Ramiz Faragalla

Sorted Input

n	Insertion Sort (CPU Running Time)	Insertion Sort (Number of steps)	Merge Sort (CPU Running Time)	Merge Sort (Number of Steps)
100	2 microseconds	596 steps	64 microseconds	7676 steps
200	2 microseconds	1196 steps	63 microseconds	17164 steps
300	3 microseconds	1796 steps	94 microseconds	27308 steps
400	3 microseconds	2396 steps	79 microseconds	37940 steps
500	4 microseconds	2996 steps	301 microseconds	48436 steps
1000	6 microseconds	5996 steps	250 microseconds	105884 steps
4000	81 microseconds	23996 steps	889 microseconds	495572 steps
10000	58 microseconds	59996 steps	2195 microseconds	1366932 steps

Reversely Sorted Input

n	Insertion Sort (CPU Running Time)	Insertion Sort (Number of steps)	Merge Sort (CPU Running Time)	Merge Sort (Number of Steps)
100	24 microseconds	20396 steps	34 microseconds	7596 steps
200	97 microseconds	80796 steps	241 microseconds	17004 steps
300	203 microseconds	181196 steps	72 microseconds	27052 steps
400	268 microseconds	321596 steps	79 microseconds	37620 steps
500	414 microseconds	501996 steps	128 microseconds	48324 steps
1000	1626 microseconds	2003996 steps	240 microseconds	105660 steps
4000	26100 microseconds	32015996 steps	997 microseconds	494676 steps
10000	151165 microseconds	200039996 steps	2188 microseconds	1358132 steps

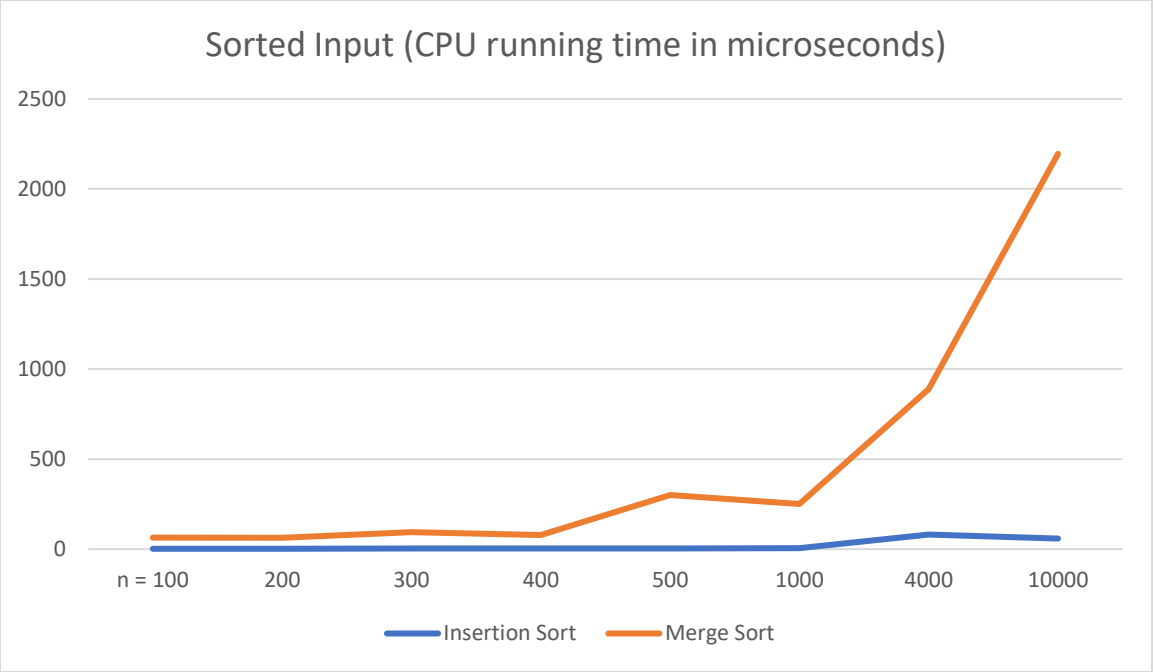
Random Permutation

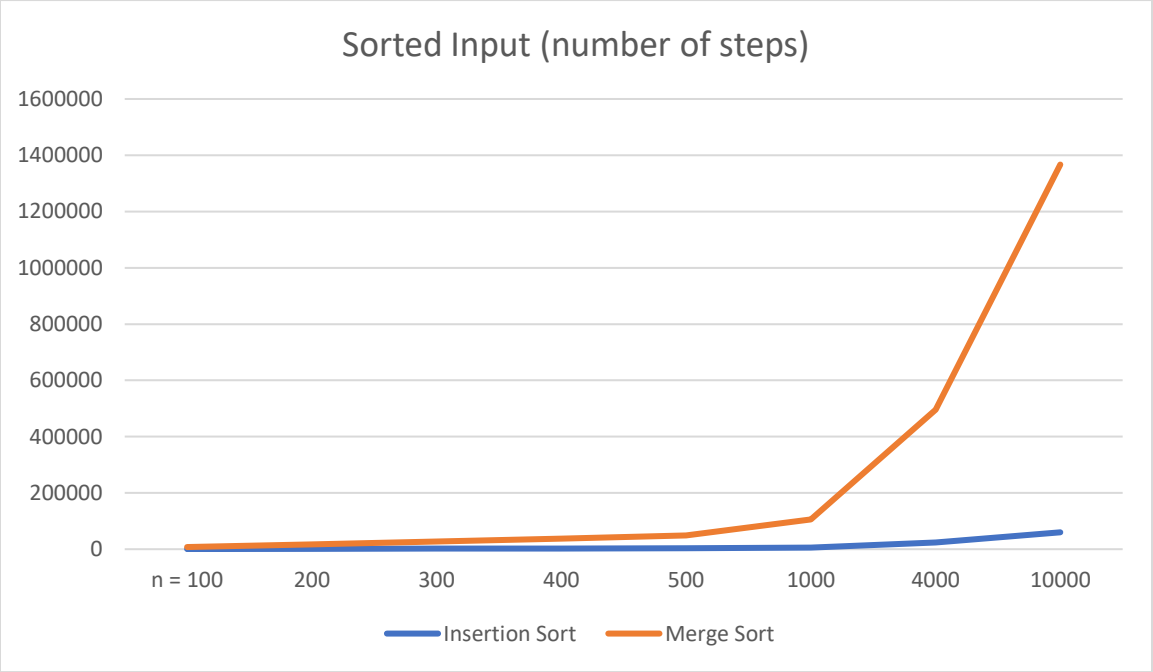
n	Insertion Sort (CPU Running Time | Number of steps)		Merge Sort (CPU Running Time | Number of Steps)	
100	21 microseconds	12996 steps	27 microseconds	8042 steps
200	61 microseconds	51748 steps	73 microseconds	18024 steps
300	108 microseconds	109304 steps	78 microseconds	28812 steps
400	192 microseconds	188952 steps	100 microseconds	40182 steps
500	242 microseconds	292044 steps	126 microseconds	51592 steps
1000	946 microseconds	1118244 steps	287 microseconds	112958 steps
4000	11078 microseconds	13013756 steps	986 microseconds	529700 steps
10000	64236 microseconds	84415316 steps	2329 microseconds	1444832 steps

50 instances of n random numbers generated in the range of [1..n]

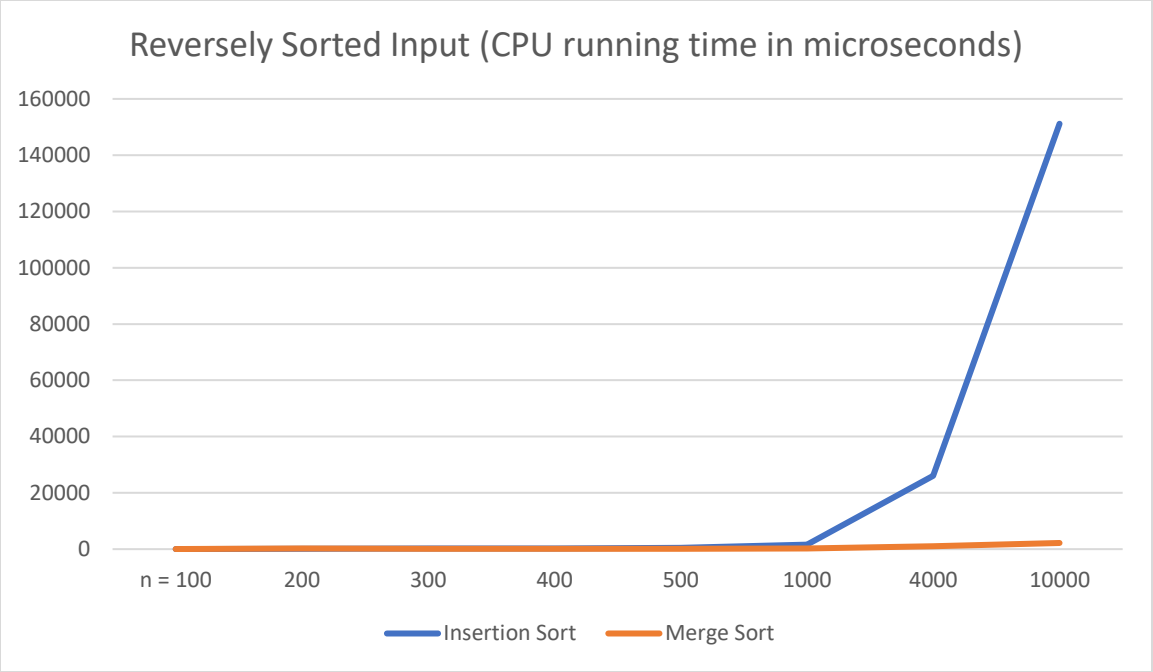
n	Insertion Sort (CPU Running Time | Number of steps) (Average)		Merge Sort (CPU Running Time | Number of Steps) (Average)	
100	12.5 microseconds	10328 steps	25.12 microseconds	8050 steps
200	44.58 microseconds	37092 steps	61.3 microseconds	18078 steps
300	79.72 microseconds	94496 steps	64.1 microseconds	28868 steps
400	139.26 microseconds	156344 steps	97.6 microseconds	40250 steps
500	222.16 microseconds	243448 steps	122.06 microseconds	51594 steps
1000	826.42 microseconds	968080 steps	260.18 microseconds	113252 steps
4000	12837.5 microseconds	1.60323e+07 steps	1119.68 microseconds	532932 steps
10000	77212.5 microseconds	1.40149e+07 steps	2828.26 microseconds	1.46991e+06 steps

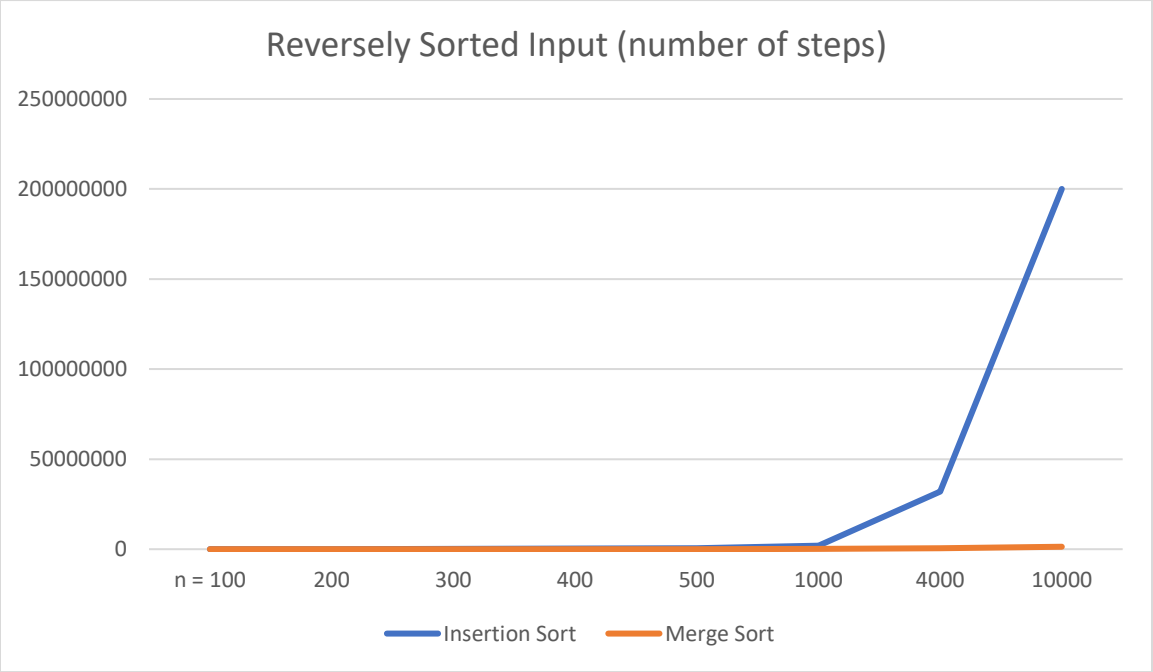
Ramiz Faragalla



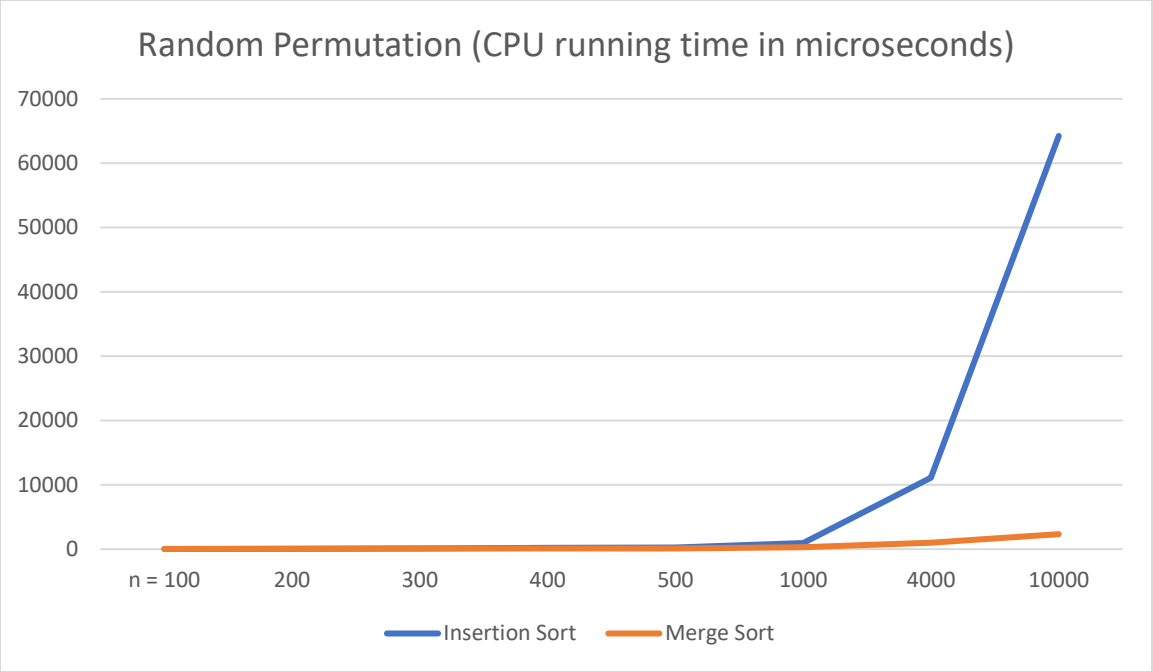


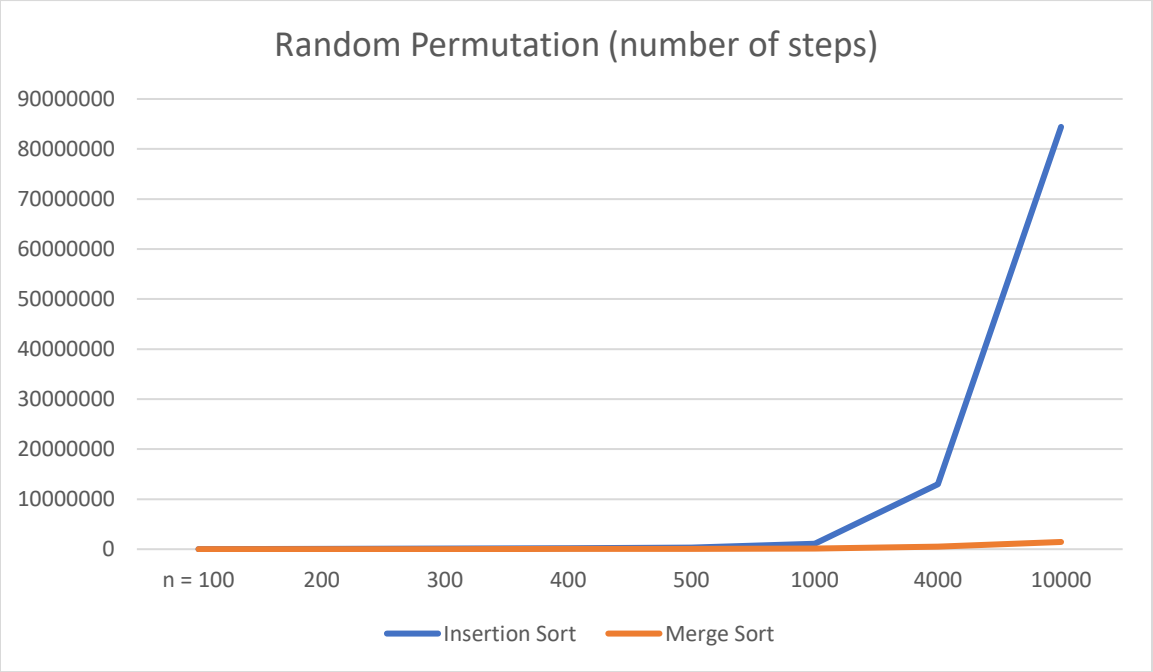
Ramiz Faragalla



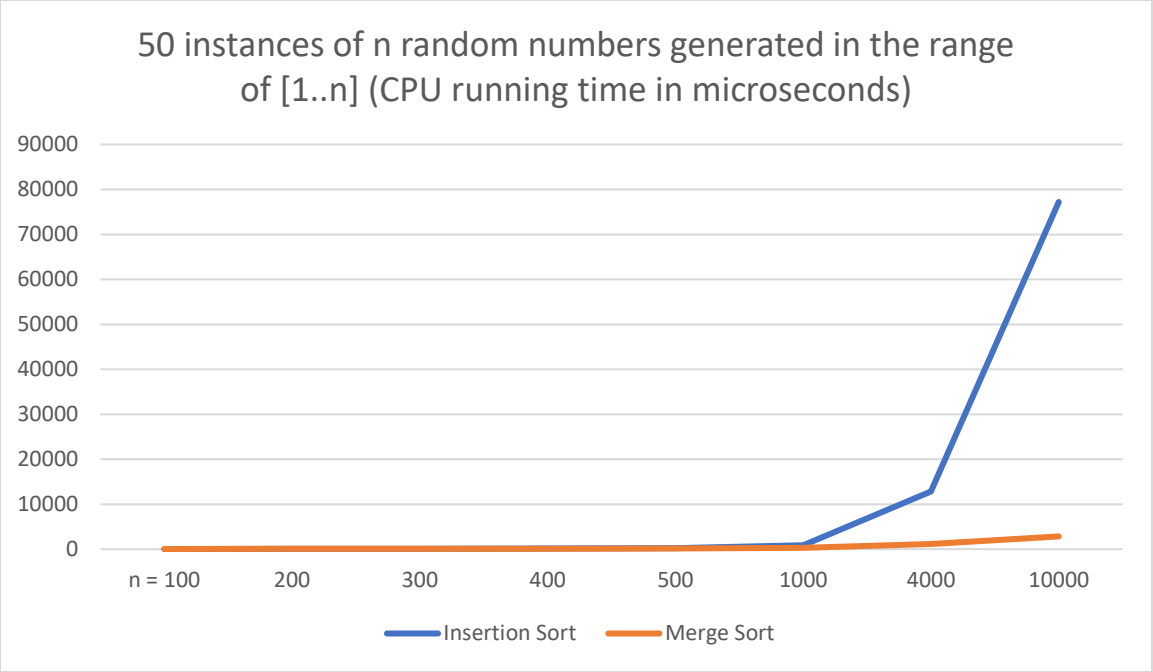


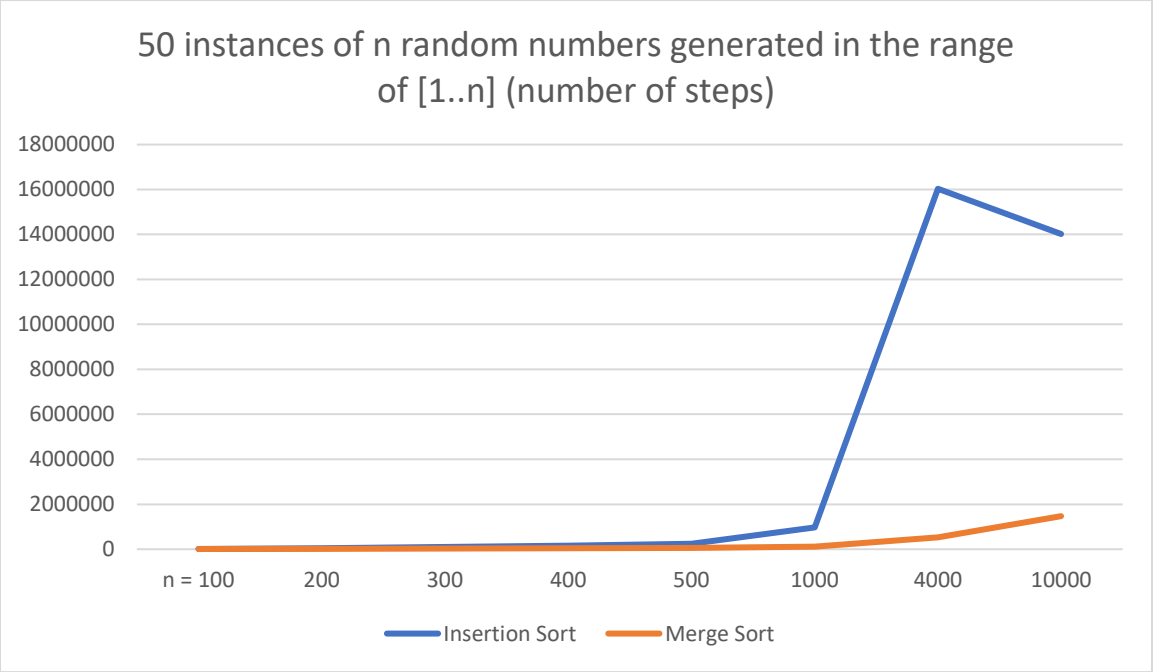
Ramiz Faragalla





Ramiz Faragalla





Ramiz Faragalla

Approximation of constant C

Insertion sort: C = num steps / n^2

*Sorted input is excluded because it's O(n) in insertion sort

n	Reversely Sorted		Random Permutation		50 instances of n random numbers	
	Steps	C	Steps	C	Steps	C
100	20396	2.0396	12996	1.2996	10328	1.0328
200	80796	2.0199	51748	1.2937	37092	0.9273
300	181196	2.013288889	109304	1.214488889	94496	1.049955556
400	321596	2.009975	188952	1.18095	156344	0.97715
500	501996	2.007984	292044	1.168176	243448	0.973792
1000	2003996	2.003996	1118244	1.118244	968080	0.96808
4000	32015996	2.00099975	13013756	0.81335975	1.60323e+07	1.00201875
10000	200039996	2.00039996	84415316	0.84415316	1.40149e+07	0.38096448

Average C for insertion sort = (sum of c) / (8*3) = 32.341 / 24
Average C = 1.348

Merge sort: C = num steps / nlog(n)

n	Sorted		Reversely Sorted		Random Permutation		50 instances of n random numbers	
	Steps	C	Steps	C	Steps	C	Steps	C
100	7676	38.38	7596	37.98	8042	40.21	8050	40.25
200	17164	37.29634127	17004	36.94867088	18024	39.16506963	18078	39.28240839
300	27308	36.74695637	27052	36.40247047	28812	38.770811	28868	38.84616729
400	37940	36.45188824	37620	36.14443953	40182	38.6059508	40250	38.67128365
500	48436	35.89221067	48324	35.80921605	51592	38.23088061	51594	38.23236265
1000	105884	35.29466667	105660	35.22	112958	37.65266667	113252	37.75066667
4000	495572	34.3950407	494676	34.33285406	529700	36.76368531	532932	36.9880014
10000	1366932	34.1733	1358132	33.9533	1444832	36.1208	1.46991e+06	36.74775

Average C for merge sort = (sum of c) / (8*4) = 1187.70985898 / 32

Average C = 37.116