**Selection Sort**

**Procedure: MIN (A, K, N, LOC)**

**An Array is in Memory.**

**This procedure finds the location LOC of the smallest element among A [K], A [K+1], ---- A [N].**

**1. Set MIN: = A [K] and LOC: =K [Initialize pointers]**

**2. Repeat for J=K+1, K+2, -------- N**

**If MIN > A [J], then Set MIN: = A [J] and**

**LOC: =J**

**[End of loop]**

**3. Return**

**The selection sort Algorithm can now be easily stated:**

**Algorithm: (Selection Sort) SELECTION (A, N)**

**This algorithm sorts the array A with N elements.**

1. **Repeat Step 2 and 3 for K=1 to N-1**
2. **Call MIN(A, K, N, LOC)**
3. **Interchange A[K] and A[LOC]**

**Set TEMP:=A[K], A[K]:=A[LOC] and A[LOC]:=TEMP**

**[End of Step 1 loop]**

1. **Exit**

**Selection Sort**

**Suppose an array A with n elements A [1], A [2], ------- A [N] is in memory.**

**The Selection sort algorithm for sorting A works as follows:**

* **First find the smallest in the list and put it in the first position.**
* **Then find the second smallest element in the list and put it in the second position.**

**Swap that value with the first element in row then ignoring the first element now.**

**Repeat the procedure again to find the next min value and then swapping it with second element and then third element and then so on…….**

**Smaller values will accumulate on the left,**

|  |  |
| --- | --- |
| **Pass 1:** | **Find the location LOC of the smallest in the list of N elements A[1], A[2], -----, A[N], and then interchange A[LOC] and A[1]. Then: A[1] is sorted.** |
| **Pass 2:** | **Find the location LOC of the smallest in the sublist of N-1 elements A[2], A[3], ----- , A[N], and then interchange A[LOC] and A[2]. Then: A[1], A[2] is sorted, since A[1] ≤ A[2].** |
| **Pass 3:** | **Find the location LOC of the smallest in the sublist of N-2 elements A[3], A[4], ----- , A[N], and then interchange A[LOC] and A[3]. Then: A[1], A[2], A[3] is sorted, since A[2] ≤ A[3].** |
| ……. | ………………………………………………….. |
| **Pass N-1:** | **Find the location LOC of the smallest of the elements A[N-1], A[N], and then interchange A[LOC] and A[N-1]. Then: A[1], A[2], A[3],---- A[N] is sorted, since A[N-1] ≤ A[N].** |

**Thus A is sorted after N-1 passes.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **32** | **51** | **27** | **85** | **66** | **23** | **13** | **57** |

**Pass 1:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Min32** | **51** | **27** | **85** | **66** | **23** | **13** | **57** |
| **32** | **51** | **Min 27** | **85** | **66** | **23** | **13** | **57** |
| **32** | **51** | **Min 27** | **85** | **66** | **23** | **13** | **57** |
| **32** | **51** | **Min 27** | **85** | **66** | **23** | **13** | **57** |
| **32** | **51** | **27** | **85** | **66** | **Min 23** | **13** | **57** |
| **32** | **51** | **27** | **85** | **66** | **23** | **Min 13** | **57** |
| **32** | **51** | **27** | **85** | **66** | **23** | **Min 13** | **57** |

**Swap Min value with First element**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **32** | **51** | **27** | **85** | **66** | **23** | **Min 13** | **57** |
| **32** | **51** | **27** | **85** | **66** | **23** | **Min 13** | **57** |

**Pass 2:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **13** | **Min 51** | **27** | **85** | **66** | **23** | **32** | **57** |
| **13** | **51** | **Min 27** | **85** | **66** | **23** | **32** | **57** |
| **13** | **51** | **Min 27** | **85** | **66** | **23** | **32** | **57** |
| **13** | **51** | **Min 27** | **85** | **66** | **23** | **32** | **57** |
| **13** | **51** | **27** | **85** | **66** | **Min 23** | **32** | **57** |
| **13** | **51** | **27** | **85** | **66** | **Min 23** | **32** | **57** |
| **13** | **Min 23** | **27** | **85** | **66** | **51** | **32** | **57** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **13** | **23** | **27** | **85** | **66** | **51** | **32** | **57** |

**Pass 3**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **13** | **23** | **Min 27** | **85** | **66** | **51** | **32** | **57** |
| **13** | **23** | **Min 27** | **85** | **66** | **51** | **32** | **57** |
| **13** | **23** | **Min 27** | **85** | **66** | **51** | **32** | **57** |
| **13** | **23** | **Min 27** | **85** | **66** | **51** | **32** | **57** |
| **13** | **23** | **Min 27** | **85** | **66** | **51** | **32** | **57** |
| **13** | **23** | **Min 27** | **85** | **66** | **51** | **32** | **57** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **13** | **23** | **27** | **85** | **66** | **51** | **32** | **57** |

**Pass 4:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **13** | **23** | **27** | **Min 85** | **66** | **51** | **32** | **57** |
| **13** | **23** | **27** | **85** | **Min 66** | **51** | **32** | **57** |
| **13** | **23** | **27** | **85** | **66** | **Min 51** | **32** | **57** |
| **13** | **23** | **27** | **85** | **66** | **51** | **Min 32** | **57** |
| **13** | **23** | **27** | **Min 32** | **66** | **51** | **85** | **57** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **13** | **23** | **27** | **32** | **66** | **51** | **85** | **57** |

**Pass 5:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **13** | **23** | **27** | **32** | **Min 66** | **51** | **85** | **57** |
| **13** | **23** | **27** | **32** | **66** | **Min 51** | **85** | **57** |
| **13** | **23** | **27** | **32** | **66** | **Min 51** | **85** | **57** |
| **13** | **23** | **27** | **32** | **66** | **Min 51** | **85** | **57** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **13** | **23** | **27** | **32** | **Min 51** | **66** | **85** | **57** |
| **13** | **23** | **27** | **32** | **51** | **66** | **85** | **57** |

**Pass 6:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **13** | **23** | **27** | **32** | **51** | **Min 66** | **85** | **57** |
| **13** | **23** | **27** | **32** | **51** | **Min 66** | **85** | **57** |
| **13** | **23** | **27** | **32** | **51** | **Min 57** | **85** | **66** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **13** | **23** | **27** | **32** | **51** | **57** | **85** | **66** |

**Pass 7:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **13** | **23** | **27** | **32** | **51** | **57** | **Min 85** | **66** |
| **13** | **23** | **27** | **32** | **51** | **57** | **Min66** | **85** |