Stage 1 – Design – UML Diagram Description

Interface and Class relationships:

- DirectedGraph (Interface) – DirectedGraph is the child of the interface DirectedEdge and is implemented by the MultiGraph class.
- DirectedEdge (Interface) – DirectedEdge is the parent class of the interface DirectedGraph and class MultiGraph. It is also implemented by the Track class.
- MultiGraph (Class) – Multigraph is the child to DirectedEdge and implements the DirectedGraph Interface. It is also associated with the MetroMapParser class.
- Track (Class) – The Track class implements DirectedEdge and is associated with the MetroMapParser class.
- Station (Class) – The Station class is associated with the MetroMapParser class and is a child to the BostonMetro class via aggregation, which allows it to exist independently to the BostonMetro class (in the case that BostonMetro is removed).
- MetroMapParser (Class) – This class is associated with the: MultiGraph, Track, Station and BostonMetro classes.
- BostonMetro (Class) – BostonMetro is the parent to the Station class via aggregation and is associated with the MetroMapParser class.

Roles of the Interfaces & Classes:

- DirectedGraph (Interface) – This is the interface implemented by the Multigraph class, allowing the program to achieve a higher level of data abstraction. The methods in this class are declared without any bodies as they are created in its subclass (MultiGraph).
- DirectedEdge (Interface) – The interface that is implemented from the Track class. Abstract methods: getSourceVertex and getTargetVertex will have their bodies created in the Track class.
- MultiGraph (Class) – The class which implements the interface DirectedGraph, the method bodies for the interface are provided from this class.
- Track (Class) – The class which implements the DirectedEdge, the method bodies for the DirectedEdge interface are provided from this class.
- Station (Class) – A class which gets and sets the ID's, lines, and names.
- MetroMapParser (Class) – This class contains the main method and parses the bostonmetro.txt file. A DirectedGraph is then constructed in this class.
- BostonMetro (Class) – This class gets the exact route between the departing and destination station.

Method Descriptions:

Multigraph (Class):

- addVertex (V vertex) – Adds a Vertex to the DirectedGraph
- addVertices (Collection<extends v> vertices) – Adds vertices to the DirectedGraph, provided that they come from a collection of type V.
- addEdge (E edge) – Adds an edge connecting two vertices together, both vertices need to be present in the DirectedGraph otherwise an exception will be thrown (VertexNotFound).
- addEdges (Collection<extends E> edges) – Adds multiple edges which will connect multiple pairs of vertices together, provided that the edges come from a collection of type E.
- removeVertex (V vertex) – This removes a vertex from the DirectedGraph along with any edge it is connected to. This method will only remove the first occurrence of the chosen vertex.
- removeEdge (V sourceVertex, V targetVertex) – Removes the edge connected by the two chosen vertices.
- removeEdge (E edge) – Removes an edge from the DirectedGraph, simply by choosing said edge this time.
- isAdjacent (V sourceVertex, V targetVertex) – This method returns true if the two chosen vertices are connected by an edge, if not then it will return false.
- isEmpty () – If the DirectedGraph contains no elements return true, if not return false.
- getNumVertices () – Returns the number of vertices in the DirectedGraph.
- getNumEdges () – Returns the number of edges in the DirectedGraph.
- getAdjacent () – Returns a list of vertices that are connected to a chosen vertex.
- getVertices () – Returns a list of all vertices in the DirectedGraph.

Track (Class):

- getLineColour () – Returns the colour of the edge.
- getSourceVertex () – Returns the vertex that the chosen edge originates from.
- getTargetVertex () – Returns the vertex that the chosen edge reaches.

Station (Class):

- getID () – Returns the station ID
- getName () – Return the station name
- getMetroLine () – Returns the name of the Metro Line
- setID () – Set the station ID
- setName () – Set the station name
- setMetroLine ()– Set the name of the Metro Line

MetroMapParser (Class):

- usage () – Prints out a usage statement of: “java ex3.MetroMapParser <filethatisparsed>”
- generateGraphFromFile () – Contains a loop which checks every line of the text file to ensure it’s not empty and that everything is well formatted before generating the DirectedGraph.

BostonMetro (Class):

- getRoute () – Returns the list of stations from the departing station to the destination station.

DirectedGraph (Interface): Methods in this interface were created in the MultiGraph class.

DirectedEdge (Interface): Methods in this interface were created in the Track class.