Virtual Laboratory for Flexural Beam Testing

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Abstract

As part of an ongoing project to build a suite of enhanced curricular tools for the Valparaiso University Civil Engineering Department, a group from Computing and Information Systems (CIS) has been tasked with creating a curricular support product that presents data from flexural concrete beam testing. The project follows earlier prototyping conducted in previous semesters and builds on the designs and requirements captured through the earlier efforts; this provides an experience of building on prior software engineering products for the CIS team.

Additionally, the latest iteration adds a MATLAB-based image processing tool that adapts the photos for proper display. The system also incorporates a back-end website for tool administrators that is constructed with PHP that allows faculty to manage uploaded data sets. The user-facing site then displays photos from the concrete flexural beam test concurrently with the numeric data from the tests in an interactive manner for the students. This reusable educational asset will allow students to experience a flexural concrete beam test and retrieve its data without wasting additional time and monetary resources. **The long-term goal is for the project to become a starting point for a multi-institutional education asset, creating greater curricular flexibility and increasing cost savings.**
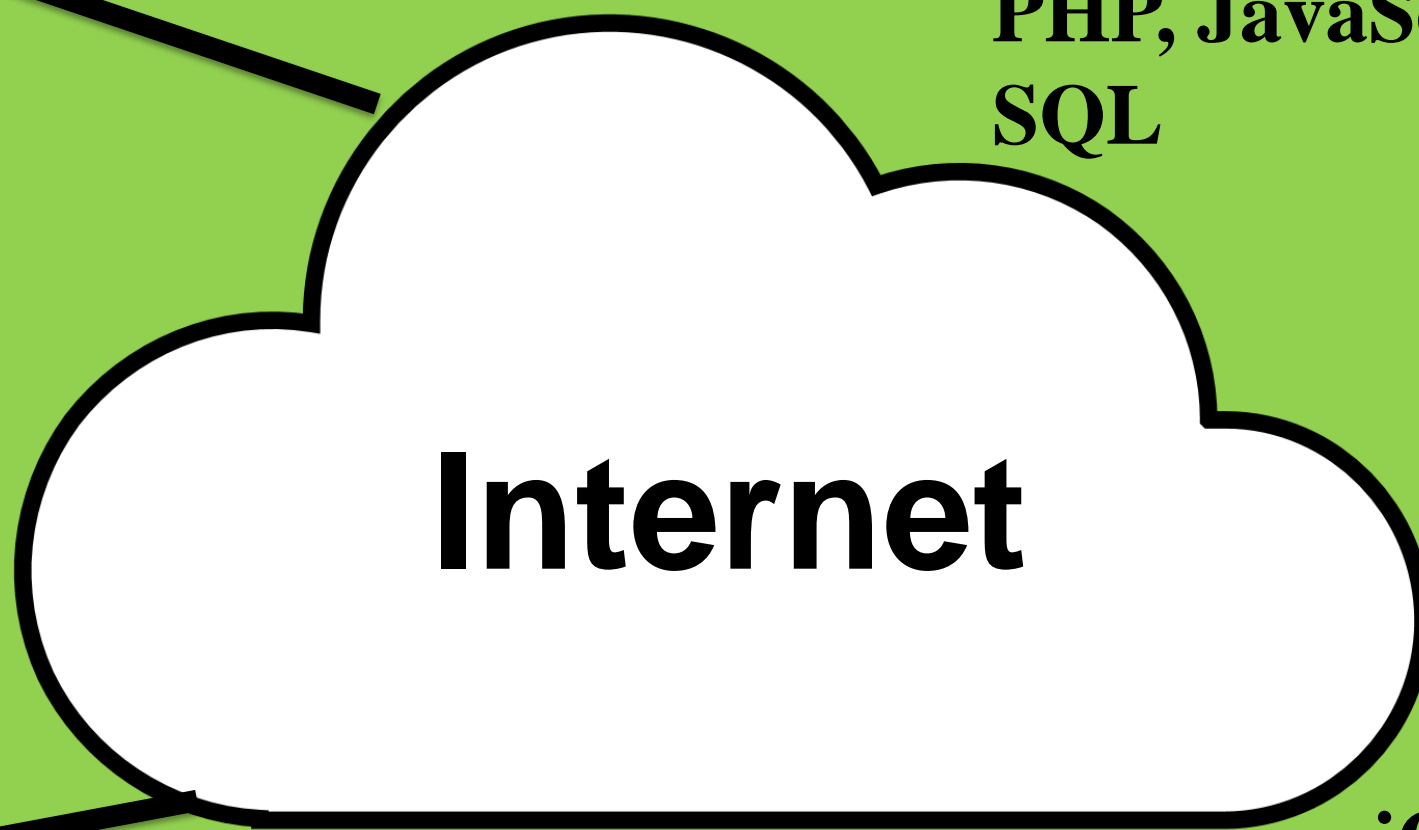
Load Displacement Interface
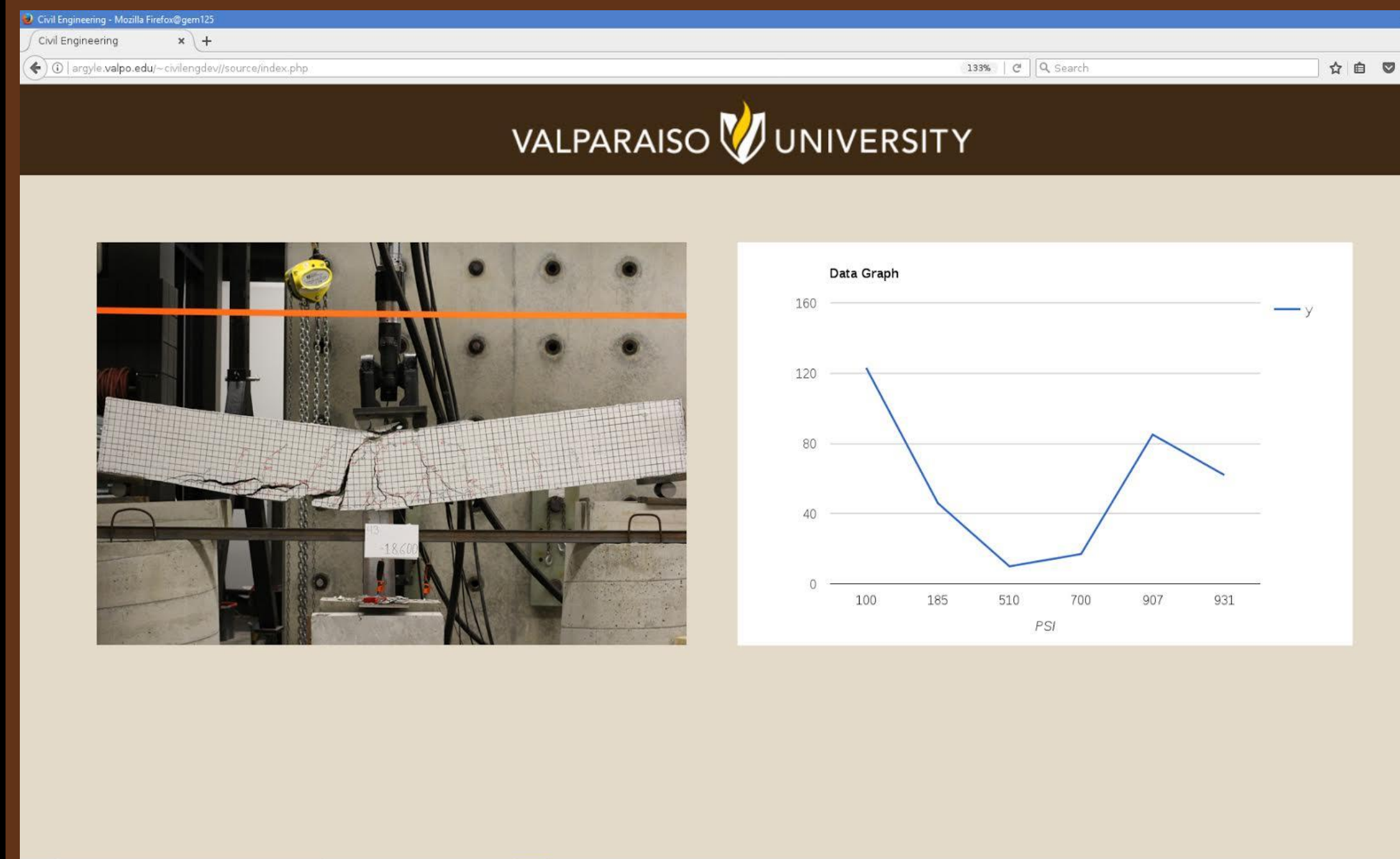
Technology Implementation

Web Browser

Web Browser

End Users

Internet
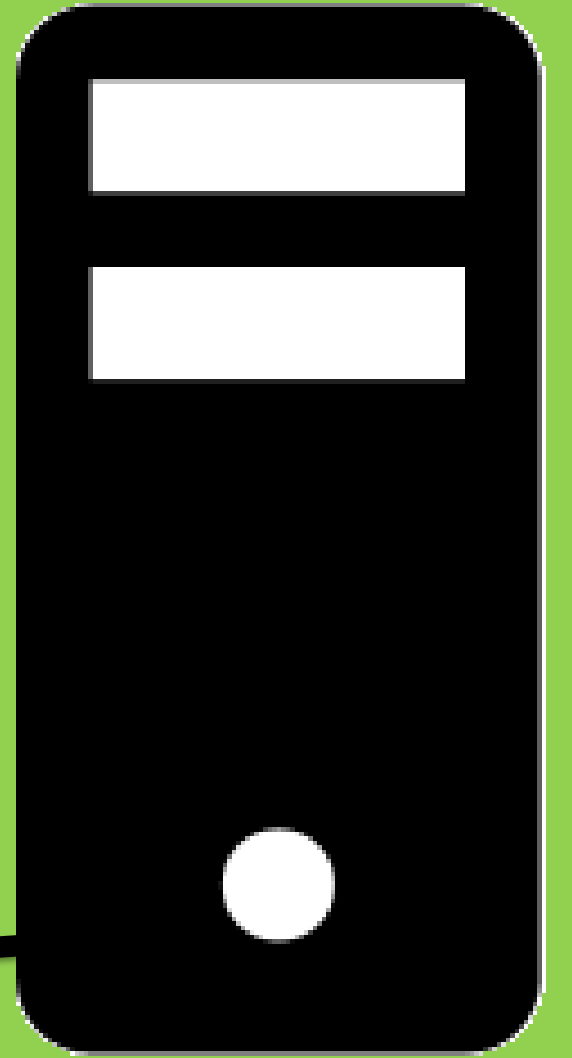
Languages used include HTML, CSS, PHP, JavaScript, & SQL

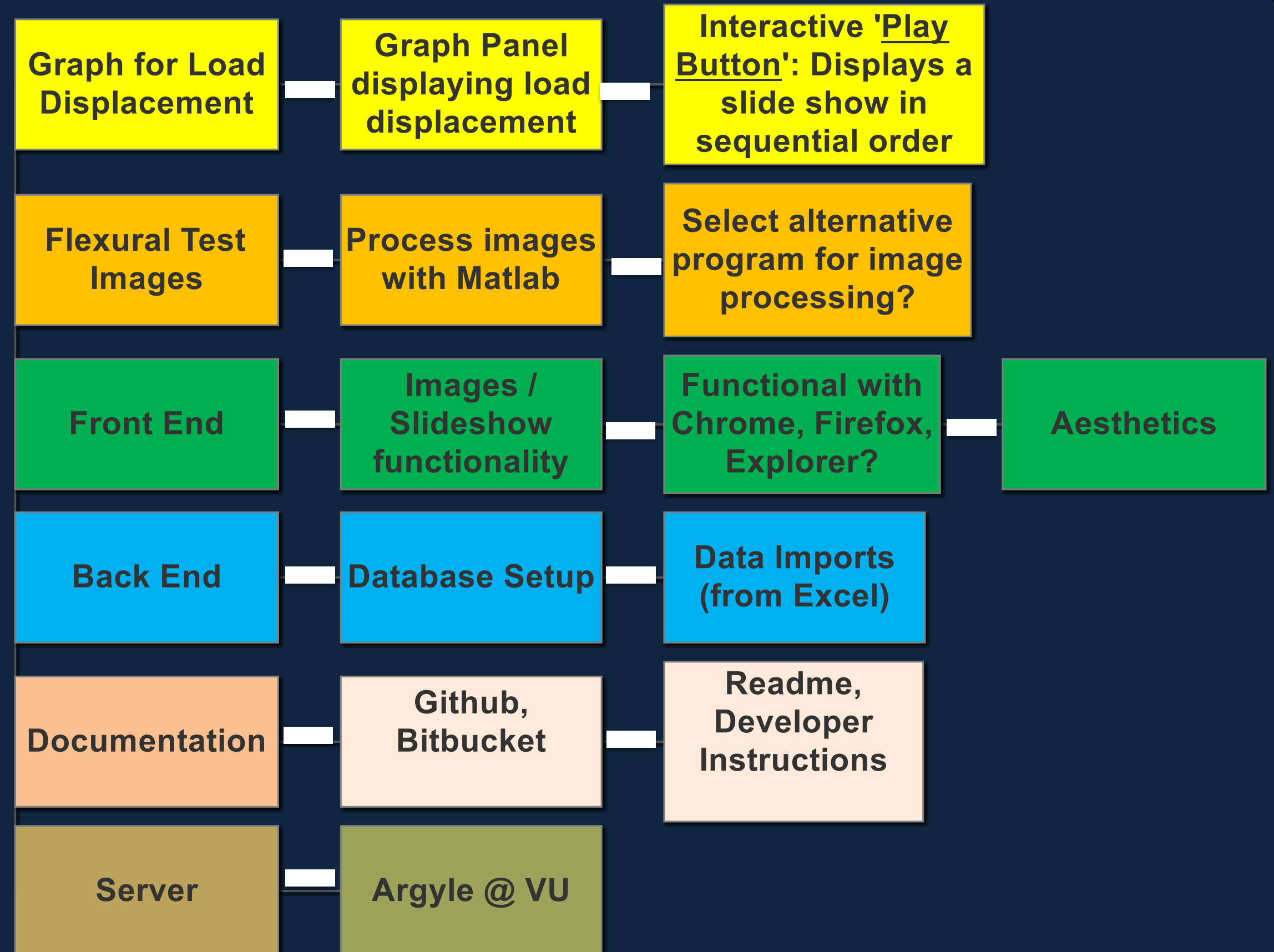MATLAB is utilized for image processing and analysis.

Server

jQuery is utilized as a JavaScript library to create animations and handle events.

Challenges

- ✓ Making load displacement data functional with images.
- ✓ Having image slideshow interact and correspond with graphed data.
- ✓ Consistently crop images via functional image processing.
- ✓ Building a simple and balanced user interface.
- ✓ Importing data from excel to coordinate metrics with images.
- ✓ Create high quality documents to pass along to future developers.

Civil Engineering Flexural Beam Test				
Graph for Load Displacement	Graph Panel displaying load displacement	Interactive 'Play Button': Displays a slide show in sequential order		
Flexural Test Images	Process images with Matlab	Select alternative program for image processing?		
Front End	Images / Slideshow functionality	Functional with Chrome, Firefox, Explorer?	Aesthetics	
Back End	Database Setup	Data Imports (from Excel)		
Documentation	Github, Bitbucket	Readme, Developer Instructions		
Server	Argyle @ VU			

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