World Insurance Indicators

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What is the problem to solve?

As someone working in the healthcare industry for the past two years, the biggest interactions I have had, other than with patients, is dealing with health insurances. Private health insurances

● What is the problem you want to solve?

● Who is your client and why do they care about this problem? In other words, how will the

client benefit from the solution that you are developing?

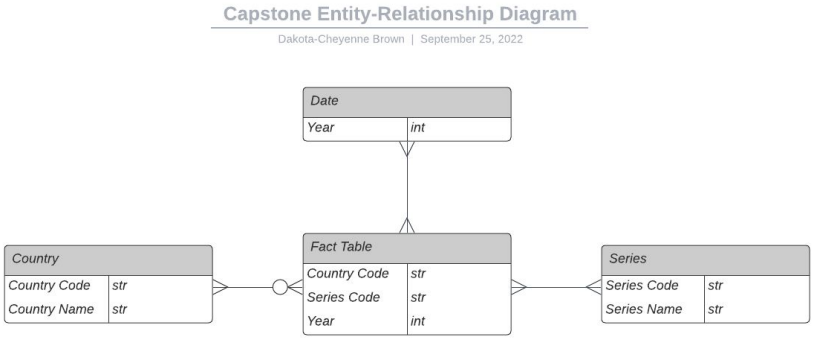
● What data are you using? How will you acquire the data?

● Briefly outline how you'll solve this problem. Your approach may change later, but this is

a good first step to get you thinking about a method and solution.

Cleaning/Transformations

Before cleaning and transforming the data, I needed to be sure it adhered to a model. After Exploratory Data Analysis, I believed the data would work best in a star schema. From there I needed to create the auxiliary tables to the fact table as well as the fact table itself.



Cleaning/Transformations cont.

I decided to use PySpark for the cleaning and transformations using AWS EMR. Using PySpark I was able to partition the data on different cores to tackle a bigger problem into smaller, easier to handle pieces.

I decided to use spot instances for both the cores and the masters to cut down on costs. When sizing the instances I chose a size big enough and computing power that could handle the data.

Testing

When testing my code, I wanted to assure that all the data I was extracting from the World Bank and World Health Organization were being pulled correctly.

The data needed to be:

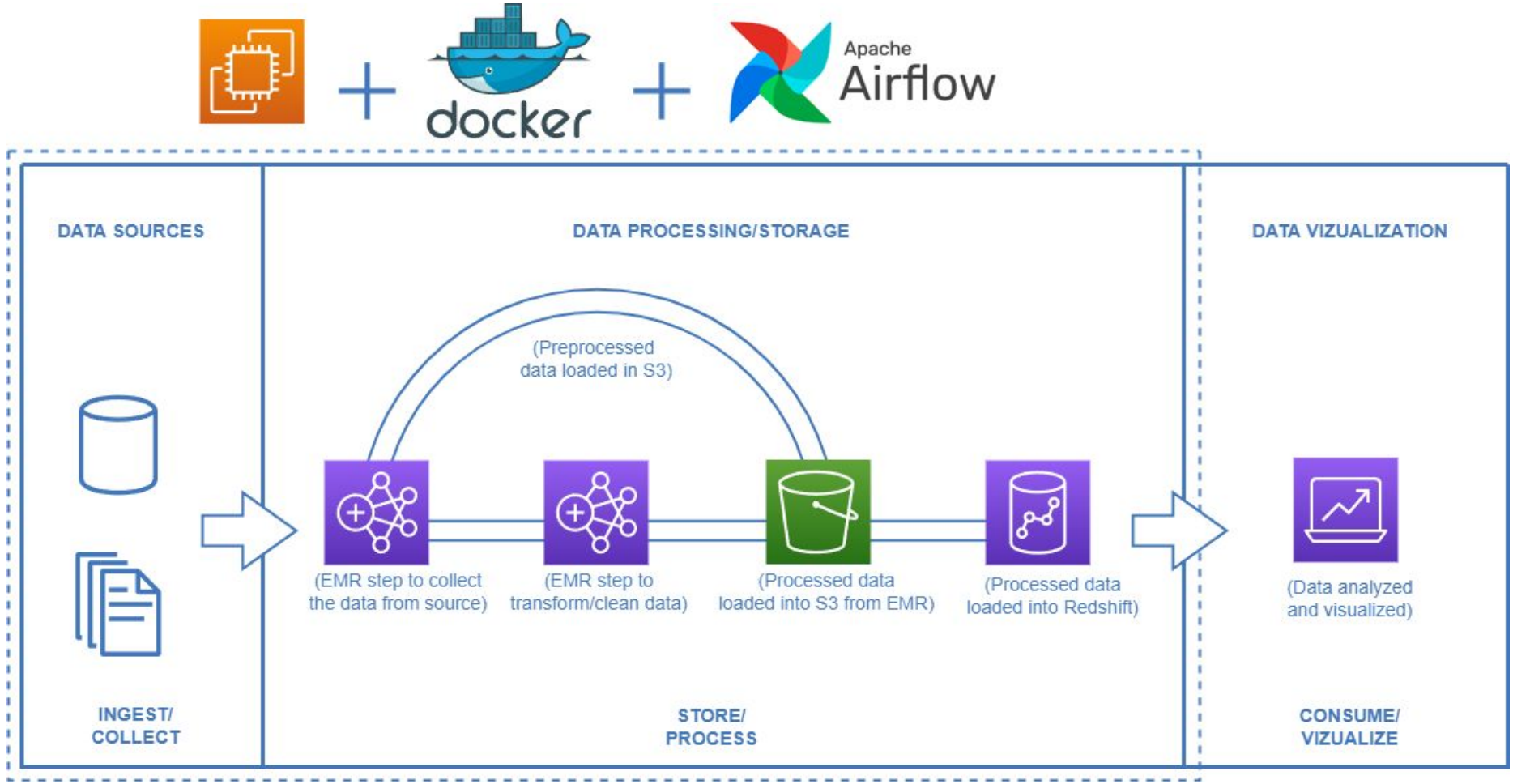
- Taken from the World Bank's API
- Extracted from zips and the correct CSV file chosen from three
- Loaded into an S3 bucket for storage before and after transformations

Through my testing, I was able to assure that the correct files were extracted and loaded into the S3 buckets before and after transformations took place

Architecture

When choosing the architecture for my project, I wanted it to be reusable, redeployable, and able to be ran by other engineers easily. I also needed to be sure the instances I used were correctly sized.

- I chose to use Apache Airflow for it use of DAGs and so it could be ran on a schedule
- From there an EMR instance was created that ran ETL code from S3
- The data was extracted into an S3, transformed in PySpark, and loaded back into S3
- All of this was containerized in Docker and ran on an EC2 instance


docker
Apache
Airflow
DATA SOURCES
DATA PROCESSING/STORAGE
DATA VIZUALIZATION
(Preprocessed
data loaded in S3)
(EMR step to collect
the data from source)
(EMR step to
transform/clean data)
(Processed data
loaded into S3 from EMR)
(Processed data
loaded into Redshift)
(Data analyzed
and visualized)
INGEST/
COLLECT
STORE/
PROCESS
CONSUME/
VIZUALIZE

Metrics

When deciding on the metrics to visualize for this project, I had to make sure that I was getting the full picture that the data was presenting, and try to reduce my biases as much as possible.

Through that, I decided what I needed to track:

- Populations
- GDP
- Government spending on healthcare
- How much people spend out of pocket
- How much private insurances contribute to costs
- How the landscape has shifted over a 10 year window

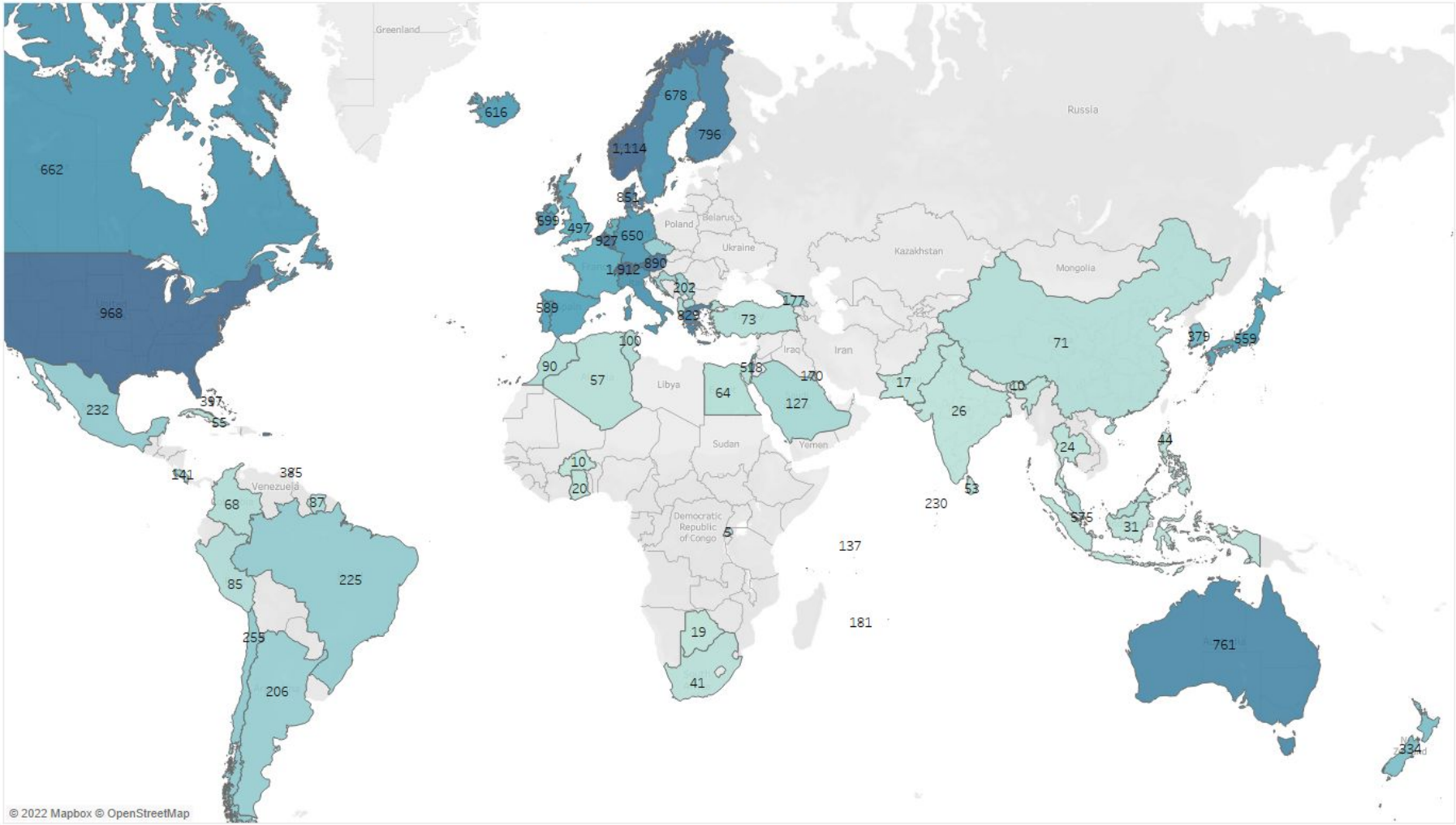
This link can be used to find all the metrics tracked for this project.

Insights

One of the insights I wanted to capture with this project was looking at the out of pocket expenditures for people in the US compared to those living in countries with socialized healthcare.

- Compared to countries with socialized healthcare the US went from third place to second in out of pocket costs for healthcare between 2009 to 2019.
- The other top three countries include behind Switzerland in the first place and Norway switching from second to third place between 2009 to 2019.
- During that time period,

2009 Out of Pocket Expenditure per Capita



2019 Out of Pocket Expenditure per Capita