Integrating geospatial big data solutions

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Key figures (per year)

• 35,000 ship visits with 400 million ton cargo
• 80,000 barge visits
• 7,500,000 trucks (25,000 per day)

Over 40 kilometers
Challenge

• Need to make strategic decisions on
  • Infrastructure/assets
  • Safety
  • Environment

• Available data:
  • Low level, e.g. AIS ship positions
  • High volume: 10 million records/day
  • High velocity: updates every 10 s

• Information in hand:
  • Business Integrators
  • Data Analysts
High level architecture
Detailed level architecture

Spark/mapreduce jobs for:
• Creating tracks
• Calculating passages (line crossings)
• Calculating port/area/berth visits
• Estimating (sea) ship emissions
Emission calculations in Hadoop

- **Position data**
- **Track builder**
  - ship 1, visit #1
  - ship 2, visit #2
- **Visit reporter**
  - Area 51
    - Enter: 12:47
    - Leave: 13:18
- **Emission calculator**
  - Ship 1, visit #1
    - Emission 15 g
  - Ship 2, visit #2
    - Emission 20 g
  - Area 51
    - Emission 3 g
- **Area-based emissions**
- **Point emissions**
Sample results

Traffic Density

Tracks

Emissions
Future ideas

• Prediction of (inland) ship arrivals
• Predictive maintenance – e.g. dredging on demand
• Monitoring of individual containers
Conclusions

• Flexible framework for providing actionable insights
  • Raw data processed in Hadoop
  • Results available through various systems
  • Data analysts can create new insights
    • Added to the Hadoop processing

Strategic decisions are made: involving millions of euros