12. Sorting Algorithms :: Comparing Merge Sort to Insertion/Selection Sort

We have shown that the worst case time complexity of merge sort is $O(n \ lg \ n)$. How does this compare to the $O(n^2)$ time complexity of the insertion and selection sort algorithms? Let's assume for merge sort that an array access also takes 25 ns (the same time we assumed for a comparison in insertion/selection sort).

Selection/Insertion Sort

n	$c(n)$	$t(n)$ sec	$t(n)$ min	$t(n)$ hr	$t(n)$ day	$t(n)$ years	$t(n)$ millennia
10^6	10^{12}	2.5×10^4	4.2×10^2	6.9×10^0			
10^7	10^{14}	2.5×10^6	4.2×10^4	6.9×10^2	2.9×10^1		
10^8	10^{16}	2.5×10^8	4.2×10^6	6.9×10^4	2.9×10^3	7.9×10^0	
10^9	10^{18}	2.5×10^{10}	4.2×10^8	6.9×10^6	2.9×10^5	7.9×10^2	
10^{10}	10^{20}	2.5×10^{12}	4.2×10^{10}	6.9×10^8	2.9×10^7	7.9×10^4	7.9×10^1

Merge Sort

n	$a(n)$	$t(n)$ sec	$t(n)$ min	$t(n)$ hr
10^6	1.99×10^7	5.0×10^{-1}		
10^7	2.33×10^8	5.8×10^0		
10^8	2.66×10^9	6.6×10^1	1.1	
10^9	2.99×10^{10}	7.5×10^2	12.5	
10^{10}	3.32×10^{11}	8.3×10^3	138.5	2.31