



Harokopio University of Athens
Department of Geography

ICIW 2008 The Third International Conference on
Internet and Web Applications and Services
June 8-13, 2008 - Athens, Greece



Web Services for Mapping

Tutorial

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Tutorial: Web Services for Mapping

Overview

- Tutorial Description
- Tutorial Schedule
- Tutorial Outline

This tutorial is also available at:

http://www.dbnet.ece.ntua.gr/~stefanak/WebServMap_Stefanakis.pdf

Tutorial Description

As geographic/map data sources **expand** and the demand to have access to them increases, the Web Mapping Services have been **grown** rapidly during the last years.

The Web services **specifications** for mapping come from the Open Geospatial Consortium (OGC) and have been implemented by commercial and open source map server software systems.

The **scope** of this tutorial is to present the web services for sharing and accessing geographic/map data on the Web.

Tutorial Schedule

Sunday, June 8th, 2008 ...

at 16:00 – 19:00...

- Part I: Theory
 - (duration ~ 1h 30 min)

- Part II: Practice
 - (duration ~ 1h 30 min)

Tutorial Outline

- Part I: Theory

1. Publishing Maps on the Web
2. XML-based languages for Geography and Mapping
3. Web Services for Mapping

- Part II: Practice

4. Mapping Servers/Services on the Web
5. Spatial Data Infrastructures (SDI)
6. The Heraklion SDI Web Services



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Tutorial: Web Services for Mapping

Part I: Theory

1. Publishing Maps on the Web

- **Static Maps**
- **Interactive Maps**
 - **Extending the client**
 - **Extending the server**

2. XML-based languages for Geography and Mapping
3. Web Services for Mapping

Web Mapping

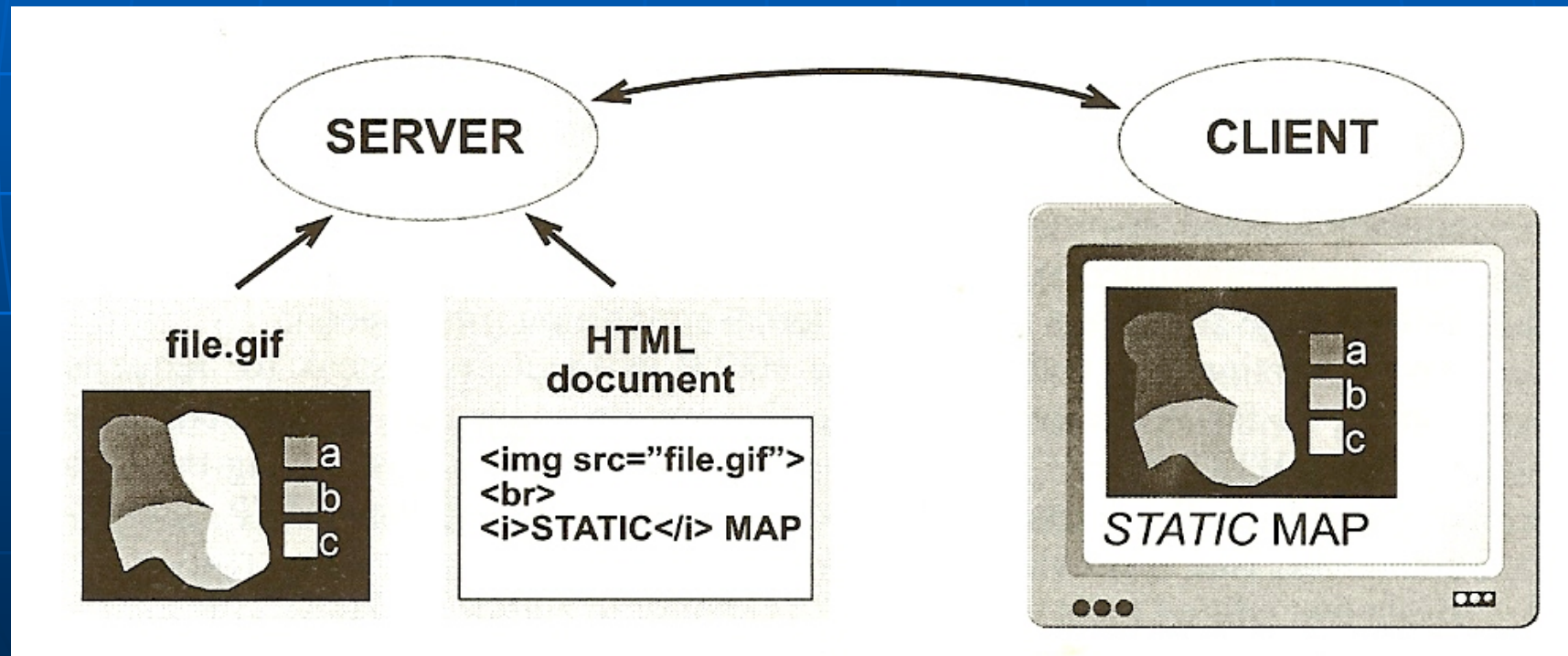
- Web ...
 - A common means of publishing maps
- **Web maps** ...
 - Million of people use web maps daily
 - Few of them know how they are actually generated

Web Mapping

- 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

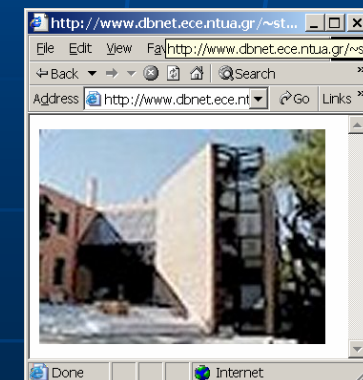
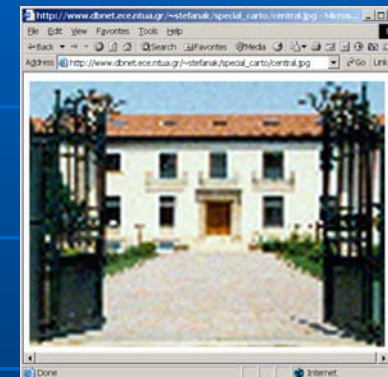
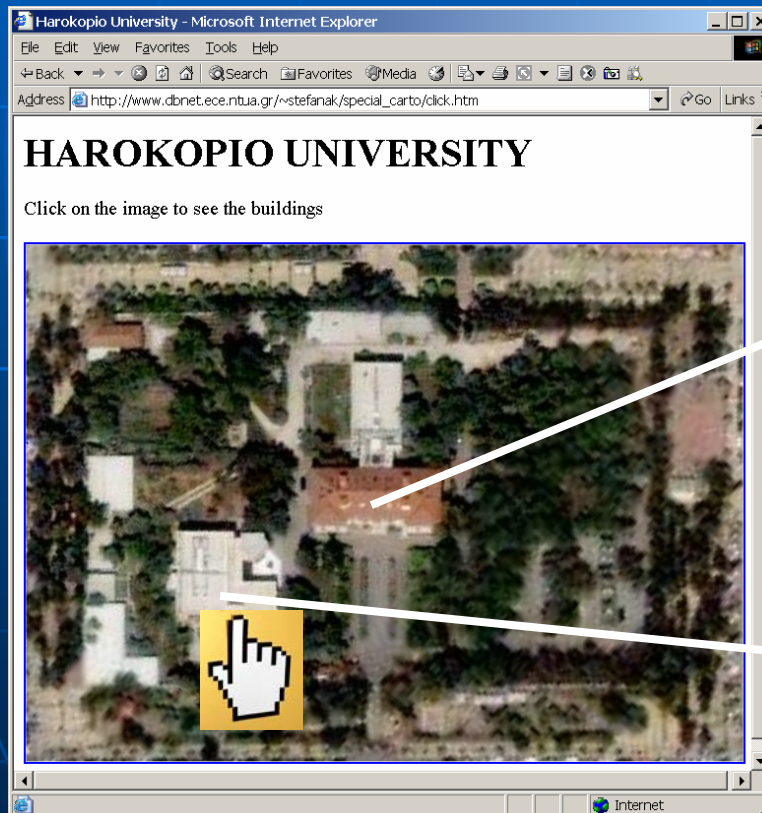
Static Maps

- Basic web publishing ...
 - distribute scanned maps (as **images**)

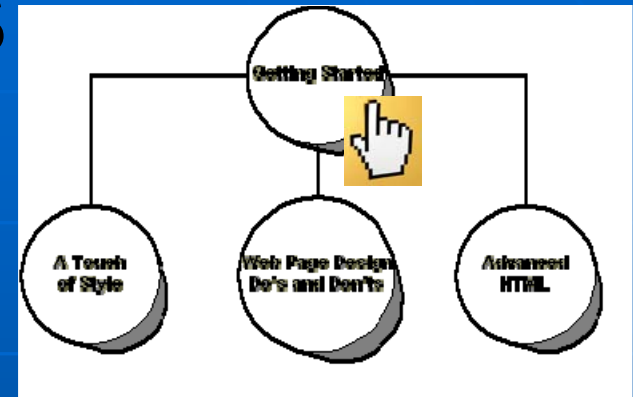


Static Maps

- Clickable maps ...
 - Images may have "sensitive areas"...



Static Maps



- Clickable maps ...
 - HTML capabilities...

- Insert an image:

```

```

- Define clickable regions within an image:

```

```

```
<map name="sitemap" >
```

```
<area shape="circle" coords="186,44,45" href="Overview.html" alt="Getting Started" >
```

```
...
```

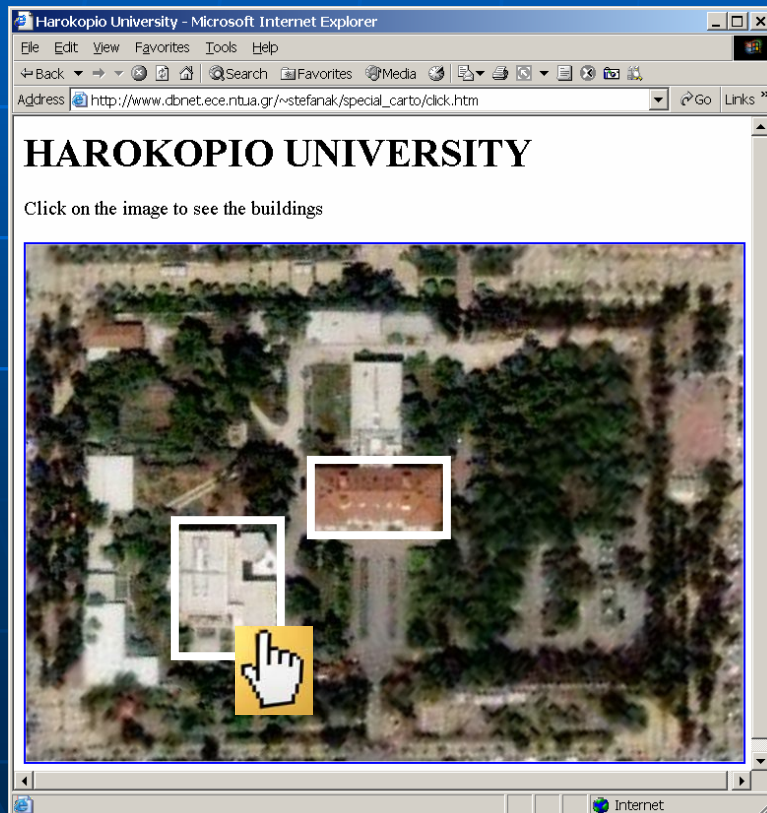
```
</map >
```

Static Maps

- Clickable maps ...
 - Define clickable regions within an image
 - **Geometry types** supported in HTML...
 - Rectangle
 - *rect: left-x, top-y, right-x, bottom-y*
 - Circle
 - *circle: center-x, center-y, radius*
 - Polygon
 - *poly: x1,y1, x2,y2, ... xn,yn*

Static Maps

- Clickable maps ...



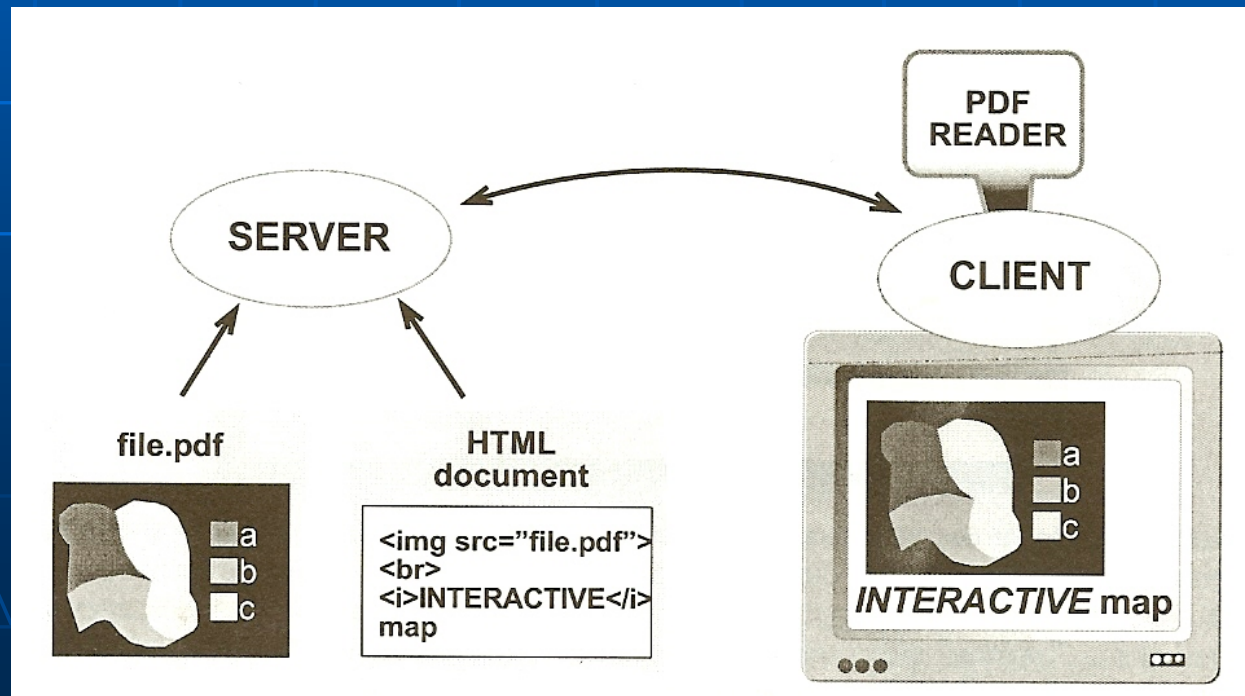
```
<html>
<title>Harokopio University</title>
<h1>HAROKOPIO UNIVERSITY</h1>
<p>Click on the image to see the buildings</p>
<p>


<map name="HUAMap">
<area href="central.jpg" shape="polygon"
      coords="285,228,293,288,420,283,423,228">
<area href="geo.jpg" shape="rect"
      coords="153, 292, 255, 403">
</map>

</p>
</html>
```

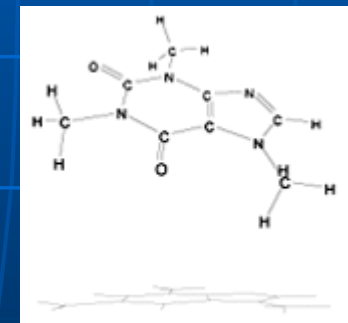
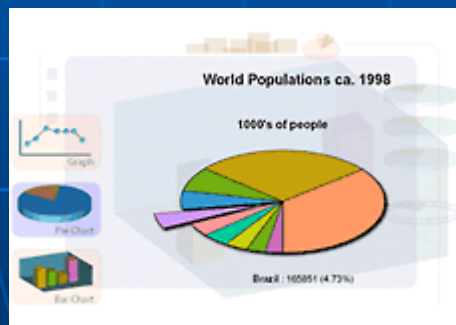
Interactive Maps

- Extending **client side** functionality
 - **Plugins**
 - Make the web browser capable to read and process additional formats



Interactive Maps

- Extending **client side** functionality
 - **Plugins – SVG Viewer**
 - eg., <http://www.adobe.com/svg/>



Interactive Maps

- Extending client side functionality
 - Plugins – SVG Viewer





SVG Visual Building Search

find

Select Building

West Tower

East Tower

Select Floor

ELEVATORNO. 1

SVG
ENABLED



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find

13th Floor, West Tower, San Jose

W-13
San Jose

Select Building

West Tower

East Tower

Select Floor

16 17 18

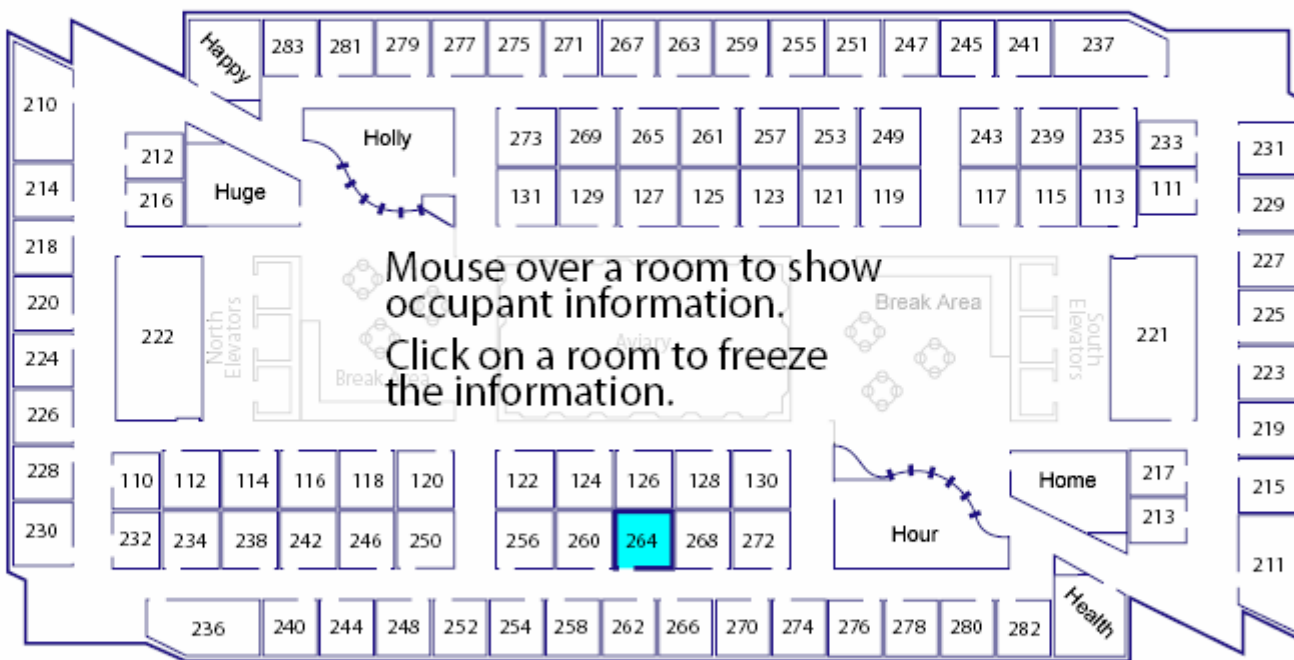
13 14 15

10 11 12

7 8 9

6

ELEVATOR NO. 1



Name

Chase Myer

Email

CMyer

Phone Number

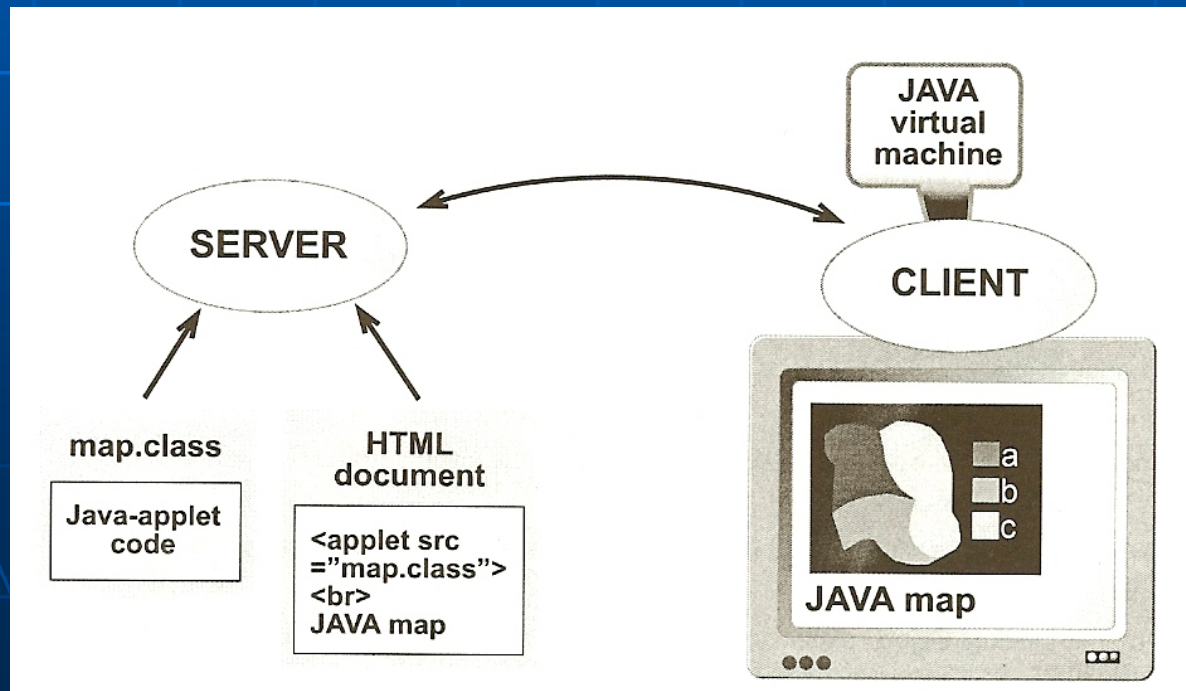
408-555-1212

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

Adobe Studio Human Resources

Interactive Maps

- Extending **client side** functionality
 - **Java + JavaScript**
 - The functionality varies ...
 - from very simple button interactivity
 - to a sophisticated mapping environment



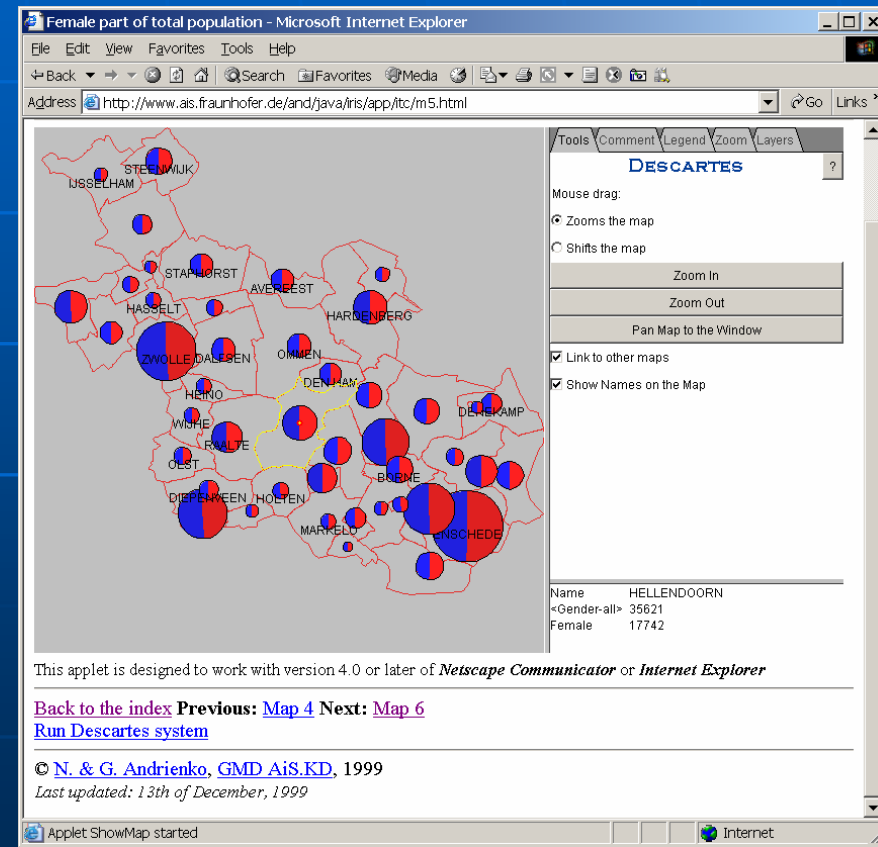
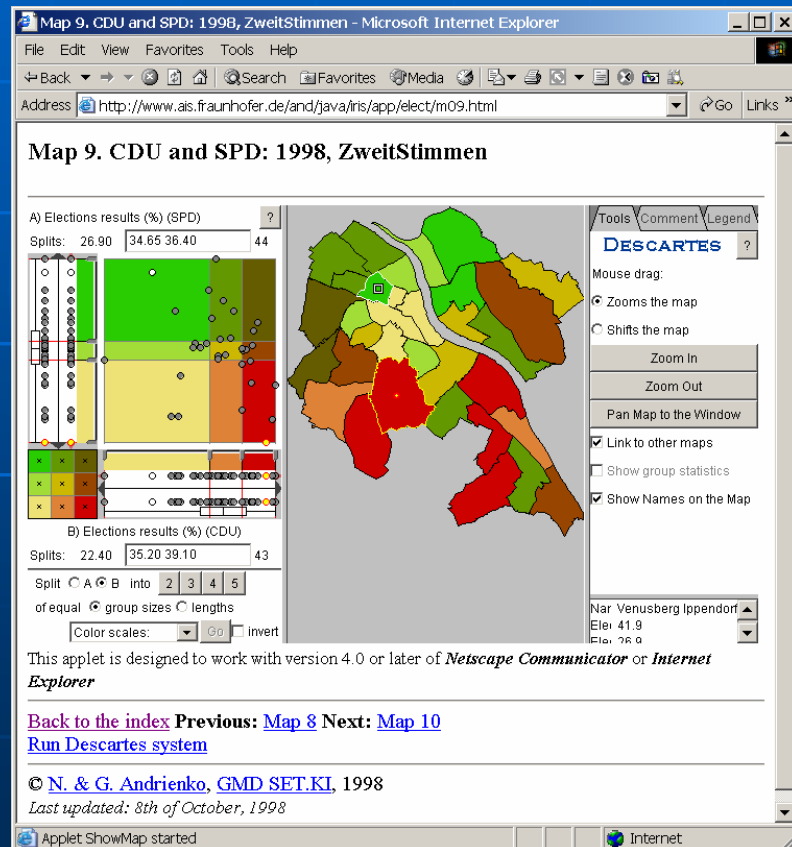
Example Applets:

Election results in the city of Bonn

<http://www.ais.fraunhofer.de/and/java/iris/app/elect/indexm.html>

Overijssel (NL) demographic information

<http://www.ais.fraunhofer.de/and/java/iris/app/elect/indexm.html>

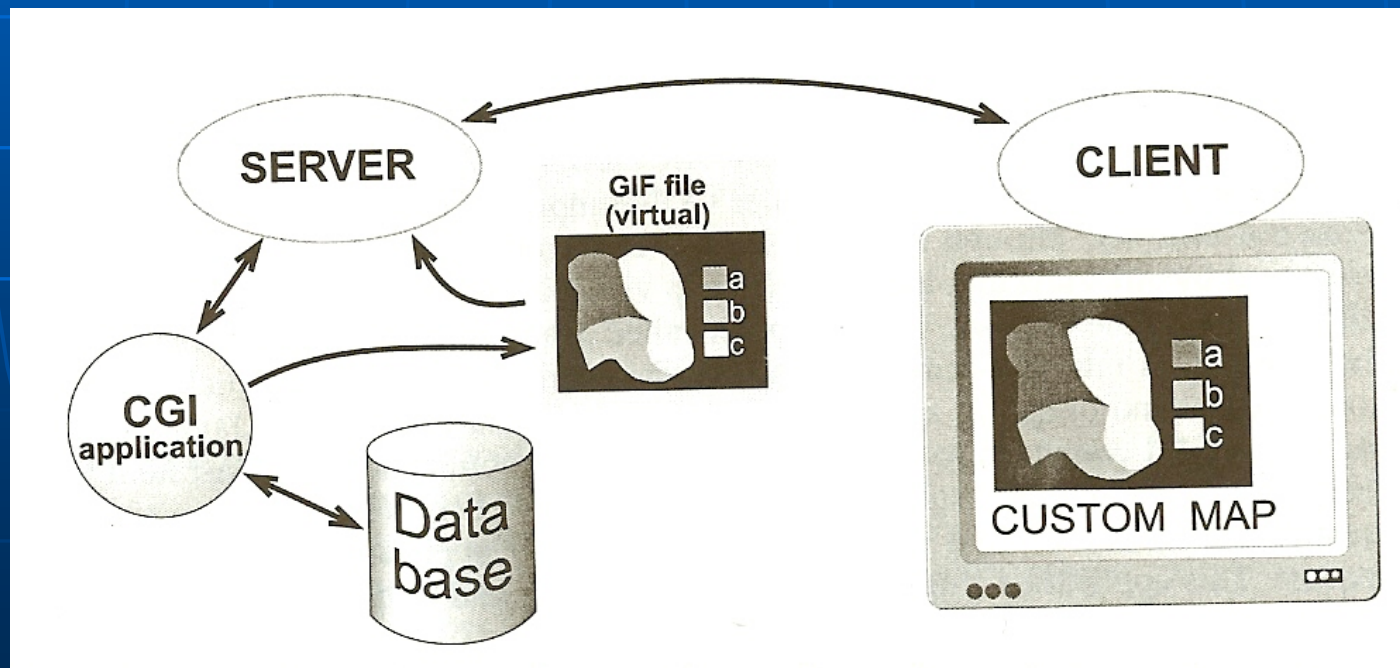


Interactive Maps

- Extending server side functionality

- **Common Gateway Interface (CGI)**

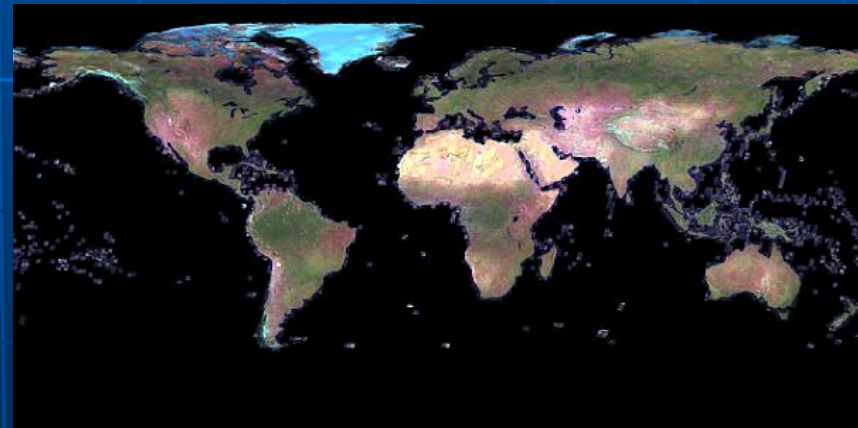
e.g., <http://carto.server.gr?doThis¶meter1¶meter2>



Interactive Maps

- Extending server side functionality
 - Common Gateway Interface (CGI)

```
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
```



Interactive Maps

- Extending server side functionality



The Atlas of Canada - Toporama – Topographic Maps - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://atlas.nrcan.gc.ca/site/english/maps/topo/map>

Toporama – Topographic Maps

Advanced Search
Explore Our Maps
 Environment
 People & Society
 Economy
 History
 Climate Change
 Freshwater
 Health
 Reference Maps
 Map Archives
 Topographic Maps
Learning Resources
 Lesson Plans
 Facts About Canada
 All Resources
Data & Services
 Wall Maps
 Free Data
 Web Services

Climate
 Ecology
 Forests
 Forest Fires
 Geology
 Hydrology
 Land
 Natural Hazards
 Sea Ice

Search using Place and Feature Names
 Enter name:

Advanced Search
Search using Topographic Map Sheet Number
 Enter map number:
 (for example, 31G or 31G5)

Search using Latitude and Longitude
 Enter Latitude (North only):
 (example: 45° 23' 59" or 45.3998)

Read more about this map
[Canada Map Office - Regional Distribution Centres](#)

0 590 1180 1770 2360 km Distance

Map Scale
 1:

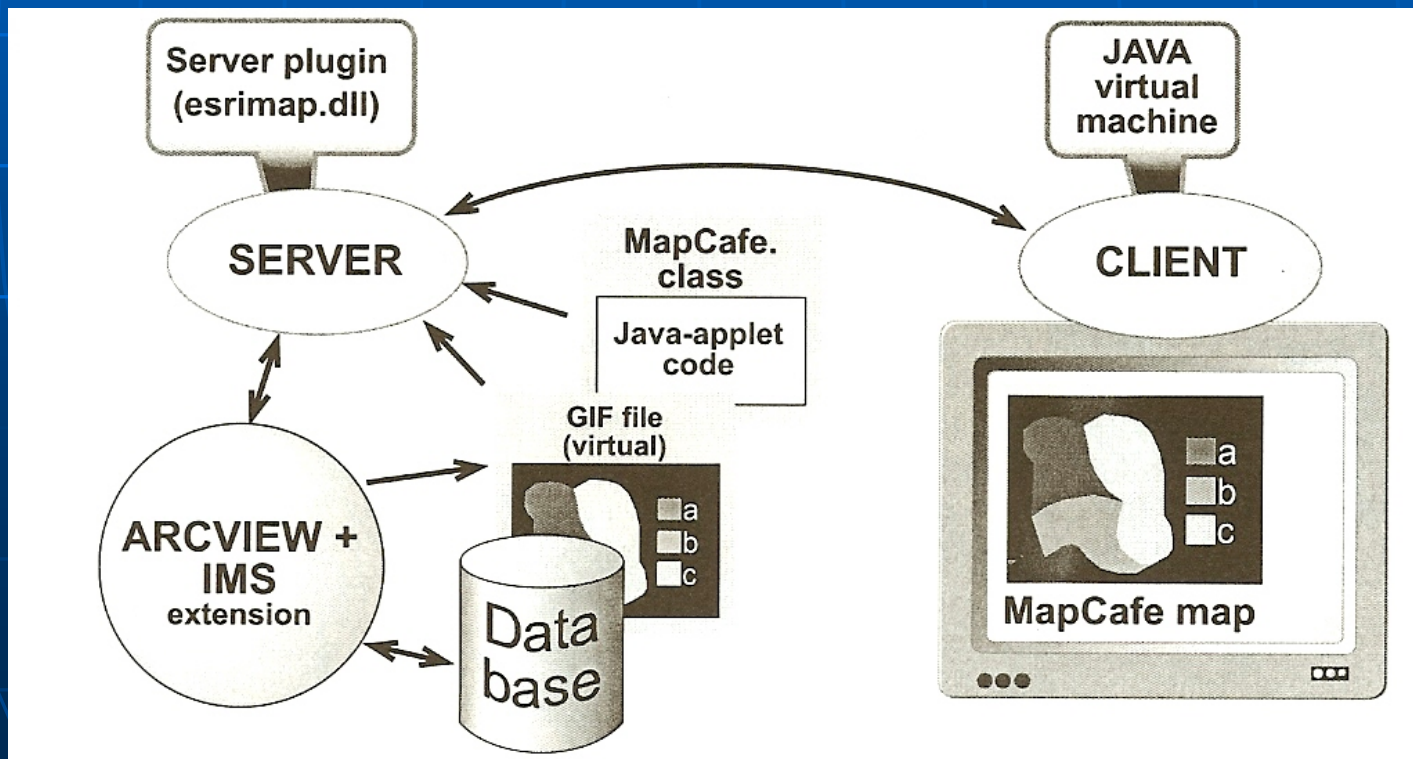
Primary Map Data:
 1:30 000 000 Atlas of Canada Base Map

[Map Sources](#)

<http://atlas.nrcan.gc.ca/site/english/maps/environment>

Interactive Maps

- Extending ...
 - both **server & client side** functionality
e.g., ESRI Arc/IMS



Interactive Maps

Δίκτυο Natura 2000 - Windows Internet Explorer

http://hermes.edpp.gr/website/Natura2000/viewer.htm

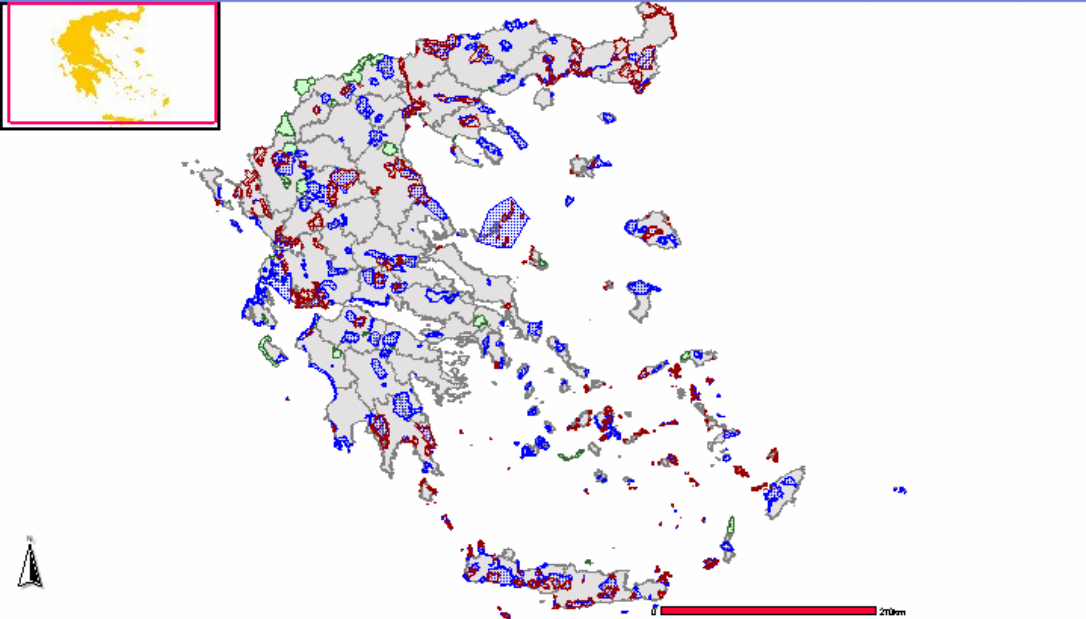
Αρχείο Επεξεργασία Προβολή Αγαπημένα Εργαλεία Βοήθεια

Google Go 43 blocked Check AutoLink Settings

Δίκτυο Natura 2000

Δίκτυο Natura 2000

Εθνικό Δίκτυο Πληροφοριών Περιβάλλοντος



Θεματικά Επίπεδα
Εμφανές Ενεργό

- Ζώνες Ειδικής Προστασίας (ΖΕΠ-SPA)
- Τόποι Κοινοτικής Σημασίας (ΤΚΣ-SCI)
- Τόποι χαρακτηρισμένοι ως ΤΚΣ και ως ΖΕΠ
- Νομοί

Ανανέωση Χάρτη

Μεγέθυνση

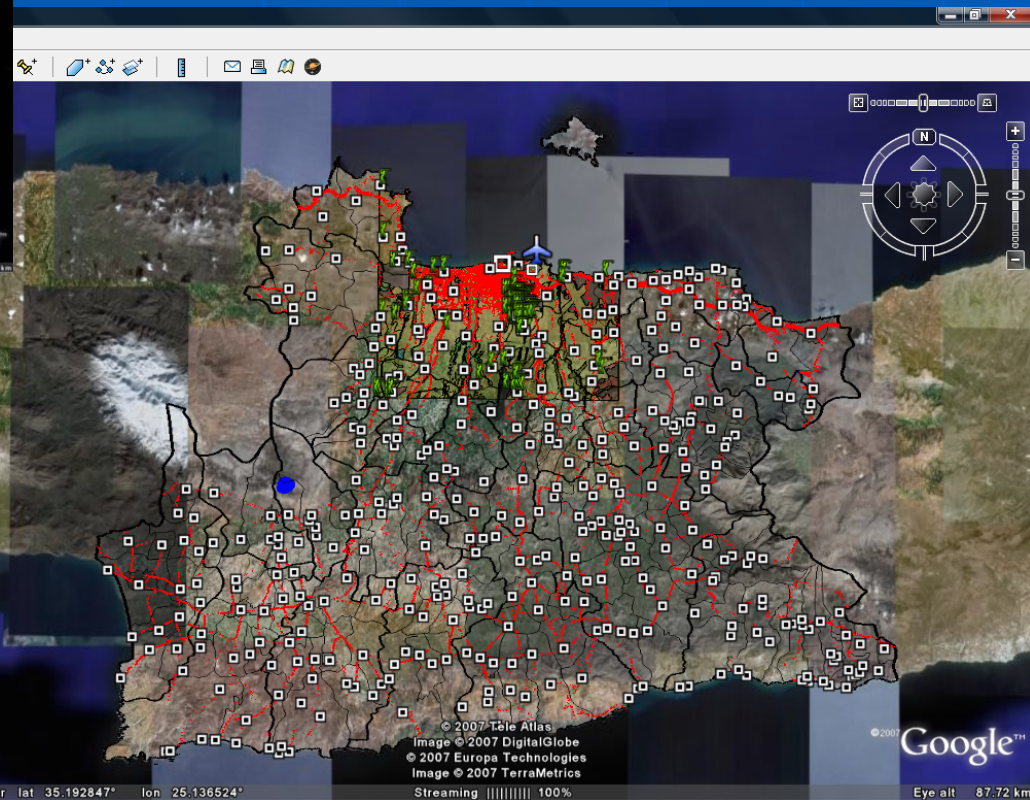
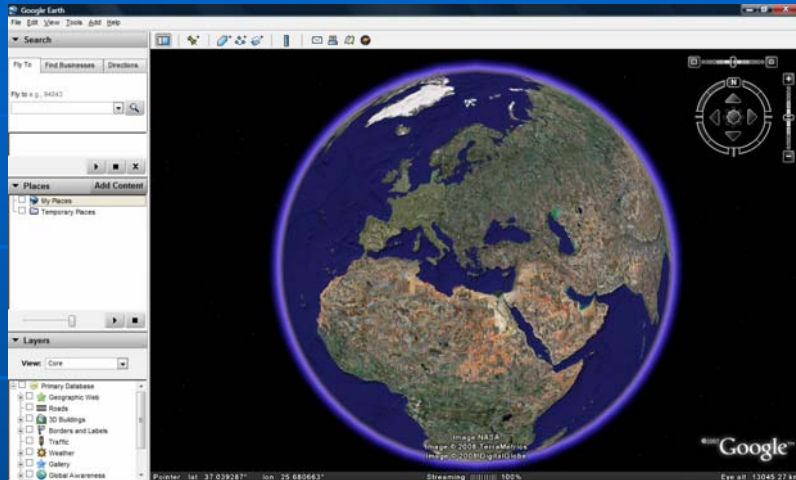
Διαδικτυακός σύνδεσμος στην εφαρμογή της Βάσης Δεδομένων

Ολοκληρώθηκε

Internet 100%

Interactive Maps

<http://earth.google.com/>





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Tutorial: Web Services for Mapping

Part I: Theory

1. Publishing Maps on the Web

2. XML-based languages for Geography and Mapping

- **GML – Geography Markup Language**
- **SVG – Scalable Vector Graphics**
- **KML – Keyhole Markup Language**

3. Web Services for Mapping

XML

- XML...
 - eXtensible Markup Language
 - Developed by the World Wide Web Consortium (**W3C**)
- Nowadays...
 - XML is widely used for **describing** and **exchanging** data

XML

- What is so **advantageous** about XML...
 - It is portable
 - it utilizes unicode
 - It is platform independent
 - It is human readable
 - it is a pure and editable text
 - It is extensible
 - extra info can be added to a format without breaking applications based on previous versions
 - It is well supported
 - A large number of off-the-self tools for processing XML exist

XML

- XML...
 - Has been built to support traditional applications (office and banking)
- What about applications involving **non-traditional** data ?
 - Other formats ... based on XML have been proposed
 - E.g.,
 - **GML** (Geography Markup Language) for transport and storage of geo-information
 - **CML** (Chemical Markup Language) for managing molecular information

Geographic Applications

- XML ...
 - has been adopted widely in geography
 - It is already a standard for geo-data sharing
- Main formats ...
 - **GML**
 - Geography Markup Language
 - **SVG**
 - Scalable Vector Graphics
 - **KML**
 - Keyhole Markup Language

Geography Markup Language (GML)

- An **XML-based** encoding standard
 - for transport and storage of geo-information
 - including both spatial and non-spatial features
- Developed by ...
 - the Open Geospatial Consortium – **OGC**
{ 270 companies, government agencies and universities }

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

Geography Markup Language (GML)

http://www.opengeospatial.org/



The screenshot shows the OGC website in a Windows Internet Explorer browser window. The address bar displays <http://www.opengeospatial.org/>. The page header includes the OGC logo, the tagline "Making location count", and navigation links for "OGC Home", "OGC Network™", "OGC User™", and "OGC Forum". A main navigation menu contains "About", "Standards", "Programs", "Press", "Events", "Implementing", and "Compliance".

The main content area is titled "Welcome to the OGC Website" and contains the following text: "The Open Geospatial Consortium, Inc.® (OGC) is a non-profit, international, voluntary consensus standards organization that is leading the development of standards for geospatial and location based services."

On the left side, there are several sections: "Areas of Interest" with links to Learn About OGC, Membership Benefits, Join OGC, OGC Standards, OGC Network™, OGC Public Forum, Registered Products, and Markets & Technologies; "Visit Our Members" featuring Northrop Grumman Information Technology TASC; and "OGC Member Portal Login" with a login form and a "Forgotten password?" link.

On the right side, there is a "Specifications" section listing various standards: Catalog Service (CAT), GML in JPEG 2000, Filter Encoding, Geography Markup Language (GML), OGC KML (KML), Sensor Model Language (SensorML), Sensor Planning Service (SPS), Styled Layer Descriptor (SLD), Symbology Encoding (Symbol), Transducer Markup Language (TML), Web Coverage Service (WCS), Web Feature Service (WFS), Web Map Context (WMC), Web Map Service (WMS), Web Service Common (WSC), and More... Below this is a "New Members" section listing SANY (Sensors Anywhere Project Consortium).

The "Recent News" section includes: "OGC Interoperability Days, 3-4 June 2008 in Potsdam", "OGC and buildingSMART alliance Release RFQ / CFP for AECOO Testbed", "OGC Announces Another Government Agency Chooses OGC Standards", "OGC Approves KML as Open Standard", and "More...".

The "Upcoming Events" section includes: "OGC Technical Committee Meeting - Potsdam, Germany", "OGC InteroperabilitatsTag", and "More...".

The "Current Requests and Initiatives" section includes: "OGC and buildingSMART alliance Release RFQ/CFP for AECOO Testbed" and "OGC Seeks to Hire IT Director".

Geography Markup Language (GML)

■ GML versions ...

- Initial release: GML specification
 - based on DTD; not used anymore
- Feb. 2000: GML2 specification
 - based on XMLSchema
- Current (since 2003): **GML3** specification
 - based on XMLSchema; includes spatial relationships, 3D geometry, and time

Geography Markup Language (GML)

- GML represents the **content**...
 - An important distinction should be made between...
 - geographic data encoded in GML (the content) and
 - their visualization (the presentation)
 - Similarly to ...
 - XML and HTML
 - XML is helping the Web to clearly **separate content from presentation**
 - GML will do the same in the world of geography!

Geography Markup Language (GML)

- GML is **Text**...
 - Like XML encoding...
 - GML represents geo-info in the form of **text**
 - Some year ago...
 - This might be censurable
 - Today...
 - This is desirable!
 - Text has advantages
 - Easy to inspect / Easy to change
 - Text formats for geography...
 - have been employed in the past (e.g., SAIF, VRML)

Geography Markup Language (GML)

- What is so different about GML ?
 - There are already...
 - Many encoding standards for GI
 - COGIF, SAIF, DLG, SDTS
 - Why GML ?
 - A simple text based encoding
 - Based on a common model of geography
 - OGC Abstract Specification
 - Developed and agreed by the vast majority of all GIS vendors
 - GML is based on XML

Geography Markup Language (GML)

- GML is based on XML (advantage...)
 - XML provides a method to verify data integrity
 - XMLSchema or DTD
 - XML can be read and edited using a simple text editor
 - Also several XML editors exist (e.g., XML Spy)
 - A large number of XML languages already available
 - e.g., XML-QL, XSL
 - XML is easy to transform
 - using XSLT or any programming language (Java, C++)
 - XML is a widely adopted public standard
 - A wide variety of commercial/free ware tools for XML exist
 - This leads to an **open (geographic) information**

Geography Markup Language (GML)

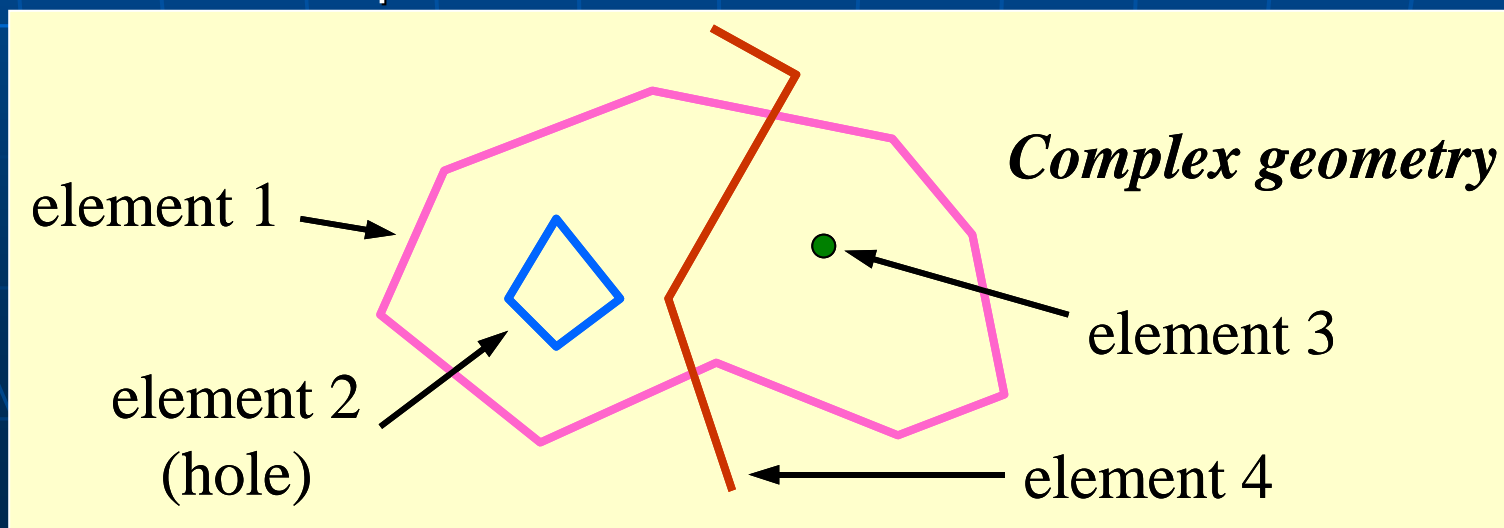
- GML Encodes Geographic Features
 - GML is based on...
 - The OGC abstract model of geography
 - Feature = Entity
 - A list of properties and geometry
 - Feature Property
 - Usual Name / type / value description
 - Feature Geometry
 - Basic building blocks
 - points, lines, curves, surfaces and polygons
 - Current version
 - 3D geometry / topological relationships / Time

Geography Markup Language (GML)

- GML Encodes Geographic Features
 - GML encoding allows ...
 - Quite complex features
 - A feature can be ...
 - Composed of other features
 - Example...
 - A Railway Station (RS)
 - is a single feature
 - composed of other features
 - Platforms
 - Ticket halls
 - Bus and taxi ways
 - Cafeterias and restaurants

Geography Markup Language (GML)

- GML Encodes Geographic Features
 - Same applies to geometry
 - A geometrically complex feature
 - composed of many geometric elements
 - Points / Line strings / Polygons
 - Example...



Geography Markup Language (GML)

■ GML Encodes Feature Geometry

```
<MiddleSchool ID ="145I" >
  <extentOf
    <Polygon srsName="epsg:27354" >
      <outerBoundaryIs>
        <LinearRing>
          <coordinates>
            491888.99,5458045.99 491904.72,5458044.91
            491908.42,5458064.58 491924.61,5458064.33
            491925.62,5458079.59 491977.66,5458120.36
          </coordinates>
        </LinearRing >
      </outerBoundaryIs>
    </Polygon>
  </extentOf>
</MiddleSchool >
```

Geography Markup Language (GML)

■ GML Encodes Feature Properties

```
<MiddleSchool ID ="145I" >  
  <description>Balmoral Middle School</description>  
  <NumStudents>987</NumStudents>  
  <NumFloors>3</NumFloors>  
  <extentOf  
    <Polygon srsName="epsg:27354">  
      <outerBoundaryIs>  
        <LinearRing>  
          <coordinates>  
            ...  
          </coordinates>  
        </LinearRing >  
      </outerBoundaryIs>  
    </Polygon>  
  </extentOf>  
</MiddleSchool >
```

Properties
(other than geometry)

Geography Markup Language (GML)

- GML Feature Collections
 - GML2, GML3 are based on XML1.0
 - XML1.0 uses ...
 - A feature collection as the basis of its document
 - Feature Collection is ...
 - A collection of features
 - Together with an envelop (it bounds features)
 - A collection of properties
 - They apply to the feature collection
 - An optional list of Spatial Ref. System Definitions
 - A Feature Collection ...
 - Can contain other Feature Collections

Geography Markup Language (GML)

- GML Encodes Spatial Ref. Systems
 - GML3 incorporates ...
 - An extensible earth based Spatial Ref. System
 - The main Projection and Geocentric Ref. Systems in use
 - The encoding scheme allows for ...
 - User defined units and Ref. System parameters
 - Future versions of GML will provide ...
 - More flexible encodings to handle local coordinate systems (e.g, mile logging)

Geography Markup Language (GML)

- GML Encodes Spatial Ref. Systems
 - Although optional ... it is very valuable...
 - Clients can validate Server SRS
 - SRS description is an XML document
 - Client can handle data from different Servers
 - GML services that transform GML data from one SRS to another are required
 - Server (web site) can accommodate (store)
 - any number of SRS definitions and related data

Geography Markup Language (GML)

■ Schemas for Spatial Data

- A schema defines
 - The characteristics of a class of objects
- In XML
 - A schema defines how data is **marked up**
- GML3.0 is compliant with
 - XML Schema Candidate Recommendation
 - Published by OGC (2003)

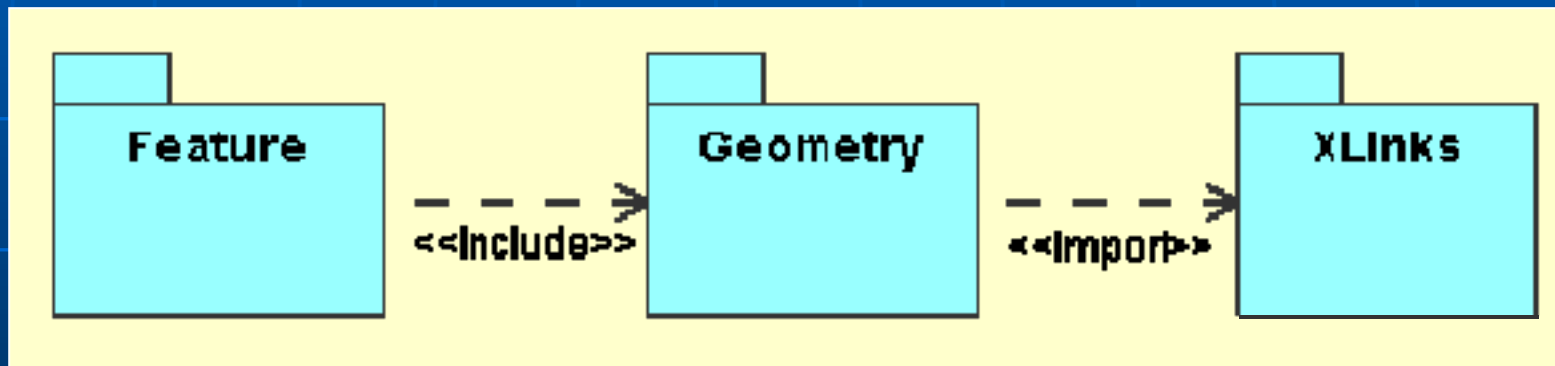
Geography Markup Language (GML)

■ GML Base Schemas

- Three base schemas
 - Geometry Schema (geometry.xsd)
 - Replaces the DTD of GML1.0
 - Feature Schema (feature.xsd)
 - It support feature collections (as feature types)
 - It includes common properties
 - fid (identifier)
 - name
 - description
 - XLink Schema
 - Provides Xlink attributes
 - Supports linking functionality

Geography Markup Language (GML)

- GML Base Schemas
 - Base schemas as packages



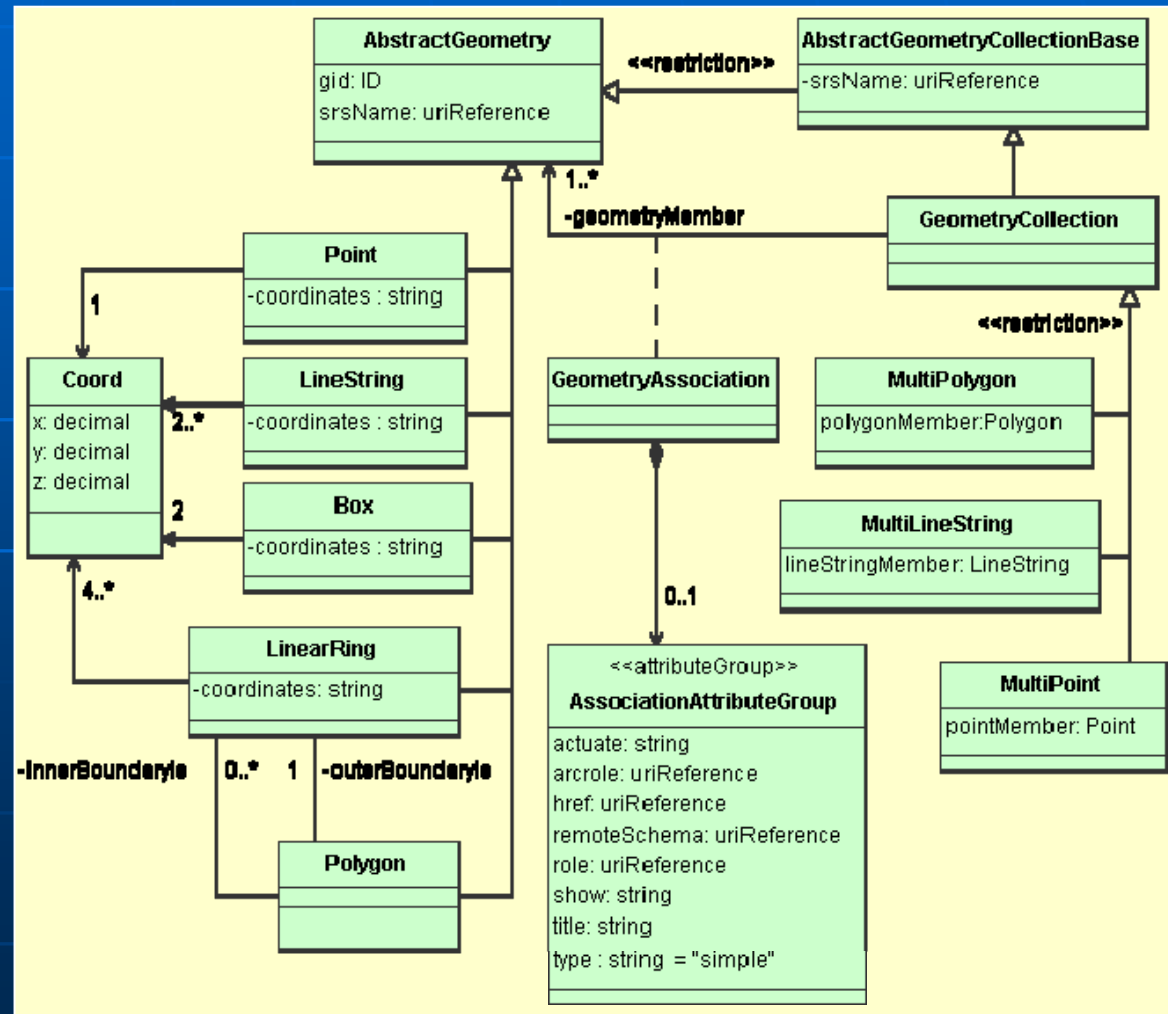
Geography Markup Language (GML)

■ GML – Geometry Schema

- It includes type definitions for ...
 - Abstract geometry elements
 - (multi) point / line / polygon
 - Complex type definitions
 - For the underlying geometry types
- It includes ...
 - The structures described in the OGC Abstract Specification (Topic 1: Feature Geometry)

Geography Markup Language (GML)

- GML
Geometry
Schema
(UML)



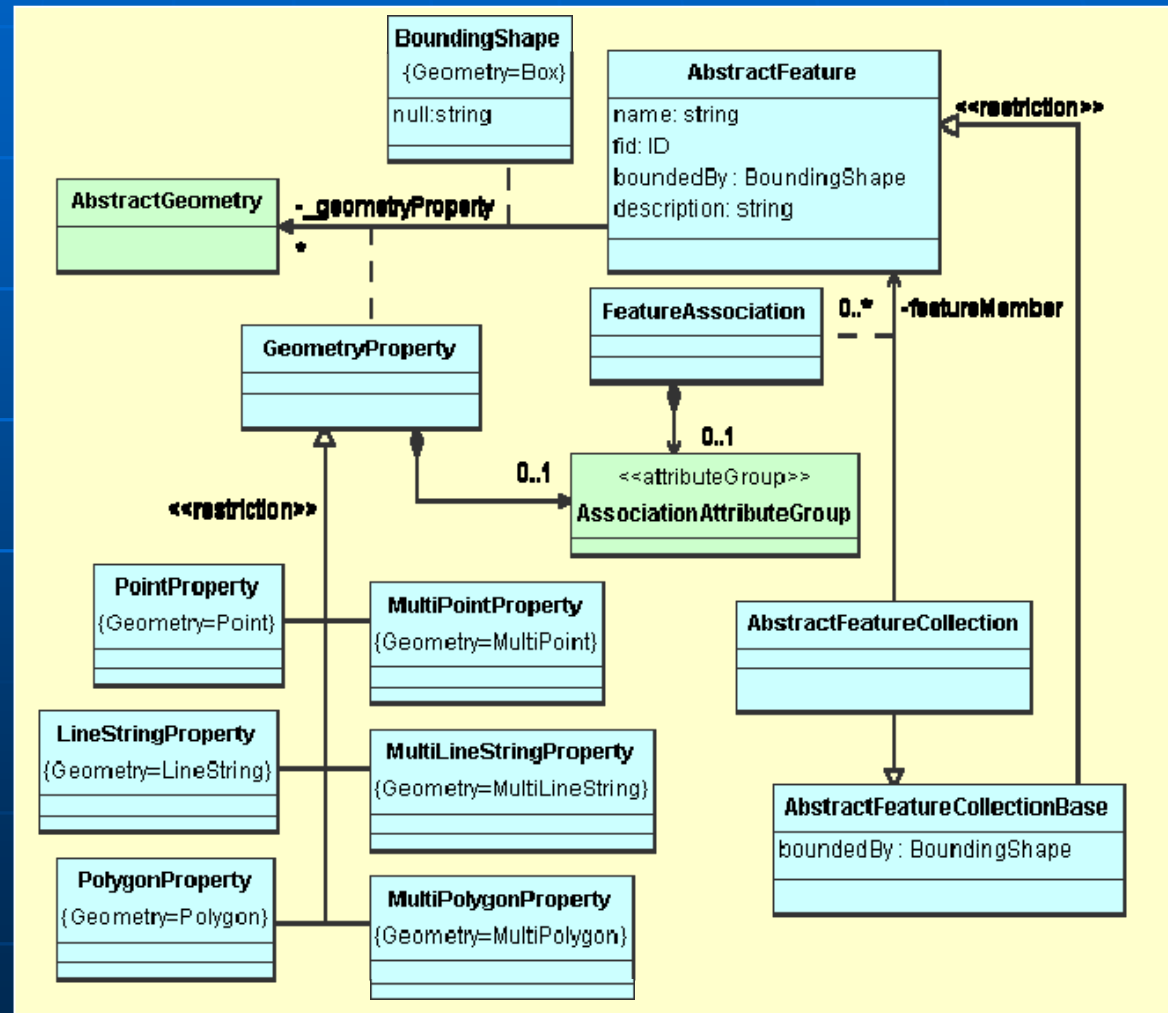
Geography Markup Language (GML)

■ GML – Feature Schema

- Uses ...
 - The <include> element
`<include schemaLocation="geometry.xsd"/>`
 - To bring in GML geometry constructs
- Hence ...
 - GML geometry constructs are available in defining feature types

Geography Markup Language (GML)

- GML Feature Schema (UML)



Geography Markup Language (GML)

- **GML Application Schemas**
 - The development of a schema for a ...
 - Particular domain (e.g., forestry)
 - Jurisdiction (e.g., France)
 - Information community
 - Incorporates the base GML schemas ...
 - Geometry schema
 - Feature schema
 - Xlink schema

Geography Markup Language (GML)

- Rules for GML **Application Schema**
 - Defines its own (new) feature types
 - They must be sub-typed from GML types
 - Defines new geometry properties
 - They must be sub-typed from GML types
 - Declares a target namespace
 - A mechanism to keep element names distinct
 - Imports schemas
 - The only means whereby GML constructs are brought in for use

Geography Markup Language (GML)

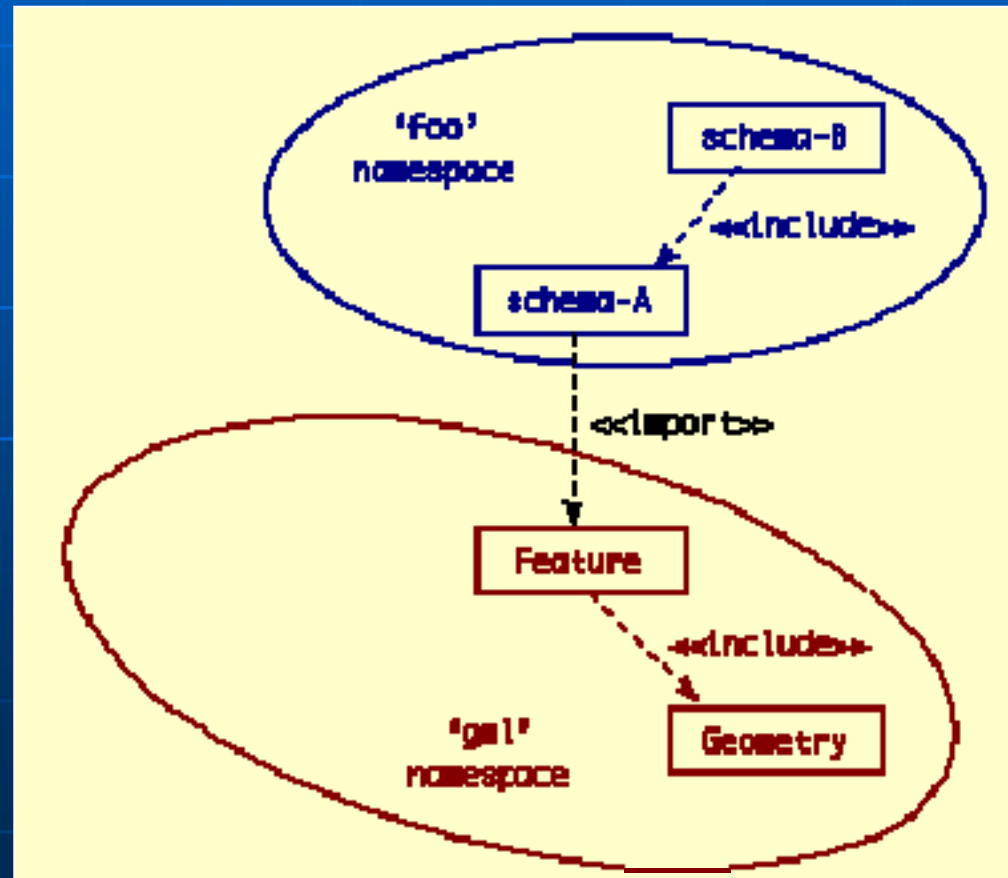
■ Rules for GML Application Schema

- Imports schemas

- `<import>`

VS

- `<include>`



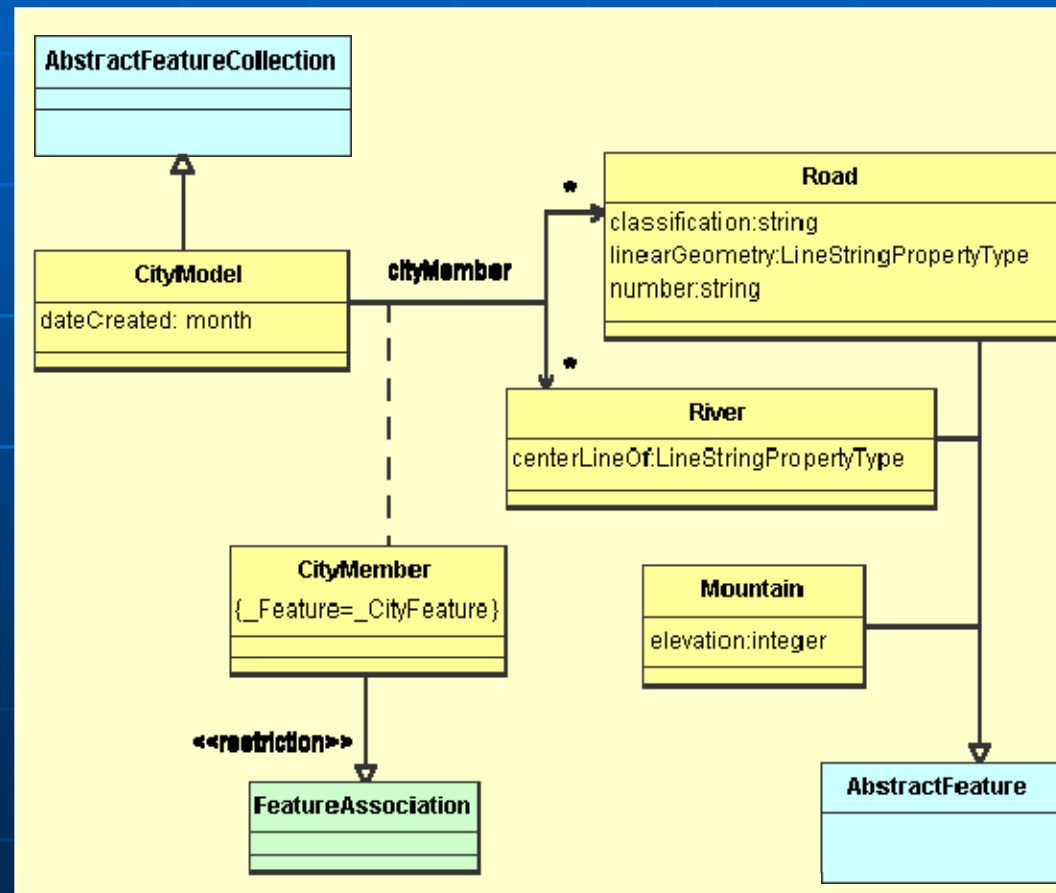
Geography Markup Language (GML)

- The Cambridge Example (Appl. Schema)
 - One Feature Collection
 - CityModel
 - String property
 - dateCreated (value: 'Nov 2000')
 - Geometry property
 - boundedBy (the bounding box) [expressed in an SRS]
 - Two features (containment relationship: 'cityMember')
 - RiverType
 - name: 'Cam', description: 'The River that runs...'
 - geometry: centerLineOf [bounding box SRS]
 - RoadType
 - description: 'M11', classification: 'motorway', number: '11'
 - geometry: linearGeometry [bounding box SRS]

Geography Markup Language (GML)

- The Cambridge Example (Appl. Schema)

(UML)



Making Maps with GML

- How to make a map with GML data ?
 - GML represents the **content**...
 - Therefore...
 - GML data must be styled into a suitable graphical presentation
 - **Map styling**...
 - The process of transforming GML data into the geometry of a visual presentation
 - A similar process is applied ...
 - When an **XML** document is transformed to a presentation format, such as **HTML**
 - ... using tools like **XSLT** (XML Transformation Language)

Making Maps with GML

■ Map styling...

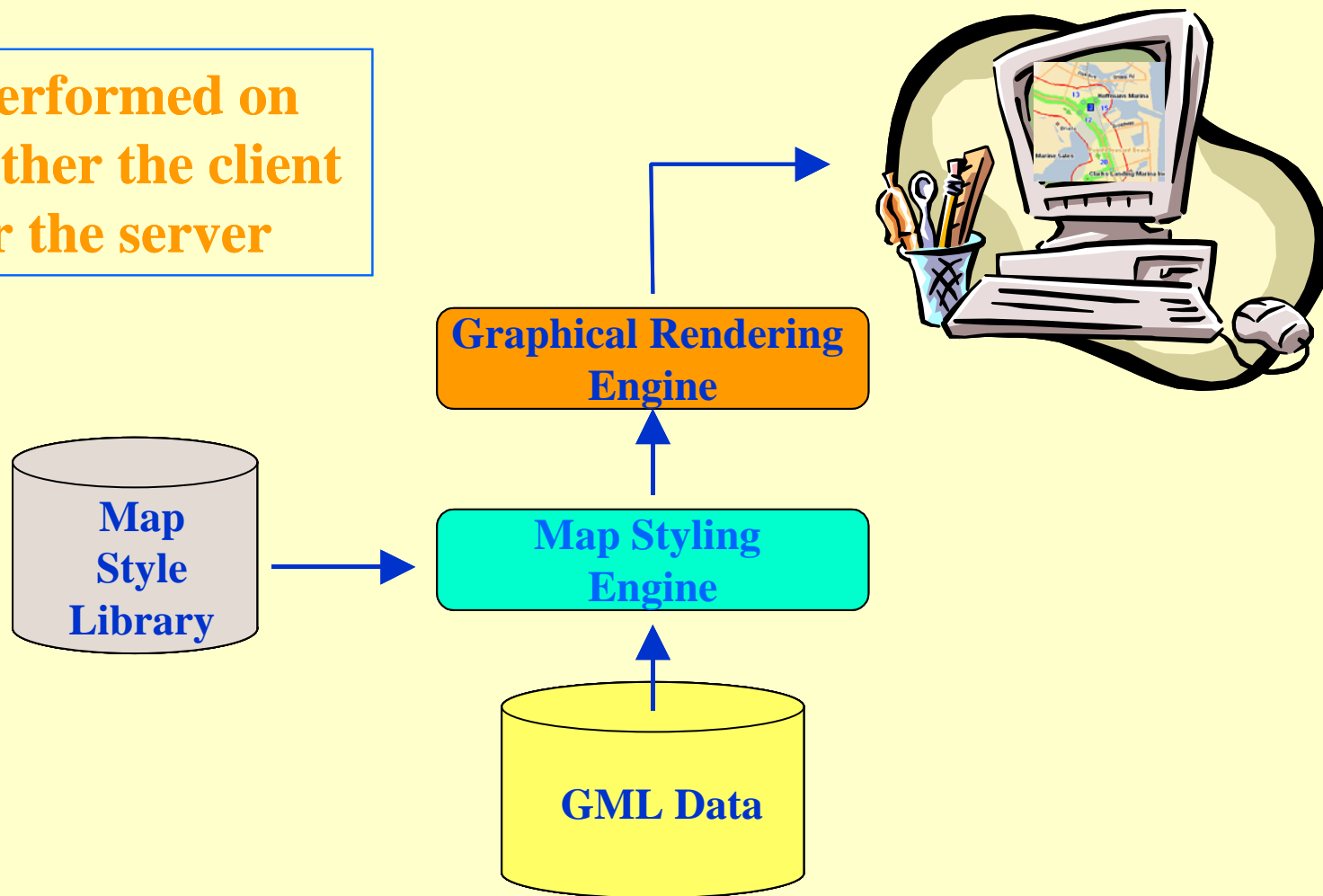
- The target of GML Map Styling can be of any format
- Usually, an XML graphical format is chosen
 - Such as SVG, VML, KML or X3D

■ Graphical rendering...

- The process of transforming the graphical representation of Map Styling process into a viewable image

Making Maps with GML

Performed on either the client or the server



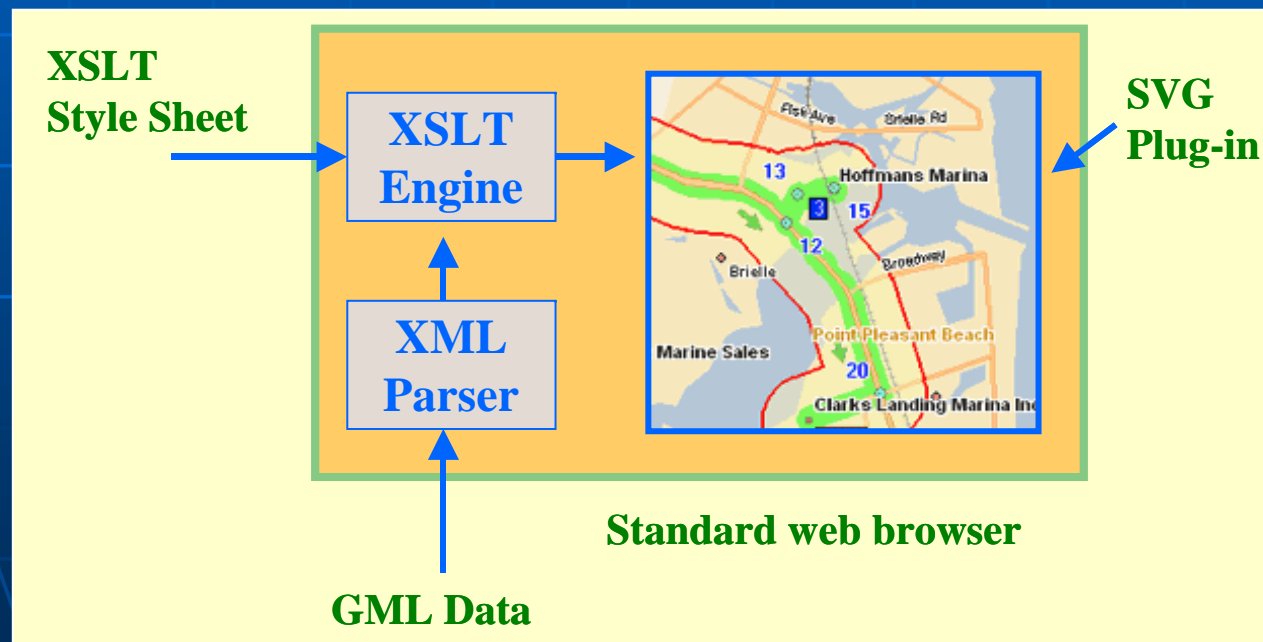
Making Maps with GML

■ Graphical renders...

- There are a variety available
- They support the different XML graphical formats
- They are ...
 - Either ... native to the web browser
 - E.g., Internet Explorer built in VML processor
 - Or ... distributed as plug-ins for many browsers
 - E.g., Adobe SVG Viewer
 - Or ... stand alone viewers
 - E.g., Java Applet SVG viewer, Google Earth

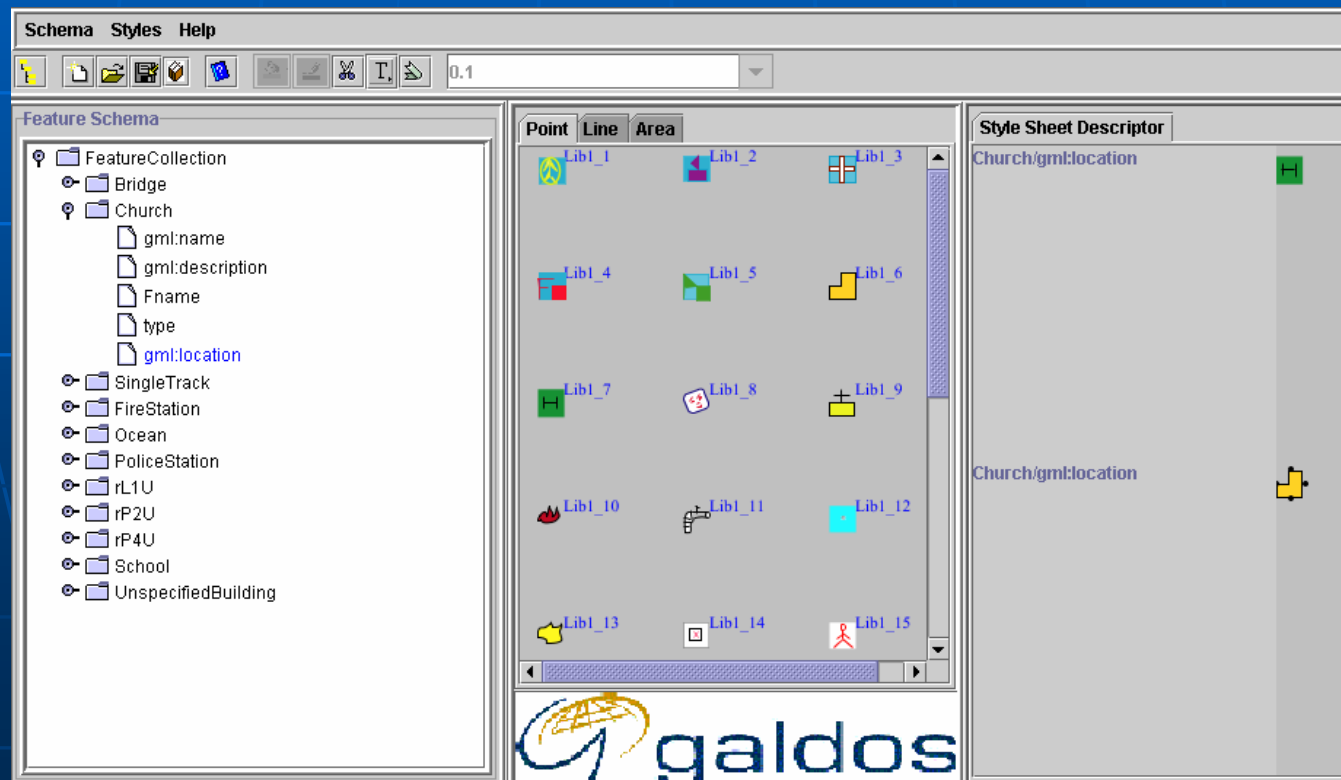
Making Maps with GML

- Making a Map with XSLT and SVG ...
 - (Galdos Systems Inc)



Making Maps with GML

- Map Style Editor ...
 - (Galdos Systems Inc)



Making Maps with GML

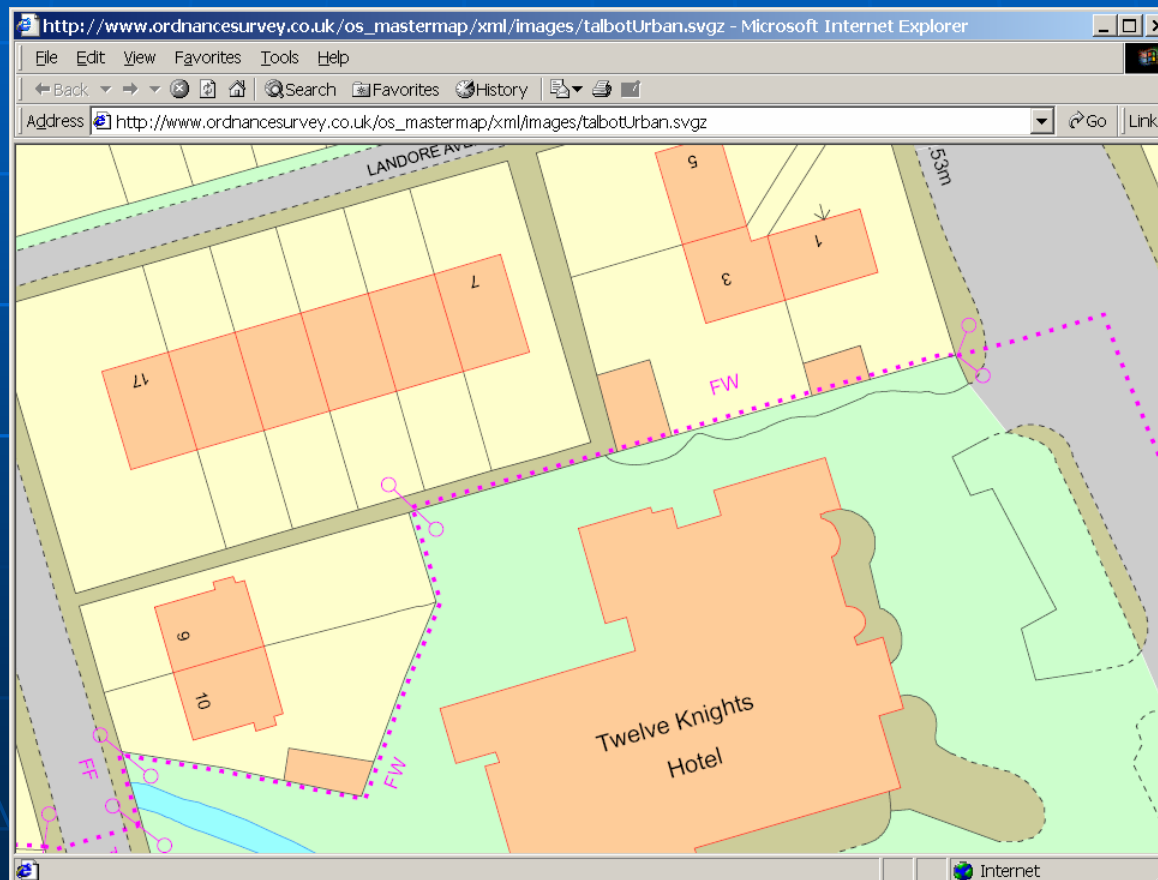
- StruMap DNF Viewer

- Displays Map files in GML
- DNF (Digital National Framework) from **Ordnance Survey, U.K.**
- The viewer supports ...
 - The display of features using appropriate symbols
 - Zoom-in/-out utilities
 - Display of attribute values assigned to features
 - Selection of themes to be displayed
 - Measuring distances/coordinate values



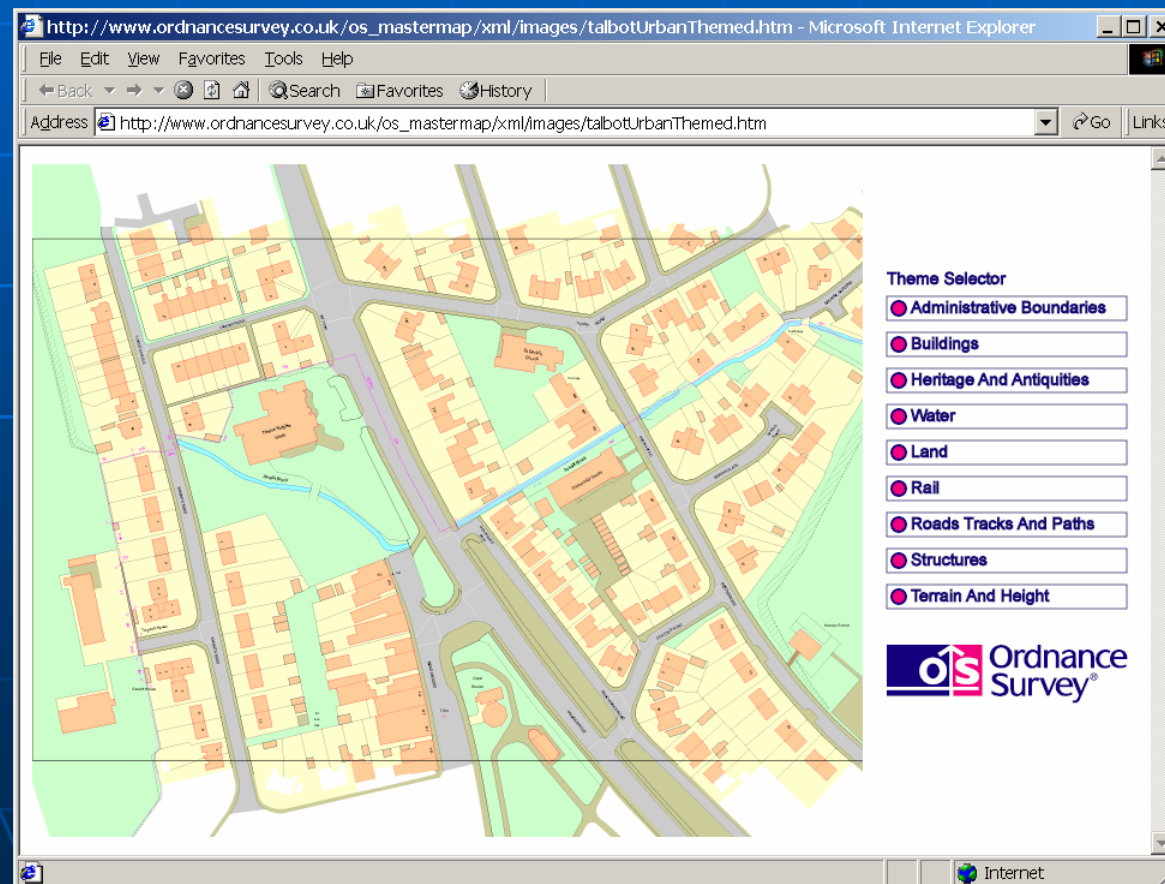
Making Maps with GML

- StruMap DNF Viewer



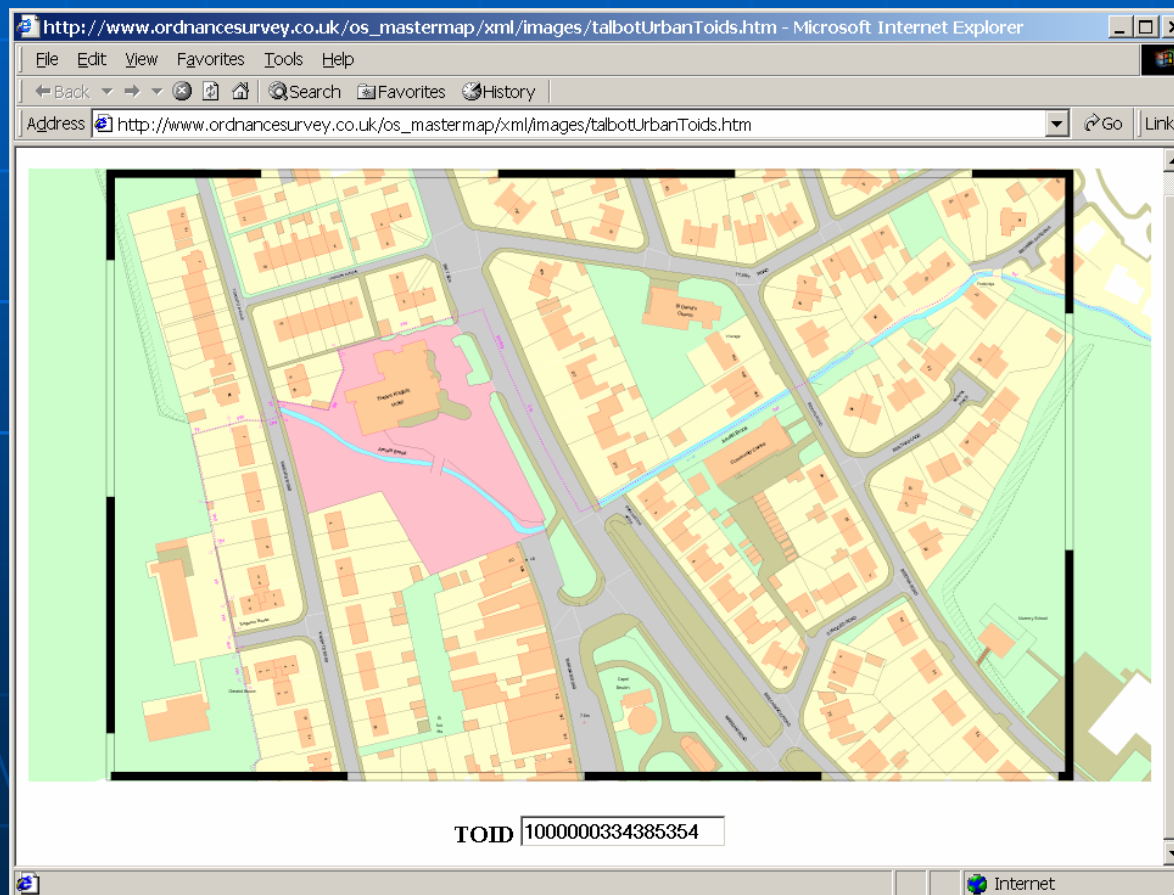
Making Maps with GML

- StruMap DNF Viewer (theme selector)



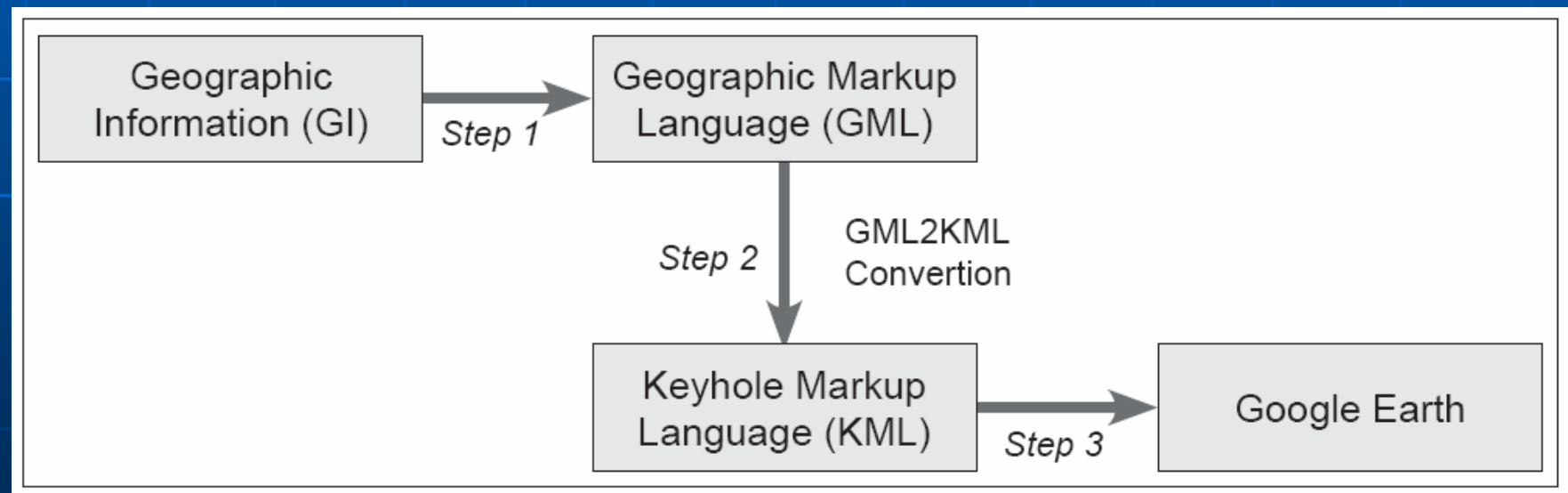
Making Maps with GML

- StruMap DNF Viewer (identifying features)



Making Maps with GML

- Many other options, e.g.,...
 - Convert GML to KML
 - Visualize the result in Google Earth



Making Maps with GML

- Convert GML to KML ...
 - OGR Simple Feature Library (OSGeo)
 - a C++ open source library
 - <http://www.gdal.org/ogr/index.html>

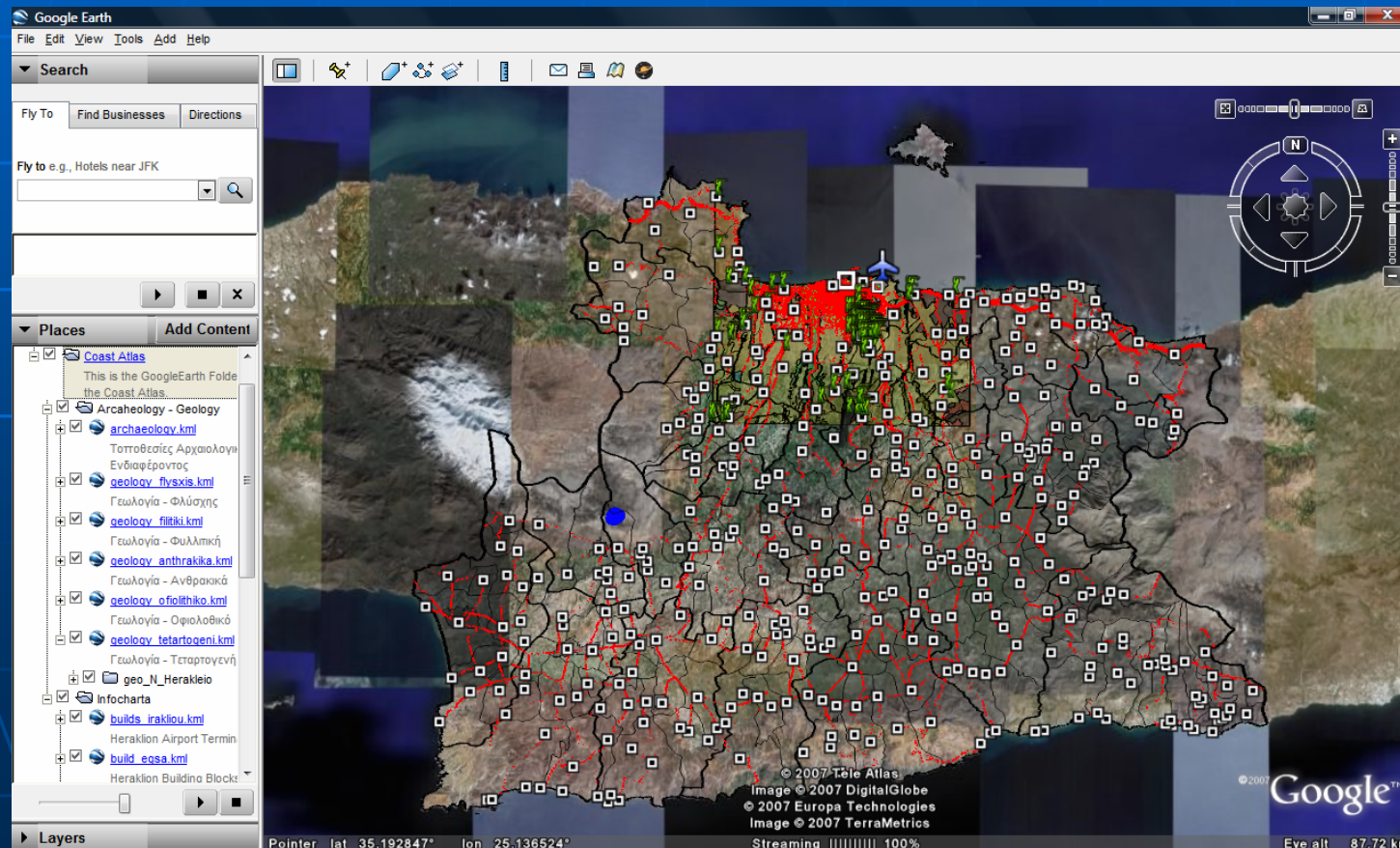
e.g.,

```
ogr2ogr -f "KML" .\infocharta\municipalities.kml  
        .\infocharta\municipalities.gml  
        -s_srs "epsg:2100"  
        -t_srs "epsg:4326"
```

```
ogr2ogr -f "KML" .\infocharta\towns.kml  
        .\infocharta\towns.gml  
        -s_srs "epsg:2100"  
        -t_srs "epsg:4326"
```

Making Maps with GML

- Convert GML to KML ...



Scalable Vector Graphics (SVG)

- SVG ...
 - language for describing...
 - two-dimensional graphics and
 - graphical applications
 - it is based on the XML standard
 - emphasis on the **visualization**
 - it describes...
 - **Content + Map Symbols + ...**

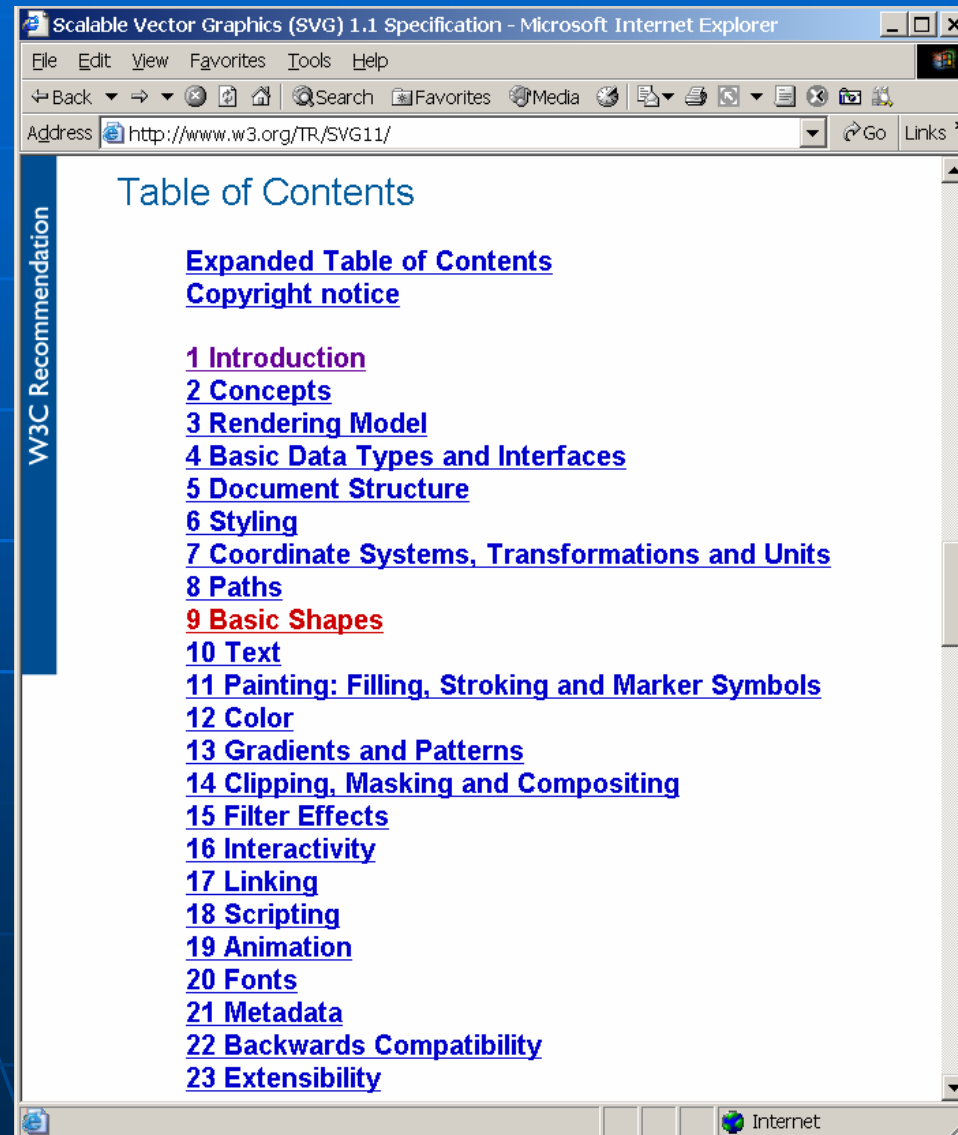
Scalable Vector Graphics (SVG)

- 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">
```

Scalable Vector Graphics (SVG)



Scalable Vector Graphics (SVG) 1.1 Specification - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Copy Paste Close Stop Reload Links

Address <http://www.w3.org/TR/SVG11/> Go Links

Table of Contents

W3C Recommendation

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Internet

Scalable Vector Graphics (SVG)

svg workshop: brescia - Microsoft Internet Explorer

Address http://www.svgopen.org/2002/material/ws_mapping/brescia/05_legend/index.html

Brescia: Source <http://www.provincia.brescia.it/gis/>

on_mouse_over

poly attributes	legend
Community: Brescia	<input type="checkbox"/> below
Population 90011	<input type="checkbox"/> between
Density / km2 2071.7	<input type="checkbox"/> above

layer_on_off

<input checked="" type="checkbox"/> Communities (areas)	<input checked="" type="checkbox"/> Water
<input checked="" type="checkbox"/> Borders	<input checked="" type="checkbox"/> Streets
<input checked="" type="checkbox"/> City points	<input checked="" type="checkbox"/> City names

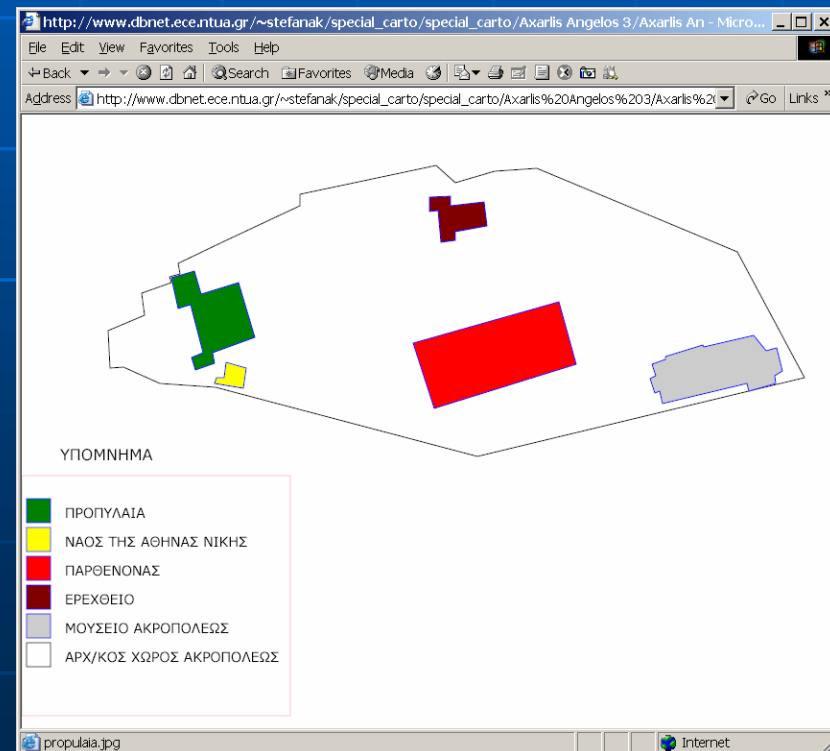
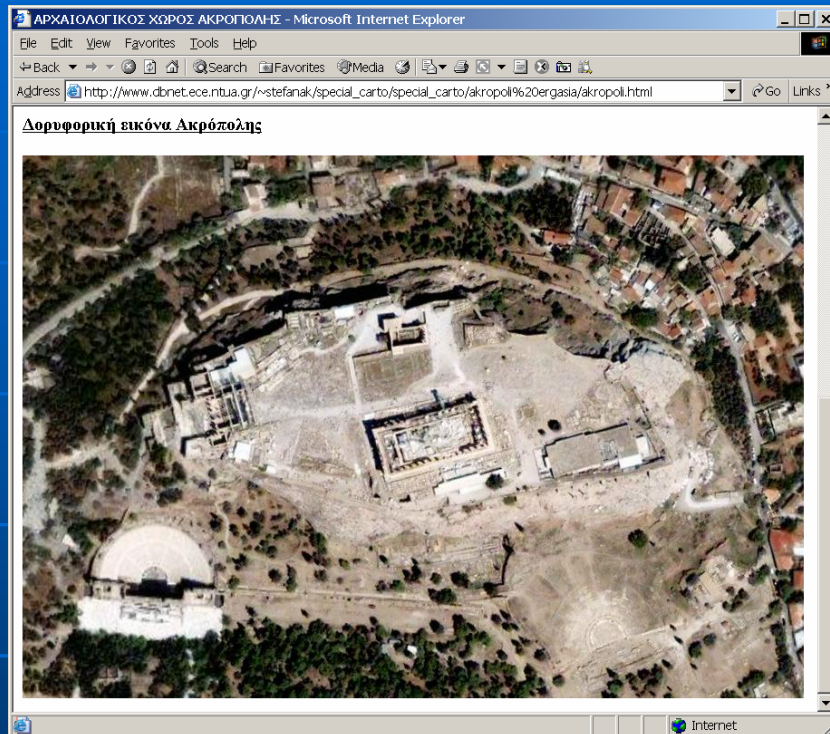
color_map

Variable	Threshold 1	Threshold 2
Population 2001 (female) in %	<input type="text"/>	<input type="text"/>

do_circle

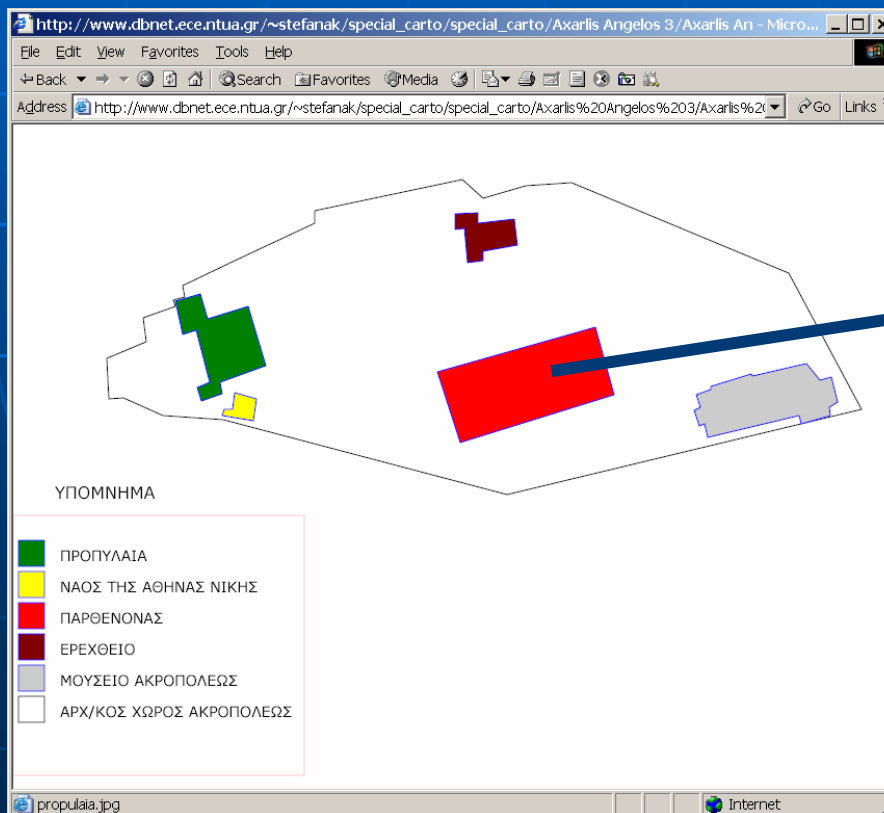
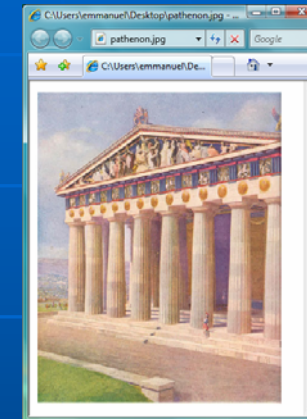
Variable	Threshold 1	Threshold 2	Scale
Population 2001 (total)	<input type="text"/>	<input type="text"/>	<input type="text"/>

Scalable Vector Graphics (SVG)



Scalable Vector Graphics (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>
```

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 - <http://www.adobe.com/svg>

Keyhole Markup Language (KML)

■ KML ...

- format to display geographic data in an Earth browser,
 - such as Google Earth, Google Maps, and Google Maps for mobile
- to be adopted by **OGC**
- it is based on the XML standard
 - emphasis on the **visualization**
- it describes...
 - **Content + Map Symbols + View point + ...**

Keyhole Markup Language (KML)

- A KML file can be created ...
 - with the Google Earth user interface, or
 - from scratch ...
 - use an XML or simple text editor to enter "raw" KML
- KMZ...
 - KML files and their related images (if any) can be compressed using the ZIP format into KMZ archives

Keyhole Markup Language (KML)

- How to share KML and KMZ files...
 - you can e-mail them,
 - host them locally for sharing within a private internet, or
 - host them publicly on a web server
- Earth browsers ...
 - such as Google Earth can display KML files
 - Just as web browsers display HTML files

Keyhole Markup Language (KML)

■ KML Specifications...

http://code.google.com/apis/kml/documentation/kml_tags_21.html

KML

KML 2.1 Reference

This section contains an alphabetical reference for all KML elements. The class tree for KML elements is shown below. In this diagram, elements to the right on a particular branch in the tree are *extensions* of the elements to their left. For example, Placemark is a special kind of *Feature*. It contains all of the elements that belong to *Feature*, and it adds some elements that are specific to the Placemark element.

Note: Click on an element name in this diagram to jump to its entry in the reference section.

Search KML 2.1

Search

- [<address>](#)
- [<AddressDetails>](#)
- [<altitude>](#)
- [<altitudeMode>](#)
- [<BalloonStyle>](#)
- [<begin>](#)
- [<bgColor>](#)
- [<Change>](#)
- [<code>](#)
- [<color>](#)

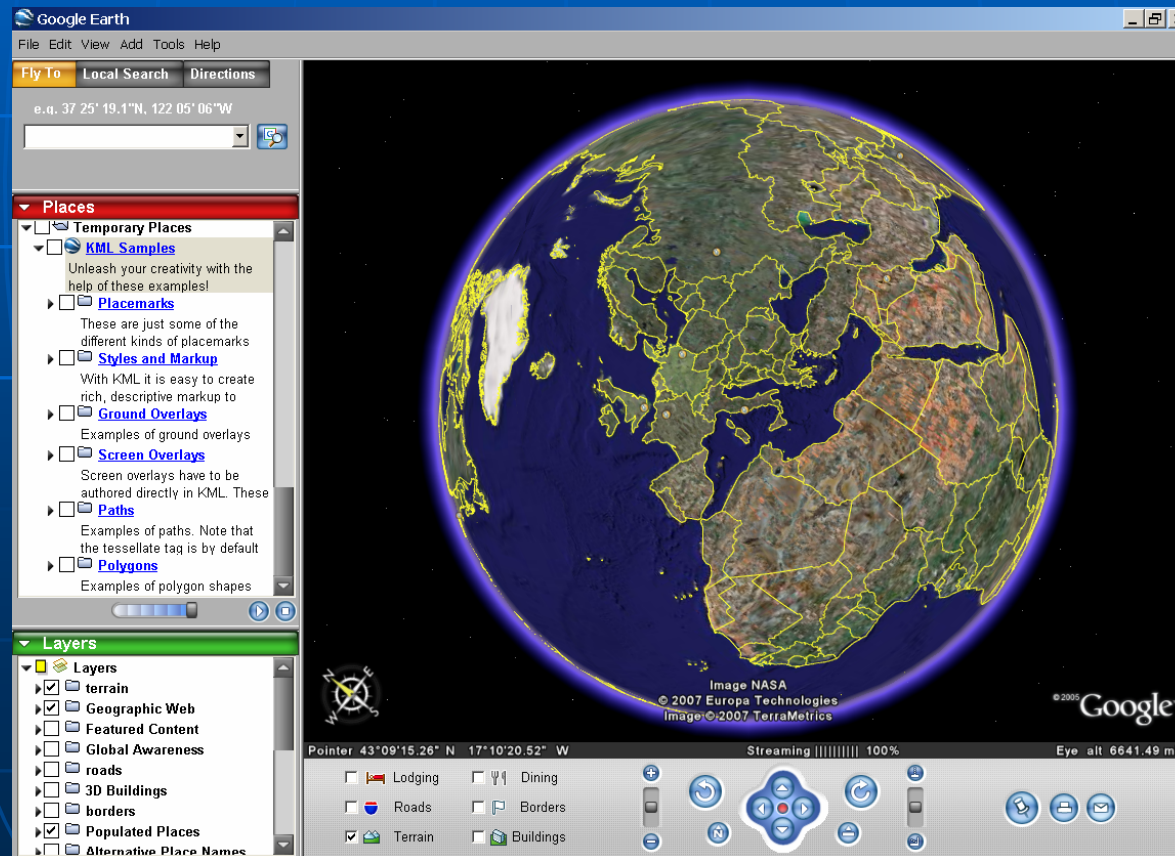
Class Tree:

- Object (has an id)
 - Feature
 - NetworkLink
 - Placemark
 - Overlay
 - ScreenOverlay
 - GroundOverlay
 - Container
 - Folder
 - Document
 - Geometry
 - Point
 - LineString
 - LinearRing
 - Polygon
 - MultiGeometry
 - Model
 - ColorStyle
 - LineStyle
 - PolyStyle
 - IconStyle
 - LabelStyle
 - StyleSelector
 - Style
 - StyleMap
 - TimePrimitive
 - TimeSpan

Keyhole Markup Language (KML)

■ KML Samples...

http://code.google.com/apis/kml/documentation/KML_Samples.kml



Fly To Local Search Directions

e.g. 37 25' 19.1"N, 122 05' 06"W

Places

- Temporary Places
 - KML Samples
 - Unleash your creativity with the help of these examples!
 - Placemarks
 - These are just some of the different kinds of placemarks
 - Styles and Markup
 - With KML it is easy to create rich, descriptive markup to
 - Ground Overlays
 - Examples of ground overlays
 - Screen Overlays
 - Screen overlays have to be authored directly in KML. These
 - Paths
 - Examples of paths. Note that the tessellate tag is by default
 - Polygons
 - Examples of polygon shapes

Layers

- Layers
 - terrain
 - Geographic Web
 - Featured Content
 - Global Awareness
 - roads
 - 3D Buildings
 - borders
 - Populated Places
 - Alternative Place Names



Pointer 43°09'15.26" N 17°10'20.52" W Streaming ||||| 100% Eye alt 6641.49 mi

<input type="checkbox"/> Lodging	<input type="checkbox"/> Dining	<input type="checkbox"/>
<input type="checkbox"/> Roads	<input type="checkbox"/> Borders	<input type="checkbox"/>
<input checked="" type="checkbox"/> Terrain	<input type="checkbox"/> Buildings	<input type="checkbox"/>

Navigation controls: zoom in (+), zoom out (-), home, compass, fly, refresh, and other navigation buttons.

Fly To Local Search Directions

e.g., 37 25' 19.1"N, 122 05' 06"W

Search input field with a magnifying glass icon

Places

- Temporary Places
 - KML Samples**

Unleash your creativity with the help of these examples!

 - Placemarks**

These are just some of the different kinds of placemarks

 - Simple placemark**

Attached to the ground. Intelligently places itself at
 - Floating placemark**

Floats a defined distance above the ground.
 - Extruded placemark**

Tethered to the ground by a customizable
 - Styles and Markup**

With KML it is easy to create rich, descriptive markup to
 - Ground Overlays**

Examples of ground overlays

Layers

- Layers**
 - terrain
 - Geographic Web
 - Featured Content
 - Global Awareness
 - roads
 - 3D Buildings
 - borders
 - Populated Places
 - Alternative Place Names



© 2007 Europa Technologies © 2005 Google

Pointer 37°25'20.02" N 122°05'02.25" W elev 13 ft Streaming 100% Eye alt 1261 ft

<input type="checkbox"/> Lodging	<input type="checkbox"/> Dining	<input type="checkbox"/>
<input type="checkbox"/> Roads	<input type="checkbox"/> Borders	<input type="checkbox"/>
<input checked="" type="checkbox"/> Terrain	<input type="checkbox"/> Buildings	<input type="checkbox"/>

e.g. 37 25' 19.1"N, 122 05' 06"W

Places

Temporary Places

KML Samples

Unleash your creativity with the help of these examples!

Placemarks

These are just some of the different kinds of placemarks

Simple placemark

Attached to the ground. Intelligently places itself at the height of the underlying terrain.

Floating placemark

Floats a defined distance above the ground.

Extruded placemark

Tethered to the ground, customizable.

Styles and Markers

With KML it is easy to create rich, descriptive markers.

Ground Overlays

Examples of ground overlays.

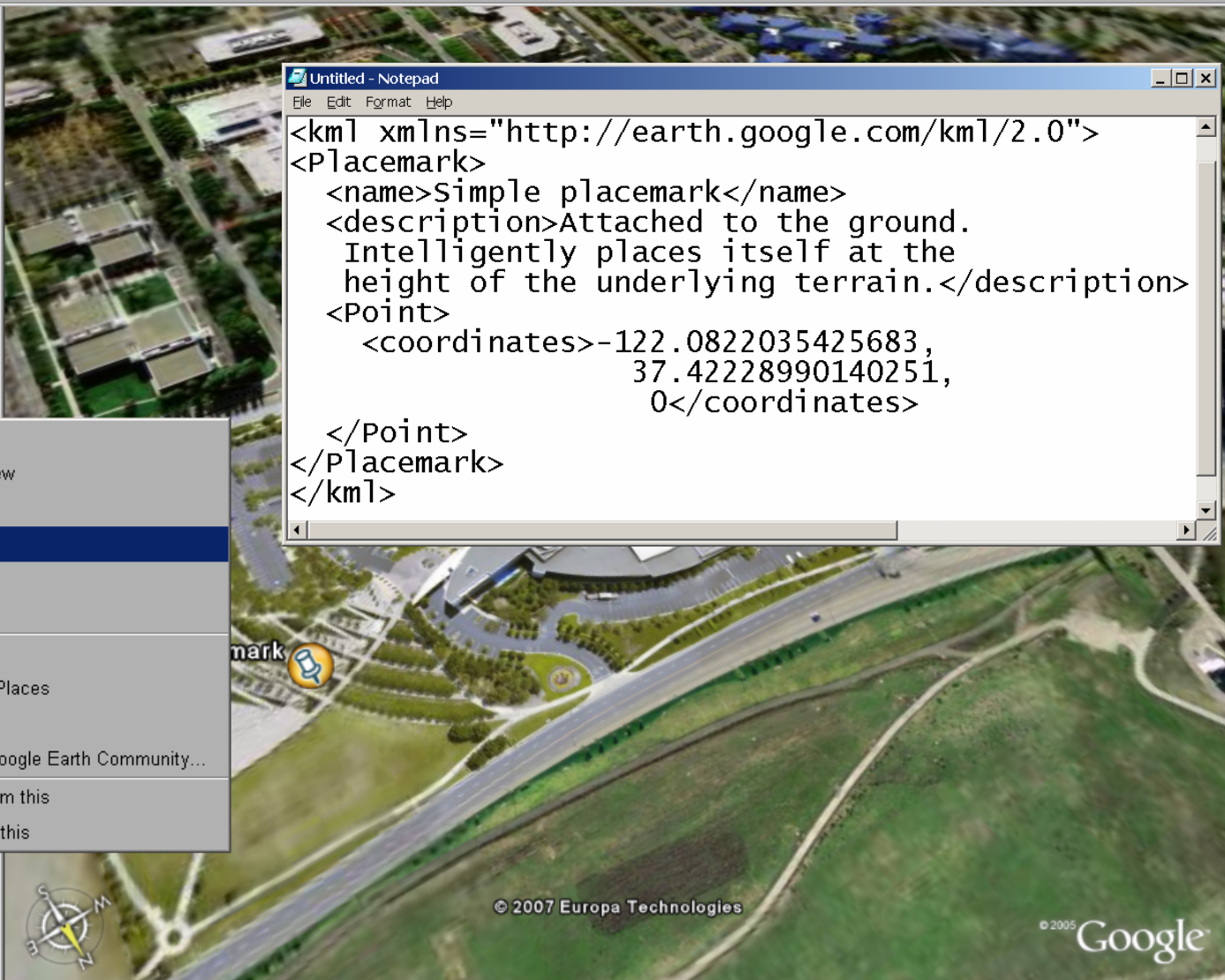
- Edit...
- Snapshot View
- Cut
- Copy
- Rename
- Delete
- Save As...
- Save To My Places
- Email...
- Share with Google Earth Community...
- Directions from this
- Directions to this

Layers

Layers

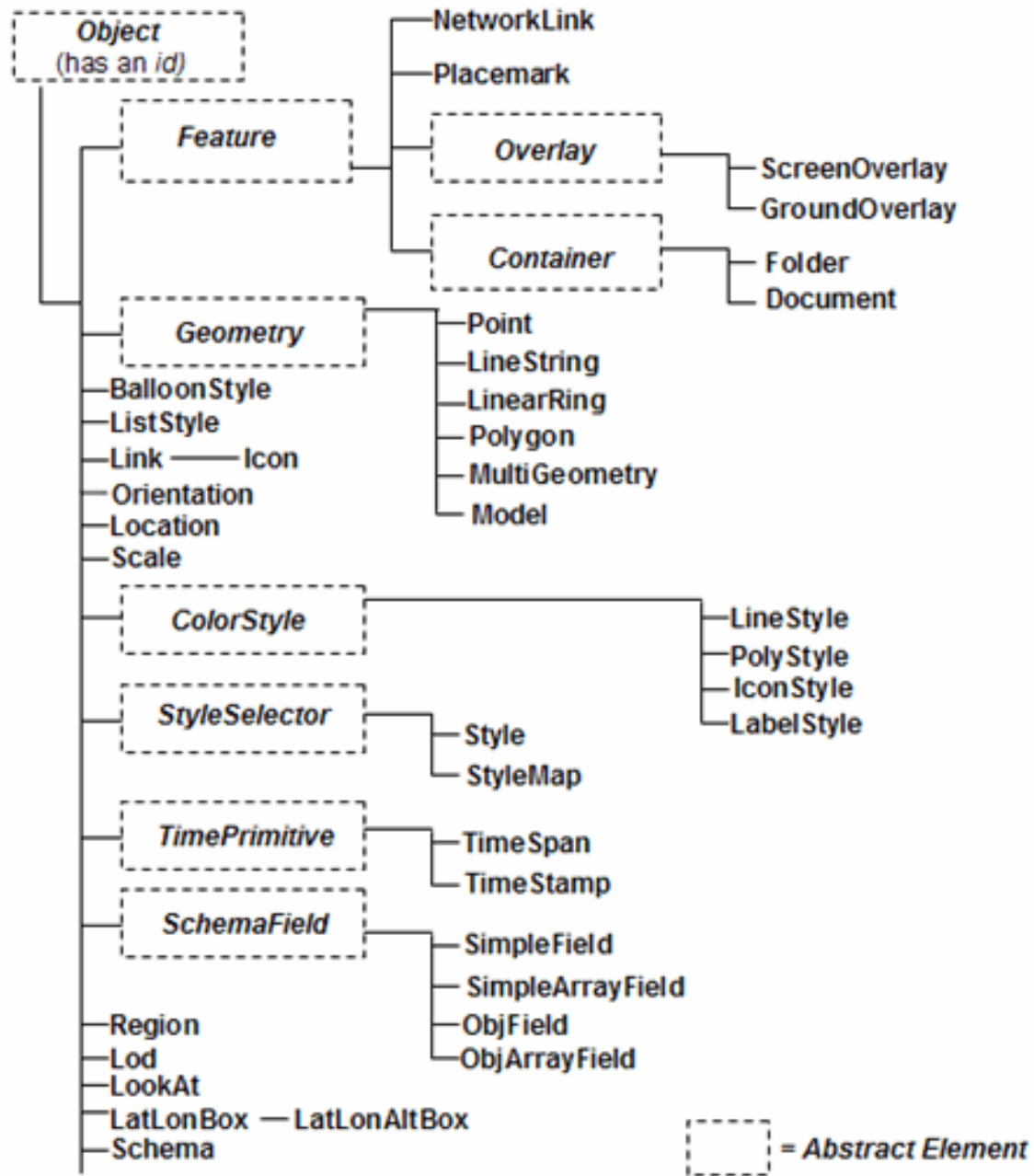
- terrain
- Geographic Web
- Featured Content
- Global Awareness
- roads
- 3D Buildings
- borders
- Populated Places
- Alternative Place Names

```
<kml xmlns="http://earth.google.com/kml/2.0">
<Placemark>
  <name>Simple placemark</name>
  <description>Attached to the ground.
  Intelligently places itself at the
  height of the underlying terrain.</description>
  <Point>
    <coordinates>-122.0822035425683,
    37.42228990140251,
    0</coordinates>
  </Point>
</Placemark>
</kml>
```



Pointer 37°25'20.02" N 122°05'02.25" W elev 13 ft Streaming 100% Eye alt 1261 ft

Lodging Dining
 Roads Borders
 Terrain Buildings



e.g. Hotels near JFK

Places

- KML Samples**
Unleash your creativity with the help of these examples!
 - Placemarks**
These are just some of the different kinds of placemarks
 - Styles and Markup**
With KML it is easy to create rich, descriptive markup to
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Examples of ground overlays
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Screen overlays have to be authored directly in KML. These
 - Paths**
Examples of paths. Note that the tessellate tag is by default
 - Polygons**
Examples of polygon shapes

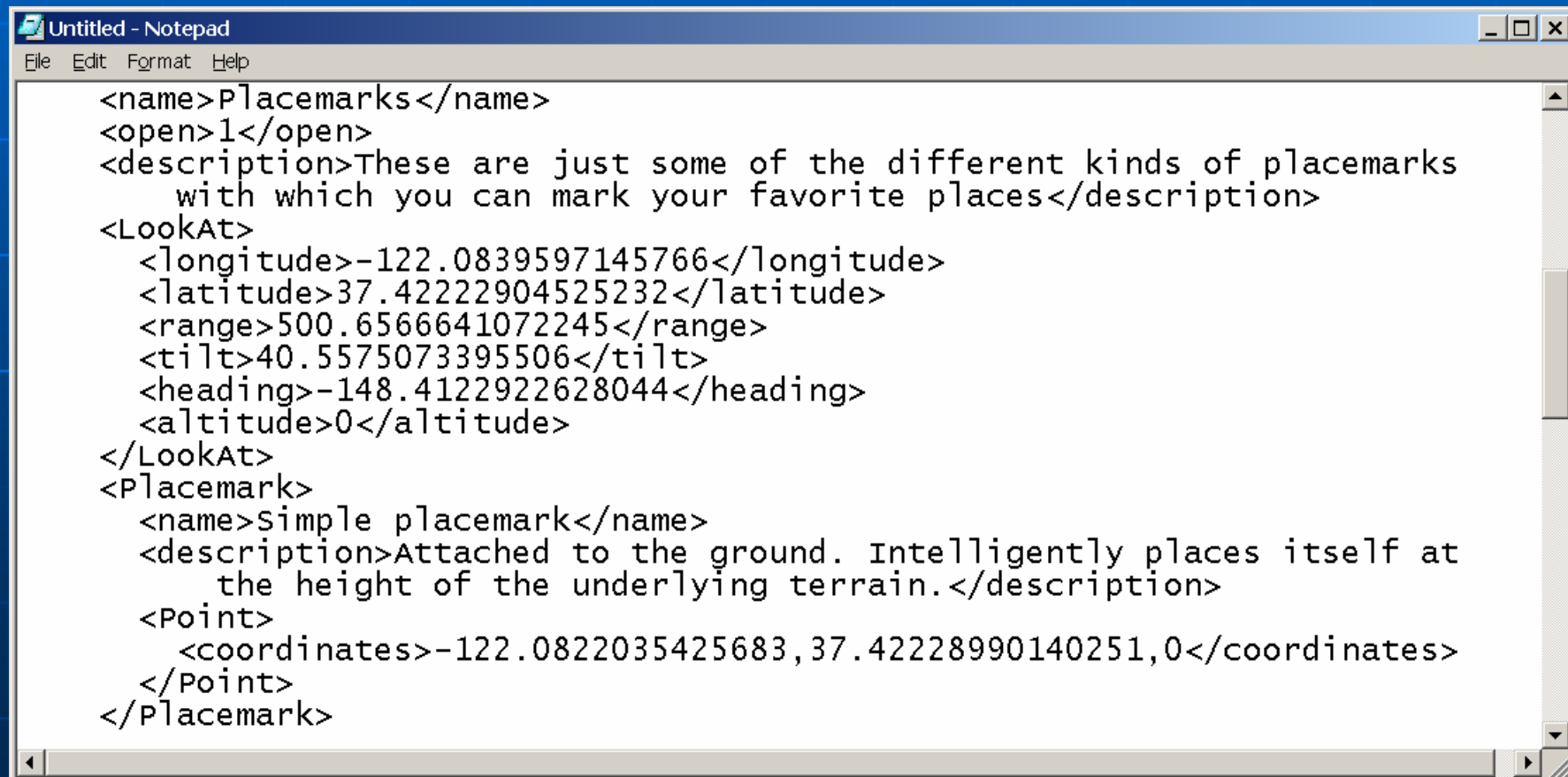
Layers

- Layers**
 - terrain
 - Geographic Web
 - Featured Content
 - Global Awareness
 - roads
 - 3D Buildings
 - borders
 - Populated Places
 - Alternative Place Names



Keyhole Markup Language (KML)

Content + Map Symbols + View point + ...

A screenshot of a Notepad window titled "Untitled - Notepad". The window contains XML code for KML. The code defines a "Placemark" with a "LookAt" view and a "Point" on the ground.

```
<name>Placemarks</name>
<open>1</open>
<description>These are just some of the different kinds of placemarks
  with which you can mark your favorite places</description>
<LookAt>
  <longitude>-122.0839597145766</longitude>
  <latitude>37.42222904525232</latitude>
  <range>500.6566641072245</range>
  <tilt>40.5575073395506</tilt>
  <heading>-148.4122922628044</heading>
  <altitude>0</altitude>
</LookAt>
<Placemark>
  <name>simple placemark</name>
  <description>Attached to the ground. Intelligently places itself at
    the height of the underlying terrain.</description>
  <Point>
    <coordinates>-122.0822035425683,37.42228990140251,0</coordinates>
  </Point>
</Placemark>
```



ICIW 2008 – The Third International Conference on
Internet and Web Applications and Services
June 8-13, 2008 - Athens, Greece
Tutorial: Web Services for Mapping

Part I: Theory

1. Publishing Maps on the Web
2. XML-based languages for Geography and Mapping

3. Web Services for Mapping

- **OGC Specifications**
 - **WMS – Web Map Service**
 - **WFS – Web Feature Service**

Web Services

■ Definition...

- ... any service that is available over the Internet
- ... uses a standardized XML messaging system
- ... it isn't tied to one operating system or programming language

(E. Cerami, 2005)

Web Services

- HTTP
 - Internet transfer protocol
- XML
 - Communication language
- Coupling {HTTP + XML}
 - allows the Internet to act as a communication network between applications
 - ... not just a service for sharing web applications

Web Services

- Significance...
 - Interoperability...
 - between applications, which were developed independently

- Web services standards ...
 - {XML-RCP, UDDI, WSDL, SOAP ...}
 - Independent of ...
 - Programming languages
 - Operating systems
 - Platforms

Web Services for Mapping

- Web Services...
 - Provide a standardized method ...
 - of communicating between web-accessible applications
 - This is especially important ...
 - to mapping applications that use the Internet to share data

Web Services for Mapping

- Mapping web services ...
 - use similar approaches and follow some common communication protocols
 - however,
 - they are maintained independent of the web services in general
 - hence,
 - they are different from the general services a web developer may be familiar with

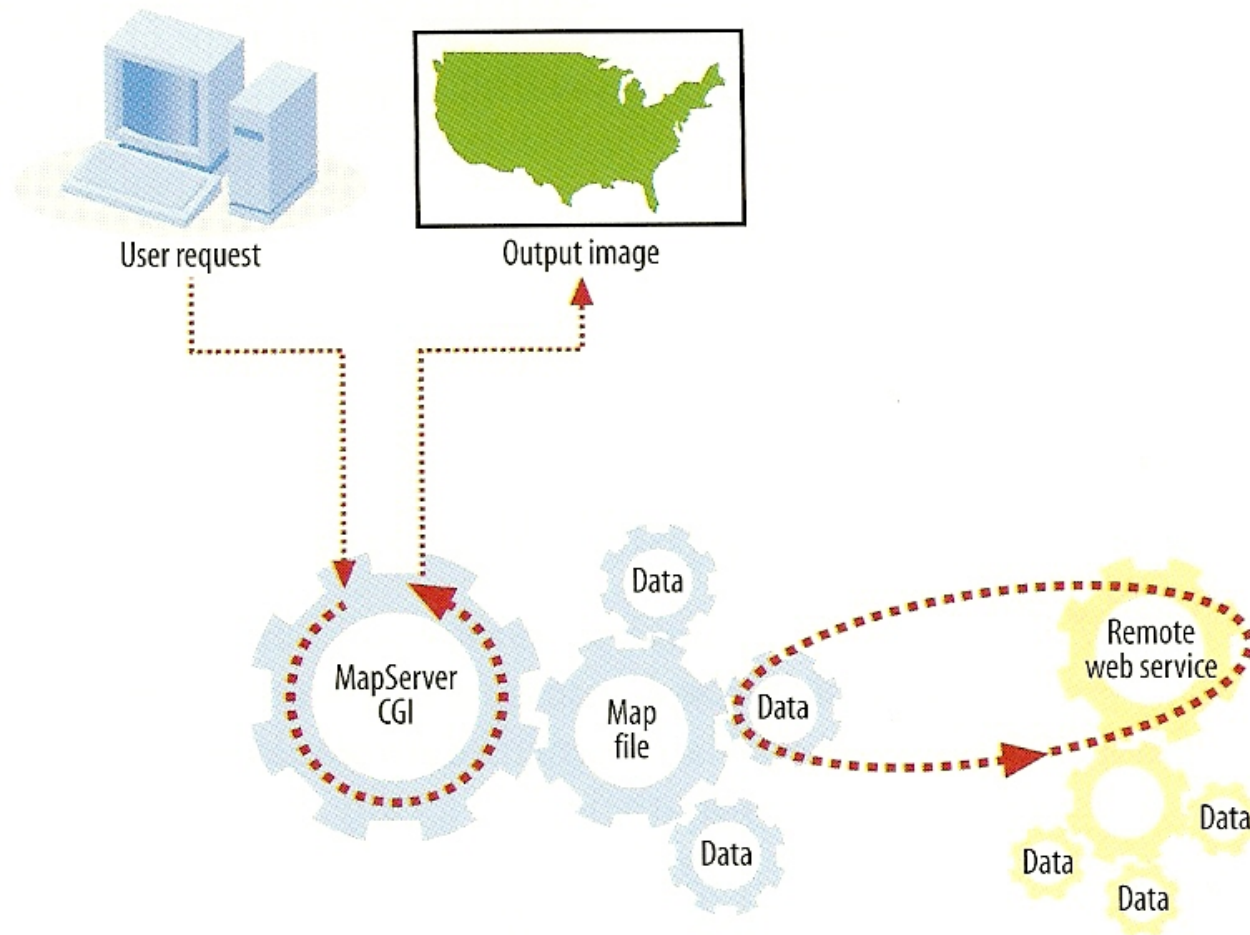
Web Services for Mapping

- All about ...
 - Sharing geo-information through maps
- They fill two roles...
 1. Accessing remote data sources as **consumer**
 2. Serving up or sharing data as a **provider**

Web Services for Mapping

- Easy to use...
 - They don't require to know
 - a bunch of details about how requests are made or sent
 - Accessing a remote server ...
 - Requires some specific knowledge about the data source
 - Data layers, data format
 - Sharing your own data ...
 - Requires a few additions to the application so that others can access the data

Web Services for Mapping



OGC Specifications

- Open Geospatial Consortium

<http://opengeospatial.org>

- Develops the specifications
{ WMS, WFS, WCS, WMC, SLD, GML }
- Focus on the specifications for sharing data

OGC Specifications

- Requests sent via URL...
 - parameters are included in the URL after a question mark (?), each separated by ampersands (&)
 - eg., "GET" method
 - Example URL:
`http://atlas.gc.ca/cgi-bin/atlaswms_en?
REQUEST=GetCapabilities`
 - Response can be ...
 - an XML document (GetCapabilities, GetFeature) or
 - an image (GetMap)

OGC Specifications

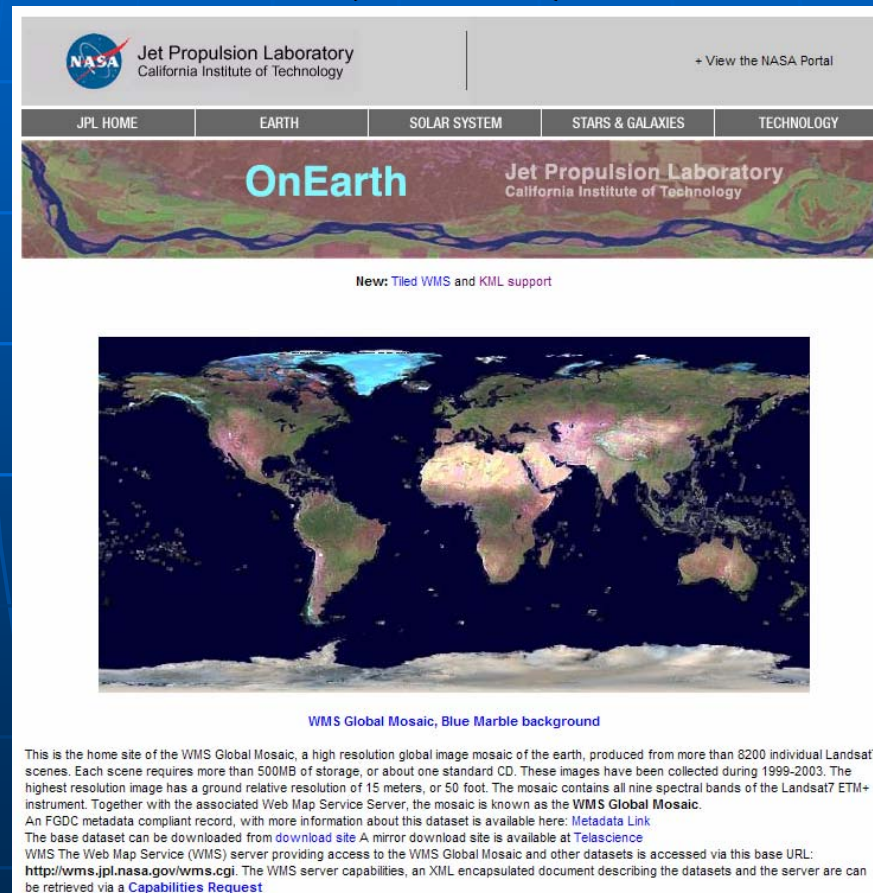
- Requests sent via URL...
 - Typical requests ...
 - **GetCapabilities**
 - What do you offer ?
 - **GetMap**
 - Give me the map as an image
 - **GetFeatures**
 - Give me the map features (as objects)
 - **GetFeatureInfo**
 - Give me the attribute values of a feature

OGC Specifications

- Web Map Service (WMS)
 - provides a way to send **map images** over the Web
 - GetMap request ...
 - Requesting a map from remote sources that have a WMS available
 - a set of parameters and options must be defined (regarding the map content and look)

OGC Specifications

- Web Map Service (WMS)



The screenshot shows the NASA Jet Propulsion Laboratory (JPL) website. At the top, there is a navigation bar with links for JPL HOME, EARTH, SOLAR SYSTEM, STARS & GALAXIES, and TECHNOLOGY. Below the navigation bar is a banner for "OnEarth" with the JPL logo. A text box below the banner reads "New: Tiled WMS and KML support". Below this is a large image of a global mosaic of the Earth, showing continents and oceans in various colors. Below the image is the caption "WMS Global Mosaic, Blue Marble background". At the bottom of the screenshot, there is a paragraph of text describing the WMS Global Mosaic, its resolution, and how to access it via a Web Map Service (WMS) server. The text includes the URL <http://wms.jpl.nasa.gov/wms.cgi> and mentions that capabilities can be retrieved via a Capabilities Request.

This is the home site of the WMS Global Mosaic, a high resolution global image mosaic of the earth, produced from more than 8200 individual Landsat7 scenes. Each scene requires more than 500MB of storage, or about one standard CD. These images have been collected during 1999-2003. The highest resolution image has a ground relative resolution of 15 meters, or 50 foot. The mosaic contains all nine spectral bands of the Landsat7 ETM+ instrument. Together with the associated Web Map Service Server, the mosaic is known as the **WMS Global Mosaic**. An FGDC metadata compliant record, with more information about this dataset is available here: [Metadata Link](#). The base dataset can be downloaded from [download site](#). A mirror download site is available at [Telascience](#). WMS The Web Map Service (WMS) server providing access to the WMS Global Mosaic and other datasets is accessed via this base URL: <http://wms.jpl.nasa.gov/wms.cgi>. The WMS server capabilities, an XML encapsulated document describing the datasets and the server are can be retrieved via a [Capabilities Request](#).

<http://wms.jpl.nasa.gov>

OGC Specifications

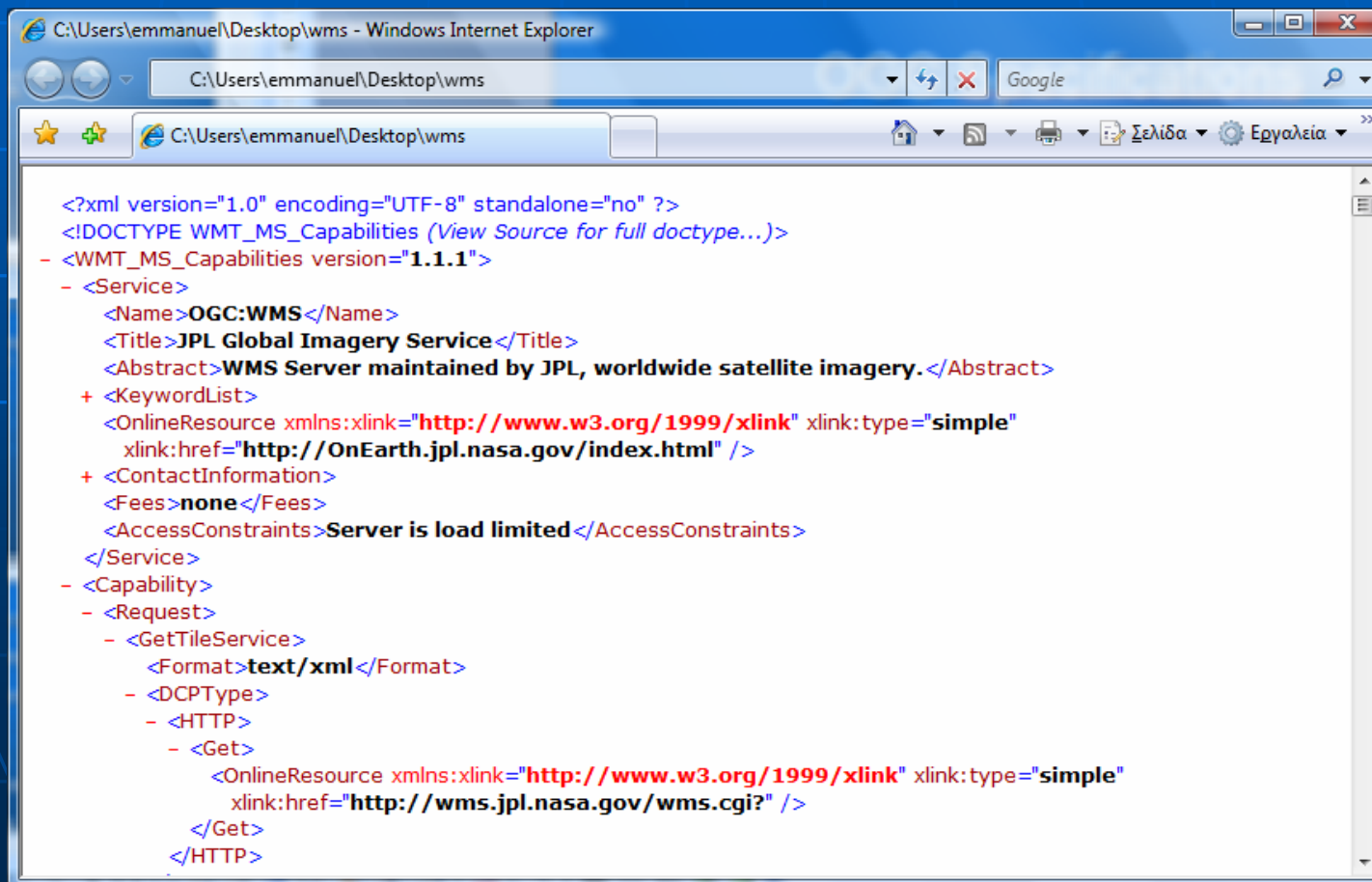
- Web Map Service (WMS)
 - GetCapabilities request ...

`http://wms.jpl.nasa.gov/wms.cgi?
request=GetCapabilities`

- *What do you offer ???*

OGC Specifications

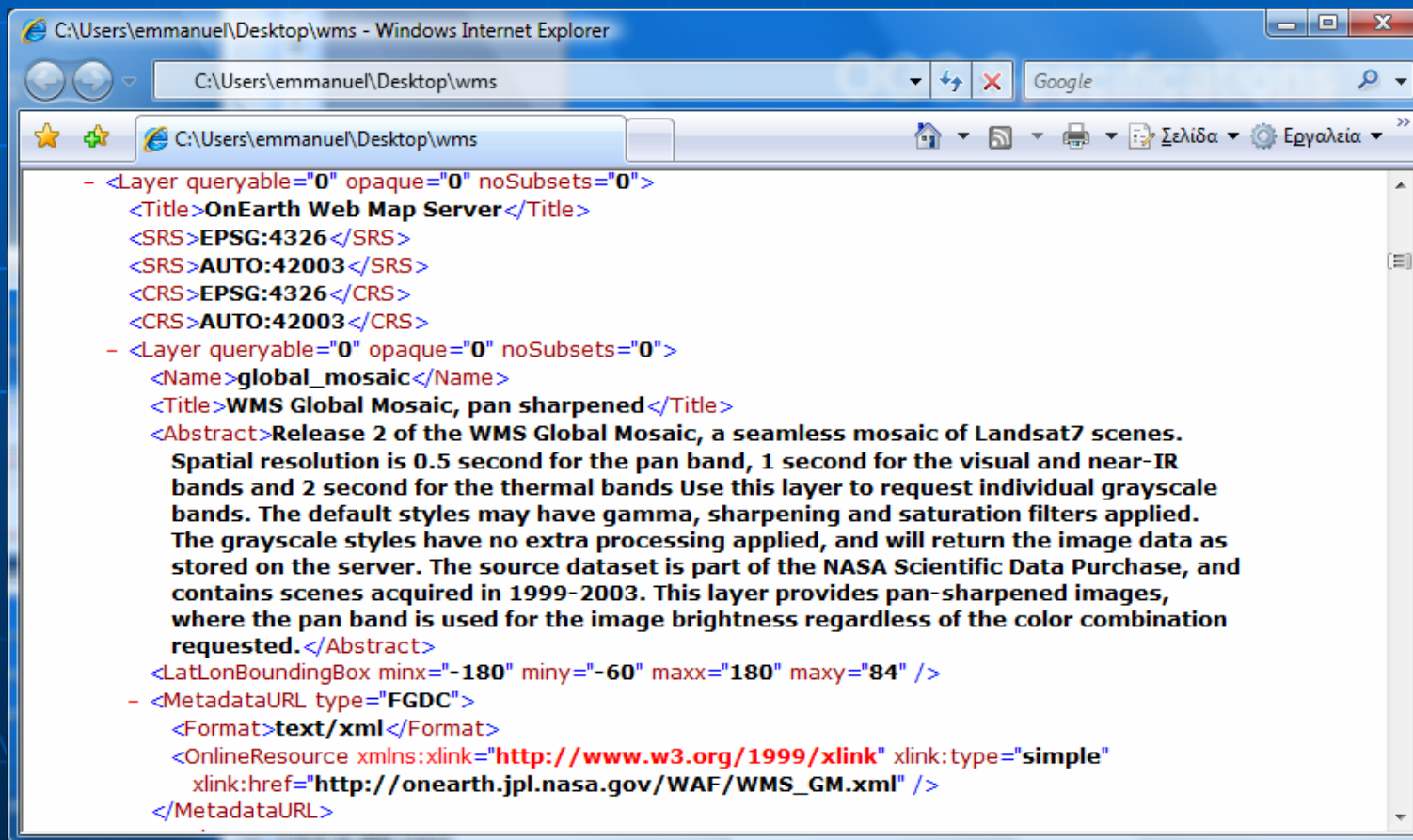
- Web Map Service (WMS)
 - GetCapabilities request ...



```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<!DOCTYPE WMT_MS_Capabilities (View Source for full doctype...)>
- <WMT_MS_Capabilities version="1.1.1">
- <Service>
  <Name>OGC:WMS</Name>
  <Title>JPL Global Imagery Service</Title>
  <Abstract>WMS Server maintained by JPL, worldwide satellite imagery.</Abstract>
+ <KeywordList>
  <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:type="simple"
    xlink:href="http://OnEarth.jpl.nasa.gov/index.html" />
+ <ContactInformation>
  <Fees>none</Fees>
  <AccessConstraints>Server is load limited</AccessConstraints>
</Service>
- <Capability>
- <Request>
  - <GetTileService>
    <Format>text/xml</Format>
  - <DCPType>
    - <HTTP>
      - <Get>
        <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:type="simple"
          xlink:href="http://wms.jpl.nasa.gov/wms.cgi?" />
        </Get>
      </HTTP>
```

OGC Specifications

- Web Map Service (WMS)
 - GetCapabilities request ...

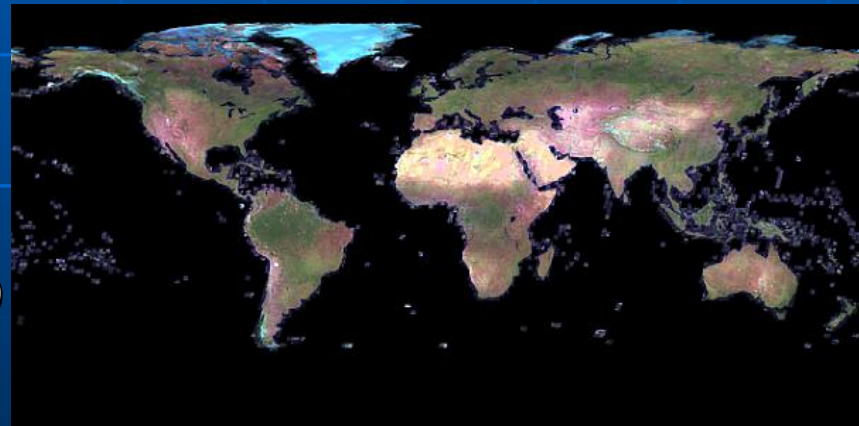


```
- <Layer queryable="0" opaque="0" noSubsets="0">
  <Title>OnEarth Web Map Server</Title>
  <SRS>EPSG:4326</SRS>
  <SRS>AUTO:42003</SRS>
  <CRS>EPSG:4326</CRS>
  <CRS>AUTO:42003</CRS>
- <Layer queryable="0" opaque="0" noSubsets="0">
  <Name>global_mosaic</Name>
  <Title>WMS Global Mosaic, pan sharpened</Title>
  <Abstract>Release 2 of the WMS Global Mosaic, a seamless mosaic of Landsat7 scenes.
  Spatial resolution is 0.5 second for the pan band, 1 second for the visual and near-IR
  bands and 2 second for the thermal bands Use this layer to request individual grayscale
  bands. The default styles may have gamma, sharpening and saturation filters applied.
  The grayscale styles have no extra processing applied, and will return the image data as
  stored on the server. The source dataset is part of the NASA Scientific Data Purchase, and
  contains scenes acquired in 1999-2003. This layer provides pan-sharpened images,
  where the pan band is used for the image brightness regardless of the color combination
  requested.</Abstract>
  <LatLonBoundingBox minx="-180" miny="-60" maxx="180" maxy="84" />
- <MetadataURL type="FGDC">
  <Format>text/xml</Format>
  <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:type="simple"
  xlink:href="http://onearth.jpl.nasa.gov/WAF/WMS_GM.xml" />
  </MetadataURL>
```

OGC Specifications

- Web Map Service (WMS)
 - GetMap request ...

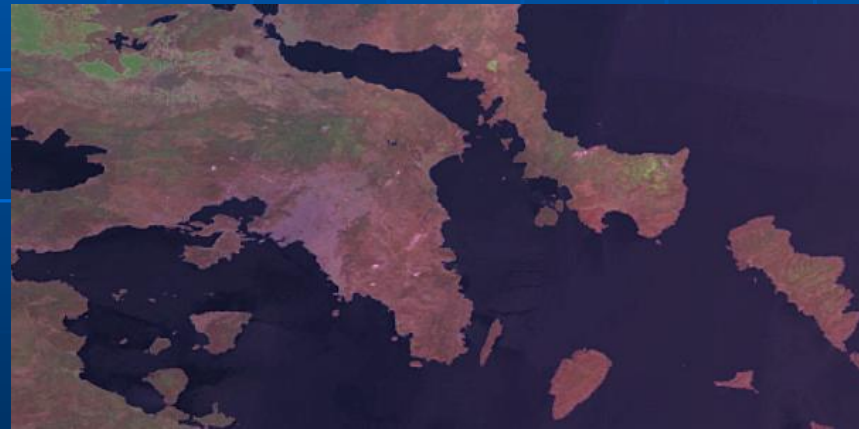
```
http://wms.jpl.nasa.gov/wms.cgi?  
request=GetMap  
&service=WMS  
&version=1.1.1  
&srs=EPSG:4326  
&format=image/jpeg  
&styles=  
&bbox=-180,-90,180,90  
&width=600  
&height=300  
&layers=global_mosaic
```



OGC Specifications

- Web Map Service (WMS)
 - GetMap request ...

```
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
```



OGC Specifications

- Web Feature Service (WFS)
 - the actual **feature data** is returned to the client (in GML)
 - WMS (vs) WFS
 - WMS returns a map image
 - WFS returns geographic features (geometries and thematic data)

OGC Specifications

- Web Feature Service (WFS)

`http://map.ns.ec.gc.ca/envdat/map.aspx
?service=WFS
&version=1.0.0
&request=GetCapabilities`

- *What do you offer ???*

OGC Specifications

■ Web Feature Service (WFS)

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
-<WFS_Capabilities version="1.0.0" updateSequence="0" xmlns="http://www.opengis.net/wfs"
xmlns:ogc="http://www.opengis.net/ogc" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://www.opengis.net/wfs
http://schemas.opengis.net/wfs/1.0.0/WFS-capabilities.xsd">
<Service>
  <Name>MapServer WFS</Name>
  <Title>Newfoundland and Labrador Water Quality Stations</Title>
  <Abstract>ENVIRODAT is a repository of water quality information including chemical, physical,
biological, and selected hydrometric data which are stored for surface, groundwater, wastewater,
precipitation and various other water types</Abstract>
  ...
</Service>
  ...
<FeatureType>
  <Name>envirodat</Name>
  <Title>ENVIRODAT - Atlantic Region Water Quality Chemistry Database</Title>
  <SRS>EPSG:4326</SRS>
  <LatLongBoundingBox minx="-64.6622" miny="46.7594" maxx="-52.6808" maxy="55.2333" />
  <MetadataURL type="FGDC"
format="TXT">http://geodiscover.cgdi.ca/gdp/search?language=en&action=entrySummary&entryT
ype=productCollection&entryId=14413&entryLang=en</MetadataURL>
</FeatureType>
```

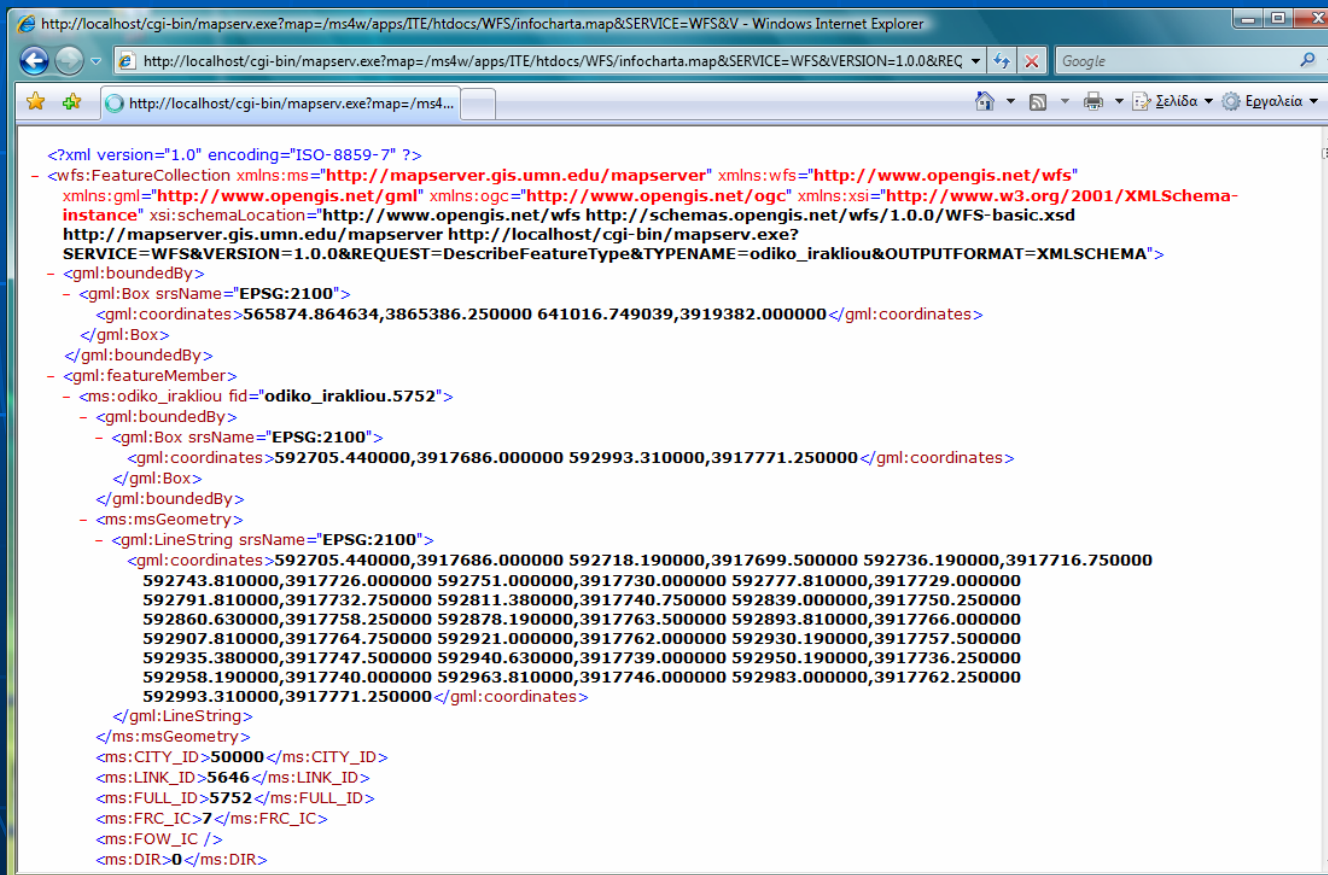

OGC Specifications

- The Web Feature Service (WFS)...
- GetFeature request

```
http://localhost/cgi-bin/mapserv.exe?  
map=/ms4w/apps/ITE/htdocs/WFS/infocharta.map&  
SERVICE=WFS&VERSION=1.0.0&  
REQUEST=GetFeature&  
typename=odiko_irakliou
```

OGC Specifications

- The Web Feature Service (WFS)...
- GetFeature request



```
<?xml version="1.0" encoding="ISO-8859-7" ?>
- <wfs:FeatureCollection xmlns:ms="http://mapserver.gis.umn.edu/mapserver" xmlns:wfs="http://www.opengis.net/wfs"
  xmlns:gml="http://www.opengis.net/gml" xmlns:ogc="http://www.opengis.net/ogc" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
  instance" xsi:schemaLocation="http://www.opengis.net/wfs http://schemas.opengis.net/wfs/1.0.0/WFS-basic.xsd
  http://mapserver.gis.umn.edu/mapserver http://localhost/cgi-bin/mapserv.exe?
  SERVICE=WFS&VERSION=1.0.0&REQUEST=DescribeFeatureType&TYPENAME=odiko_irakliou&OUTPUTFORMAT=XMLSCHEMA">
- <gml:boundedBy>
- <gml:Box srsName="EPSG:2100">
  <gml:coordinates>565874.864634,3865386.250000 641016.749039,3919382.000000</gml:coordinates>
  </gml:Box>
</gml:boundedBy>
- <gml:featureMember>
- <ms:odiko_irakliou fid="odiko_irakliou.5752">
  - <gml:boundedBy>
  - <gml:Box srsName="EPSG:2100">
    <gml:coordinates>592705.440000,3917686.000000 592993.310000,3917771.250000</gml:coordinates>
    </gml:Box>
  </gml:boundedBy>
  - <ms:msGeometry>
  - <gml:LineString srsName="EPSG:2100">
    <gml:coordinates>592705.440000,3917686.000000 592718.190000,3917699.500000 592736.190000,3917716.750000
    592743.810000,3917726.000000 592751.000000,3917730.000000 592777.810000,3917729.000000
    592791.810000,3917732.750000 592811.380000,3917740.750000 592839.000000,3917750.250000
    592860.630000,3917758.250000 592878.190000,3917763.500000 592893.810000,3917766.000000
    592907.810000,3917764.750000 592921.000000,3917762.000000 592930.190000,3917757.500000
    592935.380000,3917747.500000 592940.630000,3917739.000000 592950.190000,3917736.250000
    592958.190000,3917740.000000 592963.810000,3917746.000000 592983.000000,3917762.250000
    592993.310000,3917771.250000</gml:coordinates>
  </gml:LineString>
  </ms:msGeometry>
  <ms:CITY_ID>50000</ms:CITY_ID>
  <ms:LINK_ID>5646</ms:LINK_ID>
  <ms:FULL_ID>5752</ms:FULL_ID>
  <ms:FRC_IC>7</ms:FRC_IC>
  <ms:FOW_IC />
  <ms:DIR>0</ms:DIR>
```



ICIW 2008 – The Third International Conference on
Internet and Web Applications and Services
June 8-13, 2008 - Athens, Greece
Tutorial: Web Services for Mapping

Part II: Practice

4. Mapping Servers/Services on the Web

- ICEDS Server
- GeoNames Web Service
- Google Earth's Technology

5. Spatial Data Infrastructures (SDI)

6. The Heraklion SDI Web Services

ICEDS Server

- ICEDS...
 - Integrated CEOS European Data Server
 - CEOS...
 - Committee on Earth Observing Satellites
- Motivation / Data Sources...
 - CEOS Landsat and SRTM Project (CLASP)
 - NASA has provided to UN ...
 - SRTM (Shuttle Radar Topographer Mapper) and 3 sets of orthorectified Landsat scenes
 - The UN wish ...
 - to maximise access to these data to all of its agencies

ICEDS Server

- Web Service...
 - Developed by...
 - University College London – Dept. of Geomatics Eng.
 - ESYS plc
 - Funded by...
 - British National Space Center (BNSC)
- Functionality...
 - On-line access to ...
 - a global SRTM Digital Elevation Model
 - Landsat satellite imagery for Africa and Europe
 - Other information layers

<http://iceds.ge.ucl.ac.uk/>

ICEDS Server

- RAID Server
 - 1.7TB capacity; dual Athlon MP 2400+ processors; 1 Gb of RAM
- Mandrake Linux 9
- Apache Web Server
 - Tomcat servlet container
- UMN MapServer (ver 4.4.1) (OSGeo)
- Ionic RedSpider web mapping s/w
 - Commercial package

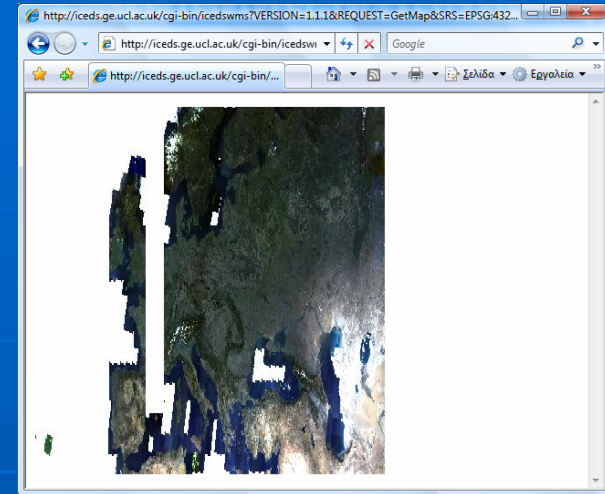
ICEDS Server

- Purely OGC-based services
 - Hence separation of client and server(s)
- ICEDS client ...
 - based on Ionic's GAF client
 - HTML + Javascript only
- Good browser compatibility...
 - PC & Mac IE,
Mozilla/Firefox/Seamonkey, Mac Safari

ICEDS Server

- Typical WMS request

```
http://iceds.ge.ucl.ac.uk/cgi-bin/icedswms?  
VERSION=1.1.1&  
REQUEST=GetMap&  
SRS=EPSG:4326&  
BBOX=-30,35,112.86,65&  
WIDTH=600&HEIGHT=420&  
LAYERS=LANDSAT5&  
FORMAT=image/jpeg&BGCOLOR=0xffffffff&  
TRANSPARENT=TRUE&  
EXCEPTIONS=application/vnd.ogc.se_inimage
```


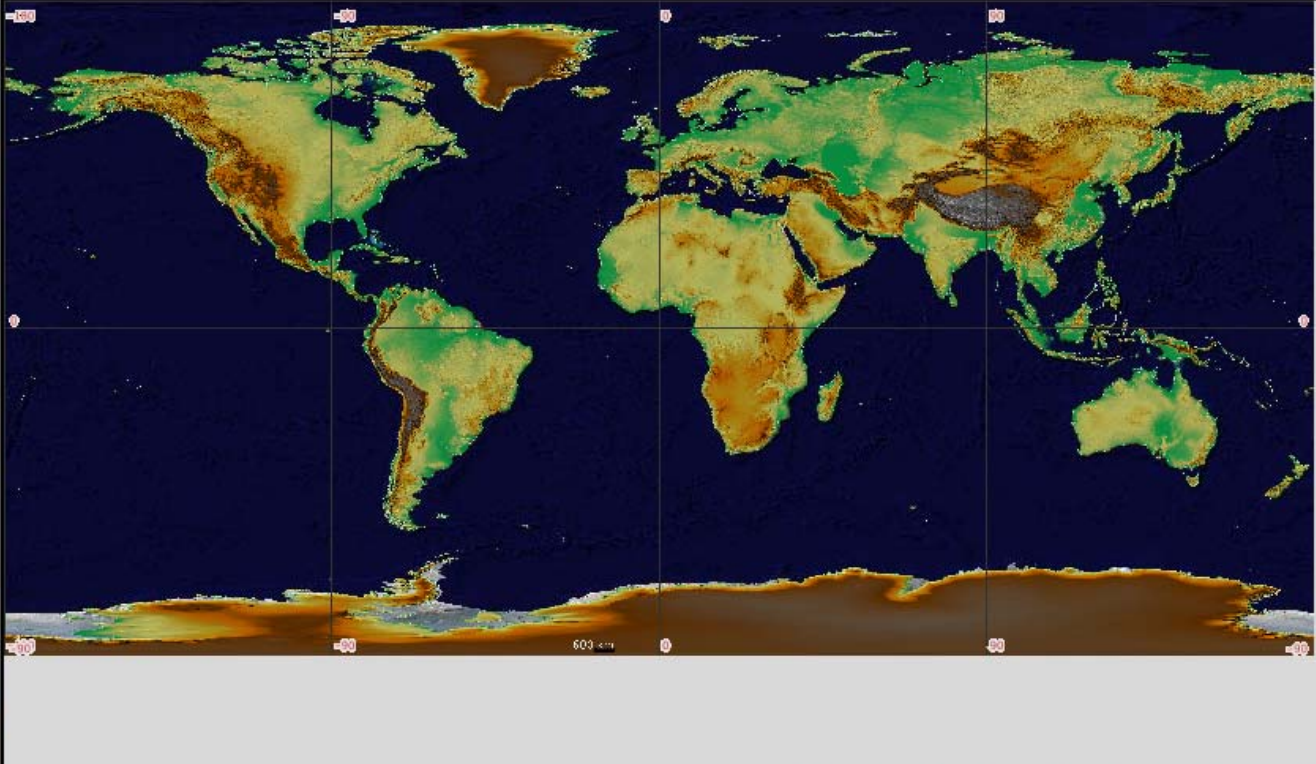


ICEDS Web Portal - Windows Internet Explorer

http://iceds.ge.ucl.ac.uk/viewer/iceds/index.html

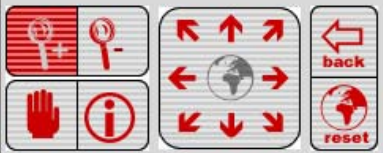
ICEDS ICEDS Web Portal

ICEDS - Integrated CEOS European Data Server

Available WMS layers

- Map Dressing (IONIC)
- Current Weather (CustomWeather)
- Global clouds (CustomWeather)
- GOES satellite imagery (Iowa State Uni.)
- World Natural Hazards (NOAA)
- MODIS Rapid Fire (UMD FIRMS)
- Water features (GLOBE)
- Administrative Info (NOAA)
- SRTM water bodies mask
- DMSP Nighttime Lights
- USGS ASTER DEM footprints
- African geological maps (SIGAFRIQUE)
- ASTER 1 Three Gorges
- SRTM Version 3 sample
- Global Population of the World v3 (CIESIN)
- SRTM terrain
- SRTM3 DEM Version 2
- SRTM3 DEM Version 1
- SRTM30 DEM
- Bathymetry (DEMIS)
- LANDSAT 5
- Onearth global imagery (1PL)



X

Y




Scale

UCL © [Help](#), [Credits](#) and [Feedback](#)

Select the layers from the above list, then scroll down and click on the button to update the map

For the complete list of WMS URLs please click [here](#)

More info on the ICEDS project is available [here](#)







ICEDS Web Portal - Windows Internet Explorer

http://iceds.ge.ucl.ac.uk/viewer/iceds/index.html

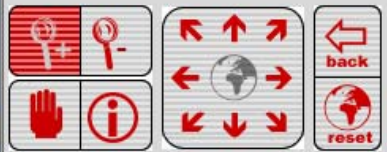
ICEDS ICEDS Web Portal

ICEDS - Integrated CEOS European Data Server

Available WMS layers

- Map Dressing (IONIC)
- Current Weather (CustomWeather)
- Global clouds (CustomWeather)
- GOES satellite imagery (Iowa State Uni.)
- World Natural Hazards (NOAA)
- MODIS Rapid Fire (UMD FIRMS)
- Water features (GLOBE)
- Administrative Info (NOAA)
- SRTM water bodies mask
- DMSP Nighttime Lights
- USGS ASTER DEM footprints
- African geological maps (SIGAFRIQUE)
- ASTER 1 Three Gorges
- SRTM Version 3 sample
- Global Population of the World v3 (CIESIN)
- SRTM terrain
- SRTM3 DEM Version 2
- SRTM3 DEM Version 1
- SRTM30 DEM
- Bathymetry (DEMIS)
- LANDSAT 5
- Google Earth global imagery (IGL)




X

Y



Scale

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 and [Feedback](#)

Select the layers from the above list, then scroll down and click on the button to update the map
For the complete list of WMS URLs please click [here](#)

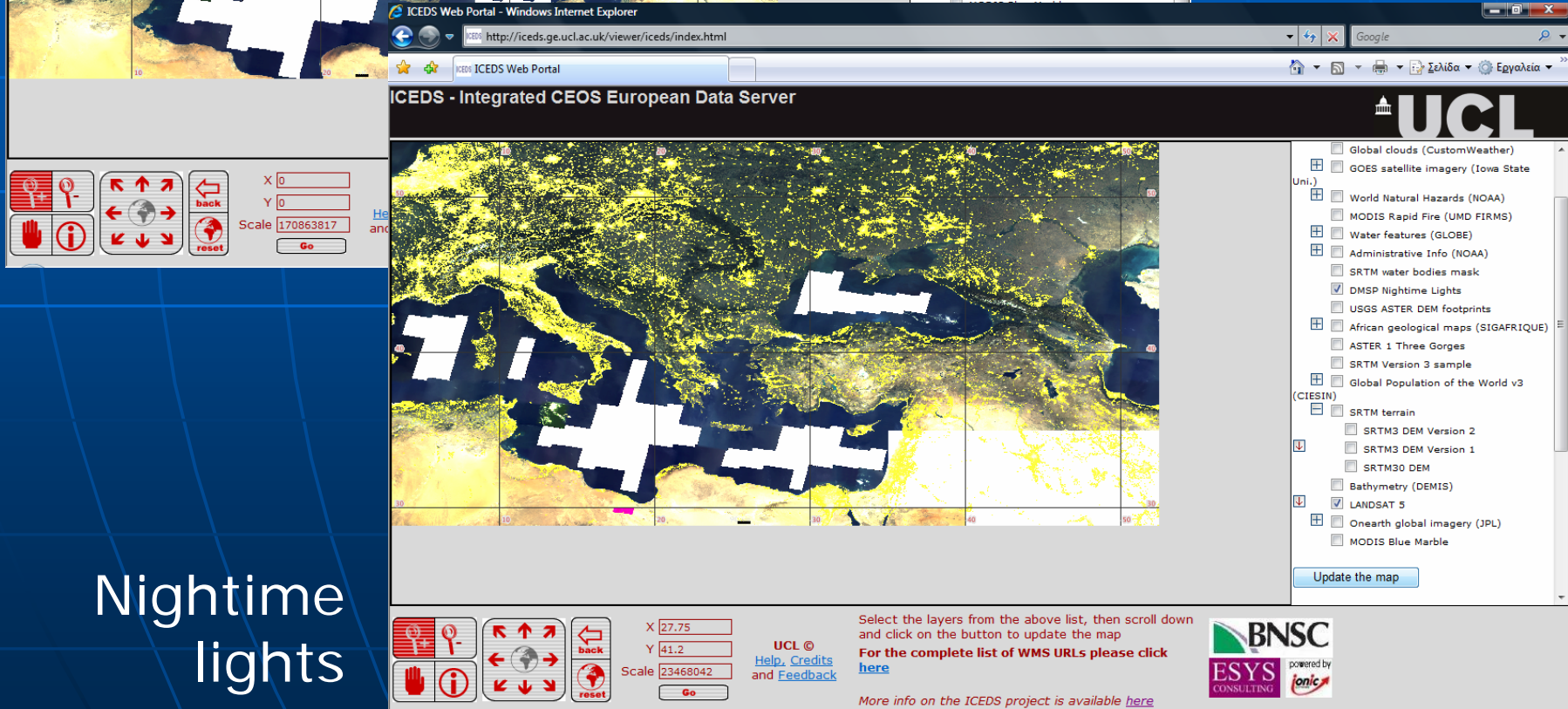
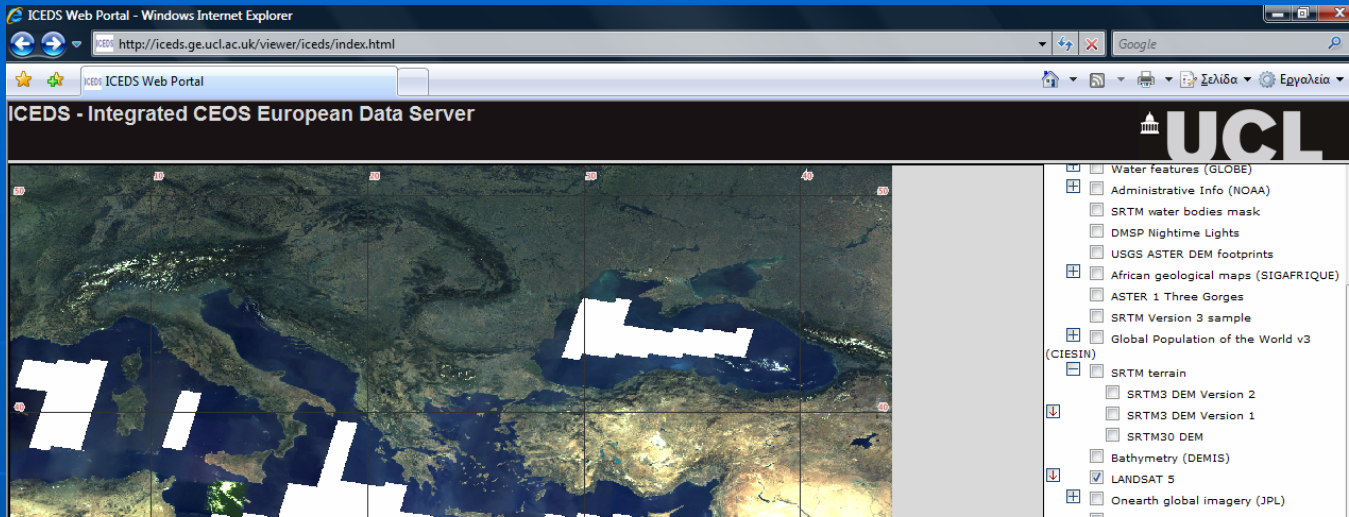


powered by

More info on the ICEDS project is available [here](#)

Landsat images



Nighttime lights

Natural Hazards (earthquakes, Volcanos, plates)

ICEDS - Integrated CEOS European Data Server

UCL

Available WMS layers

- Map Dressing (IONIC)
- Current Weather (CustomWeather)
- Global clouds (CustomWeather)
- GOES satellite imagery (Iowa State Uni.)
- World Natural Hazards (NOAA)
 - Significant Earthquakes
 - Tsunami Events
 - Volcanoes
 - Plate Boundaries
- MODIS Rapid Fire (UMD FIRMS)
- Water features (GLOBE)
- Administrative Info (NOAA)
 - City Names
 - Countries
 - SRTM water bodies mask

ICEDS - Integrated CEOS European Data Server

UCL

Available WMS layers

- Map Dressing (IONIC)
- Current Weather (CustomWeather)
- Global clouds (CustomWeather)
- GOES satellite imagery (Iowa State Uni.)
- World Natural Hazards (NOAA)
 - MODIS Rapid Fire (UMD FIRMS)
- Water features (GLOBE)
- Administrative Info (NOAA)
 - SRTM water bodies mask
 - DMSF Nighttime Lights
 - USGS ASTER DEM footprints
 - African geological maps (SIGAFRIQUE)
 - ASTER 1 Three Gorges
 - SRTM Version 3 sample
 - Global Population of the World v3
- (CIESIN)
 - SRTM terrain
 - SRTM3 DEM Version 2
 - SRTM3 DEM Version 1
 - SRTM30 DEM
 - Bathymetry (DEMIS)
 - LANDSAT 5
 - Onearth global imagery (JPL)

Clouds
(custom/current
weather)

Select the layers from the above list, then scroll down and click on the button to update the map
For the complete list of WMS URLs please click [here](#)

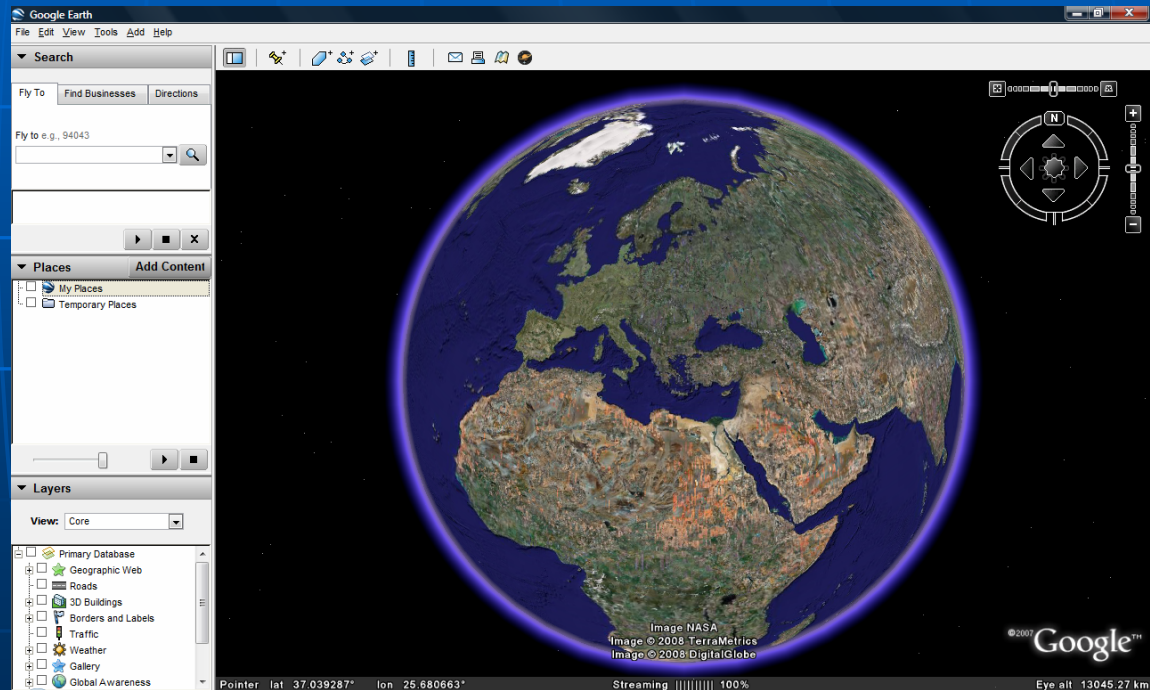
More info on the ICEDS project is available [here](#)



ICEDS Server & GE

- Add ICEDS layers to Google Earth

Add >
Image Overlay >
WMS Layer



Search

Fly To Find Business

Fly to e.g., 94043

- Folder... Ctrl+Shift+N
- Placemark... Ctrl+Shift+P
- Path... Ctrl+Shift+T
- Polygon... Ctrl+Shift+G
- Model... Ctrl+Shift+M
- Photo...
- Image Overlay... Ctrl+Shift+O**
- Network Link...

Places Add Content

- My Places
- Untitled Image Overlay
- Temporary Places

Layers

View: Core

- Primary Database
- Geographic Web
- Roads
- 3D Buildings
- Borders and Labels
- Traffic
- Weather
- Gallery
- Global Awareness

Google Earth - New

Name:

Link:

Transparency: Opaque

Clear

Description View Altitude Refresh Location

Time-Based Refresh

When:

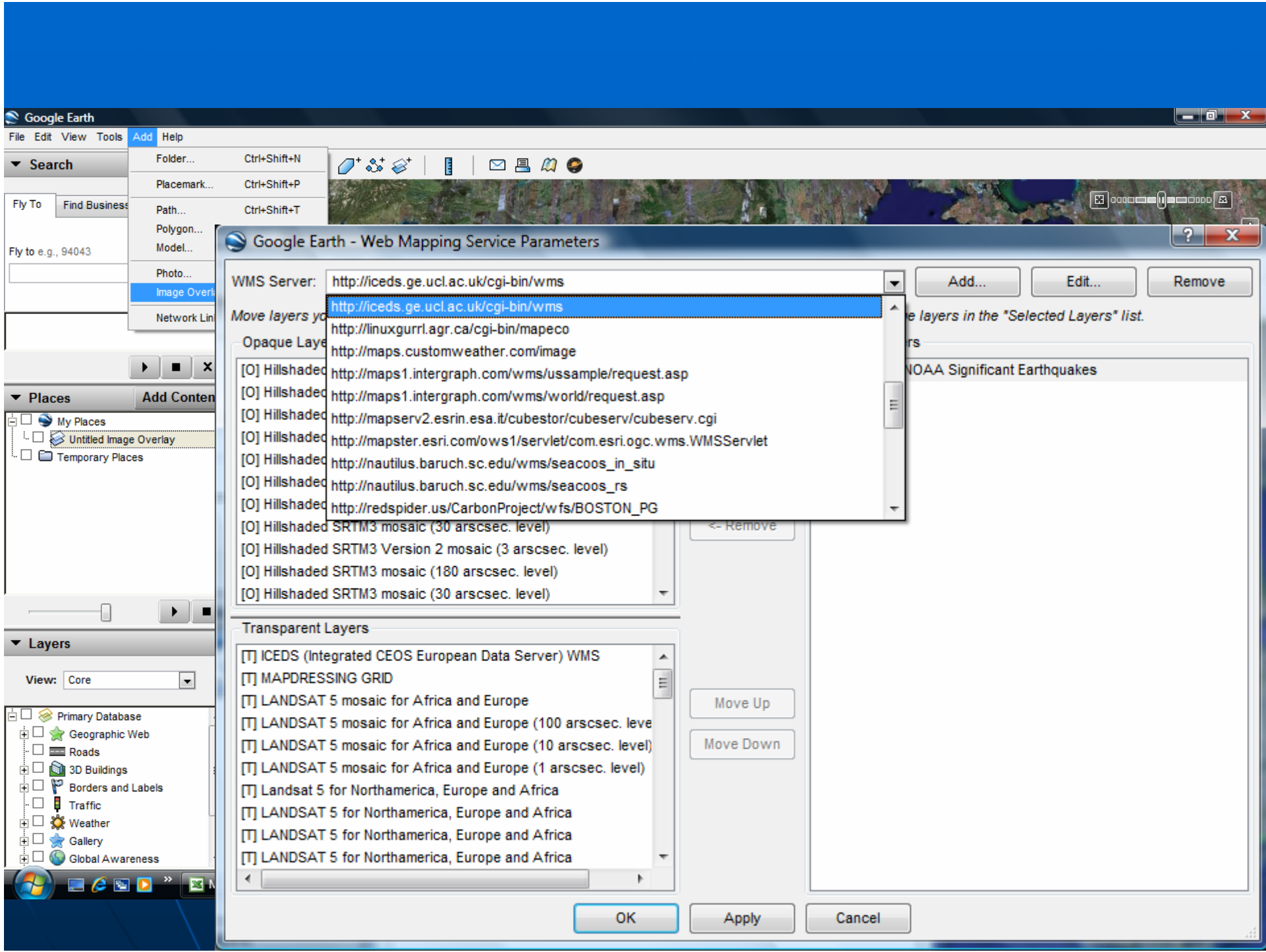
View-Based Refresh

When:

View Bound Scale:



Pointer lat 38.197454° lon 25.321802°



Google Earth - Web Mapping Service Parameters

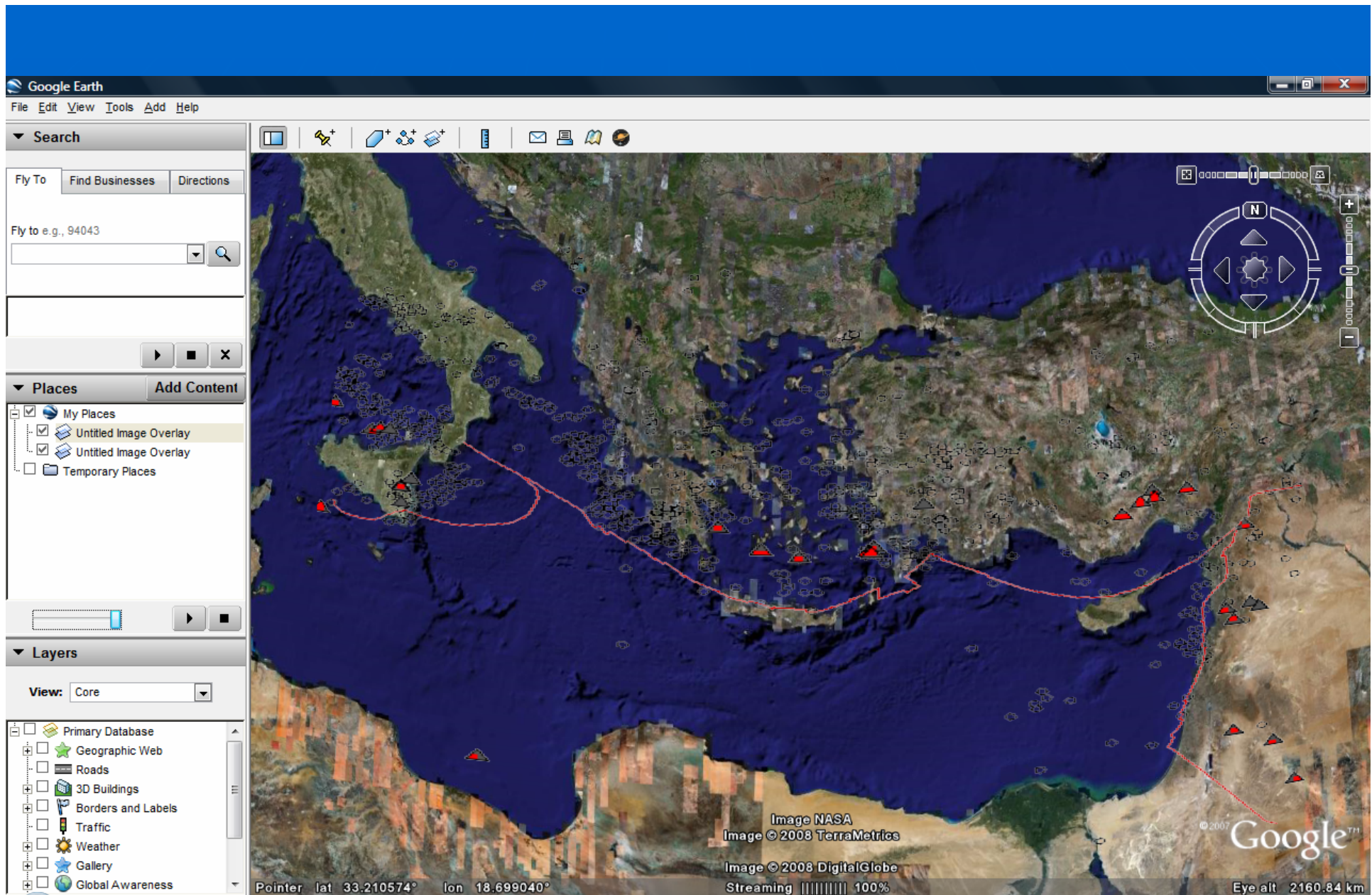
WMS Server:

- Move layers you want to add to the *Selected Layers* list.
- http://iceds.ge.ucl.ac.uk/cgi-bin/wms
 - http://linuxgurrl.agr.ca/cgi-bin/mapeco
 - http://maps.customweather.com/image
 - [O] Hillshaded http://maps1.intergraph.com/wms/ussample/request.asp
 - [O] Hillshaded http://maps1.intergraph.com/wms/world/request.asp
 - [O] Hillshaded http://mapserv2.esrin.esa.it/cubestor/cubeserv/cubeserv.cgi
 - [O] Hillshaded http://mapster.esri.com/ows1/servlet/com.esri.ogc.wms.WMSServlet
 - [O] Hillshaded http://nautilus.baruch.sc.edu/wms/seacoos_in_situ
 - [O] Hillshaded http://nautilus.baruch.sc.edu/wms/seacoos_rs
 - [O] Hillshaded http://redspider.us/CarbonProject/wfs/BOSTON_PG

- [O] Hillshaded SRTM3 mosaic (30 arcsec. level)
- [O] Hillshaded SRTM3 Version 2 mosaic (3 arcsec. level)
- [O] Hillshaded SRTM3 mosaic (180 arcsec. level)
- [O] Hillshaded SRTM3 mosaic (30 arcsec. level)

Transparent Layers

- [T] ICEDS (Integrated CEOS European Data Server) WMS
- [T] MAPDRESSING GRID
- [T] LANDSAT 5 mosaic for Africa and Europe
- [T] LANDSAT 5 mosaic for Africa and Europe (100 arcsec. level)
- [T] LANDSAT 5 mosaic for Africa and Europe (10 arcsec. level)
- [T] LANDSAT 5 mosaic for Africa and Europe (1 arcsec. level)
- [T] Landsat 5 for Northamerica, Europe and Africa
- [T] LANDSAT 5 for Northamerica, Europe and Africa
- [T] LANDSAT 5 for Northamerica, Europe and Africa
- [T] LANDSAT 5 for Northamerica, Europe and Africa



Earthquakes, Volcanos and Plate Boundaries

ICEDS Web Portal - Windows Internet Explorer

ICEDS <http://iceds.ge.ucl.ac.uk/viewer/iceds/index.html>

ICEDS ICEDS Web Portal

ICEDS - Integrated CEOS European Data Server



Vouliagmeni
Vouliagmeni

GR	37.8166667	23.7833333	PPL
GR	37.8333333	21.6	PPL

X Y Scale

UCL © [Help](#), [Credits](#) and [Feedback](#)

Select the layers from the above list, then scroll down and click on the button to update the map

For the complete list of WMS URLs please click [here](#)

More info on the ICEDS project is available [here](#)

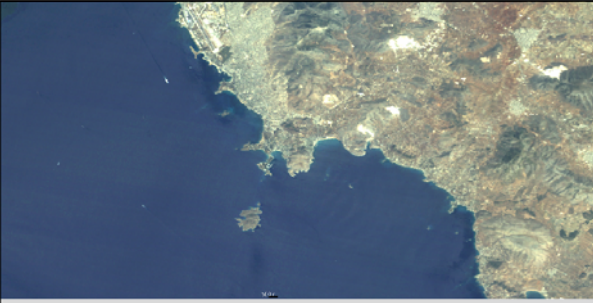
BNSC
ESYS CONSULTING powered by ionic

ICEDS Web Portal - Windows Internet Explorer

<http://iceds.ge.ucl.ac.uk/viewer/iceds/index.html>

ICEDS ICEDS Web Portal

ICEDS - Integrated CEOS European Data Server



Please wait for your search results

X Y Scale

UCL © [Help](#), [Credits](#) and [Feedback](#)

Select the layers from the above list, then scroll down and click on the button to update the map

For the complete list of WMS URLs please click [here](#)

More info on the ICEDS project is available [here](#)

BNSC
ESYS CONSULTING powered by ionic

SRTM terrain
 SRTM3 DEM Version 2
 SRTM3 DEM Version 1
 SRTM30 DEM
 Bathymetry (DEMIS)
 LANDSAT 5
 Onearth global imagery (JPL)
 MODIS Blue Marble

Select a layer effect ▾

Vouliagmeni

Bathymetry (DEMIS)
 LANDSAT 5
 Onearth global imagery (JPL)
 MODIS Blue Marble

Select a layer effect ▾

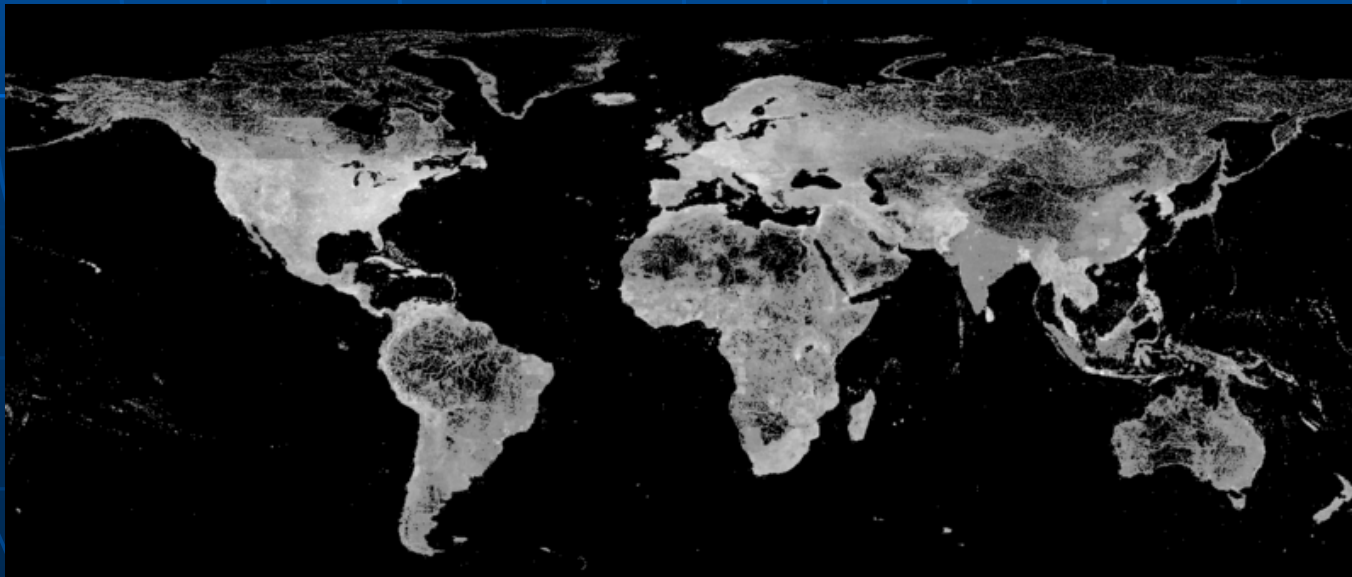
Vouliagmeni

All Feature Types
 Populated Places
 Adminstrative

The gazetteer tool

GeoNames Web Service

- Feature Density Map ...
 - bright parts
 - high density areas (lot of features per km²)
 - dark parts
 - regions with no or only few features



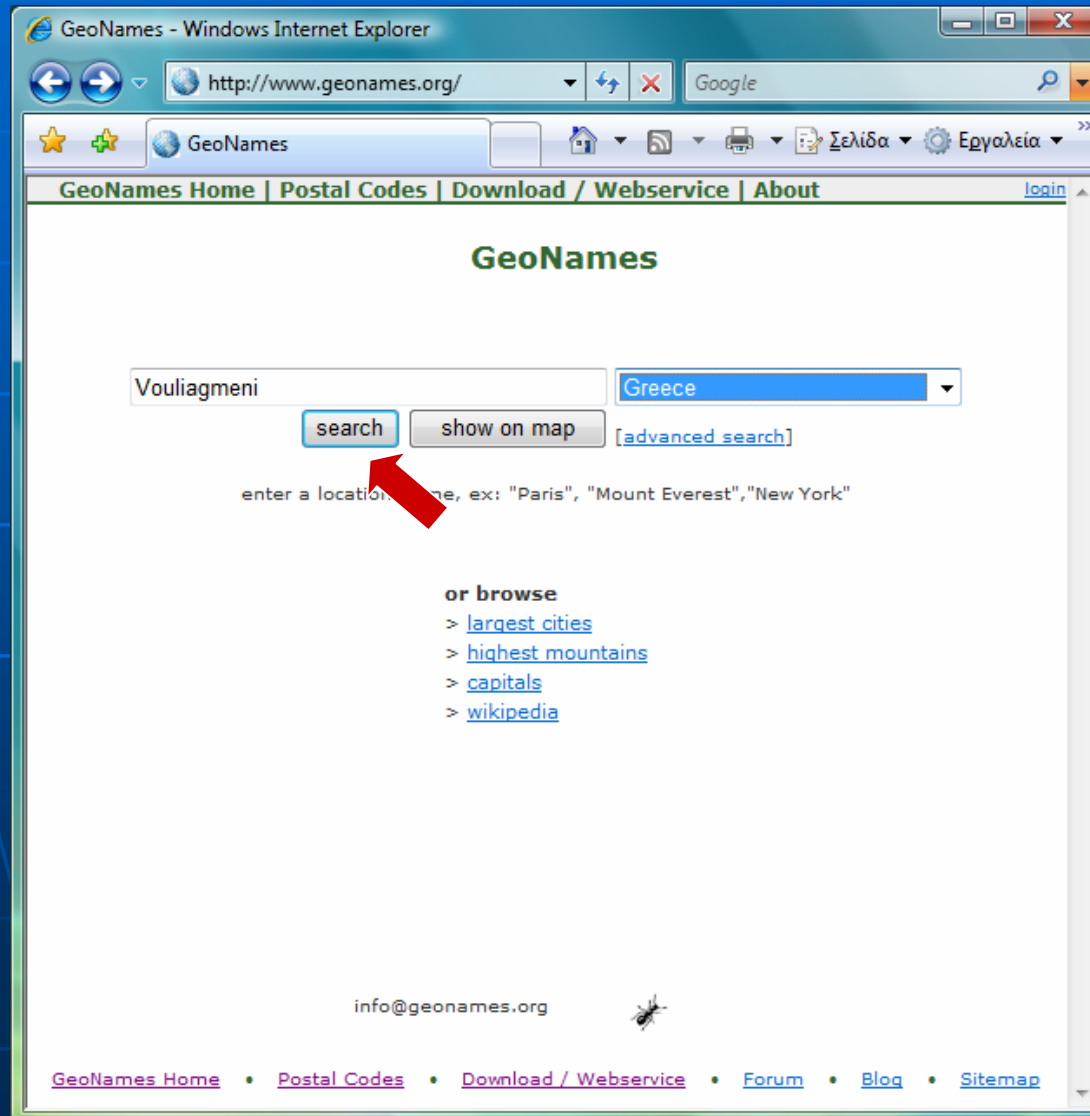
GeoNames Web Service

- The GeoNames database ...
 - is available for download free of charge
 - It contains ...
 - over 8 million geographical names
 - consists of 6.5 million unique features
 - whereof 2.2 million populated places and
 - 1.8 million alternate names.
 - All features are categorized ...
 - into 9 feature classes
 - further subcategorized into 645 feature codes

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

GeoNames Web Service

http://www.geonames.org/



GeoNames Web Service

GeoNames Fulltextsearch : Vouliagmeni - Windows Internet Explorer

http://www.geonames.org/search.htm

GeoNames Fulltextsearch : Vouliagmeni

GeoNames Home | Postal Codes | Download / Webservice | About

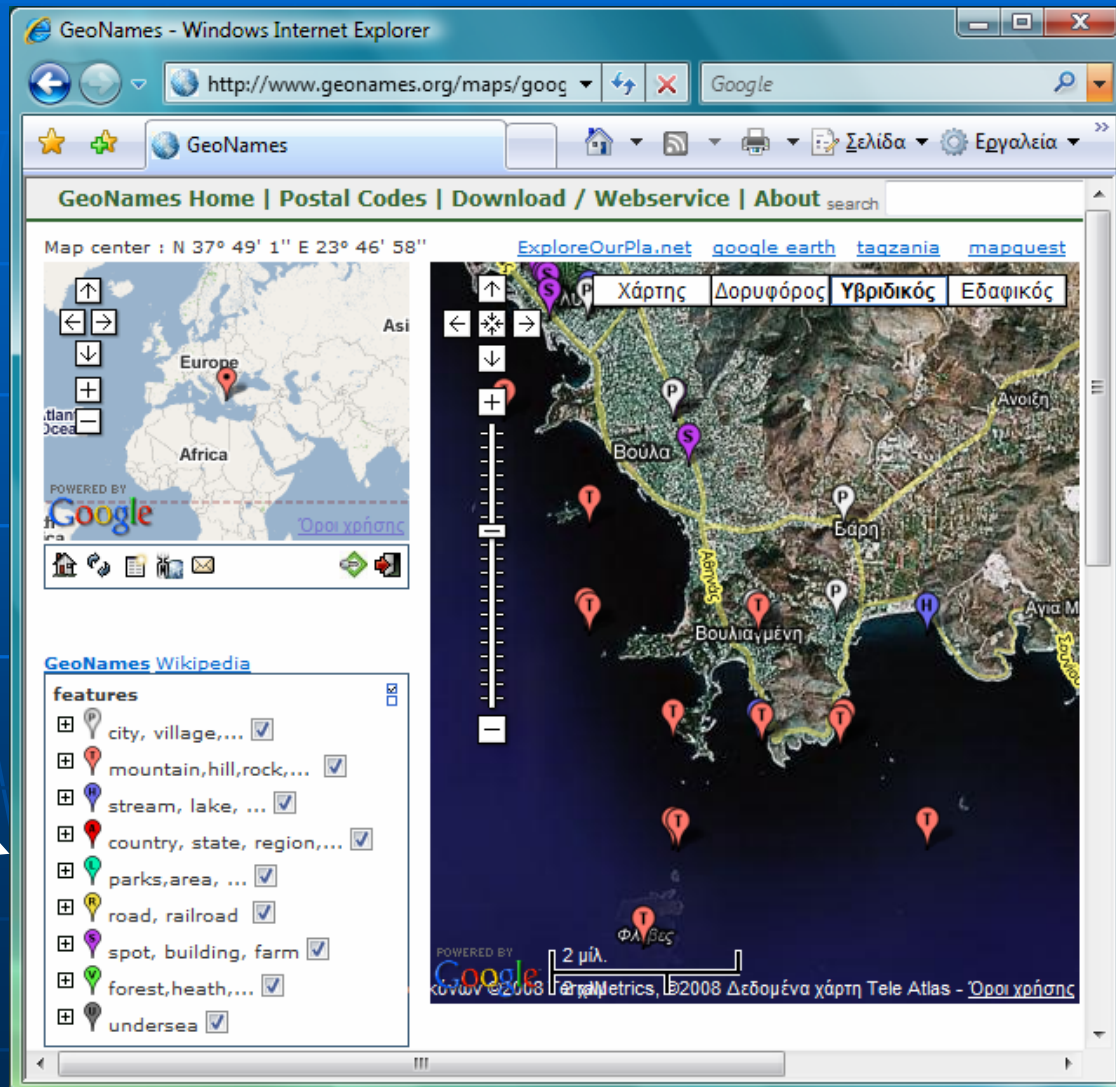
Vouliagmeni Greece

search show on map [advanced search]

5 records found for "Vouliagmeni"

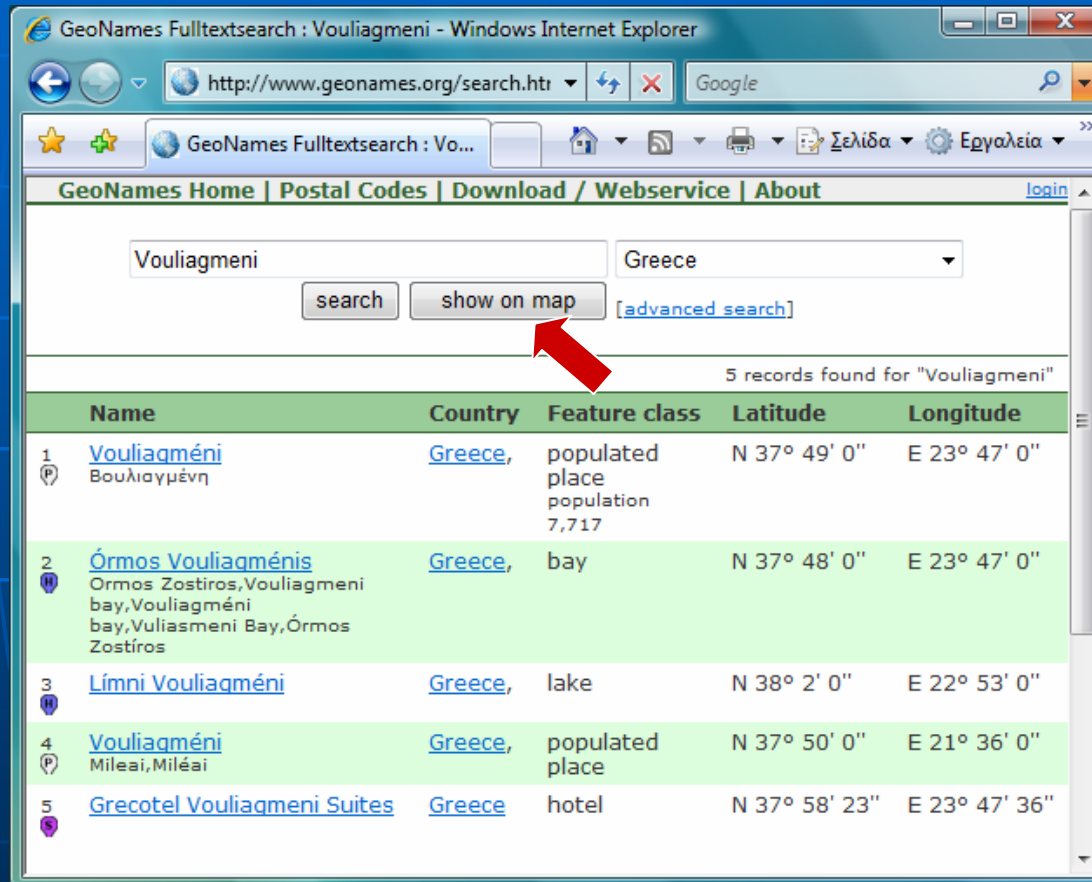
	Name	Country	Feature class	Latitude	Longitude
1 (P)	Vouliagméni Βουλιαγμένη	Greece	populated place population 7,717	N 37° 49' 0"	E 23° 47' 0"
2 (H)	Órmos Vouliagménis Ormos Zostiros,Vouliagmeni bay,Vouliagméni bay,Vuliasmeni Bay,Órmos Zostiros	Greece	bay	N 37° 48' 0"	E 23° 47' 0"
3 (H)	Límni Vouliagméni	Greece	lake	N 38° 2' 0"	E 22° 53' 0"
4 (P)	Vouliagméni Mileai,Miléai	Greece	populated place	N 37° 50' 0"	E 21° 36' 0"
5 (S)	Grecotel Vouliagmeni Suites	Greece	hotel	N 37° 58' 23"	E 23° 47' 36"

GeoNames Web Service



The 9 categories

GeoNames Web Service



GeoNames Fulltextsearch : Vouliagmeni - Windows Internet Explorer

http://www.geonames.org/search.htm

GeoNames Fulltextsearch : Vouliagmeni

GeoNames Home | Postal Codes | Download / Webservice | About

Vouliagmeni Greece

search show on map [advanced search]

5 records found for "Vouliagmeni"

Name	Country	Feature class	Latitude	Longitude
1 Vouliagméní Βουλιαγμένη	Greece ,	populated place population 7,717	N 37° 49' 0"	E 23° 47' 0"
2 Órmos Vouliagménis Ormos Zostiros,Vouliagmeni bay,Vouliagméní bay,Vuliasmeni Bay,Órmos Zostiros	Greece ,	bay	N 37° 48' 0"	E 23° 47' 0"
3 Límni Vouliagméní	Greece ,	lake	N 38° 2' 0"	E 22° 53' 0"
4 Vouliagméní Mileai,Miléai	Greece ,	populated place	N 37° 50' 0"	E 21° 36' 0"
5 Grecotel Vouliagmeni Suites	Greece	hotel	N 37° 58' 23"	E 23° 47' 36"

GeoNames Web Service

GeoNames - Windows Internet Explorer

http://www.geonames.org/maps/show

Map center : N 37° 55' 0" E 22° 41' 48"

powered by Google

searching for "Vouliagmeni country:GR"

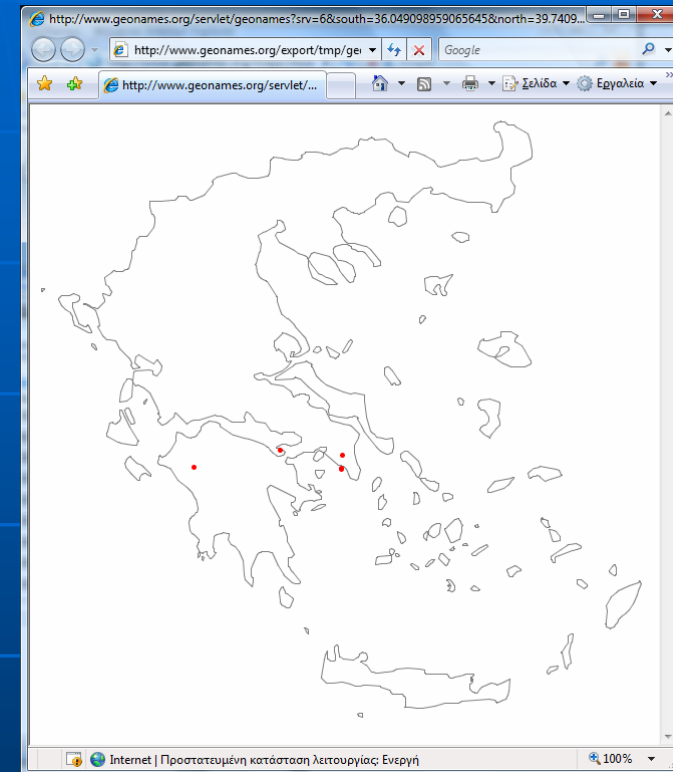
GeoNames Wikipedia

features

- city, village,...
- mountain, hill, rock,...
- stream, lake, ...
- country, state, region,...
- parks, area, ...
- road, railroad
- spot, building, farm
- forest, heath, ...
- undersea

	Name	country	feature
1	Vouliagmeni	Greece	populated pl
2	Όρμος Vouliagménis	Greece	bay
3	Lími Vouliagméní	Greece	lake
4	Vouliagmeni	Greece	populated pl
5	Grecotel Vouliagmeni Suites	Greece	hotel

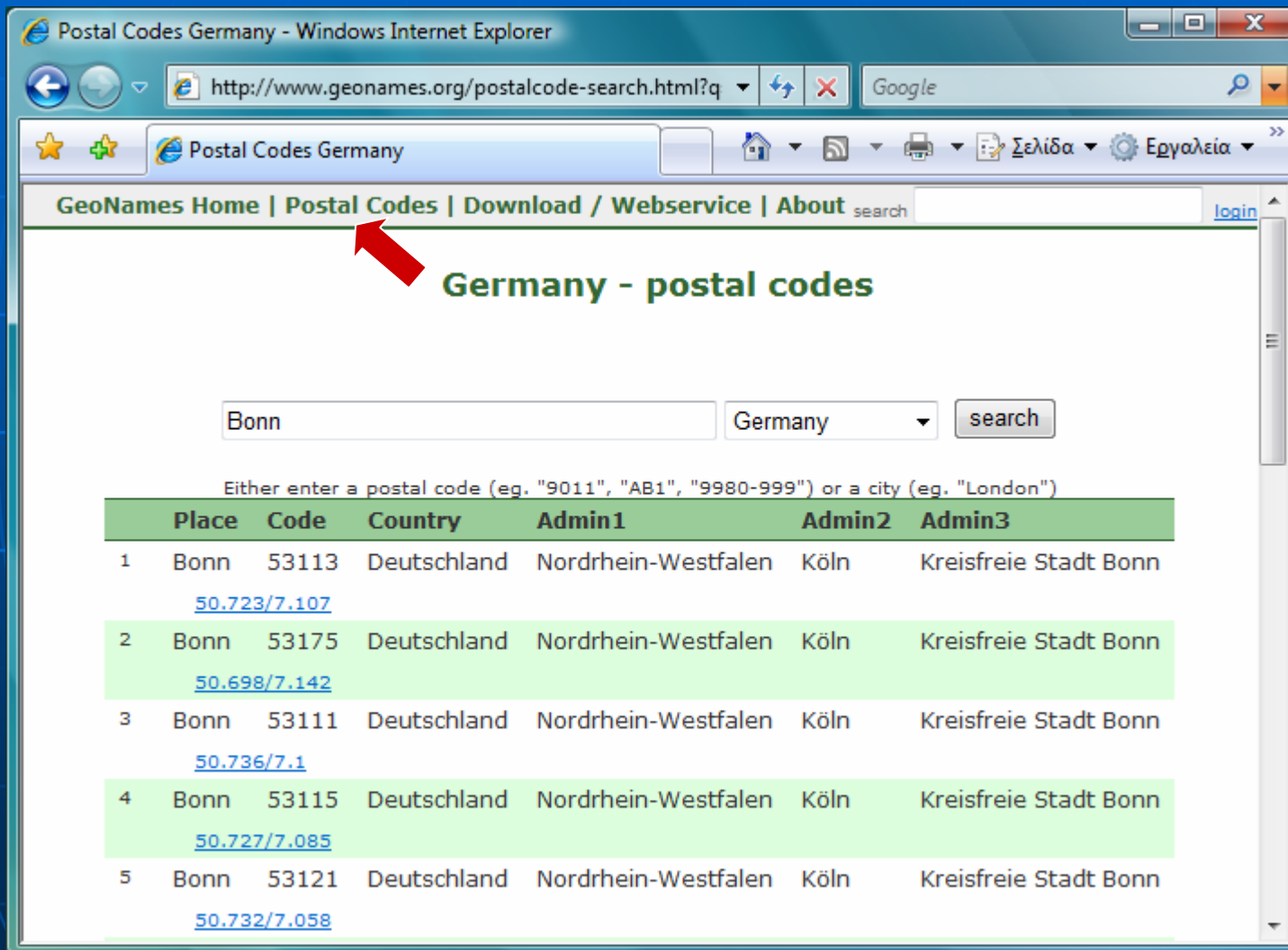
Export : csv , png



geonames58120 - Σημειωματάριο

Αρχείο	Επεξεργασία	Μορφή	Προβολή	Βοήθεια
GeoNameId	Name	Country	Latitude	Longitude
251773	Vouliagmeni	GR	37.81667	23.78333
251770	Όρμος Vouliagménis	GR	37.8	23.78333
251771	Lími Vouliagméní	GR	38.03333	22.88333
251772	Vouliagmeni	GR	37.83333	21.66
471480	Grecotel Vouliagmeni Suites	GR	37.9733	23.7936

GeoNames Web Service



Postal Codes Germany - Windows Internet Explorer

http://www.geonames.org/postalcode-search.html?q

Postal Codes Germany

GeoNames Home | **Postal Codes** | Download / Webservice | About search login

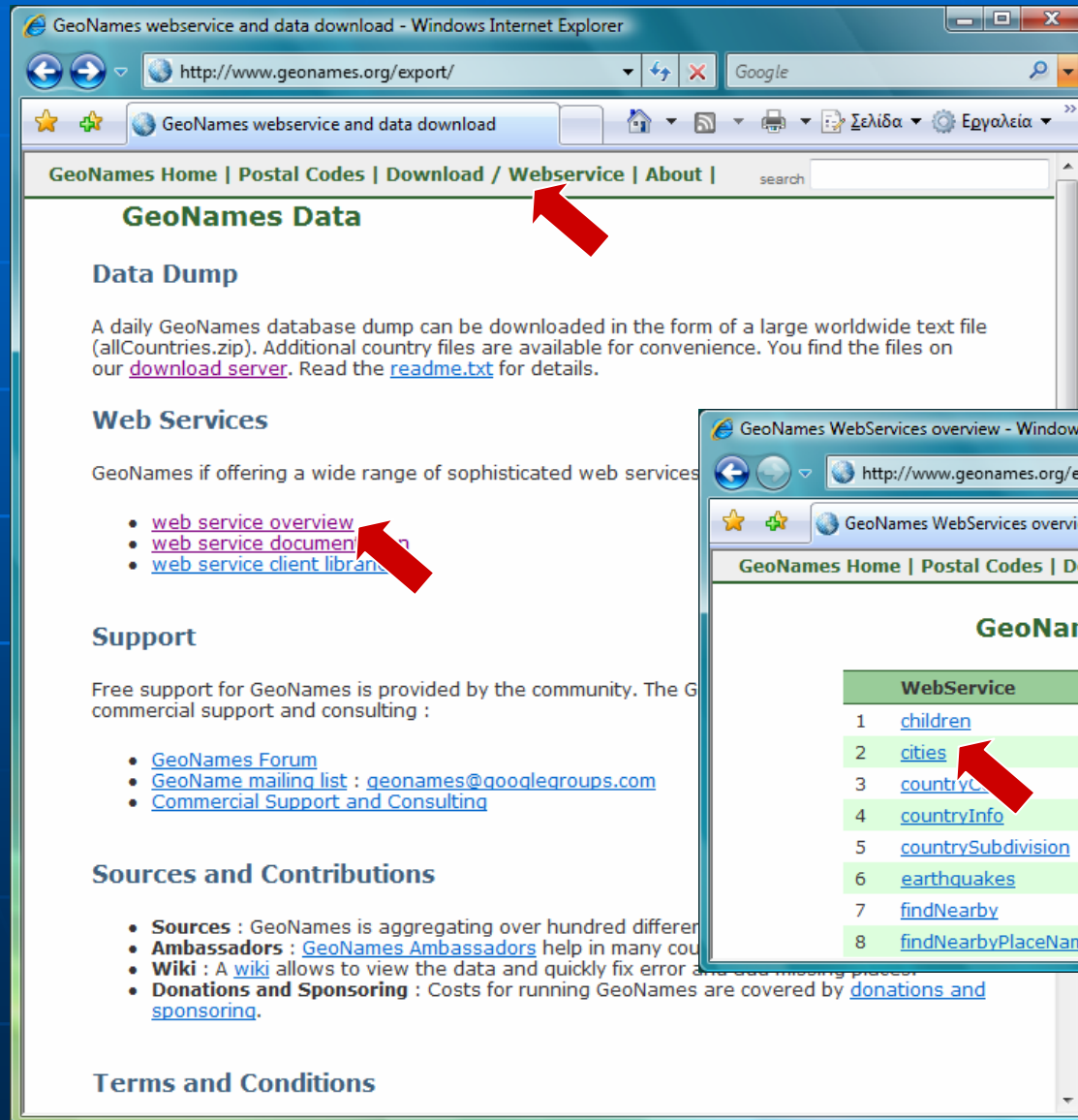
Germany - postal codes

Bonn Germany search

Either enter a postal code (eg. "9011", "AB1", "9980-999") or a city (eg. "London")

	Place	Code	Country	Admin1	Admin2	Admin3
1	Bonn	53113	Deutschland	Nordrhein-Westfalen	Köln	Kreisfreie Stadt Bonn 50.723/7.107
2	Bonn	53175	Deutschland	Nordrhein-Westfalen	Köln	Kreisfreie Stadt Bonn 50.698/7.142
3	Bonn	53111	Deutschland	Nordrhein-Westfalen	Köln	Kreisfreie Stadt Bonn 50.736/7.1
4	Bonn	53115	Deutschland	Nordrhein-Westfalen	Köln	Kreisfreie Stadt Bonn 50.727/7.085
5	Bonn	53121	Deutschland	Nordrhein-Westfalen	Köln	Kreisfreie Stadt Bonn 50.732/7.058

GeoNames Web Service



GeoNames webservice and data download - Windows Internet Explorer

http://www.geonames.org/export/

GeoNames Home | Postal Codes | Download / Webservice | About |

GeoNames Data

Data Dump

A daily GeoNames database dump can be downloaded in the form of a large worldwide text file (allCountries.zip). Additional country files are available for convenience. You find the files on our [download server](#). Read the [readme.txt](#) for details.

Web Services

GeoNames is offering a wide range of sophisticated web services

- [web service overview](#)
- [web service documentation](#)
- [web service client libraries](#)

Support

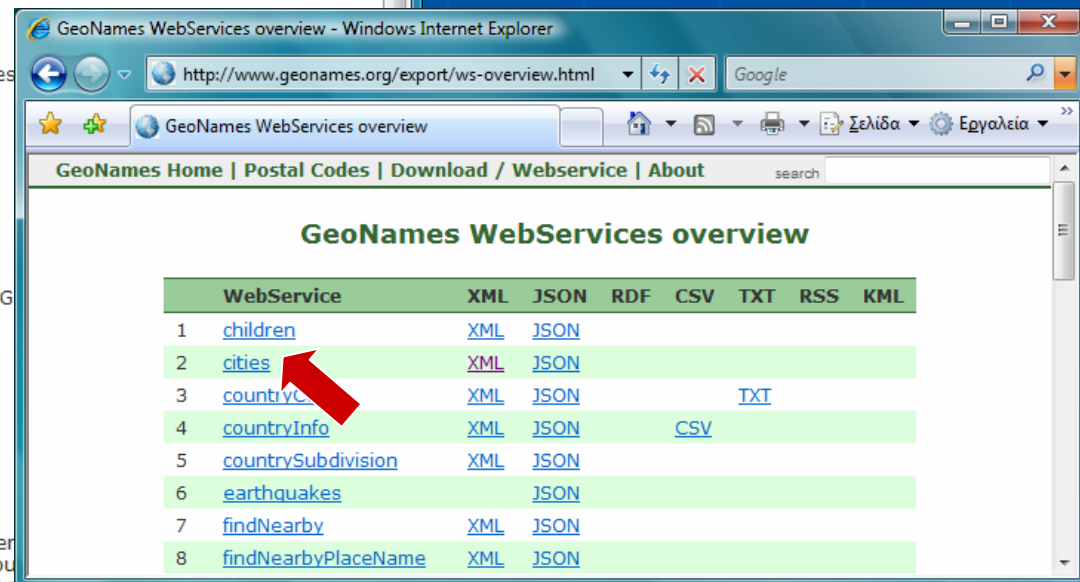
Free support for GeoNames is provided by the community. The commercial support and consulting :

- [GeoNames Forum](#)
- [GeoName mailing list : geonames@googlegroups.com](#)
- [Commercial Support and Consulting](#)

Sources and Contributions

- Sources** : GeoNames is aggregating over hundred different sources
- Ambassadors** : [GeoNames Ambassadors](#) help in many countries
- Wiki** : A [wiki](#) allows to view the data and quickly fix errors and add missing places
- Donations and Sponsoring** : Costs for running GeoNames are covered by [donations and sponsoring](#).

Terms and Conditions



GeoNames WebServices overview - Windows Internet Explorer

http://www.geonames.org/export/ws-overview.html

GeoNames Home | Postal Codes | Download / Webservice | About |

GeoNames WebServices overview

WebService	XML	JSON	RDF	CSV	TXT	RSS	KML
1 children	XML	JSON					
2 cities	XML	JSON					
3 countryCode	XML	JSON			TXT		
4 countryInfo	XML	JSON		CSV			
5 countrySubdivision	XML	JSON					
6 earthquakes		JSON					
7 findNearby	XML	JSON					
8 findNearbyPlaceName	XML	JSON					

GeoNames Web Service

[http://ws.geonames.org/cities?](http://ws.geonames.org/cities?north=38.3&south=37.6&east=24.1&west=23.0)
north=38.3&
south=37.6&
east=24.1&
west=23.0



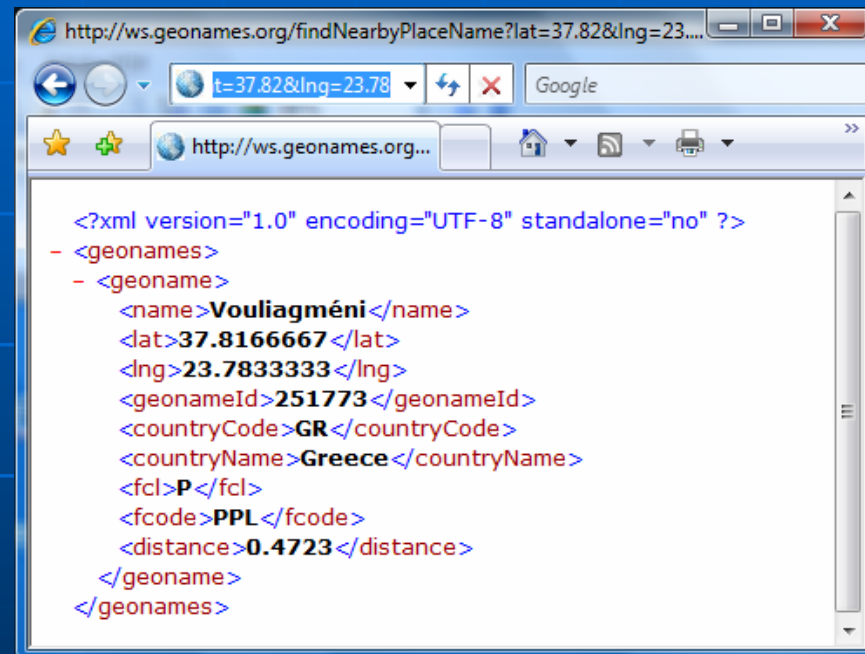
```
http://ws.geonames.org/cities?north=38.3&south=37.6&east=24.1&west=23.0
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
- <geonames>
- <geoname>
  <name>Athens</name>
  <lat>37.9833333</lat>
  <lng>23.7333333</lng>
  <geonameId>264371</geonameId>
  <countryCode>GR</countryCode>
  <countryName>Greece</countryName>
  <fcl>P</fcl>
  <fcode>PPLC</fcode>
</geoname>
- <geoname>
  <name>Piraeus</name>
  <lat>37.9474464019929</lat>
  <lng>23.6370849609375</lng>
  <geonameId>255274</geonameId>
  <countryCode>GR</countryCode>
  <countryName>Greece</countryName>
  <fcl>P</fcl>
  <fcode>PPL</fcode>
</geoname>
- <geoname>
  <name>Peristérion</name>
  <lat>38.0166667</lat>
  <lng>23.7</lng>
  <geonameId>255524</geonameId>
  <countryCode>GR</countryCode>
  <countryName>Greece</countryName>
  <fcl>P</fcl>
  <fcode>PPL</fcode>
</geoname>
```

GeoNames Web Service

<http://ws.geonames.org/findNearbyPlaceName?>

lat=37.82&

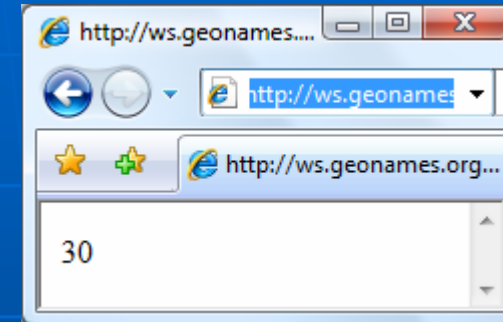
lng=23.78



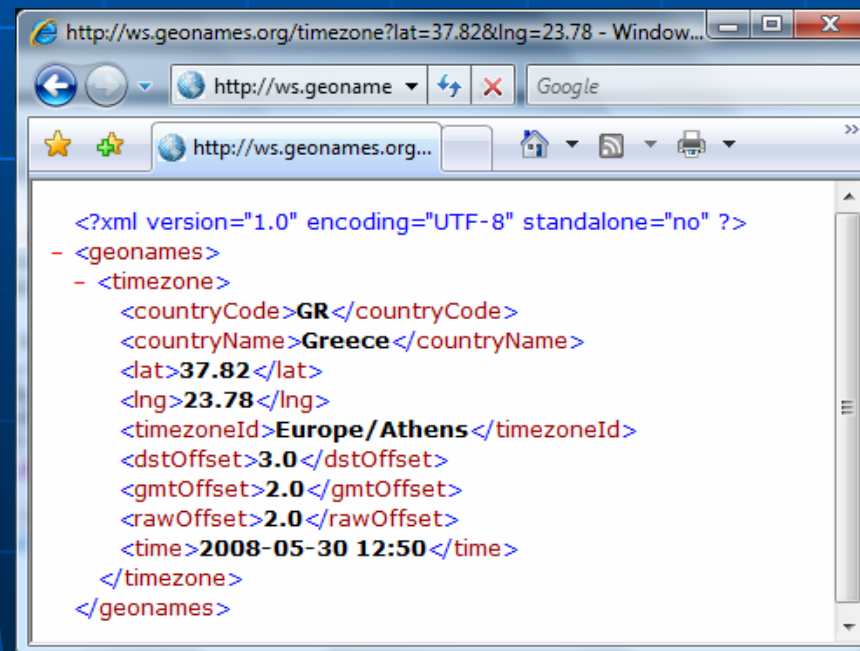
```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
- <geonames>
- <geoname>
  <name>Vouliagméni</name>
  <lat>37.8166667</lat>
  <lng>23.7833333</lng>
  <geonameId>251773</geonameId>
  <countryCode>GR</countryCode>
  <countryName>Greece</countryName>
  <fcl>P</fcl>
  <fcode>PPL</fcode>
  <distance>0.4723</distance>
</geoname>
</geonames>
```

GeoNames Web Service

[http://ws.geonames.org/gtopo30?](http://ws.geonames.org/gtopo30?lat=37.82&lng=23.78)
lat=37.82&
lng=23.78

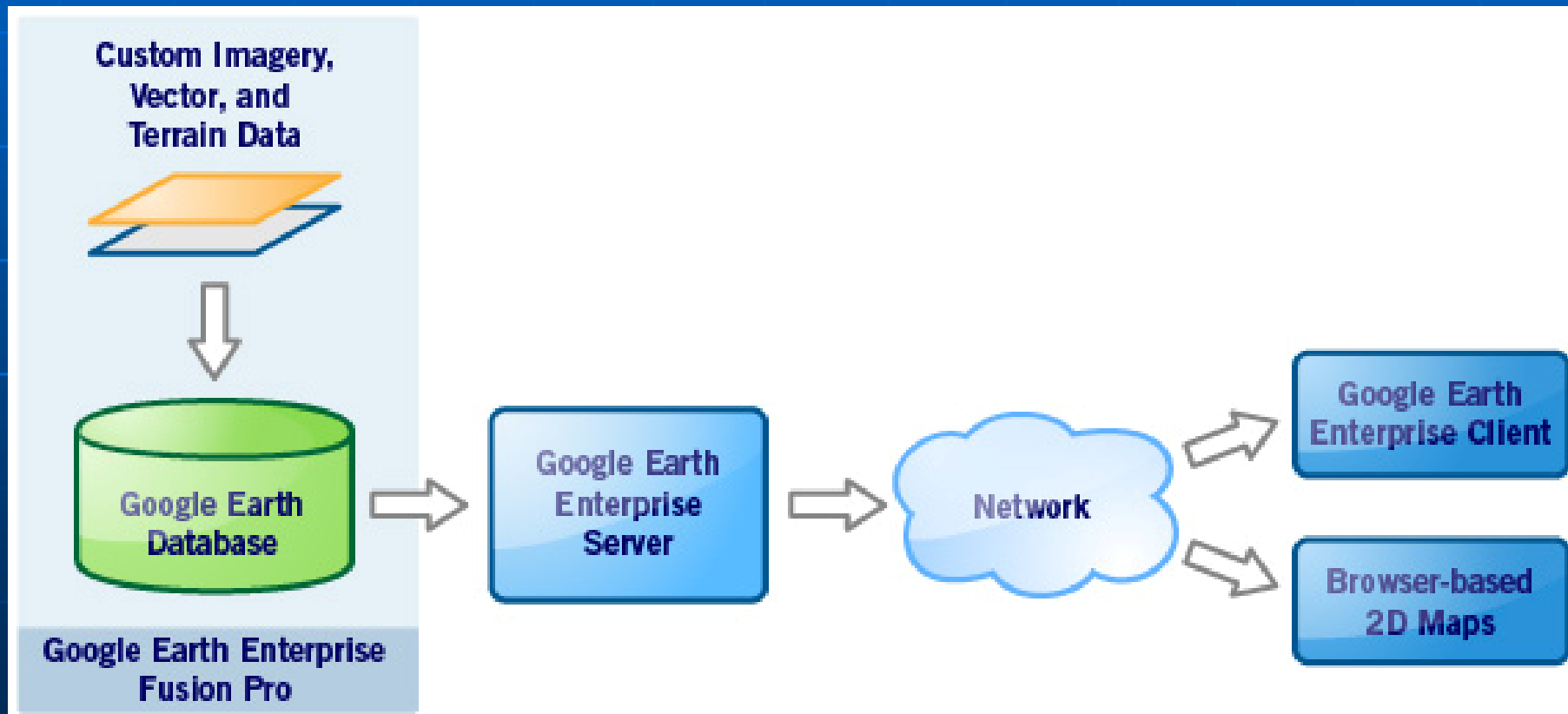


[http://ws.geonames.org/timezone?](http://ws.geonames.org/timezone?lat=37.82&lng=23.78)
lat=37.82&
lng=23.78



Google Earth's technology

- Explore Google Earth Database...



Google Earth's technology

- Google Earth provides ...
 - images/photographs cover the entire globe
 - taken sometime during the last three years
 - updated on a rolling basis
 - resolution varies from place to place
 - allows the user to see major geographic features and man-made development (towns and major roads)
 - for most of the major cities in US, Canada, Western Europe, and UK the resolution is high
 - 15cm to 1m (details for buildings, cars, humans)

Google Earth's technology

- The coordinate system used ...
 - the standard **WGS84 datum**
- All images / photographs ...
 - are geo-referenced to this system
- All terrain data / GIS data ...
 - also stored and represented in this datum

Google Earth's Database

- Data provided by Google Earth ...
 - is mainly retrieved from Google Maps and
 - several satellite and aerial datasets
 - including private Keyhole images
 - DTM by NASA's Shuttle Radar Topography Mission
- Google Maps ...
 - is a Web map server maintained by Google
 - such as Mapquest or Yahoo!Maps
 - provides ...
 - high-resolution satellite imagery and aerial photography
 - International street-level datasets
 - many other map-based services

Google Maps

Google Maps - Windows Internet Explorer

http://maps.google.com/maps?hl=en&tab=wl

google maps technology

Google Maps

Web Images Maps News Shopping Mail more

estef@hua.gr | My Profile | Help | Web History | My Account | Sign out

Google Maps e.g., "10 market st, san francisco" or "hotels near lax"

Search Maps Show search options

Search the map Find businesses Get directions

Search Results My Maps

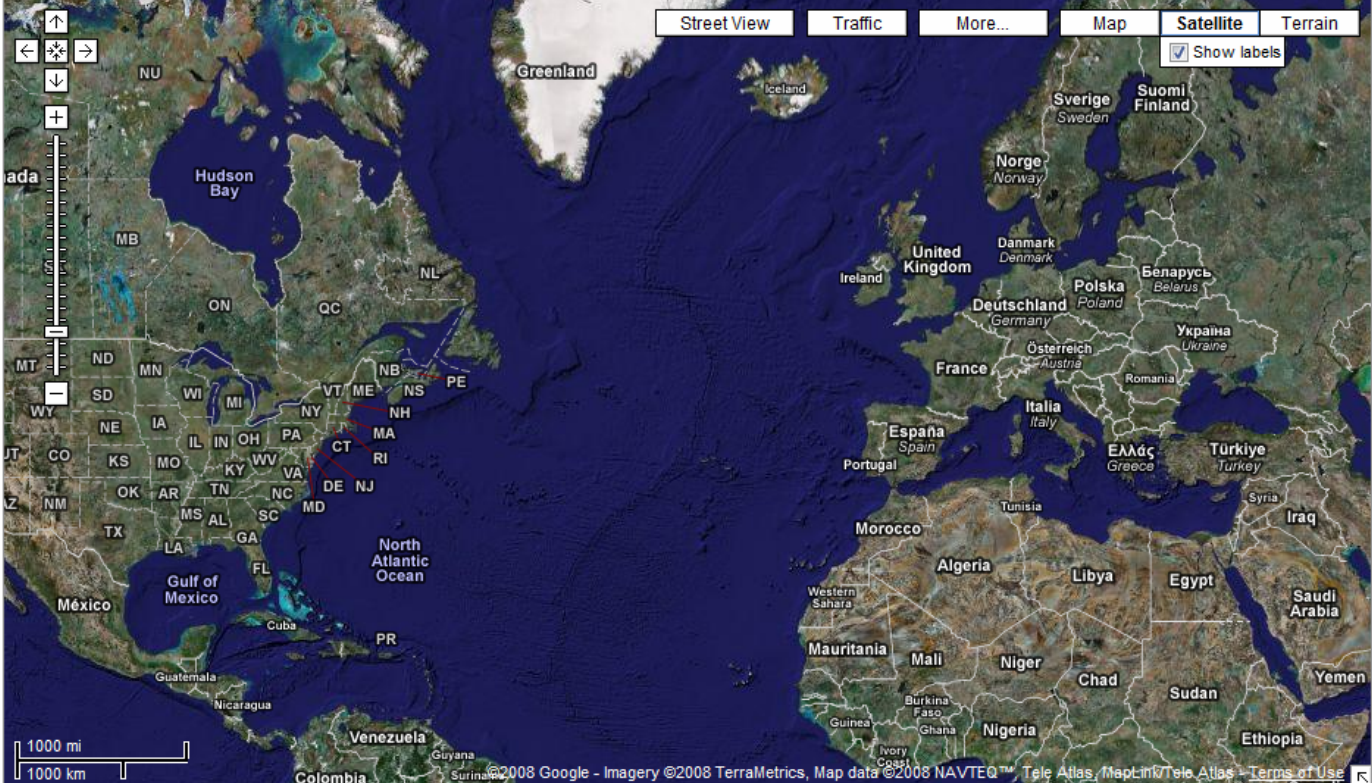
Print Send Link to this page

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Display your ads on Google Maps



Street View Traffic More... Map Satellite Terrain

Show labels

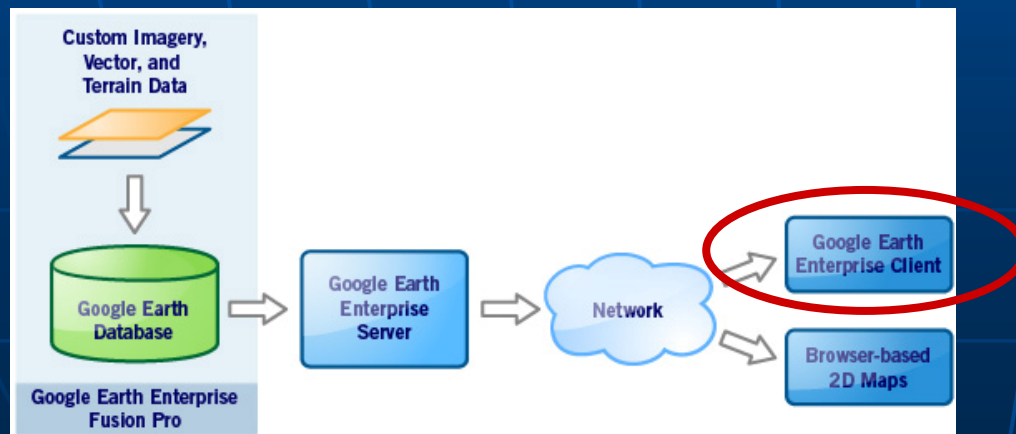
1000 mi 1000 km

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The image shows a satellite view of a map centered on North America, with labels for various countries and regions including Greenland, Iceland, United Kingdom, France, Germany, Italy, Spain, Portugal, Morocco, Algeria, Libya, Egypt, Saudi Arabia, and others. The map includes a scale bar at the bottom left and a copyright notice at the bottom center.

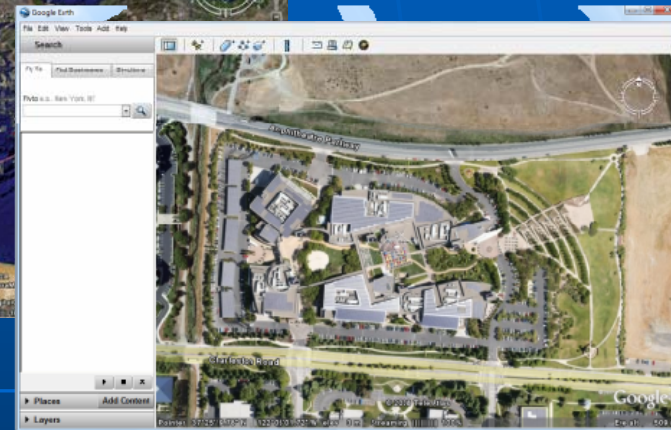
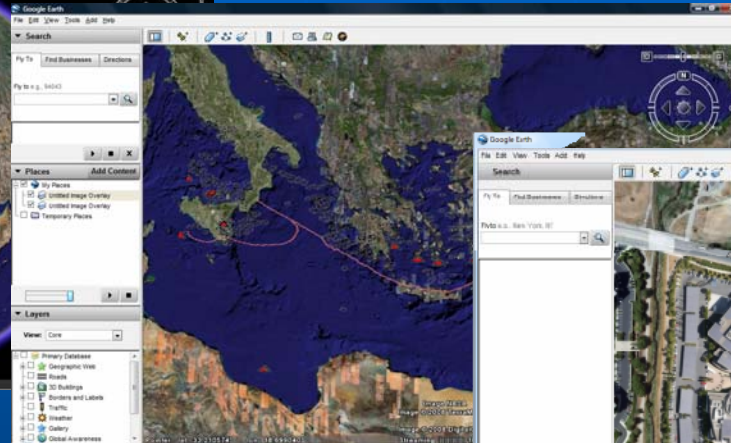
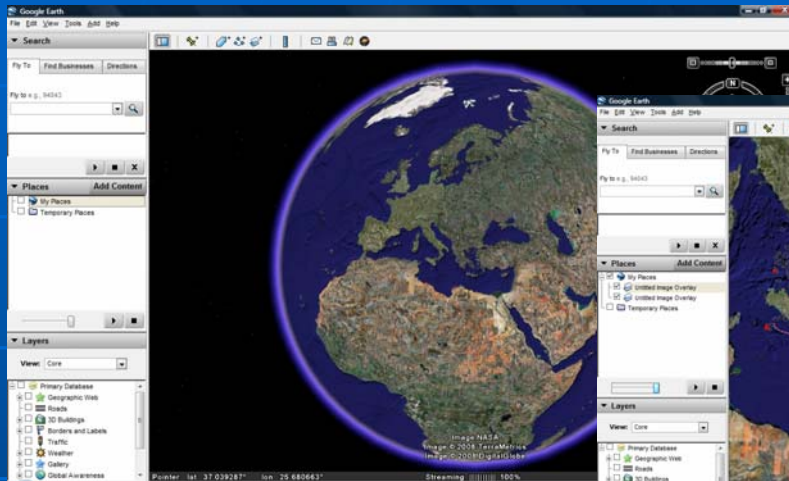
Google Earth Client

- Google Earth Client ...
 - a 3D visualization of
 - the earth
 - ... and more
 - integrates, organizes and publishes location data on Google Maps



Google Earth Client

<http://earth.google.com/>







Google SketchUp - Windows Internet Explorer

http://sketchup.google.com/intl/en/ google earth warehouse

Google SketchUp

Change language: English

Google SketchUp

Welcome to Google SketchUp


Google SketchUp is 3D for everyone

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Google SketchUp is software that you can use to create, modify and share 3D models. It's easier to learn than other 3D modeling programs, which is why so many people are already using it.

We designed SketchUp's simplified toolset, guided drawing system and clean look-and-feel to help you concentrate on two things: getting your work done as efficiently as possible, and having fun while you're doing it.


» [Learn more about Google SketchUp \(Free\)](#)



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3D Warehouse - Windows Internet Explorer

http://sketchup.google.com/3dwarehouse/

3D Warehouse

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[Prairie Cliff House](#)

Olympic Velodrome, Athens by zappy bibicy - Google 3D Warehouse - Windows Internet Explorer

http://sketchup.google.com/3dwarehouse/details?mid=d3afd381dcd8ca7f22e1c4d1

google earth warehouse

Olympic Velodrome, At... National Indoor Stadium, ...

Sign In

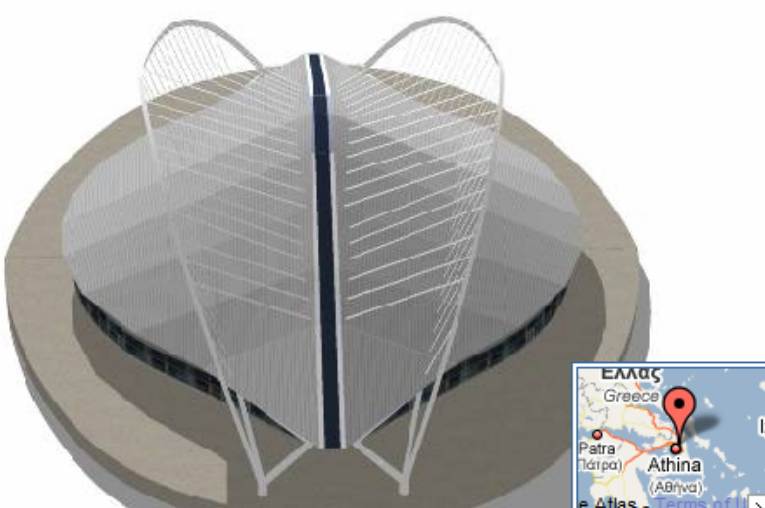
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3D Warehouse

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Olympic Velodrome, Athens by [zappy bibicy](#) Uploaded on

Image Map



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[Immeuble Dakar](#)

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The Acropolis by Dimitris Kaloudas - Google 3D Warehouse - Windows Internet Explorer


http://sketchup.google.com/3dwarehouse/details?mid=86add1ad373b067c70dc36e

Google
3D Warehouse

Search for: Models Collections

The Acropolis by [Dimitris Kaloudas](#)

Image **Map**



Download Model

Collections containing this model

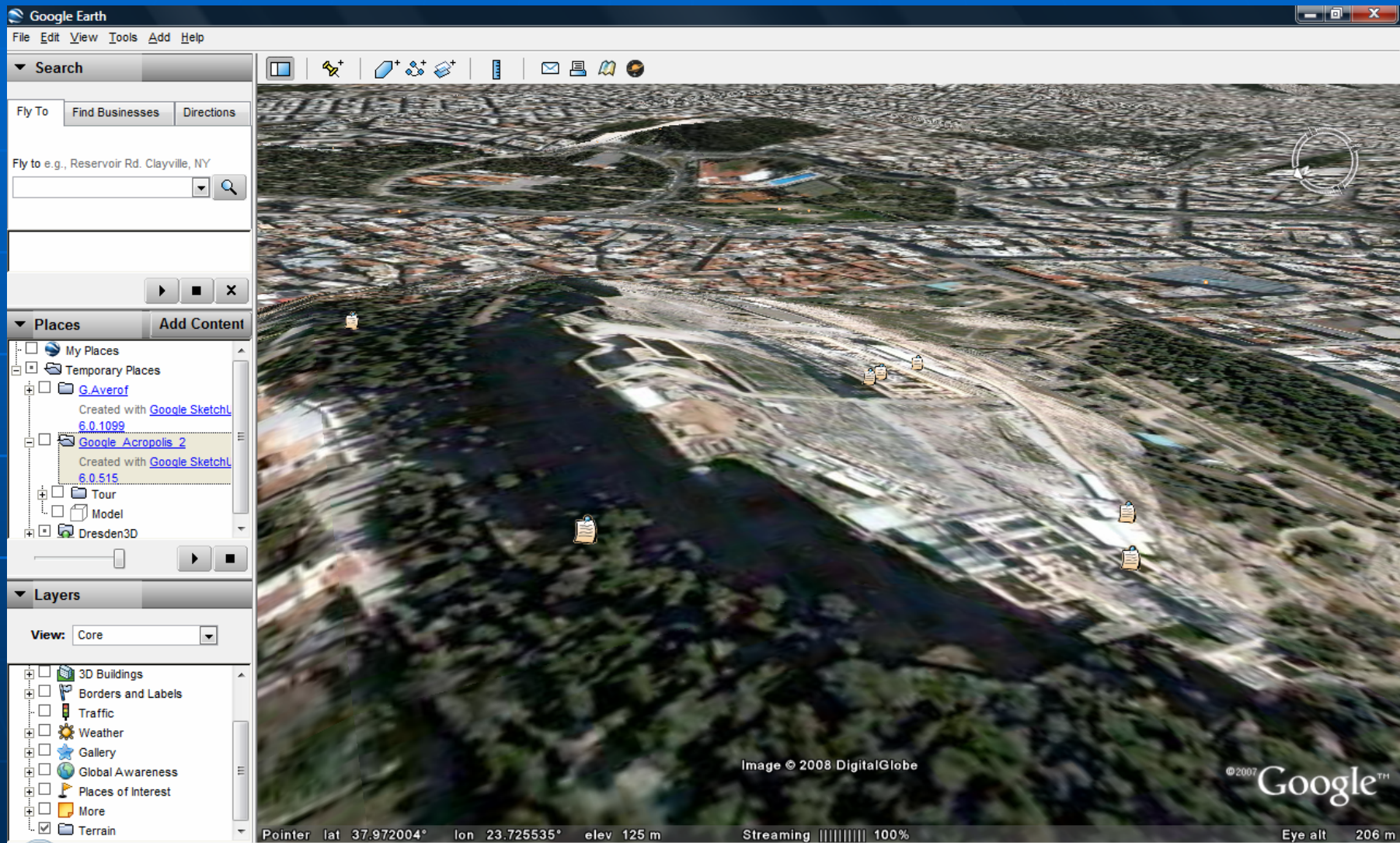
Europe

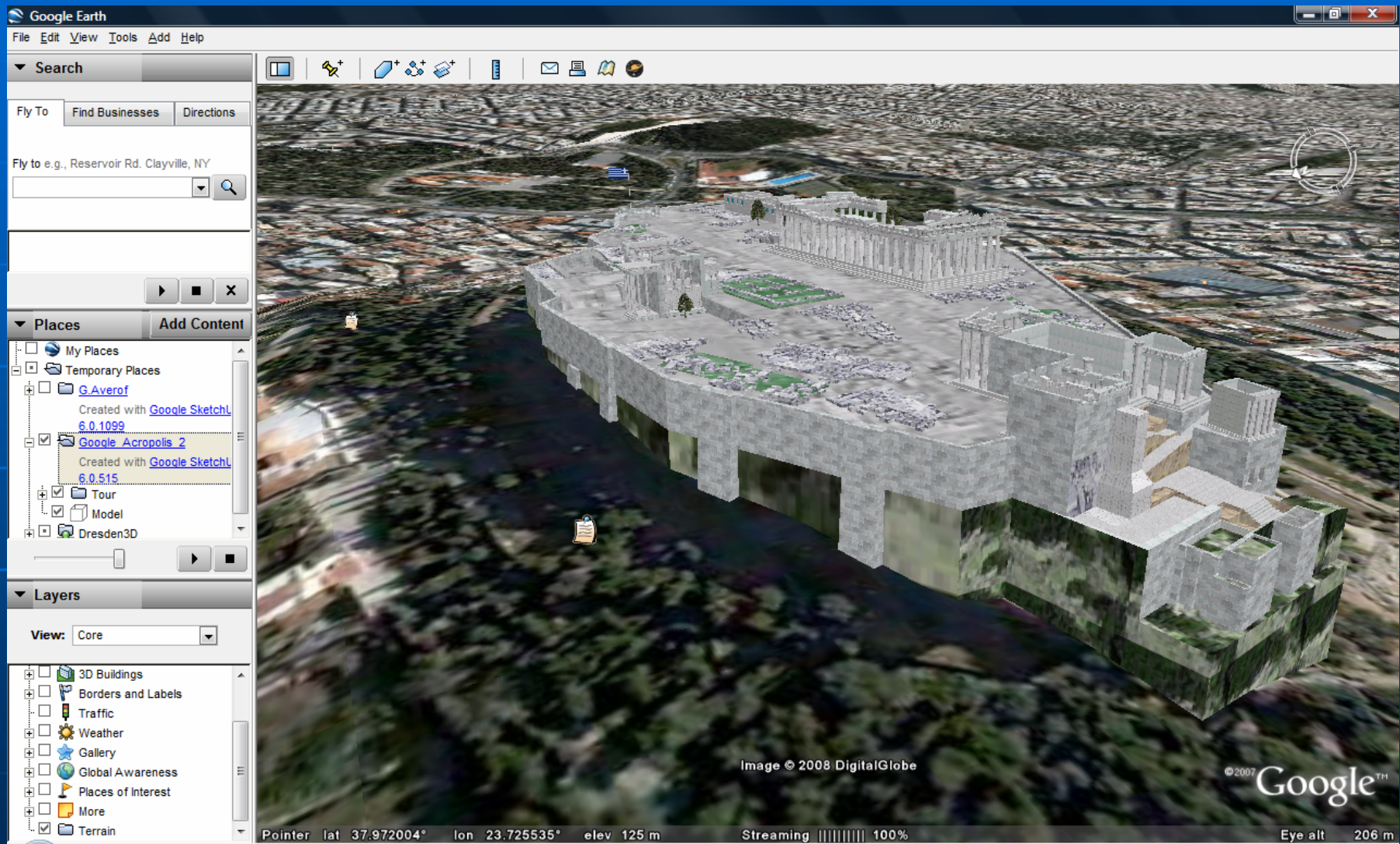
Related items

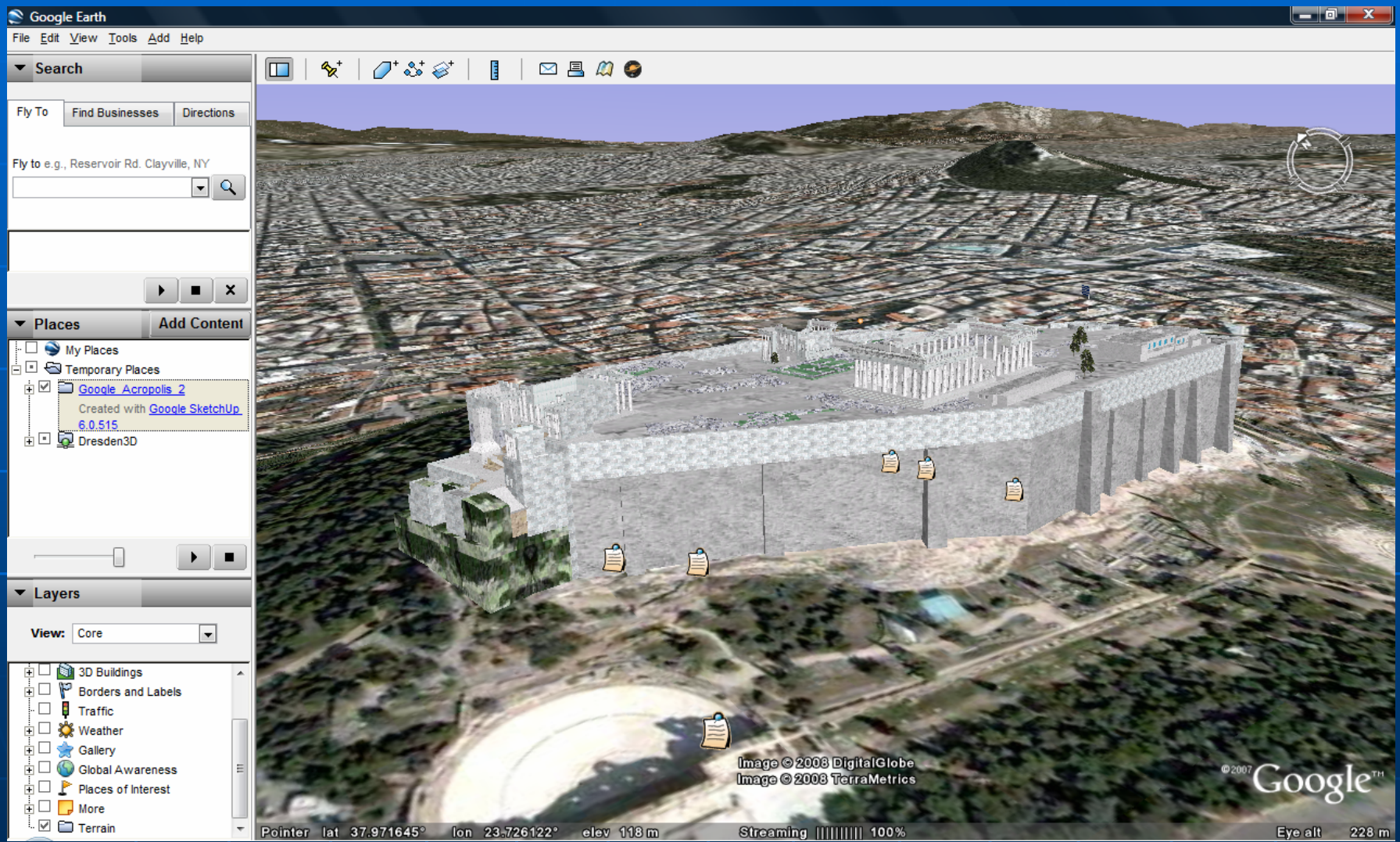
More models by [Dimitris Kaloudas](#):

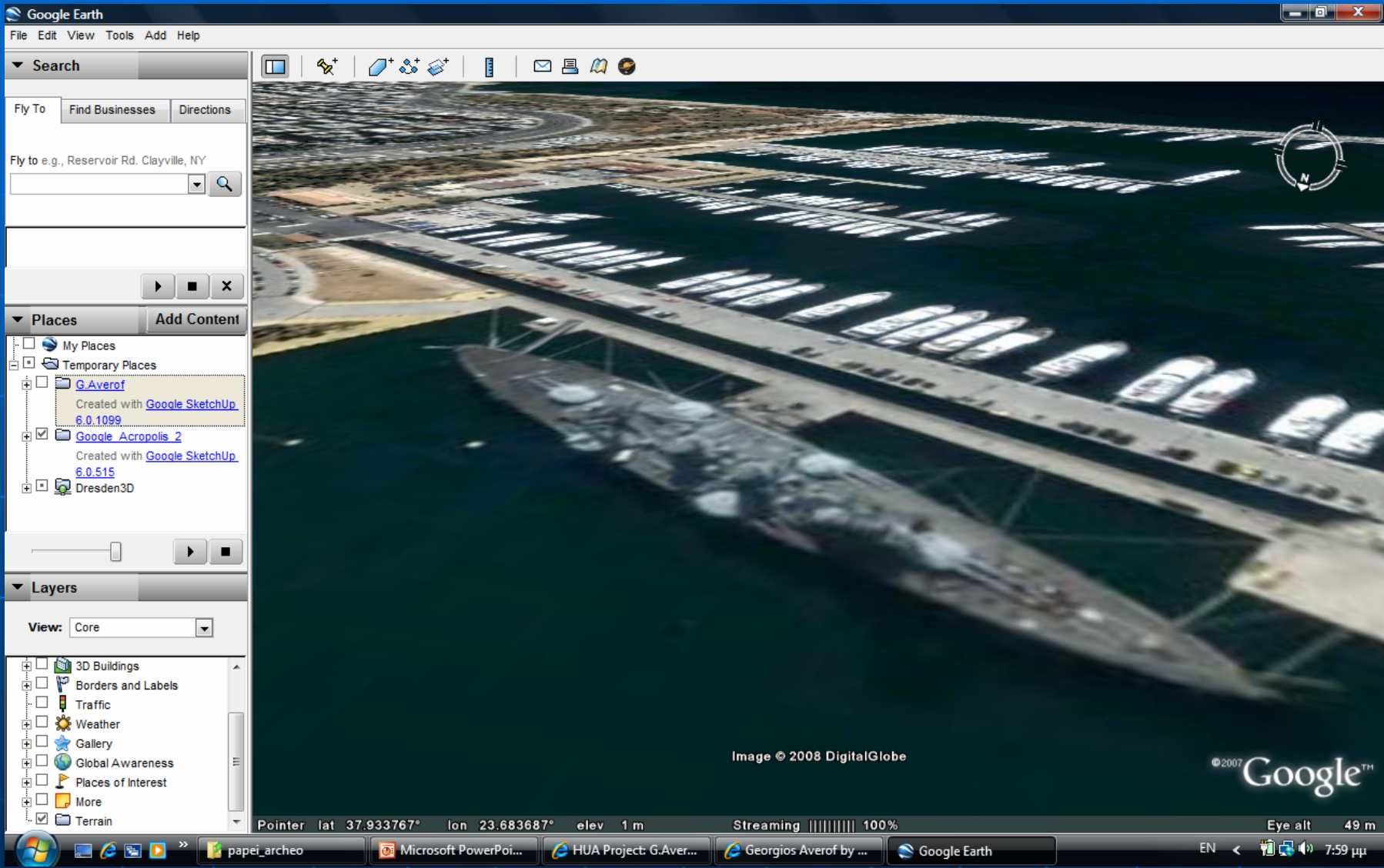
Herodion theater

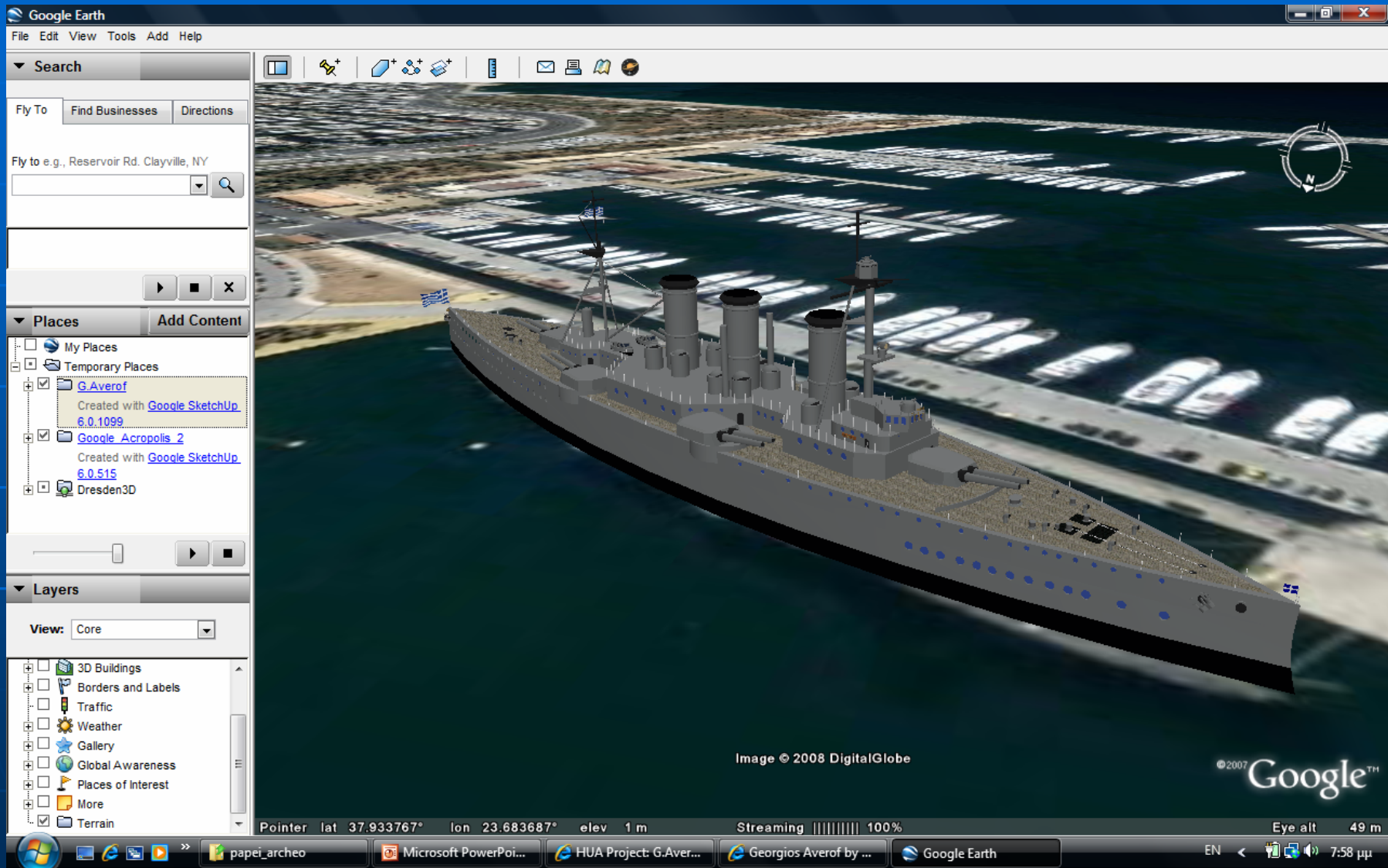
Other models you might like:











Fly To Local Search Directions

e.g. 37 25.818' N, 122 05.36' W

Places

Community layer in the default

Google Earth default view. Edit/Snapshot a new view to

Temporary Places

- ~GE1D.kmz
 - Transportation to Harokopio University
 - Public Transport
 - Μέσα Μαζικής Μεταφοράς
 - Points of interest
 - Κωμικά σημεία
 - Access By Car
 - Οδική Πρόσβαση

Layers

- Layers
 - terrain
 - Geographic Web
 - Featured Content
 - Global Awareness
 - roads
 - 3D Buildings
 - borders
 - Populated Places
 - Alternative Place Names
 - Dining
 - Lodging
 - Google Earth Community
 - Shopping and Services
 - Transportation

Google Earth Community: Viewing forum: KML Discussions - Microsoft Internet Explorer

Address <http://bbs.keyhole.com/ubb/postlist.php/Cat/0/Board/SupportKML>

Search Athens HUA

Google Earth Community

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New user · Who's Online · FAQ · KML Reference · GE Guide

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Subject	Poster	Views	Replies	Rating	Last post
Large imagery/terrain update - June 2nd, 2007	PenguinOpus	25839	0	★★★★	06/02/07 09:56 AM
Google Earth 4.1	philverney	1047			
New Google Earth layers release - 10th April	philverney	1411			
Search for KML in Google Earth	Lrae	1494			
New Support Forums	Lrae	448			

Athens HUA - Αναζήτηση Google - Microsoft Internet Explorer

Address <http://www.google.com/custom?cx=015886696515580526130%3A2q6y4vf4wgk&q=Athens+HUA&cof=GF>

Search Athens HUA

Google Earth Community Αναζήτηση στον παγκόσμιο ιστό

Αποτελέσματα 1 - 3 για Athens HUA. (0.05 δευτερόλεπτα)

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Αθηνών / Harokopio University of Athens <http://www.hua.gr/></description> ...
For line 1: <http://www.athens-trolley.gr/Network.aspx?l=1> Για την γραμμή 5 ...
bbs.keyhole.com/ubb/download.php?Number=622056 - 210k -
Προσωρινά αποθηκευμένη

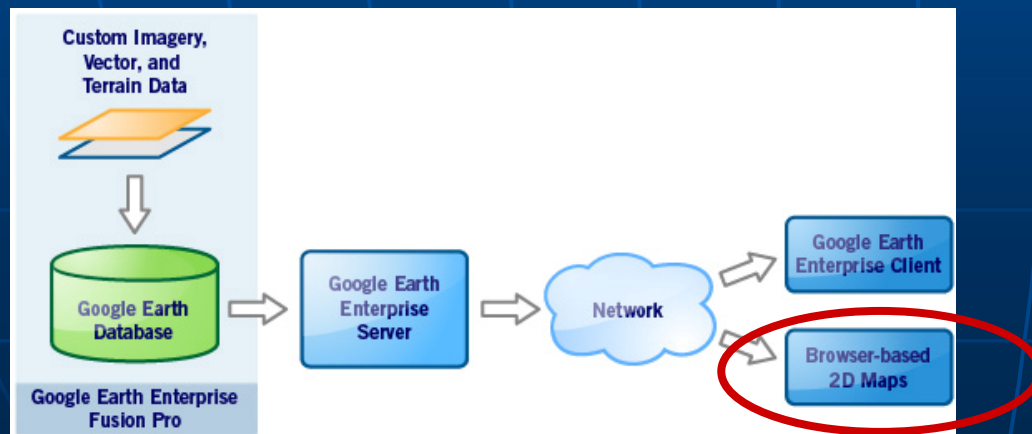
US ...
Name = AHX:ATHENS-NDR Latitude = 32.1593 Longitude = -95.8302 ID = HUA St = 1

Address: Citigroup Tower No.33 Hua Yuan Shi Qiao Road , Lu Jia Zui Finance 52 Days

<http://bbs.keyhole.com/ubb/download.php?Number=622056>

Google Maps API

- Allows Google Maps + user data
 - being integrated into web-based applications
 - viewed by any user, regardless of their client software



Google Maps API

- API ...

- Application Programming Interface
- A source code interface that an...
 - operating system,
 - library or
 - service

... provides to support requests made by computer programs

Google Maps API

- Google Maps API
 - created by Google
 - to facilitate developers integrating Google Maps into their web sites with their own data points
 - It is a free service
 - currently does not contain ads,
 - Google reserves the right to display ads in the future

Google Maps API

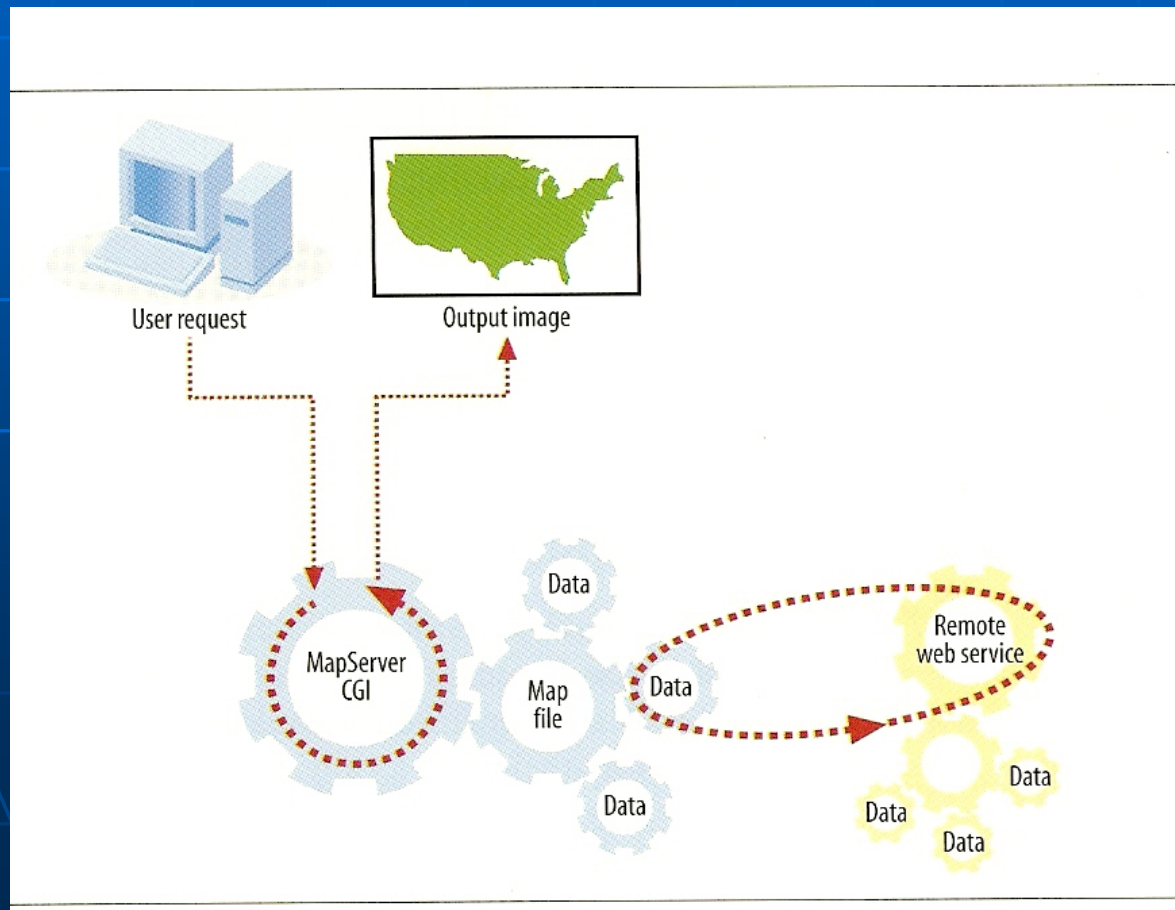
- Lets you embed Google Maps ...
 - in web pages
 - with JavaScript
- Provides a number of utilities for
 - manipulating maps
 - adding content to the map
 - through a variety of services

Google Maps API

- **Mapping Mashups...**
 1. the Google Map API along with others
 2. the Web 2.0 technologies... lead to an expansion of the so-called mapping mashups
- **Mashup is...**
 - a website or Web application that
 - uses content from more than one source to create a completely new Web service

Google Maps API

- Mapping Mashups...



Google Maps API

- The full Google Maps ...
 - can be embedded on an external web site
- Start by creating an API Key
 - it will be bound to the web site and directory
- Creating the map interface involves...
 - adding the Google JavaScript code to the web page, and
 - using Javascript functions to add points / objects to the map


```
GlInGR - Σημειωματάριο
Αρχείο Επεξεργασία Μορφή Προβολή Βοήθεια

<html>

<script src="http://maps.google.com/maps?file=api&v=2&
key=ABQIAAAAtNxdreQp4EAvf3ECF28WHhSubF171VHwydoYiEmf
3h21QVKzHBT4QGIPZ6akBuhlNZG6MXdRn3psHw"
type="text/javascript"></script>
<script type="text/javascript">

function load() {

    var map = new GMap(document.getElementById("map"));
    map.centerAndZoom(new GPoint(23.708211,37.961252), 3);
    map.setMapType(G_MAP_TYPE);

    var point = new GPoint(23.708211,37.961252);
    var marker = new GMarker(point);
    map.addOverlay(marker);
}

</script>

<body onload="load()" onunload="GUnload()">

    <h1>HAROKOPIO UNIVERSITY</h1>
    <div id="map" style="width: 450px; height: 350px" </div>

</body>

</html>
```

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

Google Earth API - Google Code

Google Earth API

Home Docs Blog Group Terms

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

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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Learn more about the Google Earth API

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 API - Google Code - Windows Internet Explorer

http://code.google.com/apis/earth/


Google Earth API - Google Code

Home Docs Blog Group Terms

Google Earth API

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4.3.9477.6413

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4. Review the Google Earth [API](#).

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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.

```
earth[1] - Σημειωματάριο
Αρχείο Επεξεργασία Μορφή Προβολή Βοήθεια
<script src="http://www.google.com/jsapi?key=ABQIAAAA5E150zA4PeDTEmlv-
sXFfRSsTL4WIgXHmZ0ZK_kHjwHeQuOD4xTdBhxbkZWuzyYTVeclkwYHpb17ZQ"></script>
<script>
google.load("earth", "1");
var ge = null;

function init() {
  google.earth.createInstance("map3d", initCallback, failureCallback);
}

function initCallback(object) {
  ge = object;
  ge.getWindow().setVisibility(true);
  var cam = ge.getView().copyAsCamera(ge.ALTITUDE_ABSOLUTE);
  cam.setAltitude(12000000);
  ge.getView().setAbstractView(cam);
  ge.getNavigationControl().setVisibility(ge.VISIBILITY_SHOW);
  document.getElementById('geplugin_version').innerHTML = ge.getPluginVersion();
}


function failureCallback(object) {
}
</script>
```

Google Earth Plugin - Interactive Samples - Windows Internet Explorer

http://www.google.com/earth/plugin/examples/samples/

Google Earth Plugin - Interactive Samples

Google Earth Plugin / Interactive Samples Version: 4.3.9477.6413 Startup time: 0.162s



Use log(string or number or object) to write output here

Camera control

- [Move camera](#) run
- [Move camera w/timeout](#) run
- [Tilt view](#) run

Placemarks and geometry

- [Create Placemark](#) run
- [Create ScreenOverlay](#) run
- [Create ScreenOverlay frame](#) run
- [Create LineString](#) run
- [LineString style](#) run
- [Create Polygon](#) run

Run code

```

var placemark = ge.createPlacemark('');
placemark.setName("placemark" + counter);
ge.getFeatures().appendChild(placemark);

// Create style map for placemark
var normal = ge.createIcon('');
normal.setHref('http://maps.google.com/mapfiles/kml/paddle/red-circle.png');
var iconNormal = ge.createStyle('');
iconNormal.getIconStyle().setIcon(normal);
var highlight = ge.createIcon('');

```


Google Maps

Google Maps - Windows Internet Explorer

http://maps.google.com/maps?hl=en&tab=wl

google maps technology

Google Maps

Web Images Maps News Shopping Mail more

estef@hua.gr | My Profile | Help | Web History | My Account | Sign out

Google Maps e.g., "10 market st, san francisco" or "hotels near lax"

Search Maps Show search options

Search the map Find businesses Get directions

Search Results My Maps

Browse popular maps

- [New Myanmar \(Burma\) Maps](#)
- [Popular user-created maps](#)
- [Places of Interest](#)
- [See more maps](#)

Put your business on Google Maps

Display your ads on Google Maps

Street View Traffic More... Map Satellite Terrain

Show labels

1000 mi 1000 km

©2008 Google - Imagery ©2008 TerraMetrics, Map data ©2008 NAVTEQ™, Tele Atlas, MapLink/Tele Atlas - Terms of Use



Search the map Find businesses Get directions

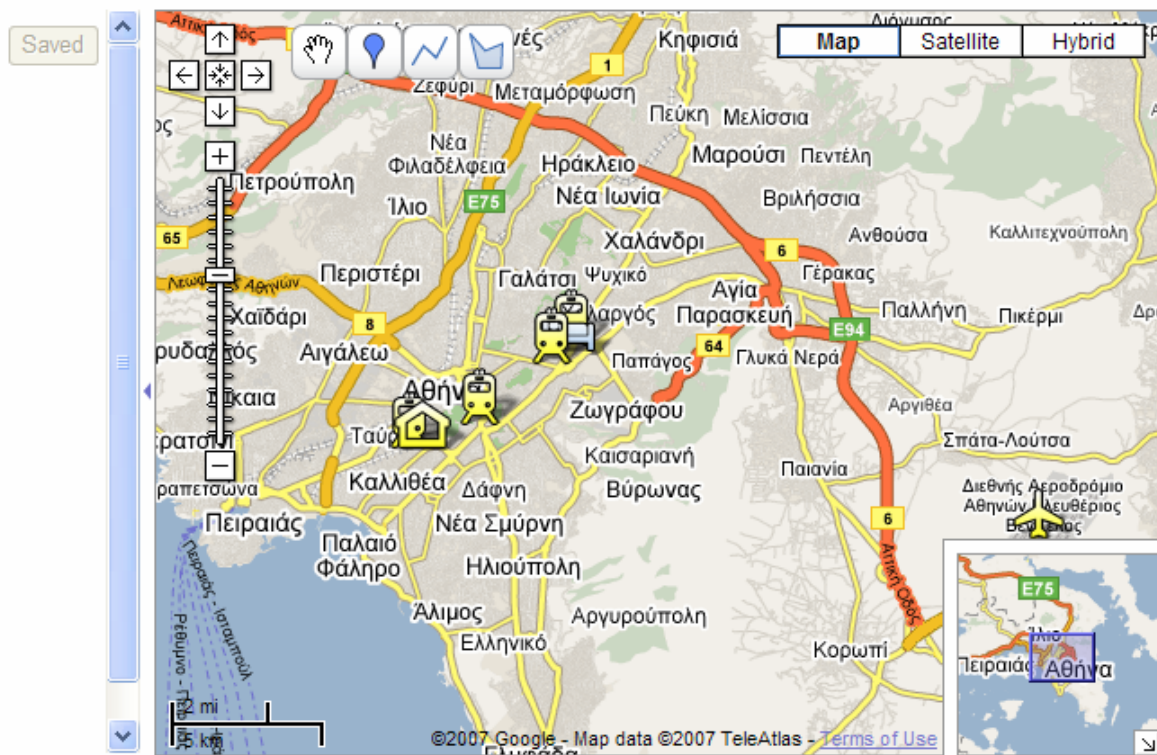
Search Results My Maps

KML Print Email Link to this page

My Maps - Create new map

HOTEL PRESIDENT
how to reach your hotel from
Public - [Edit title/settings](#)
Created by eipd on May 17

- [PANORMOU STATION](#)
- [AMPELOKIPOI STATION](#)
- [HOTEL PRESIDENT](#)
- [AIRPORT \(EL.VENIZELOS\)](#)
- [HUA](#)
- [TAVROS STATION](#)
- [AKROPOLI STATION](#)



Google Maps - Windows Internet Explorer

http://maps.google.com:80/maps/ms?ie=UTF8&hl=en&msa=0&om=1&msid=115683686283263188475.000001129c50cc7778752&ll=37.972621,23.81321&sfn=0.17673,0.31929&z=12

Δρχειο Επεξεργασία Προβολή Αγαπημένα Εργαλεία Βοήθεια

Google G Go [Icons] Bookmarks 43 blocked Check AutoLink Settings

Google Maps

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Google Maps Search Maps

Search the map Find businesses Get directions

Search Results My Maps KML Print Email Link to this page

My Maps - Create new map Saved

HOTEL PRESIDENT
how to reach your hotel from

AKROPOLI STATION

©2007 Google - Map data ©2007 TeleAtlas - Terms of Use

Internet 100%

http://maps.google.com/maps/ms
?ie=UTF8&hl=en
&msa=0
&om=1
&msid=115683686283263188475.00000
1129c50cc7778752
&ll=37.972621,23.81321
&sfn=0.17673,0.31929
&z=12

Google Maps - Windows Internet Explorer

http://maps.google.com:80/maps/ms?ie=UTF8&hl=en&msa=0&om=1&msid=115683686283263188475.000001129c50cc7778752&output=kml

Δρχείο Επεξεργασία Προβολή Αγαπημένα Εργαλεία Βοήθεια

Google G Go [Icons] Bookmarks 43 blocked Check AutoLink Settings

Google Maps

Web Images Video News Maps Mail more eipd@otenet.gr Saved Locations Help Web History My Account Sign out

Google Maps Search Maps

Search the map Find businesses Get directions

Search Results My Maps

My Maps - Create new map Saved

HOTEL PRESIDENT

how to reach your hotel from

Public - E Created by

PA AM HO AIR HU TA AK

Map Satellite Hybrid

KML Print Email Link to this page

```

<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.1">
<Document>
  <name>HOTEL PRESIDENT</name>
  <description><![CDATA[how to reach your hotel from
]]></description>
  <NetworkLink>
    <Url>
      <name>HOTEL PRESIDENT</name>
      <href>http://maps.google.com/maps/ms?ie=UTF8&hl=en&om
=1&msa=0&msid=115683686283263188475.000001129c50cc
7778752&output=kml</href>
    </Url>
  </NetworkLink>
</Document>
</kml>

```



ICIW 2008 – The Third International Conference on
Internet and Web Applications and Services
June 8-13, 2008 - Athens, Greece
Tutorial: Web Services for Mapping

Part II: Practice

4. Mapping Servers/Services on the Web

5. Spatial Data Infrastructures (SDI)

- **Architecture**
- **Components**
- **Initiatives (INSPIRE)**

6. The Heraklion SDI Web Services

Spatial Data Infrastructures (SDI)

- SDI's are frameworks of...
 - policies,
 - institutional arrangements,
 - data,
 - services,
 - technologies, and
 - people
- with a common scope...
 - to promote the **accessibility** and **usability** of **geospatial content (data and services)**

Spatial Data Infrastructures (SDI)

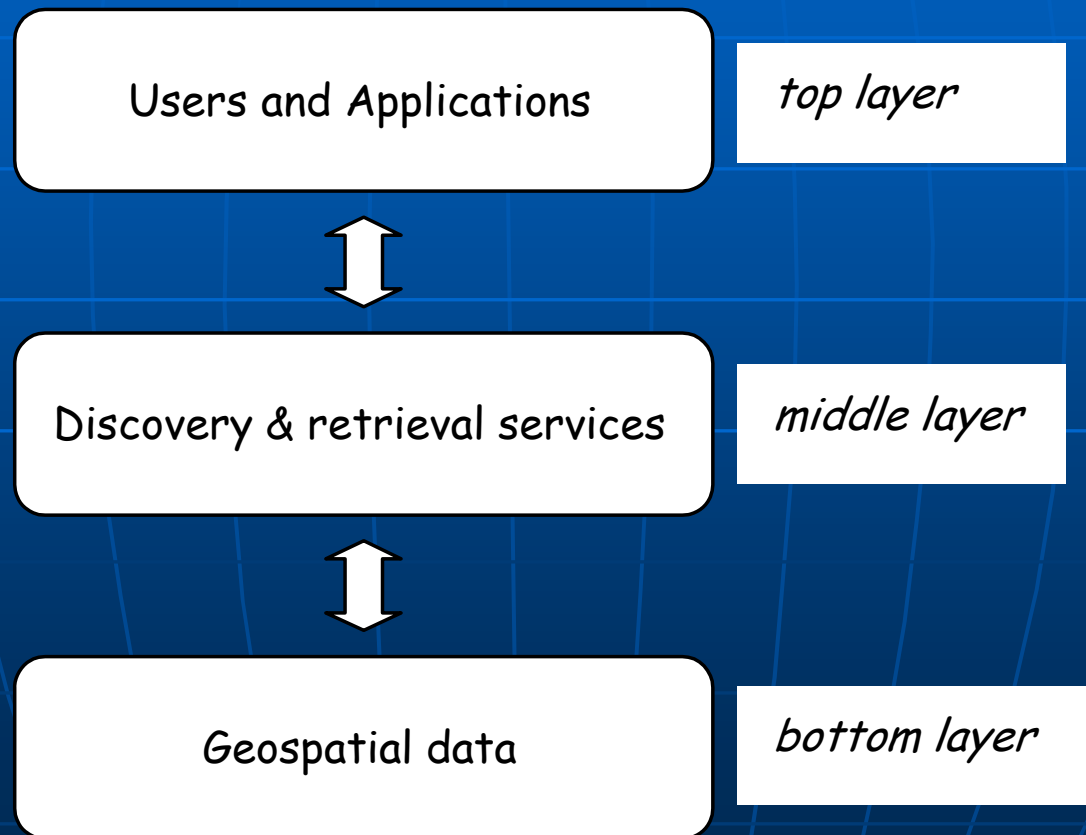
- SDI's are built at...
 - regional
 - national or
 - international level
- The participating organizations have agreed on the adoption of common...
 - vocabularies,
 - practices,
 - standards,
 - technical specifications and
 - operational components

Spatial Data Infrastructures (SDI)

- SDI is NOT a simple data repository...
- An SDI hosts...
 - geographic **content** (data and services)
 - sufficient description of this content (**metadata**)
 - effective methods to discover and evaluate this content (**data catalogs**)
 - tools to visualize the data (**web mapping**)
 - **services** and **software tools** to support specific application domains

Spatial Data Infrastructures (SDI)

- A three-tier architecture...



Spatial Data Infrastructures (SDI)

- The development of an SDI ...
 - supported by a set of sophisticated **(1) software systems and tools** and
 - must be compatible with a series of **(2) standards and specifications**

...in order to assure the **interoperability** between repositories with geospatial content

Spatial Data Infrastructures (SDI)

(1) Software Systems & Tools...

- **Commercial GIS packages ...**
 - may support the development of high quality SDIs
- **Open Source Geospatial software ...**
 - is now able to address the needs of geoscientists and professionals (OSGeo)

Spatial Data Infrastructures (SDI)

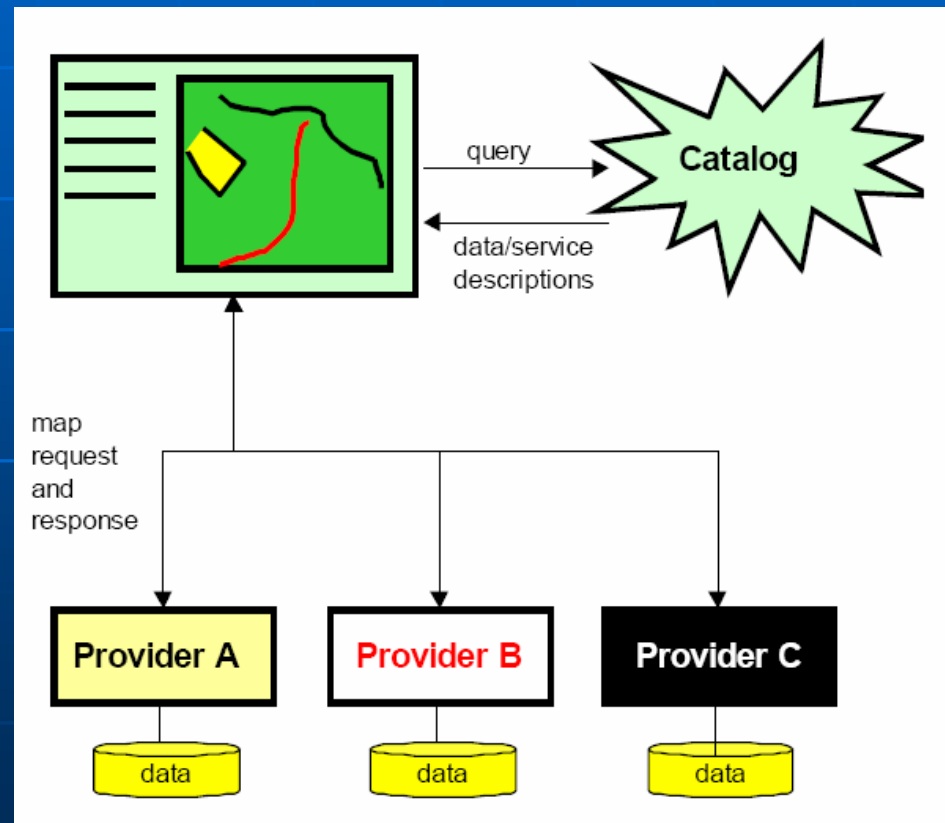
(2) Geospatial standards/specifications

- the Open Geospatial Consortium (OGC)
- the World Wide Web Consortium (W3C)
- the International Organization for Standardization (ISO)

... have already developed rich standards and specifications to support the interoperability between repositories with geospatial content

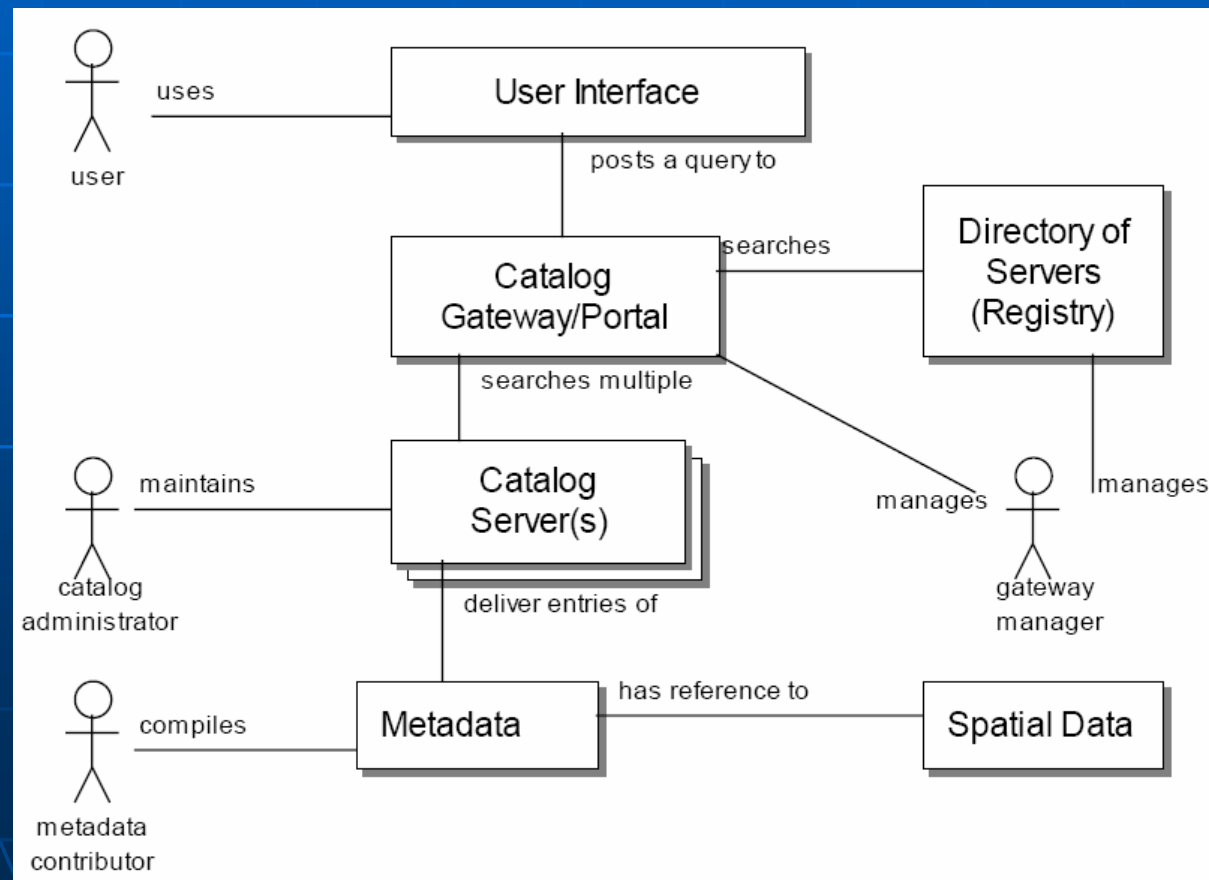
Spatial Data Infrastructures (SDI)

- SDI supports ...
 - many users (web clients)
 - many providers (web servers)



Spatial Data Infrastructures (SDI)

- SDI data/metadata/catalog services



Spatial Data Infrastructures (SDI)

■ “SDI Initiatives”

- any national, regional, and international programs and projects
- “working to improve access to available spatial data, promote its reuse, and ensure that additional investment in spatial information collection and management results in an ever growing, readily available and useable pool of spatial information”

Spatial Data Infrastructures (SDI)



INSPIRE - Windows Internet Explorer
http://www.ec-gis.org/inspire/

INSPIRE

INSPIRE DIRECTIVE
Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) was published in the official Journal on the 25th April 2007. The INSPIRE Directive entered into force on the 15th May 2007
[Full text of the directive \(EN\)](#)

The directive is available in the official languages.
[Official Journal of the European Union](#)

Headline News
May 14, 2008

INSPIRE Implementing Rules on Metadata adopted by INSPIRE Committee
It is with pleasure that we can inform you that the INSPIRE Implementing Rules on Metadata have been approved by the INSPIRE Committee. The IRs will now be sent to the European Parliament which will have one month time to comment, after which the adoption procedure will start.
May 9th, 2008

INSPIRE Conference 2008
The draft programme of the INSPIRE Conference 2008 is now available on the conference website.
Apr 1, 2008

SDICs and LMOs
Registered SDICs and LMOs can add new reference material and projects to the Implementing Rules Development databases.
[Read More](#)

Login to update your entry
[Register a new SDIC/LMO.](#)

NEWS

- 14-May-08 INSPIRE Implementing Rules on Metadata adopted by INSPIRE Committee
- 08-May-08 INSPIRE Conference 2008: Programme published
- 29-Apr-08 eContentplus 2008: Call for proposals
- 28-Apr-08 INSPIRE metadata implementing rules: summary of process
- 24-Apr-08 Open Calls for Tender: Development and demonstration of technical IT solutions for data exchange and reporting under the CAFE Directive using INSPIRE services
- 02-Apr-08 Report published: The Socio-Economic Impact of the Spatial Data Infrastructure of Catalonia

[More News](#)

<http://www.ec-gis.org/inspire/>

Spatial Data Infrastructures (SDI)



■ The need for the INSPIRE initiative

- The general situation on spatial information in Europe is one of fragmentation of datasets and sources, gaps in availability, lack of harmonisation between datasets at different geographical scales and duplication of information collection. **These problems make it difficult to identify, access and use data that is available.**

■ The INSPIRE Concept

- *INSPIRE is ambitious.* The initiative intends to trigger the creation of a European spatial information infrastructure that delivers to the users integrated spatial information services. **These services should allow the users to identify and access spatial or geographical information from a wide range of sources,** from the local level to the global level, in an inter-operable way for a variety of uses. The target users of INSPIRE include policy-makers, planners and managers at European, national and local level and the citizens and their organisations. Possible services are the visualisation of information layers, overlay of information from different sources, spatial and temporal analysis, etc.



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6. The Heraklion SDI Web Services

- **SDI Architecture and Software Systems**
- **The WMS, WFS, WCS and KML Servers**
- **The Web Client Application**
- **The Mashups**
- **The Web Catalog Server**

The Heraklion SDI

- A regional SDI ...
 - has recently been developed for the Heraklion Prefecture in Crete, Greece
 - using merely ...
 - Geographic Free and Open Source Software (**GeoFOSS**)

<http://heraklion-sdi.dynalias.net/coastatlas/index-en.html>

Heraklion SDI

- This SDI is ...
 - compatible with the geospatial standards and specifications introduced by the Open Geospatial Consortium (OGC), and
 - serves the geospatial content through widely accepted web services (e.g., WMS, WFS, WCS and CSW)

<http://heraklion-sdi.dynalias.net/coastatlas/index-en.html>

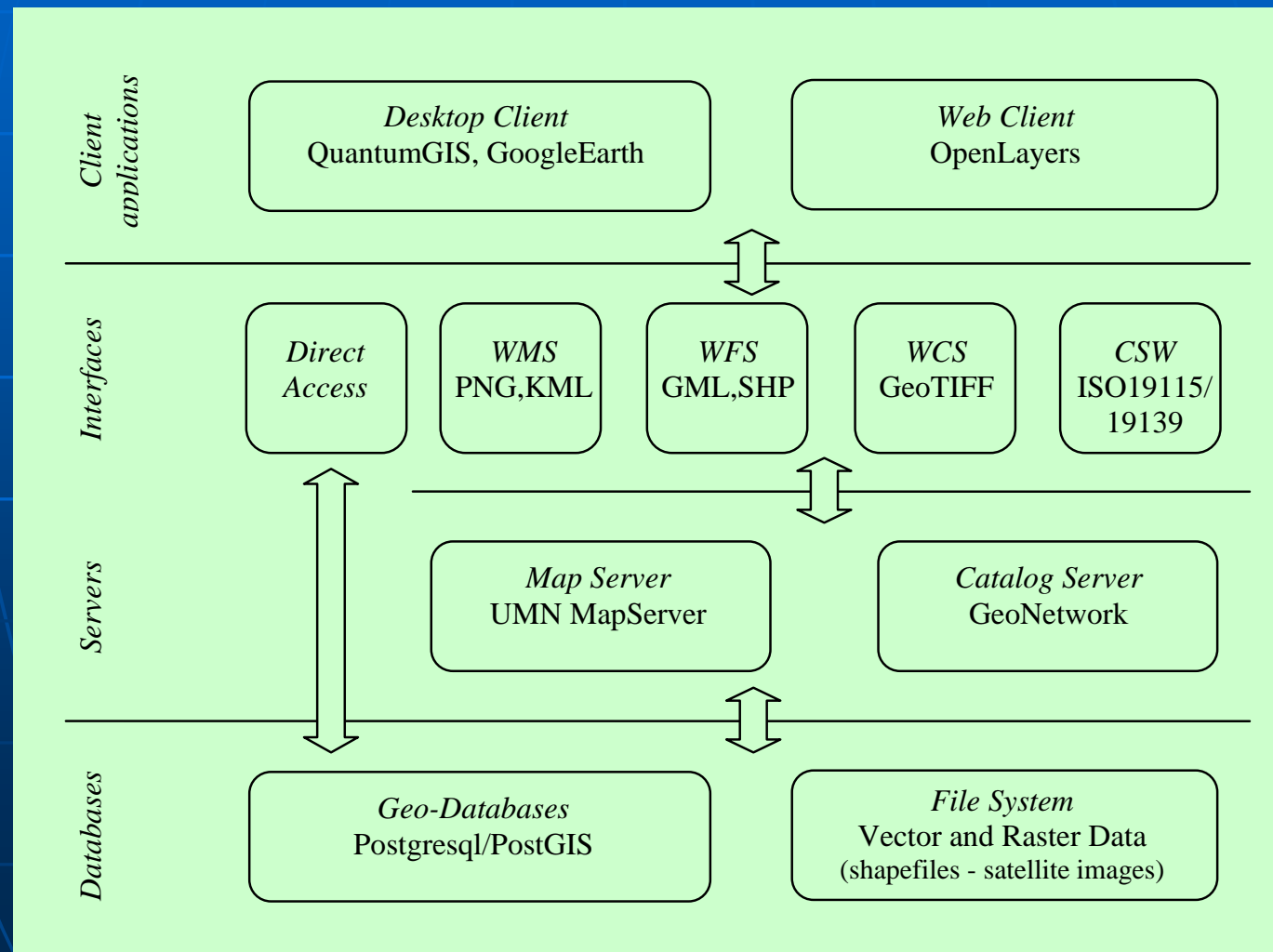
Heraklion SDI

■ Public Datasets ...

<i>Layer Content/Description</i>	<i>Format</i>	<i>Name</i>
Prefecture (outline)	Shapefile	<i>nomos_irakliou</i>
Municipalities (outlines)	Shapefile	<i>dhmoi_irakliou</i>
Municipalities Subdivisions (outlines)	Shapefile	<i>dhm_diamer_irakliou</i>
Urban Areas (outlines)	Shapefile	<i>bua_irakliou</i>
Towns and Villages (points)	Shapefile	<i>oikismoi_irakliou</i>
Road Network (lines)	Shapefile	<i>odiko_irakliou</i>
Heraklion City buildings (polygons)	Shapefile	<i>build_egsa</i>
Heraklion city Airport and Seaport (points)	Shapefile	<i>poi_irakliou</i>
Lakes (polygons)	Shapefile	<i>limnes_irakliou</i>
Geology cover (polygons)	Shapefile	<i>geo_N_Herakleio</i>
Archaeological spots (points)	Shapefile	<i>archaiologia_N_Herakleio</i>
Digital Elevation Model (raster)	GeoTiff	<i>dem</i>
Land Cover (raster)	GeoTiff	<i>lc</i>
Orthophoto Map (raster)	GeoTiff	<i>hr_ortho</i>

Architecture & Software Systems

- The architecture...



Architecture & Software Systems

- The geospatial layers of the SDI are served using ...
 - Services: WMS, WFS, WCS
 - Languages: GML, KML
 - Standards: ISO19115/139
- They are visualized via ...
 - a web application (web client)
 - a desktop GIS / GE (desktop client)

Architecture & Software Systems

■ Open Source Software Systems...

http://www.osgeo.org/

The screenshot shows the OSGeo.org website in a Windows Internet Explorer browser window. The browser's address bar displays "http://www.osgeo.org/". The website features the OSGeo logo (a green compass rose) and the tagline "Your Open Source Compass". A search bar is located in the top right corner. The main content area is divided into several sections:

- OSGeo Foundation:** A list of links including Home, About the Foundation, FAQ, Sponsors, Sponsor OSGeo, Incubator, Swag Store, and Contact.
- OSGeo Community:** A list of links including Welcome, News, Events, Wiki, Mailing Lists, Blogs, IRC, Service Providers, Journal, Sol Katz Award, Local Chapters, and Spotlights.
- Language:** A list of language options including English, Български, 简体中文, Deutsch, and Nederlands.
- Welcome to the Open Source Geospatial Foundation Website:** A paragraph explaining the foundation's goal to support and build high-quality open source geospatial software.
- Community Spotlights:** A section featuring profiles of Steve Lime and Tom Kralidis, highlighting their contributions to the community.
- News:** A list of recent news items, including FOSS4G 2008 sponsorship, deegree day 2008, FOSS4G 2008 call for papers, OSGeo Supports CASCADOSS, QGIS Releases 0.10.0, and GRASS GIS 6.3.0 Released.
- Support OSGeo:** A section for supporting the foundation, with a link for "Any Amount".
- OSGeo Projects:** A list of projects including Web Mapping (deegree, Mapbender, MapBuilder, MapGuide Open Source, MapServer, OpenLayers) and Desktop Applications (GRASS GIS, QGIS).

Architecture & Software Systems

- OSGeo...

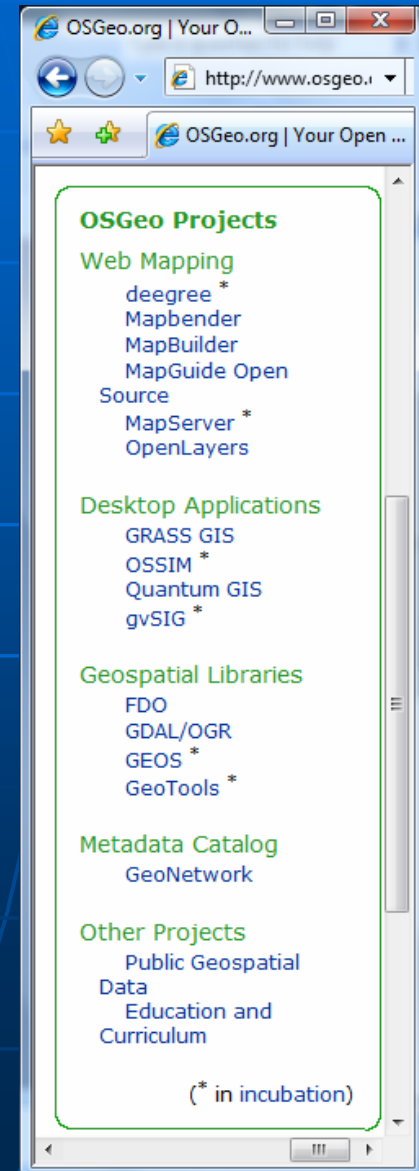
- The Open Source Geospatial Foundation...

- has been created to support and build the highest-quality open source geospatial software

- The foundation's goal is....

- to encourage the use and collaborative development of community-led projects

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



Architecture & Software Systems

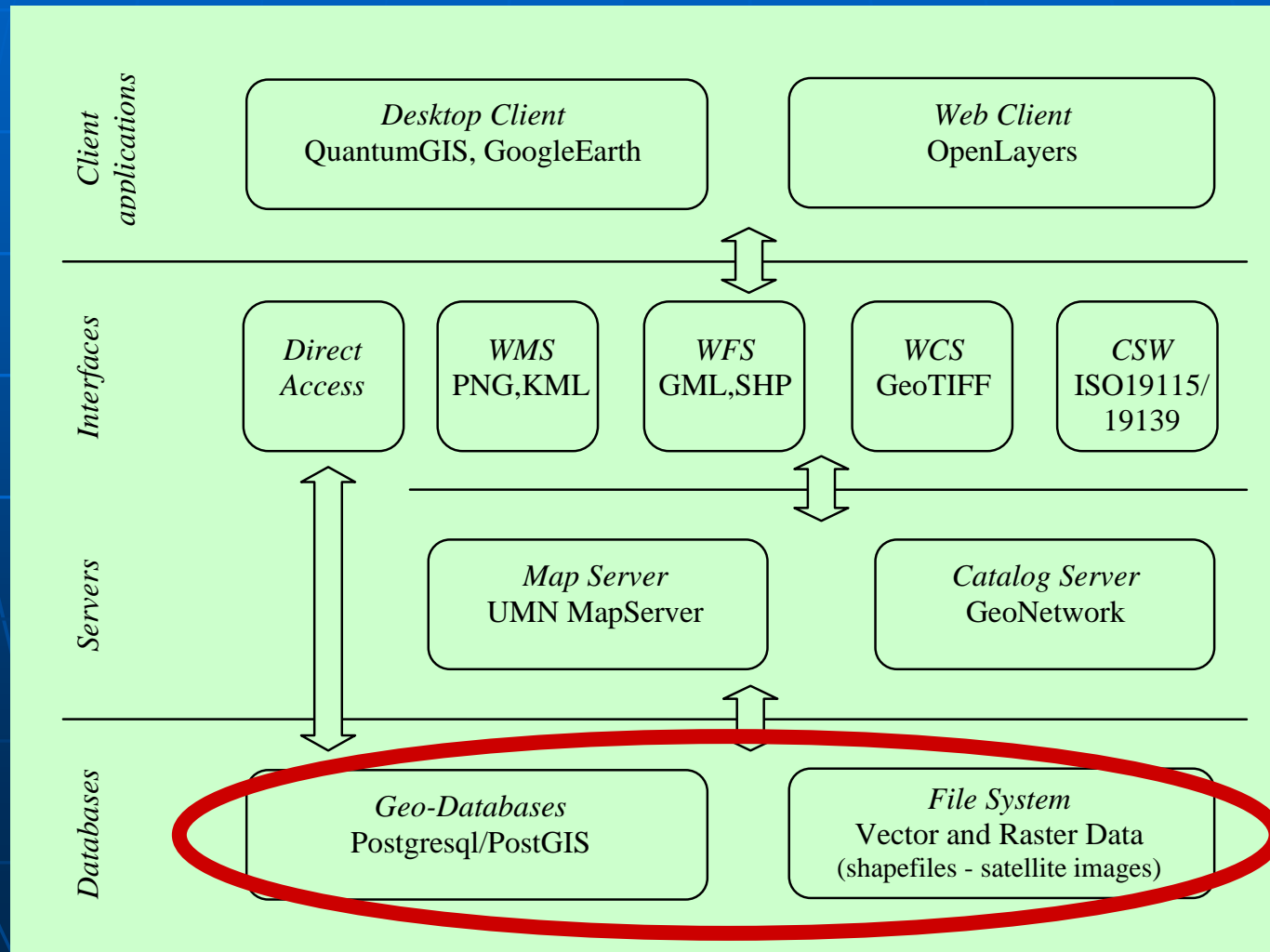
- Software Systems...
 - *Apache Web Server* (<http://www.apache.org>) in the role of the Web Server.
 - *OpenLayers JavaScript Library* (<http://openlayers.org>) in the role of the Web Client (Interface).
 - *QuantumGIS* (<http://www.qgis.org>) in the role of the Desktop Client.
 - *GoogleEarth* (<http://earth.google.com>) in the role of the Desktop Client (for the KML files).

Architecture & Software Systems

- Software Systems... (cont')
 - *UMN MapServer* (<http://mapserver.gis.umn.edu>) in the role of the Map Server.
 - *GeoNetwork Opensource* (<http://geonetwork-opensource.org>) in the role of the Catalog Server.
 - *GDAL/OGR* (<http://www.gdal.org>) in the role of the Geospatial Library.
 - *Postgresql/PostGIS* (<http://www.postgis.org>) in the role of the Spatial Database Server.

Architecture & Software Systems

- The architecture...



Heraklion SDI

■ The Geo-Databases...

SDI Public Layers

<i>Layer Content/Description</i>	<i>Format</i>	<i>Name</i>
Prefecture (outline)	Shapefile	<i>nomos_irakliou</i>
Municipalities (outlines)	Shapefile	<i>dhmoi_irakliou</i>
Municipalities Subdivisions (outlines)	Shapefile	<i>dhm_diamer_irakliou</i>
Urban Areas (outlines)	Shapefile	<i>buva_irakliou</i>
Towns and Villages (points)	Shapefile	<i>oikismoi_irakliou</i>
Road Network (lines)	Shapefile	<i>odiko_irakliou</i>
Heraklion City buildings (polygons)	Shapefile	<i>build_egsa</i>
Heraklion city Airport and Seaport (points)	Shapefile	<i>poi_irakliou</i>
Lakes (polygons)	Shapefile	<i>limnes_irakliou</i>
Geology cover (polygons)	Shapefile	<i>geo_N_Herakleio</i>
Archaeological spots (points)	Shapefile	<i>archaiologia_N_Herakleio</i>
Digital Elevation Model (raster)	GeoTiff	<i>dem</i>
Land Cover (raster)	GeoTiff	<i>lc</i>
Orthophoto Map (raster)	GeoTiff	<i>hr_ortho</i>

Shapefiles
(Vector)

GDAL/OGR

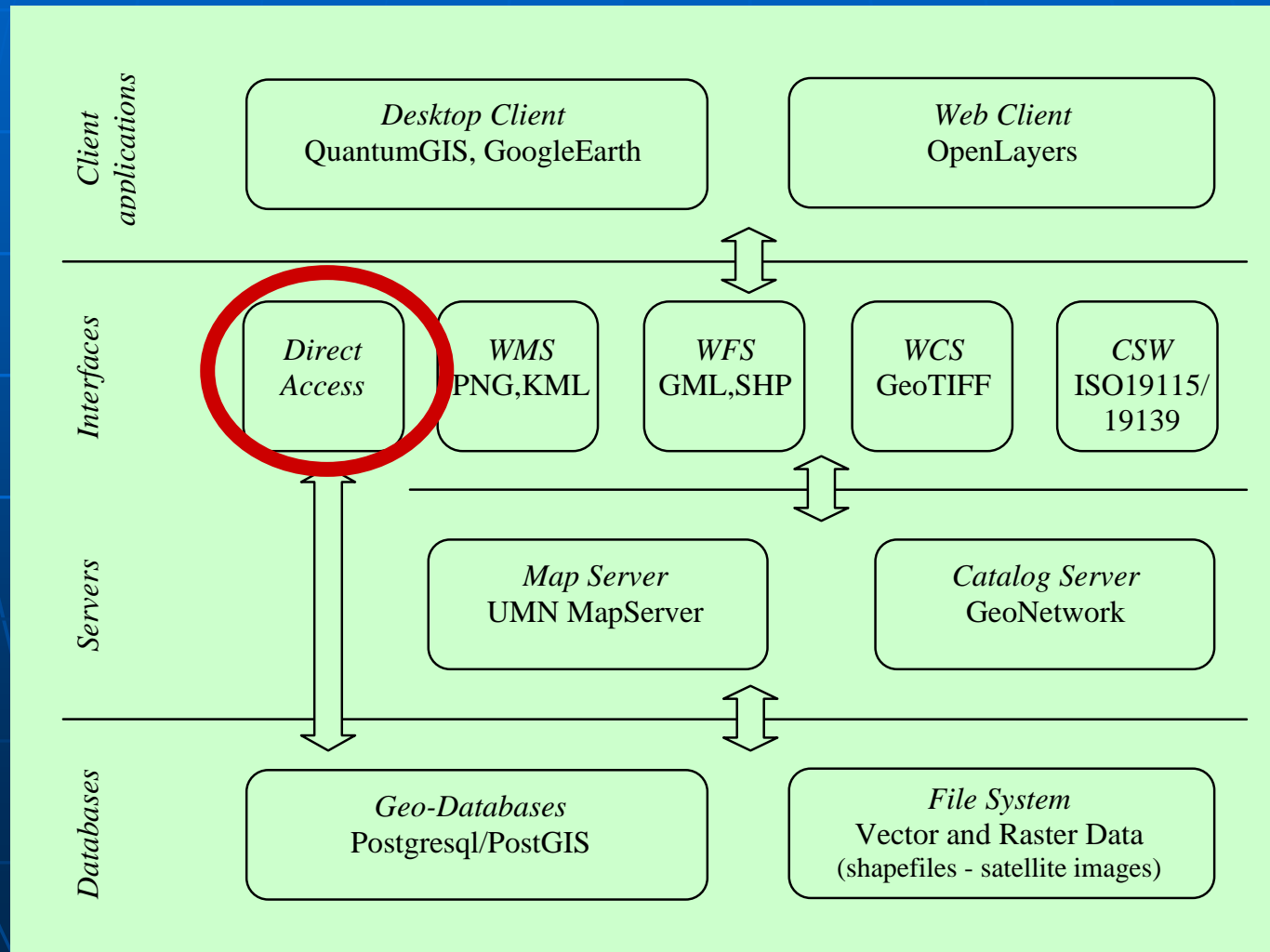


GeoTiff
(Raster)

File System

Architecture & Software Systems

- The architecture...

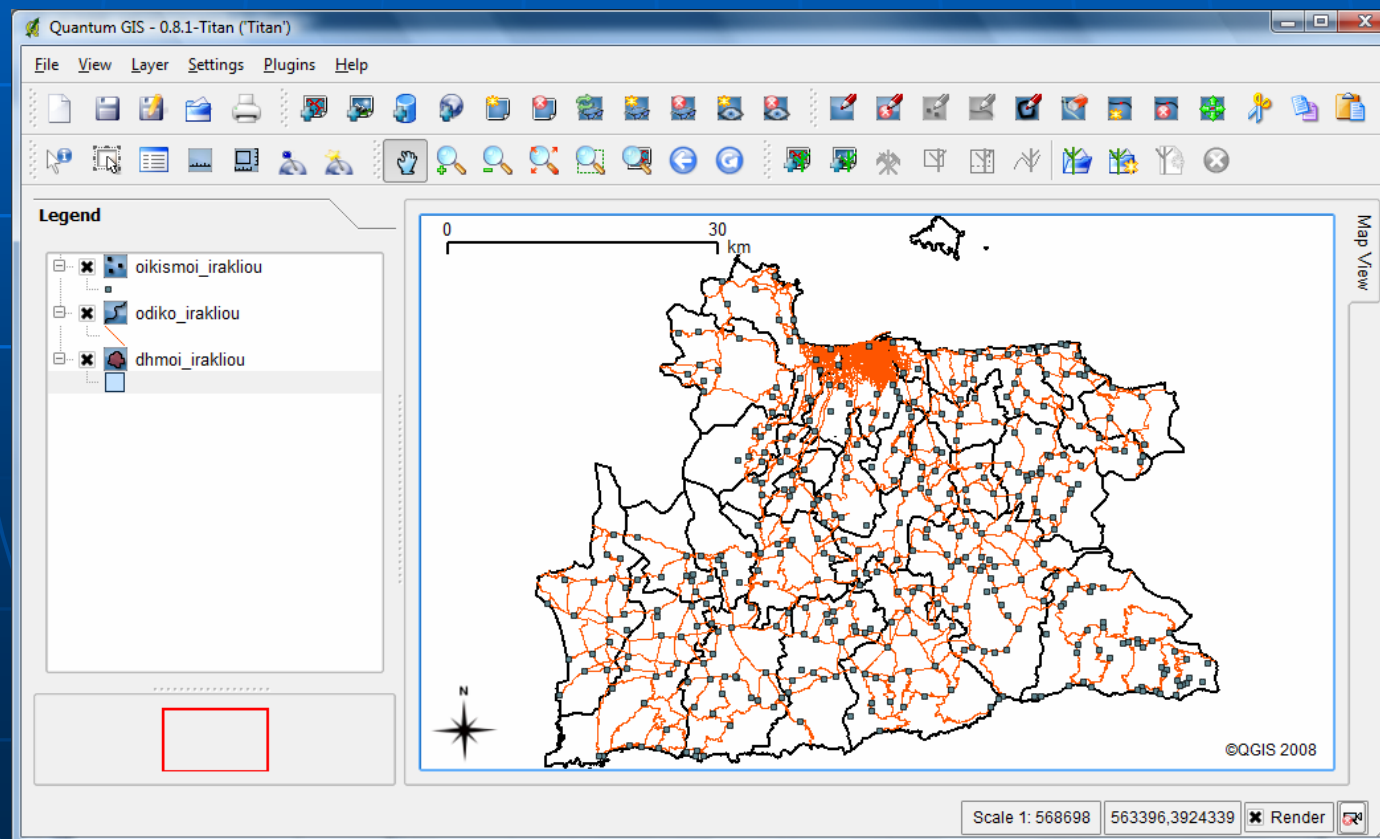


Heraklion SDI

- The middle layer...
 - provides the **Direct Access Interface**
 - to the geospatial content that resides in the spatial database server
 - The Direct Access Interface ...
 - may support effectively...
 - the querying and
 - the analysis
 - ... of the geospatial content using SQL statements

Heraklion SDI

- The Direct Access Interface...
 - Example queries...



- **Table of Municipalities: “dhmoi_irakliou” (type: multi_polygon)**

```
SELECT gid, NAMF_EN, POP_01, AsText(the_geom)
FROM dhmoi_irakliou;
```

gid (identifier)	NAMF_EN (municipality name)	POP_01 (population in 2001)	the_geom (geometry column)
1	Municipality Of Irakleio	137711	MULTIPOLYGON(...)
2	Municipality Of Agia Varvara	5310	MULTIPOLYGON(...)
3	Municipality Of Arkalochori	10897	MULTIPOLYGON(...)
4	Municipality Of Archanes	4548	MULTIPOLYGON(...)
...

26 rows

- **Table of Cities/Villages: “oikismoi_irakliou” (type: point)**

```
SELECT gid, NAMEENG, POP01, AsText(the_geom)
FROM oikismoi_irakliou;
```

gid (identifier)	NAMEENG (city/village name)	POP01 (population in 2001)	the_geom (geometry column)
1	Agia Pelagia	553	POINT(592221 3918593)
2	Paralia Fodele	99	POINT(586237 3917962)
3	Achlada	119	POINT(589949 3917093)
4	Fodele	540	POINT(586850 3915575)
...

400 rows

- **Table of Road Network: “odiko_irakliou” (type: multi_linestring)**

```
SELECT gid, SPEED, EU_CODE, AsText(the_geom)
FROM odiko_irakliou;
```

gid (identifier)	SPEED (speed limit)	EU_CODE (E75 for national roads)	the_geom (geometry column)
1	50		MULTILINESTRING(...)
2	50		MULTILINESTRING(...)
3	80	E75	MULTILINESTRING(...)
4	70	E75	MULTILINESTRING(...)
...

12228 rows

Query 1: Find how many cities there are per municipality.*SQL Statement*

```
SELECT r.NAMF_EN as Municipality,
       count(m.the_geom) as Number
FROM dhmoi_irakliou AS r,
     oikismoi_irakliou AS m
WHERE intersects(r.the_geom, m.the_geom)
GROUP BY r.NAMF_EN
ORDER BY number_of_cities DESC;
```

Output

Municipality	Number
Municipality Of Viannos	46
Municipality Of Arkalochori	40
Municipality Of Asterousia	28
Municipality Of Gortyna	26
Municipality Of Kasteelli	24
...	

Query 2: What is the length of roads fully contained within each municipality? Report only the 5 largest.*SQL Statement*

```
SELECT m.NAMF_EN as Municipality,
       sum(length(r.the_geom))/1000 as Roads_km
FROM odiko_irakliou AS r,
     dhmoi_irakliou AS m
WHERE r.the_geom && m.the_geom
AND contains(m.the_geom,r.the_geom)
GROUP BY m.NAMF_EN
ORDER BY roads_km DESC
LIMIT 5;
```

Output

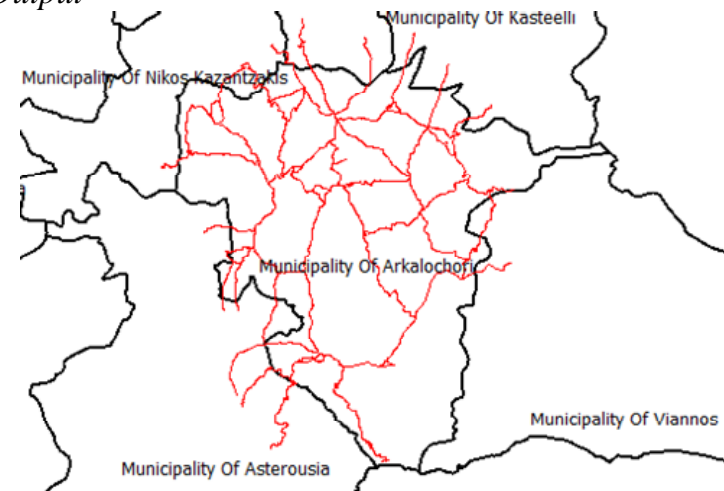
Municipality	Roads_km
Municipality Of Irakleio	595.440
Municipality Of Gazi	200.706
Municipality Of Arkalochori	147.853
Municipality Of Asterousia	146.120
Municipality Of Viannos	137.159

Query 3: Find the road segments intersected by the municipality of Arkalochori

SQL Statement

```
CREATE TABLE "ark_roads"  
  (gid serial PRIMARY KEY,"id" int4);  
SELECT AddGeometryColumn('','ark_roads',  
  'the_geom','2100','MULTILINESTRING',2);  
INSERT INTO ark_roads(id, the_geom)  
SELECT r.gid, r.the_geom  
FROM odiko_irakliou AS r,  
  dhmoi_irakliou AS m  
WHERE r.the_geom && m.the_geom  
AND intersects(m.the_geom,r.the_geom)  
AND m.NAMF_EN =  
  'Municipality Of Arkalochori';
```

Output

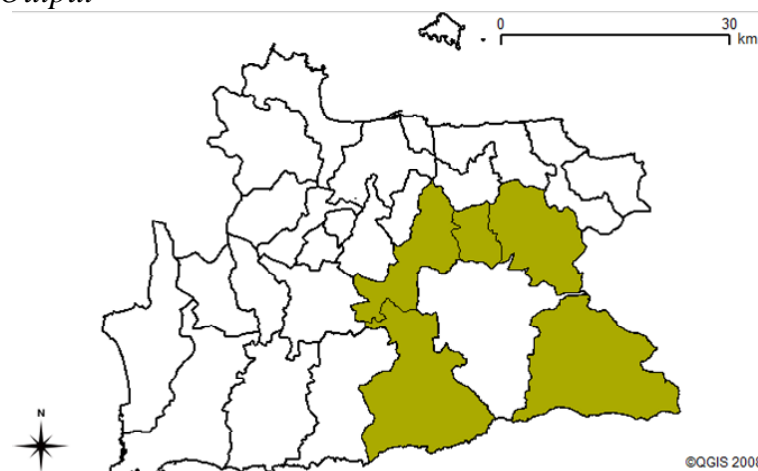


Query 4: Find the neighbors (with a common border) of the municipality of Arkalochori.

SQL Statement

```
CREATE TABLE "ark_neigh"  
  (gid serial PRIMARY KEY,"id" int4);  
SELECT AddGeometryColumn('','ark_neigh',  
  'the_geom','2100','MULTIPOLYGON',2);  
INSERT INTO ark_neigh (id, the_geom)  
SELECT n.gid, n.the_geom  
FROM dhmoi_irakliou as m,  
  dhmoi_irakliou as n  
WHERE m.NAMF_EN =  
  'Municipality Of Arkalochori'  
AND Touches(m.the_geom, n.the_geom);
```

Output



Heraklion SDI

- The Web page...

http://heraklion-sdi.dynalias.net/coastatlas/index-en.html

Heraklion SDI (PEP Crete 2006-08) - Windows Internet Explorer

http://localhost/coastatlas/index-en.html

Heraklion SDI (PEP Crete 2006-08)

FORTH > Institutes > IACM > Research Groups > RAD

Regional Analysis Division

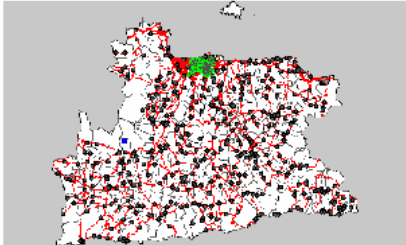
Heraklion - Spatial Data Infrastructure

[Greek Version](#)

This page provides access to the Heraklion Prefecture Spatial Data Infrastructure (SDI) geospatial content and the servers: [WMS](#), [WFS](#) and [WCS](#). Additionally, data layers are also available in [KML](#) (for visualization in Google Earth).

Browse in the data layers of the Heraklion SDI and combine them with mashups, such as the Google Maps and the CEOS European Data Server, via the [Web Client \(Viewer\)](#).

Web Map Server (WMS)



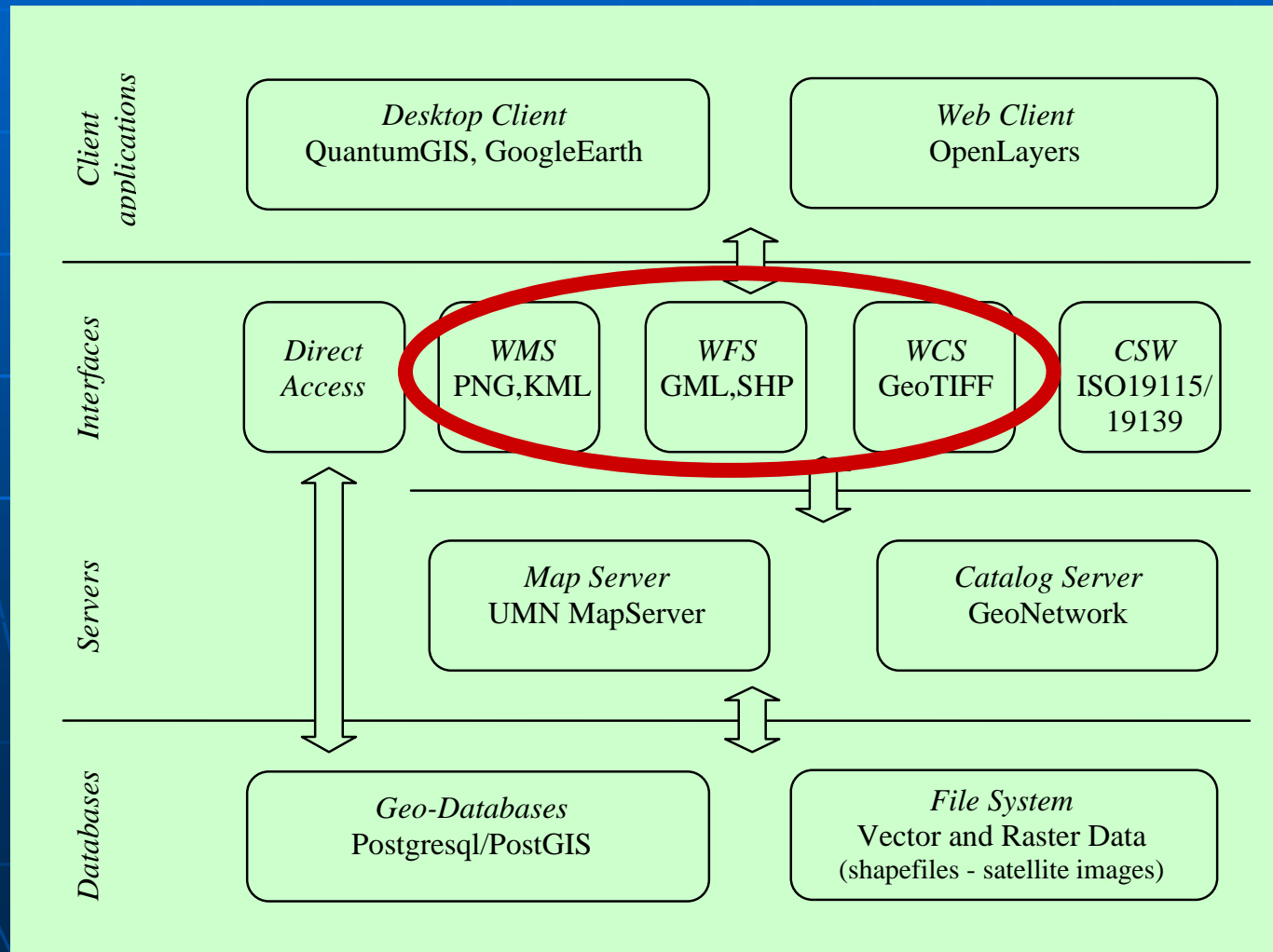
[Topography \[GetCapabilities\]](#)

[Topography Layers \[ALL\] \[GetMap\]](#)

- [Prefecture \[GetMap\]](#)
- [Municipalities \[GetMap\]](#)
- [Municipalities Subdivisions \[GetMap\]](#)
- [Road Network \[GetMap\]](#)
- [Urban Areas \[GetMap\]](#)
- [Towns and Villages \[GetMap\]](#)
- [Lakes \[GetMap\]](#)
- [Heraklion City Buildings \[GetMap\]](#)
- [Airport - Sea Port \(POI\) \[GetMap\]](#)

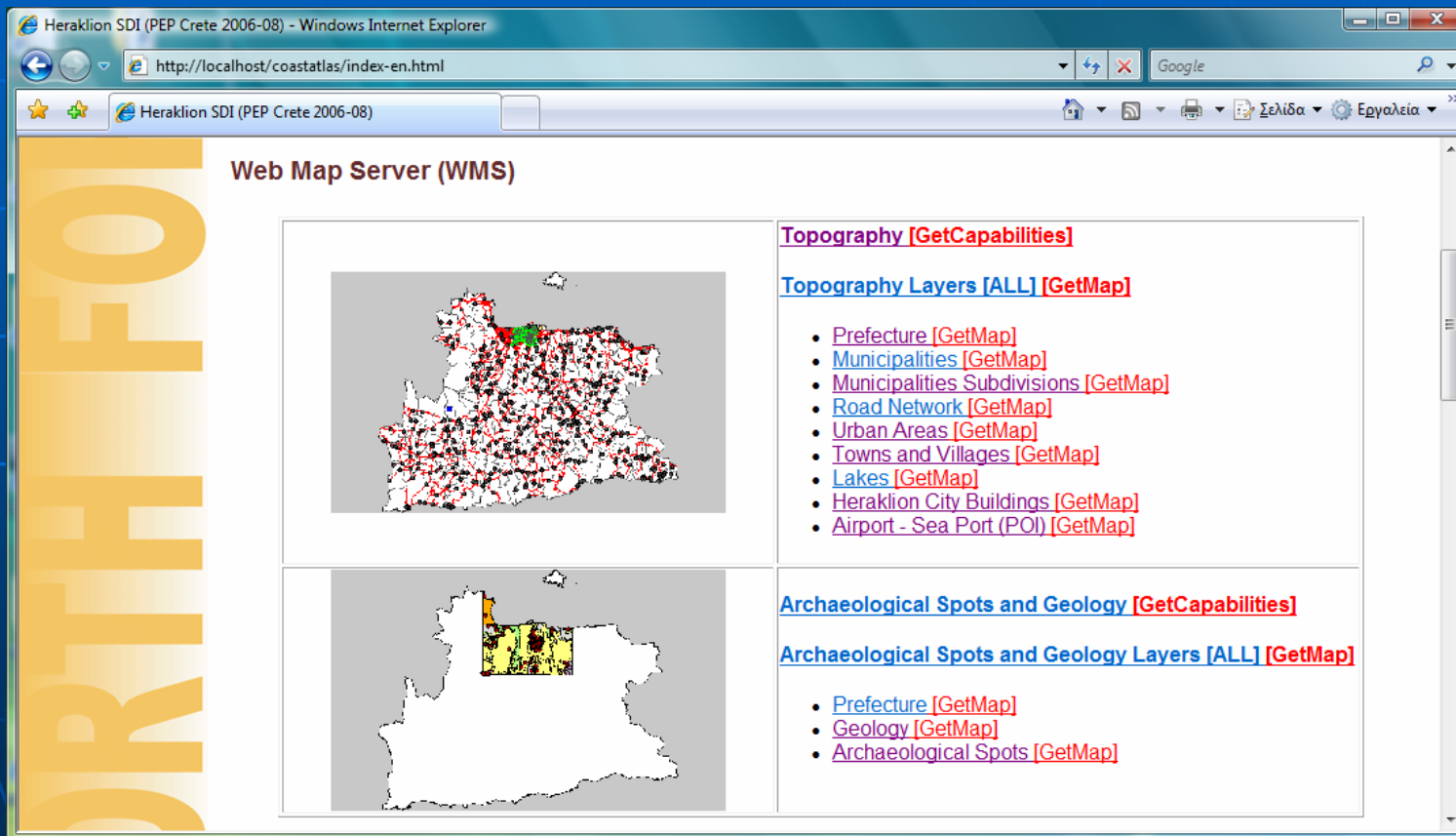
Architecture & Software Systems

- The architecture...



Heraklion SDI

- The Web Map Service (WMS)...



Heraklion SDI (PEP Crete 2006-08) - Windows Internet Explorer

http://localhost/coastatlas/index-en.html

Heraklion SDI (PEP Crete 2006-08)

Web Map Server (WMS)

Topography [GetCapabilities]

Topography Layers [ALL] [GetMap]

- [Prefecture \[GetMap\]](#)
- [Municipalities \[GetMap\]](#)
- [Municipalities Subdivisions \[GetMap\]](#)
- [Road Network \[GetMap\]](#)
- [Urban Areas \[GetMap\]](#)
- [Towns and Villages \[GetMap\]](#)
- [Lakes \[GetMap\]](#)
- [Heraklion City Buildings \[GetMap\]](#)
- [Airport - Sea Port \(POI\) \[GetMap\]](#)

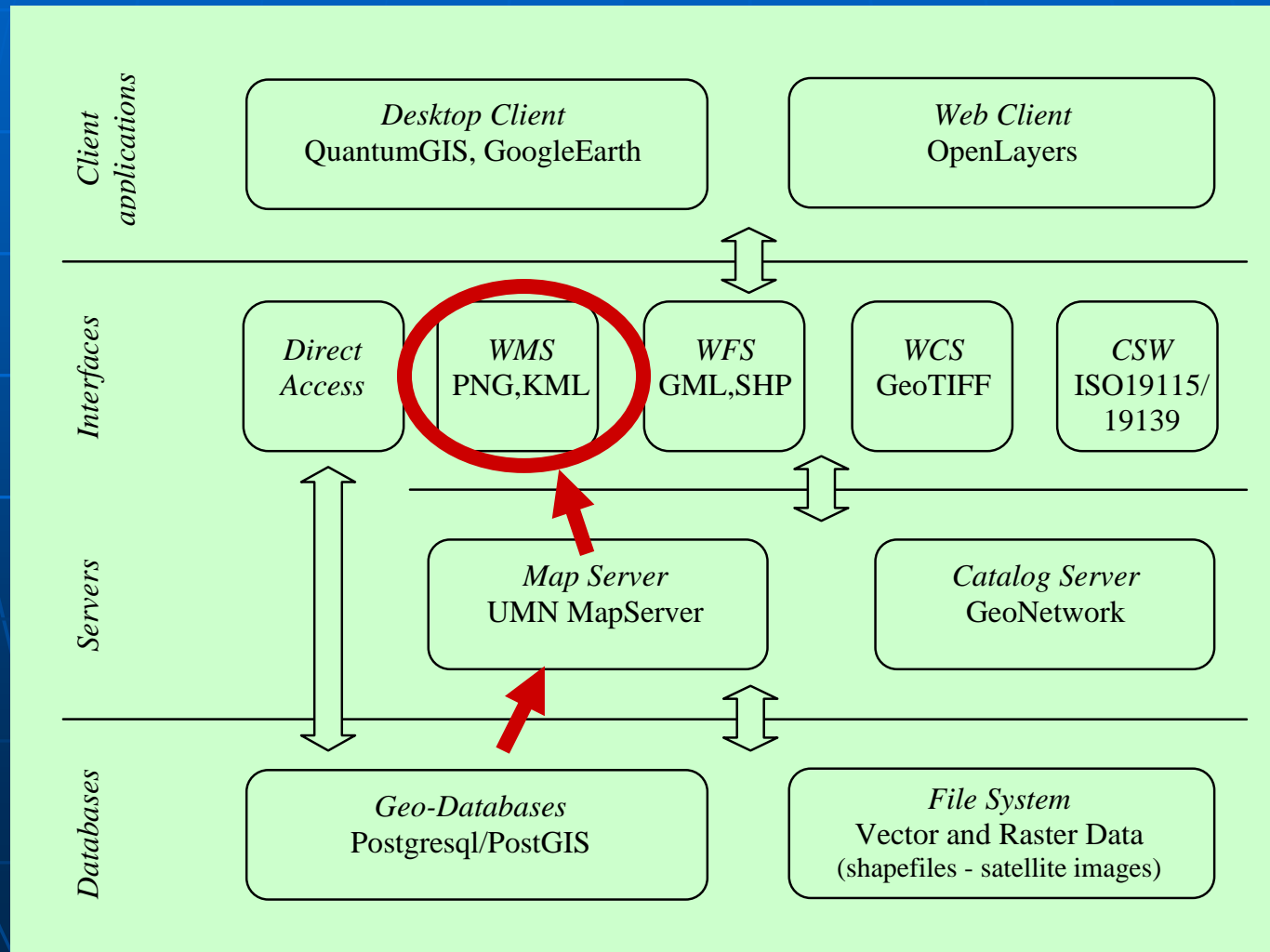
Archaeological Spots and Geology [GetCapabilities]

Archaeological Spots and Geology Layers [ALL] [GetMap]

- [Prefecture \[GetMap\]](#)
- [Geology \[GetMap\]](#)
- [Archaeological Spots \[GetMap\]](#)

Architecture & Software Systems

- The architecture...

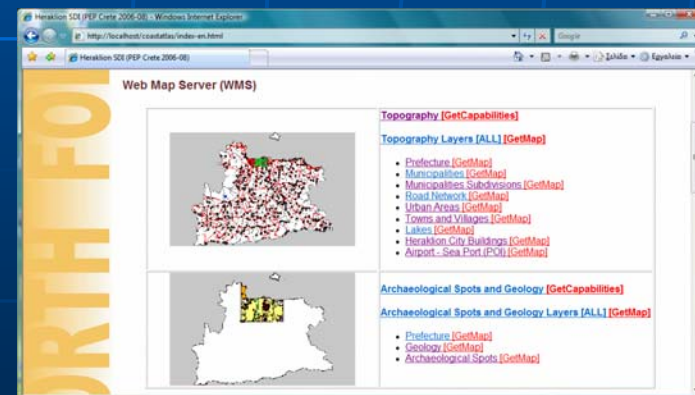


Heraklion SDI

- The Web Map Service (WMS)..
 - maps served as images
 - GetCapabilities request

```
http://localhost/cgi-bin/mapserv.exe?  
map=/ms4w/apps/ITE/htdocs/WMS/infocharta.map&  
SERVICE=WMS&
```

REQUEST=GetCapabilities

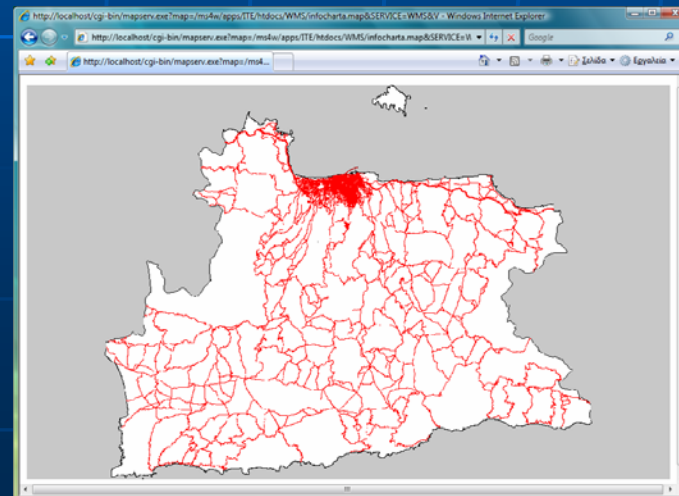


Heraklion SDI

■ The Web Map Service (WMS)...

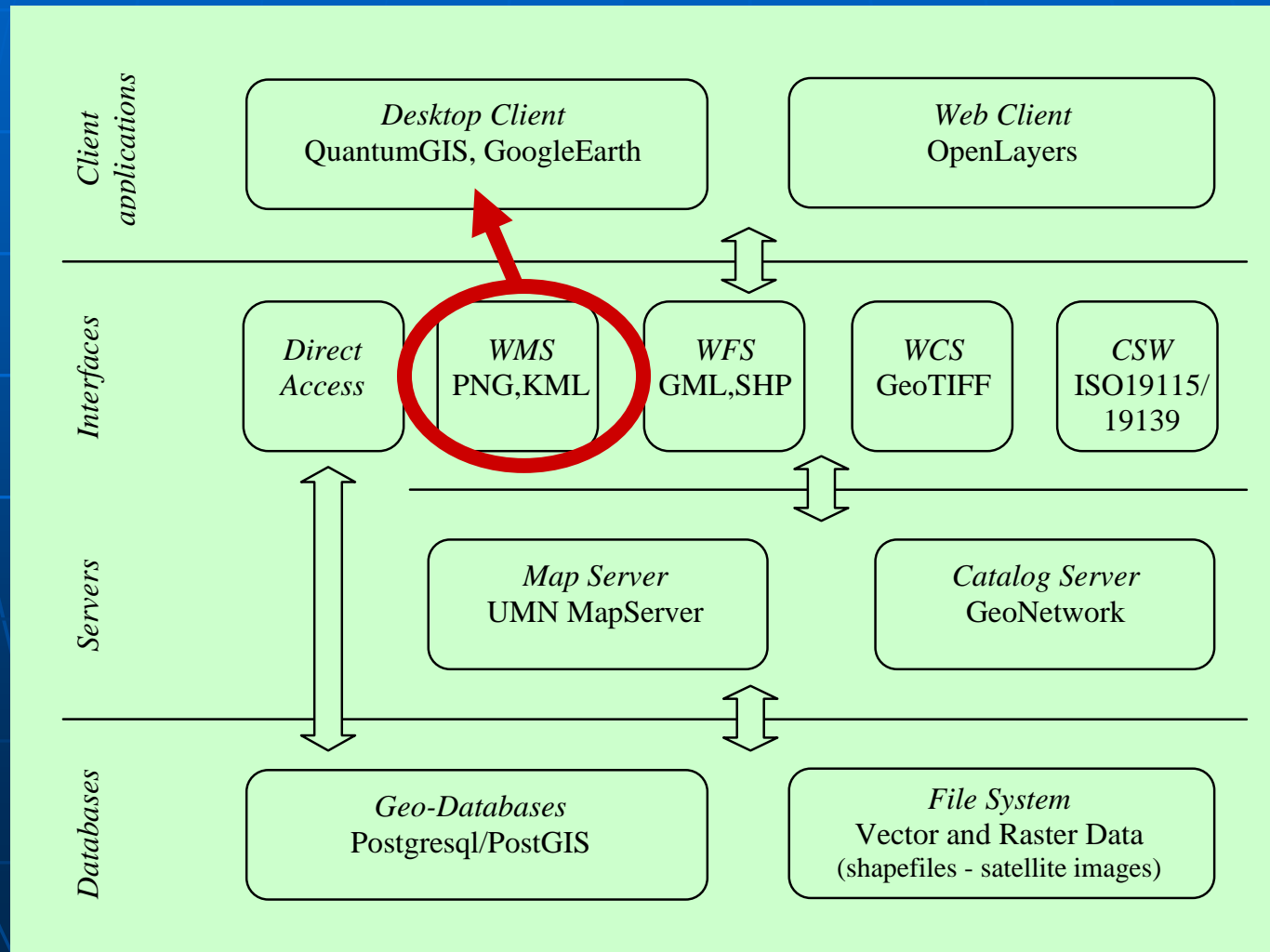
• GetMap request

```
http://localhost/cgi-bin/mapserv.exe?  
map=/ms4w/apps/ITE/htdocs/WMS/infocharta.map&  
SERVICE=WMS&VERSION=1.1.1&  
REQUEST=GetMap&  
LAYERS=odiko_irakliou&  
BBOX=553530,3864020,653540,3925230&  
STYLES=&  
SRS=EPSG:2100&  
WIDTH=500&HEIGHT=306&  
FORMAT=image/png
```



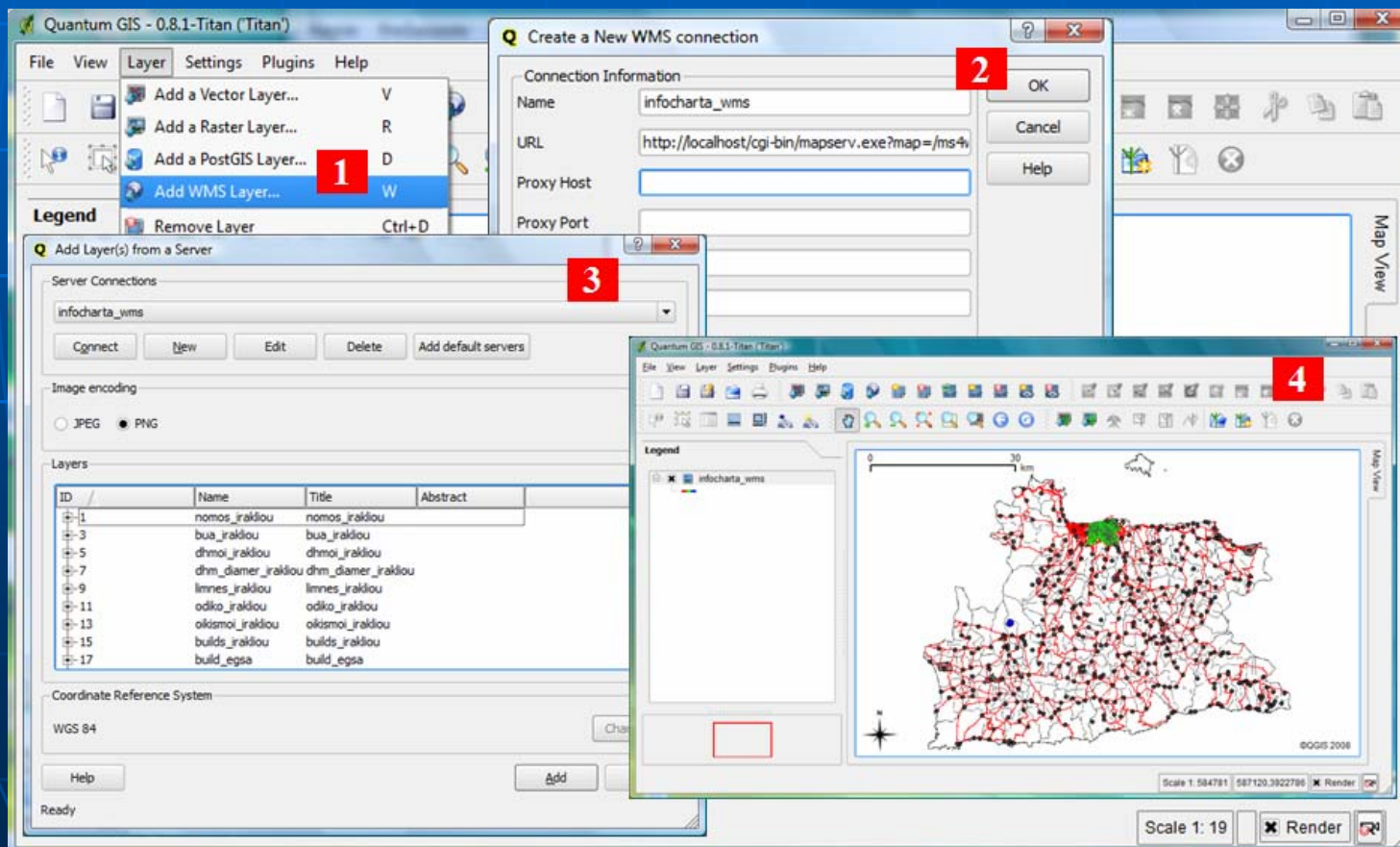
Architecture & Software Systems

- The architecture...



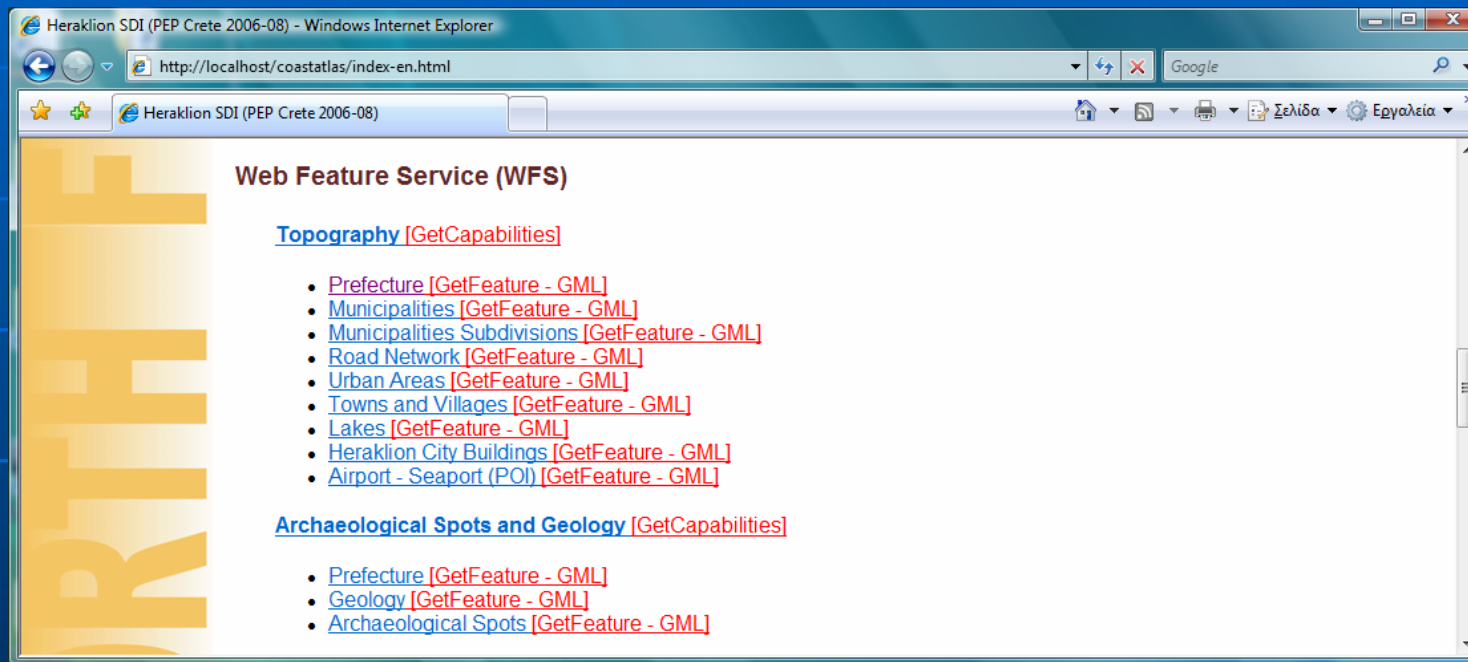
Heraklion SDI

- The Web Map Service (WMS)...
- QGIS: Connect to the WMS



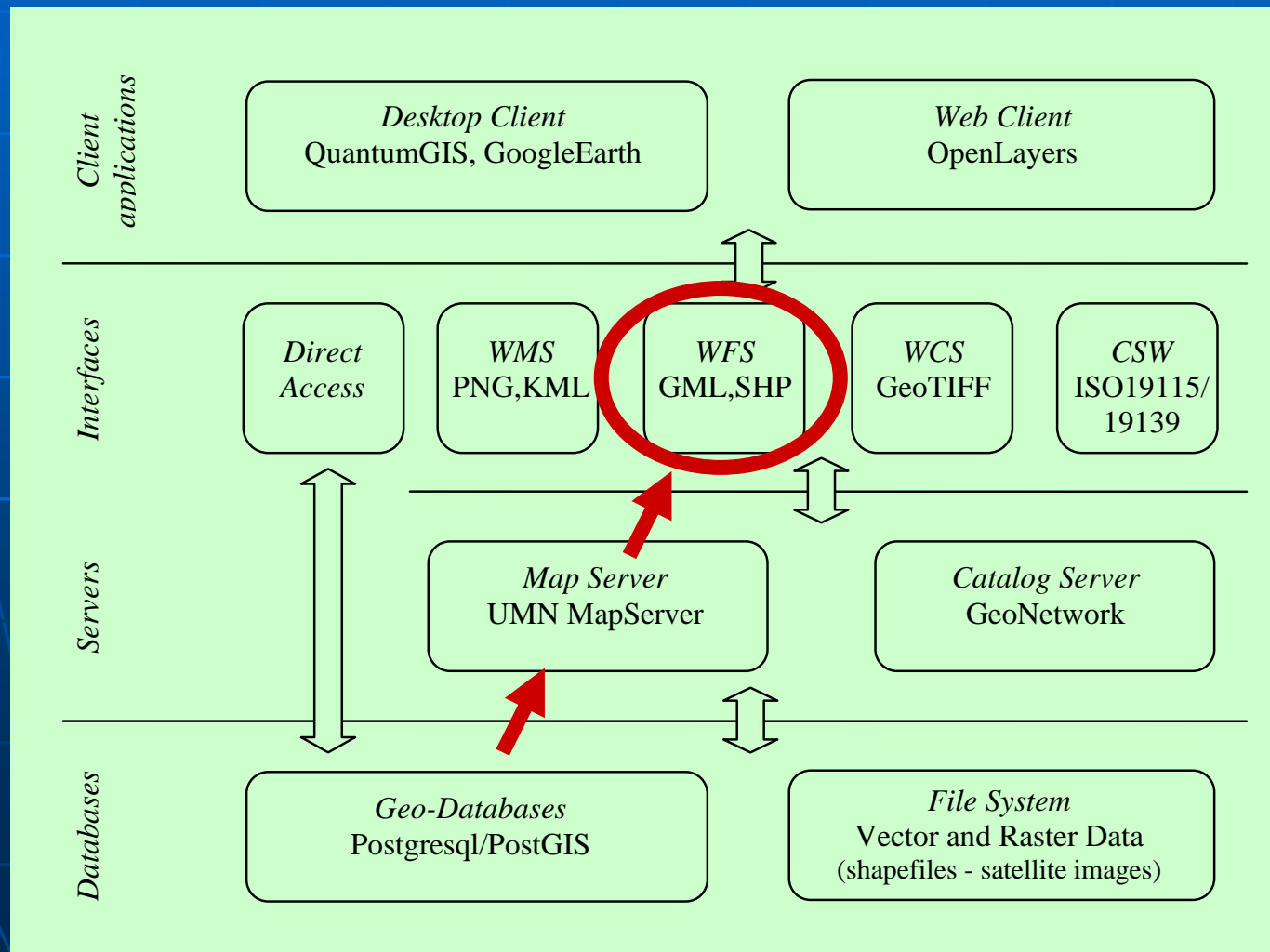
Heraklion SDI

- The Web Feature Service (WFS)...



Architecture & Software Systems

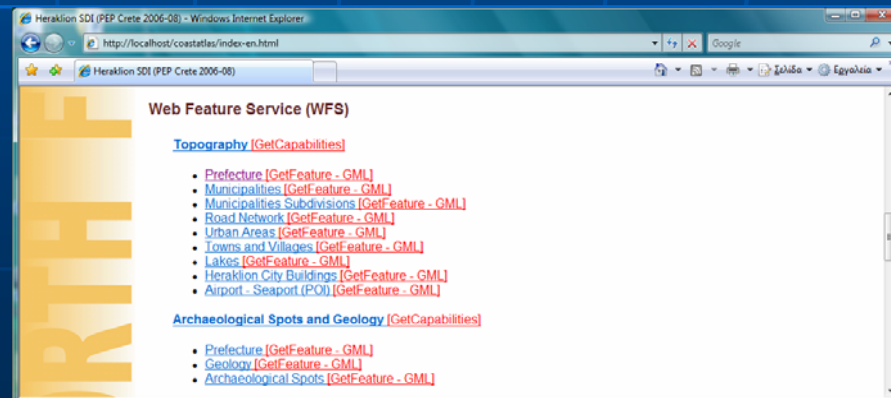
- The architecture...



Heraklion SDI

- The Web Feature Service (WFS)...
 - data served in GML
 - GetCapabilities request

```
http://localhost/cgi-bin/mapserv.exe?  
map=/ms4w/apps/ITE/htdocs/WFS/infocharta.map&  
SERVICE=WFS&  
VERSION=1.0.0&  
REQUEST=GetCapabilities
```



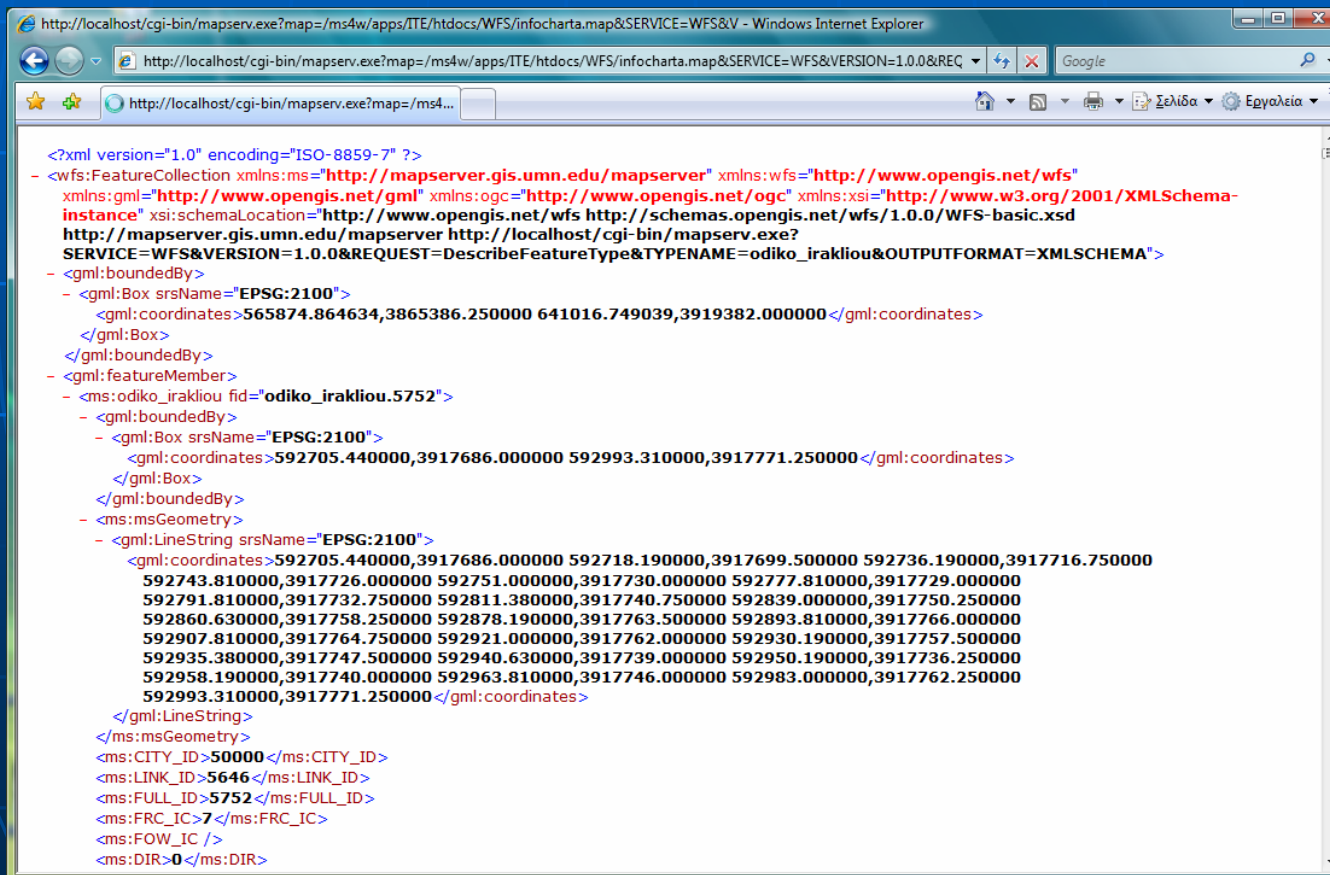
Heraklion SDI

- The Web Feature Service (WFS)...
- GetFeature request

```
http://localhost/cgi-bin/mapserv.exe?  
map=/ms4w/apps/ITE/htdocs/WFS/infocharta.map&  
SERVICE=WFS&VERSION=1.0.0&  
REQUEST=GetFeature&  
typename=odiko_irakliou
```

Heraklion SDI

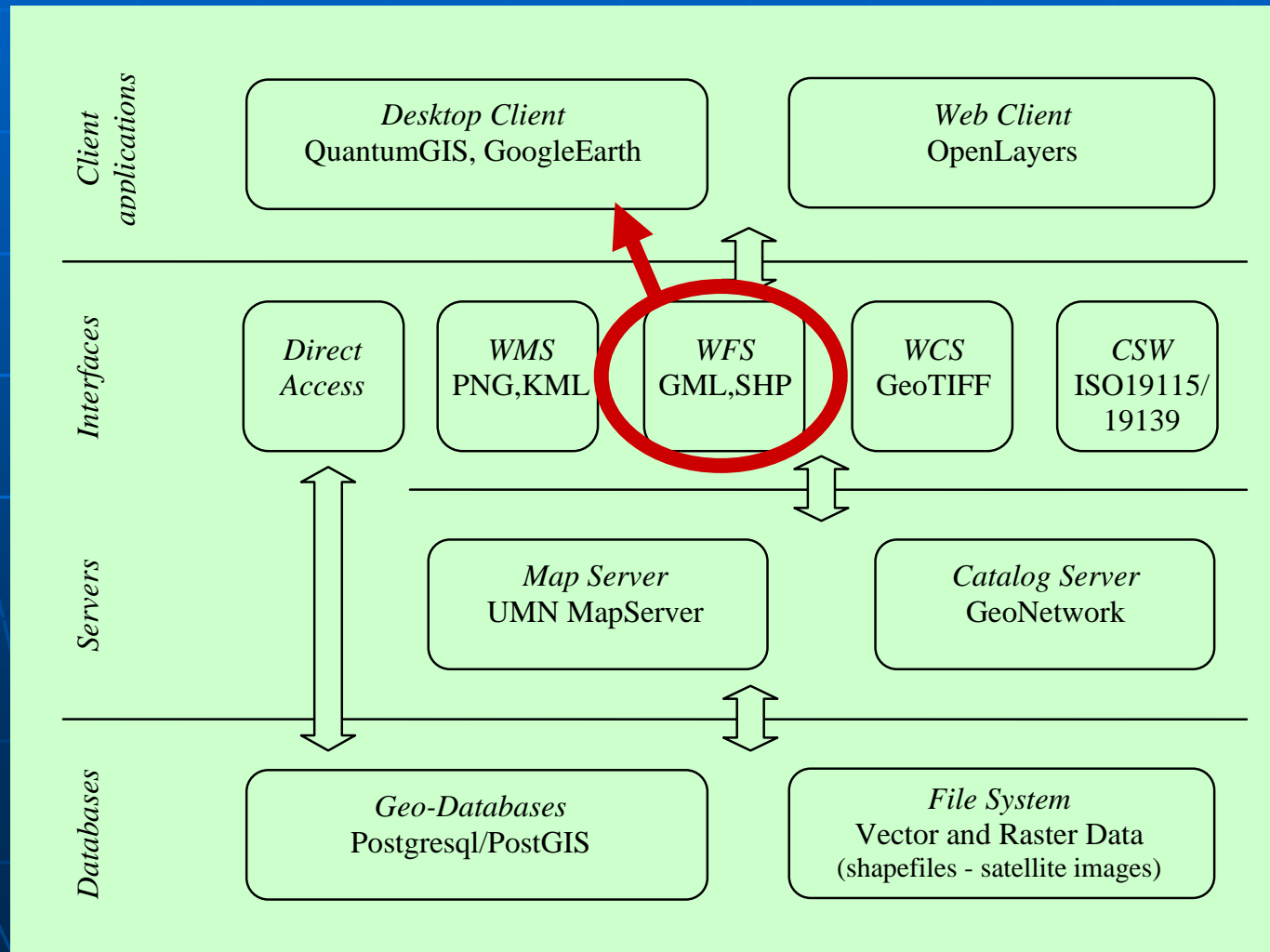
- The Web Feature Service (WFS)...
- GetFeature request



```
<?xml version="1.0" encoding="ISO-8859-7" ?>
- <wfs:FeatureCollection xmlns:ms="http://mapserver.gis.umn.edu/mapserver" xmlns:wfs="http://www.opengis.net/wfs"
  xmlns:gml="http://www.opengis.net/gml" xmlns:ogc="http://www.opengis.net/ogc" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
  instance" xsi:schemaLocation="http://www.opengis.net/wfs http://schemas.opengis.net/wfs/1.0.0/WFS-basic.xsd
  http://mapserver.gis.umn.edu/mapserver http://localhost/cgi-bin/mapserv.exe?
  SERVICE=WFS&VERSION=1.0.0&REQUEST=DescribeFeatureType&TYPENAME=odiko_irakliou&OUTPUTFORMAT=XMLSCHEMA">
- <gml:boundedBy>
- <gml:Box srsName="EPSG:2100">
  <gml:coordinates>565874.864634,3865386.250000 641016.749039,3919382.000000</gml:coordinates>
  </gml:Box>
</gml:boundedBy>
- <gml:featureMember>
- <ms:odiko_irakliou fid="odiko_irakliou.5752">
  - <gml:boundedBy>
  - <gml:Box srsName="EPSG:2100">
    <gml:coordinates>592705.440000,3917686.000000 592993.310000,3917771.250000</gml:coordinates>
    </gml:Box>
  </gml:boundedBy>
  - <ms:msGeometry>
  - <gml:LineString srsName="EPSG:2100">
    <gml:coordinates>592705.440000,3917686.000000 592718.190000,3917699.500000 592736.190000,3917716.750000
    592743.810000,3917726.000000 592751.000000,3917730.000000 592777.810000,3917729.000000
    592791.810000,3917732.750000 592811.380000,3917740.750000 592839.000000,3917750.250000
    592860.630000,3917758.250000 592878.190000,3917763.500000 592893.810000,3917766.000000
    592907.810000,3917764.750000 592921.000000,3917762.000000 592930.190000,3917757.500000
    592935.380000,3917747.500000 592940.630000,3917739.000000 592950.190000,3917736.250000
    592958.190000,3917740.000000 592963.810000,3917746.000000 592983.000000,3917762.250000
    592993.310000,3917771.250000</gml:coordinates>
  </gml:LineString>
  </ms:msGeometry>
  <ms:CITY_ID>50000</ms:CITY_ID>
  <ms:LINK_ID>5646</ms:LINK_ID>
  <ms:FULL_ID>5752</ms:FULL_ID>
  <ms:FRC_IC>7</ms:FRC_IC>
  <ms:FOW_IC />
  <ms:DIR>0</ms:DIR>
```


Architecture & Software Systems

- The architecture...



Heraklion SDI

- The Web Feature Service (WFS)...
- QGIS: Connect to the WFS

Quantum GIS - 0.8.1-Titan ('Titan')

Create a New WMS connection

Connection Information

Name: infocharta_wfs

URL: http://localhost/cgi-bin/mapserv.exe?map=/ms4v...

Proxy Host:

Proxy Port:

Proxy User:

Server Connections

infocharta_wfs

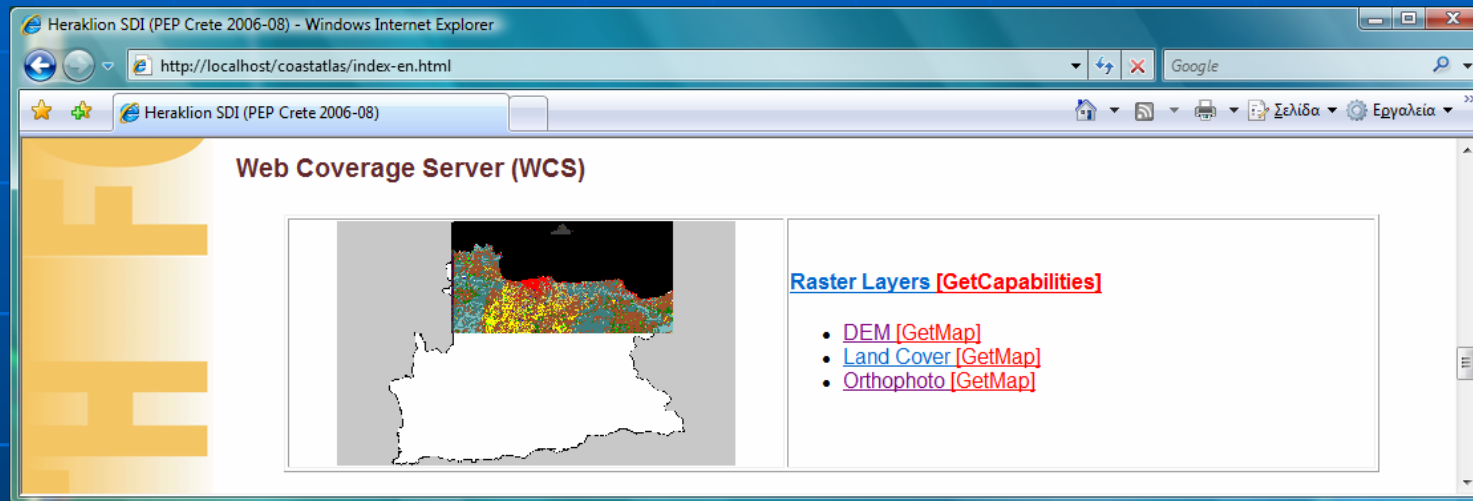
Title	Name	Abstract
nomos_irakliou	nomos_irakliou	
bua_irakliou	bua_irakliou	
dhmoi_irakliou	dhmoi_irakliou	
dhm_diamer...	dhm_diamer_irakl...	
limnes_irakliou	limnes_irakliou	
odiko_irakliou	odiko_irakliou	
oikismoi_irakli...	oikismoi_irakliou	
builds_irakliou	builds_irakliou	
build_egsa	build_egsa	
poi_irakliou	poi_irakliou	

Attribute table - dhmoi_irakliou

ID	CODE	NAMF_GR	NAMF_EN	POP_01
1	0 841 91010000	Δήμος Ηρακλείου	Municipality Of Irakleio	137711
2	1 842 91020000	Δήμος Αγίας Βαρβάρας	Municipality Of Agia Varvara	5310
3	2 843 91030000	Δήμος Αρκαλοχωρίου	Municipality Of Arkalochori	10897
4	3 844 91040000	Δήμος Αρχοντων	Municipality Of Archanes	4548

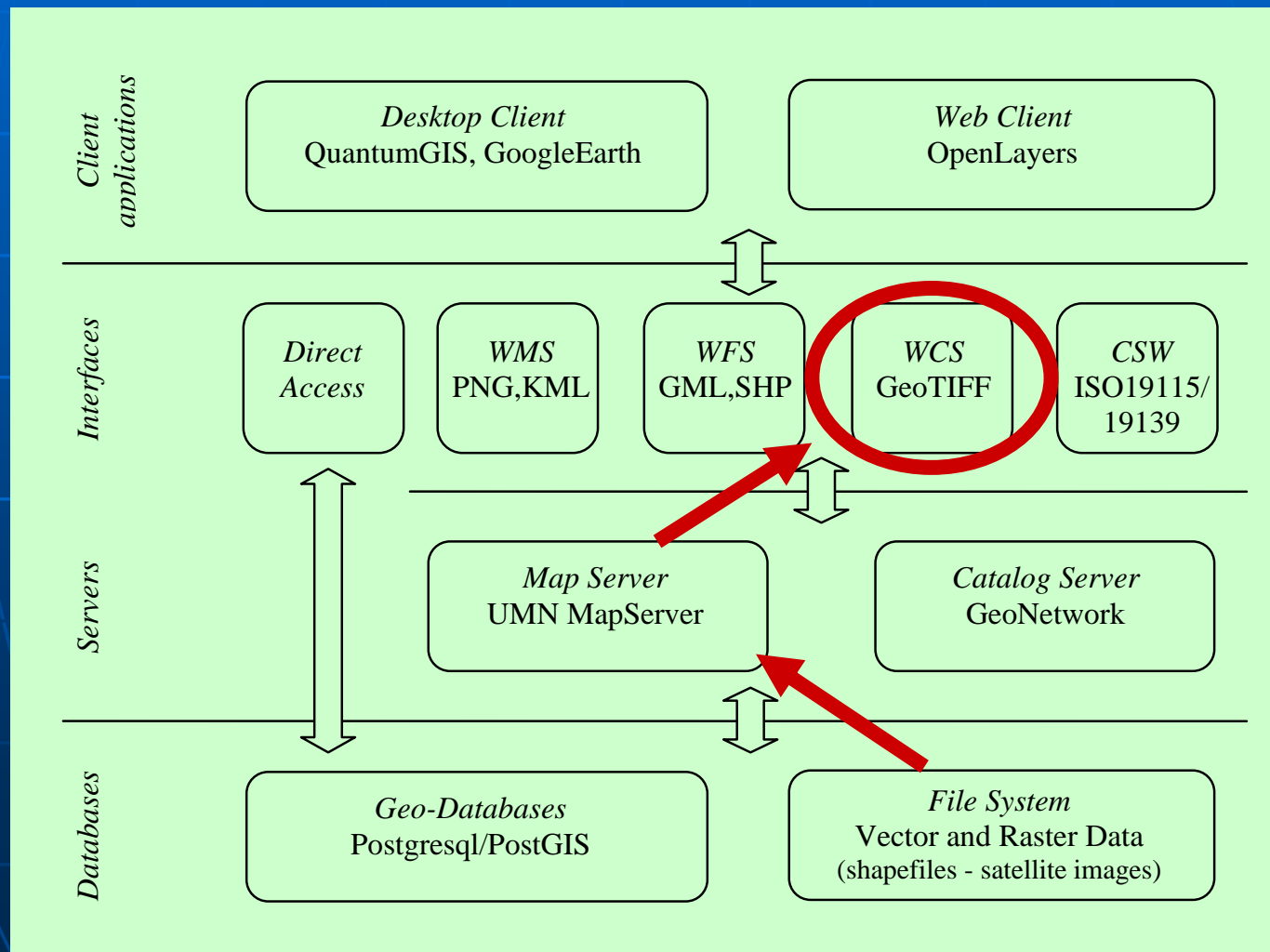
Heraklion SDI

- The Web Coverage Service (WCS)...



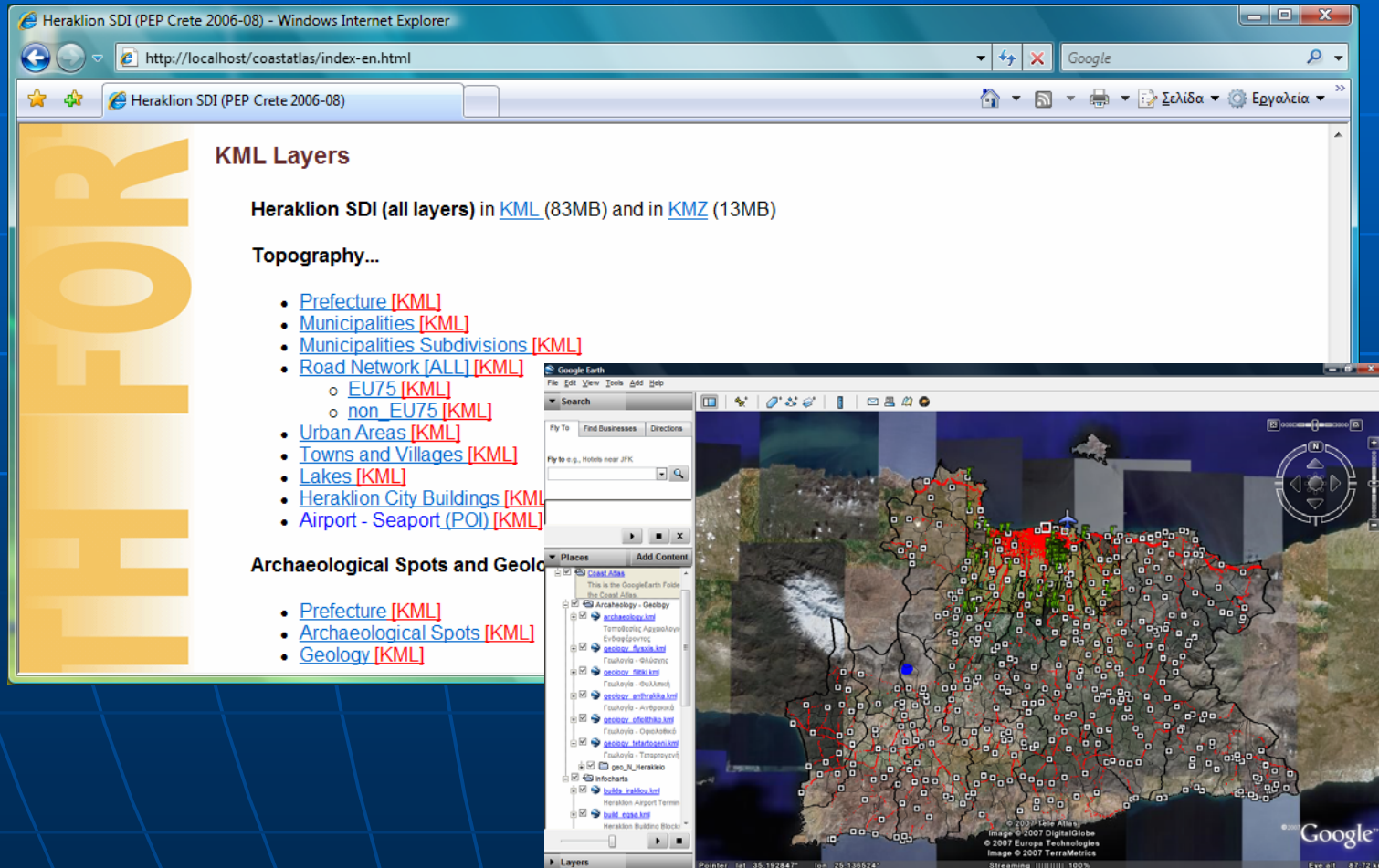
Architecture & Software Systems

- The architecture...



Heraklion SDI

■ The KML Server...



The screenshot shows a Windows Internet Explorer browser window displaying the Heraklion SDI website. The address bar shows the URL <http://localhost/coastatlas/index-en.html>. The page content includes a large vertical banner on the left with the word "HERAFOR" in yellow. The main content area is titled "KML Layers" and lists various data layers available for download in KML and KMZ formats. Below the list, there is a Google Earth application window showing a 3D map of Heraklion, Crete, with the same KML layers overlaid on the terrain. The Google Earth interface includes a search bar, a "Fly To" field, and a "Places" list on the left. The "Places" list shows several layers, including "Coast Atlas", "Archaeology - Geology", "Archaeological Spots", "Geology", "Heraklion Airport Terminals", and "Heraklion Building Blocks". The Google Earth status bar at the bottom shows the coordinates (lat: 35.192847, lon: 25.136524) and a zoom level of 100%.

KML Layers

Heraklion SDI (all layers) in [KML](#) (83MB) and in [KMZ](#) (13MB)

Topography...

- [Prefecture](#) [KML]
- [Municipalities](#) [KML]
- [Municipalities Subdivisions](#) [KML]
- [Road Network](#) [ALL] [KML]
 - [EU75](#) [KML]
 - [non_EU75](#) [KML]
- [Urban Areas](#) [KML]
- [Towns and Villages](#) [KML]
- [Lakes](#) [KML]
- [Heraklion City Buildings](#) [KML]
- [Airport - Seaport \(POI\)](#) [KML]

Archaeological Spots and Geology

- [Prefecture](#) [KML]
- [Archaeological Spots](#) [KML]
- [Geology](#) [KML]

Heraklion SDI

■ The Web Client Application ...

Heraklion SDI - Web Client in OpenLayers - Windows Internet Explorer

http://localhost/ol_coastatlas/index-en.html

Heraklion SDI - Web Client in OpenLayers

Heraklion SDI...

Base Map

- Heraklion Prefecture
- ICEDS
- Google Satellite
- Google Map
- Land Cover
- Orthophoto
- DEM

Data Layers

- Heraklion Prefecture
- Geology
- Urban Areas
- Municipalities
- Municipal.Subdiv.
- Lakes
- Road Network
- Towns & Villages
- Airport Building
- Her.City Buildings
- Airport/Seaport POI
- Archaeological Spots

Scale = 1 : 500K

λ: 25.20437, φ: 35.47303

Welcome to the Heraklion SDI (PEP Crete 2006-08) - Browse in the Geospatial Layers...
Select the base map and the thematic layers on the right frame...
Double click on the map to zoom in...
With a single click on the entities retrieve their non-spatial attributes...

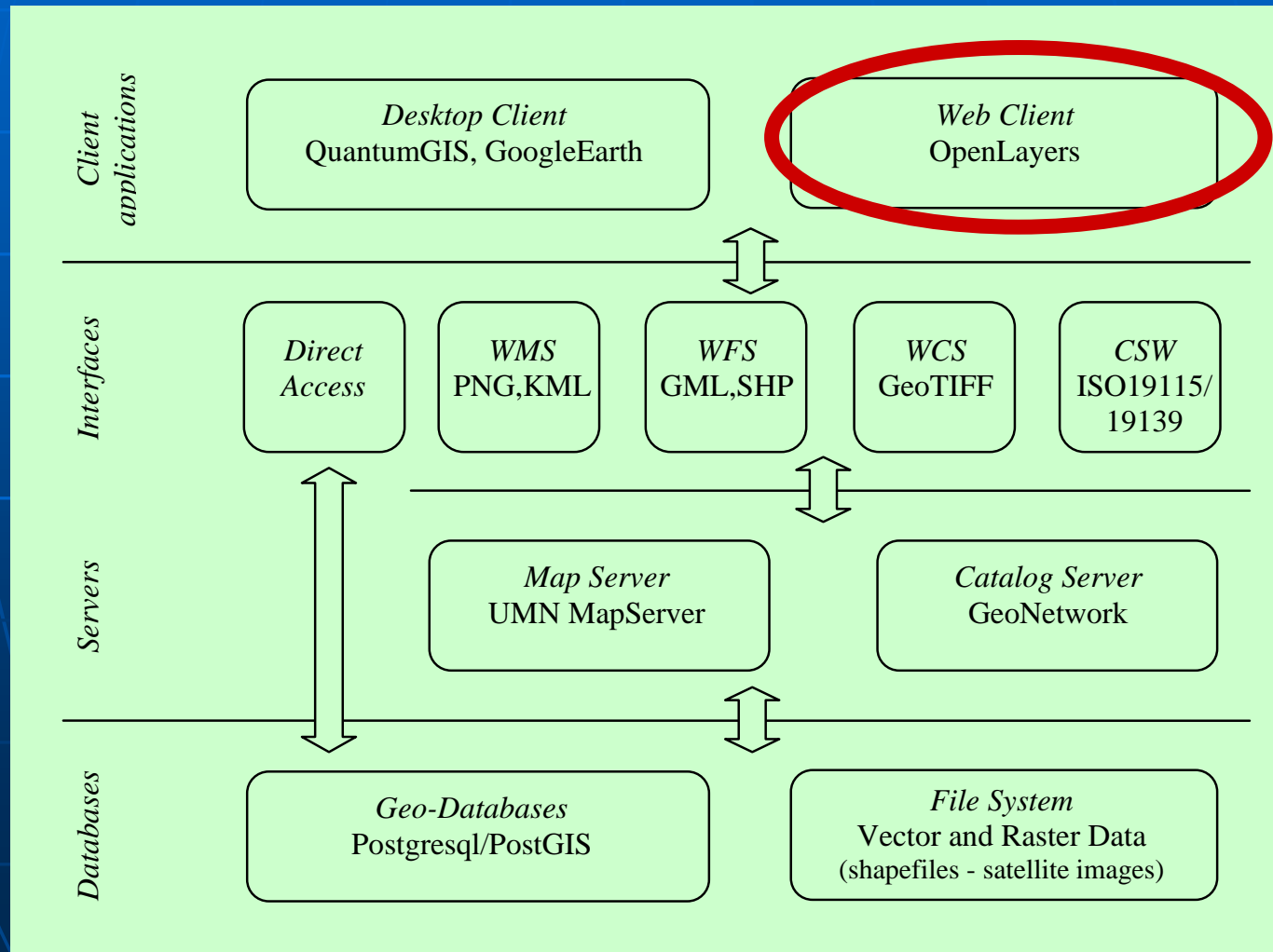
Base Maps (radio buttons)

SDI Layers (multiple selection buttons)

Report of attribute values for clicked features

Architecture & Software Systems

- The architecture...



Heraklion SDI

■ The Web Client Application ...

Heraklion SDI - Web Client in OpenLayers - Windows Internet Explorer

http://localhost/ol_coastatlas/index-en.html

Heraklion SDI - Web Client in OpenLayers

Heraklion SDI...

Base Map

- Heraklion Prefecture
- ICEDS
- Google Satellite
- Google Map
- Land Cover
- Orthophoto
- DEM

Data Layers

- Heraklion Prefecture
- Geology
- Urban Areas
- Municipalities
- Municipal.Subdiv.
- Lakes
- Road Network
- Towns & Villages
- Airport Building
- Her.City Buildings
- Airport/Seaport POI
- Archaeological Spots

Scale = 1 : 500K

λ: 25.20437, φ: 35.47303

Welcome to the Heraklion SDI (PEP Crete 2006-08) - Browse in the Geospatial Layers...
Select the base map and the thematic layers on the right frame...
Double click on the map to zoom in...
With a single click on the entities retrieve their non-spatial attributes...

Base Maps (radio buttons)

SDI Layers (multiple selection buttons)

Report of attribute values for clicked features

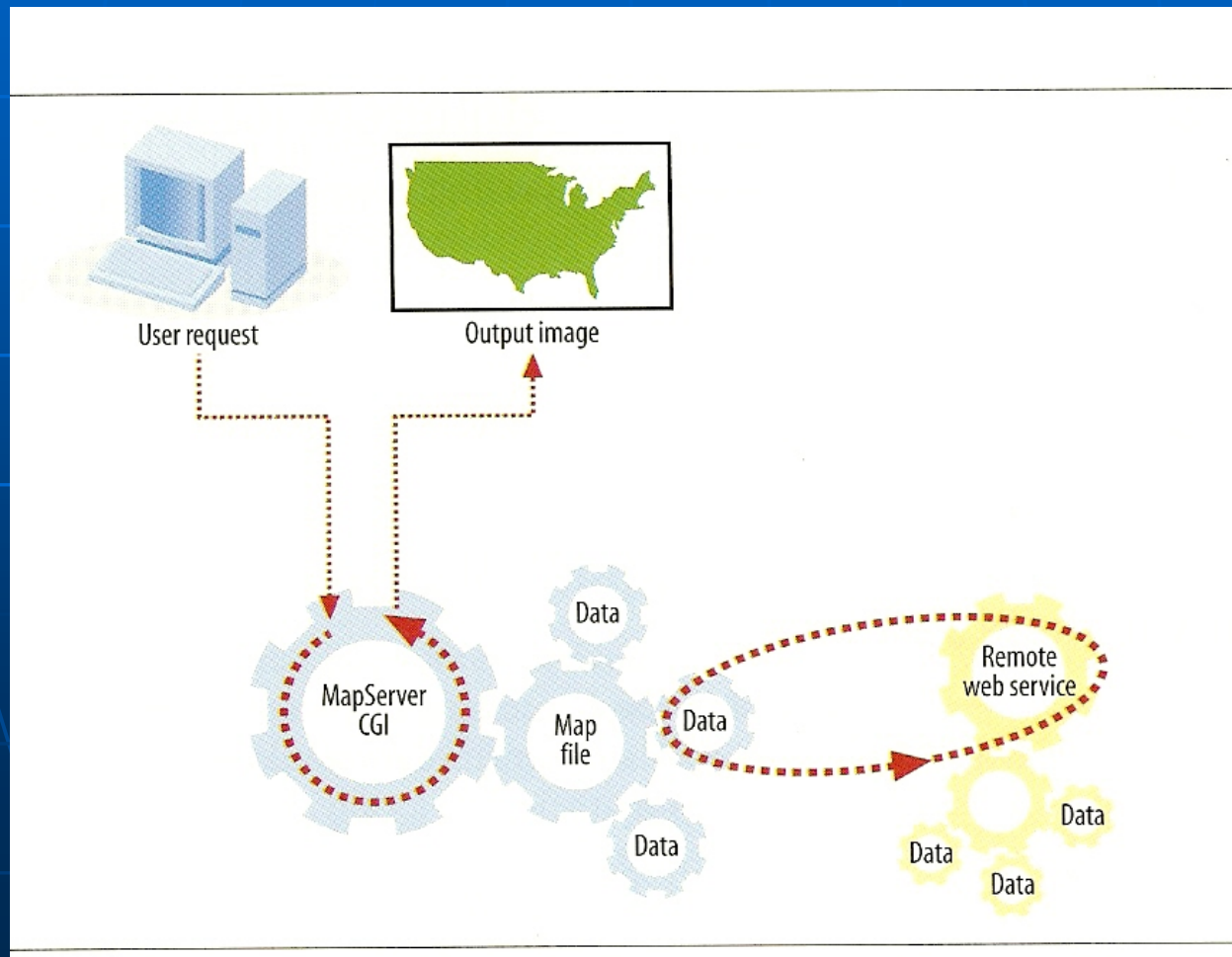
Heraklion SDI

- The Web Map Service (WMS)...
 - GetFeatureInfo request

```
dhmoi_irakliou.getFullRequestString({  
  REQUEST: "GetFeatureInfo",  
  EXCEPTIONS: "application/vnd.ogc.se_xml",  
  BBOX: dhmoi_irakliou.map.getExtent().toBBOX(),  
  X: e.xy.x, Y: e.xy.y,  
  INFO_FORMAT: "text/html",  
  FONT: "c:/ms4w/fontlist/times.ttf",  
  ENCODING: "ISO-8859-7",  
  QUERY_LAYERS: dhmoi_irakliou.params.LAYERS,  
  WIDTH: dhmoi_irakliou.map.size.w,  
  HEIGHT: dhmoi_irakliou.map.size.h});
```

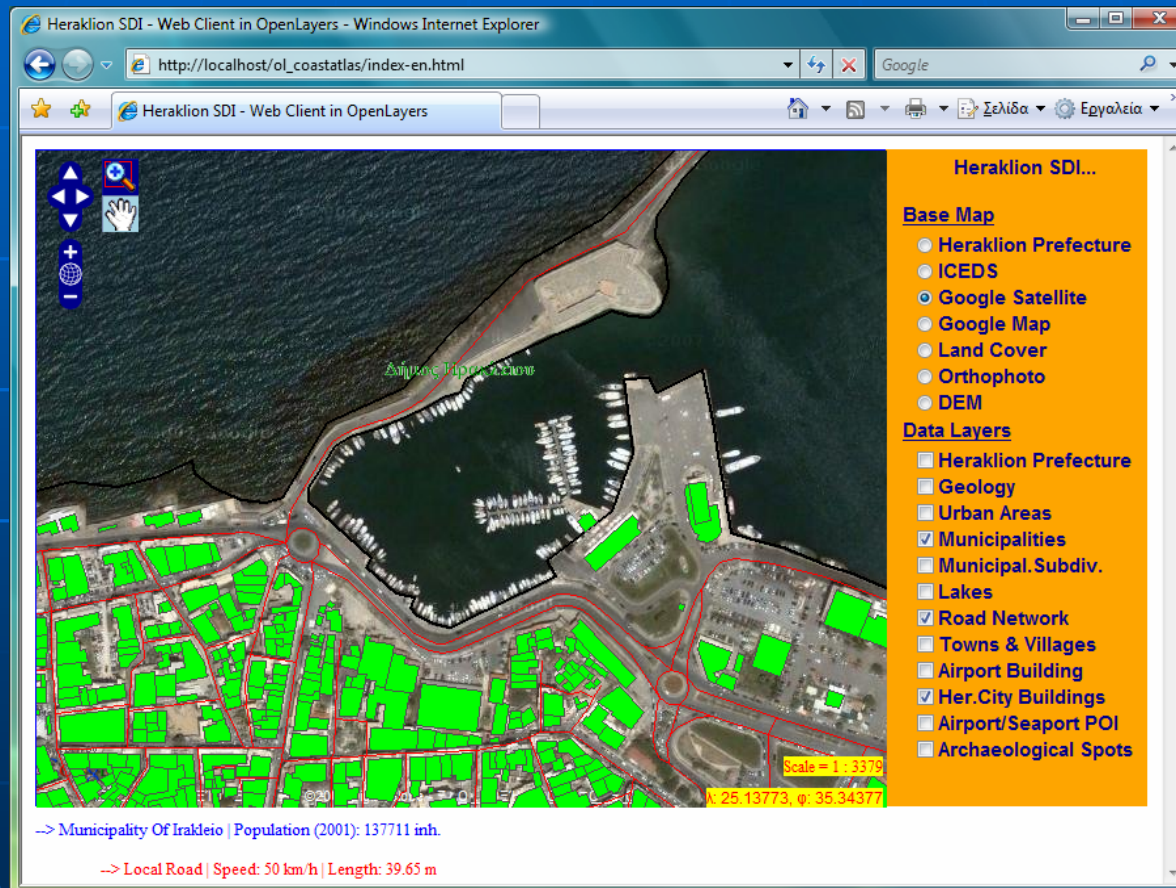
Heraklion SDI

- Mashups ...



Heraklion SDI

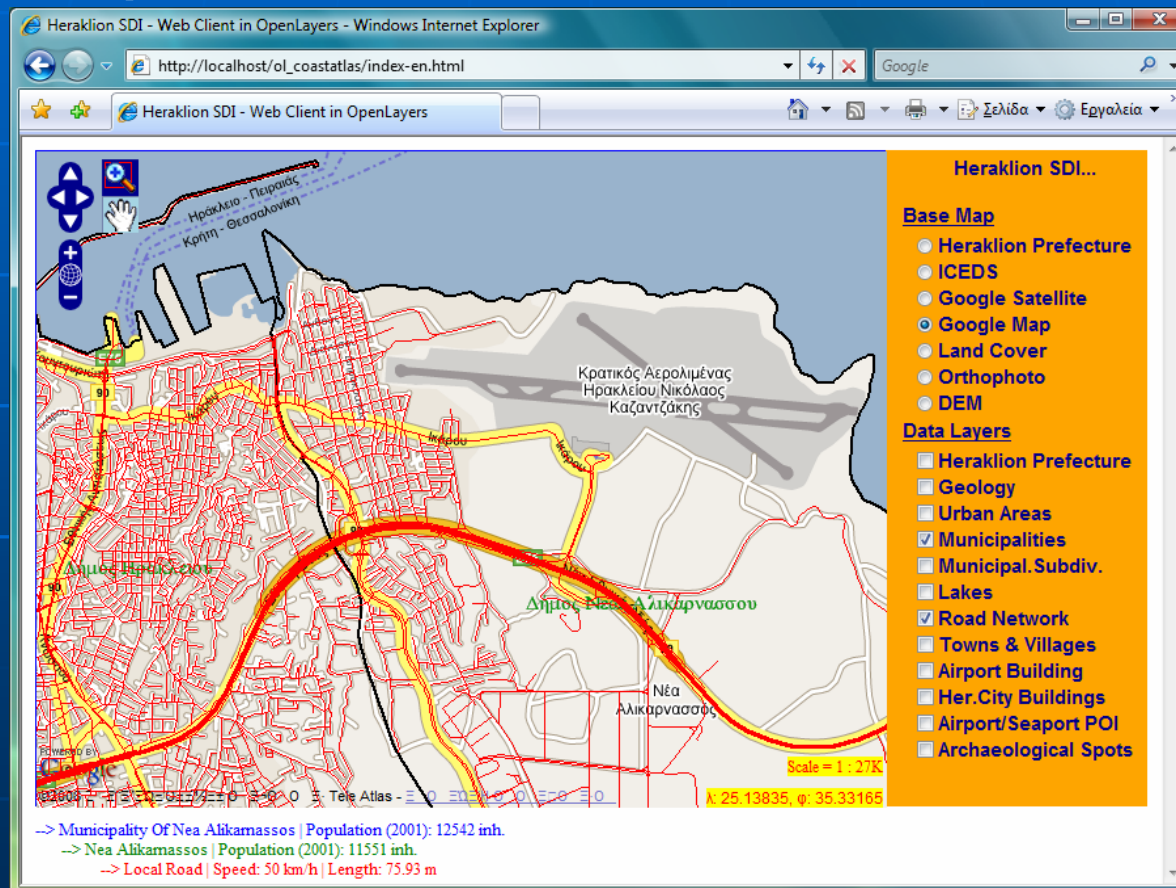
■ Mashups ...



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

Heraklion SDI

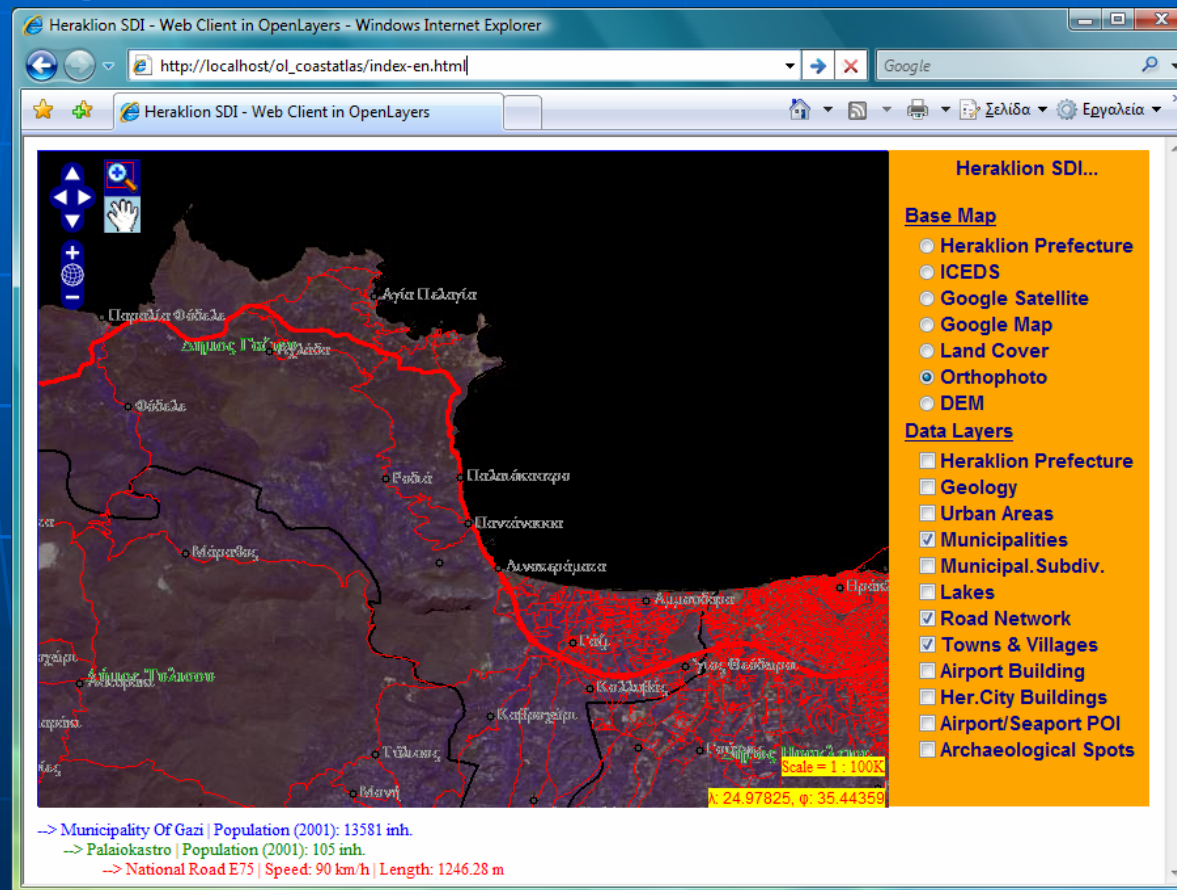
■ Mashups ...



Base Map: Google Map
Layers: Municipalities, Road Network

Heraklion SDI

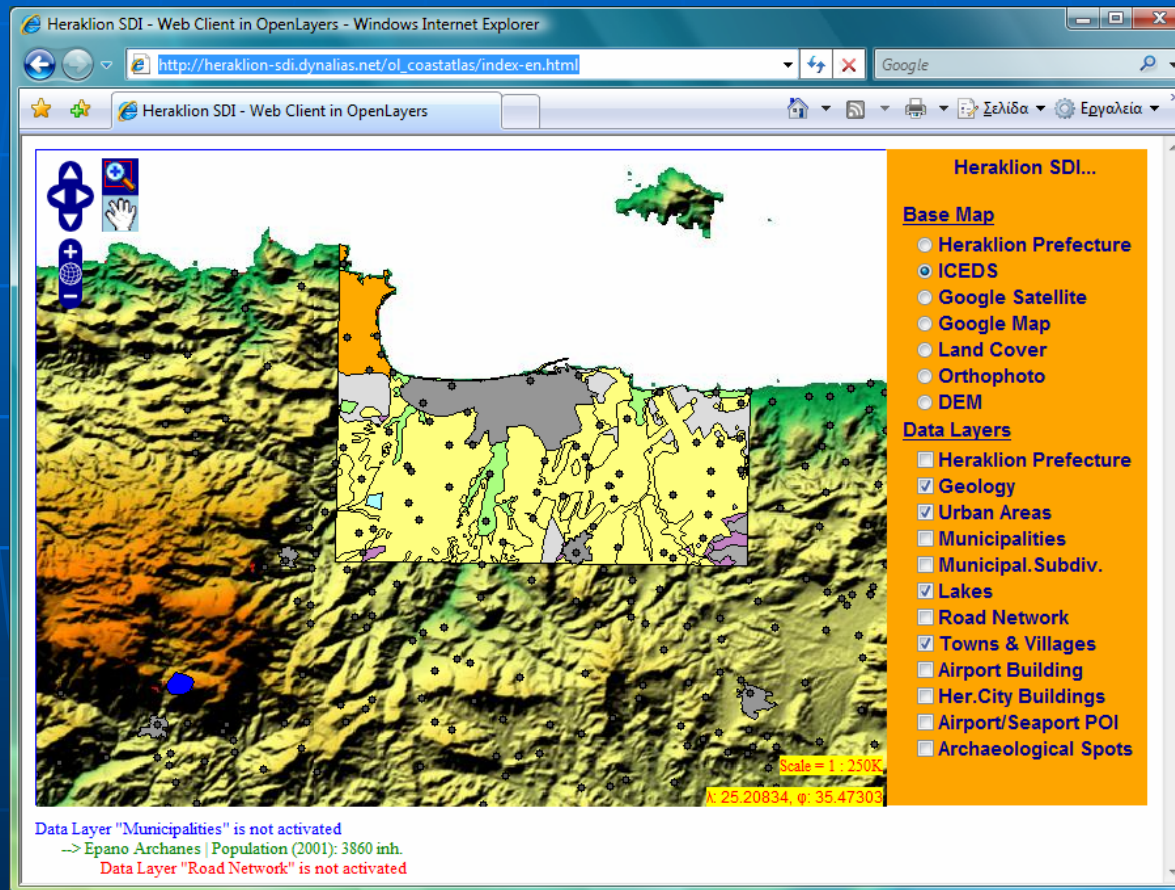
■ Mashups ...



Base Map: Orthophoto Map
Layers: Municipalities, Towns, Road Network

Heraklion SDI

■ Mashups ...



Integrated CEOS European Data Server

Base Map: ICEDS (WMS)
Layers: Geology, Urban areas, Towns, Lakes

Heraklion SDI

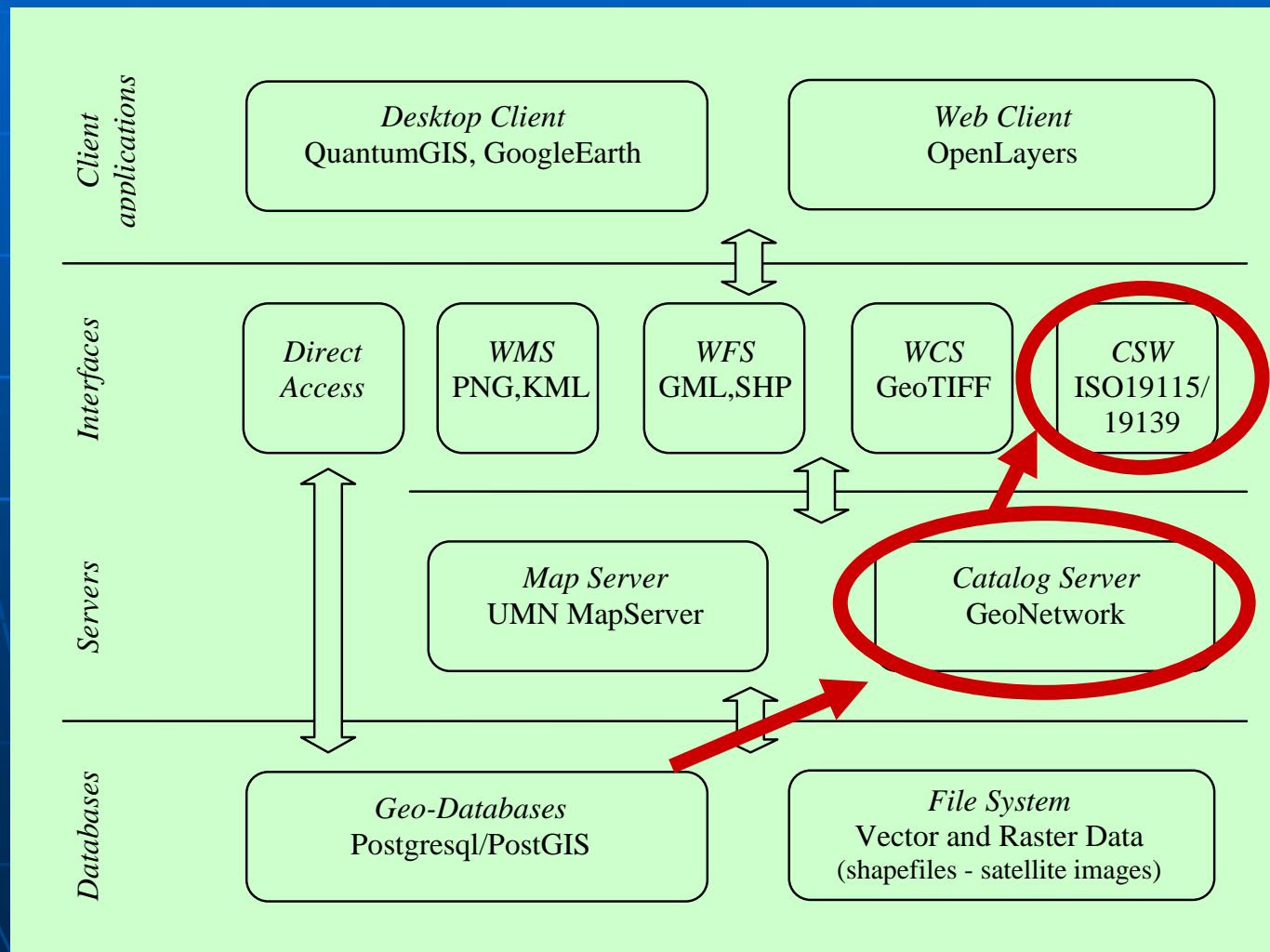
- The Catalog Server ...
 - Heraklion SDI accommodates...
 - a wide digital content of **various types and formats**
 - geospatial data layers
 - satellite images
 - web mapping applications and services

Heraklion SDI

- The Catalog Server ...
 - to make this content accessible on the web and assure its usability,
 - appropriate **metadata items** must be generated
 - a **data catalog server** is needed
 - to make the metadata items available on the web
 - support the efficient discovery and evaluation of the SDI content

Architecture & Software Systems

- The architecture...



Heraklion SDI

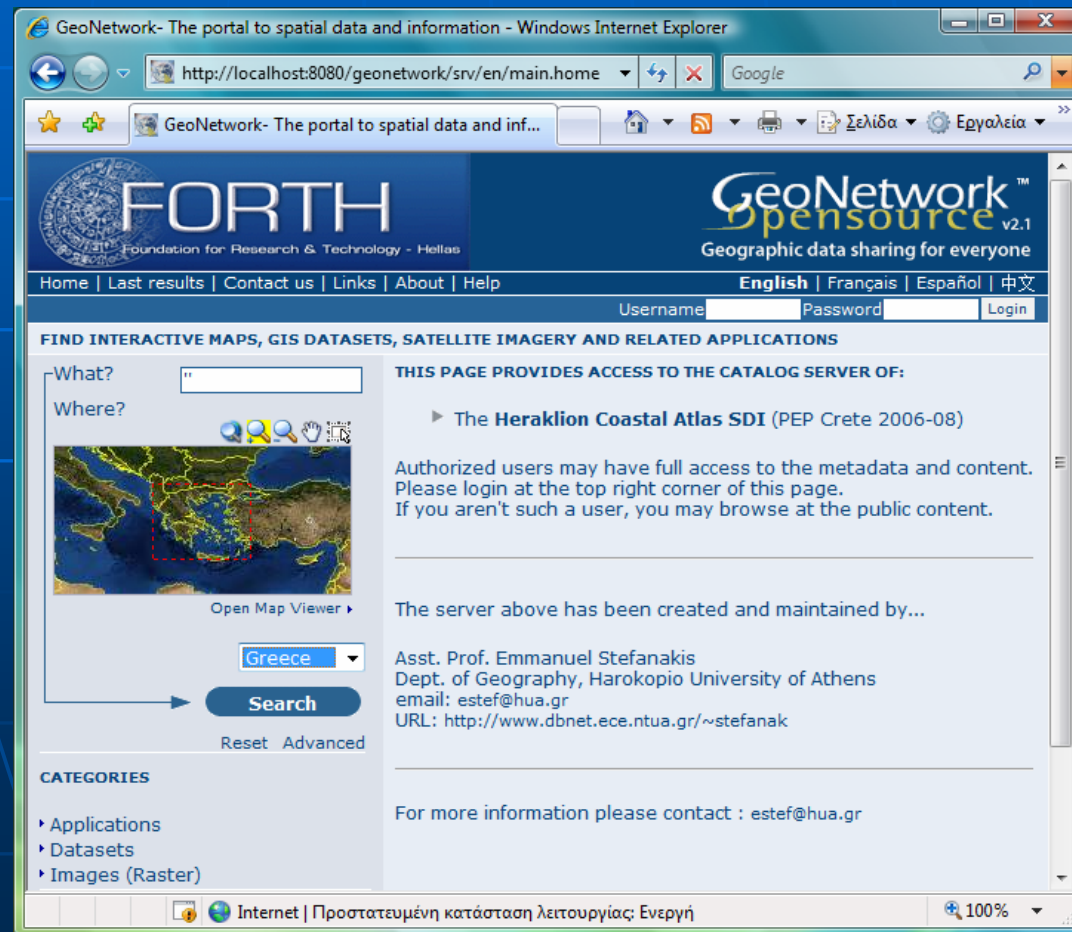
- The Catalog Server ...
 - The content items of the SDI ...
 - have been assigned appropriate metadata items in **XML format**
 - according to the specification of a customized **ISO19139 template**

Heraklion SDI

- The Catalog Server ...
 - ... then a catalog server has been implemented using **GeoNetwork Opensource Server** software ver. 2.1
 - The configuration adopted utilizes
 - the **PostgreSQL** in the role of the DBMS server and
 - the **Apache Tomcat v5.5** in the role of the Web Server.

Heraklion SDI

- The Catalog Server ...



Heraklion SDI

- The Catalog Server ...

The screenshot displays the GeoNetwork v2.1 web interface in a Windows Internet Explorer browser window. The address bar shows the URL `http://localhost:8080/geonetwork/srv/en/main.home`. The page header includes the FORTH logo (Foundation for Research & Technology - Hellas) and the GeoNetwork v2.1 logo with the tagline "Geographic data sharing for everyone". Navigation links for Home, Last results, Administration, Contact us, Links, About, and Help are present, along with language options (English, Français, Español, 中文) and a User: Logout link.

The main content area is titled "FIND INTERACTIVE MAPS, GIS DATASETS, SATELLITE IMAGERY AND RELATED APPLICATIONS". It features a search interface on the left with "What?" and "Where?" input fields, a map preview, and a "Search" button. Below the search interface are sections for "CATEGORIES" (Applications, Datasets, Images (Raster)) and "RECENT CHANGES" (Caption, Template for Dublin Core, Heraklion Orthophoto Map (Raster)).

The search results are displayed under the heading "AGGREGATE RESULTS MATCHING SEARCH CRITERIA : 1-6/6 (PAGE 1/1)". Three results are shown:

- HERAKLION CITIES (TOWNS AND VILLAGES)**: Abstract: "These are the Heraklion Prefecture towns and villages." Keywords: "cities, Heraklion, Crete Island, Greece". Includes "Metadata" and "WMS/Interactive Map" buttons.
- HERAKLION ROAD NETWORK (TRANSPORTATION)**: Abstract: "This is the Heraklion Prefecture road network." Keywords: "roads, Heraklion, Crete Island, Greece". Includes "Metadata" and "WMS/Interactive Map" buttons.
- HERAKLION MUNICIPALITIES (BOUNDARIES)**: Abstract: "These are the Heraklion Prefecture Municipalities boundaries." Keywords: "boundary, Heraklion, Crete Island, Greece". Includes "Metadata" and "WMS/Interactive Map" buttons.

The browser's status bar at the bottom shows "Ολοκληρώ" (Completed) and "Internet | Προστατευμένη κατάσταση λειτουργίας; Ενεργή" (Internet | Protected mode; Active).

Heraklion SDI

- The Catalog Server ...



Heraklion SDI

- The Catalog Server ...

The screenshot displays the GeoNetwork v2.1 interface in a Windows Internet Explorer browser window. The address bar shows the URL `http://localhost:8080/geonetwork/srv/en/main.home`. The page header includes the FORTH logo (Foundation for Research & Technology - Hellas) and the GeoNetwork v2.1 logo (Geographic data sharing for everyone). Navigation links for Home, Last results, Administration, Contact us, Links, About, and Help are present, along with language options (English, Français, Español, 中文) and a User: Logout link.

The main content area is titled "FIND INTERACTIVE MAPS, GIS DATASETS, SATELLITE IMAGERY AND RELATED APPLICATIONS". It features a search interface with "What?" and "Where?" input fields, a "Search" button, and a "Heraklion" dropdown menu. Below the search fields are links for "Open Map Viewer", "Reset", and "Advanced".

The search results are displayed under the heading "AGGREGATE RESULTS MATCHING SEARCH CRITERIA : 1-1/1 (PAGE 1/1)". The first result is "HERAKLION SDI VIEWER (APPLICATION)", which includes an abstract: "This is the application to visualize the geospatial content accommodated in the Heraklion Coastal SDI." and keywords: "SDI Viewer, Heraklion, Crete Island, Greece, mashups". There are buttons for "Metadata" and "WMS/Interactive Map" next to the result. A small thumbnail map of Crete Island is also visible.

On the left side, there are sections for "CATEGORIES" (Applications, Datasets, Images (Raster)) and "RECENT CHANGES" (Caption, Template for Dublin Core, Heraklion Orthophoto Map (Raster)).

The browser's status bar at the bottom indicates "Internet | Προστατευμένη κατάσταση λειτουργίας: Ενεργή" and a zoom level of 100%.

Heraklion SDI

■ The Catalog Server ...

**HERAKLION ROAD NETWORK (TRANSPORTATION)**

Abstract This is the Heraklion Prefecture road network.
Keywords roads, Heraklion, Crete Island, Greece

Metadata WMS/Interactive Map

Identification info

Title	Heraklion Road Network (transportation)
Date	2008-02-29T12:21:00
Date type	Publication
Edition	
Presentation form	mapDigital
Abstract	This is the Heraklion Prefecture road network.
Purpose	This layer is part of the Heraklion Coast Atlas SDI (PEP Crete 2006-08)
Status	completed

Heraklion SDI

■ The Catalog Server ...

Point of contact	
Individual name	Emmanuel Stefanakis
Organisation name	Harokopio University of Athens
Position name	Asst Professor
Delivery point	
City	
Administrative area	
Postal code	
Country	
Electronic mail address	estef@hua.gr
Role	publisher
Maintenance and update frequency	notPlanned
Descriptive keywords	roads (theme).
Descriptive keywords	Heraklion, Crete Island, Greece (place).
Access constraints	copyright
Use constraints	copyright
Other constraints	copyright
Spatial representation type	vector
Equivalent scale	
Denominator	5000
Language	English
Character set	utf8
Topic category code	transportation

Heraklion SDI

■ The Catalog Server ...

::Extent	
[Dotted grid]	
::Extent	
Geographic bounding box	
[Dotted grid]	
North bound latitude 35.5	
West bound longitude 24.7	East bound longitude 25.6
South bound latitude 34.9	
Supplemental Information	
::Distribution info	
OnLine resource	KML layer of the Heraklion Coastal SDI
OnLine resource	WFS layer of the Heraklion Coastal SDI
WMS/Interactive Map	WMS layer of the Heraklion Coastal SDI
::Reference system info	
Code	HGRS'87 (EGSA'87)
::Data quality info	
Hierarchy level	dataset
Statement	TBA

Heraklion SDI

- The Catalog Server ...

Metadata	
File identifier	3c20bd77-8eec-481e-8ba8-165143822785
Language	English
Character set	utf8
Date stamp	2008-03-08T21:27:33
Metadata standard name	ISO 19115:2003/19139
Metadata standard version	1.0
Metadata author	
Individual name	Emmanuel Stefanakis
Organisation name	Harokopio University of Athens
Position name	Asst. Professor
Delivery point	
City	
Administrative area	
Postal code	
Country	
Electronic mail address	estef@hua.gr
Role	pointOfContact

Heraklion SDI

■ The Catalog Server ...

The screenshot displays the GeoNetwork v2.1 web interface, titled "GeoNetwork- The portal to spatial data and information - Windows Internet Explorer". The browser address bar shows "http://localhost:8080/geonetwork/srv/en/user.login#". The page features the FORTH logo (Foundation for Research & Technology - Hellas) and the GeoNetwork v2.1 logo with the tagline "Geographic data sharing for everyone".

The main search area is titled "FIND INTERACTIVE MAPS, GIS DATASETS, SATELLITE IMAGERY AND RELATED APPLICATIONS". It is divided into three sections: "WHAT?", "WHERE?", and "WHEN?".

- WHAT?:** Includes input fields for "What?", "Title", "Abstract", and "Keywords" (containing "roads"). A "Search accuracy" section has radio buttons for "Precise" (selected) and "Imprecise".
- WHERE?:** Includes a map of Crete Island with a red bounding box. Input fields for "lat (min)" (35.5), "lat (max)" (34.8), "long (min)" (24.7), and "long (max)" (25.6) are present. A "Type" dropdown menu is set to "Region", and an "overlaps" dropdown menu is open, showing options: "Heraklion", "- Any -", "Greece", "Heraklion", and "World".
- WHEN?:** Includes radio buttons for "Anytime" and "From 2005-01-01T00 To 2007-12-31T00". A "Restrict to" section has dropdown menus for "Catalog" (Heraklion SDI), "Group" (Coast Atlas), and "Category" (Datasets). There are checkboxes for "Map type" (Digital checked, Hard copy unchecked) and a "Hits per page" dropdown set to 10.

A "Search" button is located at the bottom right of the search criteria section, along with "Reset" and "Hide advanced options" links.

Below the search criteria, the "AGGREGATE RESULTS MATCHING SEARCH CRITERIA: 1-1/1 (PAGE 1/1)" section displays a result for "HERAKLION ROAD NETWORK (TRANSPORTATION)". The result includes an abstract: "This is the Heraklion Prefecture road network." and keywords: "roads, Heraklion, Crete Island, Greece". There is a small map thumbnail showing the road network in red. Below the result are buttons for "Metadata" and "WMS/Interactive Map".

The left sidebar contains "CATEGORIES" (Applications, Datasets, Images (Raster)) and "RECENT CHANGES" (Caption, Template for Dublin Core, Heraklion Orthophoto Map (Raster), Heraklion DEM (Raster)).

The bottom of the page shows a status bar with the text "Ολοκληρώθηκε, αλλά υπάρχουν σφάλματα στη σελίδα." and "Internet | Προστατευμένη κατάσταση λειτουργίας: Ενεργή". The page number "252" is visible in the bottom right corner.

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- GMaps – Google Maps, <http://maps.google.com/>
- GML – Geography Markup Language, <http://www.opengeospatial.org/standards/gml>
- INSPIRE: INfrastructure for SPatial InfoRmation in Europe, <http://www.ec-gis.org/inspire/>
- ISO – International Organization for Standardization, <http://www.iso.org/>
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Web Services for Mapping

Tutorial

Ευχαριστώ! Thank you!

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