



Google  
Developer  
Day 2009





# Performance Tips for Maps API Mashups

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Google  
Developer  
Day 2009



“Every millisecond counts.”

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Google User Experience Guidelines

# Loading the Javascript API

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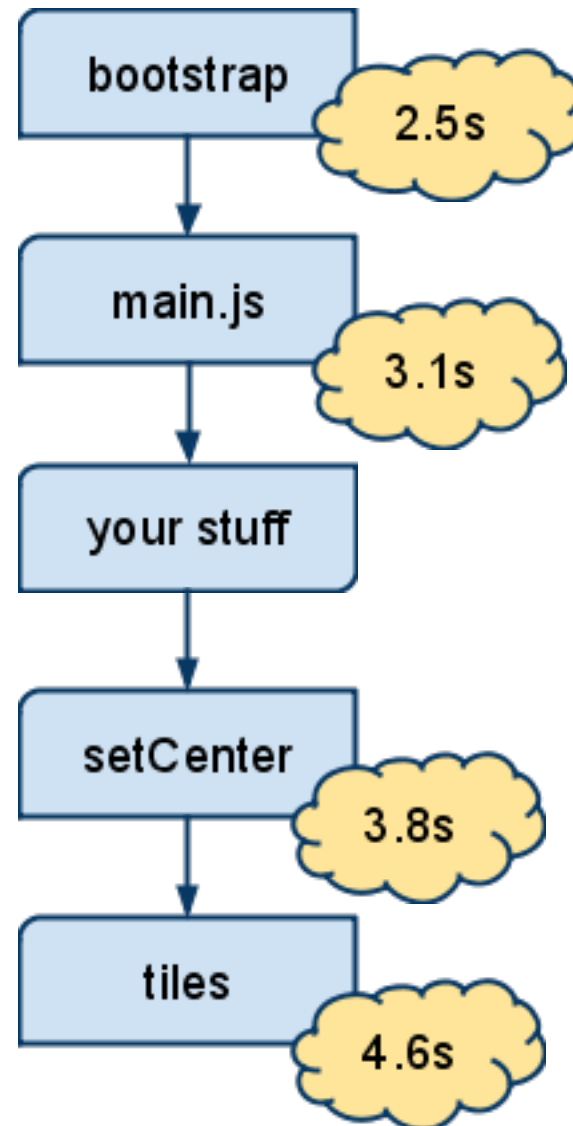


# Lots of Resources to Display a Map



Console	HTML	CSS	Script	DOM	Net
+	GET	maps?file=api&v=2&key=AB	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
<b>5 requests</b>					<b>92 KB</b>

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



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

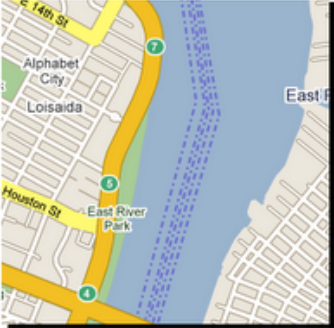
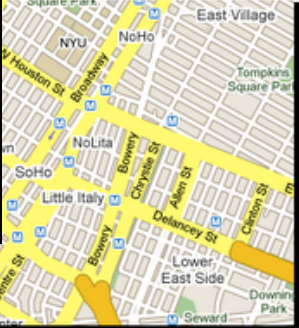
# iPhone and Android



# Too Many Files To Download

bootstrap + main.js

78KB



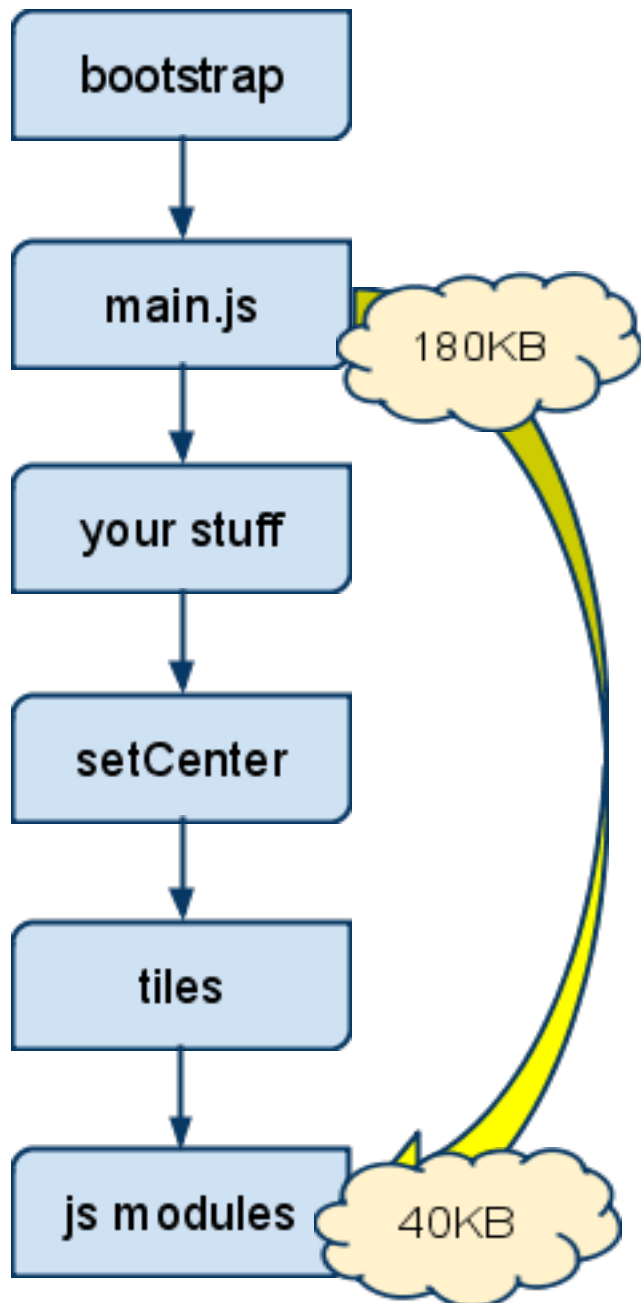
202KB

Demo: [Barry Hunter's](#)

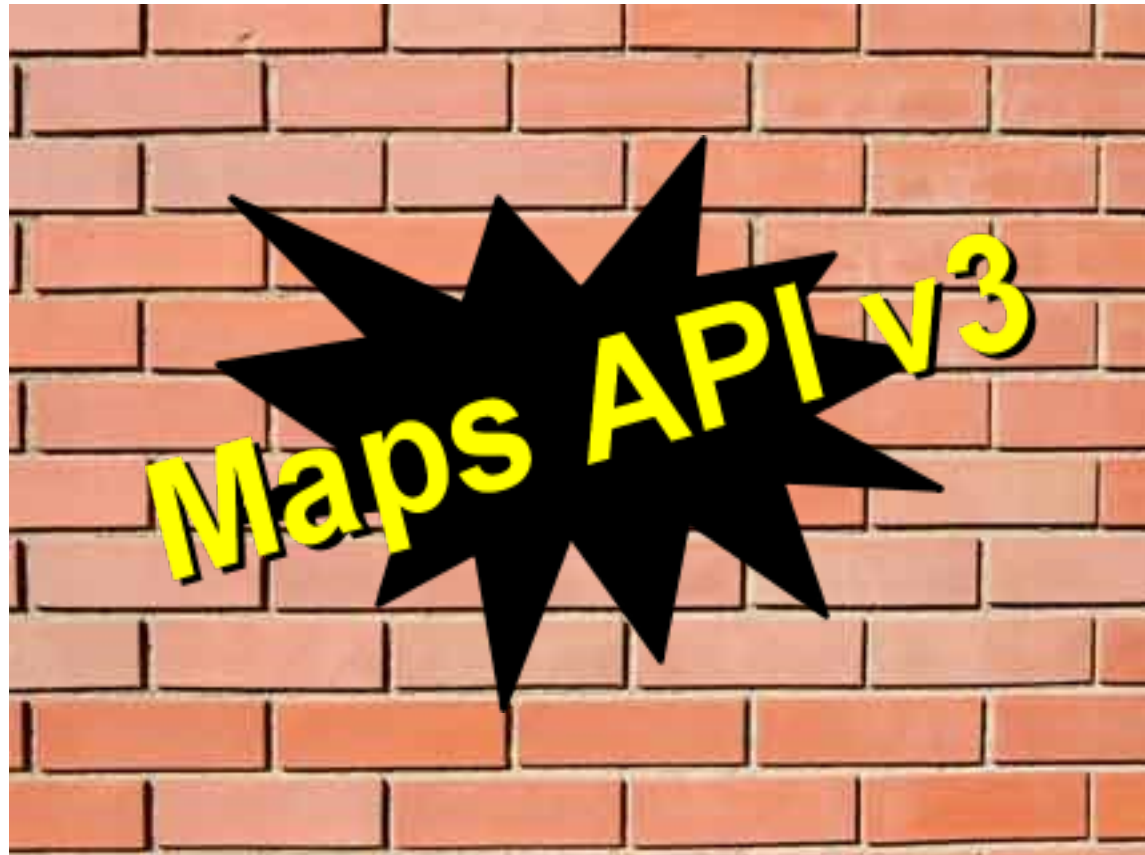




# Delay Loading JavaScript



# Bringing Down The Wall



# Maps API V3 (labs)

[Maps API v3 Docs](#)

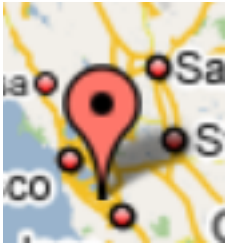
- Latency: #1 priority
  - Aggressive modularization
    - Latency features
      - iPhone / Android

# Displaying Many Markers

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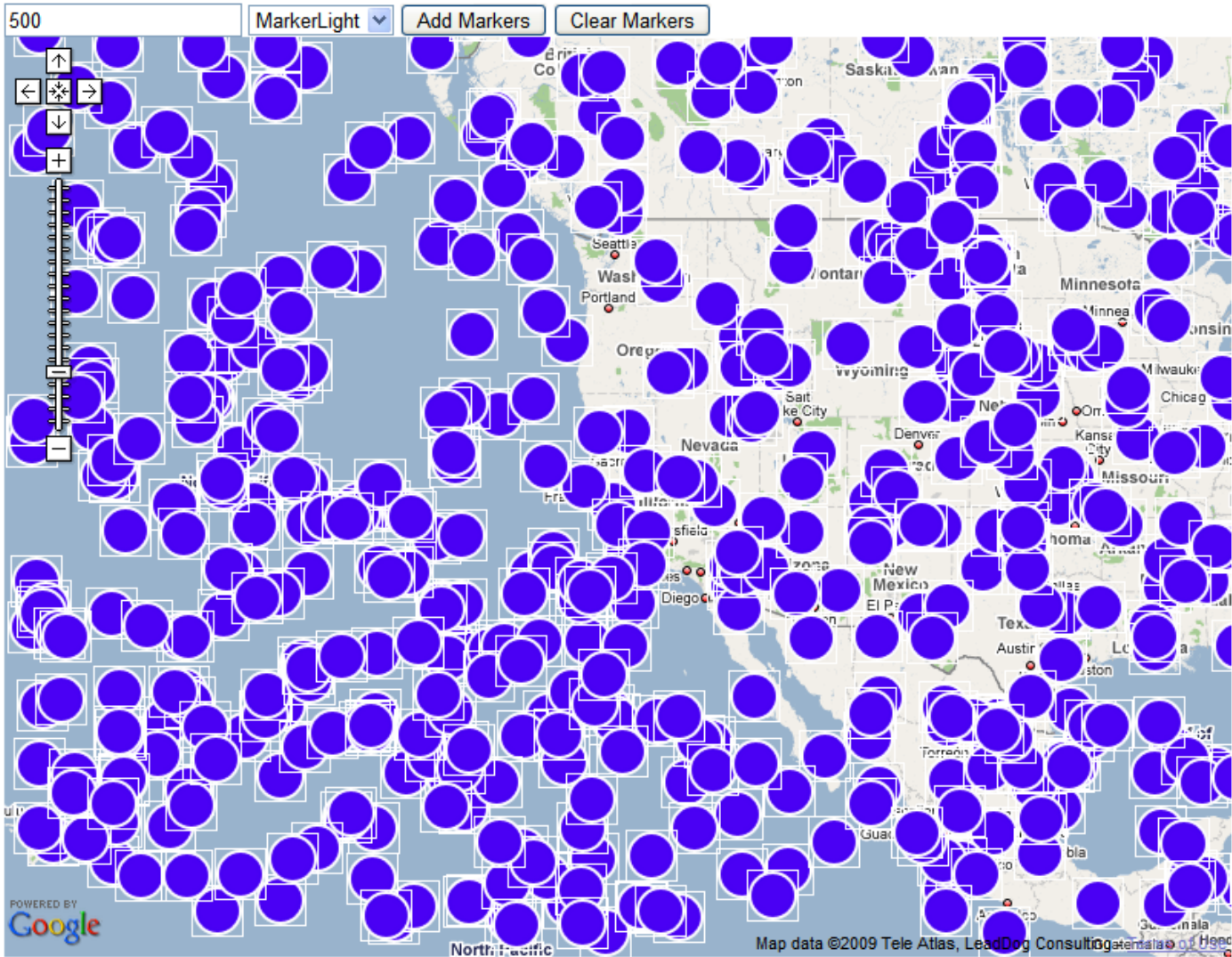
# Problem: GMarker is a Feature-full Fatty



$$= \langle \text{img} \rangle * 5 + \langle \text{map} \rangle * 1$$

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 <a href="#">GIcon.image</a> . 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 <a href="#">GIcon.image</a> ) or transparent GIFs (provided in <a href="#">GIcon.printImage</a> ). 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

# 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

http://www.redfin.com/search?lat=37.76979880604299&long=-122.41739273071289&market=sanfrancisco&num\_baths=1&sf=1,2&sta

Location:  Search Listings

Price:  to  Beds:  More Options

AGENTS | BUY | SELL | FORUMS | MY REDFIN

227 results (3 unmapped) Email Me New Listings  
MLS listings, MLS-listed foreclosures, 1+ baths, e...

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

Beds: 2 On Redfin: 5 days  
Baths: 1 Year Built: 1996  
Sq.Ft.: - Lot Size: -  
\$/Sq.Ft.: - MLS#: 356348  
Status: Active  
Last Sale: \$1,407,667 (02/28/2002)  
Listing: Brown & Co. Real Estate

ADDRESS	LOCATION	PRICE	BEDS	BATHS	SQFT	\$/SQFT	DAYS
178 San Carlos St	Inner Mission	\$425,000	2	1	-	-	5
22 Hancock St	Eureka Valley/Dolore	\$1,528,000	3	2	2,000	\$764	69
707 KANSAS St	San Francisco	\$800,000	2	1	1,190	\$672	7
707 KANSAS St	Potrero Hill	\$800,000	2	1	1,190	\$672	7
439 Arkansas St	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
LISTING STATS:		\$679,000	2.1	1.8	1,535	\$568	59

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# Demo: Custom Overlay

# Custom Overlay: Code

First, subclass GOverlay:

```
var SuperMarker = function() {  
  //This will 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):

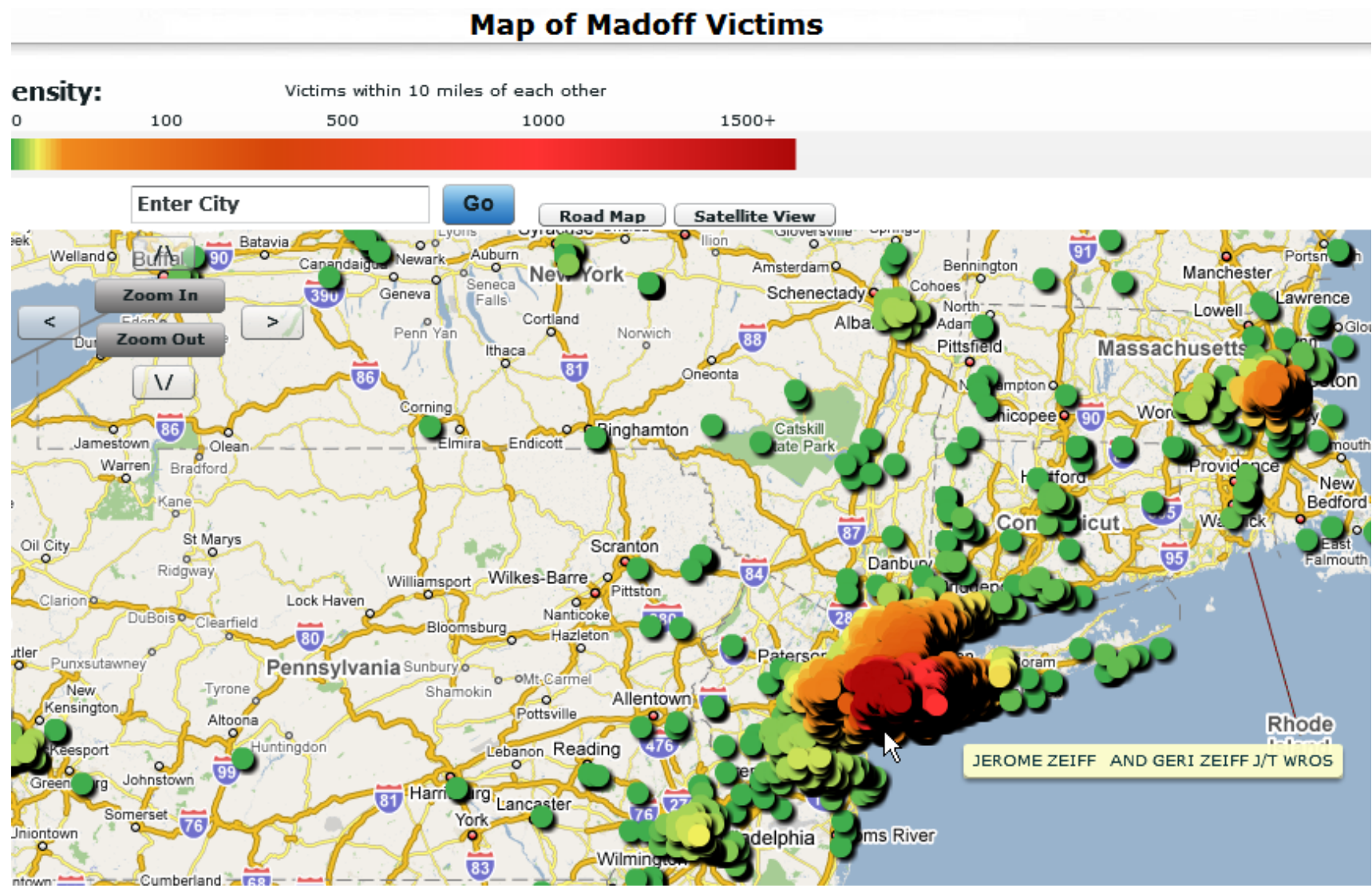
```
SuperMarker.prototype.draw = function(layer) {  
  var i = layer.markers.length;  
  var textArray = [];  
  while (i--) {  
    var divPixel = this.map_.fromLatLngToDivPixel(layer.markers[i].point);  
    textArray.push("<div style='left:'");  
  
    //Snip a lot more HTML addition to textArray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

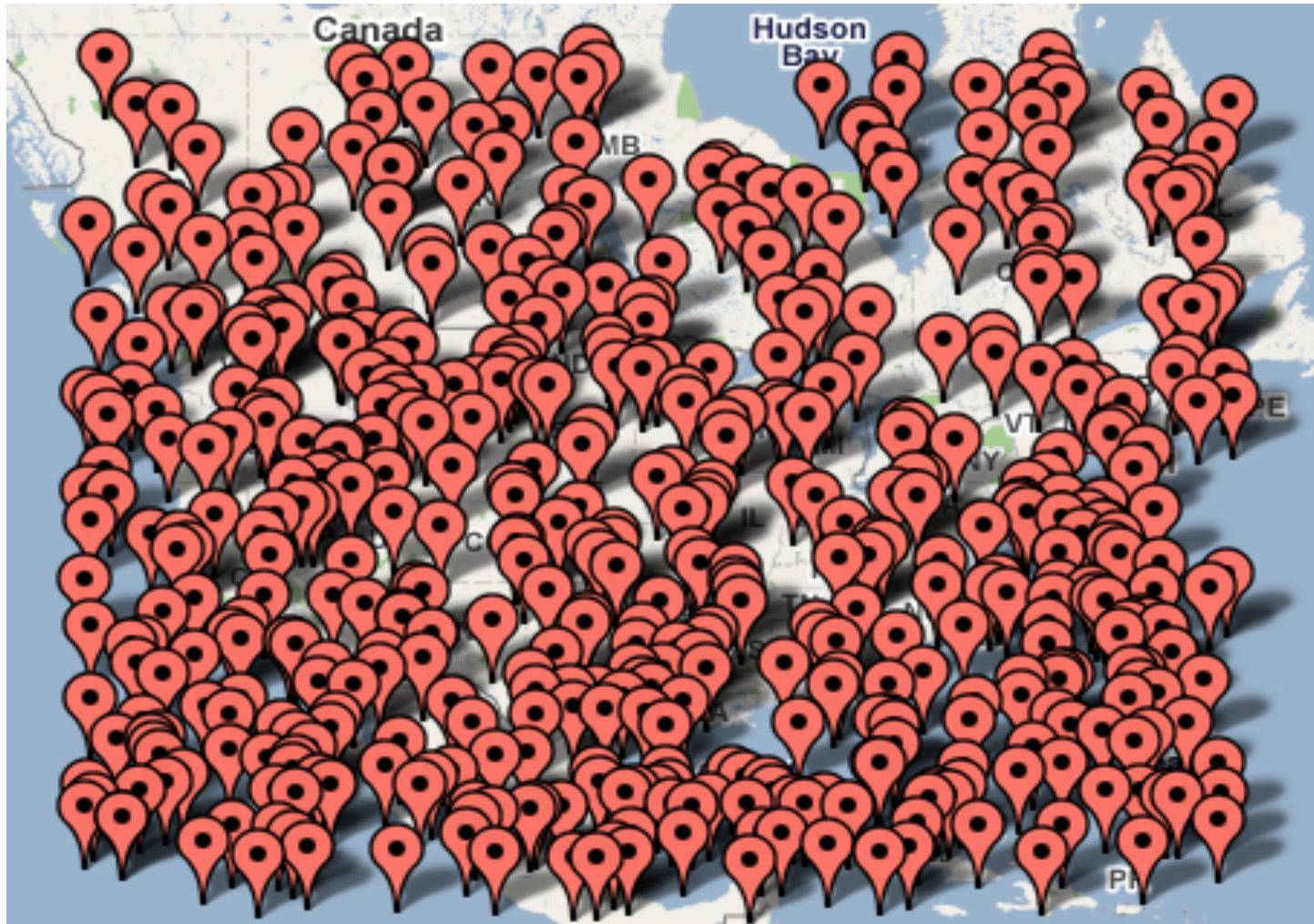
```
var superMarker = new SuperMarker();  
map.addOverlay(superMarker);  
  
// draw one marker at 10' lat 10' lon  
layer = {markers:[id:1, point:new GLatLng(10, 10)]};  
superMarker.draw(layer);  
  
// do some more stuff, now draw a different marker  
layer = {markers:[id:2, point:new GLatLng(20, 20)]};  
superMarker.draw(layer);
```

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



[MadoffMap](#)

# Problem: Too Many DOM Nodes



# Solution: Clustering

CURRENTLY DISPLAYING: Last 100 articles published



[AuthorMapper](#)



# Solution: Server-side Clustering



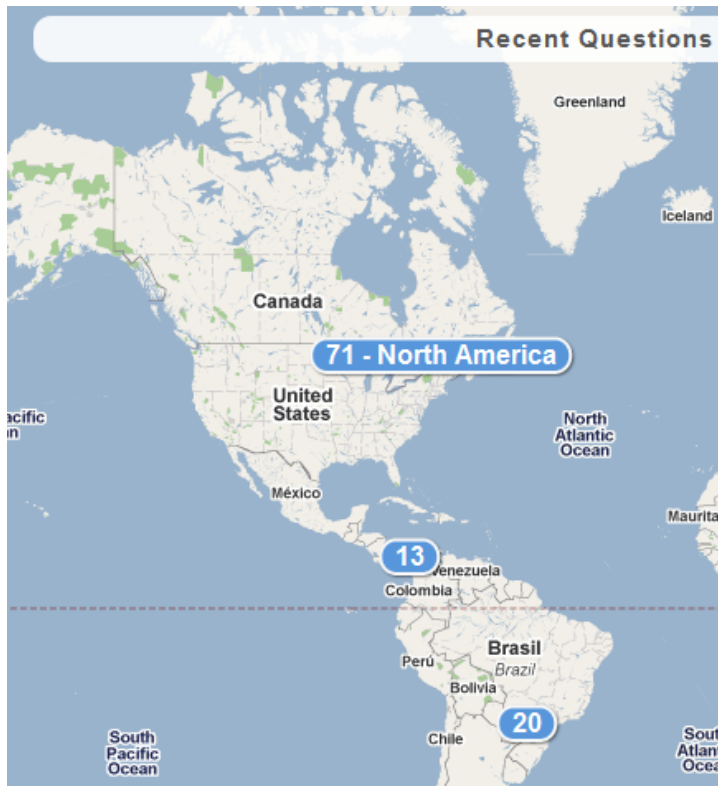
[360Cities](http://360Cities.com)

# Solution: Client-Side Clustering

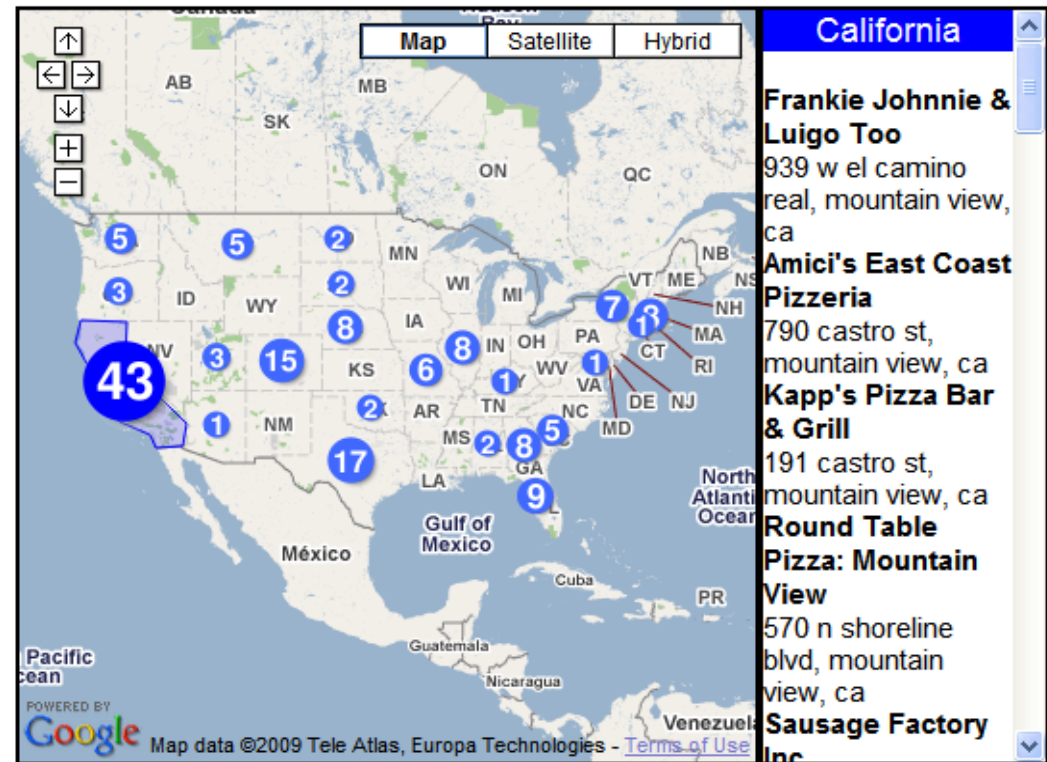


[MarkerClusterer](#)

# Solution: Regional Clustering

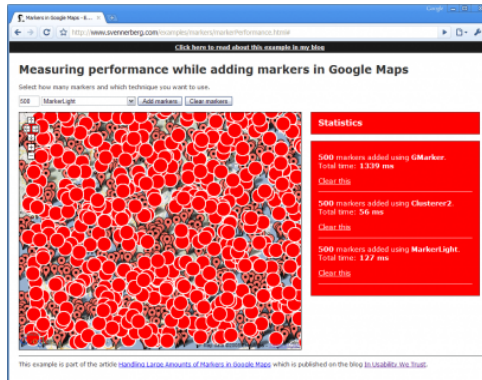


Travellr



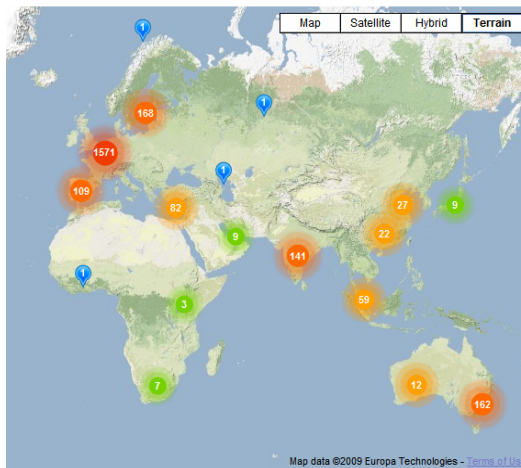
US Pizzas

# More Clustering Resources



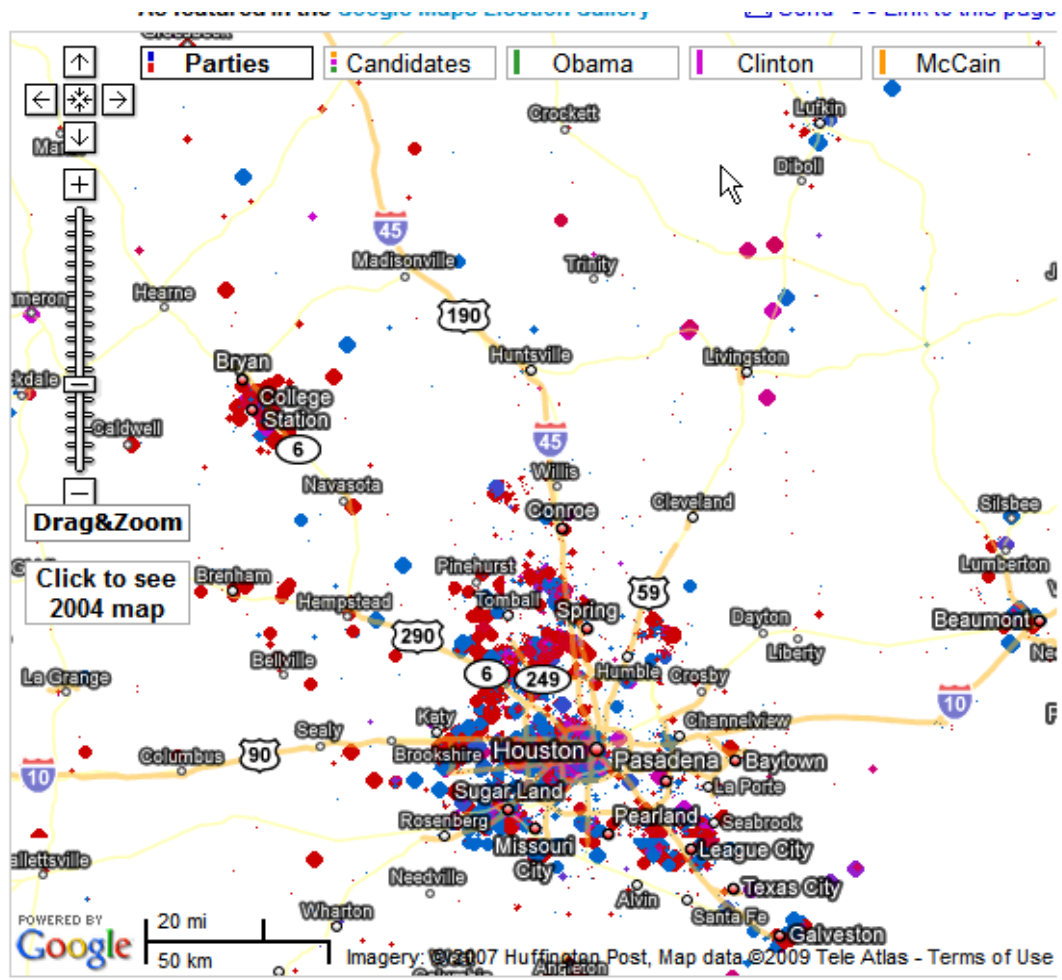
## [Article: Handling Large Amounts of Markers](#)

## [Python k-means](#)



## [Maptimize](#)

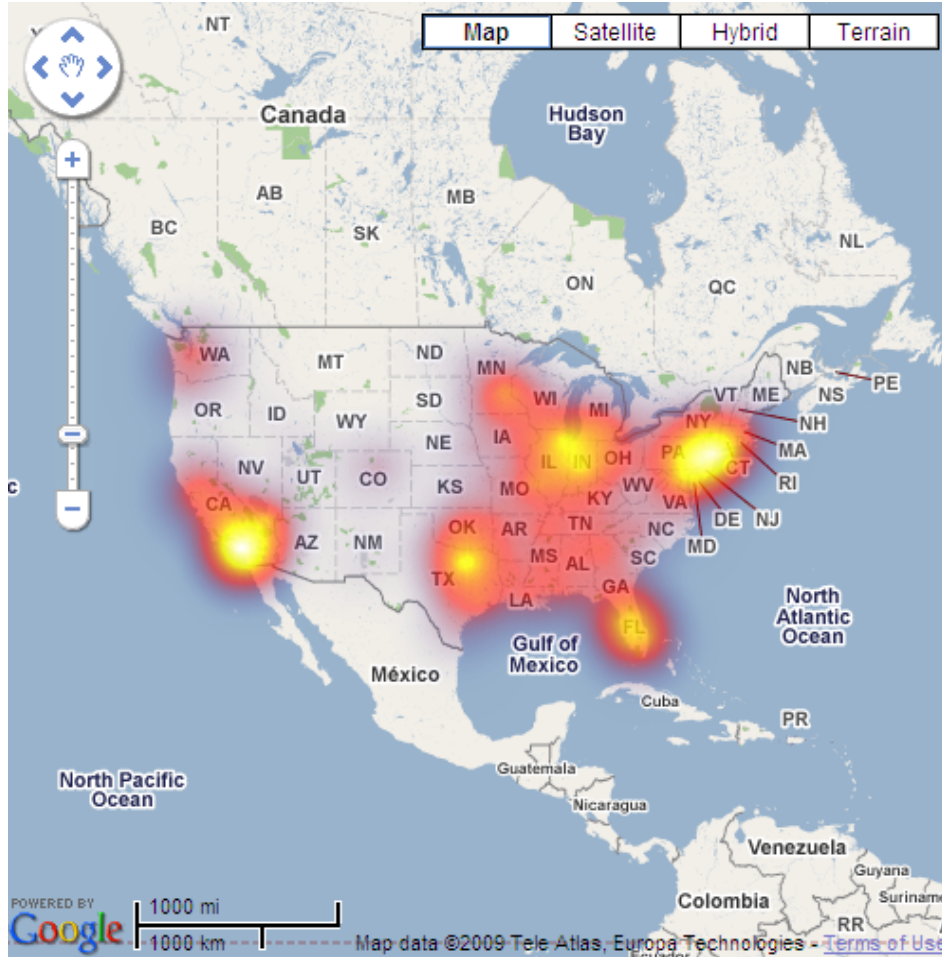
# Solution: View-only Visualization



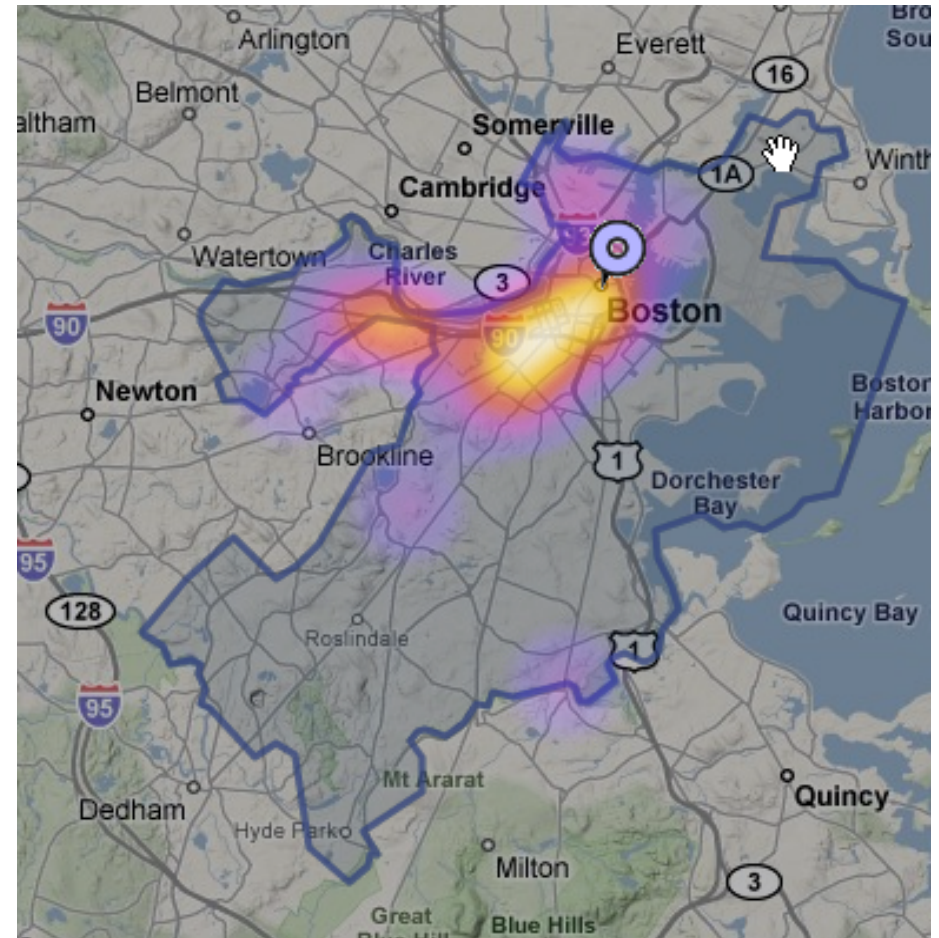
	<b>Lyndall Medearis</b> Executive Vice President Axa Advisors, LLC.	Updated Q3/2007 Hillary Clinton \$4,600	4509 HOLT ST Bellaire TX
	<b>Dana Guefen</b> Homemaker Not employed	Updated Q3/2007 Hillary Clinton \$4,600	4602 HOLT ST Bellaire TX
	<b>Andrew Gelbaugh</b> Managing Director Dynegy, Inc.	Updated Q3/2008 Barack Obama \$4,600	839 LINKWOOD DRIVE Houston TX
	<b>Alamdar Hamdani</b> Attorney Borunda, Hamdani, Simon LLP	Updated Q3/2007 Barack Obama \$3,300	4834 MCDERMED DR Houston TX
	<b>Deborah Moran</b> Musician Houston Symphony	Updated Q2/2008 Hillary Clinton \$3,002	3819 LATMA DR Houston TX
	<b>Jim Slack</b> PRESIDENT & CEO SLACK & COMPANY CONTRACTING, INC	Updated Q3/2008 John McCain \$2,300	10622 MAIN ST Houston TX
	<b>Paul Johnson</b> ENGINEER UNIVERSAL PERSONNEL	<b>NEW</b> Updated Q1/2008 Fred Thompson \$2,300	4031 MISCHIRE DRIVE Houston TX
	<b>Felix Chevalier</b> Managing Member	Updated Q2/2007 Hillary Clinton	9711 MARLIVE LN Houston TX

[FundRace](#)

# Solution: View-only Visualization

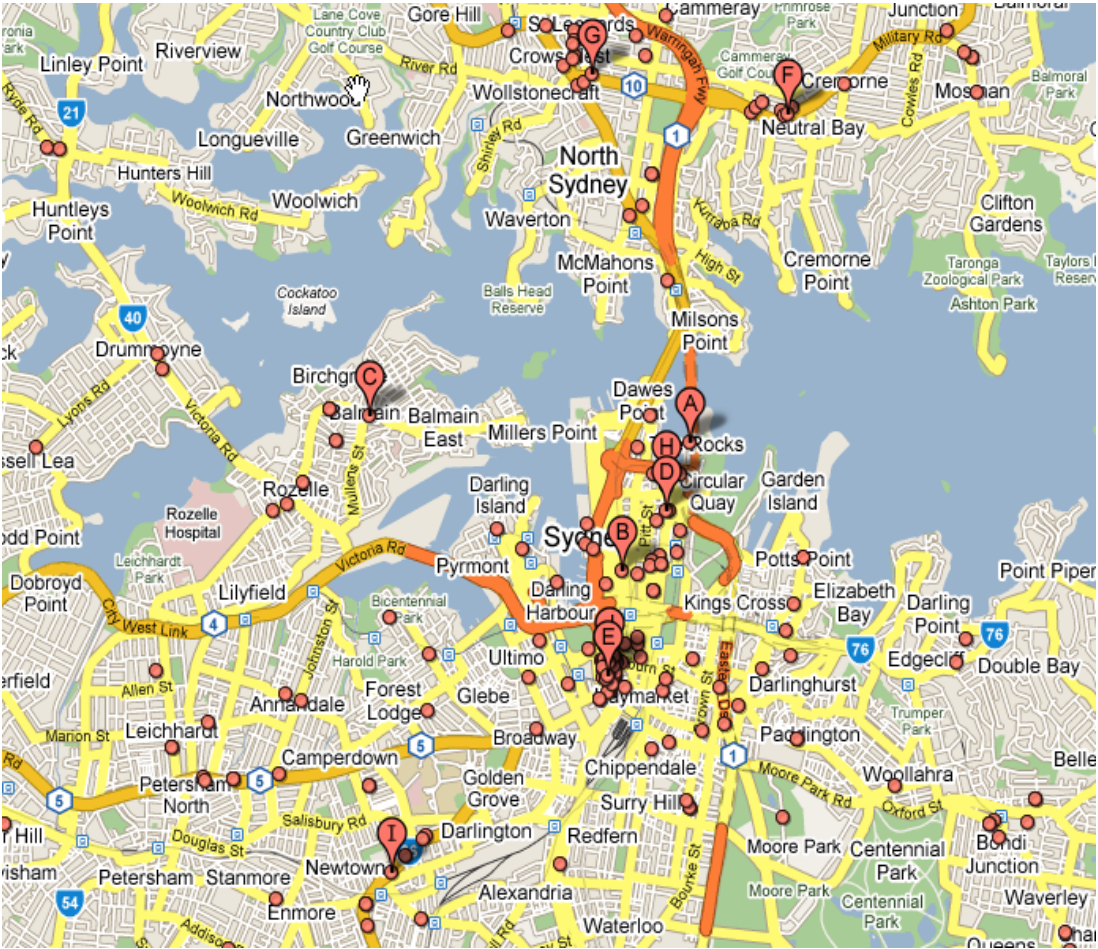


[HeatMapAPI](#)



[Boston Pizza](#)

# Solution: Tiny Clickable Markers



Clickable Tile Layer

Google Local Search

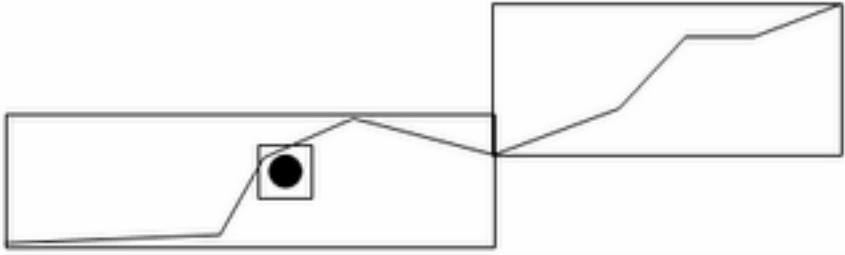
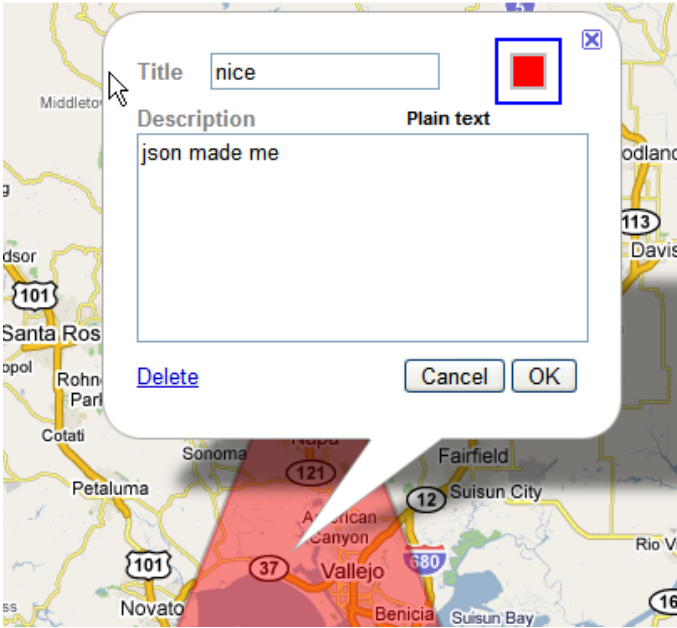
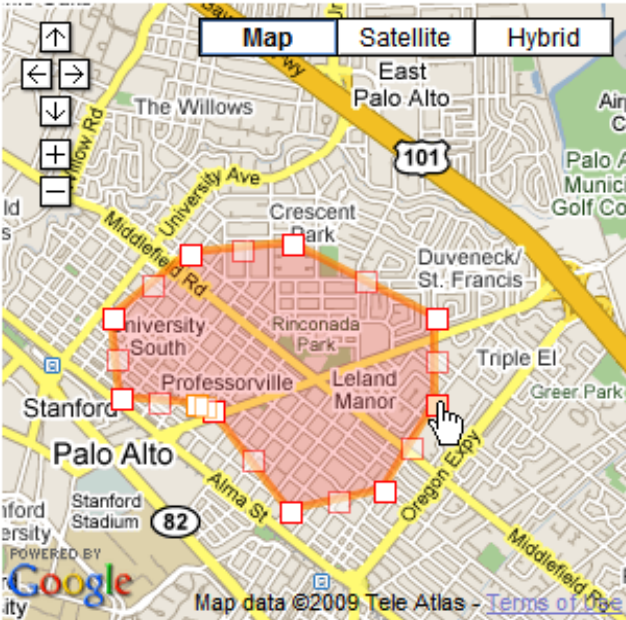
# Rendering Large Polys

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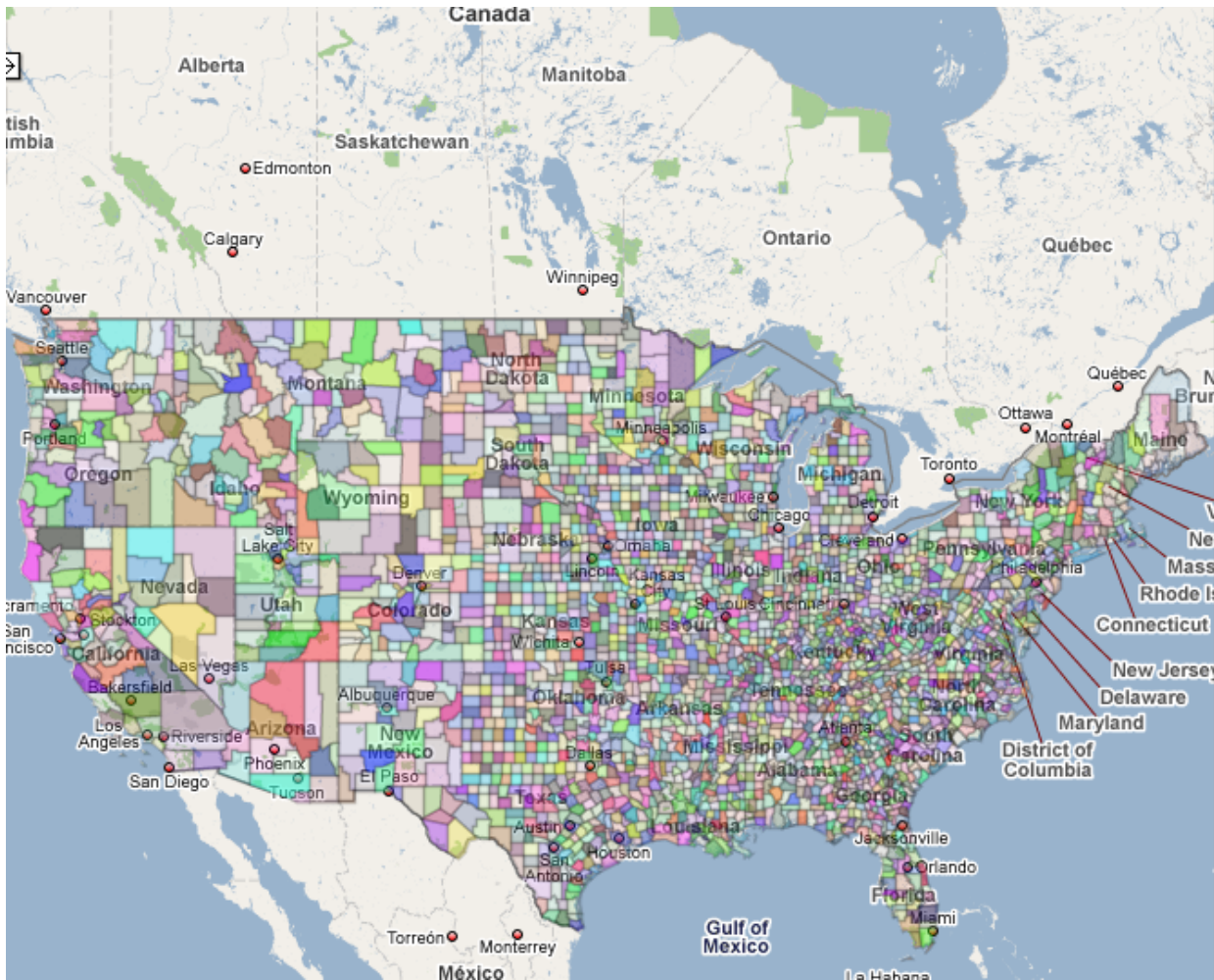




# Problem: GPolygon is a Full-Featured Fatty



# Solution: Lightweight Polys



All 3199 Counties (slow in IE!)

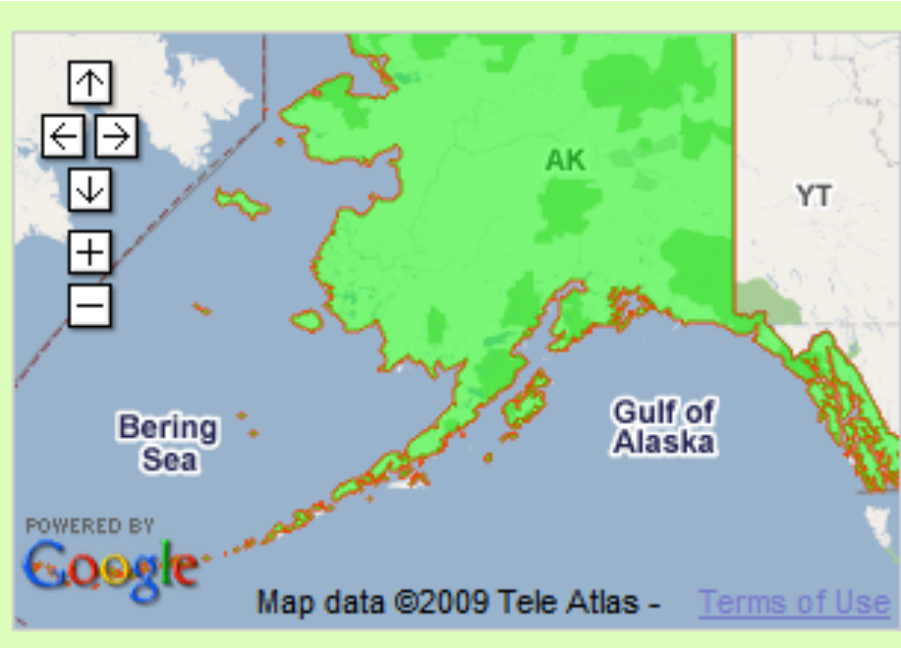
Animate

nowhere

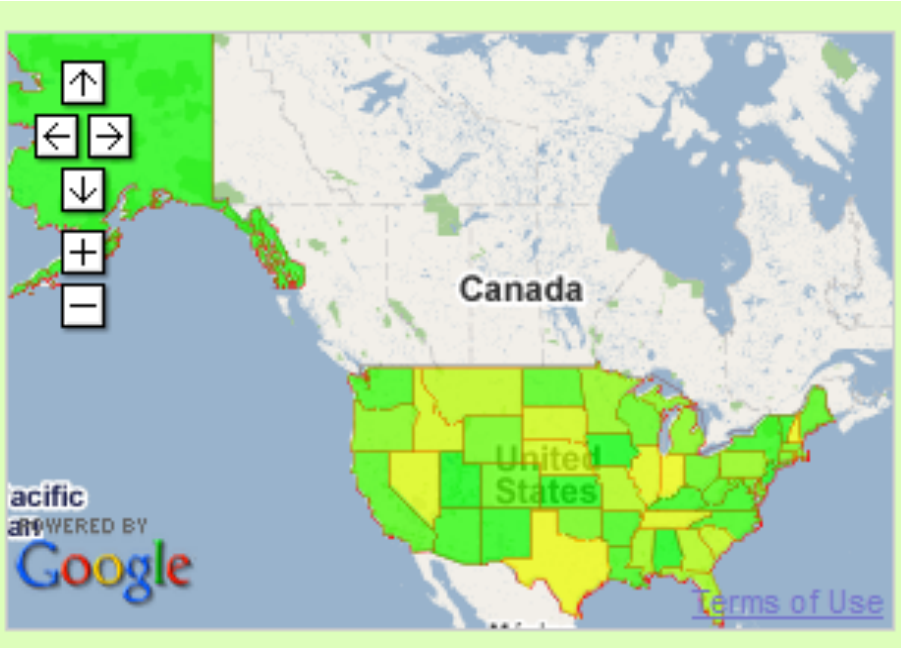
0.000 start gonzo.redraw  
0.298 end gonzo.redraw  
0.000 3199 places, 3357 shapes, 33557 points

[Polygonzo](#)

# Problem: Too Many Points

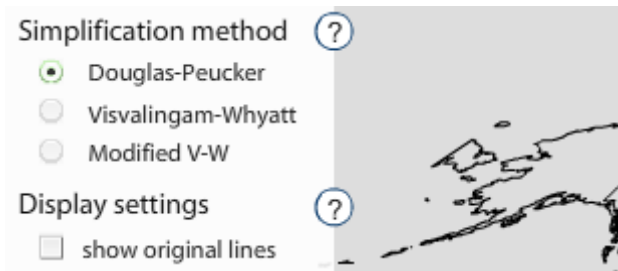


13500 points



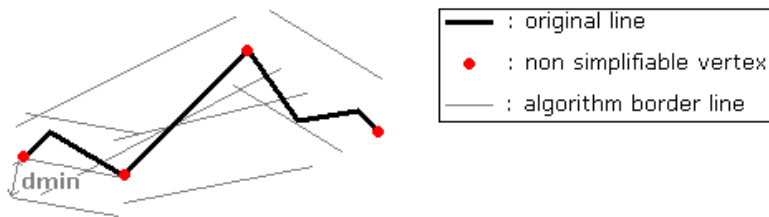
2200 points

# Data Simplification



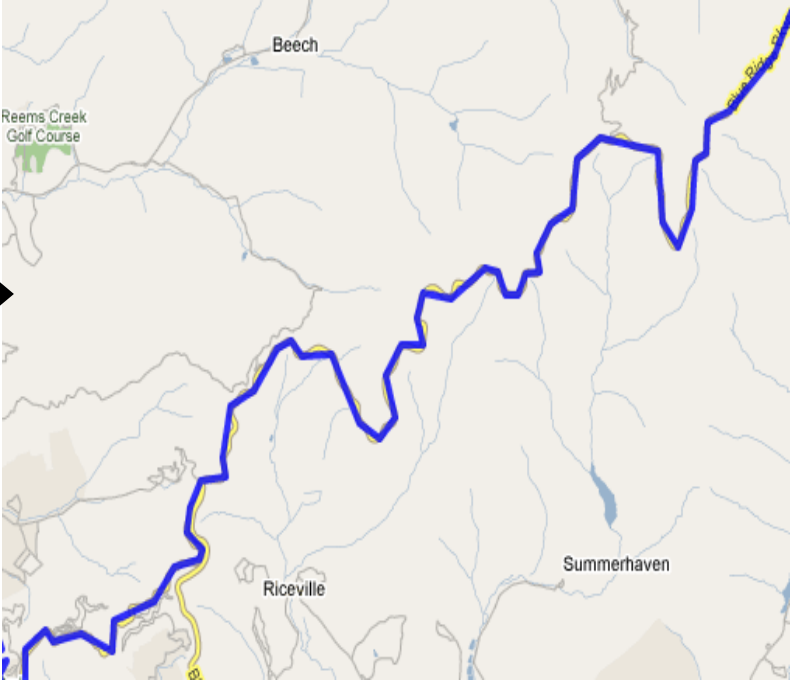
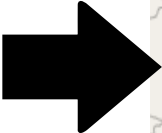
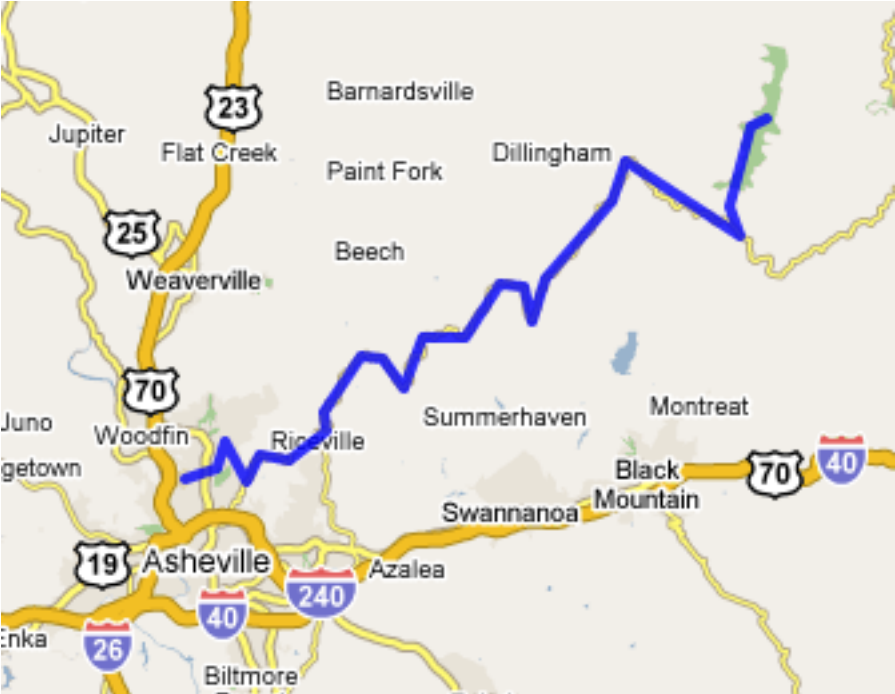
[MapShaper](#)  
[MapSimplification](#)

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



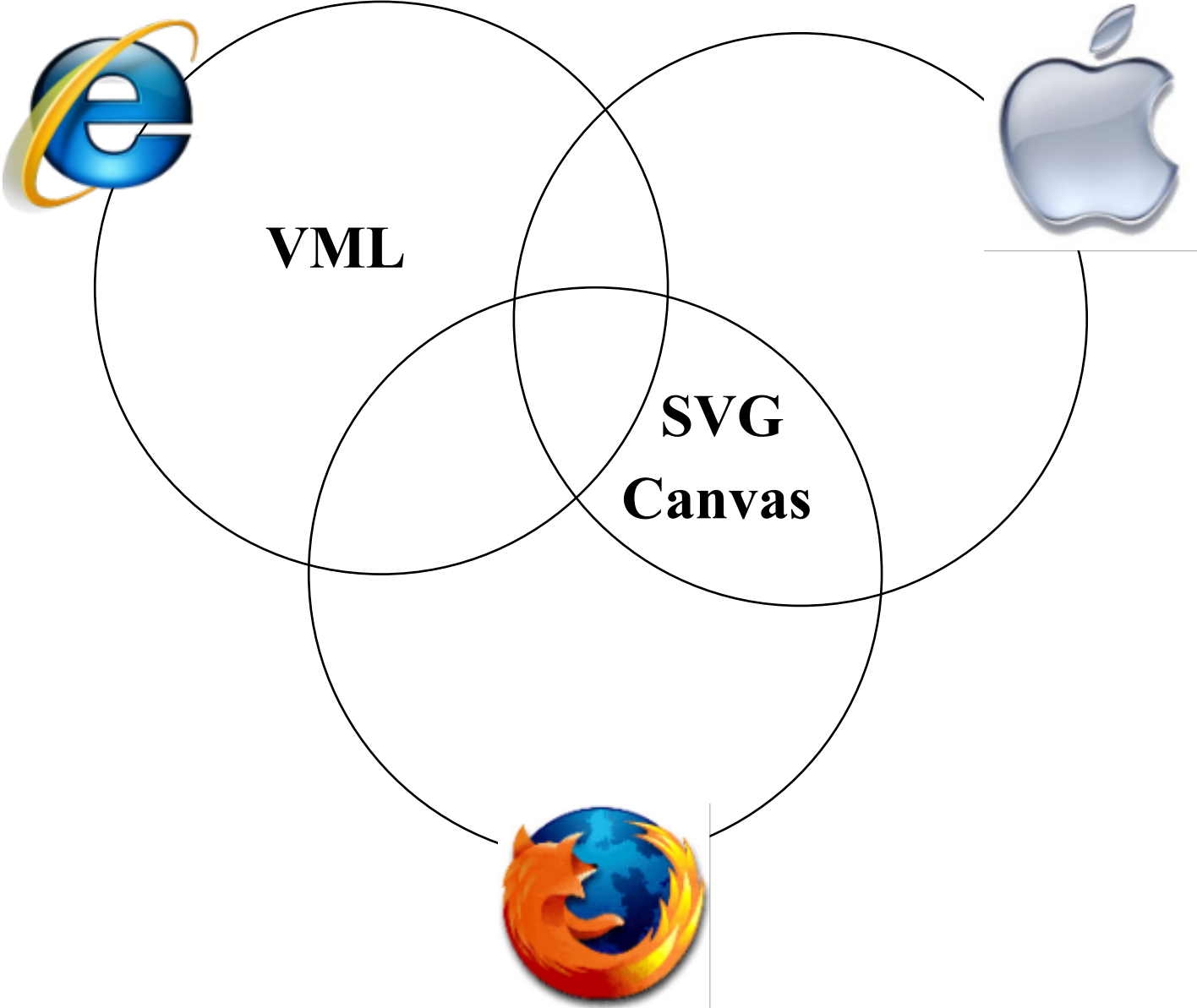
[Mapping the Votes: Resources](#)

# Solution: Encoded Polys

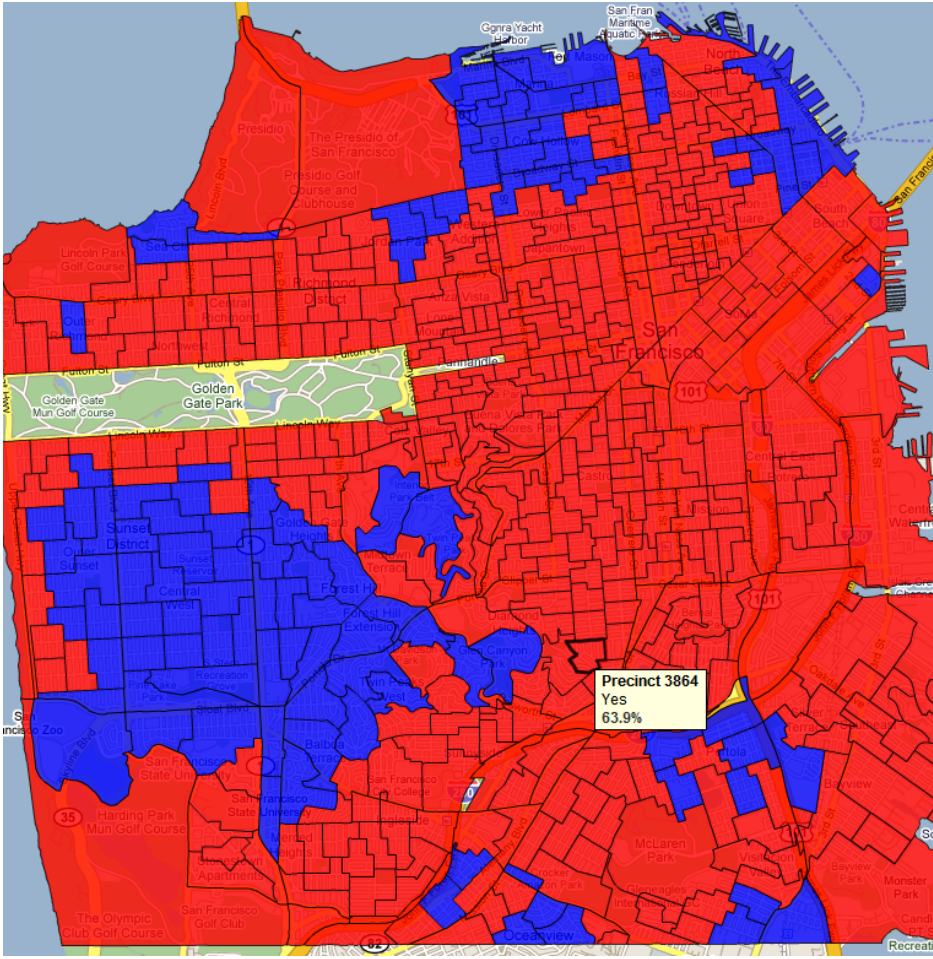


[Encoded Poly Example](#)

Browsers + Vector Graphics = :(



# Solution: Flash API

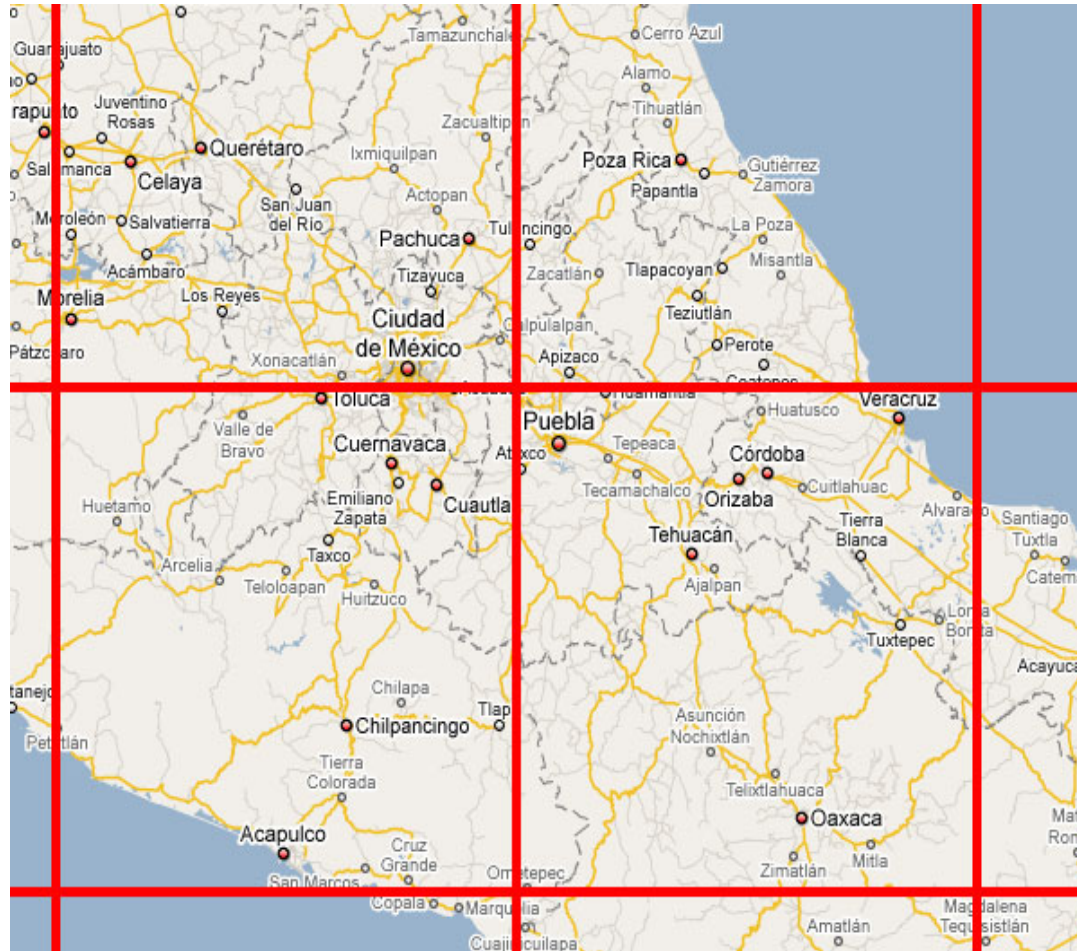


## Thematic Mapping

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

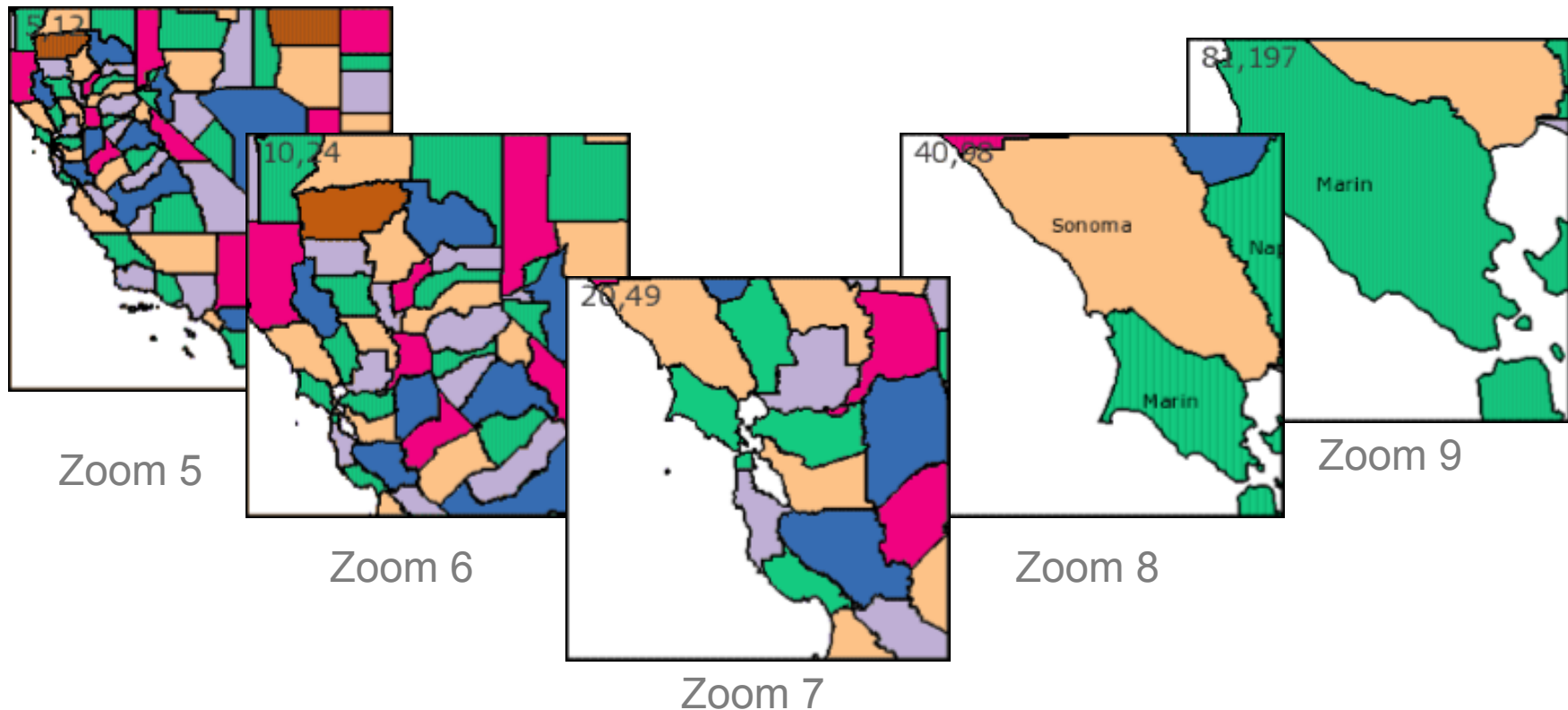
## HowSFVotes

# 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>

QUALIFIED  
DEVELOPER



## Gain developer API knowledge. Get Google cred. Make more money.

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

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# Questions

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

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