|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sorting Algorithm** | **10** | **100** | **500** | **5000** | **25000** |
| Bubble | 0 ns | 0 ns | 0 ns | 109 ns | 2807 ns |
| Insertion | 0 ns | 0 ns | 0 ns | 0 ns | 0 ns |
| Merge | 0 ns | 0 ns | 0 ns | 0 ns | 0 ns |
| Quick | 0 ns | 0 nsns | 0 ns | 35 ns | 457 ns |
| Heap | 0 ns | 0 ns | 0 ns | 0 ns | 8 ns |
| Counting | 0 ns | 0 ns | Crashed | Crashed | Crashed |
| Radix | 0 ns | 0 ns | 0 ns | 0 ns | 0 ns |
|  |  |  |  |  |  |

Output from terminal of time taken by different sorting algorithms in nanoseconds

|  |  |  |
| --- | --- | --- |
| **Sorting Algorithm** | **Big O notation** | **10 items** |
| Bubble | Θ(n^2) | 0 ns |
| Insertion | Θ(n^2) | 0 ns |
| Merge | Θ(n log(n)) | 0 ns |
| Quick | Θ(n log(n)) | 0 ns |
| Heap | Θ(n log(n)) | 0 ns |
| Counting | Θ(n+k) | 0 ns |
| Radix | Θ(nk) | 0 ns |

A Big-O complexity chart that illustrates the expectations for the various types is shown above.

Task 2's resolution follows logic. The poorest efficiency is plainly visible in the graph from our output for bubble sort and insertion sort. Merge sort should produce smaller results.

arrays at comparatively faster rates, but for bigger arrays it outperforms red zone operations like bubble and insertion sorts. According to our findings, Merge sort is not significantly faster than Quick or Heap sorts. They weren't as close to merging sort as I had anticipated in the output. Across all array sizes, counting sort is by far the

I anticipated bubble and insertion to be among the faster sorts in the small array of 10 items because they are designed for small arrays. Due to the Big-O complexity of counting sort, I also anticipated that it would be the quickest or at least among the top three. However, I also anticipated that Merge sort would be the worst for a small array. This is due to the fact that bubble and insertion only get worse as the array size grows. I also anticipated that quick and heap sorting would take about the same amount of time.