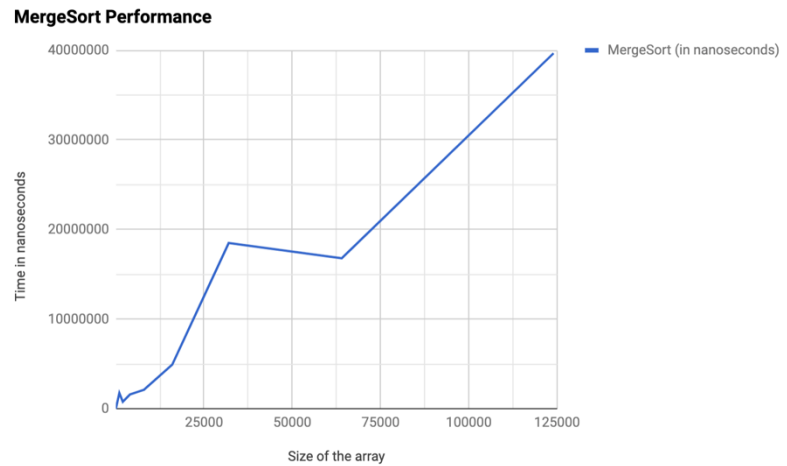A merge-sort algorithm utilises a divide and conquer technique when sorting an array. This means the array is broken into sub-arrays which are sorted into a sorted arrays that are then merged back together.

Table and Graphical representation of timings found

N	MergeSort (in nanoseconds)
8	18477.00
1000	1775185.00
2000	802645.00
4000	1615306.00
8000	2141748.00
16000	4946695.00
32000	18508254.00
64000	16800744.00
124000	39669433.00

This graph proves that a merge-sort algorithm has a time complexity of O(n log(n)).