

Finding the minimum value of an array

The minimum finding problem is specified as follows:

Input: a list of n elements $[a_0, a_1, a_2, \dots, a_{n-1}]$

Output:

“undefined”, if the list is empty ($n == 0$)

the smallest element in the list, otherwise

EXAMPLE – Minimum finding

Input: [12, 5, 6, 100, 3, 1]

Output: 1

Input: [John, James, Marie, Frank, Alicia]

Output: Alicia

Minimum Finding Algorithm: The minimum finding algorithm works by examining each element in the list in order, and keeping track of the smallest element that it has seen so far. When it finishes, it has examined each element of the list, so the smallest element it has seen is also the smallest element of the entire list.

Find_Minimum

1. Given a list L
2. If L is empty, return “undefined”
3. Min-so-far = L[0]
4. For i in range(1, len(L)):
 If $L[i] < \text{Min-so-far}$:
 Min-so-far = $L[i]$
5. Return Min-so-far

Find_Minimum in Jython

```
1 def empty(S):
2     return len(S) == 0
3
4 def min(S):
5     if empty(S):
6         return 'undefined'
7     else:
8         min_so_far = S[0]
9         for i in range(1, len(S)):
10            if S[i] < min_so_far:
11                min_so_far = S[i]
12    return min_so_far
```

The Sorting Problem

The Sorting problem is specified as follows:

Input: a list of n elements $[a_0, a_1, a_2, \dots, a_{n-1}]$

Output: The same list sorted in ascending order

EXAMPLE – Sorting Problem

Input: [12, 5, 6, 100, 3, 1]

Output: [1, 3, 5, 6, 12, 100]

Input: [James, Frank, Alicia, Bob, Alice]

Output: [Alice, Alicia, Bob, Frank, James]

Selection Sort algorithm: Given a list of n elements, Selection Sort creates a new list by finding the minimum element from the list, appending it to the new list, then removing it from the original list. We repeat this until all the elements have been removed from the original list, and added to the new list in order.

Selection_Sort:

1. Given a list L
2. SortedL = []
3. For i in range(0, len(L)):
 minElement = Min(L)
 SortedL.append(minElement)
 L.remove(minElement)
4. Return SortedL

Selection Sort in Jython

```
1 def selectionSort(S):
2     sortedS = []
3     for i in range(0, len(S)):
4         minElement = min(S)
5         S.remove(minElement)
6         sortedS.append(minElement)
7     return sortedS
```