



Faculty of Information Technology

Final Exam, 2015/2016 (1)

Course (Code) Name: COSC 313 TCP/IP Programming

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Exam Duration: 1hrs

Group:

Date: .../01/2016

INSTRUCTIONS:

- This paper comprises 4 questions
- Be short and concise
- Attempt all questions

TCP/IP Programming Theory / 35 marks

1. Assuming “**din**” is the input stream and “**dout**” is the output stream, explain the logic of the java code fragment below: / **6 marks**

```
String a = null;
while (true)
{
    a = din.readUTF ();
    System.out.println ("Client:" + a);
    dout.writeUTF (a);
    System.out.println ();
}
```

Marking scheme:

Students are expected to find out that whatever is read from the input stream is written back to the output stream. So the script is written for an echo server which returns to the client whatever the client sends.

Students are also expected to explain in clear terms how the echo is achieved by going through each statement.

Students who provide explanations for each statement but not mention it is an echo sever get 4 marks

The Java code fragment provided implements an echo server. The server continuously reads data from the input stream "din" and writes the same data to the output stream "dout", creating a loop that keeps running until interrupted.

Here is an explanation of each statement in the code:

String a = null;; This line declares a string variable "a" and initializes it with a null value.

while (true): This creates an infinite loop that keeps running until it is interrupted. Since the condition is always true, the loop runs continuously.

a = din.readUTF();: This line reads a string from the input stream "din" and stores it in the variable "a". The readUTF() method is used to read a string in UTF-8 format from the stream.

System.out.println("Client:" + a);: This line prints the string "Client:" concatenated with the value of "a" to the console. This displays the message received from the client.

dout.writeUTF(a);: This line writes the value of "a" to the output stream "dout". The writeUTF() method is used to write a string in UTF-8 format to the stream.

System.out.println();: This line prints a blank line to the console. This is done to separate the different messages received from the client and the messages sent back to the client.

Therefore, the overall logic of the code is to continuously read a message from the input stream, print it to the console, write the same message to the output stream, and then print a blank line. This creates an echo effect where the server sends back to the client whatever the client sends.

2. Consider the java code fragments below on the server side. Explain each statement.
/ 12 marks

```
1. Date date = new Date ();
   String dateAndTime = date.toString ();
   try {
       ServerSocket s=new ServerSocket (5217);
       Socket soc=s.accept ();
       DataOutputStream out=new DataOutputStream (soc.getOutputStream ());
       out.writeUTF ("Server time and date: " + dateAndTime);
   }
```

Marking scheme:

Students are expected to find out that this is a date server which sends to the client the server's date and time whenever a client connects.

Students are also expected to explain in appropriate terms how the date and time are sent to the client by going through each statement.

Students who provide explanations for each statement but not mention it is a time and date server get 4 marks. Students who provide both get 6 marks. Otherwise they get zero.

his code implements a simple date server that sends the server's date and time to a connected client. Here is an explanation of how each statement works:

1. **Date date = new Date ();** - Creates a new instance of the **Date** class, which represents the current date and time.
2. **String dateAndTime = date.toString ();** - Converts the **Date** object into a string representation of the date and time using the **toString()** method.
3. **ServerSocket s=new ServerSocket (5217);** - Creates a new **ServerSocket** object that listens for client connections on port number 5217.

4. `Socket soc=s.accept ();` – Waits for a client to connect to the server and returns a new `Socket` object to communicate with the client.
5. `DataOutputStream out=new DataOutputStream (soc.getOutputStream ());` – Creates a new `DataOutputStream` object that writes data to the client's output stream.
6. `out.writeUTF ("Server time and date: " + dateAndTime);` – Sends a UTF-encoded string to the client's output stream that includes the current date and time along with a message indicating that it is the server's date and time.

Overall, this code implements a simple server that listens for client connections, sends the current date and time to the client, and then closes the connection. The `DataOutputStream` is used to send the data to the client in a way that is easily readable by both the client and server.

```
2. try
{
    ServerSocket serverSocket = new ServerSocket (3000);
    while (true)
    {
        Socket socket = serverSocket.accept ();
        DataInputStream dis = new DataInputStream (socket.getInputStream ());
        DataOutputStream dos = new DataOutputStream (socket.getOutputStream ());
        String value1 = dis.readUTF ();
        int value2 = Integer.parseInt (value1);
        int value3 = value2*2;
        String value4 = String.valueOf (value3);
        dos.writeUTF (value4);
    } }
```

Marking scheme:

Students are expected to find out that this is a server which multiplies by 2 whatever integer it receives from the client and sends the result back.

Students are also expected to explain in appropriate terms how the server receives the integer and doubles it before sending back the result to the client.

Students who provide explanations for each statement but not mention it is a multiplying server get 4 marks. Students who provide both get 6 marks. Otherwise they get zero.

3. Write a Java program for the client and the server sides. / 10 marks

- The server receives from the client the radius of a circle, calculate the area and returns to the client the calculated area.
- The client side accepts from the key board the radius of a circle and passes it to the server.
- The area of the circle is calculated as : πr^2 where $\pi = 3.14$

Marking scheme:

4. Write a java program which accepts a class C IP address and a subnet mask from the keyboard and prints all IPs in the subnet range. / **7 marks**

<<BEST OF LUCK>>