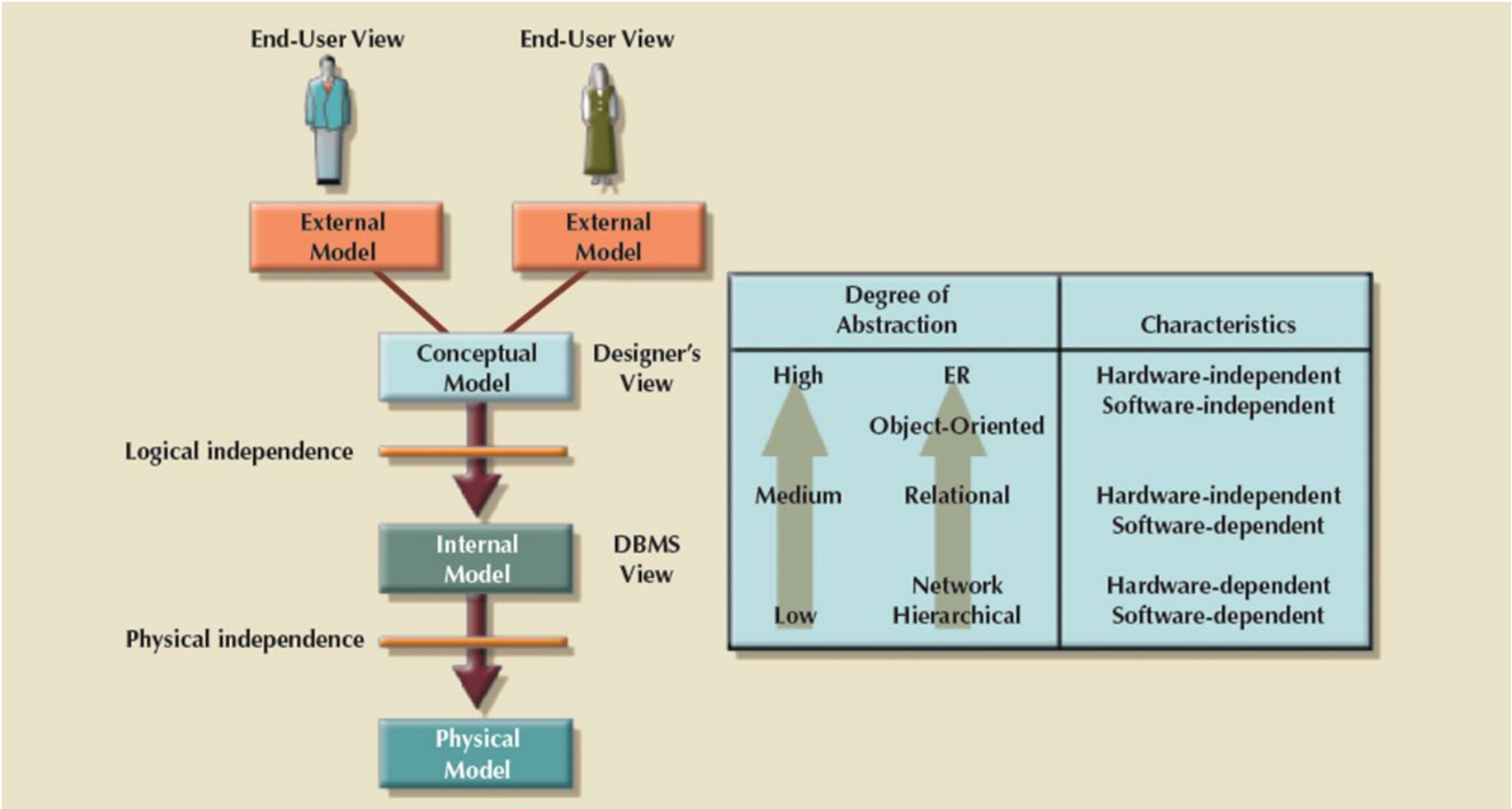
Unit 2: Database Models

(Part 2)

Learning Objectives (2 of 2)

- In this chapter, you will learn:
  - How data models can be classified by their level of abstraction

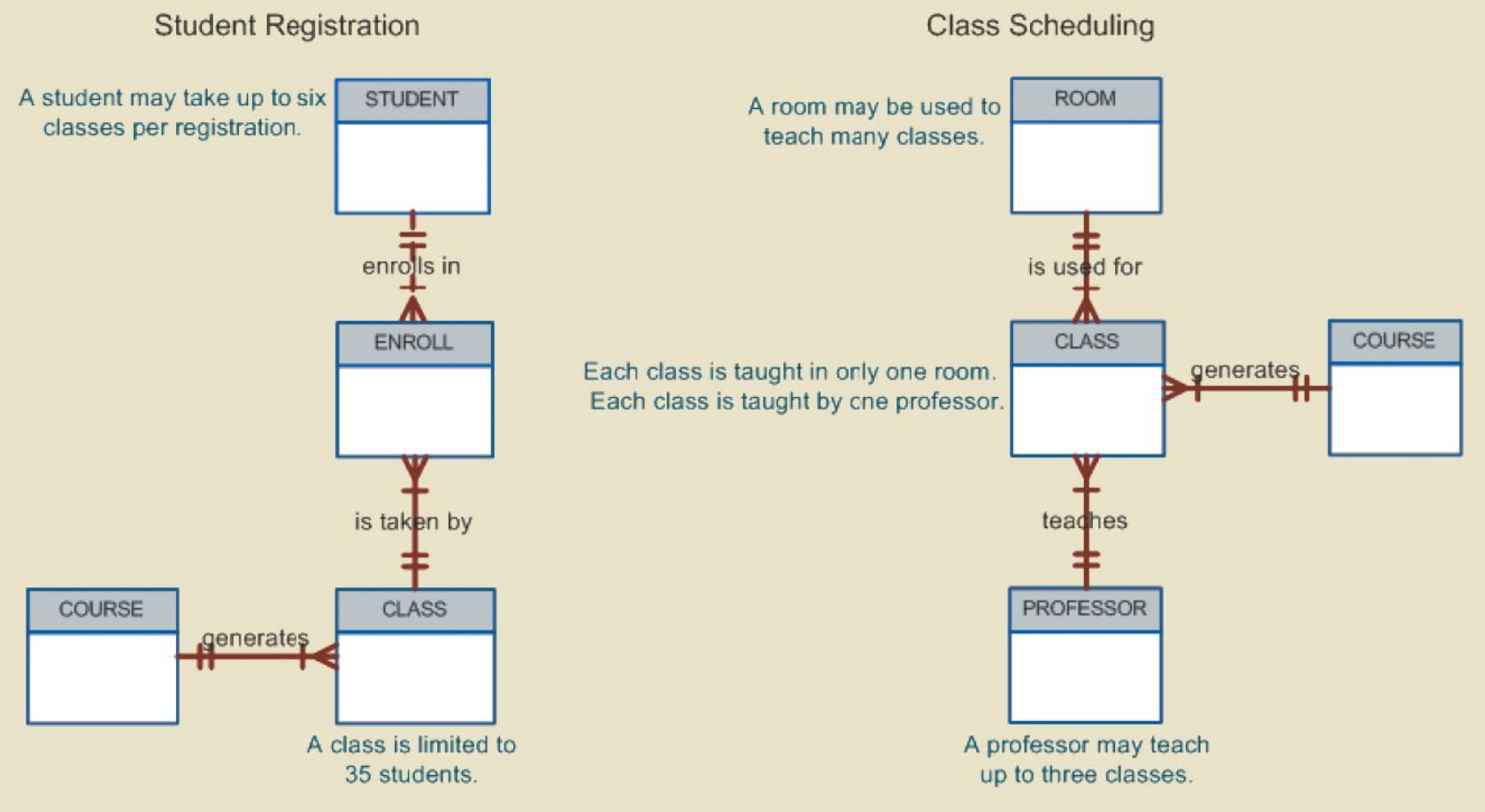
Figure 2.7 - Data Abstraction Levels



The External Model

- End users' view of the data environment
  - Different end users; different external views
- ER diagrams are used to represent the external views
- **External schema**: Specific representation of an external view

Figure 2.8 - External Models For Tiny College



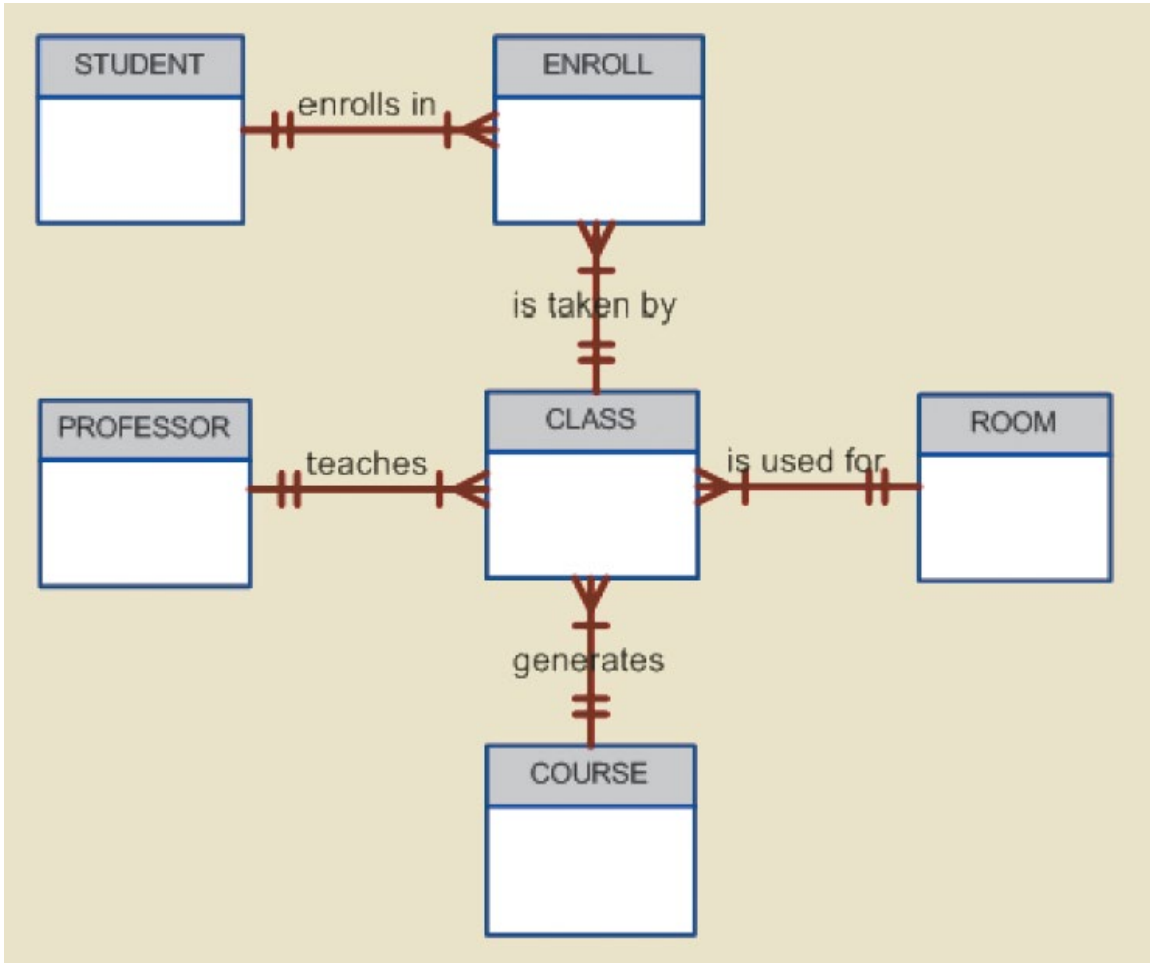
Advantages: External View

- Easy to identify specific data required to support each business unit's operations.
- Provides feedback about the model's adequacy to designer
- by their external models, as well as all operational requirements and constraints.
- Ensures security constraints in the database design.
- Simplifies application program development.

The Conceptual Model

- Represents a global view of the entire database by the entire organization
  - All external views integrated into single global view
- **Conceptual schema**: Basis for the identification and high-level description of the main data objects
- Has a macro-level (big-picture) view of data environment
- Is software and hardware independent
- **Logical design**: Task of creating a conceptual data model

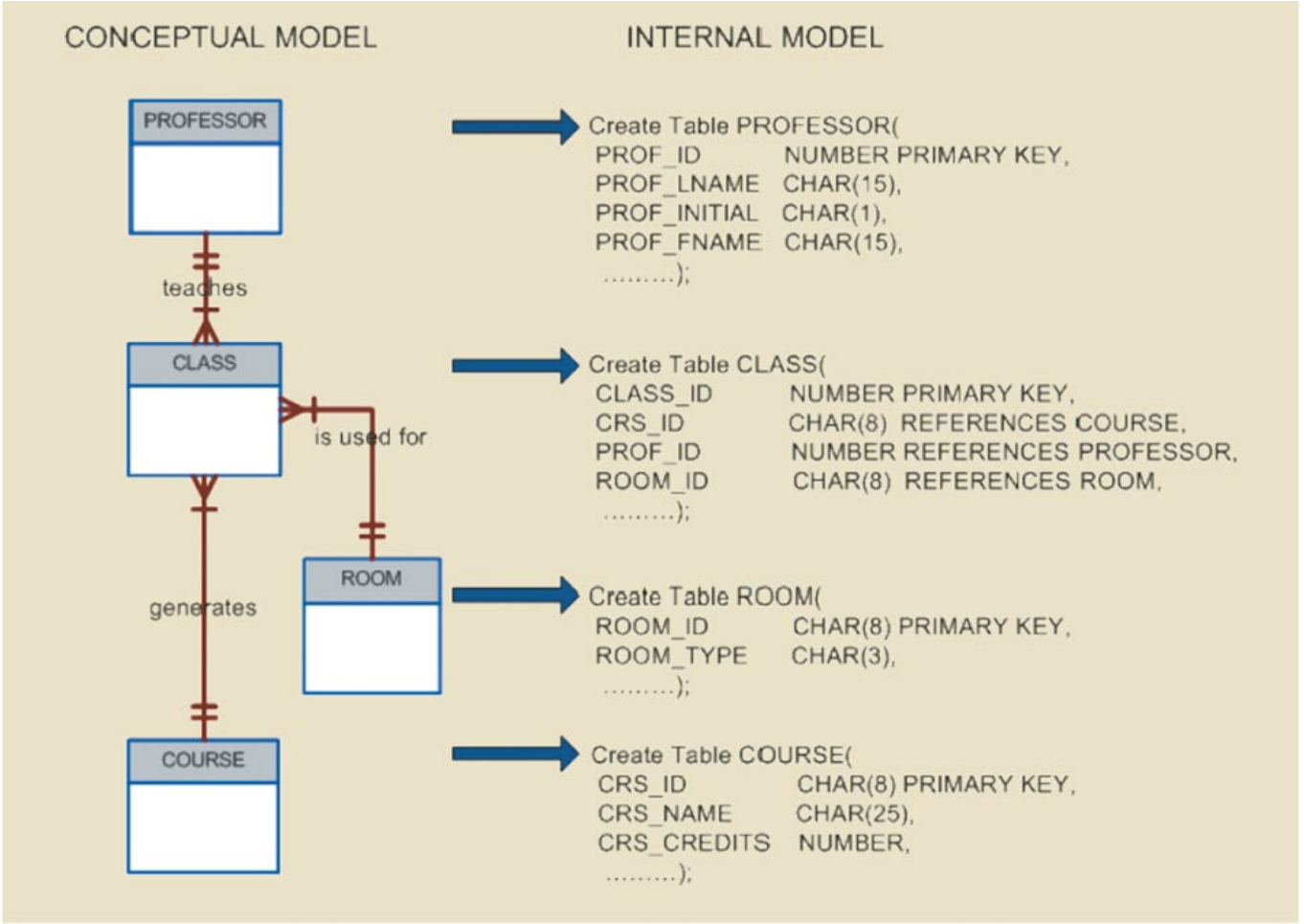
Figure 2.9 - Conceptual Model For Tiny College



The Internal Model

- Representing database as seen by the DBMS mapping conceptual model to the DBMS
- **Internal schema**: Specific representation of an internal model
  - Uses the database constructs supported by the chosen database
- Is software dependent and hardware independent
- **Logical independence**: Changing internal model without affecting the conceptual model

Figure 2.10 - Internal Model for Tiny College



The Physical Model

- Operates at lowest level of abstraction
- Describes the way data are saved on storage media such as disks or tapes
- Requires the definition of physical storage and data access methods
- Relational model aimed at logical level
  - Does not require physical-level details
- **Physical independence**: Changes in physical model do not affect internal model

Table 2.4 - Levels of Data Abstraction

MODEL	DEGREE OF ABSTRACTION	FOCUS	INDEPENDENT OF
External	High	End-user views	Hardware and software
Conceptual	↕	Global view of data (database model independent)	Hardware and software
Internal		Specific database model	Hardware
Physical	Low	Storage and access methods	Neither hardware nor software