Around The World Report

PREPARED BY

Mehul Daruka
Preeth Kanamangala
Justin Lee
Raphael Samuel
Daniela Torres Martinez

OUR MOTIVATION

We wanted to create a website where everyone can learn something about the countries and people that make up this world. No matter where you are, if you have traveled the world, not traveled at all, or something in between, we hope you learn something when visiting our site and carry that knowledge with you wherever you go.

1. PROJECT OVERVIEW

Our website aims to educate people about the world outside of their country, providing knowledge ranging from basic facts, demographics, and geography to food and tourism. Users will be able to navigate through the different countries for each of these topics and also see how these countries relate to each other in terms of their location and culture. We hope that users will absorb this knowledge in a way that will allow them to better understand different cultures, be more aware of different perspectives and ways of life, and be more accepting of others, all in a fun and interactive manner. We also hope that our website will be useful to those wanting to travel the world and explore other countries!

2. USER STORIES

PHASE 1 - STORIES WE RECEIVED FROM CLIENT

- **Mother of 4 wanting to try food**

  “Hello. I am the mother of 4 children, and I want to plan a trip to reward them for doing well so far in class. On this trip, I want to treat them to the cuisine of the world. If I could easily see the different foods around the world, that would be nice.”

  We place a picture of the main dish of each country on the food and tourism page for that country and we hope that should help in this scenario! We will look into maybe adding pictures of more dishes for each country in the future.

  Estimated: 1:00, Actual: 2:00

- **Journalist looking to sightsee**

  “Hello. I am a Journalist, and I am writing a piece about countries with the best views. My company is giving me an amount of money to visit these places to report about them first hand. I would like to be able to see the locations where they have places that I can sightsee, such as parks and famous spots in the area.”

  We have attached a tourism video for each country on the food and tourism page, and we have also listed some of the more popular tourist attractions for that country.

  Estimated: 1:00, Actual: 2:00

- **People wanting to learn about people**

  “Hello. A friend and I wanted to go to a particular country to see if we could better learn the people there. We want to learn the language, learn about the people, and know about the locations where a guide could take us around the area. Being able to see these things together would be nice!”

  We have listed basic facts about the country on the demographics page for that country, including the main languages spoken there. Furthermore, we have some popular tourist locations listed on the food and tourism page, which we hope should help with this!

  Estimated: 0:20, Actual: 0:20

- **Oppressed writer inspired by the ocean**

  “Hello. I am looking to work in a foreign country as a writer. I want to work somewhere where the government is not oppressive, since I want to express myself freely, but I also like to use the ocean as an inspiration. Being able to see if a country is an island nation would be nice to fit my needs.”

  We have some information regarding the water area of the country and the surrounding oceans on the geography page for that country. However, we will look into specifically categorizing a country as an island nation! As for the type of government, we have that listed under the demographics page.

  In Phase 2, we classify countries with no bordering nations as an island nation!

  Estimated: 1:00, Actual: 1:00

- **Rich oil baron wanting to buy things**

  “Hello. I am a rich oil baron billionaire hoping to start a tourism business in a wealthy country. I need some way to launder this money. Anyways, I would like to be able to sort the various locations by their GDP so that I may be capable of milking the most amount of money out of the people. On top of this, I will also be purchasing and constructing local restaurants in the area, so weeding out the areas devoid of restaurants or people would be nice.”

  We will be adding functionality for sorting countries by their GDP in the next few phases. In terms of the number of restaurants or people in a specific country, we currently have population data listed under the demographics section, but we will look into adding more data about restaurants in the food & tourism section!

  In Phase 3, we added functionality for sorting by population and GDP.

  Estimated: 1:00, Actual: 0:30

PHASE 1 - STORIES WE GAVE TO CUSTOMER

- **Cell phones on a budget**

  “I'm a college student on a tight budget, so I can't spend too much on new technology. Unfortunately, my cell phone just broke, so I need a new one. I want to check out which cell phones are the cheapest, so it'd be great to sort device types by price.”

- **Comparing two products**

  “I am a high school student who recently got into playing video games. I would like a feature that would allow me to compare two PCs in terms of price, graphics card, CPU, memory, ect. This would help me because I don't know much about what PC builds cater to my gaming requirements.”

- **Filtering by brand of product**

  “I'm a smartphone user who loves Apple products and have been using an iPhone for many years now. My iPhone's performance is deteriorating so I've been wanting to buy a new phone, and I know for sure that I want an iPhone over any Android smartphone. It would be super helpful for me if products could be filtered by their brand.”

- **Filtering by product type**

  “My Fitbit is getting kinda old, so I'm looking for a new smartwatch. I'm not really married to any brand, so I would love to see all my options in the same place. It would be super useful if you could filter by the product type.”

- **Filter by display size**

  “I'm a middle age person trying to buy smartphones for my elderly parents. Their eyesight is not the best, so I am trying to find some phone options that have a large screen that they can read off of. I would love if you could filter phones based on their display screen size as that is one of my highest priorities for which phone I get.”

PHASE 2 - STORIES WE RECEIVED FROM CLIENT

- **Scared tourist worried about getting robbed while on vacation**

  “Whenever I go on a vacation with my family, I am constantly worried about some no-good criminal robbing us and spoiling the vacationing mood. Is it possible for your website to provide any information regarding the crime rate of a country? I think this could help users make sure they pick a safe country to visit.”

  We looked into displaying crime rates but this is a little tough to implement, given the variation of safety across a country. However, we will look into finding more data or some sort of safety index to display in Phase 3!

  Could not implement during this phase.

- **Tourist with asthma concerned about air pollution**

  “My asthma can get pretty bad when I am exposed to heavily polluted air. Is it possible for your website to provide information about the air quality of a country? It would be a lot more convenient for me if your website could provide this kind of information all in one spot.”

  We will be sure to include some information on air quality for a country in the Food and Tourism instance pages for the safety of those wanting to visit a country, most likely by the end of the next phase!

  Could not implement during this phase.

- **Tourist interested in exchanging currencies**

“I'm heading over to Japan in a couple of months, but I'm not sure how much money I have in Japanese Yen. Can your website provide information about the currency exchange rate between US dollars and the currency of the country in question? Maybe also some information about how to exchange currency?”

While we don't have information on exchange rates just yet, we will look into this right now and have some information on it in the Food and Tourism instance pages by the end of Phase 3!

Could not implement during this phase.

- **Avid tourist interested in learning about culture**

  “As an avid tourist, I am always interested in learning about a country's culture. Can your website provide information about a country's culture or local traditions/customs? If possible, it'd be nice if your sources come from within the country so they're likely to be more accurate.”

  On our Food and Tourism pages, we have included some of the traditional food items and dishes of each country, and each of their pictures. We also have a video explaining the culture and tourism of the country, which we hope will give an insight into the local traditions and customs in most cases!

  Estimated: 1:30, Actual: 2:00

- **Worried traveler concerned about the weather**

  “My worst fear is to visit a country and end up swimming in rain throughout my vacation. Is it possible for your website to provide information about the country's weeklong weather forecast? It may be particularly helpful to have weather information for popular airports.”

  We have included data about average temperatures for the coldest and warmest months for that country, and we hope that will give you a decent idea as to what type of weather to expect!

  Estimated: 0:30, Actual: 0:45

PHASE 2 - STORIES WE GAVE TO CUSTOMER

- **Set max budget when looking for a product**

“Hello! I'm a 15-year-old girl looking for a new cellphone. My parents said I could choose any phone I want as long as it is within the budget, which they said was $800. My parents were really strict about this budget, and I don't want to get any high expectations by looking at options that are more expensive. Therefore, I would appreciate it if you can show me only the phones that are within my budget.”

- **More specs for products**

  “I am looking to buy a phone for my grandmother, and I want a mobile phone that is lightweight, slim and has a large screen so she can use it more easily. I would like to see these specs (weight, screen size etc.) for such products.”

- **Considering where a company is based in**

  “As a proud American, I want all my purchases to support the US industry. I believe that buying American products helps promote US jobs. When considering a purchase, I would like to see what country each brand is based in.”

- **Reviews for products**

  “Hello! I'm a 40 year old father looking to upgrade to the latest technology. There are so many new specs and gimmicks for products these days that I get very confused. I would like to be able to read reviews from people online who have bought this product before, not just see the rating of the product. This way, I can have a clear idea of what features other people liked and what parts they thought could be improved.”

- **Sorting brands by popularity**

  “I'm having a tough time choosing what brand to go with for my new phone, since all of them are capable of meeting my requirements, and I want to be able to see what brands are most favored or commonly used so I can use that in my decision-making process.”

PHASE 3 - STORIES WE RECEIVED FROM CLIENT

- **Culinary student interested in trying out countries’ dishes**

  “Hello, I am culinary student and as I was browsing your page I noticed you listed the main dishes of each country. Having a picture definitely made me try them all, but it would be incredibly convenient if you could provide some recipes, videos or

more information on the dish. Especially since most of these dishes are on their native language and I would love to know more about them and even try cooking them."

We have a video for each country on the tourism page of that country that may talk more about the popular foods of that country, but we will look into including recipes for the specific food items we have displayed during Phase 4.

Could not implement during this phase.

- **Old person having trouble with numbers**

  "I really love your website and all the information it shows but when it comes to the number data I am having a really hard time reading it with my old eyes and long numbers. Would it be possible for the numbers to be separated by commas to make them easier to read."

  We completely understand your concern regarding this and will be implementing it during the next phase for large numbers such as the GDP and tourism revenue of countries!

  Could not implement during this phase.

- **Geography teacher wanting to filter by region**

  "Hello, I am a geography teacher and I was using your page to show my students the different countries that came up in each continent. I noticed the website also displayed subregions which I thought was very useful to explain to my students how it went from continents to subregions. Would it be possible to filter the countries by subregions in order to show which countries are most likely to interact with each other."

  We have enabled filtering countries by the regions they belong in on the Geography page and we hope that will be useful for your purposes.

  Estimated: 0:30, Actual: 0:15

- **Student writing a paper on tourism**

  "I think your page is a great resource for a paper I am writing on the most visited countries in the world. I think your page has all the information I need but it would help me out a lot if I could sort the countries by most visited and most lucrative. In

sorting for tourism revenue I think it would also help me to know in what currency the value is based on. I am not sure if it is in dollars or that countries currency."

We have enabled sorting by tourism revenue on the Food and Tourism model page, which should allow you to see which countries have a high level of tourism. We have also added a dollar sign in front of the values, implying that the values are in US dollars.

Estimated: 0:30, Actual: 0:15

- **Curious 10-year-old looking for countries**

  "Hello I recently got into looking at maps and all the other countries in the world and your website is helping me out a lot. I was on your geography page and I wanted to look at countries in order from the most south to the most north. I think it has to do with the number latitude but I'm not sure. It would help me a lot if I could choose to have the countries that are most south or most north in order."

  We have enabled sorting by latitude on the main Geography page, so we hope that allows you to find countries in order from south to north.

  Estimated: 0:30, Actual: 0:15

PHASE 3 - STORIES WE GAVE TO CUSTOMER

- **Filter by cell phone provider**

  "I am a loyal AT&T customer and I know that I will be buying my new phone from there. I would love a feature that would allow me to filter out all the products such that I can only consider those from AT&T. Currently, I see it as part of the product name, but perhaps having a separate column/attribute for it might make things easier for me! I estimate this should take around 30 minutes to implement."

- **Add brand image in View All**

  "Hello! I'm a 40-year-old woman, and I am an extremely visual person. When I look at your Brands tab, I find it hard to spot the brand I am looking for with just the name. I think your site can appeal more to visual-minded people by adding the logo of the brands in the View All cards."

- **Clarity for ratings on products View All page**

“I do a lot of research before buying my products, and I care a lot about the ratings of these products. If I see a zero as a rating, I'd most definitely not consider it. However, on the website, I see that if a product has not been reviewed yet, it's rated a zero. Also, it's hard to understand right away what these ratings mean, since I don't know what the scale is out of.”

- **Show most popular reviews first**

  “Hello! I'm the parent of a teenager who is very into PC building. When I look at a particular product, I'm shown reviews for that product at the bottom. However, I have to click each review in order to see how many people found it helpful, which is tedious. Displaying the reviews that a lot of people find helpful first will save me lots of time and make me more confident in my purchases for my son.”

- **Filter by RAM**

  “As a tech savvy computer scientist, I care a lot about the processing power of my phone. While it is the easiest to go with the newest and best phone, it is slightly out of my price range. Can you filter the phones by the size of RAM it has?”

3. RESTful API

We created a basic structure/documentation for our API with Postman, declaring endpoints to retrieve data for **all** instances of each of the 3 models (*/demographics*, */geography* and */foodandtourism*), as well as paths for **specific** instances of each model (*/demographics/<id>*, */geography/<id>* and */foodandtourism/<id>*), which returns an instance with information for the country based on the country ID passed in. We also created specific schemas for each instance of demographics, geography, and food & tourism.

API Documentation Link: https://documenter.getpostman.com/view/17755632/UUy396JB.

4. MODELS

BASIC INFO & DEMOGRAPHICS

- Country Name **(sortable/filterable/searchable)**
- Capital **(searchable)**
- Flag

- Flag Emoji
- Population **(sortable/filterable/searchable)**
- Language(s) **(sortable/filterable/searchable)**
- GDP **(sortable/filterable/searchable)**
- GDP per capita
- Currency
- Calling code
- Country top-level domain
- Number of cities
- Number of states **(sortable/filterable/searchable)**
- Demographics video
- Countries with similar population **[CONNECTS TO GEOGRAPHY INSTANCES OF COUNTRIES]**

GEOGRAPHY

- Country Name **(sortable/filterable/searchable)**
- Longitude **(sortable/filterable/searchable)**
- Latitude **(sortable/filterable/searchable)**
- Continent **(sortable/filterable/searchable)**
- Region **(sortable/filterable/searchable)**
- Land Area
- Water Area
- Adjacent countries **[CONNECTS TO FOOD/TOURISM INSTANCES OF COUNTRIES]**
- Water percentage
- Topography Image

FOOD AND TOURISM

- Country Name **(sortable/filterable/searchable)**
- Income Level **(sortable/filterable/searchable)**
- Main dishes
- Main dishes images
- Agricultural exports
- Main attraction **(sortable/filterable/searchable)**
- Main attraction image
- Tourism video
- Number of tourists (arrivals) **(sortable/filterable/searchable)**

- Revenue from tourism **(sortable/filterable/searchable)**
- Tourism as percent of GDP
- Coldest month temperature
- Warmest month temperature
- Countries with similar tourist numbers **[CONNECTS TO DEMOGRAPHICS INSTANCES OF COUNTRIES]**

5. TOOLS

Front-End

- ReactJS - Used for the main interface and connects to our back-end.
- React Bootstrap - CSS framework used for the navigation bar and cards.
- Material UI - CSS framework used or the “view-all” tables and icons.
- D3.js - JavaScript library used to create data visualizations

Back-End

- Namecheap - Used to obtain the domain for our website as well as for our API.
- Postman - Used to create documentation for our website’s API.
- GitLab - Used as a version control system for our project and keep track of issues.
- AWS Amplify - Used to host our React web application on our domain.
- Flask - Framework for the back-end of our application and API.
- AWS Elastic Beanstalk - Hosts our Flask back-end and API.

APIs and Data Sources

- http://countrylayer.com/ - Got demographic information for countries (topLevelDomain, capital, two/three letter country code, country name, calling code, region etc.)
- https://www.bigdatacloud.com/ - Retrieved more demographic information (languages, currency, region/continent, income level, calling code, countryFlagEmoji).
- https://documenter.getpostman.com/view/1134062/T1LJjU52 - More demographic and geographic information such as population data, capital, flag, cities, states, latitude, longitude etc.
- https://developers.google.com/youtube/v3 - Retrieved YouTube videos to display for demographics and food/tourism instances.
- https://www.indexmundi.com/facts/indicators/ST.INT.ARVL/rankings - Retrieved

tourism data (number of arrivals) for each country.

- https://github.com/geodatasource/country-borders/blob/master/GEODATASOURCE-COUNTRY-BORDERS.CSV - Got data for countries and their bordering countries.
- https://en.wikipedia.org/wiki/List_of_countries_and_dependencies_by_area - Retrieved geographical information such as land area, water area etc. for countries.
- https://listfist.com/list-of-countries-by-average-temperature - Retrieved data for warmest and coldest month temperatures.
- https://www.atlasbig.com/en-us/countries-tourism-income - Data for tourism revenue for each country.
- https://www.listchallenges.com/top-rated-tourist-attraction-for-every-country/list/10 - Retrieved data for main tourist attractions and images for each country.
- https://www.listchallenges.com/national-dishes-for-every-country-in-the-world/list/5 - Has data for national dishes of each country as well as accompanying images.
- https://worldpopulationreview.com/country-rankings/agricultural-exports-by-country - Has data for main agricultural exports for each country.
- https://rapidapi.com/microsoft-azure-org-microsoft-cognitive-services/api/bing-image-search1 - Retrieved a topographic map image for each country by querying the Bing search engine

6. HOSTING

We selected and obtained a pretty URL from the hostname provider Namecheap. We collectively decided on the name “around-the-world” because it’s memorable and short, but it still aptly describes our project. On Namecheap, the top-level domain “.me” was the only free option, so we decided to go with that. We deployed our React app to AWS using Amplify, and we chose GitLab as our Git host, as per the instructions. We added “around-the-world.me” to AWS and let it verify that we were the owners of the domain. Finally, we configured the DNS settings of our domain on Namecheap to add the AWS-provided CNAME and ALIAS records. By doing this, we got a TLS/SSL certification and enabled https support for our website. The website is accessible at both https://www.around-the-world.me and https://around-the-world.me . We also later added another CNAME record for our API, accessible at https://api.around-the-world.me/.

7. PHASE II FEATURES

Database

Our first step in the process was to set up our PostgreSQL database on AWS Relational Database Service (RDS), and then getting pgAdmin set up so we could access our database and view/modify our data.

After we completed our set-up process, we brainstormed about the structure of our tables, what fields we should include in our models in addition to what we already had, and what the primary key for each row in our tables would be. We eventually decided on having 3 separate tables for each of the models, with the primary key being the 2-letter country code for the respective country.

We then developed schemas for each of our tables and created these tables in our database, and we then went ahead and populated these tables using data from our APIs through SQLAlchemy. During the process of populating our tables, we also made sure to account for connections to instances of other models and finding the correct data for that, after receiving feedback from our mistakes in Phase 1.

Lastly, we created schemas using Flask-Marshmallow with a similar structure as our tables, allowing us to correctly format the data that we would be receiving when querying from the database.

Pagination

Our pagination is handled in the queries to retrieve multiple instances of a model within the back-end. Whenever we query the “all” endpoint for a model, we pass in a page parameter (which is determined by the page the user selects on the front-end) and we also have a per_page parameter specifying the number of instances to retrieve for each page. SQLAlchemy’s paginate() function takes in these parameters and then passes back the respective data, and these items are then displayed for that page on the front-end.

For the front-end of the all the model page, we used a Pagination component from Material UI that allows the user to select different pages and navigate between them. On the demographics page, each “page” consists of 9 cards while for geography and food & tourism, each “page” has a table with 10 rows.

8. PHASE III FEATURES

Sorting

On each of the model pages, we have a dropdown allowing the user to select the attribute

by which they want to sort and whether they want to do so in ascending or descending order. When they select something, the sort parameter is updated and sent over to the API endpoint on the back-end. In the back-end, we check what attribute the user wants to sort by and in what order, and we then use SQLAlchemy's order_by() function to reorder the items accordingly.

Filtering

On each of the model pages, we have 5 different dropdowns, each for one attribute that we are filtering by. These are multi-select dropdowns, meaning that the user can select multiple values of an attribute to filter by. When they select a value for a filter, this information is sent over to the API endpoint on the back-end, in the form of a list of values for each attribute.

On the back-end, we check for all the attributes that we need to filter by, leveraging the "or" filtering for multiple values of an attribute and the "and" filtering for different attributes. We use SQLAlchemy functions such as filter(), in_() and contains() to filter all the items such that they meet the criteria, and we return these items to the front-end.

Searching

On the front-end of each model page, we have a main search bar, where the user can type in a search query. This search query is passed as a parameter to the API endpoint on the back-end.

On the back-end, we go through all the attributes of an instance that are listed on the cards/rows on the model page, and we check if any of them contain the search parameter. For the Demographics case specifically, we also have some additional checks verifying if the values start with the search parameter, since the cards on the Demographics page have preceding text before each value. We do an "or" filtering on these to ensure that we filter as long as one match is found. We leveraged SQLAlchemy functions such as contains() and startswith() for the filtering, as well as cast() to cast certain columns to Strings to search for values within them. Once filtered, the items containing the search parameter are returned.

Going back to the front-end, we highlight the search query term on each of the cards from our result, by wrapping each text component in a function that checks if a match is found and changes the background color of that text.

9. PHASE IV FEATURES

Our Visualizations

The first visualization we created for our website was a bar graph of GDP values for each country. We retrieved the GDP data for each country through an API call, and used D3 to create bars representing their GDP values in comparison to the rest of the countries. For the few countries with the largest GDP values, we also list their name and GDP so as to give more perspective to the values. The bars are also clickable and lead to the demographics instance for that country.

The second visualization was a bubble chart of country land areas. We initially tried to use a library (*@weknowinc/react-bubble-chart-d3*) but the library had some issues and we managed to adapt code from a previous SWE project that had the same issues. We used this bubble chart component to create a bubble for each country sized proportionately to its land area, and we display both the name and land area in square miles wherever possible. I also made additional changes to the component that allows for the name and area text components to be sized differently based on the size of the circle, making things look cleaner. Clicking on these bubbles leads to the geography instance for that country.

The third visualization was a donut chart (similar to a pie chart) representing the number of countries per income level. We adapted the code for creating a bubble chart from a website - https://dev.to/vineethtrv/react-d3-donut-chart-49cm - and we compiled the number of countries that fit in each income category and displayed those values accordingly in the chart.

Provider Visualizations

The first visualization we created for our providers, MyTechReview, was a donut chart that displayed the number of products by price range. We attempted to find a few price range categories that would show the split of prices between all the products somewhat evenly, but at the same time, show the right skew of product prices and how most products have prices in the lower range.

The second visualization we created was a bar graph of the average ratings per brand. To get the data, we made a call to their API to get all the brands and then used the name, average rating, and id to build up the graph. We included the name of the brand for the brands that have a 5.0 average rating, and a label for the average rating for all of the

bars. Clicking on a bar leads you to the instance of this brand, which was achieved using the extracted brand id.

The third visualization was a bubble chart depicting the number of products per brand. For this graph, we used the same brands' data that we gathered for our third visualization, and then extracted the name, number of products, and id. As for the graph itself, we used the same logic that was used for the second visualization for our website. Each bubble represents a brand, and its size is determined by the number of products the brand has. Additionally, each bubble displays the name of the brand and/or the number of products it has. Clicking on a bubble leads you to the instance of this brand, which was achieved using the extracted brand id.

10. GITLAB

https://gitlab.com/mehuldar/aroundtheworld