Computer Science Workshop-2 (CSE3141) (Network Clients)

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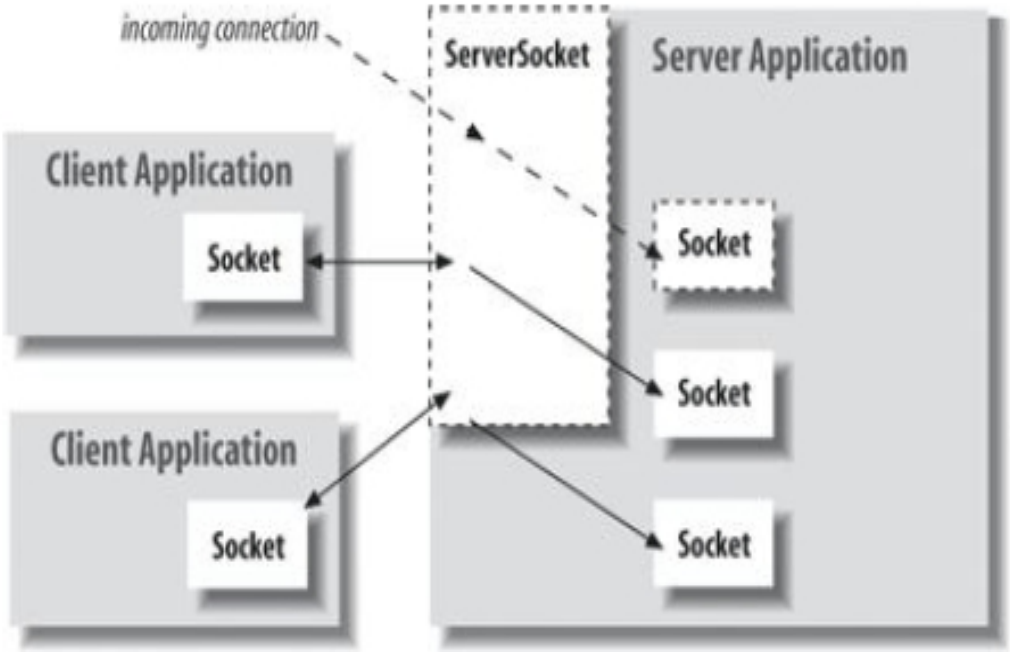
JAVA Networking

- Java Networking is a concept of connecting two or more computing devices together so that we can share resources.
- Java socket programming provides facility to share data between different computing devices.
- Used to write programs that execute across multiple devices.
- Computers present in different locations connected by a network.

JAVA Networking



JAVA Networking

- java.net package is used.
- It works on two protocols.

1) TCP - Transmission Control Protocol

- reliable as connection oriented

2) UDP - User Datagram Protocol

- connection less protocol

Advantage of Java Networking

- sharing resources
- centralize software management

InetAddress class

- It represents an IP address and provides methods to get the IP of any host name.
- An IP address is represented by 32-bit or 128-bit unsigned number.
- An instance of InetAddress represents the IP address with its corresponding host name.

InetAddress class

Method	Description
public static InetAddress getByName(String host) throws UnknownHostException	it returns the instance of InetAddress containing LocalHost IP and name.
public static InetAddress getLocalHost() throws UnknownHostException	it returns the instance of InetAdddress containing local host name and address.
public String getHostName()	it returns the host name of the IP address.
public String getHostAddress()	it returns the IP address in string format.

URL class

The Java URL class represents an URL.

URL - Uniform Resource Locator

- points to a resource on WWW

A URL contains many information:

Protocol: In this case, http is the protocol.

Server name or IP Address: www.google.com is the server name.

Port Number: It is an optional attribute. If port number is not mentioned in the URL, it returns -1.

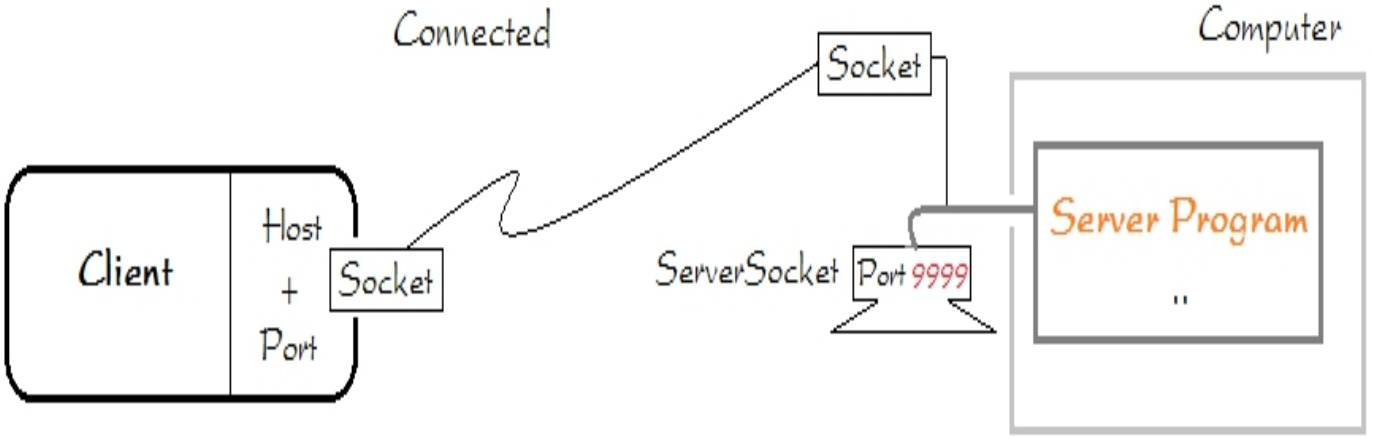
File Name or directory name: for ex, index.jsp is the file name.

Socket Programming

- communication mechanism between two computers.
- Java Socket programming can be connection-oriented (using TCP) or connection-less (using UDP).

- Socket and ServerSocket classes are used for connection-oriented socket programming
- and DatagramSocket and DatagramPacket classes are used for connection-less socket programming.

Socket Programming



Socket class

- A socket is simply an endpoint for communications between the machines.
- The Socket class can be used to create a socket.

Method	Description
1) public InputStream getInputStream()	returns the InputStream attached with this socket.
2) public OutputStream getOutputStream()	returns the OutputStream attached with this socket.
3) public synchronized void close()	closes this socket

ServerSocket class

- The ServerSocket class can be used to create a server socket.
- This object is used to establish communication with the clients.

Method	Description
1) public Socket accept()	returns the socket and establish a connection between server and client.
2) public synchronized void close()	closes the server socket.

Steps for establishing a TCP connection using sockets

1) Server creates a ServerSocket object with a port no.
2) Server invokes accept() method of ServerSocket class and waits for the clients to create a socket object.
3) Client creates a socket object which contains 2 information

a) server name

b) port no

4) attempt by client to connect

Reading and Writing Textual Data

- Open a socket.
- Open an input stream and output stream to the socket.
- Read from and write to the stream according to the server's protocol.
- Perform the data transfer
- Close the streams.
- Close the socket.

Java DatagramSocket and DatagramPacket

- Java DatagramSocket and DatagramPacket classes are used for connection-less socket programming.
- Java DatagramSocket class represents a connection-less socket for sending and receiving datagram packets.
- A datagram is basically an information but there is no guarantee of its content, arrival or arrival time.
- Java DatagramPacket is a message that can be sent or received.
- If you send multiple packet, it may arrive in any order. Additionally, packet delivery is not guaranteed.

Java DatagramSocket and DatagramPacket

- **DatagramSocket() throws SocketEeption:** it creates a datagram socket and binds it with the available Port Number on the localhost machine.
- **DatagramSocket(int port) throws SocketEeption:** it creates a datagram socket and binds it with the given Port Number.
- **DatagramSocket(int port, InetAddress address) throws SocketEeption:** it creates a datagram socket and binds it with the specified port number and host address.

Java DatagramSocket and DatagramPacket

- **DatagramPacket(byte[] barr, int length):** it creates a datagram packet. This constructor is used to receive the packets.
- **DatagramPacket(byte[] barr, int length, InetAddress address, int port):** it creates a datagram packet. This constructor is used to send the packets.

THANK YOU