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Object Oriented Programming

Assignment 4

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Group : 1

Q 1 . Write a c++ program to implement STL Data Structure Vector using some class and methods.

Functionality of class :

It should contains following methods

1 . One constructor for initialising the vector

2. Resize method for resizing the array

3. push_back method to insert element into array(vector).

4. Get method to get the element at desired index

5. Pop method to remove the element from vector

6. Print method to print the elements in the array along with size and capacity.

Consider array inputs as { 2, 4, 5, 8, 0, 23, 14, 45}

Perform some operations like get , print, push_back, pop etc.

Code:

```
#include <bits/stdc++.h>
using namespace std;
template <typename T> class vect
{
    T* arr;
    int capacity;
    int current;

public:
    // Default constructor to initialise
    // an initial capacity of 1 element and
    // allocating storage using dynamic allocation
    vect()
    {
        arr = new T[1];
        capacity = 1;
        current = 0;
    }

    // Function to add an element at the last
    void push(T data)
```

```
{

    // if the number of elements is equal to the
    // capacity, that means we don't have space to
    // accommodate more elements. We need to double the
    // capacity
    if (current == capacity)
    {
    resize();
    }
    // Inserting data
    arr[current] = data;
    current++;
}

   void resize( )
   {

        T* temp = new T[2 * capacity];

        // copying old array elements to new array
        for (int i = 0; i < capacity; i++) {
            temp[i] = arr[i];
        }

        // deleting previous array
        delete[] arr;
        capacity *= 2;
        arr = temp;

   }
// function to add element at any index
void push(T data, int index)
{

    // if index is equal to capacity then this
    // function is same as push defined above
    if (index == capacity)
        push(data);
    else
        arr[index] = data;
}

// function to extract element at any index
T    get(int index)
{

    // if index is within the range
```

```
        if (index < current)
            return arr[index];
    }

    // function to delete last element
    void pop() { current--; }

    // function to get size of the vector
    int size() { return current; }

    // function to get capacity of the vector
    int getcapacity() { return capacity; }

    // function to print array elements
    void print()
    {
        for (int i = 0; i < current; i++) {
            cout << arr[i] << " ";
        }
        cout << endl;
    }
};

// testing vector class
int main()
{
    vect<int> v;
    int choice,value,ind;
    do {
        cout<<"*****************************************************"<<endl;
    cout<<"1.INSERT ELEMET  "<<endl;
    cout<<"2.SEARCH ELEMENT "<<endl;
    cout<<"3.POP ELEMENT  "<<endl;
    cout<<"4.UPDATE ELEMENT   "<<endl;
    cout<<"5.PRINT ARRAY "<<endl;
    cout<<"6.SIZE OF ARRAY"<<endl;
    cout<<"7.CAPACITY OF ARRAY"<<endl;
    cout<<"8.EXIT"<<endl;
    cout<<"*****************************************************"<<endl;
    cout<<"ENTER THE CHOICE "<<endl;
    cin>>choice;
    switch(choice)
    {
        case 1:
           cout<<"enter the data to be inserted"<<endl;
           cin>>value;
           v.push(value);
           break;
```

```
        case 2:
         cout<<"enter the index to get the element"<<endl;
           cin>>ind;
          cout<<"element at index "<<ind<<" is "<< v.get(ind)<<endl;
           break;
        case 3:
               v.pop();
               break;
        case 4:
               cout<<"enter the index to be updated"<<endl;
               cin>>ind;
               cout<<"enter the index to be updated"<<endl;
               cin>>value;
               v.push(value,ind);
               break;
        case 5:
                 cout<<"array elements are"<<endl;
                v.print();
                 break;

        case 6:
              cout<<"SIZE IS "<<v.size()<<endl;
               break;
        case 7:
             cout<<"CAPACITY IS " <<v.getcapacity()<<endl;
             break;
        case 8:
             exit(1);
             break;
        default:
          cout<<"INVALID OPTION"<<endl;

    }
    }while(choice!=8);


    return 0;
}
```

Output:

Insertion:

```
**********************************
1.INSERT ELEMET
2.SEARCH ELEMENT
3.POP ELEMENT
4.UPDATE ELEMENT
5.PRINT ARRAY
6.SIZE OF ARRAY
7.CAPACITY OF ARRAY
8.EXIT
**********************************
ENTER THE CHOICE
1
enter the data to be inserted
14
**********************************
ENTER THE CHOICE
1
enter the data to be inserted
45
**********************************
```

Searching:

```
**************************************
1.INSERT ELEMET
2.SEARCH ELEMENT
3.POP ELEMENT
4.UPDATE ELEMENT
5.PRINT ARRAY
6.SIZE OF ARRAY
7.CAPACITY OF ARRAY
8.EXIT
**************************************
ENTER THE CHOICE
2
enter the index to get the element
45
element at index 45 is 8
**************************************
```

Updating:

```
3
**********************************
1.INSERT ELEMET
2.SEARCH ELEMENT
3.POP ELEMENT
4.UPDATE ELEMENT
5.PRINT ARRAY
6.SIZE OF ARRAY
7.CAPACITY OF ARRAY
8.EXIT
**********************************
ENTER THE CHOICE
4
enter the index to be updated
5
enter the index to be updated
10
**********************************
```

Printing:

```
******************************
1.INSERT ELEMET
2.SEARCH ELEMENT
3.POP ELEMENT
4.UPDATE ELEMENT
5.PRINT ARRAY
6.SIZE OF ARRAY
7.CAPACITY OF ARRAY
8.EXIT
******************************
ENTER THE CHOICE
5
array elements are
2 4 5 8 0 10 14
******************************
```

Size of Array:

```
1.INSERT ELEMET
2.SEARCH ELEMENT
3.POP ELEMENT
4.UPDATE ELEMENT
5.PRINT ARRAY
6.SIZE OF ARRAY
7.CAPACITY OF ARRAY
8.EXIT
**************************
ENTER THE CHOICE
6
SIZE IS 7
**************************
```

Capacity of array:

```
1.INSERT ELEMET
2.SEARCH ELEMENT
3.POP ELEMENT
4.UPDATE ELEMENT
5.PRINT ARRAY
6.SIZE OF ARRAY
7.CAPACITY OF ARRAY
8.EXIT
**************************
ENTER THE CHOICE
7
CAPACITY IS 8
**************************
```