INFO20003 Database Systems

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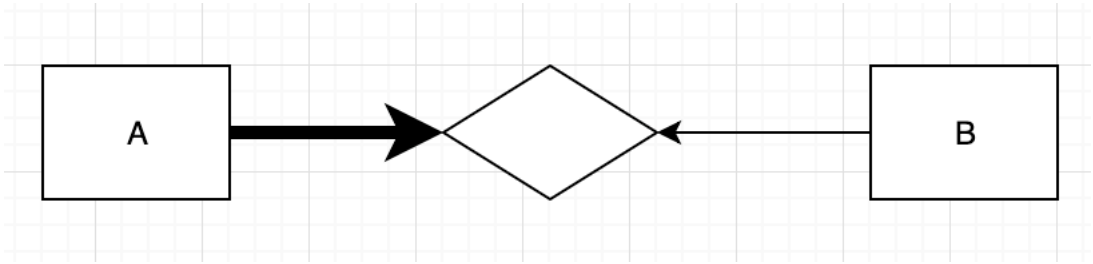
Tutorial 4
2020.03.31

Agenda

1. Quiz - 2min
2. Questions remained and Notice - 3min
3. Additional concepts in ER modeling - 10min
4. Simple case study - 15min
5. Bus company case study – conceptual and logical modelling - 30min
6. Lab - 1 hour

Quiz

1. Transforming following conceptual model to logical model, to remain relationship, which side of entity should we add foreign key to?



A side !!! WHY: to remain participating constraint

Logical Model:

A (<u>AID</u>, … , BID^{FK})

B (<u>BID</u>, …)

Physical Model: make BID^{FK} not null

Questions from Last Week

1. **Can a weak entity relies on another weak entity?**

   A: Yes! Employee <- Dependents <- multiple phones

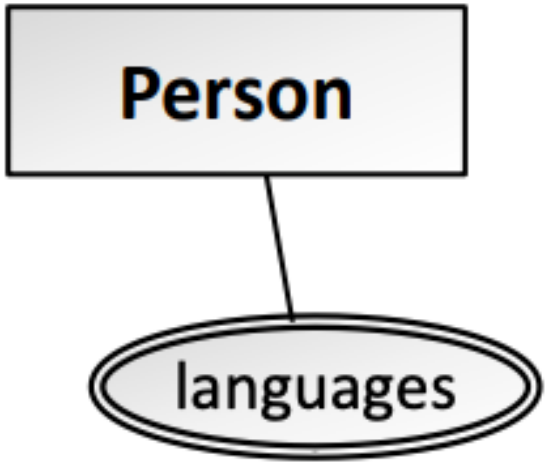
Notice

1. Assignment 1 has released - LMS Assessments
2. due date: **6:00pm Friday 10 April**
3. Tips:
   - Try modeling practice first - LMS Practice on your own
   - Read case study multiple times before designing
   - Derive from case study not real world examples
   - Subjective process, many possible solutions
   - Every time make a choice, list assumptions (400 words)
   - Carefully follow the rules about transforming models

Additional concepts in ER modeling

Multivalued and composite attributes

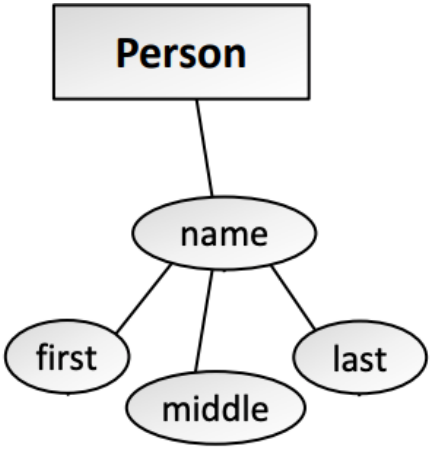
- **Multivalued attributes**:
- more than one value at the same time.
- phone numbers, skills, languages spoken
- draw using a **double outline**



Additional concepts in ER modeling

Multivalued and composite attributes

- **Composite attributes**:
- multiple components and can be broken down into multiple attributes.
- name that can be stored as first name and last name.
- draw by **branching the sub-attributes off the composite attribute**



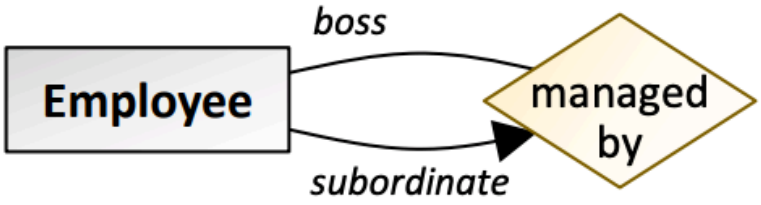
Additional concepts in ER modeling

Unary relationships

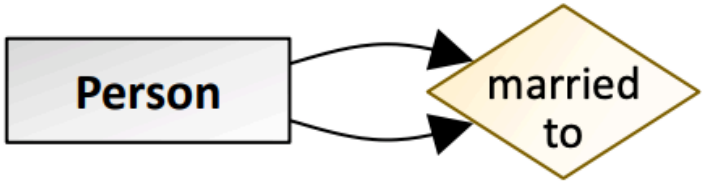
- between an entity and **itself**
- between multiple instances of the same entity
- have different cardinalities and constraints just like ordinary binary relationships
- When having different constraints, label the ends to make it clear what the constraints apply to

Additional concepts in ER modeling

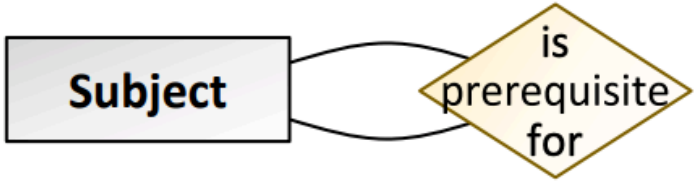
Unary relationships



One-to-many unary relationship



One-to-one unary relationship



Many-to-many unary relationship

Additional concepts in ER modeling

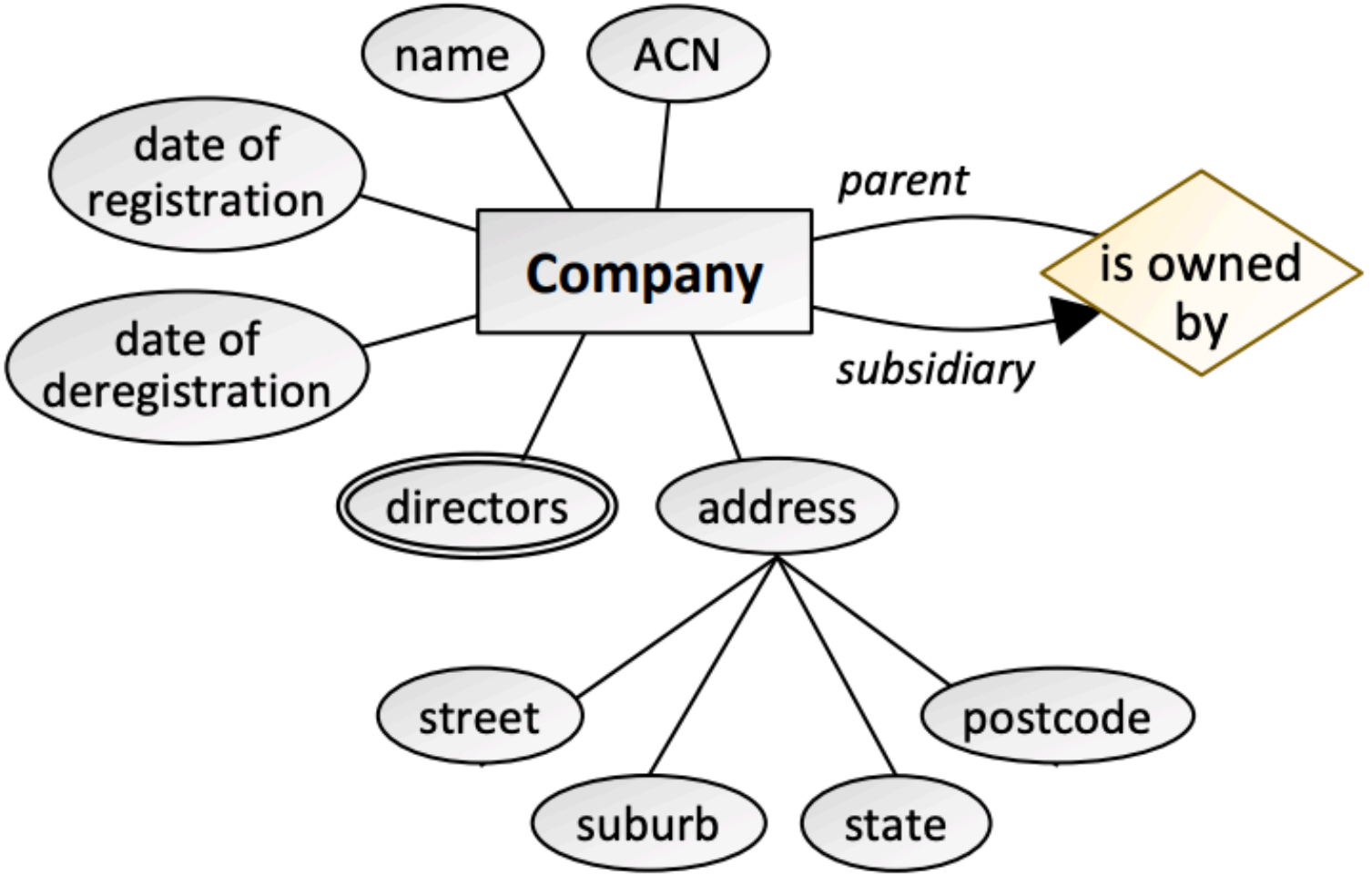
Any questions?

Small Case Studies - Individual

Australia's corporate regulator, ASIC, stores a range of information about every Australian company, 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.

Q: Use this information to model a "company" entity using Chen's notation

Small Case Studies - Individual



Case Studies - Individual

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.

Case Studies - Individual

a. Identify the **entities**.

- Bus
- Rout
- Stage
- Town
- Depot
- Driver

Case Studies - Individual

b. Identify the relationships (use business rules to identify relationships). State all the key constraints and participation constraints.

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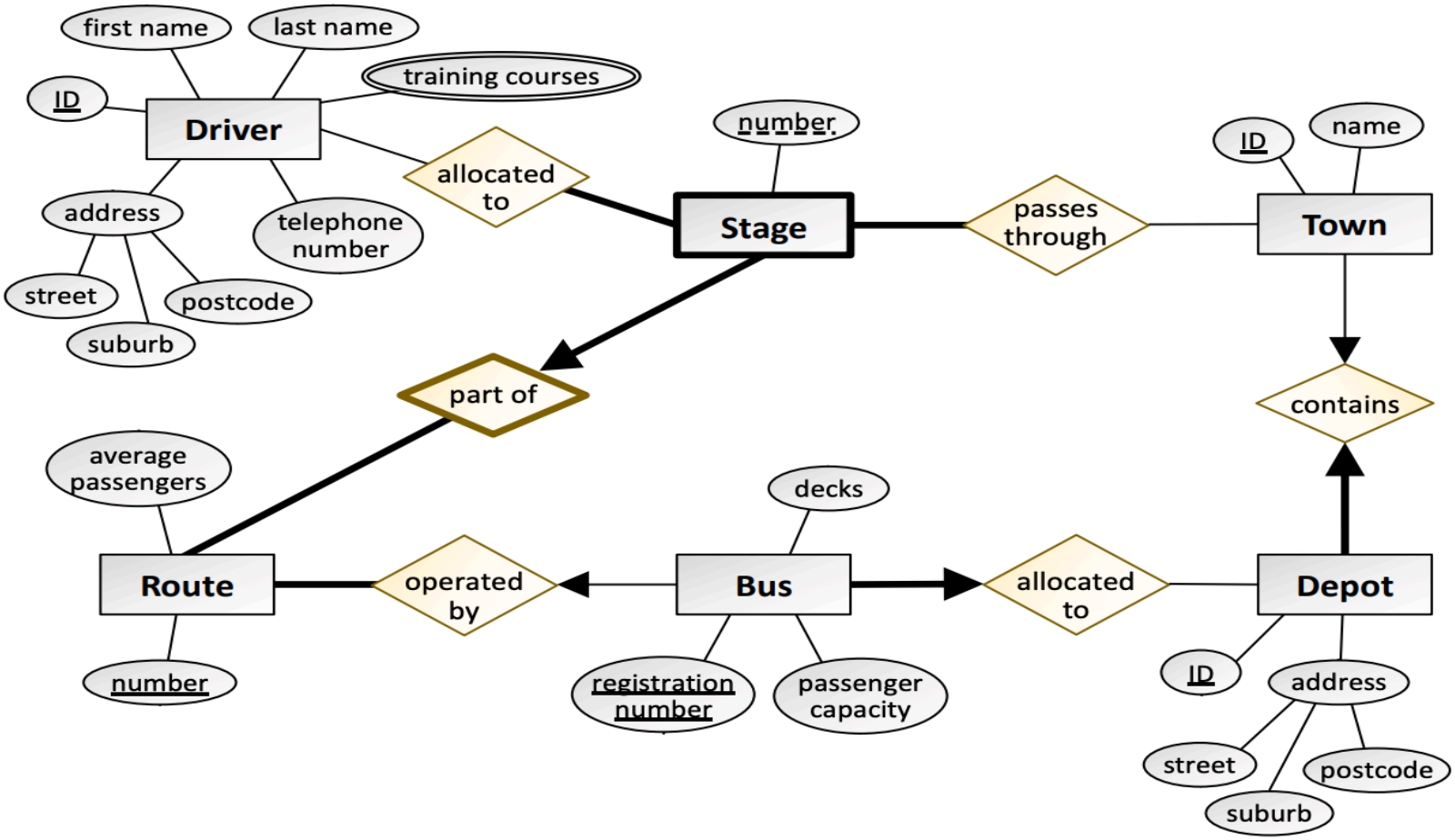
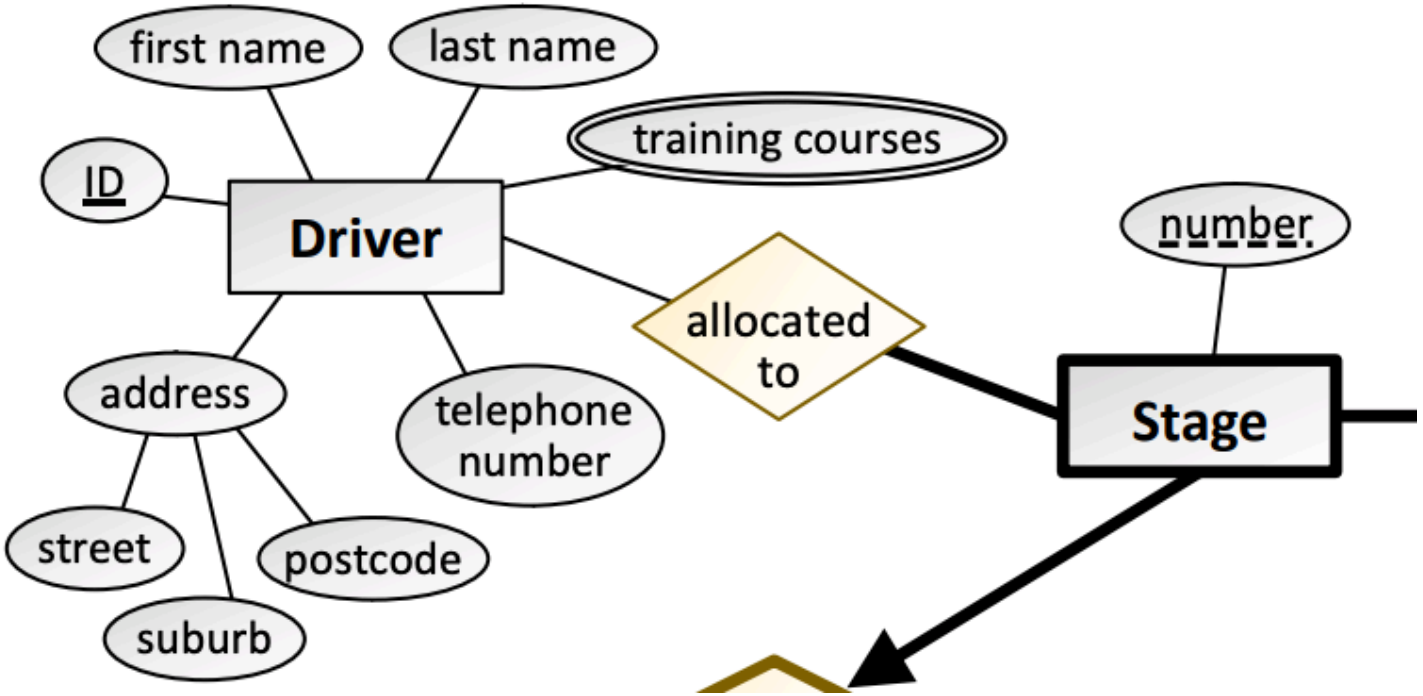
Case Studies - Individual

c. Draw a **conceptual model** and populate entities with appropriate attributes (use Chen's notation).



Case Studies - Individual

d. Discuss the **logical modeling** of the Driver entity.



Case Studies - Individual

1. resolve multivalued and composite attributes
2. Resolve relationships

Driver (<u>DriverID</u>, FirstName, LastName, AddressStreet, AddressSuburb, AddressPostcode, PhoneNumber)

DriverTrainingCourses (<u>DriverID</u>, <u>TrainingCourseName</u>)
FK

Case Studies - Individual

DriverAllocatedToStage (DriverID FK, RouteNumber FK, StageNumber FK)

Stage (RouteNumber FK, StageNumber)

Town (TownID, TownName)

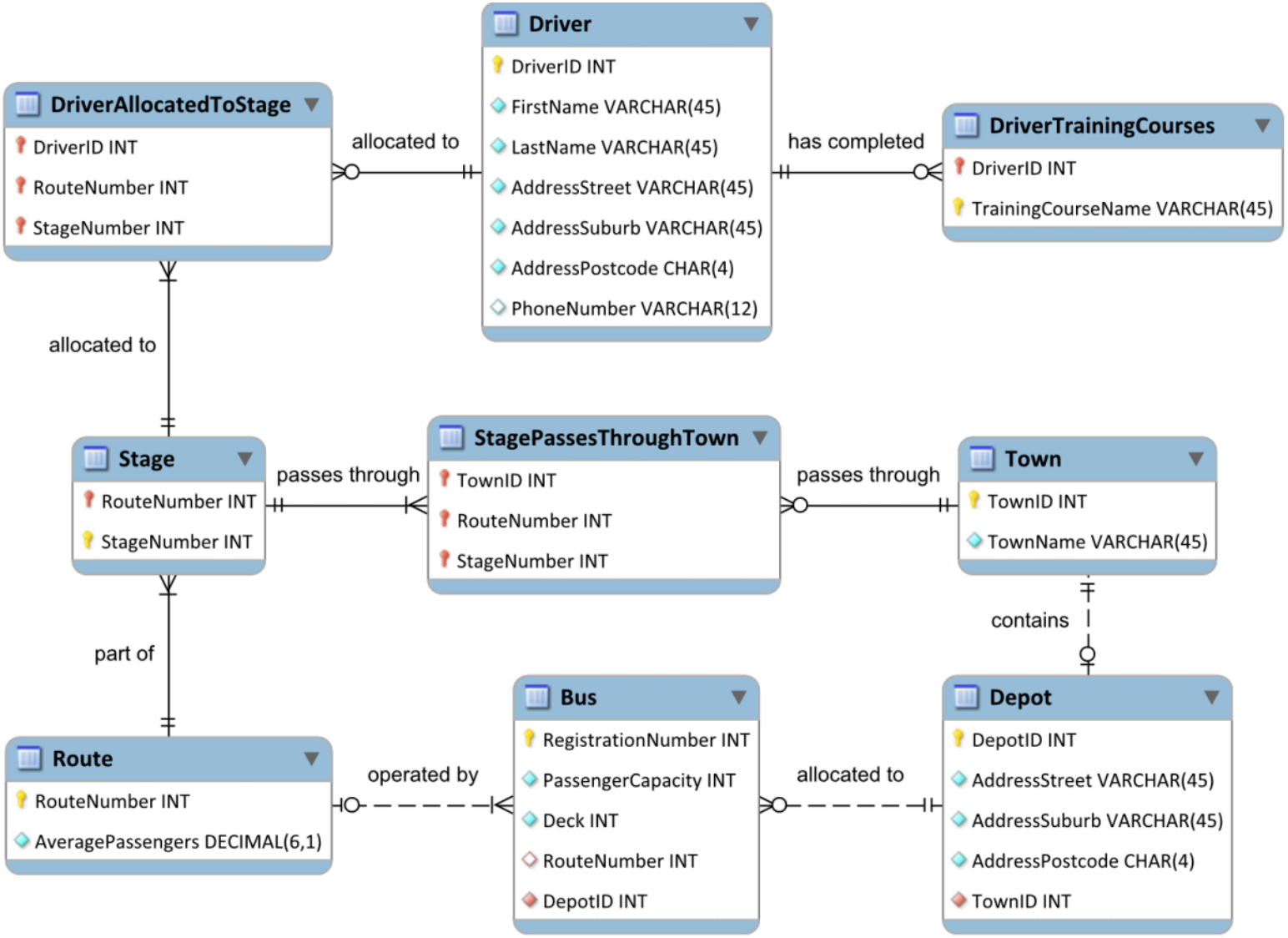
StagePassesThroughTown (TownID FK, RouteNumber FK, StageNumber FK)

Route (RouteNumber, AveragePassengers)

Bus (RegistrationNumber, PassengerCapacity, Make, Deck, RouteNumber FK, DepotID FK)

Depot (DepotID, AddressStreet, AddressSuburb, AddressPostcode, TownID FK)

Case Studies - Individual



Any questions?

Lab Time

Please refer to Lab 4 on LMS

Let me know if you encounter with any problem

ER Modelling with MySQL Workbench