

```
2  * Implementation of Graph
5  import java.io.File;
8
9  public class Graph
10 {
11     private Map<String, Vertex> vertices;
12     private Map<String, List<Edge>> edges;
13
14     public Graph()
15     {
16 //         vertices = new HashMap<>();
17 //         edges = new HashMap<>();
18     }
19
20     /**
21      * Reads a graph from the file with the given filename
22      * @param filename - file to be read from
23      */
24     public Graph(String filename) throws FileNotFoundException
25     {
26         this();
27         Scanner scanner = new Scanner(new File(filename));
28
29         while (scanner.hasNext()) {
30             String sourceLabel = scanner.next();
31             String targetLabel = scanner.next();
32             double weight = scanner.nextDouble();
33
34             addEdge(sourceLabel, targetLabel, weight);
35         }
36         scanner.close();
37     }
38
39     /**
40      * Adds an edge with the given weight from the vertex with
41      * the given source label to the given target
42      * @param sourceLabel - the label of the source vertex
43      * @param targetLabel - the label of the target vertex
44      * @param weight      - weight of the source vertex to be
```

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    added to
44     */
45     public void addEdge(String sourceLabel, String targetLabel,
    double weight)
46     {
47         Vertex source = getVertex(sourceLabel);
48         Vertex target = getVertex(targetLabel);
49
50         List<Edge> sourceEdges = edges.get(sourceLabel);
51
52         Edge edge = new Edge(source, target, weight);
53         sourceEdges.add( edge );
54         edges.put(sourceLabel, sourceEdges);
55     }
56
57     /**
58      * Returns a list of the edges that have the given vertex
    as their source
59      * @param source - the source where the edges are from
60      * @return a list of the edges that have the given vertex
    as their source
61     */
62     public List<Edge> getAdjacent(Vertex source)
63     {
64         return
    Collections.unmodifiableList(edges.get(source.label));
65     }
66
67     /**
68      * Returns a set of the vertices in the graph
69      * @return a set of the vertices in the graph
70     */
71     public Collection<Vertex> getVertices()
72     {
73         return
    Collections.unmodifiableCollection(vertices.values());
74     }
75
76     /**
```

```
77     * Returns string representation of the summary of the graph
78     * @return string representation of the summary of the graph
79     */
80     public Graph printMST()
81     {
82         return null;
83     }
84
85     /**
86     * Returns a list of all edges of the graph
87     * @return a list of all edges of the graph
88     */
89     public List<Edge> getEdges()
90     {
91         return null;
92     }
93
94     /**
95     * Returns a Vertex object for the given label and its index
96     * @param label - the given label to get vertex
97     * @return a vertex object for the given label and its index
98     */
99     public Vertex getVertex(String label)
100    {
101        if (!vertices.containsKey(label)) {
102            Vertex vertex = new Vertex(label);
103            vertices.put(label, vertex);
104            List<Edge> sourceEdges = new LinkedList<Edge>();
105            edges.put(label, sourceEdges);
106        }
107        return vertices.get(label);
108    }
109
110    /**
111    * Returns an array of labels of the vertices in the graph
112    * @return an array of labels of the vertices in the graph
113    */
114    public String[] getLabels()
115    {
```

```
116         return null;
117     }
118
119     /**
120      * Returns the adjacency matrix of the graph
121      * @return the adjacency matrix of the graph.
122      */
123     public double[][] getMatrix()
124     {
125         return null;
126     }
127
128 }
```