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5a:

RAW DATA POINTS						
Iterations	# of Students	List generation (ms)	Nested loops (ms)	Binary search (ms)	Sorting & Parallel pointers (ms)	Merge and sort (ms)
1024	1000	0.068	0.274	0.223	0.272	0.283
512	2000	0.126	0.907	0.422	0.510	0.544
256	4000	0.236	3.333	0.917	1.119	1.124
128	8000	0.470	12.747	1.851	2.222	2.416
64	16000	0.950	50.014	3.981	4.778	4.821
32	32000	1.929	197.993	8.299	9.755	10.118
16	64000	3.903	775.546	17.673	20.608	21.853
8	128000	8.120	3123.356	36.797	42.237	43.774
4	256000	18.367	12352.594	81.887	92.220	91.591
2	512000	38.835	50286.640	177.829	190.484	199.402
1	1024000	81.386	198959.610	370.477	402.082	398.836

DATA AFTER SUBTRACTING LIST GENERATION TIME				
# of Students	Nested loops (ms)	Binary search (ms)	Sorting & Parallel pointers (ms)	Merge and sort (ms)
1000	0.21	0.15	0.20	0.21
2000	0.78	0.30	0.38	0.42
4000	3.10	0.68	0.88	0.89
8000	12.28	1.38	1.75	1.95
16000	49.06	3.03	3.83	3.87
32000	196.06	6.37	7.83	8.19
64000	771.64	13.77	16.70	17.95
128000	3,115	28.68	34.12	35.65
256000	12,334	63.52	73.85	73.22
512000	50,248	138.99	151.65	160.57
1024000	198,878	289.09	320.70	317.45

5b:

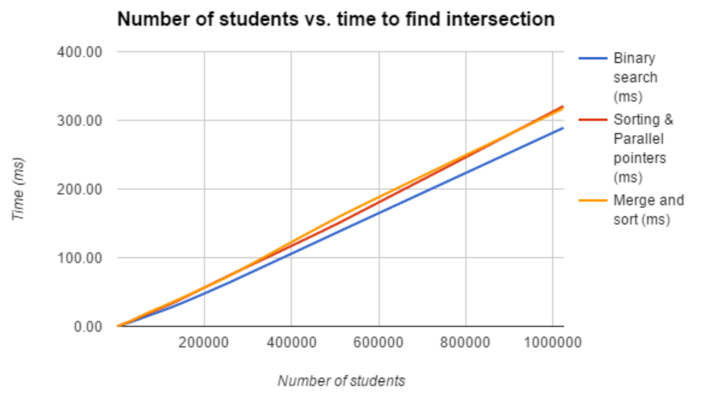
The nested loops, based on the data given, has a function as follows:
T(n) = $0.0000001884n^2 + 0.6160$ milliseconds
(exponential fit provided by LoggerPro with RMSE of 1.264)

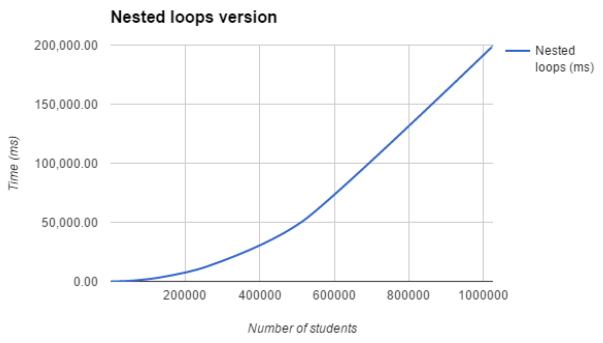
The binary search, based on the data given, has a function as follows:
T(n) = $4.700*10^{-5}$(nlog(n))

The sorting and parallel pointers, based on the data given, has a function as follows:
T(n) = $5.212*10^{-5}$(nlog(n))

The merge and sort, based on the data given, has a function as follows:
T(n) = $5.226*10^{-5}$(nlog(n))

The given functions were found using Logger Pro. Constants were not added as the graph intersected the y axis at a negative number, which would be more incorrect than not including an added constant.





5c:

L1	L2	List Generation Time (ms)	Nested loops (ms)	Binary search (ms)	Sorting & Parallel pointers (ms)	Merge and sort (ms)
32000	1024000	43.007	13,319.053	164.942	165.011	164.661
1024000	32000	42.119	12,998.070	32.878	166.555	169.374

For nested loops, the time doesn't change much as it must do n*m comparisons regardless of which list is nested within another loop. For both tries, 32000*1024000 comparisons must be made and hence it takes the same time.

For binary search, the time taken is far less if the array that has to be sorted is smaller (when L2 is smaller). This is because not only does it take more time to sort a larger array, it takes more time to search through a large array, which means that the searches and sorting time is much faster when L2 (the array being sorted) is smaller than L1.

For sorting and parallel pointers, the time taken is the same as the pointers are moving down both sorted lists. This is a symmetrical process irrespective of which list is larger, as it is going down the lists symmetrically, and hence the time is the same in both cases shown above.

For merge and sort, the exact same operation is performed and hence the time taken is the same irrespective of which list is larger, as in both cases illustrated above, the lists are merged to form a combined list of 1056000 student IDs which is then sorted. The merged list is the same in both cases and the operation done is hence the same.