

# Developing an Application for Web Map Generation

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## Introduction

Web maps have become a standard in communicating spatial data on the internet. To create your own custom web map, programming knowledge is required unless you use some form of web map generating application. With these applications, users can design a map and export them out to their source code for sharing through user's own means or to further customize them. In this project I created an open source desktop application which can be used to design and generate web maps.

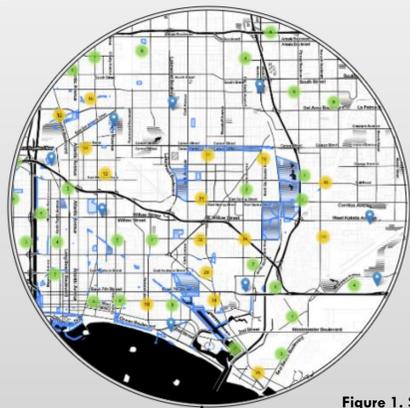
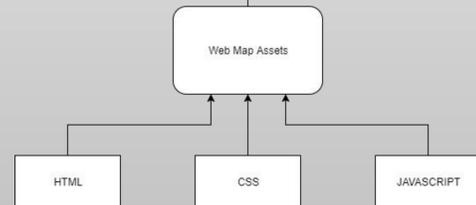


Figure 1. Static Web Maps are dependent on static code assets



## Data and Data Sources

To test the different data types and geometries I limited my sources to Long Beach and San Francisco data portals. Additionally, in table 2, I have listed the main libraries my application incorporates.

Table 1. List of data sources used to test the application

Datasets	Source
Long Beach Datasets	<a href="http://data.lb.longbeach.gov/">http://data.lb.longbeach.gov/</a>
San Francisco Datasets	<a href="https://datasf.org/">https://datasf.org/</a>

Table 2. List of main libraries used for this project

Name	Purpose	Source
Electron	Application Framework	<a href="https://electron.atom.io/">https://electron.atom.io/</a>
Node	File I/O	<a href="https://nodejs.org/en/">https://nodejs.org/en/</a>
Leaflet	Mapping	<a href="http://leafletjs.com/">http://leafletjs.com/</a>
pug	Templating engine	<a href="https://pugjs.org">https://pugjs.org</a>

## Methodology

The main purpose of the project was to create an application for web map generating while using open-source technologies. The application was planned to provide an interactive design experience for the user. To develop the application I had to research the libraries I was using, design the user interface, and finally develop the scripts for the functions of the application. The application uses *Electron* as the main framework and *Leaflet* as the mapping library. The user interface was based around the application function which resulted in dividing the interface for a menu, list of data, and a map. As for the functions of the application they can be split into two main categories: those which modify the map and those which assist in the exporting function as seen in figure 2. Furthermore, the export function instead of modifying the map uses the current modifications to the map to generate the map source code and assets in the user designated directory. All of this was developed within the Atom Integrated Development Environment.

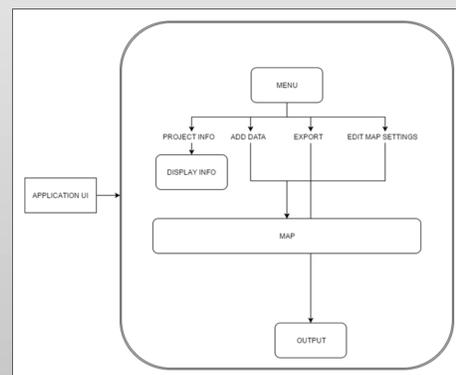


Figure 2. Application Diagram



Figure 3. Source code of application in Atom

## Timeline

Objective	Date
Template research	5/7
Template generating and exporting testing	5/14
Finish template generation	5/21
Compile a rough draft of final core application	5/28
Testing and revision of core application	6/4
Finalize development	6/28

## Results

The application made was named *Leaflet - Map Assist* (figure 4). Currently the application provides the functions to allow for users to design and generate web map assets. This is done through an intuitive user interface which uses multiple windows to provide configurations for different aspects of the map. Some of the things you can configure are basemap providers, zoom and view extents, tooltip and popup configuration, and using marker clustering. Additionally, the application is compatible with KML, GeoJSON, and CSV(point only) data formats. Once the web map is exported to source code and assets within a user designated directory they can view the assets as shown in figure 5 which renders the web map designed within the application.

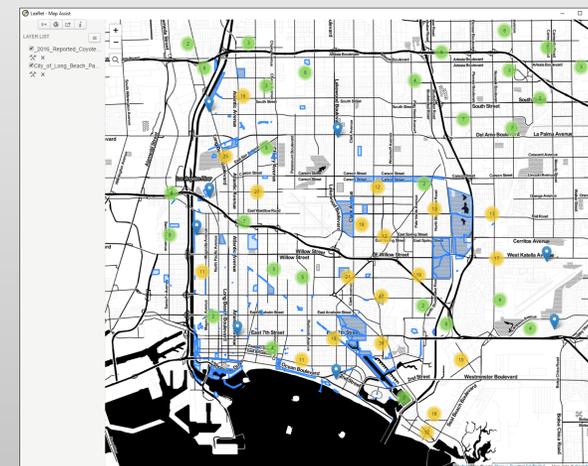


Figure 4. A map being designed inside the application

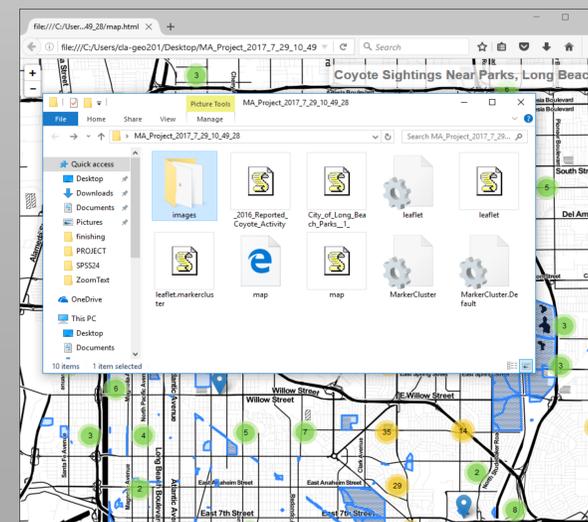


Figure 5. The map in figure 5 exported into assets and being rendered in web browser

## Discussion

*Leaflet - Map Assist* is a viable application for designing and generating static web maps in its current state. Compared to ArcGIS Online, my application still has a long way to go to provide such a wide array of functionality that is provided by Esri's online platform. Compared to open source QGIS plugin *qgis2web*, my application provides similar functionality in a more interactive approach with multiple windows and a more responsive map. Regardless, there is a lot which can still be done to improve the current functions and add new features for more usability. A good example for improving current functions would be sourcing the data parsing, writing, and reading into web workers to improve the performance of the application. Furthermore, additional features such as being able to modify symbology within the data layer options window can provide more options in the process of designing the map. Other features like expanding data format compatibility and including other useful visualization configurations would also increase the application's usability. Finally, the addition of originally planned functions for basic processing tools can be included with the *Turf* geospatial analysis library. This would provide the users access spatial analytical tools within the application like those that were originally planned for the application. The application is published on GitHub and will be supported by me as a personal project. In addition to its public access, download links to the latest build versions will be available through the GitHub link.

## Conclusion

The application provided me with a difficult task which I completed to the best of my skills within the given time frame. Fortunately, the project still has much work to be done to potentially be a more useful tool in the creation of static web maps so I will be pivoting this project as a hobby project. As explained in the discussion there are features to be added and others which need to be modified to work differently for optimal performance and improved usability. Through this project I found that open-source alternatives could be used to provide similar results as proprietary software when it comes to smaller spatial datasets. Additionally, I think further development of the application and other applications which look to provide alternatives or additional tools for web maps can use open-source libraries to provide more functionality.

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<https://github.com/ignnacho/leaflet-mapassistonline>