Semantic Web

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Organizational Issues

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Web site: http://www.uni-koblenz.de/~staab/lehre/ss05/sw/

BSCW: http://bscw.uni-koblenz.de/bscw/bscw.cgi/0/396243
(get an invitation in the first exercise)

General Schedule

Lecture
Thursdays 10.15 MK 208
Fridays 10.15 MK208

Excercises
Tuesdays 14.15 MK107
Beware of earlier false announcements regarding the room for the exercises!

Check concrete schedule on the web site for details!

Semantic Web

What is the Semantic Web?
Information Convergence

- Convergence not just in devices, also in "information"
  - Your personal information (phone, PDA,...)
    Calendar, photo, home page, files...
  - Your "professional" life (laptop, desktop, ... Grid)
    Web site, publications, files, databases, ...
  - Your "community" contexts (Web)
    Hobbies, blogs, fanfic, social networks...

- The Web teaches us that people will work to share
  - How do we CREATE, SEARCH, and BROWSE in the non-text based parts of our lives?

Syntax is not enough

- RAFAEL
  - Tel1
  - E-Mail

Syntax is not enough – B2B

<Order>
  <Amount>500</Amount>
  <Item>Schekel</Item>
  ..... 
</Order>

The Semantic Wave

YOU ARE HERE

(Berneers-Lee, 03)
Now.

- RDF, RDFS and OWL are ready for prime time
  - Designs are stable, implementations maturing
- Major Research investment translating into application development and commercial spinoffs
  - Adobe 6.0 embraces RDF
  - IBM releases tools, data and partnering
  - HP extending Jena to OWL
  - OWL Engines by Ontoprise GmbH, Network Inference, Racer GmbH
  - Proprietary OWL ontologies for vertical markets
    - c.f. pharmacology, HMO/health care, ... Soft drinks
  - Several new starts in SW space

Now: huge potential

- Data integration identified as $100Bs worldwide market
  - with significant govt interest creating a user-pull
    - Ontology development efforts, in OWL, aimed at information mgt ongoing in US govt include
      - NIST, NLM, EPA, DHS, DoD, DOJ, FDA, NIH, USGS, NOAA
  - Huge potential follow-on market - EAI for the small business
    - making external data and info resources integrable
    - Could do for integration what Visicalc (excel) did for report generation

Now: Tools for tool builders

- Like the pre-MOSAIC WWW...
  - ...but, it is much easier to get started than it was even a year ago,
    - Parsers, APIs, triple-stores
      - http://www.daml.org/tools
      - http://www.w3.org/RDF
    - End to end no longer takes a “miracle”
      - “Building the Semantic Web in one day” (BSCW)
  - End user tools just starting to emerge
    - “Metaphors” growing

Tools for markup...
Not tied to specific domains

M-OntoMat is publicly available
http://acemedia.org/aceMedia/results/software/m-ontomat-annotizer.html

Semantic Web Application Portal

[CRIS 2002]
Not tied to specific domains

Shared calendars
Social networks: e.g. Friend of a Friend (FOAF)

- Say stuff about yourself (or others) in OWL files, link to who you “know”

Using FOAF in other contexts

Coming sooner than you may think…
Emerging: Semantic Web Services

Information management capabilities
Discovery, Filtering, Composition

Semantics and services

input xsd:complex="oncogene"
- Oncogene(MYC)
- Found_In_Organism(Human)
- Gene_Has_Function(Transcriptional_Regulation)
- Gene_Has_Function(Gene_Transcription)
- In_Chromosomal_Location(8q24)
- Gene_Associated_With_Disease(Burkitts_Lymphoma)

output xsd:complex="RiskType"

OWL-S grounding (coming to WSDL 2.0)
Get a B&N price (In Euros)

Of a particular book

In its German edition?
Later: Automated composition

The “Policy Aware Web”

• The Semantic Web is here
  – The question isn’t if, but “how much”
• Semantic Web technologies have a promising future and an exciting potential
  – The business case is emerging
    • Enterprise integration on the Web
    • Database, image, and services as 1st class Web citizens
    • Portal technology “in the small”
  – The future feed is exciting
    • Rules and Proof -> “Policy Aware” Web
Semantic Web
Core Building Blocks from 10,000 feet

Why XML is not enough - Skill DB Example

Give me all persons!
XQL: //person/name
Returns only "<name>Markus</name>"!
What is missing?

- Hackers are persons.
- Seminar attendants are persons.
- There may be syntactic variations that are semantically equally valid.

Give me all people knowledgable about SGML!

XQL: //person[knowhow=SGML]/name

Returns only "<name>Markus</name>"!

Give me all people knowledgable about SGML!

<skill-database>
  <people>
    <Person>
      <name>Markus</name>
      <knowHow>SGML</knowHow>
    </Person>
    <Hacker>
      <name>Jürgen</name>
      <pgp>CB FC A8 17</pgp>
      <knowHow>SGML</knowHow>
      <knowHow>Java</knowHow>
    </Hacker>
    <Person name="Rainer">
      <knowHow>Mike</knowHow>
    </Person>
  </people>
  <seminars>
    <Seminar topic="SGML" id="SGML-19990808">
      <attendant>
        <name>Dieter</name>
        <name>Robert</name>
        <name>Rainer</name>
      </attendant>
    </Seminar>
  </seminars>
</skill-database>

XML is an important basis, but not enough

XML at the syntax layer!

Build on top!
Some Principal Ideas

- URI – uniform resource identifiers
- XML – common syntax
- Interlinked
- Layers of semantics – from database to knowledge base to proofs

Design principles of WWW applied to Semantics!!

Knowledge in Superimposed Graphs

Tim Berners-Lee, Weaving the Web
The Semantic Web