CSE3003 : Computer Networks

CN Lab 2 (Date Server and Client)

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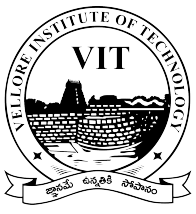

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Question :

Implement Data Server and client using Java Socket Programming.

DateServer.java

```java
import java.io.IOException;
import java.io.PrintWriter;
import java.net.ServerSocket;
import java.net.Socket;
import java.util.Date;

/**
 * A simple TCP server. When a client connects, it sends the client the current
 * datetime, then closes the connection. This is arguably the simplest server
 * you can write. Beware though that a client has to be completely served its
 * date before the server will be able to handle another client.
 */

public class DateServer {
    public static void main(String[] args) throws IOException {
        // listening to the port used
        try (var listener = new ServerSocket(59768)) {
```

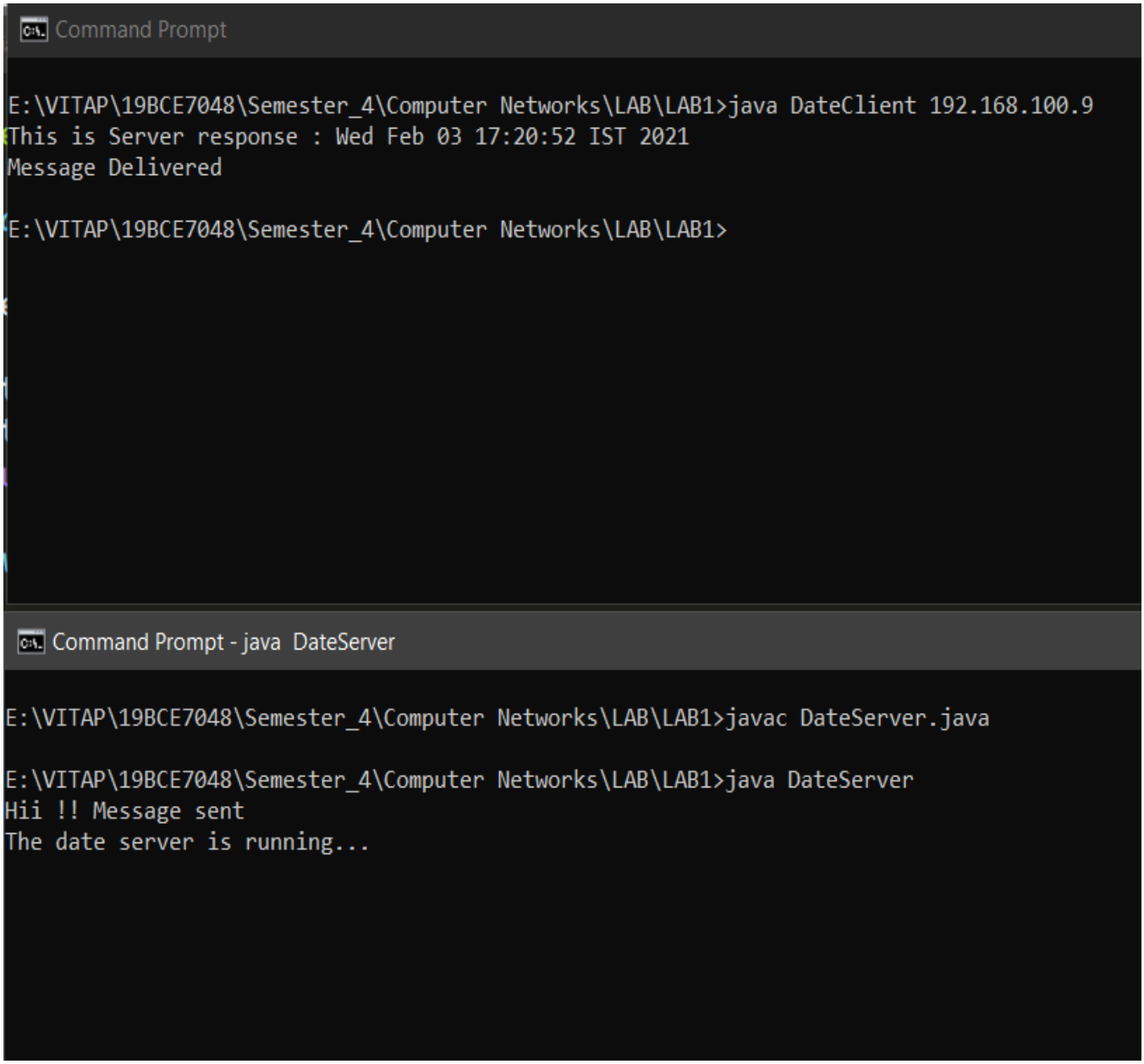
```
18              System.out.println("Hii !! Message sent");
19              System.out.println("The date server is
                   running...");
20              while (true) {
21                  // accept the request from socket
22                  try (var socket = listener.accept()) {
23                      var out = new
                           PrintWriter(socket.getOutputStream(),
                           true);
24                      // get the date and convert that to string
                           and send it to socket used
25                      out.println(new Date().toString());
26                  } catch (Exception ex) {
27                      // print all the exceptions if any
28                      ex.printStackTrace();
29                  }
30              }
31          } catch (Exception e) {
32              e.printStackTrace();
33          }
34      }
35  }
36
37  // IP address is : 192.168.100.9
38  // Port used is : 59768
```

DateClient.java

```java
import java.util.Scanner;
import java.net.Socket;
import java.io.IOException;

/**
 * A command line client for the date server. Requires the IP address of the
 * server as the sole argument. Exits after printing the response.
 */

public class DateClient {
    public static void main(String[] args) throws IOException {
        if (args.length != 1) {
            System.err.println("IP address not found, Pass the server IP as the sole command line argument..");
            return;
        }
        // creating socket with IP address and port number as arguments
        var socket = new Socket(args[0], 59768);

        // for getting input as an ordered sequence of bytes
```

```
20          var in = new Scanner(socket.getInputStream());
21
22          // getting input from server and printing date
23          System.out.println("This is Server response : " + in
                .nextLine());
24          System.out.println("Message Delivered");
25      }
26  }
27
28  // IP address is : 192.168.100.9
29  // Port used is : 59768
```

Output for above program :



LAB 2 : Answer the following Questions

Date : 10-02-2021

Q1. What are the types of address you know ? Write few words about it.

Answer :

Physical Address – MAC Address : It is a hardware level address embedded in the network card of a device by the manufacturer. Most of the Local Area networks use a 48-bit physical address written as 12-bit hexadecimal bits. **Example :** 00:1A:C2:7B:00:47

Logical Address – IP Address : It is an address used to identify different computers/devices that are inter connected on internet. It is a 32-bit address in dotted decimal notation. **Example :** 192.168.100.9

Port Address - A port number is the logical address of each application or process that uses a network or the Internet to communicate. A port number uniquely identifies a network-based application on a computer. This number is assigned automatically by the OS, manually by the user or is set as a default for some popular applications. It is 16-bit in length. **Example :** HTTP : 80 ; FTP : 21

The Physical address (MAC) will change from device to device but the Logical (IP) address and Port address will remain same.

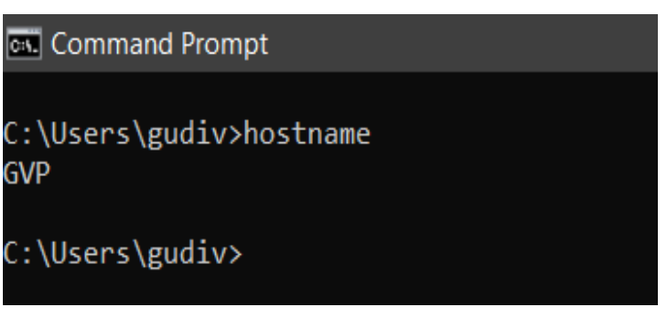
Application specific address - Some applications have user-friendly addresses that are designed for that specific application. **Example :** varaprasad.19bce7048@vitap.ac.in ; URL : www. vitap.ac.in

Q2. What are host names ?

A hostname is a label that identifies a hardware device, or host, on a network. Hostnames are used in both local networks (LANs) as well as wide area networks like the Internet. The entire hostname, including the delimiting dots, has a maximum of 253 ASCII characters. The syntax to find your Host name is ***hostname.***

Q3. What is your hostname ?

Answer : My Host name is **GVP**



Q4. What is your IP Address and MAC Address ?

Answer : using command **ipconfig/all**

IP Address : 192.168.100.1

MAC Address : 80-E8-2C-23-3D-BD

```
Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . : domain.name
   Description . . . . . . . . . . . : Realtek PCIe GbE Family Controller
   Physical Address. . . . . . . . . : 80-E8-2C-23-3D-BD
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::292e:21ee:a6e8:7753%18(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.100.9(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : 10 February 2021 09:43:31
   Lease Expires . . . . . . . . . . : 10 February 2021 21:43:32
   Default Gateway . . . . . . . . . : fe80::8226:89ff:fe0b:9622%18
                                       192.168.100.1
   DHCP Server . . . . . . . . . . . : 192.168.100.1
   DHCPv6 IAID . . . . . . . . . . . : 226551852
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-24-A3-97-48-80-E8-2C-23-3D-BD
   DNS Servers . . . . . . . . . . . : 103.57.132.236
                                       103.57.132.246
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

Q5. Change your Command Prompt to your regno. (use commands)

Answer : use the command **PROMPT <text>**

```
Command Prompt
Microsoft Windows [Version 10.0.19042.746]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\gudiv>PROMPT 19bce7048

19bce7048cd desktop

19bce7048aabb
'aabb' is not recognized as an internal or external command,
operable program or batch file.

19bce7048PROMPT 19BCE7048

19BCE7048
```

Q6. Display your Command Prompt.

Answer :

```
Command Prompt

19BCE7048
```

Q7. What do you mean by Port number ?

Answer :

A port is a communication endpoint. A port number is always associated with an IP address of a host and the type of transport protocol used for communication. It completes

the destination or origination network address of a message. The most common transport protocols that use port numbers are the Transmission Control Protocol (TCP) and the User Datagram Protocol (UDP).

Q8. How many ports are there ?

Answer :

A port number is a 16-bit unsigned integer, thus ranging from 0 to 65535 **(Total = 65536 ports)**.

Number	Assignment
20	File Transfer Protocol (FTP) Data Transfer
21	File Transfer Protocol (FTP) Command Control
22	Secure Shell (SSH) Secure Login
23	Telnet remote login service, unencrypted text messages
25	Simple Mail Transfer Protocol (SMTP) E-mail routing
53	Domain Name System (DNS) service
67, 68	Dynamic Host Configuration Protocol (DHCP)
80	Hypertext Transfer Protocol (HTTP) used in the World Wide Web
110	Post Office Protocol (POP3)
119	Network News Transfer Protocol (NNTP)
123	Network Time Protocol (NTP)
143	Internet Message Access Protocol (IMAP) Management of digital mail
161	Simple Network Management Protocol (SNMP)
194	Internet Relay Chat (IRC)
443	HTTP Secure (HTTPS) HTTP over TLS/SSL

The registered ports are those from 1024 through 49151. IANA maintains the official list of well-known and registered ranges. The dynamic or private ports are those from 49152 through 65535.

Q9. Differentiate between client and server ?

Answer :

S.No.	Client	Server
1	A client is a device that requires services via the web/internet.	A device or program that responds to the requests of the clients.
2	A client requests the server for content or service function.	Server provides functions or services to the clients when the client request for services.
3	**Example :** Desktops, Laptops, smartphones, tablets, web browsers	**Example :** Database servers, file servers, and web servers, etc..

Q10. Determine your machine address.

Answer :

Type **ipconfig /all** in the CMD. The Physical address associated is your Machine Address.

```
Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . : domain.name
   Description . . . . . . . . . . . : Realtek PCIe GbE Family Controller
   Physical Address. . . . . . . . . : 80-E8-2C-23-3D-BD
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::292e:21ee:a6e8:7753%18(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.100.9(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : 10 February 2021 09:43:31
   Lease Expires . . . . . . . . . . : 10 February 2021 23:43:31
   Default Gateway . . . . . . . . . : fe80::8226:89ff:fe0b:9622%18
                                       192.168.100.1
```

Q11. Run *getmac* and write down what does it show.

Answer :

getmac is a windows command used to display the Media Access Control (MAC) addresses i.e., the Physical Address for each network adapter in the computer.

```
Command Prompt

C:\Users\gudiv>getmac

Physical Address    Transport Name
=================== ============================================================
80-E8-2C-23-3D-BD   \Device\Tcpip_{EAAFBCB9-81A4-43E0-9D0F-C56582425BE1}
C0-B5-D7-3B-FA-A1   Media disconnected
C0-B5-D7-3B-FA-A2   Media disconnected

C:\Users\gudiv>
```

Q12. What do you mean by socket ?

Answer :

A network socket is a software structure within a network node of a computer network that serves as an endpoint for sending and receiving data across the network. The socket mechanism provides a means of inter-process communication (IPC) by establishing named contact points between which the communication take place.

Q13. How many types of socket are there ? What are they ?

Answer :

There are **four types of sockets** available to the users. The first two are most commonly used and the last two are rarely used.

Processes are presumed to communicate only between sockets of the same type but there is no restriction that prevents communication between sockets of different types.

1. Stream Sockets – If you send through the stream socket three items "X, Y, Z", they will arrive in the same order — "X, Y, Z". These sockets use TCP (Transmission Control Protocol) for data transmission.

2. Datagram Sockets — Delivery in a networked environment is not guaranteed. They're connectionless and use UDP (User Datagram Protocol) for data transmission.

3. Raw Sockets — These provide users access to the underlying communication protocols, which support socket abstractions. These sockets are normally datagram oriented.

4. Sequenced Packet Sockets – They are similar to a stream socket, with the exception that record boundaries are preserved. Sequenced-packet sockets allow the user to manipulate the Sequence Packet Protocol (SPP) or Internet Datagram Protocol (IDP) headers on a packet or a group of packets.

Q14. Can you find out figure for socket ?

Answer :

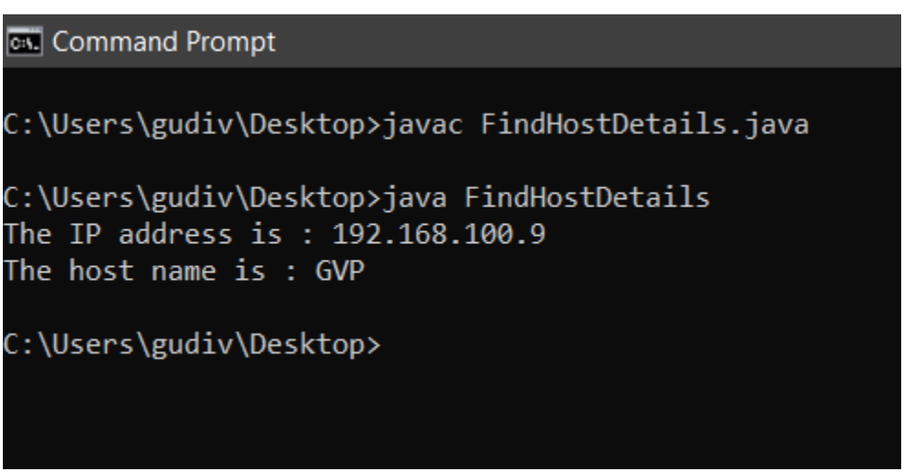
A socket is identified by: (Local IP, Local Port, Remote IP, Remote Port, IP Protocol (UDP/TCP/SCTP/etc.) And that's the information the OS uses to map the packets/data to the right handle/file descriptor of your program.

Q15. Write a small program to print your IP Address and Hostname.

Code :

```
import java.net.*;

public class FindHostDetails {

  public static void main(String[] args){

    try{

      InetAddress my_address = InetAddress.getLocalHost();

      System.out.println("The IP address is : " + my_address.getHostAddress());

      System.out.println("The host name is : " + my_address.getHostName());

    }

    catch (UnknownHostException e){

      System.out.println( "Couldn't find the local address.");

    }

  }

}
```

Output :



Q16. Mention the class used to print IP Address and Hostname.

Answer :

A class named *FindHostDetails* contains the main function. In this main function, a 'try' and 'catch' block is defined. In the 'try' block, an instance of ***InetAddress*** is created and the '***getLocalHost***' function is used to get the Host address and host name of the ***InetAddress*** instance. In case one of the attributes is not found, the 'catch' block defines catching the exception and printing the relevant message on the console.

Q17. Write few points about the class and methods used in the class.

Answer :

There are many ways to get the IP Address of a particular host. So, the method which helps to get the IP address for any Host is getHostAddress() of InetAddress class.

Syntax : public String getHostAddress()

Returns : It returns the raw IP address in a string format.

The following methods are used to get the Host Name :

1. getHostName(): This function retrieves the standard hostname for the local computer.

2. getHostByName(): This function retrieves host information corresponding to a hostname from a host database.

Q18. Write few classes you feel important for network programming.

Answer :

The core Package **java.net** contains a number of classes that allow programmers to carry out network programming :

- ContentHandler
- DatagramPacket
- DatagramSocket
- DatagramSocketImplHttpURLConnection
- InetAddress
- MulticastSocket
- ServerSocket
- Socket
- SocketImpl
- URL
- URLConnection
- URLEncoder
- URLStreamHandler