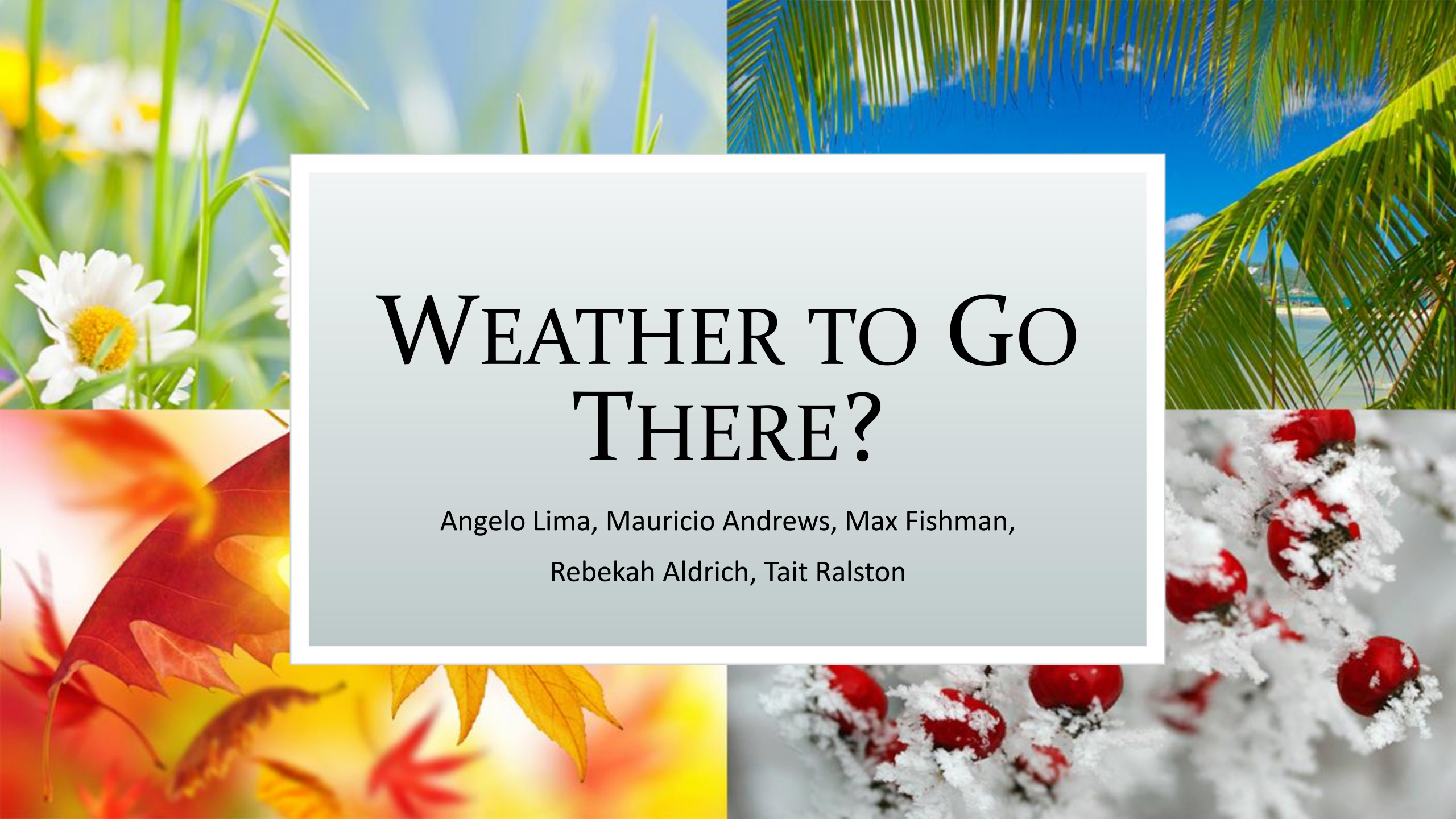
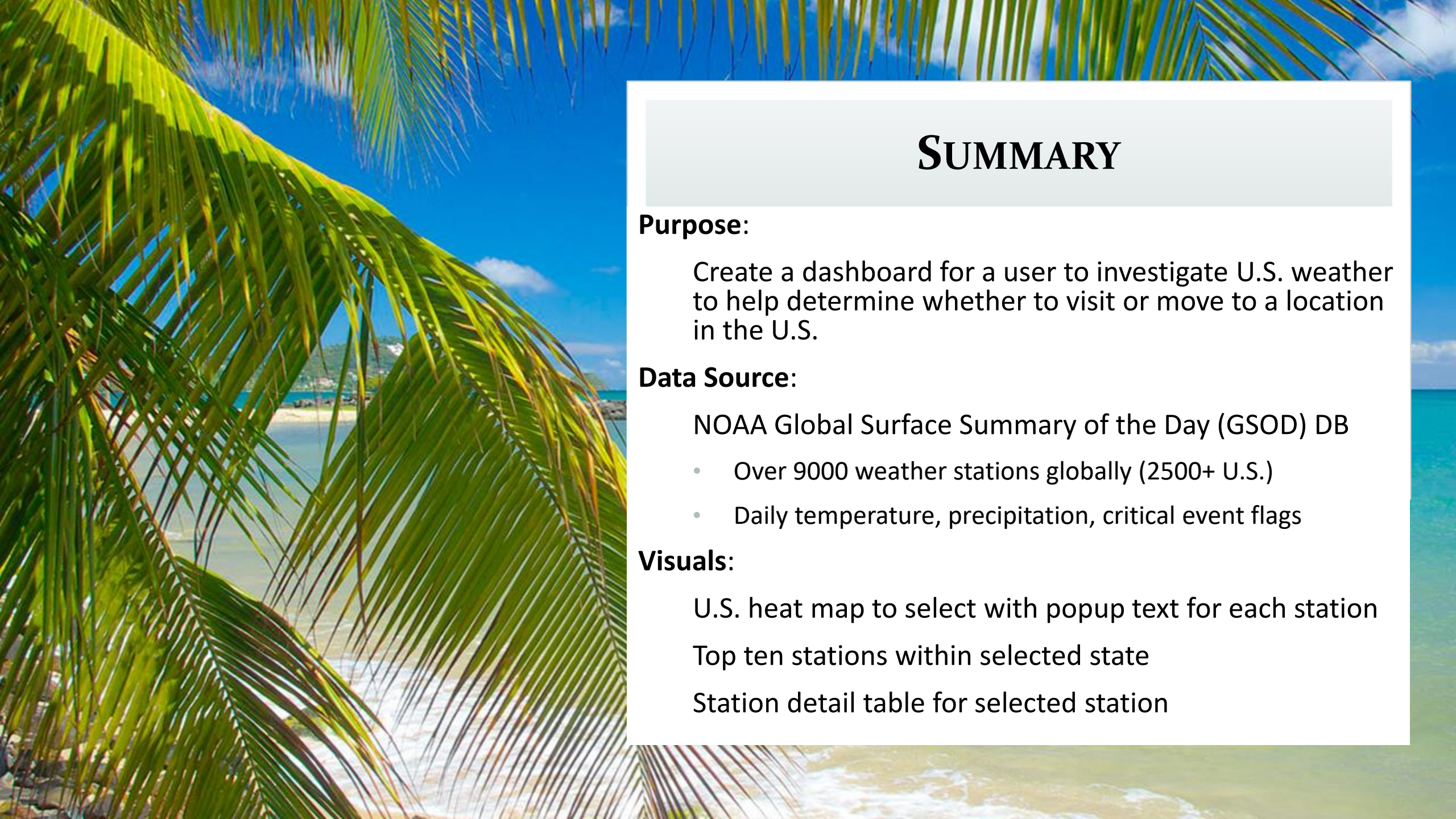


Weather to Go There?

Angelo Lima, Mauricio Andrews, Max Fishman,

Rebekah Aldrich, Tait Ralston



SUMMARY

Purpose:

Create a dashboard for a user to investigate U.S. weather to help determine whether to visit or move to a location in the U.S.

Data Source:

NOAA Global Surface Summary of the Day (GSOD) DB

- Over 9000 weather stations globally (2500+ U.S.)
- Daily temperature, precipitation, critical event flags

Visuals:

U.S. heat map to select with popup text for each station

Top ten stations within selected state

Station detail table for selected station

Our Approach

NOAA GSOD

- SQL Database hosted by Google Big Query
- Measurement data tables for each year
- Station table to identify where stations are and name

Python query script(s)

- BiqQuery Python API to run SQL queries for desired data
- Create data.js file with json/dictionary format

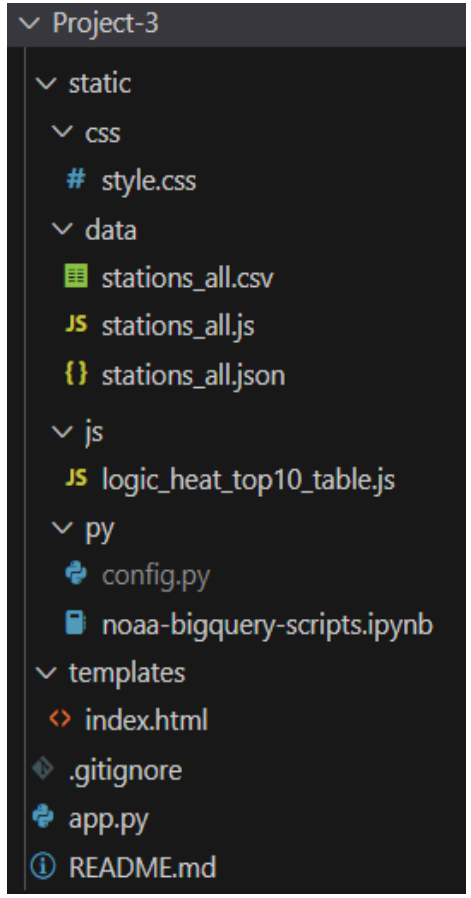
JS file creates visuals

- Pull data from js data file
- Measurement data pulled into heatmaps (leaflet)
- Top 10 measurement pulled into horizontal bar chart (plotly)
- All data for single station selected by user via dropdown (html modifications)

HTML core, CSS style, Wrap in Flask

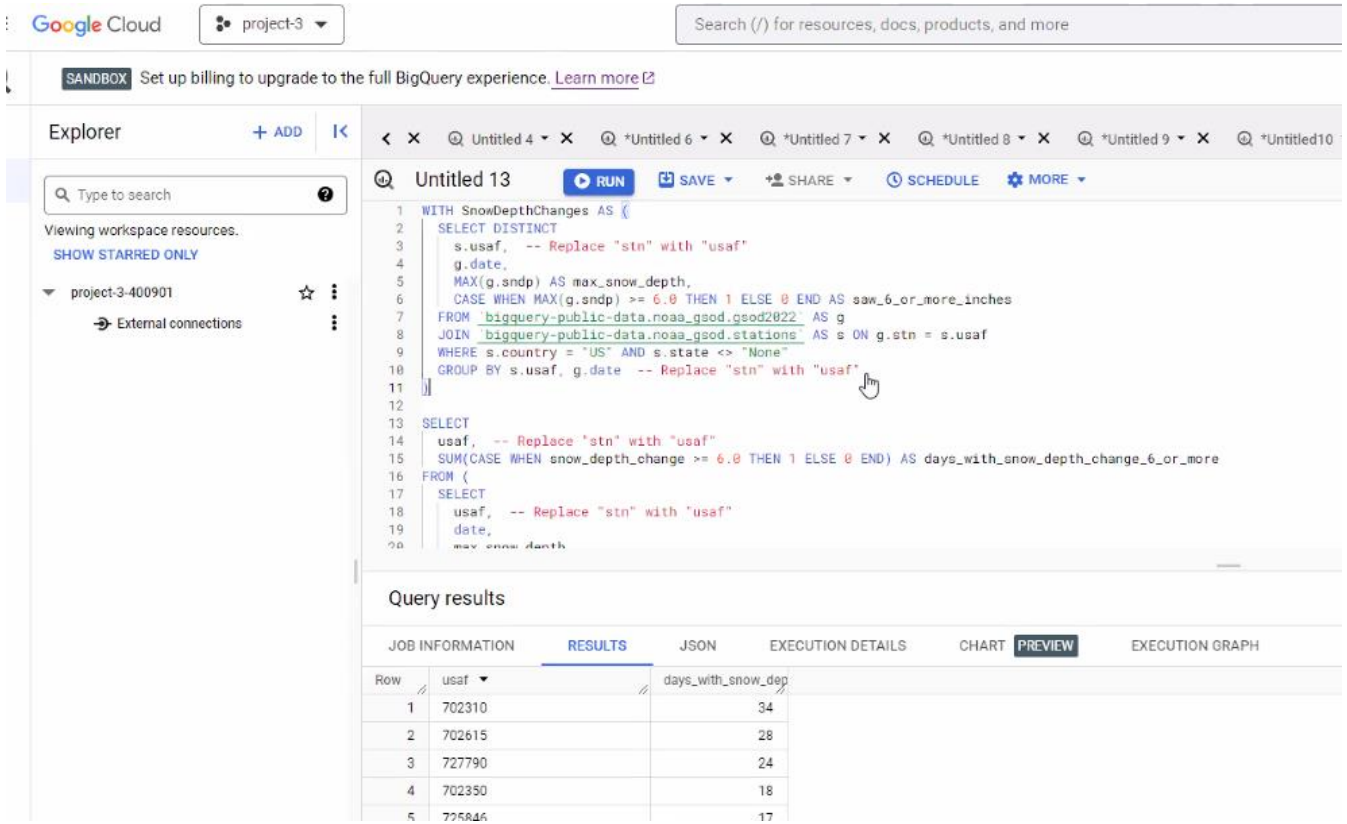
- Index.html is the skeleton
- Masonry js library to organize our components
- CSS to style the sections
- Flask to launch the page

File Structure



Data Demo

Big Query IDE



Jupyter Notebook

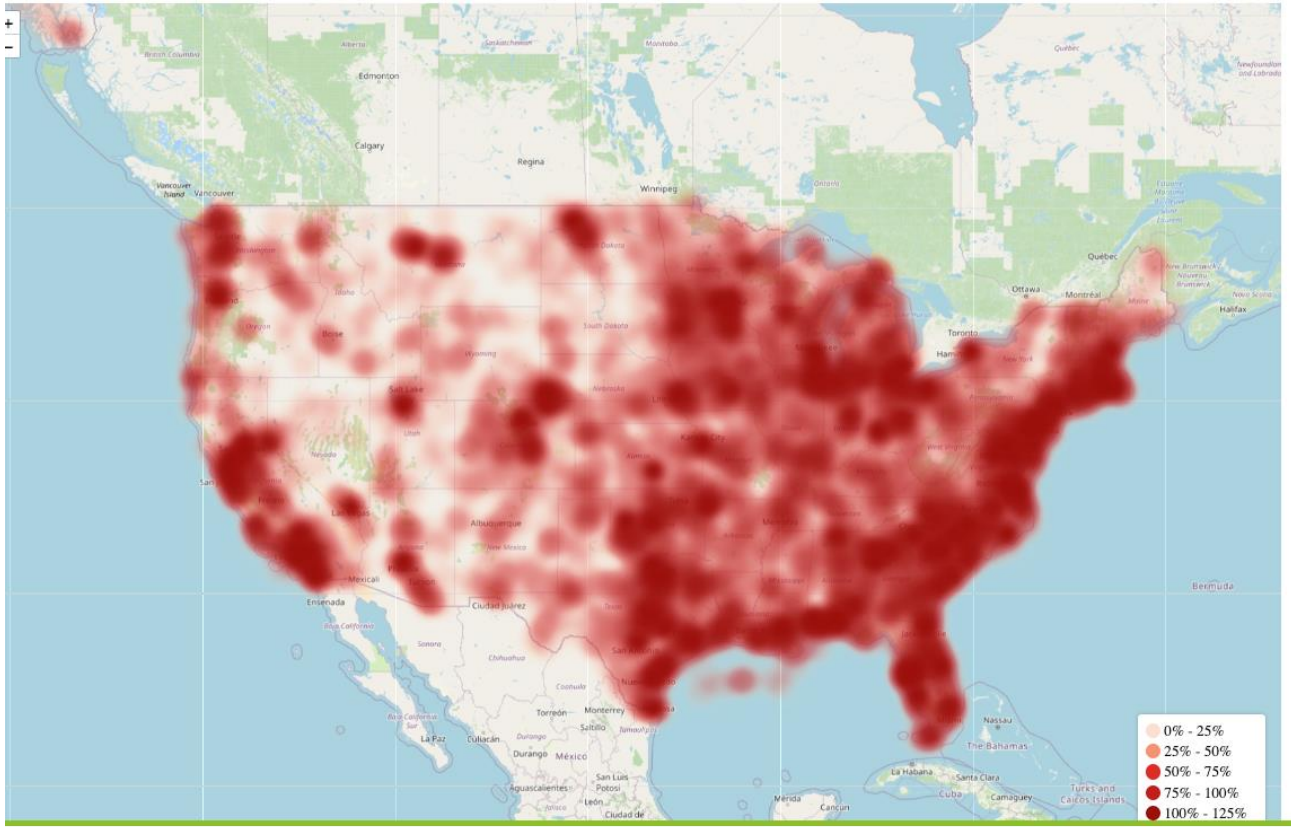
Website Demo

Weather to Go There in the U.S.?

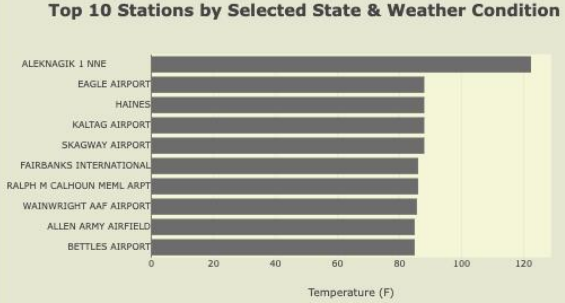
A brief look at 2022 weather in the U.S.

Select the weather aspect you want to review. Hover over the map to see specific values by weather station.
The Top Ten Stations chart will adapt based on the chosen weather select and the state you choose.
To dive into more detail by station, select the desired station.
Data Source: NOAA Global Surface Summary of the Day (GSOD)

Hottest



Select a State: AK

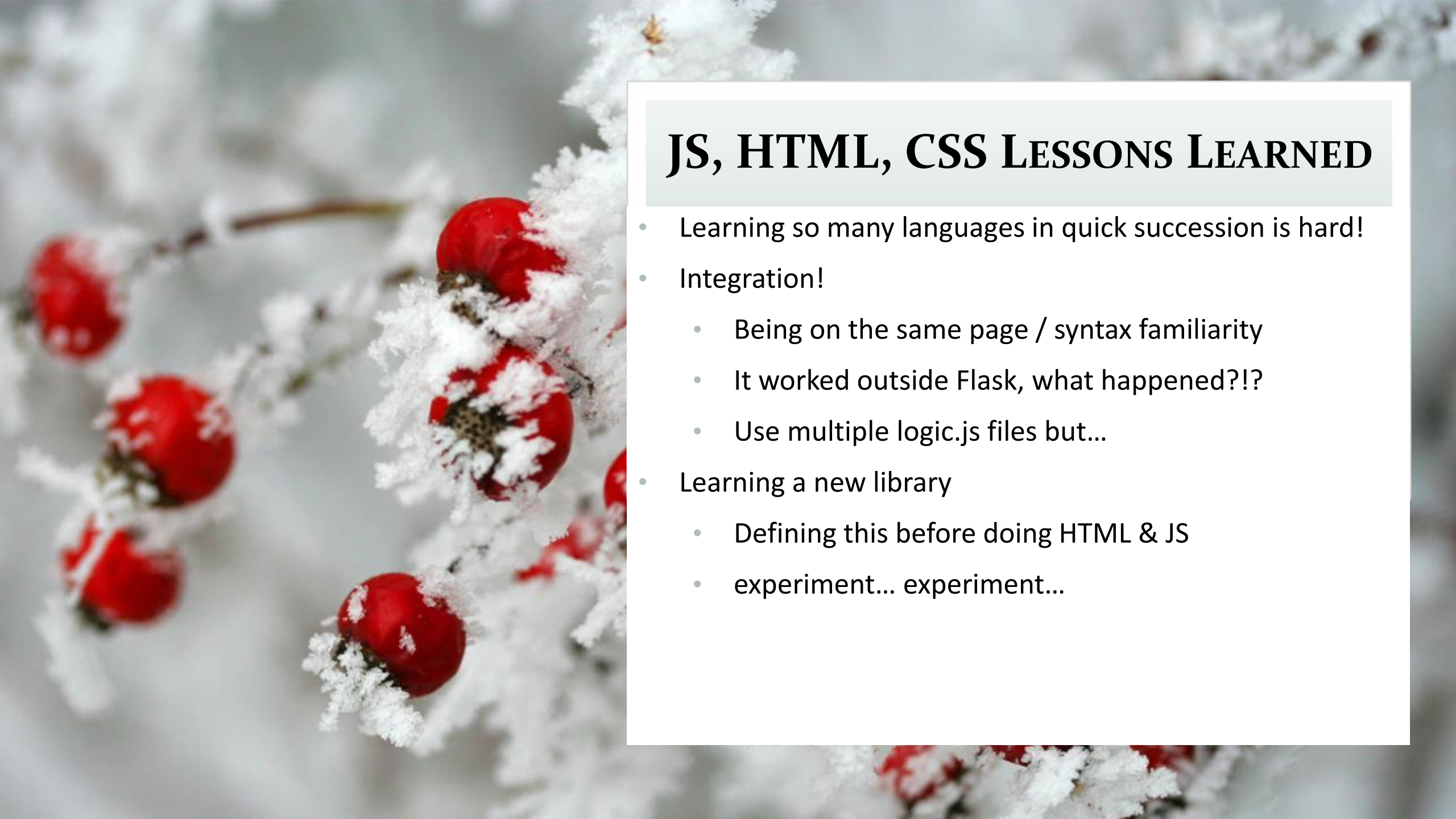


Select a Station: AK: ADAK (NAS)

2022 Summary: 704540 ADAK (NAS) , AK	
Absolute Min Temp (°F)	12.9
Mean Temp (°F)	41.9574175824
Absolute Max Temp (°F)	69.1
Total Snow	0
Total Precipitation	46.22
Days with Hail	0
Days with Tornado(s)	0

Data & Visuals Lesson Learned

- Documentation is good but… never perfect
- Understand how to fact check the data to validate query results
- Craft your queries carefully…
  - 2.7+ million rows with 1.8+ million duplicates!
- Heatmap – colors not as expected



JS, HTML, CSS Lessons Learned

- Learning so many languages in quick succession is hard!
- Integration!
  - Being on the same page / syntax familiarity
  - It worked outside Flask, what happened?!?
  - Use multiple logic.js files but…
- Learning a new library
  - Defining this before doing HTML & JS
  - experiment… experiment…

Future Features?

- State summary table for the year: temperature summary across stations (absolute min, absolute max, mean temp, standard deviation, quartiles in laymen terms)
- Station statistics: quartiles in laymen terms
- Station table update when click on heatmap stations
- Add more years / another option

Thinking big

- Split out by month or season
- Go beyond the U.S.
- Update real-time: e.g. last 12 months
- Add earthquake data (separate data set)

?

NOAA GSOD Links

- NOAA's base page: https://data.noaa.gov/dataset/dataset/global-surface-summary-of-the-day-gsod
  - Further documentation (including Readme): https://www.ncei.noaa.gov/metadata/geoportal/rest/metadata/item/gov.noaa.ncdc%3AC00516/html#
- Google's link (option to do SQl query on-line with free trial…): https://console.cloud.google.com/marketplace/product/noaa-public/gsod?pli=1
- kaggle link with some helpful info (including example code to access Kaggle dataset using python and SQL (usually jupyter notebooks): https://www.kaggle.com/datasets/noaa/gsod