UNIT TITLE: Advanced and Distributed Databases

CREDIT POINTS: 20	**UNIT CODE: SWD301**
LEVEL: 3	**DELIVERING FACULTY: Technology**
Parent Programme: BSc (Hons) Computing	**School: Computing and Communications**
Date validated: March 2001	**Date last modified: February 2008**
Unit delivery model: BL	**Max & Min Student No.: N/A**

TOTAL STUDENT WORKLOAD

Students are required to attend and participate in all the formal timetabled sessions and online collaborative activities for the unit. Students are also expected to manage their directed learning and independent study in support of the unit.

Where normal timetabled sessions do not take place, additional directed learning may be provided, and/or students are expected to undertake additional independent learning.

PREREQUISITES AND CO-REQUISITES

Database Application Development or equivalent

UNIT DESCRIPTION

Databases are deployed in increasingly sophisticated ways to meet organisations' operational and decision support requirements. This unit builds on Level 2 to develop analysis, design, implementation and evaluation skills and knowledge in the design, access and management of centralized, distributed and decision support database applications.

A particular feature of the delivery of this unit is the application of online learning resources and tools to support learning, teaching and assessment.

LEARNING OUTCOMES

On successful completion of the unit, students should be able to:

Knowledge and Understanding

1. Discuss the tools, technologies, methods and techniques associated with business database application development.

Cognitive Skills

2. Analyse, design and evaluate elements of centralised, distributed and decision support database applications.

Practical and Professional Skills

3. Undertake research of advanced database technologies.
4. Apply tools for the development of elements of centralised, distributed and decision support database applications.

AREAS OF STUDY

Data Access, Interfacing and Analysis Tools and Methods
Connectivity and access to databases in a distributed architecture
Retrieval and manipulation of distributed and replicated data
Database server-to-server connectivity, database names and links, application of synonyms and views for transparency
Java-based access methods (e.g. SQLJ/JDBC), dynamic SQL, recordset processing
Analysis of aggregated data using primarily SQL ROLLUP and CUBE functions, and pivot tables (using Excel)
An introduction to Data Mining using SQL and other tools. Market Basket Analysis and association rules
X-Forms development approaches

Development of Databases to meet Organisation and Application Requirements
Design of distributed and replicated databases
OLAP databases, Dimension modelling and OnLine Analytical Processing (OLAP)
Data mining methodology
Advanced declarative SQL integrity constraints, database triggers for integrity (and audit etc)

Database Models and Management Systems
Distributed transaction management
Object persistence and retrieval in databases
XML databases and datatypes

LEARNING AND TEACHING STRATEGY

Learning outcomes are achieved and assessed by means of an integrated approach to learning, teaching and assessment, and underpinned by the DATABASE Portal, a comprehensive online learning resource designed to support all the database units.

A "mySports" industrial case study, based primarily on human resource and customer/order/product data management, is used throughout to contextualise the learning and assessment activities. In particular, an international distributed/replicated database implementation (using 3 Oracle server nodes), and OLAP cubes (a "small" cube for initial learning, and a "large" cube involving millions of records for a more realistic application), are currently used to underpin these activities.

The first part of the unit covers a number of practical core themes spanning the areas of study of the unit. These themes currently are:

Exploiting DBMS Data Models and Server Functionality
Accessing and Manipulating Data in Client Applications
Improving Data Access by Data Distribution and Replication
Multi-Dimensional Modelling and Analysis for Decision Support
Mining Databases for Decision Support)

Students are expected to establish an initial understanding of concepts and technologies by undertaking specified guided reading for each of these themes. Informal online tests and forums are used to reinforce this directed learning, paving the way for classroom-based activities designed to develop cognitive and practical skills related to each theme. Face-to-face and/or online presentations may be used to reinforce learning where appropriate.

Students are expected to produce and upload to myCourse by the end of each theme specific (and scoped) analysis, design and implementation (with evidence of testing) artefacts relating to the case study. This enables both individual and general formative feedback to be provided prior to summative assessment later in the unit. Students are encouraged to work collaboratively for some activities using a myCourse wiki for holding group process and product documentation. For example, some activities encourage students to collaboratively produce and share analysis and design documentation which is then individually implemented.

The second part of the unit is essentially a research, application and evaluation activity of a chosen advanced topic (discussed in online forums) that extends from each of the themes in the first part of the unit. The online discussion should enable the students to make an informed choice of topic, and should provide an initial base of shared research.

The Oracle iSQLPlus tool is used throughout to underpin the practical activity in all of the themes, and is configured to enable (but not guarantee) access from off-campus. Moreover, open source business intelligence tools are used to support the decision support themes. It is therefore normally possible for the student to do the practical work both on-and-off campus.

ASSESSMENT STRATEGY

The student will be required to write, in the role of an IT expert for the mySports company, an evaluation report of the technologies, methods and tools applied throughout the unit in the context of the case study. The student is required to append all of, and refer to, the uploaded artefacts (explained in the Learning and Teaching Strategy) in this evaluation report. This report, and referenced artefacts, will clearly confirm achievement of learning outcomes, and enable grade discrimination using grids established and continually improved from previous deliveries of the unit.

As also explained in the Learning and Teaching Strategy, the student is expected to upload these artefacts to myCourse by the end of each theme thus allowing formative feedback to be provided. The student may submit improved versions of these artefacts by the assessment completion date.

ASSESSMENT

AE1	weighting:	100%
	assessment type:	Project report
	length/duration:	2500 words

Aggregation & Re-assessment Rules
No departure from standard University regulations.

INDICATIVE READING

Connolly & Begg, (2005), *Database Systems - A Practical Approach to Design, Implementation and Management* 4th Ed. Addison-Wesley

Smith, B. (2004), *Systems Building with Oracle: the theory and practice of database design.* MacMillan

Elmasri & Navathe (2007), *Fundamentals of Database Systems* 5th Ed. Addison Wesley

Berry & Linoff (2004), *Data Mining Techniques* 2nd Ed. Wiley

Online Resources
The DATABASE Portal (available in myCourse) - a comprehensive, regularly updated, searchable, online database of learning resources (developed by the unit author) available to all students taking database units in the School.

Oracle Technology Network - a comprehensive online resource covering all aspects of Oracle database products including their application and underlying technologies.
http://otn.oracle.com/index.html

Note that online access has been provided via myCourse and the DATABASE Portal to approved digitised core chapters from recommended texts. These include:
Decision Support Systems - Smith Ch.16

Distributed Databases and Client-Server Architecture - Elmasri & Navathe Ch.24
Market Basket Analysis and Association Rules - Berry & Linoff Ch.8

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