

Senior Design Final Report

The arqive: LGBTQ Storytelling App



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1 Introduction

1.1 Background:

The arqive is a digital online storytelling map for LGBTQ+ stories that seek to provide the full range of queer stories and then geolocates them and digitally preserves them. It was originally founded by Dr. Cynthia Wang in 2014 and later joined by co-founder Zachary Vernon in 2019. Users have a safe platform where they can share personal, historical, and community stories and have access to information about safe spaces. It is a digital archive of past and present movements, personal experiences, resources, and organizations. This platform creates and collects these stories and resources from all over the world, and serves as a reminder that this community is here, has always been here, and always will be.

The arqive's main purpose is to give LGBTQ+ people the opportunity to map out their stories, giving them a place in the world and in history. The arqive is both a web and mobile application. This is the 3rd year of the arqive being a senior design project. The first year was in 2020 when the website was launched. The second-year was in 2021 when the development team for that year launched a mobile application for both android and iOS to go along with the website. Our team this year worked on improving both the website and the mobile application with additional features and various bug fixes.

1.2 Design Principles:

The website and mobile application's main focus was usability and making them user-friendly. The team tried to keep the features and navigation of both the website and mobile app as minimal as possible to prevent users from being overwhelmed. The mobile app mirrors the website both visually and functionally.

1.3 Design Benefits:

With the aid of the design team, the website is visually pleasing and easy to use. The fonts are chosen specifically to be easy to read. The color and aesthetic capture the users' attention while sticking to the brand. The user interface allows posting pins to be easy since it was made to be smooth, functional, and sleek. Every section is labeled and easy to find

1.4 Achievements:

Our team was able to fix many design elements that were not working how they were supposed to due to things like outdated coding or expired elements. We were also successful at adding a lot of new features that help users and administrators which included things like security and anonymity. We also were able to start on the implementations of new features like automatic content moderation and augmented reality (AR) gamification feature.

2 Related Works and Technologies

2.1 Technologies Used

Django REST Framework is a powerful and flexible toolkit for building Web APIs. It allowed the backend of the website to be built as an API which could then be called from the mobile application.

Web API: Open Street Map is a collaborative project to create a free editable geographic database of the world.

React is a free and open-source front-end JavaScript library for building user interfaces based on UI components.

React Native is an open-source UI software framework that is used to develop applications for Android, Android TV, iOS, macOS, tvOS, Web, Windows, and UWP.

Digital Ocean is a cloud infrastructure provider organization.

Ubuntu is a Linux distribution based on Debian and composed mostly of free and open-source software.

PostgreSQL is a free and open-source relational database management system emphasizing extensibility and SQL compliance.

SciKit-Learn is a free software machine learning library for the Python programming language.

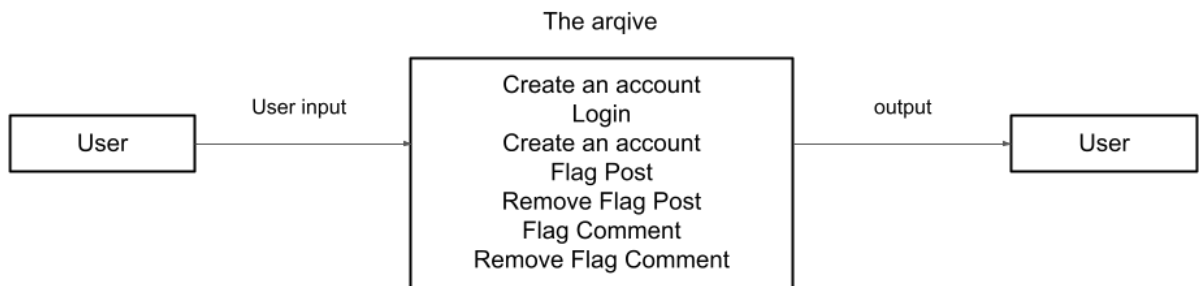
UnrealEngine is a 3D computer graphics game engine developed by Epic Games that provides a framework for building augmented reality apps.

3 System Architecture

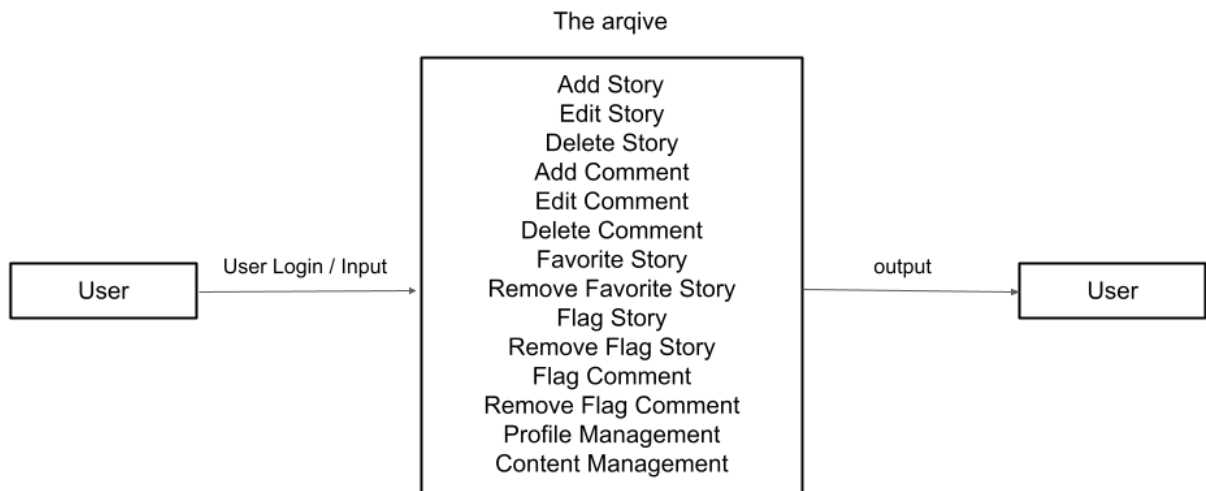
3.1 Overview

DFD Level 0

User Not Logged In



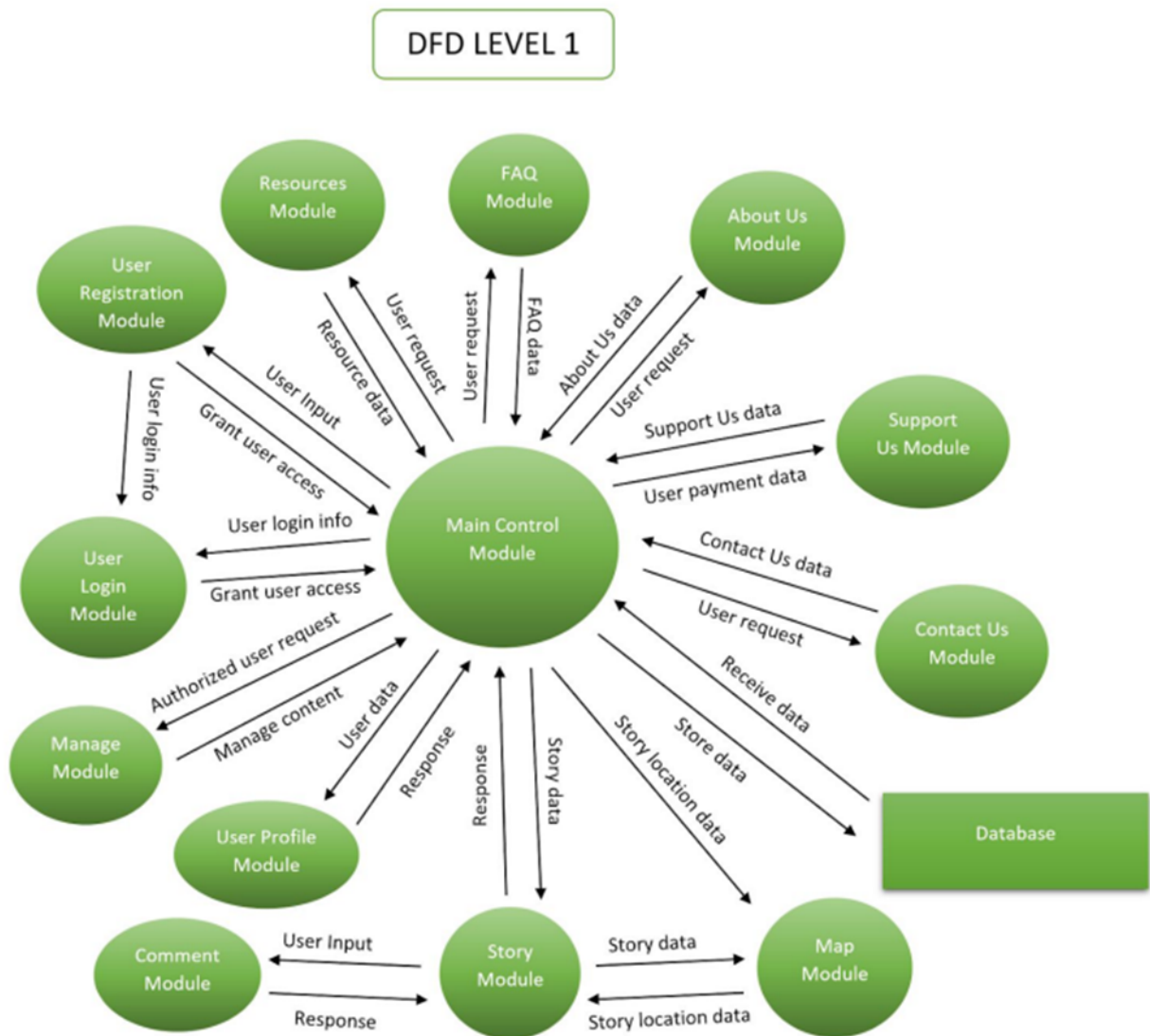
User Logged In



- **The User (Administrator):** This user has all of the powers of the user and moderator. Administrators can create and manage moderators.
- **The User (Moderator):** This user has all of the functions of a regular user in addition to responding to flagged stories and comments.

- **The User (Regular):** This user can create profiles, log in, and if logged in can create, delete, and edit their own stories. They can post comments on other stories as well as flag them if deemed inappropriate. They can use their custom profile page to customize their biography, show their posted stories, as well as show the posts that they have favorited. Any posts the user creates can also be marked as anonymous.

3.2 Data Flow



3.2.1 User Registration: This allows the user to register with an email address that has not been used before to register and a name. Users must choose a username and password.

3.2.2 User Login: This allows a user who is already registered to log into their account. In order to log in successfully, users need to solve a captcha. If the

user has forgotten their password, an email will be sent to the registered email address.

- 3.2.3 User Profile:** This allows users to customize their identity on the website. Users may upload a profile picture and customize their biography. On the settings page of the profile, users may turn on accessibility features to help navigate the site.
- 3.2.4 Story:** This module is the pins of our website. Each pin is a title, description, date, and category. It also has an optional anonymity radius. The description allows for formatted text and images. Stories may be created, favorited, flagged, or made anonymous by users who are logged in.
- 3.2.5 Map:** The module hosts the map where all the pins go. If the user allows the website access to their current location, it will center to it. The map allows you to right-click on a location to post a story or enter an address manually using the add story button.
- 3.2.6 Comment:** The comment module allows people to interact with the story by letting them post messages on the stories. Comments that do not comply with the website's and mobile applications' Terms of Service can be flagged by the user and reviewed by a moderator or administrator.
- 3.2.7 Database:** This is where all the user and story information is stored.
- 3.2.8 Manage:** This Module lets you manage your posts, favorites, etc.
- 3.2.9 About Us:** A module that tells about the main identity of the archive.
- 3.2.10 FAQ:** This shows the most frequently asked questions and allows Moderators and Administrators to add questions.
- 3.2.11 Contact Us:** This module allows users to ask more specific questions that are not on the FAQ.
- 3.2.12 Resources:** This provides many different hotlines for the LGBTQ+ community.
- 3.2.13 Support Us:** This module gives users a way to support the archive by donations
- 3.2.14 Terms of Service:** This allows the users to view the terms of service of the website and mobile application.

3.3 Development and Implementation

- 3.3.1 Database and Data Storage:** The PostgreSQL database is being held in a DigitalOcean managed database with its own host. When a user starts performing tasks on the website that has a field in a table of the database, that data will then be stored. A backup of the DigitalOcean is created in case the host cannot be contacted.
- 3.3.2 User Interface:** The user interface is designed so that users can see and know exactly what they are doing. The site uses easy-to-read fonts and bright colors to capture the user's attention.

3.3.3 Server: The website is being held on a DigitalOcean droplet that holds the server in it and interacts with the database.

3.3.4 Content Moderation: Began the implementation of a Machine Learning model that can automatically moderate posts being created on the site.

4 Results and Conclusions

4.1 Results

Overall, we were very pleased with what we were able to do in terms of the website and mobile applications. We were able to add many of the upgrades that the sponsors wanted for the archive like more security and fixing many of the things that were either out of date or needed to be enhanced.

We have made notable changes in each of the following areas: frontend, backend, content moderation, security, and AR.

In the frontend, we have made numerous UI/UX improvements. Closely relating to the frontend, the user experience has also been improved, such that the user can now stay logged in and upload images with their story on mobile. Post frequency is now limited to prevent spambots.

In the backend, we have done extensive refactoring for efficiency. We have created a secondary location for database backups in the event that our connection to DigitalOcean is interrupted or severed. The database is automatically backed up on a weekly basis.

For content moderation, a machine learning model has been trained to recognize inappropriate or toxic language using a dataset of Tweets, containing over 200,000 lines of data. The model has achieved 95% accuracy in detection.

For security, we have achieved a level of server login security by using Fail2Ban, an intrusion software, to detect excessive suspicious activity at any one IP address. We have also allowed more login attempts--since we know it's easy to forget a password.

For augmented reality, we were able to finish the proof of concept. The concept of augmented reality was to add a sense of gamification to *The archive*, by immersing the user in an interactive experience when viewing stories. It would emulate a scavenger hunt-like feel, searching for pins as the user navigates their everyday landscapes.

These improvements contributed to *The archive*, which we hope will improve user engagement with the website and mobile app.

4.2 Future Development

As for future development, we have started on some of the things that would like to be implemented on the arqive. There will be more security measures, such as the implementation of VPN or Tor, a Machine Learning model that will be used for automatic content moderation, an AR feature for the mobile application so you can see pins in your area using your phone and many more gamification features to make the user experience more fun.

5 References

the arqive Software Design Document

the arqive Software Requirement Document