January 2022 CSE208: Data Structures and Algorithms II Sessional
Offline on Branch and Bound Algorithm

You are to implement a branch and bound algorithm for reducing a sparse matrix to its minimal band. A sparse matrix is one in which the majority of the elements are zero.

Input: The first line of the input file contains the number *n*, which indicates that the dimension of the sparse matrix is *n* by *n*. It is followed by *n* lines each containing *n* characters. If the character is "X", then it indicates a non-zero element. If the character is "O", then it indicates a zero element.

An example input file may look like:

4

X 0 0 X

0 0 X 0

X 0 0 X

0 X X X

Output: The first line of output file contains the number *b*, which indicates the bandwidth of the reduced matrix. It is followed by a print out of the reduced matrix.

2

X 0 0 0

X X X 0

0 0 X X

0 0 X X

For a detailed description of the algorithm, please refer to (1) band matrix algorithm.pdf and (2) band matrix algorithm example.pdf