

User Interaction: Google Maps API

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INF 133 Fall 2014



Why maps?

- Central to much mobile interaction work.
- It can be generalized to interactions with enormous images very easily.
- Mapping data is a natural visualization that helps to reveal patterns.
- It was the first **infographic**



Why maps?

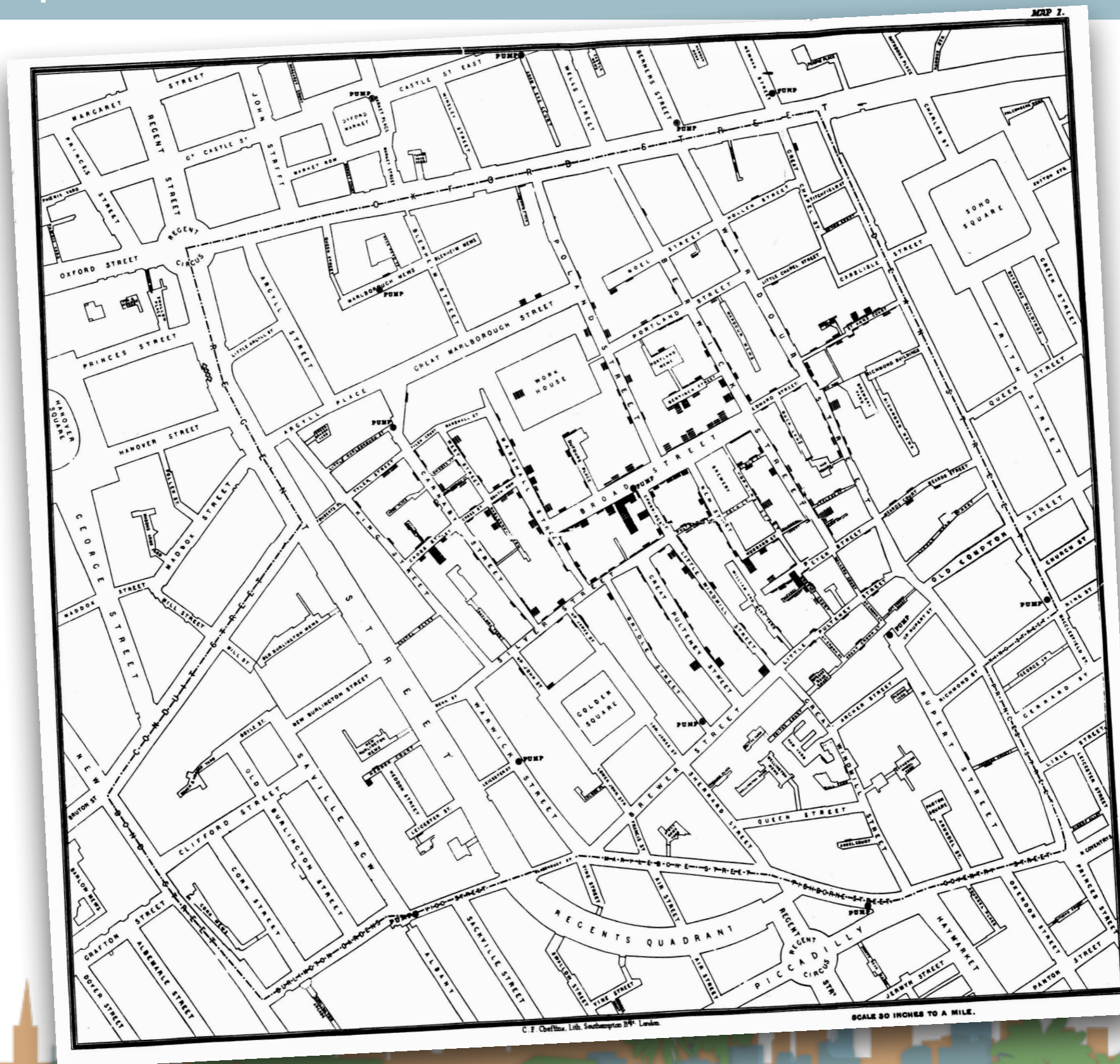


<http://gigapan.com/galleries/10347/gigapans/66626>



<http://gigapan.org/viewGigapanFullscreen.php?auth=033ef14483ee899496648c2b4b06233c>

Google Maps API



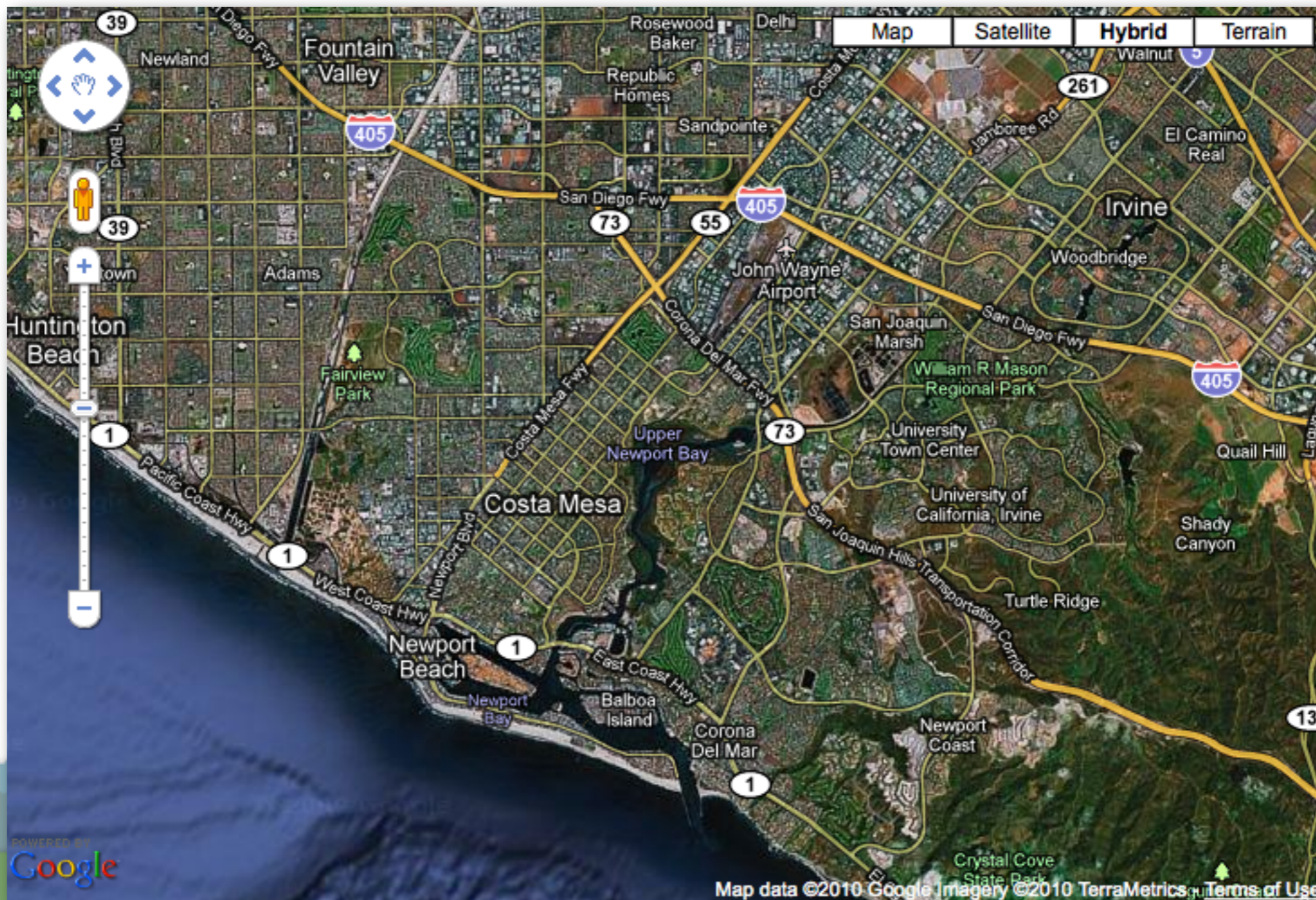
Credit: John Snow, On the Mode of Communication of Cholera, 1855

Google Maps API

The image shows a browser window displaying the Google Developers page for the Google Maps JavaScript API v3. The browser's address bar shows the URL `https://developers.google.com/maps/documentation/javascript/`. The page header includes the Google Developers logo, a search bar with the text "Google Maps JavaScript API v3", and a user profile for "donald.j.patterson.iii@gmail.com" with a "Sign out" link. A navigation menu below the header lists "Products" (Google Maps API > Google Maps JavaScript API v3), "Get Started", "Documentation", "Reference", "Showcase", "Support", and "Blog". The main content area features a large heading "Google Maps Javascript API v3" and a prominent blue "Get Started" button. Below this, a "Demos:" section lists "Base Maps", "Satellite", "Street View", "Places", "Routing", and "Data Visualization". The "Base Maps" demo is active, showing a map of New York City with various landmarks and streets. A sidebar on the right, titled "Base Maps", contains a gear icon, a text block stating "For the last decade, we've obsessed over building great maps—maps that are comprehensive, accurate, and easy to use.", and two buttons: "Base Maps" (selected) and "Styled Maps". At the bottom of the sidebar, it says "GO FURTHER".

Google Maps API

- Google Maps v3 is optimized for mobile
- It used to be just for mobile but is being adapted as the standard Maps API for all platforms



Basics

- Google hosts most of the code in a javascript library
- A developer includes the javascript library
 - Just like jQuery
- A developer makes calls to the library to:
 - display the map
 - display controls
 - display points
 - display other U/I elements



Basics

- You can register event handlers (notify functions in the Observer pattern)
- So that when a user does something on the map, you can do something on the webpage also (through JavaScript)



Basic Map Objects

```

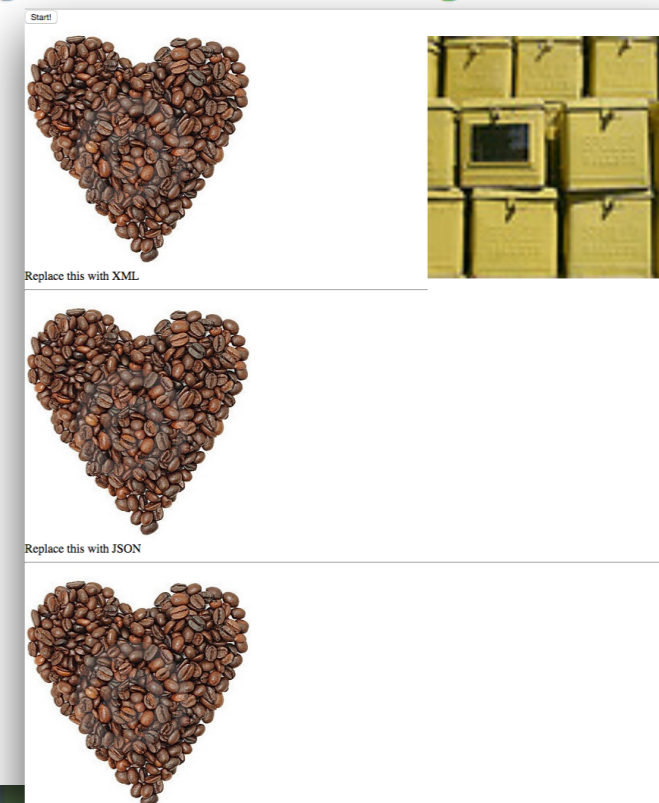
<!DOCTYPE html>

<html>
  <head>
    <script src="//ajax.googleapis.com/ajax/libs/jquery/2.1.1/jquery.min.js"></script>
    <script src="Step01.js"></script>
    <style type="text/css">
      html { height: 100%; }
      body { height: 100%; margin: 0; padding: 0 }
    </style>
  </head>

  <body>
    <div>
      <button onClick="myReadyFunction()">Start!</button>
    </div>
    <div id="map_canvas" style="float:right;width:500px;height:353px;border:black">
      <p>
        <a href="//flic.kr/p/3rcHKm">
          </a>
        </p>
      </div>

      <div class="dataXML">
        <br/>
        Replace this with XML
      </div>
      <hr/>
      <div class="dataJSON">
        <br/>
        Replace this with JSON
      </div>
      <hr/>
      <div class="dataJSONP">
        <br/>
        Replace this with JSONP
      </div>
    </body>
  </html>

```



Tip

- Absolute link
 - <http://students.ics.uci.edu/~djp3/images/picture.jpg>
- Relative link
 - picture.jpg
 - images/picture.jpg
 - /images/picture.jpg
- Protocol relative link
 - <//students.ics.uci.edu/~djp3/images/picture.jpg>



Basic Map Objects

- The size is up to you
- Android/iPhone work best at
 - full screen
- Maximizing to fill browser in HTML 5 is easy

```
<style type="text/css">
  html { height: 100% }
  body { height: 100%; margin: 0; padding: 0 }
</style>
```

```
<div id="map_canvas" style="width: 100%; height: 100%"></div>
```

List of Data	Location
63790) Schhafer Park Elementary in Hayward, Ca Last Updated: 10/23/2009	Hayward, Ca
63770) 427 S. Cabrillo Ave. (rear upstairs unit) in San Pedro, Ca Last Updated: 10/20/2009	San Pedro, Ca
63755) Coffin Creek in Corona, Ca Last Updated: 10/20/2009	Corona, Ca
63754) Callson Manor in Roseville, Ca Last Updated: 10/20/2009	Roseville, Ca
63753) Fear Overload in Sacramento, Ca Last Updated: 10/20/2009	Sacramento, Ca
63752) Los Angeles Haunted Hayride in Calabasas, Ca Last Updated: 10/20/2009	Calabasas, Ca
63703) CSUF Library, old wing in Fullerton, Ca Last Updated: 9/27/2009	Fullerton, Ca
63693) haunted forest pasadena in pasadena, ca Last Updated: 9/18/2009	pasadena, ca
63691) The Haunted Ponds. in palmdale, ca Last Updated: 9/16/2009	palmdale, ca
63680) Simon Magus House in Riverside, Ca Last Updated: 9/8/2009	Riverside, Ca
63667) Niles Canyon White Witch in Fremont, Ca Last Updated: 9/2/2009	Fremont, Ca
63666) Secret Sidewalk in Fremont, Ca Last Updated: 9/2/2009	Fremont, Ca
63665) Drawbridge in Drawbridge, Ca Last Updated: 9/2/2009	Drawbridge, Ca
63664) Oak Knolls Naval Base in Oakland, Ca Last Updated: 9/2/2009	Oakland, Ca
63663) Bulb Castle in Albany, Ca Last Updated: 9/2/2009	Albany, Ca
63661) SAN BERNARDINO,CA in SB, Ca Last Updated: 8/29/2009	SB, Ca
63660) SAINT SOPHIAS GREEK ORTHODOX CHURCH CAMP in SAN BERNARDINO, CA Last Updated: 8/29/2009	SAN BERNARDINO, CA
63659) SAN BERNARDINO MOUNTAIN AREA in SAN BERNARDINO, CA Last Updated: 8/29/2009	SAN BERNARDINO, CA
63643) watsonville institute of cosmetology in watsonville, ca Last Updated: 8/19/2009	watsonville, ca
63641) Old house in modesto, ca Last Updated: 8/19/2009	modesto, ca
63631) Date Palm Apartments in Riverside, Ca Last Updated: 8/7/2009	Riverside, Ca
63621) Sunny Acres Asylum in San Luis Obispo, Ca Last Updated: 7/31/2009	San Luis Obispo, Ca
63618) Santa Lucian Mountains in Santa Lucian Mountains, Ca Last Updated: 10/8/2009	Santa Lucian Mountains, Ca
63617) Giant Skeletons in Lompoc, Ca Last Updated: 7/31/2009	Lompoc, Ca
63616) Financle District in Los Angeles, Ca Last Updated: 7/30/2009	Los Angeles, Ca
63611) Billawack Dairy in Ventura, Ca Last Updated: 7/29/2009	Ventura, Ca
63610) Tick Canyon in Canyon Country, Ca Last Updated: 7/29/2009	Canyon Country, Ca
63609) 105 Freeway in Fillmore, Ca Last Updated: 7/29/2009	Fillmore, Ca
63599) Twin Lakes Tamarack Cabin #28 in Mammoth Lakes, Ca Last Updated: 7/21/2009	Mammoth Lakes, Ca
63594) Point Loma Nazaren University in San Diego, Ca Last Updated: 7/20/2009	San Diego, Ca
63581) Ohlone Burial Grounds in Fremont, Ca Last Updated: 7/17/2009	Fremont, Ca
63576) Westin St. Francis Hotel in San Fransisco, ca Last Updated: 7/16/2009	San Fransisco, ca
63558) fleming middle school in lomita, california Last Updated: 7/9/2009	lomita, california
63557) San Jacinto Cemetery in San Jacinto , Ca Last Updated: 7/8/2009	San Jacinto , Ca
63554) La Vista Cemetery in National City, ca Last Updated: 7/6/2009	National City, ca



Basic Map Objects

- Figuring out if you are using Android/iPhone etc. is possible, but complicated and changing all the time
- Quick and Dirty Method:

```
function detectBrowser() {  
    var useragent = navigator.userAgent;  
    var mapdiv = document.getElementById("map_canvas");  
  
    if (useragent.indexOf('iPhone') != -1 || useragent.indexOf('Android') != -1 ) {  
        mapdiv.style.width = '100%';  
        mapdiv.style.height = '100%';  
    }  
}
```

- See <http://detectmobilebrowsers.com/> for code



Basic Map Loading

- Loading the Google Maps Library

```
<script src="//maps.googleapis.com/maps/api/js?sensor=false&language=en&region=US"></script>
```

- Parameters for the library
 - "sensor": does your location come from a GPS?
 - mandatory parameter
 - allows Google to respect business agreements
 - "language": what language are the labels in? (dep?)
 - "region": bias behavior toward a region (dep?)
 - "Paris" in TX or "Paris" in France?



Basic Map Loading


- Do I need a key?
 - Not for this assignment
 - If you are going to be deploying for real, then yes
 - More than 25,000 loads per day




Putting the map on the web page

```
function initializeMap(){  
    var latlng = new google.maps.LatLng(33.643298,-117.841983);  
    var myOptions = {  
        zoom: 8,  
        center: latlng,  
        mapTypeId: google.maps.MapTypeId.ROADMAP  
    };  
    var map = new google.maps.Map($("#map_canvas")[0], myOptions);  
}
```


Load AJAX! Load Map



Replace this with XML



Google
Map data ©2012 Google, INEGI - Terms of Use Report a map error



Replace this with JSON

The image shows a comparison between two methods of loading content into a web page. The top section shows a heart shape made of coffee beans, with a button labeled 'Load AJAX!' and a button labeled 'Load Map'. Below it is a Google Map of Southern California. The bottom section shows the same heart shape made of coffee beans, with a button labeled 'Replace this with JSON'. The map is not visible in the bottom section.

Basic Map Usage

- Make sure that if you use jQuery to get your elements you pass the DOM element to Google, not an array

```
map = new google.maps.Map($('#map_canvas').get(0), myOptions);
```

```
map = new google.maps.Map($("#map_canvas")[0], myOptions);
```

- Reference:
 - <http://api.jquery.com/id-selector/>



Making a Latitude Longitude Pair

```
var latlng = new google.maps.LatLng(33.643298, -117.841983);
```

- This doesn't put anything on the map
- It's just an internal reference to a point
- Does not need to be hard coded



Passing options to a map (reference)

```
var myOptions = {  
  zoom: 8,  
  center: centerPoint,  
  mapTypeId: google.maps.MapTypeId.ROADMAP  
};
```

- Uses standard Javascript Object Notation
- zoom 0, is the whole earth, anything higher is closer
- center is where the map should be centered when drawn
- mapTypeId is what kind of map you want
 - ROADMAP, SATELLITE, HYBRID, TERRAIN



Advanced Map Options

- 45 degree imagery control
- Changing the U/I controls that are available to the user
- Custom map styling
- Custom maps (like the inauguration photo)
- Other projections (Mercator being the default)



Poll



Putting the things on the web page

- Markers



```
var marker = new google.maps.Marker({  
  position: latlng,  
  map: map,  
  title: "Hello World!"  
});
```



Recentering the map

- A javascript call to the map object

```
<button onClick="map.setCenter(centerPoint)">Recenter Map</button>
```



Putting the custom icons on the map

- Icons

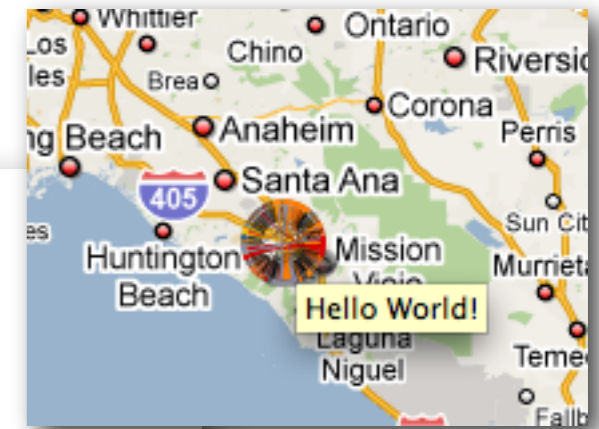
```
function initializeMap(){
  var myOptions = {
    zoom: 8,
    center: centerPoint,
    mapTypeId: google.maps.MapTypeId.ROADMAP
  };

  map = new google.maps.Map($('#map_canvas').get(0), myOptions);

  var latlng = new google.maps.LatLng(33.643298,-117.841983);

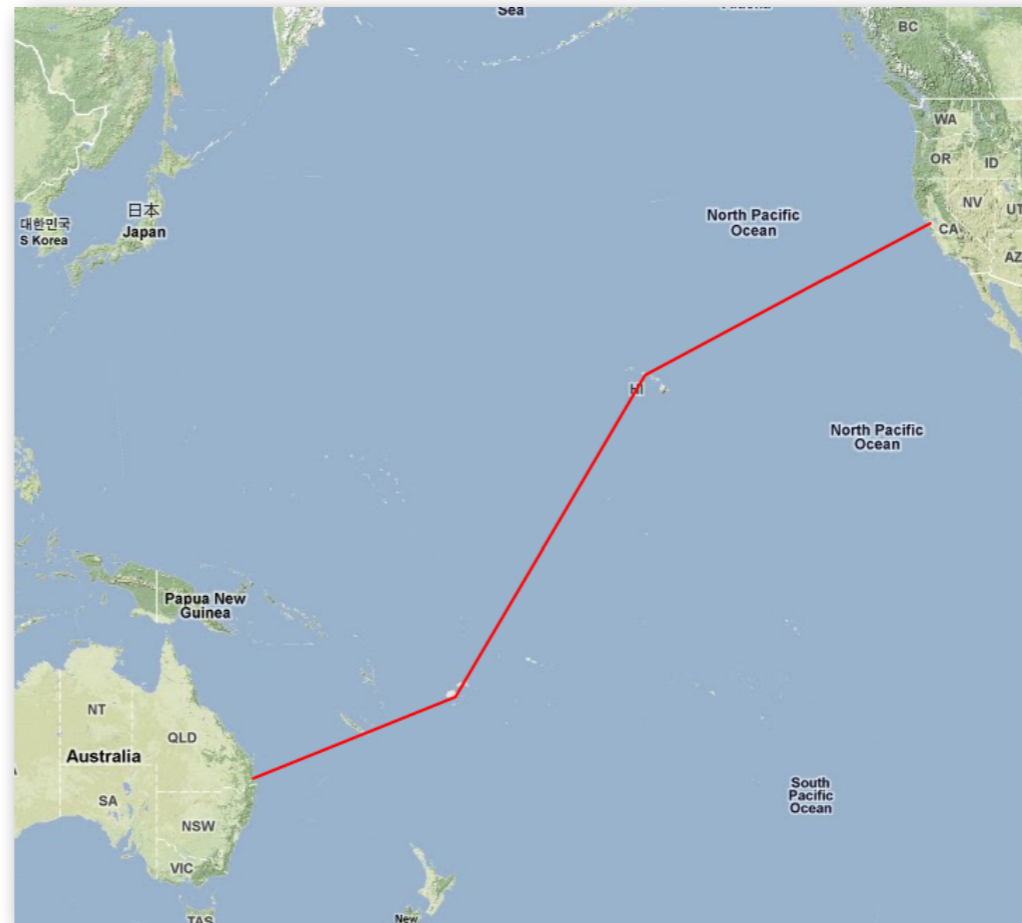
  var image = {
    url: 'icon.png',
    // This marker is 32 pixels wide by 32 pixels tall.
    size: new google.maps.Size(32, 32),
    // The origin for this image is 0,0.
    origin: new google.maps.Point(0,0),
    // The anchor for this image is at 0,16.
    anchor: new google.maps.Point(0, 16)
  };

  var marker = new google.maps.Marker({
    position: latlng,
    map: map,
    icon: image,
    title:"Hello World!"
  });
}
```



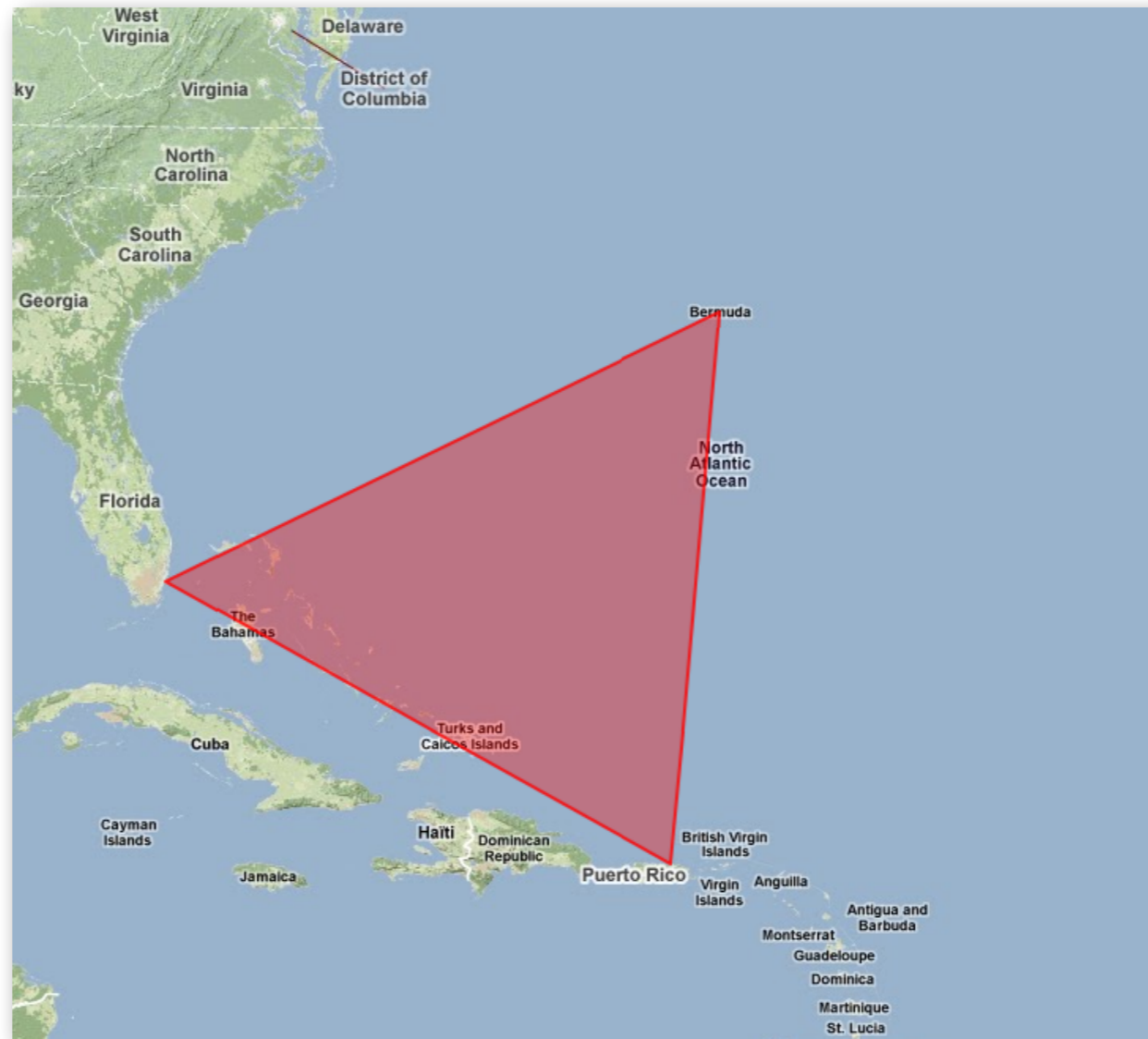
Putting the things on the web page

- Polylines



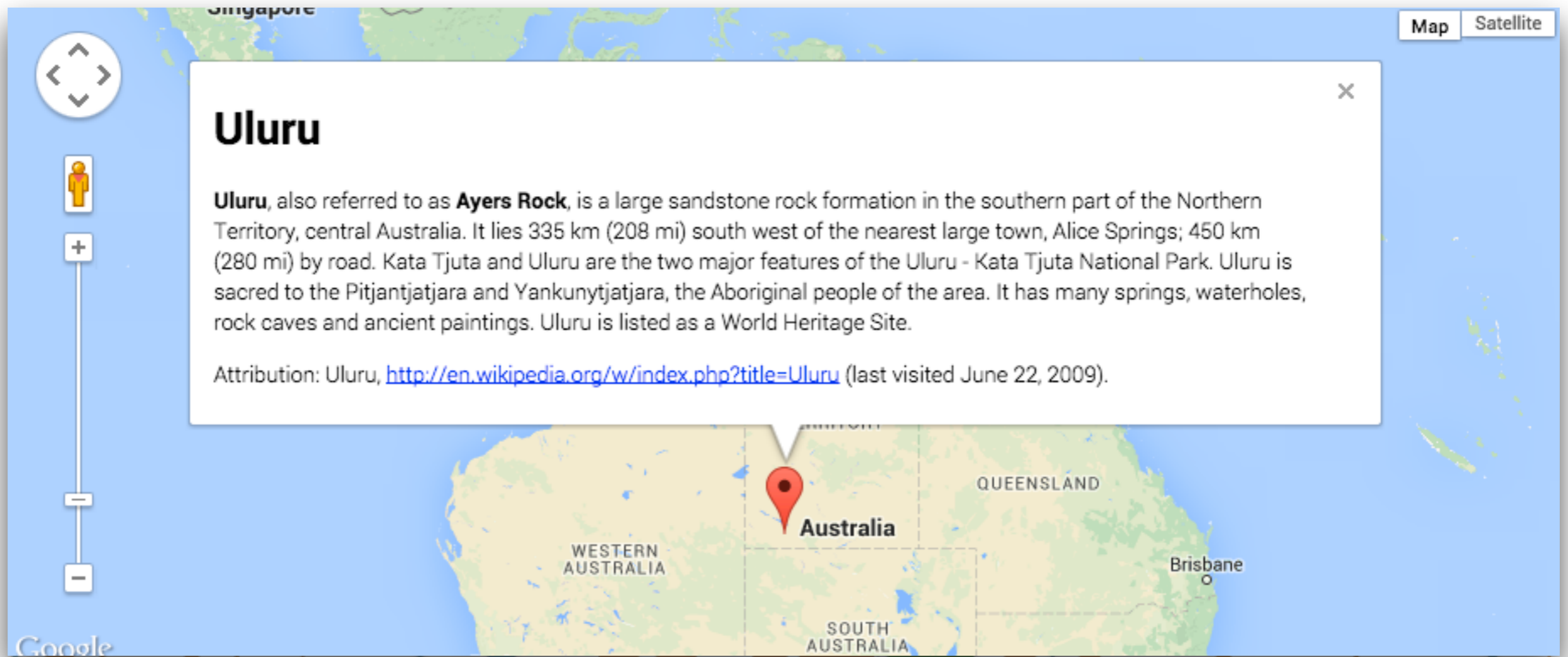
Putting the things on the web page

- Polygons



Putting the things on the web page

- Info Windows



Putting the things on the web page

- Info Windows

```
var contentString = '<div id="content">'+
  '<div id="siteNotice">'+
  '</div>'+
  '<h1 id="firstHeading" class="firstHeading">Uluru</h1>'+
  '<div id="bodyContent">'+
  '<p><b>Uluru</b>, also referred to as <b>Ayers Rock</b>, is a large ' +
  'sandstone rock formation in the southern part of the ' +
  'Northern Territory, central Australia. It lies 335 km (208 mi) ' +
  'south west of the nearest large town, Alice Springs; 450 km ' +
  '(280 mi) by road. Kata Tjuta and Uluru are the two major ' +
  'features of the Uluru - Kata Tjuta National Park. Uluru is ' +
  'sacred to the Pitjantjatjara and Yankunytjatjara, the ' +
  'Aboriginal people of the area. It has many springs, waterholes, ' +
  'rock caves and ancient paintings. Uluru is listed as a World ' +
  'Heritage Site.</p>'+
  '<p>Attribution: Uluru, <a href="http://en.wikipedia.org/w/index.php?title=Uluru&oldid=297882'+
  'http://en.wikipedia.org/w/index.php?title=Uluru</a> (last visited June 22, 2009).</p>'+
  '</div>'+
  '</div>';

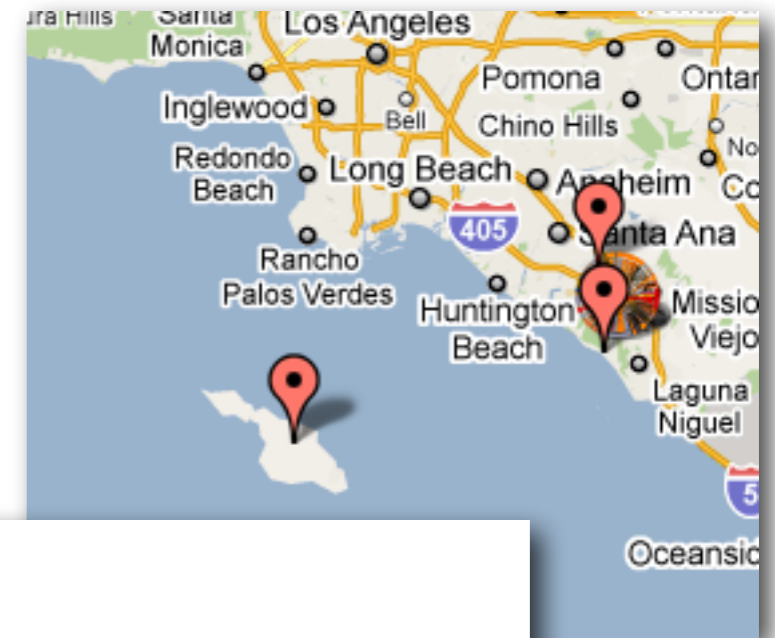
var infowindow = new google.maps.InfoWindow({
  content: contentString
});

var marker = new google.maps.Marker({
  position: myLatLng,
  map: map,
  title:"Uluru (Ayers Rock)"
});

google.maps.event.addListener(marker, 'click', function() {
  infowindow.open(map,marker);
});
```

Geocoding Addresses

- Geocoding means translating a place into a (Lat,Long) pair



```
function codeAddressHelper(results, status) {
  if (status == google.maps.GeocoderStatus.OK) {
    map.setCenter(results[0].geometry.location);
    var marker = new google.maps.Marker({
      map: map,
      position: results[0].geometry.location
    });
  } else {
    alert("Geocode was not successful for the following reason: " + status);
  }
}

function codeAddress() {
  var geocoder = new google.maps.Geocoder();
  var myAddress = $("#address").val();
  geocoder.geocode( { address: myAddress }, codeAddressHelper);
}
```



More info

- Google Maps API v3
 - <https://developers.google.com/maps/documentation/javascript/tutorial>
 - HeatMaps
 - Weather
 - Street view
 - Ads
 - Utilities
 - Events
 - Traffic
 - Infographics (FusionTables)



How do you debug?

- Chrome Web Developer Toolbar
- Firefox Error Console
- Internet Explorer Script Debugger
- Firebug
- Google's GLog library
 - For adding your own debugging statements
- screencast tutorials here:
 - <http://code.google.com/apis/maps/articles/debuggingmaps.html>



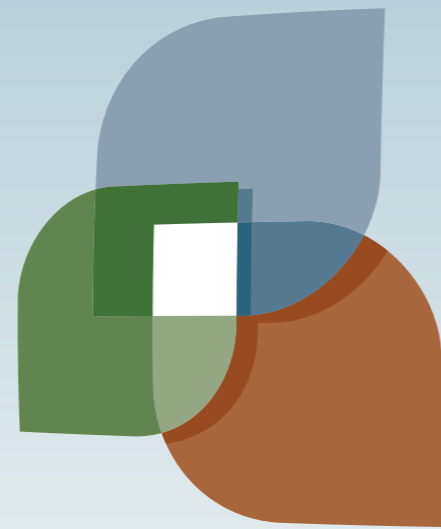
Real-time Map

- Add a map to Real-time Map
- AJAX call
- Make your row entries link to the map (center on click)
- Plot the table entries on the map
- Enhance the map in one interesting way
 - For example, multiple map marker icons
 - More than a custom marker or an info window
- There will be two bragging rights prizes awarded
 - 50% on data novelty
 - 50% on presentation



Poll





L U C I

