DSAA 5012
Advanced Database Management for Data Science

LECTURE 2 EXERCISES
ENTITY-RELATIONSHIP (E-R) MODEL AND DATA BASE DESIGN

EXERCISE 2: BUS COMPANY

We want to keep track of bus routes and schedules for a bus company.

- Each bus route has a unique route number, a departure station and a destination station.
- For each bus route, there is a schedule, which records all the departure times of buses.
- For each departure time of each route, a driver and a bus can be assigned; however, information about the driver or the bus may sometimes be missing.
- A driver has a unique employee id, a name and a phone number.
- A bus is identified by its license number and has a maximum seating capacity.

Construct an E-R diagram for the bus company application.

EXERCISE 2: BUS COMPANY—ENTITIES

We want to keep track of bus routes and schedules for a bus company.

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- For each bus route, there is a schedule, which records all the departure times of buses.
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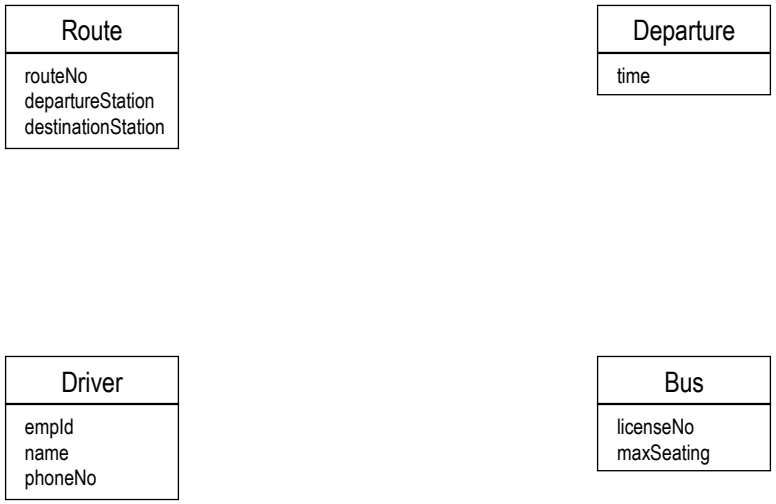
- A bus is identified by its license number and has a maximum seating capacity.

EXERCISE 2: BUS COMPANY—ATTRIBUTES OF ENTITIES

- Each bus route has a unique route number, a departure station and a destination station.
- For each bus route, there is a schedule, which records all the departure times of buses.
- A driver has a unique employee id, a name and a phone number.
- A bus is identified by its license number and has a maximum seating capacity.

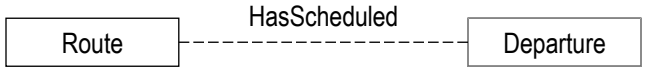


EXERCISE 2: BUS COMPANY—RELATIONSHIPS (ROUTE, DEPARTURE)

- Each bus route has a unique route number, a departure station and a destination station.
- For each bus route, there is a schedule, which records all the departure times of buses.

What should be related?

⟹ Route related to Departure.



EXERCISE 2: BUS COMPANY—RELATIONSHIPS (DRIVER, BUS)

- For each departure time of each route, a driver and a bus can be assigned; however, information about the driver or the bus may sometimes be missing.

What should be related?

⟹ Driver related to Bus.

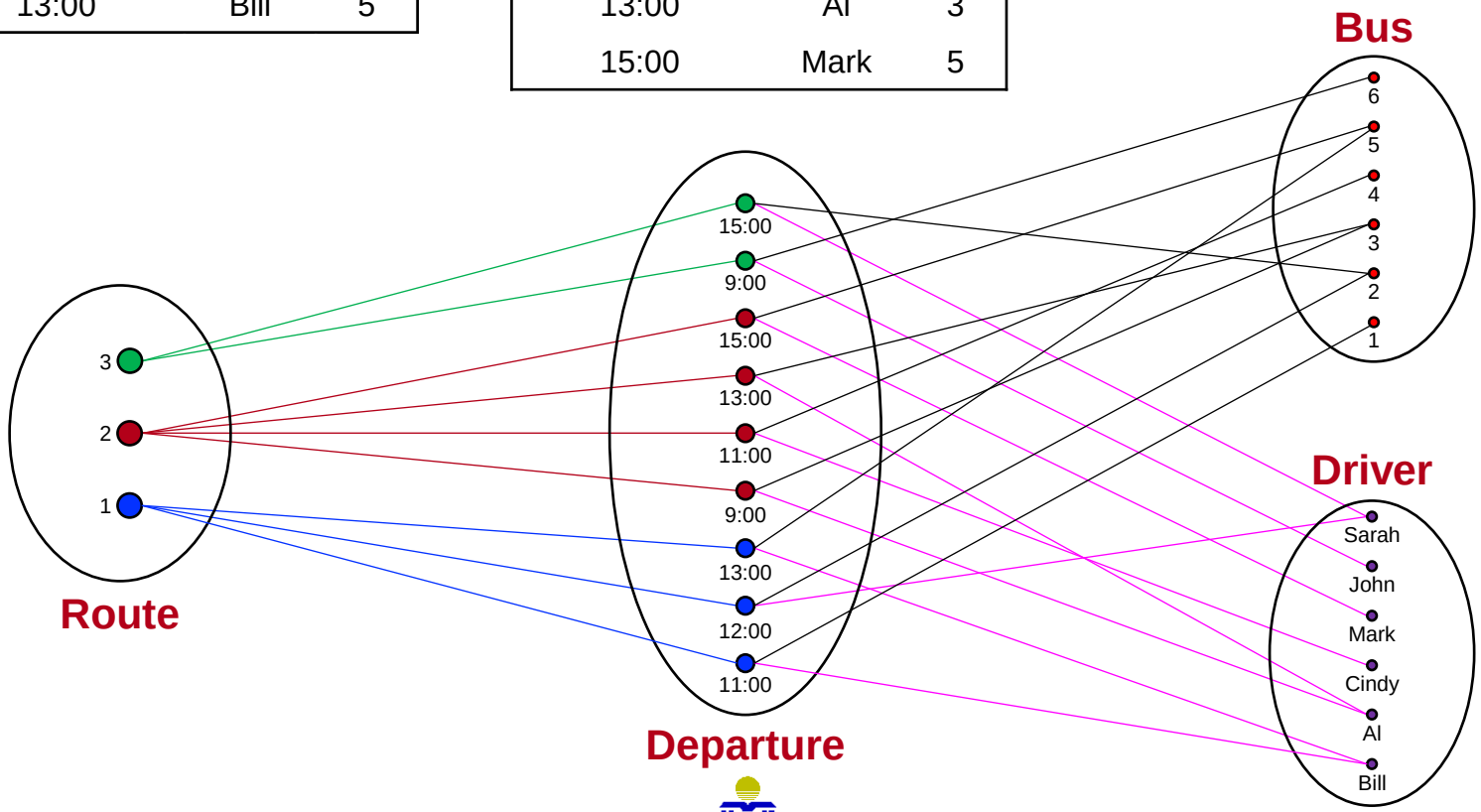
How should they be related?

EXERCISE 2: WHAT IS A SCHEDULE?

Route 1		
Departure time	Driver	Bus
11:00	Bill	1
12:00	Sarah	2
13:00	Bill	5

Route 2		
Departure time	Driver	Bus
9:00	Al	3
11:00	Cindy	4
13:00	Al	3
15:00	Mark	5

Route 3		
Departure time	Driver	Bus
9:00	John	6
15:00	Sarah	2



EXERCISE 2: BUS COMPANY—RELATIONSHIPS (DRIVER, BUS)

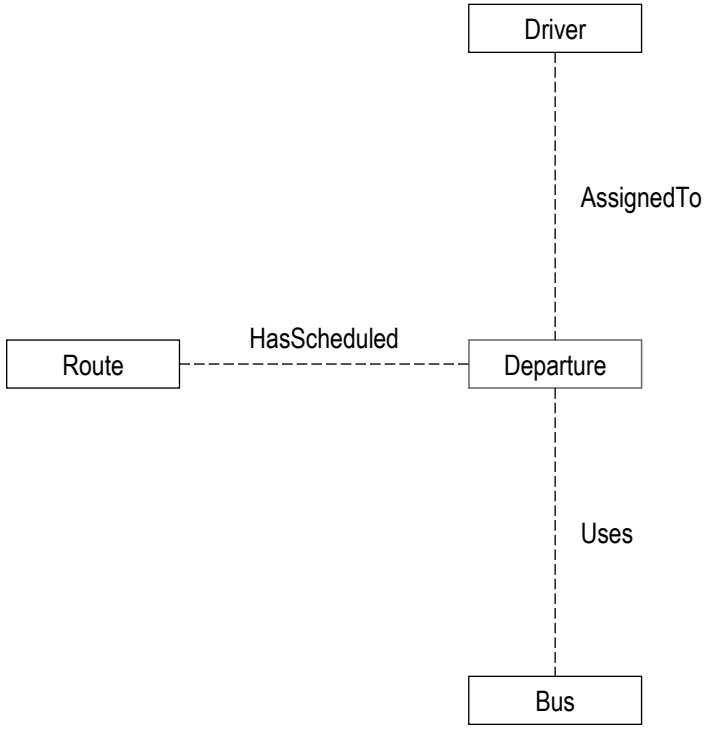
- For each departure time of each route, a driver and a bus can be assigned; however, information about the driver or the bus may sometimes be missing.

What should be related?

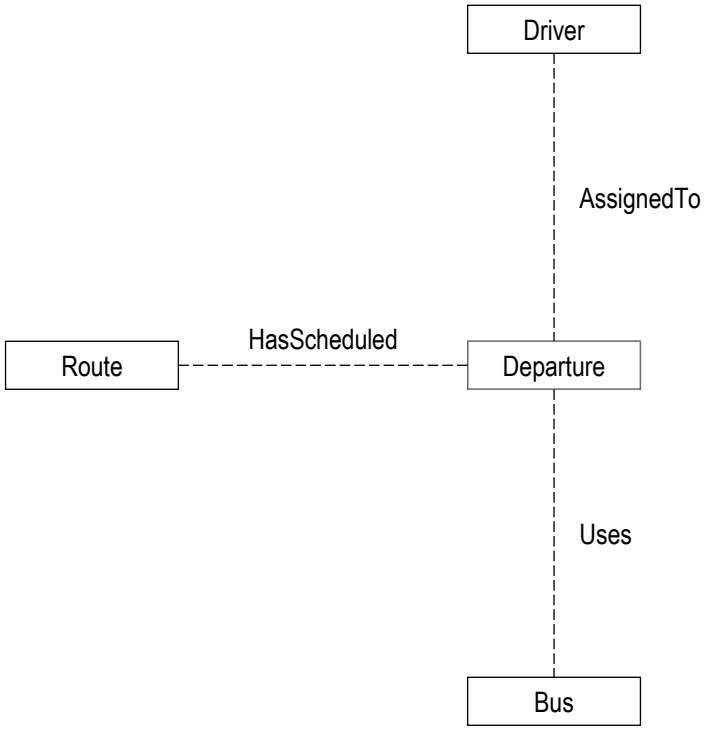
⟹ Driver related to Bus.

How should they be related?

⟹ Through the Departure entity.

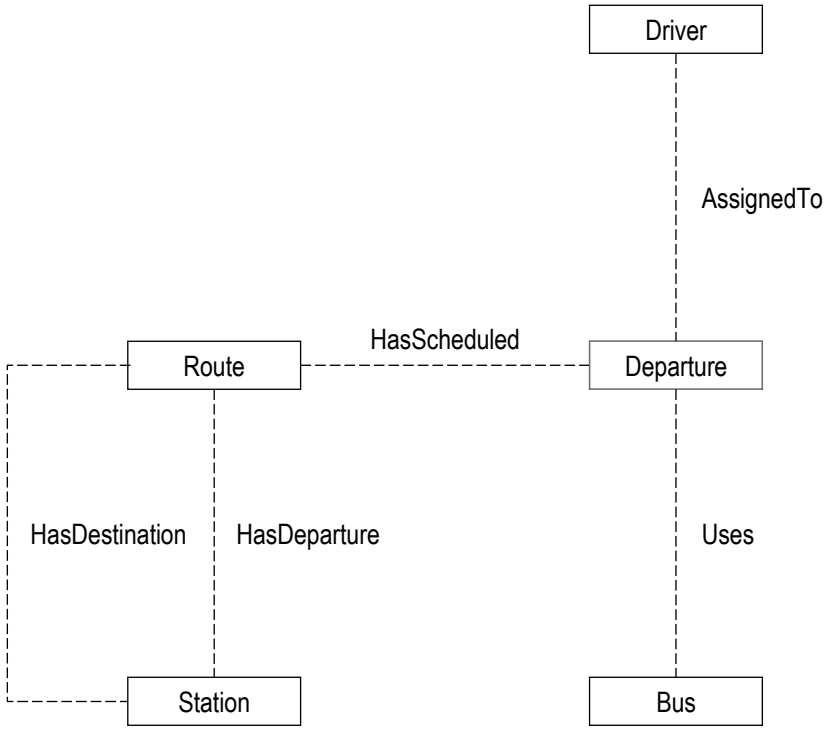


EXERCISE 2: BUS COMPANY—E-R DIAGRAM



Route	Departure	Driver	Bus
routeNo departureStation destinationStation	time	empId name phoneNo	licenseNo maxSeating

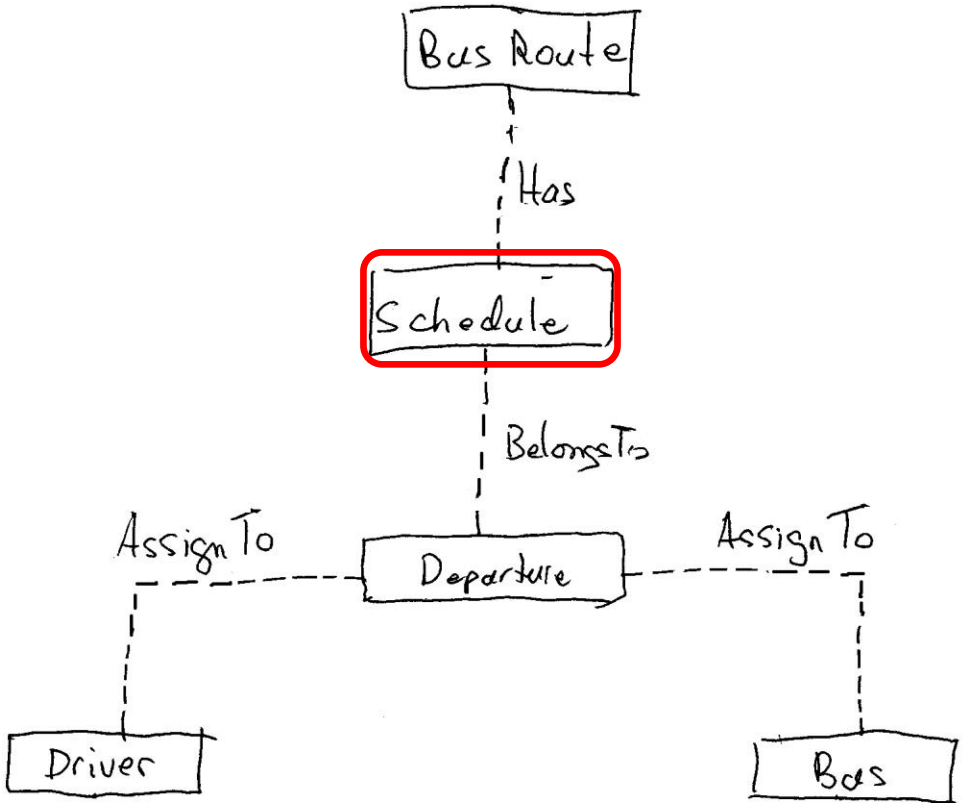
EXERCISE 2: BUS COMPANY—E-R DIAGRAM POSSIBLE REFINEMENT



Route	Departure	Driver	Bus	Station
routeNo	time	empId name phoneNo	licenseNo maxSeating	name

EXERCISE 2: BUS COMPANY— WHAT IS WRONG WITH THIS SCHEMA?

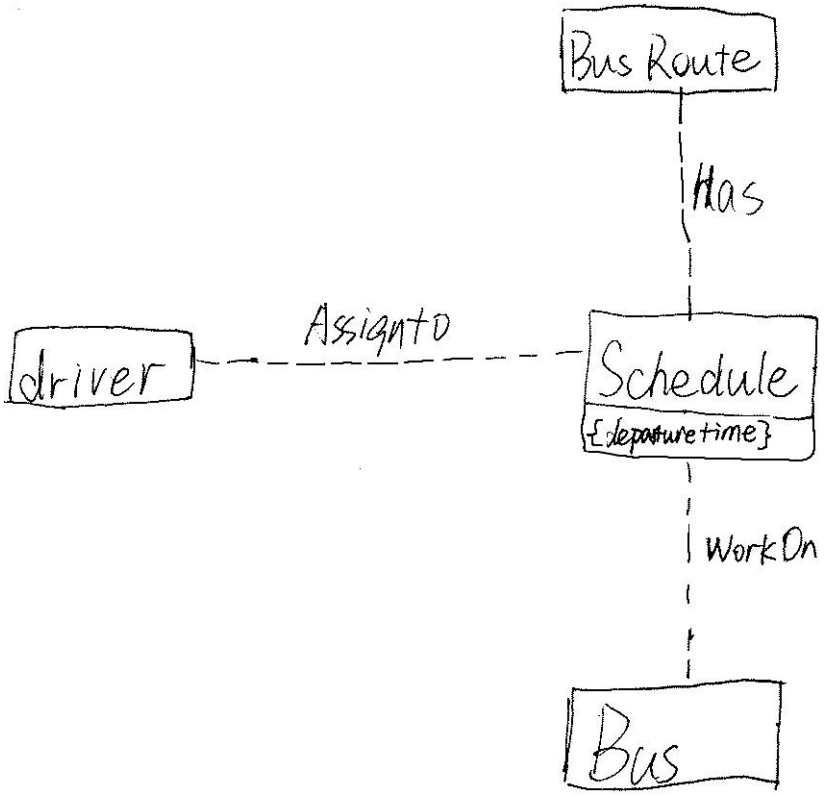
- An entity with no attributes ⟹ nothing to store!



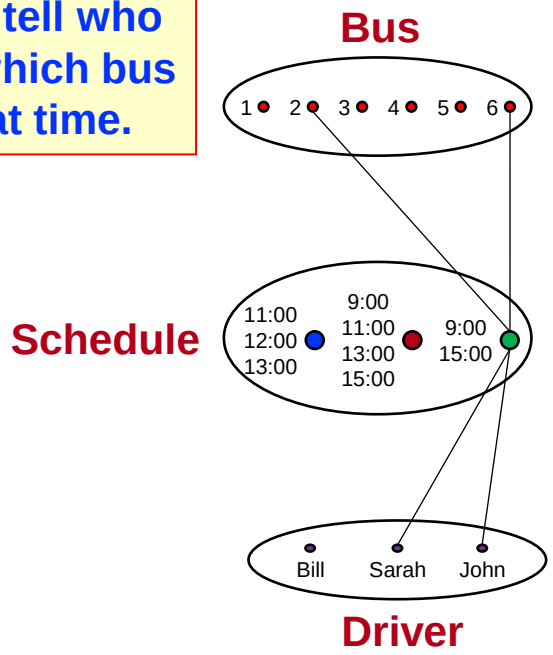
EXERCISE 2: BUS COMPANY— WHAT IS WRONG WITH THIS SCHEMA?

- Incorrect use of multivalued attribute. **Why?**

Route 3		
Departure time	Driver	Bus
9:00	John	6
15:00	Sarah	2

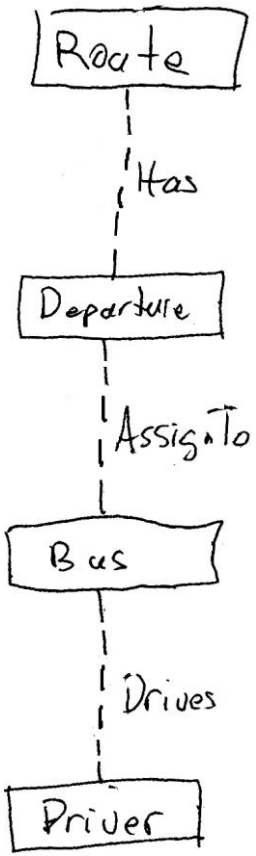


Cannot tell who drives which bus at what time.

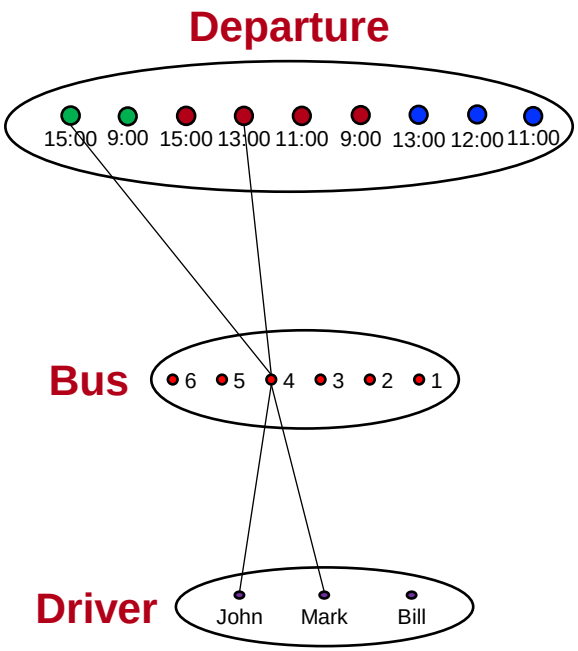


EXERCISE 2: BUS COMPANY— WHAT IS WRONG WITH THIS SCHEMA?

- Incorrect relationship ⟹ Driver needs to be related to Departure. **Why?**

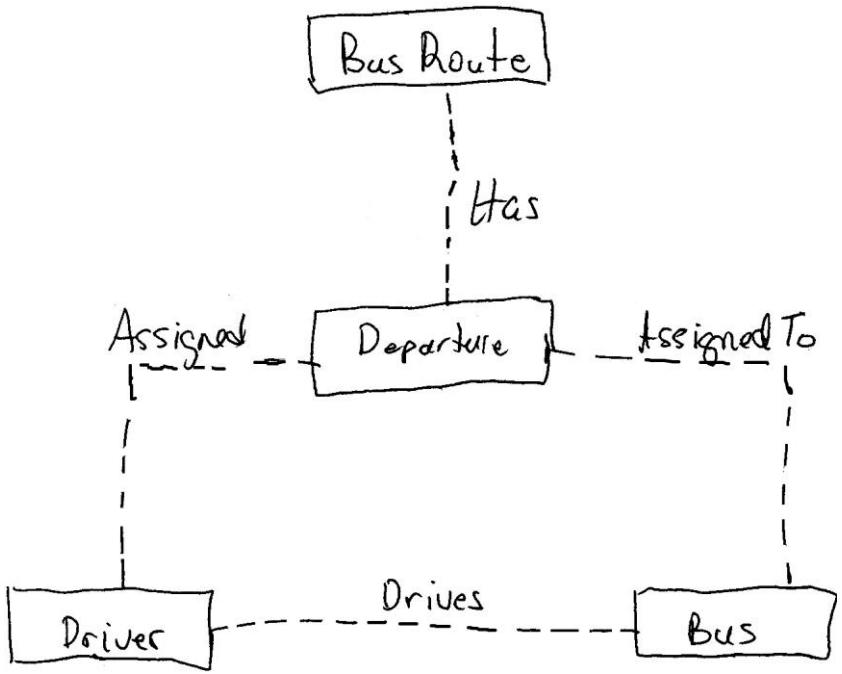


Cannot tell to which Departure instance John/Mark are related.



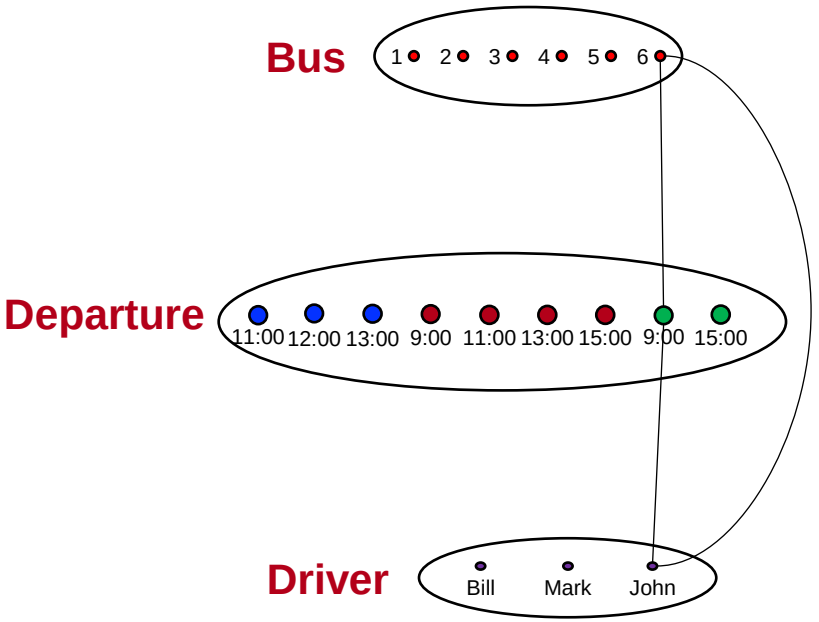
EXERCISE 2: BUS COMPANY— WHAT IS WRONG WITH THIS SCHEMA?

- It is not necessary to relate Driver to Bus. **Why?**



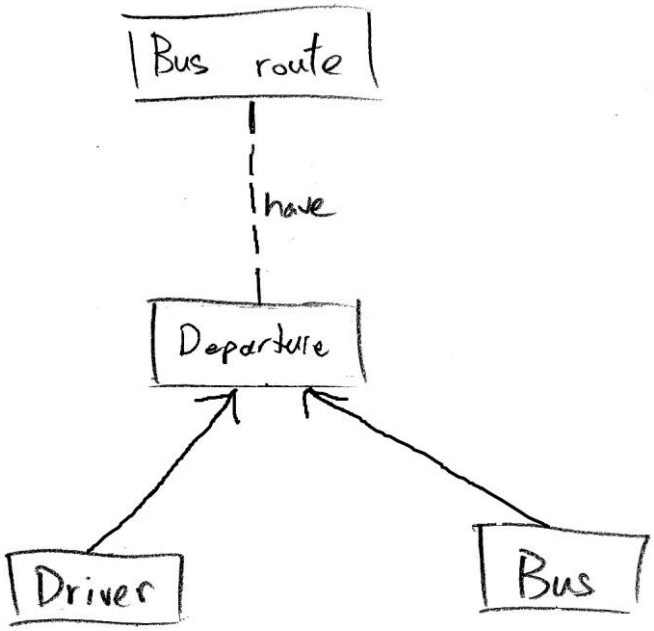
Including the Drives relationship is redundant.

Route 3		
Departure time	Driver	Bus
9:00	John	6
15:00	Sarah	2



EXERCISE 2: BUS COMPANY— WHAT IS WRONG WITH THIS SCHEMA?

- Driver and Bus are not a kind of Departure.



EXERCISE 2: BUS COMPANY— WHAT IS WRONG WITH THIS SCHEMA?

- Incorrect use of composite attributes.