Lecture: Web-based Mapping Clients: Google Maps API [lecture03-section]

[Presentation Slides][Lecture03]

Module 2.2 - Web-based Mapping Clients: Google Maps API

Part I

Outline

- What is an API
- The Google Maps API
  Version
  Reference Information
  Key Components
  Examples

What is an API

- API Stands for Application Programming Interface

  An Application Programming Interface (API) is a particular set of rules and specifications that a software program can follow to access and make use of the services and resources provided by another particular software program that implements that API. It serves as an interface between different software programs and facilitates their interaction, similar to the way the user interface facilitates interaction between humans and computers. – From Wikipedia: http://en.wikipedia.org/wiki/Api

- The Google Maps API provides an interface for interacting with Google's mapping services from external web applications

Google Maps API Version

- The version of the Google Maps API used in this class is v3 of the Javascript API
  Freely usable for free applications
  Subject to Google's Terms of Service
  No longer requires a Google API key
- Key capabilities in v3
  Interactive maps based on Google's mapping engine (contrast w. static maps API)
  Optimized for desktop and mobile platforms and applications

Reference Information

Google Maps API Family : http://code.google.com/apis/maps/

Javascript API Home Page : http://code.google.com/apis/maps/documentation/javascript/

Javascript Basics Entry Page : http://code.google.com/apis/maps/documentation/javascript/basics.html

Javascript API v3 Tutorial Page : http://code.google.com/apis/maps/documentation/javascript/tutorial.html

Key Components

- Map object options

Types (required) : ROADMAP : SATELLITE : HYBRID : TERRAIN

Latitude and Longitude (required) : specification of where the map should initially be centered

Zoom Level (required) : 0=global, higher values increasingly local. Limited by map type

Controls

- Available Controls (enabled through map options) default controls
  Zoom Control
  Pan Control
  Scale Control
  MapType Control
  Street View Control
- Different control styles may be defined
- Controls may be positioned positioning options
- Custom controls may be defined and attached to fixed location in the map

Overlays

Overlay Types documentation

Marker : points depicted by specified or defined icons at locations within the map

Polyline : linear features defined by multiple points with a defined style for the line

Polygon : closed features defined by multiple points. Supports multi-polygons, and donuts. Line and fill styles may be specified.

(Ground) Overlay Maps : Image-based map layers that replace or overlay Google layers - registered to the map coordinates

Overlays

Overlay Types documentation

Info Windows : floating content windows for displaying content defined as HTML, a DOM element, or text string

Layers : Grouped display content assigned to a specific layer: KmlLayer, FusionTablesLayer, TrafficLayer, BicyclingLayer

Custom Overlays : definition of programmatically controlled layers

Services

- Geocoding Service

  Forward and reverse geocoding: address -> LatLon & LatLon -> Nearest Address

  May be biased to current viewport, region

- Directions

  Based upon an origin, destination, and a variety of additional options

  Available directions and rendered route

Services

- Elevation

  Delivery of elevation data for locations or paths

- Streetview

  Integration of Google Streetview within a DOM element

- Maximum Zoom

  Provides information about the maximum available zoom level

Events

- Events provide the ability to attach custom behaviors to events in the interface. For example:

  Changing items in the interface as the user zooms in on a map

  Displaying additional information outside the map when the user clicks a location in the map

  Synchronizing the behavior of multiple maps as the user interacts with one map

- Requires higher-level Javascript that we will cover in this course

Examples

Simple - Roadmap

```
<!DOCTYPE html>
<html>
    <head>
        <style type="text/css">
```

```
            html { height: 100% }
            body { height: 100%;
                margin: 0px;
                padding: 0px;
                background-color: black;
                color: #CCCCCC;
                text-align: center}
            #map_canvas { width:90%;
                height:80%;
                margin-left:auto;
                margin-right: auto }
        </style>
        <script type="text/javascript"
            src="http://maps.google.com/maps/api/js?sensor=false">
        </script>
        <script type="text/javascript">
            function initialize() {
            var classroom = new google.maps.LatLng(35.084280,-106.624073)
            var myOptions = {
                zoom: 8,
                center: classroom,
                mapTypeId: google.maps.MapTypeId.ROADMAP
            };
            var map = new google.maps.Map(
                document.getElementById("map_canvas"),
                myOptions);
            }
        </script>
    </head>

    <body onload="initialize()">
        <h1>Sample Map</h1>
        <div id="map_canvas"></div>
    </body>
</html>
```

[View in new window][gmap simple 01] Your browser does not support an embedded web page. Click here to view the referenced page

[gmap simple 01]: http://kkb-classes.s3.amazonaws.com/2012/x85/webContent/examples/gmaps01.html "Link to Simple Google Map Page - Roadmap" target="_blank"

Simple - Satellite

```
<!DOCTYPE html>

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

```
                background-color: black;
                color: #CCCCCC;
                text-align: center}
            #map_canvas { width:90%;
                height:80%;
                margin-left: auto;
                margin-right: auto }
        </style>
        <script type="text/javascript"
            src="http://maps.google.com/maps/api/js?sensor=false">
        </script>
        <script type="text/javascript">
            function initialize() {
                var classroom = new google.maps.LatLng(35.084280,-106.624073)
                var myOptions = {
                    zoom: 8,
                    center: classroom,
                    mapTypeId: google.maps.MapTypeId.SATELLITE
                };
                var map = new google.maps.Map(
                    document.getElementById("map_canvas"),
                    myOptions);
            }
        </script>
    </head>

    <body onload="initialize()">
        <h1>Sample Map</h1>
        <div id="map_canvas"></div>
    </body>
</html>
```

[View in new window][gmap simple 02] Your browser does not support an embedded web page. Click here to view the referenced page

[gmap simple 02]: http://kkb-classes.s3.amazonaws.com/2012/x85/webContent/examples/gmaps02.html "Link to Simple Google Map Page - Satellelite" target="_blank"

Simple - Hybrid

```
<!DOCTYPE html>
<html>
    <head>
        <style type="text/css">
          html { height: 100% }
          body { height: 100%;
            margin: 0px;
            padding: 0px;
            background-color: black;
            color: #CCCCCC;
            text-align: center}
          #map_canvas { width:90%;
            height:80%;
```

```
            margin-left: auto;
            margin-right: auto }
        </style>
        <script type="text/javascript"
            src="http://maps.google.com/maps/api/js?sensor=false">
        </script>
        <script type="text/javascript">
          function initialize() {
            var classroom = new google.maps.LatLng(35.084280,-106.624073)
            var myOptions = {
              zoom: 8,
              center: classroom,
              mapTypeId: google.maps.MapTypeId.HYBRID
            };
            var map = new google.maps.Map(
                document.getElementById("map_canvas"),
                myOptions);
          }
        </script>
    </head>

    <body onload="initialize()">
      <h1>Sample Map</h1>
      <div id="map_canvas"></div>
    </body>

</html>
```

[View in new window][gmap simple 03] Your browser does not support an embedded web page. Click here to view the referenced page

[gmap simple 03]: http://kkb-classes.s3.amazonaws.com/2012/x85/webContent/examples/gmaps03.html "Link to Simple Google Map Page - Hybrid" target="_blank"

Simple - Terrain

```
<!DOCTYPE html>
<html>
    <head>
        <style type="text/css">
          html { height: 100% }
          body { height: 100%;
            margin: 0px;
            padding: 0px;
            background-color: black;
            color: #CCCCCC;
            text-align: center}
          #map_canvas { width:90%;
            height:80%;
            margin-left: auto;
            margin-right: auto }
        </style>
        <script type="text/javascript"
```

```
            src="http://maps.google.com/maps/api/js?sensor=false">
        </script>
        <script type="text/javascript">
          function initialize() {
            var classroom = new google.maps.LatLng(35.084280,-106.624073)
            var myOptions = {
              zoom: 8,
              center: classroom,
              mapTypeId: google.maps.MapTypeId.TERRAIN
            };
            var map = new google.maps.Map(
                document.getElementById("map_canvas"),
                myOptions);
          }
        </script>
    </head>

    <body onload="initialize()">
      <h1>Sample Map</h1>
      <div id="map_canvas"></div>
    </body>

</html>
```

[View in new window][gmap simple 04] Your browser does not support an embedded web page. Click here to view the referenced page

[gmap simple 04]: http://kkb-classes.s3.amazonaws.com/2012/x85/webContent/examples/gmaps04.html "Link to Simple Google Map Page - Terrain" target="_blank"

Simple - Hybrid - Zoomed

```
<!DOCTYPE html>
<html>
    <head>
        <style type="text/css">
          html { height: 100% }
          body { height: 100%;
            margin: 0px;
            padding: 0px;
            background-color: black;
            color: #CCCCCC;
            text-align: center}
          #map_canvas { width:90%;
            height:80%;
            margin-left: auto;
            margin-right: auto }
        </style>
        <script type="text/javascript"
            src="http://maps.google.com/maps/api/js?sensor=false">
        </script>
        <script type="text/javascript">
          function initialize() {
```

```
            var classroom = new google.maps.LatLng(35.084280,-106.624073)
            var myOptions = {
              zoom: 18,
              center: classroom,
              mapTypeId: google.maps.MapTypeId.HYBRID
            };
            var map = new google.maps.Map(
                document.getElementById("map_canvas"),
                myOptions);
          }
        </script>
    </head>

    <body onload="initialize()">
      <h1>Sample Map</h1>
      <div id="map_canvas"></div>
    </body>

</html>
```

[View in new window][gmap simple 05] Your browser does not support an embedded web page. Click here to view the referenced page

[gmap simple 05]: http://kkb-classes.s3.amazonaws.com/2012/x85/webContent/examples/gmaps05.html "Link to Simple Google Map Page - Hybrid - Zoomed" target="_blank"

Simple - Zoomed - Modified Controls

```
<!DOCTYPE html>
<html>
    <head>
        <style type="text/css">
          html { height: 100% }
          body { height: 100%;
            margin: 0px;
            padding: 0px;
            background-color: black;
            color: #CCCCCC;
            text-align: center}
          #map_canvas { width:90%;
            height:80%;
            margin-left: auto;
            margin-right: auto }
        </style>
        <script type="text/javascript"
            src="http://maps.google.com/maps/api/js?sensor=false">
        </script>
        <script type="text/javascript">
          function initialize() {
            var classroom = new google.maps.LatLng(35.084280,-106.624073)
            var myOptions = {
              zoom: 18,
              center: classroom,
```

```
            mapTypeId: google.maps.MapTypeId.HYBRID,
            zoomControl: true,
            zoomControlOptions: {style: google.maps.ZoomControlStyle.SMALL},
            mapTypeControl: true,
            mapTypeControlOptions: {
              style: google.maps.MapTypeControlStyle.DROPDOWN_MENU},
            streetViewControl: false
          };
          var map = new google.maps.Map(
              document.getElementById("map_canvas"),
              myOptions);
        }
      </script>
  </head>

  <body onload="initialize()">
    <h1>Sample Map</h1>
    <div id="map_canvas"></div>
  </body>

</html>
```

[View in new window][gmap simple 06] Your browser does not support an embedded web page. Click here to view the referenced page

[gmap simple 06]: http://kkb-classes.s3.amazonaws.com/2012/x85/webContent/examples/gmaps06.html "Link to Simple Google Map Page - Hybrid - Modified Controls" target="_blank"

Markers

```
<!DOCTYPE html>
<html>
  <head>
    <style type="text/css">
      html { height: 100% }
      body { height: 100%;
        margin: 0px;
        padding: 0px;
        background-color: black;
        color: #CCCCCC;
        text-align: center}
      #map_canvas { width:90%;
        height:80%;
        margin-left: auto;
        margin-right: auto }
    </style>
    <script type="text/javascript"
      src="http://maps.google.com/maps/api/js?sensor=false">
    </script>
    <script type="text/javascript">
      function initialize() {
        var classroom = new google.maps.LatLng(35.084280,-106.624073)
        var office = new google.maps.LatLng(35.084506,-106.624899)
```

```
            var myOptions = {
              zoom: 18,
              center: classroom,
              mapTypeId: google.maps.MapTypeId.HYBRID
              };
            var map = new google.maps.Map(
              document.getElementById("map_canvas"),
              myOptions);

            var classroomMarker = new google.maps.Marker({
              position: classroom,
              title:"Geography 485L/585L Classroom, Bandelier East, Room 106"
              });
            classroomMarker.setMap(map);

            var officeMarker = new google.maps.Marker({
              position: office,
              title:"Office, Bandelier West, Room 107"
              });
            officeMarker.setMap(map);
          }
        </script>
    </head>

    <body onload="initialize()">
      <h1>Sample Map</h1>
      <div id="map_canvas"></div>
    </body>

</html>
```

[View in new window][gmap simple 07] Your browser does not support an embedded web page. Click here to view the referenced page

[gmap simple 07]: http://kkb-classes.s3.amazonaws.com/2012/x85/webContent/examples/gmaps07.html "Link to Simple Google Map Page - Markers Example" target="_blank"

Polyline

```
<!DOCTYPE html>
<html>
    <head>
        <style type="text/css">
          html { height: 100% }
          body { height: 100%;
            margin: 0px;
            padding: 0px;
            background-color: black;
            color: #CCCCCC;
            text-align: center}
          #map_canvas { width:90%;
            height:80%;
            margin-left:
```

```
            auto;
            margin-right: auto }
        </style>
        <script type="text/javascript"
            src="http://maps.google.com/maps/api/js?sensor=false">
        </script>
        <script type="text/javascript">
          function initialize() {
            var classroom = new google.maps.LatLng(35.084280,-106.624073)
            var office = new google.maps.LatLng(35.084506,-106.624899)
            var myOptions = {
              zoom: 18,
              center: classroom,
              mapTypeId: google.maps.MapTypeId.HYBRID
              };
            var map = new google.maps.Map(
              document.getElementById("map_canvas"),
              myOptions);

            var classroomMarker = new google.maps.Marker({
              position: classroom,
              title:"Geography 485L/585L Classroom, Bandelier East, Room 106"
              });
            classroomMarker.setMap(map);

            var officeMarker = new google.maps.Marker({
              position: office,
              title:"Office, Bandelier West, Room 107"
              });
            officeMarker.setMap(map);

            var officeVisitCoordinates = [
              office,
              new google.maps.LatLng(35.084445,-106.624327),
              new google.maps.LatLng(35.084309,-106.624308),
              classroom
              ];
            var officePath = new google.maps.Polyline({
              path: officeVisitCoordinates,
              strokeColor: "#FF0000",
              strokeOpacity: 1.0,
              strokeWeight: 2
            });
            officePath.setMap(map)
          }
        </script>
    </head>

    <body onload="initialize()">
      <h1>Sample Map</h1>
      <div id="map_canvas"></div>
    </body>

</html>
```

[View in new window][gmap simple 08] Your browser does not support an embedded web page. Click here to view the referenced page

[gmap simple 08]: http://kkb-classes.s3.amazonaws.com/2012/x85/webContent/examples/gmaps08.html "Link to Simple Google Map Page - Polyline Example" target="_blank"

Polygon

```
<!DOCTYPE html>
<html>
    <head>
        <style type="text/css">
          html { height: 100% }
          body { height: 100%;
            margin: 0px;
            padding: 0px;
            background-color: black;
            color: #CCCCCC;
            text-align: center}
          #map_canvas { width:90%;
            height:80%;
            margin-left: auto;
            margin-right: auto }
        </style>
        <script type="text/javascript"
            src="http://maps.google.com/maps/api/js?sensor=false">
        </script>
        <script type="text/javascript">
          function initialize() {
            var classroom = new google.maps.LatLng(35.084280,-106.624073)
            var office = new google.maps.LatLng(35.084506,-106.624899)
            var myOptions = {
              zoom: 18,
              center: classroom,
              mapTypeId: google.maps.MapTypeId.HYBRID
              };
            var map = new google.maps.Map(
              document.getElementById("map_canvas"),
              myOptions);
            var classroomMarker = new google.maps.Marker({
              position: classroom,
              title:"Geography 485L/585L Classroom, Bandelier East, Room 106"
              });
            classroomMarker.setMap(map);
            var officeMarker = new google.maps.Marker({
              position: office,
              title:"Office, Bandelier West, Room 107"
              });
            officeMarker.setMap(map);
            var buildingCoordinates = [
              new google.maps.LatLng(35.084498,-106.624921),
              new google.maps.LatLng(35.084558,-106.624911),
              new google.maps.LatLng(35.084566,-106.624970),
              new google.maps.LatLng(35.084609,-106.624966),
```

```
            new google.maps.LatLng(35.084544,-106.624383),
            new google.maps.LatLng(35.084438,-106.624317),
            new google.maps.LatLng(35.084384,-106.623922),
            new google.maps.LatLng(35.084164,-106.623970),
            new google.maps.LatLng(35.084214,-106.624324),
            new google.maps.LatLng(35.084214,-106.624324),
            new google.maps.LatLng(35.084391,-106.624284)
            ];
          var bldgPoly = new google.maps.Polygon({
            paths: buildingCoordinates,
            strokeColor: "#FF0000",
            strokeOpacity: 0.8,
            strokeWeight: 2,
            fillColor: "#FF0000",
            fillOpacity: 0.35
          });
          bldgPoly.setMap(map)
        }
      </script>
  </head>

  <body onload="initialize()">
    <h1>Sample Map</h1>
    <div id="map_canvas"></div>
  </body>

</html>
```

[View in new window][gmap simple 09] Your browser does not support an embedded web page. Click here to view the referenced page

[gmap simple 09]: http://kkb-classes.s3.amazonaws.com/2012/x85/webContent/examples/gmaps09.html "Link to Simple Google Map Page - Polyline Example" target="_blank"

Adding an Info Window

```
<!DOCTYPE html>
<html>
  <head>
    <style type="text/css">
      html { height: 100% }
      body { height: 100%;
        margin: 0px;
        padding: 0px;
        background-color: black;
        color: #CCCCCC;
        text-align: center}
      #map_canvas { width:90%;
        height:80%;
        margin-left: auto;
        margin-right: auto }
      .infoBox { color:black }
    </style>
```

```
<script type="text/javascript"
    src="http://maps.google.com/maps/api/js?sensor=false">
</script>
<script type="text/javascript">
  function initialize() {
    var classroom = new google.maps.LatLng(35.084280,-106.624073)
    var office = new google.maps.LatLng(35.084506,-106.624899)
    var myOptions = {
      zoom: 18,
      center: classroom,
      mapTypeId: google.maps.MapTypeId.HYBRID
      };
    var map = new google.maps.Map(
      document.getElementById("map_canvas"),
      myOptions);
    var classroomMarker = new google.maps.Marker({
      position: classroom,
      title:"Geography 485L/585L Classroom, Bandelier East, Room 106"
      });
    classroomMarker.setMap(map);
    var officeMarker = new google.maps.Marker({
      position: office,
      title:"Office, Bandelier West, Room 107"
      });
    officeMarker.setMap(map);
    var buildingCoordinates = [
      new google.maps.LatLng(35.084498,-106.624921),
      new google.maps.LatLng(35.084558,-106.624911),
      new google.maps.LatLng(35.084566,-106.624970),
      new google.maps.LatLng(35.084609,-106.624966),
      new google.maps.LatLng(35.084544,-106.624383),
      new google.maps.LatLng(35.084438,-106.624317),
      new google.maps.LatLng(35.084384,-106.623922),
      new google.maps.LatLng(35.084164,-106.623970),
      new google.maps.LatLng(35.084214,-106.624324),
      new google.maps.LatLng(35.084214,-106.624324),
      new google.maps.LatLng(35.084391,-106.624284)
      ];
    var bldgPoly = new google.maps.Polygon({
      paths: buildingCoordinates,
      strokeColor: "#FF0000",
      strokeOpacity: 0.8,
      strokeWeight: 2,
      fillColor: "#FF0000",
      fillOpacity: 0.35
    });
    bldgPoly.setMap(map);
    var classInfoContent = '<div class="infoBox">' +
      '<p>This is the location for the Geography 485L/585L class</p>' +
      '</div>'
    var classInfoWindow = new google.maps.InfoWindow({
      content: classInfoContent
      });
    google.maps.event.addListener(classroomMarker, 'click', function() {
```

```
            classInfoWindow.open(map,classroomMarker);
            });
        }
      </script>
  </head>

  <body onload="initialize()">
    <h1>Sample Map</h1>
    <div id="map_canvas"></div>
  </body>

</html>
```

[View in new window][gmap simple 10] Your browser does not support an embedded web page. Click here to view the referenced page

[gmap simple 10]: http://kkb-classes.s3.amazonaws.com/2012/x85/webContent/examples/gmaps10.html "Link to Simple Google Map Page - Polyline Example" target="_blank"

Some Questions and Answers

- Use of alternative editors for homework and labs

  Certainly use whatever tools you are comfortable with - the tools we have worked with so far are just some of the possible ones that can be used.

- Use of WinSCP (Windows) or Fugu (Mac) for transferring files between local computer and class server

  WinSCP and Fugu are two programs that are recommended for transferring files from your local computer to the class server. Check out this week's class outline for links to a couple of short videos that demonstrate how to use these programs.

- Running `webupdate` on UNM's server is still required for new (and sometimes updated) files

- Other questions? Come to Tuesday's collaboratory and ask.