A Developer's Guide to Open Source Web Mapping Libraries

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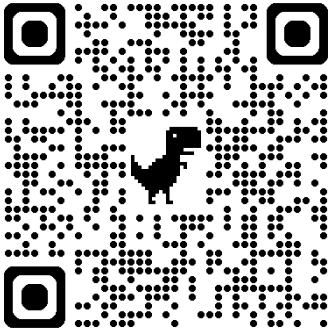
Agenda



github.com/cyatteau/oredev25-open-source-mapping

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

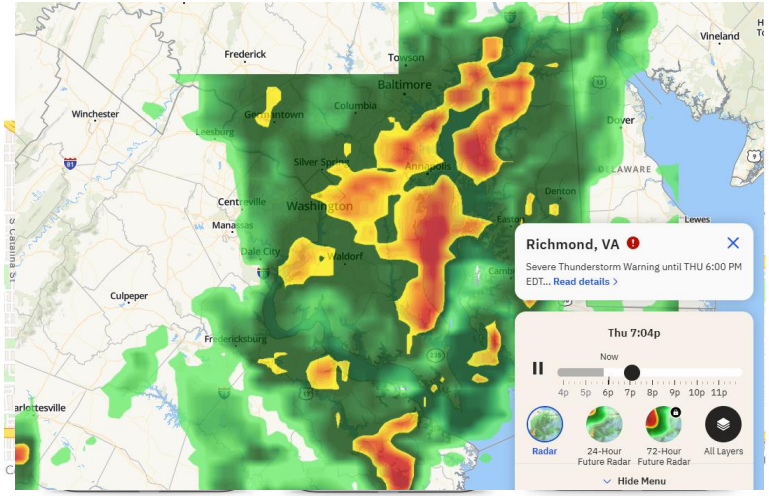
Role of Mapping

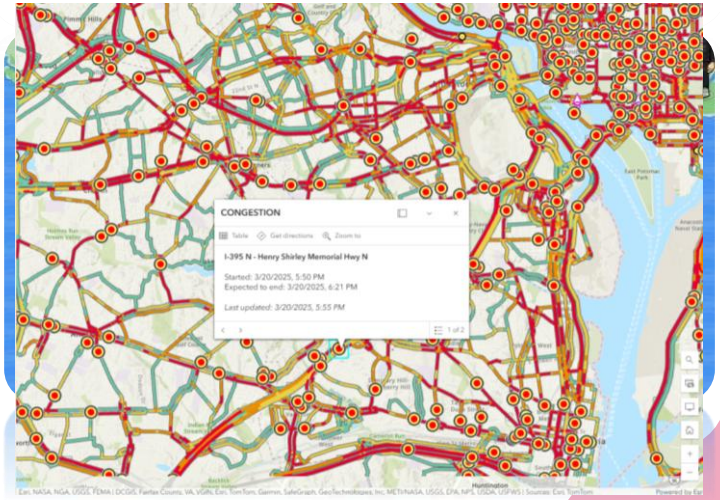
01 Visualization 🎨

02 Navigation 🚙

03 Communication 🗣️

04 Prediction 🔮



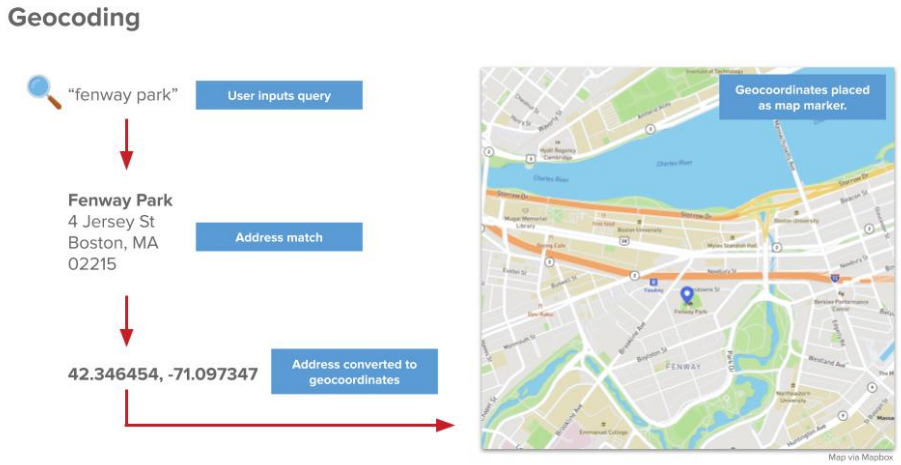


Key Web Mapping Concepts

Basemaps

Data Layers

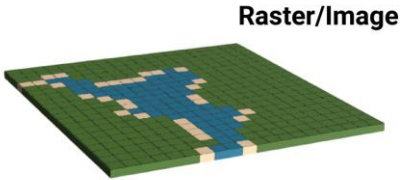
Geocoding



Basemap Formats

Raster Tiles

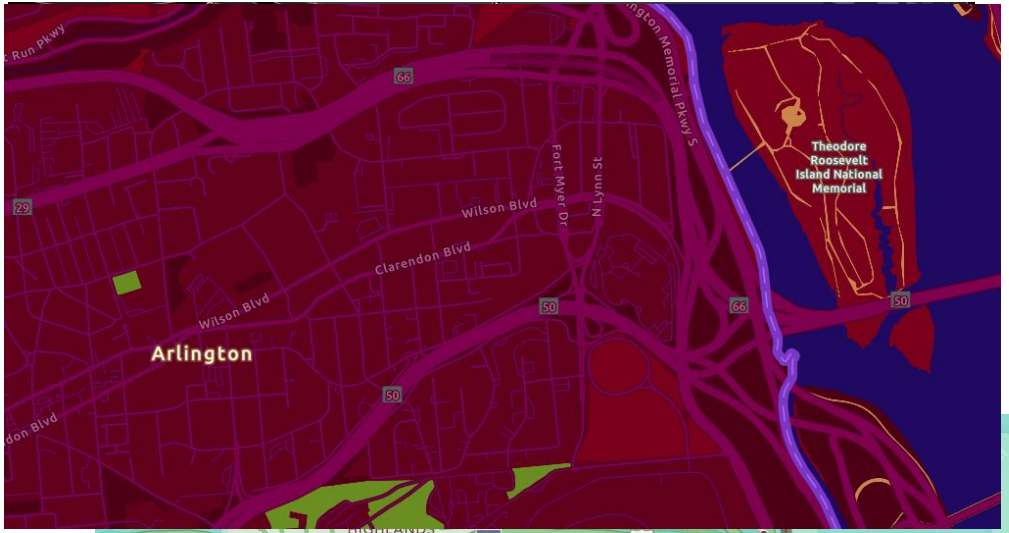
- Fixed look
- Quick and easy
- Reliable in low bandwidth

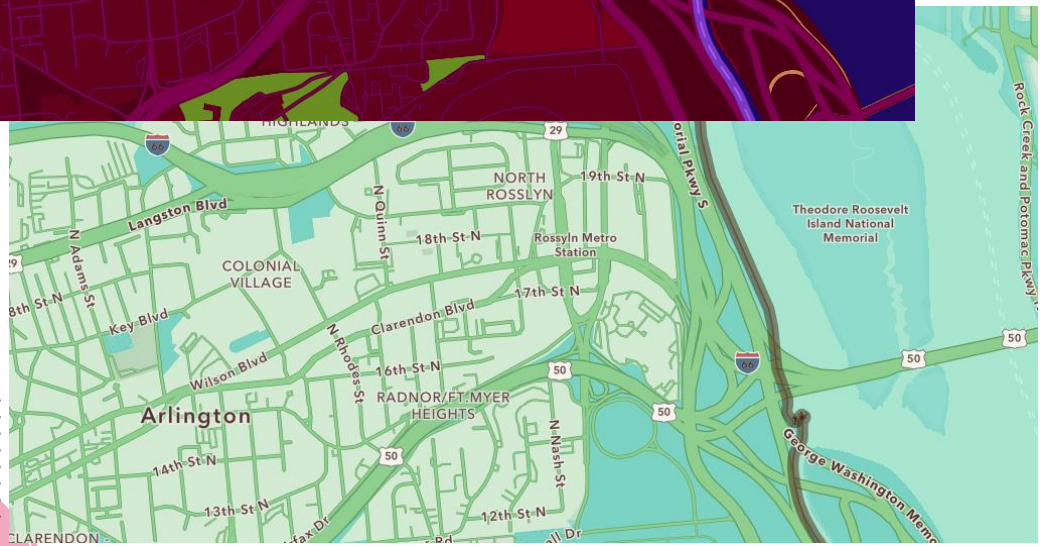


Vector Tiles

- Customizable
- Smooth and interactive
- 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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{
  "currentVersion": 11.2,
  "name": "Educational_Institutions_of_Colombia",
  "capabilities": "TilesOnly,Tilemap",
  "type": "indexedVector",
  "serviceItemId": "89a416863d324250b84e4bf95a4a76fe",
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  "sourceServiceType": "FeatureServer",
  "tileContainerName": "fabd007f6da142d99b9a8bed9a0272f9",
  "creationDate": 1731431561310,
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  "exportTilesAllowed": false,
  "maxExportTilesCount": 100000,
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  "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
  }
}
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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

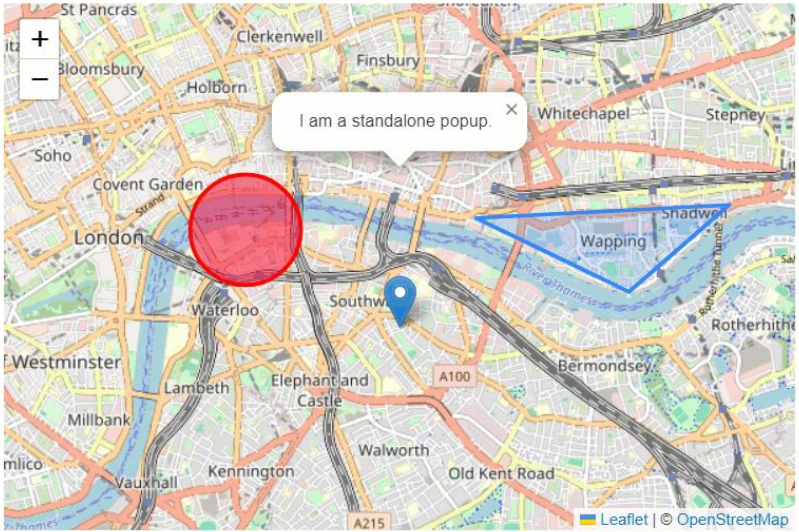
- Simple APIs
- Extensive documentation
- Abundance of Resources

Key Features

- Interactive & mobile friendly
- Customizable
- Web Mercator projection

Leaflet

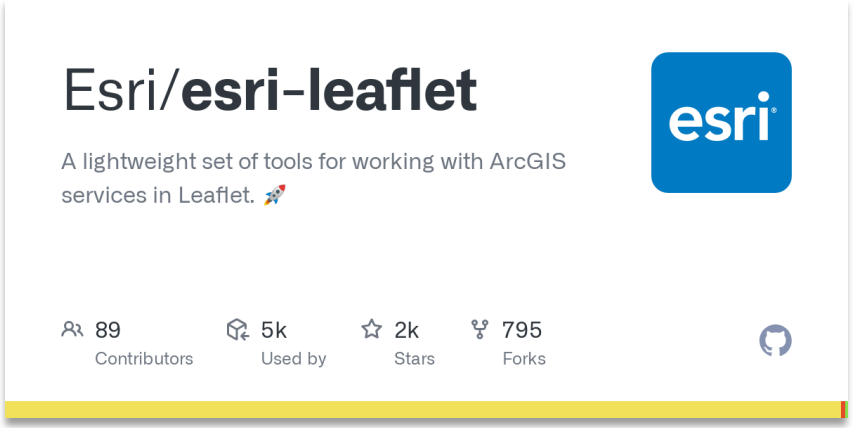
💻 leafletjs.com 👩‍💻 github.com/Leaflet



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

Esri Leaflet

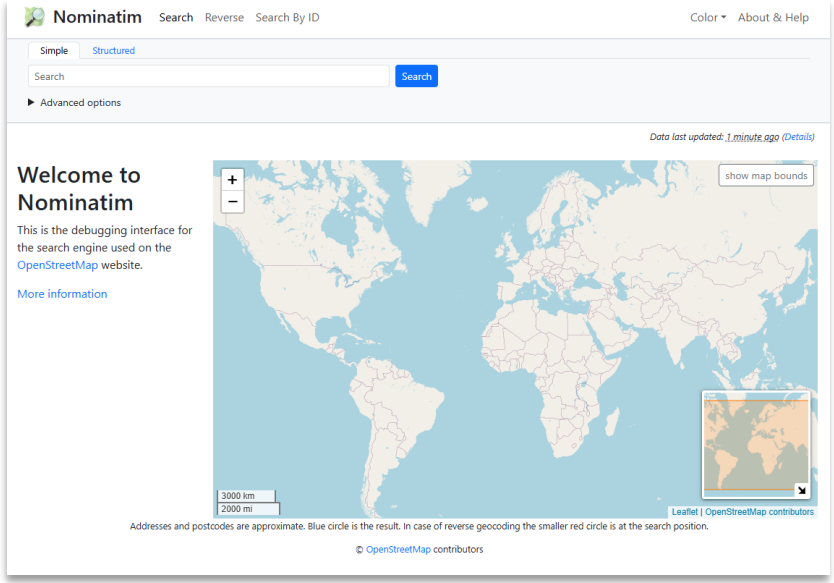
💻 developers.arcgis.com/esri-leaflet 👩‍💻 github.com/Esri/esri-leaflet



- Seamless ArcGIS integration
- Developer-friendly
- Extensive Documentation

Nominatim

💻 nominatim.openstreetmap.org
👩‍💻 nominatim.org/release-docs/latest/api/Search



- Converts place names to coordinates
- Returns GeoJSON and metadata
- Used by many Leaflet plugins
- Free to use

Leaflet Demos

1) Simple map
2) GeoJSON layer
3) Feature layer
4) Feature layer Geosearch
5) Nominatim highlighting

Leaflet Demos Takeaways

Demo 1: Simple Map

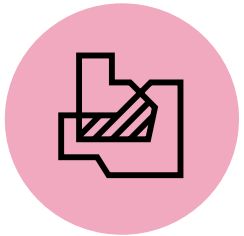
- Basemap - image tiles
- Small geoJSON layer

Demo 2: Large Data Sets

- Feature Layers – load to extent
- Clustering features

Demo 3: Geosearch

- Search with providers and set parameters

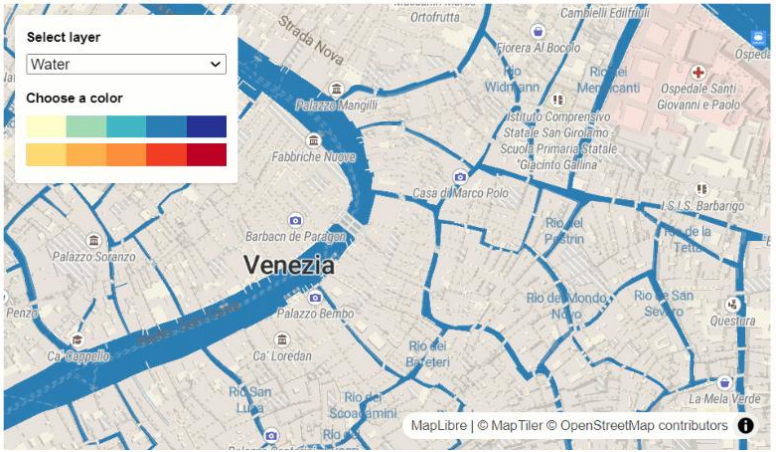


Demo 4: Nominatim highlighting

- Plugin that pairs with Nominatim

MapLibre GL JS

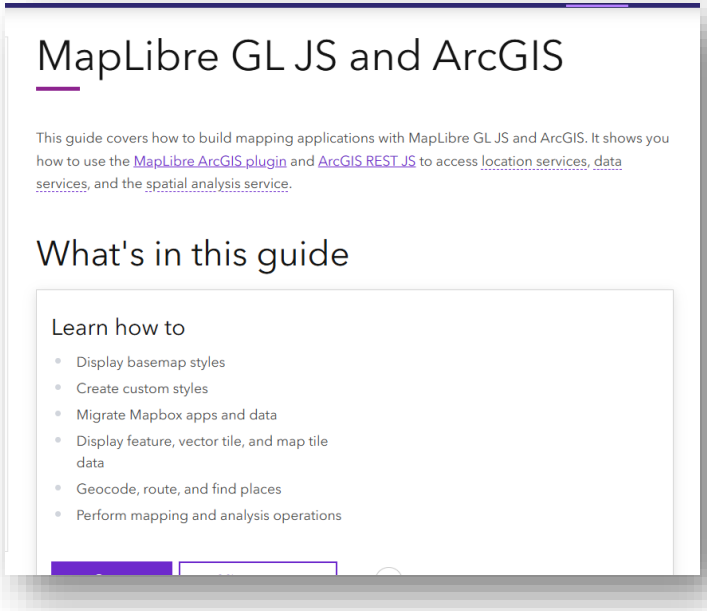
maplibre.org github.com/maplibre/maplibre-gl-js



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

MapLibre ArcGIS Plugin

💻 developers.arcgis.com/maplibre-gl-js 🤦 github.com/Esri/maplibre-arcgis



- Easy access to ArcGIS:
  - Basemap Styles service
  - feature services
  - vector tile services

ArcGIS REST JS

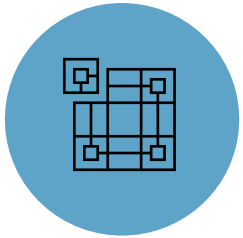
💻 developers.arcgis.com/arcgis-rest-js 👩‍💻 github.com/Esri/arcgis-rest-js

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

MapLibre GL JS Demos

1) Simple map + styles
2) Feature layer
   - Querying
3) Vector tile layer
4) Data Enrichment

MapLibre GL JS Demos Takeaways



Demo 1: Simple Map + Styles

- Basemap - vector tiles
- Various styles

Demo 2: Feature Layer

- Querying

Demo 3: Vector Tile Layer

- Handle large datasets

Demo 4: Data Enrichment

- Gain location-based insights

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

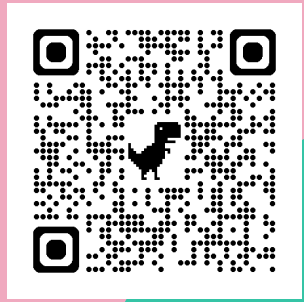
Cons
- Resource-intensive

Additional Resources

- Leaflet basemap styles providers
- Malmo's open data portal
- ArcGIS Hub (open data)
- Analysis Variable Finder
- Nominatim highlight plugin

Thank you, Øredev!

Please leave your feedback!



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