Unit I - Introduction
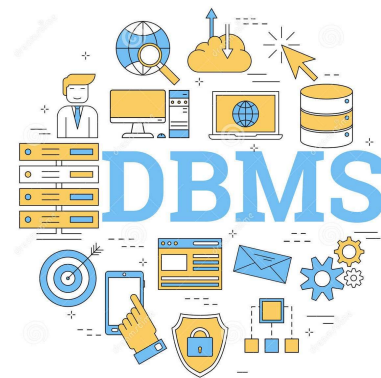
Purpose of Database System - Views of data – Data models, **Database Management system - Three-schema architecture of DBMS**, **Components of DBMS**. Entity – Relationship Model - Conceptual data modeling - motivation, entities, entity types, attributes, relationships, relationship types, E/R diagram notations, Examples

Database Architecture

- **Centralized databases**
  - One to a few cores, shared memory
- **Client-server,**
  - One server machine executes work on behalf of multiple client machines.
- **Parallel databases**
  - Many core shared memory
  - Shared disk
  - Shared nothing
- **Distributed databases**
  - Geographical distribution
  - Schema/data heterogeneity

**Database Architecture (Centralized/Shared-Memory)**
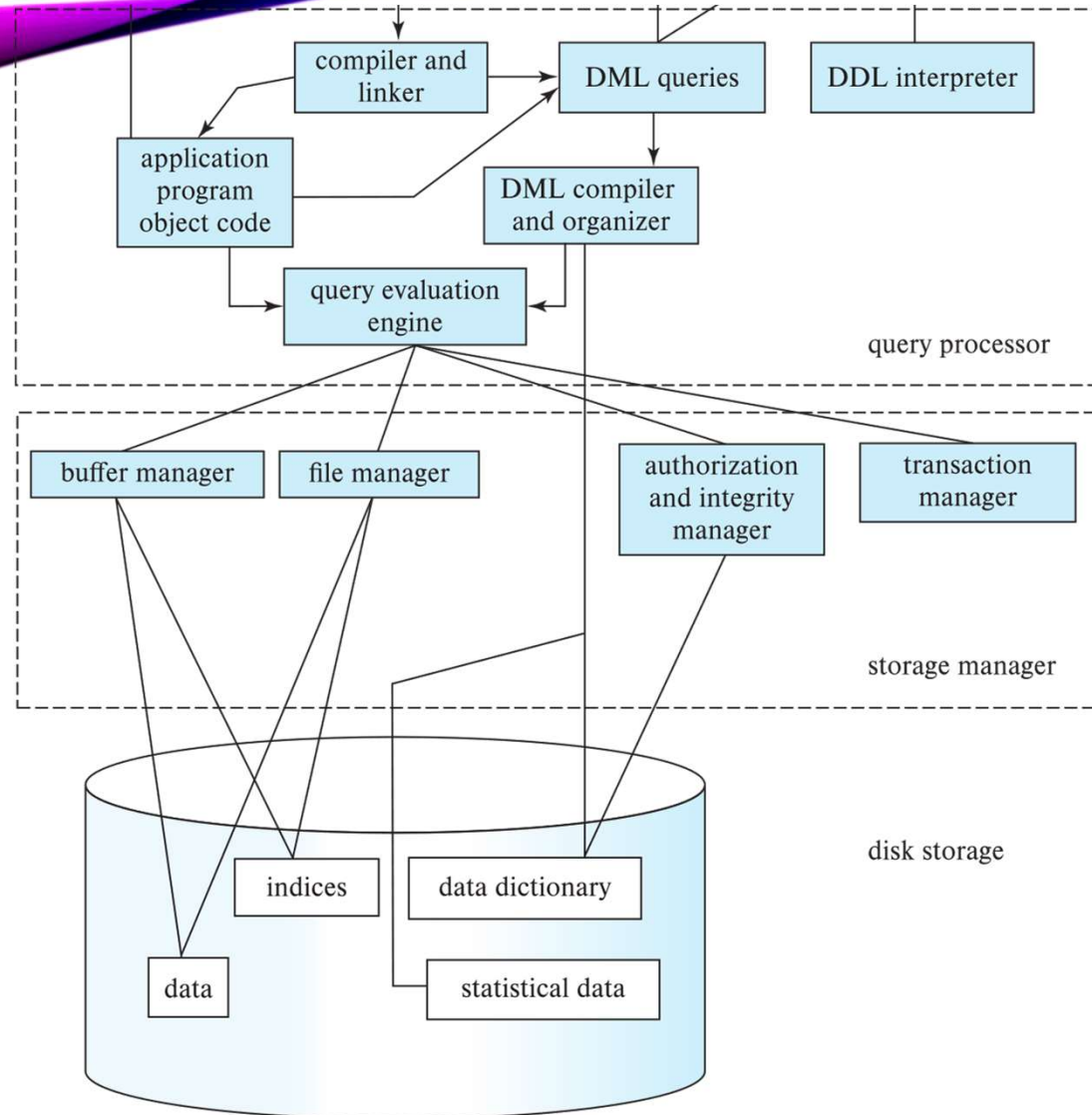
- Database applications are usually partitioned into two or three parts

- **Two-tier architecture** **--** the application resides at the client machine, where it invokes database system functionality at the server machine

- **Three-tier architecture** **--** the client machine acts as a front end and does not contain any direct database calls.

  - The client end communicates with an application server, usually through a forms interface.

  - The application server in turn communicates with a database system to access data.

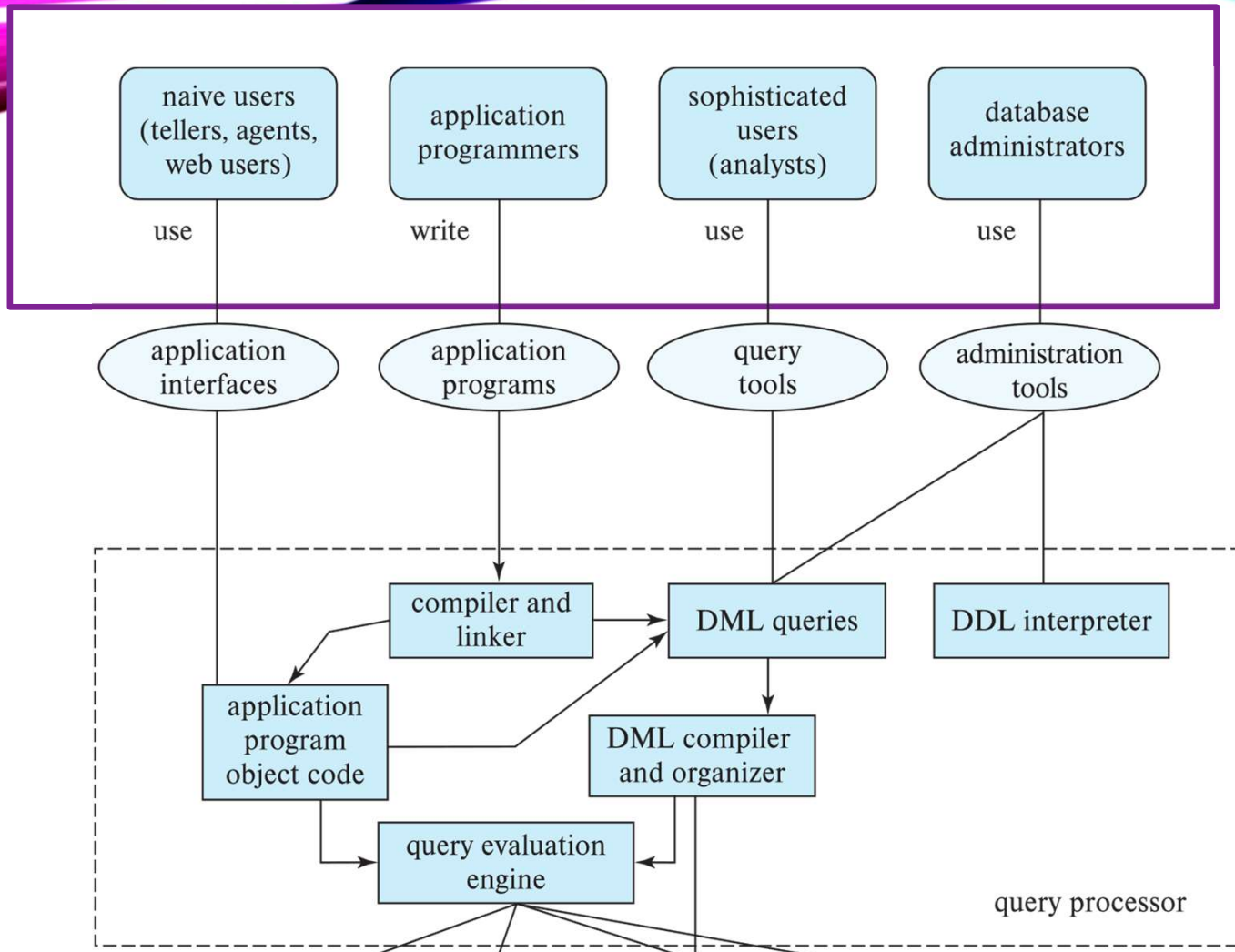# Two-tier and three-tier architectures
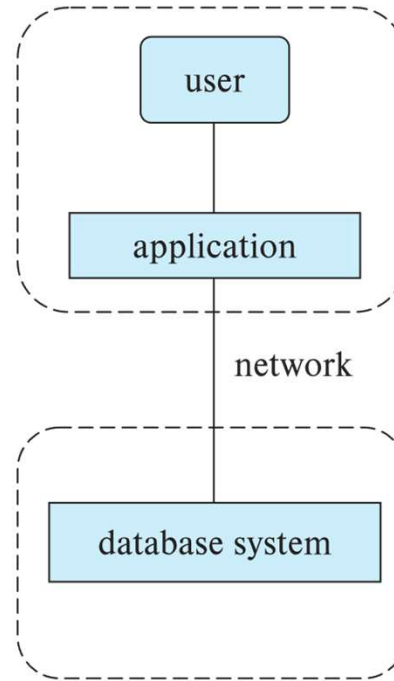
(a) Two-tier architecture
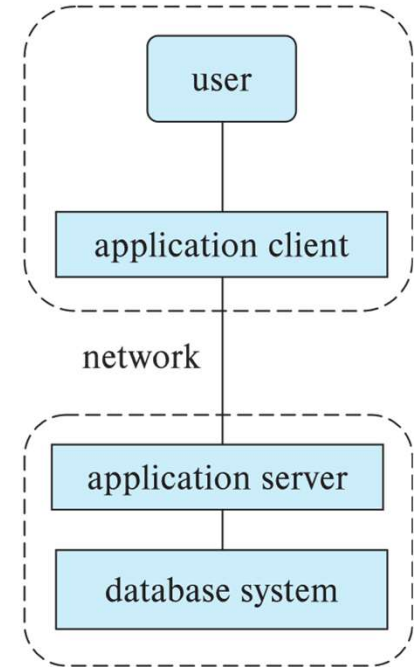
(b) Three-tier architecture

Database Users

- A person who has <mark>central control over the system</mark> is called a **database administrator (DBA).** Functions of a DBA include:

  - Schema definition

  - Storage structure and access-method definition

  - Schema and physical-organization modification

  - Granting of authorization for data access

  - Routine maintenance

  - Periodically backing up the database

  - Ensuring that enough free disk space is available for normal operations, and upgrading disk space as required

  - Monitoring jobs running on the database

History of Database Systems

- 1950s and early 1960s:
  - Data processing using magnetic tapes for storage

- Late 1960s and 1970s:
  - Hard disks allowed direct access to data

- 1980s:
  - Research relational prototypes evolve into commercial systems
    - SQL becomes industrial standard
  - Parallel and distributed database systems
    - Wisconsin, IBM, Teradata
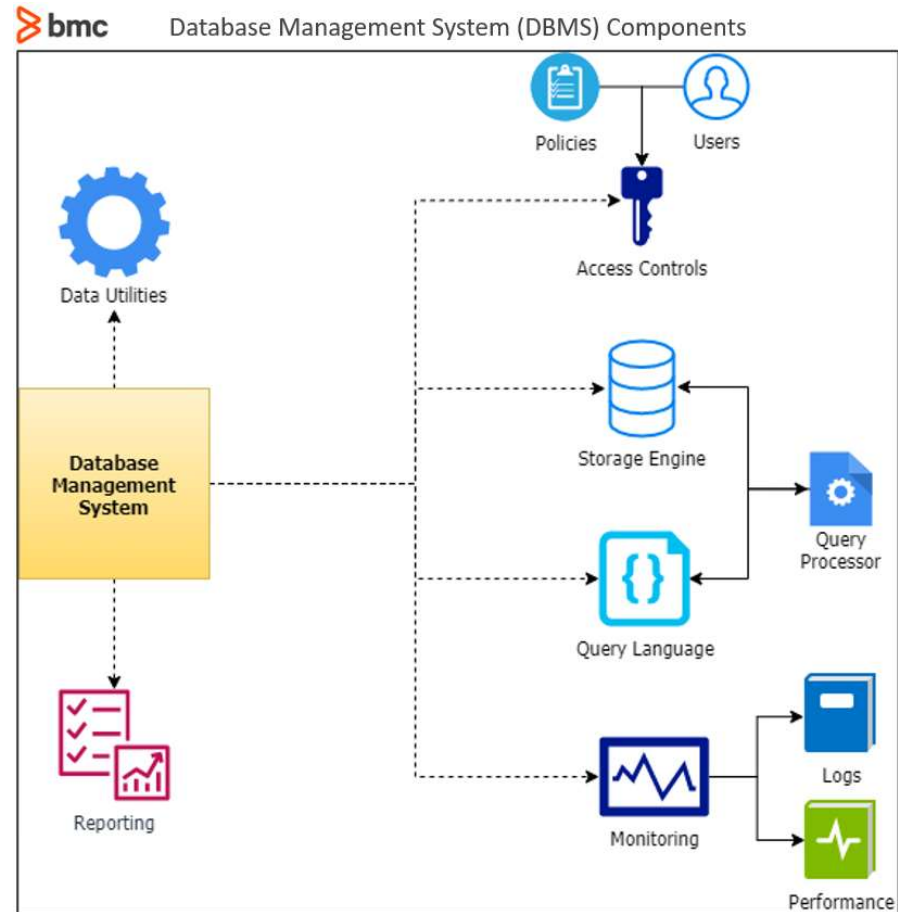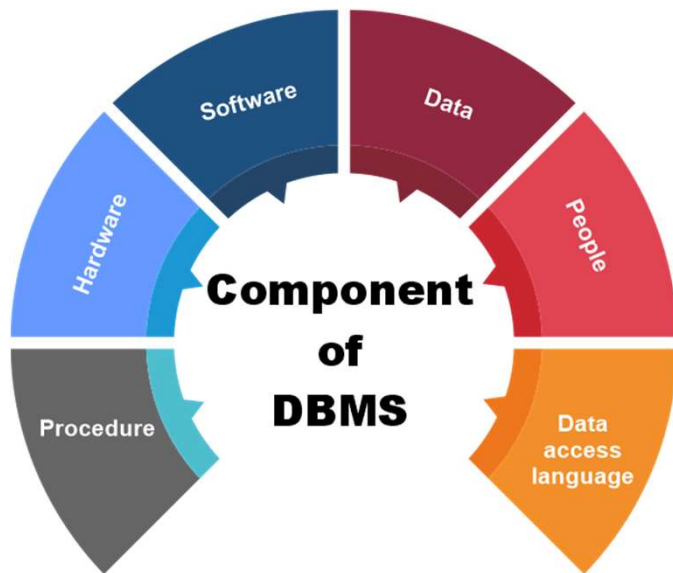 - Object-oriented database systems

- 1990s:
  - Large decision support and data-mining applications
  - Large multi-terabyte data warehouses
  - Emergence of Web commerce
- 2000s
  - Big data storage systems
    - Google BigTable, Yahoo PNuts, Amazon,
    - "NoSQL" systems.
  - Big data analysis: beyond SQL
    - Map reduce and friends

- 2010s
  - SQL reloaded
    - SQL front end to Map Reduce systems
    - Massively parallel database systems
    - Multi-core main-memory databases

Components of DBMS

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