

Team 22 - CyRide Visualization

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Project Overview



Provide a visualization of Cyride movement through a UE (user equipment) device that transmits its location when in range of given base stations (signal towers). This is called ARA and provides a wireless network to track locations. When outside of that range, it will predict the movement using GPS locations and machine learning. The application will show which method is being utilized, providing insight into the tracking methods so users can have accurate bus tracking

User Needs

Ames Students and Residents

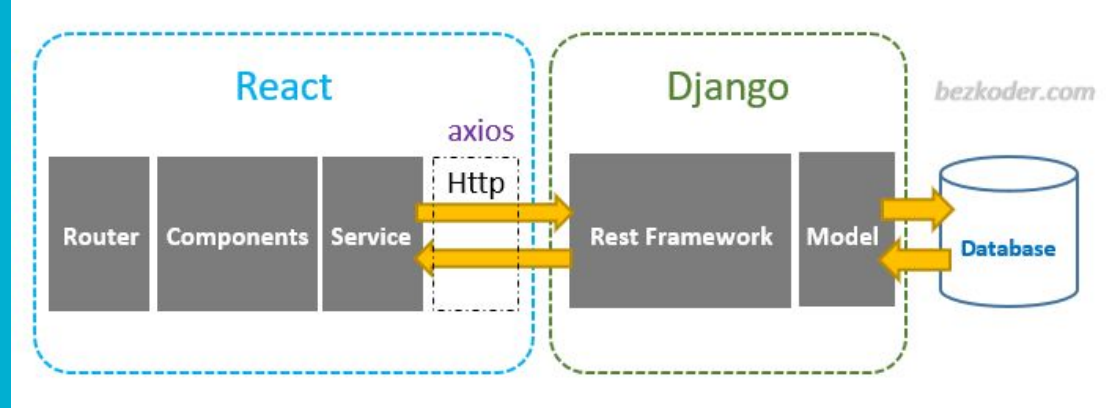
- Need a accurate live visual representation of buses routing
- Need a reliable means of transportation so they can get to their destination on time

Researchers

- Map of the connectivity to ARA network
- Knowledge of where user equipment is out of range of the network

Requirements

React Frontend - User Interface

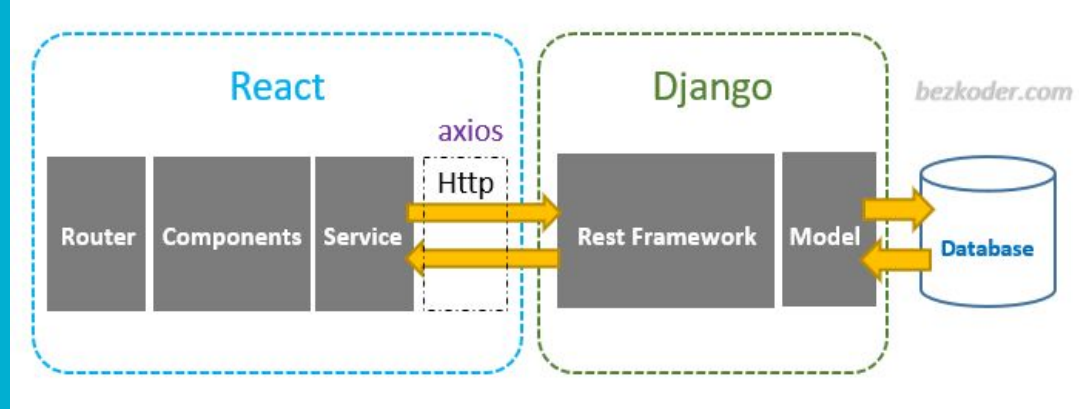


- Needs a map visualization that can be controlled by the user through actions like zooming, swiping, and tapping on buses
- Requires the map to have bus locations being update in a live feed
- The locations of buses coordinates and the UE signal strength will be displayed to users who select the corresponding bus
- Quick loading of bus updates so that predictions are accurate

Requirements

Django Backend - Location Predictor

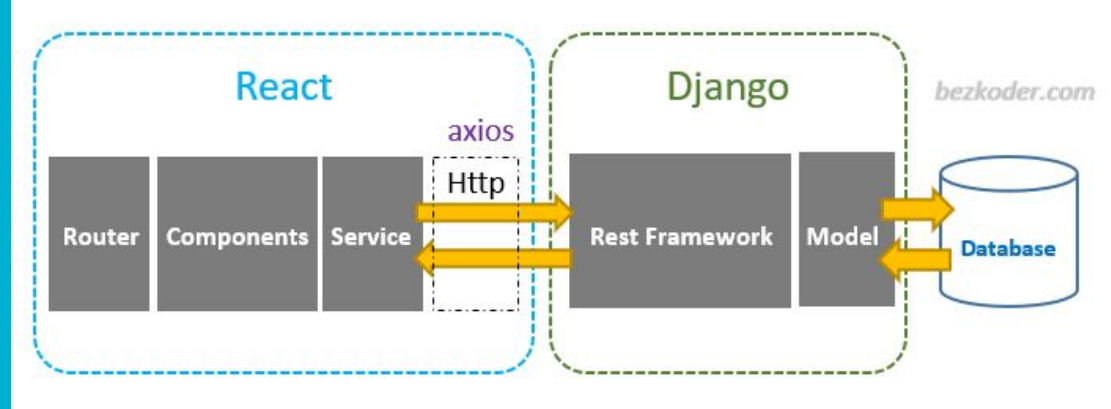
- Gather live locations and signal strength of all UE devices
- If a UE device has no signal, predict the location using GPS and machine learning
- Store/Retrieve all necessary data from the MySQL database
- Provide accurate location updates quickly to the React frontend



Requirements

MySQL database

- Tables to store location and signal strength data
- Provide fast querying to gather necessary data for the backend



Engineering Standards

- IEEE 830 – Software requirements specifications:
 - Outlines guidelines for documenting software requirements, ensuring clarity and completeness.
- IEEE 1012 – A standard for software verification and validation:
 - Covers processes, methods, and techniques to ensure that software products meet specified requirements.
- IEEE 1061 – Software quality metrics and measurement:
 - Provides guidance on measuring software quality attributes and assessing product quality.
- IEEE 1016 – Format and content of software design descriptions:
 - It helps ensure consistent and effective communication of software design decisions.

Conclusion

We want to provide a full-stack solution for providing live locations updates of bus locations so that users can have accurate predictions. This will require many parts to communicate with each other efficiently to give a seamless experience to our users.

