



COMP3311 Week 1 Monday Lecture

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- Data Modelling
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COMP3311 23T3

Database Systems



<https://webcms3.cse.unsw.edu.au/COMP3311/23T3/>

❖ Lecturer



Name: John Shepherd

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Consults: Times: TBA, Place: CSE Help!

Roles: Convenor, COMP3311 23T3
Deputy Head of School (edu)

Research: Information Extraction
Information Retrieval
e-Learning Technologies
Multimedia Databases

Extras: AFL, GABS, HP, IPA, KD

What to call me? jas, John, Dr Shepherd, HRH, Your Majesty

❖ Course Admin



Name: Dylan Brotherston

Email: cs3311@cse.unsw.edu.au

Roles: COMP3311 23T3 Admin
COMP1521 23T3 Admin

Despite the picture, Dylan is not a bat

❖ Tutors

Many, many students \Rightarrow many tutors ...

- Brianna Kim
- Calley Chai
- Carly Lim
- Dylan Brotherston
- Evan Krul
- Kenneth Li
- Kyu-Sang Kim
- Manhua Lu
- Max Xue
- Ronan Davis
- Sai Nair
- William Feng
- Xinzhang Chen
- Yun Li



❖ How COMP3311 23T3 will run

Sources of information:

- lectures (Lectures) ... summarize content + examples
- videos (Topic Videos) ... primary content
- Course Notes ... more detailed version of topic video slides
- textbooks ... most detailed version of topics

Activities:

- lectures ... summarize, work through examples, ask questions
- tutorials ... work through exercises, ask questions
- prac exercises ... learn the systems and skills
- assignments ... practice your skills
- exam ... demonstrate your knowledge/skills

❖ How COMP3311 23T3 will run (cont)

Classes:

- lectures ... live, recorded but not live-streamed
- tutorials ... mainly live (f2f), some online, starting week 2
- exam ... 3-hour, in-lab, invigilated, closed-book (no offshore/at-home)

Note on lecture enrolments:

- 1UGB = I plan to attend live lectures (CLB7, aka OShane 104)
- WEB = I do not plan to attend live lectures

Not everyone can attend live: CLB7 holds ~450, Class is ~700

❖ Know your course website

Access via <https://webcms3.cse.unsw.edu.au/COMP3311/23T3/>

- Home: where Notices and Upcomings appear
- Course Outline: the "contract"
- Timetable: info on tutors and locations for tutorials
- videos: short-form (20-40 mins), topic based videos
- Lectures: slides, videos and exercise solutions
- Tute Exercises: questions and, eventually, answers
- Course Notes: more detailed slides (incl. optional material)
- Activities: quizzes and polls

❖ Your DB Server

You run you own PostgreSQL server on the host **nw-syd-vxdb2**

How to access the **vxdb2** server

- from Vlab: **ssh YourUserName@nw-syd-vxdb2**
- from Home: **ssh YourUserName@d2.cse.unsw.edu.au**

On the **vxdb2** server you have

- your standard CSE directories
- a special directory **/localstorage/YourUserName/**

The only software you should run on **vxdb2** is PostgreSQL (**no vscode**)

❖ Exercise: Play with **vxdb2**

Login to **vxdb2**

Find your **/localstorage** directory

Set up your environment

Install your PostgreSQL server

Explore the files in your PostgreSQL server

More details on doing this are in Prac Exercise 02.

❖ Data Modelling

Aims of data modelling:

- describe what **information** is contained in the database
(e.g., entities: students, courses, accounts, branches, patients, ...)
- describe **relationships** between data items
(e.g., John is enrolled in COMP3311, Tom's account is held at Coogee)
- describe **constraints** on data
(e.g., 7-digit IDs, students can enrol in no more than 3 courses per term)

Data modelling is a **design** process

- converts requirements into a data model

❖ Some Design Ideas

Consider the following while working through exercises:

- start simple ... evolve design as problem better understood
- identify objects (and their properties), then relationships
- most designs involve kinds (classes) of people
- keywords in requirements suggest data/relationships
(rule-of-thumb: nouns → data, verbs → relationships)
- don't confuse operations with relationships
(operation: he **buys** a book; relationship: the book **is owned** by him)
- consider all possible data, not just what is available

❖ Exercise: Course Outline Data Model

Imagine that we wanted a database of course outlines.

Work out requirements by looking at real course outlines.

Develop an informal data model for it by identifying:

- the data items involved (objects and their attributes)
- relationships between these data items
- constraints on the data and relationships

❖ Exercise: Instagram Data Model

Consider Instagram (photos, videos, viewers, posters, ...)

Develop an informal data model for it by identifying:

- the data items involved (objects and their attributes)
- relationships between these data items
- constraints on the data and relationships

❖ Exercise: GMail Data Model

Consider the **GMail system** (or any other modern mail client)

Develop an informal data model for it by identifying:

- the data items involved (objects and their attributes)
- relationships between these data items
- constraints on the data and relationships

❖ Entity-Relationship Data Modelling

The world is viewed as a collection of **inter-related entities**.

ER has three major modelling constructs:

- **attribute**: **data item** describing a property of interest
- **entity**: collection of attributes describing **object** of interest
- **relationship**: **association** between entities (objects)

The ER model is not a standard, so notational variations exist

Lecture notes use notation from SKS and GUW books (simple)

❖ Entity-Relationship (ER) Diagrams

ER diagrams are a graphical tool for data modelling.

An ER diagram consists of:

- a collection of **entity set** definitions
- a collection of **relationship set** definitions
- **attributes** associated with entity and relationship sets
- connections between entity and relationship sets

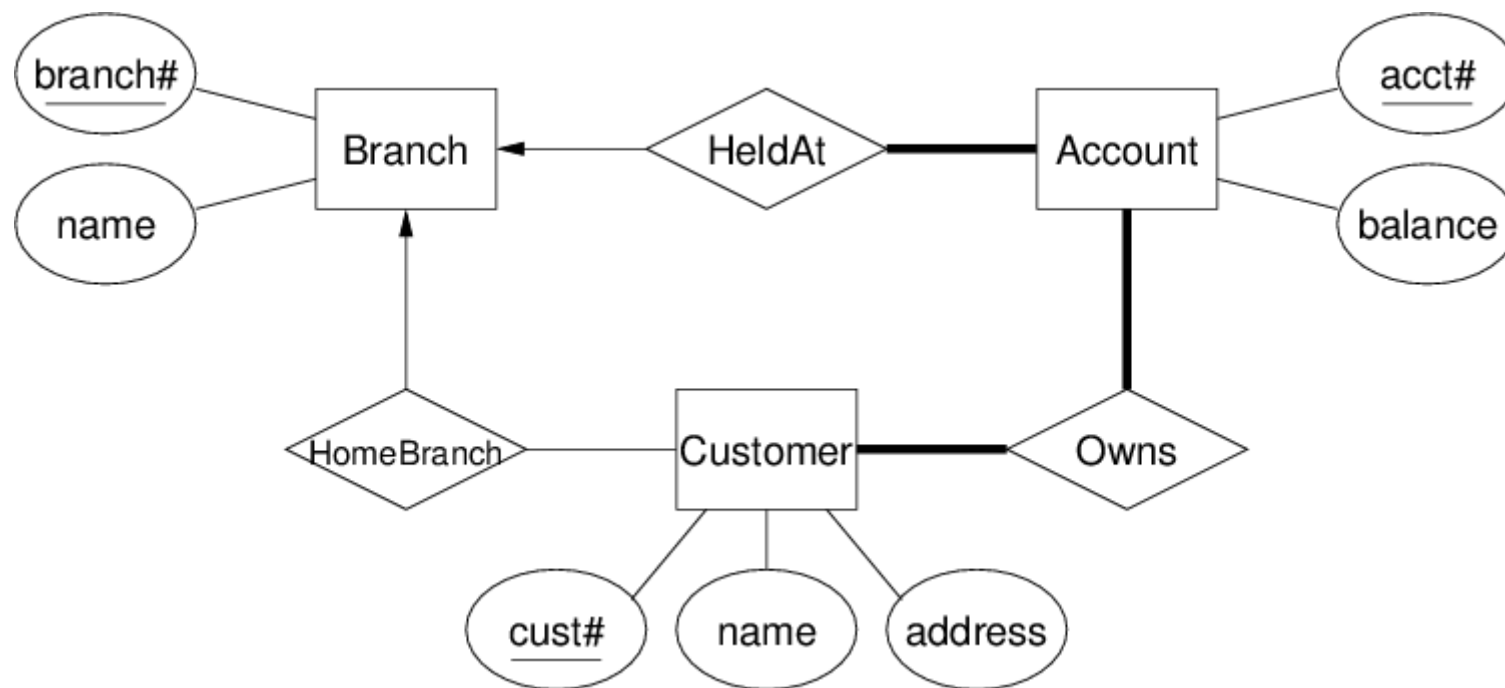
Terminology abuse:

- we say "entity" when we mean "entity set"
- we say "relationship" when we mean "relationship set"
- we say "entity instance" to refer to a particular entity

Key = set of attributes that uniquely identifies each entity instance

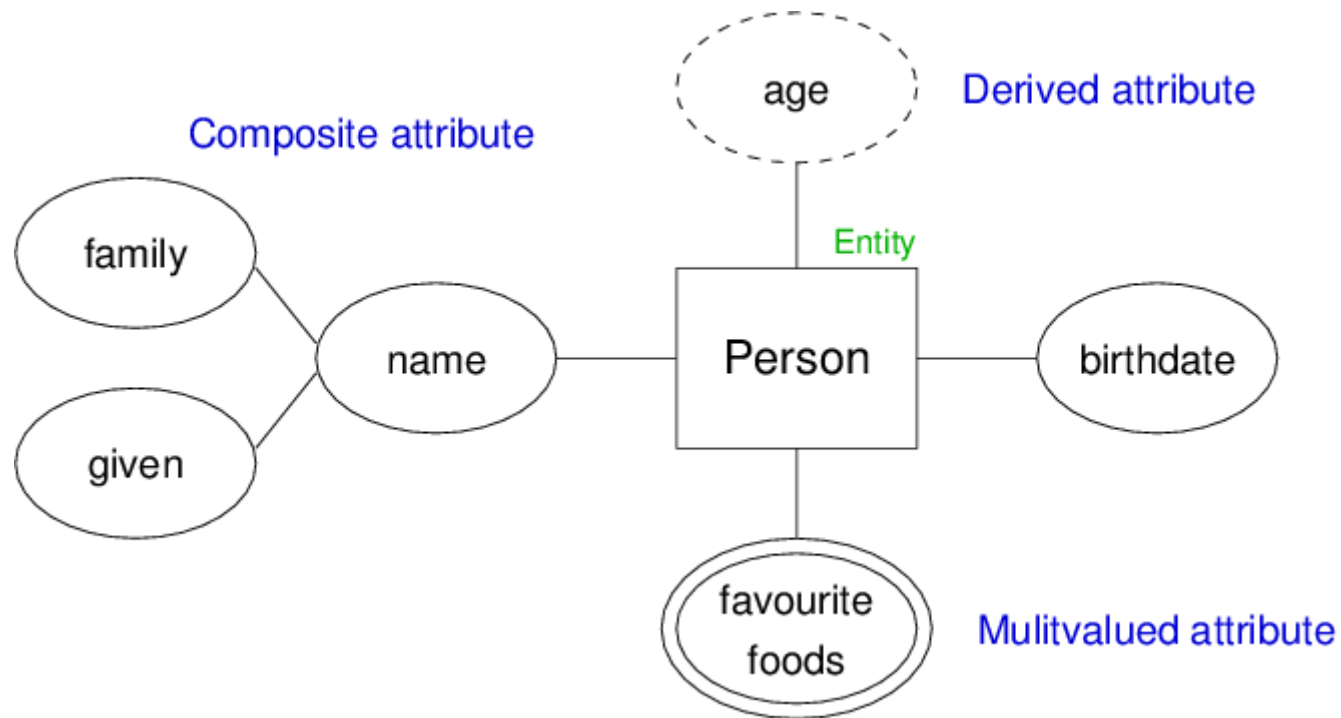
❖ Entity-Relationship (ER) Diagrams (cont)

Example ER diagram:



❖ Entity-Relationship (ER) Diagrams (cont)

Example of attribute notations:



❖ Exercise: Relationship Semantics

Describe precisely the semantics of the following relationships:



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