Instance format specification

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Note

This document details the file format used for MPVRP-CC problem instances. These specifications are essential to ensure interoperability between the instance generator, solvers, and verification tools.

1 File format

Instances are stored in text files with the `.dat` extension.

1.1 Naming convention

The filename encodes the main characteristics of the instance:

`MPVRP_A_B_sC_dD_pE.dat`

Field	Description
`A`	Instance category: `L` for large, `M` for medium, `S` for small
`B`	Unique instance number (e.g., 001, 002)
`C`	Number of service stations (customers)
`D`	Number of depots (loading points)
`E`	Number of different product types

2 Internal file structure

The file is structured in sequential data blocks. Values are separated by spaces or tabs.

2.1 UUID (line 1)

The first line contains a unique v4 UUID generated for each instance:

```
# c01ab718-9a2c-4a7d-bb95-f37e2a389409
```

This identifier ensures global uniqueness of the instance and allows tracing its origin.

2.2 Global parameters (line 2)

The second line defines the problem dimensions:

```
NbProducts NbDepots NbGarages NbStations NbVehicles
```

Example: `3 2 1 20 5` means:

- 3 product types to distribute
- 2 depots (loading points)
- 1 garage (vehicle base)
- 20 service stations (customers)
- 5 available vehicles

2.3 Transition cost matrix

This square matrix (size NbProducts $\times$ NbProducts) defines the cleaning cost required to switch from one product to another in the truck's tank.

```
Cost_P1->P1 Cost_P1->P2 ...
Cost_P2->P1 Cost_P2->P2 ...
...
```

The value at row i and column j is the cost to switch from product i to product j. The diagonal is generally zero (no cost to keep the same product).

2.4 Vehicle fleet

Each line describes an available vehicle:

```
ID Capacity HomeGarage InitialProduct
```

2.5 Depots (loading points)

Each line defines a depot:

```
ID X Y Stock_P1 Stock_P2 ... Stock_Pp
```

Field	Description
`ID`	Unique vehicle identifier
`Capacity`	Maximum transportable volume
`HomeGarage`	ID of the assigned garage
`InitialProduct`	Initial tank configuration

- `X, Y`: Geographic coordinates
- `Stock_Pi`: Available quantity for product i

2.6 Garages (bases)

Each line defines a garage:

```
ID X Y
```

Garages serve only as departure and arrival points for routes.

2.7 Service stations (customers)

Each line defines a station and its needs:

```
ID X Y Demand_P1 Demand_P2 ... Demand_Pp
```

- `Demand_Pi`: Required quantity for product i
- A demand of 0 means the station does not need this product.

3 Complete example

```
# c01ab718-9a2c-4a7d-bb95-f37e2a389409
2 1 2 3 2
0.0 18.1
61.5 0.0
1 20000 1 1
2 20000 1 2
1 81.6 63.6 57914 82626
1 98.1 49.6
2 56.8 26
1 23.5 42.2 0 4278
2 3.5 38.3 1344 2350
3 56.7 31.3 0 2319
```

This example describes an instance with:

- 2 products
- 1 depot
- 2 garages
- 3 service stations
- 2 vehicles