

# ACM North Central North America Programming Contest

## November 10, 2001

### Problem 8: DOT

You are working for the Department of Transportation (DOT) in road repair. When a road is closed for repairs, the public would like the marked detour to be the *shortest* available combination of roads that allow travel from one side of the closed road to the other.

To simplify the data, roads will be identified by the towns they connect rather than the unique identifiers normally associated with roads.

The input data will contain a list of all roads and their lengths, followed by identification of the single road that is closed for repairs. Your program is to find the shortest detour that connects the two towns that were connected by the road that is now closed, and display the detour route by listing the towns in order along the detour route.

You may use either of the two towns previously connected by the closed road as the starting point, and then list the towns along the path to the other road. You are guaranteed that there will be an acceptable detour available. The sum of the lengths of the roads comprising the detour must also be displayed.

#### Input

The first line of input contains a single integer,  $N$ , that specifies the number of towns in the data. The next  $N$  lines contain the names of the towns, each on a separate line. Town names will be no more than 16 characters long, including any embedded blanks or other punctuation.

The next lines in the input contain information on the roads. Each line contains, in order, the name of the town at one end of the road, one or more blanks, the name of the town at the other end of the road, one or more blanks, and an integer giving the length of the road. Town names that contain embedded blanks will be enclosed in double quotes. For example, Coeur d'Alene would appear in this part of the input data as "**Coeur d'Alene**". The end of this part of the input is indicated by a line containing "EOD EOD 0" (without the double quotes, and with one or more blanks between the items).

Finally there will appear a number of lines, each of which specifies two towns. Each of these towns are at the ends of a road that is to be closed for repairs, one road at a time. Again, the names of these towns may be separated by one or more blanks, and the names may be enclosed in double quotes as required. For each pair of towns, assume that only the road connecting them is closed for repairs; all preceding roads may be presumed to have been repaired. That is, treat each pair of towns as identifying a single road that is to be closed for repairs, with all other roads available for use in the detour route. The end of the roads closed for repairs is indicated by the end of file.

#### Output

For each pair of towns specifying a road closed for repairs, display a line specifying the towns. Then, on separate lines display the towns along the shortest detour route, in order, starting with either end of the detour route. Finally, on a separate line, display the total length of the detour route. Leave one blank line between the output for each detour.

## Sample Input

14  
Coeur d'Alene  
Connell  
Coulee City  
Davenport  
Ellensburg  
George  
Leavenworth  
Moses Lake  
Pasco  
Ritzville  
Sandpoint  
Spokane  
Sprague  
Wilbur  
"Coeur d'Alene" Sandpoint 48  
"Coeur d'Alene" Spokane 35  
Connell "Moses Lake" 46  
Connell Pasco 38  
Connell Ritzville 45  
Connell Wilbur 99  
"Coulee City" George 55  
"Coulee City" Leavenworth 91  
"Coulee City" "Moses Lake" 52  
"Coulee City" Wilbur 35  
Davenport Sprague 36  
Davenport Wilbur 32  
Ellensburg George 42  
Ellensburg Pasco 108  
George Leavenworth 70  
George "Moses Lake" 31  
George Pasco 91  
Leavenworth Ellensburg 56  
"Moses Lake" Pasco 72  
"Moses Lake" Ritzville 42  
Ritzville Sprague 23  
Spokane Davenport 38  
Spokane Sandpoint 86  
Sprague Spokane 36  
EOD EOD 0  
"Moses Lake" "Coulee City"  
*End of file*

## Expected Output

Detour From Coulee City to Moses Lake  
Coulee City  
George  
Moses Lake  
Total distance: 86 miles