



**Session:**

# Preparing the names database

V1

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# Content

## Preparing the names database – General issues

- What are the purposes of a database?
- Names database and Geographic Information System (GIS)
- Names database and Web
- Use cases for Web applications

## Description of database characteristics – Database management

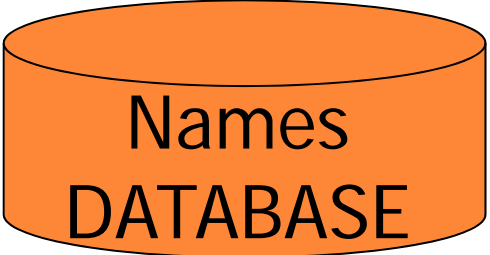
- Characteristics of databases
- Realisation of databases: open source vs. proprietary
- Example: UNECA initiative – GeoNyms desktop database application
- Data model vs. database modelling



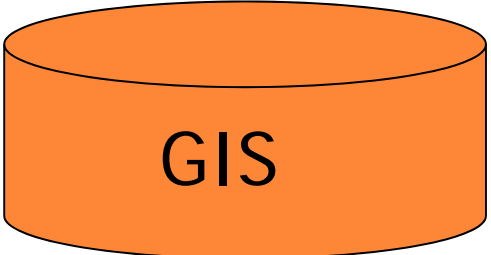
# What are the purposes of a DB?



Gazetteer  
(printed)



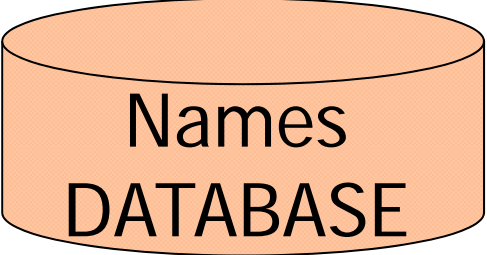
national



GIS



Map



Names  
DATABASE

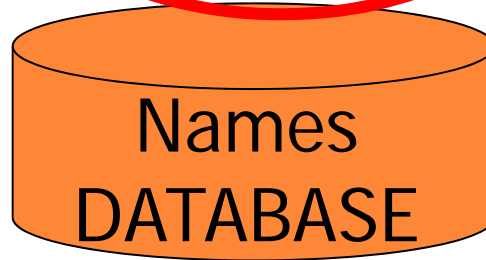
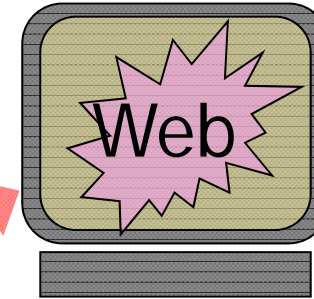
international



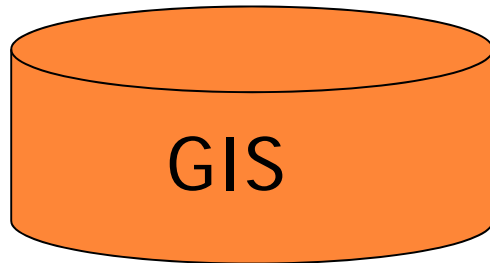
# What are the purposes of a DB?



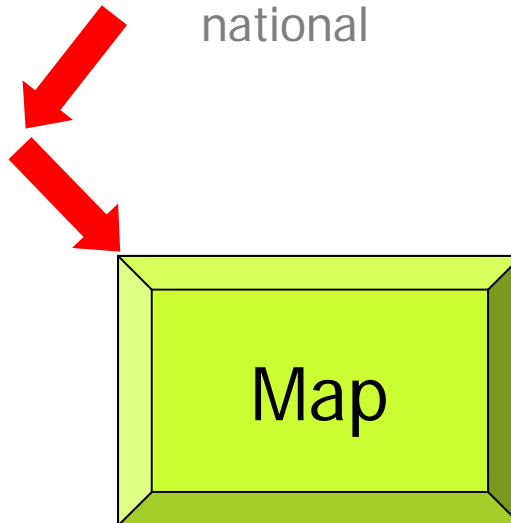
Gazetteer  
(printed)



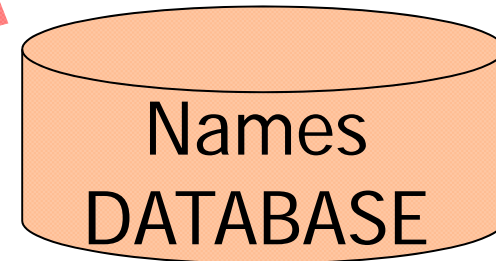
national



GIS



Map



Names  
DATABASE

international



# What are the purposes of a DB? Example: Netherlands



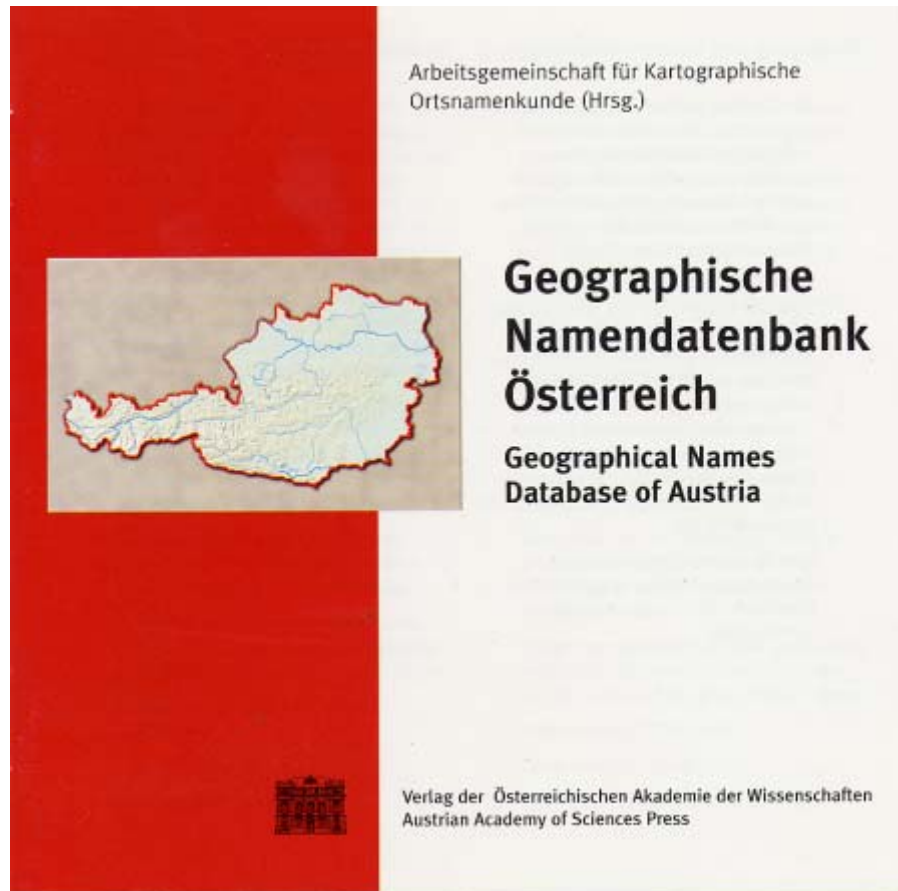
Name	Code	Long	Lat	MGRS
Amsterdamse Bos	FRST	4°49'10"	52°18'48"	FT24039743
AMSTERDAM	POPL	4°49'14"	52°20'50"	FU24000122
Gemeente Amsterdam	ADMD	4°58'09"	52°24'38"	FU33940857
Amsterdam-Zuidoost	POPL	4°58'44"	52°18'04"	FT34929637
AMSTERDAM	POPL	4°53'60"	52°22'16"	FU29340402
Amsterdam-Rijnkanaal	CNAL	4°58'43"	52°21'07"	FU34760207
Amsterdam Arena	MISC	4°56'29"	52°18'51"	FT32339775
Amsterdamse Brug	BRDG	4°57'40"	52°21'59"	FU33520359
Amsterdam-Rijnkanaal	CNAL	5°00'17"	52°12'29"	FT36998606
Amsterdam-Rijnkanaal	CNAL	5°04'53"	52°04'36"	FT42637160
Amsterdamse Straatweg	ROAD	5°04'23"	52°06'59"	FT41957600
Klein Amsterdam	POPL	6°05'57"	52°09'04"	LC01548181
Amsterdam-Rijnkanaal	CNAL	5°08'09"	52°01'21"	FT46546571
Amsterdam-Rijnkanaal	CNAL	5°12'06"	51°59'57"	FT51156322
AMSTERDAM-RIJN KAI	CNAL	5°23'44"	51°56'13"	FT64685674

Geographical  
Names Database:  
Netherlands

Offline DB



# What are the purposes of a DB? Example: Austria



**Geographical Names  
Data Base: Austria**

**Offline CD-ROM**



# What are the purposes of a DB? Example: Germany



Example of a  
topographic data file  
with integrated  
names data base:  
Germany

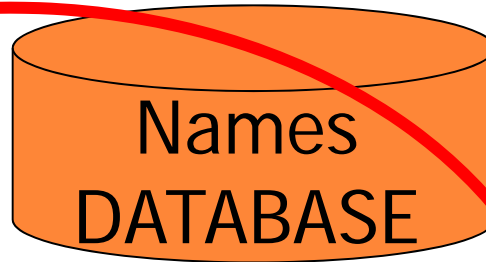
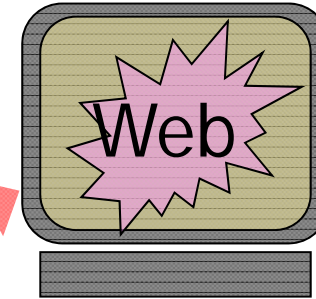
Offline CD-ROM



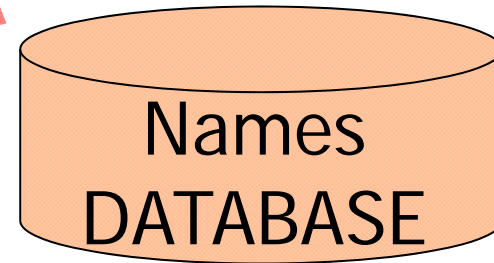
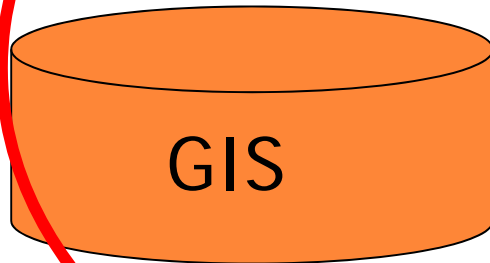
# What are the purposes of a DB?



Gazetteer  
(printed)



national



international







# Names database and Geographic Information System (GIS)



Reality

Model



- Where am I?
- Where do I find...?
- Where is the next...?
- How do I get to...?
- How far is it to...?
- Where does this way lead to?

Data models

↓ *consist of*

feature definitions + relations

↓ *including*

spatial reference to points,  
locations, areas or regions as  
specific feature

→ ***necessary information is called geo(graphic) information***

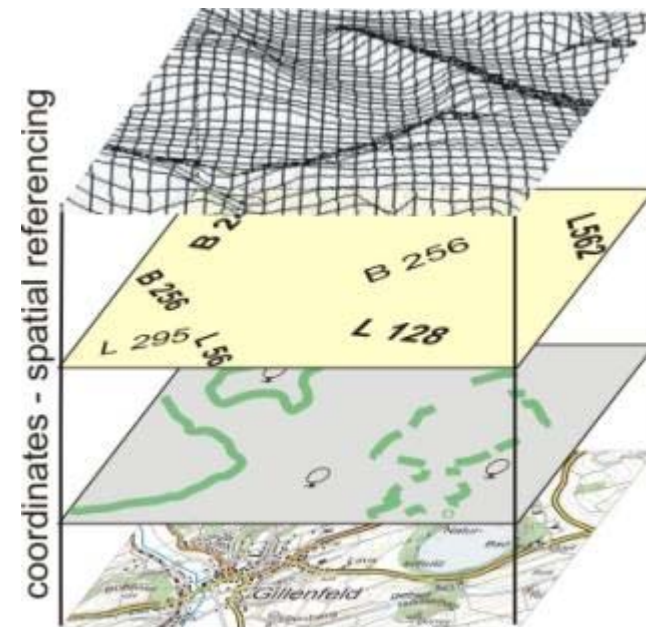
→ ***80% of all information is estimated to be spatially referenced***

## Geographic Information System (GIS)

a GIS is an organized collection of computer hardware, software, (geographic) data and personnel.

→ designed to *capture, store, update, manipulate, analyse* and *display* all forms of geo referenced information.

(see [www.GIS.com](http://www.GIS.com))





## Geo(graphic) information:

Information that is referenced to the earth's surface, whether by coordinates (direct referencing) or by identifiers such as addresses or postal codes or **geographical names** (indirect referencing).

## Geo(graphic) data / spatial data:

Computer-readable geo information

*Vector data model*  
(feature data)

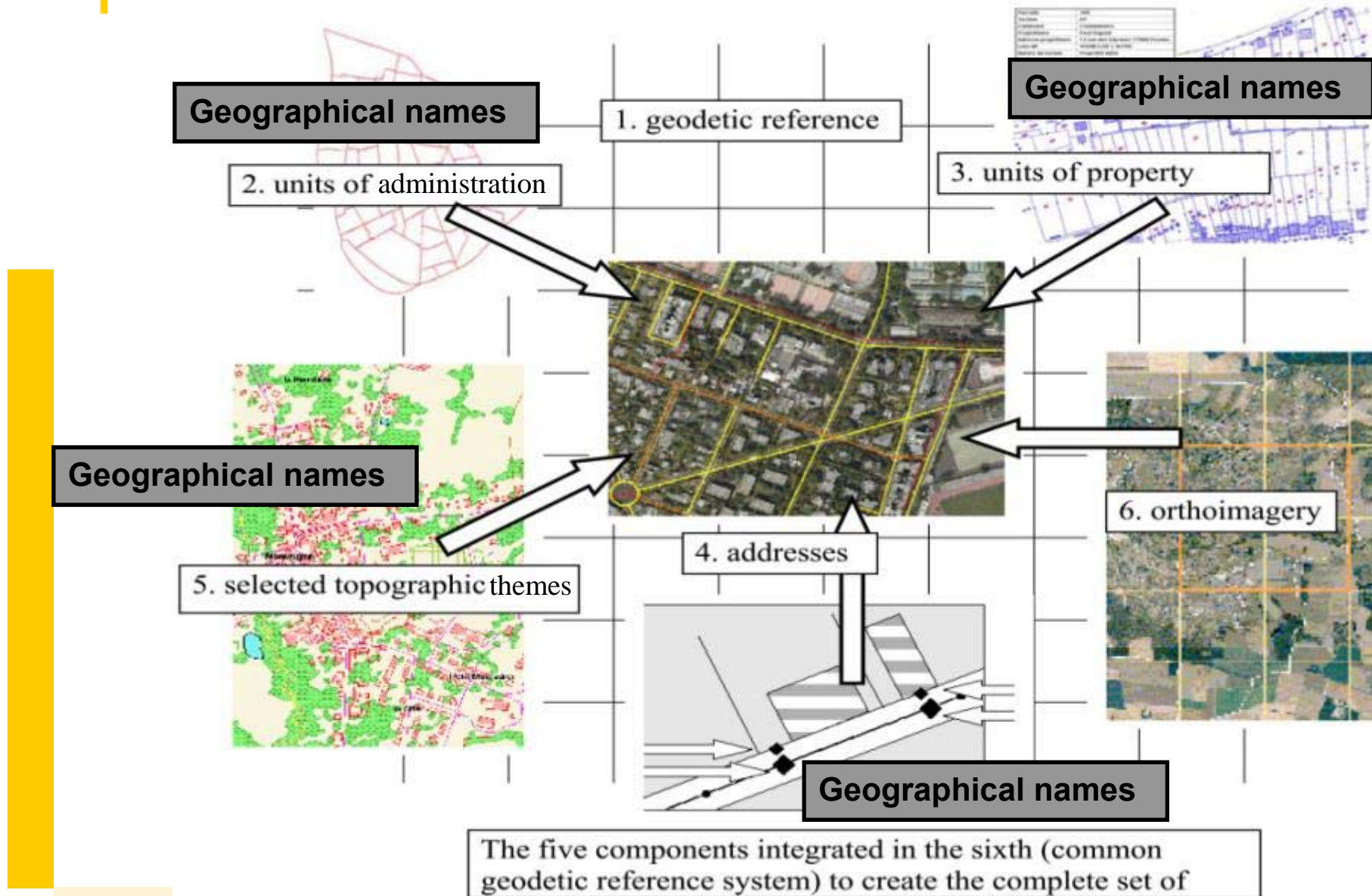
points, lines and  
polygons (areas)

*Raster data model*  
(coverage data)

gridded data (scanned maps,  
satellite images, orthophotos)

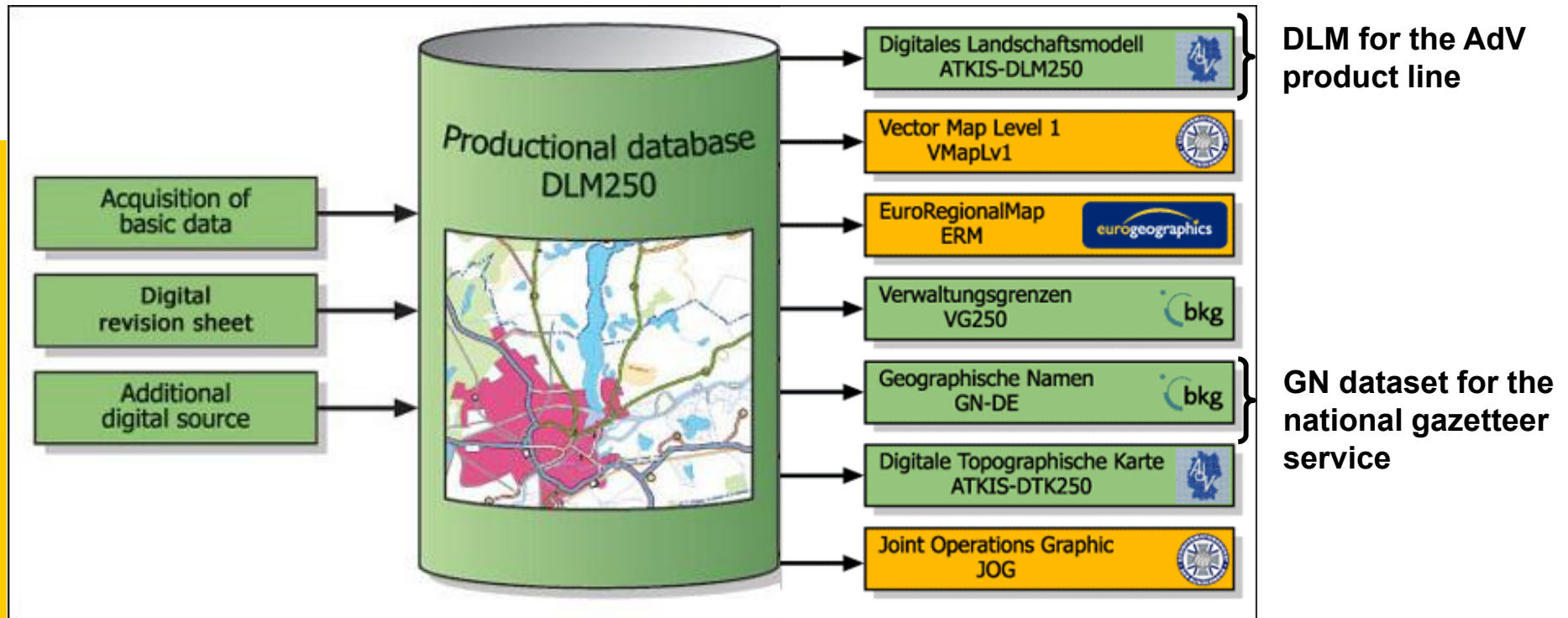


# Names database and Geographic Information System (GIS)



# Names database and Geographic Information System (GIS)

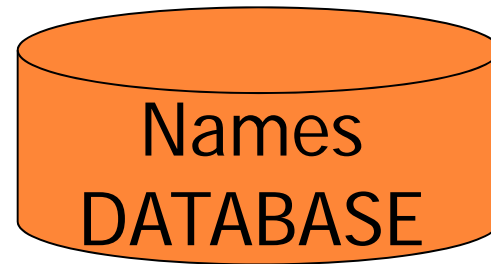
**BKG's produkt line – derived from the Digital Landscape Model (DLM250)**



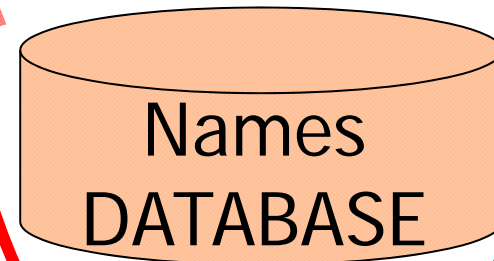
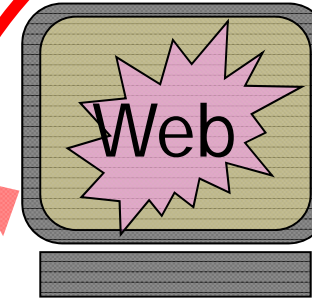
Geographical names data set **GN-DE** is essential part of the productional database and is unambiguously linked to the **spatial objects/features** through **unique identifiers (UIDs)**



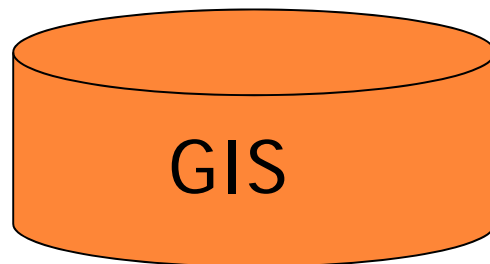
Gazetteer  
(printed)



national



international







## The national gazetteer service – search for geographical names of Germany...

**Find a Name**

Name (min.3 characters \* for arbitrary characters)


*For experts and interested people:*  
Here you can have a look at the request to the standardized Web Feature Service (WFS) and the correspondig response in XML format.

[XML Request](#) → 




[XML Response](#) ← 

Direct requests using our Applet [PostRequest](#).

**Map Presentation and Search**



Search in small map boxes only. At most 100 objects are shown.

Name	Object Type	Postcode	LAT	LON	Height	Area	Population	Language	Status	Map
Berlin	Ortslage	23823	10°26'56"	54°02'33"				deutsch	amtlich	
Berlin	Ortslage	<input type="text" value="10115"/>	13°24'37"	52°31'19"	34 m	892 km²	3387828	deutsch	amtlich	
Berlin	Siedlung		13°24'37"	52°31'19"						
Berlin	Verwaltungseinheit									
Berlin	Verwaltungseinheit									
Berlin	Verwaltungseinheit									

Gazetteer service based on the dataset **GN-DE**

- as graphical Web Application
- as OGC Web Feature Service (WFS)




## The international UNGEGN database – search for geographical names of countries and capitals

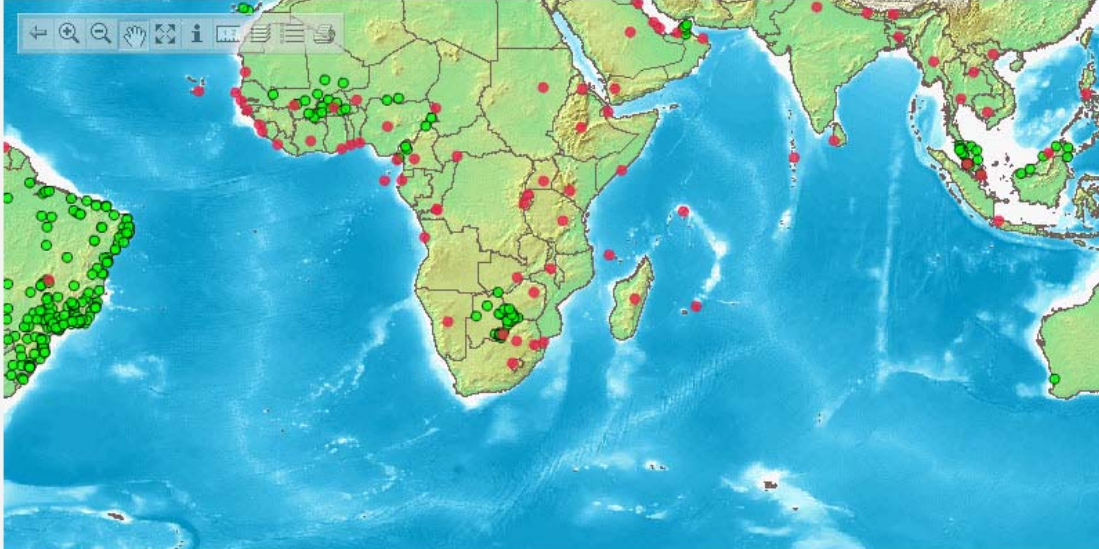


Geographical names | FAQ | Feedback | Contact

Multilingual, multiscriptual dataset of names of countries, capitals and major cities.

Select a country  

Please roll over a country to see the country name in the UN languages or over a city to see the city endonyms (where available and in romanized form only) and the English name.



Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

<http://unstats.un.org/unsd/geoinfo/geonames/>





## UNEGN World Geographical Names

Multilingual, multiscriptural dataset of names of countries, capitals and major cities.

Geographical Names Database | [About](#) | [FAQ](#) | [Feedback](#) | [Contact](#)

Beta version

Algeria

Roll over a country to display the country name in the six UN languages. Point to a city to see the city endonyms (where available and in romanized form only) and the English name. Capital cities are shown in red, other cities are shown in green.

Note: Depending on the computer settings, some names might not be able to be displayed properly.



Notes:

- The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. The source for the file is [UNGIWG](#). Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined.
- The Arabic fonts are not connected at this stage because of technical problems.



## Country names

### Endonyms

Language	Short name	Formal name	
Arabic	الجزائر <i>Al Jazā'ir</i>	الجمهورية الجزائرية الديمقراطية الشعبية <i>Al Jumhūrīyah al Jazā'irīyah ad Dīmuqrāṭīyah ash Sha'bīyah</i>	1

### United Nations languages

Language	Short name	Formal name	
Arabic	الجزائر <i>Al Jazā'ir</i>	الجمهورية الجزائرية الديمقراطية الشعبية <i>Al Jumhūrīyah al Jazā'irīyah ad Dīmuqrāṭīyah ash Sha'bīyah</i>	1
Chinese	阿尔及利亚	阿尔及利亚民主人民共和国	1
English	Algeria	the People's Democratic Republic of Algeria	1
French	Algérie (l') [fém.]	la République algérienne démocratique et populaire	1
Russian	Алжир	Алжирская Народная Демократическая Республика	1
Spanish	Argelia	la República Argelina Democrática y Popular	1



**Country names**

Endonyms

**Capital and other major cities**

**Capital city**

Lat: 36.71 | Long: 3.08 الجزائر - Al Jazā'ir

Language	City name	Source
Arabic	الجزائر <i>Al Jazā'ir</i>	UNEGN

United Nations Languages

Language	City name	Source
Arabic	الجزائر	UN terms
Chinese	阿尔及尔	UN terms
English	Algiers	UN terms
French	Alger	UN terms
Russian	Алжир	UN terms
Spanish	Argel	UN terms

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# Use cases for Web applications using names data services



**Vivium** International Property Listings

Real Estate Rentals List Your Property

Enter Listing ID or Location.

Vivium -> Real Estate -> Western Europe -> Villas

Location: Andorra - Austria - Belgium - Cyprus - Denmark - Finland - France - Germany - Greece - Greenland - Iceland - Ireland - Italy - Liechtenstein - Luxembourg - Malta - Monaco - Netherlands - Norway - Portugal - San Marino - Spain - Sweden - Switzerland - UK - Vatican City - All Locations for Villas - [List Your Property !!](#)

Also See: Single Family Homes - Mansions - Townhouses - Duplexes - Triplexes - Bungalows - Timeshares

## Villas For Sale in Western Europe - Available Properties

Showing 1 - 10 of 253 listings (Page 1 of 26)

**Villa For Sale in Lucca, Tuscany Italy - Pozzuolo** 1,150,000 €

Private and secluded farmhouse in a beauty spot close to the charming walled city of Lucca. The original stone built house nestles in 3 hectares of land. The house is built of chestnut (the house used to be a chestnut farm) and has a swimming pool. Perfect for ...

**Holiday Villa For Sale in Tuscany, Italy** 1,000,000 €

Casa Migliano - 5 Migliano set in a little valley and the house is fully restored and is a sleepy hamlet 20 km from Lucca.

**Villa For Sale in Limassol, Cyprus**

The Most Exclusive villa built utilizing the best materials. The delivery time attests to the quality. This villa has been delivered partially furnished.

**Village House For Sale in Olympia, Greece**

Raches Olympias

Village House For Sale in the village of Olympia with 500 civilians, recently renovated but needs further renovation. Mountain view from the front side, sea view from the back side. 2 balconies and garden. A 3-level house that can easily ...

Location based information on **Pozzuolo, Toscana (IT)** and its pronunciation, possibly directly from the Italian data repository!

International purchase of properties with Internet property services

⇒ Geographical names databases or web services can provide additional location based information





# Use cases for Web applications using names data services



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a service for global professionals

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All Central Europe Newsfeeds

**Poland to Be Represented by President Kwasniewski at Yushchenko's Inauguration** 20 Jan 2005 13:44

**Analysis: EU's Busek Says Kosova Needs 'Europeanization'** 20 Jan 2005 13:43

**MACEDONIA: Sasa Lead and Zinc Mine Most Likely to Be Offered at New Tender** 20 Jan 2005 13:43

- SERBIA AND MONTENEGRO: DS Leads Negotiations with G17 Plus 20 Jan 2005 13:43
- SERBIA AND MONTENEGRO: Net FDI in Montenegro Surge 60% y/y to USD 44mn in Jan-Sep. 20 Jan 2005 13:43
- SLOVENIA: Government and KBC to Decide NLB's Future 20 Jan 2005 13:43
- SLOVENIA: Dimitrij Rupel and Air Sierra - Inseparable 20 Jan 2005 13:43
- Moravian neighbors report less foot traffic 20 Jan 2005 13:42
- EU's Busek Says Kosova Needs 'Europeanization' 20 Jan 2005 13:39
- EU's Busek Says Kosova Needs 'Europeanization'

PICTURE OF THE DAY

U.S. Political News

meteorite on Mars

NASA News · Mars Exploration News

## Provision of European news

⇒ GN databases or web services can provide additional location based information

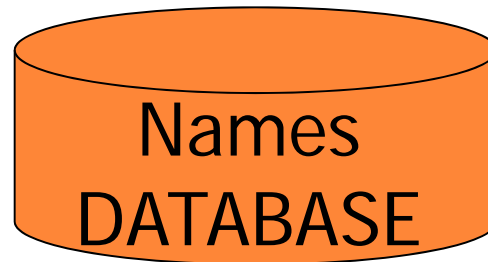
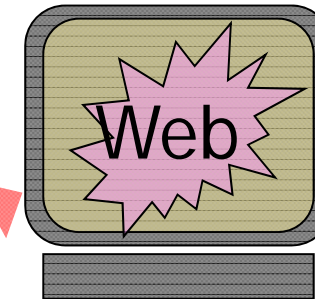
GN web service integrated in a news portal as additional functionality  
e.g. search for "Macedonia"



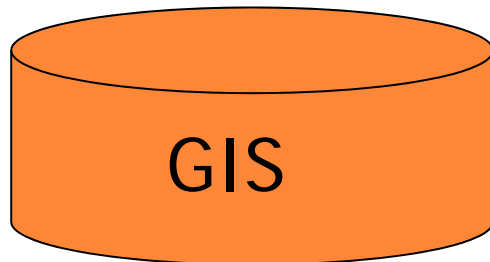
# What are the purposes of a DB?



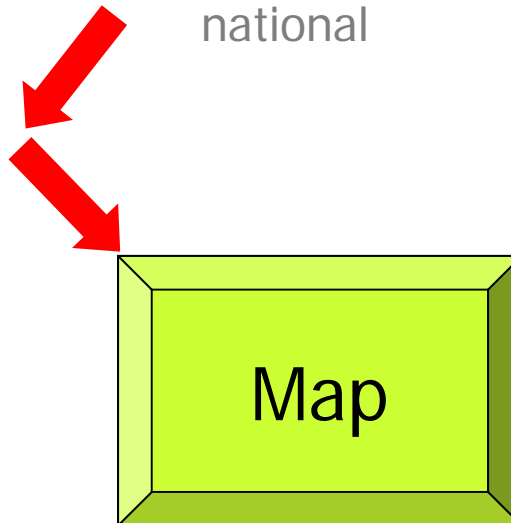
Gazetteer  
(printed)



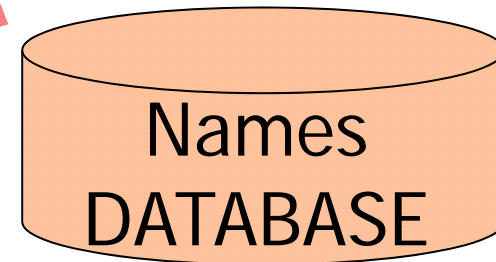
national



GIS



Map



Names  
DATABASE

international



Eighth United Nations Conference on the Standardization of Geographical Names, 2002

Resolution VIII / 6

## Integration of Geographical Names Data into National and Regional Spatial Data Infrastructures

The Conference,

....

Recommends,

that standardized geographical names data should be considered in the establishment of national and regional spatial data infrastructures and included in their constructions.





## What are the purposes of a DB?



A **spatial data infrastructure (SDI)** is a data infrastructure implementing a framework of geographic data, metadata, users and tools that are interactively connected in order to use spatial data in an efficient and flexible way.

Another definition is:

[...] the technology, policies, standards, human resources, and related activities necessary to acquire, process, distribute, use, maintain, and preserve spatial data.

The White House - Office of Management and Budget (2002) Circular No. A-16 Revised, August 19, 2002

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- Example: UNECA initiative – GeoNyms desktop database application
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# Characteristics of databases



What do you have to consider (or to know) before you start with creating a database?

Different computer support different characteristics...



Data Capture



Data Storage



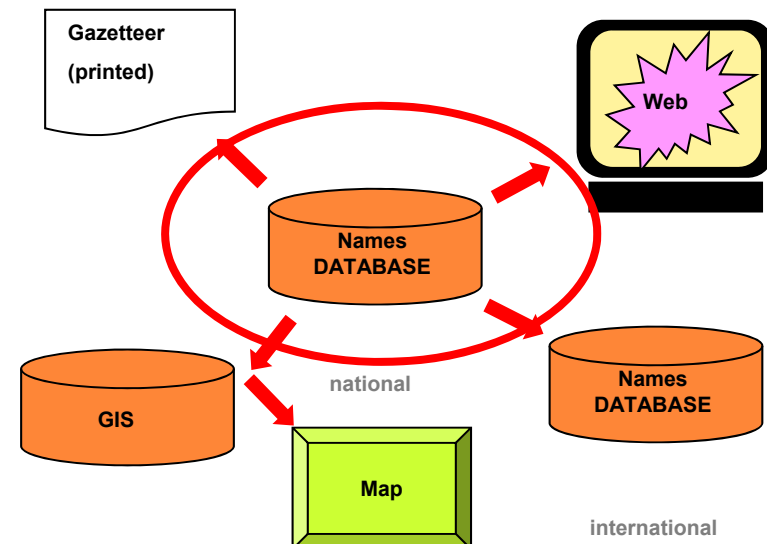
Data Processing



Data Output

from cards, lists,  
books, fieldwork, maps,  
other databases, ....

in a database





## 1. Operating system

An operating system (OS) is a software program that manages the hardware and software resources of a computer. The OS performs basic tasks, such as controlling and allocating memory, prioritizing the processing of instructions, controlling input and output devices, facilitating networking, and managing files.

### Examples:

- Microsoft Windows (proprietary)
- Linux (open source = free of charge and usage)



## 2. Database

One possible definition is that a database is a collection of records stored in a computer in a systematic way, so that a computer program can consult it to answer questions.

### Examples:

- Microsoft Access, Oracle, etc. (proprietary)
- MySQL, PostGreSQL/PostGIS, SQLite, etc. (open source)



## 3. Geographic Information System (GIS)

A **geographical information system** (GIS) is a system for creating, storing, analyzing and managing spatial data and associated attributes.

In a more generic sense, GIS is a tool that allows users to create interactive queries (user created searches), analyze the spatial information, and edit data.

### Examples:

- ESRI ArcGIS, ViewMap, etc. (proprietary)
- Quantum GIS, etc. (open source)



**e.g. Codepages!!!**

***ISO8859 character set* or *Unicode?***  
in (Microsoft Windows) operating system

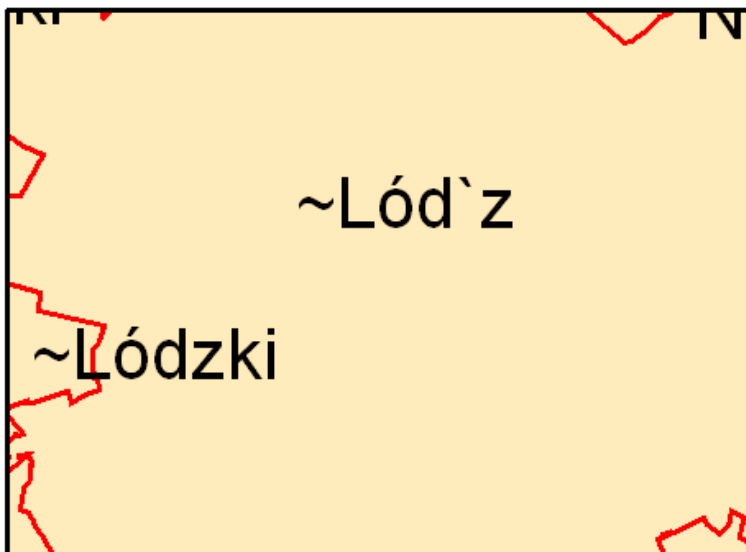
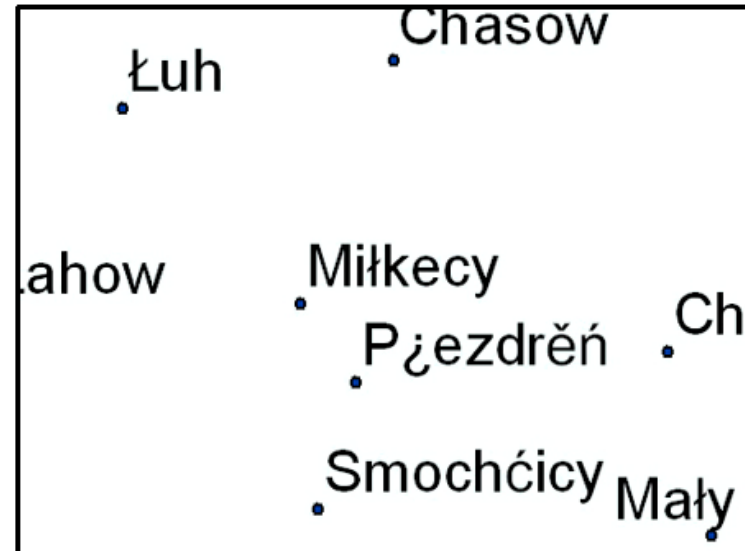
Different interpretation of characters possible in

- Database products: MS Access or similar
- GIS software: ESRI ArcGIS or similar





## Characteristics of databases





## Operating System:

Microsoft Windows?

Linux? (open source)

## Database:

Microsoft Access?

MySQL? PostgreSQL/PostGIS? (open source)

UNECA GeoNyms application? (open source)

## Geographical Information System

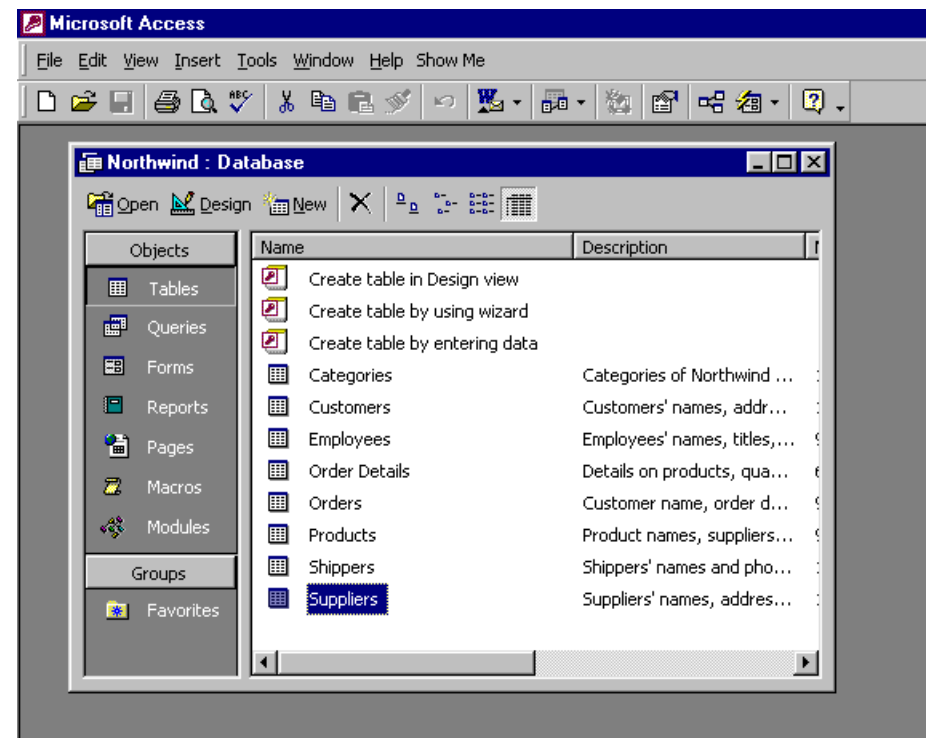
ESRI ArcGIS?

Quantum GIS? (open source)



## Database: Microsoft Access? (proprietary)

- Microsoft Access is a **pseudo-relational database management** system from Microsoft that combines the relational Microsoft Jet Database Engine with a graphical user interface and software-development tools.
- Access stores data in its **own format** based on the Access Jet Database Engine. It can also import or link directly to data stored in other applications and databases.
- Website:  
<http://office.microsoft.com/en-us/access/>





## Database:

MySQL? PostgreSQL/PostGIS? (open source)

### My SQL *“The world's most popular open source database”*

- MySQL is a **relational database management system** (RDBMS) that runs as a server providing multi-user access to a number of databases.
- The MySQL development project has made its **source code available** under the terms of the GNU General Public License, as well as under a variety of proprietary agreements.
- MySQL is a popular choice of database for use in web applications.
- Website: <http://www.mysql.com/>



## Database:

MySQL? PostGreSQL/PostGIS? (open source)

### PostGreSQL / PostGIS (open source)

- PostgreSQL, often simply Postgres, is an **object-relational database management system** (ORDBMS).
- PostgreSQL is not controlled by any single company — a global community of developers and companies develops the system.
- PostGIS **adds support for geographic objects** to the PostgreSQL object-relational database. In effect, PostGIS "spatially enables" the PostgreSQL server, allowing it to be used as a backend spatial database for geographic information systems (GIS), much like ESRI's SDE or Oracle's Spatial extension.
- Website: <http://www.postgresql.org/>  
<http://postgis.refractions.net/>



## Geographical Information System ESRI ArcGIS? (proprietary)

### ESRI Arc GIS

Esri® ArcGIS® facilitates collaboration and **lets you author data, maps, globes, and models on the desktop** and serve them for use on a desktop, in a browser, or in the field, depending on the needs of your organization.

- ArcGIS **support and educational services** consist of technical maintenance programs, software releases and updates, technical support, online support services, publications training, and consulting services.
- Website:  
<http://www.esri.com/software/arcgis/index.html>

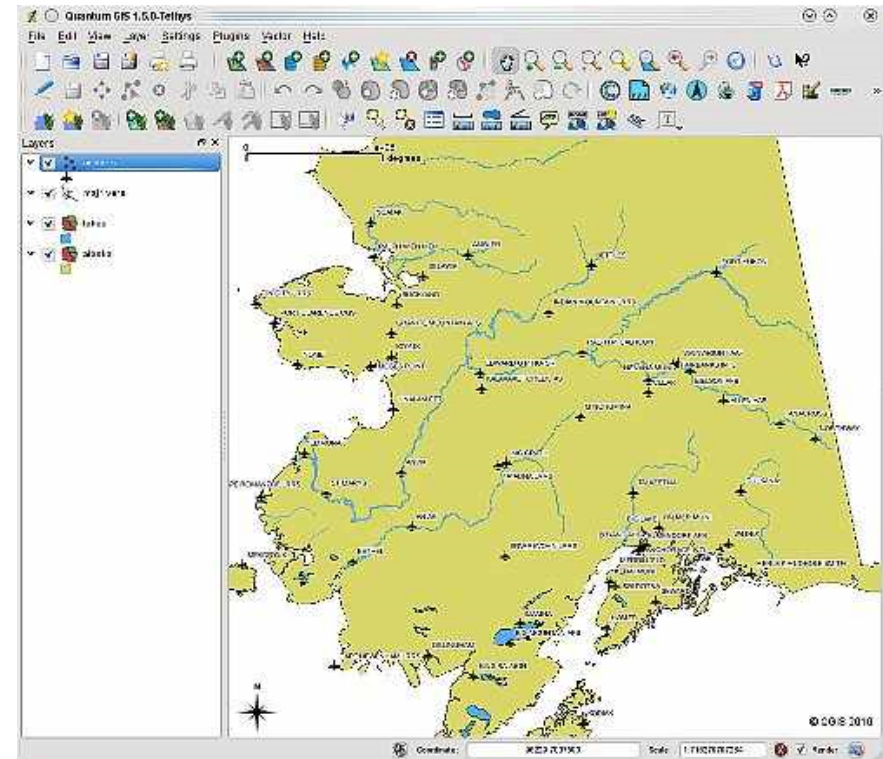




## Geographical Information System Quantum GIS? (open source)

### Quantum GIS

- QGIS provides data viewing, editing, and analysis capabilities.
- Quantum GIS (QGIS) is a user friendly Open Source Geographic Information System (GIS) licensed under the GNU General Public License.
- QGIS runs on **Linux, Unix, Mac OSX, and Windows** and supports numerous vector, raster, and database formats and functionalities.
- Website: <http://www.qgis.org/en.html>





## Open Source Software Collection

Open source software collection: **OSGeo Live**

URL: <http://live.osgeo.org/en/index.html>

about:

OSGeo Live provides bootable ISO-Images and Virtual Machines which allow users to try out fully-operational versions of popular Free Geospatial Software without the need to install a thing.





# Open your Mind through GIS: training in Open Source GIS

The University of Geneva in collaboration with UNEP/GRID-Geneva organizes \*continuing education training on Open Source GIS\*. It aims at presenting and discussing major open-source desktop GIS solutions.

The next one will be organized April - May 2015 (Inscription: 28 February 2015)

More information on:

<http://www.unige.ch/formcont/opengis.html>

University Continuing Education

**Open-Source GIS**

March to June 2012

UNEP | GRID Geneva

UNIVERSITÉ DE GENÈVE

# Content

## Preparing the names database – General issues

- What are the purposes of a database?
- Names database and Geographic Information System (GIS)
- Names database and Web
- Use cases for Web applications

## Description of database characteristics – Database management

- Characteristics of databases
- Realisation of databases: open source vs. proprietary
- Example: UNECA initiative – GeoNyms desktop database application
- Data model vs. database modelling



# UNECA initiative – GeoNyms desktop application



Welcome to AfricanGaz - The National Gazetteer Maintenance Application

A Joint Initiative of

UN Statistics Division

Geoinformation at the  
United Nations  
Economic Commission for Africa  
<https://geoinfo.uneca.org>

Date	Author
Thu Jan 15 00:00:00 GMT+0300 2009	UNGEGN Secretariat
Wed Jan 14 00:00:00 GMT+0300 2009	Helen Kerfoot
Mon Jan 12 00:00:00 GMT+0300 2009	UNECA

**Monitoring and Usage**

	Local	Global
Toponyms (N)	7,032	11,322,905
Added Last 24 Hours	0	634
Added Last 7 Days	37	2,940
Added Month to Date	105	12,488
Added Year to Date	711	301,647

Invalid Coordinates	27	Memory Usage (Kb)	28184
Status: Approved	3006	Flash Player Ver.	WIN 9,0,115,0
Status: Not Approved	285	Screen Resolution	1280 x 800
Status: Pending	4407	Language	en
UNGaz Version	2.1	Printing Enabled	true
Last Backup	3-Jan-2009	Internet Connection	true

- Open source
- Platform Independence
- Architectural Interoperability



# UNECA initiative – GeoNyms desktop application



## Multilingual

English and French are implemented ... Arabic coming

## Adaptable to National settings

1. Feature Types
2. Feature Statuses
3. Administrative Divisions

## Filtering & Exporting facility

Implemented now

1. \*.xls (Excel)
2. \*.csv (Textfile)

Planned:

3. Shape files
4. XML



Welcome



New Feature



Import facility

Load Excel File...

Import to Database

Name	Language	Lat.(decimal Degrees)
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# Importing facility

From MS. Excel

Please point to your data Excel File

Look in: GeoNyms

- .metadata
- .settings
- bin-debug
- bin-debug\_backup
- documents
- libs
- src
- Botswana.xls**
- Copy of importTemplate.xls
- ethiopia.xlsx
- ethiopia-modified.xls
- importTemplate.xls
- importTemplate\_1.xls

File name: Botswana.xls

Files of type: Ms Excel

Open Cancel

Images



enter a description or caption here

Pronunciation



Pronounce

Video



Play Pause Stop



Update Update and Close Delete

# UNECA initiative – GeoNyms desktop application

## How to get it?

Downloads/documentation in  
<http://geoinfo.uneca.org/geonyms>



The screenshot shows the UNECA website homepage. At the top, there is the UNECA logo and the text "United Nations Economic Commission for Africa". Below this is a navigation menu with links for "About ECA", "Our Work", "Subregional Offices", "Capacity Development", "Publications", "Events", "Media Centre", and "Contact us". The main content area features a large banner with a world map and a hand pointing to Africa, with the headline "Amidst fears of negative economic impact, Africa must fight Ebola hysteria - Carlos Lopes". To the right of the banner are "MAJOR EVENTS" including the "NINTH AFRICAN DEVELOPMENT FORUM" and the "AFRICAN ECONOMIC CONFERENCE 2014". Below the banner is a "RECENT STORIES" section with two articles from September 2014. Further down is a "MAIN AREAS OF WORK" section with icons for Macroeconomic Policy, Social Development, Regional Integration and Trade, Natural Resource Management, Innovation & Technology, Gender, and Governance. At the bottom, there is an "AFRICAN POLICY CENTRES" section with links to the African Centre for Statistics and the African Minerals Development Centre, and an "ECA DATABANK" section.

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## “UNGEEN schema” (proposal): elements

Field Name	Data Type	Description	Example
<b>RecordID</b>	Index	This number is assigned automatically by the system. Do not change it.	
<b>UID</b>	Number (long integer)	A <u>unique identifier</u> assigned to the name (or named feature). In our exercise, each group may start to count from 1 and add the group number multiplied by 100, e.g. 201 for the first name by group 2.	20001 might indicate e.g. 2000 for feature type 'Populated places'
<b>Name</b>	Text (50 char.)	Geographical name in Romanian	Oran
<b>Latitude</b>	Number (double)	Geographical Coordinates, in degrees decimal.	35,...
<b>Longitude</b>	Number (double)		-0,5...
<b>FeatureCode</b>	Text (50 char.)	Feature codes, from an existing feature code table	DDS
<b>AdminUnit</b>	Text (50 char.)	Name of the administrative unit where the name is situated in	Departement d' Oran, Department of Oran
<b>Language</b>	Text (50 char.)	Language of the name	
<b>Description</b>	Text (255 char.)	Field remarks, meaning of the name, language of the name, historical names if any	e.g. capital of a political entity
<b>VariantName</b>	Text (50 char.)	Enter variant names, if any e.g. Hungarian name	Wilaya d' Oran, Wilaya d' Oran
<b>MapSheet</b>	Number (long integer)	Reference to a map sheet in a topographic map series, e.g. 1:250.000	80
<b>Source</b>	Text (255 char.)	Source of the information on the name: - Informant - Interviewer	Mr. XY, old person at xyz, interview by group 1
<b>Status</b>	Text (50 char.)	The status of the name. In our case, the names are not yet approved by the Board.	not approved
<b>Pronunciation</b>	OLE-Object	Audio-files of the pronunciation of the geographical name	e.g *.wav -file
<b>Location information</b>	OLE-Object	Digital pictures of the location	e.g *.jpg – image file



## The European (INSPIRE) GN schema: elements

**mandatory**

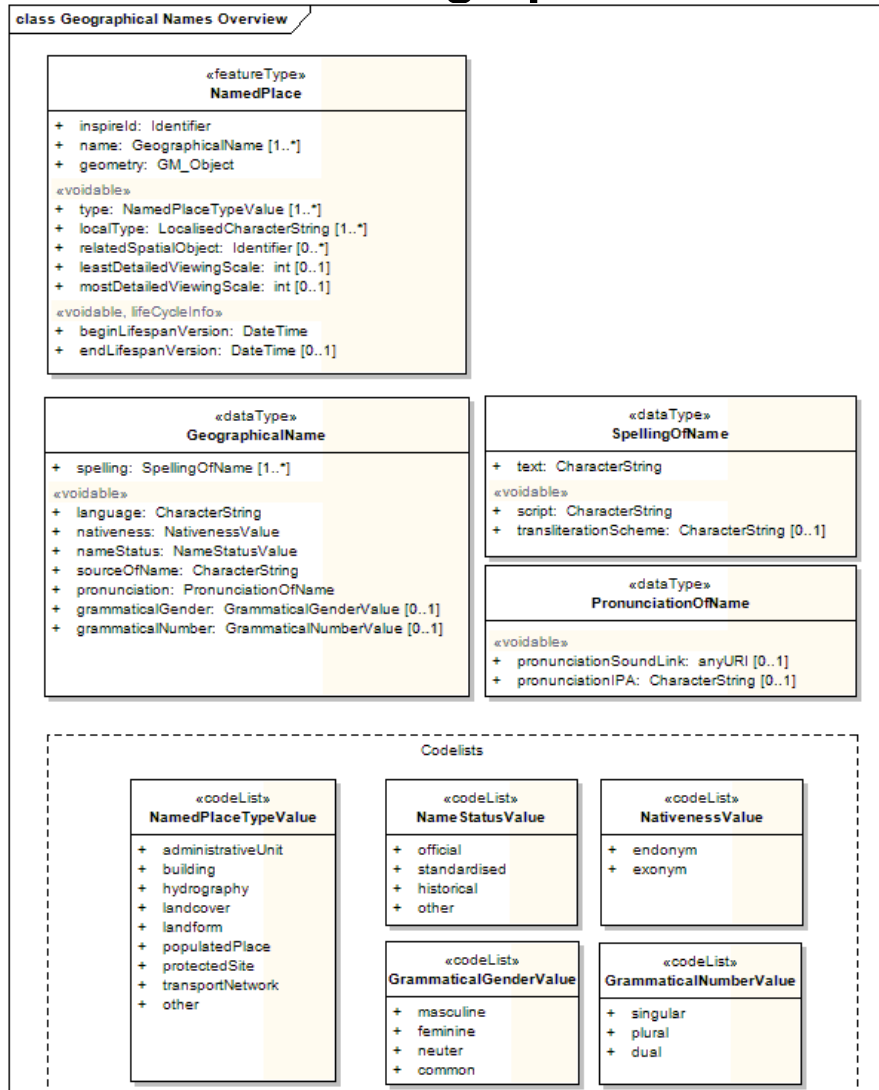
- name(s) (text, spelling)
- geometry
- feature type
- unique identifier

**‘voidable’**

- language {three letter codes from ISO 639-3 or -5}
- nameStatus {official, standardised, historical, other}
- link to relatedSpatialObject
- script {four letters codes defined in ISO 15924}
- nativeness {endonym, exonym}
- transliterationScheme
- grammatical gender {masc., fem., neuter, common}
- grammatical number {singular, plural, dual}
- pronunciation
- sourceOfName
- typeLocal
- lifeCycleInfo (begin/end of the object in the source DB)
- ...



## INSPIRE Geographical Names – UML Schema



### A Named Place,

representing a real world entity referred to by a Geographical Name

e.g “the City of Athens” type = built-up area  
geometry = {X, Y}

*is associated with one or several*

### Geographical Names,

i.e. proper noun applied to the feature

- (1) “Athína” language = Greek  
nativeValue = Endonym
- (2) “Athens” language = English  
nativeValue = Exonym

*and may have one or several*

### Spellings of Name.

i.e. proper way of writing the name

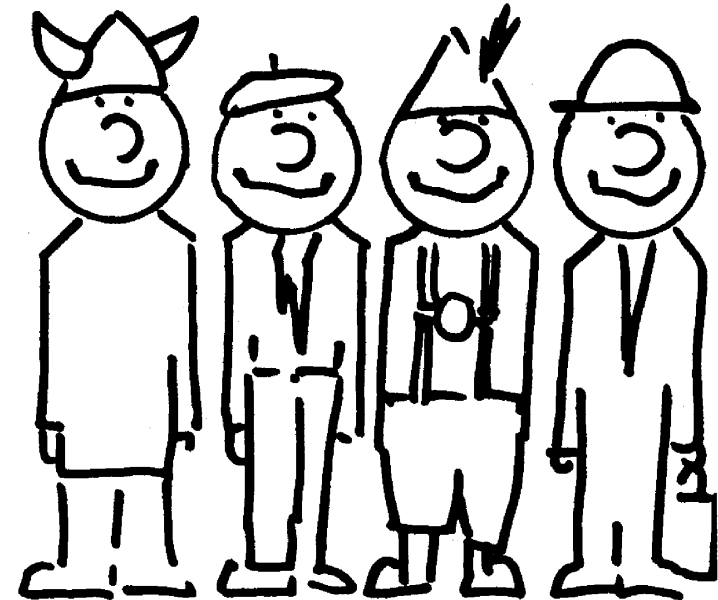
- (1.1) text = Αθνα script = Greek
- (2.1) text = Athens script = Latin
- (1.2) text = Athína script = Latin



Not standardized and very different



Almost harmonized, but with national specialities





Thank you for your attention!