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Group 18 Design Document

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Project: FuelFool - An interactive gas price map

Statement of Goals:

The Fuel Fool design team intends to provide the framework for a web/mobile map application that will provide real-time geographical gas price information to consumers. The target audience is the wide range of consumers of fuel products that are likely to want up-to-date local gas price information, who regularly use maps, and are familiar with simple web/mobile Geographic Information Systems such as Google Maps/ Google Earth. With a choropleth map coloring system, standard map pan and zoom functions, the user will be able to easily identify and differentiate the regions where gas price averages are comparatively higher and lower than their surrounding areas in a given price range. This geo-fuel pricing application will be accessible across every major web browser, zoomable down to the zip code, selectable by the four standard fuel grades: premium, mid-grade, regular, and diesel, derived from the most accurate data available, and updated at least daily. The design of this application incorporates Mapbox for use as the basemap with features and functionality added using the Leaflet.js API as a visualization toolkit. Fuel data is pulled from a reliable source; that data is then used to augment topoJSON files that are added as a layer onto the map as choropleth fuel-price data.

Functional Description:

User Story 1: A family is planning a trip across the country and has the decision of whether to take I-70 or I-80. All other things being relatively equal, gas price becomes a big factor on which route they might take. They go to FuelFool.com on their desktop computer and see a choropleth map of the United States indicating regional gas price information. They use the familiar zoom scale bar and mouse panning technique to pan and zoom to the regions that I-70 passes through and can clearly see that I-70 passes through regions of lower average gas price.

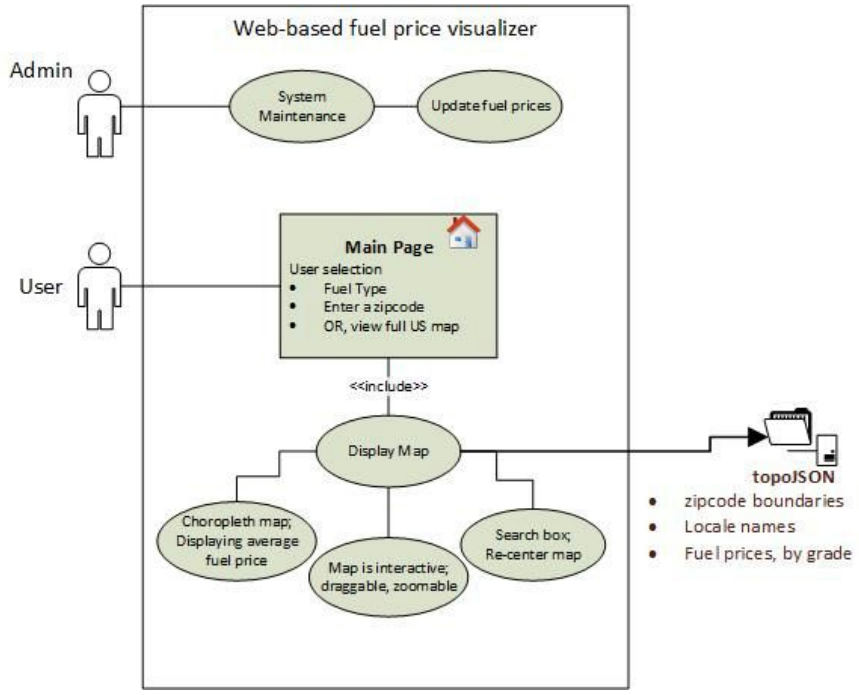
User Story 2: While on the road trip, the same family has a decision between several side trips, gas price again playing a factor. This time they use their mobile device to pan/zoom in and quickly see what kind of gas prices to expect on their new routes. The choropleth maps makes it simple to visualize and compare what prices they will encounter along the way.

User Story 3: A cross-country delivery company wants to vary the location and timing of its delivery routes according to cost. FuelFool is incorporated into their route selection process. Using the FuelFool website over an extended period of time; observing changes in gas prices from day to day enables them to either select alternative routes or time their routes accordingly.

How it works: The application will provide the user with a choropleth map of the United States, where each zip code region is shaded/colored according to the average price per gallon of a user-selected fuel type. The application will create the map with Mapbox and Leaflet.js; Mapbox will be used to create the basemap of the United States. This basemap can be selected to display things such as: place names, roads, geographic features, etc. Once the basemap is retrieved

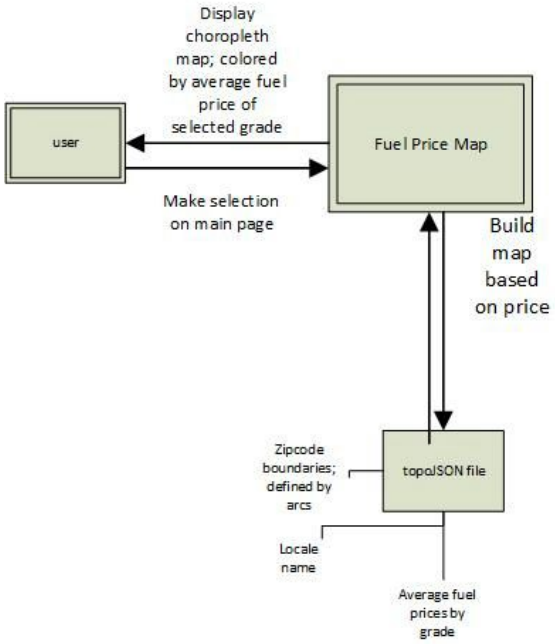
(via API call to Mapbox), it will be added as a tile layer with Leaflet.js. Again using Leaflet.js, the zip code boundaries and fuel prices will be parsed from a topoJSON file. This JSON file will be modified (by adding fuel price information) from a zip code file, readily available online (http://bl.ocks.org/jefffriesen/6892860). The selected fuel price (regular, mid, premium, or diesel) will then be parsed and used to color each zip code boundary. Each color will be based on a $0.10 price range. For example, one color may be used for any zip code where regular is between $1.50 - $1.60. When the user hovers or clicks on a zip code, the zip code and average fuel price for that zip code will be displayed.

Use case diagram

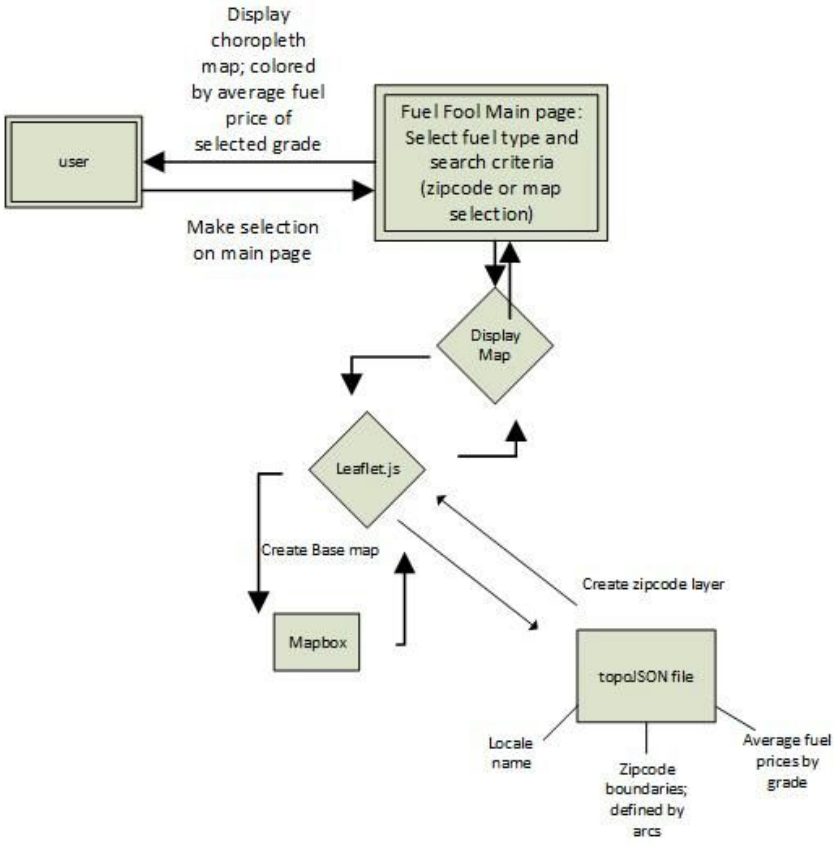


High Level Architecture

High Level Architecture



Design Diagram

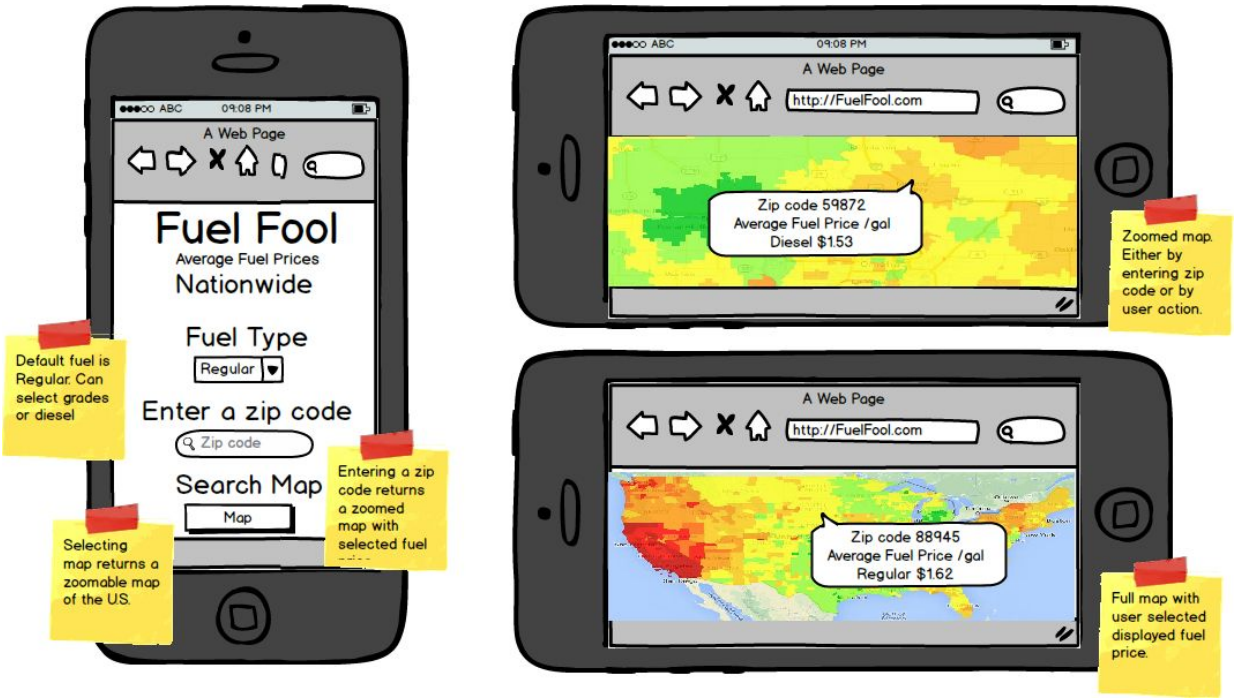


User Interface:

The user will be presented with a main page with three options in a web browser page. The first option will be to select preferred fuel type. The choices are regular, midgrade, premium gasoline and diesel. The default is regular gasoline. The next option is to enter a zip code or use the map button. Both of these actions will send the user to the next page. This next page will be a map of the United States. If the user choose to enter a zip code the map will be zoomed to the region of the zip code and the price of the preferred fuel type will be displayed. Alternatively, the user chose the map option, then the user will be presented with a full choropleth map of the U.S. The user can touch on the choropleth map to display a price for the preferred fuel type of a zip code. Or the user can zoom into a region and then select the an area for the fuel price of a zip code.

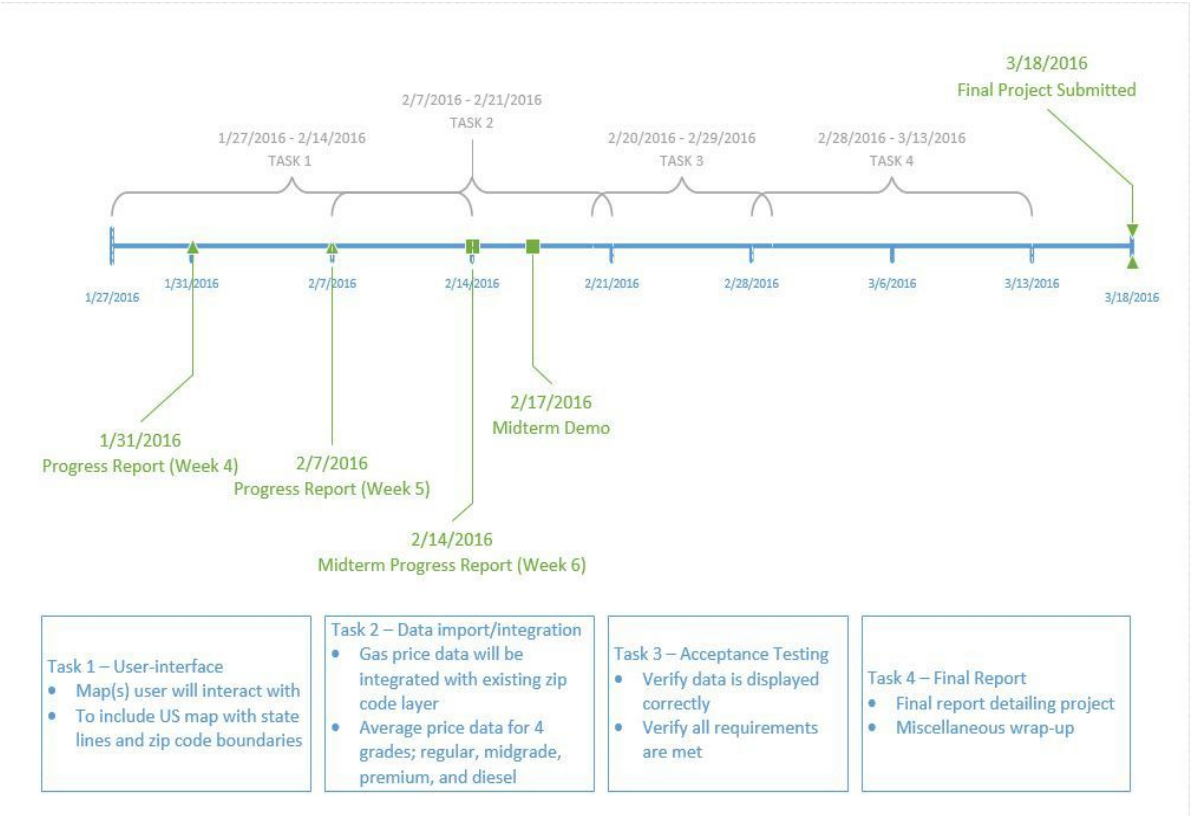
The user interface is optimized for mobile use. As it is anticipated being used by both non-mobile and mobile, the browser displays are similar. Note the sample displays of the web browser on a mobile device will work in either horizontal or vertical orientations.

FuelFool user interface prototype (as viewed from a mobile device)



Milestones/Timeline:

1. **1/31/16** - Progress report 1 issued
2. **2/7/16** - Progress report 2 issued
3. **2/14/16** - Completion of US basemap with all necessary map functionality; Progress report 3 issued
4. **2/17/16** - Midterm demo
5. **2/21/16** - Full integration of gas price data layer onto basemap; Progress report 4 issued
6. **2/28/16** - Testing completed; Progress report 5 issued
7. **3/6/16** - Progress report 6 issued
8. **3/13/16** - Final Report issued; project wrap-up
9. **3/18/16** - Project release date



Conclusion:

The design team is satisfied that this design plan addresses all requirements set forth in the previous Requirements Document. The non-functional requirements set forth in the usability and availability attributes will be satisfied by the familiar, simple web map functionality as well as the around-the-clock continuous operation of the site. Satisfaction of priority 1 functional requirements such as displaying the United States map with state boundaries, shading each zip code with the appropriate color to indicate fuel price, and the ability to display different fuel types have all been outlined in this document. In addition, some priority 2 functional requirements that have not been explicitly addressed in this documents such as: clickable zip codes, the ability to type a search by city/ state/ zip code, and the local storage of fuel price data, will also be incorporated into the design. Any and all changes to either the requirements document or the design document will be noted in the weekly progress reports as mentioned in the Milestones/Timeline section of this document.