Team Big Data

U-tification

DAR Report
Maps API

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Git Repository: https://github.com/JosephArmas/cecs-491A-Team-Big-Data

Version	Date	Author	Changes
2	12/10/2022	Frank Curry	Added versions numbers for all technologies. Added new metrics. Updated Discussion. Updated References.
1	11/28/2022	Frank Curry	Initial Draft

Technologies:
1. Google Maps Platform | Version 3.50.12a
2. Amazon Web Services, Location Services Maplibre | Version 2.4.0
3. Mapbox | Version 2.11.0
4. Esri Arcgis | Version 4.25

Metrics:
1. Total amount of markers
2. Map load time
3. Pricing
4. Data Rate Limit
5. Custom markers
6. Pop Ups
7. Street names and parks
8. Panning
9. Bound limit
10. Marker interactivity
11. Zoom limit

Introduction

The problem is that we need a map to display one of our key features. The litter map needs a map in order to function. The time required to design a map API will take too long to complete within our project plan. The technologies chosen were selected because of their reputation and wide spread use.

Technologies/ metrics	Google Maps API	Amazon Web Services (Maplibre)	Mapbox	Esri ArcGIS
Total amount of markers	Unlimited[4]	Unlimited[4]	Unlimited[4]	30000[1]
Map load time	300 - 500 ms[4]	1 second[3]	1 second[3]	3 Seconds[1]
Pricing (USD)	0.007[4]	0.04[3]	2.50[2]	500 per year[1]
Data Rate Limit	30000[2]	100000[4]	100000[4]	?[1]

Custom Markers	True[1]	True[1]	True[1]	True[1]
Pop Ups	True[1]	True[1]	True[1]	True[1]
Street names and parks	True[1]	True[1]	True[1]	True[1]
Panning	True[1]	True[1]	True[1]	True[1]
Bound limit	Implementation Defined[1]	Implementation Defined[1]	Implementation Defined[1]	Implementation Defined[1]
Marker Interactivity	Text, button, image[4]	Text, button[2]	Text, button[2]	Text, button, image[4]
Zoom Limit	0 - 22+[2] (591657550.500 000) - (1128.497220)	0 - 22[1] (?) - (?)	0 - 24[4] (73551.136 meters/pixel) - (0.018 meters/pixel)	0 - 23[3] (591657527) - (35.2655368)
Total	24	21	23	15

Each of the pricing is per 1000 users that have loaded a map and is for the first 100000 users in a month.

Discussion
Google's pricing, although labeled as 0.007 is actually free for the first 28,000 users using the map. This is due to Google having the first 200 dollars of credits be free for each month.
For Mapbox there is noticeable lag at 500 markers without a map. There is subtle lag between 300 - 450 markers. Load time for the markers was low but that may be because I was not loading a map.
AWS' maps from appearances look to provide similar experiences to the others. However, AWS allows for multiple ways to render the map. The service itself does not necessarily render them, it rather, outsources them to different libraries. This has benefits however it uses react. Amazon web services allows the use of the mapbox coding for the interactive map.
Esri Arcgis has a sample of how the map would look. Using the map, which is likely in an ideal condition. While the map load time took 3 seconds to render the marker load time took 1 additional second after the map had loaded. Since the Esri Arcgis is not as flexible of an API as the others, and it is more limited in terms of providing memory it is likely less fit for our application. Arcgis also does not provide a data rate limit from their website or even secondary sources.

The Zoom Limit is a bit difficult to completely define. Each API has their own way of defining the zoom level. For all the metrics that are true, there was no easy way to differentiate each of the features. Some of them can't be adequately quantifiable, like popups, panning, or custom markers, they either have them or they do not. For the bounds they are similar, they either have them or not, but they can be defined by the developer to anywhere on the map.
The unlimited number of markers fits within what we are looking for in the number of pins. Although the lag was noticeable, none of the other features like planning and zoom were working fine.

Conclusion

While Amazon is a close competitor with google for the maps it does not beat it out as google provides their own maps and hosting the API at a lower cost. MapBox pricing is what brings down the effectiveness of the API as the cost is greater than any of the other APIs. Esri Arcgis does not match the same levels as other technologies and may not provide what we need in a publicly available interactive map. Google Maps API looks like the preferable choice to use in our application. While the data rate limit is lower than its contemporaries it still provides an adequate amount of data that can be used for our needs.

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