DATABASE MANAGEMENT SYSTEM (DBMS)

CONTENT

- **Client-server architecture**
- **Components And Functions**
- **Application Architectures**
- **Two-Tier Client-Server Architectures**
- **Three-tier client-server architecture**

Client-server DBMS Architecture

Client-server architecture

- This is a network **architecture** in which each computer or host is on a network can be either a **client** or a **server**.
- It has two logical components:-
- **Servers** are powerful computers or processes dedicated to managing disk drives (file servers), printers (print servers), or network traffic (network servers).
- **Clients** are PCs or workstations on which users run applications. . Clients rely on servers for resources, such as files, devices, and even processing power.
- Client and server computers are connected into a software.
- Generally client responds for DBMS's services.
- DBMS processes these requests and return the result to client.
- Client Server architecture generally uses GUI.

Client/Server systems

- Operate in a networked environment Processing of an application distributed between front-end clients and back-end servers.
- Generally the client process requires some resource, which the server provides to the client.
- Clients and servers can reside in the same computer, or they can be on different computers that are networked together, usually:

Client – Workstation (usually a PC) that requests and uses a service.

Server – Computer (PC/mini/mainframe) that provides a service.

For DBMS, server is a database server

Components And Functions

- It has three general components.
- **1. Client Application:-**
- "Client/server systems operate in a networked environment, splitting the processing of an application between a front-end client and a back-end processor."
- A client here stands an end user here it uses an application/ device it may be computer - mobile etc. with software or application.
- It issues a SQL statements for data access as central environment which may be tools or user written applications.
- Each time a client application executes it contacts a server to send a request and awaits for a response when the response arrives the client continues his processing.
- Clients are easily build and require no special system privileges to operate.

Client Application

- The client is usually a browser such as Internet Explorer, Netscape Navigator or Mozilla. Browsers interact with the server using a set of instructions called protocols.
- These protocols help in the accurate transfer of data through requests from a browser and responses from the server.
- client and server may reside on same computer both are intelligent and Programmable.
- There are many protocols available on the Internet. The World Wide Web, which is a part of the Internet, brings all these protocols under one roof.
- You can, thus, use HTTP, FTP, Telnet, email etc. from one platform - your web browser

Client Application

Applications that run on computers

Rely on servers for

- Files
- Devices
- Processing power

Example: E-mail client

- An application that enables you to send and receive e-mail

Clients are Applications

Components And Functions

- **2. Network Interface:-**

- It enables client application to connect to the server and can send SQL statements and receive results or error message etc.
- This layer transfer data between client to database server.
- This layer uses web server / application to check request from client.
- It somewhere also converts the view of data according to client requirement.

Components And Functions

- **3. Database Server:-**
- A server is any program that provides services to requested process from client / client applications.
- This layer has all the data or we can say it is our main device or server which has all information.
- It take input / request from client application layer then process the request and generate the response and forward it to the application server.
- Server Contains:-
- 1. Authentication:-Verifying identity of client.
- 2. Authorization:-Permission of Accessing Services.
- 3. Data Security:-Data is not compromised.
- 4. Privacy:-Information secured from unauthorized access.
- 5. Protection:- Network Application can not get unauthorized access of system Resources.

Database Server

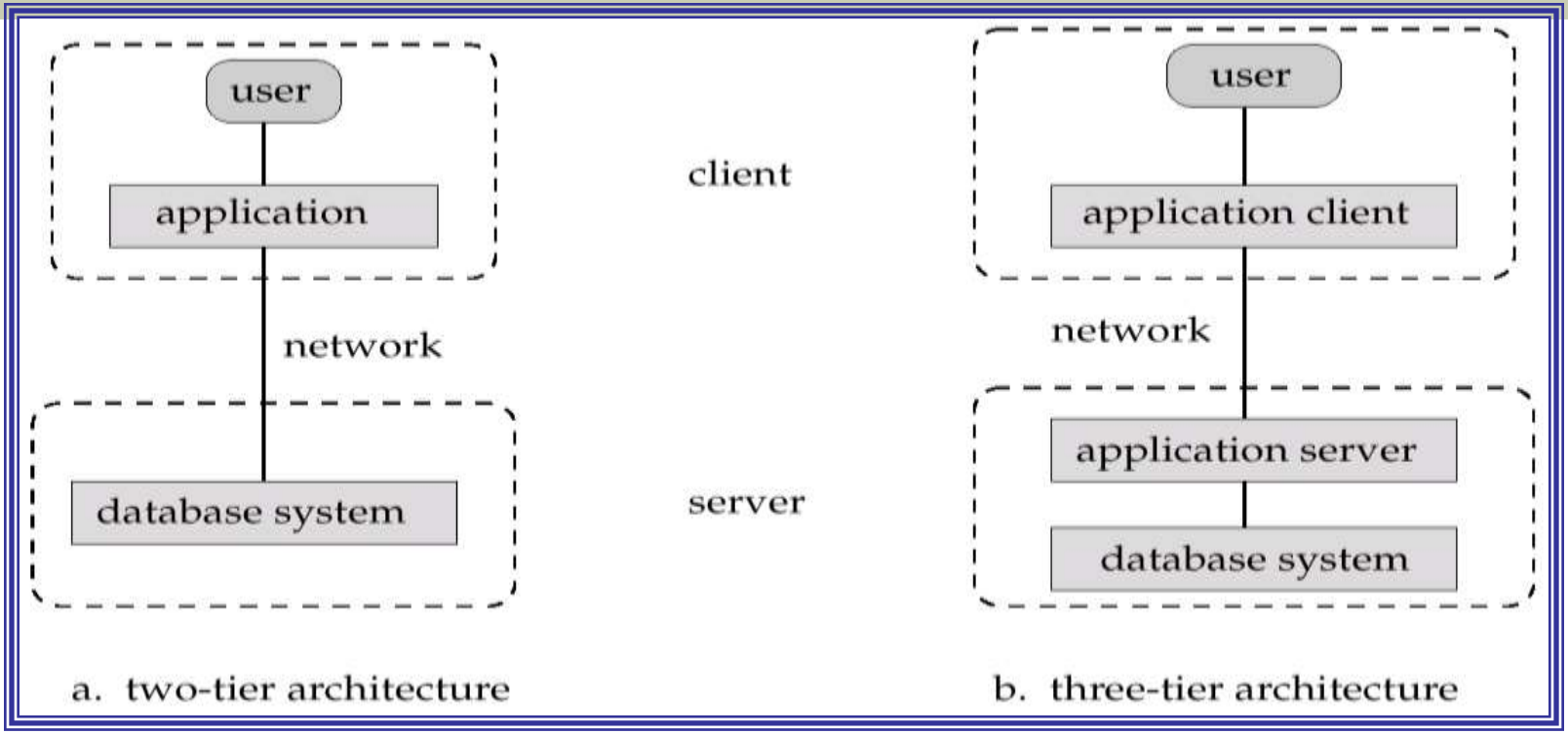
- Computers or processes that manage network resources
  - Disk drives (file servers)
  - Printers (print servers)
  - Network traffic (network servers)
- Example: Database Server
  - A computer system that processes database queries

Servers Manage Resources

Types of Servers

- Chat Servers
- Fax Servers
- FTP Servers
- Groupware Servers
- Mail Servers

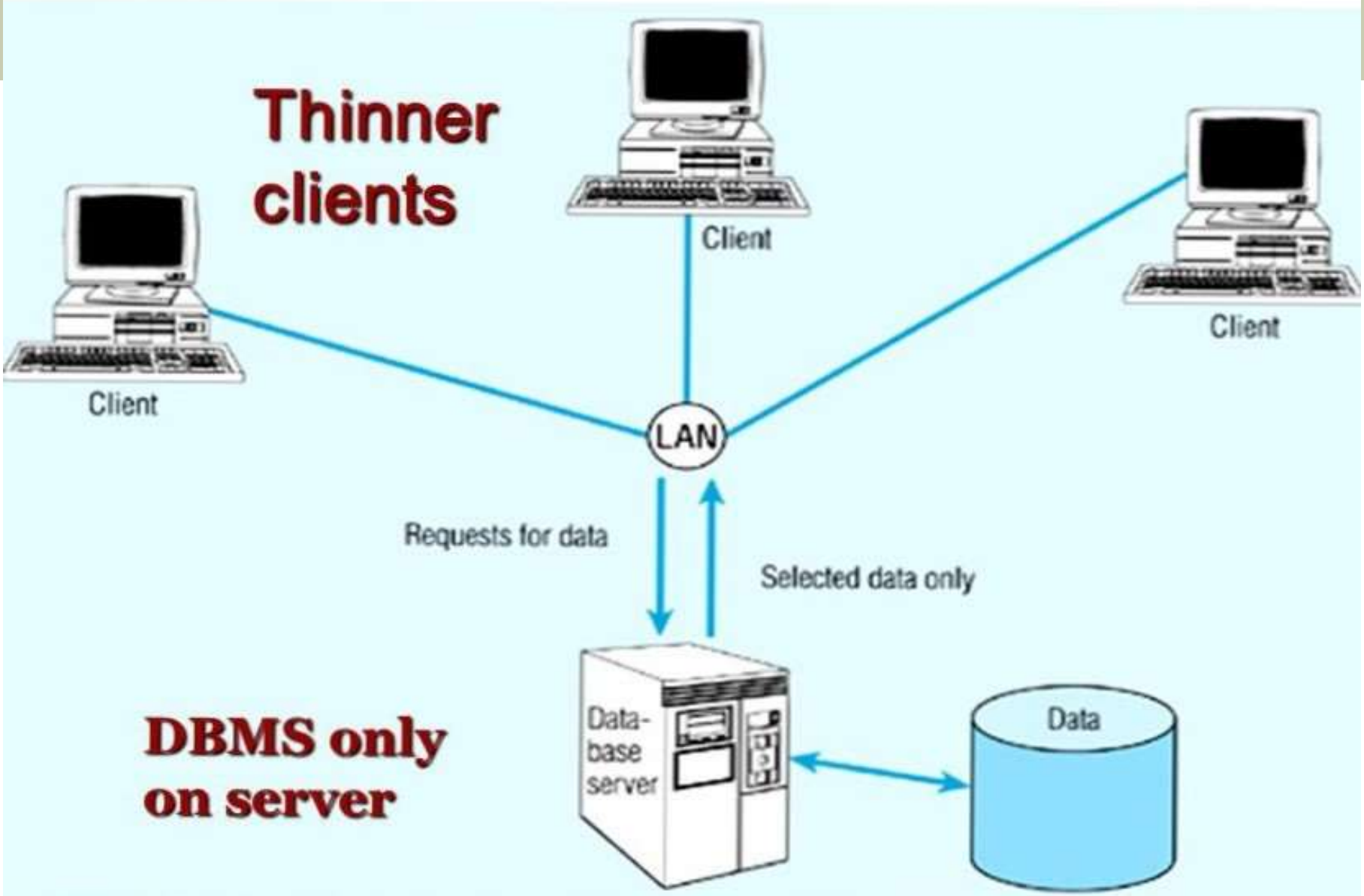
Application Architectures



- **Two-tier architecture**: E.g. client programs using ODBC/JDBC to communicate with a database
- **Three-tier architecture**: E.g. web-based applications, and applications built using "middleware"

Two-Tier Client-Server Architecture

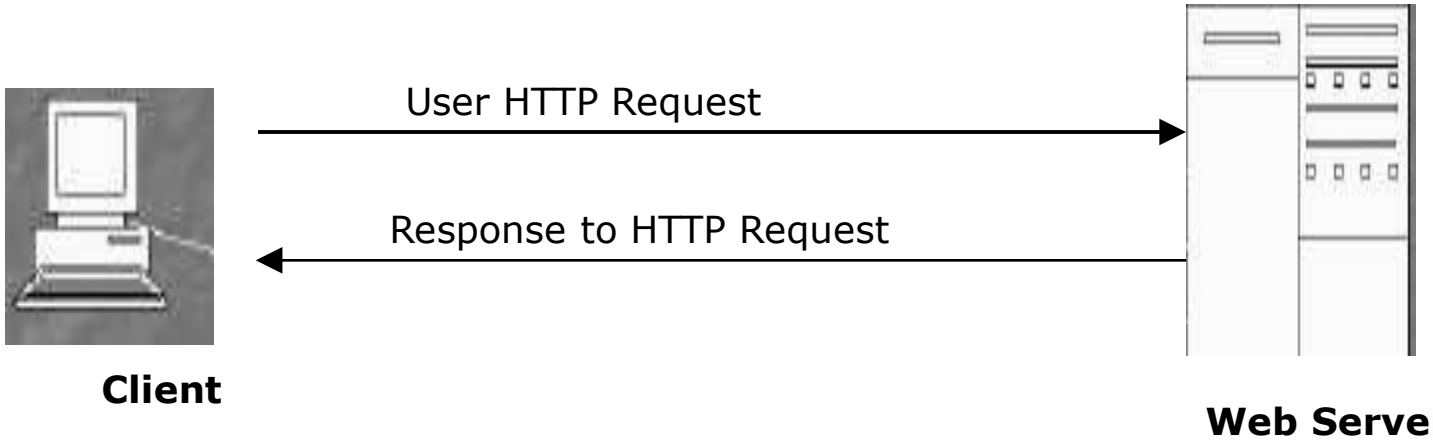
Two-tier database server architecture



Two-Tier Client-Server Architectures- Network

Distributed Database Systems *have now come to be known as client server based database systems because they do not support a totally distributed environment, but rather a set of database servers supporting a set of clients.*

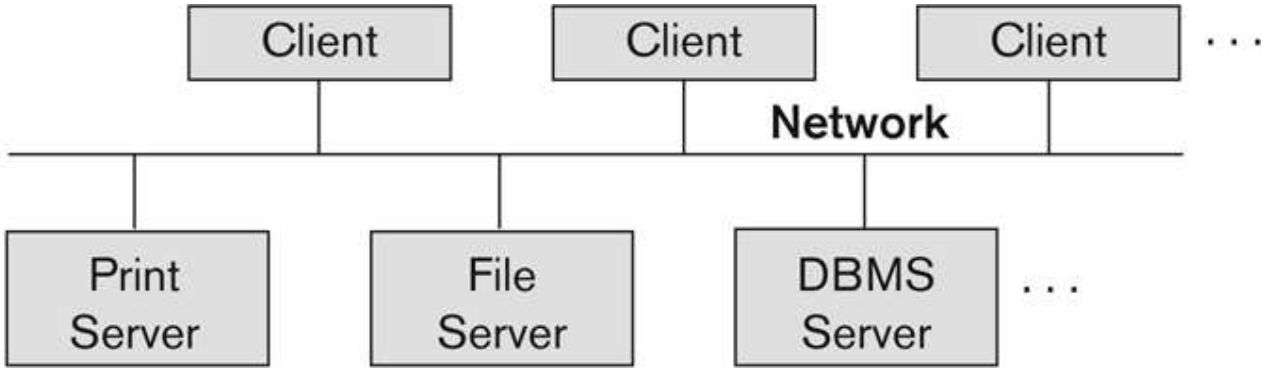
Two-Tier Client-Server Architectures- Web View



Processing of **HTML code** takes place on the **client side** and the **web page request** is processed on the **server side**

Logical two-tier client-server architecture

Figure 2.5
Logical two-tier client/server architecture.



Two-Tier Client-Server Architectures

- Specialized Servers with Specialized functions
  - Print server
  - File server
  - DBMS server
  - Web server
  - Email server
- Clients can access the specialized servers as needed.

Clients

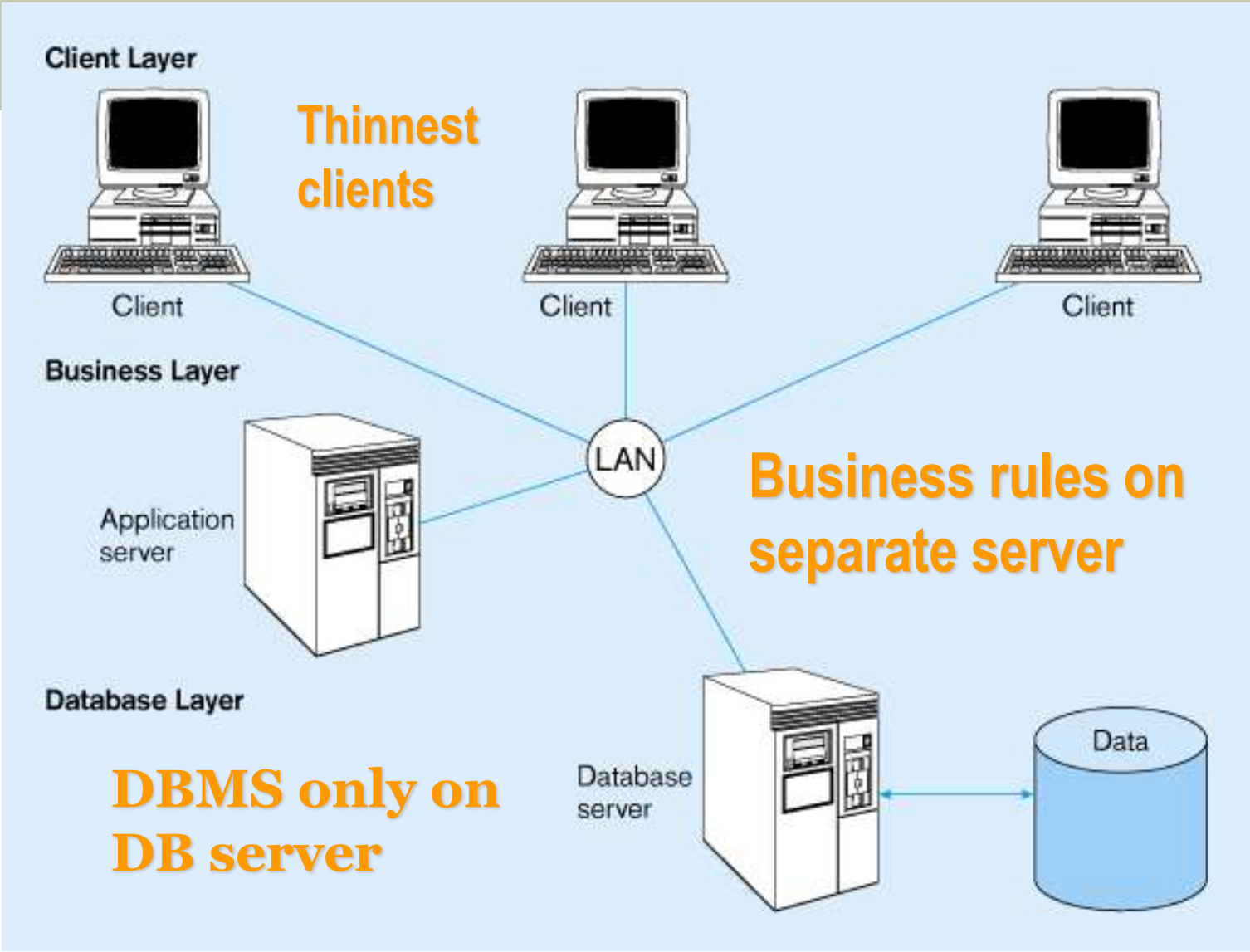
- Provide appropriate interfaces through a client software module to access and utilize the various server resources.
- Clients may be diskless machines or PCs or Workstations with disks with only the client software installed.
- Connected to the servers via some form of a network.
  - LAN: local area network, wireless network, etc.

DBMS Server

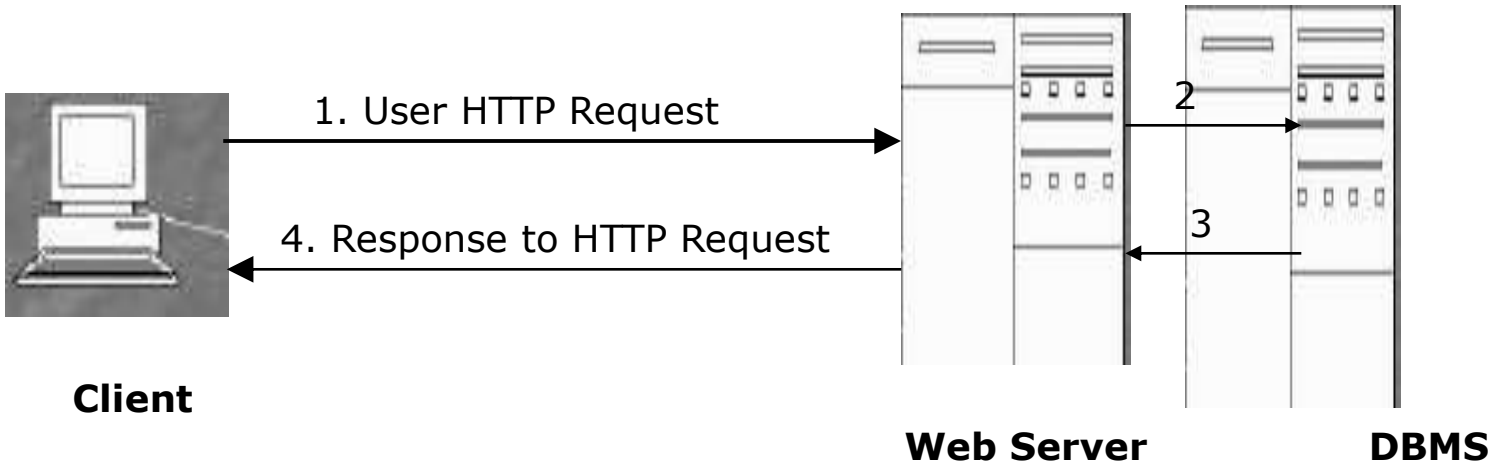
- Provides database query and transaction services to the clients
- Relational DBMS servers are often called SQL servers, query servers, or transaction servers
- Applications running on clients utilize an Application Program Interface (**API**) to access server databases via standard interface such as:
  - ODBC: Open Database Connectivity standard
  - JDBC: for Java programming access
- Client and server must install appropriate client module and server module software for ODBC or JDBC

Three-tier client-server architecture

Three-tier architecture



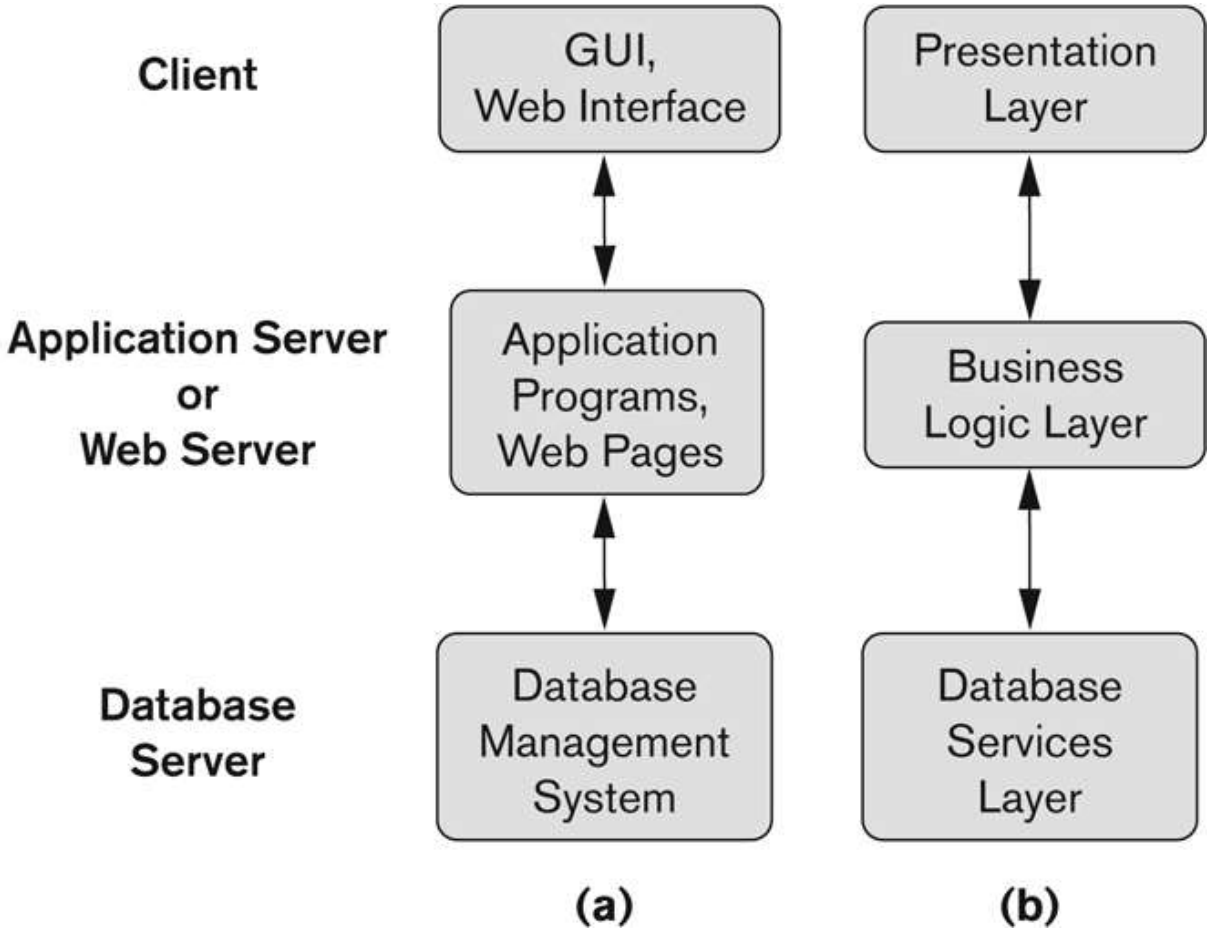
Three-tier client-server architecture



In a **3-tier architecture**, we can place our **database management system** or application software on a different processing zone or tier than the web server

Three-tier client-server architecture

Figure 2.7
Logical three-tier client/server architecture, with a couple of commonly used nomenclatures.



Three-Tier Client-Server Architecture

- Common for Web applications
- Intermediate Layer called Application Server or Web Server:
  - Stores the web connectivity software and the business logic part of the application used to access the corresponding data from the database server
  - Acts like a conduit for sending partially processed data between the database server and the client.
- Three-tier Architecture Can Enhance Security:
  - Database server only accessible via middle tier
  - Clients cannot directly access database server

Three-Tier Client-Server Architecture

- Application server in addition to client and database server
- Thin clients: do less processing
- Application server contains “standard” programs

Benefits:

- ✓ scalability
- ✓ technological flexibility
- ✓ lower long-term costs
- ✓ better match business needs
- ✓ improved customer service
- ✓ competitive advantage
- ✓ reduced risk