Real Estate Portfolio Optimization

Midpoint Presentation

Monday March 4, 2019

Iowa State University

Senior Design

ARIN: Analytics Research Intelligence Network

analytics@scale

Principal®

The Team

Blake Roberts

Project Lead / Backend

Software Engineering

Kevin Johnson

Quality Control / Frontend

Computer Engineering

Nickolas Moeller

Report Manager / Backend

Software Engineering

Leelabari Fulbel

Meeting Facilitator / Frontend

Software Engineering

Colton Goode

Meeting Scribe / Backend

Computer Engineering, Management of Information Systems

Principal®

BLUF

Bottom Line Up Front

Our mission is to design and develop a portfolio optimization system that meets the unique needs of a commercial real estate portfolio manager.

Project Scope

1. Gather requirements. Master the real estate domain and portfolio optimization.
2. Design the system and create a working prototype.
3. Test, iterate, and report out.

Agenda

- Intro to Portfolio Optimization
- The Problem and Plan
- Demonstration
- Next Steps

- Intro to Portfolio Optimization
- The Problem and Plan
- Demonstration
- Next Steps

Calculate Inputs

Portfolio optimization requires estimates of expected return and the asset covariance matrix

Local Knowledge

Allow the user to express their beliefs about a given asset, market, lifecycle, or property type

1 2 Portfolio Optimization 4 3

Optimize

Algorithm searches for the mixture of assets that minimizes or maximizes the objective function (e.g. risk-adjusted return)

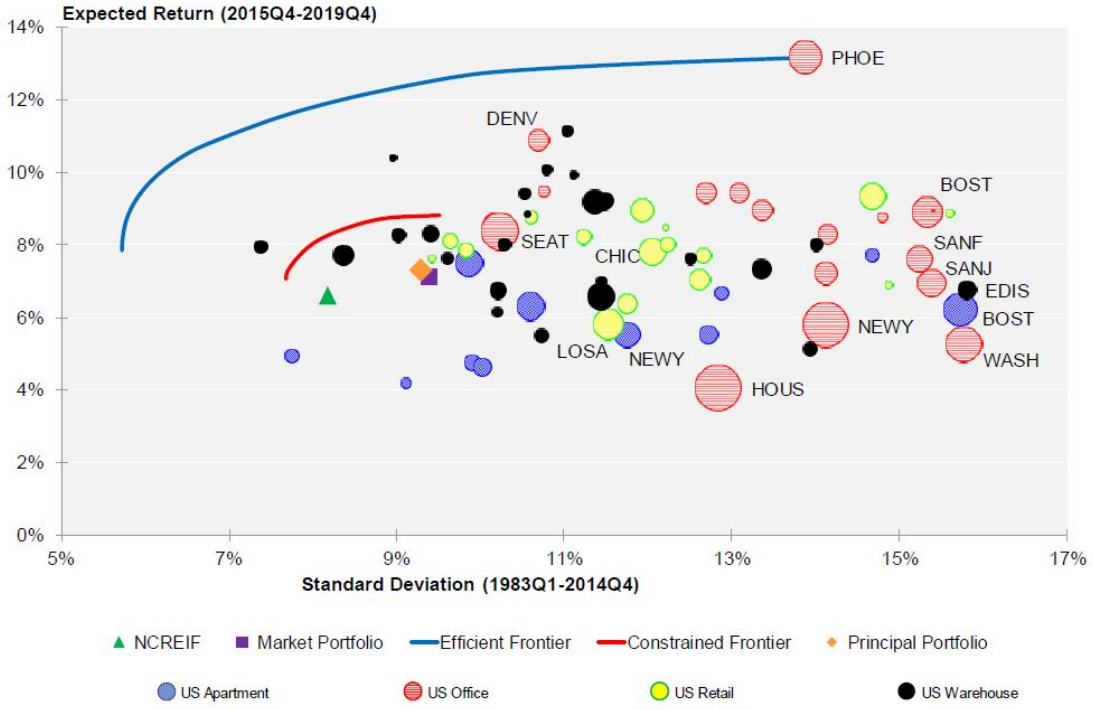
Define Constraints

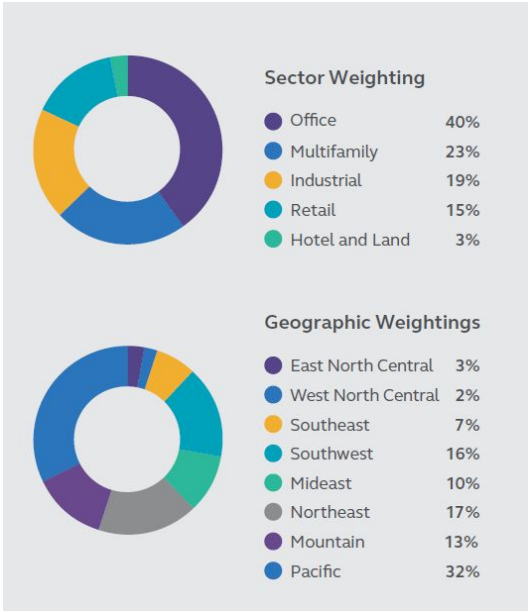
The user defines portfolio constraints.

e.g. The portfolio's allocation to NYC must be 35-40%

Balancing Risk & Reward

Help PMs efficiently allocate capital and reduce portfolio risk





Principal®

Agenda

- Intro to Portfolio Optimization
- **The Problem and Plan**
- Demonstration
- Next Steps

The Problem

No portfolio optimization currently being done in house

Market level data analysis is outsourced

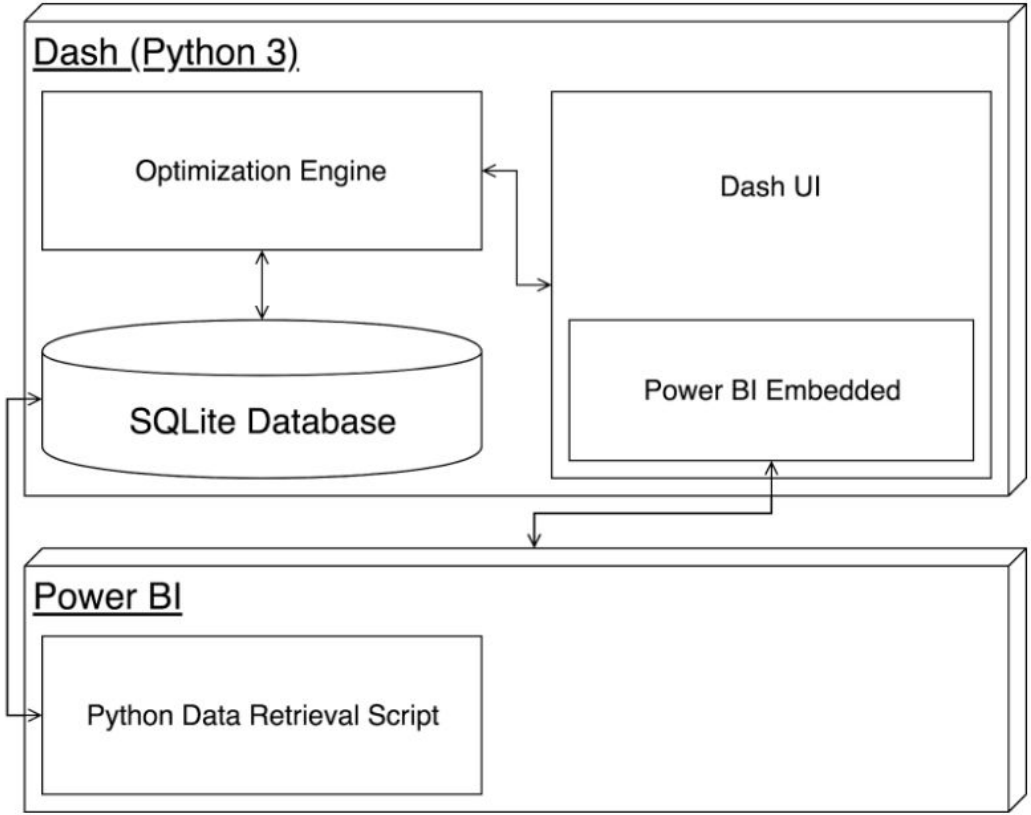
- Costar is expensive, slow, and uncustomizable

The Solution

A Software that enables PM's to optimize and compare their portfolios in real time

Control data visuals through Microsoft's Power BI

System Block Diagram



Quality of Approach

Strengths

Team experienced in:

- Web App Development
- Python

Power BI Data Visualization

Weaknesses

Dash

- callbacks limit UI possibilities
- can't use JQuery
- difficult to use JavaScript

Challenges

Modern Portfolio Theory

Markowitz Optimization

Dash UI/UX

Power BI Integration

Agenda

- Intro to Portfolio Optimization
- The Problem and Plan
- **Demonstration**
- Next Steps

Principal®

App Demo

Agenda

- Intro to Portfolio Optimization
- The Problem and Plan
- Demonstration
- **Next Steps**

Next Steps

Real Time Results

Optimization results need be sent to Power BI for visualization

UI Iteration and User Testing

Iterate Power BI dashboard design

Iterate web application interface design

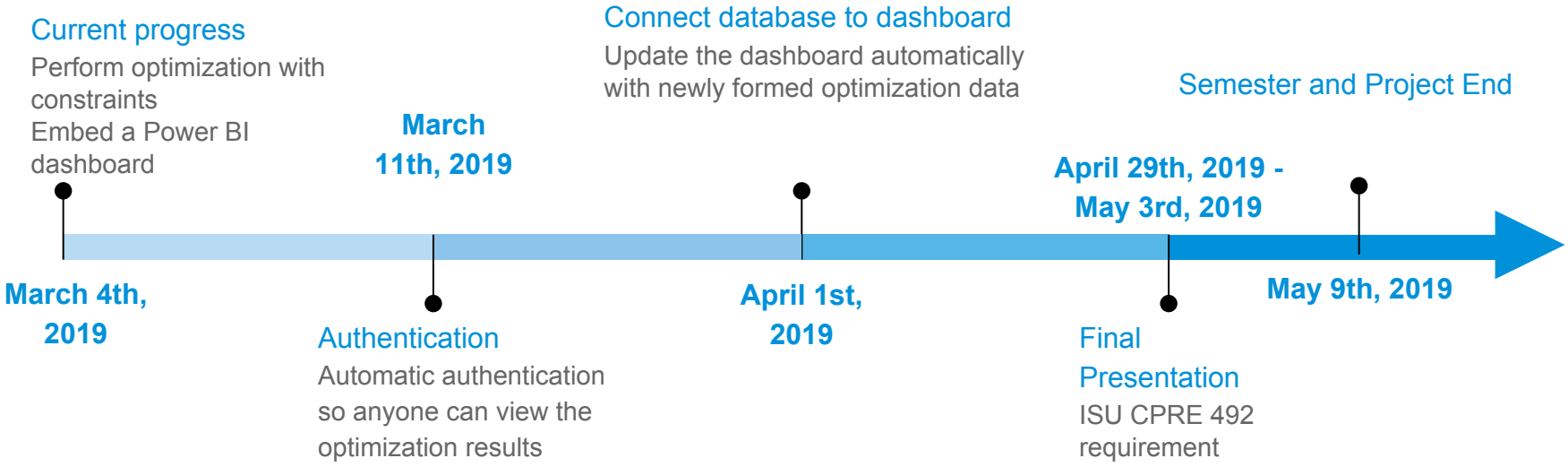
Documentation and Handoff

Document code and procedures

Deliver all project materials to the Principal Data Science team

Project Timeline

Sometimes you will want to use a subtitle



Thank You – Questions?