



UMBC CMSC 491/691s Spring 2009

Special Topics: The Semantic Web



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This special topics course is available to advanced undergraduates and graduate students. It will introduce the notion of the Semantic Web, provide an overview of the underlying theory and technology, cover existing tools and practices, and highlight current and potential applications. The course will be approximately half lecture and half seminar. Students will be expected to read, discuss and present current research papers. In the first half of the course there will be a series of homework assignments designed to get students familiar with the technology. In the second half, students will work on individual or group projects. For more information, see the [syllabus](#) and [schedule](#).

The Semantic Web provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries. It is a collaborative effort led by the World-Wide Web Consortium (W3C) with participation from a large number of researchers and industrial partners. It is based on the Resource Description Framework ([RDF](#)). Here's how the W3C describes the Semantic Web.

"The Semantic Web is a web of data. There is lots of data we all use every day, and its not part of the web. I can see my bank statements on the web, and my photographs, and I can see my appointments in a calendar. But can I see my photos in a calendar to see

491/691S blog

[Ontology Summit 2009: Toward Ontology-based Standards](#)

[Video from Tim Berners-Lee 2009 TED talk on linked...](#)

[Ian Davis code{4}lib keynote: data outlasts code](#)

[Tim Berners-Lee's map of the Web world](#)

[Read more...](#)

rdfs:seeAlso Semantic Web

[The Change We Need: DIY on a Civic Scale](#)

[Chris Bizer talks about the commercial opportunities...](#)

[Now available: Results of the Semantic Web Awareness...](#)

[Social Web Camp - W3C Track @ WWW2009](#)

[The Semantic Web Gang discuss ontologies](#)

[A Telling Map of Job Losses](#)

[Bert Armijo talks about 3Tera and Cloud Computing](#)

[Bert Armijo talks about 3Tera and Cloud Computing](#)

[Four short links: 16 Apr 2009](#)

<http://transontology.org/consciousness>

[Read more...](#)

what I was doing when I took them? Can I see bank statement lines in a calendar?

Why not? Because we don't have a web of data. Because data is controlled by applications, and each application keeps it to itself.

The Semantic Web is about two things. It is about common formats for integration and combination of data drawn from diverse sources, where on the original Web mainly concentrated on the interchange of documents. It is also about language for recording how the data relates to real world objects. That allows a person, or a machine, to start off in one database, and then move through an unending set of databases which are connected not by wires but by being about the same thing."



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Syllabus

This special topics course is available to advanced undergraduates and graduate students. It will introduce the notion of the Semantic Web, provide an overview of the underlying theory and technology, cover existing tools and practices, and highlight current and potential applications. The course will be approximately half lecture and half seminar. Students will be expected to read, discuss and present current research papers. In the first half of the course there will be a series of homework assignments designed to get students familiar with the technology. In the second half, students will work on individual or group projects. For more information, see the syllabus and schedule.

Prerequisites: There are no formal prerequisites, but ideally students will have taken an AI course (e.g., CMSC 471/671) and a database class (e.g., CMSC 461/661).

Who: [Tim Finin](#), 329 ITE, 410-455-3522, finin@cs.umbc.edu, office hours: by appointment

Where and when: Monday and Wednesday in AC IV 015 from 5:30pm to 6:45pm.

Readings: Papers and other material to read will be available online.

Structure: Class time will be spent with about 60% lecture and 40% student-led presentation and discussion of readings. We will use the private [class Google group](#) and public [class blog](#) to carry out additional discussion, comment and interactions. This will be a required part of the course and the quality and level of your participation in online discussions will play a part in determining your grade.

Assignments: Students will be required to prepare and present material to the class, complete a number of short assignments and engage in a longer project, either individually or as part of a group. I believe that the material in this course is best learned by use it, so the short assignments will be designed to give you opportunities to use the concepts and technologies we cover. Presentations should be done in HTML or Powerpoint and will be added to a collection for the course and posted to the web.

Software: We will use a number of software packages that are available for downloading.

Academic Honesty: Please read this statement on academic honesty.



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Schedule

Draft subject to change

date	day	Topic	To do
1/26	Mon	Introduction	<p>READ: The Semantic Web, Sci Am, May 2001 (pdf)</p> <p>DO: assignment one</p> <p>PPT: Introduction to the Semantic Web (pdf)</p>
1/28	Wed	Introduction	<p>READ: SWP Chapter 1</p> <p>READ: Wikipedia Semantic Web article</p> <p>VIEW: Intro to the SW, part 1</p>
2/2	Mon	Applications, XML	<p>READ: SWP 2.1-2.4</p> <p>READ: The Semantic Web in Action, Sci Am, 2007</p> <p>READ: Web 3.0 Emerging</p> <p>VIEW: 2008 Semantic Web Challenge</p> <p>PPT: Applications (pdf)</p> <p>PPT: XML (pdf)</p> <p>DO: assignment two</p> <p>DUE: assignment one</p>
2/4	Wed	XML	<p>READ: SWP Chapter 2</p> <p>PPT: XML (pdf)</p> <p>TRY: XMLSpy</p>
2/9	Mon	XML JSON	<p>READ: Introducing JSON</p> <p>READ: Wikipedia JSON article</p>
2/11	Wed	RDF	<p>READ: SWP 61-83</p> <p>READ: Creating a Science of the Web</p> <p>READ: Web Science (CACM)</p> <p>PPT: RDF Syntax (pdf)</p> <p>DUE: assignment two</p>

2/16	Mon	RDF/RDFS	<p>READ: SWP 84-106</p> <p>READ: The shortest path to the future web</p> <p>PPT: RDF Schema (pdf)</p> <p>ONTO: rdf namespace</p> <p>ONTO: rdfs namespace</p> <p>PPT: CWM notes (pdf)</p> <p>DO: assignment Three</p>
2/18	Wed	RDFS	<p>READ: SWP 109-137</p> <p>READ: N3Logic: A Logical Framework For the World Wide Web</p> <p>PPT: RDF Semantics (pdf)</p> <p>EX: RDFS rules in N3</p> <p>TRY: CWM</p> <p>SLIDES: Semantic Web tutorial using N3</p>
2/23	Mon	OWL	<p>READ: Experience with N3 rules</p> <p>PPT: OWL (pdf)</p>
2/25	Wed	DL 101	<p>READ: SWP 138-150</p> <p>VIEW: Intro to OWL (ppt)</p> <p>EX: OWL rules in N3</p>
3/2	Mon	DL 102	<p>READ: SWP 138-150</p> <p>DUE: assignment Three</p>
3/4	Wed	OWL 3	<p>PPT: DL (pdf)</p> <p>READ: An Introduction to Description Logics</p> <p>READ: Complexity of reasoning in Description Logics</p>
3/9	Mon	OWL 4	<p>TRY: Protege</p> <p>TRY: RACER</p> <p>READ: Ontology Development 101</p> <p>READ: OWL Pizzas</p> <p>READ: getting started protege OWL 4.x</p> <p>VIEW: Manchester OWL syntax</p>

			<p>PPT: protegeOWL1 (pdf)</p> <p>PPT: protegeOWL2 (pdf)</p>
3/11	Wed	Beyond OWL	<p>PPT: OWL abstract syntax (pdf)</p> <p>READ: OWL 1.1 Web Ontology Language</p> <p>READ: OWL Web Ontology Language Guide</p>
3/16	Mon	Spring break	
3/18	Wed	Spring break	
3/23	Mon	Rules	<p>READ: SWP 151-178</p> <p>PPT: Rules (pdf)</p>
3/25	Wed	Rules: SWRL	<p>DO: ASSSIGMENT 4</p> <p>READ: SWRL: A Semantic Web Rule Language</p> <p>READ: Supporting Rule System Interoperability on the SW with SWRL</p> <p>READ: Semantic web architecture: Stack or two towers</p>
3/30	Mon	presentations...	<p>DO: ASSSIGMENT 4</p> <p>READ: presentations</p>
4/1	Wed	SPARQL	<p>14 rules.ppt</p> <p>16sparql.ppt</p>
4/6	Mon	Provenance Sesame	<p>Provenance -- Curt Tilmes</p> <ul style="list-style-type: none"> • READ: A proof markup language for semantic web services • SLIDES: Semantic Web Provenance <p>Sesame -- Gary Singh</p> <ul style="list-style-type: none"> • EXPLORE: OpenRDF.org site • READ: Sesame: An Architecture for Storing and Querying RDF Data and Schema Information • PPT: Sesame • CODE: Sem_Present.java,

			short_people.rdf
4/8	Wed	Linked data DBpedia	<p>Linked Data -- Scott Barasch</p> <ul style="list-style-type: none"> • EXPLORE: linkeddata.org site • VIEW: ISWC tutorial, How to Publish Linked Data on the Web • READ: Wikipedia article on linked data • READ: Linked Data on the Web, Bizer at al., Proceedings WWW2008, Beijing, China • READ: How to publish linked on the Web • PPT: Linked data <p>DBpedia -- Krishnamurthy Koduvayur</p> <ul style="list-style-type: none"> • EXPLORE: dbpedia.org site • TRY: DBpedia lookup service • READ: DBpedia: A Nucleus for a Web of Open Data. Auer et al., ISWC 2007. (video of talk) • PPT: dbpedia
4/13	Mon	Freebase Semantic Media Wiki	<p>Freebase -- Tejas Lagvankar</p> <ul style="list-style-type: none"> • EXPLORE: Freebase site • VIEW: Freebase talk at ISWC 2008 • READ: Freebase wikipedia article • READ: Freebase: a collaboratively created graph database for structuring human knowledge, Bollacker et al., SIGMOD 2008 <p>Semantic Media Wiki -- Shivvasangari Subramani</p> <ul style="list-style-type: none"> • EXPLORE: Semanti MediaWiki site • READ: Semantic MediaWiki, Krötzsch et al., ISWC 2006. • VIEW: Semantic Wikis: Fusing the two strands of the Semantic Web, Mark Greaves on Semantic Wikis.

4/15	Wed	Search Ping the Semantic Web	<p>Search -- Varish Mulwad</p> <ul style="list-style-type: none"> • READ: Swoogle: A Search and Metadata Engine for the Semantic Web • Watson, SWSE, Falcon, Sindice • PPT: Semantic Web Search <p>Ping the semantic Web -- Shantanu Fauji</p> <ul style="list-style-type: none"> • EXPLORE: pingTheSemanticWeb.com • PPT: Ping the Semantic Web
4/20	Mon	Triple stores	<p>Triple stores: Jena -- Luke Georgalas</p> <ul style="list-style-type: none"> • EXPLORE: Jena on sourceforge • READ: Jena: implementing the semantic web recommendations • PPT: Jena.ppt <p>Triple stores: Virtuoso -- Michael Povolotsky</p> <ul style="list-style-type: none"> • EXPLORE: OpenLink Software • READ: RDF Support in the Virtuoso DBMS • READ: Towards Web Scale RDF • PPT: to come
4/22	Wed	RDFa Microformats	<p>RDFa and GRDDL -- Anand Karandikar</p> <ul style="list-style-type: none"> • READ: RDFa Wikipedia article • READ: RDFa Primer: Bridging the Human and Data Webs • READ: RDFa in XHTML: Syntax and Processing • READ: Gleaning Resource Descriptions from Dialects of Languages • READ: hGRDDL: Bridging microformats and RDFa <p>Microformats -- Vikrant Nandakumar</p> <ul style="list-style-type: none"> • explore: Microformats site • READ: Microformats: a pragmatic path to

			the semantic web
4/27	Mon	Big ontologies	<p>CYC ontology -- Patrick McCauley</p> <ul style="list-style-type: none"> • EXPLORE: Cycorp site • VIEW: Computers versus Common Sense, talk by Lenat, May 2006 • READ: CYC: a large-scale investment in knowledge infrastructure, CACM, 1995. • READ: Mapping Ontologies into Cyc, AAI, 2002. • READ: Common Sense Reasoning -- from Cyc to Intelligent Assistant, 2006 <p>Wordnet ontology -- Robert Lehman</p> <ul style="list-style-type: none"> • EXPLORE: Wordnet site • EXPLORE: Word net KB • READ: WordNet: a lexical database for English, CACM, 1995 • READ: RDF/OWL Representation of WordNet
4/29	Wed	Ontology mapping	<p>Ontology mapping 1 -- Kunal Narsinghani</p> <ul style="list-style-type: none"> • READ: Ontology Alignment: An annotated Bibliography, Noy and Stuckenschmidt, 2005 • READ: Ontology Mapping: The State of the Art, Kalfoglou and Schorlemmer, 2005. <p>Ontology mapping 2 -- Ashwini Lahane</p> <ul style="list-style-type: none"> • The PROMPT Suite: Interactive Tools For Ontology Merging And Mapping, Noy and Musen, 2004.
5/4	Mon	Uncertainty	<p>Uncertainty and the semantic web -- Jenifer Sleeman</p> <ul style="list-style-type: none"> •

5/6	Wed		
5/11	Mon		
5/13	Wed		
			READ: RIF Basic Logic Dialect READ: RIF RDF and OWL Compatibility
??/?	?	Final exam	