



BANNARI AMMAN INSTITUTE OF TECHNOLOGY

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SATHYAMANGALAM - 638 401 ERODE DISTRICT TAMIL NADU INDIA

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Day 9	Arrays
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Objectives	To learn how to declare, initialize, and access elements in a one-dimensional array and to practice performing basic operations such as insertion, deletion, and traversal on one-dimensional arrays.
Outcomes	Students will be able to, 1. Effectively use one-dimensional arrays to store and manage a collection of elements. 2. Design C code to perform basic operations on arrays, such as inserting and deleting elements.

1. Find the most frequent number:

Consider a software engineer working on a social media analytics platform to analyze the user activity data. One of the key requirements is to find the most frequent action performed by users on the platform. Given an array where each element represents an action ID performed by users, determine which action ID occurs most frequently.

Constraints:

Input :

- Number of actions: Must be between 1 and 100.
- Action ID: Each element should be a non-negative integer within the range of 0 to 99.

Output:

- Most Frequent Action: The output should be a single integer representing the most frequently performed action ID.

Test Case 1:

Input:

Enter the number of elements: 8

Enter the elements:

1 2 3 3 4 5 5 5

Output:

Most frequent element: 5

Test Case 2:



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Input:

Enter the number of elements: 11

Enter the elements:

1 1 2 2 3 3 4 4 4 2 2

Output:

Most frequent element: 2

Test Case 3:

Input:

Enter the number of elements: 5

Enter the elements:

10 30 20 30 10

Output:

Most frequent element: 10

Test Case 4:

Input:

Enter the number of elements: -4

Output:

Invalid size. Please enter a number between 1 and 100.

Test Case 5:

Input:

Enter the number of elements: 7

Enter the elements:

1 1 2 3 3 3 4

Output:

Most frequent element: 3

Test Case 6:

Input:

Input:

Enter the number of elements: 0

Output:

Invalid size. Please enter a number between 1 and 100.

Test Case 7:

Input:



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Enter the number of elements: 6

Enter the elements:

30 40 30 40 40 50

Output:

Most frequent element: 40

Test Case 8:

Input:

Enter the number of elements: 888

Output:

Invalid size. Please enter a number between 1 and 100.

2. Matching the Target value in the Array:

Suresh bought a lottery ticket in a shop. Next day morning, the list of lottery numbers was announced. Suresh needs to check his lottery number is matched with the list of lottery numbers. Write a C program to help him to check his lottery number with the list of numbers.

Constraints:

- **Input :** The array should contain positive integers within a reasonable range, and the target value should also be an integer within the same range. The size of the array is assumed to be manageable within typical memory limits.
- **Output :** The program will output "Matched", if the target value is found in the array. Otherwise "Not matched" .

Test Case 1:

Input:

Enter the number of elements: 5

Enter the elements:

[100, 200, 300, 400, 500]

Target Value: 300

Output:

Matched

Test Case 2:

Input:

Enter the number of elements: 5

Enter the elements:

[100, 200, 300, 400, 500]



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Target Value: 250

Output:

Not matched

Test Case 3:

Input:

Enter the number of elements: 5

Enter the elements:

[100, 200, 300, 400, 500]

Target Value: 500

Output:

Matched

Test Case 4:

Input:

Enter the number of elements: 5

Enter the elements:

[100, 200, 300, 400, 500]

Target Value: 600

Output:

Not Matched

Test Case 5:

Input:

Enter the number of elements: 6

Enter the elements:

[5,10, 15, 20, 25, 30]

Target Value: 15

Output:

Matched

Test Case 6:

Input:

Enter the number of elements: 4

Enter the elements:

[1, 2, 3, 4]

Target Value: 3

Output:

Matched



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Test Case 7:

Input:

Enter the number of elements: 7

Enter the elements:

[100, 200, 300, 400, 500, 650, 700]

Target Value: 675

Output:

Not Matched

Test Case 8:

Input:

Enter the number of elements: -4

Output:

Invalid size. Please enter a number between 1 and 100.

3. Display the Duplicate Elements in an Array:

Create a large music playlist with many songs. The songs are stored in an array of numbers (playlist). You're curious if there are any duplicate songs on your playlist. Write a C program to efficiently identify and display them.

Constraints:

Input:

- Array size: $1 \leq N \leq 10^3$ (where N is the number of elements in the array)
- Element values: $-10^9 \leq \text{Array}[i] \leq 10^9$

Output:

- A list of duplicate elements in their order of occurrence.

Test case 1:

Input:5

Array: [1, 2, 1, 3, 5]

Output:

Duplicate Elements: 1

Test Case 2:

Input:

5

Array: [15, 12, 15, 25, 12]

Output:

Duplicate Elements: 15 12



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Test Case 3:

Input:

5

Array: [100, 200, 300, 100, 500]

Output:

Duplicate Elements: 100

Test Case 4:

Input:

6

Array: [11, 22, 33, 44, 11, 33]

Output:

Duplicate Elements: 11 33

Test Case 5:

Input:

8

Array: [4, 5, 6, 7, 8, 9, 4, 7]

Output:

Duplicate Elements: 4 7

Test Case 6:

Input: 8

Array: [50, 50, 60, 70, 70, 80, 80, 80]

Output:

Duplicate Elements: 50 70 80

Test Case 7:

Input:

-9

Output:

Invalid size.Please give the valid Input

Test Case 8:

Input:

1002

Output:

Sorry.Number of elements exceeds the maximum allowed size.



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4. Find the Second and Third Smallest Element in an Array:

In chemistry, some reactions require specific temperature ranges. You have an array that stores the minimum temperatures required for several chemical reactions. Students are interested in the second and third lowest temperatures (excluding the absolute minimum) to identify potentially more efficient reaction setups.

Constraints:

- The input array must contain at least 3 unique elements to find the second and third smallest elements.
- Each element in the array must be an integer within the range of -10^9 to 10^9

Test case 1:

Input:

Enter the number of elements: 5

Enter 5 elements:

[25,10,18,5,32]

Output:

Second Smallest: 10

Third Smallest: 18

Test case 2:

Input:

Enter the number of elements: 5

Enter 5 elements:

[7, 7, 4, 5, 8]

Output:

Second Smallest: 5

Third Smallest: 7

Test case 3:

Input:

Enter the number of elements: 5

Enter 5 elements:

[55,22,15,88,1]

Output:

Second Smallest: 15

Third Smallest: 22



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Test case 4:

Input:

Enter the number of elements: 6

Enter 6 elements:

[3, 1, 4, 1, 5, 9]

Output:

Second Smallest: 3

Third Smallest: 4

Test case 5:

Input:

Enter the number of elements: 5

Enter 5 elements:

[6, 5, 7, 8, 7]

Output:

Second Smallest: 6

Third Smallest: 7

Test case 6:

Input:

Enter the number of elements: 6

Enter 6 elements:

[55, 11, 22, 33, 44, 66]

Output:

Second Smallest: 22

Third Smallest: 33

Test case 7:

Input:

Enter the number of elements: 5

Enter 5 elements:

[10, 20, 10, 20, 10]

Output:

Not enough unique elements to find second and third smallest.

Test case 8:

Input:

Enter the number of elements: -5



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Output:

Array must contain at least 3 elements.

5. Reversing the Array:

Develop a utility function for handling data from a scientific experiment. The experiment records data points at regular intervals, and these data points are stored in an array. To analyze the experimental data more effectively, Write a C program to reverse the order of the data points in the array. This allows you to examine the experimental results in reverse chronological or sequential order.

Constraints:

- The array must contain at least one element.
- Each element in the array should be an integer within the range of -10^9 to 10^9

Test Case 1:

Input:

Enter the number of elements: 5

Enter 5 elements:

Array: [4, 42, 7, 95, 67]

Output:

Reversed Array: [67, 95, 7, 42, 4]

Test Case 2:

Input:

Enter the number of elements: 1

Enter 1 elements:

Array: [20]

Output:

Reversed Array: [20]

Test Case 3:

Input:

Enter the number of elements: 3

Enter 3 elements:

Array: [900, 10, 1200]

Output:

Reversed Array: [1200, 10, 900]



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Test Case 4:

Input:

Enter the number of elements: 5

Enter 5 elements:

Array: [5, 5, 5, 5, 5]

Output:

Reversed Array: [5, 5, 5, 5, 5]

Test Case 5:

Input:

Enter the number of elements: 3

Enter 3 elements:

Array: [11, 22, 33]

Output:

Reversed Array: [33, 22, 11]

Test Case 6:

Input:

Enter the number of elements: 2

Enter 2 elements:

Array: [100, 200]

Output:

Reversed Array: [200, 100]

Test Case 7:

Input:

Enter the number of elements: 4

Enter 4 elements:

Array: [1, 2, 3, 4]

Output:

Reversed Array: [4, 3, 2, 1]

Test Case 8:

Input:

Enter the number of elements: -20

Output:

Invalid count. Please check



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Test Case 9:

Input:

Enter the number of elements: -2

Output:

Invalid count. Please check

Test Case 10:

Input:

Enter the number of elements: 0

Output:

Invalid count. Please check

6. Sort an Array in Ascending Order:

A school needs to efficiently manage student grades for various subjects. After calculating grades for a class, the school wants to display the students in ascending order based on their overall percentage after calculating Grades.

Constraints:

- **Input :** The array should contain integer values. The length of the array should be between 1 and 10^4 elements.
Each integer in the array should be within the range of -10^6 to 10^6 .
- **Output :** The output will be a sorted array in ascending order. The output should maintain the array's structure, with elements separated by commas.

.

Test case 1:

Input:

Enter the number of elements in the array: 4

Enter 4 integers:

4 3 2 1

Output:

Sorted array:

1 2 3 4

Test case 2:

Input:

Enter the number of elements in the array: 5

Enter 5 integers:

10 23 15 6 4



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Output:

Sorted array:

4 6 10 15 23

Test case 3:

Input:

Enter the number of elements in the array: 5

Enter 5 integers:

2 7 0 -6 -4

Output:

Sorted array:

-6 -4 0 2 7

Test case 4:

Input:

Enter the number of elements in the array: 7

Enter 7 integers:

3 15 0 7 0 2 7

Output:

Sorted array:

0 0 2 3 7 7 15

Test case 5:

Input:

Enter the number of elements in the array: 5

Enter 5 integers:

1 5 5 1 8

Output:

Sorted array:

1 1 5 5 8

Test case 6:

Input:

Enter the number of elements in the array: 100023

Output:

Invalid number of elements. Please enter a number between 1 and 10000.



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Test case 7:

Input:

Enter the number of elements in the array: -2

Output:

Invalid number of elements. Please enter a number between 1 and 10000.

Test case 8:

Input:

Enter the number of elements in the array: 0

Output:

Invalid number of elements. Please enter a number between 1 and 10000.

7. Product of all the elements

E-commerce companies have been tracking the purchasing behavior of its customers, and have a list of transaction amounts representing the individual purchases made by a specific customer over a period of time. To better understand this customer's spending patterns and provide personalized recommendations, multiply all the transaction amounts of the customer.

Constraints:

- **Input:** Array size $1 \leq n \leq 10^5$; Each integer element $-2^{31} \leq \text{element} \leq 2^{31}-1$.
- **Output:** Product of elements can be very large or very small; use a data type that can handle potential integer overflow (e.g., 64-bit integer)

Test case 1:

Input

Enter the number of elements in the array: 5

Enter the elements of the array:

[1, 2, 3, 4, 5]

Output

Product: 120

Test case 2:

Input

Enter the number of elements in the array: 5

Enter the elements of the array:

[10, -5, 8, -3, 2]

Output

Product: 2400



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Test case 3:

Input

Enter the number of elements in the array: 4

Enter the elements of the array:

[1, 0, 3, 4, 8]

Output

Product: 0

Test case 4:

Input

Enter the number of elements in the array: 4

Enter the elements of the array:

[5, 5, 5, 5]

Output

Product: 625

Test case 5:

Input

Enter the number of elements in the array: 5

Enter the elements of the array:

[2, 2, 2, 2, 2]

Output

Product: 32

Test case 6:

Input

Enter the number of elements in the array: 3

Enter the elements of the array:

[7, -7, 7]

Output

Product: -343

Test case 7:

Input

Enter the number of elements in the array: 3

Enter the elements of the array:

[6, 6, 6]

Output

Product: 216



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Test case 8:

Input

Enter the number of elements in the array: 4

Enter the elements of the array:

[1, 2, -1, -2]

Output Product: 4

Test case 9:

Input

Enter the number of elements in the array: 0

Output

Array size must be greater than 0.

Test case 10:

Input

Enter the number of elements in the array: -6

Output

Array size must be greater than 0.

8. Identify the average score:

Design an online education platform to analyze student performance across various courses. One of the tasks is to calculate the average score of students in a specific course. Each student's score is stored in an array. Write a C program that takes an array of scores and returns the average score, which will help in generating performance reports and identifying areas for improvement.

Constraints:

- **Input:** Array size $1 \leq n \leq 10^5$; Each score $0 \leq \text{score} \leq 100$.
- **Output:** Average score should be displayed with up to one decimal place.

Test Case 1:

Input:

Enter the number of scores: 5

Enter the scores:

[85, 90, 78, 92, 88]

Output:

Average of all elements: 86.6



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Test Case 2:

Input:

Enter the number of scores: 5

Enter the scores:

[70, 80, 90, 100, 60]

Output:

Average of all elements: 80.0

Test Case 3:

Input:

Enter the number of scores: 5

Enter the scores:

[1, 2, 3, 4, 5]

Output:

Average of all elements: 3.0

Test Case 4:

Input:

Enter the number of scores: 5

Enter the scores:

[55, 75, 85, 95, 65]

Output:

Average of all elements: 75.0

Test Case 5:

Input:

Enter the number of scores: 5

Enter the scores:

[25, 35, 45, 55, 65]

Output:

Average of all elements: 45.0

Test Case 6:

Input:

Enter the number of scores: 4

Enter the scores:

[40, 80, 20, 60]

Output:

Average of all elements: 50.0



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Test Case 7:

Input:

Enter the number of scores: 7

Enter the scores:

[70, 60, 50, 40, 30, 20, 10]

Output:

Average of all elements: 40.0

Test Case 8:

Input:

Enter the number of scores: 4

Enter the scores:

[10, 10, 10, 10]

Output:

Average of all elements: 10.0

Test Case 9:

Input:

Enter the number of scores: 0

Output:

Number of scores must be greater than 0.

Test Case 10:

Input:

Enter the number of scores: -2

Output:

Number of scores must be greater than 0.

9. Calculate the total sum of transactions for a given period

Consider a software engineer working on a financial application that processes transactions for a bank. One of the tasks is to calculate the total sum of transactions for a given period. Each transaction amount is stored in an array. Your goal is to implement a logic that takes an array of transaction amounts and returns the total sum of these transactions. This will help in generating financial reports and summaries.

Constraints:

- **Input:** Array size $1 \leq n \leq 10^5$; Each transaction amount $-10^9 \leq \text{transaction} \leq 10^9$



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- **Output:** Sum of all elements, which can be very large or very small; ensure proper handling of integer overflow if necessary.

Test Case 1:

Input:

Enter the number of transactions: 5

Enter the transaction amounts:

[100, 200, 300, 400, 500]

Output:

Sum of all elements: 1500

Test Case 2:

Input:

Enter the number of transactions: 5

Enter the transaction amounts:

[-100, 200, -50, 400, -250]

Output:

Sum of all elements: 200

Test Case 3:

Input:

Enter the number of transactions: 5

Enter the transaction amounts:

[0, 0, 0, 0, 0]

Output:

Sum of all elements: 0

Test Case 4:

Input:

Enter the number of transactions: 3

Enter the transaction amounts:

[20, 100, 150]

Output:

Sum of all elements: 270

Test Case 5:

Input:

Enter the number of transactions: 3

Enter the transaction amounts:



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[25, 24, 20]

Output:

Sum of all elements: 69

Test Case 6:

Input:

Enter the number of transactions: 4

Enter the transaction amounts:

[10, -5, 10, -5]

Output:

Sum of all elements: 10

Test Case 7:

Input:

Enter the number of transactions: 5

Enter the transaction amounts:

[10, -20, 30, -40, 50]

Output:

Sum of all elements: 30

Test Case 8:

Input:

Enter the number of transactions: 4

Enter the transaction amounts:

[-100, 200, -100, 100]

Output:

Sum of all elements: 100

Test Case 9:

Input:

Enter the number of transactions: 0

Output:

Number of transactions must be greater than 0.

Test Case 10:

Input:

Enter the number of transactions: -7

Output:

Number of transactions must be greater than 0.



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10. Transaction amount data in odd and even number:

Financial institutions use fraud detection systems to protect customers and finances. One approach involves analyzing transaction amounts. Separating transactions into odd and even amounts can be a preliminary step in identifying suspicious patterns. This separation helps in further analysis and reporting based on the parity of the transaction amounts.

Constraints:

- **Input:** Array size $1 \leq n \leq 10^5$; Each integer transaction amount $-10^9 \leq \text{transaction} \leq 10^9$.
- **Output:** Print odd and even numbers in separate lists; ensure proper formatting and handling of empty lists.

Test Case 1:

Input:

Enter the number of transactions: 5

Enter the transaction amounts:

[11, 22, 33, 44, 55]

Output:

Odd Numbers: [11, 33, 55]

Even Numbers: [22, 44]

Test Case 2:

Input:

Enter the number of transactions: 10

Enter the transaction amounts:

[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]

Output:

Odd Numbers: [1, 3, 5, 7, 9]

Even Numbers: [0, 2, 4, 6, 8]

Test Case 3:

Input:

Enter the number of transactions: 6

Enter the transaction amounts:

[-1, -2, -3, -4, -5, -6]

Output:

Odd Numbers: [-1, -3, -5]

Even Numbers: [-2, -4, -6]



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Test Case 4:

Input:

Enter the number of transactions: 5

Enter the transaction amounts:

[1, 3, 5, 7, 9]

Output:

Odd Numbers: [1, 3, 5, 7, 9]

Even Numbers: []

Test Case 5:

Input:

Enter the number of transactions: 5

Enter the transaction amounts:

[2, 4, 6, 8, 10]

Output:

Odd Numbers: []

Even Numbers: [2, 4, 6, 8, 10]

Test Case 6:

Input:

Enter the number of transactions: 5

Enter the transaction amounts:

[-10, -9, -8, -7, -6]

Output:

Odd Numbers: [-9, -7]

Even Numbers: [-10, -8, -6]

Test Case 7:

Input:

Enter the number of transactions: 1

Enter the transaction amounts:

501

Output:

Odd Numbers: [501]

Even Numbers: []



BANNARI AMMAN INSTITUTE OF TECHNOLOGY

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Test Case 8:

Input:

Enter the number of transactions: 1

Enter the transaction amounts:

200

Output:

Odd Numbers: []

Even Numbers: [200]

Test Case 9:

Input:

Enter the number of transactions: 0

Output:

Number of transactions must be greater than 0.

Test Case 10:

Input:

Enter the number of transactions: -7

Output:

Number of transactions must be greater than 0.