Scalable Spatio-Temporal Analysis through Open Standards: The European Datacube Engine

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Jacobs University | rasdaman GmbH
rasdaman: Big Datacube Analytics

= „raster data manager“: SQL + n-D datacubes
  – massively scalable Big Datacube Analytics engine
  – 2.5+ PB; 1000x parallelization

„leading technology“ (ESA 2017)
  – Invented datacubes [Baumann 1992]
  – Research Data Alliance datacube report 2018:
    • 19 datacube tools inspected
    • „rasdaman can be 300x faster than other tools“
    • dx.doi.org/10.15497/RDA00024
Federated Processing with rasdaman

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

1 query → 1,000+ cloud nodes
[ACM SIGMOD DanaC 2014]
[VLDB BOSS 2016]
...But That’s Not What You Want to See

- Open standards → users in comfort zone
  - Map navigation: OpenLayers, Leaflet, ...
  - Virtual globe: NASA WorldWind, Cesium, ...
  - Web GIS: QGIS, ArcGIS, ...
  - Analysis: GDAL, R, python, ...
ECMWF River Discharge Timeseries
Datacubes on Virtual Globes
NCI Australia: Landsat8 Datacubes

[data: NASA; service: NCI; running rasdaman]
BGS: Geophysical Datacubes
PlanetServer.eu

[data: NASA; service: JacobsU; running rasdaman]
Intercontinental Federation with rasdaman
BigDataCube: Public/Private Datacube Partnership

- **Datacube Federation of**
  - public CODE-DE
  - commercial cloudeo AG services

- **Security + billing**
  - configurable down to pixel level
Complement batch-oriented CODE-DE Hadoop interface with interactive spatio-temporal viewing, fusion, and analytics services on Sentinel EO imagery

- Using European Datacube engine, rasdaman

Examples:

ship detection

time-avg'ed S1A timeseries

S2 atmospheric penetration
Summary

- Datacubes = next-gen spatio-temporal services
  - Analytics & visualization, flexibility, user-friendliness
- rasdaman team pioneered Datacubes, Array Databases
  - Now becoming mainstream, increasing number of epigons
  - Still new insights every other day
- SMEs pick rasdaman for ease-of-use, flexibility, ...and speed
  - EOfarm, CropMaps, SBI, ...
- Exciting perspectives – let’s team up & put all our expertise together!

- Visit our booth for live demos!