Analysis of three-dimensional star data from MilkyWay galaxy

Salsa version: 1.1.5

1. There is 3 programs under \assignment2:
   Manager.salsa
   Worker.salsa
   ResultContainer.java

2. How to compile/run the program

   Compiling:

   Linux:

```
export PATH=$PATH:/projects/wcl/software/bin
salsac assignment2/Worker
salsac assignment2/Manager
```

   Windows:

```
salsac assignment2\Worker
salsac assignment2\Manager
```

   Running:

   2.1 Concurrent Mode

   Windows:

```
java -cp c:\salsa\bin\salsa1.1.5.jar;.  assignment2.Manager 5
assignment2\stars_9_xyz.txt
```

   Linux:

```
export PATH=$PATH:/projects/wcl/software/bin
java -cp /projects/wcl/software/salsa1.1.5/salsa1.1.5.jar:. assignment2.Manager
5 assignment2/stars_9_xyz.txt
```

   where "5" and "assignment2\stars_9_xyz.txt" are two arguments passed into the program:
   5 --- Number of Workers
   assignment2/stars_9_xyz.txt --- Input file (the star file)

   2.2 Distributed Mode

   Windows:

```
java -cp c:\salsa\bin\salsa1.1.5.jar;.  assignment2.Manager 5
assignment2\stars_9_xyz.txt assignment2\theaters.txt 192.168.1.63:3030
```

   Linux:

```
export PATH=$PATH:/projects/wcl/software/bin
java -cp /projects/wcl/software/salsa1.1.5/salsa1.1.5.jar:. assignment2.Manager
5 assignment2/stars_9_xyz.txt assignment2/theaters.txt 129.161.134.20:3030
```

   Where "5", "assignment2\stars_9_xyz.txt", "assignment2/theaters.txt", and "129.161.134.20:3030" are four arguments passed into the program:
   5 --- Number of Workers
   assignment2/stars_9_xyz.txt --- Input file (the star file)
   assignment2/theaters.txt --- The configuration file containing theaters
   129.161.134.20:3030 --- The Name Server

3. Program running in BG/Q:

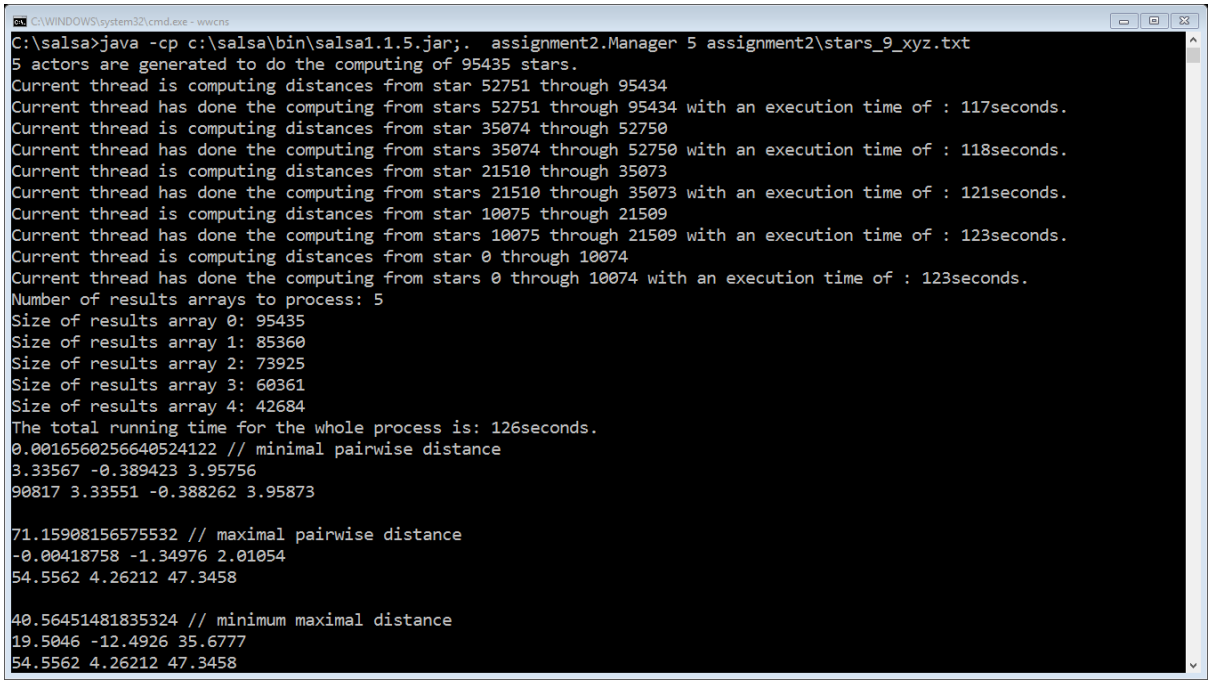
   3.1 One program to serve both Concurrent Mode and Distributed Mode
   If only the first two arguments, which are mandatory in all cases, are entered, the program will be run in Concurrent Mode.

   If all 4 arguments are entered, the program will automatically be run in Distributed Mode

   3.2 Program logic:
   The program will first validate the input arguments
   Following this, the main program will read in all data
   Based on the number of workers, then workers will be created (if distributed mode, then workers will be allocated to theaters one by one) and do the assigned computing work;
   All calculation results will be stored into a so-called MatrixSaver;
   Results will be calculated and output to screen

4. Testing Results:

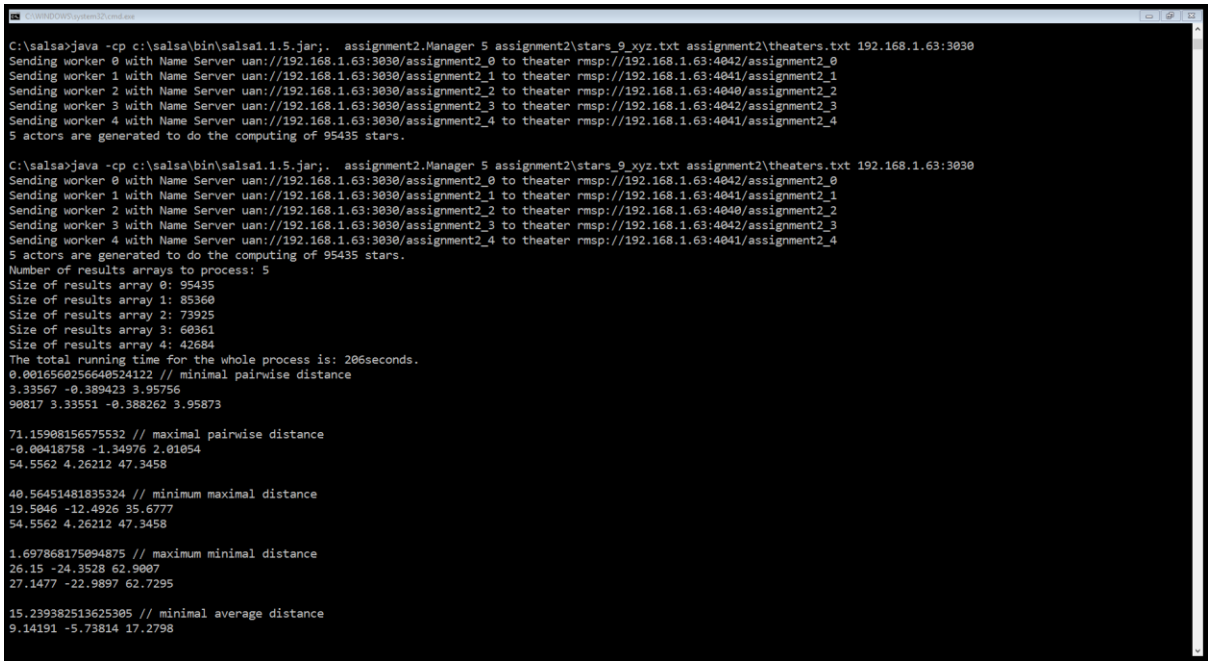
   Concurrent Mode:




```
1.697868175094875 // maximum minimal distance
26.15 -24.3528 62.9007
27.1477 -22.9897 62.7295

15.239382513625305 // minimal average distance
9.14191 -5.73814 17.2798
```

   Distributed Mode:
   (Distributed Mode is only tested in Widnows)


C:\salsa>java -cp c:\salsa\bin\salsa1.1.5.jar;. assignment2.Manager 5 assignment2\stars_9_xyz.txt assignment2\theaters.txt 192.168.1.63:3030
Sending worker 0 with Name Server uan://192.168.1.63:3030/assignment2_0 to theater rmsp://192.168.1.63:4042/assignment2_0
Sending worker 1 with Name Server uan://192.168.1.63:3030/assignment2_1 to theater rmsp://192.168.1.63:4041/assignment2_1
Sending worker 2 with Name Server uan://192.168.1.63:3030/assignment2_2 to theater rmsp://192.168.1.63:4040/assignment2_2
Sending worker 3 with Name Server uan://192.168.1.63:3030/assignment2_3 to theater rmsp://192.168.1.63:4042/assignment2_3
Sending worker 4 with Name Server uan://192.168.1.63:3030/assignment2_4 to theater rmsp://192.168.1.63:4041/assignment2_4
5 actors are generated to do the computing of 95435 stars.
C:\salsa>java -cp c:\salsa\bin\salsa1.1.5.jar;. assignment2.Manager 5 assignment2\stars_9_xyz.txt assignment2\theaters.txt 192.168.1.63:3030
Sending worker 0 with Name Server uan://192.168.1.63:3030/assignment2_0 to theater rmsp://192.168.1.63:4042/assignment2_0
Sending worker 1 with Name Server uan://192.168.1.63:3030/assignment2_1 to theater rmsp://192.168.1.63:4041/assignment2_1
Sending worker 2 with Name Server uan://192.168.1.63:3030/assignment2_2 to theater rmsp://192.168.1.63:4040/assignment2_2
Sending worker 3 with Name Server uan://192.168.1.63:3030/assignment2_3 to theater rmsp://192.168.1.63:4042/assignment2_3
Sending worker 4 with Name Server uan://192.168.1.63:3030/assignment2_4 to theater rmsp://192.168.1.63:4041/assignment2_4
5 actors are generated to do the computing of 95435 stars.
Number of results arrays to process: 5
Size of results array 0: 95435
Size of results array 1: 85360
Size of results array 2: 73925
Size of results array 3: 60361
Size of results array 4: 42684
The total running time for the whole process is: 206seconds.
0.0016560256640524122 // minimal pairwise distance
3.33567 -0.389423 3.95756
90817 3.33551 -0.388262 3.95873
71.15908156575532 // maximal pairwise distance
-0.00418758 -1.34976 2.01054
54.5562 4.26212 47.3458
40.56451481835324 // minimum maximal distance
19.5046 -12.4926 35.6777
54.5562 4.26212 47.3458
1.697868175094875 // maximum minimal distance
26.15 -24.3528 62.9007
27.1477 -22.9897 62.7295
15.239382513625305 // minimal average distance
9.14191 -5.73814 17.2798