MICHIGAN STATE UNIVERSITY

Project Plan

Investment Portfolio Construction

The Capstone Experience

Team Principal IPC

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From Students…
…to Professionals

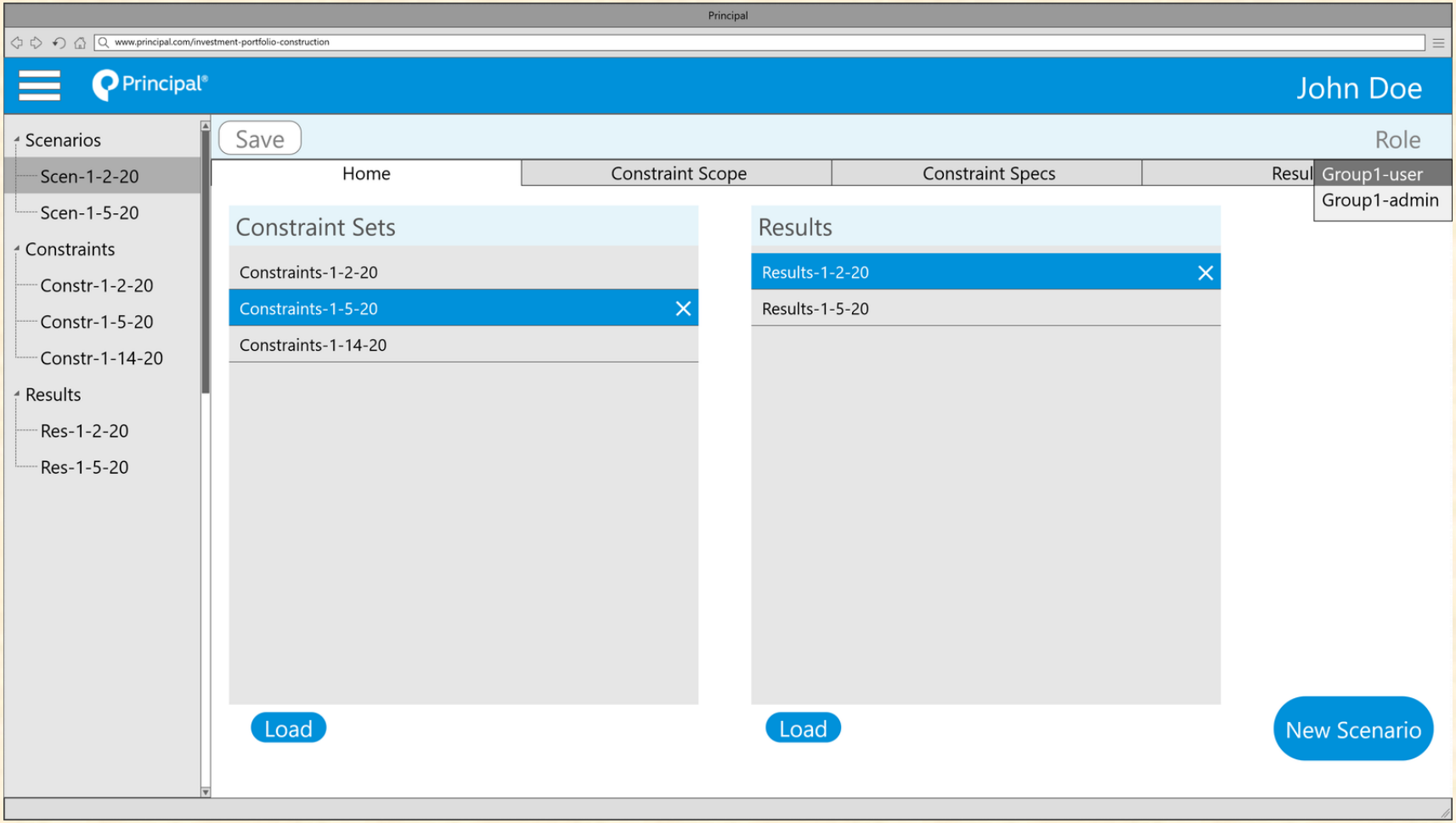
Functional Specifications

- Principal's current process involves hard-coding parameters to generate a single type of investment portfolio construction
- Our application provides a user interface for saving and loading optimization parameters and passing them to Principal's existing optimization engine
- The application assigns groups to its users, providing them with the ability to construct a variety of portfolio constructions based on custom-built portfolio-level and quantile-level constraints

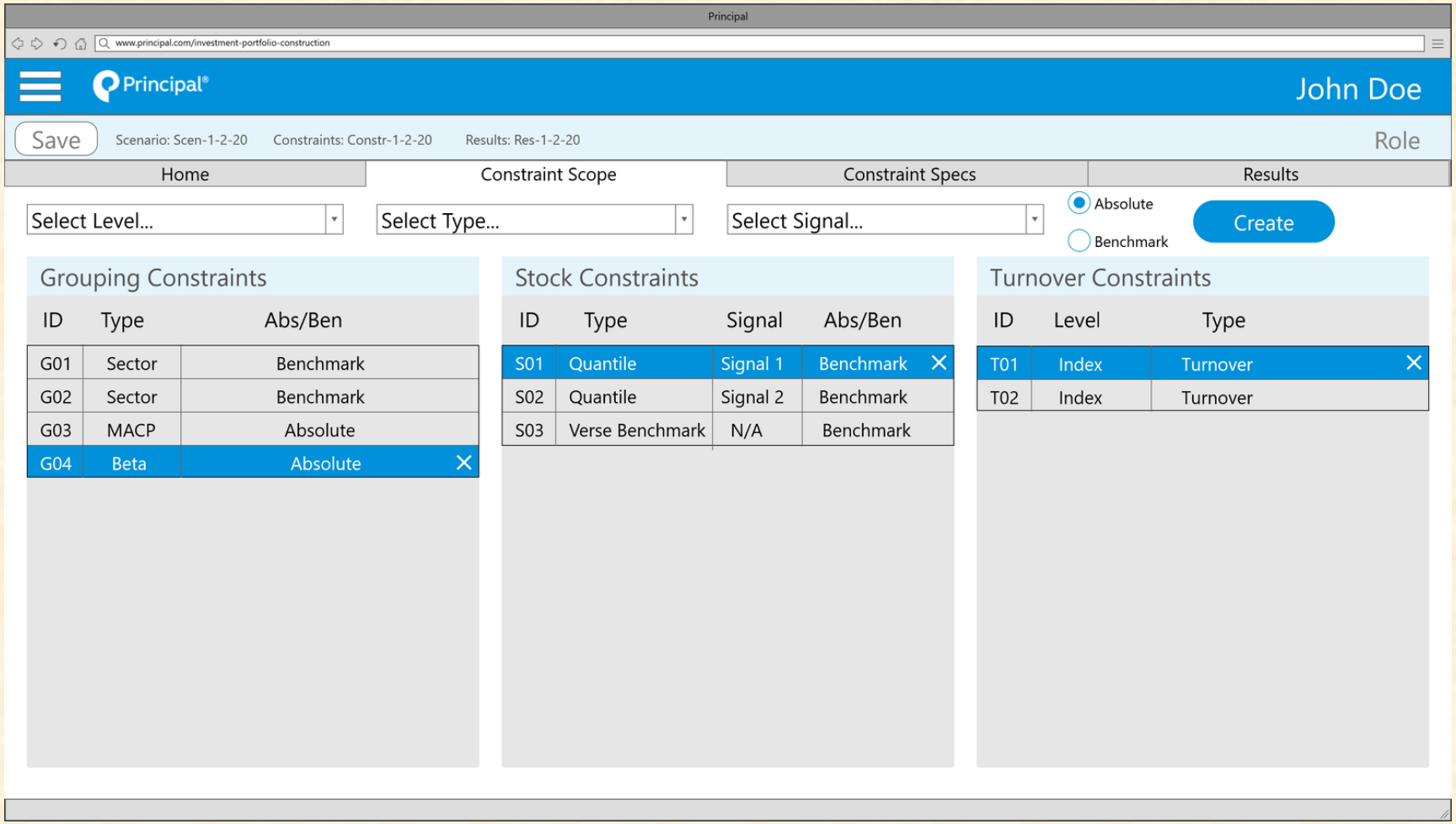
Design Specifications

- Landing Page: View any constraint sets or results saved for specific user/group
- Constraint Scoping Page: Create the basis for user constraints in a portfolio construction scenario
- Constraint Specification Page: Configure specific settings for each of the constraints defined on scoping page
- Results page: Displays the investment portfolio construction returned by the optimization engine

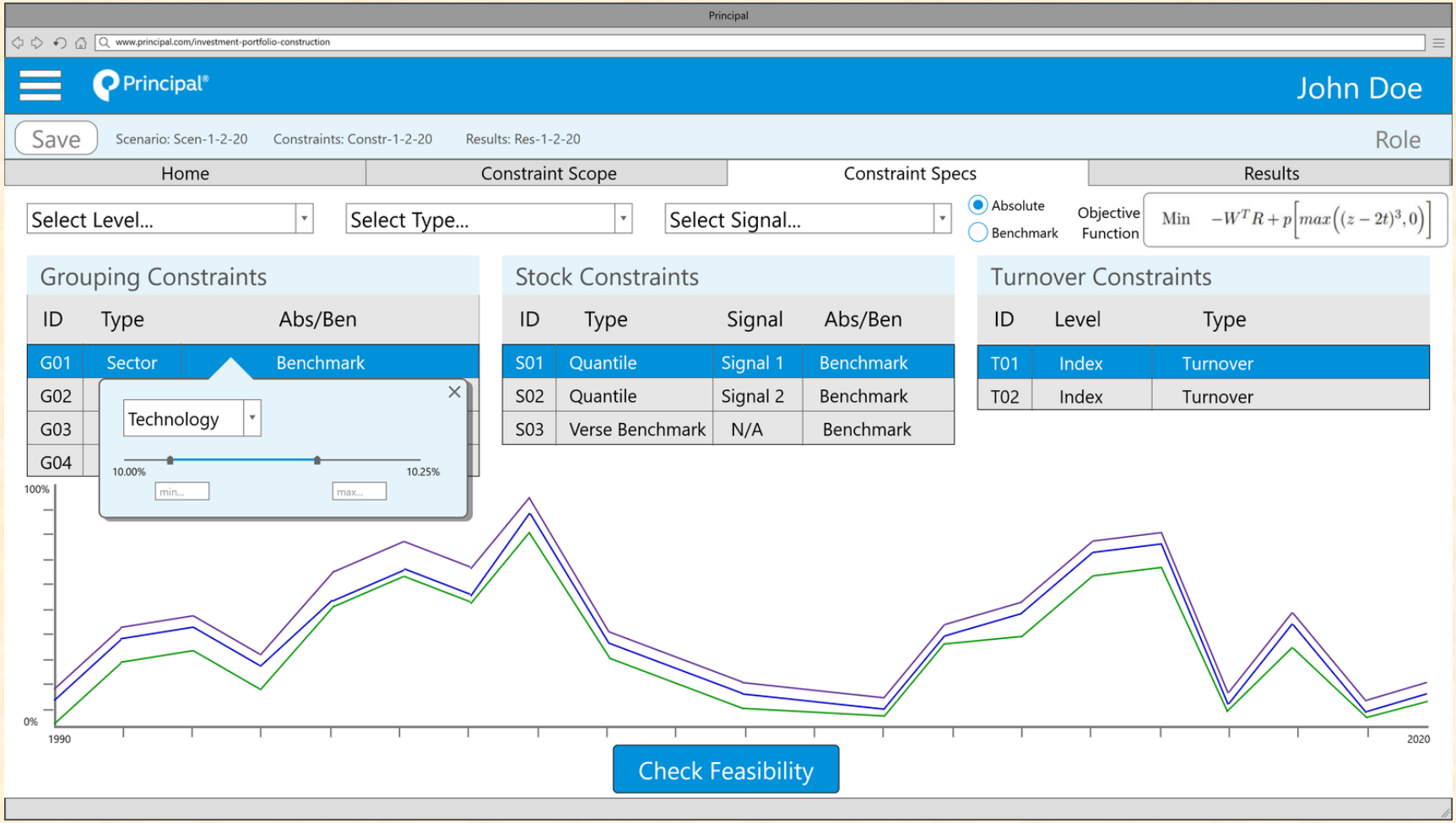
Screen Mockup: Landing/Home Page



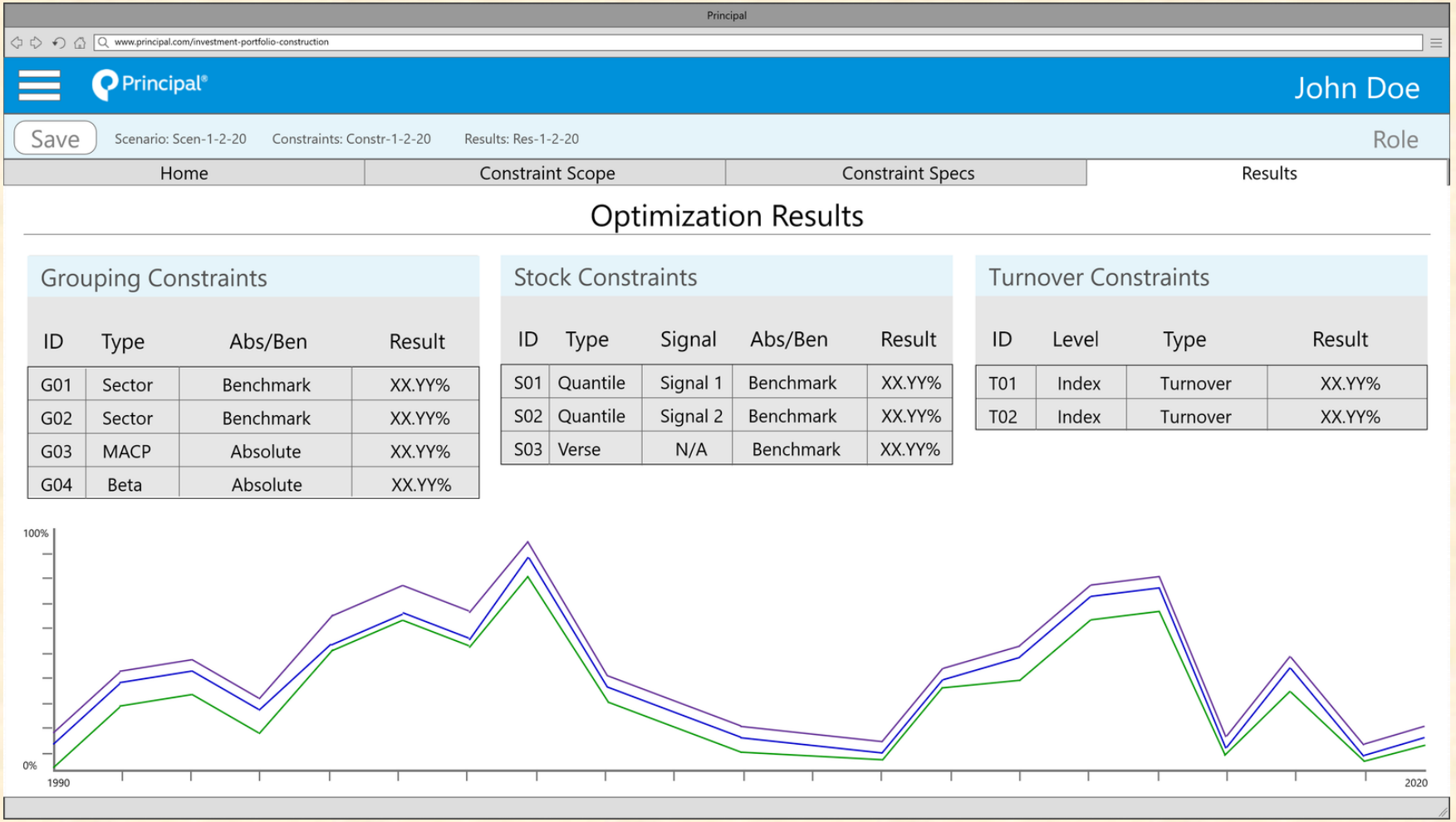
Screen Mockup: Constraint Scoping



Screen Mockup: Constraint Specifications



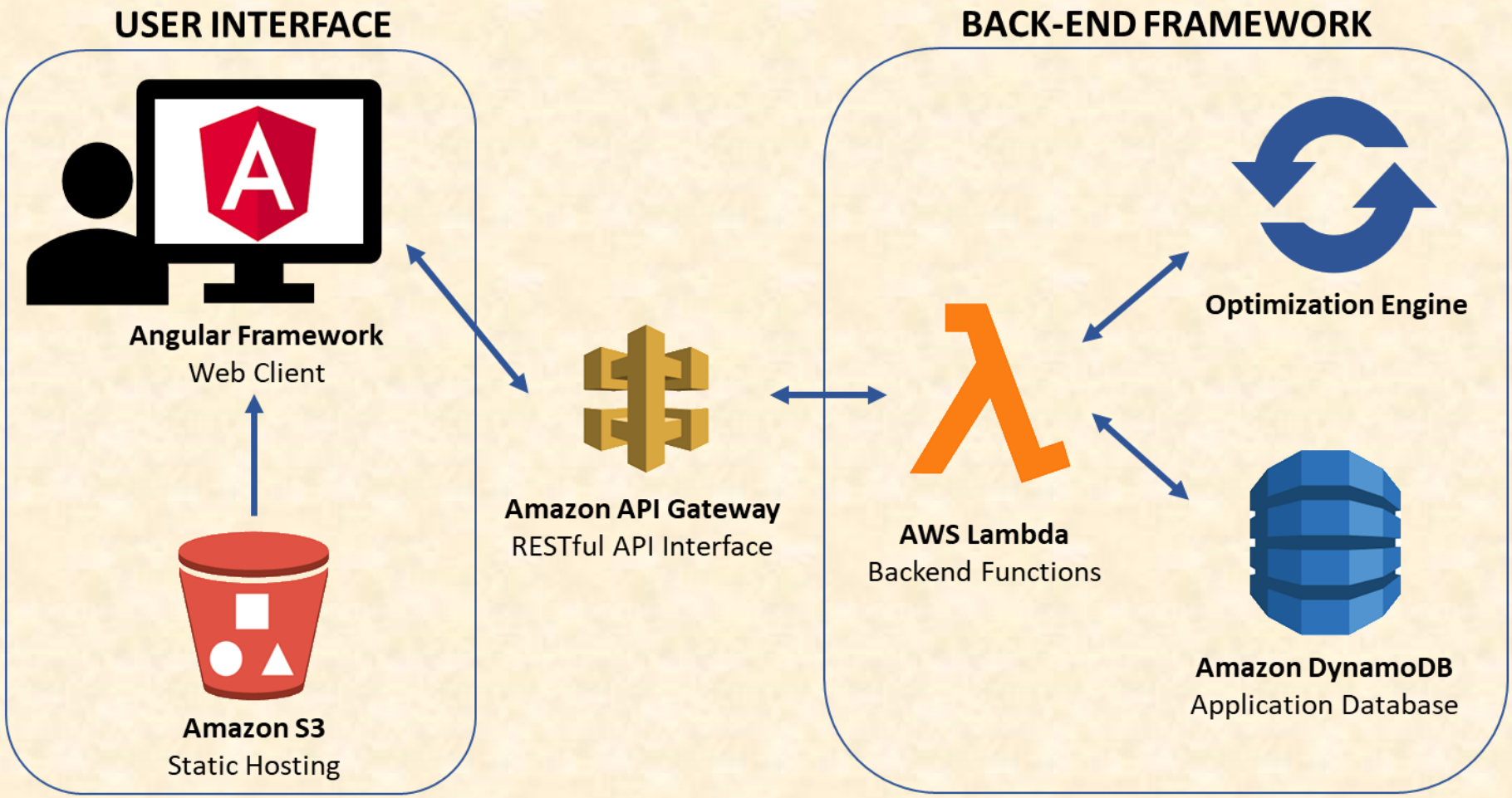
Screen Mockup: Results



Technical Specifications

- **Connection to the optimization engine and database:** a method is required for passing constraints, objective functions, and data into the optimizer
- **Constraint and objective function builder:** programmed equations let users create and store new objective functions and constraints
- **User interface:** users on the front-end can interactively specify constraints that can be saved into databases and loaded for future use

System Architecture



System Components

- Hardware Platforms
  - Computer interface required to use application
- Software Platforms / Technologies
  - Angular (implement user interface)
  - AWS S3 (host Angular application, store and retrieve local data)
  - Amazon API Gateway (link between front-end and back-end)
  - AWS Lambda (provide an environment for combining and returning the results of database queries to the front-end)
  - AWS DynamoDB (store data)

Risks

- **Compatibility with Principal's optimization engine**
  - Method for passing all data to optimization engine must be compatible with current process for accepting data
  - We are working with the client so that the method can be tested early and often directly on their optimizer
- **Serverless Architecture Model (SAM)**
  - Neither system parts nor communication can be dependent on servers
  - We are separating static elements and dynamic elements before implementation
- **API Gateway**
  - All data exchanged between user interface and back-end platforms must be passed through an API gateway designed by the team
  - We are using test functions to ensure gateway can reliably pass mock data between all necessary system components
- **Compatibility with other Principal team's user model**
  - Assignment to worldviews relies on implementation of user groups
  - We are working with Principal to understand the format of user group data

Questions?