E-D3

Spring or Summer School I

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Abstract
This document describes "Reasoning Web 2005", the first REWERSE Summer School.
The summer school proceedings [Małuszynski and Eisinger, 2005] published in the "Lecture Notes in Computer Science" series by Springer-Verlag, is an appendix to this document and forms an essential part of it.

Keyword List
semantic web, reasoning, education and training, summer school

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Contents

1 Overview

The first summer school organised by REWERSE will take place at the University of Malta from Monday 25th July 2005 to Friday 29th July 2005 (see `http://reasoningweb.org/2005`). It is named "Reasoning Web 2005" to evoke connotations with its focus, reasoning on the semantic web, but also to make clear that it is open to non-REWERSE participants and that the life-time of the series of summer schools is not restricted to the life-time of REWERSE.

2 Purposes

The main objective of "Reasoning Web 2005" is to provide an introduction into semantic web methods and issues with a particular focus on reasoning. In addition, the first in the series of summer schools also serves some REWERSE-internal purposes: it introduces into the research areas of REWERSE working groups, consolidates a common standard of knowledge of participating REWERSE members, thus supporting cooperation between REWERSE working groups and helping to establish a REWERSE identity.

Its target audience consists of PhD students with at least some basic knowledge of semantic web topics and with a strong commitment to active research in the field. Participation in the summer school depends on prior application and a selection process. Each applicant submits a half-page description addressing the applicant's research background and the advancements of this research the applicant expects from attending the summer school.

3 Types of Teaching Events

Most events in the summer school programme are courses that consist of lectures and projects.

Lectures are given by experienced researchers, most of them professors and many of them coordinators or deputy coordinators of REWERSE working groups.

A project supplements a lecture and encourages active participation of students. The flavour of a project depends on the needs of the lecture: paper exercises, problem-solving using software, or seminar-style discussion of literature that was distributed in advance.

In addition to the courses (i.e., lectures with projects) there are survey talks on selected topics.

Some time is dedicated to presentations of PhD work by students. Such presentations can be offered by applicants and are also subject to a selection process.

4 Teaching Material

Each course and each survey talk is accompanied by a full paper in the summer school proceedings. The proceedings are published in the "Lecture Notes in Computer Science" series by Springer-Verlag [Małuszynski and Eisinger, 2005]. Each participant in the summer school receives a copy of the summer school proceedings upon arrival.

Slides and similar material are available in electronic form. They are stored in the repository of educational materials called VISWER, which is maintained by the REWERSE partner Hannover in cooperation with the Virtual Institute of Semantic Web Education (VISWE), a participant of the "Knowledge Web" FP6 Network of Excellence. Storing the summer school

material in VISWER is part of the ongoing work on developing a curriculum of graduate courses for education of researchers and practitioners in the field of semantic web. Details about the curriculum work and about the agreement between REWERSE and Knowledge Web on using VISWER are described in the REWERSE deliverable E-D5.

5 Programme

The summer school starts with a course on semantic web foundations and a survey talk on rules and ontologies in F-logic, which complements the course with a view on the foundations from a slightly different angle. Together the two occupy almost one day of teaching time.

The remaining courses are introductions into the research areas of REWERSE working groups. Each of REWERSE's I-groups offers such a course, but most A-group courses had to be postponed to future summer schools in order not to overfill the programme.

The following list is therefore not organised chronologically, but starts with the foundations and orders the rest by working group. The list includes all courses and survey talks, but none of the PhD presentations.

5.1 Course: Fundamentals of Semantic Web Ontology Languages

Authors/Lecturers:
Grigoris Antoniou, Enrico Franconi and Frank van Harmelen.
Non-REWERSE contributors:
Free University of Bozen-Bolzano (Knowledge Web participant)
Vrije Universiteit Amsterdam
Contributing REWERSE participants:
Heraklion
Teaching Time:
6 hours
Abstract:

In the context of the Web, an ontology is a formal description of a domain of discourse, providing a conceptualization to be shared by application developers and users.

This course is a tutorial on Semantic Web ontology languages, designed to provide such formal descriptions. The focus is on the languages RDF Schema and (different variants of) OWL, adopted as standards by the W3C. An introduction to the languages illustrated by examples, will clarify the importance of ontology engineering. The course will also explain the logical foundations of OWL by providing an introduction to the underlying Description Logic and its use in ontology reasoning on the web.

5.2 Survey Talk: Rules and Ontologies in F-logic

Authors/Lecturers:
Michael Kifer
Contributing REWERSE participants:
New York
Teaching Time:
1 hour

Abstract:

F-logic is a formalism that integrates logic with object-oriented programming in a clean and declarative fashion. It has been successfully used for information integration, ontology modeling, agent-based systems, software engineering, and more. The talk gives a brief overview of F-logic and discusses its features from the point of view of an ontology language.

5.3 Course: Rule Modeling and Markup

Authors/Lecturers:

Gerd Wagner

Contributing REWERSE participants:

Eindhoven/Cottbus

REWERSE working group:

I1

Teaching Time:

4 hours

Abstract:

The Unified Modeling Language (UML) provides the language of class models and class diagrams for modeling and visualizing all kinds of vocabularies (and also programming language code). Since rules are based on vocabularies, it is natural to add rule modeling constructs to the language of UML class models for obtaining a general rule modeling language. For this purpose, the UML has been supplemented by the Object Constraint Language (OCL), which allows to add integrity rules (called invariants) and derivation rules to a class model in order to constrain or derive certain model elements. UML class diagrams can also be used to describe the vocabulary, and the abstract syntax, of other languages.

This course discusses several issues of rule modeling. In particular, we show how rule concepts can be described and how the abstract syntax of RDF, OWL, SWRL and RuleML can be defined by means of UML class diagrams in a concise way.

5.4 Course: Attempto Controlled English

Authors/Lecturers:

Norbert E. Fuchs, Stefan Höfler, Kaarel Kaljurand, Fabio Rinaldi, Gerold Schneider

Contributing REWERSE participants:

Zurich

REWERSE working group:

I2

Teaching Time:

4 hours

Abstract:

Attempto Controlled English (ACE) is a knowledge representation language with an English syntax. Thus ACE can be used by anyone, even without being familiar with formal notations. The Attempto Parsing Engine translates ACE texts into discourse representation structures, a variant of first-order logic. Hence, ACE turns out to be a logic language equivalent to full first-order logic. The two views of ACE — natural language and logic language — complement each other, and render ACE both human- and machine-readable. This course covers both views

of ACE. In the first part we present the language ACE in a nutshell, and in the second part we give an overview of the discourse representation structures derived from ACE texts.

5.5 Course: Types in the Semantic Web

Authors/Lecturers:
Włodzimierz Drabent
Contributing REWERSE participants:
Warsaw
REWERSE working group:
I3
Teaching Time:
2 hours
Abstract:

Various schema languages have been introduced to describe (classes of) Web documents (DTD, XML Schema, Relax NG). We present mathematical treatment of their main features. We are interested in the sets of documents a schema defines; such sets will be called types. Using a mathematical formalism makes it possible to discuss chosen aspects of a schema language in a precise and simple way. Otherwise they are hidden among numerous details of a large and sophisticated schema language.

Our goal is typing of rule languages, more precisely approximately describing their semantics by means of types. Thus we are interested in formalisms for types that facilitate constructing (efficient) algorithms performing those operations on types that are needed in type checking and type inference for rules.

5.6 Course: Reuse in Semantic Applications

Authors/Lecturers:
Uwe Aßmann
Contributing REWERSE participants:
Linkoeping/Dresden
REWERSE working group:
I3
Teaching Time:
2 hours
Abstract:

Applications using semantic technology are not fundamentally different from other software products. As standard applications, they need a well-defined development process, an appropriate modelling technology, and, to decrease construction cost, a good reuse technology for models and components.

This course shows that employing ontologies can help to enlarge the reuse factor. Ontologies improve the refinement process in object-oriented software development, simplify design of product lines, improve interoperability in component-based systems, and help in service-based applications, such as web services. Hence, ontologies will play an important role in the future engineering of software products.

5.7 Course: Web and Semantic Web Query Languages: A Survey

Authors/Lecturers:
James Bailey, François Bry, Tim Furche, Sebastian Schaffert
Contributing REWERSE participants:
Melbourne, Munich
REWERSE working group:
I4
Teaching Time:
4 hours
Abstract:
A number of techniques have been developed to facilitate powerful data retrieval on the Web and Semantic Web. Three categories of Web query languages can be distinguished, according to the format of the data they can retrieve: XML, RDF and Topic Maps.

This course introduces the spectrum of languages falling into these categories and summarises their salient aspects. The languages are introduced using common sample data and query types. Key aspects of the query languages considered are stressed in a conclusion.

5.8 Survey Talk: Information Extraction for the Semantic Web

Authors/Lecturers:
Robert Baumgartner, Thomas Eiter, Georg Gottlob, Marcus Herzog, Christoph Koch
Contributing REWERSE participants:
Vienna
REWERSE working group:
I4
Teaching Time:
1 hour
Abstract:
The World Wide Web represents a universe of knowledge and information. Unfortunately, it is not straightforward to query and access the desired information. Languages and tools for accessing, extracting, transforming, and syndicating the desired information are required. The Web should be useful not merely for human consumption but additionally for machine communication. Therefore, powerful and user-friendly tools based on expressive languages for extracting and integrating information from various different Web sources, or in general, various heterogeneous sources, are needed.

The tutorial gives an introduction to Web technologies required in this context, and presents various approaches and techniques used in information extraction and integration. Moreover, sample applications in various domains motivate the discussed topics and providing data instances for the Semantic Web is illustrated.

5.9 Course: Evolution and Reactivity for the Web

Authors/Lecturers:
José Júlio Alferes and Wolfgang May
Contributing REWERSE participants:
Goettingen, Lisbon

REWERSE working group:

I5

Teaching Time:

4 hours

Abstract:

The Web and the Semantic Web, as we see it, can be understood as a "living organism" combining autonomously evolving data sources, each of them possibly reacting to events it perceives. Rather than a Web of data sources, we envisage a Web of Information Systems, where each such system, besides being capable of gathering information (querying persistent data, as well as "listening" to volatile data such as occurring events), is capable of updating persistent data, communicating the changes, requesting changes of persistent data in other systems, and being able to react to requests from other systems. The dynamic character of such a Web requires declarative languages and mechanisms for specifying the evolution of the data.

In this course we will talk about foundations of evolution and reactive languages in general, and will then concentrate on some specific issues posed by evolution and reactivity in the Web and in the Semantic Web.

5.10 Course: Personalization for the Semantic Web

Authors/Lecturers:

Matteo Baldoni, Cristina Baroglio, Nicola Henze

Contributing REWERSE participants:

Turin, Hannover

REWERSE working group:

A3

Teaching Time:

4 hours

Abstract:

Searching for the meaning of the word "personalization" on a popular search engine, one finds twenty-three different answers, including *"the process of matching categorized content with different end users based on business rules ... upon page request to a Webserver"*, *"using continually adjusted user profiles to match content or services to individuals"*, and also *"real-time tailoring of displays, particularly Web pages, to a specific customer's known preferences, such as previous purchases"*. A little more generally, personalization is a process by which it is possible to give the user optimal support in accessing, retrieving, and storing information, where solutions are built so as to fit the preferences, the characteristics and the taste of the individual. This result can be achieved only by exploiting machine-interpretable semantic information, e.g. about the possible resources, about the user him/herself, about the context, about the goal of the interaction. Personalization is realized by an inferencing process applied to the semantic information, which can be carried out in many different ways depending on the specific task.

The objective of this course is to provide a coherent introduction into issues and methods for realizing personalization in the Semantic Web.

Appendix

See the summer school proceedings [Małuszynski and Eisinger, 2005] for the full course descriptions.

Acknowledgement

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References

[Małuszynski and Eisinger, 2005] Małuszynski, J. and Eisinger, N., editors (2005). *Reasoning Web 2005 – Summer School*, Lecture Notes in Computer Science, Berlin, Heidelberg, New York, Tokyo. Springer-Verlag. Forthcoming.