

Experiment 1 Lab 1: Basic Array Operations

main.c	Output
<pre>1 #include <stdio.h> 2 #include <stdlib.h> 3 4 int main() { 5 int n, i, largest, smallest; 6 float sum = 0, average; 7 8 // Input the size of the array 9 printf("Enter the number of elements in the array: "); 10 scanf("%d", &n); 11 12 // Declare an array of size n 13 int *arr = (int *)malloc(n * sizeof(int)); 14 15 // Input elements from the user 16 printf("Enter %d elements:\n", n); 17 for (i = 0; i < n; i++) { 18 scanf("%d", &arr[i]); 19 } 20 21 // Initialize largest and smallest elements 22 largest = arr[0]; 23 smallest = arr[0]; 24 25 // Find the largest and smallest elements 26 for (i = 1; i < n; i++) { 27 if (arr[i] > largest) { 28 largest = arr[i]; 29 } 30 if (arr[i] < smallest) { 31 smallest = arr[i]; 32 } 33 } 34 35 // Sort the array in ascending order 36 for (i = 0; i < n - 1; i++) { 37 for (int j = i + 1; j < n; j++) { 38 if (arr[i] > arr[j]) { 39 int temp = arr[i]; 40 arr[i] = arr[j]; 41 arr[j] = temp; 42 } 43 } 44 } 45 46</pre>	<pre>/tmp/PhvZLAEPFF.o Enter the number of elements in the array: 5 Enter 5 elements: 3 7 5 9 3 Largest element: 9 Smallest element: 3 Sorted array in ascending order: 3 3 5 7 9 Sum of elements: 27.00 Average of elements: 5.40 === Code Execution Successful ===</pre>

main.c	Output
<pre>22 largest = arr[0]; 23 smallest = arr[0]; 24 25 // Find the largest and smallest elements 26 for (i = 1; i < n; i++) { 27 if (arr[i] > largest) { 28 largest = arr[i]; 29 } 30 if (arr[i] < smallest) { 31 smallest = arr[i]; 32 } 33 } 34 35 // Sort the array in ascending order 36 for (i = 0; i < n - 1; i++) { 37 for (int j = i + 1; j < n; j++) { 38 if (arr[i] > arr[j]) { 39 int temp = arr[i]; 40 arr[i] = arr[j]; 41 arr[j] = temp; 42 } 43 } 44 } 45 46 // Calculate the sum and average of the array elements 47 for (i = 0; i < n; i++) { 48 sum += arr[i]; 49 } 50 average = sum / n; 51 52 // Output the results 53 printf("Largest element: %d\n", largest); 54 printf("Smallest element: %d\n", smallest); 55 printf("Sorted array in ascending order: "); 56 for (i = 0; i < n; i++) { 57 printf("%d ", arr[i]); 58 } 59 printf("\n"); 60 printf("Sum of elements: %.2f\n", sum); 61 printf("Average of elements: %.2f\n", average); 62 63 return 0; 64 }</pre>	<pre>/tmp/PhvZLAEPFF.o Enter the number of elements in the array: 5 Enter 5 elements: 3 7 5 9 3 Largest element: 9 Smallest element: 3 Sorted array in ascending order: 3 3 5 7 9 Sum of elements: 27.00 Average of elements: 5.40 --- Code Execution Successful ---</pre>

Experiment 1 Lab 2: Array of Structures

main.c	Output
<pre>1 #include <stdio.h> 2 #include <stdlib.h> 3 4 #define MAX_NAME_LEN 50 5 6 // Define the structure for Student 7 struct Student { 8 char name[MAX_NAME_LEN]; 9 int age; 10 float marks; 11 }; 12 13 // Function prototypes 14 void inputStudentDetails(struct Student students[], int n); 15 void displayStudentDetails(struct Student students[], int n); 16 void sortStudentsByMarks(struct Student students[], int n); 17 struct Student findTopStudent(struct Student students[], int n); 18 19 int main() { 20 int n; 21 22 // Input number of students 23 printf("Enter the number of students: "); 24 scanf("%d", &n); 25 26 // Declare an array of students 27 struct Student *students = (struct Student *)malloc(n * sizeof(struct Student 28)); 29 30 // Input details for all students 31 inputStudentDetails(students, n); 32 33 // Display details of all students 34 printf("\nDetails of all students:\n"); 35 displayStudentDetails(students, n); 36 37 // Sort students based on marks in descending order 38 sortStudentsByMarks(students, n); 39 printf("\nStudents sorted by marks (descending):\n"); 40 displayStudentDetails(students, n); 41 42 // Find and display the student with the highest marks 43 struct Student topStudent = findTopStudent(students, n);</pre>	<pre>/tmp/g15PjWsJbZ.o Enter the number of students: 3 Enter details for student 1: Name: Jai Age: 22 Marks: 98 Enter details for student 2: Name: Stuti Age: 21 Marks: 92 Enter details for student 3: Name: Shreya Age: 24 Marks: 96 Details of all students: Name: Jai, Age: 22, Marks: 98.00 Name: Stuti, Age: 21, Marks: 92.00 Name: Shreya, Age: 24, Marks: 96.00 Students sorted by marks (descending): Name: Jai, Age: 22, Marks: 98.00 Name: Shreya, Age: 24, Marks: 96.00 Name: Stuti, Age: 21, Marks: 92.00 Student with the highest marks: Name: Jai, Age: 22, Marks: 98.00 === Code Execution Successful ===</pre>
<pre>41 // Find and display the student with the highest marks 42 struct Student topStudent = findTopStudent(students, n); 43 printf("\nStudent with the highest marks:\n"); 44 printf("Name: %s, Age: %d, Marks: %.2f\n", topStudent.name, topStudent.age, 45 topStudent.marks); 46 47 return 0; 48 } 49 50 // Function to input details of students 51 void inputStudentDetails(struct Student students[], int n) { 52 for (int i = 0; i < n; i++) { 53 printf("\nEnter details for student %d:\n", i + 1); 54 printf("Name: "); 55 scanf("%s", students[i].name); // No spaces allowed in names, can be 56 replaced with fgets if needed 57 printf("Age: "); 58 scanf("%d", &students[i].age); 59 printf("Marks: "); 60 scanf("%f", &students[i].marks); 61 } 62 } 63 64 // Function to display details of students 65 void displayStudentDetails(struct Student students[], int n) { 66 for (int i = 0; i < n; i++) { 67 printf("Name: %s, Age: %d, Marks: %.2f\n", students[i].name, students[i] 68 .age, students[i].marks); 69 } 70 } 71 72 // Function to sort students by marks in descending order 73 void sortStudentsByMarks(struct Student students[], int n) { 74 struct Student temp; 75 for (int i = 0; i < n - 1; i++) { 76 for (int j = i + 1; j < n; j++) { 77 if (students[i].marks < students[j].marks) { 78 // Swap the students 79 temp = students[i]; 80 students[i] = students[j]; 81 students[j] = temp;</pre>	<pre>/tmp/g15PjWsJbZ.o Enter the number of students: 3 Enter details for student 1: Name: Jai Age: 22 Marks: 98 Enter details for student 2: Name: Stuti Age: 21 Marks: 92 Enter details for student 3: Name: Shreya Age: 24 Marks: 96 Details of all students: Name: Jai, Age: 22, Marks: 98.00 Name: Stuti, Age: 21, Marks: 92.00 Name: Shreya, Age: 24, Marks: 96.00 Students sorted by marks (descending): Name: Jai, Age: 22, Marks: 98.00 Name: Shreya, Age: 24, Marks: 96.00 Name: Stuti, Age: 21, Marks: 92.00 Student with the highest marks: Name: Jai, Age: 22, Marks: 98.00 === Code Execution Successful ===</pre>

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<pre>53 printf("Name: "); 54 scanf("%s", students[i].name); // No spaces allowed in names, can be // replaced with fgets if needed 55 printf("Age: "); 56 scanf("%d", &students[i].age); 57 printf("Marks: "); 58 scanf("%f", &students[i].marks); 59 } 60 } 61 62 // Function to display details of students 63 void displayStudentDetails(struct Student students[], int n) { 64 for (int i = 0; i < n; i++) { 65 printf("Name: %s, Age: %d, Marks: %.2f\n", students[i].name, students[i] .age, students[i].marks); 66 } 67 } 68 69 // Function to sort students by marks in descending order 70 void sortStudentsByMarks(struct Student students[], int n) { 71 struct Student temp; 72 for (int i = 0; i < n - 1; i++) { 73 for (int j = i + 1; j < n; j++) { 74 if (students[i].marks < students[j].marks) { 75 // Swap the students 76 temp = students[i]; 77 students[i] = students[j]; 78 students[j] = temp; 79 } 80 } 81 } 82 } 83 84 // Function to find the student with the highest marks 85 struct Student findTopStudent(struct Student students[], int n) { 86 struct Student topStudent = students[0]; 87 for (int i = 1; i < n; i++) { 88 if (students[i].marks > topStudent.marks) { 89 topStudent = students[i]; 90 } 91 } 92 return topStudent; 93 }</pre>	<pre>/tmp/g15PjWsjbZ.o Enter the number of students: 3 Enter details for student 1: Name: Jai Age: 22 Marks: 98 Enter details for student 2: Name: Stuti Age: 21 Marks: 92 Enter details for student 3: Name: Shreya Age: 24 Marks: 96 Details of all students: Name: Jai, Age: 22, Marks: 98.00 Name: Stuti, Age: 21, Marks: 92.00 Name: Shreya, Age: 24, Marks: 96.00 Students sorted by marks (descending): Name: Jai, Age: 22, Marks: 98.00 Name: Shreya, Age: 24, Marks: 96.00 Name: Stuti, Age: 21, Marks: 92.00 Student with the highest marks: Name: Jai, Age: 22, Marks: 98.00 === Code Execution Successful ===</pre>	