CS3354 Software Engineering
Final Project Deliverable 2

Media Mapper

Group Members
Sanjana Ravikumar

Nihanth Attaluri

Luke Bailey

Quintin Mitchell-Reyes

Rohan Thomas

Murtaza Khan

Alberto Escobar

River Cook

1. [5 POINTS] Well described delegation of tasks, i.e. who did what in the project. Now that your project is complete, you are required to submit the delegation of tasks from beginning of the project until the end. Please make sure to fairly distribute tasks in the team and remember that in the end of the semester, each member of a team will receive the same grade. See grading policy below for more detail. If no/poor contribution by a member, please specify clearly so that we can grade each student fairly.

Member Name	Delegated Tasks
Sanjana Ravikumar	Respond to feedback. Project scheduling. Cost, effort, and pricing estimation.
Nihanth Attaluri	Write software model rationale. Provide a case diagram. Collaborate on a test plan for the software.
Luke Bailey	Provide a sequence diagram. List of functional software requirements. Commit everything from D2 to github.
Quintin Mitchell-Reyes	Design and submit documents. Estimate cost of hardware and software and create IEEE references.
Rohan Thomas	Commit the “project_scope” file. Compare works with similar designs. Prepare presentation slides.
Murtaza Khan	Provide a class diagram, conclusion about the final evaluation, changes that needed to be made, and reasons for any deviations from original plans.
Alberto Escobar	List non-functional software requirements. Estimate cost of personnel, and consolidate all cost information into a clean and readable format.
River Cook	Provide an architectural design. Collaborate on a test plan for the software.

2. [10 POINTS] Everything required and already submitted in Final Project Deliverable. Please specify this part as "Project Deliverable 1 content".

Project Deliverable 1 Content

Final Project Draft Description:

Media Mapper is a media diary app that allows you to track any and all media that you consume such as movies, television shows, books, anime, etc. Users will be able to build profiles where their activity is logged, interact with other users through community chats and spaces, and compare their activity and preferences with that of other users. Users can rate and leave reviews on content, and they can leave personalized notes on specific media to save for their reference. Users will be provided with suggestions for new media based on their past media and preferences. Considering the sheer amount of media consumed on a daily basis, Media Mapper is an easy way to organize one's preferences and activity, and it allows for users to engage with like-minded peers.

Professor Feedback:

Good choice for a topic! Following different media at an era of technology is very cool and connecting. It is great to see that your proposal attempts to take advantage of technology so that followers can share their experiences/suggestions on the news with each other.

A detailed breakdown of the tasks you have worked on already. Good job.

In the final report, please make sure to include comparison with similar applications -if any-, make sure that you differentiate your design from those, and explicitly specify how.

Fair delegation of tasks.

Response:

As said in the feedback, we will continue with our current breakdown of tasks. As for comparing similar applications, we can use sites such as MyAnimeList or IMDB. MyAnimeList is a site that allows users to discuss different anime and create a list of anime that they have watched or are going to watch. IMDB is similar and attempts to cover more than just anime, but it does not have a community or forum of any type. Our project will cover all types of media such as books, television, and films regardless of country or genre and it will implement features that encourage discussion.

Github repository link: 3354-teamGoobers

Which software process model is employed in the project and why.

Our project employs the incremental process model. We aim to build our project incrementally, where each update builds upon the other and provides unique updates. For example, the first iteration will have the base layer allowing users to track their own personal media. As we proceed other features such as communication between users, profiles, and reviews will be added.

Functional Requirements:

1. Media Tracker
    1.1. User should be able to search a database of media
    1.2 User should be able to save media into collections
    1.3 User should be able to privately rate and review media
    1.4 User should be able to make notes on media
    1.5 User should be able to add media to a watchlist
    1.6 User should be able to delete entire collections
    1.7 User should be able to delete media from collections
2. Media Suggester
    2.1 User should be able to swipe through suggestions provided by the system
    2.2 User should be able to add suggestions to watchlist or collections
    2.3 System should update suggestions based on users likes and preferences
3. Social Aspect
    3.2 User should be able to publicly rate and review media
    3.3 User should be able to view ratings and reviews from other members
    3.4 User should be able to comment on reviews from other members
    3.5 User should be able to friend other members
    3.6 User should be able to view the profiles of other members
    3.7 User should be able to message other users
4. User Personalization
    4.1 User can control who can view their profile (friends, public, private)
    4.2 User should be able to select which types of media they would like to track
    4.3 User should be able to choose what is displayed on their public profile
    4.4 User should be able to switch between light and dark mode
5. Account Controls
    5.1 User should be able to create an account with email
    5.2 User should be able to login with google or apple
    5.3 User should be able to set a profile picture
    5.4 User should be able to set a username
    5.5 User should be able to delete their account

Non-Functional Requirements:

1. Usability
   1.1. The user interface should be intuitive; a new user should be able to register and set up their profile within 10 minutes.
   1.2 The user will be able to access desired info within 3 clicks.
2. Performance
   2.1 When initially launched the app should open and load the users homepage within 5 seconds.
   2.2 The app should process server requests between 100 - 200 ms.
   2.3 The app should be able to support a minimum of 2,000 concurrent users without significant performance degradation.
   2.4 The app should handle a 50% uptick in users through horizontal scaling.
3. Space
   3.1 The total size of the mobile app should not exceed 200 mb after installation
   3.2 The app should allocate no more than 100 mb for caching frequently accessed media.
   3.3 The app should be able to store up to 1 million media records (movies, shows, books).
4. Dependability
   4.1 The app should have a crash rate of less than 1% per user.
   4.2 The app should have an availability of 99.9%.
   4.3 The app will maintain a mean time between failure (MTBF) above 1000 hours
5. Security
   5.1 Communication between clients and servers will be encrypted using HTTPS
   5.2 The system will use Relationship-Based Access Control (ReBAC) to determine what information users can access.
6. Environmental
   6.1 The app should work reliably (maintain dependability and performance requirements) across different operating systems and devices.
   6.2 The app should consume less than 2% of a mobile device's battery life per hour that it is open.
7. Development
   7.1 The app should be developed using JavaScript, with React being used for the frontend, and Node.js for the backend. Mobile versions of the app will be developed with React Native.

7.2 The app should be developed with the use of Git to track changes and allow for collaboration between developers.

8. Regulatory

   8.1 The app should comply with Texas Data Privacy and Security Act (TDPSA) and General Data Protection Regulation (GDPR).

9. Ethical

   9.1 The app should obtain explicit consent from users before collecting any personal data or information.

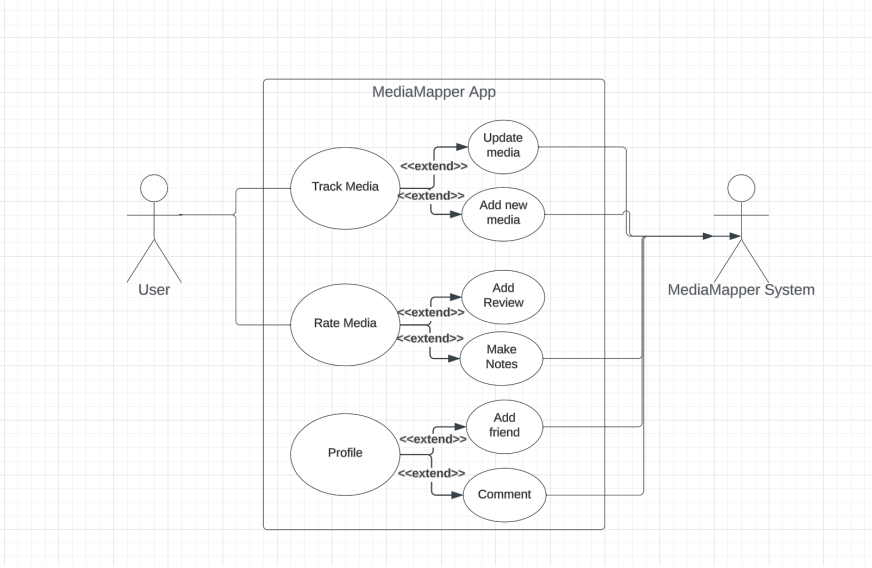
   9.2 The app should ensure that media recommendation algorithms are not influenced by sensitive factors (race, religion, etc.)

   9.3 The app will delete the data of inactive users after 1 year of inactivity.

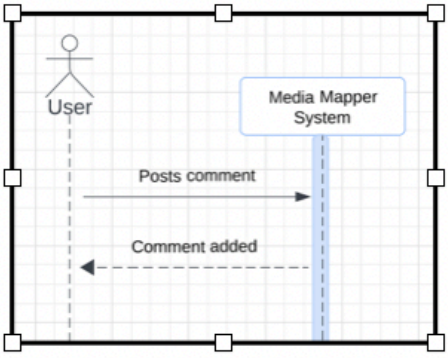
10. Accounting

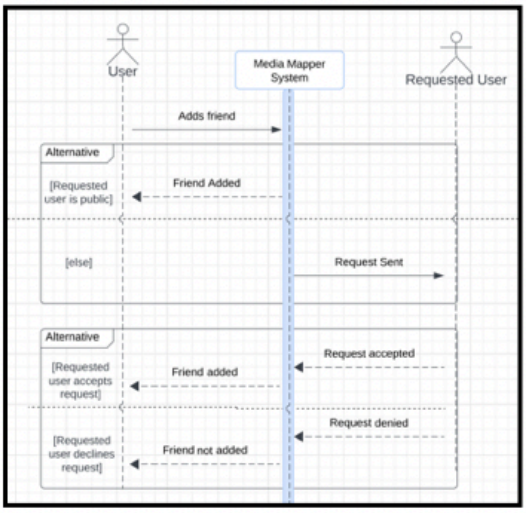
    10.1 The app will be able to process and record user activity related to ad impressions within 1 second and with an accuracy of 99.9%.

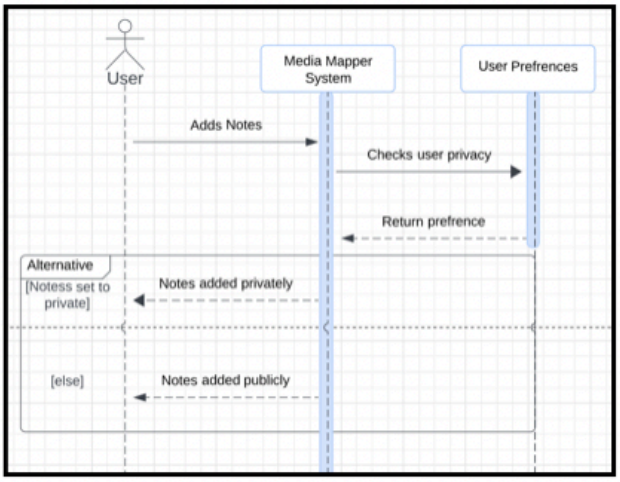
Use Case Diagram:

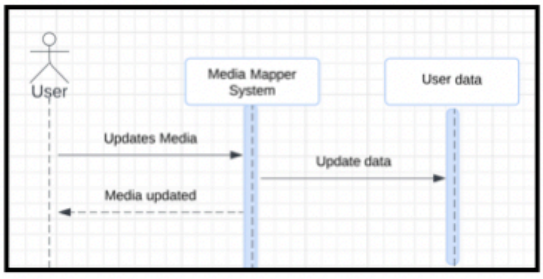


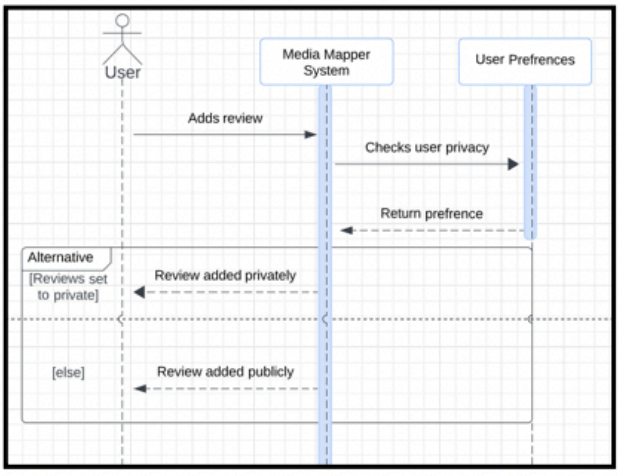
Sequence Diagram:

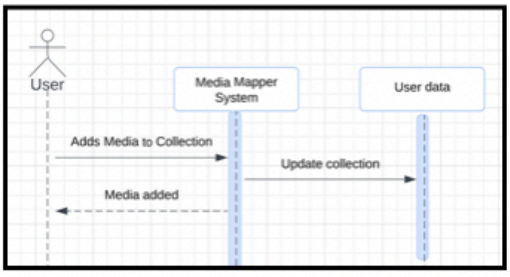




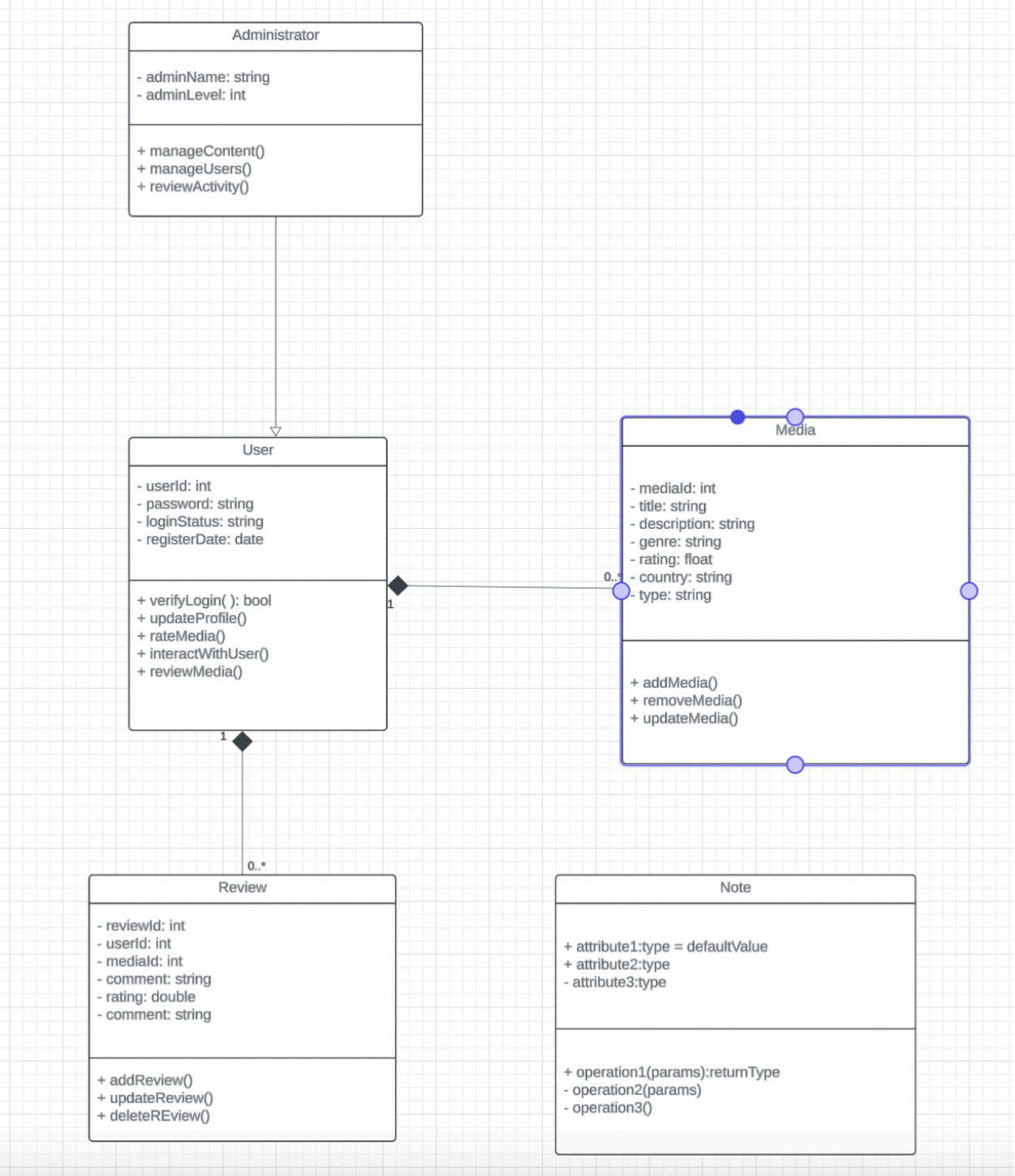




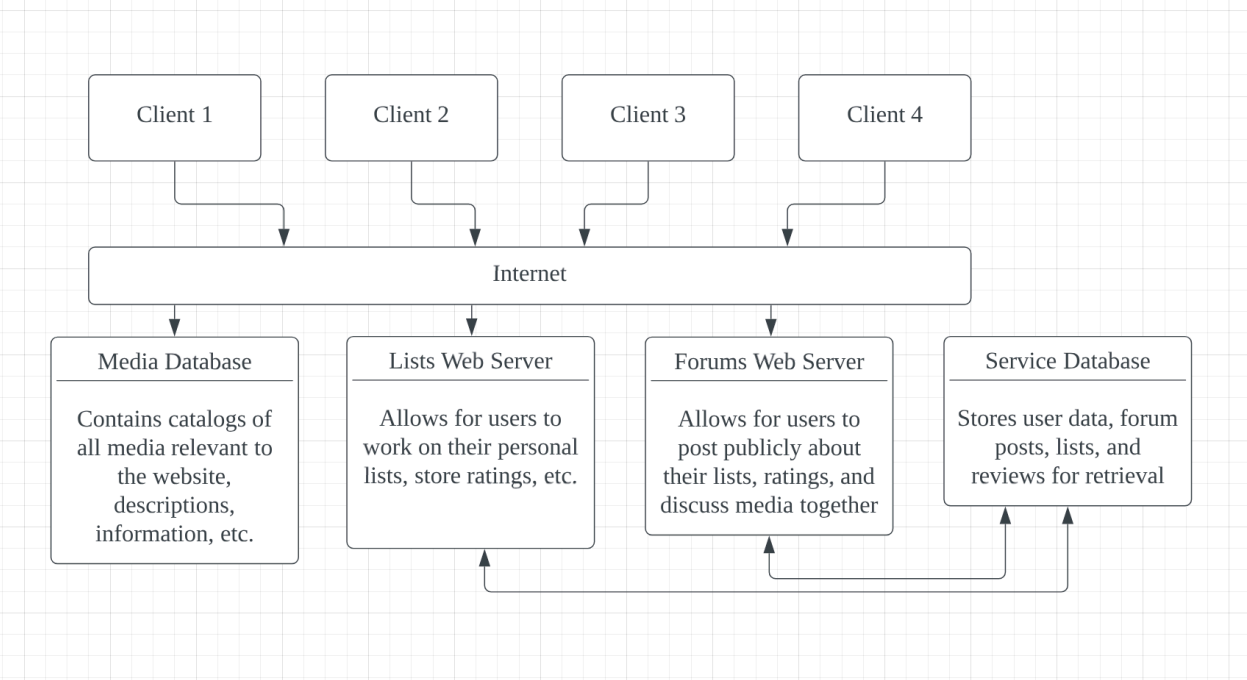




Class Diagram:



Architectural Design:



Deliverable 2 Content

IMPORTANT NOTE: The following items will all need to be calculated / worked on based on the project you are designing. As an example, if a team of 7 students in CS3354 class is working on the development of a hospital information system, this group will prepare the project scheduling, cost, effort and pricing estimation calculations based on the hospital information system design, NOT based on their 7 student team. Think of the analogy to the "Inception" movie: What you will be working on is the dream in a dream, i.e. the dream in the second level, NOT in the first level.

3. [35 POINTS] Project Scheduling, Cost, Effort and Pricing Estimation, Project duration and staffing.

3.1. [5 POINTS] Project Scheduling: estimated scheduling.

Our start date for our project will be June 3rd and our estimated end date will be June 10th, based on the calculations in the following section. The weekends will not be counted in our schedule and the number of working hours per day for the project will be at least 8 hours per day for a team of 4 members.

3.2. [15 POINTS] Cost, Effort and Pricing Estimation.

We have decided that we will be using Function Point to estimate cost modeling. Because it is a web app, it is easy to calculate the complexity from user input, output, queries, etc. Application composition is focused mainly on data and collection. Our application primarily is more concerned with the ability of the user to keep track of the media that they have watched.

User Input: User reviews, user social posts, user list-making
User Output: Display media list, display social posts, export list, display messages
User Queries: Search media, search social messages, search users, search lists
Data files and Relational Tables: Media database, user data (reviews, list, social posts), media average rating, recommendations
External Interfaces: Media library, data servers

The complexity is assumed to be simple.

	Function Category	Count	Simple	Average	Complex	Count x Complexity

1	Number of user input	3	3	4	6	9
2	Number of user output	4	4	5	7	16
3	Number of user queries	4	3	4	6	12
4	Number of data files and relational tables	4	7	10	15	28
5	Number of external interfaces	2	5	7	10	10

GFP = 75

	User Input	User Output	User Queries	Data files and Relational Tables	External Interfaces	**PC**
Q1	3	0	0	5	5	2.6
Q2	3	5	5	5	5	4.6
Q3	2	5	5	4	5	4.2
Q4	0	3	5	3	5	3.2
Q5	2	4	4	4	3	3.4
Q6	5	5	2	5	5	4.4
Q7	2	5	1	5	5	3.6
Q8	5	5	2	5	5	4.4
Q9	1	3	3	2	1	2

Q10	3	3	3	2	3	2.8
Q11	4	2	4	3	5	3.6
Q12	1	0	1	0	3	1
Q13	0	3	0	4	0	1.4
Q14	5	5	2	3	3	3.6

PCA = .65 + 0.1(PC1 + PC2 + … + PC14) = 1.098
FP = 75 * 1.098 = 82.35

Assuming 30 FP per person per week:
E = 82.35/30 = 2.75 which we would round up to 4-person weeks
D = E / team size = 2.75/4 = 0.6875, so we would round up to 1 week

3.3. [5 POINTS] Estimated cost of hardware products.

We assume that the team of developers hypothetically assigned to this project will already have computers sufficiently capable of web development. This leaves physical server components as the only remaining costs. Below are options for the most essential server components along with their retail prices.

Component	Price (USD)
Intel Xeon E-2300 Motherboard	464.99 [3]
Seagate 8TB NAS Hard Drive (x4)	959.96 (239.99 each [3])
Kingston 16GB DDR4 3200 Memory (x2)	89.98 (44.99 each [3])
Intel Xeon E-2334 Processor	299.99 [3]
SuperMicro 1400W Power Supply	378.99 [3]
Amount set aside for chassis/mount	200.00
Total	2,393.91

The total hardware cost is just about $2,400, not including other costs such as additional cooling. Although these components were chosen to be sufficient for Media Mapper's server and should be compatible with each other, the exact hardware build is subject to modification.

3.4. [5 POINTS] Estimated cost of software products.

Similarly to the previous section, this one will recommend plans and licenses to provide an estimate.

Website

The first necessary software-related products are a hosting service, domain, and an SSL certificate for security. Domain.com offers a website hosting plan that can handle up to 50,000 visitors, includes an SSL certificate, and includes a domain for the first year [4]. For this estimate, we will select a 3-year term and pay it immediately. This will be plenty for Media Mapper starting out and will allow some room for growth. After the first year, a ".com" domain will need to be paid for at a yearly rate.

IDE Licenses

As Media Mapper will be developed by a group of professionals, licenses for software such as IDEs will be necessary. IntelliJ is an IDE that provides features and support for HTML, CSS, JavaScript and related technologies. Although multiple devices can share a license, only one can use it at a time, meaning four licenses will need to be purchased to cover the entire development team [5]. Licenses for DataGrip- a general database tool IDE- are also preferred. Work on the database will be less pressing than work on the web app itself during the timeline previously set forth, which allows two licenses to be sufficient. For ongoing maintenance after release, more licenses may be purchased.

SQL Server

With a website so focused around a large database of information, a database management tool will be greatly helpful. Each server running SQL Server requires a license, with each device accessing a licensed server requiring a CAL. A standalone license costs $599.99 while an individual CAL costs $198.99 [6]. With this arrangement, a license and four CALs would be a total of $1,395.95. A license with five CALs included would cost less and allow the potential addition of a fifth developer should one be needed, so that is the option we suggest [6]. This is a one-time purchase and is included under the first year in the table below.

Product	Price (USD)		
	1st year	2nd year	3rd year
Hosting [7]	479.09	0	0

Domain [8]	0	21.99	21.99
IntelliJ License (x4) [9]	2396.00 (599 each)	1916.00 (479 each)	1436.00 (539 each)
DataGrip License (x2) [10]	458.00 (229 each)	336.00 (183 each)	274.00 (137 each)
SQL Server 2019 Standard (License, 5 CALs) [6]	1,208.99	0	0
Total	4,542.08	2,273.99	1,731.99

The total software cost is estimated at about $4,540 for the first year of development and maintenance but decreases during each subsequent year. From the third year onward, most yearly costs will remain the same given this configuration is kept. The one exception to this is the hosting plan, which will need to be renewed or changed after it expires at the end of the third year. It is currently difficult to predict how much Media Mapper will grow or change over that time, so no estimate is given for the fourth year.

3.5. [5 POINTS] Estimated cost of personnel.

Due to the nature of the app the need for personnel after installation is minimal. The need for training staff will not be necessary due to tutorials provided by the app. The only personnel needed after installation would be a customer support team of 5 people to start off with (the size of the customer support team can be scaled as the size of the app grows).
The customer support personnel will be provided by Zendesk, who will not only provide the customer support personnel but also AI-powered chatbots and analytics.

Developers
Avg annual salary of a software engineer in Texas $125,792 = $60 per hour [11]
4 devs * 8 hours a day = 160 hours
160 * 60 = $9600

Customer Support

$19 per agent / month (billed annually) = 19 * 5 = 95 * 12 = $1140 for a year [12]

Type of Personnel	Salary	Count	Total
Developers	$60 / hr	4	$9600
Customer Support	$19 / month	5	$1140 per year
		TOTAL	$10,740

4. [10 POINTS] A test plan for your software: test plan for testing minimum one unit of your software. Test code included in the submission.

The unit of software made for testing is our user credentials module. That is, the system which controls logging in and creating new users for the application. Our user's username and password are stored in two separate arrays, but they share the same index in each array for lookup purposes. The JUNIT test focuses on the CreateUser function, and the test ensures that the system will correctly detect and handle when a new user tries to create an account with an already taken username. It will tell the user that the name is already taken, and the function call will return with a 1. On a successful account creation, it returns a 0. So our test ensures that we are receiving a 0 for the first account with name "river", and then a 1 for trying to create another account under the same name. For simplicity's sake, a more complex retrieval and storage method was not selected, though for future development the entries will be encrypted and a new storage mechanism might be chosen.

5. [10 POINTS] Comparison of your work with similar designs.

The benefits of journaling for an individual's mental and physical health has been documented in several studies, and it has led to a rise in several online journaling applications. Especially since the COVID-19 pandemic and the prolific rise in media consumption, media journaling apps have proven to be an excellent way to track one's media consumption, and it's also served as a new avenue for social and community engagement [13]. There are two platforms that closely resemble the Media Mapper application: Letterboxd and MyAnimeList. Letterboxd allows users to track the media they've watched, save media they would like to watch, and send recommendations to other users [14]. However, letterboxd does not provide for recommendations to the user based on their preferences or past consumed media; the Media Mapper application will essentially provide users with a for you page or fyp. The social aspect of Letterboxd is also limited to just sharing recommendations with other users, either on the

platform or otherwise [14]. There is no forum or messaging system on the platform itself. MyAnimeList shares nearly all the qualities of the Media Mapper application. It allows users to track media, share their reviews, receive recommendations based on their consumed media and preferences, and message others either privately or on community forum pages. MyAnimeList also provides news and announcements from the anime industry at large [15]. The core difference between MyAnimeList and Media Mapper is that the former is only limited to the anime and manga genre while the latter extends to all genres. Media Mapper is thus more encompassing and expansive, and it would allow for users to create communities based on more specific genres such as anime and manga.

6. [10 POINTS] Conclusion - Evaluation of your work, challenges, any deviations from the original plan, and justification for any changes.

Our group has successfully brainstormed, planned, and developed a framework to use in developing a hypothetical media based social web application - Media Mapper. Through our work, we have uncovered the possible steps, costs, risks, and foundations of what could potentially become a very popular media website akin to MyAnimeList or IMDB. Our unique direction on the concept makes our product competitive and enticing for users in the market for a tool to keep track of their favorite pieces of media. Our main ideas for the project have remained nearly the same throughout the planning process, though it isn't inconceivable that certain changes would be necessary if we were to go about fully implementing Media Mapper.

7. [5 POINTS] References page included at the end of the document.

Also include:
8. [10 POINTS] Presentation slides included in the submission.

9. [5 POINTS] GitHub requirement:

Github repository link: 3354-teamGoobers

References

[1] I. Sommerville, *Software Engineering*, 10th ed., Pearson, 2016, ISBN: 978-0-13-394303-0.

[2] Grow Solutions, "Functional and Non-Functional Requirements: The Ultimate Checklist with Examples," *Medium*, Nov. 17, 2023. [Online]. Available: https://medium.com/@growsolutions/functional-and-non-functional-requirements-the-ultimate-checklist-with-examples-cde16aba33d7.

[3] "Newegg Business," *Newegg Business*. [Online]. Available: https://neweggbusiness.com. [Accessed: Apr. 15, 2024].

[4] "Domain Hosting | Domain and Web Hosting Services," *Domain.com*. [Online]. Available: https://www.domain.com/hosting. [Accessed: Apr. 15, 2024].

[5] JetBrains, "Can multiple employees use the same commercial license?," *Licensing and Purchasing FAQ*. [Online]. Available: LINK. [Accessed: Apr. 16, 2024].

[6] Trusted Tech Team, "Microsoft SQL Server Standard," *Trusted Tech Team*. [Online]. Available: https://www.trustedtechteam.com/collections/microsoft-sql-server-standard. [Accessed: Apr. 17, 2024].

[7] "Regular Rates Summary," *Domain.com*. [Online]. Available: https://www.domain.com/help/article/regular-rates-summary. [Accessed: Apr. 15, 2024].

[8] "domain-pricing," *Domain.com*. [Online]. Available: https://www.domain.com/domains/domain-pricing. [Accessed: Apr. 16, 2024].

[9] "Buy IntelliJ IDEA Ultimate," *JetBrains*. [Online]. Available: https://www.jetbrains.com/idea/buy/. [Accessed: Apr. 16, 2024].

[10] "Buy DataGrip: Pricing and Licensing, Discounts - JetBrains Toolbox Subscription," *JetBrains*. [Online]. Available: https://www.jetbrains.com/datagrip/buy/. [Accessed: Apr. 16, 2024].

[11] ZipRecruiter, "Software Engineer Salary in Texas," *ZipRecruiter*, Mar. 11, 2024. [Online]. Available: https://www.ziprecruiter.com/Salaries/Software-Engineer-Salary--in-Texas.

[12] Zendesk, "A guide to the 11 best social media customer service software of 2024," *Zendesk*, Jan. 22, 2024. [Online]. Available: https://www.zendesk.com/service/ticketing-system/social-media-customer-service/.

[13] J. M. Smyth, J. A. Johnson, B. J. Auer, E.K. Lehman, G. Talamo, and C. N. Sciamanna, "Online Positive Affect Journaling in the Improvement of Mental Distress and Well-Being in General Medical Patients With Elevated Anxiety Symptoms: A Preliminary Randomized Controlled Trial," *JMIR Ment Health*. PubMed Central, [online document], Dec. 10, 2018. doi: 10.2196/11290.

[14] "Letterboxd - Social film discovery," *Letterboxd*. [Online]. Available: https://letterboxd.com.

[15] “MyAnimeList.net - Anime and Manga Database and Community,” *MyAnimeList*. [Online]. Available: https://myanimelist.net/.