COMP9315
Database Systems Implementation
Course Introduction

Course Details

- Course Code/Title : COMP9315 Database System Implementation
- Units of Credit : 6
- Course Website : http://www.cse.unsw.edu.au/~cs9315
- Handbook Entry : http://www.handbook.unsw.edu.au/postgraduate/courses/2010/COMP9315.html

Course Aims

The aim of this course is to introduce

- the architecture of relational database management systems,
- algorithms and data structures for data-intensive and user-intensive computing,
- methods for transaction management.

Besides above, this course will help students develop their skills in analyzing the performance of data-intensive and user-intensive systems and implementing large software systems. This course will also introduce the inner workings of a complete RDBMS (Minibase).

Prerequisites

This course assumes that you are already familiar with:

- the Java language and programming in Java (e.g. completed COMP9024)
- developing applications on RDBMSs (SQL, relational algebra; e.g. COMP9311 or COMP3311)
- basic ideas about file organisation and file manipulation (e.g. COMP9024 or COMP2011)
- sorting algorithms and data structures for searching (quick/merge sorts, binary trees, hash tables; e.g. COMP9024 or COMP2011)

If you do not have the above prerequisite knowledge, you will struggle in this course.

Note: Lectures notes will be available by **Monday afternoon** each week.

Course Outline

We summarize the course outline as follows:

- Introduction to DBMS (Week 1)
- Storage Management (Week 2)
- Indexing and Query Processing (Week 2 - 6)
- Transaction Management and Recovery (Week 7 - 9)
- Recent Advances in DB (Week 10 - 12)

Students Learning Outcomes

At the end of this course, students should be able to

- analyze the cost/tradeoffs of relational operations;
- select appropriate tools to solve data-intensive and user-intensive computing problems;
- analyze and tune the performance of data-intensive systems;
- build a relational database management system from "scratch";
- be familiar with the recent advances in DB.

Teaching Strategies

- Lectures : deliver the basic concepts and explain with detailed examples
- Lab Work : help students implement basic database components with real-life database instance (Minibase)
- Consultation : weekly consultation to provide personalized advice to students on their progress in the course.

Teaching Rationale

The learning foci in this course are primarily lectures (theoretical knowledge) and projects (practical knowledge). The course will have an emphasis on problem solving for real applications.

Assessments

There will be 2 projects, 3 assignments, and final exam.

Assignments (30%):

- Ass1 - Week 3 - 6 (10%) : Indexing Techniques
- Ass2 - Week 7 - 9 (10%) : Querying Techniques

- Ass3 - Week 10 -12 (10%) : Transaction Control

How you should submit your work will be indicated each assignment.

Note: Penalty for later ass submission: **0** marks to any later submission

Projects (70%):

- Proj1 - Week 4 - 7 (35%) : Replacement Policy
- Proj2 - Week 8 - 11 (35%) : Join Algorithm

How you should submit your work will be indicated in each project.

Note: Penalty for later proj submission: 10% reduction for the 1st day, another 30% reduction for each following day.

Final Exam (100%):
There will be a 3-hour exam in the exam period (Oct/Nov).

Note: If you are ill on the day of the exam, **do not attend** the exam. We will **not** accept medical special consideration claims from people who have already attempted the exam.

Calculating Your Final Marks (Harmonic Mean)

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A = ass1 + ass2 + ass3 + proj1 + proj2
B = marks for final exam
Final mark = 2*A*B / (A+B)
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Course Administration

Course Staff

Name	Office	Phone	E-mail	Role
Xuemin Lin	K17-503	56493*	lxue@cse*	lecturer in charge
Gaoping Zhu	K17-201	56861*	gzhu@cse*	course admin

Note: You are invited to meet us **in person** during consultation time slots and during the lab periods. You are also welcome to contact us via e-mail if some thing is urgent.

Lectures Time

This course has a 3-hour lecture per week, held on each Tuesday from 12pm - 15pm at Civil Engineering 101 (K-H20-101).

Course Resources : Textbooks

The lecture notes of the course are more than 40% from the first textbook.

1. Ramakrishan, *Database Management Systems*, McGraw-Hill, 2000 (2nd Edition) or 2002 (3rd Edition).
2. Garcia-Molina, Jeffrey Ullman, and Widom, *Database System Implementation*, Prentice Hall, 2000.

Course Resources : References

1. Silberschatz, Korth & Sudarshan, *Database System Concepts* (3rd ed), McGraw-Hill, 1998.
2. Elmasri & Navathe, *Fundamentals of Database Systems* (3rd ed),Benjamin/Cummings, 1999.
3. Graefe, *Query Evaluation Techniques for Large Databases*, ACM Computing Surveys, 30(2), 73-170, 1993.
4. Gaede and Gunther, *Multidimensional Access Methods* ,ACM Computing Surveys, 30(2), 170-231, 1998.

Academic Honesty and Plagiarism

Plagiarism is defined as "using the words or ideas of others and presenting them as your own". UNSW and CSE treat plagiarism as academic misconduct, which means that it carries penalties as severe as being excluded from further study at UNSW. There are several on-line sources to help you understand what plagiarism is and how it is dealt with at UNSW:

- Learning Centre: Plagiarism and Academic Integrity
- MyUNSW: Plagiarism and Academic Misconduct
- CSE: Addendum to UNSW Plagiarism Guidelines
- CSE: Yellow Form (whose terms you have agreed to)

About Minibase

Minibase is a small pure-Java RDBMS from the University of Wisconsin, which is designed primarily for teaching and has some useful GUI tools. It comes with standard Java-Doc documentation which can be downloaded from our website.

Course Evaluation and Development

This course is evaluated each session using the CATEI system. In this session, we will use more concrete examples to demonstrate difficult concepts.

More Information

For further information on this course, and to keep up to date with any changes, please consult the course web site (frequently):

> http://www.cse.unsw.edu.au/~cs9315/

Xuemin Lin, 10th July 2010