A Reasoning Broker Framework for Protégé

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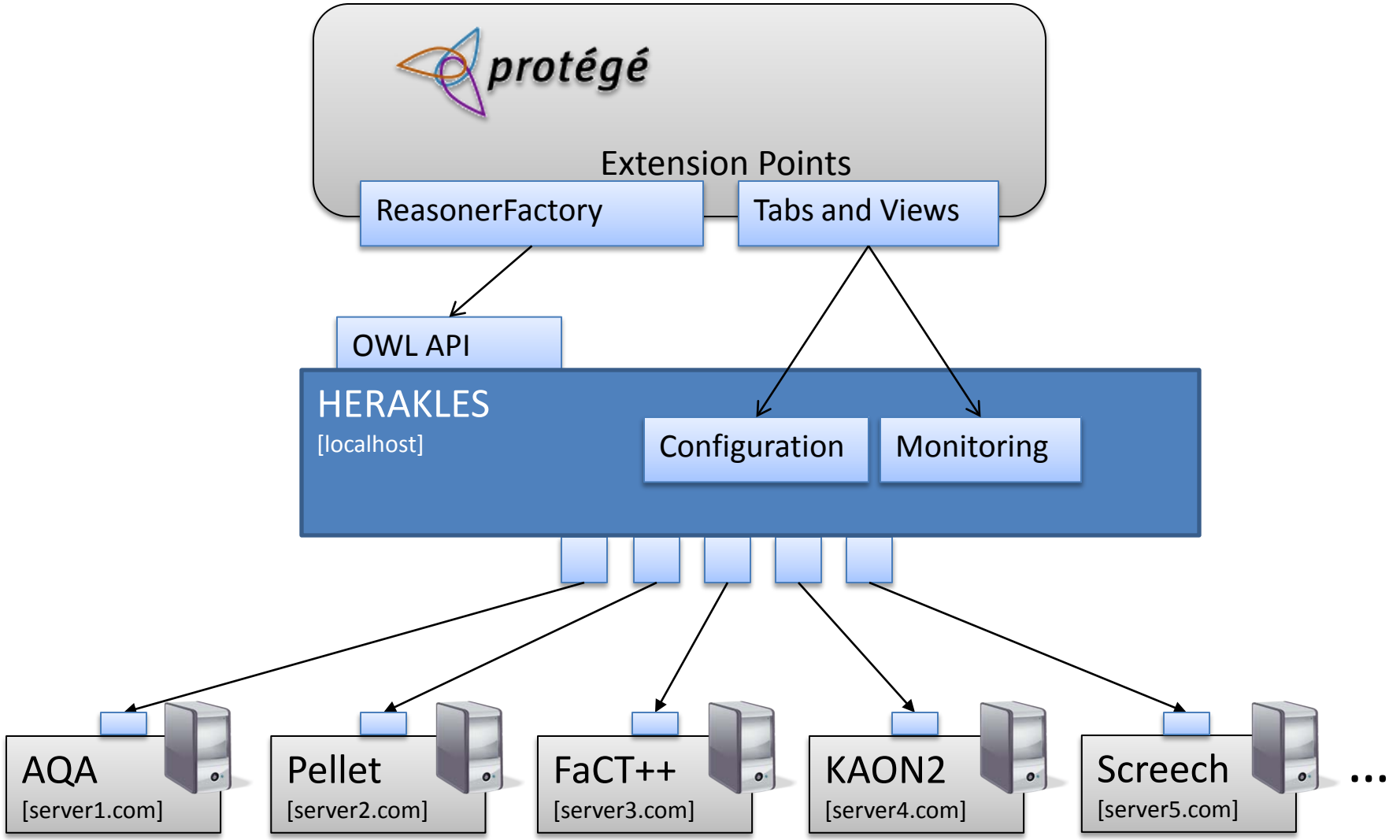
Jürgen Bock
Tuvshintur Tserendorj
Yongchun Xu
Jens Wissmann
Stephan Grimm

FZI Research Center for Information Technology
at the University of Karlsruhe

Reasoning

- Reasoning on ontologies
  - DL based ontologies provide well defined semantics
  - Allows for automatic inference of implicit knowledge
- Reasoning systems
  - Pellet, FaCT++, RacerPro, KAON2, HermiT, CEL, …, Screech, AQA
  - Different strengths and weaknesses
  - Different language expressivity
  - Different APIs
- Reasoning in protégé
  - Consistency checking
  - Querying (DL Query tab)

Reasoning Brokerage



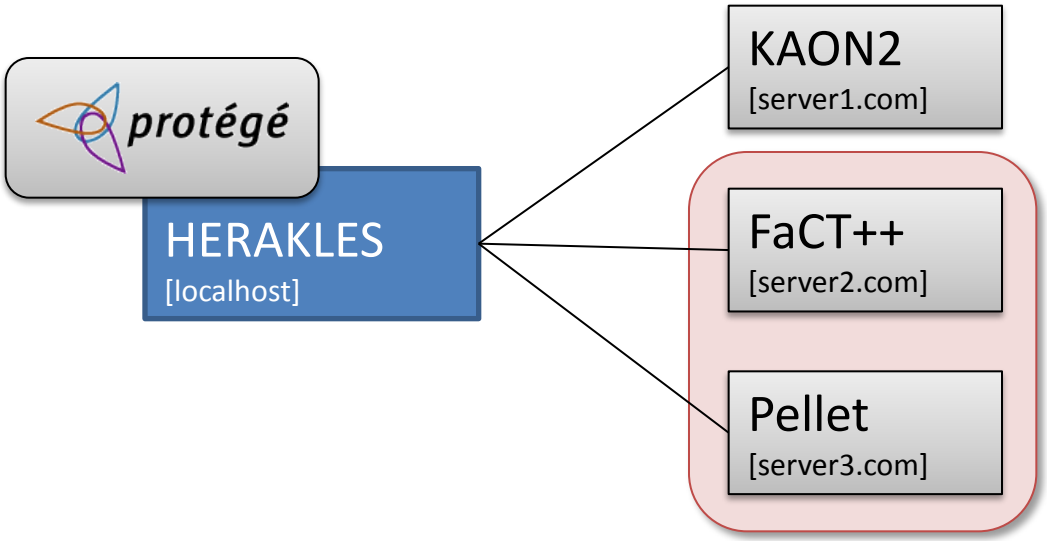
Broker Strategies

- Strategies control behaviour of reasoning broker
- Different broker features
  - Parallel execution of reasoning tasks
  - Reasoner selection
  - Partitioning of ontologies
  - Load balancing
- Development of customised strategies by using *strategy components*
  - Paralleliser
  - Selector
  - (Analyser)
  - (Modulariser)

Broker Strategies cont.

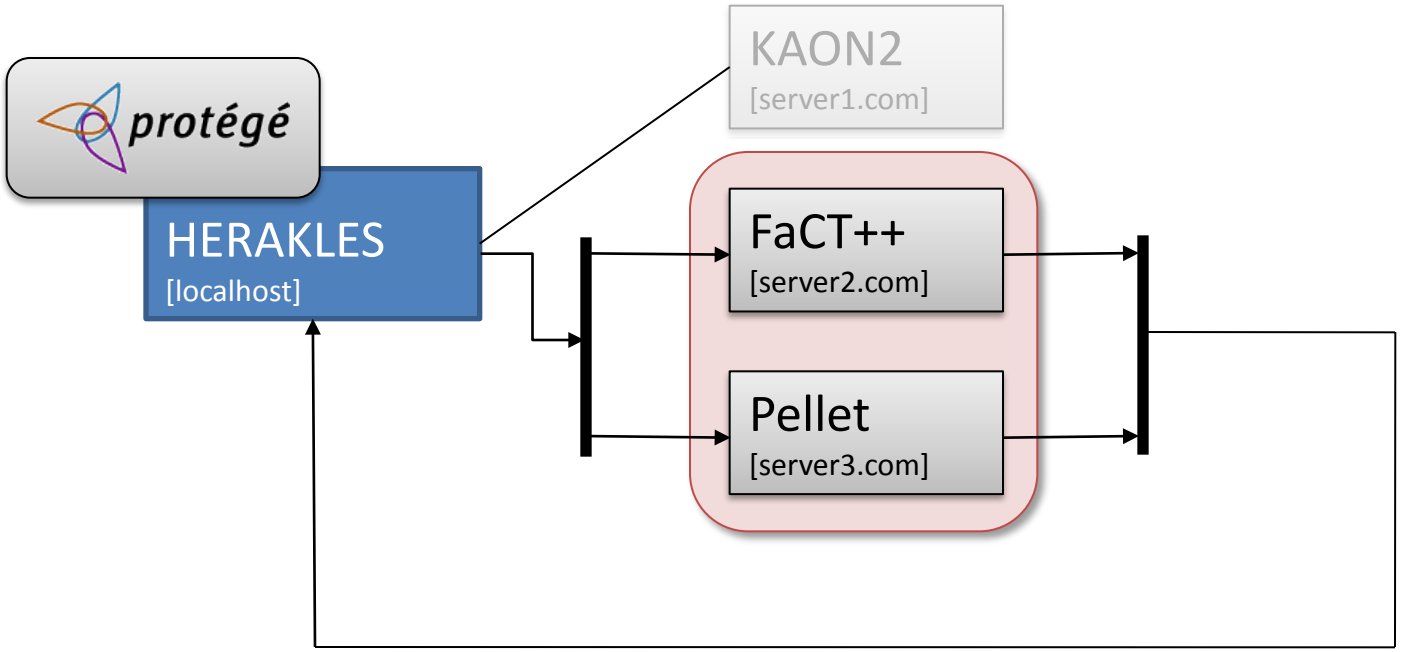
- Load strategies
  - Basic load strategy
  - Analysing load strategy
- Execution strategies
  - Parallelising strategy
  - Selection strategies
    - Selection according to reasoning task
    - Selection according to ontology properties
  - Anytime strategies
  - (Partitioning strategies)

Broker Strategies Example



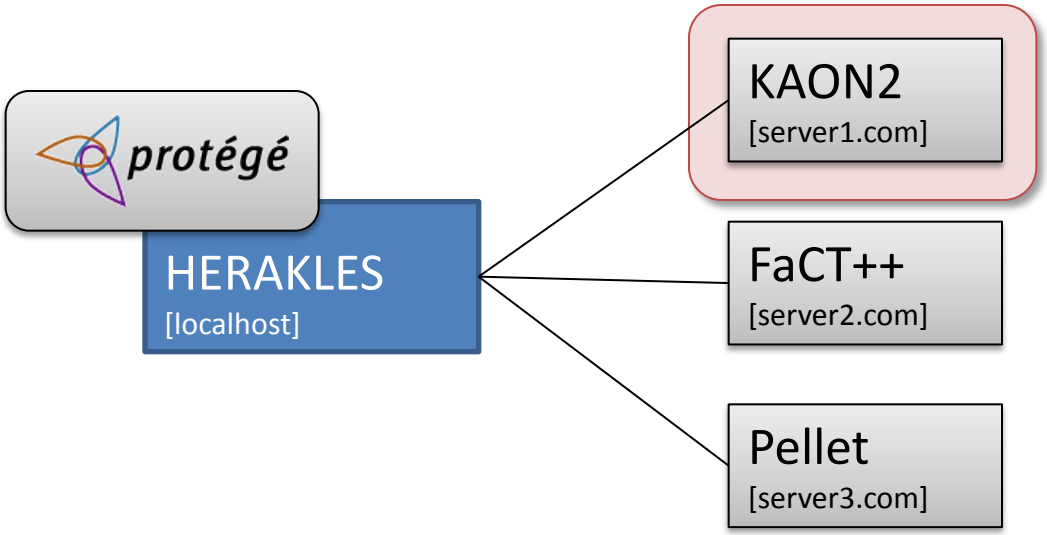
Reasoning Task: Consistency Checking

Broker Strategies Example



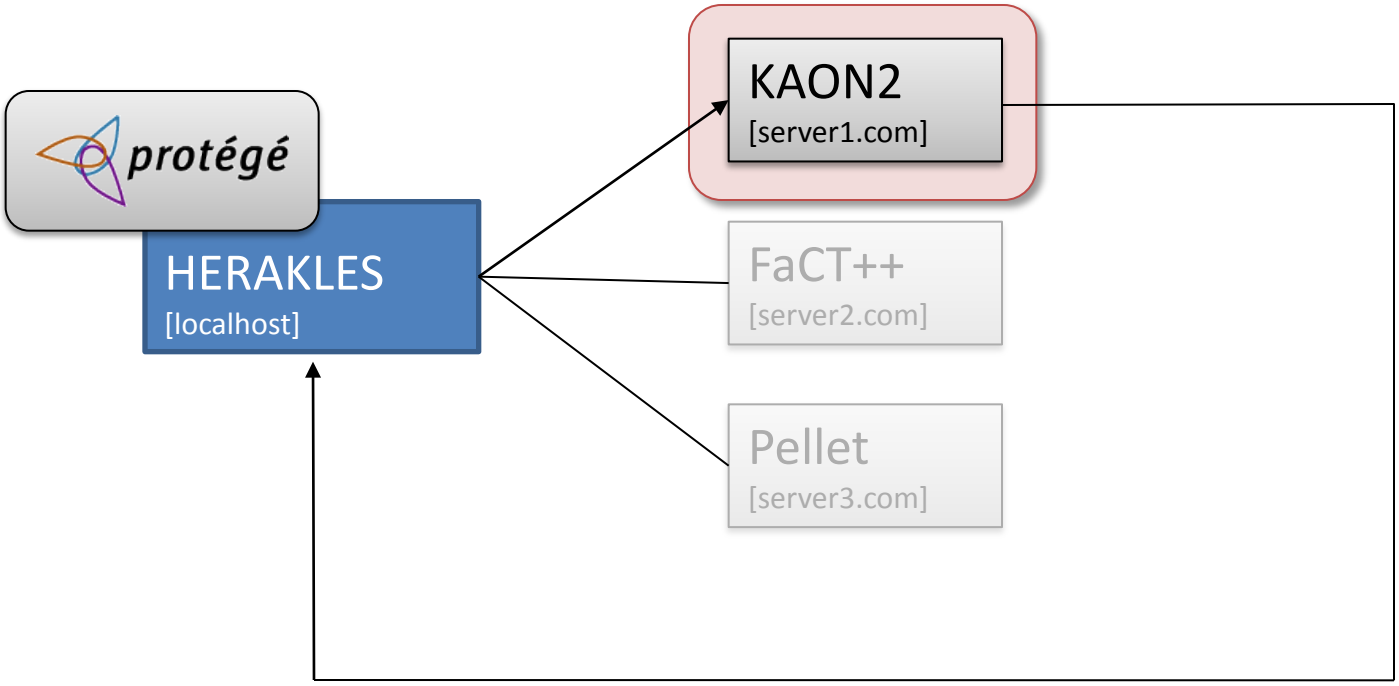
Reasoning Task: Consistency Checking

Broker Strategies Example



Reasoning Task: Instance Retrieval

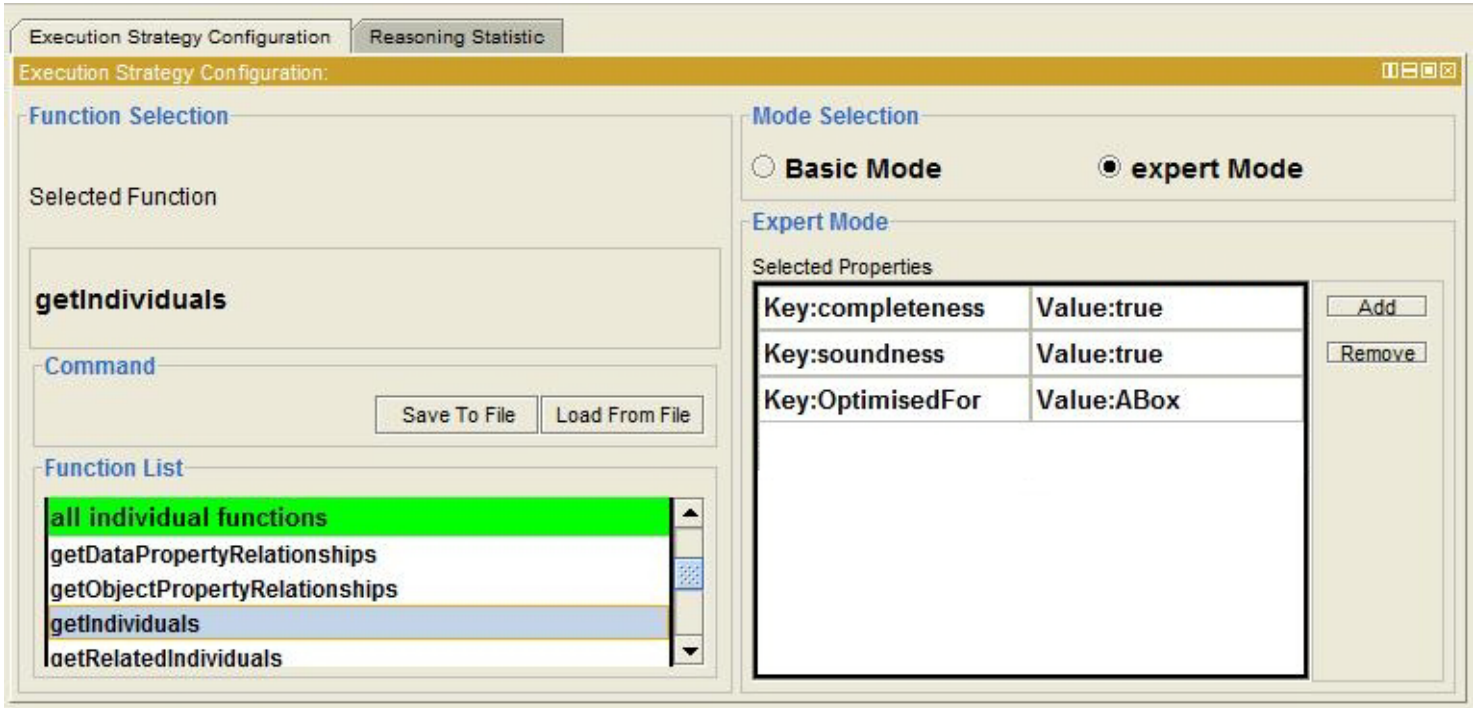
Broker Strategies Example



Reasoning Task: Instance Retrieval

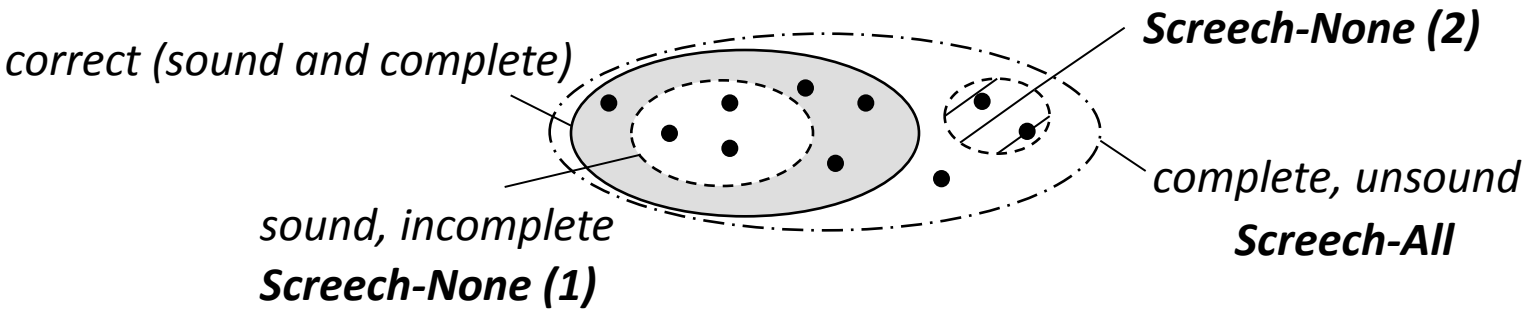
Protégé Integration

- Selection of external remote reasoners
- Strategy selection and configuration
- Monitoring of external remote reasoners
- Anytime querying



Anytime Reasoning

- Continuous delivery of (preliminary) results
- Anytime reasoner interface complementary to traditional OWLReasoner interface
- Anytime Query Tab in protégé
- Anytime behaviour by use of approximate reasoning systems (Screech, AQA)
  - Trading soundness / completeness for speed



Summary

- Protégé plug-in for HERAKLES reasoning broker
- Controlled delegation of reasoning requests to various external remote reasoners
- Behaviour controlled by broker strategies
  - Parallelisation
  - Selection
  - Partitioning (planned)
  - Anytime reasoning (currently by approximation)
- Additionally
  - Real-time benchmarking
  - Centralised caching

Thanks for your attention!