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COMP3311 Week 1 Tuesday Lecture

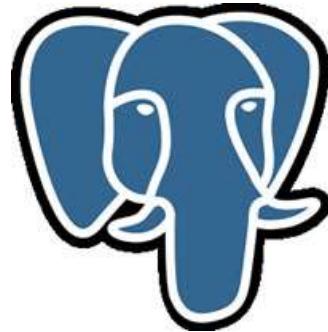
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COMP3311 23T1

Database Systems



<https://webcms3.cse.unsw.edu.au/COMP3311/23T1/>

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❖ Lecturer



Name:	John Shepherd
Email:	cs3311@cse.unsw.edu.au
Consults:	TBA
Roles:	Convenor, COMP3311 23T1 Deputy Head of School (edu)
Research:	Information Extraction Information Retrieval e-Learning Technologies Multimedia Databases
Extras:	GABS, AFL, KD, NW

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

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❖ Course Admin



Name: Dylan Brotherston
Email: cs3311@cse.unsw.edu.au
Roles: COMP3311 23T1 Admin
COMP1521 23T1 Admin

Despite the picture, Dylan is not a bat

❖ Tutors

Many, many students ⇒ many tutors ...

- Carly Lim
- Dylan Brotherston
- Evan Krul
- Jason Gong
- Kyu-sang Kim
- Manhua Lu
- Max Xue
- Minyi Zhong
- Ronan Davis
- Shirley Zhou
- William Feng
- Yifan He



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❖ How COMP3311 23T1 will run

Sources of information:

- content videos (Slides and Videos) ... primary content
- lectures (Lecture Material) ... summarises content + examples
- Course Notes ... more detailed version of content video slides
- textbooks ... most detailed version of topics

Activities:

- lectures ... work though (new) 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

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❖ How COMP3311 23T1 will run (cont)

Classes:

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

Note on lecture enrolments:

- 1UGB = I plan to attend live lectures (CLB6)
- WEB = I do not plan to attend live lectures

Not everyone can attend live: CLB6 holds ~200, Class is ~600

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❖ Know your course website

Access via

<https://webcms3.cse.unsw.edu.au/COMP3311/23T1/>

- Home: where Notices and Upcomings appear
- Course Outline: the "contract"
- Timetable: info on tutors and locations for tutorials
- Slides and videos: short-form, 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

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❖ Software

Software versions that we'll be running this semester (TBC):

- PostgreSQL 13, SQLite 3.x, Python 3.9+, psycopg2 2.8+

If you install them at home:

- get versions "close to" these
- **test all work at CSE before submitting**

Alternative to installing at home:

- log in to the vxdb2 server in a terminal window and work there

❖ Software (cont)

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 actual hostname of the vxdb2 server is nw-syd-vxdb2

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

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❖ 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

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❖ 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 want 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)

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

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❖ 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

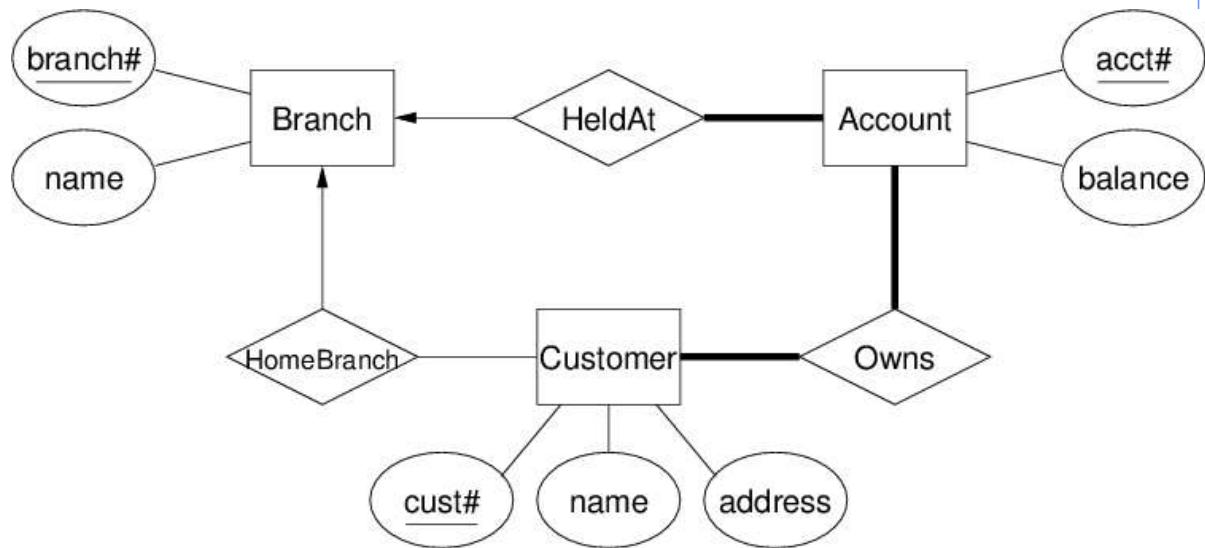
Terminology abuse:

- 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

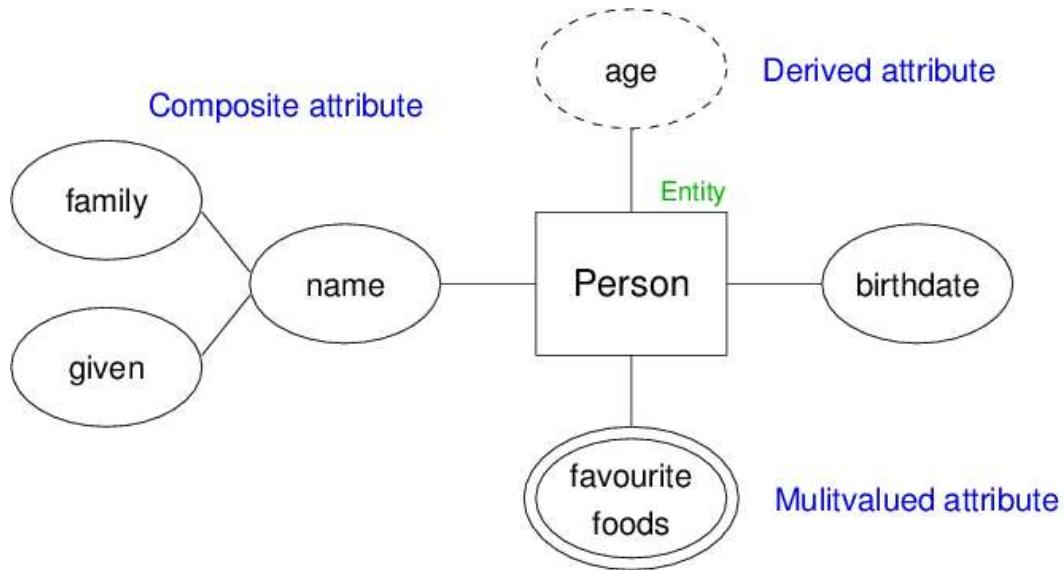
❖ Entity-Relationship (ER) Diagrams (cont)

Example ER diagram:



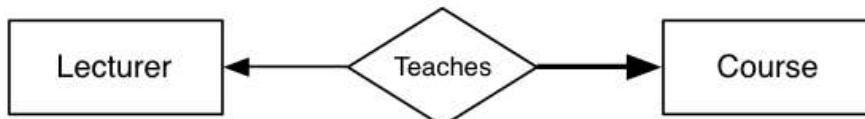
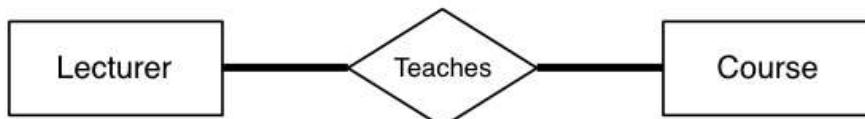
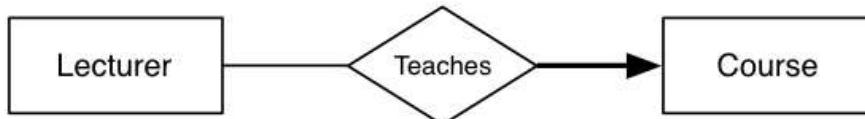
❖ Entity-Relationship (ER) Diagrams (cont)

Example of attribute notations:



❖ Exercise: Relationship Semantics

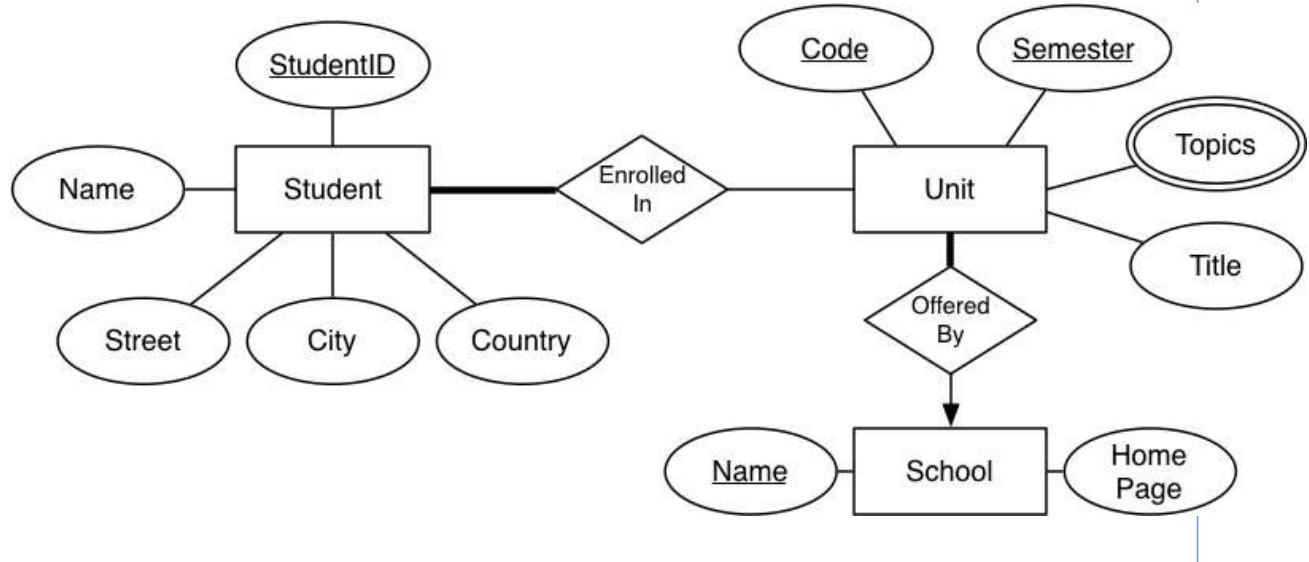
Describe precisely the semantics of the following relationships:



❖ Exercise: ER Diagram

Using the ER diagram below

- give examples of entity values
- describe the semantics of the relationships



❖ Exercise: ER Models

For each of the informal data models

- course outline
- Instagram
- Gmail

give a suitable ER diagram

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