Web Engineering

Lecture 3
3-Tier Architecture

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1.0 Traditional Host Systems

A Central Processing System (Mainframe) provides all processing.

Local Terminals are responsible for display and keyboard for user input and viewing capabilities. Local Terminals do not contain any intelligent processing capabilities.

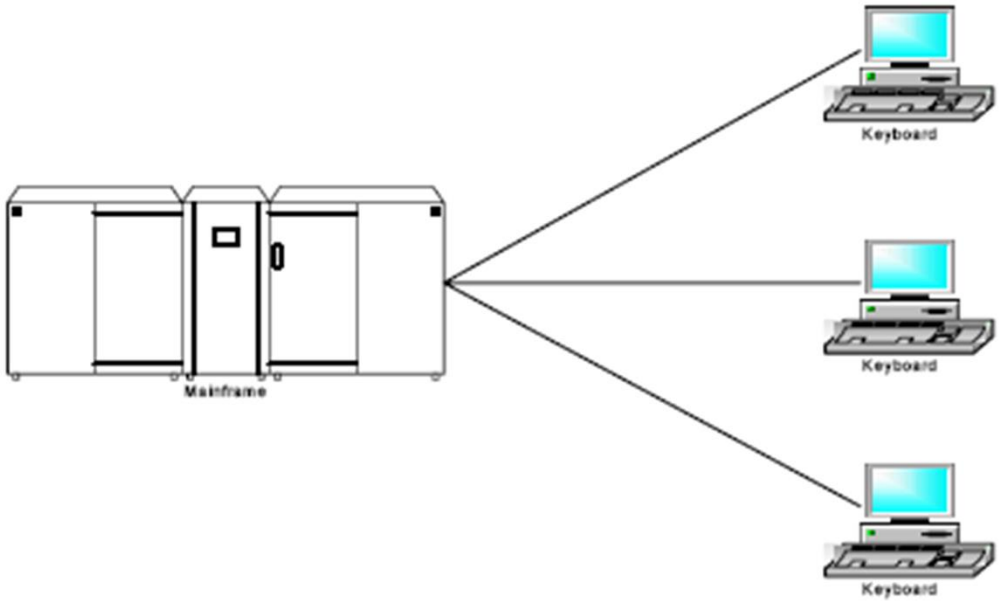

Figure 1.0.1 Non-Client-Server System

2.0 Distributed Systems

Distributed System

Both data and transaction processing are divided between one or more computers connected by a network, each computer playing a specific role in the system.

Replication

Ensures data at all sites in a distributed system reflects any changes made anywhere in the system.

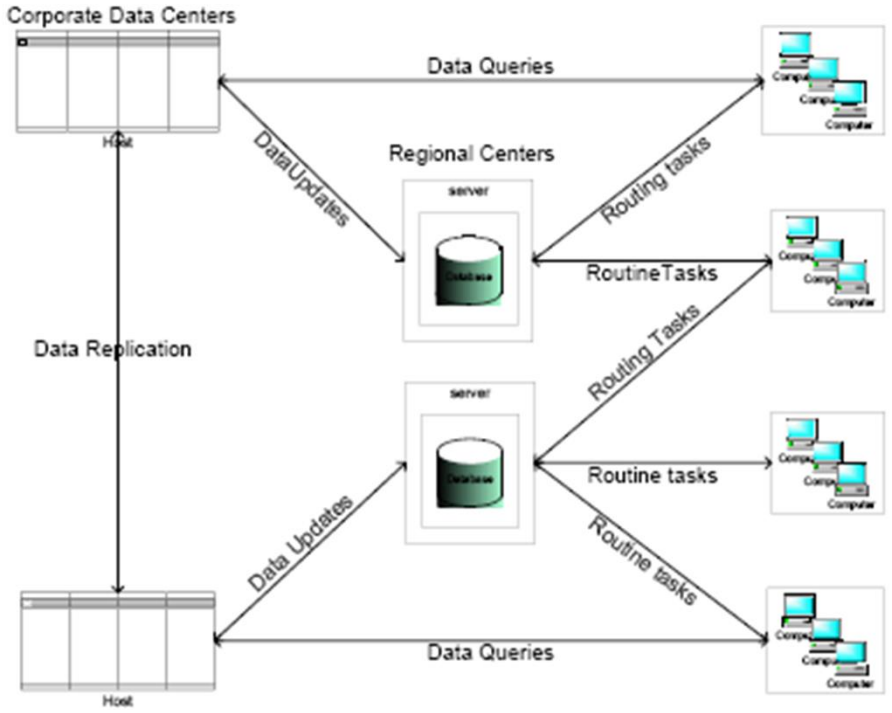

Figure 1.3. Distributed Data Centers

3.0 Client/Server Model

- Complements distributed systems
- Responds to limitations found in the two host data processing models:
    1. The traditional mainframe host model, in which a single mainframe provides shared data access to many dumb terminals, and;
    2. The local area network (LAN) model, in which many isolated systems access a file server that provides no central processing power.
- Provides integration of data and services
- Application Processing provided by multiple tiers –
    1. Database Server
    2. Application Server
    3. PC Workstation

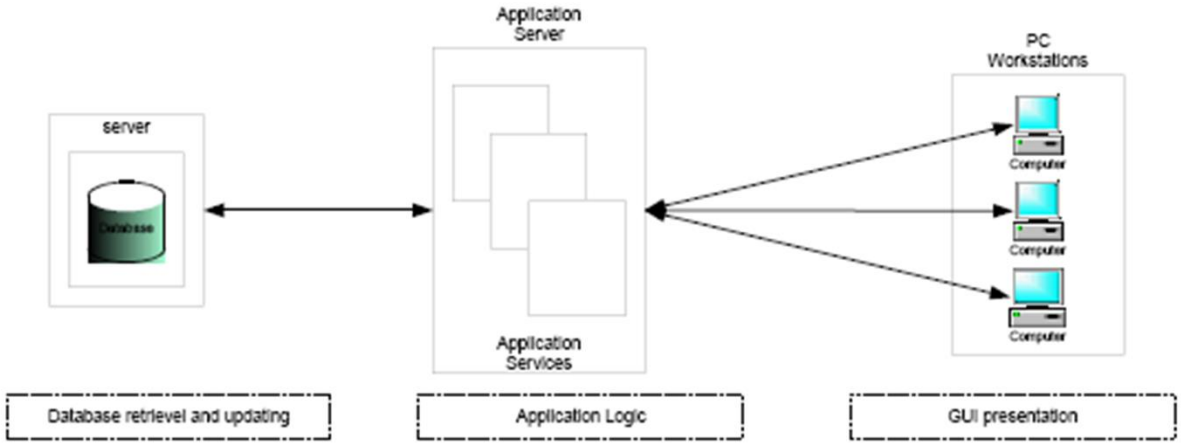

Figure 3.1 Client/Server 3-Tier Model

4.0 Distributed Client/Server Model

- Application processing provided by all tiers of the network –

    1. Mainframe
    2. Application Servers
    3. Workstations

- Multiple databases to support distributed data requirements
- Supports high volume, load balancing and scalability (extendibility)
- Requires extensive network administration and application management.

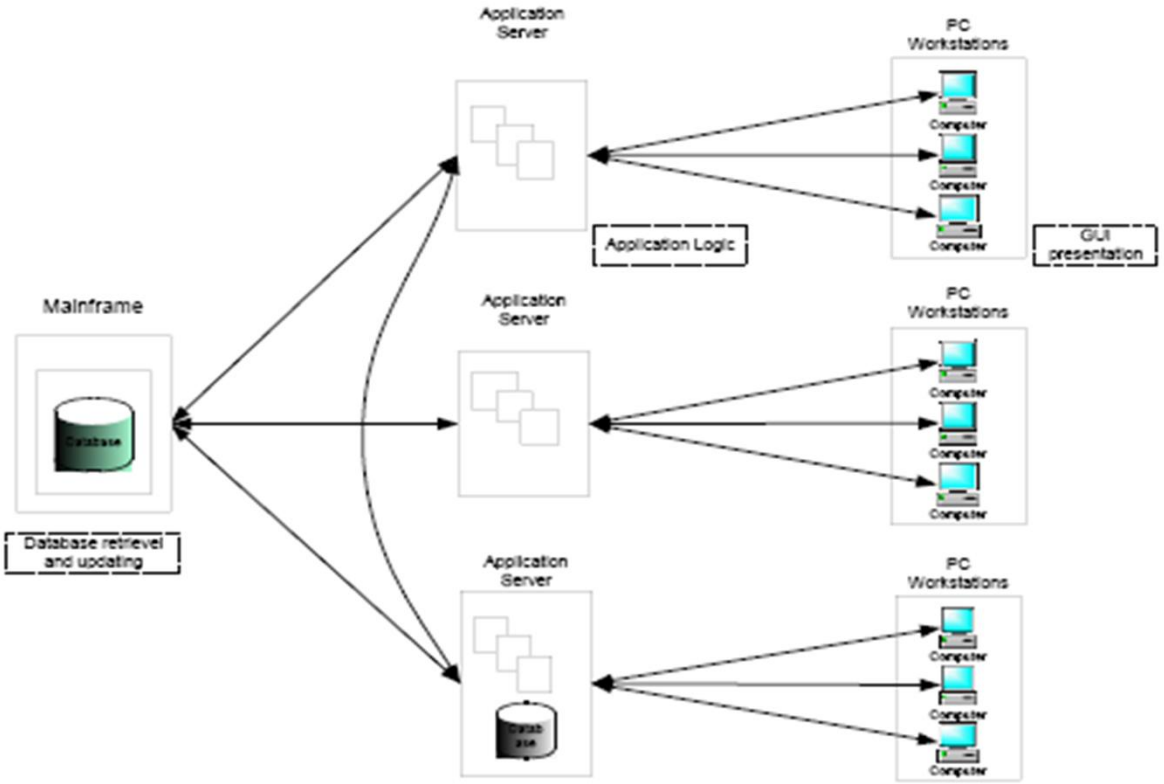

Figure 4.1 Distributed Client/Server Model

5.0 Inter-process Communication

- Basis for client/server computing
- Client process communicates with server process
- Each process performs separate functions
- Data is passed between processes using IPC functions

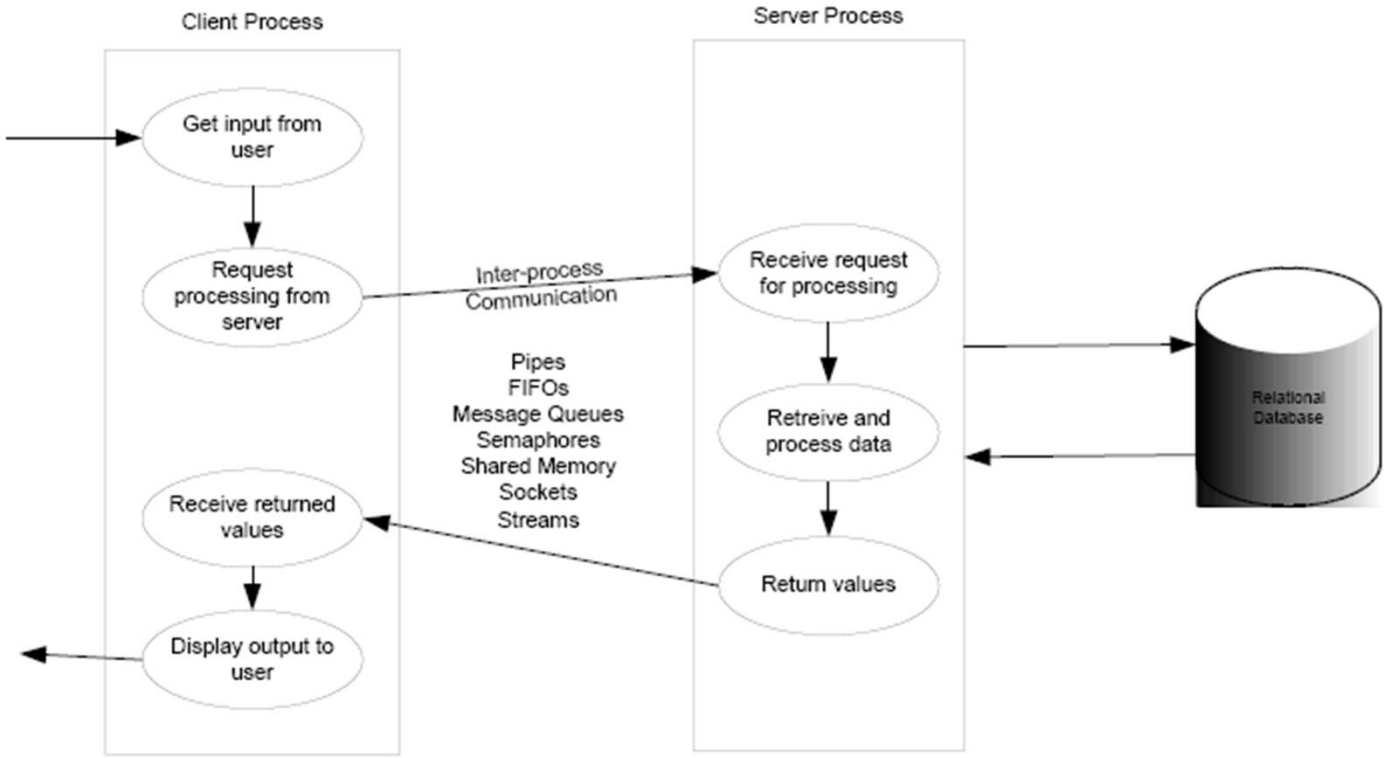

Figure 5.1 Inter-Process Communication

6.0 Benefits of the Client/Server Model

- **Divides Application Processing** across multiple machines:
  - Non-critical data and functions are processed on the client
  - Critical functions are processed on the server
- **Optimizes Client Workstations** for data input and presentation (e.g., graphics and mouse support)
- **Optimizes the Server** for data processing and storage (e.g., large amount of memory and disk space)
- **Scales Horizontally –** Multiple servers, each server having capabilities and processing power, can be added to distribute processing load.
- **Scales Vertically** - Can be moved to more powerful machines, such as minicomputer or a mainframe to take advantage of the larger system's performance
- **Reduces Data Replication** - Data stored on the servers instead of each client, reducing the amount of data replication for the application.