

ANALYSIS OF ALGORITHMS

ASSIGNMENT 3

ANSWERS:

- 1. Whether your program can be compiled and executed successfully, and including two test cases and their screen shot outputs.**

Answer:

Yes, my program can be compiled and executed successfully.

It prompts user for Sensor network Width, Height, Number of Nodes and Transmission range. It then creates the nodes and assigns them random xAxis and yAxis within the range of width and height given by the user.

Then the program creates the adjacency list by calculating the distance between them. The program prints the adjacency list.

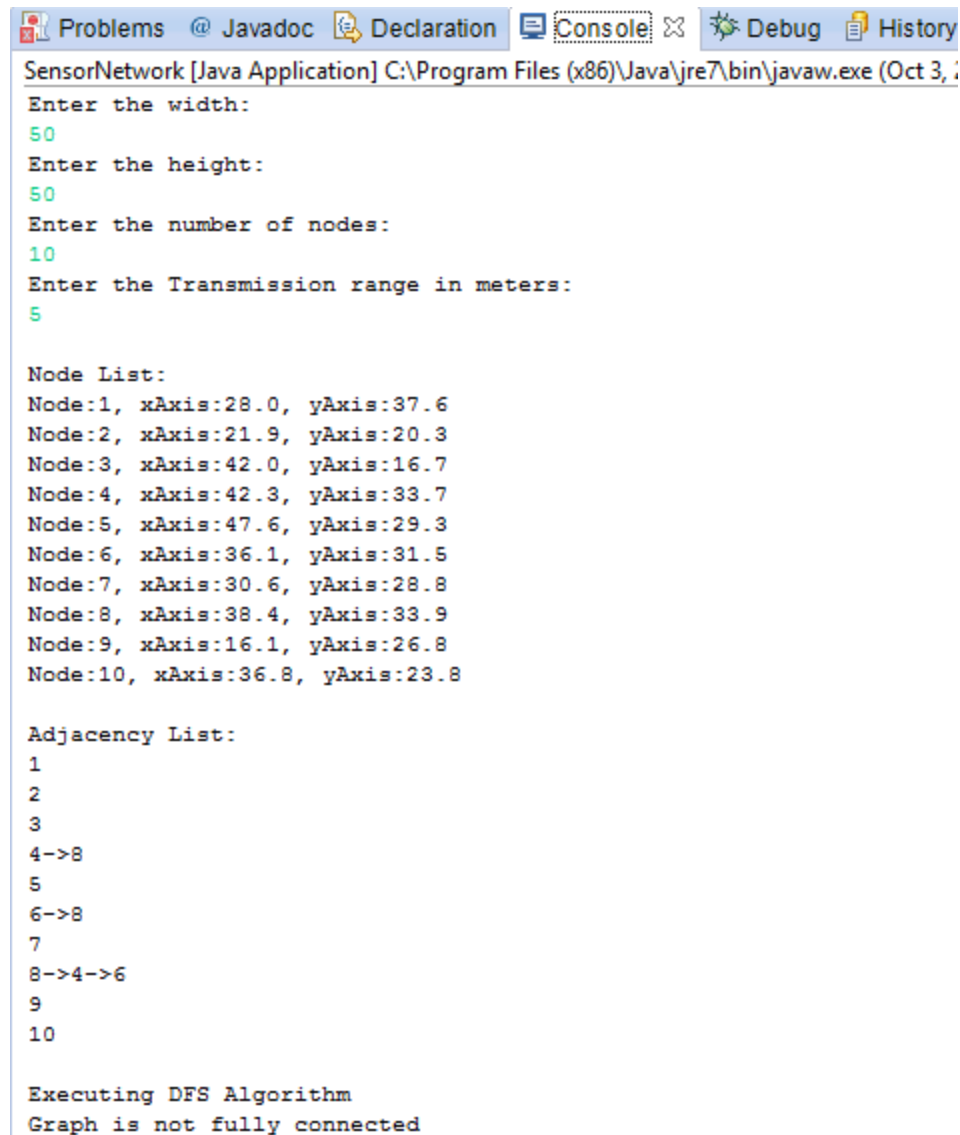
Then DFS algorithm is executed to identify the connected nodes and the program prints out the connected components list. It informs us whether the nodes are fully connected or not. The graph for this list of connected components are been displayed in a separate window.

EXECUTION: 1 (Lower transmission range)

Executed the program and given width as 50, height as 50, Number of nodes as 10 and Transmission range as 5. Randomly generated the xAxis and yAxis for each node. Calculated the distance between the nodes and created the adjacency list based on whether the distance is less than or equal to the transmission range 5. Executed the DFS algorithm to find whether the nodes are connected. The nodes are not fully connected as the transmission range was lesser than the graph width or height.

Test case 1: Test the sensor network nodes whether it is connected using DFS.

Screenshot output:



```
Problems @ Javadoc Declaration Console Debug History
SensorNetwork [Java Application] C:\Program Files (x86)\Java\jre7\bin\javaw.exe (Oct 3, 2014)
Enter the width:
50
Enter the height:
50
Enter the number of nodes:
10
Enter the Transmission range in meters:
5

Node List:
Node:1, xAxis:28.0, yAxis:37.6
Node:2, xAxis:21.9, yAxis:20.3
Node:3, xAxis:42.0, yAxis:16.7
Node:4, xAxis:42.3, yAxis:33.7
Node:5, xAxis:47.6, yAxis:29.3
Node:6, xAxis:36.1, yAxis:31.5
Node:7, xAxis:30.6, yAxis:28.8
Node:8, xAxis:38.4, yAxis:33.9
Node:9, xAxis:16.1, yAxis:26.8
Node:10, xAxis:36.8, yAxis:23.8

Adjacency List:
1
2
3
4->8
5
6->8
7
8->4->6
9
10

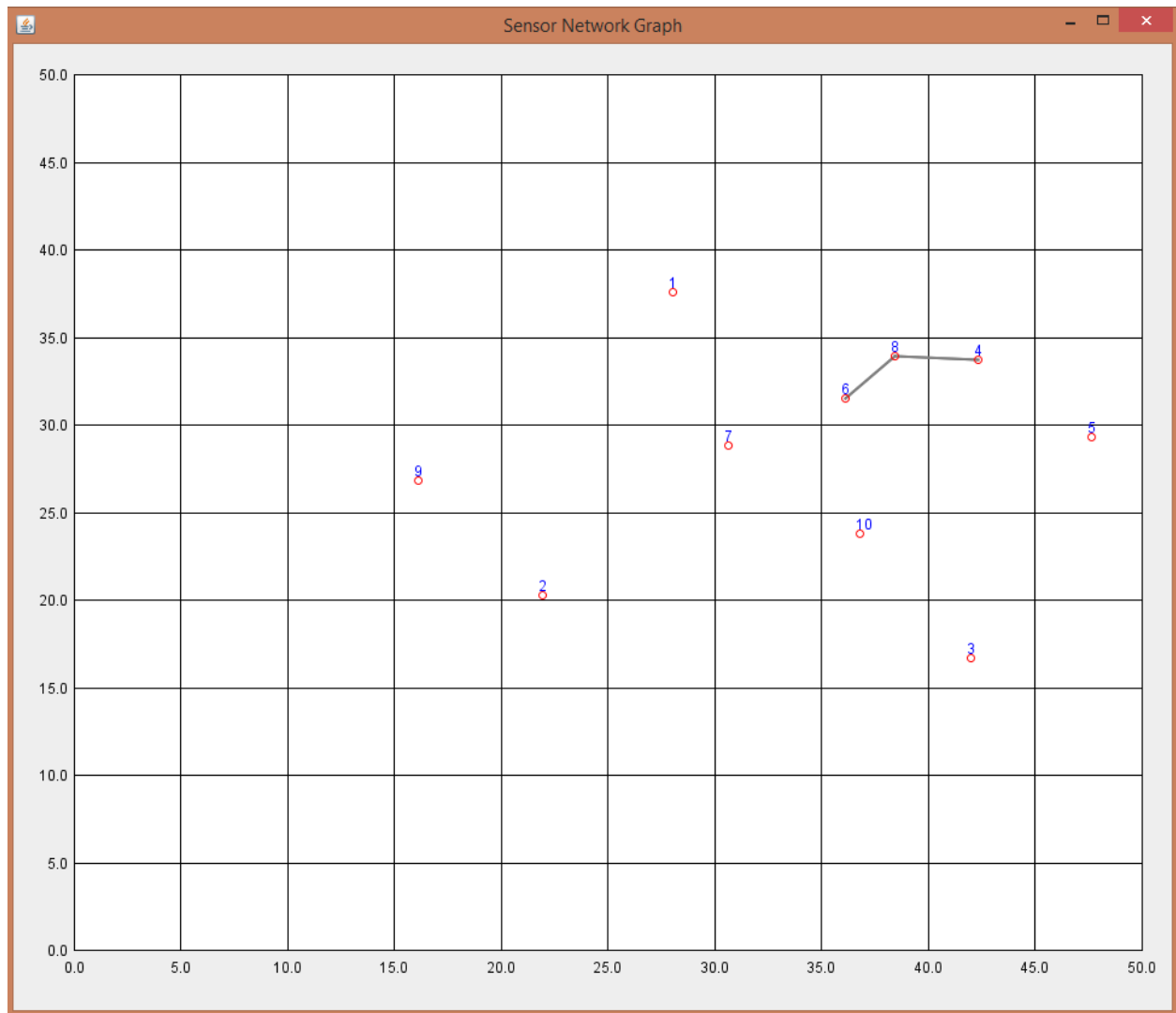
Executing DFS Algorithm
Graph is not fully connected
```

Test case 2: If it is not connected, output the set of connected components.

Screenshot output:

```
Graph is not fully connected
There are 8 connected components
[1]
[2]
[3]
[6, 8, 4]
[5]
[7]
[9]
[10]
```

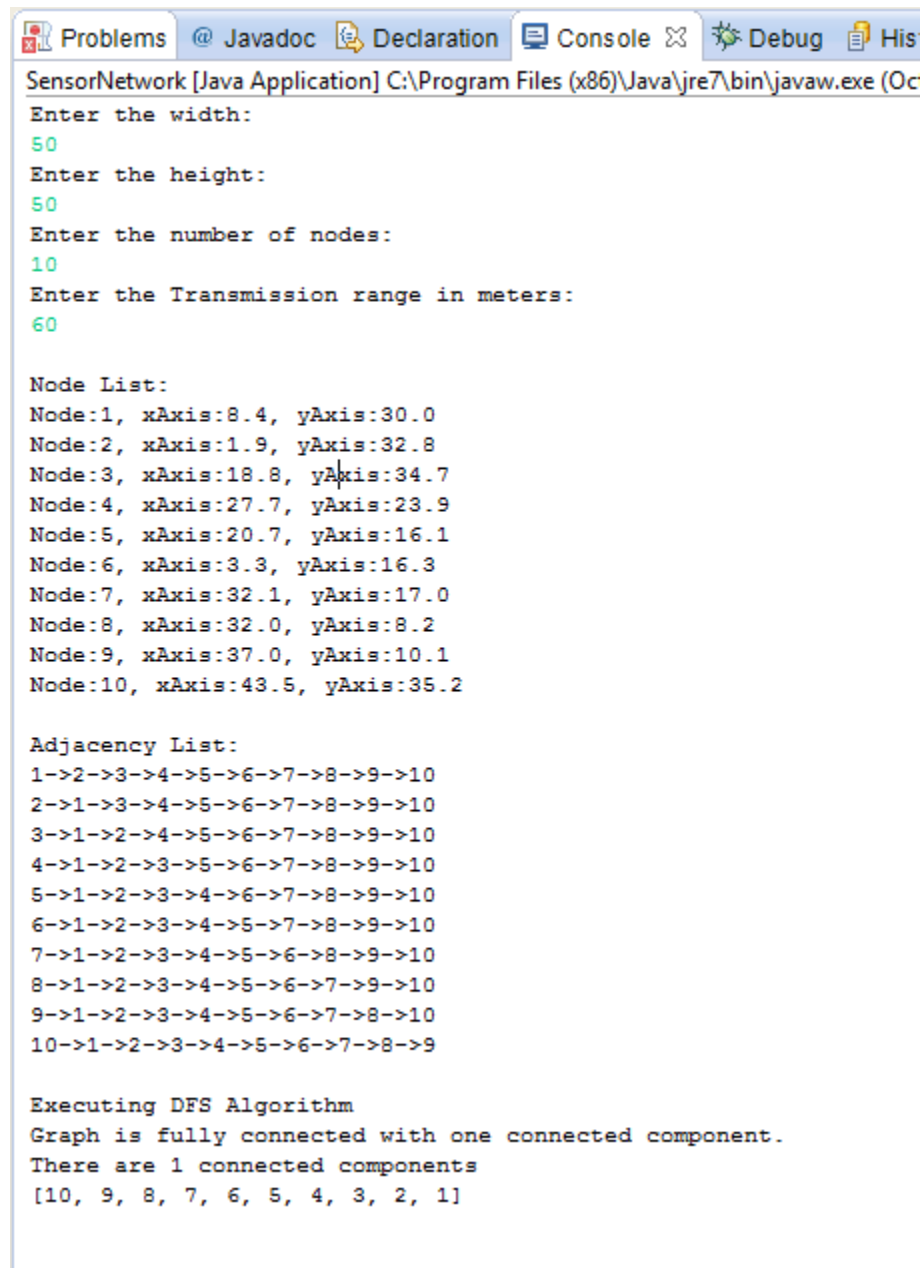
Sensor Network Graph:



EXECUTION: 2 (Higher transmission range)

Executed the program and given Width as 50, Height as 50, Number of nodes as 10 and Transmission range as **60**. Randomly generated the xAxis and yAxis for each node. Calculated the distance between the nodes and created the adjacency list based on whether the distance is less than or equal to the transmission range **60**. Executed the DFS algorithm to find whether the nodes are connected. The nodes are fully connected as the transmission range was greater than the graph width or height.

Screenshot output:



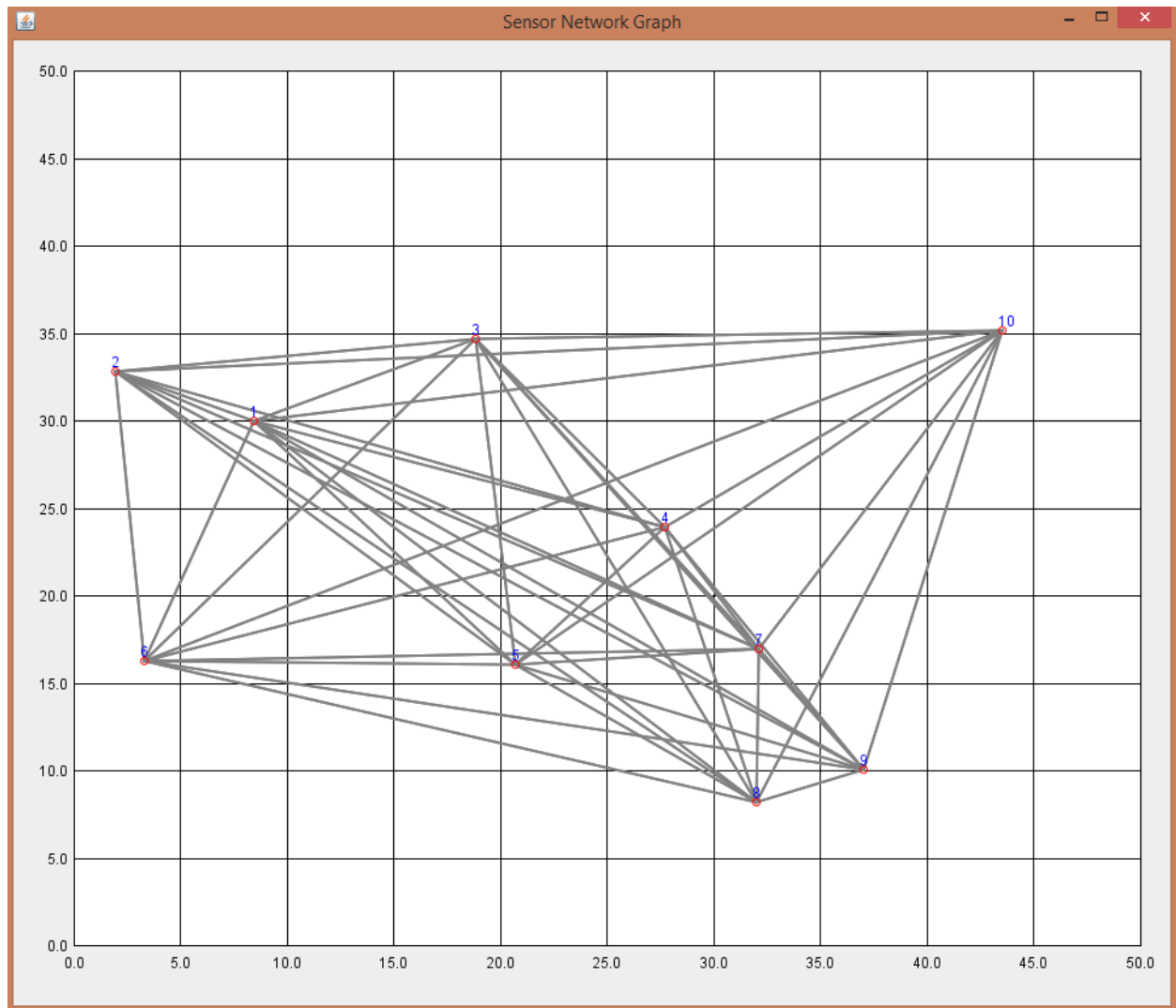
```
Problems @ Javadoc Declaration Console Debug His
SensorNetwork [Java Application] C:\Program Files (x86)\Java\jre7\bin\javaw.exe (Oc
Enter the width:
50
Enter the height:
50
Enter the number of nodes:
10
Enter the Transmission range in meters:
60

Node List:
Node:1, xAxis:8.4, yAxis:30.0
Node:2, xAxis:1.9, yAxis:32.8
Node:3, xAxis:18.8, yAxis:34.7
Node:4, xAxis:27.7, yAxis:23.9
Node:5, xAxis:20.7, yAxis:16.1
Node:6, xAxis:3.3, yAxis:16.3
Node:7, xAxis:32.1, yAxis:17.0
Node:8, xAxis:32.0, yAxis:8.2
Node:9, xAxis:37.0, yAxis:10.1
Node:10, xAxis:43.5, yAxis:35.2

Adjacency List:
1->2->3->4->5->6->7->8->9->10
2->1->3->4->5->6->7->8->9->10
3->1->2->4->5->6->7->8->9->10
4->1->2->3->5->6->7->8->9->10
5->1->2->3->4->6->7->8->9->10
6->1->2->3->4->5->7->8->9->10
7->1->2->3->4->5->6->8->9->10
8->1->2->3->4->5->6->7->9->10
9->1->2->3->4->5->6->7->8->10
10->1->2->3->4->5->6->7->8->9

Executing DFS Algorithm
Graph is fully connected with one connected component.
There are 1 connected components
[10, 9, 8, 7, 6, 5, 4, 3, 2, 1]
```

Sensor Network Graph:



2. How to compile and test your program

1. Please paste the Java programs(SensorNetwork.java, SensorNetworkGraph.java, Axis.java) anywhere in your system in the same path and copy the path where the file is placed
2. Open the command prompt (Run -> Command Prompt)
3. Enter the below command,
cmd> cd <path-to-the-java-file-from-step-1>
4. Run the below command in command line prompt
cmd> javac Axis.java
cmd> javac SensorNetworkGraph.java

```
cmd> javac SensorNetwork.java
```

```
cmd> java SensorNetwork
```

5. Enter the Width, height, Number of Nodes, Transmission range when prompted by the program and rest of the program will be executed.

(or)

1. Copy and paste the file in eclipse under the default project
2. Right click on SensorNetwork.java file and select 'Run As' -> 'Java Application'
3. Enter the Width, height, Number of Nodes, Transmission range when prompted by the program and rest of the program will be executed.