Slider: an Efficient Incremental Reasoner

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Context

The Semantic Web enables to:

- describe knowledge from data
- leverage implicit knowledge through reasoning algorithms

The main limitations of current reasoning methods are:

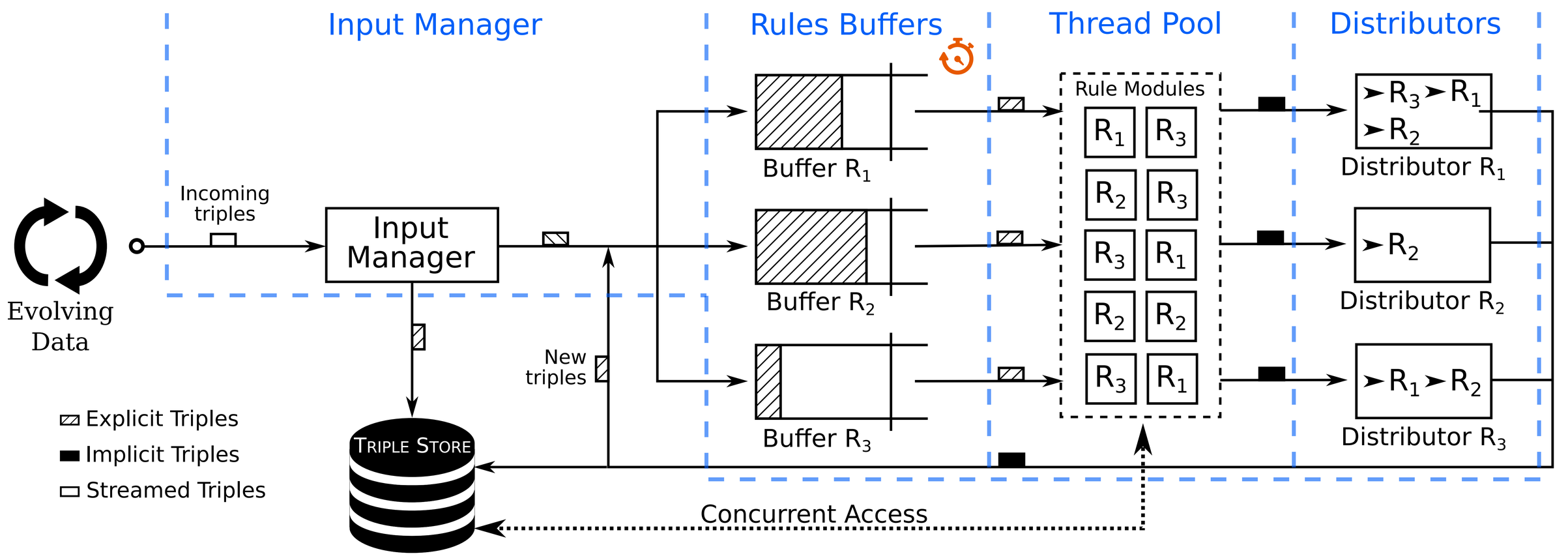
- lack of scalability for large datasets
- inability to reason over knowledge from evolving data

We contribute to solving these problems by introducing Slider, an efficient incremental reasoner.

Main Features

- **Parallel and Scalable Execution**: Each inference rule is mapped to an independent module, receiving intended triples and later distributing them to other modules for further processing.
- **Duplicates Limitation**: Vertical partitioning [1] and multiple indexing limit the production of duplicates and avoid unnecessary computation.
- **Data Stream Support**: Slider can handle both dynamic triple streams and static triples sets by employing parallel architecture.
- **Fragment's Customization**: Slider natively support both RDFS [4] and ρdf [5] fragments, and can be extended to any other fragments.

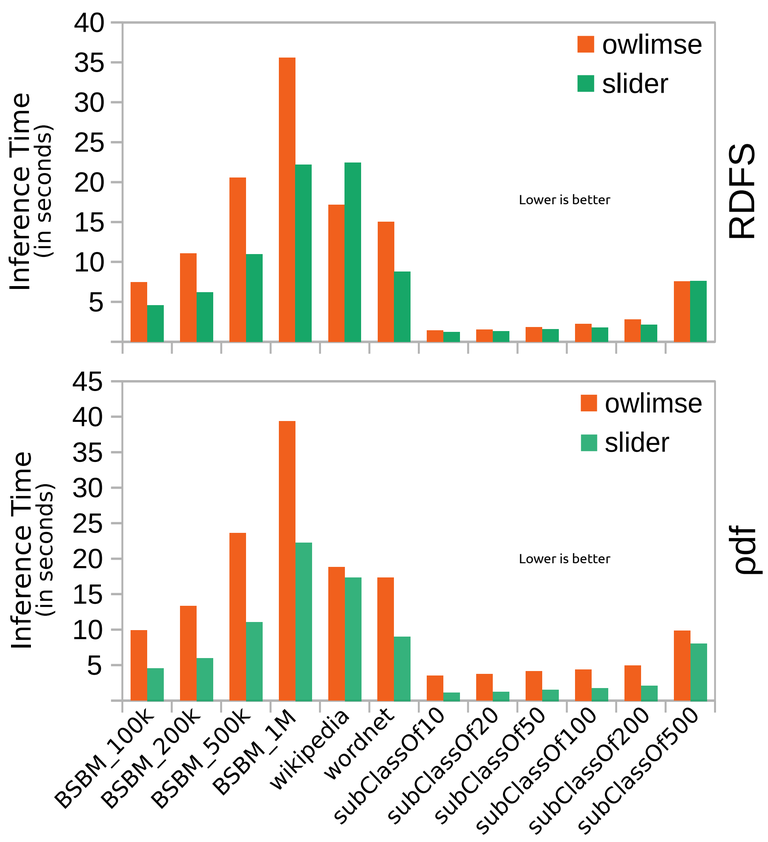
Architectural Overview



Experimentations

- Comparison with OWLIM-SE [2]
- Inference on both RDFS and ρdf
- 13 different ontologies
  - 5 generated with BSBM [3]
  - 2 from real-word datasets
  - 6 `subClassOf` ontologies

- **106.86%** improvement for ρdf
- **36.08%** improvement for RDFS
- **71.47%** improvement in average



Future Work

- Implementation of more complex inference rules, to provide reasoning over more complex fragments.
- Just-in-time optimisations of the rules execution's scheduling.
- Use of previous runs informations to adapt and be more reactive.

Source Code and Demo

The source code is available here:
`https://github.com/juleschevalier/slider`
A demo can be found here:
`http://demo-satin.telecom-st-etienne.fr/slider/`

References

[1] D. J. Abadi, A. Marcus, S. R. Madden, and K. Hollenbach. Scalable Semantic Web Data Management Using Vertical Partitioning. In *PVLDB*, 2007.

[2] B. Bishop, A. Kiryakov, D. Ognyanoff, I. Peikov, Z. Tashev, and R. Velkov. OWLIM: A Family of Scalable Semantic Repositories. *Semantic Web*, 2011.

[3] C. Bizer and A. Schultz. The berlin sparql benchmark. *IJSWIS*, 2009.

[4] D. Brickley and R. V. Guha. RDF vocabulary description language 1.0: RDF schema. 2004.

[5] S. Munoz, J. Pérez, and C. Gutierrez. Minimal deductive systems for RDF. In *The Semantic Web: Research and Applications*. 2007.

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