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Big Data Visualisation

Viewport-Driven Graph Data Reduction

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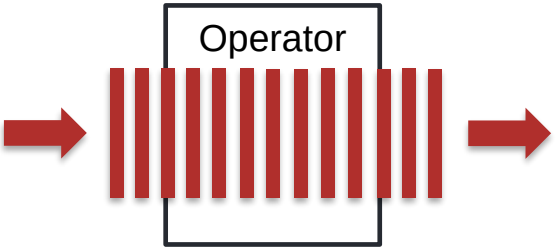
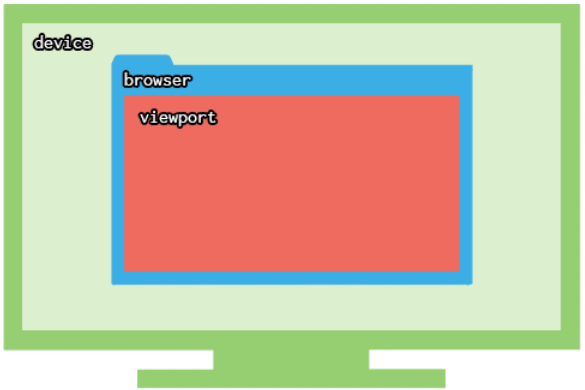
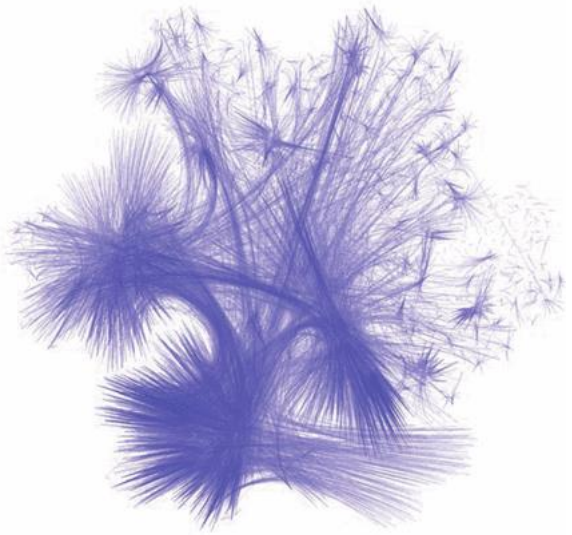
Overview

- Introduction and Related Work
  - Terms and Definitions
  - The Challenge of Big Data
  - Viewport-Driven Data Reduction (VDDR)
- VDDR on Graphs – a New Approach:
  - Application Setup
  - Back End Data Representation
- Evaluation
- To Do List
- Example Presentation

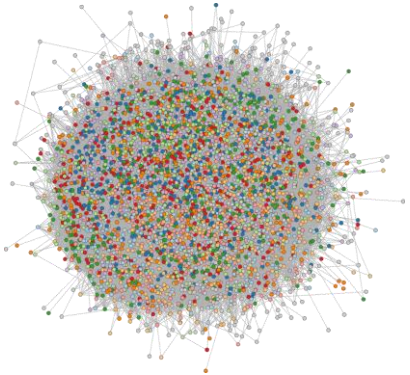

Operator


device
browser
viewport



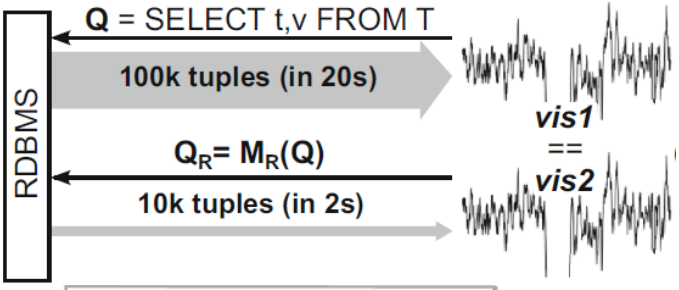
The Challenge of Big Data

- Increasing amount of network-type data
- Big Data Graph
  - Keep representation clear and focused
  - Data reduction
- Visual operations on graphs in multiple-second range
  (Gómez-Romero, 2018)

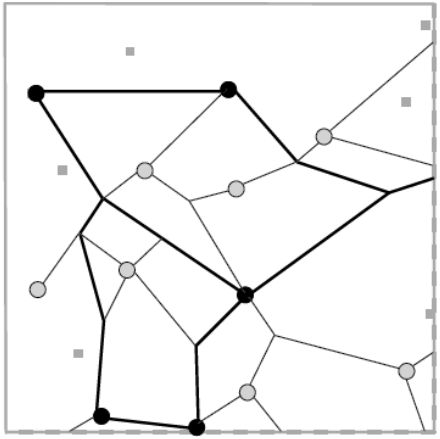


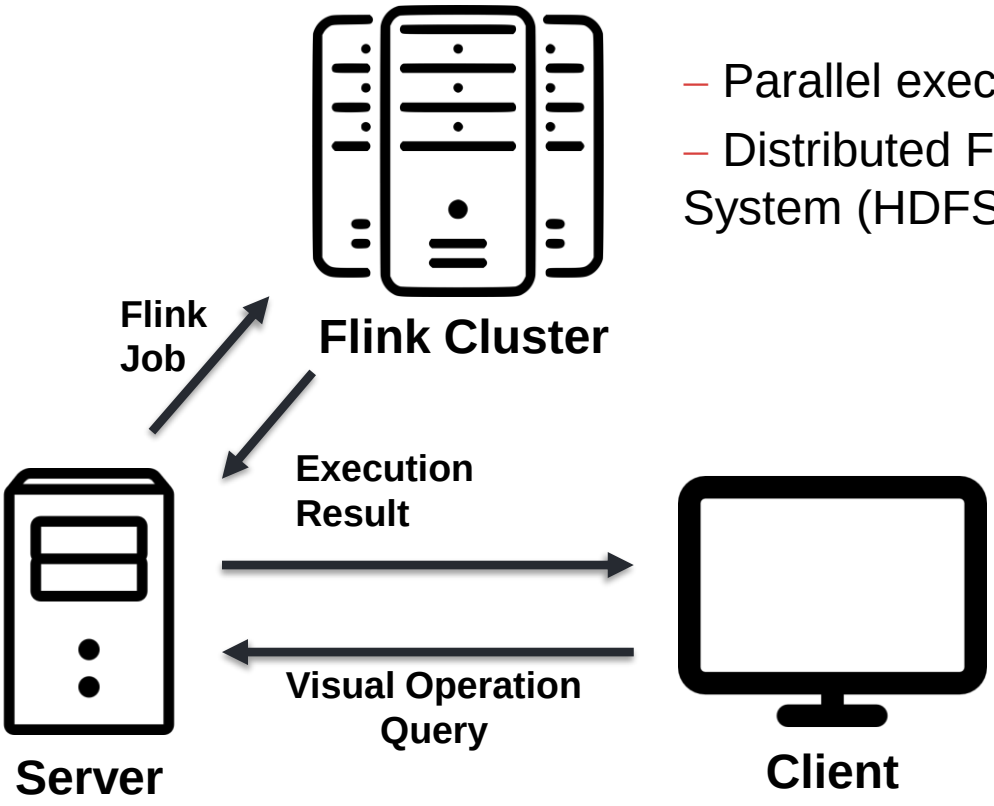
Viewport-Driven Data Reduction

Viewport-driven data aggregation in relational data bases (Jugel, Jerzak et al. 2015)



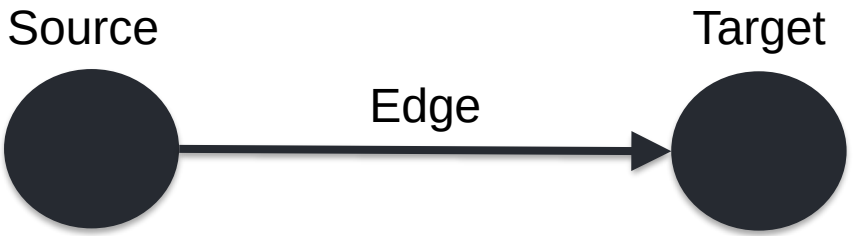
A new approach to GraphMaps (Mondal and Nachmanson 2017)





- Parallel execution
- Distributed File System (HDFS)

Stream Data Object – „Wrapper“



- Vertices‘ label
- Edge label
- Vertices‘ degree
- Vertices‘ ID
- Edge ID
- …

Back End Data Representation

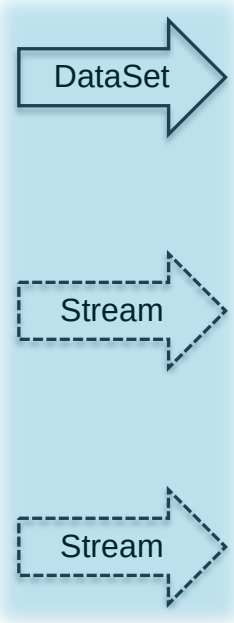
3 Different Approaches:

Gradoop:
- edge set, vertex set
- batch baseline

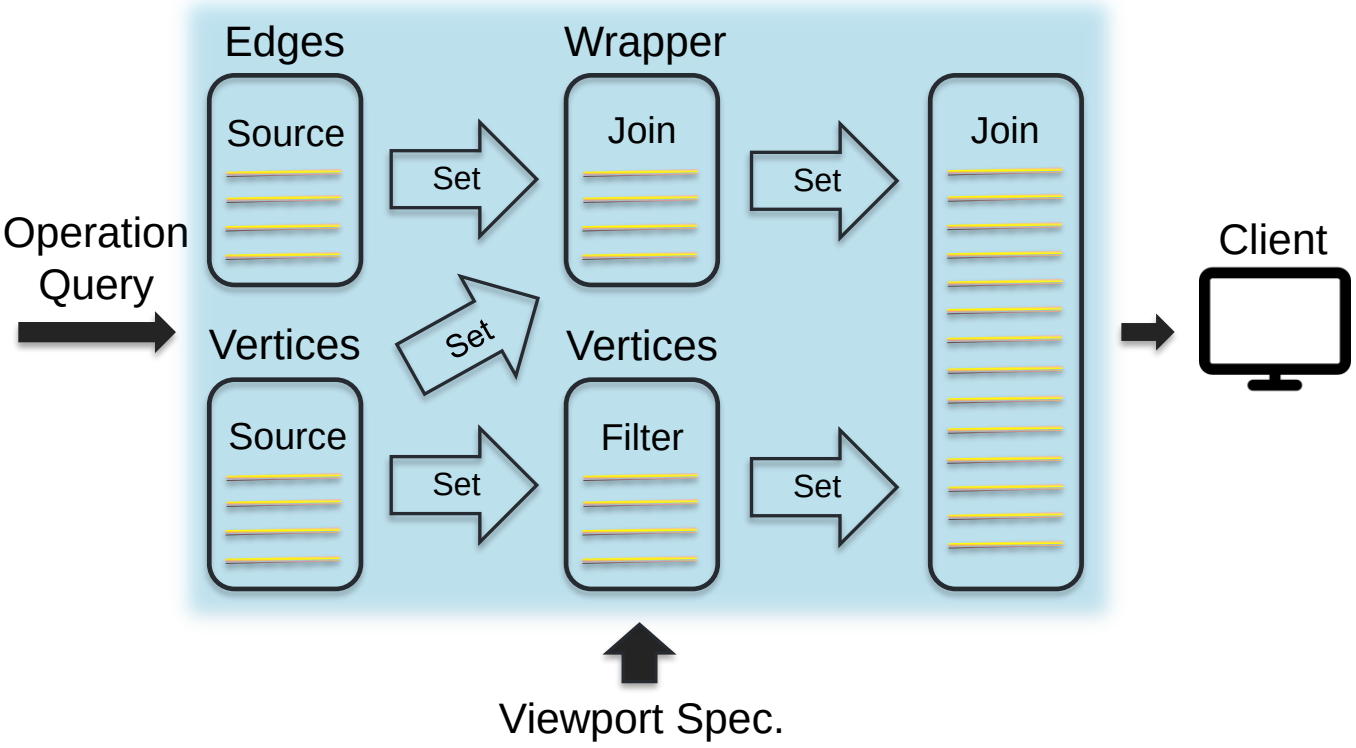
(Junghanns, Petermann et al. 2017)

Direct Wrapper Stream:
- wrapper and vertex stream source
- data sorted by degree

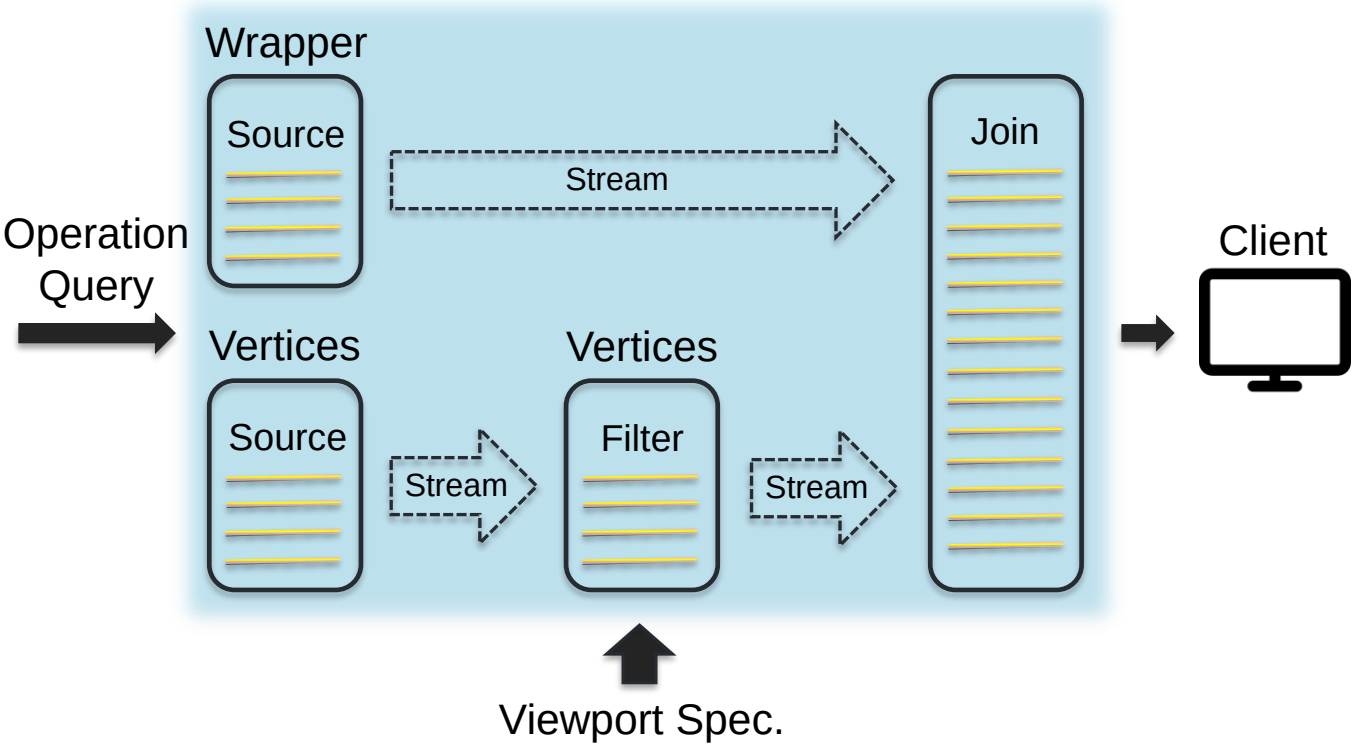
Adjacency Matrix:
- adjacency matrix, vertex stream source, wrapper map
- data sorted by degree



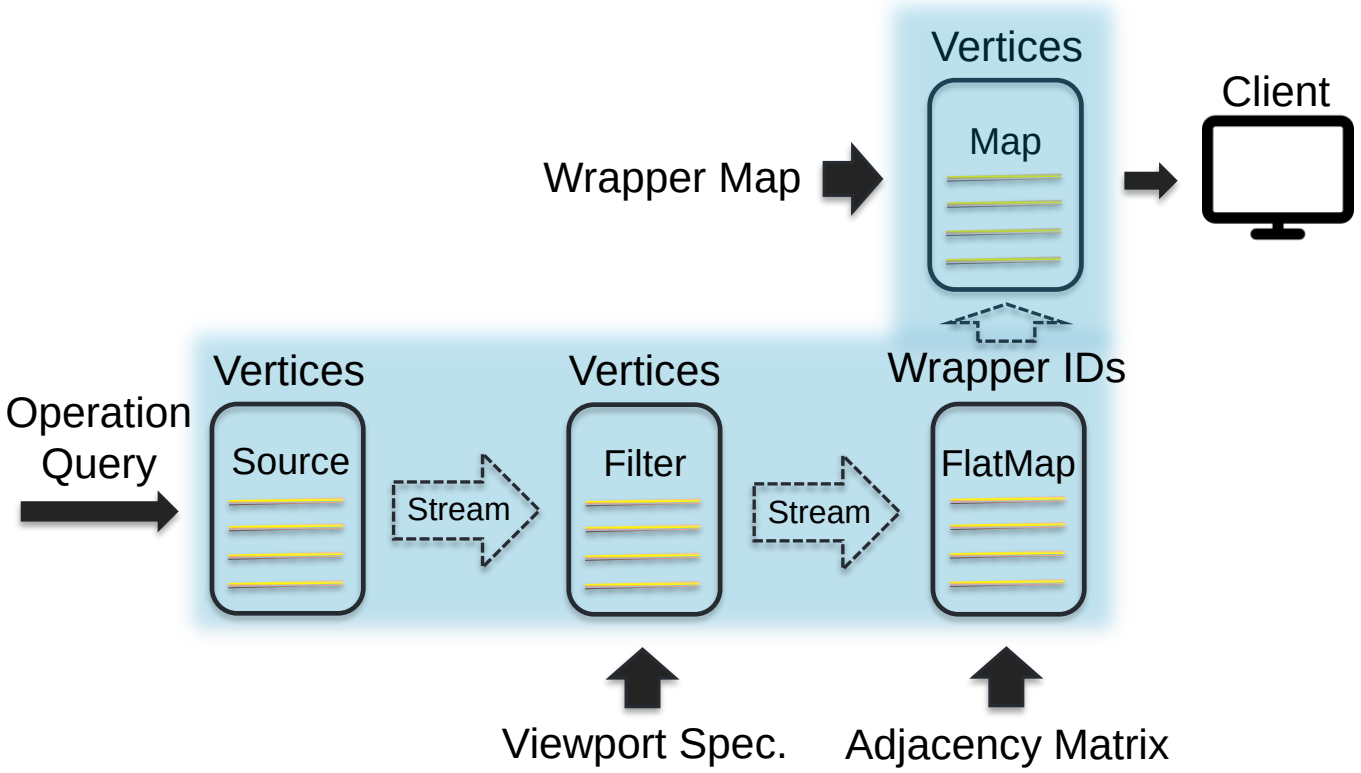
Back End Data Representation - Batch



Back End Data Representation
Direct Wrapper - Stream



Back End Data Representation
Adjacency Matrix - Stream



Evaluation

- Evaluation on Galaxy Cluster of Leipzig University
- Parameters:
  - Different approaches (stream, batch)
  - Parallelism
  - Graph size (gigabyte scale)
  - Pre-layouted and non-layouted graphs
- Measured Quantities:
  - Back End procedure time scale
  - Back End memory consumption
  - Server-Client data transfer time scale
  - Layout rendering time scale

To Do List

- Client-side ad-hoc-layout
- Evaluation
- Deployment and integration into other services

Sources

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Thank You!

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