Bilkent University

Department of Computer Engineering

Senior Design Project

BFSP

Analysis Report

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Analysis Report

CS491 Senior Design Project: BFSP

1 Introduction

BFSP is web application with a main purpose of providing students with Q&A platform for Bilkent University courses. It will be Stackoverflow-like platform [1]. It will also have several different features such as teacher ratings, course materials for sell, private lessons, online sources and announcements. For teacher ratings we will create simple form consisting of maximum five questions which are really important to the students. Course materials is a section for selling and buying course related stuff such as books, FPGA board, notes and etc. In private lessons, section students can find tutor students for help. In online sources, section students can upload useful resources they have found on the web. Announcements sections can be source of revenue through posting advertisements for university events.

1.1 Problem

The project comes up with necessary solutions for the following problems of Bilkent students. First of all, there is no such a general platform which students can ask questions about specific course topic, learn, and share their knowledge. Students tend to use social media applications for this purpose, but this is not a satisfying way out. Secondly, students need information about teachers especially in course registration period. They

want to learn about instructors' course performance, grading or personality. Another problem is to mention that currently there is not any online trading platform for Bilkent students in order to sell or buy course materials like books, fpga boards, calculator etc. The same situation is true for the private lesson. It is not easy to make contact with students who look for a tutor and who want to give private lesson. Lastly, some students find it difficult to reach online resources for courses, or it takes significant time.

1.2 Objectives

BFSF will provide students with all in one platform which is solution for the problems mentioned above. It consist of question and answer, teacher rating according to some features of instructors, course material trading, tutorship and online course resources pages. Additionally, there will be announcement page that can display club events etc.

1.3 Target Audience and Environment

Target audience of the project is all students at Bilkent University. Actually, everyone will able to access the web page, however only Bilkent students may have an account. The use of the web page will be limited for visitors. The difference between member and guest will be explained in detail in the next sections.

2 System

2.1 Overview

This section gives an overview of each part of the system and their interaction with each other.

2.1.1 App

This is a container component. App component contains all the other components. Initial setup and configuration is done in this component.

2.1.2 Feeds

This component is responsible for navigation though the parts of the system. Feeds component contains links to 4 features of the system:

- Tutorship
- Buy and Sell course material
- Online Resources
- Teach Rating

User can navigate to these pages by pressing links on this component. Feeds component has also filters for selecting specific courses. If user selects CS102 and CS319, only questions related to these courses will be shown.

2.1.3 Question block

This component is a condensed block of question and answer components. It has question as its title and beginning of answer. When user presses on this component, it expands to seperate question and answer blocks. So, to see details of question and full answer, user have to expand this component. “question_block” component creates 2 components:

- Question component
- Answer component

The system shows answered questions to a user by using this component. It is condensed because the blocks should be short enough for at least 2-3 of them to fit in one screen.

2.1.4 Announcements

This component contains links to advertisements and announcements. For example - friday night movies.

2.1.5 Header

This component contains 5 components:

- Logo
- Search component
- Profile component
- Signup button

- “ask_question” component

2.1.6 Search

This component is the most important part of the system. Speed of showing search suggestions while user types the question is critical to success of the system. This component create Suggestions component. In Suggestions component, autocomplete feature is implemented.

2.1.7 Ask question

This component creates “ask_question_panel” component. When user presses this button, the panel shows up. Then, in panel component user types in question and submits.

2.1.8 Profile

This component is shown when user is logged in to the system. When user is not logged, the system shows sign up component. Profile component is responsible for navigation to profile page and settings page. User can see questions, answers submitted and their rating on profile page. In settings page, user can edit their email, name, and password.

2.2 Functional Requirements

- Application will allow the user to create a profile including username, password, profile picture.

- Users either can login to the system or can be a guest before using it.
- Profile of a user can be seen by other users.
- The member will be asked to enter some specific properties (student id, his/her department name etc).
- Only members can post a question or answer a question.
- Only members can vote a post.
- Teachers can be voted by only students who took that instructor's course.
- In the homepage, most recent or most popular questions will be listed.
- Users can filter out posts by selecting department and course.
- Users can also find specific question by searching. Input will be typed in search field. When search button pressed, related posts will be listed on page.
- Searching feature will be supported by additional source [2]. So that auto-complete or suggestions will be provided while input is typing.
- The same feature will be valid for asking questions. If the question has been already asked, that question will be suggested to user while input is being typed.
- In order to answer a question, user should click on post.
- In order to vote a post, there will be up and down arrow.
- Members can only vote a post once.

2.3 Non-functional Requirements

- The project will be a web application that will be supported by most web browser.
- The application will not able to used without internet connection.

- BFSP will provide users with clear and user friendly interface.
- Member information, posts, online sources and all the others will be stored in our database system.

2.4 Pseudo Requirements

- The project will be completed in six months [3].
- The project will be developed in React.js IDE [4].
- Github will be used in this project [5].

2.5 System Models

2.5.1 Scenarios

Buy Course Material

Participating actor: User (ex. Solena)

Entry condition:

- The user has chosen some courses and has clicked on the Course Materials Section (for buy/sell)
- The user has clicked on the Course Materials Section (for buy/sell)

Exit condition:

- The user has clicked to some section other than Course Materials and all child components

Flow of Events:

1. User chooses some courses(optional)
2. The web page is shown according to the courses (if chosen else according to all)
3. The user clicks on Course Materials
4. The course materials section is shown
5. A course material is chosen
6. The user reserves it
7. The course materials section is shown
8. The home image is pressed to return to home webpage

Sell Course Material

Participating actor: User (ex. Solena)

Entry condition:

- The user has chosen some courses and has clicked on the Course Materials Section (for buy/sell)
- The user has clicked on the Course Materials Section (for buy/sell)

Exit condition:

- The user has clicked to some section other than Course Materials and all child components

Flow of Events:

1. User chooses some courses (optional)
2. The web page is shown according to the courses (if chosen, else according to all)
3. The user clicks on Course Materials
4. The course materials section is shown

5. The sell button is clicked
6. The sell mini panel is shown for user to fill out
7. The course material is posted
8. The course materials section is shown
9. The home image is pressed to return to home webpage

Rate a Teacher

Participating actor: User (ex. Solena)

Entry condition:

- The user has chosen some courses and has clicked on the Teacher Ratings
- The user has clicked on the Teacher Rating (all teachers' ratings are shown)

Exit condition:

- The user has clicked to some section other than Teacher Ratings and all child components

Flow of Events:

1. The user chooses some courses (optional)
2. The web page is shown according to the courses
3. The user clicks on Teacher Ratings
4. The Teacher ratings are shown according to courses, if none all teachers are shown
5. The rate button is clicked
6. The rating mini panel(form) is shown for user to fill out
7. The rating is added and teacher rating is updated
8. The teacher ratings section is shown
9. The home image is pressed to return to home webpage

Leave feedback on Teacher

Participating actor: User (ex. Solena)

Entry condition:

- The user has chosen some courses and has clicked on the Teacher Ratings
- The user has clicked on the Teacher Rating (all teachers' ratings are shown)

Exit condition:

- The user has clicked to some section other than Teacher Ratings and all child components

Flow of Events:

1. The user chooses some courses (optional)
2. The web page is shown according to the courses
3. The user clicks on Teacher Ratings
4. The Teacher ratings are shown according to courses, if none all teachers are shown
5. The users leaves a comment in the comment section
6. The comment button is pressed
7. The feedback is added
8. The home image is pressed to return to home webpage

Find Online Resources

Participating actor: User (ex. Solena)

Entry condition:

- The user has chosen some courses and has clicked on the Online Resources

- The user has clicked on the Online Resources (all online sources are shown)

Exit condition:

- The user has clicked to some section other than Online Resources and all child components

Flow of Events:

1. The user chooses some courses (optional)
2. The web page is shown according to the courses
3. The user clicks on Online resources
4. The Online resources are shown to user
5. The home image is pressed to return to home webpage

See Teacher Ratings

Participating actor: User (ex. Solena)

Entry condition:

- The user has chosen some courses and has clicked on the Teacher Ratings
- The user has clicked on the Teacher Rating (all teachers' ratings are shown)

Exit condition:

- The user has clicked to some section other than Teacher Ratings and all child components

Flow of Events:

1. The user chooses some courses (optional)
2. The web page is shown according to the courses
3. The user clicks on Teacher Ratings
4. The Teacher ratings are shown according to courses, if none all teachers are shown

5. The home image is pressed to return to home webpage

Find Tutors

Participating actor: User (ex. Solena)

Entry condition:

- The user has chosen some courses and has clicked on the Tutorship
- The user has clicked on the Tutorship (all tutors are shown)

Exit condition:

- The user has clicked to some section other than Tutorship and all child components

Flow of Events:

1. The user chooses some courses (optional)
2. The web page is shown according to the courses
3. The user clicks on Tutorship
4. The tutors are shown according to courses, if none all tutors are shown
5. The home image is pressed to return to home webpage

Post Announcements

Participating actor: Admin (ex. Alex)

Entry condition:

- Important announcement has appeared & its importance is higher than of those which are currently in the announcement section

Exit condition:

- Announcement became outdated

Flow of Events:

1. Important announcement/event/news was/were found

2. An admin adds it to database

3. The announcement is made visible in the announcements sections

4. The admin makes the announcement invisible

Block a User

Participating actor: Admin (ex. Alex)

Entry condition:

- User asks inappropriate question or
- Leaves irrelevant comment about a teacher or
- Adds irrelevant source or
- Tries to hack the web page

Exit condition:

- A period of time is passed

Flow of Events:

1. If any entry condition is satisfied the user is blocked for a period of time

Find Students to Tutors

Participating actor: User (ex. Solena)

Entry condition:

- The user has chosen some courses and has clicked on the Tutorship
- The user has clicked on the Tutorship (all tutors are shown)

Exit condition:

- The user has clicked to some section other than Tutorship and all child components

Flow of Events:

1. The user chooses some courses (optional)

2. The web page is shown according to the courses
3. The user clicks on Tutorship
4. The tutors are shown according to courses, if none all tutors are shown
5. The post button is clicked
6. The mini panel for tutor info to be filled is shown
7. The tutor is added
8. The tutors are shown according to courses, if none all tutors are shown
9. The home image is pressed to return to home webpage

Add to Online Resources

Participating actor: User (ex. Solena)

Entry condition:

- The user has chosen some courses and has clicked on the Online Resources
- The user has clicked on the Online Resources (all online resources are shown)

Exit condition:

- The user has clicked to some section other than Online Resources and all child components

Flow of Events:

1. The user chooses some courses (optional)
2. The web page is shown according to the courses
3. The user clicks on Online resources
4. The Online resources are shown to user
5. The add button is clicked
6. The mini panel is shown to add a resources to the user
7. The add button is pressed and the resource is added

8. The Online resources are shown to user

9. The home image is pressed to return to home webpage

Find Announcements

Participating actor: User (ex. Solena)

Entry condition:

- The user is in home webpage

Exit condition:

- The use is not in home webpage

Flow of Events:

1. The user is on home webpage, the announcements are found in the right side

2. The See All button is clicked to see all announcements (optional)

3. All announcements are shown

4. The home image is pressed to return to the home webpage

Ask a question

Participating actor: User (ex. Solena)

Entry condition:

- The user has pressed the Ask Question button
- The user searches a question

Exit condition:

- The user has posted the question

Flow of Events:

1. The user presses the Ask Question Button

2. The mini panel is shown for user to fill out

3. While filling out the data the suggested questions are shown to user so that he/she knows that the similar question has not been posted before

4. If the user clicks on suggested question which was asked before that question and its answers are shown

5. Else the user posts a new question and is forwarded to that question

6. The home image is pressed to return to the home webpage

Answer a question

Participating actor: User (ex. Solena)

Entry condition:

- The user has pressed one of the questions from the home webpage
- The user has chosen some courses and has picked a question
- The user searches for a question

Exit condition:

- The user has answered the question

Flow of Events:

1. The user chooses some courses (optional)

2. The user has picked the question either in the home web page or via search tool

3. The question and its current answers are shown

4. The user leaves a comment in the comment section

5. The comment button is pressed

6. The home image is pressed to return to the home webpage

Search

Participating actor: User (ex. Solena)

Entry condition:

- Input written in search bar and search pressed

Exit condition:

- Search showed results

Flow of Events:

1. The user writes some input to the search bar
2. While typing suggested results are shown
3. The user either clicks on suggested results and forwarded there or
4. The user finishes input and presses enter or on the search image
5. The web page is updated according to search results
6. The home image is pressed to return to the home webpage

2.5.2 Use-Case Model

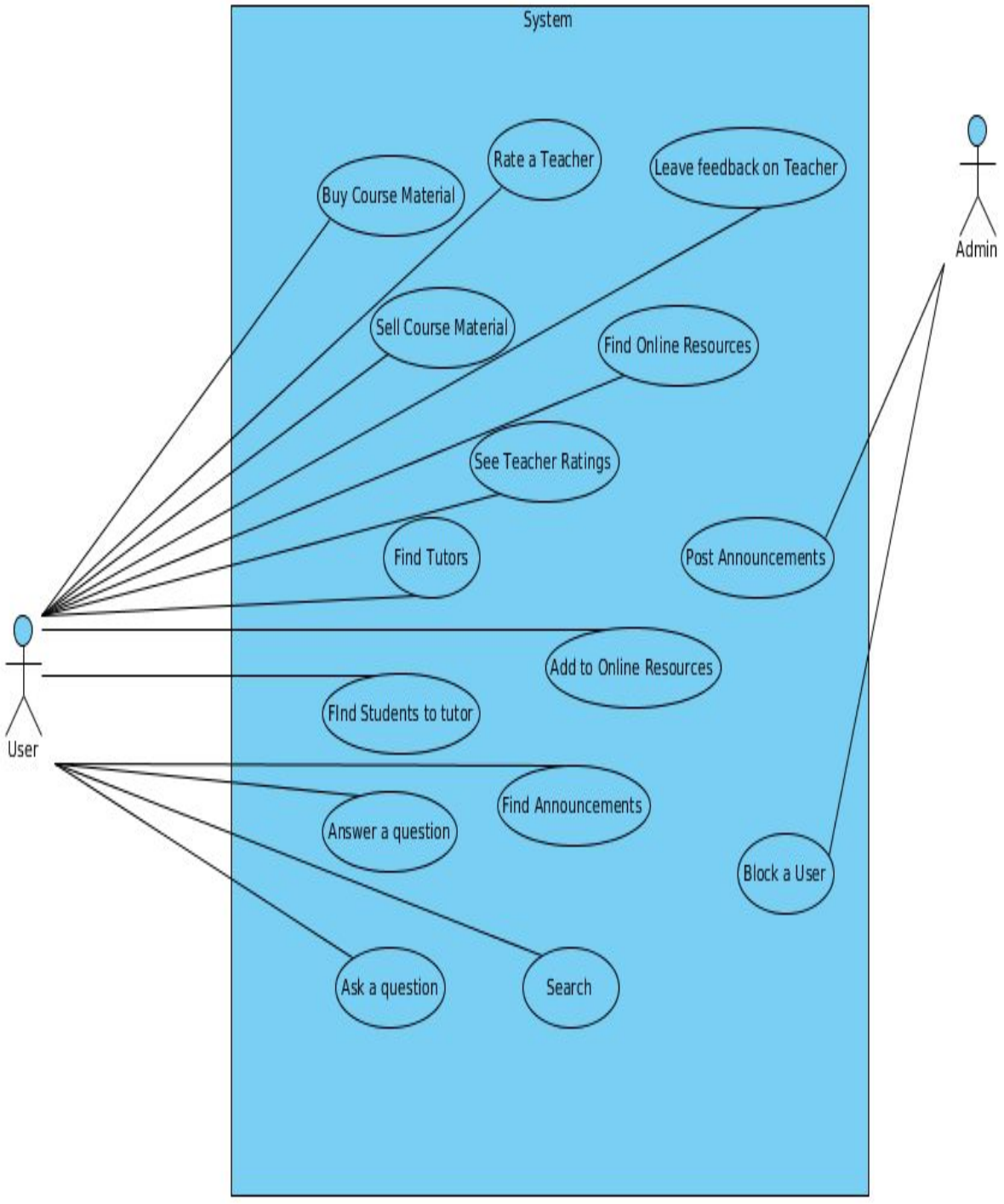

Figure 1 This figure shows Use-Case diagram of BFSP

2.5.3 Object and Class Model

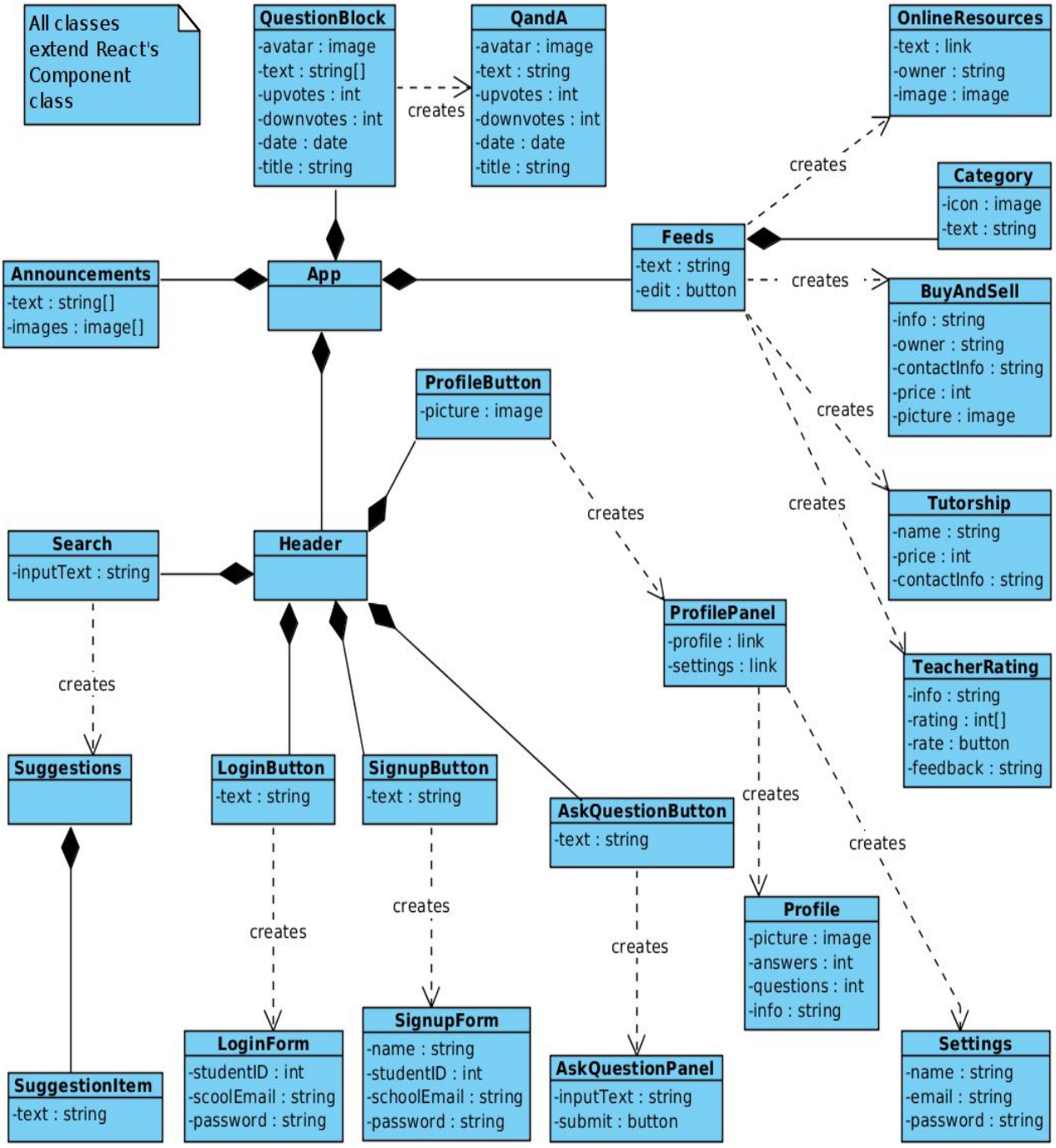

Figure 2 This figure shows Object and Class Diagram of BFSP

2.5.4 Dynamic Models

In this section, UML sequence diagrams and UML state diagrams followed by UML activity diagram are presented. Each sequence diagram is presented after a scenario.

Scenario name: Initial page loading

Participating actor: User

Scenario:

User opens the web page. Web application renders App component and all of its children: Header, Question block, Feeds, Announcements, Search, Profile, Category. Then App component renders all in DOM of the HTML page.

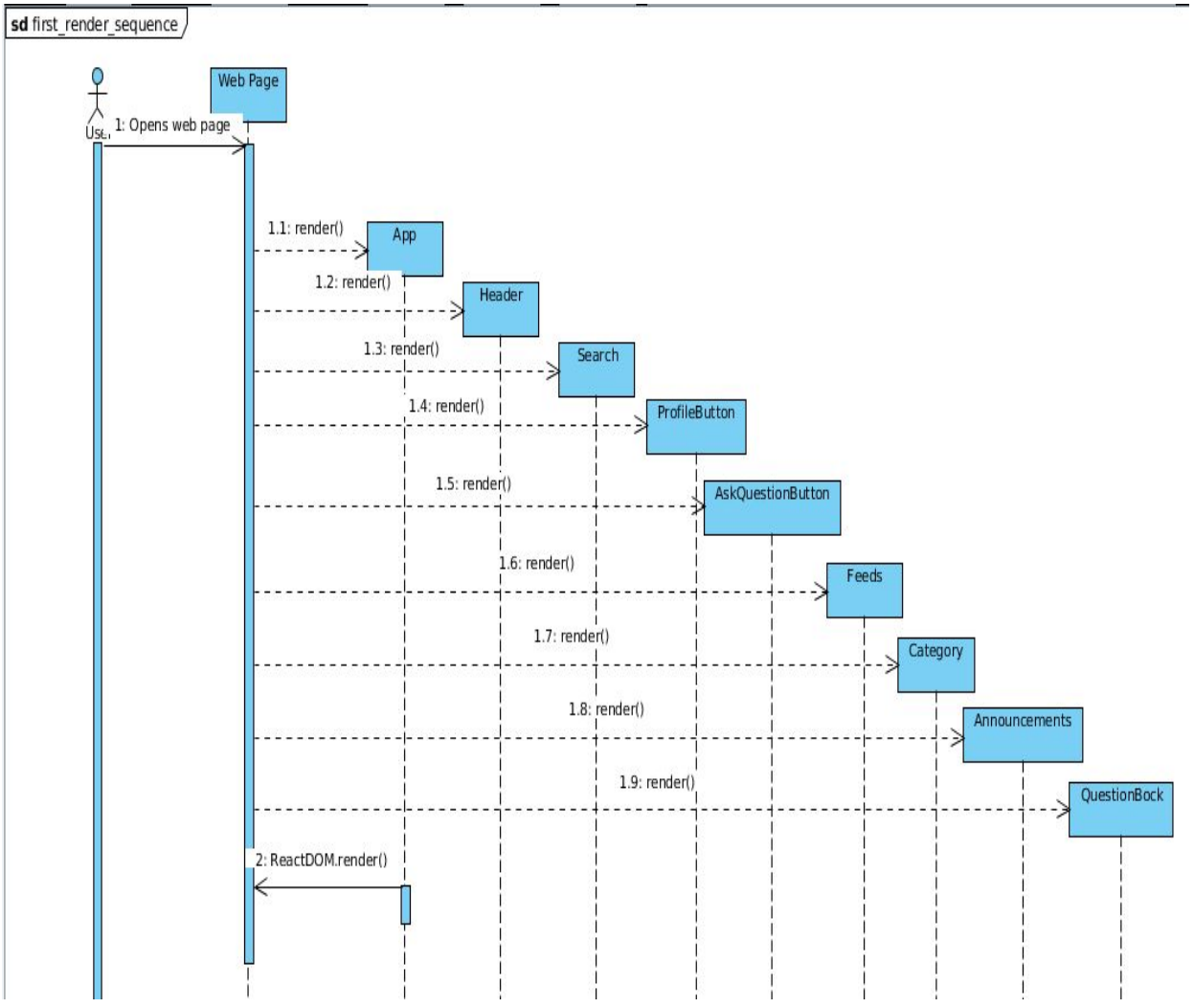

Figure 3 This figure shows sequence diagram for initial home page loading

Scenario name: Change profile settings

Participating actor: User

Scenario:

User clicks on profile button. The system responds by rendering profile panel in DOM. User clicks on Settings. The system renders Settings page in DOM. User changes their email and clicks on Save. The system renders updated version of Settings page in DOM.

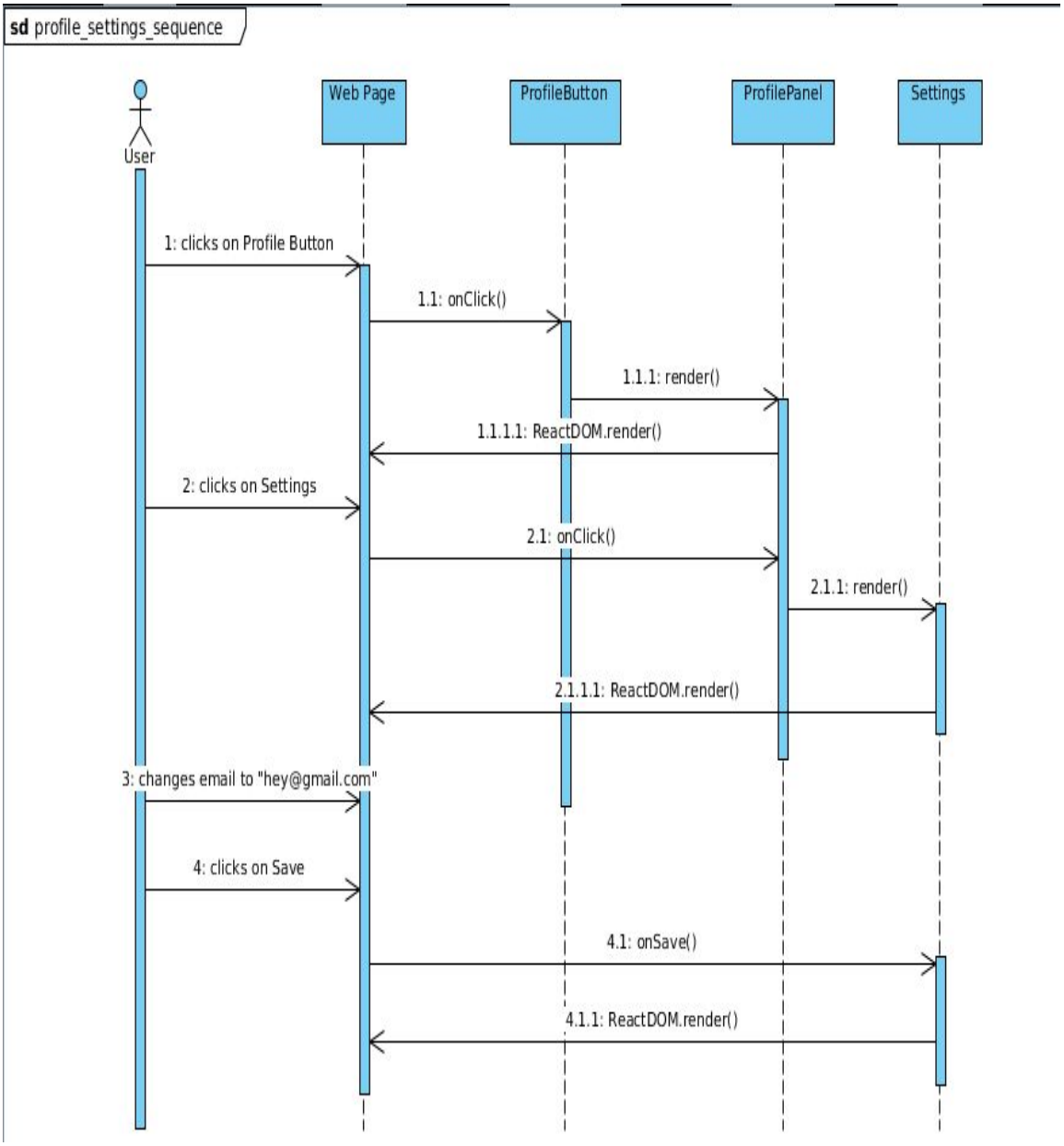

Figure 4 This figure shows sequence diagram for changing profile settings

Scenario name: Asking a question

Participating actor: User

Scenario:

User clicks on “Ask Question” button. The system renders “Ask Question” panel, *submitButton*, and *inputText* components into the DOM. User types in question “What’s aggregation?” as input and submits. The system closes the panel and renders the page into DOM.

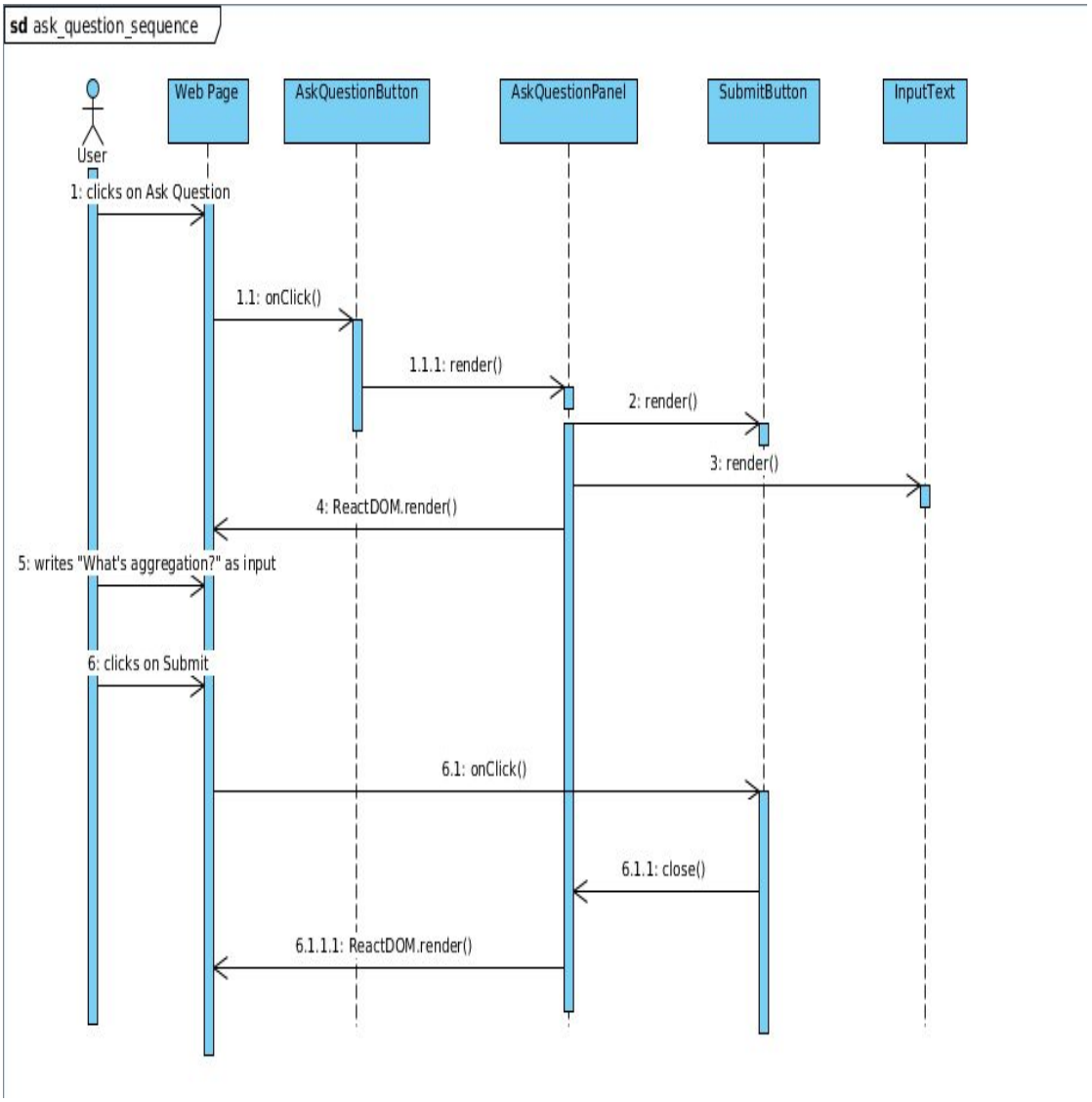

Figure 5 This figure shows sequence diagram for asking a question

Scenario name: Answering a question

Participating actor: User

Scenario:

User clicks on *questionBlock* component. The system renders *question, inputText, submitButton* components into the DOM. User writes "O(lgn)" as input and click on submit. The system renders new *answer* component into the DOM.

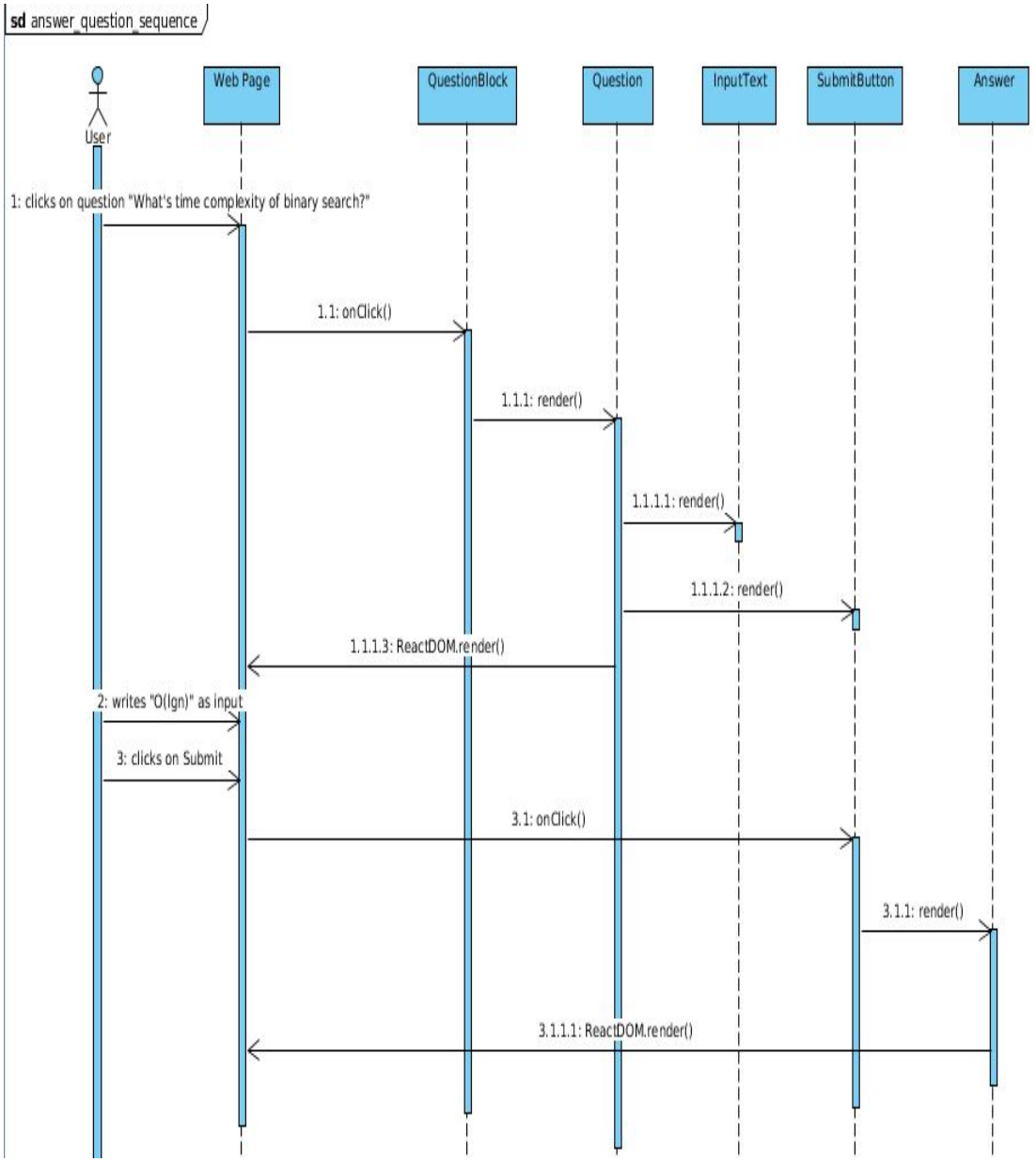

Figure 6 This figure shows sequence diagram for answering a question

Scenario name: Searching a book

Participating actor: User

Scenario:

User clicks on *Search* component and writes “Database” as input. The system responds by rendering *searchSuggestion* component into the DOM. Then, user clicks on “CS353 Database” suggestion. The system renders *courseMaterial* component into the DOM.

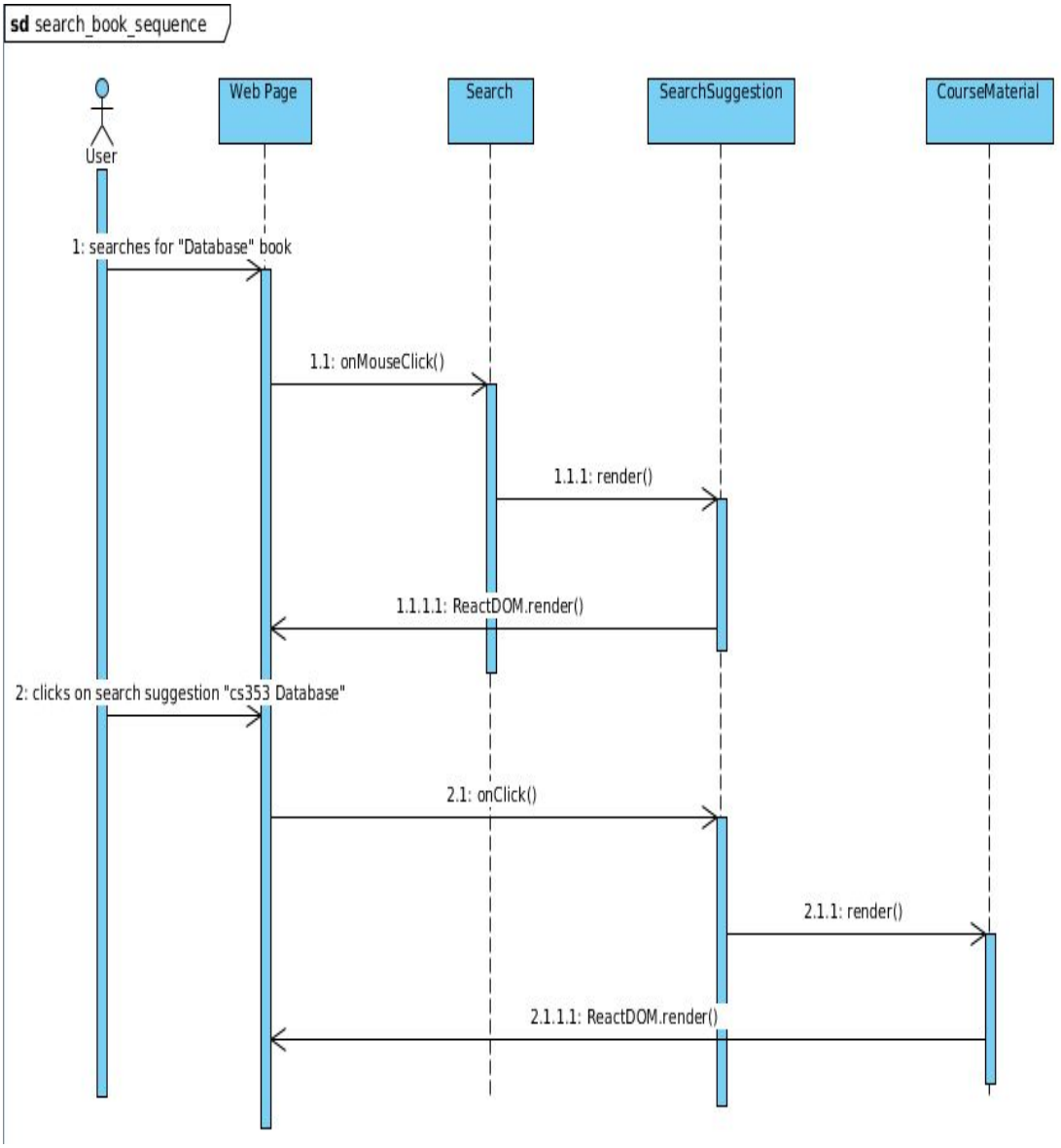

Figure 7 This figure shows sequence diagram for searching a book

In the following pages, state diagrams followed by one activity diagram of the *BFSP* system will be presented. There are 3 state diagrams.

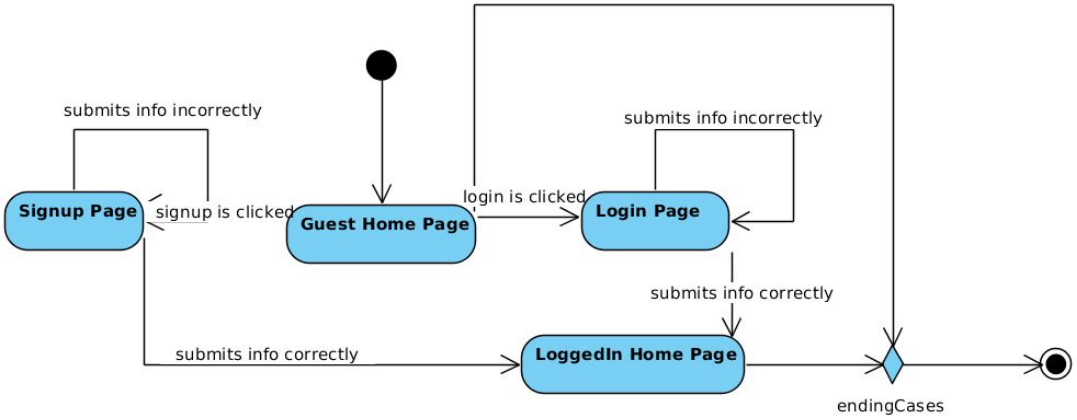

Figure 8 This figure shows relations between states of home page

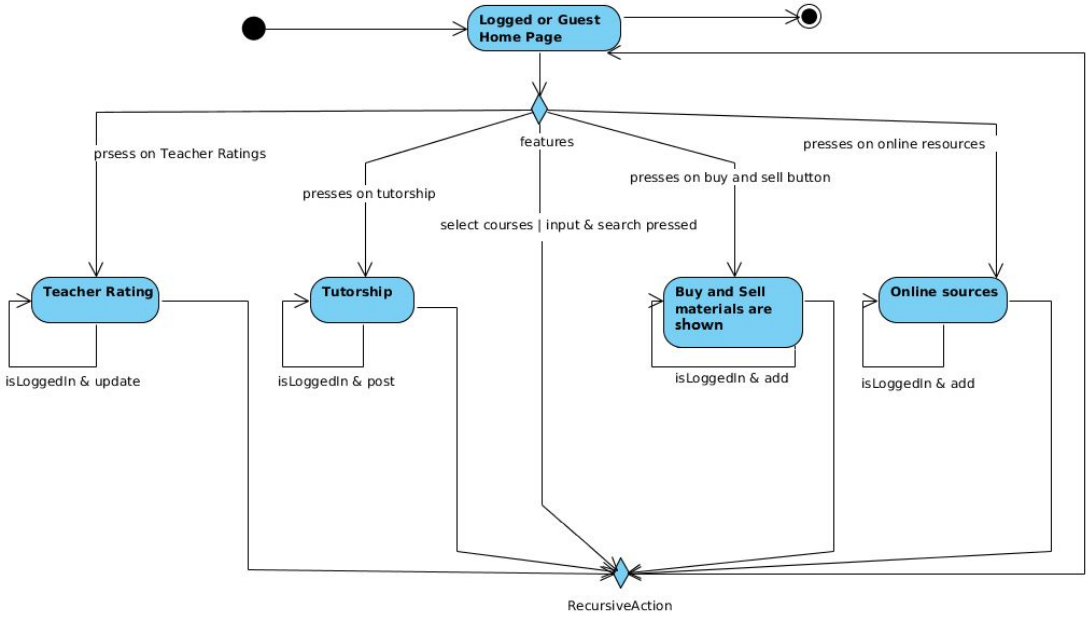

Figure 9 This figure shows relations between features' states and home/guest page

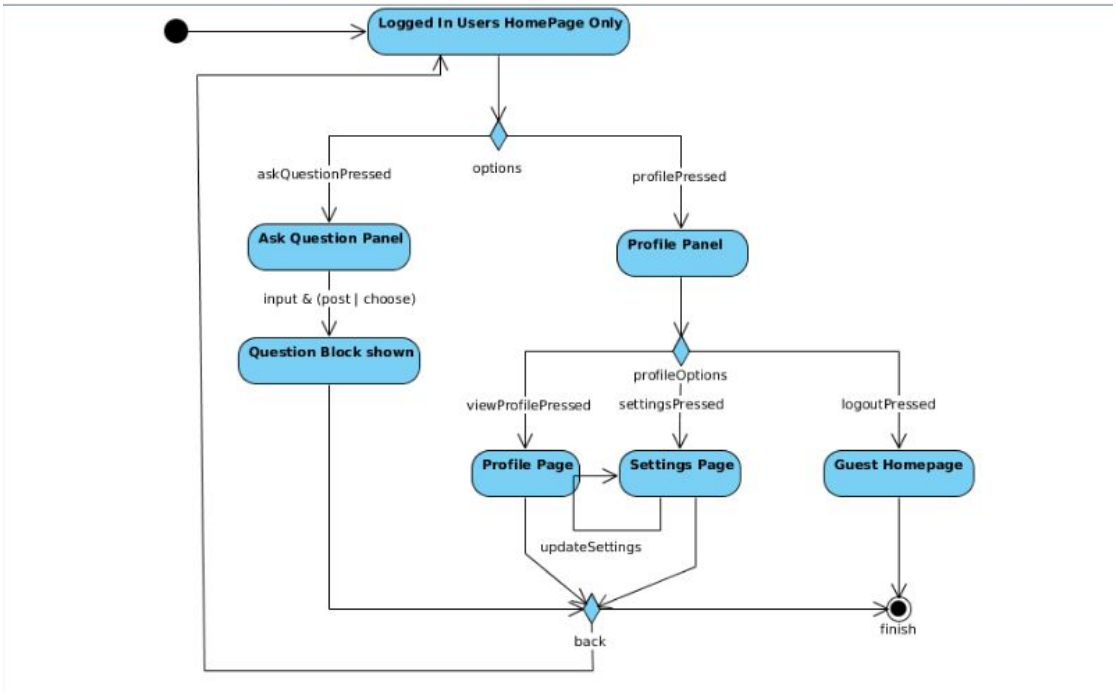

Figure 10 This figure shows relations between profile component states

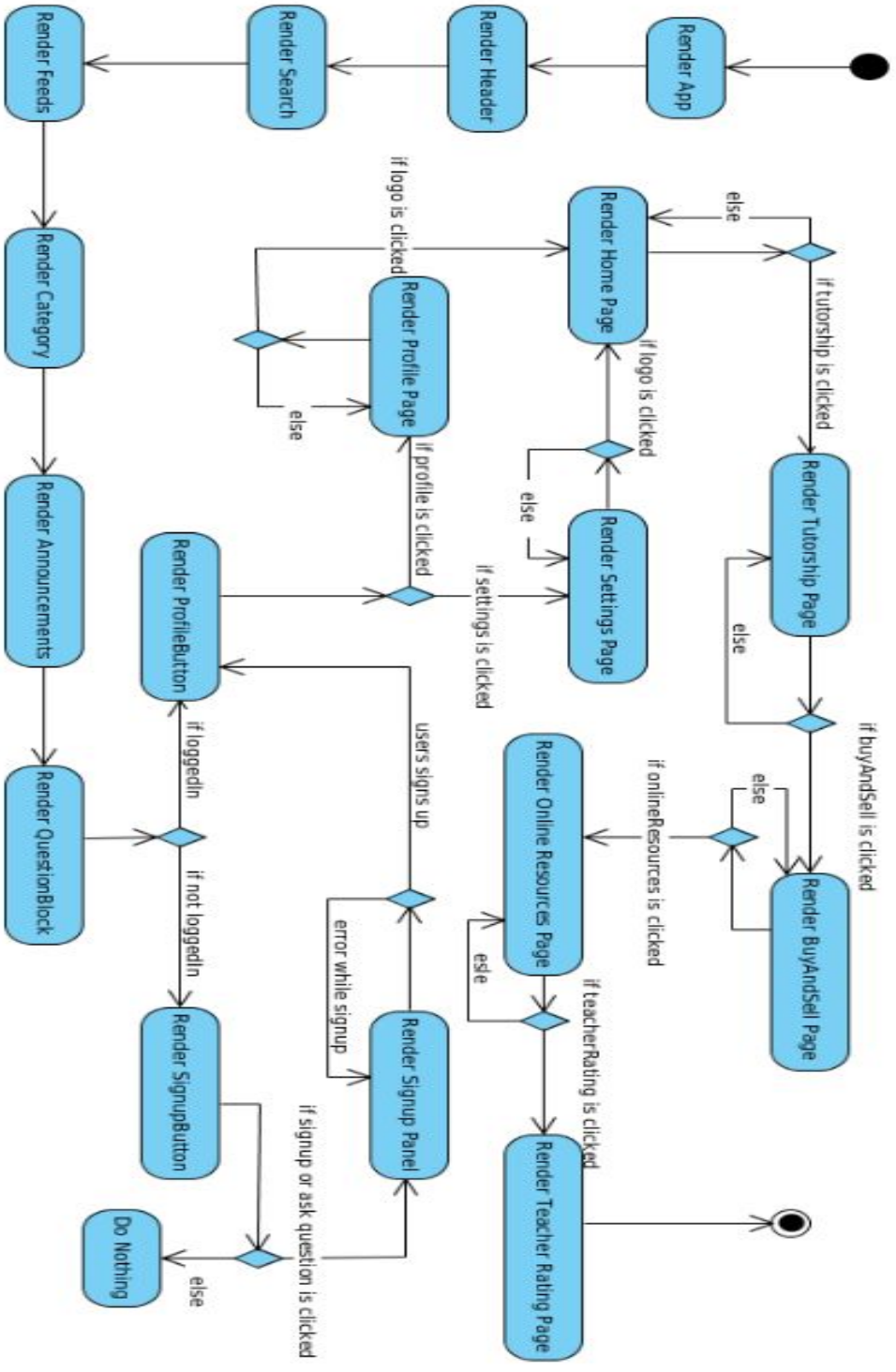

Figure 11 This figure shows activity diagram of the system BFSP

2.5.5 User Interface

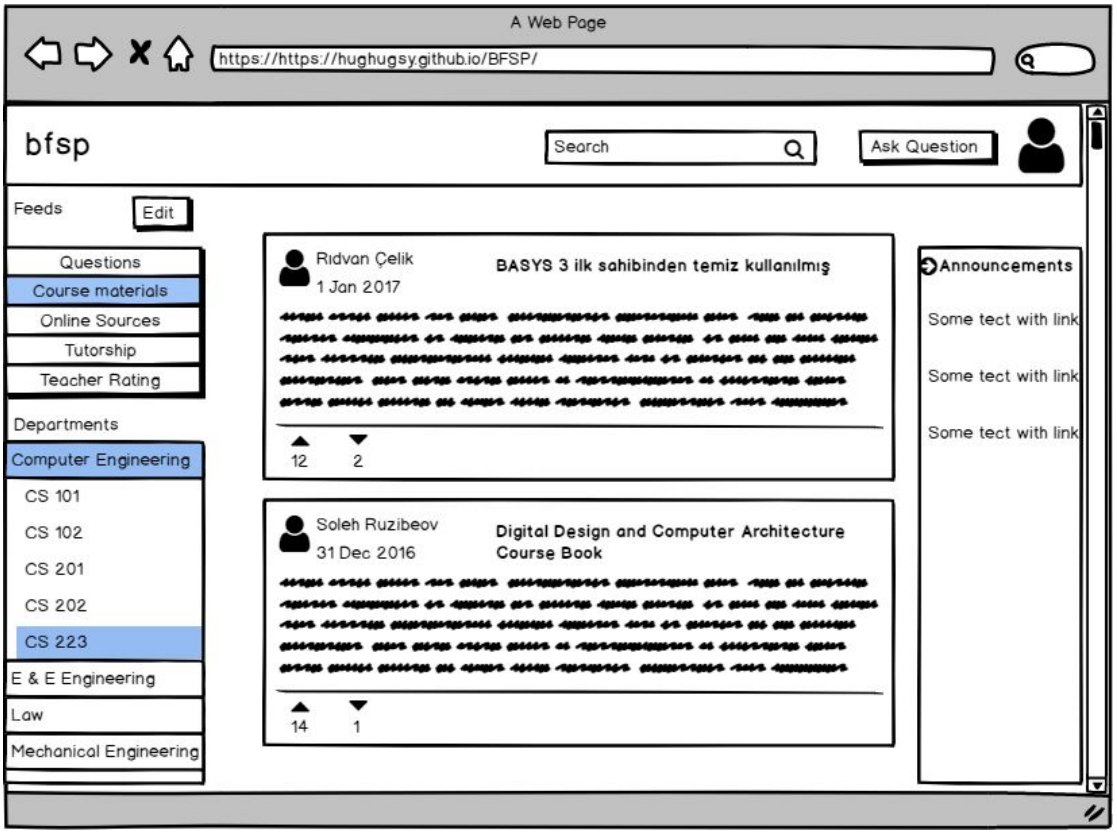

Figure 12 This Figure shows course materials page mockup

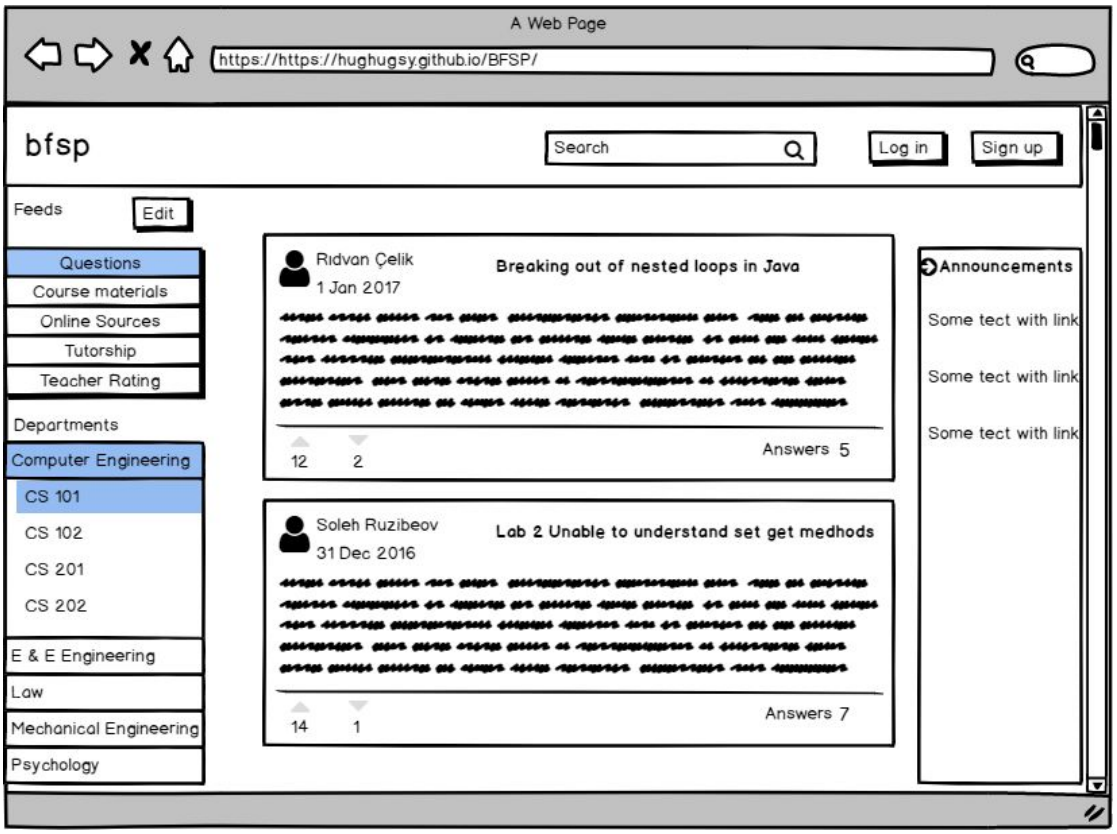

Figure 13 This figure shows home page mockup

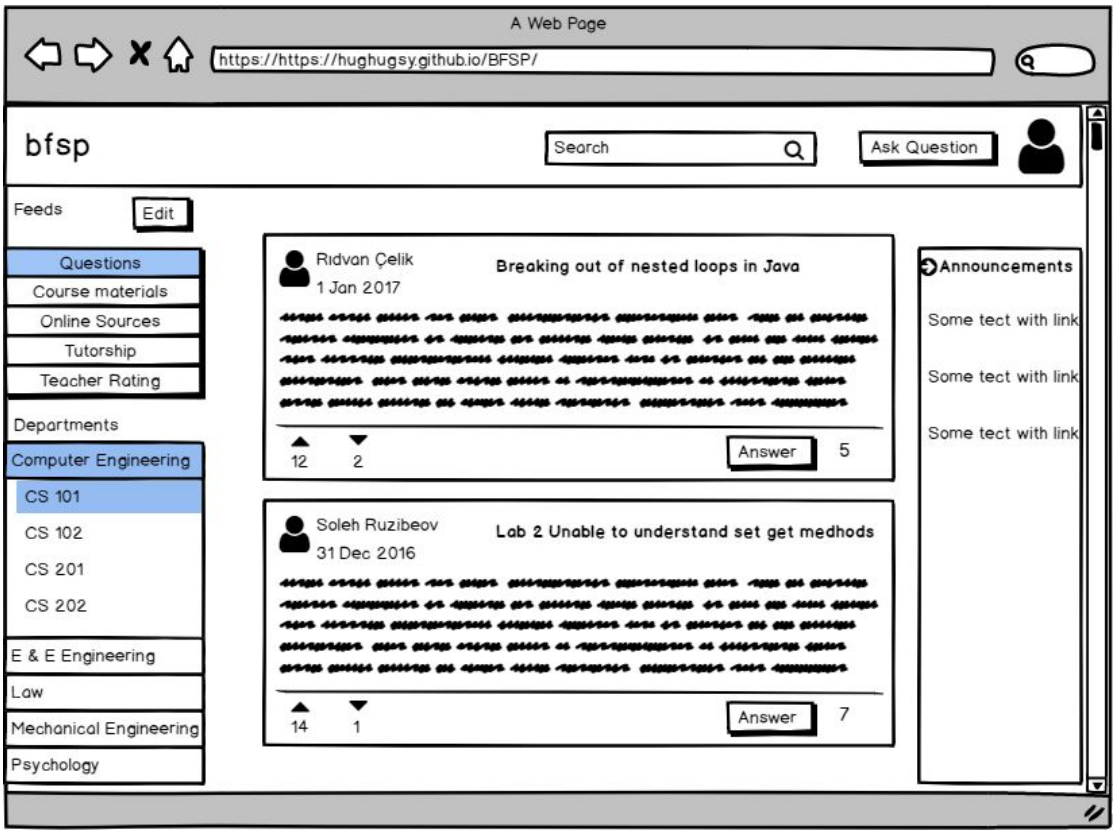

Figure 14 This figure shows signed in user's page mockup

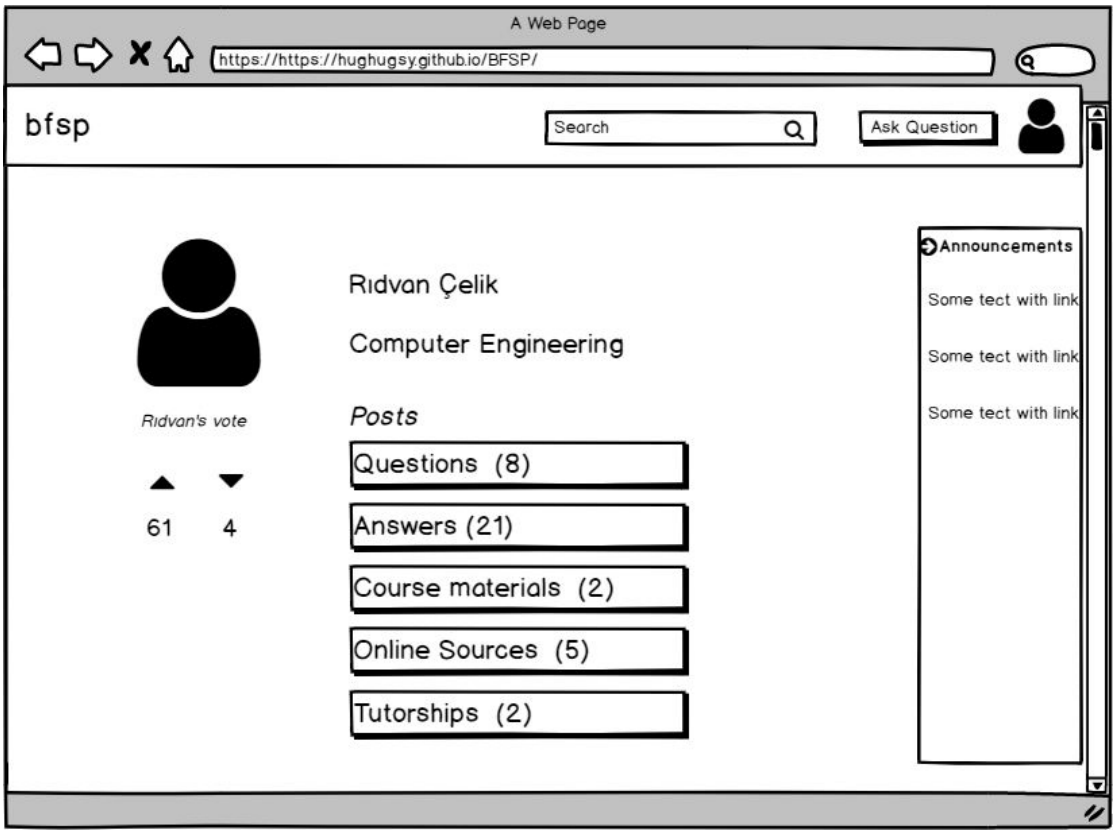

Figure 15 This figure shows profile page mockup

3 Glossary

- ReactJS - UI library created by Facebook.
- Component - a React class. In React, UI is divided in components.
- Online Resource - The resource of any type such as link, pdf, file, video or whatever else related to the course which might be useful to students.
- Announcements - The news or events which are important to students.
- Rating form - the form which includes most crucial features of teachers to rate from 1 to 10.
- Course Materials - component/section for buy/sell of course materials such as books, notes or devices.

4 References

[1] Object-Oriented Software Engineering, Using UML, Patterns, and Java, 2nd Edition, by Bernd Bruegge and Allen H. Dutoit, Prentice-Hall, 2004, ISBN: 0-13-047110-0.

[2] "Elasticsearch: RESTful, Distributed Search & Analytics | Elastic", Elastic.co, 2017. [Online]. Available: https://www.elastic.co/products/elasticsearch. [Accessed: 05- Nov- 2017].

[3] "CS491/2 - Senior Design Project I/II", Cs.bilkent.edu.tr, 2017. [Online]. Available: http://www.cs.bilkent.edu.tr/~guvenir/courses/CS491-2/. [Accessed: 06- Nov- 2017].

[4] "React - A JavaScript library for building user interfaces", Reactjs.org, 2017. [Online]. Available: https://reactjs.org. [Accessed: 06- Nov- 2017].

[5] 2017. [Online]. Available: https://github.com/hughugsy/BFSP. [Accessed: 06- Nov- 2017].