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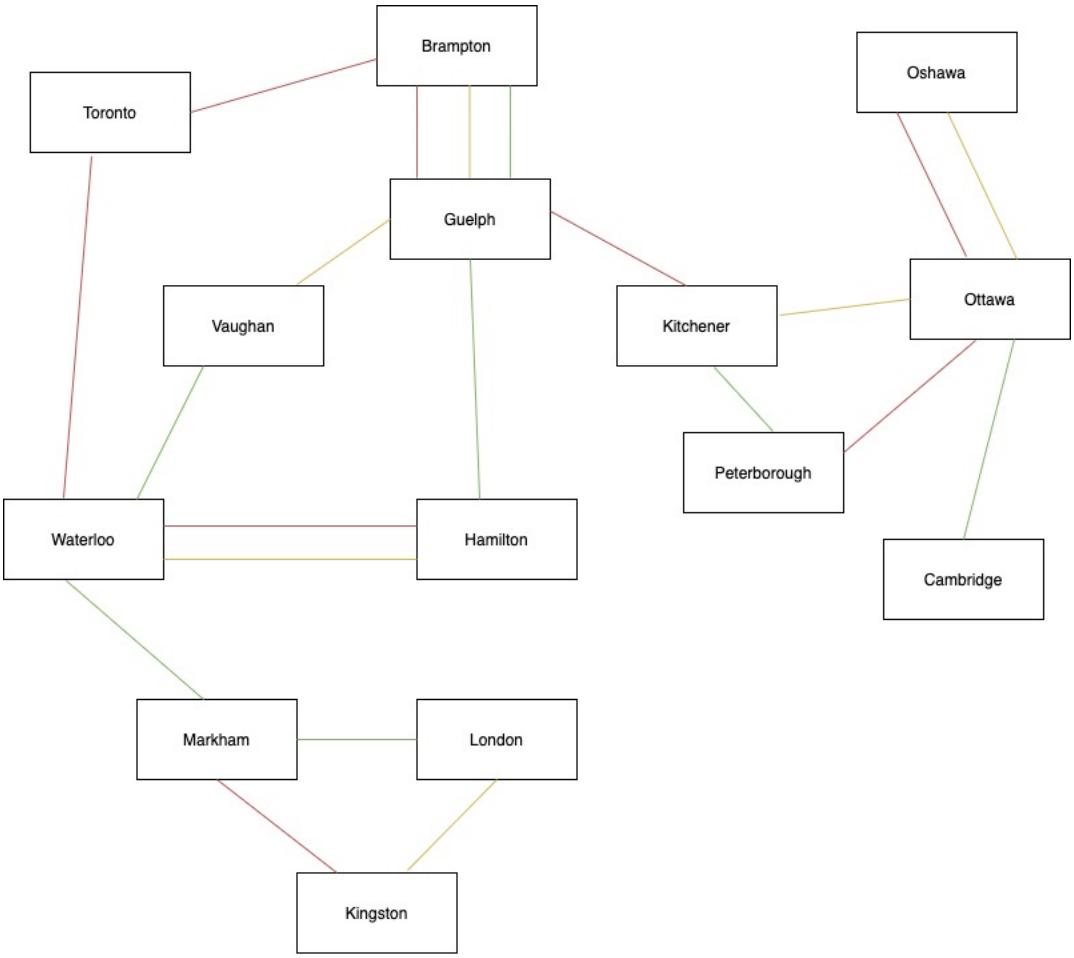
TESTING DOCUMENT FOR ASSIGNMENT 1
Subway Map

I have added a method called displayStations that displays all the stations in the system and another method called printConnection that displays all the connections between the stations.

My subway system used for the test cases



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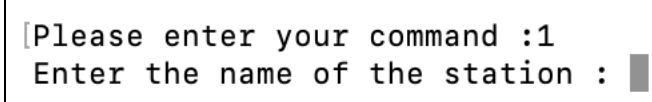
Input validation for commands

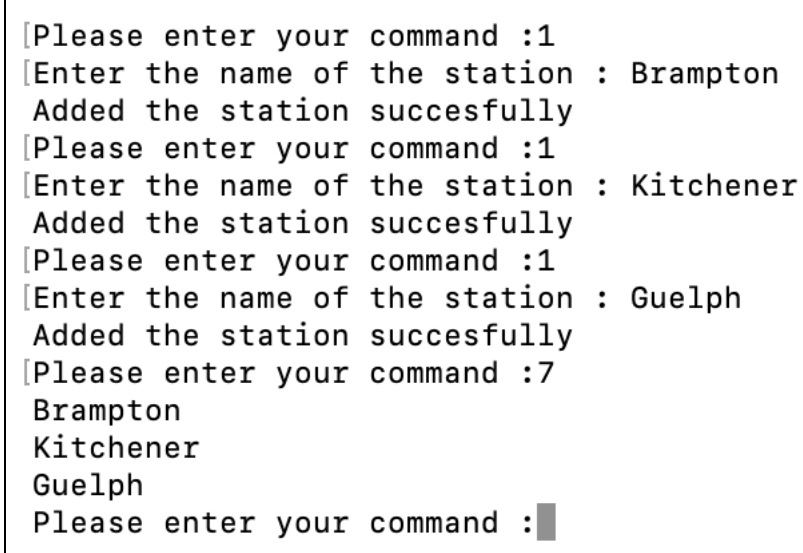
Test 1	
Description	Entering the command as a string instead of an integer
Input	add
Expected Output	Error message
Actual Output	Commands you can enter 1 for Inserting a station, 2 for Inserting a connection 3 for Removing a station 4 for Removing a connection 5 for finding the fastest route 6 for finding the critical connection 7 for Printing all the stations in the subway system 8 for Printing all the connections 9 for Quitting the program Please enter your command :add That is an incorrect command Please enter your command :

Test 2	
Description	Entering an integer out of the range
Input	15
Expected Output	Error message
Actual Output	Please enter your command :15 Incorrect command. Please enter your command :

Test 3	
Description	Entering a negative integer which is also out of range
Input	-2
Expected Output	Error message
Actual Output	Incorrect command. Please enter your command :-2 Incorrect command. Please enter your command :

Test 4	
Description	Entering the input within the correct range of accepted integers
Input	1
Expected Output	Asks for the name of the station to be inserted in the system
Actual Output	

Adding stations

Test 1	
Description	Entering a station called Brampton, Kitchener and Guelph. Also used the displayStations method to make sure the method worked.
Input	1, Brampton, Kitchener and Guelph
Expected Output	Successfully inserts the stations
Actual Output	

- I continued adding all the stations in my sample subway map. Command 7 shows all the stations in the subway system

```
Please enter your command :7
Brampton
Kitchener
Guelph
Peterborough
Toronto
Oshawa
Ottawa
Cambridge
Hamilton
Vaughan
Waterloo
Markham
London
Kingston
Please enter your command :
```

Test 2	
Description	Trying to add stations which already exist in the map
Input	Toronto and Brampton
Expected Output	Gives an error message
Actual Output	Please enter your command :1 Enter the name of the station : Brampton The station already exists Please enter your command :1 Enter the name of the station : Toronto The station already exists Please enter your command :

Adding connection (Command 2)

Test 1	
Description	Connection between two stations that exist but choosing the colour option that is incorrect
Input	Toronto, Brampton and red
Expected Output	Error message and asking for the correct colour option again
Actual Output	[Please enter your command :2 [Enter the station name where the connection should start : Toronto [Enter the station name where the connection should end : Brampton Enter the colour for the connection, 1 for red 2 for yellow [3 for green : red That is an incorrect choice Enter the colour for the connection, 1 for red 2 for yellow 3 for green :

Test 2	
Description	Connection between two stations that exist but choosing the colour option that is incorrect
Input	Toronto, Brampton , 5
Expected Output	Says the colour chosen doesn't exist and asks for the colour again
Actual Output	Enter the colour for the connection, 1 for red 2 for yellow [3 for green : 5 Sorry this colour doesnt exist. Please try again Enter the colour for the connection, 1 for red 2 for yellow 3 for green :

Test 3	
Description	Adding a connection between Toronto and Brampton with the colour red which is option 1
Input	Toronto, Brampton, 1
Expected Output	Successfully adds the connection
Actual Output	Please enter your command :2 Enter the station name where the connection should start : Toronto Enter the station name where the connection should end : Brampton Enter the colour for the connection, 1 for red 2 for yellow 3 for green : red That is an incorrect choice Enter the colour for the connection, 1 for red 2 for yellow 3 for green : 5 Sorry this colour doesnt exist. Please try again Enter the colour for the connection, 1 for red 2 for yellow 3 for green : 1 inserted the connection succesfully Please enter your command :

Test 4	
Description	Adding a connection between Toronto and waterloo with the colour red
Input	Toronto, Waterloo and 1
Expected Output	Successful insertion.
Actual Output	inserted the connection successfully Please enter your command :2 Enter the station name where the connection should start : Toronto Enter the station name where the connection should end : Waterloo Enter the colour for the connection, 1 for red 2 for yellow 3 for green : 1 inserted the connection succesfully Please enter your command :

Test 5	
Description	Adding a connection between Waterloo and Markham with the colour green
Input	Waterloo, markham and 3
Expected Output	Successful insertion message
Actual Output	Please enter your command :2 Enter the station name where the connection should start : Waterloo Enter the station name where the connection should end : Markham Enter the colour for the connection, 1 for red 2 for yellow 3 for green : 3 inserted the connection succesfully Please enter your command :

Test 6	
Description	Trying to create a connection which already exists. Also checking if the connection was stored in both ways (undirected). (Note: Previous was Waterloo to Markham.)
Input	Markham, Waterloo and 3
Expected Output	The connection already exists
Actual Output	[Please enter your command :2 [Enter the station name where the connection should start : Markham [Enter the station name where the connection should end : Waterloo Enter the colour for the connection, 1 for red 2 for yellow [3 for green : 3 This connection already exists Please enter your command :

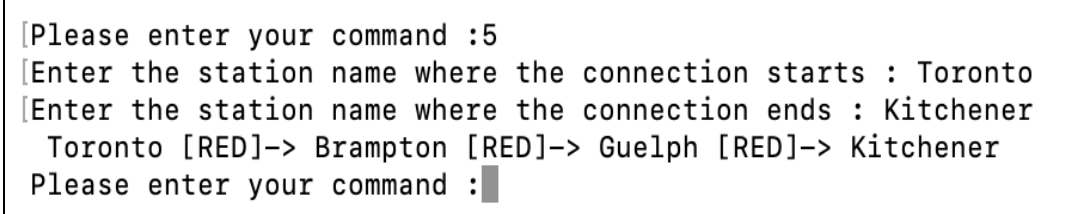
Test 7	
Description	Adding a connection between station whereby one of them does not exist in the system
Input	Peterborough, Canada and 1
Expected Output	An error message
Actual Output	[Please enter your command :2 [Enter the station name where the connection should start : Peterborough [Enter the station name where the connection should end : Canada Enter the colour for the connection, 1 for red 2 for yellow [3 for green : 1 one or both of the stations do not exist Please enter your command :

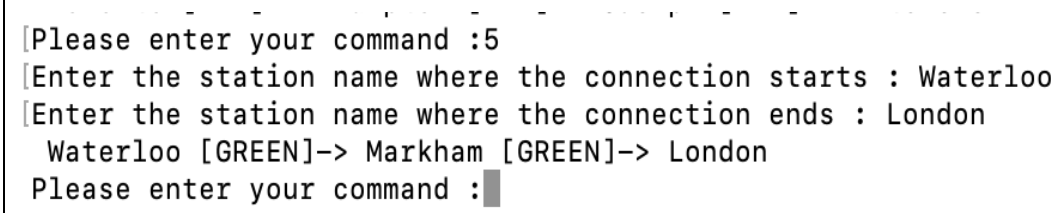
Test 8	
Description	Adding a connection between stations which do not exist in the system
Input	Usa, Uk and 2
Expected Output	An error message
Actual Output	Please enter your command :2 Enter the station name where the connection should start : usa Enter the station name where the connection should end : uk Enter the colour for the connection, 1 for red 2 for yellow 3 for green : 2 one or both of the stations do not exist Please enter your command :

- Continued adding all the connections in the system and used the printConnections method to show that all the connections have been inserted successfully.

```
Please enter your command :8
[(Brampton) to (Toronto) RED]
 (Brampton) to (Guelph) RED]
[(Brampton) to (Guelph) YELLOW]
 (Brampton) to (Guelph) GREEN]
 (Kitchener) to (Guelph) RED]
 (Kitchener) to (Peterborough) GREEN]
 (Kitchener) to (Ottawa) YELLOW]
 (Guelph) to (Vaughan) YELLOW]
 (Guelph) to (Hamilton) GREEN]
 (Guelph) to (Brampton) RED]
 (Guelph) to (Brampton) YELLOW]
 (Guelph) to (Brampton) GREEN]
 (Guelph) to (Kitchener) RED]
 (Peterborough) to (Kitchener) GREEN]
 (Peterborough) to (Ottawa) RED]
 (Toronto) to (Brampton) RED]
 (Toronto) to (Waterloo) RED]
 (Oshawa) to (Ottawa) RED]
 (Oshawa) to (Ottawa) YELLOW]
 (Ottawa) to (Peterborough) RED]
 (Ottawa) to (Kitchener) YELLOW]
 (Ottawa) to (Oshawa) RED]
 (Ottawa) to (Oshawa) YELLOW]
 (Ottawa) to (Cambridge) GREEN]
 (Cambridge) to (Ottawa) GREEN]
 (Hamilton) to (Waterloo) RED]
 (Hamilton) to (Waterloo) YELLOW]
 (Hamilton) to (Guelph) GREEN]
 (Vaughan) to (Waterloo) GREEN]
 (Vaughan) to (Guelph) YELLOW]
 (Waterloo) to (Toronto) RED]
 (Waterloo) to (Markham) GREEN]
 (Waterloo) to (Hamilton) RED]
 (Waterloo) to (Hamilton) YELLOW]
 (Waterloo) to (Vaughan) GREEN]
 (Markham) to (Waterloo) GREEN]
 (Markham) to (Kingston) RED]
 (Markham) to (London) GREEN]
 (London) to (Kingston) YELLOW]
 (London) to (Markham) GREEN]
 (Kingston) to (Markham) RED]
 (Kingston) to (London) YELLOW]
Please enter your command :
```

Fastest route (command 5)

Test 1	
Description	Finding the fastest route from Toronto to kitchener. There are three routes to pass through (refer to the map above)
Input	Toronto and Kitchener
Expected Output	Gives the shortest path
Actual Output	

Test 2	
Description	Finding the fastest route from Waterloo to London. There are to ways, either "Waterloo to Markham to London" or "Waterloo to Markham to Kingston to London"
Input	Waterloo and London
Expected Output	Waterloo to Markham to London
Actual Output	

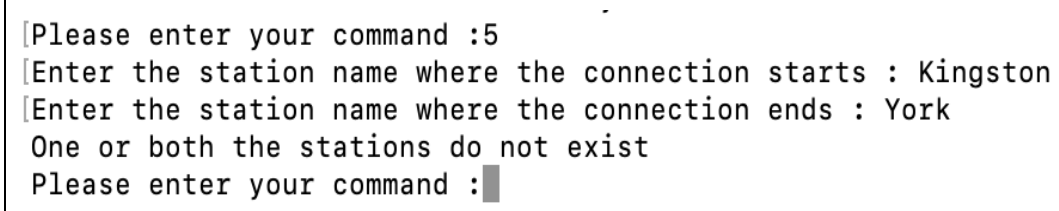
- I temporarily removed the connection between Kitchener and Guelph which has the colour red

```
[Please enter your command :4
[Enter the station name where the connection starts : Kitchener
[Enter the station name where the connection ends : Guelph
 Enter the colour for the connection,
 1 for red
 2 for yellow
[3 for green : 1
 Removed the connection successfully
 Please enter your command :
```

Test 3	
Description	Trying to find the fastestroute between two points which do not join through any route. (The removed connection above was essential to find the route)
Input	Brampton and Cambridge
Expected Output	An error message
Actual Output	[Please enter your command :5 [Enter the station name where the connection starts : Brampton [Enter the station name where the connection ends : Cambridge There is no any path to the destination Please enter your command :

- I added back the removed connection.

```
[Please enter your command :2
[Enter the station name where the connection should start : Kitchener
[Enter the station name where the connection should end : Guelph
 Enter the colour for the connection,
 1 for red
 2 for yellow
[3 for green : 1
 inserted the connection succesfully
 Please enter your command :
```

Test 4	
Description	Finding the fastest route between two points whereby one of the point does not exist in the system
Input	Kingston and York
Expected Output	Error message
Actual Output	

Critical connections (Command 6)

Note: For the critical connections method, I have assumed that although 2 stations have 3 connections between them. If I remove any one connection then the map divides into 2 or more components.

Test 1	
Description	Finding all the critical connections in my subway system
Input	Command 6
Expected Output	Gives all the critical connections
Actual Output	Please enter your command :6 The critical connections are between the following stations, Waterloo and Markham Ottawa and Oshawa Ottawa and Cambridge Guelph and Kitchener Please enter your command :

- Added a station called Mississauga and connected to Kingston inorder to have one more critical connection in the subway system

```
Please enter your command :2
Enter the station name where the connection should start : Kingston
Enter the station name where the connection should end : Mississauga
Enter the colour for the connection,
1 for red
2 for yellow
3 for green : 1
inserted the connection succesfully
```

Test 2	
Description	Finding the critical connections after adding one more connection
Input	Command 6
Expected Output	Gives the critical connections
Actual Output	Please enter your command :6 The critical connections are between the following stations, Kingston and Mississauga Waterloo and Markham Ottawa and Oshawa Ottawa and Cambridge Guelph and Kitchener Please enter your command :

- Removed the station Mississauga

```
Please enter your command :3
Enter the name of the station : Mississauga
Removed the station successfully
Please enter your command :
```

Remove connection (Command 4)

Test 1	
Description	Trying to remove a connection that does not exist
Input	Peterborough, Kitchener and red
Expected Output	No such connection exists
Actual Output	Please enter your command :4 Enter the station name where the connection starts : Peterborough Enter the station name where the connection ends : Kitchener Enter the colour for the connection, 1 for red 2 for yellow 3 for green : 1 There is no such a connection Please enter your command :

Test 2	
Description	Trying to remove a connection that exist but with a wrong colour
Input	Oshawa, Ottawa, 4
Expected Output	An error message
Actual Output	Please enter your command :4 Enter the station name where the connection starts : Ottawa Enter the station name where the connection ends : Oshawa Enter the colour for the connection, 1 for red 2 for yellow 3 for green : 4 Sorry this colour doesnt exist. Please try again Enter the colour for the connection, 1 for red 2 for yellow 3 for green :

Test 3	
Description	Trying to remove a connection between stations whereby one of them does not exist.
Input	Oshawa, York and 1
Expected Output	Error message
Actual Output	[Please enter your command :4 [Enter the station name where the connection starts : Oshawa [Enter the station name where the connection ends : York Enter the colour for the connection, 1 for red 2 for yellow [3 for green : 1 one or both the stations do not exist Please enter your command :

Test 4	
Description	Trying to remove a connection between stations successfully
Input	Oshawa, Ottawa and 1
Expected Output	Successfully removed
Actual Output	[Please enter your command :4 [Enter the station name where the connection starts : Oshawa [Enter the station name where the connection ends : Ottawa Enter the colour for the connection, 1 for red 2 for yellow [3 for green : 1 Removed the connection successfully Please enter your command :

Test 5	
Description	Trying to remove a connection which is already removed
Input	Oshawa, Ottawa and 1 (again)
Expected Output	Error message
Actual Output	[Please enter your command :4 [Enter the station name where the connection starts : Oshawa [Enter the station name where the connection ends : Ottawa Enter the colour for the connection, 1 for red 2 for yellow [3 for green : 1 There is no such a connection Please enter your command :

Test 6	
Description	Trying to remove a connection between stations with a wrong colour option
Input	Toronto, Brampton and red
Expected Output	Asks for the correct colour option
Actual Output	[Please enter your command :4 [Enter the station name where the connection starts : Toronto [Enter the station name where the connection ends : Brampton Enter the colour for the connection, 1 for red 2 for yellow [3 for green : red That is an incorrect choice Enter the colour for the connection, 1 for red 2 for yellow 3 for green :

Removing station (Command 3)

Test 1	
Description	Trying to remove connections that do not exist
Input	Trent
Expected Output	Error message
Actual Output	[Please enter your command :3 [Enter the name of the station : Trent This station does not exist Please enter your command :

Test 2	
Description	Removing the stations that exists
Input	Vaughan, Guelph and Markham
Expected Output	Successful removal
Actual Output	[Please enter your command :3 [Enter the name of the station : Vaughan Removed the station successfully [Please enter your command :3 [Enter the name of the station : Guelph Removed the station successfully [Please enter your command :3 [Enter the name of the station : Markham Removed the station successfully Please enter your command :

- **Screenshot showing all the connection remaining after the removal of the stations**

```
Please enter your command :8
[(Brampton) to (Toronto) RED]
[(Kitchener) to (Peterborough) GREEN]
[(Kitchener) to (Ottawa) YELLOW]
[(Peterborough) to (Kitchener) GREEN]
[(Peterborough) to (Ottawa) RED]
[(Toronto) to (Brampton) RED]
[(Toronto) to (Waterloo) RED]
[(Oshawa) to (Ottawa) YELLOW]
[(Ottawa) to (Peterborough) RED]
[(Ottawa) to (Kitchener) YELLOW]
[(Ottawa) to (Oshawa) YELLOW]
[(Ottawa) to (Cambridge) GREEN]
[(Cambridge) to (Ottawa) GREEN]
[(Hamilton) to (Waterloo) RED]
[(Hamilton) to (Waterloo) YELLOW]
[(Waterloo) to (Toronto) RED]
[(Waterloo) to (Hamilton) RED]
[(Waterloo) to (Hamilton) YELLOW]
[(London) to (Kingston) YELLOW]
[(Kingston) to (London) YELLOW]
Please enter your command :
```

- **Screenshot showing the remaining stations in the system**

```
Please enter your command :7
Brampton
Kitchener
Peterborough
Toronto
Oshawa
Ottawa
Cambridge
Hamilton
Waterloo
London
Kingston
Please enter your command :
```