LINFO2365 project - Dial-A-Ride
version 1.0

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1 Problem formulation

The goal of this project is to find a path for a fleet of vehicles transporting passengers. Each passenger is represented by 2 nodes (a pickup and a drop) and must be transported from its pickup until its drop by a vehicle. To transport them, all vehicles depart from a depot and visit the nodes to embark and disembark people, before returning to the depot within a given time limit.

Below is a representation of the problem with 2 vehicles and 3 passengers

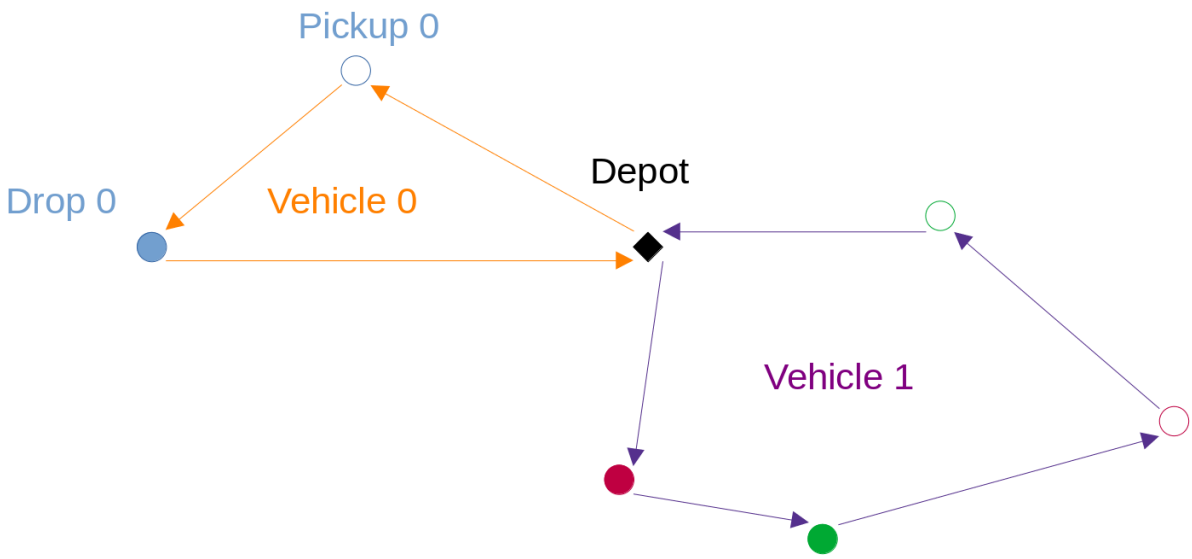

Figure 1: Path for 2 vehicles and 3 passengers

1.1 Constraints

Here are the constraints that must be respected to provide a valid route:

- Each node must be visited before the end of its time window (`window_end`) ;
- Each passenger cannot stay in the vehicle longer than `maxRideTime` time units ;
- A vehicle cannot ride for more than `maxRouteDuration` time units ;
- Each vehicle has a limited capacity: it cannot exceeds `capacity` (and must always be above 0) ;
- All passengers must be transported

The objective consists of minimizing the traveled time of all vehicles.

2 Checking your model

Writing a correct model can be hard. To be sure that you find valid solution, you can use the `compute` method from the `DialARideSolution` whenever you find a solution to ensure that it is valid. To encode a solution, please refer to the specifications available from within the class.

You should consider testing your model on the instance custom0 first, as it is the easiest one to solve.

3 Grading

The grading for the project will be done on a oral evaluation. Nevertheless, the objective values that will be able to reach on the instances will play a part in your grade. Here is a list of objective values that you should be able to reach for the instances:

Instance	Threshold 1	Threshold 2
custom0	15 500	15 000
custom1	23 000	22 500
custom2	24 500	24 000
custom3	9500	9000

Table 1: Expected thresholds

The thresholds indicates what would have been the grade if the project was evaluated on its own, without an oral examination. For each instance, finding a feasible solution would give you 7/20 for the instance, reaching the first threshold 12/20 and reaching the second threshold 14/20 or more. Again, this type of grading will not directly intervene here but the thresholds should give you an idea of the expected objective values.

The objectives are reachable within 4 CPU minutes.

Beware that even finding a first feasible solution is rather difficult. You should consider several search strategies for finding a first correct path for your vehicles.

4 FAQ

Can I use different values of parameters / heuristic depending on the instance? Yes.

Can I hard-code a solution into my code? No.

I don't reach the same objective on INGInious and on my own computer, how is it possible? We run your code on a server, which might be a bit slower / faster. However all thresholds are reachable using the server!

Can I share some code with other teams? No, as for the rest of the course. However, *you can of course discuss strategies and approaches*, but we don't want to see the same code in several teams. **We will run anti plagiarism tools on your submissions and if you plagiarize you will be rewarded with a 0/20 for the whole course (and possibly have even more problems)**.

INGInious does not seem to accept my submission. Please verify that you output your solution to stdout and that it is correct. We use our own checker whenever you give a solution: it verifies that your solution is valid and compute the cost. If you don't print to stdout, we cannot parse your solution and cannot give you a score. Use the provided `DialARideSolution` class to ensure that everything is fine!

I don't find a piece of information for the project Try the following steps, *in this order*

1. Re-read the statement
2. Read the corresponding task on INGInious
3. Read the specifications within the `DialARide.java` file
4. Contact me on Teams or by e-mail.