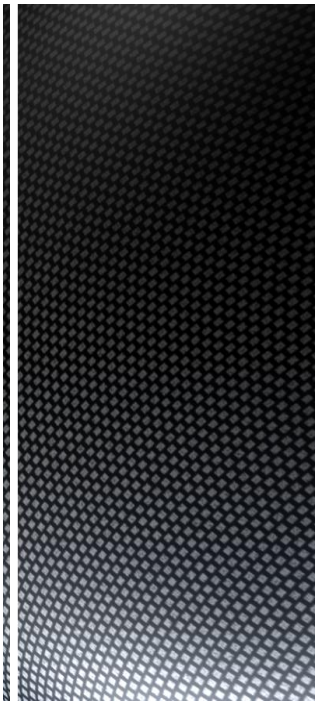
MMIS
(Manufacturing Management Information System)



Department of Industrial Engineering
Sharif University of Technology

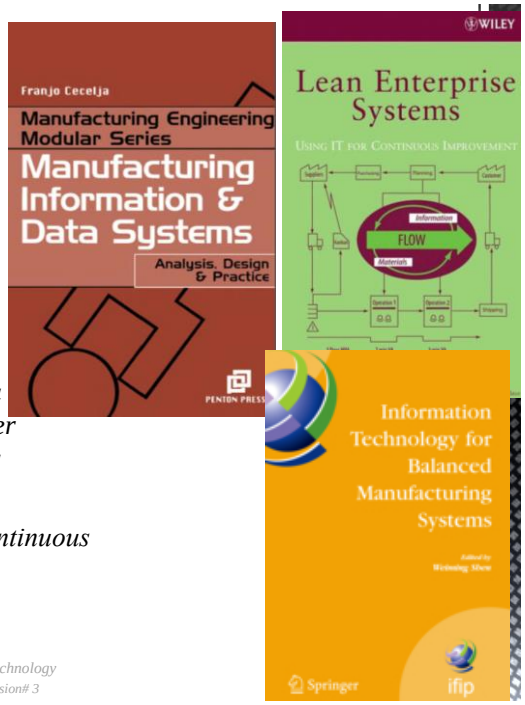
Session# 3

Course Description

- *Instructor*
  - *Omid Fatahi Valilai, Ph.D. Industrial Engineering Department, Sharif University of Technology*
  - *Email: Fvalilai@sharif.edu , Tel: 021-6616-5706*
  - *Website: http://sharif.edu/~fvalilai*
- *Class time*
  - *Saturday* *15:30~18:00*
- *Course evaluation*
  - *Mid-term* *(30%)*
  - *Final exam* *(40%)*
  - *Quiz* *(10%)*
  - *Exercise* *(20%)*

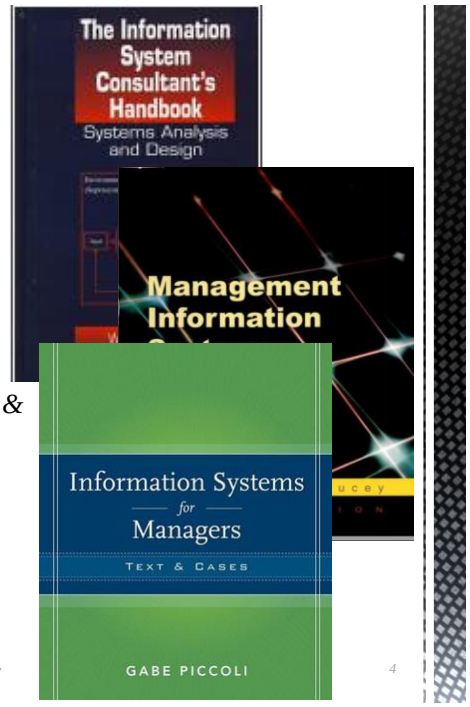
Course Description *(Continued ...)*

- *Mid-term session:*
  - *N/A*
- *Final session:*
  - *N/A*
- *Reference:*
  - *Franjo Cecelja, "Manufacturing Information and Data Systems: Analysis, Design and Practice", 2002, Elsevier*
  - *Shen, Weiming; "Information Technology for Balanced Manufacturing Systems", 2004, Springer*
  - *Steve Bell; "Lean Enterprise Systems: Using IT for Continuous Improvement", 2005, Wiley*



Course Description *(Continued ...)*

- *Reference:*
  - *William S. Davis, David C. Yen, "The information system consultant's handbook: system analysis and design", 2010, Taylor and Francis*
  - *Terence Lucey; "Management Information Systems", 2004, Cengage Learning EMEA*
  - *Gabriele Piccoli; "Information systems for managers: texts & cases ", 2007, John Wiley & Sons Inc*



Manufacturing Databases

- *A database is defined as a collection of stored operational data used by the application systems of some particular enterprise.*

- *The simplest form of computer databases are file systems, where the data are stored in various files, and the access is made through third generation programming languages*
  - *The whole database is searched for a key when the data are needed.*
  - *Producing selective reports is extremely difficult;*
  - *Experts are needed to write access programs to the data;*
  - *The data structure is structurally dependent.*

Manufacturing Databases

- *The evolution of database systems*
  - *The first computer database systems for use in manufacturing were of a form that was similar in structure to the paper-based filing cabinet, methods they were designed to replace.*
  - *Cross-referencing*
  - *DBMS (Data base management system)*

Table 2.1 *A cross-reference list: part number to part name*

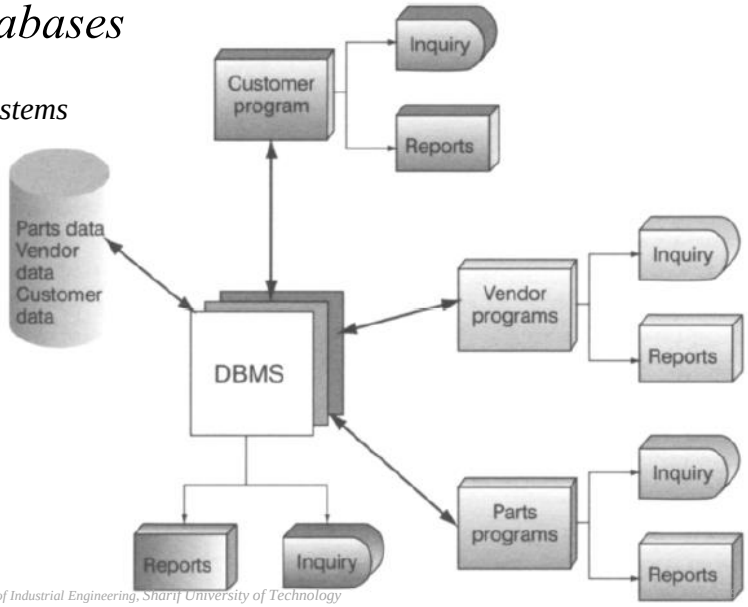
PART NUMBER	PART NAME
A1234	CIRCLIP
B5678	SHAFT
J3456	LOCKNUT
L9541	ELECTRIC MOTOR

Table 2.2 *A cross-reference list: part name to part number*

PART NAME	PART NUMBER
CIRCLIP	A1234
ELECTRIC MOTOR	L9541
LOCKNUT	J3456
SHAFT	B5078

Manufacturing Databases

- *The evolution of database systems*
  - *DBMS*



Manufacturing Databases

- *The evolution of database systems*
  - *DBMS*
    - *a DBMS must have the ability to store, retrieve and update data in the database. This is the fundamental function of a DBMS.*
    - *a DBMS must ensure that, when an update operation is performed, either the entire operation is carried out successfully or that none of it is done.*
    - *a DBMS must ensure that updates are handled correctly even though many users may be updating the database simultaneously.*
    - *a DBMS, if damaged by an accident, must have the means of preserving the data in an unblemished state.*
    - *a DBMS must allow its users to access communications software*
    - *a DBMS should provide a dictionary or catalogue that lists all the data items accessible to the users. This aspect, normally called the data dictionary*
    - *a DBMS must ensure that only authorized users can access the database.*

Manufacturing Databases

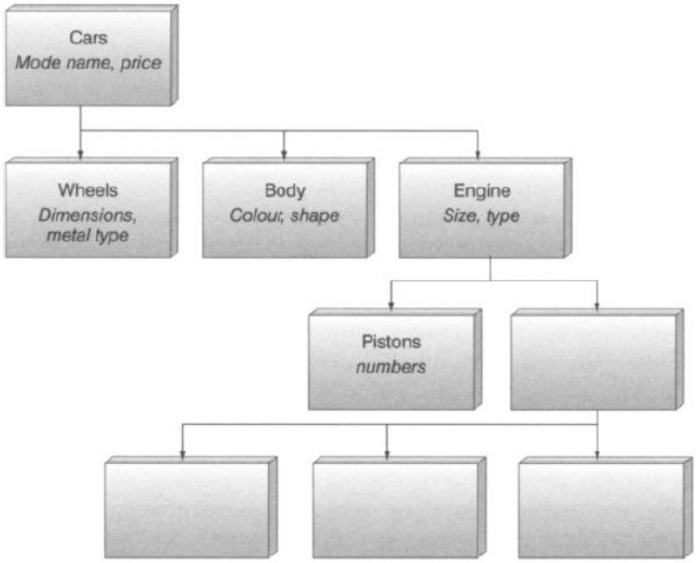
- *The evolution of database systems*
  - *DBMS*
    - *There are three established data models used in databases today:*
      - *The hierarchical model;*
      - *The network model;*
      - *The relational model.*
      - *Object oriented data base model*

Manufacturing Databases

- *The evolution of database systems*
  - *DBMS*
    - *The hierarchical model;*
      - *The hierarchical database model uses records and links to represent data and relationships and the records are organized as a collection of tree structures. Four attributes characterize the hierarchical data model:*
      - *The model always starts with a root node. It is the only node in the tree that does not have a parent;*
      - *Every node consists of a number of attributes describing the entity that is exemplified at that node;*
      - *Each node, excluding the root node, can have only one parent, but each parent node can have many children;*
      - *Each node is reached or retrieved by passing through all the preceding nodes*

Manufacturing Databases

- *The evolution of database systems*
  - *DBMS*
    - *The hierarchical model;*

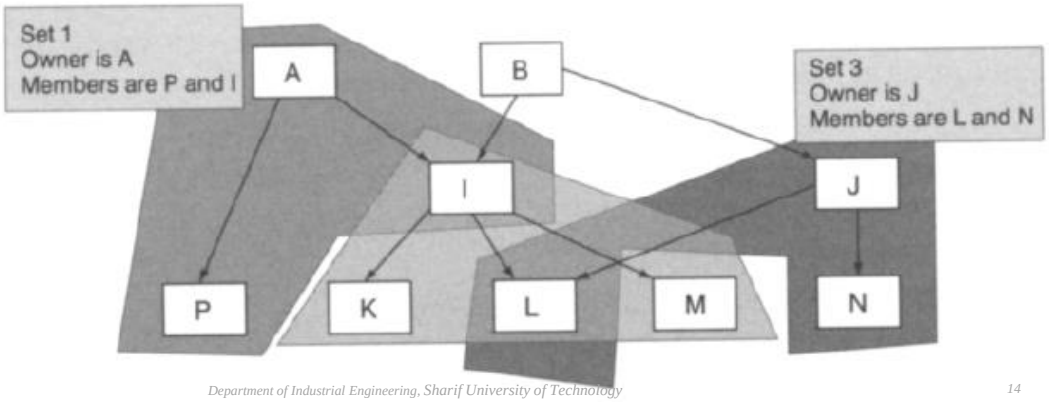


Manufacturing Databases

- *The evolution of database systems*
  - *DBMS*
    - *The network data base model;*
      - *In essence, the network database model appears to be a variation of the hierarchical data model. In practice, data can be translated from hierarchical to network and vice versa to optimize processing speed and convenience.*
      - *In the network model, the entities are represented by records, and the relationships between the data entities are represented by links. The records are organized in the form of a graph with the links forming associations between records*

Manufacturing Databases

- *The evolution of database systems*
  - *DBMS*
    - *The network data base model;*

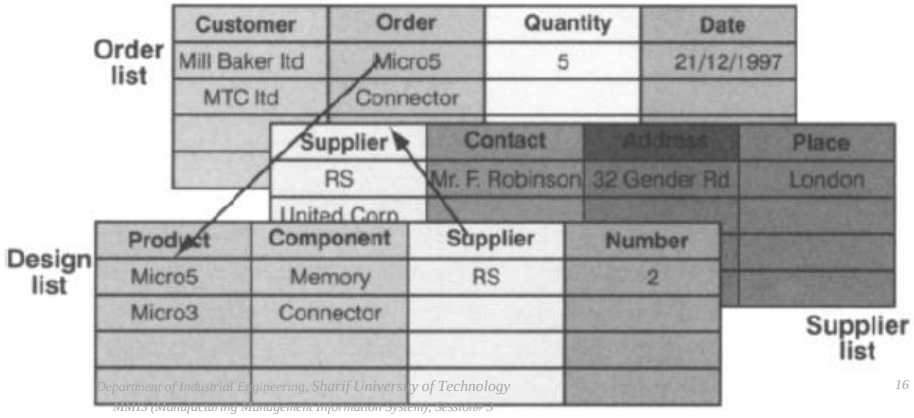


Manufacturing Databases

- *The evolution of database systems*
  - *DBMS*
    - *The relational data base model;*
      - *The relational database represents the data within a collection of tables that have a direct correspondence to the concept of a mathematical relation.*
      - *Because of the mathematical basis of the model it has been possible to develop efficient algorithms for query processing.*

Manufacturing Databases

- *The evolution of database systems*
  - *DBMS*
    - *The relational data base model;*



Manufacturing Databases

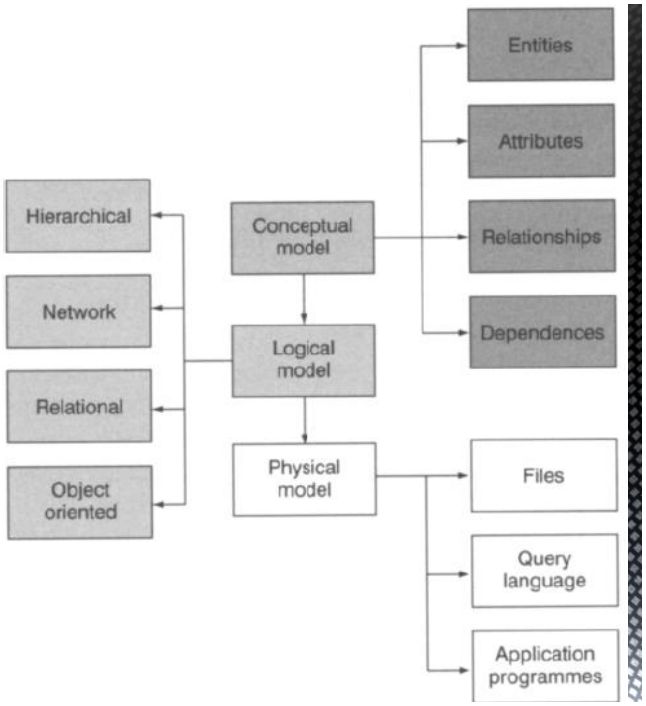
- *The evolution of database systems*
  - *DBMS*
    - *Data model;*
      - *The aim of data modelling is to describe a system model that can then be used to create a database containing the same information as the original system.*
      - *A data model is defined as a collection of mathematically well-defined concepts that help one to consider and express the static and dynamic properties of data-intensive applications*

Manufacturing Databases

- *The evolution of database systems*
  - *DBMS*
    - *Data model;*
      - *Conceptual modelling is the process of modelling all properties of an application, and is required to allow the development of application-specific data models.*
      - *In addition to the static and dynamic aspects, it is also necessary to specify integrity constraints to define allowable states of the database and legal operations. This then allows us to move on to the logical and physical models,*

Manufacturing Databases

- *The evolution of database systems*
  - *DBMS*
    - *Data model;*



Manufacturing Databases

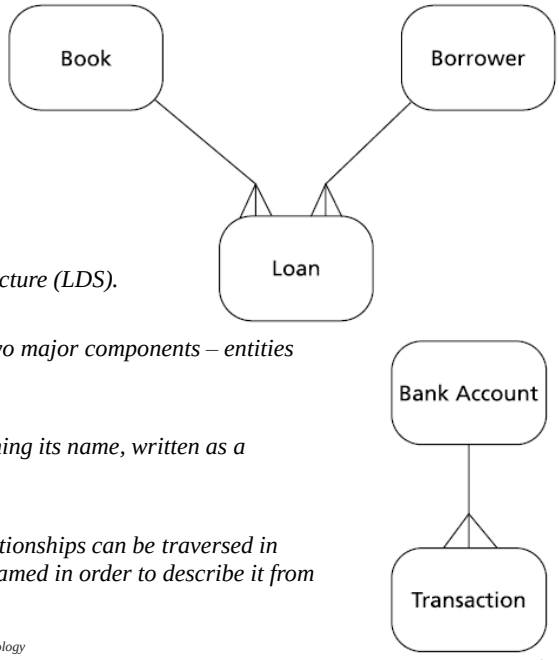
- *System Analysis*
  - *Recording the information*
    - *Data flow Diagrams*
    - *Entity Models*

The entity model in SSADM is called logical data structure (LDS).

LDSs are simpler than DFDs in that they have only two major components – entities and the relationships between them.

An entity is usually represented as a rectangle containing its name, written as a singular noun.

Relationships are shown as lines linking entities. Relationships can be traversed in both directions, and so each end of a relationship is named in order to describe it from the point of view of the entity at that end.

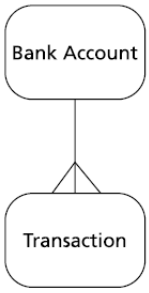


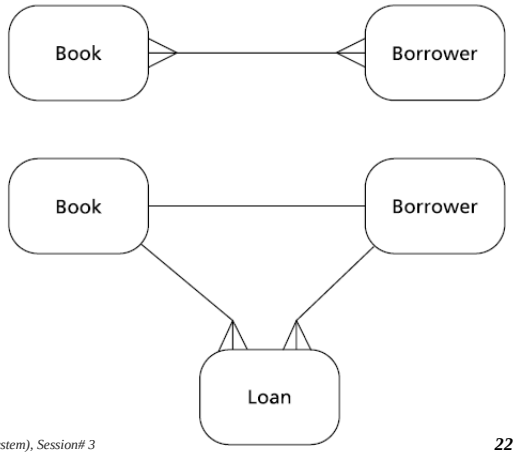
Manufacturing Databases

- *System Analysis*
  - *Recording the information*
    - *Data flow Diagrams*
    - *Entity Models*
    - *Classification of relationships is known as the degree of the relationship*
    - *Most relationships are between one master entity and many detail entities. <<one-to many relationship>>*
    - *Relationships may also be <<many-to-many >> or <<one-to-one>>.*
    - *One-to-one relationships are uncommon, as it is usually found that two entities that are linked in this way can be combined to give a single entity.*
    - *Many-to-many relationships are more common, but it is usual to resolve them by introducing a new 'link' entity that is a detail of the two original entities*

Manufacturing Databases

- *System Analysis*
  - *Recording the information*
    - *Data flow Diagrams*
    - *Entity Models*





Manufacturing Databases

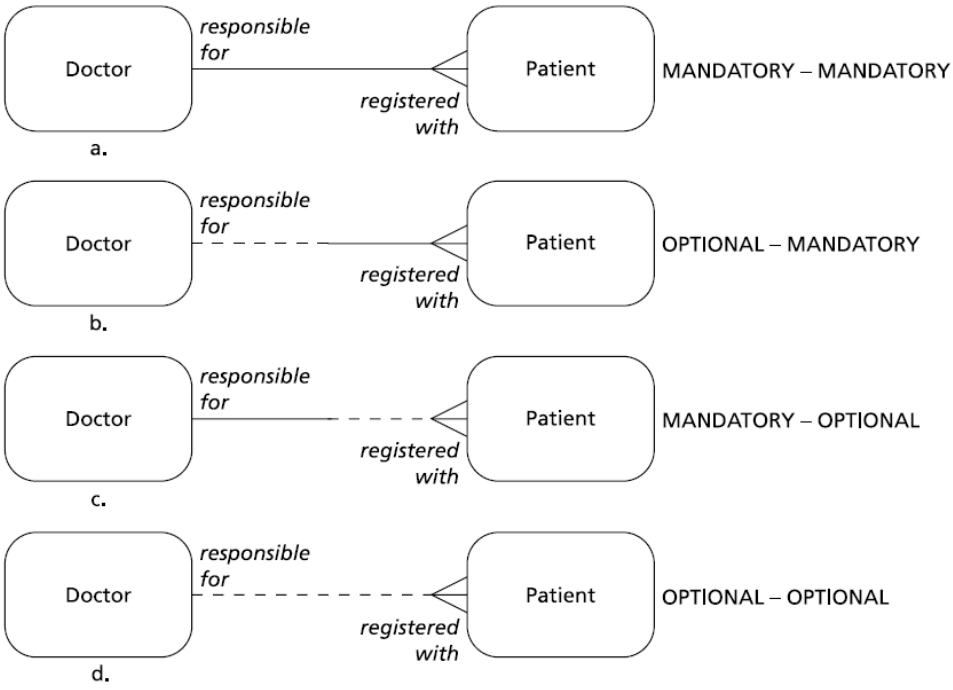
- *System Analysis*
  - *Recording the information*
    - *Data flow Diagrams*
    - *Entity Models*

    - *Relationships are also classified in terms of their optionality.*

    - *Relationships can be described as exclusive.*

    One type of exclusivity occurs if a detail entity has two (or more) masters and an occurrence of the detail may be linked to only one of the masters but not both.

    The other is the converse situation where a master may be linked to only one of two or more sets of details. Exclusive relationships are shown by drawing an exclusion arc to connect them



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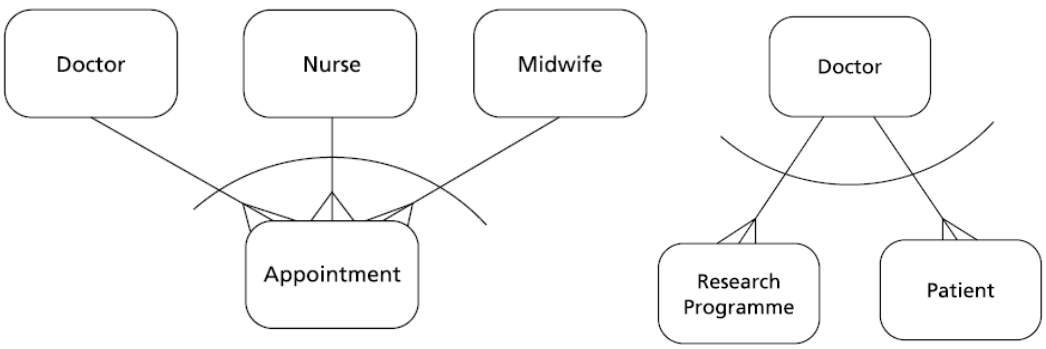
Manufacturing Databases

- *System Analysis*
  - *Recording the information*
    - *Data flow Diagrams*
    - *Entity Models*



Manufacturing Databases

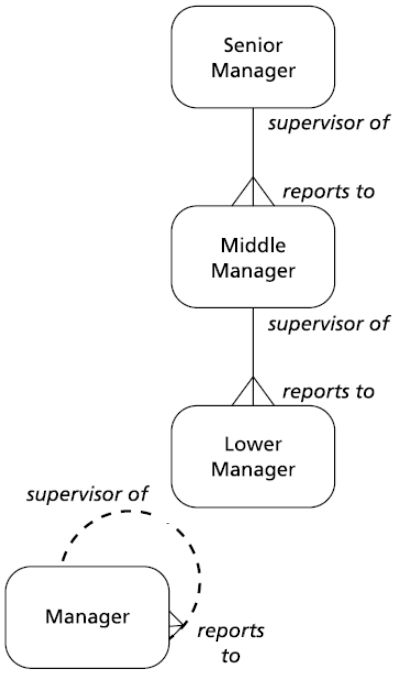
- System Analysis
  - Recording the information
    - Data flow Diagrams
    - Entity Models

    - <<Recursive relationships>>: In other words, individual occurrences of entities can be related to other occurrences of that entity.

    There are two ways in which this can happen.

    The first is where there is a one-to-many or hierarchical relationship between entity occurrences.

    or by a single entity called manager, which has a recursive relationship with itself.



Manufacturing Databases

- System Analysis
  - Recording the information
    - Data flow Diagrams
    - Entity Models

    - <<Recursive relationships>>: The second way in which an entity can be related to itself is where there is a many-to-many relationship between occurrences, indicating a network structure.

    There are two ways in which this can happen.

    One way in which the structure can be shown is as a single entity linked to itself by a many-to-many relationship.

    breaking the many-to-many relationship into two one-to-many relationships and creating a new entity that acts as a link between different occurrences of the original entity.