

# Business Intelligence

ER model

# Example: bus transportation company

- The company owns some buses, of different makes, used on different routes
  - a bus trip can take place on different routes
  - drivers and conductors (ticket collectors) may use different buses and different routes
- The personnel consists of drivers and conductors (working on given trips), sellers (staying at given stops), and maintenance and administrative staff (working in the head office)
- For every employee, we need to store the usual personal info
- For every route, we need to store start point, end point, and intermediate stops
- Vehicles are parked in depots at night. Every bus is associated with a depot.
- Every driver is associated with a depot
- The first and last trip of the day are always made by a bus of the depot to which the driver is assigned (but the other trips can also be made on vehicles from other depots)

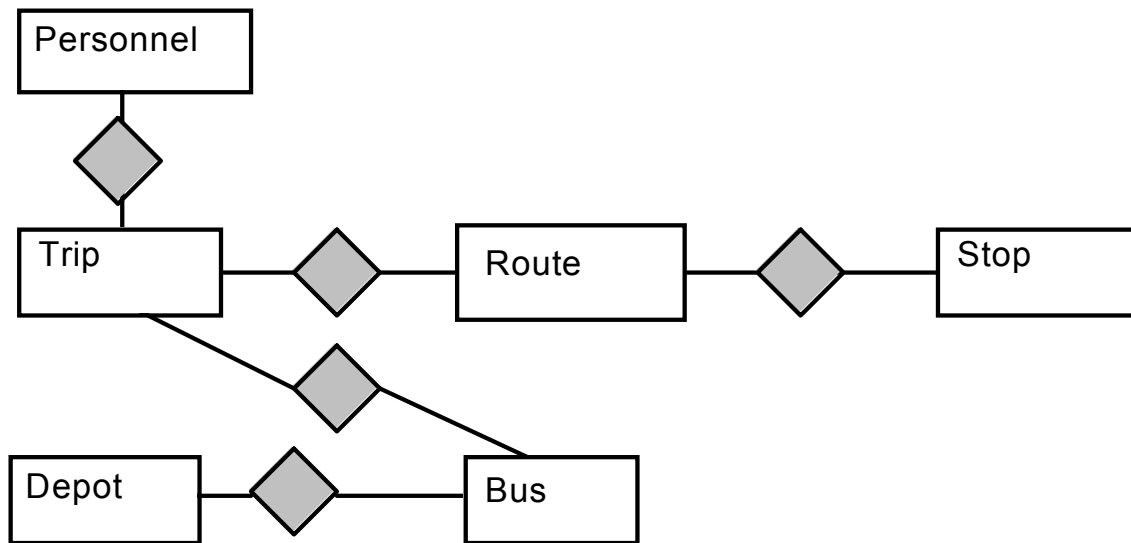
# A top-down solution

- Phase 1: identify main entities and relationships
- Phase 2: make relationships more precise, with names, and hierarchies for entities
- Phase 3: give details of hierarchies and specify identifiers
- Phase 4: specify all attributes

# Phase 1: identify main entities and relationships

- The company owns some **buses**, of different makes, used on different **routes**
  - a bus **trip** can take place on different **routes**
  - drivers and conductors (ticket collectors) may use different **buses** and different **routes**
- The **personnel** consists of drivers and conductors (working on given **trips**), sellers (staying at given **stops**), and maintenance and administrative staff (working in the head office)
- For every employee, we need to store the usual personal info
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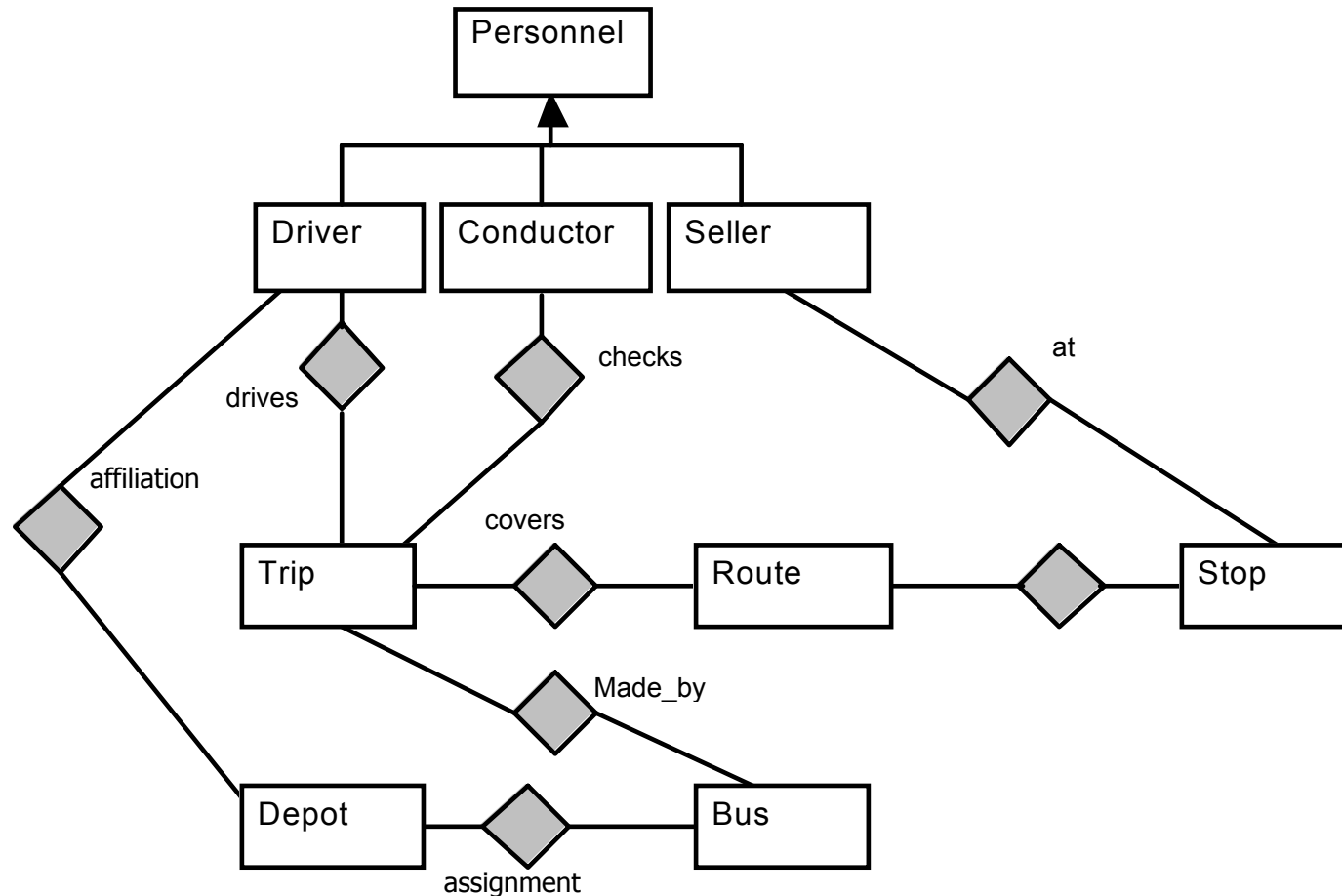
# Phase 1: identify main entities and relationships



# Phase 2: more precise relationships, with names and hierarchies

- The company owns some **buses**, of different makes, used on different **routes**
  - a bus **trip** can **take place** on different **routes**
  - drivers and conductors (ticket collectors) may **use** different **buses** and different **routes**
- The **personnel** consists of **drivers** and **conductors** (**working on** given **trips**), **sellers** (**staying at** given **stops**), and maintenance and administrative staff (working in the head office)
- For every employee, we need to store the usual personal info
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- Vehicles are **parked** in **depots** at night. Every **bus** is associated with a **depot**.
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# Phase 2: more precise relationships, with names and hierarchies

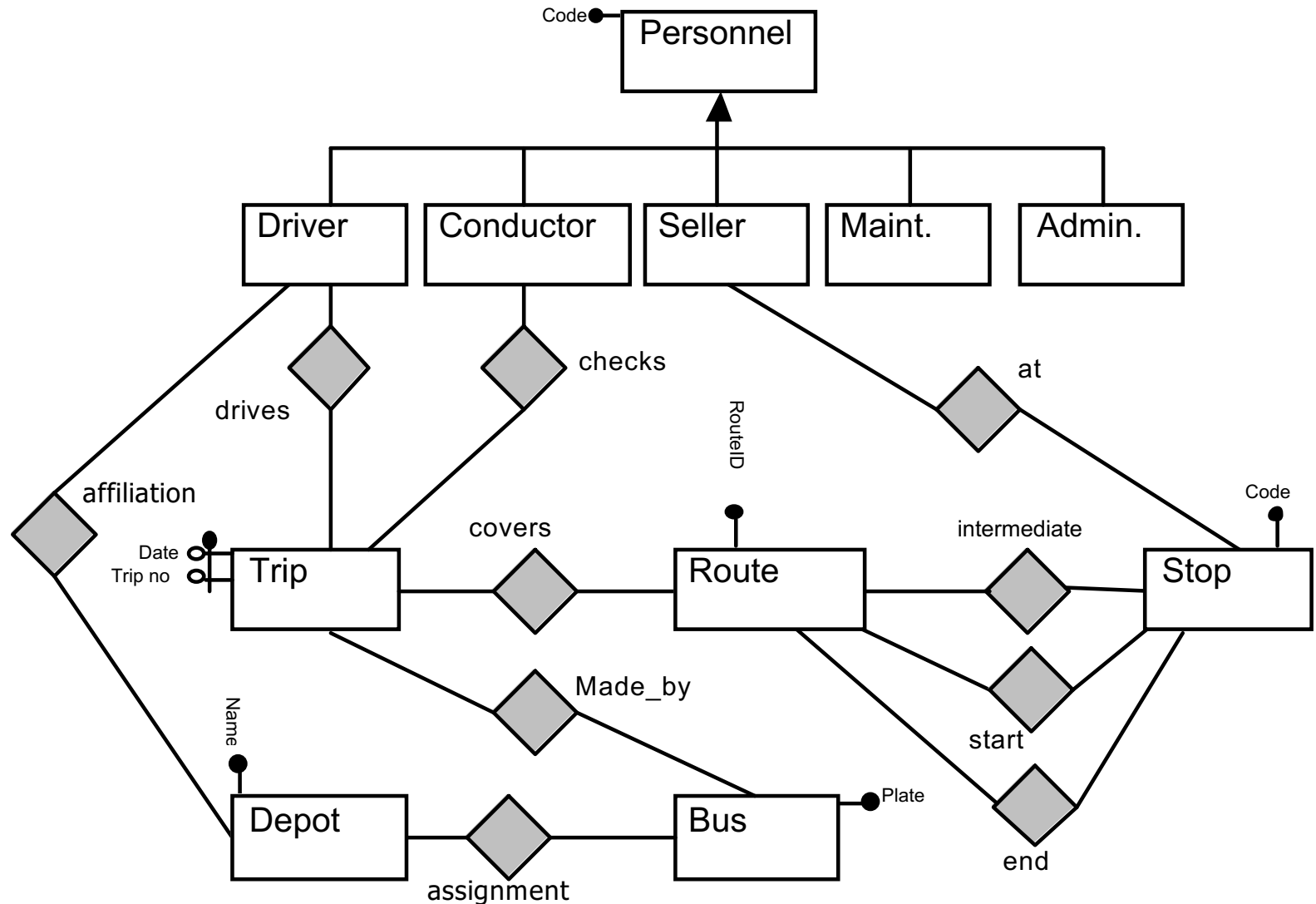


# Phase 3: details of hierarchies and identifiers

- The company owns some **buses**, of different makes, used on different **routes**
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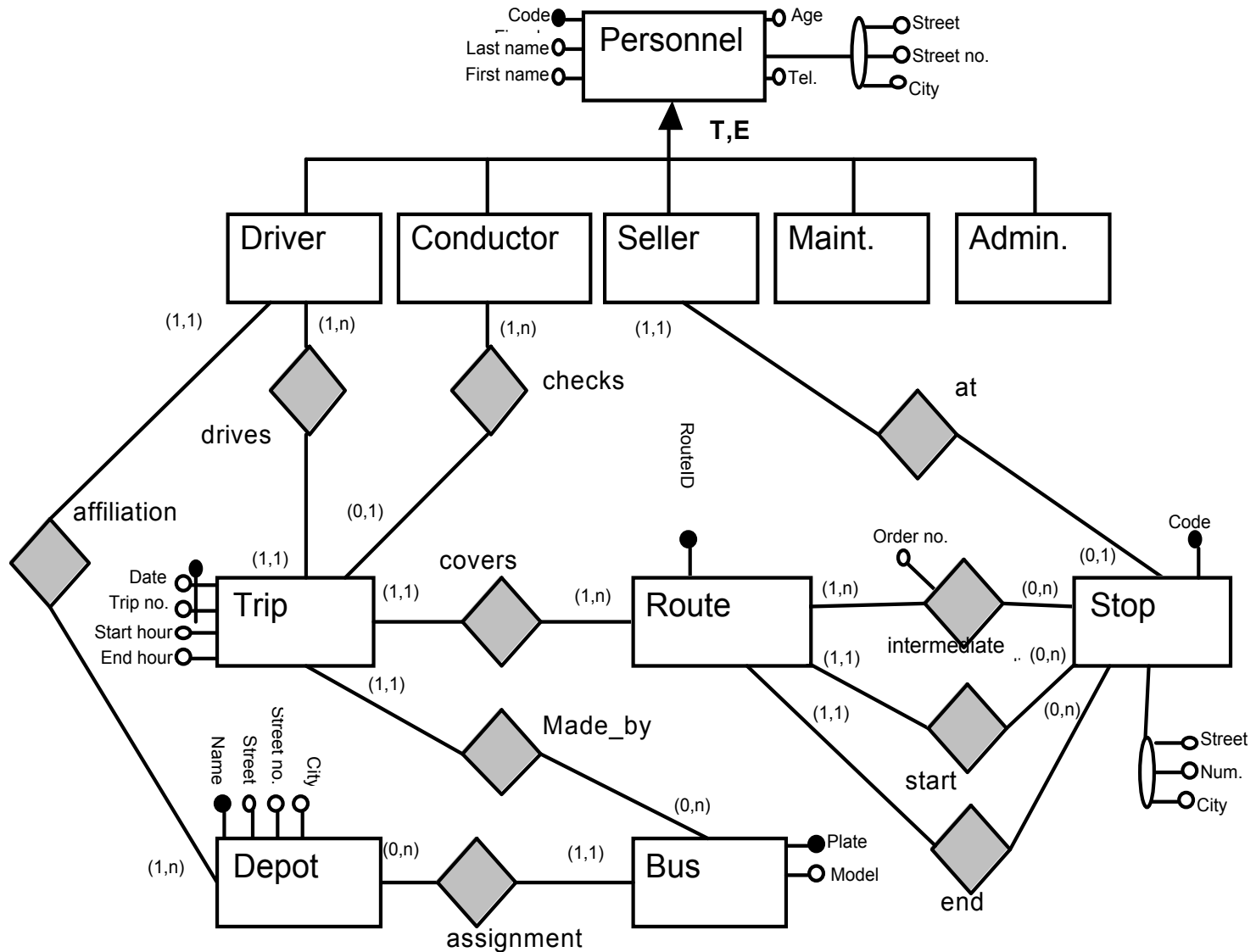
# Phase 3: details of hierarchies and identifiers



# Phase 4: all attributes

- The company owns some **buses**, of different **makes**, used on different **routes**
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- For every employee, we need to store the **usual personal info**
- For every route, we need to store **start point**, **end point**, and **intermediate stops**
- Vehicles are **parked** in **depots** at night. Every **bus** is associated with a **depot**.
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# Phase 4: all attributes



# Observations

- Even for simple texts, solutions are never unique
- We assumed that, in a route, the bus stops only once in the same place
- The “start” and “end” relationships for the “Route” entity are redundant, as they could be inferred via the “intermediate” relationship
  - yet, if “start” and “end” are frequently queried, then it might be wise to keep them in the model