UNIVERSITY OF DELTA, AGBOR, NIGERIA
COMPUTING
INFORMATION AND COMMUNICATION TECHNOLOGY
B.Sc. Information and Communication Technology

UNIDEL-ICT 402: Semantic Web Development (3 Units; Compulsory; LH=30; PH=45)

Senate-approved Relevance
The training of high-skilled graduates who are armed with concepts, technologies and techniques underlying and making up the Semantic Web which would enable them better understands information and data sharing between machines, html pages and other applications within ICT application domains in Delta State and Nigeria in general is in tandem with the vision and mission of the University of Delta, Agbor. This ensures that Information and Communication Technology graduates with demonstrable potentials and necessary skill set to build ontologies to ensure data and information sharing beyond html pages. The relevance of this is seeing and producing ICT graduates of the University of Delta, Agbor being versed in semantic web 2.0, web 3.0 and other associated technologies and standards. The students would be armed with relevant skills to model and design ontologies using Web Ontology Language and other languages which will be beneficial to Delta State and Nigeria in general.

Overview
The Web, as it exists today, primarily supports human understanding and the interpretation of the vast information space it encompasses. However, the Web was originally designed with a goal to support not only human-human communication but also as one that would enable automated machine processing of data with minimal human intervention. Semantic Web is an extension of the World Wide Web through standards by the World Wide Web Consortium (W3C). The standards promote common data formats and exchange protocols on the Web, most fundamentally the Resource Description Framework (RDF). According to the W3C, "The Semantic Web provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries". The term was coined by Tim Berners-Lee for a web of data that can be processed by machines, that is, one in which much of the meaning is machine-readable. The rationale behind such a system is that most of the data currently posted on the web is buried in HTML files suitable for human reading and not for computers to manipulate meaningfully.

This course will give an introduction to Semantic Web technologies and their applications. The crux of the Semantic Web is in semantic representation and reasoning of data using ontologies. Thus, we will delve into different aspects of Ontology representation, creation, design, reasoning, programming and applications throughout the course. Topics covered include: Introduction to the Semantic Web, Introduction to Ontologies, Ontology Languages for the Semantic Web, Resource Description Framework (RDF), Lightweight ontologies: RDF Schema, Web Ontology Language (OWL), A query language for RDF: SPARQL, Ontology Engineering, Semantic web and Web 2.0, Semantic web and Web 3.0, Applications of Semantic Web

Objectives
The objectives of this course are to: (i) Demonstrate a systematic understanding of what the Semantic Web is and how it facilitates use of and reasoning about web resources (ii) Make

effective use of metadata and inferencing (iii) Design and Deploy ontologies for classification and organization of knowledge (iv) develop a critical awareness of current research directions in the field of Semantic Web technologies (v) develop a critical awareness of state-of-the-art techniques for automated information gathering (vi) discuss and have conceptual understanding of privacy and trust issues relating to the use of Semantic Web data (vii) apply Semantic web technologies to real world applications.

Learning Outcomes

On successful completion of the course students should be able to: (i) Understand the rationale behind Semantic Web. (ii) describe and discuss model ontologies using Resource Description Framework (RDF)(iii) discuss and design RDF Schemas for ontologies. (iv) Describe, discuss, model and design ontologies using Web Ontology Language (OWL). (v) explain and discuss query ontologies using SPARQL. (vi) Understand and reflect on the principles of Ontology Engineering. (vii) Explain and describe the association between Semantic web and Web 2.0. (viii) Explain and describe the association between association between Semantic web and Web 3.0 (ix) apply Semantic web technologies to real world applications.

Course Contents

The Semantic Web Activity of W3C. Overview of techniques and standards of W3C. Introduction to Ontologies. Ontology languages for semantic web.XML with Document Type Definitions and Schemas, Resource Description Framework (RDF). The Basis of the Semantic Web. Metadata with RDF (Resource Description Framework). Metadata taxonomies with RDF Schema. Transformation/Inference rules in XSLT. RuleML and RIF. The W3C ontology language OWL. Integrating these techniques for ontology/rule-based multi-agent systems. Semantic Modeling. Semantic Web Applications. Logic for the Semantic Web. Semantic Web Vision. Ontology Design and Management using the Protege editor. Ontology Reasoning with Pellet. Ontology Querying with SPARQL. Ontology Engineering. Ontology Programming with the Jena API. Current Applications of the Semantic Web. Semantic web and Web 2.0. Semantic web and Web 3.0

Minimum Academic Standard

NUC minimum academic standard requirements for facilities.