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**ENGINEER GRADUATION THESIS
MAJOR INFORMATION TECHNOLOGY**

MAJOR CODE: D480201

TOPIC

**WEBSITE CREATE SURVEY
AND ANALYZE DATA**

| | |
|---------------------|--------------------------|
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Da Nang, 05/2016

ACKNOWLEDGEMENTS

I would like to express my heartfelt thanks to teachers at Information Technology Faculty and Da Nang University of Technology for imparting knowledge to me in the past few years.

Particularly, we would like to give my thanks to Mrs. Tran Ho Thuy Tien, Information Technology Faculty, University of Technology, for her enthusiastic instructions and encouragement during my working on the thesis.

To have today's results, I'm extremely grateful to my family for their encouraging and facilitating my learning as well as this graduation thesis.

I also would like to express my thanks to all students of Information Technology Faculty - course 11, especially students of class 11T4 for their supporting, helping and sharing knowledge and materials during the course of doing the thesis.

Thank you once again!.

Student

Vu Xuan Tuan Anh

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2. *All reference, which used in this project thesis, are quoted with author's name, project's name, time and location to publish clearly and faithfully.*
3. *All invalid copies, educated statute violation or cheating will be born the full responsibility by myself.*

Student

Vu Xuan Tuan Anh

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LIST OF ABBREVIATIONS

| Abbreviation | Stand For |
|---------------------|-----------------------------------|
| API | Application Programming Interface |
| URL | Uniform Resource Locator |
| JPA | Java Persistence API |
| ORM | Object-Relational Mapping |
| AJAX | Asynchronous JavaScript and XML |
| PK | Primary Key |
| FK | Foreign Key |
| UC | Use Case |
| ERD | Entity Relationship Diagram |
| JS | Javascript |

INTRODUCTION

1. Background and Context

In recent year, with the rapid development of Information Technology in Vietnam, the application of Information Technology in the life, work and learning has become very prevalent, which has changed the working method dramatically and brought a better result. Particularly, the application in the survey, data retrieving, information management at organizations, companies, schools is very important and necessary.

It is obvious that there has been a great demand of surveying, storing and analyzing data at companies or schools, just have few a technology solution which is truly comprehensive to satisfy that demand. Most current methods are using the available tools in the Internet, nevertheless, it leads to the difficult in retrieving and managing data. Thus, I decided to create a website, which helps manage, analyze the data easily. And this is the topic of my graduation thesis.

The question is building a management system, creating the survey model, surveying and analyzing the data in order to ensure that the information is collected accurately and conveniently. Particularly, the system must have the main functions below:

- Account Management
- Survey Management
- Template Management
- Survey
- Data Analysis

2. The purpose and Meaning of the thesis

2.1. Purpose

With my knowledge and the enthusiastic instruction of tutors, the purpose of my thesis is to do research on the problems, which occur in the process of information collection and management in order to take measures and then concretizing my knowledge after five years.

2.2. Meaning

In our information age, the creating of the system, which helps examine and analyze data, has become very important and urgent. It contributes to improve the process of information acquisition, information processing and information management effectively.

3. Method

During the implementation of the topic, I have used the following methods:

- Method of statistics, survey: To obtain the system requirements
- Method of system design analysis: To analyze and design systems
- Method of result test and evaluation

4. Research orientation

4.1. Building system technology

The applied Technology:

- Java
- Spring Boot
- Thymeleaf
- JPA-Hibernate
- Database My SQL
- HTML/CSS/Javascript
- Jquery/Ajax
- Highcharts

4.2. Operating model

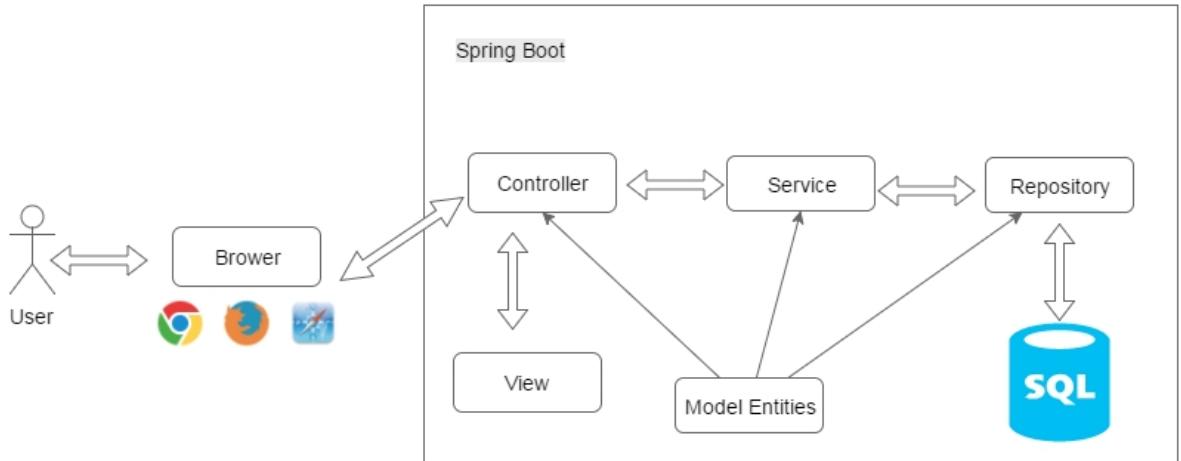


Figure Operating model

4.3. Project outcome

With the tools and knowledge synthetic, Survey System and Analyze Data will include estimated functions as below.

- Registration: register new account in order to use system
- Account management: manage information of account
 - Include functions: add new, edit, delete, block
- Template management: manage templates of the survey in order to create a survey more faster and simpler
 - Include functions: add new, edit, delete
- Survey management: manage survey of the system or personal
 - Include functions: add new, edit, delete
- Survey: send a survey to users based on completed survey form
 - There are two ways of the survey: by overall and by stepwise
- See data after making a survey: for each survey sample, we will see data after making a survey
 - There are two kinds of statistic: See by Table-Grid and by overall (summary)
- Statistic: make a statistic using time of template

- Feedback: send feedback to the system
- View feedback
- Send survey sample via email

5. Overview of Dissertation

Introduction

Chapter 1: Basic Theory: This chapter presents technologies used in the project.

Chapter 2: Analysis and Design: This chapter specifies requirement and analysis, design use case, and diagrams.

Chapter 3: Implementation & Results: This chapter presents implementation environment, results and evaluation of the project in order to bring out the advantages/disadvantages of recommended solution.

Conclusion & Development orientation

CHAPTER 1: BASIC THEORY

1.1. JAVA

Java is a programming language and computing platform first released by Sun Microsystems in 1995. There are lots of applications and websites that will not work unless you have Java installed, and more are created every day. Java is fast, secure, and reliable. From laptops to data centers, game consoles to scientific, cell phones to the Internet, Java is everywhere!

1.2. SPRING BOOT

Basically, Spring Boot is an opinionated instance of a Spring application. Spring Boot is a rapid application development platform. It uses various components of Spring, but has additional niceties like the ability to package your application as a runnable jar, which includes an embedded tomcat (or jetty) server.

Spring Boot aims to make it easy to create Spring-powered, production-grade applications and services with minimum fuss. It takes an opinionated view of the Spring platform so that new and existing users can quickly get to the bits they need. You can use it to create stand-alone Java applications that can be started using ‘java -jar’ or more traditional WAR deployments. We also provide a command line tool that runs ‘spring scripts’.

The diagram below shows Spring Boot as a point of focus on the larger Spring ecosystem. It presents a small surface area for users to approach and extract value from the rest of Spring:

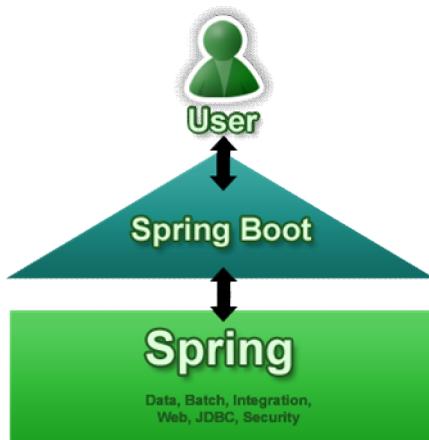


Figure 1.1. Spring Boot

The primary goals of Spring Boot are:

- To provide a radically faster and widely accessible ‘getting started’ experience for all Spring development
- To be opinionated out of the box, but get out of the way quickly as requirements start to diverge from the defaults
- To provide a range of non-functional features that are common to large classes of projects (e.g. embedded servers, security, metrics, health checks, externalized configuration)

1.3. JAVA PERSISTENCE API (JPA)

Java Persistence API is a collection of classes and methods to persistently store the vast amounts of data into a database which is provided by the Oracle Corporation.

JPA is a specification for accessing, persisting and managing the data between Java objects and the relational database. As the definition says its API, it is only the specification. There is no implementation for the API. JPA specifies the set of rules and guidelines for developing the interfaces that follows standard. Straight to the point : JPA is just guidelines to implement the Object Relational Mapping (ORM) and there is no underlying code for the implementation.

Traditionally there have been multiple Java ORM solutions:

- Hibernate
- TopLink
- JDO

To reduce the burden of writing codes for relational object management, a programmer follows the ‘JPA Provider’ framework, which allows easy interaction with database instance. Here the required framework is taken over by JPA.

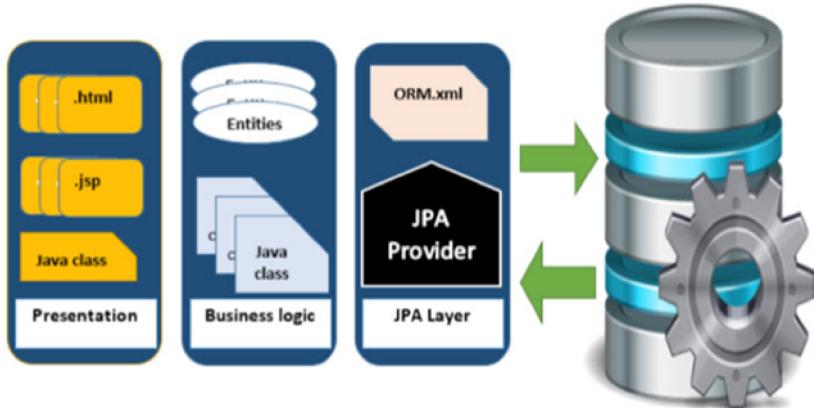


Figure 1.2. Architecture of JPA

JPA history:

- While introducing EJB 3.0, the persistence layer was separated and specified as JPA 1.0 (Java Persistence API). The specifications of this API were released along with the specifications of JAVA EE5 on May 11, 2006 using JSR 220.
- JPA 2.0 was released with the specifications of JAVA EE6 on December 10, 2009 as a part of Java Community Process JSR 317.
- JPA 2.1 was released with the specification of JAVA EE7 on April 22, 2013 using JSR 338.

1.4. THYMELEAF

Thymeleaf is a modern server-side Java template engine for both web and standalone environments.

Thymeleaf's main goal is to bring elegant natural templates to your development workflow — HTML that can be correctly displayed in browsers and also work as static prototypes, allowing for stronger collaboration in development teams.

With modules for Spring Framework, a host of integrations with your favourite tools, and the ability to plug in your own functionality, Thymeleaf is ideal for modern-day HTML5 JVM web development

1.5. JQUERY

jQuery is a fast and concise JavaScript Library created by John Resig in 2006 with a nice motto – Write less, do more.

jQuery is a JavaScript toolkit designed to simplify various tasks by writing less code. jQuery simplifies HTML document traversing, event handling, animating, and Ajax interactions for rapid web development.

1.6. AJAX

- AJAX stands for Asynchronous JavaScript and XML. AJAX is a new technique for creating better, faster, and more interactive web applications with the help of XML, HTML, CSS, and Java Script.
- Ajax uses XHTML for content, CSS for presentation, along with Document
- Object Model and JavaScript for dynamic content display.
- Conventional web applications transmit information to and from the sever using synchronous requests. It means you fill out a form, hit submit, and get directed to a new page with new information from the server.
- With AJAX, when you hit submit, JavaScript will make a request to the server, interpret the results, and update the current screen. In the purest sense, the user would never know that anything was even transmitted to the server.
- XML is commonly used as the format for receiving server data, although any format, including plain text, can be used.
- A user can continue to use the application while the client program requests information from the server in the background.

- Intuitive and natural user interaction. Clicking is not required, mouse movement is a sufficient event trigger.

1.7. HIGHCHART

Highcharts is a charting library written in pure JavaScript, offering an easy way of adding interactive charts to your web site or web application. Highcharts currently supports line, spline, area, areaspline, column, bar, pie, scatter, angular gauges, arearange, areasplinerange, columnrange, bubble, box plot, error bars, funnel, waterfall and polar chart types.

1.8. SUMMARY

This chapter presents theoretical basis, technology and tools used in the thesis.

CHAPTER 2: ANALYSIS AND DESIGN SYSTEM

2.1. USE CASE DIAGRAM

2.1.1. Use case of system

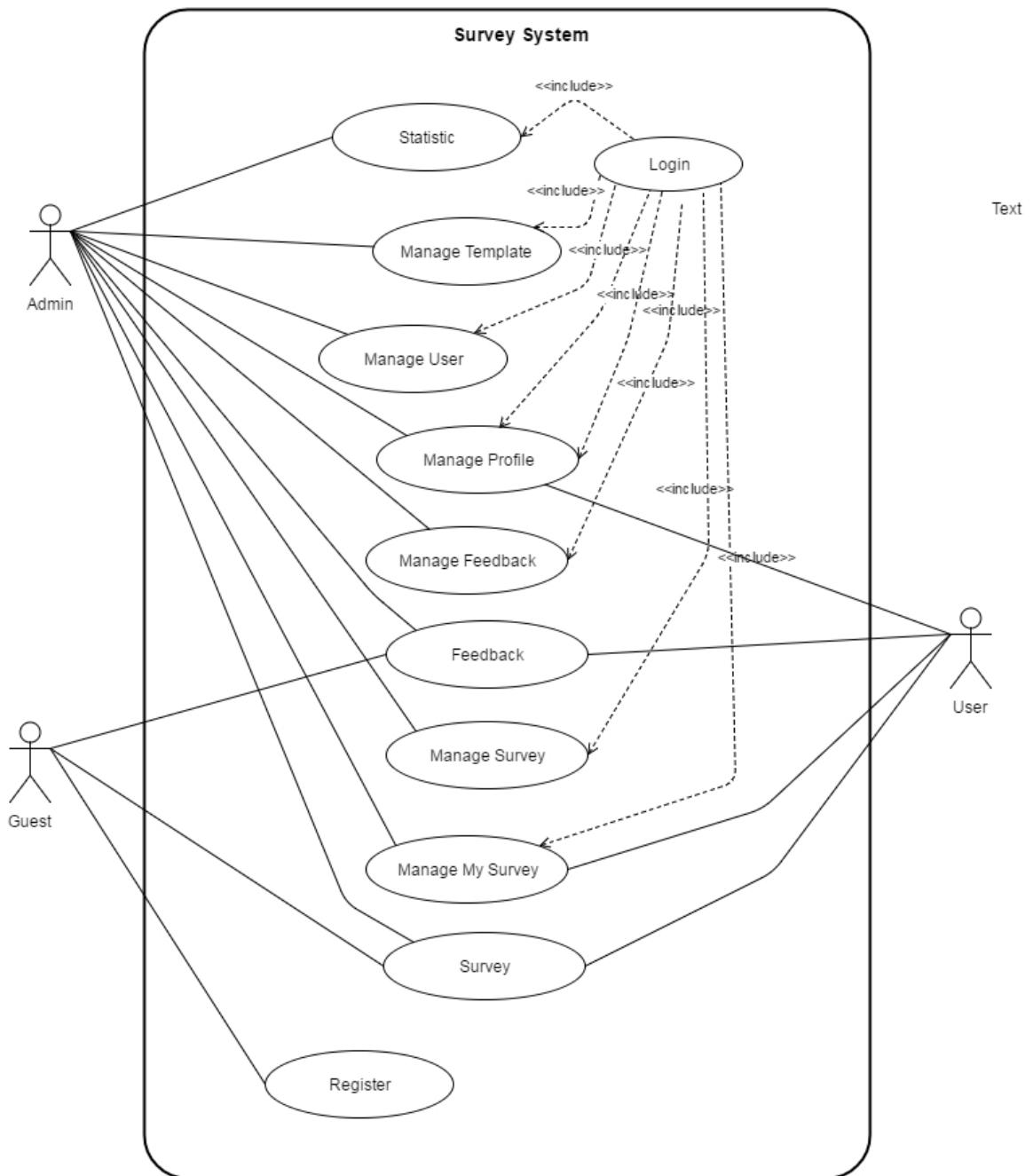


Figure 2.1. Use case diagram of system

2.1.2. Use case of Admin

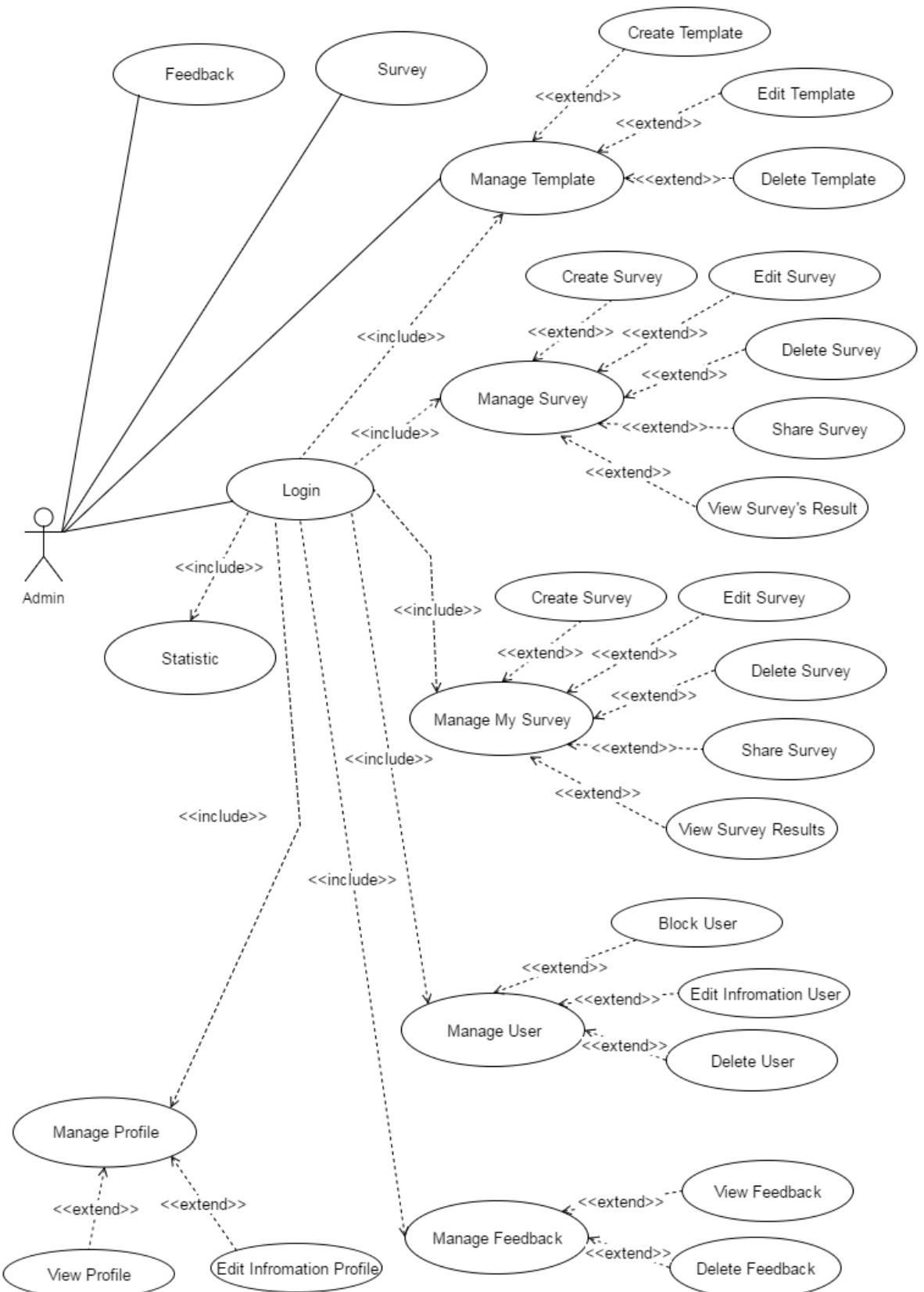


Figure 2.2. Use case diagram of Admin

2.1.3. Use case of User

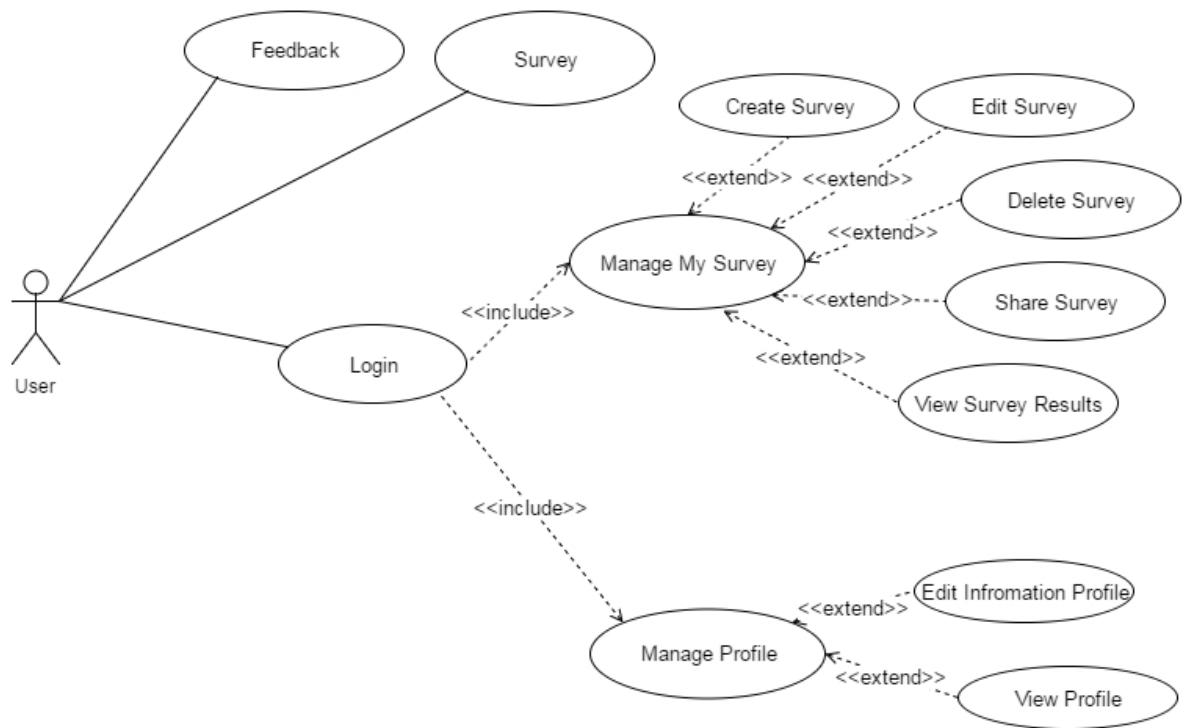


Figure 2.3. Use case diagram of User

2.1.4. Use case of Guest

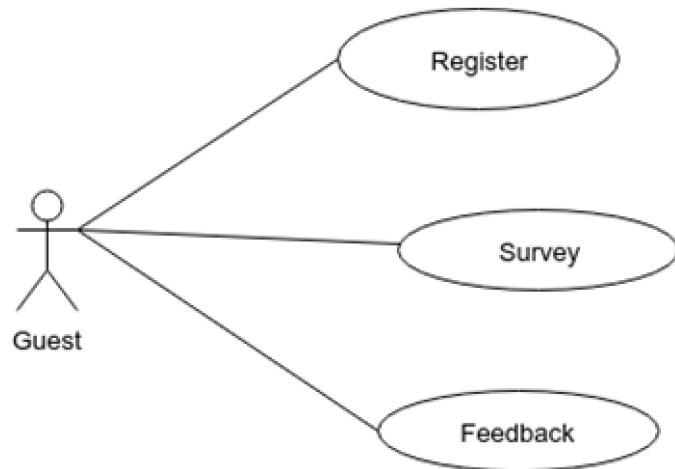


Figure 2.4. Use case diagram of Guest

2.1.5. Use case Manage My Survey

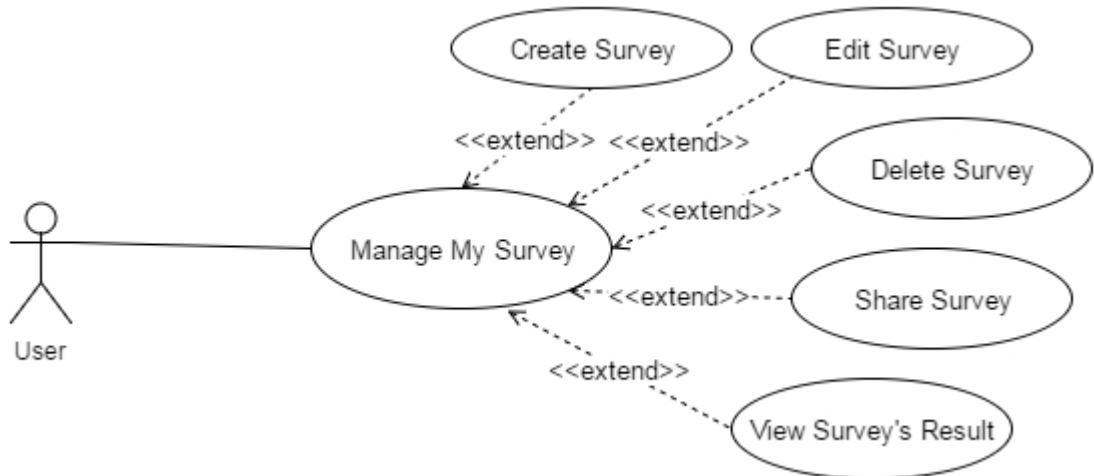


Figure 2.5. Use case diagram of Manage My Survey

2.1.6. Use case Create Survey

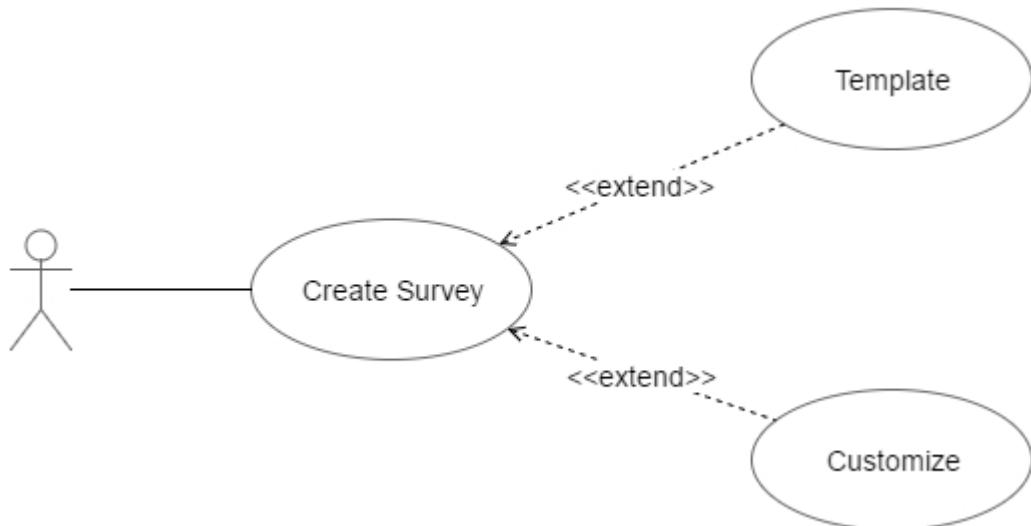


Figure 2.6. Use case diagram of Create Survey

2.1.7. Use case Survey

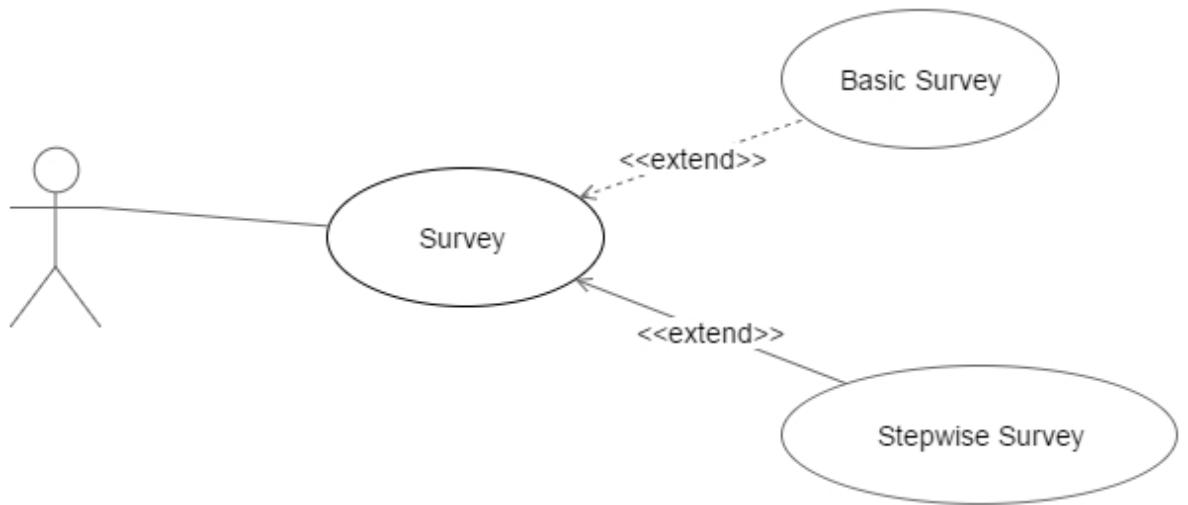


Figure 2.7. Use case diagram of Survey

2.1.8. Use case View Survey Results

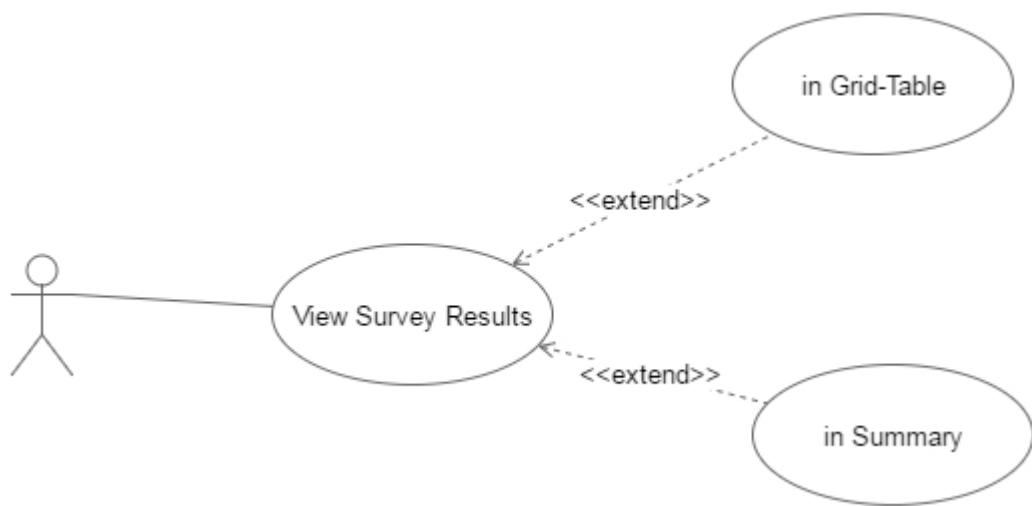


Figure 2.8. Use case diagram of Survey Results

2.2. ACTIVITY DIAGRAM

2.2.1. Activity of Admin

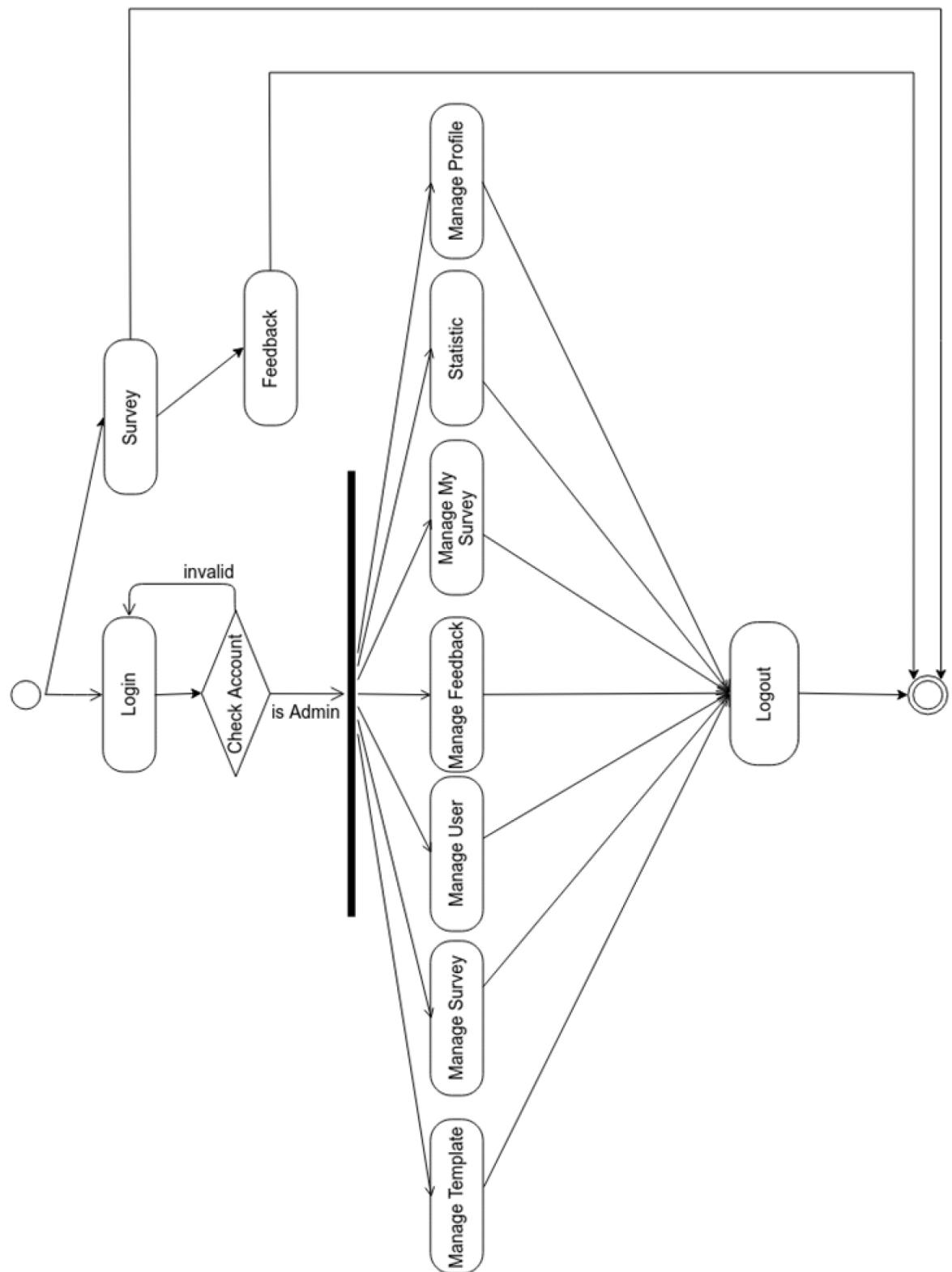


Figure 2.9. Activity diagram of Admin

2.2.2. Activity of User

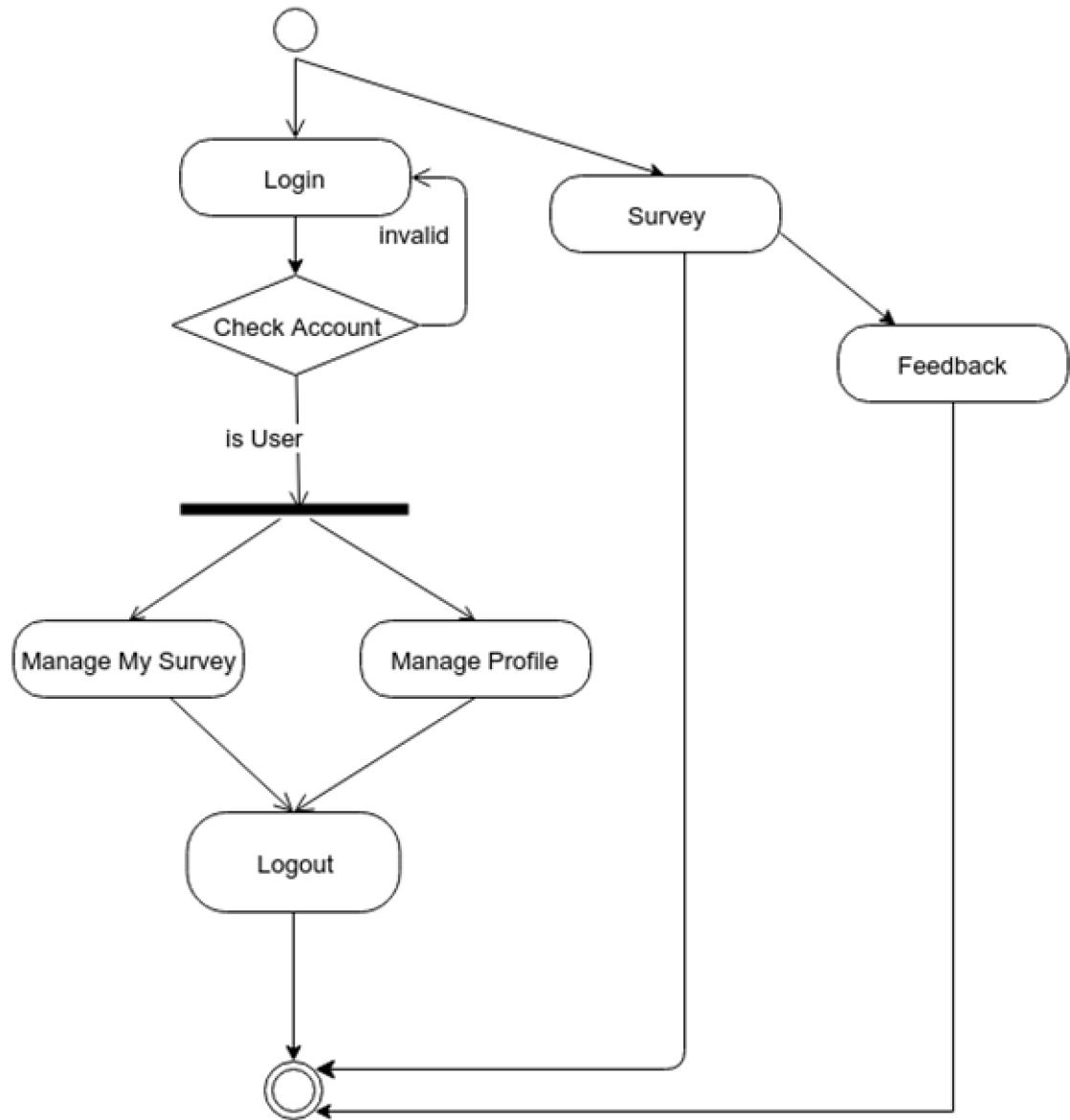


Figure 2.10. Activity diagram of User

2.2.3. Activity of Guest

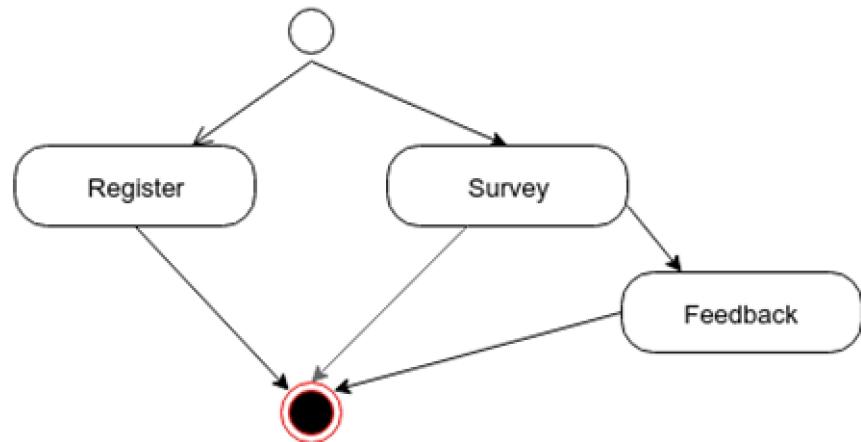


Figure 2.11. Activity diagram of Guest

2.2.4. Activity Manage My Survey

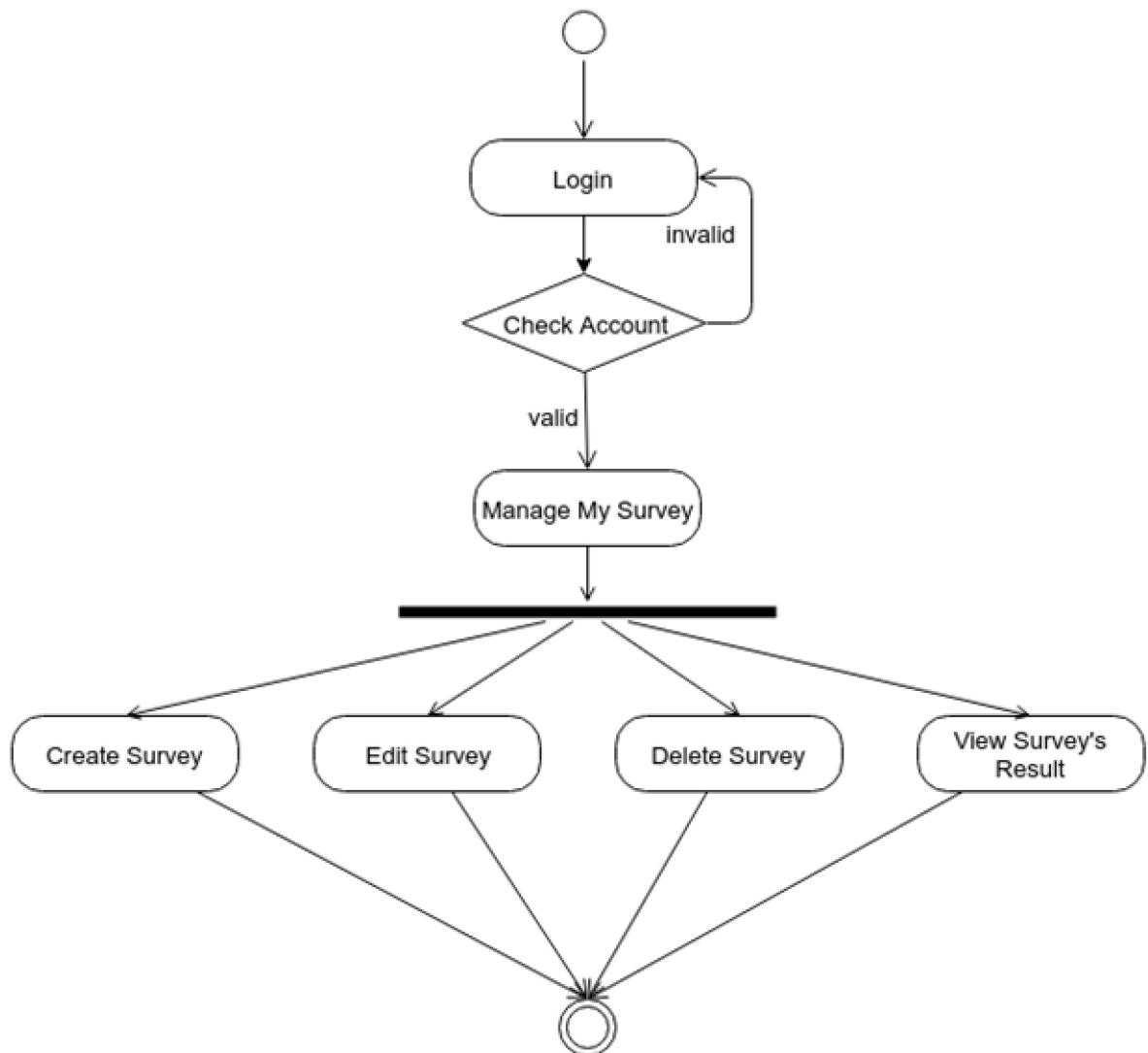


Figure 2.12. Activity diagram of Manage My Survey

2.2.5. Activity Create Survey

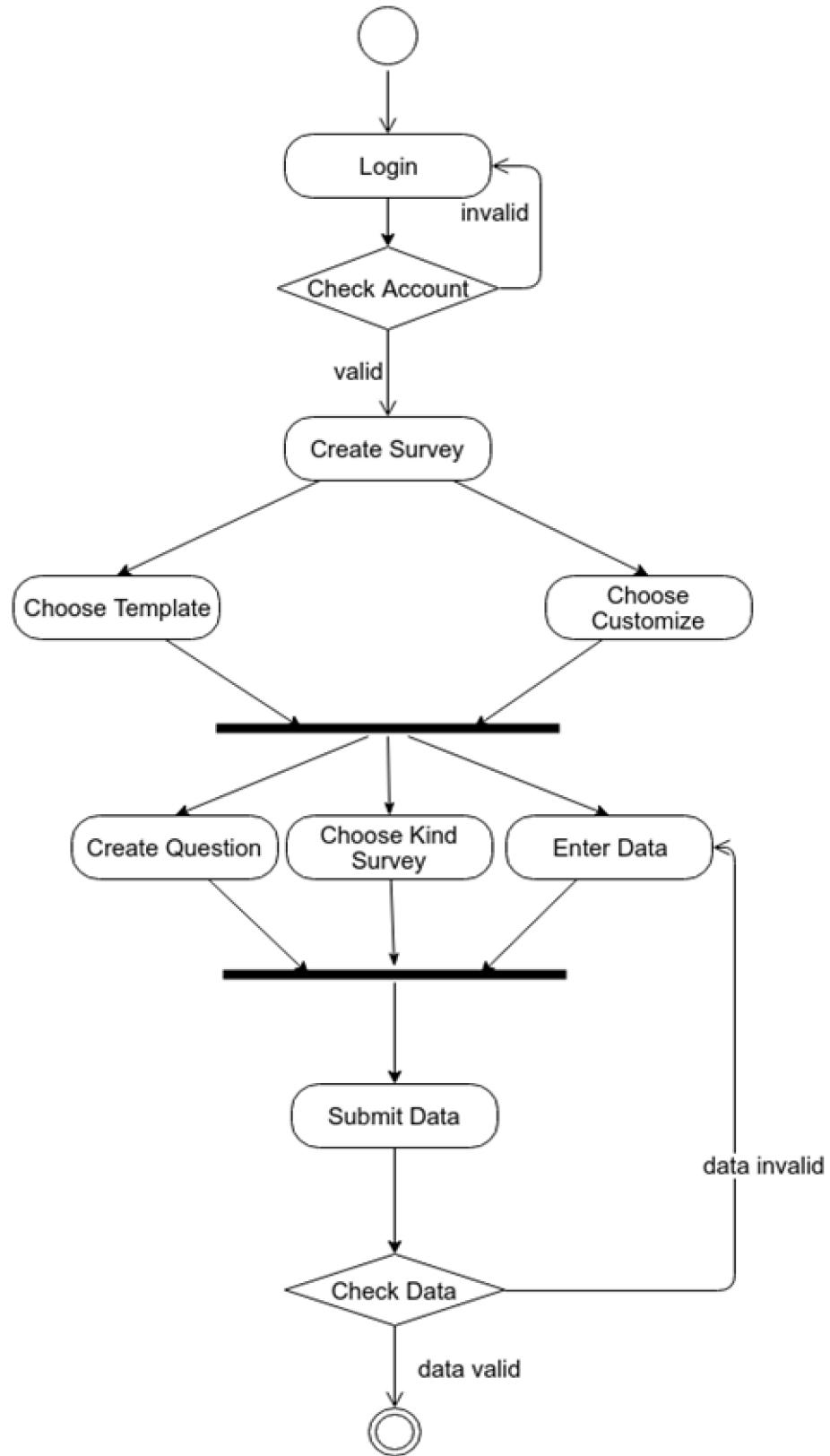


Figure 2.13. Activity diagram of Create Survey

2.2.6. Activity Survey

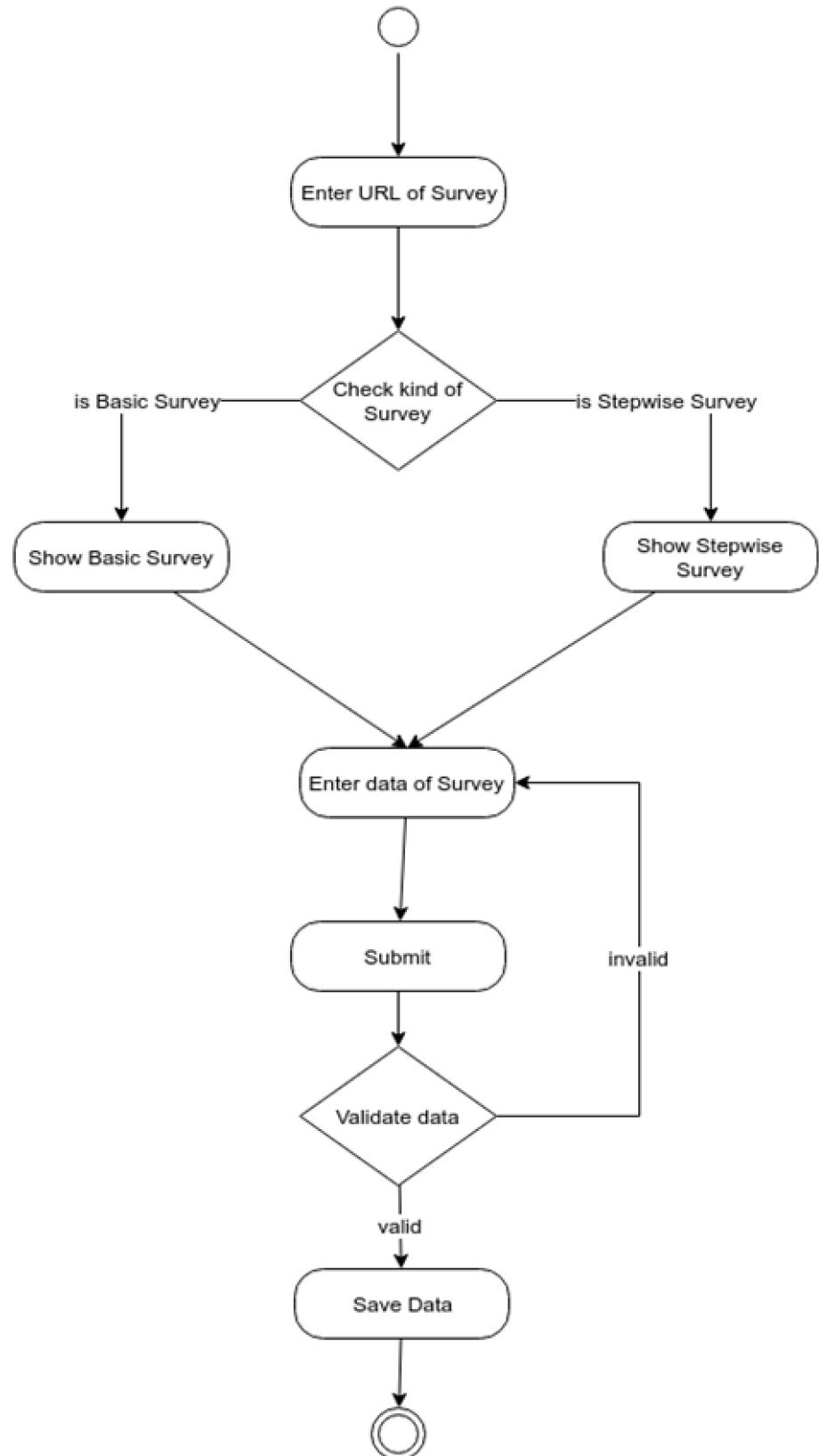


Figure 2.14. Activity diagram of Survey

2.2.7. Activity View Survey Results

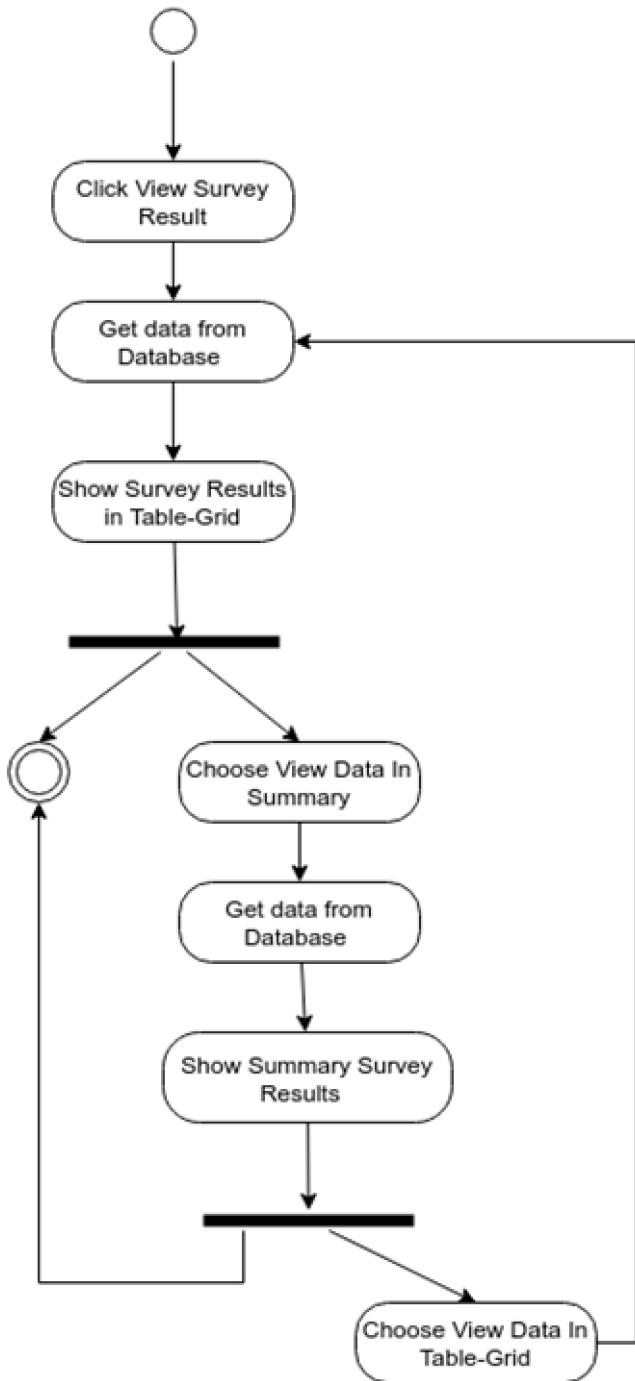


Figure 2.15. Activity diagram of View Survey Results

2.3. SEQUENCE DAGRAM

2.3.1. Create survey in Template

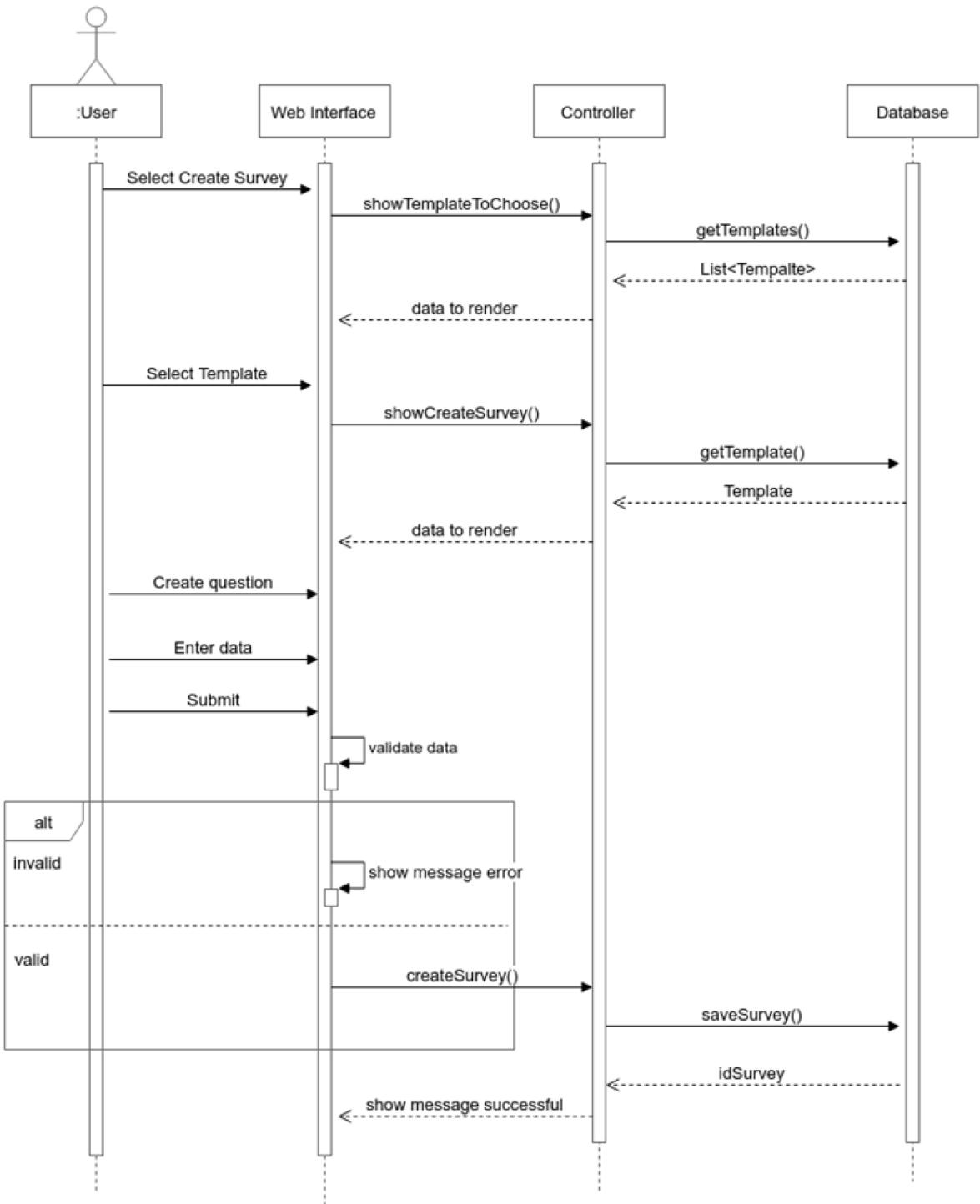


Figure 2.16. Sequence diagram of Create Survey in Template

2.3.2. Create Survey in Customize

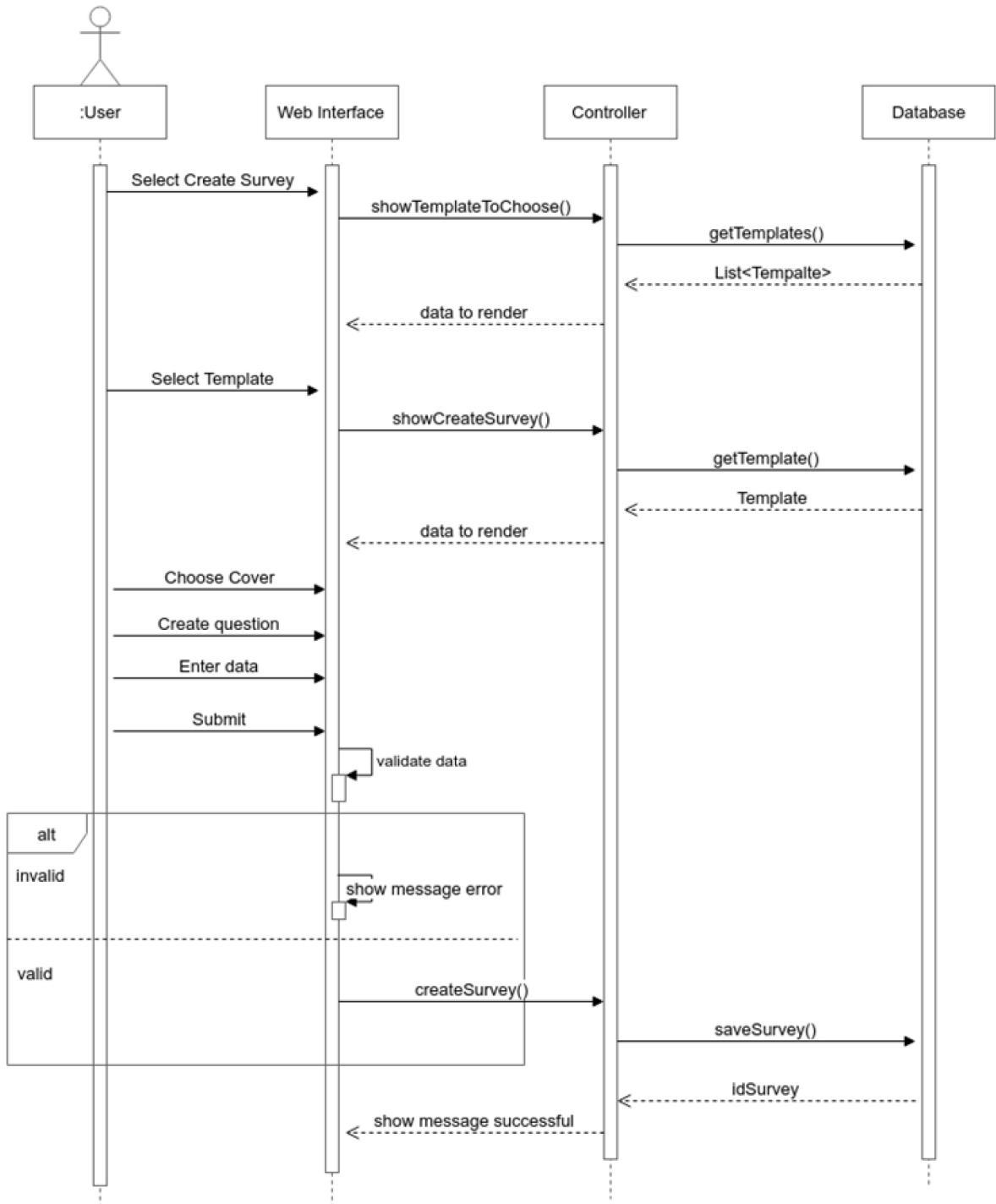


Figure 2.17. Sequence diagram of Create Survey in Customize

2.3.3. Survey

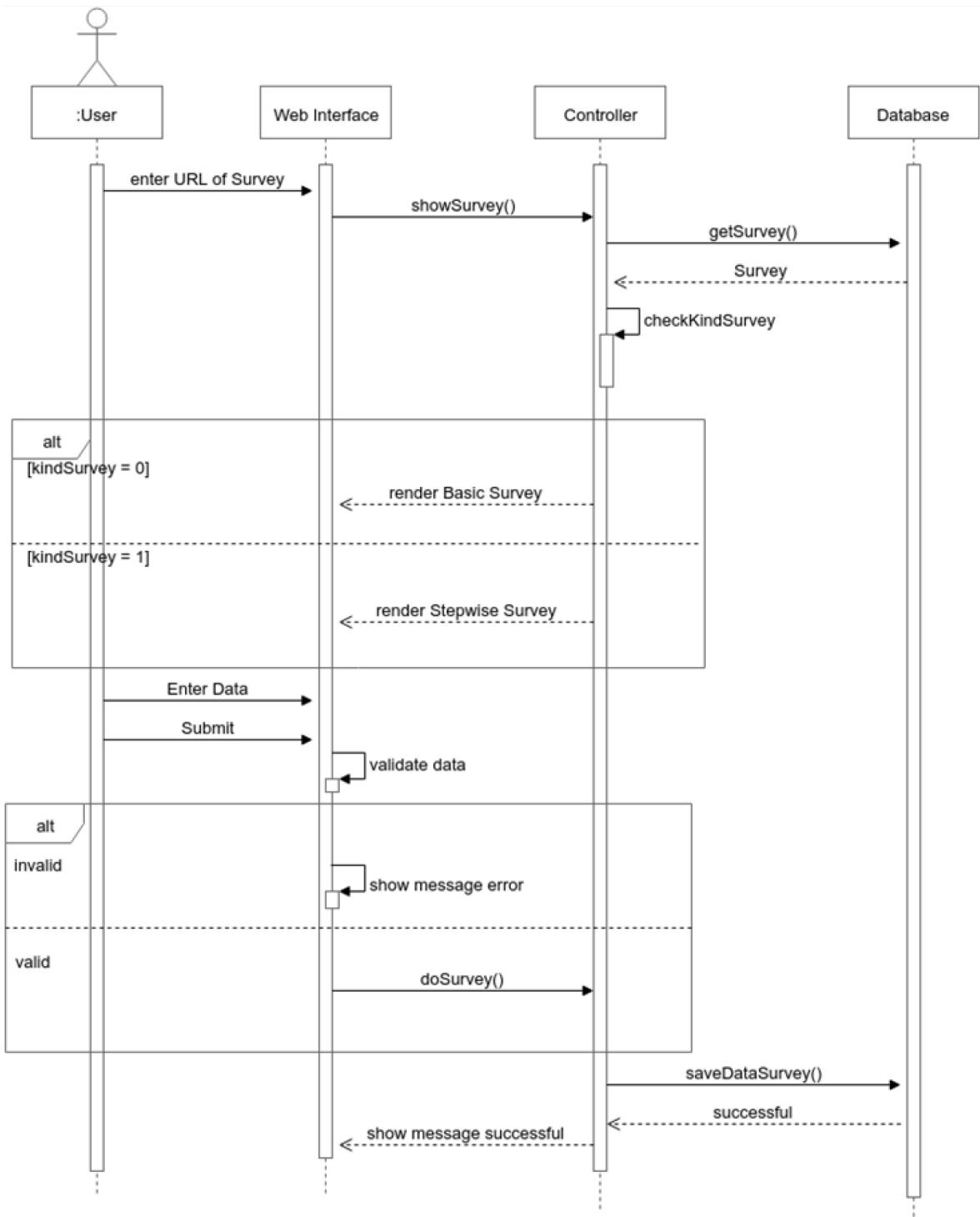


Figure 2.18. Sequence diagram of Survey

2.3.4. View Survey Results

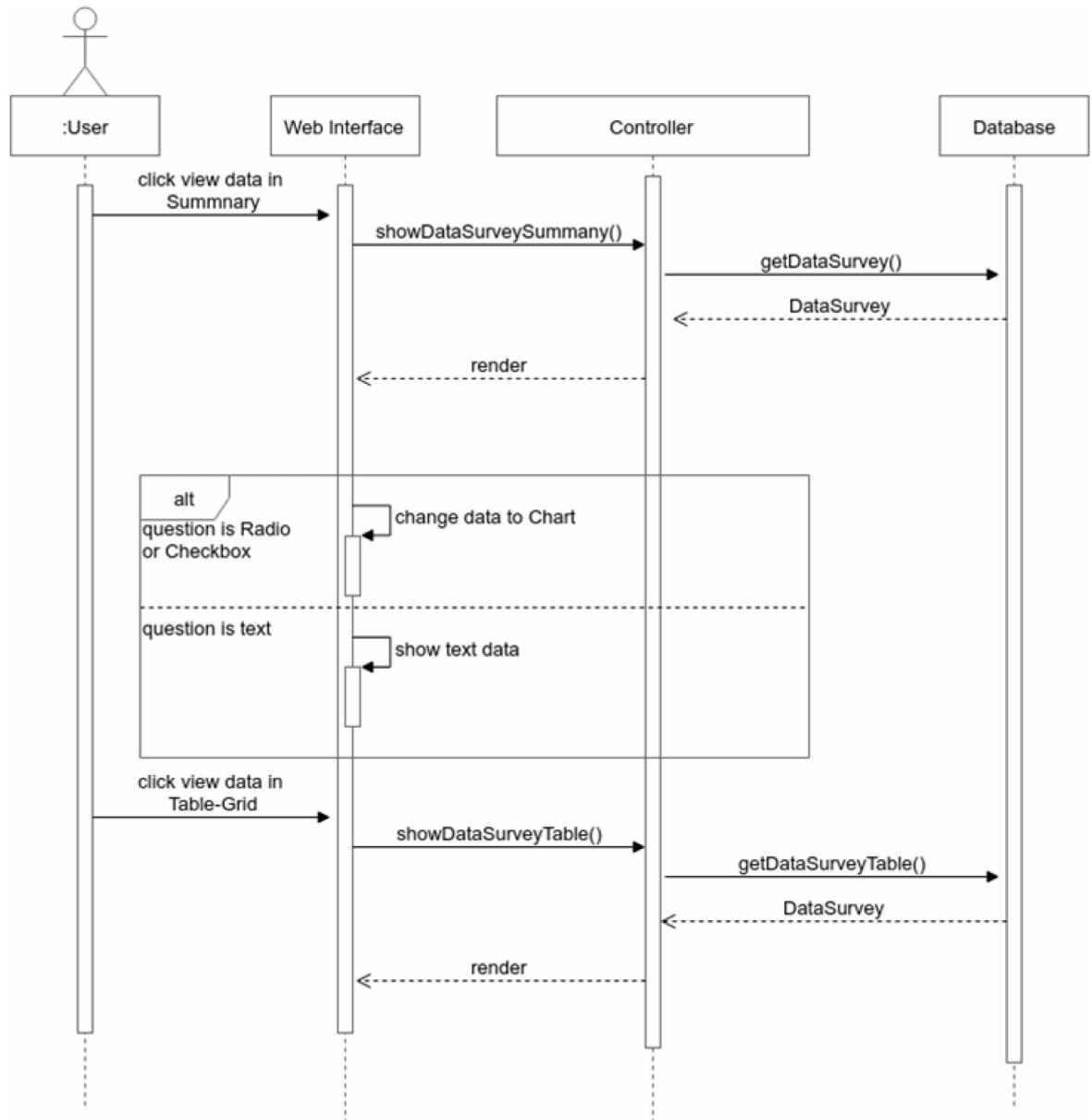


Figure 2.19. Sequence diagram of View Survey Results

2.4. DATABASE DESIGN

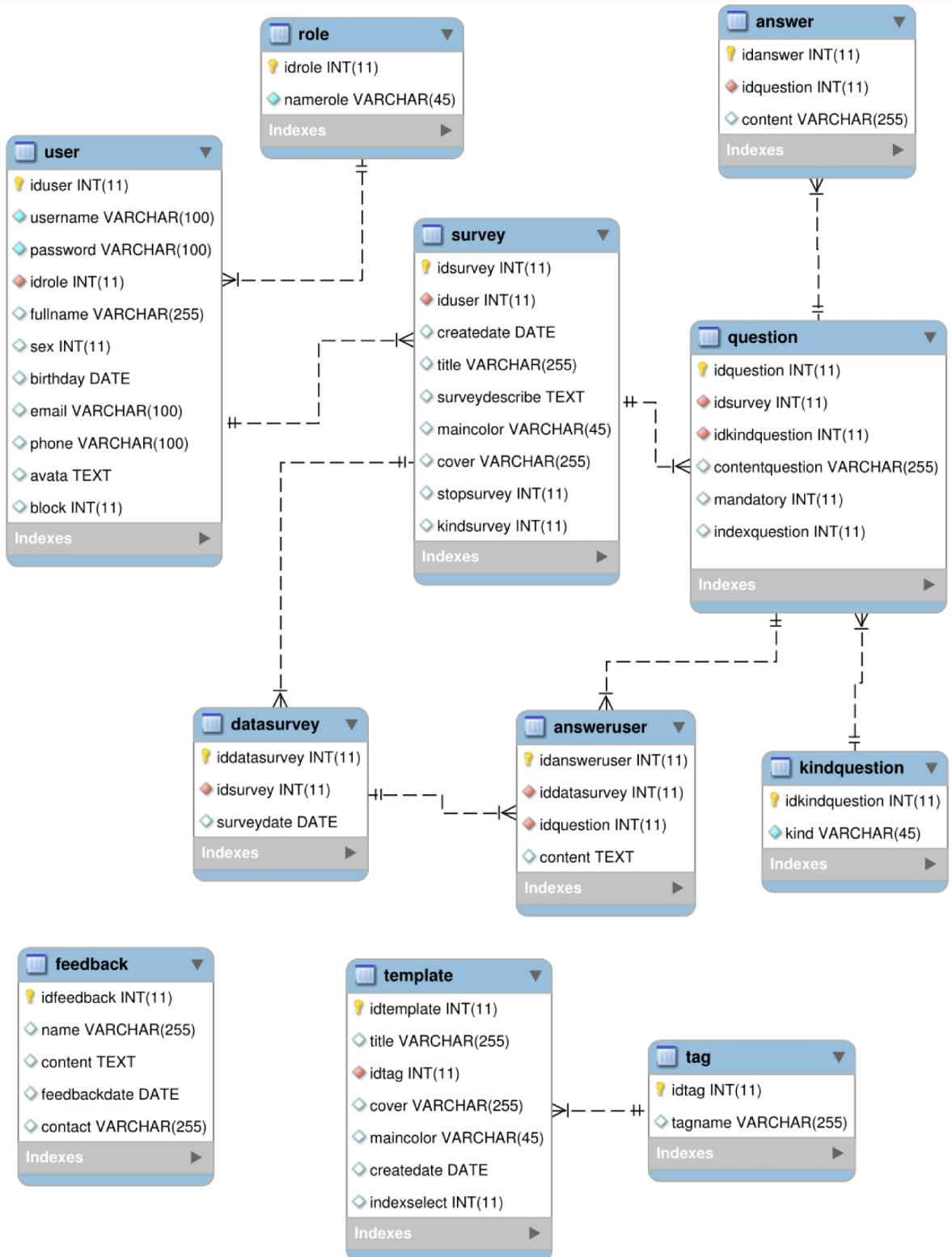
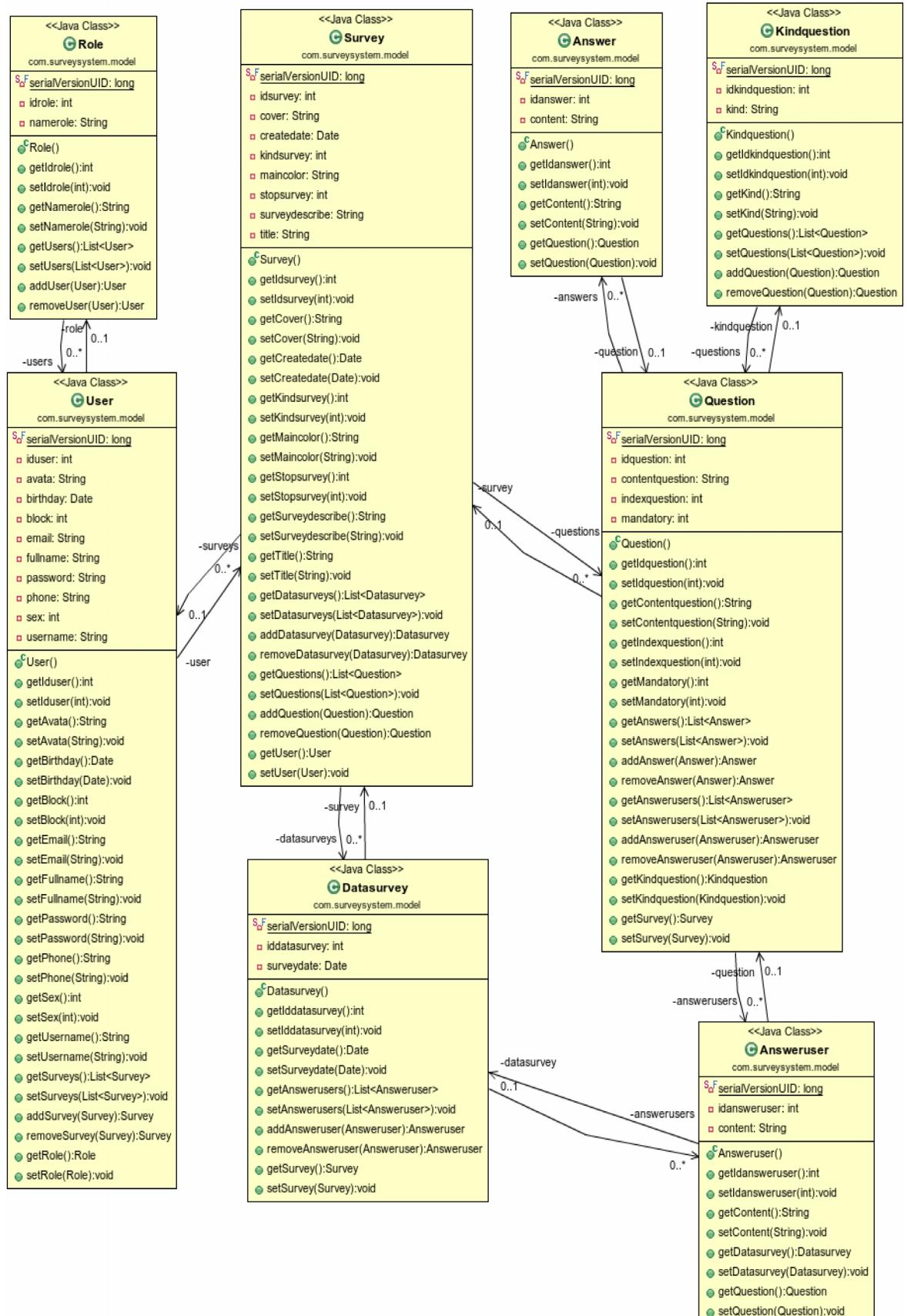


Figure 2.20. ERD

2.5. CLASS DIAGRAM



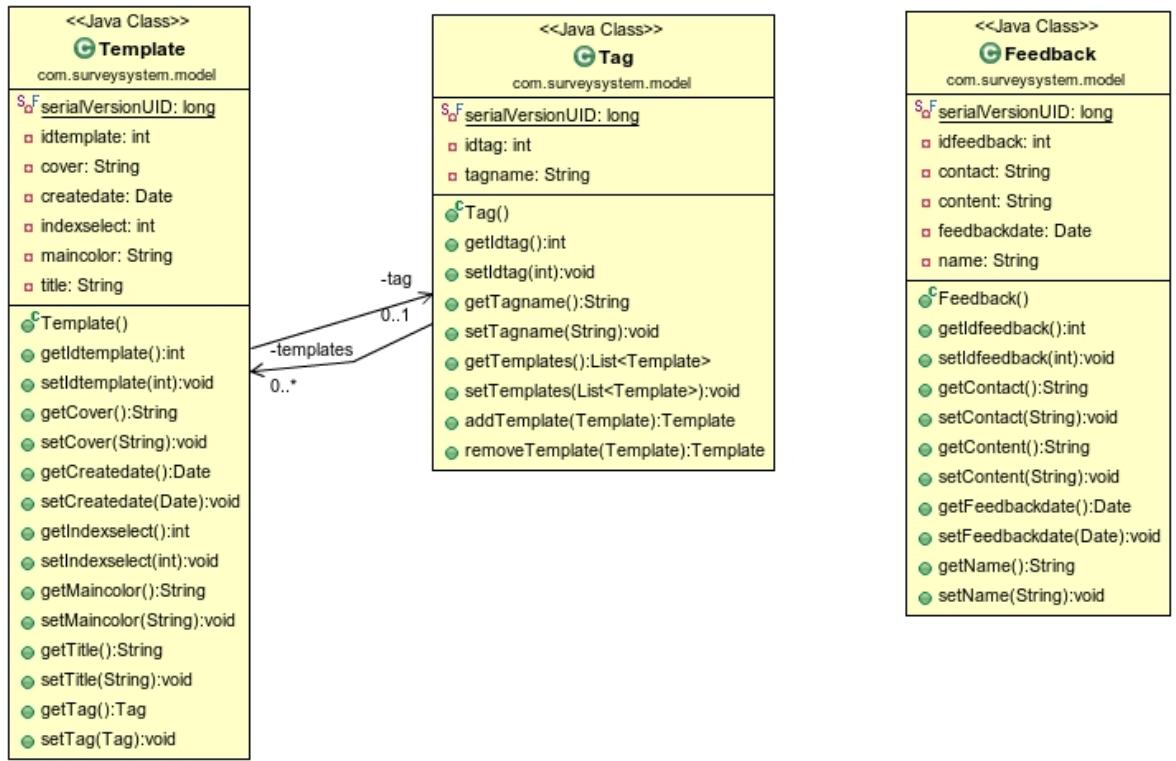


Figure 2.21. Class diagram

CHAPTER 3: IMPLEMENTATION

3.1. DEVELOP SYSTEM

3.1.1. Process

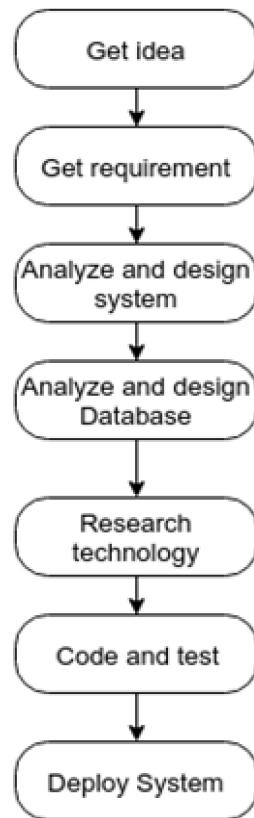


Figure 3.1. Develop system process

3.1.1.1. Get requirement

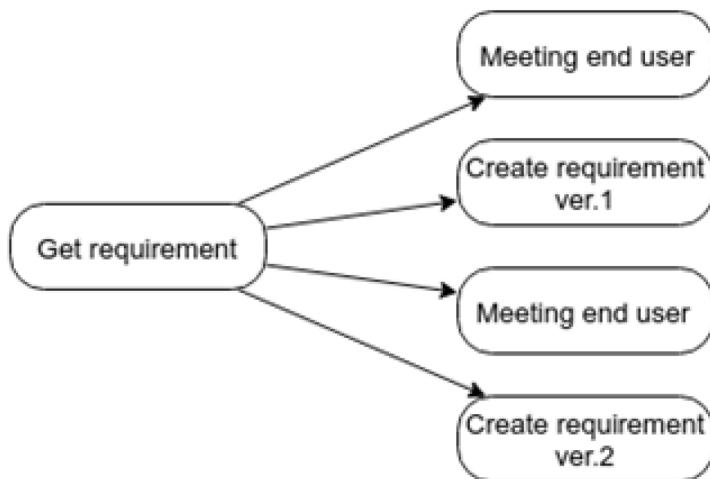


Figure 3.2. Get requirement

- Step 1: Meeting end user: Get plan and meeting end user. Discuss about the system, then get requirement.
- Step 2: Create requirement ver.1: Create requirement document version 1
- Step 3: Meeting end user: Meeting end user again to discuss about requirement document version 1.
- Step 4: Create requirement ver.2: Create requirement document version 2

3.1.1.2. *Analyze and design system*

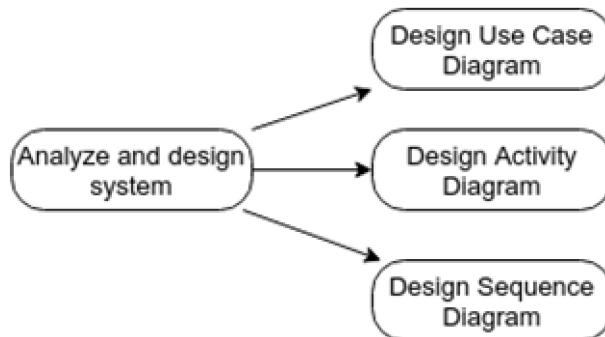


Figure 3.3. Analyze and design system

- Step 1: Design Use Case diagram of system from requirement
- Step 2: Design Activity diagram from requirement
- Step 3: Design Sequence diagram from requirement

3.1.1.3. *Analyze and design database*

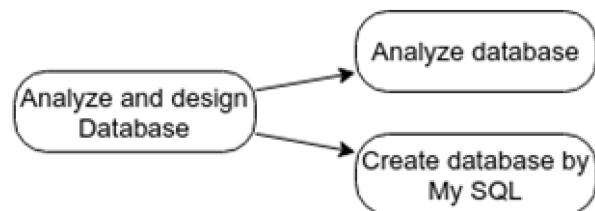


Figure 3.4. Analyze and design database

- Step 1: Analyze database: Analyze and draw database
- Step 2: Create database by My SQL

3.1.1.4. Research Technology

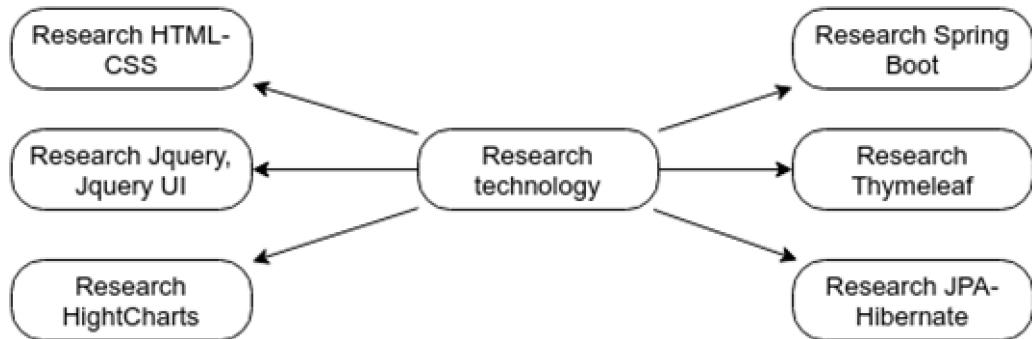


Figure 3.5. Research technology

- Step 1: Research back-end: Spring, Thymeleaf, JPA-Hibernate
- Step 2: Research front-end: HTML-CSS, Jquery, Jquery UI, HightChart.
In HTML-CSS, focus on HTML5 and CSS3.

3.1.2. Analyze main function

3.1.2.1. Create Survey

- Create survey prototype by HTML-CSS with cover and main color get from template has choose before. Survey prototype have Title field, Description, 3 kind of question (Sort text, radio, check-box).
- Create question by click into icon of questions at left of survey content. Have 4 question is: Sort text (text box), Radio, Check-box, Text-area.
- Change position of question by “drag and drop” question into expected position.
- Setup mandatory question.
- Enter full data into fields.
- Submit data to server.
- Save data into database.

3.1.2.2. Survey by Basic Survey

- Show survey in overall form. All questions and answers will show in one page.
- User enter data into form.

- Submit data. If have mandatory question don't fill data yet, system will show error message and can't submit data to server.

3.1.2.3. Survey by Stepwise Survey

- Show survey in stepwise form.
- Every once only show one question.
- User enter data or choose answer for each question.
- If question is mandatory, user can't move next question if don't enter data yet.
- Submit data if pass last question by click into “Done” button.

3.1.2.4. Analyze survey results in Table - Grid form

- Show survey results in table form.
- Table header are questions.
- Table body are answer of user.
- If questions are radio or checkbox question. User can click into the question to view question result in Chart form.

3.1.2.5. Analyze survey results in Summary form

- Show survey results in summary form.
- The question is text or textarea will show in text form. Line-by-line is answer of user.
- The question is radio or checkbox question will show in char form.
- Using HighCharts to change data to chart form.

3.1.2.6. Using HighCharts library

Have two way to change data from number to chart form:

- At first: Create chart by HTML

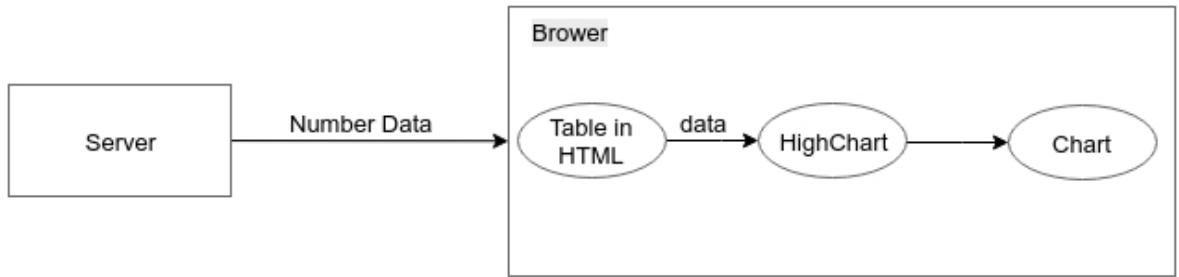


Figure 3.6. HighCharts by HTML

- Second: Create chart by direct data

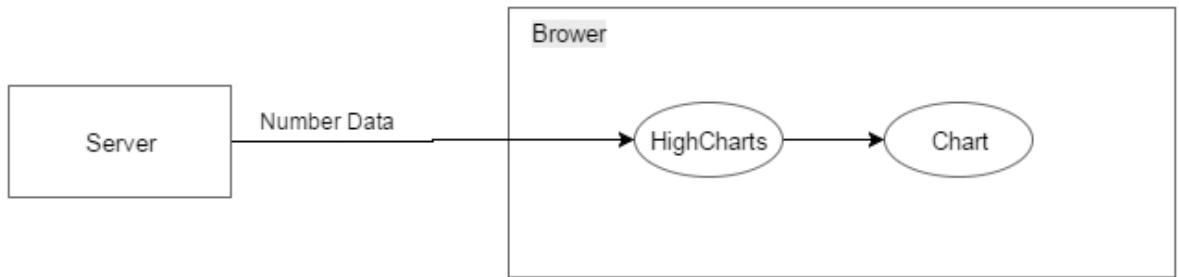


Figure 3.7. HightChart by direct data

3.2. FUNCTIONS DEMO

This is homepage of System

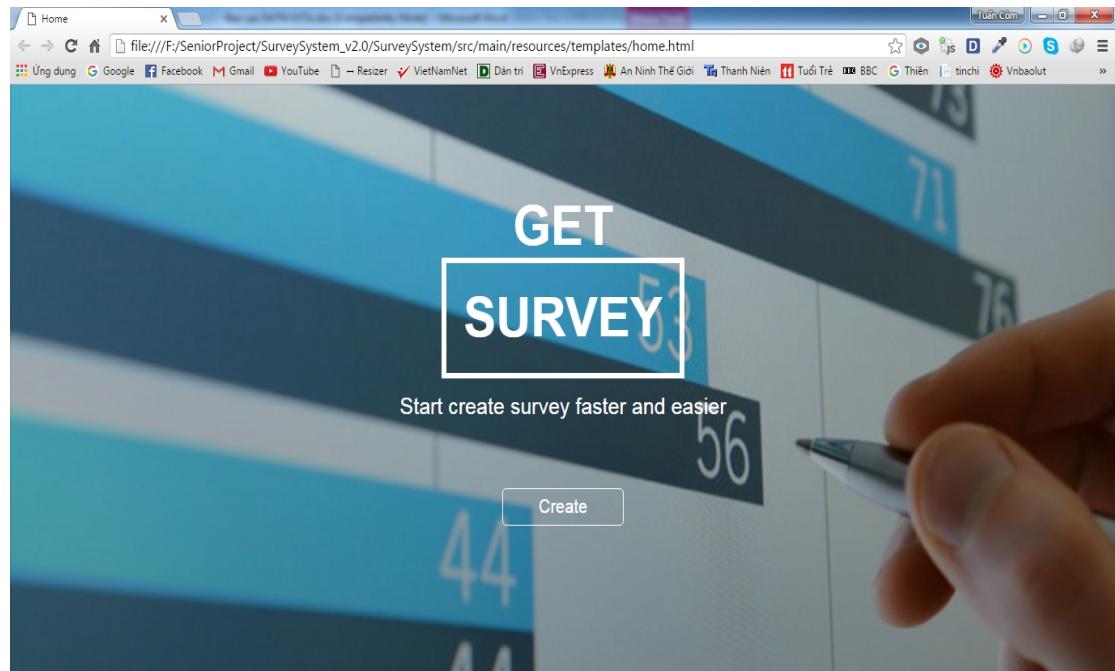


Figure 3.8. Home page

This function help login into System

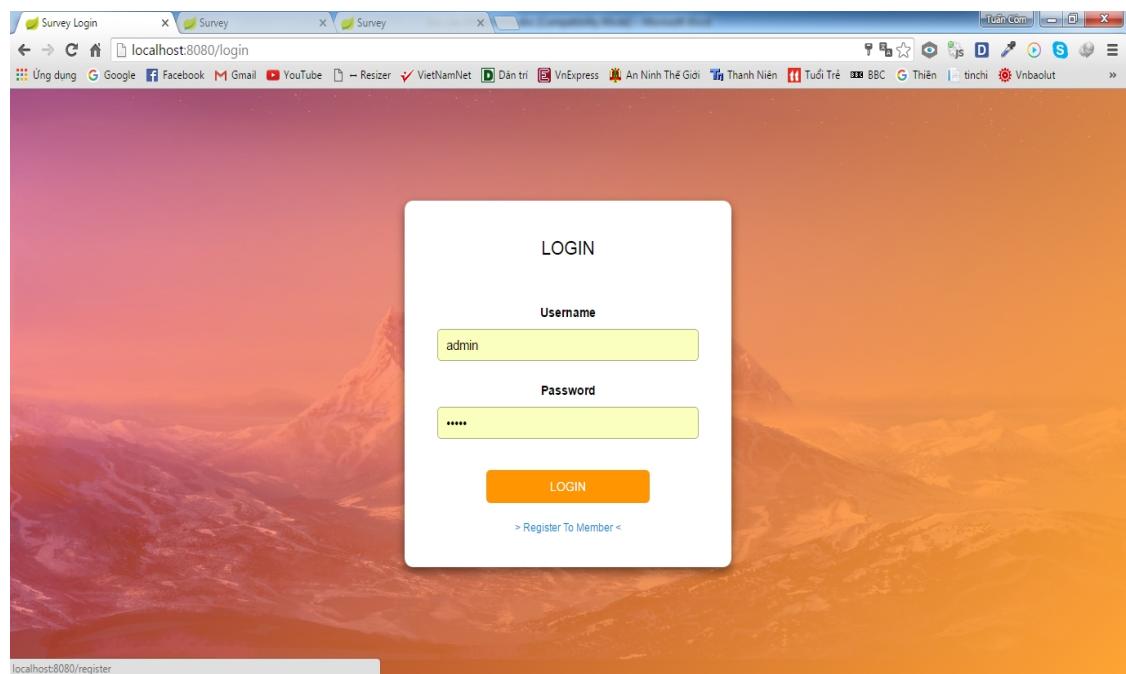


Figure 3.9. Login

This function helps Guest register become User of system.

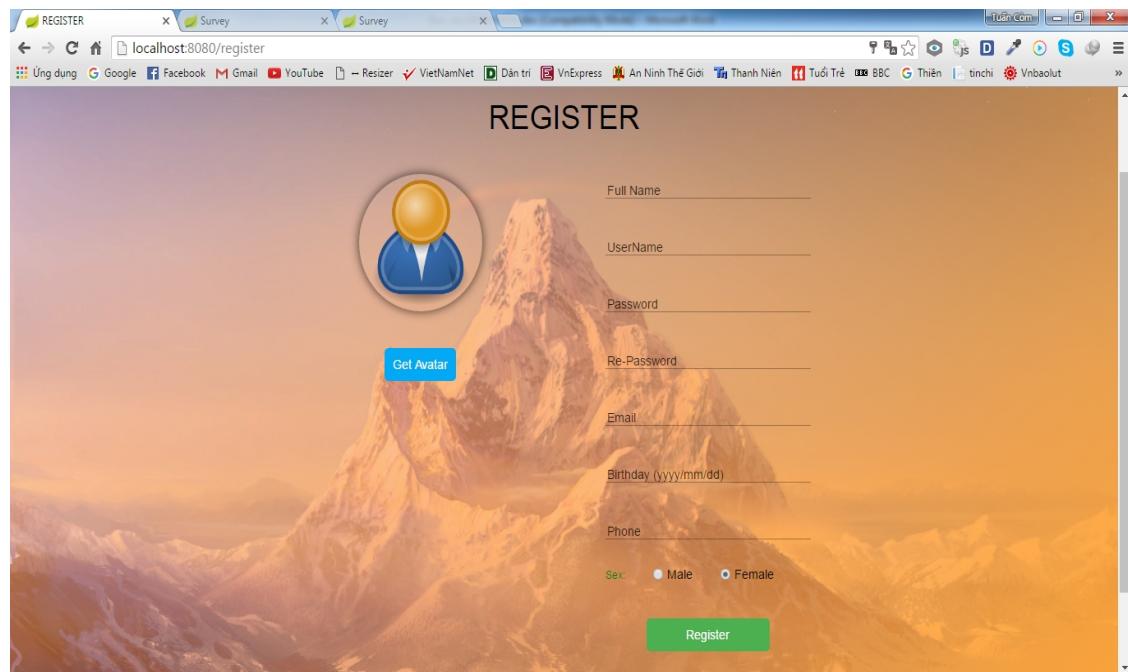


Figure 3.10. Register

This function help manage all Survey of User.

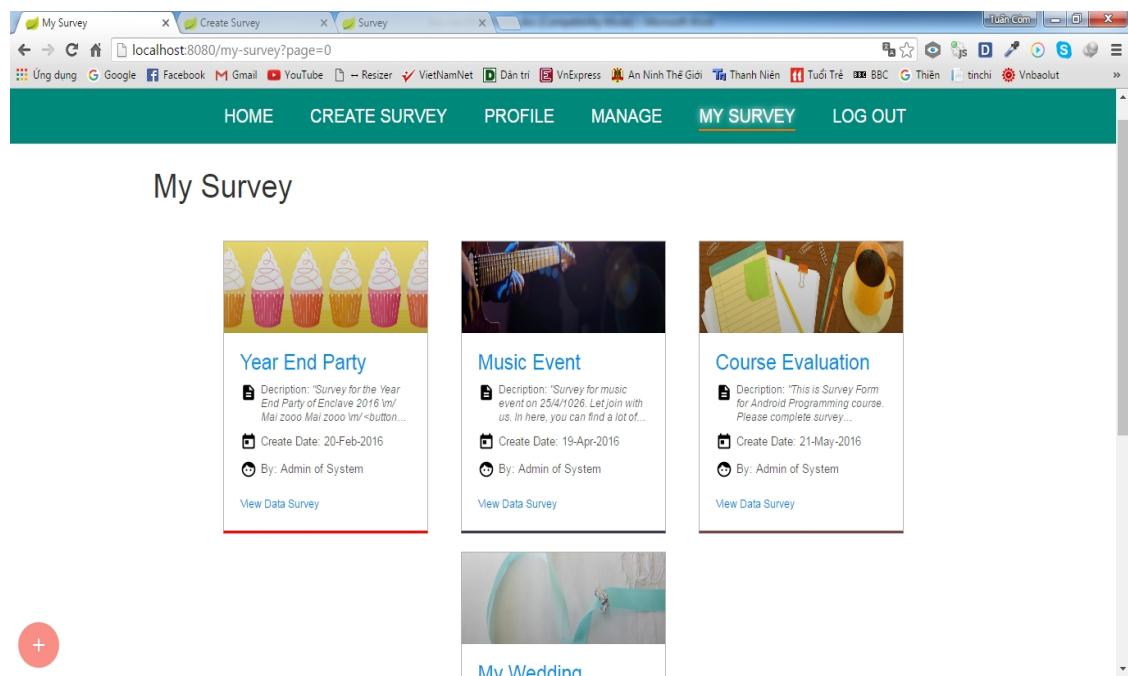


Figure 3.11. My Survey

Click into cover or survey title to survey. Click View Data Survey to view survey results.

Website Create Survey And Analyze Data

This function to get template to set cover, main color of survey.

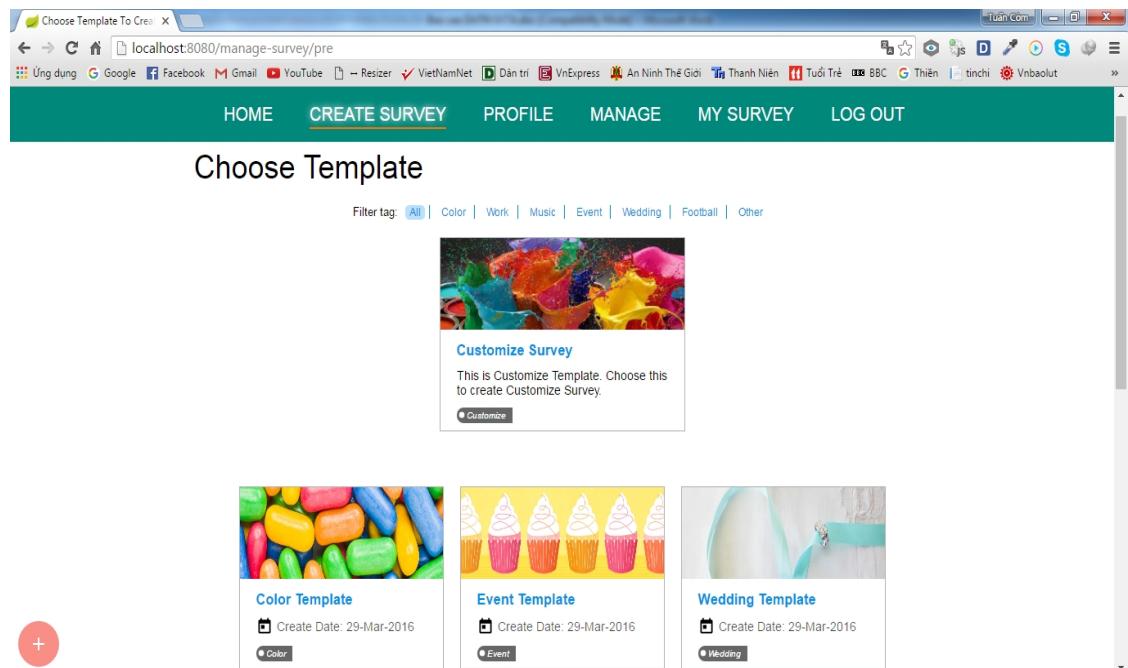


Figure 3.12. Choose Template to Create Survey

This function helps create new survey.

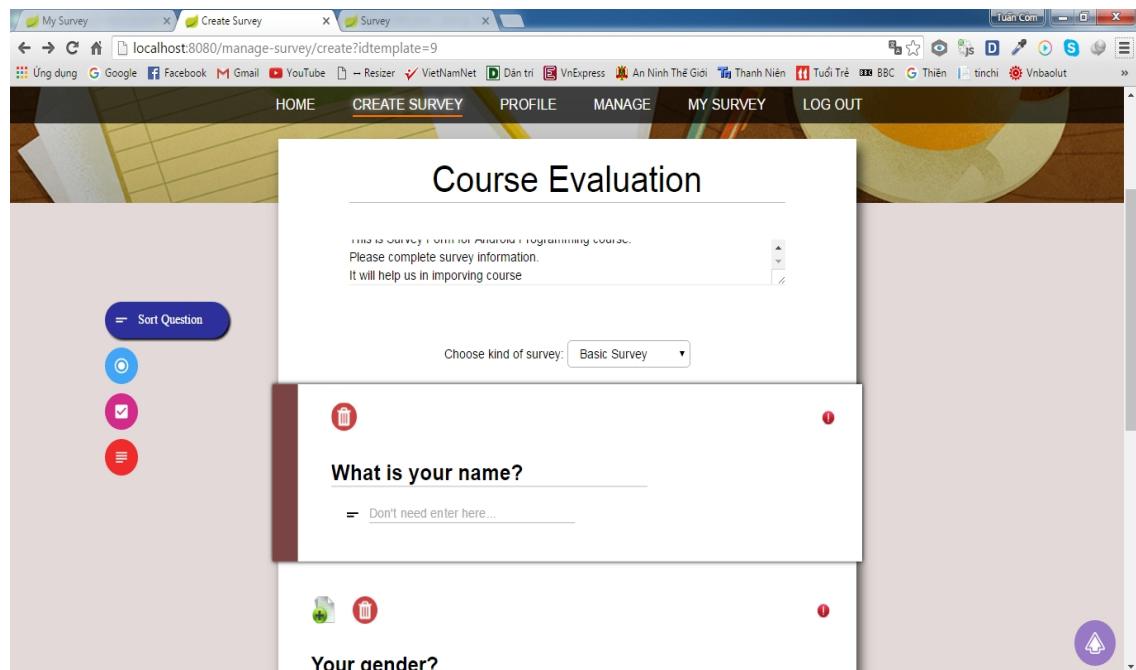


Figure 3.13. Create Survey

User can click into Survey Panel in next right Survey content to append new Question.

Hover into question and active into move icon to switch position of Question.

Click into Add icon to add more answer of question and click Delete icon to delete it.

This function is Survey.

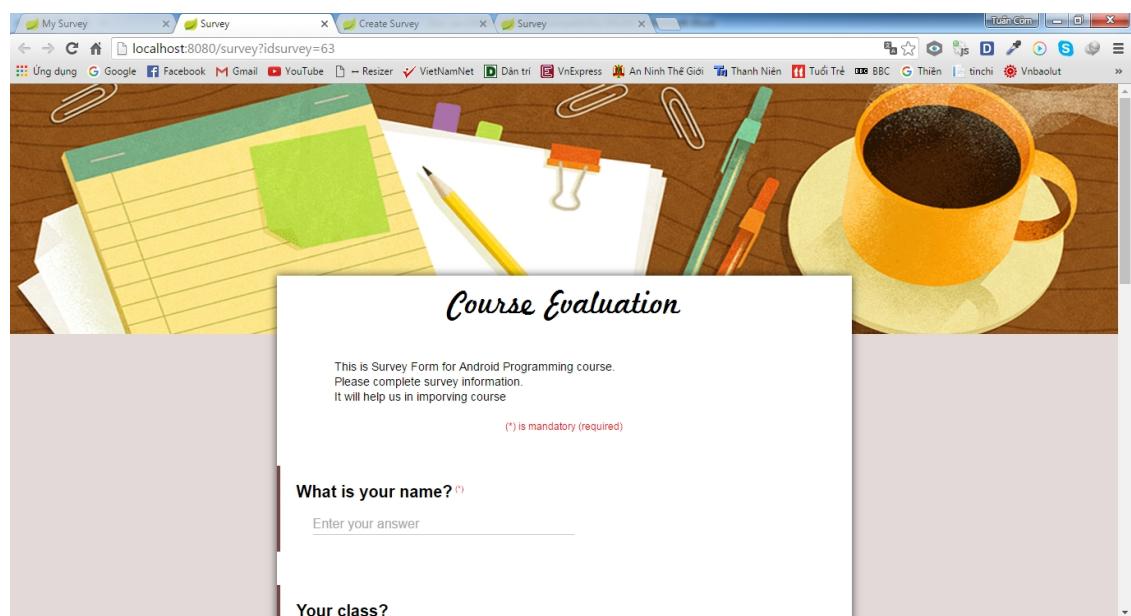


Figure 3.14. Basic Survey

This is interface of Survey function.

The screenshot shows a web browser window with multiple tabs open. The active tab is titled 'Survey Step'. The page content is a 'Course Evaluation' form. At the top, there is a decorative background image of a desk with papers, a pencil, and a coffee cup. Below the image, the title 'Course Evaluation' is centered. A brief introduction text reads: 'This is Survey Form for Android Programming course. Please complete survey information. It will help us in improving course.' A note in red at the bottom left indicates '(*) is mandatory (required)'. The form contains three questions:

- What is your name? (*)**: The input field contains 'Vu Xuan Tuan Anh'.
- Your class?**: The input field contains '11T4'.
- Your gender?**: There are two radio button options: 'Male' (selected) and 'Female'.

Figure 3.15. Basic Survey

Content of survey will zoom up and move to question was clicked

This is Stepwise Survey function.

The screenshot shows a web browser window with multiple tabs open. The active tab is titled 'Survey Step'. The page content is a 'Course Evaluation' form, identical to Figure 3.15. However, the background image has changed to a desk scene with a yellow notepad, a pencil, and a coffee cup. The form itself is also identical to Figure 3.15. At the bottom right of the form area, there are two circular navigation icons: a downward-pointing arrow and an upward-pointing arrow, which are typical for stepwise survey navigation.

Figure 3.16. Stepwise Survey

Website Create Survey And Analyze Data

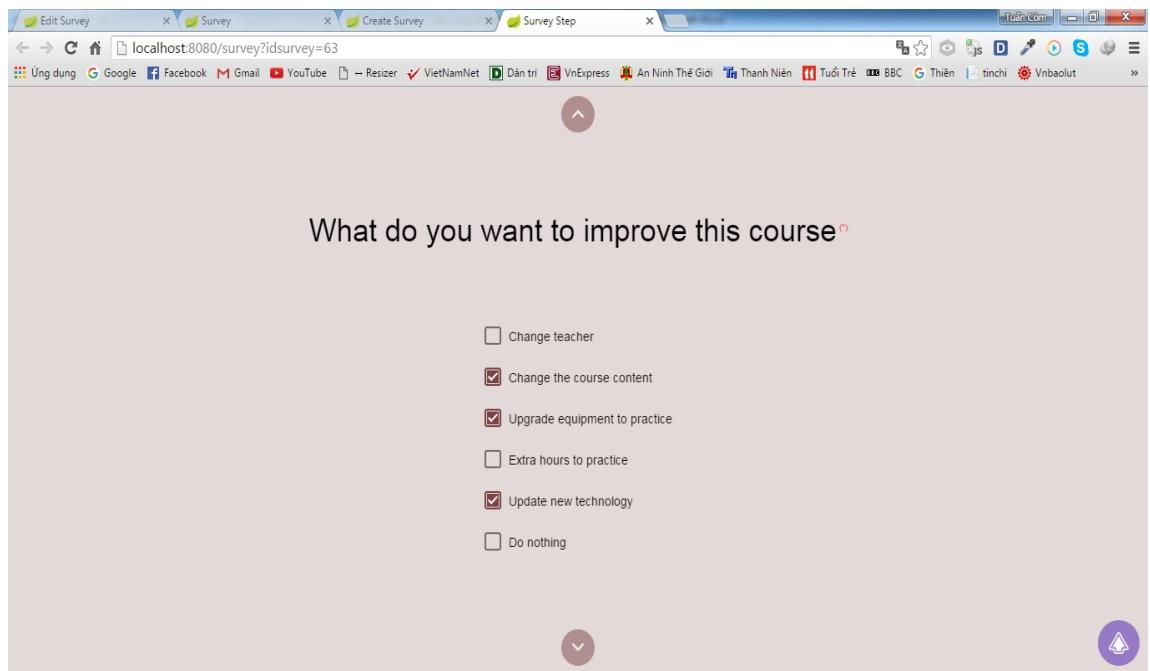


Figure 3.17. Stepwise Survey

User have to answer step-by-step each question if want to move next question.

This function helps send feedback to the system.

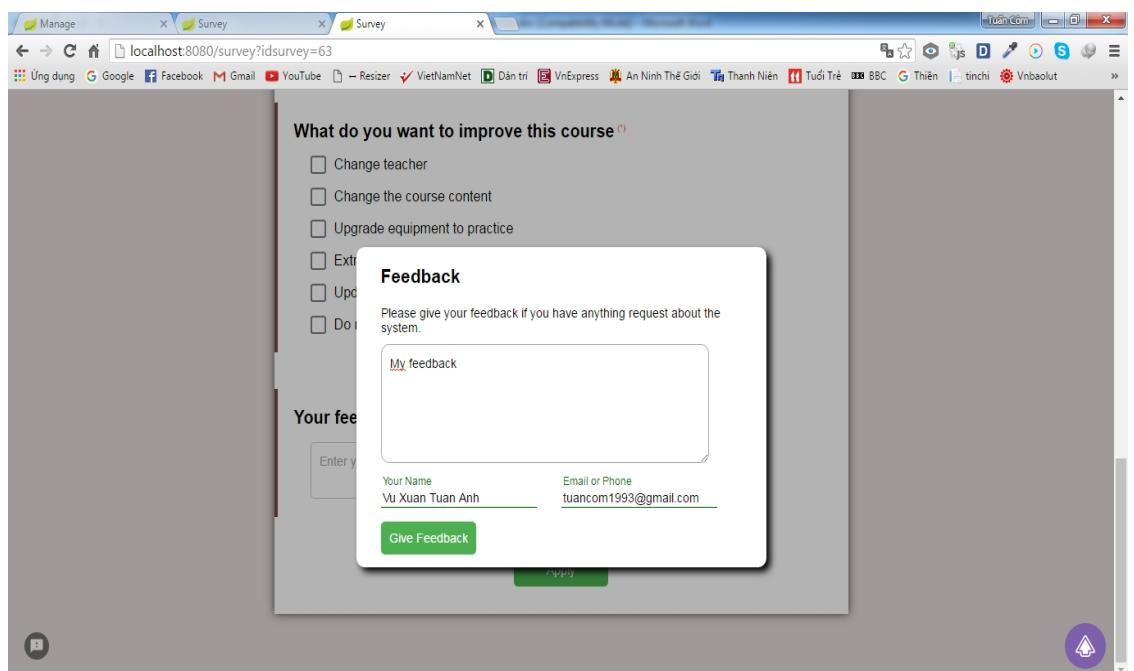
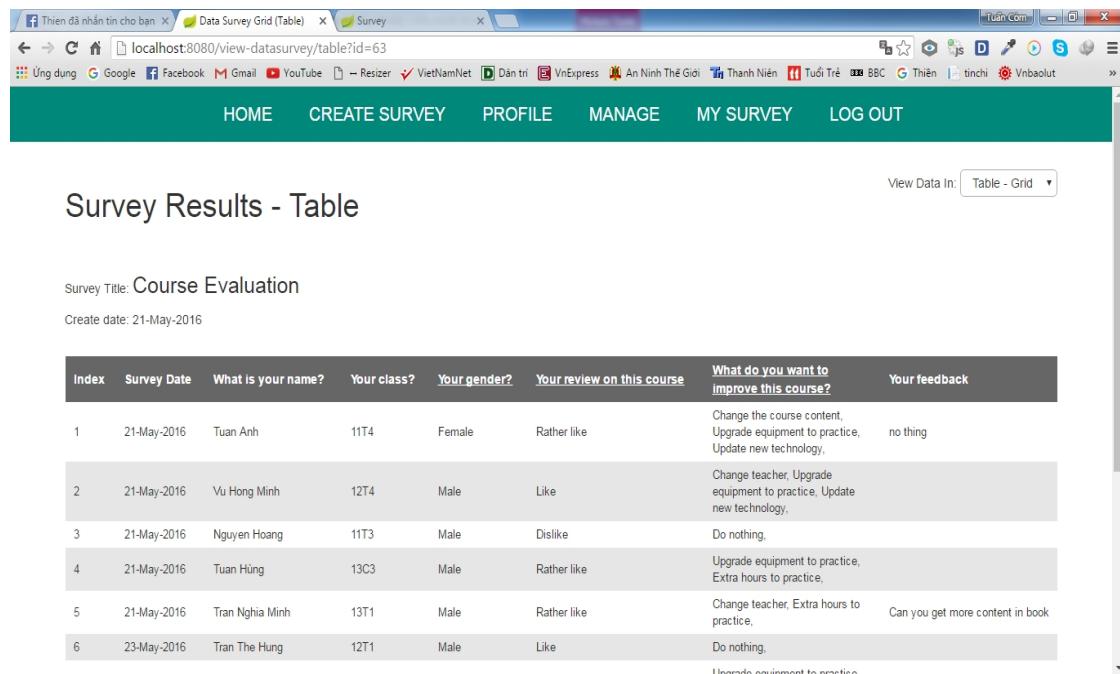


Figure 3.18. Feedback

Website Create Survey And Analyze Data

This functions helps view Survey Results in Table-Grid.



The screenshot shows a web browser window with the title "Data Survey Grid (Table)" and the URL "localhost:8080/view-datasurvey/table?id=63". The page header includes links for HOME, CREATE SURVEY, PROFILE, MANAGE, MY SURVEY, and LOG OUT. A dropdown menu "View Data In:" is set to "Table - Grid". The main content is titled "Survey Results - Table" and displays a table with the following data:

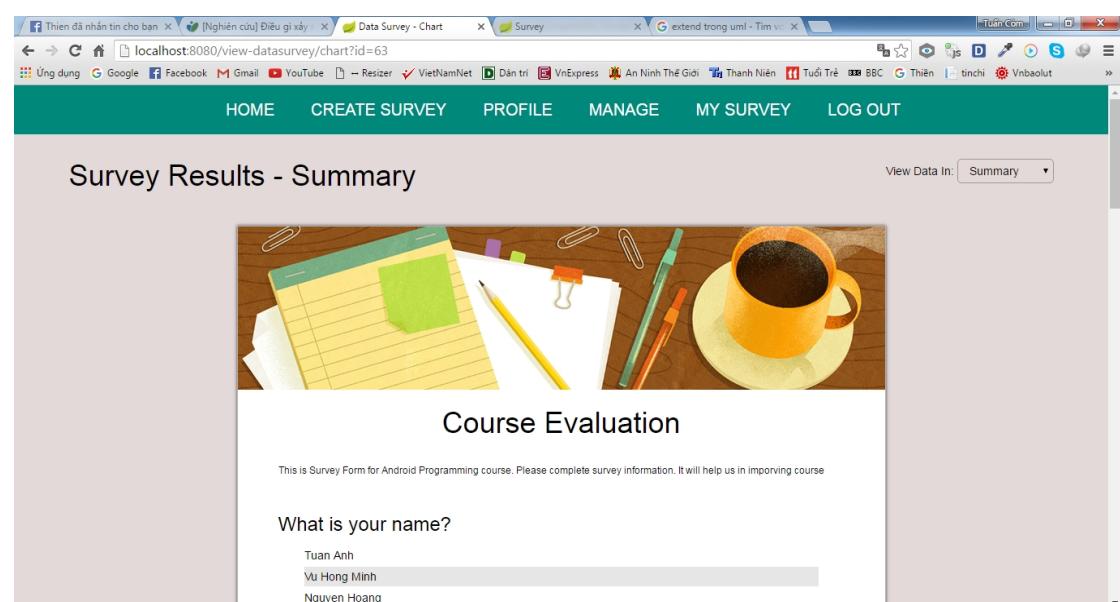
| Index | Survey Date | What is your name? | Your class? | Your gender? | Your review on this course | What do you want to improve this course? | Your feedback |
|-------|-------------|--------------------|-------------|--------------|----------------------------|--|----------------------------------|
| 1 | 21-May-2016 | Tuan Anh | 11T4 | Female | Rather like | Change the course content, Upgrade equipment to practice, Update new technology, | no thing |
| 2 | 21-May-2016 | Vu Hong Minh | 12T4 | Male | Like | Change teacher, Upgrade equipment to practice, Update new technology, | |
| 3 | 21-May-2016 | Nguyen Hoang | 11T3 | Male | Dislike | Do nothing, | |
| 4 | 21-May-2016 | Tuan Hung | 13C3 | Male | Rather like | Upgrade equipment to practice, Extra hours to practice, | |
| 5 | 21-May-2016 | Tran Nghia Minh | 13T1 | Male | Rather like | Change teacher, Extra hours to practice, | Can you get more content in book |
| 6 | 22-May-2016 | Tran The Hung | 12T1 | Male | Like | Do nothing, | Improve environment to practice |

Figure 3.19. Survey Results in Table-Grid

This describe detail each survey results, include Survey Date, questions, and answer of user.

Click into question, which have underline to view data in chart form.

This functions helps view Survey Results in Summary form.



The screenshot shows a web browser window with the title "[Nghiên cứu] Điều gì xảy ra?" and the URL "localhost:8080/view-datasurvey/chart?id=63". The page header includes links for HOME, CREATE SURVEY, PROFILE, MANAGE, MY SURVEY, and LOG OUT. A dropdown menu "View Data In:" is set to "Summary". The main content is titled "Survey Results - Summary" and features a decorative illustration of a desk with a laptop, papers, and a coffee cup. Below the illustration, the title "Course Evaluation" is displayed. A note states: "This is Survey Form for Android Programming course. Please complete survey information. It will help us in improving course". A question "What is your name?" is shown with three options: "Tuan Anh", "Vu Hong Minh", and "Nguyen Hoang".

Figure 3.20. Survey Results in Summary

Website Create Survey And Analyze Data

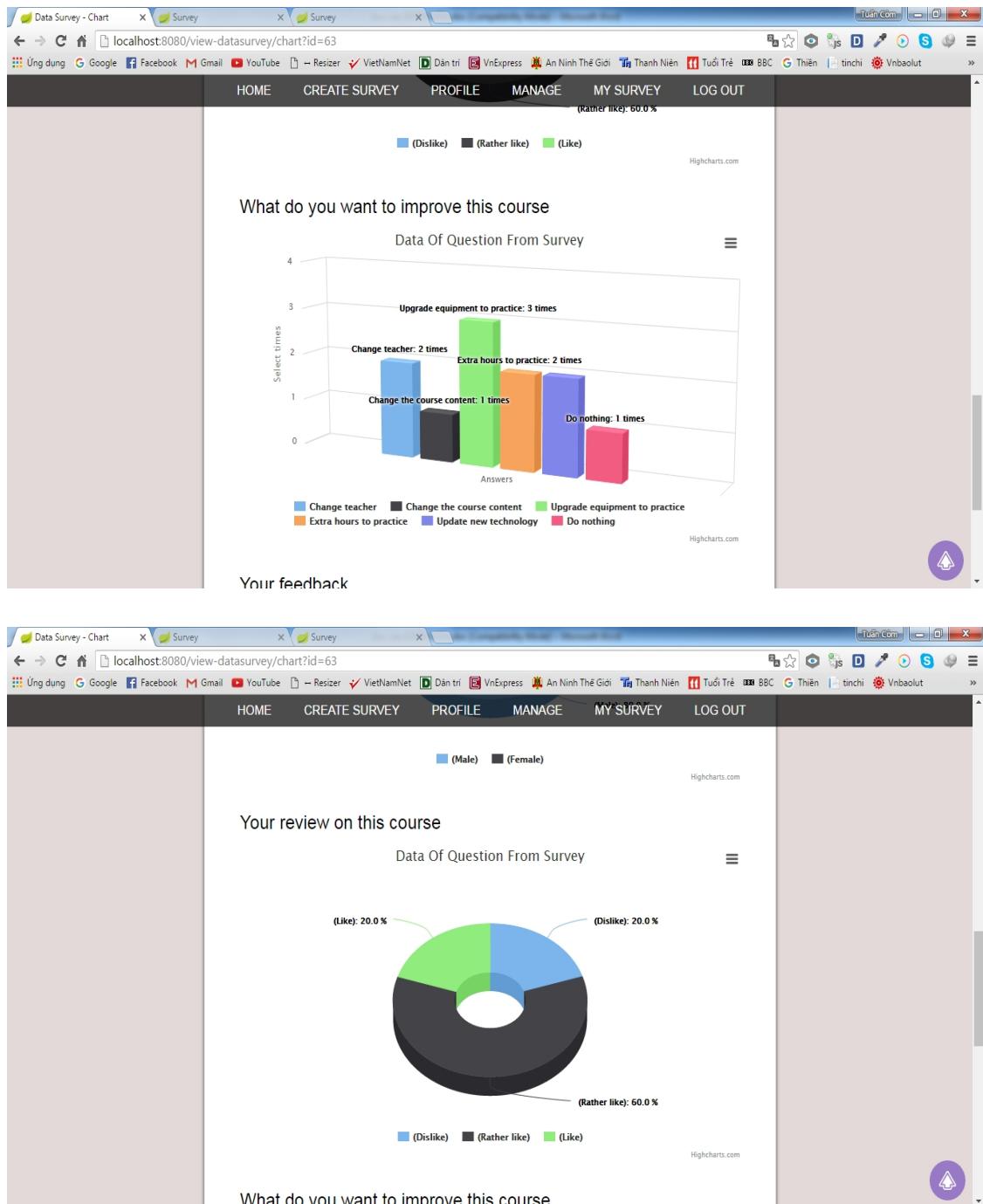


Figure 3.21. Survey Results in Summary

This is result of question in chart form.

It describe select times each answers

If question is Radio, it will be a Pie Chart

If question is Check-box, it will be a Column Chart.

Website Create Survey And Analyze Data

System used HighChart library to transform data from number to chart like this.

This function help share Survey by Email

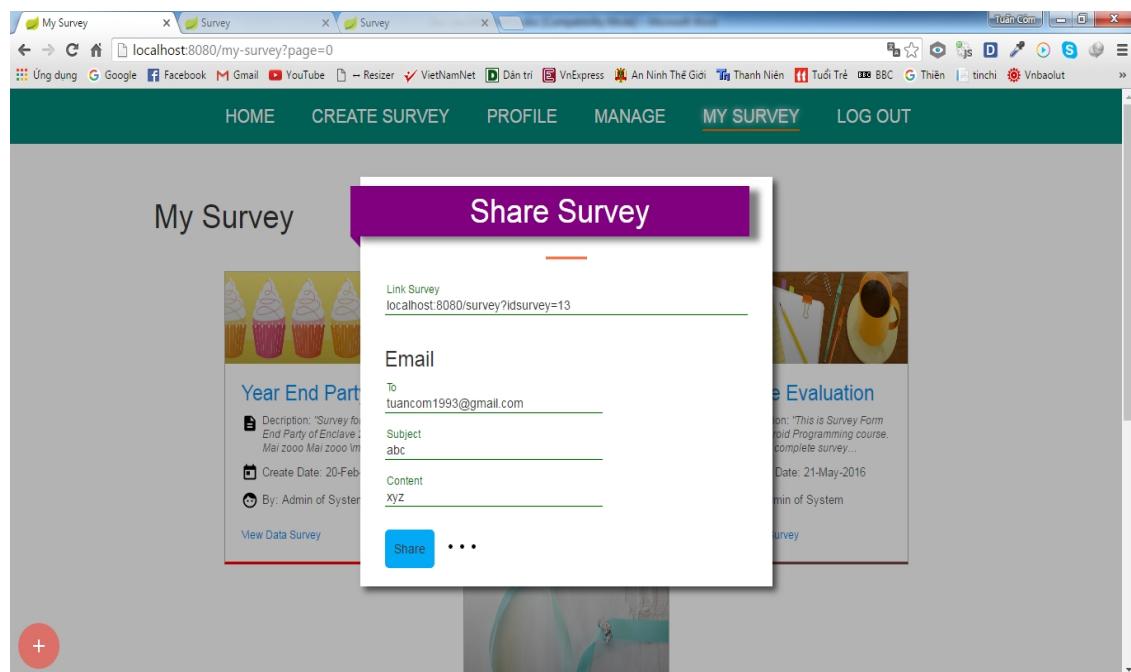
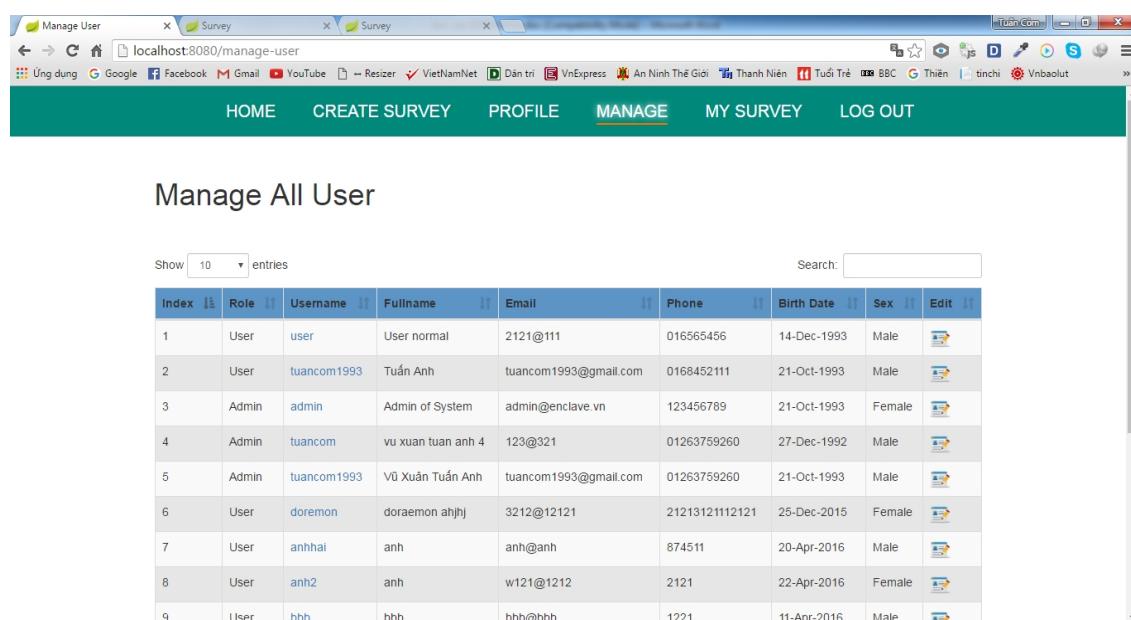


Figure 3.22. Share Survey by Email

This function helps manage all user. It is function of Admin.



| Show | 10 | entries | Search: | | | | | |
|-------|-------|-------------|--------------------|-----------------------|----------------|-------------|--------|---|
| Index | Role | Username | Fullname | Email | Phone | Birth Date | Sex | Edit |
| 1 | User | user | User normal | 2121@111 | 016565456 | 14-Dec-1993 | Male |  |
| 2 | User | tuancom1993 | Tuấn Anh | tuancom1993@gmail.com | 0168452111 | 21-Oct-1993 | Male |  |
| 3 | Admin | admin | Admin of System | admin@enclave.vn | 123456789 | 21-Oct-1993 | Female |  |
| 4 | Admin | tuancom | vu xuan tuan anh 4 | 123@321 | 01263759260 | 27-Dec-1992 | Male |  |
| 5 | Admin | tuancom1993 | Vũ Xuân Tuấn Anh | tuancom1993@gmail.com | 01263759260 | 21-Oct-1993 | Male |  |
| 6 | User | doremn | doraemon ahjhj | 3212@12121 | 21213121112121 | 25-Dec-2015 | Female |  |
| 7 | User | anhhai | anh | anh@anh | 874511 | 20-Apr-2016 | Male |  |
| 8 | User | anh2 | anh | w121@1212 | 2121 | 22-Apr-2016 | Female |  |
| 9 | User | bbb | bbb | bbb@bbb | 1221 | 11-Apr-2016 | Male |  |

Figure 3.23. Manage User

Click into Username to view the profile of User

Click into edit to edit information of user.

Enter data into Search bar to search user.

This function helps Admin manage all Template of system.

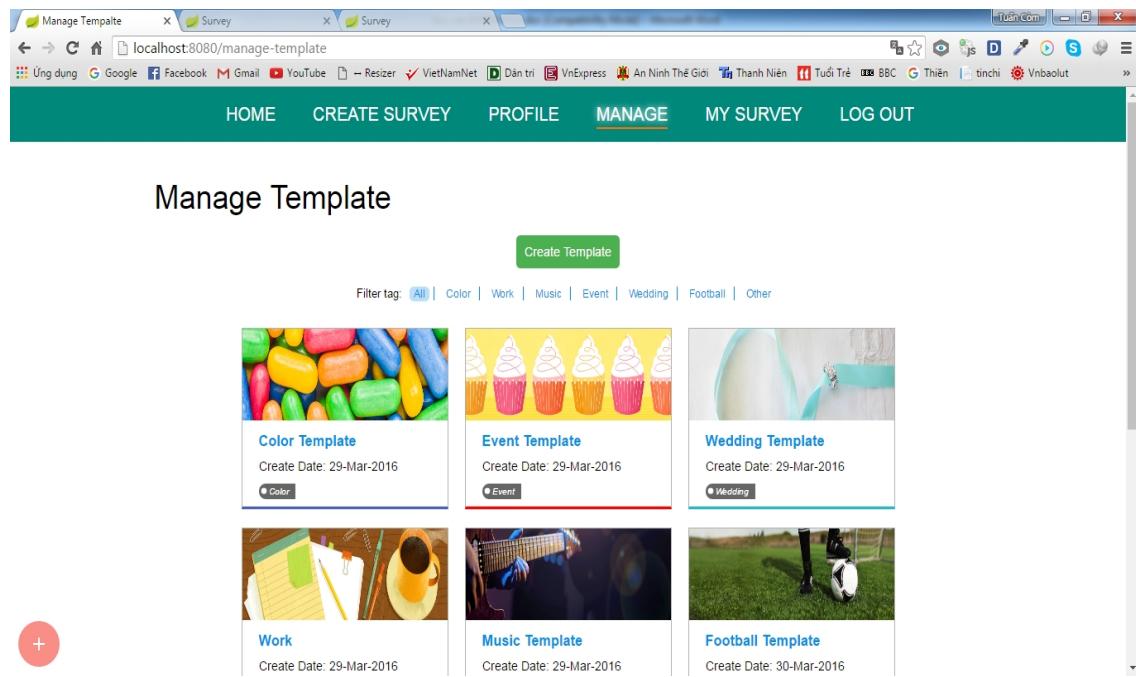


Figure 3.24. Manage Template

Click into cover or title of template to edit it.

Click button + or button Create Template to create new Template.

Click into Filter tag to get all Templates of the tag was clicked.

This function helps create new Template.

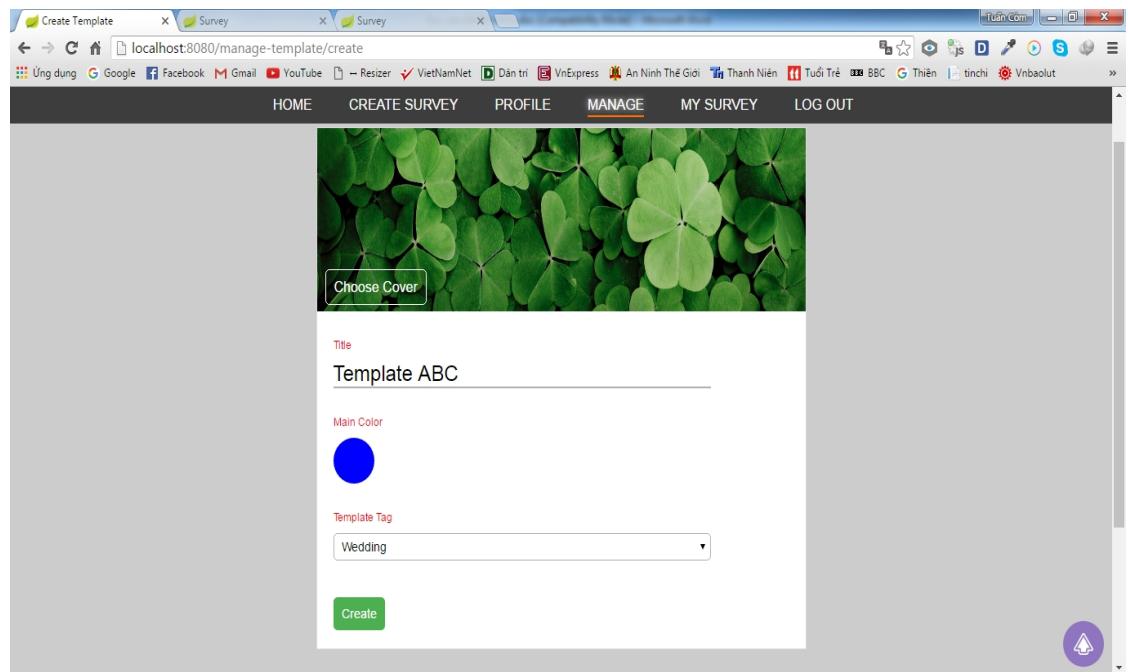


Figure 3.25. Create Template

This function helps create new Template.

Enter title, choose main color of template, this will be the main color of Survey.

Set Template Tag to identify type of Template. It helps filter template.

This function helps view information of my account.

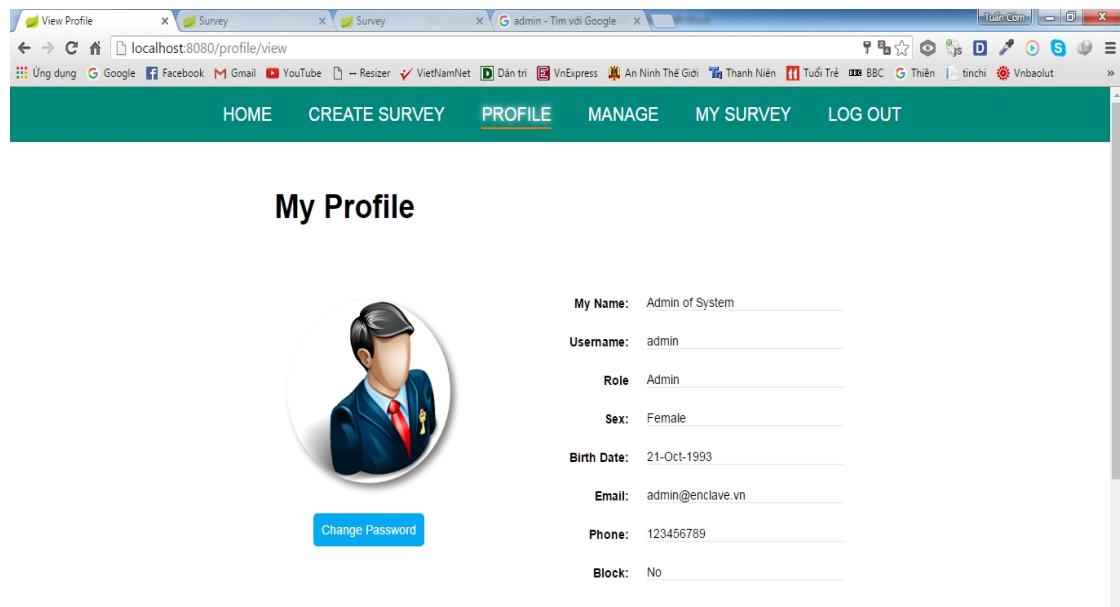


Figure 3.26. My Profile

Include Full name, username, role, sex, birth date, email, phone, block.

Click button Change Password to show field to enter new password.

This function helps update information of user account.

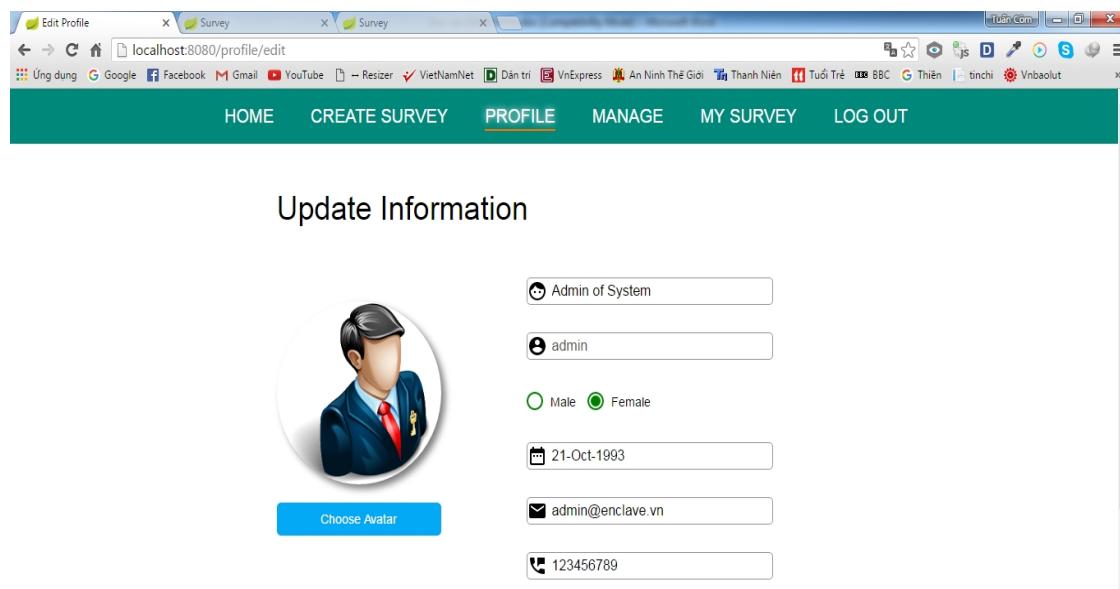


Figure 3.27. Update Information

Include Full name, username, role, sex, birth date, email, phone, block.

Click Choose Avatar to get the Avata of account.

3.3. SUMMARY

This chapter describe demo of System include Image of each function.

CONCLUSION AND DEVELOPMENT ORIENTATION

1. RESULT

During learning, research basic knowledge and development system, the project has achieved the following result:

In the abstract: I knew how to build web-app, how does it work. I have succeeded in applied new technology in the project like Spring Boot, Thymeleaf, JPA-Hibernate...

In the fact: The project has succeeded in survey, sent and receive survey's data, analyze survey results.

2. DEVELOPMENT ORIENTATION

- Make the user interface more friendly, more easier to use
- Develop some features to helps find survey.
- Make it work in real-time
- Develop mobile versions for Android, IOS, Window Phone.

REFERENCES

Internet

- [1] *http://www.spring.io*
- [2] *http://www.thymeleaf.org*
- [3] *http://mvnrepository.com/*
- [4] *http://jquey.com*