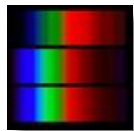




Design Review III

By Empyrean

Team Introduction



Empyrean



Henry Fye
Recorder



Nhat Nguyen
Developer



Jakob PirkI
Architect



Kadan Seward
Release Manager



Jacob Penney
Team Lead

Team Mentor: Rudhira Talla

Problem Statement

Introduction to Spectrographs

- Spectroscopy
- Chemical Composition
- Main Sequence Classification

Lowell Observatory



Dr. Joe Llama
Astronomer



Dr. Gerard van Belle
Astronomer

The Problem

- Not remote
- Issues with software
 - Errors with data collection
 - Issues with rotation of spectrograph, can get stuck and not continue functioning
- Overly complex
 - Takes lots of time to set up mundane aspects of the software, such as specifying where data is saved even though it never changes

Solution

- Free, open-source web application
- Modern, secure and spectrograph-like UI
- Constantly updated spectrograph status
- Easy log sheet manipulation feature

The screenshot displays the 'Shelyak Control' web interface. At the top, it says 'Use this interface to control the spectrograph'. The main area is divided into three sections:

- Observe:** A control panel with tabs for 'OBJECT', 'DARK', 'FLAT', and 'THAR'. It includes input fields for 'object', 'Right Ascension (h)', 'Declination (d)', 'Altitude', 'Visible', 'Number of Exposures', and 'Exposure Duration (secs)'. There are 'START' and 'STOP' buttons.
- Spectrograph Status:** A vertical list of components with their current status:

SYSTEM	STATUS
System	Ready
Camera	Idle
Current Exposure	N/A
Exposure Duration	N/A
Observation ID	N/A
LED	Off
Mirror	Off
ThAr	Off
Tung	Off
- Logsheet:** A table showing observation logs with columns for 'Observation ID', 'Target', 'Progress', 'Date', and 'Signal-to-Noise'.

Observation ID	Target	Progress	Date	Signal-to-Noise
50	m1	Complete	2023-04-12 15:59:54.681000	\$50
49	m1	Complete	2023-04-12 15:59:48.449000	\$50
48	m1	Complete	2023-04-12 15:59:27.241000	\$50

Overview

Main Technologies:

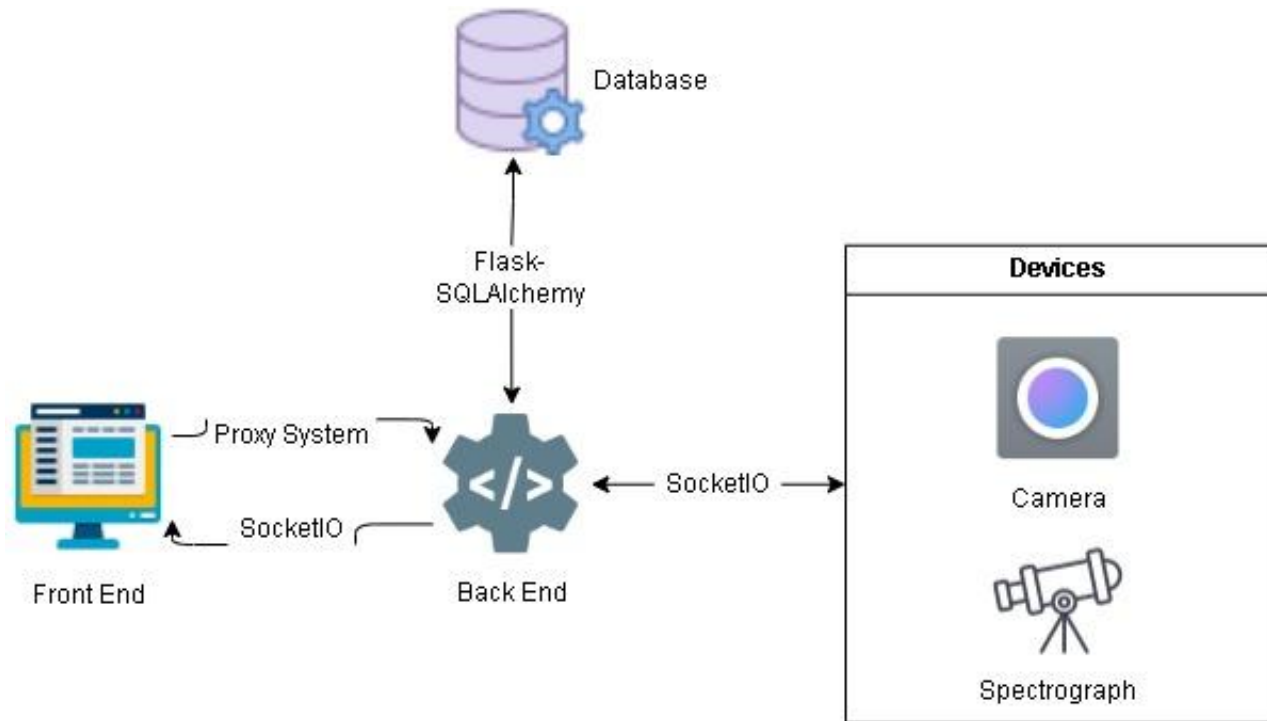
- ReactJS



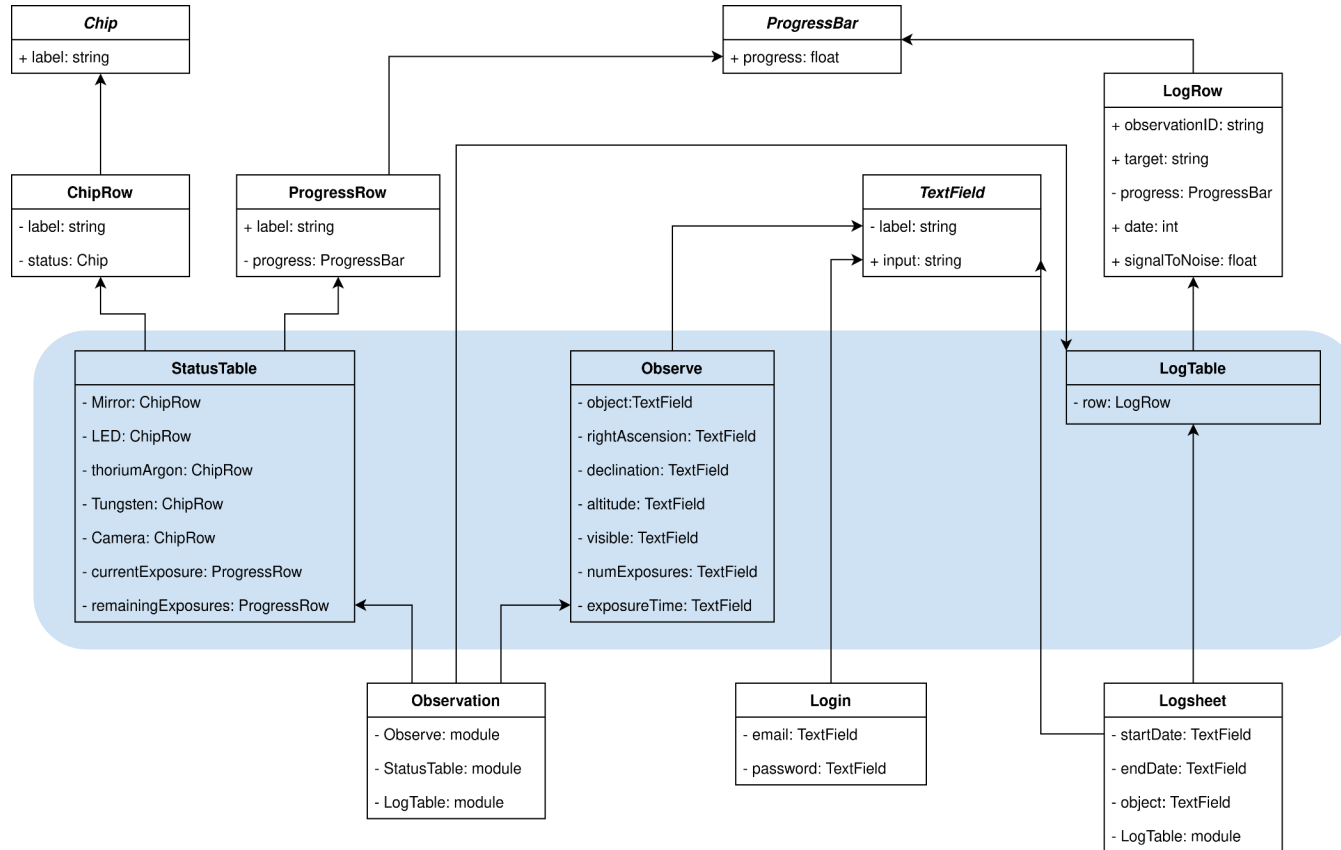
- Flask



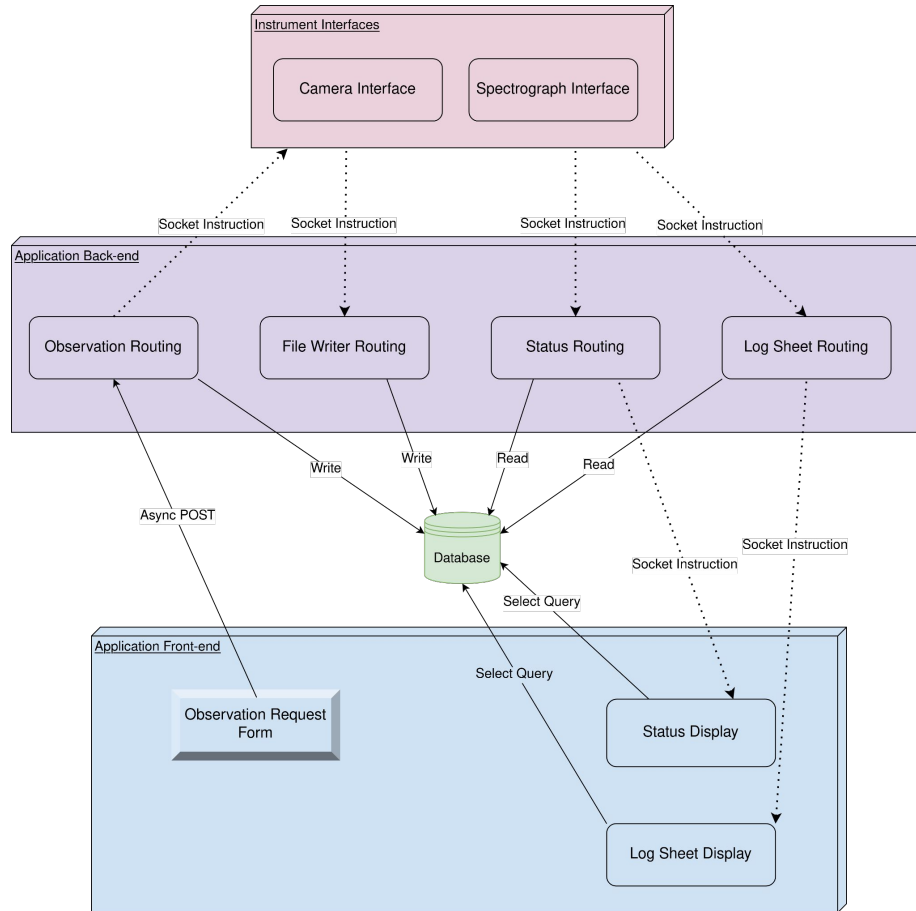
- PostgreSQL



Implementation Details: Front-end Architecture



Implementation Details: Front-end to Back-end Workflow





Prototype Demo:

- <https://www.youtube.com/watch?v=3k3aqal5TYE>

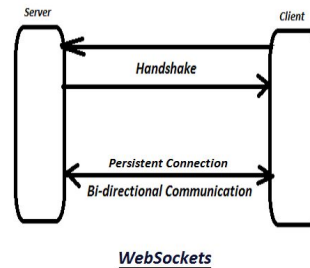
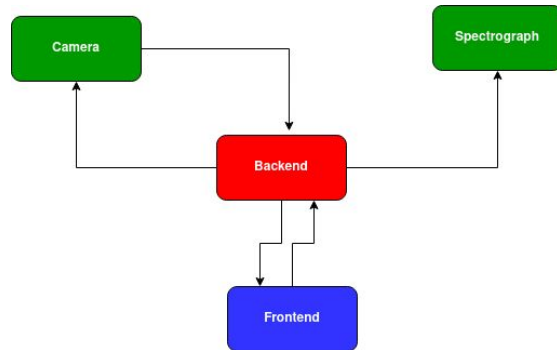
Challenges and Resolutions

Challenge 1: Real time updates on the status of the spectrograph

Solution: Websockets to allow server to push information

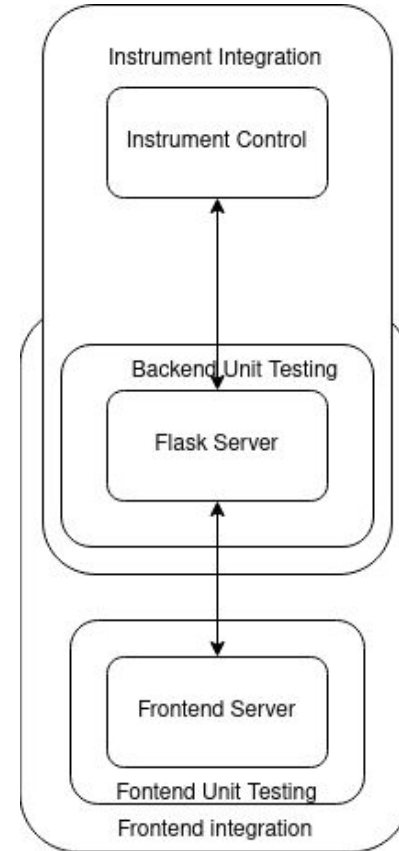
Challenge 2: Communication between subsystems

Solution: Communication between team members to coordinate related parts



Testing Plan

- Python Testing
- Javascript Testing
- Usability Testing



Schedule

- Release build including MVP and additional modules running at Lowell
- Semi-Weekly meetings with clients

Empyrean – Spring 2023 Implementation Schedule

Deliverable	Start	End	Duration in days	Week 1 (01-16)	Week 2 (01-23)	Week 3 (01-30)	Week 4 (02-06)	Week 5 (02-13)	Week 6 (02-20)	Week 7 (02-27)	Week 8 (03-06)	Week 9 (03-13)	Week 10 (03-20)	Week 11 (03-27)	Week 12 (04-03)	Week 13 (04-10)	Week 14 (04-17)	Week 15 (04-24)	Week 16 (05-01)
Develop Website	2023-01-16	2023-01-30	14	Develop Website															
Create Login/Admin	2023-01-25	2023-02-08	14		Create Login/Admin														
Setup Server	2023-02-08	2023-02-22	14			Setup Server													
Remote Access With Server	2023-02-20	2023-03-13	21				Remote Access												
Enforce Unique Observers	2023-03-10	2023-03-24	14					Unique Observers											
Store Observations	2023-03-24	2023-04-07	14						Store Observations										
Display Observations	2023-04-05	2023-04-12	7							Display Observations									
Testing	2023-04-11	2023-04-25	14													Testing			

Conclusion

Thank you!