GEOCLOUDS FOR ENVIRONMENTAL MANAGEMENT

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Aim

• To identify the degree to which Cloud Computing capabilities suite to particularities, technical specifications and functional requirements of environmental-related projects.

• To standarize the involved spatial nature of environmental parameters according to the Geospatial Web
Cloud Computing...what is it

- Cloud computing is a **model** for enabling **ubiquitous, convenient, on-demand** network access to a shared pool of **configurable computing resources** that can be released and rapidly provisioned with **minimal management effort or service provider interaction**.

Image from: http://www.cpusage.com/
CC Essential Characteristics

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

Image from: www.theworldstechnology.com
Cloud Computing Benefits

Image from: www.geospatialworld.net
Geospatial Cloud Computing - GCC

Has emerged due to the growing demand for cloud-based geospatial applications and platforms and refers to:

- Web-based map browsers
- GPS enabled applications
- In-car navigation services
- High resolution Earth imaging systems
- Mobile smart phone location applications
GCC for Environmental Management?

GCC capabilities may assist in the following aspects of Environmental Management:

• **Environmental Modeling**: complex geoprocesses on geospatial data from multiple sources requiring high performance computing platforms

• **Environmental Data Fusion**: location-referenced sensor data need to be combined (fused) with large data sets of traditional GIS data
GCC for Environmental Management?

• **Data Mining:** information creation through sophisticated **data mining based on geospatial criteria**

• **Demand Management:** satisfy geoprocessing needs of a large number of users

• **Data sharing:** environmental maps sharing over the web.

• **Environmental data delivery:** environmental data delivery among different environmental projects
GCC for Environmental Management?

- **Interoperability**: establishment of a common framework for environmental geospatial data and services
- **Security**: handle security issues relating to geospatial data exchange
- **Data Acquisition**: Collection of data sourcing from different automated spatially dispersed environmental sensors

http://geospatial.intergraph.com/
Geoclouds for Environmental Management

• The term Geocloud denotes the Geospatial aspect of Cloud Computing.

• In the present, the term “GEOCLOUDS” refers to Standards, Services and Tools, employed to support Environmental Management applications by using the “Cloud”
Open Geospatial Consortium Standards

- **Portrayal Service**: Web Map Service (WMS)
- **Data Services**: Web Coverage Service (WCS)
  - Web Feature Service (WFS)
- **Processing Services**: Web Processing Service (WPS)
- **Catalogue Services**: CS Core
Open Geospatial Consortium Standards
GeoMetadata Management Tools

• **Data from different sources** either governed by or collected with or corrected and maintained under different methods, methodologies or assumptions... ...require advanced Metadata documentation!

• **Adopting a geospatial data tool** for metadata management (e.g. INSPIRE GEOPORTAL Metadata editor) is a key action towards a successful environmental project implementation
Interoperable Spatial Data Exchange formats

• For Systems deployed under different platforms and/or software components with different underlying data models, interoperability may be achieved through:
  – XML based encodings for spatial data (GML, KML)
  – Other Web Semantic Standards for data interchange on the Web such as RDF
Indicative System Architecture

In the **client layer**, appropriate Web Services satisfy end user interaction with the project.

The **Applications Layer** contains the software and the appropriate services to provide users with the demanded functionality.

**Data Layer** supplies the application layer with data in order to perform calculations and processes.
Conclusions-Further Developments

- Environmental Projects require **real-time and archived data processing, homogenization, remote access and management functionalities** provided by cloud computing.

- The spatial nature of environmental parameters combined with the penetration of **smartphones** and the **development of location-based services**, place Geospatial Cloud Computing as the **hot topic for state-of-the-art support of environmental management**.
Conclusions-Future Developments

...may include, without being limited to:

• **specialised telematic apps:** for controlling hardware equipment based on alerts/triggers sourcing from environmental sensors

• **repositories in the Cloud:** connected with sensors dispersed around the globe providing real time environmental data and information

• real time and archived data from **fusion / combination / data mining**

• environmental-related **processes** offered through the cloud from specialized geoprocessing providers
References

• The role of OGC Web Service (OWS) standards in EO market growth retrieved from http://www.space.corila.it/Program/Slide/25_Ramage.pdf


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