Database Fundamentals

Lecture 1 – Introduction

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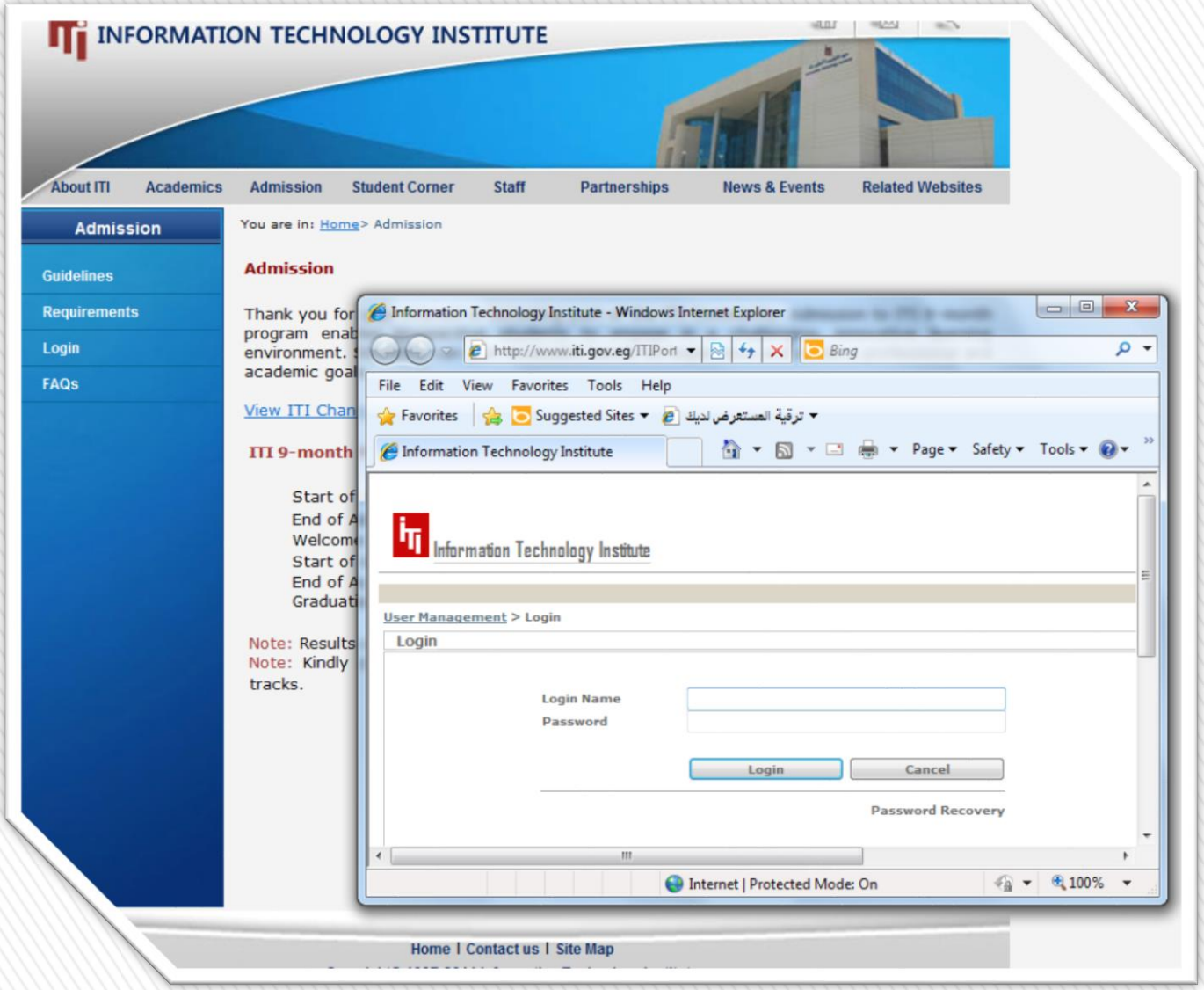
Course Outline

Grading System

- Lab assignments
- Final Exam

Example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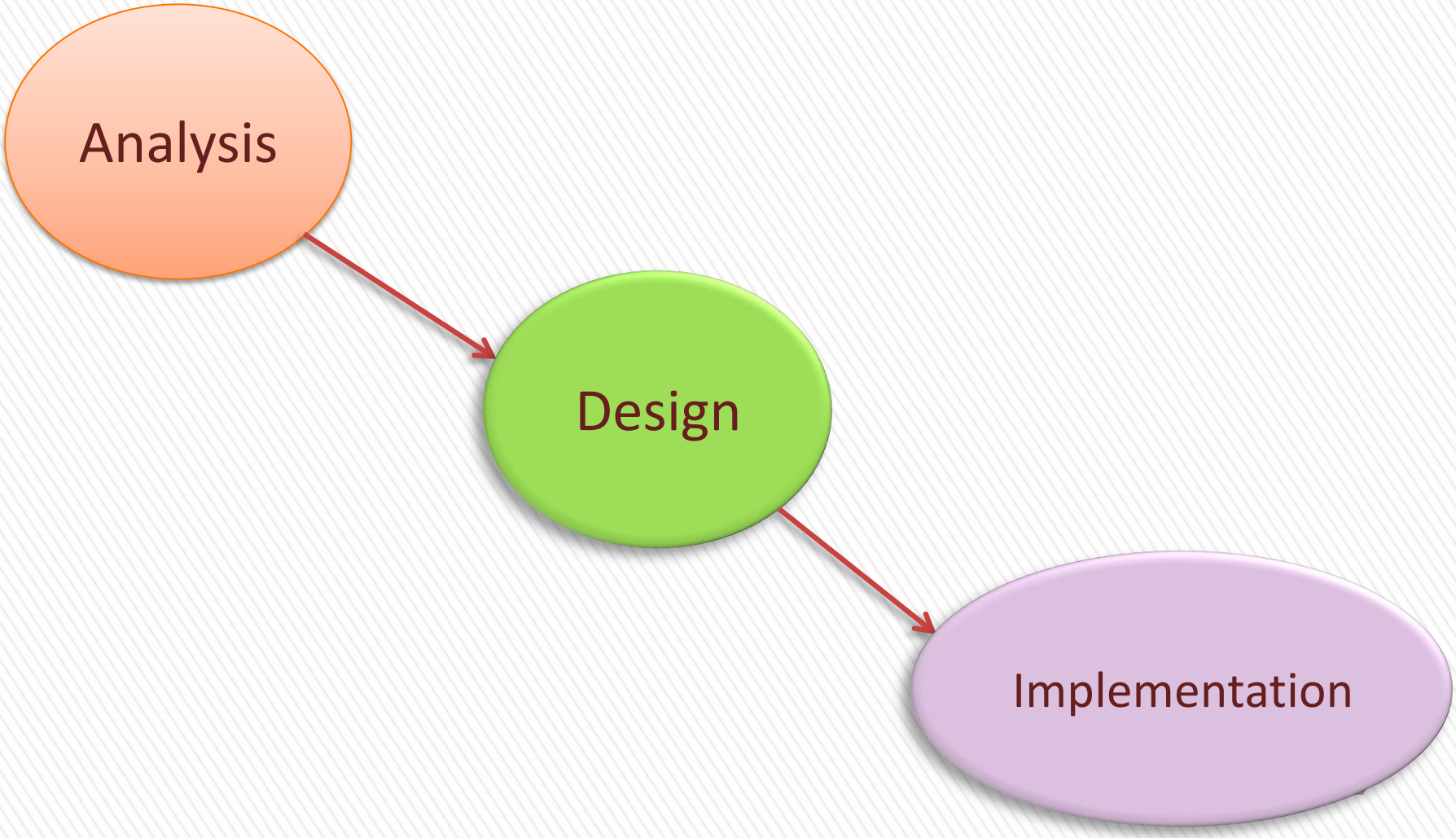
Database Development Phases



Database Processing History Stages

1- File Based System (1960)

2- Relational Model [By: E.F. Codd] (1970)

3- Object Oriented Database (1980)

4- Client Server Database Application (1990)

5- Database using Internet technology (2000)

Database Processing History

Relational Database

A data structure through which data is stored in tables that are related to one another in some way. The way the tables are related is described through a relationship.

Database Models

1- Hierarchical DBMS Model

2- Network DBMS Model

3- Relational DBMS Model

4- Object Oriented DBMS Model

5- Multi dimensional DBMS Model

Definitions

Database

- **Database**: Logical collection of **Non-Redundant, shareable** data that is used by different application systems of some given enterprise, this data represents some aspects of the real world.

Advantages:

+ Reduce Redundancy
+ Avoid inconsistency.
+ Share data
+ Security Restrictions
+ Integrity maintained.

Disadvantages:

+ Expensive due to it needs expertise , and the cost of DBMS

Database Management System

- **Database Management System (DBMS)**: A software package/ system to facilitate the creation and maintenance of a computerized database.

  It is an intermediate layer between database and the program that access the data. It enables users to create and maintain database and handle all requests from users to access the database.

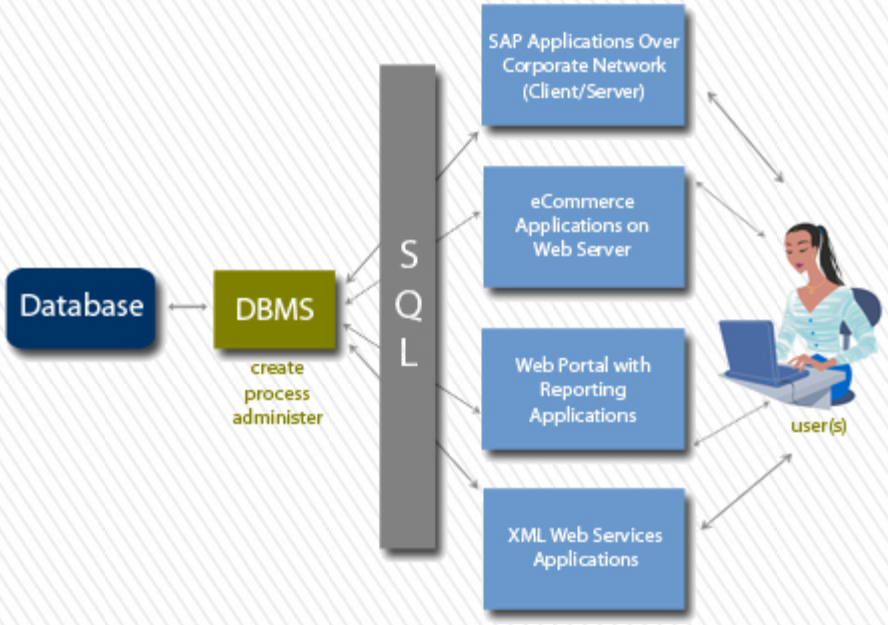
DBMS Functions

- Defining & constructing the database
- Manipulating the database.
- Data security & integrity
- Concurrency
- Recovery
- Data Dictionary
- Performance

Database Management System

» DBMS Advantages:

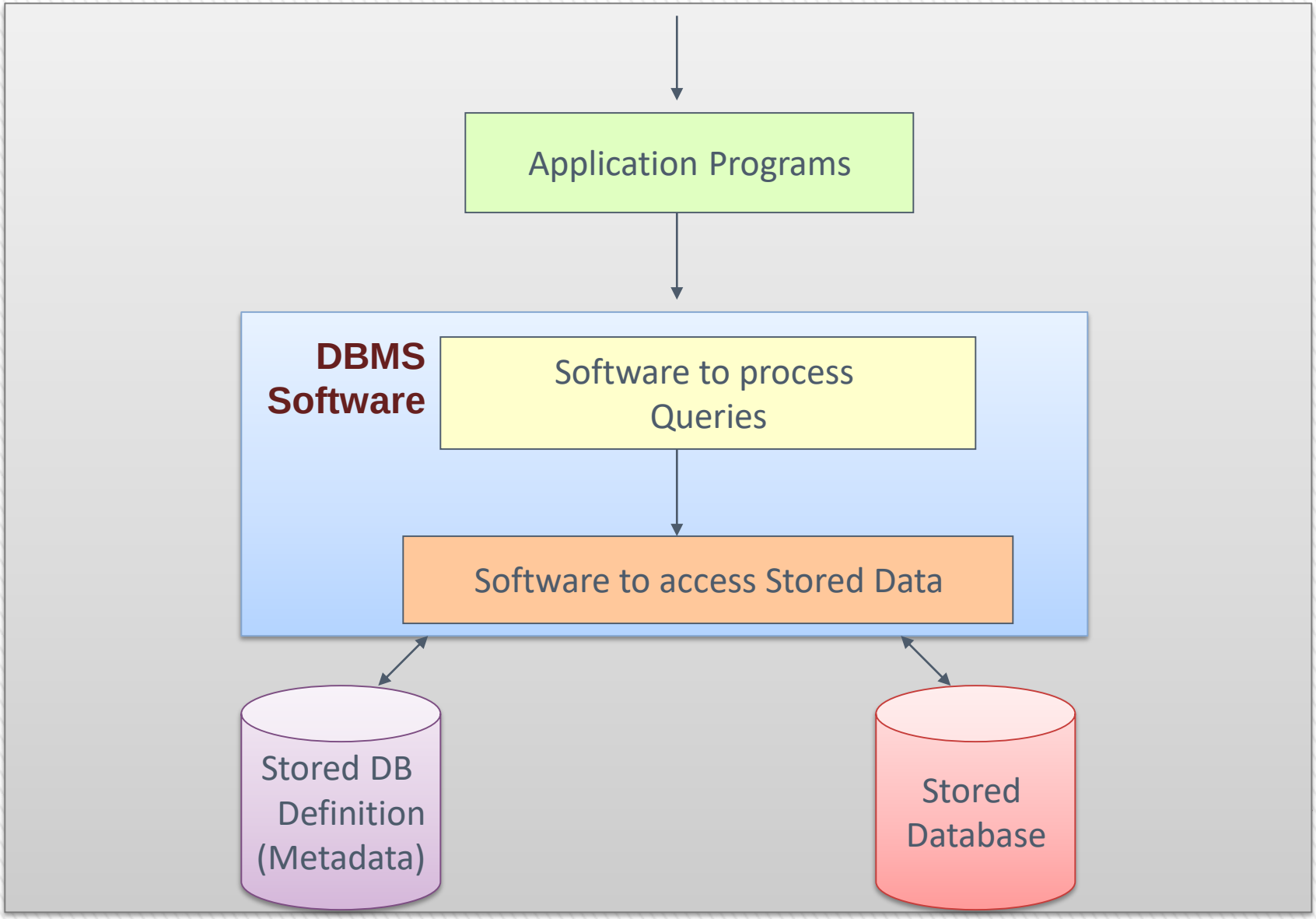
- Controlling Redundancy.
- Restricting Unauthorized Access.
- Sharing data.
- Enforcing Integrity Constraints
- Inconsistency can be avoided.
- Providing Backup and Recovery.



» DBMS Disadvantages:

- It needs expertise to use (which is expensive)
- DBMS itself is expensive

Database System



Database System

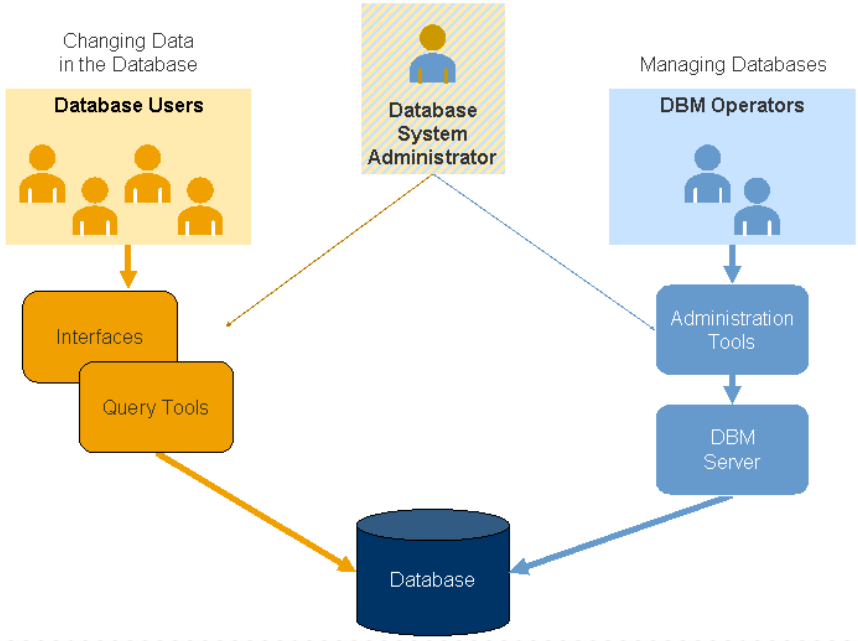
The DBMS software together with the data itself.

Sometimes, the applications are also included.

(Software + Database)

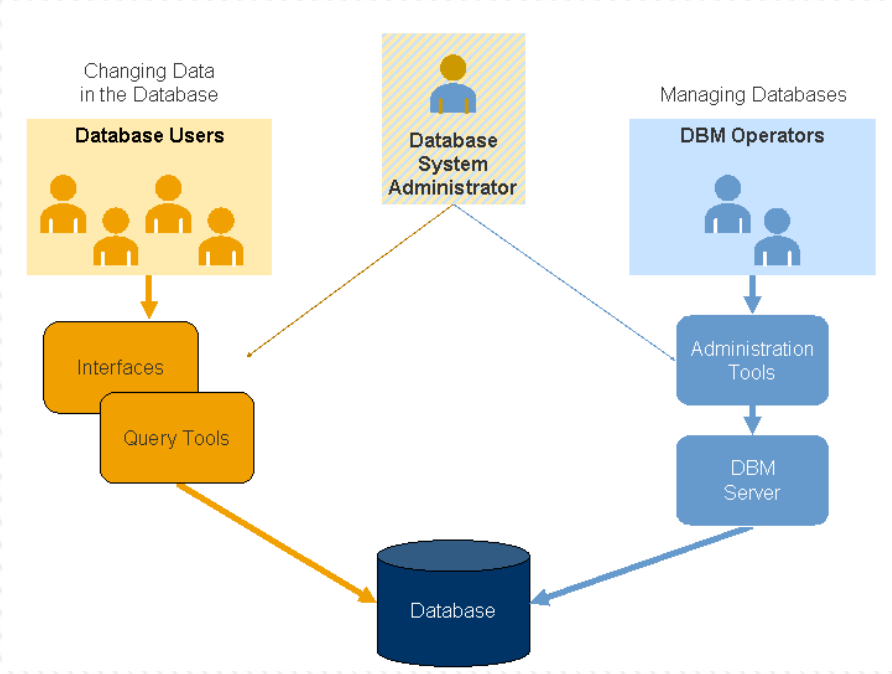
Database Users

- Database Administrator (DBA)
  - Put and implement suitable strategy & policy of the whole database
  - Define internal schema
  - Define security & integrity checks
  - Define backup & recovery procedure
  - Monitor performance
- System Analysts
  - Determine the user requirements

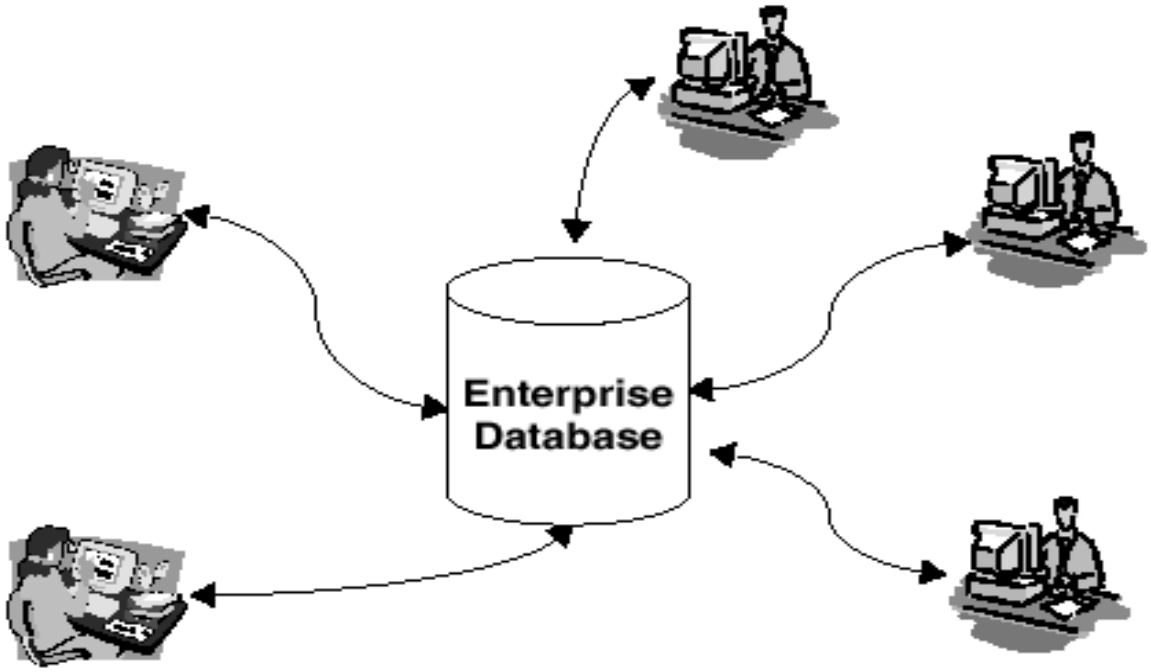


Database Users

- Database Designer
  - Choose the appropriate structure to represent data
- Application programmers
  - Implement the specifications as programs with high level language
  - Testing, Debugging, Documenting & maintaining transactions
- End users
  - Casual
  - Naïve
  - Sophisticated



Centralized Database Environment



All data at a single site.

Data access from remote sites through communication links.

Easy to administer.

Uncertain data availability.

Common Examples:

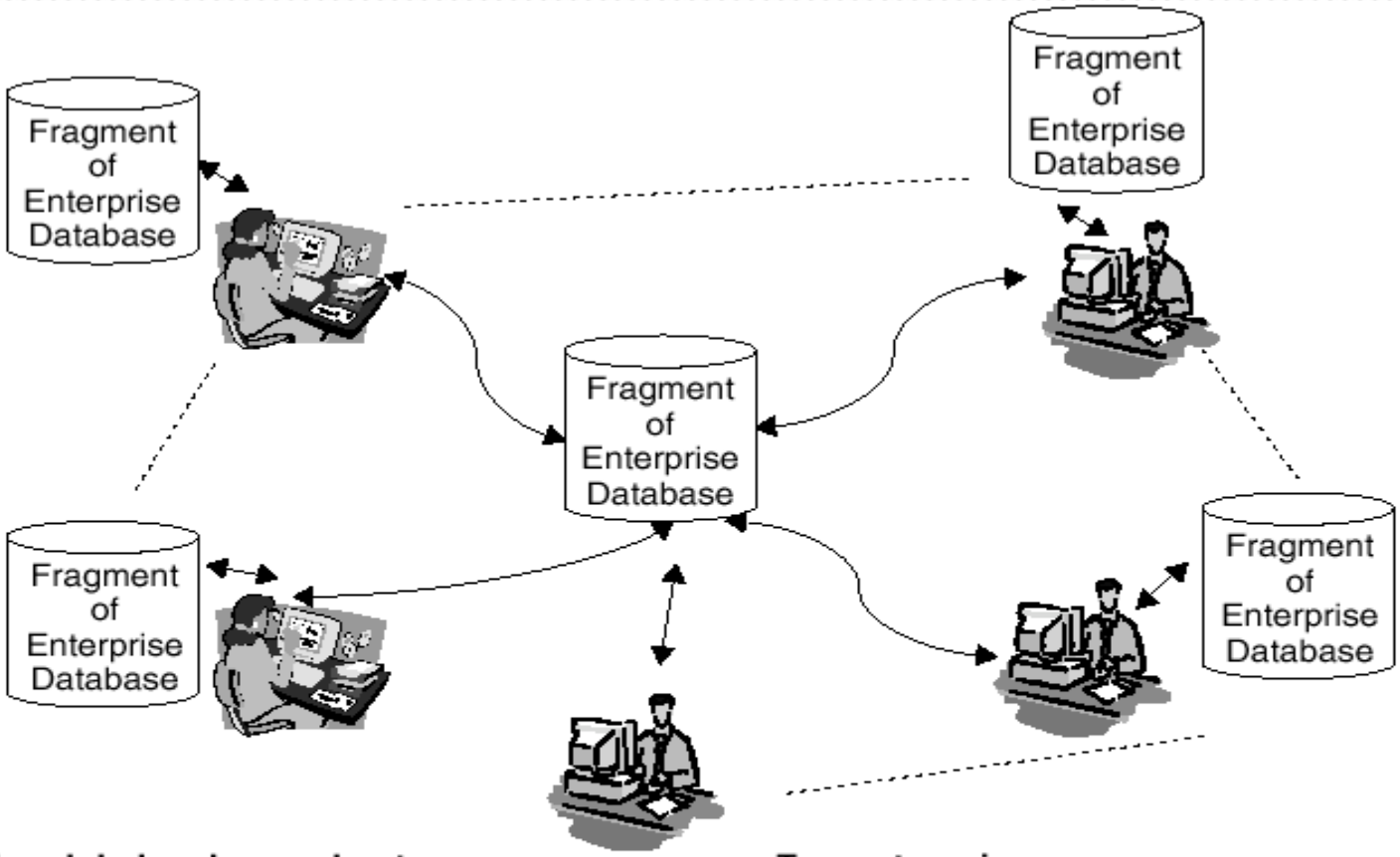
Personal Database

Central Computer Database

Client/Server Database

Centralized database.

Distributed Database Environment



For global and spread-out organizations, centralized databases not economical.

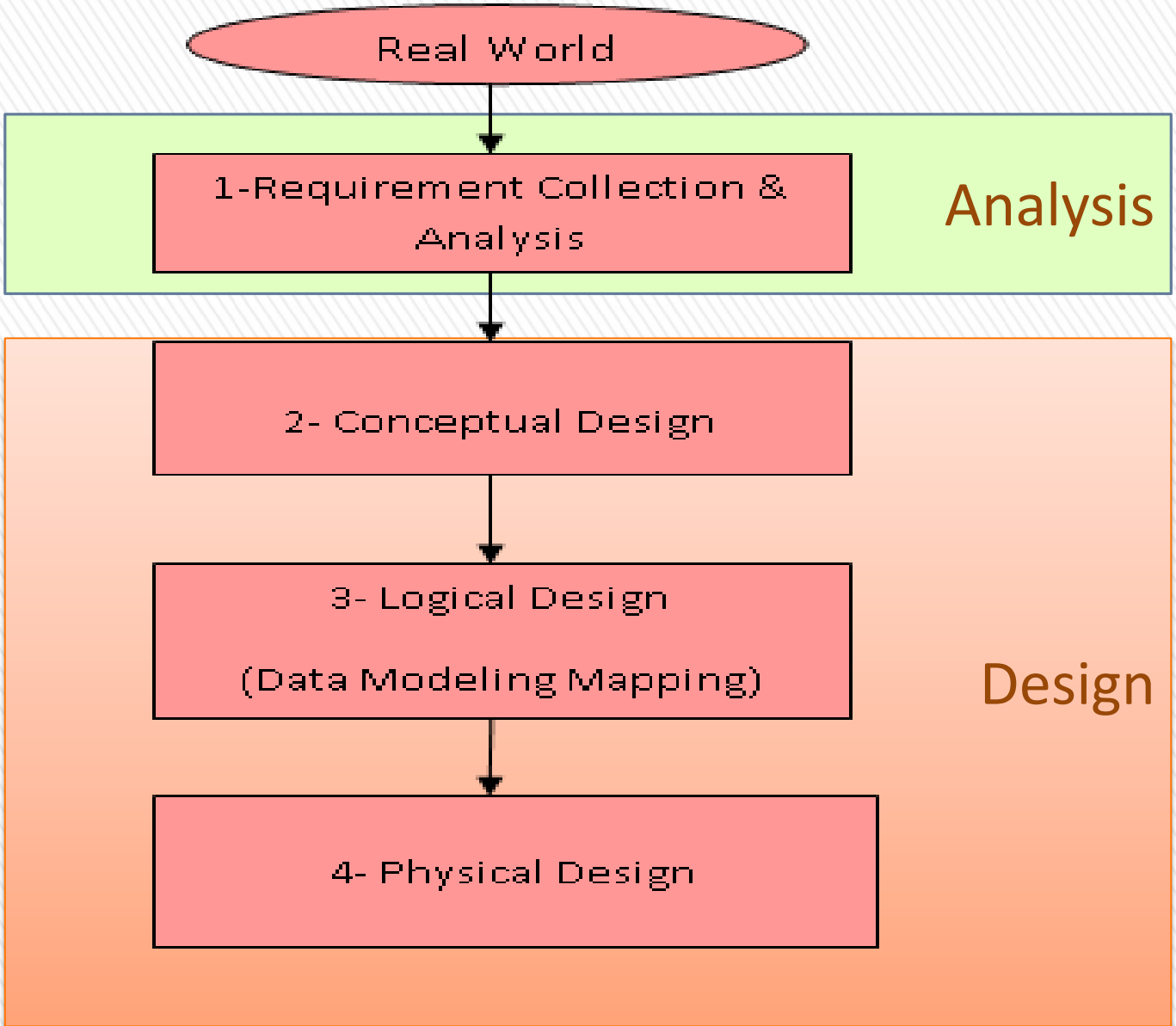
Enterprise data distributed across multiple computer systems.

Two categories:

Homogeneous databases

Heterogeneous databases

Database Design Phases



Database development stages / phases

- Enterprise Modeling
  - Analyze current data processing, general functions and their DB needs
- Conceptual Data Modeling
  - Develop conceptual model (entities – relationships – business rules)
- Logical database design
  - Create stable and well defined structure for database
  - Identify data integrity & security

Database development stages / phases

- Physical database design and definition
  - Define DB to DBMS
  - Decide physical organization of data
  - Design database processing programs
- Database implementation
  - Code & test database processing programs
  - Documentation & training material
  - Install database and convert data from prior systems
- Database maintenance
  - Improve performance
  - Backup & Recovery

Questions ?