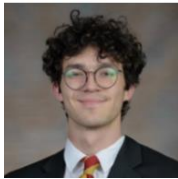




# Cloud-Based Planetary Ephemerides

Austin Carlile  
Minuka Trikawalagoda  
Nicholas Gonzalez  
Noah Schwartz

## Meet the Team

<p><b><u>Team Lead:</u></b></p> <p><b>Austin Carlile</b></p>	 A portrait of a young man with light brown hair and a beard, wearing a white shirt with a small pattern.
<p><b>Nicholas (Cole) Gonzalez</b></p>	 A portrait of a young man with dark curly hair and glasses, wearing a dark suit, white shirt, and red tie.
<p><b>Minuka Trikawalagoda</b></p>	 A portrait of a young man with dark hair, wearing a white shirt and a dark tie, against a blue background.
<p><b>Noah Schwartz</b></p>	 A portrait of a young man with dark hair and a beard, wearing a dark suit, white shirt, and yellow tie.

# CS Faculty Mentor: Scott Larocca

## PhD Student with interests in:

- remote sensing
- tropical forest drought
- how ecosystems respond to climate extremes.



# Our Client:

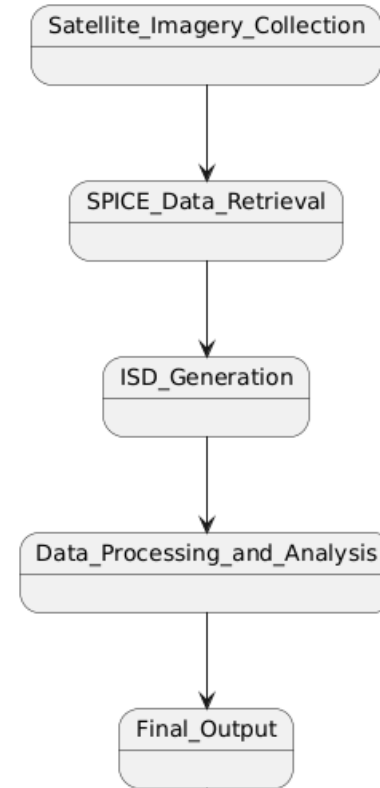


- Founded in 1963, USGS Astrogeology supports NASA and global space agencies
- Provides tools and data for planetary mapping, imagery processing and research
- Expertise in sensor models and planetary imagery provides foundation for project
- Extensive work with NASA's SPICE data system

# Client's Business

- Satellite imagery is collected
- USGS retrieves SPICE kernels
- Raw data is processed using USGS' current software to generate Image Support Data (ISD) files

## USGS Astrogeology Image Support Data (ISD) Generation Process



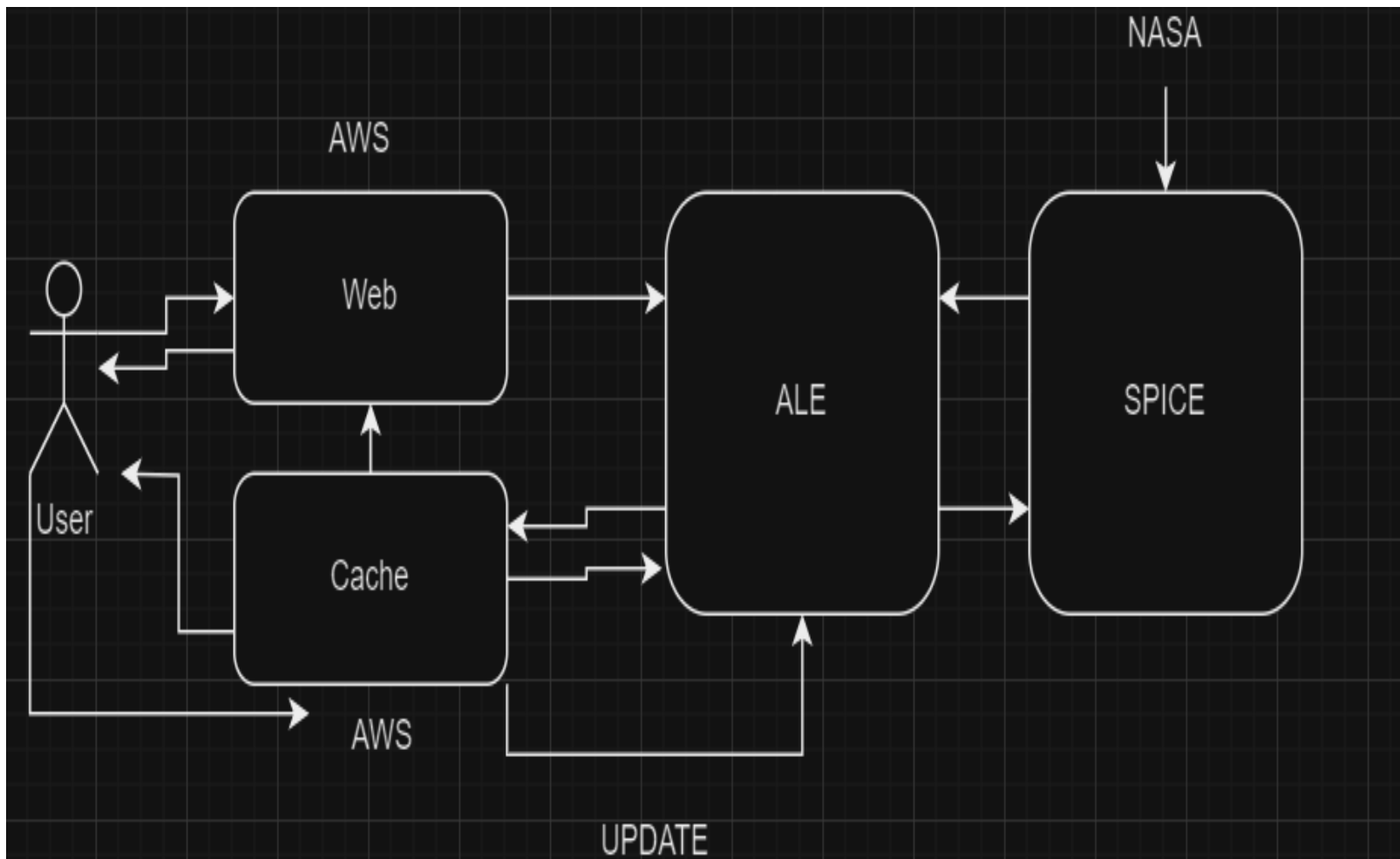
# Problem Overview

**Challenge:** The existing process for generating ISD from NASA's SPICE system requires users to download large datasets (up to a terabyte), which creates a roadblock for users, especially in high-performance computing environments.

**Impact:** Without ISD, planetary scientists cannot accurately geolocate imagery or perform various critical tasks such as mapping and photogrammetry for NASA missions.

# Solution Approach

- **Web-Based Service:** Develop a RESTful web service using Python to process planetary image labels and parameters.
- **Caching System:** Implement a caching system to reduce ISD generation time by retrieving pre-calculated ISD files.
- **Data Reduction:** Compress or convert large ISD files to reduce data footprint.
- **AWS Optimization:** Design the system to efficiently run on AWS, taking advantage of its scalability features.





# Plan for Development

- **Requirement Acquisition:**
  - Weekly Client Meetings
  - Program architecture consulting
  - Data format refinement
- **Technical Investigation:**
  - RESTful Web Service
  - ISD Caching
  - SPICE tags
  - ALE Library
  - Amazon AWS Servers
  - Amazon AWS Databases
  - Scalability

# Conclusion



- We are creating a web service and caching server for ISD images generated from NASA SPICE data
- Previous solutions were inefficient and costly to maintain
- Our solution will help the USGS Astrogeology team, NASA and future scientists at zero cost