TEMASEK JUNIOR COLLEGE

Temasek Junior College

2023 JC2 H2 Computing

Database 2 – Entity Relationship Modelling

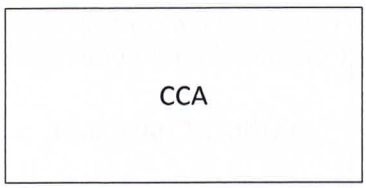
Syllabus Objectives

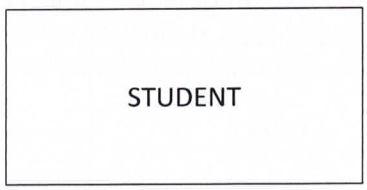
After completing this set of notes, you should be able to:

- Draw entity-relationship (ER) diagrams to show the relationship between tables.

1 What is an Entity?

- An entity is a specific object of interest.
- Collective nouns or nouns are usually used to name entities (e.g STUDENT, CCA, CUSTOMER) and they are usually expressed in UPPER CASE LETTERS.
- Entities are represented by rectangles e.g.





2 Identifying Entities

Consider the following example:

A **school** wants a simple **application** to keep track of their **students**, their **Civics Class** and the **CCA** they join. The **application** must also keep records of all the **CCAs** in the **school**, the **students** joining the **CCAs**, and **Civics Class** assigned to each **student**.

One of the common strategies that can be applied when identifying entities is to first have a description of the problem on hand and then consider the nouns used in the description.

In the example, the nouns are:

- School
- Application
- Student
- Civics Class
- CCA

The potential entities are generally nouns referring to items with data that can be tabulated:

- ~~School~~
- ~~Application~~
- Student
- Civics Class
- CCA

4 Entity-Entity Matrix

An entity-entity matrix is useful in discovering all possible relationships between entities.

	Student	Civics	CCA
Student		belongs	joins
Civics	belongs		
CCA	joins		

From the entity-entity matrix

- A student joins at least one CCA. One CCA can be joined by many students (many-to-many).
- A student must belong to a Civics Class. A Civics Class can have many students (one-to-many)

5 Worked Example

Let us recapitulate the example in the previous notes:

The final design after normalisation is as shown:

Student

MatricNo	Name	Gender	CivicsClass
1	Adam	M	18S12
2	Adrian	M	18S12
3	Adam	M	18A10
4	Bala	M	18A10
5	Bee Lay	F	18A10

Civics

CivicsClass	CivicsTutor	HomeRoom
18S12	Peter Lim	TR1
18S12	Peter Lim	TR1
18A10	Pauline Lee	TR2
18A10	Pauline Lee	TR2
18A10	Pauline Lee	TR2

StudentCCA

MatricNo	CCAName
1	Tennis
2	Choir
2	SC
3	Rugby
4	Badminton
5	Choir
5	Chess Club

CCAInfo

CCAName	CCATeacherIC
Tennis	Adrian Tan
Choir	Adeline Wong
SC	David Leong
Rugby	Andrew Quah
Badminton	Lilian Lim
Chess Club	Edison Poh

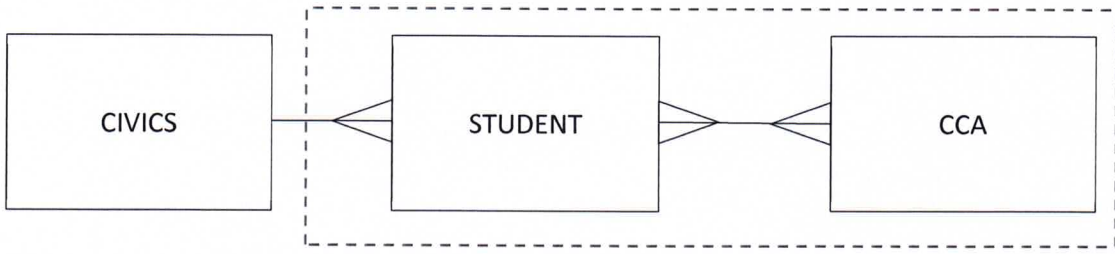
The design can be represented using the following set of table descriptions:

```
Student   ( MatricNo , Name , Gender , CivicsClass )
Civics    ( CivicsClass , CivicsTutor , HomeRoom )
StudentCCA ( MatricNo , CCAName )
CCAInfo   ( CCAName , CCATeacherIC )
```

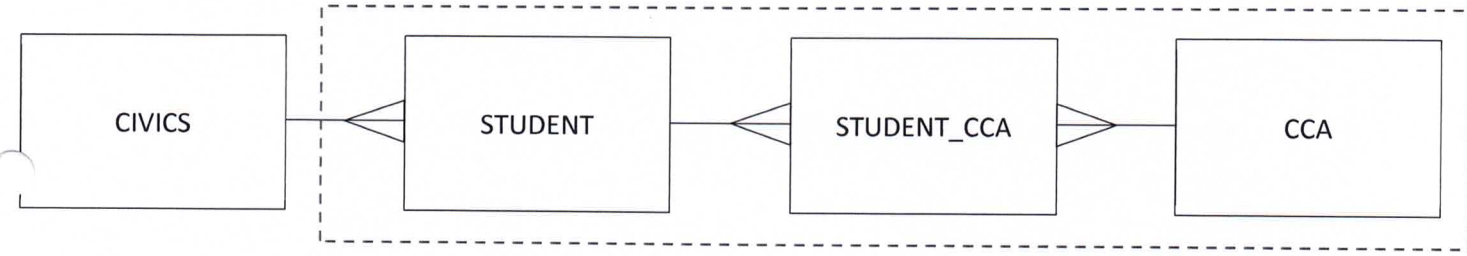
Observe that we have the following relationships:

- STUDENT – CCA
  - Many-to-many
  - To be decomposed to 2 one-to-many relationships
- CIVICS – STUDENT (one-to-many)
  - One-to-many

A preliminary entity relationship model can be:



The model can be decomposed to:



Practice Questions

1. Construct the ER diagram for your 3NF database derived from `Hire_Cars.csv`
2. Construct the ER diagram for your 3NF database derived from `Appointments.csv`.
3. Construct the ER diagram for the Concert example in the notes on normalisation.