Advanced Databases super-module
IN3001 / INM370

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How to reach Vladimir?

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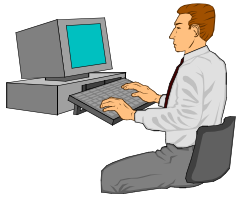

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Contact me during my *Office Hours*:

Thu 3-5PM - in person, by default, or – Message me on Teams

Outside of the Office Hours: please make an appointment by e-mail

General aims of the module

- To understand database management issues, e.g. transaction management, concurrency, recovery, etc.
- To acquire knowledge about data representation and data manipulation for object-oriented and object-relational DB systems.
- To understand fundamental concepts of distributed and replicated DB systems.
- To understand fundamental concepts about new approaches to data management.

- *To acquire the ability and skills to enter the commercial or academic worlds with knowledge that is vital, and skills that can be used for years to come, e.g. some lab sessions are based on Oracle - the market leader for (R)DBMS products.*
  - *The course offers a **mixture** of both fundamental concepts and practical skills!*

A motivational remark: Why database systems?

A point from the business perspective

- [a recent *historical* perspective on DBMS market]

“The DBMS markets are entering a period of transition in terms of both new licensing models and new database management technologies. These developments are emerging just at a time when severe economic conditions are causing most businesses to tightly constrain IT spending”

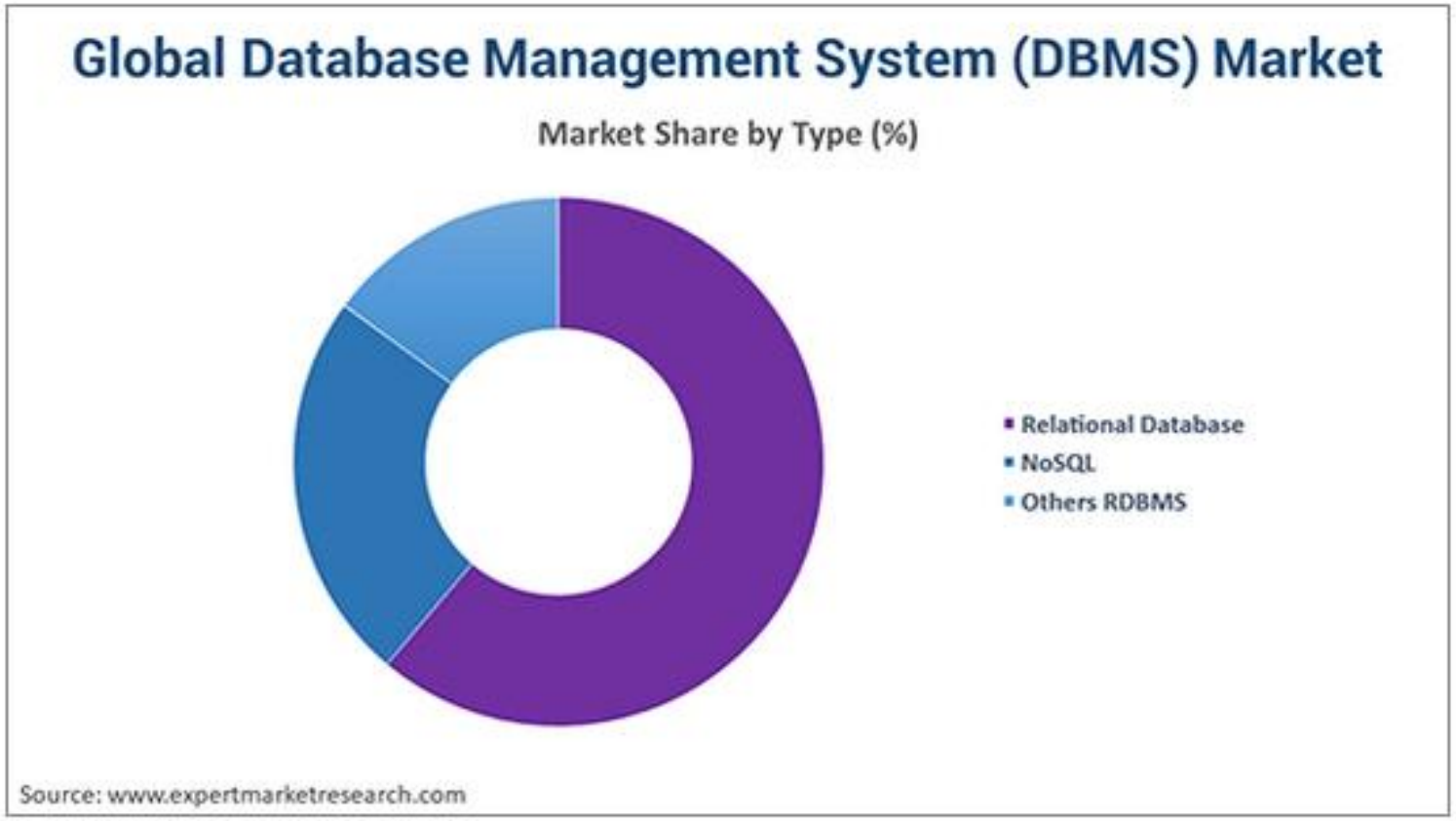
- *Worldwide database management systems 2009-2013 Forecast and 2008 Revenue Shares*, Carl W. Olofson, IDC report, July 2009.

“*This is a huge market estimated by the International Data Corporation (IDC) to be currently more than $40 billion, and predicted to have exceeded $50 billion by 2017*”

Global DBMS market

"*The global database management system (DBMS) market reached a value of almost USD 63.1 billion in 2020. The global database management system (DBMS) industry is further expected to grow at a CAGR of 12.4% between 2021 and 2026 to reach a value of almost USD 125.6 billion by 2026.*"

- https://www.expertmarketresearch.com/reports/database-management-system-market

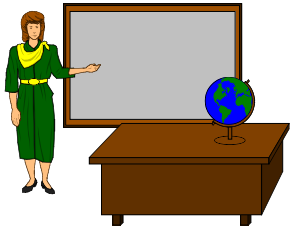


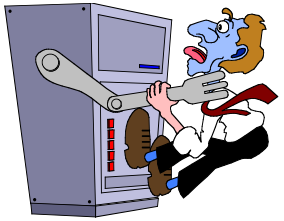
Module Contents

- (Revision of) relational database systems
- Relational database management issues, e.g. transactions, concurrency control, recovery, etc.
- Object-relational database systems
- Distributed and Replicated database management systems
- New approaches to DB modelling, e.g. NoSQL

- The course is *mostly* about fundamental topics, not (just) about current hype

Organisation of the Module





Lectures

Theory **Tutorial sessions**

Moodle resources

Reading (incl. academic papers)/ Analysis/ Critical thinking in your own time!

~120 hrs of self-directed studies needed on average for a 15-credits module (+ 30 hrs teaching time/contact hours)

Teaching...

- Nowadays (irrespective of the recent COVID19 pandemic) teaching style has changed – not based on traditional, *transmissive* mode

- Undergraduate studies (possibly Professional Pathway / Placement/Internship) + postgraduate studies + life-long learning
  - Need to look for materials elsewhere (library/books, Internet, academic papers)
  - Students ought to (further) teach themselves

Tutorials

- **PG – INM370**
  - Day/time: **Wed 11:00 – 11:50**
  - Where: **EG01**
  - Tutor(s): **Vladimir Stankovic**

- **UG – IN3001**
  - Day/time: **Wed 12:00 – 12:50**
  - Where: **A217**
  - Tutor(s): **Vladimir Stankovic**

- Please note that (some) tutorial questions are likely not to be answerable in the time allocated (50 mins!), so you must complete the exercises at home.

Module Timetable

Week	Lecture	Tutorial UG	Tutorial PG	Date
W1	Relational DBs (Revision)	Relational DB, ER, SQL-2	Relational DB, ER, SQL-2	01/02
W2	ORDB/OODB Systems	Oracle ORDB Modelling	Oracle ORDB Modelling	08/02
W3	(Relational) DB Management Issues 1: Transactions, Lock-based CC, Deadlocks	Transactions, Lock-based CC, Deadlocks	Transactions, Lock-based CC, Deadlocks	15/02
W4	(Relational) DB Management Issues 2: SI, Timestamping CC, Security	Transactions, SI, Timestamping CC	Transactions, SI, Timestamping CC	22/02
W5	(Relational) DB Management Issues 3: Recovery	Recovery, Security	Recovery, Security	01/03
W6	**Reading Week**	**Reading Week**	**Reading Week**	08/03
W7	Distributed/Replicated DB	Distributed/Replicated DB	Distributed/Replicated DB	15/03
W8	Distributed/Replicated DB	Distributed/Replicated DB	Distributed/Replicated DB	22/03
W9	NoSQL/New DB approaches - CAP Theorem	NoSQL/New DB approaches CAP Theorem	NoSQL/New DB approaches CAP Theorem	29/03
~~**W10**~~	~~NoSQL/New DB approaches - Variety of approaches~~	~~NoSQL/New DB approaches~~ ~~Variety of approaches~~	~~NoSQL/New DB approaches~~ ~~Variety of approaches~~	~~05/04~~
W11	**Lab-based, in-person** CW Assessment	**Lab-based, in-person** CW Assessment	**Lab-based, in-person** CW Assessment	12/04

Must be available on the day! 9AM-11AM, see Timetable

Module Assessment –
Both UG - IN3001, and PG - INM370

- One piece of coursework
  - 12 Apr (week 11), 9AM-11AM
  - During the usual lecture time (2 hours)
  - **Open-book**!

- One exam paper, 70% of total marks
  - IN3001 **and** INM370 exam style: “2 out of 3” questions in 90 mins, with suitable difficulty for each.

- Earlier exam papers are applicable for revision.
  - Will be made available
  - Non-applicable material, if any, will be obvious
  - But, I will point to any material that is not!
  - We will have a Revision lecture

- *Pass mark*: IN3001 - 40%, INM370 - 50%

The module content, Moodle etc.

- General info - News forum, IN3001/INM370 Discussion forums
- Lab membership – NOT negotiable!
  - Not always the same for the 2 “sub-modules”
- Timetable
- Lecture notes/material on Moodle
  - I will inform you *in advance* about the relevant book chapters, and upload slides (they are being updated continuously, however)
- Additional material / self-directed studies
- Descriptions of tutorials / tutorial notes
- Coursework assignment (more info in due course)
  - *Feedback* relates to discussion in lectures, tutorials and through electronic means, i.e. feedback is *not only* the one directly given for the coursework!
- Model answers and feedback (more info in due course)
  - Tutorial answers – about a week after the corresponding tutorial, so that you work on it yourselves first

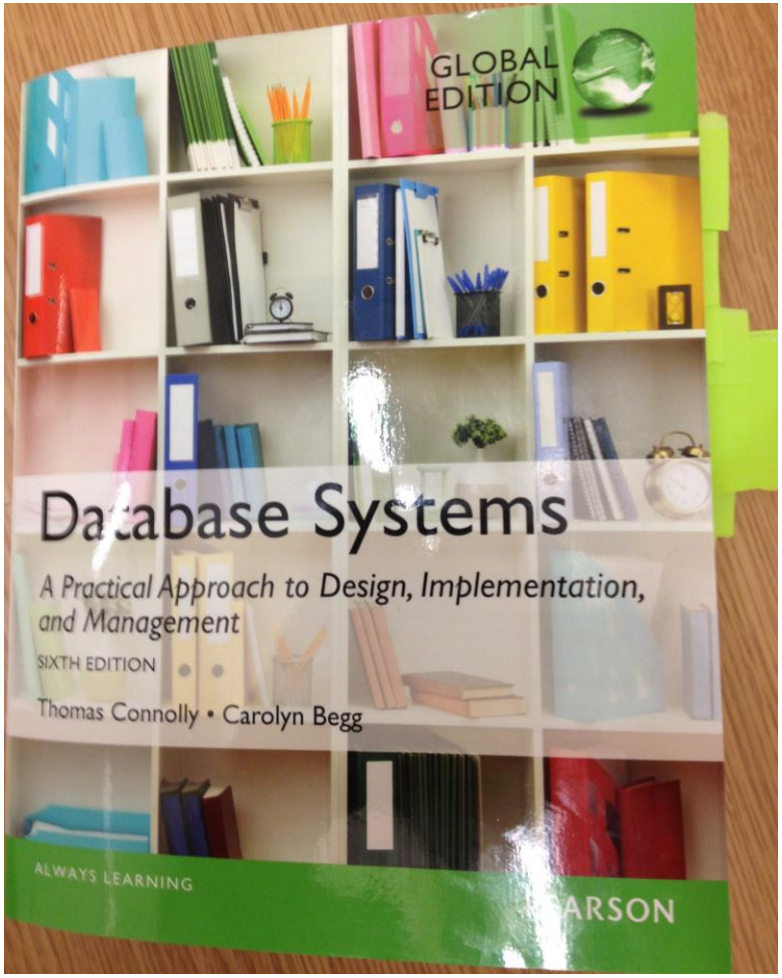
Required/Suggested Textbooks

- Connolly,T. and Begg, C. "*Database Systems - A Practical Approach to Design, Implementation, and Management*."
  - **6th Ed., Global Edition, Pearson Education Ltd, 2015 (ISBN 9781292061184), in the Library**
    - **http://library.city.ac.uk/record=b2058057**
  - 5th Ed., Addison-Wesley, 2010, (ISBN 0321523067, 9780321523068), in the Library
    - http://library.city.ac.uk/record=b1472112

- Dan Sullivan, "NoSQL for mere mortals.",
  - Hobken, NJ, Addison-Wesley, 2015 (ISBN 9780134023212), in the library
  - http://library.city.ac.uk/record=b2201576
- Korth, H., Silberschatz, A. and Sudarshan S., *"Database Systems Concepts*."
  - 7th Ed., International Ed, McGraw Hill, 2019 (ISBN 9781260084504)
    - https://library.city.ac.uk/record=b2575954 ; Available as an e-copy too - check the module's entries at http://readinglists.city.ac.uk/
  - 6th Ed., International Ed, McGraw Hill, 2011 (ISBN 9780071289597, 0071289593)
    - http://library.city.ac.uk/record=b1740591

- Research papers, Online material
  - See http://readinglists.city.ac.uk/
- Library Guide for CS department http://libguides.city.ac.uk/computing

6th Ed., Global Edition, Pearson Education Ltd, 2015 (ISBN 9781292061184), in the Library



- There is an E-book available – use this link (see the module's *readinglist* too):