

# Crossroads: Interactive Spatiotemporal Data Visualization Platform

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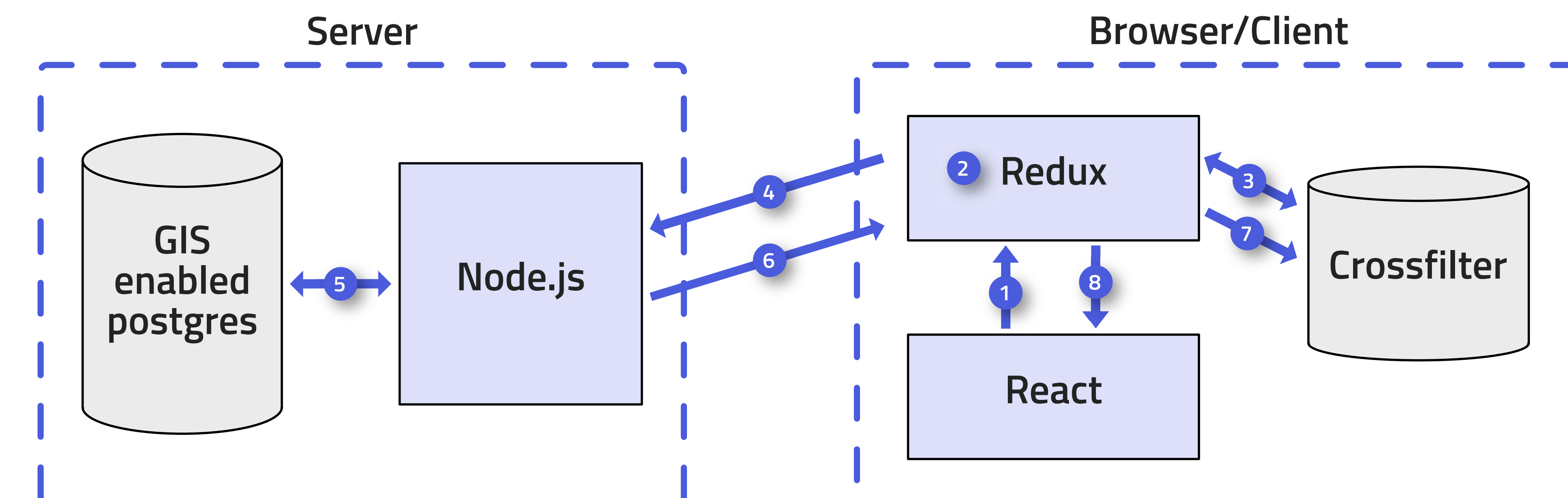
## Overview

Crossroads is a platform for exploring spatiotemporal datasets intuitively and easily, and was built with touch devices in mind for maximum usability. Even large datasets can be constrained and manipulated with realtime feedback. The platform is compatible with any movement dataset, which we define as any data set which has data points with start and end locations and times. The experimental dataset was car2go data collected from 16 different cities over the course of 2+ years.

**Problem:** Spatiotemporal datasets are too large to be consumed by humans as raw data, and existing platforms are either not tailored to the intricacies of spatiotemporal datasets, or are not able to display results real time. In addition, existing interfaces leave much to be desired in terms of usability, and are not optimized for touch and or mobile interfaces.

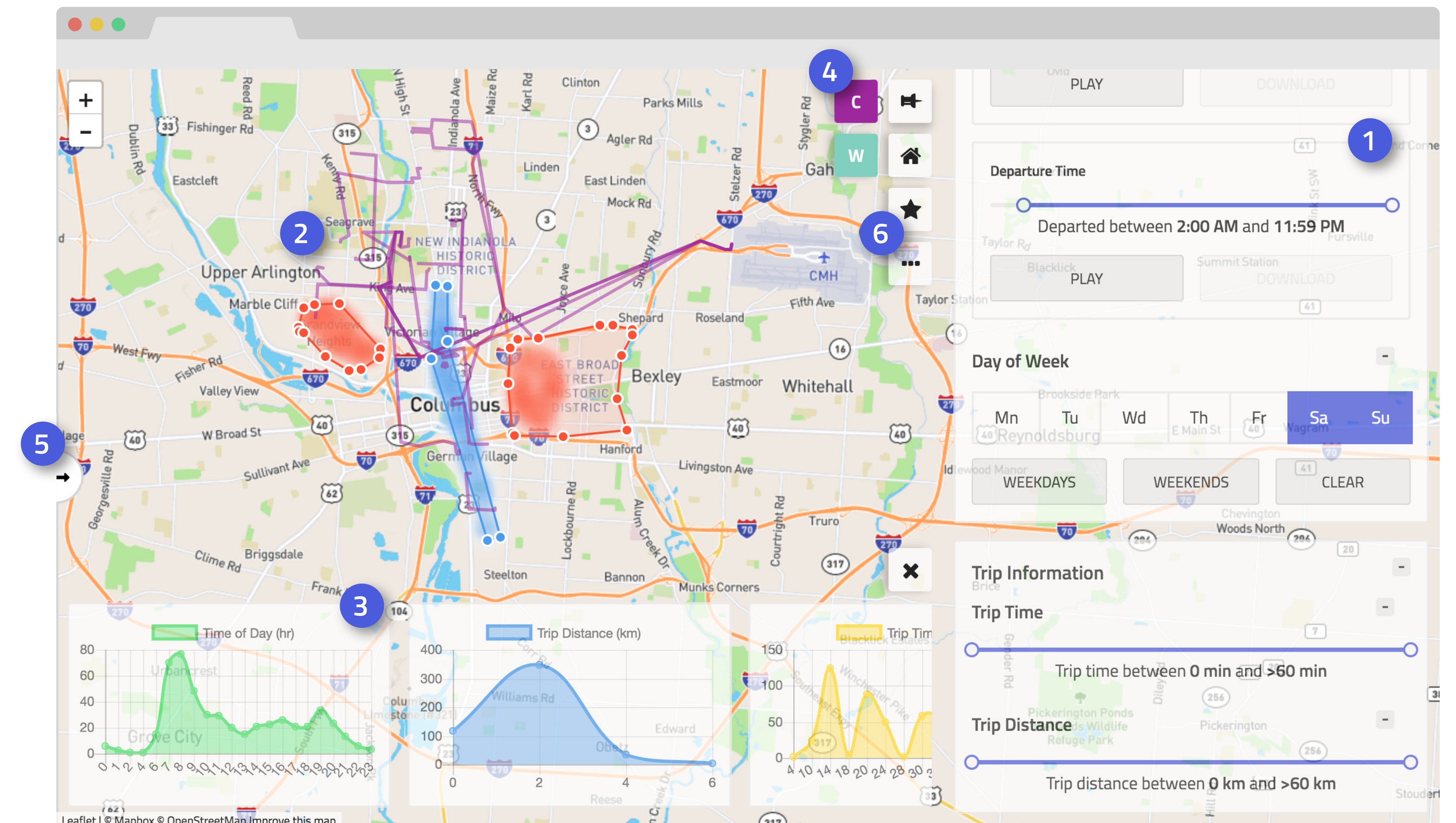
**Solution:** Crossroads ability to allow users to clearly and intuitively construct complex queries, and display the results real time, gives researchers an easy path to drawing novel conclusions from any spatiotemporal dataset. The emphasis Crossroads puts on touch and mobile devices allows for the data to be explored in any environment, easily and quickly.

## Architecture



- 1 User action signals change in redux store/query parameters
- 2 Reducers fire action on state change
- 3 Check if crossfilter can deliver the updated query, and skip to 8 if so
- 4 Socket.io emission to node, requesting a database query
- 5 SQL query
- 6 Socket.io emission from node, with sampled query data
- 7 Store new dataset in crossfilter
- 8 Update UI components with new data

## Primary Features



- 1 **The query pane.** Here, users can intuitively manipulate the dataset using a variety of constraints. Constraints include restrictions on departure and arrival times of trips, trip lengths in time and distance, specification of arrival and departure location via geofences, and more.
- 2 **Resultant visualization.** Represented as two heatmaps, one for arrival (blue) and one for departure (red). Where there is overlap, the heatmaps blend accordingly to show shades of purple. User provided datasets are also represented depending on their contents.
- 3 **Aggregate data plots.** These plots help the user to better understand the big picture of their current query, and pick out overarching trends in the data.
- 4 **List of currently active data overlays.** Users can upload arbitrary data sets to overlay over queries, in order to visualize correlations. Data sets are displayed differently based on their contents, and will vary with constraints in the query pane, if applicable. For example, Here the user has provided Google Maps routing information, which is show as purple lines on the map.
- 5 **Query comparison slider.** Any queries results can be saved, and then be slide over the current query for the sake of comparison. For example, in the above situation, it may be interesting to compare these results to those of a query where the departure geofence on the far left is remove.
- 6 **Additional options.** These include changing the map's tileset to better view a query, uploading additional datasets, downloading the current visualization, and more.