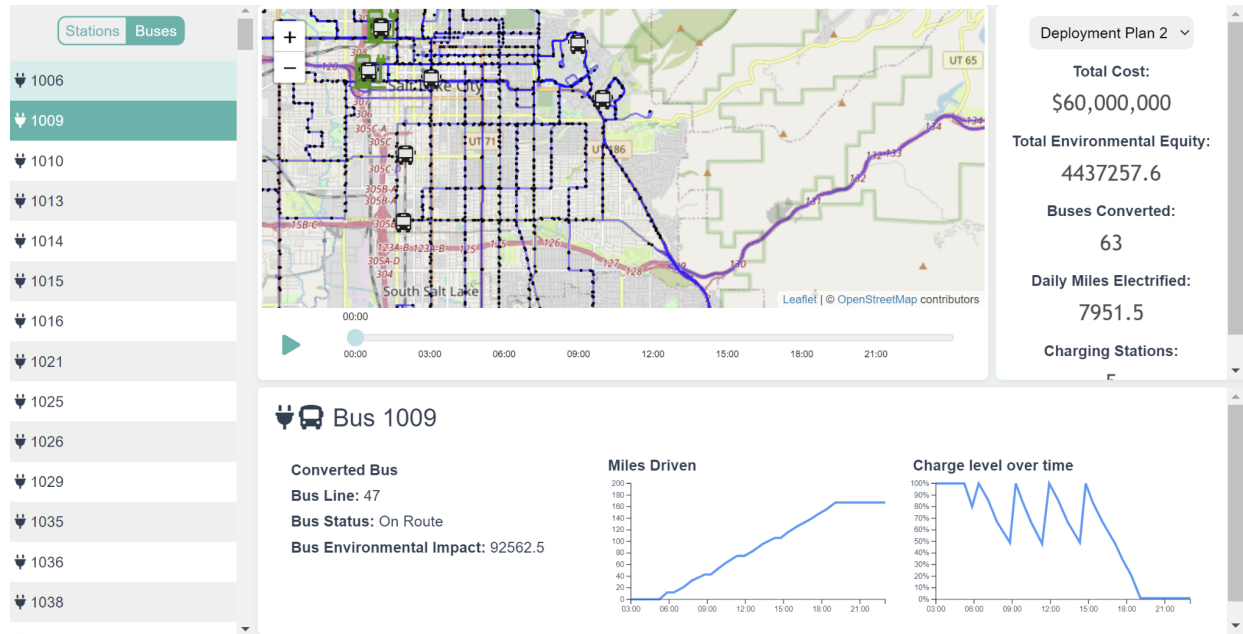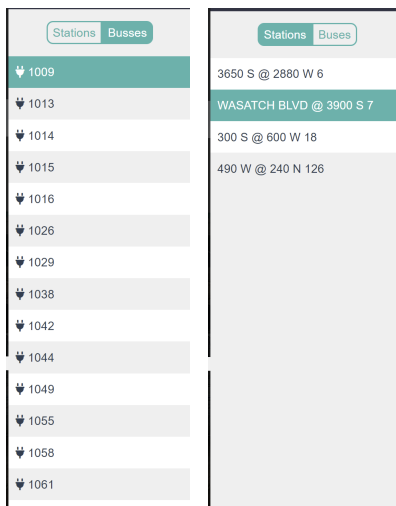Sarah Kunzler and Gabe Kudirka
Advanced Data Visualization
10/25/2021

Project 2 Report

We created a Vue.js web application with 4 main components: the bus/station selector, map, bus/station details, and plan details. Each is represented as a unique, reactive panel on the screen.


Bus/Station Selector

Found on the far left of the screen, the bus/station selector employs a switch to allow users to toggle between viewing electric buses and charging stations.

When "Buses" is selected, the list below shows a selectable item for each bus, with converted electric buses (marked with a charging symbol) at the top of the list. When a bus is selected it's details are shown in the bus details component.

When "Stations" is selected, the list shows a selectable item for each charging station. The bottom panel will show the selected station details, rather than selected bus details.

Map Component

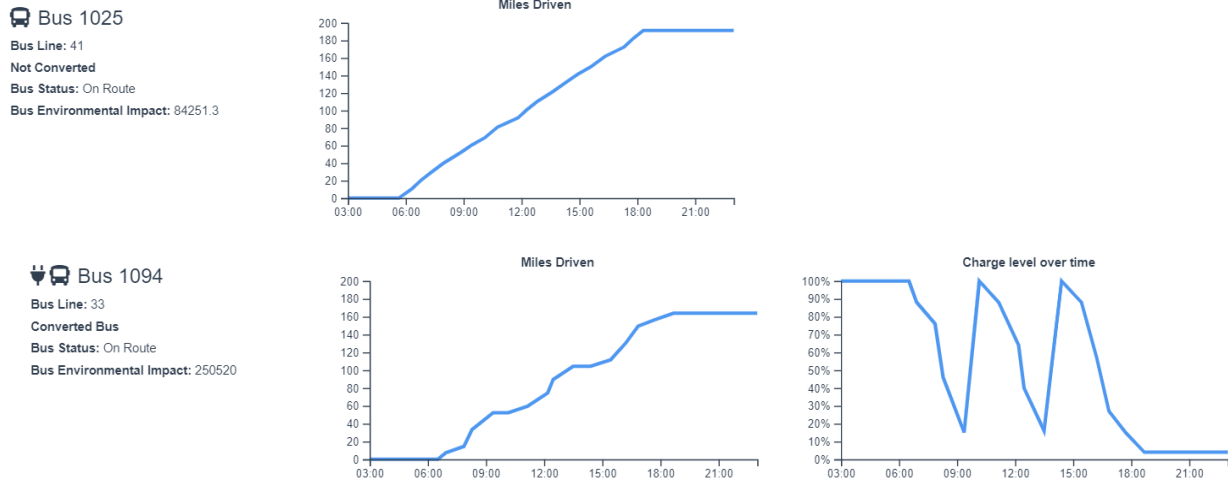The map component is made up of two parts: a reactive map, and a time slider.
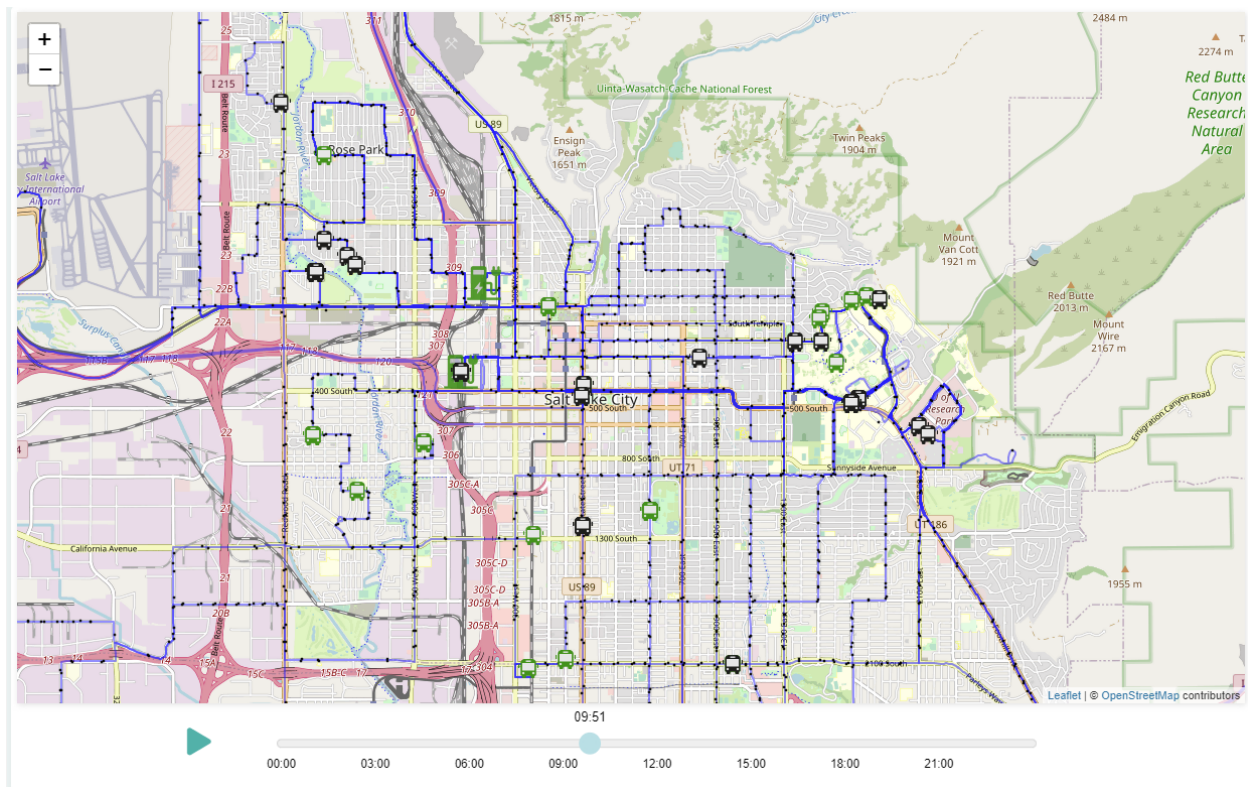
The map shows the routes, marked by blue lines, the locations of the charging stations, marked by a green charger icon, and the locations of every bus at a given time with non converted buses showing up as black and converted buses showing up as green. Upon changing the plan in the plan details component, the buses that are green will change and the locations of the charging stations will update (if it appears the buses have not changed color, change the time after changing the plan and the bus colors should change). Upon hovering over any bus icon a tooltip will appear displaying the bus's ID, route, and converted status. Clicking a bus icon will bring up that bus's information in the bus details component. Upon hovering over a charging station icon a tooltip will appear displaying the station's stop ID, stop name, and the number of stations built at that location. Clicking a charging station icon will bring up that charging station's information in the station details component.
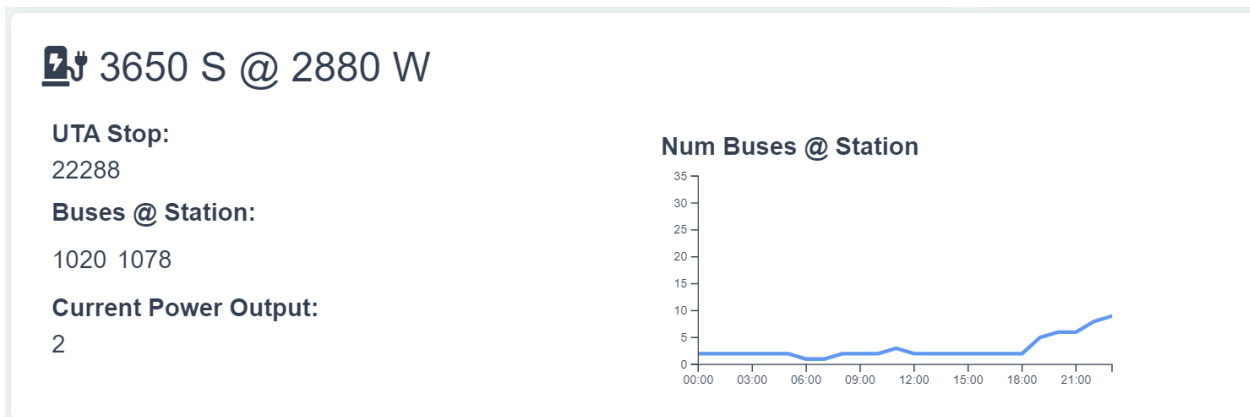
The time slider in this component adjusts the time of day. Changing the time of day using the slider will update the positions of the buses on the map as well as the dynamic data in the bus details component. Pressing the play button will cause the time to increment by 10 minutes every 100ms automatically until you press pause.

Bus/Station Details

The details component has two states, toggled with the Buses/Stations toggle in the above list. When "Buses" is selected, the bottom panel shows the selected bus details, when "Stations" is selected it shows the selected station details.

🚌 Bus 1025

Bus Line: 41
Not Converted
Bus Status: On Route
Bus Environmental Impact: 84251.3

Miles Driven

⚡🚌 Bus 1094

Bus Line: 33
Converted Bus
Bus Status: On Route
Bus Environmental Impact: 250520

Miles Driven

Charge level over time

The bus details component will show up on the bottom of the page by default and when a bus is selected. This panel shows the ID of the bus, the line the bus runs on, whether the bus is converted under the selected plan, the status of the bus ('on route' and 'charging') and environmental impact of that bus. If the bus has been converted then two charts will display, the first displaying how far the bus has traveled over the course of the day in miles, and the second shows the level of charge the bus will have at any given point in the day. The charge of the bus is calculated using the miles traveled and the theoretical maximum number of miles that can be traveled on a charge, 62. If the selected bus is not converted then only the miles traveled chart will display.

⚡🔌 3650 S @ 2880 W

UTA Stop:
22288

Buses @ Station:
1020 1078

Current Power Output:
2

Num Buses @ Station

The station details component shows up when a charging station is selected. The panel shows the station name, UTA Stop ID, the list of bus IDs currently at the station (according to the time set on the time slider), and how much power the station is currently outputting. The power output is currently just the number of buses at the station, since we do not have data on how much power each bus takes to charge at any given time. If we had that constant we could simply multiply these two to get the power output. The panel has one chart which shows the

number of buses at the station at each hour of the day. With the charging constant we could show the power output at any given time.

Plan Details

Deployment Plan 2 ⌄

Total Cost:

$60,000,000

Total Environmental Equity:

4437257.6

Buses Converted:

63

Daily Miles Electrified:

7951.5

Charging Stations:

5

The plan details component represents the static data associated with each plan. The dropdown at the top of the component allows users to switch between different deployment plans, which updates every other panel on the app according to the plan they've selected. The static data displayed includes total cost of the plan, total environmental equity, the number of buses to be converted, the daily miles electrified, and the number of charging stations to be built according to the selected plan.

Future Improvements

- Show a toggleable overlay of each of the TAZ codes where upon hovering over one of the TAZ regions on the map, a popup would appear in a corner of the map displaying economic and environmental information for that zone. The overlay would be semi transparent so you could still see the buses underneath.
- Smooth out the bus movement with time. Currently due to limitations of the data we are using the coordinates of the routes to determine the location of a bus at a given time. Because the route coordinates are a series of line segments of varying length we only draw buses on either end of these line segments. This results in somewhat stuttered movement of the buses as you change the time. With more time, we should be able to develop a better algorithm for interpolating location on the line segments, or we found some external data on the UTA website though that would allow us to plot the buses at stop coordinates. Since there are many stops that are all relatively close together, using stop coordinates would significantly improve the movement of the buses on the map.
- We would like to color different routes and highlight selected buses and charging stations.
- Filter which buses are shown. We would like to incorporate a mechanism that would allow a user to filter out which buses are shown on the map. We could filter to only show converted buses, only show buses on a selected route, or even just show the buses that a user manually selects.
- We would like to add more time varying data in the panels such as the last stop a bus visited, the bus's current charge, and the miles they have driven so far that day.
- Make this mobile-friendly

Instructions to Install/Run:
To view the deployed version of our app visit
https://617771f63dbcaff80c7cab97--gracious-heisenberg-a8a687.netlify.app/
In the chrome web browser.

To run our app locally
1. Before running our application you must have vue installed. To install run
   npm install vue

2. Clone our repository onto your machine by running the following command in the directory:
   git clone https://github.com/gabekudirka/Bus-Vis.git

3. Navigate into our app by running the following command
   cd Bus-Vis/bus-vis-app/

4. Run the following command to run the application
   npm run serve

5. To view the project open your browser to http://localhost:8080/