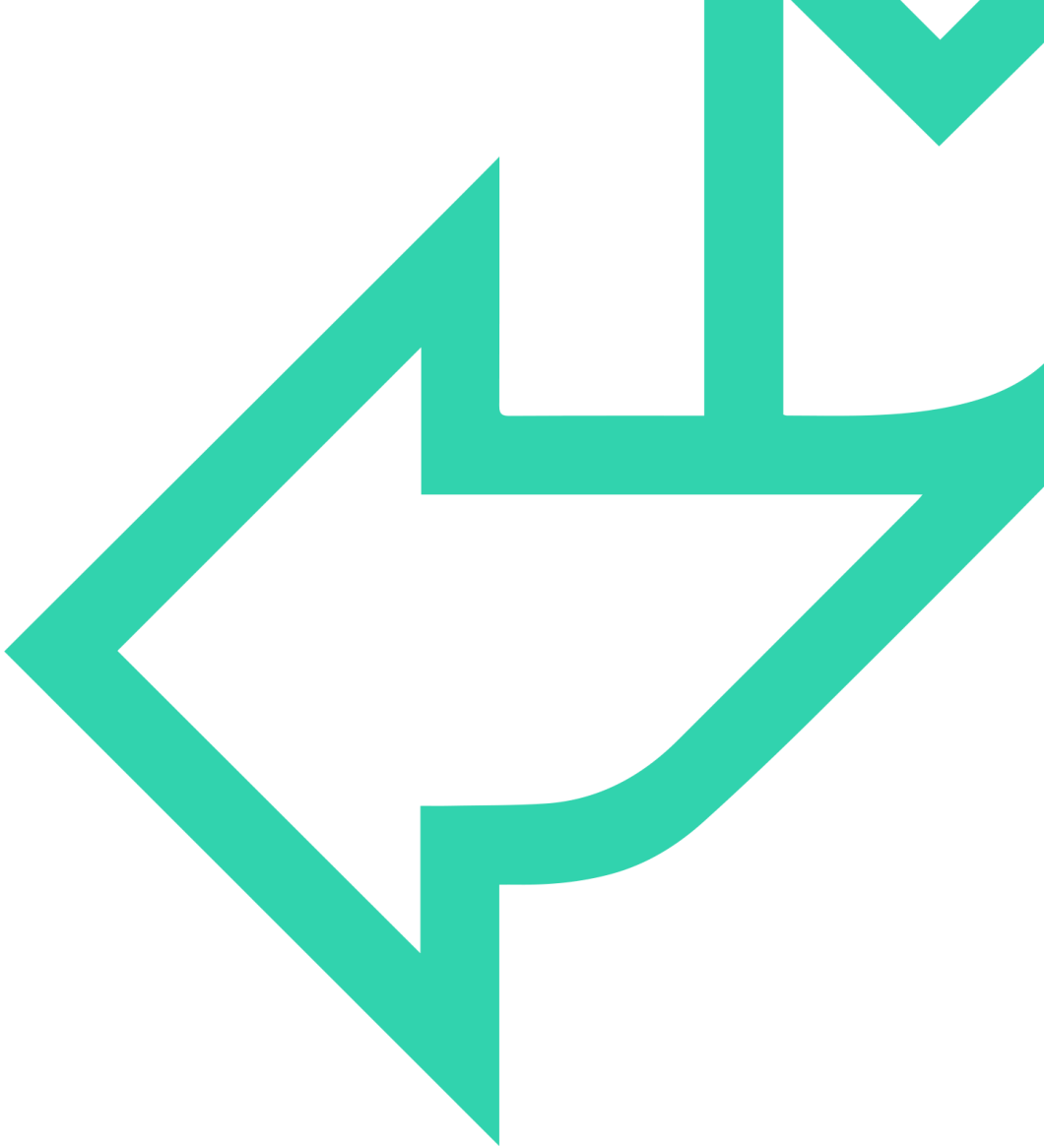
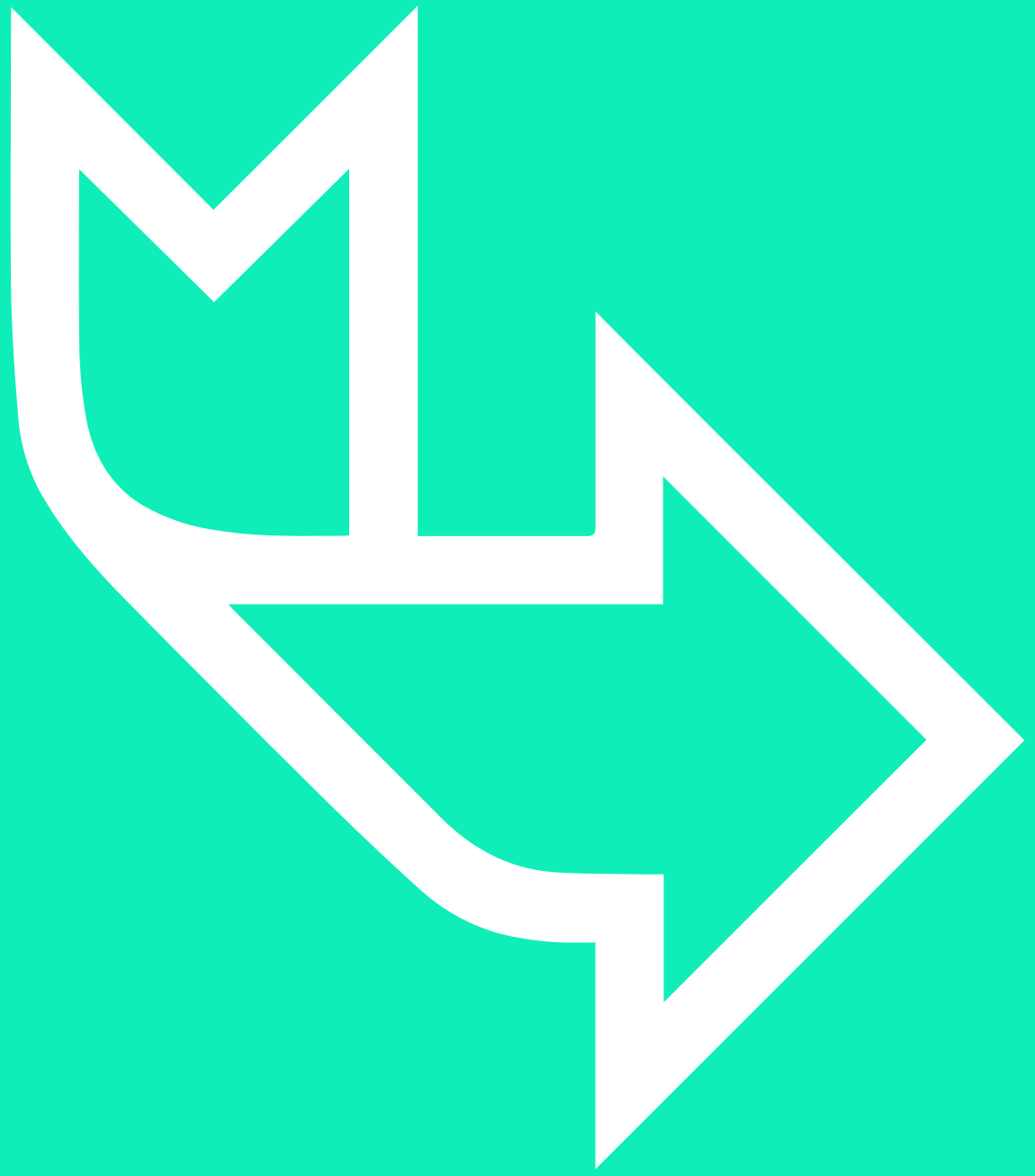
POWERING POTENTIAL

Conceptual Data Models





Data Modelling

Lesson Objectives and Contents

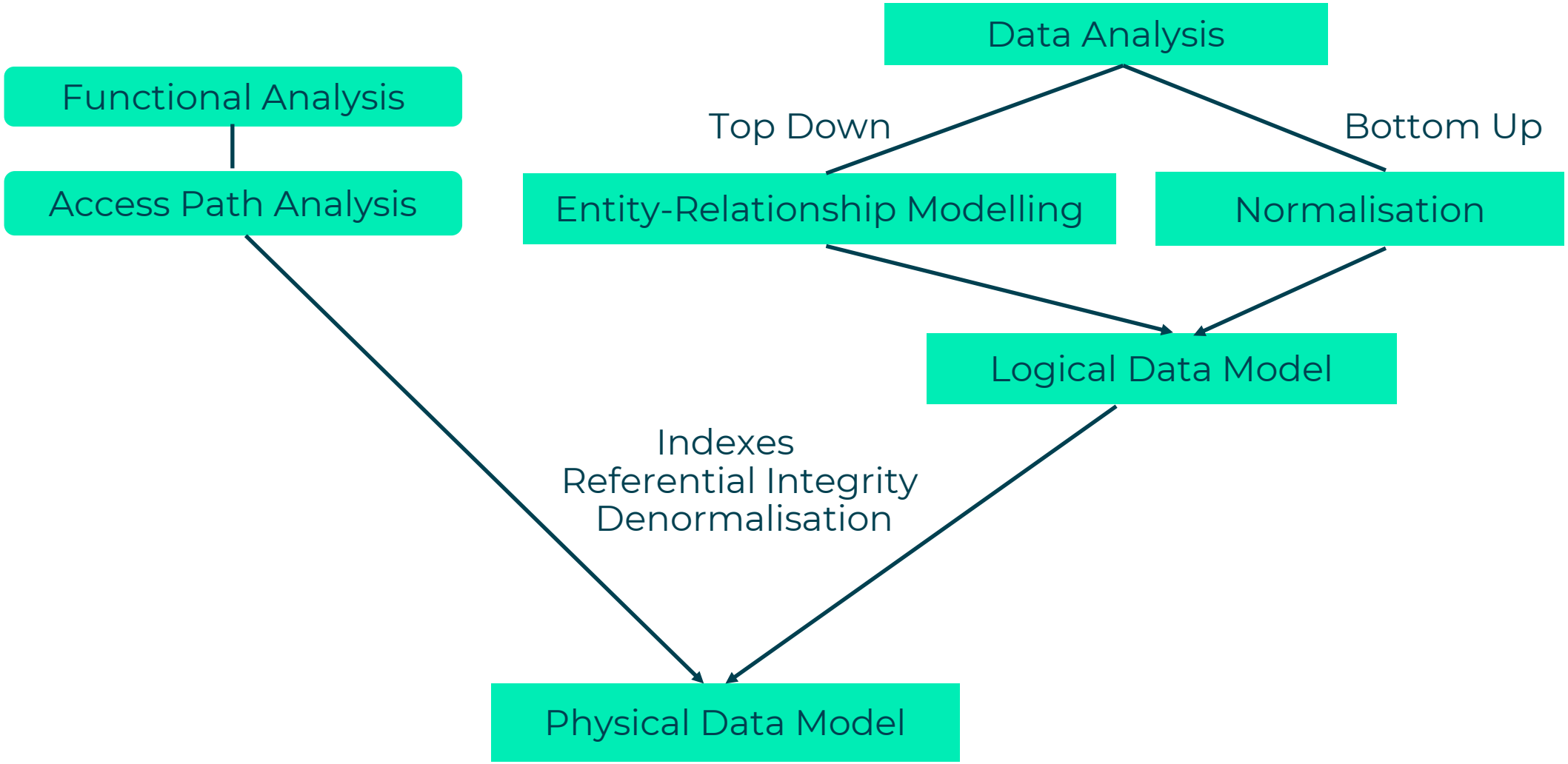
→ Conceptual Data Model

DATA MODELLING

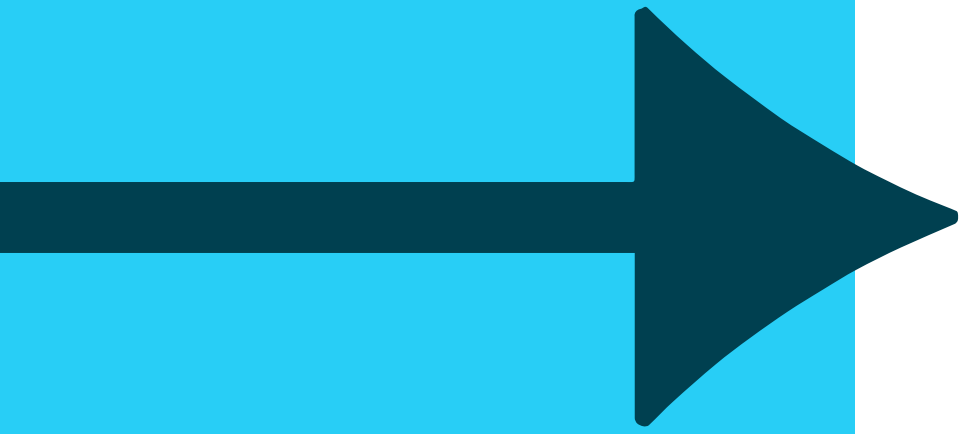
Let’s take a look at an **Airline System.**

- Passenger
- Ticket
- Aircraft
- Flight

From Analysis to Data Model...



ENTITIES AND RELATIONSHIPS



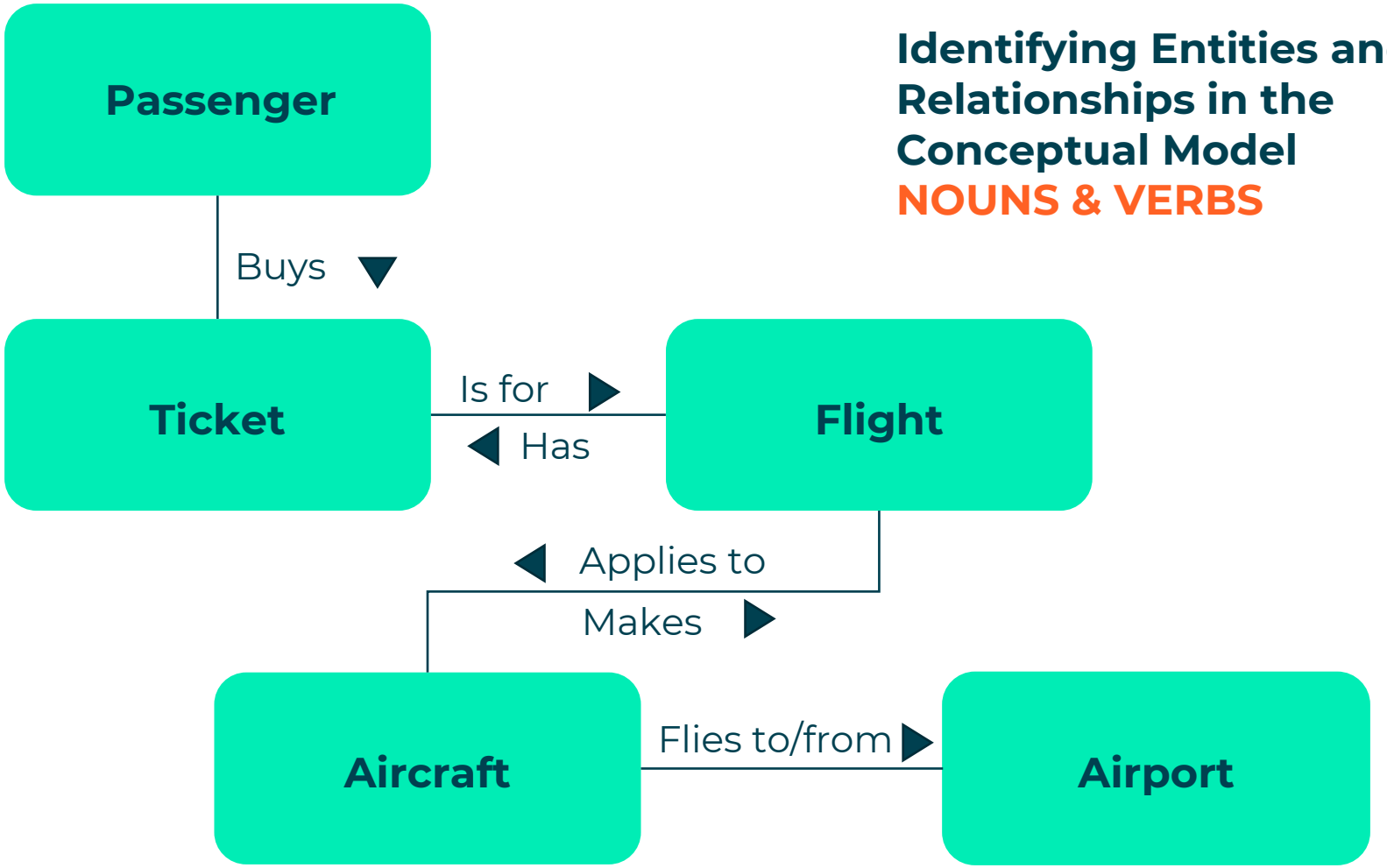
Identifying Entities and Relationships – NOUNS & VERBS

Let's take a look at an ...

Airline System

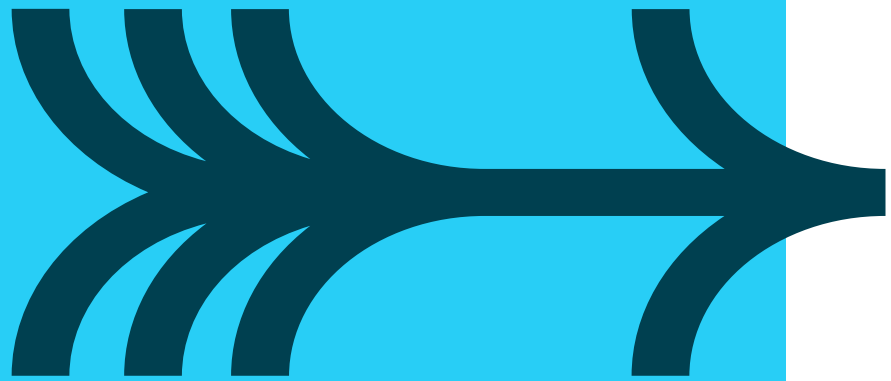
- A Passenger buys a Ticket to travel on an Aircraft which carries out a Flight from one Airport to another Airport.
- A Passenger buys a Ticket to travel on an Aircraft which carries out a Flight from one Airport to another Airport.

Entities and Relationships



Identifying Entities and Relationships in the Conceptual Model
NOUNS & VERBS

CARDINALITY



Let’s introduce another term – Cardinality.

This specifies the **number** of each **entity** that is involved in the relationship.

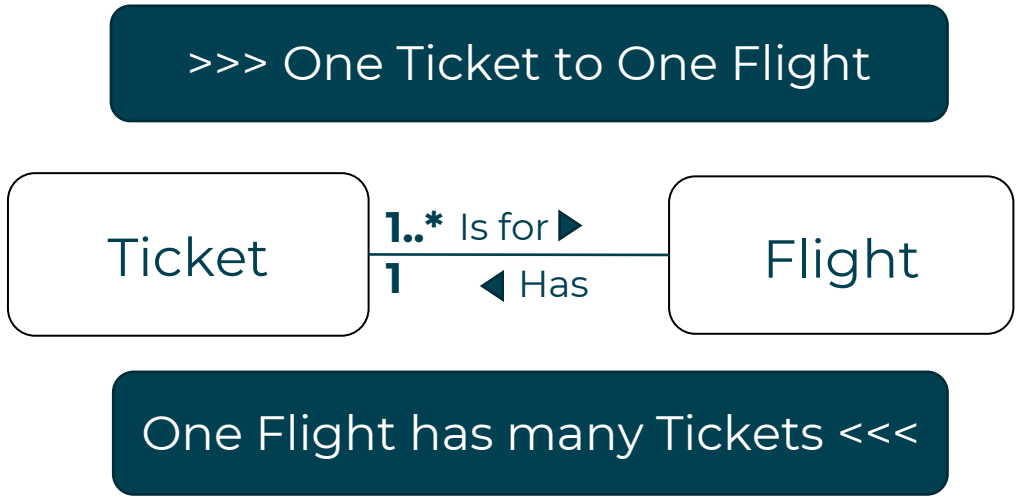
There are three types of cardinality:

1. One to one (1:1). For example, 1 person is in a relationship with another person.
2. One to many (1:m). For example, 1 manager manages many employees, each employee is managed by 1 manager.
3. Many to many (m:n). For example, each students take many modules, each module is taken by many students.

CARDINALITY

The cardinality in our Airline model.

In a UML diagram, we specify the cardinality along our relationship edge:



CARDINALITY

Cardinality is controlled by defined Business Rules, so...

Passenger ----------**Ticket**

One passenger can buy multiple tickets

Or

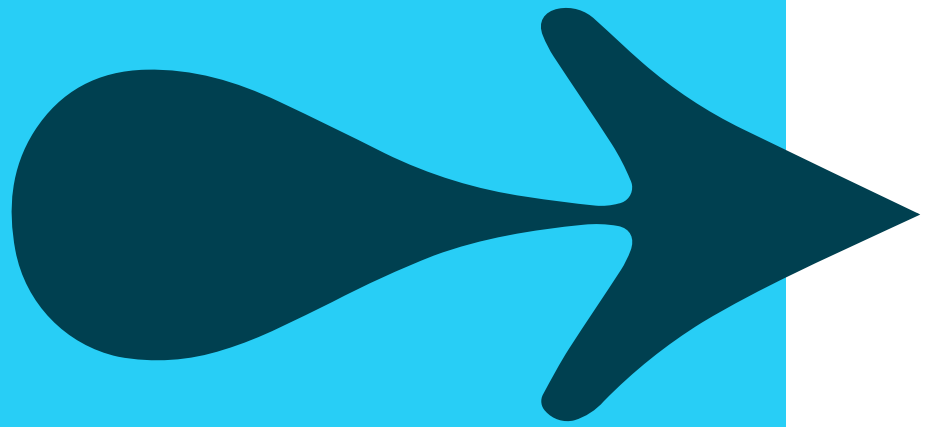
One passenger can travel on one ticket

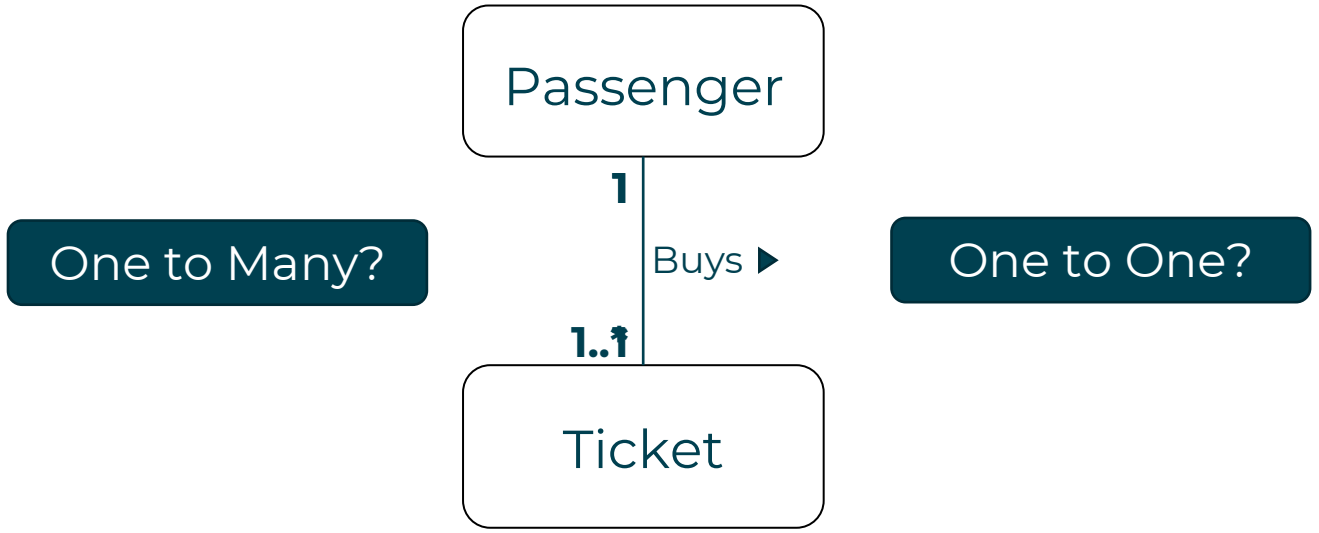
Depends on the definition of Passenger – what's the business rule?

CARDINALITY

The cardinality in our Airline model.

So, we specify the cardinality according to our business rule.



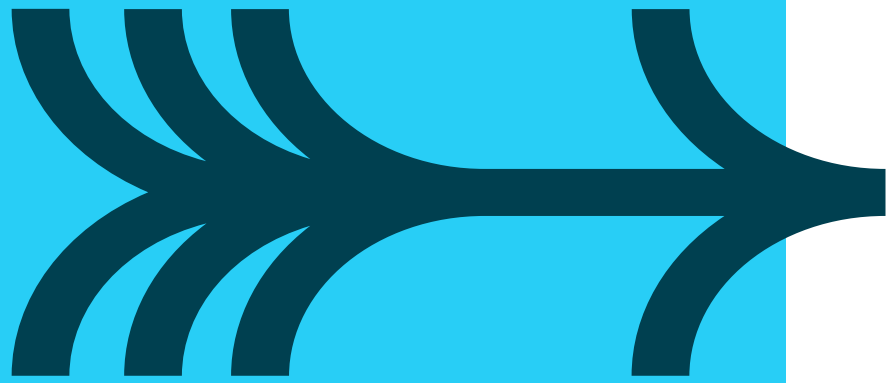


OPTIONALITY

Optionality expresses how a relationship can be optional or mandatory for each entity.

This gives three types for binary relationships:

1. **Optional** for **both** entities (not very common).
   - Employee may not have a manager.
2. **Optional** for **one** entity, mandatory for the other.
   - Employee may not have a Manager (e.g. CEO).
   - Manager must have at least one employee.
3. **Mandatory** for **both** entities.
   - Employee must work in a department.
   - Department must have at least one employee.



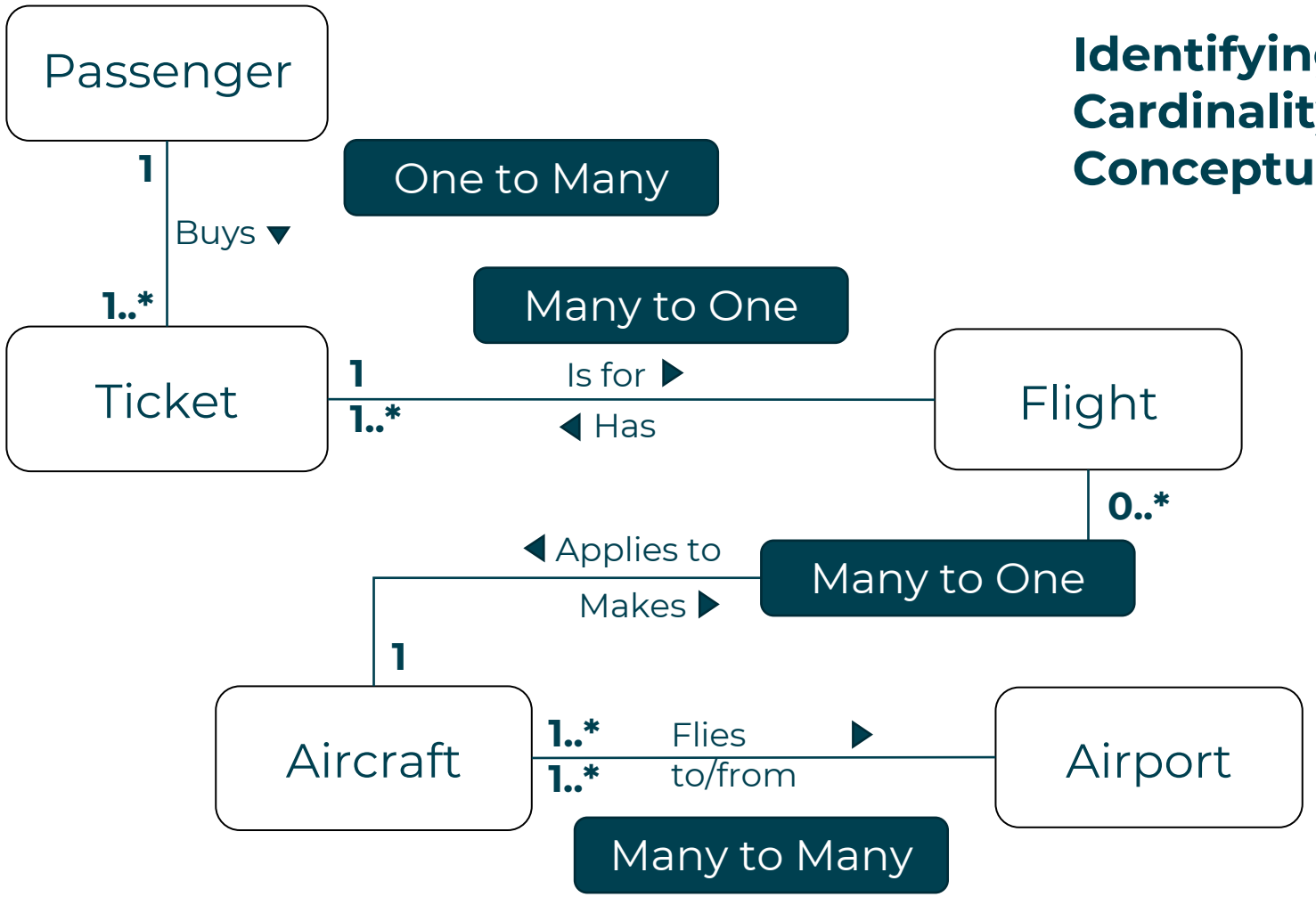
Optionality Types

Mandatory:

Conditional:

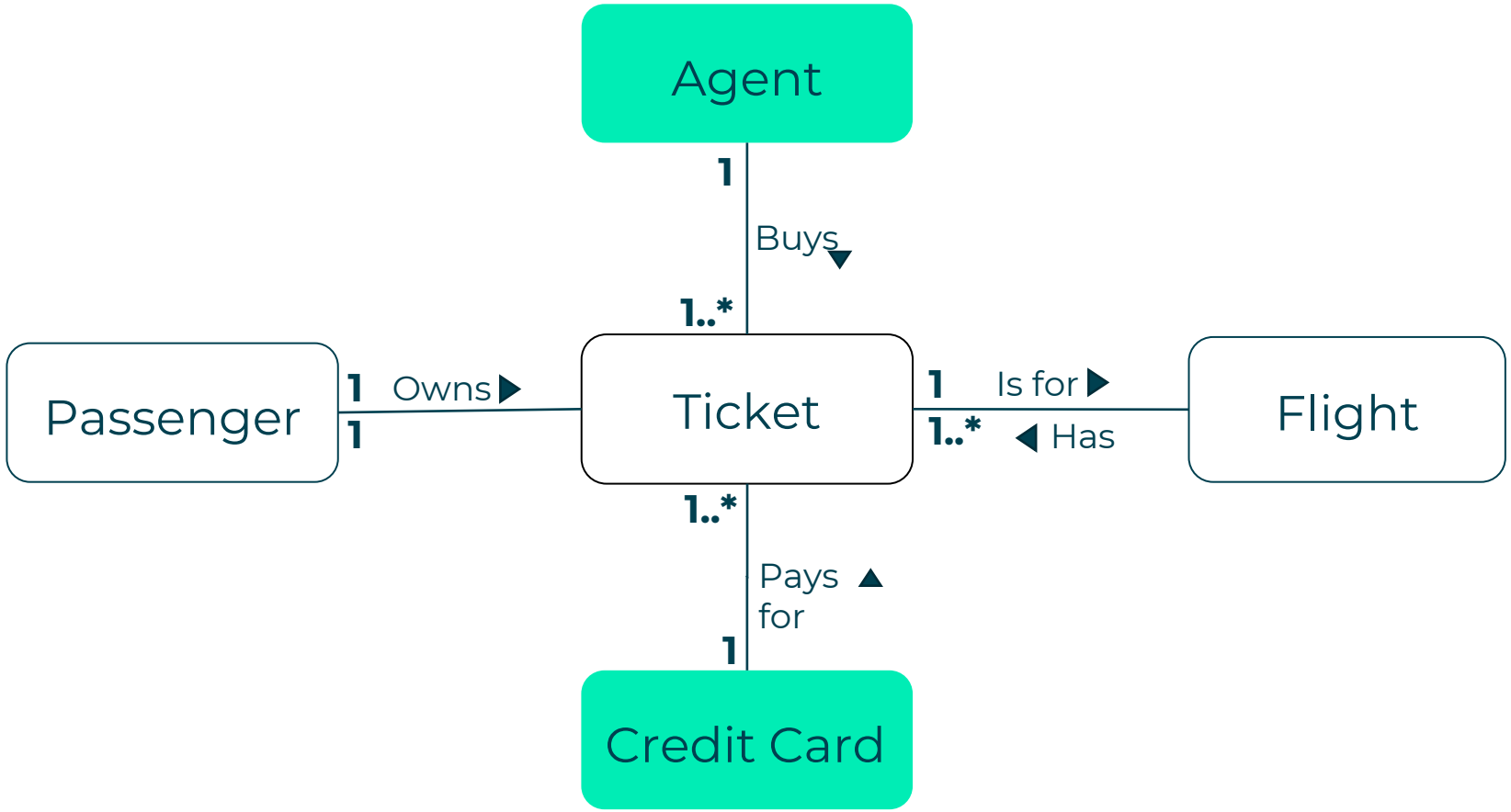
Optional:

Cardinality in our model



Identifying Cardinality in the Conceptual Model

Extending the Conceptual Model



Extended Conceptual Model

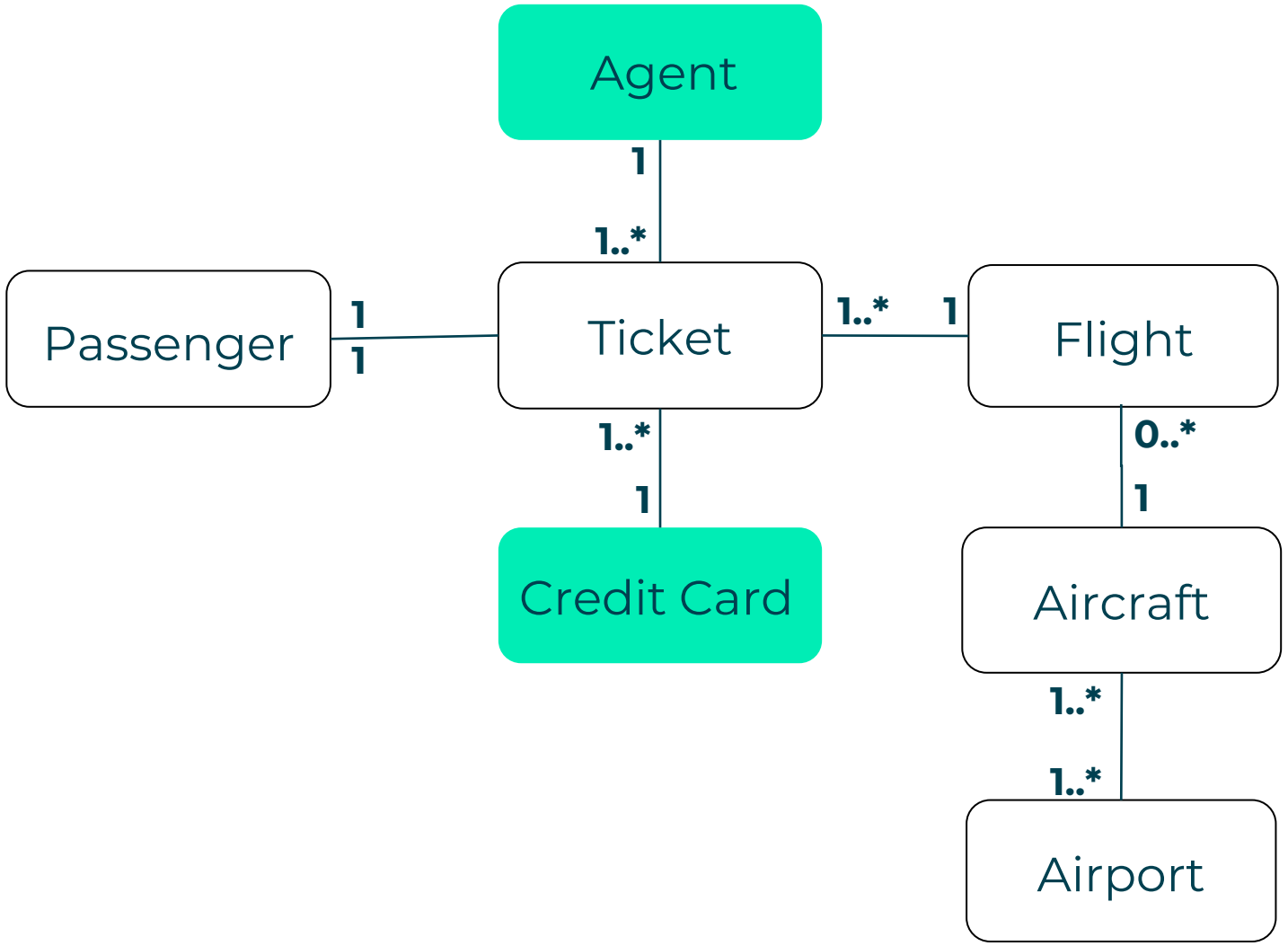


Diagram Notations - UML

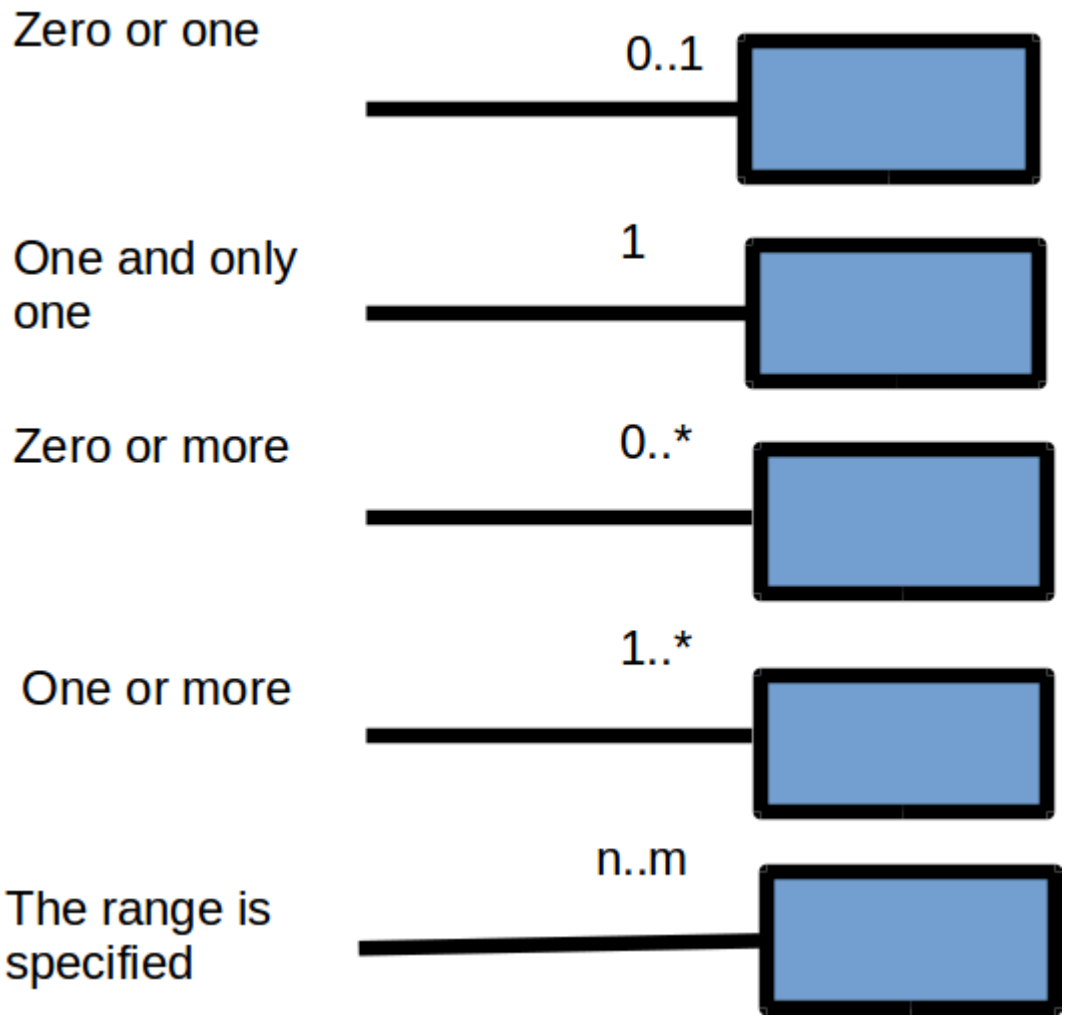


Diagram Notations – IEM (Crow's Foot)

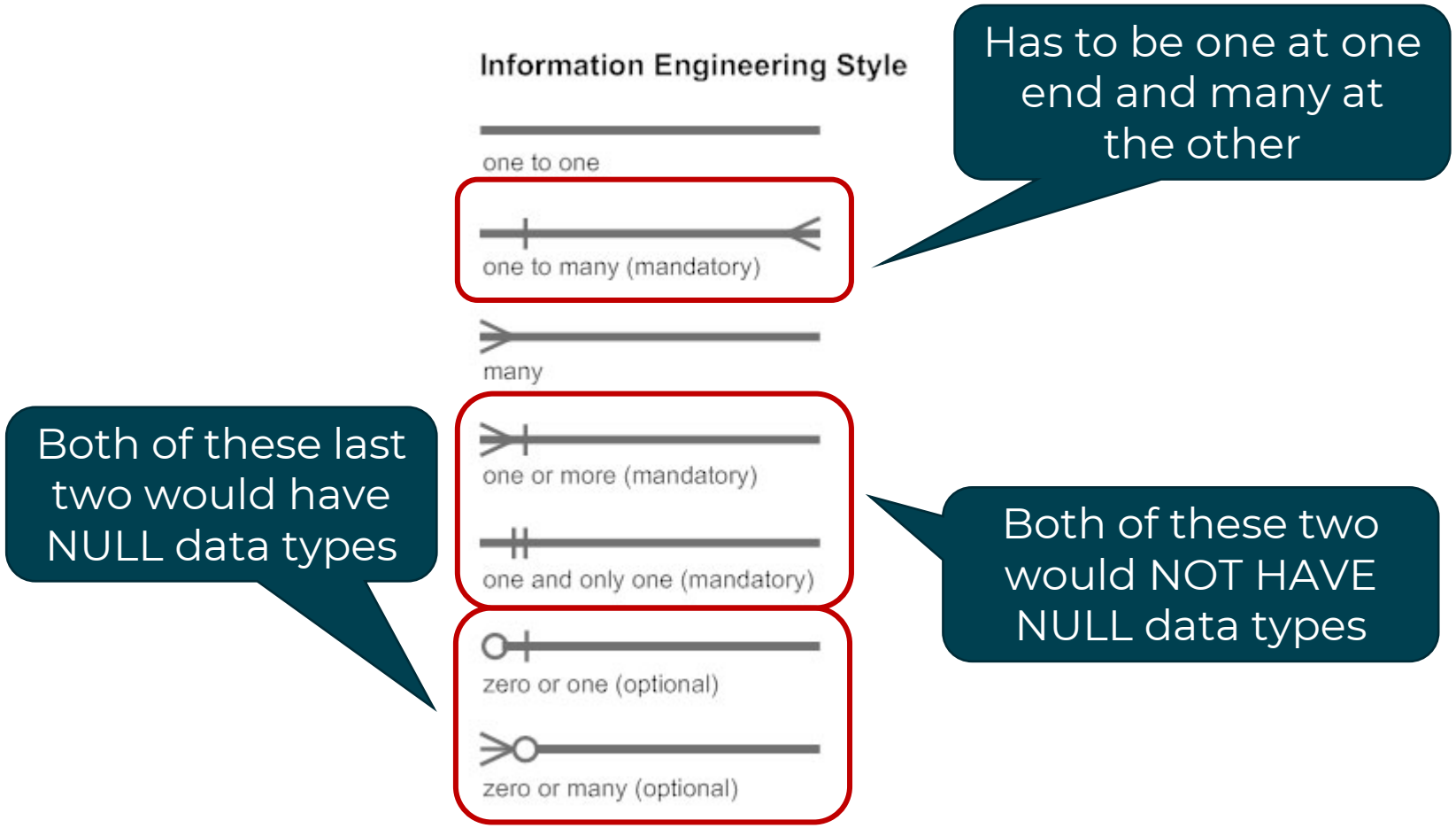


Diagram Notations – Chen

Chen

→ 1 to represent one

→ M to represent many

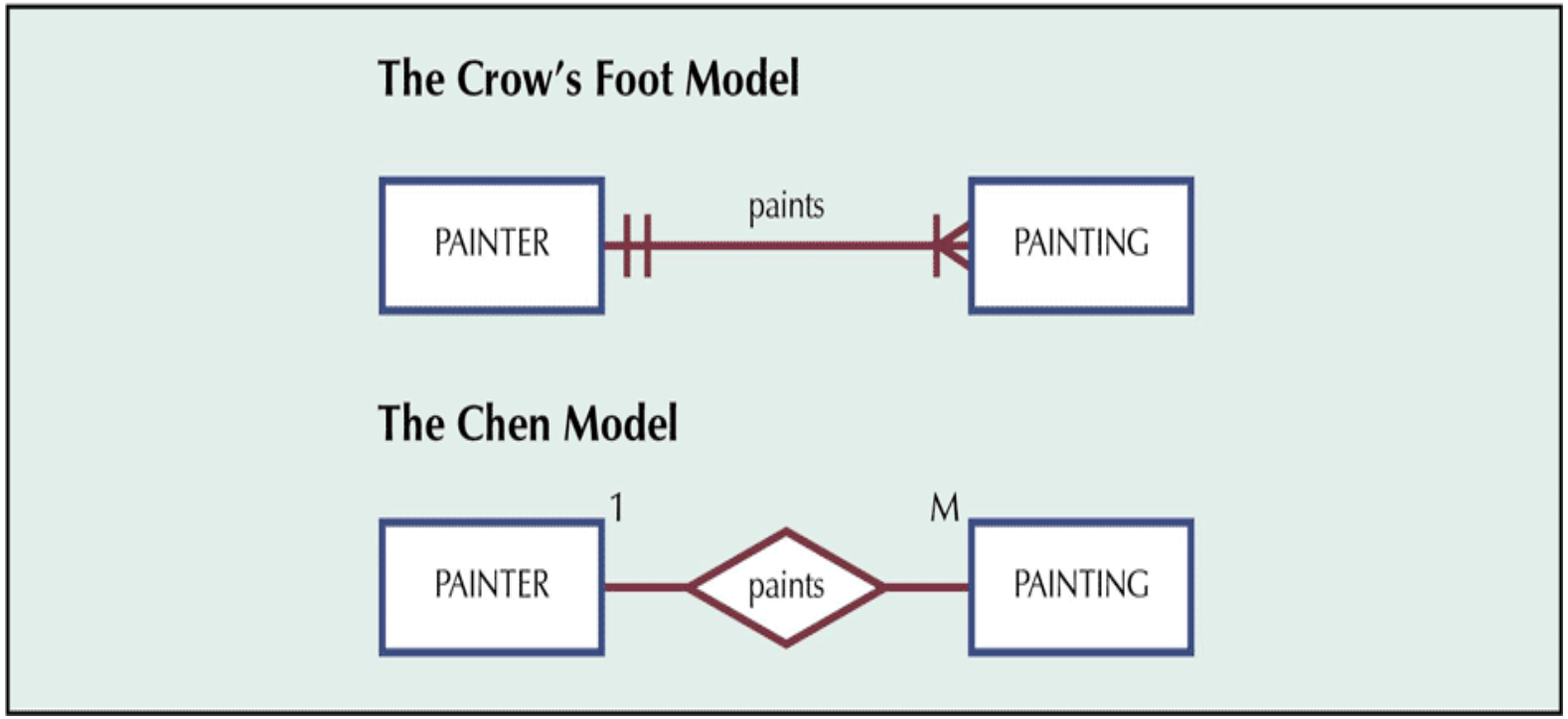
1

M

Relationships

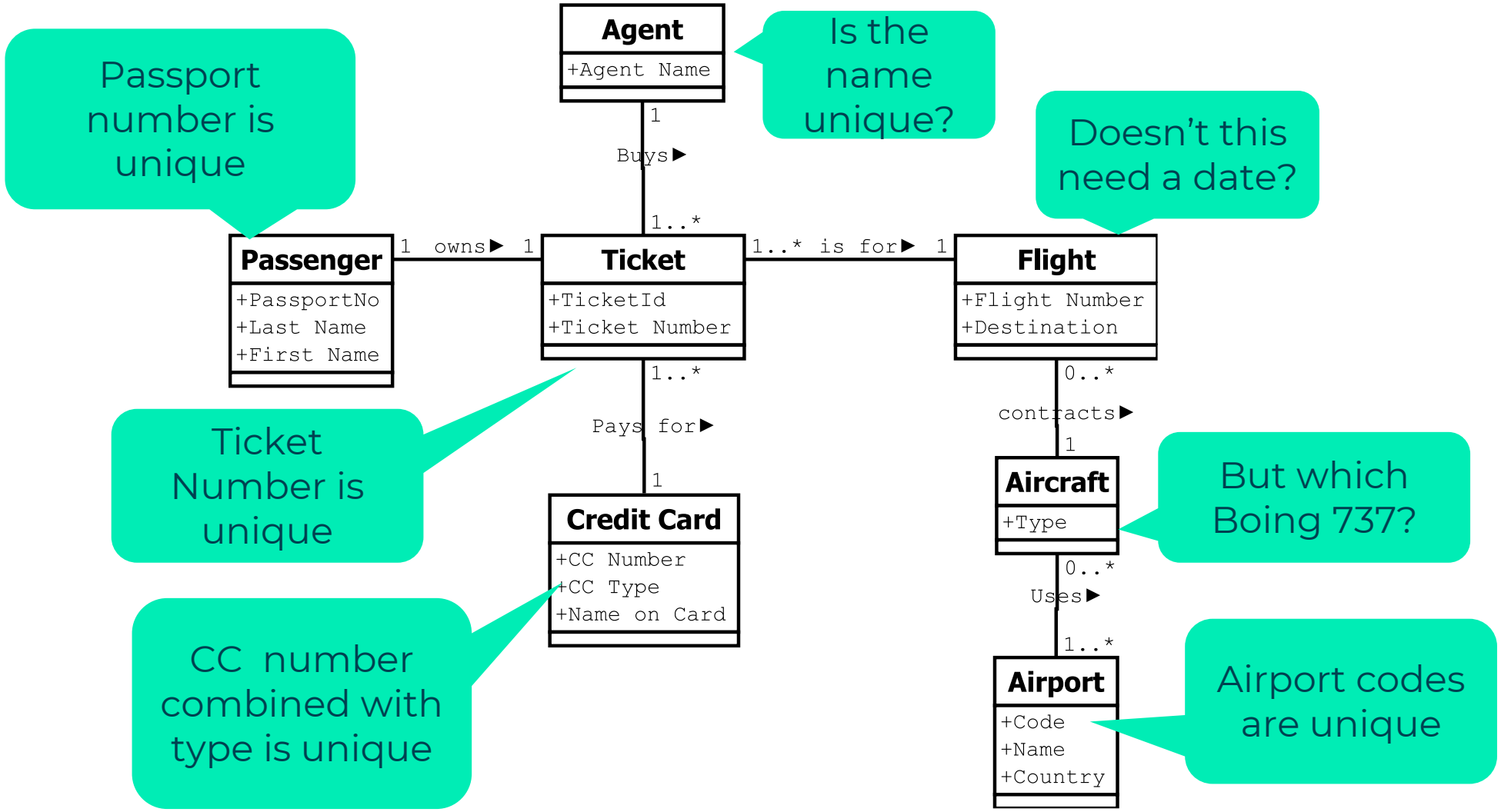
1:M relationship

- → Relational modeling ideal
- → Should be the norm in any relational database design



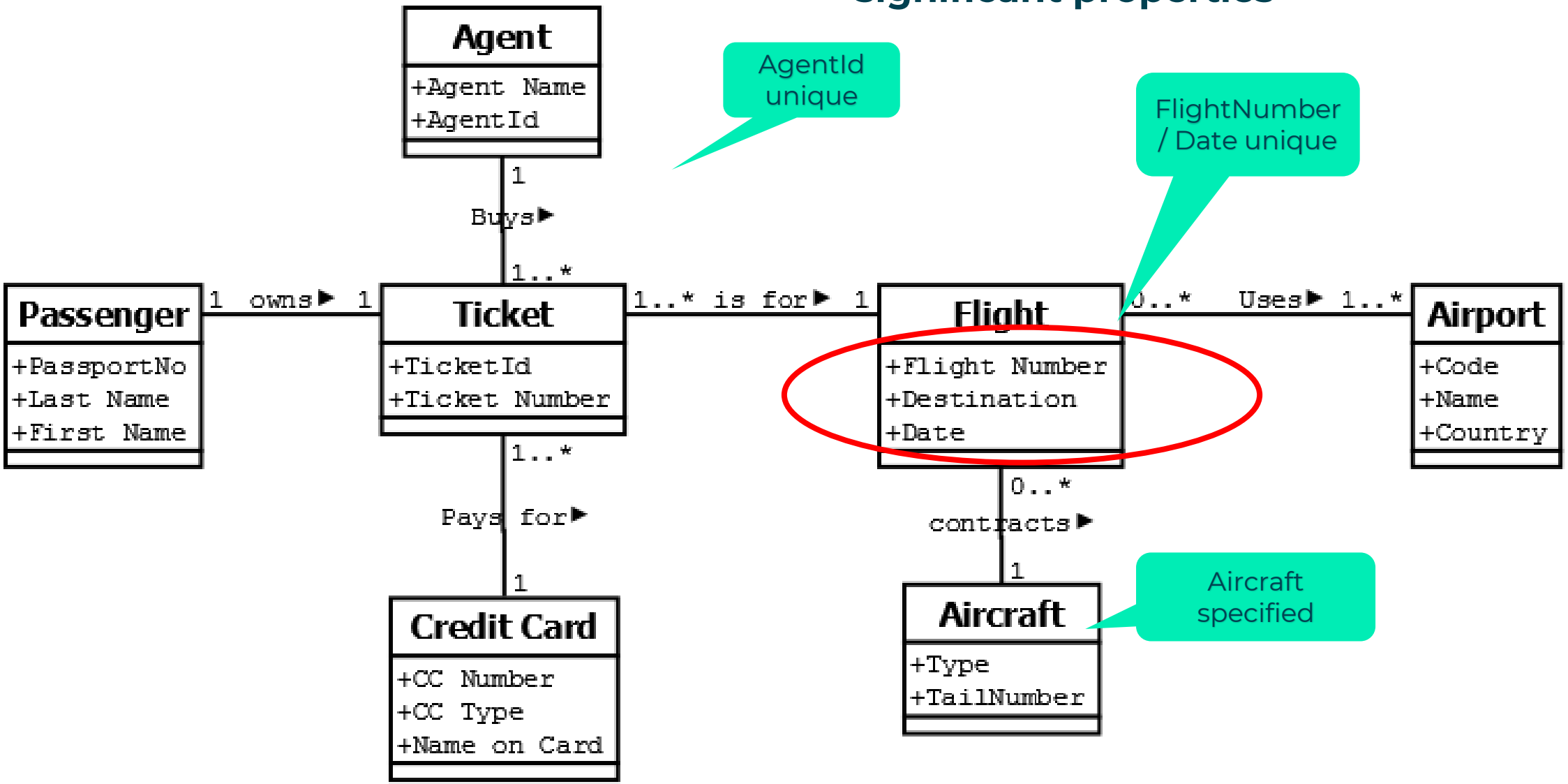
The 1: M relationship between PAINTER and PAINTING

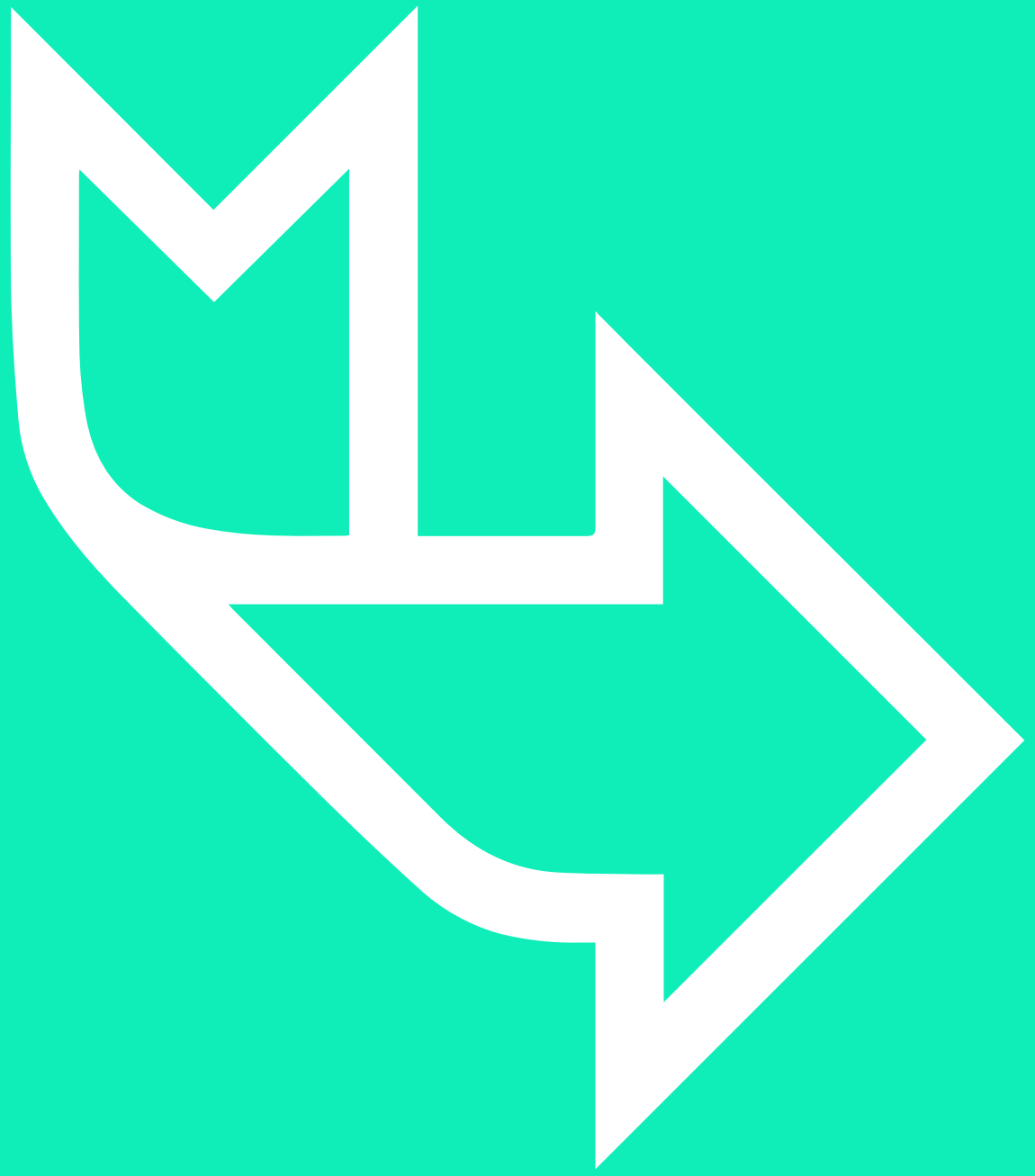
Model + significant properties



Data Modelling

Extended Conceptual Model with significant properties



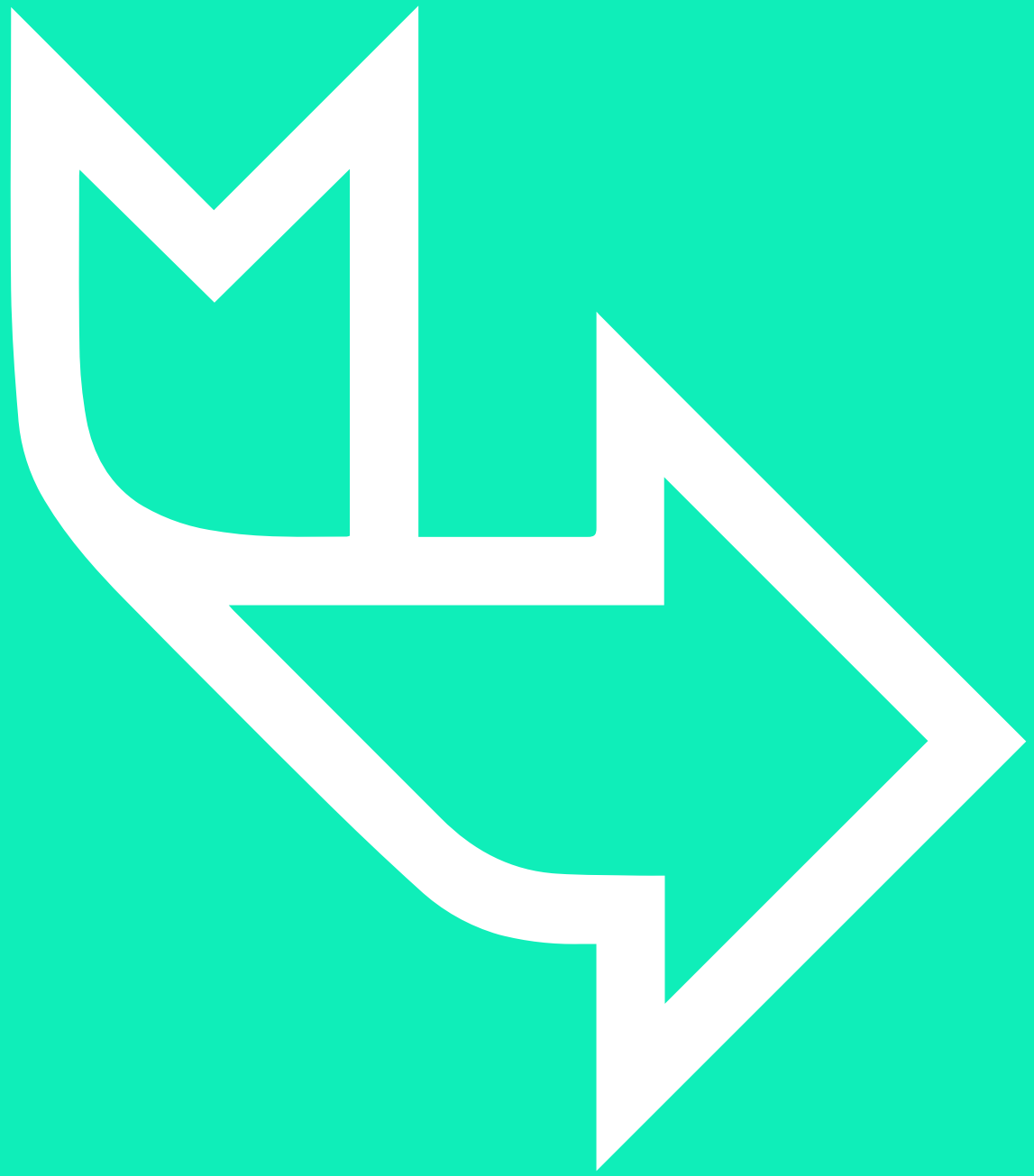


Data Modelling

Exercise EG_01-Conceptual Data Diagrams

Part 1 – Acme Vehicle Hire

Part 2 – Cerberus Security Systems



Data Modelling

Summarising ...

Conceptual Diagram

→ Entities

→ Relationships

→ Cardinality

→ Significant Attributes

→ *Inclusion is optional at this stage*

No knowledge of the database technology!