MERGE SORT ALGORITHM

It's a sorting technique that **sequences data by continuously merging items in the list**. Every single item in the original unordered list is merged with another, creating groups of two. Every two-item group is merged, creating groups of four and so on until there is one ordered list.

Merge Sort Algorithm (Working)

mergeSort(arr [ ], l, r) [arr = Array, l = leftmost index , r = rightmost index]

{

Step 1 – Find the middle point to divide the array into two halves:

Middle m = (l+r)/2

Division

Step 2 – Call merge sort for first half:

mergeSort(arr,l,m)

Step 3 – Call merge sort for second half:

mergeSort(arr,m+1,r)

Recursion

Step 4 – Merge the two halves sorted in step 2 and 3

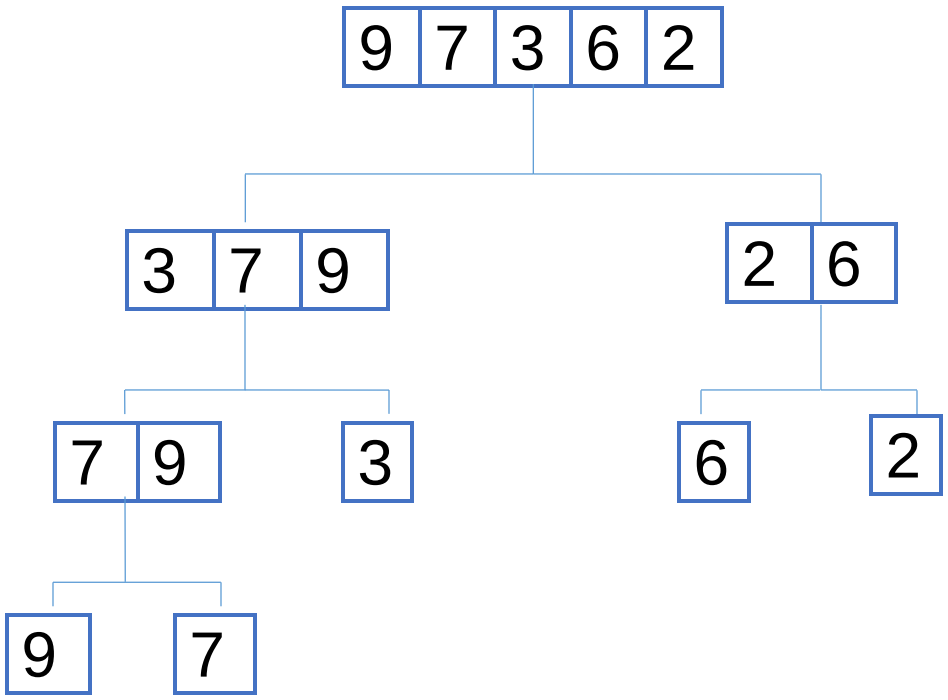
merge (arr,l,m,r)

Merging

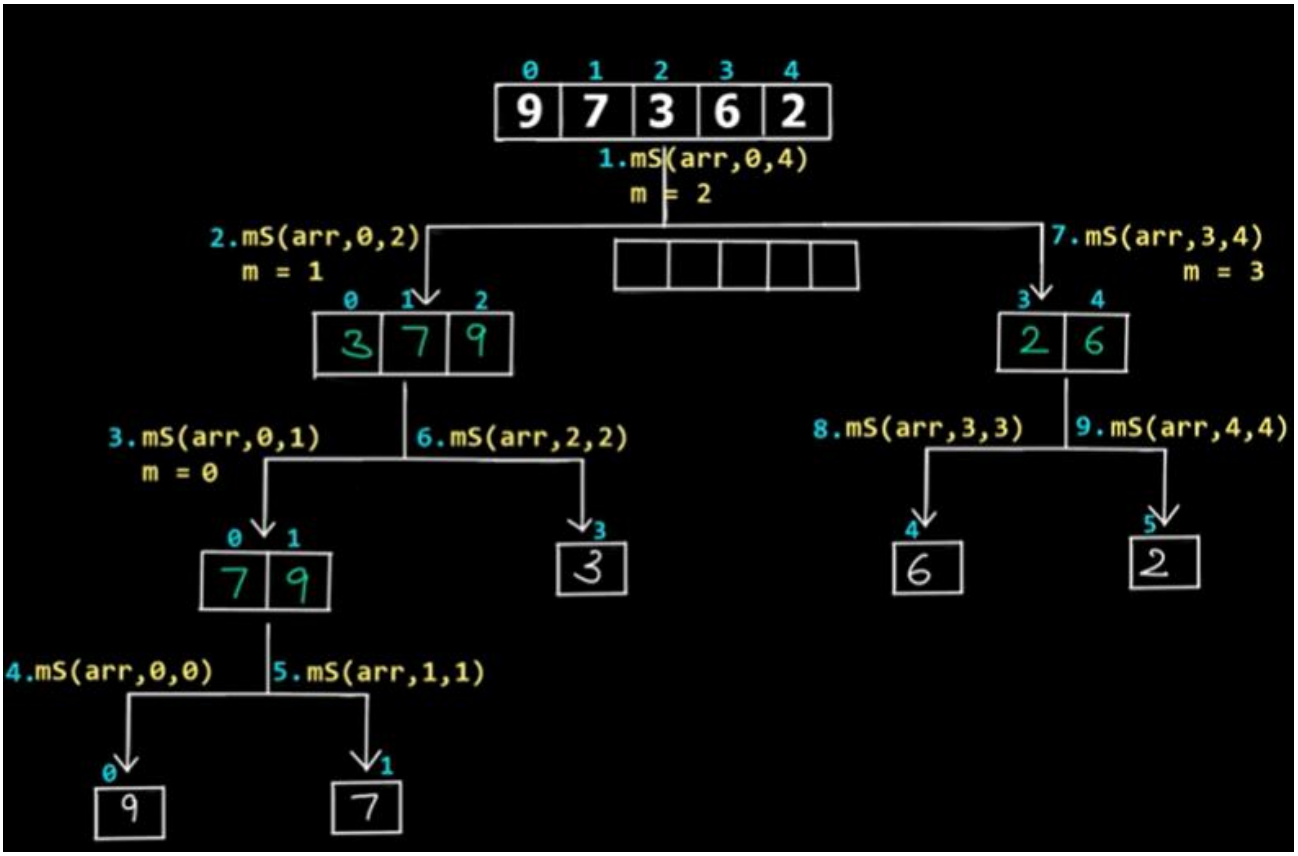
}

Merge Sort implementation

```
mergeSort(arr[],l,r)
{
  if (l<r)
  {
    1. m=(l+r)/2
    2. mergeSort(arr,l,m)
    3. mergeSort(arr,m+1,r)
    4. merge(arr,l,m,r)
  }
}
```



Representation



Step 4 Implementation

```
merge(arr,l,m,r)
{
 1.i=l,j=m+1,k=l // 3 variables
 2.temp[] //create temp array

 3.while (i<=m && j<=r)
   3.1 if(arr[i]<= arr[j])
       temp[k]=arr[i]
       i++,k++
   3.2 else
       temp[k]=arr[j]
       j++,k++
 4.while (i<=m)
    temp[k]=arr[i]
    i++,k++
 5.while(j<=r)
    temp[k]=arr[j]
    j++,k++
 6.for(int p=l;p<=r;p++)
    arr[p]=temp[p];
}
```