ASHESI UNIVERSITY COLLEGE

QUESTION AND ANSWER SITE FOR ASHESI COMMUNITY

APPLIED PROJECT

B.Sc. Management Information Systems

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2017

ASHESI UNIVERSITY COLLEGE

Creating a Social Questions and Answer Site for the Ashesi Community to Promote Education in Social Interaction

APPLIED PROJECT

Applied Project submitted to the Department of Computer Science, Ashesi University College in partial fulfilment of the requirements for the award of Bachelor of Science degree in Management Information Systems

Rejoice Hormeku

April 2017

DECLARATION

I hereby declare that this Applied Project is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature:

……

Candidate's Name:

……

Date:

……

I hereby declare that preparation and presentation of this Applied Project were supervised in accordance with the guidelines on supervision of Applied Project laid down by Ashesi University College.

Supervisor's Signature:

……

Supervisor's Name:

……

Date: ……

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Abstract

The need for communication in the world has become increasingly daunting and so has the technology to enhance it. The primary reason for communication has been pegged largely to demand for factual data. This project's sole aim is to redirect the boundless information in education available both in human minds and on the internet into a single space, available for queries, implementation and further discourse. The project is the development of a Question and Answer site tailored specifically to the needs of Ashesi Students. It utilizes a web bot capable of submitting queries to search engines and retrieving information from configured websites as a supplement to posted answers.

The project further discusses the benefits of a site as this, "an electronic mediated learning forum" to the Ashesi Community, both in terms of student development and knowledge transfer.

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CHAPTER 1: Introduction

1.1 Introduction

The need for communication in the world has become increasingly daunting and so has the technology to enhance it. The primary reason for communication has been pegged largely to demand for factual data. Needless to say, information overload is a major feature of this age which has also birthed the need for sieving information for the facts hidden in the rifts.

In academia especially, one will notice the burden of information overload where numerous search engines, chat fora, websites etc. are constantly throwing myriad of information from all topics across all borders at students. Sieving information is a responsibility the student as well as the teacher must diligently partake in. To ease the burden on students, and researchers at large, several technologies have been developed.

Before was the Internet Relay Chat (IRC). This facilitates real time communication in the form of text. It is very similar to text messaging, but designed around communicating with large groups of users ("Internet Relay Chat Help", 2017). This was tedious because the chat process works on a client-server networking model which meant IRC clients had to be installed on a system before the user could utilize them. The movement was made to web based interaction which gave rise to chat forums. Usually on forums like AnandTech Forum, 4chan, XDA-developers etc. one encounters the issue of "too much fat around the beef" where the few right answers to a question are clustered by unwanted information ("How are Q & A sites different than forums and what are the pros and cons of each", 2017).

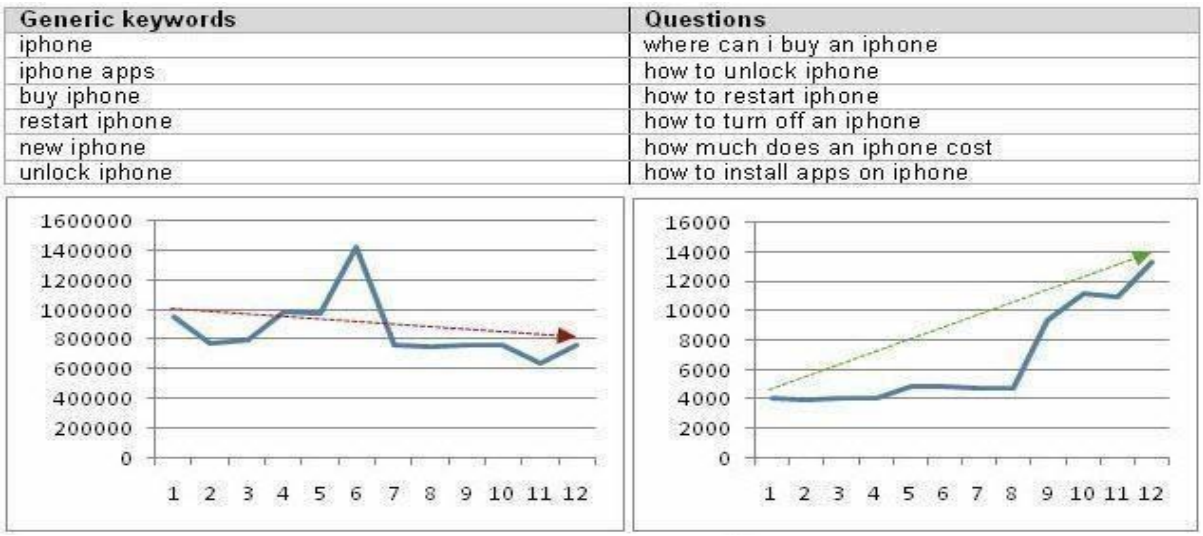
The launch of the StackExchange in 2010 introduced a whole new world of concise, precise and useful information. The StackExchange describes itself as "a network of 150+ Q&A

communities including Stack Overflow, the preeminent site for programmers to find, ask, and answer questions about software development" ("About - Stack Exchange", 2017).

Questions and Answer, hereafter known as Q&A forums are a virtual space where people are licensed to ask specific questions and expect replies from anyone in the world (Debjit, 2014). With Google as a worldwide answering machine, one may argue in favor of simply making queries to receive replies because joining a community translates as more stress for the user in terms of privacy, security, account management etc.

1.2 Motivation

Recent research on showed that people ask whole strings of questions rather than typing in keywords because when keywords are used, search results are lower and less to-the-point. Below is a comparison of generic words and heir related questions made with Google KW Tool.



(Israelsky, 2011)

Figure 1.1 Diagram showing the degree of accuracy of generic keywords against questions on Google.com

Q&A sites have been found to generate more traffic due to this fact (Decker, 2016). People google questions, not search terms and end up following links to social Q&A sites, typically Quora and StackOverflow. The fact that Q&A sites have the advantage of sounding natural/human in the types of responses provided as well as in the questions asked creates a whole new social world based on trust and truthfulness. Unlike academic websites or papers, (not intended to downplay their role as academic resources) social Q&A sites provide quick and easy search conditions.

After also conducting a study on how the Q&A forum engaged people, an article in the Mathematics Research Journal concluded that, Q&A forums was instrumental in developing a community of learners. The four principles noted in Sherin, Mendez & Louis' (1997) article of activity, reflection, collaboration and community are active in Q&A forums which makes this community one worth engaging in.

1.3 Problem Statement:

Ashesi's three majors, Business Administration, Management Information Systems (MIS) and Computer Science (CS) are courses which most students, if not all struggle to catch up with after having a first year of catching a glimpse of all courses. For CS and MIS students especially, it gets more upsetting since they do not come necessarily come from high schools where they learned programming or intensive Computer Science. University is a whole new start which will not be so difficult to start up if only there were an existing repository of knowledge from actual students and predecessors alike.

1.4. Current system

In Moodle, a discussion forum is embedded and is partially at full use by members of the school. It is noteworthy that; a discussion forum is not the same as a Q&A site and as such implements features which are not necessarily replicated in a Q&A site. Other methods

used by students to make findings include Google, Homework help, StackOverflow and more inconveniently, past questions from seniors.

1.5 Benefits of the proposed System

The beauty of Q&A forums such as StackExchange and Quora is that, they focus on answers to questions and the structure is streamlined to these functions. There's no room for unneeded arguments or low quality postings. This means with Q&A forums, questions asked are sieved and the one which suits the specified structure, is posted for "crowd knowledge" to be generated (Zhitomirsky-Geffet, Kwaśnik, Bullard, Hajibayova, Hamari & Bowman, 2016). An environment like this creates benefits in more than one way. Aside the act that it makes information gathering easier, it:

- enhances lifelong interactions and collaboration between students
- promotes knowledge sharing
- accumulates knowledge for a certain course so that new students can inherit graduates' experiences.
- manages knowledge for individuals.
- allows students to become more interactive with class content after class and during assignments.

1.6 Project Objectives and success criteria

The aim of this project is to build a student run Q&A system for the entire Ashesi community the project seeks to create a platform which will reduce the stress students go through when preparing for examinations, class tests or even when having personal studies.

Because the project organizes students by their classes and course preferences, there's an exhibition of social engagement, freedom for students who may not actively engage in class

activities to partake in knowledge sharing and more teamwork (class unity). (Rekha & Venkatapathy, 2015).

The objectives are outlined below:

1. Student engagement in class activities
2. Knowledge management for posterity
3. Increase the scope for knowledge sharing among class mates
4. Speed up the time for research
5. Generate knowledge base to prevent avoidable pressures
6. Give students the opportunity to explore areas of their interest without necessarily having to take those courses

CHAPTER 2: Background, Related Work and Technologies

2.1 Background and related terminologies

To give more insight into what a Q&A site is and how it runs, there is the need to create awareness of the mechanisms of employed by such sites. Q&A sites are meant to be like "fast-food" services where users are quickly served what they ask for with a fair compromise in quality but none in content. This is how a typical Q&A site runs:

A user with an existing account logs in and has the luxury of asking or answering any question. When the question is asked, other users are permitted to answer. The quality of an answer will determine if the answer gets "upvotes" or "downvotes". More upvotes means a lot more users find the answer to be true and usable, thus increasing the credibility of both the answerer and the answer. The asker can thus trust that answer. The opposite is true for downvoted answers. A like or upvote on a question implies that more users are facing similar problems or have similar questions and thus the site may consider adding that question to their FAQs. Comments are also allowed on answers to seek further clarification, add to a reply etc.

To add the social aspect to a Q&A site, users can create their profiles, store all activities they have engaged in on their page as well as gain followers from the community.

This is the basic building block of any social Q&A site.

2.2 Related Work

For analysis of sites already up in this field, I will employ knowledge and characteristics of one major education software application, one major student tailored Q&A site and two more other communities which are not strictly educational.

2.2.1 Learning Management Systems

A Learning Management System (LMS) is a software application for the administration, documentation, tracking, reporting and delivery of electronic educational technology (e-learning) courses or training programs (Li, Jin, Jiang, & Park, 2014). LMS typically integrates some tools to promote social software inside their platforms, such as discussions forums, blogs, wikis, email, chat, etc. Studies show that, in America, more than 90% of colleges are using LMSs matched against 95% in the UK. Moodle and Claroline are examples of LMSs which provide students online learning forums for presenting content and receiving feedback from their peers and faculty as though they were in actual classrooms (Brodie, 2007).

Although online forums make LMSs social, there are some drawbacks to this.

- Student's access to forums end when the semester ends or course periods ends. This is bad for knowledge accumulation and re-use.
- Only participants in a course can join the discussion for the course. This is bad for knowledge sharing since students interested in the domain but not taking the course can't participate.

2.2.2 StackOverflow

The trailblazing site for the StackExhange whose prime aim was to serve as an exchange of knowledge forum for programming experts.

Posts are given a unique ID number on SO, and each post has an identifier for its type (e.g., type 1 is a question, type 2 is an answer). A user is a registered member of SO. In SO, users do not "friend" or "follow" each other; they only reply or comment on each other's posts.

One prime feature of SO is reputation. “Reputation is a rough measurement of how much the community trusts you” (“StORMeD: Stack overflow ready made data”, 2017). A user can build up his reputation by posting questions, giving answers, and editing posts. A user with enough reputation points can extend a vote in favor of a posting (called an upvote) or against a posting (called a downvote). Votes show the user’s opinion of the worth of a question or the merit of an answer.

When a user posts a question, he has the ability to choose one of the answers as his accepted answer. This presumably reflects that this is the “best” answer, as judged by the original asker. A user can select a question (but not an answer or comment) as a “favorite”. Badges are given when you complete a set of activities on the page; they appear on the user profile, and the number of different types of badges appear next to the user’s name in all his postings

Stack Overflow uses a system to automatically identify and put low quality posts in an adhoc review queue. Their approach only relies on textual features (e.g., smileys count, body length). These approaches try to accelerate the low-quality post identification process by automating it. Low quality posts in Stack Overflow are identified through a review queue system managed by moderators (a restricted set of users with enough reputation to unlock specific privileges. Stack Overflow has 7 review queues:5 Late Answers, First Posts, Low Quality Posts, Close/Reopen Votes, Suggested Edits, Community Eval. Low Quality Posts Queue. It contains posts that have been automatically determined as low quality, by using several system criteria that generates a post quality score, or that have been manually flagged by users (“Improving Low Quality Stack Overflow Post Detection”, 2017).

The conclusion from a research shows that, a new mode of determining quality without the reviewers is a much better option where features concerning the content of a post (e.g., from simple textual features to more complex readability metrics) and community-related aspects

(e.g., popularity of a user in the community) are both applied.

2.2.3 ResearchGate

ResearchGate Q&A lets scientists and researchers exchange questions and answers relating to their research expertise, including areas such as techniques and methodologies. As an academic site, it implements almost the same features as Stack Overflow; in terms of users earning reputation and as such having higher authority than others.

A study to find the answer quality features of RG indicated that, answers containing social elements such as greetings or other affective words actually harm the answer quality. A possible explanation being that RG users are more concerned about the content relevance and knowledge volume in an answer rather than the social element in the answer. For the answer quality prediction, it was learned that an optimized SVM algorithm has an overwhelming advantage over other models in terms of the accuracy. They also found that, the prediction based on web-captured features had a better performance when comparing to the human-coded features like upvotes etc.

The conclusion is that academic Q&A users think “long, information-rich content” is of better quality, indicating that academic social platforms are different to generic social platforms, and the social components in academic social platforms should probably be kept separate from the information related components.

2.2.4 Quora

Unlike Stack Overflow and Researchgate, Quora is a professional site which allows socialization in terms of users following or “friending” one another. A user A can follow user A without explicit permission, and B’s actions (new questions, answers, comments and topics) will appear in A’s activity stream. In addition, users can follow topics they are interested in, and receive updates on questions and answers under this topic. Each user has

a “Top Stories” page, which shows updates on recent activities and participated questions of their friends, as well as recent questions under the topic they followed. Quora also has moderators much like SO, only these people are selected by Quora not based on their reputation. Finally, each Quora question has its own page, which includes a list of its answers and a list of related questions. Users can add new answers, and comment, edit and vote on existing answers.

Aside this major difference, all these sites share the common features mentioned about Stack Overflow. Quora is set-up to be the professional site that engages its members in a more social format as part of the aim of creating a community spirit. A study conducted to gain insight into Quora’s success as a Q&A site made the following conclusions. “We shed light on the impact of three different connection networks (or graphs) inside Quora, a graph connecting topics to users, a social graph connecting users, and a graph connecting related questions. Our results show that heterogeneity in the user and question graphs are significant contributors to the quality of Quora’s knowledge base. One drives the attention and activity of users, and the other directs them to a small set of popular and interesting questions.”

2.3 Platforms & Languages

For the development of a website like this, certain platforms and services are required which are enumerated below.

2.3.1 Ashesi Web server

Being a website tailored to the needs of Ashesi students, the project will be hosted on Ashesi’s server as part of Ashesi’s resources to facilitate learning. Thus, the url: http://www.ashesi.edu.gh/ will have a module for the deployment of this application. This platform was chosen because students constantly need to visit the school’s website in order

to access academic resources. As such, integration into this site will generate a higher traffic and student involvement.

2.3.2 PHP (Hypertext Processor)

PHP is a widely-used open source general-purpose scripting language which is flexible enough to suit web development and can be embedded into HTML as well. Commonly used for server side development, PHP has many other functionalities like command-line scripting and writing desktop applications. The main distinguishing factor of PHP from a client-side language like JavaScript is that, written code is executed on the server, producing HTML which is sent to the client for display. Thus, the client receives the results of running the PHP script, but has no idea what code was written to generate it. As mentioned earlier, all HTML files can be configured to be processed with PHP (embed HTML in PHP) which makes PHP scripting more fun and simple ("PHP: What is PHP? – Manual", 2017).

2.3.3 Command Line

The programming of the intelligent web scraping feature will employ primarily the Windows command prompt because the development is on a Windows machine. The command prompt is simply an interface for executing commands to the system. Scripts and batch files can be ran quickly using the command prompt, files may be edited and administrative changes can also be made using this terminal. These and many more are the underlying reasons for testing the "bot" through the command prompt.

2.4 Notifications

A notification is an abstract representation of something that happened, such as the delivery of a message, email or confirmation of an activity. "QueEst?" will make use of forms.

2.4.1 Push Notifications

Push notifications are messages that pop up on desktops, mobile devices etc. from a

website, mobile applications and app publishers. To receive push notifications, users don't have to be using the specific applications. This project employs the W3C Notifications API which offers a simple way of integrating desktop notifications for web apps. Push notifications have the advantage of leading the user right to the intended site or application with just an on-click of the notification ("Notifications API Standard", 2017).

2.4.2 E-mail Services

Email is short for Electronic mail which describes a message which moves from one computer user to one or more recipients using any network. There are various email services ranging from Google to Yahoo etc., however, this project will not be setting up an e-mail service, instead, users will be uniquely identified by their e-mails and notifications and messages may be sent to them if they so wish. Both push notifications and e-mails serve the need of notifications well but emails may be a longer method to achieve the same things. However, both options will be available for use as chosen by the user.

2.5 Proposed System

The system will be tailored to address the needs specific to Ashesi students. This system features primarily courses offered in this school. It is aimed at being strictly academic. The main differentiating factor of this system from the rest of the Q&A sites will be the presence of a bot which uses artificial intelligence to gather answers for users to enrich answers and start up conversations faster.

2.6 Scope

The new Q&A site named QueEst? has simply the Ashesi community as its primary user base. There may be an extension unto other campuses, however, it is presently limited to use by all students in Ashesi. In subsequent chapters the proposed system is described in further detail.

CHAPTER 3: Requirement Specification

3.1 Introduction

The primary aim of this chapter is to provide an extensive enumeration of the project's key functionalities and the types of services users are to expect.

3.2 Product Perspective

QueEst? Primarily has two partitions; the server side and the client side. The server side of the site deals with the database connectivity and employment, as well as the services run by the intelligent bot, here on out called Kubo. The client side will present the interface for users to engage in the activities of asking, answering, commenting on and voting up or down questions and answers. The diagram below shows the interaction between the server and the client side of the application.

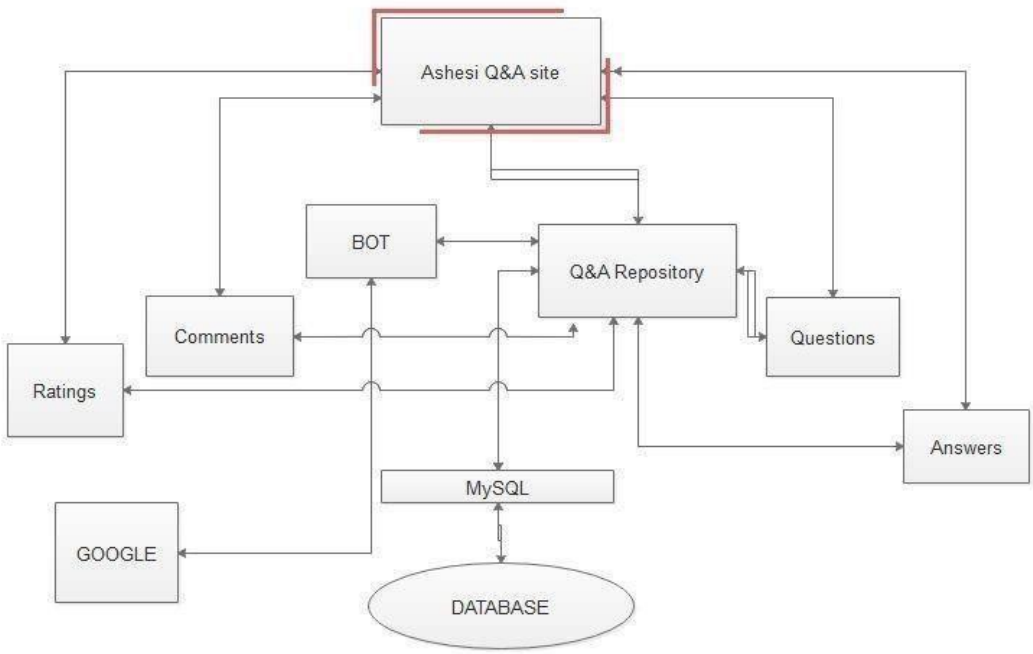


Figure 3.1 High level architecture of the systems within the QueEst? site.

3.2 Product Features

3.2.1 Communities and course selection

Users should be able to work per their courses: The system should be tailored to the specific courses of users. Users may be allowed to join other courses they are interested meaning they should not be limited to only the courses they are offering in school. This means the system should allow them select communities they want to join and start asking questions.

Figure 3.2 Communities available on site index page

3.2.2 Bot functionality

The availability of a bot to give prompt answers (2 minutes after a question is asked) so users get assurance of swift answers.

3.2.3 User homepage

The system should have a section where users can view others' profiles but not to necessarily follow or friend them. Each user should be able to customize their profile and update their pages with their activities in the various communities.

3.2.4 Privacy

Users should not be able to ask private questions or give private answers.

3.2.5 Blogging

The feature of blogging should be included in the site, where a user with enough knowledge can publish a post regarding a topic he finds problematic for a community he is in. This post is on his own page and can be accessed by anyone in that specific community.

3.2.6 Voting

Users should be able to upvote or downvote answers and well as questions they deem vague or "out of context" for the community.

3.2.7 Ask and Answer questions

Users should have the primary function of asking questions, answering questions and commenting on both questions and answers on the site.

3.3 Other Non-functional functionalities

3.3.1 Usability

The system must be simplistic in design and highly considerate of the communities within which it is working. Thus, the design for the "Accounting Community" should be different from that for the "Engineering Community".

3.3.2 Availability

The system can stay powered and supportive, giving right answers and providing users the confidence of high quality replies and answers. This could be done through the voting system.

3.3.3 Security Requirements

The security concerns come to play in ensuring security of email addresses, phone numbers, school attended and possibly classes one takes.

CHAPTER 4: Methodology and System Design

4.1 Introduction

The purpose of this chapter is to give a detailed breakdown of the way the system works by outlining its major actors and their relationship with the system Users interactions with programs and inbuilt functionalities are also explored.

4.2 Methodology

The system will be designed using agile model of development which is iterative and offers high flexibility and interaction with the system being built. The requirements for the system were gathered through experimenting with other Q&A sites, and finding out user experiences from those sites. These were primary sources of information.

4.3 System Design

4.2.1 User Interfaces Process view

That said, below is a diagram exploring the flow of events taking care of high level relationships and giving a high-level overview off how the user interfaces communicate with one another on the click of a button, submission of a form or making of a request.

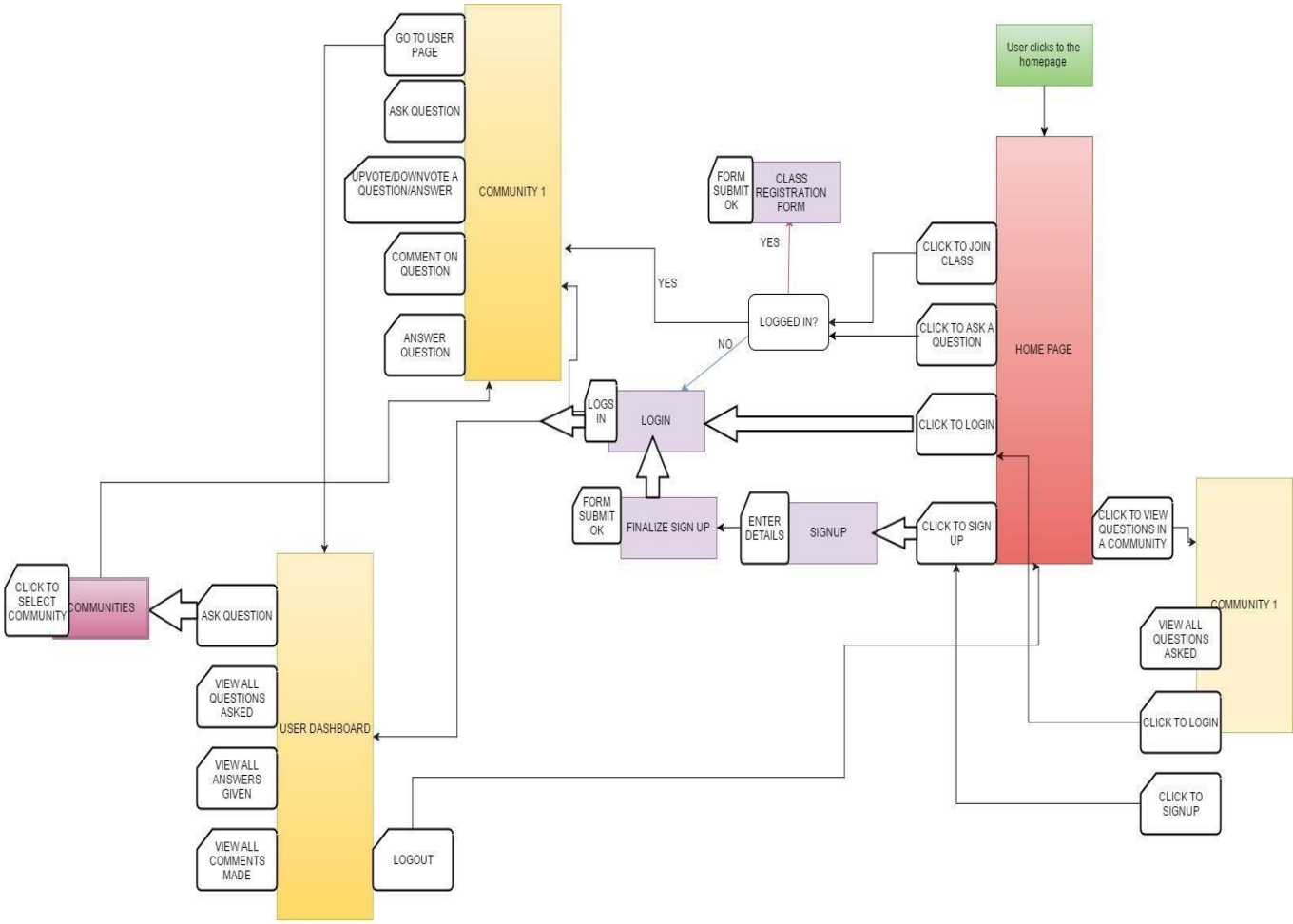


Figure 4.1 UI Flowchart for the system

4.2.2 Use Case View

Based on the user interaction with the interfaces, the main actors in the program have been mapped against specific activities they will as a matter of consequence perform and those they will mandatorily partake it.

With the use case view, there are three actors in any one circumstance of use of the system. These are the Asker, the Answerer and the Bot. it also outlines activities which will be performed on any particular instance of use of the application.

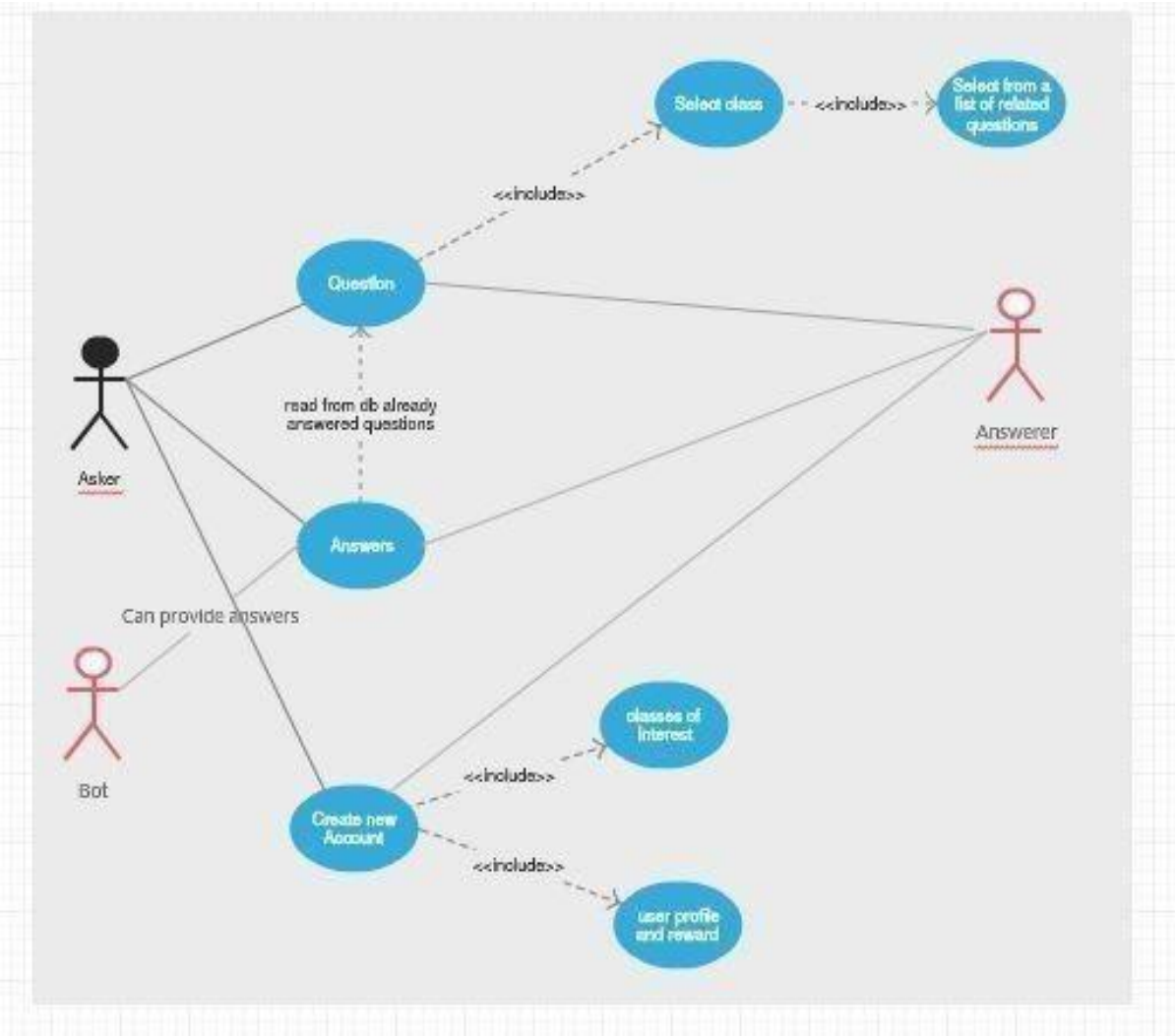


Figure 4.2 Use case View of the system

4.2.3 UML Class View

Below is a class diagram for the system. A class diagram is a kind of static structure diagram which shows relationships among the various classes in the system, while defining their attributes and the multiplicity of these relationships. For every one user, there is a relationship with questions, answers, profile, comments, votes and logins.

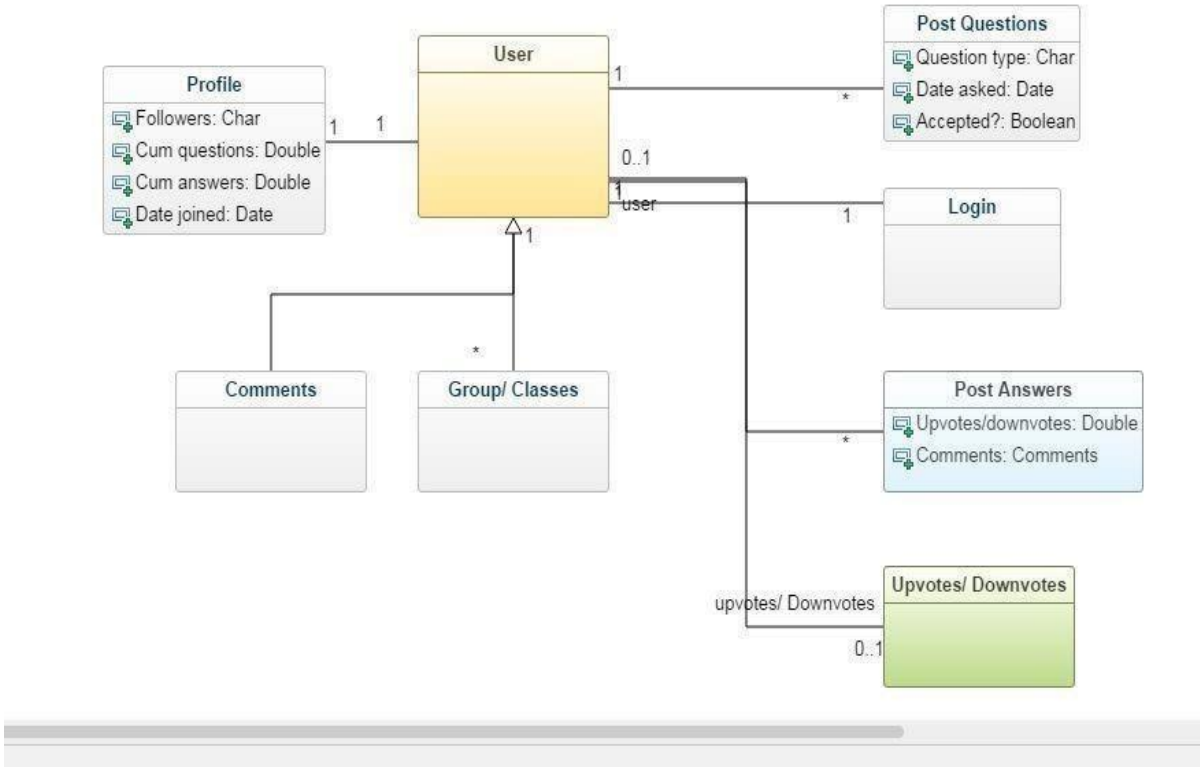


Figure 4.3 UML class view of the system's users

4.2.4 Process View

After gaining knowledge on all the possible views the system could take, the activity diagram basically takes one through a lifecycle of the system, taking into consideration all concurrency that may take place.

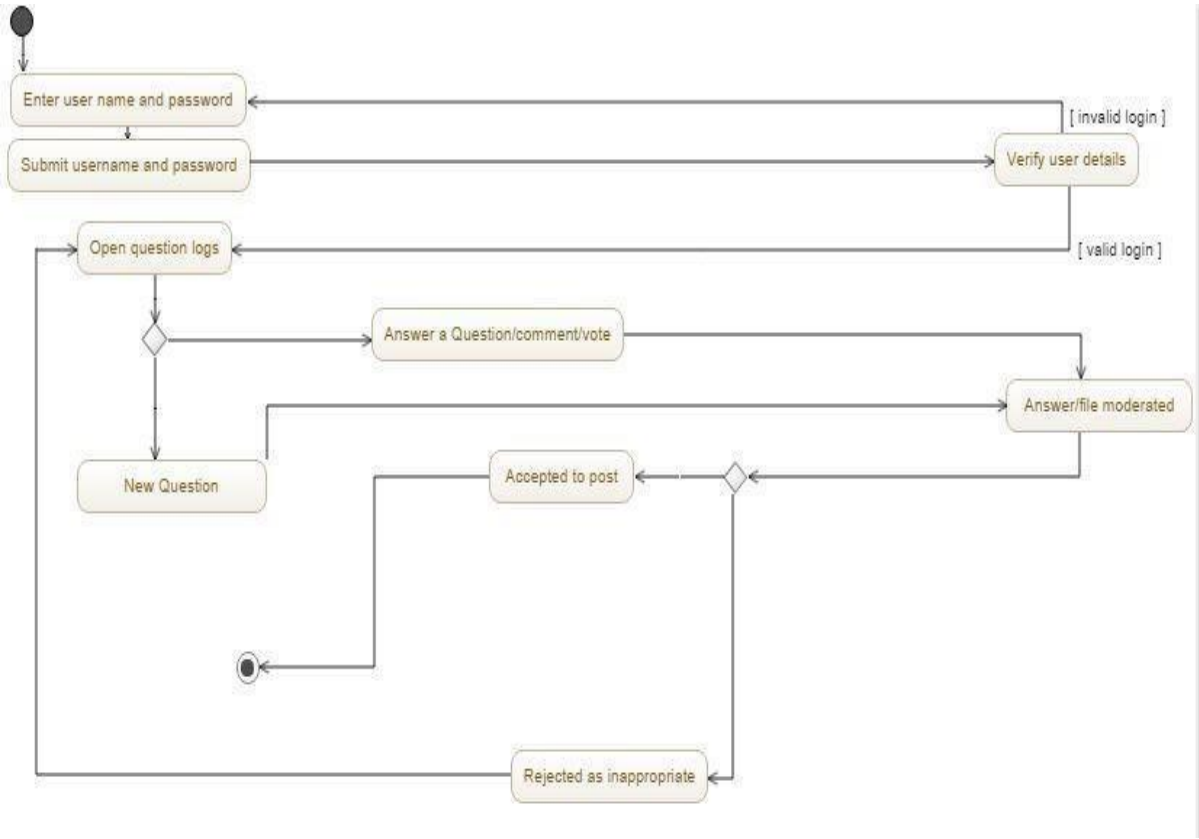


Figure 4.4 Activity diagram of the system

CHAPTER 5: Implementation Resources and Set-Up

This chapter dwells on the resources and mechanisms needed to implement the system described in the previous chapters.

5.1 Implementation of Kubo (the Bot)

Kubo is a more intelligent web scraping set of commands. It functions by basically pulling up human intelligent responses or texts from specified web pages after providing search terms for google. Kubo then displays the information in its raw state to the users giving credit to the site from where the reply was sourced.

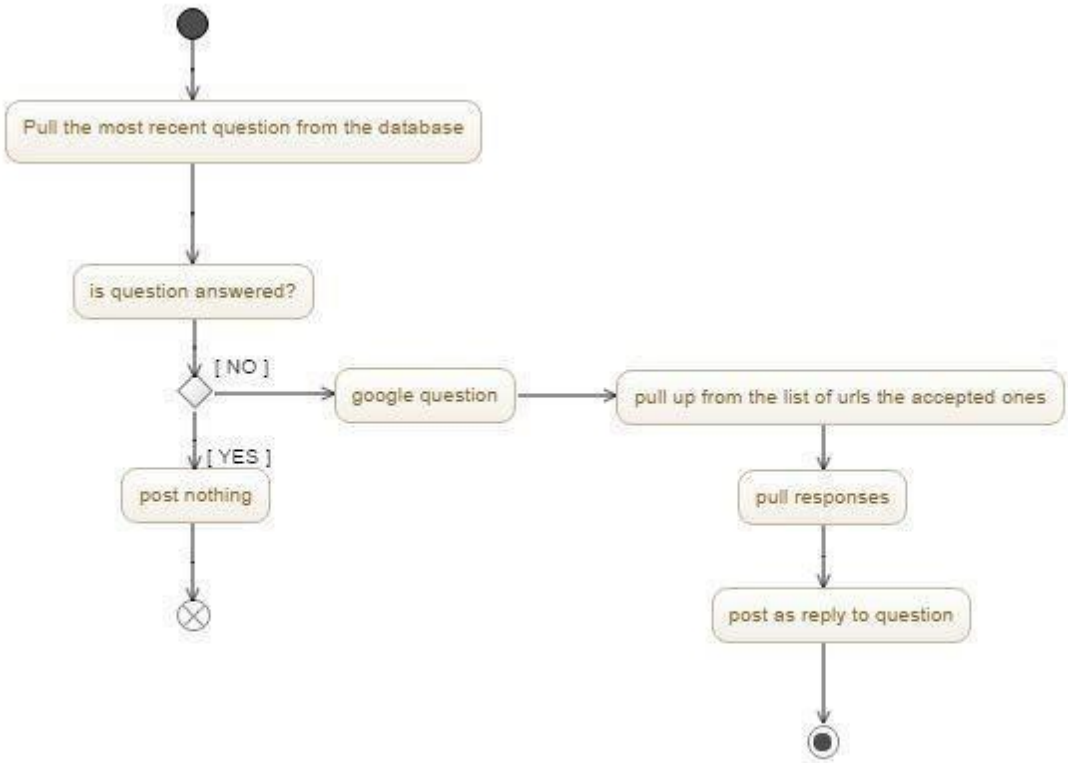


Figure 5.1 algorithm used to implement Kubo

5.2 Resources

5.2.1 Domain:

Since the site is going to be hosted on Ashesi's domain, there will be no need to get a domain set-up. All that will be required are the integration of the web pages into the site. And even better, Ashesi's migration to cloud server fulfills the requirement of a web server which will be accessed via FTP or SFTP.

5.2.2 Database

To ensure security, speed as well as easy access of the database or editing and redesigning, MySQL 5.x for will be used to design and develop the database. MySQL uses standard SQL and can compile on several platforms. Further, it is free to download and use and distributed by Oracle Corporation. The version used for this project is version 5.7.

5.2.3 Text Editor

For this project, I will use Notepad++ version 7.3.3 as the text editor simply because it has a friendly user interface, and although it may not have the most functionalities in terms of debugging, it is simple to install, run and edit with.

5.3 Communities Set-up:

5.3.1 Accounting:

This is the community for courses such as Financial Accounting, Introduction to Finance, Managerial Accounting and Corporate Finance all taught within one semester or another in the four-year journey at Ashesi.

5.3.2 Liberal Arts:

This community serves primarily as the repository for all questions regarding Social Theory, Text and Meaning, Written and Oral Communications, Music and Dance, Africa in international affairs, Pop-Culture etc.

5.3.3 Computing and Programming:

For courses like Mobile Web development, Web Technologies, Discrete Mathematics, Cryptography, Operating Systems, Data mining, Programming 1,2 and 3 etc.

Web Design and technologies: Mobile Web, Web Technologies

5.3.4 Server

The server to be used for testing will be Apache.

CHAPTER 6: Testing and Results

6.1 Testing

Considering that this is a website, the only tests run currently are those from running the site while developing, thus, system and component tests haven't been undertaken yet as the project's completion is still underway.

6.1.1 Test Description

The system comprises a maximum of 11 functionalities for the client majorly because the system has a lot of interaction with the client. These tests include:

1. Can a user view his home page?
2. Can one post a question?
3. Can one post a reply?
4. Can one post a comment?
6. Does a user's page automatically get updated with their activities?
7. Does the bot answer questions within minutes as stated?
8. Can a user's sign in and logging in be successful?
9. Are users' sessions stored so one does not lose data?
10. Are there push notifications for when answers are given for user's questions?

6.1.2 Test Results

So far, with the implemented modules and tests performed on them, the following conditions have been satisfied excellently:

- Login/Sign up

- Answer and Ask questions
- Implementation of sessions

The questions interface simply has a text area for accepting the question once a user is logged in and is apart of the community. Since there are no criteria for selecting who will join which community, any user can join any community.

A list of all questions are posted and the user has choice of following any one question to see its replies and comments. The dates and the person who asked the question are attached to the question being posted.

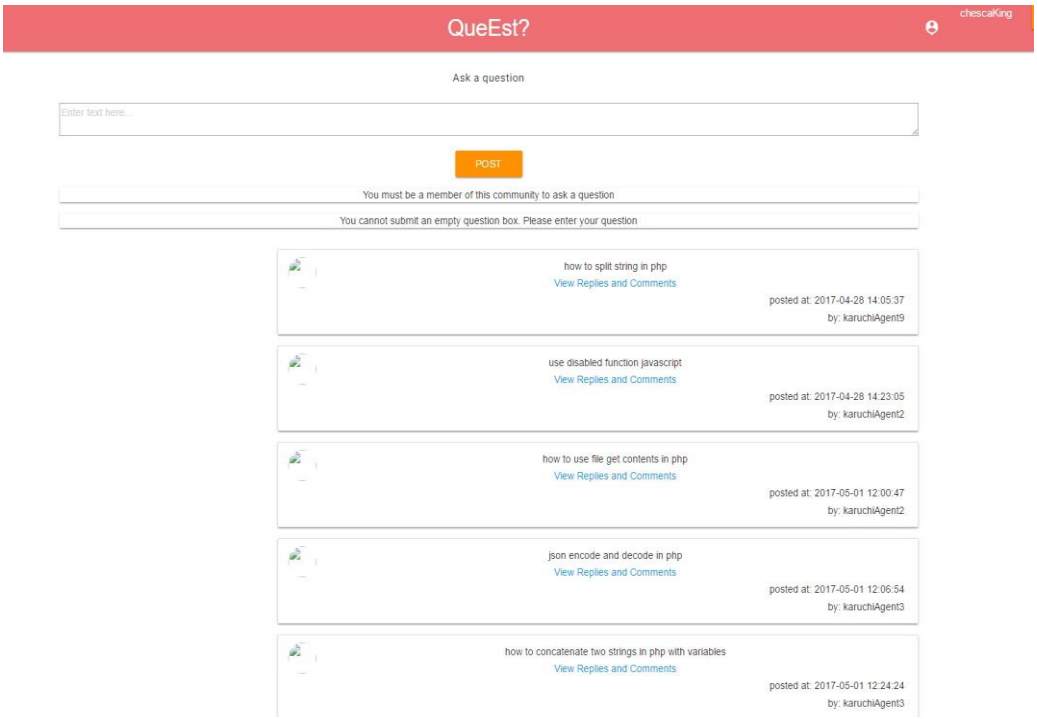


Figure 6.1 Snapshot of the questions page for the Programming Community

In figure 6.2, the flow continues where the user sees comments and replies and is able to post new or reply other comments. For efficiency, if the user is logged in and is the one who posted the comment, he has the ability to edit his comment, delete it or otherwise.

Figure 6.2 Snapshot of the comments page for a particular question

- User Home page
- User home page auto updates

As part of knowledge management and user sessions management, the user has a home page which is customizable, it constitutes the communities they are part of, and the questions and comments they have asked or made respectively.

From their homepage, they can drop communities, go to view replies others have given to their questions and follow any other community they want.

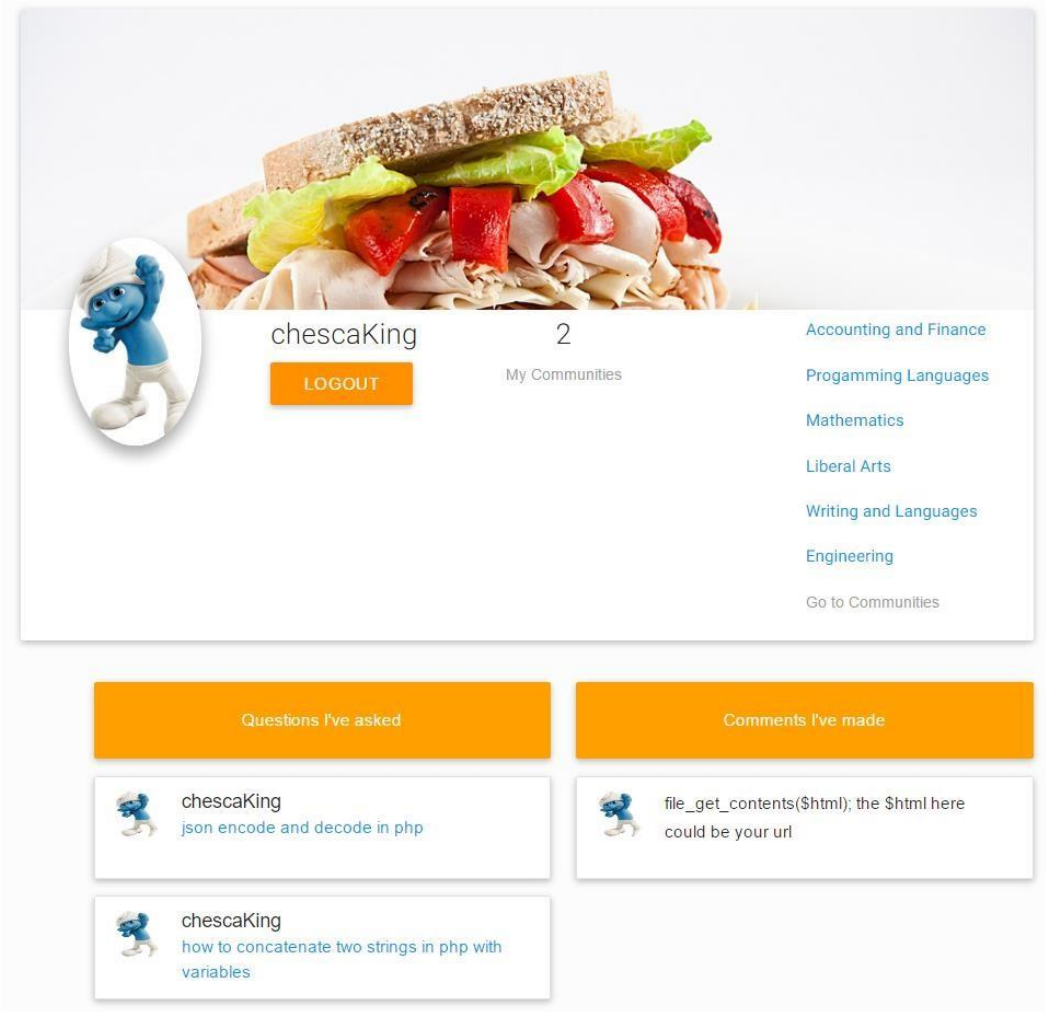


Figure 6.3 Snapshot of a typical user homepage

- Instant answering of user's questions by Kubo

Kubo has the advantage of no longer waiting for 2 minutes before printing out solutions, it gives instant replies when a question is posted. When Kubo is not able to give you a reply, then you would have to wait for other users. However, it has a high percentage assurance of a reply. It posts as an anonymous member of the community.

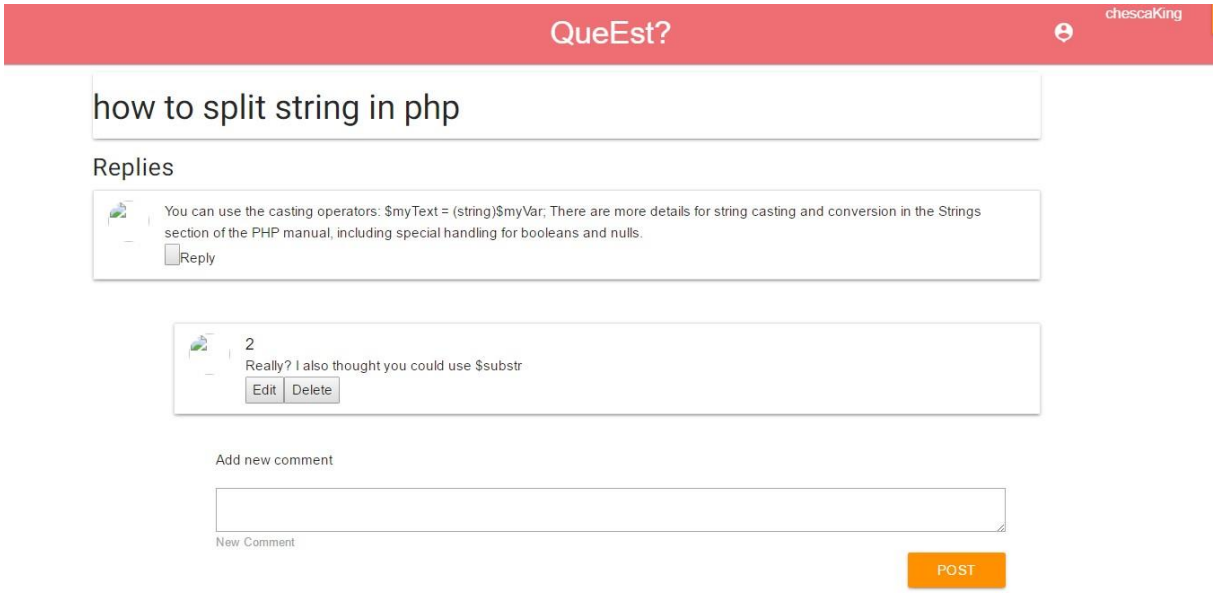


Figure 6.4 Snapshot of a reply pulled by Kubo from stackoverflow.com

CHAPTER 7: Conclusions, Recommendations and Limitations

7.1 Limitations

This system's design is largely influenced by student activeness and willingness to share information. Without the user base, the project is basically a sham. Thus, patronage by student body and willingness to utilize the platform especially in a situation where social media apps such as WhatsApp and Facebook have dominated the communication market, is not formidable.

Further limitation stems from ability to access sites and get human content and replies. Although the sites that content is pulled from to power the Bot are human based, queries over there are tailored in different ways from how queries are made in Que-Est? Thus, the search engine may take the user to StackOverflow.com when the user posts queries as "php, mysql, return results and fetch". However, upon arrival on StackOverflow, the user realizes that a question with these keywords were asked but the question's order and structure are not necessarily the same as what he wanted. Thus, a reply given may suit both askers questions but the approach will be different. This is what Kubo needs to take into account.

Thus, Kubo will need some level of data mining and artificial intelligence to sort answers it retrieves to make it relatable to the askers of the question.

Further, this work is limited in the permissions aspect, where the project does not necessarily seek permissions from neither the search engine nor the target website to pull data. Further, this project does not refer users to the site from which data is pulled. This resulted in a change in a search engine at a point in the project, where Google presented an error code of

"Service Unavailable" when the bot tried to pull. I thus, moved to Bing.com.

7.2 Future Work

As stated above, conversion of scraped content is a huge limitation of this work and can be taken up by the future generation to generate more traffic for social Q&A sites with the Bot feature implemented. Looking into natural languages and how to process retrieved content into a form that fits the query made by a user should be looked into in order to make the site more reliable.

Further future work will be focused on getting more sites on board. This project looks mainly at the study and retrieval of information from only stackoverflow.com which although is a large repository for programming, engineering, AI etc questions and answers, it does not cover all courses offered in school and may not be the best for courses as Accounting and the liberal arts.

7.3 Conclusions

Although search sites like Google and Bing are constantly evolving and adding more functionalities to their deployment, Q&A sites are rapidly engaging more and more humans by proving a familiar "written or human voice", where users feel secure and trust others online on answers, suggestions and even pieces of advice given.

Social electronic study platforms like Q&A sites have been noted as advantageous on a large front where 'communities of learners evolve' overtime while using a tool as this. (Windschitl, 1998). Literature on electronic learning indicates that online tools, specifically social Q&A sites are suitable for providing the social atmosphere that encourages collaborative knowledge structure (Blanton, Moorman & Trathen, 1998).

In the end, Q&A sites will not cease to generate more traffic and engage more people. QueEst? is the future of social educational platforms, engaging human brain activities and increasing student classroom participation. The principles of *activity*; where the student

actively contributes in discussions; *reflection* where the student is forced to reflect and think through his or her own thoughts process before posting; *collaboration* in which the students support each other's efforts by providing tips etc; and *community*, where a class or course group is not as just a collection of individuals, but as a learning community (Sherin et al., 1997).

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