Merge Sort

Conceptually the merge sort works as follows

1. First divide or partition the unsorted list or array into 2 lists of about half the size
2. Continue to make partitions till no more partitions can be created
3. Merge the 2 lists into 1 list by comparing the elements of 2 lists

This algorithm was designed by a mathemetician John Van Newman

Sort the following elements using Merge Sort algorithm & show each step

38, 27, 43, 3, 9, 82, 10

noe = 7

left mid right

0 1 2 3 4 5 6

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 38 | 27 | 43 | 3 | 9 | 82 | 10 |

mid = (left+right)/2

= (0+6)/2 = 3

Create 2 logical partitions, left to mid & mid+1 to right

left mid right

0 1 2 3

|  |  |  |  |
| --- | --- | --- | --- |
| 38 | 27 | 43 | 3 |

left mid right

4 5 6

|  |  |  |
| --- | --- | --- |
| 9 | 82 | 10 |

mid = (4+6)/2

mid=(0+3)/2 = 10/2 = 5

= 3/2

= 1

As only 1 element remains,

no more partitions possible

6

|  |
| --- |
| 10 |

left,mid right

4 5

|  |  |
| --- | --- |
| 9 | 82 |

left,mid right

2 3

|  |  |
| --- | --- |
| 43 | 3 |

left,mid right

0 1

|  |  |
| --- | --- |
| 38 | 27 |

6

|  |
| --- |
| 10 |

5

|  |
| --- |
| 82 |

4

|  |
| --- |
| 9 |

3

|  |
| --- |
| 3 |

2

|  |
| --- |
| 43 |

1

|  |
| --- |
| 27 |

0

|  |
| --- |
| 38 |

Merge 1 by 1 partitions by comparing the values

0 1 2 3 4 5 6

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3 | 9 | 10 | 27 | 38 | 43 | 82 |

4 5 6

|  |  |  |
| --- | --- | --- |
| 9 | 10 | 82 |

0 1 2 3

|  |  |  |  |
| --- | --- | --- | --- |
| 3 | 27 | 38 | 43 |

6

|  |
| --- |
| 10 |

4 5

|  |  |
| --- | --- |
| 9 | 82 |

2 3

|  |  |
| --- | --- |
| 3 | 43 |

1. 1

|  |  |
| --- | --- |
| 27 | 38 |