VIRTUAL COMMUNICATION SYSTEM FOR BEGINNER PROGRAMMER SOCIAL PLATFORM

CODERHEART

 \mathbf{BY}

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering.

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APPROVAL

This Project titled "VIRTUAL COMMUNICATION SYSTEM FOR BEGINNER PROGRAMMER SOCIAL PLATFORM CODERHEART", submitted by Md. Mamun-or-Rashid to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on First Week of May 2018.

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I hereby declare that, this project has been done by me under the supervision of Mr.

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also declare that neither this project nor any part of this project has been submitted

elsewhere for award of any degree or diploma.

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ABSTRACT

This project is on "Virtual Communication System for Beginner Programmer Social Platform: Coderheart". This is a kind of software, which helps to communicate with users within a short time. The aim of this application or software is online based communication system between multiple users virtually. And it's another objective is that they can share there thinking to other users. And it's another objective is also they can compile program here. People who register here he/she can easily compile program without installing any software, and if they face any problem in programing they can share their problem globally or they can share their problem to any other single user. To develop this project the most essential part is making a web application using HTML, CSS, JAVA-SCRIPT, JQUERY, AJAX, PHP and MYSQL. After implementation of all functions, the system is tested in different stages and it works successfully as a prototype.

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CHAPTER 1 INTRODUCTION

1.1 Introduction

Virtual communication project face tougher challenges than traditional projects. It is not easier for virtual teams to be successful than traditional teams.

Now In every single day lots of our friends spend their time in many social sites. Some of these friends are trying to find better learning platform, in whole day they spent to find where they can learning and practice coding. With this application, every user can fulfill their requirements they can compile program here and also they can communicate with other users and they can take test like social sites. Actually, it is online based Application, Virtual Communication System for Beginner Programmer Social Platform.

1.2 Motivation

The current increase of waste of time, in every single day in social sites is much bigger amount. I see lots of our friends, youngers even I am also enter social site and start waste our valuable time. There I seen lots of guys want to be a programmer but they much more love to spend their time in social site. When I think how to prevent this problem, then i think if they love social site, I make application where they can practice programming and also take taste social site. This is the actual sprite of my project. This study aims to explore the characteristics of motivation in the virtual environments, its contribution to enhance virtual project outcomes, and the role that virtual communication system project application plays in fostering motivation in dispersed teams.

This study shows what is the importance of motivation in project settings as well as the special challenges that it poses when translated to virtual environments. It shows that how can we use our valuable time on right track. It also shows that the idea of progress and self-accomplishment is probably the strongest motivator for dispersed teams, and that

project should try to connect all those people who happy to learn and help others. Finally, this study explores the possibilities of gratification as an approach to bridge the gap of motivation within project software.

1.3 Objectives

The objectives of this project is to research the potential need for a web application amongst a wider range of who interested to learn programing Language and to produce an interactive web application for to help the beginner programmer. This website must be easy to setup, customizable and easily maintained by the average user.

- Connect in touch with all users.
- Reducing time to know problem solution using social network.
- The primary objective of our project is online based Virtual Communication System.
- And another objective is reducing waste of our valuable time.
- And another objective is without installation any software users can compile program.
- And the main objective of my project is to help who want to learn programing language.

Existing guidelines for Web usability hinder web-based application/software usability since they are primarily based on interactions within a browsing allegory. The main difference is that with traditional in-house software the user only focuses on the application itself. The application is stand/depend on some helping mind users who happy to help others and those users who happy to learn. And the structure of this application helps to reduce waste of time and provide better learning environment.

1.4 Expected Outcome

Virtual communication system (**coderheart**) is a browser based system and to develop coderheart the developer may select any tool for doing it. Here, MySQL is a very popular choice of database for use in web applications.

- User registration
- User post, comment, like
- User search other user and see profile information
- User can compile web-programing, procedural and objected oriented programing language.
- Live support(chatting system group and single chat)

So, in the expected a website where outcome will be like User can share their mind can comment on other post and if feel good can like on post, see other user profile, user can practice and compile program and if they have any problem they can share using group and single user chat.

CHAPTER 2

BACKGROUND

2.1 Introduction

Virtual communication system (**coderheart**) is a browser based system and to develop coderheart the developer may select any tool for doing it. PHP is a server-side scripting language which designed for web development but also used as a general-purpose programming language.

In our project PHP is the tool we used as front-end of the coderheart as a back-end MySQL will be used my system. MySQL is the world's second highest widely used relational database management system (RDBMS) and most widely used open-source RDBMS. MySQL is a very popular choice of database for use in web applications. For every single beginner who wants to be a programmer it may very helpful.

2.2 Related Works

In my work like designing the web page user interface we have used the CSS, BOOTSTRAP, JAVA-SCRIPT, JQUERY and AJAX also. I did my project in raw PHP platform in sublime text editor. I could do it by PHP framework but i am not expert on that. So the raw coding was the perfect for me.

So, in the expected outcome will be like a website where user can share programming knowledge, other's user can like and comment on that, user can search other user and also see other user profile, user can compile program here and if they face any problem they can take solution using group and single user chat.

In the development part i have faced so many problems. One of them such was to be professional in my work and i tried to do so. I tried to do my project, and I divide it many

part like designing, coding, SQL, DATABASE, including new feature's and the outlook part of the website.

2.3 Comparative Studies

There were three parts to study in my project one of them is social activities and another one is different type of programing language compilation and finally combine both of them. So i am describing those following:

After registration user will log in the website. After log in they will be able to create post they can comment other post and they can also like post, user can see other user's profile they can search other user using search system. So for all of these activities user can take taste like social site.

On the other hand after log in, user can run web programing **html**, **css**, **JavaScript**, **bootstrap**, user can compile procedural programing language **C** and user also can compile object oriented programing language **C**++.

Another thing is if user face any problem practice programing the can take immediate solve using group chat. And if they need to contact single user they can do it using single user chat.

It's an idea to combine both social platform and those programmers who love to learn and tech. So, I think using the modern technologies coderheart system will be a solve for the beginner programmer.

So, i choose the virtual communication system coderheart and fully computerized as in my project.

2.4 Scope of the Problem

Scopes of the Problems in my project was including program compilation system, also thinking of the system design and develop the system targets and features in my website.

Program compilation was one of the difficult parts because it is the main thing in which my project will be completed. If I am unable to complete on time it would be great danger for me. So i just divide my project work in a many single part to complete each on of the task to complete the whole project. The time limit is given to the page:

Time scheduling:

Analysis 2 Month
Design of the system 1 Month
Coding 3 Months
Testing and Implementing 2 Weeks

Total 6 Months and 14 days

So, in this time to complete the whole task had to be done. But that actually took more time to complete each tasks for many circumstances. At last i did complete my project not with time but with targets.

Targets of my project was to have a system like take taste social site, compile different type of program and if they face problem take solve immediately to connect who well known about that. This was another problem for me to combine and implementation compiler on my project. After all i did the tasks and share this idea to my friends and some younger brother they are excited to accept this type of system, I also share this thinking to many of our respected teachers and the enjoyable things is they encourage me to do this project complete.

2.5 Challenges

To implement different type of program compiler on my application. To implement real time searching system, also real time chatting is very much big challenge for me. To integrate database with the program, allowing to store post, comment, likes, to see other user profile information, user information update and differentiate every users.

Requirement:

Most important challenging was to make the support system (chatting), and design part of program compilation and also implementation of different type of compiler, here also important things is different user identity for showing their information.

Time scheduling:

It was the difficult challenge because it was the main thing in which my project will be completed. If i am unable to complete on time it would be great danger for me. So i just divide my time and project work to complete each one of the task to complete the whole project.

Poor Communication:

In this project I took alone, so always I discus project supervisor. Project Supervisor provide direction at every step of the project and I tried to complete every step carefully for that reason I always try to continue communicate project supervisor, Effective communication is important to its successful completion.

Skills for the Project:

A project sometimes requires skills that by the project's go on. A project leader determines the needed skills and other team members also should have the determines to do some for the project to complete it. In this project I have no team member but some hidden team members are always with me and I always take decision discus with them.

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 Business Process Modeling

In this project, the model we used is given below.

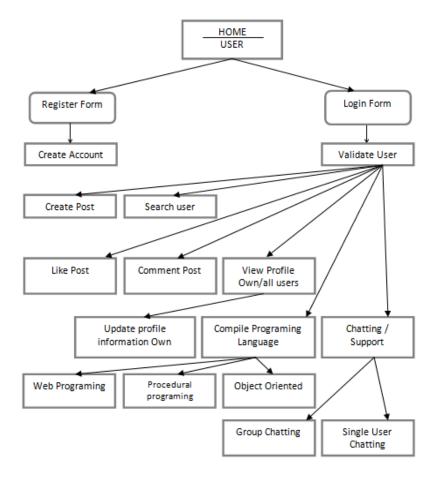


Figure 3.1: Business Processing Model

3.2 Requirement collection and analysis

Software requirements:

- Users
- Registration and Log in system for the users

- User friendly system design
- Database
- Library for compile procedural and object oriented program
- Script for run web program
- Ajax script for messaging system

Hardware and Software Requirements for Our System

Whenever you purchase software or hardware for your computer, you should first make sure your computer supports the system requirements. These are the necessary specifications your computer must have in order to use the software and hardware to be used efficiently; all or every computer software needs certain hardware components or other software resources to be present on a computer.

In development stage the system requires for all tools and platforms describe to advance the new system like

- Local Server like XAMPP / WAMP
- Code editor like Sublime text / Notepad++
- Browser like Chrome or Opera

The current social sites take our valuable time specially who interested to start learn programing. And also the problem of installation software for compile program. In my system I just try to combine the social site for share programing knowledge and include different type of compiler for compile program without installation problem. And also include support/chatting system for help each other. Using this system they can take test social site and the same time continues their practicing, so the wastes of time ovesly decrease.

Analysis- After discovering the current situation problem. I have confident to develop a new system, which stands the needs of those people. After i have seen the current

problem I realized that there is a need to develop a new system. I decided to take PHP as front end and MYSQL to be back end as solution.

Strategy for the stated problem, because PHP is a server-side scripting language which is use for developing online application and that is peaceful to be developed.

3.3 Use Case Modeling and description

The Use Case model that we used in our project given below:

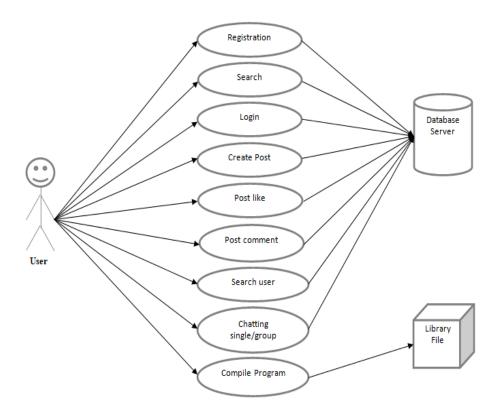


Figure 3.2: Use Case Model of CODERHEART

Brief Description: The user after login create post, comment post, like post, search user, view all user profile and update own, compile program, take support using single or group chatting.

Actor: Users

Main Flow:

a) The user first registration in the website then they can login with user name and password.

After that they can take all advantage of this site like create post, comment post, like post, search user, view all user profile, update own profile, they also can compile web programing, procedural programing, object oriented programing language, they also can communicate using single or group chatting.

3.4 Logical Data Model

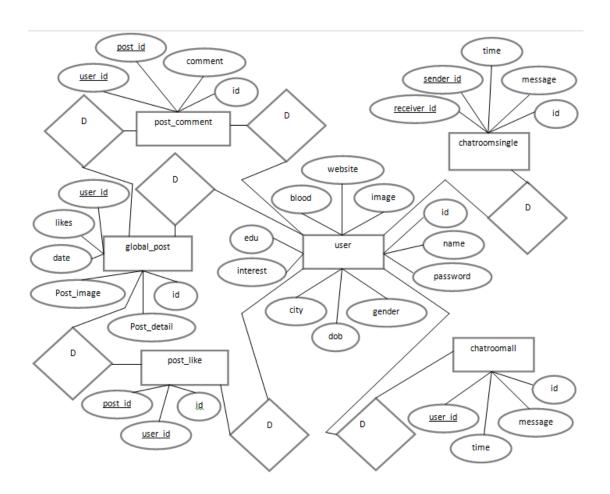


Figure 3.3: Entity Relationship Model

Logical Data modeling is a process which is used to define and analyses requirement needed to support the business processes within the scope of corresponding information systems in organizations. The Entity-Relationship model or Entity-Relationship diagram is a logical data models, it includes the entity, attributes, table and relationships.

Three main components of an ER-Diagram are the entities, which are objects or concepts that can have data stored about them, the relationship between those entities, and the cardinality, which defines that relationship in terms of numbers.

3.5 Design Requirements

When designing systems or software, following issues must be considered that reproduce the overall design of the goals that the system expected to achieve. The following goals were kept in mind while designing the system:

Make system simple and flexible for users: The system users are able to have a great amount of control over their purpose in achieving objectives. Make the system compatible: It should be fit in the total system, future maintenance and enhancement must less.

In this project, the flow chart we used is given below.

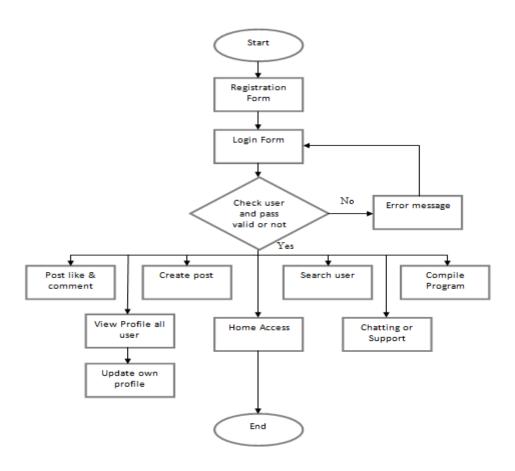


Figure 3.4: Flow Chart of CODERHEART

CHAPTER 4

DESIGN SPECIFICATION

4.1 Front-End Design

The frontend commonly consists of two parts: The web design and frontend web development.

Frontend designs entangle creating the HTML, CSS, and presentational JavaScript, Bootstrap and Jquery code that make up a user interface. Coding design patterns are about forming a set of relationships between elements. By codifying these relationships as a set of ethics instead of a single, stand-alone template, I try to make it possible for other developers to extend my work while remaining faithful to its core ideas.

The thing that is visible while using a website is a combination of HTML, CSS, Bootstrap, Jquery and JavaScript all being controlled by your computer's browser. These include things like fonts, home, drop-down menus, buttons, effects, tabs, forms of different types like register, login etc. I have basically used the HTML, CSS, Bootstrap, Jquery and Java-Script to design my system. I will discuss with my supervisor about the each and every element that i have used in my project.

Figure 4.1: Front End Design sample code

HTML

In html i did my hypertext mark-up languages for my websites. That means whatever text you the texts in my websites that have made up with HTML. So in the image i have created a page title and header titles of each feature. Actually html is the structure of a webpage.

CSS

CSS is used to ascertain styles for my web pages, including the design, layout and variations in display for different devices and screen sizes. Through the CSS i can add lot of designs, colors, text-alignment, text-styles and everything that would make my system more attractive. Actually CSS is use for styling webpages.

Java-Script

JavaScript Can Change HTML Content of a webpage. One of many JavaScript HTML methods is getElementById(). This example uses the method to "find" an HTML element and changes the element content to "new content", in my project I use java script for working with web programming.

Bootstrap

Bootstrap is a free and also open source frontend library based on HTML CSS and JS for designing website. In my project I used 3.3.7 version of bootstrap. It's make my work much faster and easier.

JQuery

JQuery is a lightweight, "write less, do more", JavaScript library. The purpose of jQuery is to make it much easier to use JavaScript on your website. JQuery takes a lot of general tasks that require many lines of JavaScript code to accomplish, and wraps them into

methods/systems that you can call with a single line of code. JQuery library is use for decries JavaScript code line.

PHP

PHP (Hypertext Preprocessor) is a widely-used open source general-purpose scripting language that is particularly suited for web development. In my project I choose php for develop my project.

MYSQL

MySQL is an open-source relational database management system (RDBMS). In my project database play very important role. Database actually store data in my project. MySQL is world second largest used database management system.

4.2 Back-end Design

Backend consists of three parts: a server, an application, and a database. When we go to a website link and see interface its frontend. And when we provide any information, once we've entered that information, the application stores it in a database that was created on a server.

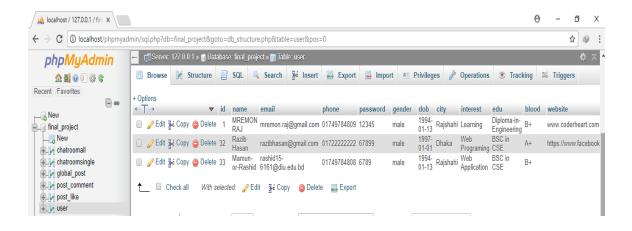


Figure 4.2: Database Sample of my project

4.3 Interaction Design and UX

User experience design is the process of enhancing user satisfaction with a product by improving the usability, accessibility, and pleasure provided in the interaction with the product.

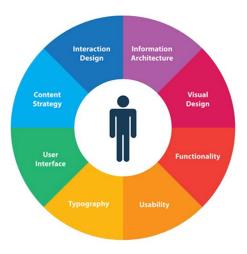


Figure 4.3: UX Design

4.3.1 First look Page Interaction Design and UX

In my application i have designed the First look page. It has two options and also about coderheart option. These two options are Login and Register. The first look page is designed with the help of Bootstrap, HTML CSS. For that reason this page looking attractive and standard looks from a view.

4.3.2 Registration Page Interaction Design and UX

I have designed a Registration form for users. For using this application new user need to registration. By filling this form user are registered. User form consists of User Name, Email, Phone Number, Password, Gender option, Date of birth, Current city, Interested Area. After registration all information stored on user table.

If any user need to register then he/she need to fill-up all the field then he/she can register.

4.3.3 Login Page Interaction Design and UX

For user I have designed the part of login page. For log in user needs the user email and password. The reason of using email and password making the site safer. Here is another option for forgot password. If anyone forget the password he or she can recover his or her accounts by clicking forget my password button. By clicking the login button user will be logged in.

4.3.4 Home Page Interaction Design and UX

I have designed a Home page look like social website. Here user can create post and also seen what other user post. User can comment any post and also can like. I put on the left side search option where user can search other user. And in the left side choose for side bar and for easily access every services. I have designed every part on this site based on user demand. So it's looking amazing and very much user friendly.

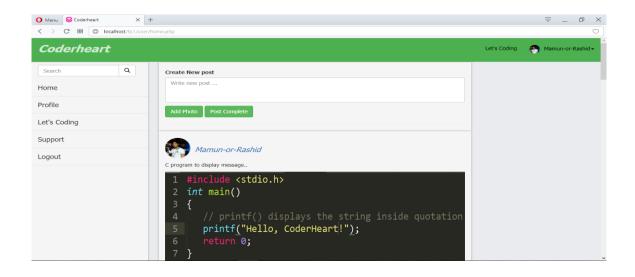


Figure 4.4: Home page view after login

4.3.5 Profile page Interaction Design and UX:

When user login to the system then if user need to see his/her information user need to go profile. And after that if user needs to add information or edit information user can do that just clicking the update button. Any user can see any users profile but can update only own profile.



Figure 4.5: Profile page

4.3.6 Let's Coding page Interaction Design and UX (WEB, Procedural, Object Oriented):

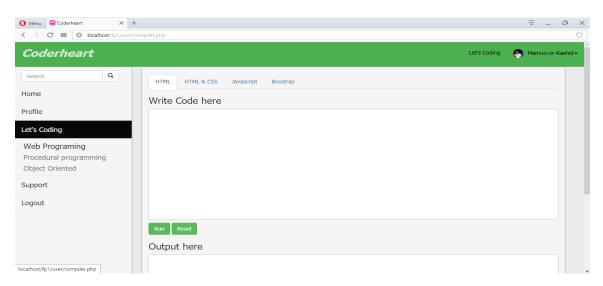


Figure 4.6: Let's coding page

When user login to the system and want to compile programing language user first need to click let's coding option after that need to select what type of program user need to compile, here three option are Web programing, Procedural programing and object oriented programing, after select an option user need to write code on code area and click run button then user can see output.

4.3.7 Search Result page Interaction Design and UX:

When user login to the system if user need to search any user then they can search by using letter or word or name all possible match are show on search result page.

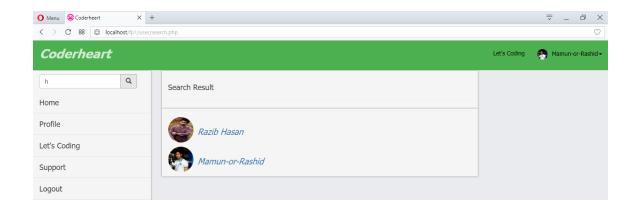


Figure 4.7: Search result page

4.3.7 Support page Interaction Design and UX:

When user login to the system and user need to contact another user then they need to go support option by clicking on sidebar. In support page user can take to advantage one of them is group chatting and another one is personal/Single user chatting.

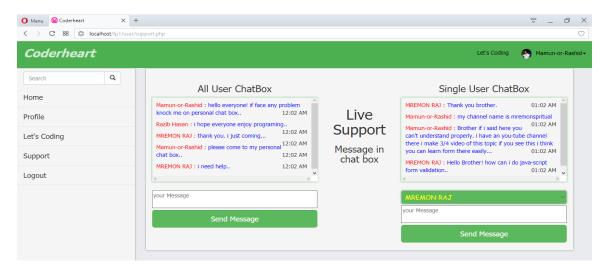


Figure 4.8: Support page

4.4 Implementation Requirements

Implementation is the carrying out, execution or practice of a plan, a method or any design, idea, model, specification, standard or policy for doing something. As such implementation is the action that must follow any preliminary thinking in order for something to actually happen.

The main thought was for my project implantation was to make the interface easier for use. The implementation Requirements was given like a very conceptual idea.

The list of implementation requirements is Easy to use the system, Easy to compile program, Easy to connect with other users, Easy to share knowledge, User-friendly, Responsive and Dynamic pages.

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation of Database

Database management system handles the requests generated from the SQL interface, producing or modifying data in response to these requests. This involves a multilevel processing system.

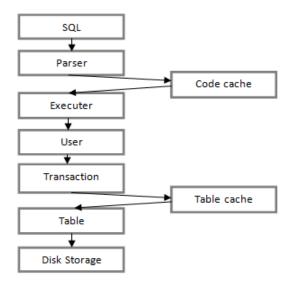


Figure 5.1: Database Processing System in Project

The 'user' context is handled in a number of different ways, it's depend on the which database system being used. The following diagram gives you an idea of working process what system MySQL and Oracle used.



Figure 5.2: Users and table spaces

Figure 5.2: Users and table spaces

In the upper image you can see that how to stored the user's information in each time they register this system and when update information or create post, comment, likes. When user register then information saved in users table, when create post then information saved in global post table and other information store and process the same way in my project.

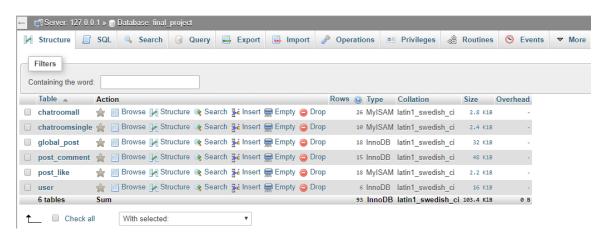


Figure 5.3: Database and all table used in project

5.2 Implementation of First Look Page Design

There are some Front-end design and the description given below:

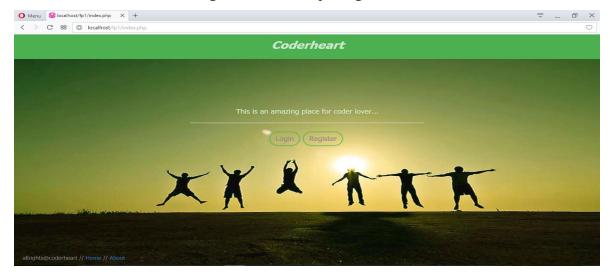


Figure 5.4: First Look page

When i implemented the project Front-end Design there are some forms that come from front-end coding. The challenge was more when i implement the form from the code i write and there the perfection was the matters for me. In the very top position I choose for Application brand name and in the middle position I choose for slogan of this application and two option for user Registration and user Login and in the bottom left position I choose for application identity and also for knowing about the Application. In Front end implementation i used HTML, CSS, Bootstrap, JavaScript and Jquery to code the website. The code i write runs inside the user's browser.

5.2.1 About page

The About page is actually for show information about this application. This is very important for this application because for those people who are do not know about this application this page is very helpful for them to knowing about this Application. Thus About page is designed first and then implemented.



Figure 5.5: About Page

5.2.2 User Registration form Page:

In this Page design for the new users who are not member of this application. So the very new users can register from here by providing there User name, Email, Phone Number, Password, Gender, Date of birth, City and Interested area then clicking register button

If anyone not provide all this information he/she can't register, if user provide all information and click register button then show successful message.

© localhost/fp1/register.php

Coderheart

Registration Form

User Name

Email Address

Phone Number

Password

Male © Female

mm/dd/yyyy

Your City Interested Area

Register If you are a member

After thinking all of this I implement code all of this thing.

Figure 5.6: User Registration Form

5.2.3 User Login form Page:

The login form design for the register member who can enter the application and take service. Basically after successfully register user redirect to login page for enter the application. And another way to come login page is in home page have option for come login page. Providing correct email and password Register user can enter the application. If anyone provide wrong or incorrect email and password they can't enter the application, and show message what is wrong.

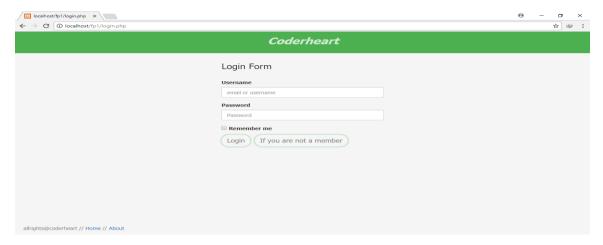


Figure 5.7: User Login Form

5.2.4 Home Page:

I already show the home page design in figure 4.4 in design specification chapter. So for implementation this I used PHP for development this. In home page when user create post then it's store in database on specific table and using query I display it in the home page. Here for all post I am very happy to implement the option for every post likes and comments what can do by different users and one user can only one line for every single post but users can comment how much they needed. Here I show single post interface how look like.



Figure 5.8: Single/Specific post Page

5.2.5 Profile Page:

I already show the profile page design in figure 4.5 in design specification chapter. So for develop this I used here PHP coding. Here user can see own profile information and also can edit/update his/her information. User also can see other user profile but only update own profile.

Here I show profile update interface how look like.

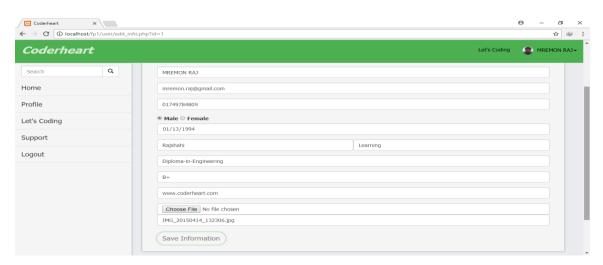


Figure 5.9: Profile Update Page

5.2.6 Let's Coding Page:

I already show the let's coding page design in figure 4.6 in design specification chapter. So here I implement three options for the different type of programing language. The three options are web programing, procedural programing and object oriented programing. In web programing users can run HTML, HTML&CSS, BOOTSTRAP and JavaScript. Here for implement this I use JavaScript and Jquery script which catch the value from textarea and show the browser.

5.2.7 Search Page:

I already show the search page design in figure 4.7 in design specification chapter. So for these options develop I use PHP, MYSQL and Ajax. Ajax give real time search result and when user type in search field then it give suggestion depend on what things user type in the field. So after submit it's redirect to search result page where show the search result based on what user find.

5.2.8 Support Page:

I already show the support page design in figure 4.8 in design specification chapter. In support page have two chatting system. One is All user group chatting and another one is Single user chatting. All user chatting is like group chatting and single user chatting is like personal chatting where for sending message need to select who receive this message. For implementation this I use here PHP, MySQL and Ajax. Ajax gives the advantage of real time transfer message.

5.3 Implementation of Interactions

In implementation interaction is a part of my system. Actually interaction means when we are in a specific page of a website if we need to go another page it take us this page. It happens because the pages are interlinked among them. So the interlinked pages interact with other's. When we submit a form it's take action in background and show us result. There are many steps have to create of a website. A website is the best medium to communicate with users and represent about what you thinking from all over the world. It is therefore essential, it should be designed in such a way that users should be attracted and be engaged on the site. This is when a website can reach its users effectively. This entire element is website interactivity.

When we just work for implementation that means we are working for make or create the website. When users use of this system service by clicking some features that was the interaction implementation for my system.

5.4 Testing Implementation

When i test the specification is prepared then it is implemented and is called test implementation. I have tested my application or system several times like Registration system, Login system, Create post, post comments, post likes, User searching system, view user profile, Update user profile, Generating Web Programing, compile C Program, compile C++ program, All user/group chatting, Single user/personal chatting and logout, the input and output for the results as many as possible for me i have tested. I also tried to input my data in the databases and in case of that i got the success on that. So i have tested the following things are:

- Registration system
- Login System
- Create post
- Post Comments
- Post likes
- User searching system
- View User profile
- Update user profile
- Generating Web programing
- Compile C program
- Compile C++ program
- All user/Group chatting
- Single user/Personal chatting
- Logout

5.4.1 Acceptance Testing - In SDLC

The acceptance test cases are executed against the test data or using an acceptance test script and then the results are compared with the expected ones.

5.4.2 Accessibility Testing

Accessibility testing is a subset of usability testing where in the users under consideration people with all abilities and disabilities are. The significance of this testing is to verify user usability and accessibility.

5.5 Test Results and Report

Everything is all right every testing result is positive. Here need more professionalism for some project work.

5.5.1 System Testing:

Test every single things to see it's work properly or not. After complete all testing it's need to serve if have any problem, and when test again and it's continue before all done.

5.5.2 User Acceptance Testing

The user acceptance testing is the final testing for user reaction about this application. I already done this and the response is very positive.

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 Discussion and Conclusion

The purpose and objective of **CODERHEART** project is achieved. By providing extremely rich graphical user interface, web page designing is easy and in an aesthetic form. Flexibility in designing makes user explore their imagination and thus, even a novice user can dream and accomplish their wish of web page designing. After the long travel of thinking, discussion, designing, implementation I am in the last session and i point that instead of completion. The virtual communication system for beginner programmer called as coderheart is made for the beginner programmers who want to start programing and also for those people who want to be a programmer but waste time in social site much more. It will help those people very much. In developing Use Case the first technical challenge i encountered was that the selection of technical indicators and the Regression model.

The Regression model involves accumulation and processing of large amount of data. Though i found the task of handling and consolidating large statistical data to be challenging at the incipient stages of the project, i manage to implement the model successfully with a holistic understanding of the model. The incrementally progressing steps of software engineering development style have helped me to build these use cases from a concept entity to a realized module.

I also faced some difficulties trying to integrate all the codes what I done and test in small steps. I able to overcome this problem by pure hard work. The objective of my project has been of great help for me in terms of developing knowledge of languages like UML and strengthened my knowledge about web services and its interface.

6.2 Scope for Further Developments

Some of the work i could have done, had i continued this project

- Work for more gorgeous look for attracting user
- Live video support
- Include more compiler
- Develop chatting system
- Blog for complete course on specific language
- Skill testing

APPENDIX

Appendix A: Project Reflection:

The purpose of this Appendix is to provide an introduction to Project refection. This is very challenging for me for complete this project because i complete this project alone every research, thinking, designing, changing, developing, add new things is very much hard me but it's very good experience for me I already know how handle the pressure of the course as a whole. I have experience to work with team, I have complete many project for semester final, but for this project I decide to do alone and in whole course I learn how to work under pressure.

The experience was how to analysis, how to do proper planning, how to thinking of solution, how to convert solution in graphical user interface, how to implementation on time, how to prevent when face implementation problem. The extensive effort required was ultimately a good think. The time seemed to fly and yet we always got a lot done and manage to help another along the way towards the end point of having a substantive policy.

Appendix B: Related Diagrams

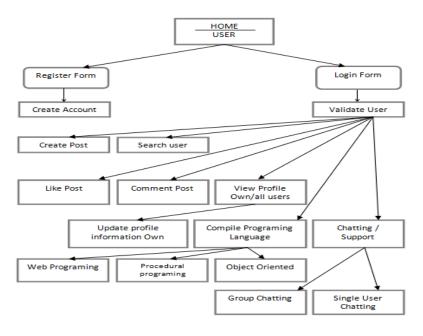


Figure 3.1: Business Processing Model

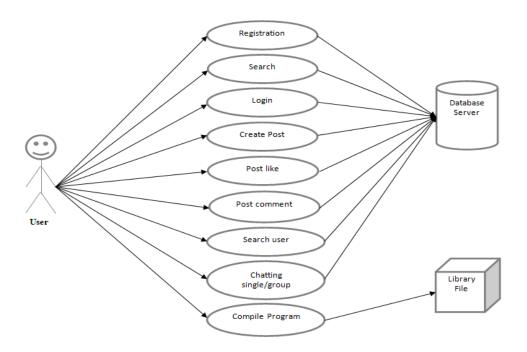


Figure 3.2: Use Case Model

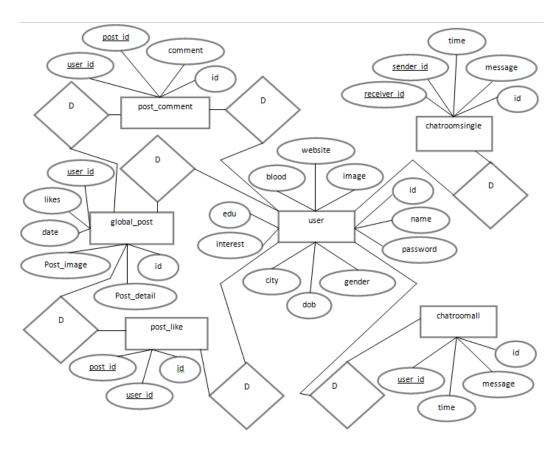


Figure 3.3: Entity Relationship Model

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