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| --- | --- |
| **Ex No: 13** | Sort the list of numbers using pass by reference |

**AIM**

To sort the list of numbers using pass by reference (selectionsort)

**ALGORITHM**

**Selection Sort:**

**Step 1:** Get started from the first element (i = 0):

**Step1.1:** From the unsorted sub list (with index j 🡪 i+1 to N-1) **Step1.1.1:**  Find the smallest in the sublist (min) and its index (m)

**Step 1.2:** if m != i:

**Step 1.2.1:** Swap the smallest A[m] with A[i]

**Step 2:** Increment the index (i) and repeat step 1 until list is sorted

**Example:**

**First Pass:**  
( **5** **1** 4 2 8 ) –> ( **1** **5** 4 2 8 ), Here, algorithm compares the first two elements,   
 and swaps since 5 > 1.  
( 1 **5** **4** 2 8 ) –>  ( 1 **4** **5** 2 8 ), Swap since 5 > 4  
( 1 4 **5** **2** 8 ) –>  ( 1 4 **2** **5** 8 ), Swap since 5 > 2  
( 1 4 2 **5** **8** ) –> ( 1 4 2 **5** **8** ), Now, since these elements are already in order (8 > 5),  
 algorithm does not swap them.

**Second Pass:**  
( **1** **4** 2 5 8 ) –> ( **1** **4** 2 5 8 )  
( 1 **4** **2** 5 8 ) –> ( 1 **2** **4** 5 8 ), Swap since 4 > 2  
( 1 2 **4** **5** 8 ) –> ( 1 2 **4** **5** 8 )  
( 1 2 4 **5** **8** ) –>  ( 1 2 4 **5** **8** )  
Now, the array is already sorted, but our algorithm does not know if it is completed. The algorithm needs one **whole** pass without **any** swap to know it is sorted.

**Third Pass:**  
( **1** **2** 4 5 8 ) –> ( **1** **2** 4 5 8 )  
( 1 **2** **4** 5 8 ) –> ( 1 **2** **4** 5 8 )  
( 1 2 **4** **5** 8 ) –> ( 1 2 **4** **5** 8 )  
( 1 2 4 **5** **8** ) –> ( 1 2 4 **5** **8** )

**PRE-LAB QUESTIONS**

1. What is function prototyping? why it is necessary?
2. What is a pointer?
3. Distinguish between library function and user defined function
4. What is the difference between pass by value and pass by reference
5. What are the operators exclusively used with pointers?

**PROGRAM**

#include "stdio.h"

void display**(**int **\*,** int**);**

void selectionsort**(**int **\***A**,** int N**)**

**{**

int i**,** j**,** min**,** m**,** t**;**

**for(**i**=**0**;** i **<** N**-**1**;** i**++)**

**{**

min **=** A**[**i**];** m **=** i**;**

**for(**j**=**i**+**1**;** j **<** N**;** j**++)**

**{**

**if** **(**A**[**j**]** **<** min**)**

**{**

min **=** A**[**j**];** m **=** j**;**

**}**

**}** // end inner for-loop

**if** **(**m **!=** i**)**

**{**

A**[**m**]** **=** A**[**i**];**

A**[**i**]** **=** min**;**

**}**

**}**

**}**

void main**()**

**{**

int numbers**[**5**]** **=** **{**42**,** 13**,** 2**,** 18**,** 22**};**

printf**(**"Before sorting\n"**);**

display**(**numbers**,** 5**);**

selectionsort**(**numbers**,** 5**);**

printf**(**"After sorting\n"**);**

display**(**numbers**,** 5**);**

**}**

void display**(**int **\***A**,** int N**)**

**{**

int i**;**

**for** **(**i**=**0**;** i **<** N**;** i**++)**

printf**(**"%d "**,**A**[**i**]);**

printf**(**"\n"**);**

**}**

**INPUT**

Before sorting

42 13 2 18 22

**OUTPUT**

After sorting

2 13 18 22 42

**POST-LAB QUESTIONS**

1. Write a C program to find the factorial of a given number using recursion
2. Write a C program to swap the content of two variables using pointers (pass by reference)

**RESULT**

Thus the C program to sort the list of numbers using pass by reference was successfully written and executed.