

# LAB ASSIGNMENT 2

## *Submitter's Details :*

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Link to my github repository : <https://github.com/karan0299/CSN-261-ASSIGNMENT>

## PROBLEMS

### *PROBLEM-1*

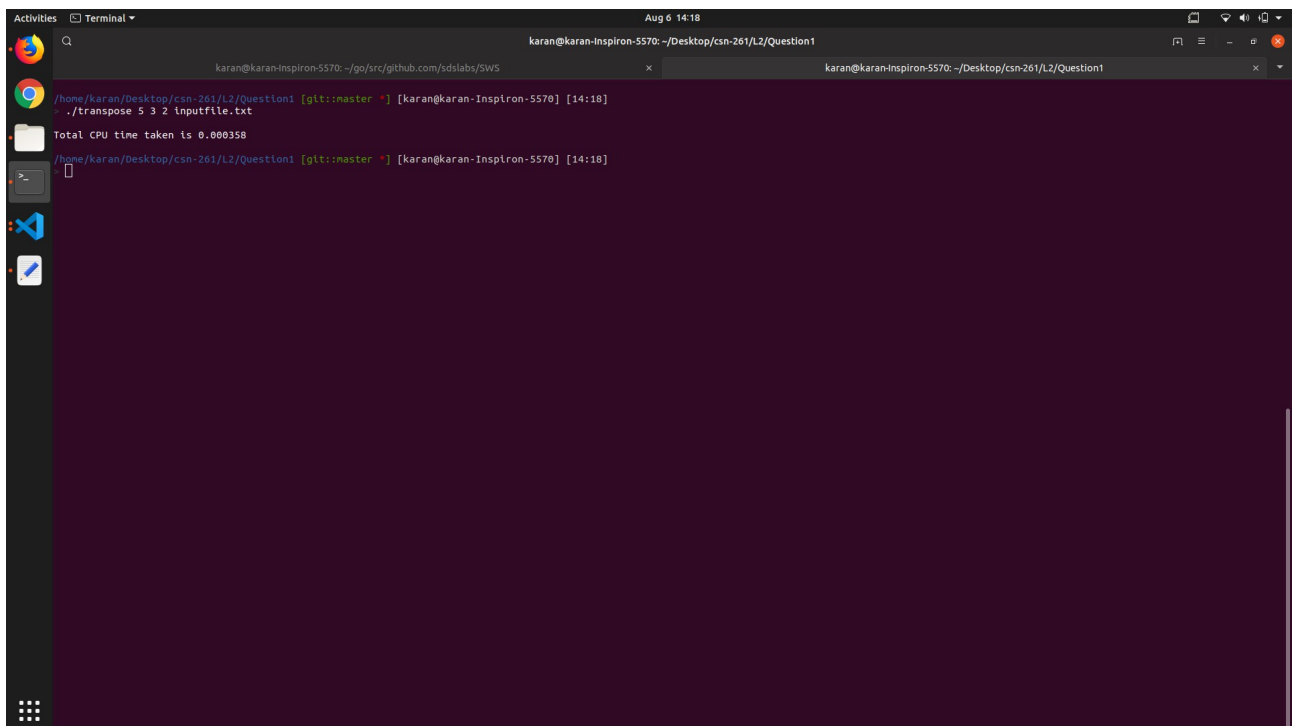
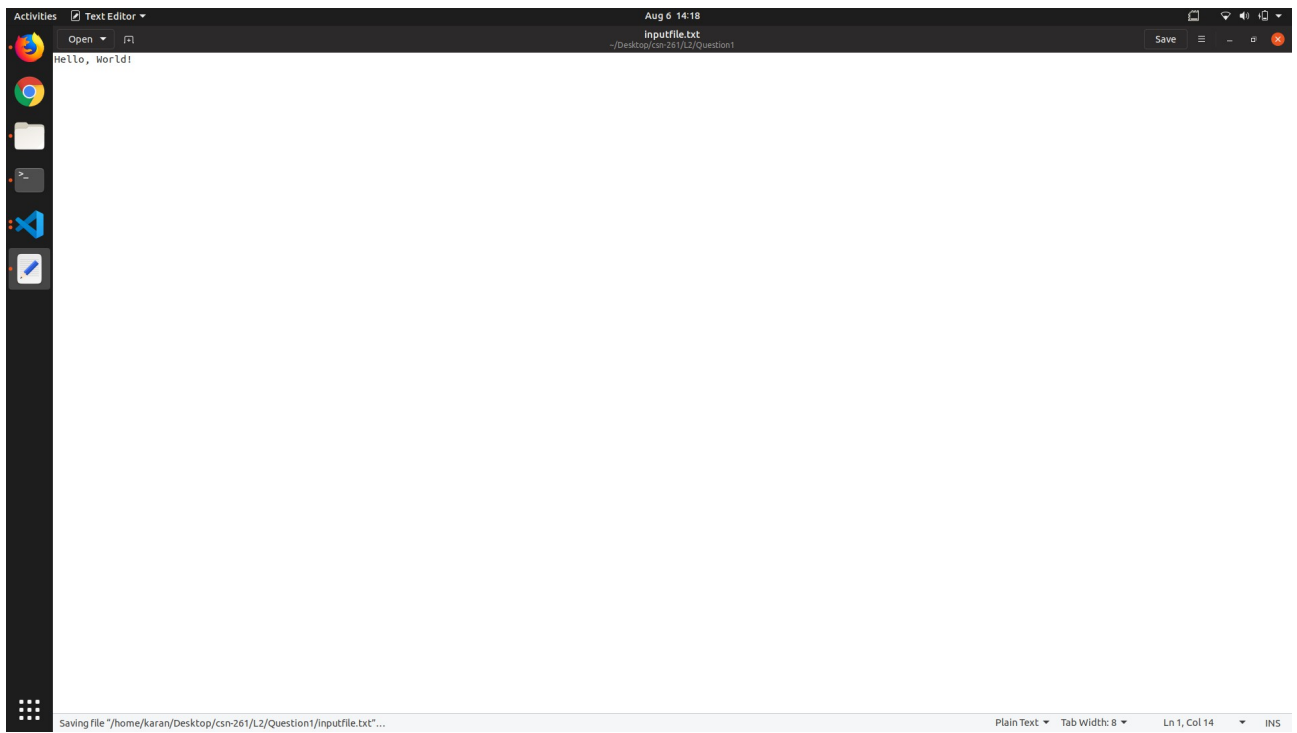
In this Problem, you have to implement a simple transposition cipher, where this cipher encrypts and decrypts a sequence of characters by dividing the sequence into blocks of size  $n$ , where  $n$  is specified by the encryption key. If the input text has a length that is not a multiple of  $n$ , the last block is padded with null characters ('\0'). In addition to  $n$ , the key also specifies two parameters  $a$  and  $b$ . For each block, the  $i$ -th output character, starting from 0 as usual, is set to the  $j$ -th input character, where  $j = (ai + b) \bmod n$ . For appropriate choices of  $a$  and  $b$ , this will reorder the characters in the block in a way that can be reversed by choosing a corresponding decryption key  $(n, a', b')$ .

Data Structures Used: i) Array 1d and 2d

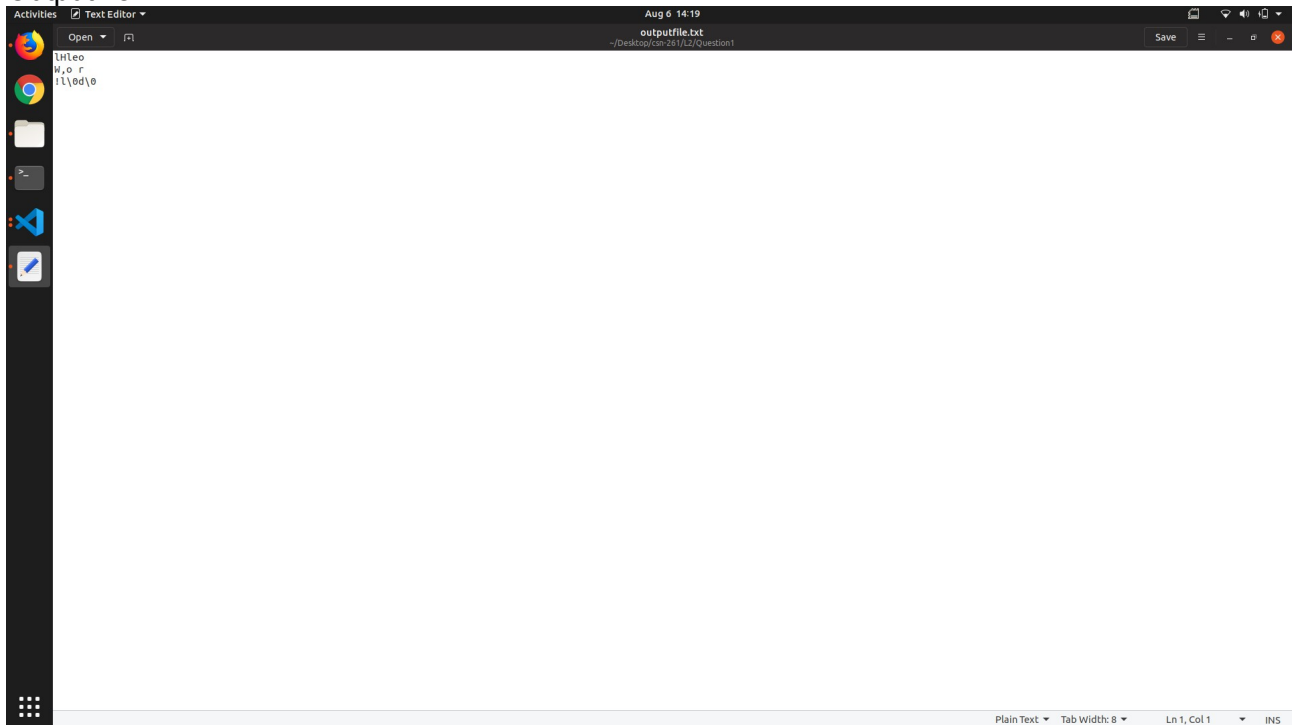
Algorithms Applied : i) Encryption  
ii) Finding Modular Inverse  
iii) Decryption Key Generation

ScreenShots:

inputFile :



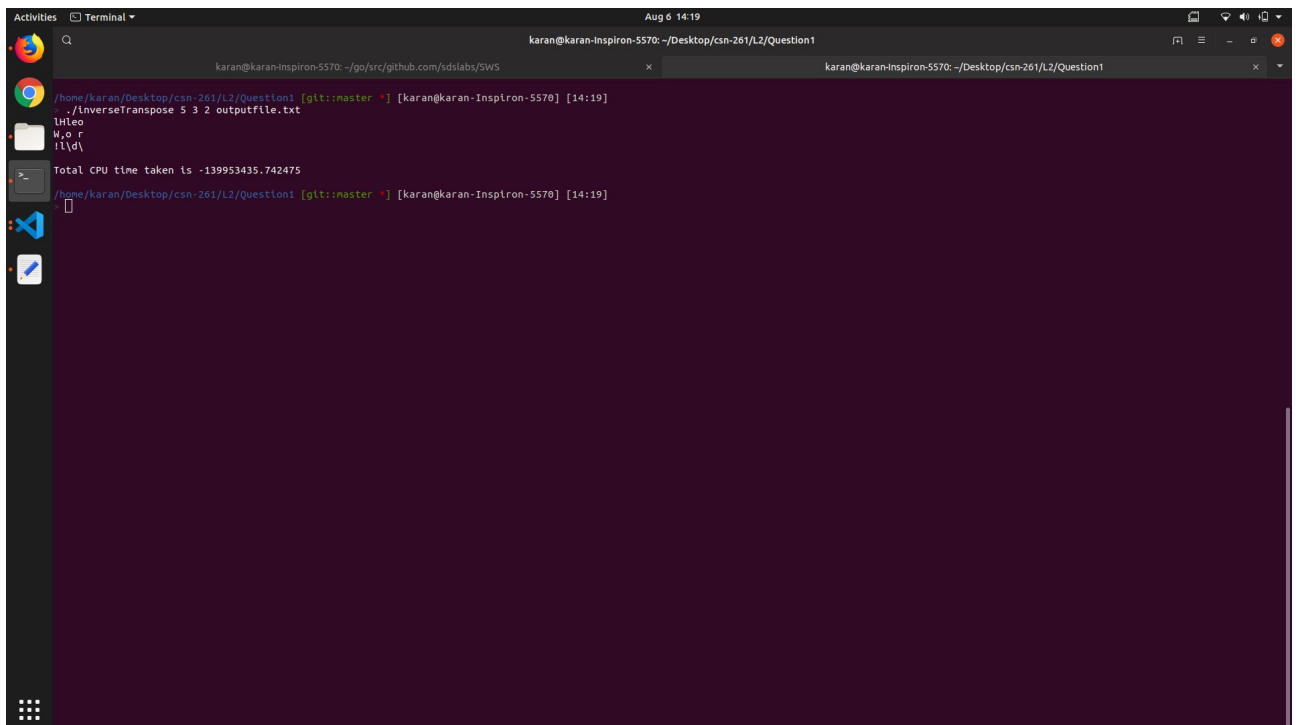
## Outputfile



The screenshot shows a text editor window titled "outputfile.txt" with the following content:

```
lHleo  
W,o r  
i\|o\
```

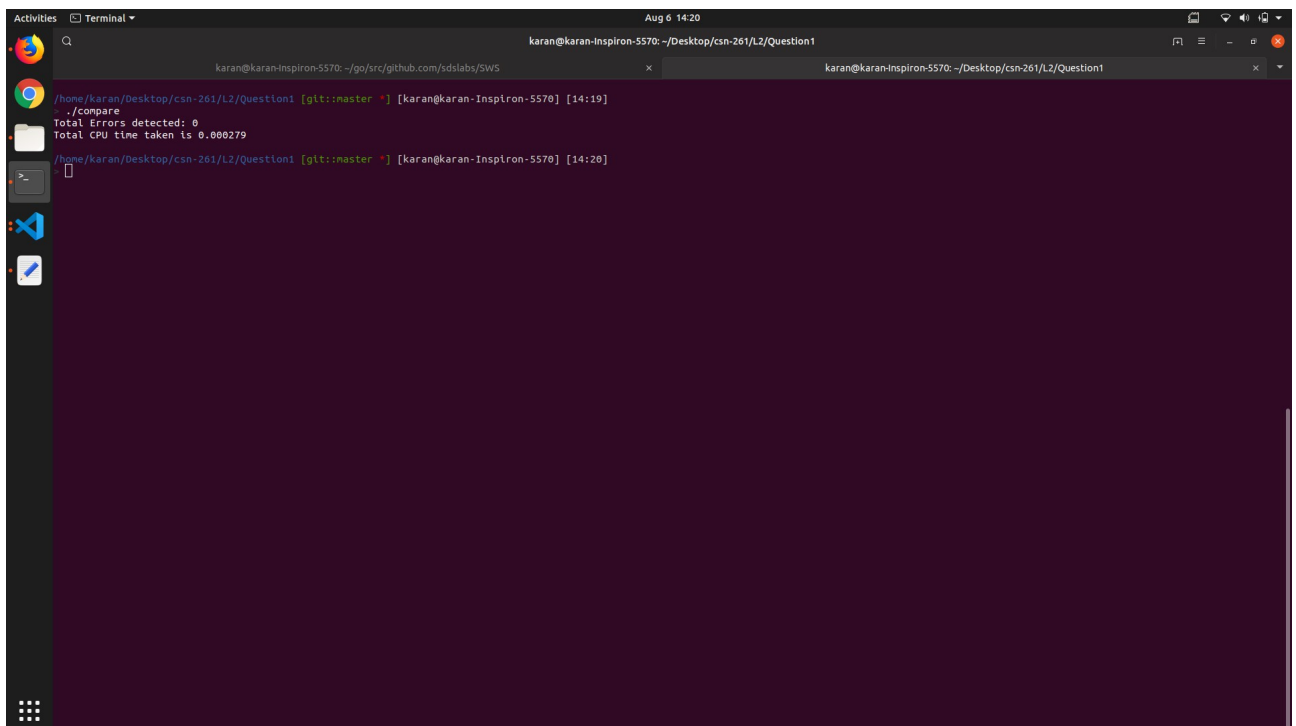
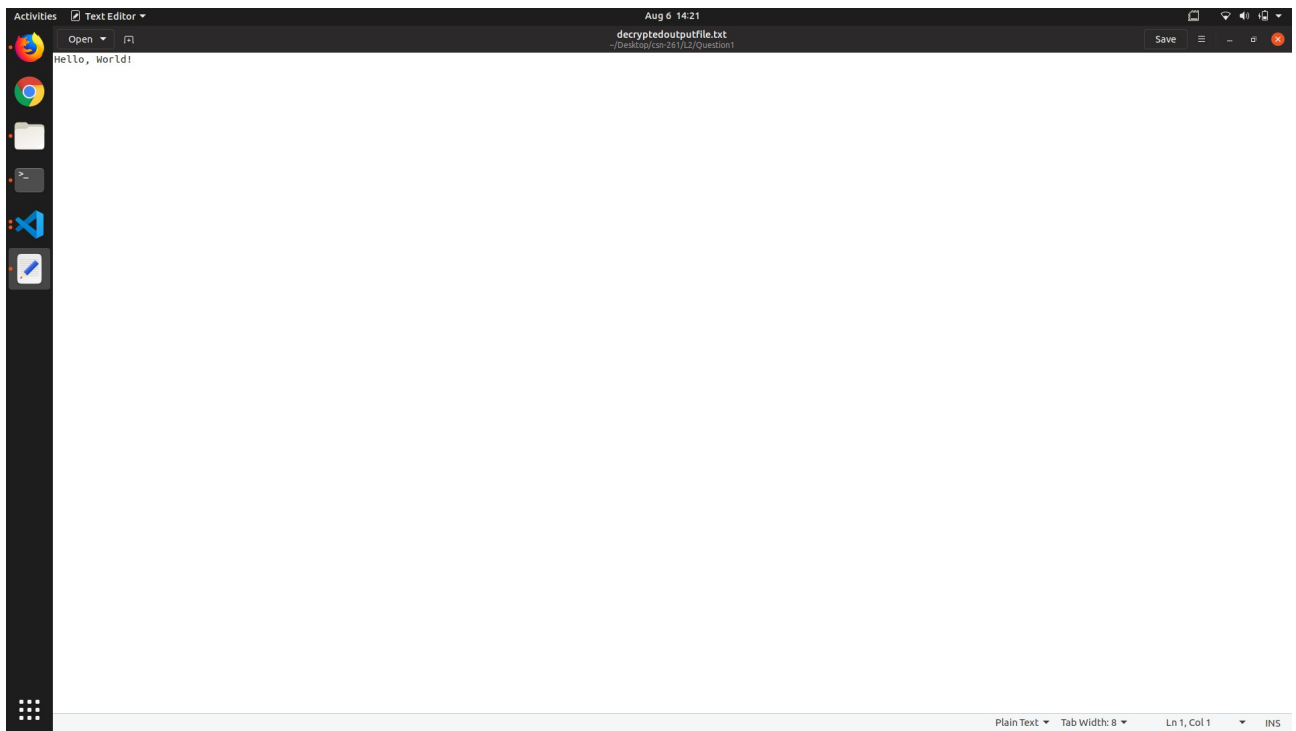
The window's status bar at the bottom indicates "Plain Text", "Tab Width: 8", "Ln 1, Col 1", and "INS".



The screenshot shows a terminal window with the following output:

```
karan@karan-Inspiron-5570: ~/Desktop/csn-261/L2/Question1  
karan@karan-Inspiron-5570: ~/Desktop/csn-261/L2/Question1  
/home/karan/Desktop/csn-261/L2/Question1 [git:master *] [karan@karan-Inspiron-5570] [14:19]  
- ./inverseTranspose 5 3 2 outputfile.txt  
lHleo  
W,o r  
i\|o\  
Total CPU time taken is -139953435.742475  
/home/karan/Desktop/csn-261/L2/Question1 [git:master *] [karan@karan-Inspiron-5570] [14:19]  
█
```

decryptedoutputfile



## PROBLEM-2

A region can be represented either by its interior or by its boundary. Here we represent the region by its interior using one of the most common methods called image array. In this case we have a collection of pixels. Since the number of elements in the array can be quite large, the main objective is to reduce its size by aggregating equal-valued pixels.

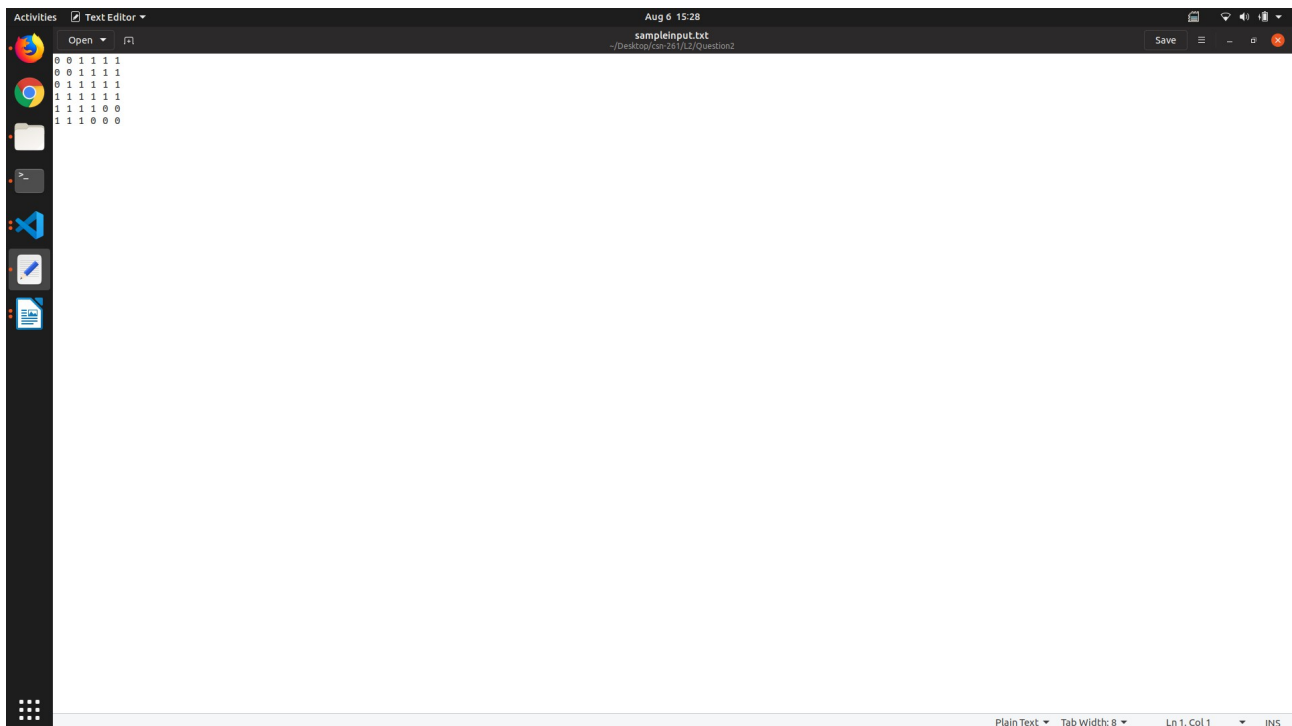
Write a C program, MAT.c to represent any region (in image array representation), into its quadtree form.

Data Structures Used: i) Array 1d and 2d  
ii) Quad Tree

Algorithms Applied : i) Mapping Area to Tree  
ii) Recursive Generation of Tree

ScreenShots:

sampleInput



The screenshot shows a text editor window titled 'sampleInput.txt' with the following content:

```
0 0 1 1 1 1
0 0 1 1 1 1
0 1 1 1 1 1
1 1 1 1 1 1
1 1 1 0 0 0
1 1 1 0 0 0
```

The editor interface includes a menu bar with 'Activities' and 'Text Editor', a toolbar with 'Open' and 'Save' buttons, and a status bar at the bottom indicating 'Plain Text', 'Tab Width: 8', 'Ln 1, Col 1', and 'INS'.

```
Activities Terminal Aug 6 15:28
karan@karan-inspiron-5570: ~/go/src/github.com/sdslabs/SWS
./MAT
/home/karan/Desktop/csn-261/L2/Question2 [git::master *] [karan@karan-Inspiron-5570] [15:26]
CPU time Taken to form Quad tree and Maximal square array is 0.000335
1.Enter to view tree in form (node value, bit value, level)
2. Two view quad tree on maximal square array form
Enter ur choice
```

```
Activities Terminal Aug 6 15:28
karan@karan-inspiron-5570: ~/go/src/github.com/sdslabs/SWS
./MAT
/home/karan/Desktop/csn-261/L2/Question2 [git::master *] [karan@karan-Inspiron-5570] [15:26]
CPU time Taken to form Quad tree and Maximal square array is 0.000335
1.Enter to view tree in form (node value, bit value, level)
2. Two view quad tree on maximal square array form
Enter ur choice
1
1 0 1
2 0 2
3 0 2
4 1 2
5 1 2
6 0 2
7 0 3
8 1 3
9 1 3
10 1 3
11 0 2
12 1 2
13 1 2
14 1 2
15 1 3
16 1 3
17 1 3
18 0 3
19 0 2
cpu time taken to perform printing operation is 0.000331
1.Enter to view tree in form (node value, bit value, level)
2. Two view quad tree on maximal square array form
Enter ur choice
```

```
Activities Terminal Aug 6 15:28
karan@karan-inspiron-5570: ~/go/src/github.com/sdslabs/SWS
x .MAT
/home/karan/Desktop/csn-261/L2/Question2 [git:master *] [karan@karan-Inspiron-5570] [15:26]
> ./MAT
CPU time Taken to form Quad tree and Maximal square array is 0.000335
1.Enter to view tree in form (node value, bit value, level)
2. Two view quad tree on maximal square array form
Enter ur choice
1
1 0 1
2 0 2
3 0 2
4 1 2
5 1 2
6 0 2
7 0 3
8 1 3
9 1 3
10 1 3
11 0 2
12 1 2
13 1 2
14 1 2
15 1 3
16 1 3
17 1 3
18 0 3
19 0 2
cpu time taken to perform printing operation is 0.000331
1.Enter to view tree in form (node value, bit value, level)
2. Two view quad tree on maximal square array form
Enter ur choice2
1 1 1 1 2 2 3 3
1 1 1 1 2 2 3 3
1 1 1 1 4 4 5 5
1 1 1 1 4 4 5 5
6 6 7 8 13 13 14 14
6 6 9 10 13 13 14 14
11 11 12 12 15 16 19 19
11 11 12 12 17 18 19 19
cpu time taken to perform printing operation is 0.000034
1.Enter to view tree in form (node value, bit value, level)
2. Two view quad tree on maximal square array form
Enter ur choice
```