The Semantic Web

CSC480: Semantic Web Technologies

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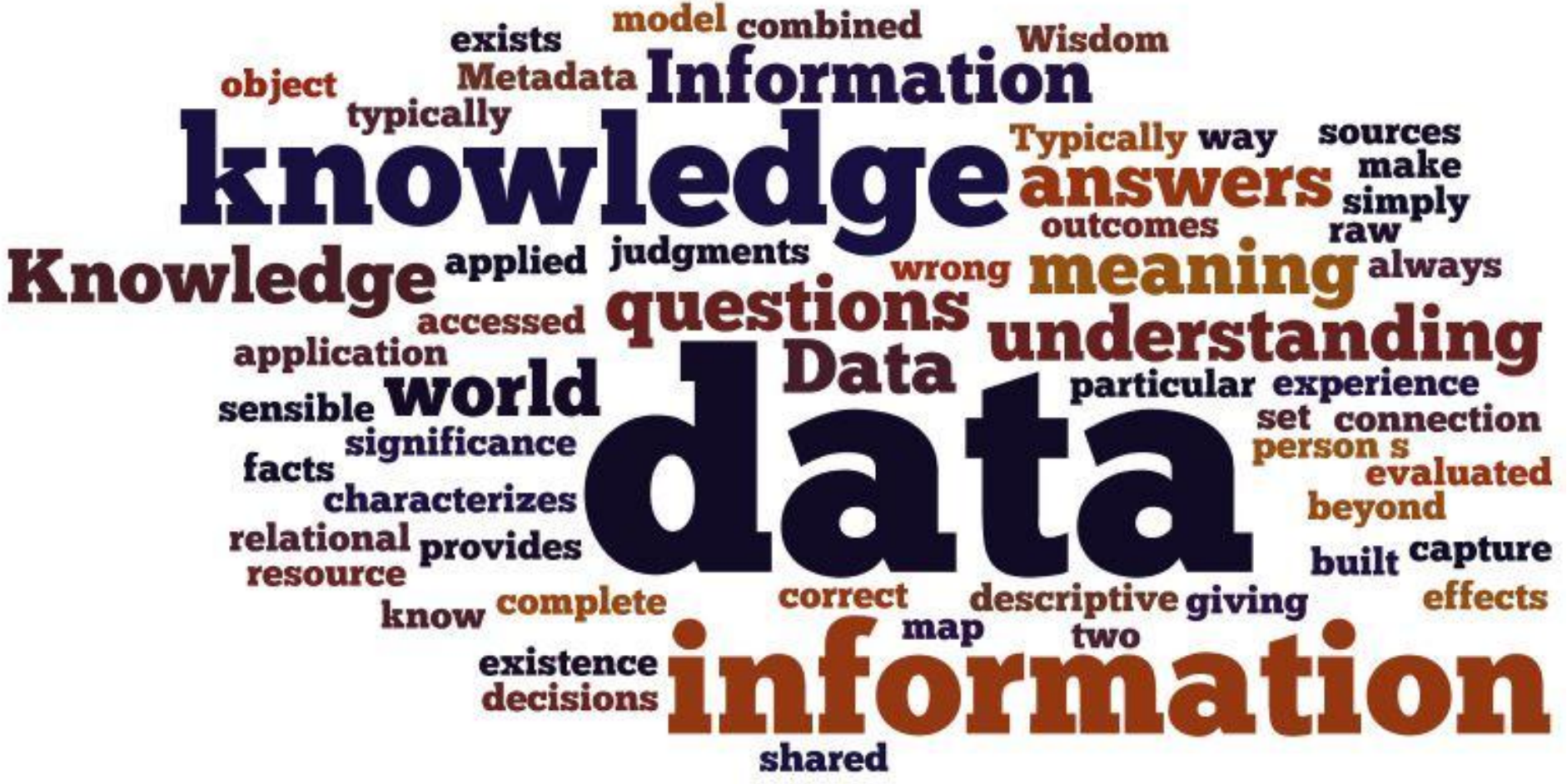
Course Objectives

- Summarize the use of Description Logic in knowledge representation.
- Explain the rationale and advantages of the Semantic Web.
- Create an XML document.
- Describe the RDF syntax.
- Explain the utilization of XML and RDF Schema.
- Analyze an RDF graph.
- Summarize the advantages of ontology.
- Produce the OWL definition file for a specific domain.
- Design an ontology-based application.
- Identify the optimal knowledge representation language for specified applications.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knowledge
Typically
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Knowledge
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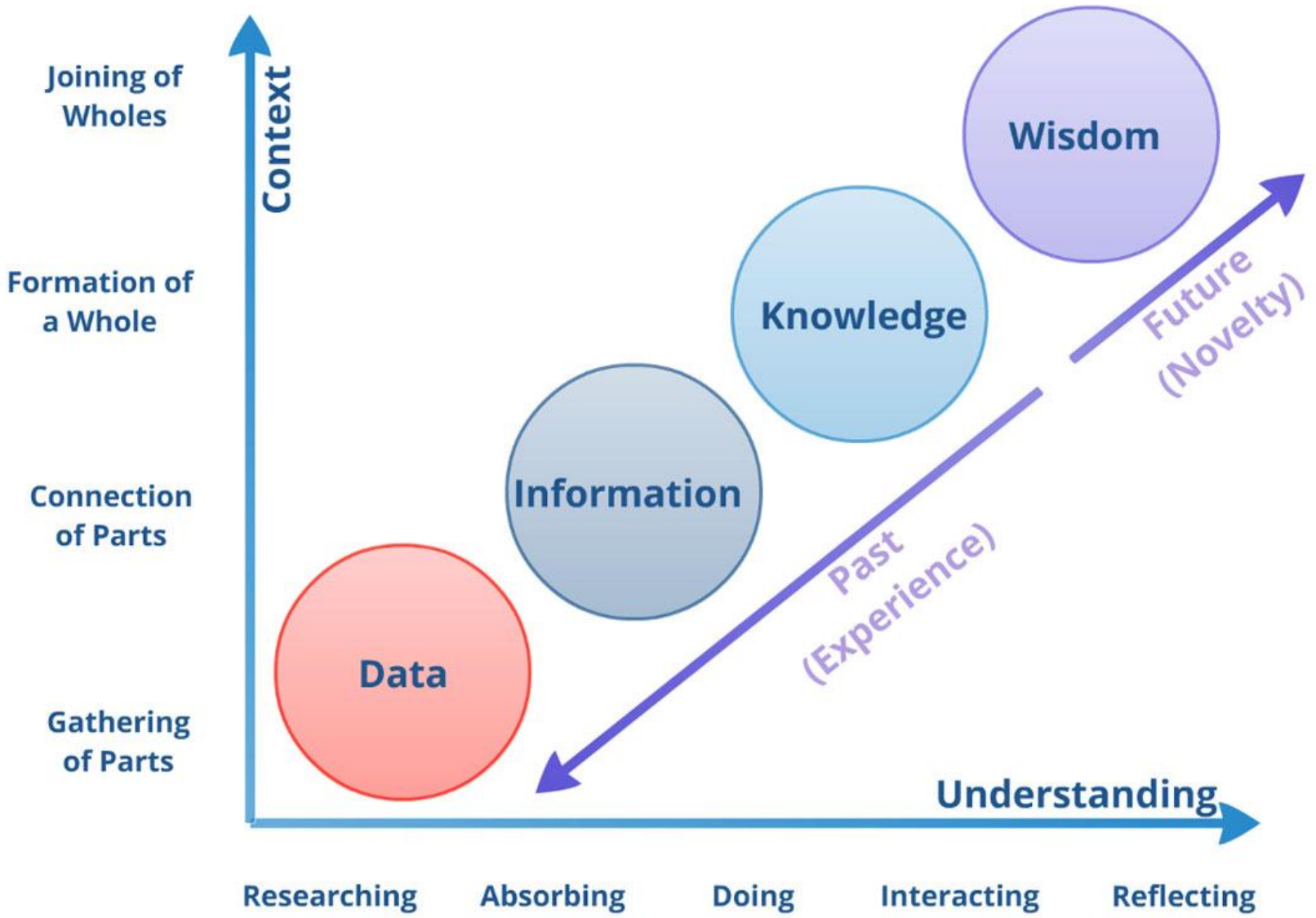


adapted from a classic paper titled “From Data to Wisdom” by Russ Ackoff

Web

- Text and images
- Computer role?

- Search

- Web 2.0
- Web 3.0

Semantic Web

- “The extension of the World Wide Web that enables people to share *content* beyond the boundaries of applications and websites.” (from http://semanticweb.org)

Semantic Web Design Principles

- Make structured and semi-structured data available in standardized formats on the web → ***labeled graphs*** (RDF)
- Make not just the datasets, but also the individual data-elements and their relationships accessible on the web → ***web identifiers*** (URIs)
- Describe the intended semantics of such data in a formalism, so that this intended semantics can be processed by machines → ***ontologies***

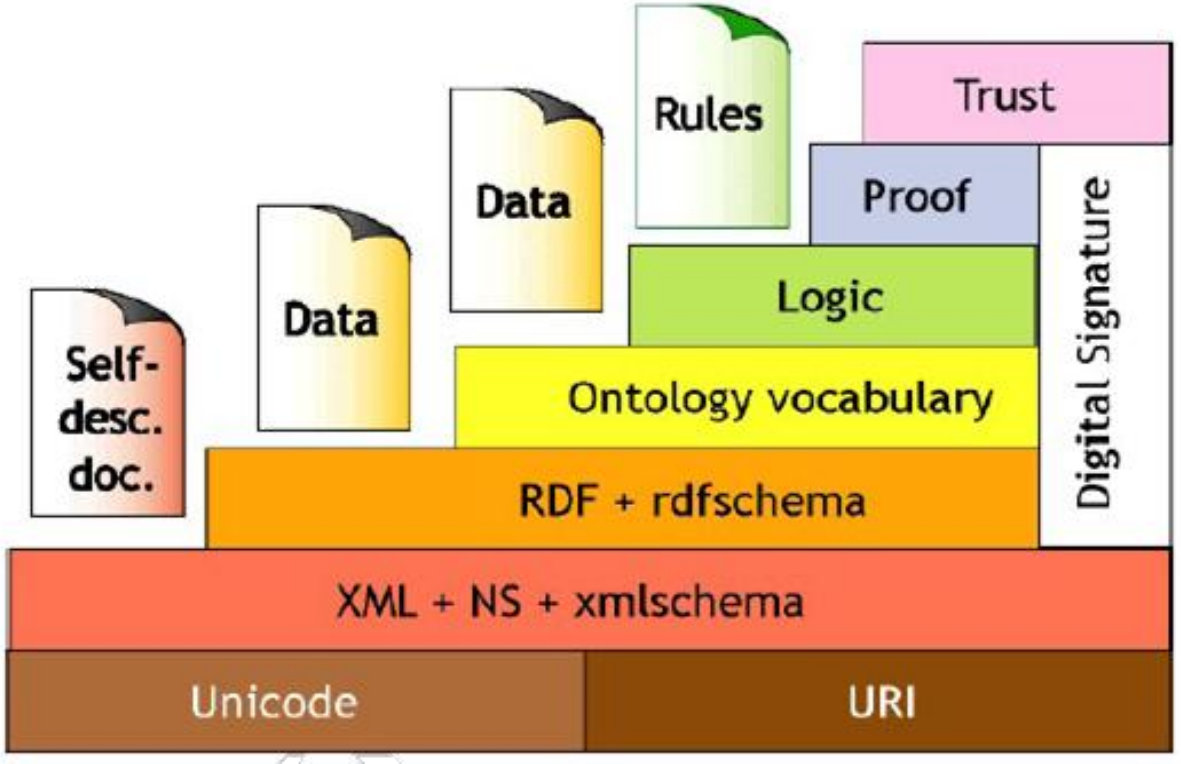
Advantages

- Ubiquitous networking
- Open everything
- Adaptive information
- Adaptive service clouds
- Federated data
- Simulated intelligence
- Automated tools

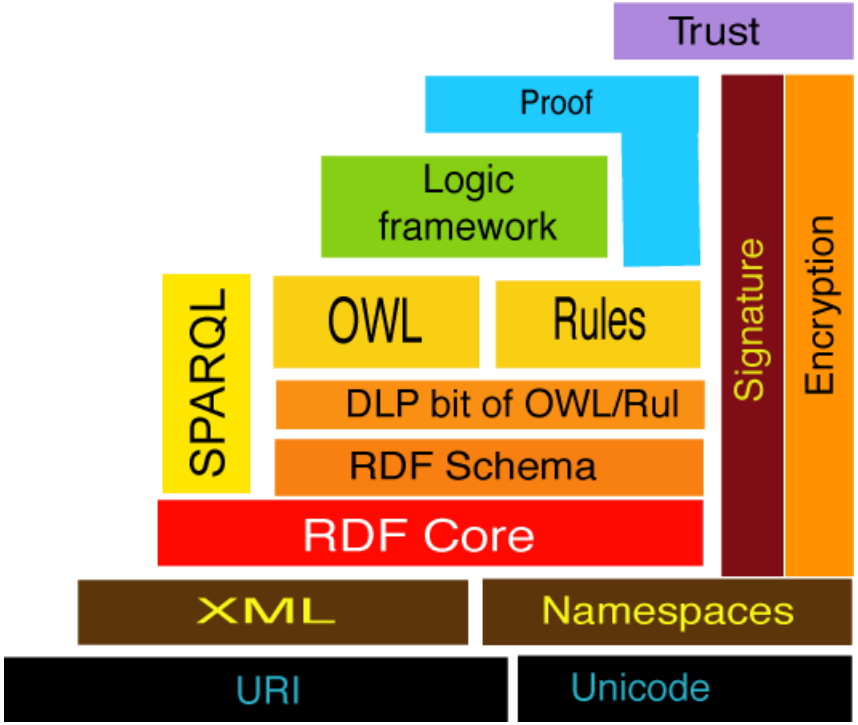
Semantic Applications

- TripIt – http://www.tripit.com
- ZoomInfo – http://www.zoominfo.com
- tvtag- http://tvtag.com
- Dbpedia - http://dbpedia.org/About
- Semantic email applications
- Semantic blogging – Zemanta - http://www.zemanta.com
- Semantic Wikis
- Friend Of A Friend (FOAF)

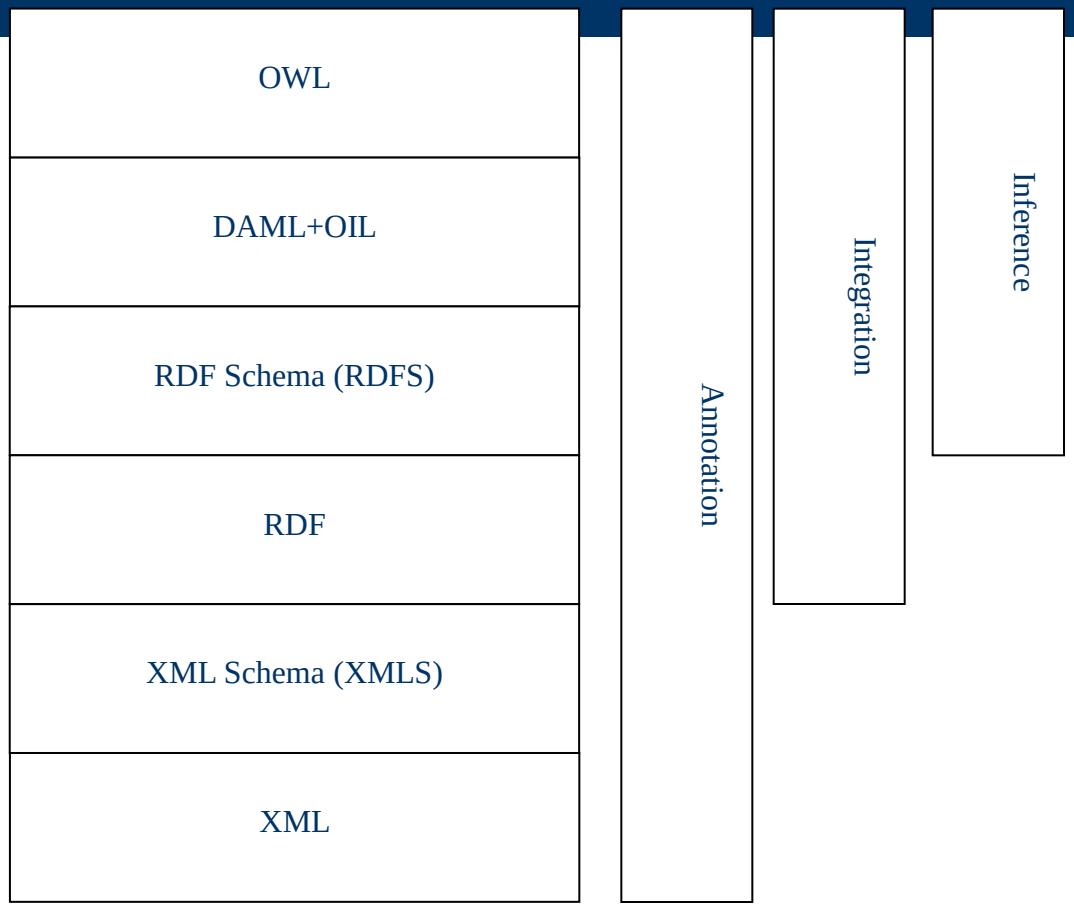
The Semantic Web Layer Tower



Alternative Semantic Web Stack



Markup Languages

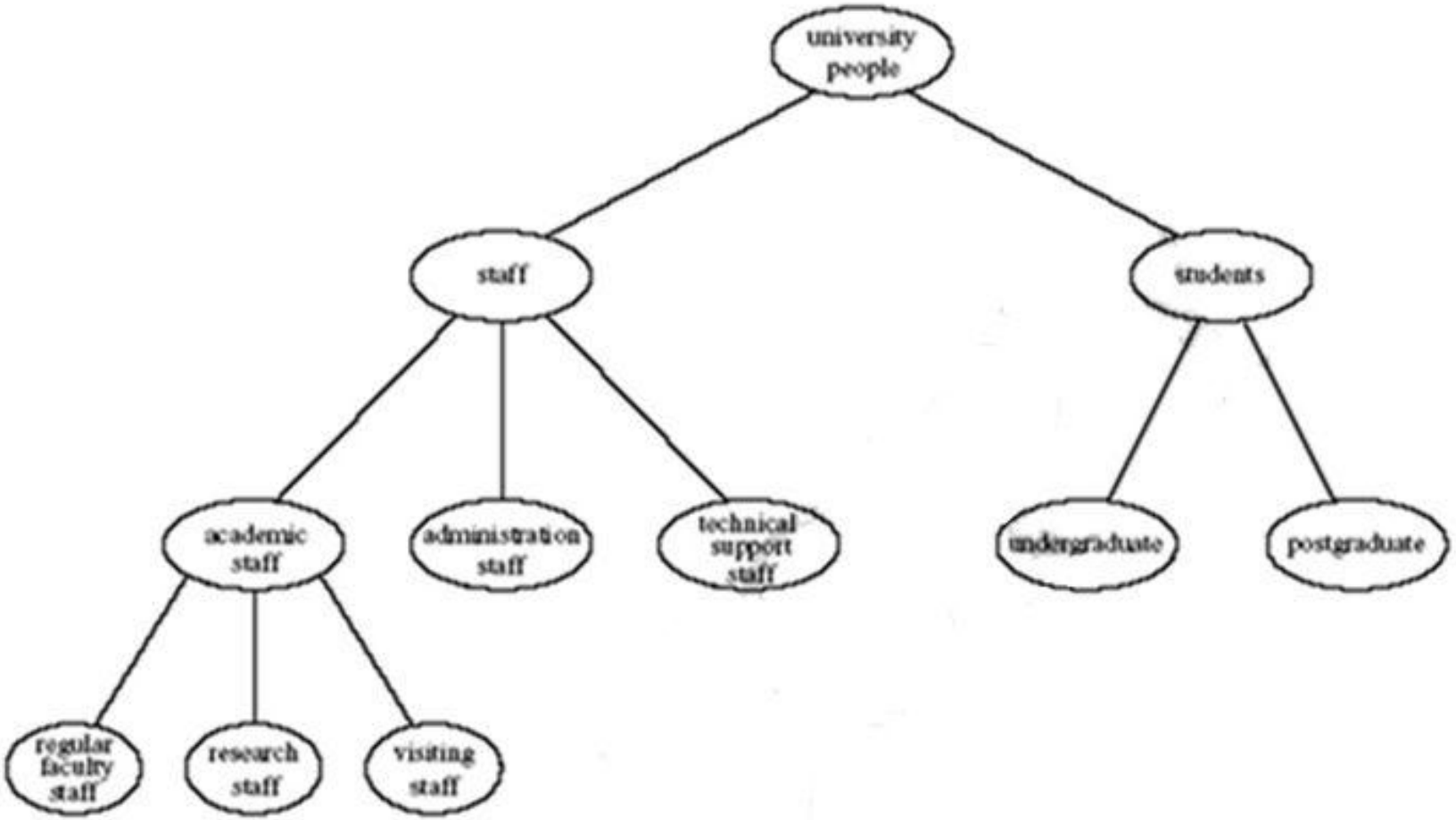


Semantic Web Layers

- XML layer
  - Syntactic basis
  - XML Schema
- RDF layer
  - RDF basic data model for facts
  - RDF Schema simple ontology language
- Ontology layer
  - More expressive languages than RDF Schema
  - Current Web standard: OWL

Semantic Web Layers (2)

- Logic layer
  - enhance ontology languages further
  - application-specific declarative knowledge
- Proof layer
  - Proof generation, exchange, validation
- Trust layer
  - Digital signatures
  - recommendations, rating agencies


university people
staff
students
academic staff
administration staff
technical support staff
undergraduate
postgraduate
regular faculty staff
research staff
visiting staff

Ontology Languages

- RDF Schema
- DAML+OIL
- OWL