INFX 563 – Advanced Relational Database Management Systems

INFX 563 – Advanced Relational Database Management Systems (4 Cr): Advanced relational (SQL) database design and development theory, concepts and skills built upon the foundation covered in INFX 543 - Relational Databases 1. Topics covered include Advanced T_SQL; Backup and Recovery; and Database Administration. Prerequisite: INFX 543

Degree Program: Information School Cross-program

Course Justification:

Database applications, database management systems and database querying are primary enabling technologies for information professionals. An in-depth understanding of the principles and application of developing database systems is a critical success factor for information professionals taking leadership roles in future information systems initiatives. This course builds on the traditional principles of database design, implementation and usage in the INFX 543 course. In addition, this course extends students understanding of concepts and theory to include working with larger relational databases in a distributed enterprise environment.

Course Format

This course can be offered either as an online or residence course including some hands-on skills exercises, discussion boards, and iPeer skill assignment feedback. There will be readings pertaining to concepts and technologies required in developing and working with database management systems in a large distributed enterprise.

Course Objectives:

At the conclusion of this course, students will be able to:

- Work with advance SQL commands and functions
- Importance of database backup and recovery
- Work database performance tuning and query optimization
- Understand distributed database management systems
- Understand business intelligence (BI) and data warehouses
- Work with database connectivity and Web technologies
- Work with database administration and security features and concepts

Outline of Course Content:

1) Terminology and concepts related to Database Management Systems (DBMS)
2) Database Administration and Security
a) Data are a valuable business asset requiring careful management
b) How a database plays a critical role in an organization
c) The technological, managerial, and cultural consequences of a new DBMS
d) What the database administrator’s managerial and technical roles are
e) About data security, database security, and the information security framework
f) About several database administration tools and strategies
g) How various database administration technical tasks are performed

3) Transaction management and Concurrency Control
   a) Database transactions and their properties
   b) What concurrency control is and what role it plays in maintaining the database’s integrity
   c) What locking methods are and how they work
d) How stamping methods are used for concurrency control
e) How optimistic methods are used for concurrency control
f) How database recovery management is used to maintain database integrity

4) Database Performance Tuning and Query Optimization
   a) Basic database performance-tuning concepts
   b) How a DBMS processes SQL queries
c) About the importance of indexes in query processing
d) About the types of decisions the query optimizer has to make
e) Some common practices used to write efficient SQL code
f) How to formulate queries and tune the DBMS for optimal performance

5) Distributed Database Management Systems (DDBMS)
   a) What is a DDBMS and what is its components
   b) How DB implementation is impacted by different levels of data and process distribution
c) How transactions are managed in a distributed database environment
d) How database design is affected by the distributed database environment

6) Database Connectivity and Web Technologies
   a) Various database connectivity technologies
   b) How Web-to-database middleware is used to integrate databases with the Internet
c) About Web browser plug-ins and extensions
d) What services are provided by Web application servers
e) What Extensible Markup Language (XML) is in Web database development
f) About SQL data services and how they can reduce the cost of data management

7) Data mining
   a) Concepts and terminology
   b) Privacy and security issues

8) Business Intelligence (BI) and Data Warehouses
   a) How BI is a comprehensive framework to support business decision making
   b) How operational data and decision support data differ
c) What a data warehouse is, how to prepare data for one, and how to implement one
d) What star schemas are and how they are constructed
e) What data mining is and what role it plays in decision support
f) About online analytical processing (OLAP)
g) How SQL extensions are used to support OLAP-type data manipulations

9) Introduction to Big Data concepts and issues
Assessment Methods:

Each subject area will have exercises and projects that require students to demonstrate knowledge and skills acquired through class participation. The term project, a complete application profile, will demonstrate synthesis of student learning.

Suggested Readings:


Other content will be PDFs, web pages and online tutorials.