

# COMP3311 Tutorial Week 2

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# A bit about me

- First year PhD student, study the field of general game playing
- Completed CompSci (Honours) degree in 22T1 at UNSW
- Second time tut COMP3311 (21T3)

# Week 1 Summary

- Self check:
  - The semantics of ER diagram (entity, relationship, participation, cardinality, etc.)
  - Definitions related to relational model (relation, attribute, domain, tuple, PK, FK)
  - Basic ER modelling, Requirements → ER diagram
- Due date: Quiz 1 (2%), Friday this week
- Install PostgreSQL Server

# Today's plan

- Definitions related to ER & relational model (Q3, Q16, Q18)
- The semantics of ER diagram (Q6, Q8, Q9)
- Requirements → ER (Q14)

# Definitions related to ER & relational model

# Q3

- Describe the similarities and differences between the following similarly-named concepts
  - relationship in the entity-relationship data model
  - relation in the relational data model

# Q3

- Describe the similarities and differences between the following similarly-named concepts
  - relationship in the entity-relationship data model
  - relation in the relational data model
- Simple answer:
  - Relationship is the “rhombus” in the ER model
  - Relation is a table in a relational data model

# Q3

- Describe the similarities and differences between the following similarly-named concepts
  - relationship in the entity-relationship data model
  - relation in the relational data model
- Formal answer:
  - Relationship describes the association of different entities, can have attributes themselves
  - Relation is an association of different attributes, has a PK, can describe relationship



# Q16

- Attribute
- Domain
- Relation schema
- Relational schema
- Tuple
- Relation
- Primary Key
- Foreign key

```
create table Recurring_Events (  
    event_id          integer,  
    start_date        date not null,  
    end_date          date check(end_date >= start_date), -- can be null means still running  
    ntimes            integer check (ntimes >= 1), -- can be null  
    primary key (event_id),  
    foreign key (event_id) references Events(id)  
);
```

# Q18

Consider the following simple relational schema:

R(a1, a2, a3, a4)  
S(b1, b2, b3)

which of the following tuples are not legal in this schema? Explain why the illegal tuples are invalid.

R(1, a, b, c) R(2, a, b, c) R(1, x, y, z)  
R(3, x, NULL, y) R(NULL, x, y, z)  
S(1, 2, x) S(1, NULL, y) S(2, 1, z)

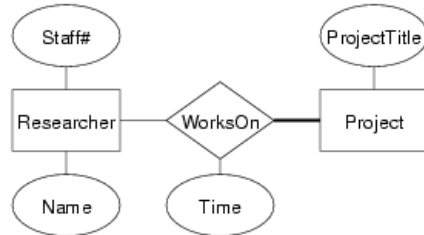
- Assume tuples are inserted in order.

# The semantics of ER diagrams

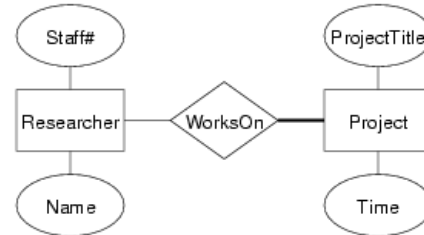
# Q6

5. Researchers work on different research projects, and the connection between them can be modelled by a **WorksOn** relationship. Consider the following two different ER diagrams to represent this situation.

(a)



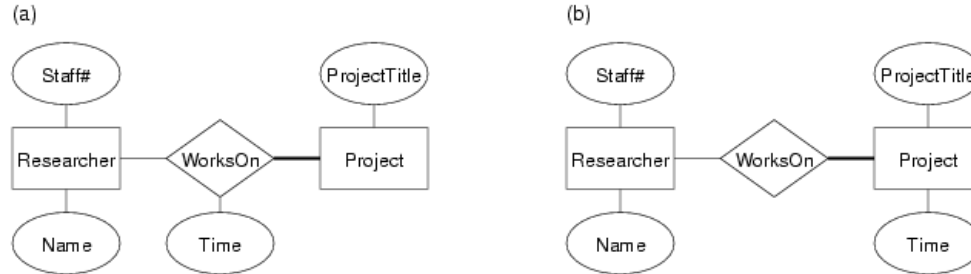
(b)



Describe the different semantics suggested by each of these diagrams.

# Q6

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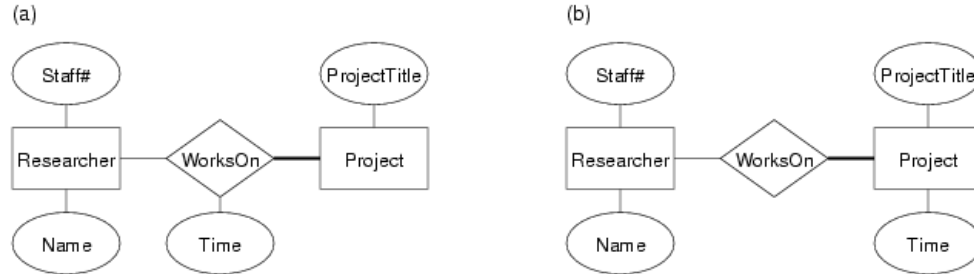


Describe the different semantics suggested by each of these diagrams.

- Time is associated with WorksOn
- Researcher Works on a specific project for a certain amount of time

# Q6

5. Researchers work on different research projects, and the connection between them can be modelled by a **WorksOn** relationship. Consider the following two different ER diagrams to represent this situation.

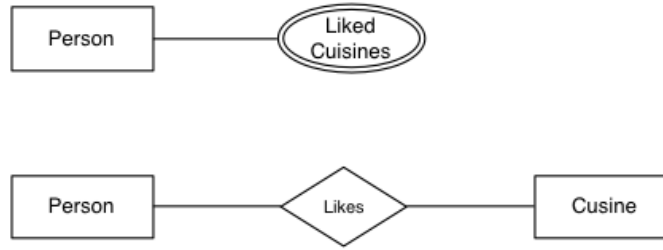


Describe the different semantics suggested by each of these diagrams.

- Time is an attribute of the Project
- Researcher works on a project
- The project has an expected workload of some time

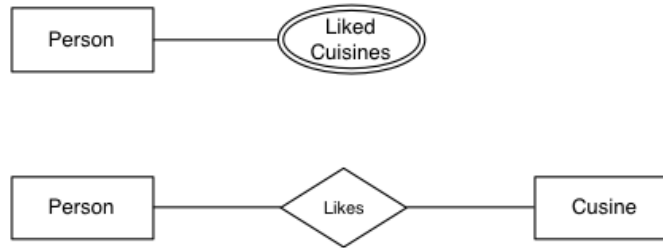
# Q8

The following two ER diagrams give alternative design choices for associating a person with their favourite types of food. Explain when you might choose to use the second rather than the first:



# Q8

The following two ER diagrams give alternative design choices for associating a person with their favourite types of food. Explain when you might choose to use the second rather than the first:



- Likes:
  - (1) Multi-valued attribute
  - (2) Relationship
- If we need some attribute with Cuisine, we'll choose (2)



## Q9 (1)

- Consider a relationship **Teaches** between **teachers** and **courses**. For each situation described below, give an ER diagram that accurately models that situation:
  - Teachers may teach the same course in several semesters, and each must be recorded

## Q9 (2)

- Consider a relationship **Teaches** between **teachers** and **courses**. For each situation described below, give an ER diagram that accurately models that situation:
  - Teachers may teach the same course in several semesters, but only the current offering needs to be recorded (assume this in the following parts)

## Q9 (3)

- Consider a relationship **Teaches** between **teachers** and **courses**. For each situation described below, give an ER diagram that accurately models that situation:
  - Every teacher must teach some course

## Q9 (4)

- Consider a relationship **Teaches** between **teachers** and **courses**. For each situation described below, give an ER diagram that accurately models that situation:
  - Every teacher teaches exactly one course

## Q9 (5)

- Consider a relationship **Teaches** between **teachers** and **courses**. For each situation described below, give an ER diagram that accurately models that situation:
  - Every teacher teaches exactly one course, and every course must be taught by some teacher

## Q9 (6)

- Consider a relationship **Teaches** between **teachers** and **courses**. For each situation described below, give an ER diagram that accurately models that situation:
  - A course may be taught jointly by a team of teachers

# ER Modelling

# Q14

14. Give an ER design to model the following scenario ...

- for each person, we need to record their tax file number (TFN), their real name, and their address
- everyone who earns money in Australia has a distinct tax file number
- authors write books, and may publish books using a ``pen-name" (a name which appears as the author of the book and is different to their real name)
- editors ensure that books are written in a manner that is suitable for publication
- every editor works for just one publisher
- editors and authors have quite different skills; someone who is an editor cannot be an author, and vice versa
- a book may have several authors, just one author, or no authors (published anonymously)
- every book has one editor assigned to it, who liaises with the author(s) in getting the book ready for publication
- each book has a title, and an edition number (e.g. 1st, 2nd, 3rd)
- each published book is assigned a unique 13-digit number (its ISBN); different editions of the same book will have different ISBNs
- publishers are companies that publish (market/distribute) books
- each publisher is required to have a unique Australian business number (ABN)
- a publisher also has a name and address that need to be recorded
- a particular edition of a book is published by exactly one publisher

State all assumptions used in developing your data model.