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Atlantic
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# PawPal

Project Engineering

Year 4

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Bachelor of Engineering (Honours) in Software and Electronic Engineering

Atlantic Technological University

2021/2022

PawPal

# Declaration

This project is presented in partial fulfilment of the requirements for the degree of Bachelor of Engineering (Honours) in Software and Electronic Engineering at Galway-Mayo Institute of Technology.

This project is my own work, except where otherwise accredited. Where the work of others has been used or incorporated during this project, this is acknowledged and referenced.

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# Acknowledgements

I would like to thank Niall O’Keeffe for his continuous mentorship and challenging me to reach my full potential throughout this year. I am also very grateful to Atlantic Technological University (formerly Galway-Mayo Institute of Technology) for being so welcoming to international students and providing a highly stimulating course of which I am truly passionate about.

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# 1 Summary

PawPal is a full stack development project that utilizes the Next framework to power an online application of aggregated canine data. In other words, it is an app for dogs. The goal of this project was to build something that dog owners from all over the world could use to keep track of future events, medical history, general dog information, as well as creating an album of photos. PawPal is intended to be used for dogs, but the scope can reach to other pets or even human use. The project is based around two main features: authentication, and databases. Authentication is used to verify users when they first access the deployed web page, this establishes a session token and permits access throughout the application. The databases are important for storing information that users input while within the app. There are two databases, one for text data and one for images. MongoDB is efficient at handling text requests, and Cloudinary is perfect for image hosting. The main methodologies used in PawPal include Sprint planning through Jira, GitHub repositories, and Vercel deploy features. Software and frameworks include Next, React, MongoDB, and Cloudinary, GitHub, Jira, Vercel, and Microsoft Teams. Languages include JavaScript and CSS, with more intricate processes with CRUD (create, read, update, delete) APIs to access the databases.

PawPal is a full-fledged working and deployed application. The app is hosted through Vercel and is meant to be used by anyone with a Gmail or GitHub account. There are five pages of content and two databases to utilize. The data entered by users is stored in the databases so that it can be accessed whenever they need to store information for a later date in time.

# 2 Poster

# PawPal

Author: Robert 'Jack' Webber
Manager: Niall O'Keeffe
BEng Software & Electronic Engineering

## Summary

PawPal is a digital aggregator of everything a dog owner needs to keep track of, all in one convenient location.

The site is designed to support dog owners by maintaining information about their dog's health, development, and well-being throughout all stages of life.

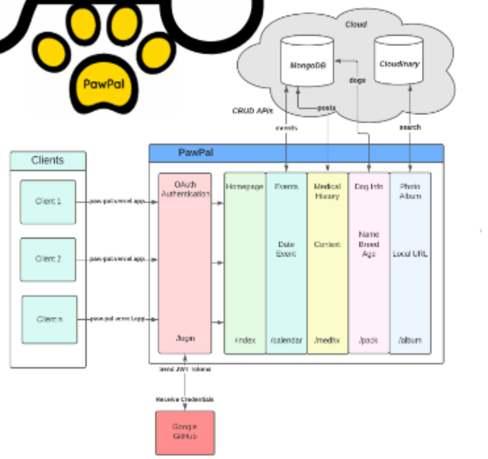
PawPal utilizes user inputs to create a dedicated space in which users can keep track of upcoming events, general trends in health, all while ensuring clean presentation for reading and sharing.

## Authentication

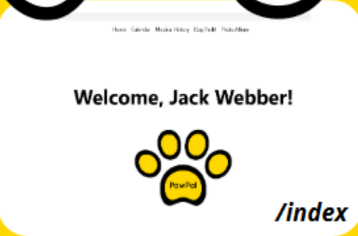
Password-less authentication is handled by NextAuth. Credentials are provided to hosts (Google or GitHub) and JSON web tokens are returned.

## Software

## Arch. Diagram

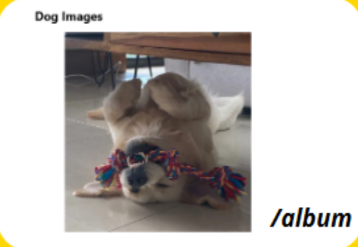


## Application

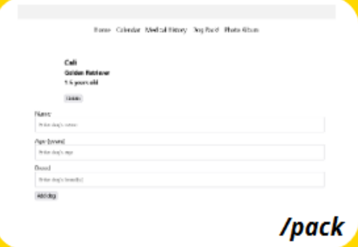

Home Calendar Medical History Dog Pack Photo Album

Welcome, Jack Webber!

/index


Dog Images

/album


Home Calendar Medical History Dog Pack Photo Album

Cali
Golden Retriever
1.5 years old

Delete

Name:
Enter dog's name
Age (years)
Enter dog's age
Breed
Enter dog's breed(s)

Add dog

/pack

# 3 Introduction

PawPal is a project that has been through a handful of iterations over the year. It began as an idea that would read data through a computer chip attached to a dog (or any roaming animal, like sheep) and track the path walked to the user. However, due to manufacturing issues the computer chip ended up malfunctioning and the idea was scrapped for the current version of PawPal.

PawPal at its core is a full stack development project with a hefty front-end and supporting back end to complete the project. The vanguard of the front-end is the authentication system by NextAuth. This framework allows clients to use a password-less sign-in feature so long as they have an account for the supported hosts. PawPal chose to have Gmail and GitHub as authentication hosts because of the wide range of people who use Gmail and for the software programming community that uses GitHub. The image processing is also handled in the front-end, by converting local image URLs to transferrable JSON files. Cloudinary destination folders are appended to the files and sent within the body of the JSON. When a user posts a photo, the application searches for the appropriate photo and renders it to their album. Right between the front-end and the back end, the database APIs established themselves as the workhorses of the application. The four APIs perform most of the heavy lifting once the user is within the application by sending and receiving data between the databases in the cloud and the server hosted through Vercel. The database storage is responsible for the backend service of storing data and images in the appropriate database.

PawPal uses sessions that are managed by NextAuth and enabled by OAuth. The credentials that NextAuth pass to Google or GitHub produce JSON web tokens that allow secure access. When a user logs in, their session is monitored, and various points of feedback are given. For instance, the home page is coded to welcome the user by using their name given to either Google or GitHub. There is a redirect functionality in place within the app, so that whenever users sign out, they are redirected to the sign in page instead of being able to have anonymous access to the application.

# 4 Background

The story behind PawPal is centred around a small Golden Retriever puppy named, Cali. Cali is the inspiration for the whole project because of the impact she has on the people around her. With people being so concerned for her well-being, there was a constant state of frantic and chaotic methods to try and keep her important events and information altogether. At one point this data was organized via sticky notes on the refrigerator, another time they were allocated to a chalkboard, and even ended up on actual napkins for a time. The sticky notes fell off the refrigerator, high traffic near the chalkboard constantly smudged and erased, and the napkins were thrown out.

At the time, there were no effective aggregative data sources for dogs. PawPal was born out of a necessity to track and store this important data for these four-legged family members. With PawPal, users can track upcoming events and important past events (ex. Vaccines, de-worming, and de-flea treatments), store medical history, upload breed and age information, as well as creating a photo album of all the best moments in their life.

# 5 Project Architecture

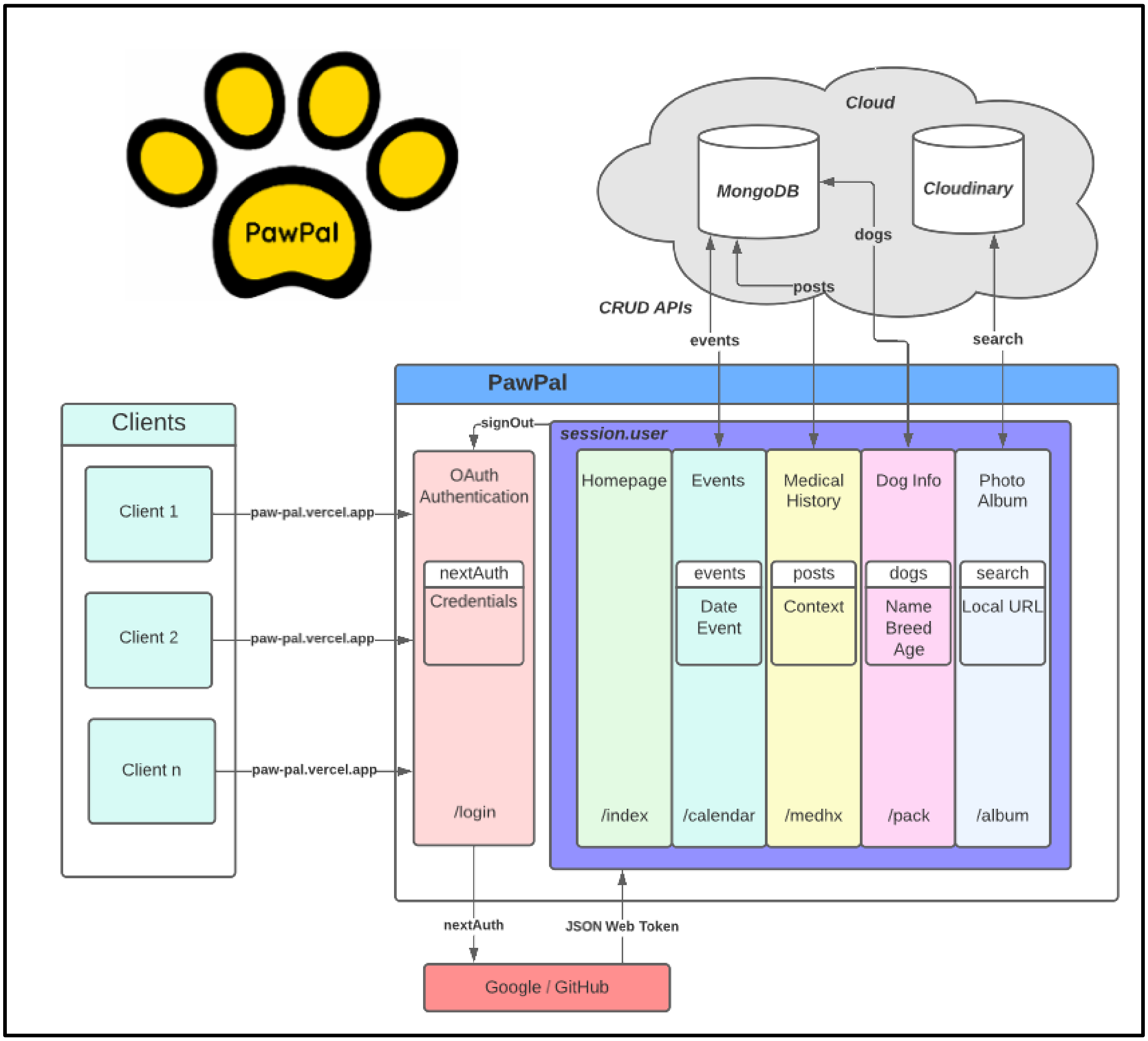


**Figure 5-1 Architecture Diagram**

# 6 Development Platform and Tools

## 6.1 Integrated Development Environment

An integrated development environment (IDE) is a platform in which provides programming and code development capabilities, Microsoft's Visual Studio Code IDE was used for this project. The main reason is that Visual Studio Code supports the building and debugging of modern web and cloud applications. The IDE also has a built-in terminal to run commands to spin up the local server or install dependencies. Furthermore, the look and feel of the code is clean and easy to read. Folder manipulation is also large component of PawPal, and this IDE made it exceptionally intuitive to add and remove folders and file paths.

## 6.2 Languages

Only two languages were used in PawPal, JavaScript and CSS. JavaScript (JS) is one of the core technologies and languages of the internet. Whenever a web application is developed, it is most likely that JS is the primary language. JS has a great ability to manage web pages and client interaction by reacting to user behaviour by handling web page navigation, on click submissions, as well as client- and server-side rendering. Along with JS, Cascading Style Sheets is also heavily used in web applications for formatting and stylizing documents. CSS works by wrapping different elements on a web page in a format (or style) and can be added to JS to enhance the user experience on the application.

## 6.3 Databases and Application Programming Interfaces

Databases are a huge component of PawPal. They are mandatory for the data storage and retrieval process. PawPal uses two different databases, MongoDB is used for text data and Cloudinary for image data. MongoDB is a document-oriented database which supports JSON files. It is a great choice for handling web application data since it can be imported with JavaScript through Node.js project manager. PawPal uses the cloud functionality of MongoDB's cluster database. The cluster has been modified to allow traffic from anywhere to post to the database. However, this is only if the incoming traffic has the proper Uniform Resource Identifier (URI) string and DB name. A URI is a location in the world wide web, similar to an address but more specific and can be used to identify anything. Cloudinary is an image processing and storing database that allows users to upload, retrieve, and transform images. Cloudinary works by using comprehensive APIs to integrate with web applications. Cloudinary predominantly works by providing resources of uploaded images which can be manipulated by the web app to filter what is displayed. PawPal filters uploaded images in a folder by the current session user which returns only images with the user's name attached.

Application Programming Interfaces (APIs) are how applications connect to assets like databases. A good way to think about how APIs work is that they build an open socket over the database, whereas the developer builds a plug over the client. The connection allows the client to access the database.

## 6.4 Authentication

PawPal uses NextAuth as it's authentication handler. NextAuth is a component of the Next framework, which allows for seamless integration and application. PawPal uses NextAuth to access their built-in OAuth providers (Google and GitHub) to receive an access token in the form of JSON web token (JWT) which PawPal uses to build a session for the user on the browser.

The process can be roughly broken down into 6 parts [1]:

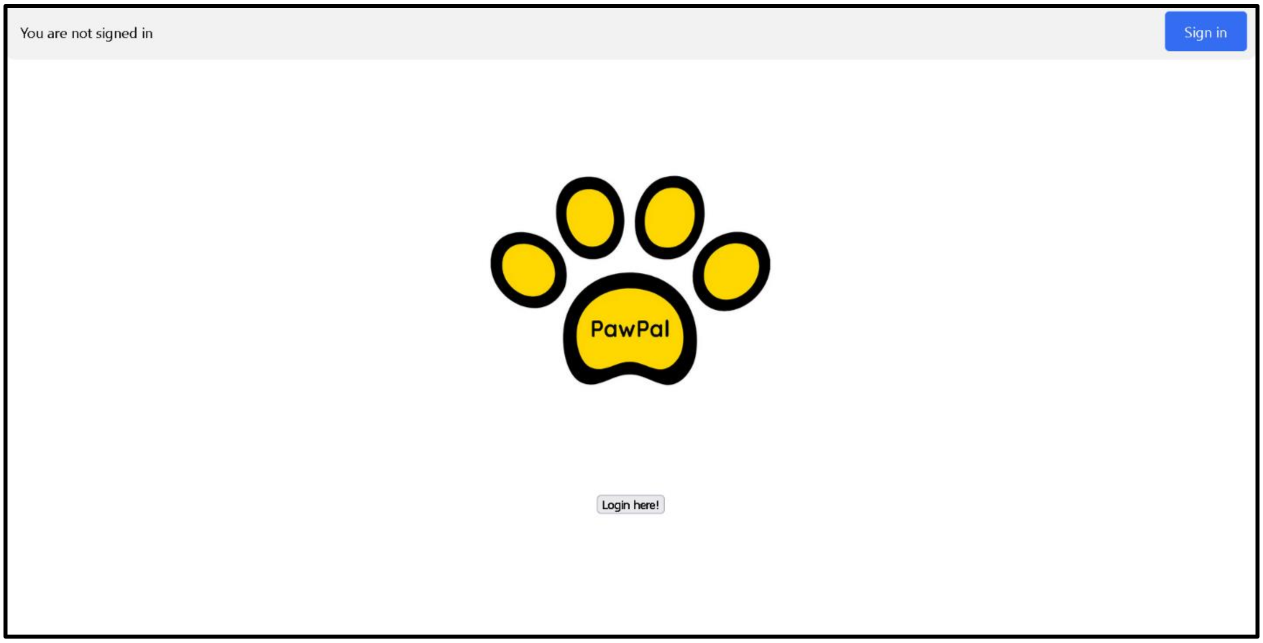
"

1. *The application requests authorization to access service resources from the user*
2. *If the user authorized the request, the application receives an authorization grant*
3. *The application requests an access token from the authorization server (API) by presenting authentication of its own identity, and the authorization grant*
4. *If the application identity is authenticated and the authorization grant is valid, the authorization server (API) issues an access token to the application. Authorization is complete.*
5. *The application requests the resource from the resource server (API) and presents the access token for authentication*
6. *If the access token is valid, the resource server (API) serves the resource to the application*

"

# 7 Web Pages

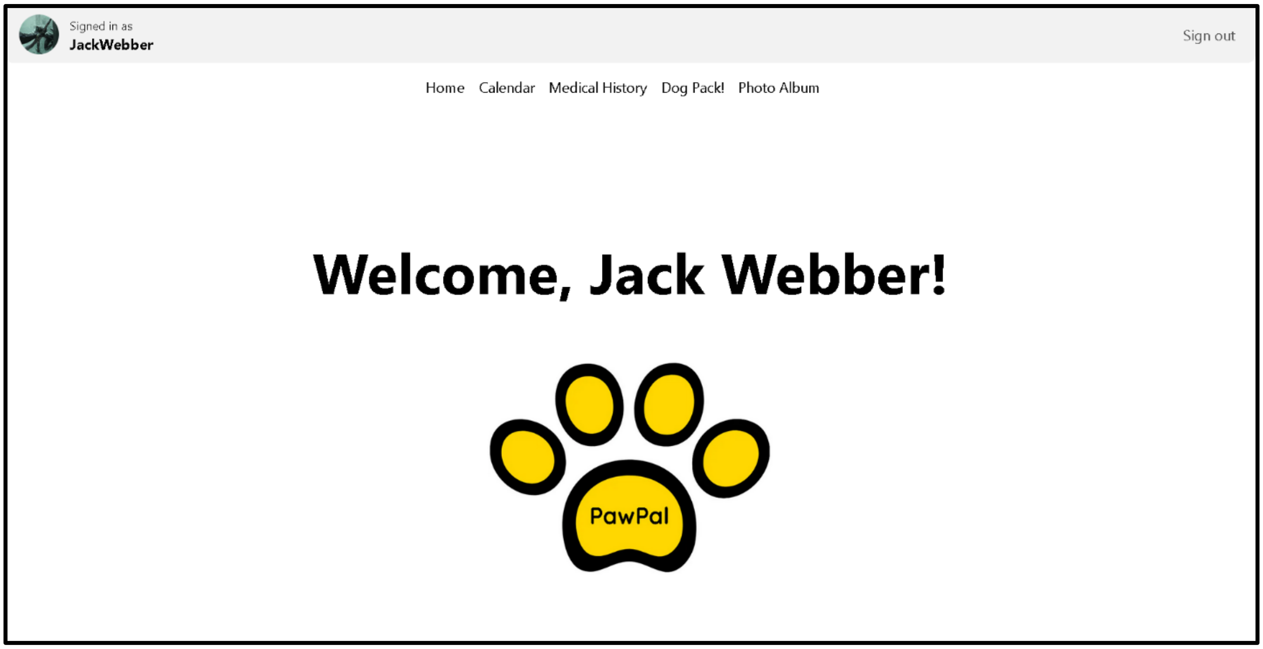
## 7.1 /login



You are not signed in

Figure 7-1 Login Page with logo

## 7.2 /index

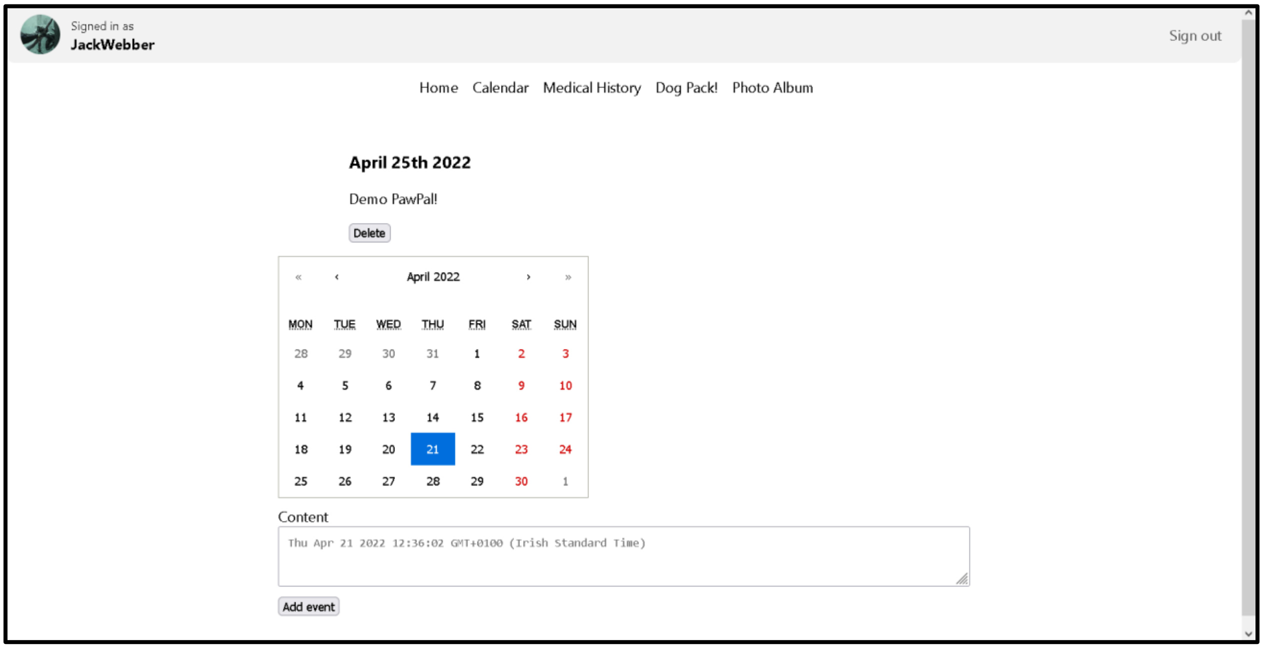


Signed in as
JackWebber

Welcome, Jack Webber!

Figure 7-2 Home Page with username and avatar in header with nav bar

## 7.3 /calendar



**April 25th 2022**

Demo PawPal!

April 2022

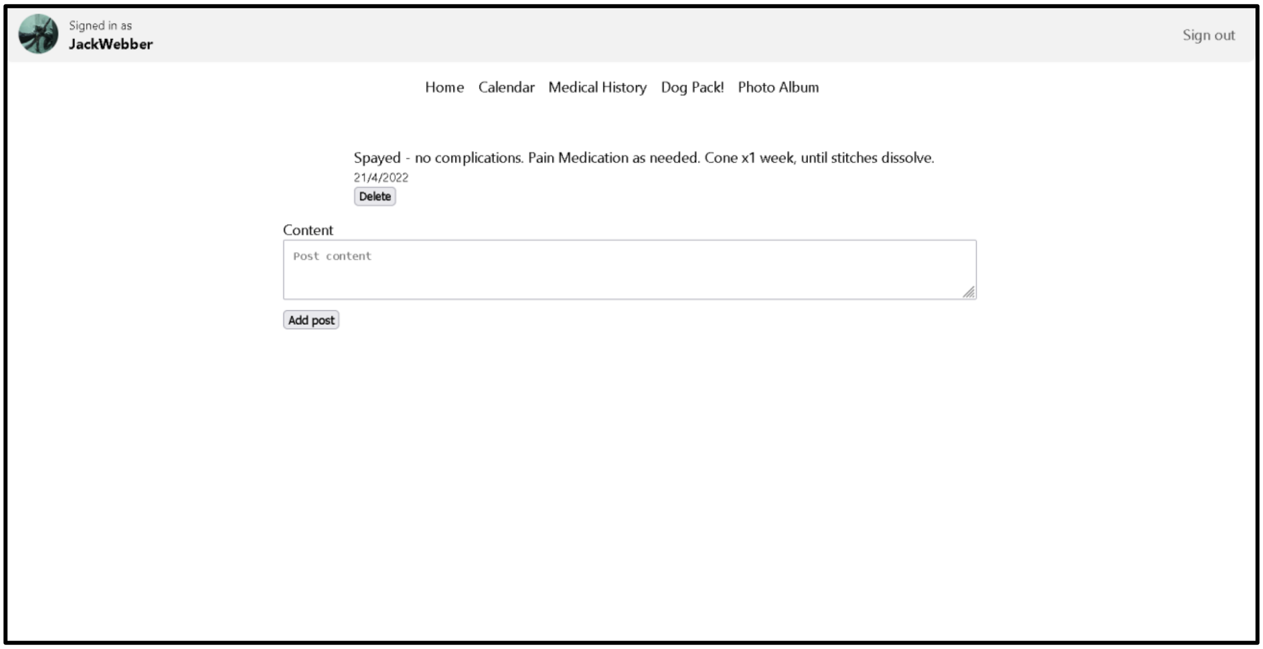
| MON | TUE | WED | THU | FRI | SAT | SUN |
|---|---|---|---|---|---|---|
| 28 | 29 | 30 | 31 | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 1 |

Content

Thu Apr 21 2022 12:36:02 GMT+0100 (Irish Standard Time)

Figure 7-3 Calendar Page with react-calendar and /api/events to MongoDB

## 7.4 /medhx



Spayed - no complications. Pain Medication as needed. Cone x1 week, until stitches dissolve.

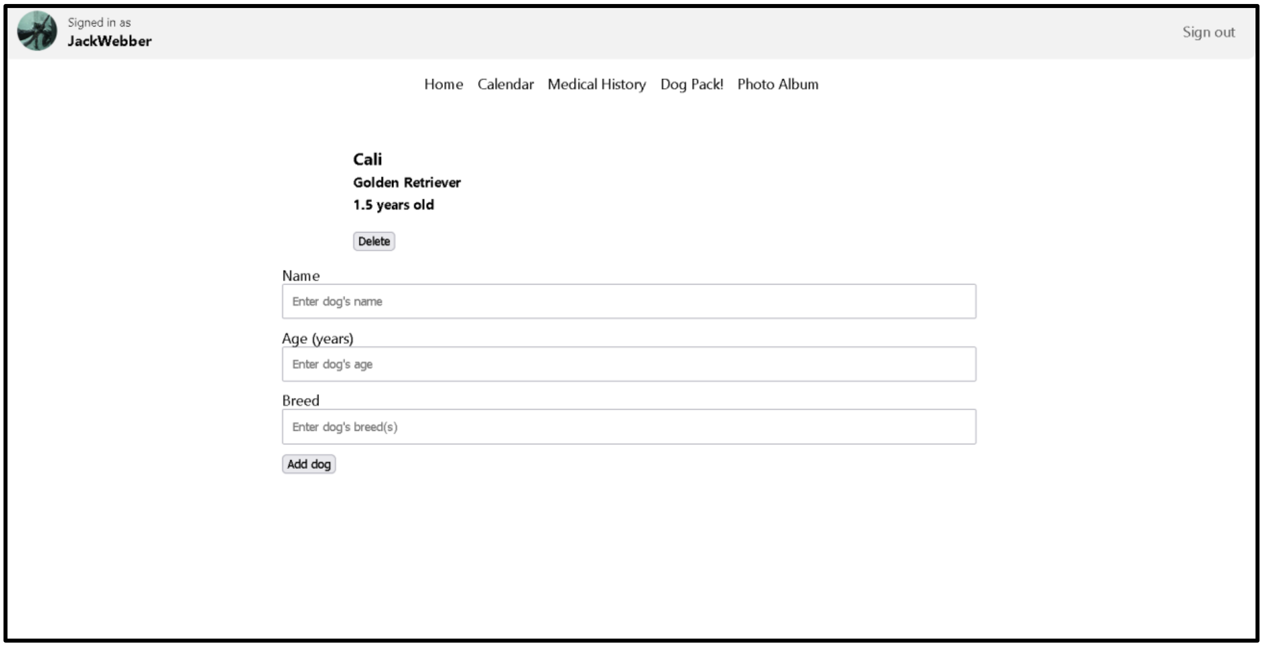
21/4/2022

Content

Post content

Figure 7-4 Medical History Page with /api/posts to MongoDB

## 7.5 /pack



**Cali**
**Golden Retriever**
**1.5 years old**

Name
Enter dog's name

Age (years)
Enter dog's age

Breed
Enter dog's breed(s)

**Figure 7-5 Dog Pack Page with /api/pack to MongoDB**

## 7.6 /album

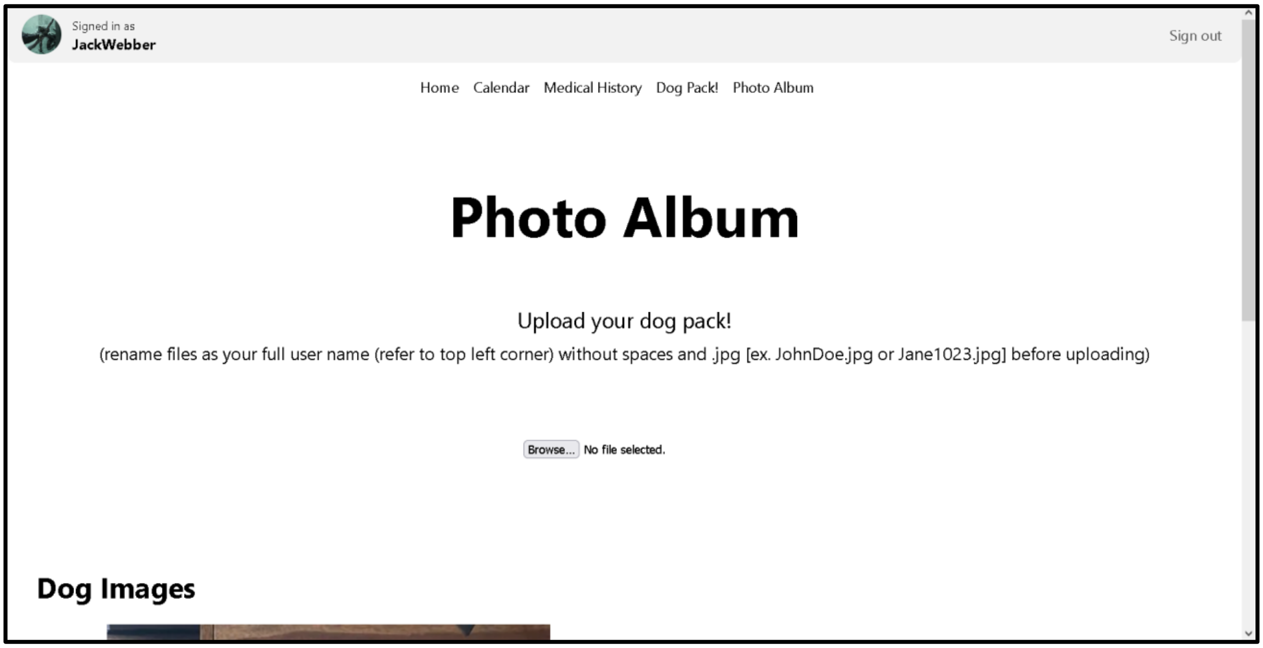


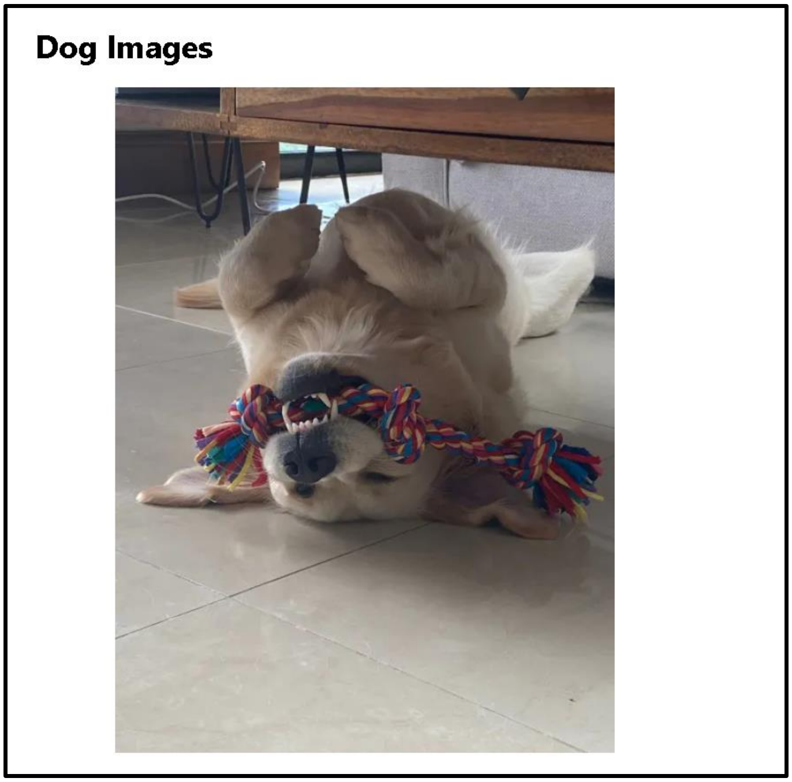
**Photo Album**

Upload your dog pack!
(rename files as your full user name (refer to top left corner) without spaces and .jpg [ex. JohnDoe.jpg or Jane1023.jpg] before uploading)

No file selected.

**Dog Images**

**Figure 7-5 Photo Album page with /api/album to Cloudinary**



Dog Images

Figure 7-6 Photo Album page with returned images [displayed: Cali]

# 8 Ethics and Disclaimer

PawPal is an ethically developed and tested web application. The application is 100% online and, although is designed for dogs, is cruelty-free boasting that no animals were harmed in the development and testing process. PawPal is designed to be purely beneficial to dogs and pets around the world.

## 8.1 Disclaimer

Limitation of Liabililty – Under no circumstances shall PawPal or its affiliates, partners, suppliers, or licensors be liable for any indirect, incidental, consequential, special, or exemplary damages arising out of or in connection with your access or use of or inability to access or use the application and any third-party content and services, whether or not the damages were foreseeable and whether or not PawPal was advised of the foregoing.

# 9 Conclusion

PawPal set out to be an application built by a dog owner, for dog owners – and that is exactly what it is. The process of building developing and planning PawPal was a rewarding experience because of how applicable it *is* to dog owners. The need to organize and keep track of dates, events, conditions, and procedures is vitally important to support the healthy lifestyle of a dog. From flea medication to Kennel Cough vaccines, to grooming appointments, to spay and neuter procedures, to photographic keepsakes as puppies grow into adults, the ability to keep everything neatly organized in one location has proved, personally, a great addition to daily dog owner routine.

PawPal is currently being hosted by Vercel as a production build, which can be accessed and used whenever by dog owners all over the world. Even after this project is submitted, PawPal will continue to be worked on and updated as seen fit into the future years. It is a project that has been passionately developed and will continue to be supported for a long time.

## 10 References

[1] NextAuth, "OAuth," [Online]. Available: https://next-auth.js.org/configuration/providers/oauth [Accessed 02 02 2021].

[x] Cloudinary. “Admin API reference”, *References*. [Online]. Available: https://cloudinary.com/documentation/admin_api Accessed: Apr 21, 2022.

[x] MongoDB. “Connect to Your Cluster” *MongoDB Atlas*. [Online]. Available: https://www.mongodb.com/docs/atlas/create-connect-deployments Accessed: Apr 21, 2022.

[x] Waitherero, Rose. “Engineering-Education”, *NextJs Application With MongoDB*. [Online]. Available. www.section.io/engineering-education/build-nextjs-with-mongodb-and-deploy-on-vercel Accessed: Apr 21, 2022.

[x] Fayock, Colby. “Space Jelly”, *Cloudinary Images in Next.JS*. [Online]. Available. https://spacejelly.dev/posts/how-to-use-cloudinary-images-in-next-js-with-blurred-placeholders Accessed: Apr 21, 2022.