

## CSC415 Assignment 3 – OSS Proposal and Specifications

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**VM Server:** csc415-server12.hpc.tcnj.edu

**VM Username:** student1

**VM Project Path:** /home/student1/assignments/assignment3/opened

**Github:** <https://github.com/bhong94/openEd>

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(+) Social Issue:

**Education** (access to education, especially for lower income communities)

(+) Project Title:

**OpenEd**

(+) Project Option:

For this project, I am choosing **option 2** – to implement a solution to help address a chosen social issue. I am choosing this option because I would like to gain experience going through the full process of learning a new language/framework, working with a NoSQL database, and implementing a project from scratch using what I learned. This is a very important skill for me to hone, especially because I am approaching graduation, and need to complete independent projects for my resume. In addition, I think it would be a good opportunity for me to examine the software engineering processes from a “tree” perspective instead of just “individual leaves”.

(+) Project Type:

**Web Application (Ruby on Rails)** – since my application will be implemented with a focus on lower income communities, I think a web application is a safer option because it may be more accessible than a mobile application. In addition, I have never worked with Ruby on Rails to develop a web app, and wanted to gain the experience.

(-) Languages: Ruby, HTML, CSS, PHP/javascript

(-) Libraries and Frameworks: Rails, Google Maps (location services), Bootstrap (styling), Google Login, Postgresql OR MongoDB

### (+) Project IDEA:

This application will aim to help provide better access to education (in both school topics and real jobs) by offering a platform for local college students to connect with and tutor local students in all areas of study.

### (+) Discussion:

This project is a relatively simple idea that would help struggling students have easy access to personalized, 1-on-1 education for an affordable price. College students would charge a significantly discounted price compared to private tutoring institutions, thus providing their local communities with accessible and affordable education. College students would also have a way of earning income while in school, which lightly addresses the student debt social issue as well. Lastly, I feel that many students get bored or lose interest in school because they are learning fundamental concepts that, to them, seem to not have any relevance to them or the field that they would like to study in the future. So, a big focus of this application is to not only provide education for traditional school topics, but for real world industry-related topics as well (such as Web Development, Health and Exercise Science, Journalism, etc.). This will provide students with a good opportunity to venture beyond the scope of their school curriculums and gain hands-on experience in a field that may interest them.

### (+) Algorithms:

**Searching for Tutors:** In the app, a student will be able to search for tutors. I must implement a searching algorithm that performs a filtered search given a list of constraints and keywords. The algorithm must first ignore all tutors that are more than a certain distance away from the student. Then, the algorithm must find a tutor that meets all of the required constraints that the student specified.

**Recommended Tutors:** The app will recommend tutors to students based on preferences, skill level, pricing, etc. The algorithm must read student profile for information, then cross-check that information with a database of tutors and find the best matches for the student. The algorithm will run once, every time the student logs in.

### (+) Data Structures:

**Hash** – key/value pairs will be useful for storing the name or id of a tutor as the key and an integer that represents that tutor's compatibility to a given student. This classification system will add some more structure and organization to the algorithm and provide better matches for the students.

- Hashes may also be used to transfer appointment information for the tutors. For example, once a student makes an appointment with a tutor, the controller will transfer the data

through a hash (key will be a student object or ID and the value will be an appointment date) to the database.

**Array** – arrays will be a very common data structure to store information that doesn't require any special features. Many of the arrays will contain other data structures (i.e array of objects, array of hashes, etc.).

**Queue** – a queue will be used to keep track of which tutors have already been checked as a potential match for the student. I will use a queue instead of a stack in order to check potential matches in a FIFO manner.

**Trie** – a trie is a good data structure to use when working with strings. All of the trie's operations have a time complexity of  $O(k)$  where  $k$  is the length of the string being operated on. This will be very useful in implementing both of my algorithms because they will involve some string searches when searching through class attributes.

### **(+) Learning Objectives:**

By working on this project, I hope to gain hands-on experience implementing a solution while following a specific development process. I plan on following an evolutionary development process because the specifications of the project may change during development depending on stakeholder feedback.

Another concept I hope to learn is version control. I've never worked on a project using version control, or specifically, Github. So, I think this will be a good opportunity to learn the ins and outs of Github and the general concepts behind version control. I also hope to become familiar with the command line tool, git.

In addition, while I do have prior web development experience, Ruby and Ruby on Rails are tools that I have never used before. So throughout this project, I hope to become fluent in the Ruby language and Rails framework, while reinforcing web development concepts that I've learned in the past.(such as MVC architecture, database queries, api calls, JSON, etc.)

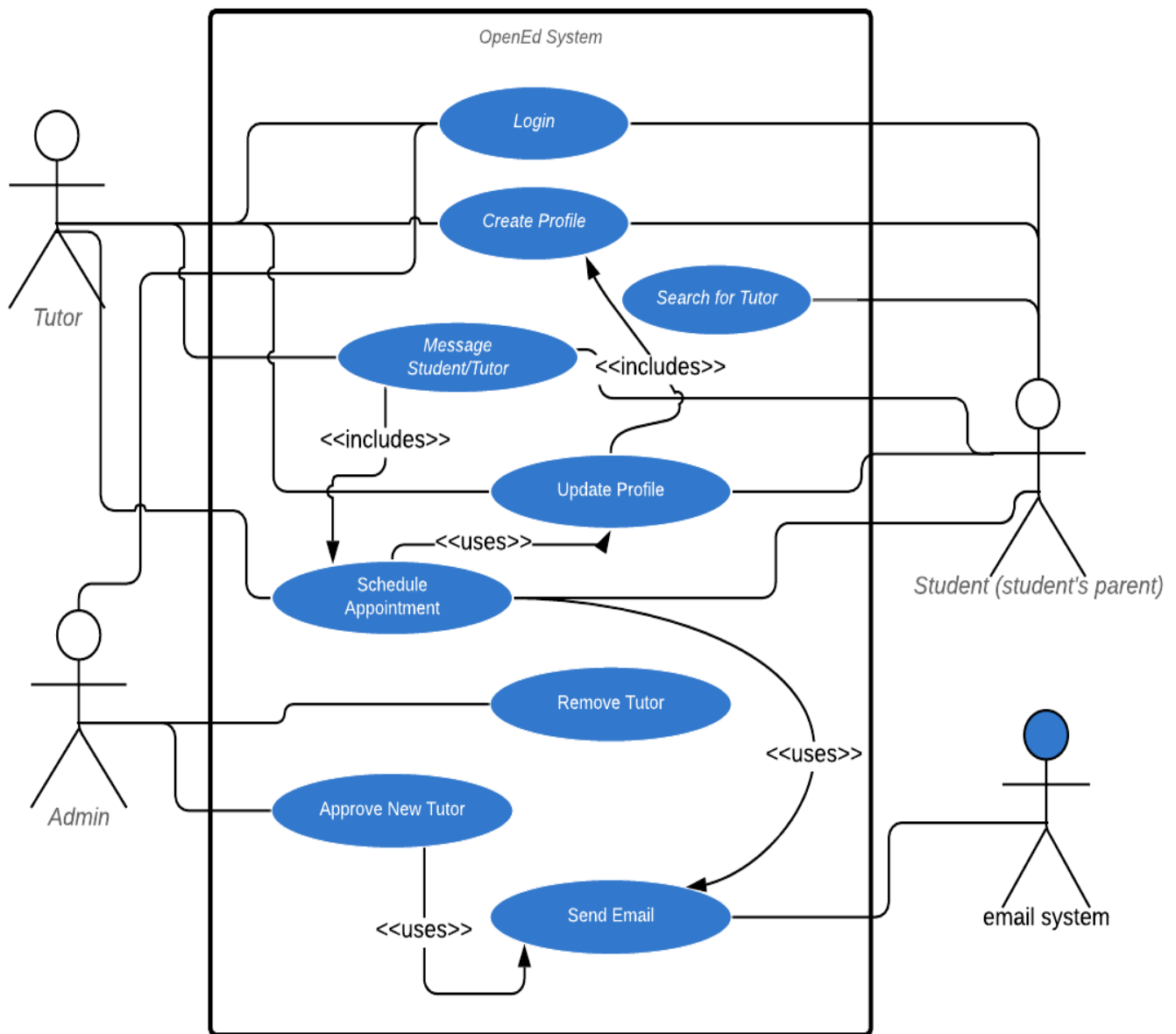
I also hope to practice learning new libraries and frameworks and integrating those technologies into my project. More specifically, I will learn how to effectively study documentation and find the information I need.

Lastly, I hope to learn how to effectively work in a Linux development environment on a remote VM. From this I hope to gain experience in bash and related tools such as ssh and sftp.

## (+) Use Case Diagram

### OpenEd

hongb1 | October 3, 2019



### Subsets to be implemented:

- Login and Profile Creation/Update
- Search for Tutor (also recommended tutors)
- Schedule Appointment

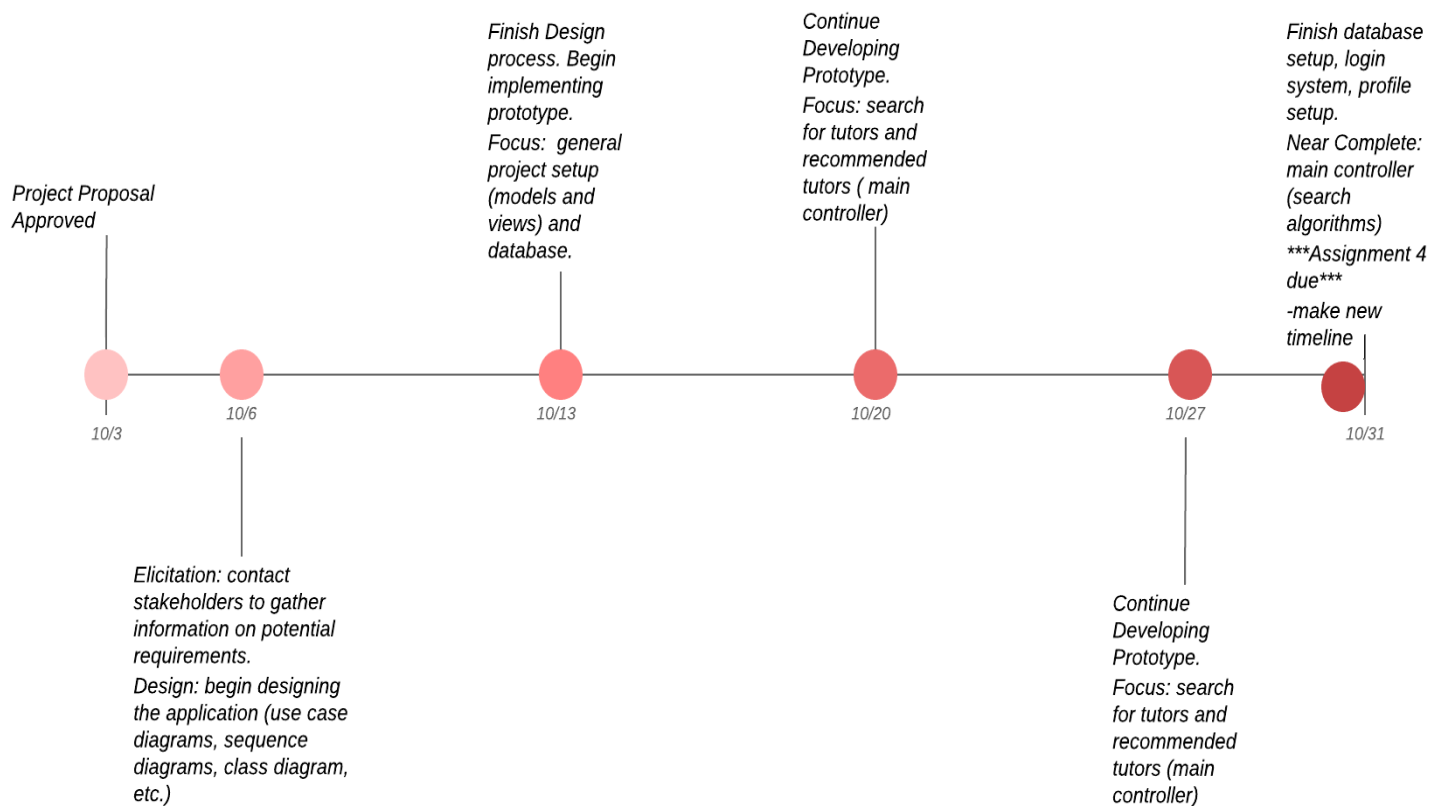
### Subsets to be implemented if time permits:

- Messaging between Tutor and Student
- Email notifications

### Subsets to be implemented in the future:

- College Admin accounts (maintains and approves college students to become tutors)
- Approval of new tutor
- Removal of tutor account (for user policy violations)

### (+) Timeline and Resources



Resources for learning:

[www.stackoverflow.com](http://www.stackoverflow.com) – general coding questions and answers

<https://www.tutorialspoint.com/ruby/index.htm> - learning the basics of ruby

<https://www.tutorialspoint.com/ruby-on-rails/index.htm> - ruby on rails basics

<https://www.ruby-lang.org/en/documentation/> - ruby documentation

<http://www.postgresqltutorial.com/> - PostgreSQL tutorial

<https://www.tutorialspoint.com/postgresql/index.htm> - PostgreSQL basics tutorial

<https://developers.google.com/calendar> - Google Calendar API Documentation

<https://developers.google.com/maps/documentation> - Google Maps API Documentation