Weather Station Analyzer

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(Group 25)

Project: Efficient Weather Station Location

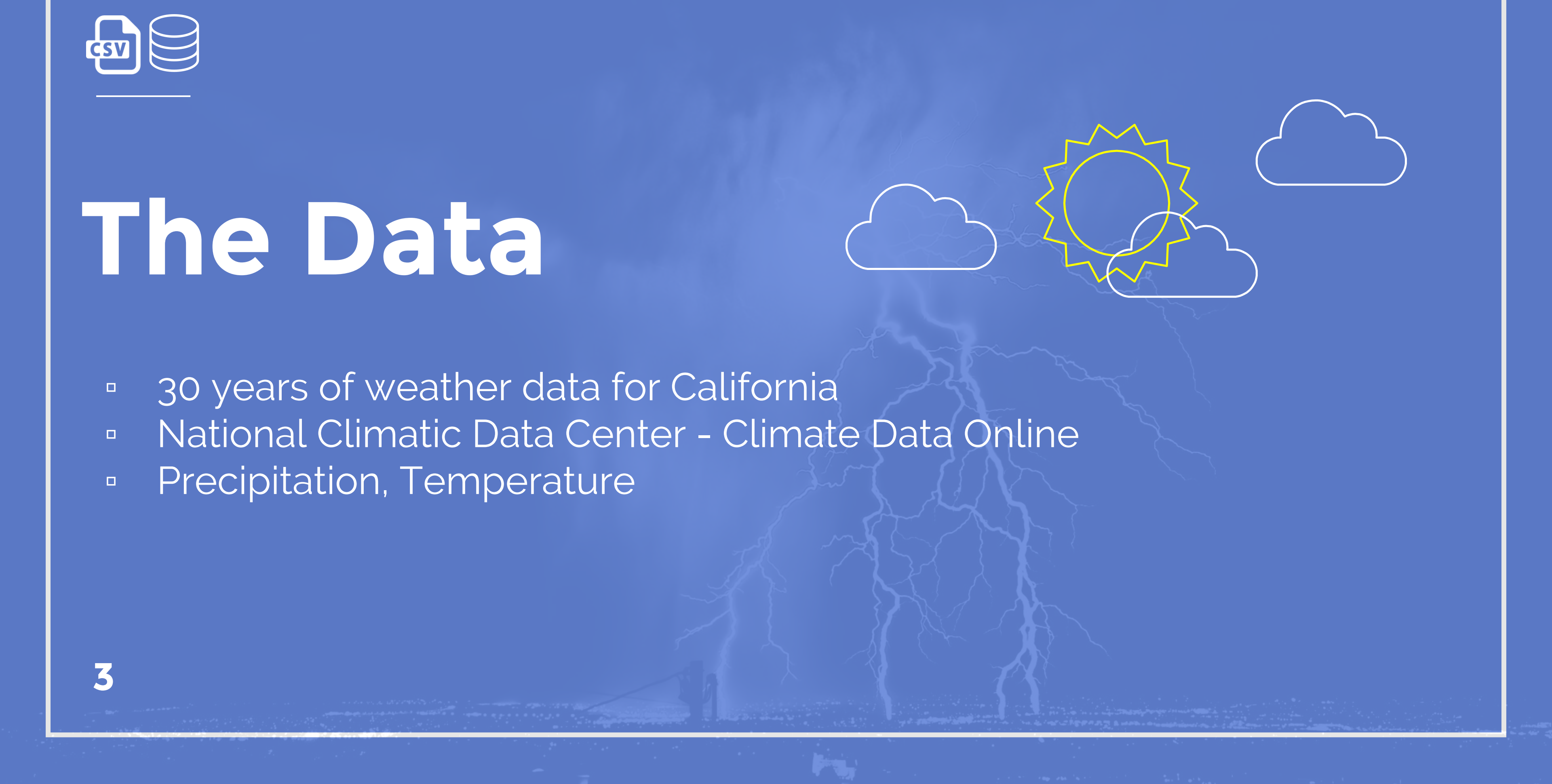
Objective: Reduce end-user costs and reallocate funds to better society

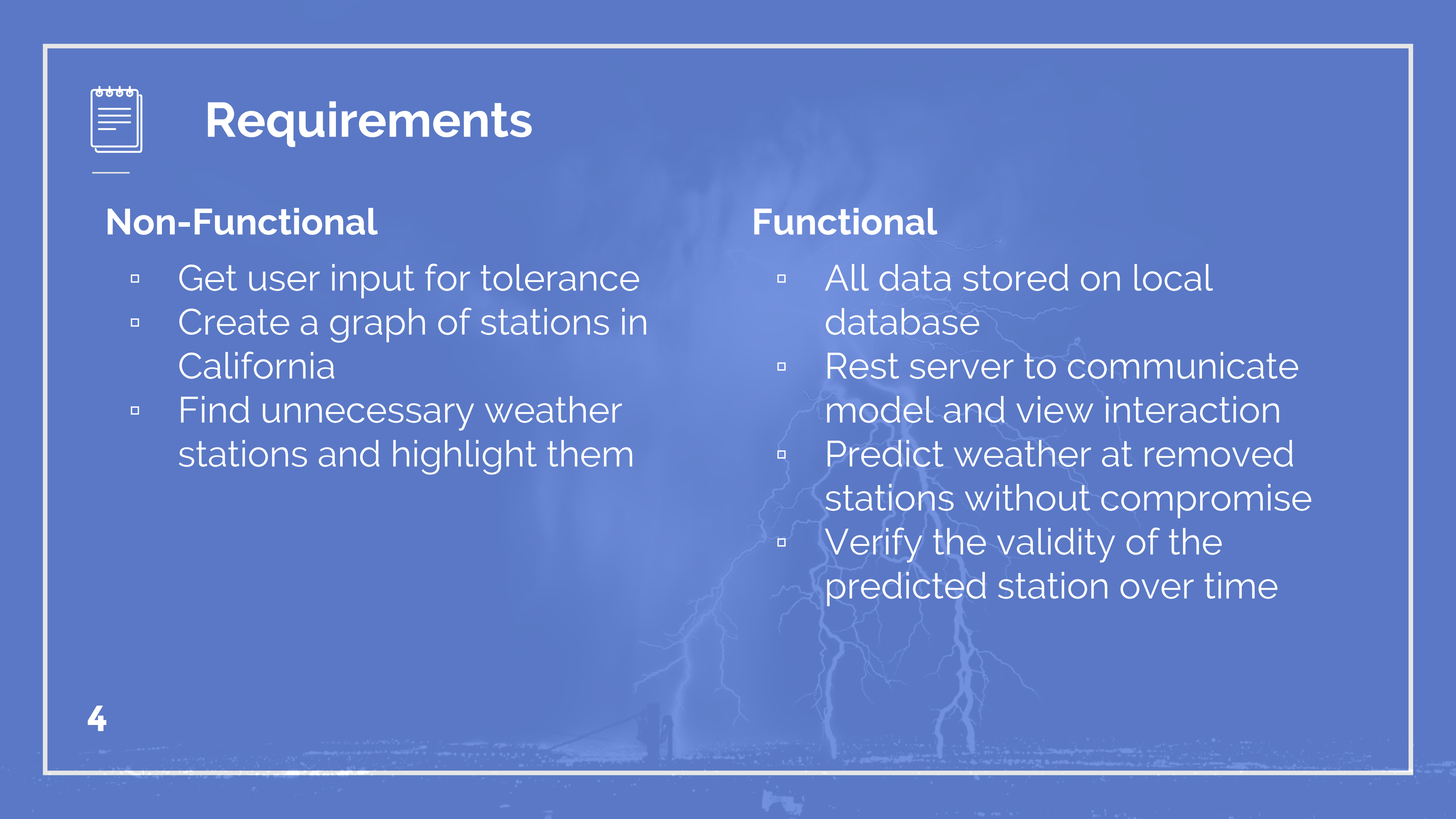
Scope: Currently California (plans to expand worldwide)

Motivation: To help minimize costs without compromising accuracy

The Data

- 30 years of weather data for California
- National Climatic Data Center - Climate Data Online
- Precipitation, Temperature





Requirements

Non-Functional

- Get user input for tolerance
- Create a graph of stations in California
- Find unnecessary weather stations and highlight them

Functional

- All data stored on local database
- Rest server to communicate model and view interaction
- Predict weather at removed stations without compromise
- Verify the validity of the predicted station over time

Algorithms

Sorting:

Custom Minimum Priority Queue

Use HeapSort to create Minimum Spanning Tree

Searching:

Linear search to find nearby stations

Linear search to find crossing edges

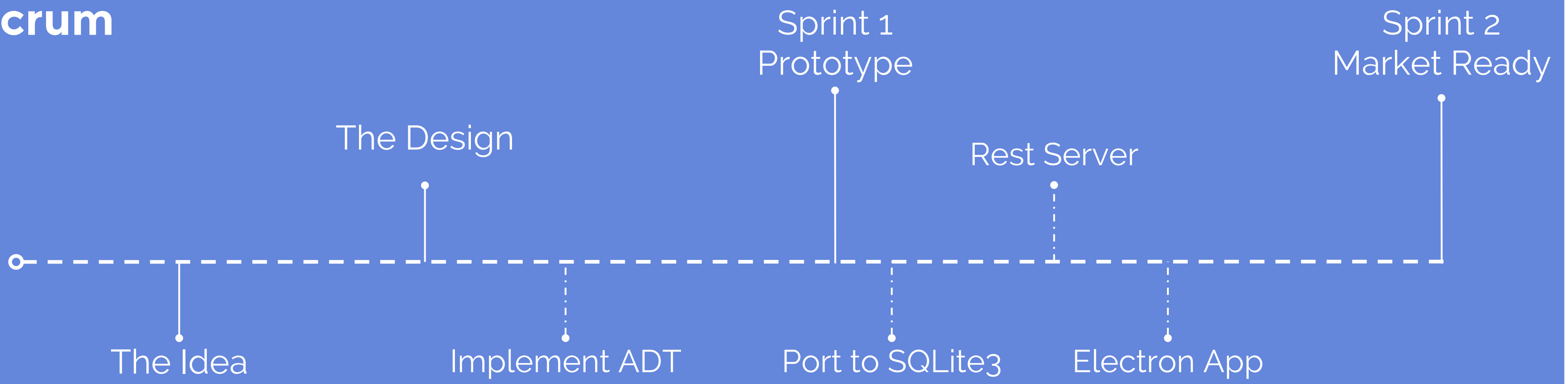
Graphing:

Undirected Graph and Minimum spanning tree

Verification & Validation

	Model	View	Controller
Whitebox	Comparing inner functional results with hand calculated results	Checking Post Request, JSON formatting	Using custom Rest client for JSON parse checks
Blackbox	Manual and Unit Testing of Functions	UI Testing the App with expected and edge cases	cURL, web browser

Scrum



The Idea

The Design

Implement ADT

Sprint 1
Prototype

Port to SQLite3

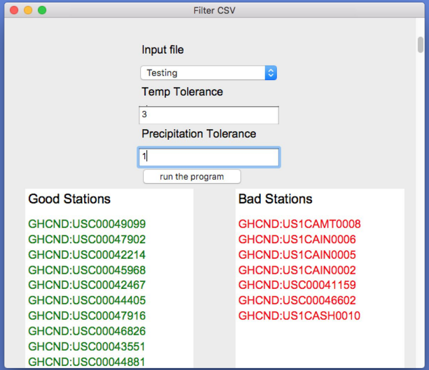
Rest Server

Electron App

Sprint 2
Market Ready

SPRINT 1 ~ THE PROTOTYPE

- ➢ CSV Parsing and Data Filtering
- ➢ Created Edges, with distance weights
- ➢ Initial Graphing
- ➢ Basic UI - in Ruby shoes



Input file

Testing

Temp Tolerance

3

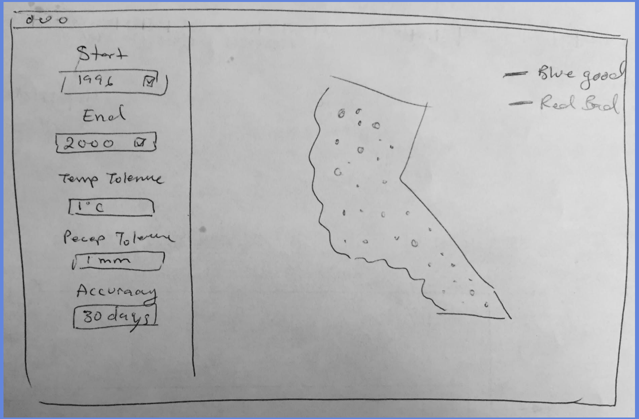
Precipitation Tolerance

1

Good Stations	Bad Stations
GHCND:USC00049099	GHCND:US1CAMT0008
GHCND:USC00047902	GHCND:US1CAIN0006
GHCND:USC00042214	GHCND:US1CAIN0005
GHCND:USC00045968	GHCND:US1CAIN0002
GHCND:USC00042467	GHCND:USC00041159
GHCND:USC00044405	GHCND:USC00046602
GHCND:USC00047916	GHCND:US1CASH0010
GHCND:USC00046826	
GHCND:USC00043551	
GHCND:USC00044881	

SPRINT 2 ~ THE APP

- ➢ Ported Filter and Parsing to SQLite3
- ➢ Implemented Rest Server
- ➢ Finalized HTML doc for Electron Wrapper



Start

1996 ☑

End

2000 ☑

Temp Tolenne

1°C

Pecep Tolerne

1 mm

Accuracy

30 days

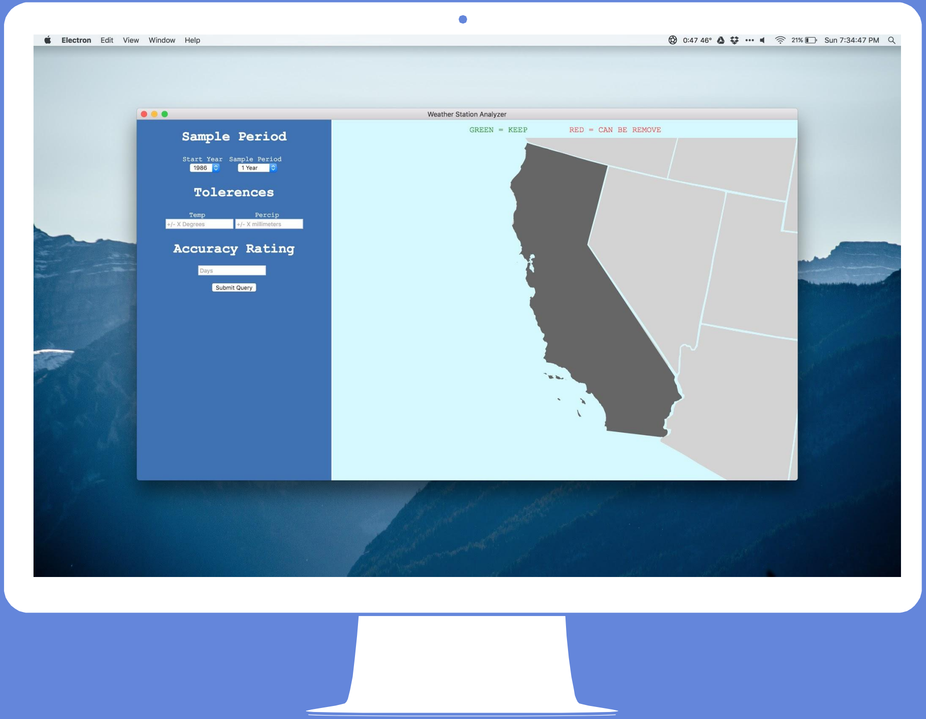
DEMO

Input:

JSON url of user parameters

Output:

Weather stations to keep / remove



Sample Period

Start Year: 1986

Sample Period: 1 Year

Tolerences

Temp: +/- X Degrees

Percip: +/- X millimeters

Accuracy Rating

Days

GREEN = KEEP RED = CAN BE REMOVE