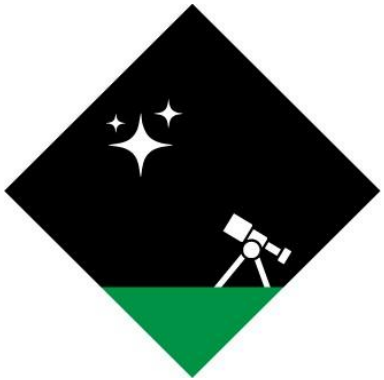
Team Dark Sky Design Review



Team: Luke Thompson, Justin Ceccarelli, Jordan Tatum

Mentor: Daniel Kramer

Faculty Leader: Michael Leverington

Our Client: The Navy Precision Optical Interferometer (NPOI)

Jim Clark:

Director and Chief Engineer at the NPOI

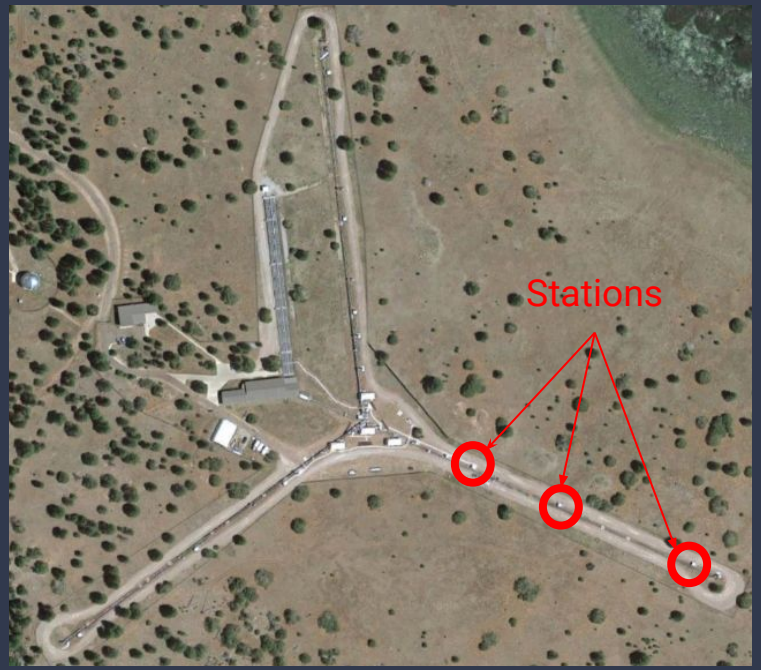
Peter Kurtz:

Software Engineer

Henrique Schmitt:

Astronomer and Head of Interferometry

Problem Statement



- **obsprep** - (Observation Preparation)
- Calculates observation angle at multiple stations
- Built with retired Python 2
- Difficult installation process
- Steep learning curve for new users

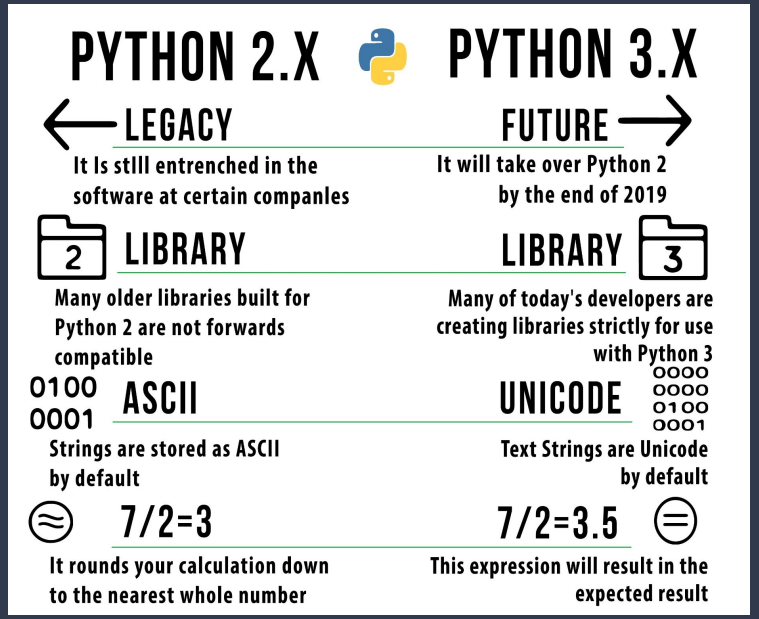
Consequences

- Unnecessary use of man-hours when an employee gets a new computer or joins the team
- Failure to troubleshoot issues efficiently leading to lost sky time
- A night of observation costs roughly $12,000

Functional Requirements

- The GUI (Graphical User Interface) is faithful to the original application
- Users can access a catalog of stars and choose precise observation specifications
- Straightforward installation and maintenance

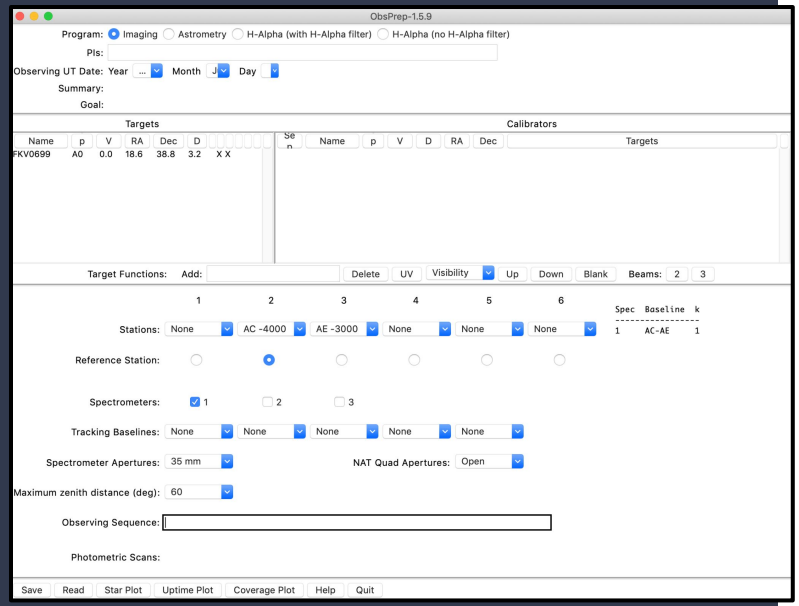
Solution Overview



- Updating obsprep involves:
  - Main GUI file
    - TKinter
  - Client supplied files - math and astronomical functions
  - C wrapped Files

Update main GUI file

Original GUI



- TKinter, a graphical framework for Python
- Update functions and widgets to match python 3 syntax
- Update matplotlib functions

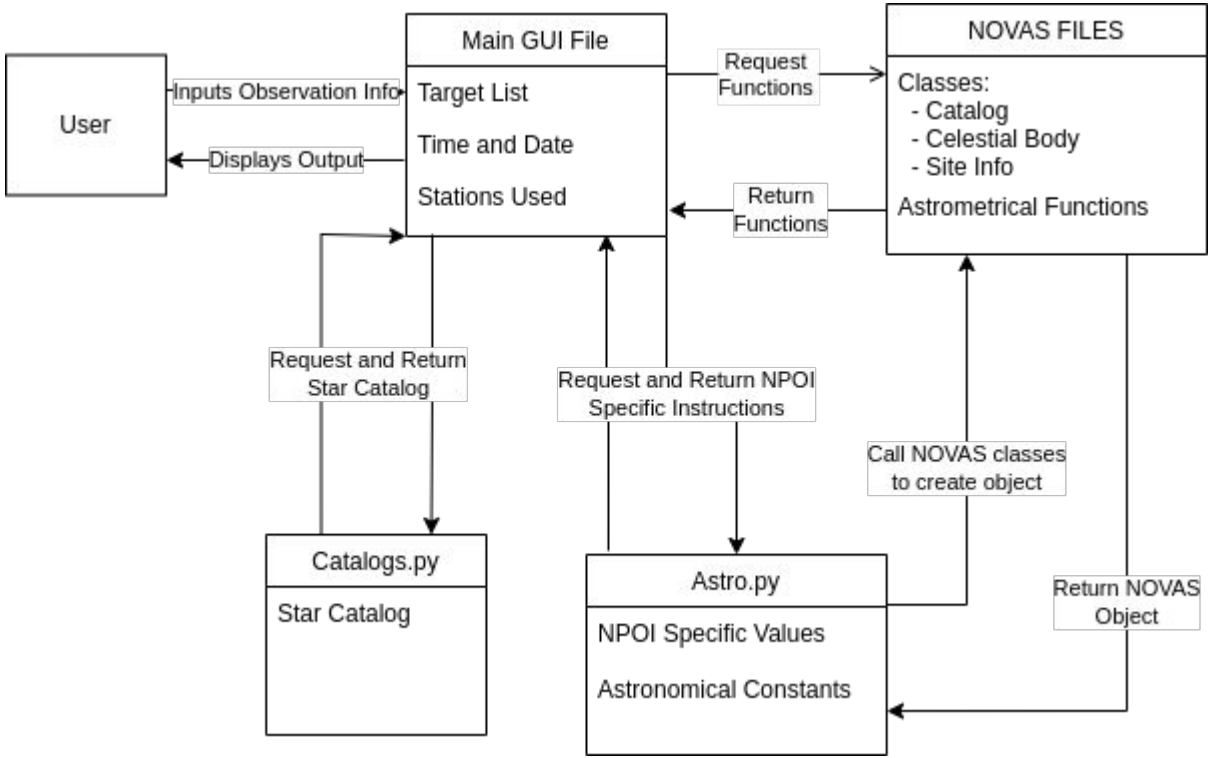
Update client supplied files

- The original files use Python 2 syntax
- Replace old Python functions
- Update syntax throughout program

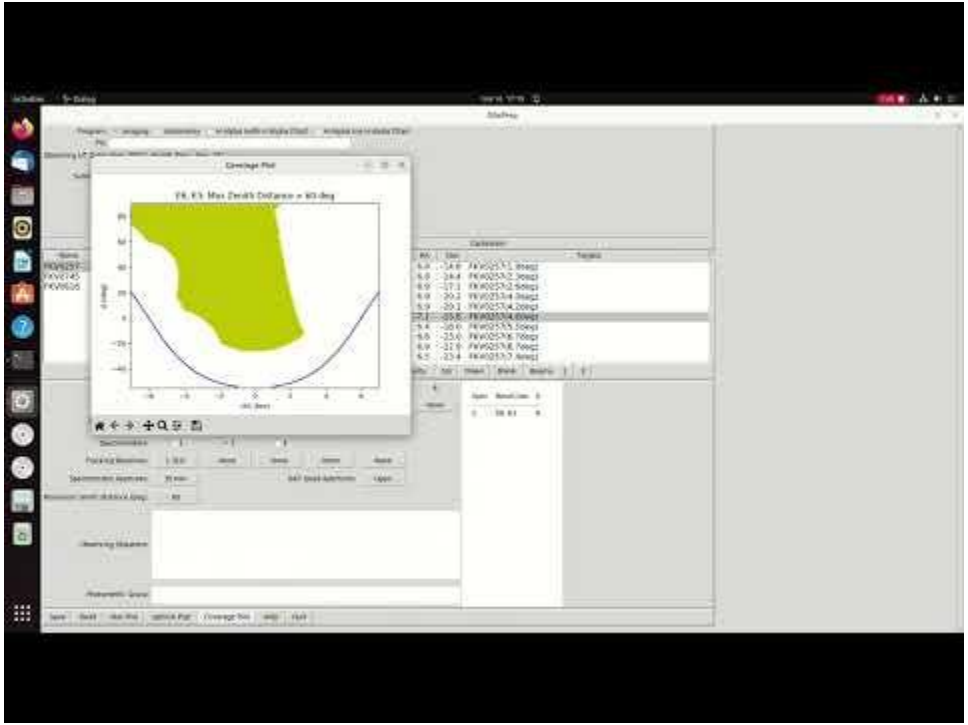
Update C wrapped Files

- Original C wrapped files used python 2 syntax
- Updated to modern Swig
- Create a new interface file
- Rewrap C files

Architecture Overview



Prototype Review



Challenges and Resolutions

Working with pre-existing code

- Python3 Conversion
  - Relearning Python, LOTS of debugging, syntax errors
- Deep Program understanding
  - Extensive code reading
- Hard to understand behavior
  - A consequence of the above

Challenges and Resolutions

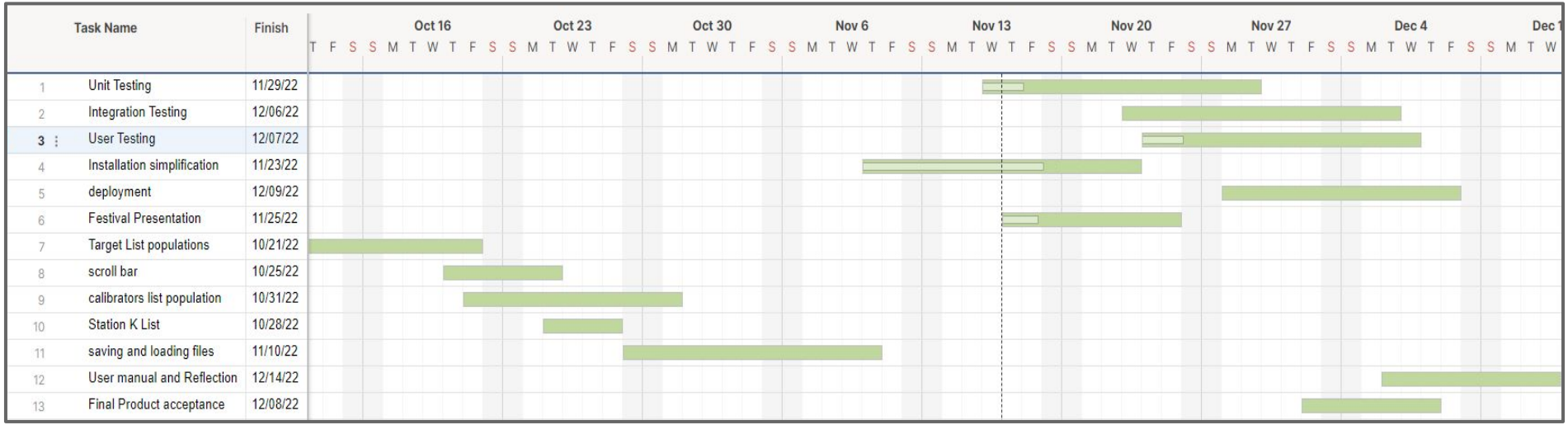
Communication and Efficiency

- Lost effort due to changing expectations/communication errors
- Install setup, original program, tables
- Testing accuracy in function and value output
    - More communication with with all points of contact at our client

Testing Plan

- Unit Testing
  - Progressive, earliest and easiest
- Integration Testing
  - Progressive, a certain amount of unit testing needed prior
- User Testing
  - Not as progressive, limited points of feedback, good news from Peter

Schedule



	Task Name	Finish
1	Unit Testing	11/29/22
2	Integration Testing	12/06/22
3	User Testing	12/07/22
4	Installation simplification	11/23/22
5	deployment	12/09/22
6	Festival Presentation	11/25/22
7	Target List populations	10/21/22
8	scroll bar	10/25/22
9	calibrators list population	10/31/22
10	Station K List	10/28/22
11	saving and loading files	11/10/22
12	User manual and Reflection	12/14/22
13	Final Product acceptance	12/08/22

Conclusion

- Our project will save astronomers hours of work every night of observation, thereby enhancing the US Navy's astronomical research
- Our client is very happy with our faithful restoration of obsprep's original form and functionality
- This project provided our team with interpersonal and technical learning opportunities
- We are on schedule to deliver a feature-complete and debugged application by the end of the semester