RacerPro Demos

STS
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Note: RacerPro ©
Racer Systems GmbH & Co. KG
www.racer-systems.com
Blumenau 50
22089 Hamburg, Germany
RacerPro is . . .

• . . . a Description Logic System for $ALCQHI_{R+}(D^-)$ (aka $SHIQ(D^-)$)
  • TBox: Terminological Box, defines domain vocabulary: “A mother is a woman and a parent”
  • Ontology: Formal Specification of a Conceptualization (Gruber)
  • ABox: Assertional Box, “Intelligent Database”, Individuals and Relationships
  • Reasoning about descriptions and information
    • “Mother without children” $\Rightarrow \neg \exists \exists$
    • “Betty is a female human with a child” $\Rightarrow$ “Betty is a mother”
RacerPro is...

- a Semantic Web reasoning engine and repository, supports W3C standards
  - Web Ontology Language
    - OWL Lite
    - OWL DL ($\approx SHO\\up I Q(\mathcal{D}_n)$)
  - Resource Description Framework (RDF)
  - Preliminary support for OWL QL
    (RacerManager semantic middleware)
    www.sts-tu-harburg.de/~at.kaya/racerManager
  - Preliminary support for SWRL
  - Expressive query language nRQL
    - ABox query language
    - RDF & OWL query language
RacerPro: System Overview

![Diagram of RacerPro system overview](image)

- Your Application
- Java API
- Lisp API
- DIG
- HTTP
- TCP/IP
- Racer extensions
  - OWL-DL
  - OWL-Lite
  - RDF
- RacerPro Kernel
  - nRQL
  - SWRL
  - Web Services
  - OWL-QL
  - SPARQL
OWL Reasoning

- “A vegetarian is defined as an animal that eats no other animals, or parts of animals.”
- “Cows are naturally vegetarians”
- “A mad cow is a cow that has been eating the brains of sheep.”
- “Sheep are animals.”
- \[\Rightarrow\] “There are no mad cows!” (inference)
- OWL modeling support with RacerPro:
  - Identification of inconsistent classes during modeling (e.g. “mad cow”)
  - Computation of logically implied inheritance relationships (“Taxonomy”)
OWL Modeling with Protégé

[Image: Screen capture of Protégé interface showing OWL modeling with classes and properties]
Ontology Based Querying

- Benefits: Use domain specific vocabulary for queries
- Detection of inconsistent queries
- Handling of incomplete and unknown information
- Example:
  - “Minnie is known to be elderly and female”
  - $\Rightarrow$ “Minnie is an old lady!” (inference)
  - “Minnie has Tom as a pet”
  - Nothing is known about Tom
  - $\Rightarrow$ “Tom must be a cat, since old ladies are cat lovers!” (inference)
RacerPorter GUI

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RacerPorter is developed by:
Michael Wessel
Ralf Möller
Minnie is elderly and female
Minnie has Tom as a pet
Definition of concept old lady
Minnie is an old lady!
Graphical network display
No knowledge concerning Tom
Tom is a cat!
Highlighting “types” of Tom
Graphical OWL Querying

- OWL Tree: Graphical interactive query composition and result browsing
- Background ontology: Lehigh University Benchmark (LUBM) Ontology
- Modeling of a university (classes for professors, courses, students, ...)
- “Real” web resources → “real” Semantic Web application!
- Queries are translated into nRQL queries, processed by RacerPro w.r.t. the background ontology
- Presentation given by RIKA students (?)

owltree.in-terminus.net/OWLTTree/index.jsp
LUBM Background Ontology
Interactive Query Composition

University Information System

Welcome to the homepage of the new university information system. The data you will see here is no real-life data. Currently, this is only dummy information. Thanks for your understanding.

FullProfessor

TeacherOf GraduateCourse

Absenden

Get a url (link) to preserve the complete state.

If you want to throw away the complete tree and start all over please click <<here>>.

Info:

Your choice:
- Start the query by clicking "submit query"
- Add a new Branch on a node by clicking on the plus sign (+) next to it
- Delete a branch by clicking the minus sign (-) next to it
### University Information System

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Ontology-based GIS

- **DLMAPS** = Description Logic Maps
- Map Data © Amt für Geoinformation und Vermessung Hamburg
- DISK ("Digitale Stadtkarte")
- Uses RacerPro as ontology server and reasoning engine
- Remodeling of "Objektschlüsselkatalog" (geographic categories) as RacerPro ontology
- Representation of map objects in an ABox
- Hybrid representation: additional spatial layer
- Spatio-thematic hybrid queries

www.sts.tu-harburg.de/~mi.wessel/dlmaps/dlmaps.html