2. IT 5433 – Database Design and Applications Supporting Material

Instructor: Dr. Lei Li

Email: lli13@kennesaw.edu

Catalog Description:
This course will provide a practical foundation of database systems with emphasis on relational database design, implementation, and management. Topics include normalization, ERD, logical and physical design, SQL query, database applications, usage of XML in database, and data warehouse.

Learning Objectives:
Students who complete this course successfully will be able to:
1. Compare and contrast the basic database models;
2. Analyze, design, develop and implement a relational database system based on business requirements;
3. Create, modify and query databases using the SQL language;
4. Analyze the major aspects of database administration and compare and contrast issues of database security;
5. Describe XML and its use in database systems;
6. Conduct independent research on a subject related to the course material.

Learning Modules

LM1. Database Environment
Learning objectives:
1. Understand key terms in database
2. Explain file processing systems
3. List parts of a database environment
4. Explain types of database develop approaches

Links:
1. http://ecomputernotes.com/fundamental/what-is-a-database/traditional-file-processing-system
2. http://ecomputernotes.com/fundamental/what-is-a-database/advantages-and-disadvantages-of-dbms
3. http://ecomputernotes.com/fundamental/what-is-a-database/type-of-database-system

Module 2 – ER & EER Model

After this module, student will be able to:

1. Explain importance of data modeling
2. Define and use the entity-relationship model
3. Define E/R terms
4. Describe the enhanced E/R model
5. Describe how super types and sub-types are modeled
6. Explain when you would use an enhanced E/R model

Links to potential free course material:

Link 1: http://www.agiledata.org/essays/dataModeling101.html
This link provides information on data modeling.
Link 2: http://jcsites.juniata.edu/faculty/rhodes/dbms/ermodel
This link provides the design, entities and attributes, entity types, keys, graphical representation, relationships, and attributes and roles of an entity relationship.
Link 3: http://jcsites.juniata.edu/faculty/rhodes/dbms/eermodel
This link is about the enhanced entity-relationship model
Link 4: http://adbc.kennesaw.edu/index.php?mainmenu=db&submenu=er_notations
Database Design – ER Notation.

Module 3 – Relational Data Model

After this module, student will be able to:

1. List the 5 properties of relations
2. List the properties of a candidate key, primary key and foreign key.
3. Be proficient in converting ERD into relational data model
4. Explain and use normalization up to 3rd normal form

Links to potential free course material:

Link 1:
http://www.cs.armstrong.edu/liang/intro9e/supplement/Supplement4fRelationalDataModel.pdf
Introduction to relational data model
Link 2: https://support.microsoft.com/en-us/kb/283878
Normalization
Link 3: http://jcsites.juniata.edu/faculty/rhodes/dbms/ermapping
This link is about ERD to relational model mapping.
Link 4: http://adbc.kennesaw.edu/index.php?mainmenu=db&submenu=er_notations
Database Design – ER to tables and Normalization.

Module 4 – Physical Design

After this module, student will be able to:

1. Describe the physical database design process
2. Explain how attributes transpose from the logical to physical model
3. Describe the different types of file organizations
4. Describe the different types of indexing
5. Describe the pros and cons denormalization

Links to potential free course material:

Link 1: https://docs.oracle.com/cd/A81042_01/DOC/server.816/a76994/physical.htm
Overview of Physical Design
Link 2: http://ewebarchitecture.com/web-databases/physical-database-design
Physical Database Design
Link 3: http://www.ovaistariq.net/199/databases-normalization-or-denormalization-which-is-the-better-technique/
Pros and Cons of Denormalization
Link 4: https://docs.oracle.com/cd/B28359_01/server.111/b28313/physical.htm#i1006325
Physical Design in Data Warehouses
Link 5:
https://www.dlsweb.rmit.edu.au/toolbox/knowmang/content/physical/file_organisation.htm#Organising
File Organization

Module 5 – SQL
After this module, student will be able to:
1. Explain the basic commands and functions of SQL
2. Use SQL for data administration
3. Use SQL for data manipulation
4. Use SQL to query a database to extract useful information
5. Use SQL to create a trigger and procedure for a database

Links to potential free course material:
Link 1: http://www.sql-tutorial.net/SQL-tutorial.asp
Link 2: http://www.sql-tutorial.net/SQL-Cheat-Sheet.pdf
Link 3: https://docs.oracle.com/cd/B28359_01/appdev.111/b28843/tdddg_procedures.htm
Link 4: http://adbc.kennesaw.edu/

Module 6 – Database Application
After this module, student will be able to:
1. Explain three components of a client-server system
2. Describe differences between a 2-tiered and 3-tiered system
3. Describe key components of a Web application using a database
4. Explain the purpose of XML, XQuery, JSP, PHP and ASP.Net

Links to potential free course material:
Link 1: https://www.youtube.com/watch?v=mm3r8EG4wLQ
Link 2: http://en.wikipedia.org/wiki/Client–server_model
Link 3: http://www.nitrosphere.com/2015/05/14/2-tier-vs-3-tier-application-architecture-could-the-winner-be-2-tier-2/

Module 6 – Data Warehouse
After this module, student will be able to:
1. Describe the needs for data warehouse
2. Describe the three levels of a data warehouse
3. Explain the independent and dependent data mart
4. Explain the basic concept of big data, NoSQL, OLAP, data visualization, and data mining.

Links to potential free course material:
Link 1: Introduction to data warehouse:
https://docs.oracle.com/cd/B10500_01/server.920/a96520/concept.htm
Link 2: Three levels of database warehouse:
http://www.tutorialspoint.com/dwh/dwh_architecture.htm
 Link 3: Data mart: http://www.zentut.com/data-warehouse/data-mart/
Link 4: Big data: http://www.sas.com/en_us/insights/analytics/big-data-analytics.html

Link 5: NoSQL: http://nosql-database.org/

Module 8 – Data Administration and Database Administration
 	
After this module, student will be able to:
 	
    1. Explain major functions of a data administration and database administration
    2. Describe data dictionaries and repositories
    3. Describe the basics of database security
    4. Understand the role of databases in Sarbanes-Oxley compliance.
 	
Links to potential free course material:
Link 1: Data administration: https://en.wikipedia.org/wiki/Data_administration
Link 2: Data administration and database administration: http://tdan.com/irm-data-administration-vs-database-administration/4197
Link 3: Data dictionaries:
https://docs.oracle.com/cd/B10501_01/server.920/a96524/c05dicti.htm
 Link 4: Databases in Sarbanes-Oxley compliance: http://www.s-ox.com/dsp_getFeaturesDetails.cfm?CID=448
Link 5: 10 common database security vulnerabilities: http://www.zdnet.com/article/the-top-ten-most-common-database-security-vulnerabilities/

Module 9 – Distributed Database
 	
After this module, student will be able to:
 	
    1. Explain distributed database models
    2. List reasons why an enterprise would choose a distributed database model over a centralized model
    3. Explain data replication and partitioning
 	
Links to potential free course material:
Link 1: Distributed Database Book Chapter:
http://wps.prenhall.com/wps/media/objects/3310/3390076/hoffer_ch13.pdf