INTERACTIVE E-LEARNING FORUM WEB APPLICATION FOR FICT UTAR

BY

CHAI WAN XIN

A REPORT
SUBMITTED TO
Universiti Tunku Abdul Rahman
in partial fulfillment of the requirements
for the degree of
BACHELOR OF COMPUTER SCIENCE (HONOURS)
Faculty of Information and Communication Technology
(Kampar Campus)

JANUARY 2021

UNIVERSITI TUNKU ABDUL RAHMAN

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Date: 11/4/2021

Date: 15th April 2021

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DECLARATION OF ORIGINALITY

I declare that this report entitled "**INTERACTIVE E-LEARNING FORUM WEB APPLICATION FOR FICT UTAR**" is my own work except as cited in the references. The report has not been accepted for any degree and is not being submitted concurrently in candidature for any degree or other award.

Signature : Xin

Name : CHAI WAN XIN

Date : 11/4/2021

ACKNOWLEDGEMENTS

First of all, I would like to express my deepest gratitude to all the people who has given me guidance, encouragement and support throughout this project, especially my project supervisor, Dr. Tan Joi San. A big thanks for Dr. Tan for giving me an opportunity to work on this project, as well as her patience, guidance, suggestion and monitoring the entire project.

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ABSTRACT

In this digital era, advancement in computer, communication technologies and the internet enable boundless peer-to-peer interaction regardless of where the people are. Other than communication, the advancement of these technologies also slowly showing its influence in education, the universities are rapidly converting the physical studies mode into the online education. Recently, COVID-19 are causing havoc all around the world, people are practicing social distancing to prevent spreading of the infections. Education is affected adversely as well due to the COVID-19 as the students are not allowed or encouraged not to return to campus. Therefore, UTAR has conducted online learning in order to enable the students to continue learning in this pandemic. However, students are having difficulties when having their online learning session. Hence, a platform that allows discussion among students are needed urgently. Nonetheless, although most of the communication platforms are evolving in a very fast pace and show no sign of stopping, the forum of UTAR have not been changed or updated along the way. The forum of UTAR plays a little role when comes serving the purpose of letting students discuss and interact with each other. This project is a forum web application for FICT UTAR students. It will not only act as a platform for students to make discussions and solving their problems, but also improves the students' learning experience especially in this COVID-19 pandemic, where online learning become the new normal. This project focus on interactivity of the forum because high interactivity encourages students to continue to use it throughout their university life. A back-office web application is developed to allow FICT UTAR lecturers and staffs to monitor the statistics produced using the data gathered in the forum. The development of the project is separated into front-end, which is the presentation layer and back-end, the data access layer. The front-end is developed using Reactjs, a Javascript library for building user interface and UI components. On the other hand, back-end is developed using PHP, which is a general-purpose scripting language suited to web development and the database used is MongoDB. RESTful API, which use HTTP requests to access data will be used to connecting the front-end and back-end. The deliverable of this project could benefit FICT UTAR by improving the students' learning experience and provide statistic for analyzation.

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LIST OF ABBREVIATIONS

API	Application Programming Interface
AWS	Amazon Web Service
CSS	Cascading Style Sheets
FICT	Faculty of Information and Communication Technology
HTML	HyperText Markup Language
REST	Representational State Transfer
S3	Simple Storage Service
SASS	Syntactically Awesome Style Sheets
SDLC	Software Development Life Cycle
SPA	Single Page Application
UI	User Interface
URL	Uniform Resource Locator
UTAR	University Tunku Abdul Rahman
WBLE	Web-Based Learning Environment

CHAPTER 1: INTRODUCTION

1.1 Background Information

In this digital era, advancement in computer, communication technologies and the internet enable boundless peer-to-peer interaction regardless of where the people are. Other than communication, the advancement of these technologies also slowly showing its influence in education especially due to COVID-19 pandemic where the universities are rapidly converting the physical studies mode into the online education. These technologies are powerful enough and they have become the alternative new tools for teaching and learning. Although the opportunities to utilize these technologies for teaching and learning have been available for a very long time, universities often show reluctance to implement and make use of these technologies (Dykman and Davis, 2008).

However, even if the universities want to make use of the technologies, many faculties and administrators are often struggle with one elusive issue which is to achieve good quality in online education. Mistakes made in the process of online education are often hard to notice because of the lack of physical contact between the faculties' lecturers and students (Dykman and Davis, 2008). This can lead to escalation of a minor problems to a disaster due to the ignorance of the faculty about the problems. As a result, students having a bad experience and opinion towards online learning, and even criticise the faculty for not doing their jobs.

This is where forums play the roles by providing the discussion platforms that enable people to gather and create discussing thread to discuss, exchange their ideas and views about a range of topics. That being said, forums can be used in education to enhance students' learning experience and solve the problems stated above. Forums are great for extending the learning process outside the lecture class by providing a place to students to discuss about the issues and problems they faced in the classes.

Apart from that, forums also provide many other benefits when being used to aid the education such as individualization of learning, which means the person that response to the forum are not limited in terms of time or length. Students can continue engage in the topics or issues that interest them the most. Besides, during the traditional approach of teaching, where students and lecturer are gathered in the same physical space, students who are shy may feel intimidated or unmotivated to speak. In the forums, these students are more likely to get involved in discussing with others because there is no face-to-face communication between them.

In this project, an interactive e-learning forum web application for FICT University Tunku Abdul Rahman (UTAR) will be developed. This forum is to provide a platform for UTAR students to discuss, interact and learn. Since the students can discuss among themselves, more often than not, the problem can be solved in the discussion. Hence, it can greatly reduce workload of the lecturers and staffs by reducing the need to reply and help each student that encounters difficulties. This forum also allows the UTAR staffs and lecturers to monitor the statistics of the forum, such as what are the most discussed topics, what are the difficulties students encounter the most, and so on. This enables them think of a most effective solutions to improve and help the students.

1.2 Problem Statement

Recently, COVID-19 are causing havoc all around the world, people are practicing social distancing to prevent spreading of the infections. Education is affected adversely as well due to the COVID-19 as the students are not allowed or encouraged not to return to campus. Therefore, UTAR has conducted online learning in order to enable the students to continue learning in this pandemic. However, students are having difficulties when having their online learning session. Hence, a platform that allows discussion among students are needed urgently.

Nonetheless, although most of the communication platforms are evolving in a very fast pace and show no sign of stopping, the forum of UTAR have not been changed or updated along the way. The forum of UTAR plays a little role when comes serving the purpose of letting students discuss and interact with each other. What’s worse is that many of the students do not even acknowledge its existence, let alone utilizing it. Moreover, there are quite a number of limitations on the forum, such as poor user interface, accessibility of the forum and so on. The details of these limitations are stated below.

1. Students facing problems during online learning process

   During this Covid-19 pandemic where most UTAR students are having online class, students are having difficulties such as not able to catch up due to internet connection problem, cannot consult their lecturers when having doubts and so on. The lecturers might not be able to help the students as well because they have too many tasks in their hands. This led to a bad learning experience to students and in worst case, it can impact students’ academic performance.

2. Accessibility of UTAR forum

   The UTAR forum can be accessed by students via WBLE. There is a forum for each subject, only the students that are taking the subjects can access to the forum. Students are not allowed to start a discussion topic unless it is enabled by the lecturers, and most of the time it is not enabled. Hence, limiting the students to engage in discussion in the forum. Even if the students start a discussion topic, problems might not be solved without the lecturers' involvement in the discussion because only students that are taking the subject can access to the respective forum as mentioned above. Students are not able to seek for senior's help through the forum because of this.

3. Poor user interface, limiting the interactivity of the forum

   User interface is one of the most important elements when it comes to attracting the user to use it. A study showed that the UI design quality had a significant effect on the user's intention to use an application as well as the usability of the application (Jung, W., 2017). The quality of UI of UTAR forum is outdated, many of the input fields and buttons are in default style, no CSS applied to them, which makes them look unattractive.

1.3 Project Objectives

There are three main objectives that this project achieves. First objective is to enable discussion among students in FICT UTAR. Students will be able to make discussions to solve their problems during online learning, improving the thinking and communication skills of the students. Students' learning experience can also be enhanced through the discussion in the forum. Lecturers can also monitor the statistic of the forum through the admin back office to identify the most effective actions to help the students.

Next objective is to allow students to access the forum without any restrictions. People can access the forum as long as they are from FICT UTAR. There is no other restrictions such as forum tied to subject, leaving other students unable to access the forum. Seniors are able to access the forum and help their juniors in the forum by giving suggestion on how to solve their problems.

The final objective of the project is to improve the interactivity of the forum. The interactivity of the forum is improved by increasing the quality of UI of the forum. Tidy user interface like displaying the discussion in grid or list view is implemented to improve user experience. Students can also perform actions other than post and reply, such as upvote and downvote discussions and replies, gain points by providing quality contents in the forum.

1.4 Proposed Approach / Study

Web application can be developed using one of the 2 main designs which are monolithic design and microservices. In this project, the forum web application is developed using microservices approach.

This approach breaks down the web application into separate interconnected components, which makes the component independent of each other and makes it easier to develop new features or modify the existing ones. Flexibility is also one of the advantages of this approach, it enables dynamic choices of the tools, technologies, and programming language.

The front-end of the web application is developed using Reactjs framework, PHP Laravel for the back-end, MongoDB as the database, and AWS S3 as the file storage. The front-end communicates with back-end by sending HTTP request to API gateway.

1.5 Highlight of What Have Been Achieved

In this project, a forum is developed to allows students to carry out basic actions like register, login, post and reply a discussion. Apart from that, upvote and downvote functions are implemented, indicating the quality and reliability of a post or reply. Students also can gain points by getting upvoted in a post or reply. Code editor will be included to enable students to express idea in discussion more effectively.

Furthermore, students can add tags to categorize their discussion, enabling others to discover their discussion easier. Students are also provided with the options to choose how the discussions to be displayed to suit their preference when browsing the forum, increasing user friendliness. The display options available are grid and list view where grid view displays the discussions in a small box and list view displaying the discussion in a default list.

Besides that, an admin back-office website is developed to help lecturers to monitor the statistics of the forum, such as what are the popular topics that are being discussed in the forum and what are the subjects the students struggle the most on. Data visualization is done by constructing charts, enabling a clear view of the data.

1.6 Summary

Here marks the end of this chapter, the overview of the project background is provided at the start of this chapter. Furthermore, problem statement also highlighted the current problems that exist within UTAR. Project objectives and proposed approach are then defined and provided afterwards. Highlight of what have been achieve is stated in the end of the chapter.

CHAPTER 2: LITERATURE REVIEW

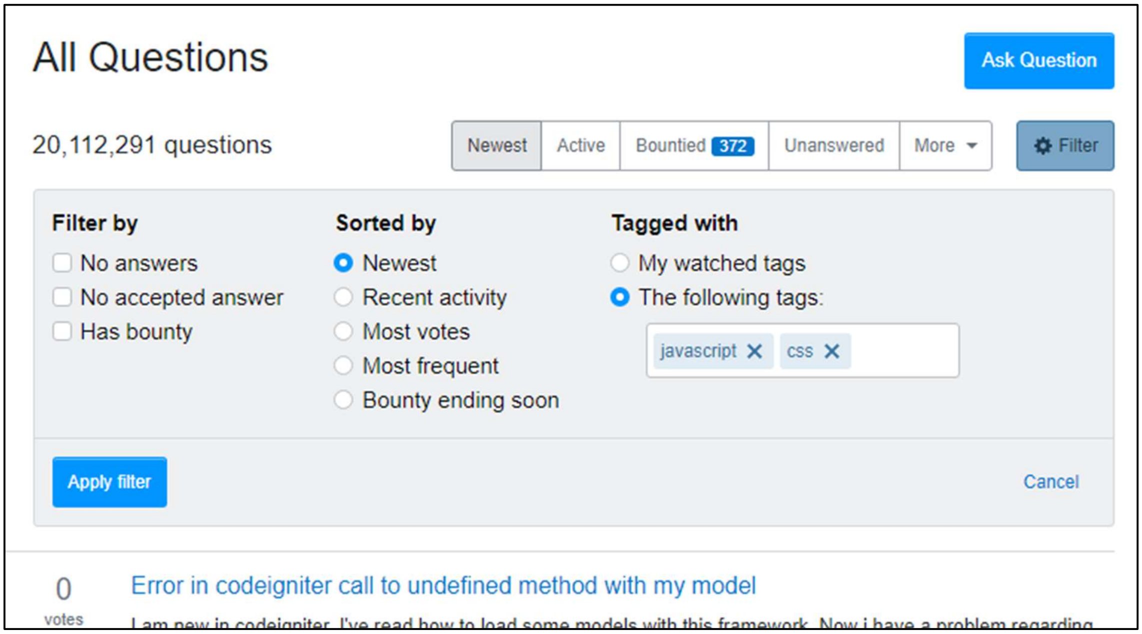
2.1 Overview

Some forums are reviewed in this chapter, the forums are Stack Overflow, UTAR Forum, Reddit and Quora. The strengths and weaknesses of the websites are discussed and compared.

2.2 Stack Overflow

Stack Overflow is a question and answer site for developers to learn, share their programming knowledge, and build their career. It is one of the most popular websites known to developers, almost every developer use or know about this website.

In the questions page of Stack Overflow, a list of questions ask by other developers is shown, and there are a number of filters and tags that can be applied to help the users to get their desire results. Figure 2.1 shows the filters and tags that can be applied to the questions.



All Questions

20,112,291 questions

Filter by

□ No answers
□ No accepted answer
□ Has bounty

Sorted by

● Newest
○ Recent activity
○ Most votes
○ Most frequent
○ Bounty ending soon

Tagged with

○ My watched tags
● The following tags:

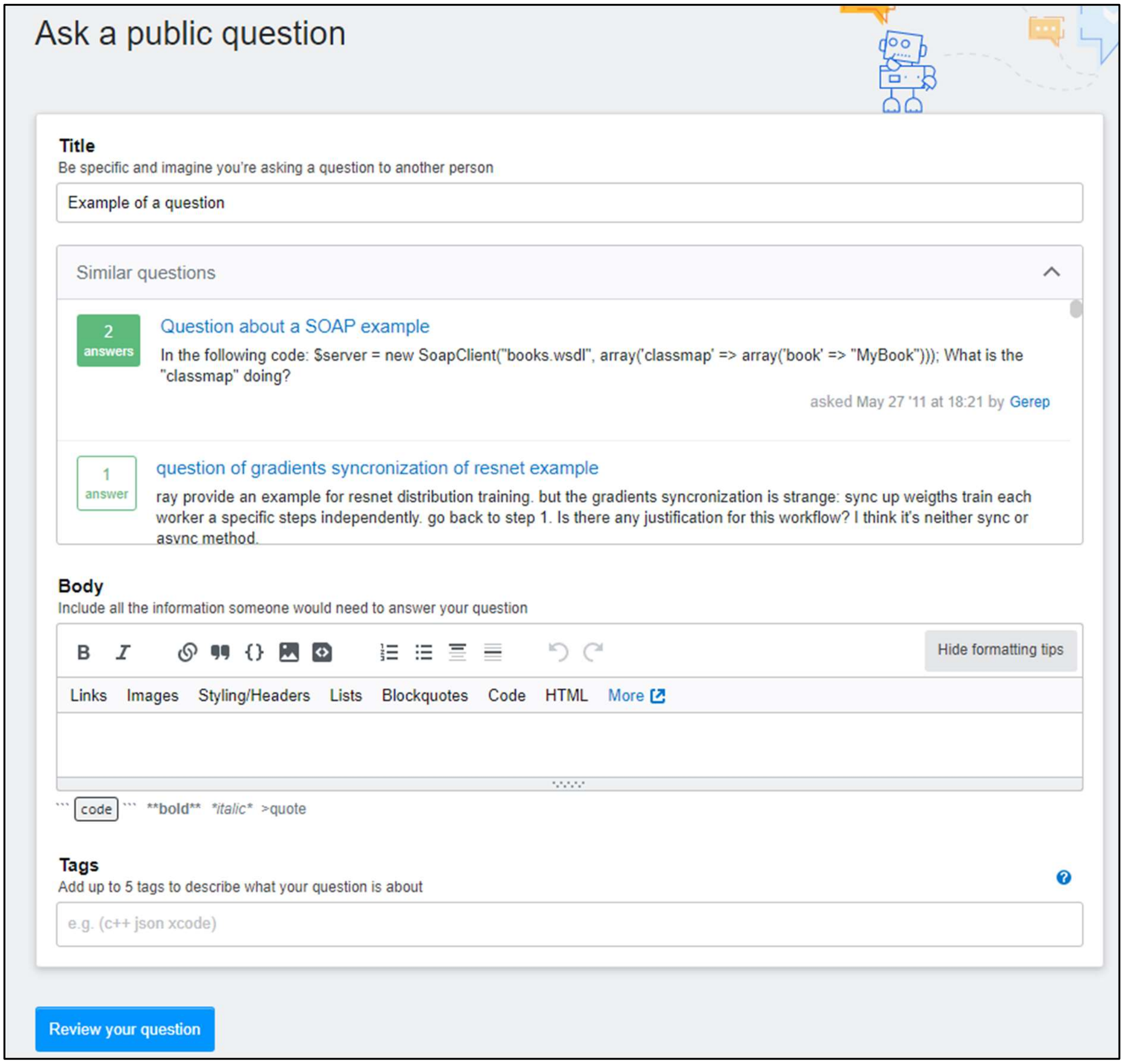
javascript ✕ css ✕

0 votes Error in codeigniter call to undefined method with my model

I am new in codeigniter. I've read how to load some models with this framework. Now i have a problem regarding

Figure 2.1: Filters and tags available in Stack Overflow

If the users want to ask a question, they can browse to the ask question page in order to do so. In the page, it consists of 3 main fields which are required the users to fill in before proceeding to publish the question, and the fields are title, body, and tag. When the users enter the title of the question, the website will search for similar questions based on the title entered and show it to the users. Therefore, users are less likely to ask duplicate questions that are asked by other users before, maintaining quality and distinction of the questions. Figure 2.2 shows the ask question page of Stack Overflow.



Ask a public question

Title
Be specific and imagine you're asking a question to another person

Example of a question

Similar questions

2 answers — Question about a SOAP example
In the following code: $server = new SoapClient("books.wsdl", array('classmap' => array('book' => "MyBook"))); What is the "classmap" doing?
asked May 27 '11 at 18:21 by Gerep

1 answer — question of gradients syncronization of resnet example
ray provide an example for resnet distribution training. but the gradients syncronization is strange: sync up weigths train each worker a specific steps independently. go back to step 1. Is there any justification for this workflow? I think it's neither sync or async method.

Body
Include all the information someone would need to answer your question

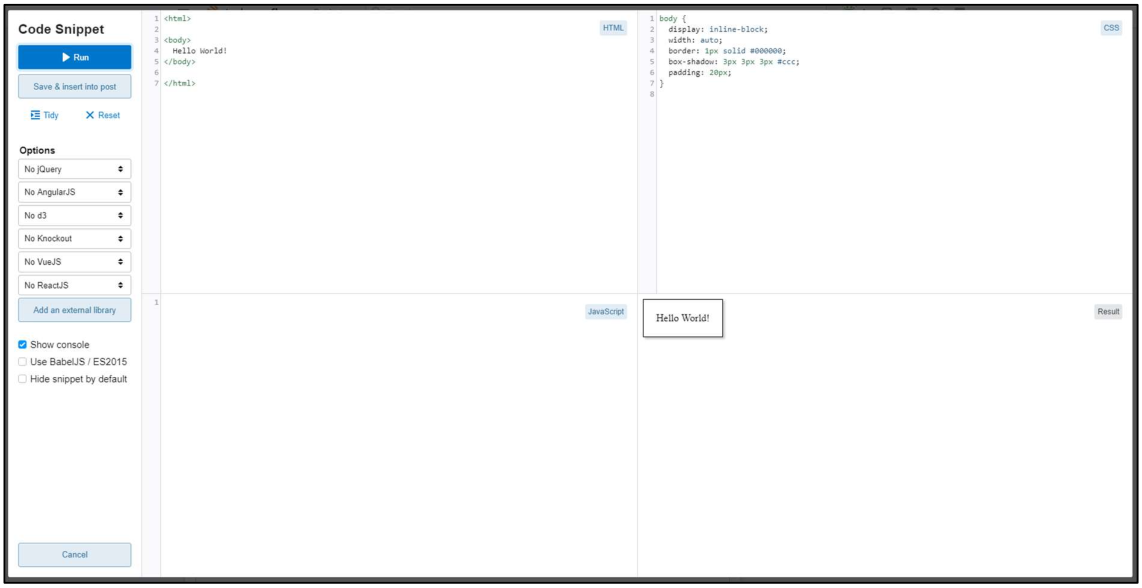
Tags
Add up to 5 tags to describe what your question is about

e.g. (c++ json xcode)

Hide formatting tips
Links Images Styling/Headers Lists Blockquotes Code HTML More
``` code ``` **bold** *italic* >quote
Review your question

Figure 2.2: Ask question page of Stack Overflow

Moreover, the editor of the question also allows the users to enter code snippet of HTML, JavaScript and CSS. The code snippet can not only be inserted into the editor, but also be run to view the result for better understanding of other users. Figure 2.3 shows the code editor of Stack Overflow and the result of the code entered.



Options

- No jQuery
- No AngularJS
- No d3
- No Knockout
- No VueJS
- No ReactJS

☑ Show console
□ Use BabelJS / ES2015
□ Hide snippet by default

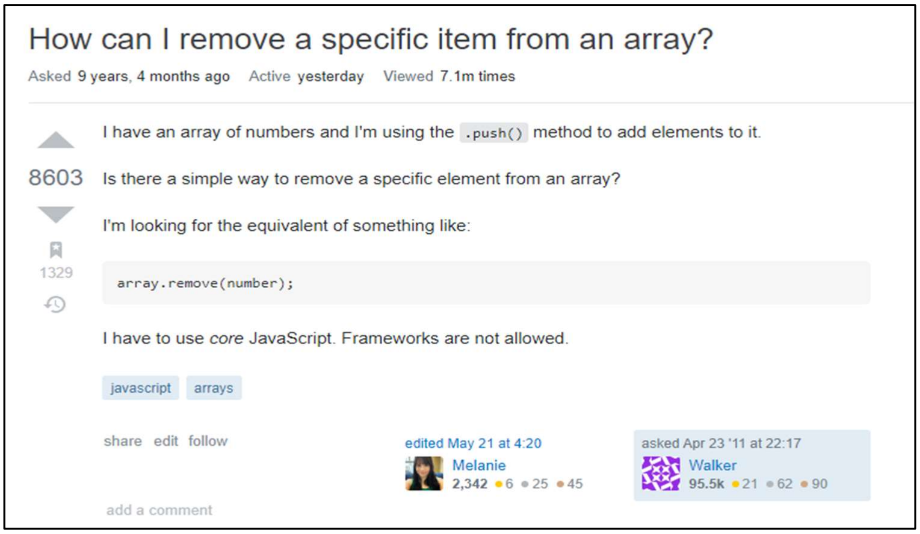
```html
<html>

<body>
  Hello World!
</body>

</html>
```

```css
body {
  display: inline-block;
  width: auto;
  border: 1px solid #000000;
  box-shadow: 3px 3px 3px #ccc;
  padding: 20px;
}
```

Hello World!

Figure 2.3: Code editor of Stack Overflow

In addition, users could mark an answer to their questions as accepted if the answer solved their problems, so that other users that have similar problems can try out the accepted answer immediately to see if it works for them. Apart from accepting answers, users can upvote or downvote the questions and answers. This functionality acts as a review that can provide a pointer to users about the reliability of a question or answer. Answer with more upvote indicate that it is very helpful to many people, therefore users can solve their problems in a shorter period by trying out the most upvoted answer. Figure 2.4 and 2.5 shows a question with accepted answer and upvotes.



How can I remove a specific item from an array?

Asked 9 years, 4 months ago Active yesterday Viewed 7.1m times

I have an array of numbers and I'm using the `.push()` method to add elements to it.

Is there a simple way to remove a specific element from an array?

I'm looking for the equivalent of something like:

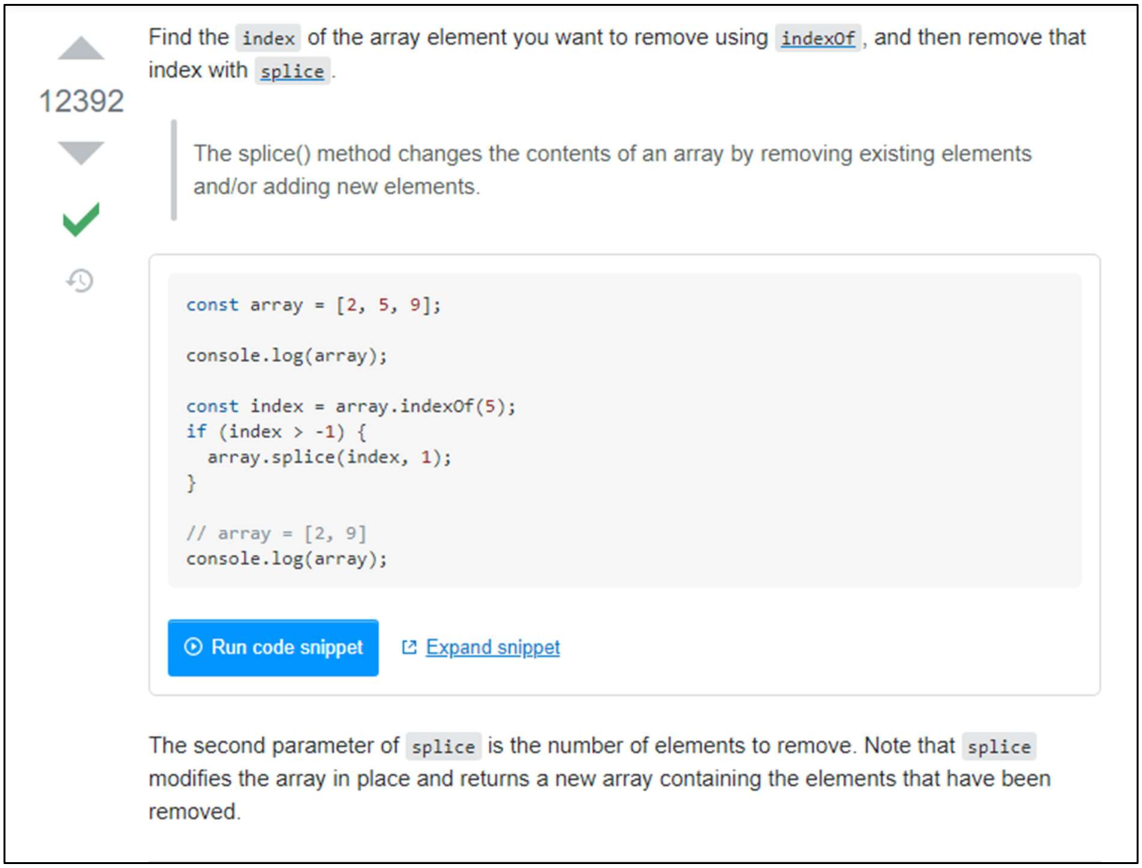
```
array.remove(number);
```

I have to use *core* JavaScript. Frameworks are not allowed.

edited May 21 at 4:20
Melanie
2,342 ●6 ●25 ●45

asked Apr 23 '11 at 22:17
Walker
95.5k ●21 ●62 ●90

Figure 2.4: Example of question in Stack Overflow



Find the `index` of the array element you want to remove using `indexOf`, and then remove that index with `splice`.

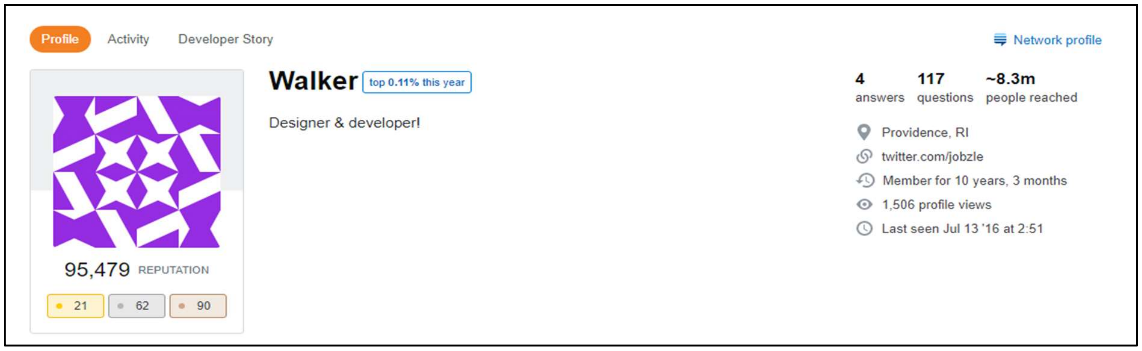
> The splice() method changes the contents of an array by removing existing elements and/or adding new elements.

```
const array = [2, 5, 9];

console.log(array);

const index = array.indexOf(5);
if (index > -1) {
  array.splice(index, 1);
}

// array = [2, 9]
console.log(array);
```

The second parameter of `splice` is the number of elements to remove. Note that `splice` modifies the array in place and returns a new array containing the elements that have been removed.

Figure 2.5: Example of accepted answer in Stack Overflow

Besides, Stack Overflow also has reputation feature that allows users to earn reputation points based on their activity in Stack Overflow. The reputation points provide sense of achievement to the users, users feel proud when they accumulate a high amount of reputation points. So, they will try their best to get as many points as they can by answering question and helping others in Stack Overflow. Figure 2.6 shows a profile of a user with high reputation points in Stack Overflow



Walker top 0.11% this year

Designer & developer!

95,479 REPUTATION

● 21 ● 62 ● 90

4 answers 117 questions ~8.3m people reached

Providence, RI
twitter.com/jobzle
Member for 10 years, 3 months
1,506 profile views
Last seen Jul 13 '16 at 2:51

Figure 2.6: Profile of user with high reputation points in Stack Overflow

2.2.1 Strengths

1. Stack Overflow allows users to apply filters and tags to get more relevant questions and discussions.
2. Stack Overflow search for similar questions when users enter their question titles to prevent users from creating duplicate questions.
3. Editor in Stack Overflow allows the insertion of code snippets and the users can even run the code to view the results for further understanding.
4. Stack Overflow allows users to mark the answer to their questions as accepted, upvoting and downvoting questions and answers to indicate the reliability of the questions and answers.
5. Stack Overflow have reputation features that enable users to gain reputation points when they get upvoted, which encourage them to keep asking questions and providing answers that are high quality, improving the overall quality of the platform.

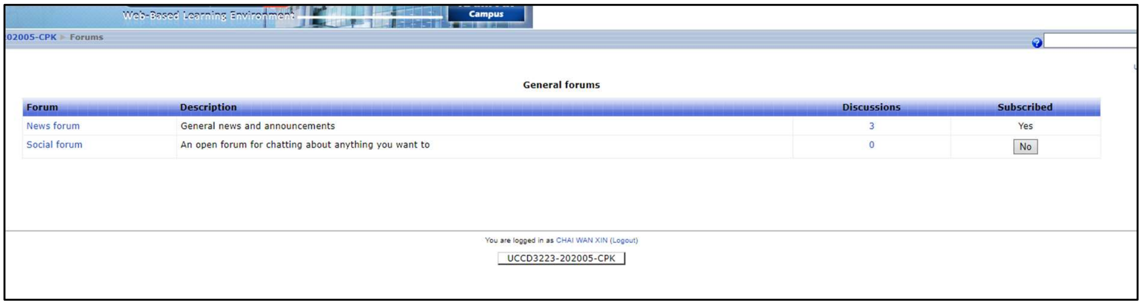
2.2.2 Weaknesses

1. The UI of Stack Overflow consists of too much information that can easily make newcomers feel overwhelmed by it.
2. The editor of Stack Overflow is complicated to users that are not familiar with it, so they cannot fully utilize the editor in Stack Overflow.
3. The questions list can only be displayed in list form, slowing the users that want to quickly browse through all the questions to find their desired questions.
4. Comments of each questions and answers are very hard to notice due to the small font size, giving the impression that the comments are not relevant. Users might miss useful solutions in the comment sections.

2.3 UTAR Forum

UTAR Forum is a platform that allows discussion between students and lecturers in UTAR. It can be accessed in WBLE of UTAR. Usually, lecturers use UTAR Forum to post announcement or let the students have their discussion in it. However, each UTAR Forum is only accessible by the students that are taking the respective subject, which means that no other people can access the forum beside students taking the subject and lecturers.

There is a forum list in each of the subjects of UTAR. Students can click the button on the right to subscribe to the forum. Then students will receive copies of forums by email if there is anything new. Figure 2.7 shows the forums list of one of the subjects of UTAR.



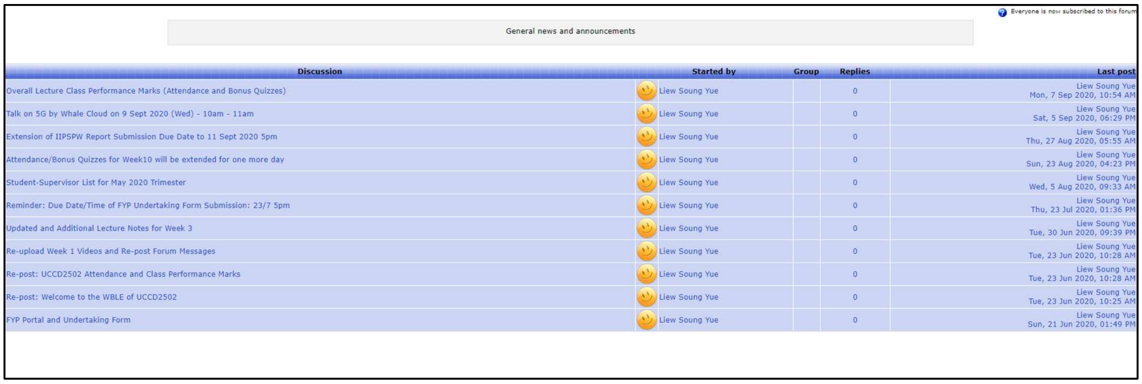
General forums

Forum	Description	Discussions	Subscribed
News forum	General news and announcements	3	Yes
Social forum	An open forum for chatting about anything you want to	0	No

You are logged in as CHAI WAN XIN (Logout)

Figure 2.7: Forum list of one of the subjects of UTAR.

Inside one of the forums, there is a discussion list where the discussions are displayed in a list form. Students can click on one of the discussions to navigate into the discussion page for taking further actions such as viewing the details of discussion, reply to the discussion and so on. Figure 2.8 shows the discussion list in one of the forums in UTAR.


Everyone is now subscribed to this forum

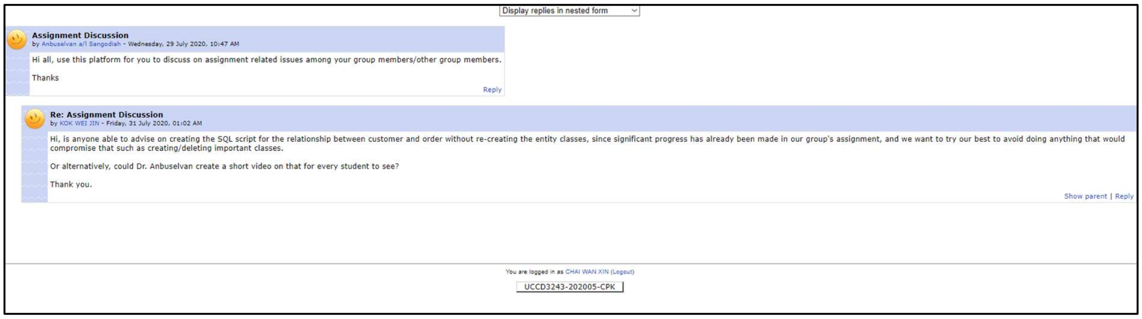
General news and announcements

Discussion	Started by	Group	Replies	Last post
Overall Lecture Class Performance Marks (Attendance and Bonus Quizzes)	Liew Soung Yue		0	Liew Soung Yue Mon, 7 Sep 2020, 10:54 AM
Talk on 5G by Whale Cloud on 9 Sept 2020 (Wed) - 10am - 11am	Liew Soung Yue		0	Liew Soung Yue Sat, 5 Sep 2020, 06:29 PM
Extension of IIPSPW Report Submission Due Date to 11 Sept 2020 5pm	Liew Soung Yue		0	Liew Soung Yue Thu, 27 Aug 2020, 05:55 AM
Attendance/Bonus Quizzes for Week10 will be extended for one more day	Liew Soung Yue		0	Liew Soung Yue Sun, 23 Aug 2020, 04:23 PM
Student-Supervisor List for May 2020 Trimester	Liew Soung Yue		0	Liew Soung Yue Wed, 5 Aug 2020, 09:33 AM
Reminder: Due Date/Time of FYP Undertaking Form Submission: 23/7 5pm	Liew Soung Yue		0	Liew Soung Yue Thu, 23 Jul 2020, 01:36 PM
Updated and Additional Lecture Notes for Week 3	Liew Soung Yue		0	Liew Soung Yue Tue, 30 Jun 2020, 09:39 PM
Re-upload Week 1 Videos and Re-post Forum Messages	Liew Soung Yue		0	Liew Soung Yue Tue, 23 Jun 2020, 10:28 AM
Re-post: UCCD2502 Attendance and Class Performance Marks	Liew Soung Yue		0	Liew Soung Yue Tue, 23 Jun 2020, 10:28 AM
Re-post: Welcome to the WBLE of UCCD2502	Liew Soung Yue		0	Liew Soung Yue Tue, 23 Jun 2020, 10:25 AM
FYP Portal and Undertaking Form	Liew Soung Yue		0	Liew Soung Yue Sun, 21 Jun 2020, 01:49 PM

Figure 2.8: Discussion list in one of the forums in UTAR

Furthermore, the discussions in the forums are very simple and lack of design just like the forum list and discussion list shown in the previous figures. Students can view the discussion details and replies of the discussion. If students want to engage in the discussion, they can either reply to the discussion or reply to one of the replies, making nested replies.

There is an option that allows students to change the way of the discussion is displayed, so that students can browse through the discussion in a more effective way if the discussion contains a lot of replies and nested replies. The options available are display replies flat with oldest first, display replies flat with newest first, display replies in threaded form and display replies in nested form. Figure 2.9 shows one of the discussions displayed in nested form.



Display replies in nested form

Assignment Discussion
by Anbuselvan a/l Sangodiah - Wednesday, 29 July 2020, 10:47 AM

Hi all, use this platform for you to discuss on assignment related issues among your group members/other group members.

Thanks

Reply

Re: Assignment Discussion
by KOK WEI JIN - Friday, 31 July 2020, 01:02 AM

Hi, is anyone able to advise on creating the SQL script for the relationship between customer and order without re-creating the entity classes, since significant progress has already been made in our group's assignment, and we want to try our best to avoid doing anything that would compromise that such as creating/deleting important classes.

Or alternatively, could Dr. Anbuselvan create a short video on that for every student to see?

Thank you.

Show parent | Reply

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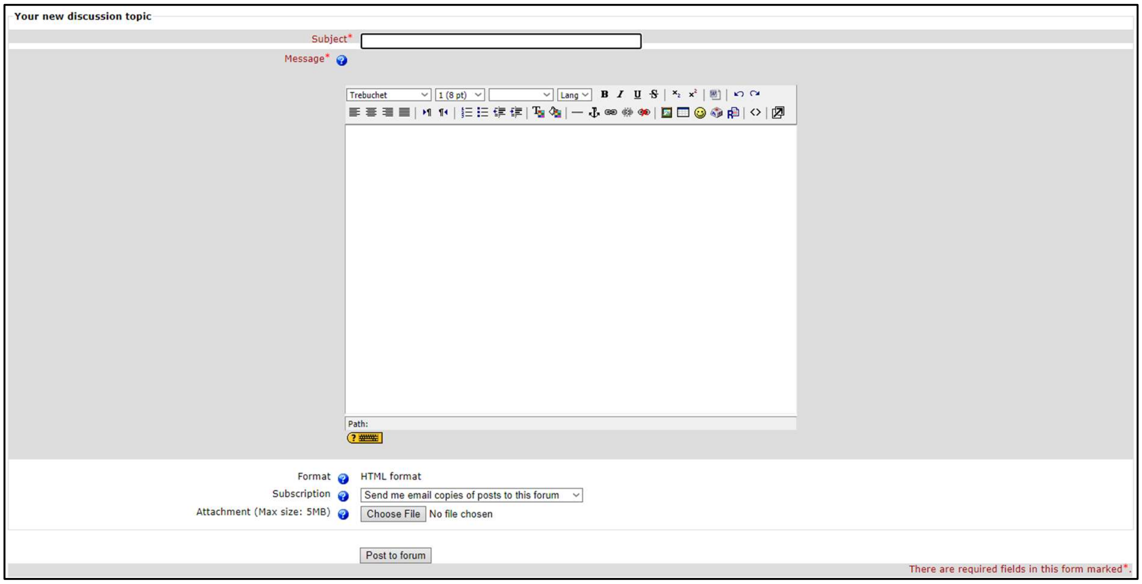
UCCD3243-202005-CPK

Figure 2.9: Discussion of UTAR Forum displayed in nested form

Last but not least, UTAR Forum has its editor just like other forums. Despite the editor consists all the basic functions that are required, but it does not deny the fact that the editor looked outdated and not attractive, especially in this era where UI is considered one of the most important elements that influence the usability of an application. The editor in UTAR Forum does not have the functionality that allows students to insert code snippets.



Your new discussion topic

Subject*

Message*

Trebuchet | 1 (8 pt) | Lang

Path:

Format: HTML format

Subscription: Send me email copies of posts to this forum

Attachment (Max size: 5MB): Choose File No file chosen

Post to forum

There are required fields in this form marked*.

Figure 2.10: Editor of UTAR Forum

2.3.1 Strengths

1. Students able to subscribe to forums to receive emails when there is anything to keep them updated.
2. Students can choose how the discussion is displayed to browse through the discussion in the way they preferred effectively.
3. Each of the forums are tied to a subject, making the forums focus on the subject only, there is no irrelevant discussion in the forum.

2.3.2 Weaknesses

1 The design of UI is bland, most of the elements do not have styling applied to them, making the UTAR Forum unattractive and discouraging students to use it.

2 Only students that are taking the subject can access to their respective forums, restricting outsiders including seniors to access the forums. Students can only count on themselves and lecturers to solve the problems.

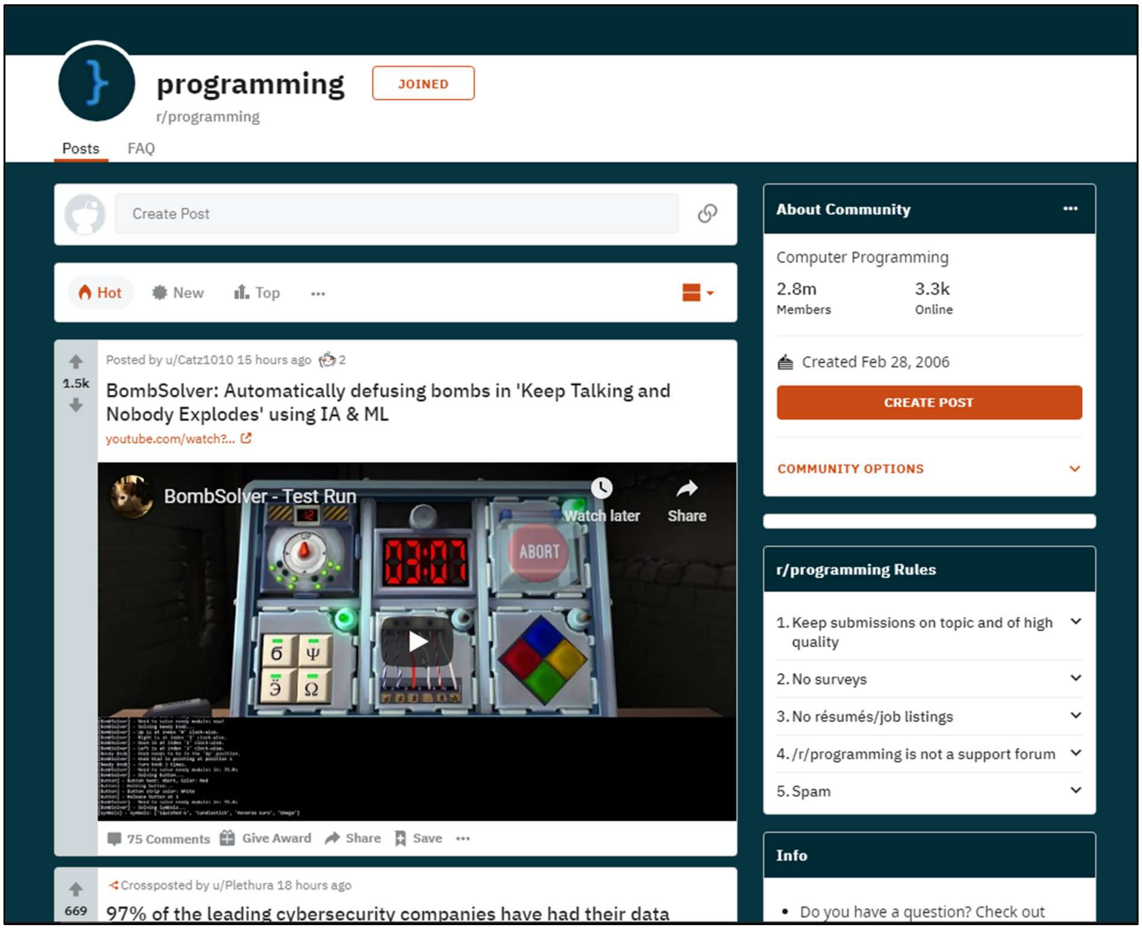
3 Editor of UTAR Forum does not allows the insertion of code snippets, causing difficulty to express their problems for FICT students.

4 No filters can be applied to the discussion list, making it difficult to find a specific discussion if there are many discussions.

2.4 Reddit

Reddit is a network of communities based on people's interests. There are a lot of communities in Reddit, each of them has their own theme of discussions. Some communities are sharing memes among each other, while some communities are focusing on discussion about career and helping each other in a serious way.

In the home page of a community, users can view all the posts that are posted by other community members. The posts can be filtered by various filters such as hot, new, top and rising. Furthermore, the posts can also be filtered by flair, which is a kind of tags that can be applied to a post to categorized it, making it easier to discovered by others. Users can also choose how the posts are displayed based on their preference, the options available are card, classic and compact. Figure 2.11, 2.12, 2.13 show all display options that are available.



Posted by u/Catz1010 15 hours ago

BombSolver: Automatically defusing bombs in 'Keep Talking and Nobody Explodes' using IA & ML

youtube.com/watch?...

Crossposted by u/Plethura 18 hours ago

97% of the leading cybersecurity companies have had their data

Computer Programming

2.8m Members

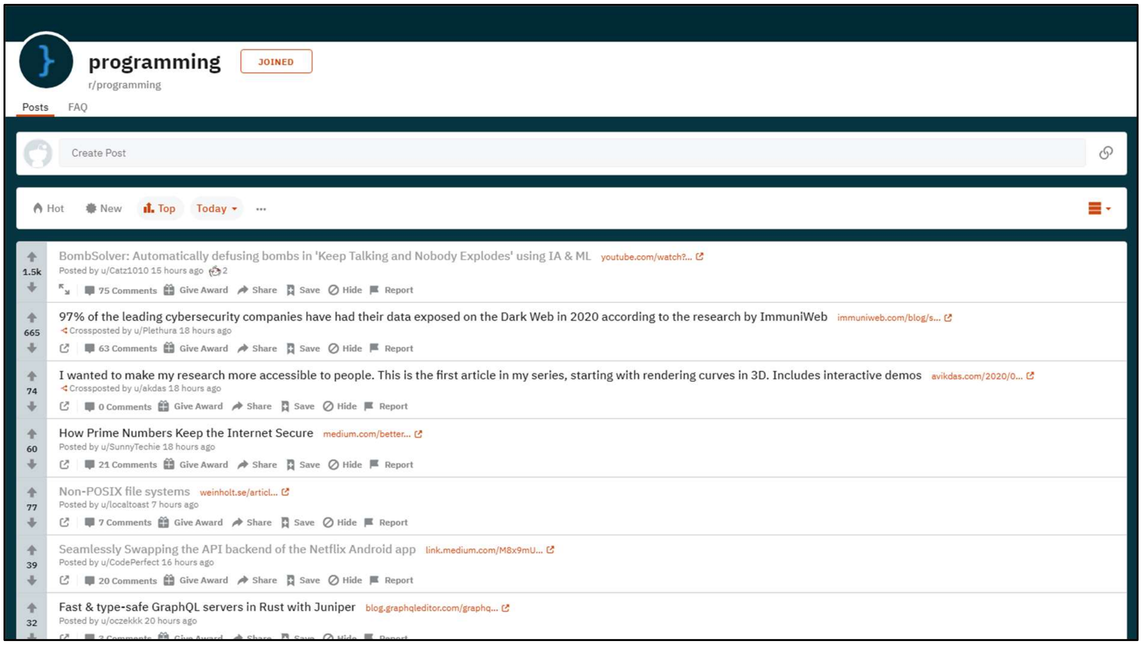
3.3k Online

Created Feb 28, 2006

1. Keep submissions on topic and of high quality
2. No surveys
3. No résumés/job listings
4. /r/programming is not a support forum
5. Spam

- Do you have a question? Check out

Figure 2.11: Card view display in Reddit



1.5k BombSolver: Automatically defusing bombs in 'Keep Talking and Nobody Explodes' using IA & ML youtube.com/watch?...
Posted by u/Catz1010 15 hours ago 2
75 Comments

665 97% of the leading cybersecurity companies have had their data exposed on the Dark Web in 2020 according to the research by ImmuniWeb immuniweb.com/blog/s...
Crossposted by u/Plethura 18 hours ago
63 Comments

74 I wanted to make my research more accessible to people. This is the first article in my series, starting with rendering curves in 3D. Includes interactive demos avikdas.com/2020/0...
Crossposted by u/akdas 18 hours ago
0 Comments

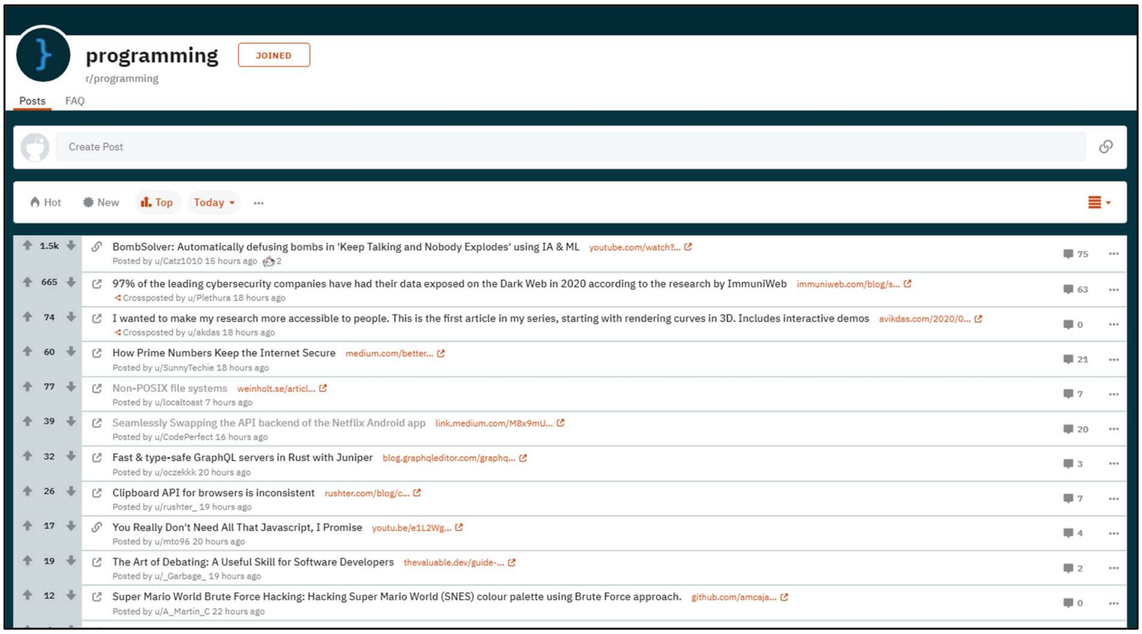
60 How Prime Numbers Keep the Internet Secure medium.com/better...
Posted by u/SunnyTechie 18 hours ago
21 Comments

77 Non-POSIX file systems weinholt.se/articl...
Posted by u/localtoast 7 hours ago
7 Comments

39 Seamlessly Swapping the API backend of the Netflix Android app link.medium.com/M8x9mU...
Posted by u/CodePerfect 16 hours ago
20 Comments

32 Fast & type-safe GraphQL servers in Rust with Juniper blog.graphqleditor.com/graphq...
Posted by u/oczekkk 20 hours ago

Figure 2.12: Classic view display in Reddit



1.5k BombSolver: Automatically defusing bombs in 'Keep Talking and Nobody Explodes' using IA & ML youtube.com/watch?... 75
Posted by u/Catz1010 15 hours ago 2

665 97% of the leading cybersecurity companies have had their data exposed on the Dark Web in 2020 according to the research by ImmuniWeb immuniweb.com/blog/s... 63
Crossposted by u/Plethura 18 hours ago

74 I wanted to make my research more accessible to people. This is the first article in my series, starting with rendering curves in 3D. Includes interactive demos avikdas.com/2020/0... 0
Crossposted by u/akdas 18 hours ago

60 How Prime Numbers Keep the Internet Secure medium.com/better... 21
Posted by u/SunnyTechie 18 hours ago

77 Non-POSIX file systems weinholt.se/articl... 7
Posted by u/localtoast 7 hours ago

39 Seamlessly Swapping the API backend of the Netflix Android app link.medium.com/M8x9mU... 20
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32 Fast & type-safe GraphQL servers in Rust with Juniper blog.graphqleditor.com/graphq... 3
Posted by u/oczekkk 20 hours ago

26 Clipboard API for browsers is inconsistent rushter.com/blog/c... 7
Posted by u/rushter_ 19 hours ago

17 You Really Don't Need All That Javascript, I Promise youtu.be/e1L2Wg... 4
Posted by u/mto96 20 hours ago

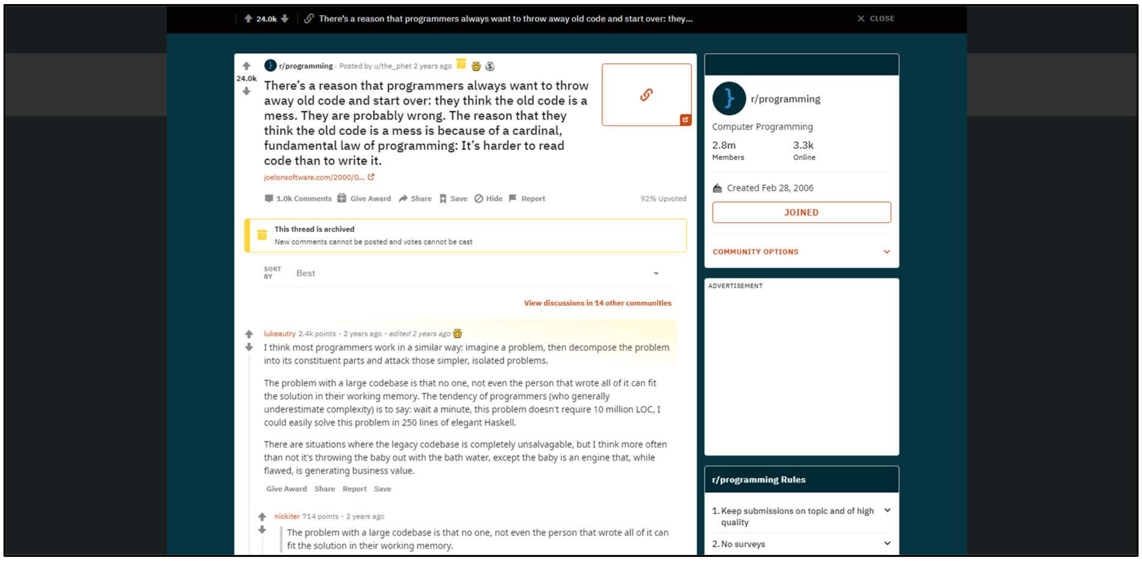
19 The Art of Debating: A Useful Skill for Software Developers thevaluable.dev/guide-... 2
Posted by u/_Garbage_ 19 hours ago

12 Super Mario World Brute Force Hacking: Hacking Super Mario World (SNES) colour palette using Brute Force approach. github.com/amcaja... 0
Posted by u/A_Martin_C 22 hours ago

Figure 2.13: Compact view display in Reddit

When a post is clicked from the post list, the post will be displayed in a modal instead of redirecting to another page. This allows the users to view the post without losing the current position of the page, this is exceptionally helpful if the users are browsing through the posts leisurely, and they can view the posts without the need of re-scrolling all the posts just to get back to the previous progress. The users can upvote the posts and comments just like Stack

Overflow, to indicate quality posts and comments. Figure 2.14 show example of a post on Reddit.



There's a reason that programmers always want to throw away old code and start over: they think the old code is a mess. They are probably wrong. The reason that they think the old code is a mess is because of a cardinal, fundamental law of programming: It's harder to read code than to write it.

joelonsoftware.com/2000/0...

This thread is archived

New comments cannot be posted and votes cannot be cast

lukeautry 2.4k points · 2 years ago · *edited 2 years ago*

I think most programmers work in a similar way: imagine a problem, then decompose the problem into its constituent parts and attack those simpler, isolated problems.

The problem with a large codebase is that no one, not even the person that wrote all of it can fit the solution in their working memory. The tendency of programmers (who generally underestimate complexity) is to say: wait a minute, this problem doesn't require 10 million LOC, I could easily solve this problem in 250 lines of elegant Haskell.

There are situations where the legacy codebase is completely unsalvagable, but I think more often than not it's throwing the baby out with the bath water, except the baby is an engine that, while flawed, is generating business value.

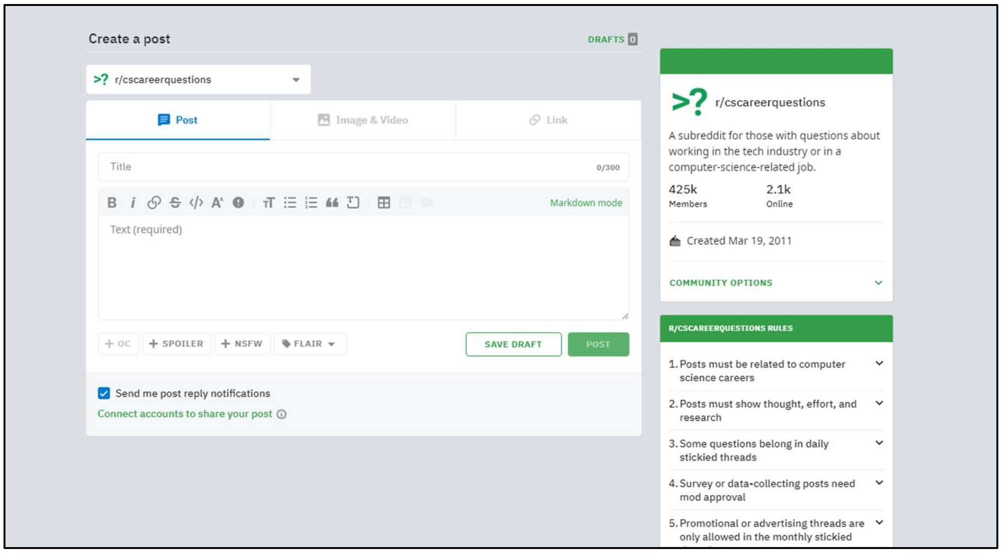
nickiter 714 points · 2 years ago

The problem with a large codebase is that no one, not even the person that wrote all of it can fit the solution in their working memory.

1. Keep submissions on topic and of high quality
2. No surveys

Figure 2.14: Example of a post on Reddit

In addition, editor in Reddit is in a simplistic design, making it easier to use even though it still contains many functionalities. Users need to enter title and content before proceeding to post. Flair can be added when creating post, but it is optional. Although Reddit is a forum website that are built not specifically for developers, the editor of Reddit still has the functionality to let users insert code snippet into it, allowing developers to discuss more conveniently. Figure 2.15 shows the editor of Reddit.



A subreddit for those with questions about working in the tech industry or in a computer-science-related job.

1. Posts must be related to computer science careers
2. Posts must show thought, effort, and research
3. Some questions belong in daily stickied threads
4. Survey or data-collecting posts need mod approval
5. Promotional or advertising threads are only allowed in the monthly stickied

Figure 2.15: Editor of Reddit

Last but not least, Reddit features karma system where users will gain or lose karma when getting upvoted or downvoted in posts. Similar to reputation feature in Stack Overflow, users tend to feel accomplished when their karma is high. So, they will keep providing useful comments in Reddit, ensuring the overall quality of Reddit.

2.4.1 Strengths

1. Reddit provides the options to display the posts in a various way, depending on the users' preference. The options include card view that contain most of the details in the posts, classic view that displays the posts in a list while contain the basic details of the posts and compact view that displays maximum number of posts in a given space but contains minimal information of the posts.
2. Users able to view the posts in a modal, preserving the browsing progress of users, improving users' immersion when using Reddit.
3. Simplistic design of editor, giving the impression that it is easy to use while offering all the basic functionality.
4. Karma system that allows users to gain and lose karma depends on the upvotes and downvotes of their post and comments, attracting the users to keep contributing a high quantity and quality of contents to gain more and more karma.

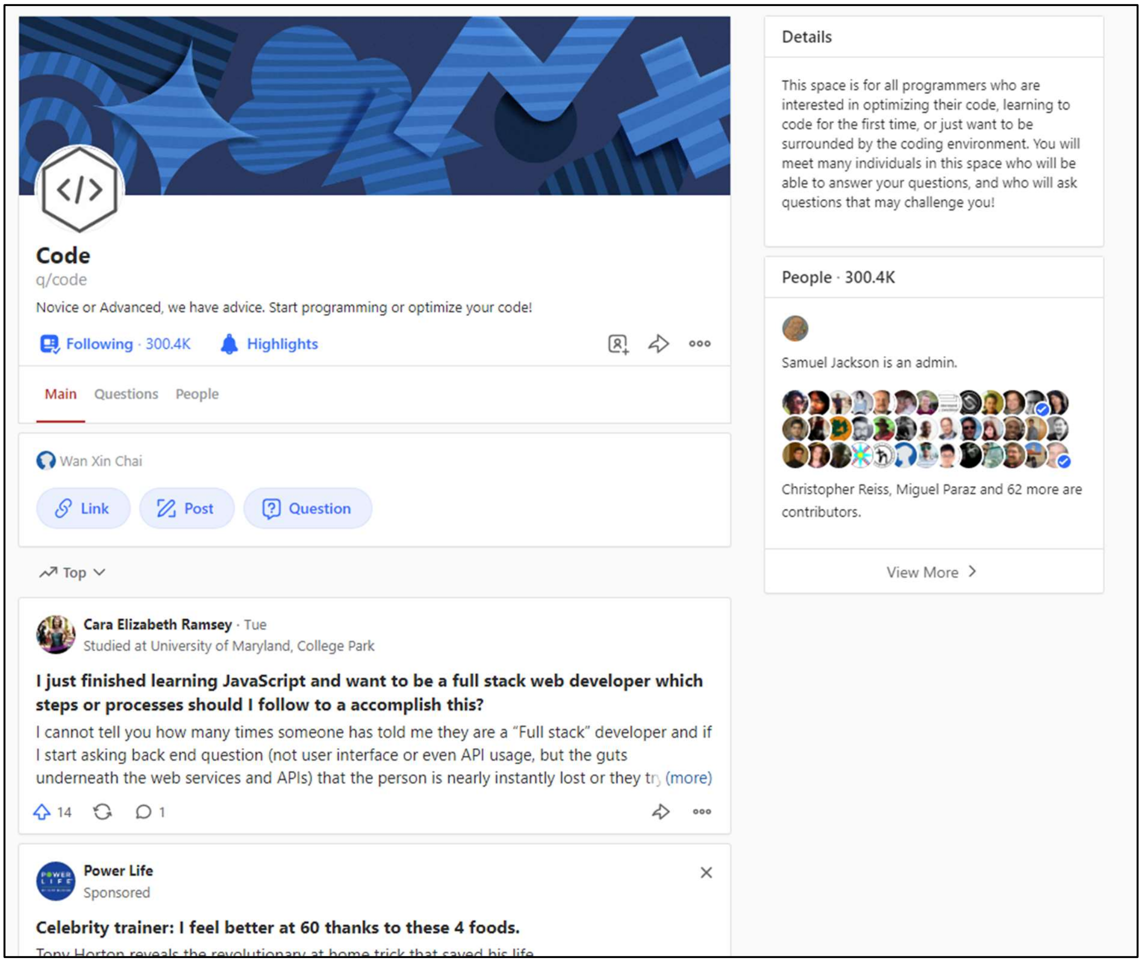
2.4.2 Weaknesses

1. There is too much information in a post, such as points, awards and so on that are just overwhelming to newcomers. This might drive away some users before they could adapt to the platform.
2. Although the nesting thread can be collapsed, sometimes it can still cause difficulty in tracking which replies are belongs to which thread, resulting in low readability.
3. Each community has their respective rules, some communities do not even allow users without a role to create a post, causing confusing for users when they are navigating from one community to another.

2.5 Quora

Quora is a question and answer forum that allows people to ask questions and other people to answer to those questions. It consists of many types of forums, ranging from general discussion to specific and professional discussion. Despite the various types of forums, the fact that Quora is a forum for all kind of discussion holds true.

The home page of one of the forums, which is called space in Quora, the questions are shown as a list. The only options that can act like filter are top questions and recent questions. Beside the details of the space, some other information that is not that relevant, and the list of questions, it has nothing much to offer. However, this can also be viewed as one of the strengths that it has, because it does not throw too much of information to users like the other forums, making easier to understand and use. Figure 2.16 shows the one of the spaces of Quora that have a list of questions.



Code

q/code

Novice or Advanced, we have advice. Start programming or optimize your code!

Cara Elizabeth Ramsey · Tue

Studied at University of Maryland, College Park

I just finished learning JavaScript and want to be a full stack web developer which steps or processes should I follow to a accomplish this?

I cannot tell you how many times someone has told me they are a "Full stack" developer and if I start asking back end question (not user interface or even API usage, but the guts underneath the web services and APIs) that the person is nearly instantly lost or they tr (more)

Power Life

Sponsored

Celebrity trainer: I feel better at 60 thanks to these 4 foods.

Tony Horton reveals the revolutionary at-home trick that saved his life

Details

This space is for all programmers who are interested in optimizing their code, learning to code for the first time, or just want to be surrounded by the coding environment. You will meet many individuals in this space who will be able to answer your questions, and who will ask questions that may challenge you!

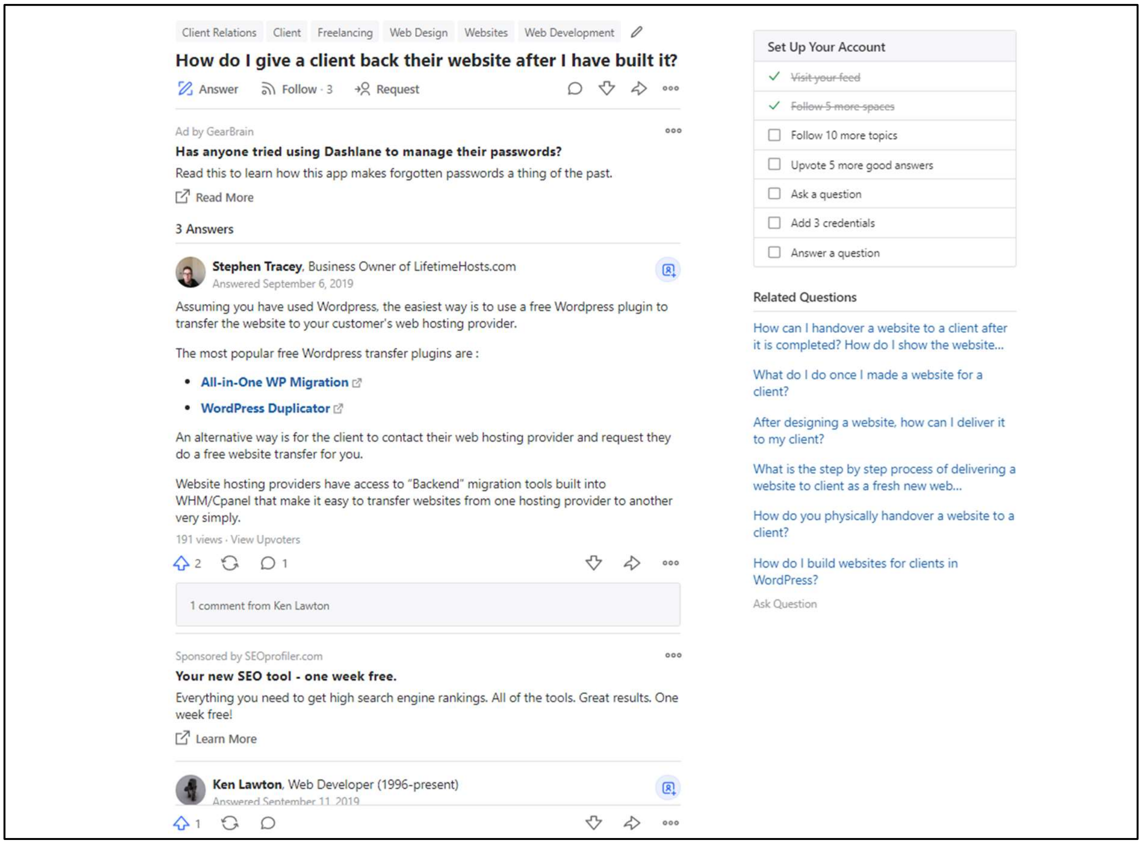
People · 300.4K

Samuel Jackson is an admin.

Christopher Reiss, Miguel Paraz and 62 more are contributors.

Figure 2.16: Space and question list of Quora

The question can be expanded in order to view the replies or answers of the post, users can also click on the questions asked which are bolded to view it in a new tab. There will be answers, suggested space, related questions and ads stacked together in a list. In addition, the suggested space, related questions and ads do not stand out among the answers, leaving the users in confusion when try to go through the questions and answers. The mixture of all these elements can affect the users' experience badly. Users will feel disconnected from the questions and find those ads disturbing as it does not contribute to the questions. This can be solved by removing or put all the irrelevant elements like ads, suggested space and related questions to the side instead of having them stacked together, blend in with the answer. Figure 2.17 shows example of a question page of Quora.



How do I give a client back their website after I have built it?

Ad by GearBrain

Has anyone tried using Dashlane to manage their passwords?

Read this to learn how this app makes forgotten passwords a thing of the past.

3 Answers

Stephen Tracey, Business Owner of LifetimeHosts.com
Answered September 6, 2019

Assuming you have used Wordpress, the easiest way is to use a free Wordpress plugin to transfer the website to your customer's web hosting provider.

The most popular free Wordpress transfer plugins are :

- **All-in-One WP Migration**
- **WordPress Duplicator**

An alternative way is for the client to contact their web hosting provider and request they do a free website transfer for you.

Website hosting providers have access to "Backend" migration tools built into WHM/Cpanel that make it easy to transfer websites from one hosting provider to another very simply.

191 views · View Upvoters

1 comment from Ken Lawton

Sponsored by SEOprofiler.com

Your new SEO tool - one week free.

Everything you need to get high search engine rankings. All of the tools. Great results. One week free!

Ken Lawton, Web Developer (1996-present)
Answered September 11, 2019

Set Up Your Account

- ✓ ~~Visit your feed~~
- ✓ ~~Follow 5 more spaces~~
- □ Follow 10 more topics
- □ Upvote 5 more good answers
- □ Ask a question
- □ Add 3 credentials
- □ Answer a question

Related Questions

How can I handover a website to a client after it is completed? How do I show the website...

What do I do once I made a website for a client?

After designing a website, how can I deliver it to my client?

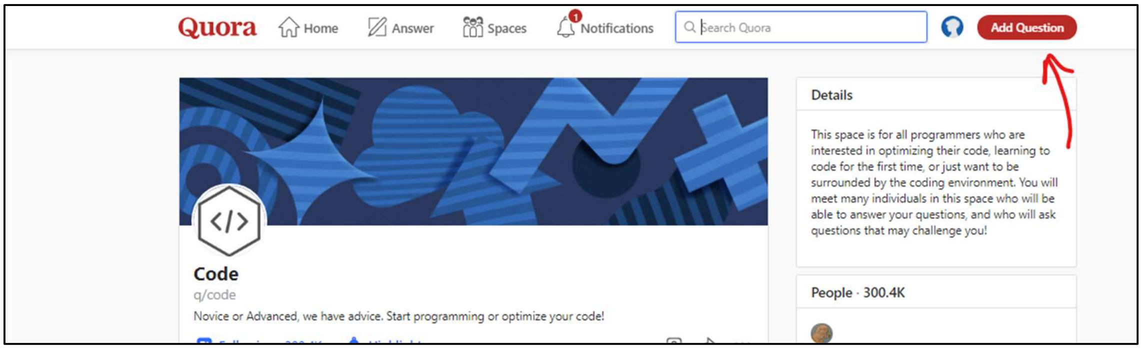
What is the step by step process of delivering a website to client as a fresh new web...

How do you physically handover a website to a client?

How do I build websites for clients in WordPress?

Figure 2.17: Question page of Quora

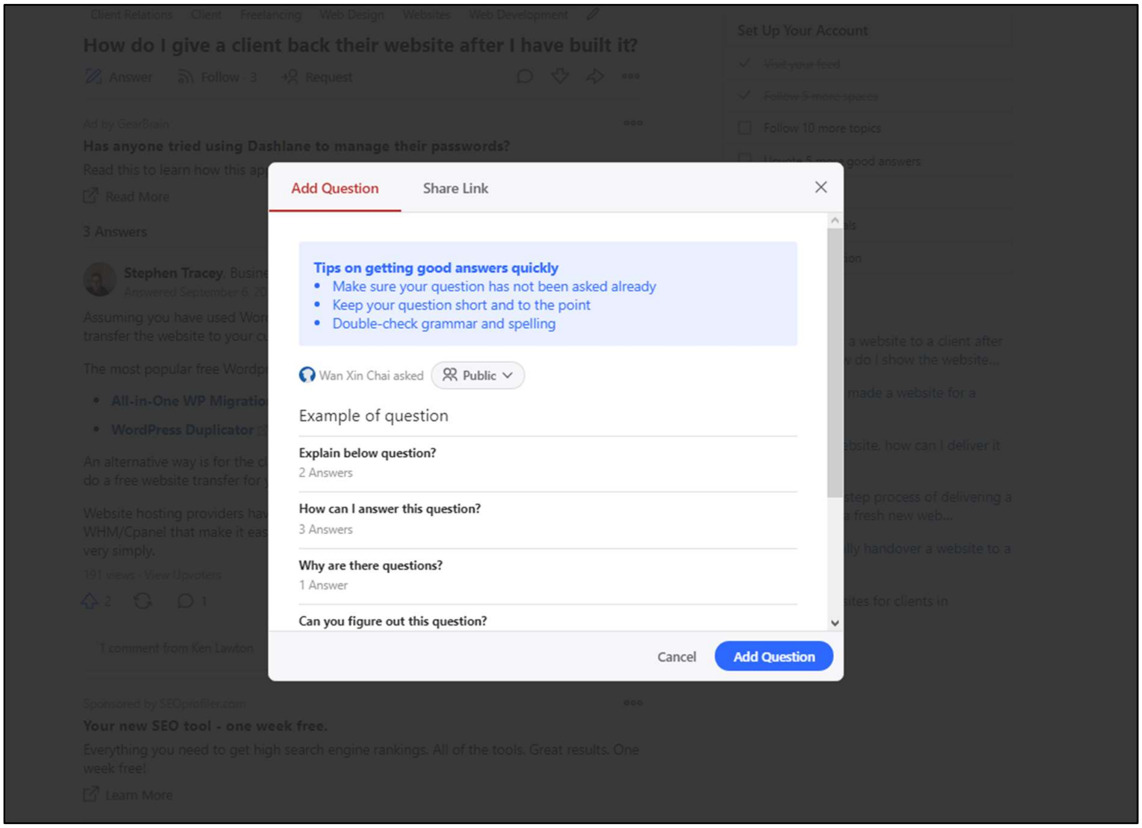
Other than that, if users want to ask questions, they can click on the add question button that are located near the navigation bar. It is red in colour which is very distinct colour in the page, because most of the elements in Quora are either white or gray. Hence, making it is easy to be spotted. When the button is clicked, a modal will be display, a question input field is provided to the user to enter their questions. When they start entering their questions into the input field, it will start searching for similar questions and displaying them to the users. This enables the users to check if the questions they want to ask have been asked and answered by other users, reducing duplicate questions in Quora. Figure 2.18 and 2.19 shows the add question button and modal of Quora respectively.



Novice or Advanced, we have advice. Start programming or optimize your code!

This space is for all programmers who are interested in optimizing their code, learning to code for the first time, or just want to be surrounded by the coding environment. You will meet many individuals in this space who will be able to answer your questions, and who will ask questions that may challenge you!

Figure 2.18: Add question button of Quora



How do I give a client back their website after I have built it?

Tips on getting good answers quickly
- Make sure your question has not been asked already
- Keep your question short and to the point
- Double-check grammar and spelling

Wan Xin Chai asked

Example of question

Explain below question?
2 Answers

How can I answer this question?
3 Answers

Why are there questions?
1 Answer

Can you figure out this question?

Figure 2.19: Add question modal of Quora

2.5.1 Strengths

1. Simple design of user interface, does not offer too much information to the user, making the website easy to understand and use.
2. Important elements such as add question button are highlighted with distinct colour which makes them stand out and easy to be spotted.
3. Quora will search for similar questions when users enter their question in the add question input field, helping users find the answers if they already exist and reducing duplicate questions.
4. Different spaces are available so that the questions can be categorized based on the spaces, allowing users to find more relevant questions in a particular space.

2.5.2 Weaknesses

1. Lack of advance filter functions that can help users to find the relevant questions effectively.
2. There is only one field in the add question modal, no other details such as code snippets and images can be entered other than the questions itself. This makes some questions hard to understand because there are no visual aids available.
3. There are many irrelevant elements mixed in a list with the answers. Affecting the user experience by disturbing and increasing disconnection between the users and the questions.

2.6 Summary

This chapter has reviewed some of the existing forums, the forums are Stack Overflow, UTAR Forum, Reddit and Quora. The strengths and weaknesses of the forums are discovered and discussed. Table 2.1 shows the overview of the strengths, weaknesses, and comparison of the forums.

Table 2.1: Overview of strengths, weaknesses, and comparison of forums

	Stack Overflow	**UTAR Forum**	**Reddit**	**Quora**
Authentication	Yes	Yes	Yes	Yes
UI design	Informative but there is too much information that may overwhelm the users	Poor UI design, almost all the elements do not have styling applied to them.	Informative, but too much information is being displayed that can confuse users	Simple design, user friendly, and easy to use
Display of discussions	Default list view	Default list view	Card, classic and compact view options are available to users	Default list view
Filters / tags	Wide range of filters and tags can be applied to the discussions	No	Good number of filters and flair to be used to filter irrelevant discussions	Only top and recent questions
Editor of the forum	Complicated design, powerful but hard to fully utilize it for newcomers	Outdated, discouraging people to use it	Simplistic design, easy to use yet packed with all the functions	Not applicable
Code snippets allowed	Yes	No	Yes	No
Attracting features	Reputation points	No	Karma system	No
Additional features	Search for similar questions when creating questions	No	No	Search for similar questions when creating questions

CHAPTER 3: System Design

3.1 Use Case Diagram

In this project, user can interact with the forum using various actions available. Figure 3.2 shows the use case diagram of FICT UTAR Forum.

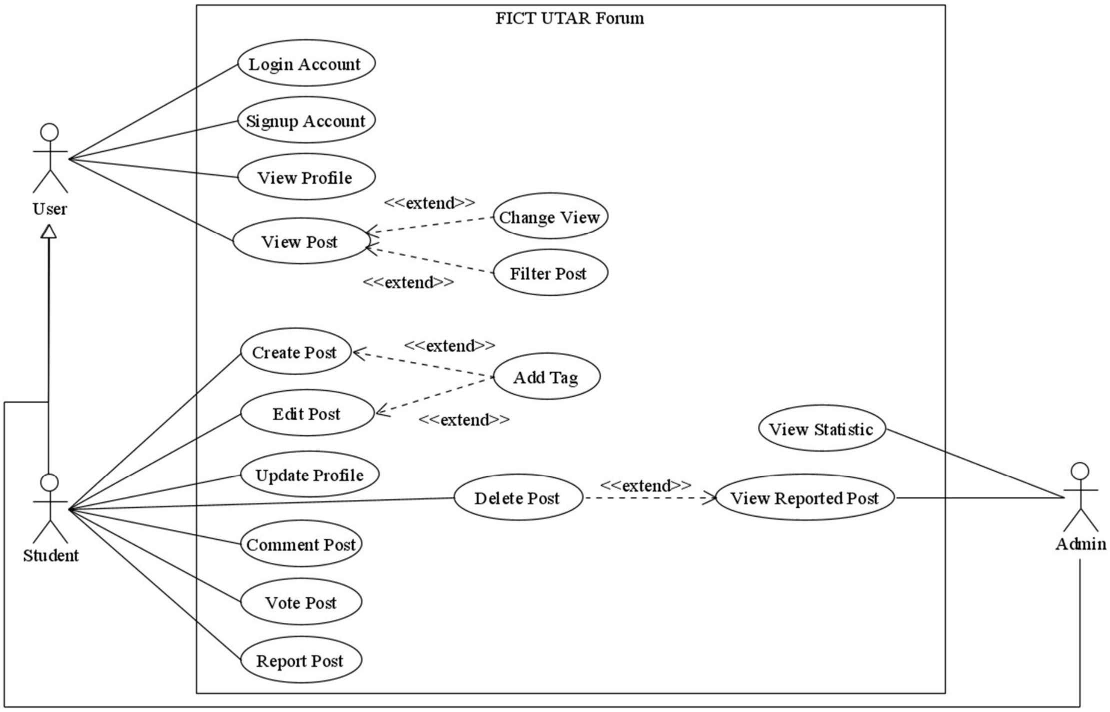
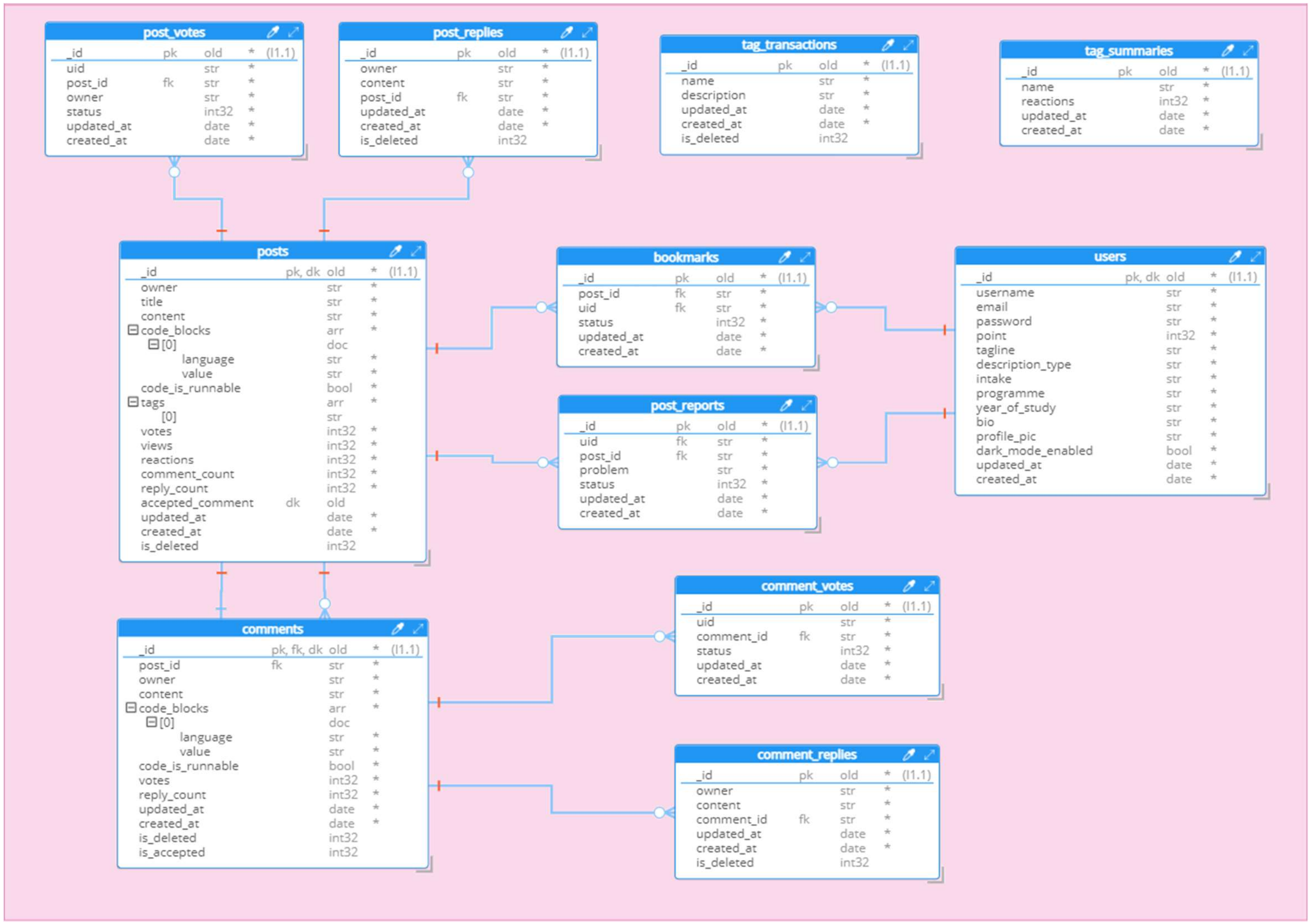


Figure 3.1: Use case diagram of FICT UTAR Forum

The use case diagram briefly describe what users can do in the forum. As shown in the diagram, users are separated into two groups, which are student and admin. Student represents the students of FICT UTAR, while admin will be the lecturers and staffs of FICT UTAR. Users can perform basic actions such as login, sign up account, view profile of other users and view post. Users can change the view and apply filter when viewing the post. Students will be able to perform additional actions such as create, edit, update, delete, comment, vote, and report posts. They can add tags to categorize their posts during creating and editing their posts. They can also edit their profile as they wish. Finally, admin will be able to view statistics of the forum and view the posts that are reported by students in the forum. Admin can delete the reported posts if the posts are violating the rules, such as involving plagiarism.

3.2 Data Model Diagram



post_votes

_id	pk	old	*	(I1.1)
uid		str	*	
post_id	fk	str	*	
owner		str	*	
status		int32	*	
updated_at		date	*	
created_at		date	*	

post_replies

_id	pk	old	*	(I1.1)
owner		str	*	
content		str	*	
post_id	fk	str	*	
updated_at		date	*	
created_at		date	*	
is_deleted		int32		

tag_transactions

_id	pk	old	*	(I1.1)
name		str	*	
description		str	*	
updated_at		date	*	
created_at		date	*	
is_deleted		int32		

tag_summaries

_id	pk	old	*	(I1.1)
name		str	*	
reactions		int32	*	
updated_at		date	*	
created_at		date	*	

posts

_id	pk, dk	old	*	(I1.1)
owner		str	*	
title		str	*	
content		str	*	
⊟ code_blocks		arr	*	
⊟ [0]		doc		
language		str	*	
value		str	*	
code_is_runnable		bool	*	
⊟ tags		arr	*	
[0]		str		
votes		int32	*	
views		int32	*	
reactions		int32	*	
comment_count		int32	*	
reply_count		int32	*	
accepted_comment	dk	old		
updated_at		date	*	
created_at		date	*	
is_deleted		int32		

bookmarks

_id	pk	old	*	(I1.1)
post_id	fk	str	*	
uid	fk	str	*	
status		int32	*	
updated_at		date	*	
created_at		date	*	

users

_id	pk, dk	old	*	(I1.1)
username		str	*	
email		str	*	
password		str	*	
point		int32	*	
tagline		str	*	
description_type		str	*	
intake		str	*	
programme		str	*	
year_of_study		str	*	
bio		str	*	
profile_pic		str	*	
dark_mode_enabled		bool	*	
updated_at		date	*	
created_at		date	*	

post_reports

_id	pk	old	*	(I1.1)
uid	fk	str	*	
post_id	fk	str	*	
problem		str	*	
status		int32	*	
updated_at		date	*	
created_at		date	*	

comments

_id	pk, fk, dk	old	*	(I1.1)
post_id	fk	str	*	
owner		str	*	
content		str	*	
⊟ code_blocks		arr	*	
⊟ [0]		doc		
language		str	*	
value		str	*	
code_is_runnable		bool	*	
votes		int32	*	
reply_count		int32	*	
updated_at		date	*	
created_at		date	*	
is_deleted		int32		
is_accepted		int32		

comment_votes

_id	pk	old	*	(I1.1)
uid		str	*	
comment_id	fk	str	*	
status		int32	*	
updated_at		date	*	
created_at		date	*	

comment_replies

_id	pk	old	*	(I1.1)
owner		str	*	
content		str	*	
comment_id	fk	str	*	
updated_at		date	*	
created_at		date	*	
is_deleted		int32		

Figure 3.2: Data model diagram of FICT UTAR Forum

3.3 Data Dictionary

The data dictionary describes the attributes of each table in the data model diagram in the previous section.

User Table

Table 3.1: Data dictionary for user table

Attribute	Data Type	Nullable	Description
_id	object id	No	Unique identifier for the user record
username	string	No	Display name of the user in the forum
email	string	No	One of the login credentials of the user
password	string	No	One of the login credentials of the user
point	integer	No	Reward gain through the point system in the forum
tagline	string	Yes	User tagline that will be displayed under username in the forum
description_type	string	No	Type of user description to be display, tagline or award title
intake	string	Yes	Intake joined in UTAR of the user
programme	string	Yes	Programme took by the user
year_of_study	string	Yes	Current year of study of the user
bio	string	Yes	User biography
profile_pic	string	Yes	URL of user profile picture
dark_mode_enable	bool	No	Decide whether to enable dark mode in the forum, true to enable and false to disable
updated_at	date	No	Latest date of the user record being updated
created_at	date	No	Date of the user record being created

Post Table

Table 3.2: Data dictionary for post table

Attribute	**Data Type**	**Nullable**	**Description**
_id	object id	No	Unique identifier for the post record
owner	string	No	The owner user id of the post, which can be referenced to user table
title	string	No	Title of the post
content	string	No	Content of the post
code_blocks	array	No	An array of code blocks, each element has language which represents the language of the code and value which is code itself
code_is_runnable	bool	No	Indicate whether the code can be run in the post
tags	array	No	An array of tags, categorize the post for filtering and data visualization purpose
votes	integer	No	Number of votes gotten by the post, upvote will increase it by 1 and downvote will decrease it by 1
views	integer	No	Number of views the post has gotten
reactions	integer	No	Number of interactions gained by the post, such as view, comment, reply and vote.
comment_count	integer	No	Number of comments on the post
reply_count	integer	No	Number of replies on the post
accepted_comment	bool	No	The accepted comment id, which can be referenced to comment table
is_deleted	integer	Yes	Indicate whether the post is deleted, 0 or null is not deleted while 1 is deleted and will not be returned
updated_at	date	No	Latest date of the post record being updated
created_at	date	No	Date of the post record being created

Post Vote Table

Table 3.3: Data dictionary for post vote table

Attribute	**Data Type**	**Nullable**	**Description**
_id	object id	No	Unique identifier for the post vote record
uid	string	No	The voter user id, which can be referenced to user table
post_id	string	No	The target post id, referenced to post table
status	integer	No	Indicate whether it is an upvote or downvote, 1 for upvote, -1 for downvote, and 0 if the user unvote the post
updated_at	date	No	Latest date of the post vote record being updated
created_at	date	No	Date of the post vote record being created

Post Reply Table

Table 3.4: Data dictionary for post reply table

Attribute	**Data Type**	**Nullable**	**Description**
_id	object id	No	Unique identifier for the post reply record
owner	string	No	The owner user id of the reply, referenced to user table
content	string	No	The content of the reply
post_id	string	No	The post id of the post that the reply belongs to, referenced to post table
is_deleted	bool	Yes	Indicate whether the reply is deleted, 0 or null is not deleted while 1 is deleted and will not be returned
updated_at	date	No	Latest date of the post reply record being updated
created_at	date	No	Date of the post reply record being created

Post Report Table

Table 3.5: Data dictionary for post report table

Attribute	**Data Type**	**Nullable**	**Description**
_id	object id	No	Unique identifier for the post report record
uid	string	No	The reporter user id, referenced to user table
post_id	string	No	The reported post id, referenced to post table
problem	string	No	Description of the problem about the post
status	integer	No	Represent the status of the report, 1 is not resolved, 2 is marked as resolved, 3 is post deleted
updated_at	date	No	Latest date of the post report record being updated
created_at	date	No	Date of the post report record being created

Bookmark Table

Table 3.6: Data dictionary for bookmark table

Attribute	**Data Type**	**Nullable**	**Description**
_id	object id	No	Unique identifier for the bookmark record
post_id	string	No	The target post id, referenced to post table
uid	string	No	The bookmark owner user id, referenced to user table
status	integer	No	Indicate whether the bookmark is active, 1 is active while 0 is not and will not be returned
updated_at	date	No	Latest date of the bookmark record being updated
created_at	date	No	Date of the bookmark record being created

Comment Table

Table 3.7: Data dictionary for comment table

Attribute	**Data Type**	**Nullable**	**Description**
_id	object id	No	Unique identifier for the comment record
post_id	string	No	The post id of the post that the comment belongs to, referenced to post table
owner	string	No	The owner user id of the comment, referenced to user table
content	string	No	Content of the comment
code_blocks	array	No	An array of code blocks, each element has language which represents the language of the code and value which is code itself
code_is_runnable	bool	No	Indicate whether the code can be run in the comment
votes	integer	No	Number of votes gotten by the comment, upvote will increase it by 1 and downvote will decrease it by 1
reply_count	integer	No	Number of replies on the comment
is_accepted	integer	Yes	Indicate whether the comment is accepted by the owner of the post, 0 or null is not accepted while 1 is accepted by the owner
is_deleted	integer	Yes	Indicate whether the comment is deleted, 0 or null is not deleted while 1 is deleted and will not be returned
updated_at	date	No	Latest date of the comment record being updated
created_at	date	No	Date of the comment record being created

Comment Vote Table

Table 3.8: Data dictionary for comment vote table

Attribute	Data Type	Nullable	Description
_id	object id	No	Unique identifier for the comment vote record
uid	string	No	The voter user id, which can be referenced to user table
comment_id	string	No	The target comment id, referenced to comment table
status	integer	No	Indicate whether it is an upvote or downvote, 1 for upvote, -1 for downvote, and 0 if the user unvote the comment
updated_at	date	No	Latest date of the comment vote record being updated
created_at	date	No	Date of the comment vote record being created

Comment Reply Table

Table 3.9: Data dictionary for comment reply table

Attribute	Data Type	Nullable	Description
_id	object id	No	Unique identifier for the comment reply record
owner	string	No	The owner user id of the reply, referenced to user table
content	string	No	The content of the reply
comment_id	string	No	The comment id of the comment that the reply belongs to, referenced to comment table
is_deleted	bool	Yes	Indicate whether the reply is deleted, 0 or null is not deleted while 1 is deleted and will not be returned
updated_at	date	No	Latest date of the comment reply record being updated
created_at	date	No	Date of the comment reply record being created

Tag Transaction Table

Table 3.10: Data dictionary for tag transaction table

Attribute	**Data Type**	**Nullable**	**Description**
_id	object id	No	Unique identifier for the tag transaction record
name	string	No	Name of the tag
description	string	No	Describe what the transaction is about
is_deleted	integer	Yes	Indicate whether the transaction has been deleted, 0 or null is not while 1 is deleted and will not be returned
updated_at	date	No	Latest date of the tag transaction record being updated
created_at	date	No	Date of the tag transaction record being created

Tag Summary Table

Table 3.11: Data dictionary for tag summary table

Attribute	**Data Type**	**Nullable**	**Description**
_id	object id	No	Unique identifier for the tag summary record
name	string	No	Name of the tag
reactions	string	No	The number of interactions with the tag
updated_at	date	No	Latest date of the tag summary record being updated
created_at	date	No	Date of the tag summary record being created

3.4 Summary

In chapter 3, use case diagram is constructed to describe the system use case for users. Data model diagram is drawn to show the relationship between the data tables. Finally, data dictionaries are done to provide context of all the attributes in the tables.

CHAPTER 4: METHODOLOGIES AND TOOLS

4.1 Methodologies and General Work Procedure

In this project, the methodology used is the traditional SDLC approach which consists of 5 main stages, planning, analysis, design, implementation, and documentation. Figure 4.1 shows an overview of the SDLC stages.

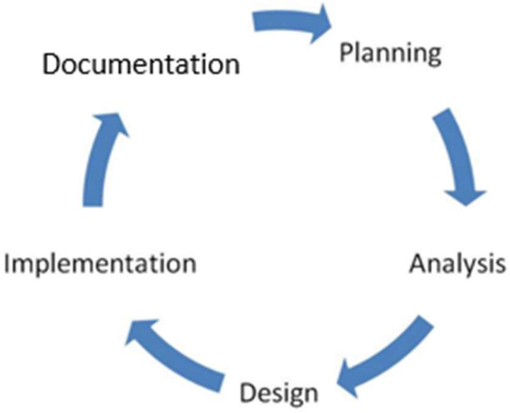


Figure 4.1: Overview of SDLC stages

In the planning stage, project is planned carefully. Project background is explored, and problem statements are formulated. Objectives corresponding to the problem statements are declared. The main purpose of the project is to provide a platform for FICT UTAR students to discuss their problems, because they might encounter many problems during the learning process, especially in this COVID-19 pandemic students learn via online classes.

In the analysis stage, research is carried out by reviewing existing forums to gather business requirements. Strengths and weaknesses of the forums are discovered and evaluated. Requirements are formed using the data gathered from the reviews, so that the strengths of the existing forums such as points accumulation and voting system are implemented, and weaknesses such as low interactivity of the forums are improved or even eliminated in this project.

During the design stage of the project, the system architecture is designed carefully. Pseudo-code and other necessary documentation are produced. The documentation provides a clear view of how the software will work, what is the flow of the software and so on. The layout of the user interface of the forum is drafted and reviewed by others to get feedback.

Improvements are done to the design based on the feedback and the UI design is finalized in this stage.

In the implementation stage, the development of the forum is started. The designs and architectures produced in the previous stage are realized. The front-end of the forum is developed using Reactjs, a JavaScript framework allow the web application to be broken down to reusable components. Moreover, PHP is used to develop the server side of this project. Php is a robust framework that allows fast development, shortening the development period. Finally, the MongoDB is used as the database of this project.

Documentation stage is the last stage of the SDLC. In this stage, the project is documented in the report. The system specification and design of the forum web application are explained in detail and suggestion for further improvement will be provided and discussed.

4.2 System Requirements

4.2.1 Hardware Specifications

Table 4.1: Requirements of Hardware Specifications

Components	**Requirements**
OS	Windows 10
Processor	AMD Ryzen 5 4600HS with Radeon Graphics 3.00 GHz
RAM	16.00 GB
System type	64-bit operating system, x64-based processor

4.2.2 Software Specifications

Table 4.2: Requirements of Software Specifications

Components	**Requirements**
Front-end	Visual Studio Code, React, HTML, CSS, JavaScript, SASS, Axios, AJAX
Back-end	Visual Studio Code, PHP, Postman
Database	MongoDB, MongoDB Compass
Storage	AWS S3

4.3 Verification Plan

The verification plan is served as the guidelines during system testing and implementation.

User Module

- The module shall be able to let users sign up an account.
- The module shall restrict users from sign up using the existing username or email.
- The module shall be able to let users log in using their accounts.
- The module shall be able to return error if the credential of the users is wrong.
- The module shall be able to let users edit their profile.
- The module shall be able to let users change their password.

Post Module

- The module shall be able to let users create a post with or without tags and code blocks.
- The module shall be able to run the code and display it if the code blocks is HTML, CSS and JavaScript.
- The module shall be able to let users view the posts, apply filters to filter the posts.
- The module shall be able to let users edit and delete their posts.
- The module shall be able to let users bookmark the posts.

Comment Module

- The module shall be able to let users create a comment with or without code blocks.
- The module shall be able to run the code and display it if the code blocks is HTML, CSS and JavaScript.
- The module shall be able to let users edit or delete their comments.
- The module shall be able to let owner of a post to accept a comment.

Reply Module

- The module shall be able to let users create a reply on a post or comment.
- The module shall be able to let users edit or delete their replies.

Point Module

- The module shall be able to let users upvote or downvote a post.
- The module shall be able to let users upvote or downvote a comment.
- The module shall be able to allocate points for the users when they get upvote, accept a comment in their post, or when their comment accepted by the owner of the post.
- The module shall be able to deduct points for the users when they get downvote.

Tag Module

- The module shall be able to display popular tags given a range of time.
- The module shall be able to display activity timeline for the tags selected by user.
- The module shall be able to let admin view the tags with the activity count and number of posts created with the tags.

Report Module

- The module shall be able to let users report a post.
- The module shall be able to let admin view the post reports and hide the resolved reports.
- The module shall be able to let admin mark the reports as resolved.
- The module shall be able to let admin resolve the reports by selecting delete post action, and the post should be deleted by the system.

4.4 Verification Result

Table 4.3: Verification result of the modules

Module	**Verification**
User	Working
Post	Working
Comment	Working
Reply	Working
Point	Working
Tag	Working
Report	Working

4.5 Summary

Here marks the end of chapter 4. In this chapter, the methodologies and general work procedure of this project are described, and system requirements are stated. Furthermore, verification plan of the project is drafted for each of the module. Verification result is then written in a table.

CHAPTER 5: IMPLEMENTATION AND TESTING

5.1 System Implementation

In this project, front-end and back-end are connected using RESTful API, because they are developed separately. The figure below shows the RESTful API architecture.

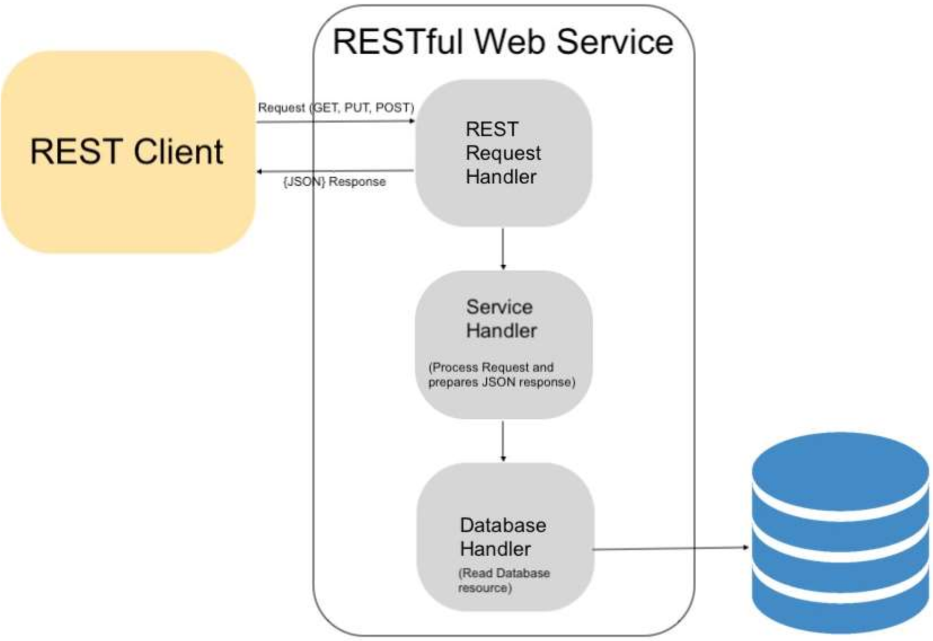
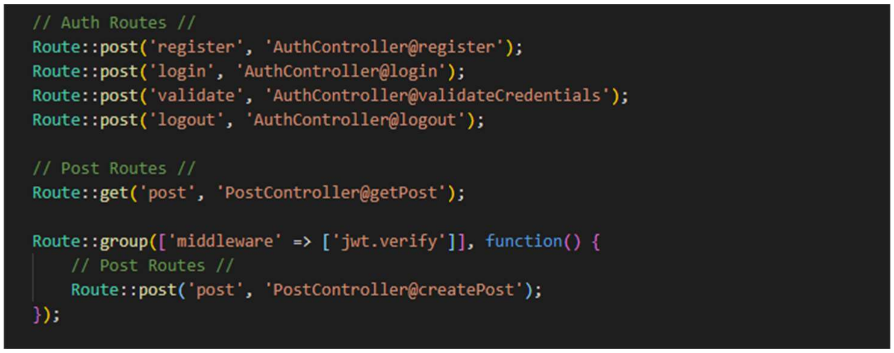


Figure 5.1: RESTful API architecture

The REST client in the figure is the forum web application and the RESTful web service is the back-end of the project. As shown in Figure 5.1, the REST client will send HTTP request to the server to request data from the server, the server will then return HTTP response after processing the request. The back-end differentiate the types of APIs using routes, which map the different APIs to different URLs and method, so that front-end can access to various APIs by sending request to different URLs and method. The code snippet below shows the routing of APIs.

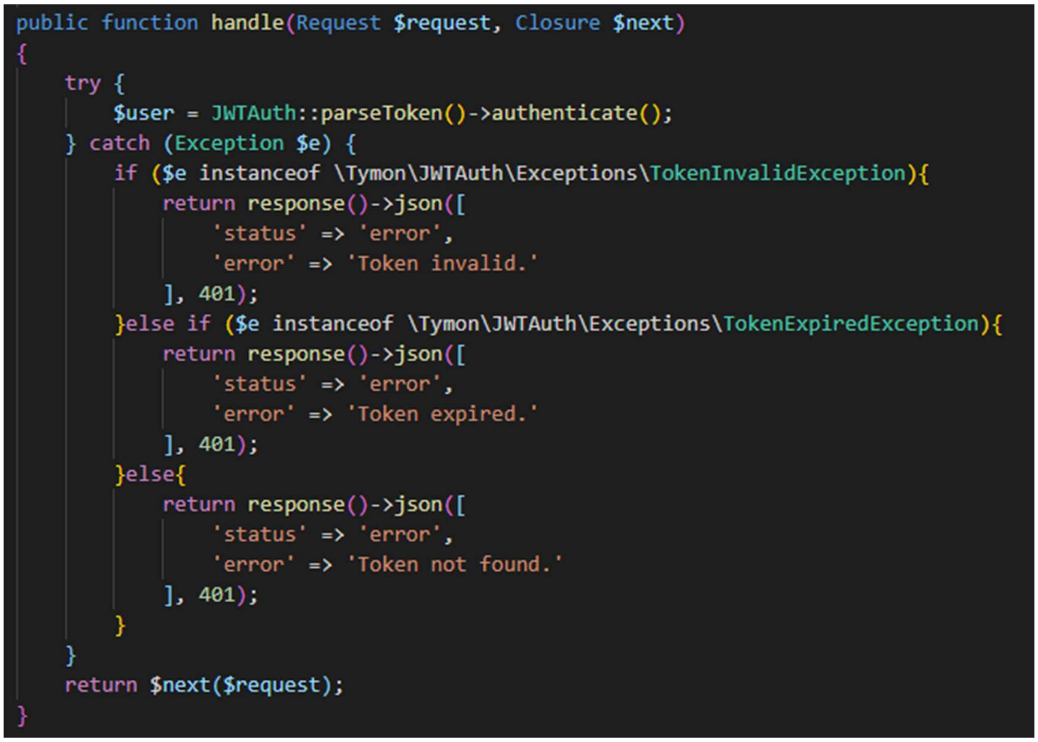


```
// Auth Routes //
Route::post('register', 'AuthController@register');
Route::post('login', 'AuthController@login');
Route::post('validate', 'AuthController@validateCredentials');
Route::post('logout', 'AuthController@logout');

// Post Routes //
Route::get('post', 'PostController@getPost');

Route::group(['middleware' => ['jwt.verify']], function() {
    // Post Routes //
    Route::post('post', 'PostController@createPost');
});
```

Figure 5.2: Routing of APIs

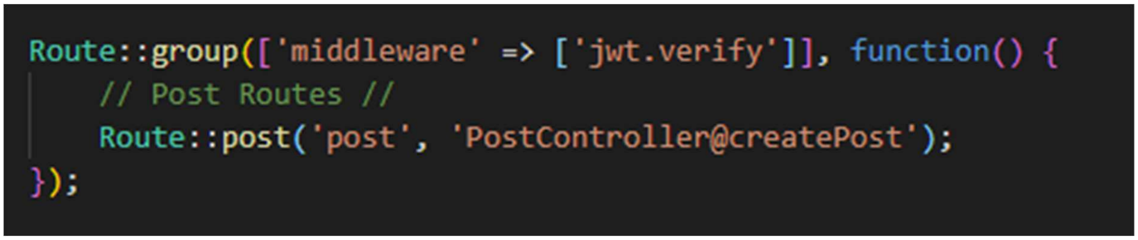
In the code snippet, the API for register is route to "/register" and method is POST, so if a user want to register an account, the request will be sent to "/register" using POST method to access the register API, same goes to other APIs. This routing feature offers a great advantage to RESTful API approach, making it easier and convenient to work with compared to monolithic web application. It is because one controller can have many functions, and in order to allow client side to access them, simply route them to respective URLs and methods will do the trick. Meanwhile in monolithic web application, one controller can only handle GET and POST method, so maximum two function per controller. Although the number of functions can be increased by using IF ELSE statement in the controller, but not only it requires additional parameter to be sent to the server, but also affects the performance of the server due to the IF ELSE statement.

However, authentication via session is not an option because client and web server communicate using HTTP request and response, there will be no way to track session using RESTful API. The authentication in this project is done using JSON Web Token (JWT). JWT acts as a proof of an authorized user, allowing the user to access API that are protected from non-authorized access. The APIs that can only be access by authorized user are protected by middleware. The code snippet of the middleware and protected APIs are shown below.



```php
public function handle(Request $request, Closure $next)
{
    try {
        $user = JWTAuth::parseToken()->authenticate();
    } catch (Exception $e) {
        if ($e instanceof \Tymon\JWTAuth\Exceptions\TokenInvalidException){
            return response()->json([
                'status' => 'error',
                'error' => 'Token invalid.'
            ], 401);
        }else if ($e instanceof \Tymon\JWTAuth\Exceptions\TokenExpiredException){
            return response()->json([
                'status' => 'error',
                'error' => 'Token expired.'
            ], 401);
        }else{
            return response()->json([
                'status' => 'error',
                'error' => 'Token not found.'
            ], 401);
        }
    }
    return $next($request);
}
```

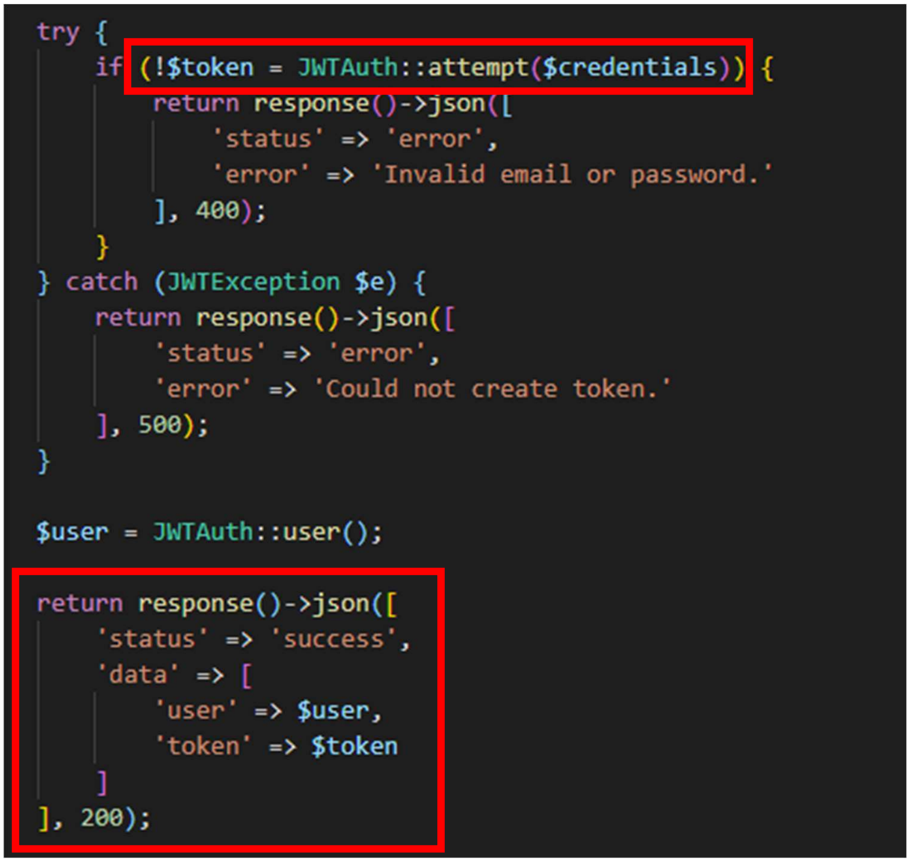
Figure 5.3: JWT middleware



```
Route::group(['middleware' => ['jwt.verify']], function() {
    // Post Routes //
    Route::post('post', 'PostController@createPost');
});
```

Figure 5.4: APIs protected from non-authorized access

In the code snippet, the create post API is protected by the JWT middleware because only authorized user can create post. The middleware will return error if there is any problem regarding the token in the HTTP request, blocking the user from continue accessing the API. When user successfully login to the forum, backend server will generate a token and send it to the user in the HTTP response. The code snippet is shown in the figure below.

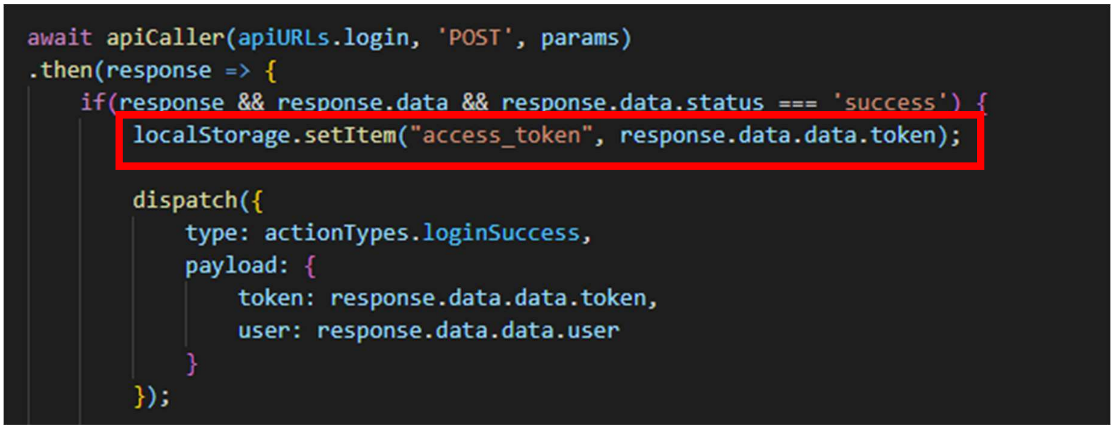


```
try {
    if (!$token = JWTAuth::attempt($credentials)) {
        return response()->json([
            'status' => 'error',
            'error' => 'Invalid email or password.'
        ], 400);
    }
} catch (JWTException $e) {
    return response()->json([
        'status' => 'error',
        'error' => 'Could not create token.'
    ], 500);
}

$user = JWTAuth::user();

return response()->json([
    'status' => 'success',
    'data' => [
        'user' => $user,
        'token' => $token
    ]
], 200);
```

Figure 5.5: Token generation

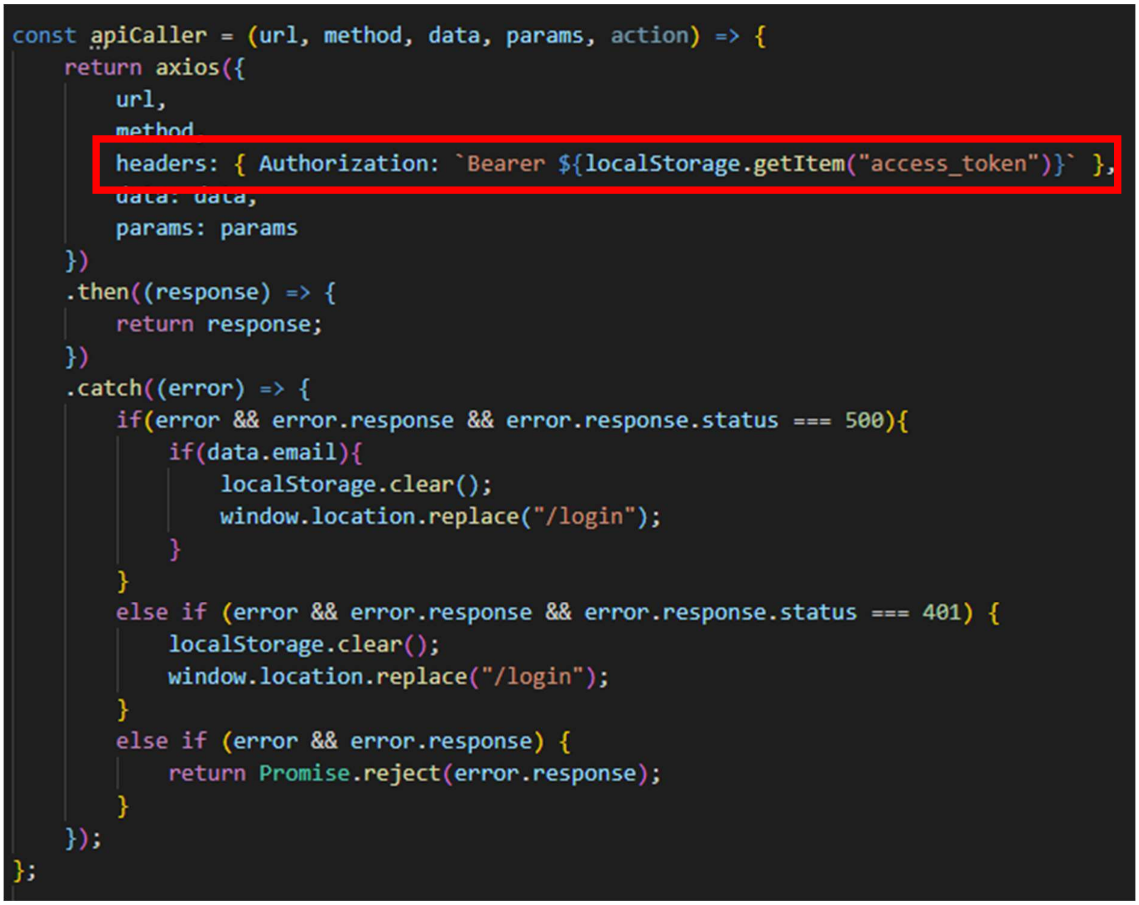
In the code snippet, $credentials is the variable that store the login credentials of the incoming request, which are email and password. The token will be generated using attempt() function if the credentials is correct. After that, the token is returned to the user in the HTTP response.

On the other hand, front-end will store this token in local storage after the response is returned from the server. The token will be included in the header of HTTP requests so that the user can access the APIs that are protected from non-authorized access. The code snippets below show the token being store in local storage and being included in HTTP request.



```
await apiCaller(apiURLs.login, 'POST', params)
.then(response => {
    if(response && response.data && response.data.status === 'success') {
        localStorage.setItem("access_token", response.data.data.token);

        dispatch({
            type: actionTypes.loginSuccess,
            payload: {
                token: response.data.data.token,
                user: response.data.data.user
            }
        });
```

Figure 5.6: Storing token in local storage



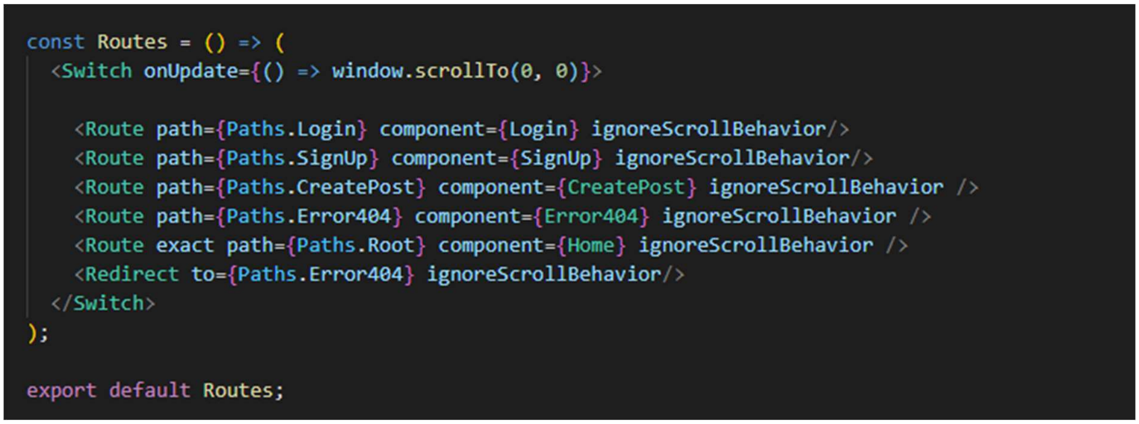
```
const apiCaller = (url, method, data, params, action) => {
    return axios({
        url,
        method,
        headers: { Authorization: `Bearer ${localStorage.getItem("access_token")}` },
        data: data,
        params: params
    })
    .then((response) => {
        return response;
    })
    .catch((error) => {
        if(error && error.response && error.response.status === 500){
            if(data.email){
                localStorage.clear();
                window.location.replace("/login");
            }
        }
        else if (error && error.response && error.response.status === 401) {
            localStorage.clear();
            window.location.replace("/login");
        }
        else if (error && error.response) {
            return Promise.reject(error.response);
        }
    });
};
```

Figure 5.7: Including token in request header

As shown in the code snippets, the token is being stored in local storage using localStorage.setItem() function. When user sends a HTTP request, the token is retrieved using localStorage.getItem() function and included in the request header.

On the other hand, the front-end of this project is developed using Reactjs as mentioned several times in the previous section of the report. Reactjs enable the web application to be developed as a Single Page Application (SPA) due to its ability to break down the web application into components. SPA is a web application that is able to interact with the users by re-rendering parts of current web page instead of loading the entire web page. Hence, the forum web application will not reload during the entire browsing process of user, improving the user experience when using the forum.

However, there will be an issue on how to navigate between different pages of the web application because the web application does not reload. In this project, the navigation between pages is done with the help of react-router-dom. It allows different components to be rendered according to the URLs, which makes the web application "navigate" to different page without reloading the web application. Figure below show the routing of components different to URLs.

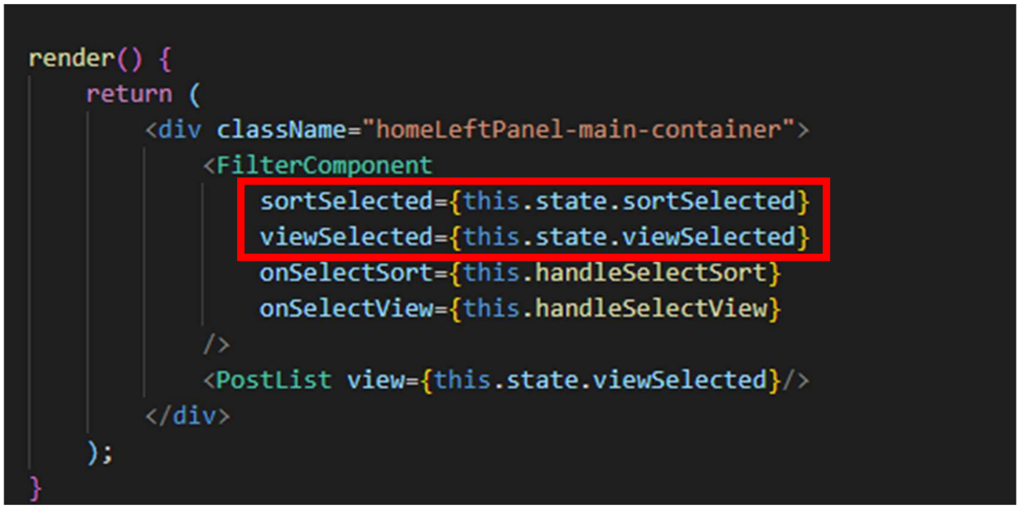


```
const Routes = () => (
  <Switch onUpdate={() => window.scrollTo(0, 0)}>

    <Route path={Paths.Login} component={Login} ignoreScrollBehavior/>
    <Route path={Paths.SignUp} component={SignUp} ignoreScrollBehavior/>
    <Route path={Paths.CreatePost} component={CreatePost} ignoreScrollBehavior />
    <Route path={Paths.Error404} component={Error404} ignoreScrollBehavior />
    <Route exact path={Paths.Root} component={Home} ignoreScrollBehavior />
    <Redirect to={Paths.Error404} ignoreScrollBehavior/>
  </Switch>
);

export default Routes;
```

Figure 5.8: Routing of Reactjs components

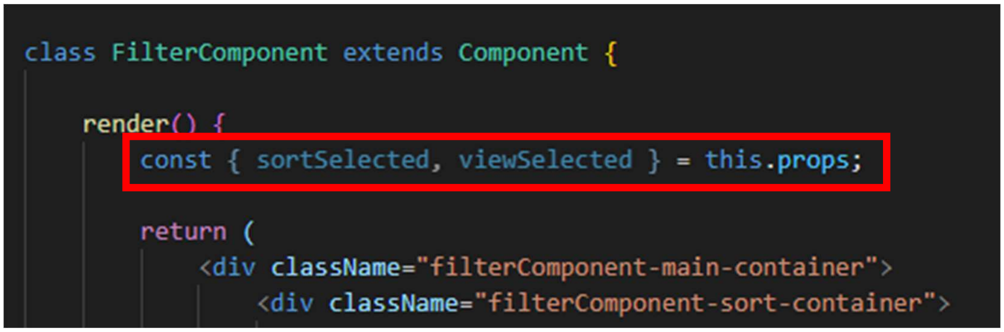
The logic of the routing is similar to switch case, if the URL is matched with the path variable, it will render the component assigned to the route, and the lowest will be default case, which will redirect the user to an error page. All the URLs are store in Paths object as key value pairs, allowing it to be more manageable and easier to understand.

Apart from that, another important element in front-end is the state management of Reactjs. State is an object exists in each Reactjs component. It is similar to variable, which is used to store values, but what makes it different then other variable is that it causes the component to re-render whenever there is changes in the state. Hence, it plays an important role because it helps to control what to render in components, which ultimately impact how the web application will look like. Nonetheless, state management of Reactjs can be very complex as the application become larger. The value of a variable in one component might be needed by other components as a parameter of in their functions or to render different UI base on the value. This can be achieved by passing the value to other components as a prop. The value can be retrieved by other components in the props object which is also available in every Reactjs component. Figures below show some value being passed as props to other components.



```
render() {
    return (
        <div className="homeLeftPanel-main-container">
            <FilterComponent
                sortSelected={this.state.sortSelected}
                viewSelected={this.state.viewSelected}
                onSelectSort={this.handleSelectSort}
                onSelectView={this.handleSelectView}
            />
            <PostList view={this.state.viewSelected}/>
        </div>
    );
}
```

Figure 5.9: Value being passed to another component



```
class FilterComponent extends Component {

    render() {
        const { sortSelected, viewSelected } = this.props;

        return (
            <div className="filterComponent-main-container">
                <div className="filterComponent-sort-container">
```

Figure 5.10: Value being retrieved from props object

As shown in the figure, values such as sortSelected and viewSelected are being passed as props to the FilterComponent. After that, the values are retrieved from the props object in the component. Nevertheless, this method only works when the value is needed by child component because there is no way to pass the value to the sibling or parent components. One of the workarounds is to store the value in parent of the components that need the value, but this method will make the relationship between components become more complex, as some components that might not need the value will also be involved in the value passing process.

Thus, react-redux is used to ease the state management between the components. The react-redux allow the value to be store in a central store like global variable. The figure below shows how react-redux works.

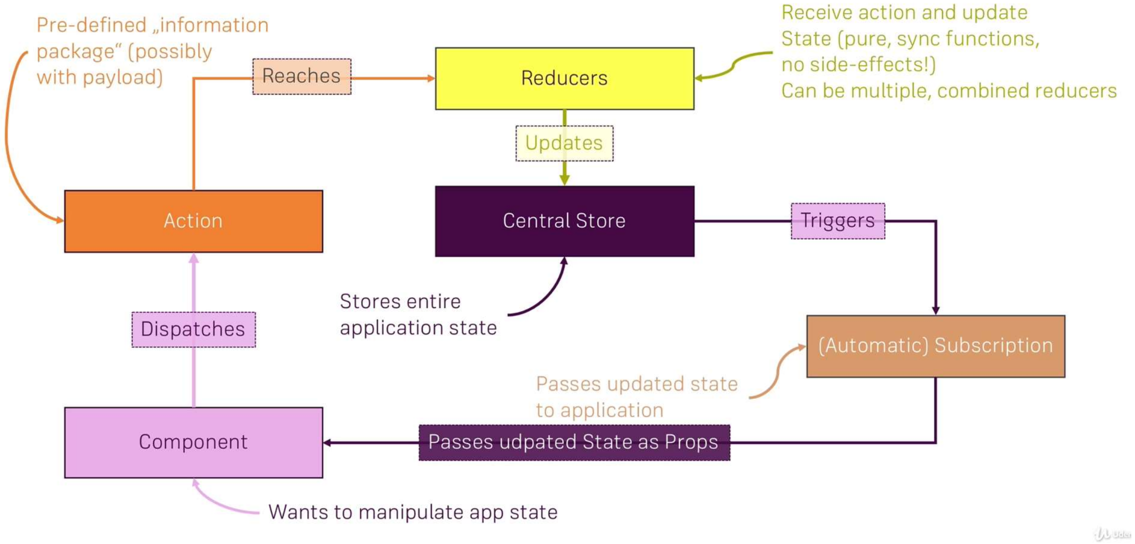
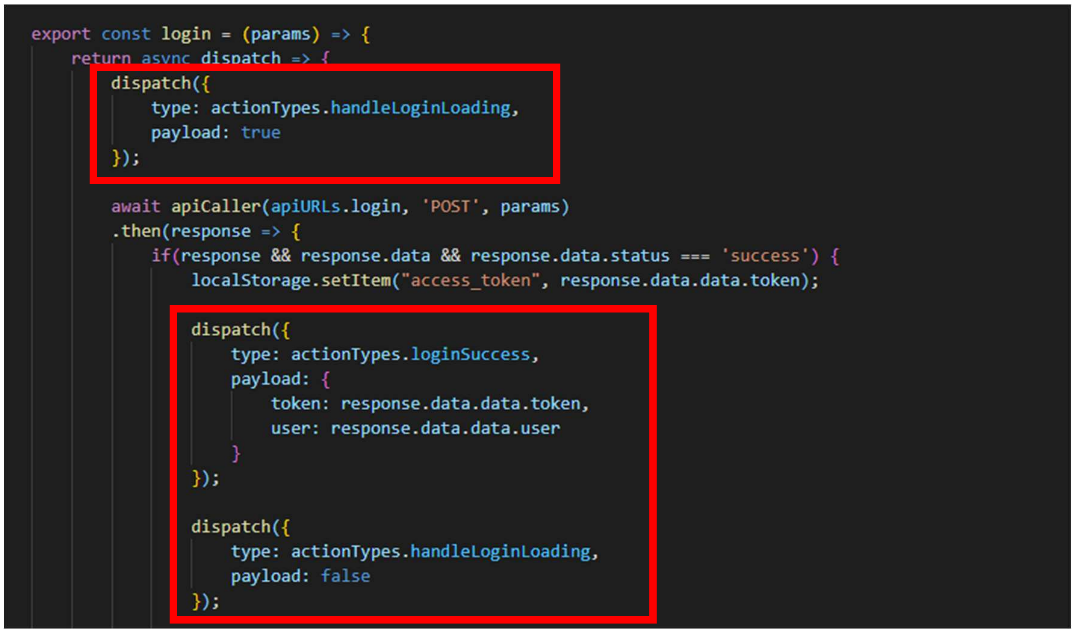

Pre-defined „information package" (possibly with payload)
Reaches
Reducers
Receive action and update State (pure, sync functions, no side-effects!)
Can be multiple, combined reducers
Updates
Action
Central Store
Triggers
Stores entire application state
Dispatches
(Automatic) Subscription
Passes updated state to application
Component
Passes udpated State as Props
Wants to manipulate app state

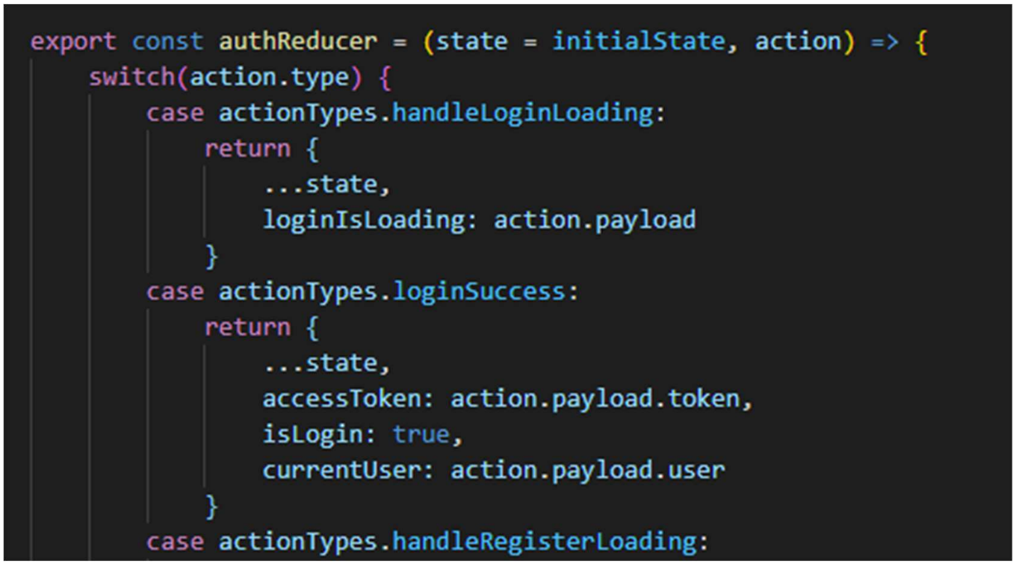
Figure 5.11: Overview of react-redux

As shown in the figure, the application state is stored in the central store. When a component wants to update the state in central store, components need to dispatch an action, which will carry out some actions such as performing calculation or fetching data from server. After that, it will reach to reducer, which is directly connected to central store. Reducer will then update the state with the payload from action. After the update is performed, central store will pass the state as props to the components that subscribe to it. Figures below shows the implementation of react-redux in this project.



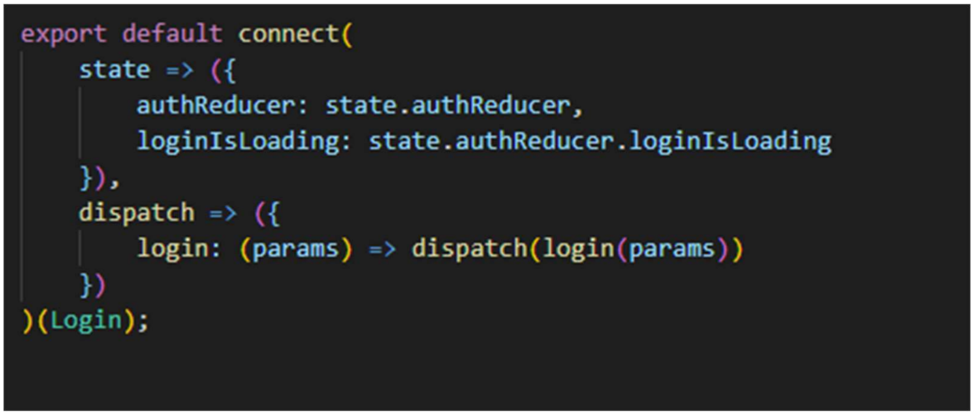
```
export const login = (params) => {
    return async dispatch => {
        dispatch({
            type: actionTypes.handleLoginLoading,
            payload: true
        });

        await apiCaller(apiURLs.login, 'POST', params)
        .then(response => {
            if(response && response.data && response.data.status === 'success') {
                localStorage.setItem("access_token", response.data.data.token);

                dispatch({
                    type: actionTypes.loginSuccess,
                    payload: {
                        token: response.data.data.token,
                        user: response.data.data.user
                    }
                });

                dispatch({
                    type: actionTypes.handleLoginLoading,
                    payload: false
                });
```

Figure 5.12: Actions being dispatched to reducer



```
export const authReducer = (state = initialState, action) => {
    switch(action.type) {
        case actionTypes.handleLoginLoading:
            return {
                ...state,
                loginIsLoading: action.payload
            }
        case actionTypes.loginSuccess:
            return {
                ...state,
                accessToken: action.payload.token,
                isLogin: true,
                currentUser: action.payload.user
            }
        case actionTypes.handleRegisterLoading:
```

Figure 5.13: Reducer updates the central store using the payload from action

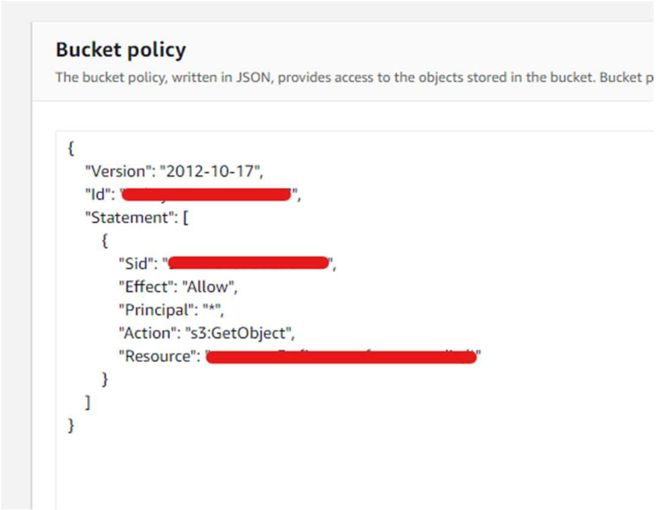


```
export default connect(
    state => ({
        authReducer: state.authReducer,
        loginIsLoading: state.authReducer.loginIsLoading
    }),
    dispatch => ({
        login: (params) => dispatch(login(params))
    })
)(Login);
```

Figure 5.14: Component subscribed to the central store

Code snippets above shows the implementation of react-redux in the login action. After login successfully, the action is dispatched to reducer with the token and user object in the payload. Then, reducer updates the central store using the payload of the action, which are token and user as the user information will be needed by other components. The components that need the value from central store can subscribe to the central store using connect() function.

Besides, in order to add profile images to users in the forum, a storage is needed to store the image files, and AWS S3 is used as the cloud storage for this project. After creating a S3 bucket in AWS, permission of the bucket is set to allow public access and bucket policy shown in figure below.



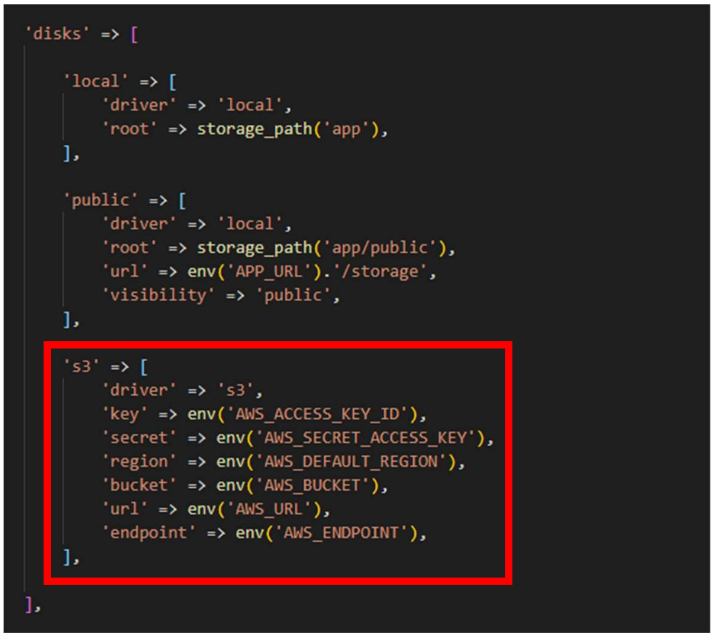
Bucket policy

The bucket policy, written in JSON, provides access to the objects stored in the bucket. Bucket p

```
{
   "Version": "2012-10-17",
   "Id": "[redacted]",
   "Statement": [
      {
         "Sid": "[redacted]",
         "Effect": "Allow",
         "Principal": "*",
         "Action": "s3:GetObject",
         "Resource": "[redacted]"
      }
   ]
}
```

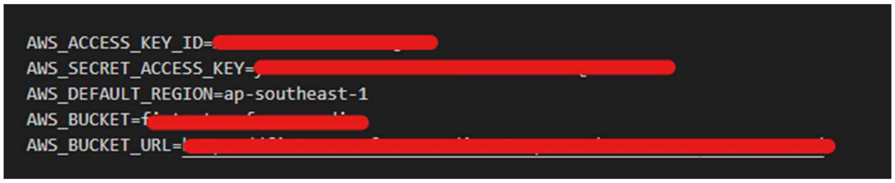
Figure 5.15: S3 bucket policy configuration

The configuration is done to allow the file access from the forum. While for back-end side, there is not much configuration needed to be done because PHP Laravel has setup the configuration for S3 as one of the file storages during the project initialization. Thus, some changes in .env file is the only step to complete the storage setup. Figures below show the storage configuration done by PHP Laravel and the changes made in .env file.



```
'disks' => [

    'local' => [
        'driver' => 'local',
        'root' => storage_path('app'),
    ],

    'public' => [
        'driver' => 'local',
        'root' => storage_path('app/public'),
        'url' => env('APP_URL').'/storage',
        'visibility' => 'public',
    ],

    's3' => [
        'driver' => 's3',
        'key' => env('AWS_ACCESS_KEY_ID'),
        'secret' => env('AWS_SECRET_ACCESS_KEY'),
        'region' => env('AWS_DEFAULT_REGION'),
        'bucket' => env('AWS_BUCKET'),
        'url' => env('AWS_URL'),
        'endpoint' => env('AWS_ENDPOINT'),
    ],

],
```

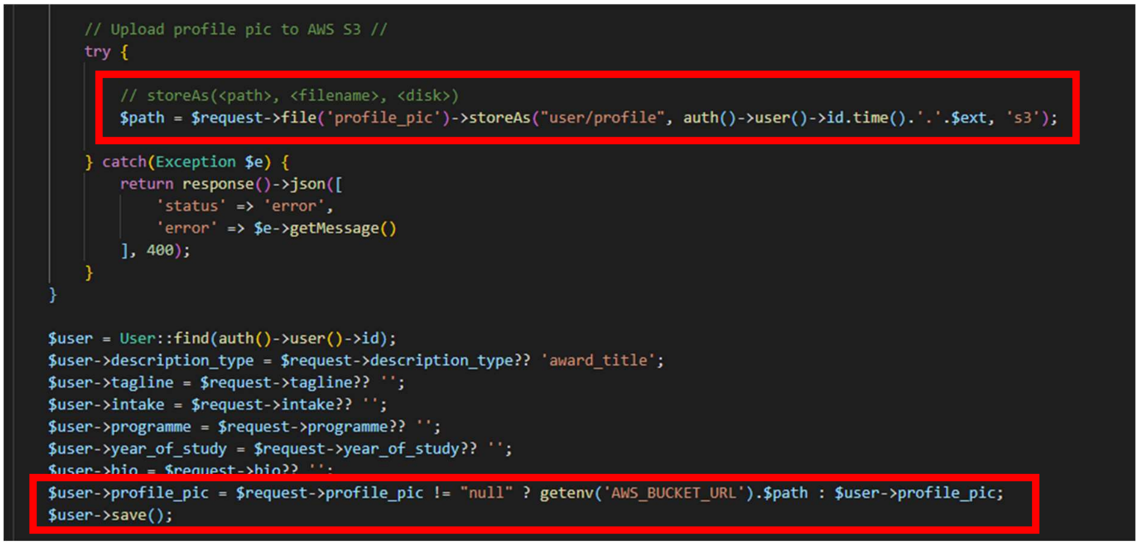
Figure 5.16: Storage configuration done by PHP Laravel



```
AWS_ACCESS_KEY_ID=[redacted]
AWS_SECRET_ACCESS_KEY=[redacted]
AWS_DEFAULT_REGION=ap-southeast-1
AWS_BUCKET=[redacted]
AWS_BUCKET_URL=[redacted]
```

Figure 5.17: Assign appropriate environment variable in .env file

Finally, the controller will be able to upload the image file to the S3 bucket and save the image URL in the user record using the code snippet shown in figure below to complete the upload profile image action.



```
        // Upload profile pic to AWS S3 //
        try {
            // storeAs(<path>, <filename>, <disk>)
            $path = $request->file('profile_pic')->storeAs("user/profile", auth()->user()->id.time().'.'.$ext, 's3');
        } catch(Exception $e) {
            return response()->json([
                'status' => 'error',
                'error' => $e->getMessage()
            ], 400);
        }
    }

    $user = User::find(auth()->user()->id);
    $user->description_type = $request->description_type?? 'award_title';
    $user->tagline = $request->tagline?? '';
    $user->intake = $request->intake?? '';
    $user->programme = $request->programme?? '';
    $user->year_of_study = $request->year_of_study?? '';
    $user->bio = $request->bio?? '';
    $user->profile_pic = $request->profile_pic != "null" ? getenv('AWS_BUCKET_URL').$path : $user->profile_pic;
    $user->save();
```

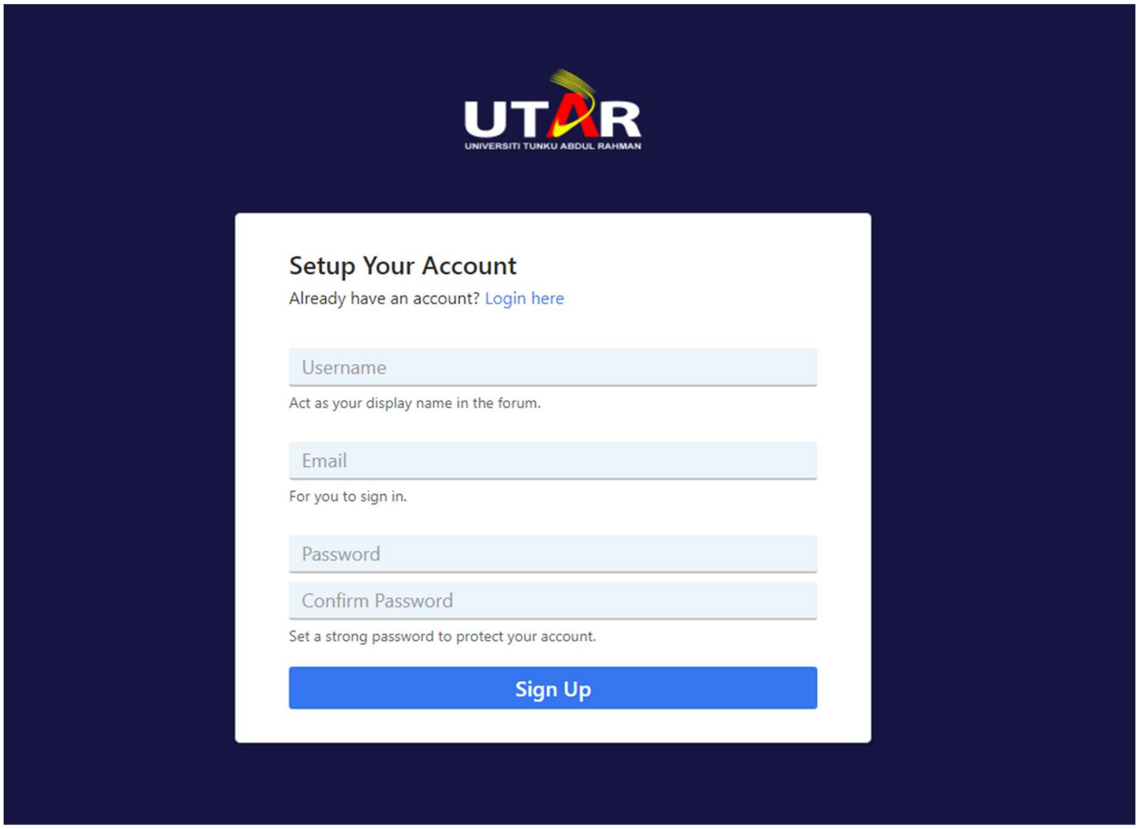
Figure 5.18: Uploading image file to AWS S3

5.2 User Interface of the System

In this section, the user interface of the system will be shown through screenshots with description. This section is divided into two main parts, the user interface of FICT UTAR Forum and the user interface of Admin Backoffice website.

5.2.1 FICT UTAR Forum

First of all, figure below shows the sign-up page of the forum.



Setup Your Account

Already have an account? Login here

Act as your display name in the forum.

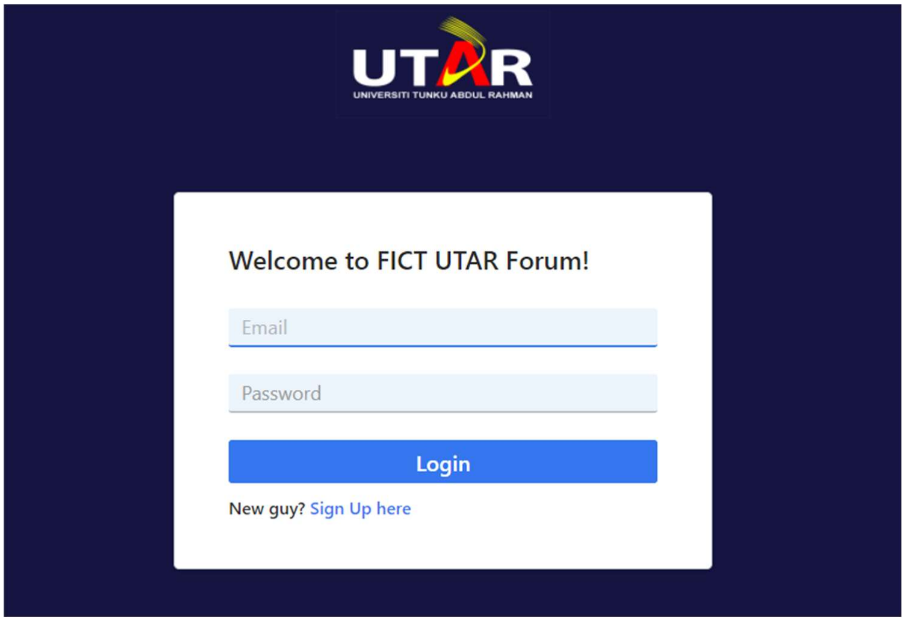
For you to sign in.

Set a strong password to protect your account.

Figure 5.19: Sign up page of FICT UTAR Forum

The sign-up page of the forum has a link located just below the title; it allows the users to navigate to login page if they already have an account. The sign-up page consists of 4 input fields, which are username, email, password and confirm password. There is a brief description for each of the inputs, letting users know what the purpose of them are. All of the input fields are required as they are the most essential information of a user. When the users lose focus of username or email input field, the system will send HTTP request to the server to check if the username or email has been taken, if it is taken, error message will be shown.

Next, the login page consists of only two input fields, which are email and password, the most basic authentication credentials. There is a link below that allows the users to navigate to sign up page if they do not have an account. The login page is shown in figure 5.20.

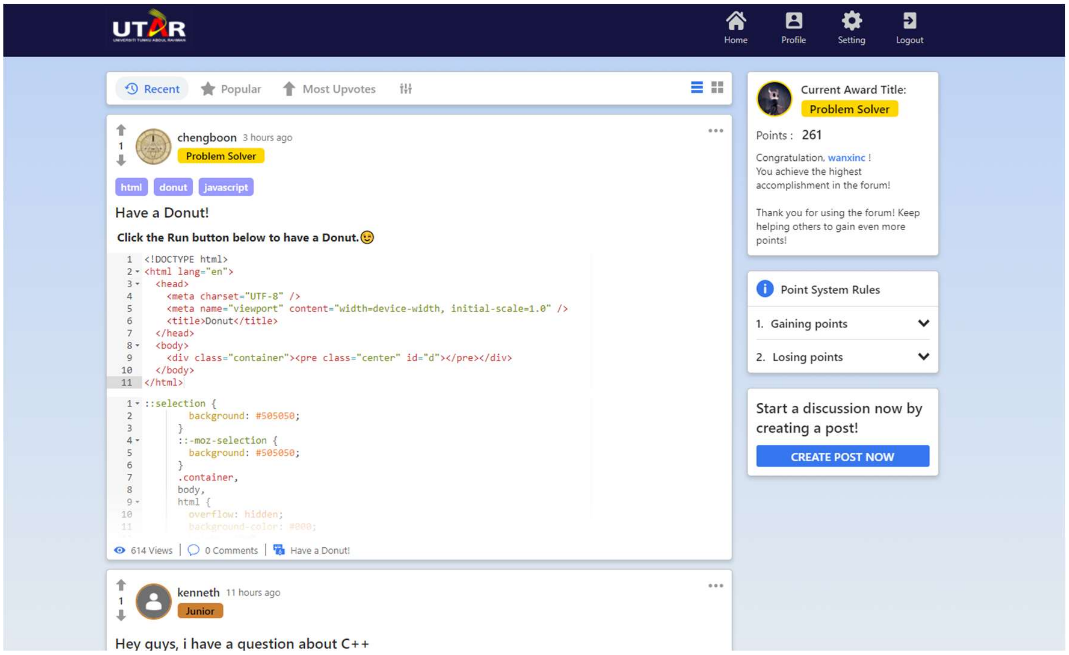


Welcome to FICT UTAR Forum!

New guy? Sign Up here

Figure 5.20: Login page of FICT UTAR Forum

After successfully login to the forum, the user will be redirected to the home page. In the home page, the posts will be requested from the server and shown to the users as default list view. There are two icons that represents list and grid view respectively at the right of the filter panel. Figure 5.21 show the home page of the forum.



chengboon 3 hours ago
Problem Solver
html donut javascript

Have a Donut!

Click the Run button below to have a Donut.😉

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <title>Donut</title>
  </head>
  <body>
    <div class="container"><pre class="center" id="d"></pre></div>
  </body>
</html>
```

```
::selection {
        background: #505050;
      }
      ::-moz-selection {
        background: #505050;
      }
      .container,
      body,
      html {
        overflow: hidden;
        background-color: #000;
```

614 Views | 0 Comments | Have a Donut!

kenneth 11 hours ago
Junior

Hey guys, i have a question about C++

Current Award Title:
Problem Solver

Points : 261

Congratulation, wanxinc !
You achieve the highest accomplishment in the forum!

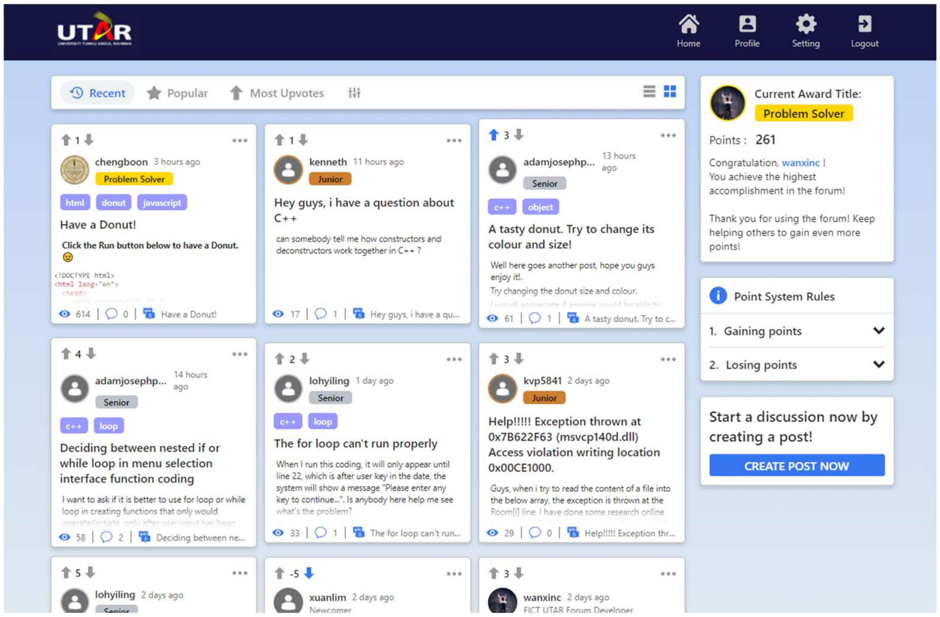
Thank you for using the forum! Keep helping others to gain even more points!

Point System Rules
1. Gaining points
2. Losing points

Start a discussion now by creating a post!
CREATE POST NOW

Figure 5.21: Default list view in home page

Users can click the grid icon in order to switch to grid view, allowing users to view more posts at the same time, but offer fewer information as the posts become smaller. In order to apply filter to the posts, users can open up the filter panel by clicking the icon at the right of sorting buttons. Figure 5.22 and figure 5.23 show the grid view of the posts and the filter options respectively.



1
chengboon 3 hours ago
Problem Solver
html donut javascript
Have a Donut!
Click the Run button below to have a Donut. 😉
```
<!DOCTYPE html>
<html lang="en">
  <head>
```
614 | 0 | Have a Donut!

1
kenneth 11 hours ago
Junior
Hey guys, i have a question about C++
can somebody tell me how constructors and deconstructors work together in C++ ?
17 | 1 | Hey guys, i have a qu...

3
adamjosephp... 13 hours ago
Senior
c++ object
A tasty donut. Try to change its colour and size!
Well here goes another post, hope you guys enjoy it!.
Try changing the donut size and colour.
I would appreciate if anyone would be able to
61 | 1 | A tasty donut. Try to c...

4
adamjosephp... 14 hours ago
Senior
c++ loop
Deciding between nested if or while loop in menu selection interface function coding
I want to ask if it is better to use for loop or while loop in creating functions that only would operate/initiate only after user input has been
58 | 2 | Deciding between ne...

2
lohyiling 1 day ago
Senior
c++ loop
The for loop can't run properly
When I run this coding, it will only appear until line 22, which is after user key in the date, the system will show a message "Please enter any key to continue...". Is anybody here help me see what's the problem?
33 | 1 | The for loop can't run...

3
kvp5841 2 days ago
Junior
Help!!!!! Exception thrown at 0x7B622F63 (msvcp140d.dll) Access violation writing location 0x00CE1000.
Guys, when i try to read the content of a file into the below array, the exception is thrown at the Room[i] line. I have done some research online
29 | 0 | Help!!!!! Exception thr...

5
lohyiling 2 days ago
Senior

-5
xuanlim 2 days ago
Newcomer

3
wanxinc 2 days ago
FICT UTAR Forum Developer

Current Award Title:
Problem Solver

Points : 261

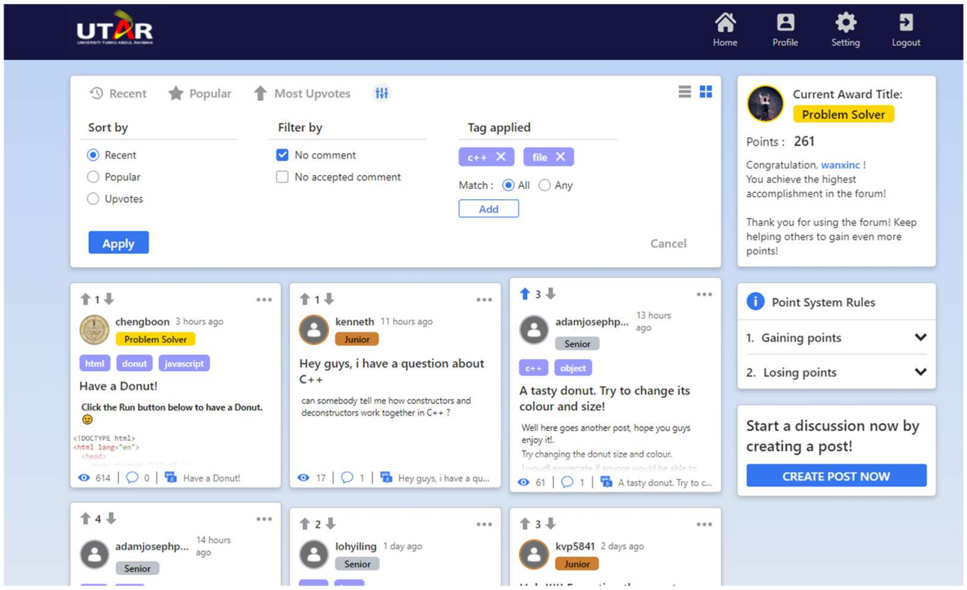
Congratulation, wanxinc !
You achieve the highest accomplishment in the forum!

Thank you for using the forum! Keep helping others to gain even more points!

Point System Rules
1. Gaining points
2. Losing points

Start a discussion now by creating a post!
CREATE POST NOW

Figure 5.22: Grid view in home page



UTAR

Home Profile Setting Logout

Recent Popular Most Upvotes

Sort by
- ● Recent
- ○ Popular
- ○ Upvotes

Filter by
- ☑ No comment
- □ No accepted comment

Tag applied

c++ ✕ file ✕

Match : ● All ○ Any

Add

Apply Cancel

Current Award Title: Problem Solver

Points : 261

Congratulation, wanxinc ! You achieve the highest accomplishment in the forum!

Thank you for using the forum! Keep helping others to gain even more points!

1 chengboon 3 hours ago Problem Solver

html donut javascript

Have a Donut!

Click the Run button below to have a Donut. 😛

```
<!DOCTYPE html>
<html lang="en">
  <head>
```

614 | 0 | Have a Donut!

1 kenneth 11 hours ago Junior

Hey guys, i have a question about C++

can somebody tell me how constructors and deconstructors work together in C++ ?

17 | 1 | Hey guys, i have a qu...

3 adamjosephp... 13 hours ago Senior

c++ object

A tasty donut. Try to change its colour and size!

Well here goes another post, hope you guys enjoy it!.

Try changing the donut size and colour.

61 | 1 | A tasty donut. Try to c...

Point System Rules
1. Gaining points
2. Losing points

Start a discussion now by creating a post!

CREATE POST NOW

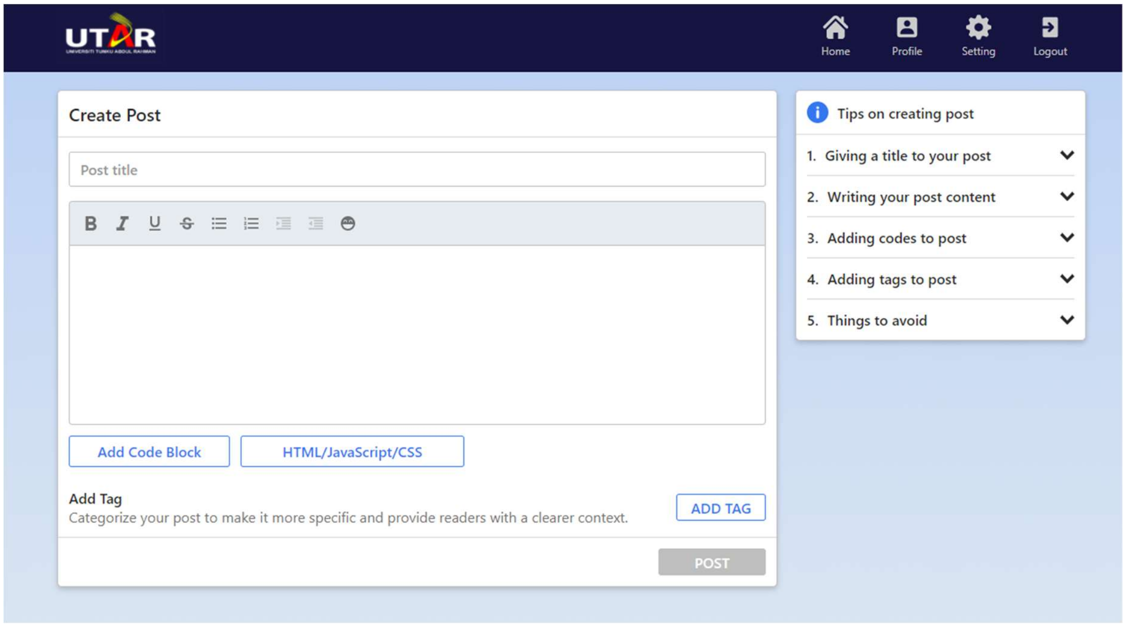
4 adamjosephp... 14 hours ago Senior

2 lohyiling 1 day ago Senior

3 kvp5841 2 days ago Junior

Figure 5.23: Filter options available for post filter

Users can create their post to start a discussion by clicking the create post now button at the right of home page to navigate to create post page. In the create post page, there are post title field, content editor, add code block button, HTML/JavaScript/CSS button, and add tag button. Figure 5.24 shows the create post page of the forum.



UTAR

Home Profile Setting Logout

Create Post

Post title

B I U S

Add Code Block HTML/JavaScript/CSS

Add Tag

Categorize your post to make it more specific and provide readers with a clearer context.

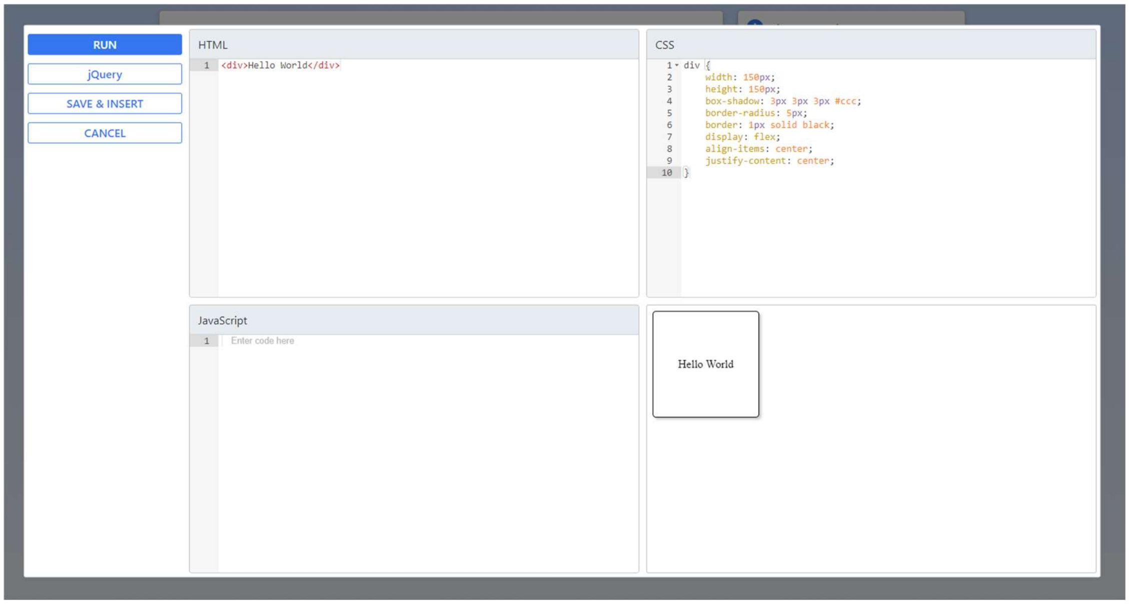
ADD TAG

POST

Tips on creating post
1. Giving a title to your post
2. Writing your post content
3. Adding codes to post
4. Adding tags to post
5. Things to avoid

Figure 5.24: Create post page of FICT UTAR Forum

If the HTML/JavaScript/CSS button is clicked, a modal with 3 code editors will be shown. In this modal, the code written into the editor can be run by clicking on the run button. User can click on the save & insert button to insert the code into their post. The code inserted in this manner can be run after the post has been created. Figure 5.25 show the HTML, JavaScript and CSS modal editor modal.

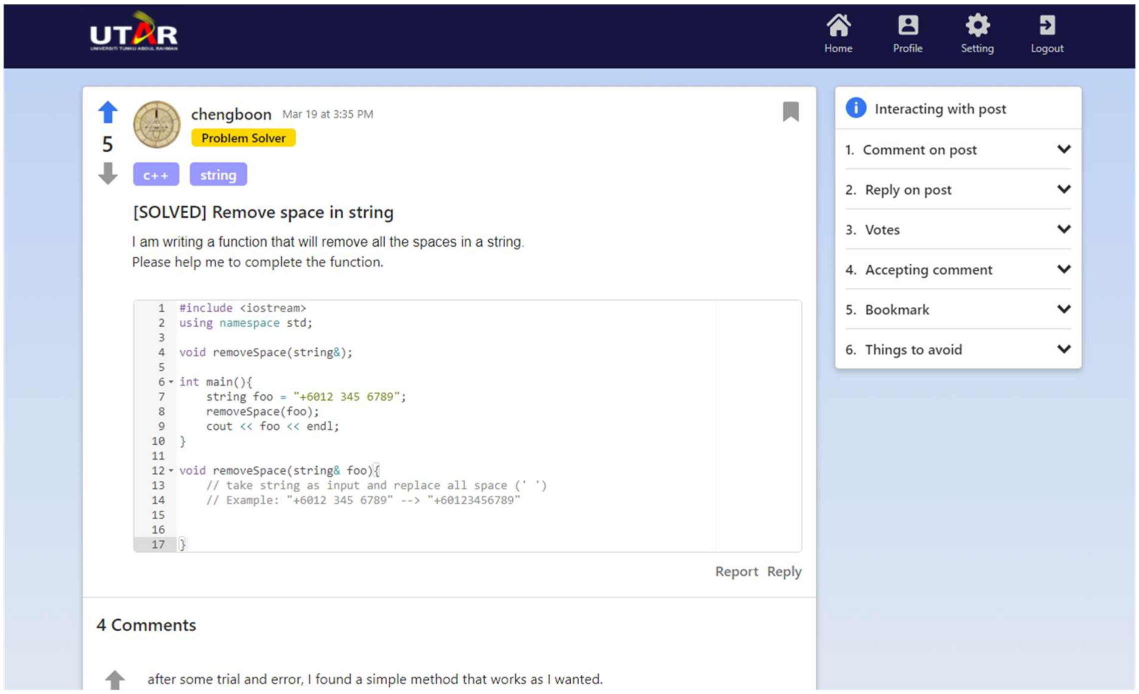


```html
<div>Hello World</div>
```

```css
div {
    width: 150px;
    height: 150px;
    box-shadow: 3px 3px 3px #ccc;
    border-radius: 5px;
    border: 1px solid black;
    display: flex;
    align-items: center;
    justify-content: center;
}
```

Figure 5.25: HTML, JavaScript and CSS modal of FICT UTAR Forum

Next, users can interact with a post by clicking on a post in the home page to navigate to the post page. In the post page, users can perform various interaction such as commenting on the post, reply on the post, vote the post, accepting comment if the user is owner of the post and bookmark the post. Figure 5.26 shows an example of a post in post page.



chengboon Mar 19 at 3:35 PM

[SOLVED] Remove space in string

I am writing a function that will remove all the spaces in a string.
Please help me to complete the function.

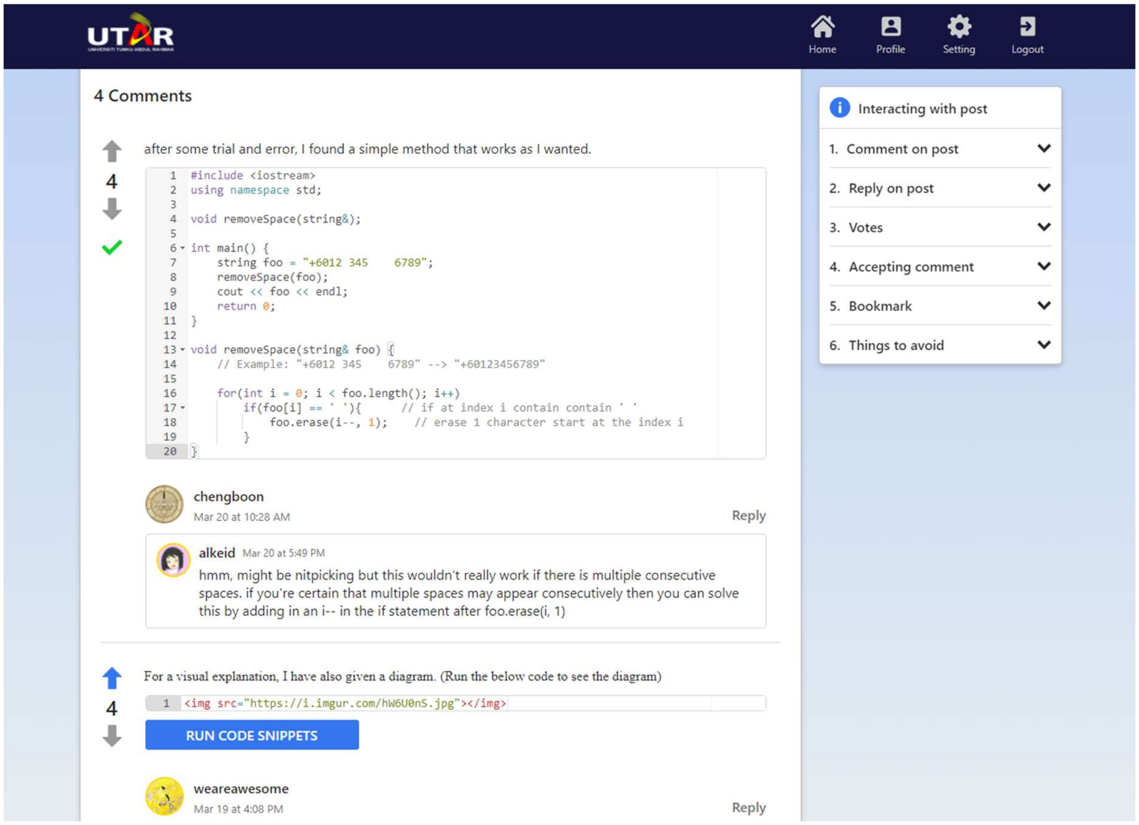
```
#include <iostream>
using namespace std;

void removeSpace(string&);

int main(){
    string foo = "+6012 345 6789";
    removeSpace(foo);
    cout << foo << endl;
}

void removeSpace(string& foo){
    // take string as input and replace all space (' ')
    // Example: "+6012 345 6789" --> "+60123456789"


}
```

4 Comments

after some trial and error, I found a simple method that works as I wanted.

Figure 5.26: A post example in post page

List of comments and replies will be shown below the post content. Finally, a comment editor is located under the comment section, allowing user to comment on the post. Figure 5.27 shows the comment section of the post in Figure 5.26 which includes an accepted comment pinned at the top of comment section and a reply on it, and Figure 5.28 shows the comment editor of the post.



4 Comments

after some trial and error, I found a simple method that works as I wanted.

```
#include <iostream>
using namespace std;

void removeSpace(string&);

int main() {
    string foo = "+6012 345    6789";
    removeSpace(foo);
    cout << foo << endl;
    return 0;
}

void removeSpace(string& foo) {
    // Example: "+6012 345    6789" --> "+60123456789"

    for(int i = 0; i < foo.length(); i++)
        if(foo[i] == ' '){      // if at index i contain contain ' '
            foo.erase(i--, 1);    // erase 1 character start at the index i
        }
}
```

chengboon
Mar 20 at 10:28 AM

alkeid Mar 20 at 5:49 PM
hmm, might be nitpicking but this wouldn't really work if there is multiple consecutive spaces. if you're certain that multiple spaces may appear consecutively then you can solve this by adding in an i-- in the if statement after foo.erase(i, 1)

For a visual explanation, I have also given a diagram. (Run the below code to see the diagram)

```
<img src="https://i.imgur.com/hW6U0nS.jpg"></img>
```

weareawesome
Mar 19 at 4:08 PM

Interacting with post
1. Comment on post
2. Reply on post
3. Votes
4. Accepting comment
5. Bookmark
6. Things to avoid

Figure 5.27: Comment section of a post with accepted comment and reply

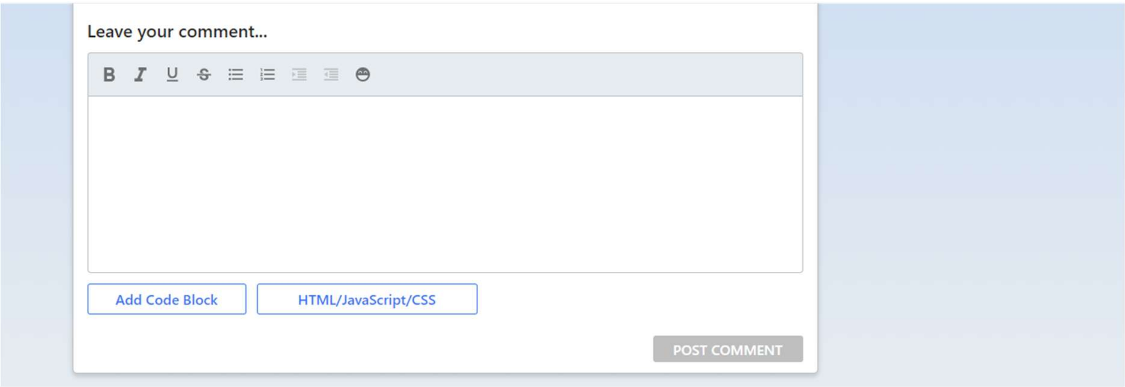
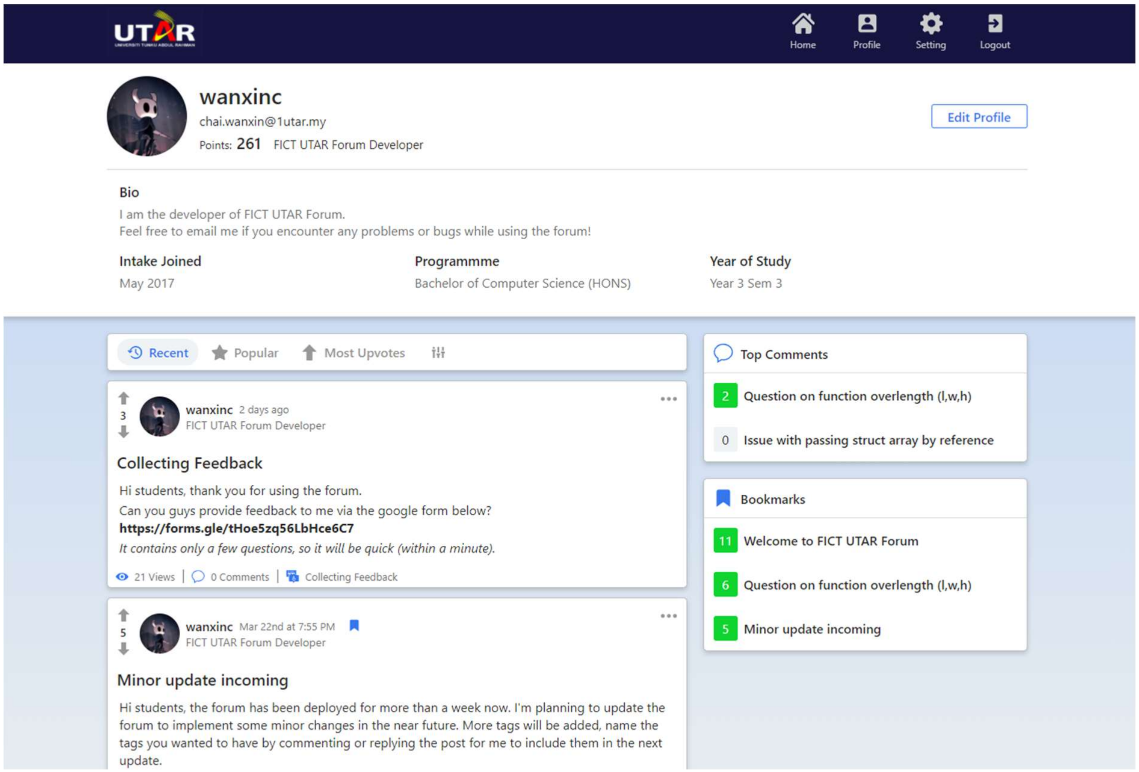

Leave your comment...

Figure 5.28: Comment editor in post page

If users want to view their profile, they can click on the profile button at the top navigation bar to navigate to profile page. The profile page will display the basic information that is set by the users themselves, top comments created by the users, bookmarks of the users, and the post created by the users. Figure 5.29 shows the profile page of the forum.



wanxinc
chai.wanxin@1utar.my
Points: 261 FICT UTAR Forum Developer

Bio
I am the developer of FICT UTAR Forum.
Feel free to email me if you encounter any problems or bugs while using the forum!

Intake Joined	Programmme	Year of Study
May 2017	Bachelor of Computer Science (HONS)	Year 3 Sem 3

3
wanxinc 2 days ago
FICT UTAR Forum Developer

Collecting Feedback

Hi students, thank you for using the forum.
Can you guys provide feedback to me via the google form below?
https://forms.gle/tHoe5zq56LbHce6C7
It contains only a few questions, so it will be quick (within a minute).

21 Views | 0 Comments | Collecting Feedback

5
wanxinc Mar 22nd at 7:55 PM
FICT UTAR Forum Developer

Minor update incoming

Hi students, the forum has been deployed for more than a week now. I'm planning to update the forum to implement some minor changes in the near future. More tags will be added, name the tags you wanted to have by commenting or replying the post for me to include them in the next update.

Top Comments

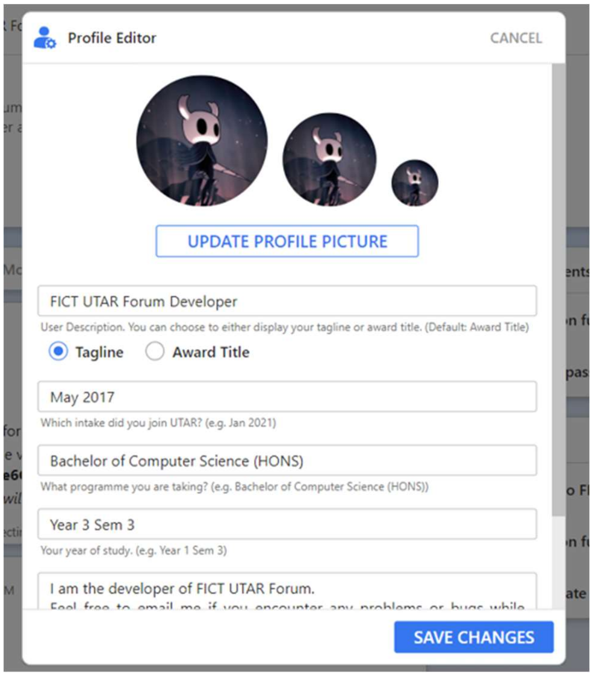
2	Question on function overlength (l,w,h)
0	Issue with passing struct array by reference

Bookmarks

11	Welcome to FICT UTAR Forum
6	Question on function overlength (l,w,h)
5	Minor update incoming

Figure 5.29: Profile page of FICT UTAR Forum

Users can click on the edit profile button located at the right of the profile page to open a profile editor modal to start editing their profile. In the profile editor, users can update their profile picture, update their user description, intake, programme, year of study, and bio. A save changes button is located at the footer of the modal for users to save the changes after they are done with the editing. Figure 5.30 shows the profile editor in the forum.



FICT UTAR Forum Developer

User Description. You can choose to either display your tagline or award title. (Default: Award Title)

● Tagline ○ Award Title

May 2017

Which intake did you join UTAR? (e.g. Jan 2021)

Bachelor of Computer Science (HONS)

What programme you are taking? (e.g. Bachelor of Computer Science (HONS))

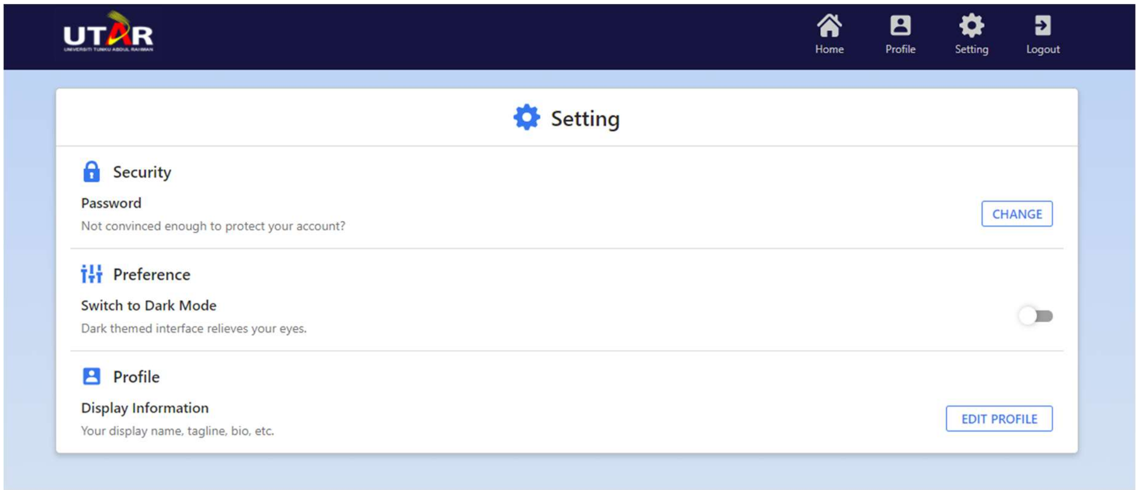
Year 3 Sem 3

Your year of study. (e.g. Year 1 Sem 3)

I am the developer of FICT UTAR Forum.
Feel free to email me if you encounter any problems or bugs while

Figure 5.30: Profile editor in FICT UTAR Forum

The last page of the forum is the setting page. Users can navigate to the setting page by clicking on the setting button in top navigation bar. In the setting page, the users are able to change their password, switch to dark mode or edit their profile. Figure 5.31 shows the setting page of the forum and Figure 5.32 shows the home page of the forum once dark mode has been turned on.



Security

Password

Not convinced enough to protect your account?

Preference

Switch to Dark Mode

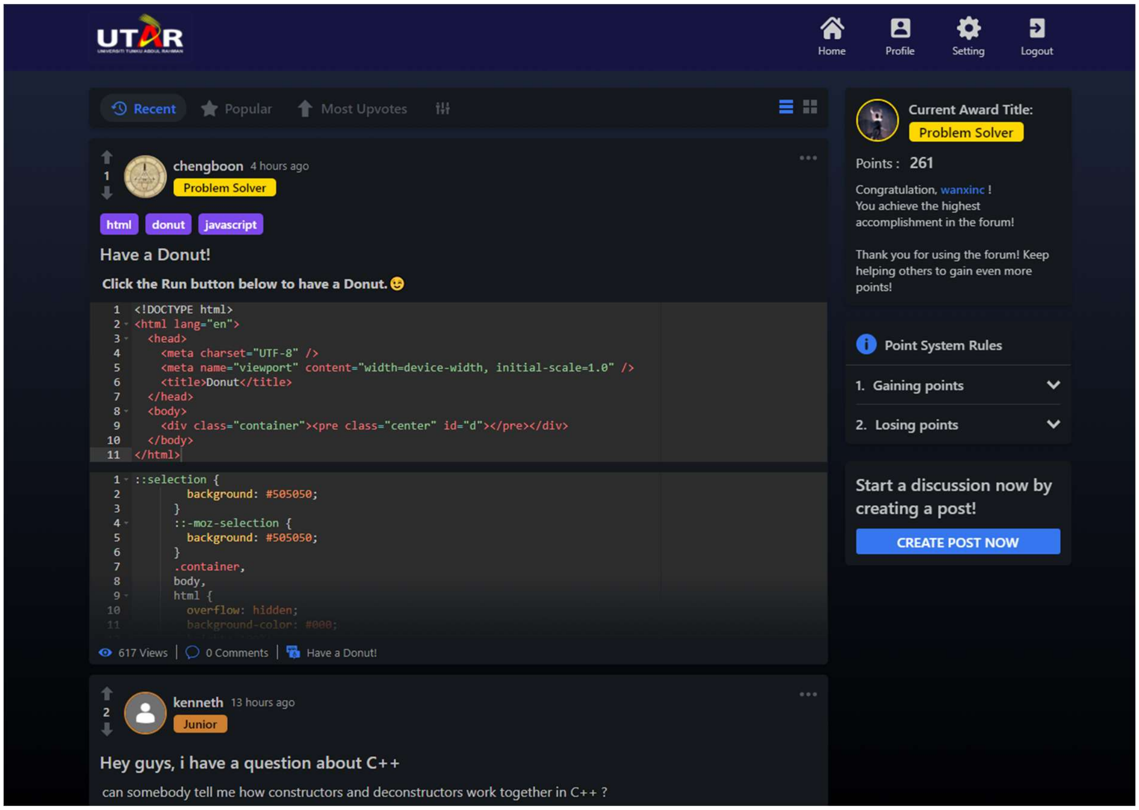
Dark themed interface relieves your eyes.

Profile

Display Information

Your display name, tagline, bio, etc.

Figure 5.31: Setting page of FICT UTAR Forum



chengboon 4 hours ago

Problem Solver

html donut javascript

Have a Donut!

Click the Run button below to have a Donut.😉

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <title>Donut</title>
  </head>
  <body>
    <div class="container"><pre class="center" id="d"></pre></div>
  </body>
</html>
```

```
::selection {
        background: #505050;
      }
      ::-moz-selection {
        background: #505050;
      }
      .container,
      body,
      html {
        overflow: hidden;
        background-color: #000;
```

617 Views | 0 Comments | Have a Donut!

kenneth 13 hours ago

Junior

Hey guys, i have a question about C++

can somebody tell me how constructors and deconstructors work together in C++ ?

Current Award Title: Problem Solver

Points : 261

Congratulation, wanxinc !
You achieve the highest accomplishment in the forum!

Thank you for using the forum! Keep helping others to gain even more points!

Point System Rules

1. Gaining points

2. Losing points

Start a discussion now by creating a post!

Figure 5.32: Dark themed home page

5.2.2 Admin Backoffice Website

The first page of Admin Backoffice website is the dashboard page. The dashboard page will display various data from the forum such as number of posts created, post solved rate, user registration number and activity in the forum. Other than that, an area chart showing the growth of user over time will be displayed as well, with the tag activities in the forum being displayed in a pie chart beside it. Figure 5.33 shows the dashboard page of Admin Backoffice.

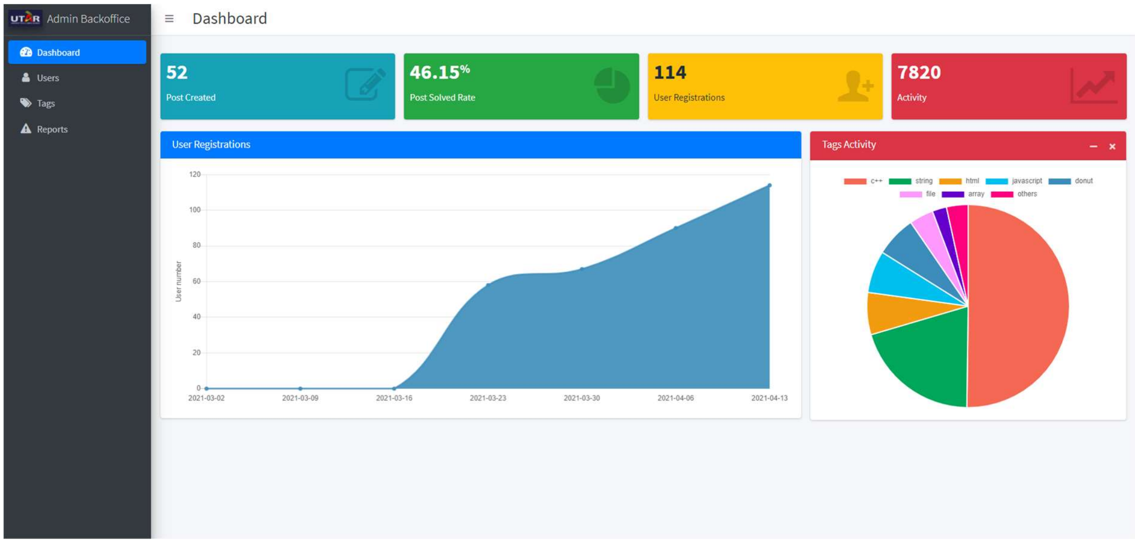
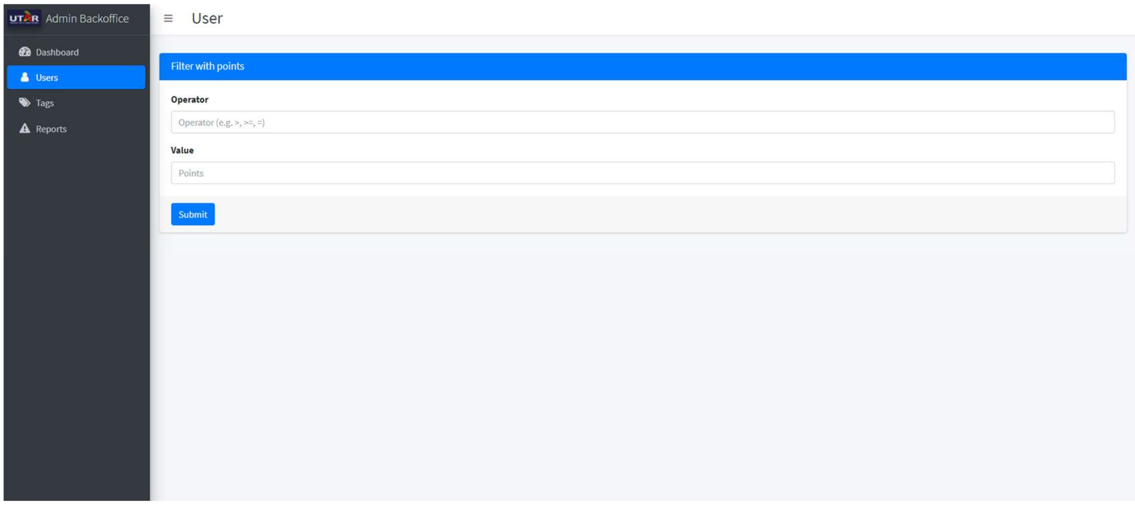


Figure 5.33: Dashboard page of Admin Backoffice

Next, the user page of the Admin Backoffice contains only two input field and a button only. Admin can enter the operator and value in order to start getting the users based on the value entered. After the user data has been returned, the data will be displayed in a table with pagination. Admin can navigate to different page of the user table using the page number, next, and previous button below the table. Figure 5.34 and Figure 5.35 shows the user page of Admin Backoffice and the user list displayed in a table after the fetching process.

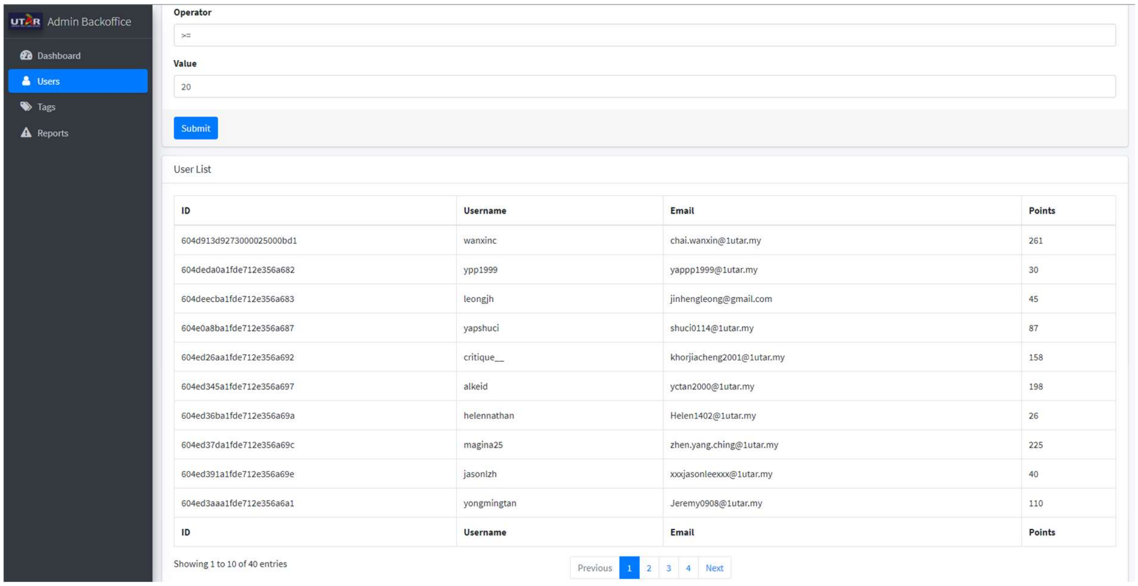


Filter with points

Operator: Operator (e.g. >, >=, =)

Value: Points

Figure 5.34: User page of Admin Backoffice



Operator: >=

Value: 20

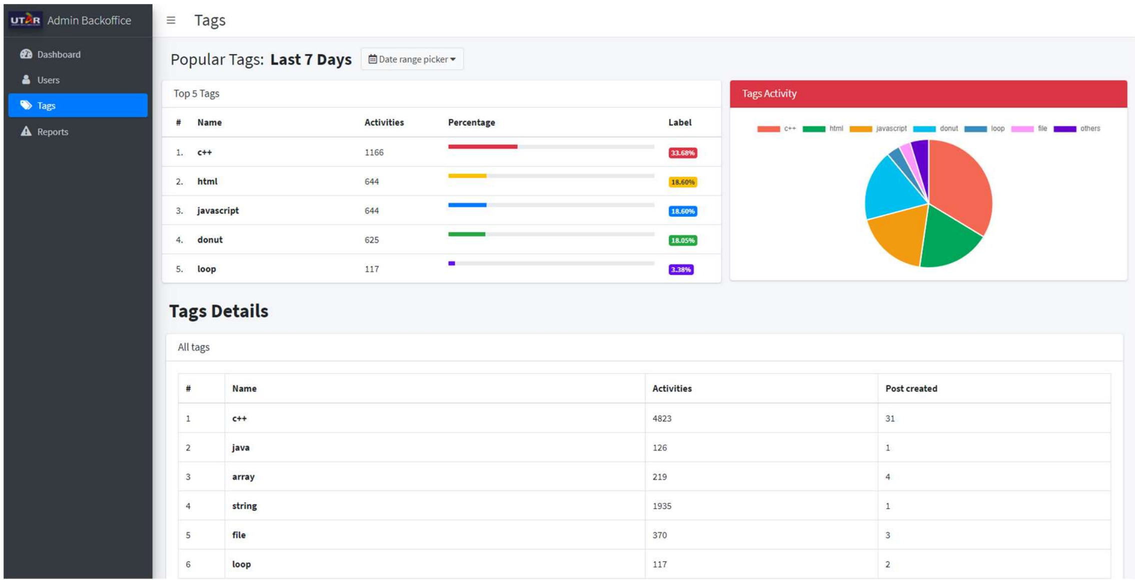
User List

ID	Username	Email	Points
604d913d9273000025000bd1	wanxinc	chai.wanxin@1utar.my	261
604deda0a1fde712e356a682	ypp1999	yappp1999@1utar.my	30
604deecba1fde712e356a683	leongjh	jinhengleong@gmail.com	45
604e0a8ba1fde712e356a687	yapshuci	shuci0114@1utar.my	87
604ed26aa1fde712e356a692	critique__	khorjiacheng2001@1utar.my	158
604ed345a1fde712e356a697	alkeid	yctan2000@1utar.my	198
604ed36ba1fde712e356a69a	helennathan	Helen1402@1utar.my	26
604ed37da1fde712e356a69c	magina25	zhen.yang.ching@1utar.my	225
604ed391a1fde712e356a69e	jasonlzh	xxxjasonleexxx@1utar.my	40
604ed3aaa1fde712e356a6a1	yongmingtan	Jeremy0908@1utar.my	110
ID	Username	Email	Points

Showing 1 to 10 of 40 entries

Figure 5.35: User list displayed in a table with pagination

In the tag page of Admin Backoffice, admin can view the popular tags within a date range. Admin can change the date range using the date range picker located at the top of the page. Then the top 5 tags and tags activity within the date range selected will be fetched and displayed in a table and pie chart. Figure 5.36 shows the tag page of Admin Backoffice with last 7 days date range selected.



Popular Tags: **Last 7 Days**

Top 5 Tags

#	Name	Activities	Percentage	Label
1.	c++	1166		33.68%
2.	html	644		18.60%
3.	javascript	644		18.60%
4.	donut	625		18.05%
5.	loop	117		3.38%

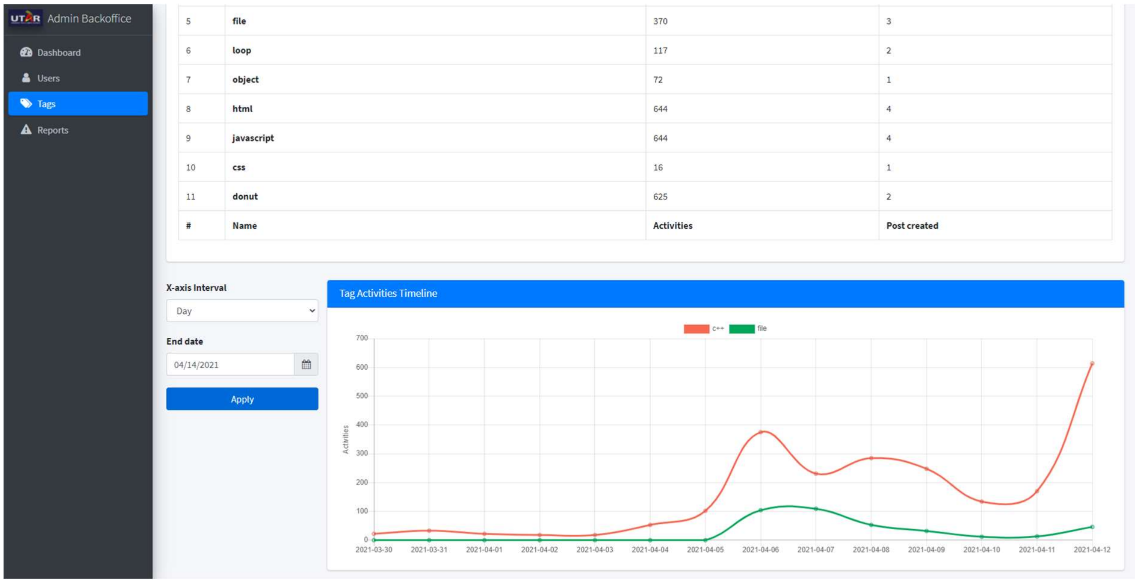
Tags Details

All tags

#	Name	Activities	Post created
1	c++	4823	31
2	java	126	1
3	array	219	4
4	string	1935	1
5	file	370	3
6	loop	117	2

Figure 5.36: Tag page of Admin Backoffice

Furthermore, admin can view the tags details in all tags table when scrolling down the tag page. Admin can click on the tags' name in the table to display the tag activities timeline of the selected tags in a chart below the table. There are two options at the left of the chart which are X-axis interval and end date. The X-axis interval option enable admin to change the timeline interval to day, week, or month, while the end date will be the last value of the x-axis. Figure 5.37 shows the tag activities timeline with the C++ and file tag selected.



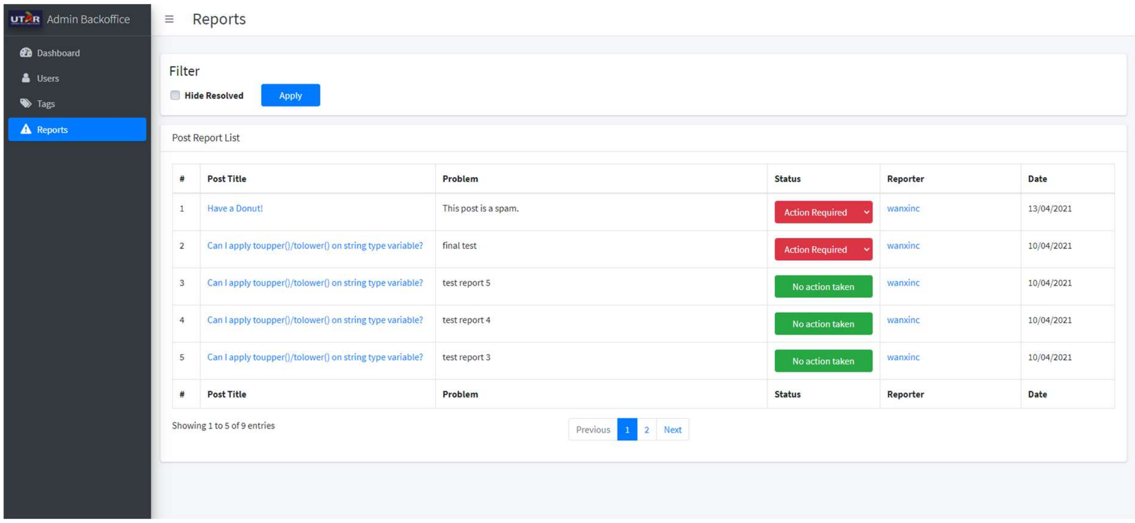
#	Name	Activities	Post created
5	file	370	3
6	loop	117	2
7	object	72	1
8	html	644	4
9	javascript	644	4
10	css	16	1
11	donut	625	2
#	Name	Activities	Post created

X-axis Interval: Day

End date: 04/14/2021

Figure 5.37: Tag activities timeline in tag page

The final page of the Admin Backoffice is the report page. In the report page, admin can view the post reported by other users in the forum. The reports will be displayed in a table which contains the post title, problem, status, reporter, and the date of report column. Admin can navigate to the post to check out the problem by clicking on the post title. After that, admin can resolve the reports by clicking on the action required drop down, which will then show two options: mark as resolved and delete post. Mark as resolved action will simply mark the report as resolved without taking any action, while delete post action will delete the post and mark the report as resolved. Figure 5.38 shows the report page of the Admin Backoffice.



Post Report List

#	Post Title	Problem	Status	Reporter	Date
1	Have a Donut!	This post is a spam.	Action Required	wanxinc	13/04/2021
2	Can I apply toupper()/tolower() on string type variable?	final test	Action Required	wanxinc	10/04/2021
3	Can I apply toupper()/tolower() on string type variable?	test report 5	No action taken	wanxinc	10/04/2021
4	Can I apply toupper()/tolower() on string type variable?	test report 4	No action taken	wanxinc	10/04/2021
5	Can I apply toupper()/tolower() on string type variable?	test report 3	No action taken	wanxinc	10/04/2021
#	Post Title	Problem	Status	Reporter	Date

Showing 1 to 5 of 9 entries

Figure 5.38: Report page of Admin Backoffice

Furthermore, admin will be able to hide the resolved report by checking the checkbox located at the top of the page and click on the apply button.

5.3 Summary

This chapter shows the system implementation and user interface of the project. The system implementation is explained in detail with the screenshots of code snippets provided. User interface for FICT UTAR Forum and Admin Backoffice Website has been shown through screenshots with descriptions.

CHAPTER 6: CONCLUSION

6.1 Project Review, Discussion and Conclusion

This project aims to develop an interactive forum for FICT UTAR students to improve their learning experience and solve their problems encountered during learning process especially in this COVID-19 pandemic, where the classes are conducted via online. The students not only extend their learning process outside of the classes by engaging in discussion in the forum, but also practice their critical thinking and communication skills which can be very useful after they graduate.

Apart from helping students as mentioned above, the forum also helps to reduce workload of lecturers as students can solve their problems via discussion in the forum. Moreover, the data gathered from the forum also helps the lecturers and staffs in FICT UTAR to better understand the problems of the students. This would certainly help a lot especially during online learning, because they often need to conduct survey get feedback from the students to ensure every student is doing well.

The development of this project can be completed and being deployed on AWS EC2. After the deployment of the project, the forum is introduced to the students of FICT UTAR. Students are able to discuss about their issues in their assignments and sharing knowledge among themselves throughout the project deployment period.

6.2 Novelties and Contributions

This project has contributed to various benefits to the students by allowing them to continue learning outside of the class. Students can be more precise when it comes to describing their problems by making use of the code editor available in the forum. Students' critical thinking skills and communication skills can also be improved through the discussion in the forum. This can lead to overall improvement in students' academic performance in FICT UTAR.

Furthermore, this project can help to reduce the work of lecturers by allowing the students to solve their problems via discussion in the forum. Moreover, with the data gathered by the forum, staffs of FICT UTAR also can provide effective academic assistance to the students. This can reduce great amount of workload of the FICT staff by saving the time conduct the survey and analyzing the data.

6.3 Future Work

Just like any other applications, this project is not perfect by any means. There are some flaws and limitation which can be improved. For example, notification feature can be added in the forum to notify users when other users replying their post or comments. This feature can speed up the discussion by allowing user to react quicker due to the notification that they received.

Furthermore, responsive styling can be applied to the forum to enable responsive view. This allows user to browse the forum easily using mobile devices by avoiding the unnecessary resizing, scrolling, and zooming. Thus, users will be able to access the forum wherever they want.

Another improvement that can be added is announcement function in admin website. This allows admin to post announcement using the admin website and the announcement will be pinned as the first post sot that every user get to see it.

Apart from that, student information such as intake, programme, year of study can be formatted for better statistics in admin website. This information can be used to analyze the group of students that are helping others the most, the group that are struggling the most and so on.

Last but not least, course code label can be added to posts to help the students find the posts related to their course more easily. Post solved ratio for each label can then be added to admin website to visualize how students are doing in each course. Immediate action can be taken if the post solved ratio is getting too low, which means students are having problems and they are not able to solve them.

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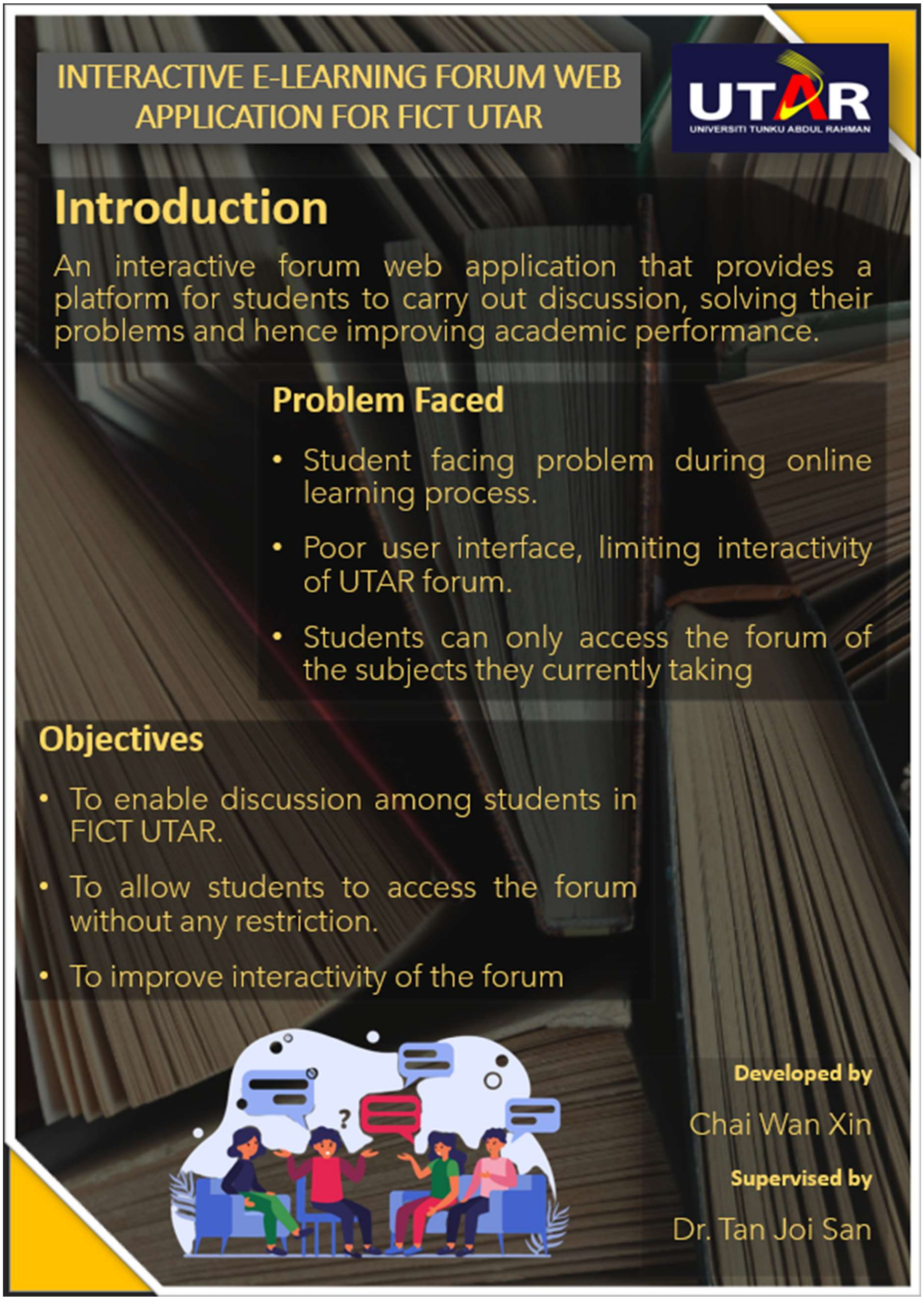
POSTER



INTERACTIVE E-LEARNING FORUM WEB APPLICATION FOR FICT UTAR

UTAR
UNIVERSITI TUNKU ABDUL RAHMAN

Introduction

An interactive forum web application that provides a platform for students to carry out discussion, solving their problems and hence improving academic performance.

Problem Faced

- Student facing problem during online learning process.
- Poor user interface, limiting interactivity of UTAR forum.
- Students can only access the forum of the subjects they currently taking

Objectives

- To enable discussion among students in FICT UTAR.
- To allow students to access the forum without any restriction.
- To improve interactivity of the forum

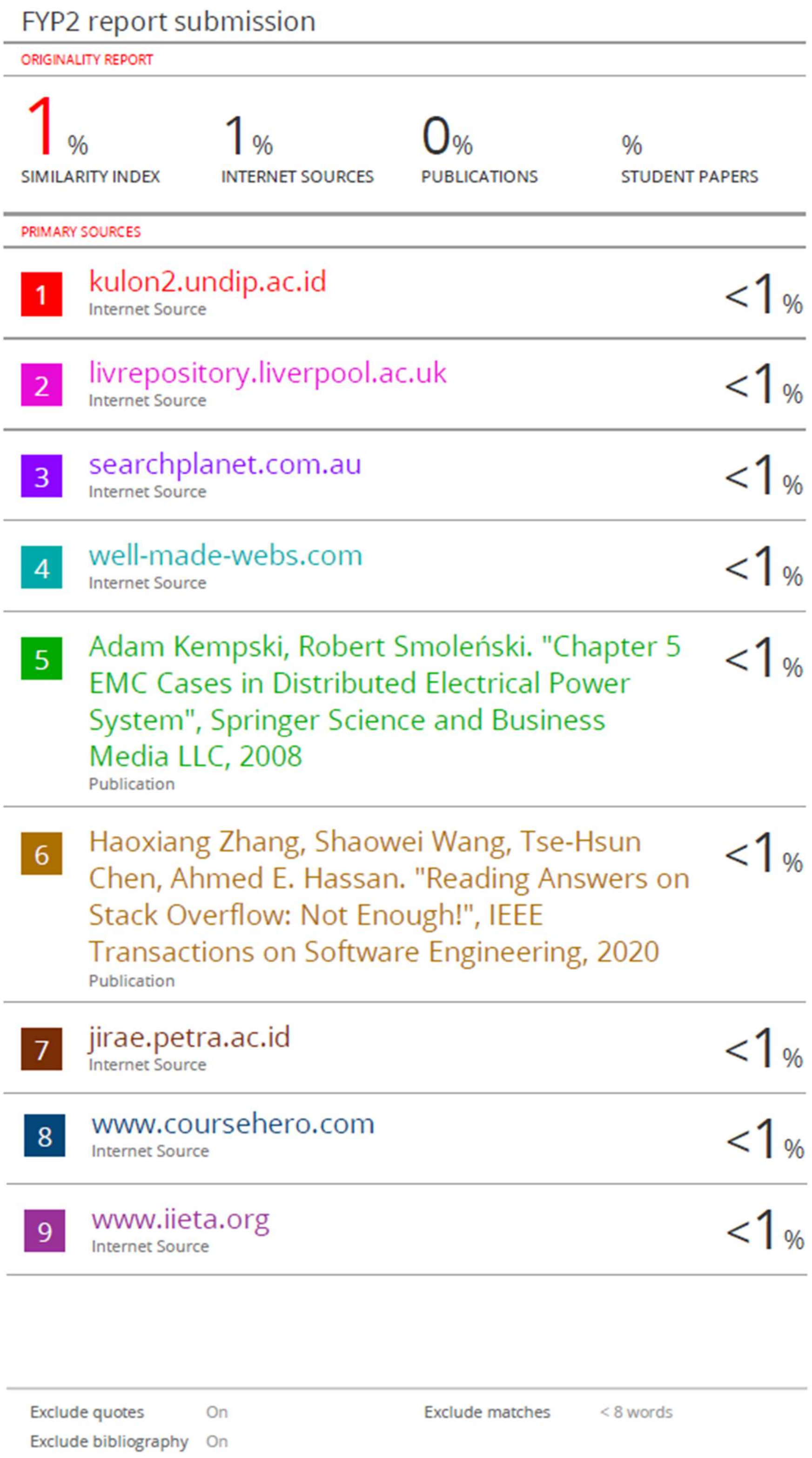
Developed by

Chai Wan Xin

Supervised by

Dr. Tan Joi San

PLAGIARISM CHECK RESULT



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Signature of Supervisor	Signature of Co-Supervisor
Name: Tan Joi San	Name: ______________________
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