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CORE JAVA

Material

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networking

Introduction to networking:-
1) The process of connecting the resources (computers) together to share the data is called networking.
2) Java.net is package it contains number of classes by using that classes we are able to connection between the devices (computers) to share the information.

3) Java.net package provide support for the TCP (Transmission Control Protocol),UDP(user data gram protocol) protocols.

4) In the network we are having to components
   a. Sender
   b. Receiver
   Sender/source: -the person who is sending the data is called sender.
   Receiver/destination:- the person who is receiving the data is called receiver.
   In the network one system can acts as a sender as well as receiver.

5) In the networking terminology everyone says client and server.
   I. Client
   II. Server
   Client:-the person who is sending the request and taking the response is called client.
   Server:-the person who is taking the request and sending the response is called server.

Categories of network:-
   We are having two types of networks
   1) Per-to-peer network.
   2) Client-server network.

Client-server:-
   In the client server architecture always client system behaves as a client and server system behaves as a server.
Peer-to-peer:-
   Inthe peer to peer client system sometimes behaves as a server, server system sometimes behaves like a client the roles are not fixed.
Types of networks:-
   Intranet:-
      It is also known as a private network. To share the information in limited area range(within the organization) then we should go for intranet.
   Internet:-
      It is also known as public networks. Where the data maintained in a centralized server hence we are having more sharability. And we can access the data from anywhere else.
   Extranet:-
      This is extension to the private network means other than the organization , authorized persons able to access.
The frequently used terms in the networking:-

1) IP Address
2) URL(Uniform Resource Locator)
3) Protocol
4) Port Number
5) MAC address.
6) Connection oriented and connection less protocol
7) Socket.

Protocol:-

Protocol is a set of rules fallowed by the every computer present in the network this is useful to send the data physically from one place to another place in the network.

- TCP(Transmission Control Protocol)(connection oriented protocol)
- UDP (User Data Gram Protocol)(connection less protocol)
- Telnet
- SMTP(Simple Mail Transfer Protocol)
- IP (Internet Protocol)

IP Address:-

1) IP Address is a unique identification number given to the computer to indentify it uniquely in the network.
2) The IP Address is uniquely assigned to the computer it is not duplicated.
3) The IP Address range is 0-255 if we are giving the other than this range that is not allowed.
4) We can identify the particular computer in the network with the help of IP Address.
5) The IP Address contains four digit number
   a. 125.0.4.255----good
   b. 124.654.5.6-----bad
   c. 1.2.3.4.5.6-------bad
6) Each and every website contains its own IP Address we can access the sites through the names otherwise IP Address.

   Site Name   :-   www.google.com
   IP Address   :-   74.125.224.72

Ex:-
```
import java.net.*;
import java.io.*;
class Test
{
        public static void main(String[] args) throws Exception
        {
                BufferedReaderbr=new BufferedReader(new InputStreamReader(System.in));
                System.out.println("please enter site name");
                String sitename=br.readLine();

                InetAddress in=InetAddress.getByName(sitename);
                System.out.println("the ip address is:"+in);

        }
}
```

Compilation   :-   javac Test.java
Execution   :-   java Test
                     www.google.com
                     The IP Address is:www.google.com/74.125.236.176

                     java Test
                     www.yahoo.com
                     The IP Address is: www.yahoo.com/ 106.10.139.246

                     Java Test
                     Please press enter key then we will get IP Address of the system.
   The IP Address is : local host/we are getting IP Address of the system

Note:-
        If the internet is not available we are getting java.net.UnKnownHostException.

URL(Uniform Resource Locator):-
1) URL is a class present in the java.net package.
2) By using the URL we are accessing some information present in the world wide web.
3) Example of URL is:-

http://www.Sravyasoft.com:10/Corejava_rattaiah.asp

Protocol   path   port   path
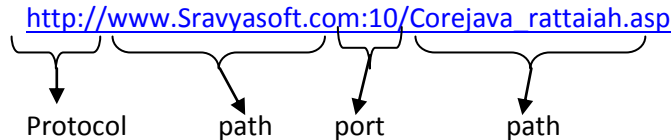
The URL contains information like
a. Protocol to use **http://**
b. Server name/IP address **www.Sravyasoft.com**
c. Port number of the particular application and it is optional(:10)
d. File name or directory name **Corejava_rattaiah.asp**
4) To crate the object for URL we have to use the fallowing syntax
      a. URL obj=new URL(String protocol, String host, int port, String path);
      b. URL obj=new URL(String protocol, String host, String path);

Ex:-
```
import java.net.*;
class Test
{
        public static void main(String[] args) throws Exception
        {
                URL url=new URL("http://www.Sravyasoft.com:10/index.html");
                System.out.println("protocal is:"+url.getProtocol());
                System.out.println("host name is:"+url.getHost());
                System.out.println("port number is:"+url.getPort());
                System.out.println("path is:"+url.getPath());
                System.out.println(url);
        }
}
```

Communication using networking :-
In the networking it is possible to do two types of communications.
1) Connection oriented(TCP/IP communication)
2) Connection less(UDP Communication)

**Connection Oriented:-**
a) In this type of communication we are using combination of two protocols TCP,IP.
b) In this type of communication the main purpose of the TCP is transferred in the form of packets between the source and destination. And the main purpose of the IP is finding address of a particular system.

To achieve the fallowing communication the java peoples are provided the fallowing classes.
      a. Socket
      b. ServerSocket

Layers of the TCP/IP connection.

Application Layer

TCP

IP

Data Link Layer

Physical Layer
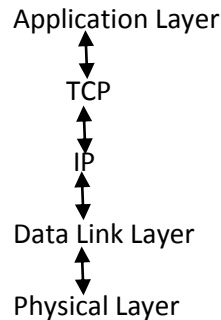
Application Layer:-
Takes the data from the application and sends it to the TCP layer.

TCP Protocol:-
it will take the data which is coming from Application Layer and divides in to small units called Packets. Then transfer those packets to the next layer called IP. The packet contains group of bytes of data.

IP:-
It will take the packets which is coming from TCP and prepare envelop called 'frames' hence the frame contains the group of packets. Then it will identify the particular target machine on the basis of the IP address and sent that frames to the physical layer.

Physical Layer:-
Based on the physical medium it will transfer the data to the target machine.

Connection Less :- (UDP)
1) UDP is a protocol by using this protocol we are able to send data without using Physical Connection.
2) This is a light weight protocol because no need of the connection between the client and server .
3) This is very fast communication compare to the TCP/IP communication.
4) This protocol not sending the data inn proper order there may be chance of missing the data.
5) This communication used to send the Audio and Video data if some bits are lost but we are able to see the video and images we are getting any problems.

   To achieve the UDP communication the java peoples are provided the fallowing classes.
   1. DataGrampacket.
   2. DataGramSocket.

Socket:-

1) Socket is used to create the connection between the client and server.
2) Socket is nothing but a combination of IP Address and port number.

3) The socket is created at client side.
4) Socket is class present in the java.net package
5) It is acting as a communicator between the client and server.
6) Whenever if we want to send the data first we have to create a socket that is acts as a medium.

Create the socket
1) Socket s=new Socket(intIPAddress, intportNumber);
   a. Socket s=new Socket("125.125.0.5",123);

   Server IP Address.Server port number.

2) Socket s=new Socket(String HostName, intPortNumber);
   a. Socket s=new Socket(Sravyasoft,123);

Client.java:-
```
import java.net.*;
import java.io.*;
class Client
{
        public static void main(String[] args)throws Exception
        {
                Socket s=new Socket("localhost",5555);
                String str="ratan from client";
                OutputStreamos=s.getOutputStream();
                PrintStreamps=new PrintStream(os);
                ps.println(str);

                InputStream is=s.getInputStream();
                BufferedReaderbr=new BufferedReader(new InputStreamReader(is));
                String str1=br.readLine();
                System.out.println(str1);

        }
}
```

Server.java:-

```java
import java.io.*;
import java.net.*;
class Server
{
        public static void main(String[] args) throws Exception
        {
                //to read the data from  client
                ServerSocketss=new ServerSocket(5555);
                Socket s=ss.accept();

                System.out.println("connection is created ");
                InputStream is=s.getInputStream();

                BufferedReaderbr=new BufferedReader(new InputStreamReader(is));
                String data=br.readLine();
                System.out.println(data);

                //write the data to the client
                data=data+"this is from server";

                OutputStreamos=s.getOutputStream();
                PrintStreamps=new PrintStream(os);
                ps.println(data);
        }
}
```