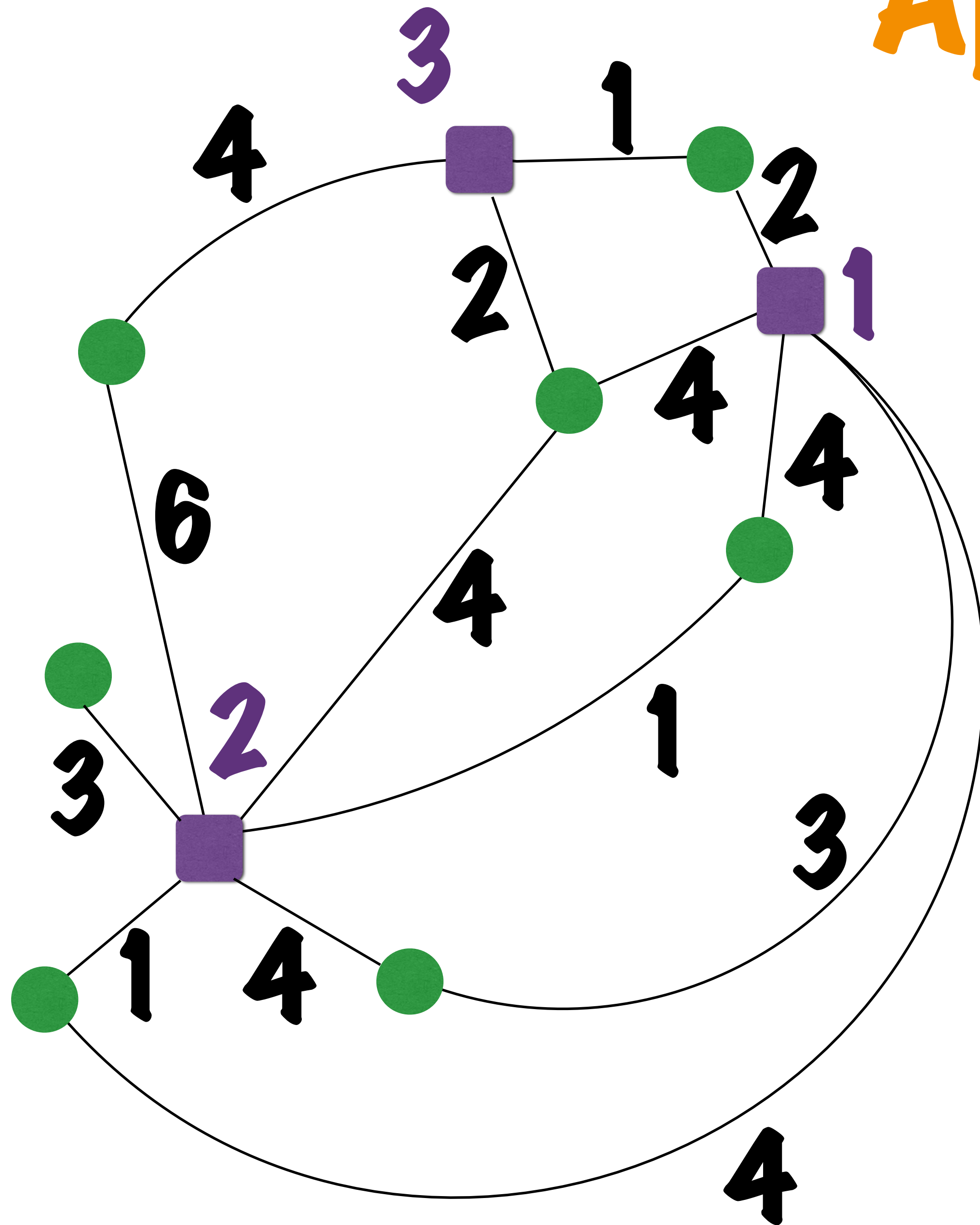# Facility location
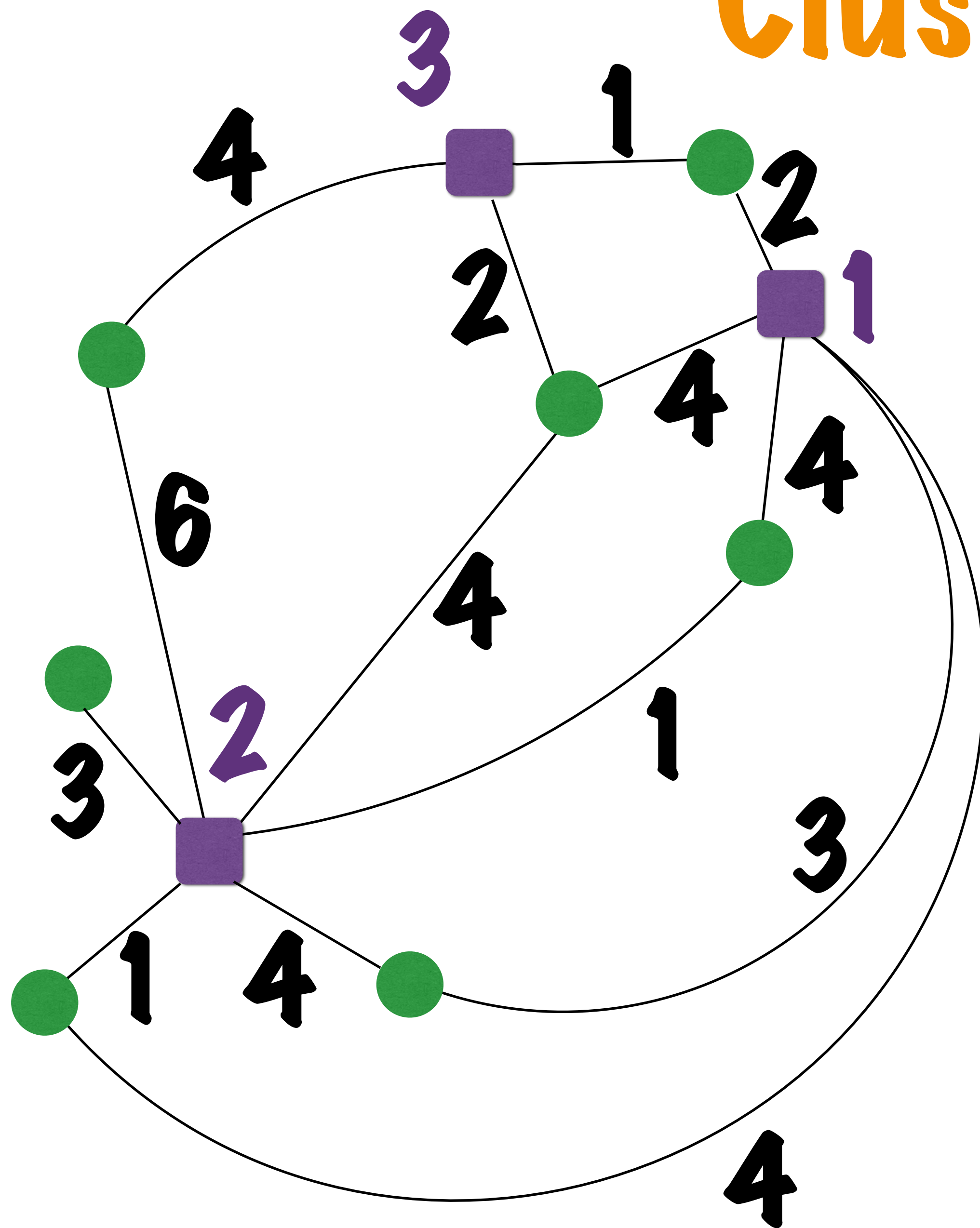
Appears in...

Deciding placements of factories, warehouses, schools, hospital. Deciding how to place servers on the web

# Clustering clients

## Input

A bipartite graph G with bipartition F (for facilities ■), C (for clients ●).

$f_i$ : Cost of opening facility i

$c_{ij}$ : Distance from client j to facility i

# Clustering clients

## Input

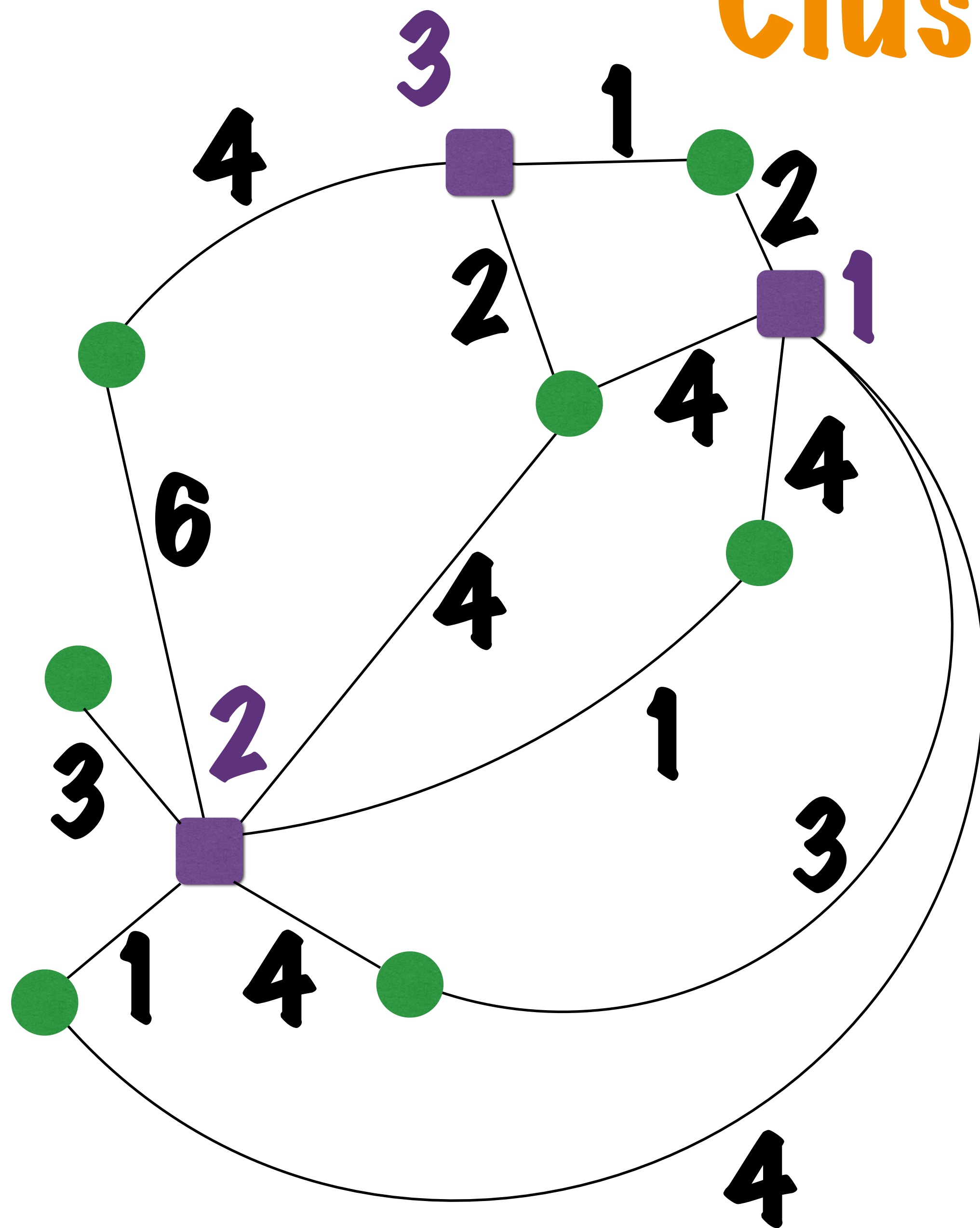A bipartite graph G with bipartition F (for facilities ▪), C (for clients ●).

## Output

Choose a set S of facilities

**minimize** :
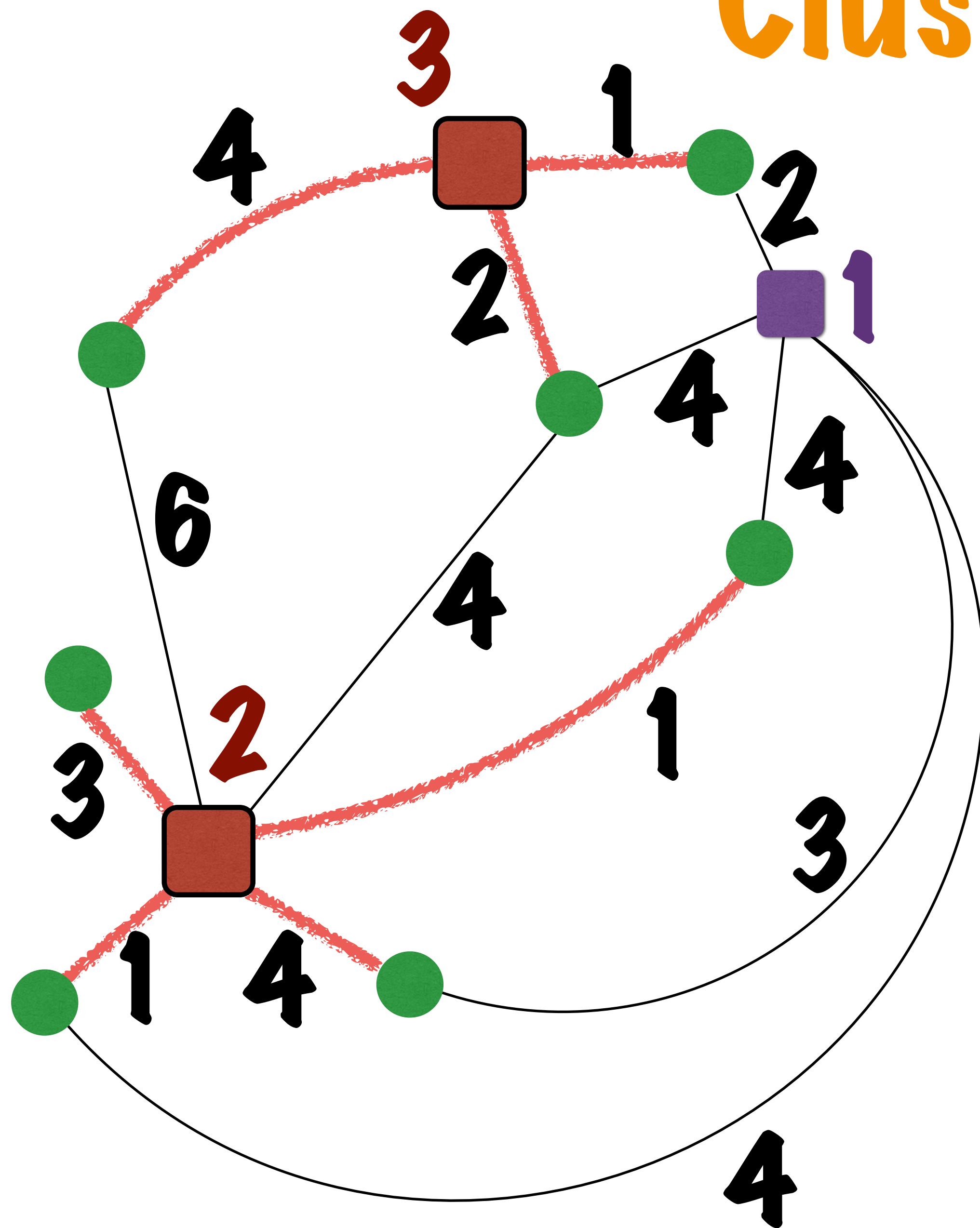
cost of the facilities of S

plus

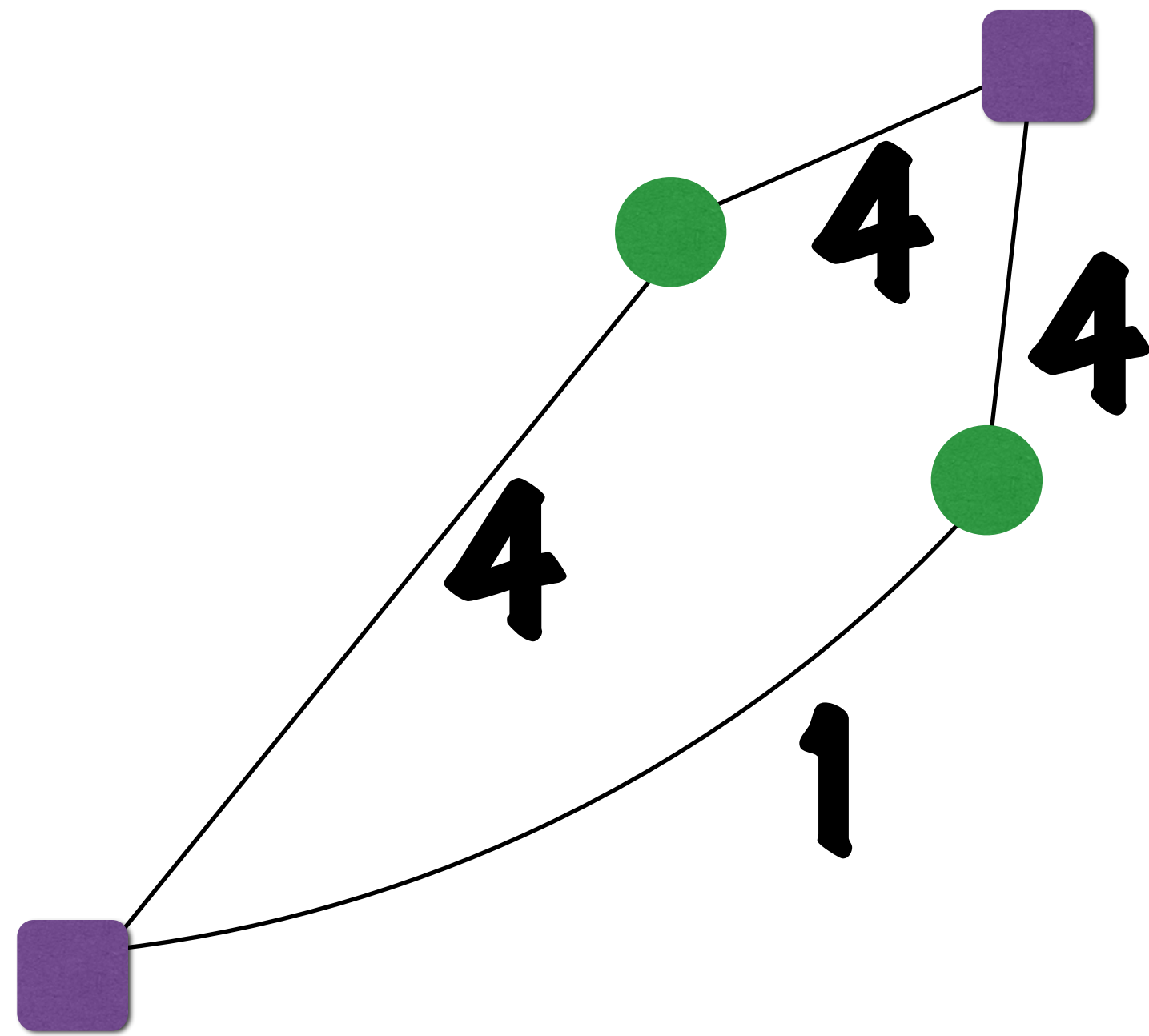the distances from each client to the closest facility of S

# Clustering clients



Facility cost = 3 + 2 = 5

Clients cost = 4 + 1 + 2
+ 1 + 4 + 1 + 3 = 16

Total cost = 21

# Metric facility location



**Triangle inequality:**

$$c_{ij} + c_{j\ell} \geq c_{i\ell}$$

# Facility location