Assignment 5

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INFO6205 – Program Structures and Algorithms

Task:

- To implement a parallel sorting algorithm such that each partition of the array is sorted in parallel.

Conclusion:

After conducting experiments with various array sizes and a wide range of cutoff values, it was discovered that sorting the array takes less time when the cutoff value is near to half the array size.

Findings:

The experiment is carried out with four distinct huge array sizes and varied cut off values ranging from 20000 to 100000, as well as a variety of parallelism levels. The experiment values for each array size are listed below.

For each array size and cut off value the array is sorted 10 times and the time taken for ten time is displayed.

Degree of parallelism 2 Array Size = 2000000

cutoff : 20000	10times Time:1703ms
cutoff : 60000	10times Time:996ms
cutoff : 100000	10times Time:971ms
cutoff : 140000	10times Time:1420ms
cutoff : 180000	10times Time:1167ms
cutoff : 220000	10times Time:1213ms
cutoff : 260000	10times Time:1542ms
cutoff : 300000	10times Time:1252ms
cutoff : 340000	10times Time:1315ms
cutoff : 380000	10times Time:770ms
cutoff : 420000	10times Time:723ms
cutoff : 460000	10times Time:884ms
cutoff : 500000	10times Time:703ms
cutoff : 540000	10times Time:768ms
cutoff : 580000	10times Time:751ms
cutoff : 620000	10times Time:768ms
cutoff : 660000	10times Time:747ms
cutoff : 700000	10times Time:783ms
cutoff : 740000	10times Time:767ms

cutoff : 780000 10times Time:750ms

cutoff : 820000 10times Time:766ms

cutoff : 860000 10times Time:750ms

cutoff : 900000 10times Time:782ms

cutoff : 940000 10times Time:750ms

cutoff : 980000 10times Time:767ms

Degree of parallelism 2 Array Size = 2500000

cutoff : 20000 10times Time:1891ms

cutoff : 60000 10times Time:1197ms

cutoff : 100000 10times Time:1304ms

cutoff : 140000 10times Time:1420ms

cutoff : 180000 10times Time:1447ms

cutoff : 220000 10times Time:1595ms

cutoff : 260000 10times Time:1329ms

cutoff : 300000 10times Time:1060ms

cutoff : 340000 10times Time:878ms

cutoff : 380000 10times Time:894ms

cutoff : 420000 10times Time:1066ms

cutoff : 460000 10times Time:906ms

cutoff : 500000 10times Time:923ms

cutoff : 540000 10times Time:908ms

cutoff : 580000 10times Time:882ms

cutoff : 620000 10times Time:899ms

cutoff : 660000 10times Time:969ms

cutoff : 700000 10times Time:964ms

cutoff : 740000 10times Time:943ms

cutoff : 780000 10times Time:971ms

cutoff : 820000 10times Time:944ms

cutoff : 860000 10times Time:954ms

cutoff : 900000 10times Time:1000ms

cutoff : 940000 10times Time:954ms

cutoff : 980000 10times Time:953ms

Degree of parallelism 2 Array Size = 3000000

cutoff : 20000 10times Time:2652ms

cutoff : 60000 10times Time:1475ms

cutoff : 100000 10times Time:1763ms

cutoff : 140000 10times Time:1599ms

cutoff : 180000 10times Time:1805ms

cutoff : 220000 10times Time:1658ms

cutoff : 260000 10times Time:1779ms

cutoff : 300000 10times Time:1600ms

cutoff : 340000 10times Time:1546ms

cutoff : 380000 10times Time:1470ms

cutoff : 420000 10times Time:1572ms

cutoff : 460000 10times Time:1542ms

cutoff : 500000 10times Time:1482ms

cutoff : 540000 10times Time:1486ms

cutoff : 580000 10times Time:1497ms

cutoff : 620000 10times Time:1610ms

cutoff : 660000 10times Time:1649ms

cutoff : 700000 10times Time:1518ms

cutoff : 740000 10times Time:1437ms

cutoff : 780000 10times Time:1528ms

cutoff : 820000 10times Time:1550ms

cutoff : 860000 10times Time:1554ms

cutoff : 900000 10times Time:1529ms

cutoff : 940000 10times Time:1537ms

cutoff : 980000 10times Time:1554ms

Degree of parallelism 2 **Array Size = 3500000**

cutoff : 20000 10times Time:2789ms

cutoff : 60000 10times Time:1825ms

cutoff : 100000 10times Time:1938ms

cutoff : 140000 10times Time:2281ms

cutoff : 180000 10times Time:1569ms

cutoff : 220000 10times Time:1392ms

cutoff : 260000 10times Time:1178ms

cutoff : 300000 10times Time:1413ms

cutoff : 340000 10times Time:1212ms

cutoff : 380000 10times Time:1214ms

cutoff : 420000 10times Time:1218ms

cutoff : 460000 10times Time:1319ms

cutoff : 500000 10times Time:1338ms

cutoff : 540000 10times Time:1319ms

cutoff : 580000 10times Time:1361ms

cutoff : 620000 10times Time:1349ms

cutoff : 660000 10times Time:1316ms

cutoff : 700000 10times Time:1337ms

cutoff : 740000 10times Time:1317ms

cutoff : 780000 10times Time:1351ms

cutoff : 820000 10times Time:1287ms

cutoff : 860000 10times Time:1271ms

cutoff : 900000 10times Time:1358ms

cutoff : 940000 10times Time:1376ms

cutoff : 980000 10times Time:1705ms

Degree of parallelism 4 Array Size = 2000000

cutoff : 20000 10times Time:1799ms

cutoff : 60000 10times Time:942ms

cutoff : 100000 10times Time:967ms

cutoff : 140000 10times Time:1172ms

cutoff : 180000 10times Time:1118ms

cutoff : 220000 10times Time:1022ms

cutoff : 260000 10times Time:1260ms

cutoff : 300000 10times Time:1083ms

cutoff : 340000 10times Time:1018ms

cutoff : 380000 10times Time:1146ms

cutoff : 420000 10times Time:895ms

cutoff : 460000 10times Time:882ms

cutoff : 500000 10times Time:1163ms

cutoff : 540000 10times Time:834ms

cutoff : 580000 10times Time:847ms

cutoff : 620000 10times Time:853ms

cutoff : 660000 10times Time:824ms

cutoff : 700000 10times Time:849ms

cutoff : 740000 10times Time:826ms

cutoff : 780000 10times Time:818ms

cutoff : 820000 10times Time:853ms

cutoff : 860000 10times Time:861ms

cutoff : 900000 10times Time:1008ms

cutoff : 940000 10times Time:962ms

cutoff : 980000 10times Time:917ms

Degree of parallelism 4 **Array Size = 2500000**

cutoff : 20000 10times Time:2389ms

cutoff : 60000 10times Time:1130ms

cutoff : 100000 10times Time:1152ms

cutoff : 140000 10times Time:1507ms

cutoff : 180000 10times Time:1368ms

cutoff : 220000 10times Time:1488ms

cutoff : 260000 10times Time:949ms

cutoff : 300000 10times Time:888ms

cutoff : 340000 10times Time:817ms

cutoff : 380000 10times Time:840ms

cutoff : 420000 10times Time:923ms

cutoff : 460000 10times Time:946ms

cutoff : 500000 10times Time:852ms

cutoff : 540000 10times Time:885ms

cutoff : 580000 10times Time:850ms

cutoff : 620000 10times Time:848ms

cutoff : 660000 10times Time:802ms

cutoff : 700000 10times Time:816ms

cutoff : 740000 10times Time:783ms

cutoff : 780000 10times Time:796ms

cutoff : 820000 10times Time:779ms

cutoff : 860000 10times Time:782ms

cutoff : 900000 10times Time:765ms

cutoff : 940000 10times Time:769ms

cutoff : 980000 10times Time:752ms

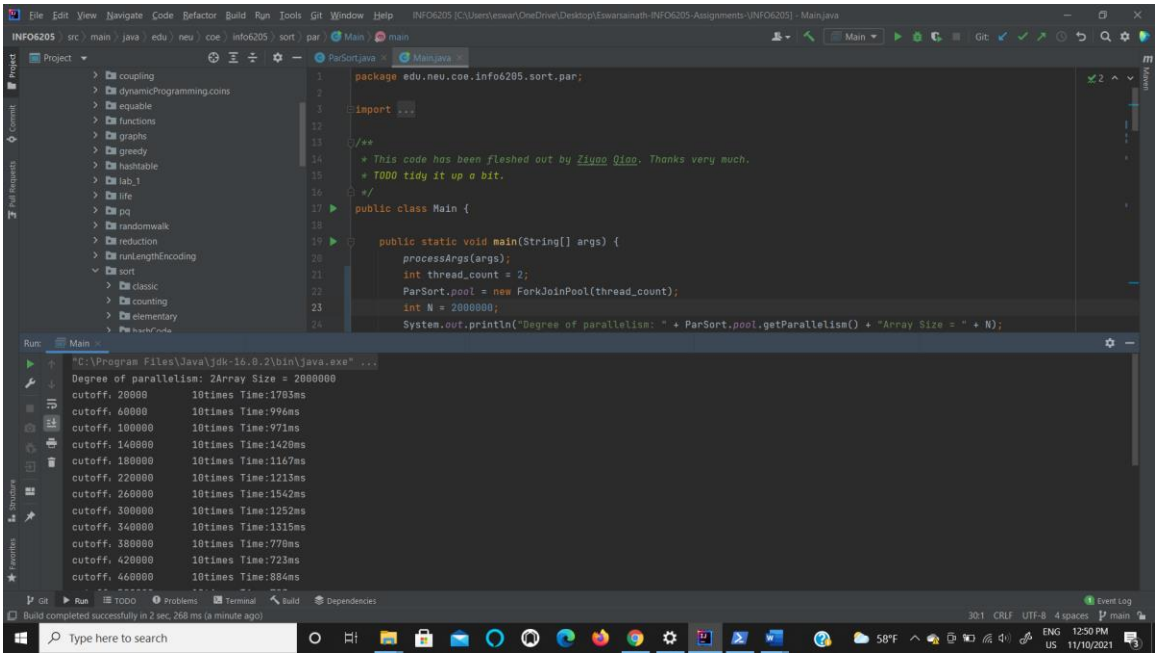
Degree of parallelism 4	**Array Size = 3000000**
cutoff : 20000	10times Time:2532ms
cutoff : 60000	10times Time:1393ms
cutoff : 100000	10times Time:1668ms
cutoff : 140000	10times Time:1642ms
cutoff : 180000	10times Time:1774ms
cutoff : 220000	10times Time:1471ms
cutoff : 260000	10times Time:1617ms
cutoff : 300000	10times Time:1322ms
cutoff : 340000	10times Time:1545ms
cutoff : 380000	10times Time:1925ms
cutoff : 420000	10times Time:1678ms
cutoff : 460000	10times Time:1576ms
cutoff : 500000	10times Time:1598ms
cutoff : 540000	10times Time:1645ms
cutoff : 580000	10times Time:1889ms
cutoff : 620000	10times Time:1520ms
cutoff : 660000	10times Time:1681ms
cutoff : 700000	10times Time:1489ms
cutoff : 740000	10times Time:1486ms
cutoff : 780000	10times Time:1480ms
cutoff : 820000	10times Time:1555ms
cutoff : 860000	10times Time:1543ms
cutoff : 900000	10times Time:1435ms
cutoff : 940000	10times Time:1293ms
cutoff : 980000	10times Time:1278ms

Degree of parallelism 4	**Array Size = 3500000**
cutoff : 20000	10times Time:3039ms
cutoff : 60000	10times Time:1756ms
cutoff : 100000	10times Time:1886ms
cutoff : 140000	10times Time:2154ms
cutoff : 180000	10times Time:1834ms
cutoff : 220000	10times Time:1532ms
cutoff : 260000	10times Time:1087ms
cutoff : 300000	10times Time:1023ms
cutoff : 340000	10times Time:1139ms
cutoff : 380000	10times Time:1062ms
cutoff : 420000	10times Time:1040ms
cutoff : 460000	10times Time:1061ms
cutoff : 500000	10times Time:1064ms
cutoff : 540000	10times Time:1087ms
cutoff : 580000	10times Time:1061ms
cutoff : 620000	10times Time:1079ms
cutoff : 660000	10times Time:1094ms
cutoff : 700000	10times Time:1064ms
cutoff : 740000	10times Time:1067ms
cutoff : 780000	10times Time:1080ms
cutoff : 820000	10times Time:1081ms
cutoff : 860000	10times Time:1083ms
cutoff : 900000	10times Time:1016ms
cutoff : 940000	10times Time:1039ms

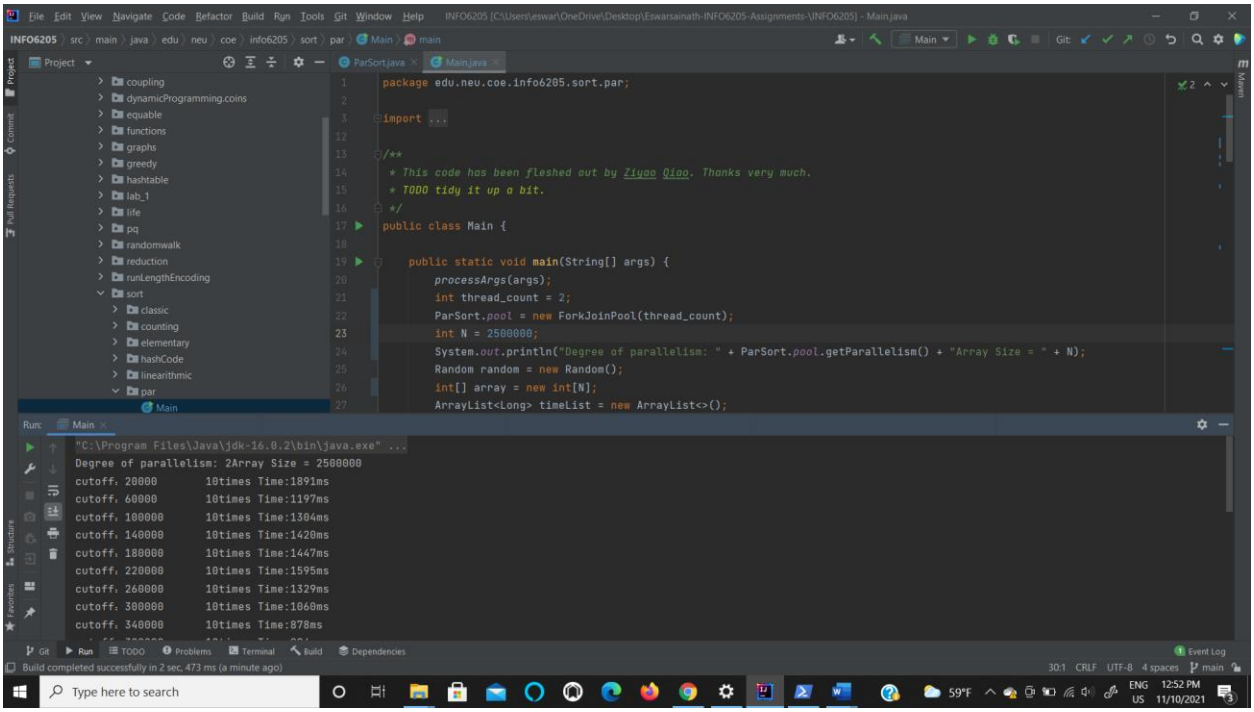
cutoff：980000　　10times Time:1086ms

Output Screenshot:

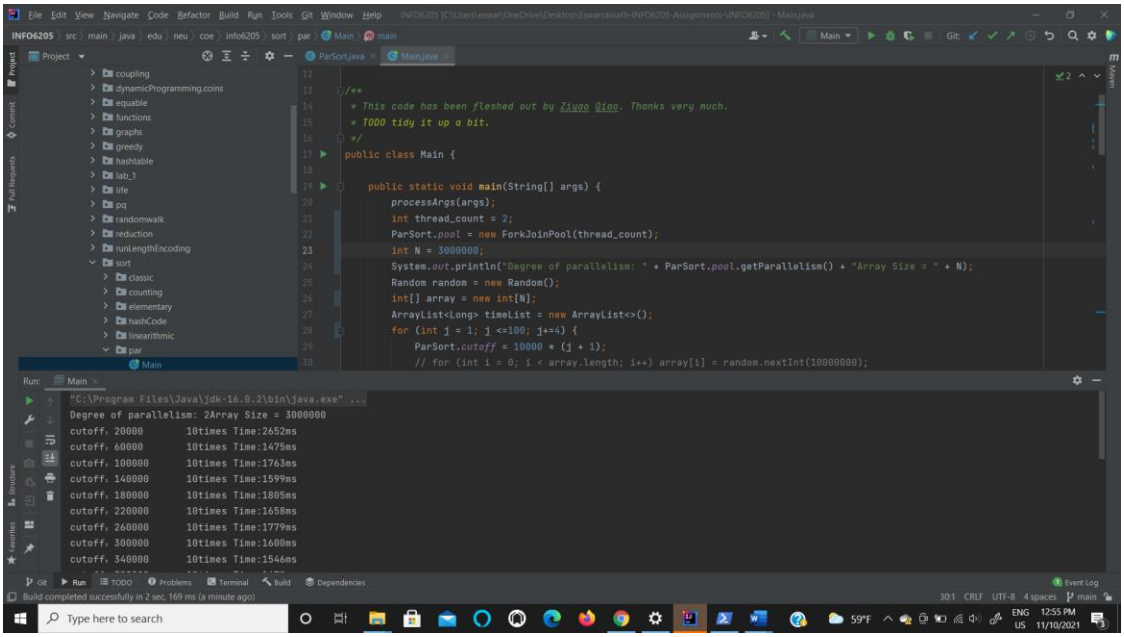
Degree of parallelism 2　　Array Size = 2000000



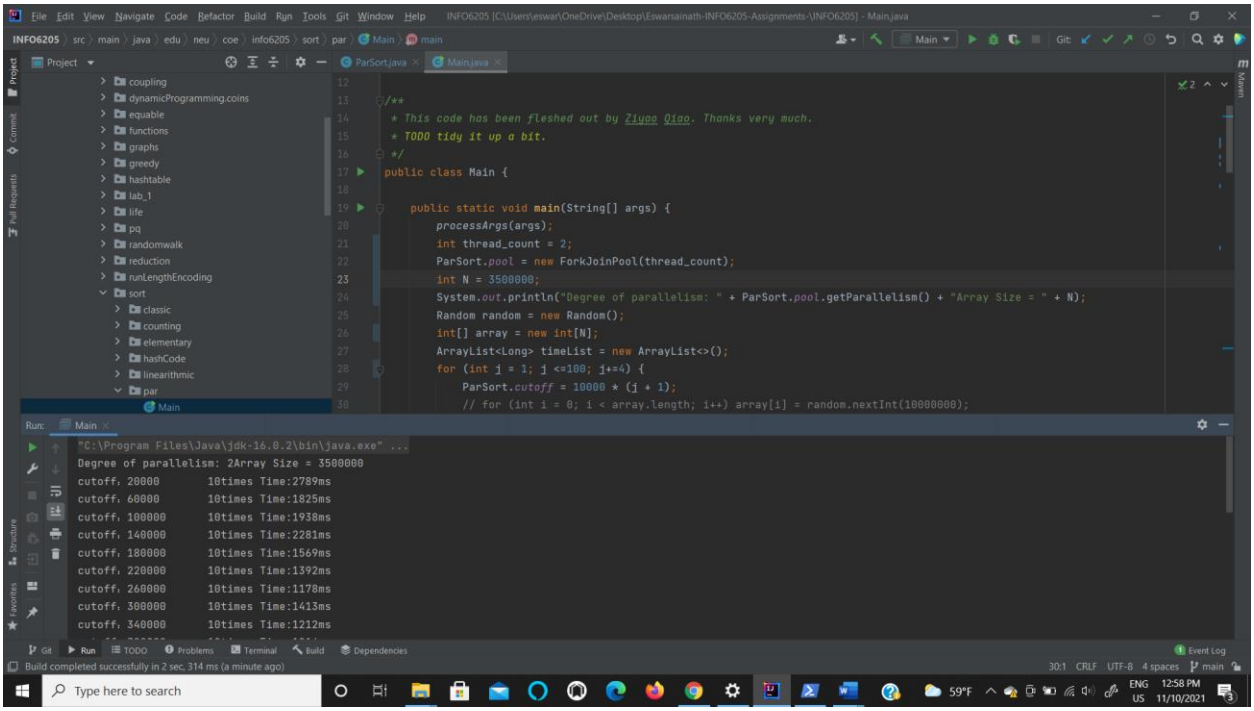
Degree of parallelism 2 Array Size = 2500000



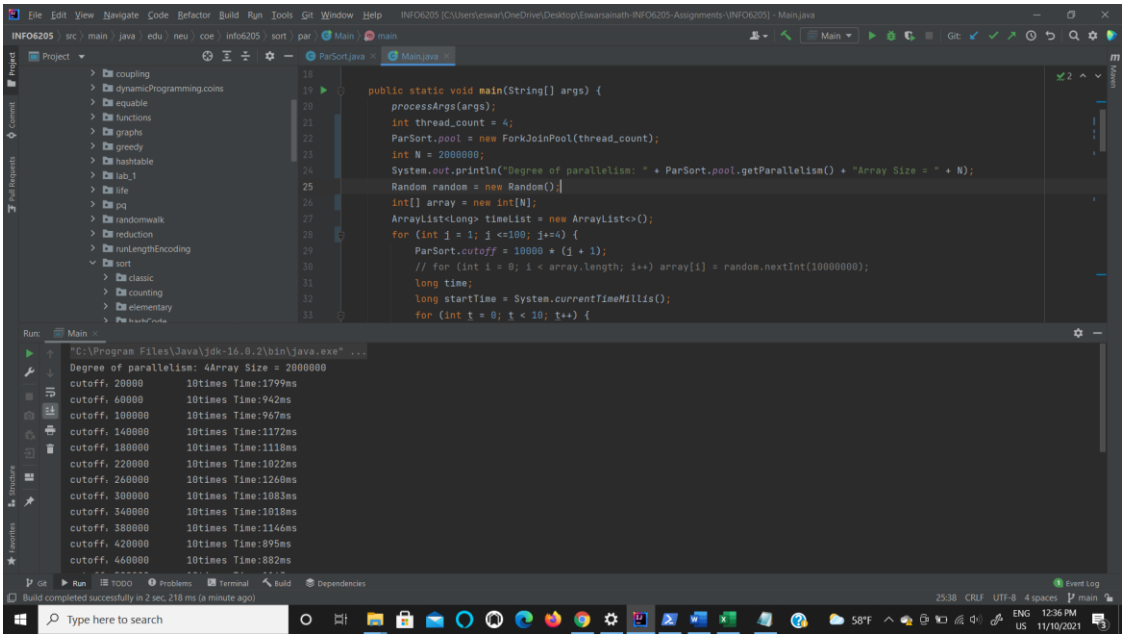
Degree of parallelism 2 Array Size = 3000000



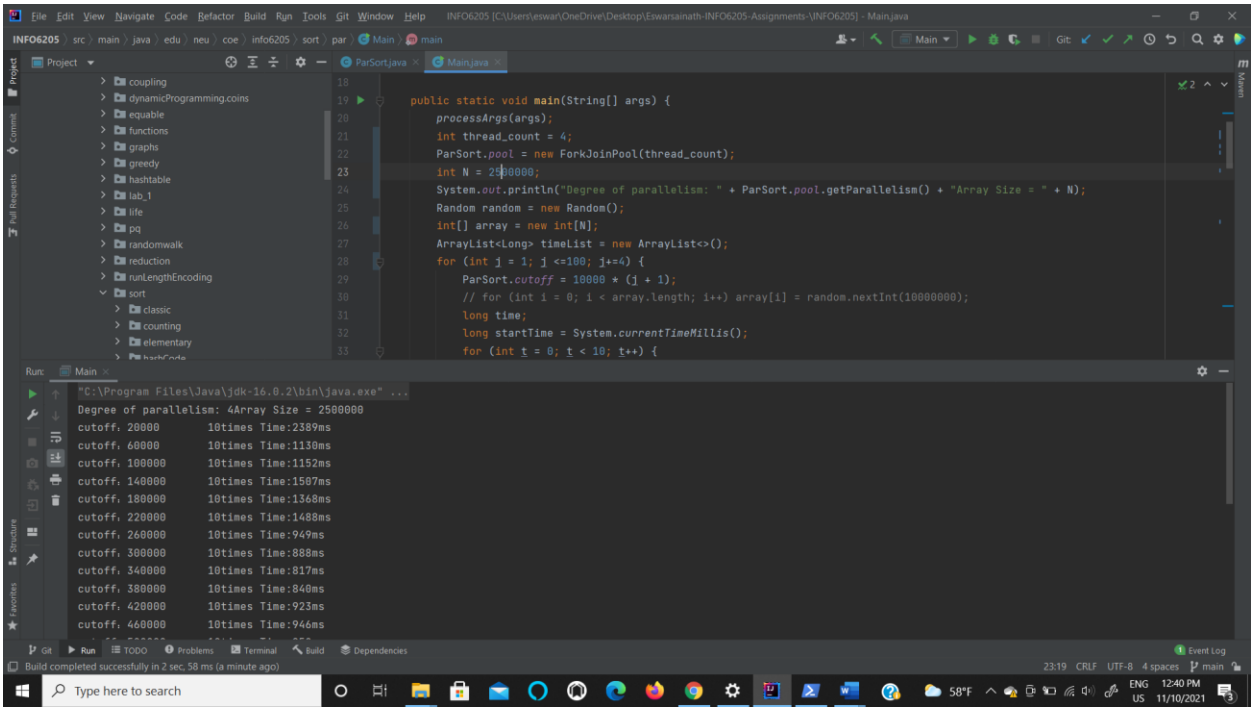
Degree of parallelism 2 Array Size = 3500000



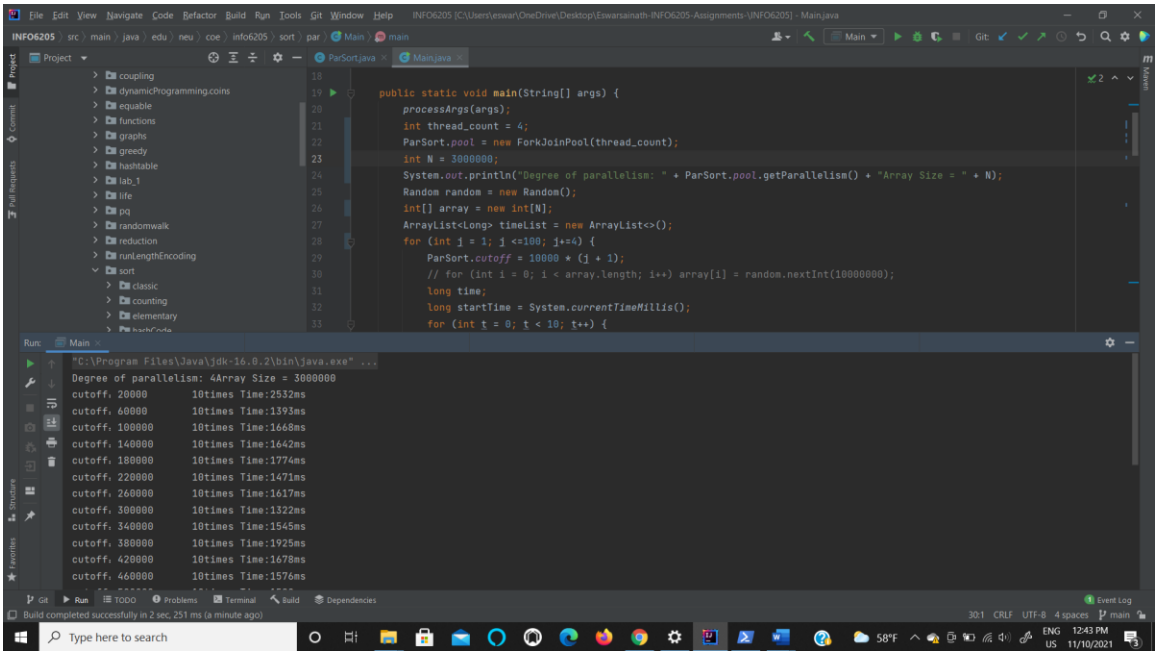
Degree of parallelism 4 Array Size = 2000000



Degree of parallelism 4 Array Size = 2500000



Degree of parallelism 4 Array Size = 3000000



Degree of parallelism 4 Array Size = 3500000