CN CSL317

ASSIGNMENT-4

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Enrol: **BT19CSE098**

➢ instructions that *clearly* describe how to run codes:

Open the command prompt/power shell in windows. (prerequisite: python installed in it)

Run the BT19CSE098_dvr.py code by adding the input file as a command-line argument.

Ex: suppose input.txt is the input file. Use the following command to run the code.

```
PS G:\6sem\CN\A2>python BT19CSE098_dvr.py input.txt
```

Input file format: The first line contains a number of routers, then second-line names of routers and the few lines distances between the routers. And at last, EOF which indicates End of file.

Input.txt example:

```
3

A B C

A B 5

A C 2

B C 8

EOF
```

➢ The working of code:

First defined a **common** dictionary,

=>common dictionary having keys: {nodeinfo, counter, lock,finalString} for storing shared information.

nodeinfo: There is a tuple of the queue and its lock for each node name.

counter: to keep a list of nodes that have computed the new table so that the second iteration begins only when all threads are finished

lock: lock for appending each node's updated DVR table to the final string

finalString: string containing the final information printed after each iteration

Then read the input text file (from command line argument) and took lines of it and extracted router information and added it to the router dictionary. The router dictionary has keys as node names for storing router information. node name is a subsequent dictionary with keys: neighbor(to store a list of all neighbors of that node) and DVR(to store the distance vector table of that node). Then printed the initial router information by calling _print() function.

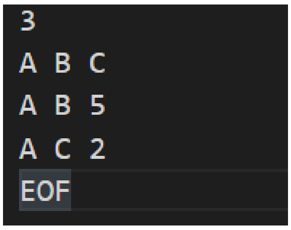
Then called task function in threading.Thread target. In task function , taking 4 iterations , in each iteration called update_queue and bellman_ford functions.

Task performed in brief:

Make a new thread for each node/router and pass it its personal router information (neighbor list and DVR table) as well as the shared data structure. After acquiring queue lock, the routing tables are first shared to all queues of each router's neighbors. Once all of a node's neighbors have shared their DVR information, tables are re-computation using the Bellman-Ford Equation. Each node's updated DVR tables are printed, and the threads wait 2s before the next iteration.

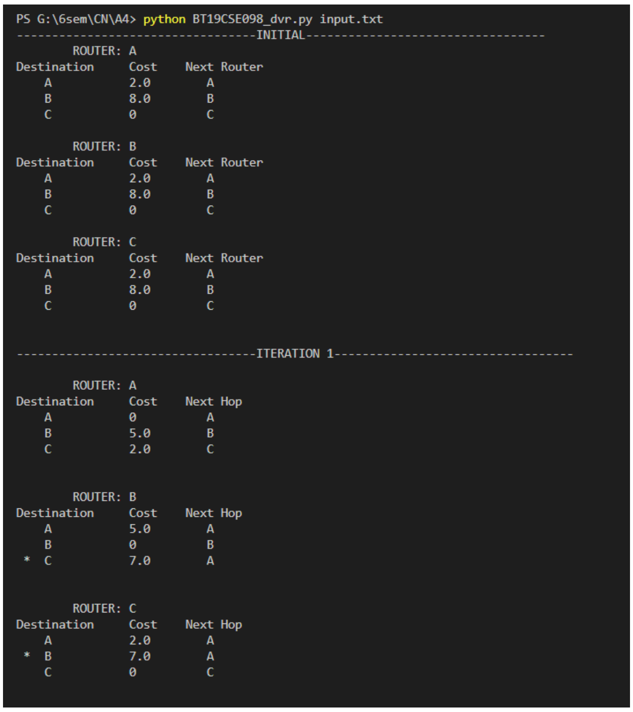
➢ Testing applied(test cases) and Screenshots of outputs:

Test Case 1:



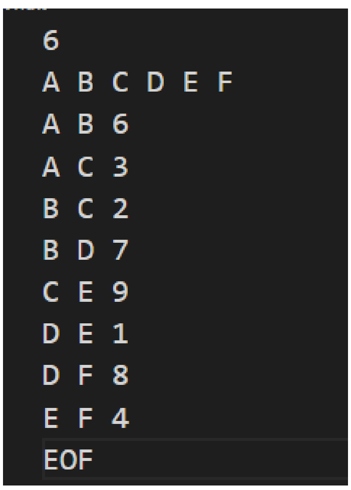
```
3
A B C
A B 5
A C 2
EOF
```

Output:



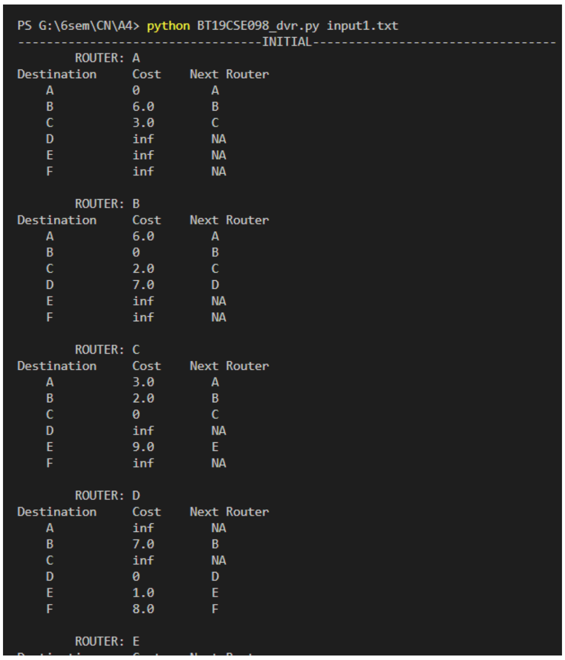
```
PS G:\6sem\CN\A4> python BT19CSE098_dvr.py input.txt
----------------------------------INITIAL----------------------------------
        ROUTER: A
Destination     Cost    Next Router
    A           2.0        A
    B           8.0        B
    C           0          C

        ROUTER: B
Destination     Cost    Next Router
    A           2.0        A
    B           8.0        B
    C           0          C

        ROUTER: C
Destination     Cost    Next Router
    A           2.0        A
    B           8.0        B
    C           0          C


----------------------------------ITERATION 1----------------------------------

        ROUTER: A
Destination     Cost    Next Hop
    A           0          A
    B           5.0        B
    C           2.0        C


        ROUTER: B
Destination     Cost    Next Hop
    A           5.0        A
    B           0          B
 *  C           7.0        A


        ROUTER: C
Destination     Cost    Next Hop
    A           2.0        A
 *  B           7.0        A
    C           0          C
```

Test Case 2:

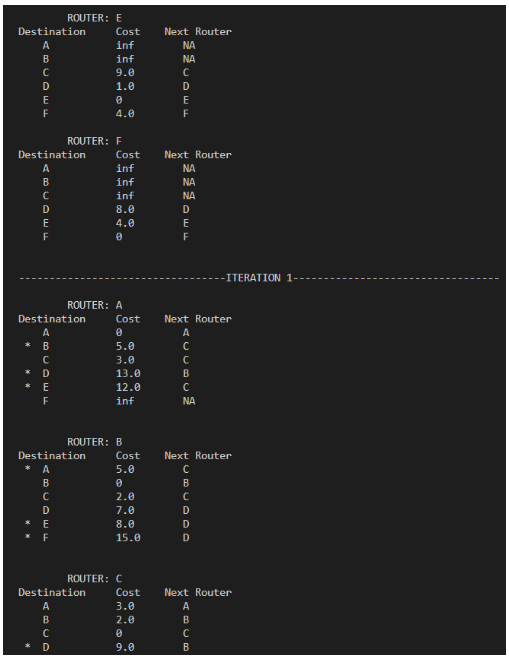


```
6
A B C D E F
A B 6
A C 3
B C 2
B D 7
C E 9
D E 1
D F 8
E F 4
EOF
```

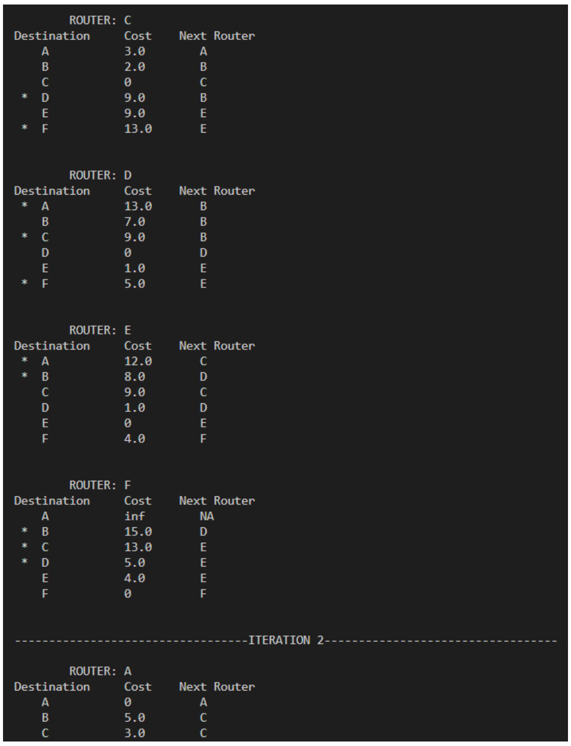
Output:



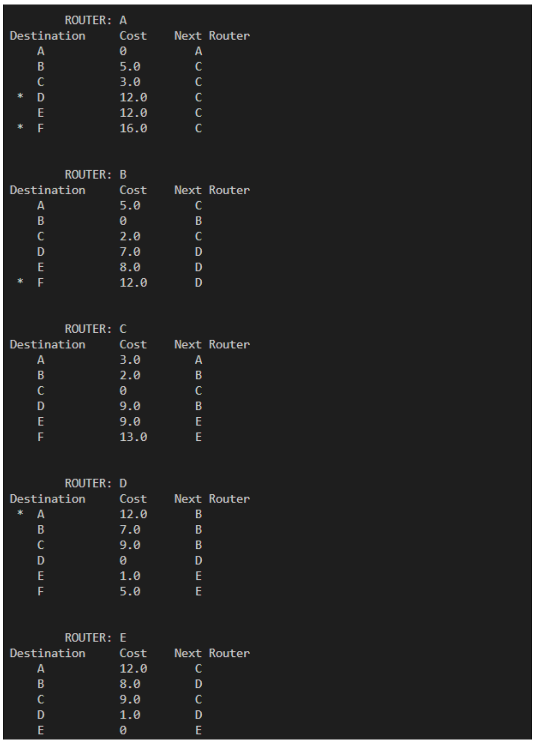
```
PS G:\6sem\CN\A4> python BT19CSE098_dvr.py input1.txt
---------------------------------INITIAL----------------------------------
        ROUTER: A
Destination     Cost    Next Router
    A           0          A
    B           6.0        B
    C           3.0        C
    D           inf        NA
    E           inf        NA
    F           inf        NA

        ROUTER: B
Destination     Cost    Next Router
    A           6.0        A
    B           0          B
    C           2.0        C
    D           7.0        D
    E           inf        NA
    F           inf        NA

        ROUTER: C
Destination     Cost    Next Router
    A           3.0        A
    B           2.0        B
    C           0          C
    D           inf        NA
    E           9.0        E
    F           inf        NA

        ROUTER: D
Destination     Cost    Next Router
    A           inf        NA
    B           7.0        B
    C           inf        NA
    D           0          D
    E           1.0        E
    F           8.0        F

        ROUTER: E
```



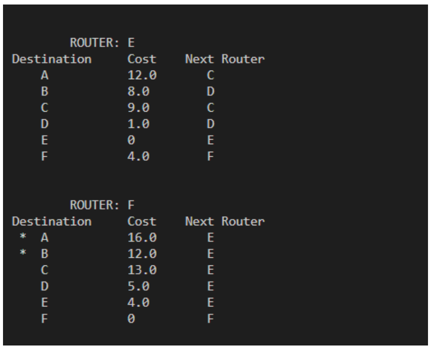
```
        ROUTER: E
Destination     Cost    Next Router
    A           inf        NA
    B           inf        NA
    C           9.0        C
    D           1.0        D
    E           0          E
    F           4.0        F

        ROUTER: F
Destination     Cost    Next Router
    A           inf        NA
    B           inf        NA
    C           inf        NA
    D           8.0        D
    E           4.0        E
    F           0          F


---------------------------------ITERATION 1----------------------------------

        ROUTER: A
Destination     Cost    Next Router
    A           0          A
 *  B           5.0        C
    C           3.0        C
 *  D           13.0       B
 *  E           12.0       C
    F           inf        NA


        ROUTER: B
Destination     Cost    Next Router
 *  A           5.0        C
    B           0          B
    C           2.0        C
    D           7.0        D
 *  E           8.0        D
 *  F           15.0       D


        ROUTER: C
Destination     Cost    Next Router
    A           3.0        A
    B           2.0        B
    C           0          C
 *  D           9.0        B
```



```
        ROUTER: C
Destination     Cost    Next Router
    A           3.0        A
    B           2.0        B
    C           0          C
 *  D           9.0        B
    E           9.0        E
 *  F           13.0       E


        ROUTER: D
Destination     Cost    Next Router
 *  A           13.0       B
    B           7.0        B
 *  C           9.0        B
    D           0          D
    E           1.0        E
 *  F           5.0        E


        ROUTER: E
Destination     Cost    Next Router
 *  A           12.0       C
 *  B           8.0        D
    C           9.0        C
    D           1.0        D
    E           0          E
    F           4.0        F


        ROUTER: F
Destination     Cost    Next Router
    A           inf        NA
 *  B           15.0       D
 *  C           13.0       E
 *  D           5.0        E
    E           4.0        E
    F           0          F


---------------------------------ITERATION 2----------------------------------

        ROUTER: A
Destination     Cost    Next Router
    A           0          A
    B           5.0        C
    C           3.0        C
```

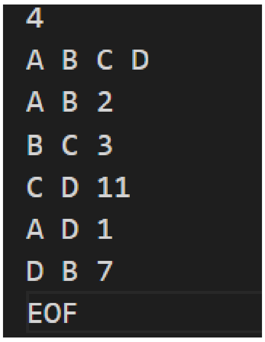


```
        ROUTER: A
Destination     Cost    Next Router
    A           0          A
    B           5.0        C
    C           3.0        C
 *  D           12.0       C
    E           12.0       C
 *  F           16.0       C


        ROUTER: B
Destination     Cost    Next Router
    A           5.0        C
    B           0          B
    C           2.0        C
    D           7.0        D
    E           8.0        D
 *  F           12.0       D


        ROUTER: C
Destination     Cost    Next Router
    A           3.0        A
    B           2.0        B
    C           0          C
    D           9.0        B
    E           9.0        E
    F           13.0       E


        ROUTER: D
Destination     Cost    Next Router
 *  A           12.0       B
    B           7.0        B
    C           9.0        B
    D           0          D
    E           1.0        E
    F           5.0        E


        ROUTER: E
Destination     Cost    Next Router
    A           12.0       C
    B           8.0        D
    C           9.0        C
    D           1.0        D
    E           0          E
```



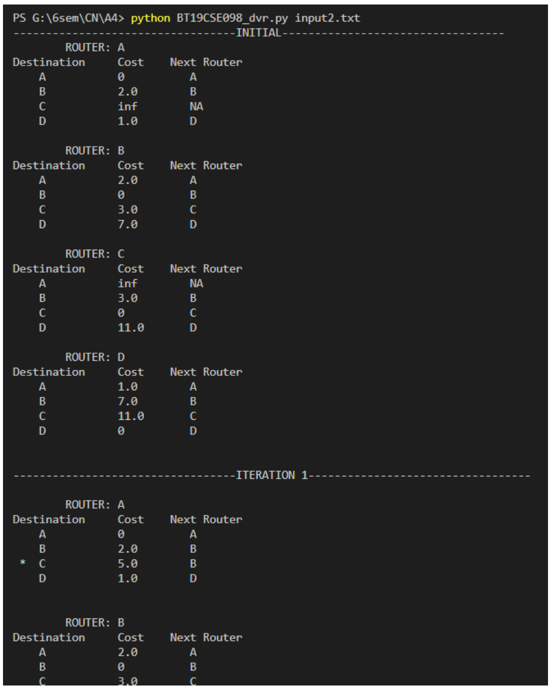
```
        ROUTER: E
Destination     Cost    Next Router
    A           12.0       C
    B           8.0        D
    C           9.0        C
    D           1.0        D
    E           0          E
    F           4.0        F


        ROUTER: F
Destination     Cost    Next Router
 *  A           16.0       E
 *  B           12.0       E
    C           13.0       E
    D           5.0        E
    E           4.0        E
    F           0          F
```

Test Case 3:

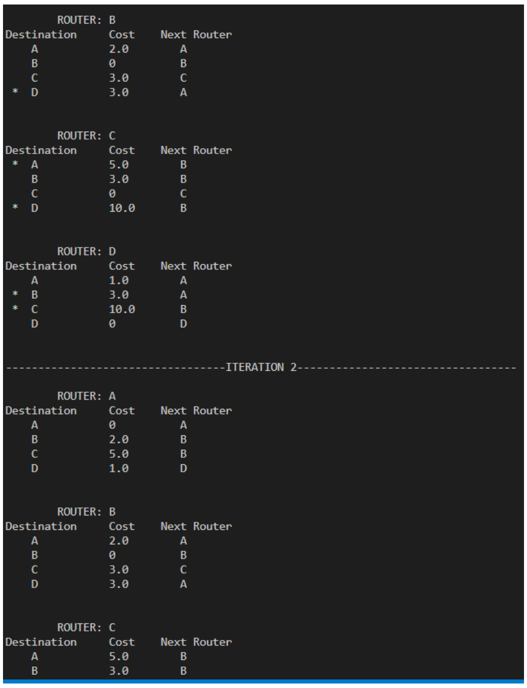


```
4
A B C D
A B 2
B C 3
C D 11
A D 1
D B 7
EOF
```

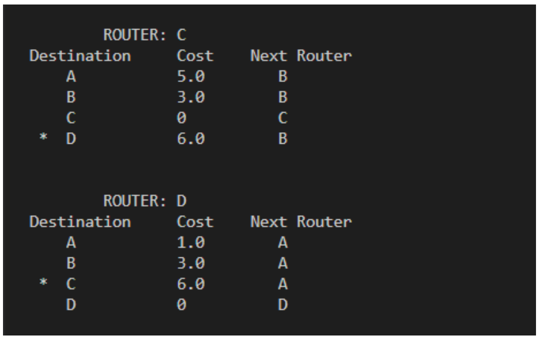
Output:



```
PS G:\6sem\CN\A4> python BT19CSE098_dvr.py input2.txt
--------------------------------INITIAL--------------------------------
        ROUTER: A
Destination     Cost    Next Router
    A           0          A
    B           2.0        B
    C           inf        NA
    D           1.0        D

        ROUTER: B
Destination     Cost    Next Router
    A           2.0        A
    B           0          B
    C           3.0        C
    D           7.0        D

        ROUTER: C
Destination     Cost    Next Router
    A           inf        NA
    B           3.0        B
    C           0          C
    D           11.0       D

        ROUTER: D
Destination     Cost    Next Router
    A           1.0        A
    B           7.0        B
    C           11.0       C
    D           0          D


--------------------------------ITERATION 1--------------------------------

        ROUTER: A
Destination     Cost    Next Router
    A           0          A
    B           2.0        B
 *  C           5.0        B
    D           1.0        D


        ROUTER: B
Destination     Cost    Next Router
    A           2.0        A
    B           0          B
    C           3.0        C
```



```
        ROUTER: B
Destination     Cost    Next Router
    A           2.0        A
    B           0          B
    C           3.0        C
 *  D           3.0        A


        ROUTER: C
Destination     Cost    Next Router
 *  A           5.0        B
    B           3.0        B
    C           0          C
 *  D           10.0       B


        ROUTER: D
Destination     Cost    Next Router
    A           1.0        A
 *  B           3.0        A
 *  C           10.0       B
    D           0          D


--------------------------------ITERATION 2--------------------------------

        ROUTER: A
Destination     Cost    Next Router
    A           0          A
    B           2.0        B
    C           5.0        B
    D           1.0        D


        ROUTER: B
Destination     Cost    Next Router
    A           2.0        A
    B           0          B
    C           3.0        C
    D           3.0        A


        ROUTER: C
Destination     Cost    Next Router
    A           5.0        B
    B           3.0        B
```



```
        ROUTER: C
Destination     Cost    Next Router
    A           5.0        B
    B           3.0        B
    C           0          C
 *  D           6.0        B


        ROUTER: D
Destination     Cost    Next Router
    A           1.0        A
    B           3.0        A
 *  C           6.0        A
    D           0          D
```