Course : TIE-20106
Student No.292119
Name : Nghia Duc Hong
File attach : - perftest-all with personal computer.txt
- perftest-all with remote desktop.txt

Function	Asymtotic complexity
all_routes()	O(h), h is number of routes
clear_all()	O(1)
add_route()	O(m), m is N.o stops of that route
routes_from()	O(h), h is N.o routes come to that stop
route_stops()	O(m), m is N.o stops of that route
clear_routes()	O(n). n is number of stops.
journey_any()	O(V+E)
journey_least_stop()	O(V+E)
journey_with_cycle()	O(V+E)
journey_shortest_distance()	O((V+E)logV)
add_trip()	O(m), m is N.o stops of that route.
route_times_from()	O(h), h is N.o routes come to that stop
journey_earliest_arrival()	O((V+E)logV)
add_walking_connection()	NO IMPLEMENT.

Space complexity : Θ(n)

The memory leak are from the previous phase that I pointed out that it is from main program.
Describe datastructures use for phase 2:
- Every point is added two more containers:
  + next_stop : this is a multimap have the keys are the pointers point to the next_stop of this stop, the values are the pair of RouteID and distance between two stops.
  + stop_time : this is a multimap have the keys are the pointers point to the next_stop of this stop, the values are the tuples contain RouteID, depart time and arrival time.
- Every point is added variables:
  + a previous_node is a stop pointer which point to the previous node that can access to the current node.
  + Color : this color is a pointer points to a color. We use a share pointer because after a function that changes colors of stops, then we have reset_color() function is that we actually change value of gray and

black to white, while we introduce a new pointer that have value of gray and black, and theyre self destructed. Because we only care about the color, after every function, we change gray into white and black into white.

+ Distance d : this is the distance that we use for Dijkstra's algorithm that shows the current distance of this stops to the initial one.

+ arrival_time : this is the earliest arrival time to this stop from the start time and a node use in Dijkstra's algorithm in journey_earliest_arrival();

An unoredered_map havs keys are RouteIDs point to vector containing all of StopIDs;

Testing :

Testing "read "example-all-in.txt" "example-all-out"" works, there is no different in the test.

Perftest : perftest-all.txt with PERSONAL COMPUTER and REMOTE DESKTOP :

- perftest-all with personal computer.txt
- perftest-all with remote desktop.txt