

January 2023 CSE 208

Online: Single Source Shortest Path

Time: 30 minutes

Subsection: A2

Mahir and Farhan are brothers. They live in two different islands I_1 and I_2 , respectively. Both I_1 and I_2 have several states, and some of them act as the port states of the islands. While going from I_1 to I_2 , one has to leave I_1 via one of its ports, then enter I_2 through one of its ports. The ports take some fixed toll charges when one wants to cross the port (both while leaving and entering). Help Mahir find the cheapest possible route to reach Farhan.

Input

Take input from a file. The first line will contain four space-separated integers $s1, r1, s2, r2$ denoting the number of states in I_1 , number of roads in I_1 , number of states in I_2 and number of roads in I_2 respectively. **All the roads are two-way.**

In the next $r1$ lines, there will be two space-separated strings (a_1, a_2) and one integer (c) denoting a road in I_1 . Here a_1 and a_2 denote the names of the two states the road is connecting, and c denotes the fixed cost to travel between a_1 and a_2 .

In the next $r2$ lines too, there will be two space-separated strings (a_1, a_2) and one integer (c) denoting a road in I_2 . Here a_1 and a_2 denote the names of the two states the road is connecting, and c denotes the fixed cost to travel between a_1 and a_2 .

The next line will contain an integer $p1$, denoting the number of port states in I_1 .

The following $p1$ lines will contain a string (a) and an integer (t). Here a denotes the name of the port state, and t denotes the fixed toll charge while crossing the port.

The next line will contain an integer $p2$, denoting the number of port states in I_2 .

The following $p2$ lines will contain a string (a) and an integer (t). Here a denotes the name of the port state, and t denotes the fixed toll charge while crossing the port.

The final line will contain two space-separated strings (s and d), denoting the names of states where Mahir and Farhan live, respectively. Here s is guaranteed to be in I_1 , and d is to be in I_2 .

Output

In the first line of the output file, print the minimum cost required to visit Farhan.

In the next line, print the names of states that Mahir should follow separating the names with " $->$ ".

See the Sample I/O for further clarification.

Sample I/O

Input File

```
8 12 9 13
Mis Flo 30
Vir Njy 50
Mis Cal 30
Cal Iow 90
Vir Flo 80
Njy Rho 40
Con Flo 10
Vir Mis 10
Mis Iow 50
Cal Vir 20
Con Iow 30
Vir Rho 40
Fl Ar 40
Ox Na 10
Ar Ox 30
Io Li 50
Cl He 20
Fl Ox 80
Na He 60
Ar Na 100
Ox Li 80
Cl Na 50
Ar Br 10
Io He 20
Li Na 30
3
Njy 50
Iow 70
Flo 20
4
Fl 10
Cl 30
Br 20
Io 40
Cal Na
```

Output File

```
150
Cal -> Mis -> Flo -> Br -> Ar -> Ox -> Na
```