

## **20MCA12C RELATIONAL DATABASE MANAGEMENT SYSTEM**

### **UNIT V: Database System Architectures**

#### FACULTY

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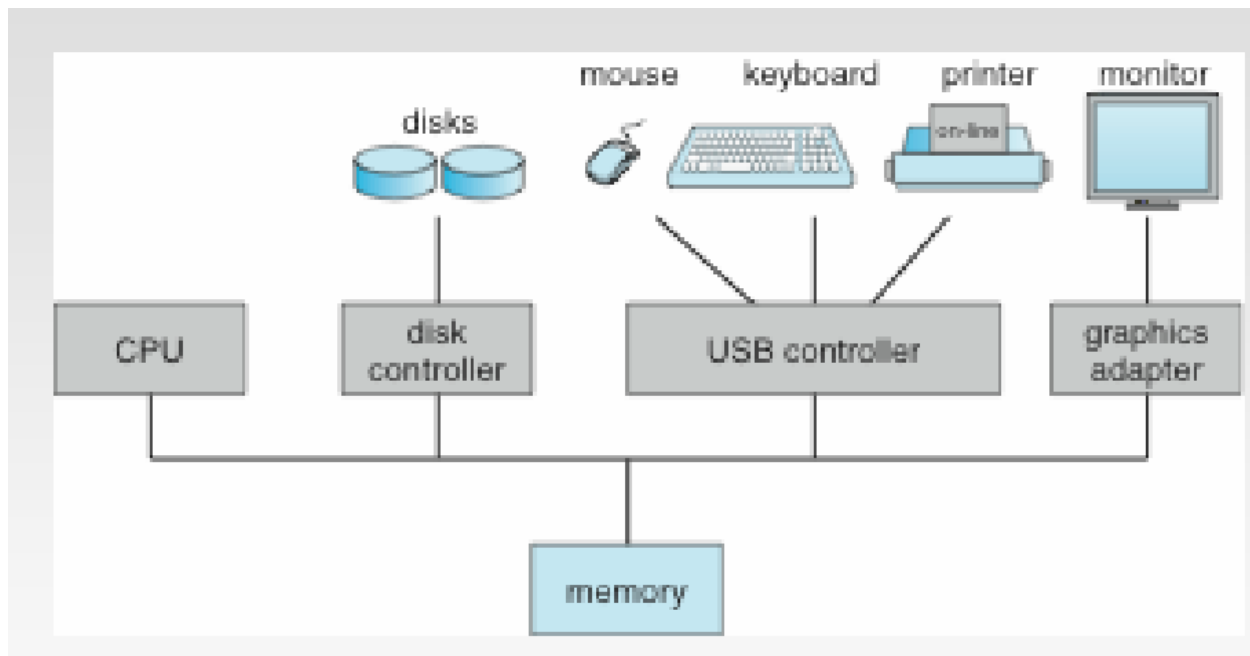
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## Centralized Systems

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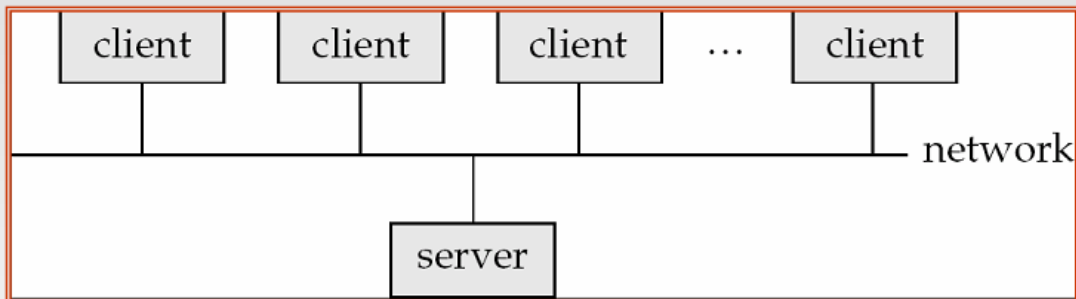
- Run on a single computer system and do not interact with other computer systems.
- General-purpose computer system: one to a few CPUs and a number of device controllers that are connected through a common bus that provides access to shared memory.
- Single-user system (e.g., personal computer or workstation): desk-top unit, single user, usually has only one CPU and one or two hard disks; the OS may support only one user.
- Multi-user system: more disks, more memory, multiple CPUs, and a multi-user OS. Serve a large number of users who are connected to the system via terminals. Often called server systems

# A Centralized Computer System

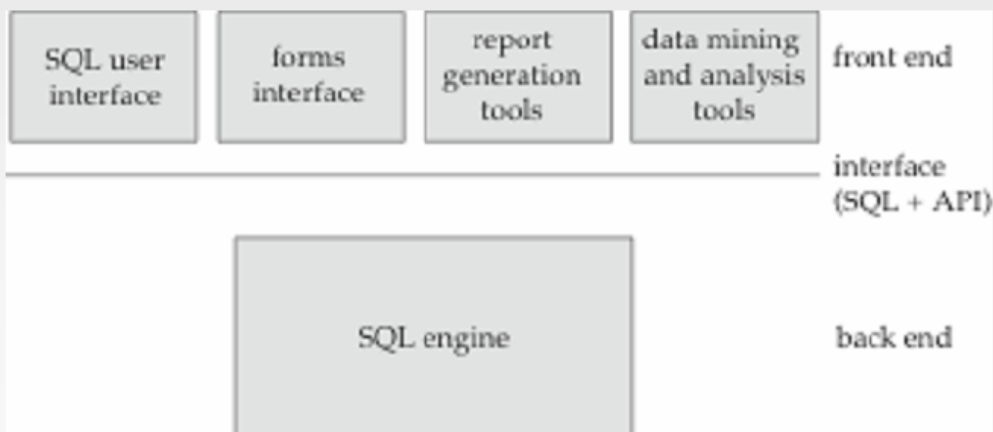


# Client-Server Systems

Server systems satisfy requests generated at  $m$  client systems, whose general structure is shown below:



- Database functionality can be divided into:
  - **Back-end**: manages access structures, query evaluation and optimization, concurrency control and recovery.
  - **Front-end**: consists of tools such as *forms*, *report-writers*, and graphical user interface facilities.
- The interface between the front-end and the back-end is through SQL or through an application program interface.



Advantages of replacing mainframes with networks of workstations or personal computers connected to back-end server machines:

- better functionality for the cost
- flexibility in locating resources and expanding facilities
- better user interfaces
- easier maintenance

## Server System Architecture

- Server systems can be broadly categorized into two kinds:
  - **transaction servers** which are widely used in relational database systems, and
  - **data servers**, used in object-oriented database systems

# Parallel Systems

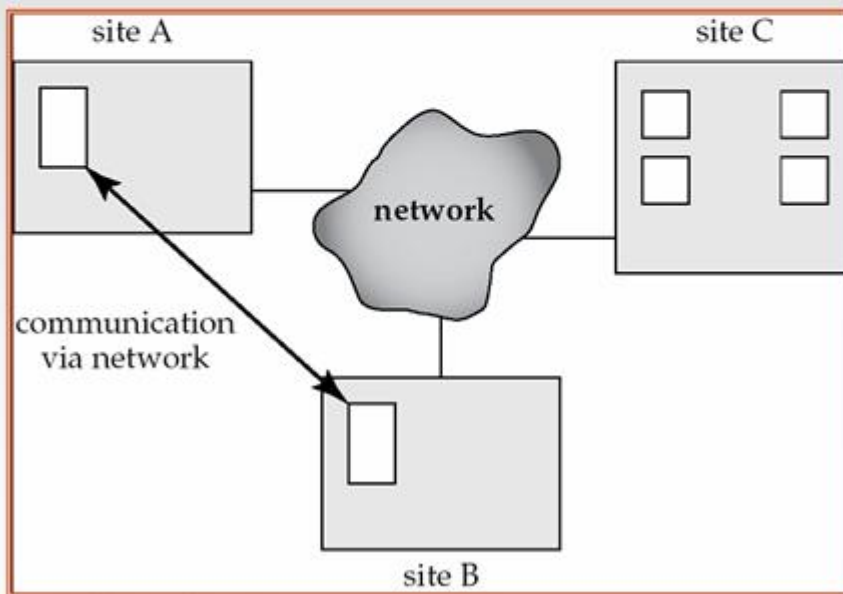
- Parallel database systems consist of multiple processors and multiple disks connected by a fast interconnection network.
- A **coarse-grain parallel** machine consists of a small number of powerful processors
- A **massively parallel** or **fine grain parallel** machine utilizes thousands of smaller processors.
- Two main performance measures:
  - **throughput** --- the number of tasks that can be completed in a given time interval
  - **response time** --- the amount of time it takes to complete a single task from the time it is submitted

# Parallel Database Architectures

- **Shared memory** -- processors share a common memory
- **Shared disk** -- processors share a common disk
- **Shared nothing** -- processors share neither a common memory nor common disk
- **Hierarchical** -- hybrid of the above architectures

## Distributed Systems

- Data spread over multiple machines (also referred to as **sites** or **nodes**).
- Network interconnects the machines
- Data shared by users on multiple machines



## Network Types

- **Local-area networks (LANs)** – composed of processors that are distributed over small geographical areas, such as a single building or a few adjacent buildings.
- **Wide-area networks (WANs)** – composed of processors distributed over a large geographical area.

WANs with continuous connection (e.g. the Internet) are needed for implementing distributed database systems

Groupware applications such as Lotus notes can work on WANs with discontinuous connection:

- Data is replicated.
- Updates are propagated to replicas periodically.
- Copies of data may be updated independently.
- Non-serializable executions can thus result. Resolution is application dependent.

**THANK YOU**

**This content is taken from the text books and reference books prescribed in the syllabus.**