Bomb Squad: Andy Shyklo, Abidur Rahman, Mark Ma, Tawab Berri
SoftDev
P01
2024-11-26
TARGET SHIP DATE: 2024-12-20

VERSION 1

Overview

We are making our spinoff of Google's Santa Tracker, except we are "tracking" the one and only Topher Mykolyk as he travels around the world on his motorbike and delivers presents to worthy devos. We will write an algorithm that calculates the likelihood of countries that Topher visits on each day, based on several factors such as holiday, population, weather, etc. We will incorporate visual elements such as a calendar of celebrated holidays all around the world, a map of where topher is on each day, and an algorithm to predict where Topher is most likely to be.

APIS (Usages are discussed in Program Components):

GeoDB Cities - Everything countries & cities
Calendarific - Everything related to calendar information (e.g. dates, holidays)
National Weather Service - Everything related to past weather & future weather predictions

Program Components:

- Home Page
    1. A map of the world and a pin where topher is on the current day. The **GeoDB Cities** API will be useful in determining the longitude/latitude of Topher's location.
    2. The ability to switch to dates in the future / in the past.
    3. On the side, there should be predictions on where Topher might be on the next day, using our algorithm. The locations should be sorted from increasing to decreasing order in probability.
    4. Important holidays that are ongoing / coming up.
- Calendar Page
    1. The **Calendarific** API will be useful for finding regional holidays.
    2. Displays the holidays of a specific day, month, or year.
    3. Able to switch months/years, where you can select days.
    4. Display the most likely country that topher will visit on each day.
- Weather Page
    1. Given the year, month, and country, use the **National Weather Service** API to display the weather of a location for that day/month.
- Algorithm for predicting Topher's location
    1. Assign a score for each country in the world.
    2. Use the following factor to calculate the score of the country for each day. Each factor should be assigned its own weight:
        - Population of the country. Can use the **GeoDB Cities** API.
        - Ongoing holidays in the country. Can use the **Calendarific** API.
        - Weather in the country. Can use the **National Weather Service** API.
        - Distance from Topher in the previous day. Can use the **GeoDB Cities** API.

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Program Component Connections:

- Routes + Python: Allow users to navigate the website, connecting the different pages. Python handles data retrieval from APIs, processes predictions for Topher's location, and renders dynamic content in HTML templates. It manages user inputs (e.g., date or location selection) and sends appropriate data to the frontend.
- Databases: For all information that we can handle through static data, we will input it into SQL Databases. Otherwise, we will make a call to each API when needed.
- Templates: Allow for dynamic web pages. Templates update in real-time to display Topher's current and predicted locations, relevant holidays, and weather information.
- Javascript and APIs: Minimal use of Javascript would allow our frontend frameworks to run properly as well as giving more flexibility in styling the website.

Database Organization:

- Our API Database will have data that we take from the APIs in general. This will allow us to quickly refer back to data that we have saved in order to not make extra calls to the APIs, which would waste our daily/monthly calls. We will have holiday information, cities/regions/countries information, and weather data, if applicable.
- We will also have a database for the locations of Topher Mykolyk. This database will be the result of our algorithm, and will consist of a table for “Locations”. The “Locations” table stores Topher's location by date, along with the data for that location, the holidays in that region/country, and the weather, all of which will be factored into his location algorithm. This ensures that when a date is accessed again, Topher’s location can be retrieved without recalculating it.

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API Output Map/SQL Database:

API Data stored in SQL Databases:

GeoDB Cities API

City Name	Region	Country	ID	Latitude	Longitude	Time Zone	Minimum Population
New York City	Northeast	U.S.	123	40.736419	-73.982108	UTC-5	8250000
Chicago	Midwest	U.S.	321	41.867084	-87.644825	UTC-6	2664000

National Weather Service API

Latitude	Longitude	Forecast	Time	Year	Month	Day	Temperature (F)
40.736419	-73.982108	Sunny	17:00	2024	11	2	65
41.867084	-87.644825	Cloudy	16:00	2025	3	5	57

Calendarific API

Holiday	Description	Region (optional)	Country	Year	Month	Day
Martin Luther King Jr. Day	Honors American Civil Rights Activist Martin Luther King Jr.		U.S.	2024	January	15
New Years Day	Celebrates the first day of the year		U.S.	2025	January	1

Location Data stored in SQL Database:

City Name	Region	Country	ID	Latitude	Longitude	Time Zone	Minimum Population	Holidays	Year	Month	Day	Time	Temperature (F)	Forecast
New York City	North-east	U.S.	123	40.736419	-73.982108	UTC-5	8250000	{Selection of Holiday API items}	2025	1	1	17:00	34	Cloudy
Chicago	Mid-west	U.S.	321	41.867084	-87.644825	UTC-6	2664000	{Selection of Holiday API items}	2024	1	15	16:00	16	Snowy

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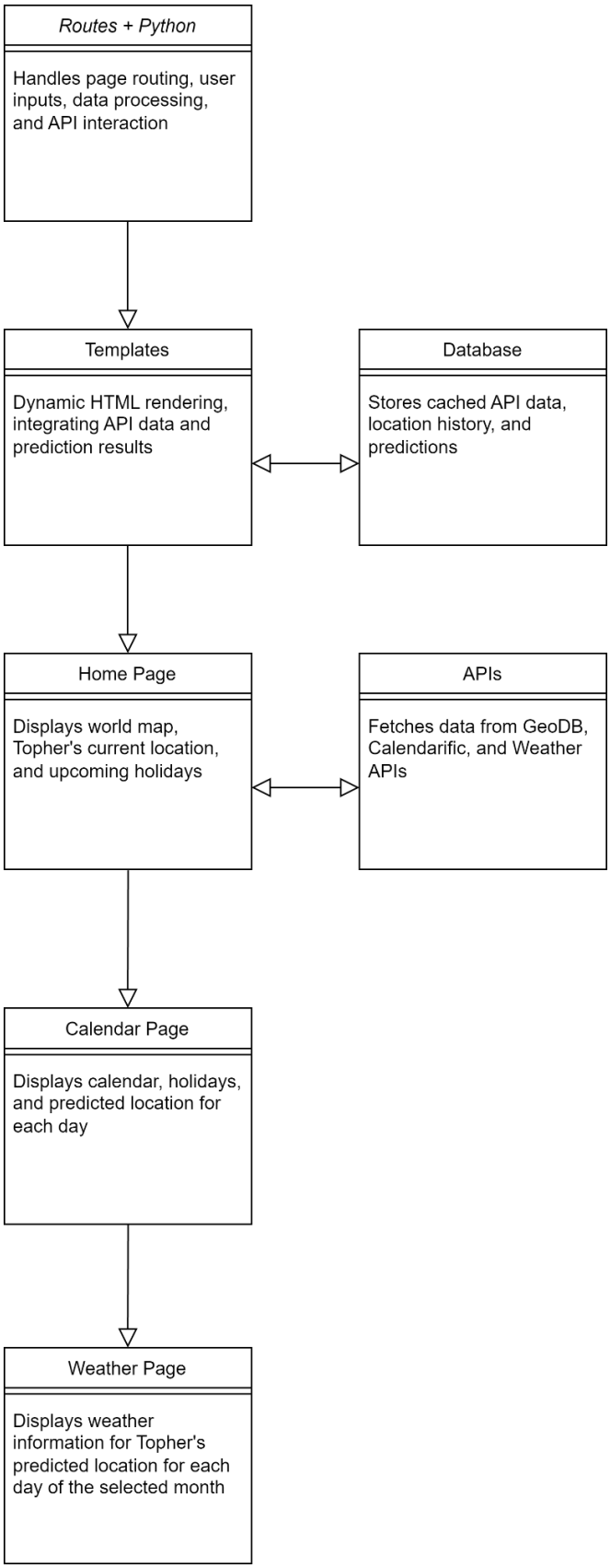
Component Map:



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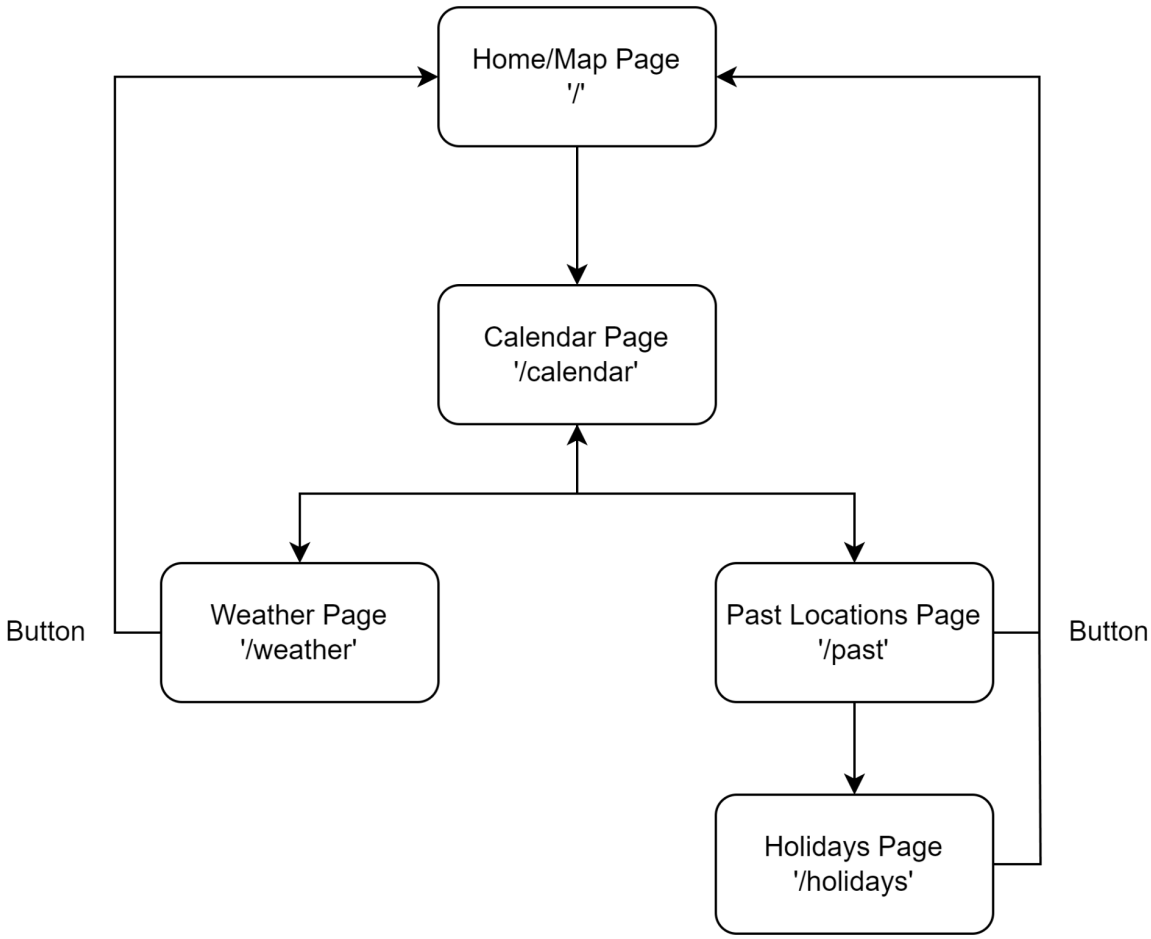
Site Map:



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Task Breakdown:

- Andy
    - Oversees the project and assists other members in their tasks.
    - Organizes the overall structure and ensures the team stays on track with deadlines.
    - Stores and Filters data from the GeoDB Cities API to meet demands made by other APIs.
    - Fullstack; working on both the Frontend and Backend.
- Mark
    - Develops the Home Page:
    - Integrates the map to display Topher's location using GeoDB Cities API.
    - Adds the ability to switch between past/future dates.
    - Displays predicted locations for the next day, sorted by probability.
- Tawab
    - Implements Backend/Database functionality:
    - Facilitates storing dates and Topher's previous locations in SQLite databases.
    - Works on the algorithm to calculate Topher’s likely next location based on factors like population, holidays, weather, and previous locations.
- Abidur
    - Develops the Calendar Page and Weather Page.
    - Creates the interface for displaying holidays, weather, and Topher's likely next locations for each day.
    - Integrates the Calendarific API to show holidays for specific months/years.
    - Implements the National Weather Service API to display weather for a specific location.

Front-end Framework

We will use Tailwind as our Front-end Framework. Given the nature of our app, users will constantly access it on the go through a variety of devices. Tailwind's responsive design ('sm', 'md', 'lg', 'xl', '2xl') will help ensure that pages such as the Weather Page and the Calendar Page work seamlessly on both desktop and mobile screens, as well as large and small devices in general.