Homework 0 Assignment

Overview

In this assignment, you will implement a vector class to manage dynamic arrays with specific functionalities such as adding, deleting, and printing elements. Your program should handle dynamic resizing of the array as needed.

Part 1: Vector Class

Problem Description:

You will implement a Vector class with the following functionalities:

1. **Add**: Add an element to the vector.
    - If the size of the vector reaches its current capacity, increase the capacity by doubling it.
2. **Delete**: Delete an element from the vector if it exists.
    - If the size of the vector becomes less than half of its capacity, reduce the capacity by halving it. Ensure that the capacity never falls below 2.
3. **Print**: Print all elements in the vector. If there are no elements in the vector, the Print function will output a new line.
4. **Size**: Output the current number of elements in the vector.
5. **Capacity**: Output the current capacity of the vector.

The vector should start with a **default capacity of 2**.

Input Format:

The input file will contain commands in the following format:

- Add(x) to add an element x.
- Delete(x) to delete an element x.
- Print to print all elements in the vector.
- Size to print the current size of the vector.
- Capacity to print the current capacity of the vector.

Example:

Add(10)

Add(20)

Add(30)

Size

Capacity

Delete(20)

Print

Output Format:

The output file will contain the result of the Print, Size, and Capacity commands, each on a new line.

Example Output:

3

4

10 30

Test Input and Answer Files Test

Case 1:

Input File:

Add(5)

Add(15)

Add(25)

Size

Capacity

Print

Delete(15)

Print

Add(35)

Print

Answer File:

3

4

5 15 25

5 25

5 25 35

Test Case 2:

Input File:

Add(1)

Add(2)

Add(3)

Add(4)

Add(5)

Size

Capacity Print

Delete(3)

Delete(5) Size

Capacity

Print

Answer File:

5

8

1 2 3 4 5

3

4

1 2 4

Test Case 3:

Input File:

Add(100)

Add(200) Capacity

Size

Print

Delete(300)

Print

Add(400)

Add(500)

Size

Capacity

Print

Answer File:

2

2

100 200

100 200

4

4

100 200 400 500

Submission Instructions

1. Create a folder named hw0 under your root directory.
2. Include the following files:
    - main.cpp: The main program file.
    - vector.h: Header file containing the Vector class definition.
    - vector.cpp: Implementation file for the Vector class.
    - ArgumentManager.h
3. Ensure your code compiles and runs correctly on the Linux server.
4. Plagiarism will be strictly checked. Submissions with more than 50% similarity will receive a grade of 0.

Good luck!

More information about submitting the homework can be found here:
https://uh.edu/nouhadrizk/about/courses/programming-and-data-structures/homework/
https://uh.edu/nouhadrizk/about/courses/programming-and-datastructures/homework/homework-introduction/