IQmulus - Cloud Platform for Point Cloud Processing

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IQmulus – Big Geo Data

- 4 year EU FP7 Research Project (8.1 Mio EUR)
- A High-volume Fusion and Analysis Platform for Geospatial Point Clouds, Coverages and Volumetric Data Sets
- IQmulus will leverage the information hidden in large heterogeneous geospatial data sets and make them a practical choice to support reliable decision making
- www.iqmulus.eu

IGN INSTITUT NATIONAL DE L'INFORMATION GÉOGRAPHIQUE ET FORESTIÈRE

Fraunhofer IGD

UCL

fömi

SINTEF

Ifremer

REGIONE LIGURIA

M.O.S.S. Computer Grafik Systeme Geoinformationssysteme

imati

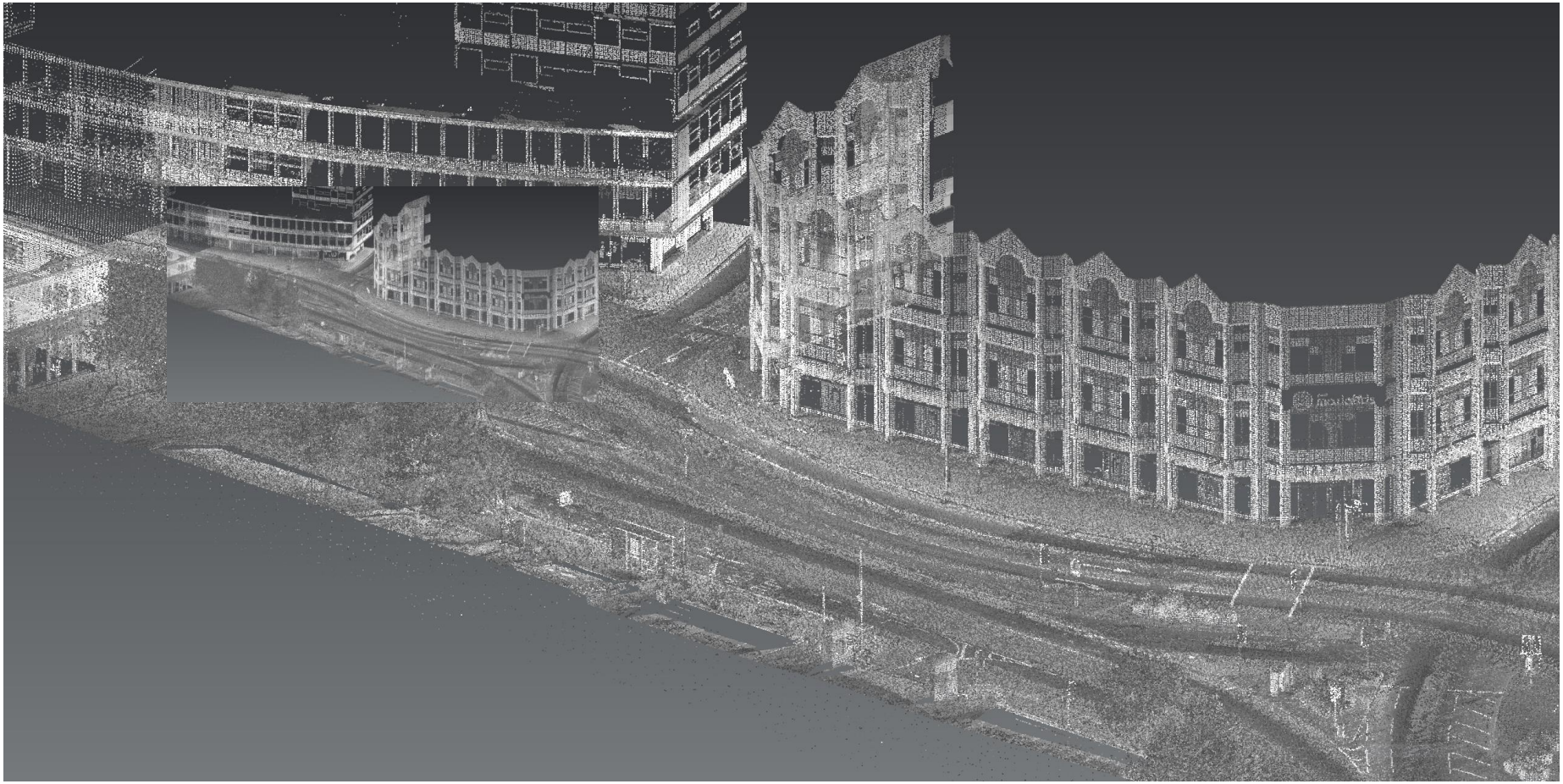
HR Wallingford Working with water

UBO université de bretagne occidentale

Big Point Cloud Data

- Point cloud data is ubiquitous
  - Airborne LiDAR & Photogrammetry
  - Mobile mapping vehicles
  - Consumer range camera & Mobile phones
- Point cloud processing
  - Typically object localization and classification
- Point cloud segmentation is fundamental
  - Automatic
  - Interactive

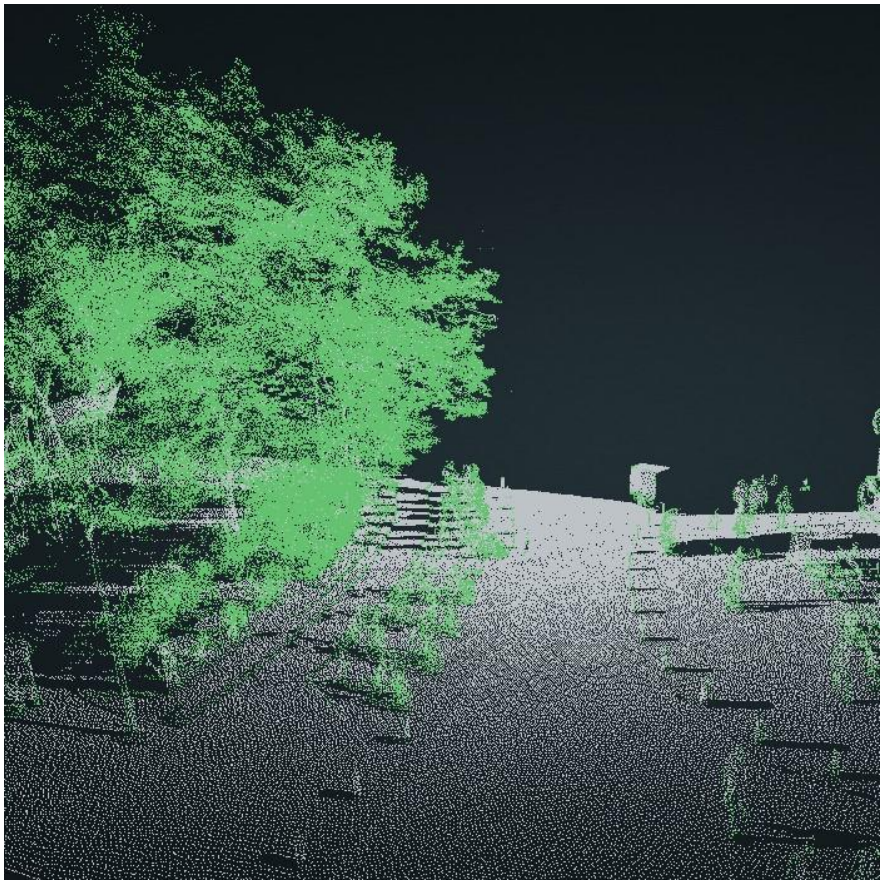
Problem: data is challenging

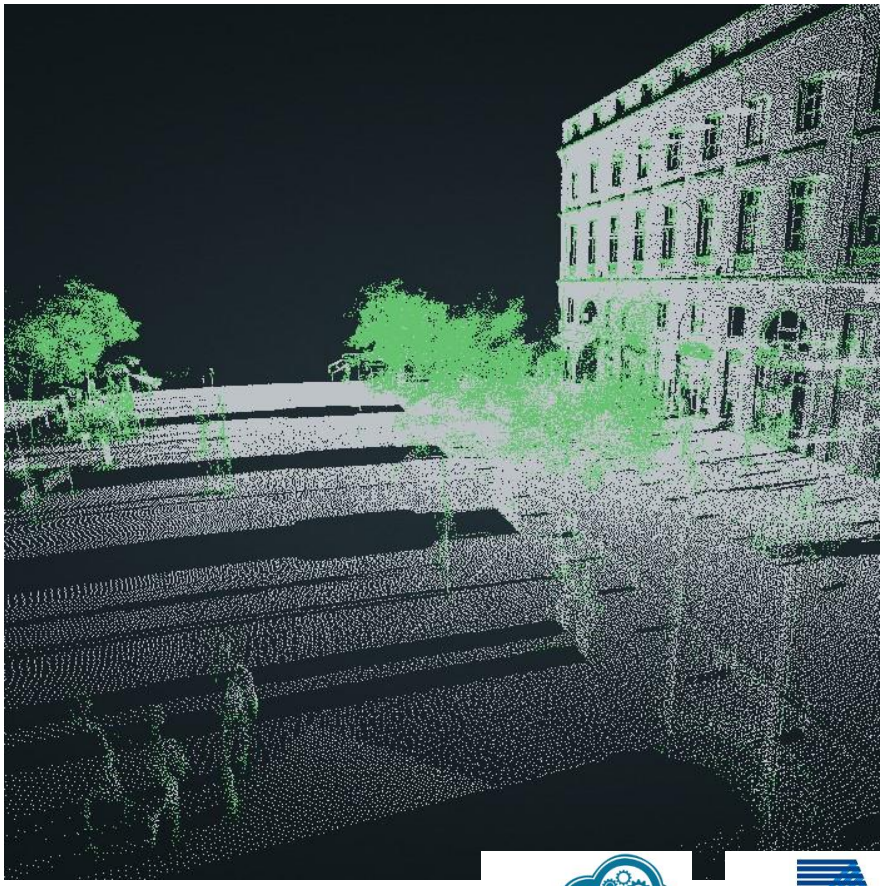


Automation: Machine Learning

- Classification using Random Forrest
- Flexible to adapt to new classes & objects using Machine Learning
- Strictly local
- Easy to parallelize
- Libraries for Cluster available

Results



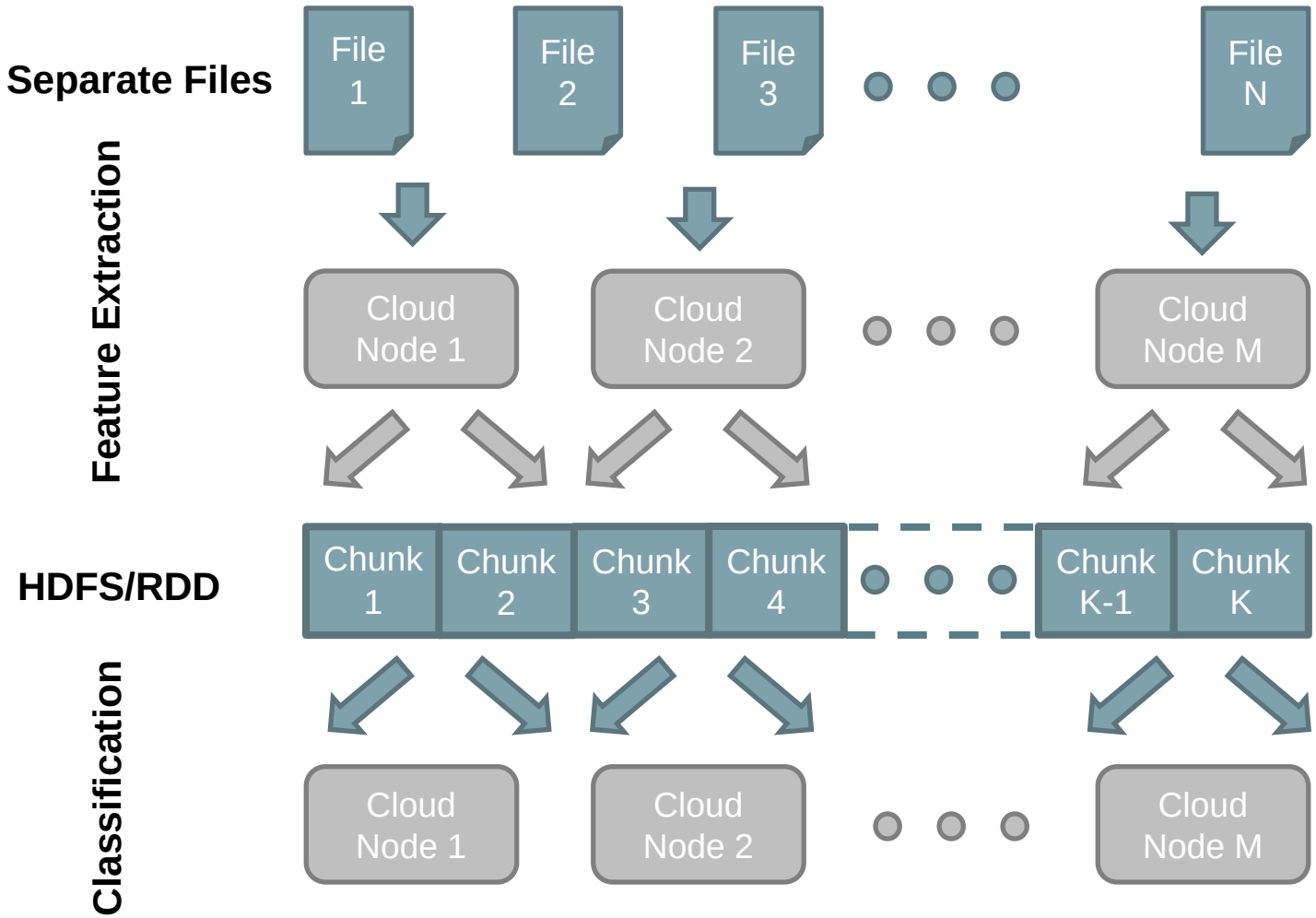


Big Data: Cloud Computing for Geospatial Data

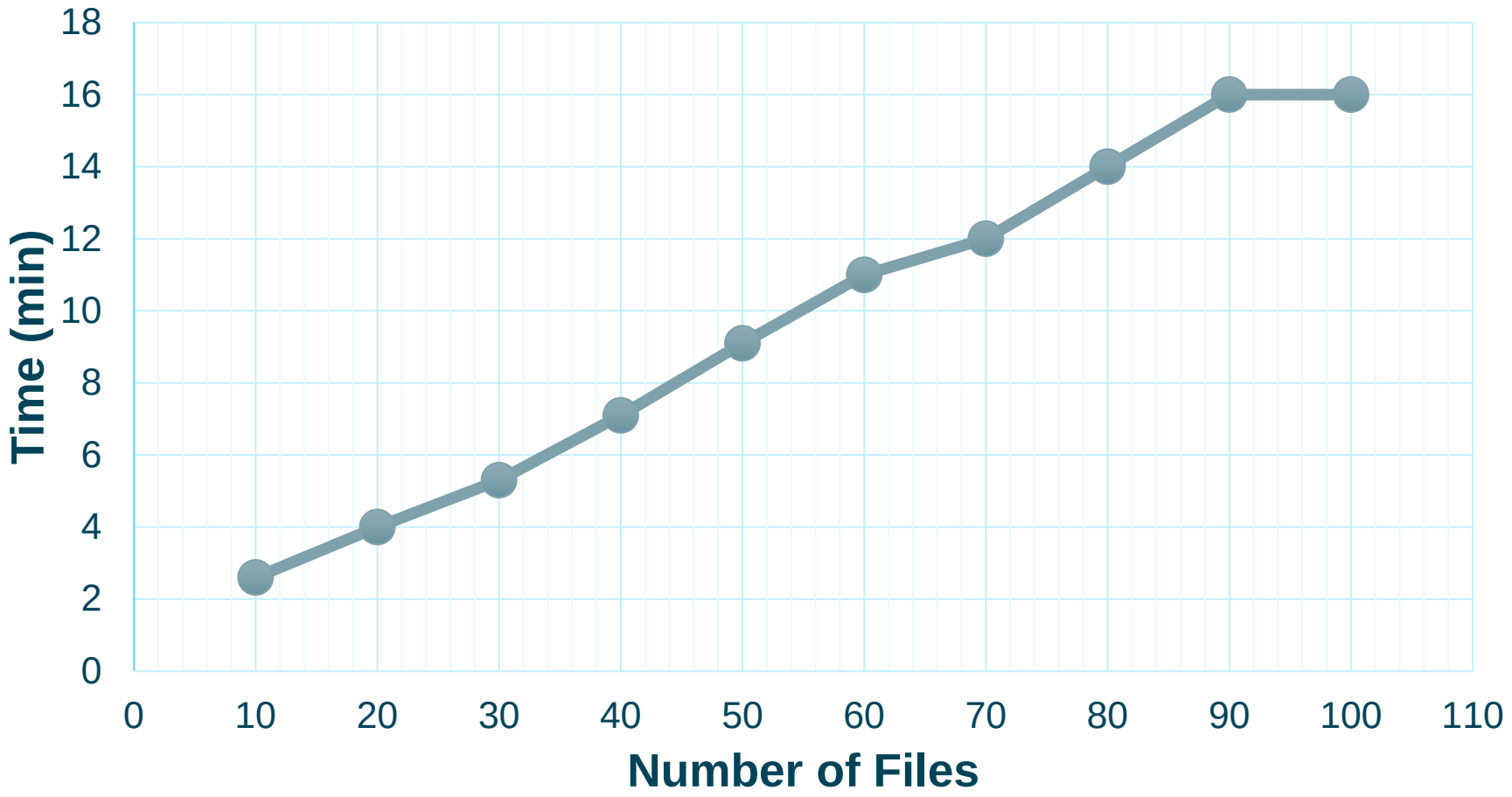
Simple Experiment:

- 100 Tiles (Files) of Land-based Mobile Mapping Data
- Around 300 Million points
- About 50 GB in binary storage
- Using Feature Computation & Automated Classification
- Use new in-memory framework from Spark
- Uploaded to Amazon Simple Storage Solution (S3)
- Using 10 nodes of Amazon Elastic Compute Cloud (EC2)

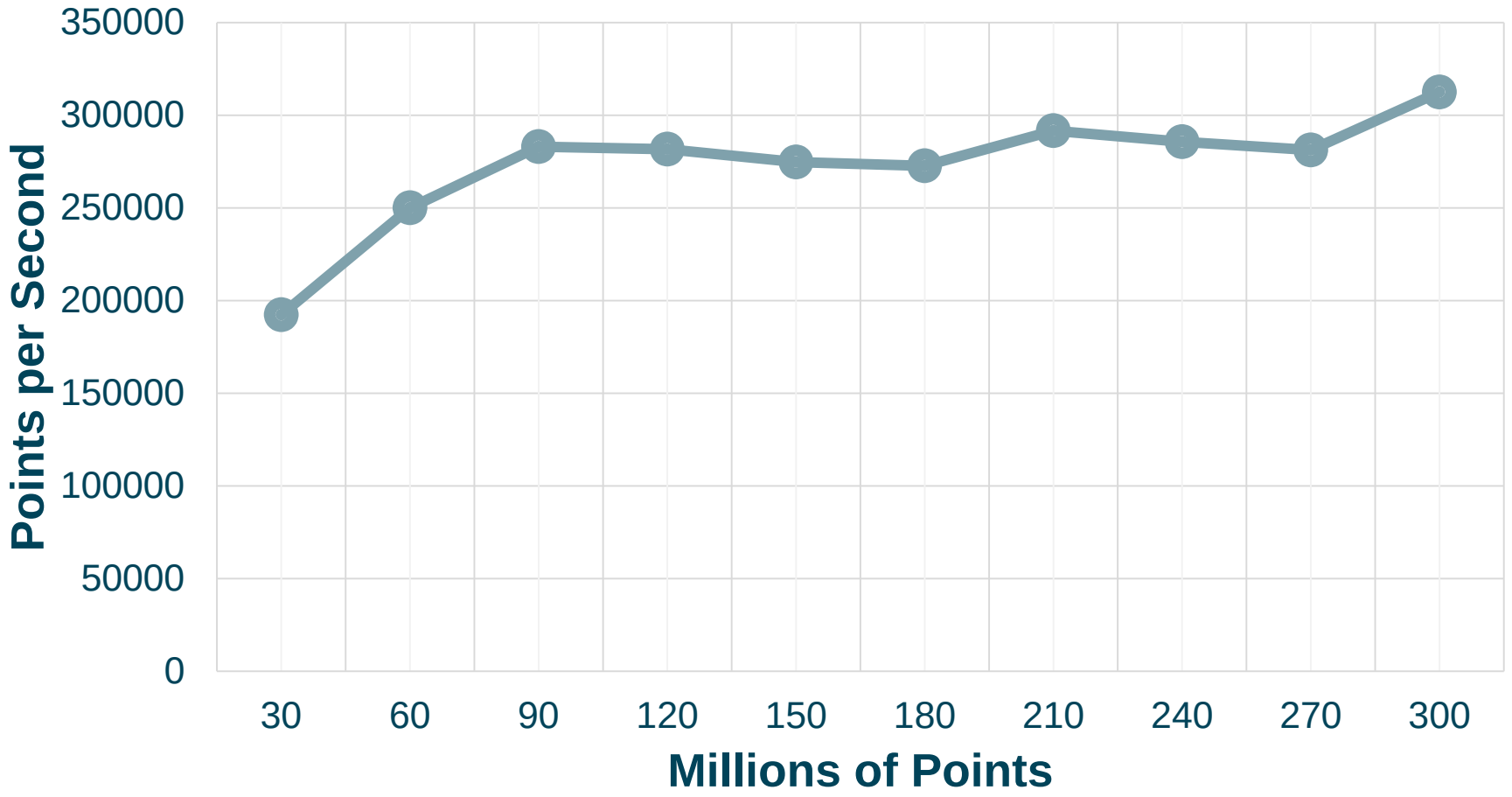
Computational Framework



Performance



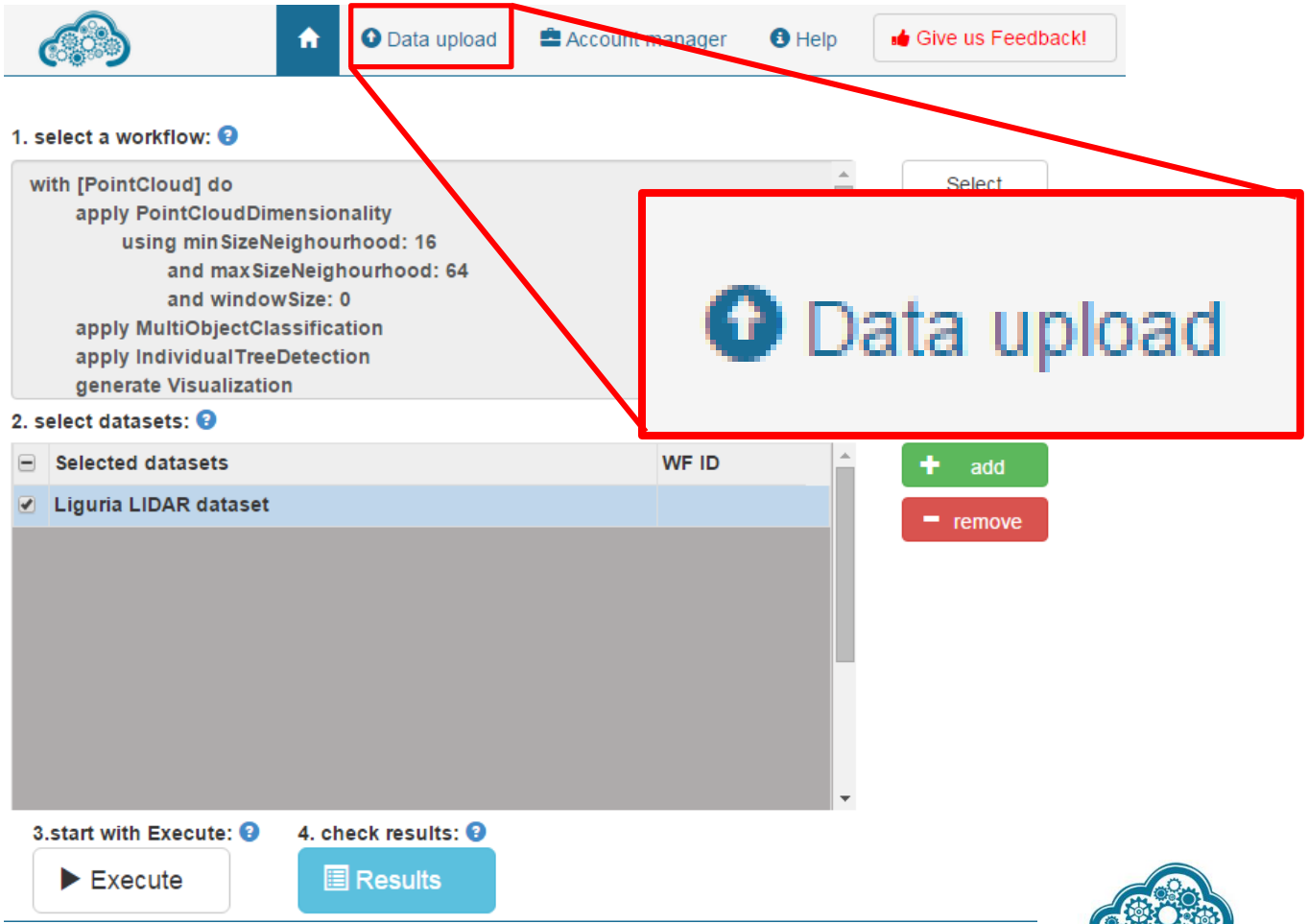
Performance (throughput)



Comparison (for 100 tiles)

Functionality	Single Node	10 Nodes Amazon AWS
Feature Extraction	271 Minutes	21 Minutes
Classification	225 Minutes	$0.50

IQmulus – service on a web page



Supported Data Format

- LAS (ASPRS)
  - Industry standard
  - Compression supported (via LASZip)
  - Difficult to extend
- PLY (Stanford)
  - Very flexible
  - Binary and ASCII
  - Research only
- Flexible Standard needed
- GeoNetwork support