Chapter 02

Issues of Web Technology

Architectural Issues of Web Layer

OSI Model

The Open Systems Interconnection Reference Model (OSI Reference Model or OSI Model for short) is a layered, abstract description for communications and computer network protocol design, developed as part of the Open Systems Interconnection initiative. It is also called the OSI seven layer model.

Trick to remember

PDNTSPA, or Please Do Not Throw Sausage Pizza Away

APSTNDP, or All People Seem To Need Data Processing

7 Application HTTP, SMTP, SNMP, FTP, Telnet, ECHO, SSH

6 Presentation XDR, SMB, AFP, NCP

5 Session ASAP, TLS, SSL

4 Transport TCP, UDP

3 Network IP, ICMP, IGMP, IPX

2 Data Link Ethernet, Token ring, HDLC, Frame relay, ISDN, ATM, WiFi, PPP

1 Physical

TCP/IP model

The TCP/IP model or Internet reference model, sometimes called the DoD model (DoD, Department of Defense), ARPANET reference model, is a layered abstract description for communications and computer network protocol design.

5. Process Layer or Application Layer

This is where the "higher level" protocols such as DHCP • DNS • FTP • HTTP • IMAP4 • IRC • MIME • POP3 • SIP • SMTP • SNMP • SSH • TELNET • TLS/SSL • RPC • • SOAP, etc operate.

4. Host-To-Host (Transport) Layer

This is where flow-control and connection protocols exist, such as TCP and UDP. This layer deals with opening and maintaining connections, ensuring that packets are in fact received.

3. Internet or Internetworking Layer

This layer defines IP addresses, with many routing schemes for navigating packets from one IP address to another. IP (IPv4 • IPv6) • ARP • BGP • ICMP • IGMP

2. Data link layer

ATM • Bluetooth Baseband & Link Manager Protocol • Ethernet • FDDI • Frame Relay • GPRS • Modems • PPP •

1. Network Access Layer (Physical)

This layer describes the physical equipment necessary for communications, such as twisted pair cables, the signaling used on that equipment, and the low-level protocols using that signaling. Bluetooth RF • Ethernet physical layer • ISDN • Modems • RS232 • SONET/SDH • USB • Wi-Fi

REFER Computer Networks for more detail but not necessary in this subject.

HTTP & FTP: Refer the handout of Chapter 1.

An Internet application is an interactive, compiled application that can be accessed through a communication line. Internet applications can perform complex business processes on either the client or the server. In a server-based Internet application, the application uses the Internet protocol to receive requests from a client, typically a Web browser, process associated code, and return data to the browser.

Tier Technology: Definition

- Tier: refers to the layer.
- Tier Technology refers to the Network application architecture.
- The concept of tier provides a convenient way to group different classes of architecture.

Types of Tier Technology:

- There exists 4 different types of tier technology:

1) 1-Tier Technology
2) 2-Tier Technology
3) 3-Tier Technology
4) N-Tier Technology

1-Tier Technology:

- All software contains codes that can be broken down into the following categories:
  - **Presentation Logic:** User Interface, displaying data to the user, accepting input from the user.

- **Business Logic:** Data validation, ensuring the data is correct before being added into database.
- **Data Access Logic:** Database communication, accessing tables and indices, packing and unpacking data

- If the 3 categories of logic are contained in a single component within a single computer then the component is said to be a 1-tier Structure.

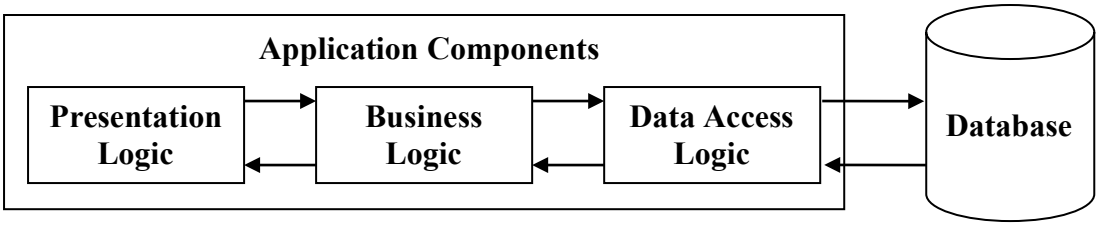


Fig: *1- Tier Technology*

2-Tier Technology:

- This technology is also known as Client/Server Technology.
- This consists of a primary tier which incorporates all presentation and business logic, and a secondary tier which contains all data access logic.
- is basically a client server model.
- There are basically two types of client:

a. Thin Client:

- The clients do not have too much work as most of the functionality is hosted on the server.
- Thin Clients were due to the fact that computing power was expensive.

b. Fat Client:

- A name given such because some of the processing has been passed onto it.
- Typical Example – if such a client were accessing a database, the client application would need to be capable of accessing the database and manipulating the data which resides on the server.

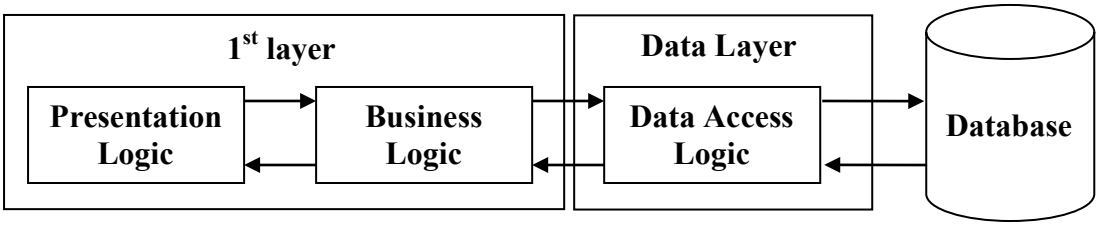


Fig: 2- *Tier Technology*

3-Tier Technology:

- If each category of logic is contained within a separate component, known as 3-tier structure.

- In this structure the presentation layer is not in direct communication with the database.
- In order to send or receive data it must communicate with the business layer, which in turn communicates with the data layer.
- Contains 3 physical tiers: client tier, business or middle tier, data tier.

a. Client Tier:

- Front –End tools with which the end user interacts.
- Not concerned with inner workings of the applications.
- E.g: Web Browser, or VB Forms.

b. Middle Tier:

- This is where the ASP pages resides upon the web-server.
- Contains rules that determine what, how & when to manipulate & access data.
- This logic is splitted into:

I. Client Side Business Logic or workflow

- Controls the input given from user.

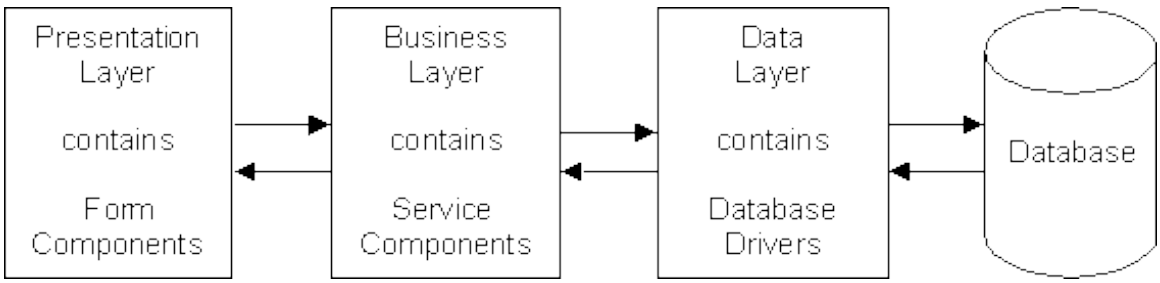
II. Server Side Business Logic

- Handles data manipulation & flow of data on server.

c. Data Tier

- Represents the storage mechanism used to hold persistent data.
- This could be a relational database, text based files, directories, mail server etc.

Fig: *3 – Tier Technology*



N-Tier Technology:

- N-Tier technology is the latest refinement of client/Server model.
- It refers to applications that have more than three tiers.
- An n-tier system is scalable because it can service a large number of clients by distributing each logical tier across one or more physical machines.
- is usually considered the most effective approach because it can provide integration of current information technology into this new, more flexible model.
- In this structure middle tier is spited to incorporate user-centric tier and data-centric tier.

a. User-centric Tier:

- User-centric tier of an ASP applications contains the ASP pages and environment-dependent ASP components that help render HTML pages to the presentation layer. E.g. – generating HTML, accessing and creating cookies.

b. Data-centric Tier–

- Data-centric tier contains the components that do not depend upon the ASP environment but is responsible for database manipulation, such as adding, deleting, querying and updating etc.

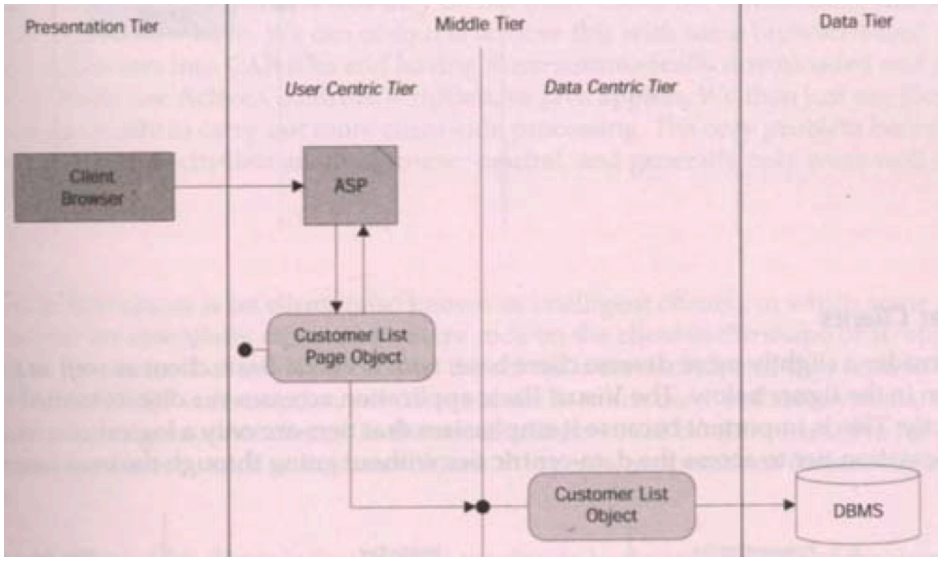


Fig: *N-Tier Technology*