

PublicaMundi

Scalable and Reusable Open Geospatial
Data



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OGC Member

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Genesis of the project

- Consortium established on active research, commercial, and personal interactions
- Consortium members are active contributors to Free and Open Source Geospatial Software
- Idea based on practical experience (2010-) from geodata.gov.gr and our interaction with users, publishers and SMEs

Why PublicaMundi?

- Imago Mundi
 - Image of the World, Babylonian world map
 - Maps, created by cartographers and geographers
- PublicaMundi
 - Image of the World, based on Open Data
 - Maps, created by open knowledge and FOSS



Consortium

Athena IMIS



Rasdaman



Geolabs



GET



Athena

- Athena Research and Innovation Center in Information, Communication and Knowledge Technologies
- Non-profit, research organization, governed by public law
- Institute for the Management of Information Systems (IMIS)

Rasdaman

- rasdaman GmbH
- R&D centric SME, established in 2003 (MBO in 2010)
- Areas of business: commercial support for rasdaman Array DBMS; consultancy on SDIs & standards
- Geospatial World Innovation Award (2013)

GeoLabs

- GeoLabs SARL
- R&D centric SME focused on FLOSS GIS
- Senegalese Land register (2007)
- 3D module development for Terra Explorer (2008) in IGN 3D Geoportal
- Development of the MapMint SDI using WPS, other OGC Web Services and OASIS

GET

- Geospatial Enabling Technologies Ltd
- SME focused on GeoInformatics
- Successful design and implementation of projects for public and private sector related to geospatial data production, management, curation, geospatial applications (desktop, mobile, web)
- One of the first Greek private companies invested in Open Source GIS technology

Experiences and Problems

Reoccurring practical problems in open geospatial data reuse:

- Data formats/CRS
- Web maps
- Interlink
- Translations
- Publishing
- OGC/INSPIRE documents not for all

Goals

Research and develop methodologies, as well as scalable, reusable tools to facilitate:

- the **publication**
- **discovery**
- and **reuse**

of open geospatial data

OPEN SOURCE



OPEN DATA



OPEN KNOWLEDGE



Goals

- Open data catalogues fully supporting **publishing, curation and management lifecycle** of geospatial data
- **Interlinking** of geospatial data and **multilinguality** support in a cross-boundary context
- Scalable technologies and services to create and reuse on-demand **maps** from open geospatial data
- **Analytics** to accurately monitor the usage of open geospatial data
- Scalable technologies and reusable data APIs supporting **querying, processing, and analysis** of open geospatial data

Free and Open Source Software (FOSS)

- It's a prerequisite for **Big Data** and **Cloud Computing**
- Everybody uses FOSS today, even without knowing it



CKAN

An abbreviation for “Comprehensive Knowledge Archive Network”

Open Source web platform for **publishing and sharing data** with impressive deployment history:

- EU Open Data Portal
- USA data.gov
- UK data.gov.uk
- Australia data.gov.au
- and many many others...



PublicaMundi and FOSS

- Based on CKAN open data catalogue
- PublicaMundi will spatially extend CKAN using OGC standards
- Development is based exclusively on the OSGeo stack

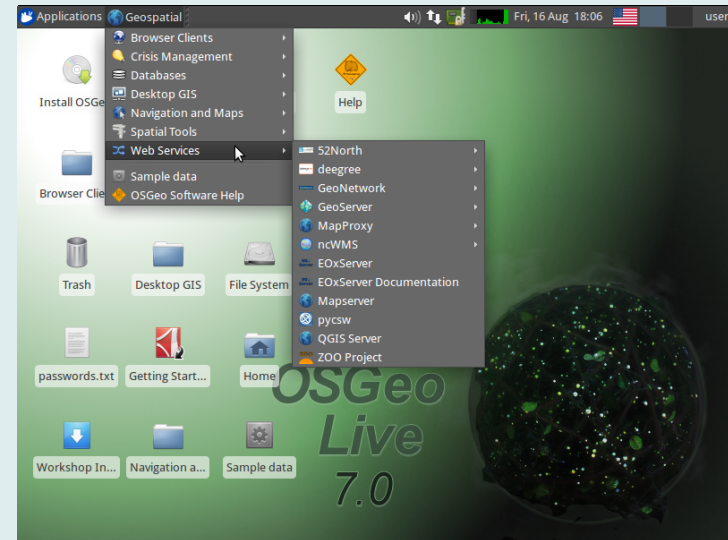
Open Source Geospatial Foundation (OSGeo)

Since 2006 A Non Profit Umbrella for:

- GeoSpatial Free and Open Source Software
- Education
- Open Data

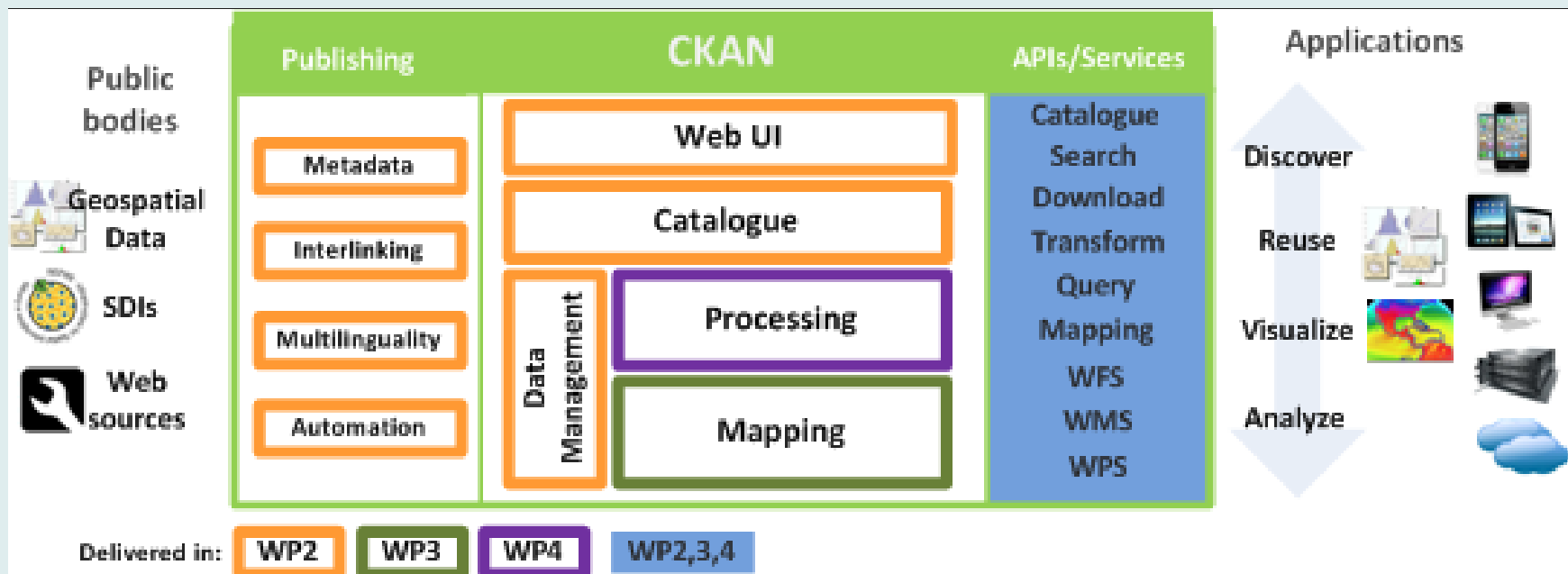


OSGeoLive



- GNU/Linux distribution
- 60+ Open Source Geospatial Applications
- Sample Datasets
- Consistent Overviews & Quickstarts
- Translations
- Unfortunately Big Data do not fit on a 4GB DVD...

High level architecture



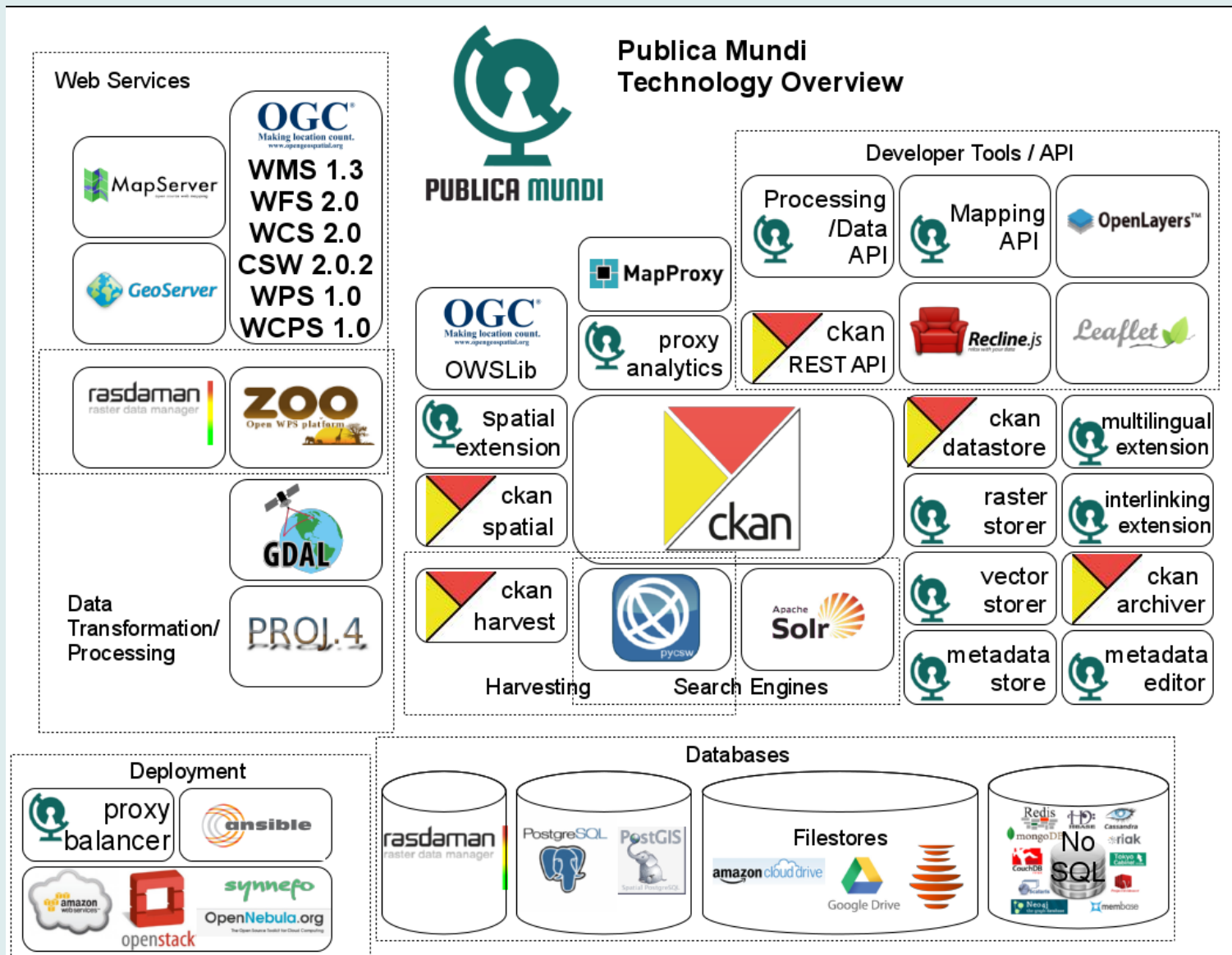
OGC standards and INSPIRE

- Discovery Services
- View Services
- Download Services
- Processing Services

Earth Observation Big Data

- Integration with rasdaman
- WCPS and WPS support

Architecture Overview



CKAN

- CKAN is a powerful data management system that makes data accessible – by providing tools to streamline publishing, sharing, finding and using data.
- CKAN is aimed at data publishers (national and regional governments, companies and organizations) wanting to make their data open and available.



CKAN Features

- Publish and find datasets
- Store and manage data
- Federated nodes
- Harvesting
- Metadata Editing/Management
- APIs and Extensions

Publish Data

Home / Organizations / National Statistics Office



National Statistics Office

This is the department of statistics, based in Middle Earth [read more](#)

Followers Members

0 **0**

Datasets

4

Datasets

Activity Stream

About

Add Dataset

Admin

Follow

Search...



4 datasets found

Order by: Relevance

Afghanistan Election Districts

About From website: Welcome to [AfghanistanElectionData.org](#). This website, created by the National Democratic Institute (NDI) in partnership with Development Seed, a Washington,...

CSV

Newcastle City Council: Payments over £500

Newcastle City Council spending data over £500. Data is published monthly and shows who was paid, how much was paid, and what this was for. This will include: all...

Search and Discovery

The image shows a screenshot of the CKAN search interface. On the left, a circular callout contains the text "Search..." at the top, "9 datasets found" in the middle, and "Groups: Data Explorer" at the bottom. A line connects this callout to the search results on the right. The main screenshot shows a browser window with the URL "http://demo.ckan.org/dataset/groups=data-explorer". The CKAN logo is visible at the top left. The search results are displayed under the heading "9 datasets found" and are ordered by "Relevance". The results list several datasets, including "A test dataset", "UK: Adur District Council Spending Data", "Afghanistan Election Districts", "Gold Prices in London 1950-2008 (Monthly)", and "Italian Regional Public Accounts". Each dataset entry includes a brief description and a "CSV" download link. The left sidebar shows filters for Groups, Tags, and Formats.

Metadata

The image shows a screenshot of a CKAN dataset page for 'UK: Adur District Council Spending Data'. The page includes a navigation bar with 'ckan', 'Datasets', 'Organizations', 'Groups', and 'About'. The dataset title is 'UK: Adur District Council Spending Data'. Below the title, there is a description: 'From Spikes Cavell, Spotlight on Spend. For Ardur, records from April 2009-March 2010 are currently available (2011-008-04)'. The 'Data and Resources' section lists two resources: 'Adur District Council April 2009' and 'Revised CSV for import'. A filter bar shows 'country-uk', 'date-2009', 'openspending', and 'regional'. The 'Additional Info' section contains a table with the following data:

Field	Value
Source	http://www.spotlight/Downloads/1038
Author	Lucy Chambers
spatial	
spatial-text	"type": "Polyc...

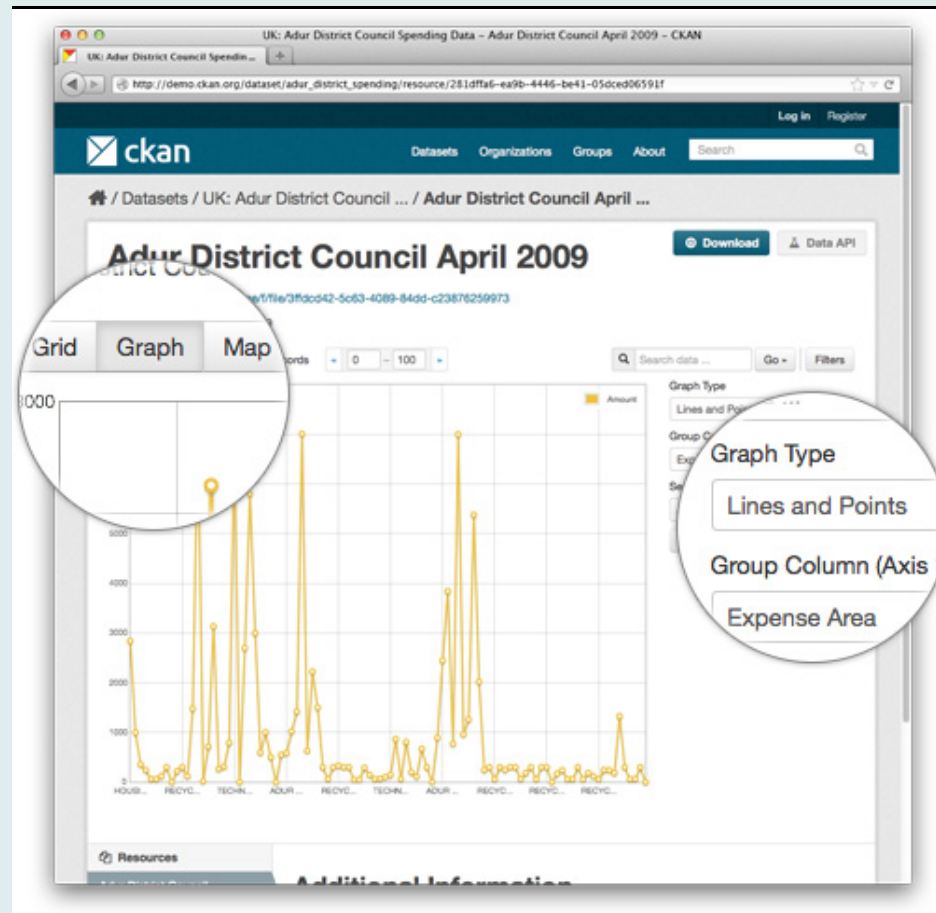
Callouts highlight the following elements:

- A circular callout on the left side of the page highlights the 'Groups' and 'Social' sections.
- A circular callout on the right side of the page highlights the 'Source' field in the 'Additional Info' table, showing the URL <http://www.spotlight/Downloads/1038>.
- A circular callout at the bottom of the page highlights the 'Activity Stream' section, showing a notification: 'Demo User updated the ... 3 days and 2 ...'.

Geospatial



Visualization



ckanext-spatial - Geo plugins for CKAN

- A spatial field on the default CKAN dataset schema, that uses PostGIS as the backend and allows to perform spatial queries and to display the dataset extent on the frontend
- Harvesters to import geospatial metadata into CKAN from other sources in ISO 19139 format and others
- Commands to support the CSW standard using pycsw
- Plugins to preview spatial formats such as GeoJSON



ckanext-spatial Features

- Spatial Search
- Spatial Harvesters
- CSW interface
- WMS Preview

Spatial Search

DATA TOPICS- IMPACT APPLICATIONS DEVELOPERS CONTACT

DATA CATALOG

/ Datasets Organizations Interactive Datasets ?

Federal datasets are subject to the U.S. Federal Government [Data Policy](#). Non-federal participants (e.g., universities, organizations, and tribal, state, and local governments) maintain their own data policies. Data policies influence the usefulness of the data.

Filter by location Clear

Map data CC-BY-SA by [OpenStreetMap](#)
Tiles by [MapQuest](#)

Search datasets...

104,775 datasets found Order by: Select an option

Datasets ordered by Popular

NOAA National Weather Service - National Mosaic of Weather Radar 🔥 Federal
National Oceanic and Atmospheric Administration, Department of Commerce – A National Mosaic view of National Weather Service (NWS)'s radar imagery allows interactivity with the display providing you with the ability to customize the way...
n/a


Climate Data Online (CDO) 🔥 Federal
National Oceanic and Atmospheric Administration, Department of Commerce – Climate Data online or CDO provides access to climate data products through a simple, searchable online web mapping service. Users can find a variety of NCDC...
HTML

Consumer Complaint Database 🔥 Federal
Consumer Financial Protection Bureau – These are complaints we've received about financial products and services.
CSV JSON XML

Dataset Type Clear All
A-Z 1-9
geospatial (80512)
non-geospatial (24263)
[Show More Dataset Type](#)

Tags Clear All
A-Z 1-9
temperature (25752)

Spatial Search

DATA TOPICS- IMPACT APPLICATIONS DEVELOPERS CONTACT


DATA CATALOG

Home / Datasets

Organizations Interactive Datasets ?

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Filter by location



Map data CC-BY-SA by [OpenStreetMap](#)
Tiles by [MapQuest](#)

Dataset Type

A-Z 1-9

geospatial (8325)

Show More Dataset Type

Tags

A-Z 1-9

temperature (2319)

physical (2240)

8,325 datasets found Order by: Relevance

Datasets ordered by Relevance

Digital Elevation Model (DEM) 250K University

Kansas Data Access and Support Center – Digital Elevation Model (DEM) is the terminology adopted by the USGS to describe terrain elevation data sets in a digital raster form. The standard DEM consists of...

[HTML](#) [HTML](#)

Ecoregions of Kansas University

Kansas Data Access and Support Center – Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. They are designed to serve as a...

[HTML](#)

Environmental Monitoring University

Kansas Data Access and Support Center – The most current surface water monitoring can be accessed through the Bureau of Environmental Field Services interactive map, located at...

[HTML](#) [HTML](#)

Spatial Datasets

DATA CATALOG

Home / Organizations / Arizona Geological Survey / Kansas Well Log Observational ...



Arizona Geological Survey

The Arizona Geological Survey collates and serves geological information for Arizona and other states through its partnership with other state geological surveys. [read more](#)

Share on Social Sites

Google+

Twitter

Facebook

Dataset extent



Map data © [OpenStreetMap](#) contributors
Tiles by [MapQuest](#)

Dataset

Kansas Well Log Observational Data

These data contain basic information describing well logs and compiled by the Kansas Geological Survey, published as a downloadable file, ESRI Service, and as a Web Feature service for the National Geothermal Data System. The downloadable documents contain 9 worksheets, including information about the template, notes related to revisions of the template, resource provider information, the data, a field list (data mapping view) and a worksheet with vocabularies for use in populating the spreadsheet (data valid terms). Fields in the data table include Well Name, API Number, Ended Drilling Date, Well Type, Bottom Logged Interval, and Log Notes.

Data and Resources

 **Service Description**

[Visit page](#)

 **Downloadable File**

[View Map](#)

 **Service Description**

[Download](#)

 **2007 zipped Excel file for Kansas Well Logs**
ks_yr1_welllogobservation_task1343_20121107.zip

[Download](#)

Metadata Source

 **ISO-19139 Metadata**
[Download Metadata](#) - [View Full Metadata](#)

Harvested from [AASG geothermal data CSW](#)

[geothermal](#) [well log depth data](#) [well logs](#) [kansas](#) [kansas geological s...](#)
[well log observatio...](#)

Spatial Datasets Preview

The screenshot displays a CKAN dataset page for 'Bulgarian Municipalities'. The page includes a navigation bar with 'ckan', 'Datasets', 'Organizations', 'Groups', 'About', and a search box. The breadcrumb trail is '/ Organizations / Organization Example / Test preview GeoJSON / Bulgarian Municipalities'. The dataset title is 'Bulgarian Municipalities', with 'Edit' and 'Download' buttons. The URL is <https://ckanet-storage.commondatastorage.googleapis.com/2013-06-07T085842/geo.json>. It is noted as taken from <http://datahub.io/dataset/bulgarian-municipalities>. A map of Bulgaria is shown with a popup window displaying the following data:

name	Рагъново
id	157
pid	113
pop	20079
oblast	Стара Загора

Spatial Datasets Preview

The screenshot shows a CKAN dataset page for 'WMS'. The page header includes the CKAN logo and navigation links for Datasets, Organizations, Groups, and About, along with a search bar. The breadcrumb trail indicates the path: Organizations / testorg / Test WMS / WMS. The dataset title is 'WMS', with 'Edit' and 'Download' buttons. The URL is <http://inspire.esriuk.com/ArcGIS/services/DFIT/Stations/MapServer/inspireViewService?Request=GetCapabilities&Service=WMS>. A note states: 'There is no description for this resource'. Under 'From the dataset abstract', a text box contains: 'Please note that the WMS previewer included in ckanext-spatial is just a proof of concept, intended as a bootstrap for developers willing to build a more sophisticated one.' The source is listed as 'Test WMS'. The main content is a map preview showing a network of green lines (RailNetwork) and red dots (Stations). A legend on the right titled 'Overlays' shows 'RailNetwork' and 'Stations' both checked. A scale bar is visible on the left side of the map.

ISO 19115 Metadata

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
- <gmd:MD_Metadata xsi:schemaLocation="http://www.isotc211.org/2005/gmd http://schemas.opengis.net/csw/2.0.2/profiles/apiso/1.0.0/apiso.xsd">
  - <gmd:fileIdentifier>
    <gco:CharacterString>caad517515720208ad5e01bce404cca7</gco:CharacterString>
  </gmd:fileIdentifier>
  - <gmd:language>
    <gco:CharacterString>eng</gco:CharacterString>
  </gmd:language>
  - <gmd:characterSet>
    <gmd:MD_CharacterSetCode codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/gmx/Codelists.xml#MD_CharacterSetCode" codeListValue="utf8">UTF-8</gmd:MD_CharacterSetCode>
  </gmd:characterSet>
  - <gmd:hierarchyLevel>
    <gmd:MD_ScopeCode codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/gmx/Codelists.xml#MD_ScopeCode" codeListValue="Dataset">Dataset</gmd:MD_ScopeCode>
  </gmd:hierarchyLevel>
  - <gmd:hierarchyLevelName>
    <gco:CharacterString>Dataset</gco:CharacterString>
  </gmd:hierarchyLevelName>
  - <gmd:contact>
    - <gmd:CI_ResponsibleParty>
      - <gmd:individualName>
        <gco:CharacterString>Christy Caudill</gco:CharacterString>
      </gmd:individualName>
      - <gmd:organisationName>
        <gco:CharacterString>AZGS</gco:CharacterString>
      </gmd:organisationName>
      - <gmd:contactInfo>
        - <gmd:CI_Contact>
          - <gmd:phone>
            - <gmd:CI_Telephone>
              - <gmd:voice>
                <gco:CharacterString>520-209-4165</gco:CharacterString>
              </gmd:voice>
            </gmd:CI_Telephone>
          </gmd:phone>
          - <gmd:address>
            - <gmd:CI_Address>
              - <gmd:deliveryPoint>
                <gco:CharacterString>416 W Congress St</gco:CharacterString>
              </gmd:deliveryPoint>
              - <gmd:city>
                <gco:CharacterString>Tucson</gco:CharacterString>
              </gmd:city>
            </gmd:CI_Address>
          </gmd:address>
        </gmd:CI_Contact>
      </gmd:contactInfo>
    </gmd:CI_ResponsibleParty>
  </gmd:contact>
</gmd:MD_Metadata>
```

CSW Interface

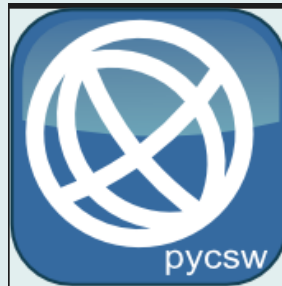


The screenshot shows a web browser window with the address bar containing the URL: `catalog.data.gov/csw-all?service=CSW&version=2.0.2&request=GetRecords&typeName=`. The browser's address bar also shows a search engine dropdown set to Google. Below the address bar, a message states: "This XML file does not appear to have any style information associated with it. The document tree is shown below." The XML content is displayed in a monospaced font with syntax highlighting. The XML is a SOAP response from a CSW service, containing a `GetRecordsResponse` element with a `SearchStatus` and a `SearchResults` element. The `SearchResults` element includes attributes for `nextRecord`, `numberOfRecordsMatched`, and `numberOfRecordsReturned`.

```
<!-- pycsw 1.8.0 -->
- <csw:GetRecordsResponse version="2.0.2" xsi:schemaLocation="http://www.opengis.net/cat/csw/2.0.2 http://schemas.opengis.net/csw/2.0.2/CSW-discovery.xsd">
  <csw:SearchStatus timestamp="2014-05-27T13:10:34Z"/>
  <csw:SearchResults nextRecord="11" numberOfRecordsMatched="406162" numberOfRecordsReturned="10" recordSchema="http://www.opengis.net/cat/csw/2.0.2" elementSet="brief"/>
</csw:GetRecordsResponse>
```

pycsw

- pycsw is a OGC CSW server implementation written in Python
- pycsw is an Open Source project released under the MIT license



What is Metadata?

Metadata is often described as “data about data”, or the who, what, where, and when.

In the geospatial world, for each dataset we maintain, we should record information about the data such as:

- general description
- location
- usage restrictions
- projection
- technical contact
- time period
- date created
- date modified
- version

Metadata Standards

- Dublin Core: established a core/common group of 15 metadata elements
- FGDC CSDGM: approved by the U.S. Federal Geographic Data Committee originally in 1994 and composed of Sections, Compound Elements, Data Elements
- ISO 19115: International Standards Organization's TC211 committee created this in 2003 and is composed of more than 400 "Core", "Mandatory", and "Optional" elements
- ISO 19139: The XML implementation schema for ISO 19115 specifying the metadata record format

OGC CSW Specification

The Open Geospatial Consortium (OGC) OpenGIS Catalogue Service Implementation Specification, currently at version 2.0.2, is a standard for discovering and retrieving spatial data and metadata.

Catalogue Services for the Web (CSW) is the HTTP protocol binding of the Catalogue Service Implementation Specification that allows for publishing and searching of metadata.

CSW Operations

- **GetCapabilities** (mandatory) - allow clients to retrieve information describing the service instance
- **DescribeRecord** (mandatory) - allows a client to discover elements of the information model supported by the target catalogue service
- **GetRecords** (mandatory) - get metadata records
- **GetRecordById** (optional) - get metadata records by ID
- **GetDomain** (optional) - obtain runtime information about the range of values of a metadata record element or request parameter
- **Harvest** (optional) - references the data to be inserted or updated in the catalog
- **Transaction** (optional) - defines an interface for creating, modifying and deleting catalogue records

Example Requests

- GetCapabilities
- DescribeRecord
- GetRecords
- GetRecordById
- GetDomain

pycsw

- pycsw fully implements the OpenGIS Catalogue Service Implementation Specification [Catalogue Service for the Web]
- pycsw allows for the publishing and discovery of geospatial metadata

pycsw

The project is certified OGC Compliant, and is an OGC Reference Implementation



pycsw is currently under OSGeo Incubation



Features

- Harvesting support for WMS, WFS, WCS, WPS, WAF, CSW, SOS
- Implements ISO Metadata Application Profile 1.0.0
- Implements FGDC CSDGM Application Profile for CSW 2.0
- Implements INSPIRE Discovery Services 3.0
- Supports ISO, Dublin Core, DIF, FGDC and Atom metadata models
- Standalone or embedded deployment (CGI or WSGI)
- Transactional capabilities (CSW-T)
- Flexible repository configuration (SQLite, PostgreSQL, PostGIS, MySQL)
- Federated catalogue distributed searching

More features...

- Simple configuration
- Extensible plugin architecture (profiles, repositories/backends)
- Seamless integration with Python environments (e.g. GeoNode, Open Data Catalog)
- Includes commandline utility to administer the metadata repository
- Implements the Search/Retrieval via URL (SRU) search protocol
- Implements OpenSearch
- Realtime XML Schema validation

Standards Support

- OGC CSW 2.0.2
- OGC Filter 1.1.0
- OGC OWS Common 1.0.0
- OGC OpenSearch Geo/Time
- OGC GML 3.1.1
- OGC SFSQL 1.2.1
- Dublin Core 1.1
- SOAP 1.2
- ISO 19115 2003
- ISO 19139 2007
- ISO 19119 2005
- NASA DIF 9.7
- FGDC CSDGM 1998
- SRU 1.1
- A9 OpenSearch 1.1

ZOO Project WPS

- ZOO is a WPS (Web Processing Service) open source project released under a MIT/X-11 style license
- It provides an OGC WPS compliant developer-friendly framework to create and chain WPS Web services

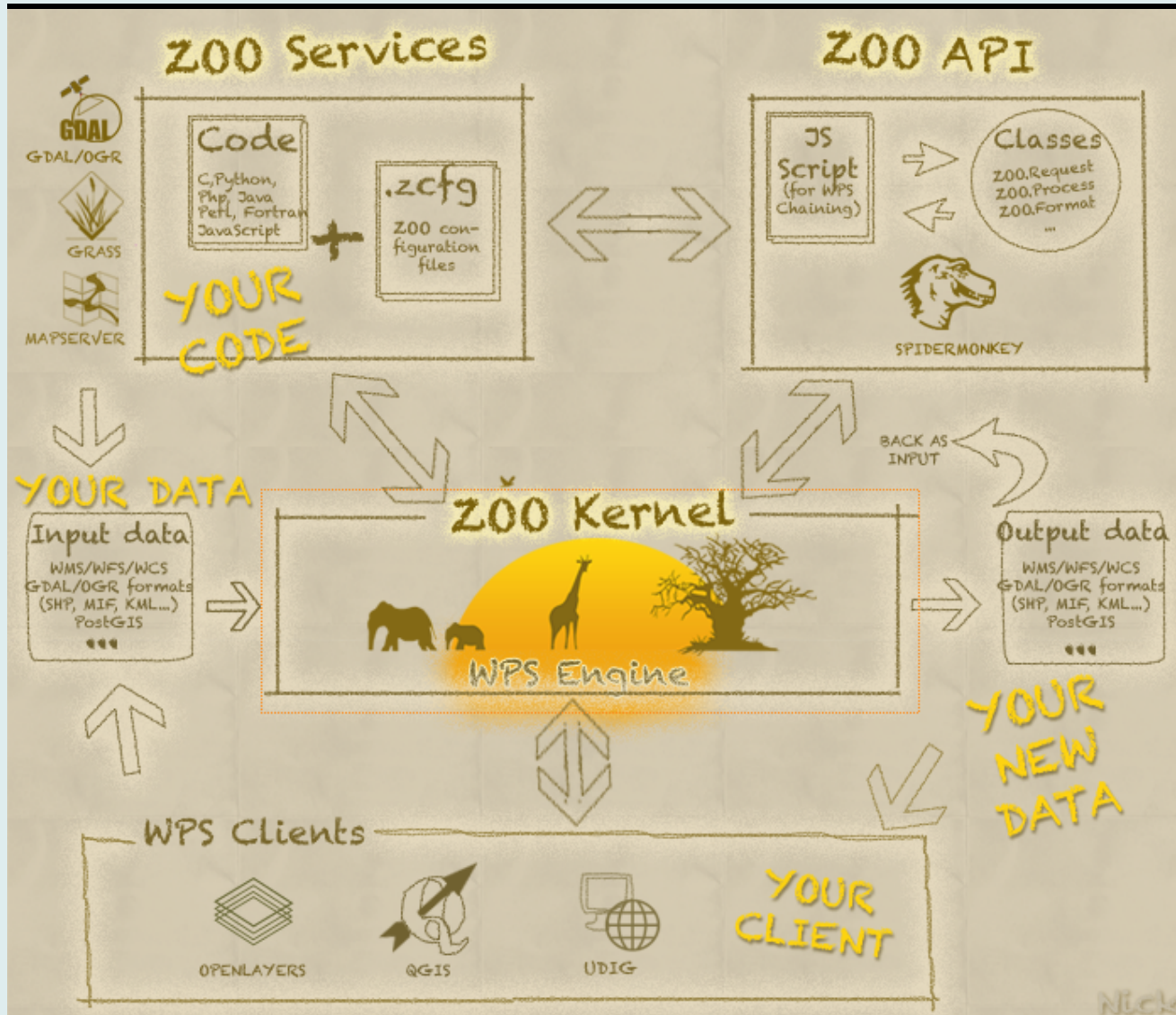


ZOO Overview

ZOO is made of three parts:

- ZOO Kernel: A powerful server-side C Kernel which makes it possible to manage and chain Web services coded in different programming languages
- ZOO Services: A growing suite of example Web services based on various Open Source libraries
- ZOO API: A server-side JavaScript API able to call and chain the ZOO Services, which makes the development and chaining processes easier

ZOO Overview



ZOO Kernel



ZOO Demos

Home Zoo Project Components Downloads Docs Demos Trac

ZOO spatial tools demo

The image shows a web interface for a spatial tools demo. At the top is a navigation menu with links: Home, Zoo Project, Components, Downloads, Docs, Demos, and Trac. Below the menu is the title "ZOO spatial tools demo". Underneath the title is a toolbar containing various icons for map navigation and interaction, such as home, zoom in, zoom out, refresh, and different map styles. The main area is a map of the United States, with state abbreviations labeled. Wyoming (WY) is highlighted with a yellow border. Other cities labeled on the map include Vancouver, Los Angeles, San Diego, Phoenix, Tijuana, San Antonio, Houston, Dallas, Monterrey, Mexico, Havana, Philadelphia, New York, Toronto, Montreal, and Chicago. The map also shows Canada to the north and Mexico to the south, with Hudson Bay and the Gulf of Mexico labeled.

Rasdaman

- Rasdaman ("raster data manager") is a domain-neutral Array Database System: it extends standard relational database systems with the ability to store and retrieve multi-dimensional raster data (arrays) of unlimited size through an SQL-style query language.
- It provides reference implementation of OGC WCS and WCPS interfaces
- Rasdaman embeds itself smoothly into PostgreSQL
- The Petascope component of rasdaman provides service interfaces based on the OGC WCS, WCPS, WCS-T, and WPS



Rasdaman features

- Rasdaman makes it easy to search in large, multi-dimensional raster data
- RASQL language
- Tiling policies
- Parallel server processing
- OGC interfaces

RASQL

The rasdaman query language, rasql, offers raster processing formulated through expressions over raster operations in the style of SQL.

Consider the following query: "The difference of red and green channel from all images from collection LandsatImages where somewhere in the red channel intensity exceeds 127"

```
select ls.red - ls.green  
from LandsatImages as ls  
where max_cells( ls.red ) > 127
```

Rasdaman Demo

Demo / By Spatial Dimensionality / 3D

[← Previous](#)[Next →](#)

> **Use case:** All possible 2-D slices from x/y/t image timeseries `climate_temperature`. Climate researchers want to obtain orthogonal 2-D slices from 3-D x/y/t climate simulation output. For this demo, a 3-D x/y/t data set is used. A 3-D visualization client allows to inspect the data set. This so-called ortho slicing utility represents the cube as three orthogonal slices. By turning the cube and shifting the slice positions all data can be viewed. The particular advantage of such a viewer is that not the whole (large) cube needs to be transported over the networks, but only three slices (which usually are comparatively small). Only when the user selects another slicing position, new slices need to be fetched. This way, the user can inspect data with a much better interactive experience.

The Service: The following Use Cases are being presented below. Hover over any cube to see the query needed to perform the respective slice and click on it to perform the slice

WCPS Query

Click on the cube to slice

```
for m in (climate_temperatur  
e)  
  return encode(  
    (char) (m[ t(10) ] )  
    , 'png' )
```


Other Geospatial Technologies Involved

PostGIS - Spatial Database

The screenshot displays the pgAdmin III interface. On the left, the Object browser shows the database structure: Servers (1) > local (localhost:5432) > Databases (5) > medford > Schemas (1) > public > Tables (19). The 'families' table is selected. The main window shows the 'Edit Data' view for the 'families' table. The table structure is as follows:

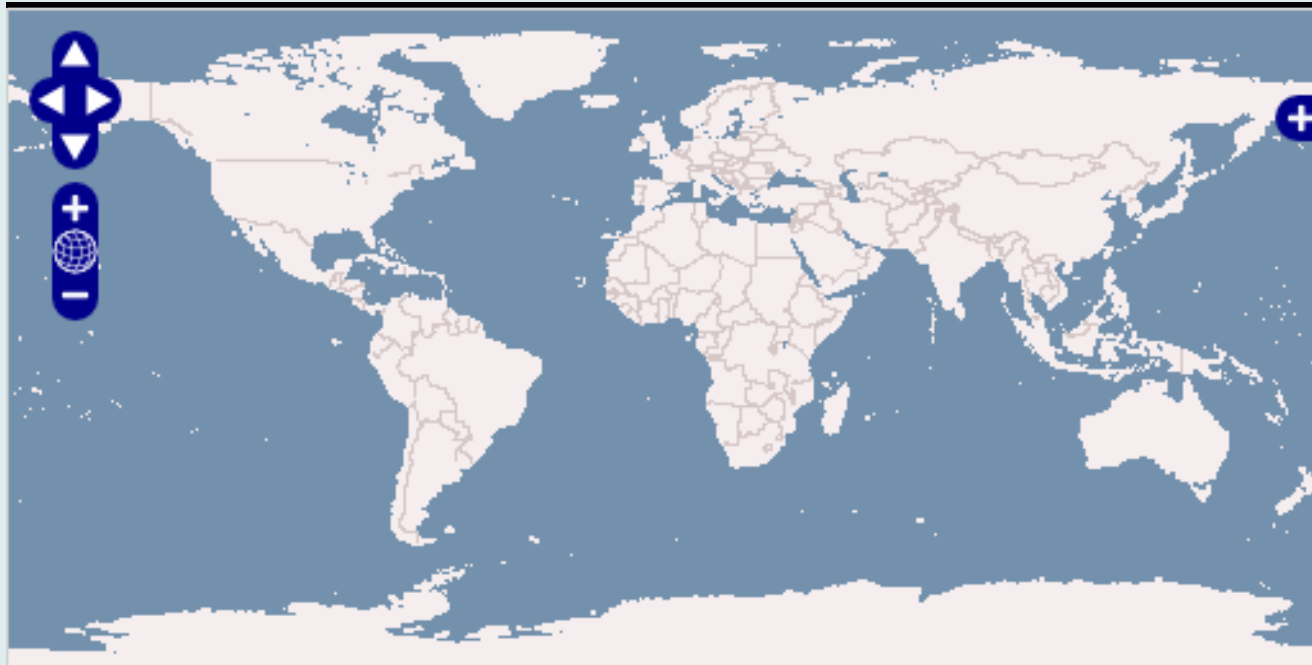
	geo_id character	geo_id2 character	sumlevel character	geo_name character	families integer
1	14000US41	410290001	140	Census Trac	395
2	14000US41	410290002	140	Census Trac	813
3	14000US41	410290002	140	Census Trac	853
4	14000US41	410290002	140	Census Trac	943
5	14000US41	410290003	140	Census Trac	1102
6	14000US41	410290004	140	Census Trac	2024
7	14000US41	410290004	140	Census Trac	2466
8	14000US41	410290005	140	Census Trac	1918

The SQL pane shows the following SQL code:

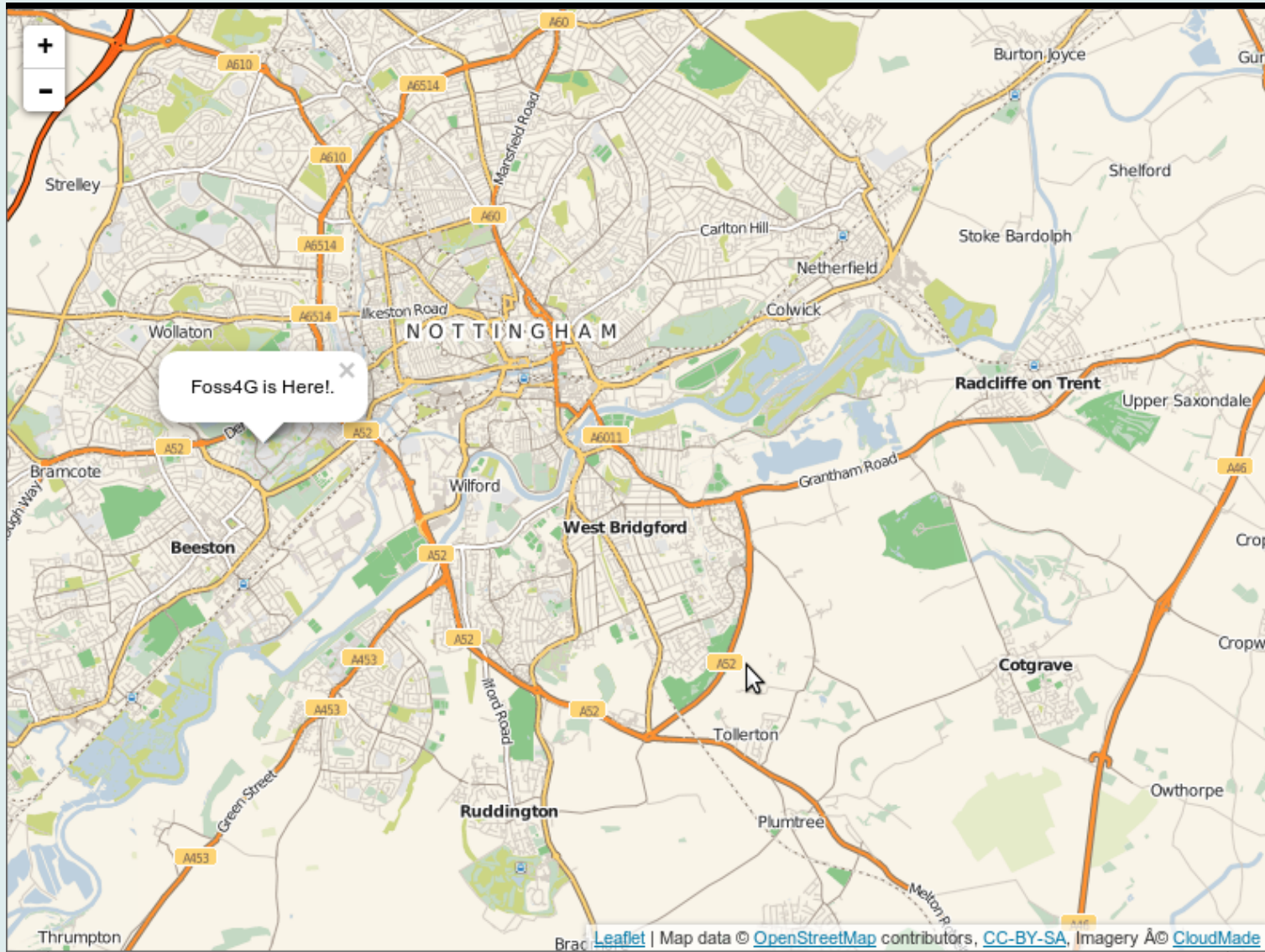
```
-- Table: fa
-- DROP TABLE
CREATE TABLE
(
  geo_id cha
  geo_id2 ch
  sumlevel c
  geo_name c
```

The status bar at the bottom indicates 'Retrieving Table details... Done.' and the taskbar shows the pgAdmin III and 'Edit Data - local (local...)' windows.

OpenLayers - Browser Mapping Library



Leaflet - Mobile Friendly Interactive Maps



GeoServer - Web Services

The screenshot displays a Mozilla Firefox browser window titled "GeoServer: Demo requests". The address bar shows the URL `http://localhost:8082/geoserver/web/?wicket:interface`. The browser has several tabs open, including "GeoServer: Demo requests" and "GeoServer: Web Feature S...".

The "GeoServer: Demo requests" tab shows a "Request" dropdown set to "WFS_getFeatureBBOX-1.0.xml" and a "URL" field containing `http://localhost:8082/geoserver/web/?wicket:interface`. The "Body" of the request is displayed as XML code:

```
1 <!-- Performs a ge
2 <!-- The BBOX fil
3 <!-- it fetches al
4 <!-- This exampl
5 <!-- case we just
6
7 <wfs:GetFeature se
8   outputFormat="GM
9   xmlns:topp="http
10  xmlns:wfs="http:
11  xmlns:ogc="http:
12  xmlns:gml="http:
13  xmlns:xsi="http:
14  xsi:schemaLocat
15
16 <wfs:Query typeN
17   <ogc:PropertyF
18   <ogc:PropertyF
19   <ogc:Filter>
20   <ogc:BBOX>
21   <ogc:Prope
22   <gml:Box s
23   <gml:co
24 </gml:Box>
```

The "GeoServer: Web Feature S..." tab shows a map of a geographical area with green land and red roads. A blue selection tool is visible on the left side of the map.

The "GeoServer: Web Feature Service" tab shows the "Web Feature Service" interface. It includes a "Server" menu with options: "Server Status", "Contact Information", "Global Settings", "JAI Settings", and "About GeoServer". Below the menu is a "Services" section with links for "GWC" and "WCS".

The "Web Feature Service" page contains the following text:

Manage the publishing of feature data.

Service Metadata

- Enable WFS
- Strict CITE compliance

Maintainer

<http://jira.codehaus.org/secure/BrowsePro>

MapServer - Web Services

osgeo-live4.0rc9 [Running] - VirtualBox OSE

Machine Devices Help

Applications Geospatial Places

MapServer - Itasca Application - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost/cgi-bin/mapserv?mode=browse&layer=lakespy2&layer=dlgstln2

Most Visited Getting Started Latest Headlines

MapServer - Itasca Application

Refresh/Query

- Browse map
- Query feature
- Query multiple features

Select Layers to Display:

Airports
Cities
Lakes & Rivers

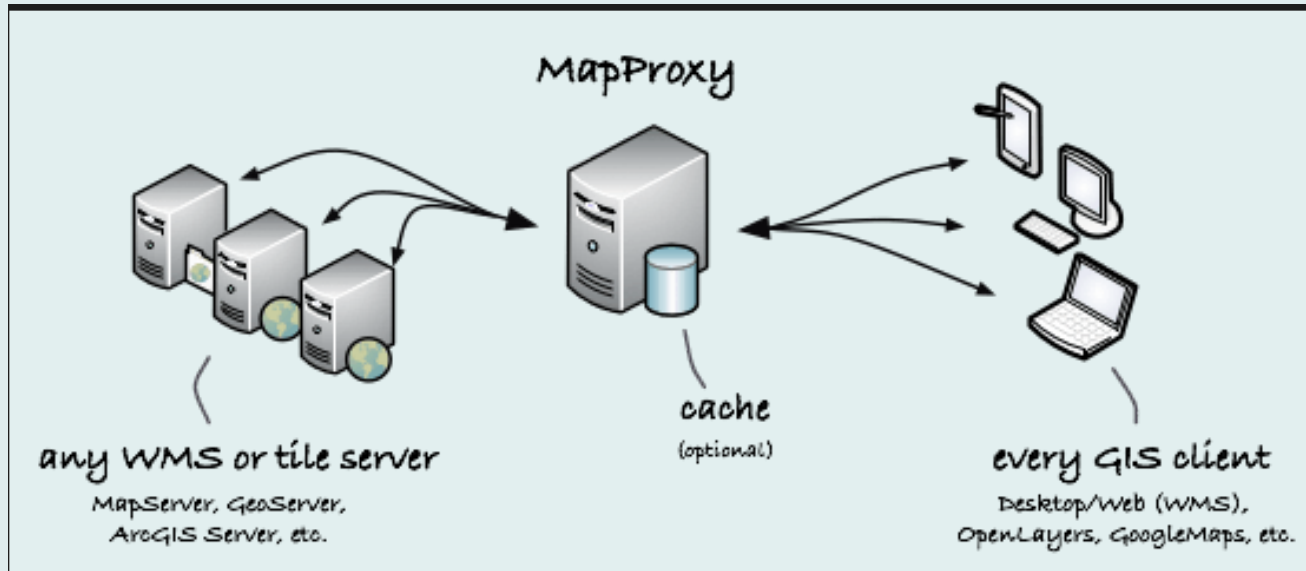
Zoom In Pan Zoom Out

Zoom Size

Legend

Streams
Lakes & Rivers

MapProxy - Proxy WMS & tile services



GDAL/OGR - Geospatial Data Translation Tools

GDAL/OGR and PROJ.4

<http://www.gdal.org>

<http://proj.osgeo.org>



GDAL for Raster Data - The Geospatial Data Abstraction Library

Arc/Info ASCII Grid, **Arc/Info** Binary Grid (.adf), AIRSAR Polarimetric, Microsoft Windows Device Independent Bitmap (.bmp), BSB Nautical Chart Format (.kap), VTP Binary Terrain Format (.bt), CEOS (Spot for instance), First Generation USGS DOQ (.doq), DODS / OPeNDAP, New Labelled USGS DOQ (.doq), Military Elevation Data (.dt0, .dt1), **ERMapper** Compressed Wavelets (.ecw), **ESRI** .hdr Labelled, ENVI .hdr Labelled Raster, Envisat Image Product (.n1), EOSAT FAST Format, FITS (.fits), Graphics Interchange Format (.gif), GMT Compatible netCDF, **GRASS Rasters**, Golden Software ASCII Grid, Golden Software Binary Grid, Golden Software **Surfer 7** Binary Grid, TIFF / **GeoTIFF** (.tif), GXF - Grid eXchange File, Hierarchical Data Format Release 4 (**HDF4**), Hierarchical Data Format Release 5 (HDF5), **Erdas Imagine** (.img), Vexcel MFF2, **Idrisi** Raster, Image Display and Analysis (WinDisp), ILWIS Raster Map (.mpr, .mpl), Japanese DEM (.mem), **JPEG JFIF** (.jpg), **JPEG2000** (JPEG2000, JP2KAK, JP2ECW, JP2MrSID), NOAA Polar Orbiter Level 1b Data Set (**AVHRR**), Erdas 7.x .LAN and .GIS, Daylon Leveller Heightfield, In Memory Raster, Vexcel MFF, Multi-resolution Seamless Image Database, **Meteosat** Second Generation, NDF, NITF, **NetCDF**, OGDI Bridge, PCI .aux Labelled, PCI Geomatics Database File, Portable Network Graphics (.png), PCRaster (.map), Netpbm (.ppm, .pgm), Swedish Grid RIK (.rik), RadarSat2 XML (product.xml), **ArcSDE** Raster, USGS SDTS DEM (*CATD.DDF), Raster Matrix Format (*.rsw, .mtw), SAR CEOS, **SGI** Image Format, USGS ASCII DEM (.dem), OGC Web Coverage Server, X11 Pixmap (.xpm)

OGR for Vector Data - Simple Feature Library

Arc/Info Binary Coverage, Comma Separated Value (.csv), DODS/OPeNDAP, DWG, **DXF**, ESRI Personal GeoDatabase, ESRI ArcSDE, **ESRI Shapefile**, FMEObjects Gateway, GML, **GMT Mapping**, **GRASS Vectors**, INTERLIS, **Google Earth KML**, Mapinfo File, Microstation DGN, Spatial **MySQL**, OGDI Vectors, ODBC generic database access layer, **Oracle** Spatial, PostgreSQL **PostGIS**, S-57 (ENC), SDTS, SQLite, UK .NTF, U.S. Census TIGER/Line, VRT - Virtual Datasource, Informix DataBlade

MetaCRS - Coordinate Reference System Transformations

Thank you for your attention!

Questions?

<http://publicamundi.eu>

