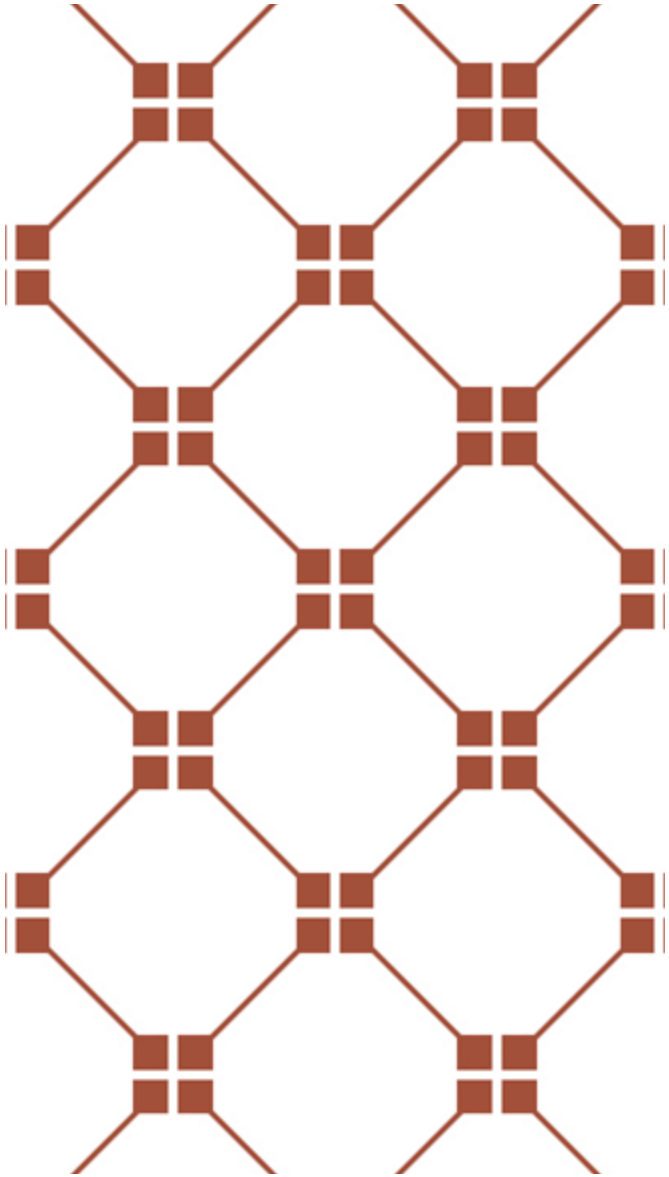


MANCHESTER 1824
The University of Manchester

ENTITY-RELATIONSHIP MODELLING

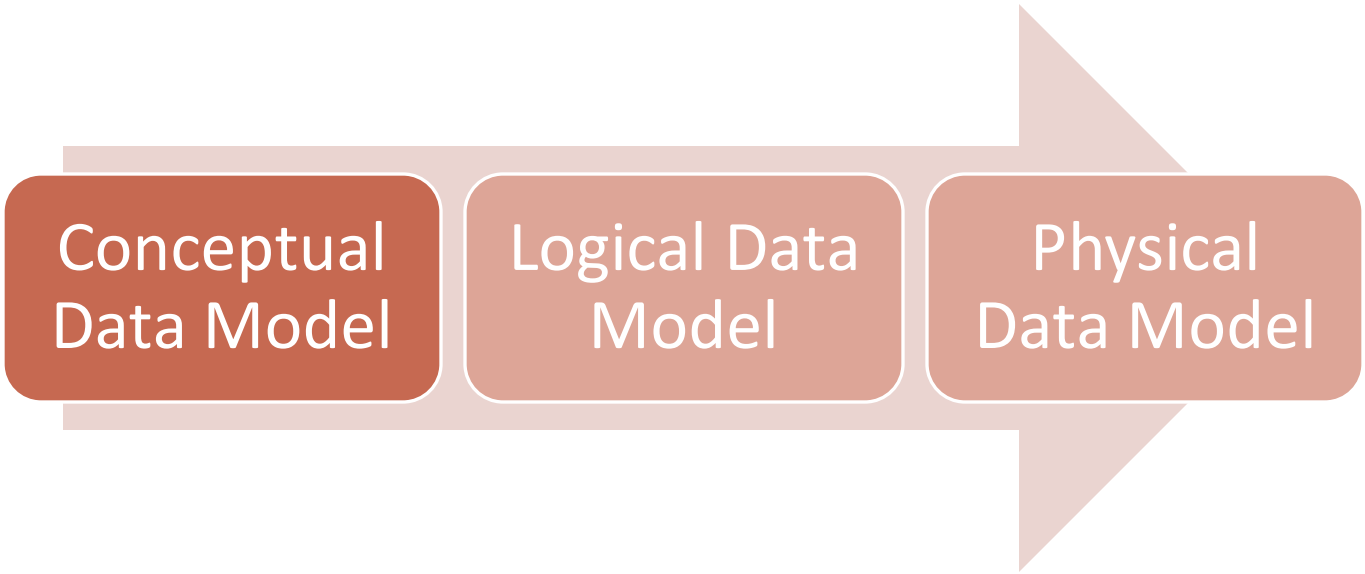
COMP23111 – Database Systems

OUTLINE

ER modelling concepts

Conceptual Data Model (via ER Diagram)

DATABASE APPLICATION DESIGN PHASES - *DATA MODELLING*



- Entity-Relationship Diagram (ERD)

ENTITY-RELATIONSHIP (ER) MODELLING

customer

order

product

ENTITY-R HIP (ER) MODEL

At least one of the attributes should be UNIQUE (*).

Attributes

- name
- tel. no
- delivery address

- ship. date

- quantity
- type

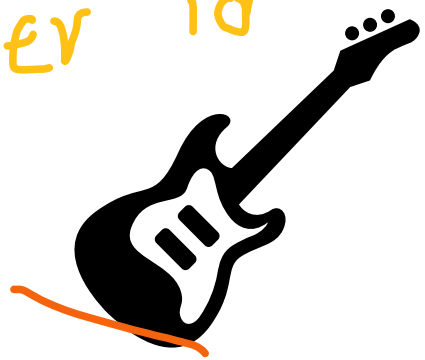
ENTITY-RELATIONSHIP (ER) MODEL

At least one of the attributes should be UNIQUE (*).

Attributes

- name
- tel. no
- delivery address
- *customer id

- ship. address
- ship. date
- *order id



- quantity
- type
- *product id

Identifier

ENTITY-RELATIONSHIP (ER) MODEL

Attribute types:

Composite	**Can be split into components.**
Vs.	
Simple (or atomic)	Cannot be split into components.

Single-valued	**Takes up a single value for each instance.**
Vs.	
Multivalued	More than one single-valued attribute for each instance.

Stored	**As is.**
Vs.	
Derived	From other stored attributes.

NULL-valued	**N/A for some reason.**
Vs.	
Complex-valued	Composite + multivalued

*Customer id | *D.O.B.* | Current age | Membership Type | Preferred delivery details

Name (First, Last) | Tel. Number | *Email* | Delivery address | Membership points

ENTITY-RELATIONSHIP (ER) MODEL

Attribute types:

Delivery address

Composite	Name (First, Last)
Vs.	
Simple (or atomic)	**Customer id*

Single-valued	Membership Type	
Vs.		
Multivalued	Tel. Number	*Email*

Stored	*D.O.B.*
Vs.	
Derived	Current age

NULL-valued	Membership points
Vs.	
Complex-valued	Preferred delivery details

Composite & complex are **different**!

ENTITY-RELATIONSHIP (ER) MODEL

Binary

Ternary (3 entities) ...

ER MODEL

Entity (an identifiable unique “thing” which independently exists).

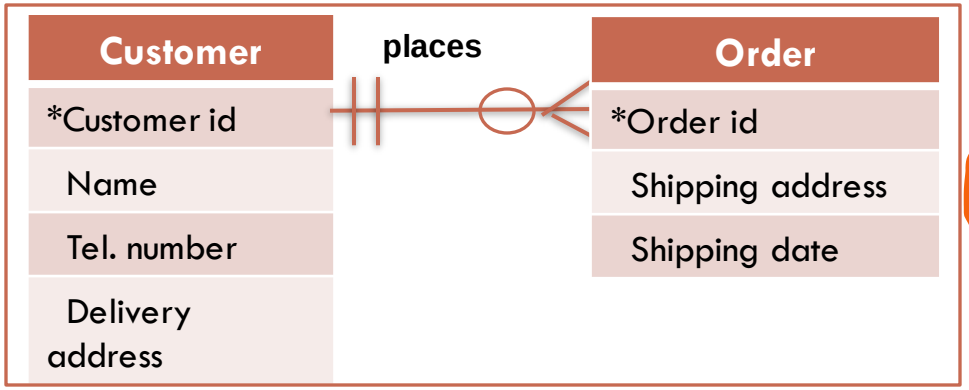
Attribute (a property of an entity).

Relationship (connects two or more entities with meaning).

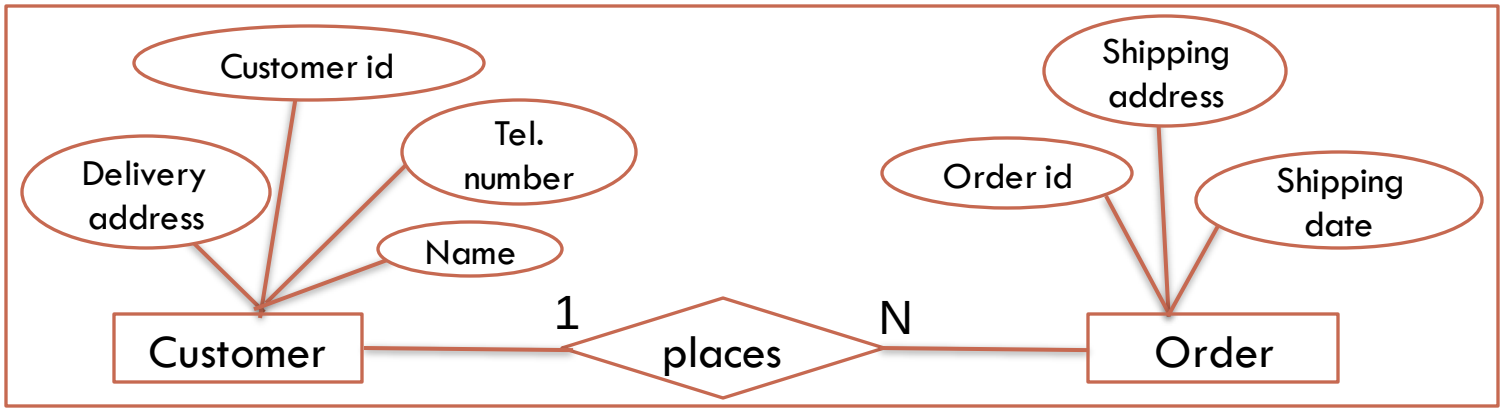
How do we represent them in an ER model?

ER MODEL – DIAGRAMS

Different types of ER diagrams:



Crow's foot
(invented by Gordon Everest)



Chen

ER MODEL – ENTITIES & ATTRIBUTES

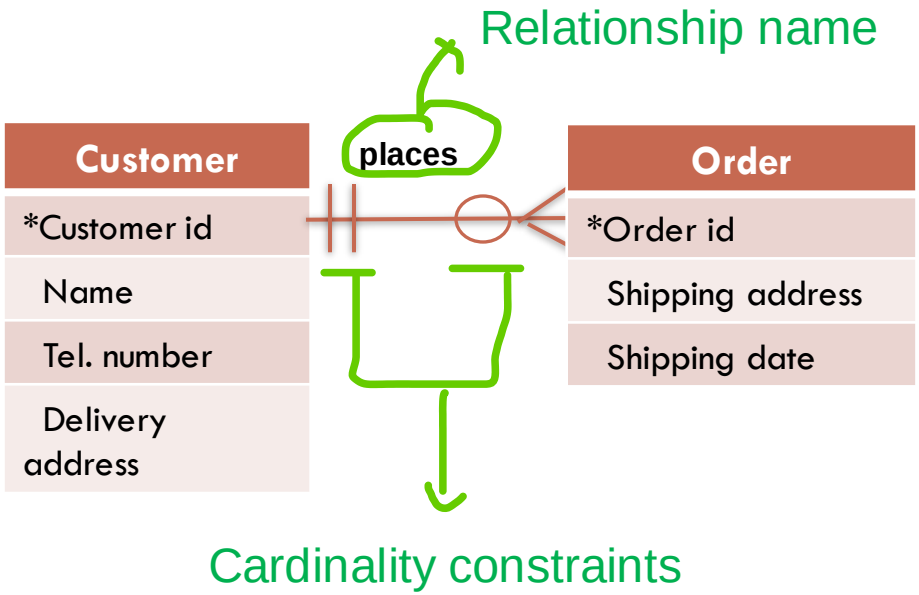
Customer
*Customer id
Name
Tel. number
Delivery address

Customer
*1877
Alex Caroll
07732425562
21 Empire St...

Customer
*4229
Mary Smiths
07762455371
101 Lever St...

	Attribute	Attribute	Attribute
Entity Instance			
Entity Instance		Data...	
Entity Instance			
Entity Instance			

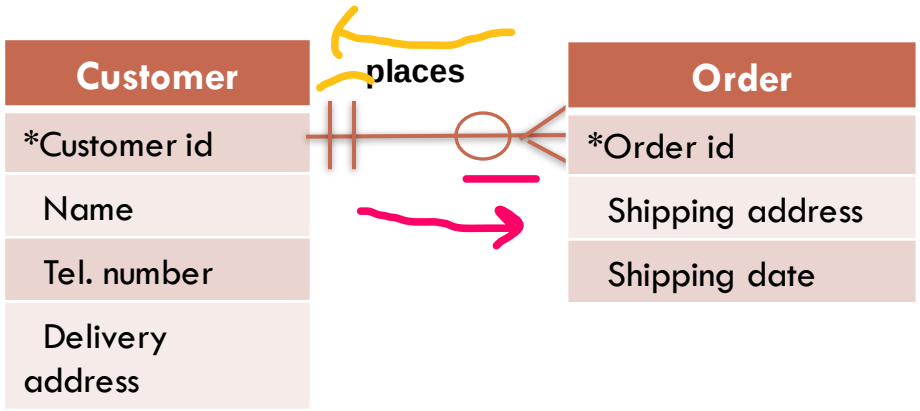
ER MODEL – RELATIONSHIPS

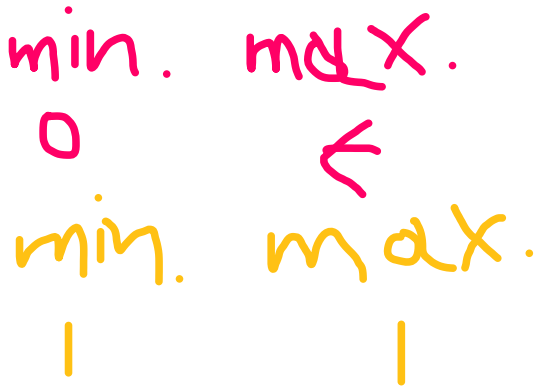


Attributes and relationships show the **logical structure** and **semantics**.

Define the relationship in numerical terms, via the concepts of *minimum* and *maximum*.

ER MODEL – RELATIONSHIPS





Cardinality constraints

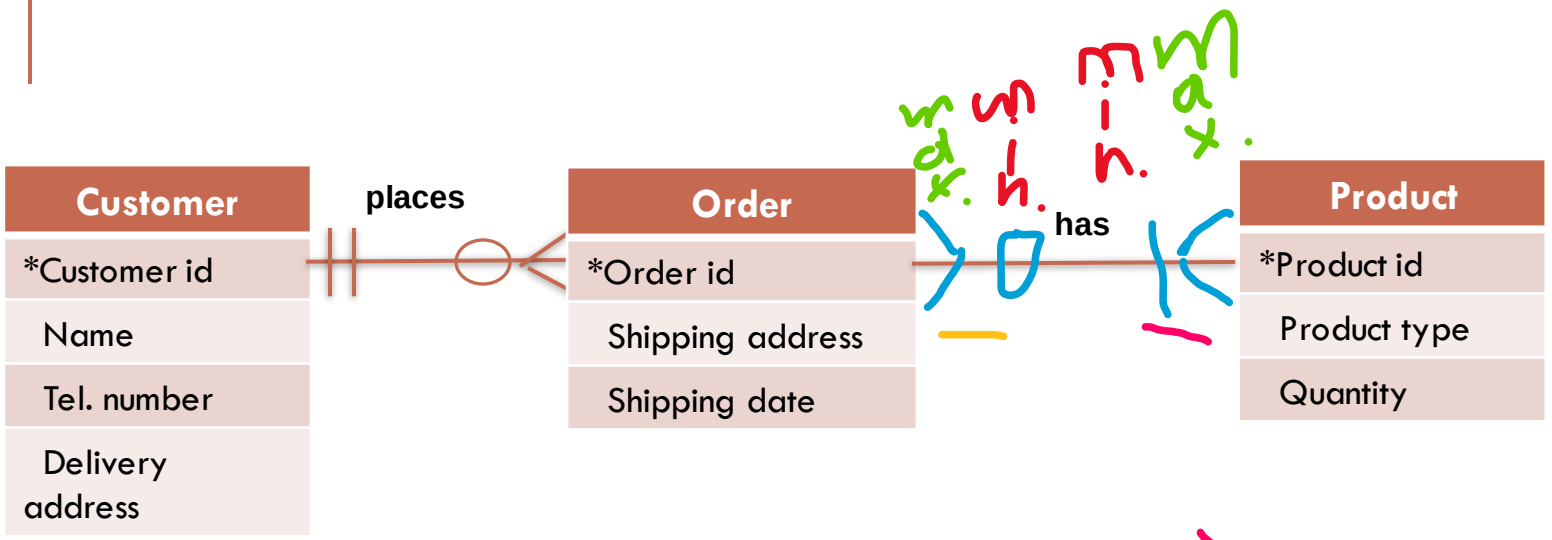
One (and only one)

Zero or one

One or many

Zero or many

ER MODEL – RELATIONSHIPS

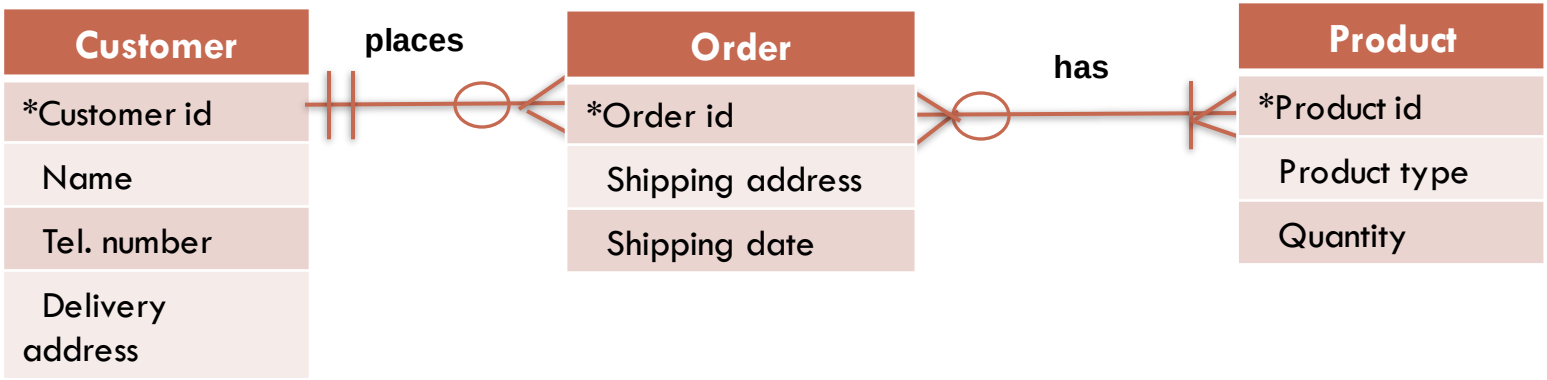


Cardinality constraints

- **One (and only one)**
- **Zero or one**
- **One or many**
- **Zero or many**

To decide the cardinality constraints, we refer to the data requirements given.

CONCEPTUAL DATA MODEL



- Entities
- Attributes
- Relationships