Entity-Relationship Diagram (ERD)

Bachelor of Information Systems

INTRODUCTION TO
DATABASE AND INFORMATION SYSTEM

Learning Objective(s)

This material should address the following question(s).

- ? How to express the data requirements?

First thing first

Expressing data requirements is a way to describe the requirements in a conceptual perspective.

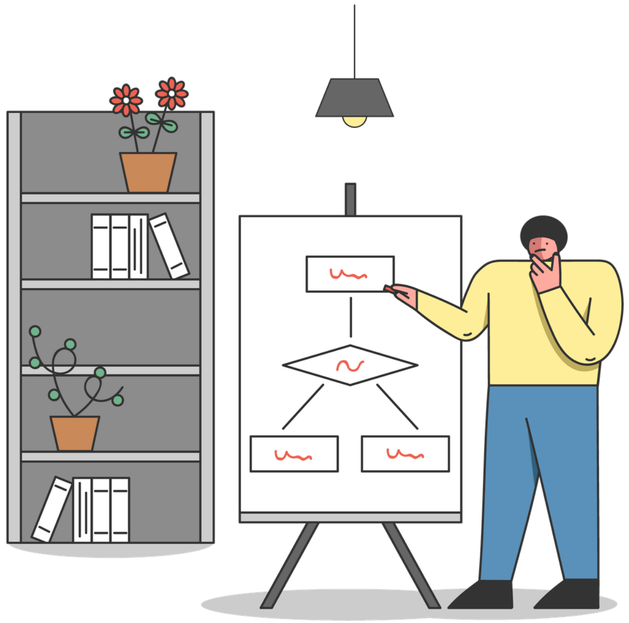
Question

How to **express**
data requirements?

Modeling

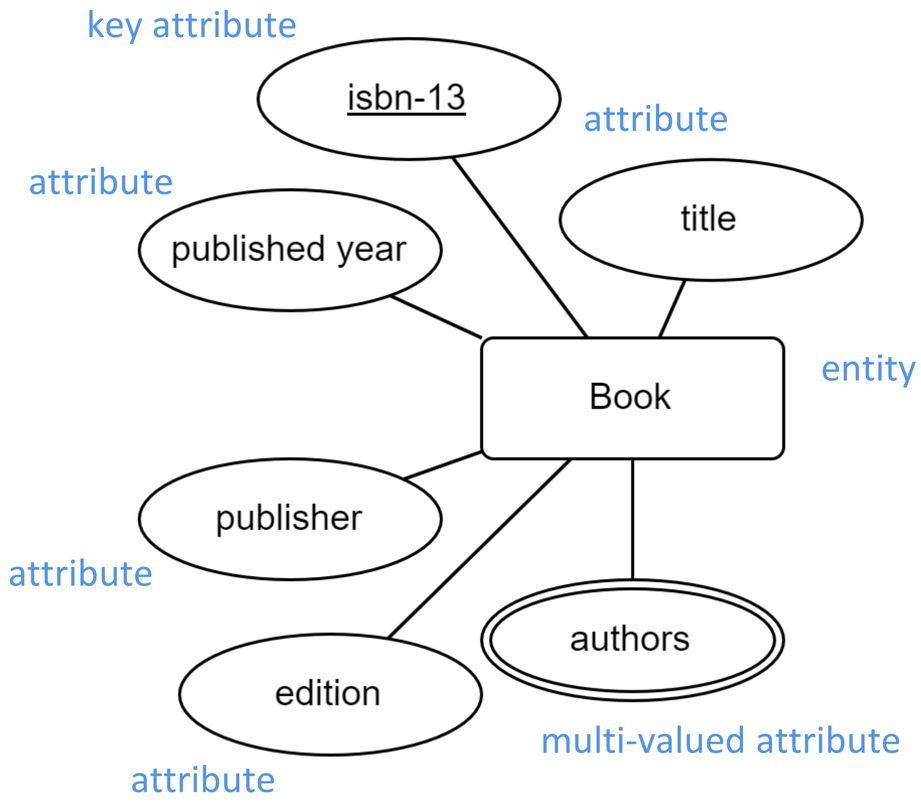
- **Entity-Relationship** (**ER**) diagram is used to model the requirements.

- ERD focuses on
  - the entities;
  - their members (attributes); and
  - the relationships between entities.



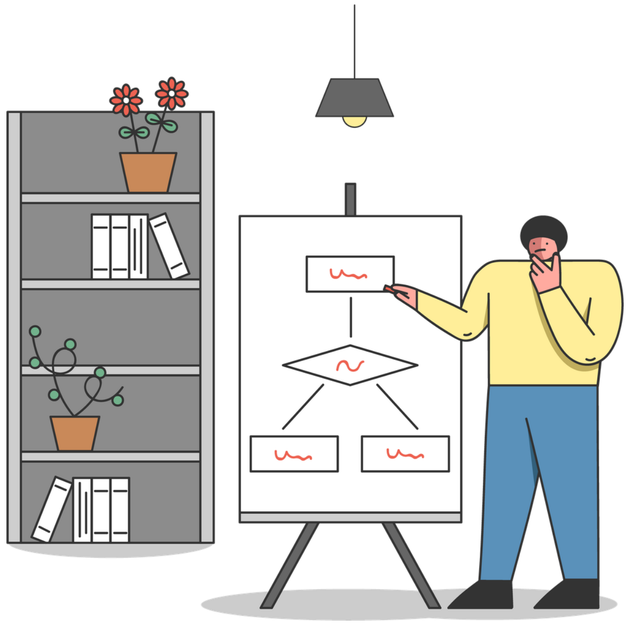
Entity & Its Members

- An entity is represented with a box with its name inside.
- Its members (attributes) are written in oval shapes.



Relationships

- Commonly used notations:
  - **Chen** notation;
  - **Crow’s foot** notation;
  - Barker notation;
  - UML class diagram notation;



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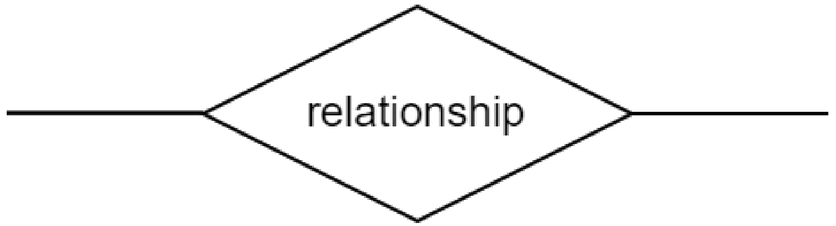
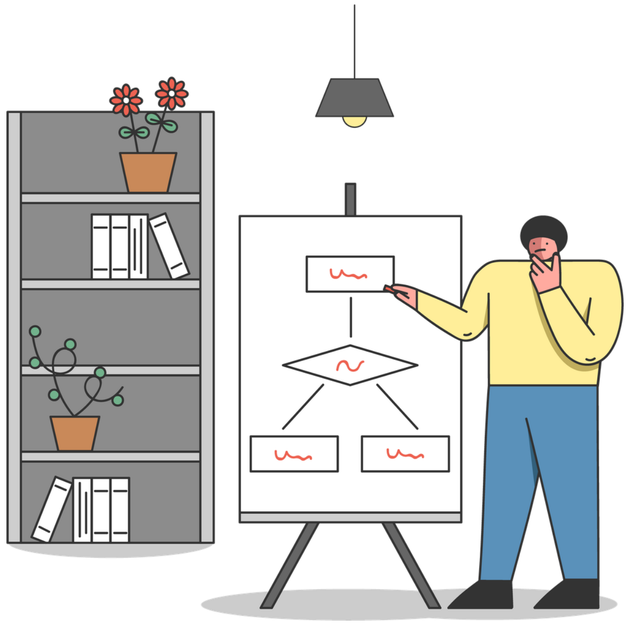
Chen notation



Crow’s foot notation

Relationships

- Types of relationship:
  - one-to-one (`1:1`);
  - one-to-many (`1:m`);
  - many-to-one (`m:1`);
  - many-to-many (`m:n`).

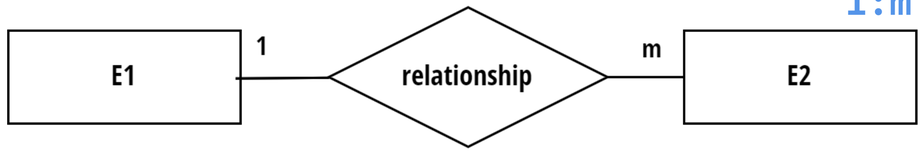


Relationships

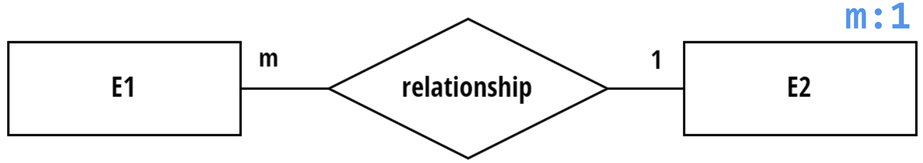
Chen notation

1:1

1:m



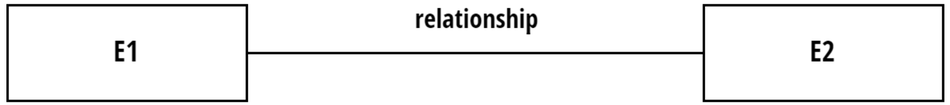
m:1



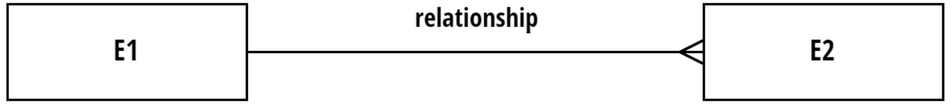
m:n

Crow's notation

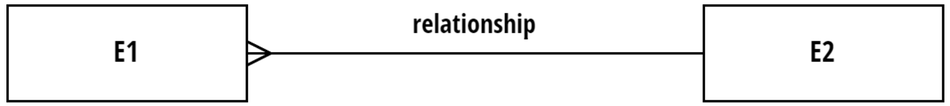
1:1



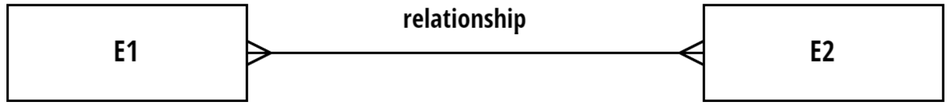
1:m



m:1



m:n



What is the benefit of using model?

As the name suggests, a model **abstracts** the actual world in a way that omits the unimportant.

Where are we now?

By now, you should have a general idea about how to express the data requirements using entity-relationship diagram (ERD).

Case Study

Inside the campus library.

Case Study

Inside the campus library.

- A library has a multitude copies of books, articles, etc.
  - New collections come every year.
- Anyone may come and enjoy the collections.
  - Library members can lend books for a particular period of time.

- There are some objects (**entities**) mentioned:
  - Books, articles, and others.
  - Library visitors and members.
  - Book lending for a limited time.
- However, the details are still **missing**.
  - In this case, we are allowed to make ***safe assumptions*** to draw a more clear requirements.

Case Study

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  - New collections come every year.
- Anyone may come and enjoy the collections.
  - Library members can lend books for a particular period of time.

- Some *safe assumptions*, e.g.:
  - A book may have multiple copies.
  - A book is identified by its ISBN, title, author(s), publisher, and pub. year.
  - A book copy is identified by its registration number.
  - A member has a name, phone number, email, and a member id.
  - etc.

Case Study

Inside the campus library.

- A library has a multitude copies of books, articles, etc.
  - New collections come every year.
- Anyone may come and enjoy the collections.
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- Should we care about …
  - Who (the librarian) handles the lending transaction?
  - Where a book copy is acquired from?
  - The member’s bank account?
  - etc.

Conclusion

- The ER diagram is a model used to express data requirements.
- Chen and crow’s foot are two commonly used notations.

References

- R, Elmasri, et. al., Fundamentals of Database Systems.
- A. Silberschatz, et. al., Database System Concepts.
- R. K. Rainer, et. al., Introduction to Information Systems.
- G. M. Marakas et. al., Introduction to Information Systems: Essentials for The e-Business Enterprise.

Course

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