

GeoServer, The Open Source Server for the interoperable management of geospatial data

Ing. Simone Giannecchini, GeoSolutions
Ing. Andrea Aime, GeoSolutions



Outline

- **GeoSolutions Facts**
- **GeoServer Overview**
 - User Interface
 - Security
 - Administration
 - OGC Services
 - Extensions and additional modules

GeoSolutions - Facts

- Founded mid 2006 in Italy
- Expertise
 - Image Processing, GeoSpatial Data Fusion
 - Java, Java Enterprise, C++, Python
 - JPEG2000, JPIP, Advanced 2D visualization
- Supporting/Developing FOSS4G projects
 - GeoTools
 - GeoServer
 - GeoBatch
 - ImageIO-Ext
 - uDig
- Focus on
 - Consultancy (agencies, large private companies, etc...)



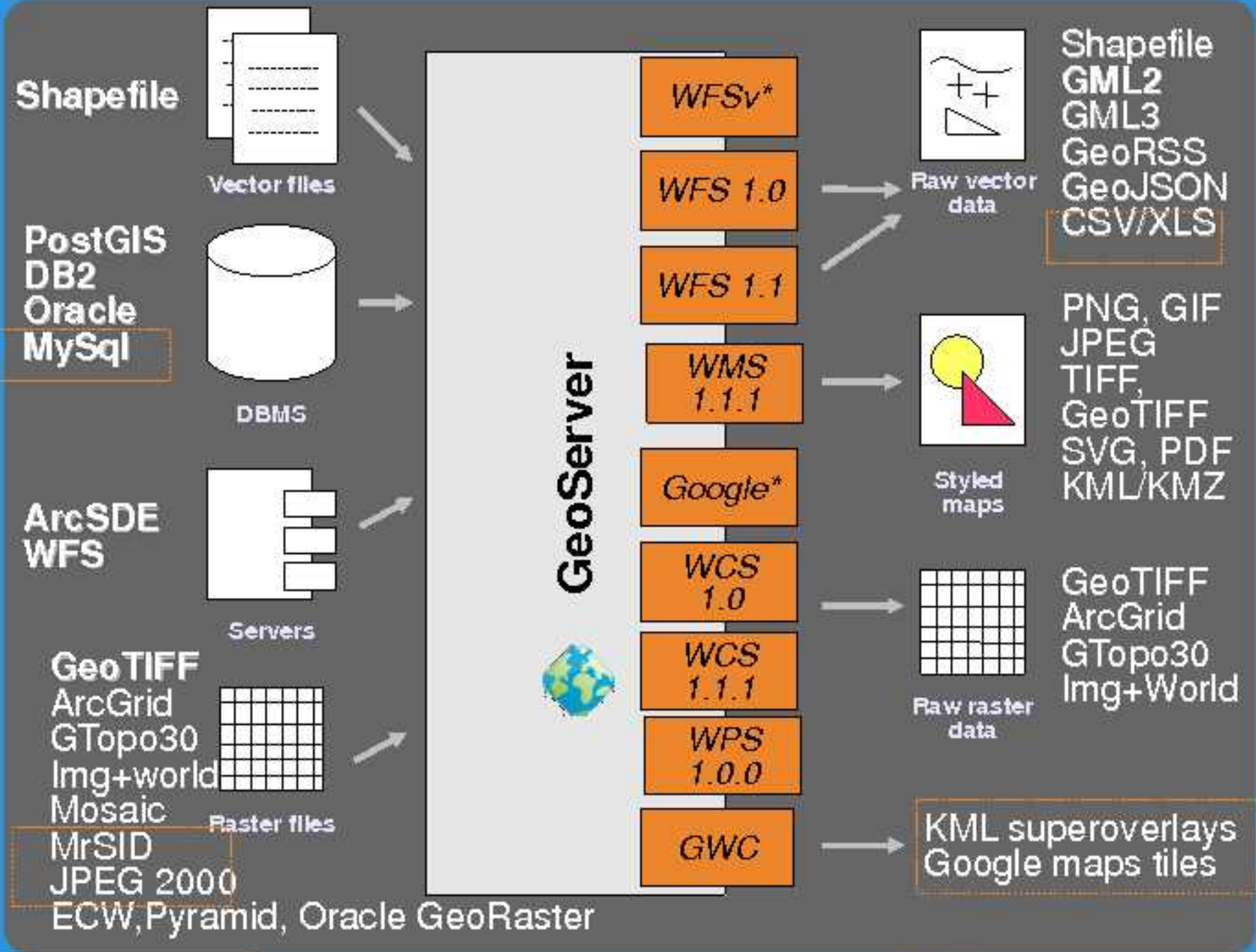


- **GeoSpatial enterprise gateway**
 - Java Enterprise
 - Management of raster and vector data
- **Standards compliant**
 - OGC WCS 1.0 - 1.1.1 (RI)
 - OGC WFS 1.0 - 1.1 (RI)
 - OGC WMS 1.1.1
 - OGC WPS* 1.0.0
- **Google Earth/Maps support**
 - KML, GeoSearch, etc..





GeoServer Facts



Integrated Security



- ACEGI framework (soon Spring Security)
- Per-layer/per-service rules support
- Simplified configuration with rules list

```
namespace.layer.mode=role1,role2,...
```

A name, or * to mean "any"

r: read
w: write

The roles that will be authorized to access the data under this rule

Integrated Security: Web UI



Username	Roles	Administration	Actions
admin	ROLE_ADMINISTRATOR	Yes	



- **Programmatic Configuration**
 - Remote (no UI)
 - Workspaces
 - DataStores/CoverageStores
 - Layers and Styles
- **Exposes Internal configuration**
 - Ajax-JavaScript friendly
- **Stable Module**
- **Integrated Security**

WMS – Advanced Styling



Advanced Labeling



WMS – Advanced Styling



Dynamic Symbolizers

ID	Name	Description	User	Event Type	Target Type
1	STATION 1	STATION 1	root	GPS	All
2	STATION 2	STATION 2	root	GPS	All
3	STATION 3	STATION 3	root	GPS	All
4	STATION 4	STATION 4	root	GPS	All
5	STATION 5	STATION 5	root	GPS	All
6	STATION 6	STATION 6	root	GPS	All
7	STATION 7	STATION 7	root	GPS	All
8	STATION 8	STATION 8	root	GPS	All
9	STATION 9	STATION 9	root	GPS	All
10	STATION 10	STATION 10	root	GPS	All



WMS – Advanced Styling



Raster Styling



KML/KMZ



ImageIO-Ext Support



- Extension of SUN ImageIO framework
- New plug-ins:
 - BigTiff*, netCDF-CF, GriB1, MatFile 5, HDF4
 - JP2000 based on kakadu
 - Ongoing work on GDAL 1.7.3
- GDAL integration via ImageIO-ext
 - JPEG2000, MrSID, ECW
 - BigTIFF, ERDAS Image, HDF4



- **Serving raw vector data to the masses!**
- **Support for 1.0 and 1.1 (RI) with Transactions**
- **Output Formats**
 - GML 2 and 3
 - GeoRSS, GeoJSON
 - Complex Features*
 - OGR-based extension
- **Extensions**
 - CQL
 - GetCapabilities Namespace filtering
 - WFS 1.0 reprojection



- **Serving raw raster data to the masses!**
 - *No maps please I want the real data!*
 - Support for TIME and ELEVATION
- **Support for 1.0.0 and 1.1.1 (RI)**
- **Output Formats**
 - GeoTiff
 - GDAL based formats*
- **Vendor Parameters**
 - ELEVATION as band management*
 - GetCapabilities Namespace filtering

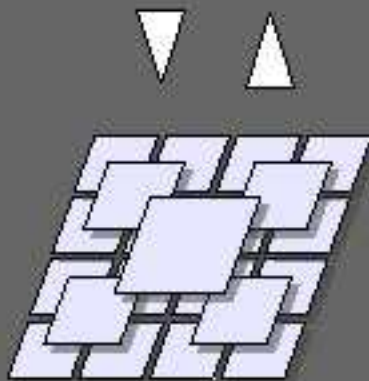


- WPS 1.0 implementation as extension
- Current Implementation is weak:
 - No Asynchronous Status Hook
 - Weak process control
 - Hard to integrate new processes
- Ongoing efforts:
 - Scripting-based processing
 - Sextante, IDL, JGrass (Grass?) integration
 - Improved robustness of infrastructure
 - Raster Algebra and Statistics

GeoWebCache Integration



GeoWebCache



Persistent raster/KML
file cache

- Tile based caching for WMS
- Mainly* static layers
- KML/raster tiles for:
 - GMap, Gearth
 - OpenLayers
 - VEarth, Bing
- Speed up factor 10/100
- REST admin interface

WMS* Cascading



The screenshot displays the GeoServer web interface. On the left is a navigation sidebar with sections for Server, Services, Data, and Security. The main content area is split into two panels:

- New data source:** A panel titled "New data source" with the instruction "Choose the type of data source you wish to". It lists three categories:
 - Vector Data Sources:** Includes Directory of spatial files (Shapefiles), PostGIS - PostGIS Database, PostGIS (UNIC) - PostGIS Database (UNIC), Properties (Allows access to Java Properties), and Shapefile - ESRI(tm) Shapefile (*.shp).
 - Raster Data Sources:** Includes ArcGrid - Arc Grid Coverage Format, GeoTIFF - Tagged Image File Format with, Stac3D - Stac3D Coverage Format, ImageMosaic - Image mosaicking plugin, and WorldImage - A raster file accompanied by.
 - Other Data Sources:** Includes WMS - Cascades a remote Web Map Serv.
- New WMS Connection:** A panel titled "New WMS Connection" with the instruction "Edit the connection to a remote WMS Connection". It contains a "Workspace" dropdown menu set to "it.geosolutions", a "Data Source Name" text field containing "calabria", a "Description" text field containing "calabria", an "Enabled" checkbox which is checked, and a "Capabilities URL" text field containing "http://pr5sit.regione.calabria.it/geoserverows?service". "Save" and "Cancel" buttons are at the bottom.

In the center, a map of Calabria, Italy, is displayed with a green and yellow color scheme, overlaid on a white background with navigation controls.

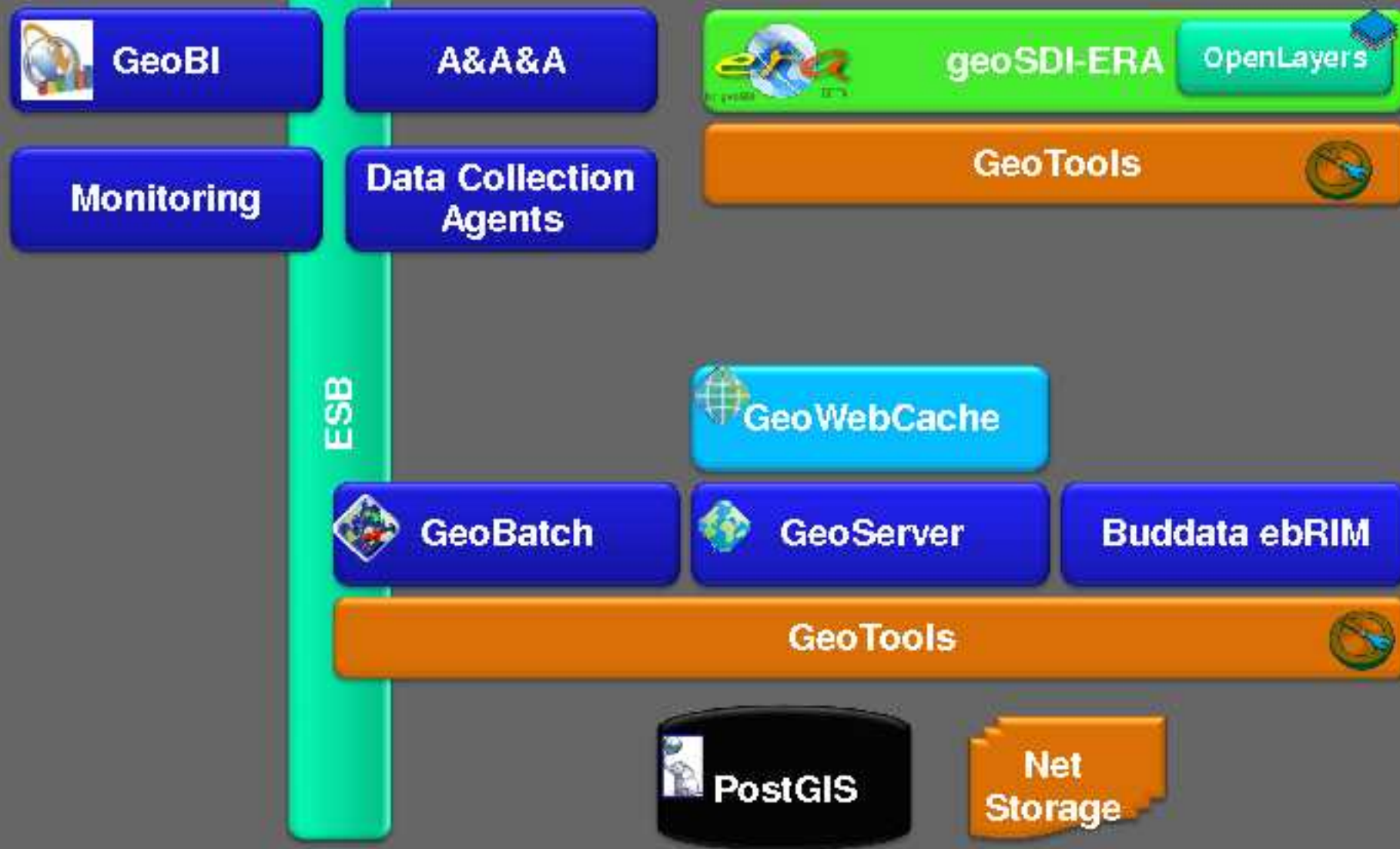
The End



Questions?

simone.giannecchini@geo-solutions.it

Enterprise Spatial Data Infrastructure



GeoServer Architecture



WCS WMS WFS WFSv REST Google GWC

GeoTools

Spring

ImageIO

JAI

JTS

GDAL

Kakadu

Raster

Style

Vector

Integrated Security



..r=*

..w=NO_ONE

private.*.r=TRUSTED_ROLE

private.*.w=TRUSTED_ROLE

topp.districts.w=LEGISLATORS

RDONLY
lock down

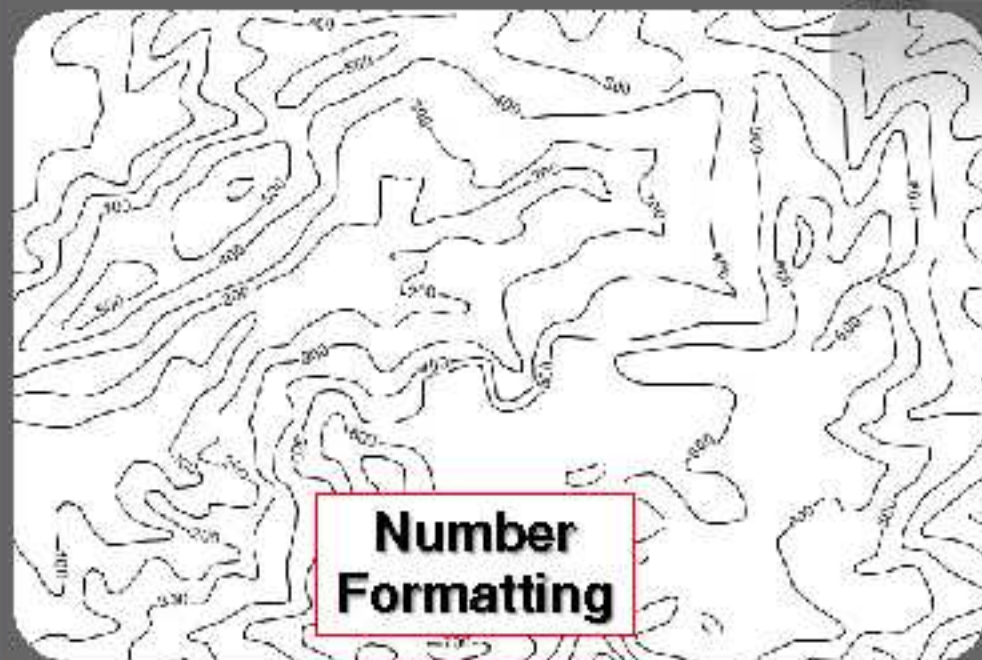
Per-layer
override

	private.*	topp.*	topp.districts	Other layers
TRUSTED_ROLE	<i>r/w</i>	<i>r</i>	<i>r</i>	<i>r</i>
LEGISLATORS	<i>(no access)</i>	<i>r</i>	<i>r/w</i>	<i>r</i>
(all other users)	<i>(no access)</i>	<i>r</i>	<i>r</i>	<i>r</i>

WMS – Advanced Styling



Filter Functions



Geometry Transformations



WMS – Advanced Styling



Continuous Maps



CSS Styling

```
<PolygonSymbolizer>  
  <Fill> <!-- CssParameters allowed are fill (the color) and fill-opacity -->  
    <CssParameter name="fill">#4DFF4D</CssParameter>  
    <CssParameter name="fill-opacity">0.7</CssParameter>  
  </Fill>  
</PolygonSymbolizer>
```

WMS - CQL

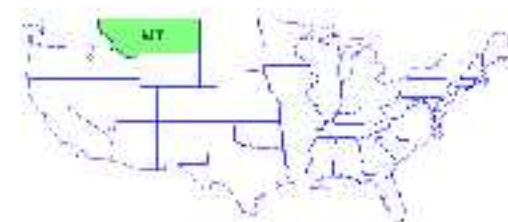


- GeoServer WMS – CQL Examples

- STATE_NAME = 'Montana'

- MALE > FEMALE

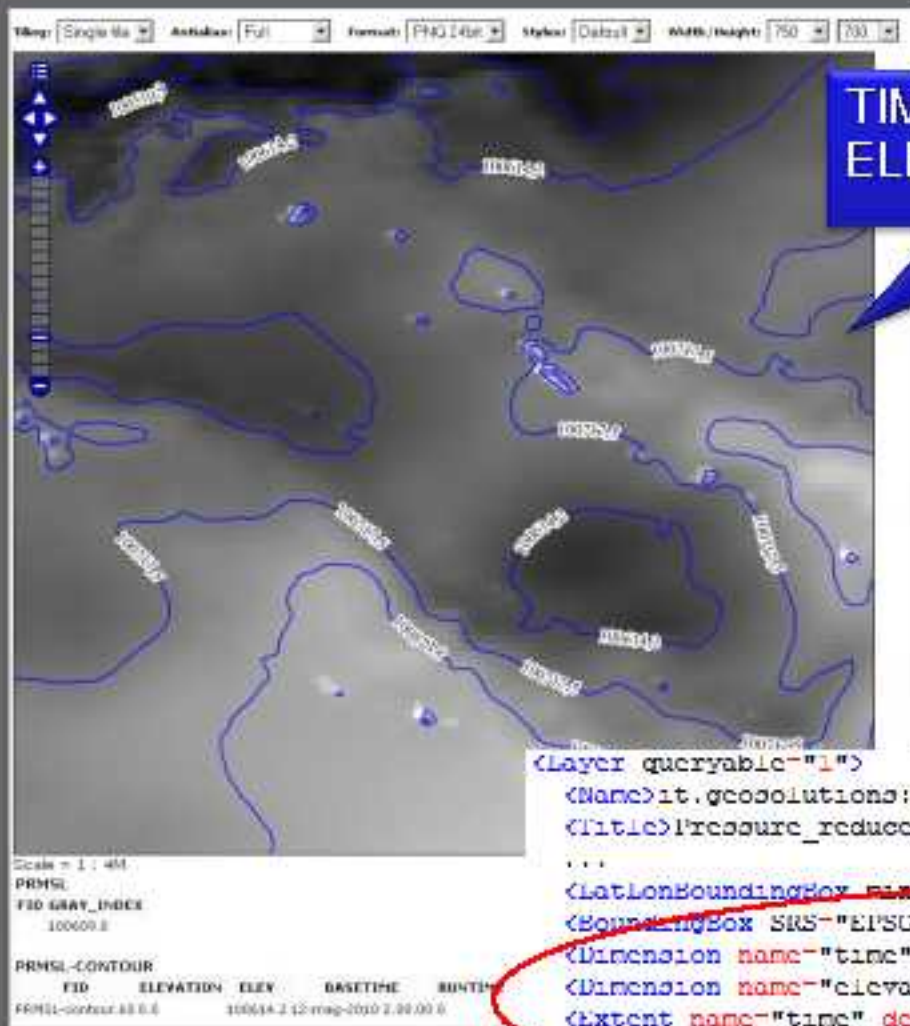
- LAND_KM > 300000



WMS TIME and ELEVATION*



TIME = 20100512T000000Z
ELEVATION = 0.0



FeatureType Editor

Time Dimension Attributes

Property:

UML Class Dimension Attributes

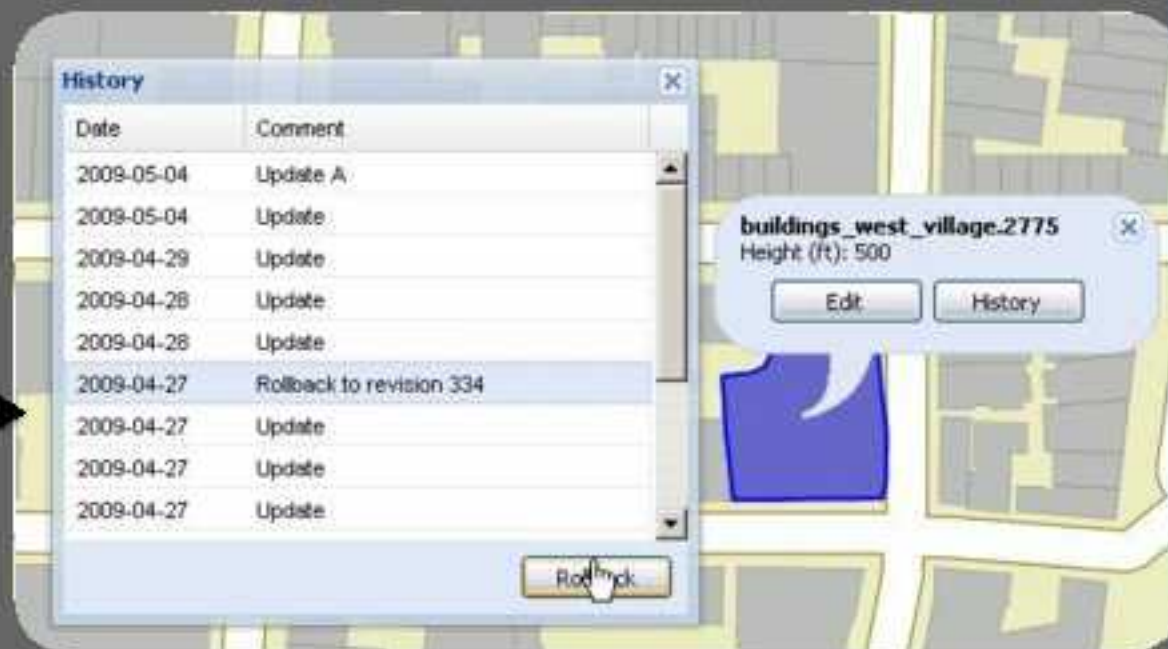
UML Class:

Property	Type	Min	Max
time	time	0.0	0.0
time	time	0.0	0.0
time	time	0.0	0.0
time	time	0.0	0.0

```
<Layer queryable="1">  
<Name>it.geosolutions:Pressure_reduced_to_MSL_contour</Name>  
<Title>Pressure_reduced_to_MSL_contour</Title>  
...  
<LatLonBoundingBox minx="0.01" miny="34.96" maxx="21.96" maxy="49.021"/>  
<BoundingBox SRS="EPSG:4326" minx="0.01" miny="34.96" maxx="21.96" maxy="49.021"/>  
<Dimension name="time" units="ISO8601"/>  
<Dimension name="elevation" units="EPSG:5039"/>  
<Extent name="time" default="current">2010-05-12T00:00:00.000Z</Extent>  
<Extent name="elevation" default="0.0">0.0</Extent>
```

WMS GetCapabilities

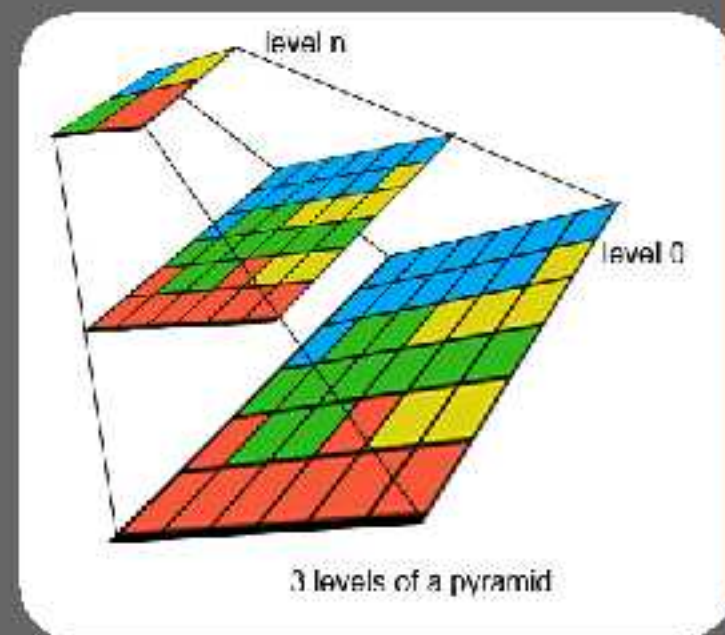
WFSv



Raster Pyramids



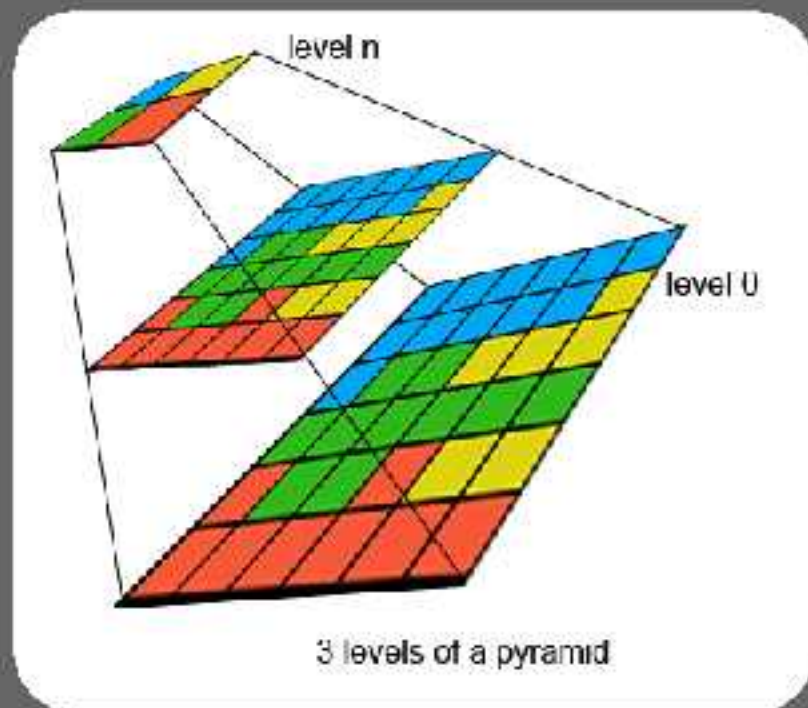
- Preprocessing raster data for performance
 - Multiple resolutions levels
 - Scale decide best resolution level
 - Multiple file (tiles) per resolutions level
 - File Based Pyramids Support
 - DBMS-based Pyramids
 - Postgis
 - DB2
 - Oracle (GeoRaster)
 - MySQL



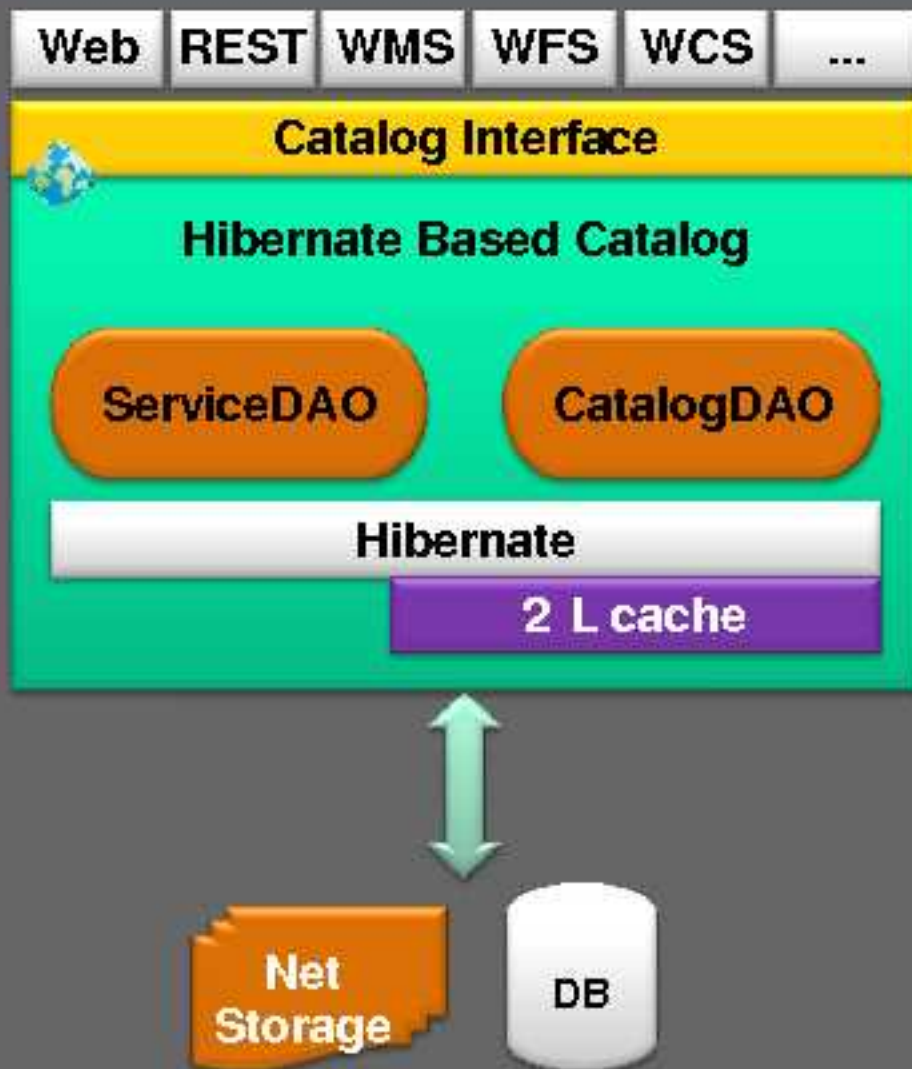
Pregeneralized Features



- Saving big geometries (complex polygons and linestrings)
 - Multiple generalized version
 - Fast WMS maps via scale-base selection
 - Transparent to WFS (read-only)



Hibernate Configuration*



- Configuration stored in DB
 - Hibernate
 - Spring based Dao
- Transactions via Spring/EJB3
- Caching with EhCache
- Same catalog interface, different implementation
- Catalog interface needs tweaking
- GeoServer UI still needs tweaking
- Transaction demarcation needs tweaking