SW Engineering CSC648/848

AquaMate

## Section 04, Team 03 Milestone 1 06 March 2024

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# Revision History

| **Date** | **Notes** |
| --- | --- |
| 06 March 2024 | Initial publication of M1 document |
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# Executive Summary

In today's digitally connected world, where hobbies and interests span vast and diverse landscapes, there exists a niche yet burgeoning community of fish enthusiasts. As such, we present an innovative solution poised to revolutionize the way individuals, regardless of their experience level in fish keeping, engage with and nurture their passion for aquatic life. Our web application serves as a comprehensive hub, providing a singular platform where users can effortlessly access detailed information on various species of aquatic flora and fauna, thus empowering them to make informed decisions about their aquatic companions.

At its core, our application addresses a critical need within the fish-keeping community by offering a centralized repository of knowledge and guidance, thereby democratizing access to expert-level insights and fostering a culture of responsible pet ownership. Through intuitive search and lookup functionalities, users can effortlessly explore the intricacies of different fish and plant species, gaining valuable insights into their care requirements, compatibility factors, and environmental needs. Moreover, our Aquarium Builder Tool represents a groundbreaking feature, allowing users to design their ideal aquatic environment with unparalleled ease and precision. By dynamically adjusting available choices based on user preferences and providing real-time feedback on tank parameters, our application streamlines the decision-making process and empowers users to create thriving ecosystems tailored to their unique preferences and circumstances.

What sets our application apart is its commitment to user-centric design and inclusivity. Unlike existing resources that often cater exclusively to experienced hobbyists, our platform caters to individuals of all skill levels, offering guidance and support every step of the way. Whether you're a novice seeking guidance on your first aquarium setup or a seasoned enthusiast looking to expand your aquatic repertoire, our application serves as a trusted companion on your journey. Furthermore, our emphasis on community engagement and collaboration sets us apart, fostering a vibrant ecosystem where users can connect, share insights, and inspire one another to achieve new heights in fish-keeping excellence.

Behind this visionary project stands a team of dedicated individuals with a shared passion for both technology and aquatic life. Combining diverse expertise in software development, user experience design, and aquatics, our team is uniquely positioned to bring this transformative vision to life. With a proven track record of innovation and a steadfast commitment to excellence, we are poised to disrupt the status quo and redefine the landscape of fish keeping for generations to come. Join us on this exciting journey as we embark on a mission to empower, educate, and enrich the lives of aquatic enthusiasts worldwide.

# Personas

1. Big ticket manager (XL tanks) - Miguel



* 1. Dean Portolla, an expert in large-scale aquarium installations, specializing in sophisticated designs for commercial spaces.
  2. Designing an expansive, wall-spanning aquarium, looking for solutions to streamline project management and client collaboration.
  3. Driven by the challenge of integrating aesthetic appeal with the technical demands of large aquarium systems, seeking advanced support for his high-end projects.  
       
     Story:  
     Dean Portolla, with years of experience in aquarium design, faced his biggest challenge yet: creating a wall-spanning aquarium for a high-end restaurant. Embracing the task, he meticulously selected a vibrant array of fish and synthetic decorations to captivate diners. Throughout the project, Dean leveraged his expertise to ensure the ecosystem's balance, making the massive tank a stunning, living artwork. Upon completion, the aquarium became the restaurant's centerpiece, earning Dean acclaim and reinforcing his reputation as a master of aquatic environments.

1. Large Scale Hobbyist - Citlalin



Paul Ingram

Wants to design 12 tanks simultaneously

Wants the tanks to be a mix of salt water and fresh water

Wants the tanks to have blending hardscape

Paul Ingram is a large-scale hobbyist with a shed dedicated to fishkeeping. He has retired, moved to a new home with a dedicated shed for his hobby, and would like to learn how to keep saltwater fish with the extra time he now has. He has kept freshwater tanks in the past and, therefore has some experience. He would like to have 6 saltwater tanks and 6 freshwater tanks. He wants to have pretty fish to look at even if they require extra care. He would like to know what colored fish would complement each other and what plants they can be around. Since Paul is retired, he has plenty of time and a large budget for his tank builds but would like to be below his budget. He is more focused on the cost of the upkeep and time requirement needed to keep his fish in the best conditions. He would like to have high-maintenance fish but will need to have some low maintenance so he can have a balance and not be overwhelmed. He wants to calculate the life expectancy of each fish so all his fish are well taken care of while he is in good health. The plants inside his tanks should complement the fish, but not be the center focus of the tanks. Paul would like the landscape of each tank to have a blended look to the tanks next to them. He wants the backgrounds to seamlessly blend into each other but will need to make sure the plant is safe for the fish living in the tank.

1. Persona Bio: Alex Rivera



Personality: Alex is friendly, inquisitive, and dedicated. They possess a naturally curious mindset which drives their passion for aquarium building. Approachable and always eager to learn, Alex enjoys sharing knowledge and experiences with fellow hobbyists.

When Alex visits the web app, they're presented with an intuitive interface that guides them through the process of building their dream aquarium. By selecting their level of expertise, Alex receives recommendations tailored to their knowledge level, ensuring they don't feel overwhelmed. They can then choose the size of their tank, which automatically filters out incompatible fish and plants. The app also suggests essential equipment and accessories based on the selected components, ensuring a thriving ecosystem. Throughout the process, Alex appreciates the educational tips and compatibility warnings, making informed decisions easier and more enjoyable. This digital tool empowers Alex to confidently expand their hobby, explore new setups, and maintain their aquariums with ease.

Bare Necessities:

- A steady supply of aquarium supplies and access to reliable information sources for maintaining and upgrading aquariums.

- Digital tools that simplify the process of researching and selecting the right components for various aquarium projects.

Top Interests and Motivations:

- Alex is deeply interested in the intricate world of aquarium ecosystems, specifically in creating harmonious environments that support both plant and aquatic life.

- Their primary motivation is to explore and implement innovative aquarium designs that are both aesthetically pleasing and sustainable for the inhabitants.

Pain Points

- Difficulty in finding a centralized source of information and tools that cater to intermediate aquarium builders.

- The overwhelming amount of research required to ensure compatibility between different species of fish, plants, and the technical specifications of aquarium hardware.

User Story: Customizing an Aquarium on the Web App

As a hobbyist aquarium builder,

I want to use a web app that lets me customize my aquarium setup easily,

So that I can select compatible fish, plants, tanks, and all necessary hardware and accessories without having to research each component individually.

Acceptance Criteria:

- Independent: The user can independently navigate the web app and use its features without external help.

- Valuable: The customization feature provides value by saving time and ensuring the compatibility of selected components, improving the overall health and aesthetics of the aquarium.

-Small: The feature is focused on simplifying the selection process, making it manageable and straightforward.

- Testable: It can be tested by simulating the selection process, ensuring that recommendations are accurate and meet the user's specifications.

1. Beginner fourth persona - Miguel



* 1. Jamie Lin is a beginner aquarium hobbyist, enthusiastic about starting their aquarium journey.
  2. Beginner aquarium setup and care, eager for guidance and resources that can help beginners.
  3. Jame’s interest is sparked by the allure of creating a serene aquatic environment, seeking simplicity and support in their new hobby.

Story:  
Jamie Lin, a newcomer to the aquarium hobby, eagerly set out to create her first fish tank, driven by a desire to bring a piece of the underwater world into her home. She spent hours researching and carefully selecting her tank's inhabitants, guided by a blend of online resources and her growing intuition. As she added each fish and decoration, Jamie's initial uncertainty transformed into confidence, fueled by the beauty and tranquility of her aquatic creation. Her journey from novice to passionate hobbyist not only enriched her living space but also ignited a lifelong fascination with aquatic life.

# Data Definitions

1. Users: Used to store user data such as username, id, password, etc. Used to check login information for a user.
   1. Id
   2. email
   3. Username
   4. Password
2. Fauna: This is used to store the properties of the different fishes. These include the common name, scientific name, pH levels necessary for the fish, compatibility with other fish, etc. This will be used to display the information for each fish on the web page to help the user decide which ones to choose for their aquarium.
   1. id
   2. commonName
   3. scientificName
   4. Type(salt/fresh)
   5. Difficulty
   6. Incompatible
   7. lifeSpan
   8. maxSize
   9. specificG
   10. Temp
   11. Ph
   12. dGH
   13. maxAmmonia
   14. maxNitrite
   15. maxNitrate
   16. dietRec
   17. notes
3. Flora: This will be used to store the information about different plants. The properties included will be plant name, scientific name, light level, growth speed, etc. This will also be used to show information about the plants to educate the user and help them choose the right plants for their aquarium.
   1. id
   2. commonName
   3. scientificName
   4. type(fresh/Salt)
   5. Ph
   6. Difficulty
   7. LightLevel
   8. growthRate
   9. AttachmentStyle
   10. roughBulk
   11. notes
4. Tanks: These include the information of different types of tanks you can buy for your aquarium. Primary use in the aquarium builder.
   1. Id
   2. Capacity
   3. shape

# Functional Requirements

* User Authentication and Authorization
  + Users should be able to create accounts and log in securely.
  + Authorized users (such as administrators or moderators) should have permission to add, modify, or delete information on specific fish or plants.
* Search and Lookup Functionality
  + Return the web page having to do with your query
  + Chatbot - direct response
    - Hint about what to ask
  + Users should be able to search for information on a specific fish, plant or disease.
  + The search functionality should return detailed information about the selected fish or plant, including care requirements, compatibility with other species, and other relevant data.
* Gallery Display
  + Filter plants/fish/both
    - Alphabetically
    - Fish type
    - Size (mid/adv)
    - Temperament (mid/adv)
    - Difficulty (all)
    - Salt vs fresh
  + The application should feature a gallery where users can browse different species of fish or plants.
  + Each species displayed in the gallery should be clickable, leading to its specific page with detailed information.
* Aquarium Builder Tool
  + Tank Design
    - Users should be able to design a tank by selecting livestock (fish) or flora (plants).
    - They should be able to specify tank size and water type (saltwater or freshwater).
    - The tool should dynamically adjust available choices based on the user's selections, removing incompatible options and highlighting potentially conflicting choices.
    - Visual indicators should be provided to demonstrate how the user's choices affect tank parameters (e.g., pH, temperature, compatibility).
  + Conflict Resolution
    - Conflicting choices (e.g., aggressive fish, incompatible species) should be highlighted to the user.
    - Warning messages should be displayed when incompatible selections are made.
    - Users should not be able to select choices that would directly conflict with existing selections.
  + Material Input
    - Users should be able to input materials they already have for their tank setup.
    - The tool should recommend additional livestock or flora based on the user's existing materials and selections.
  + Interactive Interface
    - Users should be able to add or remove choices dynamically.
    - As choices are made or deselected, the interface should update in real-time to reflect changes and provide feedback to the user.
* Administration Panel
  + Authorized users should have access to an administration panel.
  + The panel should allow administrators to add, modify, or delete information on fish, plants, and other relevant content.
  + Additionally, administrators should be able to manage user accounts and permissions.
* Responsive Design
  + The web application should be responsive, ensuring a consistent user experience across various devices and screen sizes.
* Performance and Scalability
  + The application should be optimized for performance, with fast loading times and efficient resource utilization.
  + It should be designed with scalability in mind to accommodate potential future growth in user base and content.

# Non-functional Requirements

**Usability and User Experience (UX)**

* Making the App Work Worldwide: Change the app so people from different countries and cultures can use it easily. This makes the app more appealing to a wider group of users.
* Getting User Feedback: Add ways for users to tell us what they think, like surveys or suggestion boxes. This helps us keep making the app better based on what users say.

**Performance and Reliability**

* Immediate Responses in Tools: Ensure the tool that helps users build aquariums works quickly, showing changes and warnings right away.
* Keeping the App Running: Aim to have the app available all the time (99.9% uptime) and have a good plan to get things back quickly if something goes wrong.

**Security and Privacy**

* Protecting User Information: Keep user information safe by encrypting it and storing it securely. This protects personal details and designs.
* Controlling Access: Use strong security measures to make sure only the right people can change information in the app.
* Checking for Security Risks: Regularly check the app for any security risks and fix them to keep the app safe.

**Scalability and Maintainability**

* Growing with Users: Design the app to handle more users and more information smoothly, so it can grow without problems.
* Easy to Update and Fix: Keep the app's instructions clear and organized so we can easily make updates.
* Adding New Features Easily: Plan the app's structure so we can add new features without big changes.

**Additional Considerations**

* Understanding User Behavior: Use data analysis to learn more about what users do and like, which helps us make better decisions about the app.
* Keeping Information Accurate and Respectful: Set up systems to regularly update information and manage what users add, ensuring accuracy and a positive community.

# Competitive Analysis

* + - * <https://myaquariumbuilder.com/>
        + Pros:

Comprehensive Product Selection: MyAquariumBuilder offers an extensive range of over 3,000 products, covering all essentials from tanks to decorations, ensuring you can find everything needed for your aquarium setup in one place​​.

Detailed Guides and Tutorials: The website provides in-depth guides on various topics related to aquarium setup and maintenance, such as setting up your first aquarium, choosing the right filter, and avoiding beginner mistakes, making it a valuable resource for both beginners and experienced aquarium enthusiasts​​​​.(https://myaquariumbuilder.com/guides/how\_to\_setup\_your\_first\_aquarium)

Product Comparison and Planning Tools: Users can compare products from a vast library pulled from different providers and save all products needed for an aquarium in one place, facilitating better planning and decision-making​​.

Community Engagement: MyAquariumBuilder encourages sharing and inspiration within their community, allowing users to share their aquarium setups or browse others for ideas, fostering a sense of belonging and exchange of knowledge​​.

Transparent Cost Breakdown: The site offers a detailed breakdown of the costs involved in setting up an aquarium, helping potential aquarium owners budget and plan their purchases effectively​​.(https://myaquariumbuilder.com/guides/what\_is\_the\_total\_cost\_of\_setting\_up\_an\_aquarium)

* + - * + Cons:

Potential Overwhelm with Options: With over 3,000 products and a vast array of guides, beginners might find the website overwhelming and may struggle to determine where to start or what exactly they need​​.

Cost Consideration: While providing a comprehensive cost breakdown, setting up an aquarium can be quite expensive, with the total cost potentially being a deterrent for those on a tight budget​​.

Necessity for Research: Despite the extensive resources provided, users may still need to conduct further research to ensure they are making the best decisions for their specific aquarium needs, as there's a lot of information to sift through​​.(https://myaquariumbuilder.com/guides/5\_beginner\_mistakes\_when\_starting\_an\_aquarium)

Beginner Mistakes Not Immediately Highlighted: New users might not immediately see the "5 Beginner Mistakes" guide, which is crucial to avoid common pitfalls in aquarium setup​​.

Limited Information on Individual Product Pages: While the site offers a wide range of products, detailed information or reviews for each product might not be as extensive as on specialized retailer sites, potentially requiring users to look elsewhere for more detailed product evaluations​​.

* + - * <https://www.customaquariums.com/>
        + Pros:

Customization and Variety: They provide extensive customization options for aquariums, including size, shape, style, frame, and more, allowing customers to tailor their aquarium to their specific needs and preferences​​.(https://www.customaquariums.com/configurator/)

Quality and Craftsmanship: The company emphasizes the strength of their aquariums, highlighting the quality of materials and fabrication techniques used. They offer a variety of woods for stands and canopies, ensuring high craftsmanship and durability​​​​.(https://www.customaquariums.com/information/majestic-stands-canopies/)

Comprehensive Product Range: Beyond aquariums, they sell a wide range of related products, including filtration systems, stands, canopies, and accessories, making it a one-stop shop for aquarium needs​​.(https://www.customaquariums.com/fish-tanks/)

Educational Resources and Support: The site provides a wealth of information on their products and how to maintain them, including guides on glass vs. acrylic aquariums, moving your aquarium, and more, offering support to both new and experienced aquarium owners​​.(https://www.customaquariums.com/guides/reef-aquariums/)

Testimonials and Social Proof: They feature testimonials from customers who have set up their own custom aquariums, offering real-life examples of the possibilities when purchasing from them​​.(https://www.customaquariums.com/guides/saltwater-aquariums/)

* + - * + Cons:

Complexity for Beginners: The vast array of options and the emphasis on customization might be overwhelming for beginners who are unfamiliar with aquarium specifics​​.

Pricing Transparency: While offering a range of products and customization, immediate pricing information is not readily available for all configurations, requiring potential customers to engage in the configuration process to get detailed pricing​​.

Lead Times: Customization and quality craftsmanship come with longer lead times, especially for specialized or tempered materials, which might not be ideal for customers looking for quicker setups​​.(https://www.customaquariums.com/glass-aquariums/all-aquarium-standard-sizes/)

Geographic Availability: While they offer shipping, the specifics of international shipping or limitations are not immediately clear, which might affect potential customers outside the United States​​.

Overwhelm with Options: The depth of customization, while a strength, could also be seen as a con for those looking for simpler, quick-to-set-up aquarium solutions without the need for detailed custom configurations​​.

* + - * <https://www.fishtankbank.com/>
        + Pros:

Customization Options: Fish Tank Bank specializes in custom aquariums, offering both glass and acrylic options, catering to any size and style preference​​.(https://www.fishtankbank.com/custom-tanks)

Wide Range of Sizes: They have an extensive selection of aquarium sizes, from small setups ideal for homes to large aquariums exceeding 100 gallons, and even custom sizes up to 2000 gallons​​.

Comprehensive Guides: The website provides detailed guides for various tank sizes, from 2 gallons to 1000 gallons, including tips and advice for both beginners and experienced fish keepers​​.(https://www.fishtankbank.com/category/guide/)

Expertise: The main writer and owner of Fish Tank Bank, Sam, has over 20 years of experience in fish keeping and building aquariums, indicating a high level of expertise and passion for the subject​​.(https://www.fishtankbank.com/20-gallon-fish-tank/)

Product Reviews and Recommendations: For those not looking for custom solutions, the website also reviews and recommends aquarium kits and products for various sizes, including detailed reviews for 20-gallon tanks with links to purchase​​

* + - * + **Cons:**

Limited Direct Sales of Smaller Aquariums: While they excel in custom and large aquariums, the website mentions that they do not sell many smaller aquariums directly​​.

Website Navigation: While informative, the website's navigation could be overwhelming for some users due to the vast amount of information and options presented​​.

Price Transparency: While it's understandable due to the custom nature of their offerings, there's no immediate pricing information available without contacting them for a quote, which might deter some potential customers​​.

Focus on Larger Projects: The emphasis on custom and large aquariums might make it less appealing for hobbyists looking for simpler, off-the-shelf solutions for smaller spaces​​.

Geographic Limitation: The information provided does not explicitly state if they serve customers outside the USA, which could be a limitation for international customers interested in their custom aquariums

* + - * <https://aquatic2000.com/>
        + Pros:

Customization Options: Aquatic2000 offers a wide range of customization options for both freshwater and saltwater aquariums, allowing clients to create a truly unique aquatic habitat tailored to their preferences​​​​.

Comprehensive Services: They provide a full suite of services, including design, installation, and maintenance for residential, commercial, and entertainment clients, making them a one-stop shop for aquatic design needs​​.(https://aquatic2000.com/aquarium-services-habitat-design/)

Expertise and Experience: With over 40 years of experience, their team includes designers, engineers, and a resident marine biologist, ensuring high-quality setups that are both beautiful and safe for aquatic life​​.

Maintenance Plans: They offer weekly and monthly maintenance packages, including general cleaning and water chemistry checks, ensuring the longevity and health of the aquarium​​.(https://aquatic2000.com/aquarium-maintenance/)

Educational Resources: The site provides useful information for beginners, such as the best freshwater fish for starters, helping new aquarium enthusiasts make informed decisions​​.(https://aquatic2000.com/blog/best-fresh-water-fish-for-beginners/)

* + - * + Cons:

Complexity and Commitment: Setting up and maintaining an aquarium, especially a custom one, can be complex and requires a significant commitment, which might be daunting for beginners​​​​.(https://aquatic2000.com/blog/things-about-saltwater-aquarium-maintenance/)

Cost: While specific pricing is not listed, custom aquariums and ongoing maintenance services can represent a substantial financial investment​​​​.(<https://aquatic2000.com/residential-aquarium-installation/>)

Limited Geographic Focus: Their services appear to be focused on the Los Angeles area, which might limit accessibility for potential clients living outside this region​​​​.

Information Overload: For someone new to aquariums, the vast array of options and considerations might be overwhelming without personalized guidance​​​​.(https://aquatic2000.com/blog/freshwater-tank-setup/)

Dependence on Professional Services: The emphasis on custom design and professional maintenance may discourage DIY enthusiasts or those looking to be more hands-on with their setup​​​​.(https://aquatic2000.com/aquarium-services-habitat-design/)

* + - Advantages of ours
      * User Authentication and Authorization
        + Enhanced Security: By allowing users to create accounts and log in, your website enhances the security and privacy of user data. This feature not only protects user information but also fosters trust.
        + Customized Experience: With different levels of authorization, users can have a tailored experience. Administrators and moderators can curate content, ensuring accuracy and relevance, enhancing the overall user experience.
      * Search and Lookup Functionality
        + Efficiency and Convenience: Users can quickly find specific information about fish, plants, or diseases, making the site highly user-friendly and efficient.
        + Comprehensive Data Access: The detailed information provided about each species, including care requirements and compatibility, serves as a valuable resource for both novice and experienced aquarium enthusiasts.
      * Gallery Display
        + Engaging Visual Experience: A gallery with filterable options allows users to visually explore different species, making the learning process engaging and interactive.
        + Informed Decision Making: Clickable species leading to detailed information pages help users make informed decisions about their aquarium setups.
      * Aquarium Builder Tool
        + Personalized Designing: Users can design their own tanks based on specific criteria, offering a personalized touch to aquarium planning.
        + Dynamic Adjustments and Visual Feedback: The tool's ability to dynamically adjust available choices and provide visual indicators helps prevent potential issues, ensuring a successful aquarium setup.
      * Conflict Resolution
        + Prevention of Incompatibility Issues: Highlighting conflicting choices and preventing incompatible selections helps users avoid common mistakes, saving time and resources.
        + Educational Value: Warning messages about incompatibilities serve as educational tools, teaching users about species compatibility and tank requirements.
      * Material Input
        + Customized Recommendations: Allowing users to input materials they already have and receiving recommendations based on these inputs can help users optimize their current resources.
      * Interactive Interface
        + Real-time Updates and Feedback: An interactive interface that updates in real-time based on user selections provides immediate feedback, making the tool more intuitive and user-friendly.
      * Administration Panel
        + Content Management: An administration panel for managing content and user accounts ensures the website remains accurate, up-to-date, and relevant.
        + User Management: Managing user permissions ensures a safe and respectful online community.
      * Responsive Design
        + Accessibility Across Devices: A responsive design ensures users have a consistent experience regardless of the device or screen size, increasing accessibility.
      * Performance and Scalability
        + Optimized User Experience: A focus on performance and scalability means the website can handle growth in both user base and content without compromising on speed or functionality.

# System Requirements

1. Sever Host: AWS 1vCPU 1 GB RAM
2. Operating System: Canonical, Ubuntu, 22.04 LTS, amd64 jammy image build on 2023-12-07
3. Database: Mongo DB
4. Web Server: Nginx
5. Front-end Framework : React
6. Server-Side Language: Javascript
7. Web Application Framework : Express
8. IDE: Visual Studio Code, IntelliJ, WebStorm
9. Ext. API: GPT
10. Supported Browsers: Chrome, FireFox, Edge, Oprea, Safari

# Team

Elliot Warren - Team Lead

Inderpaul Bhander - Scrum Master

Sukrit Dev Dhawan - Back-End Lead

Naing Htet - Front-End Lead

Mohamed Deeb - Git Master

Citlalin Galvan

Miguelangel Vargas

# Checklist

* Team found a time slot to meet outside of the class
  + DONE
* Scrum Master shares meeting minutes with everyone after each meeting.
  + DONE
* Github master chosen
  + DONE
* Everyone sets up their local development environment from the team’s git repo.
  + DONE
* Team decided and agreed together on using the listed SW tools and deployment server
  + DONE
* Team ready and able to use the chosen back/front-end frameworks.
  + DONE
  + For each technology (front/back-end/DB/cloud) , team decides who will lead the study of each technology and what will be the specific goal of the study within one month from the M1 announcement.
    - Ex : implement DB scheme for main data items by next 2 weeks.
  + If you list a detailed study plan for this, earn extra point!
* Team lead ensured that all team members read the final M1 and agree/understand it before submission
  + DONE