Universität Stuttgart

IPVS

Effizienz-Optimierung daten-intensiver Data Mashups am Beispiel von Map-Reduce

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BTW 2017
BigDS Workshop

Universität Stuttgart

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Towards optimizing the efficiency of data-intensive data mashups based on the example of Map-Reduce

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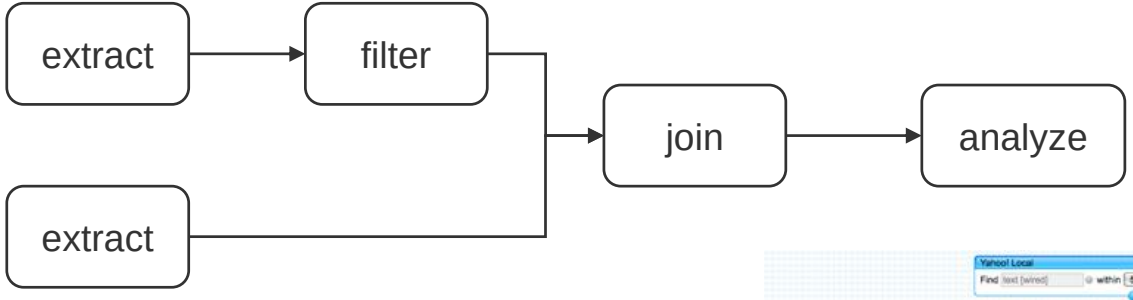
Motivation

Big Data

- Big Data: volume and complexity of data highly increases
  - New paradigms: Internet of Things, Industrie 4.0, Data Lakes, …
- It is important to gain knowledge through data processing and analysis (knowledge discovery)
- But: gaining knowledge is difficult because of the (at least) **three Vs of Big Data:**
  - Volume
  - Variety
  - Velocity

Data Mashups - Definition

- Goal: flow-based processing, analytics, and integration of data
- Modeling of data operations based on Pipes and Filters



- Famous example: Yahoo! Pipes

Motivation

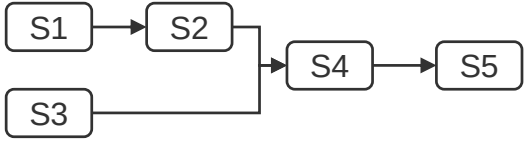
Data Processing Tools

- Data Mashup tools, ETL tools, and data analytics tools (e.g. KNIME) offer means to process and analyze data
- Focus on approaches that support abstract modeling based on the **pipes and filters** pattern
  - nodes: data operations (e.g., extraction, transformation, analysis)
  - edges: data flow
  - nodes are associated with **services** that process the data (orchestrated by workflows)
- Offer an **explorative** means to process data

- Focus lies on the Open Source Data Mashup Tool **FlexMash** developed at the Uni Stuttgart
  - Concepts are also applicable to different approaches for data processing

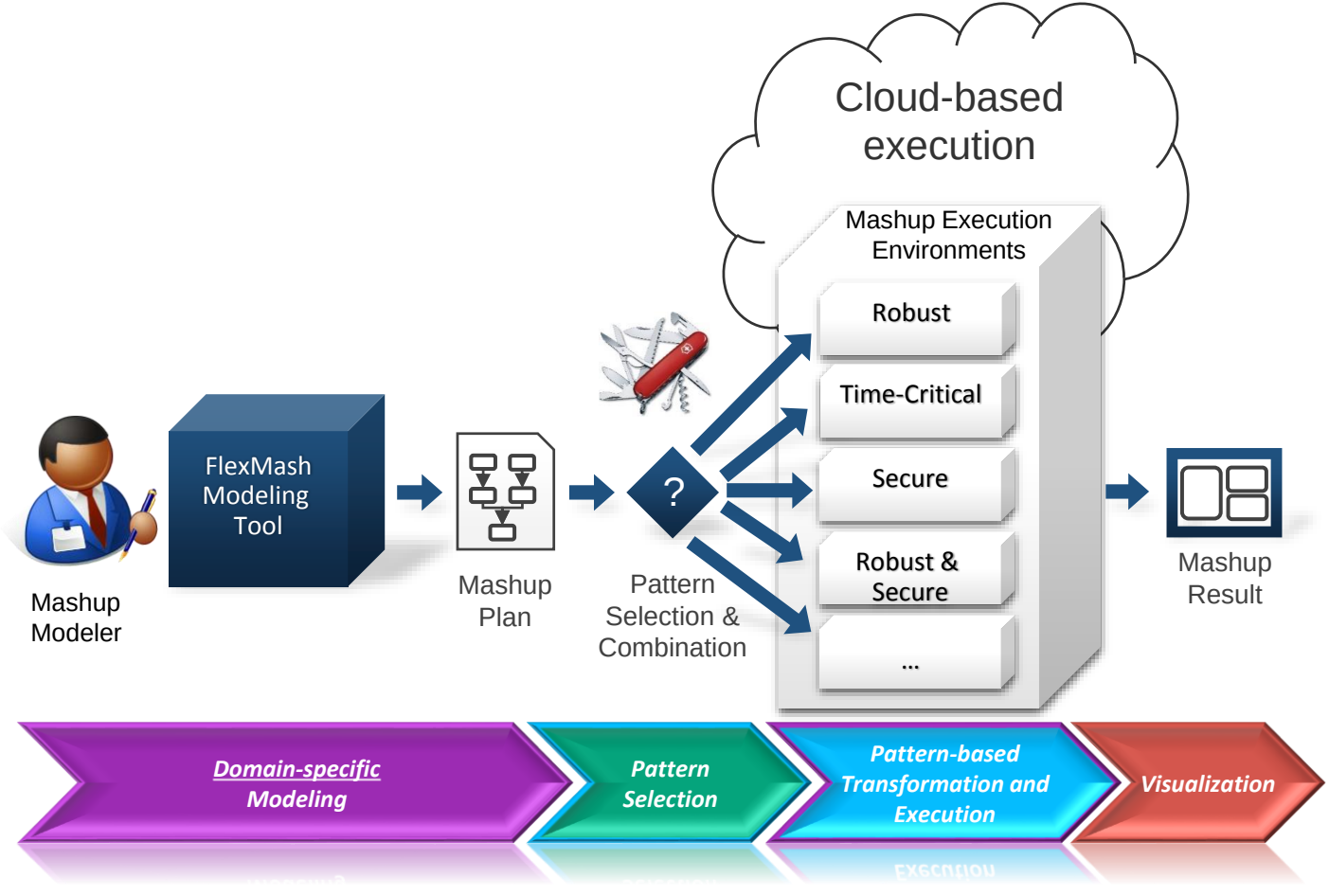
Motivation

- **Overall goal of this work:** Increasing the efficiency of service-based data processing
- **State of the art:** data processing "in-service" (memory) → scalability / memory issues

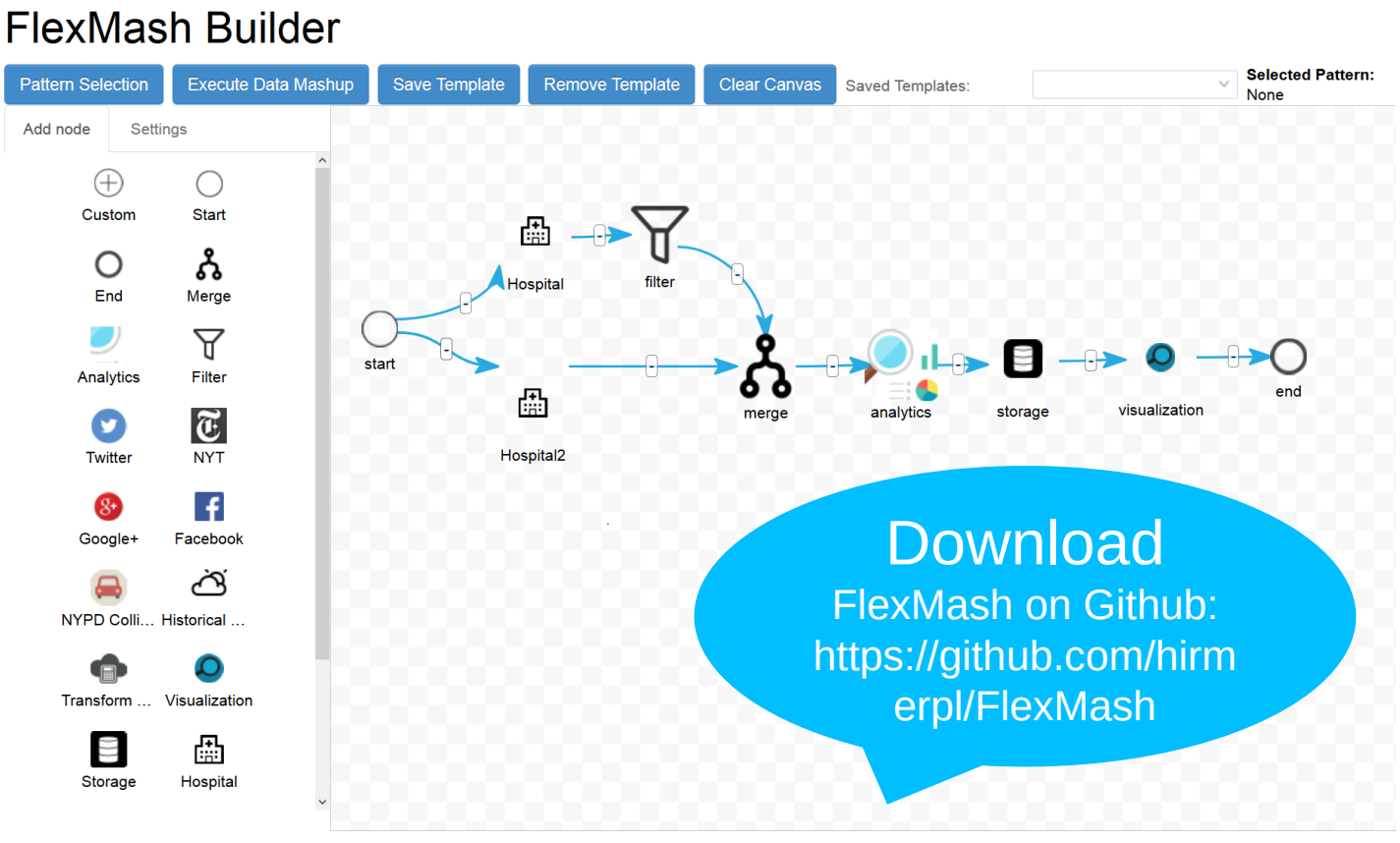


- **Approach in a nutshell:**
  - Move data processing on computing clusters and process data in parallel
  - Integration of modern data processing techniques and technologies (Map-Reduce, Apache Spark, …)
  - Coping with the generated overhead (where is the cost-value limit?)

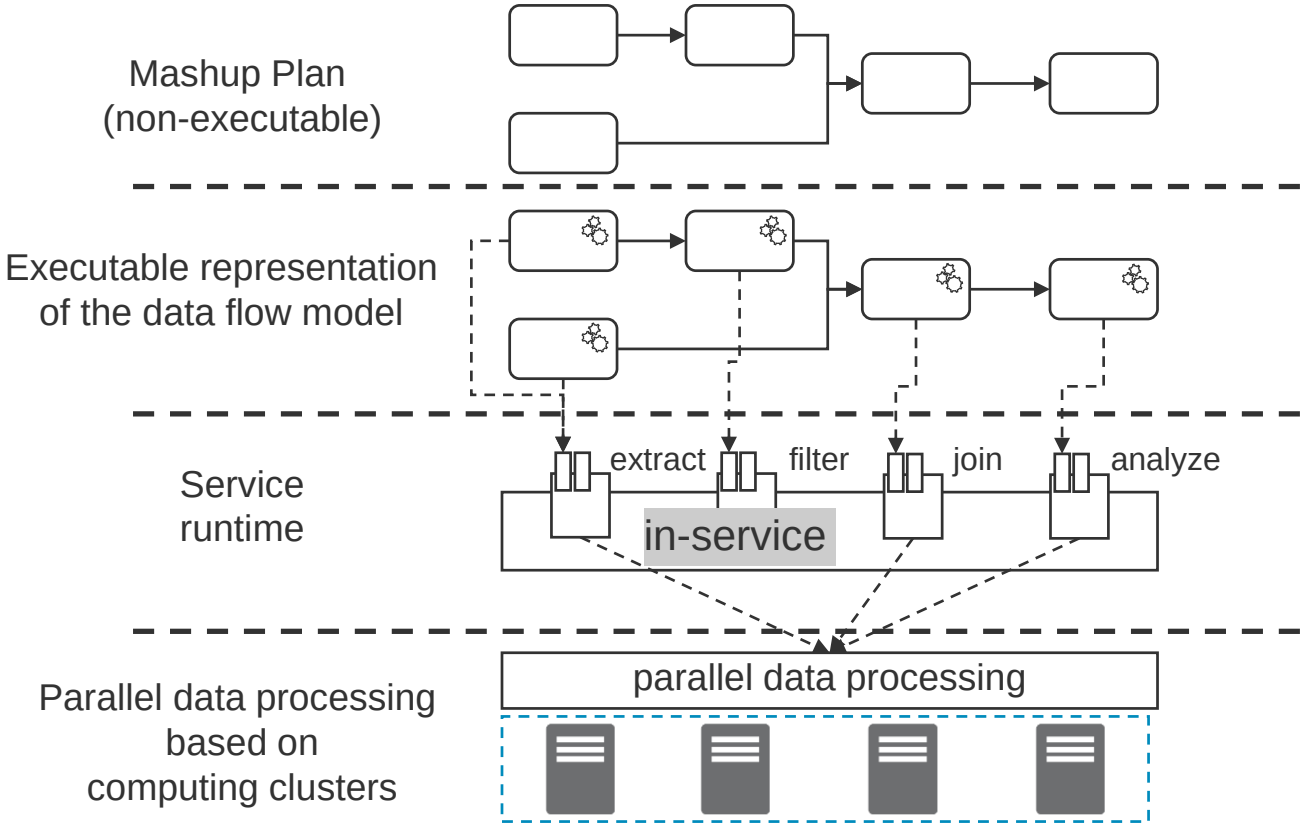
FlexMash


Cloud-based execution
Mashup Execution Environments
Robust
Time-Critical
Secure
Robust & Secure
...
FlexMash Modeling Tool
Mashup Modeler
Mashup Plan
?
Pattern Selection & Combination
Mashup Result
Domain-specific Modeling
Pattern Selection
Pattern-based Transformation and Execution
Visualization

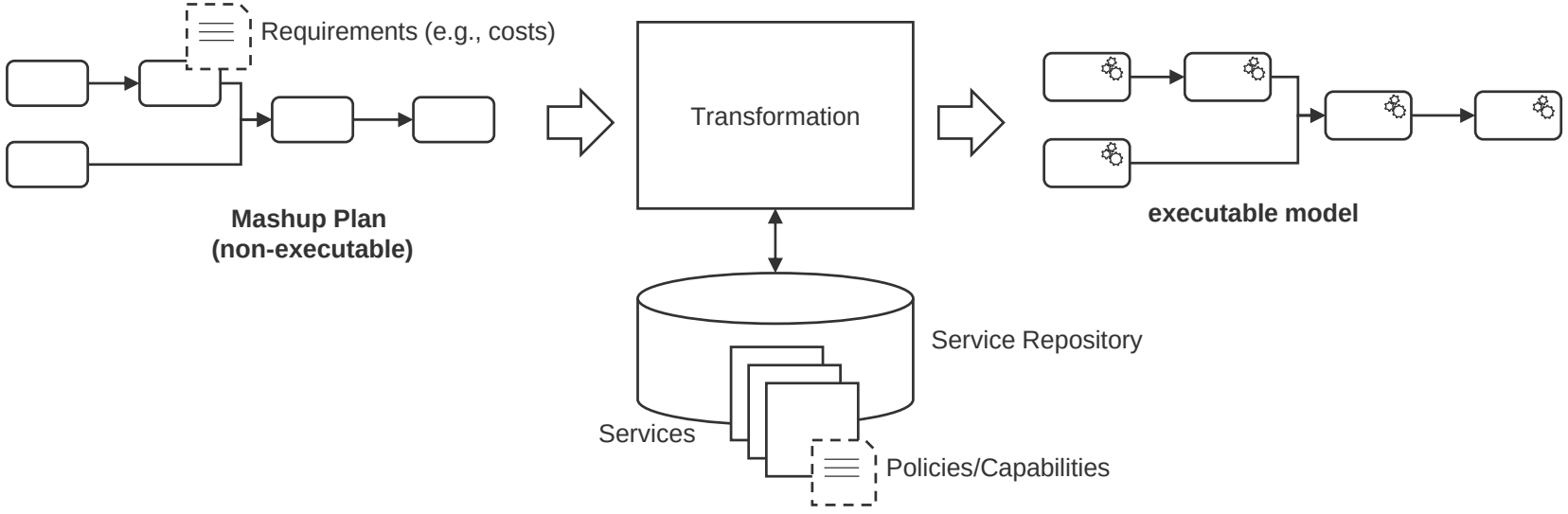
FlexMash – Graphical User Interface



Main contribution (I)



Main contribution – decision: in-service vs. distributed/parallel



Conclusion and future work

- First approach to increase the efficiency of service-based data processing tools
- Large efficiency advantages enabled through parallelization
- Finding the cost-value limit is difficult

- Future/ongoing work
  - Conducting measurements for comparison and finding cost-value limit
  - Concretizing the concepts
  - Generation of Map-Reduce jobs

Questions & Discussion

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Thank you!

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