

Computer Organization Project#1 Report

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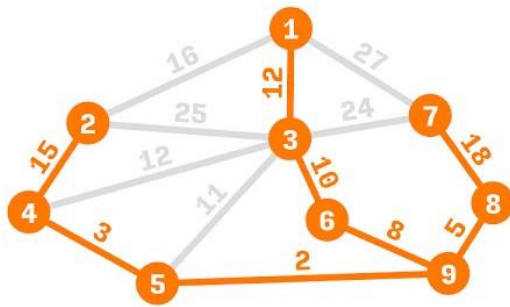
1-) MENU

```
Main Menu:  
1. Prim's Algorithm  
2. Number Series  
3. Encrypt/Decrypt  
4. Exit  
Please select an option: |
```

2-) PRIM'S ALGORITHM

Stages:

- 1- Analyze input
- 2- Fill weight array
- 3- Prim's algorithm



2-a) Analyze input

We analyze the input, and record name of each node to node_names array and determine number of nodes.

For the graph above;

node_names = {1 2 3 4 5 6 7 8 9}

number_of_nodes = 9

2-b) Fill weight array

We construct a 2d array which has size number_of_nodes x number_of_nodes. Initially, all elements of weight array equals to minus one which means there is no connection.

Then, we update

weight_array according to entered input.

For the graph above weight array will be:

Nodes	1	2	3	4	5	6	7	8	9
1	-1	16	12	-1	-1	-1	27	-1	-1
2	16	-1	25	15	-1	-1	-1	-1	-1
3	12	25	-1	12	11	10	24	-1	-1
4	-1	15	12	3	-1	-1	-1	-1	-1
5	-1	-1	11	3	-1	-1	-1	-1	2
6	-1	-1	10	-1	-1	-1	-1	-1	8
7	27	-1	24	-1	-1	-1	-1	18	-1
8	-1	-1	-1	-1	-1	-1	18	-1	5
9	-1	-1	-1	-1	2	8	-1	5	-1

2-c) Prim's algorithm

We picked first node as a starting node and add to minimum spanning tree.

We look for the shortest path of the all nodes in MSP. After that, we add new node to MSP, also remove paths between new node and all previous nodes in MSP. We are printing added path.

We do the same operation untill all nodes added to MSP.

Finally, we print total weight of MSP.

For the graph above, output will be;

```
Main Menu:
1. Prim's Algorithm
2. Number Series
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4.Exit
Please select an option: 1
Enter the graph: 1 2 16 1 3 12 1 7 27 2 3 25 2 4 15 3 4 12 3 7 24 3 5 11 4 3 5 3 6 10 5 9 2 6 9 8 7 8 18 8 9 5
Minimum Spanning Tree:
1 3 12
3 4 5
3 6 10
6 9 8
9 5 2
9 8 5
4 2 15
8 7 18
Total weight is 75
```

3-) NUMBER SERIES

- We take the first number in the series.
- We take the number of integers in the series.
- We take the offset between two successive integers in the series.

We put the number in the series to a register and print it. Then, add the number with offset value and decrease the number of integer in the series.

We did this operation untill the number of integers in series equals to zero.

Finally, we print the summation.

Sample two outputs;

Main Menu:

1. Prim's Algorithm
2. Number Series
3. Encrypt/Decrypt
- 4.Exit

Please select an option: 2

Enter the first number in the series: 7

Enter the number of integers in the series: 5

Enter the offset between two successive integers in the series: 4

The series is: 7 11 15 19 23

The summation of the numbers is 75

Main Menu:

1. Prim's Algorithm
2. Number Series
3. Encrypt/Decrypt
- 4.Exit

Please select an option: 2

Enter the first number in the series: 3

Enter the number of integers in the series: 8

Enter the offset between two successive integers in the series: 6

The series is: 3 9 15 21 27 33 39 45

The summation of the numbers is 192

4-) Encrypt/Decrypt

We take a string and a offset value as an input.

Stages

- Change each lowercase letter to uppercase letter.
- Check sign of offset value if it is negative, add 26 to offset to get the positive equivalent.
- Encryption phase.

Encryption phase:

We analyze the input char by char. For each character:

- If it is not a letter, we did not do any operation.
- If it is a letter, we add the offset value to its ascii code.
 - o If the ascii code is bigger then 91 which means there is an overflow. We subtract 26 from the ascii code to find the encrypted letter.
(e.g. T has ascii value 84 and offset value 20 it will be 104 , $104 - 26 = 78$
78 = N which is correct!)

Sample outputs:

```
Main Menu:
1. Prim's Algorithm
2. Number Series
3. Encrypt/Decrypt
4.Exit
Please select an option: 3
Enter an input string: i am an engineer!
Enter an offset value: 25
SOURCE: I AM AN ENGINEER!
PROCESSED: H ZL ZM DMFHMDDQ!

Main Menu:
1. Prim's Algorithm
2. Number Series
3. Encrypt/Decrypt
4.Exit
Please select an option: 3
Enter an input string: i am an engineer!
Enter an offset value: -1
SOURCE: I AM AN ENGINEER!
PROCESSED: H ZL ZM DMFHMDDQ!

Main Menu:
1. Prim's Algorithm
2. Number Series
3. Encrypt/Decrypt
4.Exit
Please select an option: 3
Enter an input string: Vdkbnld sn LzqlZqz TmHUdqrhsx :)
Enter an offset value: -25
SOURCE: VDKBNLD SN LZQLZQZ TMHUDQRHSX :)
PROCESSED: WELCOME TO MARMARA UNIVERSITY :)
```

For each iteration, we cleared the memory space we used.