# Merge Sort

## Merge Sort vs Improved Merge Sort vs Insertion Sort

**Legend:** — N — Merge Sort — Insertion Sort — Improved Merge Sort

Y-axis: Time (in nanoseconds), ranging from 0 to 2.0E+9
X-axis: Number of elements sorted (10, 100, 1000, 10000, 100000)
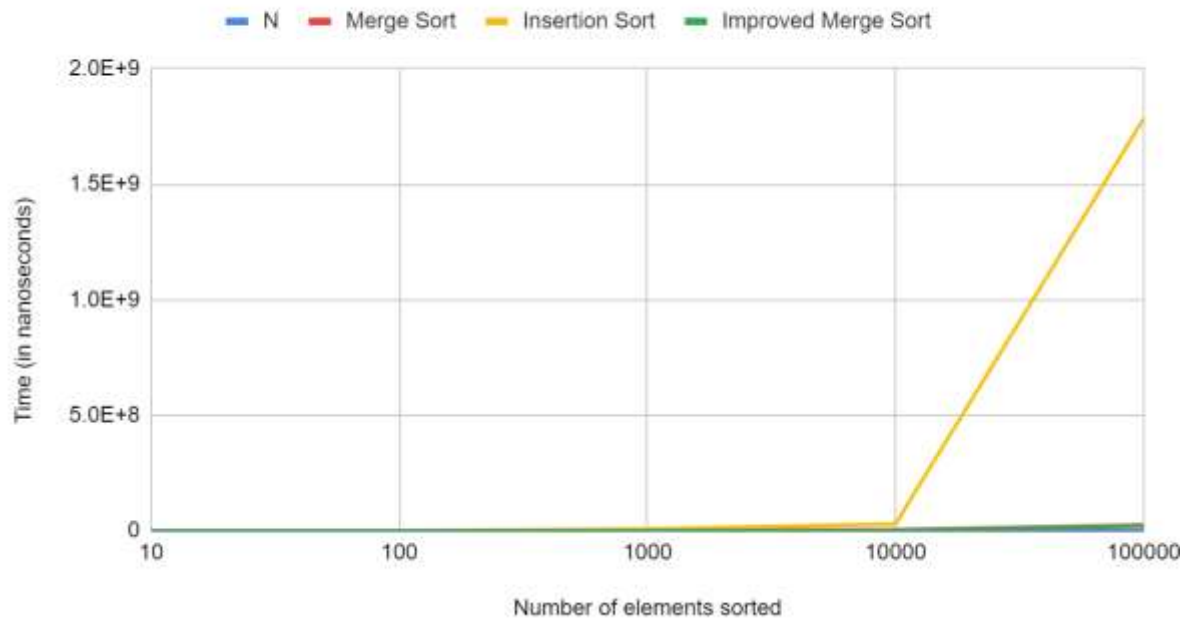
We can clearly see that with very large arrays Insertion sort is completely unfeasible. This is due to it having a time complexity of $O(n^2)$.

If we remove insertion sort from the graph we can get a better look at Merge Sort vs Improved Merge Sort.

## Merge Sort vs Improved Merge Sort

**Legend:** — N — Merge Sort — Improved Merge Sort

Y-axis: Time (in nanoseconds), ranging from 0 to 2.5E+7
X-axis: Number of elements sorted (10, 100, 1000, 10000, 100000)
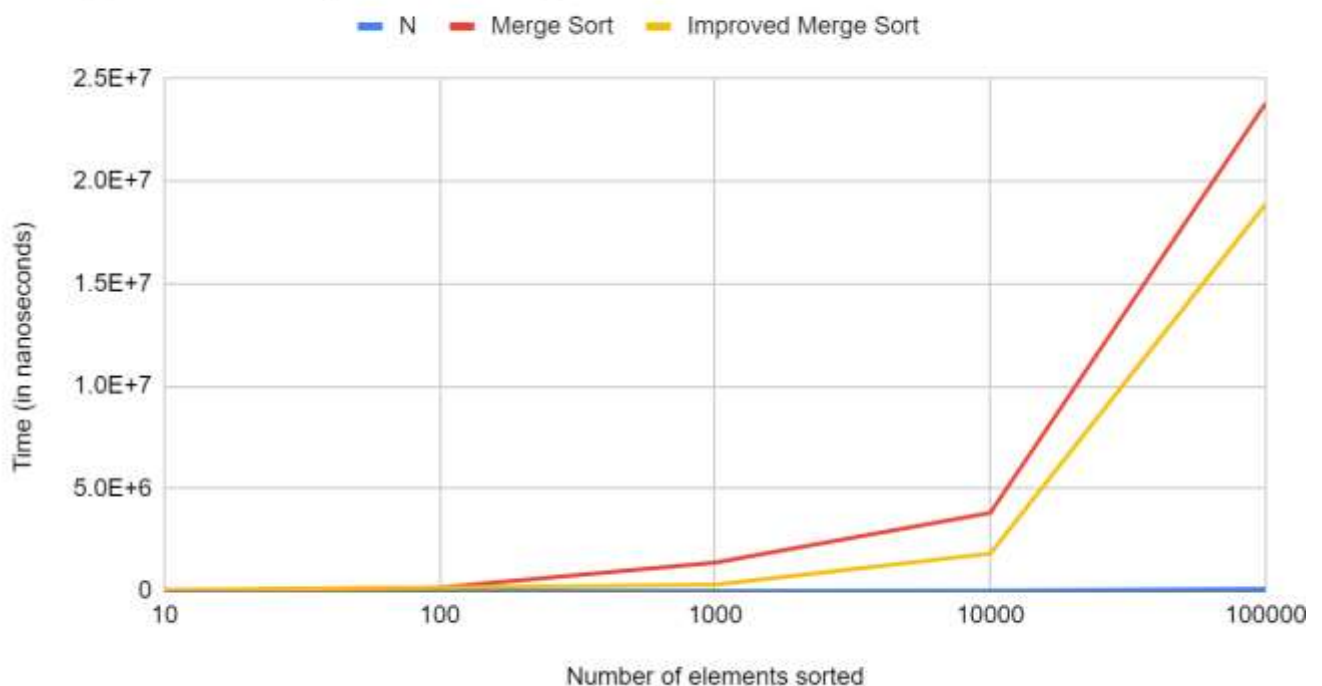
Note: horizontal axis is logarithmic.

We can see from this chart that Improved Merge Sort is a clear improvement over Merge Sort.

Improved Merge Sort had an improvement, on average, of roughly 35% on my PC.