

# SW Engineering CSC648-848-05 Spring 2024

## Application Name: **Swamp Study**

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### Version Table

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Milestone 1 V2	Apr 1, 2024
Milestone 2	Apr 4, 2024
Milestone 2 V2	Apr 24, 2024
Milestone 3	Apr 24, 2024

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# Data Definitions

## User

A User is a student that has signed up with their email for the platform. The email has to have an “@sfsu.edu” ending.

## Account

Each User has an account which correlates to their email and password. The password is stored hashed in the Database as a string

## Profile

A Profile contains a User's description and profile picture. This data will be used to facilitate better matches

## Profile Picture

An image used to identify users on the platform. Represented by a .jpg extension can have a maximum size of 5 MB.

## Match

A Match is a set of 2 or more users that have both liked each other. This Match is then used to facilitate a meeting and communication between the users.

## Profile

A profile is a public display of a user's information, such as availability, subject and many more.

## Availability

Availability is the times available a user can attend a study session. Represented by a Date and Time field, typically showing days and times in AM/PM that the user is available

## Forum

The Forum is a part of the Application where Users can ask and answer questions related to specific classes. The Forum is organized into threads by class

## Class

A Class is the representation of an SFSU course. Represented by a string Department and Course Name, as well as an integer representing the Class Number

## Thread

A Thread is used to organize the Forum. Each thread contains one question and many answers. Each thread belongs to a specific class

## Question

A Question is a text written by a User, the Author. Each Question automatically creates a thread

## Answer

An Answer is a text written by a User in response to a question. Each answer belongs to a thread.

## Application

The application holds all the components and necessary data for the user to interact with and engage with the platform.

## Rating

Each user will have ratings which will get averaged to get their rating within the system as a study partner

## Schedule

A Schedule is the mapping of which classes a User is taking. Each entry contains the user and the class

# Functional Requirements

## Priority 1: Must Have

### **1. User**

- 1.1. A User shall be able to create an account
- 1.2. A User shall only have one account
- 1.3. A User shall be able to view other users' accounts in the system
- 1.4. A User shall be able to set their availability
- 1.5. A User shall be able to establish their profile
- 1.6. A User shall be able to ask many questions in the Forum
- 1.7. A User shall be able to answer many questions in the Forum
- 1.8. A User shall be able to like other Users
- 1.9. A User shall be able to match with other Users

### **2. Profile**

- 2.1. A Profile shall be owned and edited by one and only one user
- 2.2. A Profile shall be allowed one picture of the owner
- 2.3. A Profile shall be allowed a short biography
- 2.4. A Profile shall have many subject attributes
- 2.5. A Profile shall be able to set a filter for their study partner preferences
- 2.6. A Profile shall be marked Student or Educator
- 2.7. A Profile marked Educator shall be able to access the Forum
- 2.8. A Profile marked Educator shall be allowed to answer questions in the Forum

### **3. Account**

- 3.1. An Account shall have one email associated with it

### **4. User Interface**

- 4.1. The Interface shall allow a User to navigate through a potential Match's profile
- 4.2. The Interface shall allow a User to access/edit their Profile
- 4.3. The Interface shall allow a User to access/edit their Account

### **5. Match**

- 5.1. A Match shall be provided a meeting link
- 5.2. A Match shall be provided a meeting time
- 5.3. A Match shall be made based on different criteria

### **6. Forum**

- 6.1. The Forum shall allow one main question per Thread
- 6.2. The Forum shall allow many answers until marked done
- 6.3. The Forum shall allow each class its section
- 6.4. The Forum shall allow users to post in their class Forum

6.5. The Forum shall allow many questions

## Priority 2: Desired

### 1. Profile

- 1.1. A Profile shall be allowed to be invisible when not wanting to study
- 1.2. A Profile marked Educator shall be allowed to remove questions from the Forum

### 2. User

- 2.1. A User shall be able to flag another user for review
- 2.2. A User shall have a match rating which determines visibility
- 2.3. A User shall review a match after their first meeting
- 2.4. A User shall be allowed to block another User

### 3. User Interface

- 3.1. The Interface shall allow a user to swipe right or left on a potential study partner

### 4. Matching System

- 4.1. The Matching System shall highlight common attributes users have with each other
- 4.2. The Matching System shall notify users when they have a Match
- 4.3. The Matching System shall send a notification to the user's device
- 4.4. The Matching System shall show a user their ideal match
- 4.5. The Matching System shall let users decide whether they want to meet in person or online

### 5. Forum

- 5.1. The Forum shall limit access to students taking that class
- 5.2. The Forum shall allow educators to access all the Threads

## Priority 3: Opportunistic

### 1. Account

- 1.1. An Account shall be allowed to log in from one device at a time

### 2. User

- 2.1. A User shall be able to Video Call with their partner

# Use Cases

## Priority 1: Must Have

Use case 1: Students using the site need a partner for a group project.

*Use case 1 Storyboard:*

Sebastian is worried about his grades and is stressed about midterms. He wants to find a study partner but has trouble.



Remembering hearing about SwampStudy, Sebastian signs up and starts to look for a study partner.



The image displays two screenshots of the SwampStudy website, illustrating the user account creation process.

**Screenshot 1: Login Page**

Welcome! Finding study buddies made easy!

Email:   
Password:

**Login** Don't have an account?  
[Register](#)

**Screenshot 2: Registration Page**

First Name:  Last Name:   
Email:   
Password:  Confirm Password:

I have read and accept the [Terms and Conditions](#)

**Click!** **Register** Already have an account?  
[Login](#)

**Navigation and Social Links**

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**Red Annotations:**

- A large red arrow points from the "Register" button on the second screenshot down towards the bottom left of the image.
- A smaller red arrow points from the "CLICK HERE" link on the first screenshot towards the right side of the image.

**Top Screenshot: Matching Page**

The page shows a search bar with "Search for threads..." and a button "Search". Below it is a post titled "Graduation tickets" by "Sarah". A red arrow labeled "CLICK HERE" points to the "View Details" link.

**Bottom Screenshot: Profile Settings Page**

This page has two main sections: "Profile Settings" and "Account Settings". In the "Profile Settings" section, there is a "Profile Picture" field with a placeholder "Click here to upload image". A red arrow labeled "Click here" points to this field. There is also a "Bio" field with a "Rating" of 5 stars and a "Edit Bio" button. In the "Account Settings" section, there is a "Update Account" form with fields for "First Name", "Last Name", "Email", "New Password (optional)", and "Confirm New Password". There are also "Hide Account" and "Introverts only" toggle switches, and "Update Account" and "Delete Account" buttons. A red arrow labeled "Click here" points to the "Update Account" button.

The screenshot shows the SwampStudy matching interface. At the top, there are navigation links: 'About' (highlighted in yellow), 'SwampStudy' (in large blue text), 'Settings', and 'Logout'. Below this, a purple bar indicates 'Currently in Matching'. The main area has a heading 'Find your next study partner'. On the left, there is a red 'X' icon. In the center, a profile card displays a 'Profile picture' placeholder, 'Name' and 'Rating' columns, and sections for 'Is Available:' and 'Courses Studying:'. To the right, a 'Your Matches' section is shown. A green checkmark and a red arrow pointing to a white button labeled 'CLICK HERE' are overlaid on the interface.

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This screenshot shows the same matching interface after a match has been made. The 'Your Matches' section now displays a message 'You matched with [Name]'. The profile card on the left includes 'Availability:' and 'Courses Studying:' sections. To the right, a 'Meeting Details' section is present with fields for 'Date:', 'Time:', 'Location:', 'Study Course:', and 'Email:'. A yellow button labeled 'Rate Partner' is located at the bottom right of this section. A yellow box highlights the 'You matched with [Name]' message. A red arrow points from the 'CLICK HERE' button in the first screenshot to this highlighted message in the second screenshot.

After matching with a study partner and getting automatically scheduled a time and place for the study session, Sebastian feels much less worried.

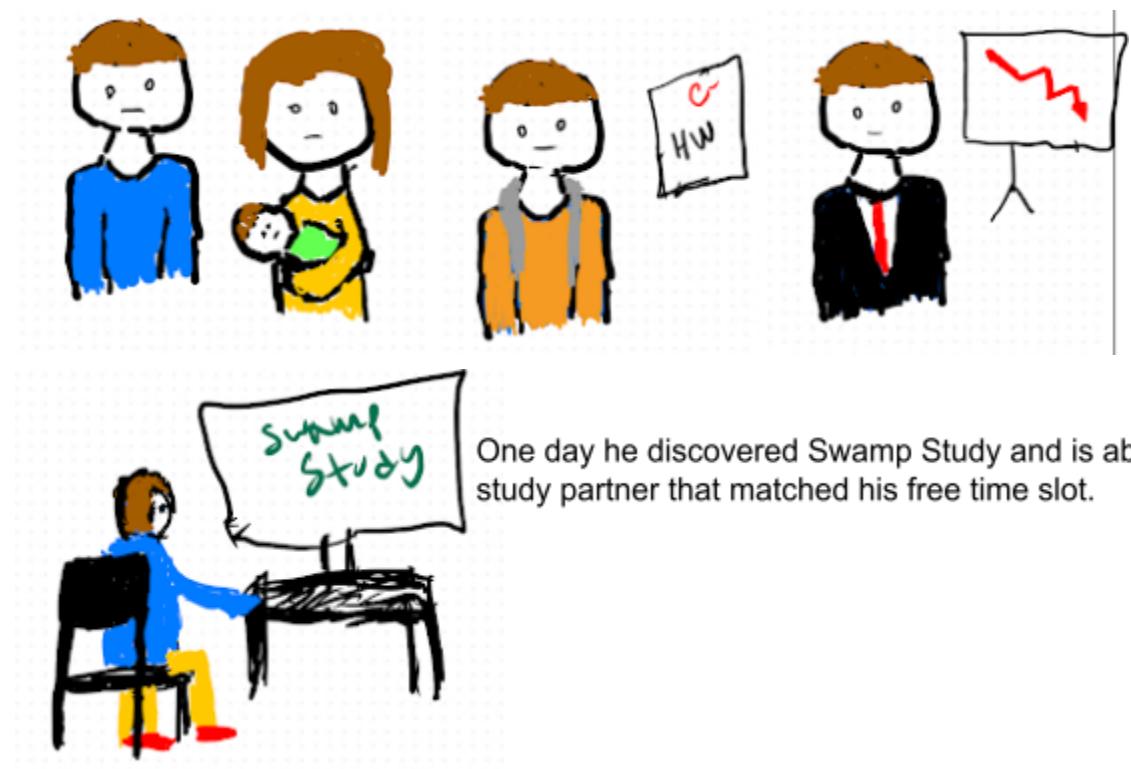


### Use case 3: Non-Traditional Student looking for Study Partner/ Availability

*Use case 3 Storyboard:*

Richard has a lot on his plate, he has a family, goes to school full time and has a full time job.

Due to not being able to find someone to study with that also has his rigid schedule, his home life, school work and his job are suffering



About

# SwampStudy



Welcome!  
Finding  
study buddies  
made easy!

Email:   
Password:

Login

Don't have an account?  
[Register](#)

SwampStudy

click!

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About

# SwampStudy



Matching

Currently in...

Settings Logout

Department: General Chat: v

Class: College Help: v

Search for threads...  Search

Graduation tickets

Does anyone have any extra graduation tickets???

Asked By: Sarah 

View Details

click!

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The image displays two screenshots of the SwampStudy website, showing different sections of the platform.

**Top Screenshot: Profile Settings and Account Settings**

This screenshot shows the "Profile Settings" and "Account Settings" sections. The "Profile Settings" section includes fields for Name, Bio, Profile Picture (with an "upload image" button), Availability (checkboxes for Monday through Sunday), and Current Courses. The "Account Settings" section includes fields for First Name, Last Name, Email, New Password (optional), Confirm New Password, Hide Account (checkbox), Introverts only (checkbox), Update Account (button), and Delete Account (button). Red arrows labeled "Click!" point to the "upload image" button in the profile picture section, the "Edit Bio" button, the "Update Account" button, and the "Delete Account" button.

**Bottom Screenshot: Matching and Forums**

This screenshot shows the "Matching" and "Currently in Forums" sections. The "Matching" section includes a dropdown for "General Chat" and "Class" (set to "College Help"). The "Currently in Forums" section features a search bar ("Search for threads...") with a "Search" button and a "Make a Post" button. A thread titled "Graduation tickets" is shown, asking "Does anyone have any extra graduation tickets???", posted by "Sarah". A red arrow labeled "Click!" points to the "View Details" link in the forum thread.

**Common UI Elements:**

- Header:** SwampStudy logo, About, Settings, Logout.
- Footer:** SwampStudy logo, follow us! (Facebook, Instagram, YouTube, Twitter icons), About, Privacy Policy, Licensing, Contact.

**SwampStudy**

Currently in Matching

Forums

Find your next study partner

Name Rating

Profile picture

Is Available: Courses Studying:

**X** ✓

Your Matches

Rate your previous study partner

View Matches

**CLICK HERE**

SwampStudy

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**SwampStudy**

Currently in Matching

Forums

Meeting Details with [Name]

Profile picture

Date:  
Time:  
Location:  
Study Course:  
Study Partner:

Availability:  
Mon  
Tue  
Wed  
Thu  
Fri  
Sat  
Sun

Courses Studying:

Unmatch

Your Matches

Rate your previous study partner

You matched with [Name]

Back to Matches

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Now he can stop worrying so much about school and focus on his job and family. Everyone is happier.

Use case 4: User looking to find a safe person to study with

*Use case 4 Storyboard: Draft in progress*

This is Melanie. She gets  
distracted from studying easily  
and her grades suffering.



Melanie gets on her SwampStudy account and matches with a potential study partner. Melanie appreciates the pre-confirmation contact methods available before meeting in real life.



Welcome!  
Finding  
study buddies  
made easy!

Email: \_\_\_\_\_  
Password: \_\_\_\_\_

**Login**

Don't have an account?  
[Register](#)

**click!**

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**click!**

**Matching** **Currently in Forums**

Department: General Chat:   
Class: College Help

Search for threads...

Graduation tickets

Does anyone have any extra graduation tickets???

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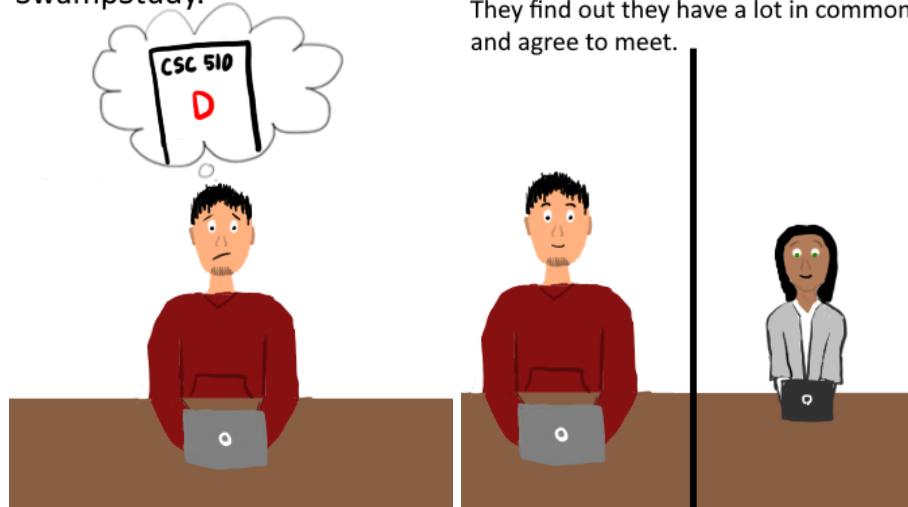
The screenshot shows the SwampStudy matching interface. On the left, a large red arrow points down to the 'Profile picture' section of a study partner's profile. The profile picture placeholder contains a red 'X'. To the right of the profile picture, there is a green checkmark icon and a red 'CLICK HERE' button with a curved arrow pointing to it. The profile includes fields for 'Name', 'Rating', 'Is Available:', and 'Courses Studying:'. Below the profile is a 'View Matches' button.

The screenshot shows the SwampStudy meeting details interface. A large red arrow points down to the 'Email:' field, which is highlighted with a yellow background. The page displays 'Meeting Details with [Name]' and includes sections for 'Profile picture', 'Availability' (listing days from Mon to Sun), 'Courses Studying:', and 'Email:' (highlighted). To the right, a 'Your Matches' sidebar shows a message: 'You matched with [Name]'. At the bottom, there is a 'Back to Matches' button.

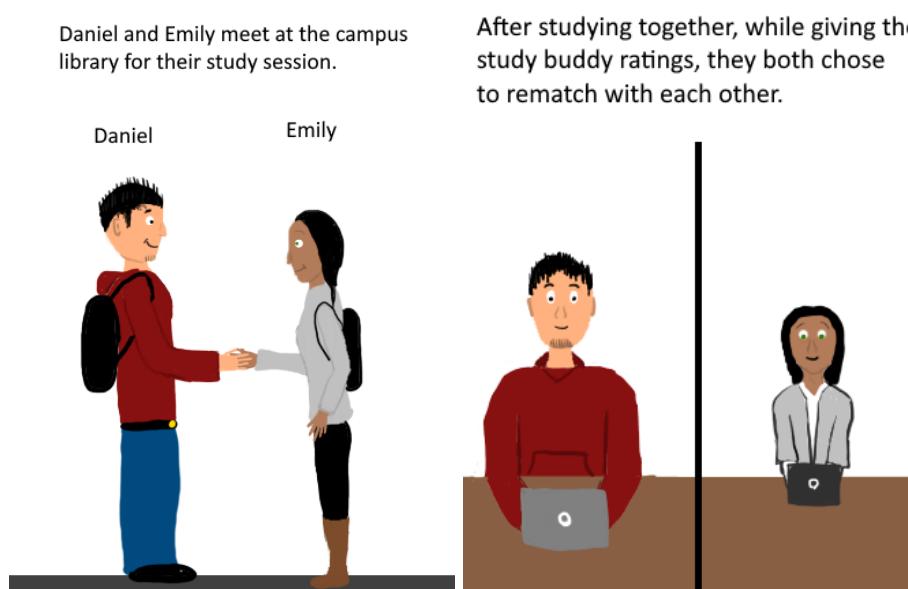
## Use case 5: Finding a long-term study partner

*Use case 5 Storyboard (FROM DANIEL'S PERSPECTIVE):*

Daniel is struggling with CSC510 and wants to find a study partner so he logs into SwampStudy.



Daniel matches with Emily and they discuss their study habits and etc. They find out they have a lot in common and agree to meet.



Daniel and Emily meet at the campus library for their study session.

After studying together, while giving the study buddy ratings, they both chose to rematch with each other.

The image displays three screenshots of the SwampStudy website, each with red arrows indicating user interactions:

- Screenshot 1: Login Page**
  - Welcome!** Finding study buddies made easy!
  - Email:** [Input Field]
  - Password:** [Input Field]
  - Login** (Yellow button)
  - Don't have an account?**
  - Register**
- Screenshot 2: Matching Page**
  - Matching**
  - Currently in Forums**
  - Department:** General Chat
  - Class:** College Help
  - Search for threads...**
  - Search**
  - Make a Post**
  - Graduation tickets**
  - Asked By: Sarah**
  - Does anyone have any extra graduation tickets???**
  - View Details**
- Screenshot 3: Forum Thread Page**
  - SwampStudy**
  - About** **Privacy Policy** **Licensing** **Contact**
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**SwampStudy**

About            Settings      Logout

Currently in Matching      Forums

Find your next study partner

Name      Rating

Profile picture

Is Available: Courses Studying:

✓ **CLICK HERE**

Your Matches

Rate your previous study partner

**View Matches**

**SwampStudy**

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**SwampStudy**

About            Settings      Logout

Currently in Matching      Forums

You matched with [Name]

Name      Rating

Profile picture

Availability: Courses Studying:

Mon :      Thu :      Fri :      Sat :      Sun :

Meeting Details

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Location: \_\_\_\_\_

Study Course: \_\_\_\_\_

Email: \_\_\_\_\_

**Rate Partner**

Your Matches

You matched with [Name]

**Back to Matches**

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Currently in Matching

Forums

About SwampStudy Settings Logout

Rate your previous study partner [Name]

How would you rate your study partner?

[Name]

★ ★ ★ ★ ★

would you study with this person again??

Submit

Your Matches

You matched with [Name]

Back to Matches

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## Use case 6: Hiding Profile

### Use case 6 Storyboard



Kyle is a social butterfly, he craves company. He is also very studious, he is a regular SwampStudy user. But sometimes he is overwhelmed.

He needs the app but he also needs a break.

He is happy to see StudySwamp has a “Hide your Profile” feature.

About

# SwampStudy



Welcome!  
Finding  
study buddies  
made easy!

Email:   
Password:

Login

Don't have an account?  
[Register](#)

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click!

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About

# SwampStudy



Matching

Currently in...

Settings Logout

Department: General Chat: v

Class: College Help: v

Search for threads...  Search

Graduation tickets

Does anyone have any extra graduation tickets???

Asked By: Sarah 

View Details

click!

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**SwampStudy**

About      Settings      Logout

Profile Settings

Name:

Profile Picture

upload image

Bio:

Edit Bio

Rating: ★★★★★

Availability

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

Current Courses

SwampStudy

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Account Settings

Update Account

First Name:

Last Name:

Email:

New Password (optional):

Confirm New Password:

Hide Account

CLICK HERE 

Update Account

Delete Account

About      Privacy Policy      Licensing      Contact



**SwampStudy**

About      Settings      Logout

Profile Settings

Name:

Profile Picture

upload image

Bio:

Edit Bio

Rating: ★★★★★

Availability

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

Current Courses

SwampStudy

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Account Settings

POP UP !!!

ACCOUNT IS HIDDEN  
WE WILL NOT BE ABLE TO MATCH

OK

New Password (optional):

Confirm New Password:

Hide Account  Introverts only

CLICK HERE 

Update Account

Delete Account

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[About](#)  [Settings](#) [Logout](#)

**Profile Settings**

Name:

Profile Picture: 

upload image

Bio:

Edit Bio

Rating: 

Availability:  Monday  Tuesday  Wednesday  Thursday  Friday  Saturday  Sunday

Current Courses:

**Account Settings**

POP UP !!!  
ACCOUNT IS HIDDEN  
WE WILL NOT BE ABLE TO MATCH

New Password (optional):

Confirm New Password:

Hide Account  Introverts only

Update Account  Delete Account 

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Currently in Matching [Forums](#)

Find your next study partner

	Name	Rating	
Profile picture			

< Is Available: >

Courses Studying:

Your Matches

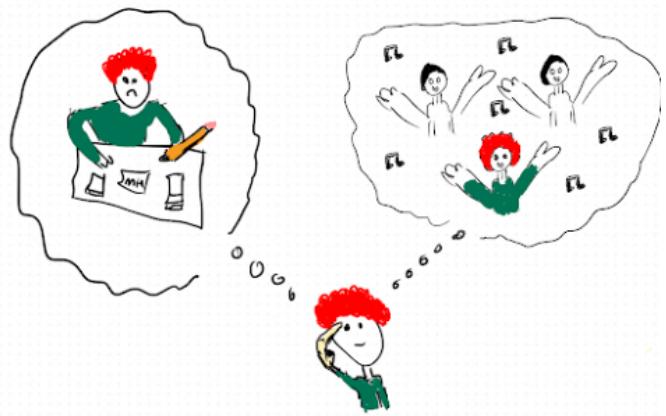
Rate your previous study partner

View Matches

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Hiding his profile allows him to focus on himself, not on studying or social pressure.

Use case 7: Introvert looking for someone with similar traits to study with

Use Case 7 Storyboard



Taylor is an introvert, she is shy around others and prefers to keep to herself. But unfortunately she needs help in school and is anxious that the partner will talk about nonsense and end up distracting her.



She is happy to find that SwampStudy has a "introvert" filter that fixes her issue.

About

# SwampStudy



Welcome!  
Finding  
study buddies  
made easy!

Email:   
Password:

Login

Don't have an account?  
[Register](#)

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click!

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About

# SwampStudy



Matching

Currently in...

Settings Logout

Department: General Chat: v

Class: College Help: v

Search for threads...  Search

Graduation tickets

Does anyone have any extra graduation tickets???

Asked By: Sarah 

View Details

click!

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The screenshot shows the SwampStudy website interface. At the top, there are navigation links: 'About' (highlighted), 'Settings', and 'Logout'. The main title 'SwampStudy' is displayed prominently. On the left, the 'Profile Settings' section includes fields for 'Name' (with a placeholder 'Profile Picture' and a 'upload image' button), 'Bio' (with a multi-line text area and an 'Edit Bio' button), and 'Availability' (with a grid of days from Monday to Sunday, each with a red toggle switch). Below these is a 'Rating' section with five yellow stars. A large red arrow points from the bottom center towards the 'Edit Bio' button. On the right, the 'Account Settings' section contains fields for 'First Name', 'Last Name', 'Email', and 'Phone' (labeled as optional). There is also a 'Confir.' field, a 'Hide Ac.' button, and a toggle switch for 'Introverts only'. Below these are 'Update Account' and 'Delete Account' buttons. A second red arrow points from the bottom center towards the 'Delete Account' button. The footer features the SwampStudy logo, social media links for Facebook, Instagram, and YouTube, and links for 'About', 'Privacy Policy', 'Licensing', and 'Contact'.



[About](#)  **SwampStudy**  [Settings](#) [Logout](#)

Currently in Matching [Forums](#)

Find your next study partner

	Name	Rating	
	Profile picture		Introvert
Is Available:	Courses Studying:		

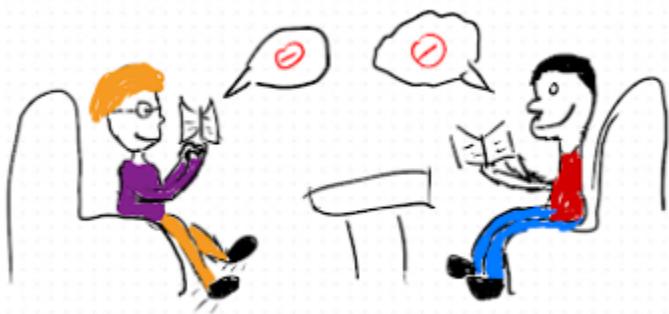


Your Matches

 **SwampStudy**

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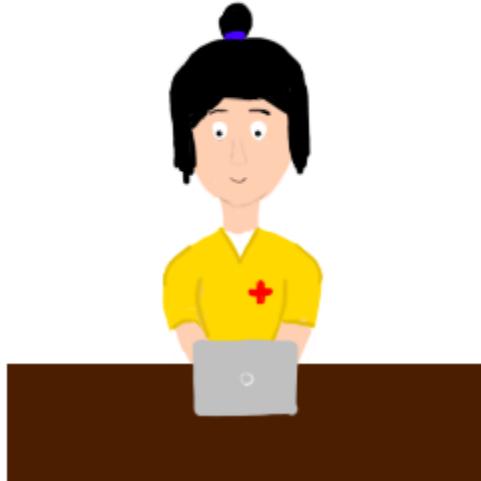


She is now free to study with others just like her, and avoid the uncomfortable small talk extroverts tend to do.

## Use case 8: Users ensuring the quality of matches by reporting

### *Use Case 8 Storyboard*

This is Michelle, she matches with Karen and they schedule a session.



Michelle is finding Karen to be intollerable and is losing patience.



Michelle is giving Karen a bad rating. She ends this session hoping no one else has to deal with Karen.



[About](#) SwampStudy 

Welcome! Finding study buddies made easy!

Email:   
Password:

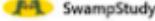
**Login** Don't have an account?  
[Register](#)

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Matching Currently in Forums

Search for threads...

Class: College Help

Graduation tickets Asked By: Sarah  
Does anyone have any extra graduation tickets???

[View Details](#)

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The screenshot shows the SwampStudy website interface. At the top, there is a purple header bar with the following elements from left to right: a yellow 'About' button, the 'SwampStudy' logo (a green frog icon), a yellow 'Forums' button, a yellow 'Settings' button, and a yellow 'Logout' button. Below the header, the page title 'Currently in Matching' is displayed. To the right of the title is a green checkmark icon followed by the text 'Your Matches' and a link 'Rate your previous study partner'. On the left side of the main content area, there is a large red 'X' icon. In the center, there is a table with two rows. The first row has three columns labeled 'Name', 'Rating', and 'Profile picture'. The second row has two columns labeled 'Is Available:' and 'Courses Studying:'. To the right of the table, there is a green checkmark icon followed by a red arrow pointing to a white button labeled 'CLICK HERE'. Below the table, there is a 'View Matches' button. At the bottom of the page, there is a footer bar with the 'SwampStudy' logo, social media links (Facebook, Instagram, YouTube, and a question mark icon), and links for 'About', 'Privacy Policy', 'Licensing', and 'Contact'.

The image displays two screenshots of the SwampStudy website, illustrating the reporting process for a matched user.

**Screenshot 1: Initial Match View**

This screenshot shows the user interface after a match has been made. The main content area displays the matched user's profile picture, name, rating, availability, and study details. A red arrow points to the "Report" button, which is highlighted with a red box and labeled "Click".

Name	Rating
[Profile Picture]	[Rating]

**Screenshot 2: Reporting Confirmation**

This screenshot shows the result of the reporting action. A purple modal dialog box is displayed, stating "USER has been reported. You have been unmatched." An "OK" button is visible at the bottom right of the dialog. A large red curved arrow on the left side of the image points from the first screenshot down to the second, indicating the progression of the action.

**User Profile Details (Visible in Both Screenshots)**

Availability:	Profile picture	Rating:	Meeting Details
Mon : Tue : Wed : Thu : Fri : Sat : Sun :	[Profile Picture]	[Rating]	Date: Time: Location: Study Course: Email:

**Buttons (Visible in Both Screenshots)**

- Report (Red button)
- Rate Partner (Yellow button)
- Back to Matches (Grey button)

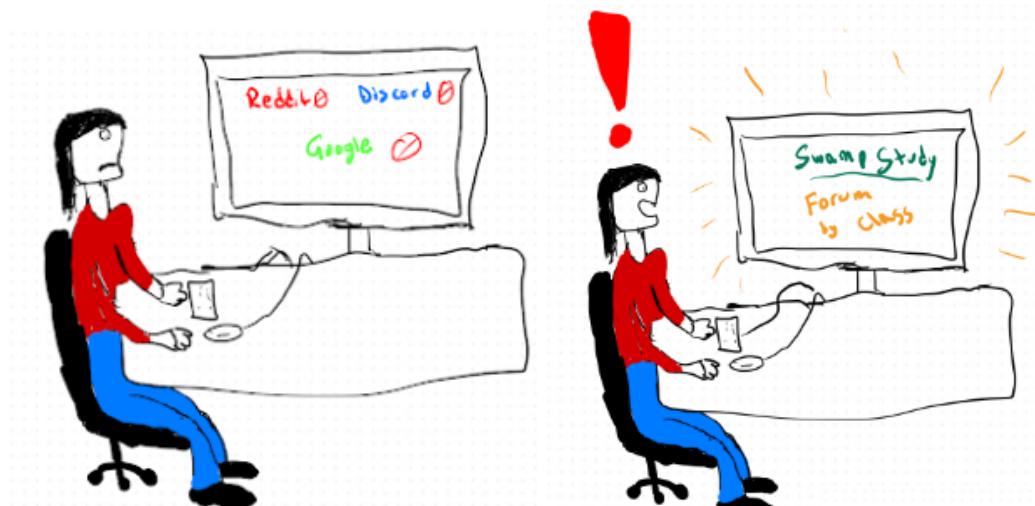
## Use case 12: User getting his questions answered on the forum

### Use Case 12 Storyboard



Geronimo missed the first week of an online class, he finds out there is a textbook that is required, but can't find which one is right.

He panics as the professor doesn't answer emails, and he does not have anyone else's contact information.



He tried to search the conventional places, but had no luck. Until he found the Swamp Study Website, here he was able to Ask in the class specific forum and get his answer.



Welcome!  
Finding  
study buddies  
made easy!

Email: \_\_\_\_\_

Password: \_\_\_\_\_

Don't have an account?  
[Register](#)

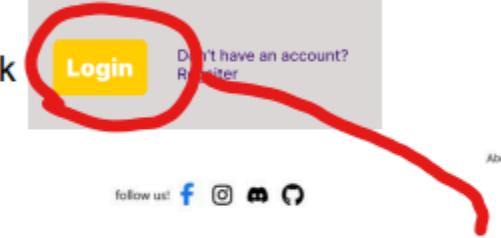
**Login**

Click **Login**

SwampStudy

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Matching

Currently in Forums

Department: General Chat: v

Class: College Help v

Search for threads... **click** [Search](#)

Graduation tickets

Does anyone have any extra graduation tickets???

[View Details](#)

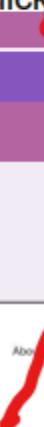
Asking by: Sarah

**Make a Post**

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The screenshot shows the SwampStudy website's header. It features a purple navigation bar with several buttons: 'About', 'Matching', 'Currently in Forums' (which is highlighted in yellow), 'Settings', and 'Logout'. A red arrow points from the 'Logout' button towards the main content area.

A modal window titled 'Make a Post' is displayed. It contains fields for 'Department' (set to 'General Chat'), 'Class' (set to 'College Help'), 'Title' ('enter title'), and 'Question' ('type your question here...'). At the bottom are 'Cancel' and 'Submit' buttons. A red arrow points to the 'Submit' button.

The footer of the website includes the 'SwampStudy' logo, social media links for Facebook, Instagram, and Twitter, and links for 'About', 'Privacy Policy', 'Licensing', and 'Contact'.

The screenshot shows the forum search results page. On the left, there are dropdown menus for 'Department' (set to 'General Chat') and 'Class' (set to 'College Help'). The main area displays two search results:

- Graduation Tickets**  
Asked By: Sarah  
[View Details](#)
- Finding my textbook**  
Asked By: John  
[View Details](#)

A red arrow points to the 'View Details' link under the second result.

The footer of the website includes the 'SwampStudy' logo, social media links for Facebook, Instagram, and Twitter, and links for 'About', 'Privacy Policy', 'Licensing', and 'Contact'.

**About** SwampStudy  **Settings** **Logout**

Currently in Matching Currently in Forums

**click**

Finding my textbook

Is there a place to ask about old textbooks around here?

Asked by: Joe

John: yeah what class is this for?

Joe: really, its for calc 1

John: ok just go to the calc 1 forum they'll help you out!

Add your answer.

**Cancel** **Submit**



**About** SwampStudy  **Settings** **Logout**

Matching Currently in Forums

**click**

1. Department: General Chat: v

2. Class: College Help: v

Search for threads...

Search Make a Post

Graduation Tickets Asked By: Sarah

Anyone have any extra graduation tickets??

**View Details**

Finding my textbook

Is there a place to ask about old textbooks around here?

**View Details** Asked By: John



The screenshot shows the SwampStudy homepage with a purple header. On the left, there's a sidebar with dropdown menus for 'Department' (Math) and 'Class' (Calculus 1). The main content area has a search bar with the placeholder 'Search for threads...'. Below it, a thread titled 'Integrals' is listed, asking 'what is an Integral?' and noting it was 'Asked By: John'. A red arrow points from the top-left towards the sidebar, and another red arrow points from the top-right towards the search bar.

This screenshot shows the 'Make a Post' dialog box overlaid on the SwampStudy page. It contains fields for 'Department' (Math), 'Class' (Calc 1), 'Title' (enter title), and 'Question' (type your question here...). At the bottom are 'Cancel' and 'Submit' buttons. A red arrow points from the top-right towards the 'Submit' button.

The screenshot shows the SwampStudy interface. At the top, there's a purple navigation bar with yellow circular buttons for 'About', 'Settings', and 'Logout'. The title 'SwampStudy' is in the center. Below the bar, there are two tabs: 'Matching' (gray) and 'Currently in Forums' (purple). A red arrow points down from the 'Matching' tab towards the main content area.

**Matching**

**Currently in Forums**

**Search for threads...**

**Search** **Make a Post**

**Department:** MATH **Class:** Calculus I

**Integrals** Asked By: John

what is an integral? **View Details**

Finding my textbook Asked By: Joe

Anyone take calc 1 with mr Jones, need help finding the text book. **View Details**

**click**

The screenshot shows a detailed view of a forum post titled 'Finding my textbook'. The post was made by 'Joe' and has a link: 'AVgAQVigUYQ6iCBBAGBSYAvrClBgGGSerUljAuMaAHmww&solient=ges-wiz-serp'. There is a text input field labeled 'add your answer.' and two buttons at the bottom: 'Cancel' and 'Submit'.

**Finding my textbook**

Anyone take calc 1 with mr Jones, need help finding the text book. Asked by: Joe

Steve: dude he used this old pdf its impossible to find, heres the link :  
AVgAQVigUYQ6iCBBAGBSYAvrClBgGGSerUljAuMaAHmww&solient=ges-wiz-serp

**add your answer.**

**Cancel** **Submit**

# Database Architecture

## 1. Database Requirements

### 1.1. Registered User (Weak)

- 1.1.1. A User shall be able to make many matches
- 1.1.2. A User shall be able to post many questions
- 1.1.3. A User shall be able to answer many question
- 1.1.4. A User shall have zero or one account

### 1.2. Account (Strong)

- 1.2.1. An Account shall belong to one or zero Registered User
- 1.2.2. An Account shall be in many matches
- 1.2.3. An Account shall have many attributes
- 1.2.4. An Account shall have one or zero profiles
- 1.2.5. An Account shall have many Ratings
- 1.2.6. An Account shall take many Classes

### 1.3. Match (Strong)

- 1.3.1. A Match shall contain two users
- 1.3.2. A Match shall have a class associated with it
- 1.3.3. A Match shall have one meeting
- 1.3.4. A Match shall have one meeting link
- 1.3.5. A Match shall have one meeting time

### 1.4. Question (Weak)

- 1.4.1. A Questions shall be posed by one Account
- 1.4.2. A Question shall have one or many answers
- 1.4.3. A Question shall have a class associated with it
- 1.4.4. A Question shall be in one and only one thread

### 1.5. Answer (Weak)

- 1.5.1. An Answer shall belong to one and only one Thread
- 1.5.2. An Answer shall have one account author
- 1.5.3. An Answer shall have one rating

### 1.6. Rating (Weak)

- 1.6.1. A Rating shall belong to one and only one question

### 1.7. Thread (Weak)

- 1.7.1. A Thread shall contain one and only one question
- 1.7.2. A Thread shall contain one or many answers
- 1.7.3. A Thread shall be marked with its status

### 1.8. Class (Strong)

- 1.8.1. A Class shall belong to many questions
- 1.8.2. A Class shall belong to many matches
- 1.8.3. A Class shall be associated with many users
- 1.8.4. A Class shall be taken by many Users

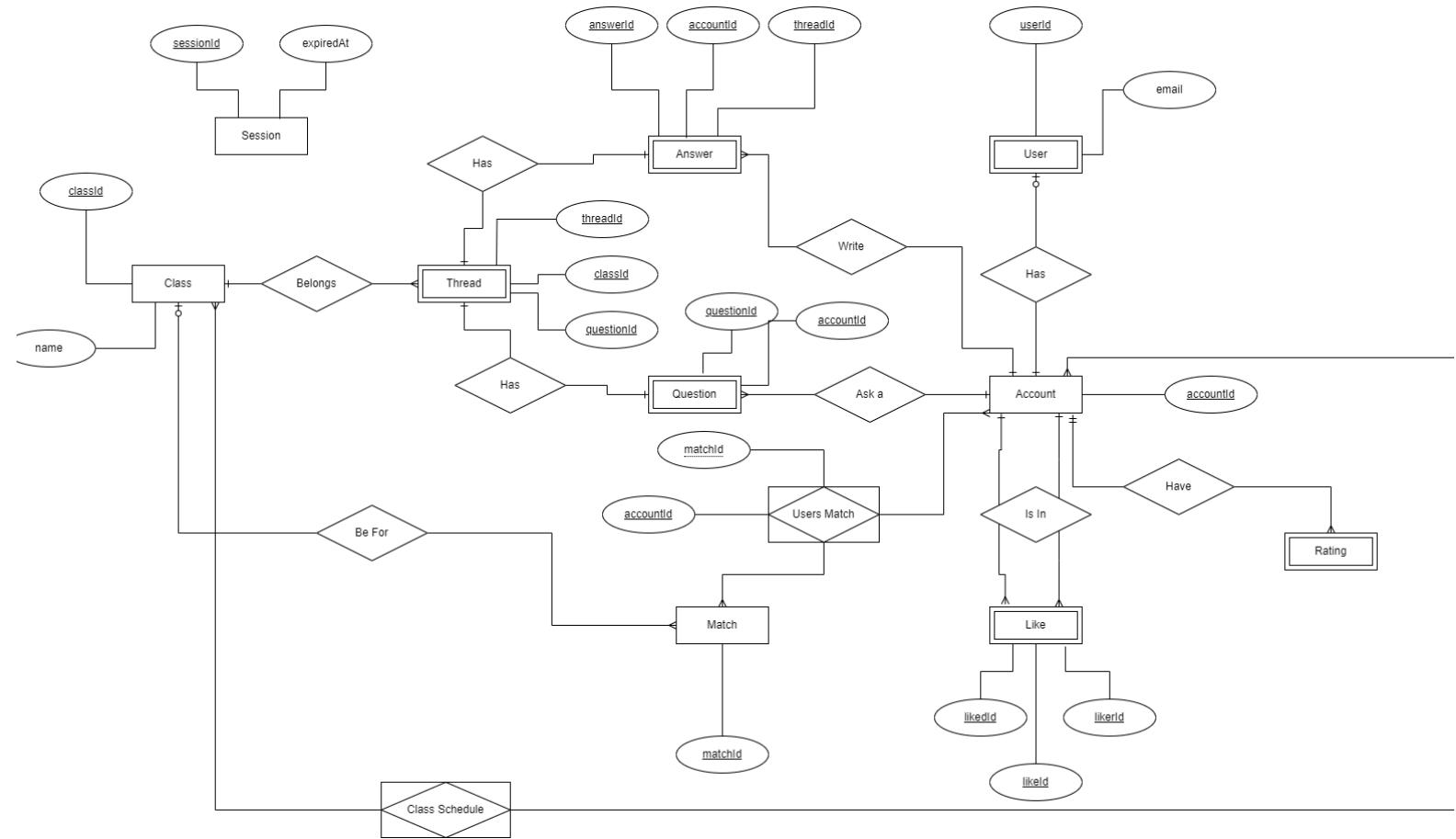
### 1.9. Profile (Weak)

- 1.9.1. A Profile shall belong to one account
- 1.9.2. A Profile shall have one or many attributes

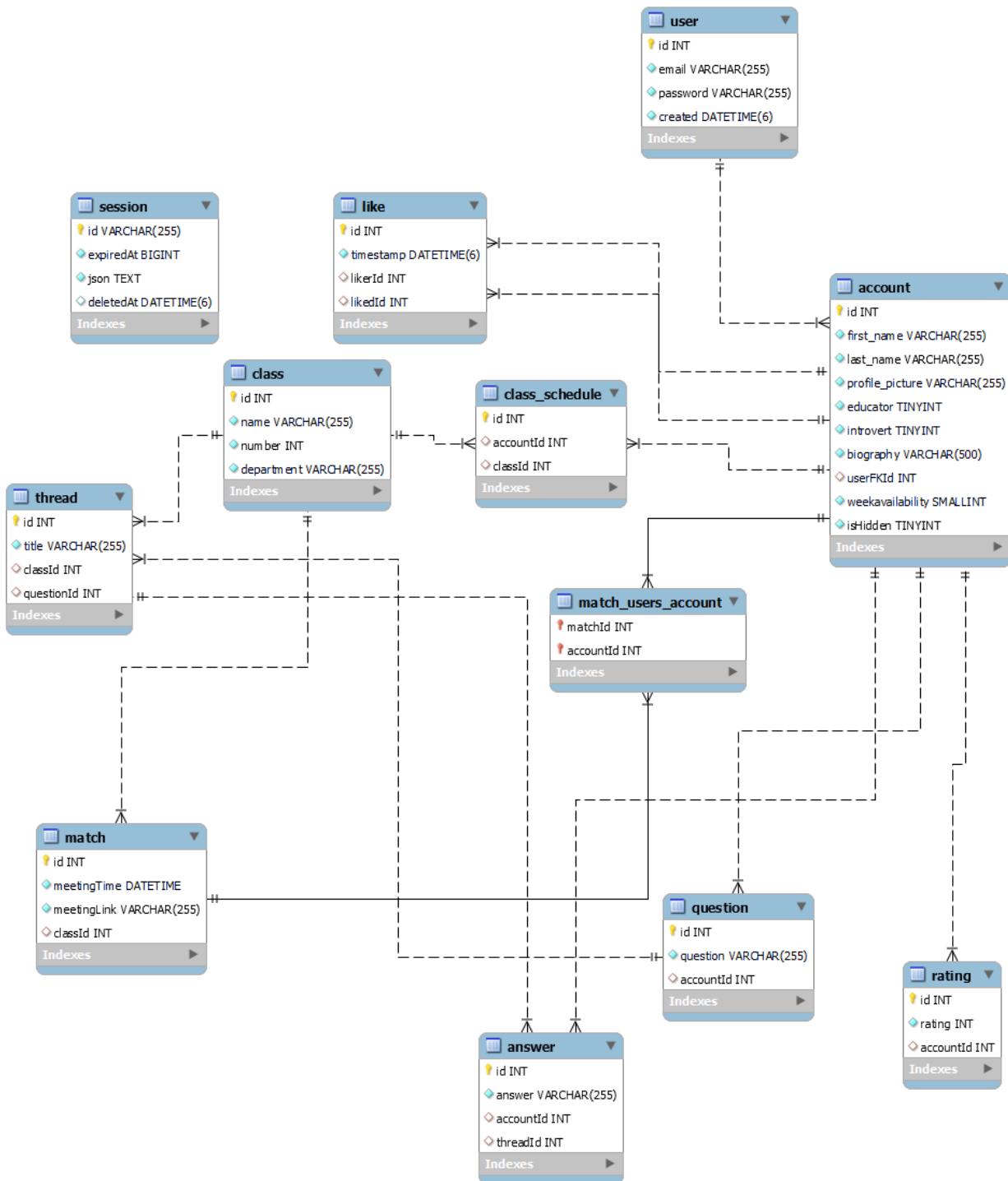
- 1.10. Like (Weak)
  - 1.10.1. A Like shall have one or more accounts
2. Entity Attributes, Relationships, and Domains
  - 2.1. user (Weak)
    - 2.1.1. id: PK, Numeric, Generated
    - 2.1.2. email: unique, alphanumeric
    - 2.1.3. password: alphanumeric, hashed
    - 2.1.4. created: datetime, generated
    - 2.1.5. account: Numeric, ForeignKey
  - 2.2. account (Strong)
    - 2.2.1. id: PK, Numeric, Generated
    - 2.2.2. first\_name: alphanumeric
    - 2.2.3. last\_name: alphanumeric
    - 2.2.4. profile\_picture, upload (S3 Link)
    - 2.2.5. educator: tinyint (Boolean)
    - 2.2.6. introvert: tinyint (Boolean)
    - 2.2.7. biography: varchar(500)
    - 2.2.8. userFKId: Numberi, Foreign Key
    - 2.2.9. weekavailability: smallInt
    - 2.2.10. isHidden: tinyInt
  - 2.3. match (Strong)
    - 2.3.1. id: PK, Numeric, Generated
    - 2.3.2. classId: FK, Numeric, class\_id
    - 2.3.3. meetingTime: datetime
    - 2.3.4. meetingLink: Alphanumeric
  - 2.4. match\_users\_account (Weak)
    - 2.4.1. matchId: PK, Numeric, Generated
    - 2.4.2. accountId: FK, Account, user\_id
  - 2.5. class (Strong)
    - 2.5.1. id: PK, INT
    - 2.5.2. name: Alphanumeric
    - 2.5.3. number: INT
    - 2.5.4. department: Alphanumeric
  - 2.6. question (Weak)
    - 2.6.1. id: PK, Numeric, Generated
    - 2.6.2. accountId: FK, Numeric, account\_id
    - 2.6.3. question: alphanumeric
  - 2.7. answer (Weak)
    - 2.7.1. id: PK, Numeric, Generated
    - 2.7.2. accountId: FK, Numeric, account\_id
    - 2.7.3. answer: alphanumeric
    - 2.7.4. threadId: FK, Numeric, thread\_id
  - 2.8. thread (Weak)
    - 2.8.1. id: PK, Numeric, Generated

- 2.8.2. classId: FK, Numeric class\_id
  - 2.8.3. questionId: FK, Numeric, question\_id
  - 2.8.4. title: alphanumeric
- 2.9. like (Weak)
    - 2.9.1. id: PK, Numeric, Generated
    - 2.9.2. likerId: FK, Numeric, Account ID
    - 2.9.3. likedId, FK, Numeric, Account ID
    - 2.9.4. timestamp: Date time, Generated
- 2.10. session (Strong)
    - 2.10.1. id: PK, VarChar, Generated
    - 2.10.2. expiredAt: Big Int
    - 2.10.3. json: text
    - 2.10.4. deletedAt: datetime
- 2.11. rating (weak)
    - 2.11.1. id: PK, Numeric, Generated
    - 2.11.2. rating: Numeric, int
    - 2.11.3. accountId, int
- 2.12. classSchedule (weak)
    - 2.12.1. Id: PK, Numeric, Generated
    - 2.12.2. account: FK, Numeric Account ID
    - 2.12.3. class: FK, Numeric, Class ID

## Entity Relationship Diagram



## Entity Establishment Relation Diagram (EER)



## DBMS System

The DBMS system we chose is MySQL. We made this decision since it's the system we have the most experience with and there are existing integrations. We also integrated TypeORM into our application which is a TypeScript ORM library which allows us to define our database within our application code.

## Media Storage

For our media storage we are using an AWS S3 bucket and storing the links to the images within our database. The integration is done using the AWS SDK which integrates into our express application.

## Searching the Database

All the searching is done through the TypeORM library.

There are 2 mechanisms for searching, EntityManager, and Repository, our application utilizes the Repository feature.

```
const result = await myDataSource
  .getRepository(Account)
  .findOneBy({ id: userId as unknown as number });
```

The above example is using the Repository, which is meant for grabbing single tables/entities from the database. The one above is an example of getting an Account based on the User Id

We can also build more complex search queries by combining the Repository with the QueryBuilder

```
const matches = await myDataSource
  .getRepository(Match)
  .createQueryBuilder("match")
  .innerJoin("match.users", "account")
  .where("account.id = :userID", { userID: id })
  .getMany();
```

With the QueryBuilder we are able to join tables and build virtually any SQL query that we need.

To Optimize searching we can mark tables with relations as eager, which then automatically loads the tables marked in the relation which makes for faster and more efficient searching.

```
@ManyToMany((type) => Category, (category) => category.questions, {
  eager: true,
})
```

# High Level API's and Main Algorithms

## Login API:

The login API lets the existing users access their accounts by verifying their email and passwords with the database. The API checks if the email and password fields are provided and will respond if there is anything missing. Should there be no user found it will return a not found response. The API will check the database for the user name then check if the password stored matches using bcrypt's compare function adding a layer of protection. A session for the user is generated with userId.

## Logout API:

The logout api handles user logout by ensuring that the session is properly destroyed and removed from the database.

## Register API:

The Register API processes a new user to SwampStudy. It starts by validating the essential fields like first name, last name, and etc. If there were to be a missing field then the return will be a bad request response. The API will check for existing users in the database. When all the checks are successful it will hash the password, and create a new user entity with corresponding account entity.

## Match API

The match API retrieves a given user's matches and returns the information for the match in JSON format. The API returns an array of a user's matches or an empty array

if there are none. On error it returns a negative status code along with a response message.

#### Like API

The Like API sends a request to create a like, based on the current user and the profile the current user wishes to like. Requests are sent with the two profiles, the liker and the liked. Once the request is sent in the background the matching algorithm determines whether there is a match. On success returns a positive status code and response message. On failure returns a negative error code and error message.

#### Forum API:

The forum API facilitates the creation, retrieval, and management of questions, answers, and discussion threads within the forum. It supports operations such as posting new questions and answers to questions, fetching questions along with their corresponding answers, and organizing discussions by classes and departments. This ensures a structured and interactive environment for users to engage in topic specific discussions, leveraging data integrity and validation to maintain a robust platform.

#### Like and Match Algorithm

The Matching algorithm gets run every time a user likes another user. As soon as this action takes place, the algorithm checks if there is a reciprocal like in the system. If that exists, a match is formed and put into the system for the user to interact with. If not the like gets inserted and can be used to create a potential match if the other person ever likes this user.

## Session Algorithm

The session management algorithm in SwampStudy encompasses session creation , validation, and destruction across both frontend and backend areas. This begins at user login, where existing users pass an email, and password to the backend. When the backend receives the request to login, it is routed to the user controller, where in the email is used to query for the corresponding users information stored in the db provided that the password passes a comparison check using bcrypts compare function against the stored hash. This user information is then used to set key session data used for validation at different junctions of our web application. In our backend, sensitive routes are protected using a session validation middleware, which ensures the session is valid by checking that the appropriate data is present in the session. This middleware is attached to the request and calls next() upon successful validation of the session indicating to continue to the next function or it'll return an error response indicating the session is invalid. At different points in the web application, the frontend will check that a session is authenticated to determine whether to grant or prevent a user from accessing certain site resources and or updating the appearance of the UI dynamically. This check for session validity is primarily handled by the authentication controller, which sends back a status upon checking that the session is populated with the correct data. This data can only be accessed from the db itself and is set at the login phase.

## Search Algorithm

The Search algorithm is implemented using the ORM database connection. In order to search for Forum Posts using title keywords, we take the Keyword placed into the

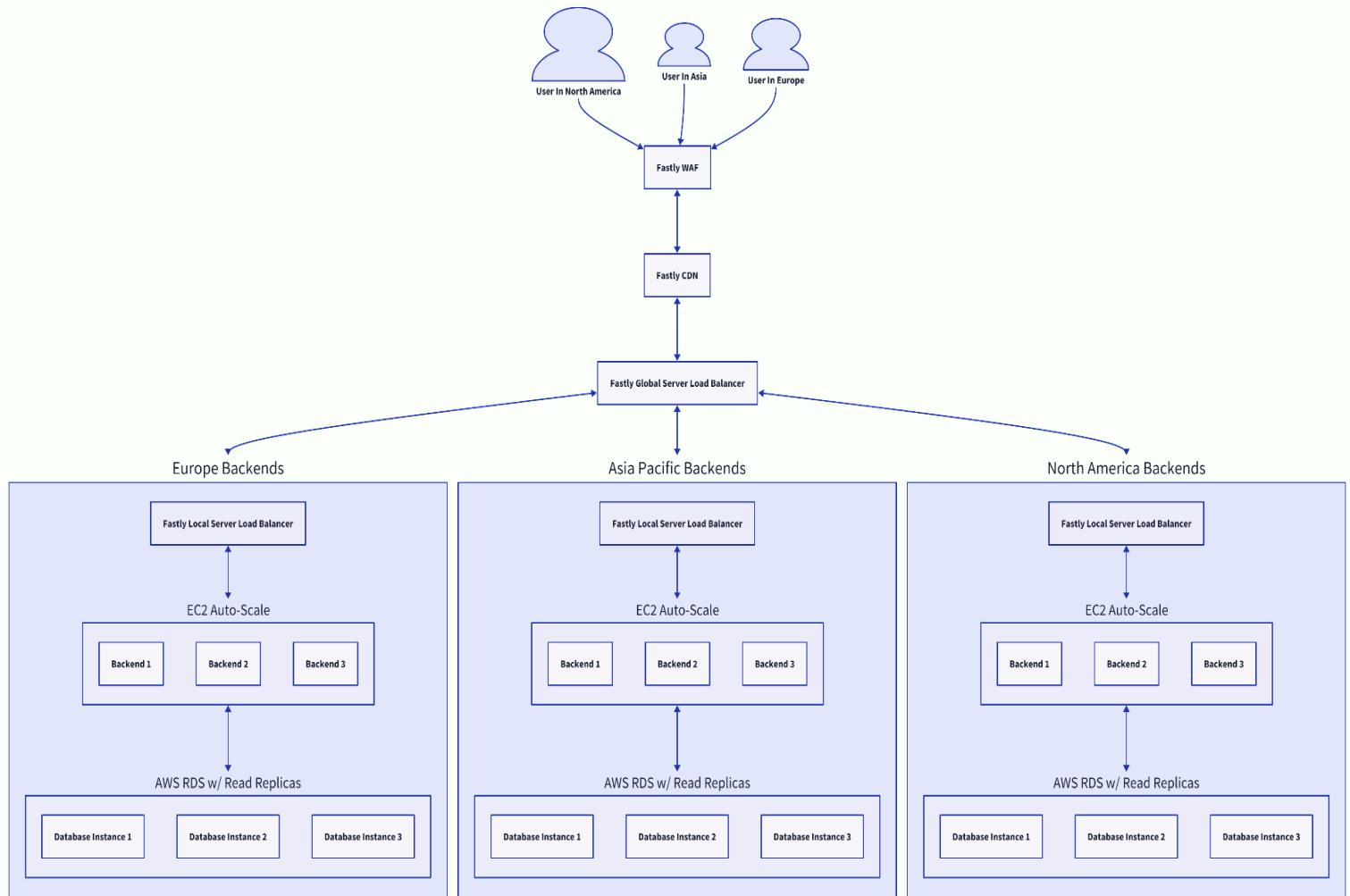
search box and then use a query with the ‘where’ keyword and regex wildcards to determine which posts fit the given criteria and then filter and display the results based on that keyword. We also scan the answers of each question as well in order to give a more comprehensive search. What gets returned are any threads with question/titles/answers that contain the requested keywords. This gives the customers a more comprehensive result given that it also takes into account the answers provided by other users.

# System Design

UML Class Diagram:

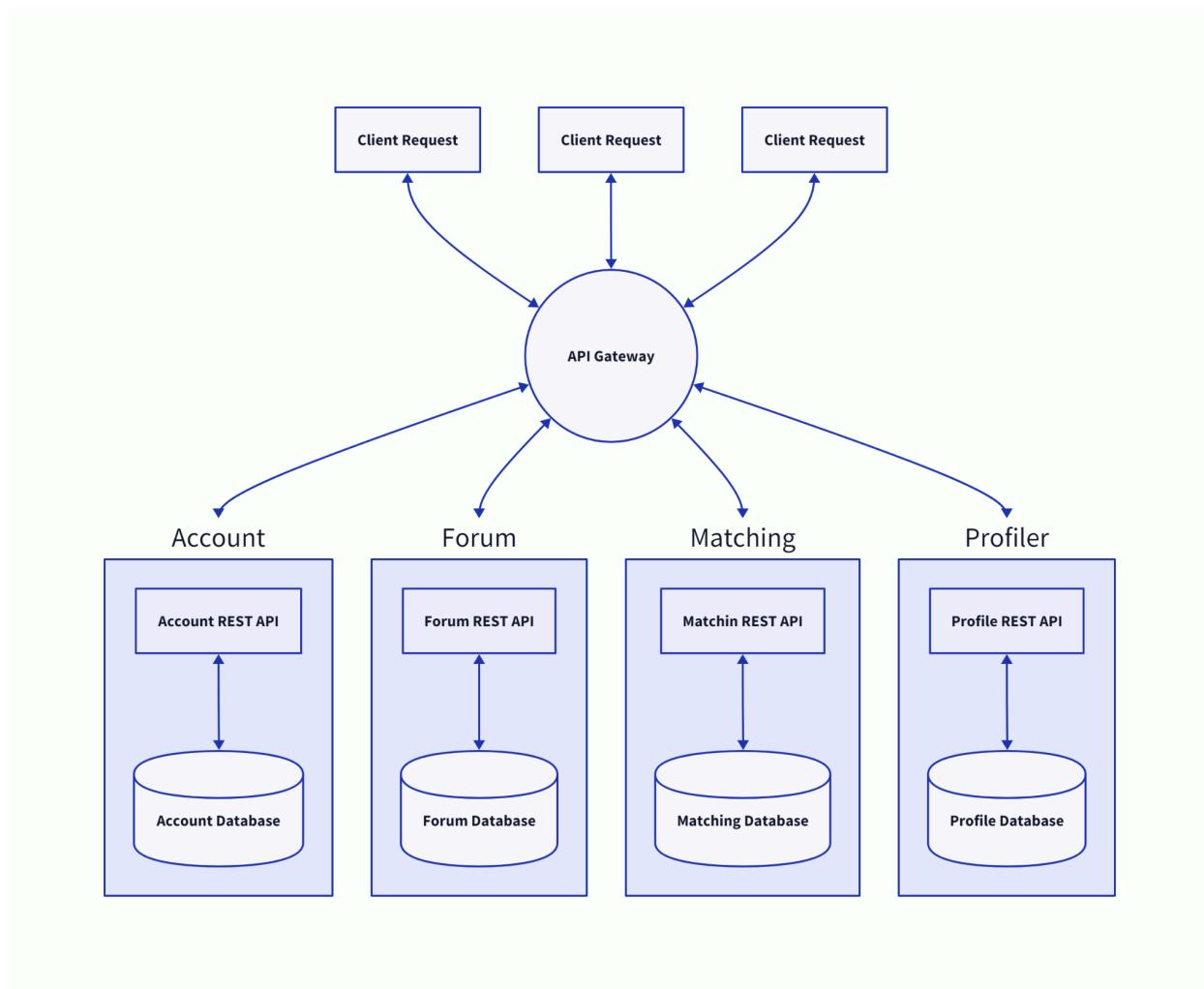
See the end of the Document for full size diagram

## Scalability Diagram



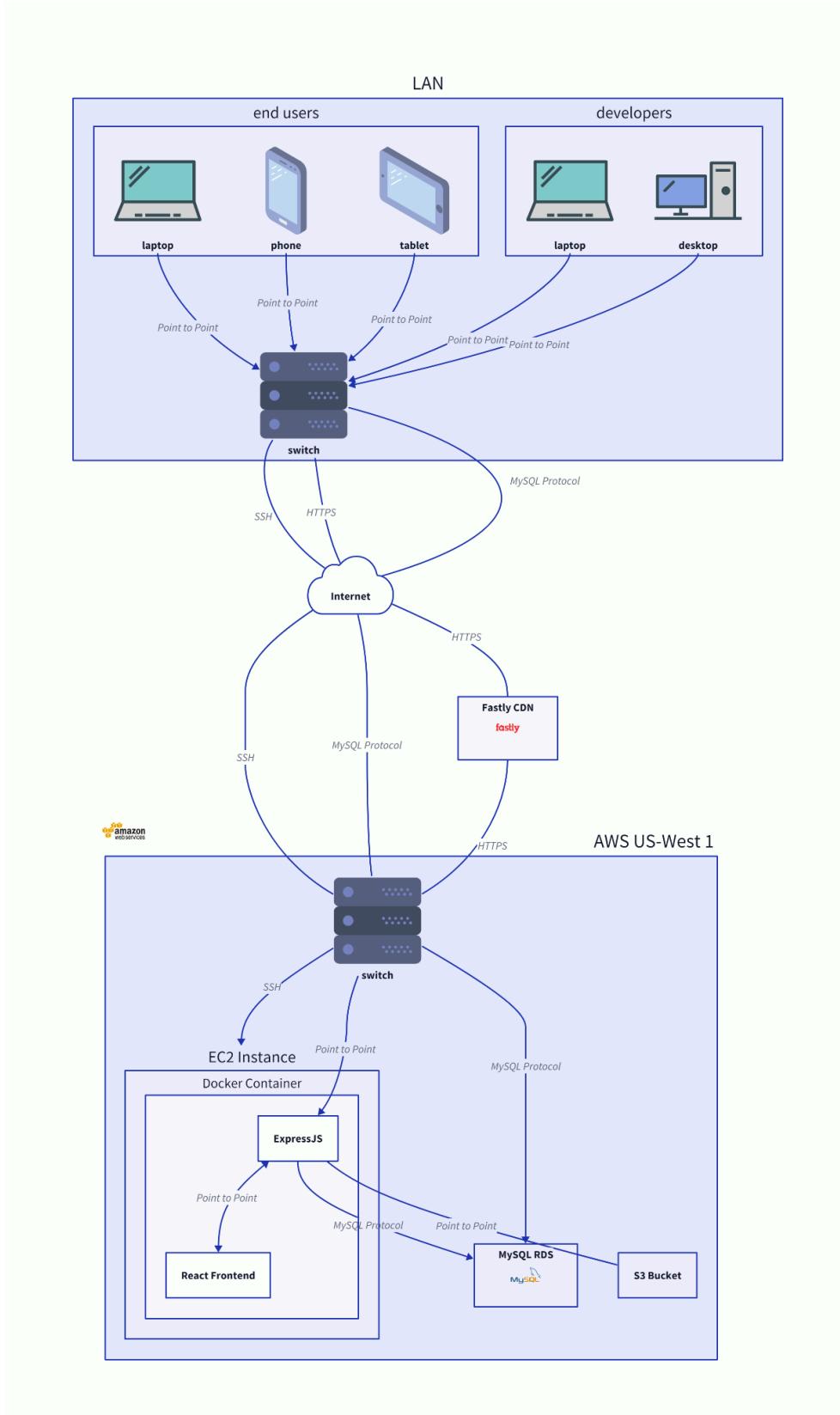
To let our service scale with ease, we first introduce a WAF at the top of the chain. This will allow us to filter malicious requests and bots trying to gain access to the system. We then run all the requests through our CDN which allows for request collapsing and to deliver cached content far quicker from the edge. After that requests hit the global load balancer which decides which server is the fastest and most responsive to handle that traffic. After being sent to a local region there is another load balancer which checks the availability of the local servers and determines the most appropriate server. The servers then have multiple Read Replicas of the Database they can access in order to make the reading quicker. All the servers/EC2 instances have a Auto-Scale setup which means if the traffic ever exceeds the current resources more will be created to handle with the increased demand.

Microservices Diagram

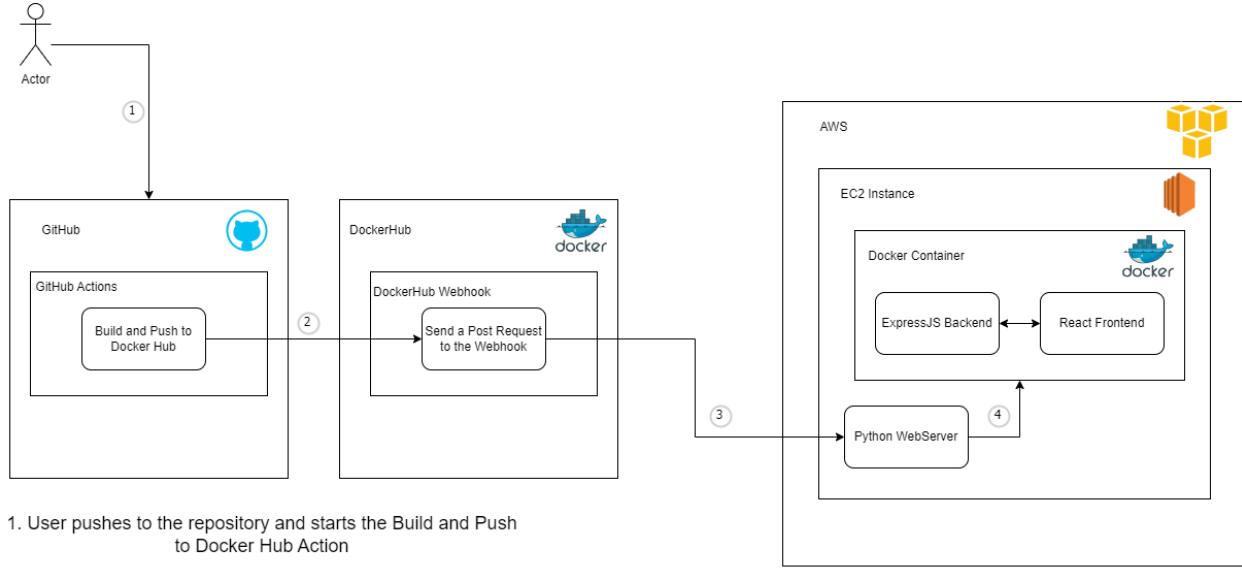


# High Level Application Network and Deployment Design

Network Diagram



## Deployment Diagram



1. User pushes to the repository and starts the Build and Push to Docker Hub Action

2. DockerHub notices a new push and initiates a post request sent to the webhook

3. Python WebServer receives the Post request notifying of a new version of the application

4. Python WebServer downloads the new Docker image, and then restarts the application with the new image

# Key Risks

## Skills Risks:

Even though we chose a Tech Stack we were all mostly comfortable with. Working across a Full Stack project with many integrations and interactions is still a challenge at times. We have been taking these skills risks head on by discussing frequently on Discord meetings in person and making videos to explain tricky pieces of code and integrations that might not be 100% intuitive.

## Schedule Risks:

With 7 weeks remaining in the Semester we will be definitely pushing the limits with our full suite of requirements. I have full faith in our ability to get the application into a workable state. One of our risks also includes the passion of the team to add more features and ideas that pop up along the way. We have to be very selective in admitting new ideas and they have to be fully thought out to gain admission. All team members have also been very proactive to make meetings and complete their work which gives us the best chance of finishing this project in a timely manner.

## Project Management

For Project Management we have been using Notion as our tool of choice. Using Notion has allowed us to create a new sub project for each Milestone. By doing this we are able to see at a glance what our progress is and where we need to make more progress. Every team meeting we go through our Notion Board/Tasks and evaluate deadlines and priorities, shifting as needed. Each task in our Notion has an assigned contributor and deadline. For our future Milestones we are going to continue using Notion, so far it has served us very well and allowed us to have a great overview with fine detail control. We also have internal documentation within Notion that everyone can contribute to which allows us to have a centralized location for all our notes. Along with Notion we use Discord for our team communication and quick exchanges. And Zoom as our meeting platform where we host our weekly team meetings, as well as other shorter brainstorming sessions.

# Team Evaluation

## Lennart (Team Lead) 10

- Project Planning
- Developed Backend API for Matching
- Developed Backend API for Likes
- Various Bug Fixes
- Network Diagram
- Deployment Diagram
- Scalability Diagram
- Microservice Diagram
- Attended all meetings
- Responsive on Discord

## Rafael (Backend Lead) 10

- Session API
- Session Implementation
- Bug Fixes in Forum
- Assisted in Front-End Development
- The Connection between front and back end
- Session API Description
- Reviewed Diagrams for the Document
- Bug Fixes on the front end
- Implemented the Search bar and algorithm
- Attended all meetings
- Responsive on Discord

## Edmund (Frontend Lead) 10

- Drew Mockups
- Drew Storyboards
- Login Component
- Logout Component
- Registration Form
- Terms and Conditions
- Attended all meetings
- Worked with UX Researcher

Responsive on Discord  
Created Frontend Matching Page  
Worked on Figma pages

## Julio (Docs-Editor) 10

Drew Mockups  
Drew Storyboards  
Aided in organization of Document  
M1V2 Submission  
Nav Bar on Website  
Registration Form on Website  
Forum implementation on Website  
Meeting Summaries  
Attended all meeting  
Worked with UX Researcher  
Responsive on Discord  
Reserved Library rooms

## Conrad (Github-Admin) 10

Managed GitHub Conflicts  
UML Diagram for Document  
API Description for Forum  
API Implementation for Forum  
Forum Entities  
Reviewed and improved all Entities  
Attended all meeting  
Responsive on Discord