

DB Week 4

Workshop

INFO20003 | Sandy Luo

Workshop Overview

01

**ER: Additional
Concepts**

02

**Case Study: ER
Modelling**

03

**Lab: ER
Modelling**

Assignment 1 is out! Practice material on Canvas

01

**Multivalued &
Composite Attributes**

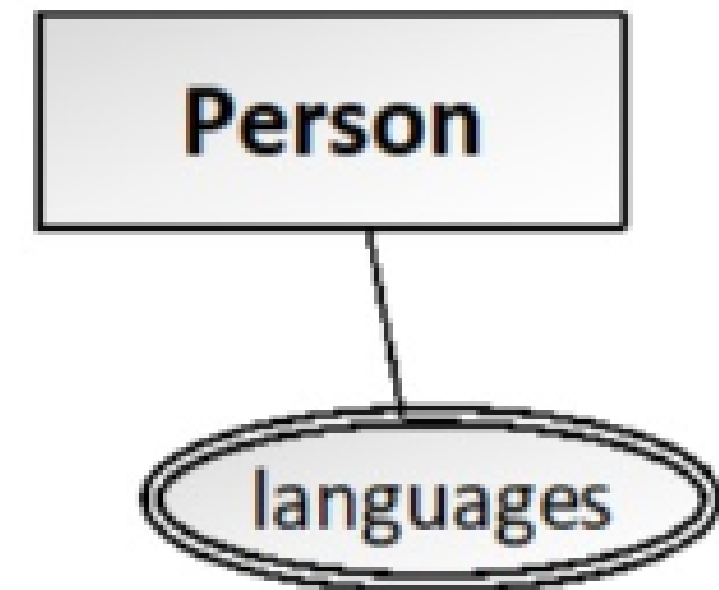
02

Unary Relationship

ER: Additional Concepts

Multivalued Attributes

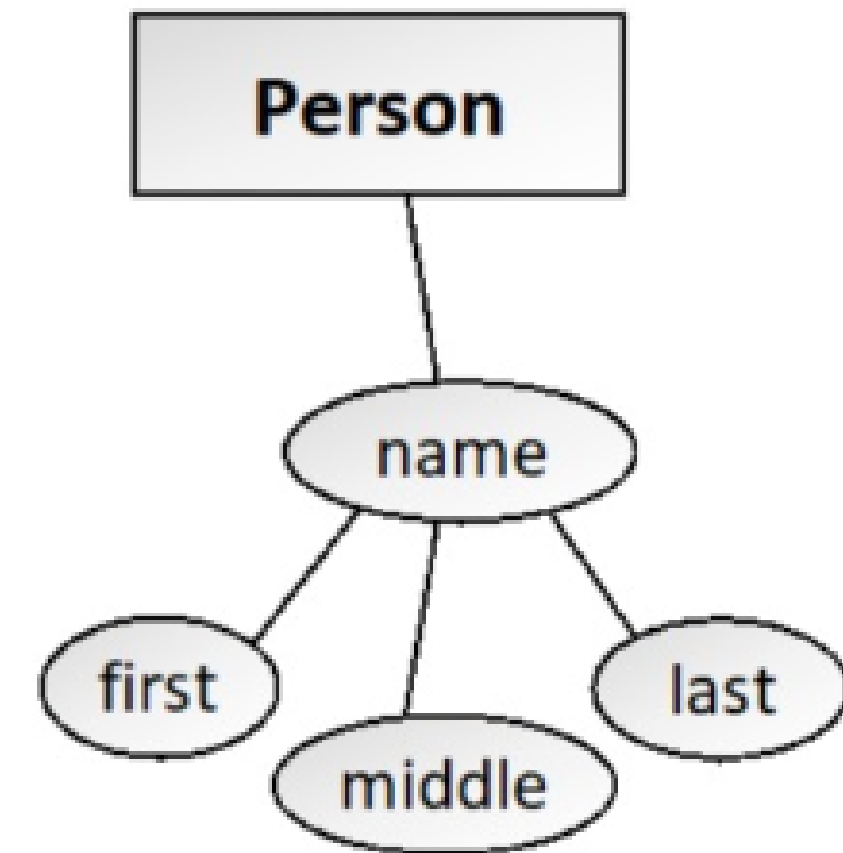
- Can have **multiple values** at once
- Examples:
 - Phone numbers
 - Languages
 - Skills



Multivalued attribute

Composite Attributes

- Stores **multiple components** of data
 - Somewhat hierarchical
 - Can break down into smaller attributes
- Examples:
 - Name → FirstName + LastName
 - Address → # + Street + PostCode...



Composite attribute

01

Multivalued &
Composite Attributes

02

Unary Relationship

ER: Additional Concepts

Unary Relationship

- Relationship b/w an entity & **itself**
- Like any other relationships, has constraints and cardinality
- **If the two sides of the relationship have different constraints, you must label the two ends to clarify what the constraints apply to**

Case Study

Q2

Australia's corporate regulator, ASIC, stores a range of information about companies, including the name, the nine-digit ACN (Australian Company Number), the date of registration and deregistration, and the names of the company's directors. Every company has a registered address, made up of the street address, suburb, state and postcode. A company may be owned by another company; in this situation ASIC keeps track of the company's parent company.

Use this information to model a “company” entity using Chen's notation.

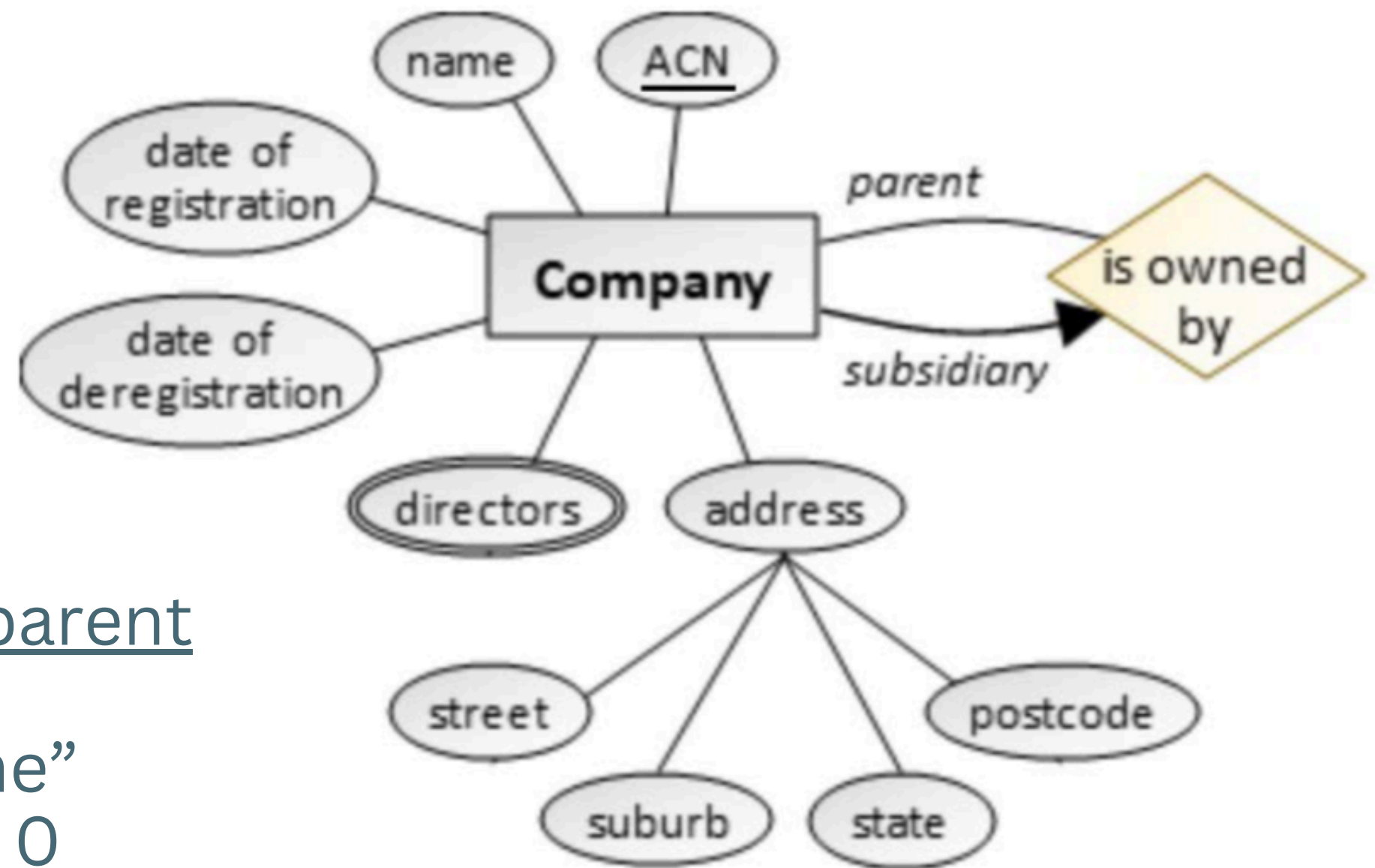
Q2

Australia's corporate regulator, ASIC, stores a range of information about **companies**, including the name, the nine-digit ACN (Australian Company Number), the date of registration and deregistration, and the names of the company's directors. Every company has a registered address, made up of the street address, suburb, state and postcode. A company may be owned by another company; in this situation ASIC keeps track of the company's **parent company**.

Use this information to model a “company” entity using Chen's notation.

Q2

- Multivalued attribute
- Composite attribute
- Unary relationship
- Each company **may** have a parent company.
 - Partial participation, “one”
- Every company may own ≥ 0 companies
 - Partial participation, “many”



Q3(a): Identify Entities

A bus company owns a number of buses. Each bus is allocated to a particular route, although some routes may have several buses. Each route passes through a number of towns. One or more drivers are allocated to each stage of a route, which corresponds to a journey through some or all of the towns on a route. Some of the towns have a depot where buses are kept – each bus always returns to its allocated depot at the end of the day.

Each of the buses is identified by its registration number and can carry different numbers of passengers, since the vehicles vary in size and can be single or double-decked. Each route is identified by a route number and information is available on the average number of passengers carried per day for each route. Drivers have an employee number, name, address, and sometimes a telephone number, and the names of the training courses they have completed need to be stored.

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Entity 1	Entity 2	Relationship	Cardinality
• Route	• Bus	• Operated by	• one-to-many

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Entity 1	Entity 2	Relationship	Cardinality
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Q3(b): Identify Relationships

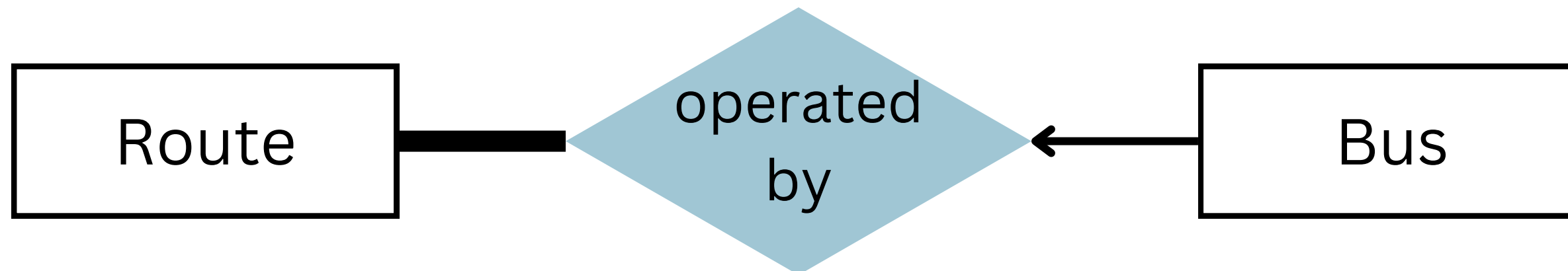
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Entity 1	Entity 2	Relationship	Cardinality
<ul style="list-style-type: none">• Route• Driver• Stage• Stage• Town• Bus	<ul style="list-style-type: none">• Bus• Stage• Route• Town• Depot• Depot	<ul style="list-style-type: none">• Operated by• Allocated to• Part of• Passes through• Contains• Allocated to	<ul style="list-style-type: none">• one-to-many• many-to-many• one-to-many• many-to-many• one-to-one• one-to-many

Q3(b): Identify Relationships

Route 'operated by' bus

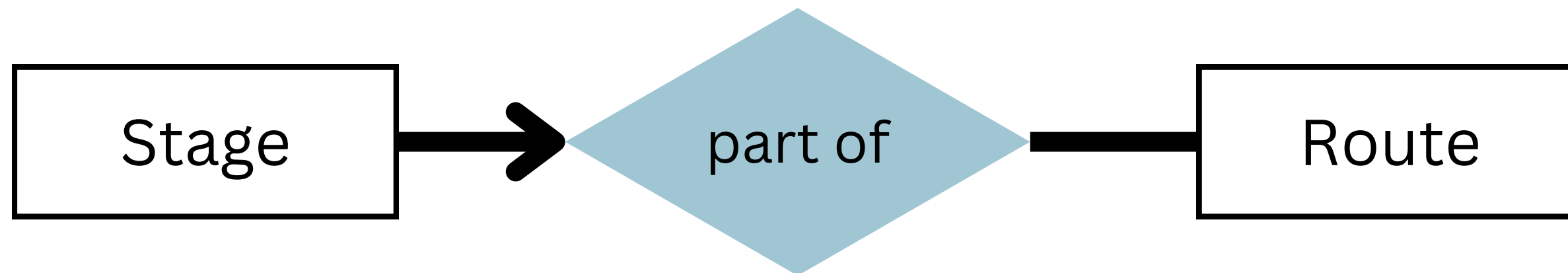
- The participation of **Bus** in the relationship '**operated by**' is partial as at some point the bus could be under repair instead of being assigned to a *route*.
- However, the participation of **Route** is total as every route should have a bus assigned.



Q3(b): Identify Relationships

Stage 'part of' Route

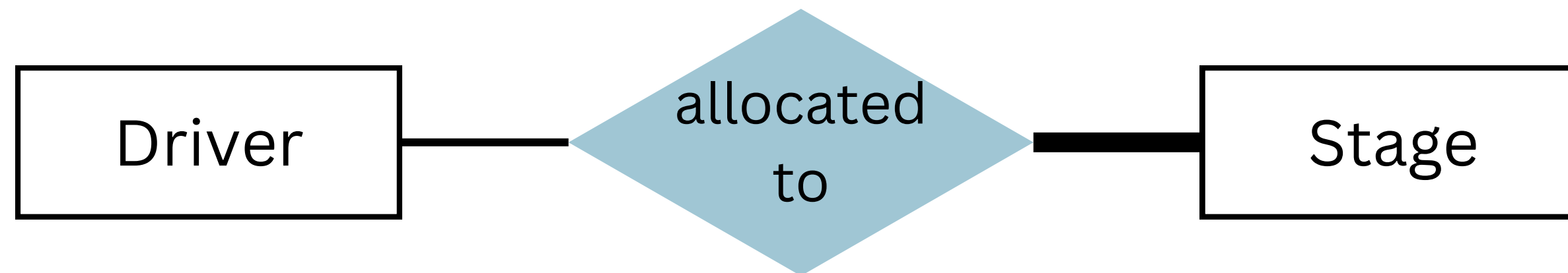
- The participation of **Route** and **Stage** is total in the relationship between the two entities



Q3(b): Identify Relationships

Driver 'allocated to' Stage

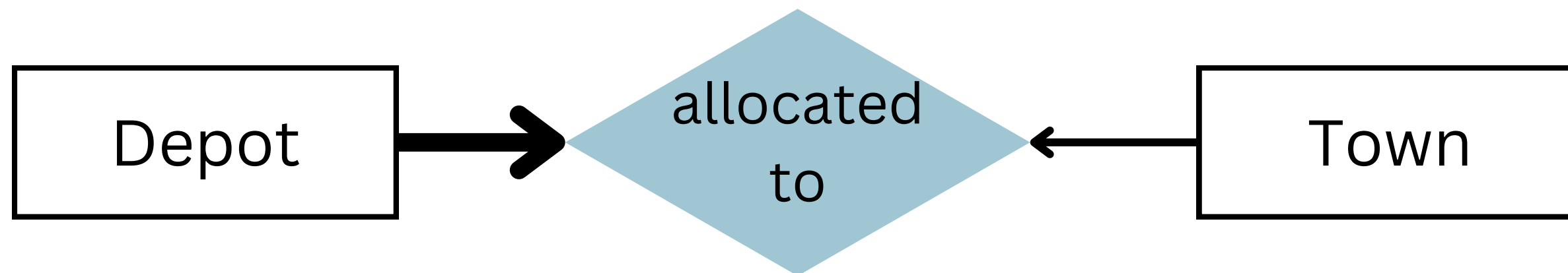
- The participation of **Stage** is total in the relationship '**allocated to**' as each stage must have a driver allocated
- But the participation of **driver** is partial to accommodate newly appointed or on-leave drivers.



Q3(b): Identify Relationships

Town 'contains' Depot

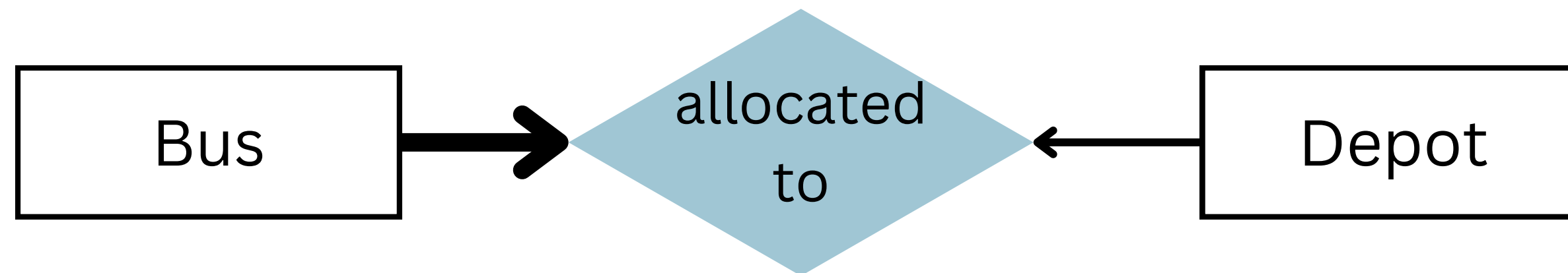
- The participation of **Depot** is total
- **Town** is partial in 'contains' as not every town has a depot



Q3(b): Identify Relationships

Bus 'allocated to' Depot

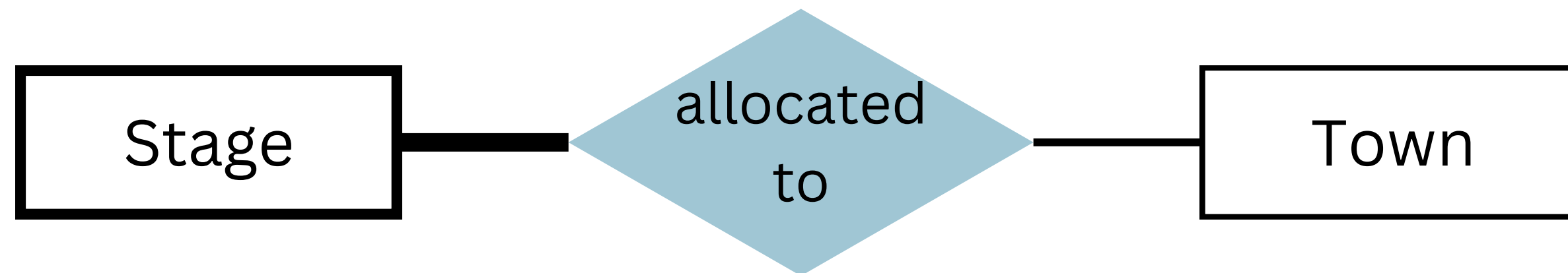
- The participation of **Depot** in relationship '**allocated to**' is partial.
- However, the participation of **Bus** is total, as each bus will be associated with a depot where it is stored when not in use.



Q3(b): Identify Relationships

Stage 'passes through' Town

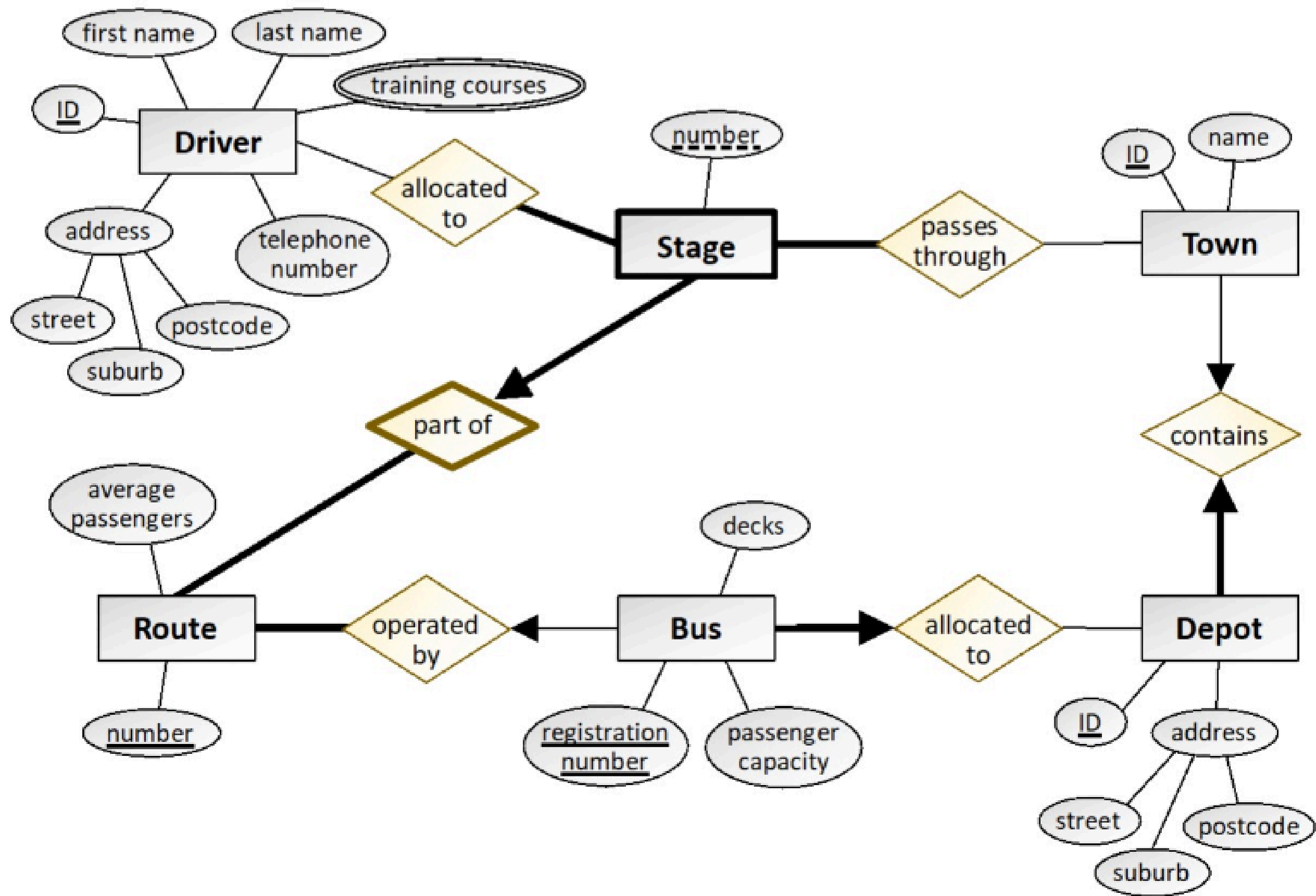
- **Stage** is totally participating in relationship '***passes through***' as each stage has to pass through at least one town.
- However, each **Town** does not necessarily have a stage (perhaps it only has a depot), hence partial participation.



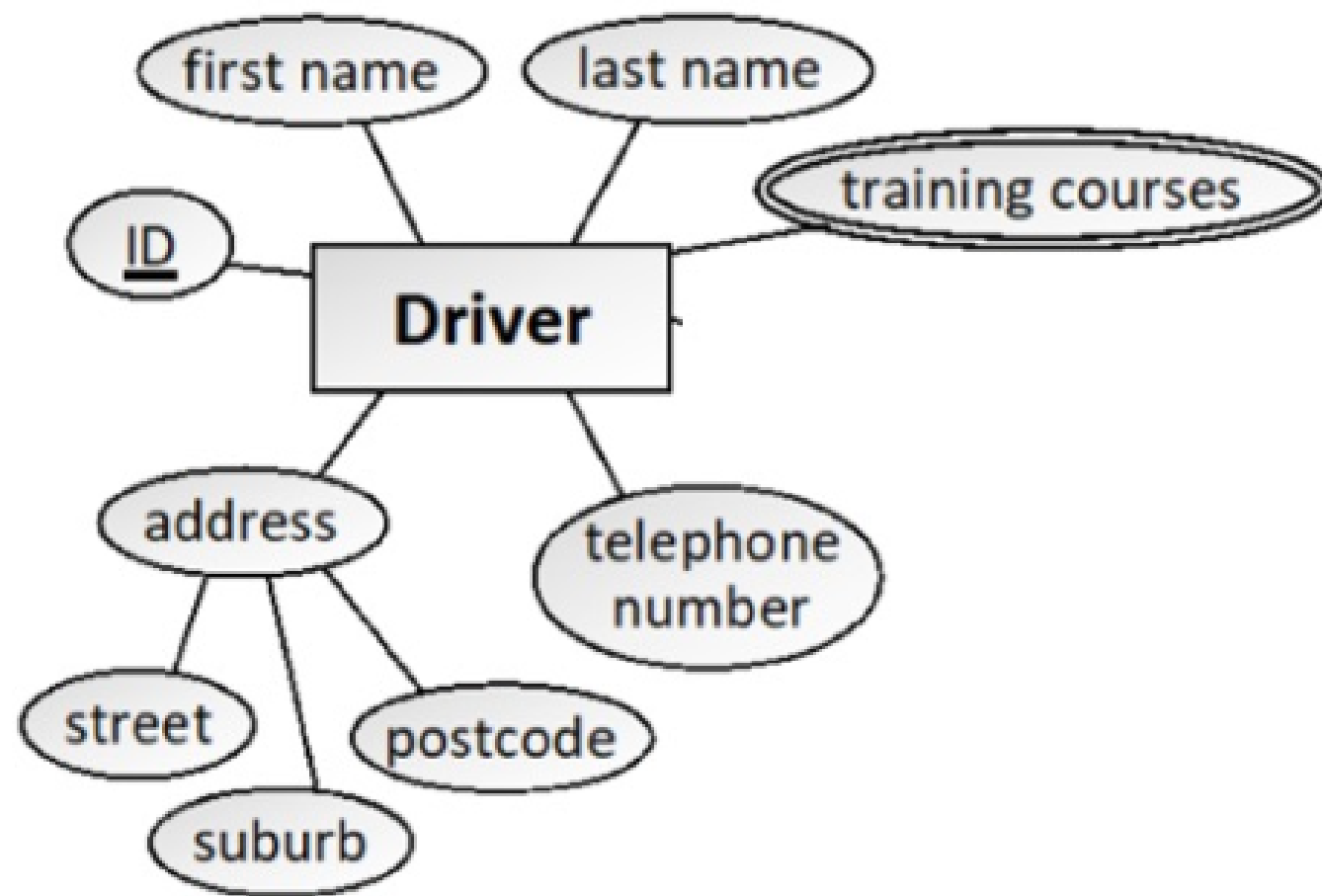
Q3(c): Conceptual Model (ER)

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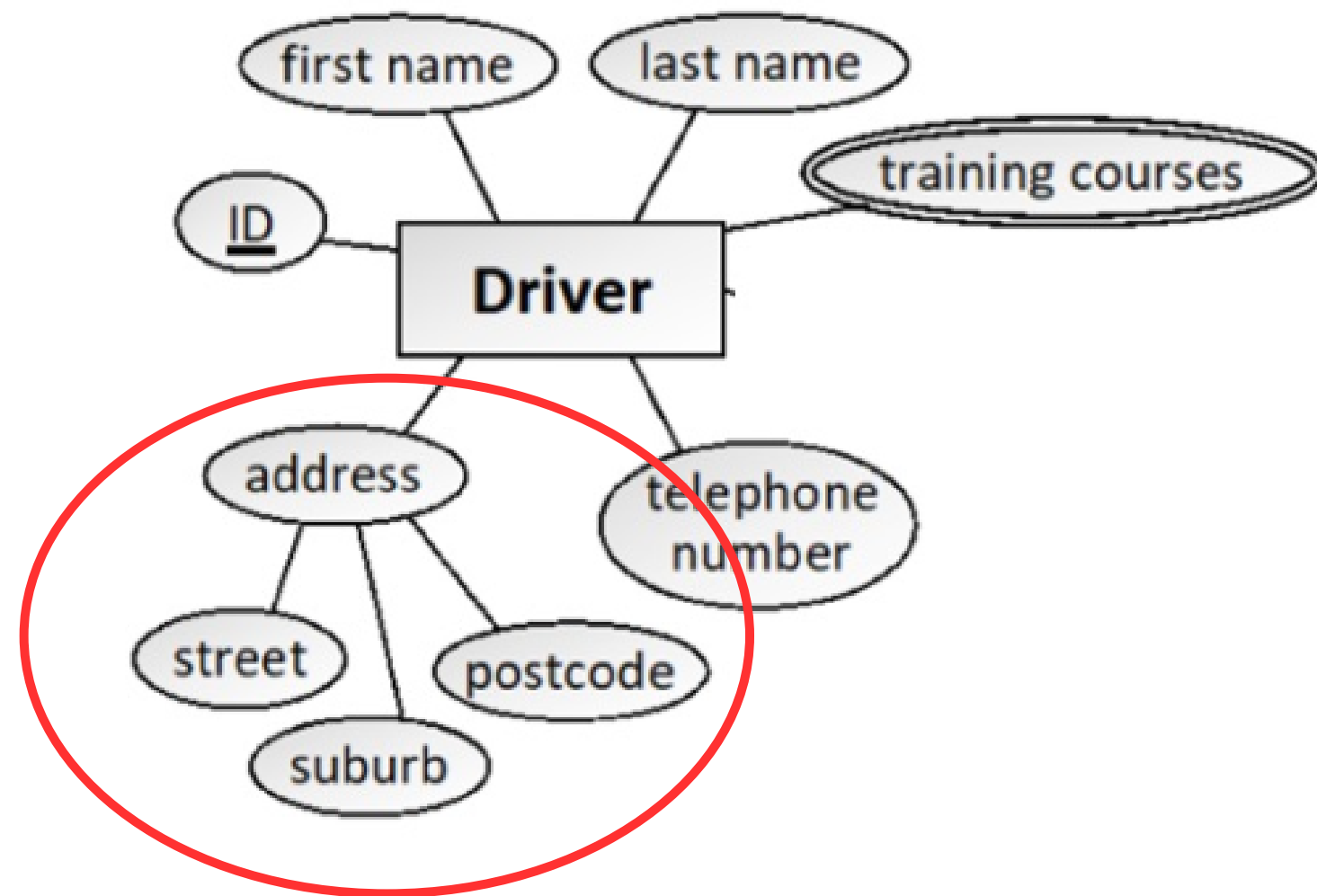


Q3(d): Conceptual → Logical

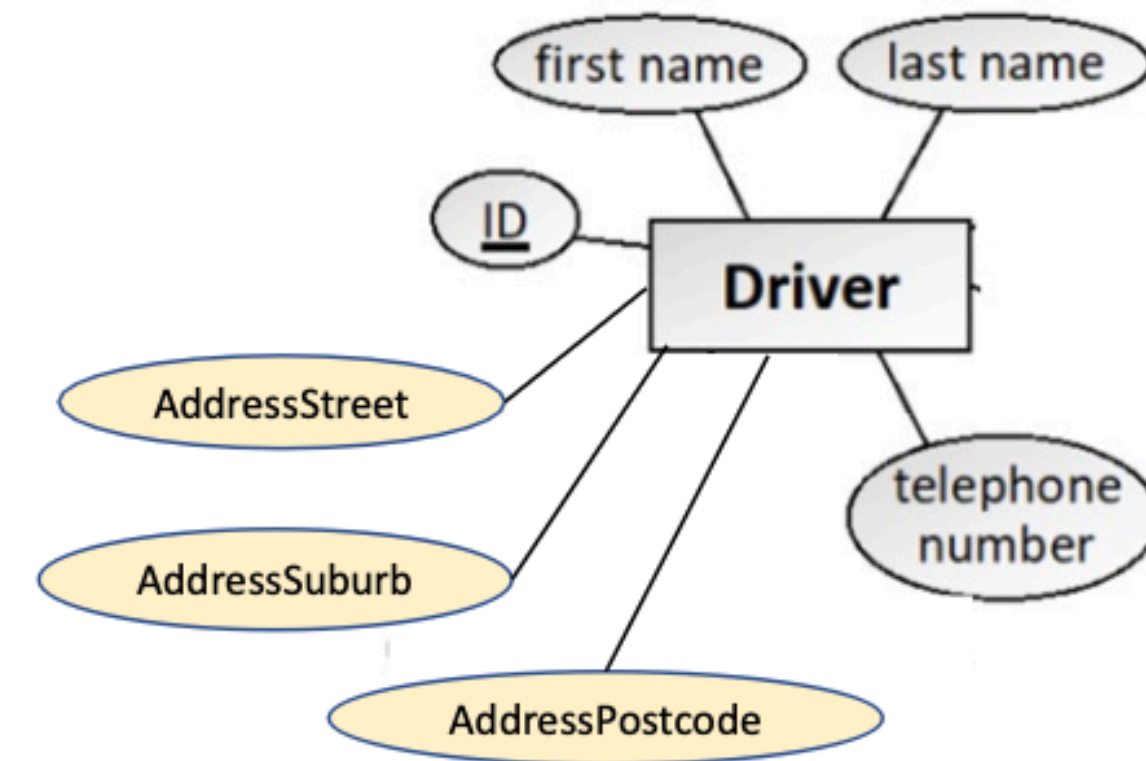


- Resolve composite attributes
- Resolve multivalued attributes

Q3(d): Conceptual → Logical



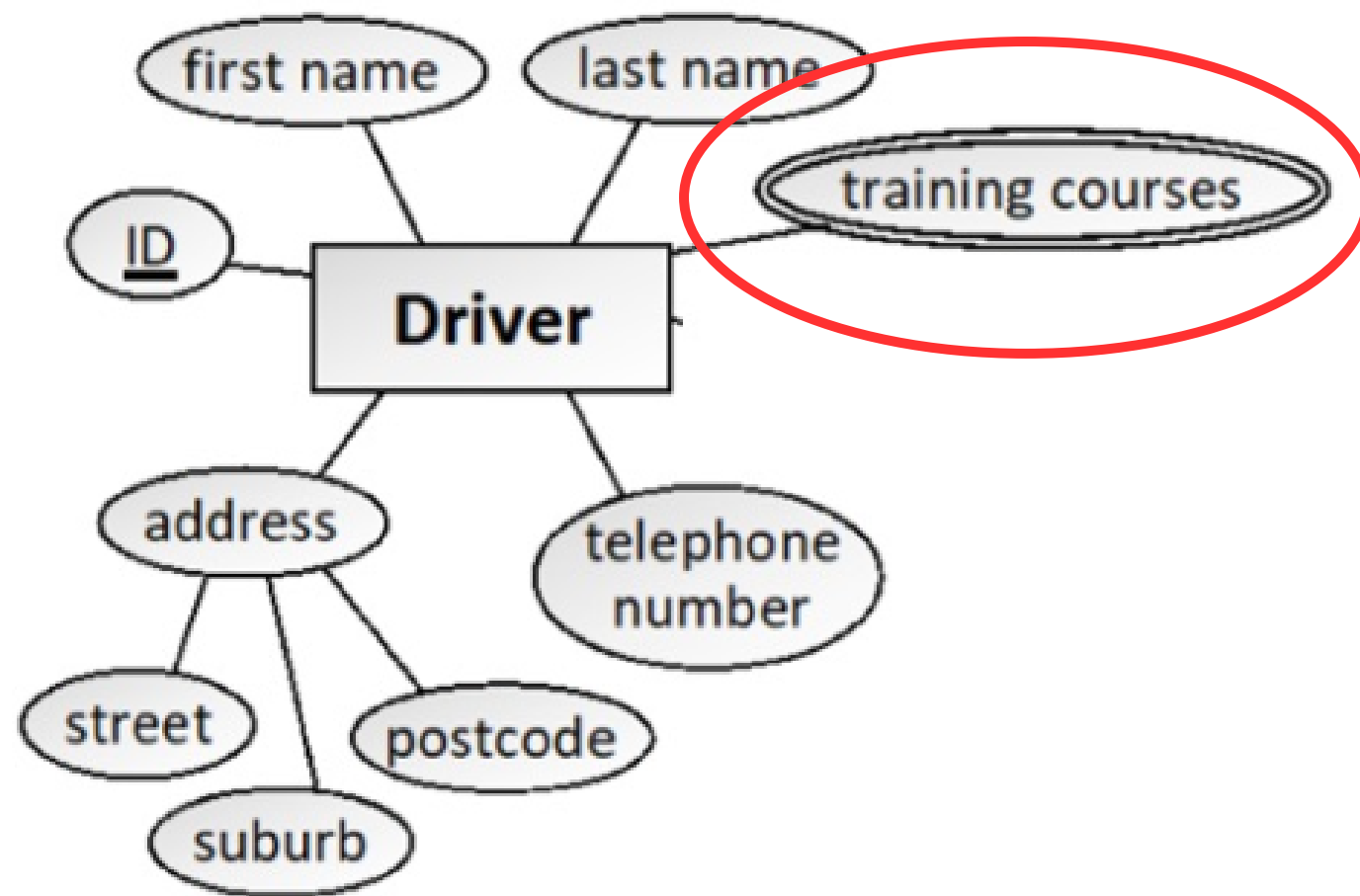
Composite, flatten attributes



Driver (DriverID, FirstName, LastName, AddressStreet, AddressSuburb, AddressPostcode, PhoneNumber)

Q3(d): Conceptual → Logical

Multivalued, create new entity



FK
DriverTrainingCourses (DriverID, TrainingCourseName)

