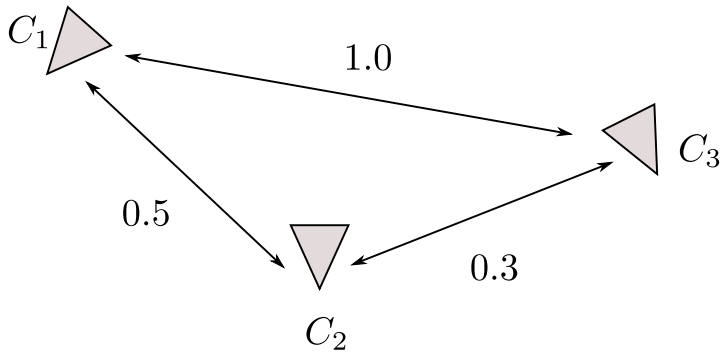
Problem 1: Ray of Light

A common task in computer vision is to calibrate a camera array. One way to do this is to take pairs of cameras, find their location and orientation relative to each other, and compute re-projection error values (measured in pixels) by projecting features from one camera into another. To finish calibration, we need a common frame of reference. This is is typically defined in terms of the camera in the array which has the minimal summed re-projection error relative to all other cameras in the array, where errors may be expressed as concatenations of pairwise errors. For example, consider the following scenario:



There are two ways to compute the re-projection error of camera C_1 relative to camera C_3: directly, or through camera C_2. Notice that the error is smaller when taking the indirect route (0.8 pixels) than when taking the direct route (1.0 pixel).

Write a program which, given a description of m pairwise re-projection errors for an array of n cameras, computes and outputs the reference-frame camera c that satisfies the following two conditions: (1) the maximum re-projection error between c and any other camera is less than one pixel, and (2) the sum of all re-projection errors between c and the other cameras in the array is minimized. Your input will be an $(m+1)$-line textfile, in which the first line contains the values of n and m and each of the subsequent m lines describes a pairwise re-projection error as a triplet of numbers (i, j, e), where i and j are camera indices and e is the the error between these two cameras. Camera indices are in the range 0 to $(n-1)$ inclusive. If two or more cameras satisfy the conditions given above, output the camera with the smallest index. You may assume that all input files are formatted correctly.

Sample input #1 (available as file "test1a.dat"):

```
3 3
0 1 0.5
0 2 1.0
1 2 0.3
```

Sample output #1:

```
Reference frame camera: 1
```

Sample input #2 (available as file "test1b.dat"):

```
5 6
0 1 0.1
0 2 0.5
1 2 0.9
2 3 0.9
2 4 0.5
3 4 0.1
```

Sample output #2:

```
Reference frame camera: 2
```

Sample input #3 (available as file "test1c.dat"):

```
9 14
0 1 0.1
0 3 0.3
1 2 0.4
1 4 0.3
1 5 0.1
2 6 0.5
3 4 0.05
3 7 0.01
4 5 0.05
4 7 0.03
5 6 0.3
5 8 1.1
6 8 0.06
7 8 0.02
```

Sample output #3:

```
Reference frame camera: 4
```