

# Google Developer Day 2009



# Performance Tips for Maps API Mashups

Pamela Fox

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Developer  
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“Every millisecond counts.”

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Google User Experience Guidelines

# Loading the Javascript API

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# Lots of Resources to Display a Map



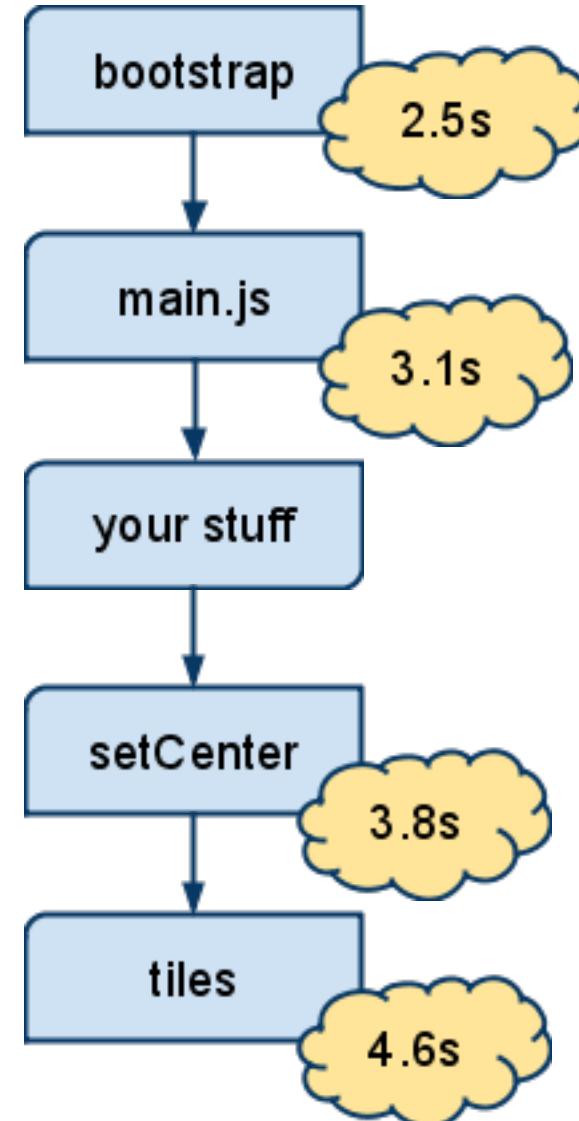
Inspect Clear All HTML CSS JS XHR Images Flash

Console HTML CSS Script DOM Net ▾

[+]	GET maps?file=api&v=2&key=ABl	200 OK	maps.google.com 5 KB
[+]	GET main.js	200 OK	maps.google.com 72 KB
[+]	GET vp?spn=146.673954,351.5625	200 OK	maps.google.com 3 KB
[+]	GET %7Bmod_legacy_api_gc.mod	200 OK	maps.google.com 11 KB
[+]	GET vp?spn=146.673954,351.5625	200 OK	maps.google.com 3 KB

5 requests 92 KB

# The Load Sequence - How Is Time Spent\*?



\*Median times, measured from when the hosting page was requested

# iPhone and Android



# Too Many Files To Download



bootstrap + main.js



Demo: Barry Hunter's

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# Too Much Code To Parse

## Control Classes:

[GControl](#)  
[GControlAnchor](#)  
[GControl](#)  
[GControlPosition](#)

[GHierarchicalMapTypeControl](#)  
[GMapType](#)  
[GMapTypeControl](#)  
[GMapTypeOptions](#)

[GMapUIOptions](#)  
[GMenuMapTypeControl](#)  
[GNavBarControl](#)

## Overlay Classes:

[GCopyright](#)  
[GCopyrightCollection](#)  
[GGroundOverlay](#)  
[GIcon](#)  
[GLayer](#)  
[GMarker](#)  
[GMarkerManager](#)  
[GMarkerManagerOptions](#)  
[GMarkerOptions](#)

[GMercatorProjection](#)  
[GOverlay](#)  
[GEditingOptions](#)  
[GStyleOptions](#)

[GScreenOverlay](#)  
[GScreenPoint](#)  
[GScreenSize](#)  
[GTileLayer](#)  
[GTileLayerOptions](#)  
[GTileLayerOverlay](#)  
[GTileLayerOverlayOptions](#)

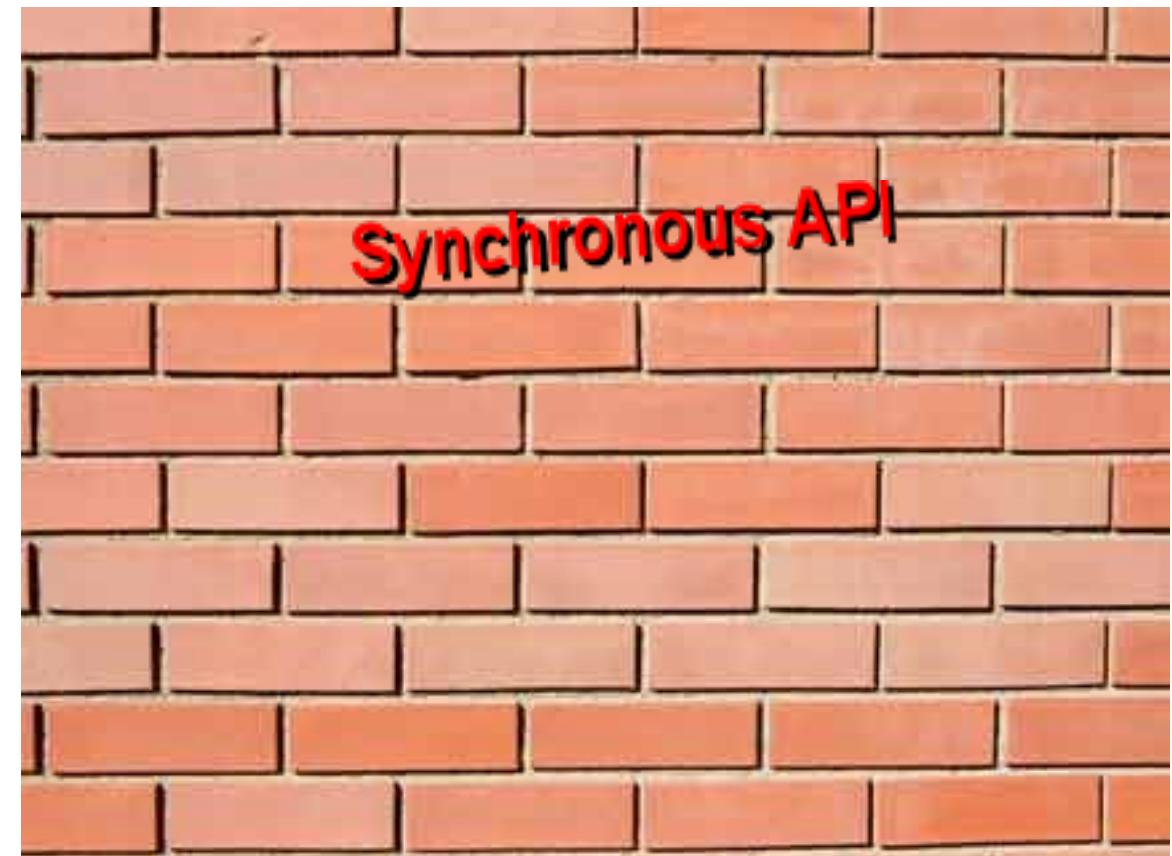
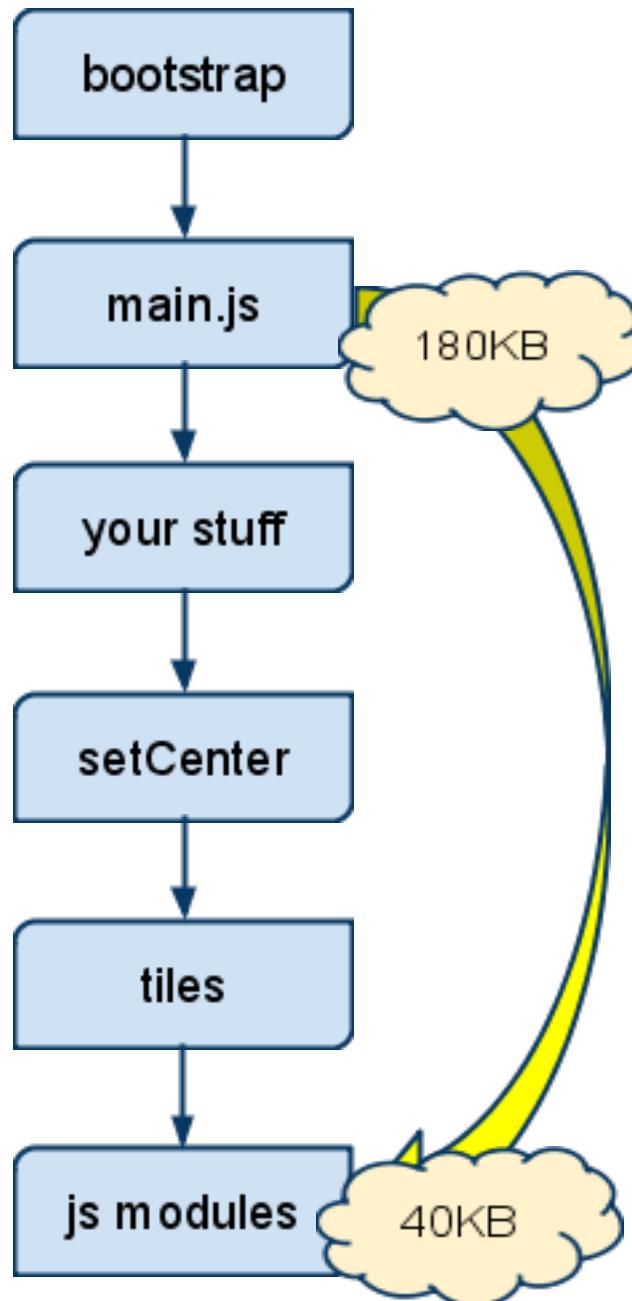
## Service Classes:

[GAdsManager](#)  
[GAdsManagerOptions](#)  
[GClientGeocoder](#)  
[GDirections](#)  
[GDirectionsOptions](#)  
[GDownloadUrl](#)  
[GFactualGeocodeCache](#)  
[GGeoAddressAccuracy](#)  
[GGeoStatusCode](#)  
[GGeoXml](#)  
[GGeocodeCache](#)  
[GGoogleBar](#)

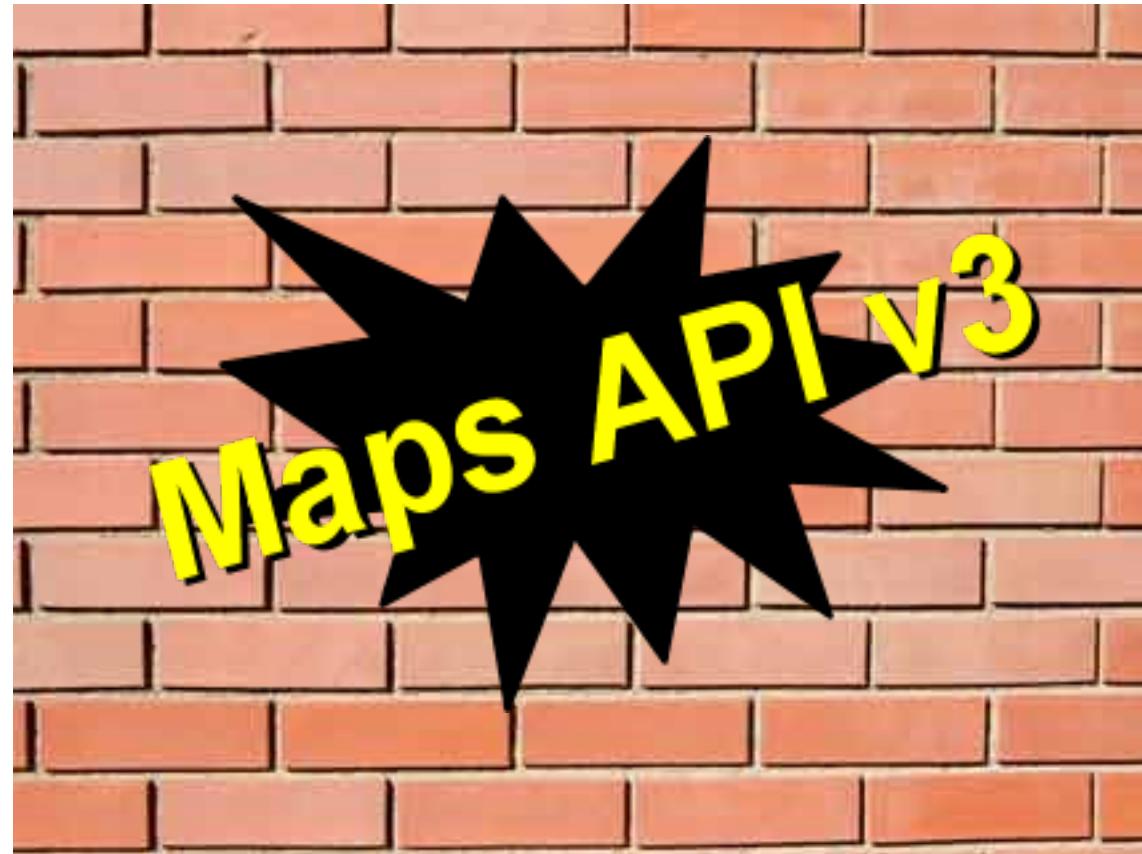
[GList](#)  
[GMarkerOptions](#)  
[GMarkerResultList](#)  
[GPoint](#)  
[GRule](#)  
[GStop](#)  
[GStreetviewClient](#)  
[GStreetviewClient.ReturnValues](#)  
[GStreetviewData](#)  
[GStreetviewLink](#)

[GStreetviewLocation](#)  
[GStreetviewOverlay](#)  
[GStreetviewPanorama](#)  
[GStreetviewPanorama.ErrorValues](#)  
[GStreetviewPanoramaOptions](#)  
[GTrafficOverlay](#)  
[GTrafficOverlayOptions](#)  
[GTravelModes](#)  
[GXml](#)  
[GXmlHttp](#)  
[GXslt](#)

# Delay Loading JavaScript



# Bringing Down The Wall



# Maps API V3 (labs)

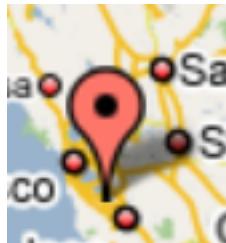
[Maps API v3 Docs](#)

- Latency: #1 priority
  - Aggressive modularization
  - Latency features
- iPhone / Android

# Displaying Many Markers

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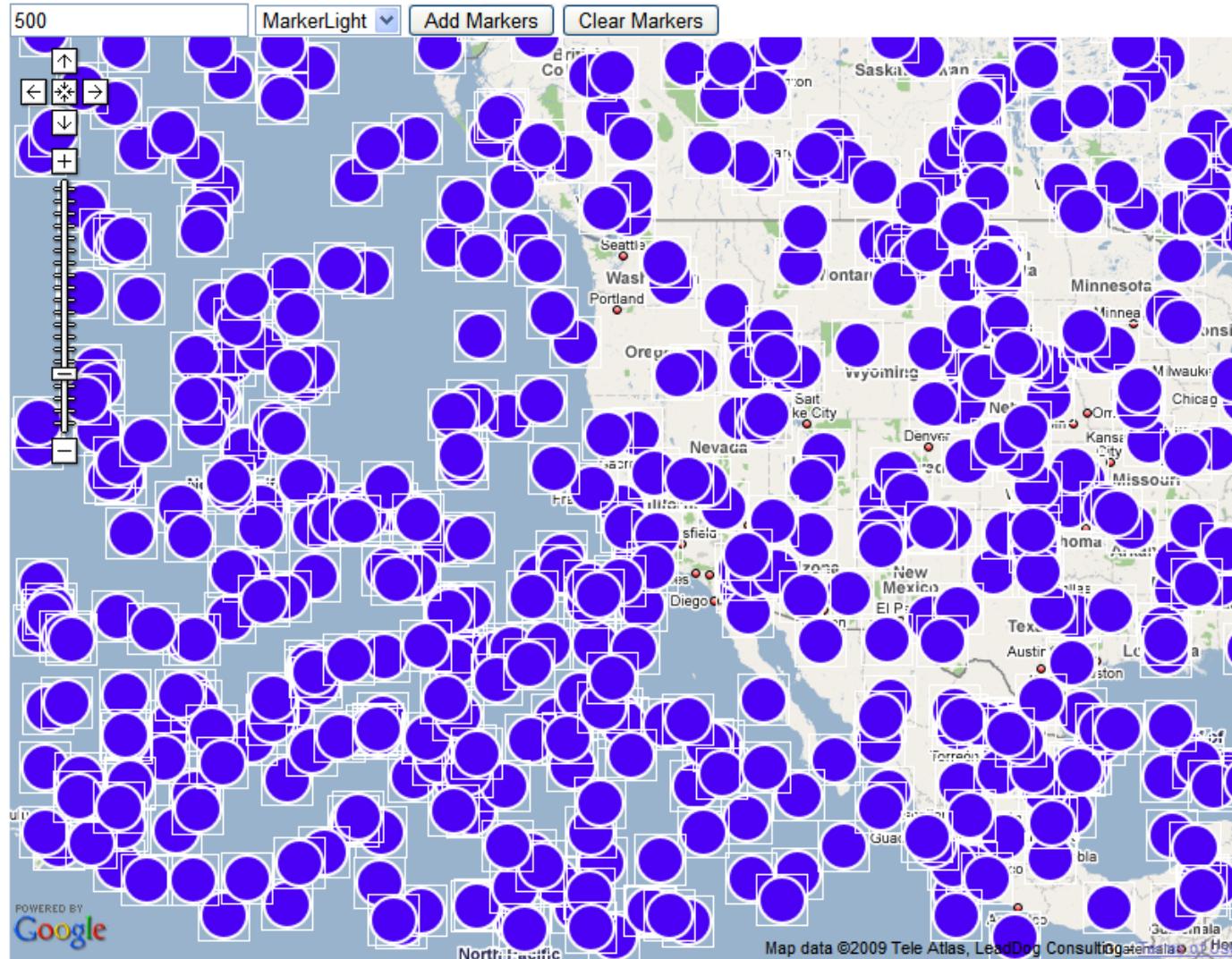
# Problem: GMarker is a Feature-full Fatty



= **<img>**\*5 + **<map>**\*1

Property	Type	Description
<code>image</code>	<code>String</code>	The foreground image URL of the icon.
<code>shadow</code>	<code>String</code>	The shadow image URL of the icon.
<code>printImage</code>	<code>String</code>	The URL of an alternate foreground icon image used for printing on browsers incapable of handling the default <code>GIcon.image</code> . Versions of IE typically require an alternative image in these cases as they cannot print the icons as transparent PNGs. Note that browsers capable of printing the default <code>image</code> will ignore this property.
<code>mozPrintImage</code>	<code>String</code>	The URL of an alternate non-transparent icon image used for printing on browsers incapable of handling either transparent PNGs (provided in the default <code>GIcon.image</code> ) or transparent GIFs (provided in <code>GIcon.printImage</code> ). Older versions of Firefox/Mozilla typically require non-transparent images for printing. Note that browsers capable of printing the default <code>image</code> will ignore this property.
<code>printShadow</code>	<code>String</code>	The URL of the shadow image used for printed maps. It should be a GIF image since most browsers cannot print PNG images.
<code>transparent</code>	<code>String</code>	The URL of a virtually transparent version of the foreground icon image used to capture click events in Internet Explorer. This image should be a 24-bit PNG version of the main icon image with 1% opacity, but the same shape and size as the main icon.
<code>imageMap</code>	<code>Number[]</code>	An array of integers representing the x/y coordinates of the image map we should use to specify the clickable part of the icon image in browsers other than Internet Explorer.

# Solution: Light-weight Marker



Many Markers Comparison

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# Redfin: Map Driven UI

- Online real estate search site
- Map drives our whole user interface
- Shows up to 500 houses at a time, so speed is critical
- We use a custom overlay to achieve performance

Redfin – Find San Francisco Bay Area Real Estate

Location:  Search Listings

Price: No min  No max  More Options

Call: 877-973-3346 | Home | Sign In

AGENTS | BUY | SELL | FORUMS | MY REDFIN

227 results (3 unmapped) Email Me New Listings

MLS listings, MLS-listed foreclosures, 1+ baths, e...

Map data ©2009 Google, [Map](#), [Atlas](#), [Terms of Use](#)

**178 San Carlos St** San Francisco, CA 94110 \$425,000

 1 of 7 Quick Map

Beds: 2 On Redfin: 5 days  
Baths: 1 Year Built: 1908  
Sq.Ft.: 1,190 Lot Size: 698  
Status: Active MLS#: 355348  
Last Sale: \$1,407,667 (02/28/2002)  
Listing: Brown & Co. Real Estate

[View Details](#) [Go See It](#)

[Add to Favorites](#) [Email Listing](#)

Our Bay Area home-buyers saw 1,194 homes in April. [How many made offers?](#)

**ADDRESS**

178 San Carlos St	LOCATION	PRICE	BEDS	BATHS	SQFT	S/SQFT	DAYS
	Inner Mission	\$425,000	2	1	-	-	5
22 Hancock St	Eureka Valley/Dolores	\$1,528,000	3	2	2,000	\$764	69
707 KANSAS St <a href="#">OPEN</a>	San Francisco	\$800,000	2	1	1,190	\$672	7
707 Kansas St <a href="#">OPEN</a>	Potrero Hill	\$800,000	2	1	1,190	\$672	7
439 Arkansas St <a href="#">OPEN</a>	Potrero Hill	\$1,079,000	3	2	2,307	\$468	62
617 CAROLINA St #60	San Francisco	\$750,000	2	2	1,100	\$682	71

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LISTING STATS: \$679,000 2.1 1.8 1,535 \$588 59

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Report a Problem

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# Demo: Custom Overlay

# Custom Overlay: Code

First, subclass GOverlay:

```
var SuperMarker = function() {  
  //This will be the pseudo-marker objects  
  this.layer = null;  
  
  //This will hold the layer DOM object  
  this.node = null;  
}  
  
SuperMarker.prototype = new GOverlay();
```

# Custom Overlay: Code

Next, implement `initialize`, which is called by the API:

```
SuperMarker.prototype.initialize = function(map) {  
  this.map_ = map;  
  
  //Create a DIV dom node for the layer  
  this.node = document.createElement("div");  
  
  // add the node to the map marker pane.  
  this.map_.getPane(G_MAP_MARKER_PANE)  
  .appendChild(this.node);  
  
  this.redraw(true);  
};
```

# Custom Overlay: Code

Next implement draw (note use of text array + innerHTML):

```
SuperMarker.prototype.draw = function(layer) {  
  var i = layer.markers.length;  
  var textArray = [];  
  while (i--) {  
    var divPixel = this.map_.fromLatLngToDivPixel(layer.markers[i].point);  
    textArray.push("<div style='left:");  
  
    //Snip a lot more HTML addition to textArray  
  }  
  
  //Insert the HTML into the overlay  
  this.node.innerHTML = textArray.join('');  
};
```

# Custom Overlay: Code

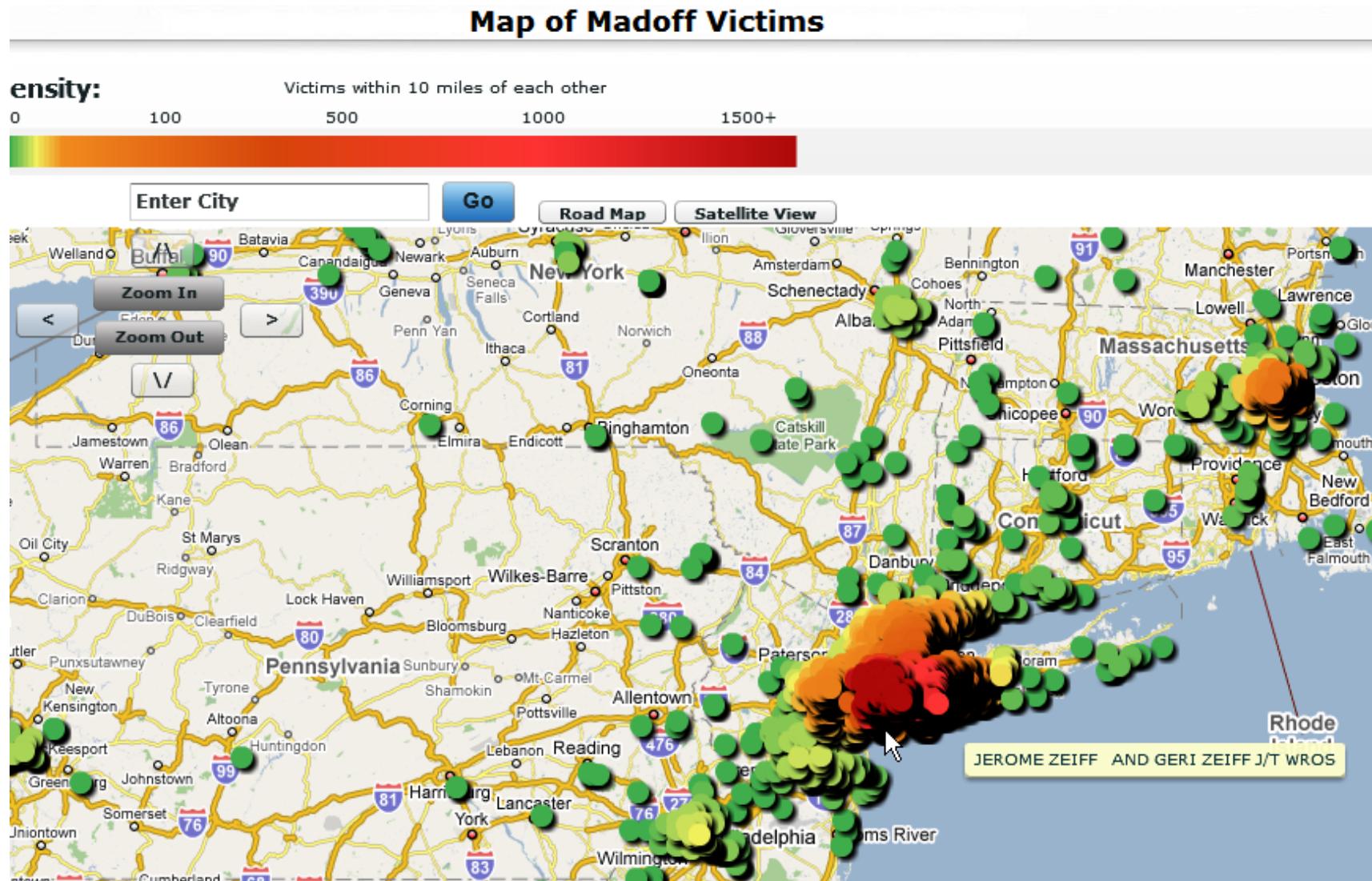
Finally, add just one SuperMarker to the GMap, and call the SuperMarker's draw method when you want to draw pseudo-markers:

```
var superMarker = new SuperMarker();
map.addOverlay(superMarker);

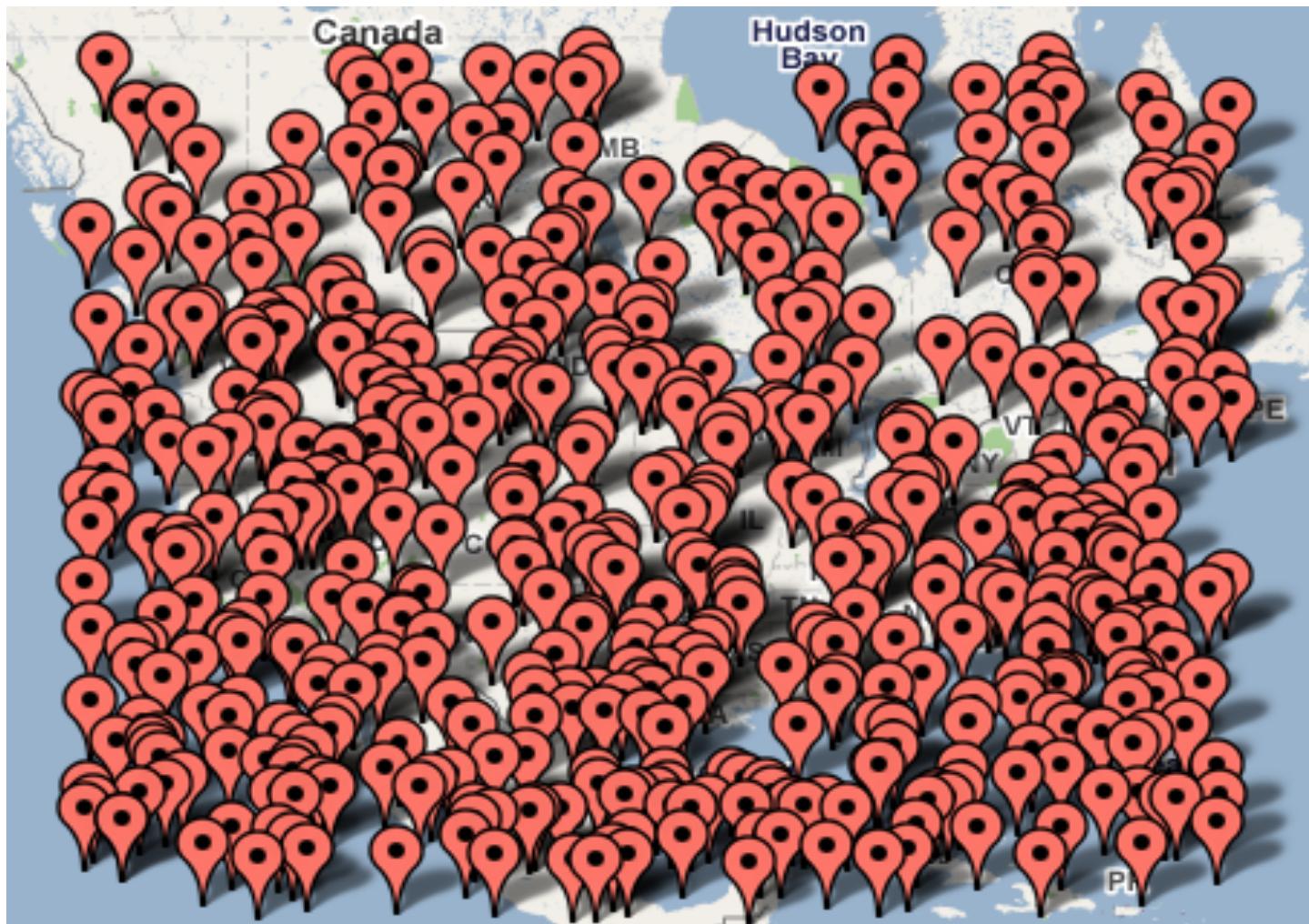
// draw one marker at 10' lat 10' lon
layer = {markers:[id:1, point:new GLatLng(10, 10)]};
superMarker.draw(layer);

// do some more stuff, now draw a different marker
layer = {markers:[id:2, point:new GLatLng(20, 20)]};
superMarker.draw(layer);
```

# Solution: Light-weight Marker.. for Flash, too!



# Problem: Too Many DOM Nodes



# Solution: Clustering

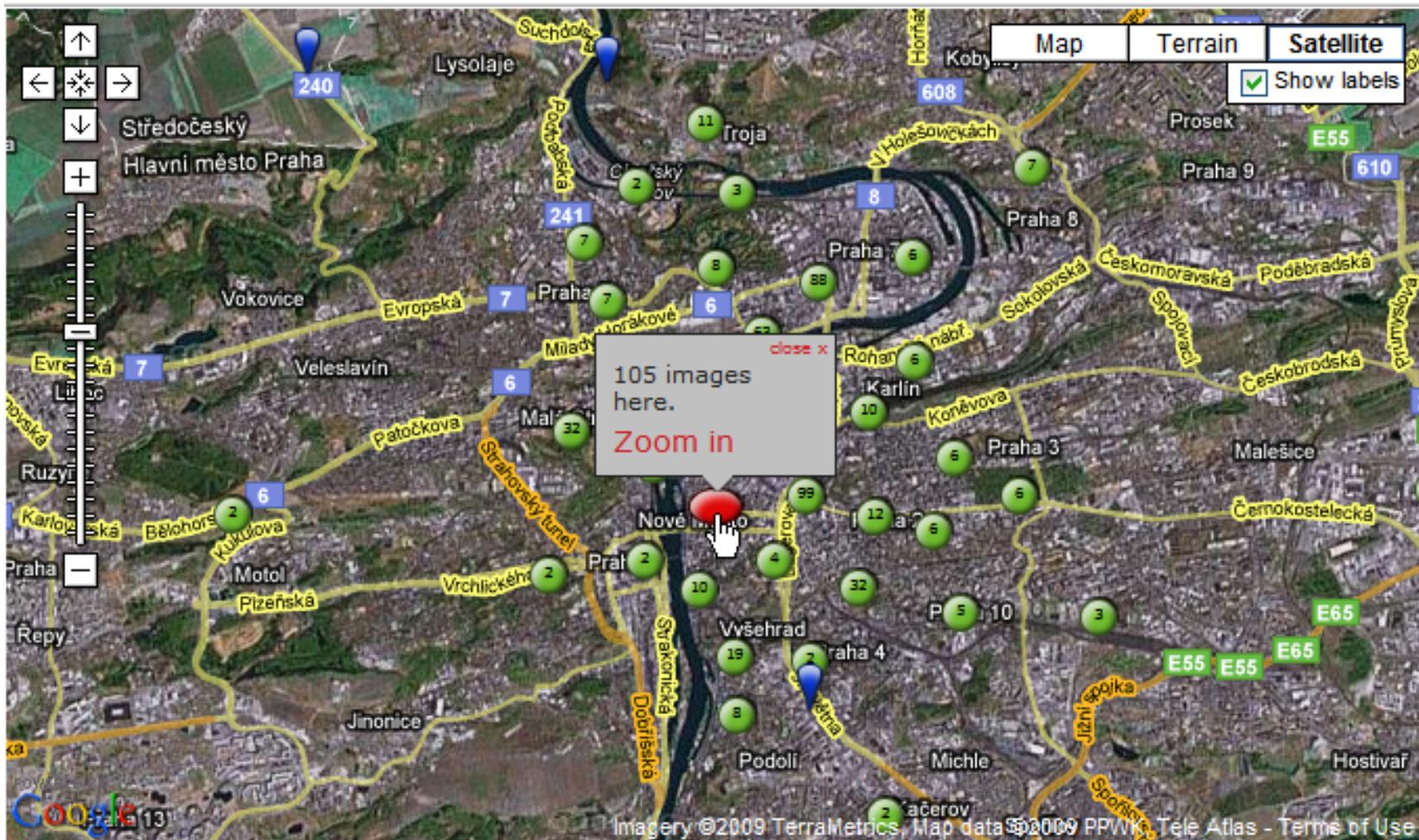
CURRENTLY DISPLAYING: Last 100 articles published



AuthorMapper

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# Solution: Server-side Clustering



# 360Cities

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Day 2009

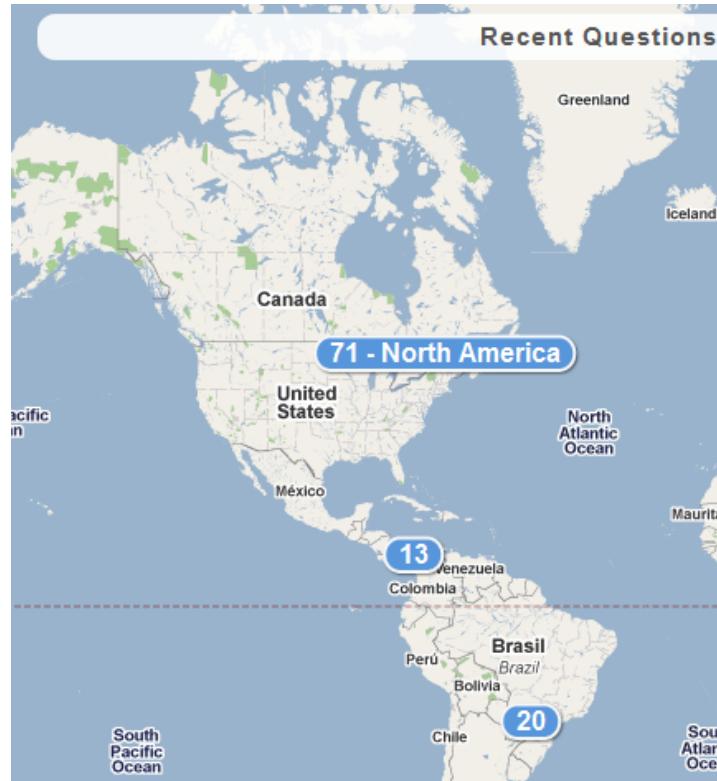
# Solution: Client-Side Clustering



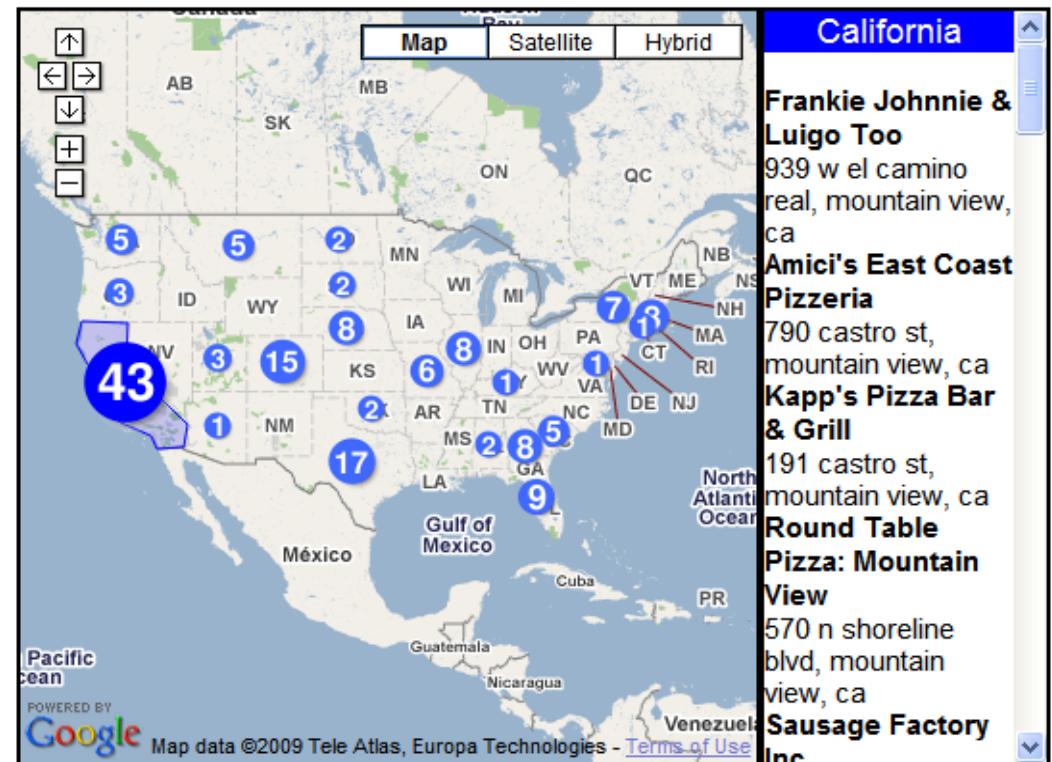
MarkerClusterer

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# Solution: Regional Clustering

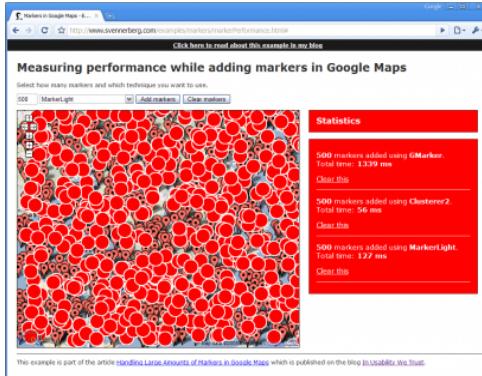


# Travellr



# US Pizzas

# More Clustering Resources



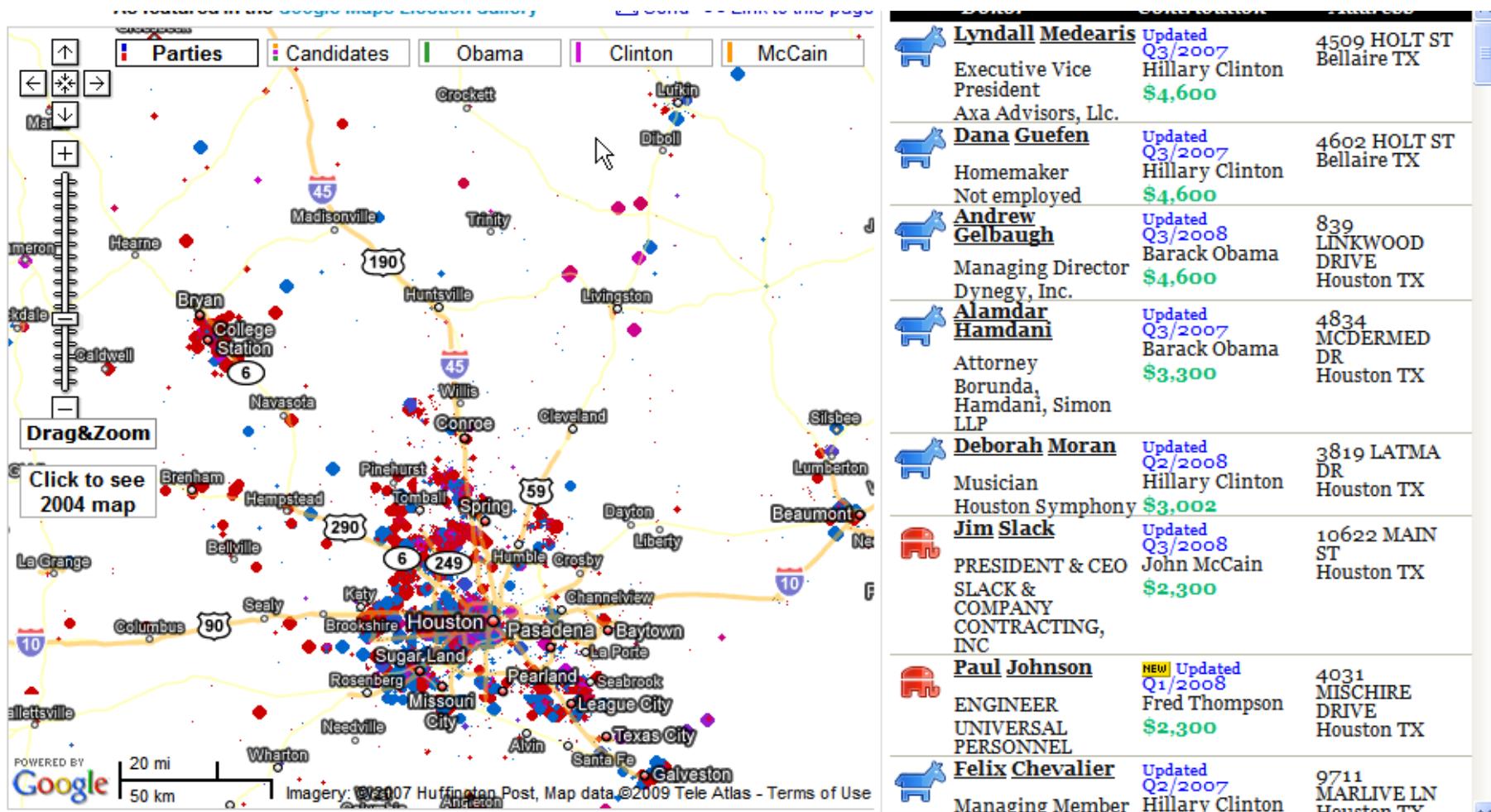
## [Article: Handling Large Amounts of Markers](#)

## [Python k-means](#)



## [Maptimize](#)

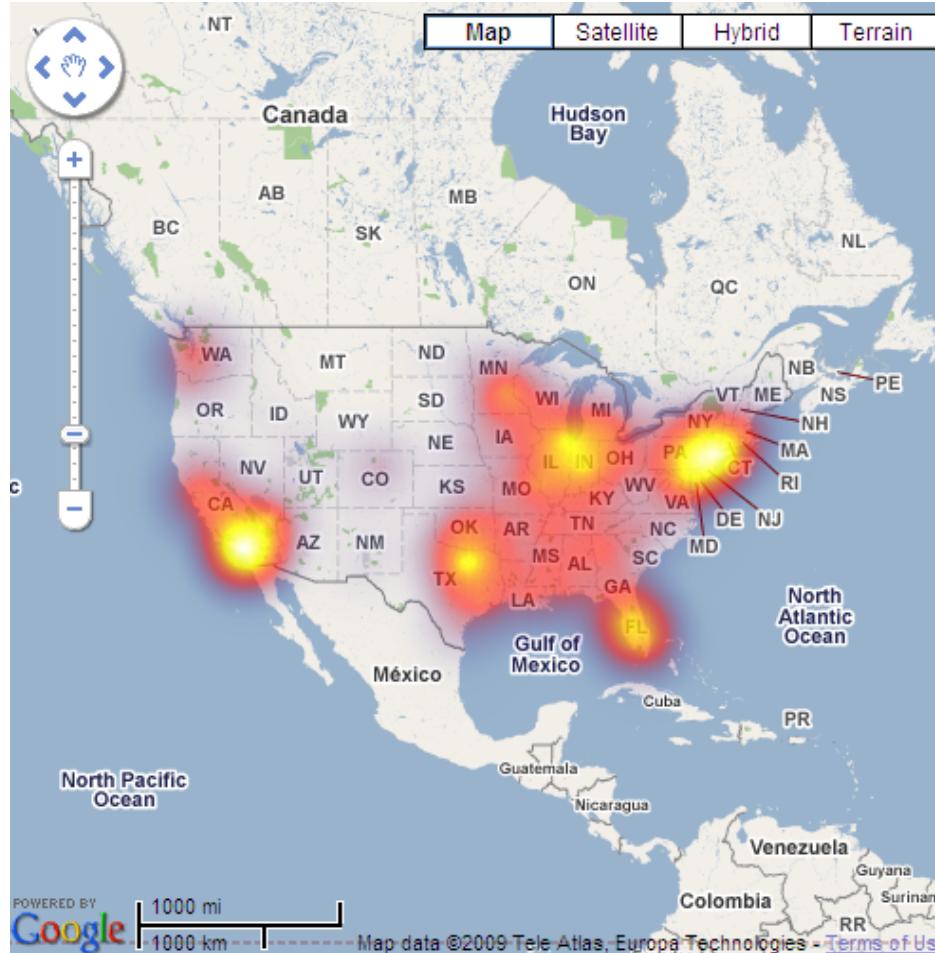
# Solution: View-only Visualization



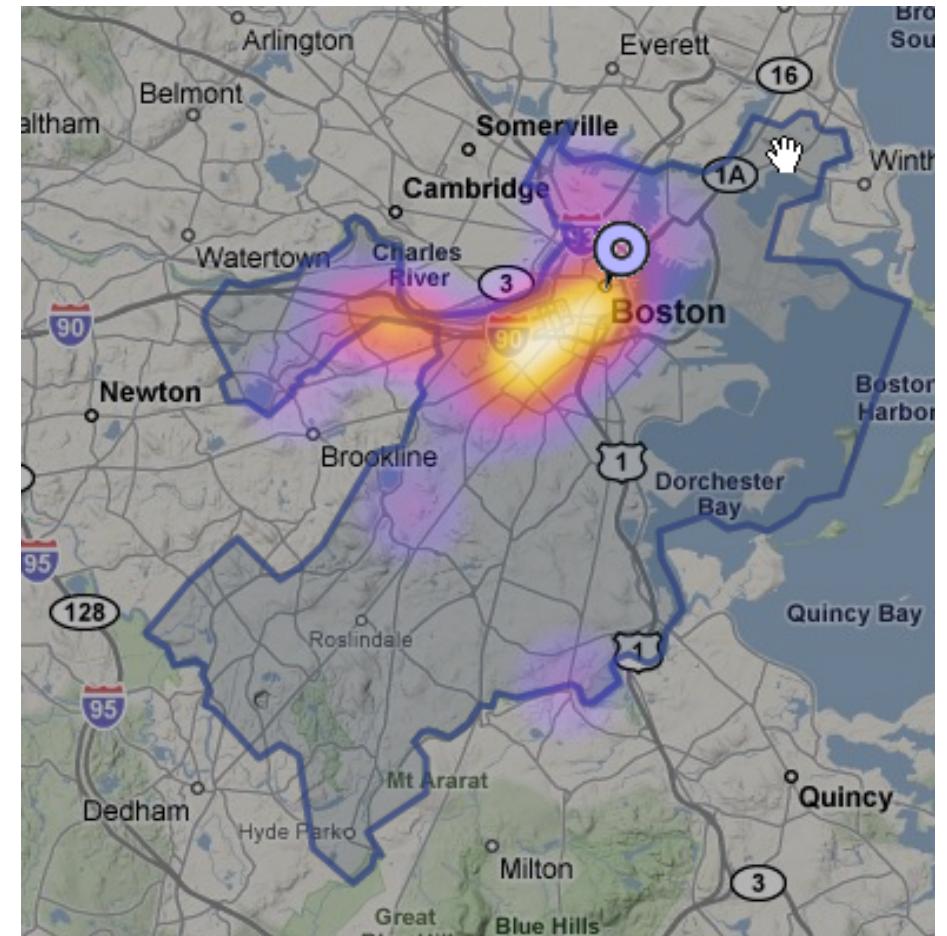
[FundRace](#)

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# Solution: View-only Visualization



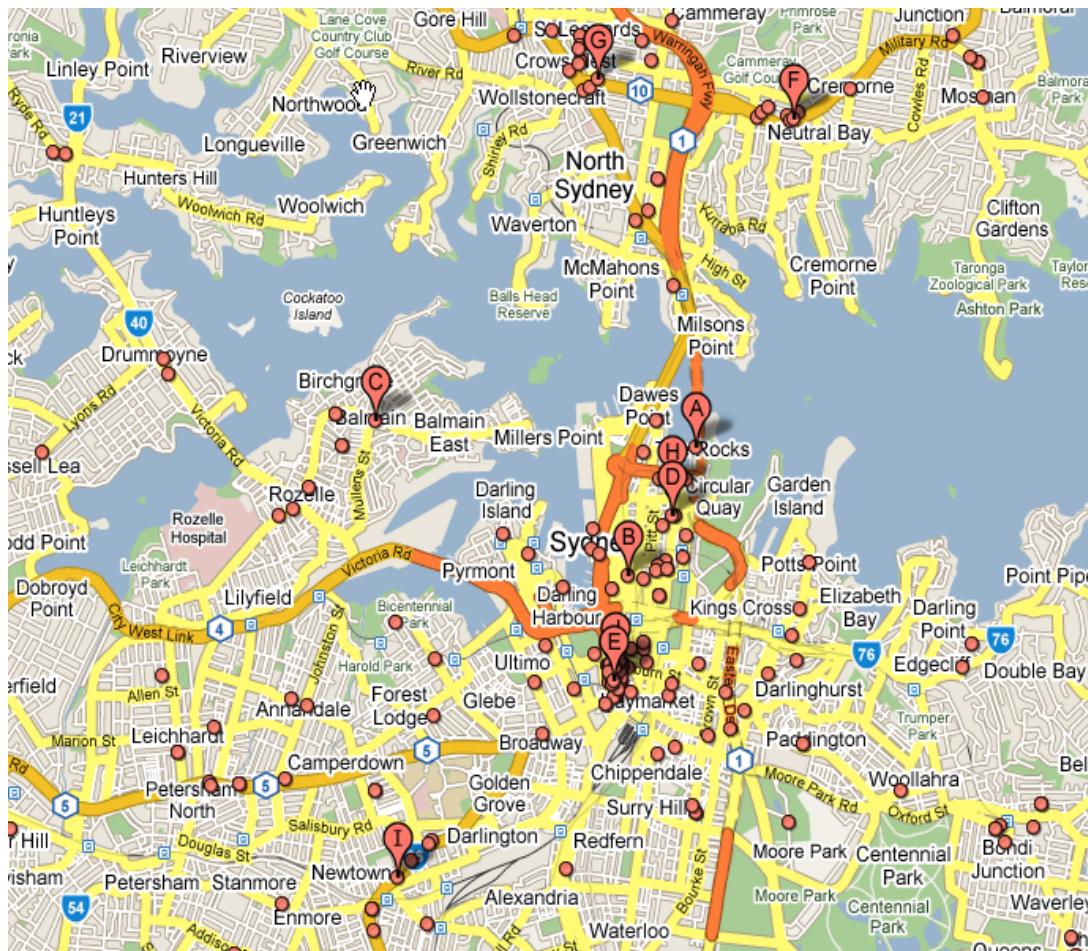
[HeatMapAPI](#)



[Boston Pizza](#)

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# Solution: Tiny Clickable Markers



## Clickable Tile Layer

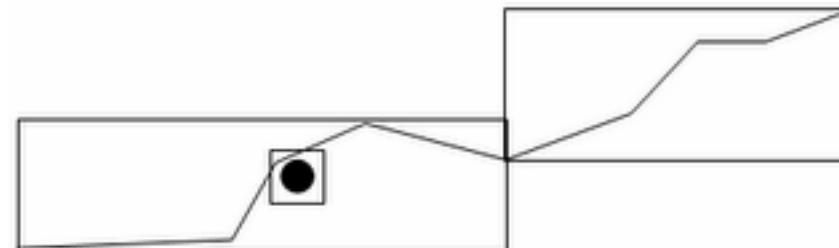
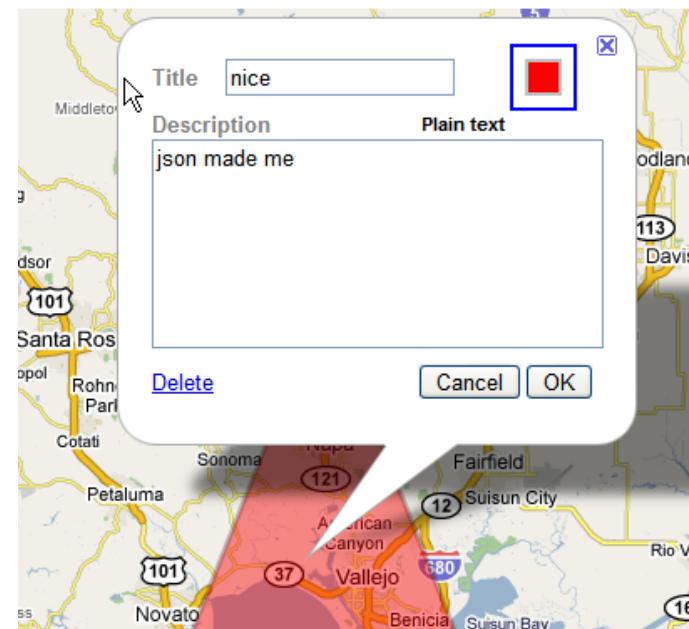
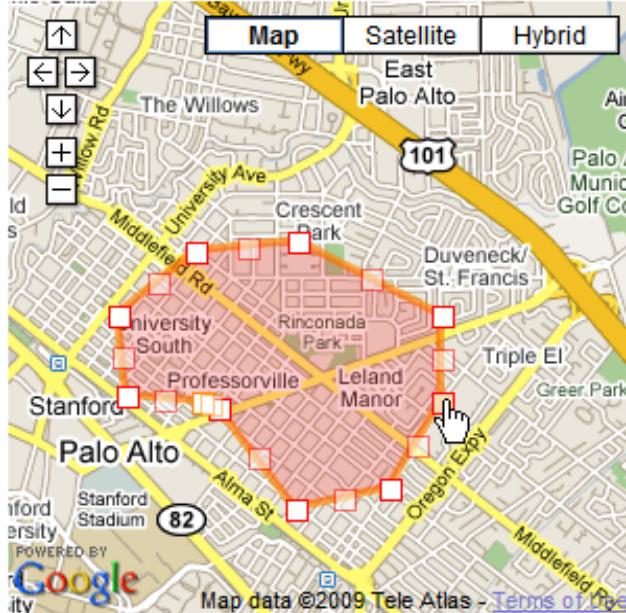
Google Local Search

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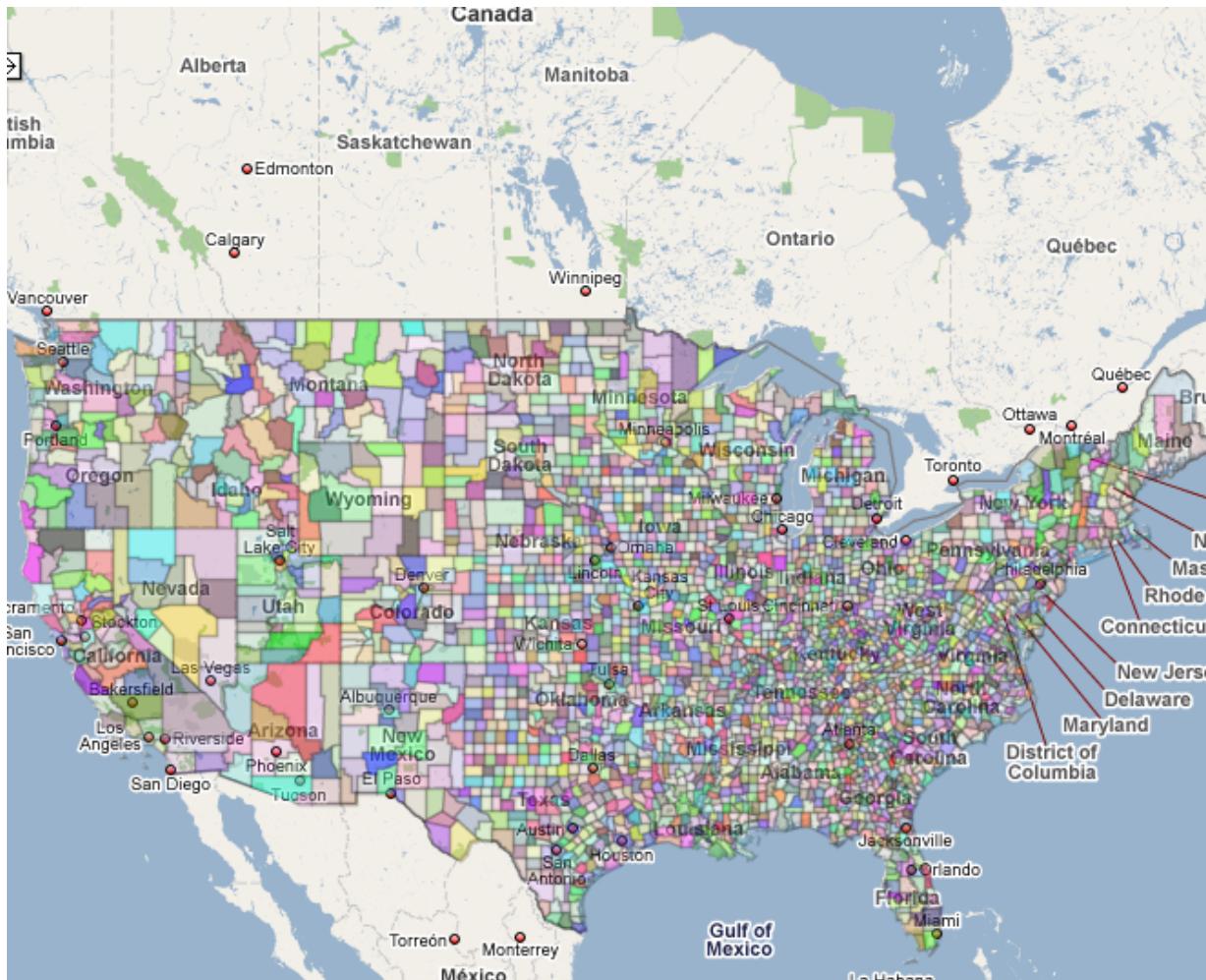
# Rendering Large Polys

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# Problem: GPolygon is a Full-Featured Fatty



# Solution: Lightweight Polys



All 3199 Counties (slow in IE!)

Animate

nowhere

0.000 start gonzo.redraw

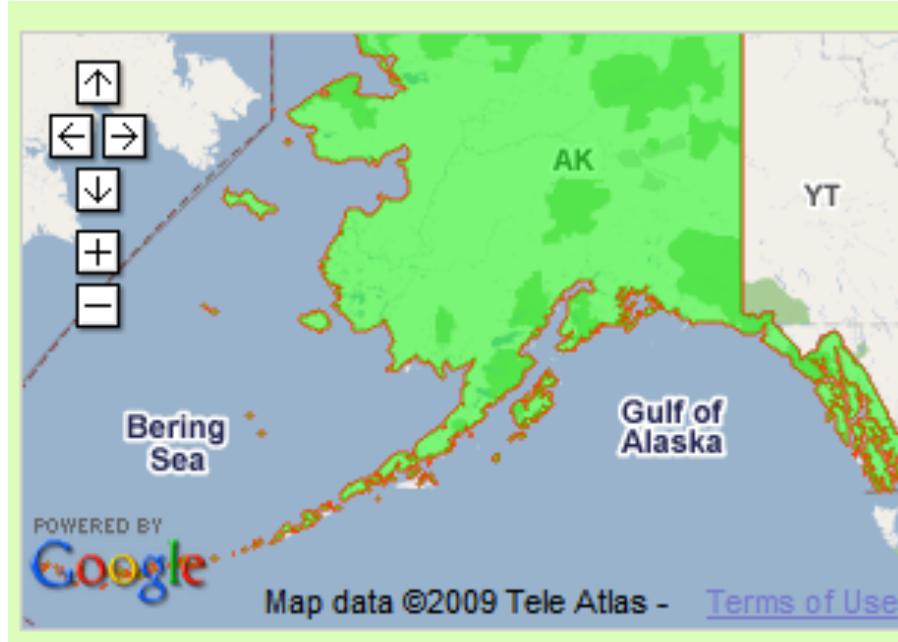
0.298 end gonzo.redraw

0.000 3199 places, 3357 shapes, 33557 points

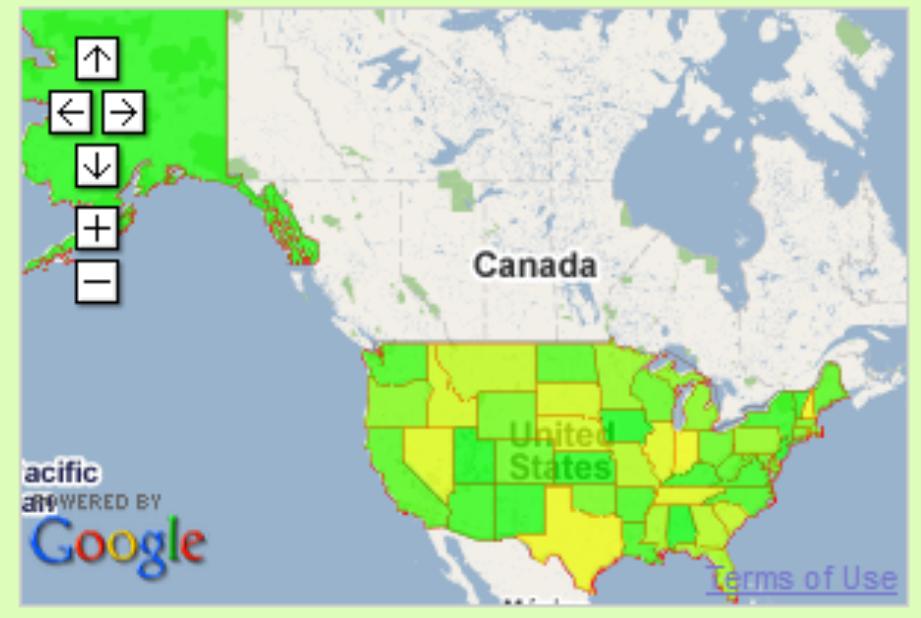
Polygonzo

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# Problem: Too Many Points

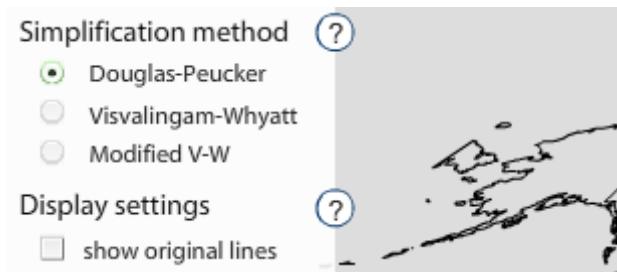


13500 points



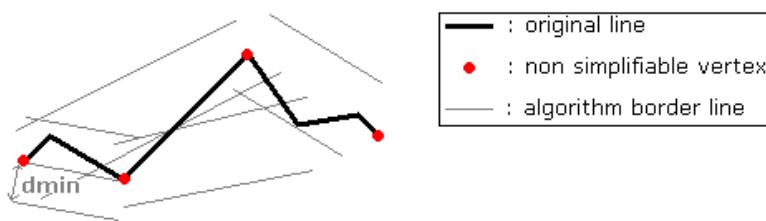
2200 points

# Data Simplification



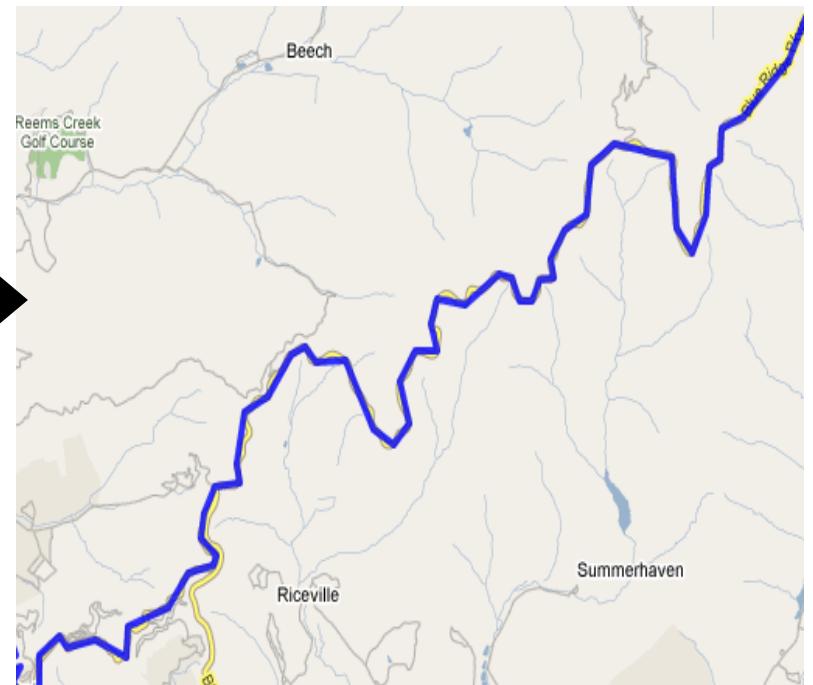
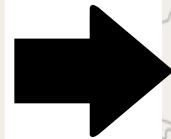
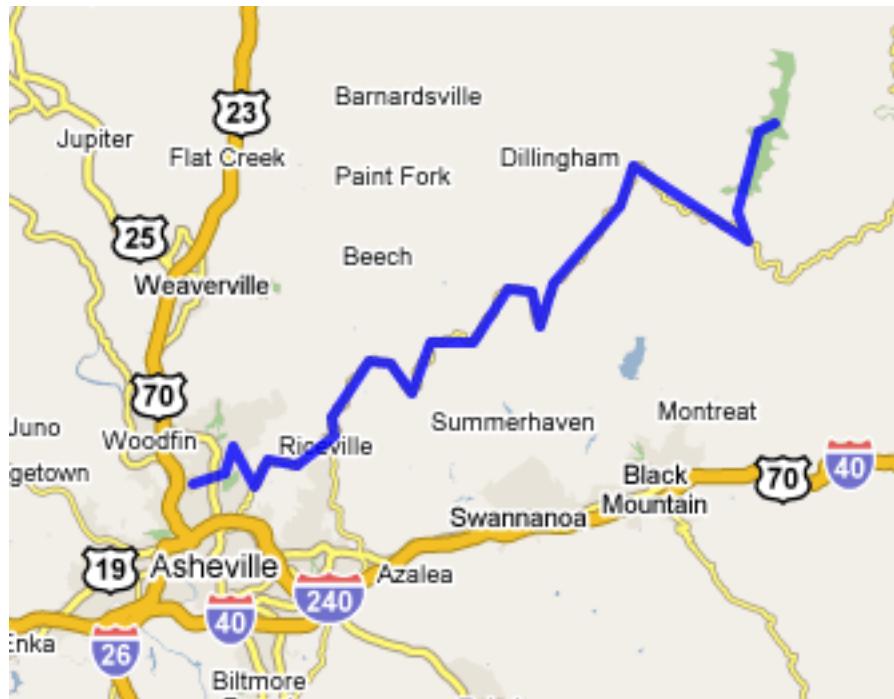
[MapShaper](#)  
[MapSimplification](#)

A short example of the Douglas-Peucker algorithm  
on a polyline



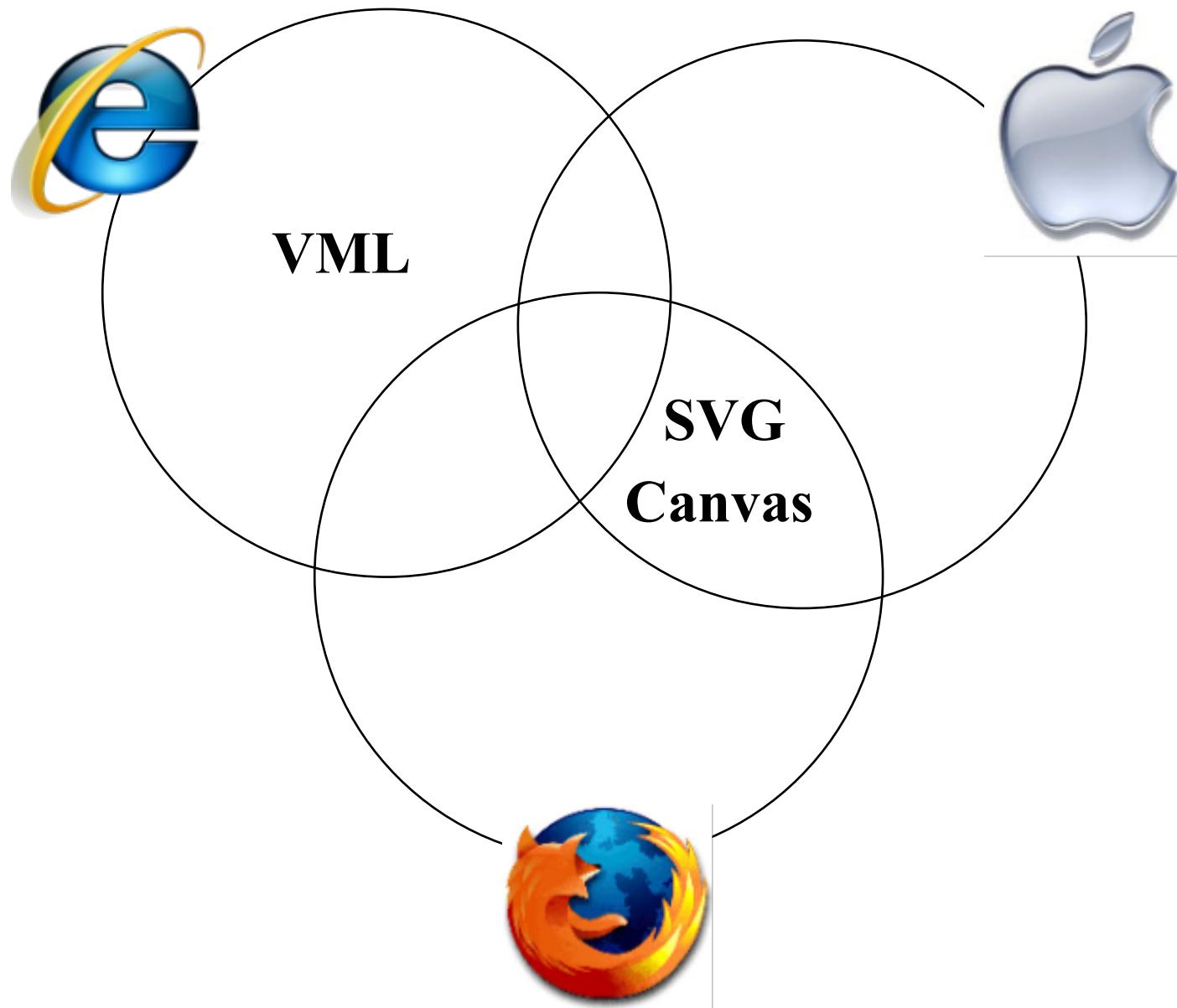
[Mapping the Votes: Resources](#)

# Solution: Encoded Polys

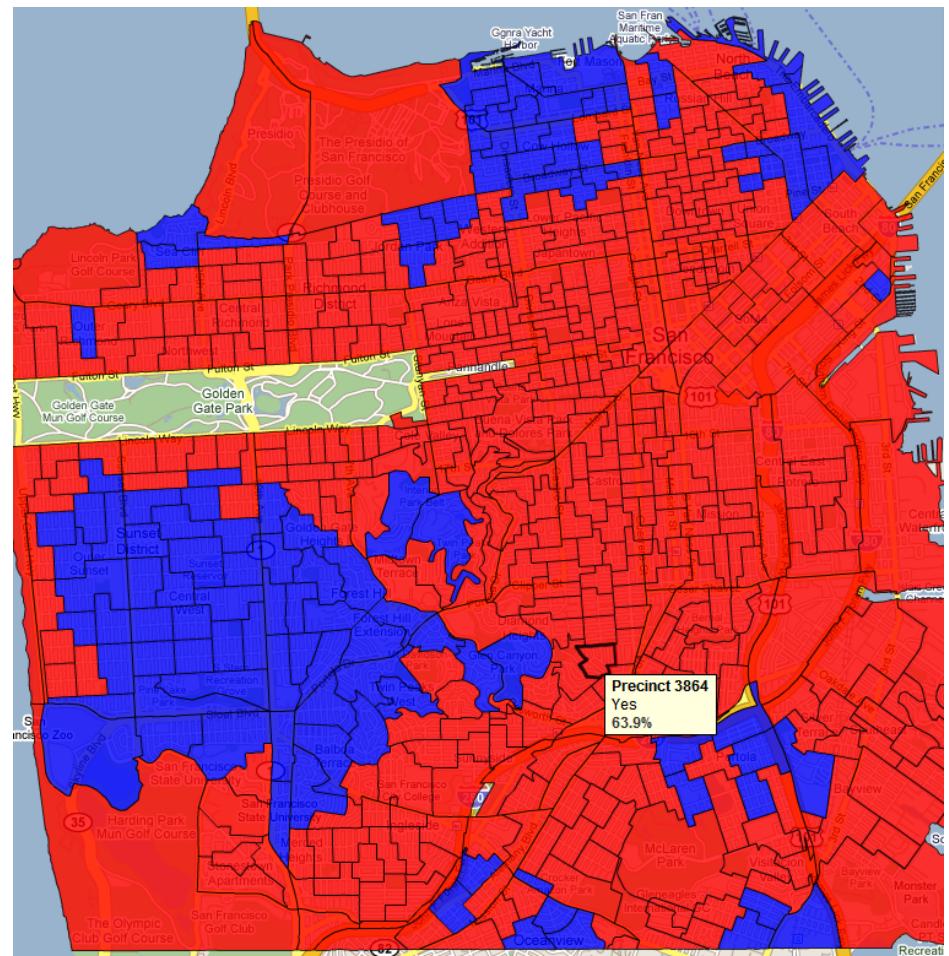


Encoded Poly Example

# Browsers + Vector Graphics = :(



# Solution: Flash API

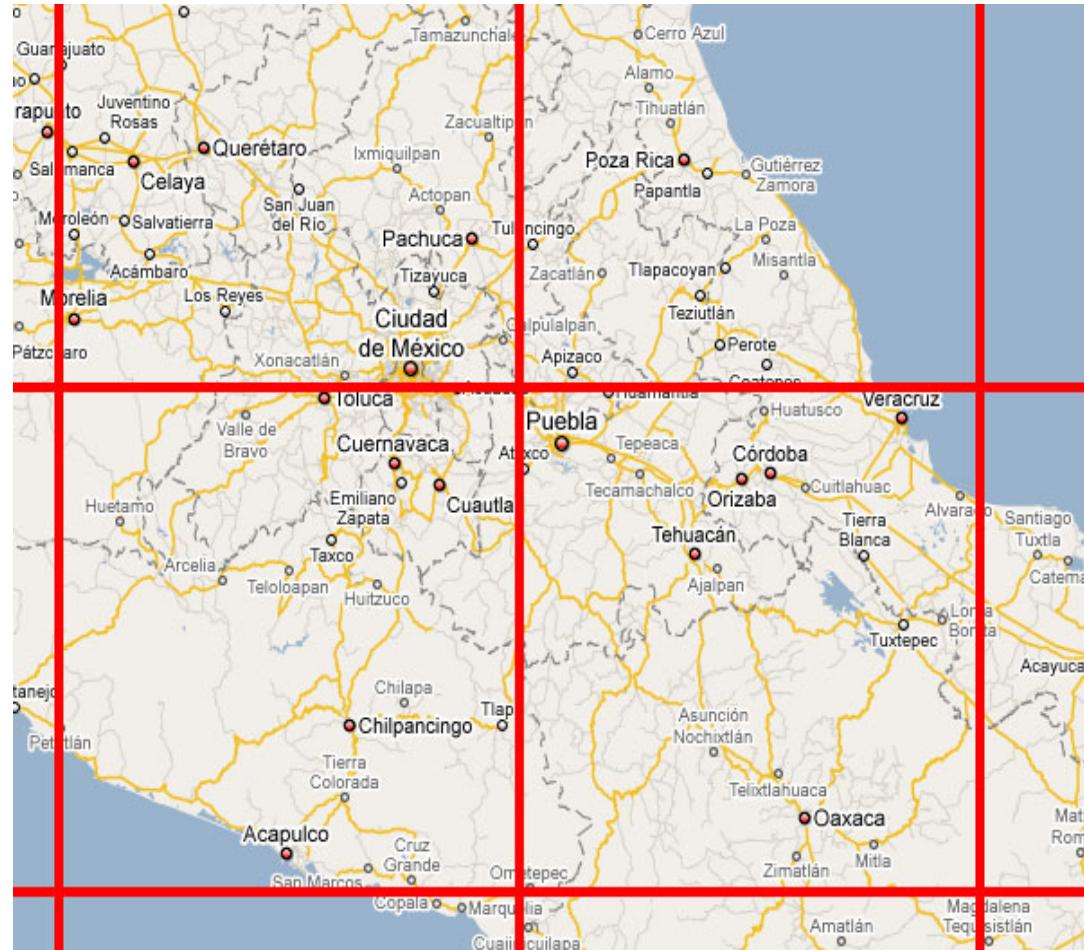


Thematic Mapping  
(Compare to the [Javascript API](#))

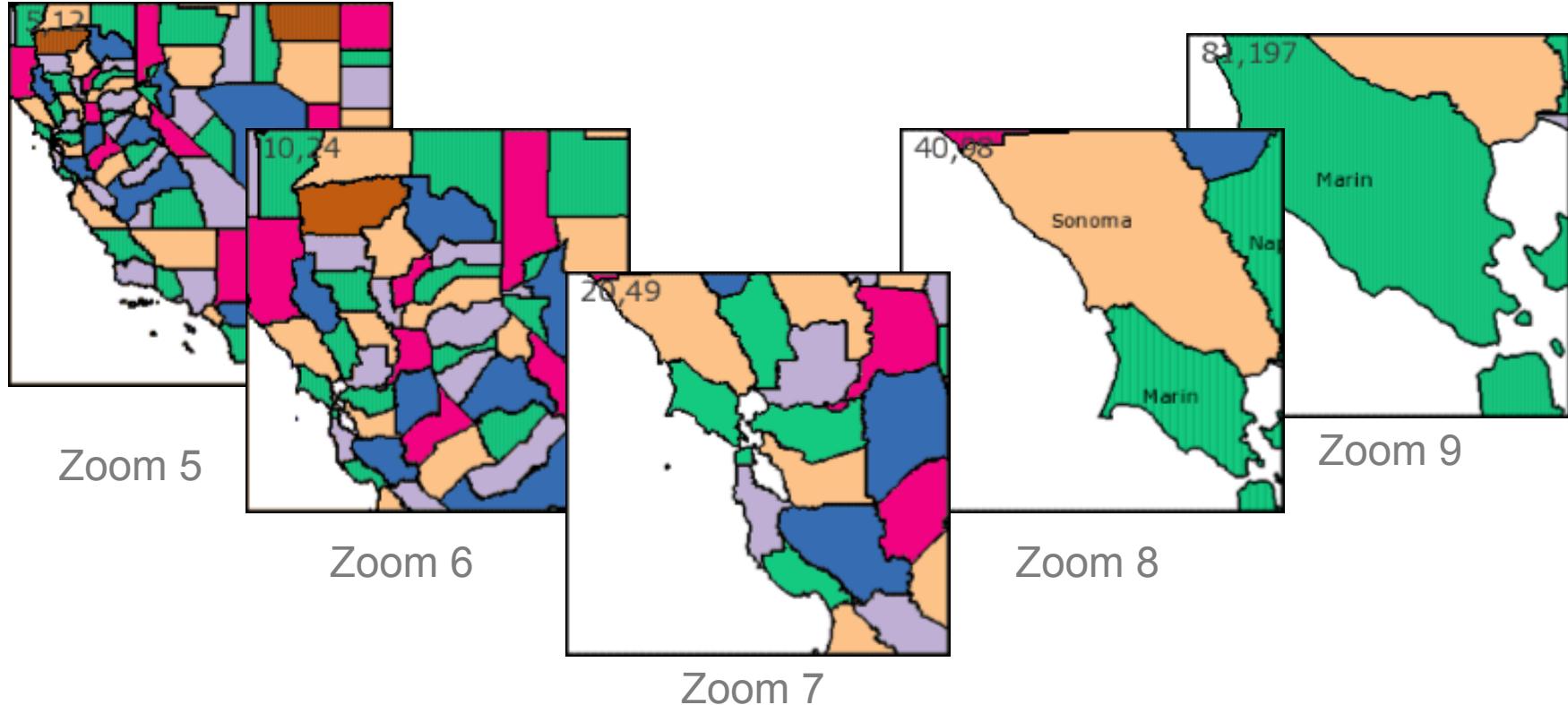
HowSFVotes

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# Solution: Tile Layers



# Static data tiles: Counties Example



## Generated County Tiles

- Tiles generated with Perl script using data in PostGRE database for zoom levels 5-9

# Qualification

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# Get Qualified.

<http://code.google.com/qualify>

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**Gadgets and Gadget Ads and Maps APIs** are currently supported.

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# Questions

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A vertical decorative sidebar on the left side of the slide features a repeating pattern of five icons: a green gear, a blue speech bubble, a yellow person, a red briefcase, and a green Android robot head.

Learn more at <http://code.google.com/apis/maps/>

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