Asset Portfolio Performance

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Background

- Predicting returns on investment portfolios is uncertain
- Investors want to understand risk-reward tradeoff
- Different quantitative measures of risk and return may yield different investment decisions

- **Goal:** Help investors understand how the numbers that drive their decisions are sensitive to their measures of risk and return and assumptions about how the past predicts the future

Data Used

- U.S. stock market indices
  - S&P 500 index
  - Wilshire large, medium, and small capitalization indices
- U.S. Treasury bond market indices
  - 0-1 year maturity
  - 1-3 year
  - 3-5 year
  - 5-7 year
- U.S. corporate investment-grade bonds
  - Bloomberg Barclays AAA index
  - Bloomberg Barclays BBB index

Use Cases

Our app allows a user to:

- Compare asset portfolios composed of different types of stocks and bonds
- Compare quantitative measures of risk
  - Example: standard deviation of return, historical probability of loss
- View risk and return over different time horizons
- See how well past risk and return predict the future

Demo

Asset allocation

- Introduction
- Portfolios
- Risk return graph
- Datasets

Measure of return

Change in log of portfolio value

Measure of risk

Probability of return below a threshold

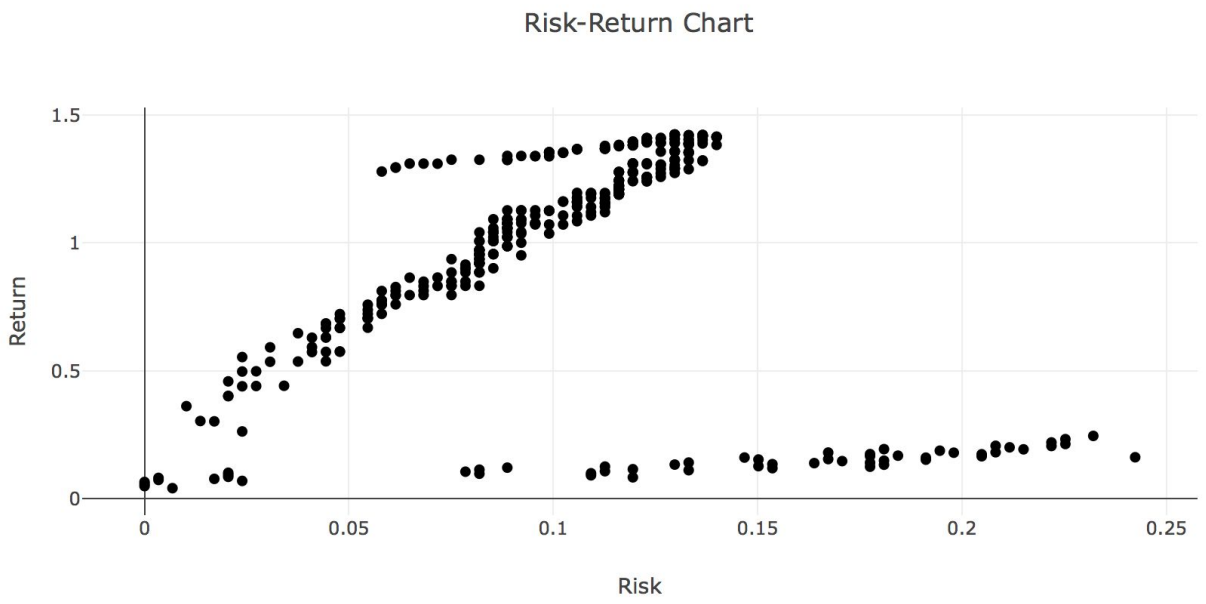
Period of return (days) to use for risk measure 365

Threshold rate of return 0

Frequency to measure return 10

Use annualized return

Return Risk



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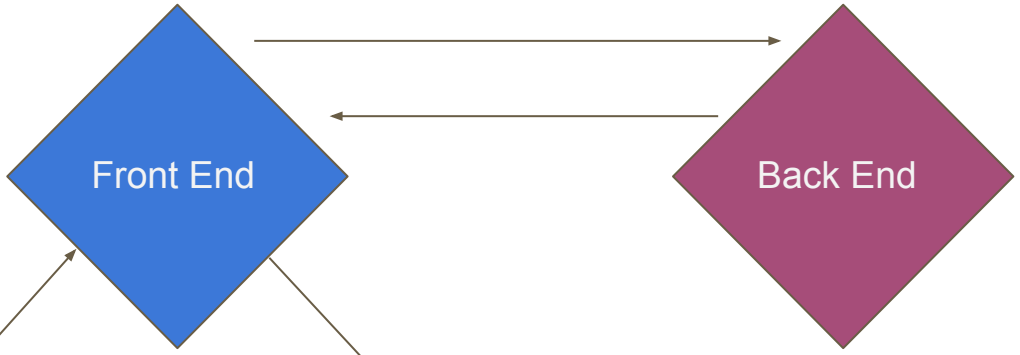
Design

Front End



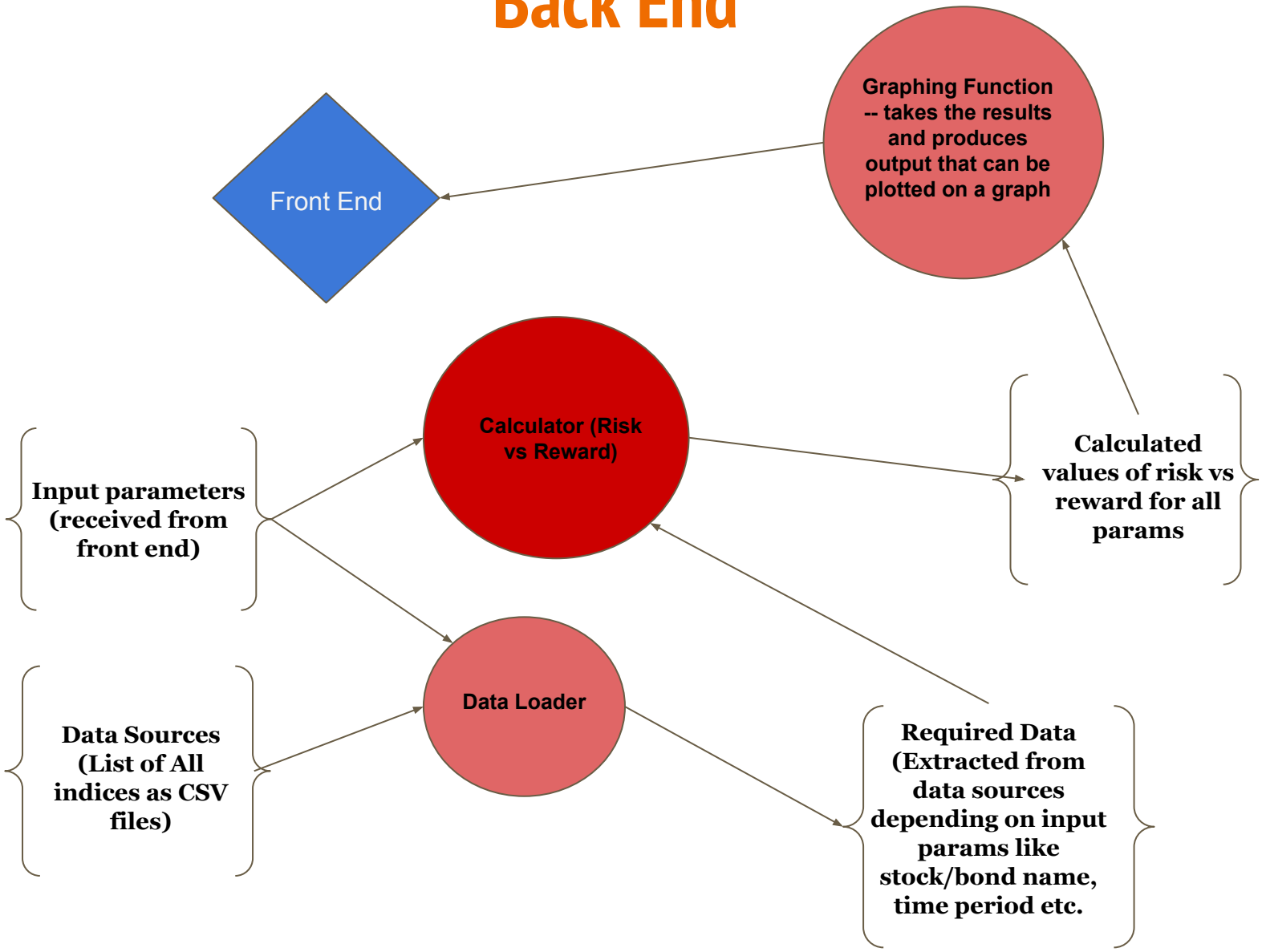
Risk Measure (User Selected, single choice)

Portfolio Considered (User Selected, multiple choices available)

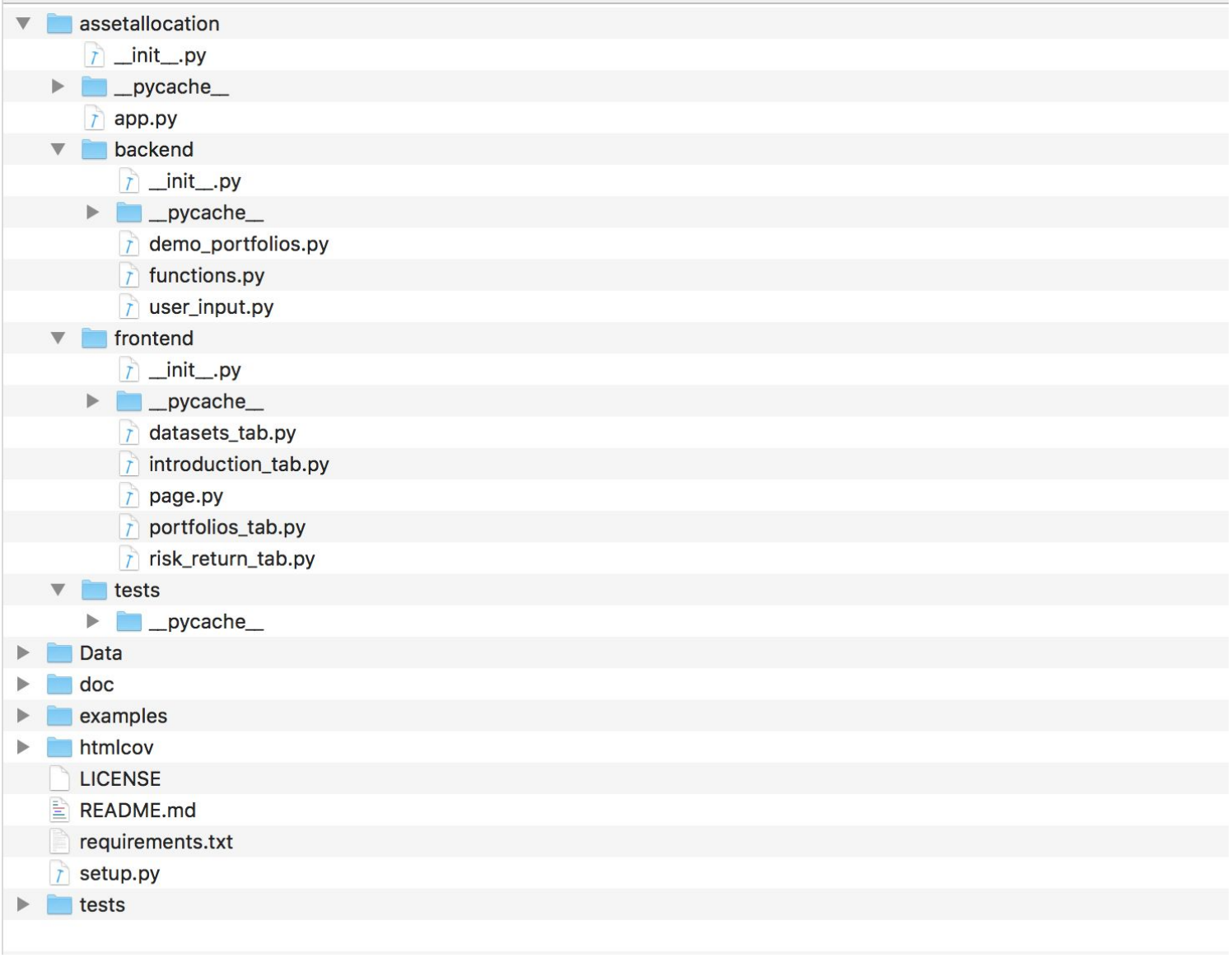
Time Period (Default)

A plot of Risk vs Reward for the input parameters (calculated in the backend)

Back End


Front End
Graphing Function -- takes the results and produces output that can be plotted on a graph
Calculator (Risk vs Reward)
Input parameters (received from front end)
Calculated values of risk vs reward for all params
Data Loader
Data Sources (List of All indices as CSV files)
Required Data (Extracted from data sources depending on input params like stock/bond name, time period etc.

Project Structure



Lessons and Future Work

- Lessons:
  - For some asset classes, indices are relatively new and historical index data hard to get
  - Using the right data structure in each situation is important
  - Be thorough in technology review

- Future improvements:
  - Gather more historical data, especially on bonds
  - Add more investing options, e.g. international stocks
  - Add more ways of viewing the data, e.g., time series of a portfolio
  - Add inflation-adjusted returns; more user flexibility in general