Multiple Depot Vehicle Scheduling Problem with controlled trip shifting

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Multiple Depot Vehicle Scheduling Problem

Trip Schedule				
Ligne A	9h00	9h10	9h20	9h30
Ligne B	9h04	9h19	9h34	9h49
Ligne C	8h55	8h15	8h30	8h45

Find a cheap vehicle assignement that covers all trips

Bus lines

Initial IP formulation

Master Problem

Initial IP formulation

Min $\sum cost$

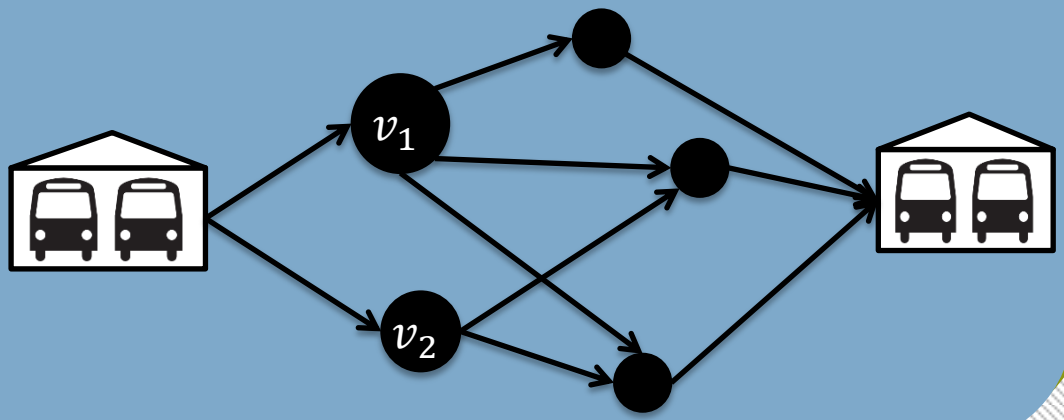
- Do all trips

- Respect depot capacity

Column Generation

Sub Problem

Create valid and cheap itineraries



MDVSP with trip shifting

Trip Schedule				
Ligne A	9h00	9h10	9h20	9h30
Ligne B	9h04	9h19	9h34	9h49
Ligne C	8h55	8h15	8h30	8h45

8h58
or
9h00
or
9h02

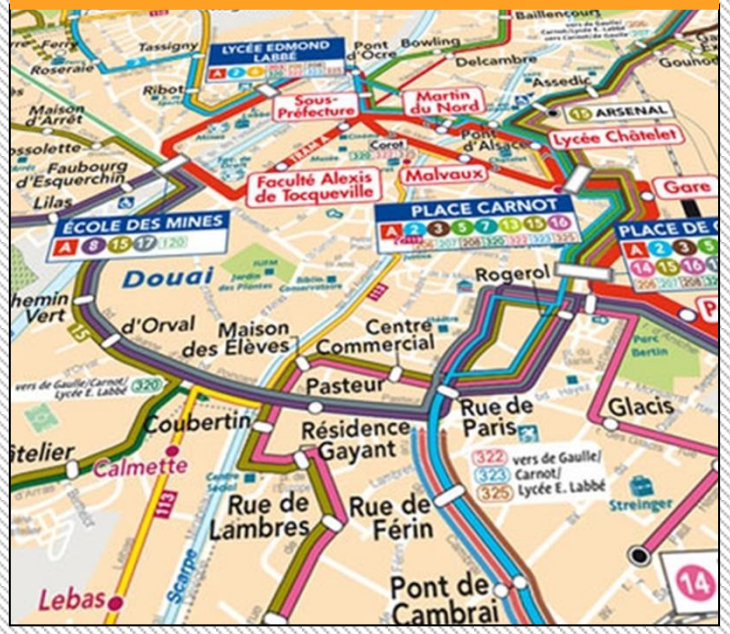
Bus lines

MDVSP with controlled trip shifting

Trip Schedule				
Ligne A	**9h02**	**9h08**	9h20	9h30
Ligne B	9h04	9h19	**9h32**	9h49
Ligne C	8h55	**8h12**	8h30	**8h47**

- **Initial schedule**
- **Regular Headway**
- **Connections**

Bus lines



Initial IP formulation

Column Generation

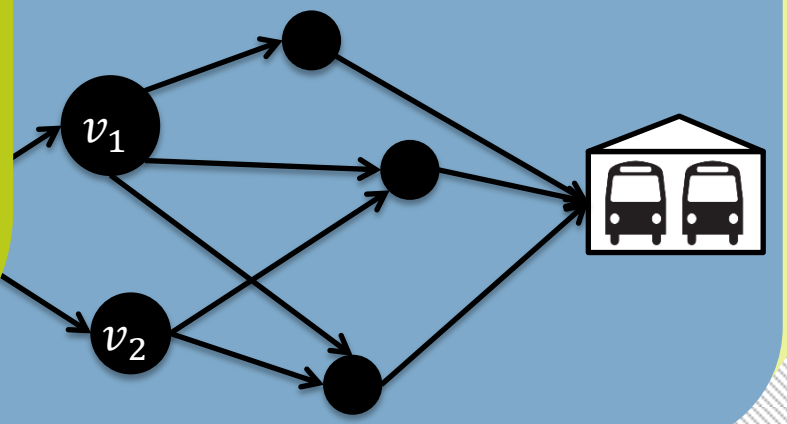
Master Problem

$$\text{Min} \sum cost$$

- Do all trips
- Respect depot capacity
- Respect headways…
- Respect connexions…
- Other constraint….

Sub Problem

valid and cheap
ies



Master Problem

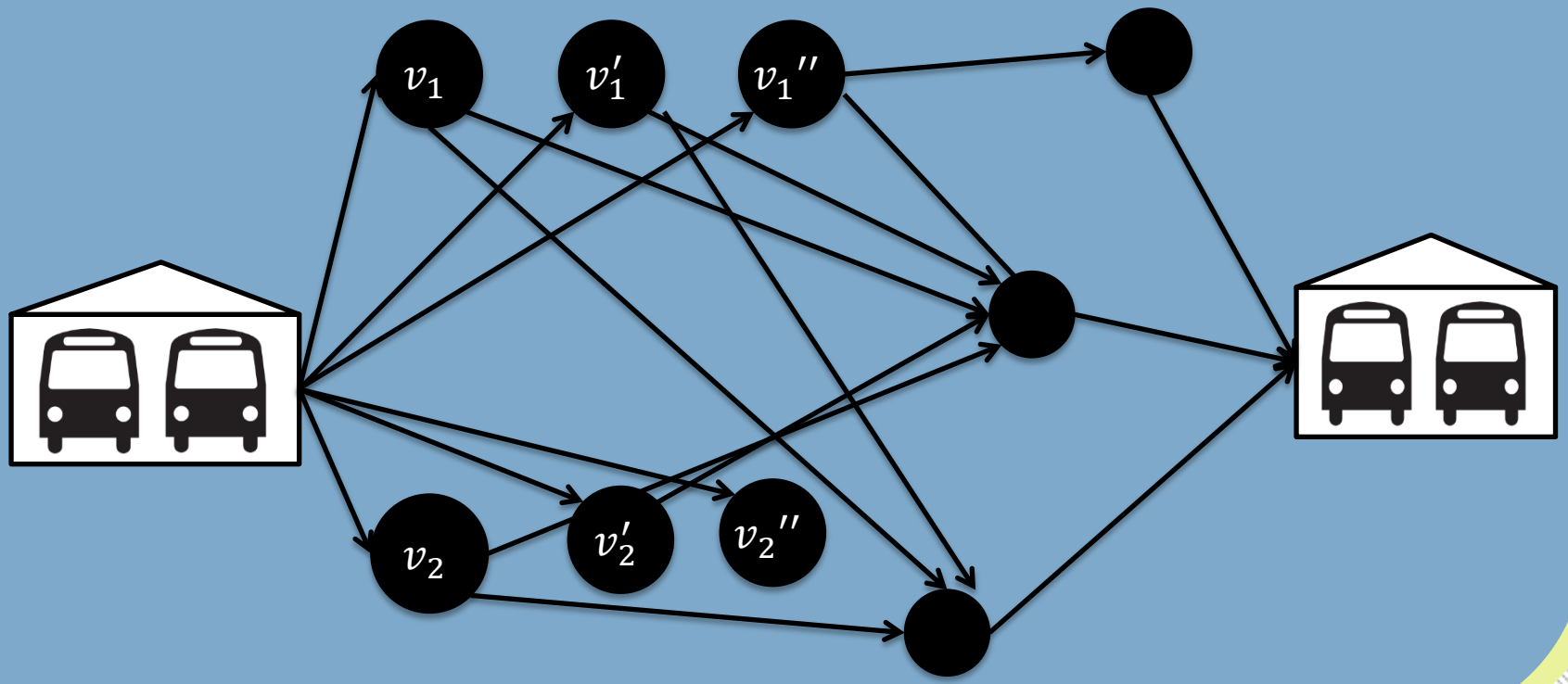
Initial IP formulation

Column Generation ☹

$\mathbf{Min} \sum \boldsymbol{cost}$

Sub Problem

Create valid and cheap itineraries



Initial IP formulation

Master Problem

Min ∑

Generation ☹

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