**Herman Mann**

**CMSC 204**

**Assignment 6**

**TownGraph Implementation**

**GUI SCREENSHOTS OF ASSIGNMENT 6 Execution (TownGraph)**

**Graphical user interface

Description automatically generatedGraphical user interface

Description automatically generatedAfter reading in the MD Town file After reading in the US Town file**

**Github Screenshot of Assignment 6 (TownGraph in directory)**

**Graphical user interface

Description automatically generated**

**Table

Description automatically generated**

Reflection Paragraphs

Assignment 6’s implementation gave me such great insight onto the more advanced Data Structures of Object-Oriented Programming, specifically in Java. All throughout the completion of the Assignment 6 which was on TownGraph and how to connect a set of towns and maintain them and the roads connecting them. I got to learn and experience a lot of different object-oriented programming skills and even newer skills which are far more advanced in Computer Science Object-Oriented programming principles such as using and utilizing Dijkstra’s algorithm of finding the shortest path of two given towns, exception handling, and implementing a lot of unique data structures based in java interfaces, throwing critical exceptions and much more through this Assignment’s implementation. Using the methods of containsVertex, removeEdge, shortestPath, addAllTowns, and addAllRoads really showed me the big picture of creating and maintaining many networks of different towns and connecting to them to of the roads as followed. I really enjoyed how the assignment is getting me introduced to the new and more new and unique data structures of object-oriented programming, and I am interested to look at these different data structure algorithms as the class keeps going on. Also, I got to experience more in-depth knowledge and reasoning in the different types of uses of generic classes, using vertices, edges, and other data structures like these, and using the concept of testing and planning using Junit tests and using Javadoc to make the appropriate commenting on each of the assignment’s implementation methods. The learning of the utilization of more graph based and advanced data structures of Java itself and the different town and road methods I got to handle and complete really showed me how broad Java Object-Oriented Programming is and what else I can do in this important subject of the Computer Science field. Using vertices which represented the towns and the edges which represented the roads showed me the importance of key computer science data structure algorithms like of the Dijkstra’s shortest path algorithm of finding the shortest distance between two towns (the source and destination).

In the completion of this assignment, I struggled with a couple of things towards the end of things. First, I struggled with starting and finishing the implementing of Dijkstra’s algorithm method and then from there the shortest path method which calls the Dijkstra’s algorithmic method which it was supposed to come up with the shortest distance between two given towns of connection using vertices and edges (towns and roads). My program came to an error towards middle part of the Dijkstra’s method algorithm. I solved the issue by editing and changing some stuff in my Dijkstra’s method algorithm and played around with it a lot and eventually got to figure out why it was not working, and then it worked successfully. Another problem I struggled with were creating the student Junit tests, some methods towards the end of this assignment’s student tests had me thinking about how to approach it. So, my solution to the problem was looking at the other methods of the student test that I had done previously and from there I solved the issue successfully by changing things here and there to make the test work according to the certain test I was doing at the time by following the way the other tests were made and solved to be working successfully after the student test ran through.

When I had completed the entirety of this project, I found out a lot of things to be useful for me and would help me out for the completing of future assignments/projects. I learned and experienced that the use of interfaces, exception handling techniques, the use of sets, vertices, edges and other java data structure stuff, static methods and the numerous town and road methods will serve me a big deal and help me to know for the future and will be a great thing to be well-experienced in the concept of using the graph structures of Java itself as well. Also, Javadoc will help me in the future not just for the upcoming assignments but also in my career of Computer Science, for accurate and important commenting of various programs that I will be coding for bigger and widespread company projects. Also, computer critical analysis especially learned from the completion of this project implementation will be so useful, significant, and demanding in the field for advancement to write larger scope programs with various object-oriented programming techniques. Most importantly, the importance of exception handling, unhandled exceptions, the different graph type data structure java methods, and the different classes of graph data structures served such an important purpose of furthering my knowledge on Java and its object-oriented principles/techniques. This assignment implementation of TownGraphs helped me in so many great ways its satisfying to know I chose a great career path majoring in Computer Science.