Assignment 1 Discussion Questions

3. In order to determine the average runtime for the program, we record the average times taken for 20 different data arrays from 1000 to 20,000. For ISort an average of 5 time values per data array was recorded. For ISSort an average of 3 time values per data array was recorded. Once the times are recorded, we can divide each time by the number of data and average each processing time per data to get an average runtime per data.

For ISort the average runtime was 22936.00059 ns. For ISSort the average runtime was 47431.23379 ns, or roughly two times ISort.
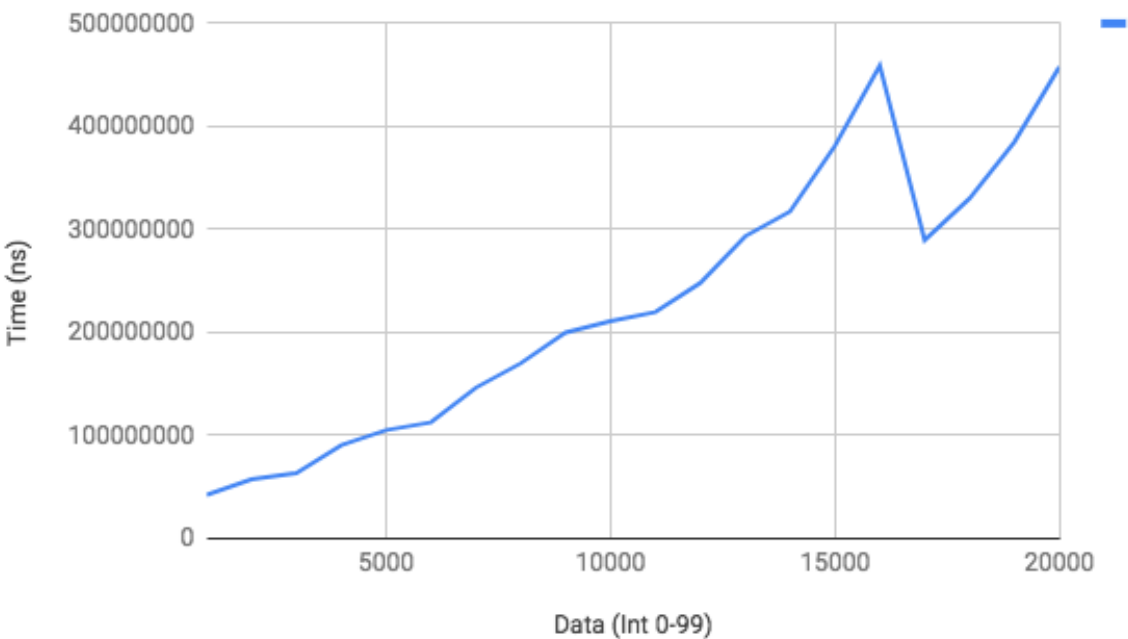
4. see below.

5. Since the 'structuring' pass involves making a pass through all values of N, the structured insertion sort takes roughly twice as long as ISort. It's interesting to note however that for both cases there was a significant reduction in processing time at 16,000 – 17,000 data. This is because the processor dynamically allocates more power to the program.

Data Tables

Isort data	Isort avg time (ns)	Isort time/data (ns)	ISSort data	ISSort avg time (ns)	ISSort time/data (ns)
1000	42392985	42392.985	1000	72505141	72505.141
2000	57533585	28766.7925	2000	157877709	78938.8545
3000	63317275	21105.75833	3000	169068014	56356.00467
4000	90520724	22630.181	4000	199130234	49782.5585
5000	105196274	21039.2548	5000	244139063	48827.8126
6000	112755975	18792.6625	6000	336481105	56080.18417
7000	146392323	20913.189	7000	263439117	37634.15957
8000	170046289	21255.78613	8000	332077734	41509.71675
9000	199870353	22207.817	9000	354165746	39351.74956
10000	210805910	21080.591	10000	426305376	42630.5376
11000	219804987	19982.27155	11000	432471880	39315.62545
12000	248096175	20674.68125	12000	442784916	36898.743
13000	293417555	22570.58115	13000	595980215	45844.63192
14000	317427773	22673.41236	14000	698424419	49887.4585
15000	381242979	25416.1986	15000	763136366	50875.75773
16000	459089614	28693.10088	16000	682116652	42632.29075
17000	289577101	17033.94712	17000	607304670	35723.80412
18000	330086809	18338.15606	18000	723008235	40167.12417
19000	385068272	20266.75116	19000	769827322	40517.22747
20000	457717890	22885.8945	20000	862905875	43145.29375
	average:	22936.00059		average:	47431.23379

Data Graphs

ISort Performance

ISSort Performance