Practical 7

Distributed Operating System

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AIM:

Construct a program to implement two phase commit protocol.

THEORY:

Distributed two-phase commit reduces the vulnerability of one-phase commit protocols. The steps performed in the two phases are as follows −

Phase 1: Prepare Phase

- After each slave has locally completed its transaction, it sends a "DONE" message to the controlling site. When the controlling site has received "DONE" message from all slaves, it sends a "Prepare" message to the slaves.
- The slaves vote on whether they still want to commit or not. If a slave wants to commit, it sends a "Ready" message.
- A slave that does not want to commit sends a "Not Ready" message. This may happen when the slave has conflicting concurrent transactions or there is a timeout.

Phase 2: Commit/Abort Phase

- After the controlling site has received "Ready" message from all the slaves −
    - The controlling site sends a "Global Commit" message to the slaves.
    - The slaves apply the transaction and send a "Commit ACK" message to the controlling site.
    - When the controlling site receives "Commit ACK" message from all the slaves, it considers the transaction as committed.
- After the controlling site has received the first "Not Ready" message from any slave −
    - The controlling site sends a "Global Abort" message to the slaves.
    - The slaves abort the transaction and send a "Abort ACK" message to the controlling site.
    - When the controlling site receives "Abort ACK" message from all the slaves, it considers the transaction as aborted.

PROGRAM:

TPCServer.java

```
import java.io.*;
import java.net.*;
public class TPCServer
{

    public static void main(String a[])throws Exception
        {
            BufferedReader br;
            InetAddress lclhost;
            lclhost=InetAddress.getLocalHost();
            Server ser=new Server(lclhost);

            System.out.println("Server in sending mode…..");


            // Sending data to client 1
            ser.setSendPort(9000);   //recport=8000
            ser.setRecPort(8001);   //sendport=9001

            System.out.println("Send request data to client1..");
        br=new BufferedReader(new InputStreamReader(System.in));
        String s=br.readLine();
            System.out.println("Data is "+s);
            ser.sendData();
            System.out.println("Waiting for response from client1….");
            ser.recData();

            // Sending data to client 2
            ser.setSendPort(9002);  //recport=8002
            ser.setRecPort(8003);  //senport=9003
            System.out.println("Send request data to client2..");
        br=new BufferedReader(new InputStreamReader(System.in));
        String s1=br.readLine();
            System.out.println("Data is "+s1);
            ser.sendData();
            System.out.println("Waiting for response from client2….");
            ser.recData();


            //Sending the final result to client 1
            ser.setSendPort(9000);
            ser.sendData();

            //Sending the final result to client 2
            ser.setSendPort(9002);
```

```
            ser.sendData();
        }
}

class Server
{

    InetAddress lclhost;
    int sendPort,recPort;
    int ssend =0;
    int scounter=0;
    Server(InetAddress lclhost)
    {
        this.lclhost=lclhost;
    }

    public void setSendPort(int sendPort)
    {
        this.sendPort=sendPort;
    }

    public void setRecPort(int recPort)
    {
        this.recPort=recPort;
    }

    public void sendData()throws Exception
    {

        DatagramSocket ds;
        DatagramPacket dp;
        String data="";

        if(scounter<2 && ssend<2)
            {
                data="VOTE_REQUEST";
            }

        if(scounter<2 && ssend>1)
            {
                data="GLOBAL_ABORT";
                data= data + " TRANSACTION ABORTED";

            }
        if(scounter==2 && ssend>1)
            {
                data="GLOBAL_COMMIT";
                data= data + " TRANSACTION COMMITED";
```

```
            }



        ds=new DatagramSocket(sendPort);
        dp=new DatagramPacket(data.getBytes(),data.length(),lclhost,sendPort-
1000);
        ds.send(dp);
        ds.close();
        ssend++;
    }

public void recData()throws Exception
        {
            byte buf[]=new byte[256];
            DatagramPacket dp=null;
            DatagramSocket ds=null;
            String msgStr="";
            try{
            ds=new DatagramSocket(recPort);
            dp=new DatagramPacket(buf,buf.length);
            ds.receive(dp);
            ds.close();
            }
            catch(Exception e)
            {
                e.printStackTrace();
            }
             msgStr=new String(dp.getData(),0,dp.getLength());
System.out.println("String = "+msgStr);
if(msgStr.equalsIgnoreCase("VOTE_COMMIT"))
                {
                    scounter++;
                }
        System.out.println("Counter value = "+scounter + "n Send value =
"+ssend);
    }

};
```

TPCClient1.java

```
import java.io.*;
import java.net.*;
public class TPCClient1
{
```

```
    public static void main(String a[])throws Exception
        {
            InetAddress lclhost;
            lclhost=InetAddress.getLocalHost();
            Client clnt=new Client(lclhost);


            clnt.setSendPort(9001);   //recport=8000
            clnt.setRecPort(8000);   //sendport=9001
            clnt.recData();
            clnt.sendData();
            clnt.recData();
        }
}

class Client
{
InetAddress lclhost;
    int sendPort,recPort;
    Client(InetAddress lclhost)
    {
        this.lclhost=lclhost;
}

    public void setSendPort(int sendPort)
    {
        this.sendPort=sendPort;
    }

    public void setRecPort(int recPort)
    {
        this.recPort=recPort;
    }

    public void sendData()throws Exception
    {
        BufferedReader br;
        DatagramSocket ds;
        DatagramPacket dp;
        String data="";
        System.out.println("Enter the Response 'VOTE_COMMIT' || 'VOTE_ABORT'
");
        br=new BufferedReader(new InputStreamReader(System.in));
        data = br.readLine();
        System.out.println("Data is "+data);
```

```
        ds=new DatagramSocket(sendPort);
        dp=new DatagramPacket(data.getBytes(),data.length(),lclhost,sendPort-
1000);
        ds.send(dp);
        ds.close();

    }

public void recData()throws Exception
        {
            byte buf[]=new byte[256];
            DatagramPacket dp;
            DatagramSocket ds;

            ds=new DatagramSocket(recPort);
            dp=new DatagramPacket(buf,buf.length);
            ds.receive(dp);
            ds.close();
            String msgStr=new String(dp.getData(),0,dp.getLength());
            System.out.println("Client1 data " +msgStr);

    }

};
```

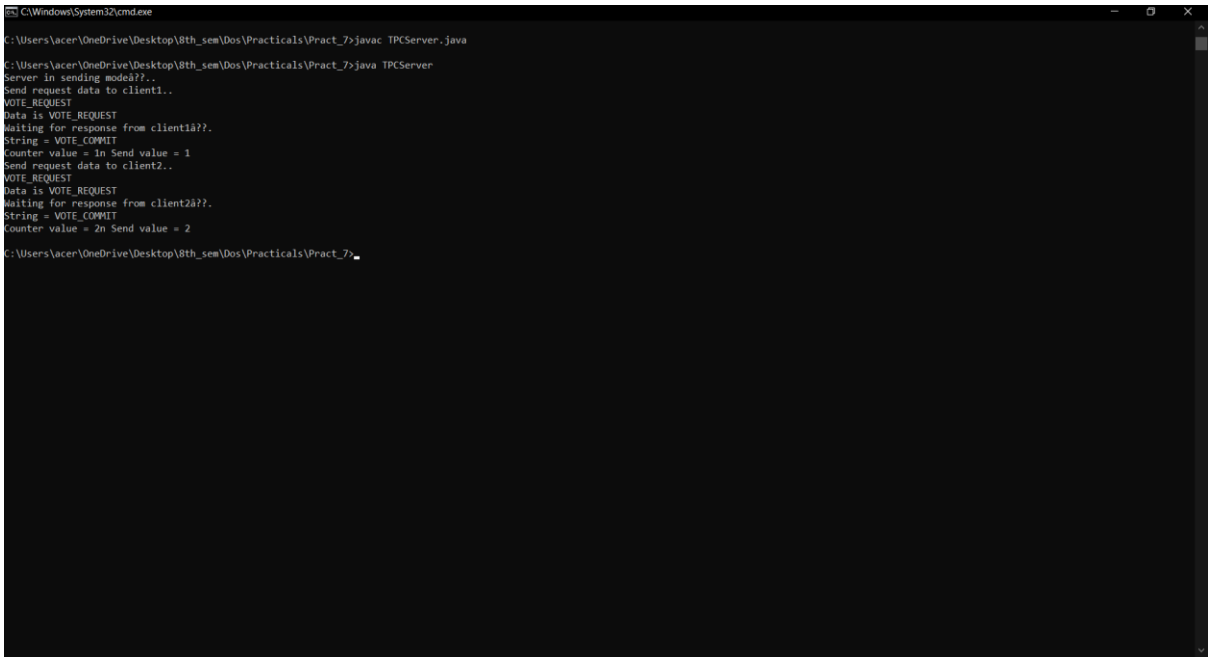
TPCClient2.java

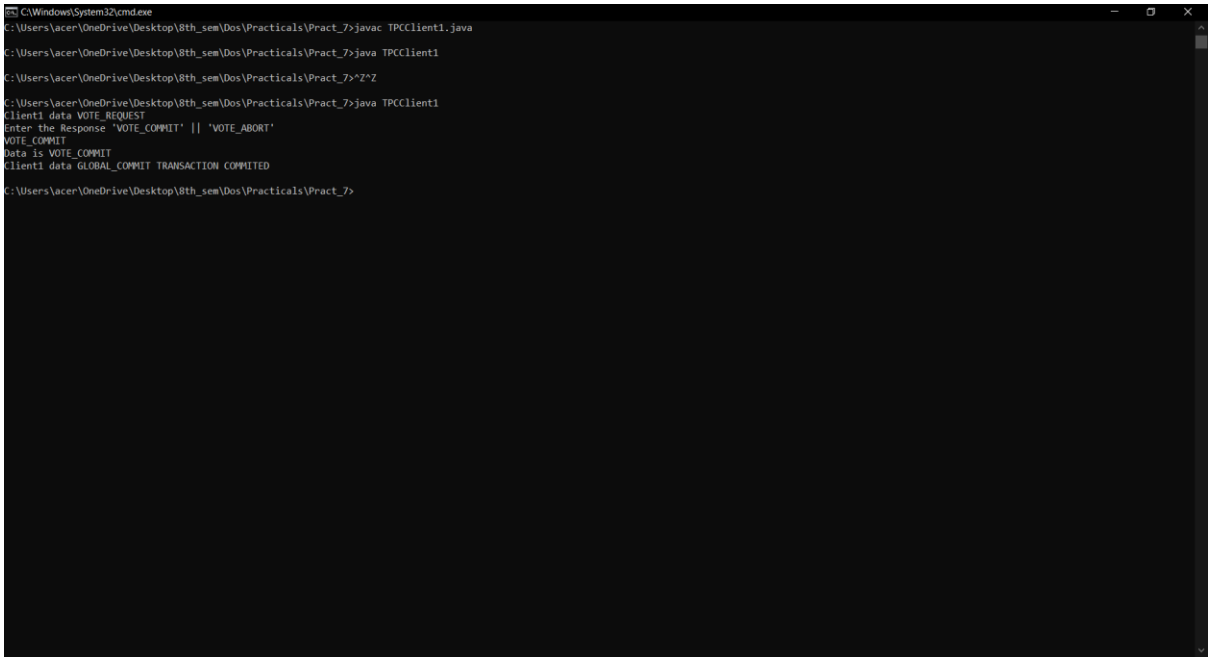
```
import java.io.*;
import java.net.*;
public class TPCClient2
{

    public static void main(String a[])throws Exception
        {
            InetAddress lclhost;
            lclhost=InetAddress.getLocalHost();
            Client client=new Client(lclhost);

            // Sending data to client 2
            client.setSendPort(9003);  //recport=8002
            client.setRecPort(8002);  //senport=9003
            client.recData();
            client.sendData();
            client.recData();

    }
}
```

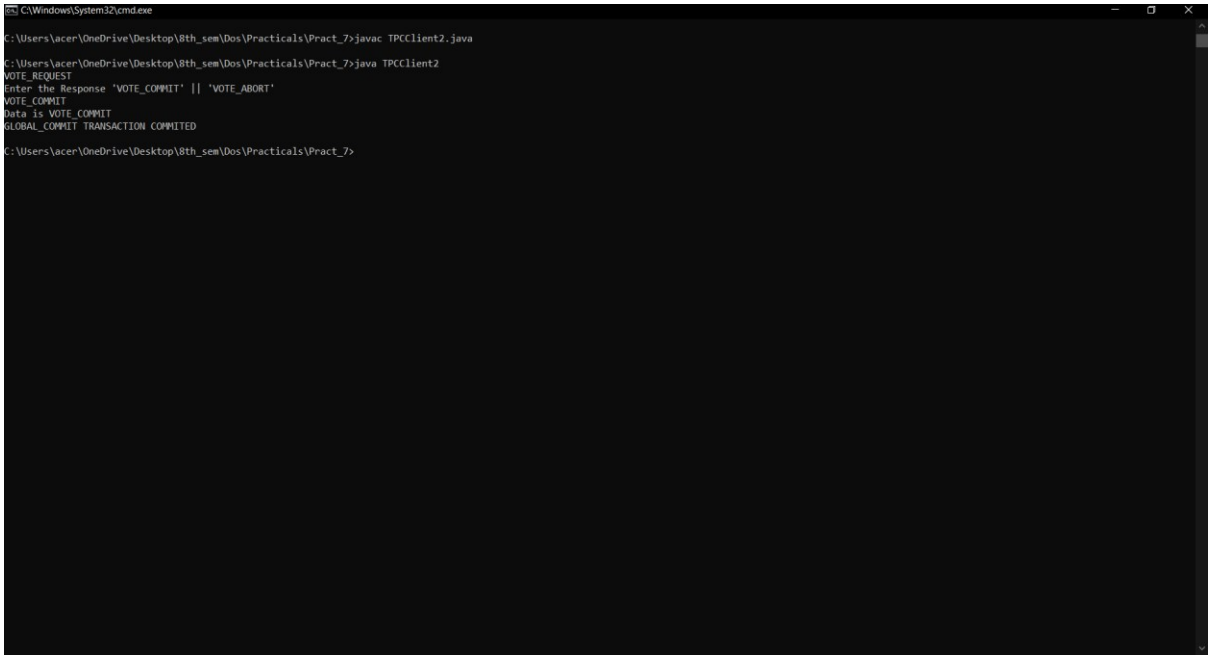
```
class Client
{

    InetAddress lclhost;
    int sendPort,recPort;
    Client(InetAddress lclhost)
    {
        this.lclhost=lclhost;
    }

    public void setSendPort(int sendPort)
    {
        this.sendPort=sendPort;
    }

    public void setRecPort(int recPort)
    {
        this.recPort=recPort;
    }

    public void sendData()throws Exception
    {
        BufferedReader br;
        DatagramSocket ds;
        DatagramPacket dp;
        String data="";
        System.out.println("Enter the Response 'VOTE_COMMIT' || 'VOTE_ABORT'
");
        br=new BufferedReader(new InputStreamReader(System.in));

        data = br.readLine();
        System.out.println("Data is "+data);

        ds=new DatagramSocket(sendPort);
        dp=new DatagramPacket(data.getBytes(),data.length(),lclhost,sendPort-
1000);
        ds.send(dp);
        ds.close();

    }

public void recData()throws Exception
        {
            byte buf[]=new byte[256];
            DatagramPacket dp;
            DatagramSocket ds;
            ds=new DatagramSocket(recPort);
            dp=new DatagramPacket(buf,buf.length);
```

```
            ds.receive(dp);
            ds.close();
            String msgStr=new String(dp.getData(),0,dp.getLength());

            System.out.println(msgStr);
    }

};
```

OUTPUT:







CONCLUSION:

Hence we have successfully built a program to implement two phase commit protocol.