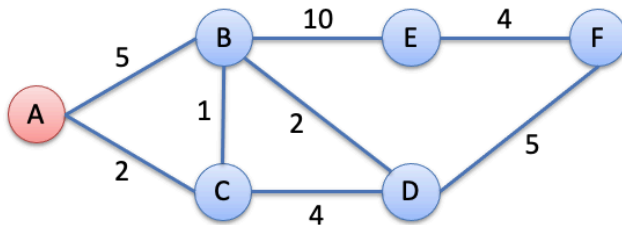


Dijkstra's Algorithm – Step 0



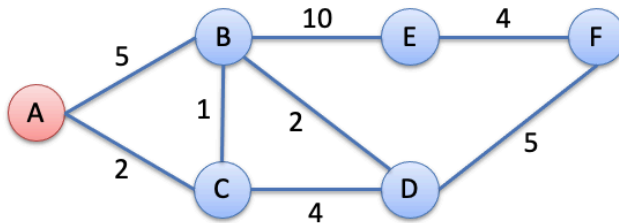
Previous Step

Dest	Path	Cost D(v)
A		
B		
C		
D		
E		
F		

This Step

Dest	Path	Cost D(v)
A	A	0
B	B	5
C	C	2
D	?	∞
E	?	∞
F	?	∞

Dijkstra's Algorithm – Step 1



Previous Step

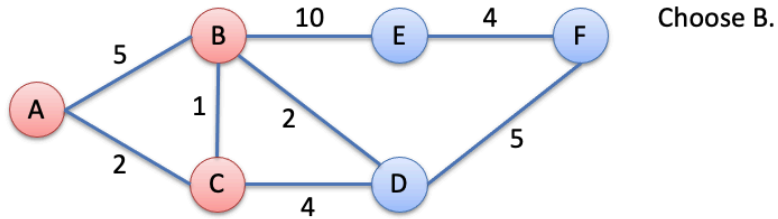
Dest	Path	Cost D(v)
A	A	0
B	B	5
C	C	2
D	?	∞
E	?	∞
F	?	∞

Pick Min

This Step

Dest	Path	Cost D(v)
A	A	0
B		
C		
D		
E		
F		

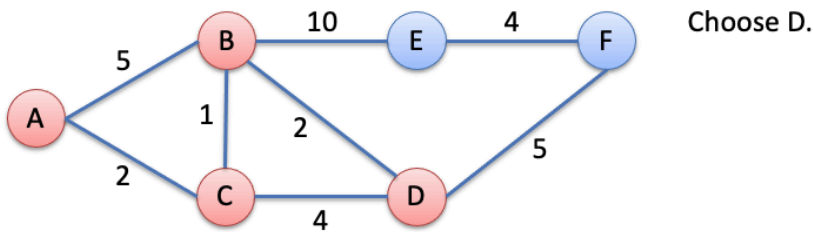
Dijkstra's Algorithm – Step 2



Previous Step			This Step		
Dest	Path	Cost D(v)	Dest	Path	Cost D(v)
✓ A	A	0	✓ A	A	0
✓ B	C, B	3	✓ B	C, B	3
✓ C	C	2	✓ C	C	2
D	C, D	6	D		
E	?	∞	E		
F	?	∞	F		

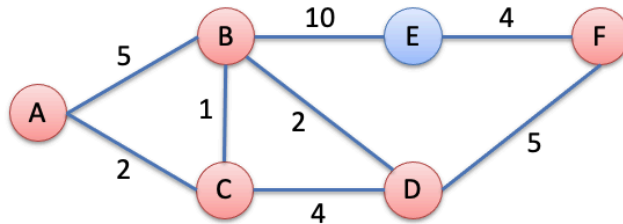
Pick Min

Dijkstra's Algorithm – Step 3



Previous Step			This Step		
Dest	Path	Cost D(v)	Dest	Path	Cost D(v)
✓ A	A	0	✓ A	A	0
✓ B	C, B	3	✓ B	C, B	3
✓ C	C	2	✓ C	C	2
D	C, B, D	5	✓ D	C, B, D	5
E	C, B, E	13	E		
F	?	∞	F		

Dijkstra's Algorithm – Step 4



Choose F.

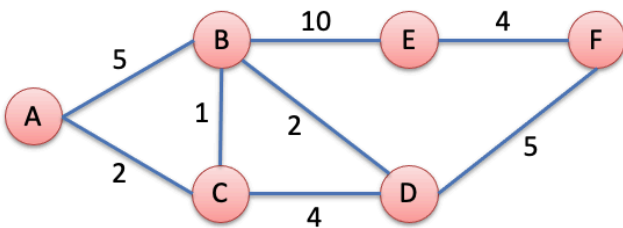
Previous Step

Dest	Path	Cost D(v)
✓ A	A	0
✓ B	C, B	3
✓ C	C	2
✓ D	C, B, D	5
E	C, B, E	13
F	C, B, D, F	10

This Step

Dest	Path	Cost D(v)
✓ A	A	0
✓ B	C, B	3
✓ C	C	2
✓ D	C, B, D	5
✓ E		
✓ F	C, B, D, F	10

Dijkstra's Algorithm – Step 5



Choose E.

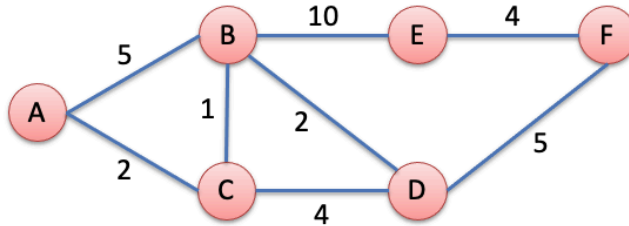
Previous Step

Dest	Path	Cost D(v)
✓ A	A	0
✓ B	C, B	3
✓ C	C	2
✓ D	C, B, D	5
✓ E	C, B, E	13
✓ F	C, B, D, F	10

This Step

Dest	Path	Cost D(v)
✓ A	A	0
✓ B	C, B	3
✓ C	C	2
✓ D	C, B, D	5
✓ E	C, B, E	13
✓ F	C, B, D, F	10

Dijkstra's Algorithm – Done!



Lot more state
in routing table! Final Answer

✓	Dest	Path	Cost $D(v)$
✓	A	A	0
✓	B	C, B	3
✓	C	C	2
✓	D	C, B, D	5
✓	E	C, B, E	13
✓	F	C, B, D, F	10

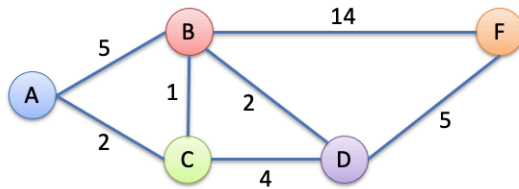
Populate
Forwarding
Table



Dest	Forward To

Distance Vector Routing

Distance Vector – Round 0



Routers populate their forwarding table by taking the row minimum.

Router F

Via→ ↓ To	B	D
A		
B	14	
C		
D		5

Router A

Via→ ↓ To	B	C
B	5	
C		2
D		
F		

Router B

Via→ ↓ To	A	C	D	F
A	5			
C		1		
D			2	
F				14

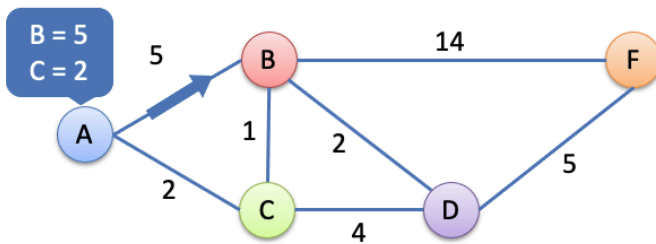
Router C

Via→ ↓ To	A	B	D
A	2		
B		1	
D			4
F			

Router D

Via→ ↓ To	B	C	F
A			
B	2		
C		4	
F			5

Distance Vector – Round 1



Router F

Via→ ↓ To	B	D
A		
B	14	
C		
D		5

Router A

Via→ ↓ To	B	C
B	5	
C		2
D		
F		

Router B

Via→ ↓ To	A	C	D	F
A	5			
C	7	1		
D			2	
F				14

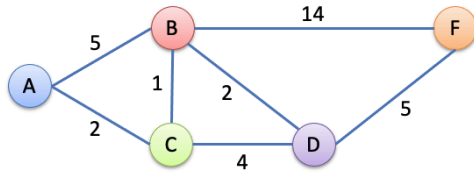
Router C

Via→ ↓ To	A	B	D
A	2		
B		1	
D			4
F			

Router D

Via→ ↓ To	B	C	F
A			
B	2		
C		4	
F			5

At the end of round 1, how many routers need to update their forwarding tables?



A-1, B-2, C-3, D-4, E-5

Router F

Via→ ↓ To	B	D
A	19	
B	14	7
C	15	9
D	16	5

Router A

Via→ ↓ To	B	C
B	5	3
C	6	2
D	7	6
F	19	

Router B

Via→ ↓ To	A	C	D	F
A	5	3		
C	7	1	6	
D		5	2	19
F			7	14

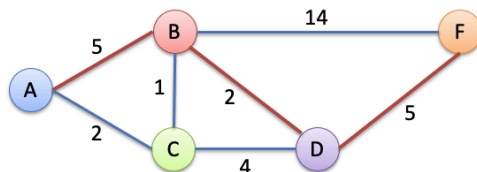
Router C

Via→ ↓ To	A	B	D
A	2	6	
B	7	1	6
D		3	4
F		15	9

Router D

Via→ ↓ To	B	C	F
A	7	6	
B	2	5	19
C	3	4	
F	16		5

Of the links in red below, for how many would a failure cause a loop?



A-0, B-1, C-2, D-3

Consider the failures independently (not all at the same time).

Router F

Via→ ↓ To	B	D
A	17	10
B	14	7
C	15	8
D	16	5

Router A

Via→ ↓ To	B	C
B	5	3
C	6	2
D	7	5
F	12	10

Router B

Via→ ↓ To	A	C	D	F
A	5	3	7	24
C	7	1	4	22
D	10	4	2	19
F	15	9	7	14

Router C

Via→ ↓ To	A	B	D
A	2	4	9
B	7	1	6
D	7	3	4
F	12	8	9

Router D

Via→ ↓ To	B	C	F
A	5	6	15
B	2	5	12
C	3	4	13
F	9	12	5