

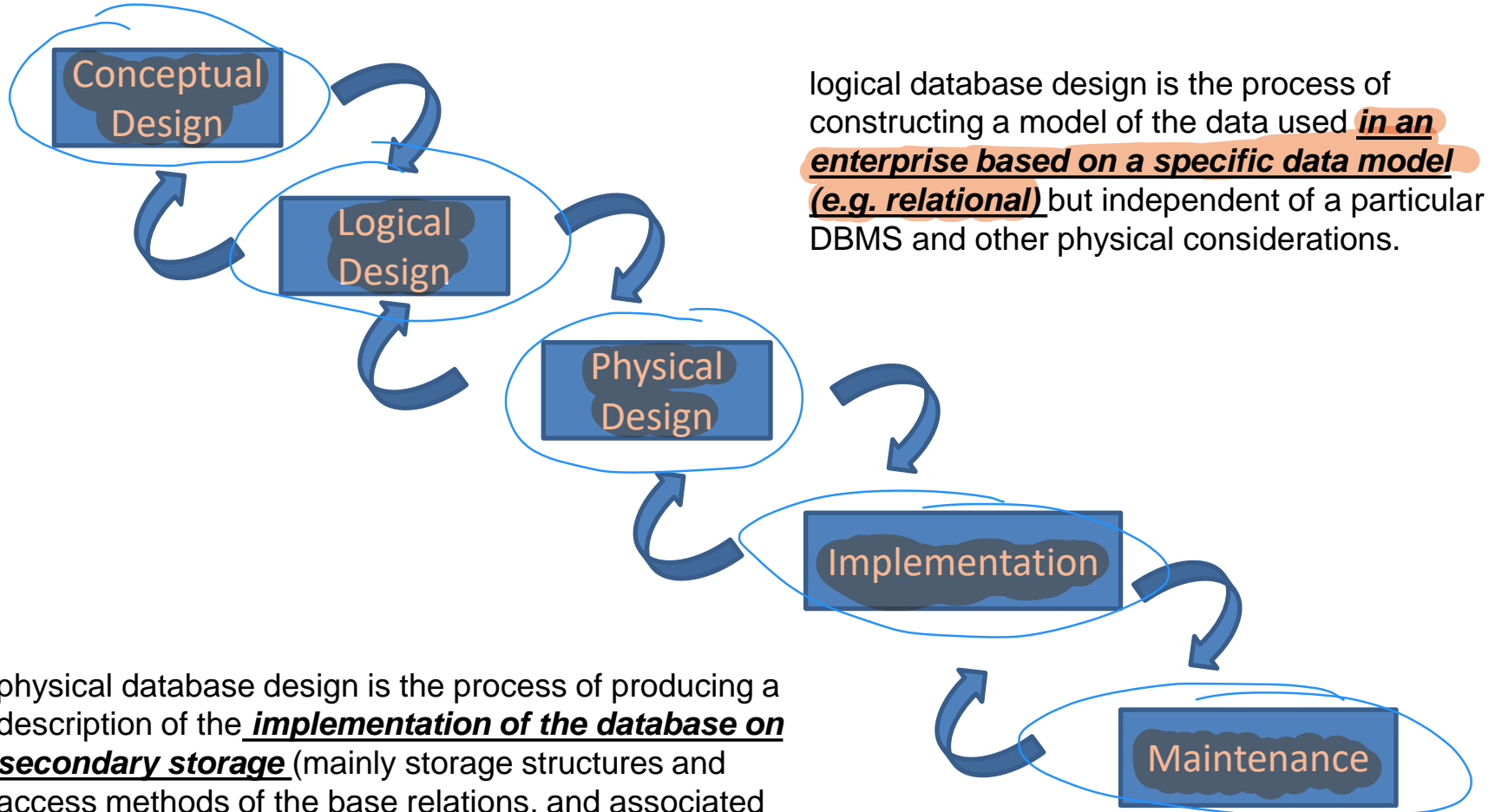
# Database Design

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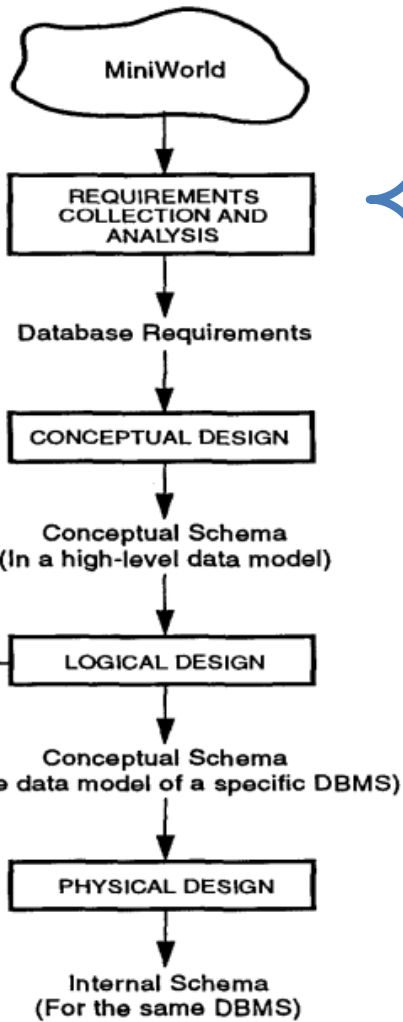
conceptual database design is the process of constructing a model of the data used in an enterprise, independent of all physical considerations (e.g. ER model)



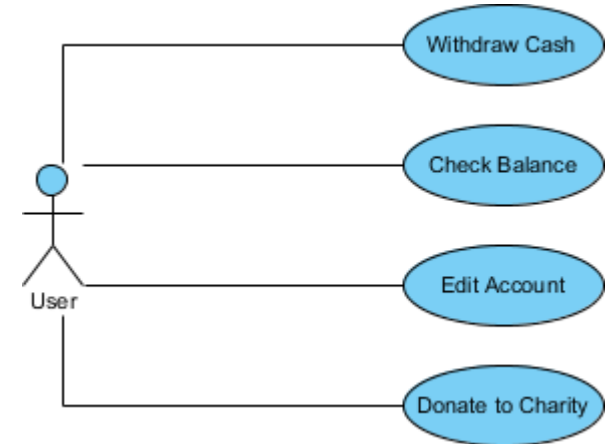
logical database design is the process of constructing a model of the data used in an enterprise based on a specific data model (e.g. relational) but independent of a particular DBMS and other physical considerations.

physical database design is the process of producing a description of the implementation of the database on secondary storage (mainly storage structures and access methods of the base relations, and associated integrity constraints and security measures), and speed up consideration.

# Requirements Capture



- Uses Cases



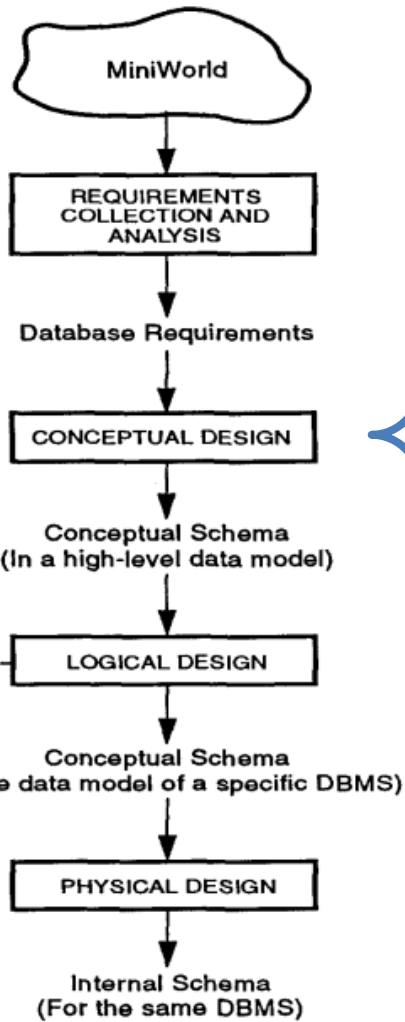
- Detail Specification
  - Identify Nouns and Verbs

Customer withdraws cash from a service till

- By example
  - Apply abstraction



# Requirements Capture



Human  
(System Analyst)

Requirement Specification  
(ER Diagram)

# No fast rules in Conceptual Design

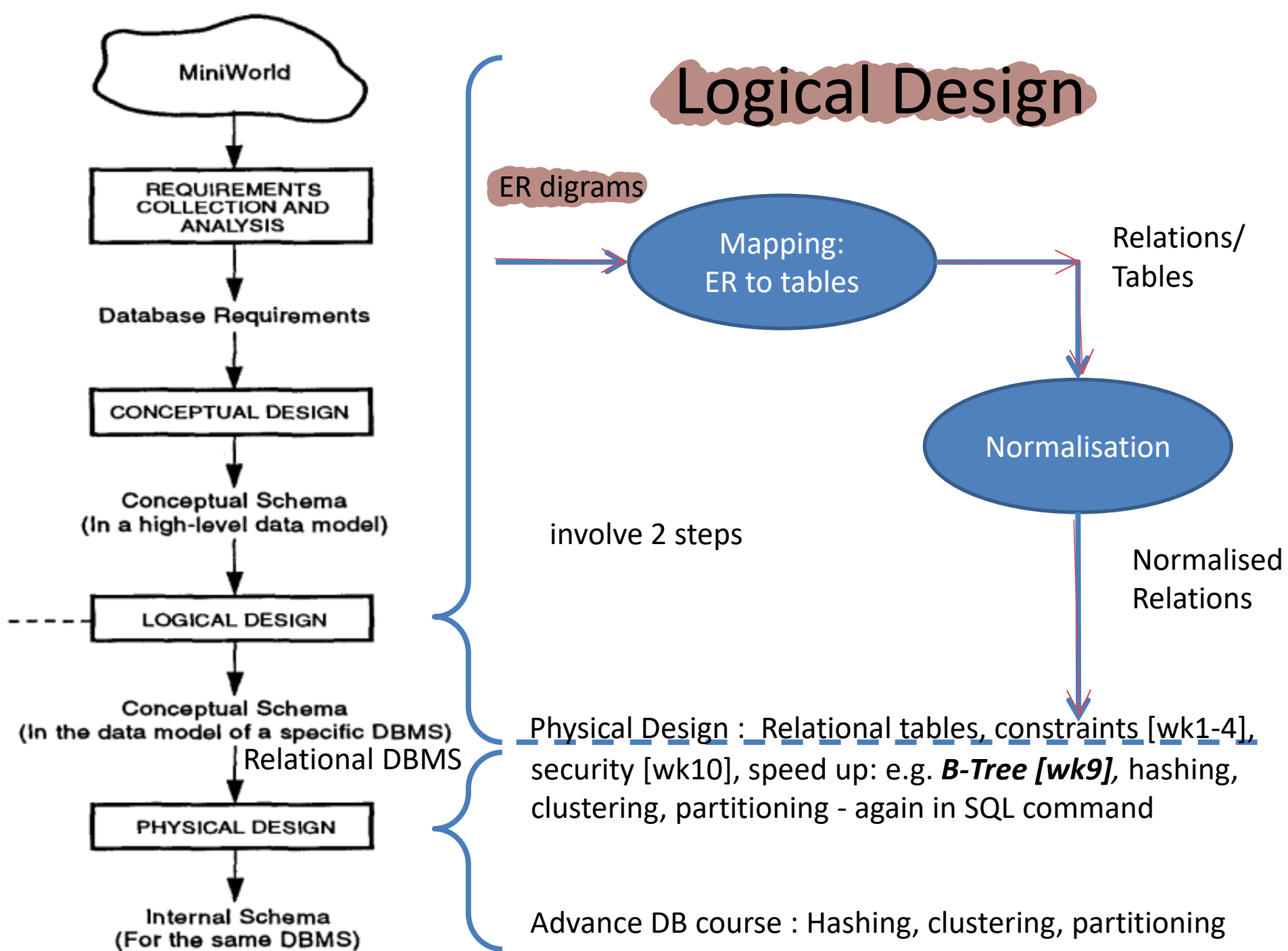
- To create a design from a specification is much harder than implementing one, and requires a lot of practice and experience
- We do not always have definitive answers for questions such as

Is Company really a class or just an attribute of employee (describing where the employee works)?

# No fast rules in Conceptual Design

- This may surprise you, but remember:
  - The purpose of conceptual design is to iteratively clarify vague points with clients before implementation
  - There is no single correct design for any situation and only the experience can help
  - Specification may be vague, but your design will not.
- Practice, practice and practice!
  - Career-long practice





# Normalisation

- It is possible to derive different conceptual models from the same specification
- Consider the following example

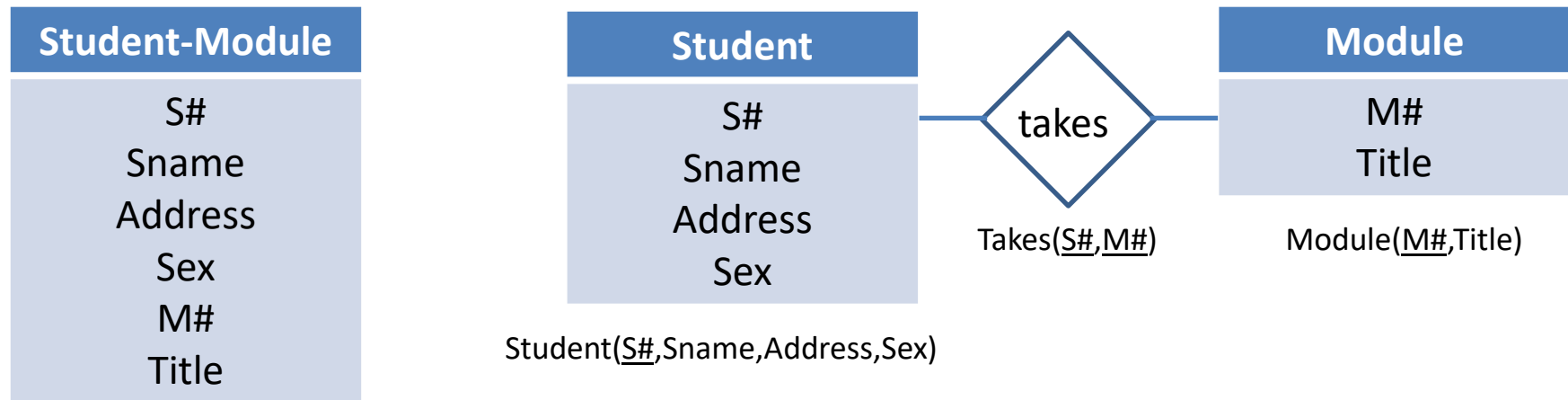
Design a database which will record information about students and modules. Each student is described by his or her ID, name and address. Each module is recorded by its ID and title The database also records information about which student is taking which module.



# Normalisation

Design a database which will record information about students and modules. Each student is described by his or her ID, name and address. Each module is recorded by its ID and title. The database also records information about which student is taking which module.

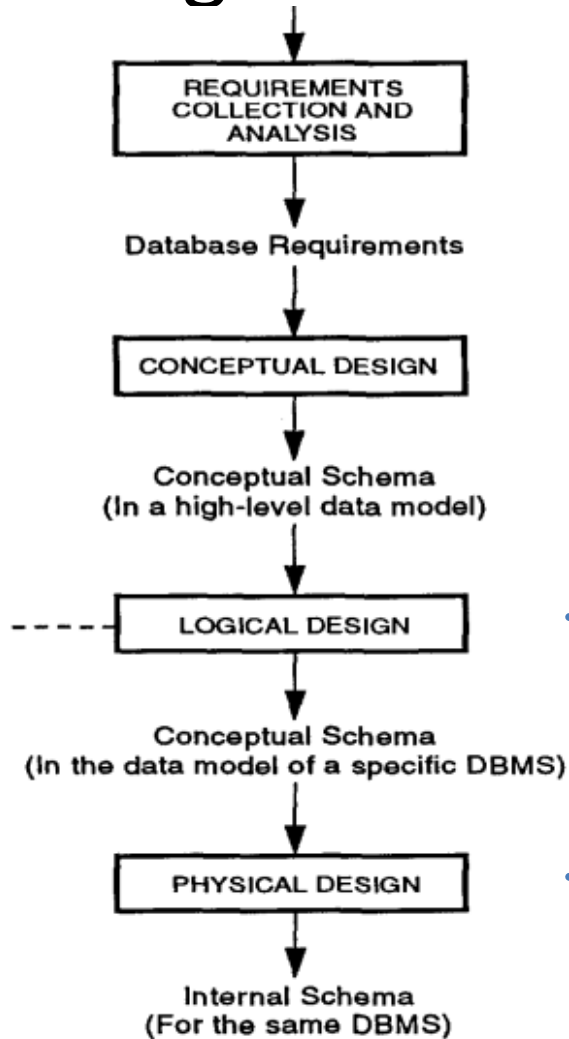
- Two conceptual models (ER diagrams) are possible:



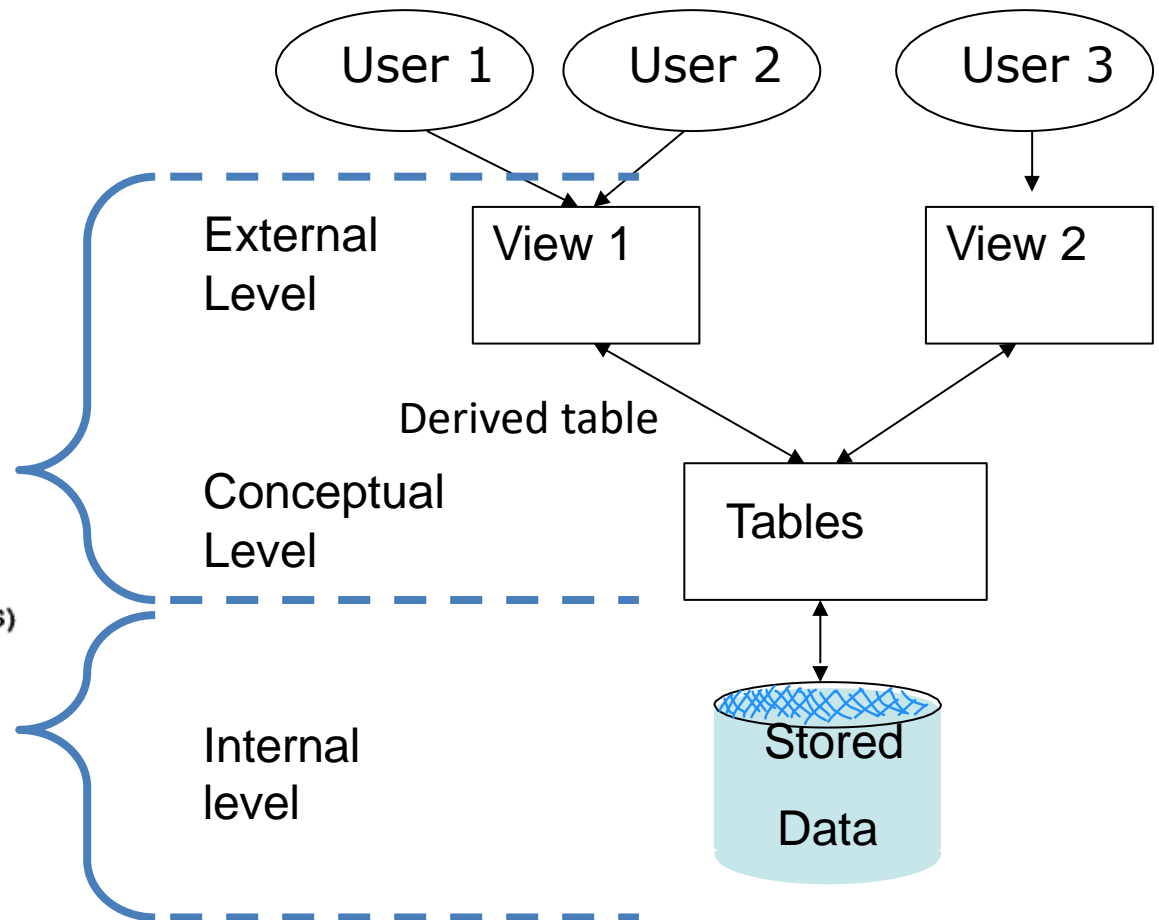
Student(S#,Sname,Address,Sex,M#,Title)

Normalisation helps to determine which logical scheme is better

## Design Process



## ANSI/SPARC architecture



- Further reading: S.B. Navathe, "Evolution of Data Modelling for Databases", Communications of the ACM, Vol. 35, No. 9 (Sept. 1992) 112-123.