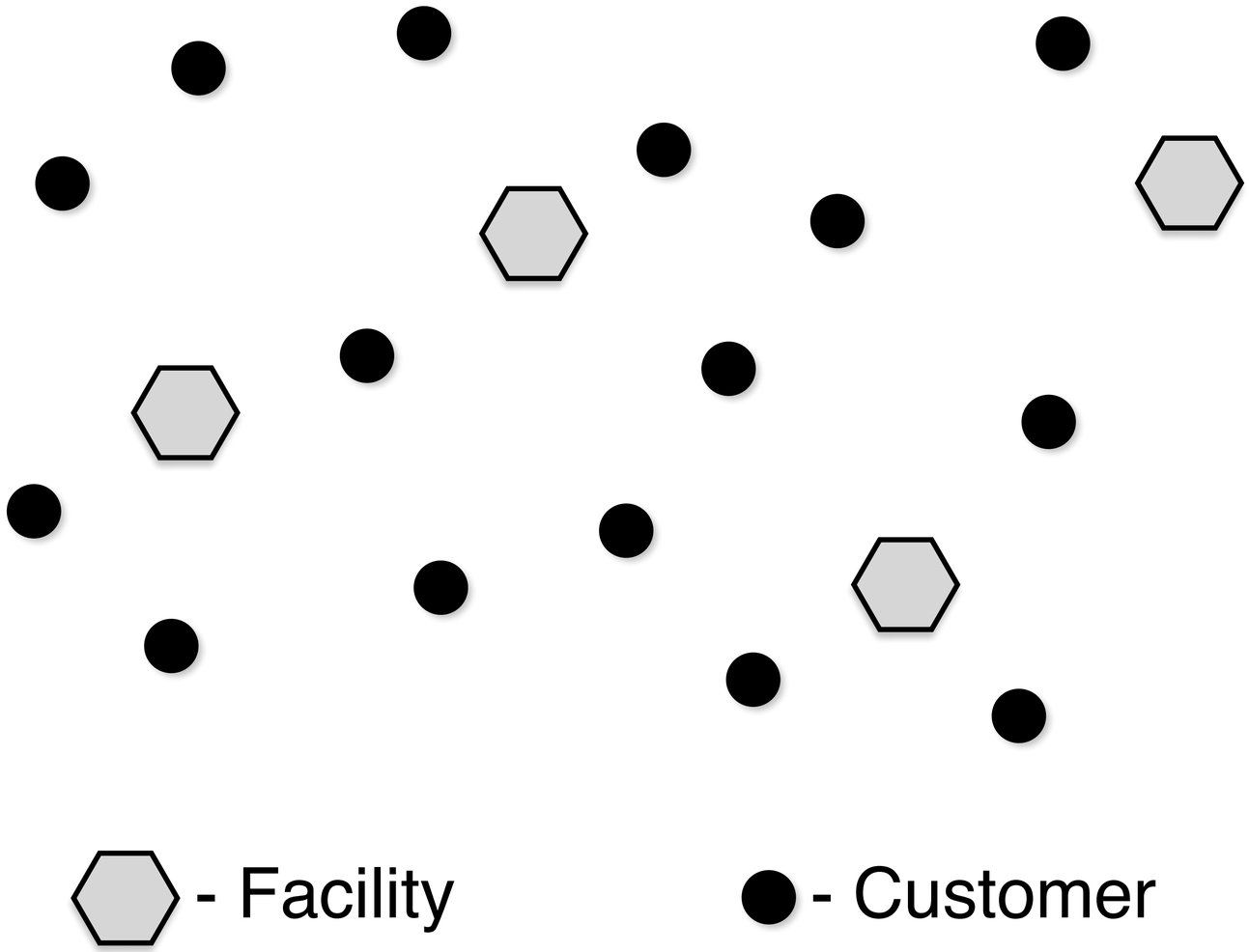
Discrete Optimization

Assignments: Facility Location

Facility Location



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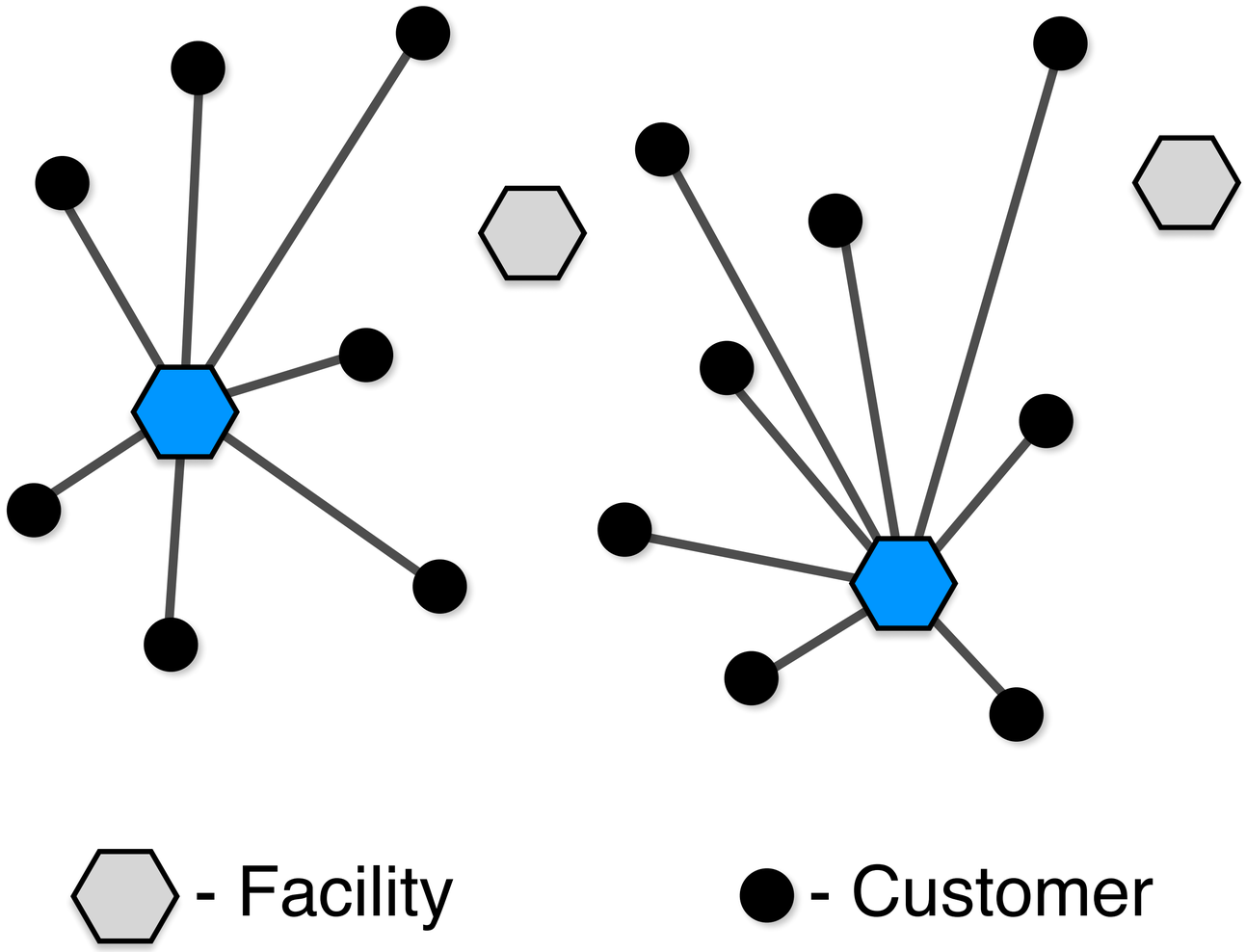

Facility Location

- *n* Facilities, *m* Customers,
- Customer demand d_c
- Facility costs s_f and capacity cap_f
- Facility-Customer cost *dist(f,c)*
- a_f the customers allocated to Facility *f*

$$\text{minimize:} \quad \sum_{f \in N} \left((|a_f| > 0) s_f + \sum_{c \in a_f} dist(f, c) \right)$$

$$\text{subject to:}$$

$$\sum_{c \in a_f} d_c \leq cap_f \quad (f \in N)$$

$$\sum_{f \in N} (c \in a_f) = 1 \quad (c \in M)$$

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Input

```
|N| |M|
s_0 cap_0 x_0 y_0
s_1 cap_1 x_1 y_1
...
s_|N|-1 cap_|N|-1 x_|N|-1 y_|N|-1
d_|N| x_|N| y_|N|
d_|N|+1 x_|N|+1 y_|N|+1
...
d_|N|+|M|-1  x_|N|+|M|-1 y_|N|+|M|-1
```

Output

```
obj opt
c_1 c_2 c_3 ... c_|M|
```

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Input

```
3 4
100 100 1065.0 1065.0
100 100 1062.0 1062.0
100 500    0.0    0.0
50 1397.0 1397.0
50 1398.0 1398.0
75 1399.0 1399.0
75  586.0  586.0
```

$a_0 = \{2\}, a_1 = \{0, 1\}, a_2 = \{3\}$

Output

```
2550.013 0
1 1 0 2
```

Assignment Tips

- See Warehouse Location in the lectures
- Different Formulations
- Different Approaches
  - Local Search
  - Branch and Bound
- *FAST* neighborhood computation

Have Fun!