Conceptual modeling

Process

- **Input:** specification of the requirements (natural language description of a sample database domain)
- **Tools:** conceptual modelling formalism, (UML class diagrams, OMT, E-R, ORM, functional diagrams, etc)
- **Output:** conceptual schema (diagram)

A simple methodology

Pass 1
Find the classes of objects
Pass 2
Find the associations and association classes
Pass 3
Find the attributes and link attributes
Pass 4
Find the identifiers
Pass 5
Find the qualifications of associations
Pass 6
Find the generalizations

Example 1

A group of employees works on the projects.
Some of employees supervise other employees.
An employee is described by an employee number and full name.
A project is described by a project title, completion date and budget.
Employees are identified by the employee numbers and projects are identified by the titles.

Pass 1: Find the classes of objects

A group of employees works on the projects. Some of employees supervise other employees. An employee is described by an employee number and full name. A project is described by a project title, completion date and budget. Employees are identified by the employee numbers and projects are identified by the titles.

Pass 2: Find the associations

A group of employees works on the projects. Some of employees supervise other employees. An employee is described by an employee number and full name. A project is described by a project title, completion date and budget. Employees are identified by the employee numbers and projects are identified by the titles.

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3. Conceptual modeling

Pass 3: Find the attributes

A group of employees works on the projects. Some of employees supervise other employees. An employee is described by an employee number and full name. A project is described by a project title, completion date and budget. Employees are identified by the employee numbers and projects are identified by the titles.
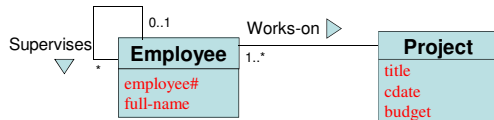
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3. Conceptual modeling

Pass 4: Find the identifiers

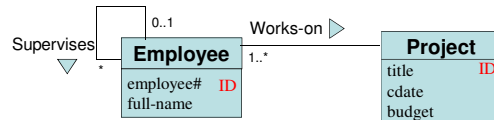*A group of employees works on the projects. Some of employees supervise other employees. An employee is described by an employee number and full name. A project is described by a project title, completion date and budget. Employees are identified by the employee numbers and projects are identified by the titles.*

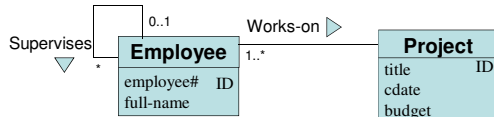
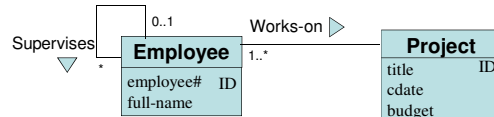## 3. Conceptual modeling

Pass 5: Find the qualifications

A group of employees works on the projects. Some of employees supervise other employees. An employee is described by an employee number and full name. A project is described by a project title, completion date and budget. Employees are identified by the employee numbers and projects are identified by the titles.

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3. Conceptual modeling

Pass 6: Find the generalizations

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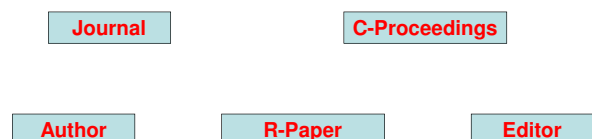
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3. Conceptual modeling

Example 2

A publishing company publishes the journals and conference proceedings.
The research papers are included in the journals and proceedings.
The company employs the general editors who take responsibility for the editing research papers.
A research paper is written by one or more authors.

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3. Conceptual modeling

Pass 1: Find the classes of objects

A publishing company publishes the journals and conference proceedings. The research papers are included in the journals and proceedings. The company employs the general editors who take responsibility for the editing research papers. A research paper is written by one or more authors.

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Pass 2: Find the associations

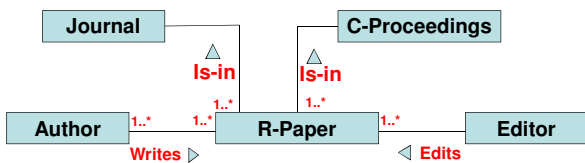*A publishing company publishes the journals and conference proceedings. The research papers are included in the journals and proceedings. The company employs the general editors who take responsibility for the editing research papers. A research paper is written by one or more authors.*

Pass 3: Find the attributes

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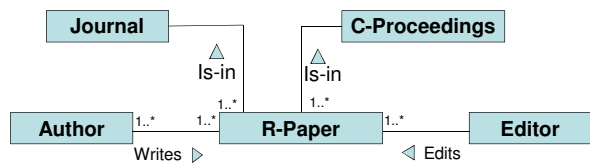

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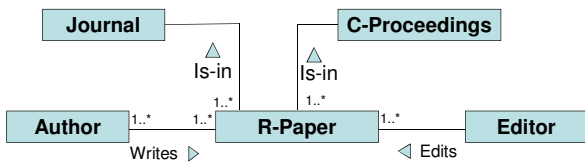

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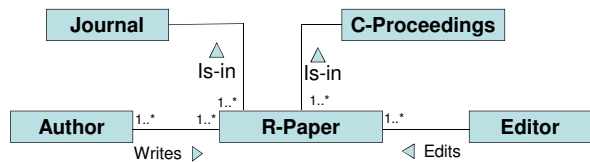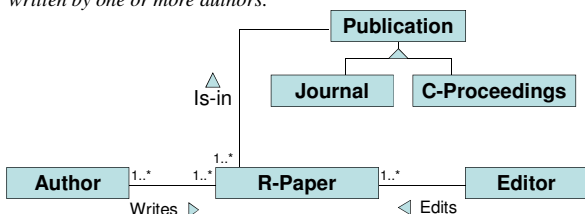

Example 3

A group of construction companies is involved in the construction of industrial buildings.
Each building is located at a different address, it has a unique name, and completion date.
A number of construction stages apply to each building
A construction stage is described by the names of construction companies involved together with the start date, completion date, and the total costs.
A construction company is usually involved in many construction stages of the same building.
Many companies are involved in one construction stage.

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3. Conceptual modeling

Pass 1: Find the classes of objects

A group of construction companies is involved in the construction of industrial buildings. Each building is located at a different address, it has a unique name, and completion date. A number of construction stages apply to each building. A construction stage is described by the names of construction companies involved together with the start date, completion date, and the total costs. A construction company is usually involved in many construction stages of the same building. Many companies are involved in one construction stage.

Company	**C-Stage**	**Building**

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3. Conceptual modeling

Pass 2: Find the associations

A group of construction companies is involved in the construction of industrial buildings. Each building is located at a different address, it has a unique name, and completion date. A number of construction stages apply to each building. A construction stage is described by the names of construction companies involved together with the start date, completion date, and the total costs. A construction company is usually involved in many construction stages of the same building. Many companies are involved in one construction stage.

Involved in ▷   **Applies** ▷
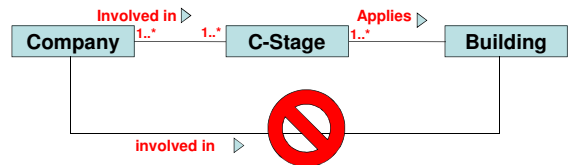
Company 1..* 1..* **C-Stage** 1..* **Building**

involved in ▷ 🚫

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3. Conceptual modeling

Pass 2: Find the associations

A group of construction companies is involved in the construction of industrial buildings. Each building is located at a different address, it has a unique name, and completion date. A number of construction stages apply to each building. A construction stage is described by the names of construction companies involved together with the start date, completion date, and the total costs. A construction company is usually involved in many construction stages of the same building. Many companies are involved in one construction stage.
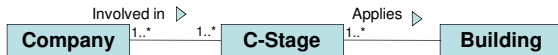
Involved in ▷   Applies ▷

Company 1..* 1..* **C-Stage** 1..* **Building**

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3. Conceptual modeling

Pass 3: Find the attributes

A group of construction companies is involved in the construction of industrial buildings. Each building is located at a different address, it has a unique name, and completion date. A number of construction stages apply to each building. A construction stage is described by the names of construction companies involved together with the start date, completion date, and the total costs. A construction company is usually involved in many construction stages of the same building. Many companies are involved in one construction stage.
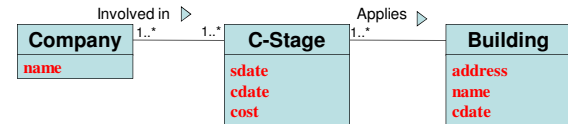
Involved in ▷   Applies ▷

Company 1..* 1..* **C-Stage** 1..* **Building**

Company	C-Stage	Building
name	sdate cdate cost	address name cdate

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3. Conceptual modeling

Pass 4: Find the identifiers

A group of construction companies is involved in the construction of industrial buildings. Each building is located at a different address, it has a unique name, and completion date. A number of construction stages apply to each building. A construction stage is described by the names of construction companies involved together with the start date, completion date, and the total costs. A construction company is usually involved in many construction stages of the same building. Many companies are involved in one construction stage.

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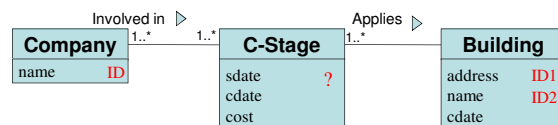
Company 1..* 1..* **C-Stage** 1..* **Building**

Company	C-Stage	Building
name ID	sdate ? cdate cost	address ID1 name ID2 cdate

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3. Conceptual modeling

Pass 5: Find the qualifications

A group of construction companies is involved in the construction of industrial buildings. Each building is located at a different address, it has a unique name, and completion date. A number of construction stages apply to each building. A construction stage is described by the names of construction companies involved together with the start date, completion date, and the total costs. A construction company is usually involved in many construction stages of the same building. Many companies are involved in one construction stage.
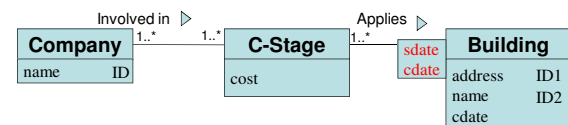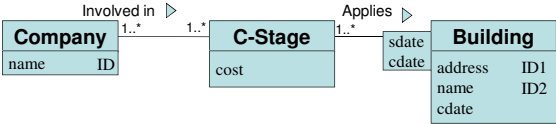
Involved in ▷   Applies ▷

Company 1..* 1..* **C-Stage** 1..* **Building**

sdate cdate

Company	C-Stage	Building
name ID	cost	address ID1 name ID2 cdate

Pass 6: Find the generalizations

A group of construction companies is involved in the construction of industrial buildings. Each building is located at a different address, it has a unique name, and completion date. A number of construction stages apply to each building. A construction stage is described by the names of construction companies involved together with the start date, completion date, and the total costs. A construction company is usually involved in many construction stages of the same building. Many companies are involved in one construction stage.

References

Elmasri R., Navathe S. B., *Database Systems*, chapters 9, 10