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CS443

Project Final Report

Project Statement

My final project is called MBTA Tracker. It is an Android app for navigating the MBTA public transportation system in Greater Boston. Users can easily use their phones to search for stations and lookup train arrival prediction times for the subway and commuter rail. The app displays an ETA (Estimated Time of Arrival) so users know how long to wait for the train. Users can also use the app to view the surrounding area in Google Maps. Many types of transit users can benefit from this application including first-time train riders and daily commuters. There are many similar applications for the MBTA on the Android market, but this app has a simpler and easier to use interface. There are no special requirements for using the app.

Application Design

The app layout is designed to be on a smartphone. Most of the app's functions are in the MainActivity. The app uses AsyncTasks to connect to a HttpURLConnection and download JSON data using the MBTA API.


App initialization
•App Layout
•HashMap for station names and IDs, hardcoded in strings.xml
•Download information for stations and routes using AsyncTask
•Zoom in map to Boston
User types a station name
•User then clicks OK or presses Enter
•App clears previous data
•Scroll to top of RecyclerLayoutView
Hashmap used to lookup ID from the typed station
•For example: "park st" → "place-pktrm"
Use stored station info to find coordinates for the station ID
•Add marker on Google Maps and zoom to location
•Remove previous marker
Get prediction data using Async Task
•Extract information from the JSON object
•Route
•Trip ID
•Prediction time
Use another Async Task to get trip information from ID
•Destination name extracted from trip info data
Calculate ETA
•Use departure or arrival time depending on the station
•Subtract current time from prediction time
Display information in a RecyclerViewLayout
•Similar to GridLayout but also scrollable
•Users can click on a prediction to view the vehicle location which is found using another AsyncTask

Application Implementation and Evaluation

The app was implemented mostly in the MainActivity class. There are subclasses for each of the AsyncTasks. There is also a MyRecyclerViewAdapter class which extends the RecyclerView.Adapter and is used for the RecyclerView. The app was tested on an Android emulator for Nexus 5X, using API level 28 and Android 9.0. Many station names were entered and tested. The startup time for the app varies between 2 seconds and 30 seconds for unknown reasons. If the emulator did not have Play Store enabled, the emulator occasionally needed to be restarted to correct the current system time for calculating ETA predictions.

References

https://developer.android.com/reference/android/support/classes

https://www.mbta.com/developers/v3-api

https://api-v3.mbta.com/docs/swagger/index.html

Experiences and Thoughts

Several functions could be added to the app in the future. Information for each train station, such as transfer lines and station layouts could be displayed. The app currently does not support bus information, but the app layout could be improved to allow users to select bus stops from a drop-down menu. The API for bus predictions is the same as for train predictions, so the functionality could be

easily added. Another function that could be added is for the app to draw the route diagram on the map.