



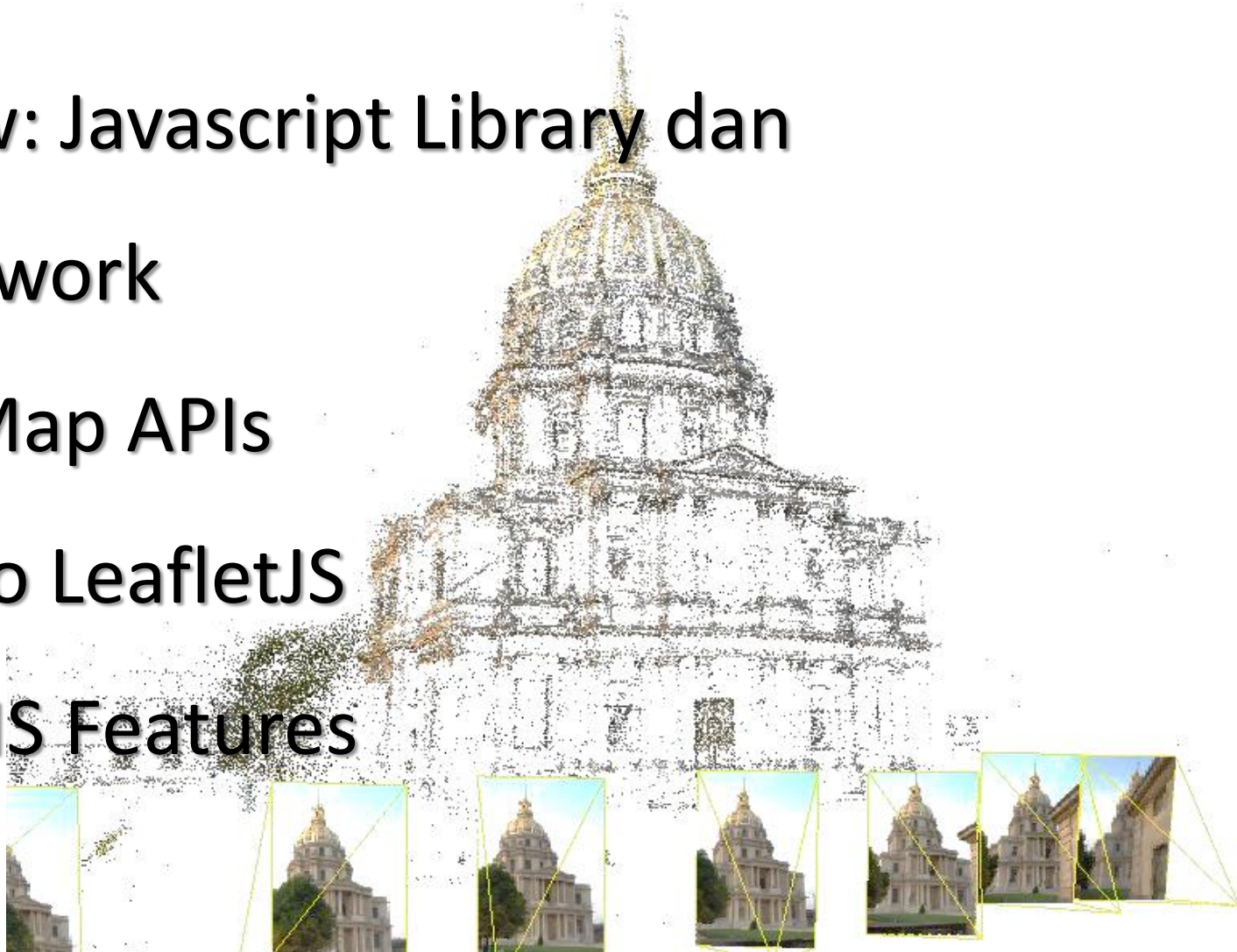
**Jurusan Teknik Geodesi dan Geomatika
Universitas Gadjah Mada Yogyakarta**

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*

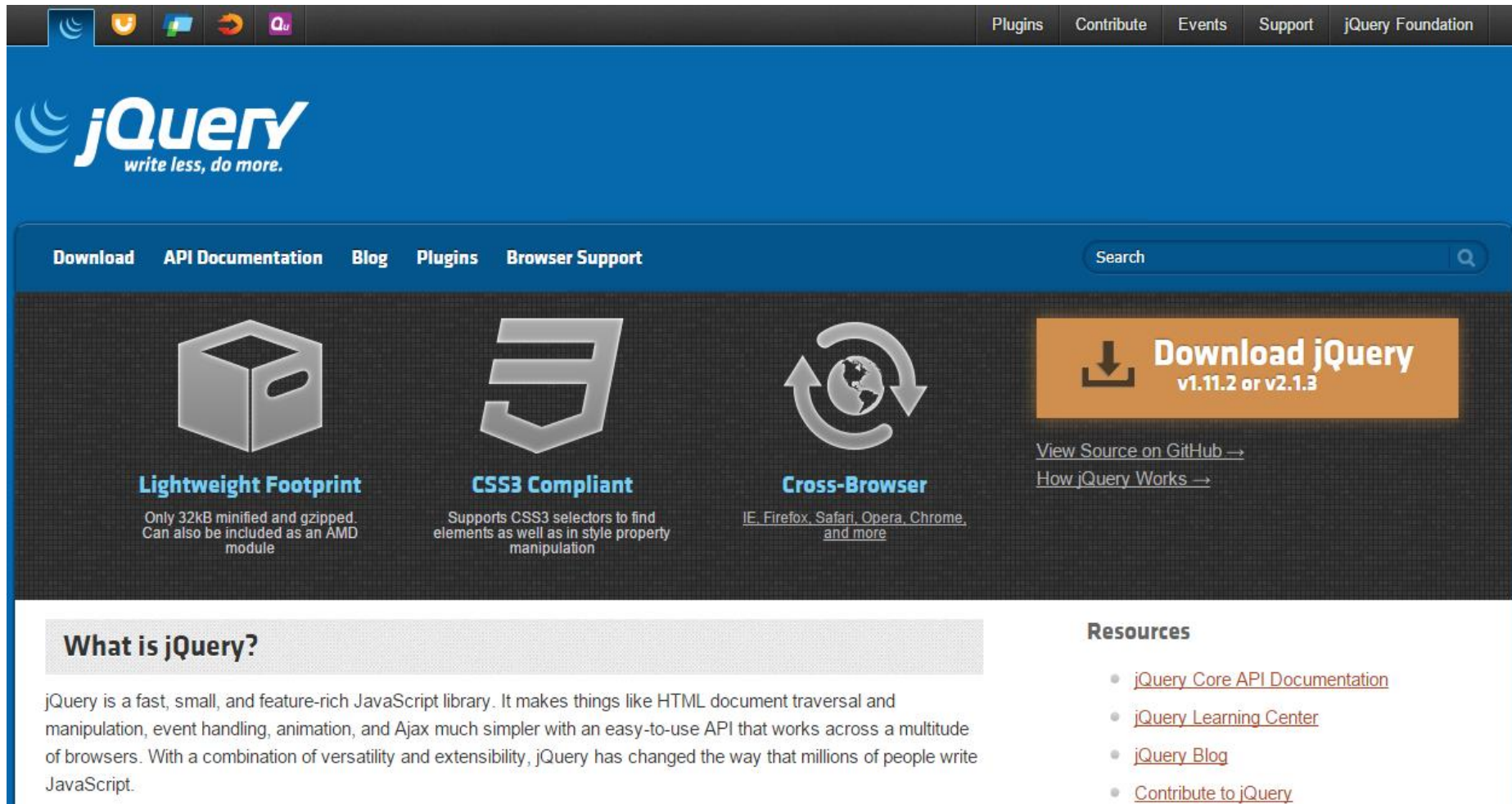
Server

- *NodeJS*

Dst..



Javascript Library - JQuery



The screenshot shows the jQuery website homepage. At the top, there is a navigation bar with links for Plugins, Contribute, Events, Support, and jQuery Foundation. Below this is the jQuery logo with the tagline "write less, do more.". A secondary navigation bar contains links for Download, API Documentation, Blog, Plugins, and Browser Support, along with a search box. The main content area features three key features: "Lightweight Footprint" (32kB minified and gzipped), "CSS3 Compliant" (supports CSS3 selectors), and "Cross-Browser" (works on IE, Firefox, Safari, Opera, Chrome, and more). A prominent orange button encourages downloading jQuery v1.11.2 or v2.1.3. Below the features, there is a "What is jQuery?" section and a "Resources" section with links to documentation, learning center, blog, and contribute.

Download API Documentation Blog Plugins Browser Support Search

Lightweight Footprint
Only 32kB minified and gzipped.
Can also be included as an AMD module

CSS3 Compliant
Supports CSS3 selectors to find elements as well as in style property manipulation

Cross-Browser
[IE, Firefox, Safari, Opera, Chrome, and more](#)

Download jQuery
v1.11.2 or v2.1.3

[View Source on GitHub →](#)
[How jQuery Works →](#)

What is jQuery?

jQuery is a fast, small, and feature-rich JavaScript library. It makes things like HTML document traversal and manipulation, event handling, animation, and Ajax much simpler with an easy-to-use API that works across a multitude of browsers. With a combination of versatility and extensibility, jQuery has changed the way that millions of people write JavaScript.

Resources

- [jQuery Core API Documentation](#)
- [jQuery Learning Center](#)
- [jQuery Blog](#)
- [Contribute to jQuery](#)

<https://jquery.com/>



Javascript Library - Bootstrap

Bootstrap Getting started CSS Components JavaScript Customize

Expo Blog



Bootstrap is the most popular HTML, CSS, and JS framework for developing responsive, mobile first projects on the web.

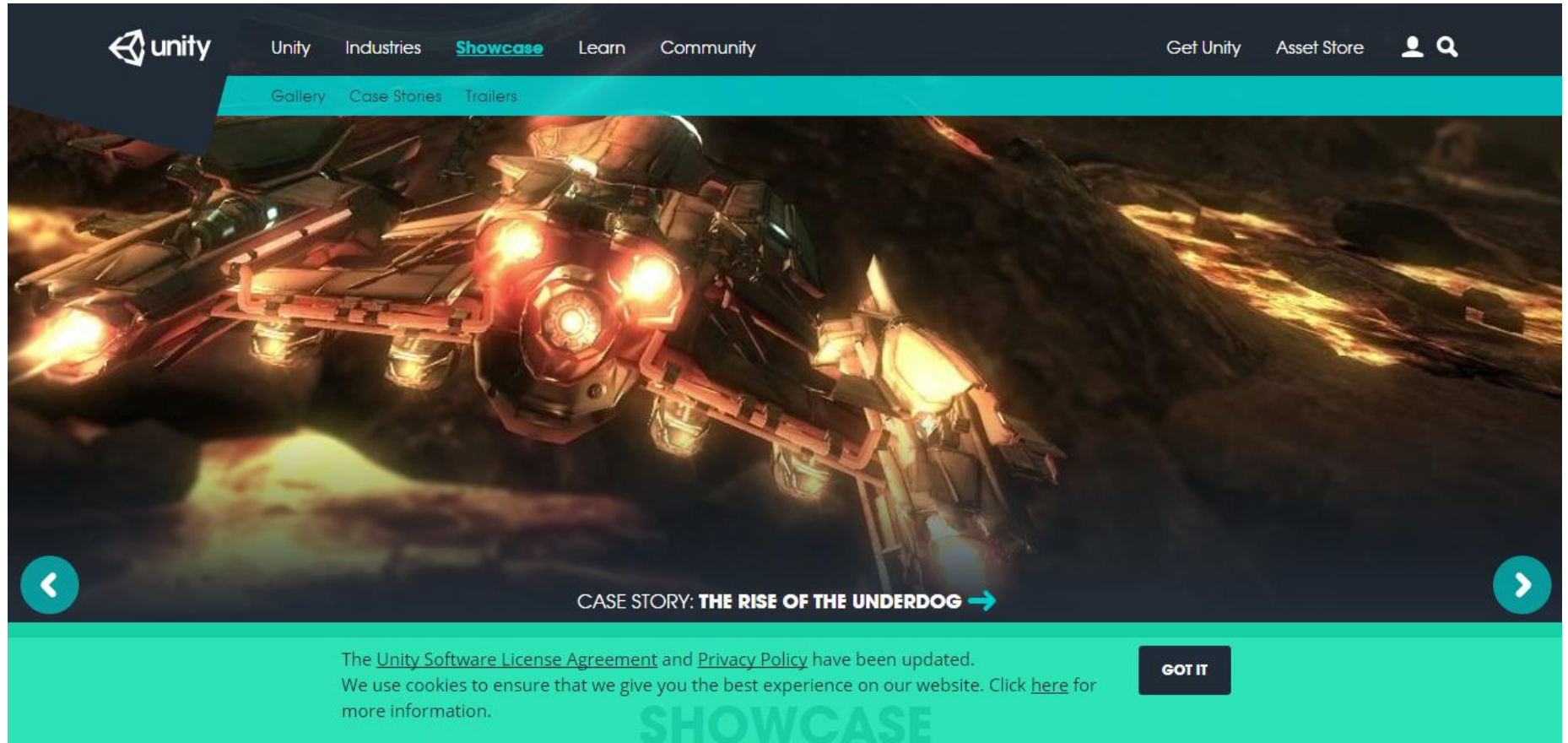
Download Bootstrap

Currently v3.3.4

<http://getbootstrap.com/>



Javascript Library - Unity

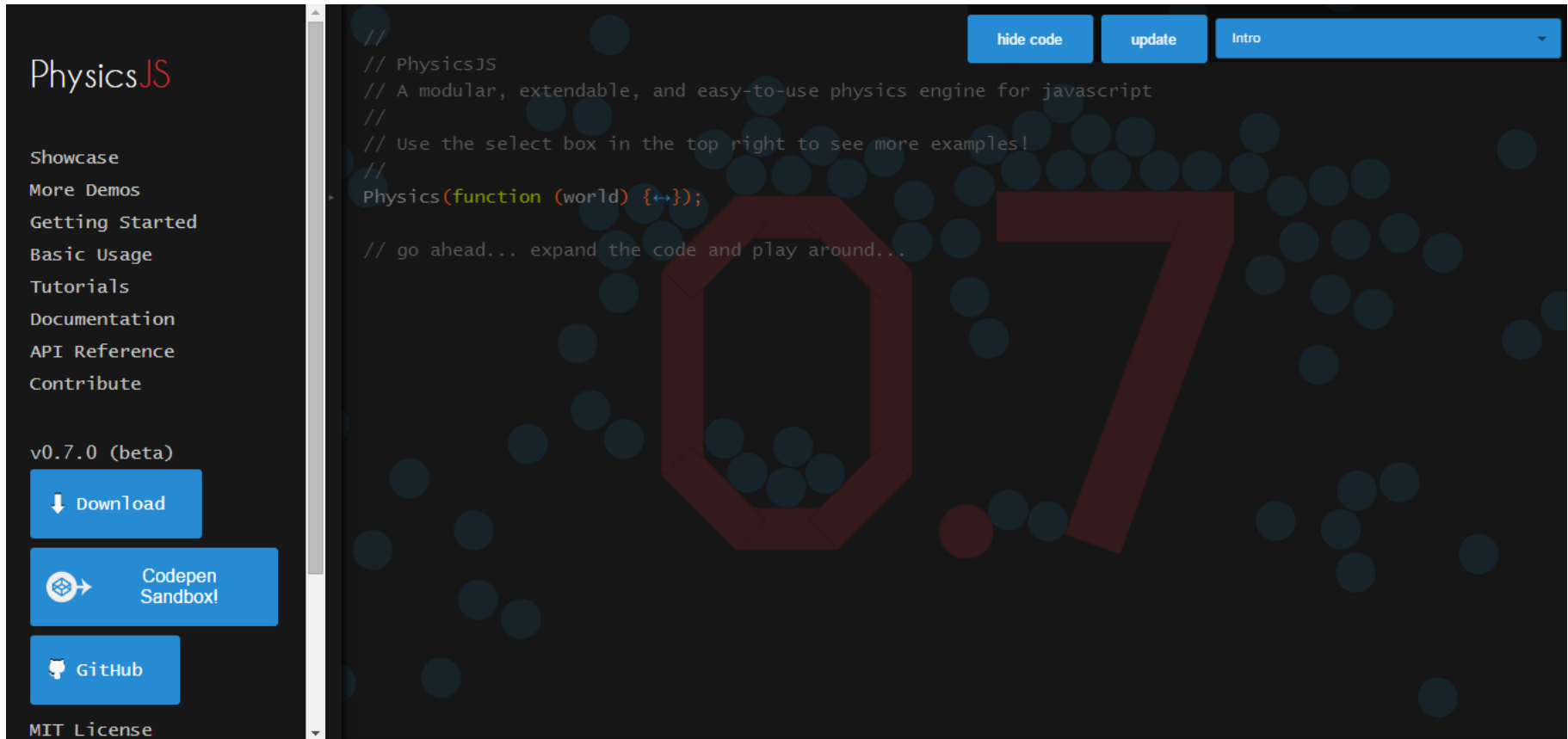


The screenshot shows the Unity Showcase website. At the top, there is a navigation bar with the Unity logo and links for Unity, Industries, Showcase, Learn, and Community. On the right side of the navigation bar, there are links for Get Unity, Asset Store, and a user profile icon. Below the navigation bar, there is a teal banner with links for Gallery, Case Stories, and Trailers. The main content area features a large 3D rendering of a futuristic spaceship with glowing orange lights, set against a dark, rocky background. Below the rendering, there is a teal banner with the text "CASE STORY: THE RISE OF THE UNDERDOG" and a right-pointing arrow. Below this banner, there is a teal banner with the text "The Unity Software License Agreement and Privacy Policy have been updated. We use cookies to ensure that we give you the best experience on our website. Click [here](#) for more information." and a "GOT IT" button. The word "SHOWCASE" is displayed in large, teal, semi-transparent letters at the bottom of the banner.

<http://unity3d.com/showcase>



Javascript Library – PhysicsJS

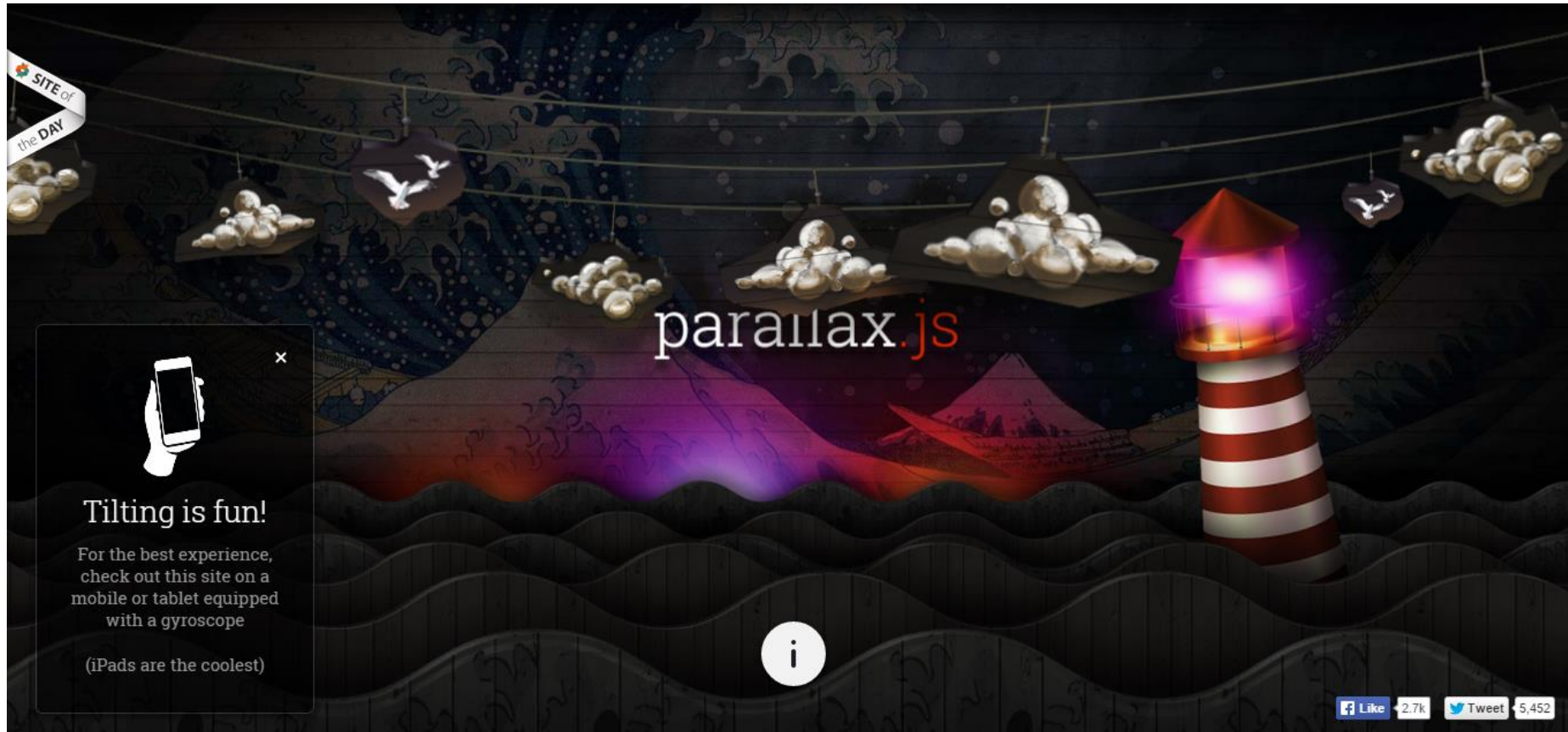


The screenshot displays the PhysicsJS website interface. On the left is a dark sidebar with navigation links: Showcase, More Demos, Getting Started, Basic Usage, Tutorials, Documentation, API Reference, and Contribute. Below these links, it shows the version 'v0.7.0 (beta)' and three buttons: 'Download', 'Codepen Sandbox', and 'GitHub'. At the bottom of the sidebar is the 'MIT License' text. The main content area features a code editor with a dark background and light blue text. The code includes comments and a function definition: `Physics(function (world) {↔});`. Above the code editor are three buttons: 'hide code', 'update', and 'Intro'. The background of the main area shows a physics simulation with a large red '07' and several blue circles representing particles or objects.

<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**



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

Map Compare **Help** **GEOFABRIK tools**

Choose map type:

100.35894, -0.92516 zoom=17 number of maps: [1](#) [2](#) [3](#) [4](#) [6](#) [8](#)

All maps except Bing/Google/HERE based on OSM data © [OpenStreetMap](#) (License: ODBL 1.0), OSM Tiles licensed CC-BY-SA 2.0 - [help](#) - [contact](#) - [fullscreen](#)

<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



9,868

Tweet

Follow

12.2K followers

Like

5.4k

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

Overview

Features

Tutorials

API

Download

Plugins

Blog

GitHub

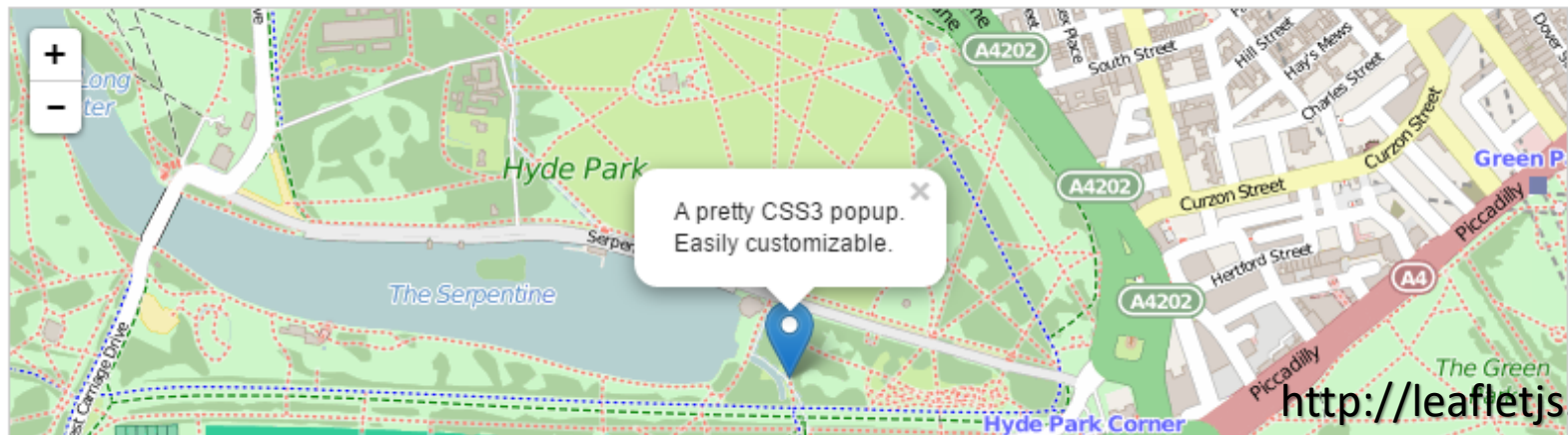
Twitter

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

 OpenLayers 3

[Learn](#) [Examples](#) [API](#) [Code](#)

A high-performance, feature-packed library for all your mapping needs.

LATEST

OpenLayers v3.3.0 is here! Check out the [docs](#) and the [examples](#) to get started. The full distribution can be downloaded from the [release page](#).

If you've come here looking for OpenLayers 2.x information, you'll find everything you need on the [2.x page](#).

FEATURES

Tiled Layers

Pull tiles from OSM, Bing, MapBox, Stamen, MapQuest, and any other XYZ source you can find. OGC mapping services and untiled layers also supported.



Fast & Mobile Ready

Mobile support out of the box. Build lightweight custom profiles with just the components you need.



Vector Layers

Render vector data from GeoJSON, TopoJSON, KML, GML, and a growing number of other formats.



Cutting Edge & Easy to Customize

Map rendering leverages WebGL, Canvas 2D, and all the latest greatness from HTML5. Style your map controls with straight-forward CSS.



<http://openlayers.org/>



Google Maps API

Google Developers Search

Products > Google Maps API > Google Maps JavaScript API v3

Google Maps Javascript API v3

Get Started >

Demos: [Base Maps](#) [Satellite](#) [Street View](#) [Places](#) [Routing](#) [Data Visualization](#)

Base Maps

For the last decade, we've obsessed over building great maps—maps that are

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



Mapbox JS

The screenshot shows the Mapbox website's API documentation for Mapbox.js v2.1.6. The top navigation bar includes links for Design, Data, Industries, Enterprise, Plans, Help, Developers, Blog, Sign In, and Sign up. The left sidebar lists various API components such as Map Object, Layers, Geocoding, Controls, Markers, Simplestyle, and Utility. The main content area features a navigation bar with 'Mapbox.js', 'API', 'Examples', and 'Plugins' tabs, along with a search bar. Below this is a map of Manhattan with a code snippet for initializing a Mapbox map. The code includes comments and a placeholder for an access token. At the bottom, a promotional banner states 'Build anything with Mapbox.js, a library for fast & interactive maps.' and lists three key features: 'Built on top of Leaflet', 'Open source and available on GitHub', and 'Browser tested with IE8+ and more'.

Mapbox

Design Data Industries Enterprise Plans Help Developers Blog Sign In Sign up

API v2.1.6

Map Object

- L.mapbox.map

Layers

- L.mapbox.tileLayer
- L.mapbox.gridLayer
- L.mapbox.featureLayer

Geocoding

- L.mapbox.geocoder

Controls

- L.mapbox.infoControl
- L.mapbox.legendControl
- L.mapbox.gridControl
- L.mapbox.geocoderControl
- L.mapbox.shareControl

Markers

- L.mapbox.marker.icon
- L.mapbox.marker.style

Simplestyle

- L.mapbox.simplestyle.style

Utility

- L.mapbox.sanitize

{ } Mapbox.js

API Examples Plugins

+

-

WATER ST FOR DR BROOKLYN BRID

Downtown Manhattan Heliport

1 278

LEE AVE MARCY AVE


Marcy Houses


MYRTLE


BED NC W

```
<script>  
  // Provide your access token  
  L.mapbox.accessToken = '<your access token here>';  
  // Create a map in the div #map  
  L.mapbox.map('map', 'examples.map-zr0njcay');  
</script>
```

**Build anything with Mapbox.js,
a library for fast & interactive maps.**

 Built on top of **Leaflet**, an

 **Open source** and available on

 **Browser tested** with IE8+ and

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



ArcGIS Javascript API

ArcGIS for Developers ▾ FEATURES PLANS DOCUMENTATION COMMUNITY

SEARCH

ArcGIS API for JavaScript

Home

Guide

API Reference

Sample Code

Use the API

Reference the ArcGIS JavaScript API from our CDN and you are ready to get started:

```
<link rel="stylesheet" href="http://js.arcgis.com/3.13/esri/css/esri.css">
<script src="http://js.arcgis.com/3.13/"></script>
```

Your first map



ArcGIS Integration

Use ArcGIS.com or your own on-premises ArcGIS Server. The API provides tools to make working with both simple.

Any Screen, Any Browser

Whether it's mobile devices or desktops, the API is designed to work in a wide variety of situations.

HTML5 and CSS3

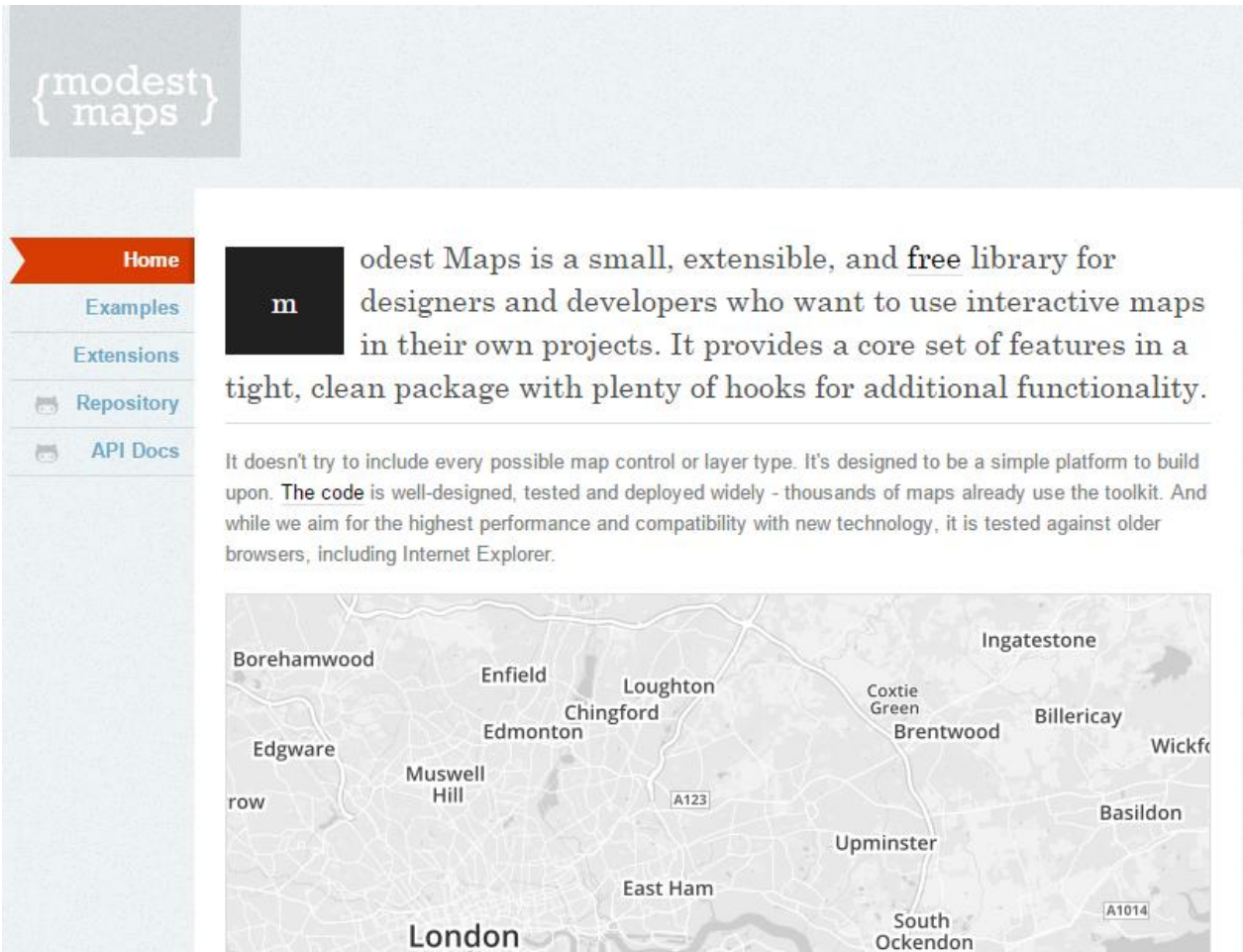
Leverage the latest HTML 5 and CSS 3 standards to increase the flexibility and performance of your mapping applications.

[JS SDK OVERVIEW](#)

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



Modest Maps

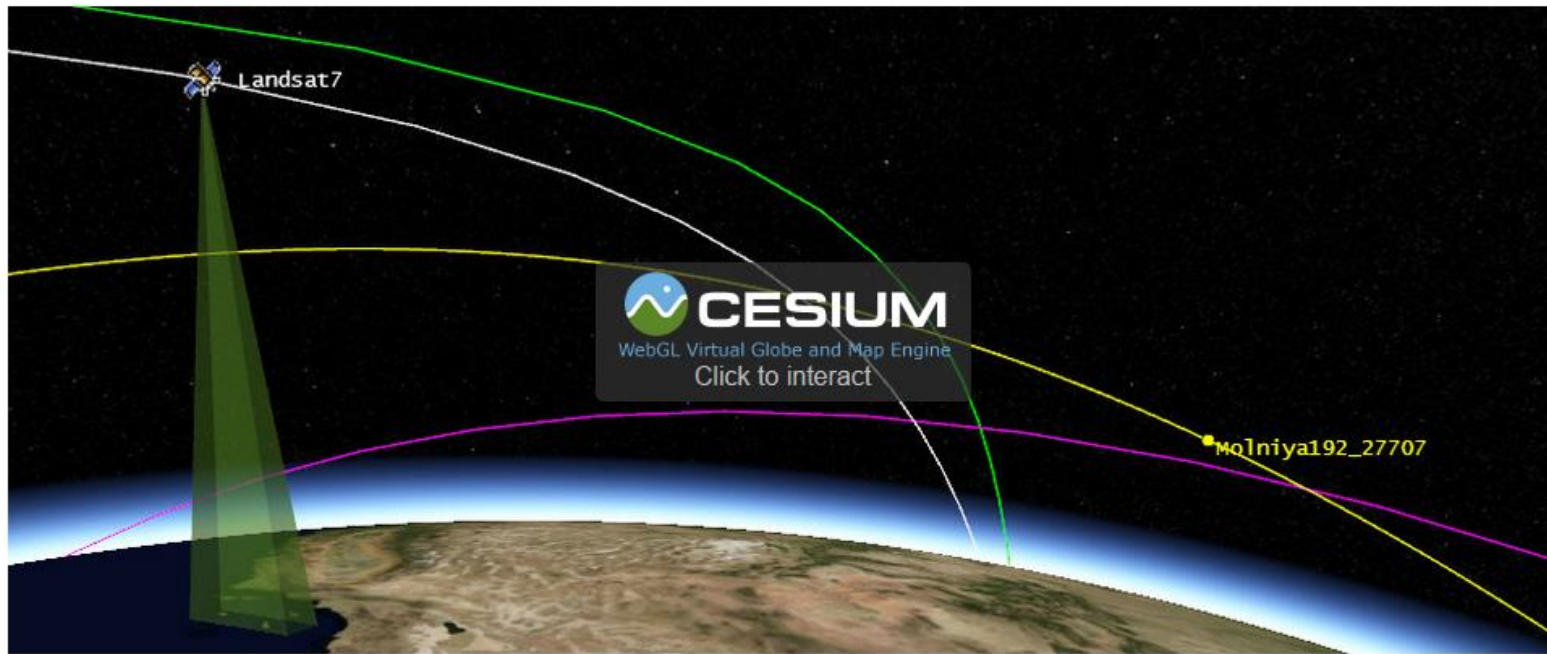
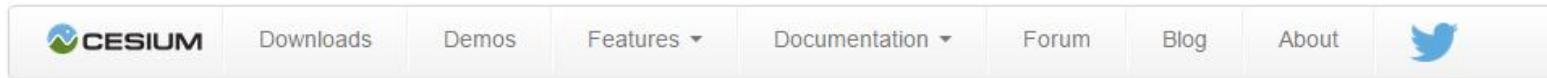


The screenshot shows the Modest Maps website. On the left is a navigation menu with the following items: Home (highlighted in a red ribbon), Examples, Extensions, Repository (with a GitHub icon), and API Docs (with a GitHub icon). The main content area features a large black square with a white lowercase 'm' on the left, followed by the text: "odest Maps is a small, extensible, and free library for designers and developers who want to use interactive maps in their own projects. It provides a core set of features in a tight, clean package with plenty of hooks for additional functionality." Below this is a paragraph: "It doesn't try to include every possible map control or layer type. It's designed to be a simple platform to build upon. **The code** is well-designed, tested and deployed widely - thousands of maps already use the toolkit. And while we aim for the highest performance and compatibility with new technology, it is tested against older browsers, including Internet Explorer." At the bottom of the main content area is a map of the London area with various locations labeled, including Borehamwood, Enfield, Loughton, Chingford, Edmonton, Muswell Hill, East Ham, London, South Ockendon, Upminster, Brentwood, Coxtie Green, Ingatestone, Billericay, Wickford, Basildon, and A1014.

<http://modestmaps.com/>



Cesium JS



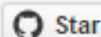
Cesium is a JavaScript library for creating 3D globes and 2D maps in a web browser without a plugin. It uses WebGL for hardware-accelerated graphics, and is cross-platform, cross-browser, and tuned for dynamic-data visualization. Cesium is open source under the Apache 2.0 license. It is free for commercial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

<http://cesiumjs.org/>



LeafletJS

LEAFLET JAVASCRIPT MAP API



9,868



12.2K followers



5.4k

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

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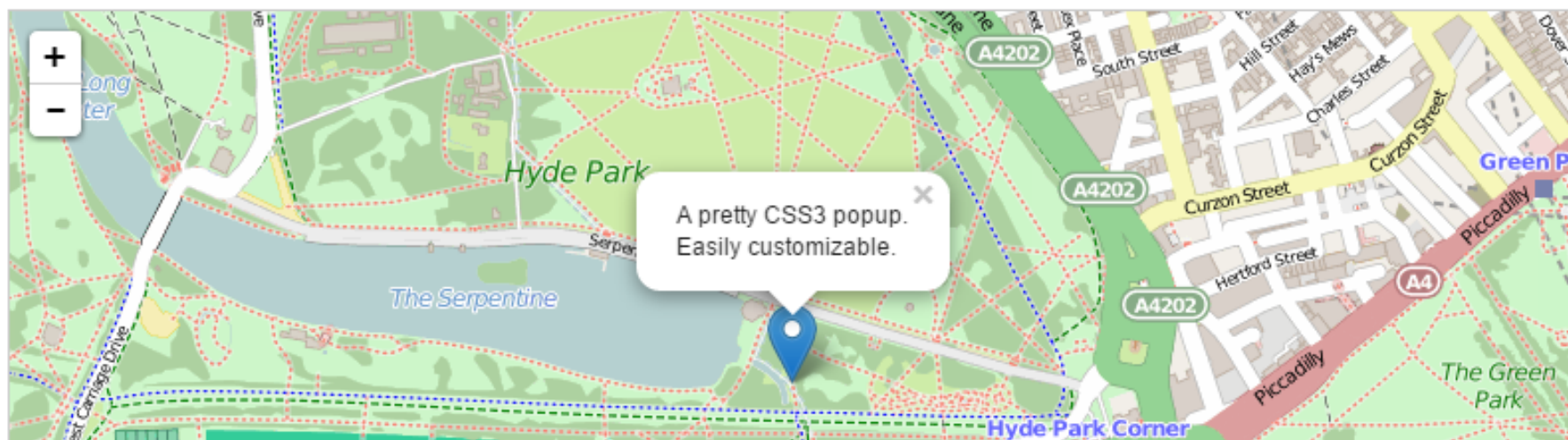


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Used by: Flickr foursquare Pinterest craigslist Data.gov IGN Wikimedia OSM Meetup WSJ Mapbox CartoDB GIS Cloud ...



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

Available Map Layers

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

Map Controls

- Zoom buttons
- Attribution
- Layer switcher
- Scale

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 Ferguson
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. <i>Recommended!</i>	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

