

G. H. RAISONI COLLEGE OF ENGG., NAGPUR
(An Autonomous Institute under UGC Act 1956)
Department of Artificial Intelligence

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Practical Subject: Data Structures and Algorithms
Session: 2020-21

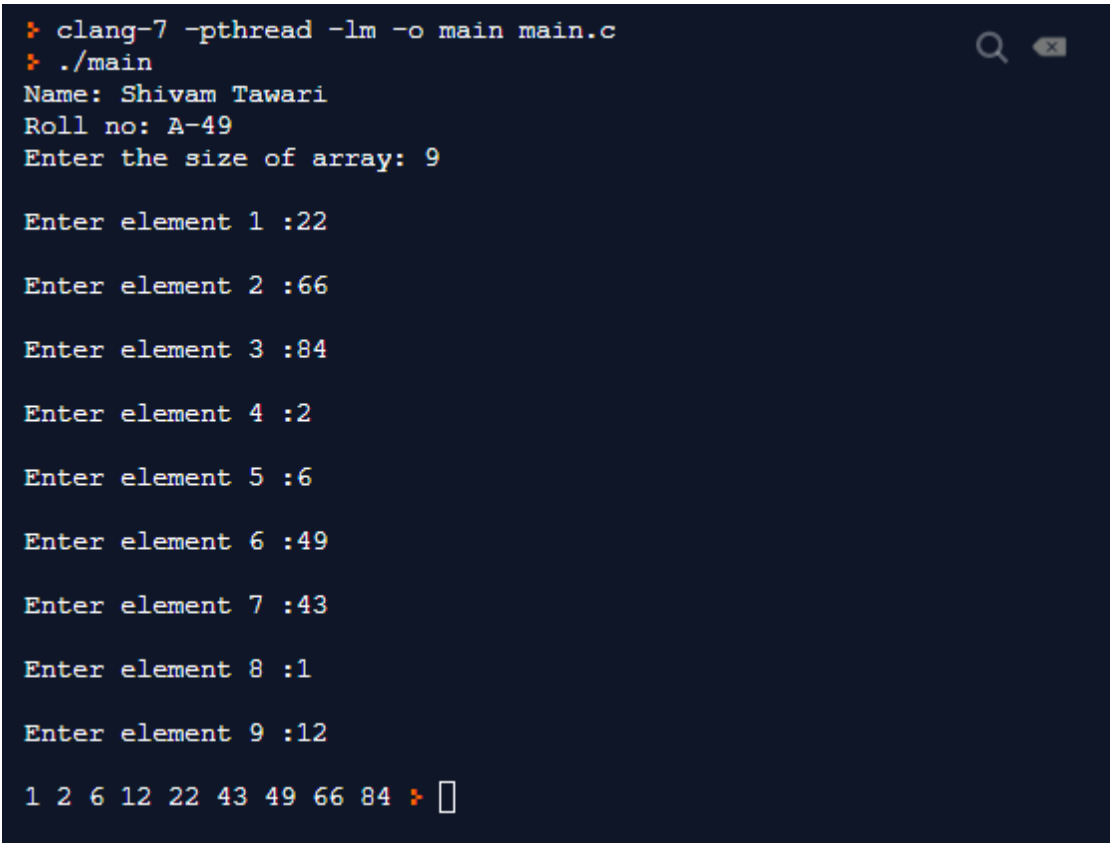
Student Details:

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Practical Details: Practical Number- 1

Practical Aim	Write a program in C or C++ or java to implement bubble sort.
Theory	<p><i>Theory:</i></p> <p>Bubble sort is a simple sorting algorithm. This sorting algorithm is comparison-based algorithm in which each pair of adjacent elements is compared and the elements are swapped if they are not in order. It takes in an unsorted list and keeps comparing each element with its right-side element in order to sort the data. Whichever element is smaller gets shifted to the left. After completion of one round, the largest number ends up in its correct position. In other words, the largest number bubbles to the top or right in this case. Then, the process is repeated again and again until all of the data is sorted.</p> <p><i>Time Complexity:</i></p> <p>Best: $\Omega(n)$ Average: $\theta(n^2)$ Worst: $O(n^2)$</p>

Procedure	<ol style="list-style-type: none"> 1. We look through the array in an orderly fashion, comparing only adjacent elements at a time. 2. Whenever we see two elements which are out of, we swap them so that the smaller element comes before the greater element. 3. We keep performing the above steps over the array again and again till we get the sorted form.
Algorithm	<p>Step 1: START</p> <p>Step 2: Starting with the first element, compare the current element with the next element of the list.</p> <p>Step 3: If the current element is greater than the next element of the list, swap them.</p> <p>Step 4: If the current element is less than the next element, move to the next element. Repeat Step 2.</p> <p>Step 5: STOP</p>
Program	<pre> 1 #include<stdio.h> 2 3 void swap(int *, int *); 4 void bubble(int *, int); 5 void display(int *, int); 6 int main() 7 { 8 int arr[100], i, siz; 9 printf("Name: Shivam Tawari"); 10 printf("\nRoll no: A-49"); 11 printf("\nEnter the size of array: "); 12 scanf("%d", &siz); 13 for(i=0; i<siz; i++) { 14 printf("\nEnter element %d :", i+1); 15 scanf("%d", &arr[i]); 16 } 17 bubble(arr, siz); 18 return 0; 19 } 20 void swap(int *a, int *b) 21 { 22 int temp; 23 temp = *a; 24 *a = *b; 25 *b = temp; 26 } 27 void bubble(int arr[], int siz) 28 { </pre>

	<pre> 29 int i, j; 30 for(i=0; i<siz-1; i++) { 31 for(j=0; j<siz-1-i; j++) { 32 if(arr[j] > arr[j+1]) { 33 swap(&arr[j], &arr[j+1]); 34 } 35 } 36 } 37 display(arr, siz); 38 } 39 void display(int *arr, int siz) 40 { 41 int i; 42 printf("\n"); 43 for(i=0; i<siz; i++) { 44 printf("%d ", arr[i]); 45 } 46 } </pre>
<p>Output</p>	 <pre> ❯ clang-7 -pthread -lm -o main main.c ❯ ./main Name: Shivam Tawari Roll no: A-49 Enter the size of array: 9 Enter element 1 :22 Enter element 2 :66 Enter element 3 :84 Enter element 4 :2 Enter element 5 :6 Enter element 6 :49 Enter element 7 :43 Enter element 8 :1 Enter element 9 :12 1 2 6 12 22 43 49 66 84 ❯ </pre>
<p>Conclusion</p>	<p>Hence, successfully understood time complexity of bubble sort and implemented the algorithm in program.</p>