Towards Private/Public Datacube Analytics Federations

Symposium “Neue Perspektiven der Erdbeobachtung”
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BigDataCube Team
BigDataCube: Mission & Goals

- Interactive spatio-temporal datacubes for analysis-ready data
  - Sample service: maritime wind & sea state

- Public/private datacube federation
  - CODE-DE + cloudeo; open
  - security & billing

- Status:
  - CODE-DE datacube precursor + cloudeo operational
  - www.bigdatacube.org, code-de.bigdatacube.org
Partners & Tasks

- Jacobs University (project coordinator) & rasdaman GmbH
  - European Datacube engine, rasdaman
  - adding billing & authorization down to single pixel level
  - Interactive datacube services @ CODE-DE

- cloudeo
  - commercial scalable geo-infrastructure
  - enhancing GeoMarketplace with datacubes

- DLR Maritime Safety and Security Lab
  - EO-based near real-time ocean condition assessment
  - maritime wind & sea state products derived from Sentinel-1
Parallel, Distributed Processing

select
  max((A.nir - A.red) / (A.nir + A.red))
  + avg(B.green)
  + max((C.red + C.green + C.blue) / 3)
  + max((D.nir + D.red) / 2)
from A, B, C, D

1 query → 1,000+ cloud nodes
[ACM SIGMOD DanaC 2014]
[VLDB BOSS 2016]

Ex: ECMWF / UK

Ex: NCI / AUS

Ex: ESA OPS-SAT
...But That’s Not What You Want to See

- Let users remain in comfort zone of well-known tools
  - Map navigation: OpenLayers, Leaflet, ...
  - Virtual globe: NASA WorldWind, Cesium, ...
  - Web GIS: MapServer, GeoServer, QGIS, ArcGIS, ...
  - Analysis: GDAL, R, python, ...

- ...via OGC W*S standards

[screenshots: diverse clients accessing rasdaman]
German recommendations for Roadmap

EO Big Data

- Establish „European Datacube Federation“ as a strategic goal
  - Advancing user service quality, specifically, timeseries analytics
  - Enable flexible framework for value-adding services, through open standards
  - Maintain European technology lead
  - EarthServer as reference example to be enlarged

- Foster and Organize joint activities with platform developers and operators in member states
  - Analyse existing EO Exploitation Platforms with respect to common functions and interoperable interfaces
  - Define federation requirements including IT security aspects on appropriate levels
  - Support harmonization and standardization on interfaces of federated platforms
  - Develop components and workflows supporting harmonized scenarios and interfaces
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