E-R Modeling

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Database Design

- Requirement Analysis
- Conceptual Design
- Logical Design
- Schema Refinement
- Physical Design
- Security Design

Database Design

- Requirement Analysis — user's needs
- Conceptual Design — high level (ER)
- Logical Design — Tables
- Schema Refinement — Normalization
- Physical Design — Indices etc.
- Security Design — Access control

Overview

- Concepts
  - Entities
  - Relationships
  - Attributes
  - Specialization/Generalization
  - Aggregation
  - ER modeling questions

Tools

- Nouns -> entity sets
- Verbs -> relationship sets

Entities (‘entity sets’)

Relationships (‘rel. sets’)

and mapping constraints

attributes

Example

- A country 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 garage where buses are kept and each of the buses are identified by the registration number and can carry different number 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.

Example - Entities

- Bus – Company owns buses and will hold information about them.
- Route – Buses travel on routes and will need described.
- Town – Buses pass through towns and need to know about them.
- Driver – Company employs drivers, personnel will hold their data.
- Stage – Routes are made up of Stages. Garage –
- Garage houses buses, and need to know where they are.

Example - Relationships

- A bus is allocated to a route and a route may have several buses.
- Bus-route (m:1) is serviced by a route comprises of one or more stages.
- Route-Stage (1:m) Comprises One or more drivers are allocated to each stage.
- Driver-stage (m:1) is allocated A Stage passes through some or all of the towns on a route.

Example - Relationships

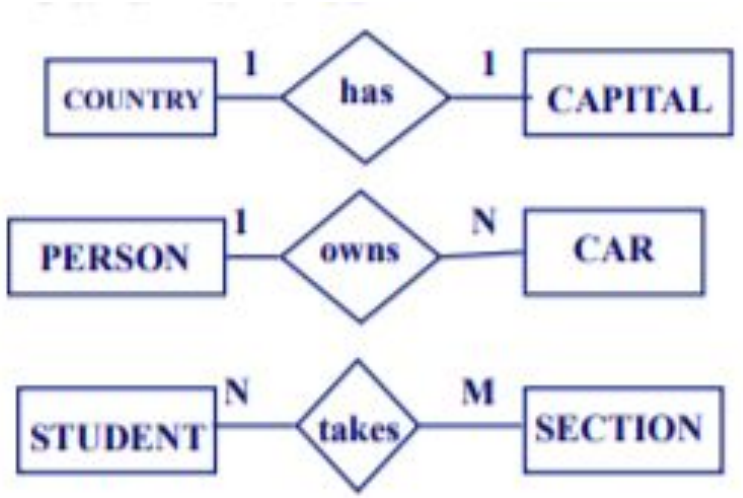
- Stage-town (min) passes-through. A route passes through some or all of the towns.
- Route-town (min) passes-through Some of the towns have a garage.
- Garage-town (1:1) is situated Agarage keeps buses and each bus has one home garage.
- Garage-bus (m:1) is garaged.

Example - Attributes

- Bus (reg-no, make, size, deck, no-pass)
  - Route (route-no avg-pass)
- Driver (emp-no, name, address, tel-no)
  - Town name)
  - Stage (stage-no)
  - Garage (name, address)

Cardinalities

- 1 to 1 (example?)
- 1 to N
- N to M



Total/Partial Participation