Birla Institute of Technology and Science

Assignment - 1
First Semester 2021-2022
DISCRETE STRUC FOR COMP. SC. (CS F222)

MM: 30   **Date: 06/11/2021**

General Instructions:
1. **This is a group assignment. Each group must contain at most 3 members.**
2. **You must implement the following assignment using C language only.**
3. **Please refrain from plagiarising the code. We may additionally run a plagiarism checker and if your code is found to be plagiarised then it may incur some penalty.**
4. **We expect you to have a complete knowledge of whatever you have implemented in the assignment and your final scores will depend upon your ability to explain those concepts in the viva as well.**

In this assignment, you have to write a program that can answer some user queries based on the input relation data. The program will display various menus as shown in the figure 1. The user provides the option number as an input and the appropriate result is shown to the user.

The program takes a ".csv" file as an input. It contains data about websites and the links each website has along with the labels. If a website with label "A" has a link to website with label "B" then there is '1' present in the cell corresponding to the row of A and column of B, otherwise '0'.

For the consistency in the output of the programs, please note the following: -

1. For the queries which has a simple binary output "Yes/No", print a single string "Yes" or "No" in a new line. If you need to open a new menu after it, print that menu or else print the same menu again.

2. For displaying the results of queries which involve displaying the website name/names print a space separated string/strings in a single line.

3. For displaying/visualising the graph, you can use the function already implemented in the "visualiser.c" file. You need to represent your relation in a matrix format and write that to a ".csv" file. Then you can pass the name of your csv file as an argument to the function "plot". Please read the installation guide carefully in order to successfully run the function on your systems.

Note: Please refrain from using algorithms that fall outside the domain of this course. Also if you have learnt multiple algorithms for a problem, use the most optimised algorithm in your program.

Also please observe the "SampleInput.csv" File provided with this assignment. You must take input in the same format and also produce ".csv" files in the same format whenever you want to display it using the plot function.

Main Menu

1. Does every website has a link to itself?
2. Is it possible to always return back to the previous website from the current website in one step?
3. Does every website has all the links to the websites which are reachable from it?
4. Does there exist any website that contains a link to itself?
5. Is it impossible to return to the previous website from the current website in one step?
6. Is it impossible to return to the previous website from the current website in one step(excluding the cases where the current and previous website is same)?
7. Is it possible to divide the network into multiple pieces such that every website in a piece is reachable from every other website in that piece?
8. Is this relation an example of poset?
9. Exit

IF no

IF no

IF no

IF no

IF yes

IF poset

Menu 2

Do you want to visualise how the network will look if we add minimum links to satisfy the property? (If yes, display the graph, else return back to Main Menu)

Menu 3

Do you want to know the nodes in each piece? (List all the pieces and their corresponding websites else return to Main Menu)

Menu 4

1. Display the hasse diagram.
2. Display the website whose link is available in every website.
3. Display the website which has links of every website.
4. Display the websites that do not have links to any other website except itself.
5. Display the websites which can't be reached from any other website except itself.
6. Given some websites, display the websites which are reachable from all of them. (Take some input from user and display result)
7. Given some websites, display the websites from which you can reach all those websites. (Process similar to 5)
8. Is this relation an example of lattice?
9. Return to Main Menu

If lattice

Menu 5

1. Given two websites A and B, display the website which is reachable by both A and B and can also reach to all such websites that both A and B can reach.
2. Given two websites A and B, display the website which can reach to both A and B and is also reachable from all such websites which can reach to both A and B.
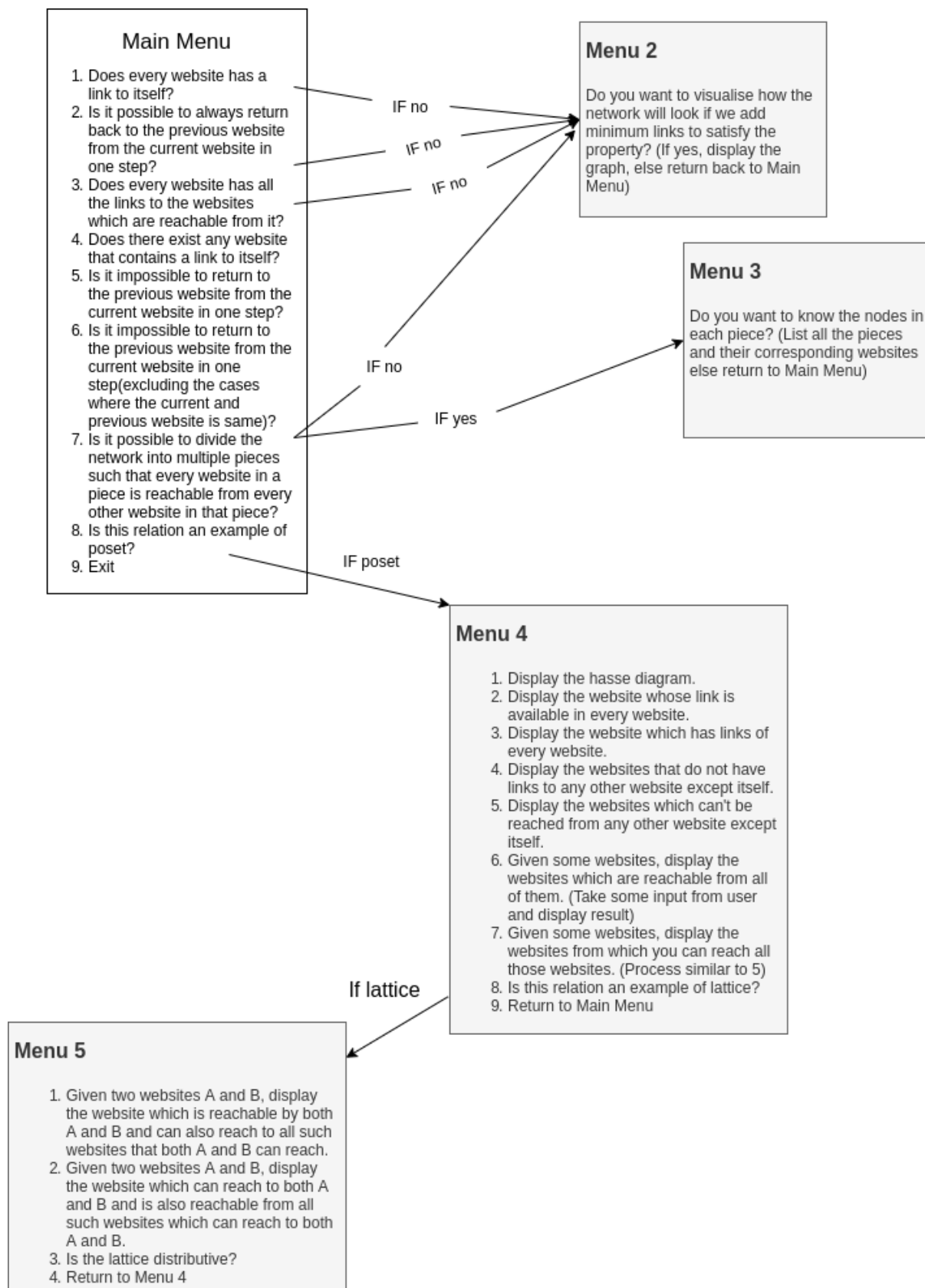3. Is the lattice distributive?
4. Return to Menu 4

Fig. 1 : Complete Layout of the Program output