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Overview of the Animated Database Courseware: A Set of Interactive Software Modules to Support the Teaching of Database Concepts

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OVERVIEW OF THE ANIMATED DATABASE COURSEWARE: A SET OF INTERACTIVE SOFTWARE MODULES TO SUPPORT THE TEACHING OF DATABASE CONCEPTS

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ABSTRACT

Database concepts are considered foundational knowledge in Information Systems curriculum. However, there are many challenges to teaching database technology including prioritizing the topics to be covered, incorporating emerging trends and supporting students who find the topic challenging. One solution to address these dilemmas is the development of thematic modules supplemented with instructional materials. Through a National Science Foundation Course Curriculum and Laboratory Instructional materials grant, a set of interactive instructional software modules was developed to enhance and enrich the presentation of important database concepts. These modules, which include over 100 different animations, cover a wide variety of database concepts including database design, Structured Query Language, embedded SQL code, transaction processing and database security. The software is not tailored to any specific product or textbook but is intended to be complementary to classroom instruction. The courseware was designed to facilitate student learning by providing a venue for practice and feedback fostering an opportunity to include more depth or breadth to the concepts covered in a database course. The courseware has been made freely available and is located on the Web at <http://adbc.kennesaw.edu>.

Keywords

database, instructional materials, instructional software

OUTLINE

This tutorial will introduce participants to ADbC and its application in the classroom. The following modules will be covered:

- Database Design which introduces the various ER diagram notation sets, provides practice in identifying correct E-R diagrams from scenario descriptions, converting E-R diagrams to tables, determining functional dependencies and normalizing tables to 3rd normal form.
- Structured Query Language which provides practice in the construction of SQL statements to create tables and manipulate data, simple SQL queries, SQL queries joining multiple tables, SQL views, SQL functions, stored procedures and triggers. The module also provides an animation of pseudo code generated from various SQL statements using relational algebra constructs. Additional topics include practice in applying the concepts of referential integrity and embedding SQL code in various programming languages.
- Transactions which provides an overview of the concepts of concurrency including demonstrations on deadlocking, serial locking, lost update and record locking. Also included in this module is an overview of the various methods of data recovery.
- Security covers database security concepts of control, vulnerability, inference and auditing. Within these areas practice is provided in applying access control and row level security, experimenting with SQL injections, applying database auditing mechanisms and exploring the challenges of database inference vulnerabilities. In addition, the use of a security matrix as a way to explicitly identify application program required access rights to database objects is presented.

The tutorial is intended to be of interest to a wide audience and will be of particular interest to faculty teaching a database course or course that includes database concepts. Modules within the ADbC are explicitly designed as instructional aids to supplement classroom teaching. The software is not tailored to any specific product or textbook nor is it intended to be a substitute for them. ADbC components may be used in the classroom, the lab or as out-of-class assignments.

REFERENCES

1. Animated Database Courseware (ADbC). Available online : <http://adbc.kennesaw.edu>