Advanced Web Technologies

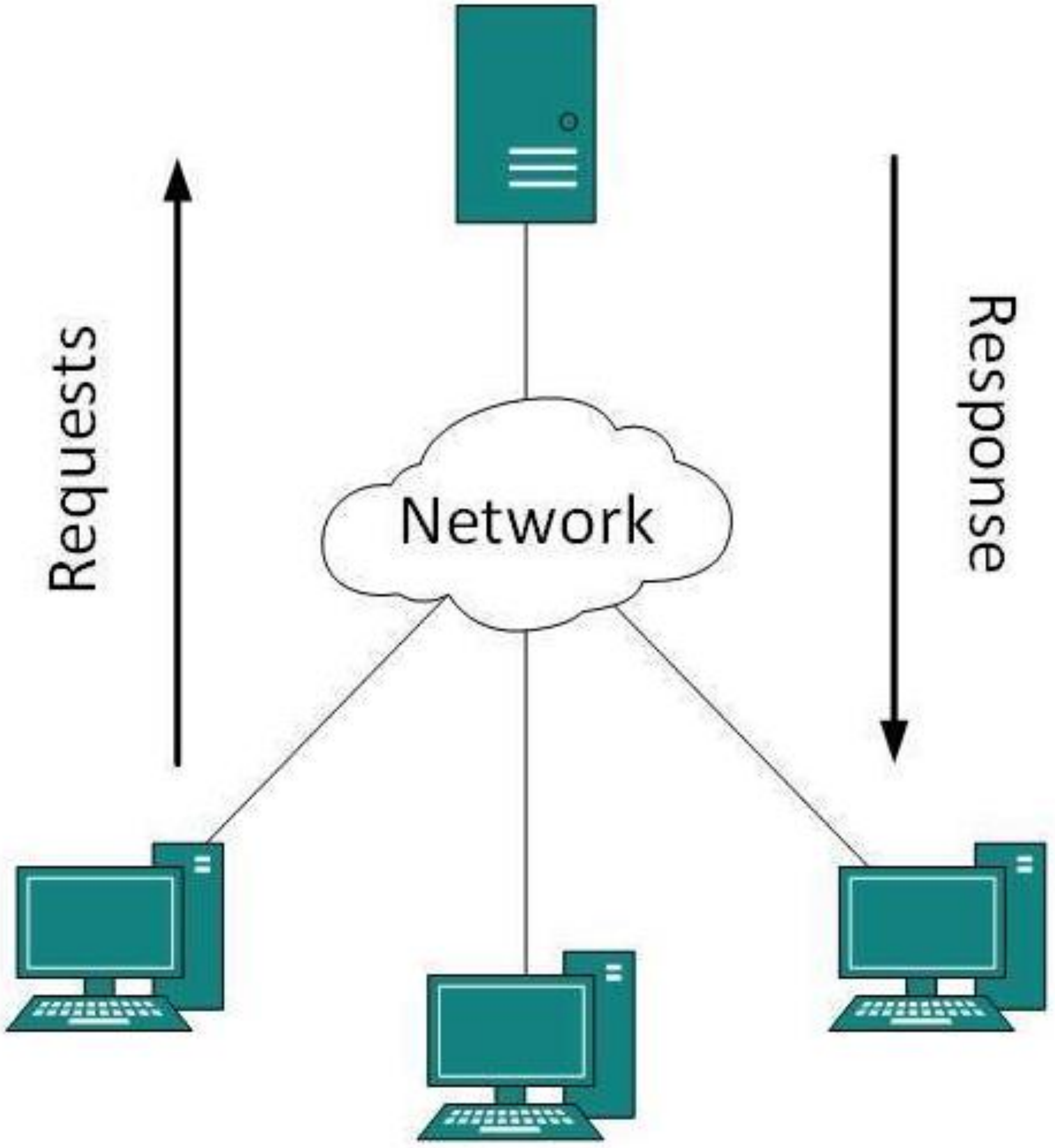
TICT 3132

Lecture - 01

Client Server Concepts

Client Server Concepts

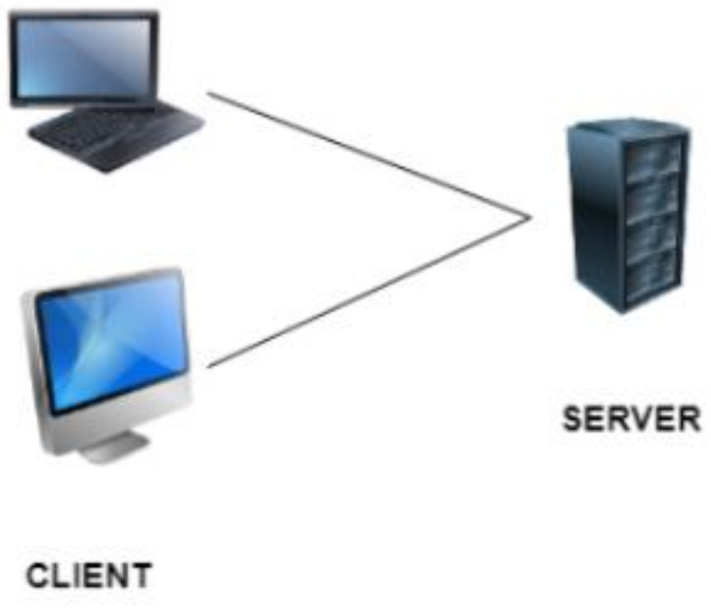
- One remote process acts as a Client and requests some resource from another application process acting as Server. In other words, the clients requests a resource and the server provides that resource.
- A server may serve multiple clients at the same time while a client is in contact with only one server.
- In client-server model, any process can act as Server or Client. It is not the type of machine, size of the machine, or its computing power which makes it server; it is the ability of serving request that makes a machine a server.


Requests
Network
Response

- A system can act as Server and Client simultaneously. That is, one process is acting as Server and another is acting as a client. This may also happen that both client and server processes reside on the same machine.
- There are 2 different structures of client-server model.
  - Two - Tier Client/Server
  - Three - Tier Client/Server

Two - Tier Client/Server Structure

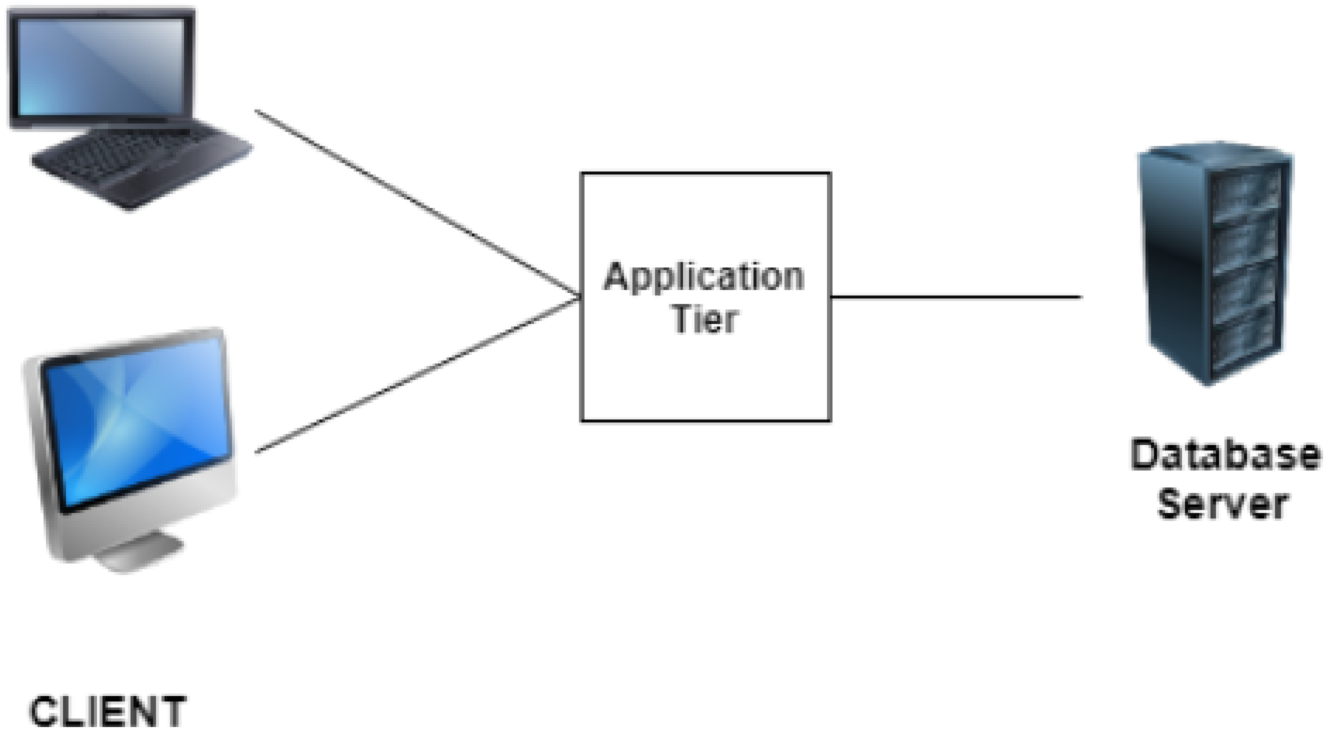
- The two tier architecture primarily has two parts, a client tier and a server tier. The client tier sends a request to the server tier and the server tier responds with the desired information.
- An example of a two tier client/server structure is a web server. It returns the required web pages to the clients that requested them.



- Advantages of Two - Tier Client/Server Structure
  - This structure is quite easy to maintain and modify.
  - The communication between the client and server in the form of request response messages is quite fast.
- Disadvantages of Two - Tier Client/Server Structure
  - If the client nodes are increased beyond capacity in the structure, then the server is not able to handle the request overflow and performance of the system degrades.

Three - Tier Client/Server Structure

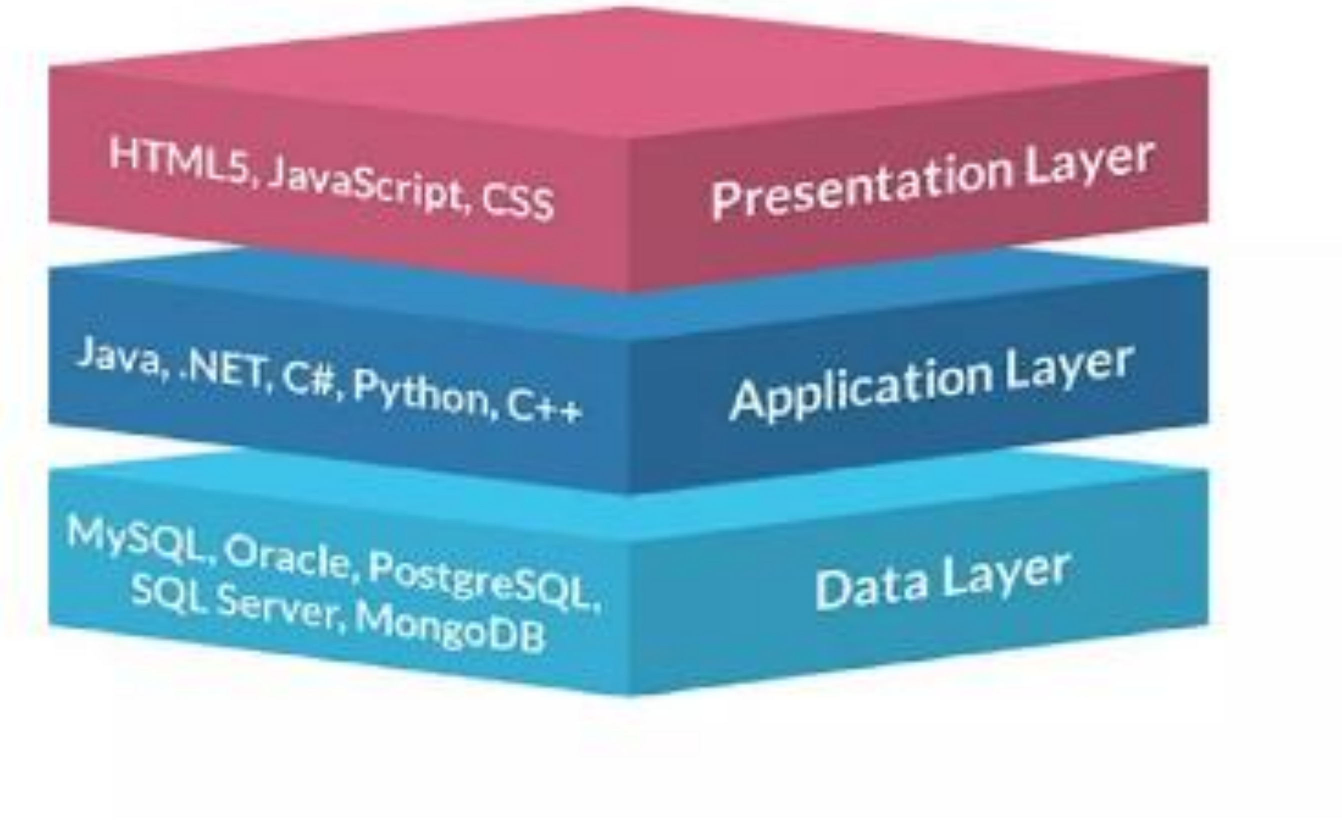
- The three tier architecture has three layers namely client, application and data layer.
  - Presentation layer : requests the information. In this case it could be the GUI, web interface etc.
  - Application layer : interface between the client and data layer. It helps in communication and also provides security.
  - Data layer : actually contains the required data.



Application Tier

Database Server

CLIENT



HTML5, JavaScript, CSS
Presentation Layer
Java, .NET, C#, Python, C++
Application Layer
MySQL, Oracle, PostgreSQL, SQL Server, MongoDB
Data Layer

- Presentation Layer:
    - Sends content to browsers in the form of HTML/JS/CSS. Browser engines can understand them and render.
    - Eg: This can be done via frameworks like React, Angular, Ember, etc.
- Application Layer:
    - Uses an application server (like JBOSS, Apache Tomcat) and process the business logic for the application.
    - Eg: This can be written in Java, C#, C++, Python, Ruby, etc.
- Data Layer:
    - It is a database management system that provides access to application data.
    - Eg: This could be MSSQL, MySQL, Oracle, PostgreSQL, Mongo, etc.

- Advantages of Three - Tier Client/Server Structure
  - The three tier structure provides much better service and fast performance.
  - The structure can be scaled according to requirements without any problem.
  - Data security is much improved in the three tier structure.
  - Easy to update.
  - Easy to maintenance.
  - Risks can be mitigated easily.
- Disadvantages of Three - Tier Client/Server Structure
  - Three - tier client/server structure is quite complex due to advanced features.

Strategies for communication in client-server system

- We can explore three strategies for communication in client-server systems:
  - Socket
  - Remote Procedure Call (RPC)
  - Pipes
- Sockets:
  - End point for communication.
  - A pair of processes communicating over network employees or a pair of sockets, one for each process.
  - A socket is identified by an IP address connected with a port number.
  - In general, sockets use client server architecture.
  - The server waits for incoming client requests by listening to a specified port.
  - Once a request is received, the server accepts a connection from the client-server to complete the communication.

- Remote Procedure Call (RPC):
  - It is one of the most common forms of remote service in the RPC paradigm.
  - The RPC was designed as a way to abstract the procedure call mechanism for use between systems with network connection.
  - It is usually built on top of such a system. However, we are dealing with an environment in which the processes are executing on separate systems.
  - We must use a message-based communication schema to provide remote service.
- Pipes:
  - A pipe acts as a connection which allows two processes to communicate.
  - They typically provide one of the simpler ways for processes to communicate with one another, although they also have some limitations.

Thank you