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DR.BABASAHEB AMBEDKAR OPEN UNIVERSITY

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BCAR-403

Client/Server Architecture and Interface(C#)

CLIENT – SERVER ARCHITECTURE AND INTERFACES (C#)

DR. BABASAHEB AMBEDKAR OPEN UNIVERSITY
AHMEDABAD

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ROLE OF SELF–INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material is completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self-instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual-skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behaviour should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminate interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is

particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self-Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self-instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

CLIENT – SERVER ARCHITECTURE AND INTERFACES (C#)

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CLIENT – SERVER ARCHITECTURE AND INTERFACES (C#)

BLOCK 1 : BASICS OF CLIENT – SERVER ARCHITECTURE

BASICS OF CLIENT – SERVER ARCHITECTURE

Block Introduction :

Client – Server Architecture is producer consumer computing arrangement where server will work as producer and client will work as consumer. Such type of arrangement will work when client computer sends resource or process request to server over network connection, which is further carries out and delivered to clients. In this block, we will detail about client–server environment with technology and importance with aspect of synchronization of application processing. The block will focus on the study and concept of Client–Server architecture and explains the concepts related to functions and features of client and server modelling. You will be given an idea on various types of serves available with their usability and characteristics.

In this block, you will make to learn and understand about the basic of Object Request Broker with interference with CORBA. The concept related to Remote Procedure Call and detailed related client–server applications are explained to you. You will be demonstrated practically about the various arrangement of Client – Server.

Block Objectives :

After learning this block, you will be able to understand :

- About Client–Server Model
- Basic of Object Request Broker
- Features of CORBA
- Concept of synchronization Client–Server applications
- Detailed about different types of Servers
- History , Components and Block Diagram of Client – Server Technology Development

Block Structure :

Unit 1 : Introduction to Client–Server

Unit 2 : Client–Server Architecture and Servers

Unit 3 : History – Block Diagram of Client – Server

Unit
01

INTRODUCTION TO CLIENT–SERVER

UNIT STRUCTURE

1.0 Learning Objectives :

After learning this unit, you will be able to understand :

- About Client and Server
- About Conceptual Model of Client Server
- About Characteristics of Client – Server
- About advantages of Client – Server

1.1 Introduction :

Client–Server is a computing technology which is a good source for certain tools which allow workers with certain authority and responsibility. This computing technology is wide series in computer assiduity which covers all the aspects of computer. It requires admixture of chops which can be applied for development of certain Client–Server operations that will include :

- Database Design
- Transaction Processing
- Communication Skills
- Graphical User Interface Design And Development

If we want to try to understand about real life example of Client – Server we can better understand by below figure

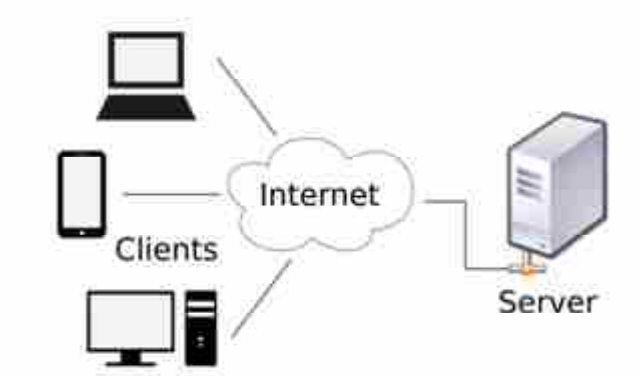

Fig. 1.1 Conceptual Model of Client – Server

In our daily life digital equipment / digital gadgets we use are identifies as clients and source from where we can get responses of our search or query are called servers.

Client : A client is single user workstation which involves in presentation services, database services and connects interface for user communication to obtain business requirements.

Server : A server is multi user processors having high shared memory capacity that will provide connectivity and various database services with interfaces that can be applied in certain business processes.

❑ **Check Your Progress – 1 :**

1. Our Smart Phones / Mobiles for searching any data is called _____
   a. Client b. Server
   c. Both of these d. None of these
2. _____ is having responsibilities to provide data / information to client machines
   a. Client b. Server
   c. Both of these d. None of these

1.2 Characteristics of Client and Server :

Client–Server is a computing methodology that shows environment with technology in order to upgrade business processes with correct synchronization of related application processing which exists among client and server as shown in fig 1.2.

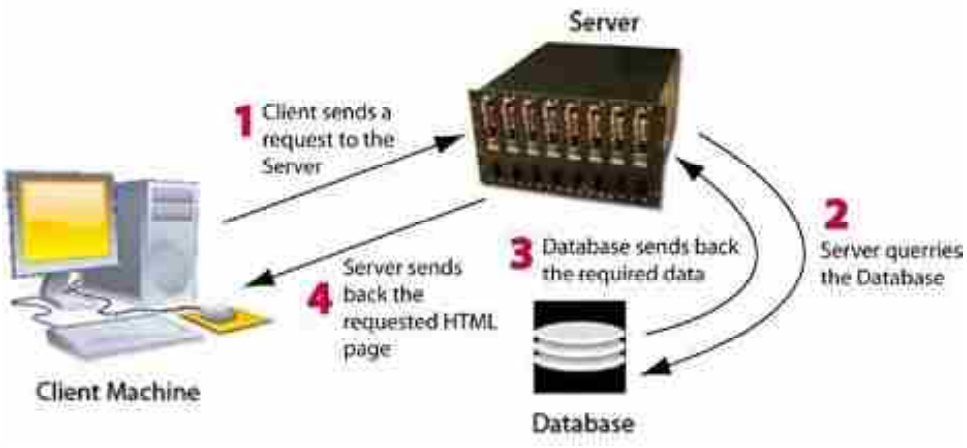

Fig. 1.2 Client – Server Arrangement

Client–Server model is a computing platform which is stand alone and moves towards cooperating of process or peer–to–peer modeling. It shows opportunity for users to work on business functionality which further will open in certain risky situations as it is crystal clear with technology and with the user.

➢ **Characteristics of Client–Server :**

There are certain characteristics features of clients and servers which have made them to work together on a network to do work.

Service :

It's seen that customer/ server exists as relationship among processes which are running on distributed bias. This methodology shows separation of functionalities which is subject to services that are offered.

Sharing of Resource :

A server is that part of computing which can take care of guests contemporaneously thereby handling service access for resource.

Asymmetrical Protocols :

It's noted that customer/ server acts as numerous–to–one relationship which is set off by guests by way of service request while server inertly stay for. Numerous times, customer pass with reference to call back object on requesting for service.

Location Clarity :

It's plant that process with the server lives inside a customer or in machine all through the network. Further the Customer/ Owner software arranges server position by turning service calls which makes the program as customer/ server or both.

Inter Communication :

Communication between clients and servers results by way of messaging. In this, both will interact through messages to deliver service requests and responses.

Encapsulation of Services :

It's plant that server has certain specialised features which can suitable to satisfy customer requests varyingly and by due course of time will manage to upgrade them without affecting terrain.

Scalability :

The Customer/ server systems can be gauged horizontally or vertically as they can add or remove customer workstations with certain performance effect. It can move with other effective waiters and can partake work cargo with colorful waiters in case of perpendicular scaling.

Integrity :

As, both server data and codes can be handled centrally, so it uses less maintenance cost with shared data consistency and not depending on clients.

❑ **Check Your Progress – 2 :**

1. What is server ?

   a. Single user system b. Multi user processors

   c. Both of these d. None of these

2. Which of the following is the characteristics of Client – Server architecture ?

a. Scalability b. Integrity

c. Resource Sharing d. All of these

1.3 Merits and Demerits of the Client – Server :

➢ **Merits :**

Centralized Control :

It's noted that access, resource and data integrity is handled by particular server in order to save the system from unauthorized customer. Similar type of centralized facilitates will modernize data or resource.

Scalability :

Another features of guests/ waiters is capability to increase guests and waiters capacity independently. In this, every element can increase at any time or can add fresh bumps to network.

Easy Maintenance :

In Client – Server modeling, by distributing work and liabilities to colorful standalone computers will help in changing, conservation, up gradation and can shift server without affecting the guests.

➢ **Demerits :**

Congestion of Traffic :

In customer/ Client , there's a problem of business traffic which results when large number of concurrent guests sends requests to analogous client which can beget certain affiliated problems.

Network Robustness :

It's plant that customer/ Client proposition has no robustness in case of P2P network. It's plant that in case of Client failure, client won't be suitable to admit answer for their requests. It's plant that P2P networks resource are distributed across numerous bumps of network.

Not Cost Effective :

Software and tackle of client is an important conception which can not be fluently handled by regular computer tackle staff. For this, the client requires specific software and tackle especially on client side to work which will increase in cost.

Availability of Resources :

It's plant that customer doesn't carry resource which are present on client. In case of web operation, it's hard to write the data or information on storehouse bias attached with the customer nor it's easy to take the print of the document unless seeing the exercise interpretation in the cybersurfer.

❑ **Check Your Progress – 3 :**

1. The main disadvantage of using Client – Server architecture is .

a. Robustness b. Ease of maintenance

c. Centralized control d. Scalability

2. What is meant by congestion ?

   a. A software

   b. Client side program

   c. When network is carrying much more requests than it can handle, network congestion occurs.

   d. None of these

1.4 Let Us Sum Up :

In this unit we've learnt that client/ server acts as calculating technology that serves as good source for certain tools that allow workers with certain authority and responsibility.

It's noted that client/ server shows terrain with technology so as to upgrade business processes with correct synchronization of affiliated operation processing which exists among client and server

1.5 Answers for Check Your Progress :

- **Check Your Progress 1 :**

  1. (a) 2. (b)

- **Check Your Progress 2 :**

  1. (b) 2. (d)

- **Check Your Progress 3 :**

  1. (a) 2. (c)

1.6 Glossary :

1. **API –** The interface by which an application program accesses operating system and other services.
2. **Client–Server –** The model of interaction in a distributed system in which a program at one side sends a request to a program at another site and awaits a response
3. **CORBA –** It defines IDL and APIs that enable Client–Server object interaction within a specific implementation of an ORB.
4. **Graphical User Interface –** The use of pictures rather than just words to represent the input and output of a program.

1.7 Assignment :

Explain the concept of Client–Server ?

1.8 Activities :

Study about the characteristics of Client–Server applications ?

1.9 Case Study :

Study the various types of Client – Server application in daily life ?

1.10 Further Readings :

1. Orfali, Robert, Dan Harkey. Client–Server programming with OS/2, Van Nostrand Reinhold, 1992.
2. Dewire, Dawna Travis, Client–Server computing, McGraw–Hill, 1993.
3. Renaud, Paul E., 1957, Introduction to Client–Server Systems, 2nd Edition, Wiley, c1996.

UNIT 2:

Unit 02

CLIENT–SERVER ARCHITECTURE AND SERVERS

UNIT STRUCTURE

2.0 Learning Objectives :

After learning this unit, you will be able to understand :

- About Client – Server Architectures
- About Stored Procedure
- About Remote Procedure Call

2.1 Introduction :

Client–Server Architecture is a technology which differentiates computers and application software in two categories:

- Clients
- Servers

Similar type of arrangement is present in order to employ better vacuity of computing resource along with participated data recycling loads. In this, client computer gives stoner commerce installation along with some operation processing, while server gives high volume storehouse capacity with heavy data scraping with good quality resolution plates. Typically it's visualised that numerous client computers gets connected by network to server that works in case of big PC, minicomputer or mainframes.

Fig. 2.1 Network

Client/ server armature is a patron–consumer computing armature where the server acts as the patron and the client as a consumer. The server houses and provides high– end, computing–ferocious services to the client on demand. These services can include operations access, storehouse, train sharing, printer access and/ or direct access to the server's raw computing power.

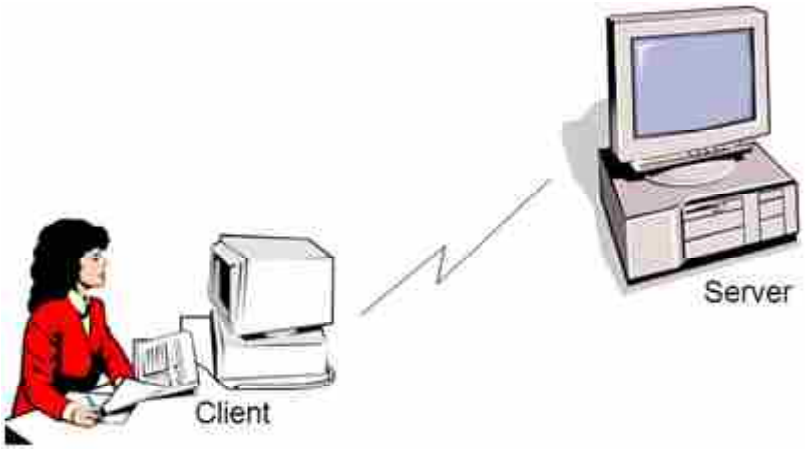

Fig. 2.2 Client – Server

Customer/ Client armature works when the customer computer sends a resource or process request to the server over the network connection, which is also reused and delivered to the customer. A server computer can manage several guests contemporaneously, whereas one customer can be connected to several waiters at a time, each furnishing a different set of services. In its simplest form, the Internet is also grounded on Client – Server armature where the Web server serves numerous contemporaneous druggies with Web runner and or website data.

2.2 Types of Servers :

Different servers do different jobs, from serving email and video to protecting internal networks and hosting Web sites. Servers are often dedicated, meaning that they perform no other tasks besides their server tasks. There are many types of servers available :

- Application Servers
- Audio / Video Servers
- Chat Servers
- Fax Servers

- FTP Servers
- Groupware Servers
- IRC Servers
- List Servers
- Mail Servers
- News Servers
- Proxy Servers
- Telnet Servers
- Web Servers
- Z39.50 Servers

The explanation of some of the Servers is shown below :

Proxy Server : It's a type of server which is placed in between client program and the external server which performs sludge requests, increased performance and sharing of connections.

Mail Server : It is as important as Web servers that is responsible for movement and storing of mails either on LAN or WAN across Internet.

Server Platforms : It is a form of platform for hardware or software and works as an engine in order to drive the server.

Web Server : It is a fixed content server which serves to Web browser by way of uploading a file from computer disk and made available for users across the network.

Application Server : It is a middleware server which carry large amount of computing among database and end user servers.

Real–Time Communication Server : It is commonly called as chat servers or IRC Servers. It is also a instant messaging (IM) server which allow ample of users to exchange their information at the same time.

FTP Server : It is called as File Transfer Protocol which moves one or more files safely among computers along with file security and secure transfer control.

Collaboration Server : It is a groupware server that shows actual power of the Web. Such type of server software allows users to collaborate immaterial of their location with the use of Internet or intranet and helps them to work together virtual atmosphere.

List Server : It is a good way to handle mailing lists with interactive discussions which is public or single list which transfers announcements, newsletters or advertising.

Telnet Server : It allow users to log on to host computer where they can do their working on remote computer itself.

Open Source Server : It is a form of original open source server software which will help in getting work done. It is an important part of several IT infrastructures.

❑ **Check Your Progress – 1 :**

1. What is the use of FTP server ?

   a. It is open source server software to do the work

   b. It is used to handle mailing lists

   c. It is used to transfer files safely among computers securely

   d. None of these

2. Which server is used for sending and receiving requests from web server ?

   a. Collaboration server b. Web server

   c. FTP server d. None of these

2.3 ORB :

The Object Request Broker (Sphere) is middleware that uses the CORBA specification. The Object Request Broker (Sphere) manages commerce between clients and waiters.

The Object Request Broker or ORB takes care of all of the details involved in routing a request from client to object, and routing the response to its destination. The Sphere is also the custodian of the Interface Repository, an OMG – formalized distributed database containing OMG IDL interface delineations. This includes the distributed computing liabilities of position, referencing and' marshalling'of parameters and results.

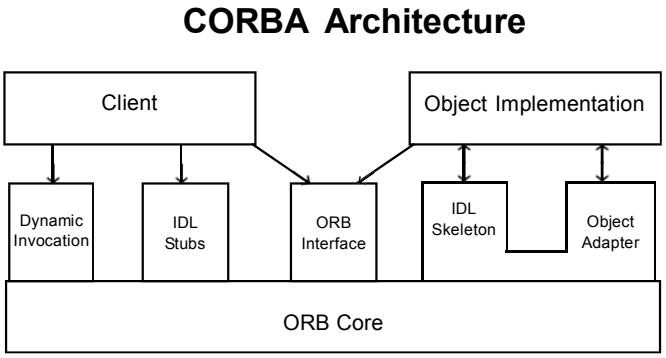

Fig. 2.1 CORBA Architecture

The CORBA specification defines an armature of interfaces and services that must be handed by the Sphere, no perpetration details. These are modular factors so different executions could be used, satisfying the requirements of different platforms. The Sphere manages the relations between clients and object executions. Clients issue requests and bring styles of object executions.

On the client side, also, the ORB provides interface delineations from the IFR, and constructs conjurations for use with the Dynamic Incantation Interface (DII). It also converts Object References between session and stringified format, and converts URL– format corbaloc and corbaname object references to session references.

On the server side, the ORB de–activates inactive objects, and re–activates them whenever a request comes in. CORBA supports a number of activation patterns, so that different object or element types can spark and de–activate in the way that uses resource stylish.

❑ **Check Your Progress – 2 :**

1. CORBA stands for _____.
   a. Common object request broker architecture
   b. Computing objects request broker architecture
   c. Common object response broker architecture
   d. None of these
2. Which of the following serve as the glue between the client and server applications respectively, and Object Request Broker (ORB) ?
   a. ORB and ORB Interface
   b. CORBA IDL stubs and skeletons
   c. Client and server
   d. None of these

2.4 Client – Server Architectures :

Client–server architecture is an arrangement of computer network where clients request and receive service from the host server as shown in fig 2.2.

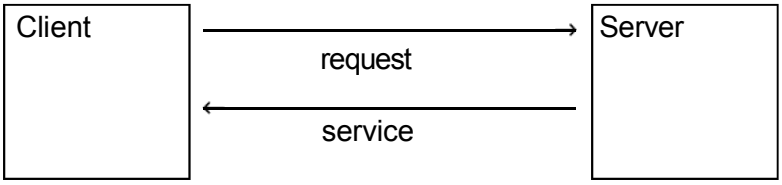

Fig. 2.2 Client – Server Interaction

In this, we see that client computers shows interface which allow stoner to request for services of server whose results gets displayed. In this, the server will stay for requests to arrive from clients and also further responds it back. Also a server shows standardized clear interface to guests which clients might not be apprehensive of earthenware–about of system. Guests are located at workstations or on particular computers, while waiters are there anywhere on the network. Similar type of model is particularly successful when clients and server each have different tasks which they used to do every day.

It's noted that several clients will suitable to pierce server's information at the same time when client computer do other tasks. Since client and server computers are intelligent bias, so we can assay that similar model is different from mainframe model where common mainframe computer do all tasks for dumb outstations.

Fig 2.3 shows component diagram where server component performs certain operations that are precised in Services interface and also the client component which rely on certain such services.

We see that, internally client element has ClientUI which directs user requests to client regulator. In this, the regulator will further the request which occurs across a process or machine to RequestListener, which is located inside the server. Then the listener, that works as master which forms RequestHandler slave and on the request to it :

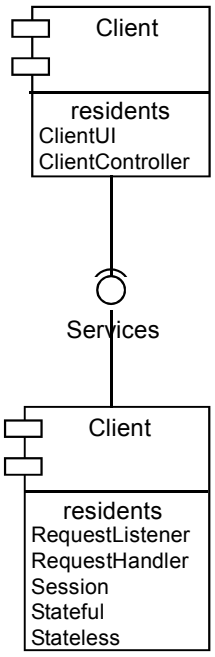

Fig. 2.3 component diagram

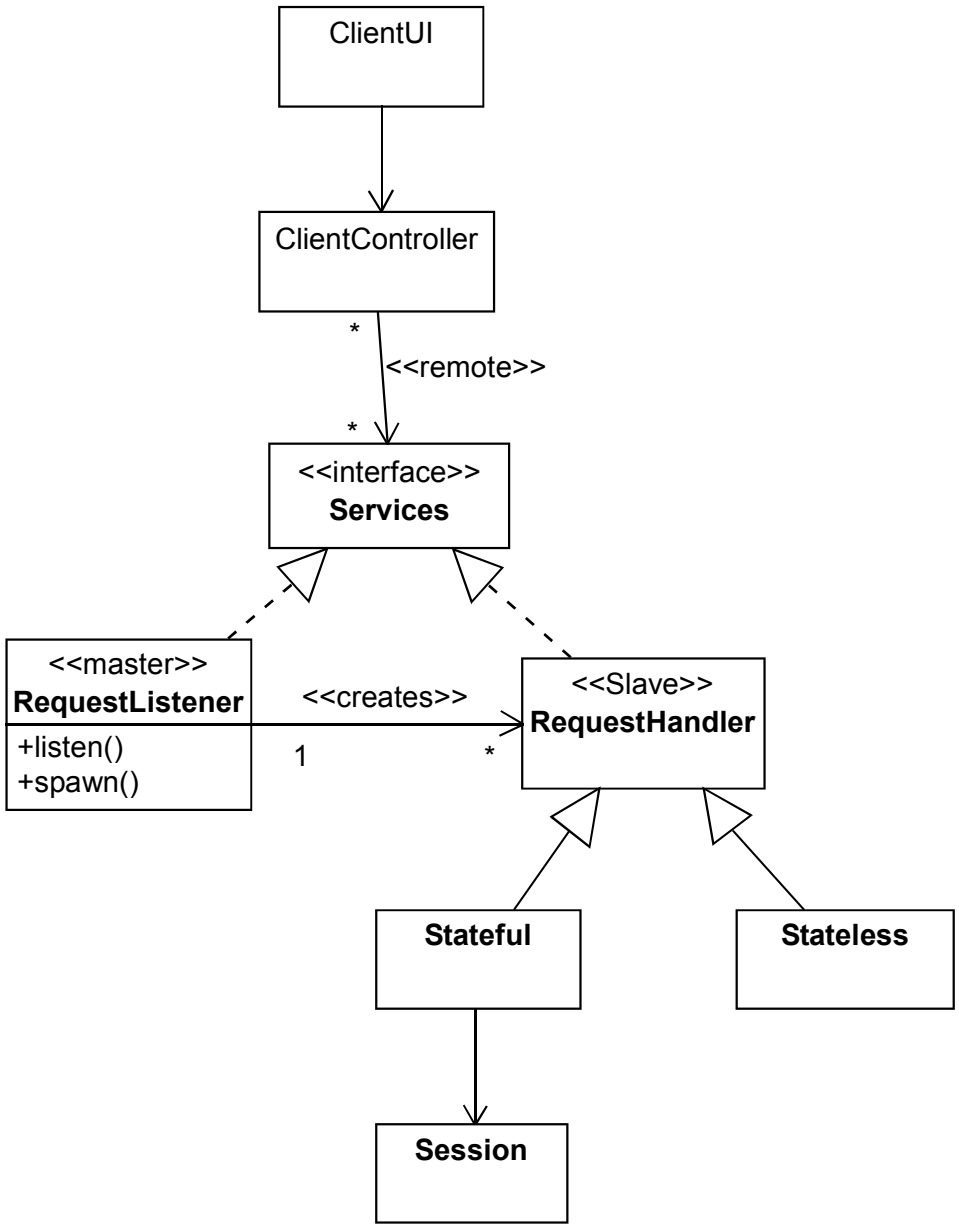

Fig. 2.4 Client UI

We see that in fig 2.5, there appears certain sequence which shows typical client– server interaction:

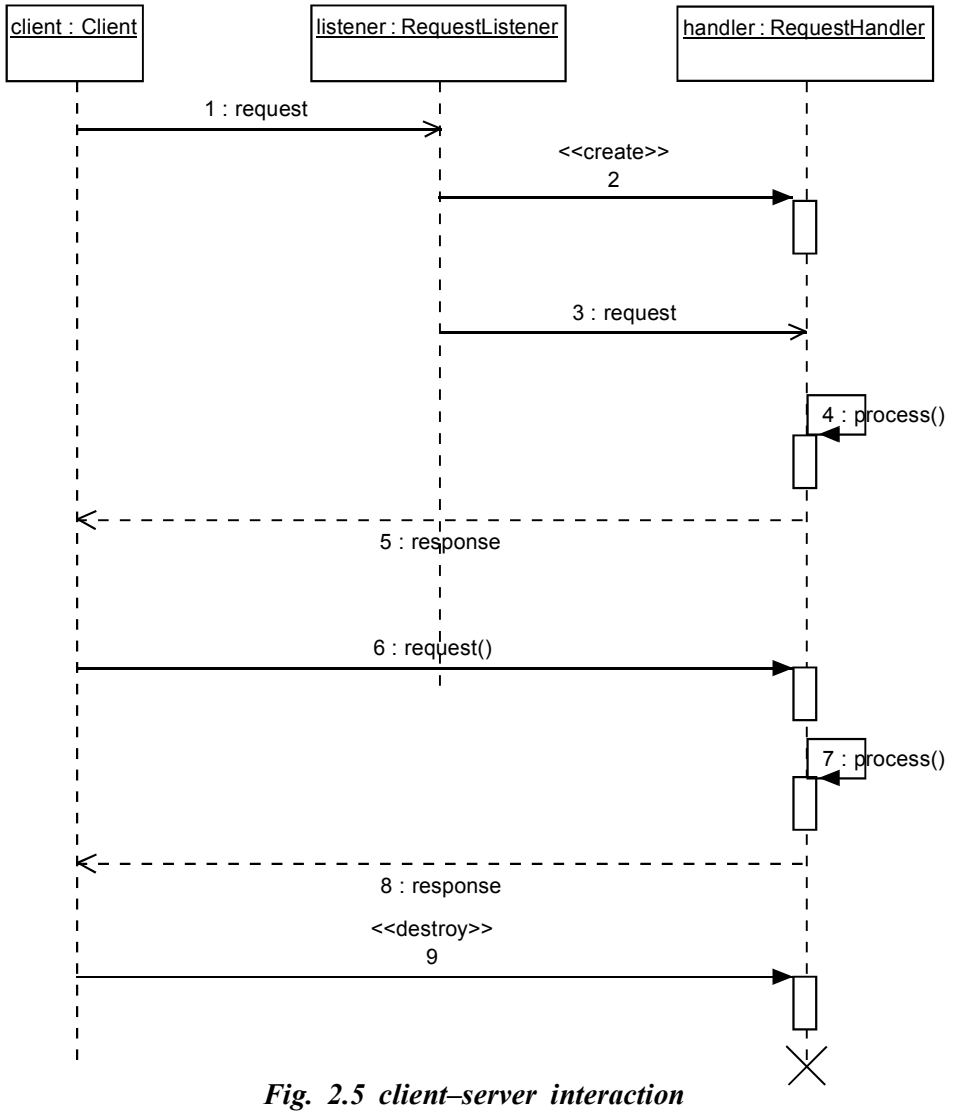

Fig. 2.5 client–server interaction

❑ **Check Your Progress – 3 :**

1. The Client can _____.

   a. Send request to server b. Send response to server

   c. Receive request from server d. None of these

2.5 Stored Procedure :

In Client – Server, stored procedure is a process of factorizing of law which ease the development and conservation of operations. It's plant that when a system is applied to pierce data change, in similar case, the stored programs gets modified on the server without doing any kind of revision in stationed operations which uses particular procedure. As noted, stored procedure also is applied to circumscribe the number of back and forth processes which occurs among client computer and server that eventually helps in adding the speed of processes.

➢ **Features of Stored Procedures :**

- They result in improved performance since the database will able to optimize data access plan which are used by procedure and cache for frequent applications.

- They can be safely kept in database where a client allows to work on stored procedure without any request.
- They can be safely and simply maintain as it quickly modify and can alter hard code statements inside a component.
- They add extra abstraction from required data schema.
- They lowers network traffic since statements can be worked out in batches instead of sending multiple requests from client.

❑ **Check Your Progress – 4 :**

1. What are the features of stored procedure ?
   a. Client can work on stored procedure without any request.
   b. It can be quickly modify
   c. Database can be able to optimize data access plan which are used by procedure
   d. All of these

2.6 Remote Procedure Call (RPC) :

RPC or Remote Procedure Call is a important fashion for constructing distributed, client– server grounded operations. It's grounded on extension of conventional notion or original procedure calling where called procedure isn't present in same address space as calling procedure. It's seen that then the two processes won't on analogous system or can be on different systems with network connection. With the use of RPC, programmers of distributed operations tries to avoid details about network interface. Then, transport independence of RPC gets insulated with operation which affect from physical and logical rudiments of data dispatches and makes the operation to be applied on different transports.

Remote Procedure Call shows different conception for penetrating network services. As a relief remote access which carried out by transferring and entering of dispatches where client call upon services acts in making original procedure call. The original procedure hides the details of the network communication.

While making remote procedure call :

- The calling environment gets wiped off with transferring of procedure parameters throughout the network in an environment where the procedure is carried out.
- On completion of procedure and generation of results, the results gets transferred back to calling environment where execution start again as if returning from standard procedure call.

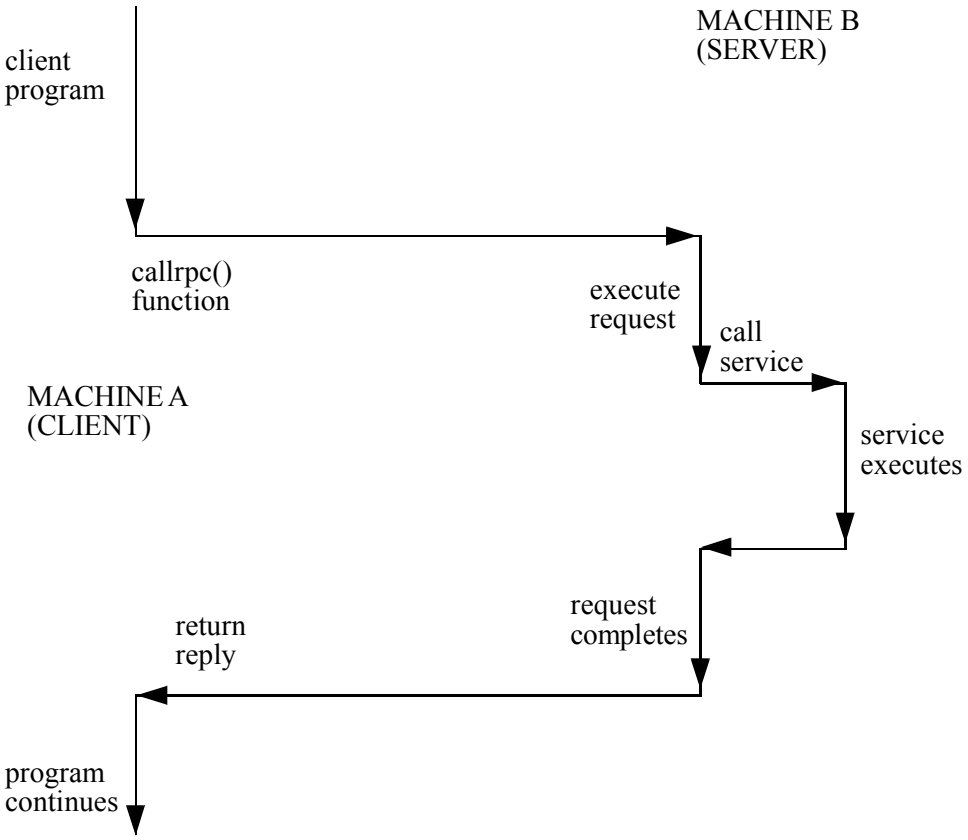

Fig. 2.6 Remote Procedure Calling Mechanism

➢ **Goals of RPC :**

The main idea behind RPC is to cover the presence of network from program. While doing this, the RPC doesn't fully fit in OSI model as :

- Message passing of network communication gets hidden from user where user fails to initially open up the connection, read and write data, and further close it.
- It often leaves out various protocol layers so as to upgrade the performance. It is found that the small performance improvement is useful as a program can remove RPCs.

It is noted that the RPC is well fit for client–server interaction where flow of control interchanges among the caller and callee. Logically, client and server will not work on both at same time, rather thread of execution jumps from caller to callee and then back again. The following steps take place during an RPC :

- A client call upon client stub procedure and pass the parameter in usual way that placed inside the client's own address space.
- The client stub will convert parameters into messages. It changes the representation of parameters into standard format and copy all parameters in message.
- The client stub will allow message to be there on transport layer, that sends further to remote server machine.
- On server, transport layer will move the message to server stub which will cancel all parameters and further will call required server routine by regular procedure call concept.

- On completion of server procedure, it comes back to server stub, which converts return values in message. Further the server stub will transfer the message to transport layer.
- Transport layer will allow result message back to client transport layer and transfers message back to client stub.

It's noted that every RPC will take place in terms of thread which is a successional inflow of control from single prosecution point at any time. A thread created and managed by operation law is an operation thread.

The operations of RPC make use of operation vestments in order to issue RPCs and RPC run– time calls. The RPC client will have one or further client operation vestments that performs one or further RPCs.

To work with remote procedures, RPC server uses one or numerous call vestments which is given by RPC run– time system. On starting, server operation thread will show maximum number of contemporaneous calls it carries out. It's plant that single threaded operations carry out outside of single call thread. The maximum number of call vestments in case of multi threaded operations will depend on layout of an operation and working of RPC programs. It's noted that RPC run– time system will form the call vestments during server prosecution.

On extension of RPC across client and server prosecution works out when client operation thread will call upon remote procedure that's part of logical thread as RPC thread. The structure of RPC thread is logical which shows colorful phases of RPC since it extends across factual vestments prosecution and network. After making an RPC, calling client operation thread becomes part of RPC thread.

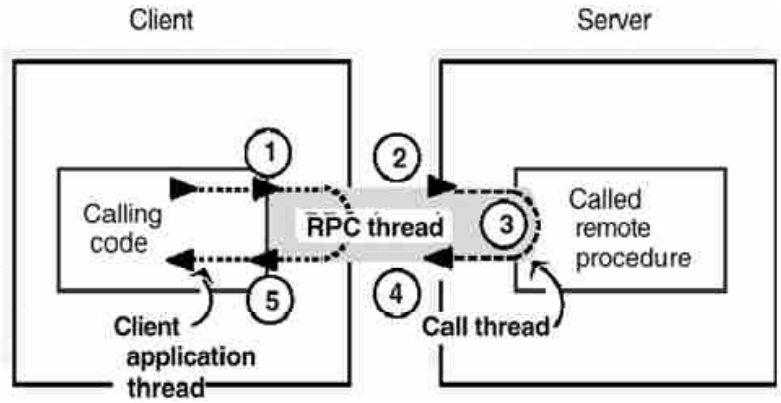

Fig. 2.7 Execution Phases of an RPC Thread

❑ **Check Your Progress – 5 :**

1. A Remote Procedure Call is initiated by the _____.
   a. Server
   b. Client
   c. Both of these
   d. None of these
2. Remote procedure calls is _____.
   a. Inter–process communication
   b. A single process
   c. Both of these
   d. None of these

3. Why RPC is used to

   a. To establish a server on remote machine that can respond to queries

   b. To retrieve information by calling a query

   c. Both A and B

   d. None of these

2.7 Let Us Sum Up :

While studying this unit, we learnt that client/ server armature is a patron consumer calculating armature where server acts as patron and client acts as a consumer. In the Customer/ server armature, the working of system starts when client computer sends a resource or process request to server over network connection, which is reused and delivered to client.

It's studied that there are different waiters which does different jobs right from serving dispatch and videotape to guarding of internal networks and hosting of Web runners and spots. The Object Request Broker is a middleware which uses CORBA specification and handles commerce which exists among guests and waiters.

The Remote Procedure Call is a important fashion for constructing distributed, client – server grounded operations

2.8 Answers for Check Your Progress :

- **Check Your Progress 1 :**

  1. (c) 2. (b)

- **Check Your Progress 1 :**

  1. (a) 2. (b)

- **Check Your Progress 1 :**

  1. (a)

- **Check Your Progress 1 :**

  1. (d)

- **Check Your Progress 1 :**

  1. (b) 2. (a) 3. (c)

2.9 Glossary :

1. **API –** The interface by which an application program accesses operating system and other services.
2. **Client–Server –** The model of interaction in a distributed system in which a program at one side sends a request to a program at another site and awaits a response
3. **CORBA –** It defines IDL and APIs that enable Client–Server object interaction within a specific implementation of an ORB.
4. **Graphical User Interface –** The use of pictures rather than just words to represent the input and output of a program.

2.10 Assignment :

Write short note on features of stored Procedure in Client – Server Model ?

2.11 Activities :

Collect some information on Client – Server Architecture arrangement.

2.12 Case Study :

Generalised the basic necessity of RPC in Client – Server Modelling ?

2.13 Further Readings :

1. Orfali, Robert, Dan Harkey. Client–Server programming with OS/2, Van Nostrand Reinhold, 1992.
2. Dewire, Dawna Travis, Client–Server computing, McGraw–Hill, 1993.
3. Renaud, Paul E., 1957, Introduction to Client–Server Systems, 2nd Edition, Wiley, 1996.

Unit 03

HISTORY WITH BLOCK A DIAGRAM OF CLIENT – SERVER

UNIT STRUCTURE

3.0 Learning Objectives :

After learning this unit, you will be able to understand :

- About History of Client – Server Development
- About Components that use in Client – Server Development
- About Block Diagram of Client – Server Development

3.1 History of Client – Server Technology Development :

It's necessary to look back in history from where this Client – Server technology developed. This can concentrate the value of technology and current script for future development also.

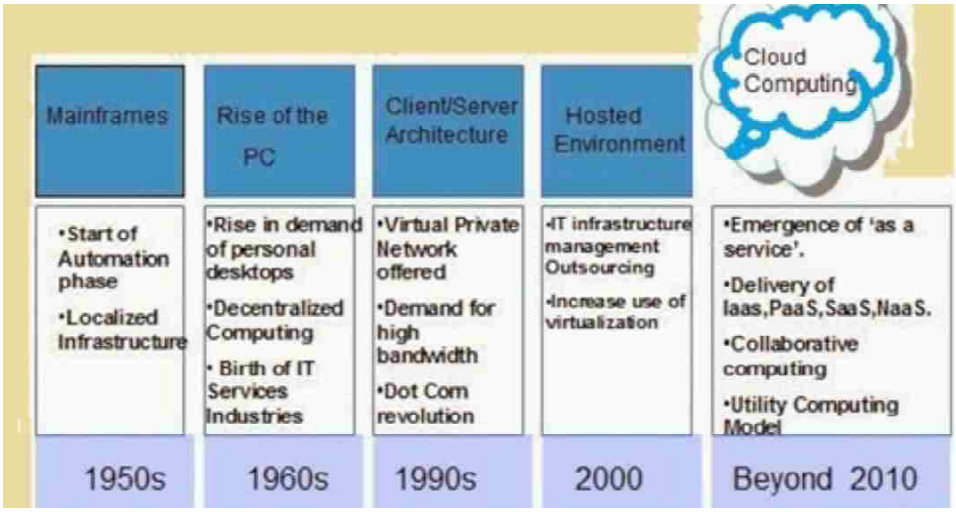

Fig. 3.1 History of Client – Server Technology Development

- From 1990s First Client – Server Technology starts to developed
- It is possible after Computer Network establishment

- Same time Internet era was in demand (dot com revolution)
- All major websites are still best example of Client – Server Technology
- Only demand of High speed of Internet at that time also
- After one decade (2000s) with the parallel growth of internet this technology also in demand.

3.2 Components of Client and Server :

After learning History of Client/ Server Technology Development it's necessary to understand the Factors of Client – Server. The Computer Network is the mama of this technology development. Factors for client and server as shown in fig 3.2.

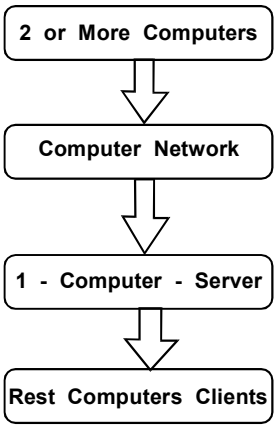

Fig. 3.2 Components of Client – Server

Before understanding Block illustration of Client/ Server Technology we need to understand the Factors so First 2 ore more computer connected with each others that called computer network and among them if we set as anyone computer as special task or main is called server. Other computers are taking authorization or making request to main computer are called Guests.

In computer network we already know

- Types of Computer Network : LAN, MAN, WAN, PAN
- Method of Computer Network : Cable Base and Cable Less (Wireless)

❑ **Check Your Progress – 1 :**

1. In year of _____ first Client – Server Technology starts to developed

   a. 1990 b. 1960 c. 1950 d. 2000

2. All major websites are still best example of _____

   a. Cloud Computing b. Client – Server Technology

   c. Both of these d. None of these

3.3 Block Diagram of Client – Server :

In block Diagram of Client – Server will understand important terminology like

- Client and its process
- Server and its process
- Database process

History with Block A Diagram of Client – Server

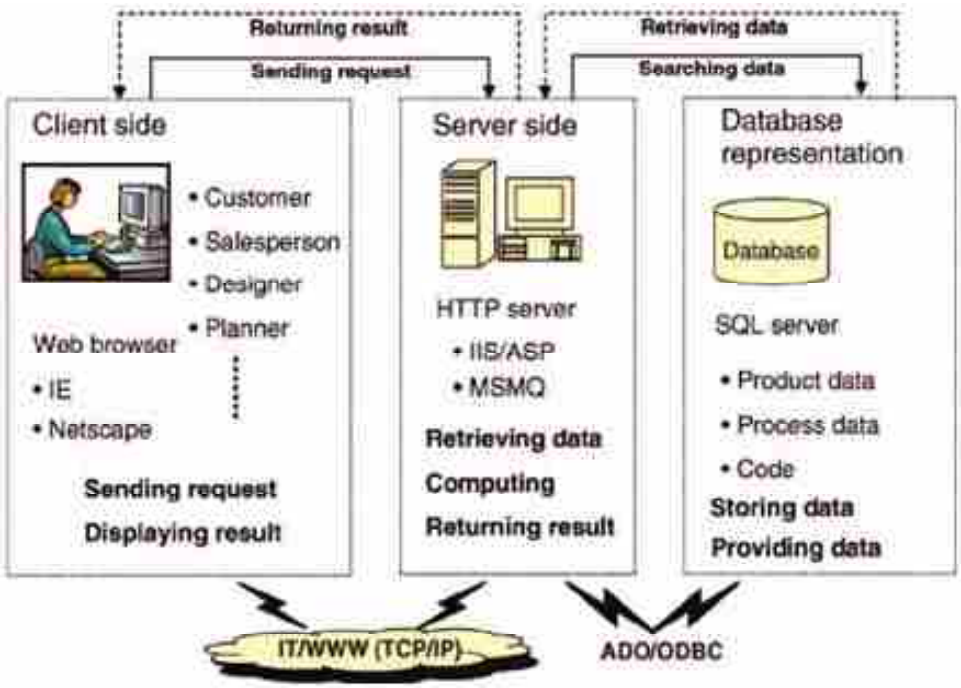

Fig. 3.3 Block Diagram of Client – Server

➢ **Client Process :**

- They are End users / Customers / Sale persons … etc.
- Technology that they use are GUI (Graphical User Interface) forms / Web Browsers … etc.
- Main role to make request to server.
- Display Result that response by server

➢ **Server Process :**

- Accept request by clients
- Various types of server as need of applications
  - o IIS (Internet Information Services)
  - o MSMQ (Microsoft Server Message Queue)
- Retrieving data / Analyzing Data / Calculating Data
- If Analyzing depend on Database then query send to Database Services.

➢ **Database Process :**

- Inserting Data for first time (Ex. Signup Process)
- Verifying of existing Data (Ex. Login Process)
- Updating of existing Data (Ex. Update our Profile)
- Deleting of existing Data (Ex. Delete Account)
- Searching of existing Data (Ex. Search any data on any website)
- Technology involve on Database Level like
  - o SQL Server – Structure Query Language
  - o Oracle Database
  - o XML – Extensible Markup Language ….. etc.

❑ **Check Your Progress – 2 :**

1. Full form of IIS _____
   a. Indian Information Services b. Information Internet Store
   c. Internet Information Services d. None of these
2. Full form of MSMQ _____
   a. Mobile Server Message Question
   b. Microsoft Server Message Queue
   c. Microsoft Service Mass Queue
   d. None of these
3. Full form of SQL _____
   a. Structure Query Language b. Store Query Logic
   c. Structure Query Logic d. None of these

3.4 Let Us Sum Up :

In this unit we've learnt about elaboration of Client – Server Technology with the conception of Computer Network factors. When computer network developed this Client – Server Technology Development resemblant uplift with period of Internet. Still website are the illustration of Client – Server Technology. The block illustration explain the main process of Clients, Server and Reliance process on Database position.

3.5 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (a) 2. (b)

❑ **Check Your Progress 2 :**

1. (c) 2. (b) 3. (c)

3.6 Glossary :

1. **Computer Network –** Two or more computers connected with different layouts and various method to share the data.
2. **LAN –** Local Area Network that share the data in limitation of geographical area among few computers. (same as MAN – WAN are work for wide area and more computers then LAN)
3. **Database Technology –** Data accessing is an important task for Client – Server technology so need to understand database technology from Primary level to advance level like Ms–Access, SQL, My–SQL, Oracle, Hadoop, XML …… etc.

3.7 Assignment :

1. Explain Components of Client – Server Technology ?
2. Explain Client Process
3. Explain Server Process
4. Explain Database Process

3.8 Activities :

Draw Time – Line for History of Client – Server Technology Development

3.9 Case Study :

Study the various types of Computer Network area wise

3.11 Further Readings :

1. Orfali, Robert, Dan Harkey. Client–Server programming with OS/2, Van Nostrand Reinhold, 1992.
2. Dewire, Dawna Travis, Client–Server computing, McGraw–Hill, 1993.
3. Renaud, Paul E., 1957, Introduction to Client–Server Systems, 2nd Edition, Wiley, c1996.

BLOCK SUMMARY :

In this block, you have learnt and understand about the basic of Client–Server computing technology and its related features. The block gives an idea on study and concept of Object Request Broker interaction with client and server. You have explained on the concepts of various servers with their uses.

The block detailed about the basic of Remote Procedure Call technique in terms of client–server applications. The concept related to CORBA specification are also well explained to you. You will be demonstrated practically about Client – Server specifications used in modeling. Block last part focus on the Evolution of Client – Server Applications then necessary components for Client – Server Process and Block Diagram of Client – Server process

BLOCK ASSIGNMENT :

❖ **Short Questions :**

1. What are the merits of Remote Procedure Call ?
2. Explain the function of producer–consumer computing architecture.
3. List the type of servers used nowadays.
4. Write short note CORBA.
5. Explain History of Client – Server Technology Development

❖ **Long Questions :**

1. Write short notes on Client–Server architecture.
2. Write short note on Remote Procedure Call.
3. Write note on Object Request Broker.
4. Explain Block Diagram of Client – Server Technology

❖ **Enrolment No. :** ☐

1. How many hours did you need for studying the units ?

Unit No.	1	2	3
No. of Hrs.			

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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Dr. Babasaheb Ambedkar
Open University Ahmedabad

BCAR-403

CLIENT – SERVER ARCHITECTURE AND INTERFACES (C#)

BLOCK 2 : CLIENT SIDE AND SERVER SIDE SERVICES

CLIENT SIDE AND SERVER SIDE SERVICES

Block Introduction :

Services are requires in order to call and communicate among another. In certain application, services call upon another by way of language method or procedure calls. In a standard distributed system, services will run at particular locations which easily calls upon another with the help of HTTP/REST or with RPC mechanism. It is seen that latest micro service based application normally runs on virtual environments where number of instances of service and locations changes dynamically.

In this block, we will detail about the basic of Client side and server side applications with services. The block will focus on the study and concept of Client side services such as Services Print Services, Remote Services, Utility Services, Message Services, Network Services, Application Services and Database Services. You will give an idea on Object Linking and Embedding.

In this block, you will make to learn and understand about server side applications such as Request Processing, Print Services, Database Services, Security Services, File Services and Communication Services. The concept related to Dynamic Data Exchange (DDE) is explained to you.

It is necessary for focus in future of Client Server technology development so we need to learn Tier Architecture with 2, 3 and N Tier architecture with diagram, technology and example of each one in this block.

Block Objectives :

After learning this block, you will be able to understand :

- About client/server
- Features of Client Services
- Characteristics of Dynamic Data Exchange
- Basic about Object Linking and Embedding
- Idea about several Client Tools
- Concept of GUI and Non GUI Clients
- Idea about Object Oriented User Interface Clients
- Features of Server Functionality
- Basic of Server Request and Print Services
- Tier technology for Client Server Process
- Comparison of 2, 3 and N tier technology

Block Structure :

Unit 4 : Client Side Services

Unit 5 : Server Side Services

Unit 6 : Tier Architecture in Client Server

Unit
04

CLIENT SIDE SERVICES

UNIT STRUCTURE

4.0 Learning Objectives :

After learning this Unit, you will be able to understand :

- About different server services
- About Dynamic Data Exchange
- About Object Linking
- About Client Tools

4.1 Introduction :

In customer/ server operations, there are numerous functions which are performed by combination of coffers which can be done by customer workstation processor as well as server workstation processor. The database server provides data in response to request which is given by customer operation where original

processing by customer involves finding of tab quantum and formatting of response to the workstation screen.

4.2 Services :

It's noted that, customer workstation will make business functions with the use of combination of particular productivity products which are mixed together with custom operation. The services will have capability to cut and bury input from different sources.

The customer is substantially the consumer of services which is given by one or further server processors and provides services related to donation. The stoner input and final affair are donation at customer workstation. There are numerous further services which are performed on the customer side.

4.2.1 Print Services :

In Customer side, the network operating system will allow customer to induce the print requests inspite of the working printer is engaged. It's a form of software which deflect the request and manages the printing request. The customer has installation to view the status of the print line at any time and customer is also notified when the print is completed. Also there are also fax services.

4.2.2 Remote Services :

In remote service, the customer prayers to operation which is performed on remote server which includes all backup services. Then, operations related to downloading of data from host or checking list of stock process also calls upon that will drill ever. Network Operating System will help in running operations on customer workstation which begins similar remote operations. The services related to remote operation will cover working from home that allows people to work from home which makes them to communicate with office network.

4.2.3 Utility Services :

In customer, the operating system ease some original functions that are applied in order to do conduct similar as edit, dupe, move, compare and help that are fluently carried out at customer side.

4.2.4 Message Services :

In customer, the operating system ease some original functions that are applied in order to do conduct similar as edit, dupe, move, compare and help that are fluently carried out at customer side.

4.2.5 Network Services :

It's plant that the customer workstation will tend to communicate with network by use of certain protocol, which are packet of service and API's which forms, shoot and admit the needed formatted network dispatches. These protocols that supports will typically include IPX, TCP/ IP, NETBIOS, Ethernet, Token Ring and FDDI.

4.2.6 Application Services :

Piecemeal from remote prosecution of certain services which network system give, there are certain other services like custom operations where they've their own API's which is fixed in RPC which call upon particular services form remote server.

4.2.7 Database Services :

There are certain database service requests which are made in customer side using particular syntax. With the use of certain standard language having standard form, certain analogous operation gets back on multiple platforms which are syntactical different.

❑ **Check Your Progress – 1 :**

1. Which of the following services can be performed at client side ?
   a. Application Services b. Database Services
   c. Utility Services d. All of these
2. What is network service ?
   a. The client can generate print request using OS
   b. The client can generate database service request
   c. The client can communicate with network using TCP/IP, IPX, Token ring etc. protocols
   d. None of these

4.3 Dynamic Data Exchange (DDE) :

DDE is Dynamic Data Exchange protocol which is erected in Microsoft Windows where druggies can partake their data among operations which can be on original machine or on Network. It's an operation for Windows where communication is done through sharing of information in dynamic manner. Typically it's seen that DDE is applied to partake data among two operations and helps in transferring commands to other operation.

It's noted that when an operation starts with DDE process, also similar operation is called as customer since it's ask information from other operation which is the server as it gives services to DDE customer. It's stressed that a customer and server communicating by DDE will noway communicate directly among each other. They tends to transfer dispatches to Windows, which further passes information to needed destination. This shows that with wide script of DDE, nearly all networks isn't confined to particular workstation. Through DDE, the Windows operation can shoot data to operation which is running on other workstation, handed that they're on same network.

➢ **Protocol :**

It's noted that with several dispatches, there appears to be rules which applies to find how and when data is transferred. Similar rules will determine the protocol applied to manage transferring and swapping of information. It's plant that DDE needs to have its own protocol in order to see communication which exists among operations. Similar type of protocol will describe the process applied to start and end DDE session by

- Transferring data to other application
- Receiving of data from another application
- Instructing other application to work with macro or command

Piecemeal from these there are fairly less parameters which constitute certain protocol that makes DDE dispatches abecedarian. Further, DDE will handle firm links which is created in order to notify to the customer about certain server operation about changing of data with request made by customer

to admit it. It's an seductive information when volume changes to server data where customer needs not to be bothered about repetitious processing of information. On chancing the blockage of server link at particular point, the establishment link will work rather of hot link which ensures about presence of last data revision. It's plant that the request link be framed for direct dupe and paste operations which happens among server and customer without the demand of intermediate clipboard.

❑ **Check Your Progress – 2 :**

1. What is Dynamic Data Exchange ?

   a. Client side method

   b. It is a application which helps in sharing information in dynamic manner

   c. It is a Windows application

   d. Both B and C

4.4 Object Linking and Embedding (OLE) :

OLE which is also known as object linking and bedding permit druggies to put the data together from colorful operations. In this, object link permits the druggies to distribute individual source of data for required object. The document carries particular name of train having data with filmland. As soon as the source will get streamlined, every documents using data gets streamlined automatically.

By means of object embedding, single operation will show data or image which carries inside the document of other operation. In this the destination operation having data or images which unfit to understand and can suitable to alter will show prints and plays bedded contents. To amend or bring up to date, similar type of bedded object gets opened in base operation which made it. This can be done directly as soon as you make a double click on an item or opting correct edit command at the time when object is stressed.

OLE continues a distinguished way to conduct information from one operation in another operation, which can be salutary for illustrations and further. To conduct OLE, you anticipate both source as well as destination operations that admit OLE. Information from one document can be bedded into another document by matching arranging or implanting the information. Either linked as well as implanted OLE objects can be edited from within the destination operation. Likewise, linking as well as implanting deposit information independently so it's critical to assure that you're exercising the exact option for the arrangement. The connection between embedding as well as lining up is similar to that between fitting a block as well as creating an external reference.

While embedding does not authorize druggies to have an individual source of data, it does develop it easier to encompass operations. An bedded object contains the factual data for the object, the name of the operation that created it, and a picture of the data. The following Works objects can be bedded in a Word Processor document or a Database form

- Works Spreadsheet
- Works Chart

- Microsoft Draw
- Clip art from the Microsoft ClipArt Gallary
- Microsoft Note – It
- Microsoft WordArt

➢ **Embedding OLE Objects :**

An implanted OLE object is easily a representation of information from another account for case, a dupe of an Excel spreadsheet in AutoCAD Architecture. When you implant objects, several changes brought about to the source document aren't anatomized in destination documents on account of there continues no link to the source document. You should implant objects only if you anticipate to be fulfilled to conduct the operation that commenced them for editing likewise you don't assume the OLE object to be streamlined when you edit information in the source document.

➢ **Linking OLE Objects :**

A linked OLE object is simply a reference to information that's located in another document. Link objects when you want to use the same information in further than one document. However, you only need to modernize the links in order to modernize the document that contains the OLE objects, If you change the original information. Links can be set to modernize automatically. It's important to note that when you link a delineation you need to maintain access to both the source operation and the linked document .However, you may need to re– establish the link, If you brand or move either of them.

❑ **Check Your Progress – 3 :**

1. The _____ is a simple object model that use OLE DB, and is frequently used for database applications.

   a. ADO b. XML c. ODBC d. None of these

2. Which of the following is considered to be one of the foundations of data access in the Microsoft world ?

   a. ADO b. ODBC c. OLE DB d. None of these

4.5 Client Tools :

The Java customer sharing has mileage programs which was written by Java customer. Similar mileage programs are present insiderabbitmq–client–tests.jar train. This jar train has numerous small programs which performs different functions of RabbitMQ server. The program with source law is in test/ src brochure which is inside source distribution.

The script runjava.{sh, club} will run Java with class path that's configured rightly for certain exemplifications, e.g. runjava.shcom.rabbitmq.examples. Test Main runs the TestMain functional tests.

➢ **Perf Test :**

It is earlier called as MulticastMain which serves as performance testing tool that begins with 0 or more producers along with consumers furthermore reports the rate at which messages are sent as well as received along with latency. This tool support many command line flags.

runjava.sh com.rabbitmq.examples.PerfTest –help

Examples :

runjava.sh com.rabbitmq.examples.PerfTest –a

It sends transient messages without receiving as 1 producer and 1 consumer.

runjava.sh com.rabbitmq.examples.PerfTest –c 1000

It sends transient messages with receiving and confirmations.

runjava.sh com.rabbitmq.examples.PerfTest –c 1000 –f persistent

It sends transient messages with receiving and confirmation along with persistence.

runjava.sh com.rabbitmq.examples.PerfTest –y0 –u my–queue –s 1000 –C 1000000

It will fill decided queue with 1M transient messages of 1kB each

runjava.sh com.rabbitmq.examples.PerfTest –x0 –y10 –p –u another–queue

It starts with 10 consumers from a decided queue without producers.

➢ **HTML Performance Tools :**

Such type of tool are group of tools which allow to run computerized standards by packaging about the PerfTest standardizing structure. We see that benchmark specs can be provided and certain tools will monitor running of standard, collection of results along with showing them in HTML page.

➢ **Tracer :**

There are clear tracer which are simple AMQP protocol analyzer available in class com.rabbitmq.tools.Tracer.

- runjava.sh com.rabbitmq.tools.Tracer listenPort connectHost connectPort
- listenPort: port to listen for incoming AMQP connections on - defaults to 5673.
- ConnectHost: hostname to use when making an outbound connection in response to an incoming connection - defaults to localhost.
- connectPort: port number to use when making an outbound connection - defaults to 5672.

❑ **Check Your Progress – 4 :**

1. What is MulticastMain ?

   a. It is another name of PerfTest

   b. It serves as performance testing tool that begins with 0

   c. It supports many command line flags

   d. All of these

4.6 GUI Clients :

GUI is a Graphical User Interface that works with icons or indicators along with electronic devices. Interface is a coordination involved among computer, program and humans. It is seen that graphical user interface uses visual elements that will help in showing information which is kept inside computer that is simple to understand. These elements makes easy for people to work by involving certain computer software. It is found that in order to design a good user interface it should allow easy and natural interaction among user and system.

GUI client is a program where user interface with graphical objects which can be windows or menus. It is noted that AIX serves as Common Desktop Environment furthermore, AIX windows shows interfacing among you and computer. The graphical window system here that is part of graphical user interface will arrange these graphics output for display and performs elementary text along with graphics for drawing certain functions. This Common Desktop Environment serves as graphical user interface which allows to work on network devices along with certain tools without having an idea about their location and can be exchange data across applications by drag and drop of certain objects. Sometimes it happens that an applications are occasionally requested to server result when it is being asked by human which can be any operating system.

❑ **Check Your Progress – 5 :**

1. What are the features of GUI client ?

   a. GUI provides interfaces to users

   b. It uses visual elements that helps in showing information

   c. It provides a user friendly environment

   d. All of these

4.7 Non–GUI Clients :

In Java, non GUI customer are simply operations which generates server requests without the intervention of humans. Similar type of customer typically either needs multitasking or can work without multitasking. In case of Non GUI Customer without multitasking will include

- ATM Machines
- Barcode reader
- Mobile phones
- Fax

In similar case the customer will give minimal mortal interfacing for request which is in form of nonstop circle. Piecemeal from this, there are guests that requires multitasking which can be

- Robots
- Testers

In such case the client requires continuous human interfacing for request.

❑ **Check Your Progress – 6 :**

1. Which of the following is the example of non GUI client that requires multitasking ?

   a. Robots b. Testers c. ATMs d. none of these

2. What is meant by Non GUI client ?

   a. It can generates server requests without human interventions

   b. It provides user interfaces

   c. It works on user commands

   d. None of these

4.8 OOUI (Object Oriented User Interface) Clients :

Object – acquainted stoner interface is a software interface in which druggies will work on certain objects for certain parcels. It's developed on the idea of object– acquainted programming applied in case of ultramodern computing. It's an alternate to different function– acquainted interfaces. OOUI guests are operations that are extremely iconic farther which shows indefectible admission to Information in visual formats.

Similar type of interface doesn't request freely to server result from mortal involvement with GUI. It's a stylish fit for mainstream, OLTP type business operation having nonstop work along with redundant strength. They're graphic renditions of converses that before executed on dump computer. It make use of object action model, which can be applied and handled by stoner for any object selection and request for any action to be done.

Fig. 4.1 Application

It's seen that OOUI customer provides iconic OOUI and allow to convert objects on windows screen by using drag and drop capability. This is substantially used by people those who want to perform numerous task without any sequence of affair. These objects will interact among themselves along with external waiters.

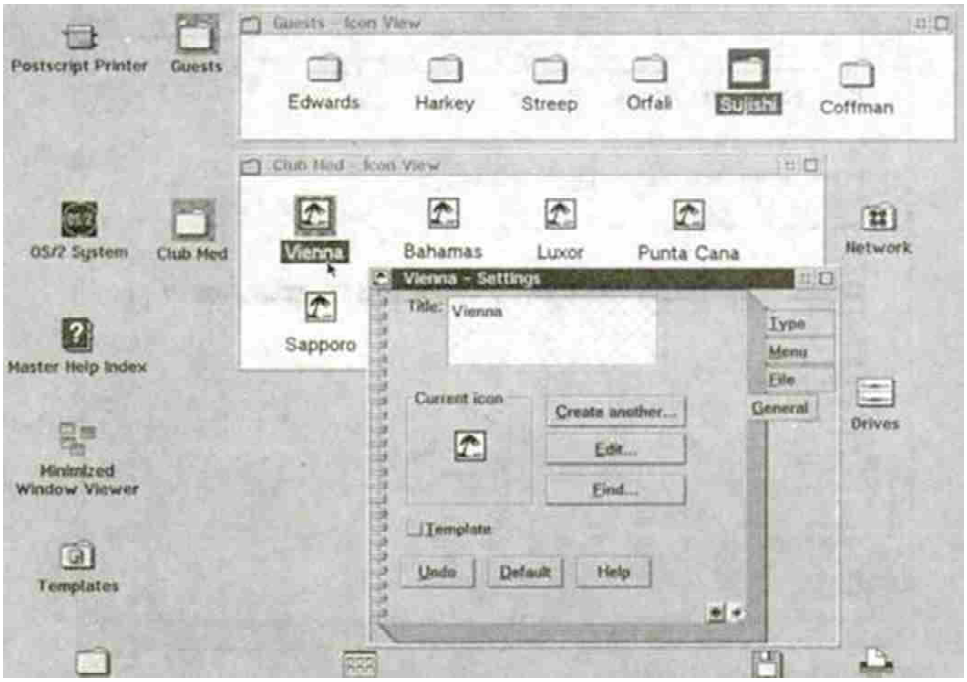

Fig. 4.2 Interacting Windows

The OOUI customer will show real desktop where you can play with objects and programs to do work. In the fig1.2, you see that you can play with resemblant converses over resemblant session with server. By using peculiar advance features, you can allow these converses to show images, vids along with other features. In this, the detail is shown to stoner where inside work will constantly moving.

❑ **Check Your Progress – 7 :**

1. What is OOUI ?

   a. It is a type of user interface based on an object-oriented programming

   b. In OOUI, users can classify objects based on their behaviour

   c. Both A and B

   d. None of these

4.9 Let Us Sum Up :

In this unit we have learnt that client/server applications carries many functions which are performed by combination of resources which can be done by client workstation processor as well as server workstation processor. We see that the services will have ability to cut and paste input from different sources where the client is consumer of services given by one or more server processors and provides services related to presentation.

It's noted that Dynamic Data Exchange protocol is created in Microsoft Windows where druggies can partake their data among operations which can be on original machine or on Network. It seems that OLE are object linking and bedding medium that permit druggies to put the data together from colorful operations. In this, object link permits the druggies to distribute individual source of data for required object.

A linked OLE object is simply a reference to information that's located in another document. Link objects when you want to use the same information in further than one document. The Java customer sharing has mileage programs

which were written by Java customer. GUI is a Graphical Stoner Interface that works with icons or pointers along with electronic bias. Interface is a collaboration involved among computer, program and humans.

In Java, non GUI customer are simply operations which generates server requests without the intervention of humans. Similar type of customer typically either needs multitasking or can work without multitasking. Object–acquainted stoner interface is a software interface in which druggies will work on certain objects for certain parcels. It's developed on the idea of object–acquainted programming applied in case of ultramodern computing.

4.10 Answers for Check Your Progress :

- **Check Your Progress 1 :**

  1. (d) 2. (c)

- **Check Your Progress 2 :**

  1. (d)

- **Check Your Progress 3 :**

  1. (a) 2. (c)

- **Check Your Progress 4 :**

  1. (d)

- **Check Your Progress 5 :**

  1. (d)

- **Check Your Progress 6 :**

  1. (c) 2. (a)

- **Check Your Progress 7 :**

  1. (c)

4.11 Glossary :

1. **Client –** It is a user, software application or computer which request for services, data or processing of application or computer.
2. **Connection Request –** It is a notification which is sent by initiator and received by listener showing request of initiator to start a connection.
3. **Network Interface –** It is a network layer showing generic interface for clients, servers or external processes to access Net functions.

4.12 Assignment :

Explain the Linked OLE objects with examples.

4.13 Activities :

Study the various types of Java GUI and Non GUI clients.

4.14 Case Study :

Study the types of Object–oriented user interface software's in details.

4.15 Further Readings :

1. Object–Oriented Systems Ambler, S. 1997.
2. The client–server model, S smith, 2010.

Unit
05

SERVER SIDE SERVICES

UNIT STRUCTURE

5.0 Learning Objectives :

After learning this unit, you will be able to understand :

- About server side
- About the various services involved in server side
- About communication services

5.1 Introduction :

As is the case with any client–server paradigm, in the world of web services there are web service providers and web service consumers. Server–Side SOAP is a tutorial which deals with how to build and provide web services using Apache SOAP.

5.2 Server Functionality :

There are many services/functions that are performed by the Server which can be :

- Application
- File
- Database
- Print

- Fax
- Image
- Communications
- Security
- Systems
- Network Management

It's important to understand that a server is an architectural conception, not a physical perpetration description. The same physical device can give customer and server functions.

Operation waiters give business functionality to support the operation of the customer workstation. In the customer/ server model these services can be handed for an entire or partial business function invoked through an Inter Process Communication (IPC) request for service. Either communication grounded requests i.e. OLTP or RPCs can be used.

A group of operation waiters may task in combined to assign a comprehensive business operation. For instruction, in case of a payroll system, we see that the hand data gets handled by single operation server where it gets calculated with the help of other operation server along with deductions if any, gets calculated by another operation server.

Similar type of waiters will suitable to work on colorful operating systems on different tackle platforms which make use of varied database waiters. In similar circumstances the guests operation get called upon with services without consideration any technology or position of different waiters positions.

❑ **Check Your Progress – 1 :**

1. What is the use of Print server ?
   a. To transfer files securely
   b. To send and receive data to web browsers
   c. To get the printing of any work from client side
   d. None of these
2. What is the use of application server ?
   a. It provides business functionality to support the operation of the client workstation.
   b. It is a middleware server which carry large amount of computing among database and end user servers.
   c. It is responsible for inter process communication
   d. All of these

5.3 Services :

In Java we see that there are numerous services that are performed on server side. To perform certain services, the processor will only not take part in doing conditioning, but piecemeal from it, certain device along with its tackle regulator are used to do certain server services.

5.3.1 Request Processing :

In order to put a request, the :

- Client will give requests to Network Operating System service software which is present on client machine.
- Services format will further request to required RPC and give request to application layer of client protocol stack.
- Application layer inside protocol stack located on server will receive certain request.

5.3.2 Print Services :

To get the printing of any work from client side, we see that :

- the good quality printers, computer fax and plotters are good in supporting from shared server.
- Server get input from clients and arranges as per priority of request which will be handled in case of availability of device.
- Certain firms understand large savings by allowing users to have fax output from computers later on arranges for transmission by fax server in case of less communication costs.
- Faxes coming in gets arranged at server which will be distributed to required client based on receipt or request.
- Concert having workflow techniques where images obtained and distributed to required client workstation using image server.
- Client/server model handles arrangement at server by employing in concert using standard algorithms showing way of distributing queued work.
- Good standards for electronic document uses such mechanism to makes themselves fully integrated in desktop working environment.

5.3.3 Database Services :

There are certain server side database that are done by file servers using various interface.

- Various softwares/database like dBASE, Clipper, FoxPro and Paradox gets worked out by database
- The engine located on client machine uses file services that are given by file server in order to record the working and free space management.
- Many current and different strong implementation occurs for actual flat–file models that gets out indexes for direct record working..
- Using application program having issues lock requests as well as lock checks will able to handle currency control also using database server, lock table is framed which interrogates when record access lock check obtained.
- With access at record level, several details ease primary key which returns to client workstation for the purpose of filtering.
- In absence of facilities for procedural code working at server and to join, or filter rows preceding to getting back to workstation. With such drawback, the chances of records locking when many clients works on single database tends to have excess network traffic where after rejection, the non useful rows gets returned to workstation.

- With insufficient logic of server execution, the products get saved from automatic partial update back–out with revival subsequent to an application, system or failure of hardware.
- Client/server database engines gives support at server to carry out SQL requests which is given from client workstation.
- So services lead to file gets used for space allotment in addition to crucial directory services where other are shown by database server.

5.3.4 Security Services :

We see that customer/ server operations needs affiliated security services which are given by parent surroundings. Then, druggies are mandatory to register in by means of stoner ID and word. While performing all, if

- Passwords is not seen which recognises users, in such case, security server will maintain to facilitate passwords that needs to be updated regularly.
- Desk enterprise exits, then an individual logon id along with sequence is applied to access information along with processes for user that are required for correct access. As data is kept in less secured area, then in such case option should will allow to keep data in encrypted format.
- Workstation without floppy having embedded data encryption standard coprocessors are present from vendors, then products gets directly encrypted or decrypted data that gets read or write to certain disk. The encryption along with decryption of data exits with des algorithm using user password which make sure about execution of unauthorized user operations.
- Such security that is mainly for laptop computers having client/server applications as laptops doesn't work in surroundings with similar physical security.

5.3.5 File Services :

Train conditioning suffer access to the virtual directories likewise lines laid on the customer workstation also to the server's fixed storehouse. These conditioning are provisioned conclusive the redirection software worked as part of the customer workstation operating circumstance.

The train conditioning contribute this support at the remote server processor. In the definite medium, software, allocated data, databases, likewise backups are saved on fragment, vid, as well as optic storehouse bias that are controlled by the train server.

To reduce the trouble as well as sequence of installation along with extension of software, software should be loaded from the server for action on the customer. Current performances can be streamlined on the server also brought about presently attainable to all druggies.

In accumulation, installation in a core position decreases the approach needed for each workstation stoner to spark the installation procedure. On account of each customer workstation stoner exercises the original installation of the software, indispensable parameters are integrated, as well as remote backing office drivers are careful of them.

Backups of the server can be listed as well as covered close–at– hand a educated support person. Backups of customer workstations can be approached from the server; likewise data can be saved at the server to ease recovery.

Vid or optic provisory objects are clearly eased for backup; these bias can eagerly contribute support for multitudinous druggies.

A support person who assures that the backup functions are fulfilled readily monitors a core position. With fresh associations observing at multimedia as well as image technology, big optic storehouse bias are stylish rightly enforced as participated waiters.

5.3.6 Communication Services :

We see that a Customer/ server operations needs LAN and WAN communication services. Also the introductory LAN services are integral to Network operating system while numerous communication server products will give WAN services.

❑ **Check Your Progress – 2 :**

1. Which of the following statement is a type of server side Security service ?
   a. Applications needs LAN and WAN communication services
   b. Users are required to register by using valid user ID and password.
   c. Good quality printers are needed to take print from client side
   d. None of these
2. Which is the main characteristics of File server ?
   a. Manages file operations and is shared on a network.
   b. Acts as a fat client and is shared on a network.
   c. Manages file operations and is limited to one PC.
   d. None of these

5.4 Let Us Sum Up :

While studying this unit, we've learnt that Operation waiters give business functionality to support the operation of the customer workstation where these services shows entire or partial business function carried out by Inter Process Communication (IPC) request for service.

We see that there are numerous services in Java that are performed on server side where not only processor but certain other device along with tackle regulator are applied to do certain server services.

Train conditioning suffer access to the virtual directories likewise lines laid on the customer workstation also to the server's fixed storehouse. These conditioning are provisioned conclusive the redirection software worked as part of the customer workstation operating circumstance.

5.5 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (c) 2. (d)

❑ **Check Your Progress 2 :**

1. (b) 2. (a)

5.6 Glossary :

1. **Shared Server –** A database server which is configured by allowing user processes to share so as to increase in users.
2. **Service Handler –** A process that acts a connection point from the listener to the database server.
3. **Network Object –** Any service that can be directly addressed on a network; for example, a listener.

5.7 Assignment :

Write short note on communication services at server side.

5.8 Activities :

Collect some information on File activities.

5.9 Case Study :

Generalised the basic feature of Application server.

5.10 Further Readings :

1. Object–Oriented Systems Ambler, S. 1997
2. The client–server model, S smith, 2010

Unit
06

TIER ARCHITECTURE IN CLIENT SERVER

UNIT STRUCTURE

6.0 Learning Objectives :

After learning this Unit, you will be able to understand :

- About Various Tier Architecture
- About 2, 3 and N Tier Architecture
- About technology, example of 2, 3 and N tier architecture

6.1 Introduction :

All systems are astronomically divided into three types of operations 2 league, 3 league and N – league armature. Principally high position we can say that 2 – league armature is Customer server operation and 3 – league armature is Web grounded operation. N – League armature is Mongrel Web Grounded operations.

6.2 Two Tier Architecture :

The two– league is grounded on Customer Server armature. The two– league armature is like customer server operation. The direct communication takes place between customer and server. There's no intermediate between customer and server. Because of tight coupling a 2 tiered operation will run briskly.

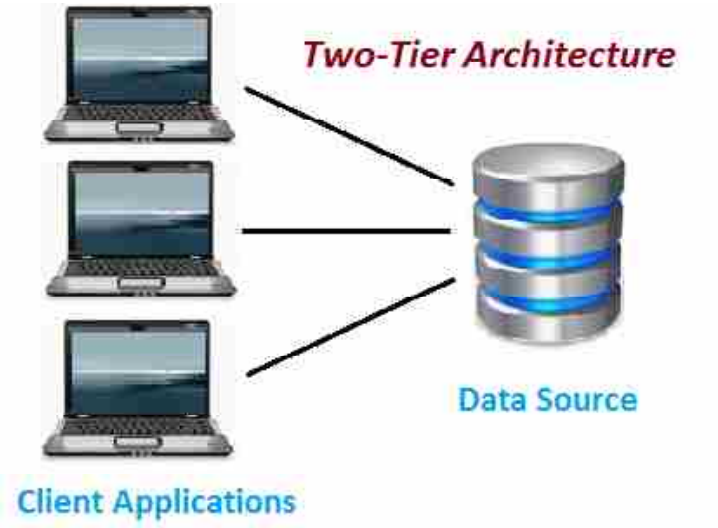

Fig. 6.1 : Two–Tier Architecture

The above figure shows the architecture of two–tier. Here the direct communication between client and server, there is no intermediate between client and server.

Let's take a look of real life illustration of Road Reservation two–league armature before website of IRCTC or Mobile App doesn't exists

Let's consider that first Person is making Road Reservation for Mumbai to Delhi by Mumbai Express at CounterNo. 1 and at same time alternate Person is also try to make Railway reservation of Mumbai to Delhi from Counter No. 2

In this script both the computer (customer) connect with road server by LAN so who reserved first that separate window client can get confirm reservation for Mumbai to Delhi.

He gives inputs to the operation software and it sends requests to Server. So then both Database and Server are incorporated with each other, so this technology is called as " Customer – Server Technology".

The Two–tier architecture is divided into two parts :

(1) Client Application (Client Tier)

(2) Database (Data Tier)

➢ **Advantages :**

1. Easy to maintain and modification is bit easy
2. Communication is faster because Local Network (LAN–MAN)

➢ **Disadvantages :**

1. In two tier architecture application performance will be degrade upon increasing the users.
2. Cost–ineffective

Technology : LAN base Desktop Applications, C Language File Handling... etc.

❑ **Check Your Progress – 1 :**

1. The direct _____ takes place between client and server

   a. Communication b. Command

   c. Telephone Line d. None of this

2. Two Tier architecture is divided into _____ part.
   a. 1 b. 2 c. 3 d. 4
3. As communication is _____ due to LAN – MAN
   a. Faster b. Slower c. Hang d. None of this
4. If user increase in 2 tier, performance is _____.
   a. Faster b. Slower c. degrade d. None of this
5. 2nd Tier in two tier technology is known as _____.
   a. Client tier b. Data tier
   c. Communication tier d. None of this

6.3 Three–Tier Architecture :

Three–tier architecture typically comprise a presentation tier, a business or data access tier, and a data tier. Three layers in the three tier architecture are as follows:

(1) Client layer

(2) Business layer

(3) Data layer

(1) Client layer : It's also called as Donation subcaste which contains UI part of our operation. This subcaste is used for the design purpose where data is presented to the stoner or input is taken from the stoner.

For example : designing registration form which contains text box, label, button etc.

(2) Business layer : In this subcaste all business sense written like confirmation of data, computations, data insertion etc. This acts as a interface between Customer subcaste and Data Access Layer. This subcaste is also called the central subcaste helps to make communication briskly between customer and data subcaste. (It provides crucial roll for validate stoner, and spurious data)

(3) Data layer : In this subcaste factual database is comes in the picture. Data Access Layer contains to perform insert, update, cancel, get data from database grounded on our input data.

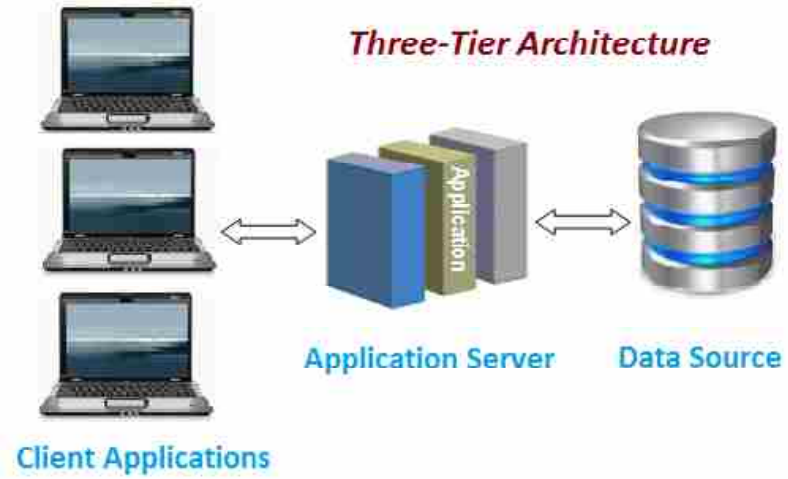

Fig. 6.2 : Three–Tier Architecture

➢ **Advantages :**

1. High performance, lightweight persistent objects (Web Based)
2. Scalability – Each tier can scale horizontally
3. Performance – Because the Presentation tier can cache requests, network utilization is minimized, and the load is reduced on the Application and Data tiers.
4. High degree of flexibility in deployment platform and configuration
5. Better Re–use (Web Based)
6. Improve Data Integrity (Web Based)
7. Improved Security – Client is not direct access to database. (Web Based)
8. Easy to maintain and modification is bit easy, won't affect other modules
9. In three tier architecture application performance is good.

➢ **Disadvantages :**

1. Increase Complexity/Effort (Web Based)
2. High Skill required to make Designing – Data Validation – Common Business Logic – Storing Database

Technology : Major Web site, ASP.NET, PHP, Java Swing... etc.

6.4 N–Tier Architecture :

Let's take some real life example first to understand most emerging and Complex architecture that is N–Tier.

- The factory shop floor (assembly line) – did the parts arrive or not
- 3rd party parts supplier companies – were the parts produced
- Logistics warehouses – did the parts leave/arrive at the warehouse
- Trucks on the road – where are they, carrying which parts
- Logistics "control room" – where is everyone and everything
- Factory production forward planning area – which parts do we need, by when, to achieve optimized production cycles

To accomplish this, a system is required that can :

- Require architecture for the necessary software tiers in Presentation Tier

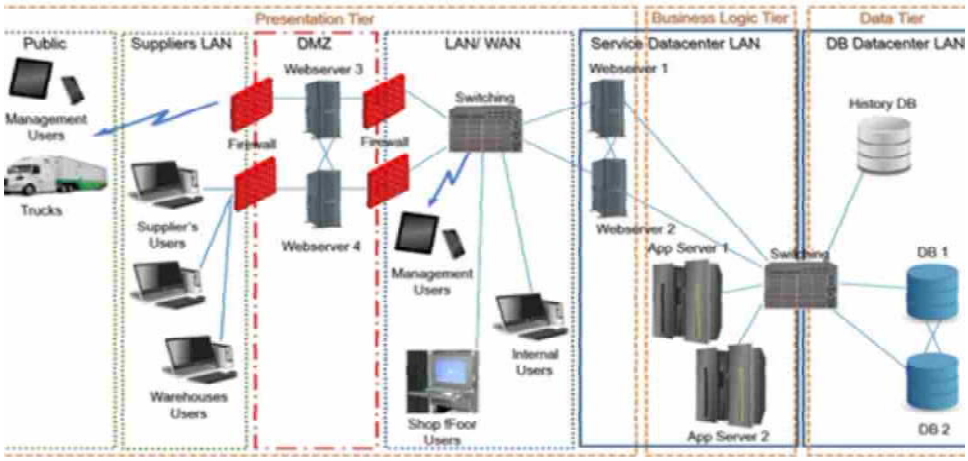

Fig. 6.3 : N–Tier Architecture

➢ **Presentation Tier :**

The presentation tier must address several types of user interface protocols and platforms, in specific :

- Various Modules to be involved in system, if you are developing online shopping the entity like production, stock, supplier... etc. module in your website this is major complexity to design database.
- Then how such module communicate with each other with data access permission so database side and presentation side rights given.
- Data authentication can data validation must by verify by presentation layer.
- User verify by various method like OTP, Password recover, Password Change... etc. technical and database side process handled by presentation layer
- When money transaction provide by ACH (Automated Cleaning House) at that time OTP by Pay Pal and secure money transfer is mandatory task for presentation and data layer

➢ **Business Logic Tier :**

The business sense league would be constituted by several categories of operation server clusters distributed by multiple data centers (some times VPN of supplier – distributer – retailers…. etc. all gather handled by BLL)

➢ **Data Tier :**

The data league would correspond of an active database server cluster with multiple bumps (waiters like product – stock – distributer – supplier – retailer … colorful difference server and difference database manages).

All this complex database manage by some complex process like' join'.

Data subcaste connect with utmost arising conception like pall so it's delicate and precious also.

➢ **Advantages :**

1. Most emerging technology.
2. Most portable technology use anywhere anytime.
3. Hybrid technology performance is always high on web based or mobile based (app)
4. High scalable performance.
5. User as well as process level data security and authentication is very strong by OTP – Verify User – Reset Password Link…. etc.
6. Improve Data Integrity in various data base.
7. N number of Database and N – web server easily interconnect.
8. Handle N – Type of users.
9. Data presentation use various method of Data Mining and Data Analysis so easy to track product – users or other entity of project.
10. Its most hybrid technology so it can connect emerging concept like GPS – IOT – Scalable data mining… etc.

➢ **Disadvantages :**

1. Increase complexity when it developing phase.
2. High Skill requirement for all layers specially Presentation layer.
3. Maximum use of third party software so may be licence and copyright issues arises.
4. Manage multiple LAN for various entity like Production – Stock – Suppliers – Retailers – Customers… etc. so portability in network and security of network is must.
5. For financial transaction process validation and user authentication is must by OTP and verifying users.

Technology : Web Based : MVC in ASP.NET, Hybrid in PHP… etc. if real life examples are :

- IRCTC mobile app
- www.makemytirp.com
- www.trivago.com
- amazon
- flipkart….. etc.

❑ **Check Your Progress – 2 :**

1. _____ is task of Business Logic Layer in 3–tier architecture
   a. Data Updating b. Data Insertion
   c. Data Deletion d. Data Validation
2. In 3 – Tier architecture 2nd Layer known as _____.
   a. Business Logic Layer b. Client Layer
   c. Data Layer d. None of this
3. Full form of BLL is _____.
   a. Board Logic Layer b. Business Logic Layer
   c. Business Link Layer d. None of this
4. Full form of VPN is _____.
   a. Virtual Private Network b. Visual Private Network
   c. Virtual Process Network d. None of this
5. Online shopping websites are example of _____.
   a. 2 tier b. 3 tier c. N tier d. None of this

6.5 Let Us Sum Up :

All systems are vastly divided into three types of operations 2 league, 3 league and N– league architecture. Basically high position we can say that 2 league architecture is Client server operation and 3– league architecture is Web predicated operation. N– League architecture is Mongrel Web Predicated operations.

2 – League armature are Predicated on Client Garcon architecture. The two– league architecture is like client server operation. The direct communication takes place between client and server. There is no intermediate between client and server. Because of tight coupling a 2 tiered operation will run hastily.

The business sense league would be constituted by several orders of operation server clusters distributed by multiple data centres (some times VPN of supplier – distributer – retailers…. etc. all combined handled by BLL)

6.6 Answer for Check Your Progress :

- **Check Your Progress 1 :**

  1. (a) 2. (b) 3. (a) 4. (c) 5. (b)

- **Check Your Progress 1 :**

  1. (d) 2. (a) 3. (b) 4. (a) 5. (c)

6.7 Glossary :

1. **2 Tier Architecture –** Only Client and Server works as request and response process of any desktop application, Network application. It is very simple to build and easy to debug.
2. **3 Tier Architecture –** Client, Server as well as business logic layer involve in this framework. The main task of this layer is to validate the data before sending to server or database.
3. **N Tier Architecture –** Client, Server and so many other layers as well as third party involvement that create this system some what complex in term of hardware but this one is most efficient. Now a days Artificial Intelligence (AI), GPS , IOT… etc. technology involve in this architecture.

6.8 Assignment :

1. Write short note on 3 – Tier architecture in your words.
2. Comparison of 2 and 3 Tier architecture

6.9 Activity :

List out activities and response you get while you order in Online Shopping (E–Commerce) as N – Tier Architecture.

6.10 Case Study :

Detail comparison between 2 – 3 and N tier architecture in your words.

6.11 Future Reading :

1. Object–Oriented Systems Ambler, S. 1997
2. The client–server model, S smith, 2010

BLOCK SUMMARY :

In this block, you have learnt and understand about various Client side and server side applications along with their usage. The block gives an idea on the study and concept of Object Oriented User Interface Clients. You have been well explained with the concepts of various types of Server tools.

The block detailed about the basic of GUI and non GUI Clients techniques with illustrated examples. The concept related to Server Functionality along with its necessary services is well detailed to you. You will be demonstrated practically about various types of GUI Clients.

In the unit of Tier Architecture we learnt about process of request and response by Client and Server along with various types of new technology involve in 2, 3 and N Tier Architecture that focus you one emerging trend of technology

BLOCK ASSIGNMENT :

❖ **Short Questions :**

1. What is client/server model ?
2. Explain the features of Client Services.
3. Write note on Object Linking and Embedding.
4. Write short note on Server Request.
5. Advantages and Disadvantages of 3 Tier Architecture.

❖ **Long Questions :**

1. Write short notes on Client side services.
2. Write short note on Server side services.
3. Write note on Object Oriented User Interface Clients.
4. Explain N – Tier Architecture with it's Block diagram.

❖ **Enrolment No. :** ☐

1. How many hours did you need for studying the units ?

Unit No.	1	2	3
No. of Hrs.			

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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Dr. Babasaheb Ambedkar
Open University Ahmedabad

BCAR-403

CLIENT – SERVER ARCHITECTURE AND INTERFACES (C#)

BLOCK 3 : CLIENT SERVER DEVELOPMENT

CLIENT SERVER DEVELOPMENT

Block Introduction :

CASE tools along with execution methodologies that describe systems requirements repetitively with high as well as introductory user integration have been confirmed to essentially clarify analysis phase errors. Availability referred to a system uptime or potential of the system to be accessible for handing out information as well as undertaking its accepted work at whatever time it is called.

In this block, we will detail about the basic performance of network management issues with information on System Administration. The block will focus on the study and concept of various hardware in Client/Server System Development. You will give an idea on CASE tools.

In this block, you will made to learn and understand objectives of effective project management techniques. The concept related to data storage disk storages devices will also be explained to you. You will be demonstrated practically about PC level processing units.

Block Objectives :

After learning this block, you will be able to understand :

- Basic of System Development environment
- Concept of Productivity Measures
- Knowledge related to CASE tools
- Features related to Hardware/Network acquisition
- Idea about various service and supports in software
- Qualities of System Administration
- Features of Software Distribution
- Emerging technology like OPC UA involve with Microsoft .NET framework.
- OPC UA pros and cons with requirement in Client Server technology development.

Block Structure :

Unit 7 : Client Server System Development Software

Unit 8 : Hardware – Data Storage in Network

Unit 9 : Client / Server System Development

Unit 10 : Overview of OPC UA for Client Server

Unit 07

CLIENT SERVER SYSTEM DEVELOPMENT SOFTWARE

UNIT STRUCTURE

7.0 Learning Objectives :

After learning this unit, you will be able to understand :

- Basic of File systems
- Structure and file partition concepts
- Types of files
- Non–contiguous and contiguous storage allocation
- Idea about Disk scheduling

7.1 Introduction :

The Index Group announces that the Computer–Backed Software Development (CASD) as well as external technologies that velocity software prosecution are reproached hard 70 percent of the tope IT authorities examined as the foremost critical technologies to apply.

This current order of software tools assists associations admit fresh hastily by slashing the time it acquires to commence current operations along with bringing about them simpler to alter or admit. Old styles, sightlessly automating being homemade procedures, can quicken a company's death knell.

7.2 Factors Driving Demand for Applications Software Development :

CASE tools along with prosecution methodologies that describe systems conditions repetitively with high as well as introductory stoner integration have been verified to basically clarify analysis phase crimes.

Expect for Platform Migration as well as Reengineering of continuing approaches :

Aged along with present operations are being rightly revaluated as well as in several cases desisted when they do not expend off. A 16–percent lower in personal technology impulses had been benchmarked in 1993 likewise this direction will extend as associations flow to expose approaches along with workstation technology.

BPR (Business Product Resource) approaches to dwindle business approach cost along with complexity close–at– hand actuating decision– making obligation to those individualities who beforehand deal with the consumer or difficulty. Organizations are exercising the customer/ server to carry information to the plant of amped workers.

Need for a Common Interface across Platforms

Graphical user interfaces (GUIs) that authorize a similar appearance along with experience as well as frontal– end operations that negotiate antithetical operations are on the heighten.

Concurrently superior significance to the single– system appearance consideration is that every consumer from every workstation acquire approach to every operation for which they cleave a desire as well as right without honor to or heedfulness of the technology.

Increase in Applications Development by Users

As workstation energy advances in addition bones–per–MIPS (Million Instructions Per Second) decline, fresh energy continues flowing into the assistants of the end user. The Index Group descriptions that end stoners are also and now conducting fresh than one–third of operation development; IT departments are rehearsing fresh analogous a benefit. This continues the after–effect of IT department group experience the shrink of conservation systems that restrain programmers from meeting critical backlog demand for new development.

❑ **Check Your Progress – 1 :**

1. BPR stands for _____.

   a. Business process reengineering b. Business product resource

   c. Basic Product Research d. None of These

2. CASD stands for _____.

   a. Computer Aided Software Development

   b. Com Aid Sap Data

   c. Computer Aided Software Device

   d. None of These

3. GUI stands for _____.

   a. Grand User Introduction b. Graphical Useless Interface

   c. Graphical User Interface d. None of These

4. Organizations are utilizing the _____ to carry information

   a. Internet b. Small Network

   c. Client / Server d. None of These

5. MIPS stands for _____.

a. Million Instruction Per Second b. Mass Instruction Per Second

c. Million Instrument Per Second d. None of These

7.3 Client/Server System Development Methodology :

The purpose of a methodology is to describe a disciplined process through which technology can be applied to achieve the business objectives.

Methodology should describe the processes involved through the entire life cycle, from BPR and systems planning through and including conservation of systems in product.

These companies offer methodologies tuned for the customer/ server computing terrain. Still, every methodology has its own strengths, which are important to understand as part of the systems integration seller selection process.

The following table depicts the details of the major conditioning of each stage of the systems integration life cycle methodology.

SILC Phase	**Major Activities**
Systems Planning	Initiate systems planning
	Gather data
	Identify current situation
	Define requirements
	Analyze applications and data architectures
	Analyze technology platforms
	Prepare implementation plan
Project Initiation	Screen request
	Identify relationship to long–range systems plan
	Initiate project
	Prepare plan for next phase
Architecture Definition	Gather data
	Expand the requirements to the next level of detail
	Conceptualize alternative solutions
	Develop proposed conceptual architecture
	Select specific products and vendors
Analysis	Gather data
	Develop a logical model of the new application system
	Define general information system requirements
	Prepare external system design
Design	Perform preliminary design
	Perform detailed design
	Design system test
	Design user aids
	Design conversion system

Development	Set up the development environment
	Code modules
	Develop user aids
	Conduct system test
Facilities Engineering	Gather data
	Conduct site survey
	Document facility requirements
	Design data center
	Plan site preparation

7.4 Project Management :

Multitudinous ingredients do well to a design's successfulness. One of the foremost necessary continues bedding a productive design administration along with reporting medium. Sound design control behaves not only advance the chance of getting planned design approaches likewise also advance a performing circumstance where the morale continues broad as well as the alertness endures polychromatic. This is characteristically disparaging moment when technology is wherefore liquid and the anticipation for banning the inventor from the specific technology is so meaningful. The objects of effective design operation are as listed below :

1. Plan the project :

- Define project scope
- Define deliverables
- Enforce methodology
- Identify tasks and estimates
- Establish project organization and staffing
- Document assumptions
- Identify client responsibilities
- Define acceptance criteria
- Define requirements for internal quality assurance review
- Determine project schedules and milestones
- Document costs and payment terms

2. Manage and control project execution :

- Maintain personal commitment
- Establish regular status reporting
- Monitor project against approved milestones
- Follow established decision and change request procudures log and follow up on problems

3. Complete the project :

- Establish clear, unambiguous acceptance criteria
- Deliver a high–quality product consistent with approved criteria
- Obtain clear acceptance of the product

Current methodology which can be customer/ server posed heavy weighted on armature describing sphere. Due to lower experience in creating customer/ server results will mix with fresh paradigm quality by stoner which makes possible for needed prototyping of operations. Similar features will affect in redefining of armature which is cheap as well as correct as per rearmost technology.

The tools for prototyping in the customer/ server platform are important enough that prototyping is constantly briskly in determining stoner conditions than traditional modeling ways were.

7.5 Architecture Definition :

The idea about armature while designing shows that operation armature will have varied technology platform for running an operation. In order to choose an operation architecture, you should estimate firstly the demand and necessity of priorities. Certain priorities must consider and weight for following criteria :

- **Cost of Operation :**

Initially the company should have all the answers related to cost involvement.

The cost is required for carrying all functions related to:

- Trained STAFF
- Computer literate
- Cost to user

There are many questions in terms of cost involved in company which lead to :

- Occasional users
- Scary user
- Users with little patience
- Public situation regarding training to users
- Effect on user creating mistakes

- **Response Time :**

It is another important aspect which describes :

- real speed requirement
- utilizing full time
- impact due to non timely response
- effect of response lag

- **Availability :**

In this, the company used to sense for actual needs which will be calculated based on number of days with number of working hours.

- **Security :**

It is related to actual security requirement.

- **Flexibility to Change :**

This involves the flexible time needed to change an application change which depends on various factors :

- marketing priorities
- legislative changes
- technology changes driving the system

➢ **Use of Existing Technology :**

It concerns with present investment and is dependent on growth capabilities which involves conservation and support issues.

➢ **System Interface :**

It involves types of system demanded for particular operation which can be internal or external and can be altered.

These operation armature issues must be precisely estimated and counted from a business perspective. Only after completing this process can directors legitimately review the specialized armature options. They must be suitable to justify the technology selection in the way it supports the business precedences

Once directors understand the operation armature issues, it becomes applicable to estimate the specialized armature options. Notice that staff aren't yet opting product, only architectural features. It's important to avoid opting the product before purchasers understand the birth conditions.

7.6 System Development Environments :

Just one time after defining an association, an operation along with specialized structure along with asked tools involves certain step that explains how to apply certain tools. It seems that inventors won't come good system builders as they carry effective set of tools which are good as their development terrain explains about tools operation.

It's admit that SDE (Software Development Mastermind) carries tackle, software, interfaces, norms, procedures along with training which gets accepted and are applied using an enterprise in order to optimize its information systems support which is framed for intended planning, operation along with operations.

- Architecture explanation designed to select fixed technology platform.
- Interfaces that isolate the user and developer from the specifics of the technical platform should be used to support the creation of a single system image.
- Standards procedures be explained and developed to give applications with good appearance.
- Continuous components gains productivity that handle single–system image.
- Training programs will assure users with developers to know more on environment.

The SDE will include several phases of systems development life cycle that gets bedded along with desktop which gives strong redundant tools for workstation druggies which a lot in colorful features of having an information.

An significance from SDE involves conscious trouble made to produce applicable factors. With the mistrustfulness neighboring product selection for customer/ server operations moment, the payment by means of SDE will cut off the inventors from technology that are important. Certain factors gets included in SDE which are setup by an association:

- **Built–in Navigation :**

All process applies analogous process which needs to move among processes. In this, process gets linked to coming process with available processes. A business critic likewise, not inventor go with navigation explanation. Every stoner and every inventor also views navigation in the same way.

- **Standardized Screen Design :**

It's noted that every norms are in position for every type of functions likewise certain defenses gets formed by dereliction business process. Druggies along with inventors gets familiar with several defenses applied for help, add, change, cancel and view likewise table operation functions.

- **Integrated Help :**

All the same, environment–sensitive help out service that act in response to the correct problem present in the business process. Then none of the programmer development will be entertained. It's noted that end– stoner along with critic that understands the operation view of system stoner given to help textbook which is maintained by stoner after system is in product.

- **Integrated Table Maintenance :**

Tables are designing conception of program which calls for standard reference data which can be program error canons, printer control canons and so on that gets stored in single set of lines or databases. It's seen that individual table conservation function is given for several operations in an association. Then programmers along with druggies just call upon its services make operations to partake with standard tables.

- **Comprehensive Security :**

It's noted that individual security profile is handled for every honored stoner where navigation is connected to security where druggies have options which can be applied for farther use. Then all programmer with stoner contains analogous security installations that are handled by authorized stoner which applies for maintaining table installations.

- **Automatic View Maintenance :**

It's noted that defenses are created, navigated is needed and architecture of programs that are created on base of security profile along with business requirements for particular process. The inventor doesn't have to write special law to prize data from the database. All access is generated grounded on the defined business processes and security.

- **Standard Skeleton Programs :**

It seems that critic will answer particular questions which is attained as figure program for all business process having point like standard functions which is demanded by programmer.

7.7 Productivity Measures :

It's examined that there are numerous experimenters that carry needed existential examinations in order to conclude that numerous software development quality, tool, system or certain grouping carries important collision on software product. Certain studies first and foremost will stress on expansion of LSS where main software effectiveness dimension studies get re–examined together with global spots. In adding together, numeric other academic with experimental

studies of programmer effectiveness, cost– benefit disquisition, software cost judgment, along with software product improvement program needs to be consider again. Concertedly, similar studies make available as approximately–predicated foundation that identifies numerous design which describes similar influence software productivity.

Presently, numerous reasons are there to measure software productivity that was reported. The idea behind this is to find how to lower the software development costs, bettered software quality along with perfecting rate at which software is created which includes :

- Increasing volume of work from present staff
- Do similar amount of work with smaller staff
- Develop products of more complexity value with similar staff workload
- Avoiding getting extra staff to increase work
- Rationalize higher levels of capital–to–staff investment
- Lower error volume in deliver products and lowering amount of time with effort required to alter software errors
- Straight or downsize software production operations
- Finding required product defects before the development
- Finding resource utilization patterns to find production bottlenecks and underutilized resources
- Find high–output personnel to receive rewards
- Find low–output personnel for extra training or reassignment.

It's noted that there are different reasons for measuring software productivity. It isn't desirable to try to achieve for the utmost part or all of these objects through a single effectiveness capacity program. For illustration, unlike people concerned in a large software design may charge definite of these option further than others. in the same way, each option involve definite kinds of data be together.

Programmer or director tone– reported data are the fewest precious to bring contemporaneously, indeed though they may be of amiss correctness. On the other hand, if effectiveness measures are to be applied for help assessment, also one shouldn't look forward to far below ground trustability or strength in tone– reported data. In same way, if productivity measures are employed as base of allocating coffers or prices, also the data journalists will have an incitement to ameliorate their reported product values.

Indispensable, by egging software product, degree of implicit handed for useful information to design directors with inventors to grease perfecting their knowledge along with experience over time. External spectators bring together similar information with lower cost than tone report. Also, motorized product performance observers used, but this is still an arising area of technology taking further sapience for what should be measured and how.

❑ **Check Your Progress – 2 :**

1. SDE stands for _____.

   a. Software Development Engineer b. Software Disk Error

   c. Software Device Enlargment d. None of These

2. A process gets identified to next _____ with available _____ in system analyst

   a. Process, Process b. Process, Method

   c. Network, Data d. None of These

3. In productivity management Increasing _____ of work from present staff

   a. Time b. Salary c. Volume d. None of These

4. Finding required product defects before the development

   a. Quality b. defects c. Client/Server d. None of These

5. Ability to link various module with each other by _____ in client level

   a. Navigation b. Cost c. Quality d. None of These

7.8 Let Us Sum Up :

In this unit we've learnt that Index Group for Computer– Backed Software Development using external technologies shows software prosecution with affiliated top IT authorities. In this we see that CASE tools using prosecution methodologies describe systems conditions with high introductory stoner integration having verified to basically clarify analysis phase crimes.

The purpose of a methodology is to describe a disciplined process through which technology can be applied to achieve the business objects. It's seen that numerous ingredients do good to design's successfulness as it's foremost necessary that bed productive design administration with reporting medium.

The idea about armature while designing shows that operation armature will have varied technology platform for running an operation. In order to choose an operation armature, you should estimate originally the demand and necessity of precedences. Just one time after defining an association, an operation along with specialized structure along with asked tools involves certain step that explains how to apply certain tools.

7.9 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (b) 2. (a) 3. (c) 4. (c) 5. (a)

❑ **Check Your Progress 2 :**

1. (a) 2. (a) 3. (c) 4. (b) 5. (a)

7.10 Glossary :

1. **CASE Tools –** Tools that shows systems needs continuously using high integration clarifying analysis phase errors.
2. **Client/Server Applications –** Client processing demands on client processor with server that uphold protected mode.

7.11 Assignment :

Explain the objectives of effective project management.

7.12 Activities :

Study about System Development environment.

7.13 Case Study :

Study about Hardware/Network acquisition.

7.14 Further Reading :

1. Boehm, B. W., "Improving Software Productivity", Computer, 20(8), 43–58, 1987.
2. Scacchi, W., "Understanding Software Productivity", Advances in Software Engineering and Knowledge Engineering, 1995.
3. Boehm, B. and R. W. Wolverton, "Software Cost Modelling : Some Lessons Learned", J. Systems and Software 1(1980).
4. Bailey, J. and V. Basili, "A Meta–Model for Software Development Resource Expenditures", Proc. 5th. Intern. Conf. Soft. Computer Society, (1981).

Unit
08

HARDWARE AND DATA STORAGE IN NETWORK

UNIT STRUCTURE

8.0 Learning Objectives :

After learning this unit, you will be able to understand :

- About Basic of CASE with Client / Server System of Hardware
- About Hardware Network acquisition with workstation of Unix Hardware
- About cross platform process for Client / Server
- About How to manage Data storage for Client / Server ?

8.1 Introduction :

In Customer/ Garçon armature tackle and its perpetration is veritably important for System Development. When we talk about Customer/Garçon it is necessary to concentrate on computer network accession. While data commerce between Customer and Garçon network path, colorful operating system like Unix, Linux and Numerous point to concentrate on Customer/ Garçon Architecture. Eventually as we know till this part Data Storage is part of Garçon.

With well–known with effortlessness of operation development on the workstation will not recognize paper or optical models of their operation. They can only completely dream of result model when they can touch and feel it. This is the advantage of prototyping, which provides a real touch and feel. Incremental from this, foremost stages of result conceptualization, tools for prototyping ought to be created by means of similar products that are applied for product development.

8.2 CASE :

CASE tools are created on enterprise model of procedure which are motorized where systems integration takes with software development. Similar abecedarian bid model applied by CASE is critical to tool's convenience. Tools foundation grounded on deprived model will witness on or after poor integration which aren't able to handle precise order of information which involve photocopy data entry that won't has multitudinous critic– inventor brigades along with to non elastic sufficient which handle growing new ways for identify and erecting systems results. Tools having inadequate models boundary with their druggies able of development capacities.

In all most important CASE products serve applied in customer/ garçon surroundings uses Intel 486–grounded workstations that will serve at 60 MHz or quicker with 16–24 M bytes of memory with 260 M byte hard disks along with UNIX workstations of similar size that are hardly essential. Thus, combining tackle using CASE software costs raised CASE costs up to$ per stoner workstation/ outstation.

Unluckily, a regular reassess of accessible CASE products shows that nothing creditably make available clear support for development of customer/ garçon operations along with GUIs. Similar type of short support takes place in malignancy of the information which serve as network– grounded operations having development of host– grounded operations. There's substantial motivation to make up products with intention of holding up customer/ garçon model. The Bachman tools are in frontal position in this area for reason that their focus on sustain for business procedure reengineering. With lots of customer/ garçon request being ported from a minicomputer or mainframe, the capacities to use again the live models and to turn round mastermind the databases are extensively important and timesaving features.

It appears likely that no sole seller will make up best–integrated tool for entire system's life cycle. As an volition, in probable state of affairs, inventors mix the stylish products from relatively lot of merchandisers. IBM envisions this situation in their Announcement/Cycle creation line by Computer Associates in CA90 products and by NCR in their Open Cooperative Computing series of products.

A supplementary innovative development is passing as CASE tools like the Bachman products are individual integrated with development tools from other merchandisers. These development tools, used with an SDE, allow operations to be prototyped and also reengineered back into the CASE tool to produce process and data models. With the power of GUI–grounded development surroundings to produce and demonstrate operation look and feel, the prototyping approach to rapid–fire operation design (RAD) is the only cost–effective way to make customer/garçon operations moment.

Druggies well–known with effortlessness of operation development on the workstation won't fete paper or optic models of their operation. They can only fully dream of result model when they can touch and feel it. This is the advantage of prototyping, which provides a real touch and feel. Piecemeal from this, foremost stages of result conceptualization, tools for prototyping ought to be created by means of analogous products that are applied for product development.

8.3 Client/Server System Development–Hardware :

Entry–position customer workstations can extent from an abecedarian Intel–grounded PC to an entry–position Apple Macintosh or anX–Terminal. These entry– position guests commence at about$ likewise exercise LAN waiters for imprinting, backup, software accumulation, operation coercion, as well as WAN connectivity. High–end customer workstations can amount fresh than $ for engineering stations that assign fortified capacities similar as a gigabyte or fresh of original storehouse, high–resolution plates observers, 100–MIPS processing, direct WAN connectivity, 1000–dpi color printing, or authoritative multimedia prosecution tools. The conventional customer workstation has compressed from $ 5000 to $ 2000 in the concluding two times. This acquires an appearance with the processing power indistinguishable to an 8Mbyte Intel 33–MHz 486DX PC with immediate storehouse of 250 M bytes, LAN connectivity, along with a VGA–original examiner. This quantum order isn't restrained to deteriorate important in addition, on account of GUI software as well as reengineered operation constraints commission steadily elevate the processing power demands for entry– position machines.

Garçon tackle approaches the largest as well as foremost complicated set of options. Waiters plunge the arrangement from a$ 30M conventional IBM mainframe, to a 4–to 16– way symmetric portion multiprocessor machine, to a 32–to 32767–processor heavilynon–convergent cluster admitting hundreds of druggies, to a$ PC exercised to assign train along with connectivity services for a compact LAN workgroup. Multitudinous associations also have customer/ garçon operations that exercise the benefits of prevailing IBM 370 mainframes plunging VM, MVS, or VSE, DEC VAX minicomputers running VMS or Ultrix, along with stupendous RISC– grounded systems actuating UNIX – each as high–end waiters.

External mainframe as well as minicomputer tackle platforms, pacing personal operating systems, are constantly exercised in terminal fake condition from the customer workstation. Thenon–IBM as well as DEC personal operating system platforms sometimes are exercised to assign outside services, like as database as well as RPC–invoked operation services. There continues a miss of tools doable in these surroundings to develop or accumulate customer/ garçon operations. Waiters grounded on the IBM, DEC, along with UNIX operating systems consideration assign operation services employing continuing operations through terminal emulation or RPC–invoked operation services. These original waiters will assign connectivity along with database services to the original customer/ garçon operations in an association.

Connectivity requires every customer workstation to be connected to a LAN or through a WAN to a remote garçon. In the usual situation, the workstation is connected through an Ethernet, Token Ring, FDDI, CDDI, or sometimes a resemblant or periodical interface to the LAN. The primary connection types bear a network interface card (NIC) to be fitted in the workstation to give the protocol processing necessary to establish and maintain the connection. The cost of LAN connectivity has declined fleetly in resemblant with the assiduity reduction in workstation costs.

Cabling costs vary extensively, depending on the physical difficulty of installation and whether the network itineraries choose unshielded crooked–brace (UTP), shielded crooked– brace (STP), or glass– fiber lines. Cable costs

without installation run from $ 1 per bottom for UTP, $ 1.50 per bottom for STP, to $ 3 per bottom for glass fiber. Installation costs vary from$ 1 per bottom to $ 15 per bottom, depending on the physical terrain and connection conditions. Glass– fiber termination outfit is more expensive than crooked–brace, although the costs are declining. Current costs are between $ 100–200 for Ethernet, $ 300–500 for Token Ring, $ 300–700 for CDDI, and $750–1250 for FDDI.

Presently, multitudinous merchandisers deliver the tackle for these connections. Each seller attempts several benefits in terms of cost, action, as well as fidelity. Motorola ascribes wireless Ethernet connectivity at consolidate pets along with advanced charges than wired connections. Wireless connections are a benefit in breathing structures with no string connected likewise with fairly low– speed dispatches constraints.

Pasty connectivity needs each workstation to be articulately fixed to the WAN or to a dispatches garçon composite to the WAN. Maximum contemporary LANs are established enforcing dispatches waiters. There are costs, operation, as well as particularly network operation inducts for exercising a LAN dispatches garçon. A considerable benefit accumulates since there's no anticipate to string each workstation to the WAN. Workstations that are autonomously attached to the WAN accreditation an implanted regulator card for chronological dispatches including both a modem and periodical connection for asynchronous dispatches. These surely conduct at pets of 2400–64000 bits per second (bps) skewered analog or digital modems. Each workstation necessary has its own string joining it to the Pasty regulator. Workstations fixed to the WAN fulfilled a dispatches garçon impute a advanced– speed connection, clearly 14400 bps, 56000 bps, or 1.54 Mbps.

8.4 Hardware/Network Acquisition :

Before, opting customer tackle for end druggies makes associations to define with standard for classes of druggies. Similar set of norms simplify collection of suitable customer tackle demanded for stoner which allow buyers to organize copping agreements to increase volume of price abatements.

Accessibly, there are numeric issues to suppose about while opting customer workstation as well as processor type, coprocessor capability, internal machine structure, size of base unit and so on. Still of issues, one of main overlooked with respect to customer/ garçon operations is use of GUI. GUI operations needs VGA or better screen motorists where defenses should be larger than 15– inch standard that should be mandatory for druggies who generally have numerous active windows at single time. Along with this, windows active on– screen, larger the examiner viewing area, more will be the image operation, plates or full– stir videotape resolution. It's important to keep in mind that effectiveness is oppressively exaggerated by incapacity simply to read screen. Infelicitous resolution will lead to prostration and incapacity.

The bid on office needs to have needed bandwidth that's accessible to supply receptiveness to desktop user. However, router grounded internetworking is mandatory, If usual entrance to out LAN data is necessary. However, islands can be applied, If occasional off LAN contact is necessary. Routers give fresh advantage of supporting multiprotocol internetworking which is essential as associations put 10BaseT Ethernet in active Token Ring terrain. Fast Ethernet and FDDI are getting more common as multimedia operations are set free.

❑ **Check Your Progress – 1 :**

1. What is the full form of CASE tools ?
   a. Computer acquired software enable tools
   b. Computer aided software engineering tools
   c. Computer abled software enable tools
   d. None of These
2. We can connect client / server workstations by using _____.
   a. Ethernet b. Token Ring c. FDDI d. All of These
3. _____ is the more secure in term of data security and user restrictions
   a. Extranet b. Internet c. Intranet d. None of These
4. Full form of UTP
   a. Universal Top Post b. Unshielded Twisted Pair
   c. Unshielded Tower Post d. None of These
5. While selecting client workstations we should take care of _____.
   a. Processor Type b. Coprocessor Ability
   c. Internal Bus Structure d. All of These

8.5 PC Level Processing Units :

Customer/garçon operations bumble consequentially in their customer processing demands likewise their I/ O demands on the customer processor along with garçon. In common, guests that uphold defended–mode appealing should be acquired. This denotes the function of 32– bit processors – maybe with a 16– bit I/ O machine if the I/ O condition is low. Low describes the customer is not impelled to shoot as well as acquire stupendous quantities of data, analogous as images, which could be 100K bytes or enlarged, on a fixed condition.

As multi windowed as well as multimedia operations suit habitual in the course of 1994, multitudinous operations will dictate the bandwidth sole stationed by a 32– bit I/ O machine easing VESA VL– machine or Intel PCI technology. Windowed operations dictate critical processing power to assign permissible response situations. The opening of operation integration via DCE, OLE, as well as DOE indicatively advances the medium demands at the desktop. The approved minimum configuration for desktop processors acquires the processing breadth of a 33Mhz Intel 486SX. Proximate early 1995, the minimum demand will be the processing proportions of a 50Mhz Intel 486DX or a 33Mhz Intel Pentium.

➢ **Macintosh :**

The Mac System 7 operating system is visually intuitive and provides the stylish productivity when response time to GUI operations is secondary. The Motorola 68040, 8Mbytes RAM, 120Mbyte fragment is recommended. By early 1995, the vacuity of PowerPC technology and the integration of System 7 with AIX and Windows means that druggies will need vastly further processor capacity. Fortunately, the PowerPC will give this for the same or lower cost than the being Motorola technology.

➢ **Notebooks :**

Consumers operating ever on a conventional condition may assess that a tablet computer more satiates their demands. The tablet computer continues the fastest developing business present. The contemporary technology in this arena endures doable for Intel PC, Apple Macintosh, as well as SPARC UNIX processors. On account of scrapbooks ar e"miniaturized," their fragment drives are frequent not differing to full–size desktop units. Thus, the fairly slower speed of fragment I/O on scrapbooks brings about it preferable to establish addition RAM, developing"virtual" fragment drives.

A negligible configuration endures a processor with the identical processing power of a 33Mhz Intel 486SX, 8mbytes of RAM as well as 140Mbytes of fragment. In accumulation, the tablet with battery should compare lower than seven pounds also embrace a battery life of three hours. Color uphold continues a selection throughout 1994 likewise will be mandatory for complete near 1995. In expansion, if the operation will plunge a insulated GUI, it continues witching to establish software to compact the GUI as well as V. 32 modem dispatches at 9600 bps or V. 32bis at 14400 bps, applying V. 42 as well as V. 42bis contraction, independently. The productive outturn continues two to three times the baud rate motive of contraction. The operation of MNP4 as well as V. 42 or MNP5 also V. 42bis disfigurement correction authorizes these pets to serve consequentially indeed throughout noisy line conditions. The preface of PCMCIA technology, credit card size modems, and flash memory are available to upgrade the tablet.

➢ **Pen :**

Pen– grounded consumers impute the capability to exercise operations employing a pen to van further choose or correspond without anticipation for a mouse or keyboard. Generally, they're conducted for blessing, selection, as well as examination operations where selection checks are attainable. Developers employing this technology grease object– acquainted software approaches that are RAM–ferocious.

The forward of particular digital adjunct (PDA) technology in 1993 embraces released the request to compact size computing. For the time being, in 1994, this technology will developed with fresh storehouse understanding through cheaper, thick RAM as well as flash memory technology. The screen industriousness will correct, as well as operations will be created that aren't contingent upon cursive jotting recognition.

The PDA business continues price–sensitive to a$ 500–$ 1000 device with the aptitude to gallop a Windows–like operating arrangement in 4 MB of RAM, a 20Mhz Intel 486SX processor, also 8 MB of flash memory. Appliances with this capability will conduct in 1994, as well as meaningful approaches distant particular journals will be in employment. For the time being in 1995, 16 MB of RAM as well as 32 MB of flash memory will commence to arise, agreeing these bias to measure a complete request far 1996. In composition with wireless technology approaches, this will profit the private information source for electronic news, magazines, books, besides so on. Your electronic Personal Wall Street announcement will approach you for opening on your PDA.

8.6 Unix Workstation Server Hardware :

UNIX customer workstations typically are applied in similar case when customer processing conditions are more. It's plant in certain operations that need of UNIX, X–terminals which is joined across UNIX donation garçon will be preferred by the guests. It's typically seen that:

- UNIX client workstation carries several working power as compared to normal computing device client.
- With the start of software from SunSoft, Insignia Solutions as well as Locus Computing, it seems that these companies support execution work of DOS along with Windows 3.x applications which is available in UNIX window that makes UNIX desktop present to user needs software from both environments.

Client Server System Development Software

8.7 Data Storage :

It's seen that fixed storehouse requirements are specific to particular operation along with volume of fragment storehouse with certain issues that exists in terms of performance as well as trustability. There are certain fragment warehouses bias similar as:

➢ **Magnetic Disk :**

- Disk storage uses SCSI–2 standard controller interface.
- Shows best performance in standards environment.
- Deliver by vendors having good capacity, performance as well as reliable disk devices for controller.
- Using high–capacity cache storage will rapidly increases in performance.
- Latest SCSI–2 controllers with configurable having 266K cache.
- It is an important component of architecture.
- It carries latest drives standard 3.6 sizes with 1.0–1.6Gbyte capacity.

We see that working of compression software will double the capacity. If the size of GUI software increases then use of multimedia applications will comes in demand for high disk capacity during 1994 and beyond.

➢ **Mirrored Disk :**

When operations stipulate expansive responsibility, it may be befitting to conduct features that uphold duplicated disks. With this features, details exists automatically recorded to two disks. This authorizes the operation to sustain indeed if a failure develops on one fragment.

System lines along with illustrations lines should be approached for mirroring. Indeed likewise system lines are constantly read– only, the quantum of druggies infected by attainability of the lines may clarify this intemperateness. In accession, exertion can advance on account of binary reads can be experienced in resemblant.

➢ **RAID–Disk Array :**

Conventional Glamorous fragment knowledge is over and over again appertained to as sole great precious fragment. Extremely high donation as well as high availability can be fulfilled through a laid off array of nicely priced

drives. These grease data lines to be extended across colorful physical drives where data can be reflected as part of the configuration.

RAID moxie will make available a significant performance enhancement for the reason that numerous corresponding I/ O operations can be rehearsed at same time. Elevated capacity caches applied in combination with RAID technology to negotiate utmost favourable recital. The size will be linked as part of the armature description.

- **Tape :**

Although most permanently stored data uses disk, tape is a very popular form of low–cost magnetic storage and is used primarily for backup purposes.

The standard backup vid device moment is digital audiotape (DAT). These videotapes give roughly1.2 Gigabytes of storehouse on a standard cartridge–size mail vid. Vid is a successional medium and doesn't adequately support direct (arbitrary) access toinformation.However, distribution of information by posting videotapes can be a cost–effective dispatches medium for large amounts of information that don't bear real– time transmission or availability

If an association standardizes on a single vid format and technology..

- **Optical Disks :**

Optical disk storage technology provides the advantage of high–volume, economical storage with somewhat slower access times than traditional magnetic disk storage.

- **CD–ROM :**

Compact disk–read only memory (CD–ROM) optical drives are used for storage of information that is distributed for read–only use. A single CDROM can hold up to 800 MB of information.

- **WORM**

Write Formerly, read numerous (WORM) optic drives are used to store information that's to be written to fragment just formerly but read numerous times. This type of storehouse is constantly used to library data that shouldn't be modified. Traffic tickets issued by police departments are scrutinized and stored on WORM drives for reference on payment or remitment. The WORM technology guarantees that the image can not be tampered with. A glamorous drive can be used to store an indicator into the data on the WORM drive.

- **Erasable Optical :**

Erasable optical drives are used as an alternative to standard magnetic disk drives when speed of access is not important and the volume of data stored is large.

- **Network Interface Cards :**

Customer and garçon processors are attached to the LAN through NICs. These give the physical connectivity to the line and the protocol support to shoot/ admit dispatches. The most popular network protocols moment are Token Ring, Ethernet, and FDDI.

- **Power Protection Device :**

A lot has been written in books, magazines, and journals about computer tackle and software; and a number of computer specialty businesses are devoted to helping you work through issues of specific concern to your business objects.

❑ **Check Your Progress – 2 :**

1. Client server applications can be run on _____.

   a. Windows OS b. MAC OS c. Both of these d. None of These

2. PDA stands for _____.

   a. Personal Digital Assistance

   b. Problem Digital Assistance

   c. Personalize Directory Assistance

   d. None of These

3. UNIX workstations are applied wher _____.

   a. There are more processing requirements from client

   b. More working power as compared to normal computing device client is required

   c. Both of These

   d. None of These

4. What is NIC ?

   a. They are magnetic disk drives

   b. NIC helps to attach client and server process through LAN

   c. It is optical drive

   d. All of These

5. Full form of NIC

   a. Network Interchange Card b. National Information Cross

   c. Network Interface Card d. None of These

8.8 Let Us Sum Up :

The main purpose of a methodology is to describe a disciplined process through which technology can be applied to achieve the business objects. It's seen that numerous ingredients do good to design's successfulness as it's foremost necessary that bed productive design administration with reporting medium.

The idea about armature while designing shows that operation armature will have varied technology platform for running an operation. In order to choose an operation armature, you should estimate originally the demand and necessity of precedences. Just one time after defining an association, an operation along with specialized structure along with asked tools involves certain step that explains how to apply certain tools.

8.9 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (b) 2. (d) 3. (a) 4. (b) 5. (d)

❑ **Check Your Progress 2 :**

1. (c) 2. (a) 3. (c) 4. (b) 5. (c)

8.10 Glossary :

1. **CASE Tools –** Tools that shows systems needs continuously using high integration clarifying analysis phase errors.
2. **Client/Server Applications –** Client processing demands on client processor with server that uphold protected mode.

8.11 Assignment :

Explain about CASE tools in details

8.12 Activities :

List out Data Storage and it 's Detail Comparisons in your words

8.13 Case Study :

WROM in Data storage

8.14 Further Reading :

1. Boehm, B. W., "Improving Software Productivity", Computer, 20(8), 43–58, 1987.
2. Scacchi, W., "Understanding Software Productivity", Advances in Software Engineering and Knowledge Engineering, 1995.
3. Boehm, B. and R.W. Wolverton, "Software Cost Modelling: Some Lessons Learned", J. Systems and Software 1(1980).
4. Bailey, J. and V. Basili, "A Meta–Model for Software Development Resource Expenditures", Proc. 5th. Intern. Conf. Soft. Computer Society, (1981).

Unit 09

CLIENT/SERVER SYSTEM DEVELOPMENTS

UNIT STRUCTURE

9.0 Learning Objectives :

After learning this unit, you will be able to understand :

- Concept of I/O devices
- Understand about Bus Architecture
- Detailed regarding features of DMA controlled I/O
- Basic of Input Output Programme
- Idea of DMA Channels

9.1 Introduction :

Transformations are approaching for the desktop guests. At several allowed time, top associations acquire a combination of customer types. The" heavy–set customer "acquires better of its program sense as well as data accumulated on its own hard drive. The" narrow customer" acquires foremost of its operating software from the server. Gartner type acquires chased the identity " ultra lite "for Web guests without procedure sense or data. Ultra lite guests do not acquire to be impotent. They library be considerable, graphical installations that conduct from a remote server.

The ultra lite customer continues praying on account of dependently its comfort of administration. Operations as well as data are efficiently conceded in a core position. Likewise, this methodology exhausts stupendous allotments of bandwidth. LAN– attached druggies will embrace to flow up to briskly

topologies along with exchanging tackle. Remote services with ultra lite guests will no longer be suitable to operate across 56Kb lines.

The mobility of clones, graphical data, as well as program law continues formerly detainments on T1 lines. Respectable exertion authorizations harmonious faster transmission mediums, along with their bending advanced costs.

At the contender end, the heavy– set customer archetypal demonstrates different problems. Data replication and synchronization between thousands of workstations is a abecedarian issue. This problem is farther exacerbated by replicating to telephone–in mobile druggies.

The thin customer provides middle ground for numerous associations now. Operations run on the customer, and the data resides on a remote server. Both the thin and fat guests bear individual software licenses. Neither can take advantage of software metering from an operation server.

9.2 Service and Supports :

Personal computer users in the past have dissimilar prospect. In earlier period, condition subsequent to hour operational on worksheet makes the system to get suspended where power fails and further virus will reboots the machine, when users without doubt experience exasperated but not actuality astonished.

Also, by means of companies so as to have effused further than single–stoner PC request which likewise squeeze networking where druggies in the History have been more broad–inclined of lower quantum of exact principles. For case, the systems which costs to handle circulated set of connections of PCs along with waiters which will be 10 to 30 fresh as compared to handling minicomputers along with mainframes. Other studies have claimed costs are double. This advanced cost is the cases as soon as LANs develop along with operations are put together with no an architectural view along with applicable norms to hold up the design.

By means of moving customer/ server computing, the need for mainframe–suchlike performance from customer/ server infrastructures tends to raised. Condition enterprises are going down to shift the business of the pot into the customer/ server world, mainframe prospects will succeed in addition to mainframe support which should be rendered.

Ultramodern understanding with ever handled LAN operations shows that costs are analogous to or smaller than costs for conventional mainframe operations. Successful remote operation involves systems along with operation infrastructures that look forward to necessity for isolated operation

9.3 System Administration :

Analogous to numerous effects in life, the standard of doing right first time signifies long– term accomplishment of customer/ server operation. Thus, it's significant to make sure that customer/ server tackle is particular along with assembled as per needed organizational norms which can be checked before the starting. As seen, originally the software gets loaded by experience staff which gets tested in order to insure that it gets installed as per norms along with anticipation of work. It's noted that numerous stoner problems do due to incorrect installation along with outfit which appears out of order during installation. Numerous LAN administration struggle gets saved by correct structure which is handled by good installers.

9.4 Availability :

Vacuity appertained to as system uptime or eventuality of the system to be accessible for handing out information as well as bearing its accepted work at whatever time it's called. Minicomputer in addition to mainframe data centres ought to make available at fewest 99 vacuity as per rearmost technology. Similar position of vacuity can be attained by admixture of specialized as well as practical way goes before. It's noted that numerous vacuity failure at present is embedded by mortal error. In order to lower this, data centers should put into practice inflexible measures just to administer change.

It's claimed that if the change is tackle, network, system, operation software, strict procedures to request, validate, test along with prosecution of change that are explained and stick on to. Pull out procedures explains along with test so as to make sure that in case of lapse occurs posterior to performing of revision, the data centre be suitable to fall back to its antedating position.

Specialized description which can be break up electrical power resource, countersign diesel creator as well as battery power resource, laid off processors along with glamorous fragment bias are applied to make sure that breakdown of a single element won't take down data center. Veritably significant systems use fault–tolerant processors on or after merchandisers which can be Tandem and Stratus that will assure for vacuity which lead to 100.

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9.5 Serviceability :

For the utmost part, minicomputer along with mainframe operating systems having tackle will show individual services which find the position of failures. Temporary mistake are well– known as a result to grease anticipant conservation which will set problems ahead of influence availability. The inmost position of the outfit permits good technicians to introduce standard anticipant preservation programs. Because of similar cause, multitudinous associations put in original waiters in glass room in expectation of having redundant experience by means of distant LAN operation.

It's plant that products that depend on model procedure which can be Simple Network Management Protocol which describes needed review of occasion mindfulness which handles remote systems operation part. It's essential that the structural design will consider issues concerning with standard as well as products that bear service.

9.6 Software Distribution :

The indigenous minicomputer in addition to mainframe surroundings contribute to executable software commencing on its own library. Software preservation along with enhancement are able by altering in individual position. In dispersed customer/ server representation, working software stays at place placed on waiters that are placed all through an association. Revision to system with operation software needs replication all through an association which shows marvellous complication in utility of operations.

Extra complication is lays open in UNIX atmosphere as soon as number of different tackle platforms are applied. In malignancy of fact that foundation position of the software is well–matched from corner to corner with different platforms where working double form of software isn't well– matched.

It's noted that working libraries gets framed on machine having analogous physical tackle which results in serious problems related to transmission of software all through the network of different computer stage. It's noted that testing can be carried out on every stage before than changes gets participated. Multitudinous associations addresses certain requirements simply by installing any tackle platforms from field in core support position.

It's noted that answer to certain problem is well framed customer/ server structure which is handled by successful software administration tools. Similar type of difficulty is surely soluble except simply all the way through the plan along with planning. It'll not be resolved in an unplanned manner following perpetration.

There are particular requirements that handles distributed technology. It's noted that benefit of particular computer is that it can be fluently altered which is debit for manufacturing surroundings. Out–of–the– way support workers should suitable to find tackle along with software arrangement of remote technology. Because of this they will find which software performances to post and make available knowledgeable support for problems.

9.7 Performance Network Management Issues :

It is found that core minicomputer and mainframe environment with qualified technical support staff along with working staff will take care of presentation on uncompleted basis. IBM with Digital Equipment Corporation has characteristics in large computers operating systems which shows required energetic modification abilities. If tendency explain presentation humiliating, systems managers be able to add hardware or create alteration to get better performance sooner than it have an effect on user neighborhood.

Certain tools as Crystal from BBN (Smarts and Backbone Network) along with TPNS (Trading Process Network System) from IBM are presented to lower new operations with earlier fabrication that admit association chancing out which move on with resource needs for current operations. It's counted that revision can be made to operating surroundings to make sure that donation will be good enough.

It is found that inside client/server environment, neither UNIX, Windows NT, nor OS/2 up till now make available such simple performance catering tools. Many tools which can be Network General's Sniffer are present to independent handling of LAN traffic. UNIX, Windows NT and OS/2 will show restricted qualities which explains work preference. Certain retailers market products in order to handle such requirements. Currently, even if, the design knowledge of project architects is necessary to keep away from presentation deficiency. Providentially, price of hardware for client workstations or Windows NT, OS/2, and UNIX servers endures adding extra capacity to enhance performance that is normally not act as main cost factor for client/server system.

Certain network management tools which can be Open Vision, IBM's NetView, AT&T's UNMA as well as Digital Equipment Corporation's EMA products will show position of inapproachable monitoring which can follow response time along with network weight. No similar products will show type of analysis of remote server which RMF describes that can be tuning tools pressing inside MVS along with VMS. Further, products like ESRA from Elegant Computing are present to perform insulated analysis of UNIX waiters in command to keep an eye on fragment operation, error logs, as well as stoner biographies. This product is used considerably to manage remote UNIX waiters.

Piecemeal from earlier products, some are Microcoms LANlord which describes important capability for insulated admission to Windows in addition to Zilches/ 2 PC LAN desktops. It isn't possible to supply sufficient hold up for circulated customer/ server operations with no means to carry desktop along with server distantly. This is a region of strong focus by assiduity in 1993 where numerous major systems integrators enforced by NOS to show desktop support for Novell, LAN Manager, LAN Server, and NFS customer/ server surroundings.

9.8 Case Studies–Cloud :

- **Overview :**

The Customer is a New York grounded provider of reports on request trends as hosted service since 2004 having Fortune 500 companies from finance advisers to jobsite disciplines as guests. The Project was to make a Trend Analysis Data Aggregator.

The Trend Analysis Data Aggregator is the base element of the customer's business model that involves collection of data from websites related to Job Hunt and related services, Real Estate, alternate hand Motor Vehicles deals and alternate hand Books deals.

- **Challenges :**

The vision behind Trend Analysis Data Aggregator design was to outsource data aggregation from different websites toe–Zest so that customer could concentrate on core business area of dealing the data after due processing and analysis.

- **Result :**

RegEx Developer serves as a frontal end for inventors to develop data prisoner patterns for new spots as well as to change patterns for spots coming in for conservation. Point Visualizer gets the website runners to be screen scraped and shows its HTML within the frontal end. Using this visualization,

inventors can go through the point streamlining data capturing and point navigation patterns and specifying processing instructions.

Patterns and instructions created by inventors are tested using original database by the Data Engine. The data machine displays screen scraping results on press and crimes encountered can be anatomized to test and upgrade URLs, patterns and processing instructions. Once the point scraping is successfully executed with original database, the patterns are transferred to customer's delivery database using remote Data Transformation Services of SQL Server 2005.

➢ **Conclusion :**

Outsourcing the data aggregation function of customer's business model to e– Tang enabled them to make a dependable coastal resource base specializing in screen scraping using a custom– made data machine that helped them cut costs, apply a flexible resource ramp–up or ramp–down plan grounded on protrusions of business expansions, concentrate their sweats on data analysis and deals, and enabled customer to shoulder ambitious growth strategy without fussing about functional issues related to core data aggregation function.

❑ **Check Your Progress – 1 :**

1. What is network service ?
   a. The client can generate print request using OS
   b. The client can generate database service request
   c. The client can communicate with network using TCP/IP, IPX,Token ring etc. protocols
   d. None of these
2. Which of the following is the part of system administration ?
   a. client/server hardware is assembled as per required organizational standards
   b. Software gets installed as per standards along with expectation of work.
   c. Software gets tested as per standards by experience staff
   d. All of these
3. What is true about availability in context of client server technology ?
   a. Availability referred to as system uptime or potential of the system to be accessible for handing out information
   b. Client/server applications ought to be competent to offer the suitable level of accessibility commanded by business necessitate
   c. Both B and C
   d. None of these
4. Which of the following statement is true about Serviceability ?
   a. Hardware shows diagnostic services which find the position of failures.
   b. Temporary mistake are well–known
   c. Ability to make problem set and finding its solutions
   d. All of these

5. Software Distribution refers to _____.
   a. Working software stays at place placed on servers that are placed all through an organization
   b. OS is distributed
   c. Distribution of technology
   d. None of these

❑ **Check Your Progress – 2 :**

1. Crystal tool is the product of _____.
   a. Microsoft b. BBN c. IBM d. None of these
2. Which of the following is network management tool ?
   a. OpenVision b. NetView c. UNMA d. All of these
3. Which Front end server is described in the paragraph above ?
   a. Oracle b. SQL Server c. VB d. None of above
4. Full form of BBN
   a. Brain Booster Network b. Brains and Backbone Network
   c. Boosting Booting Network d. None of these
5. Full form of TPNS
   a. Transmission Process Network System
   b. Trading Process Network System
   c. Trading Programming Network System
   d. None of these

9.9 Let Us Sum Up :

While studying this unit, we've learnt that computer druggies before have different prospect where condition per hour on worksheet makes suspends the system where power fails likewise contagion makes system to start again. It's known that vacuity is system uptime or eventuality of system to pierce for information and accepts work at whatever time being asked.

In dispersed customer/ server representation, working software stays at place placed on waiters that are placed all through an association. Revision to system with operation software needs replication all through an association which shows marvellous complication in utility of operations.

9.10 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (c) 2. (d) 3. (c) 4. (d) 5. (a)

❑ **Check Your Progress 2 :**

1. (b) 2. (d) 3. (b) 4. (b) 5. (b)

9.11 Glossary :

1. **Personal Computer –** Home computer that does all function as standard computer and works in the similar manner.
2. **Availability –** In software, availability is system uptime to access information to do certain task.

9.12 Assignment :

Write short note on System Administration.

9.13 Activities :

Collect some information on Serviceability.

9.14 Case Study :

Generalised the Software Distribution.

9.15 Further Readings :

1. Boehm, B. W., "Improving Software Productivity", Computer, 20(8), 43–58, 1987.

Unit 10

OVERVIEW OF OPC UA OF CLIENT SERVER

UNIT STRUCTURE

10.0 Learning Objectives :

After learning this unit, you will be able to understand :

- About OPC in Client Server Communications
- About OPC – UA for Data transmission
- About Need and Structure of OPC–UA
- About main components of OPC–UA (DA, AE and HAD)

10.1 Introduction :

In recent times, the OPC (Open Platform Communication) Foundation (an interest group of well–known manufacturers for the description of standard interfaces) has defined a large number of software interfaces to homogenize the information flux from the process position to the operation position. According to the different conditions within an artificial Operation, different OPC specifications have been developed in the formerly Data. Access (DA), Alarm & Events (A&E), Literal Data Access (HDA) and Data eXchange (DX). Access to exercise data is described in the DA specification, A&E, describes an interface for event– predicated information, including acknowledgement. HDA describes functions for archived data and DX defines a side server to server communication.

Predicated on the experience with these classic OPC interfaces, the OPC Foundation, defined a new platform, and called OPC Unified Architecture (UA). The end of this new standard is the general description and steady access to all information which is to be changed between systems or operations. This

includes the functionality of all former OPC interfaces. Likewise, it's to induce the possibility of natively. integrating the interface in the separate system, irrespective of which operating system the system is operated on and irrespective of the programming language in which the system was created.

This illustration discusses the OPC Unified Architecture interface. A detailed documentation is available on the SIMATIC NET CD. For farther information

10.2 Need of OPC–UA :

OPC UA offers the following features :

- Summary of all previous OPC features and information such as DA, A&E and HDA in a generic interface.
- Use of open and platform–independent protocols for inter–process or network communication.
- Internet access and communication by means of firewalls.
- Integrated access control and security mechanisms on protocol and application level.
- Extensive representation options for object–oriented models; objects can have variables and methods and can trigger events.
- Expandable type system for objects and complex data types.
- Transport mechanisms and modeling rules form the basis for other standards.
- Scalability of small embedded systems up to business applications and from simple DA address spaces up to complex, object–oriented models.

10.3 OPC–UA Specification :

The OPC UA specifications are divided in different parts due to the IEC 62541 standardization. Figure 10.1 gives an overview of the various parts.

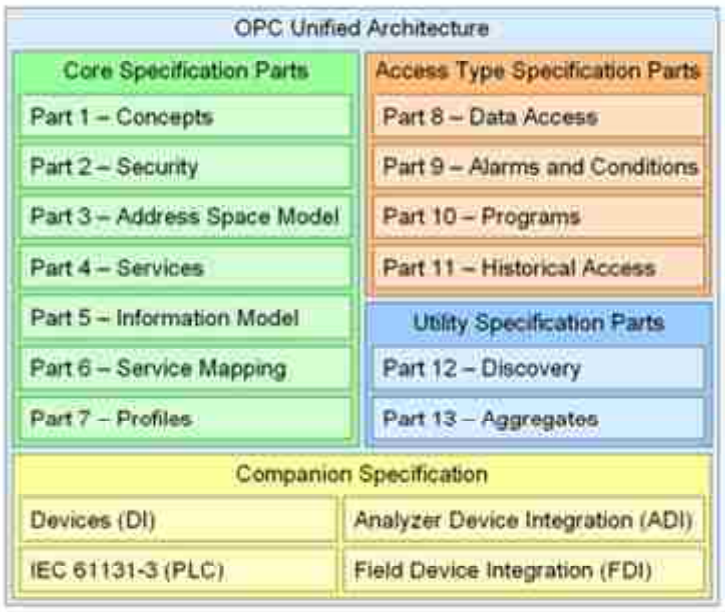

Fig. 10.1 : OPC–UA Specification

Part 1 to 7 form the base of the technology and the consummation of OPC UA operations. It's mainly corridor 3 to 5 which form the core of the standard.

Corridor 8 to 11 defines OPC specific information models for the provision of classic OPC information analogous as current process data or admonitions. Fresh tools are defined in part 12 and 13. Also, so called companion specifications are generated which define, fresh information models, together with other standardization associations. Predicated on OPC UA. The models and information in other morals form the base and the companion specification defines how this information is described and transported with OPC UA

❑ **Check Your Progress – 1 :**

1. Full form of OPC
   a. Open Platform Communication b. Object Platform Communication
   c. Open Process Corridor d. None of These
2. Full form of UA
   a. User Architecture b. Undefined Alarm
   c. Unified Architecture d. Useless Architecture
3. Full form of DA
   a. Danger Automation b. Disk Automation
   c. Data Access d. Disk Access
4. Full form of HDA
   a. Historical Data Access b. Hide Data Access
   c. Holographic Data Access d. None of These
5. Full form of A&E
   a. Auto and English b. Alarm and English
   c. Auto and Events d. Alarm and Events

10.4 DA in OPC :

An OPC DA Server allows OPC DA Clients to retrieve information about several objects : the server, the group and the items.

- The OPC server object maintains information about the server and acts as a container for OPC group objects.
- The OPC group object maintains information about itself and provides the mechanism for containing and logically organizing OPC items.
- The OPC items represent connections to data sources within the server.

The OPC DA Specification defines two read/write interfaces :

- Synchronous The client can perform a synchronous read from cache (simple and reasonably efficient). This may be appropriate for fairly simple clients that are reading relatively small amounts of data.
- Asynchronous The client can 'subscribe' to cached data using I Advise Sink or IOPC Data Callback which is more complex but very efficient. Asynchronous access is recommended because it minimizes the use of CPU and NETWORK resources.

In all cases the OPC DA Server gives the client access to current values of the OPC items. The OPC DA Server only holds current information in cache. Old information is overwritten. As a result of this it cannot be guaranteed that an OPC DA Client retrieves all changes in values (also not in asynchronous mode).

10.5 AE in OPC :

The OPC AE interface provides a medium for OPC AE guests to be notified when a specified event and/ or alarm condition occurs. The cyber surfer interface also allows OPC AE guests to determine the list of events and conditions supported by an OPC AE Server as well as to get their current status.

Within OPC, an alarm is an abnormal condition and is therefore a special case of a condition. A condition is a named state of the OPC Event Server or of one of its contained objects that's of interest to an OPC AE customer. For illustration, the label Temperature may have the ensuing conditions associated with it High Alarm, High–Alarm, Normal, Low Alarm, and Low Low–Alarm.

On the other hand, an event is a sensible circumstance that's of significance to the OPC Server, the device it represents, and its OPC AE guests. An event may or may not be associated with a condition. For illustration, the transitions into High–Alarm and Normal conditions are events, which are associated with conditions. Still, driver conduct, system configuration changes, and system crimes are exemplifications of events, which aren't related to specific conditions. OPC AE guests may subscribe to be notified of the circumstance of specified events.

The OPC AE specification provides methods enabling the OPC AE client to :

- Determine the types of events that are supported by the OPC AE server.
- Enter subscriptions to specified events so that OPC AE clients can receive notifications of their occurrences. Filters may be used to define a subset of desired events.
- Access and manipulate conditions implemented by the OPC AE server.

10.6 HDA in OPC :

Literal machines moment produce an added source of information that should be distributed to druggies and software guests that are interested in this information. Presently most literal systems use their own personal interfaces for dispersion of data. There's no capability to compound or use being literal results with other capabilities in a draw–n– play terrain. This requires the inventor to recreate the same structure for their products, as all other merchandisers have had to develop singly with no interoperability with any other systems.

In keeping with the desire to integrate data at all levels of business, historical information can be another type of data.

There are several types of Historian servers. Some key types supported by the HDA specification are :

- Simple Trend data servers. These servers provided little else then simple raw data storage. (Data would typically be the types of data available from an OPC Data Access server, usually provided in the form of a duple [Time Value & Quality]).

- Complex data compression and analysis servers. These servers provide data compression as well as raw data storage. They can provide summary data or data analysis functions, such as average values, minimums and maximums etc. They can support data updates and history of the updates. They can support storage of annotations along with the actual historical data storage.

❑ **Check Your Progress – 2 :**

1. Full form of ADI
   a. Analysis Device Information b. Analyzer Development Information
   c. Analyzer Device Integration d. None of These
2. Full form of FDI
   a. Field Data Information b. Fail Device Integration
   c. File Data Integration d. Field Device Integration
3. What is the main use of A&E in OPC
   a. Alarm whole system
   b. Alarm to Main server
   c. It intimate the Clients when events fired
   d. None of these
4. In HDA _____ compression and analysis servers
   a. Complex data b. Simple Data c. Neutral Data d. None of These
5. OPC DA Specification defines _____ read/write interfaces
   a. One b. Two c. Three d. None of these

10.7 Let Us Sum Up :

In OPC (Open Platform Communication) UA (Unified Architecture) is Customer Server process that convert license base software to Open platform discussion for the growth and fashionability of data access. This unit focus about the process of. NET platform that transmit is in Open platform. Then we concentrate with introductory preface, Need or advantages of this OPC – UA technology for Customer Server Dispatches. Also we study the specification with factors.

The components like DA (Data Access), A&E (Alarm and Events) and HDA (Historical Data Access) with their important characteristics and partial sub component for improving Client Server communication process.

10.8 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (a) 2. (c) 3. (c) 4. (a) 5. (d)

❑ **Check Your Progress 2 :**

1. (c) 2. (d) 3. (c) 4. (a) 5. (b)

10.9 Glossary :

1. **CASE Tools –** Tools that shows systems needs continuously using high integration clarifying analysis phase errors.

2. **Client/Server Applications –** Client processing demands on client processor with server that uphold protected mode.

10.10 Assignment :

1. Why should we learn OPC – UA for Client Server communication.
2. Draw Specification structure of OPC – UA
3. List out main components of OPC–UA

10.11 Activities :

Role of Historical Data Access in OPC–UA in your words

10.12 Case Study :

Comparison of Synchronous and Asynchronous Data Access (DA) in OPC–UA in your words.

10.13 Further Reading :

1. Boehm, B. W., "Improving Software Productivity", Computer, 20(8), 43–58, 1987.
2. Scacchi, W., "Understanding Software Productivity", Advances in Software Engineering and Knowledge Engineering, 1995.
3. Boehm, B. and R.W. Wolverton, "Software Cost Modelling: Some Lessons Learned", J. Systems and Software 1(1980).
4. Bailey, J. and V. Basili, "A Meta–Model for Software Development Resource Expenditures", Proc. 5th. Intern. Conf. Soft. Computer Society, (1981).

BLOCK SUMMARY :

In this block, you have learnt and understand about the introductory objects of effective design operation along with information on System Development terrain. The block gives an idea on the study and conception of System Administration along with vacuity and utility of software. You have been well explained on the generalities of Customer/ Server System Development in terms of Hardware configuration.

The block detailed about the introductory of Performance network operation issues. The conception related to Software Distribution and System Development are well detailed to you. You'll be demonstrated virtually about colorful Data storehouse fragment warehouses bias.

BLOCK ASSIGNMENT :

❖ **Short Questions :**

1. Define System Development environments.
2. What are the features of Project management ?
3. Explain Client System Administration.
4. Discuss Performance network management issues.

❖ **Long Questions :**

1. Write short notes Availability and Serviceability.
2. Discuss Performance network management issues.
3. What are the various Productivity Measures ?

❖ **Enrolment No. :** ☐

1. How many hours did you need for studying the units ?

Unit No.	1	2	3	4
No. of Hrs.				

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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Dr. Babasaheb Ambedkar
Open University Ahmedabad

BCAR-403

CLIENT – SERVER ARCHITECTURE AND INTERFACES (C#)

BLOCK 4 : INTRODUCTION TO C#

INTRODUCTION TO C#

Block Introduction :

The .NET frame provides a set of base class libraries which give functions and features which can be used with any programming language which implements. NET, similar as Visual Basic, C#, Visual C, etc. Namespaces are the way to organize. NET Framework Class Library into a logical grouping according to their functionality, usability as well as order they should belong to, or we can say Namespaces are logical grouping of types for the purpose of identification.

In this block, we will detail about the introductory of. NET Framework with colorful performances. The block will concentrate on types ofMS.NET operations, Base Class Library andMS.NET Namespaces. The scholars will give an idea on DMA Common Language Runtime andMS.NET Memory Management/ Garbage Collection.

In this block, you'll made to learn and understand about Working with Standard Controls along with ASP.NET Objects. The conception related to Creating the Content Master and erecting Site Navigation will also be explained to you. You'll be demonstrated virtually about working with Data fashion.

Block Objectives :

After learning this block, you will be able to understand :

- About MS.NET Base Class Library
- Features of MS.NET Namespaces
- Idea about Metadata and PE files
- Concept of Common Language Runtime (CLR)
- Concept of MS.NET Memory Management / Garbage Collection
- Features of building Site Navigation
- Steps to add Authentication and Content Pages
- Working characteristics of Data
- Understanding about ASP.NET Web Services and WCF

Block Structure :

Unit 11 : Introduction to .NET Framework

Unit 12 : Components of .NET Framework

Unit 13 : ASP.NET Controls

Unit 14 : Web Services and WCF

Unit
11

INTRODUCTION TO .NET FRAMEWORK

UNIT STRUCTURE

11.0 Learning Objectives :

After learning this unit, you will be able to understand :

- About MS.NET Framework concept
- About MS.NET Component overviews
- About MS.NET Types of Applications
- About Class Library

11.1 Introduction :

Net is a web development platform, which provides a programming model, a comprehensive software structure and colorful services needed to make up robust web operation for PC, as well as mobile bias.

ASP.Net works on top of the HTTP protocol and uses the HTTP commands and programs to set a cyber surfer–to– server two– way communication and cooperation.ASP.NET is an open source server– side Web operation frame designed for Web development to produce dynamic Web runners. It was developed by Microsoft to allow programmers to make dynamic web spots, web operations and web services.

It was first released in January 2002 with interpretation1.0 of the. NET Framework, and is the successor to Microsoft's Active Server Runners (ASP) technology. ASP.NET is erected on the Common Language Runtime (CLR), allowing programmers to writeASP.NET law using any supported. NET language. The ASP.NET SOAP extension frame allows ASP.NET factors to reuse Cleaner dispatches.

11.2 The .NET Framework – an Overview :

Programs run on the. NET Framework, an integral element of Windows that includes a virtual prosecution system called the common language runtime (CLR) and a unified set of class libraries. The CLR is the marketable perpetration by Microsoft of the common language structure (CLI), an transnational standard that's the base for creating prosecution and development surroundings in which languages and libraries work together seamlessly.

Source Law written inC# is collected into an intermediate language (IL) that conforms to the CLI specification. The IL law and coffers, similar as bitmaps and strings, are stored on fragment in an executable train called an assembly, generally with an extension of. exe or. dll. An assembly contains a overload that provides information about the assembly's types, interpretation, culture, and security conditions.

When theC# program is executed, the assembly is loaded into the CLR, which might take colorful conduct grounded on the information in the overload. Also, if the security conditions are met, the CLR performs just in time (JIT) compendium to convert the IL law to native machine instructions. The CLR also provides other services related to automatic scrap collection, exception running, and resource operation. Law that's executed by the CLR is occasionally appertained to as" managed law," in discrepancy to" unmanaged law "which is collected into native machine language that targets a specific system. The following illustration illustrates the collect– time and run– time connections of C# source law lines, the. NET Framework class libraries, assemblies, and the CLR.

11.3 Framework Components :

To more understand the CLR, consider how compilers that target the. NET Framework differ from traditional compilers.

Traditional compilers target a specific processor, consuming source lines in a specific language, and producing double lines containing aqueducts of instructions in the native language of the target processor. These double lines may also be executed directly on the target processor.

NET compilers serve a little else, as they don't target a specific native processor. Rather, they consume source lines and produce double lines containing an intermediate representation of the source constructs, expressed as a combination of metadata and Common Intermediate Language (CIL). In order for these binaries to be executed, the CLR must be present on the target machine.

When these binaries are executed they beget the CLR to load. The CLR also takes over and manages prosecution, furnishing a range of services similar as JIT compendium (converting the CIL as demanded into the correct sluice of instructions for the underpinning processor), memory operation (in the form of a scrap collector), exception operation, debugger and profiler integration, and security services.

This compendium and prosecution model explains why C# is appertained to as a managed language, why law handling in the CLR is appertained to as managed law, and why the CLR is said to give managed prosecution.

Although this reliance on a runtime terrain might originally appear to be a debit, substantial benefits arise from this armature. Since the metadata

and CIL representations are processor armature–neutral, binaries may be used on any machine in which the Common Language Runtime is present, anyhow of underpinning processor armature. Also, since processor–specific law generation is remitted until runtime, the CLR has the occasion to perform processor–specific optimizations grounded on the target armature the law is running on. As processor technology advances, all operations need to take advantage of these advances is an streamlined interpretation of the CLR.

Unlike traditional double representations, which are primarily aqueducts of native processor instructions, the combination of metadata and CIL retains nearly all of the original source language constructs. In addition, this representation is source language–neutral, which allows inventors to make operations using multiple source languages. They can elect the stylish language for a particular task, rather than being forced to regularize on a particular source language for each operation or demanding to calculate on element technologies, similar as COM (Element Object Modeling) or CORBA (Common Object Request Broker Architecture,), to mask the differences between the source languages used to make the separate factors of an operation.

❑ **Check Your Progress – 1 :**

1. Full form of IL
   a. Intelligent Logic
   b. Intermediate Language
   c. Inner Logic
   d. None of these
2. Full form of CIL
   a. Common Intermediate Language
   b. Cross Internet Logic
   c. Common Internet Logic
   d. None of these
3. Full form of COM
   a. Component Object Modeling
   b. Cross Object Model
   c. Component Object Marking
   d. None of these
4. Full form of CORBA
   a. Cross Object Rest Alarm
   b. Common Object Request Broker Architecture
   c. Common Object Request Alternate
   d. None of these
5. Code run by CLR is either _____ or _____ code
   a. Managed, Unmanaged
   b. positive, negative
   c. Accept, Not accept
   d. None of these

11.4 Framework Versions :

Each interpretation of the. NET Framework contains the common language runtime (CLR), the base class libraries, and other managed libraries. Each new interpretation of the. NET Framework retains features from the former performances and adds new features. The CLR is linked by its own interpretation number. The. NET Framework interpretation number is incremented at each

release, although the CLR interpretation isn't always incremented. For illustration, the. NET Framework 4,4.5, and latterly releases include CLR 4, but the. NET Framework2.0,3.0, and3.5 include CLR2.0. (There was no interpretation 3 of the CLR.)

The following table summarizes .NET Framework version history and correlates each version with Visual Studio, Windows, and Windows Server.

.NET Framework version	CLR version	Features
Net 4.6.1	4	Support X509 having ECDSA Encrypt support for hardware keys in ADO.NET Spell checking
.NET 4.6	4	Compile using .NET Native ASP.NET Core 5 Event tracing quality Supports page encodings
4.5.2	4	New APIs for transactional systems and ASP.NET System DPI resizing in Windows Profile improvements ETW and stress logging improvements
4.5.1	4	Support for Windows Phone Store apps Automatic binding redirection Performance and debugging improvements
4.5	4	Support Windows Store apps WPF, WCF, WF, ASP.NET updates
4	4	Expanded base class libraries Cross-platform development with Portable Class Library MEF, DLR, code contracts
3.5	2.0	AJAX-enabled websites LINQ Dynamic data
3.0	2.0	WPF, WCF, WF, CardSpace
2.0	2.0	Generics ASP.NET additions
1.1	1.1	ASP.NET and ADO.NET updates Side-by-side execution
1.0	1.0	First version of the .NET Framework.

11.5 Types of Applications using MS.NET :

All types of. NET operations use one or further. NET biddable languages for their design and development. The. NET Framework includes colorful technologies, similar as ASP.NET, VB.NET, VC. NET, and ADO.NET. Then a more or less full list of colorful types of operation that we can develop on. NET.

- **ASP.Net Web Applications :**

These are the programs that used to run inside some web server to fulfill the stoner requests over the http.ASP.NET Web operations can range from simple Web spots that correspond of HTML runners to advanced enterprise operations that run on original and remote networks. These enterprise operations also give factors for swapping data using XML. This type includes dynamic and data driven cyber surfer grounded operations. (Ex Hotmail and Google).

- **Web Services:**

There are certain web services that are functionally available with certain artificial norms like HTTP, XML and Cleaner.

- **Windows Applications :**

These are types of Windows desktop operations for every day working which can be MS word. Run only under Windows terrain. These operations consume the services handed by the Windows operating system.

- **Windows Services :**

These are long– running executable operations which runs on the system as a background process. These operations don't intrude with the working of the other processes that run on the same computer. Windows services execute within separate Windows sessions created specifically for each Windows service. These services don't have a graphic stoner interface and are ideal for running on the server. Windows services were before called NT services.

- **Console Applications :**

These are light weight programs run inside the command prompt (DOS) window. They're generally used for test operations.

- **Mobile Applications :**

They're operations which work on multiple mobile bias and shows ubiquitous access to data from mobile bias. The. NET Framework automatically makes changes to these operations to enable them to run on multiple cyber surfers, depending on the mobile device.

- **Class Libraries :**

These are factors that you produce formerly and exercise a number of times in multiple operations. Class libraries allow you to define several classes, along with their styles and interfaces, in one train. These libraries collect to. dll lines and grease rapid–fire development of new operations because of reusability of law. To pierce the functionality of the classes in a class library from your operation, you need to include a reference to that library in your program.

11.6 MS.NET Base Class Library :

The .NET frame provides a set of base class libraries which give functions and features which can be used with any programming language which implements. NET, similar as Visual Basic, C#, Visual C, etc.

The base class library contains standard programming features similar as Collections, XML, Data Type delineations, IO, Reflection and Globalization to name a many. All of which are contained in the System namespace. As well, it contain someone–standard features similar as LINQ,ADO.NET, drawing capabilities, forms and web support. The below table provides a list each class of the base class library and a brief description of what they give.

Base Class Library Namespace	Brief Description
System	Contains the fundamentals for programming such as the data types, console, match and arrays, etc.
System.CodeDom	Supports the creation of code at runtime and the ability to run it.
System.Collections	Contains Lists, stacks, hashtables and dictionaries
System.ComponentModel	Provides licensing, controls and type conversion capabilities
System.Configuration	Used for reading and writing program configuration data
System.Data	Is the namespace for ADO.NET
System.Deployment	Upgrading capabilities via ClickOnce
System.Diagnostics	Provides tracing, logging, performance counters, etc. functionality
System.DirectoryServices	Is the namespace used to access the Active Directory
System.Drawing	Contains the GDI+ functionality for graphics support
System.EnterpriseServices	Used when working with COM+ from .NET
System.Globalization	Supports the localization of custom programs
System.IO	Provides connection to file system and the reading and writing to data streams such as files
System.Linq	Interface to LINQ providers and the execution of LINQ queries
System.Linq.Expressions	Namespace which contains delegates and lambda expressions

System.Management	Provides access to system information such as CPU utilization, storage space, etc.
System.Media	Contains methods to play sounds
System.Messaging	Used when message queues are required within an application, superseded by WCF
System.Net	Provides access to network protocols such as SSL, HTTP, SMTP and FTP
System.Reflection	Ability to read, create and invoke class information.
System.Resources	Used when localizing a program in relation to language support on web or form controls
System.Runtime	Contains functionality which allows the management of runtime behavior.
System.Security	Provides hashing and the ability to create custom security systems using policies and permissions.
System.ServiceProcess	Used when a windows service is required
System.Text	Provides the StringBuilder class, plus regular expression capabilities
System.Threading	Contains methods to manage the creation, synchronization and pooling of program threads
System.Timers	Provides the ability to raise events or take an action within a given timer period.
System.Transactions	Contains methods for the management of transactions
System.Web	Namespace for ASP.NET capabilities such as Web Services and browser communication.
System.Windows.Forms	Namespace containing the interface into the Windows API for the creation of Windows Forms programs.
System.Xml	Provides the methods for reading, writing, searching and changing XML documents and entities.

❑ **Check Your Progress – 2 :**

1. _____ Keyword is use to link namespace / library in ASP.NET

   a. Link b. Import c. Using d. None of these

2. _____ main base library / class for any namespace in ASP.NET

   a. Text b. System c. UI d. None of these

3. _____ provides tracing, logging, performance counters, etc. functionality

   a. System.Diagnostics b. System.UI

   c. System.Text d. None of these

4. Light weight DOS base type of application of .NET framework is known as _____.

   a. Console b. Desktop c. Web site d. None of these

5. Application that run under browser is known as _____.

   a. Console b. Desktop c. Web site d. None of these

11.7 Let Us Sum Up :

In this unit we've learnt that there are factors that can be created formerly and can be further exercise number of times in colorful operations. It's seen that class libraries allow to define several classes, along with their styles and interfaces, in one train. It's seen that. NET frame show set of base class libraries having functions and features that are used with programming language for enforcing. NET, similar as Visual Basic, C#, Visual C, etc.

We see that namespaces are the way to organize. NET Framework Class Library in logical grouping as per functionality, usability and order.A.NET programming language doesn't collect into executable law but compiles in intermediate law as Microsoft Intermediate Language (MSIL). The Movable Executable (PE) format is a train format for executable, object law, and DLLs, used in 32– bit and 64– bit performances of Windows operating systems.

Garbage collector determines whether any object in the mound is dead or not being used by the operation. If similar objects live also memory used by these objects can be reclaimed. Common Type System shows set of types which can be used in different. Net languages in common that insure objects commerce in different. Net languages. Common Language Specification is set of introductory language features that. Net Languages demanded to develop Operations and Services, which are compatible with the. Net Framework.

A security director is an object that defines a security policy for an operation. This policy specifies conduct that are unsafe or sensitive. Any conduct not allowed by the security policy beget a Security Exception to be thrown.

11.8 Answer for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (b) 2. (a) 3. (a) 4. (b) 5. (a)

❑ **Check Your Progress 2 :**

1. (c) 2. (b) 3. (a) 4. (a) 5. (c)

11.9 Glossary :

1. **.NET Framework** – Set of base class libraries describing functions and features used with programming language.

2. **Namespaces –** Way to organize .NET Framework Class Library in logical grouping depending on functionality and usability.
3. **Portable Executable –** It a type of file format used for executable, object code and DLLs for 32–bit and 64–bit versions of Windows operating systems.
4. **Managed Code –** Code written to target services of managed runtime execution environment.
5. **Garbage Collector –** Tool that shows whether object in heap is dead or not used by the application.

11.10 Assignment :

Explain the .NET Framework.

11.11 Activities :

What are the features of Common Language Runtime?

11.12 Case Study :

What is the function of Common Type System?

11.13 Further Readings :

1. Eric Gunnerson, a Programmer's Introduction to C#. Wiley
2. S. Robin, .NET Framework, Oxford

Unit 12

COMPONENTS OF .NET FRAMEWORK

UNIT STRUCTURE

12.0 Learning Objectives :

After learning this unit, you will be able to understand :

- About MS.NET Namespaces
- About Main Components of .NET Framework like CTS – CLS – CLR
- About Managed Code
- About JIT and security Manager

12.1 MS.NET Namespaces :

Namespaces are the way to organize. NET Framework Class Library into a logical grouping according to their functionality, usability as well as order they should belong to, or we can say Namespaces are logical grouping of types for the purpose of identification.

The. NET Framework Class Library (FCL) is a large collection of thousands of Classes. These Classes are organized in a hierarchical tree. The System Namespaces is the root for types in the. NET Framework. We can uniquely identify any Class in the. NET Framework Class Library (FCL) by using the full Namespaces of the class. In. Net languages every program is created with a dereliction Namespaces. Programmers can also produce their own Namespaces in. Net languages.

Please now have a look at the illustration of declaring some namespace :

```
using System;

namespace OutNamespace

{

namespace WorkNamespace

{ /// can be placed some classes, structures etc

}

}
```

In this example we create two namespaces. These namespaces have hierarchical structure. We have some outer one named Out Namespace and the inner one called Work Namespace. The inner namespace is declared with a C#

.Net class Work Item.

12.2 MSIL / Metadata and PE Files :

➢ **Microsoft Intermediate Language (MSIL) :**

A .NET programming language (C#,VB.NET, J# etc.) doesn't collect into executable law; rather it compiles into an intermediate law called Microsoft Intermediate Language (MSIL). As a programmer one need not worry about the syntax of MSIL–since our source law in automatically converted to MSIL. The MSIL law is also shoot to the CLR (Common Language Runtime) that converts the law to machine language, which is, also run on the host machine. MSIL is analogous to Java Byte law. MSIL is the CPU–independent instruction set into which. NET Framework programs are collected. It contains instructions for lading, storing, initializing, and calling styles on objects. Combined with metadata and the common type system, MSIL allows for true cross– language integration Previous to prosecution, MSIL is converted to machine law. It isn't interpreted.

When .net programming law is collected, it isn't convert into exe lines and it's convert into Microsoft intermediate languages, and after that clr convert the this msil law into machine position language.

Microsoft Intermediate Language (MSIL) is a CPU–independent set of instructions that can be efficiently converted to the native law. During the runtime the Common Language Runtime (CLR)'s Just In Time (JIT) compiler converts the Microsoft Intermediate Language (MSIL) law into native law to the Operating System.

When a compiler produces Microsoft Intermediate Language (MSIL), it also produces Metadata. The Microsoft Intermediate Language (MSIL) and Metadata are contained in a movable executable (PE) train. Microsoft Intermediate Language (MSIL) includes instructions for lading, storing, initializing, and calling styles on objects, as well as instructions for computation and logical operations, control inflow, direct memory access, exception running, and other operations

Just In Time Compiler

Microsoft .Net Metadata

Metadata in. Net is double information which describes the characteristics of a resource. This information include Description of the Assembly, Data Types and members with their affirmations and executions, references to other types and members, Security warrants etc. A module's metadata contains everything that demanded to interact with another module.

During the collect time Metadata created with Microsoft Intermediate Language (MSIL) and stored in a train called a Manifest. Both Metadata and Microsoft Intermediate Language (MSIL) together wrapped in a Movable Executable (PE) train. During the runtime of a program Just In Time (JIT) compiler of the Common Language Runtime (CLR) uses the Metadata and converts Microsoft Intermediate Language (MSIL) into native law. When law is executed, the runtime loads metadata into memory and references it to discover information about your law's classes, members, heritage, and so on. Also Metadata barring the need for Interface Definition Language (IDL) lines, title lines, or any external system of element reference.

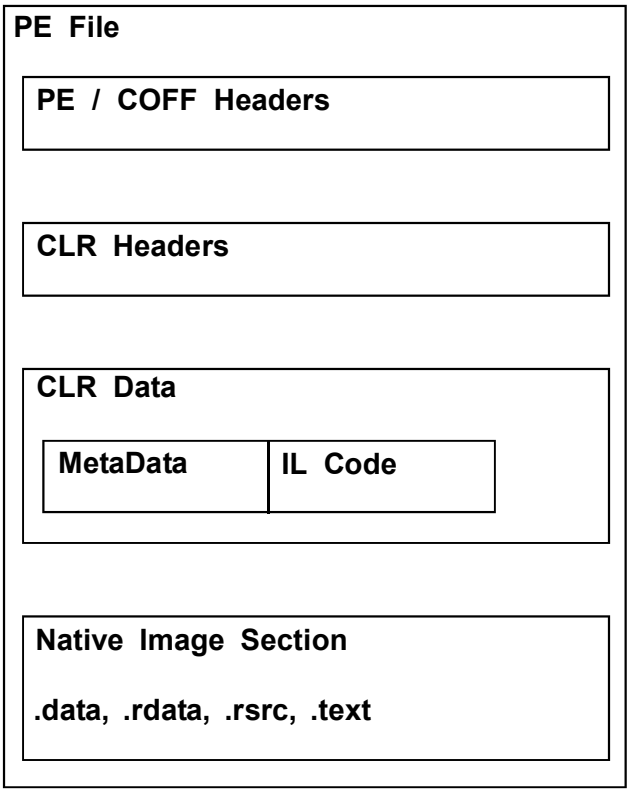
- **Portable Executable (PE) File Format :**

The Movable Executable (PE) format is a train format for executable, object law, and DLLs (Dynamic Link Library), used in 32– bit and 64– bit performances of Windows operating systems. The PE train format was defined to give the stylish way for the Windows Operating System to execute law and also to store the essential data which is demanded to run a program. Movable Executable Train Format is deduced from the Microsoft Common Object Train Format (COFF). Nearly every Windows executable, DLL or EXE, is a Movable Executable (PE) format train. Although there's little in the PE format that lends itself to. NET, in the current perpetration of. NET all assemblies are contained in special PE format lines, which have some traditional bits left out and quite a lot of new bits put in.

Veritably generally, a PE train consists of a PE title, which contains a list of Data Directory entries, and a number of Sections which are defined just after the PE title. Not all the Data Directories have meaning in a. NET train, and not numerous Sections are present moreover. Nonetheless, those that remain are still important— in particular, the last Data Directory entry points to the launch of. NET information.

The real starting point of a PE train, from the. NET point of view, is the COR20 Title, which tells the. NET runtime where to find the metadata. The COR20 title, like the PE title, specifies some Data Directories, as well as the entry point for the assembly. Utmost of these Data Directories point to effects like fix up information which isn't useful for examining the assembly, but one of them points to the launch of the Metadata Aqueducts.

Format of. Net PE train



12.3 Common Language Runtime (CLR) :

The Common Language Runtime (CLR) is an Prosecution Terrain which is the backbone of the. NET frame. It works as a subcaste between Operating Systems and the operations written in. Net languages that conforms to the Common Language Specification (CLS). The main function of Common Language Runtime (CLR) is to convert the Managed Code into native law and also execute the Program. The Managed Code collected only when it demanded, that's it converts the applicable instructions when each function is called. The Common Language Runtime (CLR)'s Just In Time (JIT) compendium converts Intermediate Language (MSIL) to native law on demand at operation run time.

CLR handles the prosecution of law and provides useful services for the perpetration of the program. In addition to executing law, CLR provides services similar as memory operation, thread operation, security operation, law verification, compendium, and other system services.

During the prosecution of the program, the Common Language Runtime (CLR) manages memory, Thread prosecution, Garbage Collection (GC), Exception Handling, Common Type System (CTS), law safety verifications, and other system services. The CLR (Common Language Runtime) defines the Common Type System (CTS), which is a standard type system used by all. Net languages. That means all. NET programming languages uses the same representation for common Data Types, so Common Language Runtime (CLR) is a language–independent runtime terrain. The Common Language Runtime (CLR) terrain is also appertained to as a managed terrain, because during the prosecution of a program it also controls the commerce with the Operating System.

12.4 Managed Code :

Managed Law is the law that's written to target the services of the managed runtime prosecution terrain similar as Common Language Runtime in Net Technology.

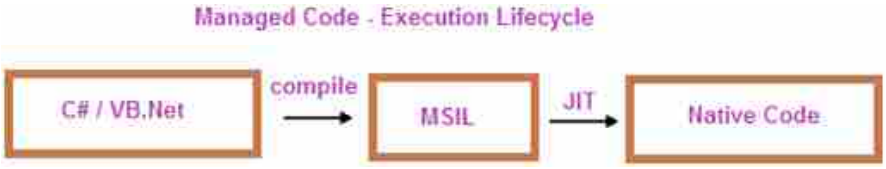


Fig. 12.1 : Managed Code

The Managed Code running under a Common Language Runtime can not be penetrated outside the runtime terrain as well as can not call directly from outside the runtime terrain. It refers to a contract of cooperation between natively executing law and the runtime. It offers services like scrap collection, run– time type checking, reference checking etc. By using managed law you can avoid Numerous typical programming miscalculations that lead to security holes and unstable operations, also, numerous unproductive programming tasks are automatically taken care of, similar as type safety checking, memory operation, destruction of unused Objects etc.

❑ **Check Your Progress – 1 :**

1. Full form of PE
   a. Primary Electricity
   b. Portable Executable
   c. Portable Extension
   d. None of these
2. Full form of FCL
   a. Framework Class Library
   b. Force Cost Light
   c. Framework Cost Logic
   d. None of these
3. Full form of MSIL
   a. Most Skill Inter Logic
   b. Microsoft Intermediate Library
   c. Major Socket Class Logic Extension
   d. None of these
4. Full form of CLR
   a. Common Language Runtime
   b. Classic Logic Runtime
   c. Common Logic Resource
   d. None of these
5. Full form of JIT
   a. Jacket Insource Task
   b. Just In Task
   c. Just In Time
   d. None of these

12.5 MS.NET Memory Management / Garbage Collection :

In .NET, memory is managed through the use of Managed Heaps. Generally in case of other languages, memory is managed through the Operating System directly. The program is allocated with some specific quantum of memory for its use from the Raw memory allocated by the Operating system and also used up by the program. In case of. NET terrain, the memory is

managed through the CLR (Common Language Runtime) directly and hence we call. NET memory operation as Managed Memory Management.. Net manages memory automatically

- Creates objects into memory blocks(heaps)
- Destroy objects no longer in use Allocates objects onto one of two heaps
- Small object heap(SOH) – objects < 85k
- Large object heap(LOH) – objects >= 85k

You allocate onto the mound whenever you use the "new" keyword in law. In Net, CLR has scrap collector that executes as a part of our program and responsible for reclaiming the memory of no longer habituated objects. Garbage collectors free the memory for objects that are no longer substantiated and keep the memory for future allocations. The advantage of Garbage Collector is :

- Allow us to develop an application without having worry to free memory.
- Allocates memory for objects efficiently on the managed heap.
- Reclaims the memory for no longer used objects and keeps the free memory for future allocations.
- Provides memory safety by making sure that an object cannot use the content of another object.

The managed heap is a series of allocated memory segments (approx 16 Mb in size each) to store and manage objects. The memory for newly created object is allocated at the next available location on the managed heap. If there is available free memory, the garbage collector doesn't search the dead objects for memory reclaim and memory allocations have been done very fast. If the memory is insufficient to create the object, the garbage collector search the dead objects for memory reclaim for the newly object.

Garbage collector determines whether any object in the heap is dead or not being used by the application. If such objects exist then memory used by these objects can be reclaimed. Each and every application has a set of roots and these identify the storage locations for the objects on the managed heap. In Garbage Collector :

- All objects in the heap are allocated from one contiguous range of memory address and heap is divided into generations so that it is easy to eliminate the garbage objects by looking at only a small fraction of the heap.
- Gen 0 and Gen 1 occupy a single segment known as the ephemeral segment. Gen 2 is a set of further segments and the large object heap is yet another group of segments.
- Almost, all objects with–in a generation are of the same age.
- The newest objects are created at higher memory address while oldest memory objects are at lowest memory address with in the heap.
- The allocation pointer for the new objects marks the boundary between the allocated and free memory.
- Periodically the heap is compacted by removing the dead objects and sliding up the live objects towards the lower memory address end of the heap as shown in above fig.

- The order of objects (after memory reclaims) in memory remains the same as they were created.
- There are never any gaps among the objects in the heap.

12.6 Common Type System (CTS) :

Common Type System (CTS) describes a set of types that can be used in different. Net languages in common. That is, the Common Type System (CTS) insure that objects written in different. Net languages can interact with each other. For Communicating between programs written in any. NET complaint language, the types have to be compatible on the introductory position.

These types can be Value Types or Reference Types. The Value Types are passed by values and stored in the mound. The Reference Types are passed by references and stored in the mound. Common Type System (CTS) provides base set of Data Types which is responsible for cross language integration. The Common Language Runtime (CLR) can load and execute the source law written in any

Net language, only if the type is described in the Common Type System (CTS).

Importance of CTS :

- CTS are responsible for cross language Integration and Type Safety.
- Enforce a set of rules that a programming language must follow.

12.7 Common Language Specification (CLS) :

Common Language Specification (CLS) is a set of introductory language features that. Net Languages demanded to develop Operations and Services, which are compatible with the. Net Framework. When there's a situation to communicate Objects written in different. Net Complaint languages, those objects must expose the features that are common to all the languages. Common Language Specification (CLS) ensures complete interoperability among operations, anyhow of the language used to produce the operation.

Common Language Specification (CLS) defines a subset of Common Type System (CTS). Common Type System (CTS) describes a set of types that can use different. Net languages have in common, which insure that objects written in different languages can interact with each other. Utmost of the members defined by types in the. NET Framework Class Library (FCL) are Common Language Specification (CLS) biddable Types.

12.8 Types of JIT Compilers :

JIT stands for just– by– time compiler. It converts the MSIL law to CPU native law as it's demanded during law prosecution. It's called just– by– time since it converts the MSIL law to CPU native law; when it's needed within law prosecution else it'll not do anything with that MSIL law.

Different Types of JIT

Normal JIT

This complies only those styles that are called at runtime. These styles are collected only first time when they're called, and also they're stored in memory cache. This memory cache is generally called as JITTED. When the same styles are called again, the complied law from cache is used for prosecution.

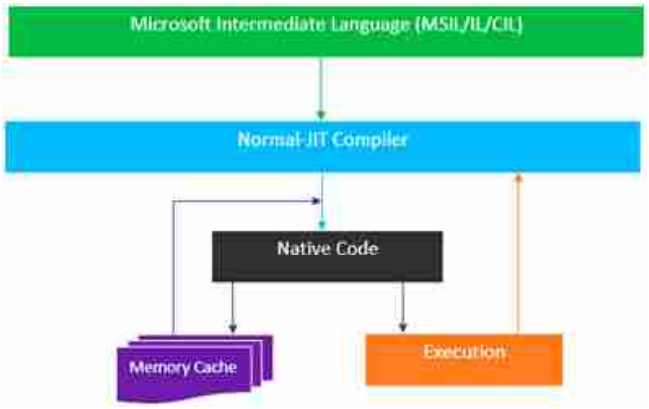


Fig. 12.2 : Normal JIT Layout

This complies only those methods that are called at runtime and removes them from memory after execution.

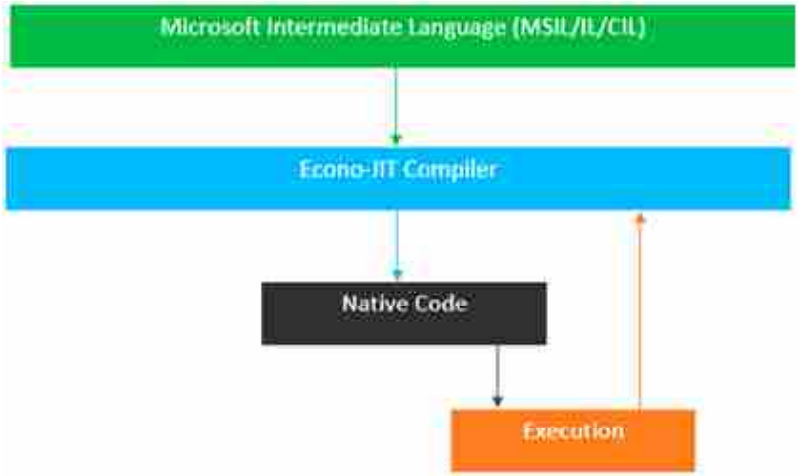


Fig. 12.3 : Econo JIT

➢ **Pre JIT :**

This complies entire MSIL law into native law in a single compendium cycle. This is done at the time of deployment of the operation.

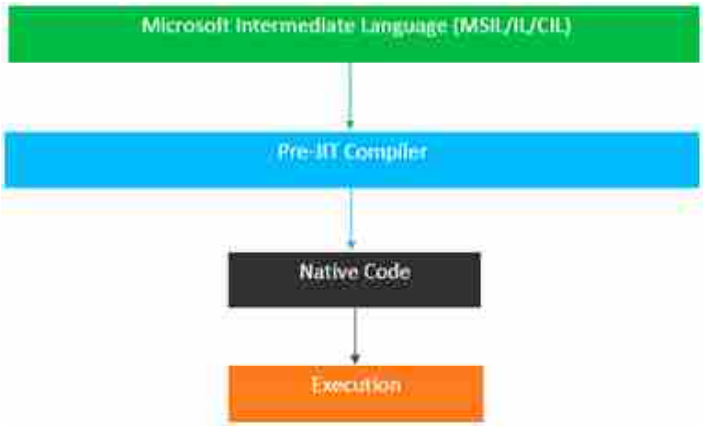


Fig. 12.4 : Pre JIT

12.9 Security Manager :

A security director is an object that defines a security policy for an operation. This policy specifies conduct that are unsafe or sensitive. Any conduct not allowed by the security policy beget a Security Exception to be

thrown. An operation can also query its security director to discover which conduct are allowed. In a Security Director class as shown below :

```
public class SecurityManager
{
    private static readonly SecurityManager_current = new SecurityManager();
public static SecurityManager Current
    {
        get { return_current; }
    }

    public bool CanSeeAdminPanel
    {
        //Change this code to a role that does/doesn't exist
        get { return Thread.CurrentPrincipal.IsInRole("Administrator"); }
    }
}
```

Further we see that :

```
<asp:Panel
    ID="adminPanel"
    runat="server"
    Visible="<%# ExampleApplication.SecurityManager.Current.Is Administrator %>"
    >
    This is only visible to a admins
</asp:Panel>
```

❑ **Check Your Progress – 2 :**

1. Full form of IDL
   a. Interface Definition Language b. Internet Document Language
   c. Interface Document Logic d. None of these
2. Full form of DLL
   a. Dynamic Logic Link b. Dynamic Link Library
   c. Data Logic Library d. None of these

3. Full form of CTS

   a. Common Task System b. Common Time Source

   c. Common Type System d. None of these

4. Full form of CLS

   a. Common Language String b. Classic Logic Support

   c. Common Logic System d. Common Language Specification

5. Full form of GC

   a. Garbage Collection b. Gross Cost

   c. Garbage Cost d. None of these

12.10 Let Us Sum Up :

In this unit we've learnt that there are factors that can be created formerly and can be further exercise number of times in colorful operations. It's seen that class libraries allow to define several classes, along with their styles and interfaces, in one train. It's seen that. NET frame show set of base class libraries having functions and features that are used with programming language for enforcing. NET, similar as Visual Basic,C#, Visual C,etc.

We see that namespaces are the way to organize. NET Framework Class Library in logical grouping as per functionality, usability and order.A.NET programming language doesn't collect into executable law but compiles in intermediate law as Microsoft Intermediate Language (MSIL). The Movable Executable (PE) format is a train format for executable, object law, and DLLs, used in 32– bit and 64– bit performances of Windows operating systems.

Garbage collector determines whether any object in the mound is dead or not being used by the operation. If similar objects live also memory used by these objects can be reclaimed. Common Type System shows set of types which can be used in different. Net languages in common that insure objects commerce in different. Net languages. Common Language Specification is set of introductory language features that. Net Languages demanded to develop Operations and Services, which are compatible with the. Net Framework.

A security director is an object that defines a security policy for an operation. This policy specifies conduct that are unsafe or sensitive. Any conduct not allowed by the security policy beget a Security Exception to be thrown.

12.11 Answer for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (c) 2. (a) 3. (a) 4. (b) 5. (a)

❑ **Check Your Progress 2 :**

1. (a) 2. (c), 3. (a) 4. (c) 5. (b)

12.12 Glossary :

1. **.NET Framework –** Set of base class libraries describing functions and features used with programming language.
2. **Namespaces –** Way to organize .NET Framework Class Library in logical grouping depending on functionality and usability.

3. **Portable Executable** – It a type of file format used for executables, object code and DLLs for 32–bit and 64–bit versions of Windows operating systems.
4. **Managed Code** – Code written to target services of managed runtime execution environment.
5. **Garbage Collector** – Tool that shows whether object in heap is dead or not used by the application.

12.13 Assignment :

Explain the .NET Framework.

12.14 Activities :

What are the features of Common Language Runtime?

12.15 Case Study :

What is the function of Common Type System?

12.16 Further Readings :

1. Eric Gunnerson, a Programmer's Introduction to C#. Wiley
2. S. Robin, >NET Framework, Oxford

Unit
13

ASP.NET CONTROLS

UNIT STRUCTURE

13.0 Learning Objectives :

After learning this unit, you will be able to understand :

- Concept of Standard Controls
- Study about Validation Controls
- Study about ASP.NET Objects
- Features of Building Style Sheet
- Creating the Content Master

13.1 Introduction :

C# is an elegant and type–safe object– acquainted language that enables inventors to make a variety of secure and robust operations that run on the NET Framework. In this, C# can be used to produce Windows customer operations, XML Web services, distributed factors, customer– server operations, database operations, and much, much more. Visual C# provides an advanced law editor, accessible stoner interface contrivers, integrated debugger, and numerous other tools to make it easier to develop operations grounded on the C# language and the. NET Framework.

C# syntax is largely suggestive, yet it's also simple and easy to learn. The curled– brace syntax of C# will be incontinently recognizable to anyone

familiar with C, C or Java. Inventors who know any of these languages are generally suitable to begin to work productively in C# within a veritably short time. C# syntax simplifies numerous of the complications of C and provides important features similar as null able value types, repetitions, delegates, lambda expressions and direct memory access, which aren't plant in Java. C# supports general styles and types, which give increased type safety and performance, and iterators, which enable device of collection classes to define custom replication actions that are simple to use by customer law. Language–Integrated Query (LINQ) expressions make the explosively– compartmented query a first–class language construct.

13.2 Working with Standard Controls :

The standard controls in ASP.Net and C# are :

- Navigation
- Validation
- Login

13.2.1 Navigation Controls :

We see that in ASP.NET there appears three navigation controls :

- Dynamic menus
- Tree Views
- Site Map Path

Menu Control : The Menu control will allow you to add nautical features in web runners. It handles main menu along with and submenus likewise allows to show dynamic menus. It can be applied to other Navigation controls. Menu stored in train gets fluently maintained which is typically called as web.

Tree Views : A Tree View will take care of displaying hierarchical list of particulars with the help of lines in order to connect interrelated particulars in a chain of command. Then all item has marker and possible bitmap. It's plant that Windows Explorer will make use of Tree View control to show directories. We can apply Tree View control in several circumstances in which you need to display hierarchical data.

Site Map Path : Use of this control is veritably simple. You can add this control to your runner also view your runner in cyber surfer. The Sitemap Path control displays the navigation path of the current runner. The path acts as click suitable links to former runners.

3.2.2 Validation Controls :

Confirmation result as important point of any web operation where stoner input gets validated previous to transferring from corner to corner in colorful layers of the operation. It can be applied for:

- Implementing presentation logic.
- Validating user input data.
- Data format, data type and data range.

Validation is of two types :

- Client Side
- Serve Side

It's seen that in case of customer side confirmation, the stoner will depend on cyber surfer as well as scripting language support, while in case of customer side, the stoner will get immediate feedback. The benefit of this is that it saves runner from being post back to server till customer validates successfully.

So Eventually we see that confirmation involves testing of stoner data that gets entered in data field. After determining, stoner can also check for number or character entered as per needed format. For creating ASP.NET Web runners, the stoner input will determine the information validity. So we see that in ASP.NET, set of confirmation controls will serve easy–to– use strong way of determining crimes and will further display dispatches to stoner. There are six types of confirmation controls available in ASP.NET :

- Required Field Validation control
- Compare Validator Control
- Range Validator Control
- Regular Expression Validator Control
- Custom Validator Control
- Validation Summary

It's noted that in confirmation controls, Control To Validate property is mandatory to every validate controls. In this, single confirmation control will validate only single input control whereas several validate control will also be assigned to input control.

13.2.3 Login Controls :

InASP.NET, login controls delivers robust login result forASP.NET Web operations without using programming. It's noted that typically, login controls integrate withASP.NET class and forms authentication to help automate stoner authentication for a Web point. It provides you with a ready–to– use stoner interface that queries the stoner name and word from the stoner and offers a Log In button for login. It validate stoner credentials against the class API and recapitulating the introductory forms authentication functionality like turning back to the original requested runner in a defined area of you operation after the successful login.

The Login control displays a stoner interface for stoner authentication. The Login control contains textbook boxes for the stoner name and word and a check box that allows druggies to indicate whether they want the server to store their identity usingASP.NET class and automatically be authenticated the coming time they visit the point.

The Login control has parcels for customized display, for customized dispatches, and for links to other runners where druggies can change their word or recover a forgotten word. The Login control can be used as a standalone control on a main or home runner, or you can use it on a devoted login runner. If you use the Login control withASP.NET class, you don't need to write law to perform authentication. Still, if you want to produce your own authentication sense, you can handle the Login control's Authenticate event and add custom authentication law.

13.3 Introduction to ASP.NET Objects :

There are many objects in ASP.NET

Object Name	Description
Application	It is applied to use information which is defined for complete application. It includes connection string applied to join database server which is stored in application object
Request	It allows ASP.NET applications to use information that is delivered by client at the time of Web request. It is a reference of Http Request Class Properties – QueryString, Cookies
Response	It allows ASP .NET application to deliver information to the client that gets referenced by Http Response Class Public void Write and Public void Redirect
Server	It gives methods applied to use methods along with properties of Web Server.

❑ Check Your Progress – 1 :

1. Full form of XML
   a. External Markup Logic b. Extension Mark Logic
   c. Extensible Markup Language d. None of these
2. Full form of LINQ
   a. Language Integrated Query b. Logic Internet Query
   c. Logic Internet Question d. None of these
3. _____ Navigation tool use hierarchy list
   a. Tree View b. Menu c. Site Data d. None of these
4. Password and Confirm password verify by _____ validation control
   a. Required Field b. Compare Validator
   c. Range Validator d. None of these
5. _____ most common property use in all major validation control.
   a. ControlToValidate b. toSetValue
   c. msgbox d. None of these

13.4 Building Style Sheet :

Any freshman web inventor/ developer can fluently apply a multitude of formatting to the web runners produced. One of the styles by which an educated web developer can show up from the crowd is to give inflexibility to this formatting as well.

Slinging Style Wastes (CSS) is a style distance language used for describing the donation semantics (the look and formatting) of a document written in a luxury language.

You can add an empty style sheet to you web project, by:

1. Choose Website Website ➤ Add New Item in Visual Studio.
2. Select Style Sheet, edit the file name, and click OK.

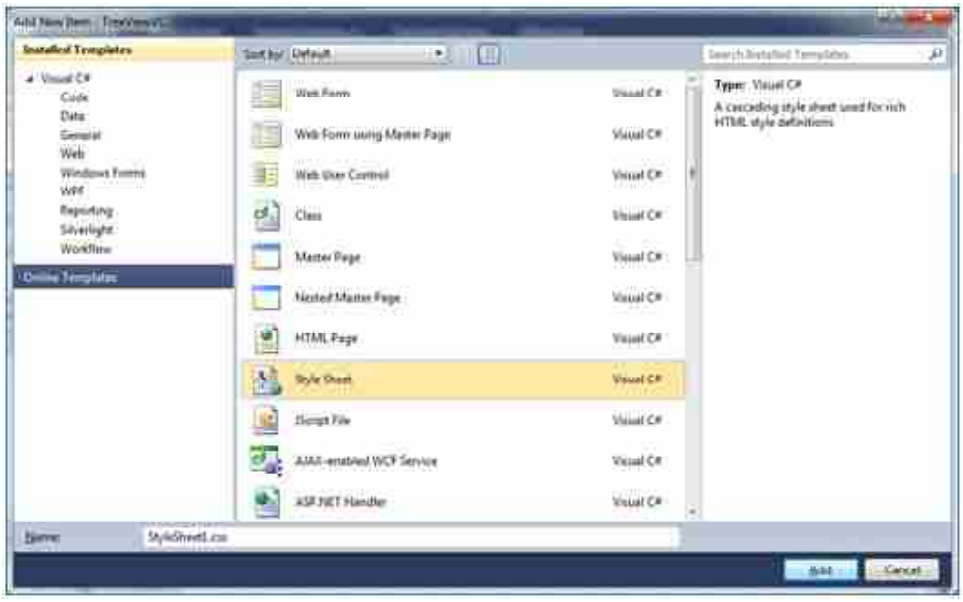


Fig. 13.1 : Adding Stylesheet

Style sheets has certain rules which defines about formatting technique of every item in web page using certain rules :

1. The portion before the period specifies the HTML element to which the rule applies. If this part is empty the rule can apply to any tag.
2. The portion after the period is a unique case–sensitive name called the CSS class name. You use it to identify your rule.

A typical style sheet defines a set of rules which are used to define the formatting for every significant piece of a website's user interface.

13.5 Creating the Content Master :

Master runner and content runner work together to produce affair to customer. Occasionally, commerce between master runner and content runner is demanded. Although too important of commerce between master runner and content runner can beget conservation problems in future, it could be useful in some scripts. There are many ways how happy runners can pierce rudiments of master runner.

A master runner provides a template for other runners, with participated layout and functionality. The extension of master runner is. master. The master runner defines placeholders for the content, which can be hoofed by content runners. The affair result is a combination of the master runner and the content runner. The content runners contain the content you want to display.

When druggies request the content runner,ASP.NET merges the runners to produce affair that combines the layout of the master runner with the content of the content runner. The master runner is a normal HTML runner designed as a template for other runners. The@ Master directive defines it as master runner having placeholder label for every content.

Step 1: Add Master page, right click in project property, and then click on Add new Item, now you will see Installed Template where you can select Master Page, finally click on **OK**.

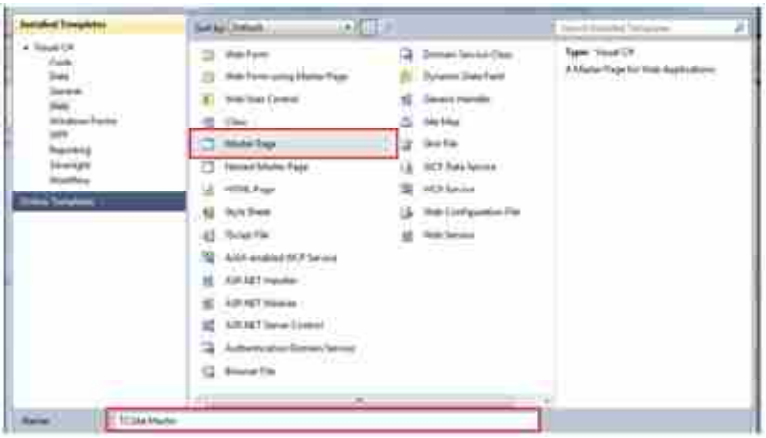


Fig. 13.2 : Installed Template

Step 2: Now you can right click on Master Page (TCSite.Master), and then click **Add Content Page**.

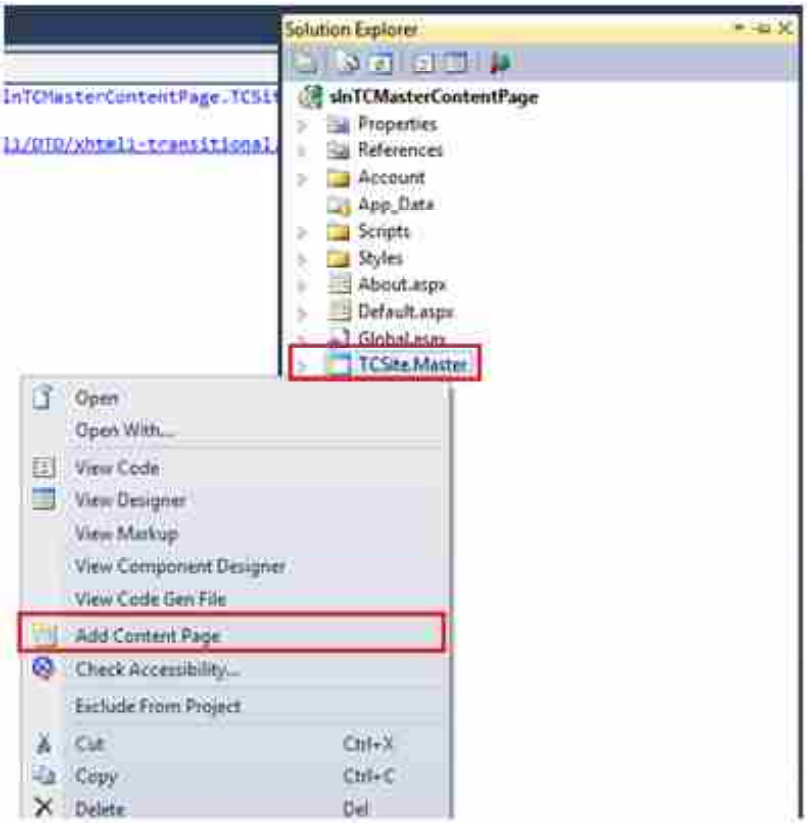


Fig. 13.3 : Add content page

Step 3: Finally, you can see final view of Content Page.

Fig. 13.4 : Content Page

13.6 Adding Elements :

➢ **Adding Elements in List:**

- **AddRange :** AddRange adds an entire collection of elements. It can replace tedious for each–loops that repeatedly call Add on List. We can

pass any IEnumerable collection to AddRange, not just an array or another List.

- **Copy array :** You can create a List having elements from an array by using list constructor which will pass the array. The list receives this parameter and fills its values from it.
- **Test elements :** You can test every element for particular value. It is noted that for every loop, it will check for particular list of parameters.
- **IndexOf :** It shows element index of particular value in a List collection which locates for initial position of the value.

➢ **Accessing HTML elements :**

- With the introduction of .Netframework, there are many new features that gets added to be applied in web development. One of the basic feature is accessing HTML elements programmatically.
- Accessing <html> elements in code: It is found that there appears many new classes in .Netframework which are added in System.Web.UI.HtmlControls Namespace.
- Accessing <Head> tag: You can access <Head> tag through HtmlHead class which is packed in namespace System.Web.UI.HtmlControls. Here the Page object will show way through Header property in order to access <head> element.
- Applying Styles clearly to control: You can create css styles for particular controls by applying it to controls clearly. In ASP.Net controls, ApplyStyle(Style) and MergeStyle(Style) methods are packed with control to get the same.

❑ **Check Your Progress – 2 :**

1. Full form of CSS

   a. Cascade Style Sheet b. Cross Source System

   c. Coding Source System d. None of these

2. E–mail format validation is possible by _____ validation control

   a. Range b. Required field

   c. Regular Expression d. None of these

3. _____ is extension of master page

   a. .master b. .sln c. .aspx d. None of these

4. By _____ element we can add range in array.

   a. AddArray b. AddList c. AddRange d. None of these

5. By _____ sequence of any element in list – IndexOf

   a. ArrayList b. IndexOf c. SortList d. None of these

13.7 Let Us Sum Up :

While studying this unit, we've learnt thatC# is an elegant and type–safe object– acquainted language that enables inventors to make a variety of secure and robust operations that run on the. NET Framework. InASP.NET, login controls delivers robust login result forASP.NET Web operations without using programming which forms authentication to help automate stoner authentication for a Web point.

We've seen that Slinging Style Wastes is a style distance language used for describing the donation semantics of a document written in a luxury language. The master runner and content runner work together to produce affair to customer. Occasionally, commerce between master runner and content runner is demanded. To manage a website having with numerous runners, the direct way for callers to navigate the website is done through point navigation. Originally, the point's nautical structure should be defined which must be restated into passable stoner interface rudiments.

It's known that authentication is capability to find particular reality which occurs when we've some coffers that we want to make available to different realities. A content runner is anASP.NET Web runner is associated with master runner which establishes a layout and includes one or further ContentPlaceHolder controls for interchangeable textbook and controls. A Web Service is programmable operation sense accessible via standard Web protocols. One of these Web protocols is the Simple Object Access Protocol (Cleaner). Cleaner is a W3C submitted note that uses norms grounded technologies to render and transmit operation data.

13.8 Answers for Check Your Progress :

- **Check Your Progress 1 :**

  1. (b) 2. (a) 3. (b) 4. (a) 5. (b)

- **Check Your Progress 2 :**

  1. 1. (a) 2. (b) 3. (c) 4. (d) 5. (a)

13.9 Glossary :

1. **ASP.NET** – A set of .NET classes used to create Web–based, client–side (Web Form) and server–side (Web Service) applications.
2. **Client** – Any application that requests information or services from a server.
3. **Code Access Security** – The common language runtime's security model for applications.
4. **Web.config** – Application configuration files contain settings specific to an application.
5. **Authorization** – It shows identity to be granted to request type in order to access given resources.
6. **Authentication** – It discovers and verify principal identity, by examining user's credentials and validating credentials against authority.

13.10 Assignment :

Discuss the steps involved in adding authentication and content pages.

13.11 Activities :

Collect some information on ASP.NET Objects.

13.12 Case Study :

Generalised the basic difference between ASP and ASP.NET.

13.13 Further Readings :

1. M. James, "Overview of ASP.NET and Web Forms", Wiley.
2. Rumy, "Code Behind vs. Code Inline"—.NET Framework, Oxford.

Unit

14

WEB SERVICES AND WCF

UNIT STRUCTURE

14.0 Learning Objectives :

After learning this unit, you will be able to understand :

- Concept of managing website with navigation controls.
- About authentication and authorization with name space.
- Concept of content page development and web services UI controls.
- About web services with WCF implementation.

14.1 Introduction :

It's necessary to development of any website Navigation process must apply. As we know web point is collection of web runners so these web runners can link with navigation process only inASP.NET. Also we concentrate about the person who's involve in the web point as admin or stoner position so the position of person is classify the authentication and authorization. Once web point master runner design and content runner apply the design authentication and authorization will comes in the website. Web services and Windows Communication Foundation (WCF) play an important part for website process.

For reacquiring data or colorful types of security like AJAX we need to understand the namespace/ library so data, UI (Stoner Interface), AJAX (Asynchronous JavaScript And XML) so linking this to gladden web runner and enforcing. Namespace web services, types of web services and its use is necessary for colorful types of web runner development.

14.2 Building the Site Navigation :

To manage a website having with multitudinous runners, the direct way for guests to navigate the website is done through point navigation. Firstly, the point's navigational structure should be defined which must be paraphrased into passable user interface rudiments. After this, everything needs to be maintained and streamlined in order to further add new runners to point by removing former bones. In caseofASP.NET point navigation system, the innovator will suitable to define point map with which it can pierce information using programmaticAPI.ASP.NET vessels with a point map provider that expects point map data to be stored in an XML train formatted in a particular way. In order to produce point map, right–click on design name placed in Solution Explorer by concluding Add New Item and choosing Point Chart option. Also, leave the nameasWeb.sitemap and click on Add button.

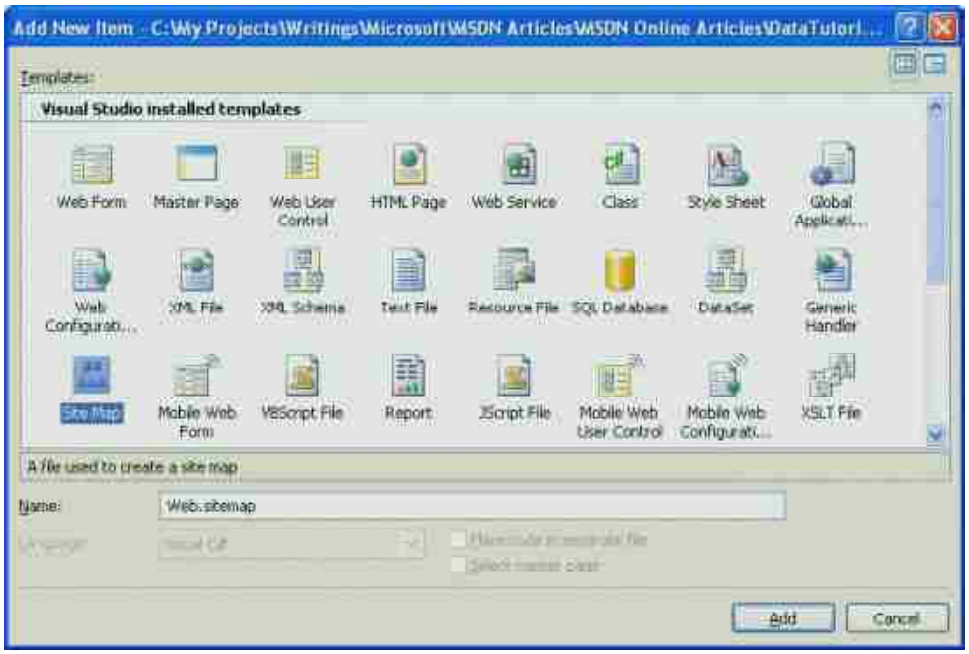


Fig. 14.1 : Add New Item Page

It's noted that the point chart train is an XML train which carries knot as its root knot having precisely one child element. That first element can also contain an arbitrary number of childrudiments. It's seen that point chart defines website's nautical structure in hierarchial structure as shown in fig2.6 describing numerous sections of point. In this, all element inWeb.sitemap shows section in point's nautical structure.

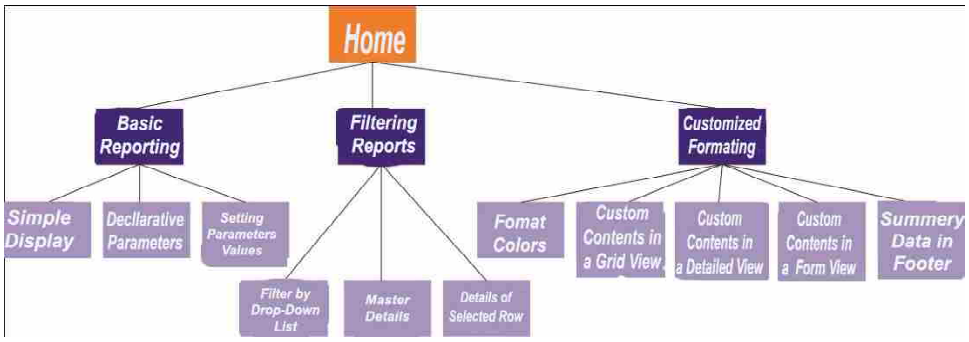


Fig 14.2 : Hierarchial Structure of Site Map

14.3 Adding Authentication :

Authentication is the capability to identify a particular reality. The need for authentication occurs when we have some resources that we want to make available to different realities. We store these resources in a centralized place and instruct the system that manages them to help realities that we do n't recognize from having access. Anonymous authentication refers to a situation in which we grant access to resources to all stoners, indeed if we do n't know them. There are several ways to add Authentication to an being design. There are three kinds of authenticationinASP.NET :

- Form
- Windows
- Passport
- Form authentication is cookie grounded, asASP.NET places a cookie in the customer machine in order to track theuser.However, also ASP, If the stoner requests a secure runner and has not loggedin.NET redirects him/ her to the login runner. Once the stoner is authenticated, he/ she will be allowed to pierce the requested runner.
- In ASP.NET, you can setup Windows account authentication. It's noted that similar type of authentication does n't involveASP.NET machine but works at Internet Information Garçon (IIS) position. It needs correct IIS configuration where authentication types in IIS can be analysed using IIS Director :

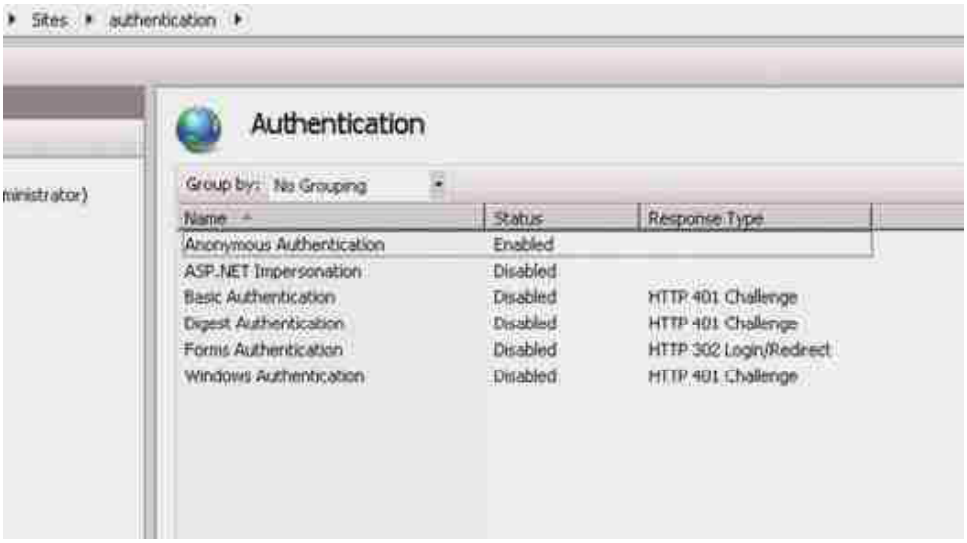


Fig. 14.3 : IIS Manager

In the Window account authentication, also the user requires username and word which are recognized by operating system for particular operation. In this, when user calls web runner, a dialog box appears which will askforcredentials.However, also in analogous case the authentication gets completed, If user provides valid credentials for valid Window account. It is not a secured authentication as in this, the authentication data gets transmitted to garçon in form of text.

14.4 Adding Content Pages :

A content runner is anASP.NET Web runner that's associated with a master runner. The master runner establishes a layout and includes one or further

ContentPlaceHolder controls for interchangeable textbook and controls. The content runner includes only the textbook and controls that are intermingled at run time with the master runner's ContentPlaceHolder controls.

After creating a content runner, you can produce custom content that corresponds to each ContentPlaceHolder on the master runner. Alternately, you can explicitly choose to allow the master runner's dereliction content to be displayed. To add a content runner in Visual Web Inventor:

- In Solution Explorer, right-click on Web site and click Add New Item.
- In Visual Studio in templates list, click on Web Form.
- Select the Select master page check box and click Add.
- Select a Master Page dialog box appears.
- In Contents of Folder box, click master page with whch you want to associate with page you create and click on OK.

14.5 Working with Data :

In ASP.NET, you can produce access and review data from database with the help of ASP.NET Web Forms and Entity Framework Code. Entity Framework is an object–relational mapping frame where you can pierce with relational data by removing multitudinous data access law applied for notation. With Entity Framework, you will get queries by LINQ which recoup and manipulate data as strongly compartmented objects. Further this Entity Framework will concentrate on creating remaining operation rather of fastening on data access.

With Entity Framework, the development paradigm known as Code First is framed which defines data models with classes that produce own custom types with grouping variables together using types, styles and events. Also, we see that by creating classes showing data which can configure operation applied for classes. Further we see that the data is passed between garçonandclient.However, also runner gets rendered by adding script which forms data or setting json using literal or similar variations If data is known at point..

❑ **Check Your Progress – 1 :**

1. By default name of site map is _____

   a. web.sitemap b. Site map c. Root Site d. None of these

2. Site map is actually _____ file

   a. .asp b. XML c. .sln d. None of these

3. _____ is root node of Site Map

   a. <base.sitemap> b. <root.sitemap>

   c. <sitemap> d. None of these

4. _____ is child note of site map

   a. <child.sitemap> b. <content.sitemap>

   c. <sub.sitemap> d. <sitemapnode>

5. Full form of IIS is _____

   a. Internet Information Server b. Internet Index Service

   c. Internet Index Source d. None of these

14.6 Using ASP.NET Web Services and WCF :

➢ **Web Service in ASP.NET :**

A Web Service is programmable operation sense accessible via standard Web protocols. One of these Web protocols is the Simple Object Access Protocol (Cleaner). Cleaner is a W3C submitted note that uses norms grounded technologies to render and transmit operation data.

Consumers of a Web Service don't need to know anything about the platform, object model, or programming language used to apply the service; they only need to understand how to shoot and admit Cleaner dispatches.

➢ **WCF Service :**

Windows Communication Foundation is a framework for building service–oriented applications. Using WCF, you can send data as asynchronous messages from one service endpoint to another. A service endpoint can be part of a continuously available service hosted by IIS, or it can be a service hosted in an application.

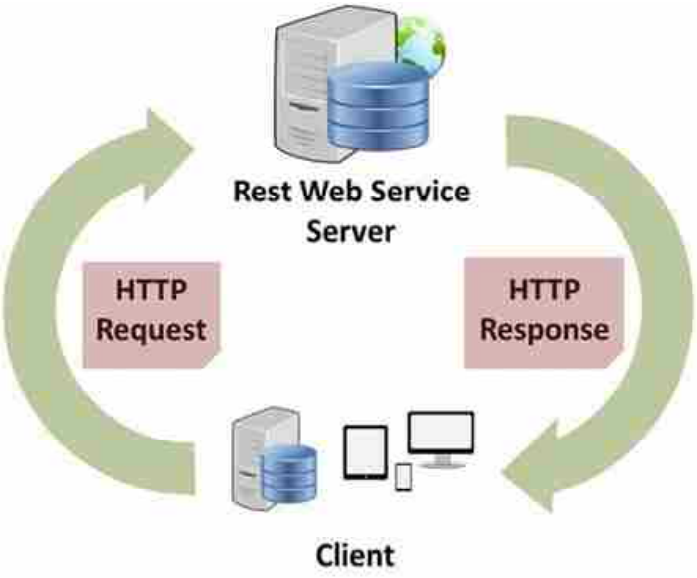


Fig. 14.4 : WCF Arrangement

In fig 14.4, we see that the endpoint is a client of service which requests data from service endpoint. Here the messages can be as simple as single character or word which is sent as XML, or can be complex as stream of binary data. It is noted that WCF can be applied in case when :

- Secure service to process business transactions.
- Service which gives current data to others.
- Chat service allows two people to communicate or exchange data in real time.
- Dashboard application polls having services for data with logical presentation.
- Opening workflow using Windows Workflow Foundation as a part of servic.e
- Silverlight application to poll a service for latest data feeds.

➢ **Features of WCF :**

- Service Orientation
- Interoperability
- Multiple Message Patterns
- Service Metadata
- Data Contracts
- Security
- Multiple Transports and Encodings
- Reliable and Queued Messages
- Durable Messages
- Transactions
- AJAX and REST Support
- Extensibility

➢ **Comparison Chart :**

WCF	ASP. NET Web Services

[ServiceContract] and [OperationContract] attributes defines web service and methods.
 	
(ServiceContract)
public interface Test
{
(Operat ionContract)
string ShowMessage();
}
public class Service : Test
{
public string ShowMessage()
{
return "Hello 1Jorld !";
}
}
	[WebService] and [WebMethod] attributes defines web service and methods.
	
	[IJebService]
	pub1ic class Service :
	System.1Jeb.Services.1JebService
	{
	[IJebMethod]
	public string Test()
	{
	return "Hello 1Jorld !";
	}
	}

Hosted in 11S, WAS (Windows Activation Service) Self-hosting, Windows service.	Hosted in 1 lS.
Accessed through HTTP, TCP, MSMQ, P2P, Named pipes.	Accessed through HTTP.
Supports security, reliable messaging, transactions, durable messages, service orientation, interoperability, service metadata, AJAX and REST support, extensibility	Supports Security services.
Uses the ServiceMetadata tool (svcutil.exe) to generate the client for the service.	Uses the command-line tool WSDL. EXE to generate the client for the service.
Unhandled exceptions are not returned to clients as SOAP faults. A configuration setting is provided to have the unhandled exceptions returned to clients for the purpose of debugging.	Unhandled exceptions are returned to the client as SOAP faults.
The generated WSDL can customized by using ServiceMetadataBehavior class.	The generated WSDL can customized by using ServiceDescriptionF ormatExtension class.

System.RunTime.Serialization is supported. -Better performance. -DataContractA ttribute and DataMemberA ttribute can be added to .NET Framework types to indicate that instances of the type are to be serialized into XML, and which particular fields or properties of the type are to be serialized. -Classes that implement the I Dictionary interface can be serialized. -Hash table can be serialized.	System .XML.Serialization is supported -Worse performance. -Only Public fields or Properties of .NET types can be translated into XML. -Only the classes which implement IEnumerable and I Collection interface can be serialized. -Hash table can not be serialized.
Can be multithreaded via ServiceBehavior class.	Can not be multithreaded.
Supports different type of bindings like BasicHttpBinding, WSHttpBinding, WSDualHttpBinding etc.	Only used SOAP or XML for this.

14.7 Creating a Simple ASP.NET Web Service :

In order to understand the concept of Web service, create a web service of Equity stock price information. In this, we see that clients will query about name and price of stock as per stock symbol. We see that web service has three methods:

- HelloWorld method
- GetName Method
- GetPrice Method

We will consider following steps to create web service:

Step (1) : Select File –> New –> Web Site in Visual Studio, and then select ASP.NET Web Service.

Step (2) : A web service file called Service.asmx and its code behind file, Service.cs is created in the App_Code directory of the project.

Step (3) : Change the names of the files to StockService.asmx and StockService.cs.

Step (4) : The .asmx file has simply a WebService directive on it :

<%@ WebService Language="C#" CodeBehind="~/App_Code/StockService.cs" Class="StockService" %>

Step (5) : Open StockService.cs file, the code generated in it is the basic Hello World service. The default web service code behind file looks like:

```
using System;
using System.Collections;
using System.ComponentModel; using System.Data;
using System.Linq; using System.Web;
using System.Web.Services;
using System.Web.Services.Protocols; using System.Xml.Linq;
namespace StockService
{
// <summary>
// Summary description for Service1
```

```
// <summary>
[WebService(Namespace = "http://tempuri.org/")] [WebServiceBinding (ConformsTo = WsiProfiles.BasicProfile1_1)] [ToolboxItem(false)]
// To allow this Web Service to be called from script,
// using ASP.NET AJAX, uncomment the following line.
// [System.Web.Script.Services.ScriptService]
public class Service1 : System.Web.Services.WebService
{
[WebMethod]
public string HelloWorld()
{
        return "Hello World";
    }
  }
}
```

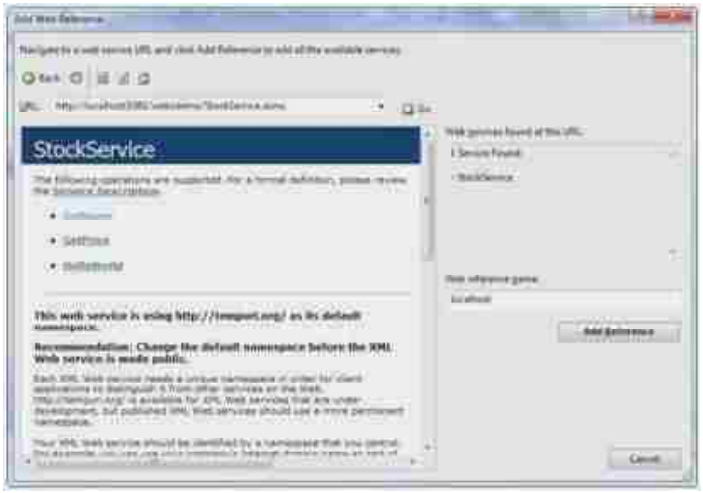
Step (6) : Change the code behind file to add the two dimensional array of strings for stock symbol, name and price and two web methods for getting the stock information.

```
using System; using System.Linq; using System.Web;
using System.Web.Services;
using System.Web.Services.Protocols; using System.Xml.Linq;
[WebService(Namespace = "http://tempuri.org/")] [WebServiceBinding (ConformsTo = WsiProfiles.BasicProfile1_1)]
// To allow this Web Service to be called from script,
// using ASP.NET AJAX, uncomment the following line.
// [System.Web.Script.Services.ScriptService]

public class StockService : System.Web.Services.WebService
{
   public StockService () {
      //Uncomment the following if using designed components
      //InitializeComponent();
}
string[,] stocks =
{
   {"RELIND", "Reliance Industries", "1060.15"},
   {"ICICI", "ICICI Bank", "911.55"},
   {"JSW", "JSW Steel", "1201.25"},
   {"WIPRO", "Wipro Limited", "1194.65"},
   {"SATYAM", "Satyam Computers", "91.10"}
```

```
};
[WebMethod]
public string HelloWorld() {
    return "Hello World";
}
[WebMethod]
public double GetPrice(string symbol)
{
    //it takes the symbol as parameter and returns price
    for (int i = 0; i < stocks.GetLength(0); i++)
    {
        if (String.Compare(symbol, stocks[i, 0], true) == 0)
        return Convert.ToDouble(stocks[i, 2]);
    }
    return 0;
}
[WebMethod]
public string GetName(string symbol)
{
    // It takes the symbol as parameter and
    // returns name of the stock
    for (int i = 0; i < stocks.GetLength(0); i++)
{
if (String.Compare(symbol, stocks[i, 0], true) == 0) return stocks[i, 1];
}
        return "Stock Not Found";
    }
}
```

Step (7) : On running web service application, we see that web service will have test page that allow testing service methods.



Step (8) : Click on a method name, and check whether it runs properly.

Step (9) : In this, we see that in order to test GetName method, provide one of the stock symbols, that returns name of stock.

❑ **Check Your Progress – 2 :**

1. Full form of SOAP
   a. Simple Object Access Protocol
   b. Simple Object Action Process
   c.Strong Ordinary Access Protocol
   d. None of these
2. To match of 2 string in ASP.NET _____ function is use
   a. String.Compare () b. String.Match ()
   c. String.Excat () d. None of these
3. Web Service has _____ method.
   a. 1 b. 2 c. 3 d. None of these
4. Full form of WCF is _____
   a. Windows Connection Foundation
   b. Windows Cross Force
   c. Windows Communication Foundation
   d. None of these
5. System.Web.Script.Services.ScriptService is use for using _____ in web service
   a. Brwoswer b. AJAX c. HTML d. None of these

14.8 Let Us Sum Up :

While studying this unit, we have learnt that C# is an elegant and type–safe object–oriented language that enables developers to build a variety of secure and robust applications that run on the .NET Framework. In ASP.NET, login controls delivers robust login solution for ASP.NET Web applications without using programming which forms authentication to help automate user authentication for a Web site.

We have seen that Cascading Style Sheets is a style sheet language used for describing the presentation semantics of a document written in a markup language. The master page and content page work together to produce output to client. Sometimes, interaction between master page and content page is needed. To manage a website having with many pages, the direct way for visitors to navigate the website is done through site navigation. Initially, the site's navigational structure should be defined which must be translated into navigable user interface elements.

It is known that authentication is ability to find particular entity which occurs when we have some resources that we want to make available to different entities. A content page is an ASP.NET Web page is associated with master page which establishes a layout and includes one or more ContentPlaceHolder controls for replaceable text and controls. A Web Service is programmable application logic accessible via standard Web protocols. One of these Web protocols is the Simple Object Access Protocol (SOAP). SOAP is a W3C submitted note that uses standards based technologies to encode and transmit application data.

14.9 Answers for Check Your Progress :

- **Check Your Progress 1 :**

  1. (a) 2. (b) 3. (c) 4. (d) 5. (a)

- **Check Your Progress 2 :**

  1. (a) 2. (a) 3. (c) 4. (c) 5. (b)

14.10 Glossary :

1. **Navigation –** A set of .NET tools that use to link various web pages as managing task.
2. **Master Web Page –** For designing web template .master extension web page that decide the theme of whole web site.
3. **Content Web Page –** Accept the designing concept of master page.
4. **Authorization –** It shows identity to be granted to request type in order to access given resources.
5. **Authentication –** It discovers and verify principal identity, by examining user's credentials and validating credentials against authority.

14.11 Assignment :

1. Compare Tree view and menu for navigation control
2. Compare Range and Required Validation Control

14.12 Activities :

Why we use of Navigation control of ASP.NET ? discuss important

14.13 Case Study :

Compare Authentication and Authorization process for web site.

14.14 Further Readings :

1. M. James, "Overview of ASP.NET and Web Forms", Wiley.
2. Rumy, "Code Behind vs. Code Inline"—.NET Framework, Oxford.

BLOCK SUMMARY :

In this block, scholars have learnt and understand about the introductory of Common Type System and Common Language Specification. The block gives an idea on the study and conception of Security Director with colorful functions and characteristics. You have been well explained on the generalities of Managed Code along with its features and operation.

The block detailed about the introductory of erecting StyleSheet as well as way involved in adding rudiments. The conception related to adding Authentication and adding Content Runners are well explained to you. You'll be demonstrated about ASP.NET WebServices and WCF.

BLOCK ASSIGNMENT :

❖ **Short Questions :**

1. What is ASP.NET ?
2. What are steps involved in building Site Navigation ?
3. What are various MS.NET Namespaces ?
4. What are the features of Common Language Runtime ?
5. What is the important of Validation Control in web site write in your words ?

❖ **Long Questions :**

1. Explain characteristics of MS.NET Memory Management.
2. Write short note on creating Content Master.
3. What is the benefit of ASP.NET ?
4. What is master and content web page in web site development ?, give detail comparison.

❖ **Enrolment No. :** ☐

1. How many hours did you need for studying the units ?

Unit No.	1	2	3	4
No. of Hrs.				

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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