

# Merge Sort

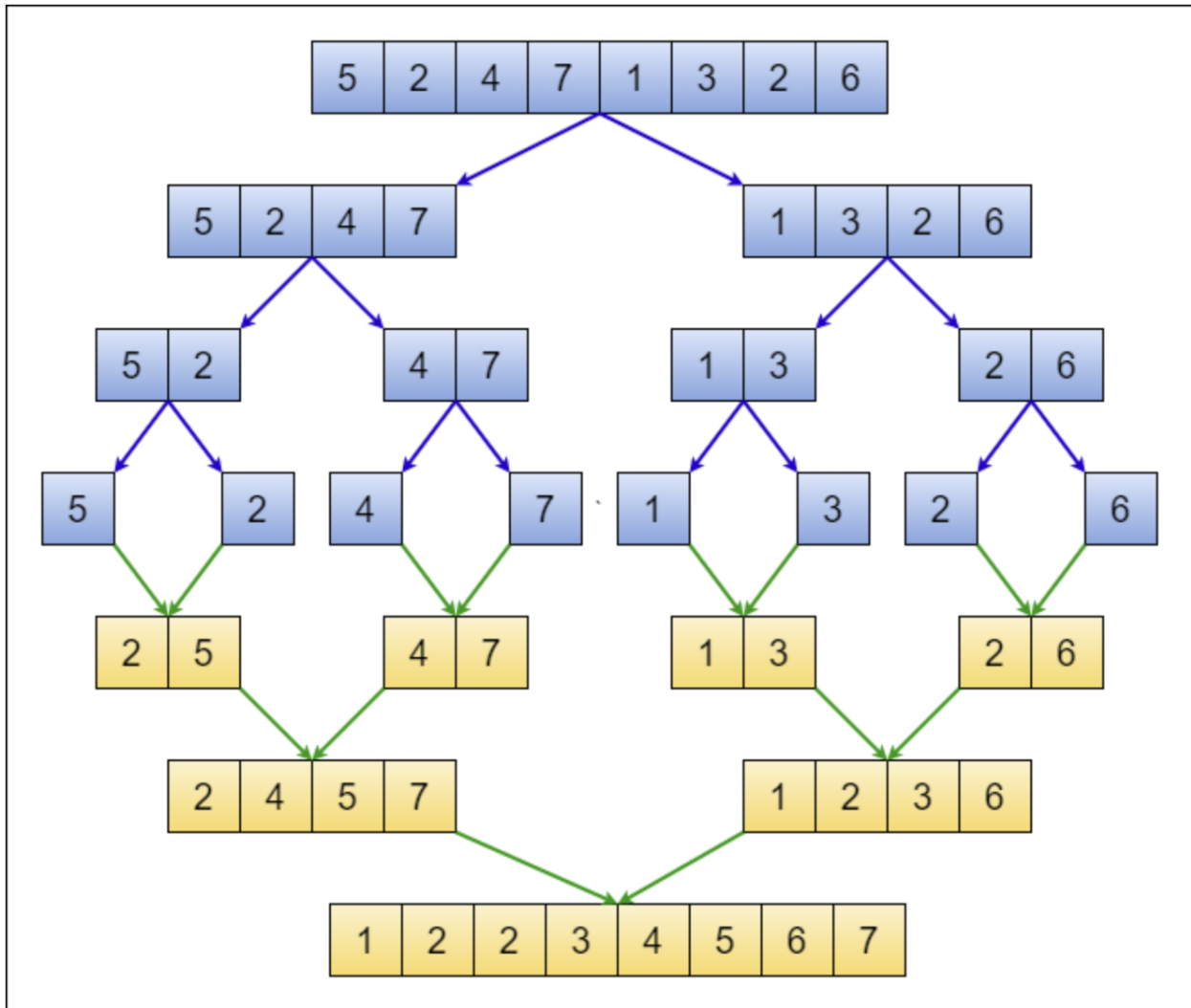
Merge sort is a sorting technique based on divide and conquer technique. With worst-case time complexity being  $O(n \log n)$ .

## **Working of Merge sort :**

Merge sort first divides the array into equal halves and then combines them in a sorted manner.

Merge sort divides an array repeatedly until the sub arrays are indivisible (length 1), After they are divided like this, we merge all the small lists together such that the combined list is sorted. The combining is done in the same order as they were broken down.

Visualisation is as follows :



## Pseudo Code :

```

procedure mergesort( var a as array )
    if ( n == 1 ) return a

    var l1 as array = a[0] ... a[n/2]
    var l2 as array = a[n/2+1] ... a[n]

    l1 = mergesort( l1 )
    l2 = mergesort( l2 )

    return merge( l1, l2 )
end procedure

procedure merge( var a as array, var b as array )

    var c as array

```

```
while ( a and b have elements )
  if ( a[0] > b[0] )
    add b[0] to the end of c
    remove b[0] from b
  else
    add a[0] to the end of c
    remove a[0] from a
  end if
end while

while ( a has elements )
  add a[0] to the end of c
  remove a[0] from a
end while

while ( b has elements )
  add b[0] to the end of c
  remove b[0] from b
end while

return c

end procedure
```