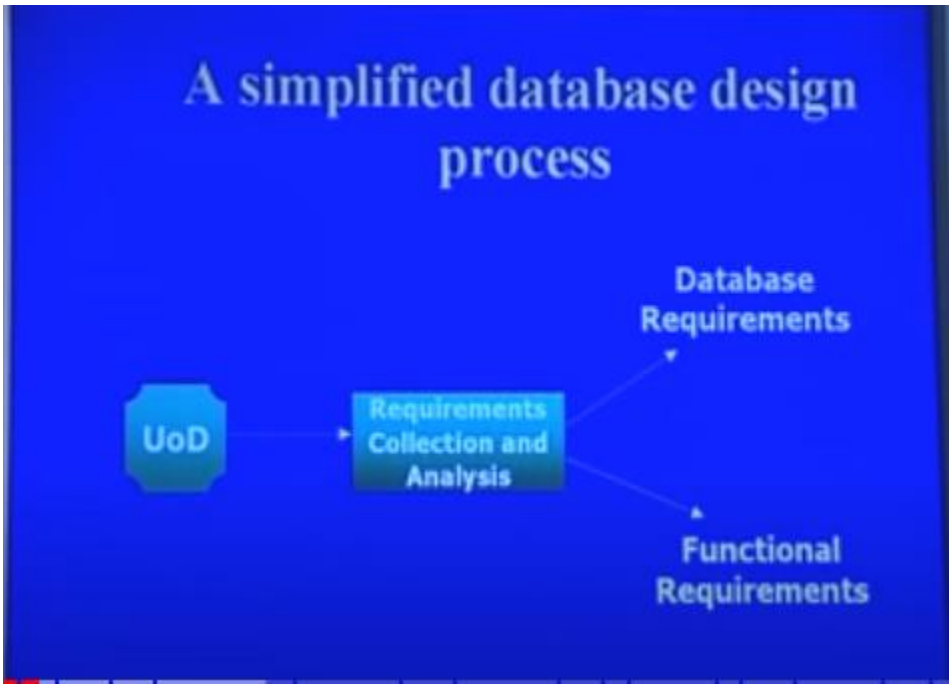
Database Design Process:

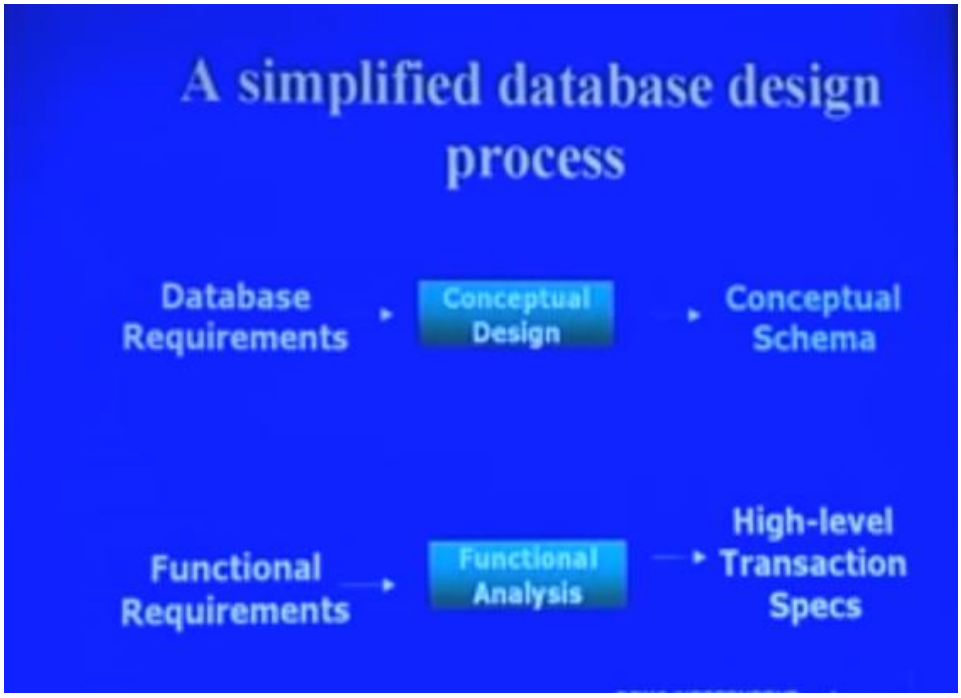


Step 1:

- The **initial phase** of database design is to characterize **fully the data needs** of the prospective database users.
- The **database designer** needs to interact extensively **with domain experts and users** to carry out this task. The outcome of this phase is a **specification of user requirements.**

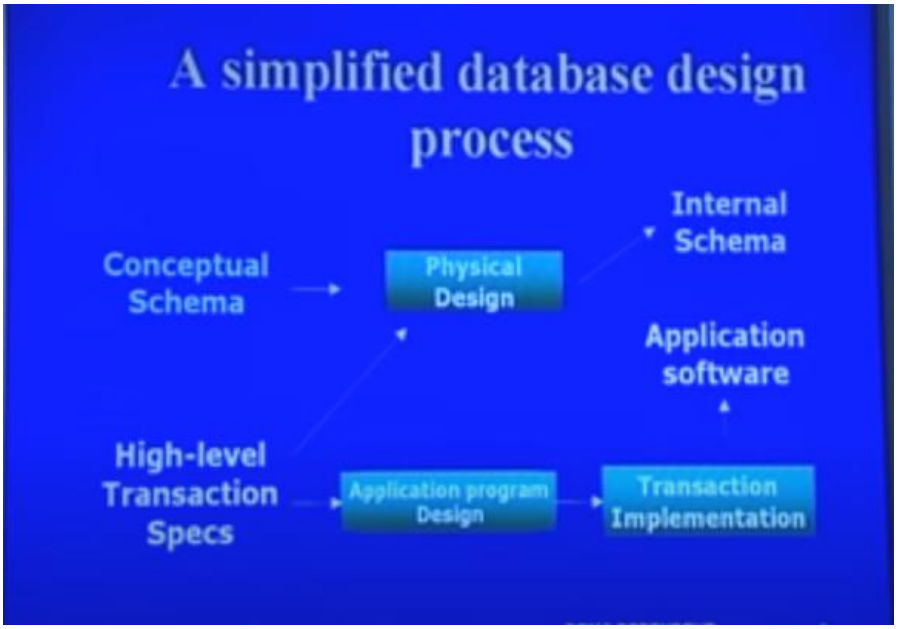
Step 2:

- Next, **the designer chooses a data model** (ER Model here) and, by applying the concepts of the chosen data model, **translates these requirements into a conceptual schema** of the database.
- The schema developed at this conceptual-design phase provides a detailed overview of the enterprise.
- The designer reviews the schema to confirm that all data requirements are indeed satisfied and are not in conflict with one another. She can also examine the design to remove any redundant features. Her focus at this point is on describing the data and their relationships, rather than on specifying physical storage details.



Step 3:

- A fully developed **conceptual schema also indicates the functional requirements** of the enterprise. In a specification of functional requirements, **users describe the kinds of operations (or transactions)** that will be performed on the data.
- Example operations include **modifying or updating data, searching for and retrieving specific data, and deleting data.**
- At this stage of conceptual design, the designer can review the schema to ensure it meets functional requirements.



Step 4:

The process of moving from **an abstract data model to the implementation** of the database proceeds in two final design phases:

- In the **logical-design phase**, the designer maps the high-level conceptual schema onto the implementation data model of the database system that will be used.
- The **implementation data model is typically the relational data model**, and this step typically consists of mapping the conceptual schema defined using the entity-relationship model into a relation schema.
- Finally, the designer uses the resulting system-specific database schema in the subsequent **physical-design phase**, in which the physical features of the database are specified. These features include the form of file organization and choice of index structures.

Summary of Design Process:

The task of creating **a database application**:

- Involves design of the *database schema*
- *Design of the programs* that access and update the data,
- *Design of a security scheme* to control access to data.

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