The SymbolicData Project
Towards a Computer Algebra Social Network
Talk given at the CICM 2014 Work in Progress Section

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Coimbra, 2014-07-07

Network
e Science

The
SymbolicData
Project

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Johanning

Aim and
Scope

What does
SymbolicData
offer?

Some History

Basic
Concepts

SymbolicData
meets RDF

Towards a CA
Social
Network
(CASN)

Links

Aim and Scope

Scope

- Develop concepts and tools for profiling, testing and benchmarking Computer Algebra Software (CAS) from different areas of Computer Algebra.

- Collect and interlink relevant data and activities from different Computer Algebra subcommunities.

SymbolicData is an

- inter-community project that has its roots in the activities of different Computer Algebra Communities and

- aims at interlinking these activities using modern Semantic Web concepts.

Tools and data are designed to be used both

- on a local site for special testing and profiling purposes

- and to manage a central repository at http://www.symbolicdata.org.

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What does SymbolicData offer?

Data:

- Polynomial Systems Solving
- Geometry Theorem Proving
- Fano Polytopes (A. Paffenholz)
- Free Algebras
- G-Algebras
- Test Sets from Integer Programming

Draft:

- Birkhoff Polytopes (A. Paffenholz)
- Transitive Groups (J. Klüners, G. Malle)

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What does SymbolicData offer?

Tools:

SDEval Package (Albert Heinle)

- Aim: Set up, run, log, monitor standardized Computations on SD data series in a reliable way
- Technology: Python standalone on top of the OS
- http://symbolicdata.org/wiki/SDEval

SDSage Package (Andreas Nareike)

- Aim: Call the new Polynomial Systems format from Sagemath
- Technology: Sagemath Python Package
- http://symbolicdata.org/wiki/PolynomialSystems.Sage

Short demo on local data and sdsage.

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Some History

ISSAC 1998: Special session on Benchmarking

1999-2002: Phase 1 – Olaf Bachmann, Hans-Gert Gräbe

- Focus: Polynomial Systems, tools and concepts
- Technology: XML-like special markup, elaborated Perl tools

2005-2007: Phase 2 – around the Groebner Special Year in Linz

- Focus: Geometry Theorem Proving, first interlinking projects with the GB bibliography and the GB facilities projects
- Technology: Switch to true XML concepts

2012-2014: Phase 3 – E-Science Saxonia supported project (Andreas Nareike, Hans-Gert Gräbe, Simon Johanning)

- Focus: Switch to Linked Data and Semantic Web concepts, XML resources, RDF meta data, data reorganization
- Release of version 3 in Sept. 2013

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RDF and Linked Data Principles

- RDF = Resource Description Framework
  - Main idea: Store pieces of information in a unified way as triples, use standard tools to manage these data.
- *Resources:* URI, HTTP access
  - URI = Unique Resource Identifier
  - Access to worldwide distributed data in a unified way
- *Resource Descriptions:* Deliver a valuable piece of information in structured RDF format, that can be combined with other pieces of information from other sources into new RDF sentences.
- Run *RDF Triple Stores* as part of a worldwide distributed data storage infrastructure
- (Federated) Query Language SPARQL
- Run *SPARQL Endpoints* on RDF triple stores

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SymbolicData Infrastructure

- Main repository http://github.com/symbolicdata and several clones (following the Integration Master Pattern)
- A project wiki at http://symbolicdata.org
- A mailing list
- Web access to the XML resources
- Two centrally operated Virtuoso based RDF data stores for meta informations ('Data' and 'casn')
- Organized along Linked Data Principles
- Regular dumps of RDF data in Turtle format
- Two SPARQL endpoints to query the data
- Advise for local installation of tools and data based on Virtuoso and a local Apache Web server

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SymbolicData Data Structures

Resources:

- SD provides own resources in an XML based format
    - Polynomial Systems, Geometry Theorem Proving, . . .
- Draft: SD addresses other resources at different stores
    - Polytopes, Transitive Groups
- Maintenance of resources requires special semantic knowledge, semantic aware tools and semantically educated people

Resource Descriptions:

- Precomputed *fingerprints* of the different resources in RDF format to navigate and search within the data.
  It requires *semantic* knowledge both to compute fingerprints and to use them in an appropriate way.

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SymbolicData Data Structures

Resource Descriptions (cont.)

- *Background information:* Use RDF to manage additional data, try to interlink that data with other sources along the Linked Data Principles.
  - Annotations – a notational system to associate background information to different examples and series of examples
- Bibliography – bibliographical references system (to be aligned with ZBMath)
- People – different people and groups (to be aligned with ZBMath)
- Systems – list of CA software (aligned with swmath)

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Towards a CA Social Network (CASN)

How to turn a DDS[1] into a vivid, well recognized Social Network with plenty of valuable background information?

Central observation: Valuable background information is information that people care about.

- Find out the places where such information is spread today. Usually it is *streamed*, not *stored*.
- Try to semantically annotate that information.
- Build views (web sites) that harvest such information.

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[1]DDS = Dead Data Store

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An RDF based Road Map to a CASN

How to reach such a goal with RDF based semantic technologies?

- Main idea: Turn passive users into active ones.
- Identify and shape appropriate ontologies.
- Collect RDF data of such types, link to other sources along the Linked Data Principles.
  A very first prototype is used to collect such information and to display it within the Wordpress based CAFG site.
- The stakeholders understand, that this is a techno-social, and even more a social than a technical process that is best discussed on the Symbolicdata Mailing list.
- The CASN germ at `http://symbolicdata.org/casn` matures thanks to common efforts.

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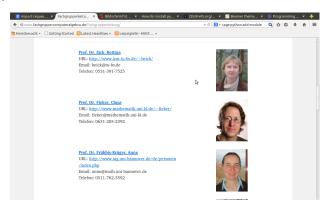Some History

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Towards a CA
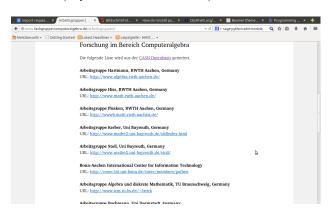Social
Network
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Links

What is already done?

`http://symbolicdata.org/casn/CAFG-Intern/`

Basic information about People – 410 instances of RDF type `foaf:Person` (i.e., passive users) from different sources. Used in particular to display people from the CAFG Board within the Wordpress based CAFG site.

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What is already done?

`http://symbolicdata.org/casn/WorkingGroups/`

Standard information about CA Working Groups – 17 Instances of
RDF type `foaf:Group` and `sd:WorkingGroup` from the old CAFG
site. Used to display that within the Wordpress based CAFG site.

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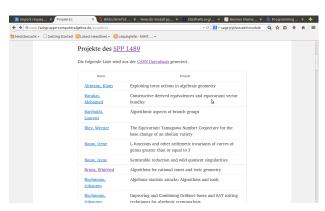
SymbolicData
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Towards a CA
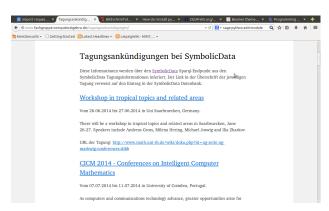Social
Network
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Links

What is already done?

`http://symbolicdata.org/casn/SPP-Projekte/`

Standard information about CA Projects – 60 instances of RDF type
`sd:Project`, compiled from the list of projects within the SPP 1489
priority program.

What is already done?

`http://symbolicdata.org/casn/UpcomingConferences/`

Information about upcoming CA conferences – 60 instances of RDF type `sd:Event`, compiled from different sources. Used as input for the printed version of the CA Rundbrief.

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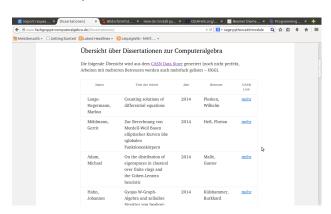
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`http://symbolicdata.org/casn/Dissertationen/`

Information about dissertations in CA – 28 instances of RDF type `bibo:Thesis`, compiled from the CA Rundbrief.

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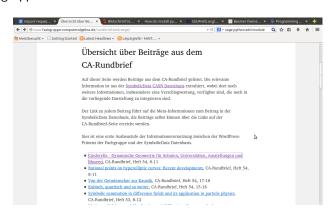
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What is already done?

`http://symbolicdata.org/casn/CAR-Beitraege/`

Information about articles in the CA Rundbrief – 75 instances of RDF type `sd:Reference` to be displayed at the website of the German Fachgruppe.

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What is already done?

http://symbolicdata.org/casn/News/

A first approach to Annotated News – 2 instances of RDF types
sioc:BlogPost and bibo:Document related to blog posts on the
website of the German Fachgruppe.

No picture – pure harvesting functionality
to be used with SPARQL querying.

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Links

- `http://symbolicdata.org` – the SD Wiki

- `http://symbolicdata.org/XMLResources` – the SD XML Resources

- `http://symbolicdata.org/RDFData` – the SD RDF Data Turtle Files

- `http://symbolicdata.org/Data` – the SD OntoWiki view on RDF data

- `https://github.com/symbolicdata` – the SD Repository at github