New Species UK Application

QA Fundamental Project

Introduction

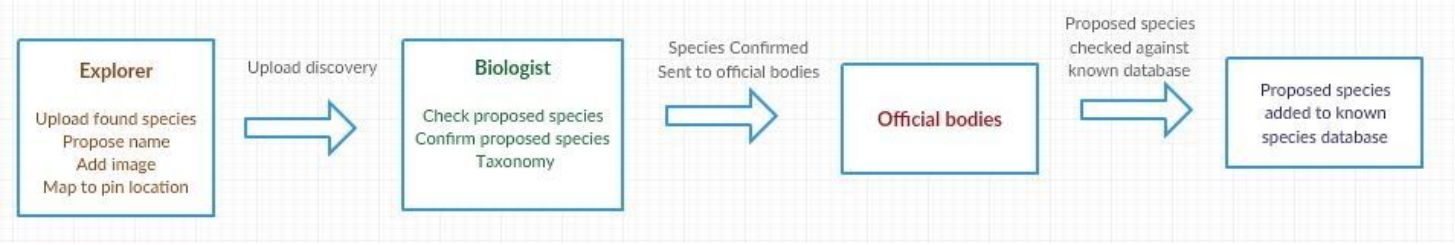
Requirements

The MVP was an application which required basic CRUD (create, read, update, delete) functionality using AGILE methodology, tools and technologies we have learned so far in our QA Devops module.

- Trello board with user stories, MOSCOW methodology, SPRINT planning.
- Relational database to store data on a permanent basis
- Design document to explain the application architecture
- Risk assessment tables
- Functional CRUD application created in python
- Python, open source, easy to use interpreted language
- Flask was used as a web application framework, light weight, optional packages for simplicity
- Jenkins was the choice for automation, open source, free
- Unit testing
- Automated test validation for the application
- Application built on a Cloud based virtual machine

My application

My idea was to create an application that users (explorers) can use to upload their discovered species, the image, proposed name, and map to pin the location of the discovery. Once uploaded, users (biologists) can confirm whether it is a new species, use taxonomic categorisation and send it to official bodies to add it to our known species list.

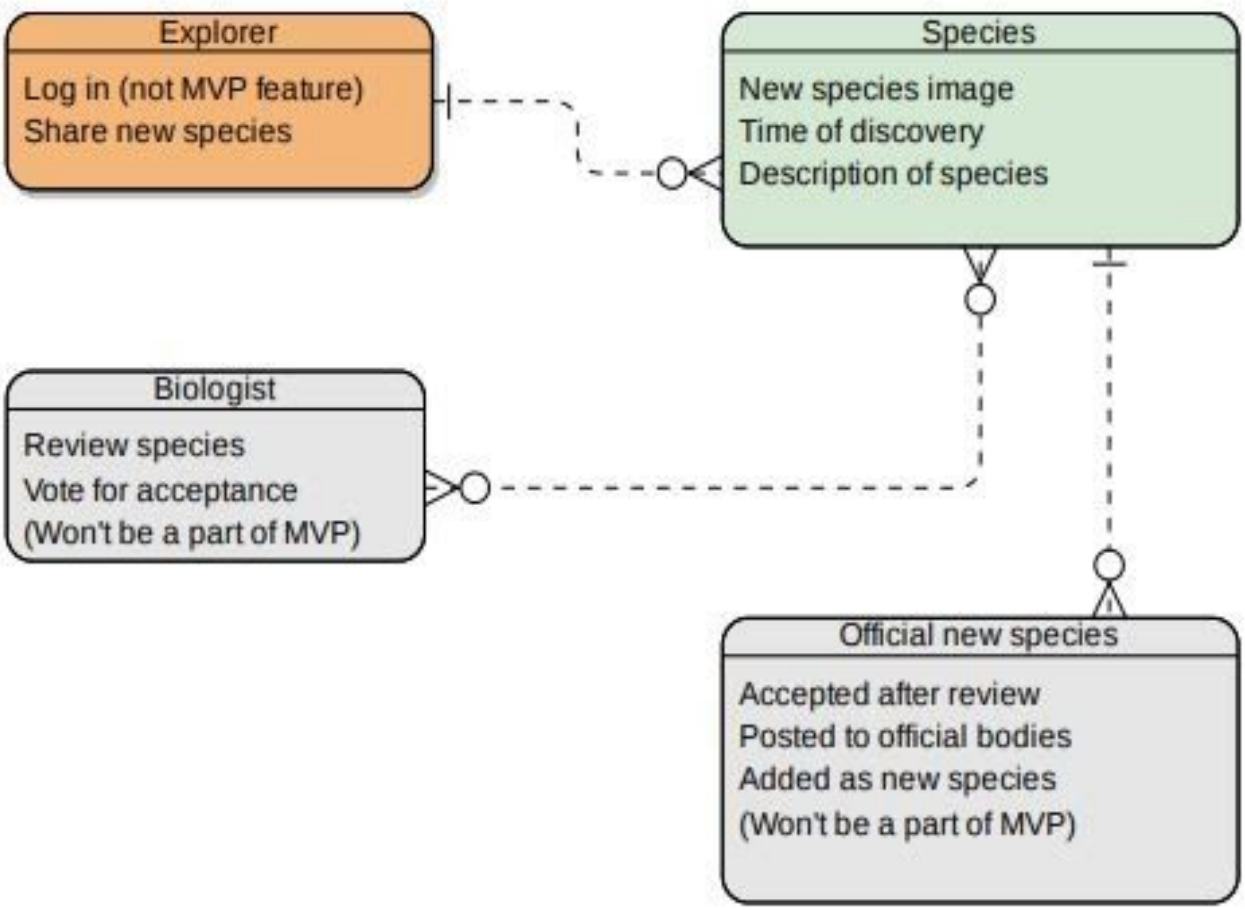


Architecture

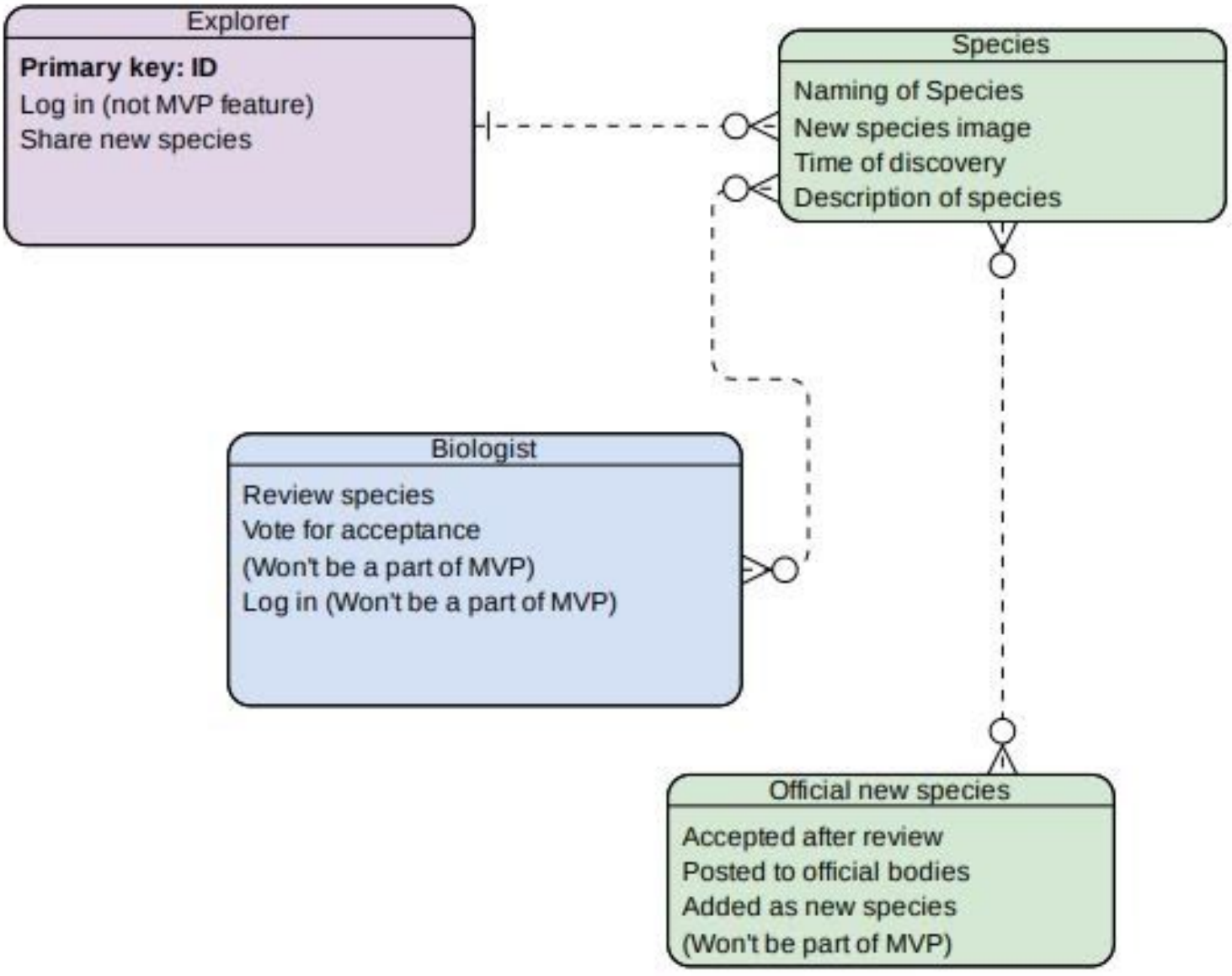
Database Structure

The ERD charts created to show the structure of my database with the relations taking place:

Initial ERD chart before the project:

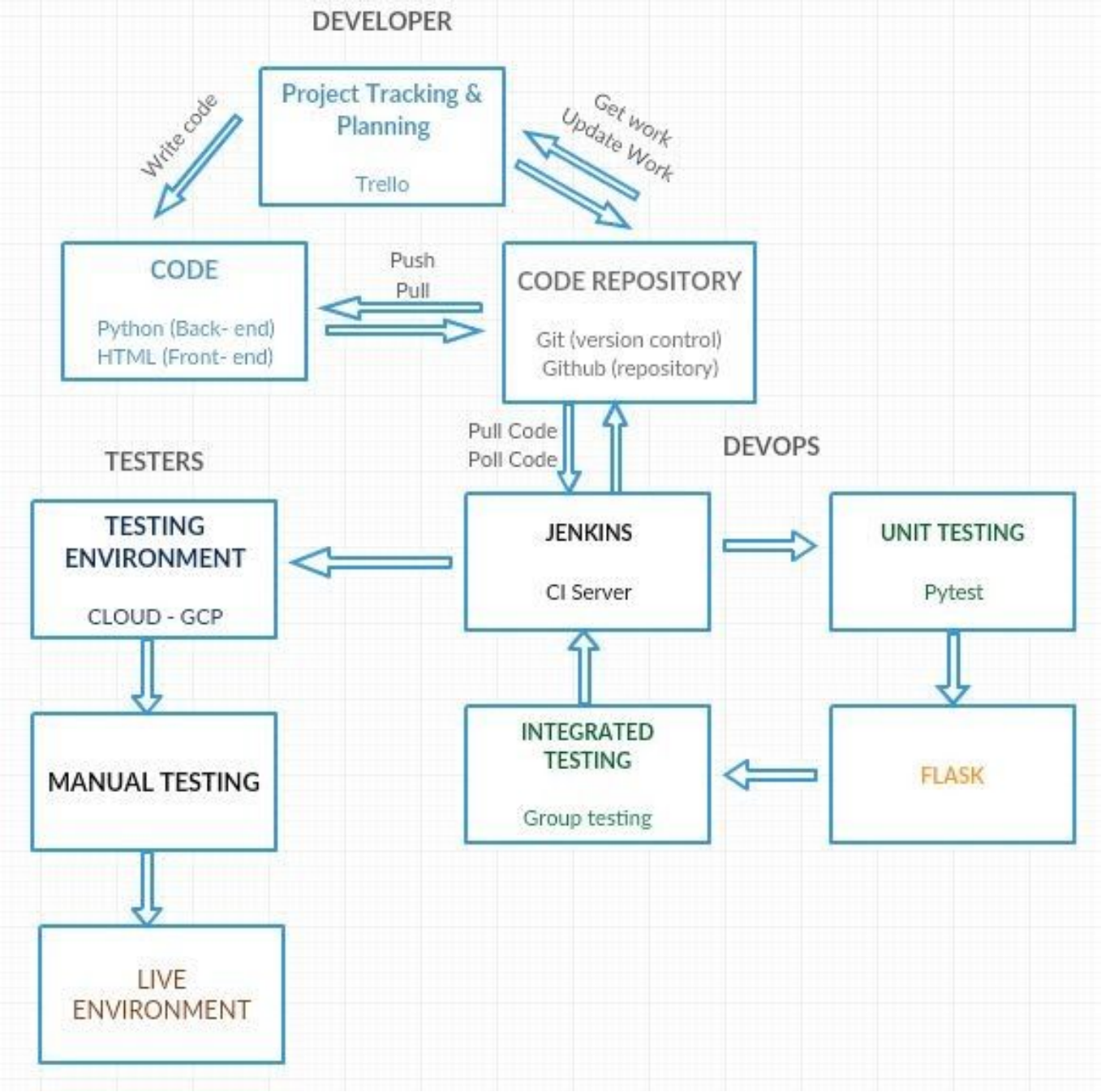


ERD chart after working on the project:



CI Pipeline

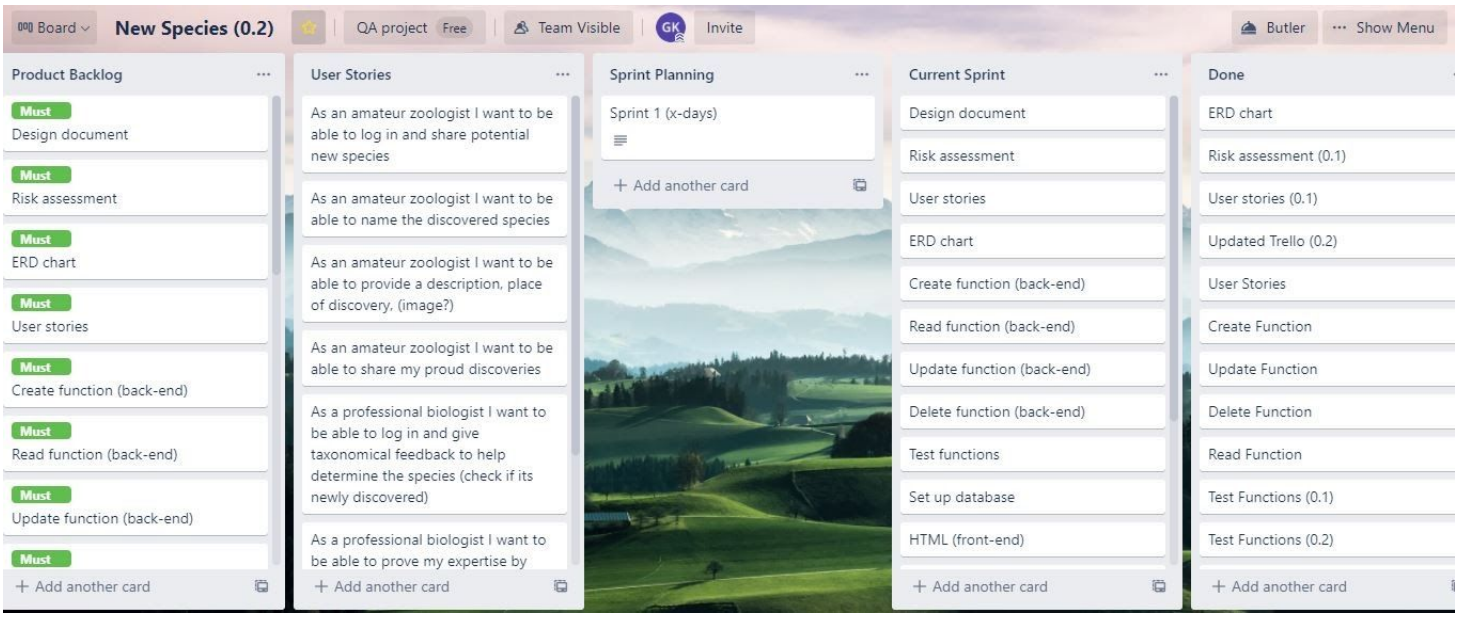
The following chart shows the CI pipeline with the services and tools used to make, deploy and test a well functioning and tested application.



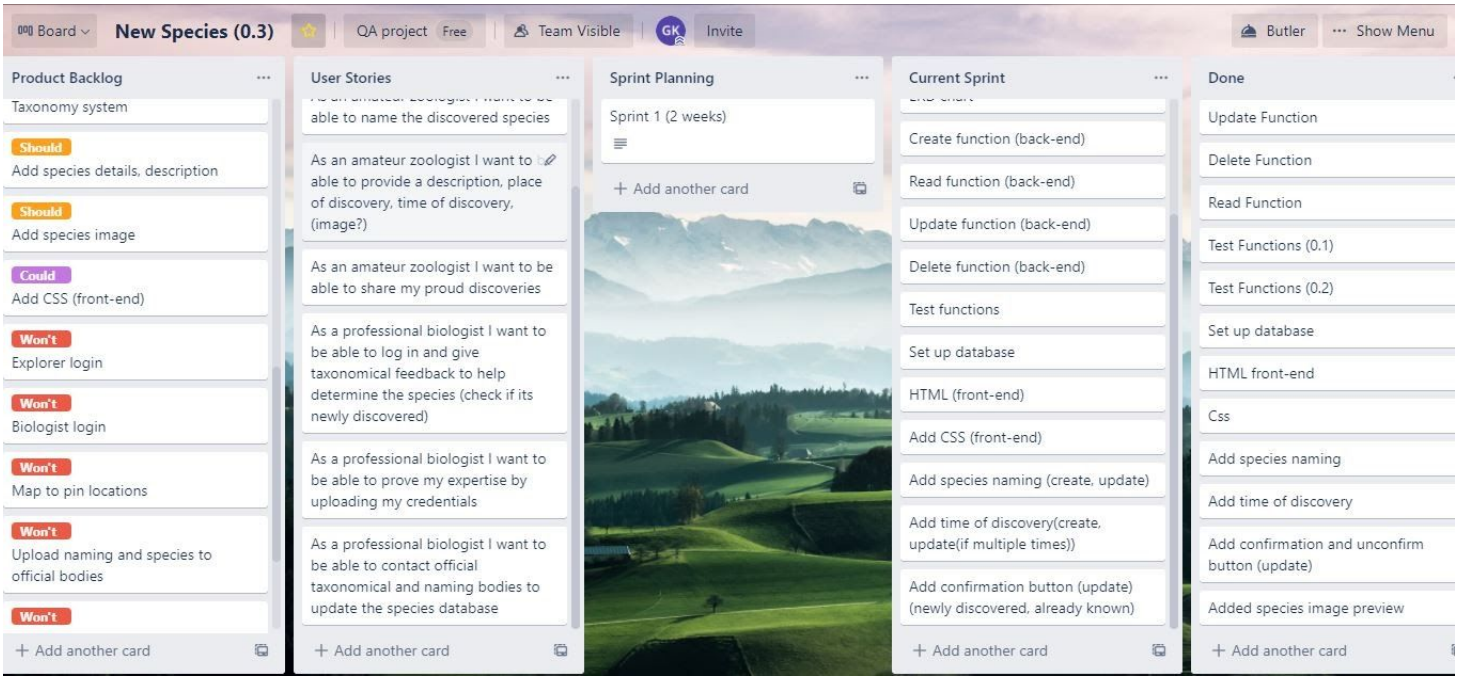
Project tracking

This project was made using AGILE methodologies, in order to track progress and demonstrate the workflow in all stages - planning, testing, completion - Trello was used.

Initial Trello board, at the beginning of the project:



The refined Trello board used during the project. This is a public board, it can be viewed here.



Risk Assessment

Below is the initial risk assessment table, showing the potential mitigation and impact of risks if occurring:

Risk assessment table (version 0.1) - Created at the start of the project

Risk assessment (0.1)	Likelihood of occurrence	Impact if occurring	Severity	Potential Mitigation	What to do if occurred	Responsibility
Fake verification	**Medium** (depends on professionals present)	**High** (lose credibility)	**High**	Multiple steps verification, At least 3 professionals have to confirm	Immediately clarify, grace period before acceptance	Provider / Biologist
Fake professionals	**Medium**	**High** (lose credibility)	**High**	Upload studies, diplomas, courses	Ban fake professional users	Provider
DDOS and other attacks	**High**	**High** (loss of data, service down)	**High**	3rd party security as extra	Backups and scalable hosts for extra performance	Provider
Risky discoveries due to covid restrictions	**High**	**Medium** (government fine? Financial loss?)	**Medium**	Inform users of current rules and regulations	Request more information, Provide a relevant government guidelines leaflet (email template)	Provider / Explorers
Fake discoveries	**Medium**	**High** (lose credibility)	**High**	Same as fake verification	Grace period	Provider / Explorers / Biologists
Low quality images	**Low**	**Low** (difficult to verify discovery)	**Low**	Minimum criteria on image upload, Clearly communicate this to users	Request new image, Verification pending until fulfilled, Cannot accept due to risk of fake verification	Explorers

A second risk assessment table was made towards the end of the project, with a better understanding of the potential risks and mitigating techniques for my application idea:

Risk assessment table (version 0.2) - Created at the end of the project

Risk assessment (0.2)	Likelihood of occurrence	Impact if occurring	Severity	Potential Mitigation	What to do if occurred	Responsibility
Fake verification	**Medium** (depends on professionals present)	**High** (lose credibility)	**High**	Multiple steps verification, At least 3 professionals have to confirm	Immediately clarify, grace period before acceptance	Provider / Biologist
Fake professionals	**Medium**	**High** (lose credibility)	**High**	Upload studies, diplomas, courses	Ban fake professional users	Provider
DDOS and other attacks	**High**	**High** (loss of data, service down)	**High**	3rd party security as extra	Backups and scalable hosts for extra performance	Provider
Risky discoveries due to covid restrictions	**High**	**Medium** (government fine? Financial loss?)	**Medium**	Inform users of current rules and regulations	Request more information, Provide a relevant government guidelines leaflet (email template)	Provider / Explorers
Fake discoveries	**Medium**	**High** (lose credibility)	**High**	Same as fake verification	Grace period	Provider / Explorers / Biologists
Low quality images	**Low**	**Low** (difficult to verify discovery)	**Low**	Minimum criteria on image upload, Clearly communicate this to users	Request new image, Verification pending until fulfilled, Cannot accept due to risk of fake verification	Explorers
Unprofessional - Offensive naming	**High**	**High** (request renaming from official bodies)	**High**	Review naming before submitting to official bodies	Request re-naming ASAP, Remove species until name change completed (especially if offensive)	Explorers
Server issues - Data loss	**Medium**	**Medium** (potential to lose important scientific discoveries) (since images uploaded from explorers devices, likelihood of personal back ups is high)	**High**	Premium services to ensure server stability Frequent back ups Request explorers to keep images and important data	Contact service provider / explorers ASAP, Roll-back server before loss occurred, Restore server from most recent back-up	Provider
Important personal data leaking / stolen	**Medium**	**High** (biologists are expected to upload sensitive information in the form of qualifications)	**High**	3rd party security Only accept personal info through secure channels (encrypted?) 24/7 3rd party (or local) security to monitor activity	Immediately suspend services to prevent further data loss, Fix weaknesses and exploits before resuming services,	Provider

Testing

Pytest was used to check the functionality of my app as well as looking for potential bugs.

My coverage:

```
    'SQLALCHEMY_TRACK_MODIFICATIONS adds significant overhead and '

-- Docs: https://docs.pytest.org/en/stable/warnings.html

---------- coverage: platform linux, python 3.7.3-final-0 ----------
Name                                                 Stmts   Miss  Cover
------------------------------------------------------------------------
/home/gerge/qa-project-0.1/application/__init__.py       7      0   100%
/home/gerge/qa-project-0.1/application/forms.py          6      0   100%
/home/gerge/qa-project-0.1/application/models.py         7      0   100%
/home/gerge/qa-project-0.1/application/routes.py        41      4    90%
------------------------------------------------------------------------
TOTAL                                                   61      4    93%

======================================================================== 12 passed, 1 warning in 0.96s
(venv) gerge@flask-try:~/qa-project-0.1/tests$
```

Jenkins

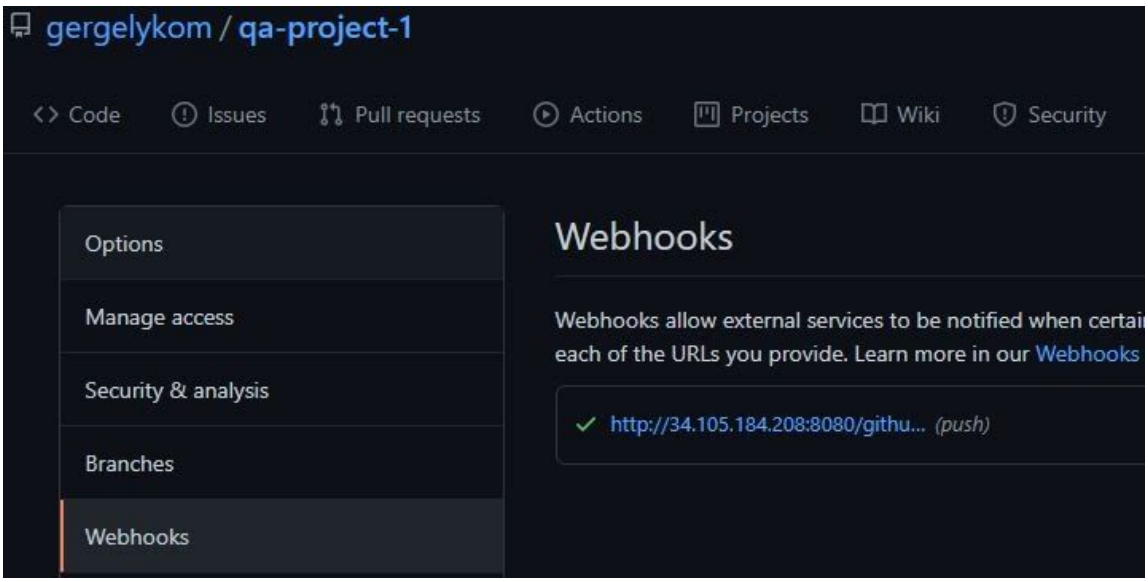
Jenkins running successfully:

Jenkins was used to automate the testing process:

```
Installing collected packages: click,
Successfully installed Flask-1.1.2 Fl
1.0.1 click-7.1.2 itsdangerous-1.1.0
+ cd tests
+ python3 test_unit.py
Finished: SUCCESS
```

Webhooks

I have a webhook set up so Jenkins can automatically build upon changes in the repository:



Front end design

The front end of the application was made using basic HTML with very minimal CSS. The GUI looks extremely basic and it requires a lot of design work but it is simple and intuitive enough to be used as a functioning application even at these early stages.

The homepage:

New Species UK - Home

Home
Upload your discovery

Unconfirmed Species

chi-rex

2020-12-07 06:08:22
Change Proposed Name

Delete

Your proposition is under evaluation by our experts!

Confirm

Confirmed Species

ligon
2020-12-07 16:28:42
Change Proposed Name

Delete

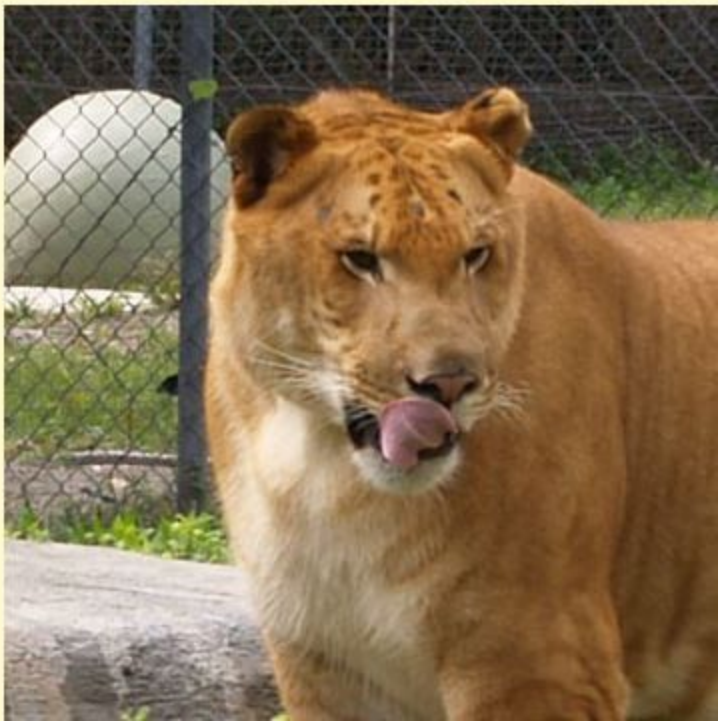
Unconfirmed

Adding new species:

Proposed Name liger

Add Species

Add your image

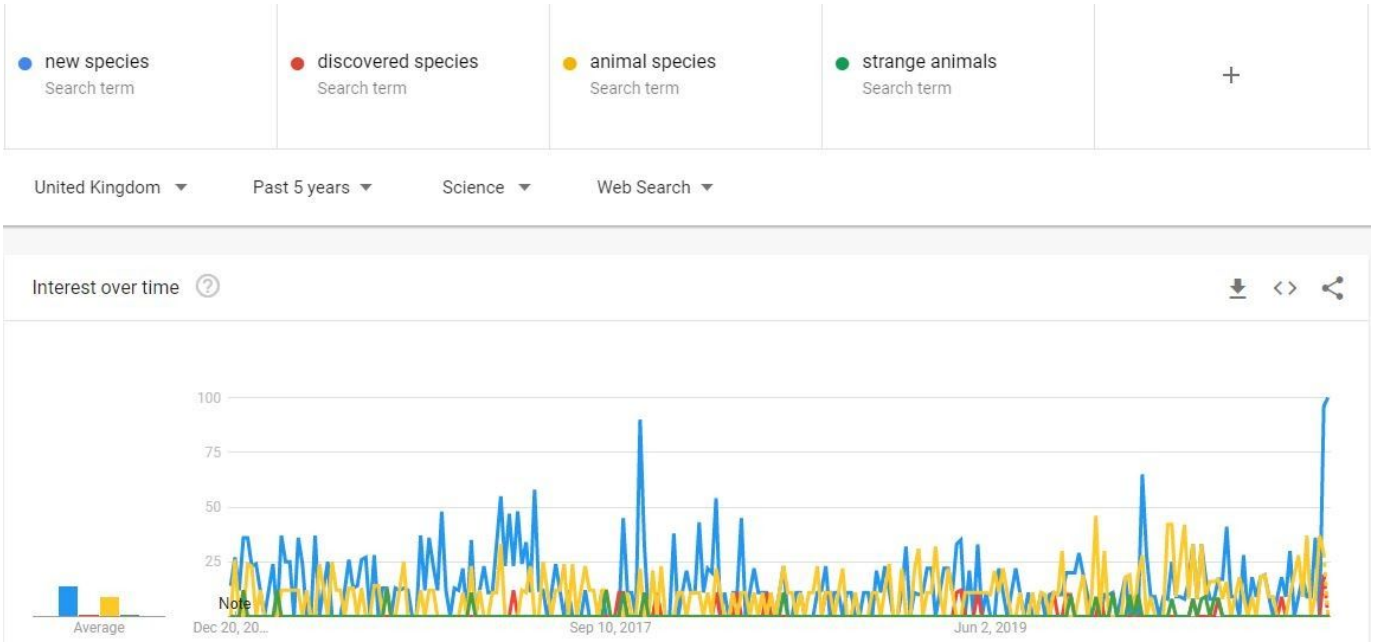


Potential for the application

- No real competition, no application like this exists
- Most organisations use local databases for their species, this could unify the zoology community
- Since Covid (zoonotic virus) biology receives more funding
- Cheaper and much easier than maintaining a local database

- Commercial use, a new species named after you!
- Educational use
- Promotes a healthier lifestyle through hiking and exploring areas
- Promotes protection of natural habitats through building appreciation for nature

Interest trends over the years in new species, could utilise spikes in general interest:



Potential Improvements:

Since the application is in the very early stages there is much room for improvements both in a functional and GUI perspective.

- Add separate logins for explorers and biologists with separate functions
- Image upload, map pin for explorers
- Add credentials for biologists
- Simple share button for your discoveries for organic promotion and advertisement
- Running on multiple vm's to prepare for spikes in usage
- Enhance security
- Add more validators
- Much more work on the front end
- Optimise code for a more efficient and faster experience

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