SWE 207
Database Management Systems

~ Entity Relationship Model Applications ~

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Content

- Design with Entity Relationship Model (ERM)
- Applications
  - Vehicle Producer
  - Bookstore Software
  - University Information System

Design with Entity Relationship Model (ERM)

- Database design is an iterative (spiral model or iterative model in software development) process rather than linear or sequential (like the waterfall model in software development).
- Iterative means "do it over and over again". An iterative process is based on repeating processes and procedures.
- Developing an entity relationship diagram usually involves the following steps:

Design with Entity Relationship Model (ERM)

- A detailed scenario containing the description of the work of the institution is created. The scenario will be much more realistic and effective, especially if it is developed in consultation with the role representatives within the organization.
- Business rules are created based on the descriptions of the works in the scenario.
- Entities and relationships between the entities are created based on business rules.
- The first entity relationship diagram is developed.
- The attributes and primary keys that clearly define entities are created.
- The Entity Relation Diagram is reviewed and if necessary, the above steps are repeated until the desired state is reached.

Vehicle Producer

- Scenario
  - A vehicle manufacturer produces different models of vehicles.
  - The manufacturer demands a software system.
  - The manufacturer wants to store and manage some information like the vehicles, the materials used in the vehicles, suppliers, etc.

Vehicle Producer

- Business Rules
  - Each vehicle has chassis number, color, type (automobile, truck, minibus, etc.), model and production date information. Vehicles are distinguished from each other by their chassis number.
  - The vehicle types have a code and name.
  - A vehicle can only have one type. There may be no vehicle of a type or many vehicles of a type.
  - Vehicle models have a code, name, weight and number of passengers information.
  - A vehicle has only one model. There may not be any vehicle belonging to a model, or there may be many vehicles belonging to a model.

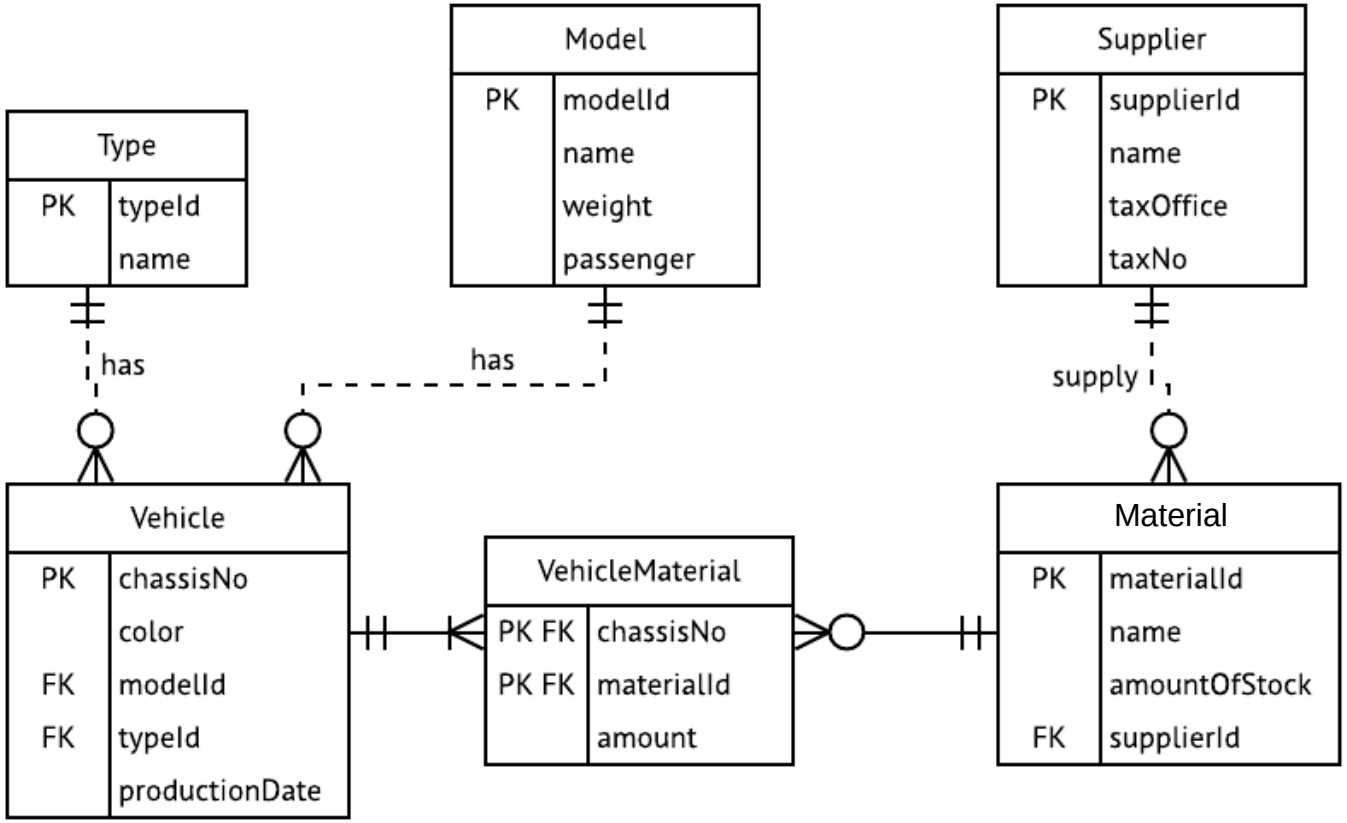
Vehicle Producer

- Business Rules

  - Materials have a code, name and amount of stock information.
  - Supplier companies have a code, name, tax office, tax number information.
  - Materials are purchased from supplier companies.
  - A supplier may not supply any material or supply one or more materials. A material is supplied only by one supplier.
  - A vehicle consists of many materials. It must include at least one material. One material can be used in more than one vehicle. However, it may not have been used in any vehicle yet.
  - Each vehicle is made of different amounts of material. This information should also be recorded.

Vehicle Producer

- Entity Relationship Model



Bookstore Software

- Scenario
  - A database will be designed for a bookstore software.
  - It is expected that the database will contain information about the sold books in the bookstore, the authors of these books and publishers of these books.

Bookstore Software

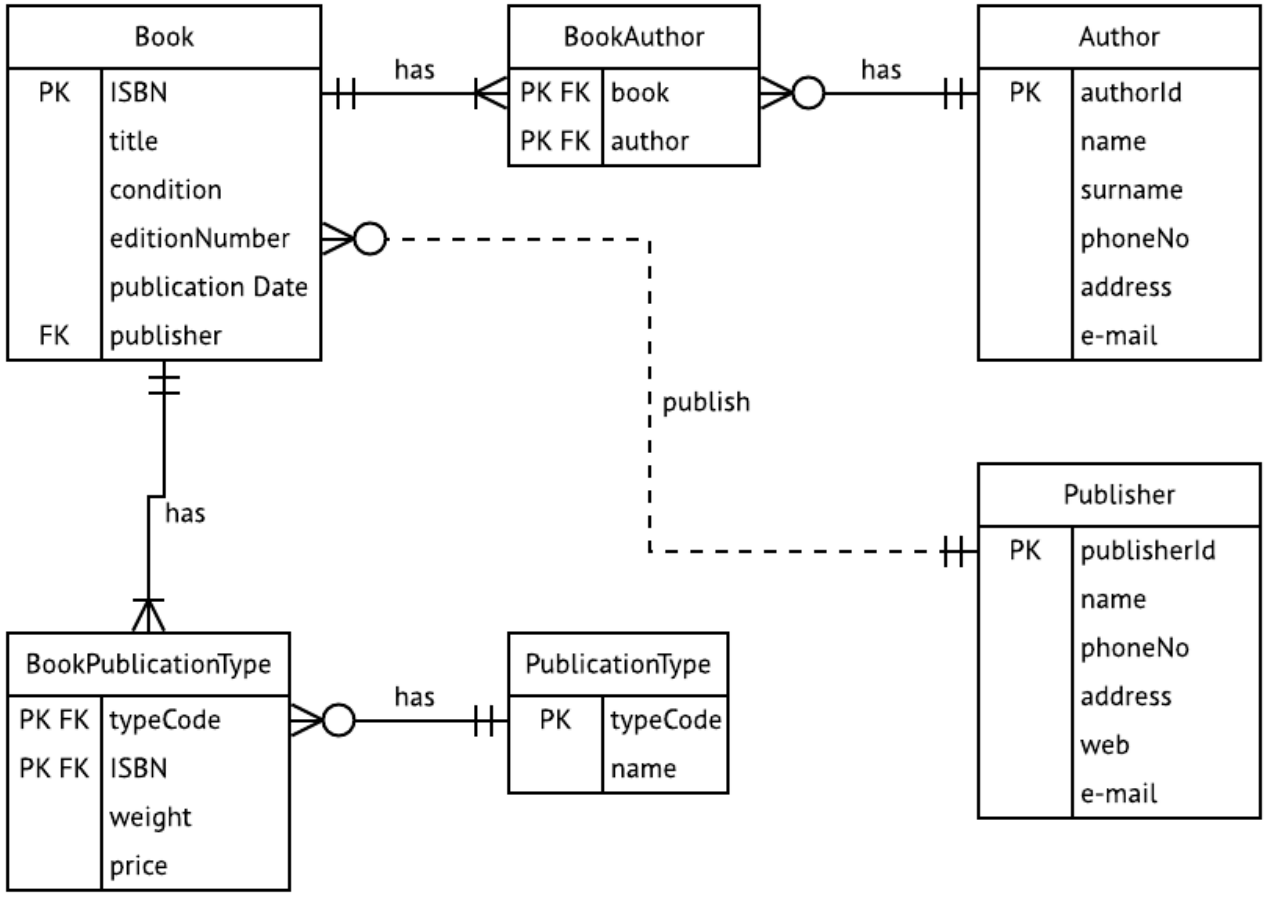
- Business Rules
  - Each book has an ISBN, title, condition (new, used), publication type (paper cover, paperback, electronic), edition number, and date of publication. Each book has different ISBN.
  - Publishers have a code, name, telephone number, web address, e-mail address and address information.
  - Books are published by publishers.
  - Each book is published by just one publisher. A publisher may not have any books but may also have more than one book.

Bookstore Software

- Business Rules
  - Authors have an author number, name, surname, telephone number, e-mail, address information.
  - A book must have at least one author, but it can also have more than one author. An author may not have any books at all but may also have many.
  - Publication type has name and code information.
  - A book can have many publication types. There must be at least one publication type. There may be many books of a publication type. There may not be any books either.
  - Books which have different publication type has different prices and weights. This information should also be recorded.

Bookstore Software

- Entity Relationship Model



University Information System

- Scenario
  - In the university information system, it is desired to store and manage the information of a university.
  - It is required to keep the information of faculties, departments, catalog course of departments, faculty members, opened courses, classrooms, students' records, the university buildings and classrooms in the buildings.

University Information System

- Business Rules
  - The university consists of faculties.
  - Faculties has universty name and university code information
  - Faculties consist of departments. A department has a name, department code and a head of the department elected from the faculty members.
  - The faculty member information should include identity number, name, surname, and department information.
  - Within the catalog course information offered by the departments, the information of the course code, course name, credit and the department information should be included.

University Information System

- Business Rules
  - The information of the opened courses must include the code of the opened course, catalog course code, department, branch information, the faculty member giving the course and the information of the classroom.
  - Student number, department number, name, surname and information of the supervisor should be included in the student information.
  - Building information should include building no, building name and location information.
  - Classroom information should include the code of the classroom and the information about the building in which the classroom is located.

University Information System

- Business Rules
  - A faculty must have only one dean (among the faculty members). A faculty member can be the dean of at most one faculty.
  - A faculty must have at least one department but may also have more than one department. A department can only be found in one faculty.
  - A faculty member can work in only one department. A department must have at least one faculty member, but there can also be more than one faculty member.
  - A department has to be managed by only one faculty member. A faculty member can manage at most one department.

University Information System

- Business Rules
  - A faculty member can be a supervisor to many students or no students. Only one faculty member can be a supervisor for a student.
  - A department has many students. A student can enroll in only one department.
  - A faculty member can teach more than one opened course or no opened course. An opened course must be taught by only one faculty member.
  - A department can offer many catalog courses or no catalog courses. A catalog course is offered by only one department.

University Information System

- Business Rules
  - A student can enroll in one or more opened course. One or more student can enroll in a opened course.
  - For the opened course, student's registration dates and student's grades taken from the course should also be kept.
  - An opened course use only one classroom. A classroom can be used by many opened courses or no opened course.
  - An opened course is opened for just one department. For a department there can be many opened courses or no opened course.
  - An opened course belongs to just one catalog course. There can be many opened courses from the catalog course list. Also, there may not be any
  - One classroom is only in one building. A building can have many classrooms or no classrooms.

University Information System

- ERM

(This is extended version of of the scenerio)