UNB

Google Maps API Web Services

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Introduction

- Google offers a collection of
  - **HTTP interfaces** to Google services
  - providing geographic data for map-mashup applications
    - Directions API
    - Distance Matrix API
    - Elevation API
    - Geocoding API
    - Time Zone API
    - Places API

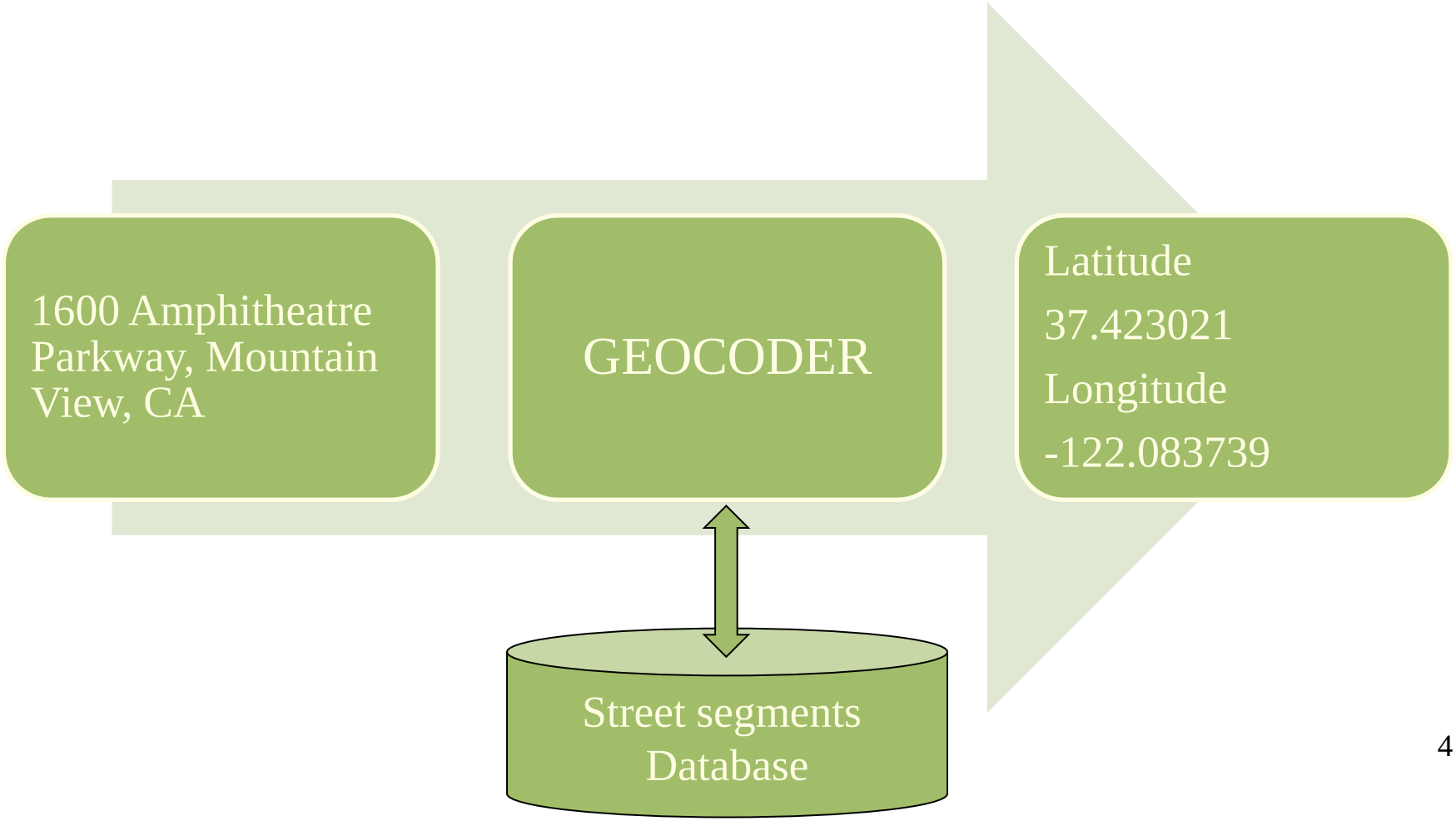
https://developers.google.com/maps/documentation/webservices/

Geocoding API

- Geocoding…
  - is the process of **finding associated geographic coordinates** (often expressed as latitude and longitude)
  - **from other geographic data**, such as street addresses, or zip codes (postal codes).

- **Reverse geocoding**…
  - finding an associated textual location such as a street address, from geographic coordinates.

Geocoding Example



Geocoding – How?

- Method: **Address interpolation**…
  - a street database
    - street segments mapped within the coordinate space
    - each street segment is attributed with address ranges
  - geocoding
    - finds the segment
    - interpolates the position of the address
    - reports coordinates

e.g., 25 Elm Street, Hollywood, CA

Geocoding – difficulties…

- Ambiguous addresses…
  - 742 Evergreen Terrace
  - 742 W Evergreen Terrace
- Missing addresses…
  - Not yet added to the street database
- Synonyms …
  - 742 Evergreen Terrace in Springfield
  - 742 Evergreen Terrace in Shelbyville
    - Need to ask for the city name, province, country (postal code)

(address verification practices)

Google Geocoding API

- It provides…
  - a direct way to access a **geocoder**
  - via an **HTTP request**

- Additionally, the service allows…
  - the **reverse geocoding**

HTTP requests

http://maps.googleapis.com/maps/api/geocode/output?parameters

output:

- Json or
- Xml

parameters:

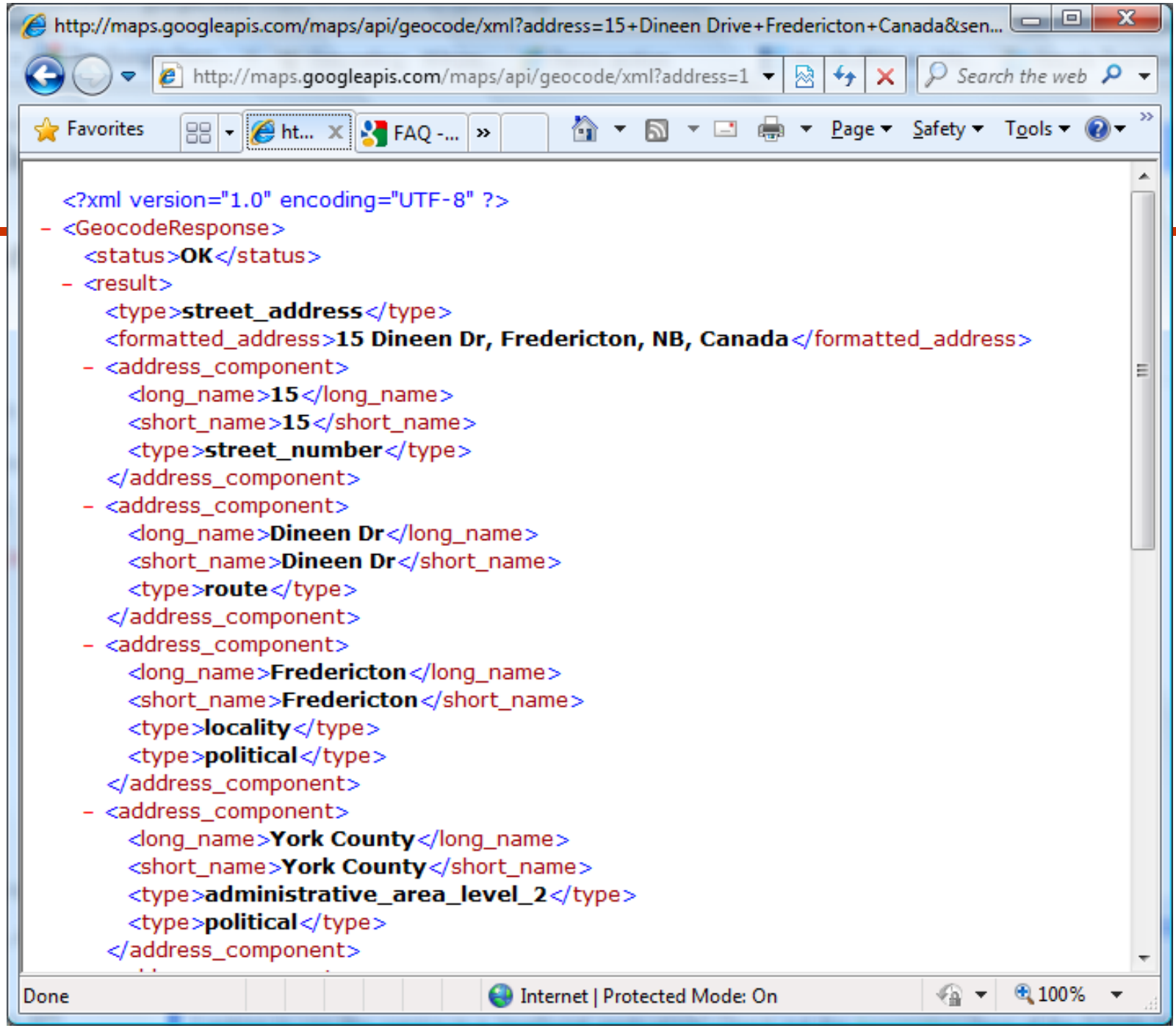
- address (required)
- latlng (required) [for reverse geocoding]
- sensor (required)
  - whether or not the request comes from a device with a location sensor (true or false).

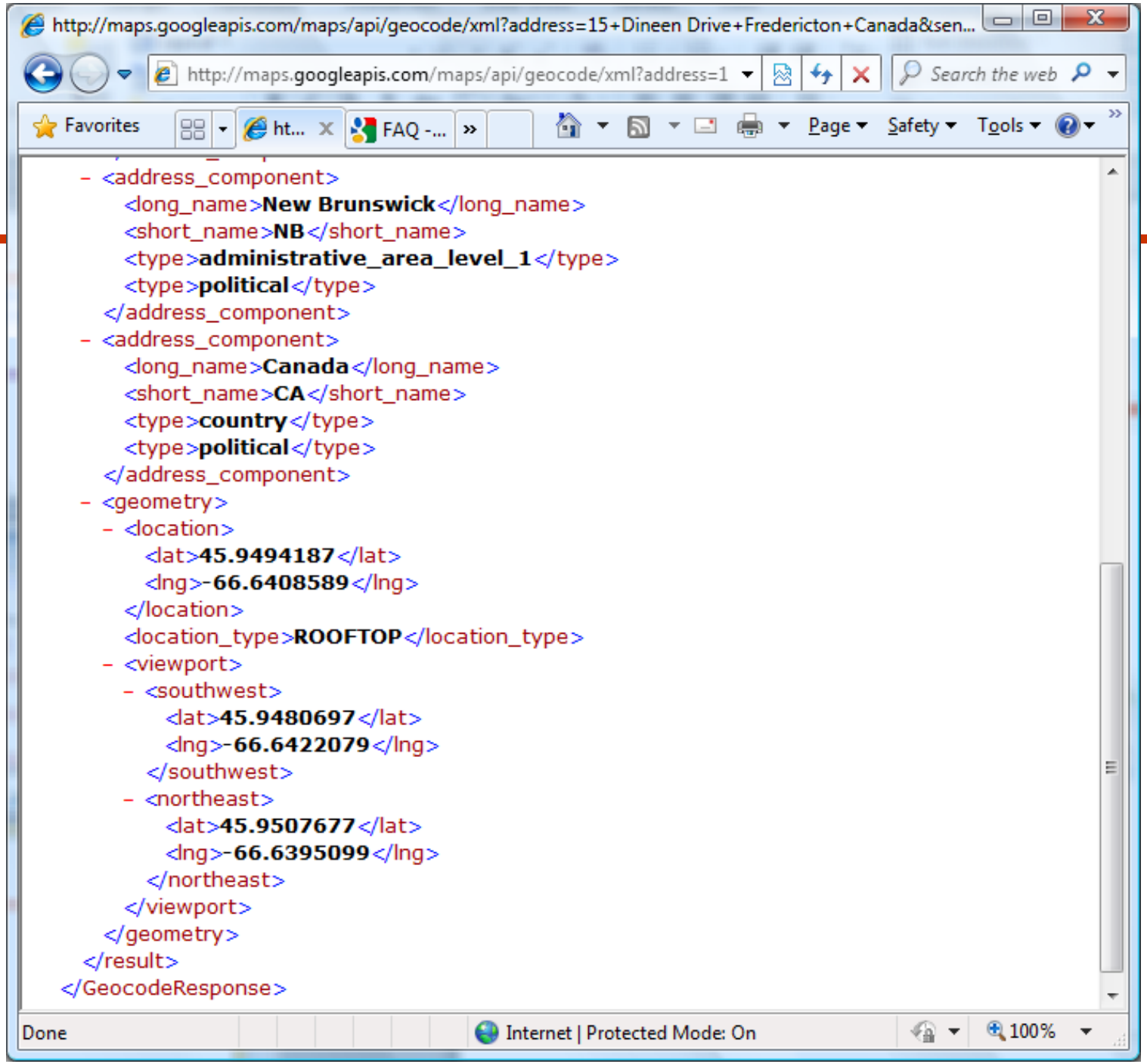
HTTP requests

http://maps.googleapis.com/maps/api/geocode/xml?address=15+Dineen Drive+Fredericton+Canada&sensor=false

http://maps.googleapis.com/maps/api/geocode/xml?address=15+Dineen%20Drive+Fredericton+Canada&sensor=false

Google has changed its policy. To try this request you need to have a google account. Read more details here: : http://g.co/dev/maps-no-account


http://maps.googleapis.com/maps/api/geocode/xml?address=15+Dineen Drive+Fredericton+Canada&sen...
http://maps.googleapis.com/maps/api/geocode/xml?address=1
Search the web
Favorites
ht...
FAQ -...
Page
Safety
Tools
<?xml version="1.0" encoding="UTF-8" ?>
<GeocodeResponse>
<status>OK</status>
<result>
<type>street_address</type>
<formatted_address>15 Dineen Dr, Fredericton, NB, Canada</formatted_address>
<address_component>
<long_name>15</long_name>
<short_name>15</short_name>
<type>street_number</type>
</address_component>
<address_component>
<long_name>Dineen Dr</long_name>
<short_name>Dineen Dr</short_name>
<type>route</type>
</address_component>
<address_component>
<long_name>Fredericton</long_name>
<short_name>Fredericton</short_name>
<type>locality</type>
<type>political</type>
</address_component>
<address_component>
<long_name>York County</long_name>
<short_name>York County</short_name>
<type>administrative_area_level_2</type>
<type>political</type>
</address_component>
Done
Internet | Protected Mode: On
100%


http://maps.googleapis.com/maps/api/geocode/xml?address=15+Dineen Drive+Fredericton+Canada&sen...
http://maps.googleapis.com/maps/api/geocode/xml?address=1
Search the web
Favorites
ht...
FAQ -...
Page
Safety
Tools
<address_component>
<long_name>New Brunswick</long_name>
<short_name>NB</short_name>
<type>administrative_area_level_1</type>
<type>political</type>
</address_component>
<address_component>
<long_name>Canada</long_name>
<short_name>CA</short_name>
<type>country</type>
<type>political</type>
</address_component>
<geometry>
<location>
<lat>45.9494187</lat>
<lng>-66.6408589</lng>
</location>
<location_type>ROOFTOP</location_type>
<viewport>
<southwest>
<lat>45.9480697</lat>
<lng>-66.6422079</lng>
</southwest>
<northeast>
<lat>45.9507677</lat>
<lng>-66.6395099</lng>
</northeast>
</viewport>
</geometry>
</result>
</GeocodeResponse>
Done
Internet | Protected Mode: On
100%

HTTP Requests

- More parameters
  - for address verification…

- `address` (*required*) — The address that you want to geocode.*

  OR

- `latlng` (*required*) — The textual latitude/longitude value for which you wish to obtain the closest, human-readable address.*
- `bounds` (*optional*) — The bounding box of the viewport within which to bias geocode results more prominently. (For more information see Viewport Biasing below.)
- `region` (*optional*) — The region code, specified as a ccTLD ("top-level domain") two-character value. (For more information see Region Biasing below.)
- `language` (*optional*) — The language in which to return results. See the supported list of domain languages. Note that we often update supported languages so this list may not be exhaustive. If `language` is not supplied, the geocoder will attempt to use the native language of the domain from which the request is sent wherever possible.
- `sensor` (*required*) — Indicates whether or not the geocoding request comes from a device with a location sensor. This value must be either `true` or `false`.

HTTP Requests

- Viewport Biasing
  - instructs the Geocoding service to prefer results within a given viewport
    - expressed as a bounding box
- Region Biasing
  - address results influenced by the region (typically the country)
    - searches for "San Francisco" may return different results if sent from a domain within the United States than one sent from Spain

HTTP Requests

- **Reverse geocoding**…

http://maps.googleapis.com/maps/api/geocode/xml?

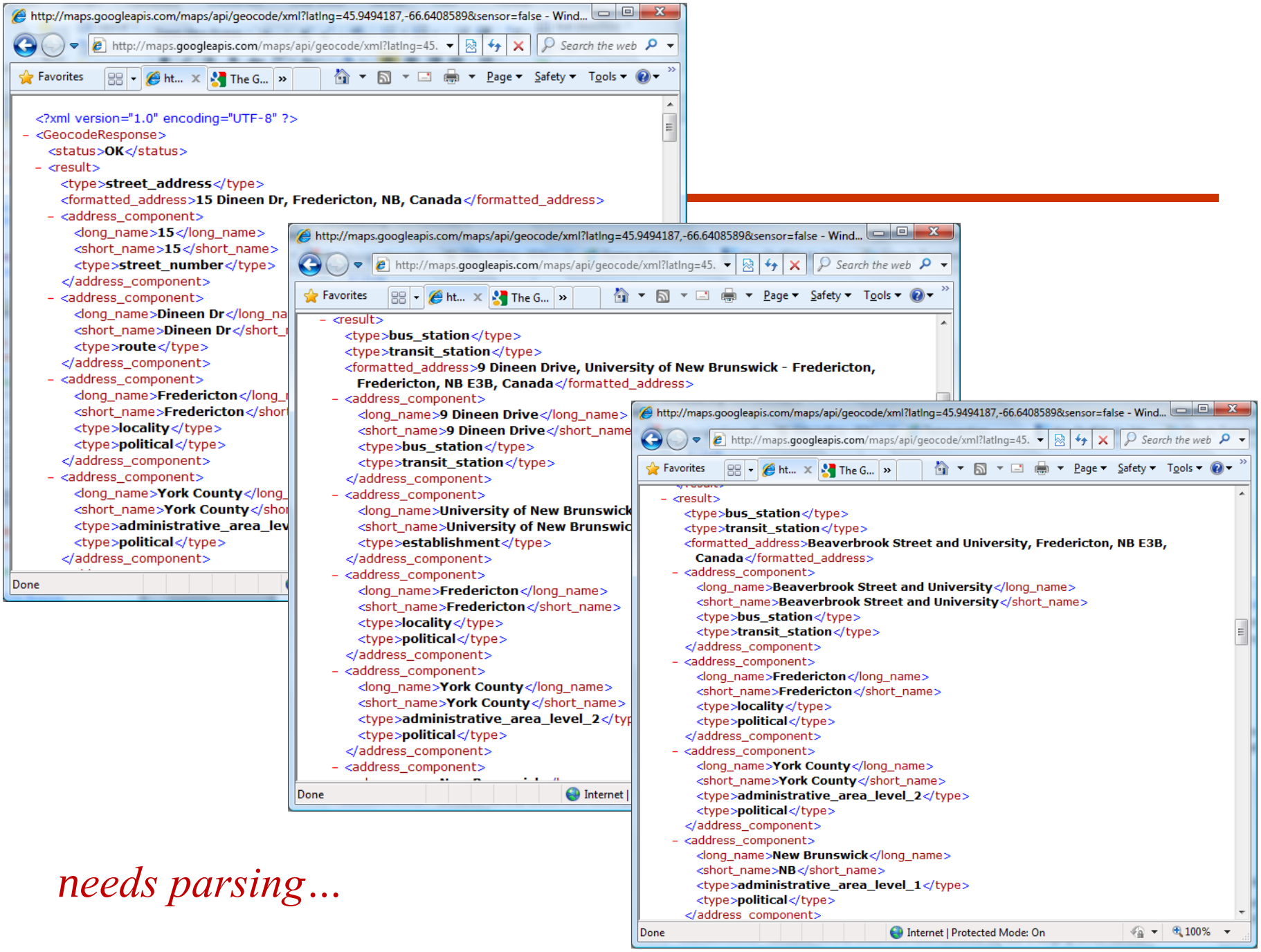
latlng=45.9494187,-66.6408589&

sensor=false

http://maps.googleapis.com/maps/api/geocode/xml?latlng=45.9494187,-66.6408589&sensor=false

(more than one results – not only addresses)

Google has changed its policy. To try this request you need to have a google account. Read more details here: : http://g.co/dev/maps-no-account



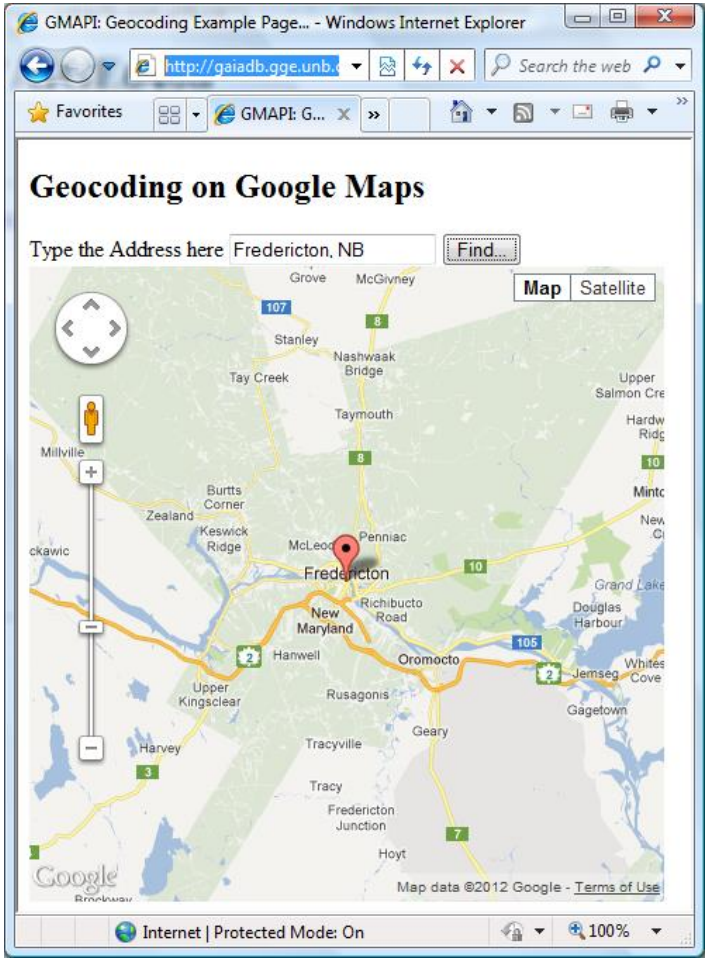
needs parsing…

Google Geocoding API

- A query **limit of** …
  - 2,500 geolocation requests per day
- Google Maps API for Business …
  - up to 100,000 requests per day
  - If service abused …
    - in 24-hours may stop working temporarily
    - if continuously, it may be blocked.

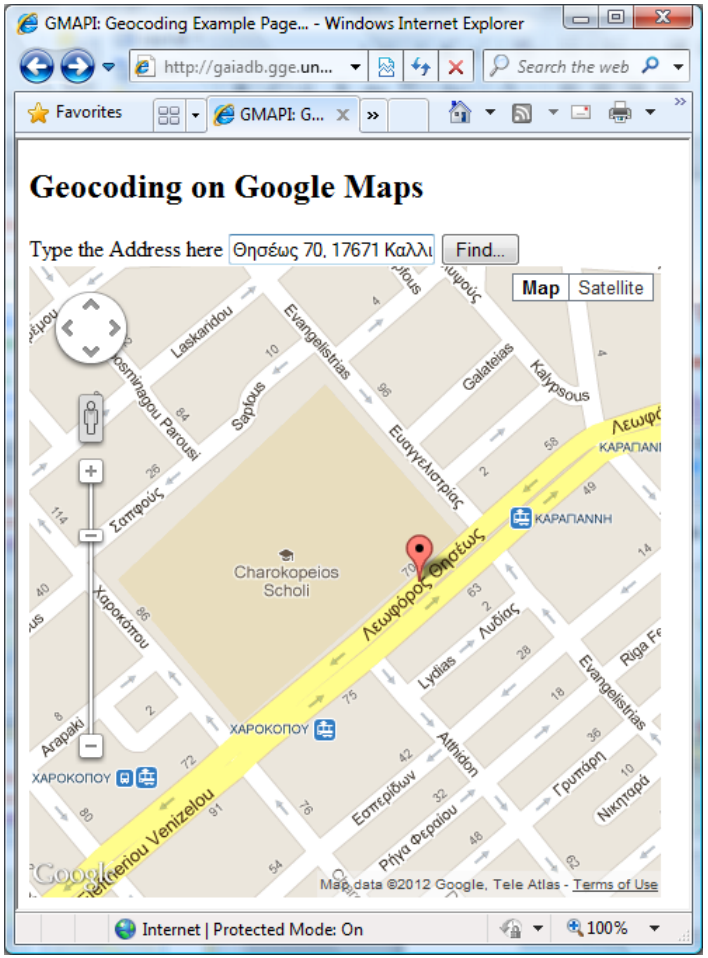
Geocoding in Google Maps API

This application is unavailable



Geocoding in Google Maps API

This application is unavailable



geocoding - Notepad

File Edit Format View Help

```
<!DOCTYPE html>
<html>
<head>
<title>GMAPI: Geocoding Example Page...</title>

<script type="text/javascript" src="//maps.googleapis.com/maps/api/js?
sensor=false"></script>
<script type="text/javascript">
  var geocoder;
  var map;
  function initialize() {
    geocoder = new google.maps.Geocoder();
    map = new google.maps.Map(document.getElementById('map'), {
      center: new google.maps.LatLng(45.94825776,-66.64133335),
      zoom: 9,
      mapTypeId: 'roadmap'
    });
  }

  function codeAddress() {
    var address = document.getElementById("address").value;
    geocoder.geocode( { 'address': address}, function(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);
      }
    });
  }
</script>
</head>
```

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https://developers.google.com/maps/documentation/webservices/

Directions API

- **Directions** API
  - calculates directions between locations using an HTTP request.
  - Directions may specify
    - origins, destinations and waypoints either as text strings (e.g. "Chicago, IL" or "Darwin, NT, Australia") or as latitude/longitude coordinates.

Directions API

- **Example**

  http://maps.googleapis.com/maps/api/directions/xml?

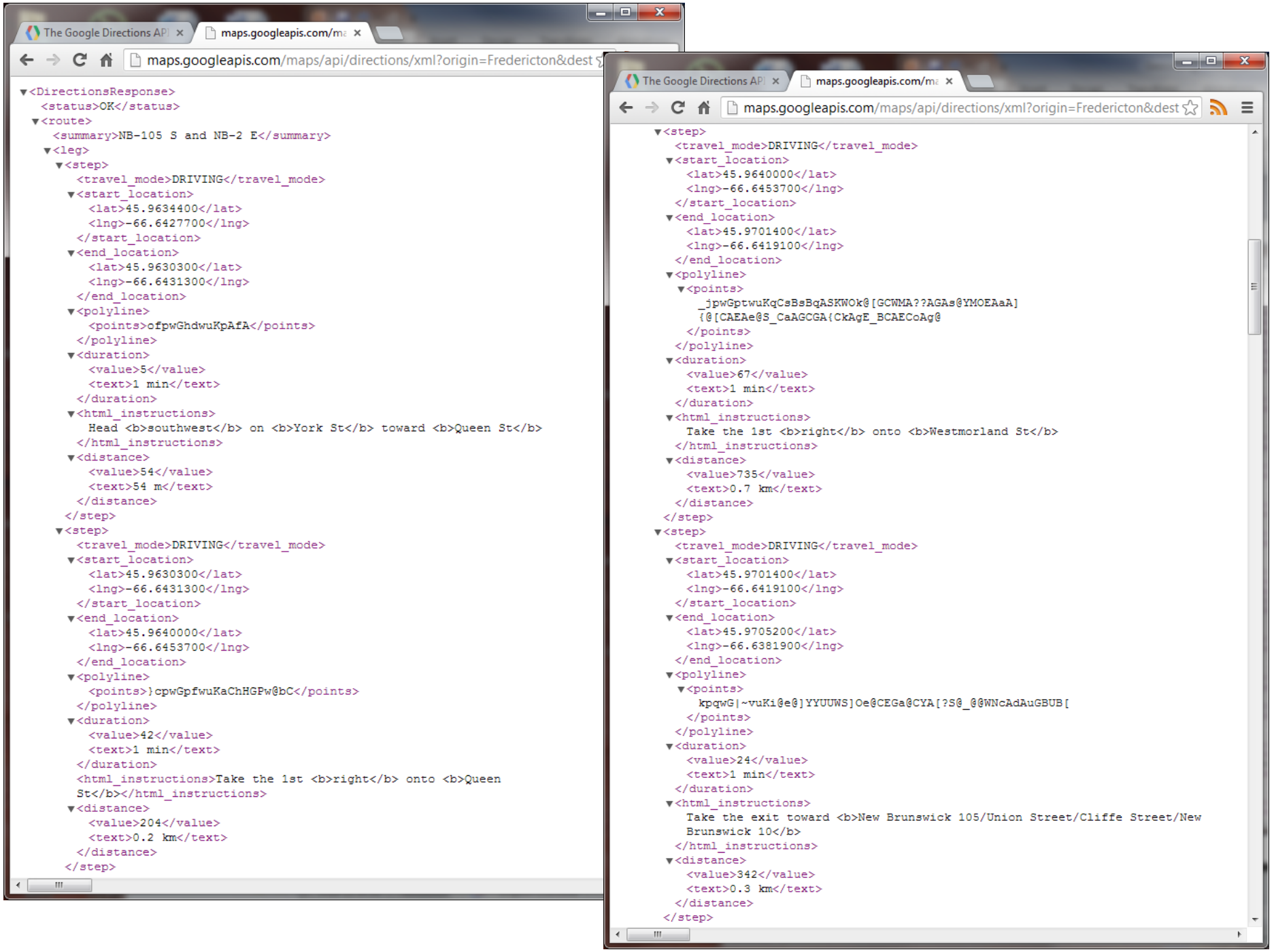
  origin=Fredericton&

  destination=Moncton& (bicycling, walking, transit)

  sensor=false (avoid=tolls; avoid=highways)

  http://maps.googleapis.com/maps/api/directions/xml?origin=Fredericton&destination=Moncton&sensor=false

Google has changed its policy. To try this request you need to have a google account. Read more details here: : http://g.co/dev/maps-no-account


The Google Directions API
maps.googleapis.com/ma
maps.googleapis.com/maps/api/directions/xml?origin=Fredericton&dest
<DirectionsResponse>
<status>OK</status>
<route>
<summary>NB-105 S and NB-2 E</summary>
<leg>
<step>
<travel_mode>DRIVING</travel_mode>
<start_location>
<lat>45.9634400</lat>
<lng>-66.6427700</lng>
</start_location>
<end_location>
<lat>45.9630300</lat>
<lng>-66.6431300</lng>
</end_location>
<polyline>
<points>ofpwGhdwuKpAfA</points>
</polyline>
<duration>
<value>5</value>
<text>1 min</text>
</duration>
<html_instructions>
Head southwest on York St toward Queen St
</html_instructions>
<distance>
<value>54</value>
<text>54 m</text>
</distance>
</step>
<step>
<travel_mode>DRIVING</travel_mode>
<start_location>
<lat>45.9630300</lat>
<lng>-66.6431300</lng>
</start_location>
<end_location>
<lat>45.9640000</lat>
<lng>-66.6453700</lng>
</end_location>
<polyline>
<points>}cpwGpfwuKaChHGPw@bC</points>
</polyline>
<duration>
<value>42</value>
<text>1 min</text>
</duration>
<html_instructions>Take the 1st right onto Queen
St</html_instructions>
<distance>
<value>204</value>
<text>0.2 km</text>
</distance>
</step>
The Google Directions API
maps.googleapis.com/ma
maps.googleapis.com/maps/api/directions/xml?origin=Fredericton&dest
<step>
<travel_mode>DRIVING</travel_mode>
<start_location>
<lat>45.9640000</lat>
<lng>-66.6453700</lng>
</start_location>
<end_location>
<lat>45.9701400</lat>
<lng>-66.6419100</lng>
</end_location>
<polyline>
<points>
_jpwGptwuKqCsBsBqASKWOk@[GCWMA??AGAs@YMOEAaA]
{@[CAEAe@S_CaAGCGA{CkAgE_BCAECoAg@
</points>
</polyline>
<duration>
<value>67</value>
<text>1 min</text>
</duration>
<html_instructions>
Take the 1st right onto Westmorland St
</html_instructions>
<distance>
<value>735</value>
<text>0.7 km</text>
</distance>
</step>
<step>
<travel_mode>DRIVING</travel_mode>
<start_location>
<lat>45.9701400</lat>
<lng>-66.6419100</lng>
</start_location>
<end_location>
<lat>45.9705200</lat>
<lng>-66.6381900</lng>
</end_location>
<polyline>
<points>
kpqwG|~vuKi@e@]YYUUWS]Oe@CEGa@CYA[?S@_@@WNcAdAuGBUB[
</points>
</polyline>
<duration>
<value>24</value>
<text>1 min</text>
</duration>
<html_instructions>
Take the exit toward New Brunswick 105/Union Street/Cliffe Street/New
Brunswick 10
</html_instructions>
<distance>
<value>342</value>
<text>0.3 km</text>
</distance>
</step>

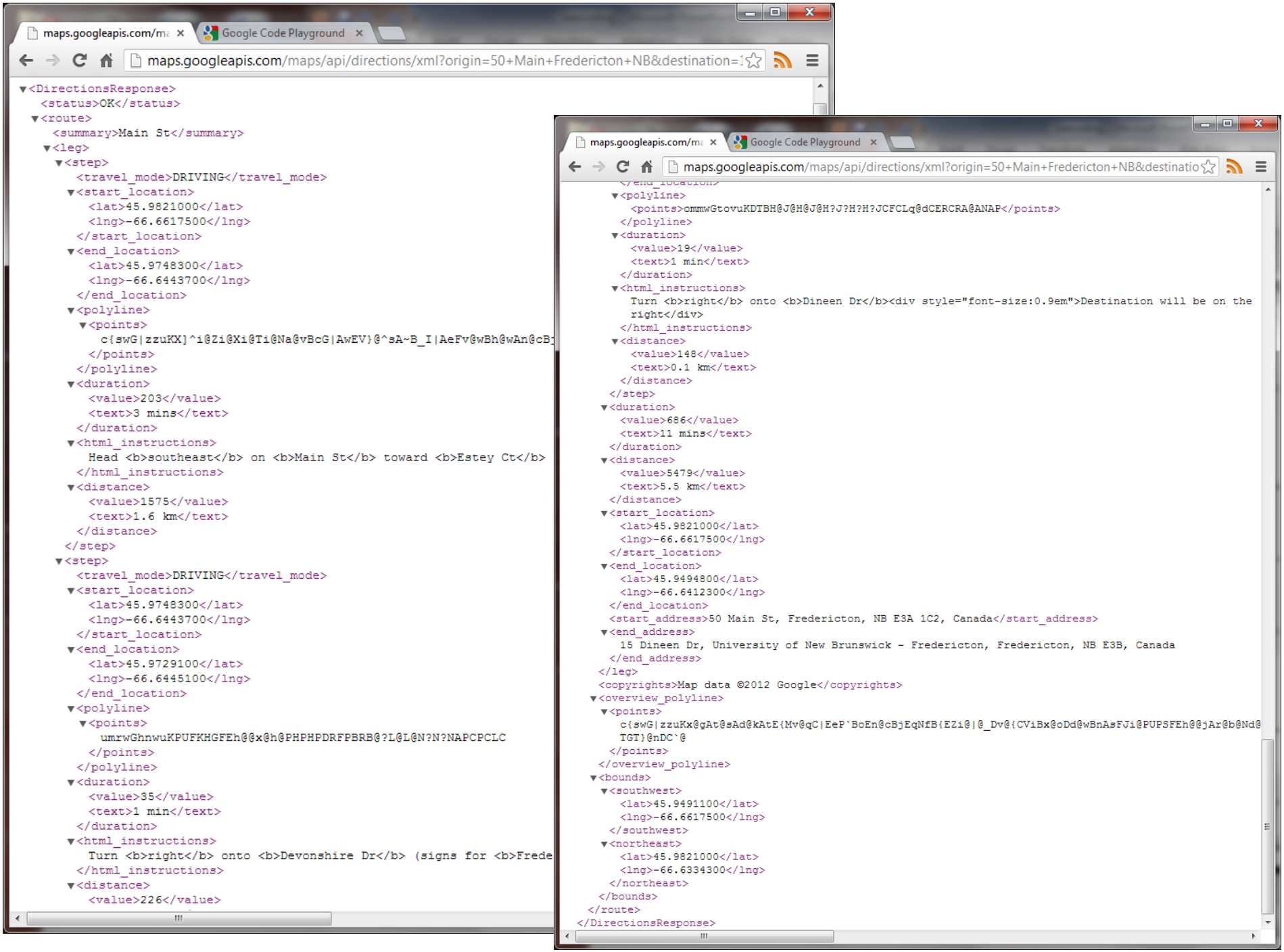
Directions API

- **Example**

  http://maps.googleapis.com/maps/api/directions/xml?
  origin=50+Main+Fredericton+NB&
  destination=15+Dineen+Drive+Fredericton+NB&
  sensor=false

  http://maps.googleapis.com/maps/api/directions/xml?origin=50+Main+Fredericton+NB&destination=15+Dineen+Drive+Fredericton+NB&sensor=false

Google has changed its policy. To try this request you need to have a google account. Read more details here: : http://g.co/dev/maps-no-account


maps.googleapis.com/ma
Google Code Playground
maps.googleapis.com/maps/api/directions/xml?origin=50+Main+Fredericton+NB&destination=1
maps.googleapis.com/maps/api/directions/xml?origin=50+Main+Fredericton+NB&destinatio
<DirectionsResponse>
<status>OK</status>
<route>
<summary>Main St</summary>
<leg>
<step>
<travel_mode>DRIVING</travel_mode>
<start_location>
<lat>45.9821000</lat>
<lng>-66.6617500</lng>
</start_location>
<end_location>
<lat>45.9748300</lat>
<lng>-66.6443700</lng>
</end_location>
<polyline>
<points>
c{swG|zzuKX]^i@Zi@Xi@Ti@Na@vBcG|AwEV}@^sA~B_I|AeFv@wBh@wAn@cB
</points>
</polyline>
<duration>
<value>203</value>
<text>3 mins</text>
</duration>
<html_instructions>
Head southeast on Main St toward Estey Ct
</html_instructions>
<distance>
<value>1575</value>
<text>1.6 km</text>
</distance>
</step>
<step>
<travel_mode>DRIVING</travel_mode>
<start_location>
<lat>45.9748300</lat>
<lng>-66.6443700</lng>
</start_location>
<end_location>
<lat>45.9729100</lat>
<lng>-66.6445100</lng>
</end_location>
<polyline>
<points>
umrwGhnwuKPUFKHGFEh@@x@h@PHPHPDRFPBRB@?L@L@N?N?NAPCPCLC
</points>
</polyline>
<duration>
<value>35</value>
<text>1 min</text>
</duration>
<html_instructions>
Turn right onto Devonshire Dr (signs for Frede
</html_instructions>
<distance>
<value>226</value>
<points>ommwGtovuKDTBH@J@H@J@H?J?H?H?JCFCLq@dCERCRA@ANAP</points>
<duration>
<value>19</value>
<text>1 min</text>
<html_instructions>
Turn right onto Dineen Dr Destination will be on the
right
<distance>
<value>148</value>
<text>0.1 km</text>
<duration>
<value>686</value>
<text>11 mins</text>
<distance>
<value>5479</value>
<text>5.5 km</text>
<start_location>
<lat>45.9821000</lat>
<lng>-66.6617500</lng>
<end_location>
<lat>45.9494800</lat>
<lng>-66.6412300</lng>
<start_address>50 Main St, Fredericton, NB E3A 1C2, Canada</start_address>
<end_address>
15 Dineen Dr, University of New Brunswick - Fredericton, Fredericton, NB E3B, Canada
<copyrights>Map data ©2012 Google</copyrights>
<overview_polyline>
<points>
c{swG|zzuKx@gAt@sAd@kAtE{Mv@qC|EeP`BoEn@cBjEqNfB{EZi@|@_Dv@{CViBx@oDd@wBnAsFJi@PUPSFEh@@jAr@b@Nd@
TGT}@nDC`@
</points>
<bounds>
<southwest>
<lat>45.9491100</lat>
<lng>-66.6617500</lng>
<northeast>
<lat>45.9821000</lat>
<lng>-66.6334300</lng>
</route>
</DirectionsResponse>

GMAPI: Geocoding Exam | Google Code Playground

code.google.com/apis/ajax/playground/#directions_simple

Pick an API Search

- Service Examples
  - Geocoding Simple
  - Geocoding Extraction
  - Geocoding Reverse
  - Geocoding Cache
  - GeoXML RSS
  - GeoXML KML
  - Traffic Overlay
  - Directions Simple
  - Directions Advanced
  - Streetview Simple
  - Streetview Object
  - Streetview Layer
  - Streetview Data
- Maps V3
- News Search
- Patent Search
- Search
- Video Search
- Visualization New Samples!
- Web Search
- YouTube

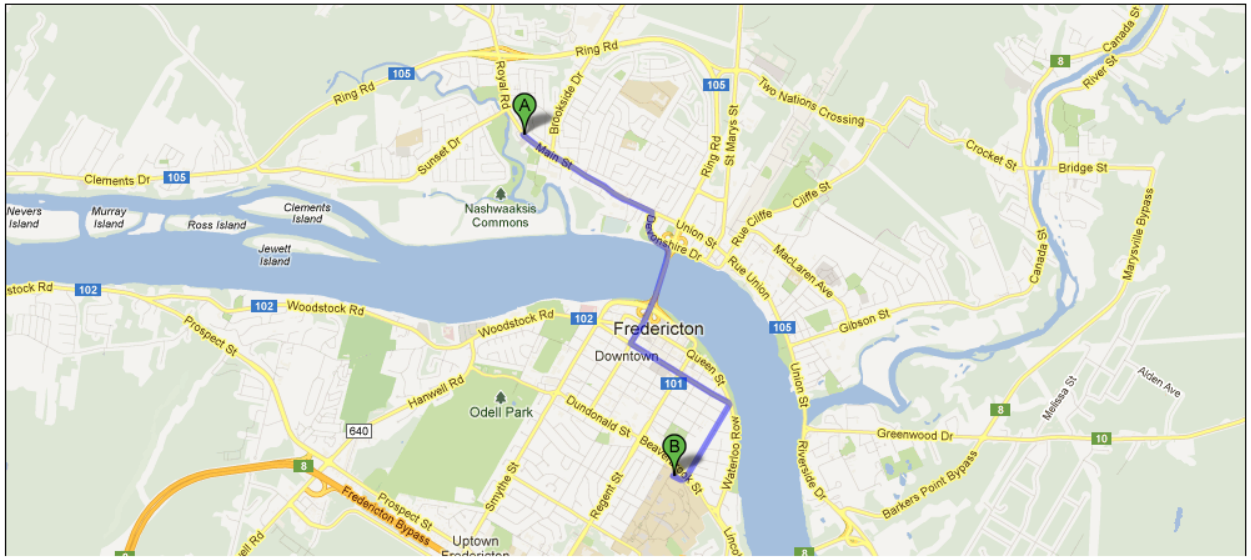
Edit Code Service Examples » Directions Simple — View Docs | Edit HTML

```
// Create a directions object and register a map and DIV to hold the
// resulting computed directions

var map;
var directionsPanel;
var directions;

function initialize() {
  map = new GMap2(document.getElementById("map_canvas"));
  map.setCenter(new GLatLng(45,-66), 15);
  directionsPanel = document.getElementById("route");
  directions = new GDirections(map, directionsPanel);
  directions.load("from: 50 Main, Fredericton, NB to: 15 Dineen Drive, Fredericton, NB");
}
```

Output — Debug Code | Run Code



A 50 Main St, Fredericton, NB E3A 1C2, Canada

5.5 km (about 11 mins)

1. Head **southeast** on **Main St** toward **Estey Ct** — 1.6 km
2. Turn right onto **Devonshire Dr** (signs for **Fredericton/Downtown/Centre-Ville**) — 230 m
3. Take the ramp to **Fredericton Centre** — 450 m
4. Merge onto **Westmorland St** — 950 m
5. Turn left onto **Brunswick St** — 1.2 km
6. Turn right onto **University Ave** — 900 m
7. Turn right onto **Dineen Dr** — 150 m
   Destination will be on the right

B 15 Dineen Dr, Fredericton, NB, Canada

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https://developers.google.com/maps/documentation/webservices/

Distance Matrix API

- **Distance Matrix** API
  - provides travel distance and time for a matrix of origins and destinations
  - consists of rows containing duration and distance values for each pair
  - does not return detailed route information
  - route information obtained by Directions API

Distance Matrix API

- **Example**

  http://maps.googleapis.com/maps/api/distancematrix/xml?

  origins=Fredericton&

  destinations=Moncton& (bicycling, walking)

  mode=driving& (avoid=tolls; avoid=highways)

  sensor=false

  http://maps.googleapis.com/maps/api/distancematrix/xml?origins=Fredericton&destinations=Moncton&mode=driving&sensor=false

Google has changed its policy. To try this request you need to have a google account. Read more details here: : http://g.co/dev/maps-no-account

Distance Matrix API

Distance Matrix API

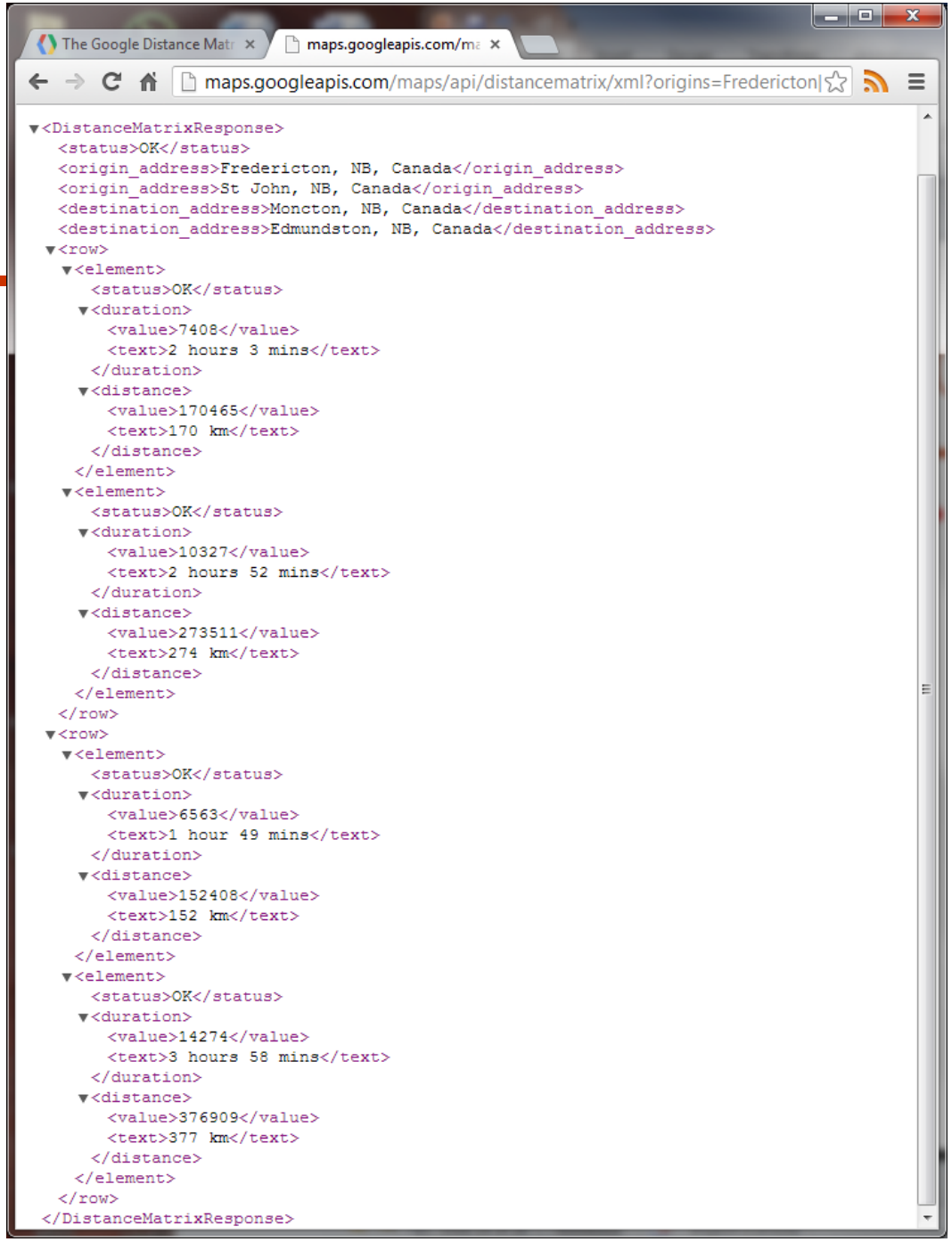
- **Example**

  http://maps.googleapis.com/maps/api/distancematrix/xml?
  origins=Fredericton|Saint+John&
  destinations=Moncton|Edmundston&
  mode=driving&
  sensor=false

  http://maps.googleapis.com/maps/api/distancematrix/xml?origins=Fredericton|Saint+John&destinations=Moncton|Edmundston&mode=driving&sensor=false

Google has changed its policy. To try this request you need to have a google account. Read more details here: : http://g.co/dev/maps-no-account

Fredericton	Moncton
St John	Edmundston



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https://developers.google.com/maps/documentation/webservices/

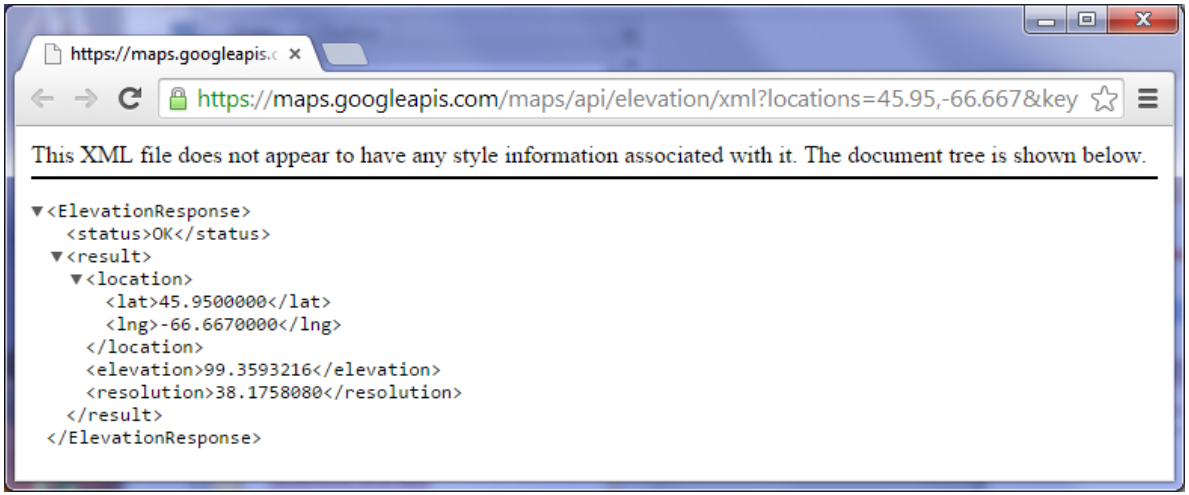
Elevation API

- **Elevation** API
  - provides elevation data
    - for all locations on the surface of the earth,
    - including depth locations on the ocean floor
      - which return negative values
  - when not exact elevation available
    - the service will interpolate and return an averaged value using the four nearest locations.

Elevation API

- Example request:

https://maps.googleapis.com/maps/api/elevation/xml?locations=45.95,-66.667&key



Google has changed its policy. To try this request you need to have a google account. Read more details here: : http://g.co/dev/maps-no-account

Other Google Maps API Web Services

- Google offers a collection of
  - **HTTP interfaces** to Google services
  - providing geographic data for map-mashup applications
    - Directions API
    - Distance Matrix API
    - Elevation API
    - Geocoding API
    - Time Zone API
    - Places API

https://developers.google.com/maps/documentation/webservices/

Time Zone API

- **Time Zone** API
  - provides time offset data for locations on the surface of the earth
  - requesting the time zone information for a specific Latitude/Longitude pair will return
    - the name of that time zone,
    - the time offset from UTC, and
    - the Daylight Savings offset

Places API

- **Places** API
  - returns information about Places
    - defined within this API as establishments, geographic locations, or prominent points of interest
    - requests specify locations as latitude/longitude coordinates.

References

- Wikipedia
  - http://en.wikipedia.org/wiki/Geocoding
- Google Maps API Web Services
  - https://developers.google.com/maps/documentation/webservices/

UNB

Google Maps API Web Services

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