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COM 301

Assignment 6

1. Input: 9 8 7 6 5 4 3 2 1

At the first pass of the shell sort, when h = 7 (elements with a gap 7), perform insertions sort on the separate sub-arrays (9, 2), ( 8, 1), (7), (6), (5), (4) and (3).

After insertion sort sub-arrays are: (2, 9), (1, 8), (7), (6), (5), (4) and (3)

Therefore, after the first pass elements are as follows: 2 1 7 6 5 4 3 9 8

At the second pass, when h = 3 (elements with a gap 3), perform insertions sort on the separate sub-arrays (2, 6, 3), (1, 5, 9) and (7, 4, 8).

After insertion sort sub-arrays are: (2, 3, 6), (1, 5, 9) and (4, 7, 8)

Therefore, after the second pass elements are as follows: 2 1 4 3 5 7 6 9 8

At the third and last pass, when h = 1 (elements with a gap 1), perform an ordinary insertions sort on the entire array (2 1 4 3 5 7 6 9 8)

After insertion sort the list of elements are as follows: 1 2 3 4 5 6 7 8 9

Therefore, shell sort the final list of elements are as follows: 1 2 3 4 5 6 7 8 9

1. List is 3, 1, 4, 1, 5, 9, 2, 6

Split the list in two. Find the length of the list i.e., 8. As 8 >1 therefore split the list in two i.e., 8/2 = 4

3, 1, 5, 1 and 5, 9, 2, 6

Both the lists length is not equal to 1, hence the lists are split again i.e., 4/2 =2

(3, 1) (4, 1) (5, 9) (2, 6)

Again, the length of each list is not equal to 1 i.e., 2. So we split again

(3, 1, 4, 1, 5, 9, 2, 6)

Now merge adjacent items in one list by comparing with each other. Like 3 > 1 so list is (1, 3), 4>1 so other list is (1, 4), 5<9 so list is (5, 9) , 2 < 6 so ( 2, 6)

(1,3) (1,4) (5,9) (2,6)

Compare the items in one list to another.

1>=1 and 3< 4 so list1 is (1, 1, 3, 4)

5 > 2 and 5<6, 9>6 so list2 is (2, 5, 6, 9)

Compare each item in list1 to list2 and merge to form a single list

As 1< 2 so first item is 1

1<2 so second item is 1

3> 2 so third item is 2

3< 5 so fourth item is 3

4<5 so fifth item is 4

As list1 items are over for comparison so sixth item will be 5 and seventh will be 6 and eighth will be 9 direct from list 2

1, 1, 2, 3, 4, 5, 6, 9

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Input | 3 | 1 | 4 | 1 | 5 | 9 | 2 | 6 |
| i=0 | \*3 | 1 | 4 | 1 | 5 | 9 | 2 | 6 |
| i=1 | 3 | 1\* | 4 | 1 | 5 | 9 | 2 | 6 |
| Insert | 1 | 3 | 4 | 1 | 5 | 9 | 2 | 6 |
| i=2 | 1 | 3 | \*4 | 1 | 5 | 9 | 2 | 6 |
| i=3 | 1 | 3 | 4 | \*1 | 5 | 9 | 2 | 6 |
| Insert | 1 | 1 | 3 | 4 | 5 | 9 | 2 | 6 |
| i=4 | 1 | 1 | 3 | 4 | \*5 | 9 | 2 | 6 |
| i=5 | 1 | 1 | 3 | 4 | 5 | \*9 | 2 | 6 |
| i=6 | 1 | 1 | 3 | 4 | 5 | 9 | \*2 | 6 |
| Insert | 1 | 1 | 2 | 3 | 4 | 5 | 9 | 6 |
| i=7 | 1 | 1 | 2 | 3 | 4 | 5 | 9 | \*6 |
| Insert | 1 | 1 | 2 | 3 | 4 | 5 | 6 | 9 |
|  | 1 | 1 | 2 | 3 | 4 | 5 | 6 | 9 |