A Developer's Guide to Open Source Web Mapping Libraries

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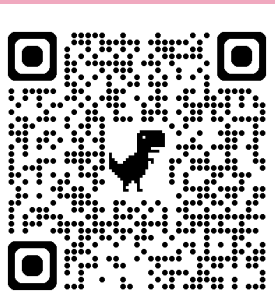
Agenda



01

Intro to Mapping

Vocab, concepts, etc.

02

Web Mapping Libraries

Two different open source options

03

Other Library Integrations

Using third-party plugins

04

Conclusions

Real-world examples and summaries

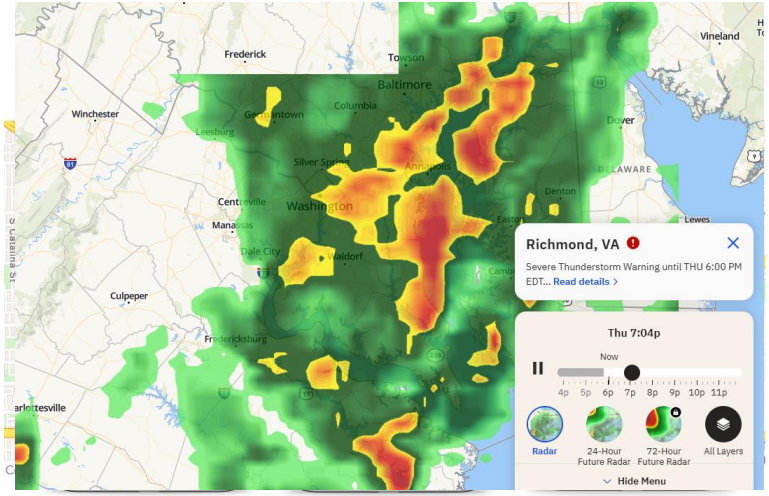
Role of Mapping

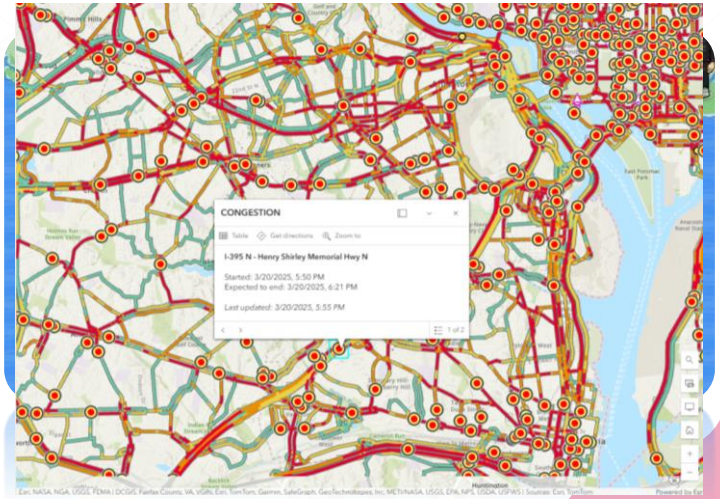
01 Visualization 🎨

02 Navigation 🚗

03 Communication 🗣️

04 Predication 🔮



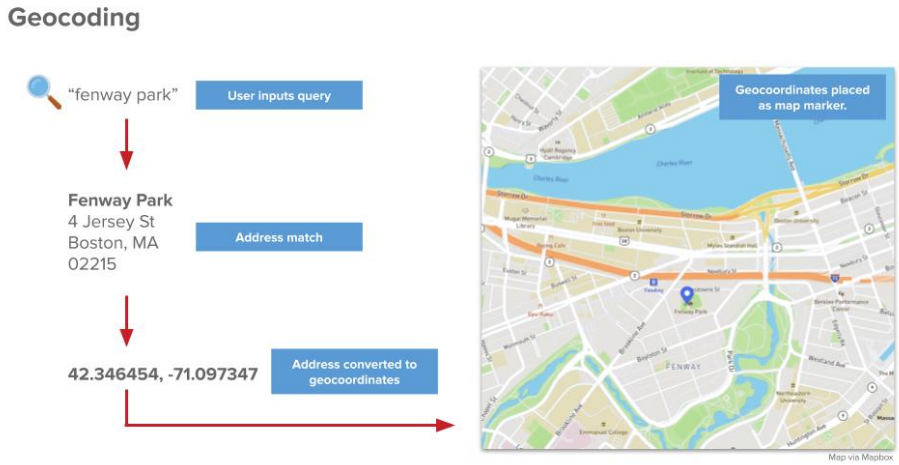


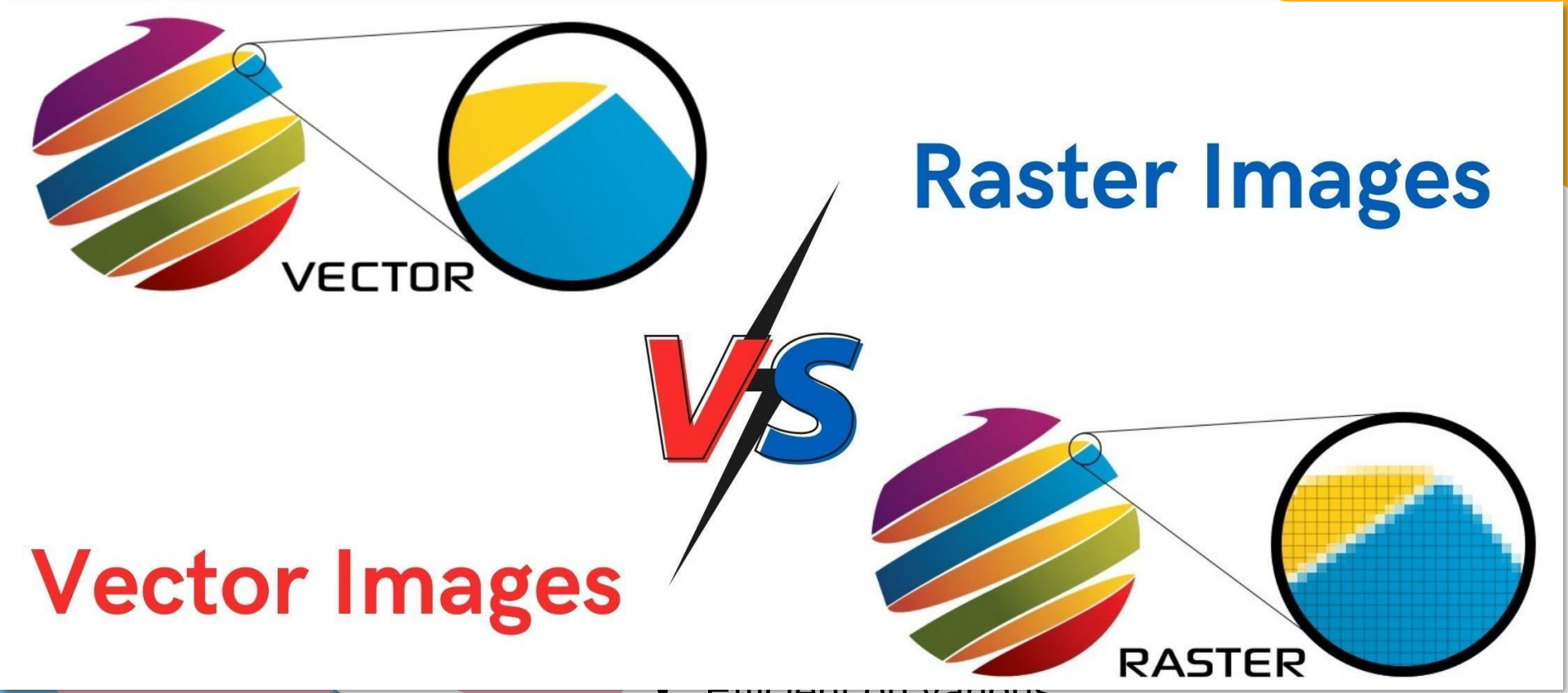
Key Web Mapping Concepts

Basemaps

Data Layers

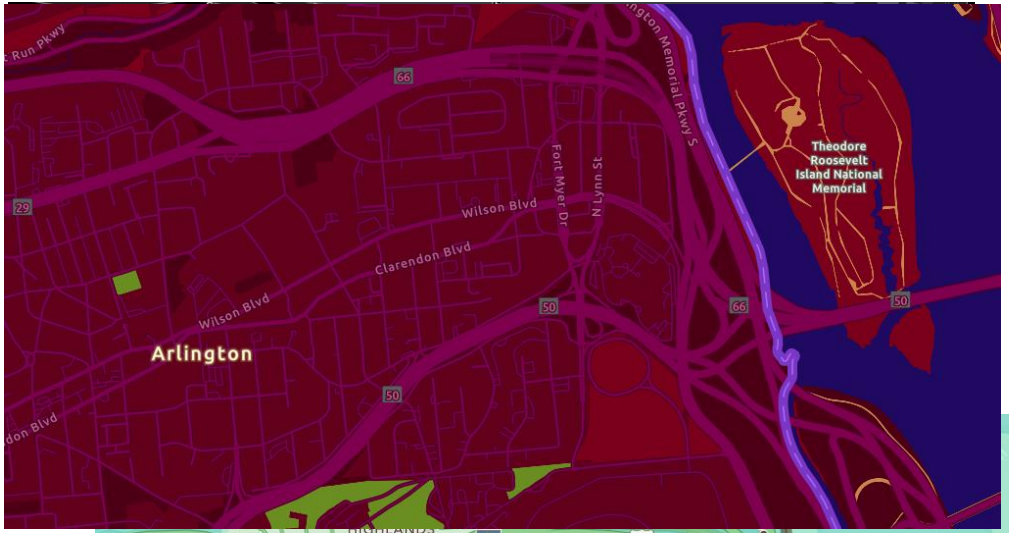
Geocoding

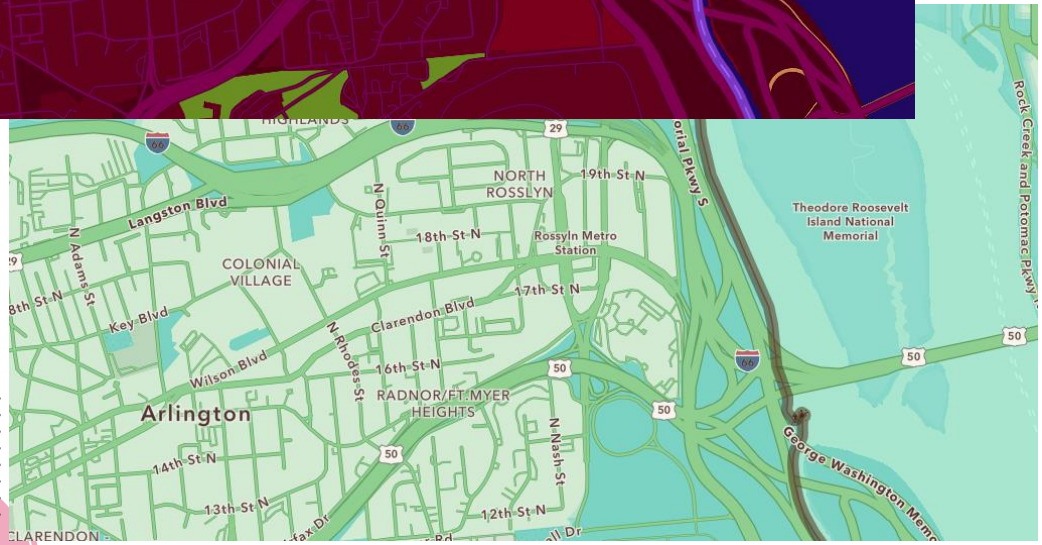




- Efficient on various devices

Basemap Styles





- **Streets**
- **Satellite Imagery**
- **Terrain/ Topographic**
- **Dark/Light Modes**
- **Custom Themes**

Data Layer Types

01 GeoJSON Layer

02 Esri Feature Layer

03 Vector Tile Layer


```
{
  "currentVersion": 11.2,
  "name": "Educational_Institutions_of_Colombia",
  "capabilities": "TilesOnly,Tilemap",
  "type": "indexedVector",
  "serviceItemId": "89a416863d324250b84e4bf95a4a76fe",
  "publishJobId": "90bc7681-d478-49a9-93db-5012ea095490",
  "jobServiceId": "453a16cb-0963-40e4-b863-07d0c8745a0b",
  "ownerUserName": "",
  "serviceDescription": "",
  "description": "",
  "isEnabled": true,
  "id": 3219,
  "sourceServiceName": "Educational_Institutions_of_Colombia",
  "sourceServiceType": "FeatureServer",
  "tileContainerName": "fabd007f6da142d99b9a8bed9a0272f9",
  "creationDate": 1731431561310,
  "datasource": "db",
  "exportTilesAllowed": false,
  "maxExportTilesCount": 100000,
  "tileMap": "tilemap",
  "defaultStyles": "resources/styles",
  "tiles": [ … ], // 1 item
  "initialExtent": { … }, // 5 items
  "fullExtent": { … }, // 5 items
  "minScale": 295828763.795777,
  "maxScale": 35.265536760789715,
  "maxZoom": 23,
  "tileInfo": { … }, // 8 items
  "resourceInfo": {
    "styleVersion": 8,
    "tileCompression": "gzip",
    "cacheInfo": { … } // 1 item
  }
}
```

Library Commonalities

Core Tech

- Built on JavaScript
- Compatible with HTML & CSS
- Works across modern browsers

Open Source

- Cost-Effectiveness
- Community-driven
- Modifiable
- Interoperable

Easy to Learn

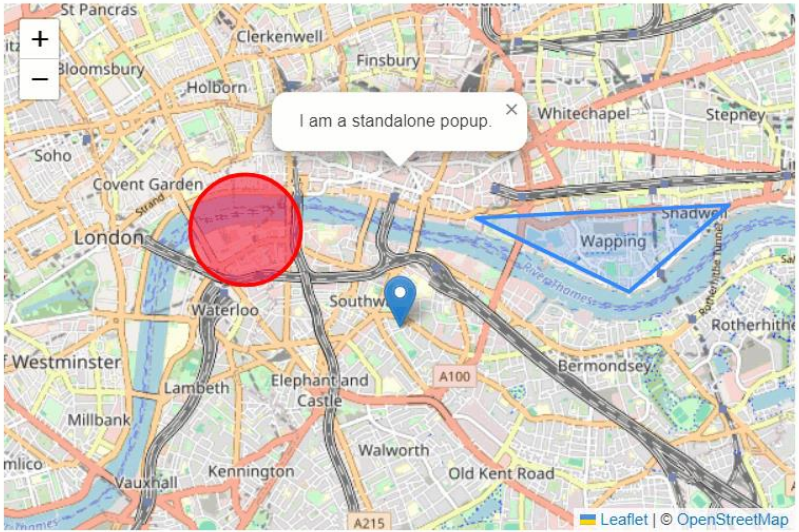
- Simple APIs
- Extensive documentation
- Abundance of Resources

Key Features

- Interactive & mobile friendly
- Customizable
- Web Mercator projection

Leaflet

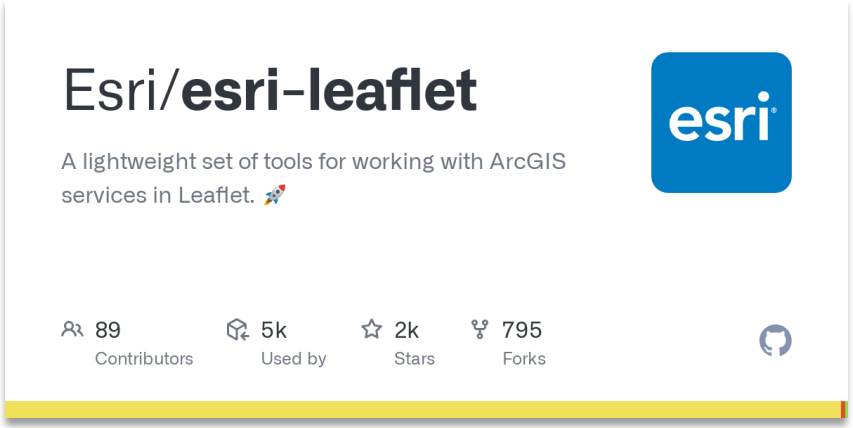
💻 leafletjs.com 👩‍💻 github.com/Leaflet



- Lightweight (~42 KB JS)
- Tons of plugins
- Focuses on simplicity and performance

Esri Leaflet

💻 developers.arcgis.com/esri-leaflet github.com/Esri/esri-leaflet



- Seamless ArcGIS integration
- Developer-friendly
- Extensive Documentation

Leaflet Demos

1) Simple map
2) GeoJSON layer
3) Feature layer
4) Feature layer Geosearch
5) Places Service

Leaflet Demos Takeaways

Demo 1: Simple Map

- Basemap - image tiles
- Small geoJSON layer

Demo 2: Large Data Sets

- Feature Layers – load to extent
- Clustering features

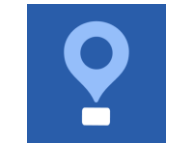
Demo 3: Geosearch

- Search with providers and set parameters

Demo 4: Places Service

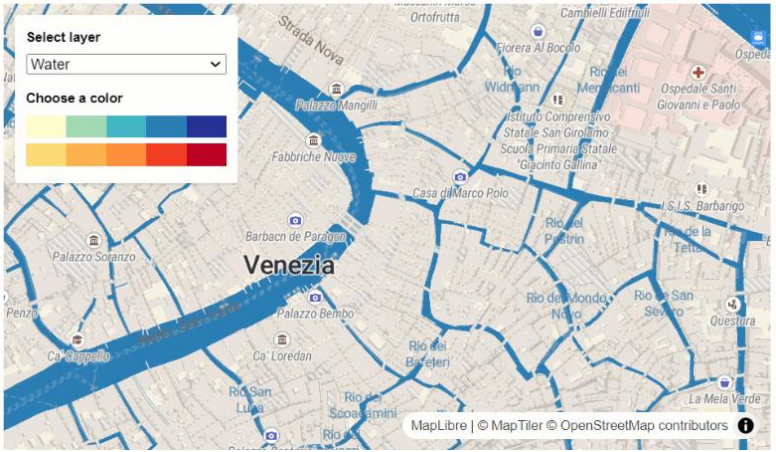
- On-demand place search
- Near-point or extent

MapLibre GL JS



maplibre.org

github.com/maplibre/maplibre-gl-js



- Fork of Mapbox GL JS 1.x
- WebGL rendering
- Dynamic data integration
- Customizable styling options

ArcGIS REST JS

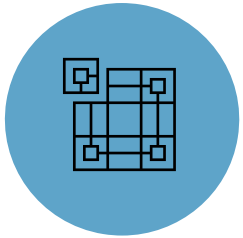
💻 developers.arcgis.com/arcgis-rest-js 👨‍💻 github.com/Esri/arcgis-rest-js

- Wrapper for ArcGIS REST APIs
- Module & promise-based
- No map component

MapLibre GL JS Demos

1) Simple map + styles
2) Feature layer
   - Pagination
   - Query feature layer
3) Vector tile layer
4) Basemap Places + Places Service

MapLibre GL JS Demos Takeaways



Demo 1: Simple Map + Styles

- Basemap - vector tiles
- Various styles

Demo 2: Feature Layer

- Pagination
- Querying

Demo 3: Vector Tile Layer

- Handle large datasets

Demo 4: Basemap Places + Places service

- Utilizes vector tiles embedded info

Real-World Examples

Conclusions

Leaflet

Pros
- Lightweight, easy
- Many plugins

Cons
- Limited for large datasets
- Simple visualizations

MapLibre GL JS

Pros
- Large dataset handling
- vector basemaps

Cons
- Resource-intensive

Thank you, Frontrunners!

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https://github.com/cyatteau/frontrunners25-open-source-mapping