INSTITUTE OF BIOINFORMATICS AND APPLIED BIOTECHNOLOGY
TERM-END EXAMINATION | MSc12 Third Semester | MONDAY 04 DEC 2023
BTBIP - 309: ADVANCED JAVA AND WEB APPLICATIONS

Time: 4 hours Maximum Marks: 60

PART - A
Answer any TWO Questions OUT of THREE.
Each Question carries 8 marks

1. Write an html form that takes 3 matrices of 4 x 4 order , as input from the user. Each of these matrices will contain integer numbers. Once submitted, a PHP script / Servlet/CGI script will receive these matrices and does the following:
   - It swaps rows and columns values of Matrix-2.
   - It multiplies each value in Matrix-1 by 3.
   - It adds the updated Matrix-2 to updated Matrix-1 to create another Matrix_Sum.
   - Finally it subtracts Matrix-3 from Matrix_Sum to create a final Matrix, namely Matrix_Res
   - Prints all the original matrices, intermediate matrices and final matrix.

   Ex: Let the three matrices entered be:

Matrix-1 :	Matrix-2	Matrix-3
1 1 1 1	1 2 3 4	0 1 0 1
1 1 1 1	1 2 3 4	0 1 0 1
1 1 1 1	1 2 3 4	0 1 0 1
1 1 1 1	1 2 3 4	0 1 0 1

   After swapping of rows and columns of Matrix-2, it looks like:
   1 1 1 1
   2 2 2 2
   3 3 3 3
   4 4 4 4
   After multiplying each value of Matrix-1 by 3 we get:
   3 3 3 3
   3 3 3 3
   3 3 3 3
   3 3 3 3
   Matrix_Sum will be:
   4 4 4 4
   5 5 5 5
   6 6 6 6
   7 7 7 7
   After subtracting Matrix-3 from Matrix-Sum, we get:
   4 3 4 3
   5 4 5 4
   6 5 6 5
   7 6 7 6

2. Write an SQL script that does the following:
- Creates three databases namely Text1,Text2,Text3
- Create three tables in each database. Name them as below:
    - table1 is called Technical
    - table2 is called Management
    - table3 is called Sports
- Each table contains at least 4 fields
    - BookName
    - BookAuthor
    - NoOfPgs
    - Publisher
- Store information on at least 3 books under each table.
- Read the databases and tables and print all the information onto the screen.

3. Write a Servlet/jsp code that takes the filename and content to be written into file, as inputs . Now create a file with the filename, and write the content into that file. Write another Servlet/jsp code that takes the filename as input and reads and prints the content of the file. Here use the same filename for both write and read operation so that second Servlet/jsp reads the content that was written from first Servlet/jsp.
For both Servlets , inputs are given using html form.
One html form works with first Servlet/jsp and another separate html form works with the second Servlet/jsp. No need to link html forms.

PART -B
Answer any Three Questions OUT of Four.
Q5 or Q7 should be attempted. It carries 16 marks.
Rest of the Qs are for 14 marks.

4. Write a java program that creates three threads.
- First Thread will create a File named “input.txt” and writes 4 lines of text onto the file.
- Second Thread will create a File named “input2.txt” and writes 4 lines of text onto the file.
- The Third Thread will read from both the files created by other 2 threads, concatenates contents and writes the same onto another file “output.txt”
- The concatenated text will contain contents of input2.txt first, followed by the contents of input.txt
- Its not a mandate that all three threads are created and started by main().
- Wherever required, use Thread Synchronization.

5. Submit 10 binary numbers , each of length 4 , using an html form.
A JSP / Servlet code will take these 10 numbers and process the same using the following protocol:

- Will reduce the numbers to 5, by concatenating two binary numbers. Since there are 10 numbers, after concatenation, it creates 5 new binary numbers.

- Concatenation happens between numbers 1 and 2, 3 and 4, 5 and 6, 7 and 8, 9 and 10

- Will convert each of these binary numbers to decimal numbers (base 2 to base 10).
- Will reject 1 number, based on its decimal value

- Now with the 4 numbers left over, it adds 15 to each number
  that results in 4 new numbers.

- These 4 numbers are sorted in ascending order and printed onto the screen along with their binary equivalent.

Ex: If the initial binary numbers submitted are :
0001, 1001, 1100, 1101, 1011, 0100, 0001, 0010, 1111, 1110

After concatenation:
00011001, 11001101, 10110100, 00010010, 11111110

After converting to decimal the numbers would be:
25, 205, 180, 18, 254

Based on decimal value, 4^{th} number is rejected as 18 is the least value one.

Adding 15 to each of the remaining 4 numbers will give:
40, 220, 195, 269.

Then sorting in ascending order gives: 40,195,220,269.
Binary equivalent in ascending order : 101000, 11000011, 11011100, 100001101
NOTE: Library method can be used either for decimal to binary or binary to decimal Conversion, but not for both.

6. Create an XML file that satisfies the following conditions:
- This XML file has root node as Animals
- It contains 4 categories under it:
  - Predator
  - Prey
  - Big Animal
  - Small Animal
- Important information/properties to be stored under each category are
  - Name
  - Country
  - Life Span
  - Food
- Under each of main category, above information should be stored for at least 4 Animals. The structure to be followed is as given below:

```
<Animal>
    <Predator>
        <Predator1>
            <Name> …… </Name>
            <Country> ----------</Country>
            <LifeSpan>----------</LifeSpan>
```

```
            <Food>----------</Food>
        </Predator1>
        <Predator2>
            ----------
            ----------
        </Predator2>
        ----------
        ----------
        ----------
        ----------
</Predator>
```

Make sure this XML is a well formed one. Write an external/internal DTD to validate this XML.

7. Write a Servlet/jsp code with JDBC that does the following:

- Takes name of 3 Databases to be created .
- Takes name of 2 tables to be created under each Database.
- One database is dedicated to store information on human chromosome(s).
- One database is dedicated to store information on mammals in general.
- One database is dedicated to store information on small birds.
- Each table should contain at least 3 important fields relevant to the above categories.
- Three sets of data/values is a mandate, in each table.
- Read all tables from all the databases and print the data/values as it is.
- Find common elements between tables of first and third Databases and print the same.
- Sort the data from all the tables in descending order based on a key, and print the Same (You can decide on the key).

NOTE: DB name(s), table name(s) and all the values of table(s) are submitted using an html form.