Project 4 Task 2 Covid Tracker App

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Description:

My application takes a US state code from the user and displays the COVID related metrics for that state fetched from the web service deployed to Heroku which in turn gets this data from Covid Act Now API (https://apidocs.covidactnow.org/). Each request made by the user is logged to the MongoDB Atlas. The logs and some operational analytics based on the logs are available in the form of a dashboard at:

https://quiet-earth-22508.herokuapp.com/dashboard

1. Log useful information

The following information are logged:

- Device – Android device model used to make the request
- Timestamp – Time at which the request was received by web service
- API Response Status Code
- API Response Time
- State Code
- Population
- Test Positivity Rate
- Infection Rate
- ICU Capacity Ratio
- Vaccinations Initiated Ratio
- Vaccinations Completed Ratio

2. Store the log information in a database

CovidTrackerModel.java class connects to the database. CovidTrackerModel.java sends the necessary information to CovidTrackerLogger.java class where the data is logged to database. The connection string is as follows:

```
"mongodb+srv://" + username + ":" + pwd + "@covidtrackercluster.8htga.mongodb.net/myFirstDatabase?retryWrites=true&w=majority"
```

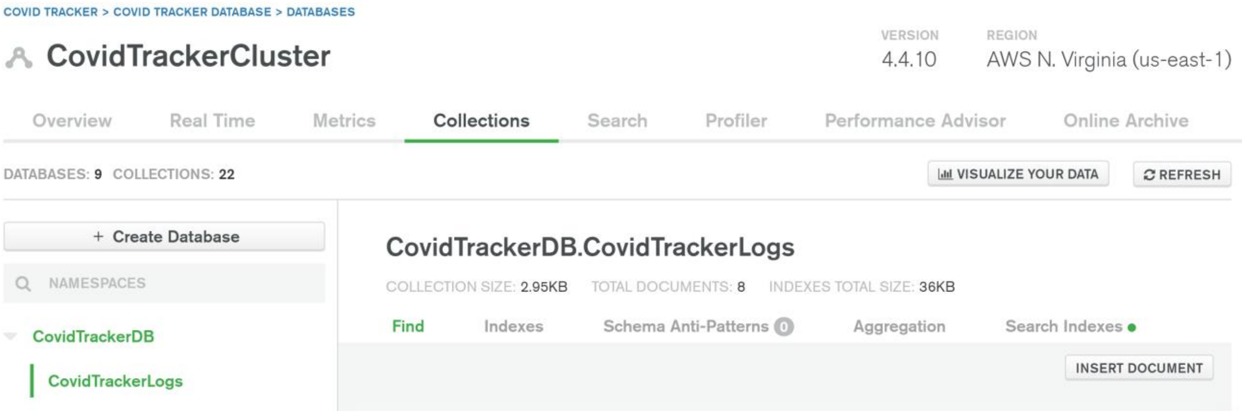
where:

- username is my username as set on MongoDB Atlas
- pwd is my password as set on MongoDB Atlas

Cluster name: CovidTrackerCluster

Database name: CovidTrackerDB

Database Collection: CovidTrackerLogs



VERSION 4.4.10

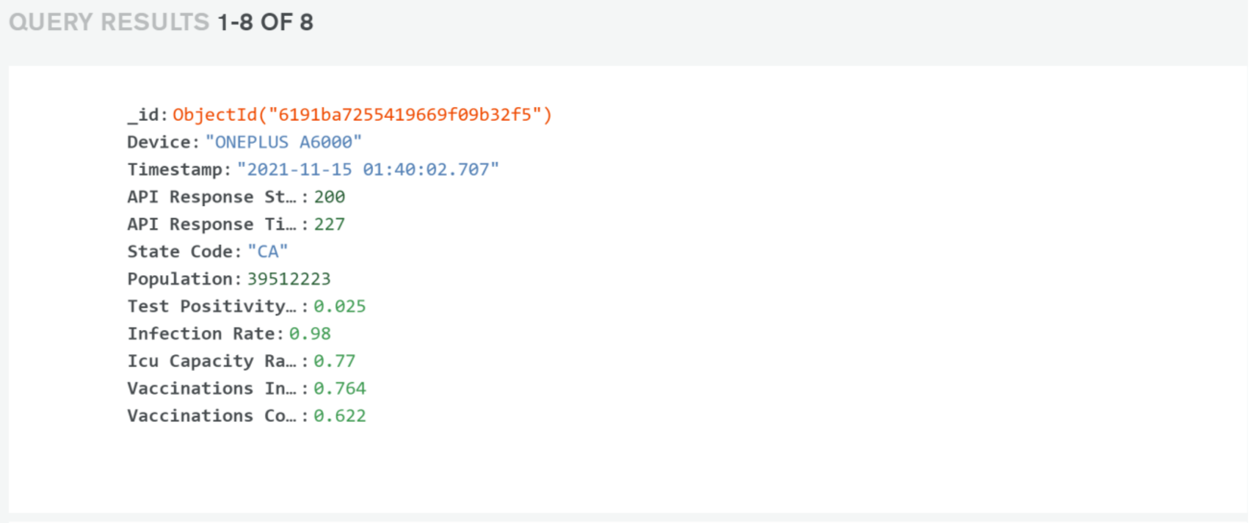
REGION AWS N. Virginia (us-east-1)

DATABASES: 9 COLLECTIONS: 22

CovidTrackerDB.CovidTrackerLogs

COLLECTION SIZE: 2.95KB TOTAL DOCUMENTS: 8 INDEXES TOTAL SIZE: 36KB

An example of logged information in database is as follows:



QUERY RESULTS 1-8 OF 8

```
_id: ObjectId("6191ba7255419669f09b32f5")
Device: "ONEPLUS A6000"
Timestamp: "2021-11-15 01:40:02.707"
API Response St…: 200
API Response Ti…: 227
State Code: "CA"
Population: 39512223
Test Positivity…: 0.025
Infection Rate: 0.98
Icu Capacity Ra…: 0.77
Vaccinations In…: 0.764
Vaccinations Co…: 0.622
```

3. Display operations analytics and full logs on a web-based dashboard

CovidTrackerModel.java retrieves the documents from the database and sends to CovidTrackerDashboard.java to form the table.

3.1. A unique URL addresses a web interface dashboard for the web service.

The dashboard url is:

https://quiet-earth-22508.herokuapp.com/dashboard

3.2. The dashboard displays at least 3 interesting operations analytics.

The operational analytics provided based on logged data are:

- Number of searches today
- Fastest API response
- The most searched state code

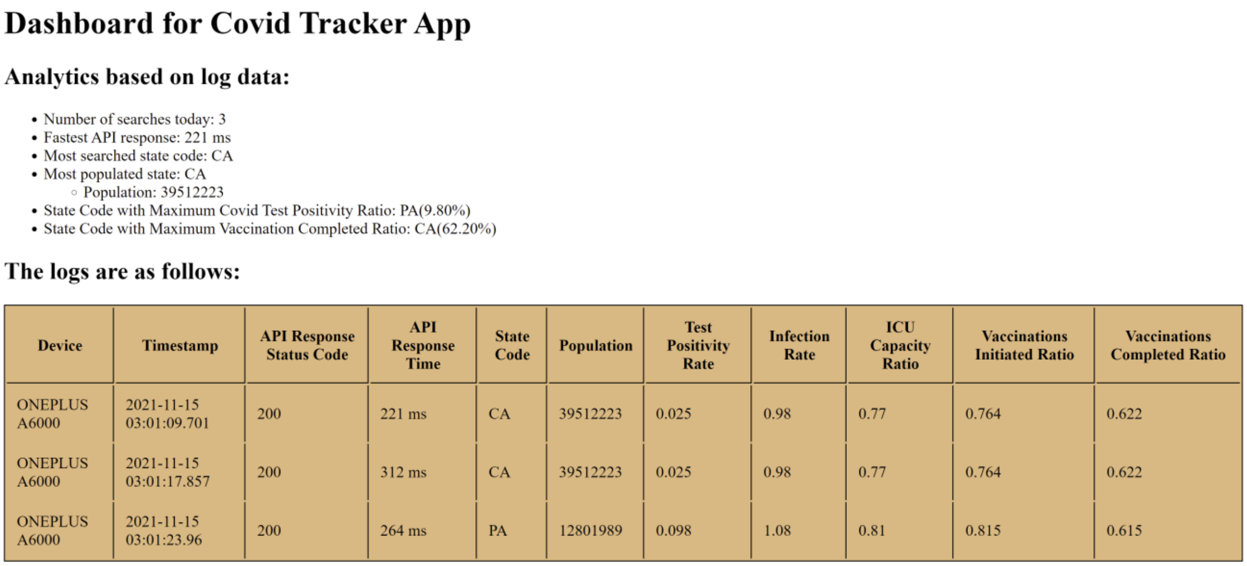
- Most populated state and its population
- State Code with Maximum Covid Test Positivity Ratio and its percentage
- State Code with Maximum Vaccination Completed Ratio and its percentage

3.3. The dashboard displays formatted full logs.

All the data logged into the database is displayed in the dashboard as logs. The logs include the:

- Device – Android device model used to make the request
- Timestamp – Time at which the request was received by web service
- API Response Status Code
- API Response Time
- State Code
- Population
- Test Positivity Rate
- Infection Rate
- ICU Capacity Ratio
- Vaccinations Initiated Ratio
- Vaccinations Completed Ratio

The dashboard looks as follows:



Dashboard for Covid Tracker App

Analytics based on log data:

- Number of searches today: 3
- Fastest API response: 221 ms
- Most searched state code: CA
- Most populated state: CA
  - Population: 39512223
- State Code with Maximum Covid Test Positivity Ratio: PA(9.80%)
- State Code with Maximum Vaccination Completed Ratio: CA(62.20%)

The logs are as follows:

Device	Timestamp	API Response Status Code	API Response Time	State Code	Population	Test Positivity Rate	Infection Rate	ICU Capacity Ratio	Vaccinations Initiated Ratio	Vaccinations Completed Ratio
ONEPLUS A6000	2021-11-15 03:01:09.701	200	221 ms	CA	39512223	0.025	0.98	0.77	0.764	0.622
ONEPLUS A6000	2021-11-15 03:01:17.857	200	312 ms	CA	39512223	0.025	0.98	0.77	0.764	0.622
ONEPLUS A6000	2021-11-15 03:01:23.96	200	264 ms	PA	12801989	0.098	1.08	0.81	0.815	0.615

4. Deploy the web service to Heroku

The URL of my webservice deployed to Heroku is:

https://quiet-earth-22508.herokuapp.com/

The project directory name is Project4Task2.

4.1. Implementation of web service

In my project the web service consists of:

Model: CovidTrackerModel.java
View: index.jsp, dashboard.jsp
Controller: CovidTrackerServlet.java
Helper classes: CovidTrackerLogger.java, CovidTrackerDashboard.java

4.2. Receives an HTTP request from the native Android application and web browser

CovidTrackerServlet.java receives the HTTP GET request with the argument “state” and “device”. It passes these strings on to the CovidTrackerModel.java.
CovidTrackerServlet.java receives the HTTP GET request with url pattern: /dashboard. This redirects to the dashboard page by creating table and setting view from dashboard.jsp.

4.3. Executes business logic appropriate to your application. This includes fetching XML or JSON information from some 3rd party API and processing the response.

CovidTrackerModel.java makes a HTTP GET Request to API:

API endpoint: "https://api.covidactnow.org/v2/state/"+state+".json?apiKey="+apiKey

Where state is the state code for which the Covid metric is to be fetched

apiKey is my API key for accessing the API data.

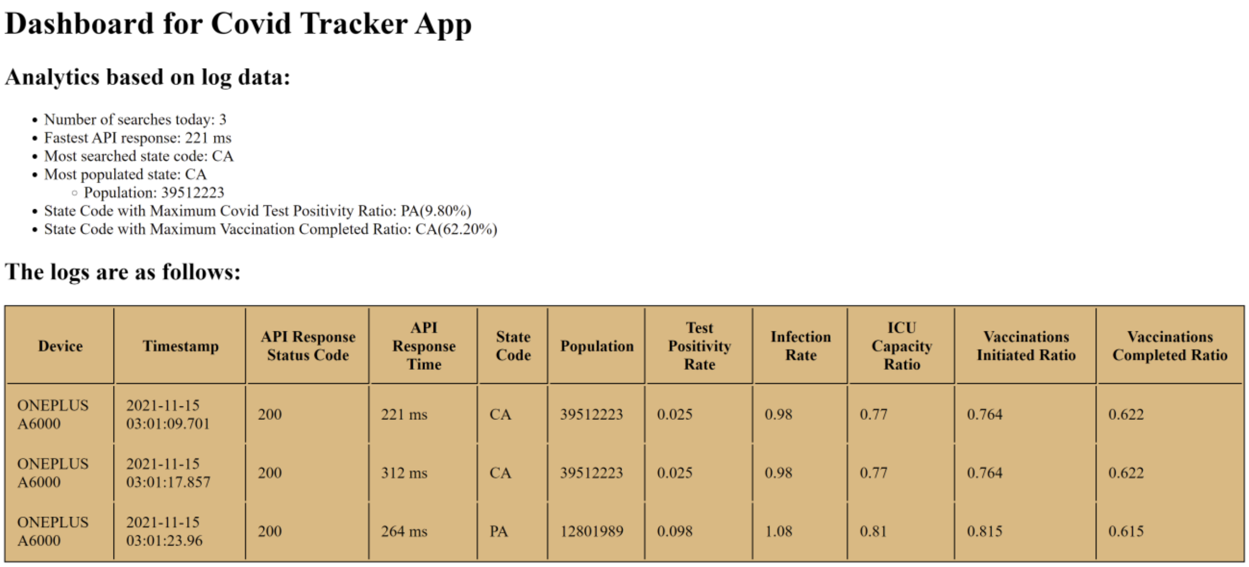
It then parses the JSON response and extracts parts it needs to respond to the Android application.

CovidTrackerServlet.java calls a method in CovidTrackerModel.java to retrieve data from database and create a table to display in the dashboard. The operation analytics are performed in CovidTrackerDashboard.java and parameters for the operation analytics are set in CovidTrackerModel.java

4.4. Replies to the Android application with an XML or JSON formatted response. The schema of the response can be of your own design. Creates and displays dashboard

The CovidTrackerServlet.java receives the formatted JSON response from CovidTrackerModel.java and returns the formatted JSON response to the Android application. Example of JSON response:
{"testPositivityRatio":0.025,"infectionRate":0.98,"state":"CA","vaccinationsCompletedRatio":0.622,"icuCapacityRatio":0.77,"vaccinationsInitiatedRatio":0.764,"population":39512223}

The CovidTrackerServlet.java displays the dashboard when the dashboard url is hit.



Dashboard for Covid Tracker App

Analytics based on log data:

- Number of searches today: 3
- Fastest API response: 221 ms
- Most searched state code: CA
- Most populated state: CA
  - Population: 39512223
- State Code with Maximum Covid Test Positivity Ratio: PA(9.80%)
- State Code with Maximum Vaccination Completed Ratio: CA(62.20%)

The logs are as follows:

Device	Timestamp	API Response Status Code	API Response Time	State Code	Population	Test Positivity Rate	Infection Rate	ICU Capacity Ratio	Vaccinations Initiated Ratio	Vaccinations Completed Ratio
ONEPLUS A6000	2021-11-15 03:01:09.701	200	221 ms	CA	39512223	0.025	0.98	0.77	0.764	0.622
ONEPLUS A6000	2021-11-15 03:01:17.857	200	312 ms	CA	39512223	0.025	0.98	0.77	0.764	0.622
ONEPLUS A6000	2021-11-15 03:01:23.96	200	264 ms	PA	12801989	0.098	1.08	0.81	0.815	0.615

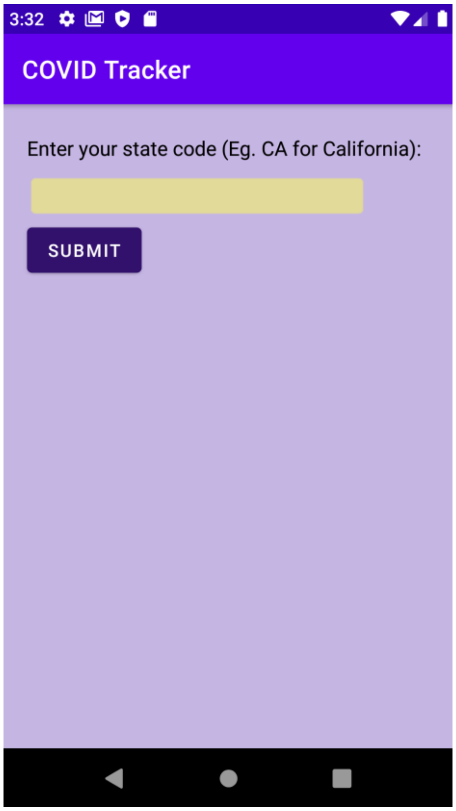
5. Implement a native Android application

The name of my native Android application project in Android Studio is CovidTrackerApp.

5.1. Has at least three different kinds of Views in your Layout (TextView, EditText, ImageView etc.).

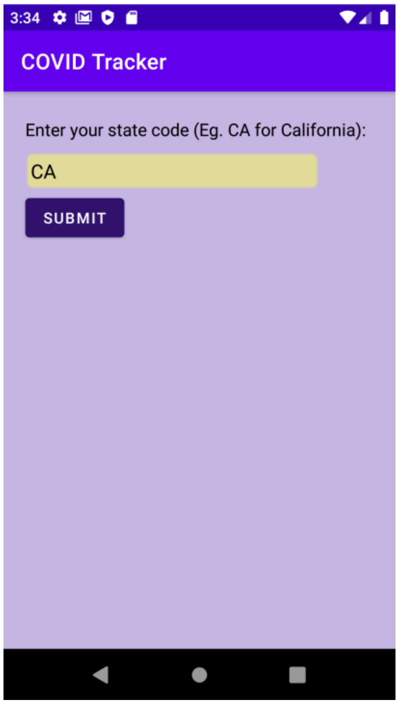
My application uses TextView, EditText, Button, ScrollView. See context_main.xml for details of how they are incorporated with a LinearLayout.

Here is a picture of the layout before fetching the metrics for a state code.



5.2. Requires input from the user

Here is a screenshot of the user searching for the state code of California, i.e., CA



Enter your state code (Eg. CA for California):

CA

5.3. Makes an HTTP request (using an appropriate HTTP method) to your web service

My application does an HTTP GET request in GetAPIData.java. The HTTP Request is:

https://quiet-earth-22508.herokuapp.com/getCovidData?state="+searchTerm+"&device="+model

where:

- searchTerm is the user's search term
- model is the model name of Android device making the request

The search method makes this request to the web service deployed on Heroku, which in turn uses the query parameter attached to the url to fetch the data from the API.

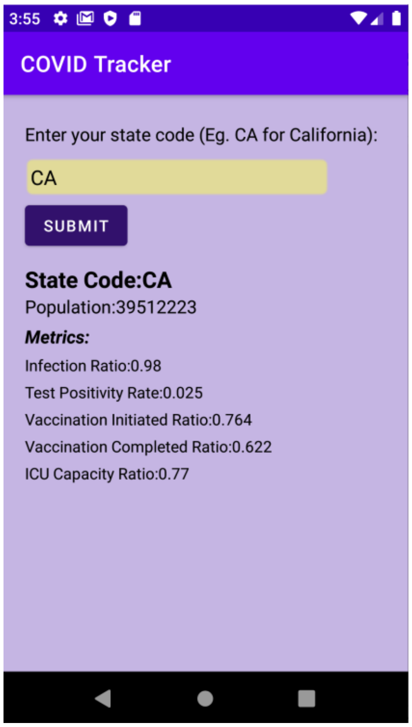
5.4. Receives and parses an XML or JSON formatted reply from your web service

An example of the JSON response is:

{"testPositivityRatio":0.025,"infectionRate":0.98,"state":"CA","vaccinationsCompletedRatio":0.622,"icuCapacityRatio":0.77,"vaccinationsInitiatedRatio":0.764,"population":39512223}

5.5. Displays new information to the user

Here is the screenshot after the search result is obtained.



Enter your state code (Eg. CA for California):

CA

State Code:CA

Population:39512223

Metrics:

Infection Ratio:0.98

Test Positivity Rate:0.025

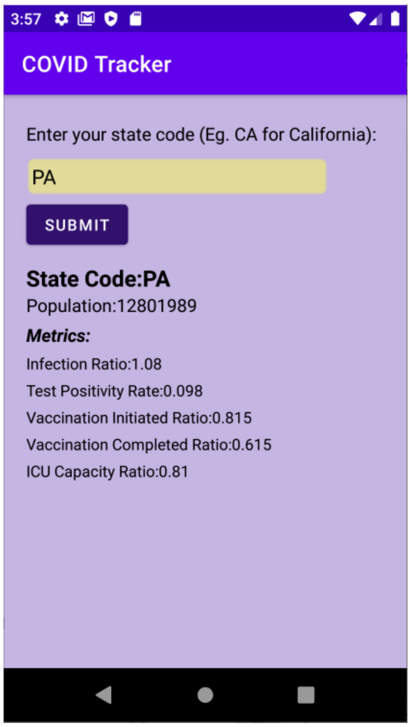
Vaccination Initiated Ratio:0.764

Vaccination Completed Ratio:0.622

ICU Capacity Ratio:0.77

5.6. Is repeatable (i.e., the user can repeatedly reuse the application without restarting it.)

The user can search for the metrics of another state code and hit Submit button. Here is an example for the state code of Pennsylvania, i.e., PA



Enter your state code (Eg. CA for California):

PA

State Code:PA

Population:12801989

Metrics:

Infection Ratio:1.08

Test Positivity Rate:0.098

Vaccination Initiated Ratio:0.815

Vaccination Completed Ratio:0.615

ICU Capacity Ratio:0.81