Rutgers The State University of New Jersey  
Newark Campus  
Ph.D. Program – IT Major  
Applications of Database Systems  
26:198:731  
Spring 2010  
Thursdays 2:30 – 5:20 pm, Newark, Venue: TBA

Instructor: Prof. Nabil Adam  
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Purpose: The purpose of this course is to present advanced topics in database systems and delve into research in these areas. The topics include distributed, object-oriented, active, deductive and temporal databases, as well as advanced application domains that influence database research such as Web services, semantic Web, cloud computing, digital libraries, electronic commerce, and information security & privacy.

Prerequisite: 22:198:603 (Database Systems) or equivalent.

Reading Material: There is no text assigned to this course at the moment. However, the following books either cover one topic in depth or cover some of the preliminary concepts of the topics. In addition to the books listed below, the reading list includes a number of research papers.

5. Current projects funded by NSF  
6. The DBLP Bibliography An Excellent source for the Research materials in the Database area
Expected Work:

1. Presentation, and Home Work Assignments 20%
   a. Applications of the topics covered in the first half of the course
   b. Programming Assignments related to some of the topics discussed in the first half of the course
2. Research Paper/Project and Presentation 30%
   a. Either, write a comprehensive survey paper on one of the topics as agreed upon with the instructor.
   b. Or, work on the following development projects:
      i. Web service composition including all of the following: i) development of a client Web service application; ii) development and hosting of Web service at the server end; iii) development of a composite Web service composed of multiple Web services; and iv) publishing of Web service to UDDI.
      ii. Using protégé, implement a disaster management ontology in OWL format that facilitates sharing of disaster management related information through Web services.
      iii. Implement the commutative encryption-based technique for computing the EQUI JOIN of database tables from distributed sources in a privacy-preserving manner. The privacy requirement entails that the records in the Final JOIN table cannot be linked to individuals. This project will be implemented in the context of healthcare data integration where data from different sources need to be joined on the patient’s identifier.
      iv. Using sequence mining techniques, implement a software project that focus on identifying temporal patterns from a sample data set (clinical dataset or stock dataset).
3. Mid-term Examinations 25%
   a. Will include one question comparing the recent work on the various aspects of Advanced Database Systems with the research papers listed in the course handout. Student need to identify their own topic for this comparison.
4. Final Examinations 25%

Jan. 21 Course Overview, Distributed Databases, and Web Information System Vision

Reading Assignment
  1. Chapter 20, 21, 22 from 1 and Chapter 25 from 2.

Jan. 28 Semantic Web + Ontologies

Reading Assignment:
2. The Semantic Web Scientific American Paper by Tim Berners Lee et al. (http://www.sciam.com/article.cfm?articleID=00048144-10D2-1C70-84A9809EC588EF21)

Additional Reading:

Feb 4 and 11 Semantic Web Services

Reading Assignment

1. Chapters 1, 5, 6, 8, and 13 from 4 (Web Services: Principles and Technology by Papazoglu)
3. Sheila A. McIlraith, Tran Cao Son, and Honglei Zeng, Semantic Web Services, IEEE Intelligent Systems, 2002

Feb 18 Database/Web Service Security

Reading Assignment:

1. Chapter 8 from 1; Chapter 23 from 2; and Chapter 21 from 3


Feb 25 Data Mining and Data Warehousing

Reading Assignment:
1. Chapter 18 from 1; Chapters 27 and 28 from 2; Chapter 26 from 3.

Additional Reading

March 4 Mid-term Exam

March 11 and March 25 Cloud Computing

Reading Assignment:

April 1 and April 8 – Data Management in the Worldwide Sensor Web

Reading Material

April 15, 22, 29 Student Presentations

May 6 Final Exam