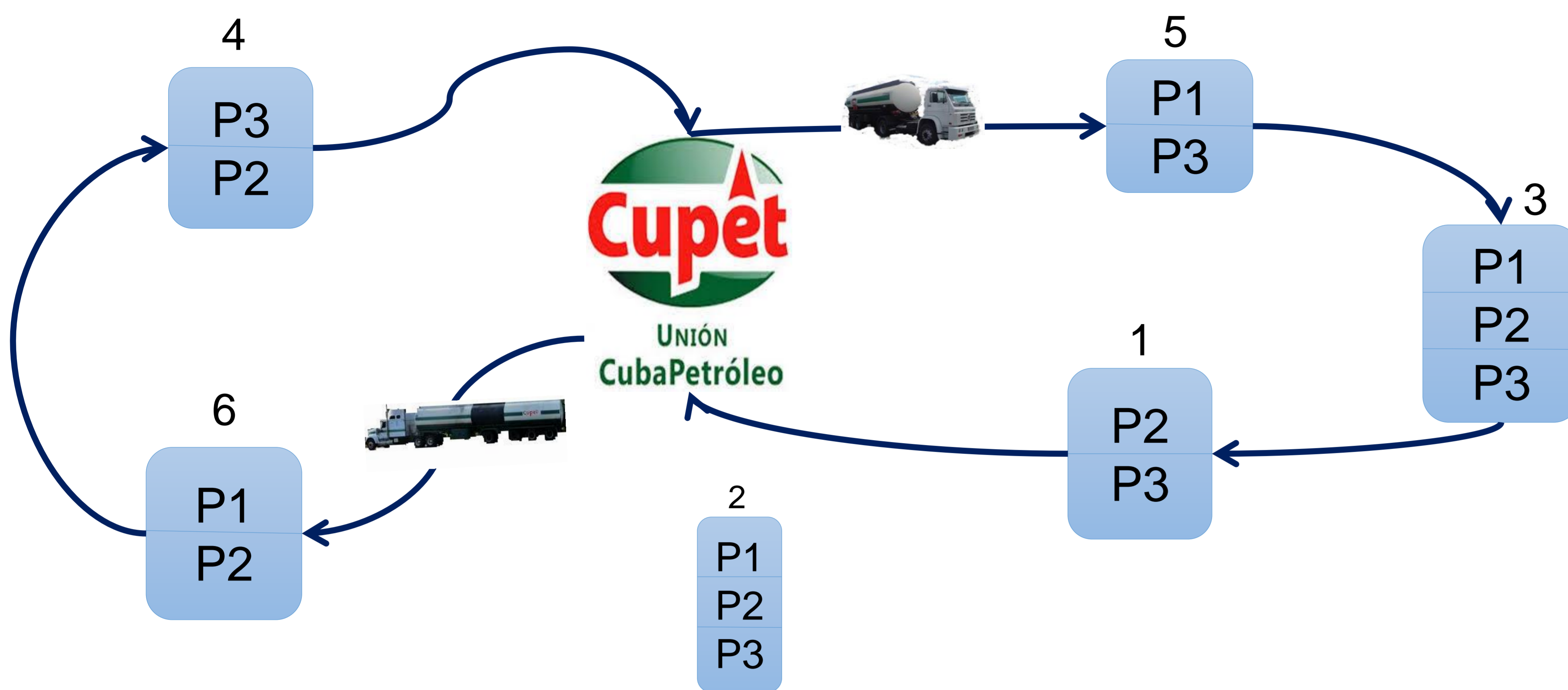


Problem Definition:



Products: $P = \{1, 2, \dots, p\}$.

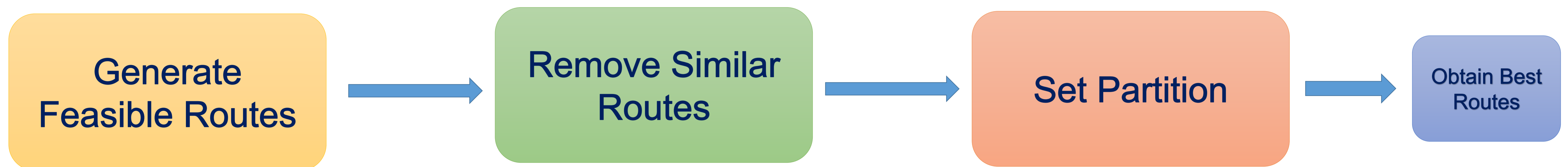
Clients: $I = \{1, 2, \dots, n\}$

- $0 \rightarrow$ central depot.
- $I^+ = I \cup \{0\}$
- $d_{ip}: i \in I, p \in P, \rightarrow$ client i demand of product p .
- $c_{ij}: i \neq j, j, i \in I^+ \rightarrow$ travel cost between clients.

Vehicles: $K = \{1, 2, \dots, m\}$

- $q^{kp} \rightarrow$ capacity of product p .
- $I^k, n \leq k \rightarrow$ clients that can be attended.
- $n^k \rightarrow$ number of travels.

Solution Strategy:



Generate Routes:

For every vehicle v_k :

- Assume that the number of travels is unlimited.
- Let I^k the set of clients that can be attended by the vehicle k .
- Separate the clients and create one client for every demanded product.

Variants of choosing the next candidate:

1. Select the client which insertion minimized the cost of the route.
2. Insert the nearest client.

Strategies	Advantages	Disadvantages
Greedy (Lower cost and Nearest)	Diversification	Overlapping
Greedy-Random $\alpha = [0,1]$	More diversification	Overlapping
Remove Overlapping	More diversification Not overlapping	Computational Cost

Routes Similar:

- Same vehicle.
- Serving the same customers (in any order).
- Supplying the same products to these customers.

Set Partition:

Models	Advantages	Disadvantages
Minimized Route Costs	Set of routes with less cost	It is forced to be served all customers It is not considered the amount of fuel
Maximized Client Priority	Set of route that contains higher priority customers	Ignores: Route costs Amount of fuel
Maximized Amount of Fuel	Exploit of vehicle capacity	Ignores: Route costs Clients' priority
Maximized: Client Priority and Amount of Fuel	Unified two objectives	Choose scalars to weight the parameters values
Maximized: Client Priority, Amount of Fuel and Route Cost	Unified three objectives	Choose scalars to weight the parameters values

Results:

Products: 4

Vehicles:

- quantity: 20 – 50
- travels: 1 – 3

Clients:

- quantity: 50 – 200
- demand: 1000 – 3000

Models	Count Initial Routes	Count Non Similar Routes	Count Solution Routes	Total Cost	Client Attend	Total Fuel Served
Minimized Route Costs	1926	1702	28*	338853639*	606	1664027
Maximized Client Priority	1926	1702	29	1507860288	876*	2683495*

Vehicles: 29

Clients: 194