Dept. of Computer Science and Engineering
University of Rajshahi
www.ru.ac.bd

Dr. Shamim Ahmad

Constructing an ER model

- Before beginning to draw the ER model, read the requirements specification carefully.
- Document any assumptions you need to make.

Constructing an ER model (cont)

1. **Identify entities** - list all potential entity types. These are the object of interest in the system. It is better to put **too many** entities in at this stage and them **discard** them later if necessary.

Constructing an ER model (cont)

2. **Remove duplicate entities** - Ensure that they **really separate entity types** or **just two names for the same thing**.
   - Also do not include the **system as an entity type**
   - e.g. if modelling a library, the entity types might be books, borrowers, etc.
   - The library is the system, thus should not be an entity type.

Constructing an ER model (cont)

3. List the attributes of each entity (all properties to describe the entity which are **relevant** to the application).

- Ensure that the entity types are really needed.
- are any of them just attributes of another entity type?
- if so keep them as attributes and cross them off the entity list.
- Do not have attributes of one entity as attributes of another entity!

Constructing an ER model (cont)

4. Mark the primary keys.

- **Which attributes uniquely identify instances of that entity type?**
- **This may not be possible for some weak entities.**

Constructing an ER model (cont)

5. Define the relationships

- **Examine each entity type to see its relationship to the others.**

Constructing an ER model (cont)

6. Describe the cardinality and optionality of the relationships

- **Examine the constraints between participating entities.**

Constructing an ER model (cont)

7. Remove redundant relationships

Examine the ER model for redundant relationships.

Constructing an ER model (cont)

- ER modelling is an iterative process
- So draw several versions, refining each one until you are happy with it
- Note that there is no one right answer to the problem, but some solutions are better than others!

Problem (story) : *National* Bus Company

- The *National* Bus Company owns a number of busses. Each bus is allocated to a particular route, although some routes may have several busses. Each route passes through a number of towns.

Problem (story) : *National* Bus Company

- 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.

Problem (story) : *National* Bus Company

- Some of the towns have a garage where busses are kept and each of the busses are identified by the registration number and can carry different numbers of passengers, since the vehicles vary in size and can be single or double-decked.

Problem (story) : *National* Bus Company

- 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.

Solution: Entities

- **Bus** - Company owns busses 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.

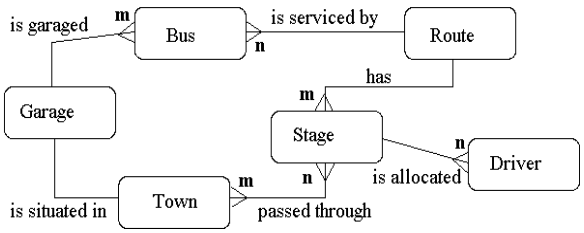
Solution: Relationships

- 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.
  - stage-town (m:n) passes-through

Solution: Relationships (cont)

- A route passes through some or all of the towns
  - route-town (m:n) passes-through
- Some of the towns have a garage
  - garage-town (1:1) is situated
- A garage keeps buses and each bus has one `home' garage
  - garage-bus (m:1) is garaged

Solution: Draw E-R Diagram



Solution: Relations

- 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)