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CS443

Final Project Report

Project Statement

The purpose of the project is to create an app that shows the live locations of multiple MBTA bus routes, in both directions, at the same time. Most other apps only show one direction of one route, so to see any others you need to manually switch between them. When there are multiple bus routes nearby that can take someone to the same destination, being able to see which one is coming first can help them decide which bus stop they should go to.

Additionally, people at bus stops in the middle of a route may only be interested in the location of buses traveling in one direction, but near the start and end of the route often the other direction is useful as well. When a bus is running late or stuck in traffic, there's no way to tell how far away it is since the route hasn't "started" yet.

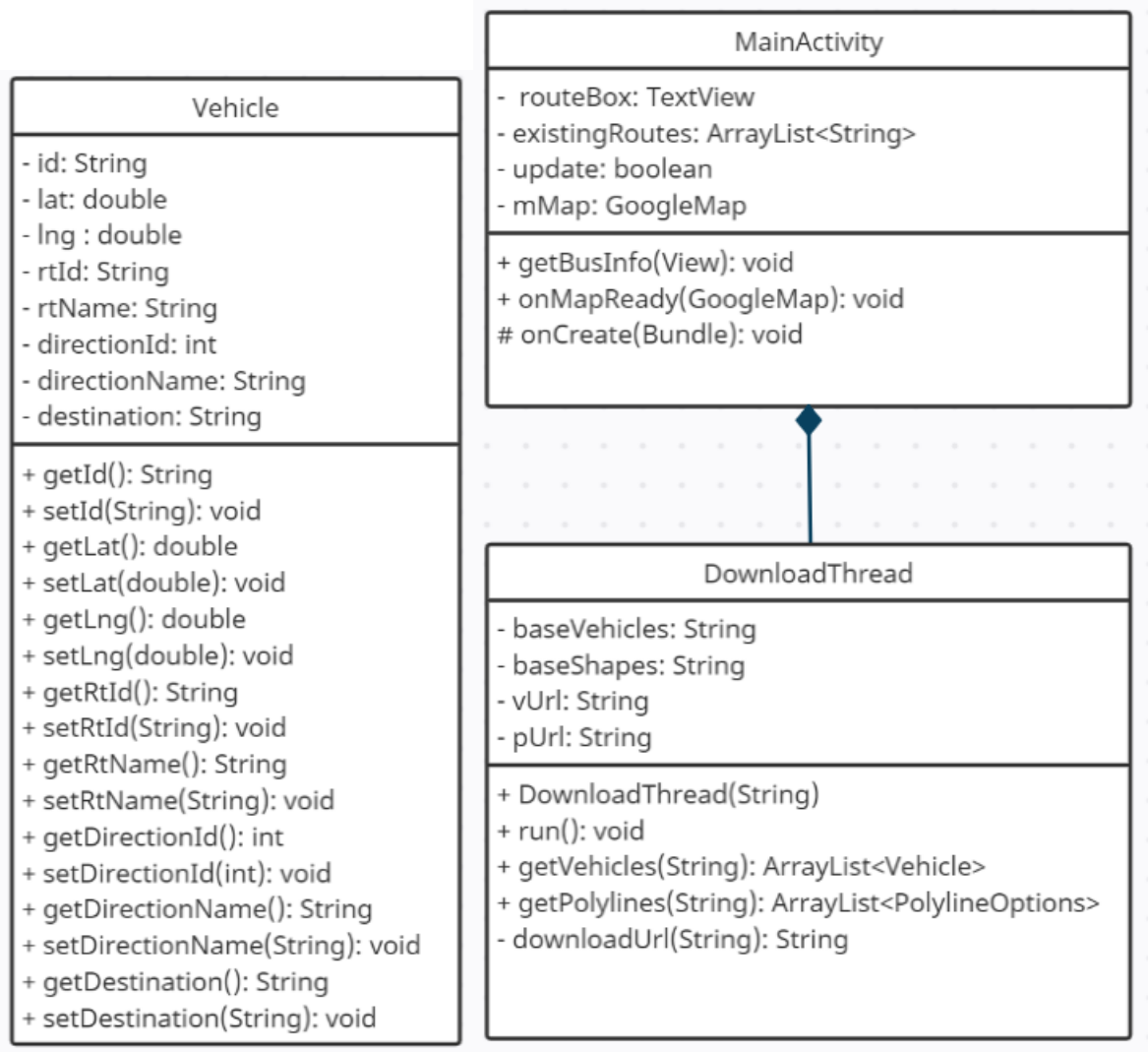
Application Design

The app interacts with Google Maps and the MBTA API. It gets the name of the route, direction of travel, destination, and locations of all buses on the route from the MBTA API. It also gets a Polyline showing the route pattern(s), which it displays on a map. Each bus currently on the route is shown with a marker, that is placed at its current location and labeled with its route, direction, and destination.

The app can run on either smartphones or tablets, but as a practical matter it will probably mostly be used on smartphones. It was designed for smaller screens, so the default zoom level may look too low on tablets.

Its UI consists of a map, a text box, a button, and a label. Entering a route number into the text box and pushing the button adds the bus to the map and displays its information in the label, which has a transparent background.

Classes:



MainActivity uses a MapFragment, TextView, ConnectivityManager, and NetworkInfo

DownloadThread uses a LatLng, MarkerOptions, CameraUpdateFactory, InputStream, HttpsURLConnection, BufferedReader, JSONObject, and JSONArray

Application Implementation and Evaluation

The app receives data from the MBTA API in JSON form, adds routes as polylines to the map, and adds markers to the map with vehicle locations. When a new route is added, its name is displayed at the top and it's added to the map. When a route that already exists is added, it updates all of the locations (of all routes) by clearing the map and re-downloading the information. The map automatically zooms to a location along the route, and is zoomed out enough that the whole route should be visible.

References

The base started out as HW3, but was heavily modified. The information about how to use the MBTA API came from https://api-v3.mbta.com/docs/swagger/index.html, information about

adding markers came from https://developers.google.com/maps/documentation/android-sdk/marker, and information about adding polylines came from https://developers.google.com/maps/documentation/android-sdk/shapes and https://googlemaps.github.io/android-maps-utils/javadoc/com/google/maps/android/PolyUtil.html

Experiences and Thoughts

I was thinking of having the locations update automatically, but with multiple routes being shown I was concerned about rate limiting.