

IT2201 / IT2601 / IT2564 / IT2621 / IT2521 / IT2323

Database Management Systems



Unit 3 Overview of Database Development

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Unit Objectives

- At the end of this unit, you should be able to:
 - Describe the role of databases in an information system.
 - Describe activities to be performed in database development.
 - Identify types of facts collected throughout the database application lifecycle.
 - Describe the most commonly used fact-finding techniques.

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Database & Software Development

- ▣ Database development is part of the software development process.
- ▣ Activities in database development include
 - Database planning
 - Data requirement collection and analysis
 - Database design
 - Database implementation
 - Data conversion and loading

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Database & Software Development

Software development activities	Database development activities
Planning	Database planning
Requirements	Data requirement collection and analysis
Analysis & Design	Database design Transaction design
Implementation	Database Implementation
Test	Data conversion & Loading
Deployment	

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Database Planning

- ▣ The management activities that allow the stages of the database application to be realized as efficiently and effectively as possible.
 - Define mission statement
 - Define mission objectives
 - Specifying the scope and boundaries of the database application and the major user views.

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Data Requirements Collection and Analysis

- ▣ Information is gathered for each **user view** including
 - a description of data used or generated
 - details of how data is to be used/generated
 - any additional requirements for the new application
- ▣ Information gathered is then analyzed to identify the requirements. Documented in **requirements specifications**.

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Database Design

- The process of creating a design for a database that will support the enterprise's operations and objectives.
- Two approaches
 - Top-down – using **Entity-Relationship model**, more appropriate for complex databases.
 - Bottom-up - using **Normalization**, more appropriate for simple databases with a relatively small number of attributes.

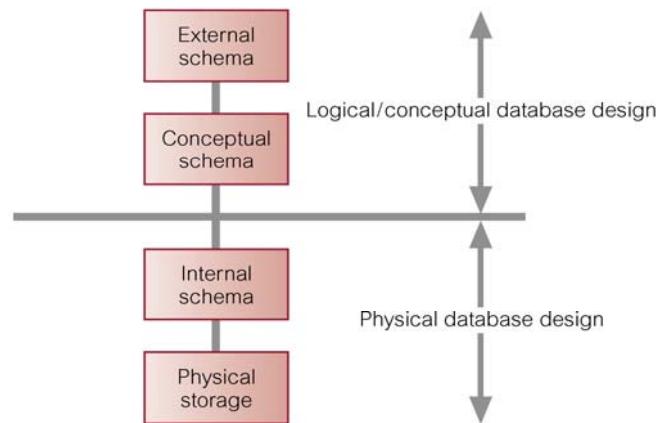
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Database Design

- Three phases of database design
 - Conceptual database design
 - The process of constructing a model of the data used in an enterprise, independent of all physical considerations.
 - Logical database design
 - The process of constructing **a model of the data** used in an enterprise **based on a specific data model, but independent of a particular DBMS** and other physical considerations.
 - Physical database design
 - The process of producing a **description of the implementation** of the database on secondary storage; **Tailored to a specific DBMS System.**

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Three-level Architecture and phases of database design



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Transaction Design

□ Transaction

- An action, or series of **actions**, carried out by a single user or application program, which **accesses or changes content of the database**.

□ Transaction design aims to define and document

- Data to be used by the transaction
- What the transaction will do
- Output of the transaction
- Importance to the users
- Expected rate of usage

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Implementation

- ▣ The physical realization of the database and application designs.
 - Use DDL to create database schemas and empty database files.
 - Use DDL to create any specified user views.
 - Create application programs, including database transactions, created using DML embedded in a host programming language (eg C + + , Java).

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Data Conversion and Loading

- Transferring any existing data into the new database and converting any existing applications to run on the new database.
- Only required when new database system is replacing an old system.
- DBMS normally has utility that loads existing files into new database.

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Match the descriptions to database development stages

Logical and physical design of the database.

Transfer any existing data into the new database

Creating the external, conceptual and internal database definitions.

Planning how the stages of the lifecycle can be realized most efficiently and effectively.

Collection and analysis of the requirements of users and application areas.

Define and document the high-level characteristics of the transactions.

Database Planning

Requirement Collection & Analysis

Database Design

Transaction Design

Implementation

Data conversion & Loading

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Fact-Finding Techniques

□ When to use fact-finding

- Used throughout database development process but crucial to the data requirements collection and analysis stage.

□ Why fact-finding

- Enables developer to learn about the terminology, problems, opportunities, constraints, requirements, and priorities of the organization and the users of the system.

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Fact-Finding Techniques

- ❑ Database developer normally uses several fact-finding techniques during a single project including
 - Examining documentation
 - Interviewing
 - Observing organization in operation
 - Research
 - Questionnaires

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Summary of fact-finding

- ❑ **Fact-finding is the formal process of using techniques such as interviews and questionnaires to collect facts about systems, requirements, and preferences.**
- ❑ **The five most common fact-finding techniques are examining documentation, interviewing, observing the enterprise in operation, conducting research, and using questionnaires.**
- ❑ **User and system requirements collected is documented in requirements specification.**

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Exercise

- Which fact-finding technique(s) is/are preferred in gathering each of the following facts?
 1. Find out the scope of the system.
 2. Find out what type of data is required by different user groups.
 3. Find out what type of database is suitable for your application.

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Reference Materials

1. Database Systems, Connolly, Ch 10 & 11
2. Database Solutions, Connolly, Ch 3 & 4

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Exercise - Answer

- Which fact-finding technique(s) is/are preferred in gathering each of the following facts?
 1. Find out the scope of the system.
Interviewing
 2. Find out what type of data is required by different user groups.
Interviewing, Examine Documentation.
 3. Find out what type of database is suitable for your application.
Research, Interviewing.

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