

# CS 2110: Computer Programming Lab (Odd 2012)

## Lab 8

### Characterizing a Relation

Instructor - John Augustine

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#### Notes

- Your code must be written as **a single .c file**. Please compress the file (use `gzip -c lab8.c > lab8.c.gz`) before uploading it.
- Please follow the input/output format.

#### Problem Definition

Today's lab will help reinforce your understanding of relations that we discussed in the theory class. In particular, you will focus on relations defined on a single set. Your task is to read in a relation given to you as an adjacency matrix and report the following.

1. Is the relation an equivalence relation? If so, what are the equivalence classes?
2. Is the relation a partial order?

Apart from the above basic properties that you must report about, you will have to report one of the following.

1. Report the transitive closure of the given relation using Warshall's algorithm. See <http://chuck.ferzle.com/Notes/Notes/DiscreteMath/Warshall.pdf> for a reminder about this algorithm.
2. If the relation is a partial order, report a topologically sorted list of the partial order. Think of your own algorithm to solve this problem. It's OK if your algorithm is naive, but it should be correct. Avoid going to the Internet.

For this lab, you are allowed to remind yourself of the definitions by looking for them on the web. The wikipedia page ([http://en.wikipedia.org/wiki/Binary\\_relation](http://en.wikipedia.org/wiki/Binary_relation)) has most of the information. In particular, look under the section titled "Relations over a set." You may use the si

#### 0.1 Command Line Arguments

Your command line argument for this assignment is a single input file name.

## 0.2 The Input File Format

Each input file should contain one relation. The format is as follows. First you must have an integer  $n$  which represents the number of elements in the set on which the relation is defined. Given  $n$ , the  $n$ -element set is implicitly understood to be  $\{0, 1, \dots, n-1\}$ . Then, you will need to have a  $n \times n$  binary matrix. The following is an example.

```
4
1 0 0 1
1 0 1 1
0 0 0 0
0 1 0 1
```

## 0.3 Output Format

For this lab, you get a reprieve from strict output formatting. You must simply report all the required information in an understandable way.

## Uploading into MOODLE

Your code should be written as a single `.c` file. You must first compress the file using `gzip -c filename.c > filename.c.gz` and then the **compressed .gz file** must be uploaded into moodle. A link will be set up for this purpose in moodle.

## Your TA for this lab

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CS11B022 — CS11B032	Saurav Kant Jha
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