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**Answer 1->**

Language used : Java

Time Complexity = O(nlogn)

Sorting method : Merge Sort

**import** java.io.BufferedReader;

**import** java.io.BufferedWriter;

**import** java.io.File;

**import** java.io.FileNotFoundException;

**import** java.io.FileReader;

**import** java.io.FileWriter;

**import** java.io.IOException;

**import** java.io.Reader;

**import** java.util.Scanner;

**public** **class** fileMerge {

**public** **static** **void** main(String[] args) **throws** IOException {

**if**(args.length> 0){

//get the 3 lines from the command prompt

File inputFile1 = **new** File(args[0]);

File inputFile2 = **new** File(args[1]);

File outputFile = **new** File(args[2]);

**try** {

//read the 2 files..

Scanner readerL = **new** Scanner(inputFile1);

Scanner readerR = **new** Scanner(inputFile2);

FileWriter fw = **new** FileWriter(outputFile);

BufferedWriter bw = **new** BufferedWriter(fw);

**boolean** flagL = **true**;

**boolean** flagR= **true**;

String line1=**null**;

String line2=**null**;

//if we havent traversed to the end of BOTH the files..

**while** (readerL.hasNextLine() && readerR.hasNextLine()) {

**if**(flagL){

line1= readerL.nextLine();

}

**if**(flagR){

line2= readerR.nextLine();

}

//if both have the same value,i.e.duplicate the sotre one and update the pointers for both

**if** (line1.compareToIgnoreCase(line2) == 0) {

bw.write(line1);

bw.newLine();

System.***out***.println(line1);

flagL=**true**;

flagR = **true**;

}**else** **if**

//if the word from file1 is alphabetically before the word from file2

(line1.compareToIgnoreCase(line2) < 0) {

//write the word from the first file to the output file and increment pointer

bw.write(line1);

bw.newLine();

System.***out***.println(line1);

flagL= **true**;

flagR= **false**;

}**else** {

//else write the word from the second file and increment pointer

bw.write(line2);

bw.newLine();

System.***out***.println(line2);

flagL=**false**;

flagR=**true**;

}

}

//if we have reached the end of file for the second file,copy all the contents from first file

**while**(readerL.hasNextLine()){

line1= readerL.nextLine();

bw.write(line1);

bw.newLine();

System.***out***.println(line1);

}

//if we have reached the end of file for the first file,copy all the contents from second file

**while**(readerR.hasNext()){

line2= readerR.nextLine();

bw.write(line2);

bw.newLine();

System.***out***.println(line2);

}

readerL.close();

readerR.close();

bw.close();

} **catch** (FileNotFoundException e) {

e.printStackTrace();

}

}

}

**public** **static** String readLine(Scanner reader) {

**if** (reader.hasNextLine())

**return** reader.nextLine();

**else**

**return** **null**;

}

}

**Answer 2 ->**

**The 2-tier application** (client-server application) is the most restrictive since each client application requires its own (database) session. As a result, 2 tier applications **do not scale** as easily as other architectures i.e. it **cannot serve multiple request at the same time**. Also, this means that the application performance will **degrade** upon increasing the number of users.

Because of tight coupling between client and server it runs faster.

Example: Java user interface(SWING/AWT) and batch data processing.

Thus, we have moved to 3 tier architectures or N tier architectures. (can be 4 as well).

**The components of a 3-tier architecture include:**

* Client Layer (Presentation Layer)
* Business Layer
* Data Later

**PRESENTATION LAYER**: Contains UI part of the application. This layer is used for the **design purpose** where data is presented to the user or input is taken from the user.

The main function of this layer is to translate tasks and results to something that the user understands.

Because the **Presentation tier can cache requests, network utilization is minimized**, and the load is reduced on the Application and Data tiers.

->Registration form which contains textbox, label, button.

->In a web application this is the part which receives the HTTP request and returns the HTML response.

The technologies involved GUI for smart client interaction and web based technologies for browser based interaction (e.g. HTML, CSS ,JavaScript, etc..).

**BUSINESS LAYER:**

This layer coordinates the application, processes commands and makes logical decisions and evaluations and performs calculations. All the business logic is written **like validation of data, calculations, data insertion**. Acts as an interface between the surrounding layers (client layer and data layer),

In this layer, the detailed processing of data from presentation layer takes place. **Server such as Apache (or IIS) or Server Script (such as PHP) can be used to support this.**

With Server (Apache or IIS) the appropriate action to be taken is identified, such as fetching a file, or passing request to an interpreter.

With Server script (example in PHP) interacting with server such as accessing input or generating input is done. It interprets the requests according to business rules and past transactions from this client, and requests appropriate data from the persistence layer. It also computes the derived data and creates HTML (or GIF…) for the page.

**DATA LAYER**

Here information is **stored or retrieved from a database or file system**. The information is passed to the logic tier (Business Layer) for processing and then eventually back to the user.

This layer communicates with the database by **constructing SQL queries** and executing them via the relevant API.

This tier consists of database servers. The interaction with the database is done using standard languages such as SQL queries using database specific protocol over TCP/IP.

The data structures (for example tables) are defined and modified themselves, that insertion, updating and deleting of data for example. Data maintenance should be maintained with backup and recovered.

**Answer 3 ->**

Assumptions->

* "getConnection" returns an ADO connection object connected to a SQL database.

The method GetCustomerDetails returns a List of the customers with their respective names, date and total order.

public static List<Customer> GetCustomerDetails()

{

List<Customer> Customers = new List<Customer>();

try

{

//make connection to the database(SQL)

//this returns the SQLConnection to the Database

using(SQLConnection myConnection= getConnection());

{

myConnection.Open();

using(SqlCommand myCommand= new SqlCommand(“\*\*\*\* insert query\*\*\*”))

{

SqlDataReader myReader= myCommand.ExecuteReader();

If(myReader.HasRows)

while(myReader.Read()){

string customerName= myReader[“NAME”].ToString();

string date = Convert.toDateTime(MyReader[“Date”]).ToString(“dd/MM/yyyy”);

int totalOrder = (int)myReader[“TOTALORDER”];

Customers.Add(

new Customer(customerName, date, totalOrder));

} }

myConnection.close();

}

catch (Exception exp)

{

Console.WriteLine(exp.toString());

}

return Customers;

}

}