CN ASSIGNMENT-3

Distance Vector Routing

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Instructions to run the code:

On cmd line run: python BT18CSE107_dvr.py filename.txt

For eg: cmd> python BT18CSE107_dvr.py input1.txt

Working:

Data Structure Used

- For storing router information:
 - Router is a dictionary with keys as node names. For each node name there is a subsequent dictionary with keys:
 - **neighbours**: to store list of all neighbours of that node
 - **dvr:** to store distance vector table of that node
- For storing shared information:
 - **Shared** is a dictionary with keys as:
 - **node-names:** For each node name there is a tuple of the queue and its lock
 - **counter**: to store a list of nodes that have computed the new table so that the second iteration starts only when all the threads are completed
 - **printLock:** lock for appending the updated dvr table of each node to the final string
 - **finalString:** string that has the final information after each iteration which is printed

Execution Flow

- Create a new thread for each node/ router and pass its personal router information (neighbour list and its dvr table) and the shared data structure.
- First the routing tables are shared to queues of all neighbours of each router after acquiring queue lock.
- Once all neighbours of a node have shared their dvr information, re-computation of tables takes place using the Bellman-Ford Equation.
- The updated dvr tables of each node are printed and the threads wait for 2s before the next iteration.

Test Case 1

3

ABC

AB5

AC2

BC8

EOF

(base) vansh	ikajain@Va			Book-Air Assign4 % python dvr.py input1.txt
ROUTI	ER: A			-INITIAL
Destination		Nevt	Hon	
A	0	A	пор	
В	5.0	В		
c	2.0	c		
ROUTI	ER: B			
Destination		Next	Hop	
A	5.0	A		
В	0	В		
C	8.0	c		
ROUTI	ER: C			
Destination	Cost	Next	Hop	
A	2.0	A		
В	8.0	В		
С	0	C		
				-ITERATION 1
POLITI	ER: A			Ŧ
Destination	Cost	Nevt	Hor	-
A	0	A		
B	5.0	B		
C	2.0	C		
C	2.0	·		
ROUTI	ER: B			
Destination		Next	Нор	
A	5.0	A		
В	0	В		
* C	7.0	Ā		
ROUTI	ER: C			
Destination	Cost	Next	Hop	
A	2.0	A		
* B	7.0	A		
C	0	C		
				TTERITTON O
				-ITERATION 2-
ROUTI	ER: A			
Destination	Cost	Next	Hop	
A	0	A		
B	5.0	B		
c	2.0	c		
-	2.0			
	ER: B			
Destination				
A	5.0	A		
В	0	В		
C	7.0	A		
	ER: C			
Destination				
A	2.0	A		
	2.0 7.0 0	A A C		

Test Case 2

5

ABCDE

АВ1

A C 5

B C 3

C D 4

B E 9

DE2

EOF

(base) vanshika	jain@Va	nshikas-Mac	Book-Air Assign4 % python dvr.py input2.txt
ROUTER:			
Destination			
	0	A	
	1.0	В	
	5.0	C	
D E	inf inf	NA NA	
ROUTER:			
Destination A	1.0	Next Hop A	
	0	В	
	3.0	C	
	inf	NA	
E	9.0	E	
ROUTER:	c		
Destination		Next Hop	
	5.0	A	
В	3.0	В	
	0	C	
D	4.0	D	
E	inf	NA	
ROUTER:			
Destination	Cost	Next Hop	
A	inf	NA	
В	inf	NA	
	4.0	C	
D E	0 2.0	D E	
c	2.0	-	
ROUTER:			
Destination			
	inf 9.0	NA B	
	inf	NA.	
D	2.0	D	
	0	E	
			-ITERATION 1
ROUTER:	Δ.		
Destination		Next Hop	
	0	A	
В	1.0	В	
	4.0	В	
	9.0	C	
* E	10.0	В	
ROUTER:		Neut He-	
Destination A	1.0	Next Hop A	
	0	B	
	3.0	C	
	7.0	č	
	9.0	E	
ROUTER:			
	Cost	Next Hop	
* A B	4.0	B B	
	0	C	
·			

ROUTER:	C		
Destination	Cost	Next	Нор
* A	4.0	В	
	3.0	B	
	0 4.0	D	
	6.0	D	
ROUTER:	D		
Destination	Cost	Next	Нор
* A	9.0	C	
	7.0	C	
	0	D	
	2.0	E	
ROUTER:			
Destination * A	Cost 10.0	Next	Нор
В	9.0	В	
* C	6.0	D	
D	2.0	D	
E	0	Е	
ROUTER:		Nove	Hor
Destination A	0	Next	nop
В	1.0	В	
С	4.0	В	
* D E	8.0	B B	
E	10.0	В	
ROUTER:	В		
Destination	Cost	Next	Нор
A	1.0	A	
	0	В	
	3.0 7.0	C	
E	9.0	E	
ROUTER:	С		
Destination	Cost	Next	Hop
	4.0	B B	
	0	C	
D	4.0	D	
E	6.0	D	
	_		
ROUTER: Destination		Nev+	Hon
* A	8.0	Next	нор
В	7.0	C	
	4.0	C	
D E	0	D E	
E	2.0	-	
	E		
ROUTER:			
Destination A	Cost 10.0	Next B	Нор

Test Case 3

6

ABCDEF

A B 6

A C 3

B C 2

B D 7

C E 9

DE1

D F 8

E F 4

EOF

A 6.8 A B 0 B C 2.0 C D 7.0 D E int NA F int NA F int NA ROUTER: C Destination Cost A B 2.0 B C 0 C D int NA E 9.0 E F int NA ROUTER: D Destination Cost Next Hop A int NA B 7.0 B C int NA D 0 D E 1.0 E F 8.0 F ROUTER: E Destination Cost Next Hop A int NA D 0 C D int NA D 0 D E 1.0 E F 8.0 F ROUTER: E Destination Cost Next Hop A int NA D 0 D E 1.0 D E 0 C D I.0 D E 0 C D I.0 D E 0 C D I.0 D E 0 F A 0 F			1	NITIAL	 	 input3.tx
A						
B						
C 3.0 C D inf NA E inf NA E inf NA B inf NA B 0 B C 2.0 C D 7.0 D E inf NA F inf NA F inf NA ROUTER: C Destination Cost Next Hop A A 3.0 A B 2.0 B C 0 C D inf NA B 2.0 B C 0 C D inf NA E 9.0 E C 0 C D inf NA E 9.0 E F inf NA ROUTER: D Destination Cost Next Hop A B 2.0 B C 0 C D inf NA E 9.0 E F inf NA ROUTER: D Destination Cost Next Hop A B 7.0 B C inf NA D E 1.0 E F 8.0 F ROUTER: C D						
D inf NA E inf NA ROUTER: B Destination Cost Next Hop A 6.0 A B 0 B C 2.0 C D 7.0 D E inf NA ROUTER: C Destination Cost Next Hop A 3.0 A B 2.0 B C 0 C D inf NA B 2.0 B C 0 C D inf NA E inf NA E 9.0 E F inf NA E 9.0 E F inf NA E 9.0 E F inf NA B 7.0 B C inf NA B 7.0 B C inf NA B 7.0 B C inf NA D 0 D E 1.0 E F 8.0 F ROUTER: C DESTINATION COST NEXT HOP A inf NA D 0 D E 1.0 E F 8.0 F ROUTER: D E NEXT HOP A inf NA D 0 D E 1.0 E F 8.0 F ROUTER: D E NEXT HOP A inf NA D 0 D E 1.0 E F 8.0 F ROUTER: D E NEXT HOP A inf NA D 0 D E						
E						
ROUTER: B						
ROUTER: B Destination Cost Next Hop A						
Destination	F	inf	NA			
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 Hop A 3.0 B C 0 C D inf NA E 9.0 E F inf NA ROUTER: D Destination Cost NA B 7.0 B C inf NA C inf NA D 0 D E 1.0 E F 8.0 F ROUTER: E Destination Cost Next Hop A inf NA C 9.0 C D 1.0 D E 1.0 E F 8.0 F ROUTER: E Destination Cost Next Hop A inf NA C 9.0 C D 1.0 D E 0 C	ROUTER:	В				
B	Destination	Cost	Next Hop			
C 2.0 C D 7.0 D E 1nf NA F 1nf NA F 1nf NA F 1nf NA ROUTER: C Destination Cost Next Hop A 3.0 A B 2.0 B C 0 C D inf NA E 9.0 E F 1nf NA E 9.0 E F 1nf NA ROUTER: D Destination Cost Next Hop A 1nf NA D 0 D D E 1.0 E F 8.0 F ROUTER: E Destination Cost Next Hop A 1nf NA C 9.0 C D Next Hop A 1nf NA C 9.0 C D D 1.0 D E 1.0 E F 8.0 F ROUTER: E Destination Cost Next Hop A 1nf NA C 9.0 C D 1.0 D E 0 E F 8.0 F ROUTER: F Destination Cost Next Hop A 1nf NA C 9.0 C D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A 1nf NA C 9.0 C D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A 1nf NA C 9.0 C D 1.0 D E 0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A 1nf NA C 9.0 C D 1.0 D E 0 D E 0 E F 4.0 F	A	6.0	A			
D 7.0 D E int NA ROUTER: C Destination Cost Next Hop 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 Hop A inf NA B 7.0 B C inf NA D 0 D D E 1.0 E F 8.0 F ROUTER: D ROUTER: D ROUTER: D ROUTER: C Destination Cost Next Hop A inf NA D 0 D E 1.0 E F 8.0 F ROUTER: C Destination Cost Next Hop A inf NA C 9.0 C D 1.0 D E 0 C D 1.0 D E 0 C D 1.0 D E 0 C E 0	В	0	В			
E inf NA F inf NA ROUTER: C Destination Cost A 3.0 A B 2.0 B C 0 C C D inf NA E 9.0 E F inf NA B 7.0 B C inf NA D 0 C E 1.0 E F 8.0 F ROUTER: E Destination Cost Next Hop A inf NA D 0 C E 1.0 E F 8.0 F ROUTER: E Destination Cost Next Hop A inf NA D 0 C D D D E 1.0 E F 8.0 F ROUTER: E Destination Cost Next Hop A inf NA C 9.0 C D 1.0 D E 0 E F 8.0 F ROUTER: F Destination Cost Next Hop A inf NA B inf NA C 9.0 C D D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A inf NA C 9.0 C D Next Hop A inf NA C 9.0 C D Next Hop A inf NA C 9.0 C D Next Hop A inf NA C 9.0 C D Next Hop A inf NA C 9.0 C D D 1.0 D E 0 E F 4.0 F	С	2.0	C			
## ROUTER: C Destination Cost Next Hop A 3.8 A B 2.0 B C 0 C D inf NA E 9.0 E F inf NA BROUTER: D Destination Cost Next Hop A inf NA B 7.0 B C inf NA D E 1.0 E F 8.0 F ROUTER: D ROUTER: D ROUTER: D ROUTER: D ROUTER: C Next Hop A inf NA E E 1.0 E E E E E E E E E E E E E E E E E E E	D	7.0	D			
## ROUTER: C Destination Cost Next Hop A 3.8 A B 2.0 B C 0 C D inf NA E 9.0 E F inf NA ## ROUTER: D ## ROUTER: D	E		NA			
Destination						
Destination	ROUTER:	С				
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 Hop A inf NA D 0 D E F 8.0 F ROUTER: E Destination Cost Next Hop A inf NA D 0 E F 8.0 F ROUTER: E Destination Cost Next Hop A inf NA C 9.0 C D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A inf NA C 9.0 C D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A inf NA C 9.0 C D Next Hop A inf NA C 9.0 C D Next Hop A inf NA C 9.0 C D Next Hop A inf NA C 9.0 C D D 1.0 D E 0 E F 4.0 F			Next Hop			
B 2.0 B C 0 C C D inf NA E 9.0 E F inf NA ROUTER: D Destination Cost Next Hop A inf NA C inf NA C 9.0 C D 0 D ROUTER: C ROUTER: C Destination Cost Next Hop A inf NA B inf NA C 9.0 C D 1.0 D E 0 E F 0 E F 1.0 D E 0 E F 1.0 D E 0 E F 1.0 D E 0 D						
C						
D inf NA E 9.0 E inf NA ROUTER: D						
E 9.0 E F 101 NA ROUTER: D Destination Cost Next Hop A 1nf NA B 7.0 B B C 1nf NA D 0 D E E 1.0 E F 8.0 F ROUTER: E Destination Cost Next Hop A 1nf NA C 9.0 C D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A 1nf NA C 9.0 C D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A 1nf NA C 9.0 C D 1.0 D E 0 E F A.0 F						
F						
Destination						
Destination	DOLUTED .					
A inf NA B 7.0 B C inf NA D 0 D E 1.0 E F 8.0 F ROUTER: E Destination Cost Next Hop A inf NA C 9.0 C D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost NA B inf NA C 9.0 C D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A inf NA C 9.0 C D 1.0 D E 0 E F 4.0 F			Nove Hea			
B 7.0 B C inf NA D E 1.0 E F 8.0 F ROUTER: E Destination Cost Next Hop A inf NA C 9.0 C D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A inf NA C 9.0 C D 1.7 D E 0 E F A.0 F Destination Cost Next Hop A inf NA C inf NA C inf NA D 8.0 D E 4.0 E						
C inf NA D 0						
D 0 D E 1.0 E 8.0 F ROUTER: E Destination Cost Next Hop A inf NA C 9.0 C D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A inf NA C inf NA D 8.0 D E 4.0 E						
E						
F 8.0 F ROUTER: E Destination Cost Next Hop 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 Hop A inf NA B inf NA C inf NA C inf NA C inf NA C inf NA D 8.0 D E 4.0 E						
ROUTER: E Destination Cost Next Hop 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 Hop A inf NA B inf NA C inf NA C inf NA D 8.0 D E 4.0 E						
Destination Cost Next Hop A inf NA B inf NA C 9.0 C D 1.0 D E 0 E F 4.0 F Destination Cost Next Hop A inf NA B inf NA C inf NA C inf NA D 8.0 D E 4.0 E	F	8.0	F			
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 Hop A inf NA B inf NA C inf NA D 8.0 D E 4.0 E						
B inf NA C 9.0 C D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A inf NA B inf NA C inf NA D 8.0 D E 4.0 E						
C 9.0 C D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A inf NA B inf NA C inf NA C inf NA D 8.0 D E 4.0 E	A	inf	NA			
D 1.0 D E 0 E F 4.0 F ROUTER: F Destination Cost Next Hop A inf NA B inf NA C inf NA D 8.0 D E 4.0 E	В	inf	NA			
E		9.0	C			
F 4.0 F ROUTER: F Destination Cost Next Hop A inf NA B inf NA C inf NA D 8.0 D E 4.0 E	D	1.0	D			
ROUTER: F Destination Cost Next Hop A inf NA B inf NA C inf NA D 8.0 D E 4.0 E	E	0	E			
Destination						
Destination Cost Next Hop	ROUTER:	F				
A inf NA B inf NA C inf NA D 8.8 D E 4.8 E			Next Hop			
B inf NA C inf NA D 8.0 D E 4.0 E						
C inf NA D 8.0 D E 4.0 E						
D 8.0 D E 4.0 E						
E 4.0 E						

			-ITERATION 1
DOLLET D.			
ROUTER: Destination	Cost	Next Hon	
A	0	A A	
* B	5.0	ĉ	
C	3.0	c	
* D	13.0	В	
* E	12.0	С	
F	inf	NA	
ROUTER:	R		
Destination		Next Hon	
* A	5.0	C	
В	0	В	
С	2.0	С	
D	7.0	D	
* E	8.0	D	
* F	15.0	D	
ROUTER:			
Destination	Cost	Next Hop	
A	3.0	A	
В	2.0	В	
С	0	C	
* D	9.0	В	
E	9.0	E	
* F	13.0	E	
ROUTER:			
Destination	Cost	Next Hop	
* A	13.0	В	
В	7.0	В	
* C	9.0	B D	
E	1.0	E	
* F	5.0	Ē	
* "	5.0	_	
ROUTER:		Nove II	
Destination			
* A * B	12.0	C D	
* B	9.0	C	
D	1.0	D	
E	0	E	
F	4.0	F	
ROUTER:			
Destination		Next Hon	
A	inf	NA NA	
* B	15.0	D	
* C	13.0	Ē	
* D	5.0	E	
E	4.0	E	
F	0	F	

				-ITERATION 2
DOLUTED -				
ROUTER:		Novt	Hon	
Destination A	0	Next	нор	
B	5.0	Č		
	3.0	c		
* D				
	12.0	C		
E * F	12.0	C		
* F	16.0	С		
ROUTER:	В			
Destination		Next	Нор	
A	5.0	C		
В	0	В		
	2.0	c		
D	7.0	D		
E	8.0	D		
	12.0			
	_			
ROUTER:				
Destination	Cost	Next	нор	
A	3.0	A		
В	2.0	В		
	0	C		
	9.0	В		
E	9.0	E		
F	13.0	E		
ROUTER:	D			
Destination * A	Cost	Next	Hop	
* A	12.0	В		
В	7.0	В		
	9.0	В		
	0	D		
E	1.0			
	5.0	E E		
ROUTER: Destination	E			
			нор	
	12.0			
	8.0	D		
	9.0	C		
	1.0	D F		
E	0			
F	4.0	F		
ROUTER:	F			
Destination	Cost	Next	Hop	
* A	16.0	E		
* B	12.0	E		
C	13.0	Ē		
D	5.0	Ē		
	0.0			
E	4.0	E		

				-ITERATION 3
ROUTER:				
Destination		Novt	Hon	
A	0	A	nop	
В	5.0	C		
C	3.0	c		
D	12.0	C		
E	12.0	C		
F	16.0	C		
r	10.0	C		
ROUTER:	В			
Destination		Next	Нор	
A	5.0	C		
	0	В		
C	2.0	c		
D	7.0	D		
E	8.0	D		
F	12.0			
ROUTER:				
		Nove	Hor	
Destination			нор	
A	3.0	A		
В	2.0	В		
	0	С		
D	9.0	В		
E	9.0	E		
F	13.0	Е		
ROUTER:	D			
Destination	Cost	Next	Hop	
A	12.0	В		
В	7.0	В		
C	9.0	В		
D	0	D		
E	1.0	E		
F	5.0	E		
ROUTER:				
Destination		Novt	Hon	
A	12.0		nob	
B	8.0	D		
C	9.0	C		
D	1.0	D		
E	0	E		
E F		F		
r	4.0	F		
ROUTER				
Destination			Hop	
A	16.0	Е		
В	12.0	E		
C	13.0	E		
D	5.0	E		
E	4.0	E		
F	0	F		