

COMP9315 Course Welcome

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COMP9315 22T1 DBMS Implementation

(Data structures and algorithms inside relational DBMSs)



Lecturer: *John Shepherd*

Web Site: <http://www.cse.unsw.edu.au/~cs9315/>
(If WebCMS unavailable, use
<http://www.cse.unsw.edu.au/~cs9315/22T1/>)

❖ Lecturer

Name: John Shepherd

Office: K17-410 (turn right from lift)

Email: cs9315@cse.unsw.edu.au

Online: Tuesday 12-2, Thursday 3-5

Research: Information Extraction/Integration
Information Retrieval/Web Search
e-Learning Technologies
Multimedia Databases
Query Processing

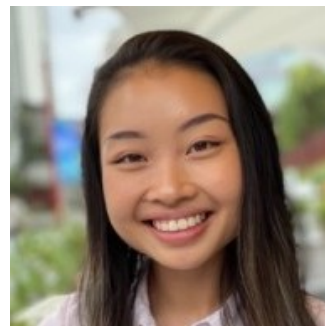
❖ Course Admin

Name: Minyi Zhong
Office: outside UNSW
Email: cs9315@cse.unsw.edu.au
Research: Container-izing Webcms3

Mug shots:



John



Minyi

❖ Problems?

Email cs9315@cse.unsw.edu.au

- Technical issues (e.g. problems compiling PostgreSQL)
- Detailed assignment questions (shared-screen debugging)

Special consideration:

- <https://student.unsw.edu.au/special-consideration>

Educational Adjustments:

- <https://student.unsw.edu.au/els>

❖ Course Goals

Introduce you to:

- architecture of relational DBMSs (e.g. PostgreSQL)
- algorithms/data-structures for data-intensive computing
- representation of relational database objects
- representation of relational operators (sel,proj,join)
- techniques for processing SQL queries
- techniques for managing concurrent transactions

Develop skills in:

- analysing the performance of data-intensive algorithms
- the use of C to implement data-intensive algorithms

❖ Pre-requisites

We assume that you are already familiar with

- the C language and programming in C
(e.g. completed ≥ 1 programming course in C)
- developing applications on RDBMSs
(SQL, [relational algebra] e.g. an intro DB course)
- basic ideas about file organisation and file manipulation
(Unix **open**, **close**, **lseek**, **read**, **write**, **flock**)
- sorting algorithms, data structures for searching
(sorting, trees, hashing e.g. a data structures course)

If you don't know this material very well, **don't take this course**

PostgreSQL, Assignments and Exam all involve C programming.

❖ Learning/Teaching

What's available for you:

- Textbooks: describe some syllabus topics in detail
- Course Notes: describe syllabus topics in some detail
- Content videos: short videos covering one topic (4-5 / week)
- Slides: from Content Videos
- Readings: research papers on selected topics
- Online: live Q&A and problem-solving sessions (like a tute)

The onus is on **you** to make use of this material.

Online sessions are on Zoom, Tue 12-2, Thu 3-5

❖ Learning/Teaching (cont)

Things that you need to **do**:

- **Exercises**: tutorial-like questions
- **Prac work**: lab-class-like exercises
- **Assignments**: large/important practical exercises
- **On-line quizzes**: for self-assessment

Dependencies:

- Exercises → Exam (theory part)
- Prac work → Assignments → Exam (prac part)

There are **no** tute/lab *classes*; use Forum, Email, Consults

- debugging is best done in person (can see full context)

❖ Rough Schedule

- Week 01 relational algebra, catalogs
- Week 02 storage: disks, buffers, pages, tuples
- Week 03 RA ops: scan, sort, projection
- Week 04 selection: heaps, hashing, indexes
- Week 05 selection: N-d matching, similarity
- Week 06 *no new content, no online sessions*
- Week 07 joins: naive, sort-merge, hash join
- Week 08 query processing, optimisation
- Week 09 transactions: concurrency, recovery
- Week 10 database trends (guest lecturer?)

❖ Textbooks

No official text book; several are suitable ... 

- Silberschatz, Korth, Sudarshan
"Database System Concepts"
- Elmasri, Navathe
"Database Systems: Models, languages, design ..."
- Kifer, Bernstein, Lewis
"Database Systems: An algorithmic-oriented approach"
- Garcia-Molina, Ullman, Widom
"Database Systems: The Complete Book"

but not all cover all topics in detail

❖ Prac Work

In this course, we use PostgreSQL v14

Prac Work requires you to compile PostgreSQL from source code

- instructions explain how to do this on Linux at CSE
- also works easily on Linux and MacOS at home
- PostgreSQL docs describe how to compile for Windows

Make sure you do the first Prac Exercise when it becomes available.

Sort out any problems ASAP (preferably at a consultation).

❖ Prac Work (cont)

PostgreSQL is a **large** software system:

- > 2000 source code files in the core engine/clients
- > 1,500,000 lines of C code in the core

You **won't** be required to understand all of it :-)

You **will** need to learn to navigate this code effectively.

We discuss relevant parts in videos/lectures to help with this.

PostgreSQL books?

- tend to add little to the manual, and cost a lot

❖ Assignments

Schedule of assignment work:

Ass	Description	Due	Marks
1	Storage Management	Week 5	15%
2	Query Processing	Week 9	20%

Assignments will be done individually

Assignments will require up-front code-reading (see Pracs).

Test cases available before submission (extra tests after submission)

Ultimately, submission is via CSE's **give** system.

Late penalties apply; plagiarism checking will be used

❖ Quizzes

Over the course of the semester ...

- five online quizzes
- taken in your own time (but there are deadlines)
- each quiz is worth a small number of marks

Quizzes are primarily a review tool to check progress.

But they contribute 15% of your overall mark for the course.

❖ Exam

Three-hour** exam in the May exam period.

Exam is NOT held in CSE Labs; you do it at home (via ssh or vlab)

The exam is totally open-book ("open-web").

Things that we **can't** reasonably test in the exam:

- writing **large** programs, running **major** experiments

Everything else is potentially examinable.

Contains: descriptive questions, analysis, small programming exercises.

Exam contributes 50% of the overall mark for this course.

** 3-hours worth of work; 4-hours allowed to complete

❖ Exam (cont)

If you cannot attend the final exam ...

- because of documented illness/misadventure
- and you apply for special consideration (within 3 working days)

then you will be offered a Supplementary Exam.

You get **one chance** at passing the exam

- unsw's new fit-to-sit rule applies

Exam hurdle = 20/50 (which is only 40%)

❖ Assessment Summary

Your final mark/grade is computed according to the following:

```
ass1    = mark for assignment 1      (out of 15)
ass2    = mark for assignment 2      (out of 20)
quiz    = mark for on-line quizzes   (out of 15)
exam    = mark for final exam        (out of 50)
okExam  = exam > 20/50               (after scaling)

mark     = ass1 + ass2 + quiz + exam
grade    = HD|DN|CR|PS,   if mark ≥ 50 && okExam
          = FL,           if mark < 50 && okExam
          = UF,           if !okExam
```

❖ Forum Etiquette

Webcms3 has a contextual forum

- posts form part of a comment thread on resource pages

Before posting: check that your query is not already answered

- main forum page has a search function
- single search keywords work best

To receive notification of posts

- each resource with Comments has a bookmark icon
- toggle it to dark to be notified of new posts on that resource

❖ General Etiquette

The course website is a *workplace* platform

- make all communication professional and respectful

Any 9315-related discussion on external platforms

- is treated by UNSW the same as the course website

Summary: work hard and be nice to each other.

❖ Course Outline

All of the above is described in detail in the Course Outline.

Read it.

It forms a contract between you and me on how this course will run.

Additional resources:

- The Nucleus, in the Library
- Forms for various requests: unsw.to/webforms
- Student Counselling: student.unsw.edu.au/counselling

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