

Web Mapping

Emmanuel Stefanakis

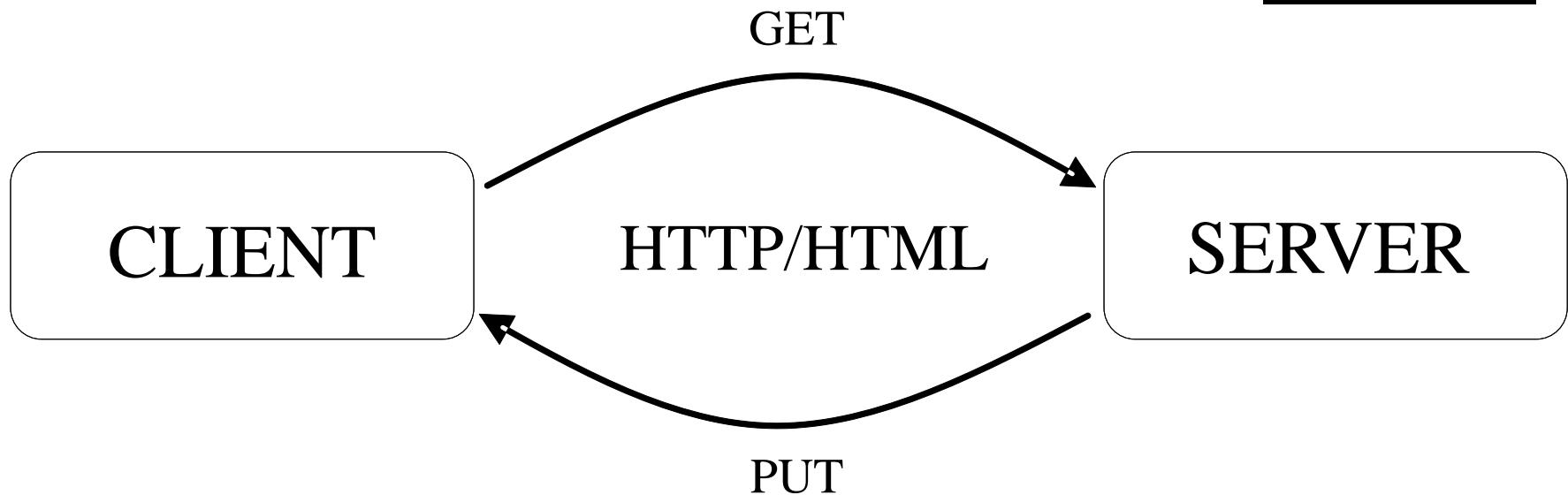
estef@unb.ca

Publishing Maps on the Web

- The World Wide Web ...
 - A common means of publishing maps
- Web maps ...
 - Millions of people use web maps daily
 - Few of them know how they are actually generated

The Web...

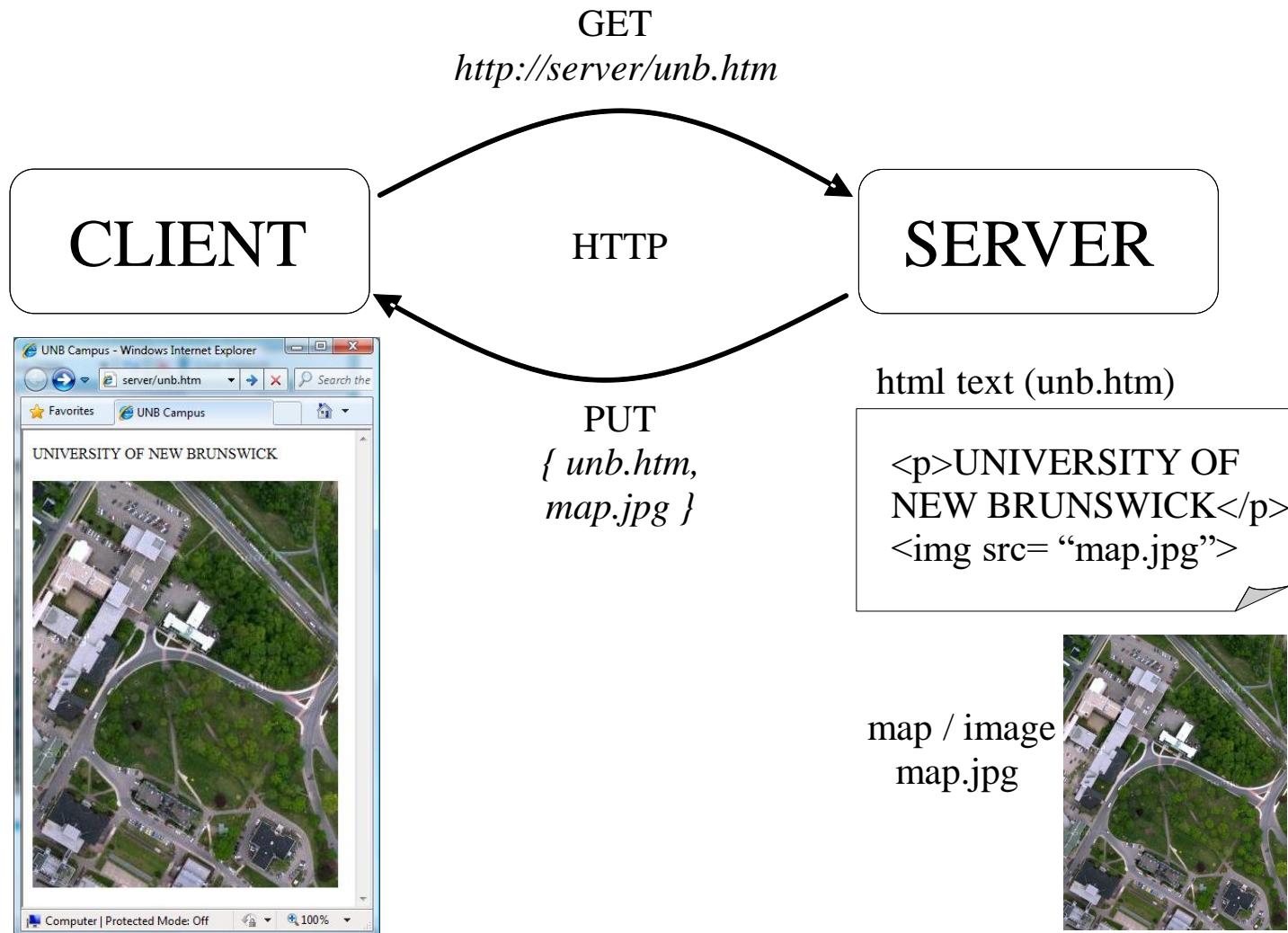
- Communication of computers
 - Client-Server Architecture....



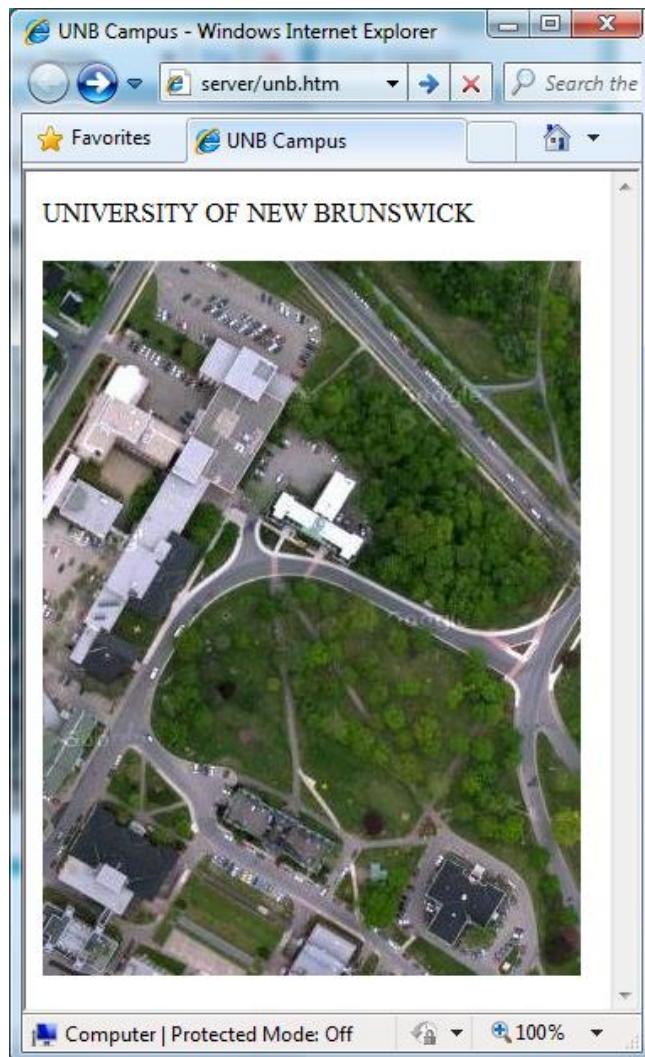
Publishing Maps on the Web

- Two approaches ...
 - Static maps
 - Apply the basic web resources
 - Interactive maps
 - Enriched functionality by extending
 - The client side functionality
 - The server side functionality

Static Maps...



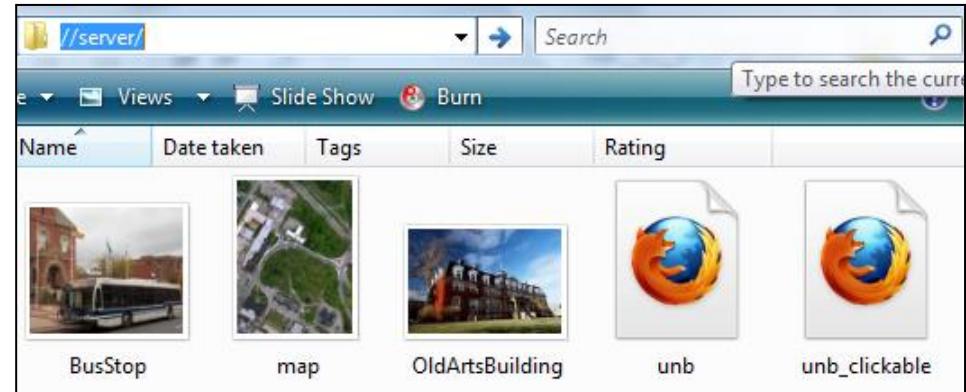
Static Maps...



```
<html>
<head>
    <title>UNB Campus</title>
</head>

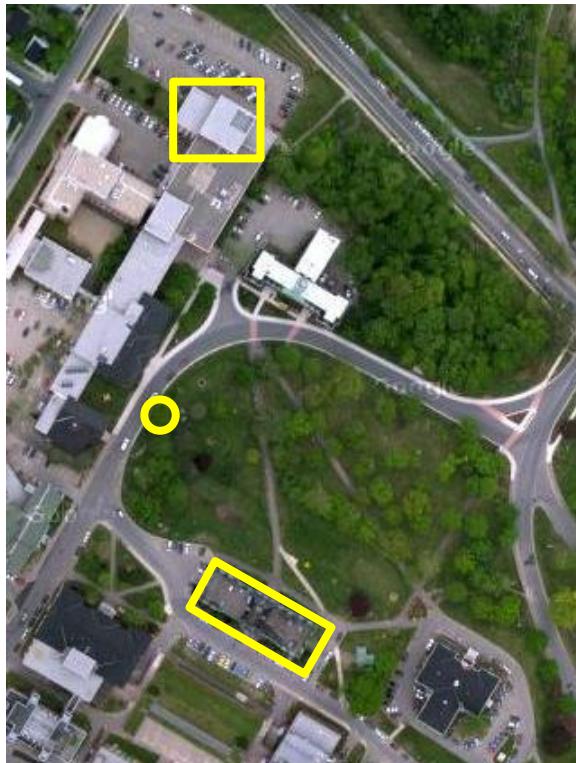
<body>
    <p>UNIVERSITY OF NEW BRUNSWICK</p>
    <img src= "map.jpg">
</body>

</html>
```



Static Maps...

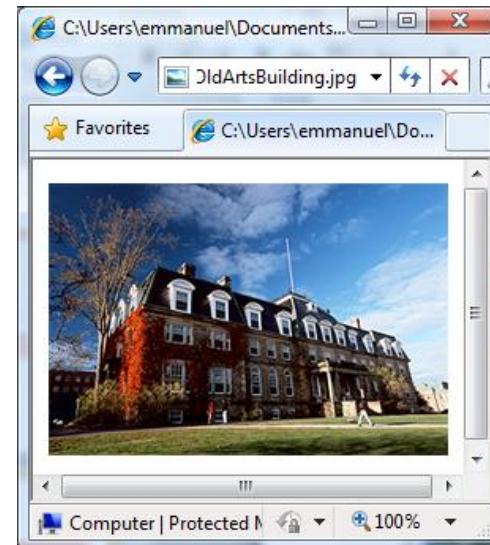
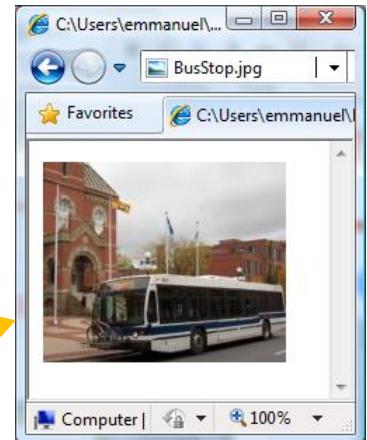
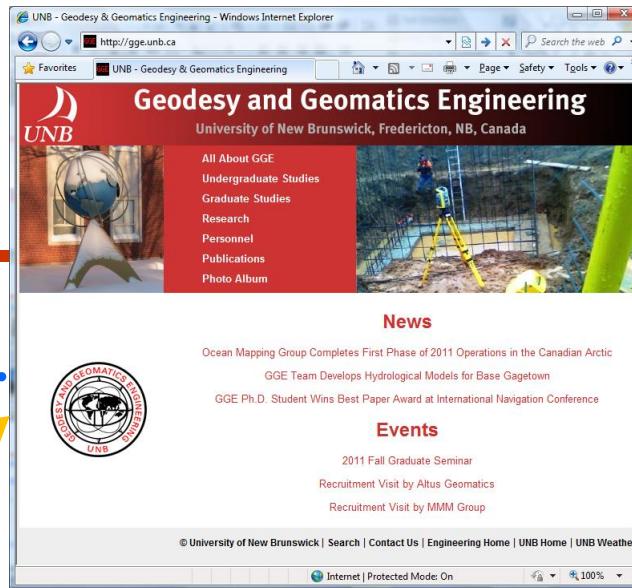
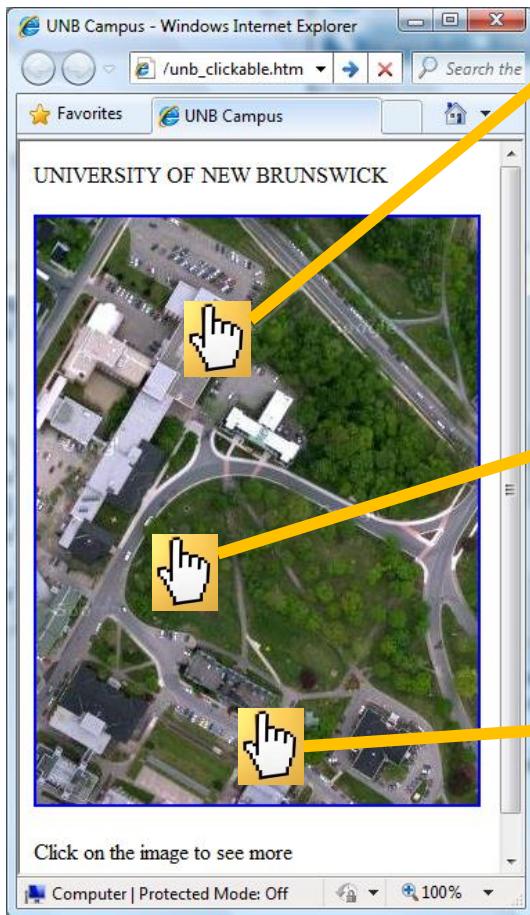
- Clickable maps ...
 - Images may have “sensitive areas” ...



**associate a hyperlink
to these areas...**

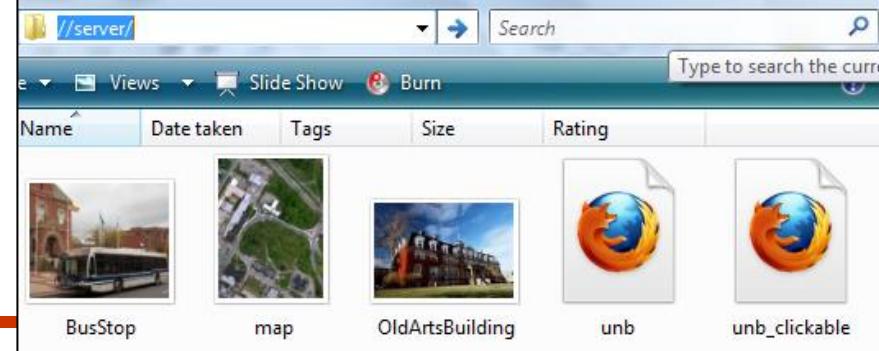
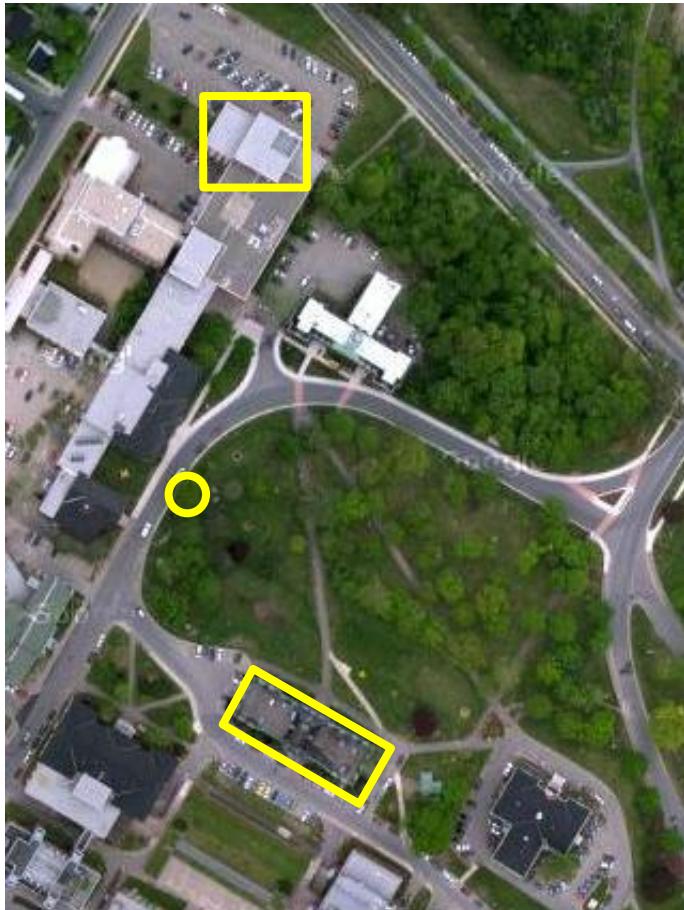
Static Maps...

- Clickable maps ...



Static Maps...

- Clickable maps ...

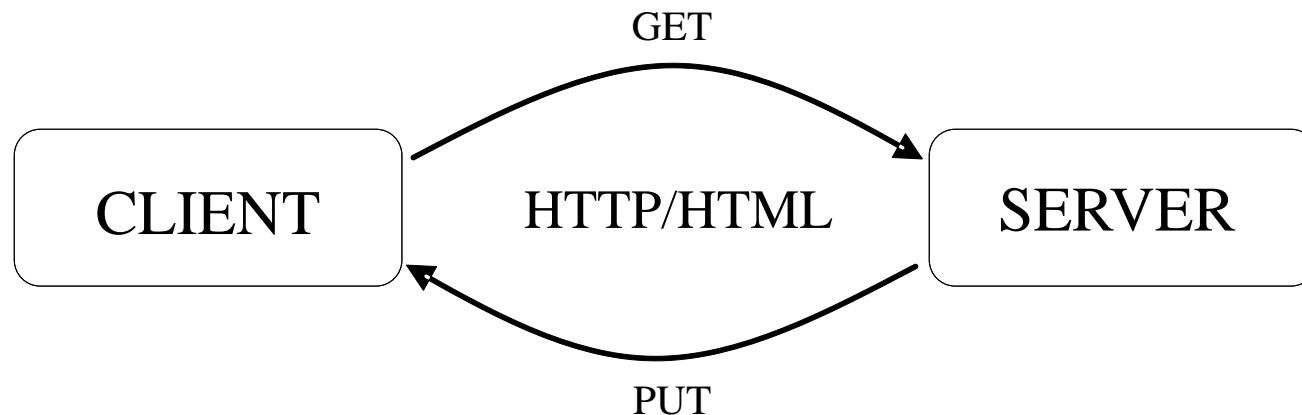


```
<html>
<head>
  <title>UNB Campus</title>
</head>
<body>
  <p>UNIVERSITY OF NEW BRUNSWICK</p>
  
  <p>Click on the image to see more</p>

  <map name="UNBMap">
    <area href="OldArtsBuilding.jpg" shape="polygon"
          coords="113,315, 101,334, 164,372, 172,346">
    <area href="http://gge.unb.ca" shape="rect"
          coords="93,39, 135,94">
    <area href="BusStop.jpg" shape="circle"
          coords="85,233, 10">
  </map>
</body>
</html>
```

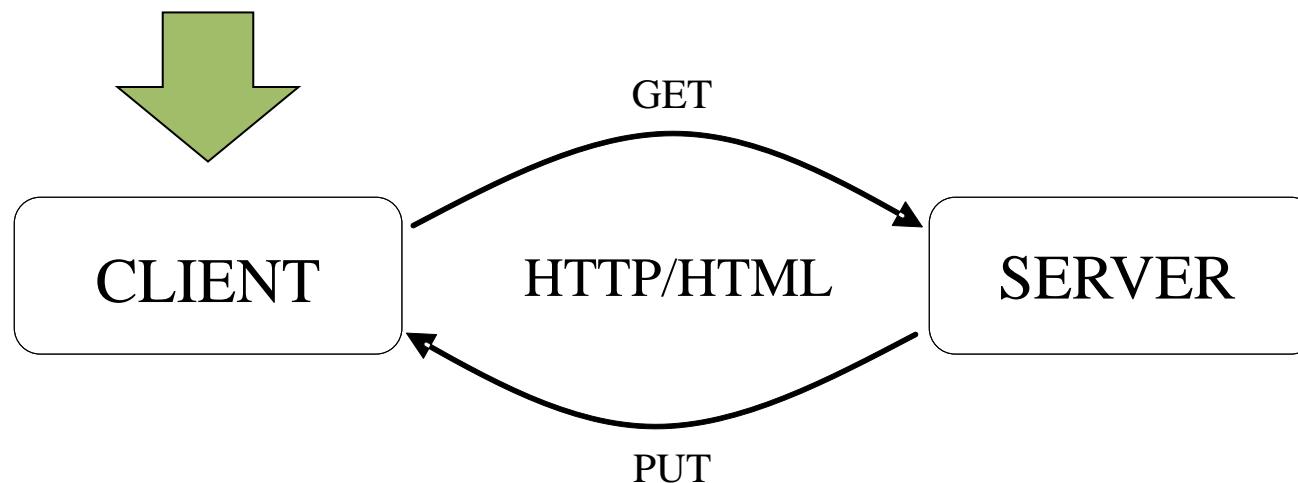
Interactive Maps...

- Enriched functionality by extending...
 - the **client side** functionality
 - the **server side** functionality



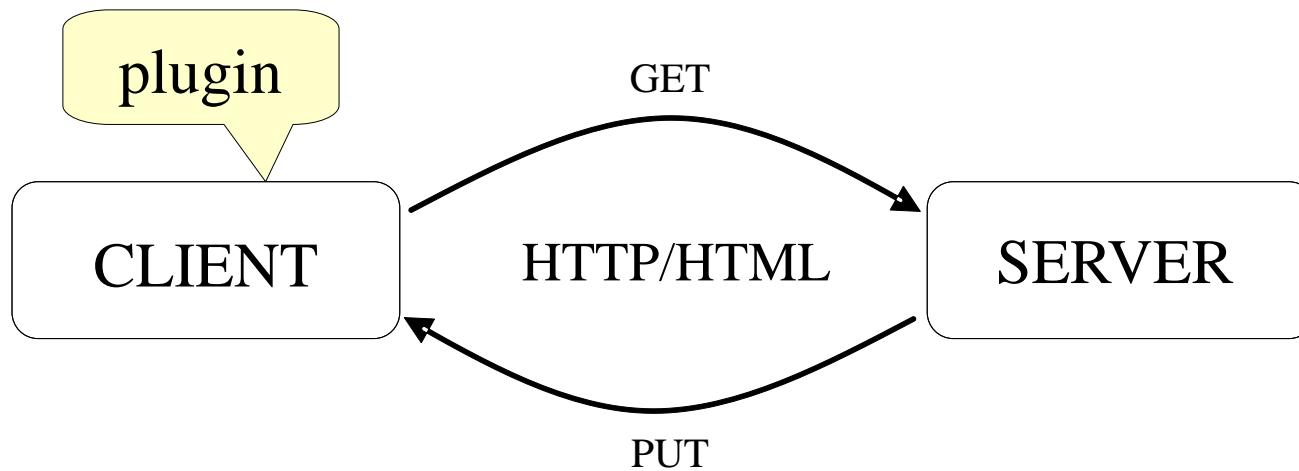
Interactive Maps...

- Enriched functionality by extending...
 - the **client side** functionality
 - the **server side** functionality



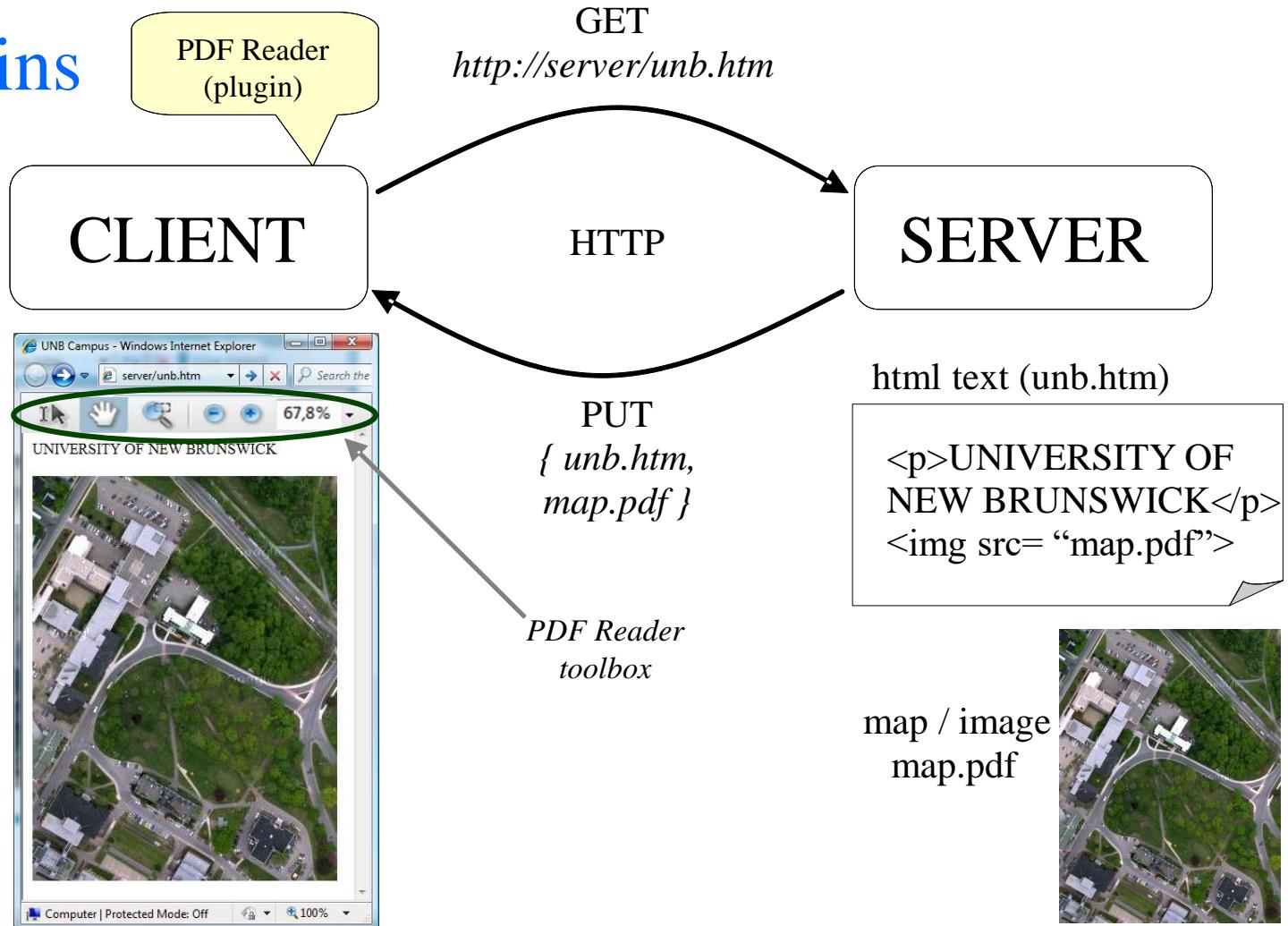
Extend the Client-side...

- Plugins...
 - make the web browser capable to read and process additional formats



Extend the Client-side...

- Plugins



Extend the Client-side...

- Plugins...
 - Scalable Vector Graphics (SVG) ...
 - is a language for describing two-dimensional graphics and graphical applications
 - it is based on the XML standard
 - it describes...
 - Content + Map Symbols + ...

Extend the Client-side...

- Plugins...
 - Scalable Vector Graphics (SVG) ...
 - A W3C standard (current version 1.1)...
 - <http://www.w3.org/Graphics/SVG/>
 - SVG Document Type Declaration (DTD)

```
<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"
"http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">
```



GROUP DETAILS

- [Charter](#)
- [Roadmap](#)
- [Group Participants](#)
- [Wiki](#)
- [Test Suites](#)
- [Royalty-free Patent Policy](#)

FEEDBACK

- [Public Mailing List <www-svg@w3.org>](#)
- [Blog](#)
- [Twitter](#)
- [Feedback Page](#)
- [Known SVG Issues](#)

RECOMMENDATIONS

- [SVG 1.1 2nd Edition](#)
- [SVG Tiny 1.2](#)
- [SVG Mobile 1.1](#)

STANDARDS | PARTICIPATE | MEMBERSHIP | ABOUT W3C

Views: desktop mobile print

Google™



SCALABLE VECTOR GRAPHICS (SVG)

SVG is a widely-deployed royalty-free graphics format developed and maintained by the W3C SVG Working Group. This is a public group, which works on an open mailing list and which welcomes your feedback.



Upcoming Events

The Graphical Web 2014 – Winchester, England, August 27–30, 2014

The Graphical Web will showcase SVG, as well as related technologies like Canvas, WebGL, CSS, Javascript, and HTML5 video and audio. The theme of the 2014 edition of the conference will be Visual Storytelling – using new technology to produce compelling visual narratives on the web. The Graphical Web 2014 is being organised by the Data Visualisation Centre of the UK's Office for National Statistics. The event will be of interest to a broad range of attendees, from graphics professionals right through to data journalists. As well as conference sessions and training workshops, the W3C SVG Work Group will be holding meetings as part of the conference.

News

CSS-SVG Effects Task Force Started

The CSS and SVG Working groups have started a joint task force to discuss and develop mutual features such as gradients, transforms, filters, and animation. The aim is to specify a

What is SVG?



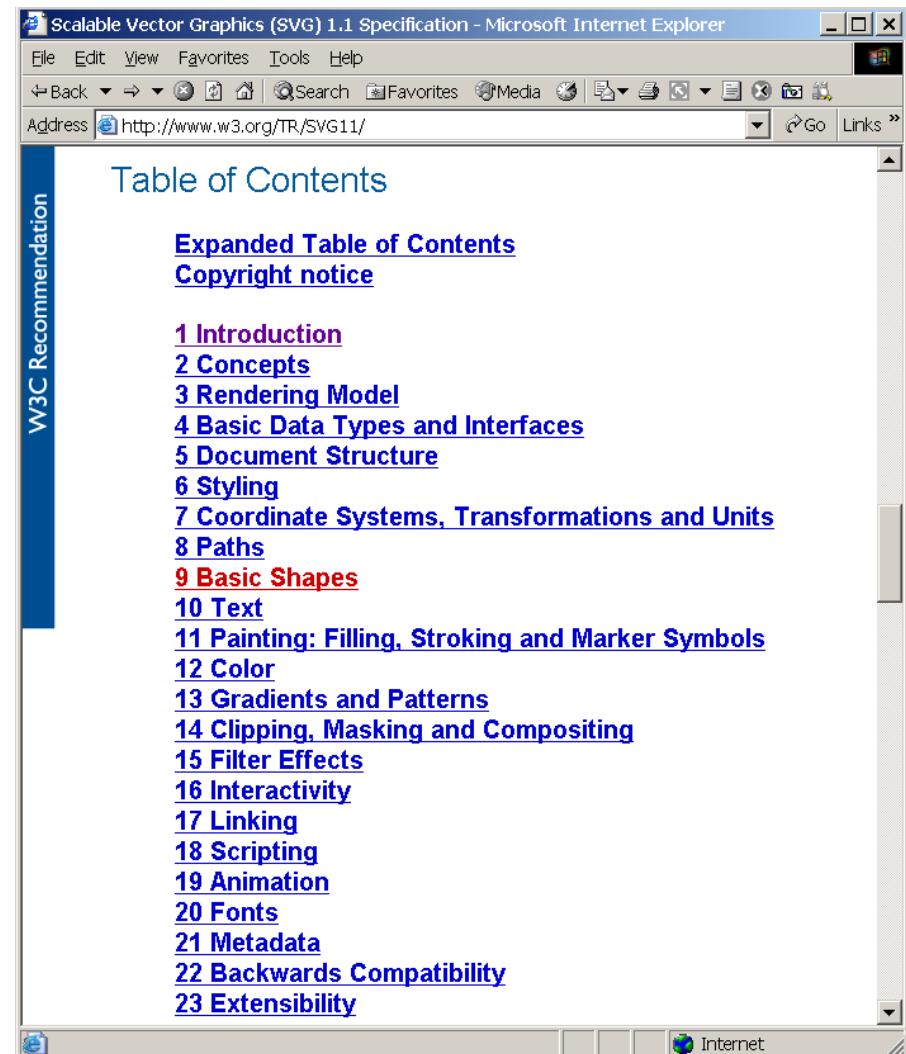
Graphics Markup for the Web

SVG is a markup language for describing two-dimensional graphics applications and images, and a set of related graphics script interfaces. [SVG 1.1](#) is a W3C Recommendation and is the most recent version of the full specification; a second edition of SVG 1.1 which includes clarifications and minor improvements based on developer feedback is currently in Last Call. [SVG Tiny 1.2](#) is a W3C Recommendation, and targets mobile devices.

SVG 2 is currently under development

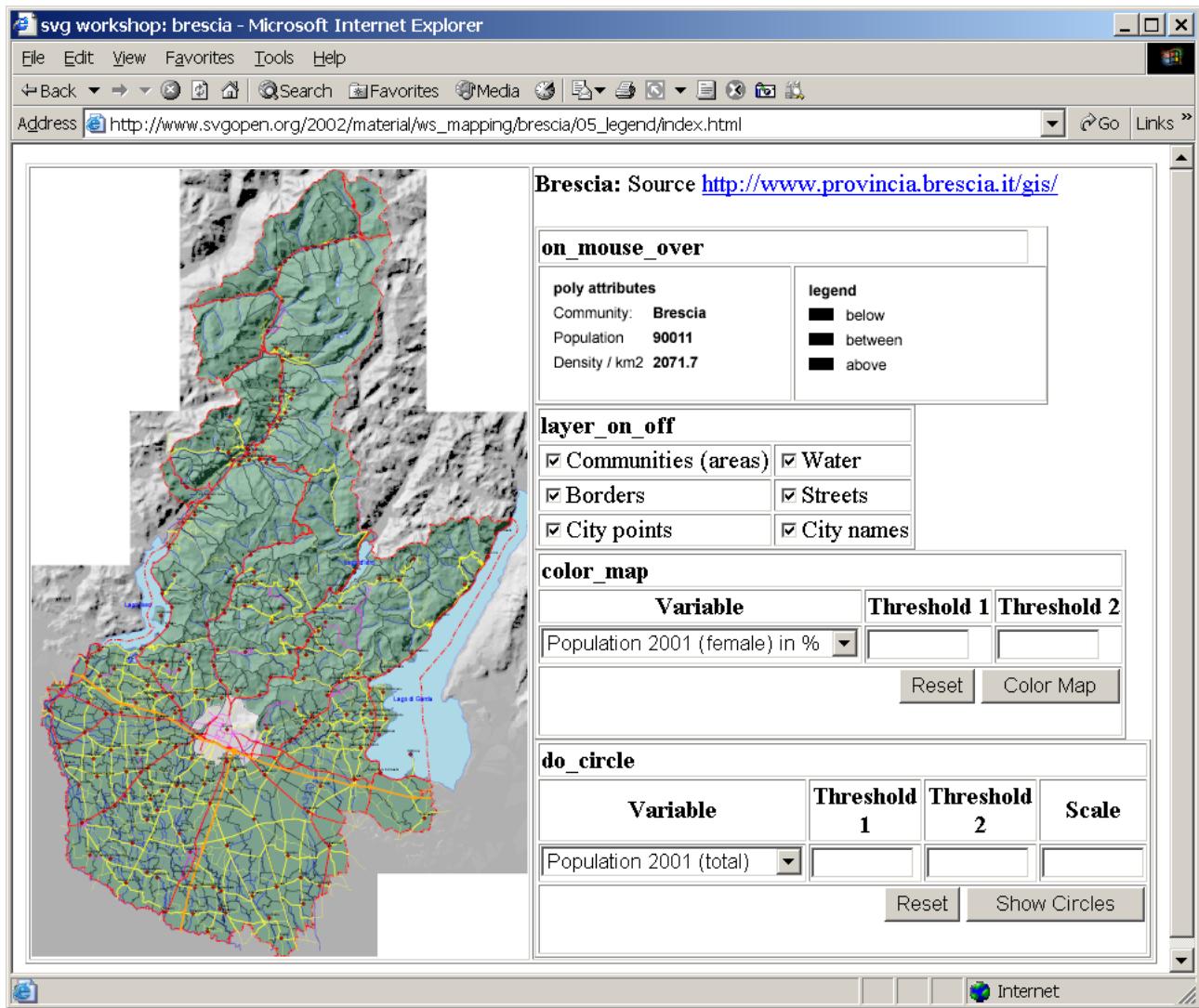
Extend the Client-side...

- Plugins...
 - Scalable Vector Graphics (SVG) ...

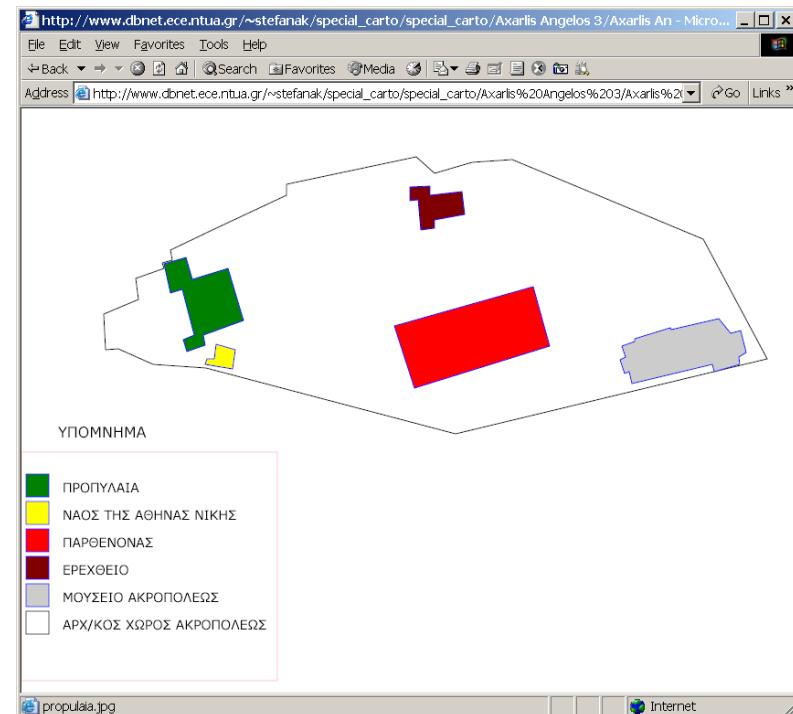
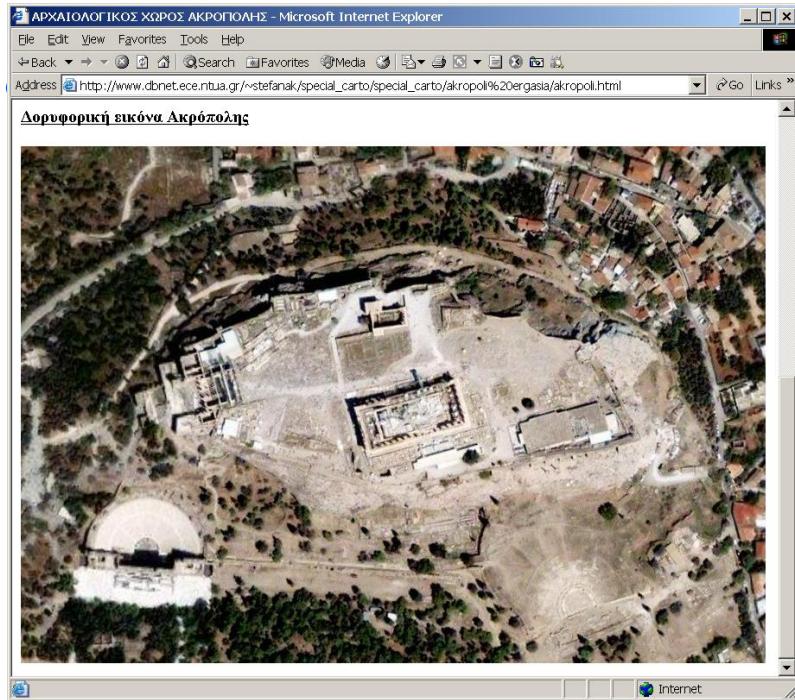


Extend the Client-side...

- Plugins...
– SVG

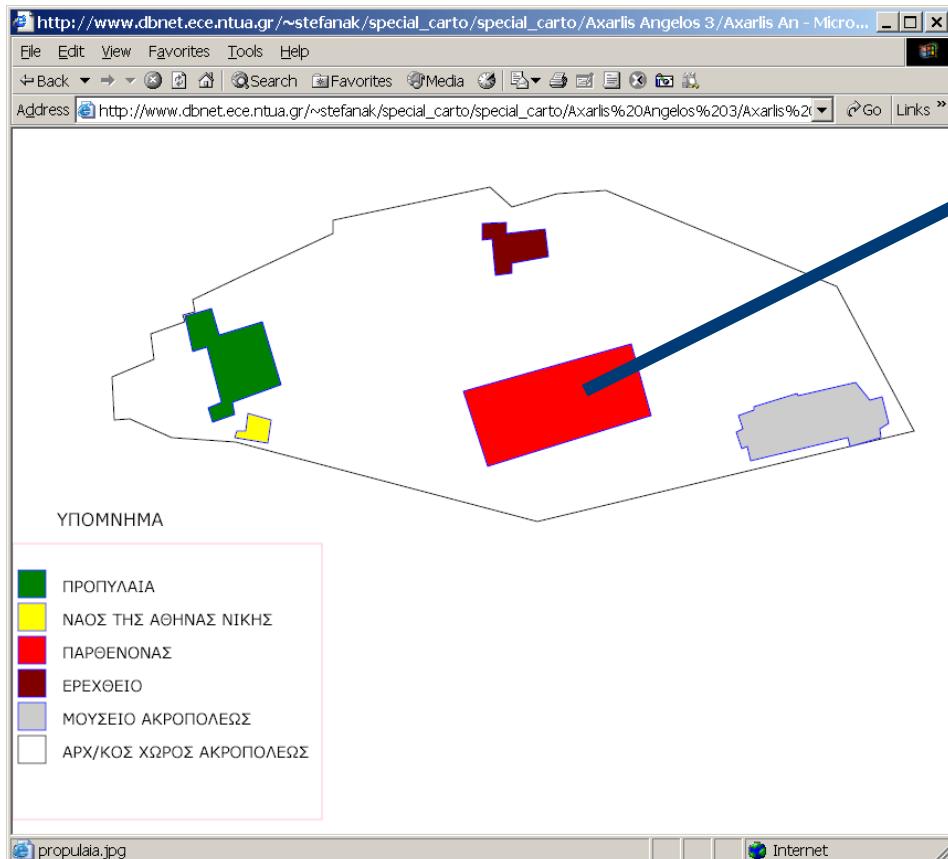


SVG...



SVG...

```
<?xml version="1.0" standalone="no"?>
<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN" "http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">
<svg width="100%" height="100%" version="1.1" xmlns="http://www.w3.org/2000/svg">
```



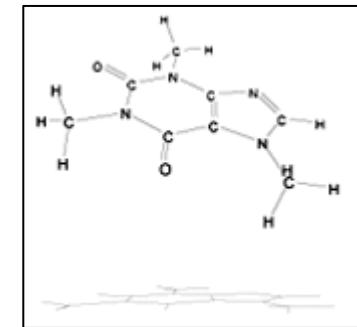
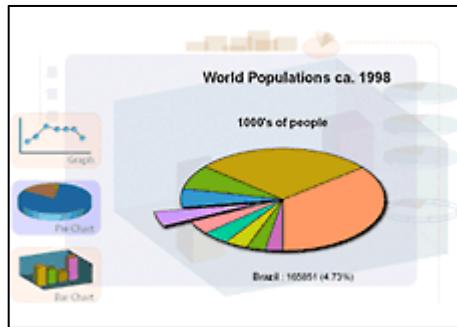
```
<a xlink:href="parthenon.jpg">
<polygon points="408,238
560,195 578,260 430,306"
style="fill:red; stroke:blue;
stroke-width:1"/> </a>
```

Extend the Client-side...

- Plugins...
 - Scalable Vector Graphics (SVG) ...
 - An SVG document **can be created** ...
 - from scratch in a text editor
 - using an SVG editor
 - as an output of another program
 - » e.g., ArcGIS, Adobe Illustrator, etc.
 - An SVG file **can be viewed** ...
 - in a Web browser if an appropriate plugin is loaded
 - » e.g., Adobe SVG Viewer - www.adobe.com/svg

Extend the Client-side...

- Plugins...
 - Scalable Vector Graphics (SVG) ...
 - SVG Viewer
 - eg., <http://www.adobe.com/svg/>



Extend the Client-side...

- Plugins...
 - SVG Viewer





Visual Building Search

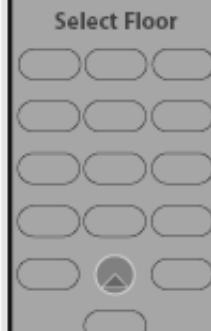
find



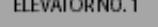
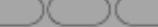
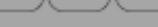
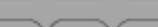
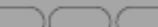
Select Building

West Tower

East Tower



Select Floor





Visual Building Search

find

W-13
San Jose

13th Floor, West Tower, San Jose

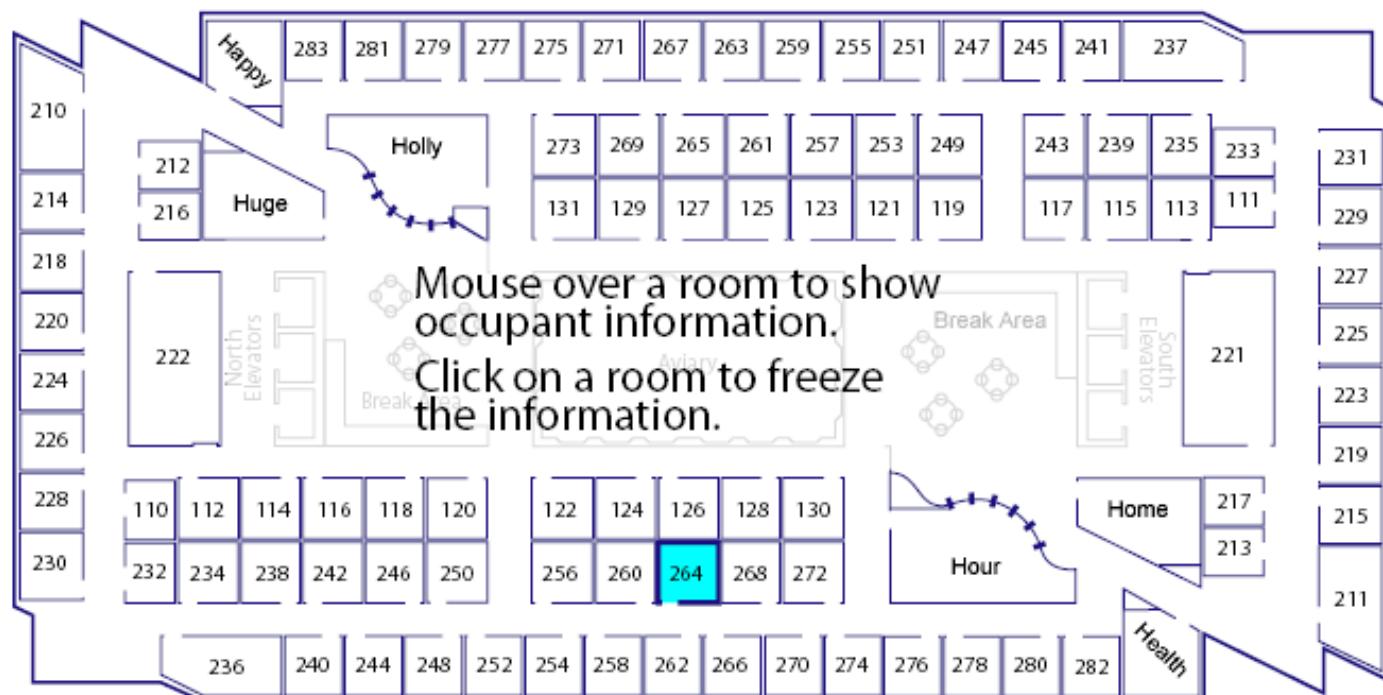
Select Building

 West Tower East Tower

Select Floor

 16 17 18 13 14 15 10 11 12 7 8 9 6

ELEVATOR NO. 1

SVG
ENABLED

Name

Chase Myer

Email

CMyer

Phone Number

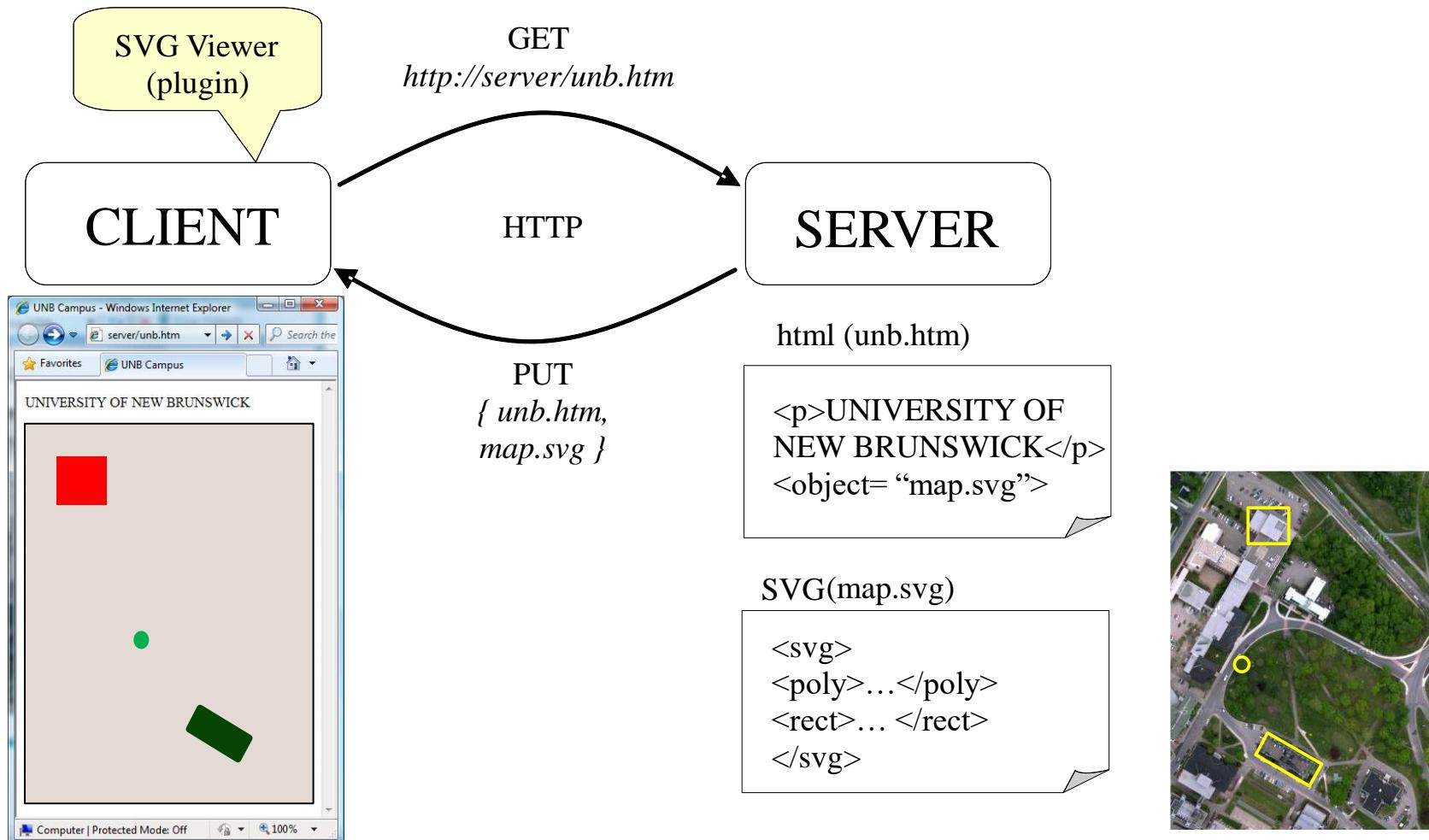
408-555-1212

Other Info ([Select text to scroll](#))

Adobe Studio Human Resources

Extend the Client-side...

- Plugins... SVG



Extend the Client-side...

- Plugins...
 - Google Earth Viewer

The Google Earth API - Google Code - Windows Internet Explorer
http://code.google.com/apis/earth/

Google Earth API

What is the Google Earth API?

The Google Earth Plug-in and its JavaScript API let you embed Google Earth, a true 3D digital globe, into your web pages. Using the API you can draw markers and lines, drape images over the terrain, add 3D models, or load KML files, allowing you to build sophisticated 3D map applications. If you have an existing [Maps API site](#), you can 3D-enable your page with as little as one line of code.

The Google Earth Plugin instance could not be created. Try installing again.

Get the Google Earth Plugin now

3D Google Maps in your browser

Supported browsers currently include **Firefox 2.x, IE6, and IE7**, all on **Windows**. [Learn more »](#)

Google

The Google Earth API is a free beta service, available for any web site that is free to consumers. Please see the [terms of use](#) for more information.

Google Earth plugin

Home Docs Blog Group Terms

How do I start?

1. Check out some Google Earth Plug-in [examples](#).
2. [Sign up for a Google Maps API key](#).

The Google Earth API - Google Code - Windows Internet Explorer
http://code.google.com/apis/earth/

Google Earth API

What is the Google Earth API?

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How do I start?

1. Check out some Google Earth Plug-in [examples](#).
2. [Sign up for a Google Maps API key](#).
3. Read the [Google Earth API Developer's Guide](#).
4. Review the [Google Earth API](#).

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Featured Video

Image NASA
Image © 2008 TerraMetrics

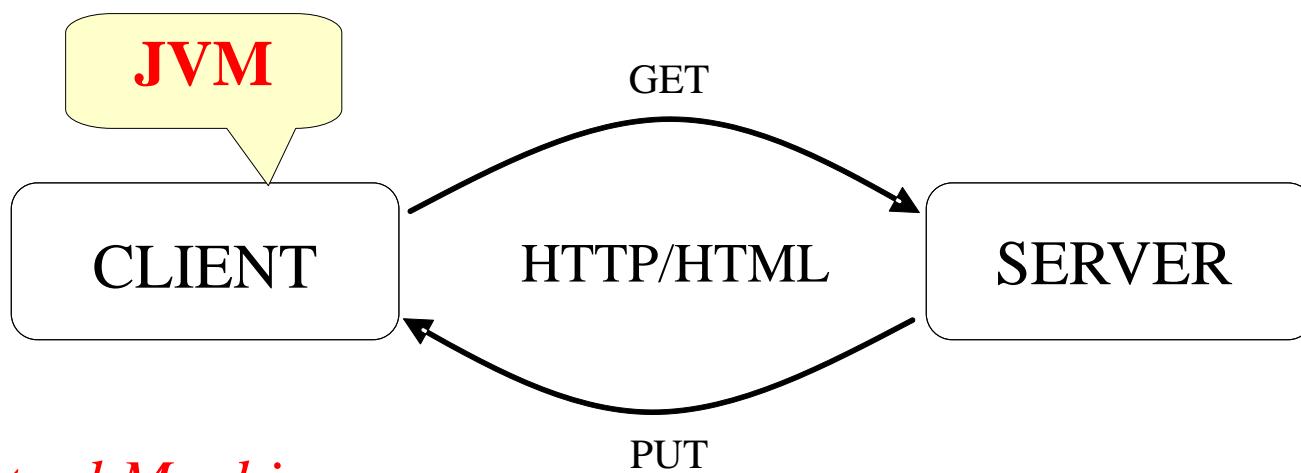
4.3.8477.8410

The Google Earth API is a free beta service, available for any web site that is free to consumers. Please see the [terms of use](#) for more information.

Learn more about the Google Earth API

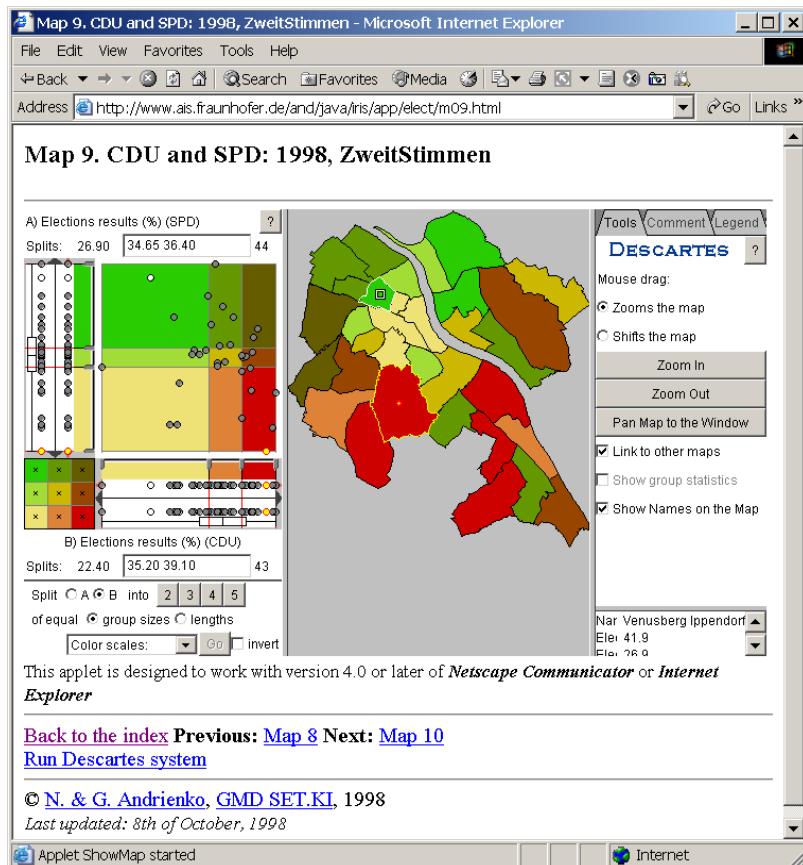
Extend the Client-side...

- Java Applets – JavaScripts (API's)
 - The functionality varies ...
 - from very simple button interactivity
 - to a sophisticated mapping environment



Extend the Client-side...

- Java Applets – Examples...



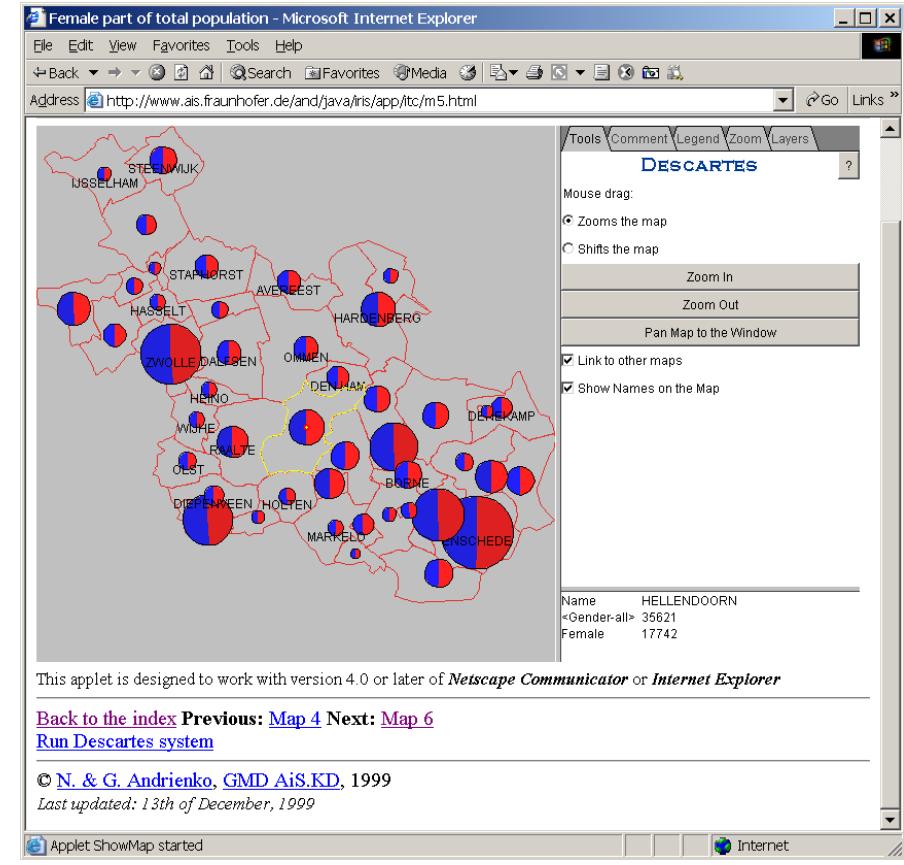
[Back to the index](#) [Previous: Map 8](#) [Next: Map 10](#)

[Run Descartes system](#)

© N. & G. Andrienko, GMD SET.KI, 1998

Last updated: 8th of October, 1998

Applet ShowMap started



[Back to the index](#) [Previous: Map 4](#) [Next: Map 6](#)

[Run Descartes system](#)

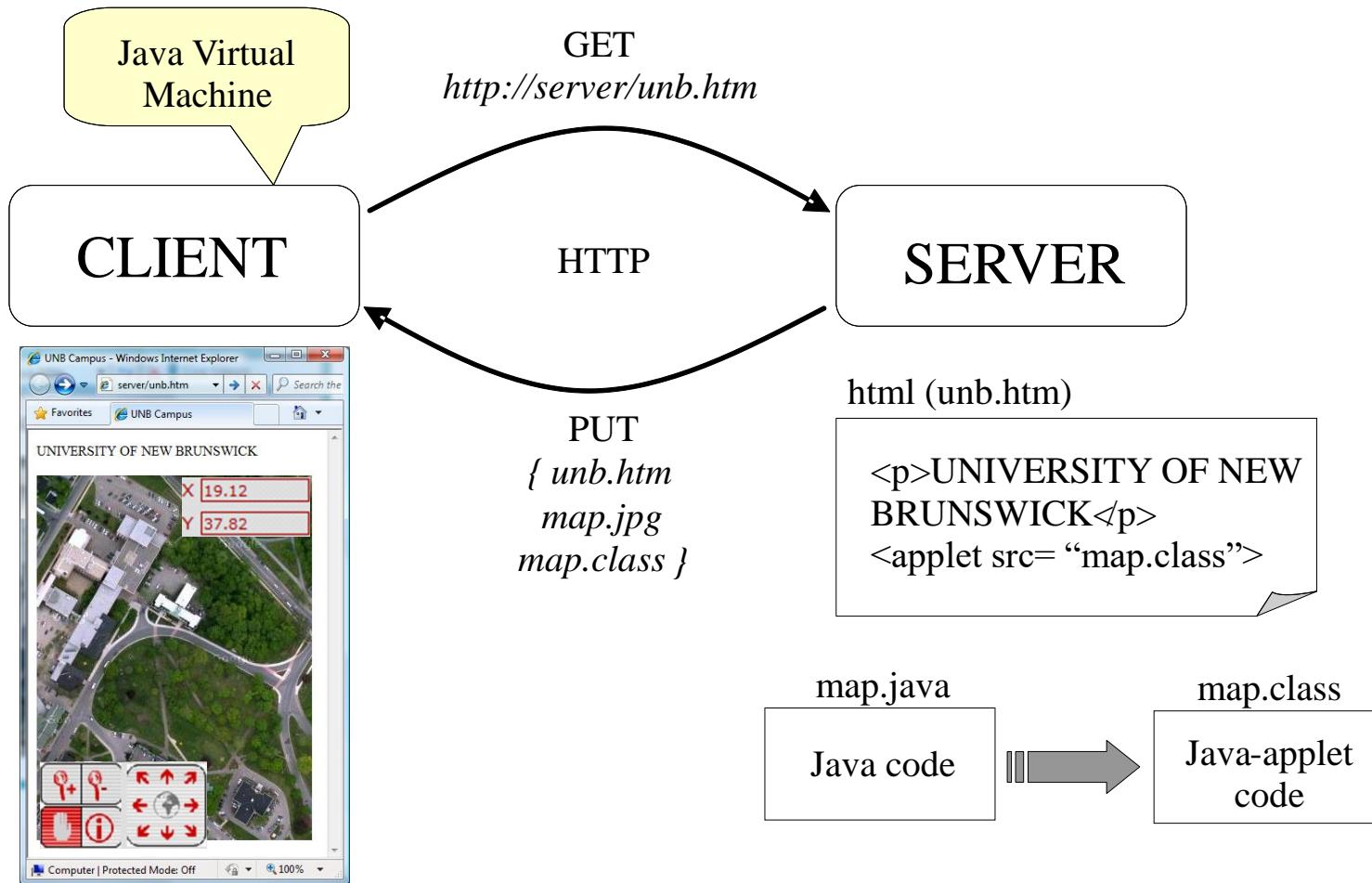
© N. & G. Andrienko, GMD AiS.KD, 1999

Last updated: 13th of December, 1999

Applet ShowMap started

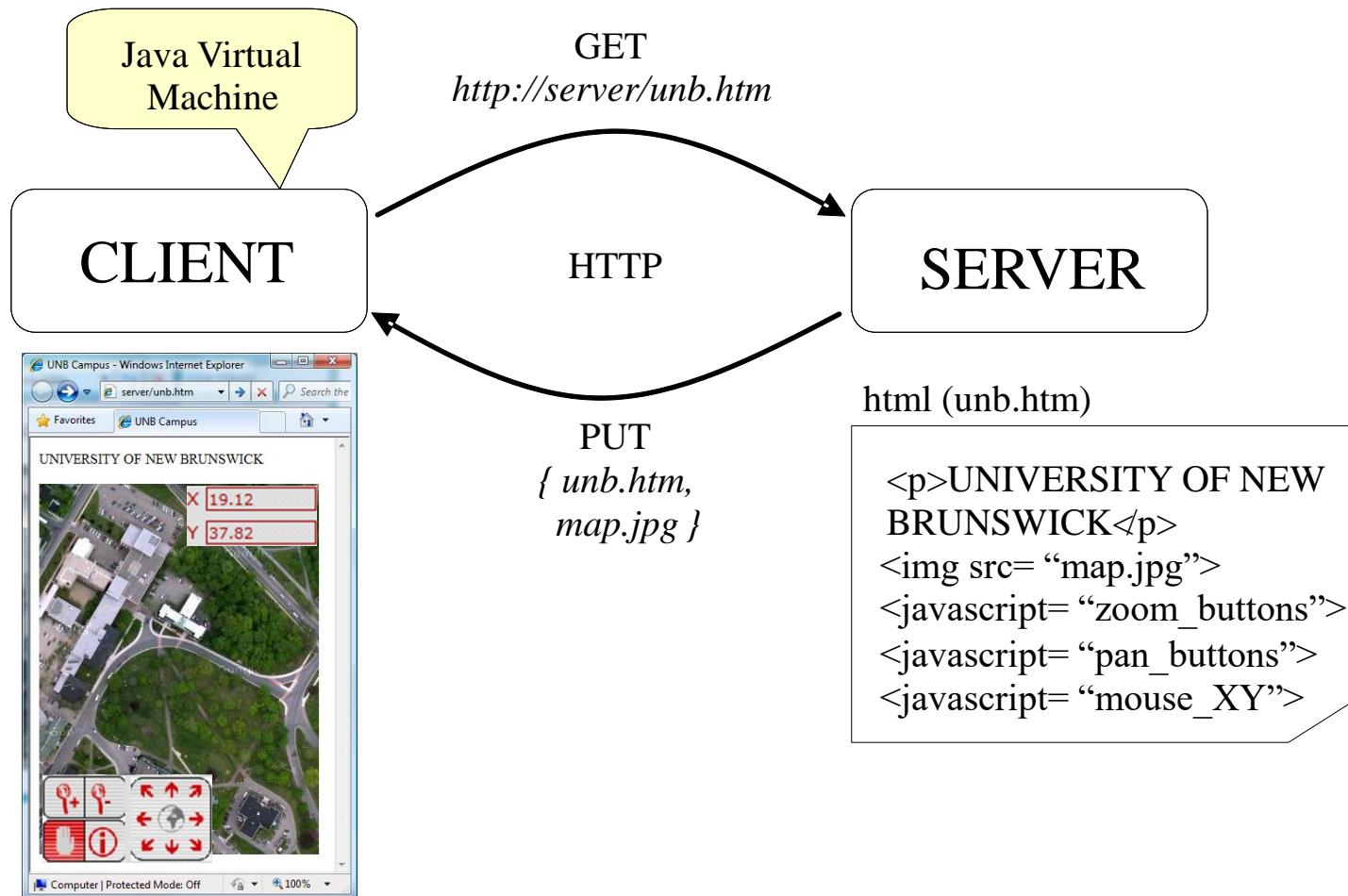
Extend the Client-side...

- Java Applets...



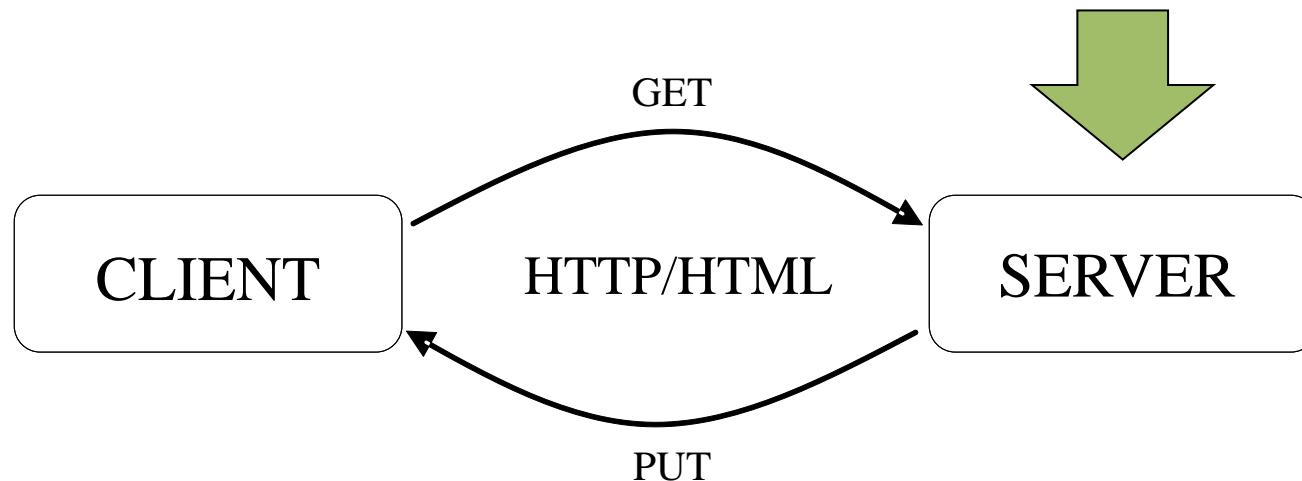
Extend the Client-side...

- JavaScripts...



Interactive Maps...

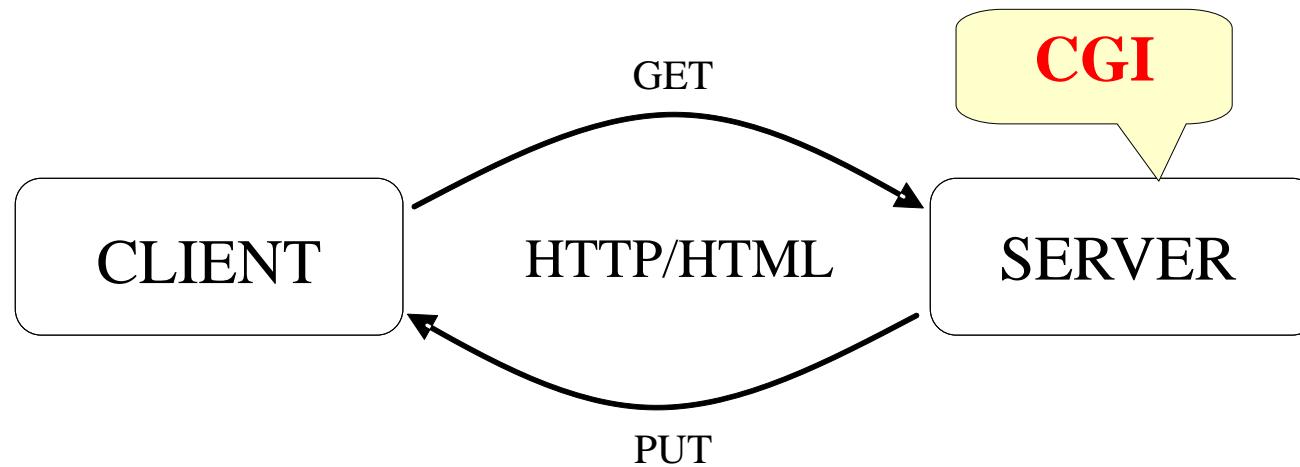
- Enriched functionality by extending...
 - the **client side** functionality
 - the **server side** functionality



Extend the Server-Side

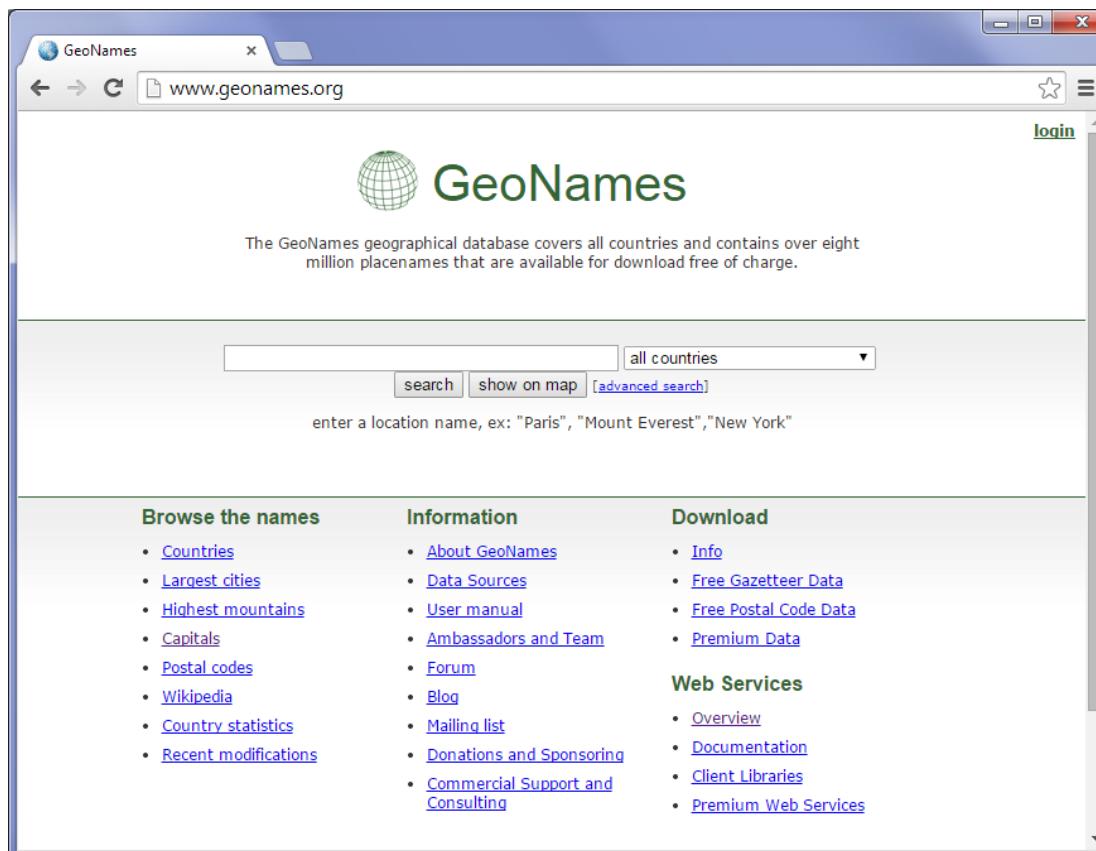
- Common Gateway Interface (CGI)

e.g., `http://server?doThis¶meter1¶meter2`



Extend the Server-Side

- GeoNames Server

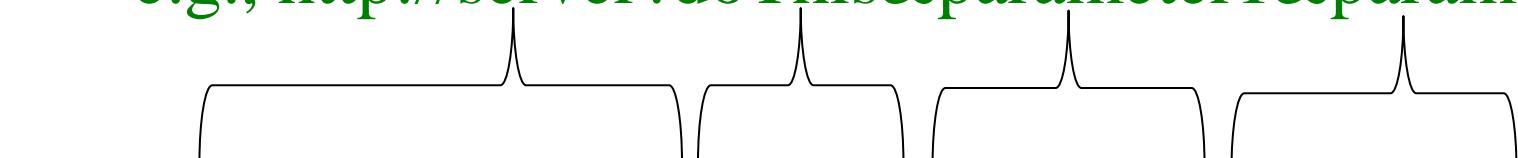


<http://www.geonames.org/>

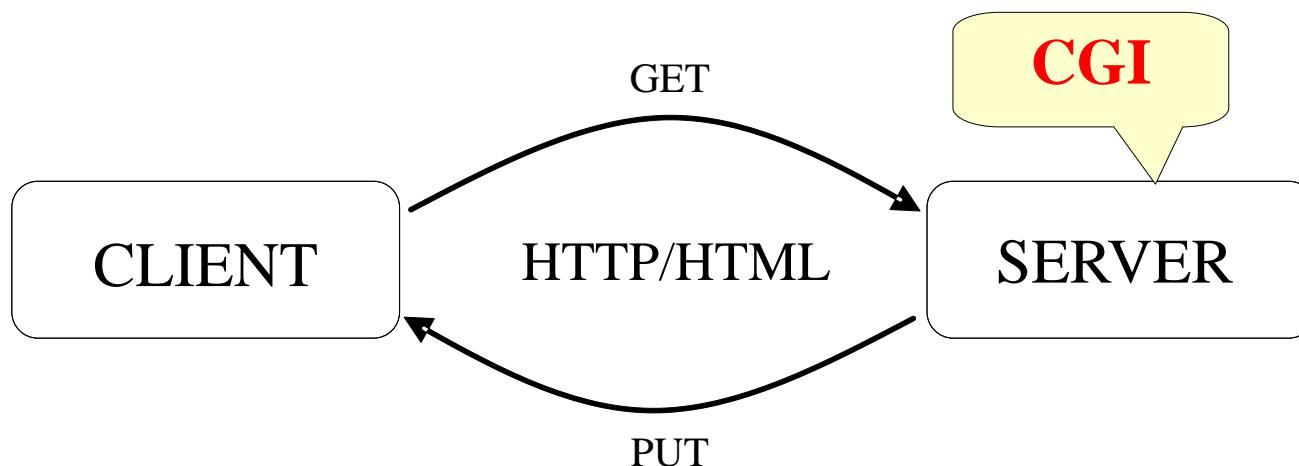
Extend the Server-Side

- Common Gateway Interface (CGI)

e.g., `http://server?doThis¶meter1¶meter2`

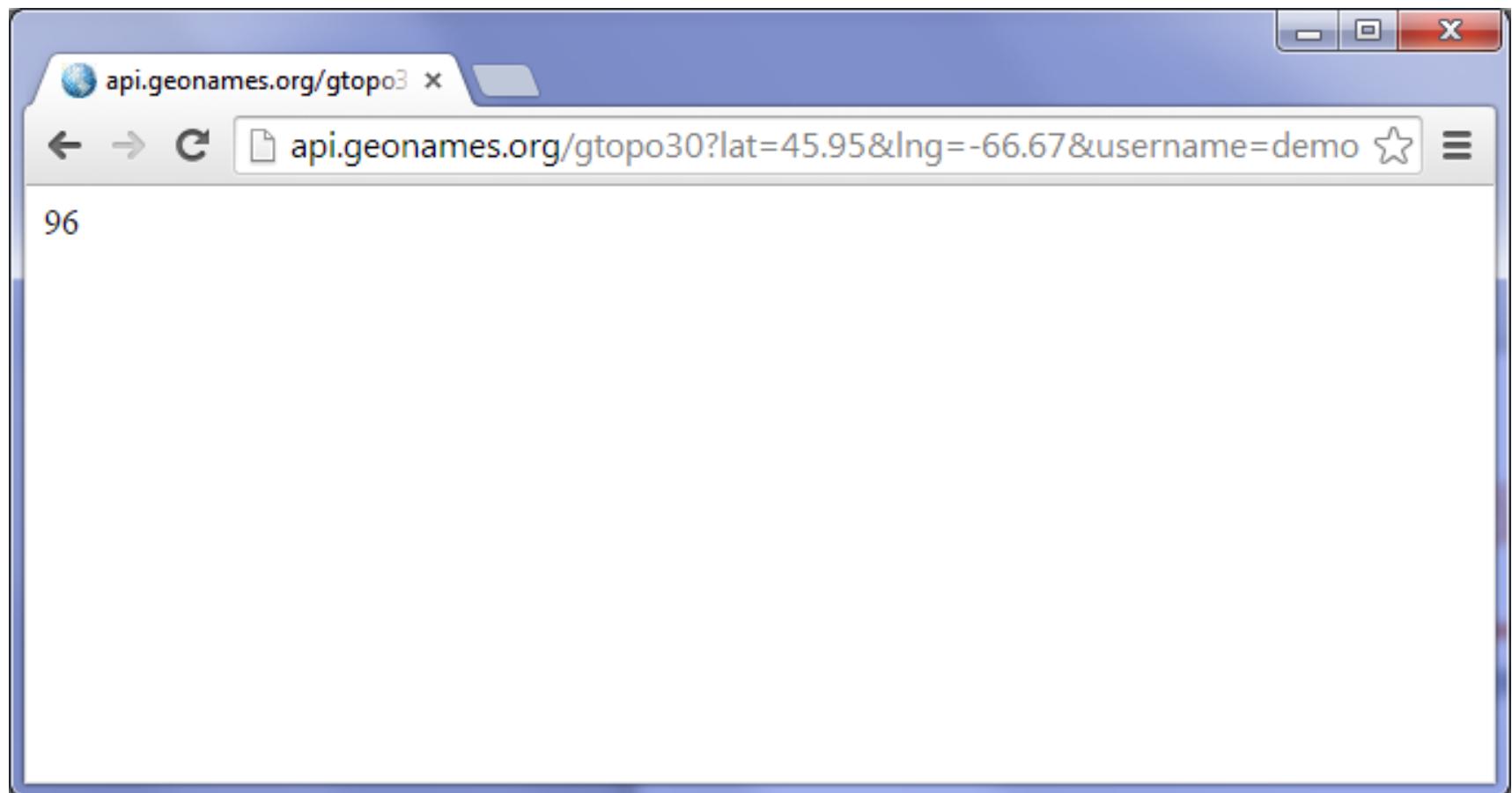


`http://api.geonames.org/gtopo30?lat=45.95&lng=-66.67
&username=demo`



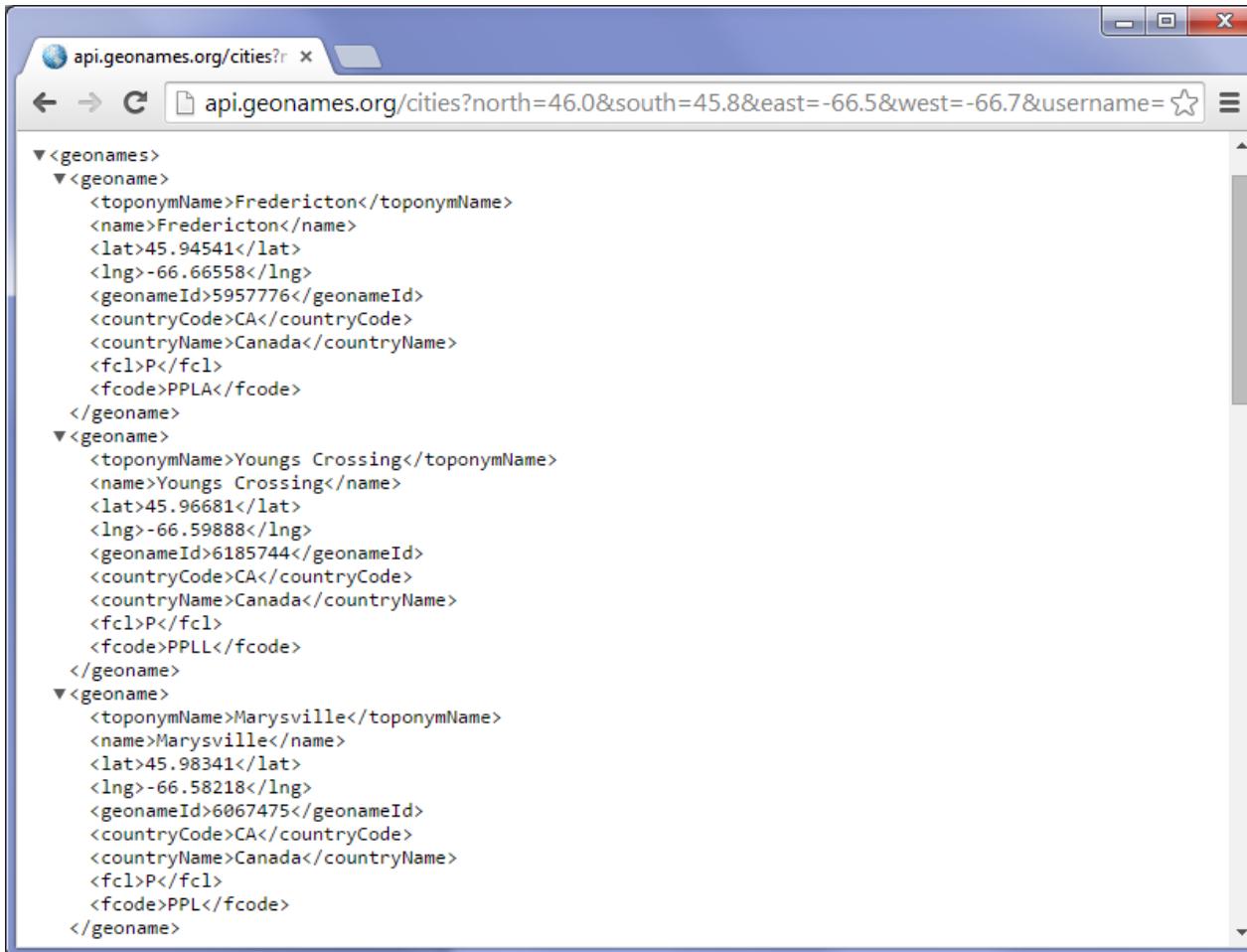
Extend the Server-Side

<http://api.geonames.org/gtopo30?lat=45.95&lng=-66.67&username=gge5403>



Extend the Server-Side

<http://api.geonames.org/cities?north=46.0&south=45.8&east=-66.5&west=-66.7&username=gge5403>



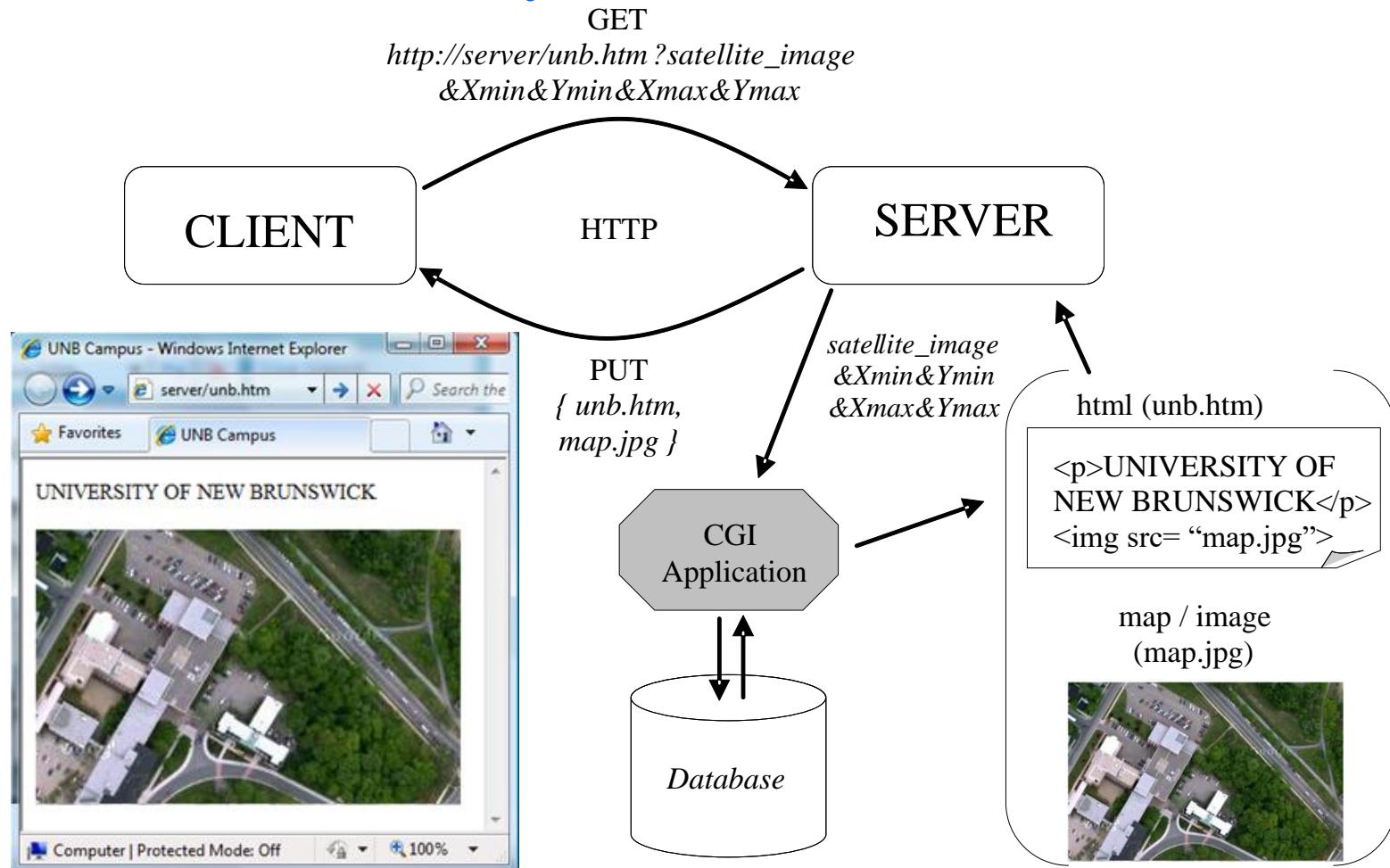
The screenshot shows a Windows-style window with a title bar "api.geonames.org/cities?r" and a URL bar containing the same URL. The main content area displays an XML document representing geographical data. The XML structure is as follows:

```
<?xml version="1.0"?>
<geonames>
  <geoname>
    <name>Fredericton</name>
    <lat>45.94541</lat>
    <lng>-66.66558</lng>
    <geonameId>5957776</geonameId>
    <countryCode>CA</countryCode>
    <countryName>Canada</countryName>
    <fccl>P</fccl>
    <fcode>PPLA</fcode>
  </geoname>
  <geoname>
    <name>Youngs Crossing</name>
    <lat>45.96681</lat>
    <lng>-66.59888</lng>
    <geonameId>6185744</geonameId>
    <countryCode>CA</countryCode>
    <countryName>Canada</countryName>
    <fccl>P</fccl>
    <fcode>PPLL</fcode>
  </geoname>
  <geoname>
    <name>Marysville</name>
    <lat>45.98341</lat>
    <lng>-66.58218</lng>
    <geonameId>6067475</geonameId>
    <countryCode>CA</countryCode>
    <countryName>Canada</countryName>
    <fccl>P</fccl>
    <fcode>PPL</fcode>
  </geoname>

```

Extend the Server-Side

- Common Gateway Interface (CGI)

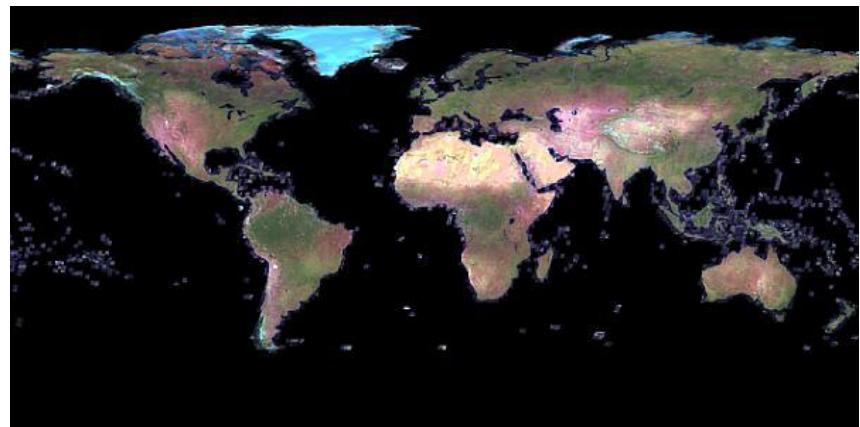


Extend the Server-Side

- CGI – Example (JPL NASA Server)

`http://wms.jpl.nasa.gov/wms.cgi
?request=GetMap
&service=WMS
&version=1.1.1
&srs=EPSG:4326
&format=image/jpeg
&styles=
&bbox=-180,-90,180,90
&width=600
&height=300
&layers=global_mosaic`

*This service is
unavailable.*

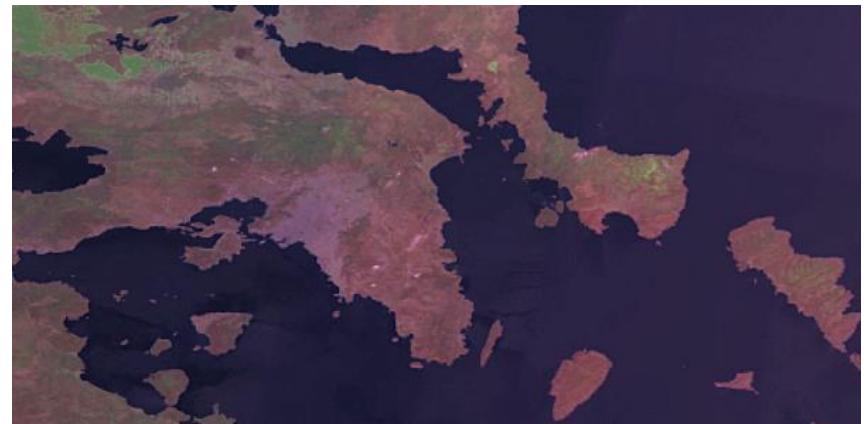


Extend the Server-Side

- CGI – Example (JPL NASA Server)

`http://wms.jpl.nasa.gov/wms.cgi
?request=GetMap
&service=WMS
&version=1.1.1
&srs=EPSG:4326
&format=image/jpeg
&styles=
&bbox=23,37.5,25,38.5
&width=600
&height=300
&layers=global_mosaic`

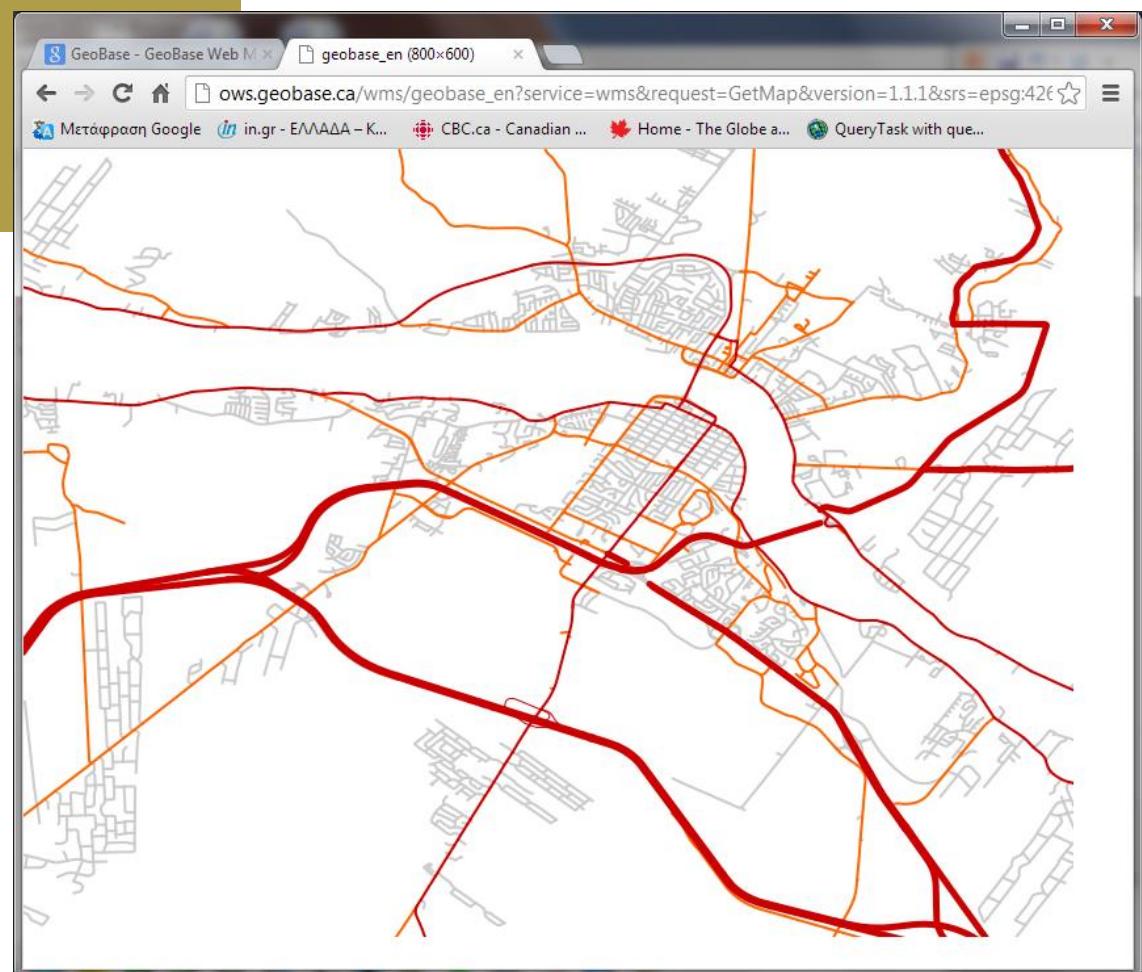
*This service is
unavailable.*



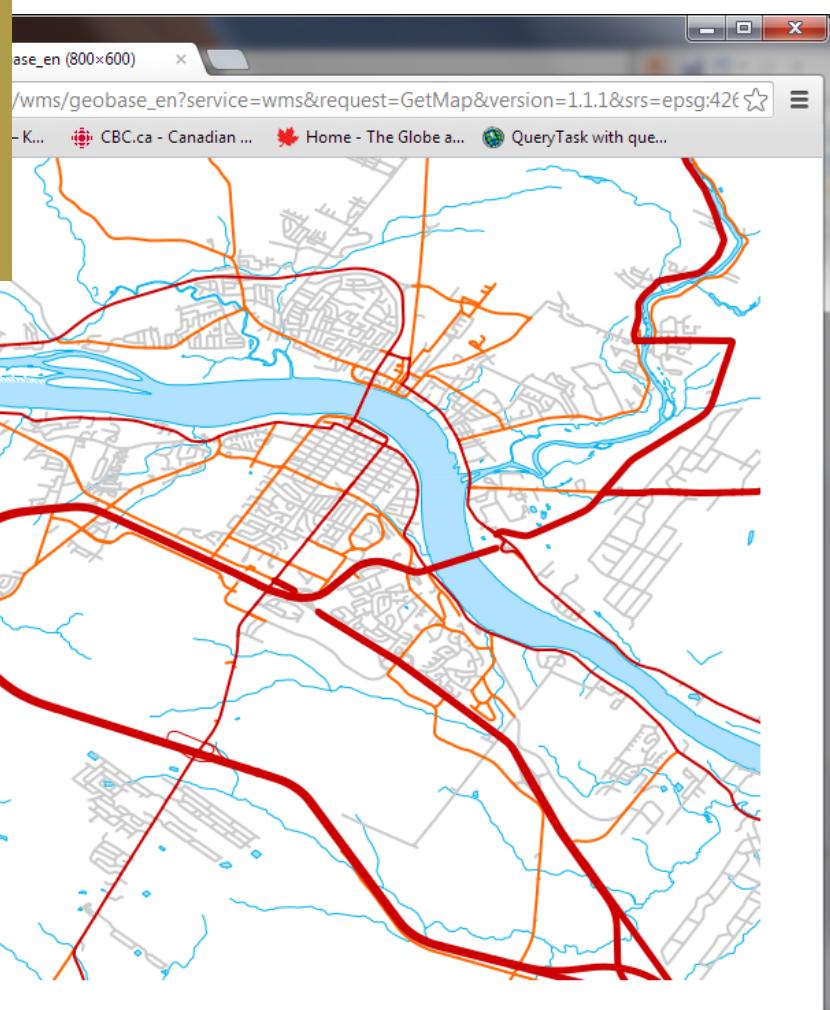
```
http://ows.geobase.ca/wms/geobase_en?  
service=wms  
&request=GetMap  
&version=1.1.1  
&srs=epsg:4269  
&bbox=-66.77,45.87,-66.57,46.01  
&width=800&height=600  
&style=&format=image/png  
&layers=nrn:roadnetwork
```

This service is unavailable. Try this one (more examples in Module 5):

```
https://maps.geogratis.gc.ca/wms/canvec_en?  
request=GetMap&service=wms&  
&version=1.1.1  
&srs=epsg:4269  
&bbox=-66.77,45.87,-66.57,46.01  
&width=800&height=600  
&style=&format=image/png  
&layers=transport
```



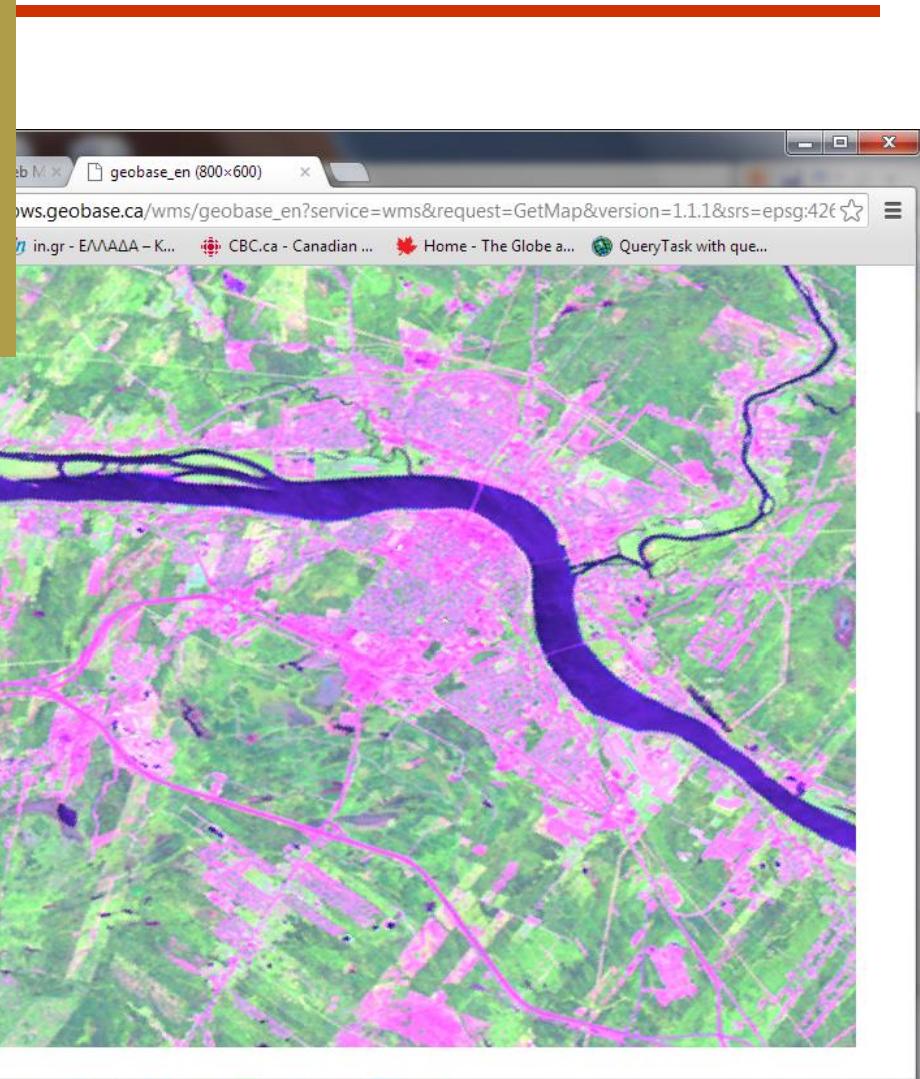
[http://ows.geobase.ca/wms/geobase_en?
service=wms
&request=GetMap
&version=1.1.1
&srs=epsg:4269
&bbox=-66.77,45.87,-66.57,46.01
&width=800&height=600
&style=&format=image/png
&layers=nhn:hydrography,nrn:roadnetwork](http://ows.geobase.ca/wms/geobase_en?service=wms&request=GetMap&version=1.1.1&srs=epsg:4269&bbox=-66.77,45.87,-66.57,46.01&width=800&height=600&style=&format=image/png&layers=nhn:hydrography,nrn:roadnetwork)



*This service is
unavailable.*

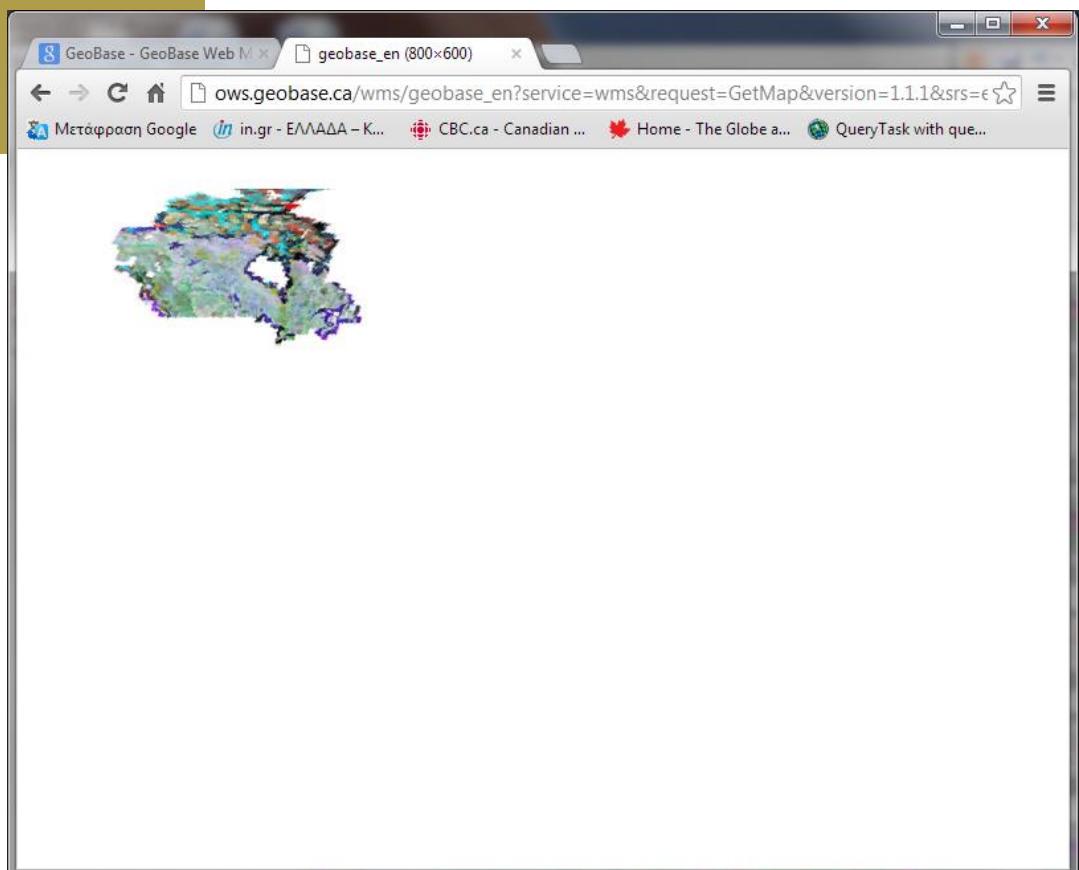
[http://ows.geobase.ca/wms/geobase_en?
service=wms
&request=GetMap
&version=1.1.1
&srs=epsg:4269
&bbox=-66.77,45.87,-66.57,46.01
&width=800&height=600
&style=&format=image/png
&layers=imagery:Landsat7](http://ows.geobase.ca/wms/geobase_en?service=wms&request=GetMap&version=1.1.1&srs=epsg:4269&bbox=-66.77,45.87,-66.57,46.01&width=800&height=600&style=&format=image/png&layers=imagery:Landsat7)

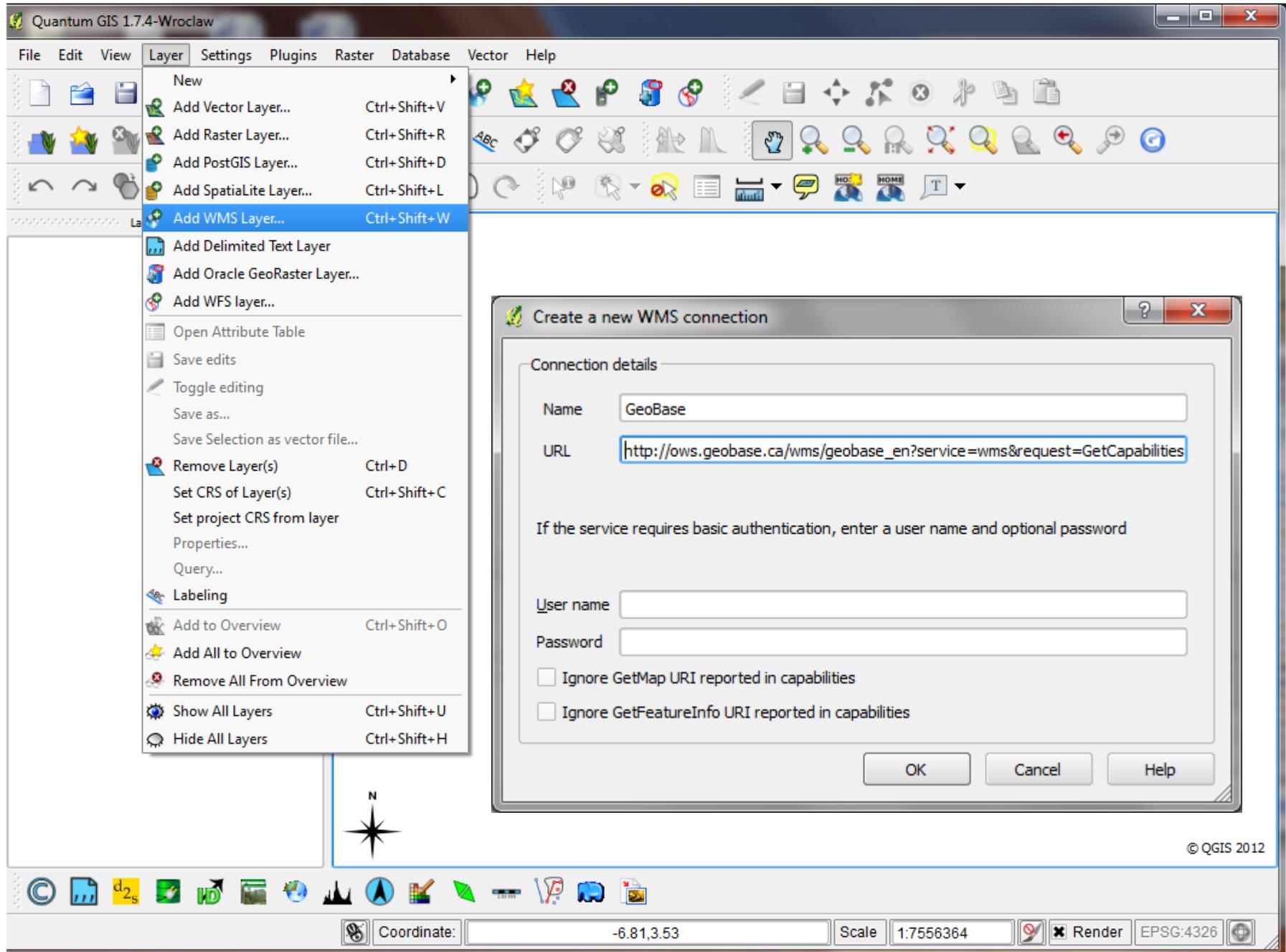
*This service is
unavailable.*



`http://ows.geobase.ca/wms/geobase_en?
service=wms
&request=GetMap
&version=1.1.1
&srs=epsg:4269
&bbox=-180,-90,180,90
&width=800&height=600
&style=&format=image/png
&layers=imagery:Landsat7`

*This service is
unavailable.*





Quantum GIS 1.7.4-Wroclaw

Add Layer(s) from a Server

File Edit View Layer Settings Plugins Raster Database Vector Help

Layers Layer Order Tilesets Server Search

GeoBase

Connect New Edit Delete Load Save Add default servers

ID	Name	Title	Abstract
0	WMS-GeoBase	Data Collection...	The data available are: Administrative Boundaries (Aboriginal Lands, Cana...
1	elevation:cded2...	Canadian Digit...	The Canadian Digital Elevation Data (CDED) consists of an ordered array o...
10	elevation:cded5...	Canadian Digit...	The Canadian Digital Elevation Data (CDED) consists of an ordered array o...
21	landcover:csc2...	Land Cover, Cir...	Land Cover information is the result of vectorization of raster thematic da...
73	imagery:landsat7	Landsat 7 Ortho...	The orthoimage data set is a complete set of cloud-free (less than 10%) or...
75	reference:bathy...	Reference: bathy...	Shows the depths (bathymetry) of the waters in and around Canada.
77	reference:land...	Canadian and F...	Canadian and Foreign landmass at 1:1M scale (Atlas of Canada)
82	reference:boun...	Geopolitical Bo...	The Atlas of Canada 1,000,000 National Frameworks Data, Administrative ...
85	reference:nts	Index of the Nat...	Topographic maps produced by Natural Resources Canada conform to th...
92	reference:hydro	Hydrography	This group covers drainage (coastlines, rivers, lakes) for the Canadian land...
101	reference:roads	Road Network	This group covers the road network (primary and secondary highways, se...
105	reference:place...	Populated place...	Populated Places data set shows a selection of named populated places s...

Image encoding

PNG PNG24 JPEG GIF TIFF

Options

Layer name Change ...

Add Close Help

115989 of 115989 bytes of capabilities downloaded.

GIS 2012

Coordinate: -6.81,3.53 Scale 1:7556364 Render EPSG:4326

Quantum GIS 1.7.4-Wroclaw

Add Layer(s) from a Server

Layers **Layer Order** **Tilesets** **Server Search**

GeoBase

Connect **New** **Edit** **Delete** **Load** **Save** **Add default servers**

ID	Name	Title	Abstract
0	WMS-GeoBase	Data Collections from GeoBase	The data available are: Administrative Boundaries (Abor...
1	elevation:cded250k	Canadian Digital Elevation Data, 1:250,000	The Canadian Digital Elevation Data (CDED) consists of ...
10	elevation:cded50k	Canadian Digital Elevation Data, 1:50,000	The Canadian Digital Elevation Data (CDED) consists of ...
21	landcover:csc2000	Land Cover, Circa 2000	Land Cover information is the result of vectorization of ...
73	imagery:landsat7	Landsat 7 Orthorectified Imagery over Canada (1999-2003)	The orthoimage data set is a complete set of cloud-free...
75	reference:bathymetry	Reference: bathymetry	Shows the depths (bathymetry) of the waters in and ar...
77	reference:landmass	Canadian and Foreign Landmass	Canadian and Foreign landmass at 1:1M scale (Atlas of ...
82	reference:boundaries	Geopolitical Boundaries	The Atlas of Canada 1,000,000 National Frameworks Da...
85	reference:nts	Index of the National Topographic System of Canada	Topographic maps produced by Natural Resources Can...
92	reference:hydro	Hydrography	This group covers drainage (coastlines, rivers, lakes) for...
101	reference:roads	Road Network	This group covers the road network (primary and seco...
105	reference:placenames	Populated places in Canada	Populated Places data set shows a selection of named p...
110	boundaries:geopolitical	Canadian Geopolitical Boundaries	Canadian Geopolitical Boundaries contains the internat...
114	boundaries:aboriginal	Aboriginal Lands	Aboriginal Lands including Indian Reserves, Land Clai...
119	boundaries:municipal	Municipal Boundaries	Municipal Boundaries data product consists of a series ...
124	nrr:roadnetwork	NRN Network	The National Road Network (NRN) product contains qu...
129	nrr:streetnames	NRN Street Names	Street Names of National Road Network
134	nrr:addressrange	NRN Address Range	Address Ranges of National Road Network
140	nhn:hydrography	NHN Hydrography	The National Hydro Network (NHN) focuses on providi...
159	nhn:network	NHN Network	A network flowing through naturally occurring or constr...
168	nhn:drainageareas	Boundaries of Drainage Areas	Canadian territory subdivision used to manage and dist...
176	nhn:toponyms	NHN Toponyms	A feature delineating the extent, in whole or in part, of ...

115989 of 115989 bytes of capabilities downloaded.

Add Close Help

GIS 2012

Coordinate: -6.81,3.53 Scale: 1:7556364 Render: EPSG:4326

Quantum GIS 1.7.4-Wroclaw

Add Layer(s) from a Server

Layers Layer Order Tilesets Server Search

GeoBase

Connect New Edit Delete Load Save Add default servers

ID	Name	Title	Abstract
0	WMS-GeoBase	Data Collections from GeoBase	The data available are: Administrative Boundaries (Abor...
1	elevation:cded250k	Canadian Digital Elevation Data, 1:250,000	The Canadian Digital Elevation Data (CDED) consists of ...
10	elevation:cded50k	Canadian Digital Elevation Data, 1:50,000	The Canadian Digital Elevation Data (CDED) consists of ...
21	landcover:csc2000	Land Cover, Circa 2000	Land Cover information is the result of vectorization of ...
73	imagery:landsat7	Landsat 7 Orthorectified Imagery over Canada (1999-2003)	The orthoimage data set is a complete set of cloud-free...
75	reference:bathymetry	Reference: bathymetry	Shows the depths (bathymetry) of the waters in and ar...
77	reference:landmass	Canadian and Foreign landmass	Canadian and Foreign landmass at 1:1M scale (Atlas of ...
82	reference:boundaries	Geopolitical Boundaries	The Atlas of Canada 1,000,000 National Frameworks Da...
85	reference:ents	Index of the National Topographic System of Canada	Topographic maps produced by Natural Resources Can...
92	reference:hydro	Hydrography	This group covers drainage (coastlines, rivers, lakes) for...
101	reference:roads	Road Network	This group covers the road network (primary and seco...
105	reference:placenames	Populated places in Canada	Populated Places data set shows a selection of named p...
110	boundaries:geopolitical	Canadian Geopolitical Boundaries	Canadian Geopolitical Boundaries contains the internat...
114	boundaries:aboriginal	Aboriginal Lands	Aboriginal Lands including Indian Reserves, Land Clai...
119	boundaries:municipal	Municipal Boundaries	Municipal Boundaries data product consists of a series ...
124	nrr:roadnetwork	NRN Network	The National Road Network (NRN) product contains qu...
129	nrr:streetnames	NRN Street Names	Street Names of National Road Network
134	nrr:addressrange	NRN Address Range	Address Ranges of National Road Network
140	nhn:hydrography	NHN Hydrography	The National Hydro Network (NHN) focuses on providi...
159	nhn:network	NHN Network	A network flowing through naturally occurring or constr...
168	nhn:drainageareas	Boundaries of Drainage Areas	Canadian territory subdivision used to manage and dist...
176	nhn:toponyms	NHN Toponyms	A feature delineating the extent, in whole or in part, of ...

Save connections to file

Image encoding

PNG PNG24 JPEG GIF TIFF

Coordinate Reference System (66 available)

Layer name: imagery:landsat7

WGS 84 Change ...

Add Close Help

1 Layer(s) selected

Quantum GIS 1.7.4-Wroclaw

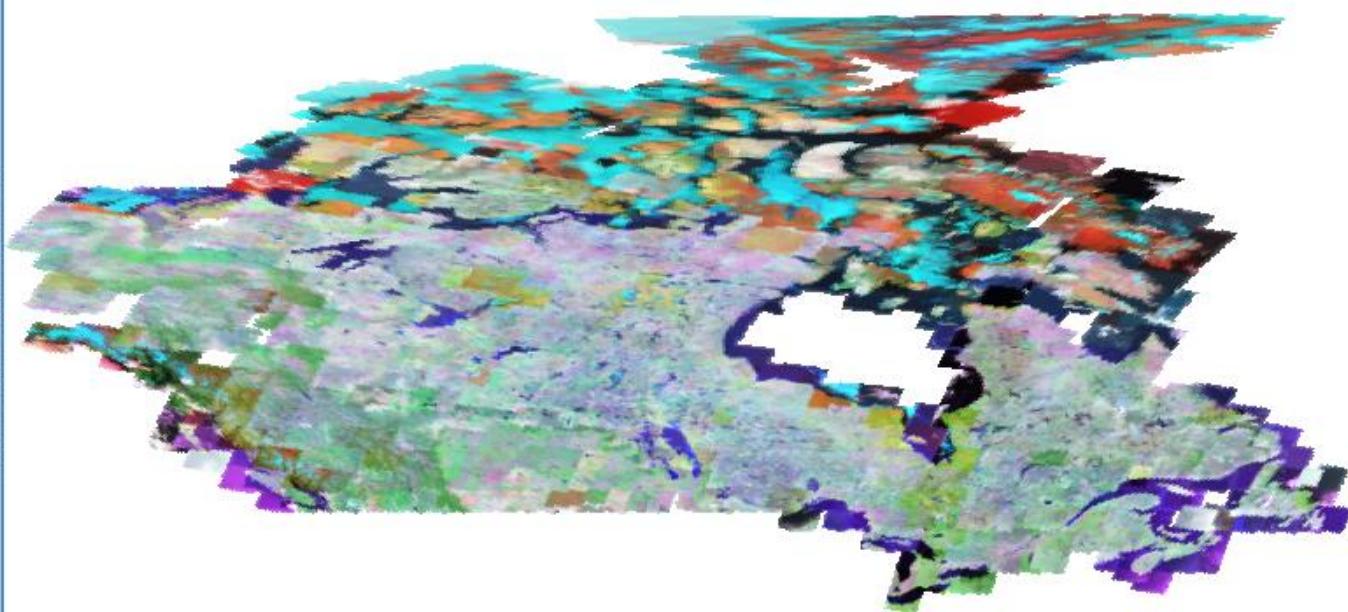
File Edit View Layer Settings Plugins Raster Database Vector Help



Layers

imagery:landsat7

0 30 degrees



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416768 of 416768 bytes of map downloaded.



Coordinate:

-66.7,46.0

Scale

1:16606858



Render

EPSG:4326



Quantum GIS 1.7.4-Wroclaw

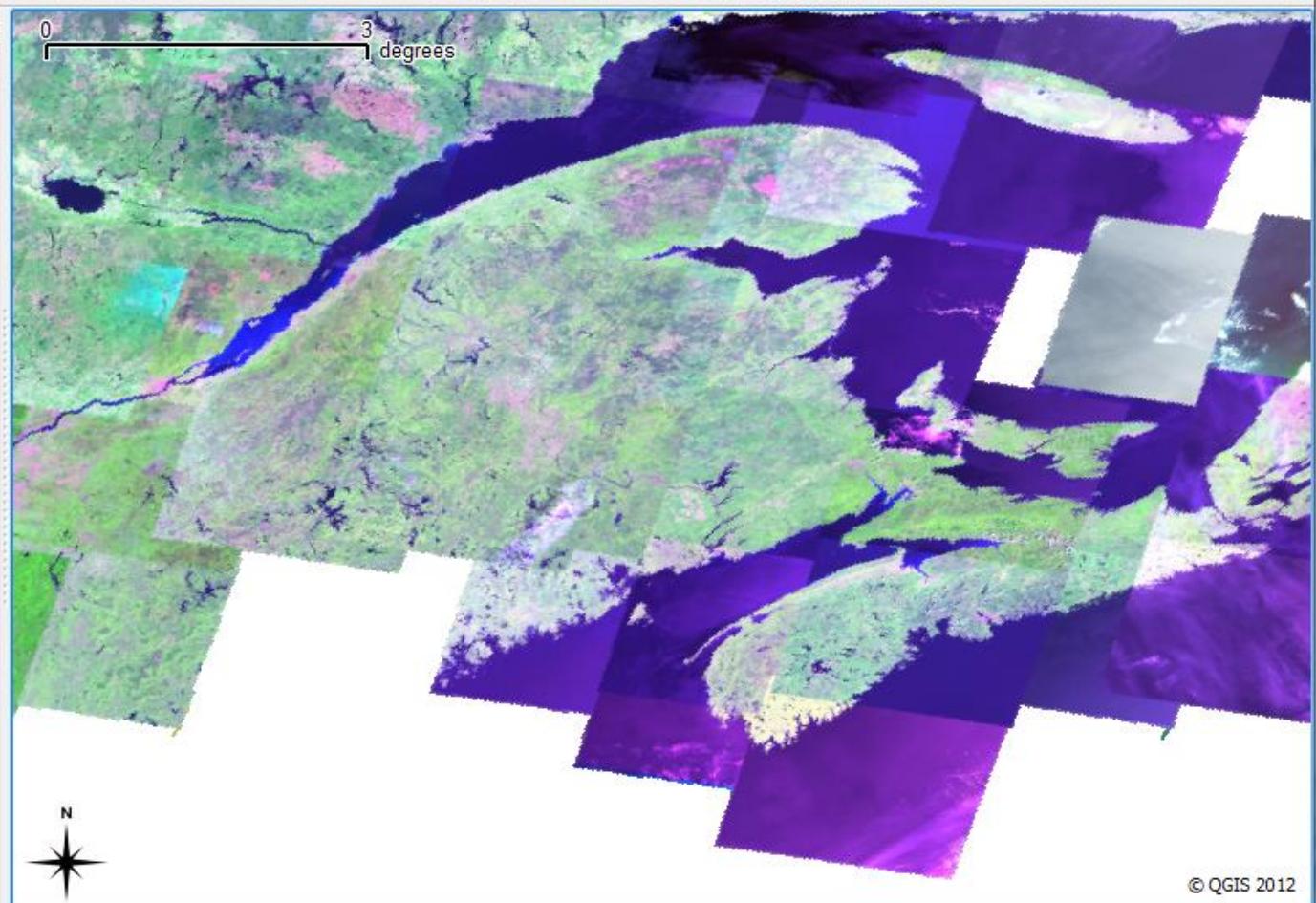
- □ ×

File Edit View Layer Settings Plugins Raster Database Vector Help



Layers

imageries:landsat7



769393 of 769393 bytes of map downloaded.



Coordinate:

-66.23,46.74

Scale

1:3168347



Render

EPSG:4326



Quantum GIS 1.7.4-Wroclaw

File Edit View Layer Settings Plugins Raster Database Vector Help



Layers

imagery:landsat7



918877 of 918877 bytes of map downloaded.

Coordinate:

-66.6585,45.9922

Scale 1:27117

Render

EPSG:4326

Add Layer(s) from a Server

Layers Layer Order Tilesets Server Search

GeoBase

Connect New Edit Delete Load Save Add default servers

ID	Name	Title	Abstract
0	WMS-GeoBase	Data Collection...	The data available are: Administrative Boundaries (Aboriginal Lands, Canadian Geopolitical Boundaries an...
1	elevation:cded2...	Canadian Digit...	The Canadian Digital Elevation Data (CDED) consists of an ordered array of ground elevations at regularly ...
10	elevation:cded5...	Canadian Digit...	The Canadian Digital Elevation Data (CDED) consists of an ordered array of ground elevations at regularly ...
21	landcover:csc2...	Land Cover, Cir...	Land Cover information is the result of vectorization of raster thematic data originating from classified La...
73	imagery:landsat7	Landsat 7 Ortho...	The orthoimage data set is a complete set of cloud-free (less than 10%) orthoimages covering the Canadi...
75	reference:bathy...	Reference: bathy...	Shows the depths (bathymetry) of the waters in and around Canada.
77	reference:land...	Canadian and F...	Canadian and Foreign landmass at 1:1M scale (Atlas of Canada)
82	reference:boun...	Geopolitical Bo...	The Atlas of Canada 1,000,000 National Frameworks Data, Administrative Boundaries consists of area and ...
85	reference:nts	Index of the Nat...	Topographic maps produced by Natural Resources Canada conform to the National Topographic System ...
92	reference:hydro	Hydrography	This group covers drainage (coastlines, rivers, lakes) for the Canadian landmass.
101	reference:roads	Road Network	This group covers the road network (primary and secondary highways, selected ferry routes) for the Cana...
105	reference:place...	Populated place...	Populated Places data set shows a selection of named populated places suitable for use at various scales. ...
110	boundaries:geo...	Canadian Geop...	Canadian Geopolitical Boundaries contains the international, inter-provincial and territorial boundaries, as...
114	boundaries:abo...	Aboriginal Lands	Aboriginal Lands including Indian Reserves, Land Claim settlement and other Indian Lands.
119	boundaries:mu...	Municipal Boun...	Municipal Boundaries data product consists of a series of municipal features, each defined as a bounded ...
124	nrn:roadnetwork	NRN Network	The National Road Network (NRN) product contains quality geospatial data (current, accurate, consistent...)
129	nrn:streetnames	NRN Street Na...	Street Names of National Road Network
134	nrn:addressrange	NRN Address R...	Address Range
140	nhn:hydrography	NHN Hydrogra...	The National Hydro Network (NHN) focuses on providing a quality geometric description and a set of ba...
159	nhn:network	NHN Network	A network flowing through naturally occurring or constructed bodies of water.
168	nhn:drainageare...	Boundaries of D...	Canadian territory subdivision used to manage and distribute NHN data. NHN Work Units limits general...
176	nhn:toponyms	NHN Toponyms	A feature delineating the extent, in whole or in part, of a toponymic phenomenon for which the geometr...

Image encoding

PNG PNG24 JPEG GIF TIFF

Coordinate Reference System (66 available)

Layer name: nrn:roadnetwork

WGS 84 Change ...

Add Close Help

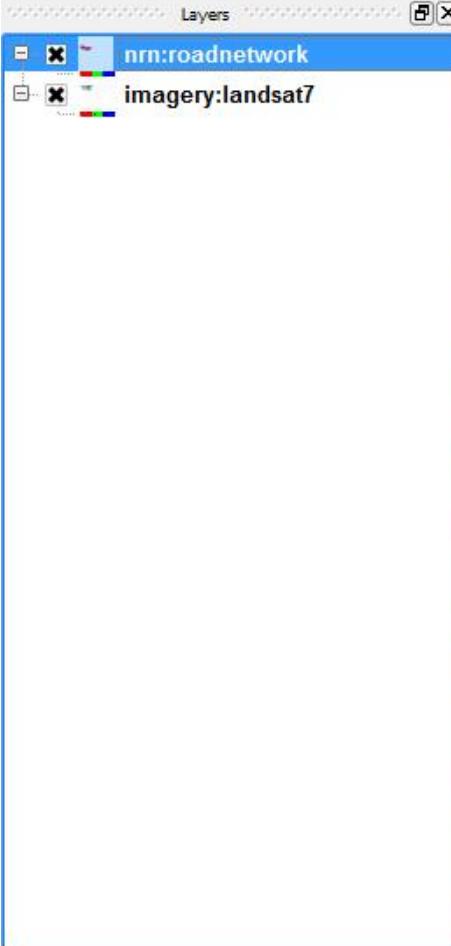
1 Layer(s) selected



Quantum GIS 1.7.4-Wroclaw



File Edit View Layer Settings Plugins Raster Database Vector Help



Coordinate:

-66.6945,45.9779

Scale 1:27117

Render

EPSG:4326



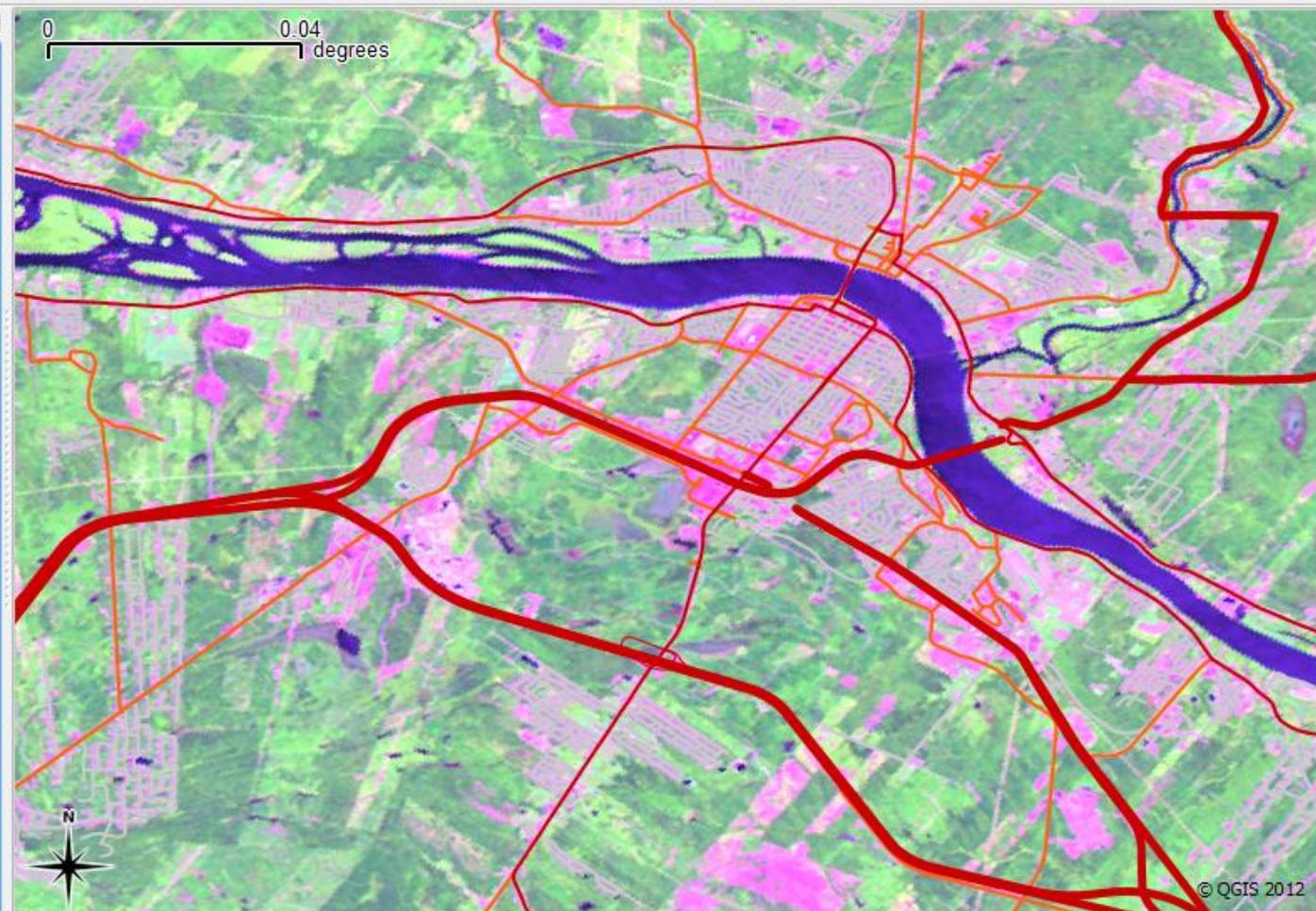
Quantum GIS 1.7.4-Wroclaw

File Edit View Layer Settings Plugins Raster Database Vector Help

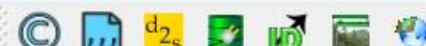


Layers

- nrn:roadnetwork
- imagery:landsat7



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59534 of 59534 bytes of map downloaded.

Coordinate:

-66.7734,46.0066

Scale 1:54254

Render

EPSG:4326

Add Layer(s) from a Server

File

Layers **Layer Order** **Tilesets** **Server Search**

GeoBase

Connect **New** **Edit** **Delete** **Load** **Save** **Add default servers**

ID	Name	Title	Abstract
0	WMS-GeoBase	Data Collections from GeoBase	The data available are: Administrative Boundaries (Aboriginal Lands, Canadian Geopolitic...
1	elevation:cded2...	Canadian Digital Elevation Data,...	The Canadian Digital Elevation Data (CDED) consists of an ordered array of ground elevati...
10	elevation:cded5...	Canadian Digital Elevation Data,...	The Canadian Digital Elevation Data (CDED) consists of an ordered array of ground elevati...
21	landcover:csc2...	Land Cover, Circa 2000	Land Cover information is the result of vectorization of raster thematic data originating fr...
73	imagery:landsat7	Landsat 7 Orthorectified Imager...	The orthoimage data set is a complete set of cloud-free (less than 10%) orthoimages cov...
75	reference:bathy...	Reference: bathymetry	Shows the depths (bathymetry) of the waters in and around Canada.
77	reference:land...	Canadian and Foreign Landmass	Canadian and Foreign landmass at 1:1M scale (Atlas of Canada)
82	reference:boun...	Geopolitical Boundaries	The Atlas of Canada 1,000,000 National Frameworks Data, Administrative Boundaries con...
85	reference:nts	Index of the National Topograp...	Topographic maps produced by Natural Resources Canada conform to the National Topo...
92	reference:hydro	Hydrography	This group covers drainage (coastlines, rivers, lakes) for the Canadian landmass.
101	reference:roads	Road Network	This group covers the road network (primary and secondary highways, selected ferry rou...
105	reference:place...	Populated places in Canada	Populated Places data set shows a selection of named populated places suitable for use a...
110	boundaries:geo...	Canadian Geopolitical Boundaries	Canadian Geopolitical Boundaries contains the international, inter-provincial and territor...
114	boundaries:abo...	Aboriginal Lands	Aboriginal Lands including Indian Reserves, Land Claim settlement and other Indian Lands.
119	boundaries:muni...	Municipal Boundaries	Municipal Boundaries data product consists of a series of municipal features, each define...
124	nrn:roadnetwork	NRN Network	The National Road Network (NRN) product contains quality geospatial data (current, acc...
129	nrn:streetname	Save connections to file	Street Names of National Road Network
134	nrn:addressrange	NRN Address Range	Address Ranges of National Road Network
140	nhn:hydrography	NHN Hydrography	The National Hydro Network (NHN) focuses on providing a quality geometric descrip...
159	nhn:network	NHN Network	A network flowing through naturally occurring or constructed bodies of water.
168	nhn:drainageare...	Boundaries of Drainage Areas	Canadian territory subdivision used to manage and distribute NHN data. NHN Work Unit...
176	nhn:toponyms	NHN Toponyms	A feature delineating the extent, in whole or in part, of a toponymic phenomenon for whi...

Image encoding

PNG PNG24 JPEG GIF TIFF

Coordinate Reference System (66 available)

Layer name:

WGS 84

1 Layer(s) selected

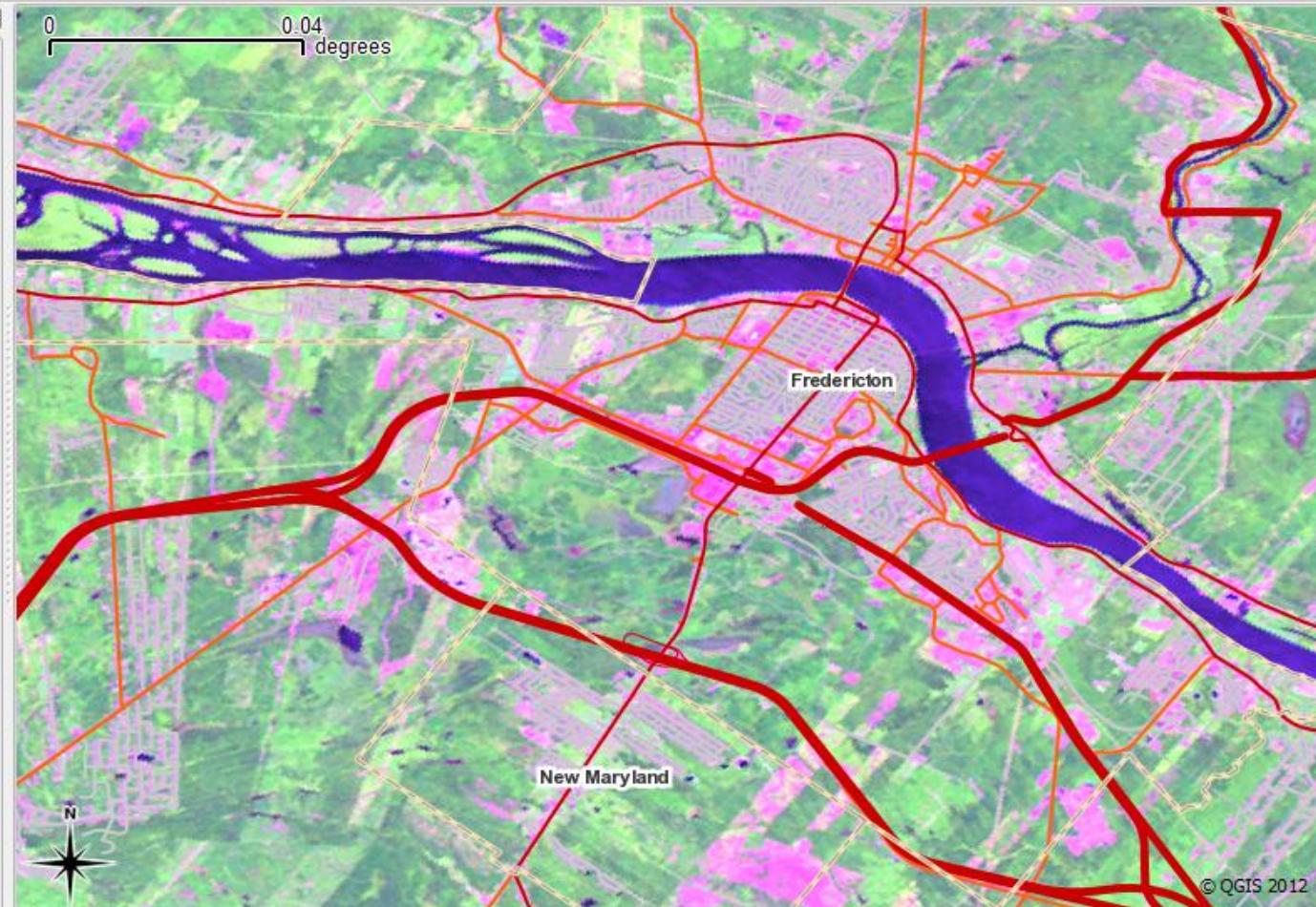
59534

File Edit View Settings Plugins Raster Database Vector Help



Layers

- boundaries:municipal
- nrn:roadnetwork
- imagery:landsat7



Coordinate:

-66.7713,46.0032

Scale

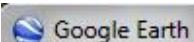
1:54254



Render

EPSG:4326





File Edit View Tools Add Help

▼ Search

ex: pizza near NYC

Get Directions H

▼ Places

- My Places
- Temporary Places



▼ Layers Earth Gallery »

- Primary Database
 - Borders and Labels
 - Places
 - Photos
 - Roads
 - 3D Buildings
 - Ocean
 - Weather
 - Gallery
 - Global Awareness
 - More

Folder Ctrl+Shift+N

Placemark Ctrl+Shift+P

Path Ctrl+Shift+T

Polygon Ctrl+Shift+G

Model Ctrl+Shift+M

Tour

Photo

Image Overlay Ctrl+Shift+O

Network Link



Sign in

Google Earth - New Image Overlay

Name: Untitled Image Overlay

Link:

Browse...

Transparency:

Clear

Opaque

Description View Altitude Refresh Location

Time-Based Refresh

When: Once 0 hrs 0 mins 4 secs

View-Based Refresh

When: Never 0 hrs 0 mins 4 secs

View Bound Scale: 0.75

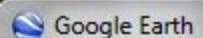
WMS Parameters

OK

Cancel

gle earth

15.81 km



Google Earth



File Edit View Tools Add Help

Google Earth - Web Mapping Service Parameters



WMS Server: http://demo.cubewerx.com/demo/cubeserv/cubeserv.cgi



Add...

Edit...

Remove

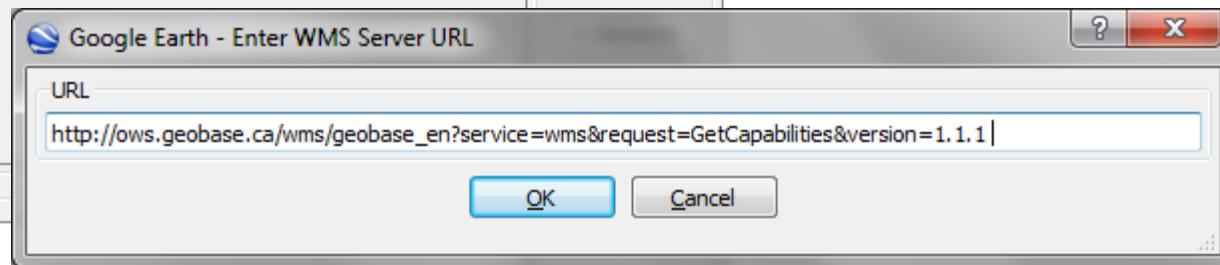
Move layers you want to see from left to right side. Order layers such that transparent layers follow opaque layers in the "Selected Layers" list.

Opaque Layers

WMS Capability fetch failed.

Selected Layers

Add ->



Transparent Layers

OK

Cancel

Move Up

Move Down

OK

Cancel

Apply

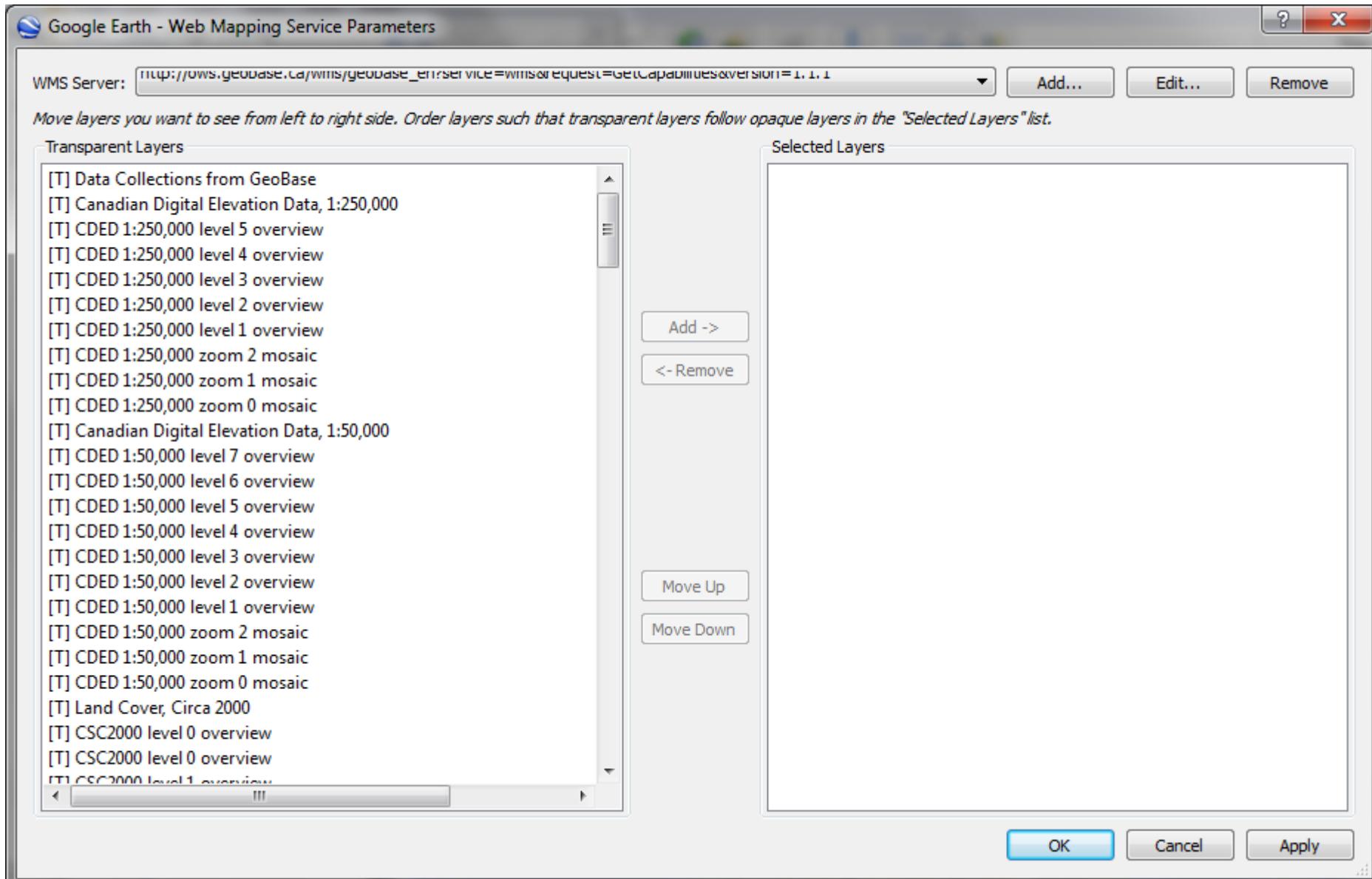
More

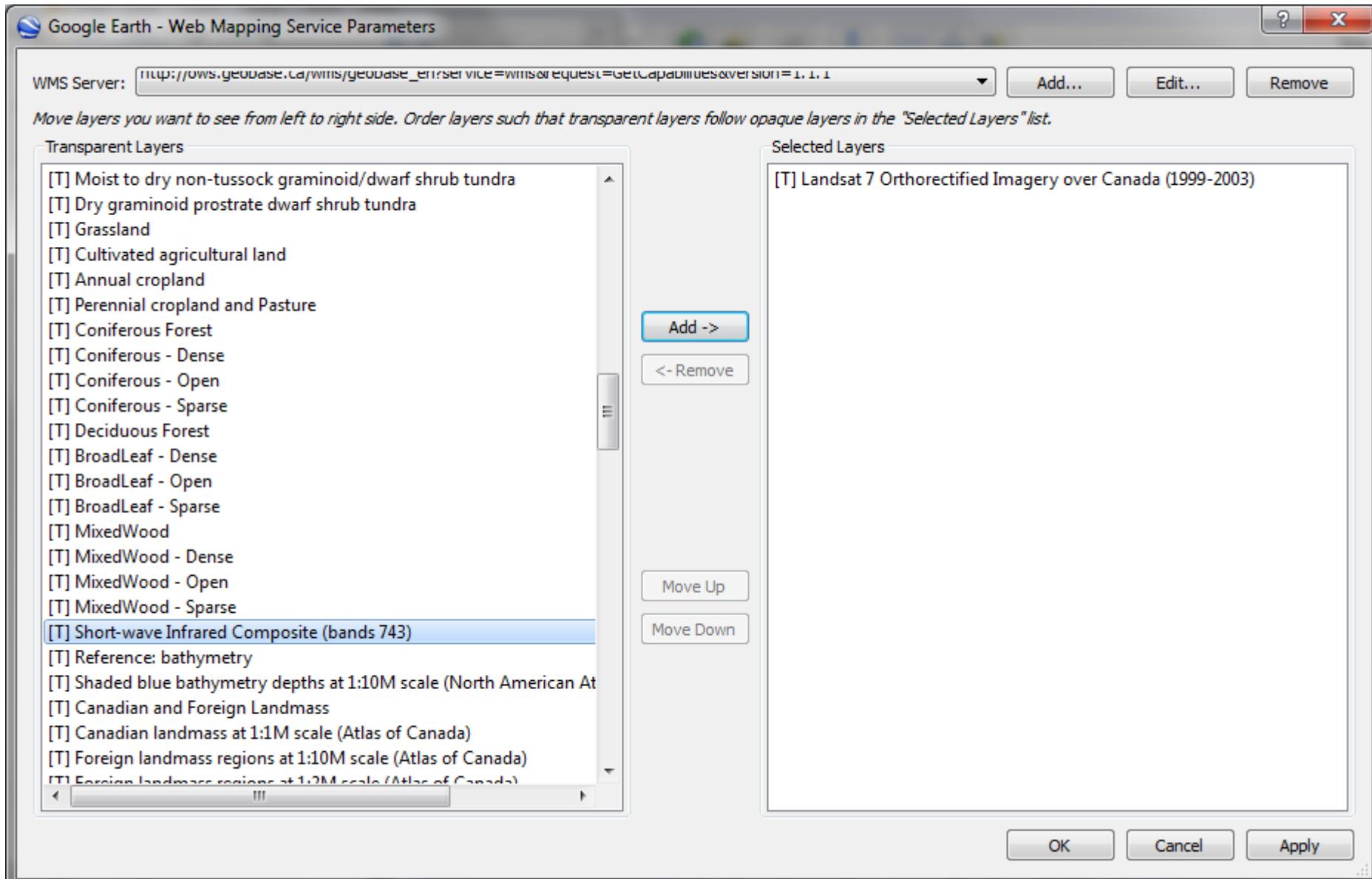
OK

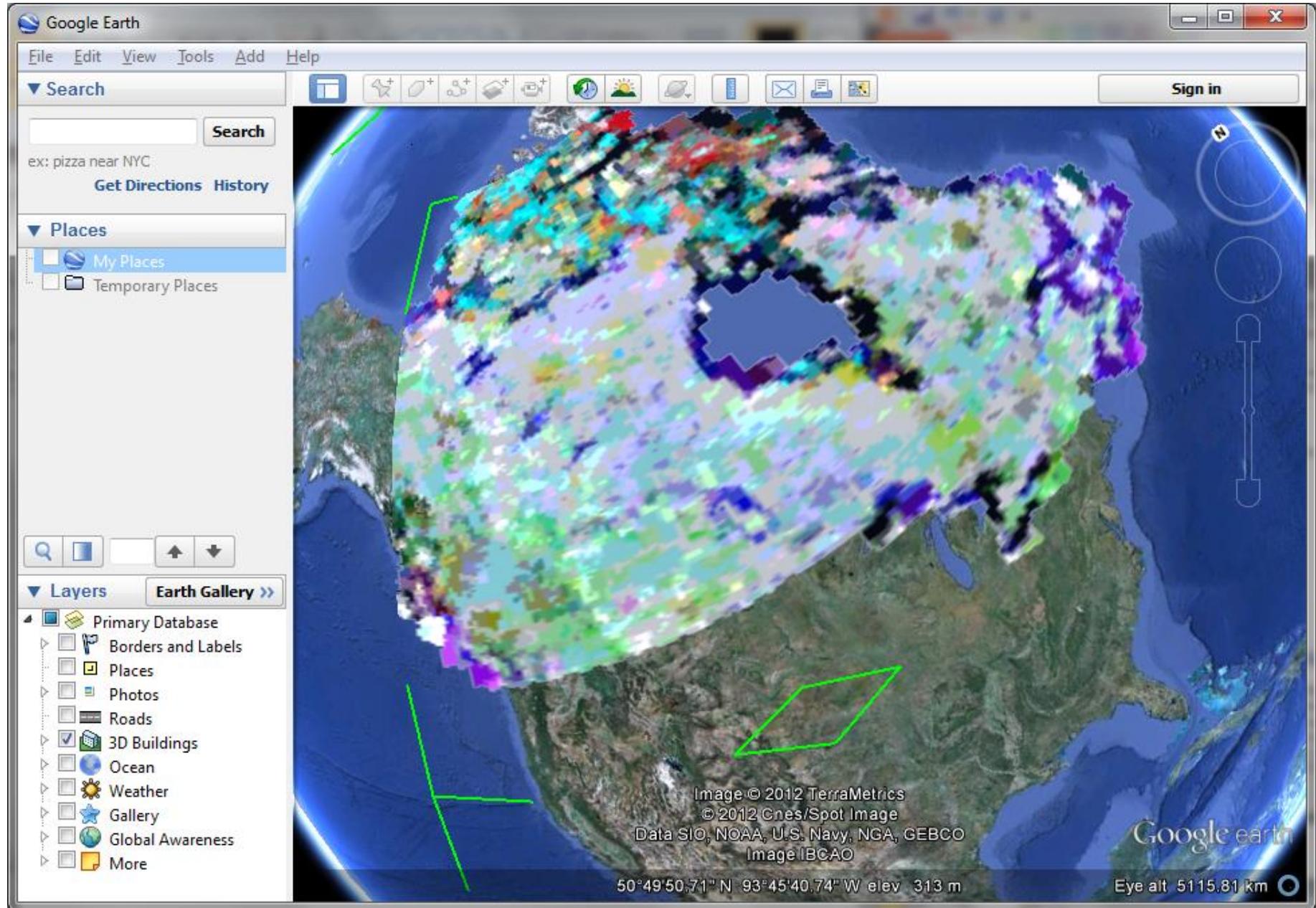
Cancel

Cancel

5115.81 km



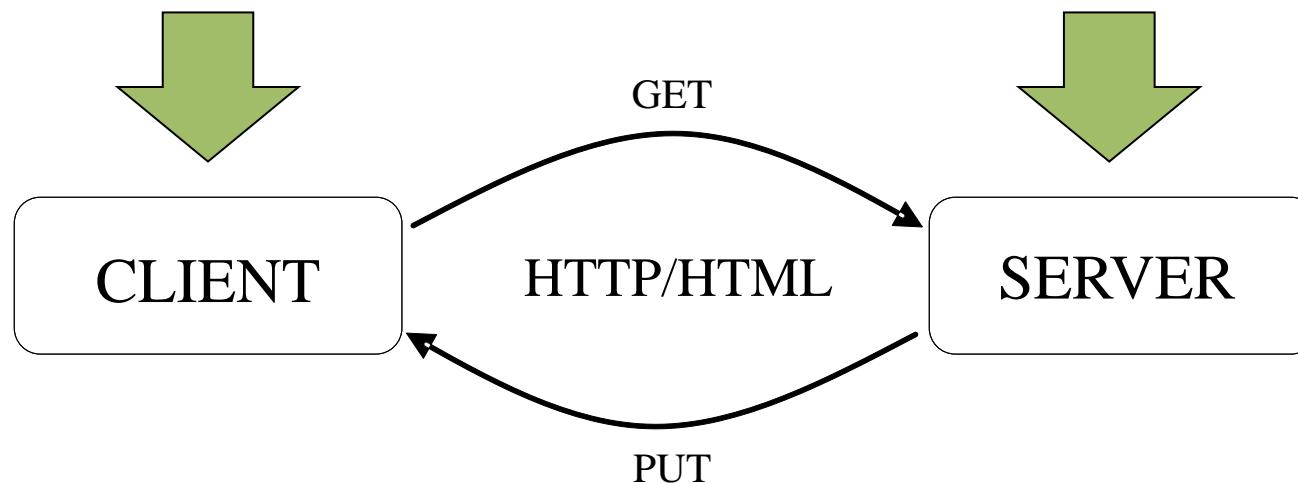




Interactive Maps...

- Enriched functionality by extending...

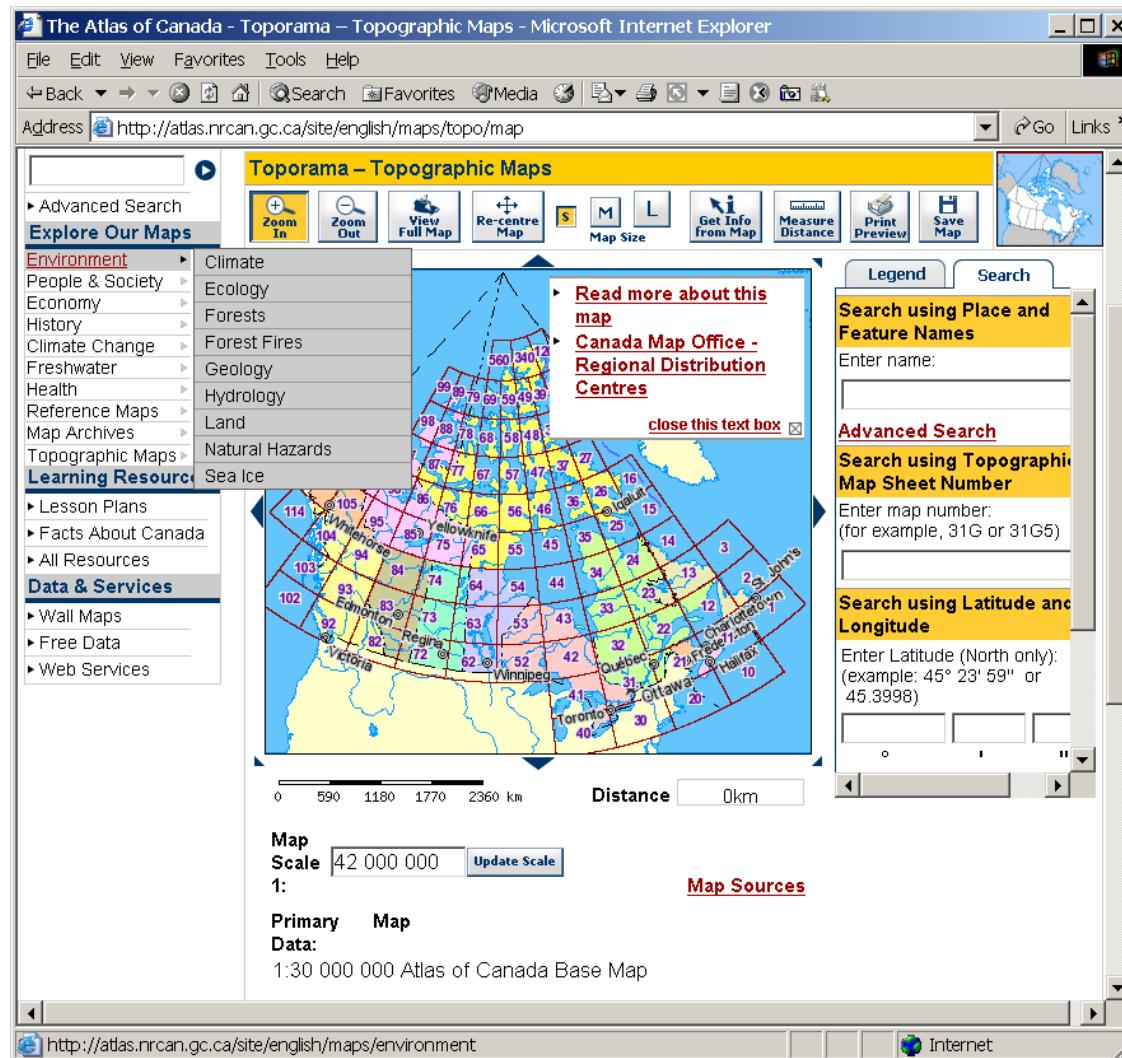
- the **client side** functionality
- the **server side** functionality



Extend both the Client and Server

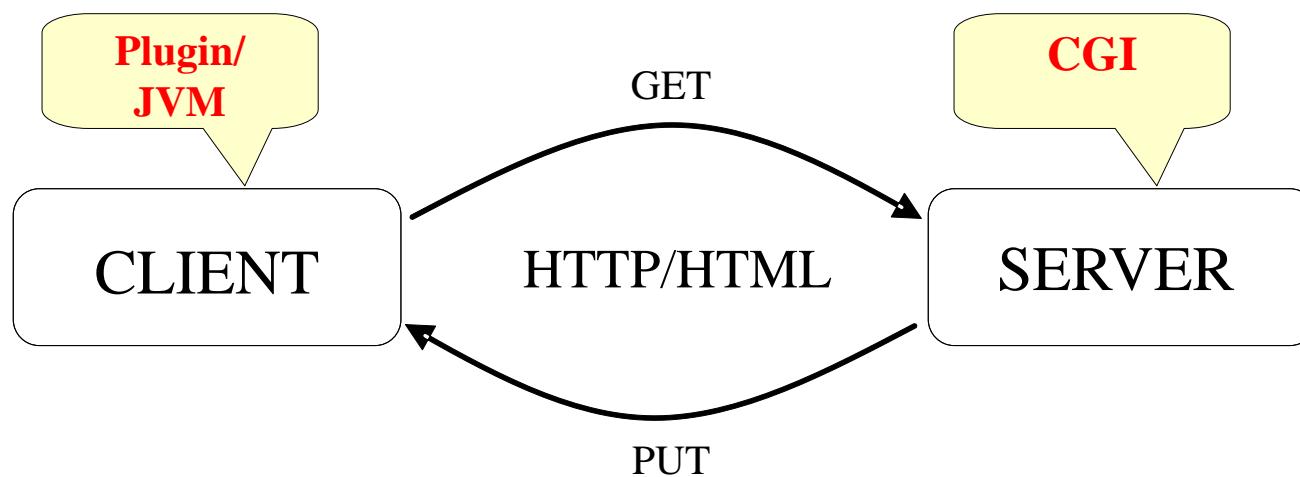


Extend both the Client and Server

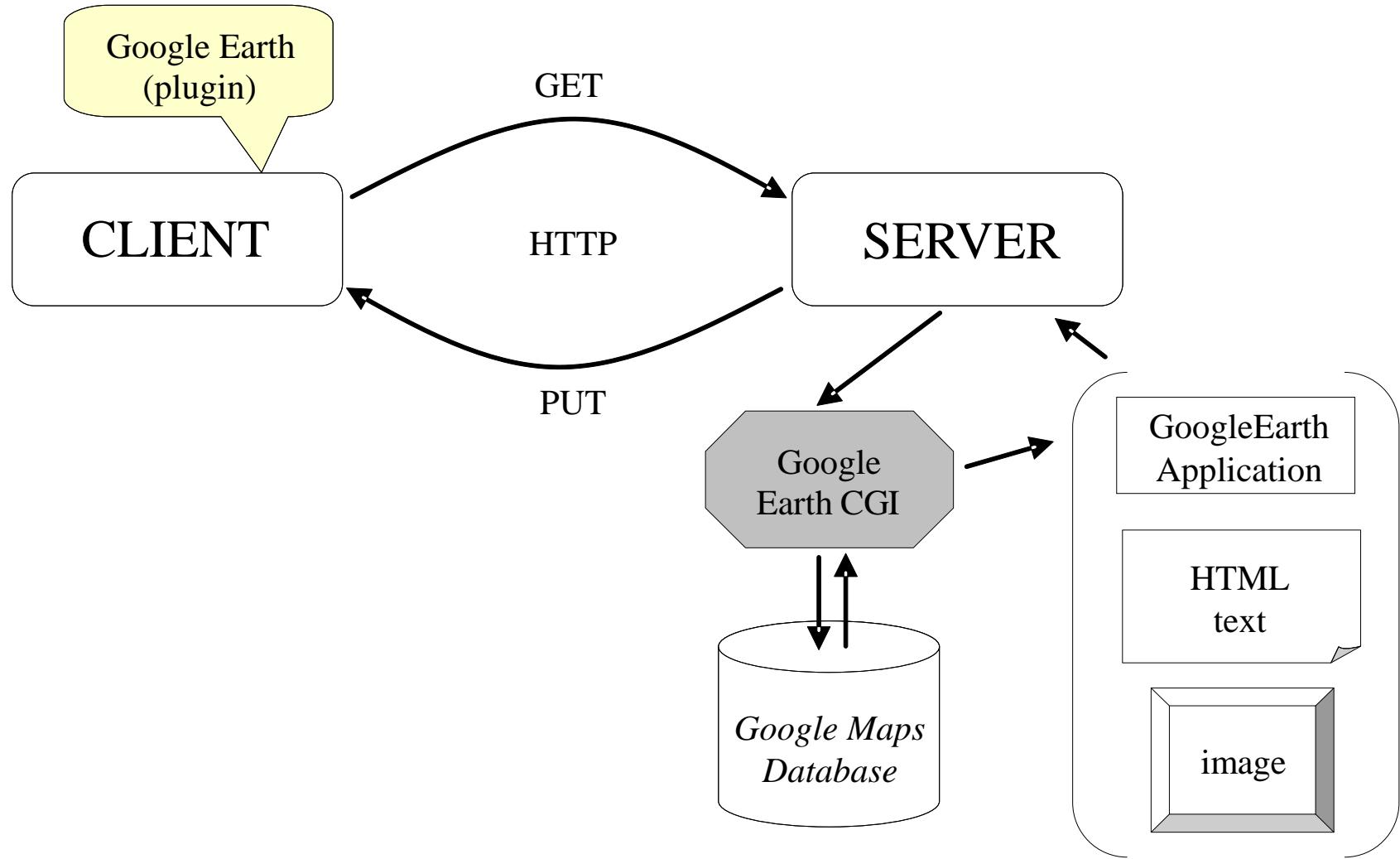


Extend both the Client and Server

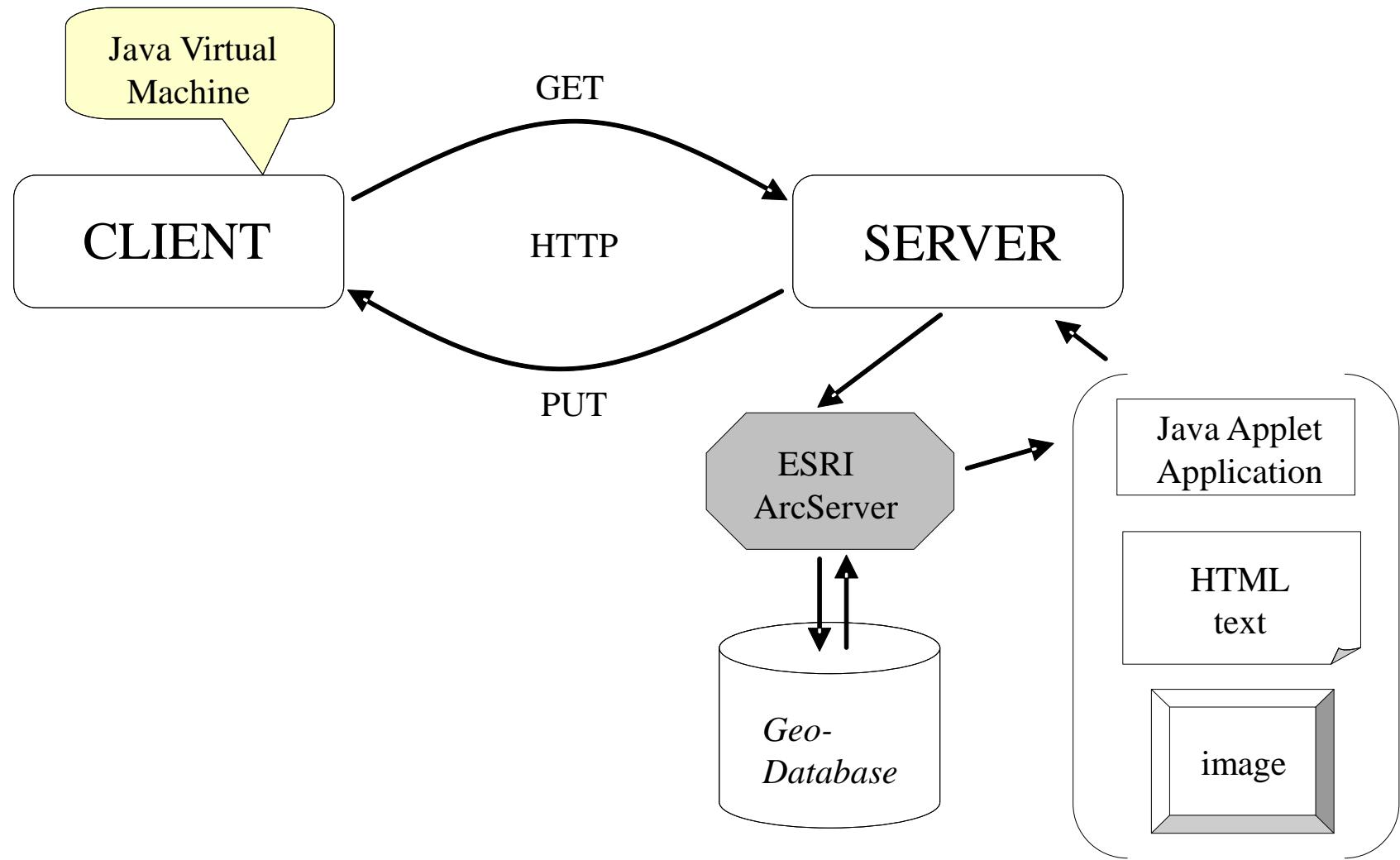
- Example architecture...



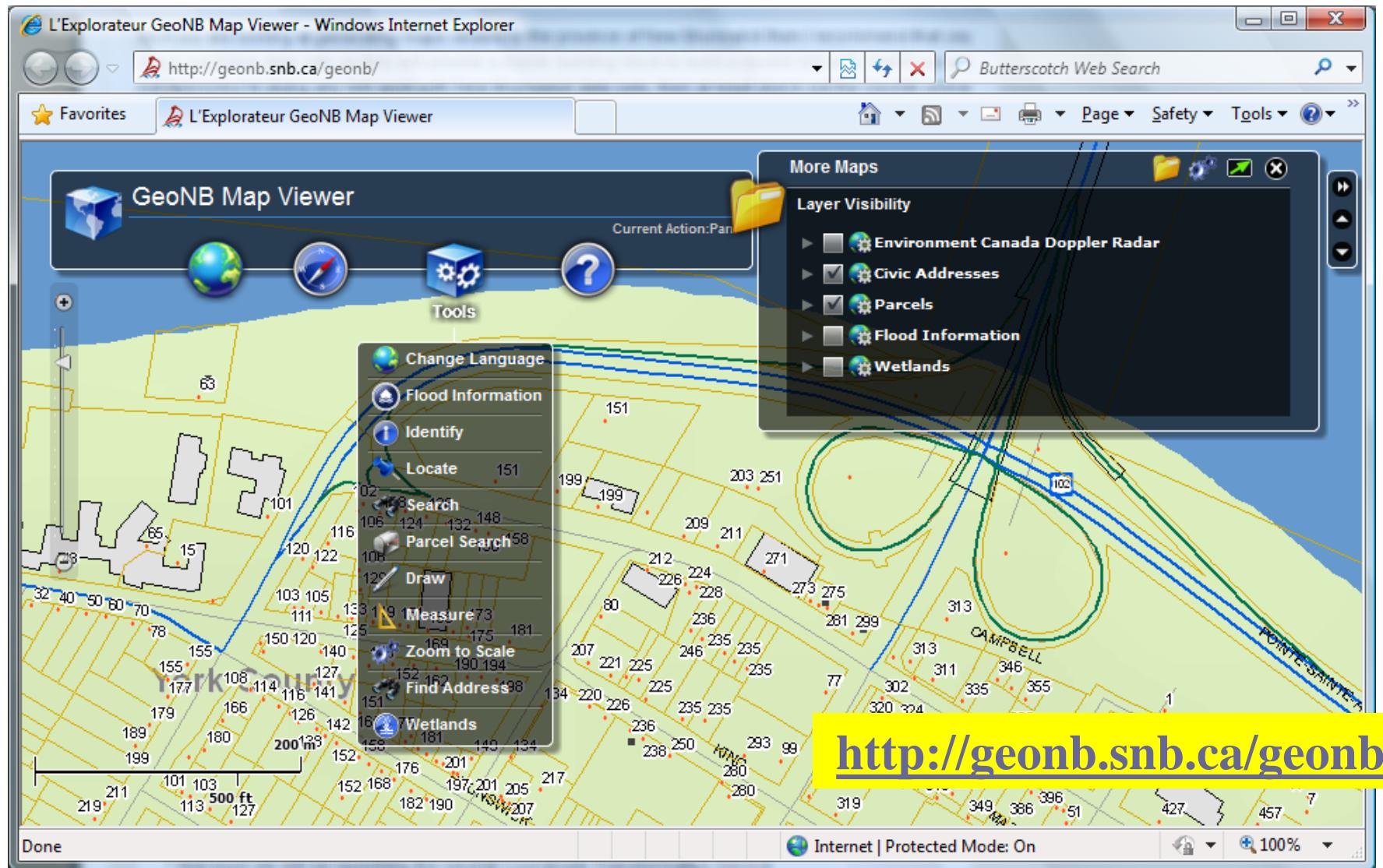
Extend both the Client and Server



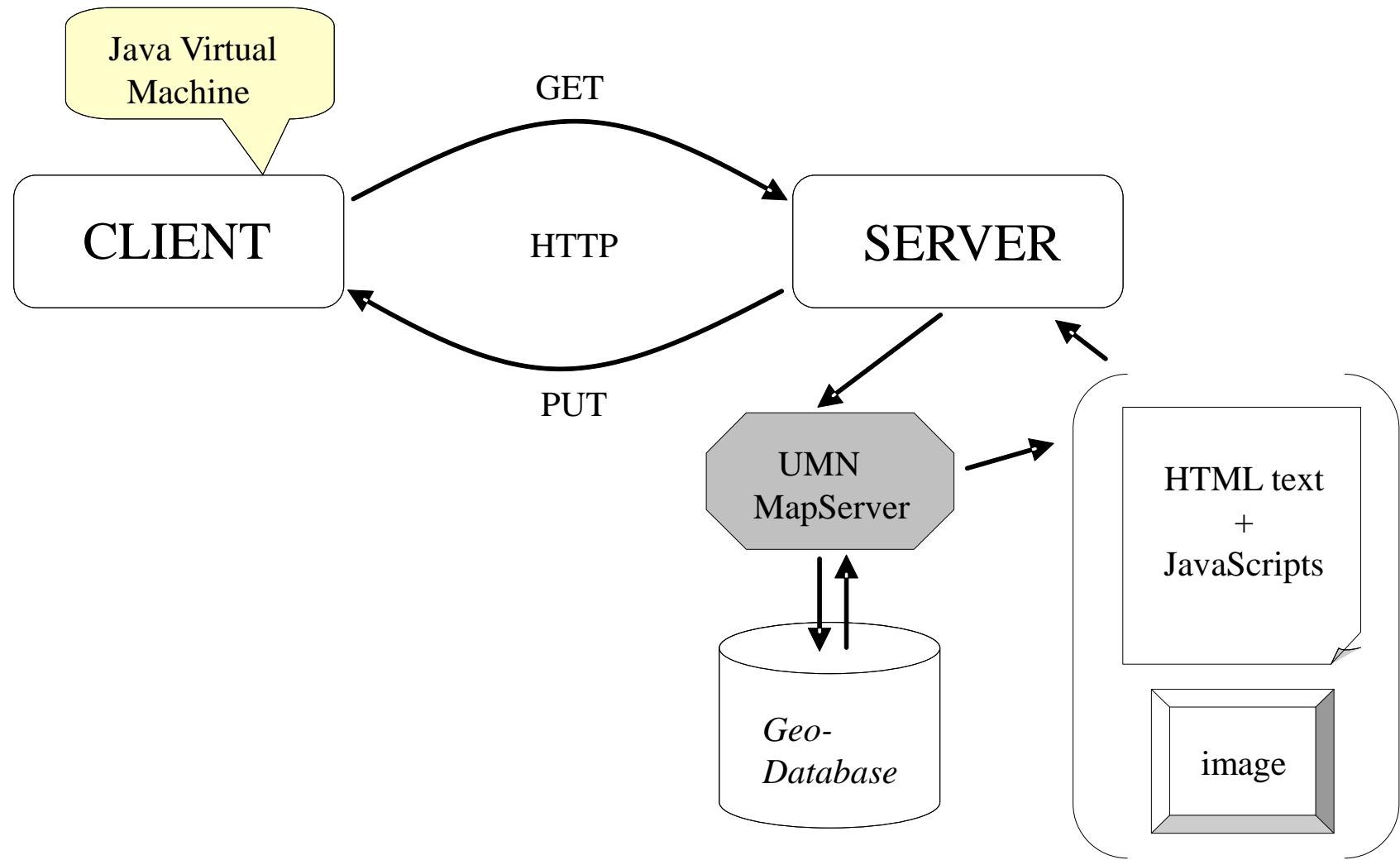
Extend both the Client and Server



Extend both the Client and Server

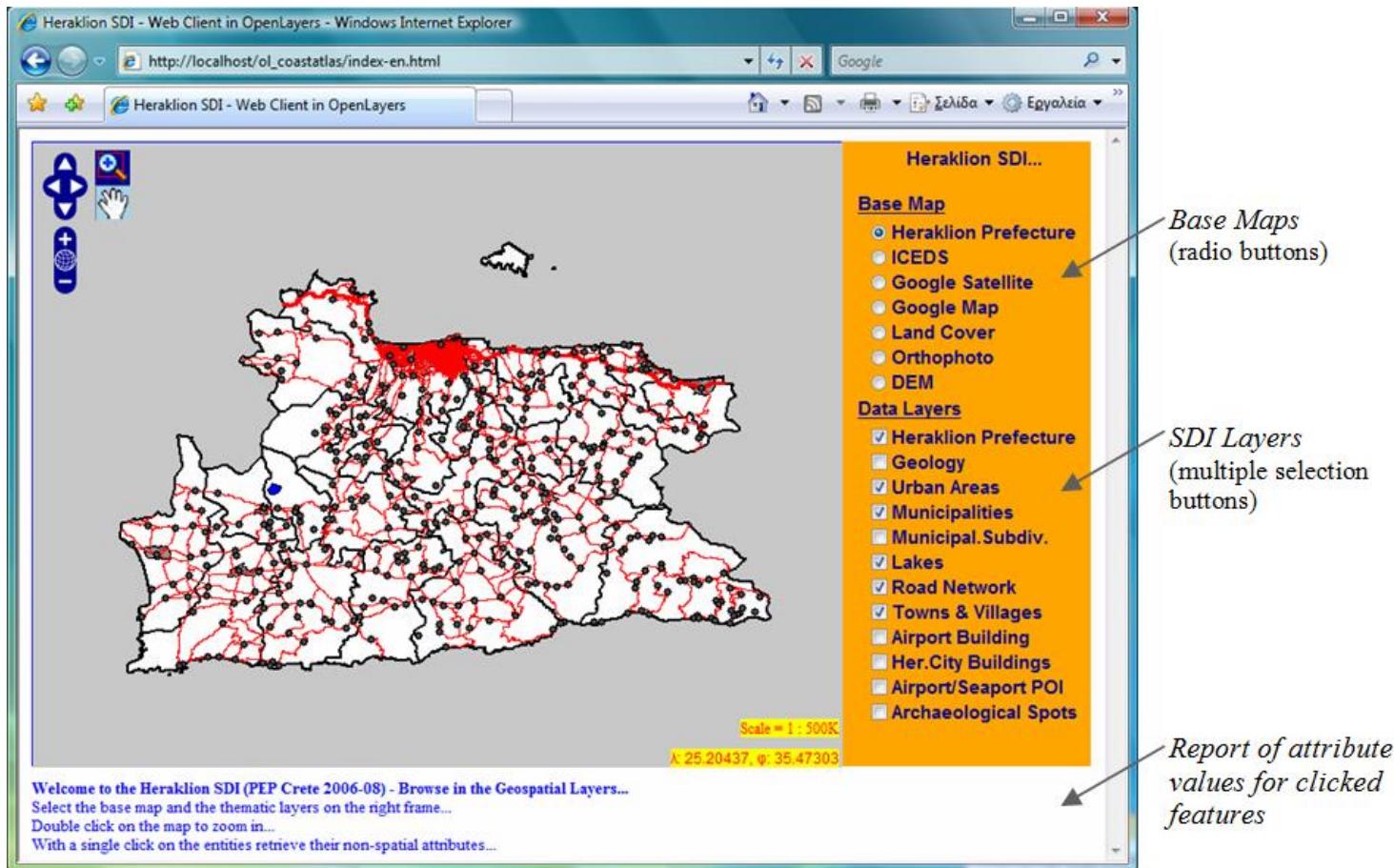


Extend both the Client and Server



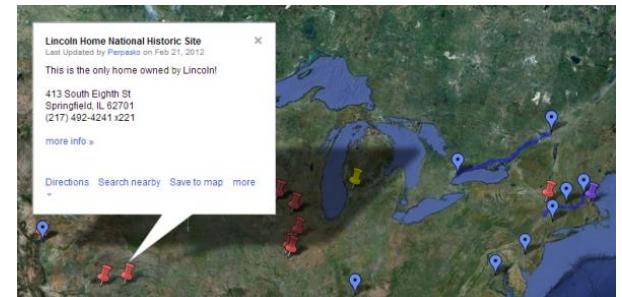
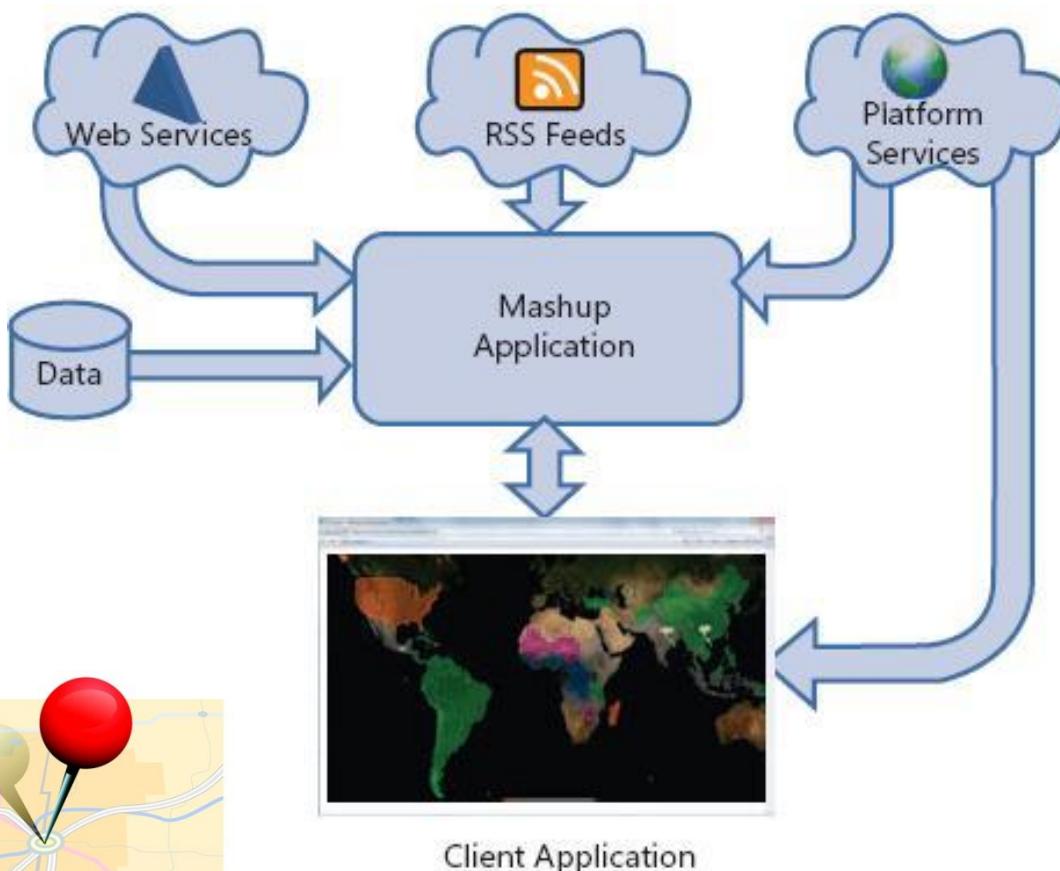
Extend both the Client and Server

- MapServer (CGI) and Openlayers (JS)



Involve a third party → Mashups

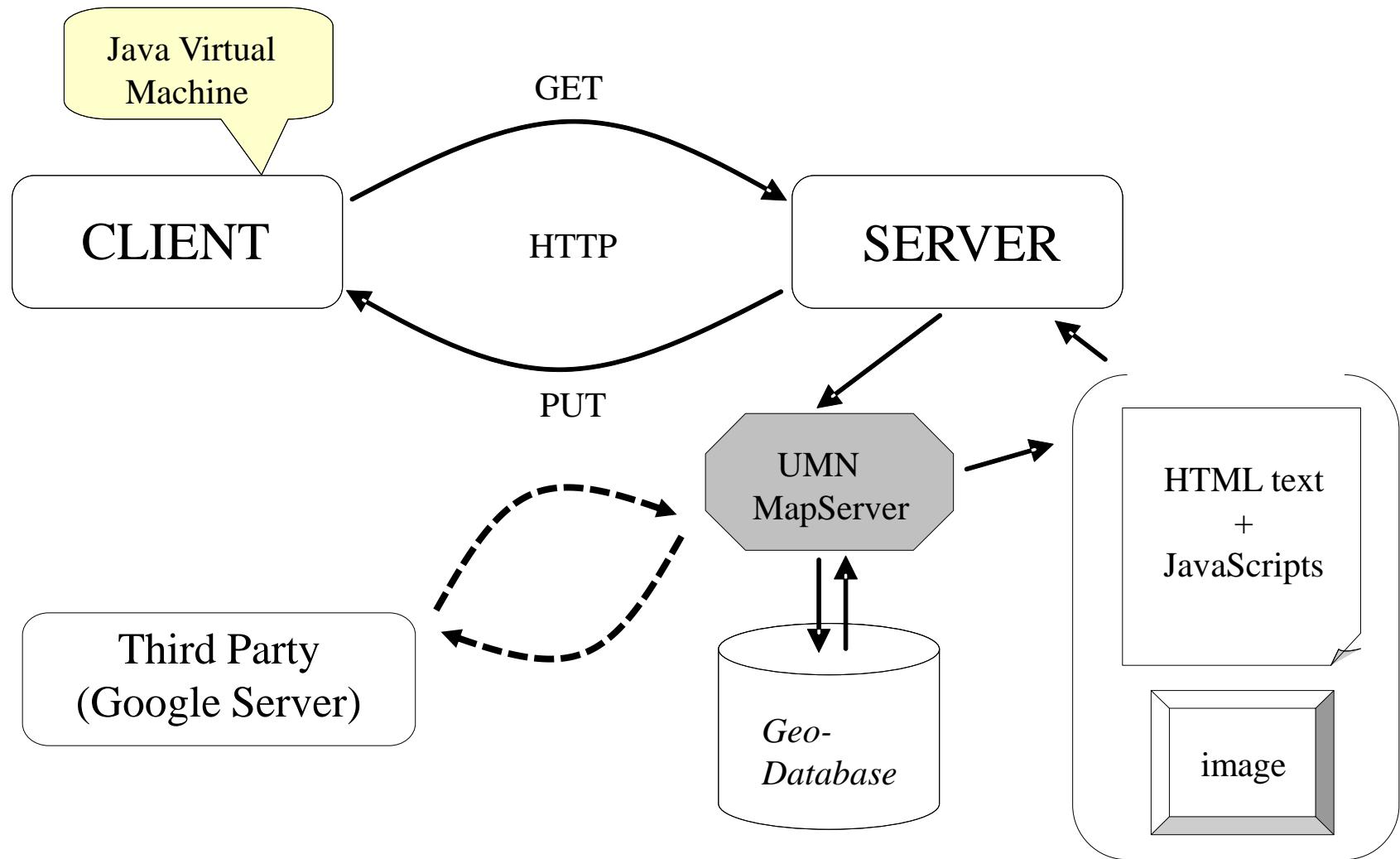
- Map-Mashups...



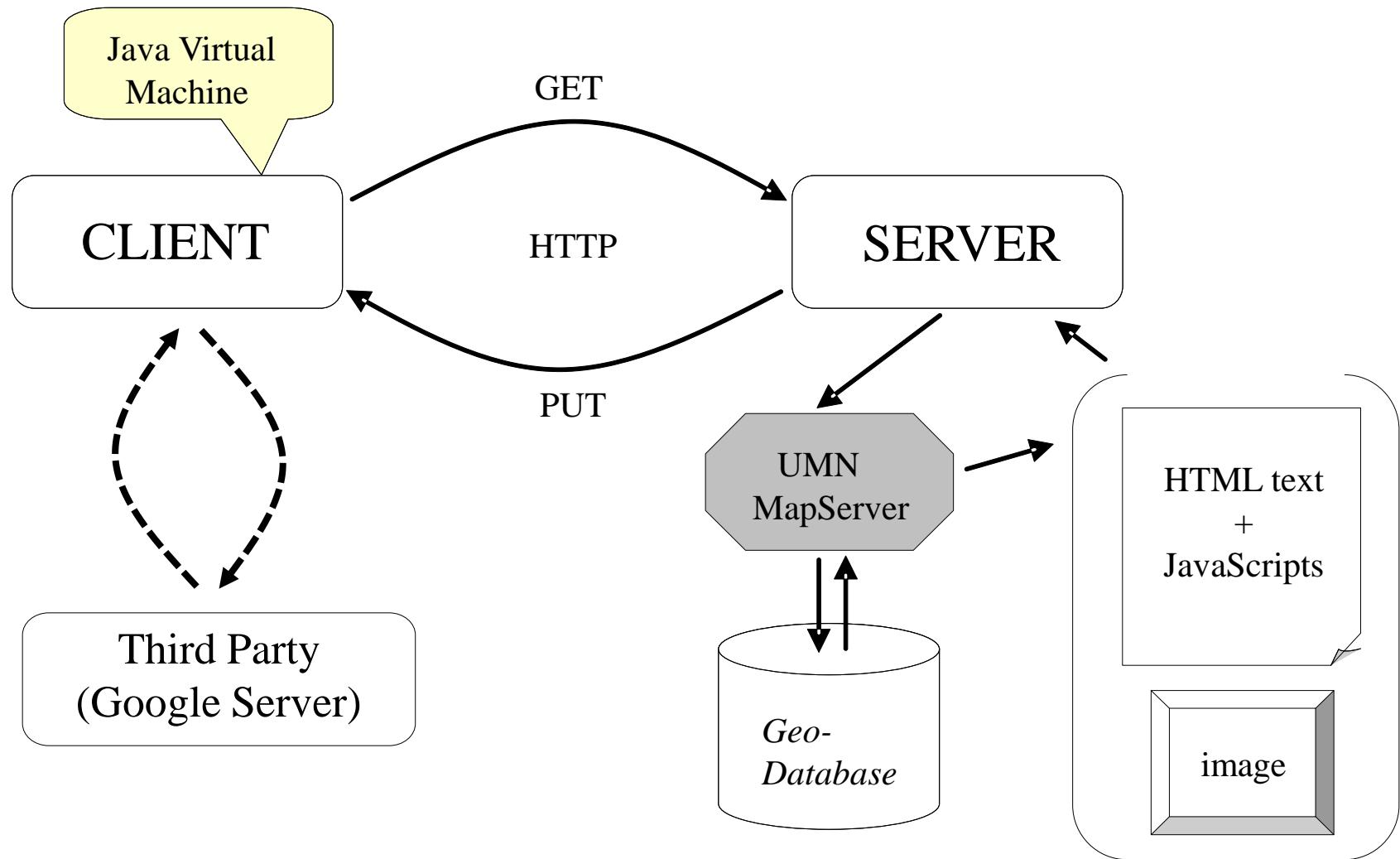
Involve a third party → Mashups

- Alternative architectures
 - Web-based mashups
 - Combination of the content and formatting on the client side (web browser)
 - Server-based mashups
 - Combination of the content and formatting on the server

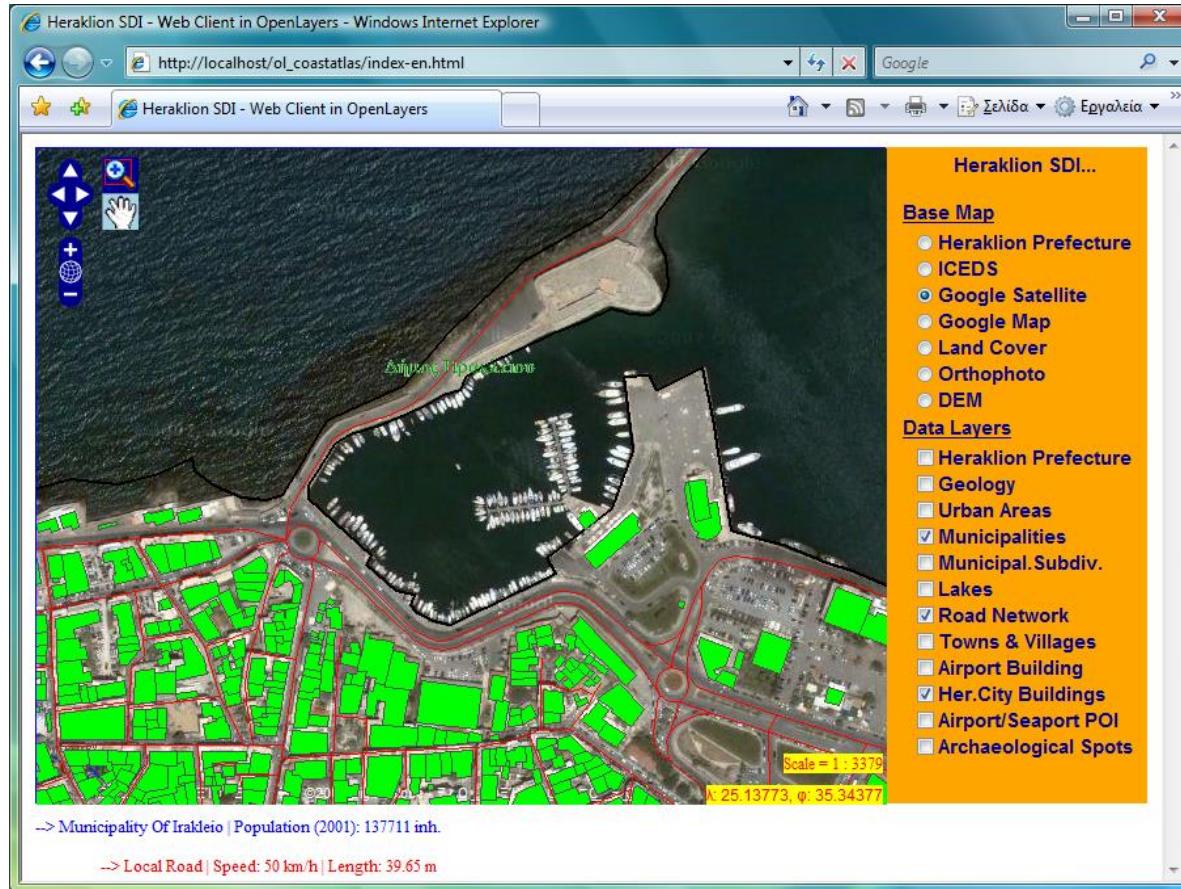
Server-based Mashups



Web-based Mashups

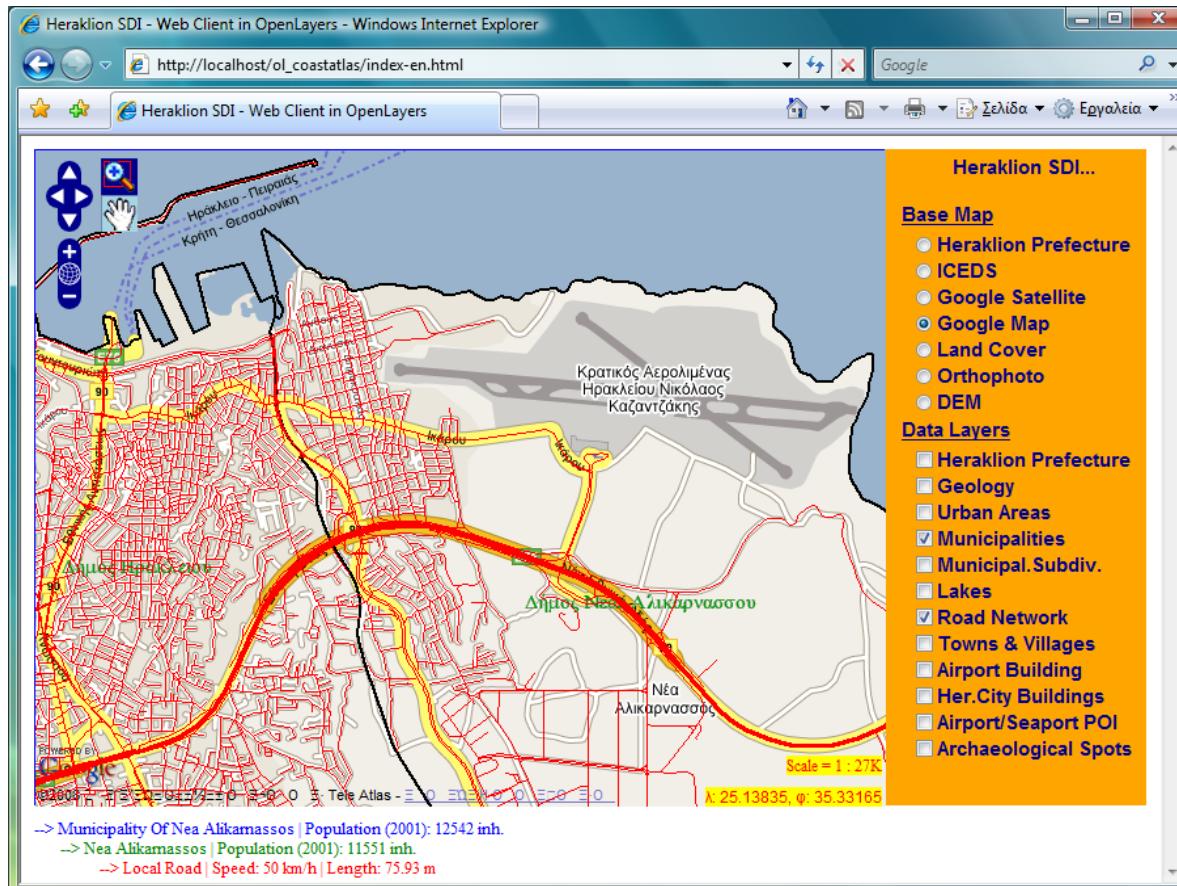


Map Mashups...



Base Map: Google Satellite
Layers: Municipalities, Road Network, Buildings

Map Mashups...



Base Map: Google Map
Layers: Municipalities, Road Network

Map Mashups...

*This application
is unavailable.*

The screenshot shows a map of Fredericton, NB, overlaid with historical housing data from the Loyalists. The map includes street names like Queen St, King St, Brunswick St, and York St, along with various parks and landmarks. A sidebar on the right lists approximately 30 historical houses, each with a checkbox and a year built. The sidebar also includes buttons for 'Select all' and 'Remove all', and options for 'Street Map', 'Satellite Image', and 'Historical Map'. The map is powered by Google, as indicated in the bottom left corner.

THE LOYALISTS IN FREDERICTON, NB

EARLY HOUSING IN FREDERICTON

Map data ©2012 - Terms of Use

You have selected all houses to be shown on the map/image...

Early housing in Fredericton : <http://gaia.gge.unb.ca/eh/loyalists.html>

- [1785] -- 808 Brunswick Street
- [1786] -- 12-14 Waterloo Row
- [1787] -- 38 Waterloo Row
- [1787] -- 774 King Street
- [1791] -- 778 Queen Street
- [1796] -- 752 King Street
- [1800] -- 736 King Street
- [1800] -- 750 Brunswick Street
- [1800] -- 888 George Street
- [1800] -- 710 Queen Street
- [1800] -- 78 Waterloo Row
- [1820] -- 102 Queen Street
- [1822] -- 102 Waterloo Row
- [1825] -- 306 Brunswick Street
- [1826] -- 759 George Street
- [1828] -- Woodstock Road
- [1828] -- 15 Carleton Street
- [1828] -- Queen Street
- [1829] -- 3 Bailey Drive
- [1830] -- 433 Charlotte Street

Select all Remove all

Street Map Satellite Image Historical Map

Lat: -66.64364, Lon: 45.95560

Map Mashups...

The screenshot shows a web browser window displaying a map of Fredericton, NB, overlaid with historical housing data. The map is a satellite view of a residential area, with several small thumbnail images of houses placed on the map. A larger pop-up window is centered over one of these thumbnails, providing details about a specific house:

Year: 1787
Address: 38 Waterloo Row
Owner: none
Description: Royal Oak Inn
[Read more...](#)

The top of the page features a banner with the University of New Brunswick logo and the text "THE LOYALISTS IN FREDERICTON, NB" and "EARLY HOUSING IN FREDERICTON". To the right of the map, a vertical list of historical addresses is shown, each preceded by a checked checkbox. At the bottom right of the map area, there are buttons for "Select all" and "Remove all". Below the map, there are buttons for "Street Map", "Satellite Image", and "Historical Map".

Imagery ©2012 - Terms of Use
You have chosen the satellite image as a background...

THE LOYALISTS IN FREDERICTON, NB

EARLY HOUSING IN FREDERICTON

[1785] -- 808 Brunswick Street
[1786] -- 12-14 Waterloo Row
[1787] -- 38 Waterloo Row
[1787] -- 774 King Street
[1791] -- 776 Queen Street
[1796] -- 752 King Street
[1800] -- 736 King Street
[1800] -- 780 Brunswick Street
[1800] -- 868 George Street
[1800] -- 710 Queen Street
[1800] -- 76 Waterloo Row
[1820] -- 102 Queen Street
[1822] -- 102 Waterloo Row
[1825] -- 306 Brunswick Street
[1826] -- 759 George Street
[1828] -- Woodstock Road
[1828] -- 15 Carleton Street
[1828] -- Queen Street
[1829] -- 3 Bailey Drive
[1830] -- 433 Charlotte Street

Select all Remove all

Street Map Satellite Image Historical Map

Lat: -66.63302, Lon: 45.95518

Map Mashups...

The Loyalists in Fredericton

gaia.gge.unb.ca/eh/loyalists.html

University of New Brunswick

THE LOYALISTS IN FREDERICTON, NB
EARLY HOUSING IN FREDERICTON

THE LOYALISTS
LES LOYALISTES

CANADA

UNB

Year: 1829
Address: 3 Bailey Drive
Owner : Old Arts Building
(UNB)
Description: Oldest University

FREDERICTON, N.B.

-66.69720, lat: 45.99008

Select all Remove all

Street Map Satellite Image Historical Map

You have selected all houses to be shown on the map/image...

- [1785] -- 808 Brunswick Street
- [1786] -- 12-14 Waterloo Row
- [1787] -- 38 Waterloo Row
- [1787] -- 774 King Street
- [1791] -- 776 Queen Street
- [1796] -- 752 King Street
- [1800] -- 736 King Street
- [1800] -- 750 Brunswick Street
- [1800] -- 888 George Street
- [1800] -- 710 Queen Street
- [1800] -- 76 Waterloo Row
- [1820] -- 102 Queen Street
- [1822] -- 102 Waterloo Row
- [1825] -- 306 Brunswick Street
- [1826] -- 759 George Street
- [1828] -- Woodstock Road
- [1828] -- 15 Carleton Street
- [1828] -- Queen Street
- [1829] -- 3 Bailey Drive
- [1830] -- 433 Charlotte Street

References

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- Kraak, J.M., and Brown A. (Eds) 2000. Web Cartography.
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- Mitchell, T., 2005. Web Mapping. O'Reilly:USA.
- OGC – Open Geospatial Consortium,
<http://www.opengeospatial.org/>
- OSGeo – Open Source Geospatial Foundation,
<http://www.osgeo.org/>
- W3C – World Wide Web Consortium, <http://www.w3.org/>