Program Structures & Algorithms

Spring 2022

Assignment No. 4

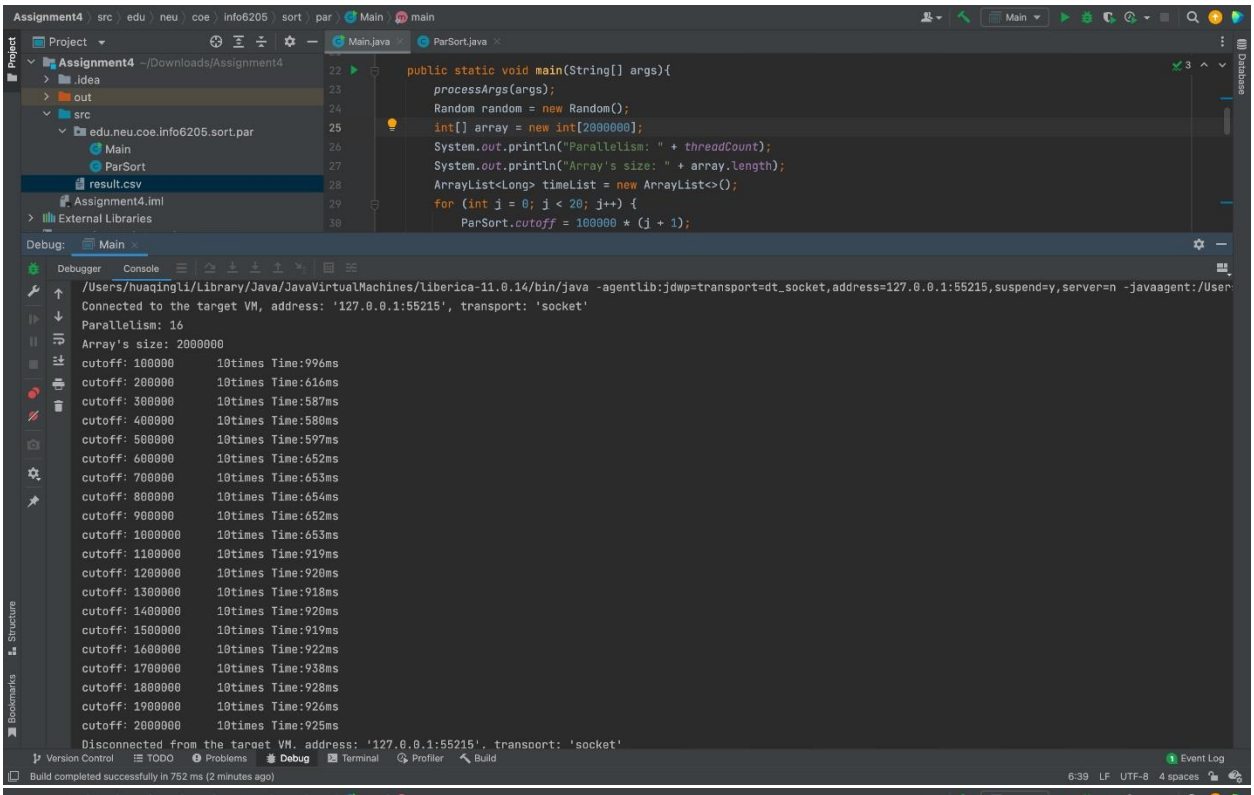
Name: Huajie LI

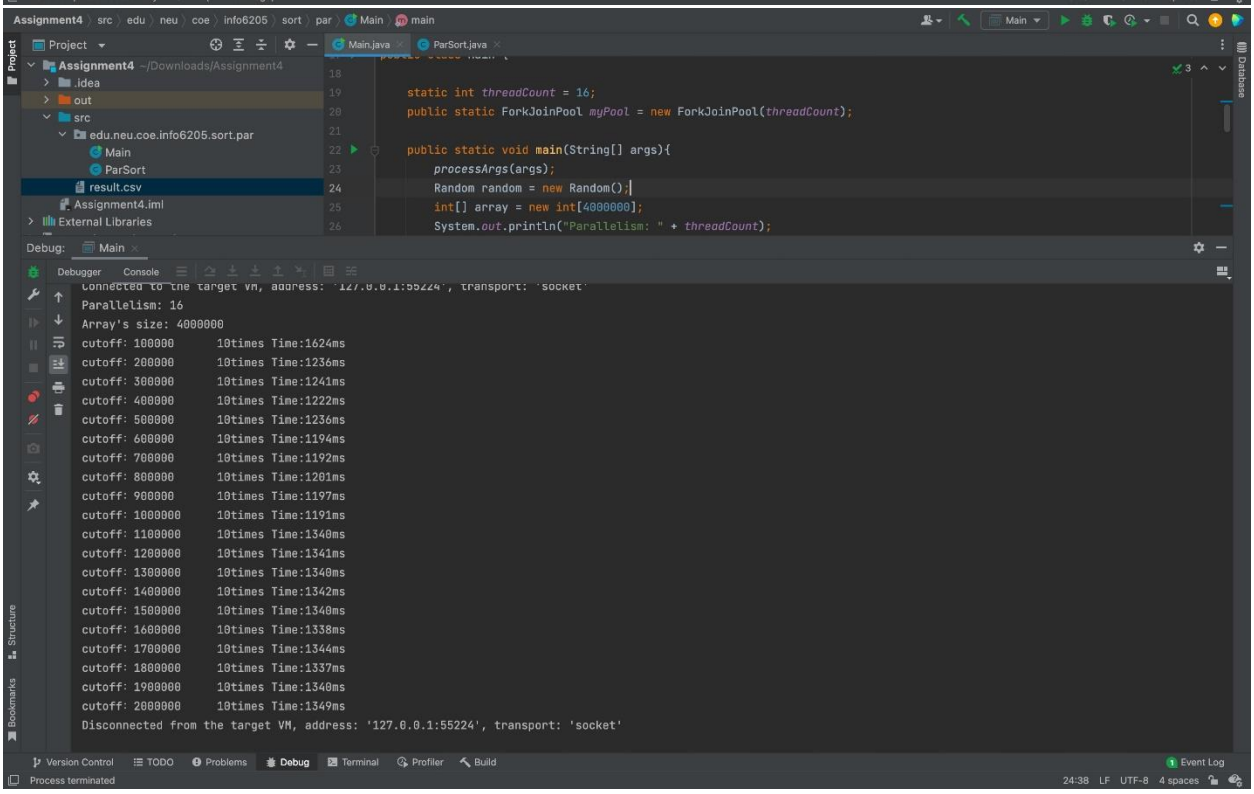
(NUID): 002989082

- **Task**

  No test for this assignment.

- **Output screenshot**


Assignment4 src edu neu coe info6205 sort par Main main
Main
Project
Assignment4 ~/Downloads/Assignment4
.idea
out
src
edu.neu.coe.info6205.sort.par
Main
ParSort
result.csv
Assignment4.iml
External Libraries
Main.java
ParSort.java
public static void main(String[] args){
processArgs(args);
Random random = new Random();
int[] array = new int[2000000];
System.out.println("Parallelism: " + threadCount);
System.out.println("Array's size: " + array.length);
ArrayList<Long> timeList = new ArrayList<>();
for (int j = 0; j < 20; j++) {
ParSort.cutoff = 100000 * (j + 1);
Debug: Main
Debugger
Console
/Users/huaqingli/Library/Java/JavaVirtualMachines/liberica-11.0.14/bin/java -agentlib:jdwp=transport=dt_socket,address=127.0.0.1:55215,suspend=y,server=n -javaagent:/User
Connected to the target VM, address: '127.0.0.1:55215', transport: 'socket'
Parallelism: 16
Array's size: 2000000
cutoff: 100000 10times Time:996ms
cutoff: 200000 10times Time:616ms
cutoff: 300000 10times Time:587ms
cutoff: 400000 10times Time:580ms
cutoff: 500000 10times Time:597ms
cutoff: 600000 10times Time:652ms
cutoff: 700000 10times Time:653ms
cutoff: 800000 10times Time:654ms
cutoff: 900000 10times Time:652ms
cutoff: 1000000 10times Time:653ms
cutoff: 1100000 10times Time:919ms
cutoff: 1200000 10times Time:920ms
cutoff: 1300000 10times Time:918ms
cutoff: 1400000 10times Time:920ms
cutoff: 1500000 10times Time:919ms
cutoff: 1600000 10times Time:922ms
cutoff: 1700000 10times Time:938ms
cutoff: 1800000 10times Time:928ms
cutoff: 1900000 10times Time:926ms
cutoff: 2000000 10times Time:925ms
Disconnected from the target VM, address: '127.0.0.1:55215', transport: 'socket'
Version Control
TODO
Problems
Debug
Terminal
Profiler
Build
Event Log
Build completed successfully in 752 ms (2 minutes ago)
6:39 LF UTF-8 4 spaces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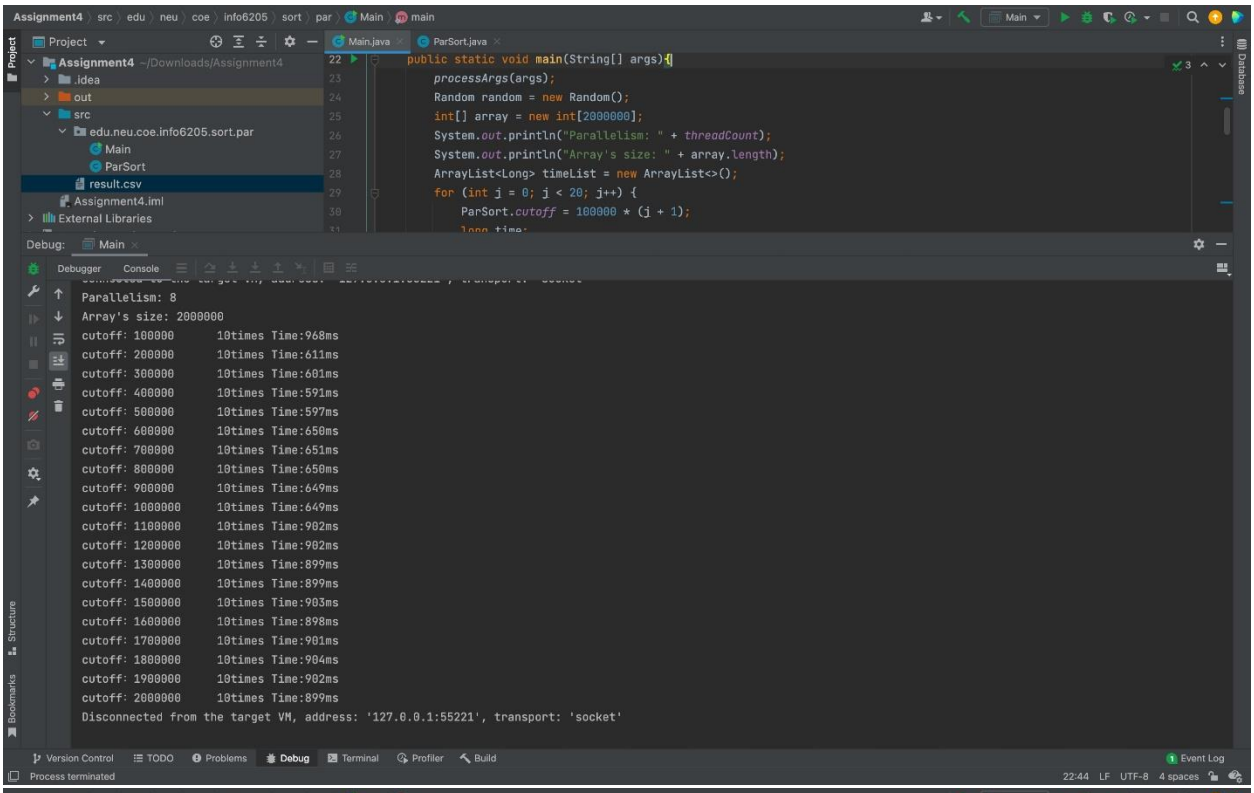
Main
ParSort
result.csv
Assignment4.iml
External Libraries
Main.java
ParSort.java
static int threadCount = 16;
public static ForkJoinPool myPool = new ForkJoinPool(threadCount);
public static void main(String[] args){
processArgs(args);
Random random = new Random();
int[] array = new int[4000000];
System.out.println("Parallelism: " + threadCount);
Debug: Main
Debugger
Console
Parallelism: 16
Array's size: 4000000
cutoff: 100000 10times Time:1624ms
cutoff: 200000 10times Time:1236ms
cutoff: 300000 10times Time:1241ms
cutoff: 400000 10times Time:1222ms
cutoff: 500000 10times Time:1236ms
cutoff: 600000 10times Time:1194ms
cutoff: 700000 10times Time:1192ms
cutoff: 800000 10times Time:1201ms
cutoff: 900000 10times Time:1197ms
cutoff: 1000000 10times Time:1191ms
cutoff: 1100000 10times Time:1340ms
cutoff: 1200000 10times Time:1341ms
cutoff: 1300000 10times Time:1340ms
cutoff: 1400000 10times Time:1342ms
cutoff: 1500000 10times Time:1340ms
cutoff: 1600000 10times Time:1338ms
cutoff: 1700000 10times Time:1344ms
cutoff: 1800000 10times Time:1337ms
cutoff: 1900000 10times Time:1340ms
cutoff: 2000000 10times Time:1349ms
Disconnected from the target VM, address: '127.0.0.1:55224', transport: 'socket'
Version Control
TODO
Problems
Debug
Terminal
Profiler
Build
Event Log
Process terminated
24:38 LF UTF-8 4 spaces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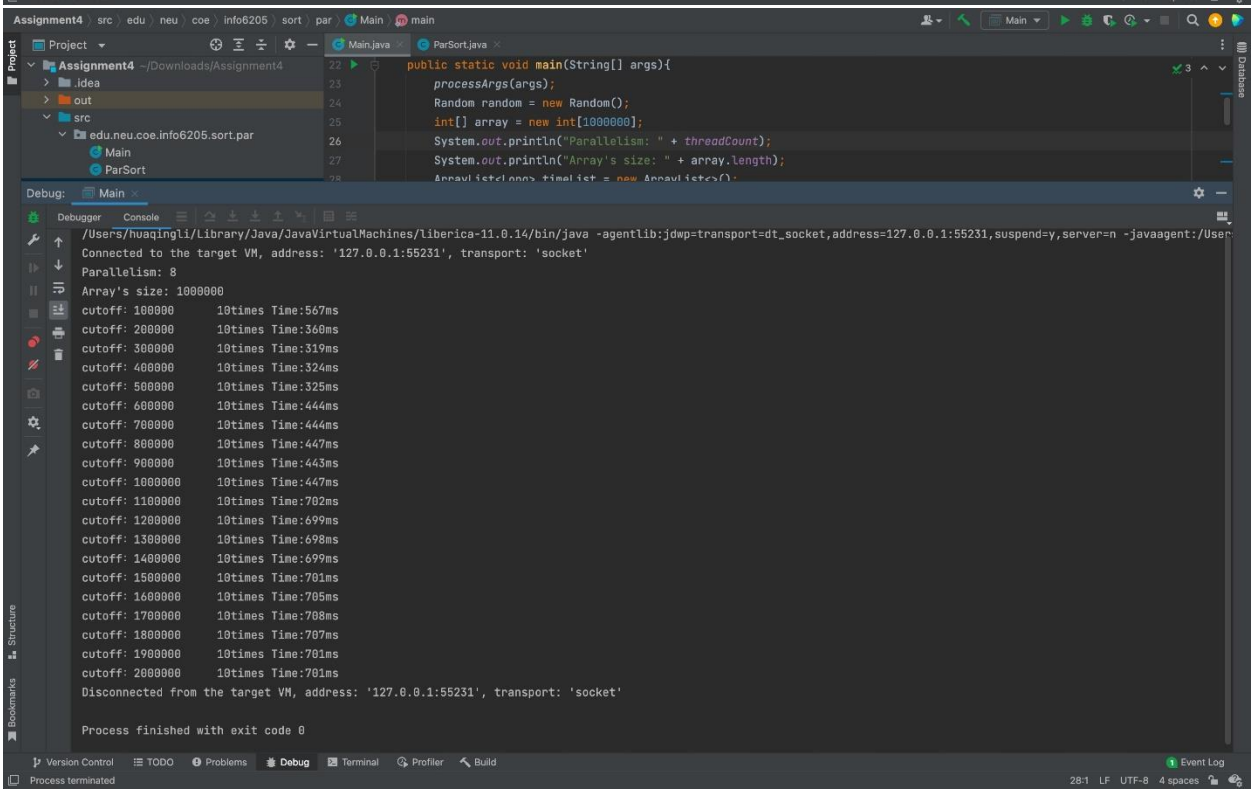
.idea
out
src
edu.neu.coe.info6205.sort.par
Main
ParSort
result.csv
Assignment4.iml
External Libraries
Main.java
ParSort.java
public static void main(String[] args){
processArgs(args);
Random random = new Random();
int[] array = new int[2000000];
System.out.println("Parallelism: " + threadCount);
System.out.println("Array's size: " + array.length);
ArrayList<Long> timeList = new ArrayList<>();
for (int j = 0; j < 20; j++) {
ParSort.cutoff = 100000 * (j + 1);
Debug: Main
Debugger
Console
Parallelism: 8
Array's size: 2000000
cutoff: 100000 10times Time:968ms
cutoff: 200000 10times Time:611ms
cutoff: 300000 10times Time:601ms
cutoff: 400000 10times Time:591ms
cutoff: 500000 10times Time:597ms
cutoff: 600000 10times Time:650ms
cutoff: 700000 10times Time:651ms
cutoff: 800000 10times Time:650ms
cutoff: 900000 10times Time:649ms
cutoff: 1000000 10times Time:649ms
cutoff: 1100000 10times Time:902ms
cutoff: 1200000 10times Time:902ms
cutoff: 1300000 10times Time:899ms
cutoff: 1400000 10times Time:899ms
cutoff: 1500000 10times Time:903ms
cutoff: 1600000 10times Time:898ms
cutoff: 1700000 10times Time:901ms
cutoff: 1800000 10times Time:904ms
cutoff: 1900000 10times Time:902ms
cutoff: 2000000 10times Time:899ms
Disconnected from the target VM, address: '127.0.0.1:55221', transport: 'socket'
Version Control
TODO
Problems
Debug
Terminal
Profiler
Build
Event Log
Process terminated
22:44 LF UTF-8 4 spaces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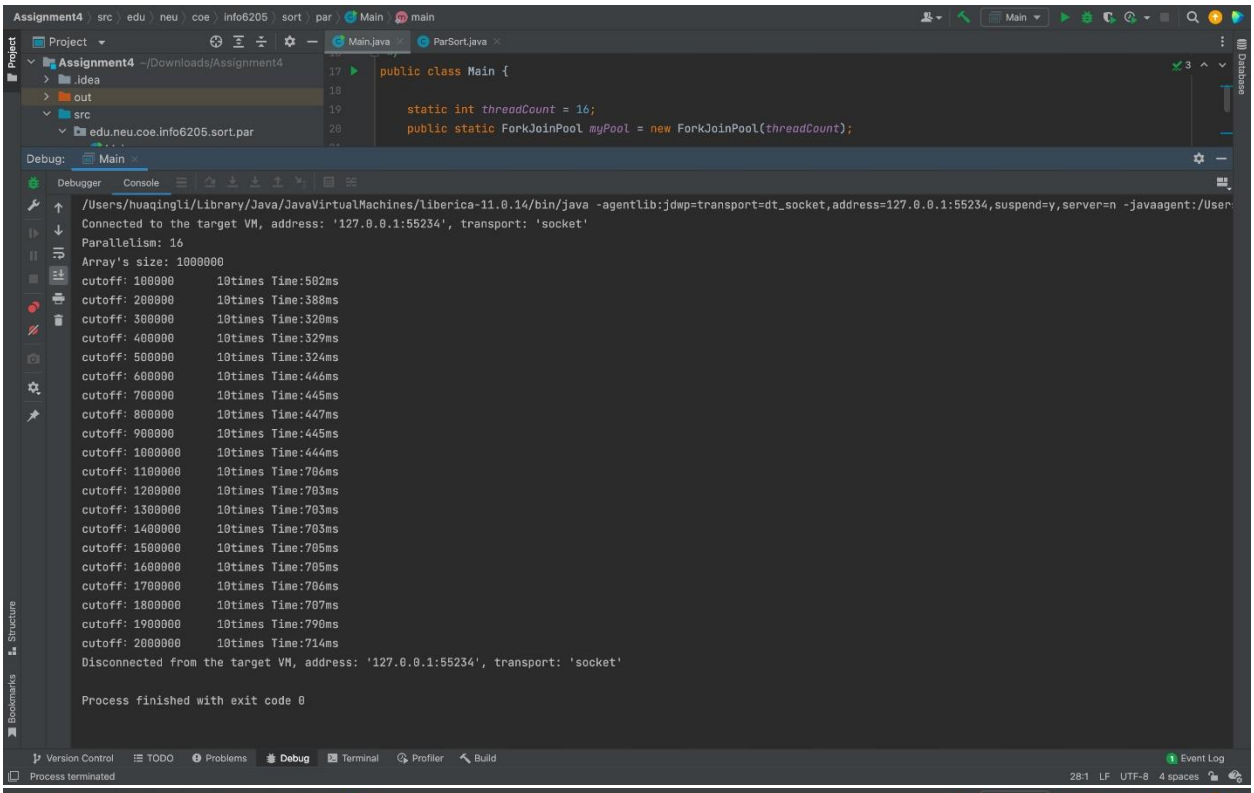
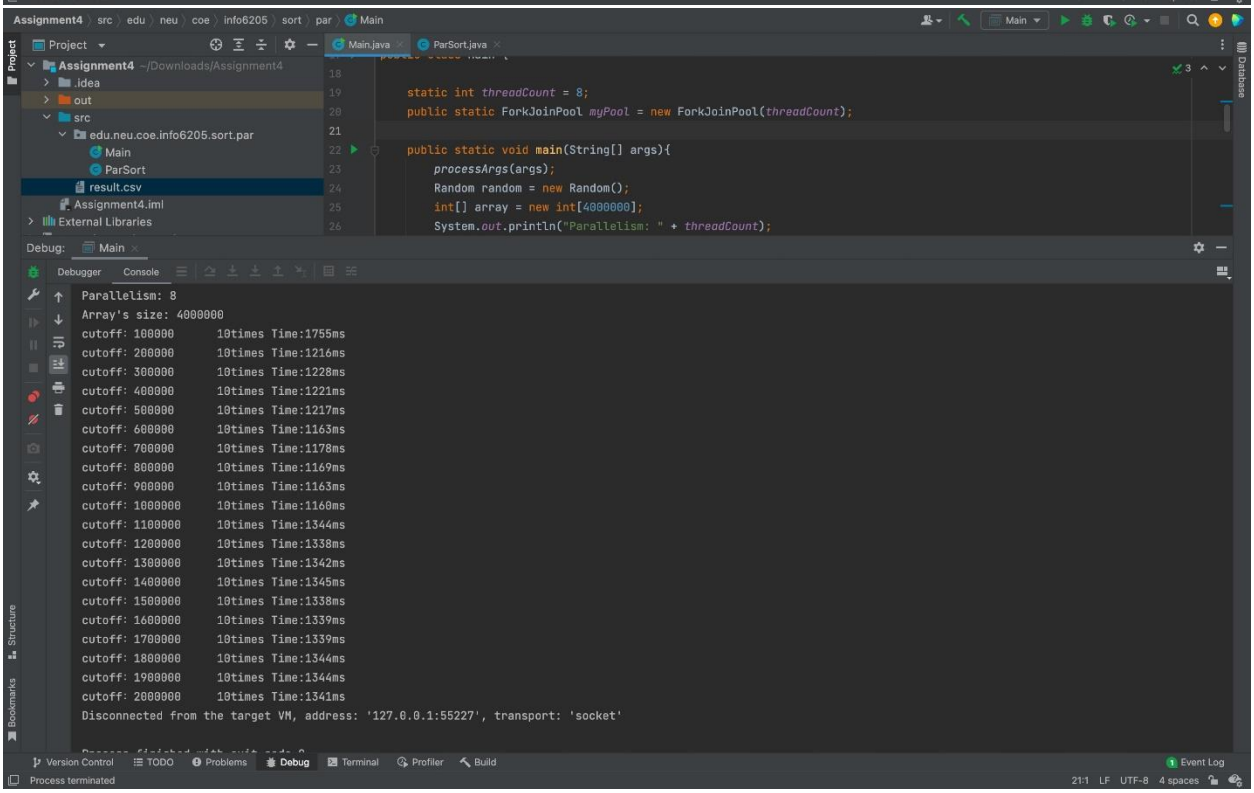
Main
Project
Assignment4 ~/Downloads/Assignment4
.idea
out
src
edu.neu.coe.info6205.sort.par
Main
ParSort
Main.java
ParSort.java
public static void main(String[] args){
processArgs(args);
Random random = new Random();
int[] array = new int[1000000];
System.out.println("Parallelism: " + threadCount);
System.out.println("Array's size: " + array.length);
Debug: Main
Debugger
Console
/Users/huaqingli/Library/Java/JavaVirtualMachines/liberica-11.0.14/bin/java -agentlib:jdwp=transport=dt_socket,address=127.0.0.1:55231,suspend=y,server=n -javaagent:/User
Connected to the target VM, address: '127.0.0.1:55231', transport: 'socket'
Parallelism: 8
Array's size: 1000000
cutoff: 100000 10times Time:567ms
cutoff: 200000 10times Time:360ms
cutoff: 300000 10times Time:319ms
cutoff: 400000 10times Time:324ms
cutoff: 500000 10times Time:325ms
cutoff: 600000 10times Time:444ms
cutoff: 700000 10times Time:444ms
cutoff: 800000 10times Time:447ms
cutoff: 900000 10times Time:443ms
cutoff: 1000000 10times Time:447ms
cutoff: 1100000 10times Time:702ms
cutoff: 1200000 10times Time:699ms
cutoff: 1300000 10times Time:698ms
cutoff: 1400000 10times Time:699ms
cutoff: 1500000 10times Time:701ms
cutoff: 1600000 10times Time:705ms
cutoff: 1700000 10times Time:708ms
cutoff: 1800000 10times Time:707ms
cutoff: 1900000 10times Time:701ms
cutoff: 2000000 10times Time:701ms
Disconnected from the target VM, address: '127.0.0.1:55231', transport: 'socket'
Process finished with exit code 0
Version Control
TODO
Problems
Debug
Terminal
Profiler
Build
Event Log
Process terminated
28:1 LF UTF-8 4 spaces





- **Relationship Conclusion**

1.The change of threads' num might won't affect the results.(My cpu is M1)
2. The screenshot above. With the increase of cutoff, the time for sorting would decrease then increase a a little bit.
3. The size of array. The larger the size, the more time for sorting

- **Evidence / Graph**
  The screenshots above.

- **Unit tests result**
  No test for this assignment.