

# Emerging Database Technologies

Duration : 04hrs

# Detailed Syllabus

9.1 Database Server, Client/Server Platforms,  
Distributed Databases

9.2 Data Warehousing and Data Mining

9.3 Open Systems, Interoperability, Database access  
over Internet, Open Database Connectivity  
(ODBC)

# Database Server, Client/Server Platforms, Distributed Databases

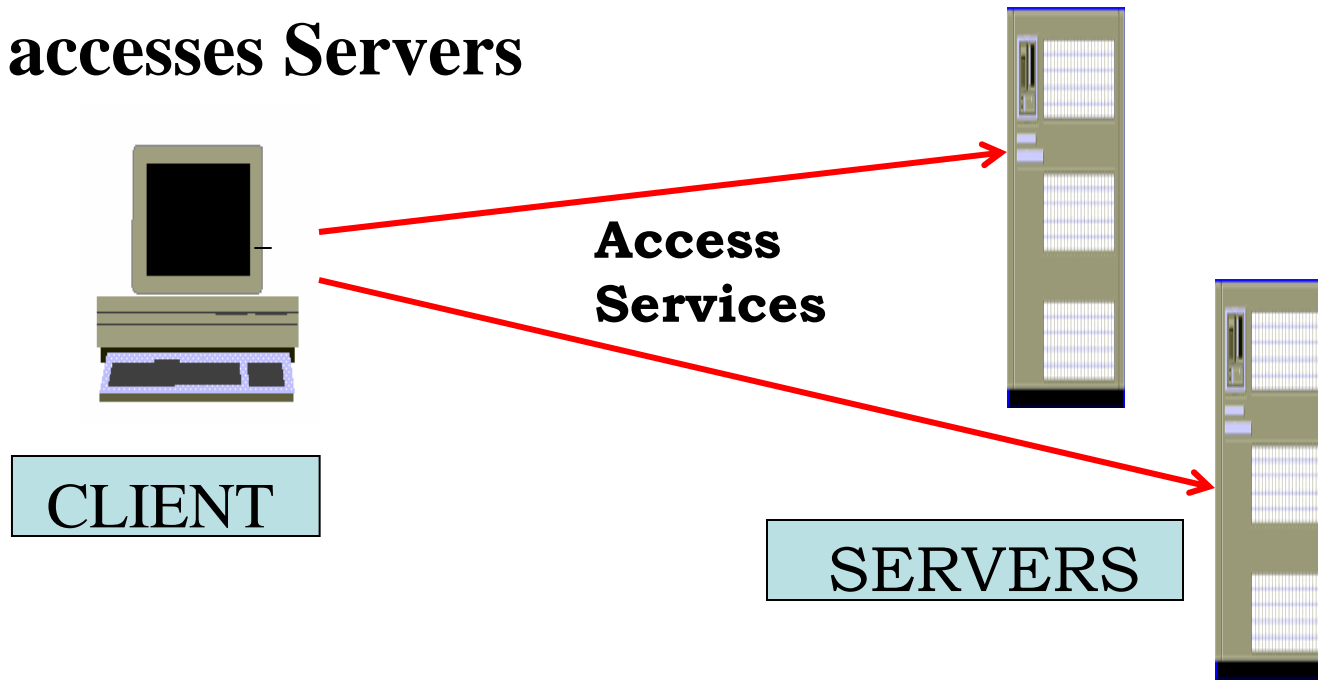
# Client / Server Concepts

Applications are partitioned between Clients and Servers

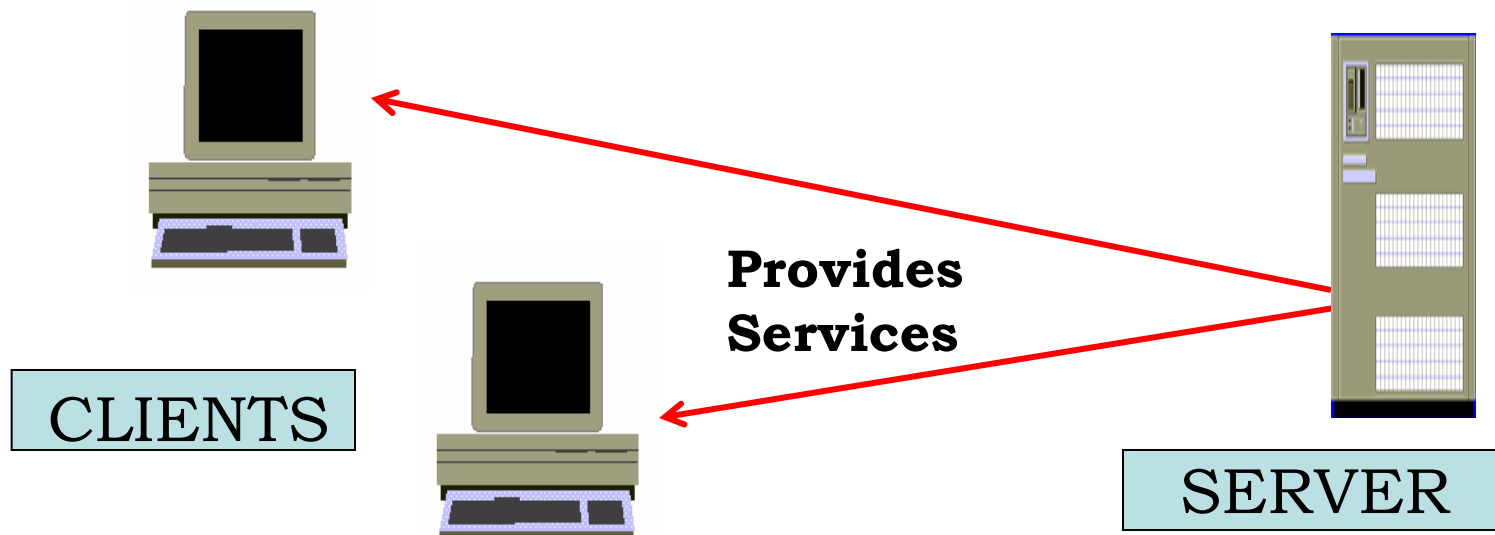
**Client** - *Access services provided by one or more servers*

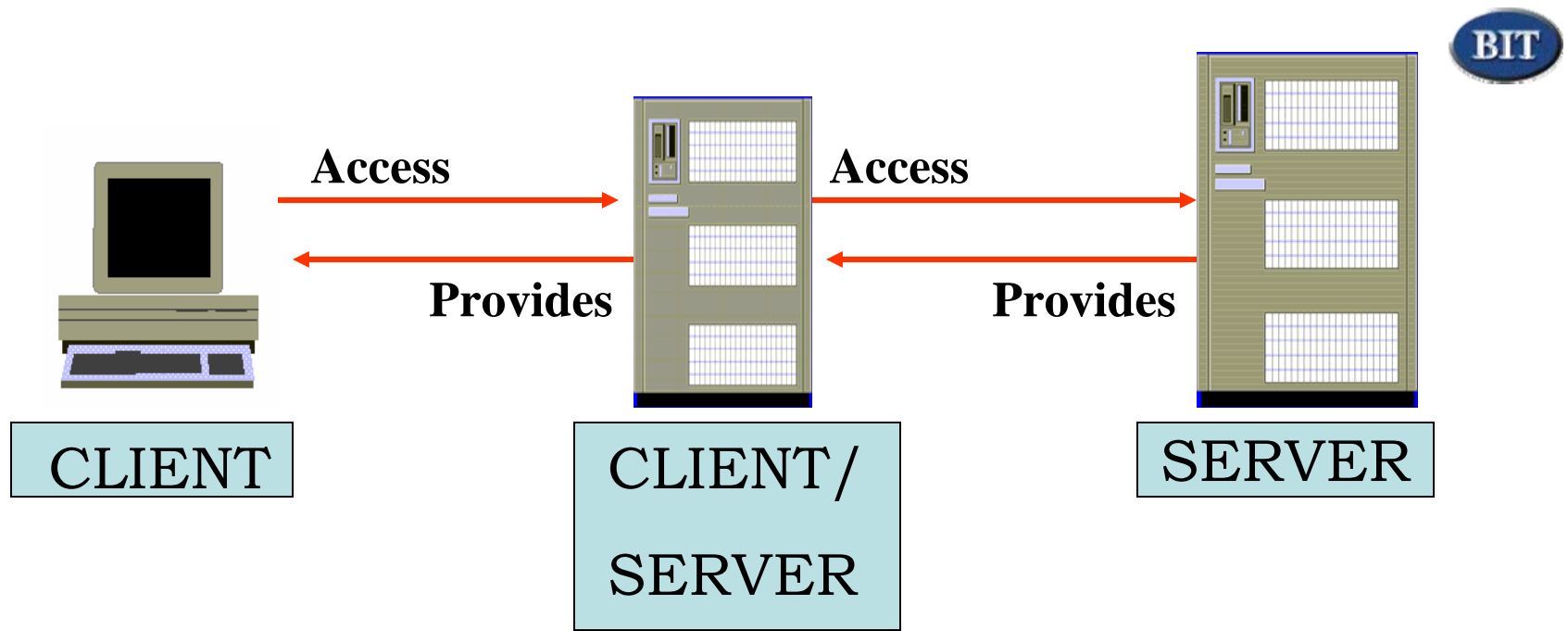
**Server** - *Provides services accessed by one or more clients*

# Client accesses Servers



# Server responds to Clients





**One Computer** can have **both**  
**Clients** and **Servers** executing on it.

*Usually separate computers for clients and servers*

# **C/S Architecture**

## **contains two major components**

- **Technical Architecture**
  - structured collection of computing technologies  
( *h/w, o/s, service providing s/w* )
- **Application Architecture**
  - organization and location of s/w components  
( *design* )

# Technical Architecture

- Vary in Complexity
  - *fairly simple to very complex*
- Size of system measured by
  - number of users
  - transaction volume
  - geographical area



# Common Components to Every C/S Technical Architecture

- Client
- Server
- Networks

# Clients

- S/W only
- S/W and H/W Components

## Usage

- Client Workstation

# **Client Workstation**

**Computer device at which user interacts with the client portion of a C/S application**

# Servers

Great variety of H/W and O/S

Usage : 3 common types

- File servers
- Print servers
- Database servers

# File Servers

- Provides file sharing capabilities
- Users at several different clients can store and retrieve data in files on the disk drives connected to and managed by the file server

## To the client

- File server's disk drivers are *Virtual disks*
- Client w/s access them across the network almost as if they were actually part of it.

# Print Servers

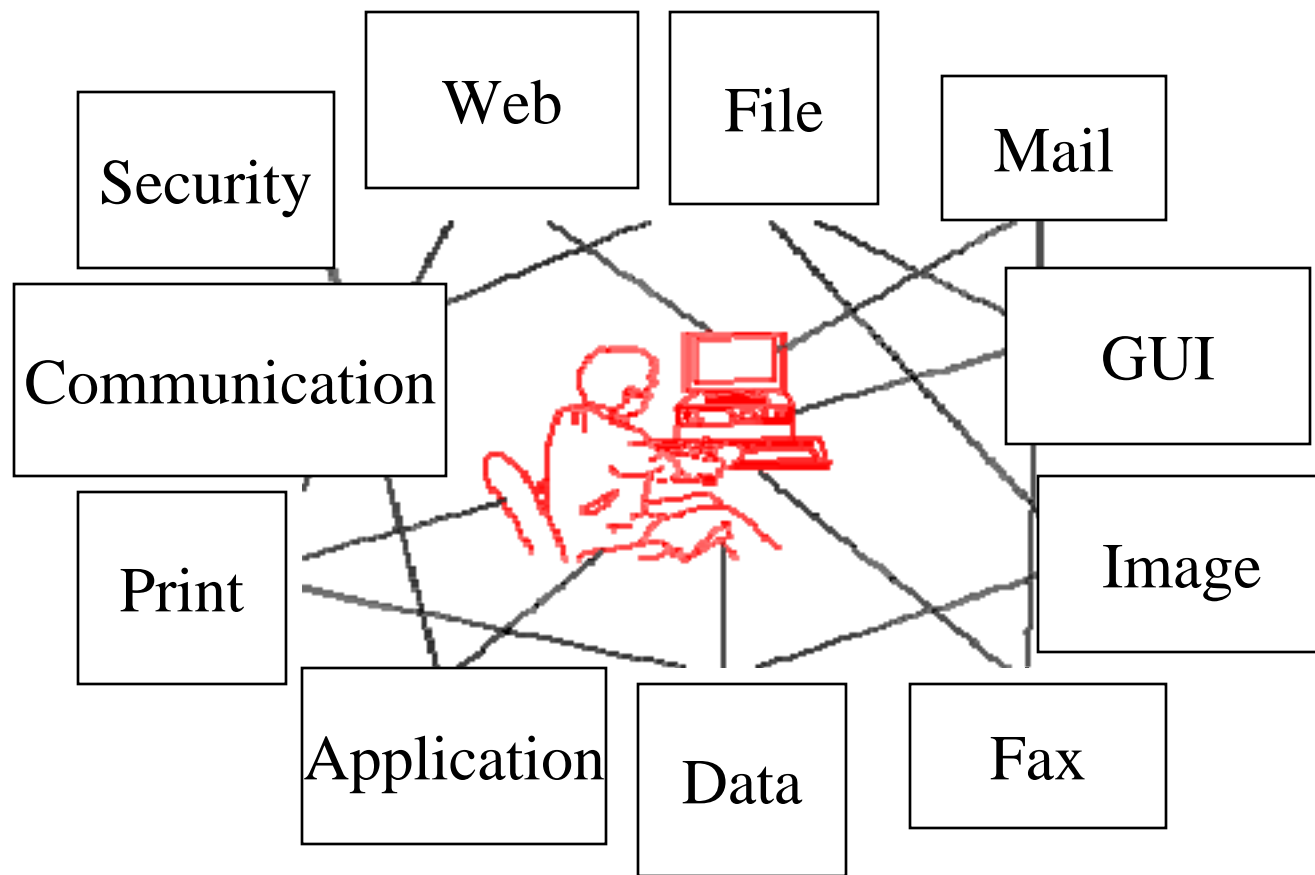
- Allows to share printers.
- Printers connected to and managed by a print server can be accessed across the network by a client w/s almost as if they were directly connected to it.

# Database Servers

- manage one or more or databases
- most applications are built using a database as a DBMS provides a mechanism for managing **multiple user access** to a **set of structured data**.

*DBMS usually based on the relational database model support a version of SQL for retrieving and manipulating the data in the database*

# Other Usage



Capability

Network bandwidth.

Sufficient memory.

Powerful processors.

*Technical Architecture must have appropriate technology components to provide any of the above facilities*



# Server H/W

- Powerful PC
- Mini computer

# Server O/S

- Multitasking O/S  
OS/2, Windows NT, Unix

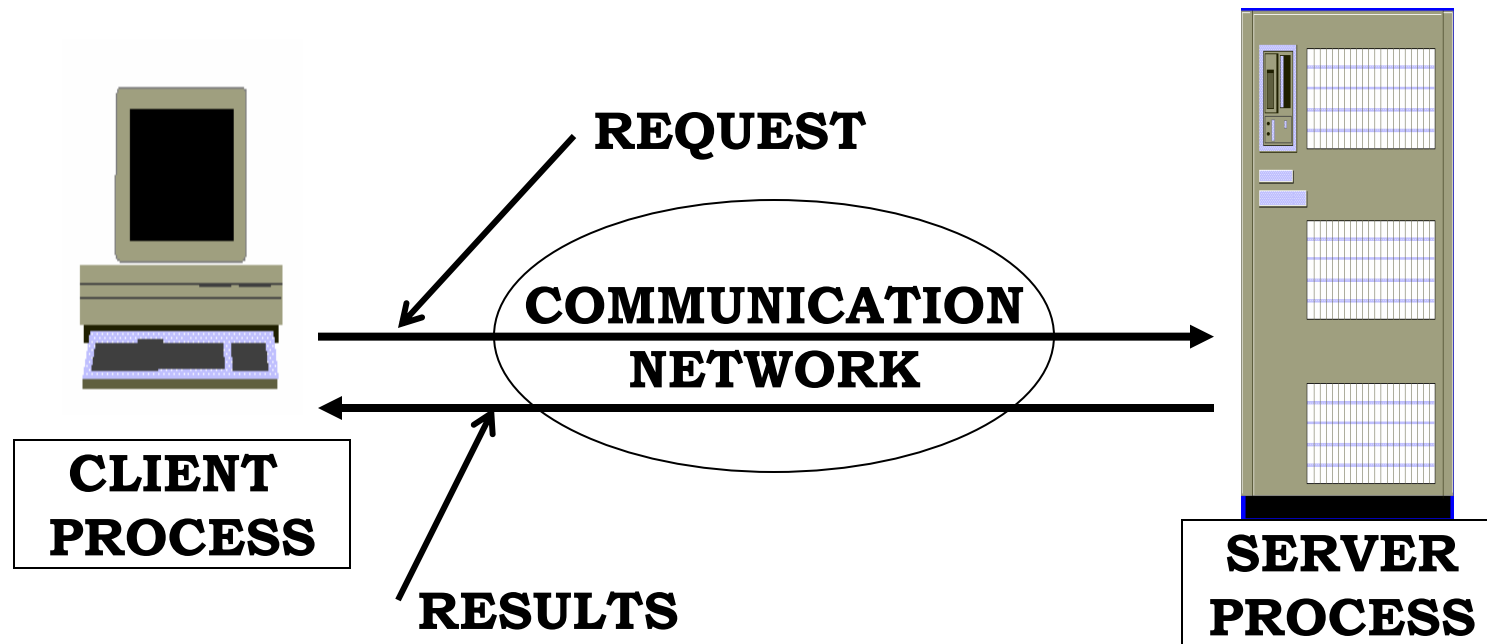
# Networks

Collection of H/W and S/W services that enables computers connected to it to communicate with each other.

- Networking S/W configured into their O/S so they can send information over the network using well defined protocols and message formats.

# Putting it together (C/S Technical Architecture )

The basic components (H/W, O/S, S/W) just described are combined to form the foundation of a Client/Server Technical Architecture



# Fairly simple C/S Technical Architecture

- few users
- high performance PC servers used as
  - file servers
  - database servers
  - Network O/S

## Usual

- dedicated database servers.
- often a version of UNIX

# Very Complex

- Many O/S

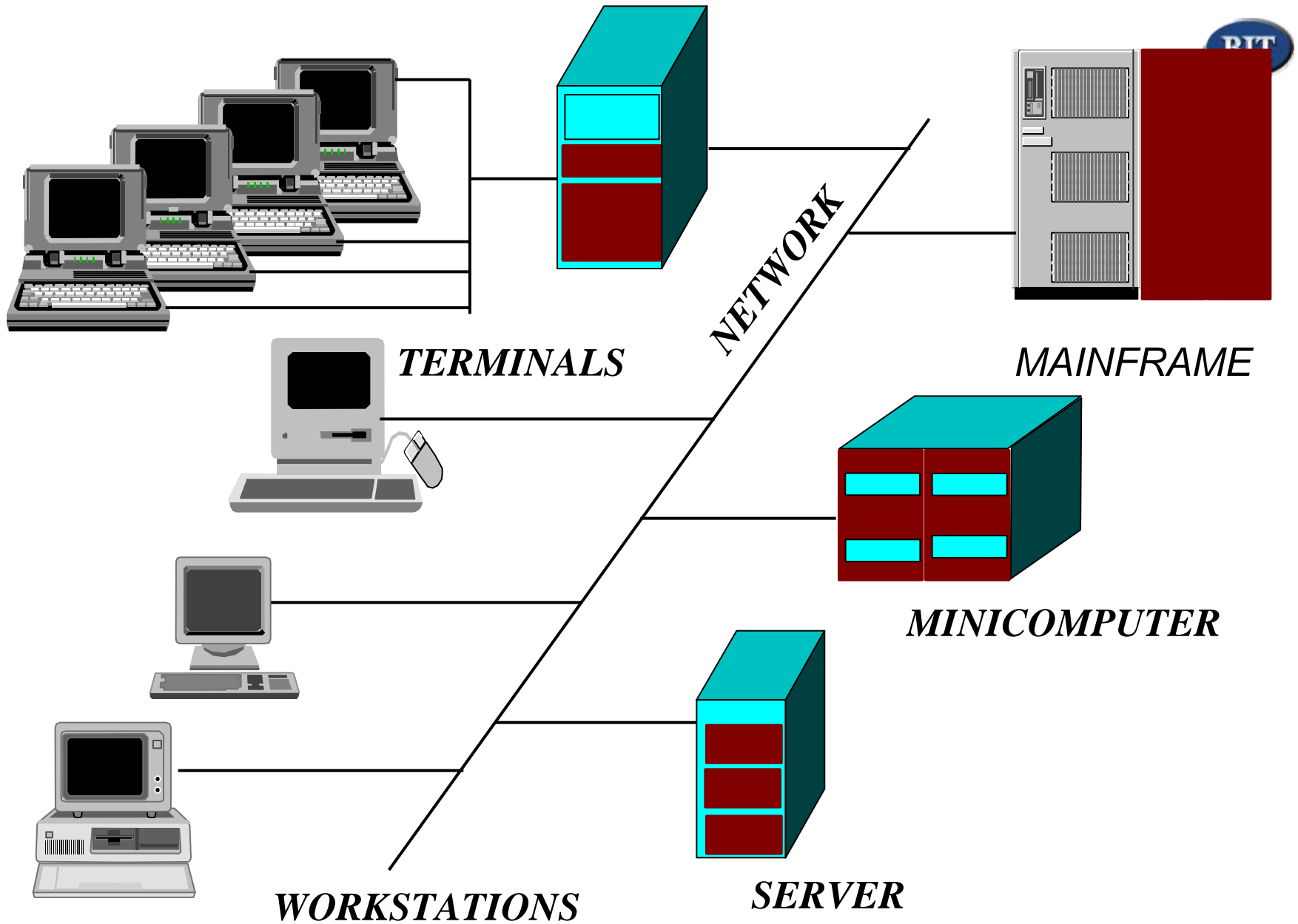
MVS, OS/400, VMS a Unix variant or two,  
perhaps a real-time O/S and one of the  
3 main Network O/S

But ...

*most exist in an isolated environment or  
tied to the rest by way of file transfer facility*

**Required is**

*interactive ties between different environments*



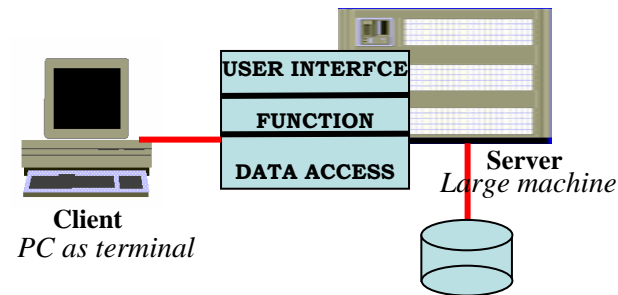
## *Very Complex Client/Server Architecture*

# Application Architecture

Four fundamental configurations

- Single computing system
- User interface distribution
- Data access distribution (two-tier)
- Function distribution (three- tier)

# Single Computing System Model



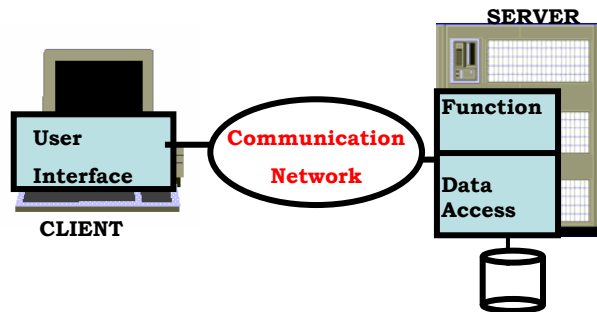
*All in one place*

most computing during the past



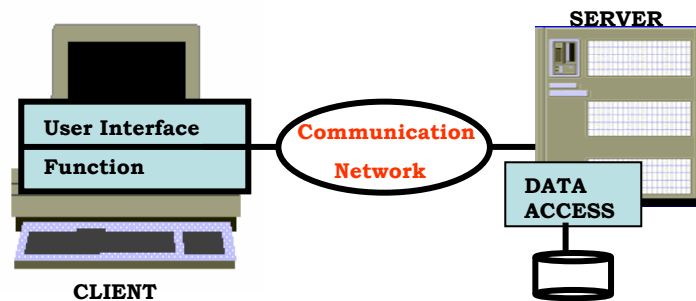
# User Interface Distribution Model

BIT



# Data Access Distribution Model

two-tier



- data distribution
- data in different machines
- database servers used

# Two - tier

two processing tiers or locations  
where the application where execute

- Client Workstation and  
DBMS server

# Client portion of the application

- allows users to enter data
- submit requests to retrieve data from the database
- summarize and display data in various ways

# Client application code

- interprets the user's inputs
- translate them into SQL statements
- transmits the SQL across the network to the database server

# Server application code (DBMS)



- actual insertions of new data
- updates to existing data
- retrievals of data in response to a query from a client W/S
- In case of query, prepares the return set of requested data and transmits it back across the network to the client application code on the appropriate W/S

# Servers Applications

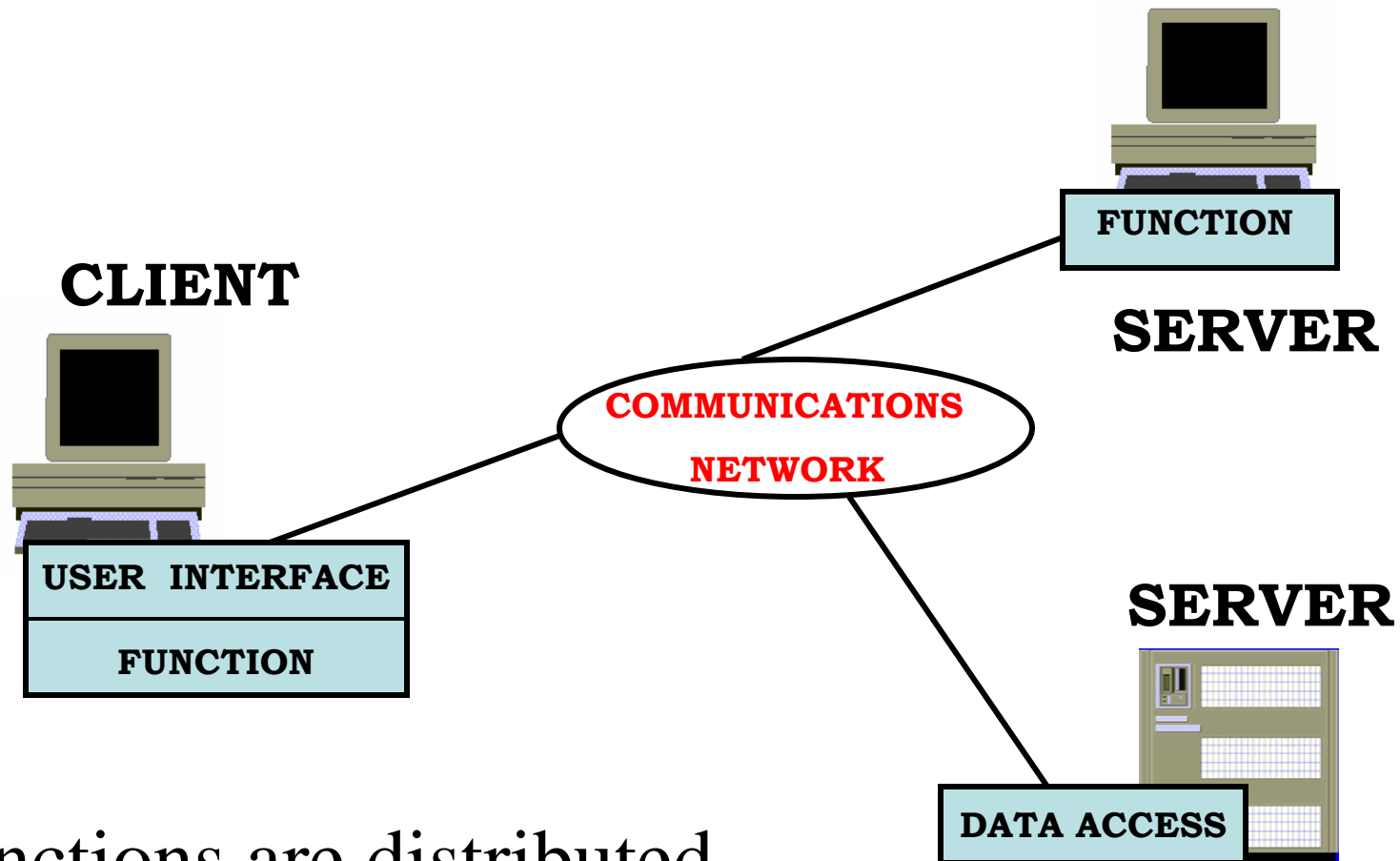
- manipulate large sets of data
- perform a series of complex calculations

# Client Applications

- interpretive 4GL in a Windows environment

# Function Distributed Model

## Three-tier



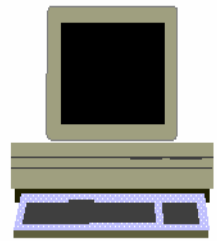
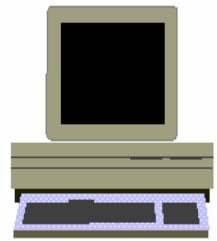
Functions are distributed



# Multi-tier



**APPLICATION SERVER**



**CLIENT**

**COMMUNICATIONS  
NETWORK**

**COMMUNICATIONS  
NETWORK**

**APPLICATION SERVER**

**DATA SERVER**

# Correct Architectural Solution

depends on

- » Problems to be solved
- » Organization that must solve it
- » Platform to be used
- » Tools available

*This gives more options to the designers  
**but** makes selecting the final architecture more  
difficult*