MICHIGAN STATE UNIVERSITY

Project Plan

Railroad Physics Data Visualization

The Capstone Experience

Team Union Pacific

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Fall 2019

From Students…
…to Professionals

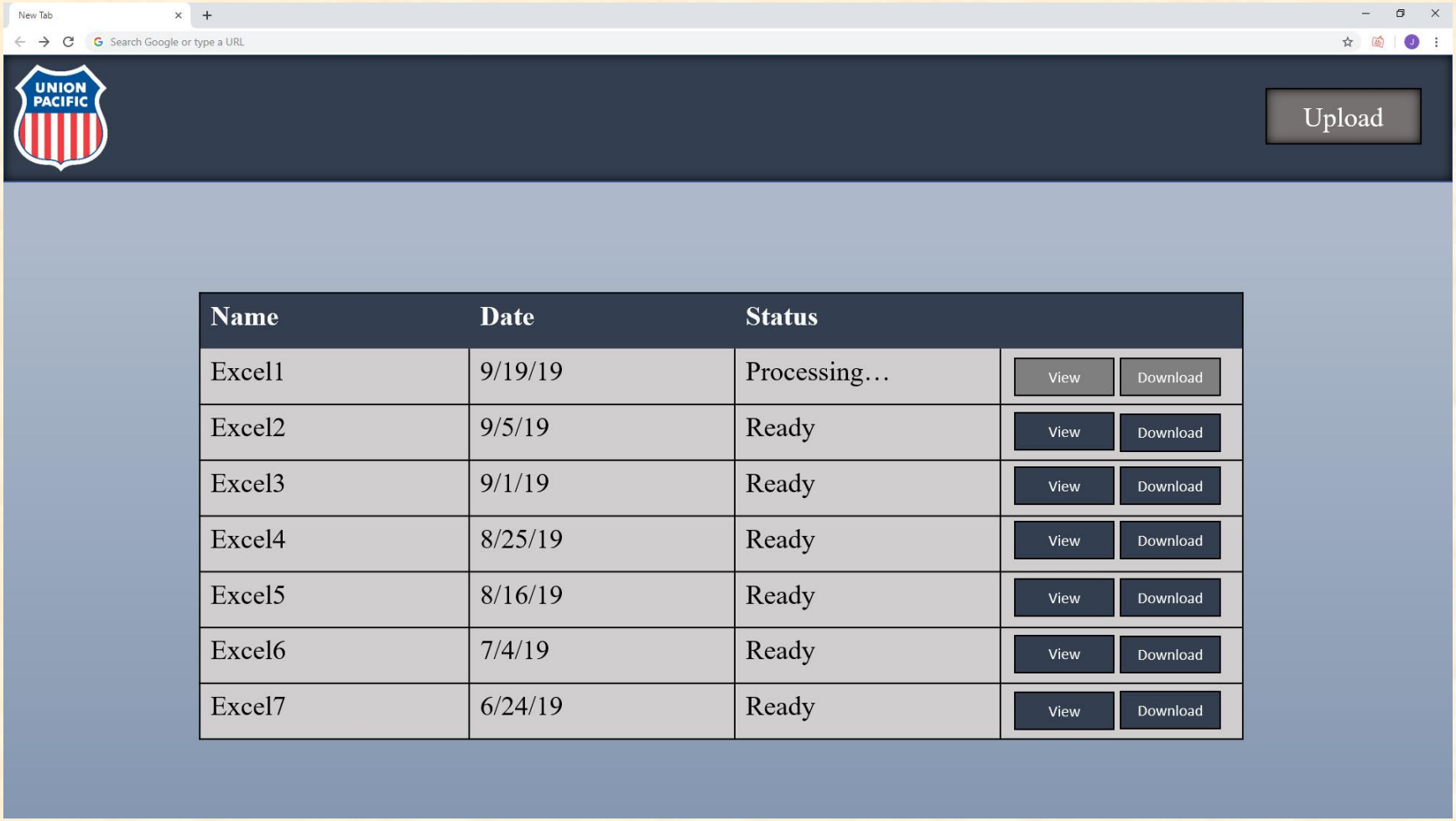
Functional Specifications

- PS Technology has a unity physics engine that simulates train operation and records varying data points
- They need a way to process the outputted CSV file into a graphical output to help improve diagnostics on the simulation run
- Our solution will create web-based UI that accepts the CSV files and displays the graphical output on both the UI and in a downloadable Excel file

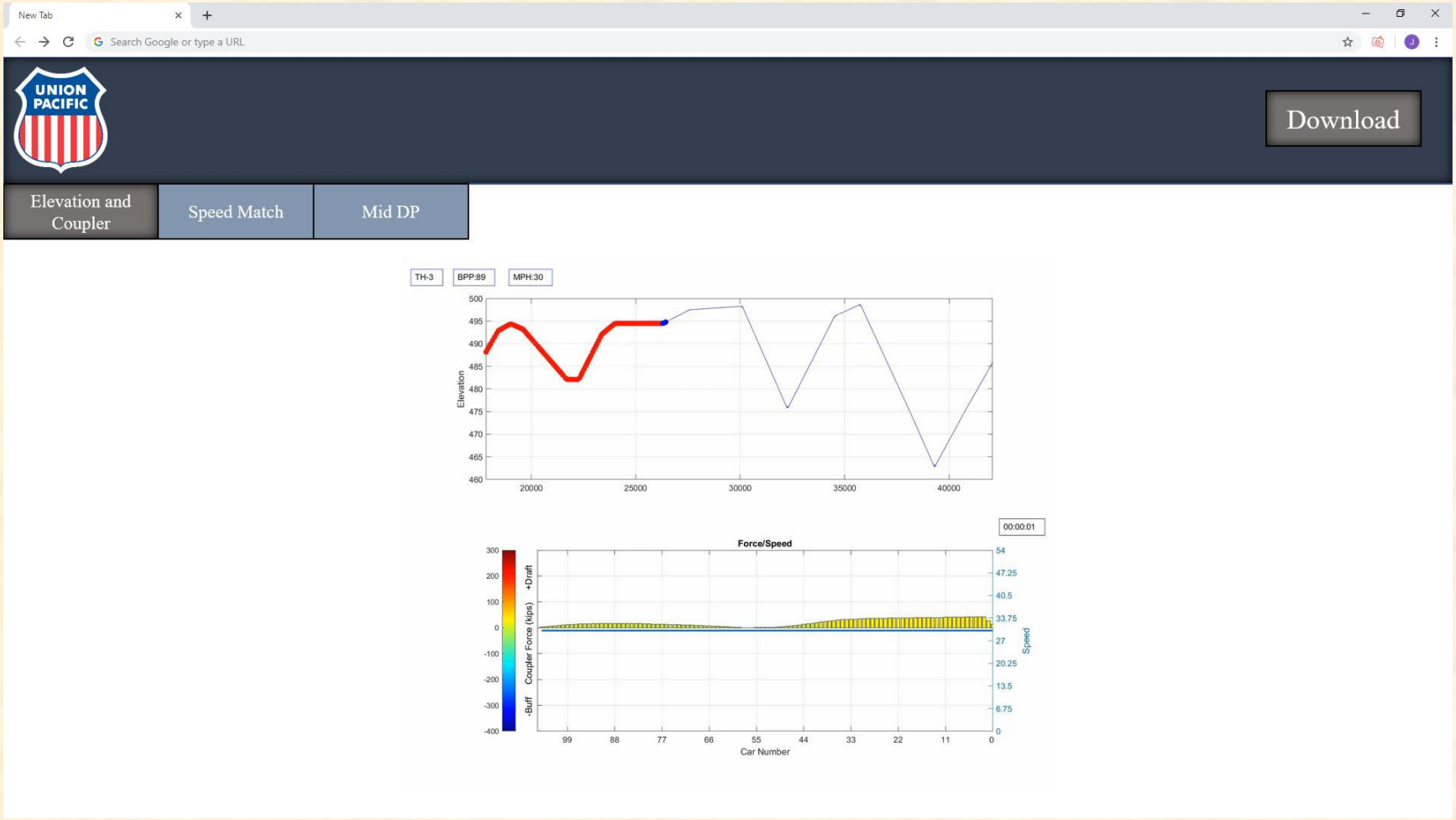
Design Specifications

- Provide visual processing of user-provided data, including both static charts and animated graphs.
- Build a web page as users interface which provides uploading CSV files, viewing graph online and downloading Excel files.
- Implement a back-end logic that allows the functionalities of validating, processing inputs, displaying and storing the expected correct output.

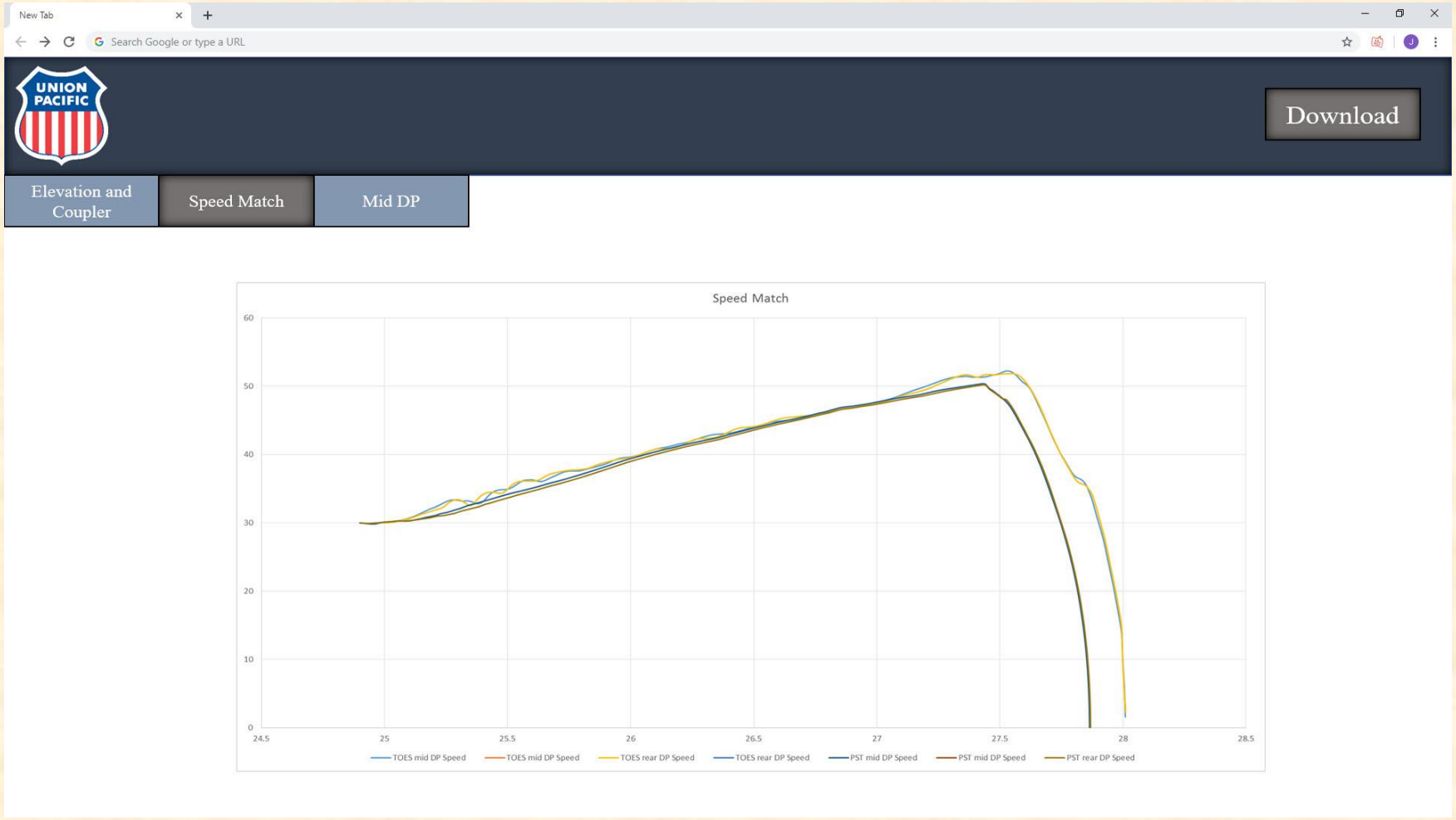
Screen Mockup: Upload Screen



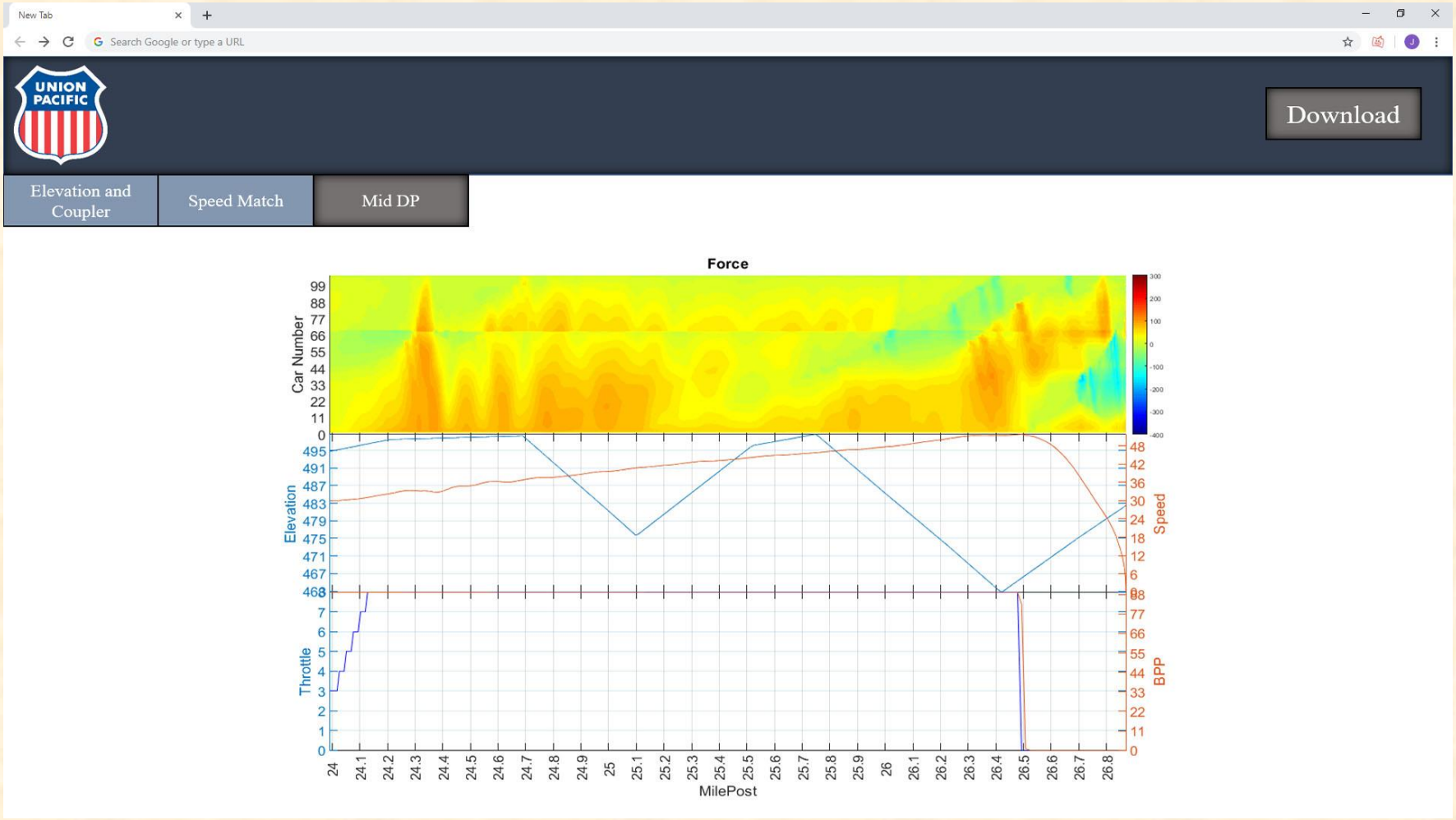
Screen Mockup: Graph 1



Screen Mockup: Graph 2



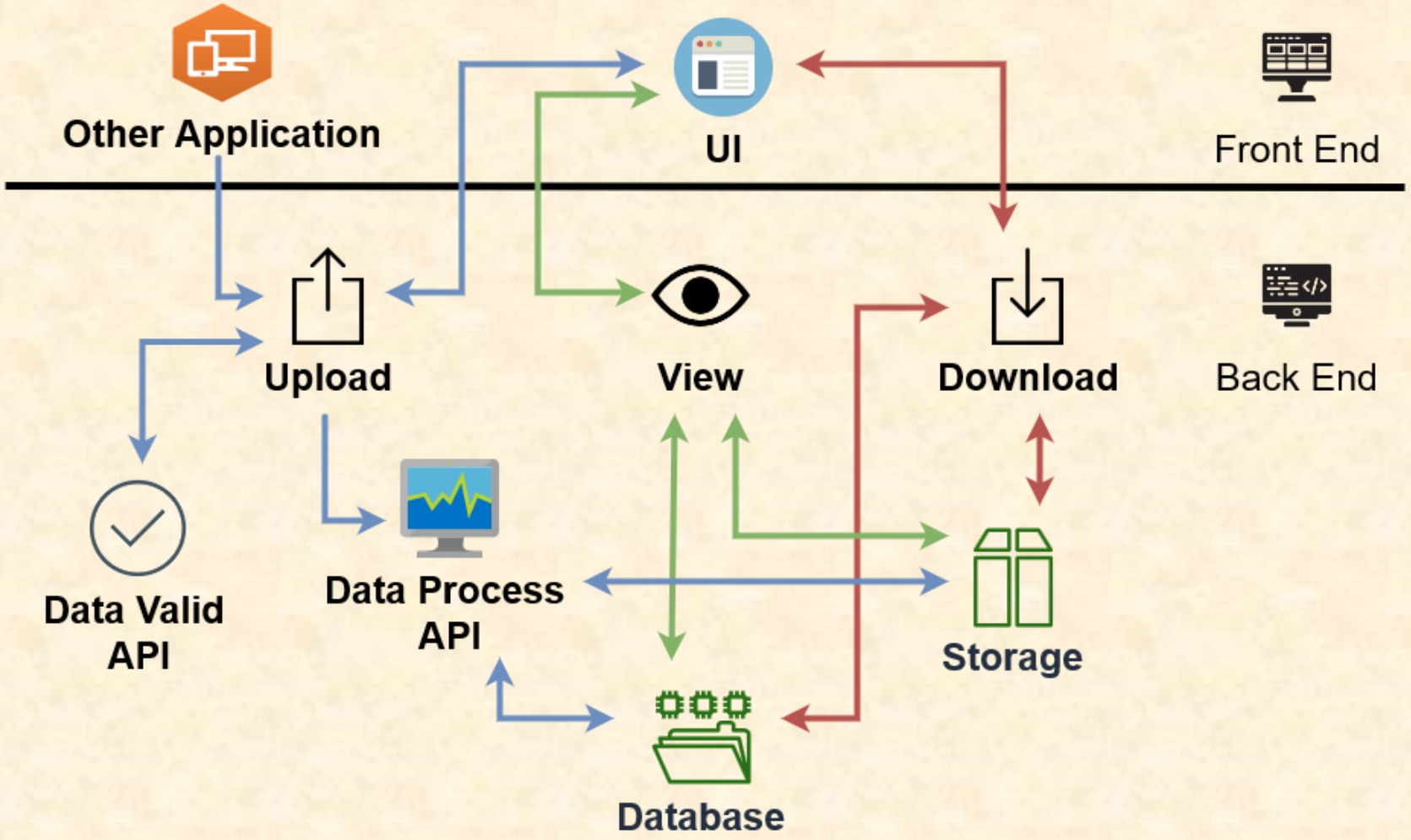
Screen Mockup: Graph 3



Technical Specifications

- Web UI
- Upload micro service
  - Data Validation API
  - Data Processing API
- View micro service
- Download micro service
- Database
  - Storage

System Architecture



System Components

- Hardware Platforms
  - Tomcat server running on Linux
  - Oracle MySQL database
- Software Platforms / Technologies
  - Java for back-end
  - Angular for front-end
  - Excel for generating graphs
  - Apache POI for reading and writing Excel files

Risks

- Risk 1 (High)
  - Description: The graphs being generated comes from an Excel file. The precision of the graphs in the we UI need to be at par with the data from its parent Excel file.
  - Mitigation : The exact graphs from the Excel file will be used in the web user interface.
- Risk 2 (High)
  - Description : There is a need to fully and correctly understand the sample graphs provided. If we do not understand what the graphs are showing, we cannot write code that will generate them.
  - Mitigation : We will be setting up a meeting with the client to specifically discuss and understand the graphs and its related features.
- Risk 3 (High)
  - Description : The back-end needs to generate animated graphs in the Excel file. The Java library for generating Excel outputs may not include the ability to construct animated graphs.
  - Mitigation : We have researched another library called JFreeChart that can generate an animated graph that can then be imported into the Excel file using Apache POI.
- Risk 4 (Medium)
  - Description : Uploading or using an invalid CSV data can sometime happen. This data could be difficult to differentiate from the real valid physics data.
  - Mitigation : : An API call that is specifically designed to validate input data will be created

Questions?