Insertion Sort runs :-

Sr. no	State	No. of Records	Insertion Sort (Population)	Insertion Sort (Name)
1	Alabama	1102	0:6220307	0:21858865
			0:6192281	0:22039859
			0:6230162	0:21828652
			0:6201139	0:21925319
			0:6234081	0:22029658
2	California	3920	0:60767413	0:294453619
			0:60751463	0:290456534
			0:60806482	0:289410194
			0:60951847	0:295574157
			0:60632345	0:290984646
3	Idaho	7932	0:38560198	1:326508906
			0:37328105	1:30314947
			0:340496817	1:330229663
			0:339848367	1:343900169
			0:33568236	1:307298952
4	Iowa	21236	3:180874737	10:245863238
			3:12115258	10:160425756
			3:14456297	10:258459747
			3:199821871	10:414878956
			3:185553497	10:232411896
5	Missouri	41712	12:349223284	46:589090559
			11:78717880	39:840330100
			12:804230884	40:264797636
			12:976739143	43:730789903
			12:893191779	41:972716954
6	POP	81746	45:835600428	205:533827697
			40:344029188	148:446311554
			39:897138121	148:351765735
			45:68771501	149:744272253
			45:75480331	147:9369401

INSERTION SORT (by Population)

Sr .no	State	No. of Records	Time (Mili-Seconds)
1	Alabama	1102	6.192281
2	California	3920	60.632345
3	Idaho	7932	335.68236
4	Iowa	21236	3121.15258
5	Missouri	41712	11007.87179
6	POP	81746	39897.13812
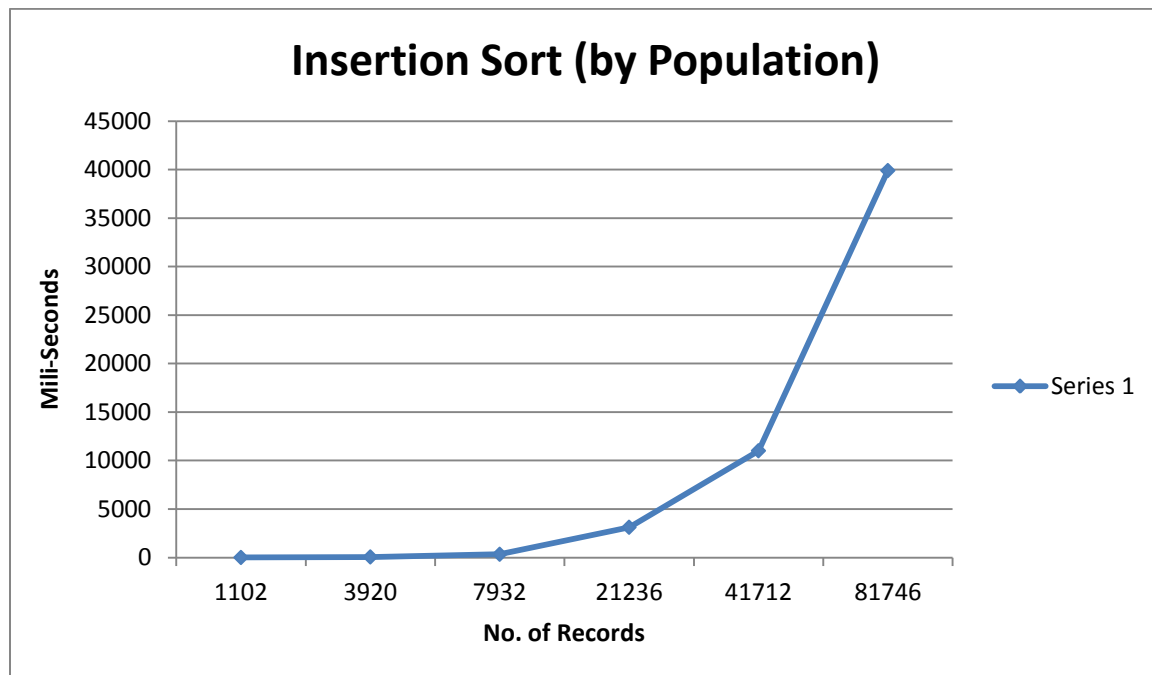
INSERTION SORT (by Name)

Sr .no	State	No. of Records	Time (Mili-Seconds)
1	Alabama	1102	2.1828652
2	California	3920	289.410194
3	Idaho	7932	130.314947
4	Iowa	21236	10160.42576
5	Missouri	41712	39840.3301
6	POP	81746	147936.9402

Insertion Sort (By Name)

Series 1

Y-axis: Mili-Seconds (0 to 160000)

X-axis: No.of Records (1102, 3920, 7932, 21236, 41712, 81746)
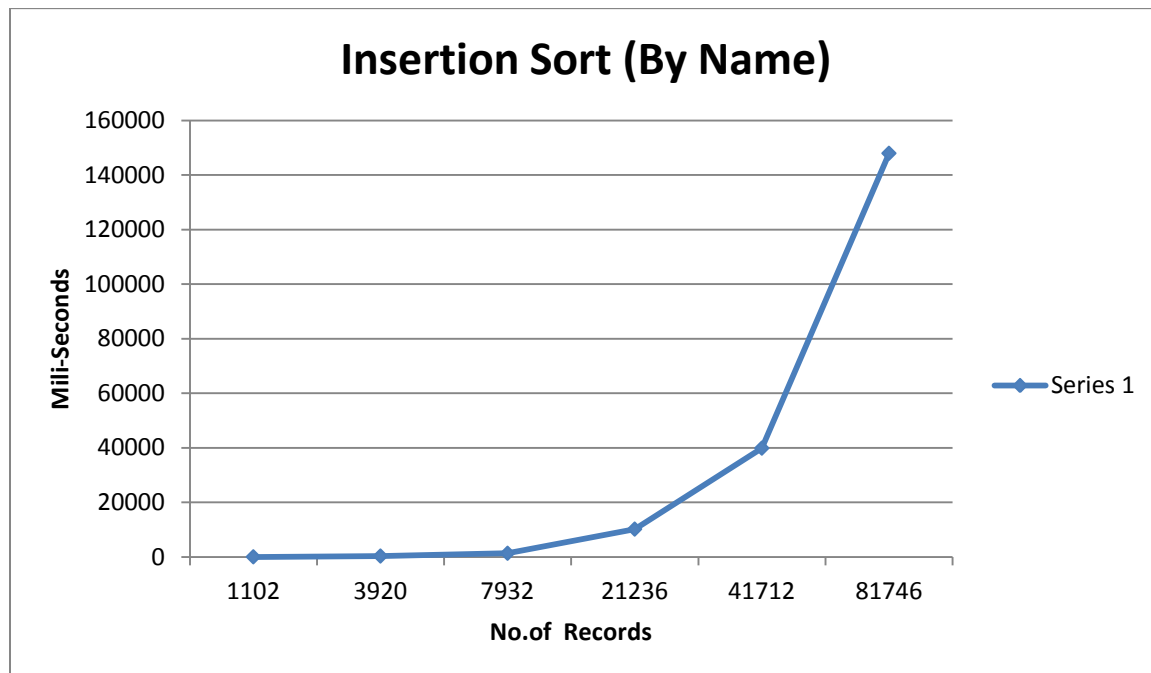
Merge-Sort Runs:-

Sr.no	State	No.of Records	Merge-Sort(Population)	Merge-Sort(Name)
1	Alabama	1102	0:2390020	0:2586069
			0:2408476	0:2582166
			0:2402474	0:2584678
			0:2379957	0:2650254
			0:2417267	0:2612425
2	California	3920	0:9036214	0:10080213
			0:9059356	0:10097654
			0:8995969	0:10037042
			0:9039448	0:10099159
			0:9145264	0:10089897
3	Idaho	7932	0:19090187	0:2175195
			0:19005819	0:21541376
			0:19216886	0:21774202
			0:19073673	0:201990914
			0:19023013	0:21581608
4	Iowa	21236	0:56845452	0:66489121
			0:57226294	0:68679058
			0:56538788	0:66522069
			0:56564502	0:67763848
			0:56387871	0:66112542
5	Missouri	41712	0:122532535	0:158886913
			0:119835156	0:149869637
			0:115862362	0:138534796
			0:120244458	0:152129671
			0:1178303998	0:145770049
6	POP	81746	0:237699264	0:292517689
			0:241223918	0:297892929
			0:239369095	0:292663086
			0:238690029	0:299205337
			0:244534651	0:295021448

MERGE-SORT (by Population)

Sr .no	State	No. of Records	Time (Mili-Seconds)
1	Alabama	1102	2.379957
2	California	3920	8.995969
3	Idaho	7932	19.005819
4	Iowa	21236	56.387871
5	Missouri	41712	115.862362
6	POP	81746	237.699264

Merge-Sort(By Population)
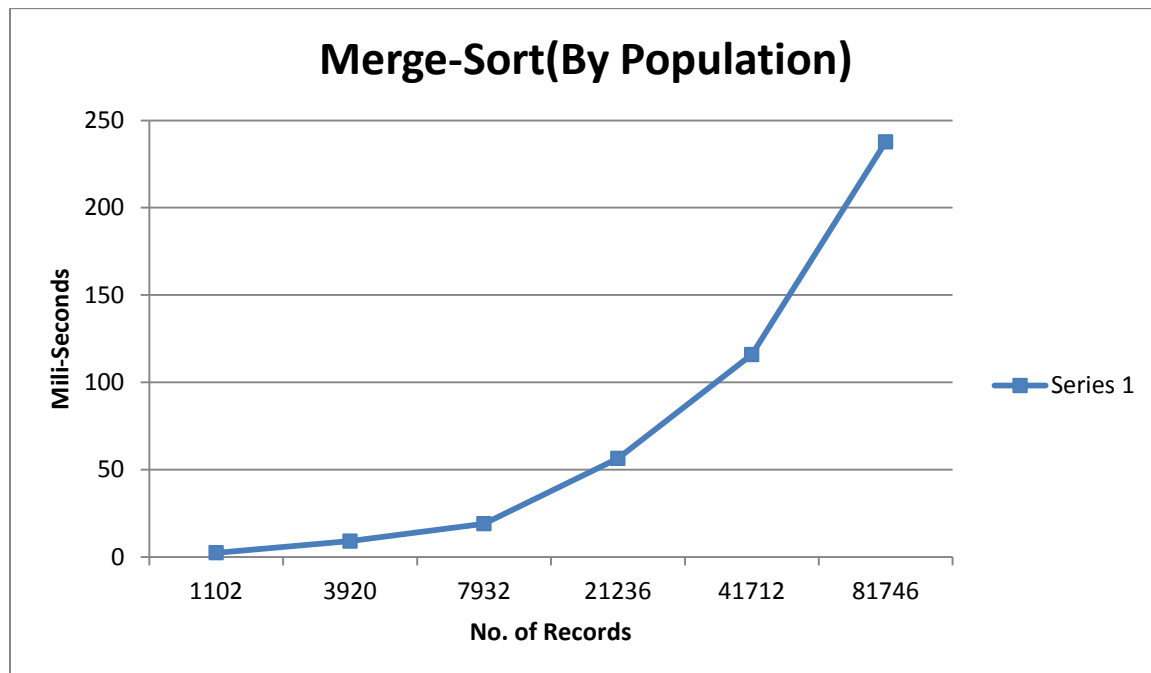
MERGE-SORT (by Name)

Sr .no	State	No. of Records	Time (Mili-Seconds)
1	Alabama	1102	2.582166
2	California	3920	10.037042
3	Idaho	7932	21.541276
4	Iowa	21236	66.112542
5	Missouri	41712	138.534796
6	POP	81746	292.517689
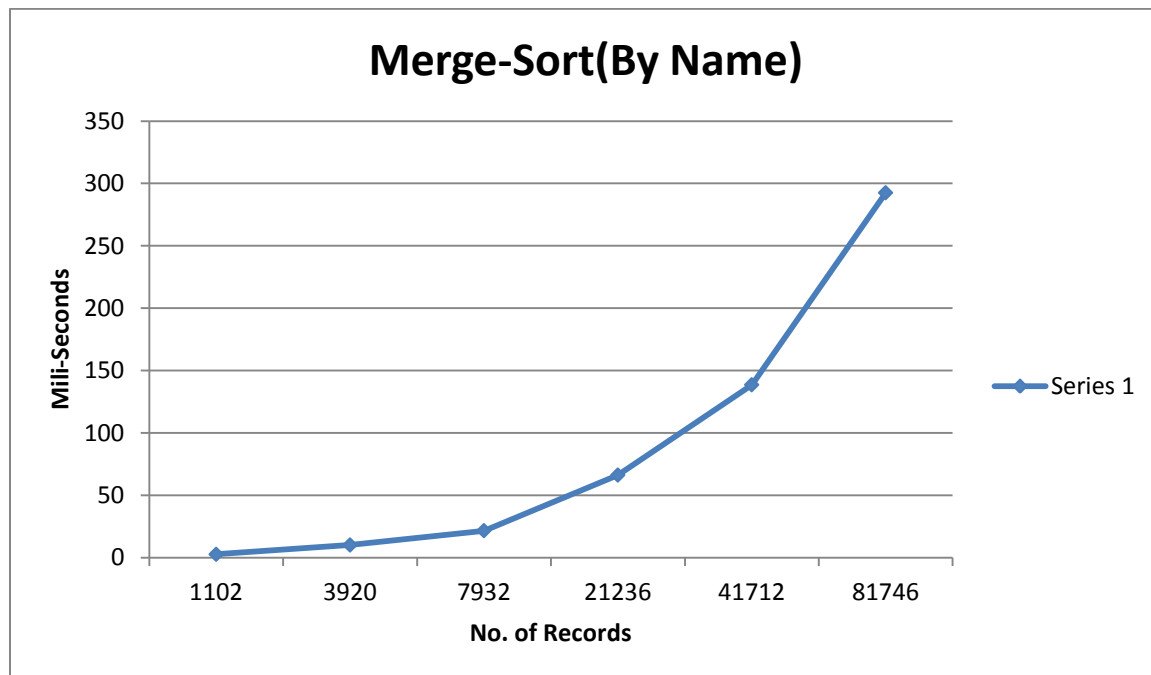
Quick Sort runs:-

Sr.no	State	No.of records	Quick-Sort(Population)	Quick-Sort(Name)
1	Alabama	1102	0:737980	0:1176847
			0:779820	0:1227664
			0:756893	0:1173719
			0:783297	0:1188170
			0:769985	0:1202297
2	California	3920	0:3739038	0:5101017
			0:3824848	0:5110044
			0:3907668	0:50536669
			0:3935692	0:5080220
			0:3895171	0:5036684
3	Idaho	7932	0:7445524	0:11097374
			0:7424745	0:121111262
			0:7170640	0:11907243
			0:7083207	0:12546385
			0:7296221	0:11324427
4	Iowa	21236	0:27236270	0:39971364
			0:26739968	0:37721813
			0:26746070	0:37049313
			0:27909983	0:38767689
			0:31721258	0:37698904
5	Missouri	41712	0:70824509	0:106322789
			0:75884578	0:99959123
			0:69158772	0:80749639
			0:73617167	0:86680643
			0:67680025	0:88282327

QUICK-SORT (by Population)

Sr .no	State	No. of Records	Time (Mili- Seconds)
1	Alabama	1102	0.73798
2	California	3920	3.739038
3	Idaho	7932	7.083207
4	Iowa	21236	26.739968
5	Missouri	41712	67.680025
6	POP	81746	170.765103

Quick-Sort (by population)
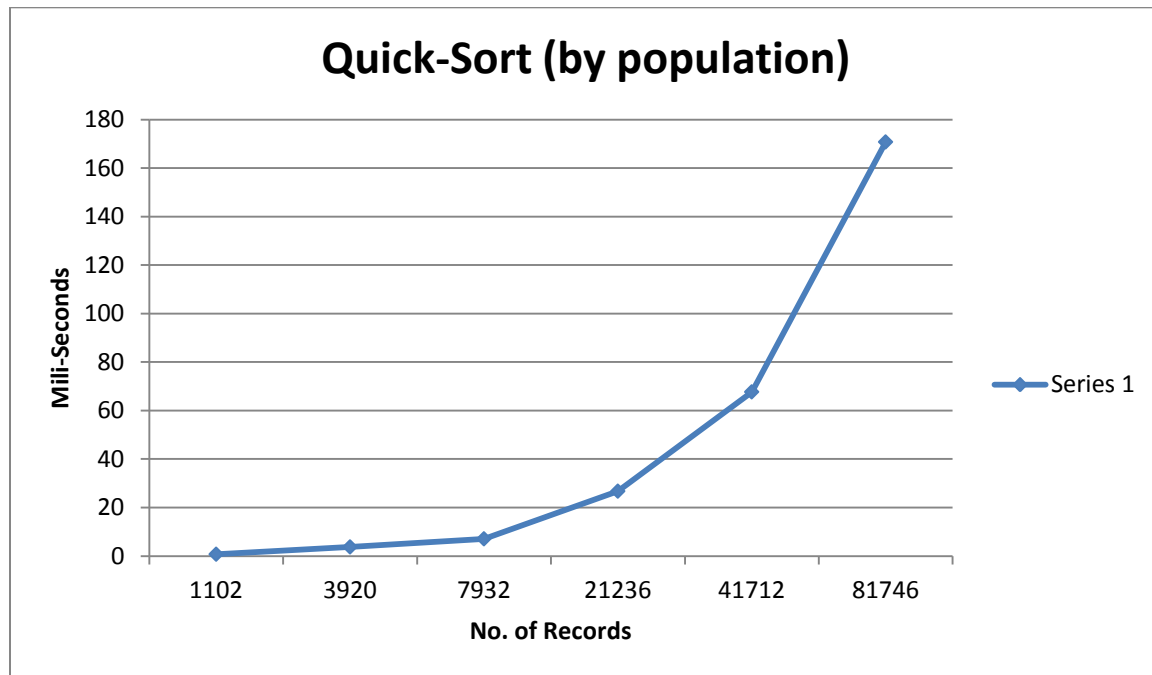
QUICK-SORT (by Name)

Sr .no	State		Time (Mili-Seconds)
1	Alabama	1102	1.173719
2	California	3920	5.036684
3	Idaho	7932	11.097374
4	Iowa	21236	37.049313
5	Missouri	41712	80.749639
6	POP	81746	184.792005
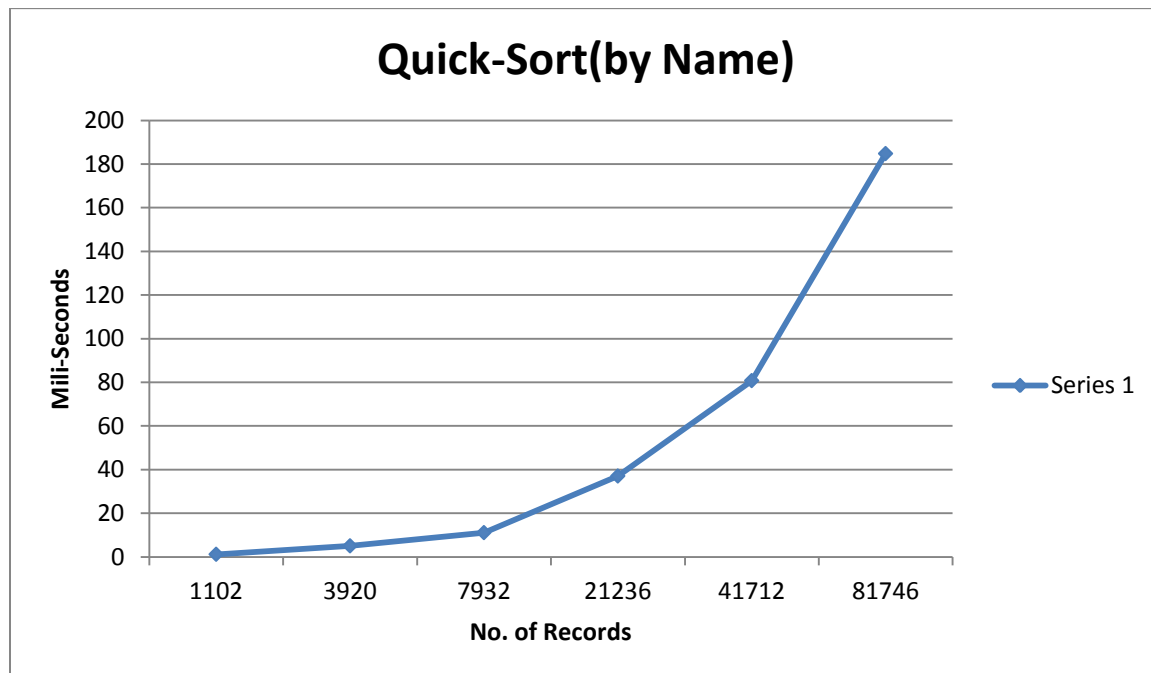
Conclusion:-

1.)Insertion Sort:-

- In the initial no. of records where the values are increasing slowly, we can see that it takes less time.
- But as the no. *of records increase steadily , there is a rapid increase in the time taken to sort.*
- Insertion Sort is not the best algorithm to be used among three given options.

2.)Merge-Sort:-

- There is always a steady increase in the curve with the increase in the no. of records.
- It gives better results than Insertion Sort.

3.)Quick Sort:-

- This is the fastest among all the Three sorting algorithms.
- Insertion Sort almost takes thrice the time of quick sort.