INFO-H-509 : XML and Web Technologies
Course Plan

The objectives in brief

This course studies principles, architectures, and systems for storing, producing, exchanging, consuming, and reasoning with data on the World Wide Web.

Our first objective in this respect is to untangle the recent spaghetti soup of Web Standards (URIs, HTTP, XML, DTDs, XML Schema, XPath, XSLT, XQuery, SAX, DOM, RDF, OWL, ...) and obtain a foundational and formal understanding of the theory underlying these technologies. Our second objective is to understand in what scenarios a certain technology is applicable, and how they should be applied in that case.

Content-wise, the course is divided into 4 parts as follows.

Part 1 : Introduction and basic web architecture.   Introduces the history of the Web, its objective, and its overall architecture (URIs as a means for addressing resources, HTTP as a protocol for communicating resources, and resource representation languages—originaly HTML).

Part 2 : The syntactic web.   Introduces newer resource representation languages based on XML, and the associated concept of schema languages, with DTDs and XML Schema as two concrete examples. Studies various way of accessing, transforming, and querying data in XML format (by means of XPath, XSLT, and XQuery, respectively).
   Contrasts XML with JSON.

Part 3 : The Semantic Web and Linked Open Data.   Introduces the basic concepts of semantic descriptions by means of logic and ontologies. Studies the recent expression of these ideas on the Web through RDF and the ontology languages RDF Schema and OWL. Also studies ways of querying Semantic Web data through SPARQL, how to produce RDF and Linked Data, and how to consume it.

Part 4 : Web Services   Introduces the possibilities of Web Services als means of communicating between different information systems on the World Wide Web. Study and comparison of Web Services based on the REST architecture and Web Services based on the Big-WS* architecture (SOAP, WSLDL). Critical evaluation of the benefits and inconveniences of both approaches.

Course responsibles

— Lecturer : Stijn Vansummeren (S.UB4.125, `stijn.vansummeren@ulb.ac.be`)
— Assistant : Michael Waumans (`mwaumans@ulb.ac.be`)
— Course web page : `http://cs.ulb.ac.be/public/teaching/infoh509`

Schedule

See the on-line calendar available at the course webpage. Be sure to check regularly for modifications.

The course outcomes

At the end of the course the students should master the following compentences.

1. Be able to construct simple HTML pages and simple CSS stylesheets.
2. Be able to construct well-formed XML documents, with appropriate use of namespaces.
3. Be able to construct and/or correct DTDs and XML Schema's for given application scenarios ; be able to validate an XML document with respect to a schema and correct it where necessary.
4. Be able to access, transform and query XML documents with XPath, XSLT and XQuery.
5. Be able to interpret and construct RDF data ; be able to query RDF with SPARQL.
6. Be able to construct RDF ontologies (in both RDF Schema and OWL) ; given certain RDF ontologies show all inferences that can be made from them.
7. Explain the formal semantics of RDF ontologies.
8. Be able to use RDF in practice : linked data.
9. Be able to interact with (consume) RESTfull web services.
10. Be able to design new RESTfull web services.
11. Be able to interact with (consume) BIG-WS* web services.
12. Understand and be able to explain the differences between RESTfull and BIG-WS* web services. Be able to motivate which of the two is preferable given a concrete application scenario.

Organisation and evaluation

The course comprises 5 ECTS credits (24h theory - 14h exercises - 2 ECTS of project work).

Evaluation is based on a written exam (closed) book (14/20) and project work (6/20).