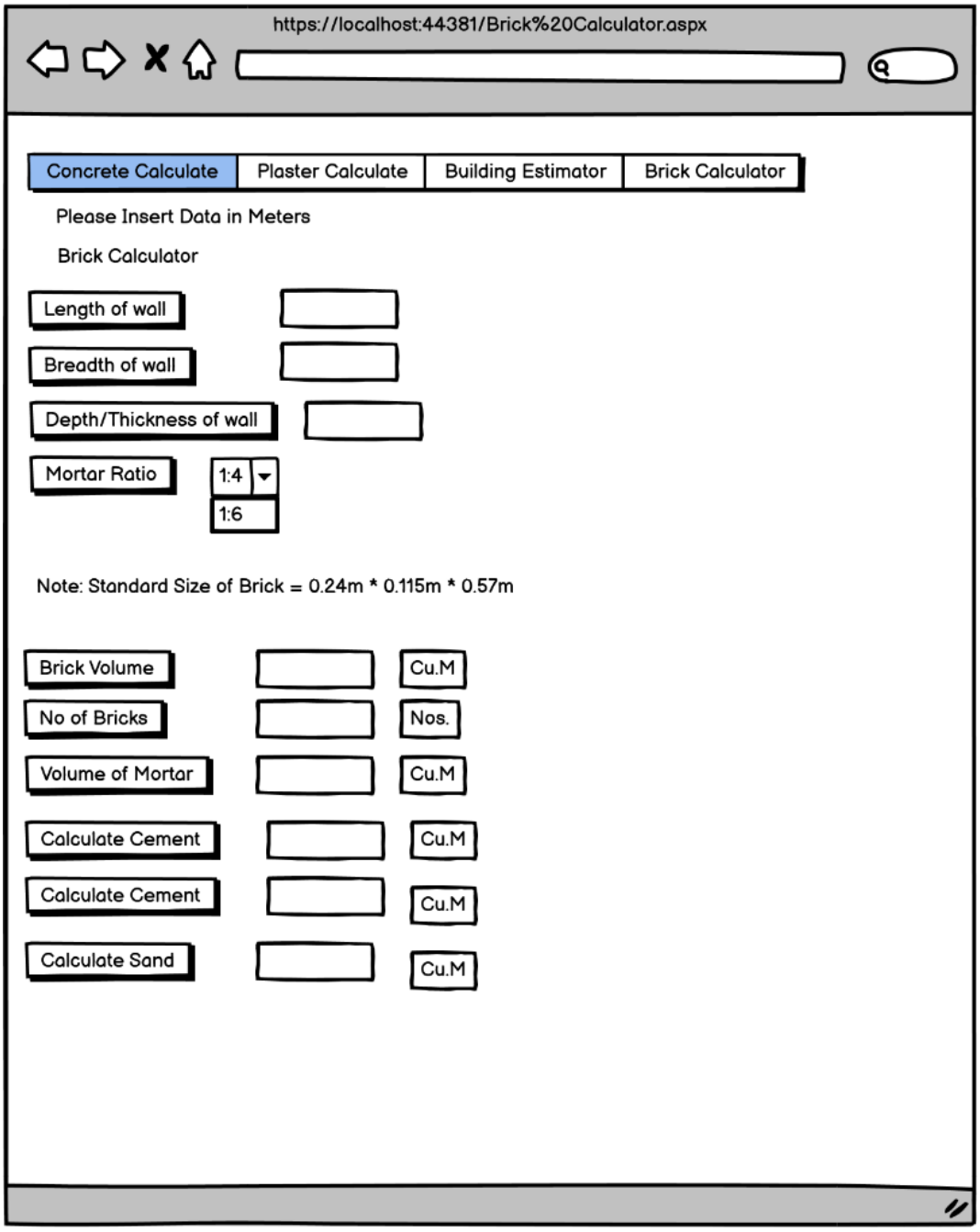

Figure 15 Brick

The above figure shows the Brick calculator sheet. The user can generate various quantities related to brick from this sheet. There are three text box for the user data entry. And one dropdown combo box for user entry. Rest are the buttons for the calculation process.

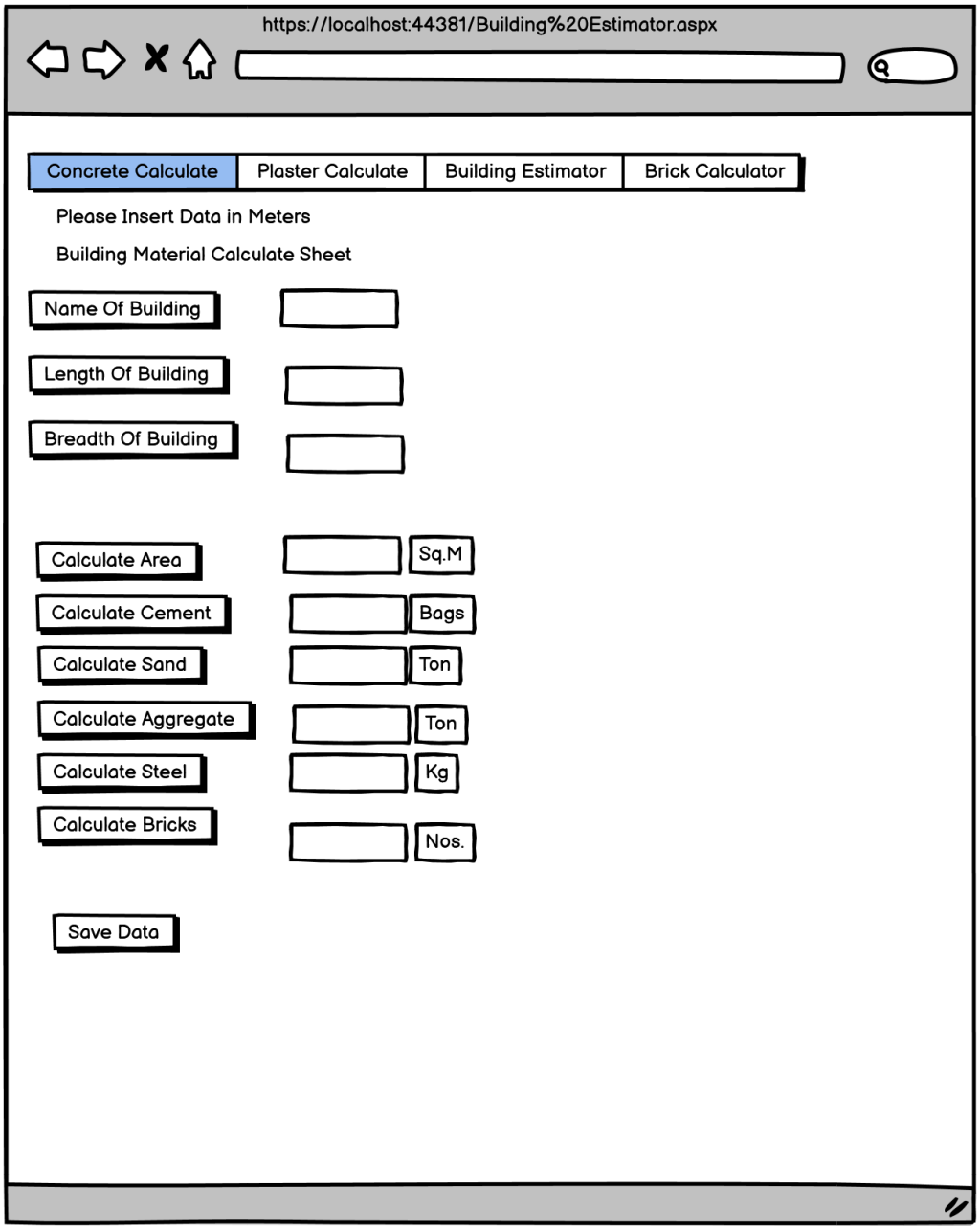

Figure 16 Building Estimator

The above figure shows the Building Estimator sheet. The user can generate various quantities related to building from this sheet. There are three text boxes for the user data entry. Rest are the buttons for the calculation process. The save button is for saving the data to the database file.

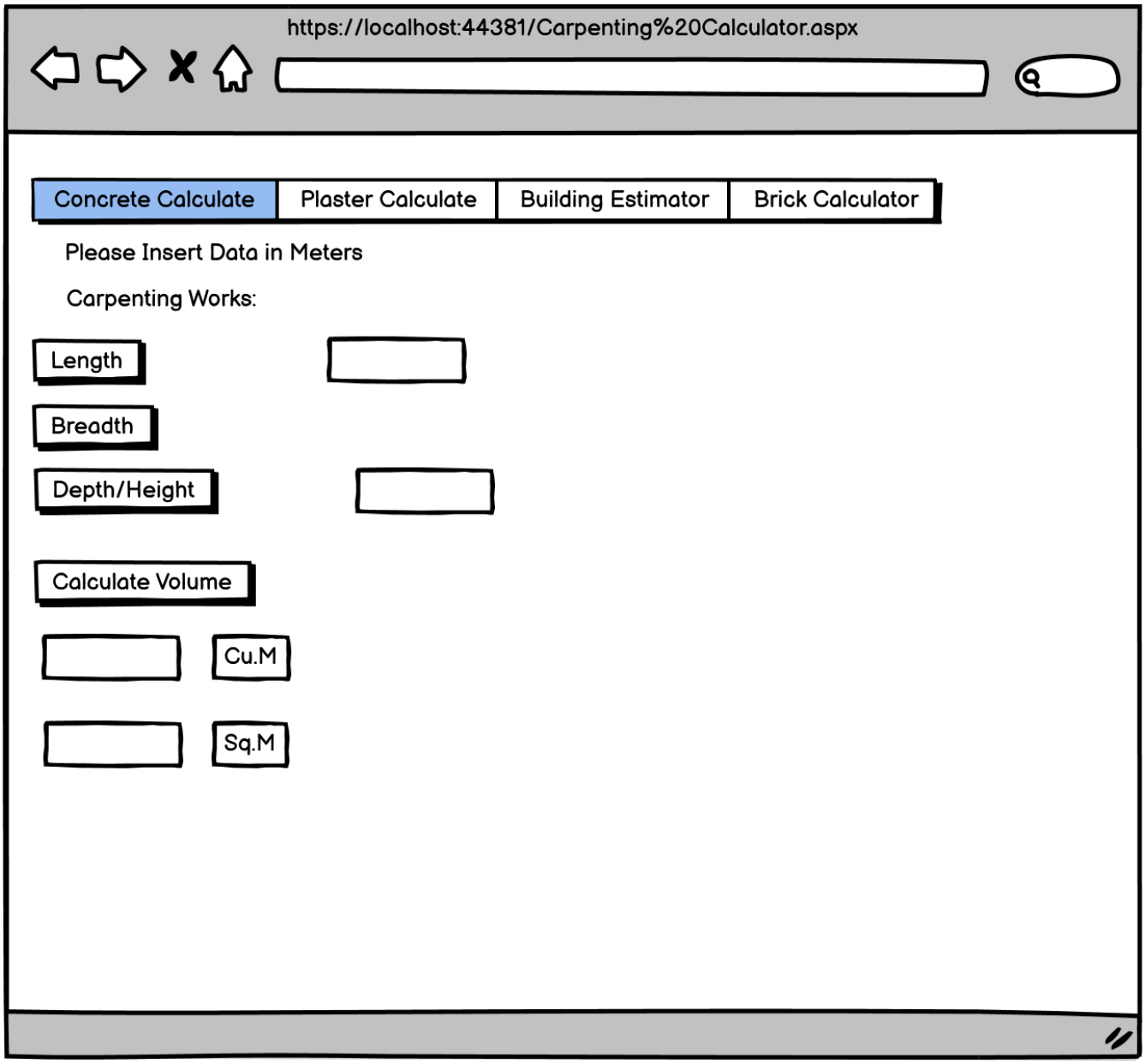

Figure 17 Carpenting Calculator

The above figure shows the Building Estimator sheet. The user can generate various quantities related to building from this sheet. There are three text boxes for the user data entry. Rest are the buttons for the calculation process.

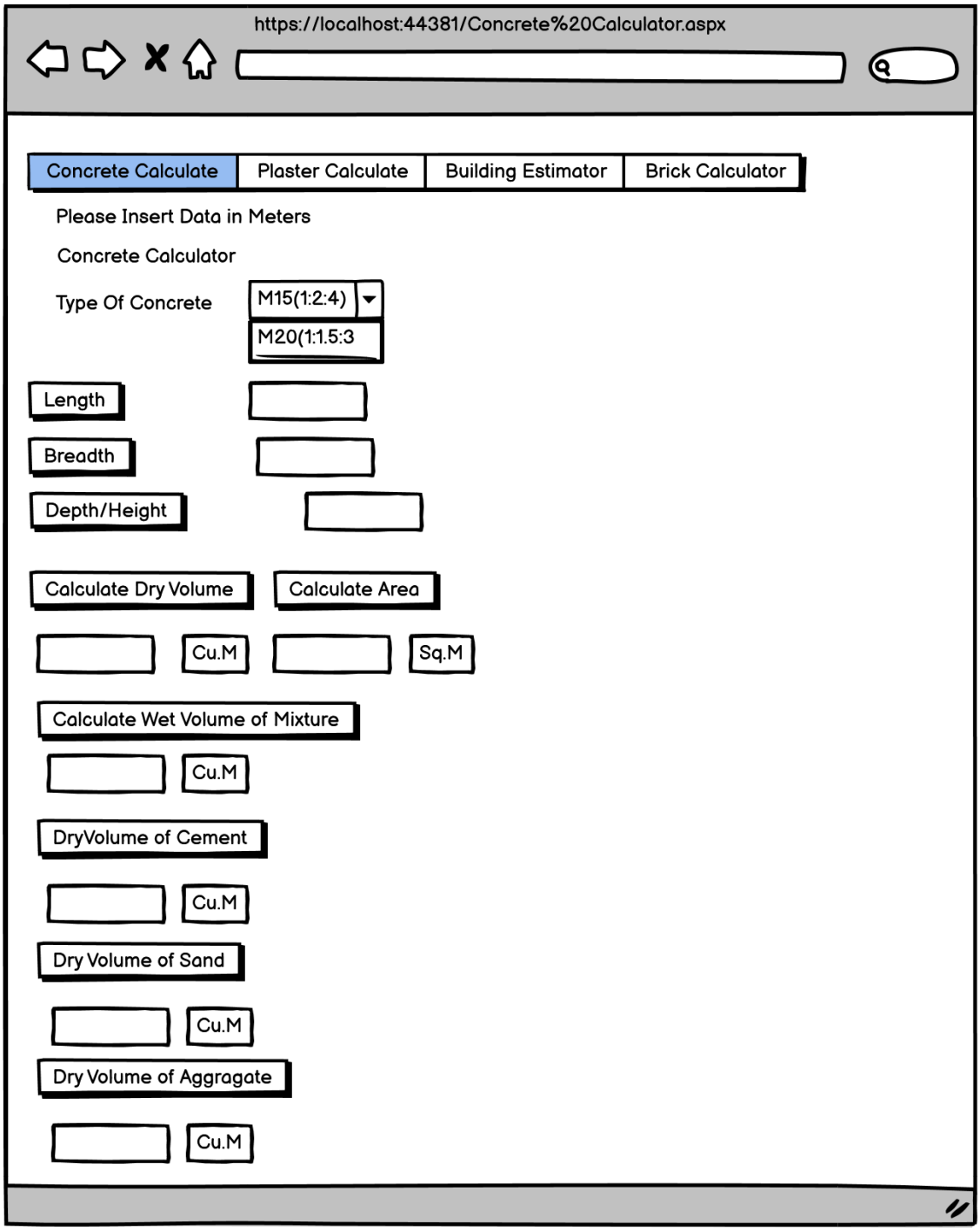

Figure 18 Concrete Calculator

The above figure shows the Building Estimator sheet. The user can generate various quantities related to building from this sheet. There are three text boxes for the user data entry. Rest are the buttons for the calculation process.

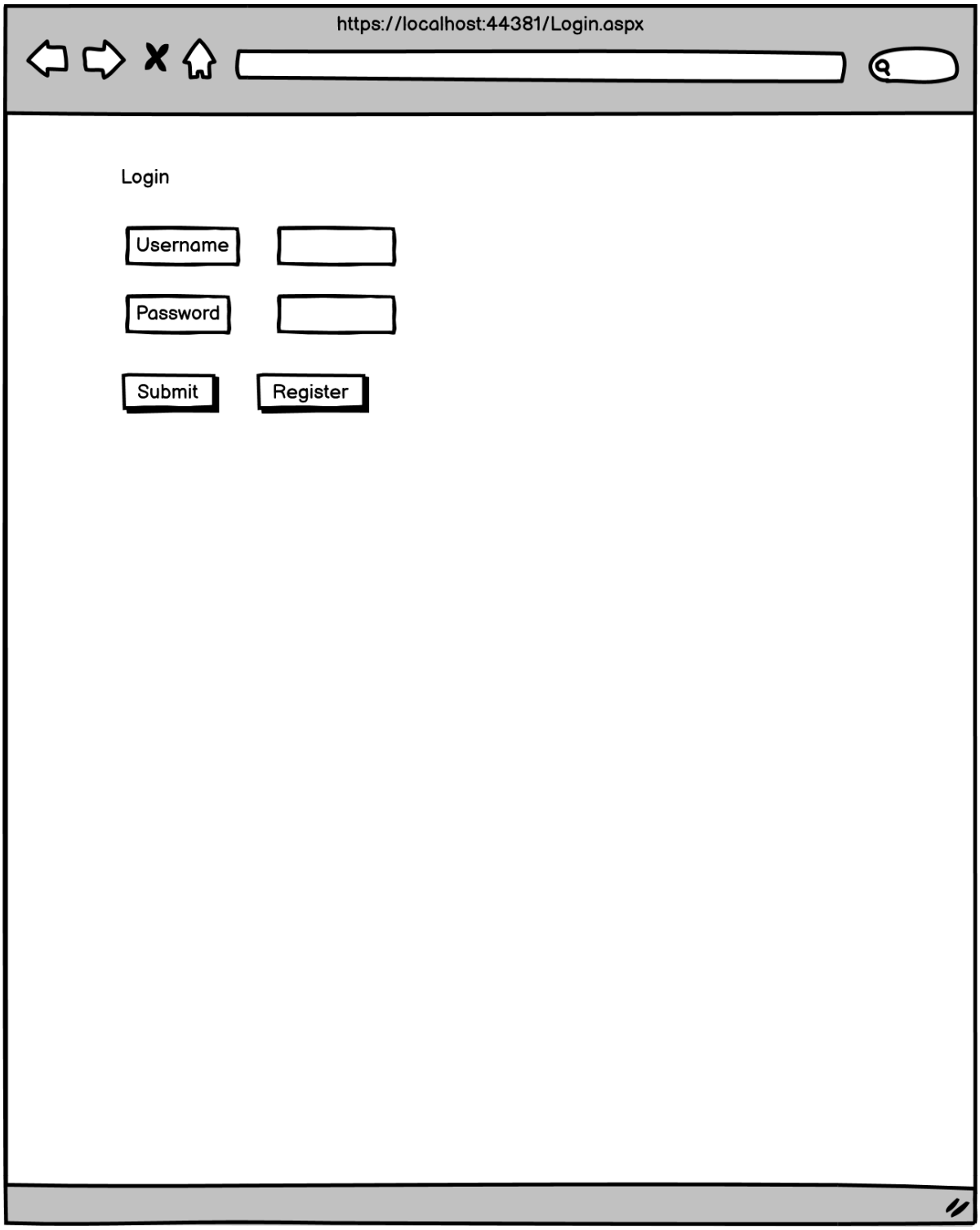

Figure 19 Login

This is the login page, there are two textbox for data entry for user. And two different buttons for login and register.

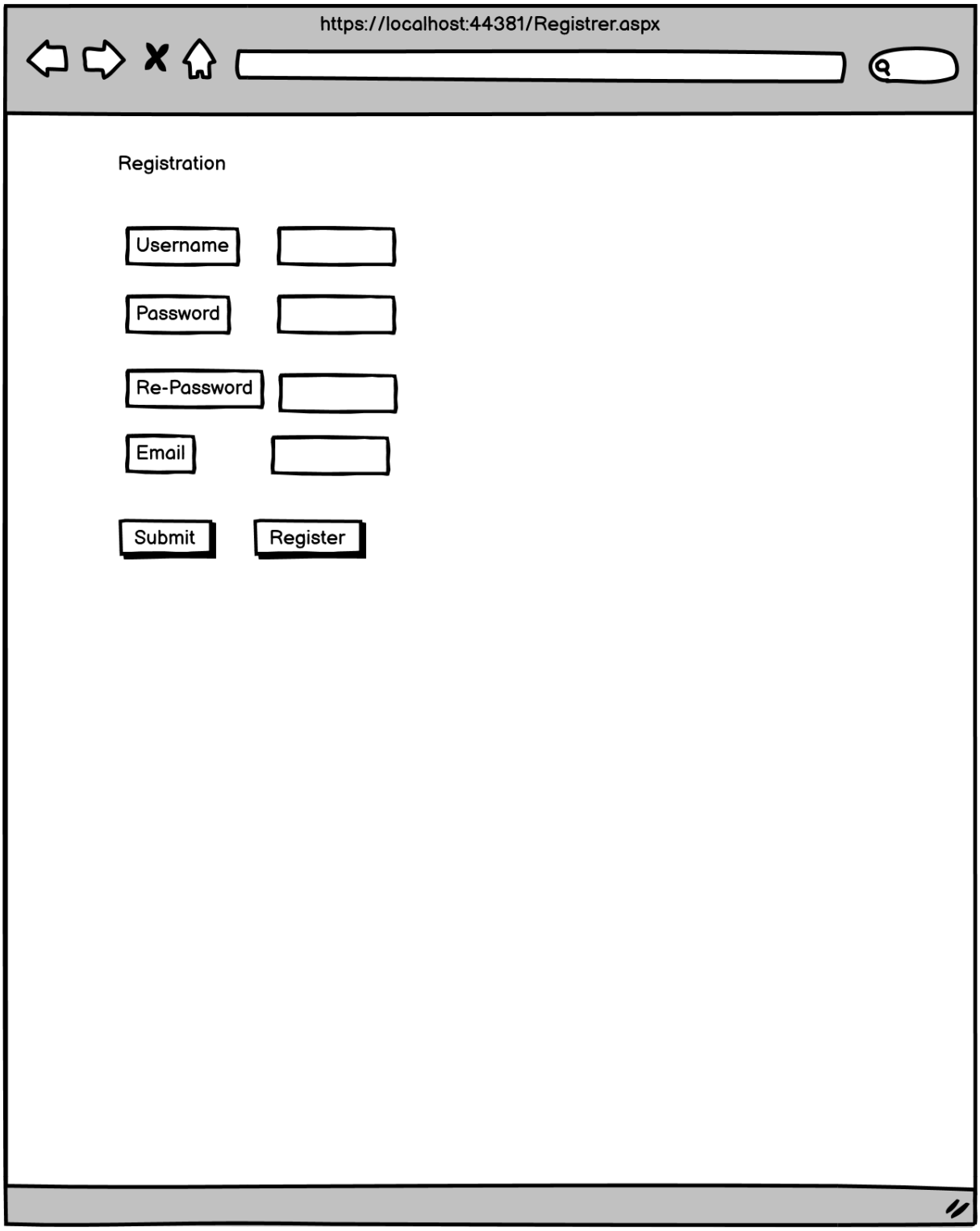

Figure 20 Pharmacy Screen

This is the Register page, there are four textbox for data entry for user. And two different buttons for login and register.

5.2. Use Case Diagram

The key software architecture standard, which is underdeveloped software requirements, is the usage case diagram. The predicted behavior is seen in the use cases, but not the right solution. We'll build on the textual and visual descriptions of the approach until we know what use cases we're representing. In our use-case studies so far, we have analyzed. What our users want is at the heart of our thinking. It's a useful technique to have in explaining behaviors from the user's perspective, from end-user perspective. Actor Identification

In the use cases, actor communicates with the system for meaningful work that can assist it in achieving its target and in determining its overall position in the system. The actors in this system are as follows:

1. Customer
2. Admin

- Use case Identification
- Use Case defines the features that are to be implemented in a planned system and that could include the features of another Use Case or extend it to include its own conduct. The main and most common cases in which this system is used are:
- Register User
- Log In
- Concrete Calculate
- Plaster Calculate
- Building Estimator
- Brick Calculator
- Carpenting Calculator
- Steel Calculator

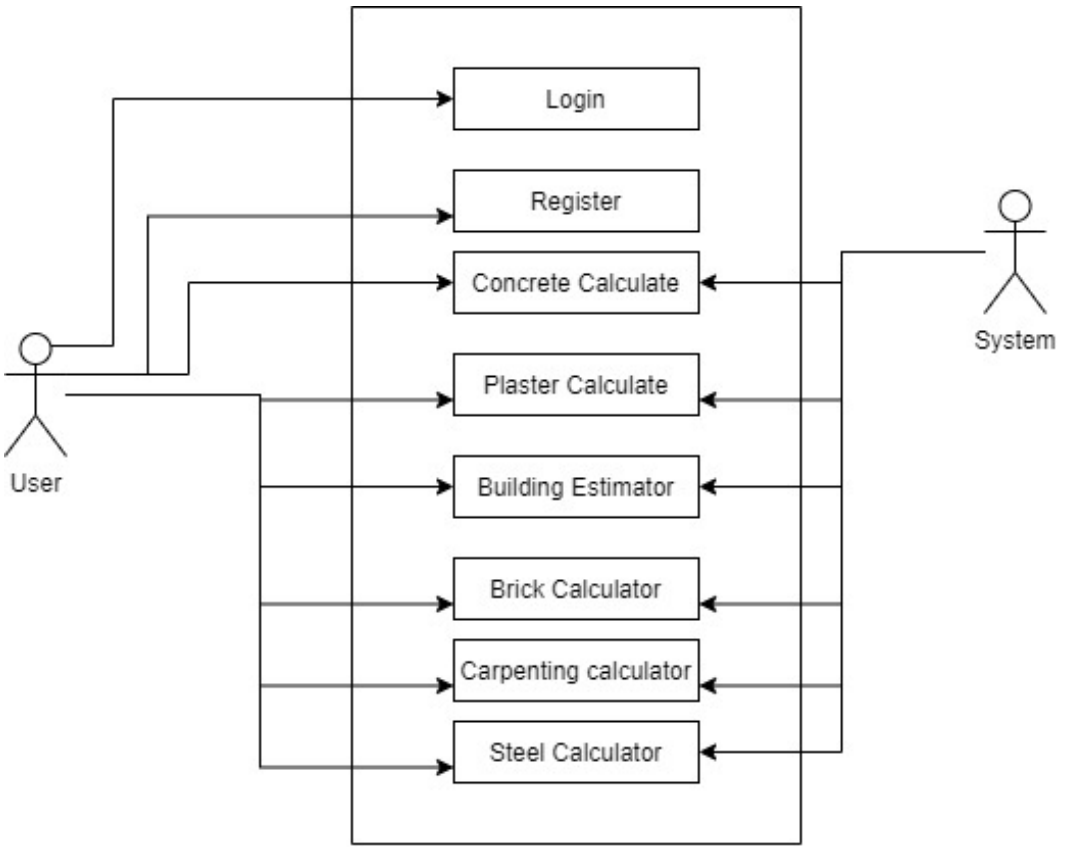

Figure 21 Use case diagram for Mero Hisab

5.3. Flow Chart

A flow chart is a visual representation of an algorithm, a procedure or a method. It consists of various geometric symbols and arrows. Lines and arrows indicate the sequence of the steps and their connections. It shows a method, an algorithm of a machine or a device. They are also used in several fields in an easy-to-understand way to represent, track, investigate, enhance and express a range of processes. Often, flux diagrams are drawn with rectangles, ovals, and sometimes diamond-like and arrow-like.

The objectives of activity diagram are:

- To perform analysis in an efficient manner, preserved resources and cost.
- To illustrating the logic behind a system.
- To help in debugging processes.
- To serve as a guideline for the systems analysis and software progress.

Flowchart for user Register and Login

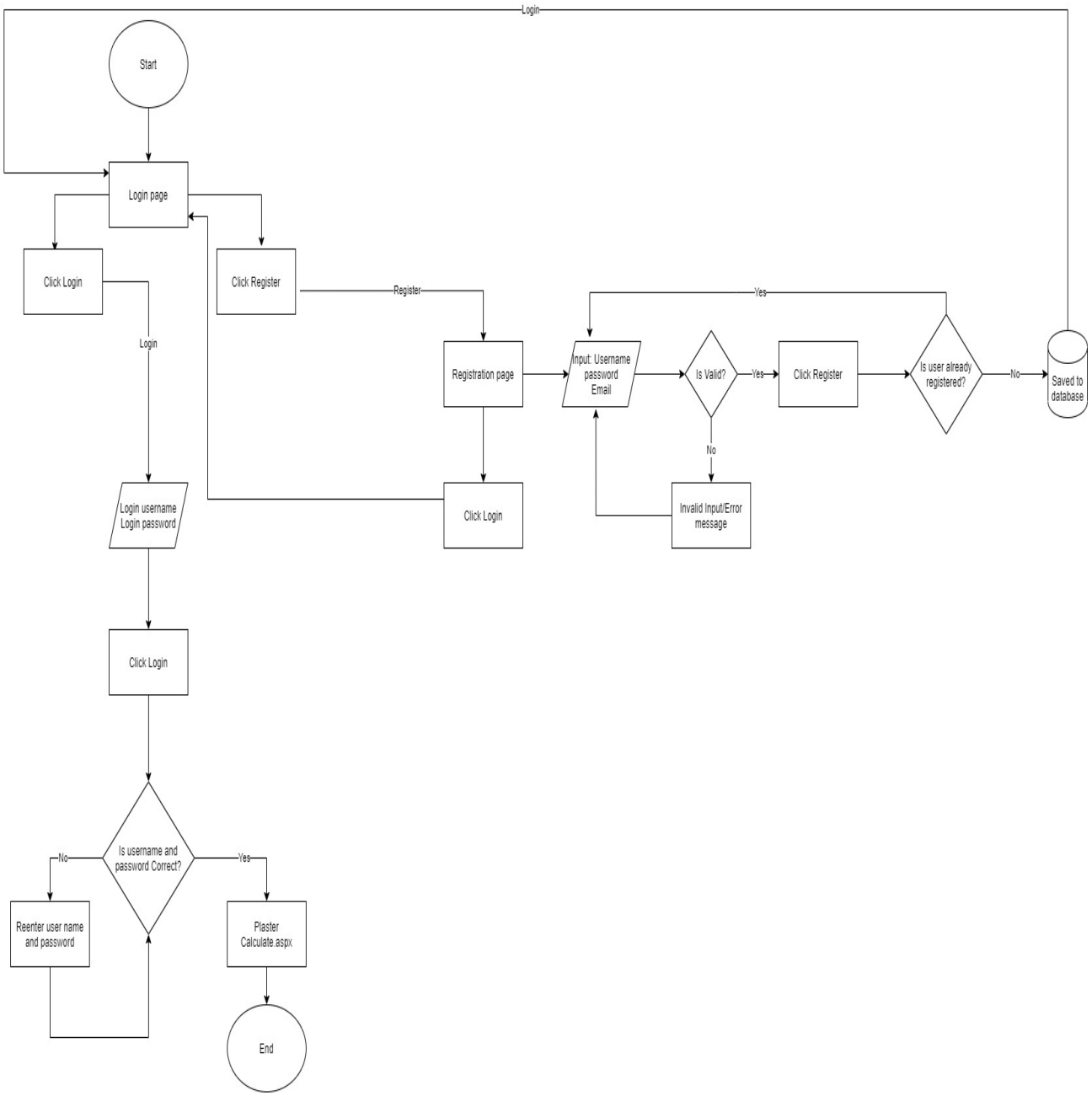

Figure 22 Flowchart for user register and Login

Flowchart for Bricks

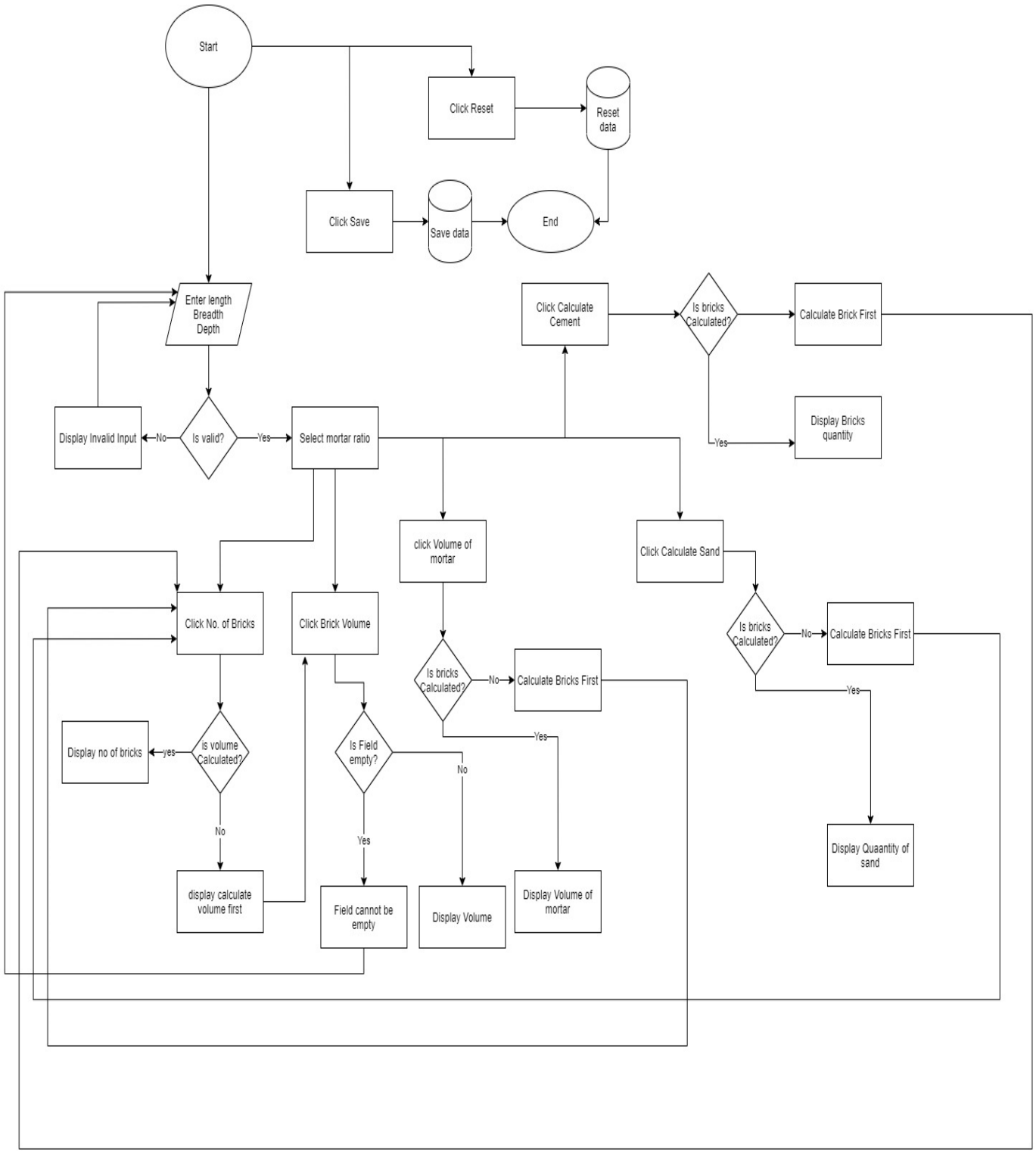

Figure 23 Flow chart for

Flow Chart for Building Estimator

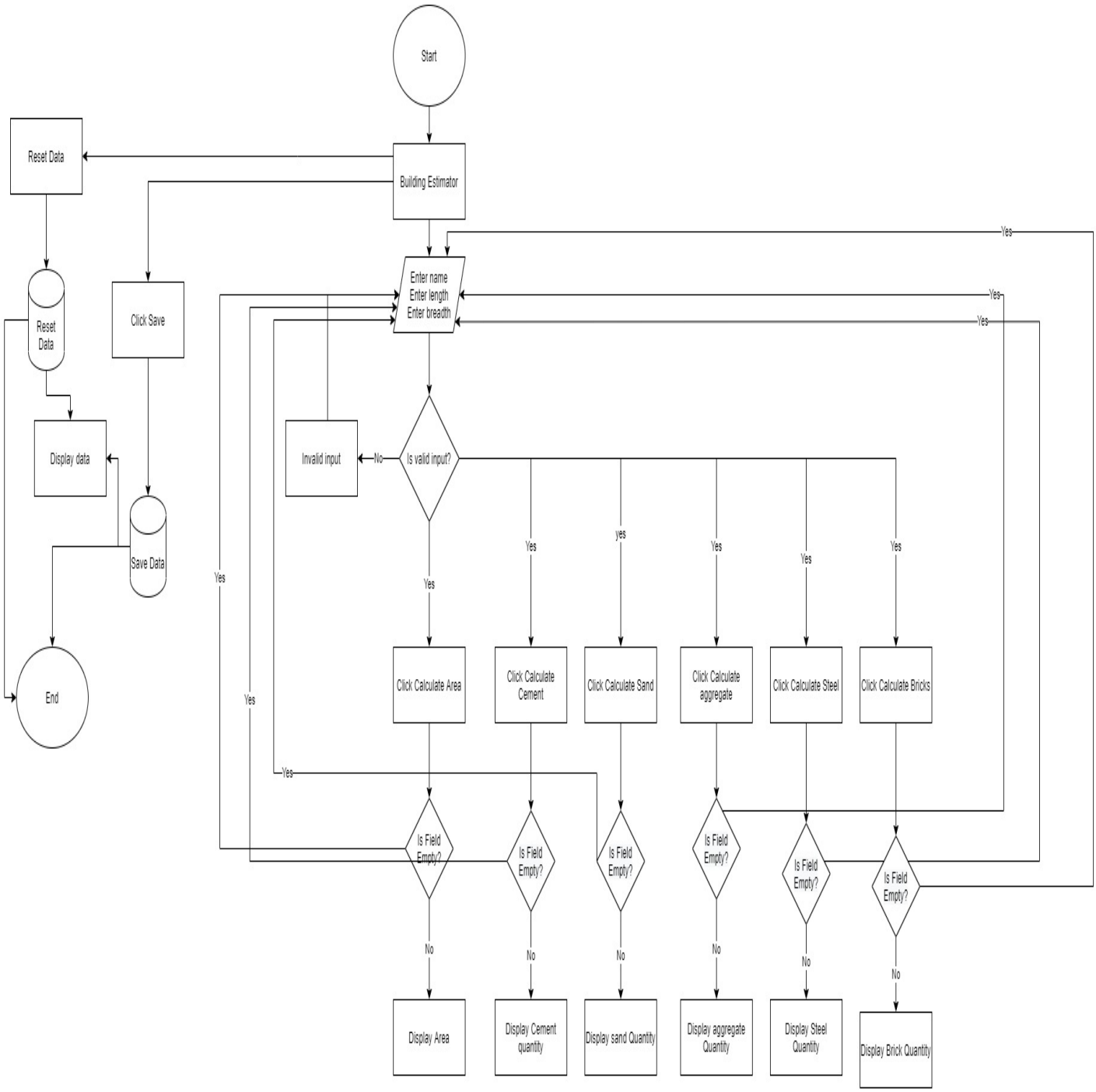

Figure 24 Flow Chart for Building Estimator

Flow Chart for Concrete Calculator

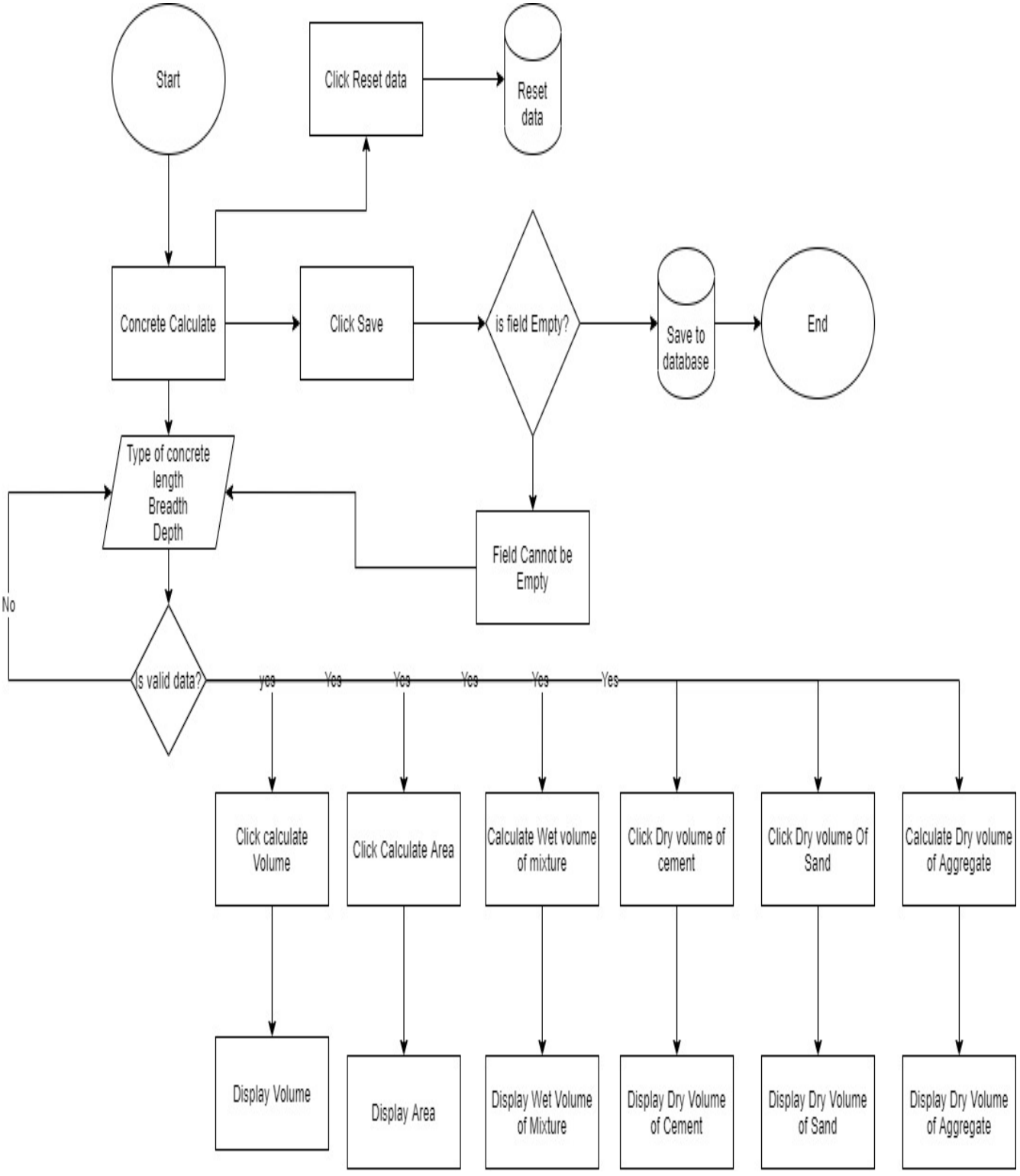

Figure 25 Flow Chart for Concrete Calculate

Flowchart for Plaster

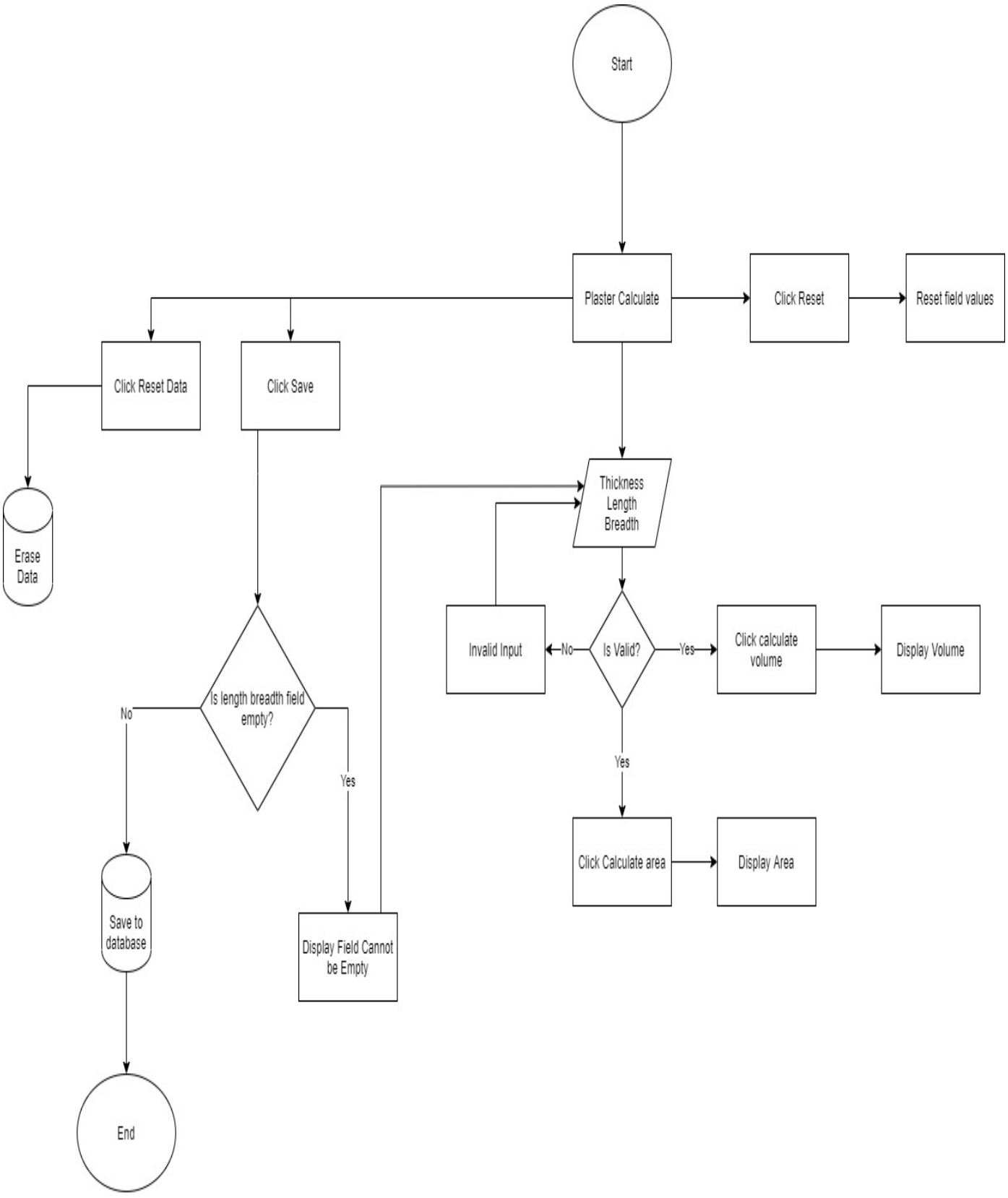

Figure 26 Flowchart for Plaster

Flowchart for Plaster

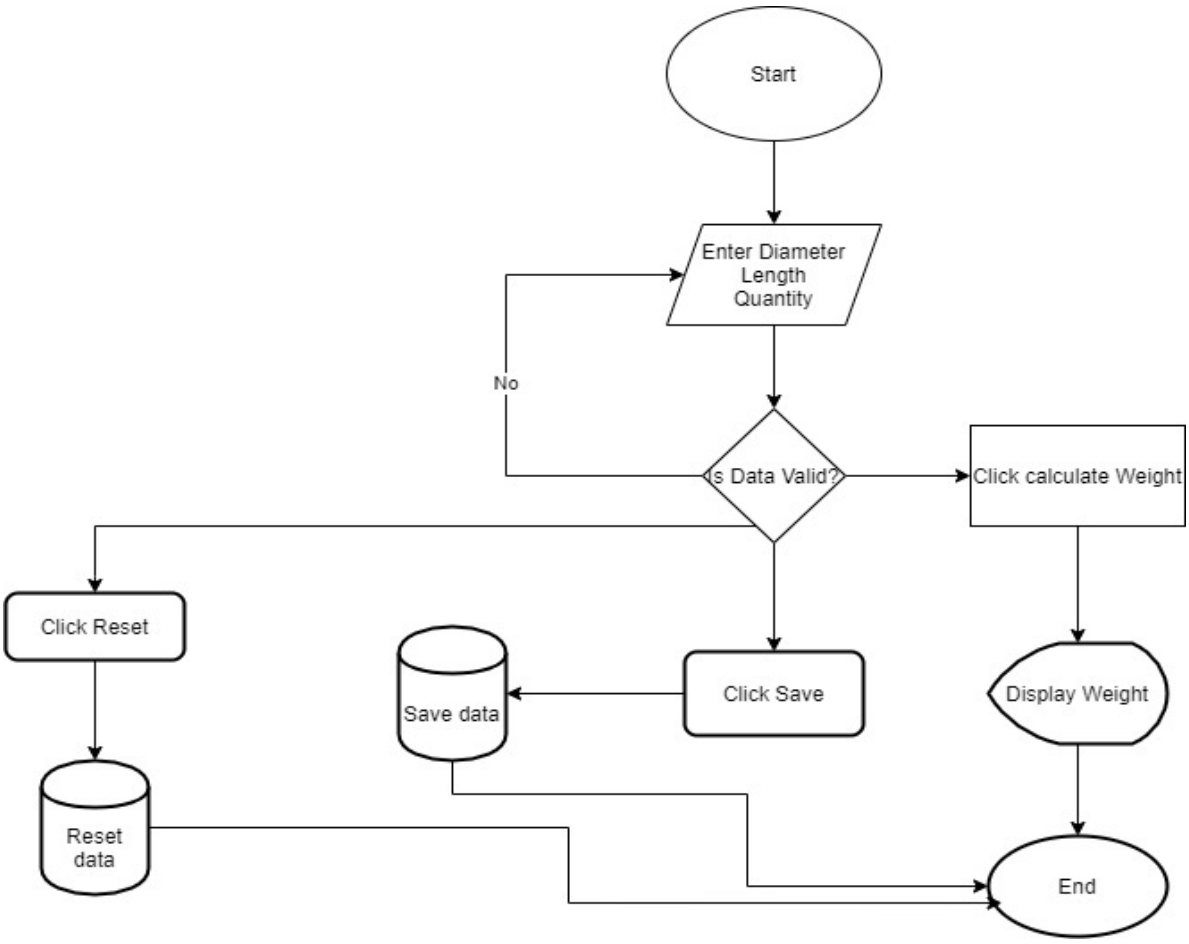

Figure 27:Steel calculate

5.4. Activity Diagram

Another complex section of the UML graph to illustrate is the activity diagram. The activity diagram basically consists of a more advanced kind of flowchart that shows how the process progresses. The diagrams illustrate how activities are linked in various stages of abstraction to provide services. Generally, operations must lead to an incident, particularly where multiple activities are used, because a number of cases typically involve overlapping or where specific activities work together. It is ideal not only for the design of market flows, but also for the modelling of workflows in a set of case uses. (Visual Paradigm, 2021)

The objectives of activity diagram are:

- • Displaying system activity flow.
- • Describe the branched, parallel and simultaneous flow of the system.
- To describe the sequence of different activities.

Login activity diagram

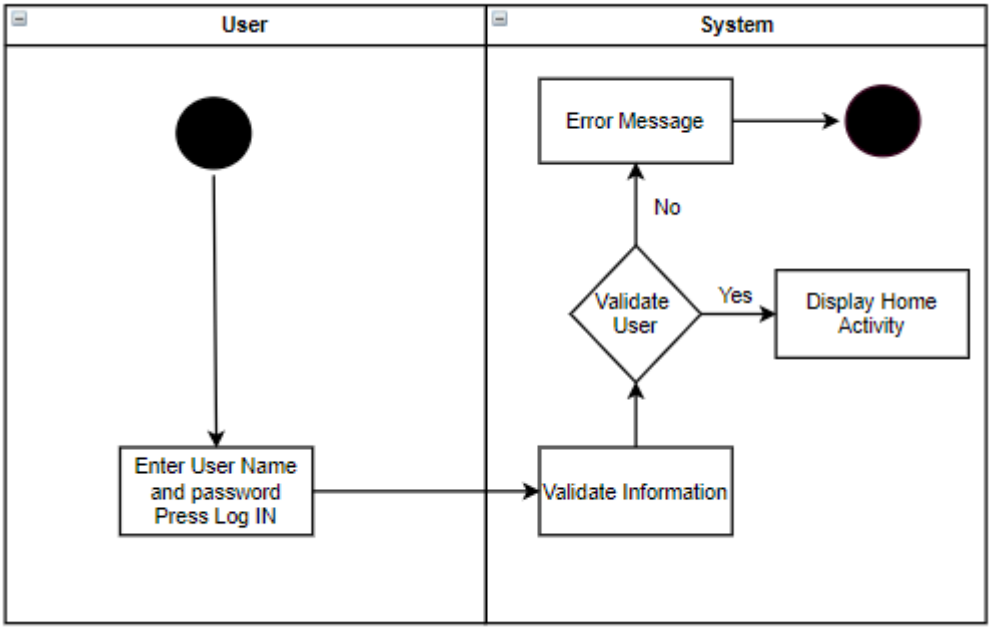

Figure 28 Login activity diagram

In the above diagram, we can see is login activity diagram. The user is required to enter their username and password on the process is initiated when user press the login button on the login form. The user is only able to log in if his credentials are correct even if username or password is incorrect, error message will be displayed.

Register activity diagram

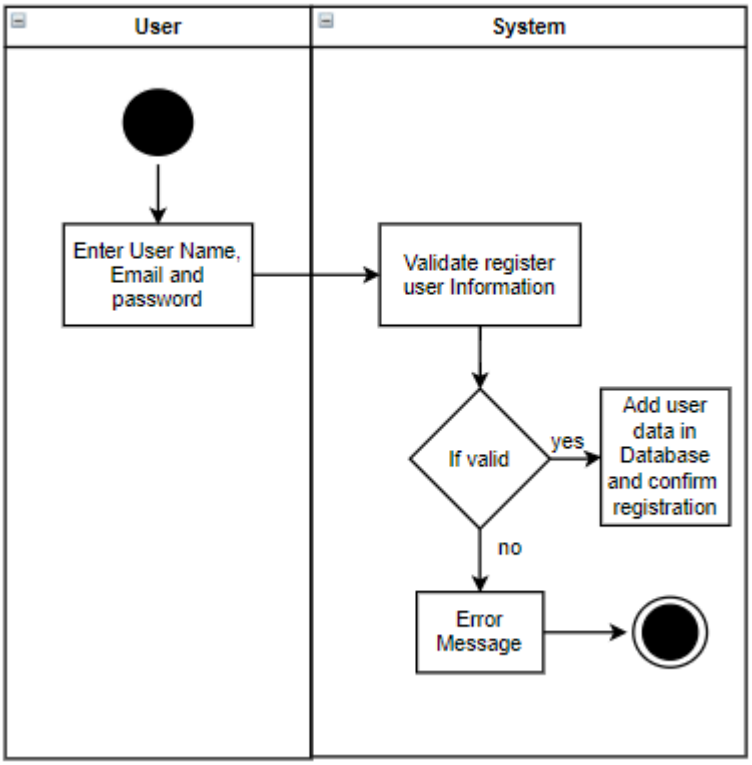

Figure 29 Register activity diagram

In the above diagram, we can see is register activity diagram. The user is required to enter their email, username and password on the process. When user tap the register button on the register form the data provided by user will be validated. If the data are correct, data will be saved in database otherwise error message will be displayed to the user.

Save activity diagram

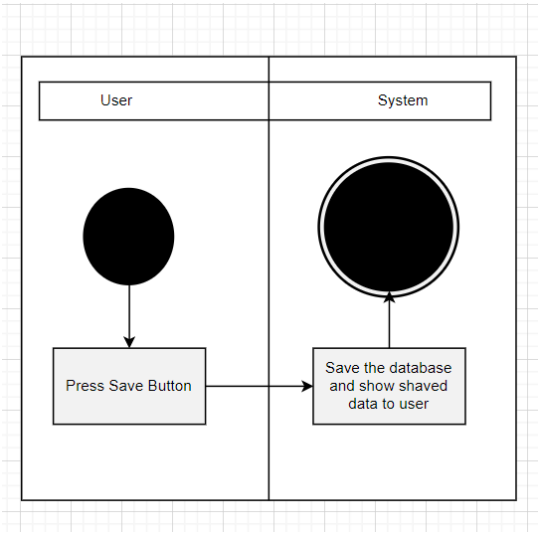

Figure 30 Save Activity Diagram

The above diagram is the save activity Diagram. When the user clicks the save button, data is saved to database and saved data is displayed to the user.

Reset button Activity Diagram

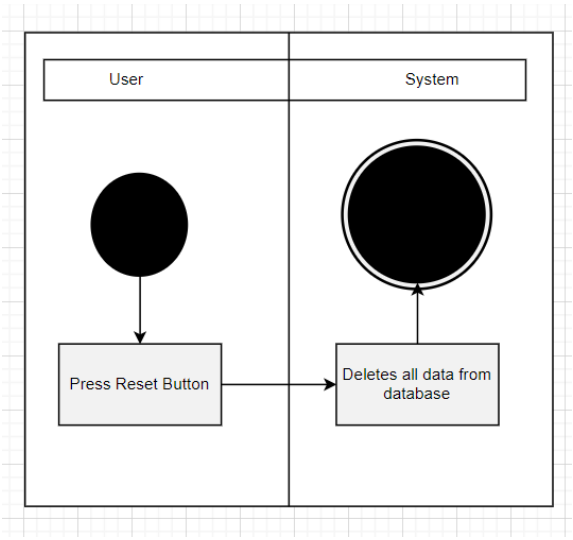

Figure 31 Reset Button activity diagram

The above diagram is Reset button diagram. When the user clicks the Reset button, all data from the data will be erased.

5.5. Sequence Diagram

Sequence diagrams are diagrams that is similar to interaction diagrams in that they represent the details of how processes are performed. In interaction design, one entity can communicate with other objects not alone, but as part of a team. Sequence Diagrams indicate the order of the communication and show the passage of time by utilizing the vertical axis of the figure. It is an excellent way to view and check various run times. It represents how objects or object group communicate with the system. This can lead to predicting how a system will be behaving and determining the responsibilities a class would need in modelling a new system. (Poranen, et al., 2015)

The objectives of sequence diagram are:

- To interact between model and active objects in framework in high level.
- To deliver a collaboration in which each object instance realizes a use case.
- To model the relationship among artefacts in a use case collaboration.

Sequence diagram for login

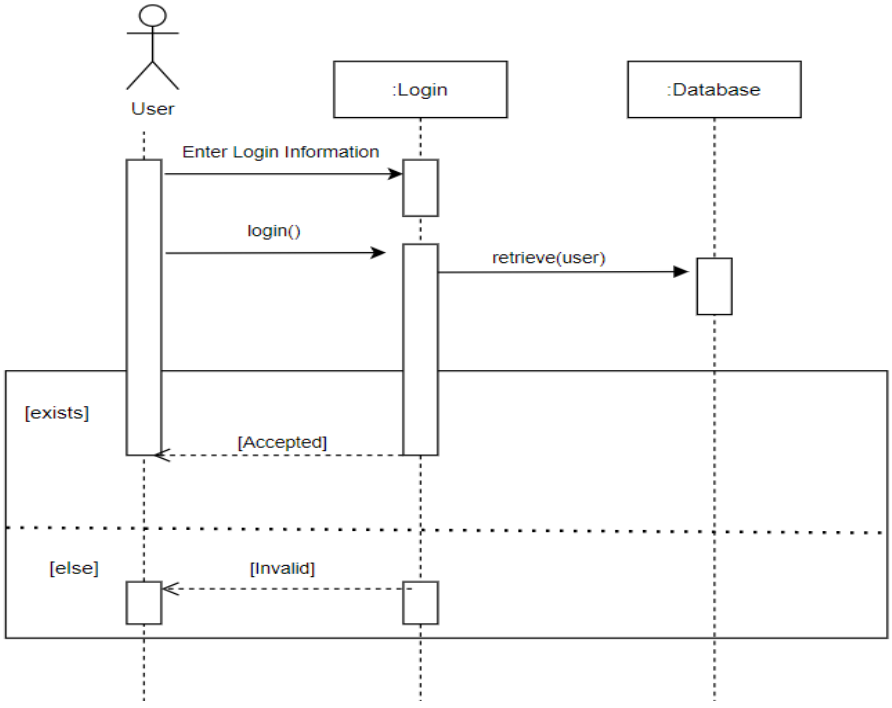

Figure 32 Sequence diagram for login

The graphic describes how a user has access to the system to validate the information about their authentication. Above, there is an actor trying to login and the system data then checks. If user cannot log on to the system, error message will appear, but the user will be forwarded to his home activity when the user logs in.

Sequence diagram for register

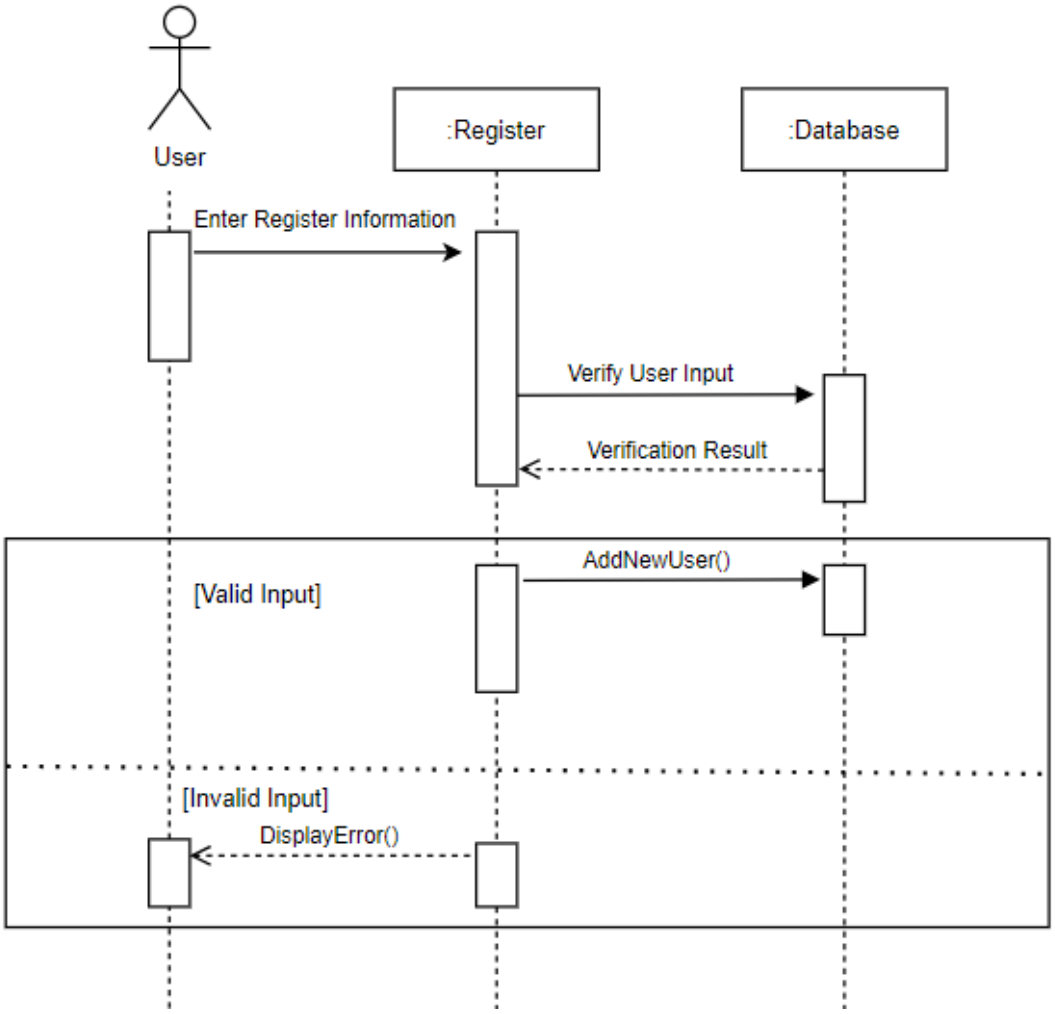

Figure 33 Sequence diagram for Register

This graph describes how the information of a user authentication is recorded in the system. An actor attempts to register with a system and then checks the user's input to the database. An error message will be shown if the user cannot register in the system. Sequence diagram for doctor appointment.

Sequence diagram for brick calculate

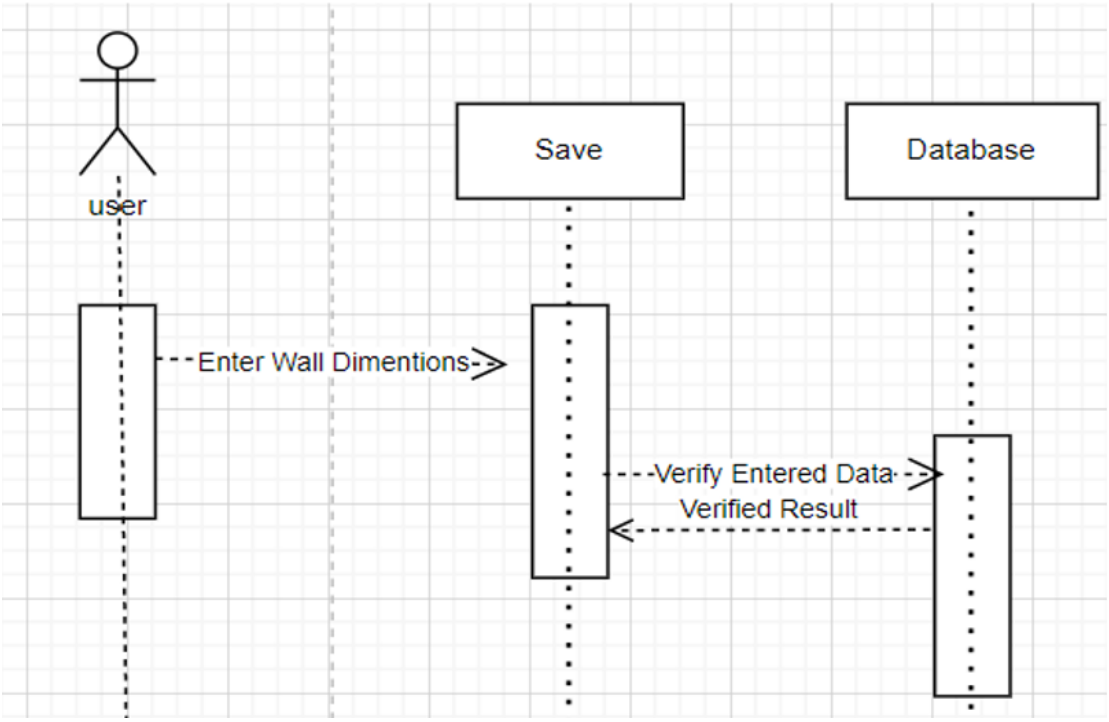

Figure 34 Sequence diagram for brick calculate

Sequence Diagram for Reset Data

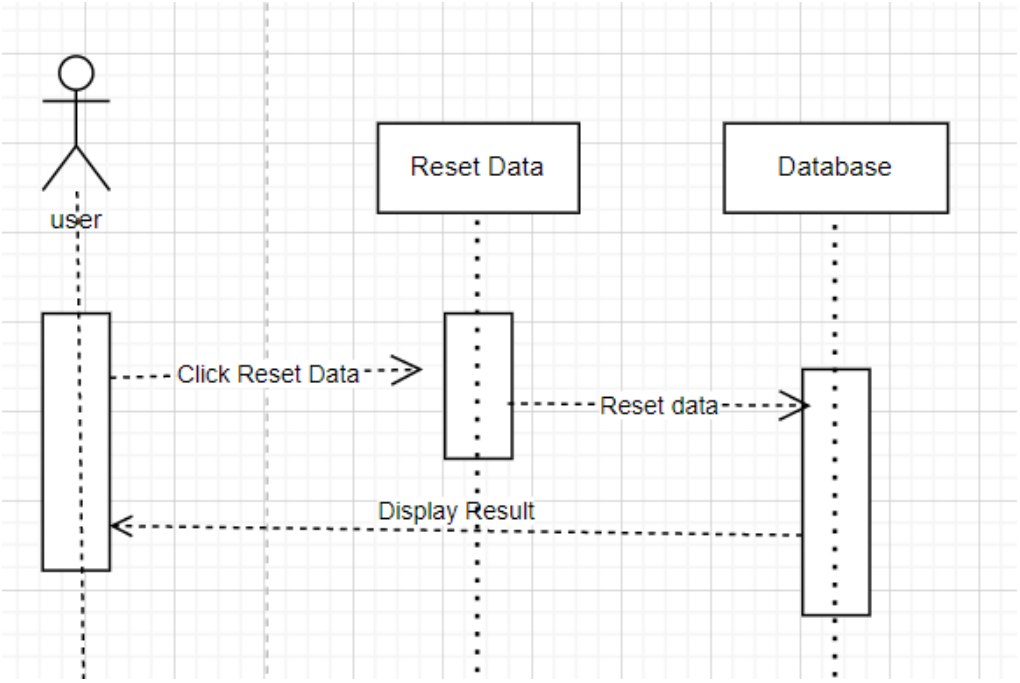

Figure 35 Sequence diagram for Reset data

5.6. ER Diagram

ER Diagram is a form of structural diagram used in database design. The relationship between entities in a database is shown. An entity set is a collection of identical entities. These entities may have characteristics which detect their properties. The ER diagram illustrates the conceptual framework of databases by defining the entities, their features or their interactions. It is used to build a database design. The entity relation diagram of the Mero Hisab Web app can be seen below. It demonstrates the relationship between the database and the tables.

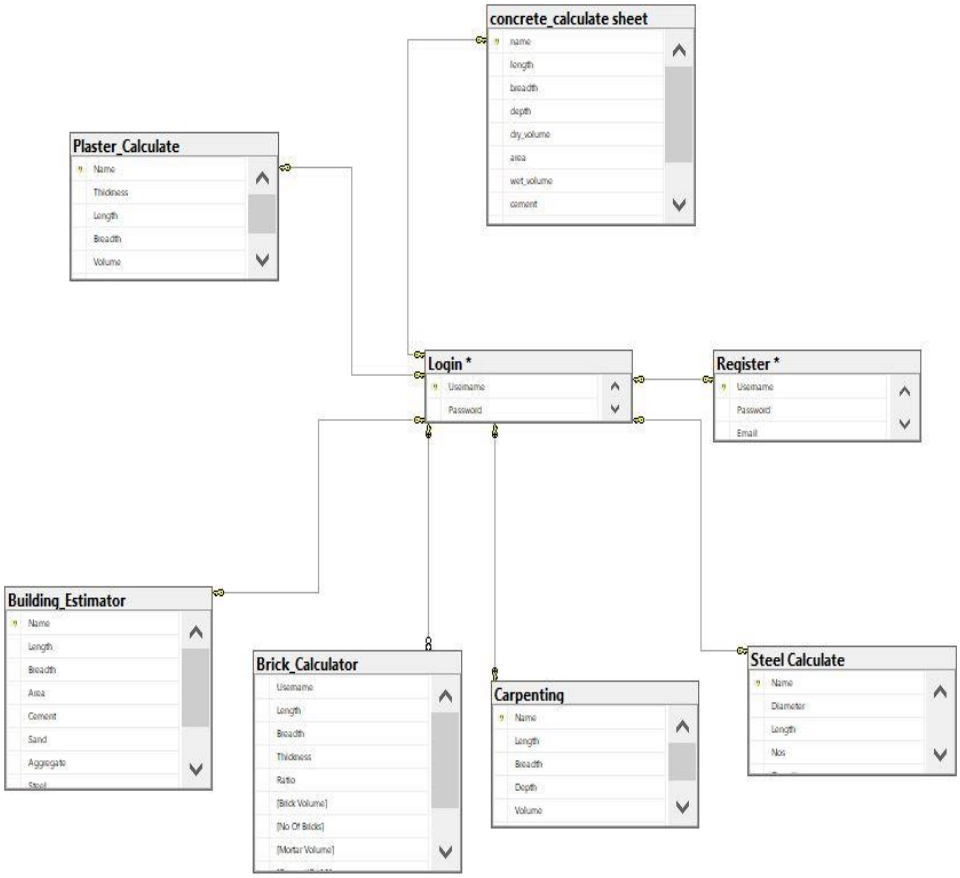

Figure 36 ER Diagram for Mero Hisab

5.7. Class Diagram

The class scheme is a diagram used to illustrate the configuration of the system by describing the class, the characteristics, the object attributes, and the various functions in which the objects are involved, and by virtue of their attributes. A class diagram is a great help to visualize the various aspects of

system design and to develop applications. It describes the system attributes and operations and the limitations the system needs to fulfil. Due to their close matching with the programming languages, class diagrams are used to model object-oriented programmes, making them the only UML graphs in which objects are mapped directly. (Tutorials Point, 2021)

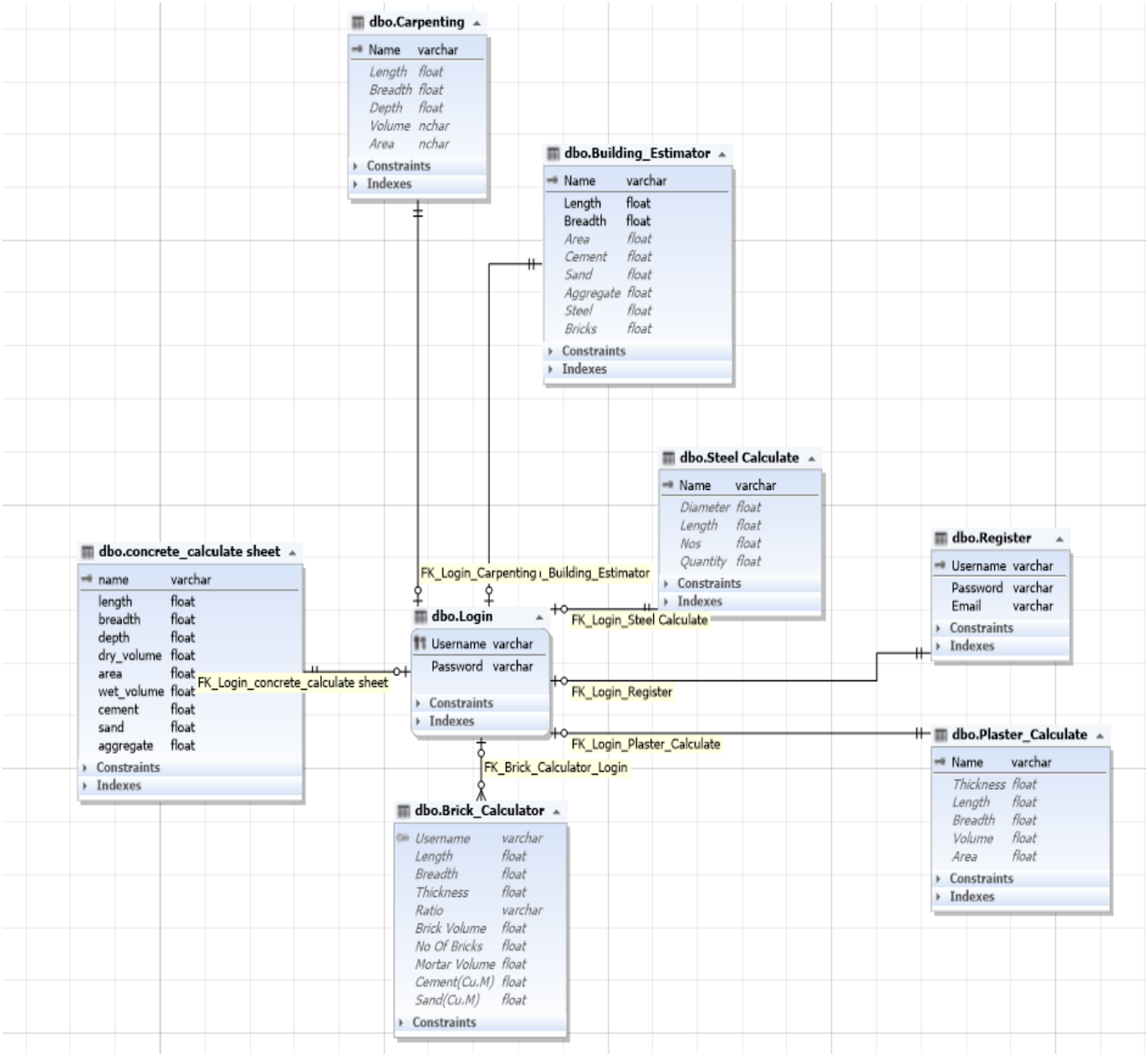

Figure 37 Class diagram for Mero Hisab

5.8. UI Designs

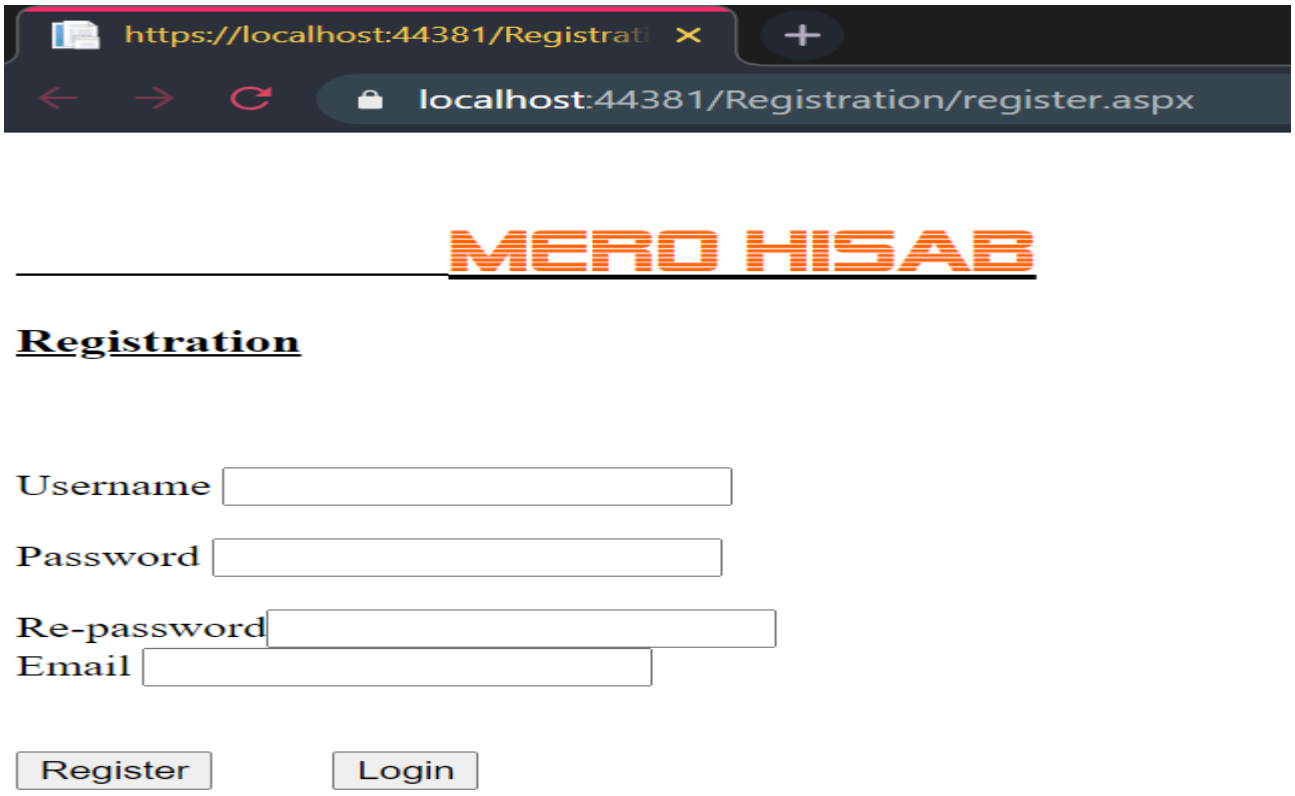

Figure 38:Registration Page

Figure 42: shows the Registration page of web-based app named as “Mero Hisab”. In this page, the user must register by entering the username, password and email. This is the initial stage of starting the app. After giving the username, password and email, the user must click the register button to get registered. After the registration the user will be redirected to the Login page automatically. But if the User is already registered, a message will be shown as” Username Already Exist”. And if the user already exists, then the user can directly go to the login page by clicking the Login button.

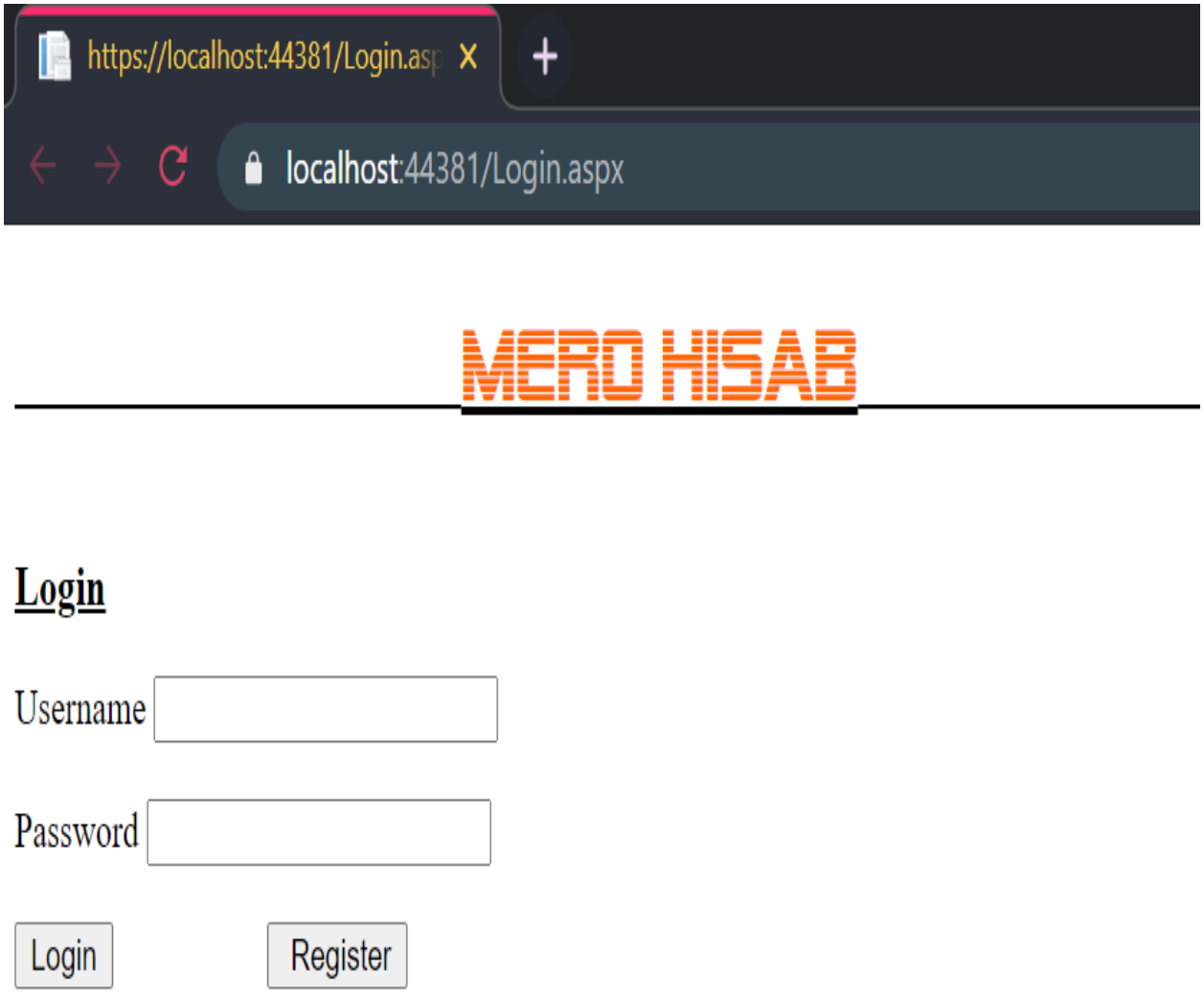

Figure 39:Login Page

Figure 2 shows the Login Page of “Mero Hisab” Web-App. The pre-registered user can enter the username and password in the mentioned field for getting access to the full functionality of the application. If the user gets to the login page mistakenly by clicking the login button in registration page without being registered in Mero Hisab then the user can click the Register button available in the login page to get back to the registration page for the new registration purpose. If the user enters the wrong username and password the message will be shown as “ Invalid Login Attempt”.

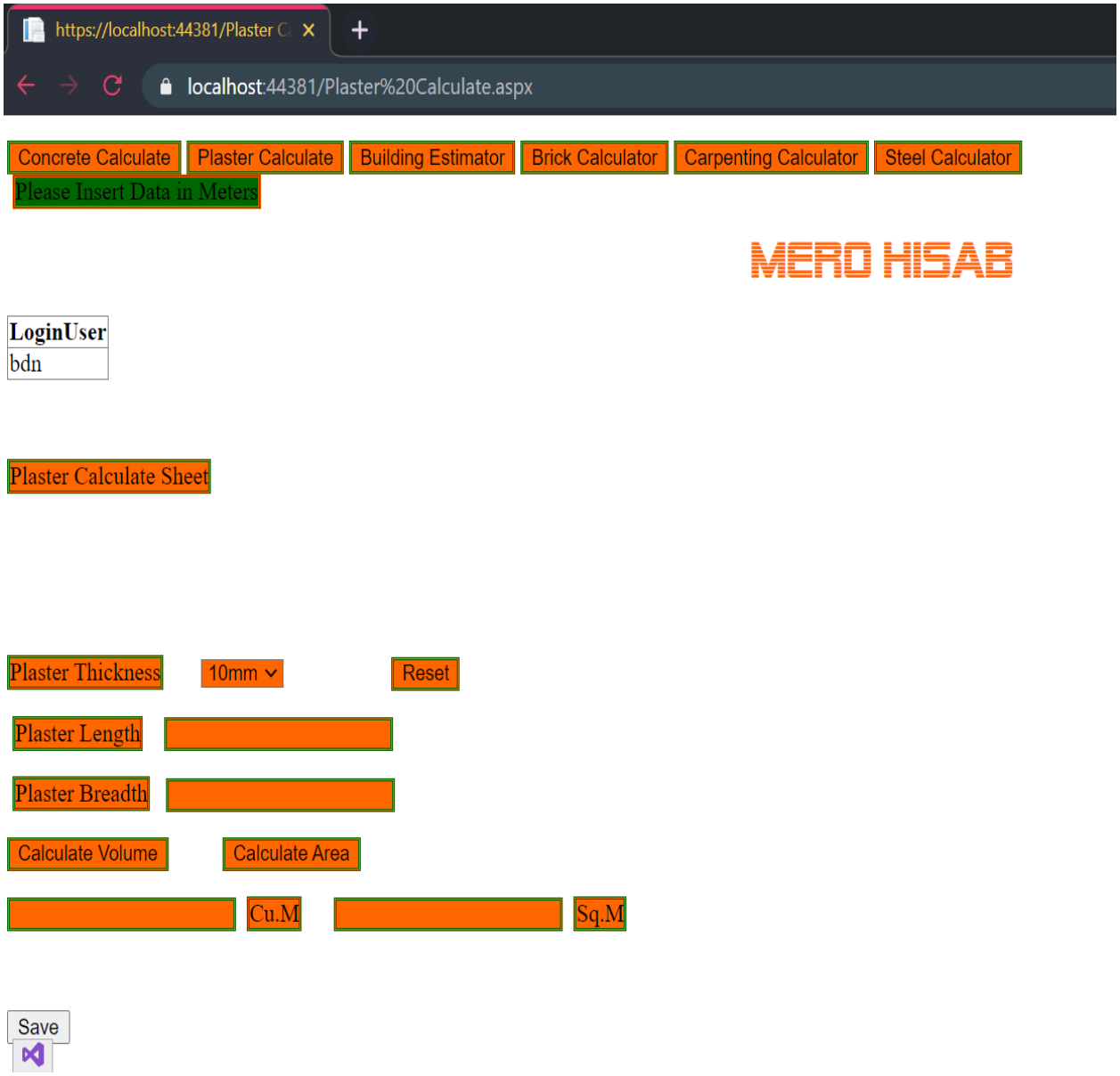

Figure 40: Plaster Calculate

The Figure 3 shows the Plaster calculate page. This page is set as the default page after user gets logged in. The user can see the top menu bar where different buttons are kept for the navigation purpose between the tabs. Concrete calculate, Plaster Calculate, Building Estimator, Brick Calculator, Car are the name of buttons for the navigation purpose between the tabs.

In this tab, Name of the registered user is shown in the top left corner of the screen. The user can select the thickness of the plaster from the dropdown button and length and breadth are entered manually. The user can calculate the volume of the plaster and can also find the total area of the plaster area. The user can also save the data in the database file for the future record by clicking the save button placed at the bottom left of the page.

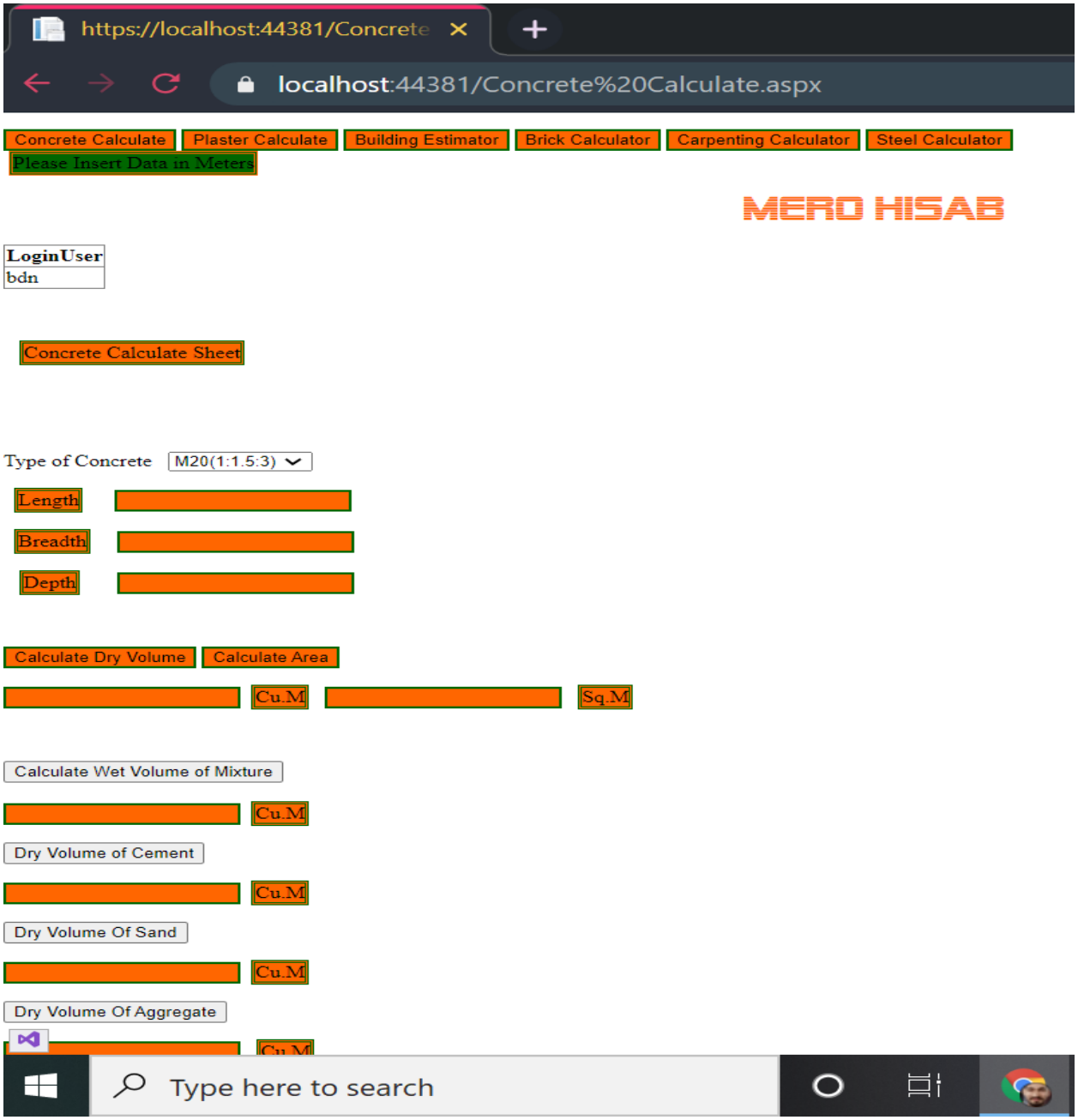

Figure 41: Concrete Calculate Sheet

When the button named as “concrete calculate” is clicked by the user, then the user will be redirected to the concrete calculate sheet. In this sheet the user can calculate the wet volume of the mixture. Also the user can calculate the quantity of cement, quantity of sand and quantity of aggregate. For that calculation, the user must provide some data to the system through the textbox. The user have to enter the length, breadth and depth/thickness of the concrete. Then the user can select the type of concrete. After that desired result can be obtained by just clicking the buttons given. The user also can save the data for further use and reset the data if needed.

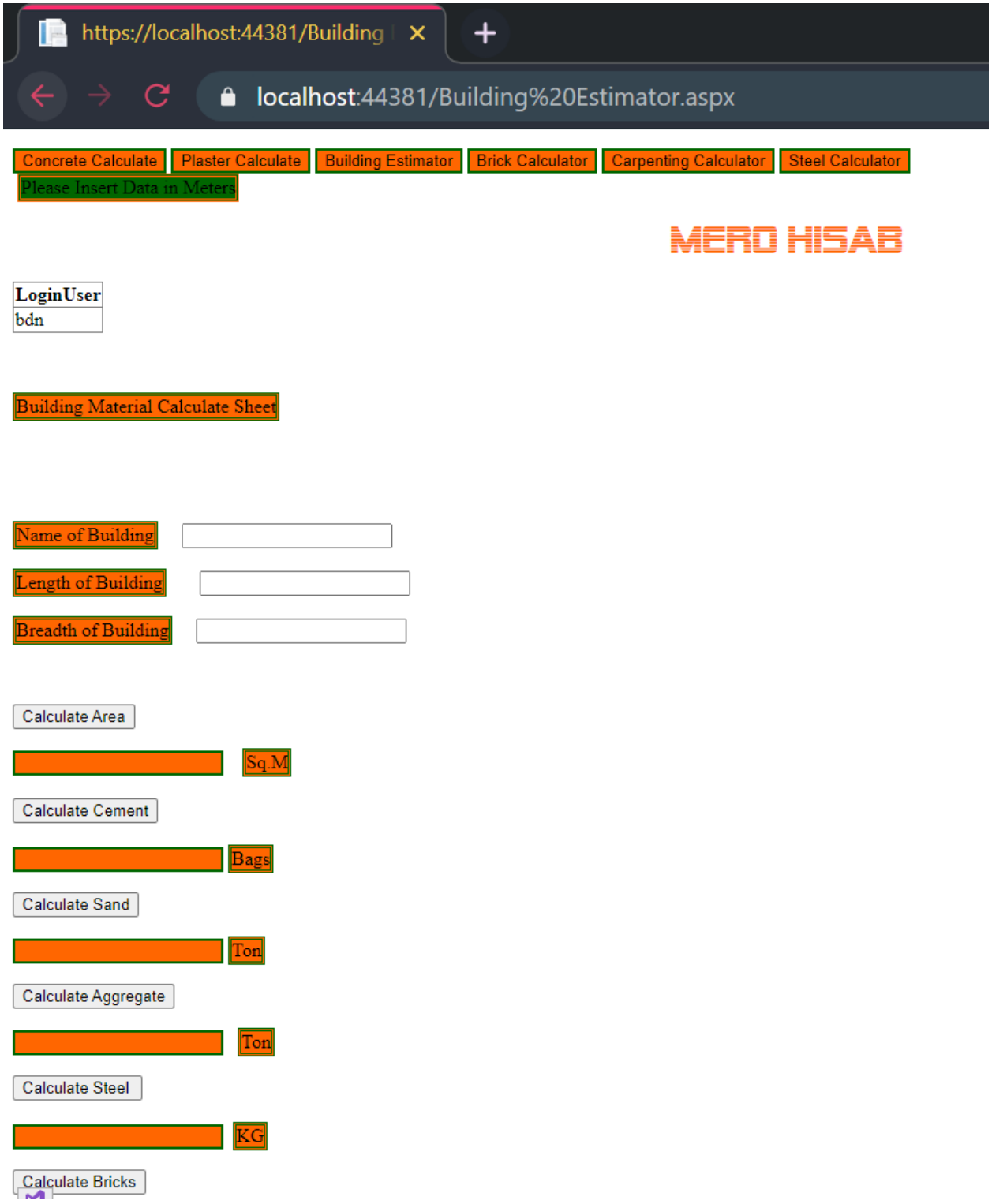

Figure 42: Building Material Estimate sheet

Figure 5 shows the building Estimator page of Mero Hisab web app. In this page the user can calculate the volume of various materials needed to build the building in the obtained area. First of all the user have to enter the name of the building, then the user must enter the length and breadth where the building is to be made. After that, the user can calculate the area by clicking the “Calculate

Area” Button. Which will give the total area of the building. Also, the user can click the next button just below the “calculate Area” button named as “Calculate Cement” to find the no of cement bags required to complete the project. Similarly, User can find the Quantity of Sand, Aggregate, steel and bricks that are needed for the construction of the building. The user can save the data by clicking the save button for the future use and record. If the user wants to clear the data from the record, the user can delete the data by clicking the button named as “Reset Data” button.

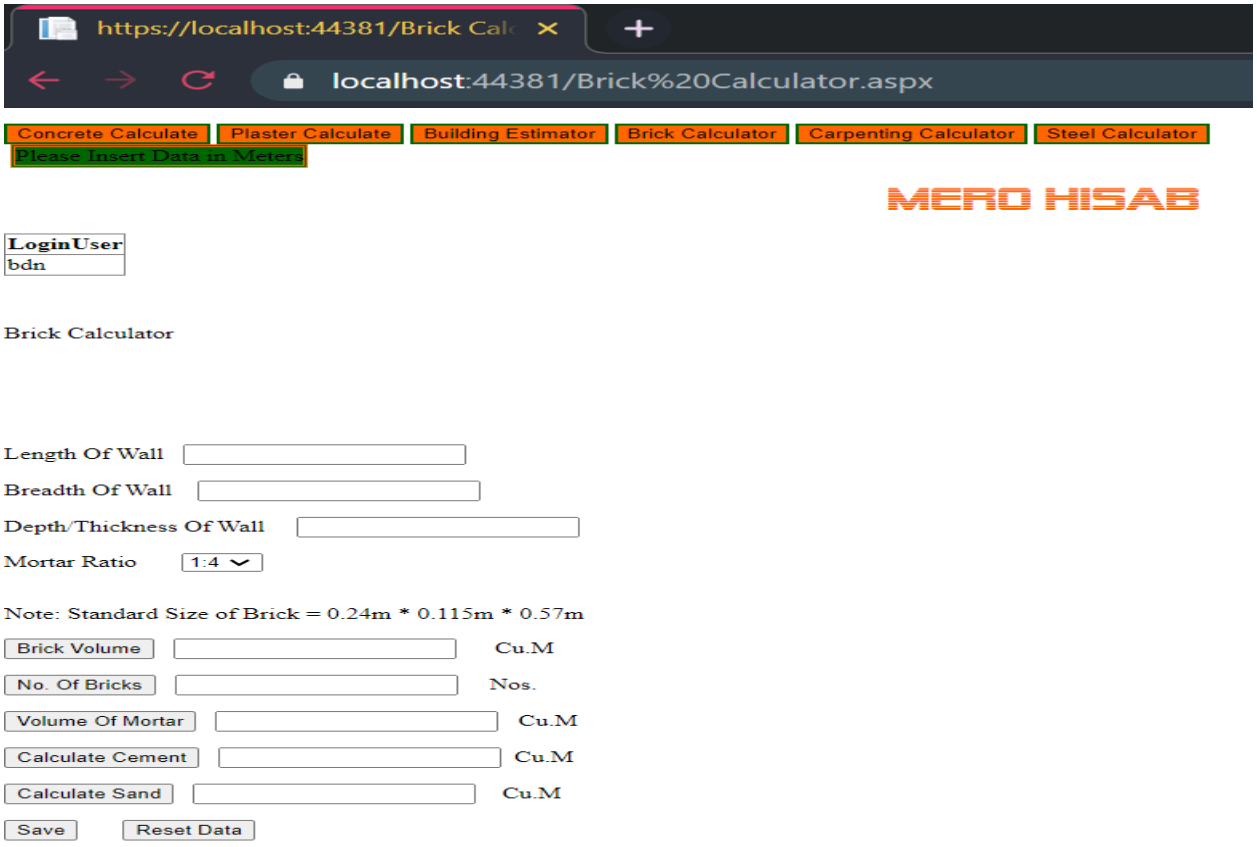

Figure 43:Brick Calculator

When the user clicks the brick calculator button available on the top bar of the screen. The user is redirected to the “Brick Calculator” sheet of Mero Hisab Web App. In this page, the user can do various calculations related to bricks. The user must enter some data to the system and can get the desired result by just click of the buttons. The user must enter the length of the wall, Breadth of the wall and the depth of the wall. The user may also select mortar ratio for the joints of the bricks. Then the user can find the volume of bricks in the wall by click of “Brick Volume” Button. Number of bricks needed for the wall can be found out by the click of the button named as “No. of Bricks”. Volume of Mortar can be found out by the click of “Volume of Mortar” button. Also, the user can

calculate the quantity of cement and sand by the click of “Calculate Cement” button and “Calculate Sand” button respectively.

The user also can save the data for the record or future use by the click of save button. The user can also click the reset button to reset all data.

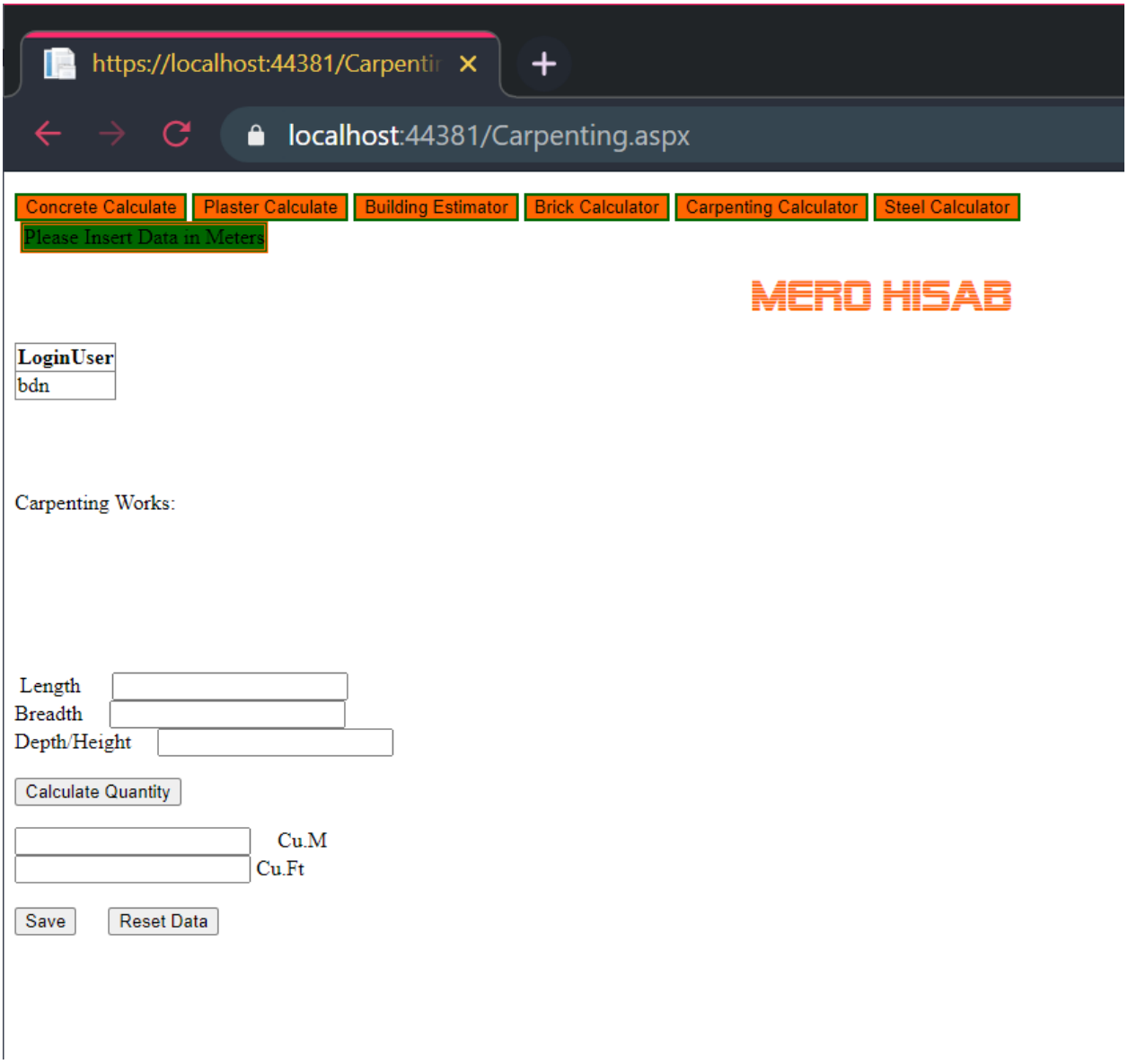

Figure 44: Carpenting Works

When the user clicks the Carpenting Calculator button, the user is redirected to the Carpenting sheet. In this Sheet, the user can find the quantity of woods required. The user has to enter the length, breadth and depth in the sheet. After entering the data to the textbox, the user can generate both volume and area of the woods with a click of the button named as “Calculate Quantity”. By clicking the save button the user can save the data for record or future use. Also the user can click the “Reset Data” button to reset the data in the database.

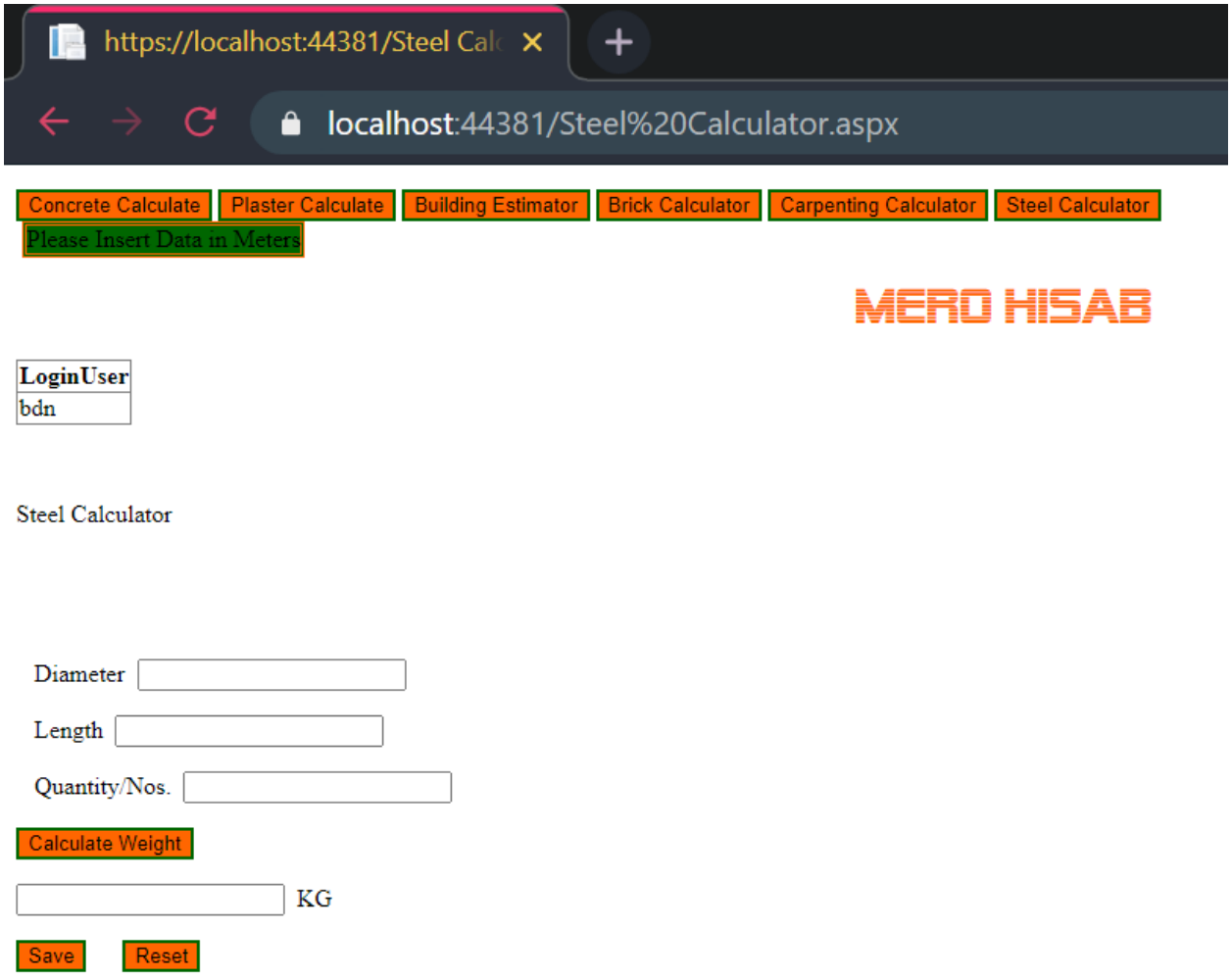

Figure 45: Steel Calculator

After the click of the button named as “Steel Calculator”, The user is redirected to the Steel Calculate sheet. The user can calculate the total weight of the steel by entering the diameter, length and no of steel. The user must enter the Diameter of the steel in the Diameter Textbox, Length in the Length Textbox, and No of steels in Quantity/Nos. textbox, then the user can click the calculate weight button to find the weight of the steel in kg.

The data thus generated can be saved for future user or just for record by clicking the save button. The user can reset the data in record by just click of Reset button.

SHREERAMPOKHREL\S....Brick_Calculator | SHREERAMPOKHREL\....FYP - Diagram_1*

Column Name	Data Type	Allow Nulls
Username	varchar(50)	☑
Length	float	☑
Breadth	float	☑
Thickness	float	☑
Ratio	varchar(50)	☑
[Brick Volume]	float	☑
[No Of Bricks]	float	☑
[Mortar Volume]	float	☑
[Cement(Cu.M)]	float	☑
[Sand(Cu.M)]	float	☑
		☐

Figure 46:Database for brick Calculator

SHREERAMPOKHREL\...uilding_Estimator | SHREERAMPOKHREL\S....Brick_Calculator | SHREERAMPOKHREL\....FYP - Diagram

Column Name	Data Type	Allow Nulls
Name	varchar(50)	☐
Length	float	☐
Breadth	float	☐
Area	float	☑
Cement	float	☑
Sand	float	☑
Aggregate	float	☑
Steel	float	☑
Bricks	float	☑
		☐

Figure 47:Database for Building Estimate

SHREERAMPOKHREL\....FYP - dbo.Login | SHREERAMPOKHREL\...e_calculate sheet | SHREERAMPOKHREL\...- dbo.Carp

Column Name	Data Type	Allow Nulls
Username	varchar(50)	☐
Password	varchar(50)	☐
		☐

Figure 48:Database for Login

SHREERAMPOKHREL\...P - dbo.Register | SHREERAMPOKHREL\...Plaster_Calculate | SHREERAMPOKHREL\...- dbo.LoginUser

Column Name	Data Type	Allow Nulls
Username	varchar(50)	☐
Password	varchar(50)	☐
Email	varchar(50)	☐
		☐

Figure 49:Database for Register

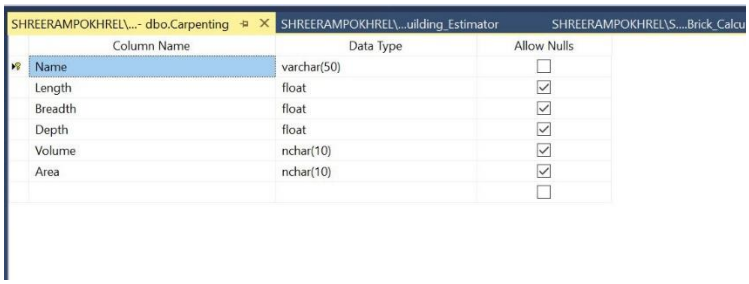

Figure 50:Database for Carpenting

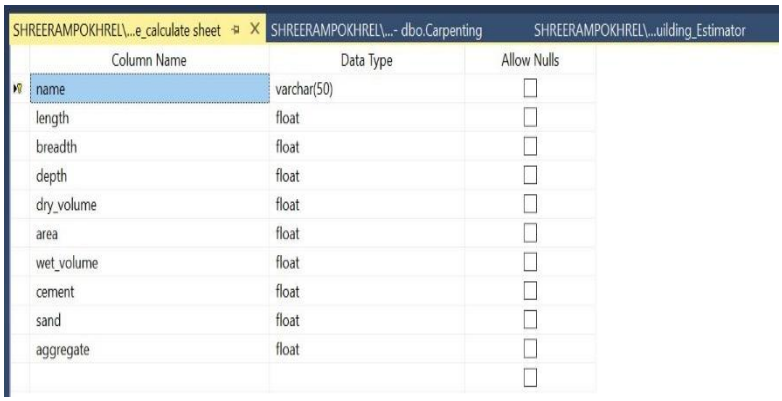

Figure 51:Database for Concrete

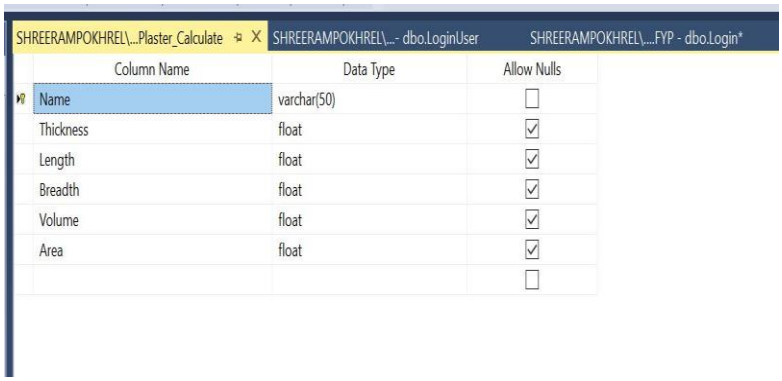

Figure 52:Database for Plaster

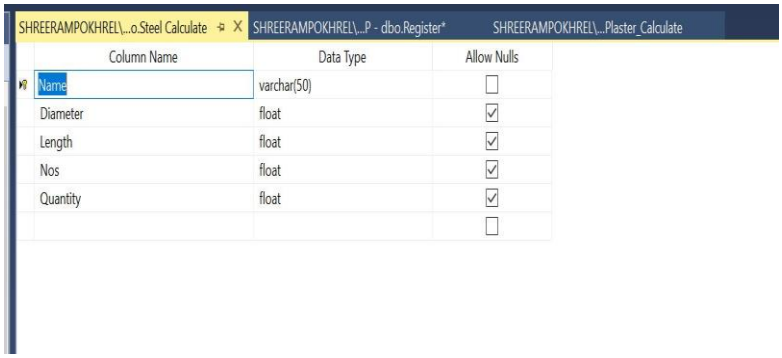

Figure 53:Database for Steel

6. Testing

The application assessment phase is used to measure specific components or units. This test aims to check that each unit/module performs in the correct manner. A software can be checked for the smallest component. Normally, the input and output are very small. The unit may be the program, process or procedure in the program, etc. The smallest unit in which object-oriented programming, the process or the function can fall within a basic/super class, abstract or derivative/child class.

Testing units is a software testing method in which programs are tested on each module. The objective is to detect whether each software unit works properly. The developers perform unit testing during application development. A piece of code is tested in unit tests and its accuracy is insulated. An individual function, technique, operation, part, module or process may be described as a group. (Smartbear, 2021)

I was able to obtain several different conditions and scenarios when I made the application for testing, so I could gather the applications results. Since the initial test has passed, the application is already closer to deployment.

Test case 1

Test Case	1
Objective	To test the application whether it allows the non-registered user to Log in or not
Excepted test result	The application should not allow the user to login.

Actual result	The application did not allow user to logged in.
Conclusion	Test was successfully done.

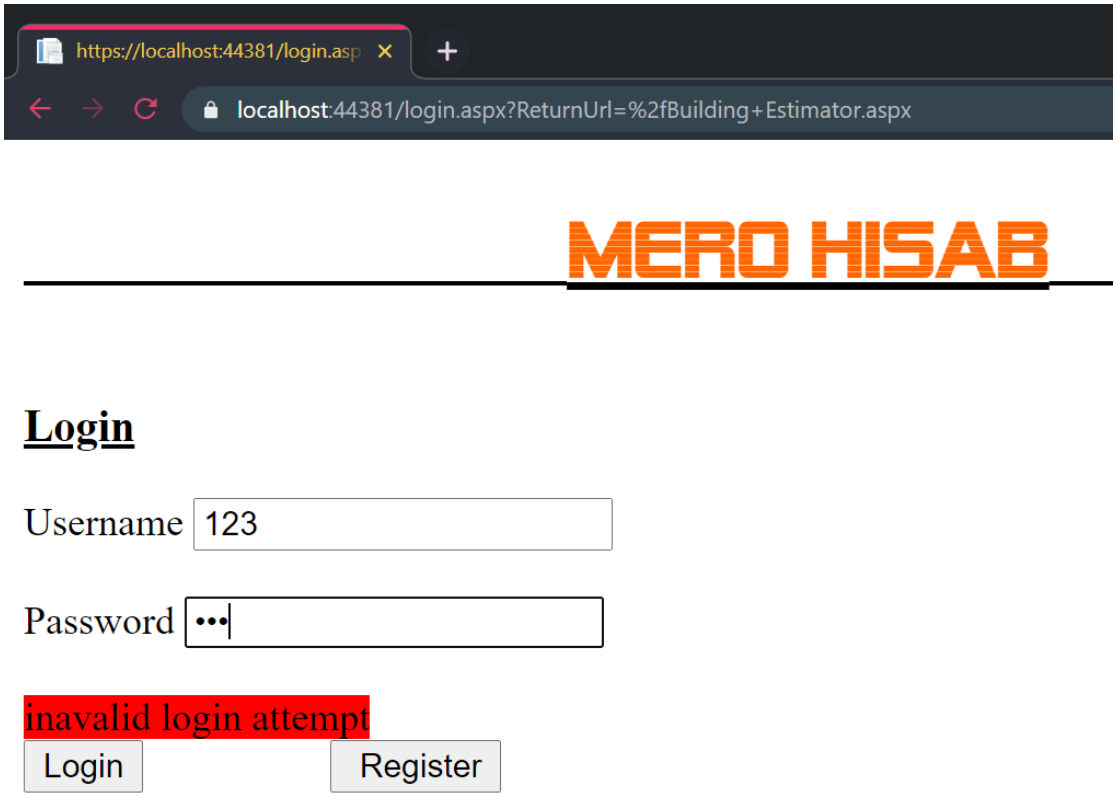

Figure 54:login test showing error

Test case 2

Test Case	2
Objective	To test whether the application generates the area after entering data in Building Material Estimate Sheet.
Excepted test result	The application should show the area.
Actual result	It shows the area of the building.
Conclusion	Test is successfully done.

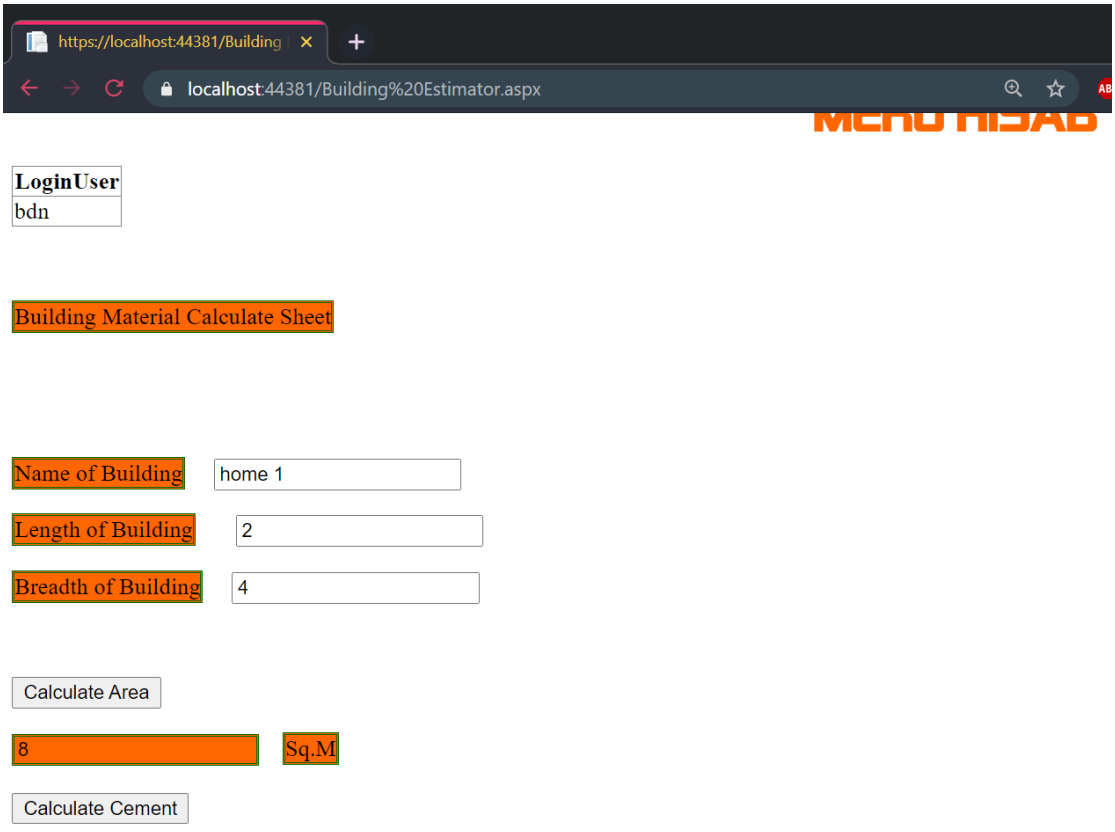

Figure 55:building estimate area calculate

Test case 3

Test Case	3
Objective	To test whether the no of bricks will be calculated without calculating volume of bricks.
Excepted test result	The application should show error message “calculate volume first”
Actual result	It shows the error message” Calculate volume First”.
Conclusion	Test is successfully done.

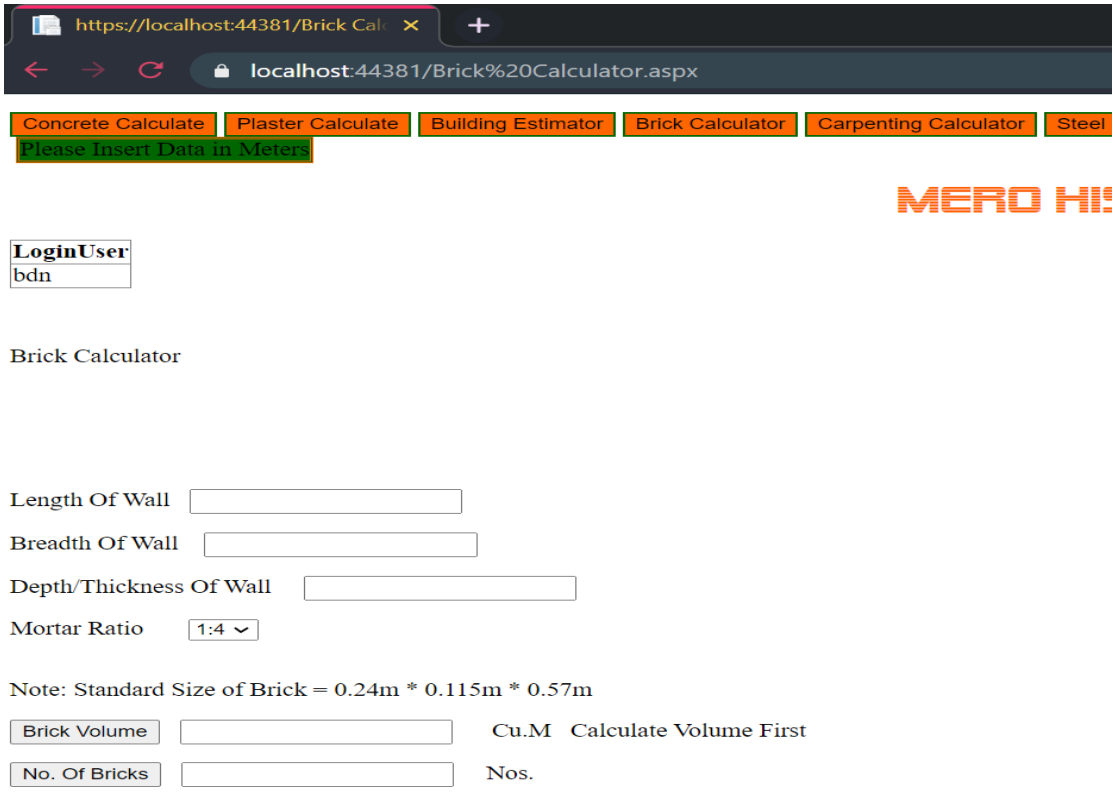

Figure 56:error message for No of bricks

Test case 4

Test Case	4
Objective	To test whether the volume of mortar will be calculated without calculating no of bricks.
Excepted test result	The application should show error message “calculate no of bricks first”
Actual result	It shows the error message” calculate no of bricks first”.
Conclusion	Test is successfully done.

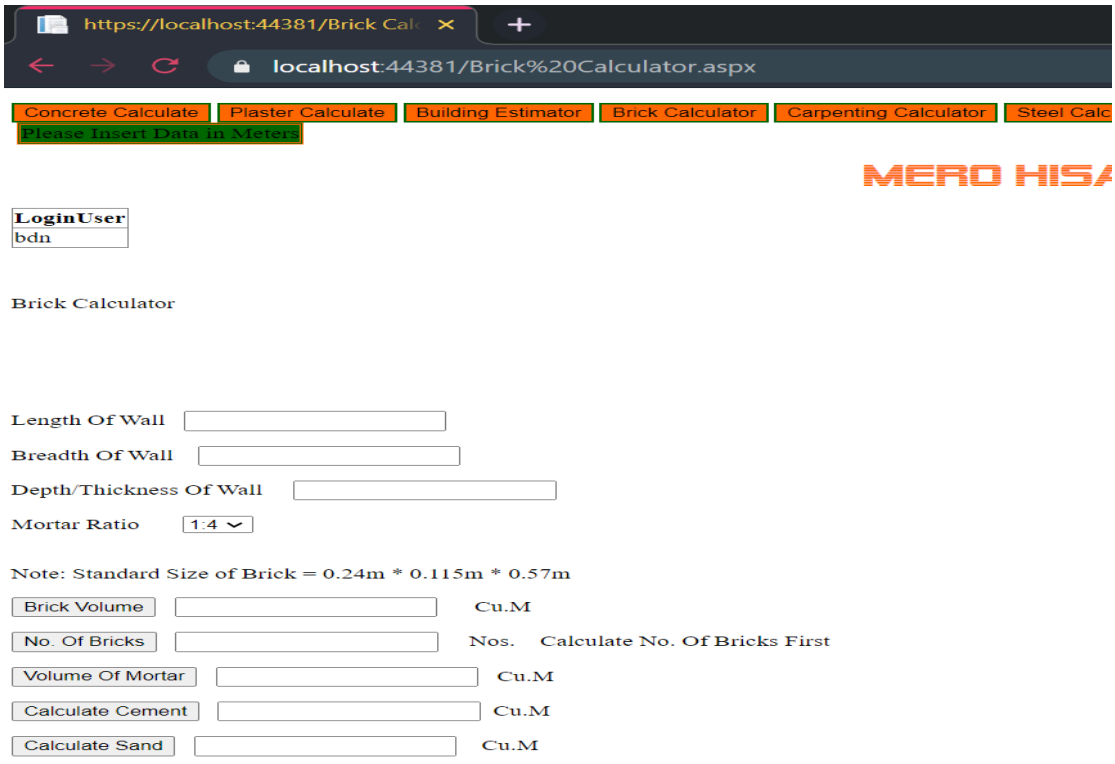

Figure 57:Error message for volume of mortar

Test 5

Test Case	5
Objective	To test whether the volume of Bricks will be calculated if the data is given.
Excepted test result	The application should show the volume of bricks.
Actual result	It shows the volume of bricks.
Conclusion	Test is successfully done.

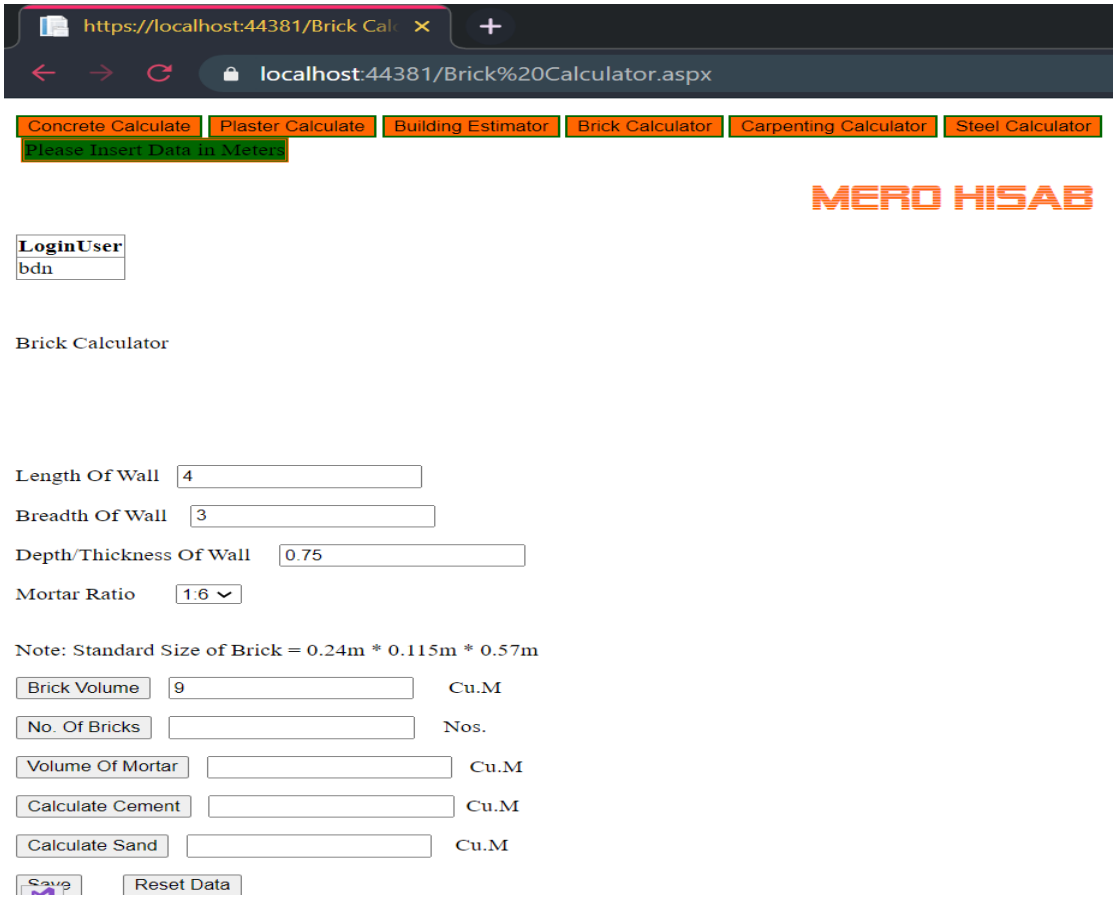

Figure 58:testing for Brick Volume calculate

Test 6

Test Case	6
Objective	To test whether the quantity of sand will be calculated before calculating the volume of mortar by click of calculate sand button.
Excepted test result	The application should show the “calculate volume first” error message.
Actual result	It shows the “calculate volume first” error message. .
Conclusion	Test is successfully done.

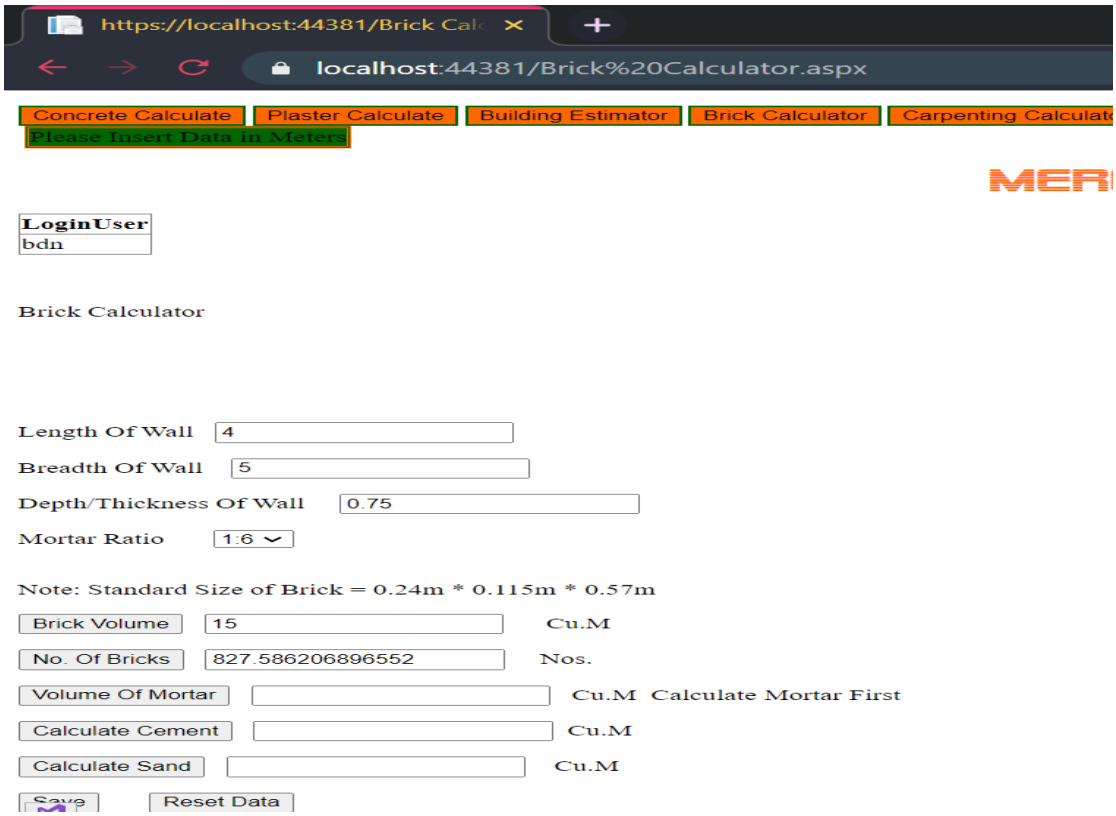

Figure 59: Test for calculate sand

Test 7

Test Case	7
Objective	To test whether the quantity of Steel will be calculated without entering the length
Excepted test result	The application should show the “Field Cannot be Empty” error message.
Actual result	It shows the “Field Cannot be Empty” error message. .
Conclusion	Test is successfully done.

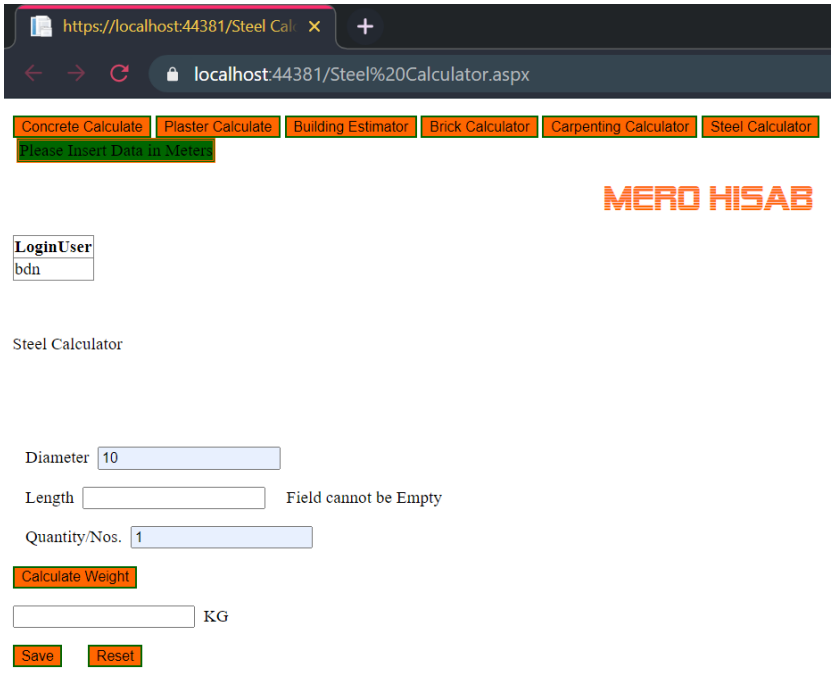

Figure 60:Test Case for calculate Steel without length

Test 8

Test Case	8
Objective	To test whether the quantity of Steel will be calculated with full data entered.
Excepted test result	The application should show the steel quantity.
Actual result	It shows the steel quantity. .
Conclusion	Test is successfully done.

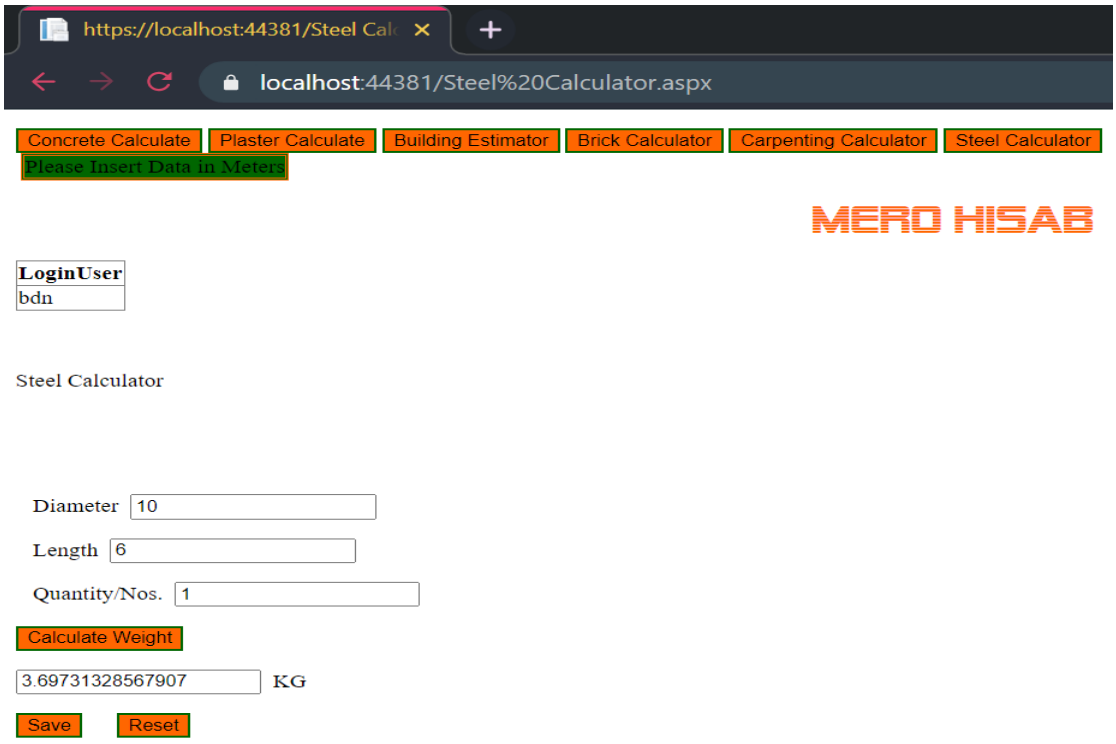

Figure 61:test for calculate weight in steel

Test Case 9

Test Case	9
Objective	To test whether the wrong password will get registered or not.
Excepted test result	The application should show “Password Do not match” error
Actual result	It shows the “Password Do not match” error. .
Conclusion	Test is successfully done.

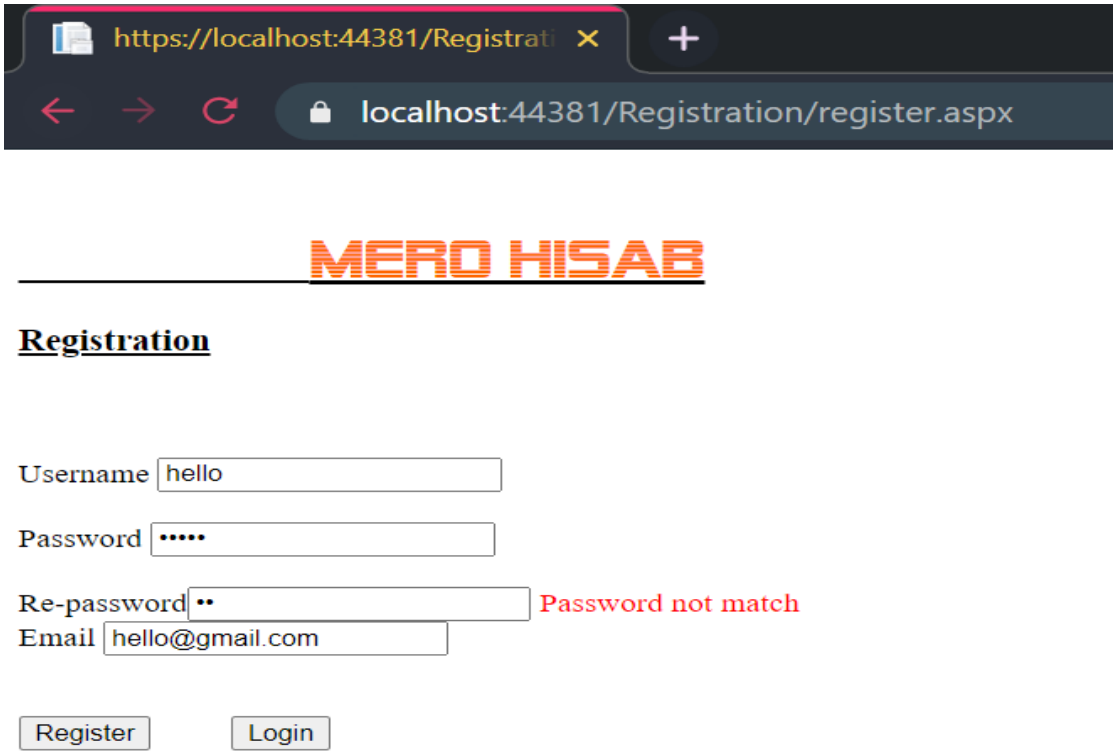

Figure 62: test for wrong password

Test Case 10

Test Case	10
Objective	To test whether the empty Email will get registered or not.
Excepted test result	The application should show “Please Enter Valid Mail” error
Actual result	It shows the “Please Enter Valid Mail” error. .
Conclusion	Test is successfully done.

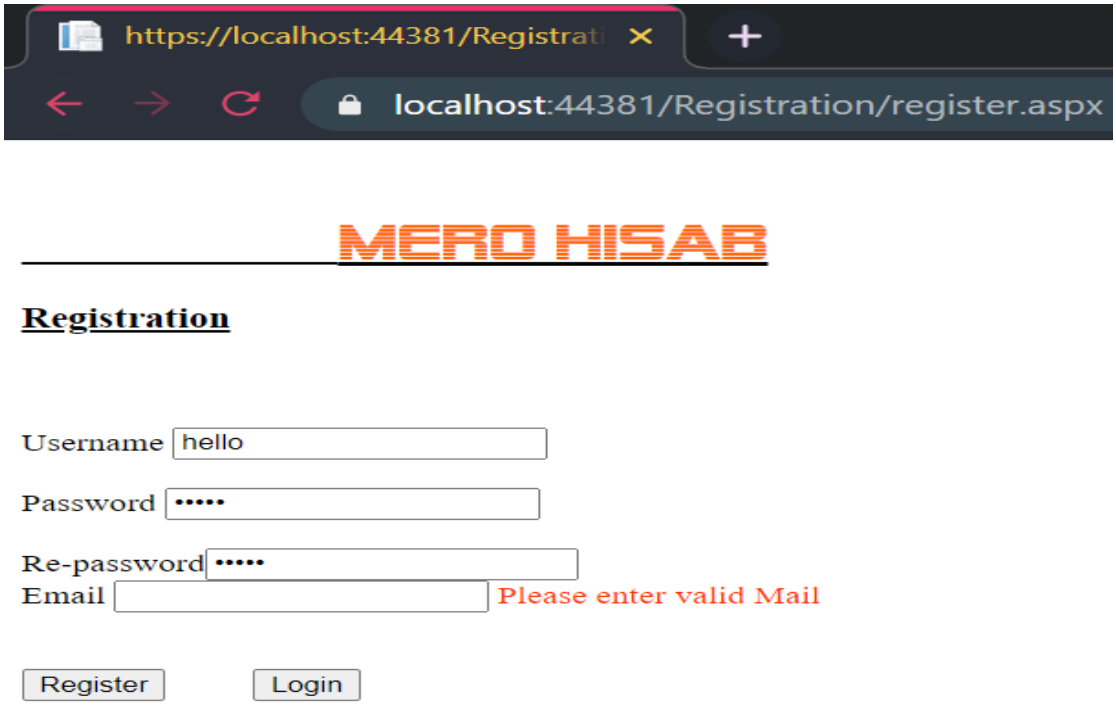

Figure 63:Test case for empty email

7. Analysis

7.1. Critical Analysis

According to our fellow students who can select their own final year project and develop and document their own choice, their final year project must be compulsory. The final year project is mandatory. After the last-year project form indicated in the Google Lection, after the first supervisor's approval of the student and part of the documentation has to be met, the student starts the creation and documentation section. The project creation for the last year was a high priority as it was our primary curriculum activity. Every student has to create an app in the last year, whether it's Android, Flutter or any other web app. I applied for my final year project at the Visual Studio. The Web developer is demanding and I have developed great faith in the development of web applications after the successful completion of this application in this modern society and world of hurry. In several languages, including C#, Net and Visual Studio, I have also developed this project. I planned my wireframes and other personalities in balsamic and draw.io. I hoped I would remove estimated trouble one day. The most important thing now is that all the programming knowledge is properly stored, while the many variables used in the project creation stage are not overloaded. I have read the objectives of the interim report and this project is on track to achieve them both. I see myself as opening up the well-established company as something other than creating this long-term project, since I have many experiences as a result of this project's development. The main objective of the project was not a server or an administration panel, but the Android application component. The design and user interface of this project are very carefully considered.

7.2. SWOT Analysis

The strategic planning needs realistic and analytical assessment. SWOT analyses important internal and external challenges and refresh the strategies and tactics of the marketing plan. To achieve your future aspirations, it is necessary to understand where the objectives are. The popular SWOT analysis is unarmed simple. Project evaluation should be carried out in preparation for a STRENGTH, WEAKNESSES and even MORE THREATS. It's a "inclusive" exercise that asks you to compile, investigate and evaluate critical factors critically. The new information can be used in a few ways. A survey of the strengths, weaknesses, opportunities and threats in implementation will be used to evaluate the project. The following are described: strengths, weaknesses, opportunities and threats: Strengths.

- Application can be accessed from any place where internet connectivity is available
- Application helps to save time and money of the user.
- This application can satisfy the customer by app service.

Weakness

- Every user cannot afford mobiles and laptop to use app.
- Data theft of user details due to unsecure servers.
- Internet may be unavailable in every place and every time.

Opportunity

- This application can help to reduce the time for estimate.
- Can be a helpful to digitalize estimate service for developing countries such as Nepal.

Threats

- Privacy and security threats on user due to app.
- Change in market demand of the app and competition with different similar app

7.3. Pest Analysis

Before getting started on a strategic planning process, some companies use a PEST survey to analyse their estimate related application to identify issues that can affect their success. This is because performance in a strategy is partly dependent on the external factors. A PEST analysis applies to civil estimate, focusing at events and trends in different fields that can impact the success which are used in the development of a new calculative approach:

Political factors

- Changes in the laws may affect the application or its services.
- Changes in the taxes imposed the application or its services

Economic factors

- Changing economic conditions will affect the government's financial policies and can lead user to unable to afford smart phones.

Sociocultural factors

- Should take into consideration things like these as well using sociocultural views will help to with promotion and branding.

Technological factors

- Emerging technologies and measurement equipment outside of the estimation may also impact the software.

7.4. Tools required

Various resources are required for the creation of this application from initiation to completion. The list of products needed to build this application are given below:

7.4.1. Hardware Requirement

Operating system: Windows10

RAM: 8GB

Storage: 60GB

Processor: Intel I7

7.4.2. Software Requirements

Visual Studio:

Visual Studio is a Microsoft-developed integrated development environment (IDE) for the development, consoles, web applications, web applications, mobile app, cloud and web services etc. Visual Studio is an integrated development environment (GUI). With this IDE, both managed code and native code can be created. It uses various software development platforms such as Windows Store, Silverlight and Windows API, etc. You can use that to write code in C#, C++, VB(Visual Basic), Python, JavaScript, etc. It's not a language-specific IDE. It supports 36 different languages of programming. It can be used on both Windows and MacOS.

Visual Studio Evolution: The first VS (Visual Studio) version was released in 1997 called Visual Studio 97 with 5.0 version. Visual Studio's latest version is 15.0, released on 7 March 2017. It is also called the 2017 Visual Studio. The endorsed . In the latest Visual Studio Net Framework versions are 3.5 to 4.7. In older versions of Visual Studio, Java was supported but the most recent version does not support Java.

Editions of Visual Studio

Microsoft Visual Studio is published in three editions:

1. Community: is an announced free version in 2014. Every other issue is paid. This includes similar features to the professional edition. Any particular developer can build their own free or paid apps, for example, with this edition. Net apps, Web applications and much more. This edition has some limitations in an organization of companies. For instance, you are not permitted to use this edition if your organization has more than 250 PCs with an annual return of over $1 million (US Dollars). Up to five users can use this edition in a non-company organization. Its main purpose is to provide support for the C#, VB, F#, C ++, HTML, JavaSkript, Python, etc., ecosystem and languages.

2. Professional: it's Visual Studio's commercial edition. The latest versions are available at Visual Studio 2010. It supports the editing of XML and XSLT and includes the Server Explorer tool and Microsoft SQL Server integration. This edition is provided in Microsoft for free and the user must pay for its continued use after the trial period. Its main objective is to offer Flexibility, Productivity (CodeLens powerful features improve the productivity of your team), Collaborative (Agile project design tools, charters, etc.) and subscriber benefits such as Microsoft software plus Azure, Pluralsight, etc. The project is a very efficient development tool.

3. Company: an integrated, end-to-end solution for teams of all sizes with high quality and scale requirements. Microsoft offers a 90-day free trial of this issue and the user has to pay for continued use after the trial period. The main advantage of this issue is that it's very scalable and offers software of high quality. (GEEKSFORGEEKS, n.d.)

Programming language: C#

C# is an object-oriented, modern programming language that was created by Microsoft. It runs on the .NET Framework. C# is very close to C/C++ and Java programming languages. It was developed by Anders Hejlsberg and his team within the .NET initiative that approved by the European Computer Manufacturers Association (ECMA) and International Standards Organization (ISO). The first version of C# was released in 2002 and the latest version is **8.0** released in September 2019. Before we start, we must learn about the .NET Framework and Visual Studio.

Database: MySQL

MySQL Server is a related open source database management system that supports web-based applications. As data are stored and exchanged over the Web data bases and related tables are a major component of many sites and apps. Even all websites for social networking are primarily dependent on MySQL data, mainly Facebook, Twitter and Google. For all these reasons, the MySQL server is the default web application choice.

The MySQL server is used to query, sort, filter, group, modify and add tables to data operations. Let us look at some of the benefits of MySQL before we learn the commonly used queries.

MySQL Benefits:

Fast and fast database performance.
Easy to use, to manage and to control.
Database integrity is easily accessible and maintained.
Provides scalability, usability and confidence.
Hardware low cost.
MySQL can read and write simple, complex queries.
InnoDB is the most common storage engine and default.
It offers strong support for indexing.
Provides secure connections with SSL support.
Provides a strong encryption and precision of data.
Offers compatibility between cross platforms.
Provides the repetition of minimum code. (GEEKSFORGEEKS, n.d.)

XML:
Extensible Markup Language stands for XML. It is a text-based characterisation language derived from the Generalized Standard Markup (SGML).

Instead of specifying how to display data like the HTML tags used to show data, XML tags are used to identify data and save and organize data. In the near future, XML is not going to replace HTML, but introduces many successful features of HTML with new possibilities.

Three important XML features make this useful in a variety of systems and solutions −

The − XML allows you to create your own tags or language for your application that are self-descriptive, or XML extensible.

XML carries the information, doesn't display it − XML lets you store your data regardless of how it is displayed.

XML is a public standard – XML has been developed and is available as an Open Standard by an organization called the World Wide Web Consortium. (Tutorialspoint, n.d.)

Prototype design: Balsamiq
Balsamiq Wireframes is a tool for designing wireframes from the user interface (sometimes called mockups or low-fidelity prototypes).

You can use it to generate your idea or concept digitally for an application or website, in order to facilitate debate and understanding before any code can be written. The finished wireframes are available to users to test, clarify your vision, get stakeholder feedback or get approval for the development process. (balsamiq, n.d.)

7.5.3. Support Libraries

You may want a standard way to develop Apps supporting multi-API versions to provide new features on earlier Android versions or gracefully restore equivalent features. You can use these libraries to provide the compatibility layer rather than build code to manage earlier versions of the platform. Additional convenience classes and features which are not available in the default Framework API are also provided in the support libraries for easier development and support across more devices.

The libraries used in this project are following:

```
 System;
 System.Collections.Generic;
 System.Linq;
 System.Web;
 System.Web.UI;
 System.Web.UI.WebControls;

System.Data.SqlClient;
```

8. Conclusion

8.1. Conclusion

This application has been very difficult to develop. Finally, I discovered everything on my topic, after a month's worth of work. I have learned to study this subject during all the dozens of other topics, in the meantime in the process of learning. My backend is C#, which allows me to concentrate on C# growth. Visual Studio's Debugging C# and .Net were among my most challenging duties but finding out a lot takes a while. Although it was hard to do at first, I enjoyed the development process later.

I start work on app design after specifying the study topics. I begin by using a paper with simple hand-drawn wireframes. And, for creating my wireframes, I used balsamic. During the construction of my application, I had some difficulties. First, I had to do a lot of research on this new subject. Secondly, because of the unfavourable environment caused by the increase in the amount of corona viruses in our region, college was often closed. I have researched and used many YouTube videos, websites, newspapers and articles well. I have frequently visited my supervisor and received various inputs, which have greatly supported my project.

8.2. Further Enhancements

Certain features are not included as time and resources are lacking. With knowledge of C#, MySQL, XML and .Net, many functionalities can be implemented. Here are some of the features in the application.

Printing

Users in Mero Hisab web app can view the sqldata in grid view but there is not printing facility.

Saved as other data formats.

The application has the facility to save the data but only to the database. The system could have the facility of saving the data in other formats like .xlsx, .docx or .pdf.

Khati api

Integration of khalti api could have been done in mero hisab.

Up-to-date

An application must always follow changing laws and regulation in government and with change in time and society, the app needs to keep up with the times with new features and facility.

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Appendix

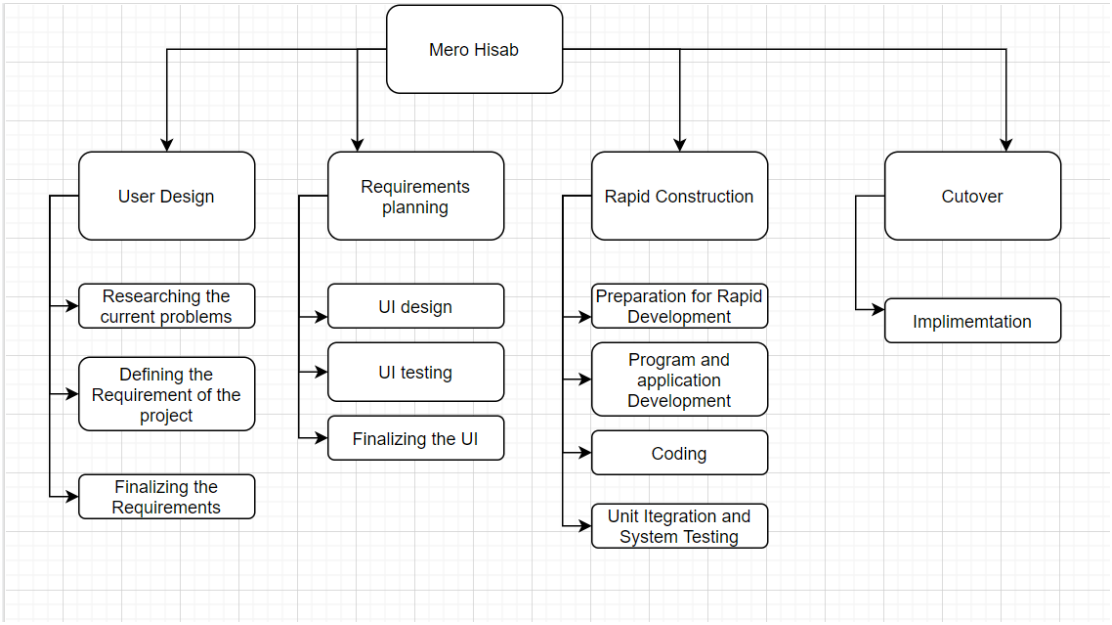

Figure 64: Break Down Structure

Sample source of Building Estimate:

```
<%@ Page Title="" Language="C#" MasterPageFile="~/Site1.Master"
AutoEventWireup="true" CodeBehind="Building Estimator.aspx.cs"
Inherits="last_hour.Building_Estimator" %>
<%@ Register assembly="System.Web.DataVisualization, Version=4.0.0.0,
Culture=neutral, PublicKeyToken=31bf3856ad364e35"
namespace="System.Web.UI.DataVisualization.Charting" tagprefix="asp" %>
<asp:Content ID="Content1" ContentPlaceHolderID="head" runat="server">
</asp:Content>
<asp:Content ID="Content2" ContentPlaceHolderID="ContentPlaceHolder1"
runat="server">
    <p>
        <asp:Label ID="LabelConcreteCalculateSheet" runat="server"
BackColor="#FF6600" BorderColor="#006600" BorderStyle="Double"
ForeColor="Black" Text="Building Material Calculate Sheet"></asp:Label>
</p>
    <p>
         </p>
    <p>
         </p>
    <p>
    <asp:Label ID="Label4" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double" Text="Name of Building"></asp:Label>
   
    <asp:TextBox ID="TextBoxName" runat="server"
ValidationGroup="buildingvalidate"></asp:TextBox>
       
    <asp:RequiredFieldValidator ID="RequiredFieldValidatorlengthofbuilding0"
runat="server" ControlToValidate="TextBoxName" ErrorMessage="Field Cannot be
```

```
Empy" ForeColor="#000066"
ValidationGroup="buildingvalidate"></asp:RequiredFieldValidator>
    <br />
</p>
<p>
    <asp:Label ID="Label2" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double" Text="Length of
Building"></asp:Label>
     
    <asp:TextBox ID="TextBoxLength" runat="server"
ValidationGroup="buildingvalidate"></asp:TextBox>
    <asp:RequiredFieldValidator ID="RequiredFieldValidatorlengthofbuilding"
runat="server" ControlToValidate="TextBoxLength" ErrorMessage="Field Cannot be
Empy" ForeColor="#000066"
ValidationGroup="buildingvalidate"></asp:RequiredFieldValidator>
 <asp:RegularExpressionValidator ID="RegularExpressionValidatorLength"
runat="server" ControlToValidate="TextBoxLength" ErrorMessage="Invalid Input"
ValidationExpression="^[0-9]\d{0,9}(\.\d{1,3})?%?$"
ValidationGroup="buildingvalidate"></asp:RegularExpressionValidator>
</p>
    <p>
        <asp:Label ID="Label3" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double" Text="Breadth of
Building"></asp:Label>
   
        <asp:TextBox ID="TextBoxBreadth" runat="server"
ValidationGroup="buildingvalidate"></asp:TextBox>
        <asp:RequiredFieldValidator
ID="RequiredFieldValidatorbreadthofbuilding" runat="server"
ControlToValidate="TextBoxBreadth" ErrorMessage="Field Cannot be Empy"
ForeColor="#000066"
ValidationGroup="buildingvalidate"></asp:RequiredFieldValidator>
 <asp:RegularExpressionValidator ID="RegularExpressionValidatorBreadth"
runat="server" ControlToValidate="TextBoxBreadth" ErrorMessage="Invalid Input"
ValidationExpression="^[0-9]\d{0,9}(\.\d{1,3})?%?$"
ValidationGroup="buildingvalidate"></asp:RegularExpressionValidator>
</p>
    <p>
         </p>
    <p>
        <asp:Button ID="ButtonCalculateArea" runat="server"
OnClick="ButtonCalculateArea_Click" Text="Calculate Area"
ValidationGroup="buildingvalidate" />
</p>
    <asp:TextBox ID="TextBoxArea" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double"></asp:TextBox>
  
    <asp:Label ID="LabelSqM" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double" Text="Sq.M"></asp:Label>

            &
nbsp;           &n
bsp;           
    <br />
    <br />
    <asp:Button ID="ButtonCalculateCement" runat="server" Text="Calculate
Cement" OnClick="ButtonCalculateCement_Click"
ValidationGroup="buildingvalidate" />
    <br />
    <br />
    <asp:TextBox ID="TextBoxCement" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double"></asp:TextBox>
```

```
    <asp:Label ID="Labelbags" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double" Text="Bags"></asp:Label>
    <br />
<p>
    <asp:Button ID="ButtonCalculateSand" runat="server" Text="Calculate Sand"
OnClick="ButtonCalculateSand_Click" ValidationGroup="buildingvalidate" />
</p>
    <p>
        <asp:TextBox ID="TextBoxSand" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double"></asp:TextBox>
    <asp:Label ID="LabelTon0" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double" Text="Ton"></asp:Label>
</p>
<p>
    <asp:Button ID="ButtonCalculateAggregate" runat="server" Text="Calculate
Aggregate" OnClick="ButtonCalculateAggregate_Click"
ValidationGroup="buildingvalidate" />
</p>
    <p>
        <asp:TextBox ID="TextBoxAggregate" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double"></asp:TextBox>
     
    <asp:Label ID="LabelTon" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double" Text="Ton"></asp:Label>
</p>
    <asp:Button ID="ButtonCalculateSteel" runat="server"
OnClick="Button1_Click" Text="Calculate Steel "
ValidationGroup="buildingvalidate" />
    <br />
    <br />
        <asp:TextBox ID="TextBoxSteel" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double"></asp:TextBox>
     <asp:Label ID="LabelKg" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double" Text="KG"></asp:Label>
    <p>
        <asp:Button ID="ButtonCalculateBricks" runat="server"
OnClick="Button2_Click" Text="Calculate Bricks"
ValidationGroup="buildingvalidate" />
</p>
<p>
        <asp:TextBox ID="TextBoxBricks" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double"></asp:TextBox>
    <asp:Label ID="LabelNos" runat="server" BackColor="#FF6600"
BorderColor="#006600" BorderStyle="Double" Text="Nos."></asp:Label>
    </p>
<p>
         </p>
<p>
        <asp:Button ID="ButtonCreateChart" runat="server" Text="Save Data"
OnClick="ButtonCreateChart_Click" ValidationGroup="buildingvalidate" />
         
        <asp:Button ID="ButtonReset" runat="server" OnClick="ButtonReset_Click"
Text="Reset data" />
        </p>
    <p>
        <asp:GridView ID="GridViewSavedData" runat="server"
AutoGenerateColumns="False" DataSourceID="SqlDataSource1" DataKeyNames="Name">
            <Columns>
                <asp:BoundField DataField="Name" HeaderText="Name"
SortExpression="Name" ReadOnly="True" />
                <asp:BoundField DataField="Length" HeaderText="Length"
SortExpression="Length" />
```

```
                <asp:BoundField DataField="Breadth" HeaderText="Breadth"
SortExpression="Breadth" />
                <asp:BoundField DataField="Area" HeaderText="Area"
SortExpression="Area" />
                <asp:BoundField DataField="Cement" HeaderText="Cement"
SortExpression="Cement" />
                <asp:BoundField DataField="Sand" HeaderText="Sand"
SortExpression="Sand" />
                <asp:BoundField DataField="Aggregate" HeaderText="Aggregate"
SortExpression="Aggregate" />
                <asp:BoundField DataField="Steel" HeaderText="Steel"
SortExpression="Steel" />
                <asp:BoundField DataField="Bricks" HeaderText="Bricks"
SortExpression="Bricks" />
            </Columns>
        </asp:GridView>
        <asp:SqlDataSource ID="SqlDataSource1" runat="server"
ConnectionString="<%$ ConnectionStrings:FYPConnectionString %>"
SelectCommand="SELECT * FROM [Building_Estimator]"></asp:SqlDataSource>
    </p>
    <br />
    <br />
    <br />
    <br />
</asp:Content>
```

C# source of Building Estimate

```
using System;
using System.Collections.Generic;
using System.Data;
using System.Data.SqlClient;
using System.Linq;
using System.Web;
using System.Web.UI;
using System.Web.UI.WebControls;
using System.Windows;

namespace last_hour
{
    public partial class Building_Estimator : System.Web.UI.Page
    {
        protected void Page_Load(object sender, EventArgs e)
        {

        }

        protected void ButtonCalculateArea_Click(object sender, EventArgs e)
        {
            TextBoxArea.Text = (float.Parse(TextBoxLength.Text) *
float.Parse(TextBoxBreadth.Text)).ToString();
        }

        protected void ButtonCalculateCement_Click(object sender, EventArgs e)
        {
            TextBoxCement.Text = (float.Parse(TextBoxLength.Text) *
float.Parse(TextBoxBreadth.Text) * 0.4).ToString();
        }

        protected void ButtonCalculateSand_Click(object sender, EventArgs e)
        {
```

```
            TextBoxSand.Text = (float.Parse(TextBoxLength.Text) *
float.Parse(TextBoxBreadth.Text) * 0.816).ToString();
        }

        protected void ButtonCalculateAggregate_Click(object sender, EventArgs
e)
        {
            TextBoxAggregate.Text = (float.Parse(TextBoxLength.Text) *
float.Parse(TextBoxBreadth.Text) * 0.608).ToString();
        }

        protected void Button1_Click(object sender, EventArgs e)
        {
            TextBoxSteel.Text = (float.Parse(TextBoxLength.Text) *
float.Parse(TextBoxBreadth.Text) * 4).ToString();
        }

        protected void Button2_Click(object sender, EventArgs e)
        {
            TextBoxBricks.Text = (float.Parse(TextBoxLength.Text) *
float.Parse(TextBoxBreadth.Text) * 8).ToString();
        }

        protected void ButtonCreateChart_Click(object sender, EventArgs e)
        {
            string cs =
System.Configuration.ConfigurationManager.ConnectionStrings["FYPConnectionStrin
g"].ConnectionString;

            SqlConnection con = new SqlConnection(cs);


            SqlCommand cmd = new SqlCommand("INSERT INTO Building_Estimator
(Name,Length,Breadth,Area,Cement,Sand,Aggregate,Steel,Bricks) VALUES('" +
TextBoxName.Text + "','" + TextBoxLength.Text + "','" + TextBoxBreadth.Text +
"','" + TextBoxArea.Text + "','" + TextBoxCement.Text + "','" +
TextBoxSand.Text + "','" + TextBoxAggregate.Text + "','" + TextBoxSteel.Text +
"','" + TextBoxBricks.Text + "')", con);

            con.Open();

            cmd.ExecuteNonQuery();

            con.Close();

        }

        protected void GridView1_SelectedIndexChanged(object sender, EventArgs
e)
        {

        }

        protected void ButtonReset_Click(object sender, EventArgs e)
        {
            string cs =
System.Configuration.ConfigurationManager.ConnectionStrings["FYPConnectionStrin
g"].ConnectionString;

            SqlConnection con = new SqlConnection(cs);
            SqlCommand cmd1 = new SqlCommand("TRUNCATE TABLE
Building_Estimator", con);
```

```
            con.Open();

            cmd1.ExecuteNonQuery();

            con.Close();
            Server.Transfer("./Building Estimator.aspx");

        }
    }
}
```