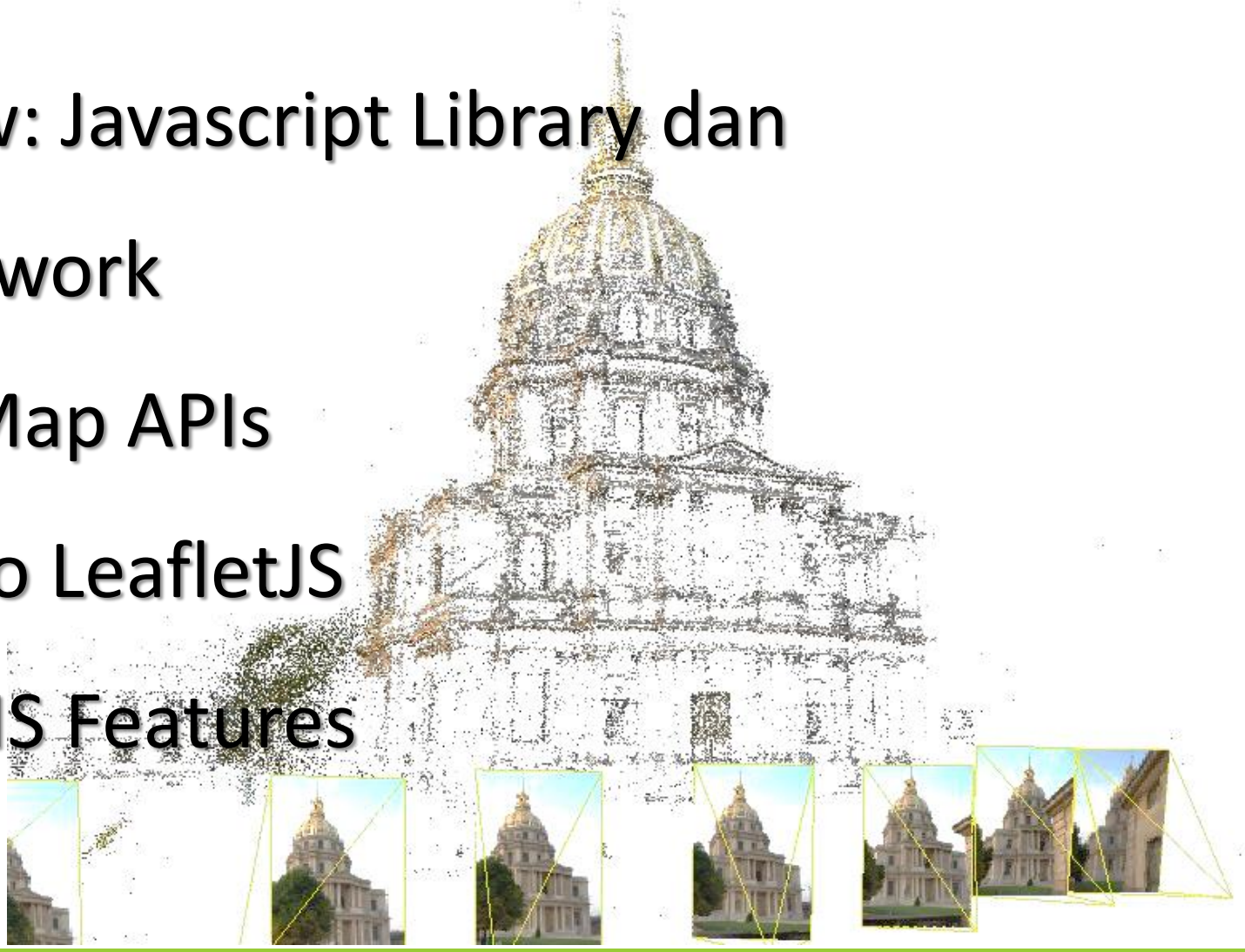
Jurusan Teknik Geodesi dan Geomatika
Universitas Gadjah Mada Yogyakarta

Javascript Map API: LeafletJS

Dany Laksono

Daftar isi

- Review: Javascript Library dan Framework
- Web Map APIs
- Intro to LeafletJS
- WebGIS Features



Review: JS Library & Framework

JAVASCRIPT LIBRARY DAN FRAMEWORK

Javascript Library

Advanced JavaScript programming (especially the complex handling of browser differences), can often be very difficult and time-consuming to work with.

To deal with these difficulties, a lot of **JavaScript (helper) libraries** have been developed.

These JavaScript libraries are often called **JavaScript frameworks**.

Javascript Library

Manajemen browser dan AJAX

- *JQuery*
  (http://www.w3schools.com/jquery)

Visualisasi dan widget

- *Bootstrap* (getbootstrap.com)
- *ExtJS*
- *AngularJS*

Pembuatan Game

- *Unity3D*
- *Crafty*

Pembuatan grafik

- *D3JS*
- *Raphael*

WebGL frameworks (3D)

- *ThreeJS (threejs.org)*
- *BabylonJS*

Animasi dan Simulasi Fisis

- *PhysicsJS*
- *ParallaxJS*
- *KineticJS*
- *ReflectionJS*

Matematika

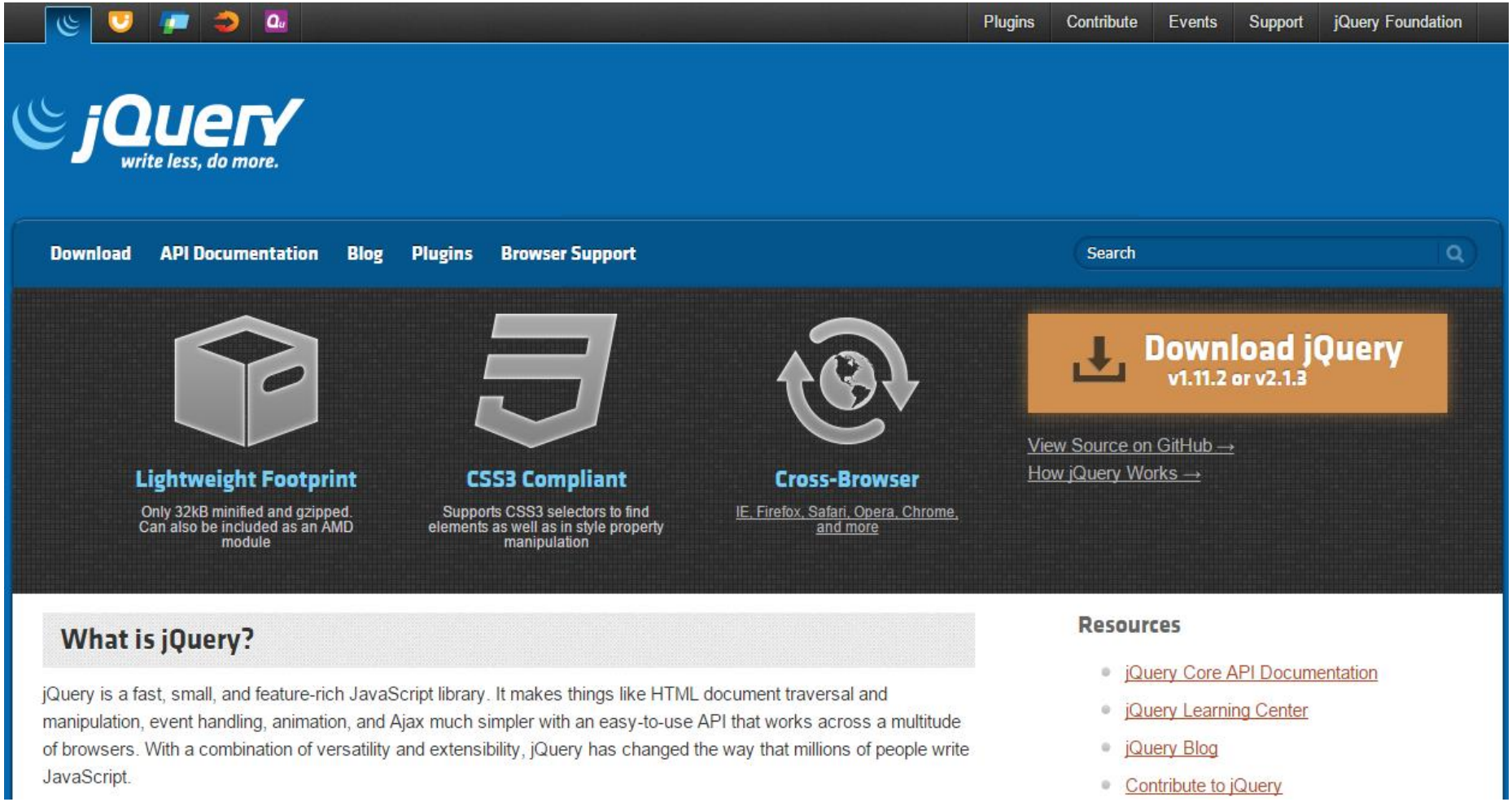
- *MathJS*

Server

- *NodeJS*

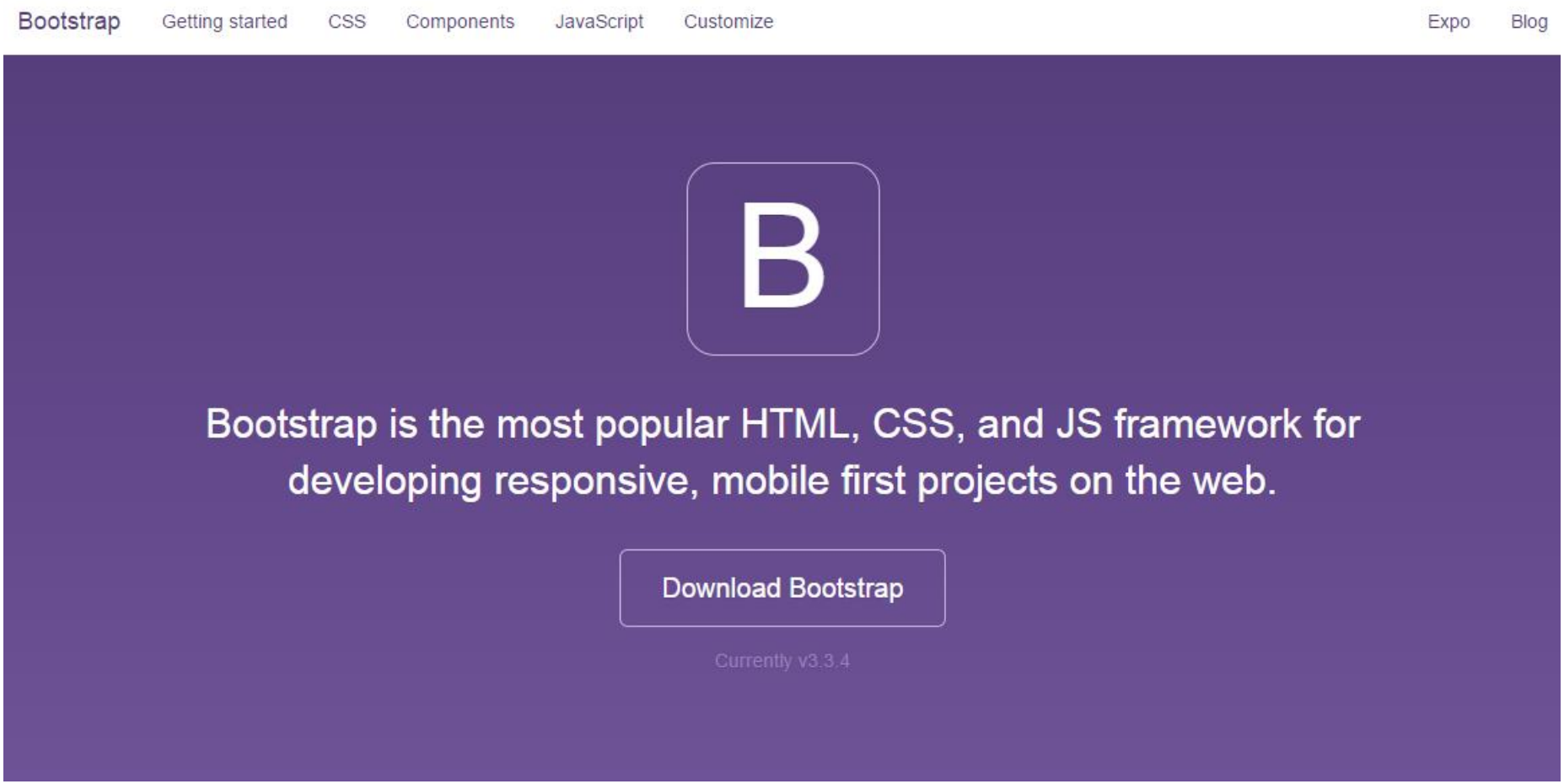
Dst..

Javascript Library - JQuery



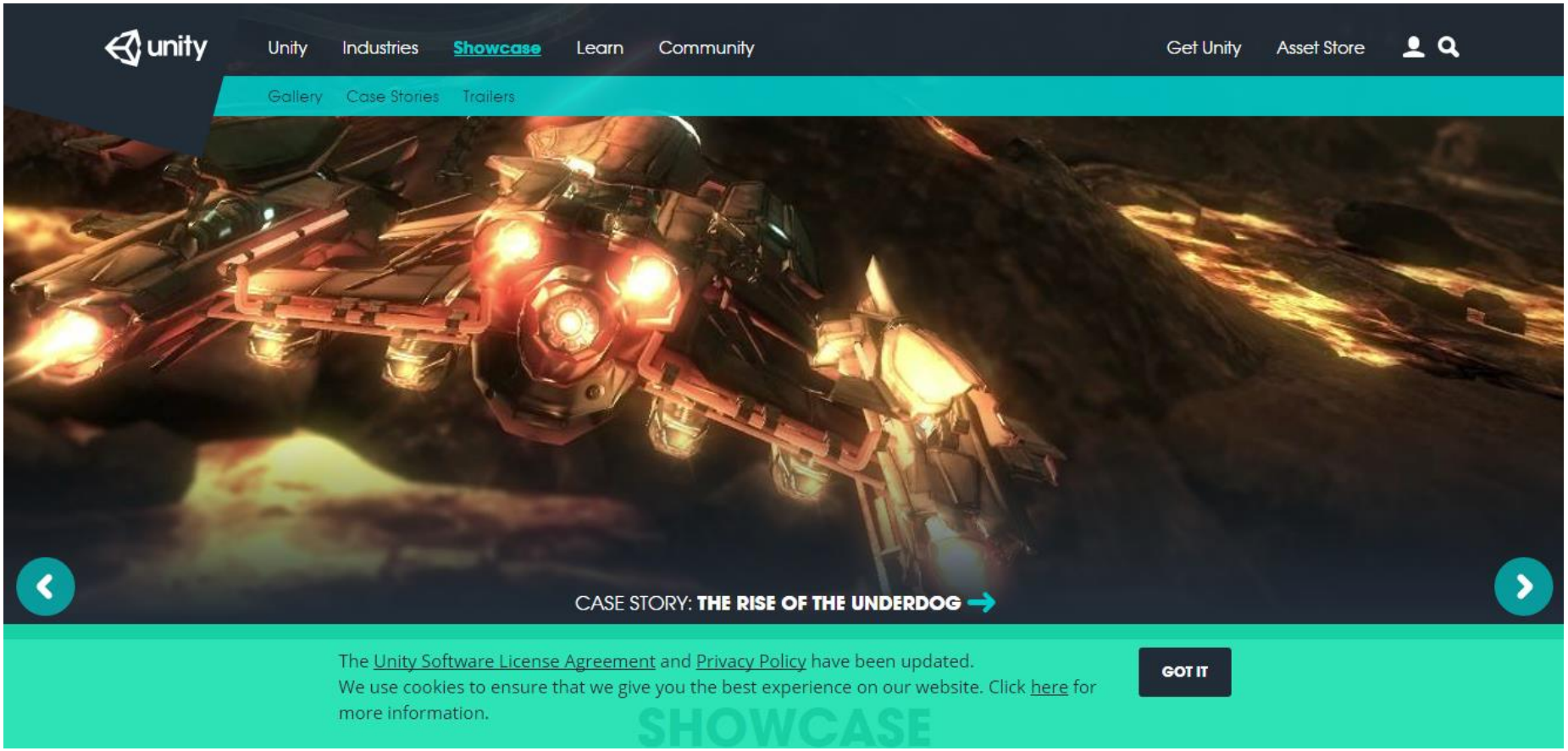
https://jquery.com/

Javascript Library - Bootstrap



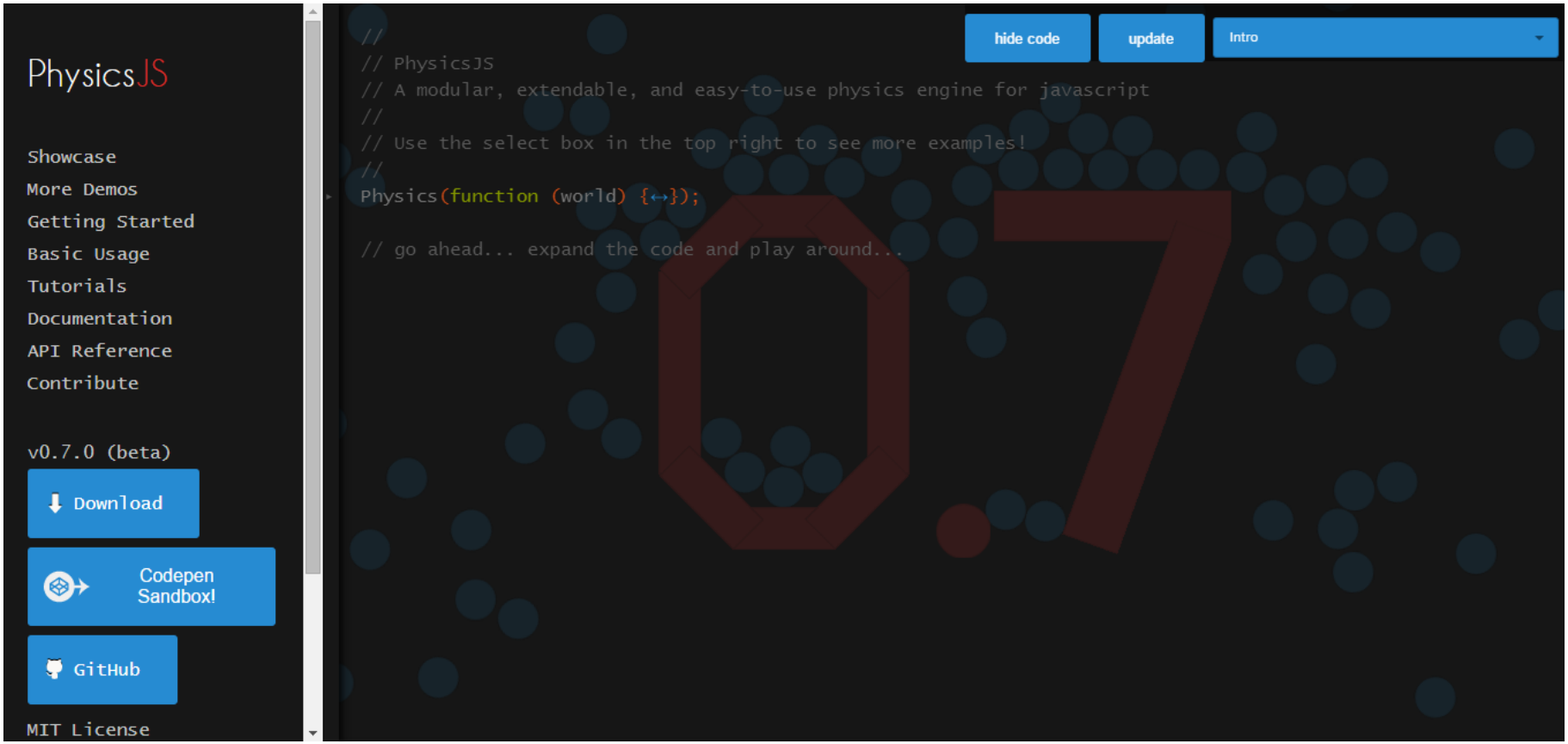
http://getbootstrap.com/

Javascript Library - Unity



http://unity3d.com/showcase

Javascript Library – PhysicsJS



http://wellcaffeinated.net/PhysicsJS/

Javascript Library – ParallaxJS

http://matthew.wagerfield.com/parallax/

Javascript Library

Javascript Libraries provide wide implementations, serve wide range of purposes to develop a **web application**

Javascript Library

What about **Mapping Library**?

Web Map APIs and JS Library

INTRODUCTION TO WEB MAP API AND JAVASCRIPT LIBRARY

Web GIS?

Peta dapat ditampilkan di Internet melalui:

- ✓ ImageMap/SVG
- ✓ Map API
- ✓ Cloud-based Map Services
- ✓ Map Server
- ✓ Geoportal

Web Map Services

- Menyediakan layanan **latar belakang** peta untuk disajikan pada peta online
- Peta disajikan dalam berbagai **jenis** (citra satelit, peta garis) dan **kartografi** yang berbeda
- Peta disajikan dalam bentuk **Tile Service**
- Terkadang disebut juga dengan **Map Tile Service** atau **Map Tile Provider**
- Sebagian merupakan **turunan** dari map service yang lain (ex. OSM dari BingMaps)

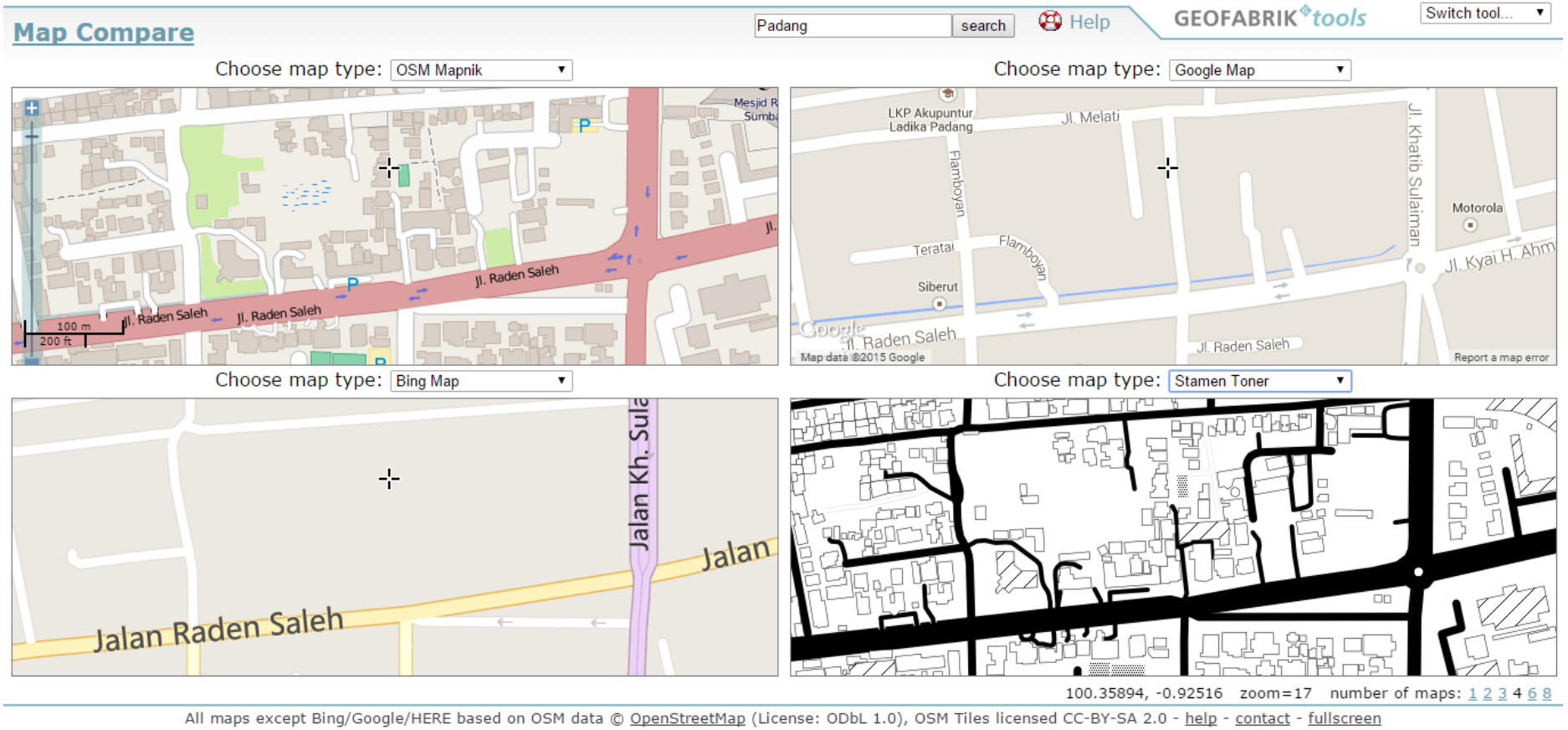
Web Map Services

Contoh Web Map Services:

- Google Maps
- Yahoo! Maps
- Bing Maps
- Open Street Map
- ESRI Maps
- Stamen Maps
- MapQuest
- Nokia Here
- Apple Maps
- Yandex Maps

http://en.wikipedia.org/wiki/Comparison_of_web_map_services

Web Map Services - Comparison



http://tools.geofabrik.de/mc/

Web Map API and JS Library

- **Web Map API** menyediakan layanan untuk dapat menggunakan tile dari Web Map Service pada sebuah halaman web
- Dengan kata lain, Web Map API digunakan untuk **memanggil** layanan yang menyediakan background peta (map tiles) berikut **fungsi-fungsi** yang mengatur **interaksi pengguna dengan peta**
- **Web Map API** seringkali dibuat dalam bentuk **Javascript Library**

Web Map API/JS Libraries

Contoh Web Map API:

- Google Maps API
- Yahoo! Maps API
- Bing Maps API
- OSM Slippy Map
- ESRI Arcgis API JS
- LeafletJS
- OpenLayers
- MapboxJS
- CartoDB API
- ModestMaps

http://techslides.com/50-javascript-libraries-and-plugins-for-maps

LeafletJS

Leaflet

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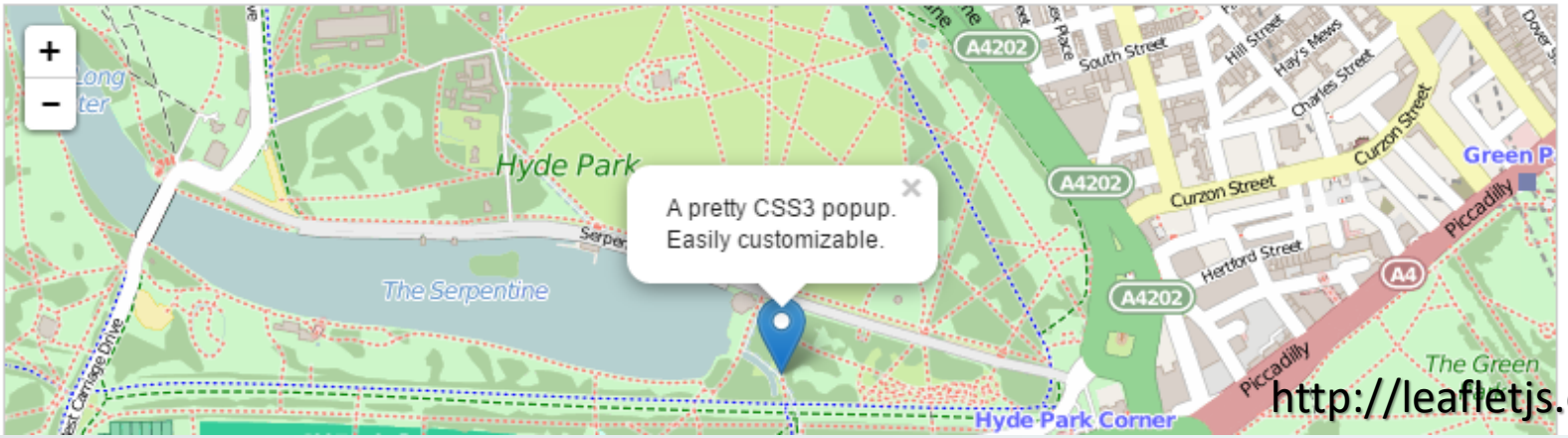
An Open-Source JavaScript Library for Mobile-Friendly Interactive Maps

Overview | Features | Tutorials | API | Download | Plugins | Blog | GitHub | Twitter | Forum

Leaflet is a modern open-source JavaScript library for mobile-friendly interactive maps. It is developed by Vladimir Agafonkin with a team of dedicated contributors. Weighing just about 33 KB of JS, it has all the features most developers ever need for online maps.

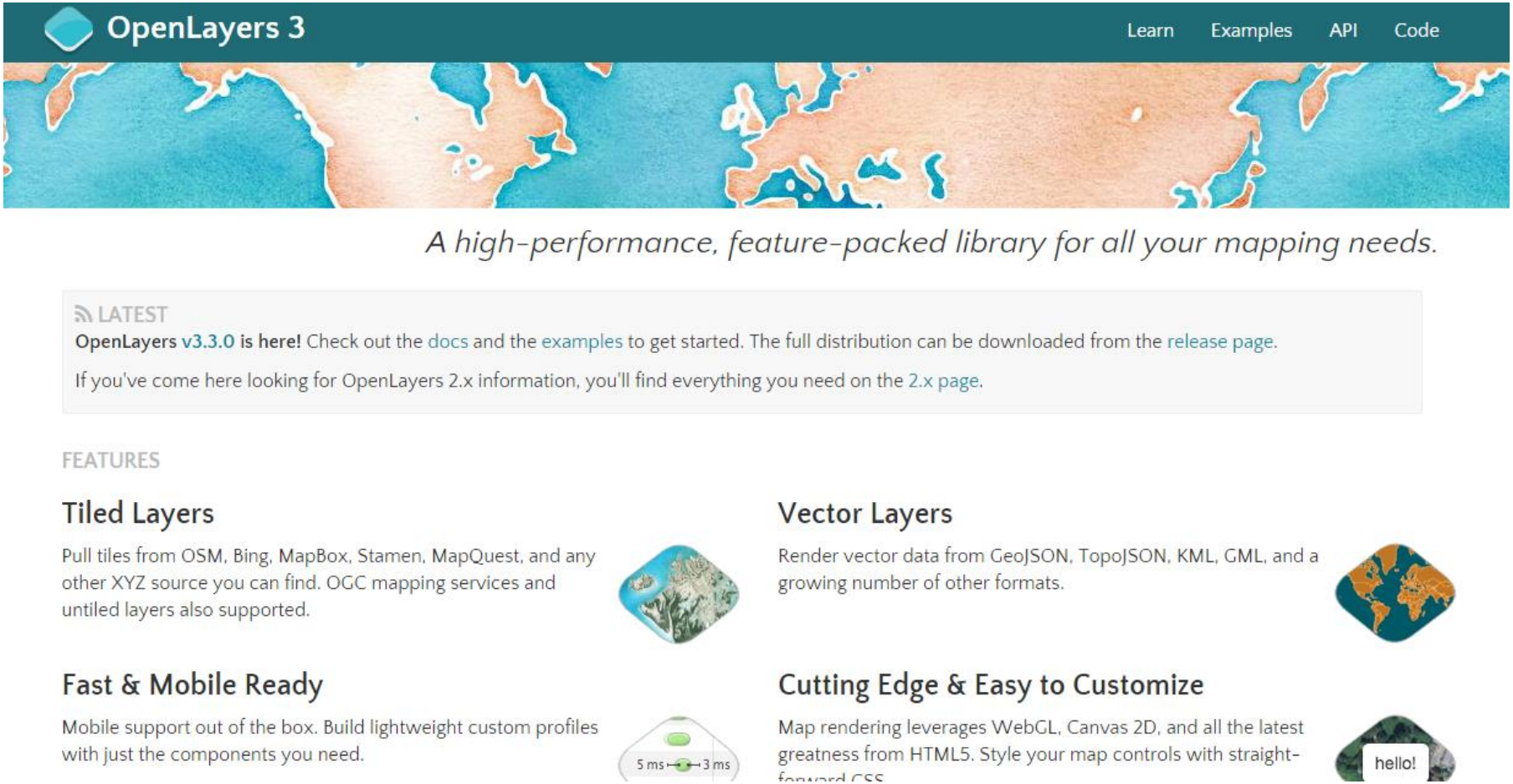
Leaflet is designed with *simplicity*, *performance* and *usability* in mind. It works efficiently across all major desktop and mobile platforms out of the box, taking advantage of HTML5 and CSS3 on modern browsers while still being accessible on older ones. It can be extended with a huge amount of plugins, has a beautiful, easy to use and well-documented API and a simple, readable source code that is a joy to contribute to.

Used by: Flickr foursquare Pinterest craigslist Data.gov IGN Wikimedia OSM Meetup WSJ Mapbox CartoDB GIS Cloud ...



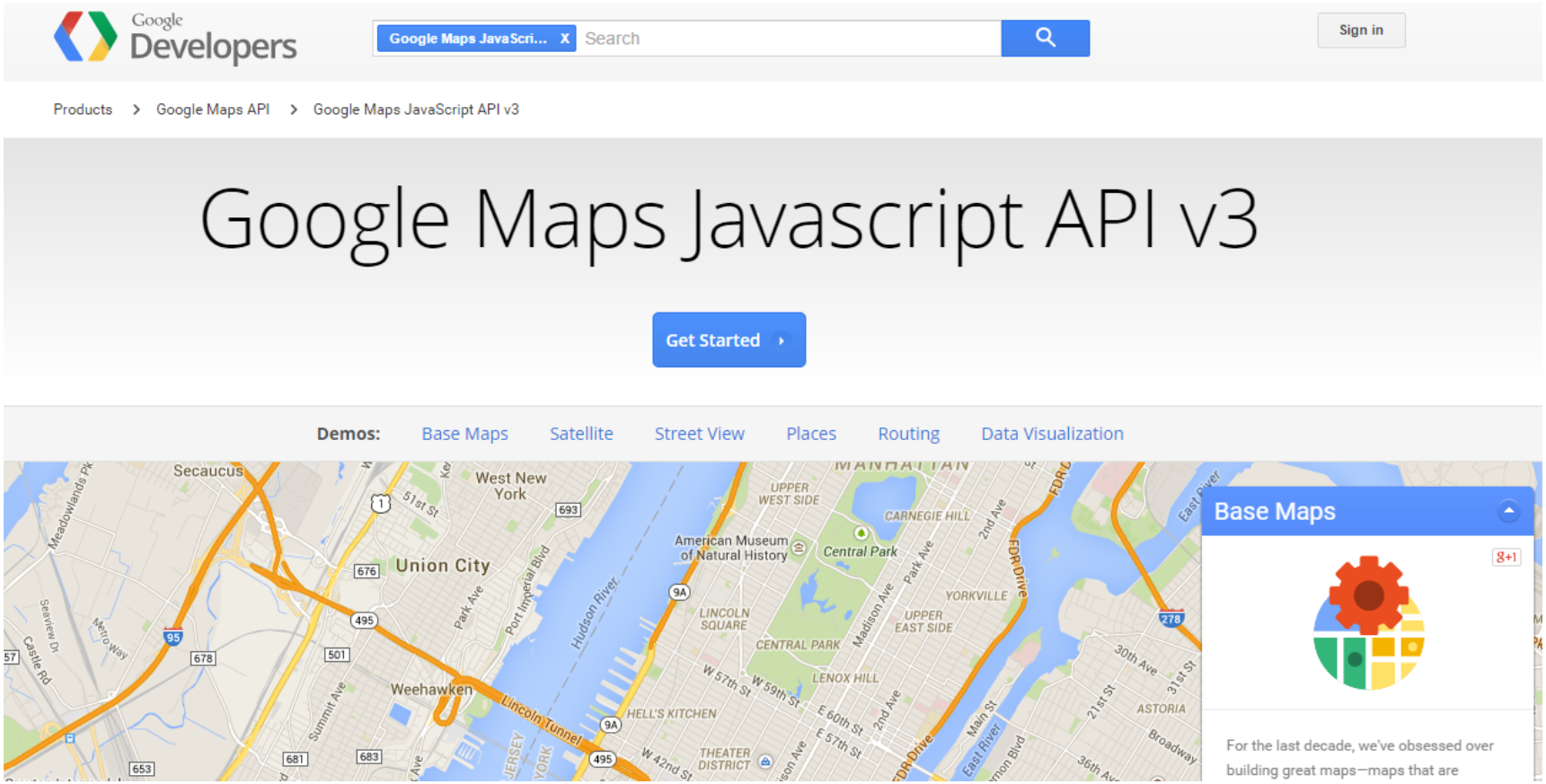
http://leafletjs.com/

OpenLayers



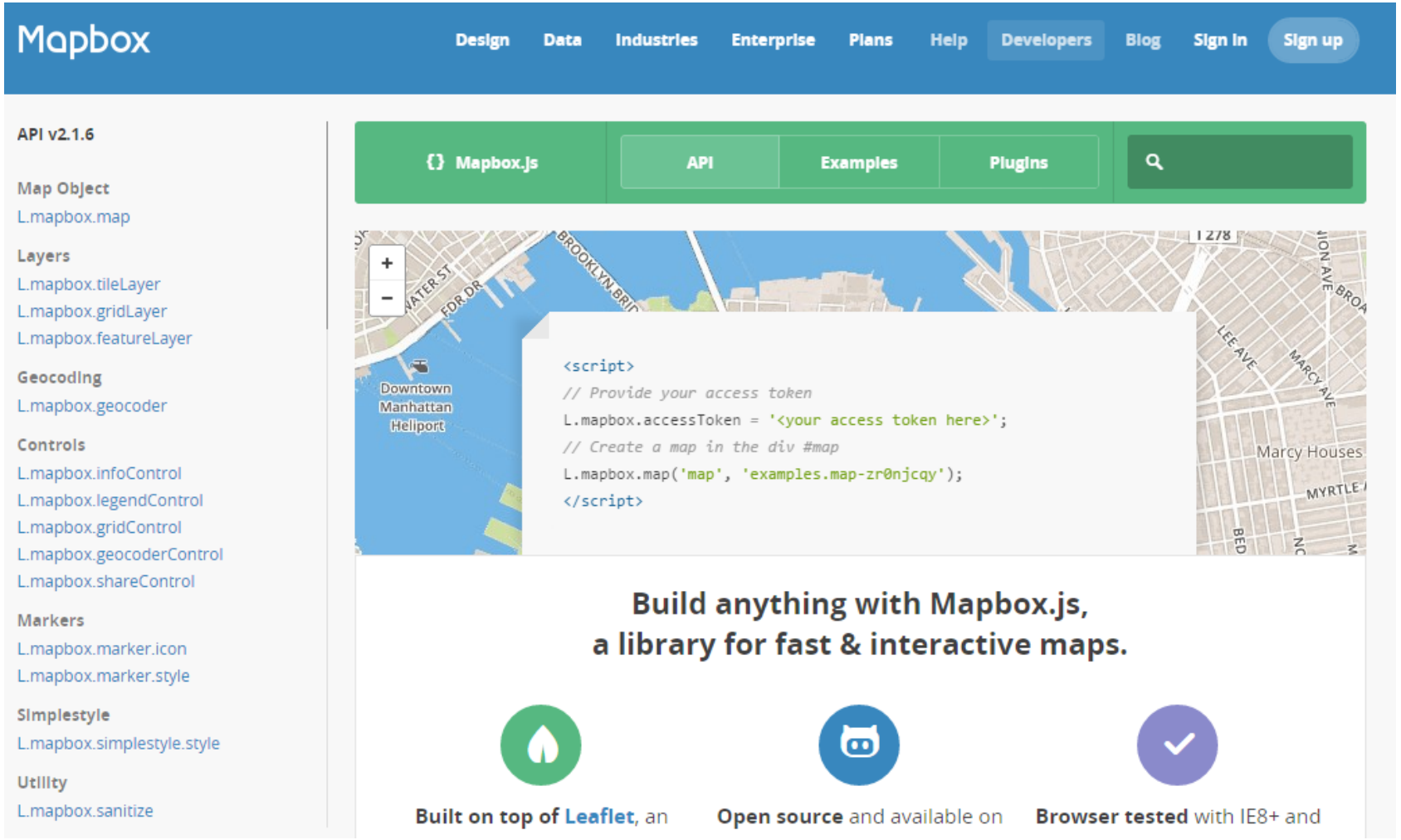
http://openlayers.org/

Google Maps API



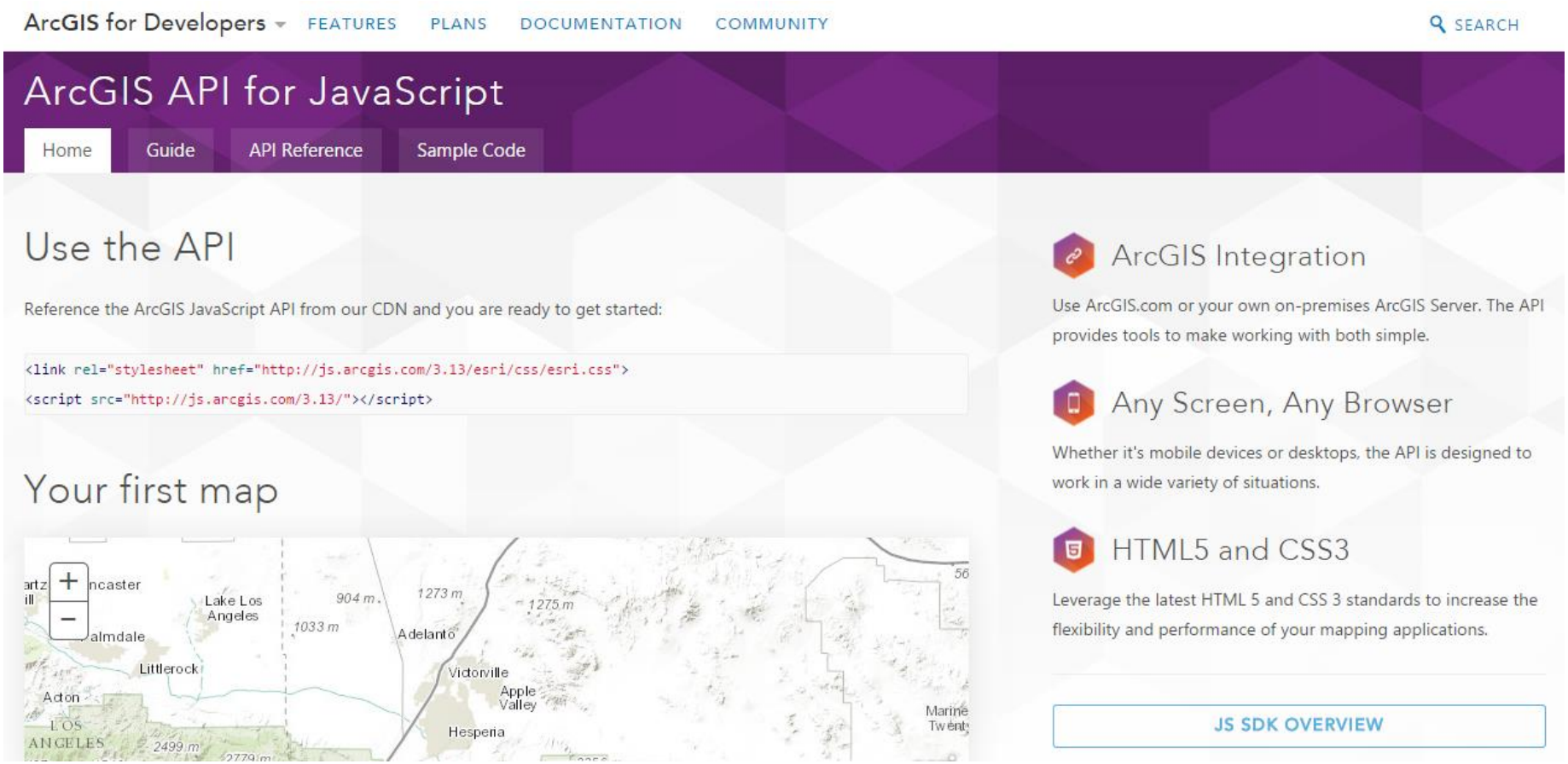
https://developers.google.com/maps/documentation/javascript/

Mapbox JS



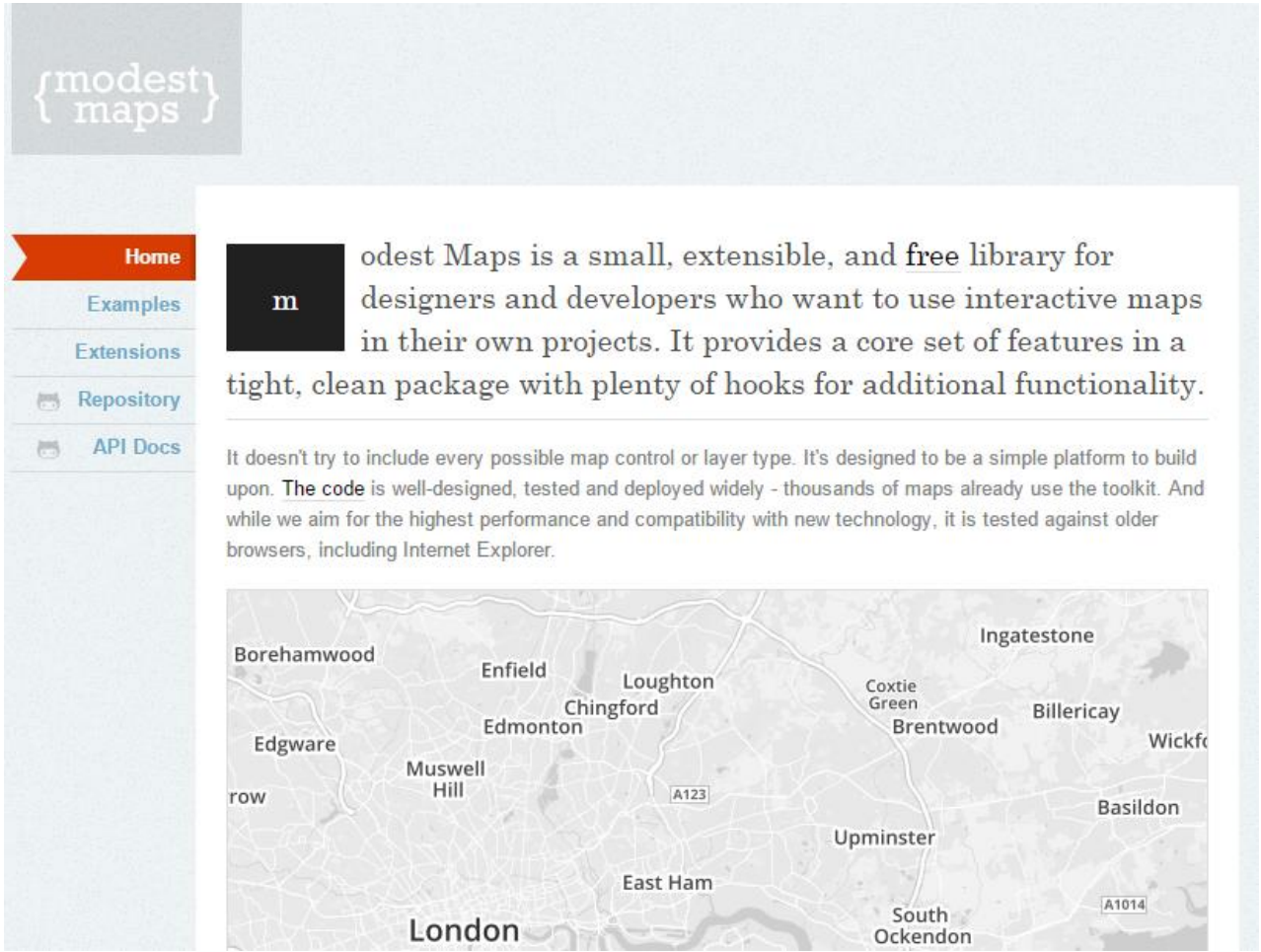
https://www.mapbox.com/mapbox.js/api/v2.1.6/

ArcGIS Javascript API



https://developers.arcgis.com/javascript/

Modest Maps



http://modestmaps.com/

Cessium JS

Cesium is a JavaScript library for creating 3D globes and 2D maps in a web browser without a plugin. It uses WebGL for hardware-accelerated graphics, and is cross-platform, cross-browser, and tuned for dynamic-data visualization. Cesium is open source under the Apache 2.0 license. It is free for commercial and non-commercial use.

http://cesiumjs.org/

LeafletJS

LEAFLET JAVASCRIPT MAP API

Leaflet

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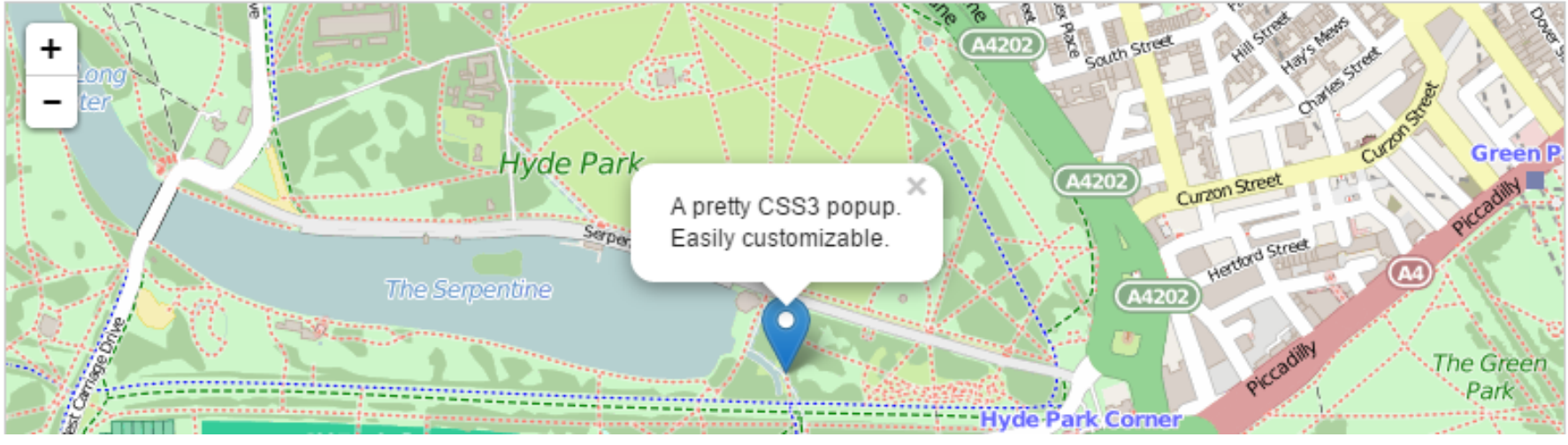

Bagaimana menggunakan LeafletJS?

Before writing any code for the map, you need to do the following preparation steps on your page:

- Include Leaflet CSS file in the head section of your document:

```
<link rel="stylesheet" href="http://cdn.leafletjs.com/leaflet-0.7.3/leaflet.css" />
```

- Include Leaflet JavaScript file:

```
<script src="http://cdn.leafletjs.com/leaflet-0.7.3/leaflet.js"></script>
```

- Put a `div` element with a certain `id` where you want your map to be:

```
<div id="map"></div>
```

- Make sure the map container has a defined height, for example by setting it in CSS:

```
#map { height: 180px; }
```

Now you're ready to initialize the map and do some stuff with it.

http://leafletjs.com/examples/quick-start.html

Gunakan kemampuan **Googling** kalian untuk membuat sebuah halaman peta pada Leaflet JS dengan ketentuan berikut:

1. Halaman peta **menampilkan peta kota asal anda** dengan perbesaran antara 10-15 kali
2. Gunakan **background tile** dari OpenStreetMap (OSM)
3. Buat **Marker** pada lokasi kota anda tersebut
4. **Popup** pada marker berisi nama kota dan nama anda
5. Ukuran **kanvas peta** bebas
6. **Unggah** ke web hosting anda sebagai halaman index

Basic LeafletJS Components

Setup map

```
var map = L.map('map').setView([51.505, -0.09], 13);
```

Tile Background

```
L.tileLayer('http://{s}.tiles.mapbox.com/v3/MapID/{z}/{x}/{y}.png'
,{ attribution: 'Map data &copy’, maxZoom: 18 }).addTo(map);
```

Marker

```
var marker = L.marker([51.5, -0.09]).addTo(map);
```

Popup

```
marker.bindPopup("<b>Hello world!</b><br>I am a popup.").openPopup();
```

LeafletJS Features

Interaction Features

General

- Drag panning with inertia

On Desktop Browsers

- Scroll wheel zoom
- Double click zoom
- Zoom to area (shift-drag)
- Keyboard navigation (with arrows and +/- keys)

On Mobile Browsers

- Multi-touch zoom (iOS, Android 4+, Win8)
- Double tap zoom

For Layers

- Various events: click (tap), mouseover, contextmenu, etc.
- Marker dragging

Visual Features

- Zoom animation (for all layers, including tile layers, markers and vector layers)
- Panning animation
- Smooth continuous zoom on modern mobile devices
- Tile and popup fade animation
- Very nice default design for markers, popups and other map controls
- Retina resolution support for tile layers and markers

Map Controls

- Zoom buttons
- Attribution
- Layer switcher
- Scale

Available Map Layers

- Tile layers
- Markers
- Popups
- Vector layers: polylines, polygons, circles, rectangles, circle markers
- GeoJSON layers
- Image overlays
- WMS layers
- Layer groups

Customization Features

- Pure CSS3 popups and controls for easy restyling
- Image- and HTML-based markers
- A simple interface for implementing custom map layers
- The same for custom map controls
- Custom map projections (with `EPSG:4326`, `EPSG:3857` and `EPSG:3395` out of the box)
- Powerful OOP facilities for extending existing classes

LeafletJS Plugins

Notable Leaflet Plugins

While Leaflet is meant to be as lightweight as possible, and focuses on a core set of features, an easy way to extend its functionality is to use third-party plugins. Thanks to the awesome community behind Leaflet, there are lots of nice plugins to choose from.

Layers and Overlays

Plugin	Description	Maintainer
Leaflet.FreeDraw	Zoopla inspired freehand polygon creation using Leaflet.js and D3.	Wildhoney
Leaflet.ellipse	Leaflet.ellipse place ellipses on map by specifying center point, semi-major axis, semi-minor axis, and tilt degrees from west.	JD Fergason
Leaflet.plotter	leaflet-plotter allows you to create routes using a leaflet powered map. You can click on the mid-points to create a new, draggable point.	Nathan Mahdavi
Leaflet.markercluster	Beautiful, sophisticated, high performance marker clustering solution with smooth animations and lots of great features. *Recommended!*	Dave Leaver
Leaflet.label	Adds text labels to map markers and vector layers.	Jacob Toye
RaphaelLayer	Allows you to use Raphael as a layer on a Leaflet map for advanced animations and visualizations.	Dynamic Methods

Web GIS Features

COMMON WEB GIS FEATURES

Some Features of A Web GIS

Attribute Query

Spatial Query

Geolocation

Geocoding

Reverse Geocoding

Routing

LBS

Next Week

Mini Project: Membuat peta dengan Leaflet JS

Terima Kasih