

2640 Database Management Systems and Applications

Introduction

2640 DATABASE MANAGEMENT SYSTEMS AND APPLICATIONS provides an understanding of the functionality of databases and their role in modern business environments. Students are introduced to relational conceptual data modelling, database design, implementation issues, data management and advanced database applications. A fundamental knowledge of such concepts equips students to effectively deploy a commercial database management system in response to the needs of a business organisation.

Case studies

As part of the overall subject design, scenarios from a fictitious company, *Xenon Engineering*, build a context or pose a problem related to designing a database. As students proceed through the subject, the scenarios will progressively lead from the fundamentals of database design to the final stages of database design completion.

Who should attend

- Managers seeking to enhance their understanding of database management systems and their applications
- Architects and administrators who need to evaluate and plan an organisation's enterprise information architecture
- Information technology practitioners wishing to hone their operational knowledge about relational databases and data management
- Decision makers supporting strategic IT planning and key organisational decisions

Learning objectives

Upon completion of the subject, students should be able to

- describe the role and basic principles of distributed data management, data warehousing and the organisational processing environment
- extract specifications to create entity relationship conceptual data models
- effectively map conceptual data models to a relational database schema and apply the fundamental principles of correct relational database design
- understand and break down complex Structured Query Language (SQL)
- construct a simple database application, given a business scenario
- implement practices for data management aimed at maintaining data quality

Delivery method

The subject is delivered online over a 12-week period, with an assigned Professor acting as mentor. The class will comprise students from different countries and industry backgrounds. Practical case studies and discussions help to stimulate learning and knowledge exchange, while an examination at the end of the subject will help students review and apply the knowledge and skills learnt.

Prerequisites

None

Assessment

Case analyses (team and individual)	45%
Discussion board activities	30%
Final examination	25%

Syllabus

Segment 1: Introduction

Students are introduced to the syllabus, the resources and communication tools available within the course.

Segment 2: The Database System

A brief overview of the evolution of database technology introduces students to the purpose and scope of a database management system. Important functions, such as concurrency control, security, backup and recovery, and data dictionary management are discussed. Students also learn about the various database models, viz., the hierarchical, network, relational, entity-relationship and object-oriented data models.

Segment 3: The Relational Model

The relational model of data is explained, as a foundation to understand the principles of current technologies on relational data storage and management. Modern database management systems are based on the relational database theory. Students are introduced to concepts on entities, relationships and relational operators, as well as the practical application of MS Access, a database management system developed by Microsoft.

Segment 4: The Entity Relationship Model

The Entity Relationship (ER) model is a widely-accepted technique for data modelling, intended to facilitate communication, documentation and verification of data requirements when designing an information system. Students are introduced to the ER notation and technique, which helps extract data relevant concepts from a given specification and construct a data model.

Segment 5: Database Design

Database design is a critical step in the information system life cycle. A bad database design can lead to update anomalies and query inefficiencies, compromising the success of the information system deployment. The segment helps students achieve a good database design by concurrently using ER modelling and normalisation. Students learn to map relational schemas from a given entity relationship model, use functional dependencies analysis and apply the normalisation process to achieve a recipe for proper relational database design.

Segment 6: Structured Query Language

The Structured Query Language (SQL) is the best known high-level query language for relational databases. A basic level of SQL competency is essential for all users of database technology. Students learn about the SQL command types, basic SQL command syntax and use SQL to query a relational database and extract useful information. The segment also discusses more advanced SQL query options, including aggregation, grouping and nesting.

Segment 7: Advanced Applications

The segment introduces the basic principles of Decision Support Systems (DSS) by demonstrating a contrast between operational data and decision support data. Students look at the data warehousing architecture, different DSS architectural styles and Online Analytic Processing (OLAP). Design issues and typical data structures, such as star schemas, facts and dimensions, are also discussed.

Required textbook

Rob, P. and C. Coronel. *Database Systems Design, Implementation and Management* (5th ed). Boston: Course Technology, 2002.

Global Faculty

Subject Author

Professor Ruth King
University of Illinois

Subject Reviewer

Professor Wing Lam
U21Global

U21Global subjects are created by acknowledged experts in their field, usually senior academics who have strong understanding of postgraduate requirements. The subject content is further reviewed by academic specialists who appraise the subject from an independent perspective, ensuring a high-quality, professional product.

2640 DATABASE MANAGEMENT SYSTEMS AND APPLICATIONS was created for U21Global by **Ruth King**, Assistant Professor at the Department of Business Administration, University of Illinois at Urbana-Champaign in the US. A former faculty member at the University of Pittsburgh, Dr King's research and teaching interests include management of information systems, telecommunications technology and management, systems analysis and design, database design and management, decision support systems, impact analysis of emerging technology and organisation theory. Her PhD in Information Systems was awarded by the University of Texas at Austin, US.

The subject was reviewed by **Wing Lam**, Dean of Information Technology Management Programmes and Director of Pedagogy at U21Global. Dr Lam is a former faculty member of the Institute of Systems Science and Programme Manager for Research at the National University of Singapore. He has held consultancy positions with Logica-CMG, Fujitsu (formerly ICL) and Accenture (formerly Andersen Consulting). Dr Lam's research interests include enterprise integration, knowledge management and software engineering management. He has a PhD in Computer Science from King's College, University of London, UK.

Professors

Students' progress will be guided by dedicated Professor Facilitators based around the world. They provide an international perspective and impart knowledge through a wealth of experience in their field of specialisation. Our Professor Facilitators will help students make sense of the information to enable students to transform the information into knowledge and creative solutions.



Adam HUARNG

Adam Huang is Professor of Information Systems at California State University, Los Angeles, US. He previously taught at Minnesota State University and Purdue University, Fort Wayne, where he also served as Chair for the Computer Science Department. Dr Huang's research interests are in the area of software development, database analysis and eCommerce development. He has also worked as a software engineer for the Telecommunication Labs in Taiwan, Federal Express in Memphis, Tennessee and Micro Tech Concepts in Los Angeles, California. He received his PhD in Business Administration with major in Management Information Systems from The University of Memphis.



France CHEONG

France Cheong is Senior Lecturer in the School of Business Information Technology at RMIT University in Melbourne, Australia. A former lecturer in the School of Computing Science at Queensland University of Technology, Dr Cheong was a Management Information Systems Consultant in Mauritius, from where he originates. His research interest lies mainly in the area of modelling and simulation of business and other systems, such as eBusiness, mobile commerce, economics and finance, management and manufacturing systems. He received his PhD in Computer Systems Engineering and Master of Computer Science from La Trobe University, Australia.

AFFILIATED UNIVERSITIES

Fudan University



Korea University



Lund University



National University of Singapore



Shanghai Jiao Tong University



Tecnológico De Monterrey



University College Dublin



University of Birmingham



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