Methodology of DB Design

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Outline

- What is a Design Methodology
- Methodology for Database Design
- Phases for Database Design
- Overview of the Database Design Methodology

What is a Design Methodology

- Design Methodology
  - A structured approach that uses procedures, techniques, tools, and documentation aids to support and facilitate the process of design.
- Database design process is divided into three main phases: conceptual, logical, and physical database design.

Methodology for Database Design

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Business

Reqs

Data

Problems in NL

Role

Application

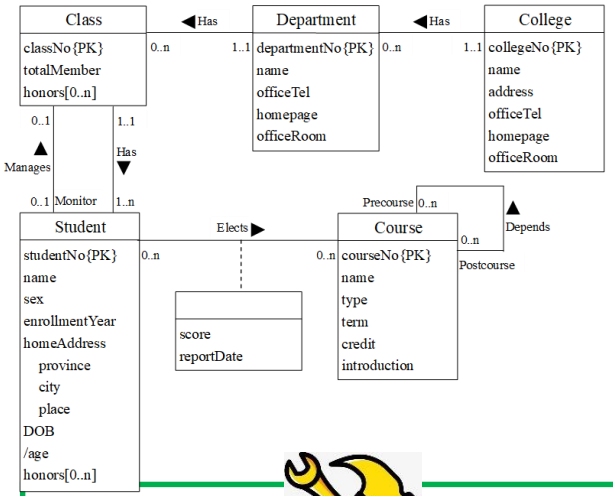
Product

DB

Conceptual

Logical

Physical



Theory of Relation Schema:
1NF
2NF
3NF
BCNF

Performance、Integrity and Security:
Constraints
Index
Authorization

Exercise

Phases for Database Design

- Conceptual database design
  - The process of constructing a model of the information used in an enterprise, independent of all physical considerations.

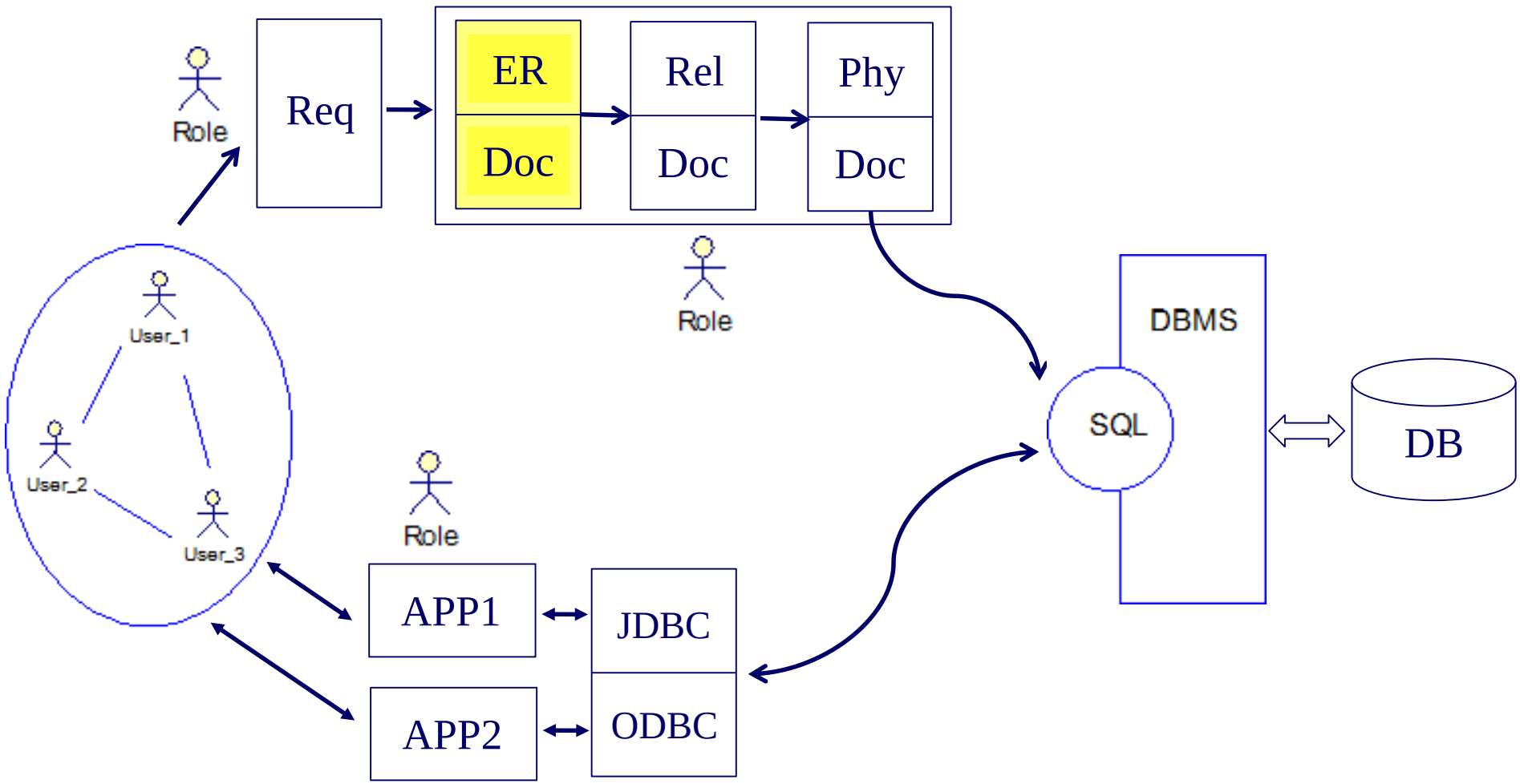
Phases for Database Design

- Logical database design
  - The process of constructing a model of the information used in an enterprise based on a specific data model, but independent of a particular DBMS and other physical considerations.
- The logical database design phase maps the conceptual model on to a logical model, which is influenced by the data model for the target database.

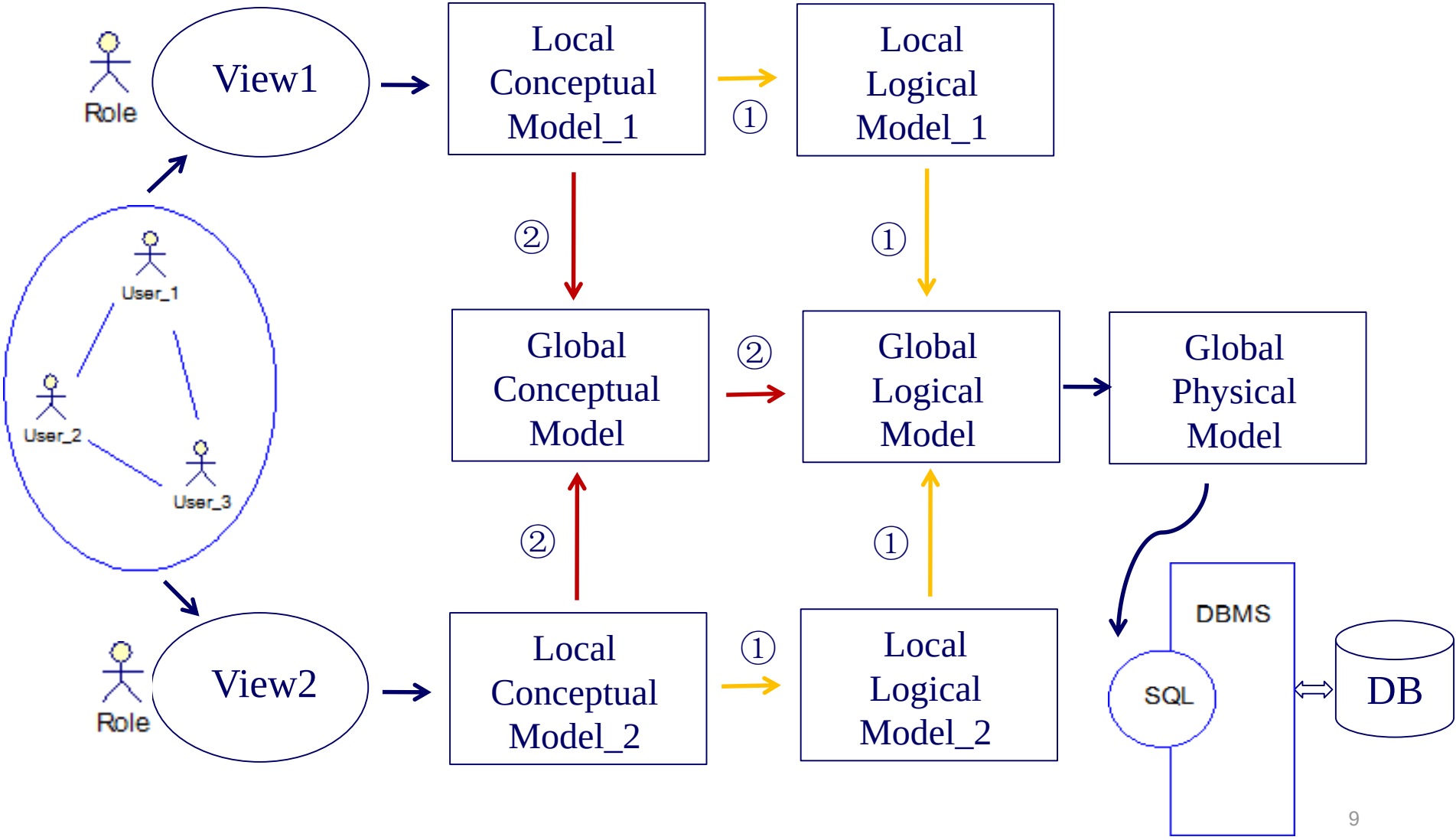
Phases for Database Design

- Physical database design
  - The process of producing a description of the implementation of the database on secondary storage; it describes the base relations, file organizations, and indexes used to achieve efficient access to the data, and any associated integrity constraints and security measures.
- There is feedback between physical and logical design, because decisions taken during physical design for improving performance may affect the logical data model.

Phases for Database Design



Overview of the Database Design Methodology



Overview of the Database Design Methodology

- Conceptual database design
  - Step 1 Build local conceptual data model for each view
    - Step 1.1 Identify entity types
    - Step 1.2 Identify relationship types
    - Step 1.3 Identify and associate attributes with entity or relationship types
    - Step 1.4 Determine attribute domains
    - Step 1.5 Determine candidate and primary key attributes
    - Step 1.6 Consider use of enhanced modeling concepts (optional)
    - Step 1.7 Check model for redundancy
    - Step 1.8 Validate local conceptual model against user transactions
    - Step 1.9 Review local conceptual data model with user

Overview of the Database Design Methodology

- Logical database design for the relation model
  - Step 2 Build logical data model
    - Step 2.1 Remove features difficult to mapping directly
    - Step 2.2 Derive relations for logical data model
    - Step 2.3 Validate relations using normalization
    - Step 2.4 Validate relations against user transactions
    - Step 2.5 Define integrity constraints
    - Step 2.6 Review logical data model with user

Overview of the Database Design Methodology

- Merge local data models to global model
  - Merge elements in local data models
  - Validate global model
  - Check model for integrity and consistency
  - Review global data model with users

Overview of the Database Design Methodology

- Physical database design for relational database
  - Step 3 Translate global logical data model for target DBMS
    - Efficiency- Analyze transactions, Choose file organizations, Choose indexes, Estimate disk space requirements
    - Security – Privilige control, Access control, Role design, Design user views

Overview of the Database Design Methodology

- Throughout this methodology, users play a critical role in continually reviewing and validating the data model and the supporting documentation.
- Database design is an iterative process, which has a starting point and an almost endless procession of refinements.
- The methodology should act as a framework to help guide the designer through database design effectively.

CASE Tools for Database Design

- Example

Summary

- In this chapter you should have learned: