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Problem No. 4

Problem Statement :

Write C data representation and functions for the operations on the Set in a Header file, with array as the base data structure. Write a menu-driven main program in a separate file for testing the different operations and include the above header file.

Solution Approach:

As the set data structure we create an array to store the elements inside the set.

Whenever we add an element we traverse the set once to check if the element is already present or not and then update the required set if the element is not present to maintain the uniqueness .

Whenever deleting an element we check the presence of the element inside the set and remove it by setting some random unused values in the set which can be called a sentinel.

At any time to find the number of elements present inside the set we need to traverse the set once till we get the end which can be marked by using some unused value as the sentinel which is not in the range of the values which could be inserted inside the set.

Structured Pseudocode :

1.initialise a set data structure with say array[MAX]

2.//to insert an element

3.for i from 0 to end of set

4. check if set.array[i]==value

5. if true

6. print”value already present “

7. else

8. insert the value

9.//search the set for a particular value

10.from i from 0 to end

11. if(value==set.array[i])

12. print”value is found”

13. else

14. print”value is not found”

15.//delete an element from the set

16. for i from 0 to set ends

17. if element ==set.array[i]

18. delete the element

19. else

20. print”value not found inside the set”

21. //size of the set

22. for i from 0 till sentinel is reached

23. return i

Results:

We are declaring array as the base date type in this case to implement the set data structure .We need to store the set elements index wise in the array and whenever any insertion is done we check for the presence of the value from earlier.

We obtain the set after the operation and at any time we can print or perform any other operation like remove the element or search for a particular element in the set we can easily get it.The operations are linear in terms of algorithmic time complexity .

Discussion:

We need to ensure that the size of the array is sufficient because .Whenever a new value is entered the user must handle the case of checking duplicacy and return do the following operation after that .

The set element must be unique .The sentinel must be properly handled since it will denote the end of the set and must be updated after any such operations where it can get affected.

Separate files containing commented source code

The file has been attached.