

RDF, OWL And SPARQL

Ontologies, Standards, Triples, Datatypes, RDF, RDF Schema, OWL, Entities, SPARQL, Reasoning

This course provides a guided tour of the world of knowledge representation and reasoning, from an ontology perspective. We will see that a graph is the most scalable, extensible and distributed form of knowledge representation and facilitates knowledge reasoning to incorporate additional facts.

Resources are identified with internationalized URIs (IRIs). We start with an agreed set of basic datatypes (number types, strings, URI, dates), then use them to define simple statements in the form of triples (subject-predicate-object), then build groups of such statements into graphs, and then combine multiple graphs into datasets.

W3C has defined a layered set of standards related to defining and querying ontologies. We will discover how each standard builds on a foundation to add more ontology-related functionality and together they define a comprehensive solution to ontology management.

We add a query engine in front of such datasets to make them accessible to distributed clients. We can define rules to add more control over ontology interaction. We support knowledge reasoning via inferencing.

Contents of One-Day Training Course	
<p>Target Audience Software engineers and knowledge engineers who wish to learn more about creating and interrogating ontologies using the latest W3C standards</p> <p>Prerequisites A software engineering background with some experience of creating semantic models</p>	<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p style="text-align: center;">Ontologies</p> <p>Representing knowledge The knowledge graph Description Logics (DL) Reasoning about knowledge Tour of the world of ontologies</p> <p style="text-align: center;">Ontology Standards</p> <p>W3C has been very active in defining a suite of standards related to ontologies Review of W3C layered standards</p> <p style="text-align: center;">Protégé Tooling</p> <p>Stanford University has created the Protégé tool (http://protege.stanford.edu) - "A free, open-source ontology editor & framework for building intelligent systems"</p> <p style="text-align: center;">XML Datatypes</p> <p>The common primitives (int, string, date) for ontologies and the knowledge graph Value space vs. lexical space Facets for specialization</p> <p style="text-align: center;">Introduction to RDF</p> <p>Role of Resource Description Framework Statement: subject, predicate, object Managing triples</p> <p style="text-align: center;">RDF Schema</p> <p>Extending the RDF vocabulary Defining classes and their properties Reification</p> <p style="text-align: center;">Introduction to OWL</p> <p>Web Ontology Language (OWL) expands the vocabulary for representing knowledge Tour of OWL capabilities – axioms, etc. Literals/datatypes/dataranges/expressions</p> </div> <div style="width: 48%;"> <p style="text-align: center;">OWL Entities</p> <p>Named Individual Class Datatype Object Property Data Property Annotation Property</p> <p style="text-align: center;">SPARQL Introduction</p> <p>SPARQL is to ontologies what SQL is to a relational database – a flexible language to query and update knowledge graphs</p> <p style="text-align: center;">Advanced SPARQL</p> <p>Result formats Update Federated queries</p> <p style="text-align: center;">Existing Datasets</p> <p>Exploring available big datasets, e.g.: - Dbpedia (http://wiki.dbpedia.org/) - Wikidata (https://www.wikidata.org)</p> <p style="text-align: center;">Reasoning & Rules</p> <p>Inferencing over ontologies Discovering new relationships Defining rules using RIF</p> <p style="text-align: center;">Ontologies & Machine Learning</p> <p>Some folks think of ontologies as competing with ML – we look at this question and how to use them together</p> <p style="text-align: center;">Ontology Design</p> <p>Review of how to create ontologies using what we have learnt</p> <p style="text-align: center;">Project</p> <p>Designing a large software solution incorporating ideas explored in this course</p> </div> </div>