MICHIGAN STATE UNIVERSITY

Project Plan Presentation

Railroad Data Visualization

The Capstone Experience

Team Union Pacific

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From Students…
…to Professionals

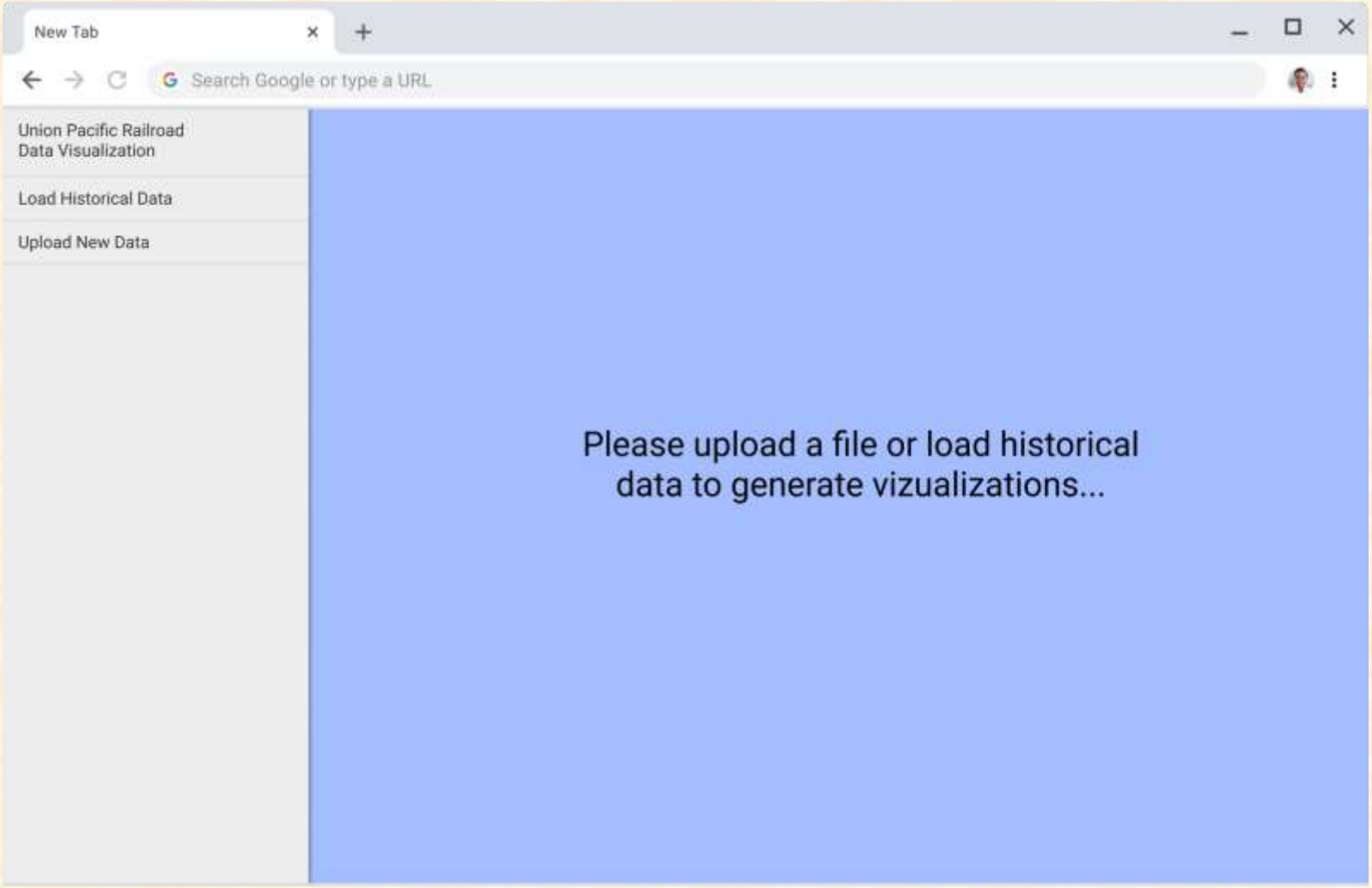
Functional Specifications

- Visualizes data created by train simulation software.
- Allows for an easier understanding of the data by generating meaningful visualizations.
- Generates visualizations based on new and already existing data.

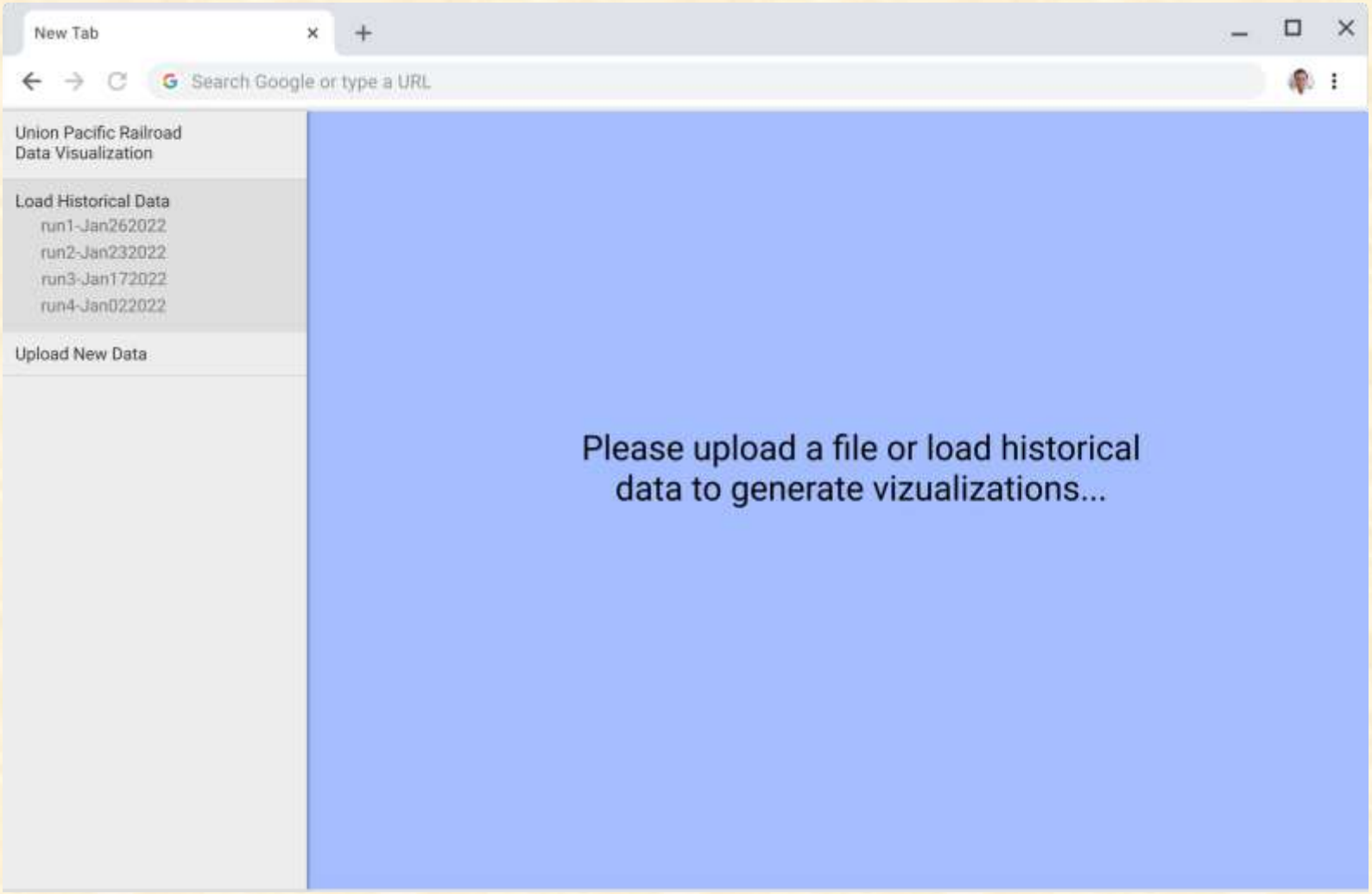
Design Specifications

- Animated visualizations over time that allow for complete user control including a scrollbar to control playback and standard video control buttons (play, pause, etc.)
- Ability for user data input to generate new visualizations
- Ability to access historical data to generate visualizations
- Multiple visualization methods to express the data differently

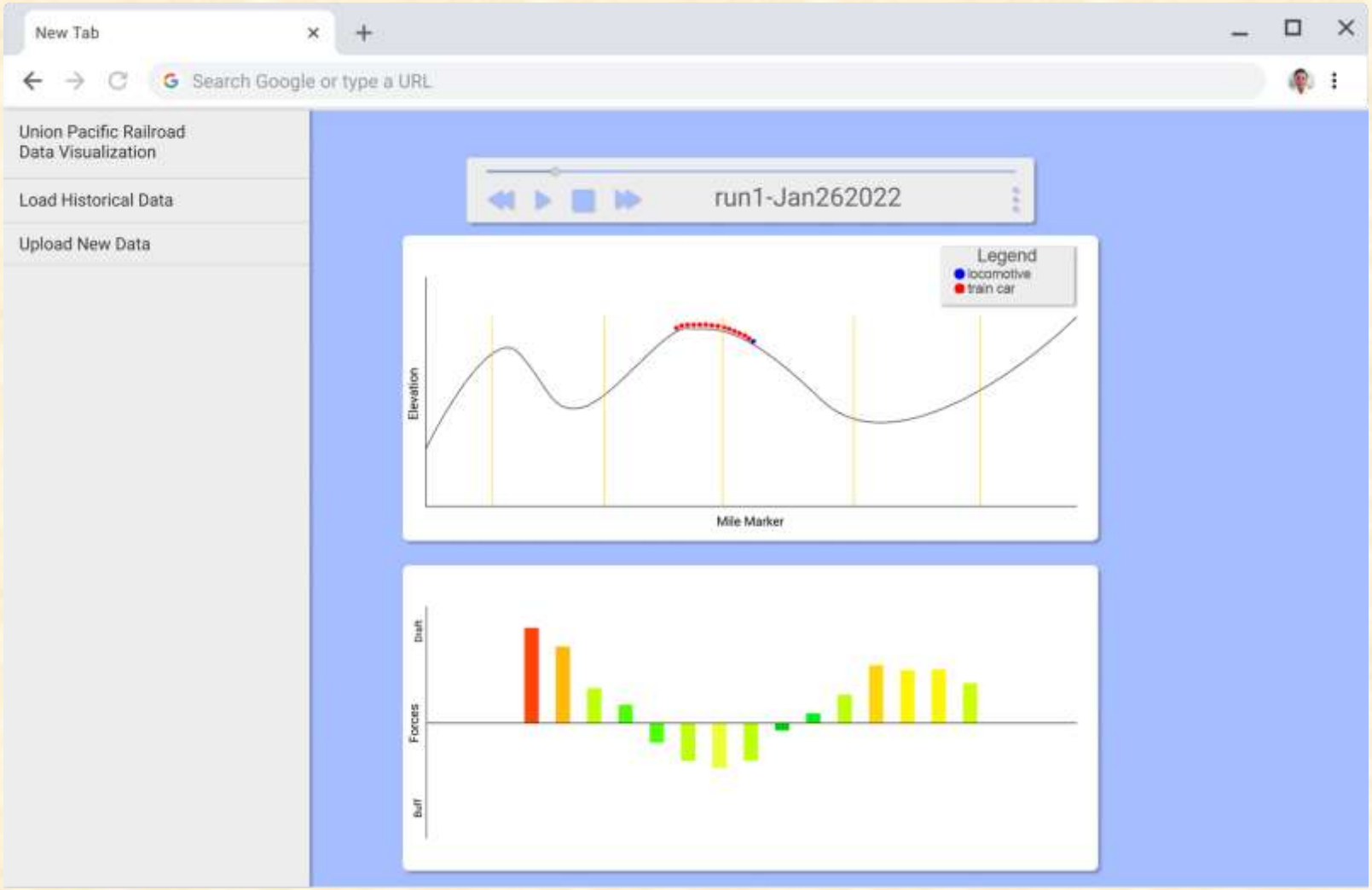
Screen Mockup: Before File Loading



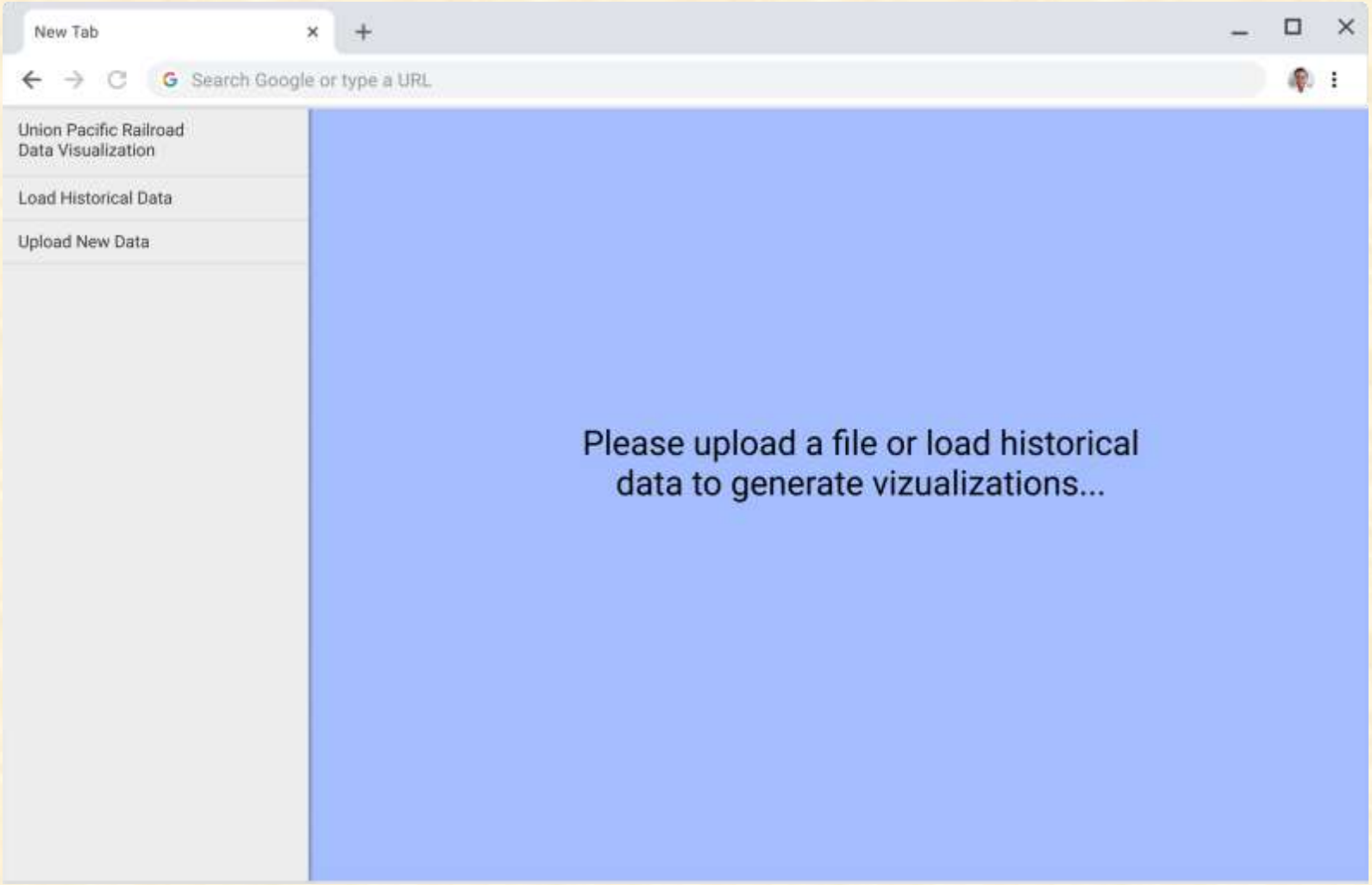
Screen Mockup: Historical Data Selection



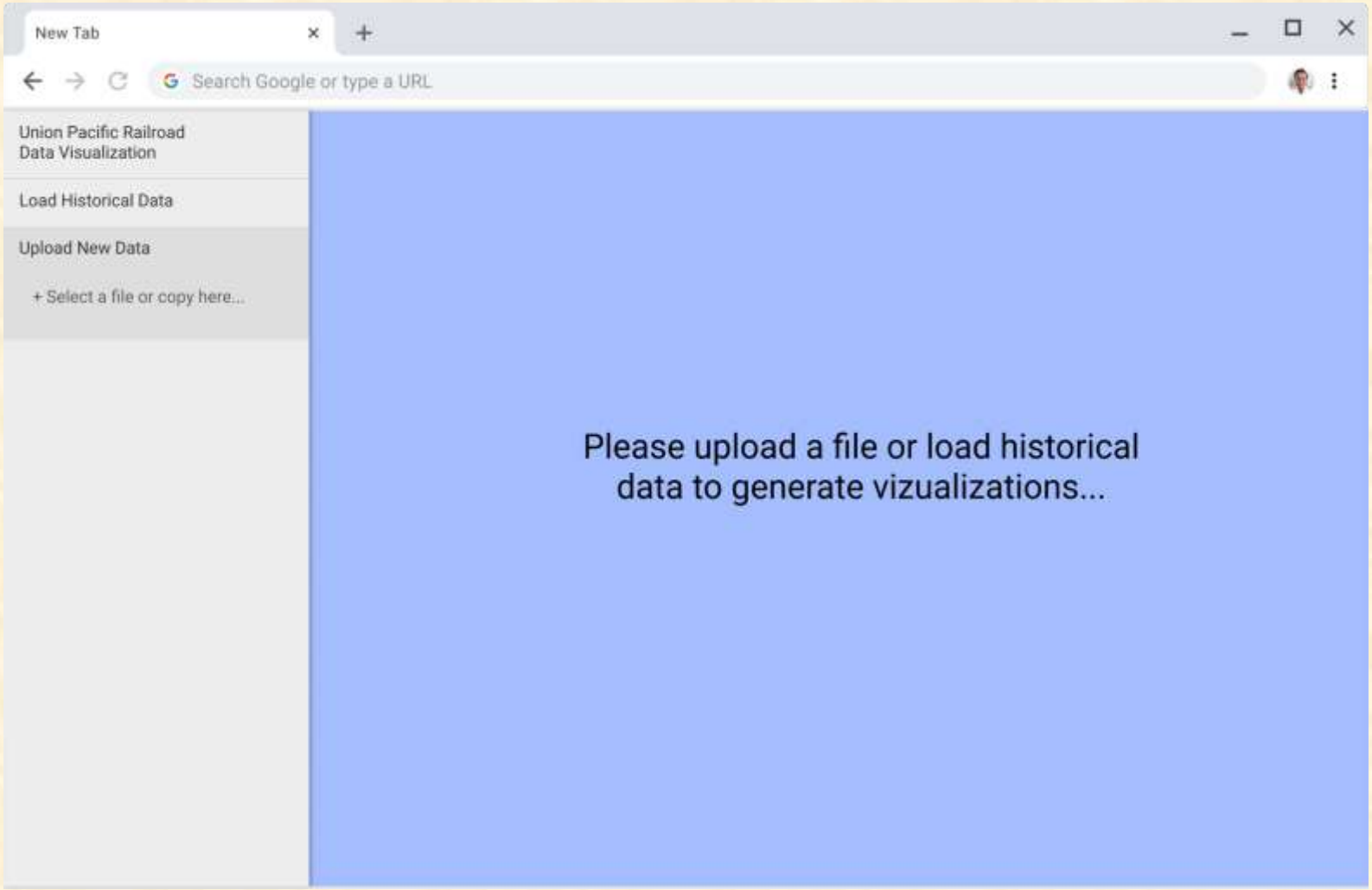
Screen Mockup: Historical Data Loaded and Visualized



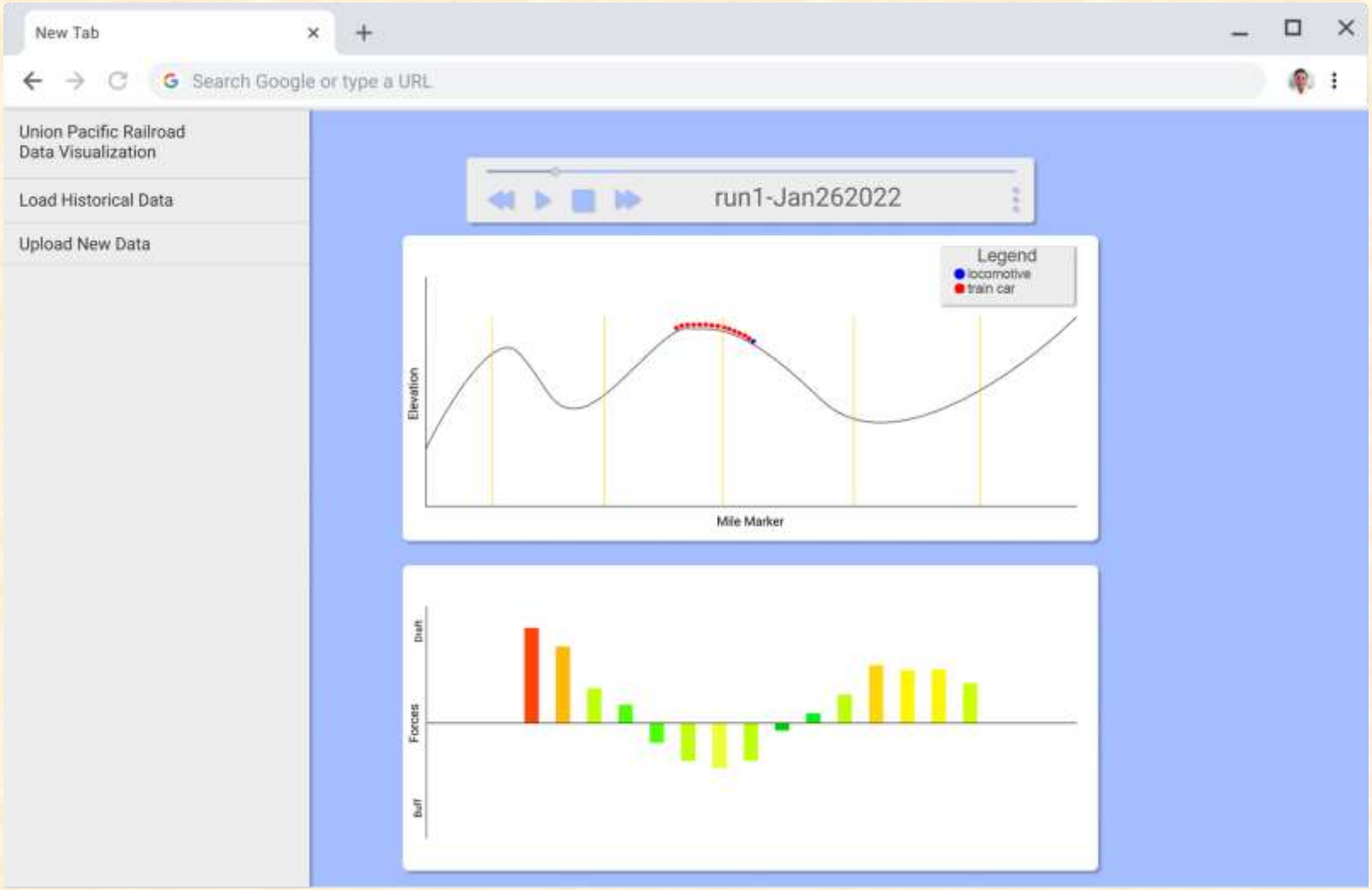
Screen Mockup: Before file loading



Screen Mockup: Uploading New Data



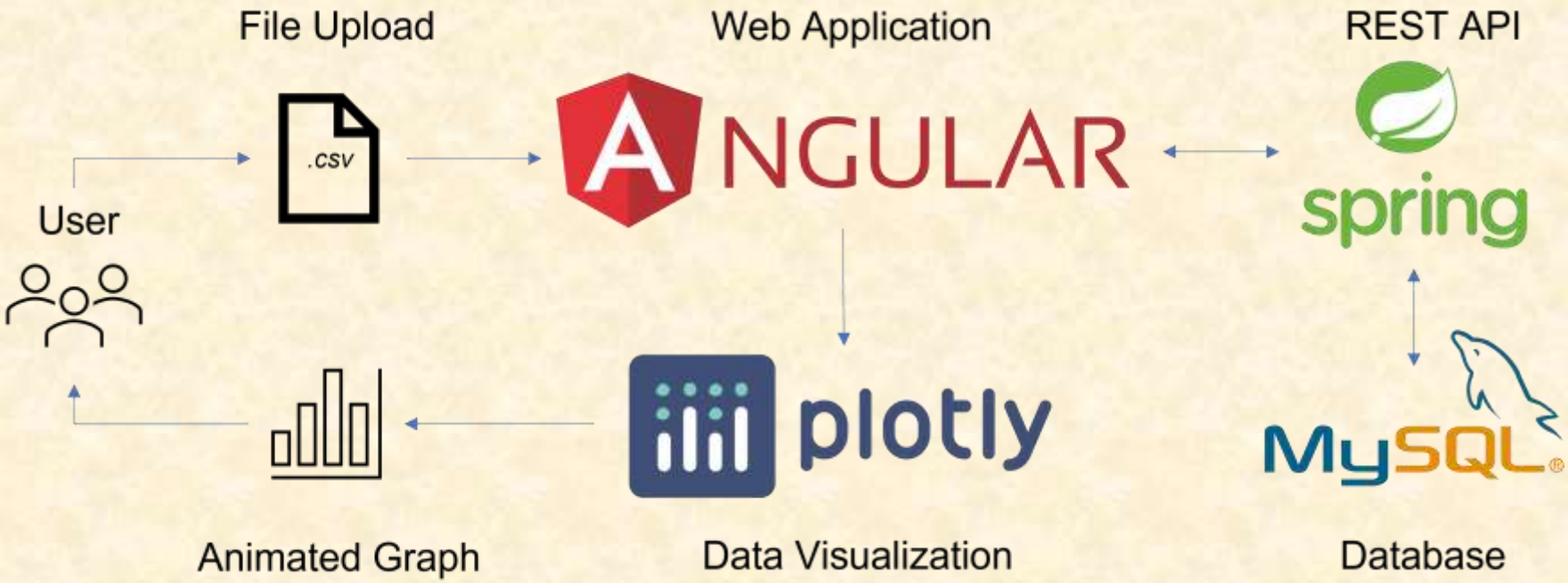
Screen Mockup: New Data Loaded and Visualized



Technical Specifications

- Front end controlled using the Angular framework for scalability and reliability along with the Nebular library for UI components
- Visualization created using Plotly because of its powerful and versatile graphing capabilities
- Back end made using the Spring Java Framework to simplify application development
- Database stored using MySQL to comply with client's current structure

System Architecture



System Components

- Hardware Platforms
  - N/A
- Software Platforms / Technologies
  - Angular & Nebular
  - Plotly
  - Spring
  - MySQL

Risks

- Connecting front-end to back-end
  - How to properly interface with the API from the front end
  - Mitigation: Research Angular documentation for info
- Finding a data visualization tool
  - Finding a visualization library which can display our data with respect to time
  - Trains and trips come in variety of lengths, need to have visualization be readable and look nice for all situations
  - Mitigation: Research visualization libraries, starting with suggestions from our client
- Calculating position of individual train cars
  - Car length is not stored in input file, not standard for all cars
  - Car couplings compress and stretch
  - Mitigation: Assume all cars have standard length for now, will obtain car length at later point

Questions?