

Data System Environment,
Server Architectures,
Classification of DBMSs

CS157A

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Outline

- Database System Environment
- Centralized Server Architecture
- Client-Server Architecture
- Two-tier and Three Tier Architectures
- Classification of DBMSs

DBMS Component Modules

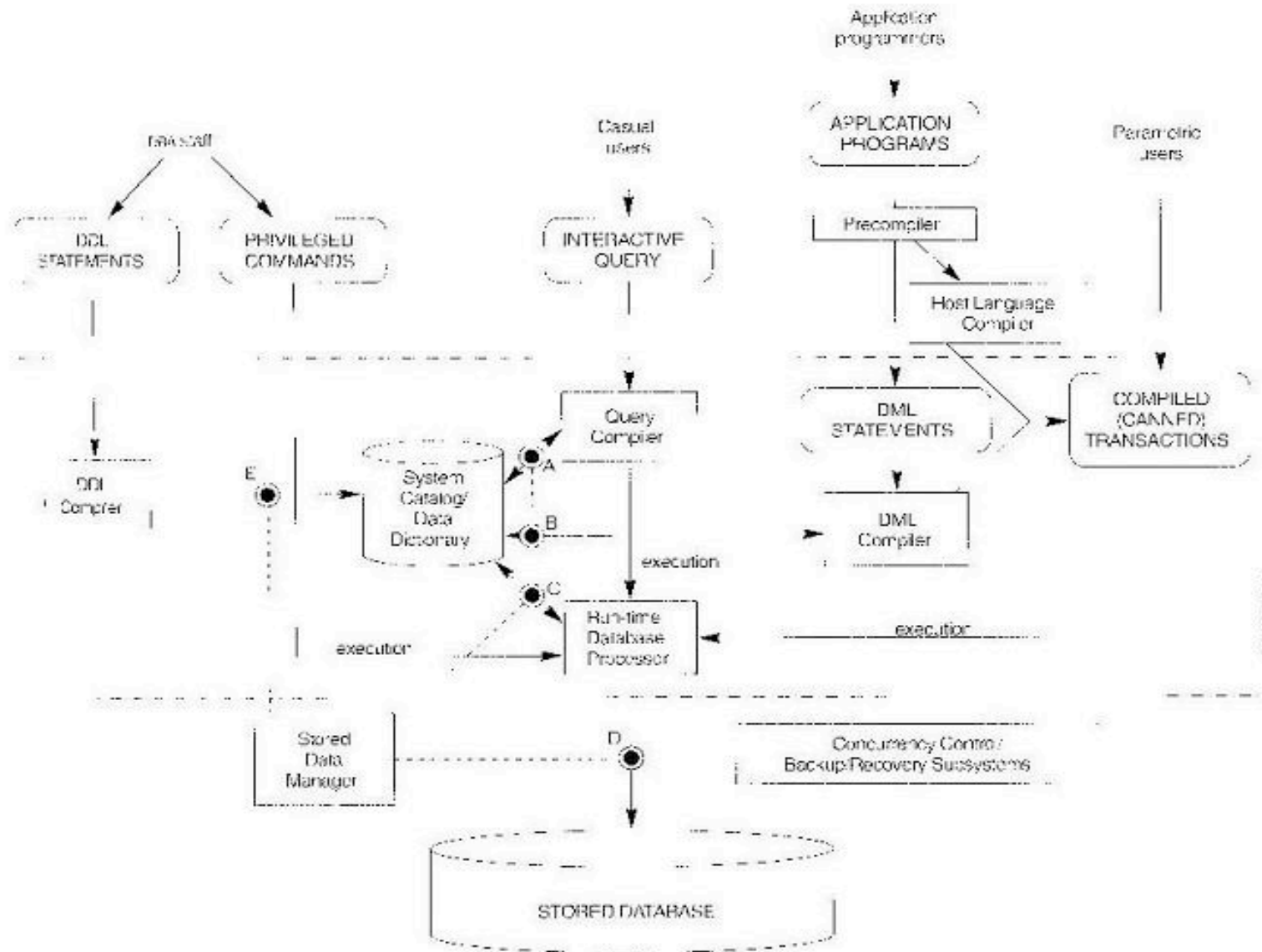


FIGURE 2.3 Component modules of a DBMS and their interactions.

Some Remarks

- The catalog is usually stored on disk
- Access to the disk is usually controlled by the OS, which schedules disk I/O, although some DBMS have their own buffer manager
- A higher level storage data manager module of DBMS controls access to DBMS information
- A DDL compiler processes schema definitions and stores them in the catalog
- A Runtime Data Processor handles DB requests at runtime, processing updates and retrievals
- A Query processor handles high level queries

Database System Utilities

- Loading
- Backup
- File reorganization
- Performance monitoring

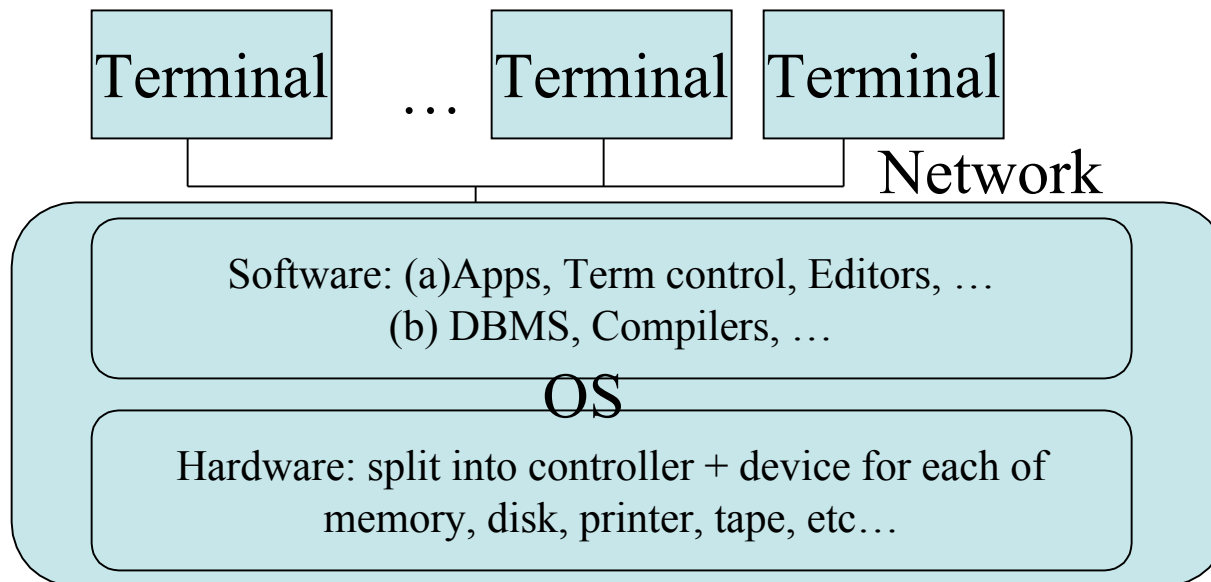
Other possible utilities that might be available: sorting, data compression, user monitoring, networking, etc

Tools, Application Environments, and Communication facilities

- The design of the data dictionary (catalog) is often done with CASE (computer aided software engineering) tools. Ex: Oracle Designer, Rational, etc.
- Application programs are often developed with a IDE (integrated development environment). Ex: Eclipse, Visual Studio, etc.
- Databases can be connected to each other over a network from a LAN to a larger network. So might have a DB/DC system to handle this (DC is data communication).

Centralized Architectures from DBMSs

- This is the original model for interacting with a DBMS.
- Essentially, is the mainframe paradigm.

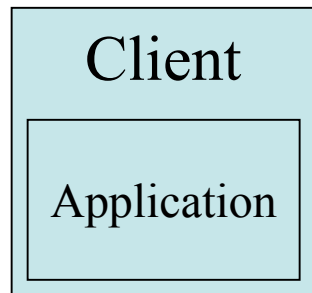


Basic Client/Server Architecture

- Developed to handle environments where a large number of PCs, workstations, file servers, printers, database servers, web servers, etc are connected by a network.
- The idea is that a specialized server provides some functionality (file serving like a Samba server, printing like cups, etc).
- These also provide necessary controllers, drivers, etc.
- A client that wants to use these services connects to them over the network. The client machine has the application. For example, Word on the client might connect to a print server.

Two-tier and Three Tier Architectures for DBMSs

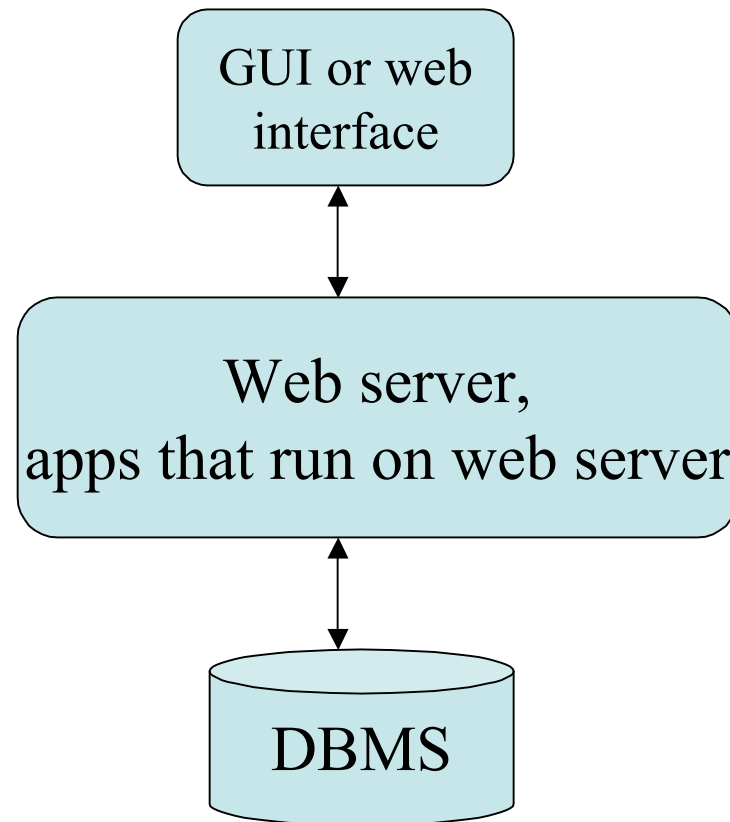
Two Tier



Connects with an API such as ODBC or JDBC

Query server/transaction server, SQL server

Three Tier



Classification of Database Management Systems

- Can classify DBMSs by data model: relational, OO, XML, network, hierarchical
- Number of users: single-user/multi-user
- Number of sites:
 - Is DBMS located at one site? i.e., **centralized**
 - Spread over many sites? i.e., **distributed.**
 - If it is a DDBMS:
 - Do all the sites run the same DBMS? If so, it is *homogeneous*; otherwise, it is *heterogeneous*. If very loosely coupled can be a *federated* DDBMS.
- Cost: low end < \$3000, mid range \$10,000 to \$100,000, high end >\$100,000

More on Classifying DBMSs

- Can classify by available access paths:
 - Ex: based on inverted file structure (like some early system).
 - General versus Special Purpose.
 - Airline reservations are often special purpose as geared toward booking transaction.
 - This kind of special purpose system sometimes an OLTP system. (Online Transaction Processing).