

The Integration of Grid Technology with OGC Web Services (OWS) in NWGISS for NASA EOS Data

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Integration of Grid Technology with OWS

System Architecture and Data Flow











Integration of Grid Technology with OWS

System Architecture and Data Flow





Introduction -1/2

- Grid provides an approach for sharing geographically and organizationally dispersed heterogeneous computational resources.
- Globus is the key middleware that provides core Grid capabilities. It facilities the creation of usable Grid.
- NASA Earth Science Enterprise (ESE) is generating a huge volume of remote sensing data in HDF-EOS format for supporting Earth system science and application research.
- OGC Web Service (OWS) is proposed for addressing the lack of interoperability of geospatial data and processing system based on the Web.



Introduction -2/2

LAITS at GMU developed a OGC-specification compliant software package called the NASA Web GIS Software Suite (NWGISS), which includes WCS, WMS, MPGC etc.

The Committee on Earth Observation Satellites (CEOS) Working Group on Information Systems and Services (CEOS WGISS) started a CEOS-Grid Testbed in September 2002 to evaluate the feasibility and applicability of Grid technology to the Earth Observation (EO) community.

So we are contributing to NASA, OGC and CEOS-Grid by integrating OGC technology with Grid technology through the development of Grid-enabled NWGISS.





- Background
- Integration of Grid Technology with OWS
- System Architecture and Data Flow
- Conclusion and Future Work



Background -1/2

- Globus Project just released Globus 3.0 Beta based on OGSA. But we used Globus 2.2 which includes GRAM, MDS, GSI, GridFTP, MCS, RLS and simple CA etc.
- HDF-EOS is a standard format for NASA EOS data and products. It inherits the portability and multiple data model support of HDF, also adds the three new EOS specific data models – point, swath and grid.
- LAITS' NWGISS significantly increases the accessibility, interoperability and inter-use of HDF-EOS data. It works with all generic HDF-EOS files.



Background -2/2

Since 1999, OGC has successfully implemented three web-based geospatial interoperability programs: WMT I, WMT II and OWS I. And produced a set of web-based data interoperability specifications as WCS, WMS, WFS, and WRS.

Currently, CEOS-Grid Testbed consists of five Grid demonstration projects:

- NOAA Operational Model Archive and Distribution System (NOMADS)
- USGS EDC's Data Delivery
- ESA ESRIN Ozone
- NASA GSFC's Advanced Data Grid
- NASA EOSDIS Data Pools





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Integration of Grid technology with OWS

George Mason University



Integrating Grid technology with OWS I





- Background
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System Architecture and Data Flow -1/3

George Mason University



LAITS' Host, User and Service certificates: "O=Grid, OU=GlobusTest, OU=simpleCA-laits.gmu.edu, CN=host/laits.gmu.edu", "O=Grid, OU=GlobusTest, OU=simpleCA-laits.gmu.edu, OU=laits.gmu.edu, CN=Aijun Chen" "O=Grid, OU=GlobusTest, OU=simpleCA-laits.gmu.edu, CN=Idap/laits.gmu.edu"

Laits' Virtual Organization and Certificate Authorization center



System Architecture and Data Flow -2/3

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- Broken lines show internal requests of NWGISS

Solid lines show requests related to Globus.

System architecture and simplified data flow (request from machine A to machine B)



System Architecture and Data Flow -3/3

PFN



Metadata Catalog Service

Replica Index Node

LFN

Local Replica Catalog

Replica Location Service



Web Coverage

Requested Data

LFN: Logical File Name; PFN: Physical File Name

PFN

Integration mechanism of Globus MCS with geospatial metadata





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Conclusion

- Extended the applications of Grid technology to the EO community.
- Made OGC technology Grid enabled.
- Finally, we provides the user community a standard, secure, disciplinary specific access to a huge volume of geospatial data managed by Grid while shielding the details of Grid infrastructure underneath.



Future Work

Integration of OGC Web Registry Service (WRS) and Grid catalog systems for providing geospatial-specific OGC-compliable and Grid-enabled catalog services.

Enabling the virtual geospatial data services.

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Thank You for your attention !

Any Questions ? achen6@gmu.edu