Assignment B5

Problem Definition

A Web application for Concurrent implementation of ODD-EVEN SORT is to be designed using Real time Object Oriented Modeling(ROOM).

Give the necessary design diagrams and write the test cases for the white box testing. Draw Concurrent collaboration Diagrams.

Learning Objective

1. To Study and Understand concurrent ODD-EVEN sort.
2. To develop web application.
3. To study jsp,HTML and CUDA programming.
4. To study and understand ROOM modelling.

Theory

* Web applications :

In computing, a web application or web app is a client-server software appli- cation in which the client (or user interface) runs in a web browser. Web appli- cations are popular due to the ubiquity of web browsers, and the convenience of using a web browser as a client to update and maintain web applications without distributing and installing software on potentially thousands of client computers is a key

reason for their popularity, as is the inherent support for cross-platform compatibility.

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Web sites most likely to be referred to as ”web applications” are those which have similar functionality to a desktop software application, or to a mobile app. HTML5 introduced explicit language support for making applications that are loaded as web pages, but can store data locally and continue to function while online.

* ODD-EVEN sort :

In computing, an odd-even sort or odd-even transposition sort (known as brick sort) is a relatively simple sorting algorithm, developed originally for use on parallel processors with local interconnections. It is a comparison sort related to bubble sort, with which it shares many characteristics. It functions by com- paring all (odd, even)-indexed pairs of adjacent elements in the list and, if a pair is in the wrong order (the first is larger than the second) the elements are switched. The next step repeats this for (even, odd)-indexed pairs (of adjacent elements). Then it alternates between (odd, even) and (even, odd) steps un- til the list is sorted. On parallel processors, with one value per processor and only local left-right neighbor connections, the processors all concurrently do a compare-exchange operation with their neighbors, alternating between odd-even and even-odd pairings. The algorithm extends efficiently to the case of multiple items per processor. In the Baudet-Stevenson odd-even merge-splitting algo- rithm, each processor sorts its own sublist at each step, using any efficient sort algorithm, and then performs a merge splitting, or transposition-merge, opera- tion with its neighbor, with neighbor pairing alternating between odd-even and even-odd on each step. Performance and complexity: 1. Worst case performance $O(n^V 2)$

2. Best case performance O(n) 3.
Worst case space complexity : O(1) *
ROOM modelling :

Real Time Object Oriented Modeling (ROOM) is a domain specific language. ROOM was developed in the early 1990s for modeling

Realtime systems. The initial focus was on telecommunications, even though ROOM can be ap- plied to any event-driven real-time system. ROOM is supported by ObjecTime Developer (commercial) and eTrice When UML was defined, many elements of ROOM were taken over. Developing real time software is particularly chal- lenging since the complexity of the physical world has to be accommodated as well as stringent resource and timeliness constraints. Such circumstances re- quire special language support over and above what can be found in general purpose programming languages. ROOM is both an object oriented modeling language and a development method specifically designed for dealing with large real time systems. It supports automatic code generation to ensure reliability and increase productivity. Model real time systems based on timeliness, dynamic internal structure, reactiveness, concurrency and distribution, using the ROOM notation. ROOM is an objectoriented methodology for real-time systems developed originally at BellNorthern Research. ROOM is based upon a principle of using the same model for all phases of the development process. ROOM models are composed of actors which communicate with each other by sending messages along protocols. Actors may be hierarchically decomposed, and may have behaviors described by ROOM charts, a variant of Harel's state charts. Descriptions of actors, protocols, and behaviors can all be reused through inheritance.

* ROOM Diagram Software Features:

1. Chart Templates
2. Drag and Drop Interface
3. Snap-to
4. Automatic Spacing and Alignment
5. Change Connector Path
6. Add Connector Points to Symbols
7. Multiple Pages
8. Symbol Gallery
9. Grids and Guides
10. Change Existing Diagram Shapes
11. Multiple Connector Points
12. Connector Labels

13.Junction Jogs

14.Add Hyperlinks

15.Expandable Canvas

Mathematical Model :

S = s, e, I, o, f, DD, NDD, success, failure

S = Initial state of system

I = input of system

O = Output of system

DD = Deterministic Data

NDD = Non-Deterministic Data

Success = Desired outcome generated

Failure = Desired outcome not generated

I = I1, I2

I1 = 0-9

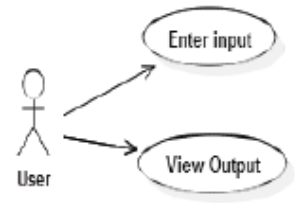
I2 =NDD = A-Z, a-z

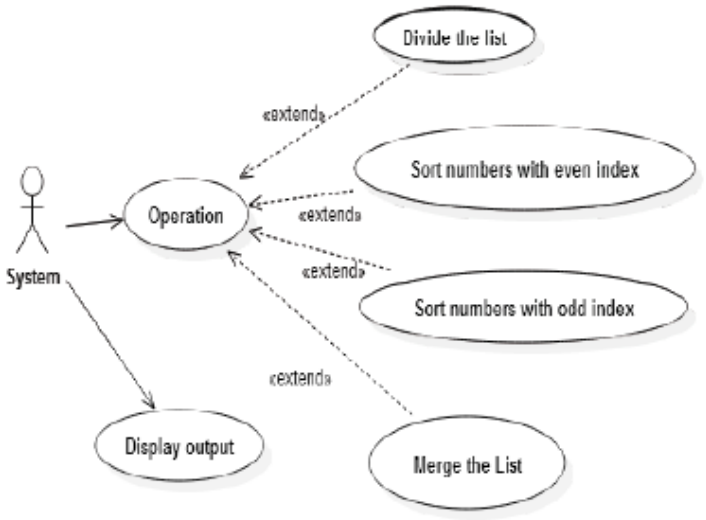
F = divide(), sort-even(), sort-odd(), merge(),display() divide() = Divide list according to index sort-even() =sort the list with even index sort-odd() = sort the list with odd index merge() = merge both the list display() = display the sorted array success = desired output is generated i.e. the list is sorted successfully. failure = desired output is not generated.

Algorithm:

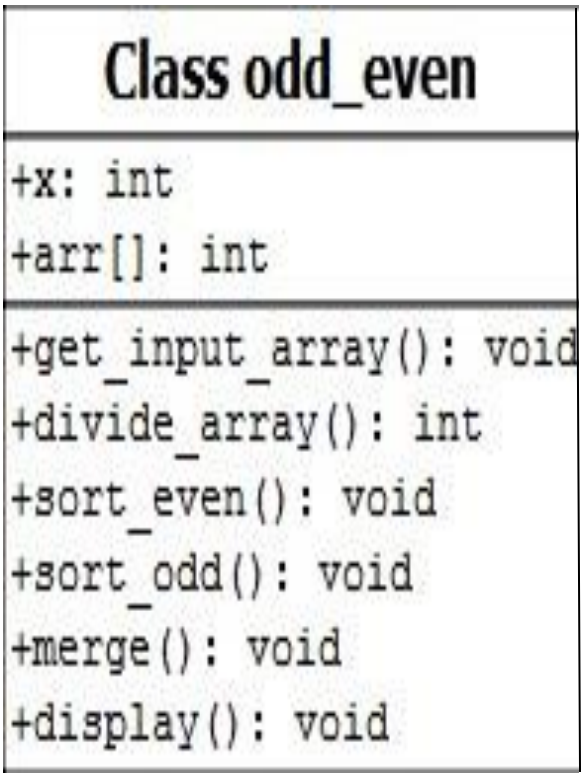
1. Start
2. Enter the unsorted array in one text area.
3. Unsorted array sorted using Odd Even sort algorithm.
4. Display the sorted array in another text area.
5. Stop

Use-case diagram:





Class diagram:



Black box testing :

Black-box testing is a method of software testing that examines the functionality of an application without peering into its internal structures or workings.

This method of test can be applied to virtually every level of software testing: unit, integration, system and acceptance. PRECONDITIONS:

1. number of elements given as input.
2. array as input.

White box testing:

White-box testing is a method of testing software that tests internal structures or workings of an application, as opposed to its functionality (i.e. black-box testing).

White box testing is a testing technique, that examines the program structure and derives test data from the program logic/code. The other

names of glass box testing are clear box testing, open box testing, logic driven testing or path driven testing or structural testing.

It checks :- 1. get-input-array

2. divides the array

3. sort numbers with even index
   4. sort numbers with odd
   index 5. merge the lists.

6. display sorted array.

Negative Testing:

Negative testing ensures that your application can specifically handle invalid input or unexpected user behaviour.

1. out of range input.
2. Any data type other than integer .

Positive Testing:

Positive testing is a testing technique to show that a product or application under test does what it is supposed to do.

Positive testing verifies how the application behaves for the positive set of data.

1. specified data type for numbers entered.

Conclusion

We have successfully implemented Web application for Concurrent implementation of ODD-EVEN SORT using ROOM modelling.