Flow trace-back algorithm

An algorithm that sorts out the orders from network flow results.

For each combination of product, treatment (eg. P11-I003), we have a network flow from source country to demand country for different demands. Each demand is a combination of (product, treatment, demand country, week and amount). For example, a demand looks like this:

Product: P11- Treatment: I003- Country: Italy- Week: 23- Amount: 2000

We have 5 different processing steps: Sourcing, Conditioning, Treatment, Forwarding and Delivery

The network flow for each product, treatment (eg. P11-I003) are given in a table format like below:

product	treatment	sent_from_cnt	to_processing_cnt	for_process	Week	Amount
P11	I003	-	AUSTRIA	Sourcing	1	2222
P11	I003	AUSTRIA	AUSTRIA	Conditioning	1	2222
P11	I003	AUSTRIA	SLOVENIA	Treatment	5	2222
P11	I003	SLOVENIA	CROATIA	Forwarding	14	1454
P11	I003	SLOVENIA	CROATIA	Forwarding	18	768
P11	I003	CROATIA	CROATIA	Delivery	21	1454
P11	I003	CROATIA	BOSNIA-HERZ.	Delivery	23	768

You are asked to trace back each demand to the source and generate results like below.

Process1	Cnt	Week	Amount	Process2	Cnt	Week	Amount	Process3	Cnt	Week	Amount	Process4	Cnt	Week	Amount	Process5	Cnt	Week	Amount	Demand
Sourcing	AUSTRIA	1	1454	Condition	AUSTRIA	1	1454	Treatmen	SLOVENIA	5	1454	Forwardin	CROATIA	14	1454	Delivery	CROATIA	21	1454	1
Sourcing	AUSTRIA	1	768	Condition	AUSTRIA	1	768	Treatmen	SLOVENIA	5	768	Forwardin	CROATIA	18	768	Delivery	BOSNIA-H	23	768	2

In the example above we have two demands. You can get the demands using the “for_process” column by checking

“for_process” == “Delivery”. The two demands in the example are:

Demand 1: Product: P11-Treatment: I003- Country: CROATIA-Week: 21-Amount: 1454

Demand 2: Product: P11-Treatment: I003- Country: BOSNIA-HERZ.-Week: 23-Amount: 768

For each demand you need to traceback and get all the information for processing steps like the example output above! For demand column you can assign a unique number to each of the demands in the input table.

But as you figured this is a very straight forward example, the network flow can be more complicated than that. In the data that we have provided you can find more difficult examples and the right outputs for some of them. You need to come up with a general algorithm to solve this problem. You may need more than one row for each demand when you trace back them as the amounts for processing may have been split among different countries.

In the excel file that has been provided you can see 5 different inputs. The right output for two of them has been provided for your reference.

This is a real problem and it’s not easy. Don’t worry if you couldn’t find the perfect solution that solves all the edge cases. After reviewing the challenge, please let me know, how much time you think you need to solve it and feel free to ask as many questions as you need to understand the problem.