



THE UNIVERSITY OF  
MELBOURNE

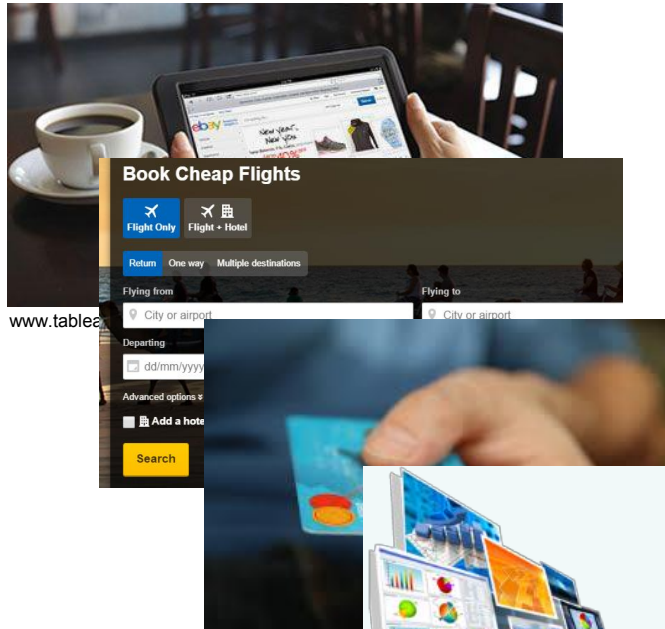
# INFO20003 Database Systems

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Welcome

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[The Economist]



**50-fold from 2010-2020\***

\* "The Digital Universe in 2020: Big Data, Bigger Digital Shadows, and Biggest Growth in the Far East", 2012, IDC

<http://reportlogix.com/reporting.html>

## And grows exponentially...



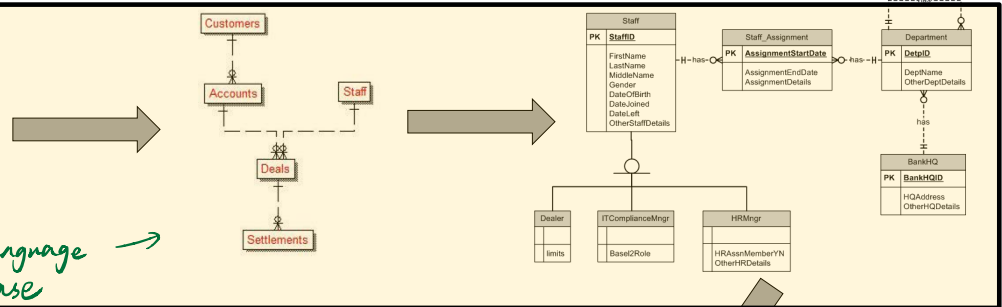
## Equals to finding the needle in a haystack

# What this subject is all about

## Organisational Description and Problem Area

An investment bank wants to have a database to provide it with the ability to store information about its trading operations. The bank essentially works with customers by providing the capability for trading stocks, shares and other commodities. The bank has three branches in which exist a number of departments. Departments have a department manager who supervises a number of staff within the department. A set of accounts are used to store information about the currency of the organisations operations. Accounts can be customer accounts or internal "house" accounts, each of which allow trades to be made upon them. There are a number of account types. There are many customers and customers may have one or more contacts. Customers have a facility for lending money to pay for their purchases of stocks and commodities. Staff make deals on the behalf of their customers using a funding source and keeping track of settlements on the deals being made. There are many types of deal to be made. Settlements are full or partial payments of the deals and are recorded whenever a payment is made. Please note that this section is purely made up and by all means is a very short description of a real investment bank (although many details have been left out and wide ranging assumptions have been made).

transform human language →  
to a database



MODELLING

## ARCHITECTURE / INTERNAL WORKINGS

Results

Process

Access

Store

Database System



SQL  
Queries

select val from sales  
where id = max;



## 1. How to design & build a database application

+ Model and write SQL queries

## 2. A brief look “under the hood” of a DBMS

Why?

- The best application writers & database administrators understand DBMS internals
- DBMS technology is still very much in evolution in industry (plenty of job opportunities)



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- Organization
- Week by week plan
- Assessment



## 1. LECTURES

Teach concepts

## 2. TUTORIALS

Apply

## 3. LABS

Practice at home



## COMPLEMENTARY

### Assessments:

- |   |   |                |
|---|---|----------------|
| 1. Assignment 1: 10% (ER modelling)                                   | } | Hurdle 1 (15%) |
| 2. Assignment 2: 10% (RA & SQL)                                       |   |                |
| 3. Assignment 3 ( <b>Quiz</b> ): 10% (Query Processing/ Optimisation) |   |                |
| <b>BOTH REQUIRED</b>  |   |                |
| 4. Weekly quizzes: 10% (1% per week)                                  | } | Hurdle 2 (35%) |
| 5. <b>Final Exam: 60%</b>   |   |                |



# Week by week schedule

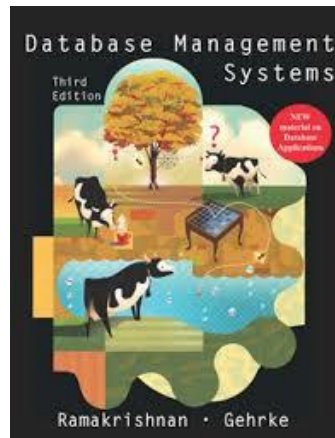
- **LMS** (up to date) allow minor changes here

Week	Lecture 1	Lecture 2	Tutorial	Lab	Assessments
W01 3-Aug	1. Introduction to the Subject and Database Systems	2. The Database Development Process	MySQL Overview/Installation		
W02 10-Aug	3. Introduction to ER Modelling	4. Relational Model	Tutorial: Introduction to Database Development	Lab: ER modelling with MySQL Workbench	
W03 17-Aug	5. ER Example with MySQL Workbench	6. Hands-on Modelling	Tutorial: Conceptual and Logical Modelling (ER)	Lab: ER modelling with MySQL Workbench continued	A01 ER post
W04 24-Aug	7. Relational Algebra	8. SQL	Tutorial: ER modelling case study	Lab: ER modelling case study	
W05 31-Aug	9. SQL Summary	10. Storage and Indexing	Tutorial: Relational Algebra and translation to SQL	Lab: SQL Skills	<b>A01 ER DUE Friday</b>
W06 7-Sept	11. Query Processing-Part 1 (Selection & Projection)	12. Query Processing-Part 2 (Joins)	Tutorial: Indexing and Storage	Lab: More SQL Skills	A02 SQL post
W07 14-Sept	13. Query Optimization-Part 1	14. Query Optimization-Part 2	Tutorial: Query Processing	Lab: Even More SQL Skills	
W08 21-Sept	15. Normalization	16. Normalization (hands-on)	Tutorial: Query Optimization	Lab: Query Optimization using Execution Plan	<b>A02 SQL DUE Friday</b>
W09 28-Sept	17. Database Administration	18. Transactions	Tutorial: Normalization	Tutorial: Normalization	
	<b>Mid Semester Break</b>	<b>Mid Semester Break</b>	<b>Mid Semester Break</b>		
W10 12-Oct	19. Data Warehousing	20. Distributed Databases	Tutorial: Database Administration and Transactions	Lab: Database Admin: Backup and Recovery	
W11 19-Oct	21. Introduction to NoSQL	22. Adaptive databases for the future (nonexaminable: introducing database research avenues)	Tutorial: Data Warehousing	Lab: Transaction exercise using MySQL Workbench	<b>A03 QP/QO Quiz</b>
W12 28-Oct	23. Review 1	24. Wrap up and Review 2	Tutorial: NoSQL	Tutorial: Exam FAQs	



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- Lectures and lecture notes
- Tutorials (and solutions)
- Labs (and solutions)
- Textbook: Ramakrishnan and Gehrke, 3rd Edition (not mandatory)
  - Other good database books are recommended on the LMS Subject Information page



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- **Head Tutor:** Colton Carner
  - Email: [colton.carner@unimelb.edu.au](mailto:colton.carner@unimelb.edu.au)
- Tutors: Benedict, Sehrish, Ibrahim, Xiuge, Firman, Gilbert, Oscar, Neven



Colton

Benedict

Sehrish

Ibrahim

Xiuge

Firman

Gilbert

Oscar

Neven





- One live class & workshop per week on Zoom
- Three workshop support consultations
- Use ED discussion board for questions
- Email to us (only if personal)
- Our emails to you:
  - For assignments clarifications/guidance
  - Feedback on your assignments (marks)

**What do you expect us to cover in the subject?**