

Programme

- 1 Variations on TSP
 - TSP in a Directed Graph
 - Hamiltonian Cycles in Graphs

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TSP in a directed Graph

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- In the case of undirected graph, we used the MST to make an estimation of the best score.

TSP in a directed Graph

- In the case of undirected graph, we used the MST to make an estimation of the best score.
- We have not defined MST in directed graphs.

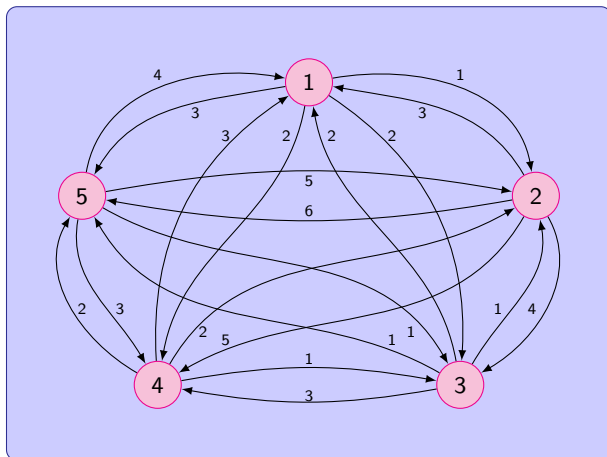
TSP in a directed Graph

- In the case of undirected graph, we used the MST to make an estimation of the best score.
- We have not defined MST in directed graphs.
- We use another strategy: the reduction of the adjacency matrix, which we explain next.

TSP in a directed Graph

- In the case of undirected graph, we used the MST to make an estimation of the best score.
- We have not defined MST in directed graphs.
- We use another strategy: the reduction of the adjacency matrix, which we explain next.
- The explanation will be by means of an example.

TSP in a Directed Graph: an Example



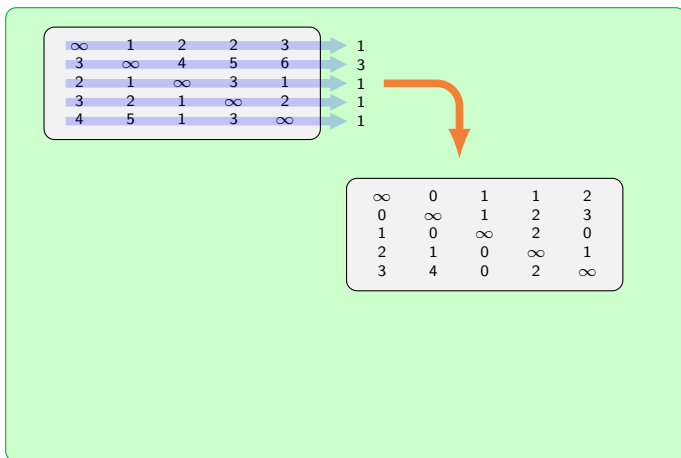
Cost Calculation a Directed Graph

∞	1	2	2	3
3	∞	4	5	6
2	1	∞	3	1
3	2	1	∞	2
4	5	1	3	∞

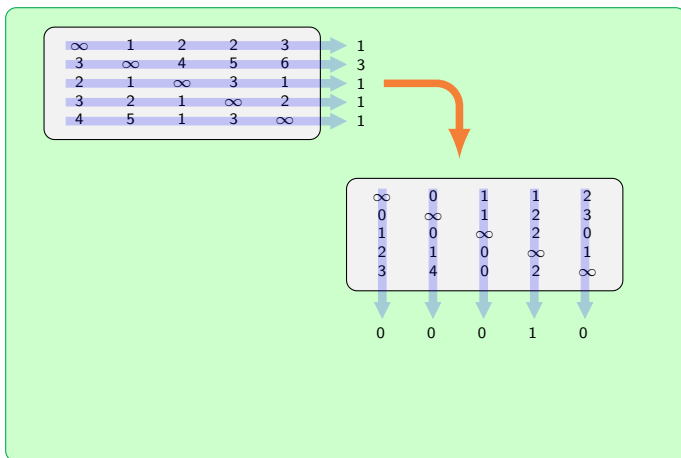
Cost Calculation a Directed Graph

∞	1	2	2	3	1
3	∞	4	5	6	3
2	1	∞	3	1	1
3	2	1	∞	2	1
4	5	1	3	∞	1

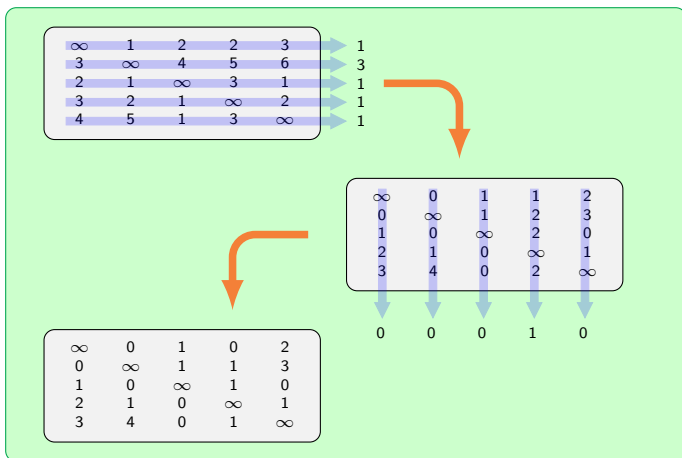
Cost Calculation a Directed Graph



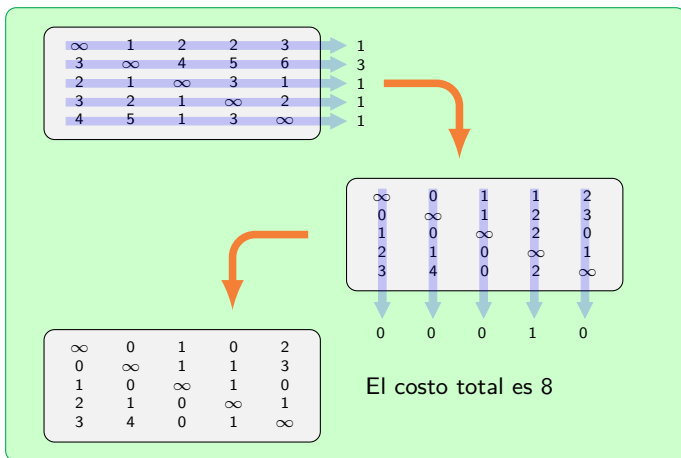
Cost Calculation a Directed Graph






Cost Calculation a Directed Graph



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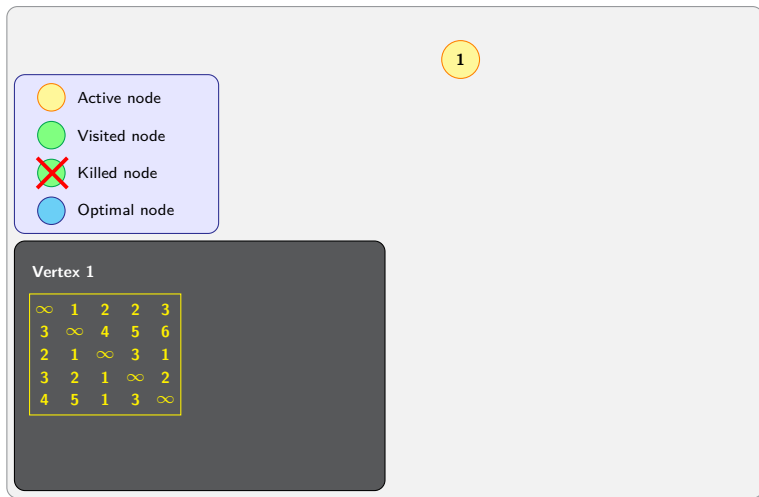


TSP in Directed Graphs

-  Active node
-  Visited node
-  Killed node
-  Optimal node






TSP in Directed Graphs



TSP in Directed Graphs

upper = 12

1

-  Active node
-  Visited node
-  Killed node
-  Optimal node




Vertex 1

∞	1	2	2	3
3	∞	4	5	6
2	1	∞	3	1
3	2	1	∞	2
4	5	1	3	∞

TSP in Directed Graphs

upper = 12

1

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-  Visited node
-  Killed node
-  Optimal node

Vertex 1


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3	∞	4	5	6	3
2	1	∞	3	1	1
3	2	1	∞	2	1
4	5	1	3	∞	1

$\text{cost}[1] = 7 +$

TSP in Directed Graphs

upper = 12

1

-  Active node
-  Visited node
-  Killed node
-  Optimal node

Vertex 1

∞	0	1	1	2
0	∞	1	2	3
1	0	∞	2	0
2	1	0	∞	1
3	4	0	2	∞

0 0 0 1 0


$$\text{cost}[1] = 7 + 1 = 8$$

TSP in Directed Graphs

upper = 12

c=8

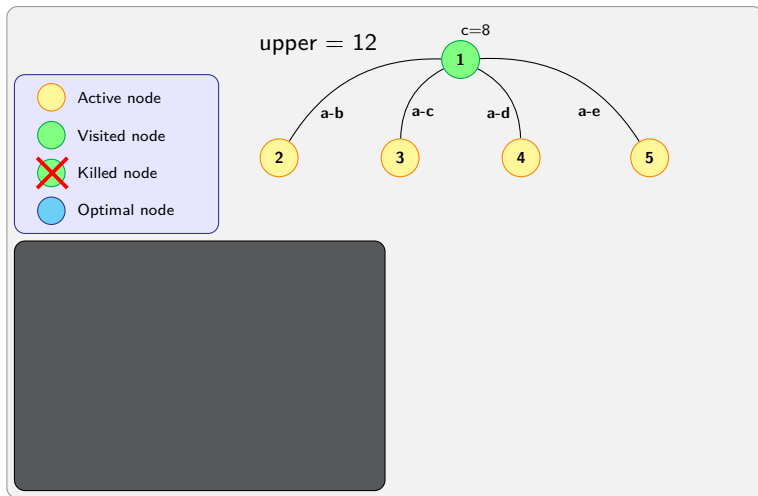
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-  Active node
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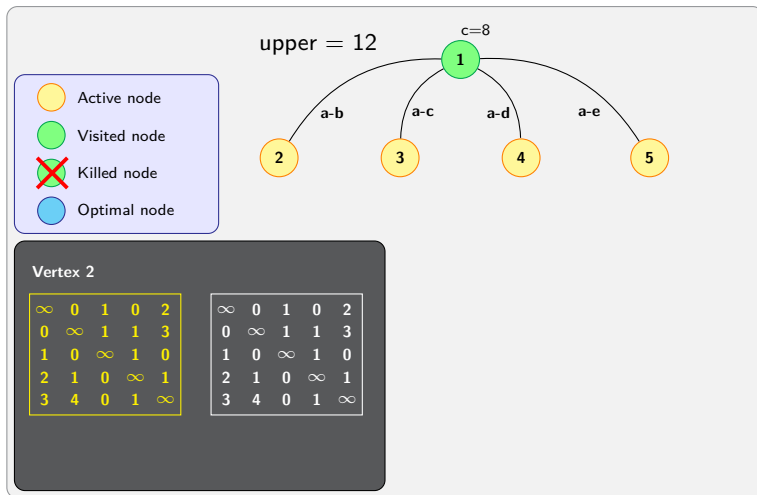
Vertex 1

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0	∞	1	1	3
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3	4	0	1	∞

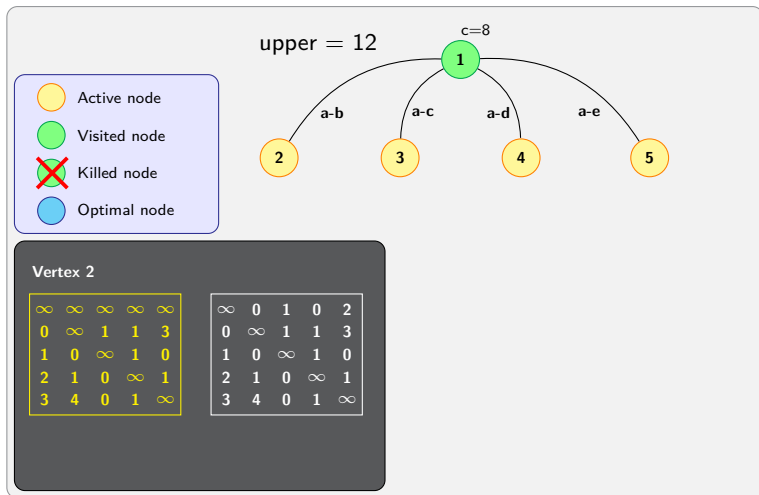
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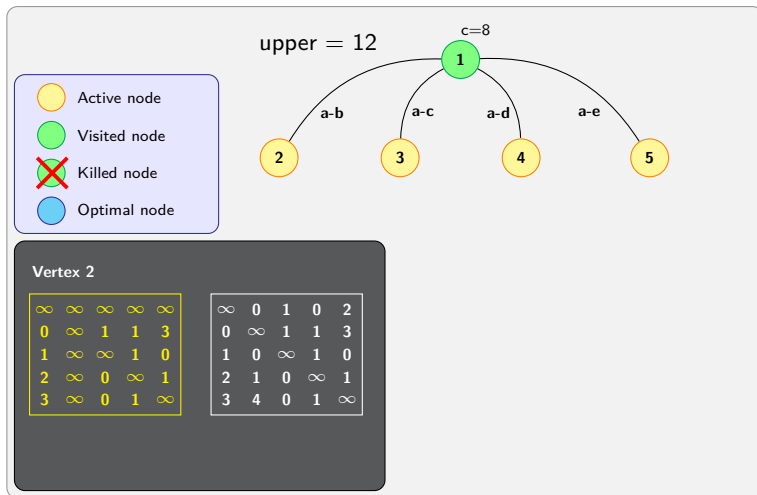
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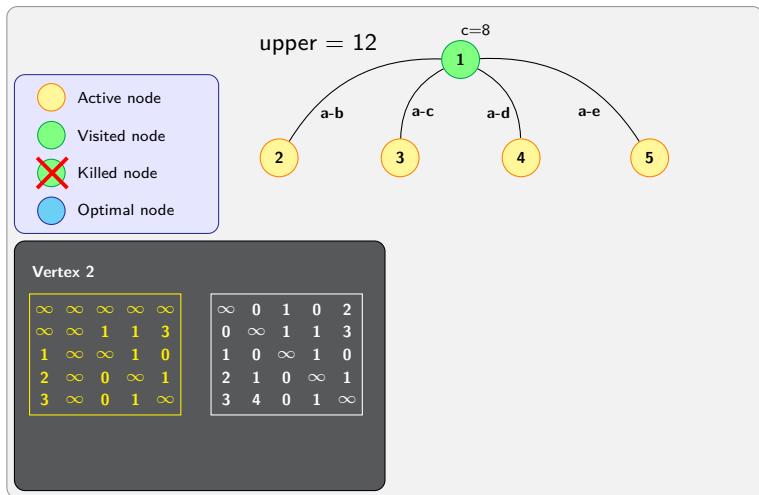
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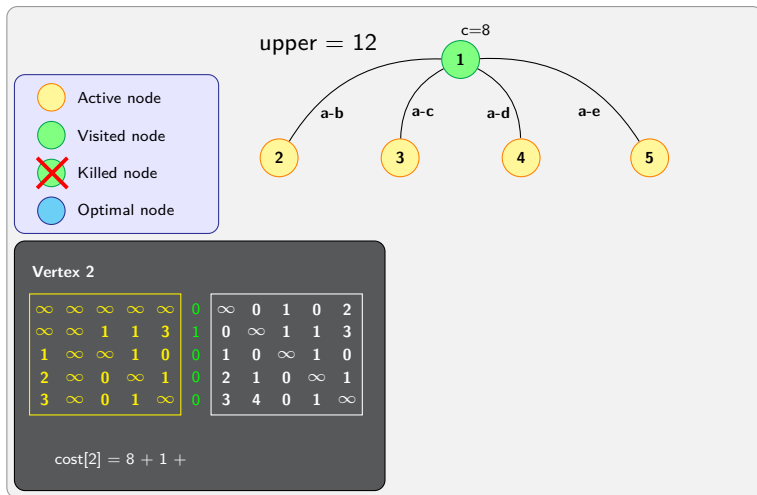
TSP in Directed Graphs



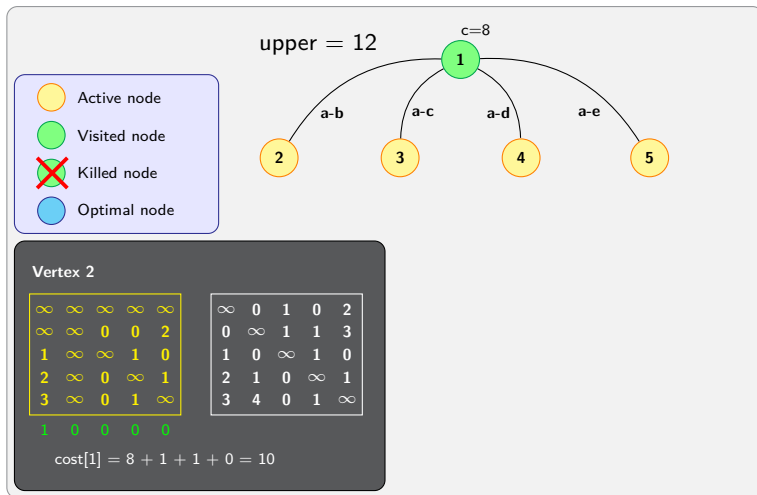
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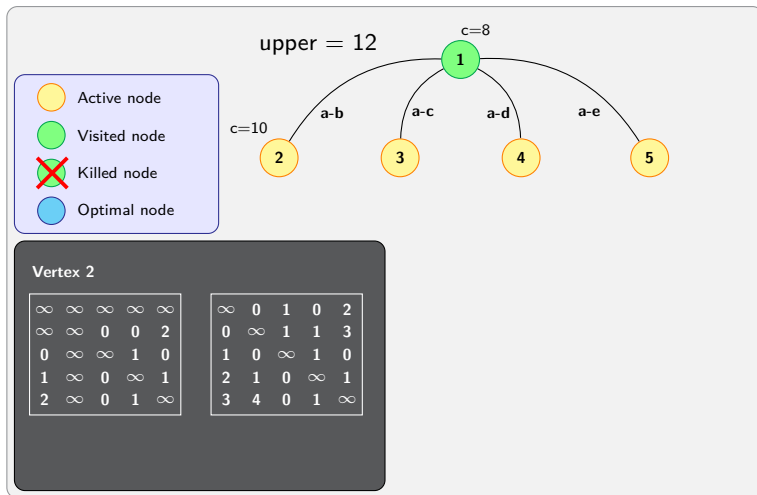
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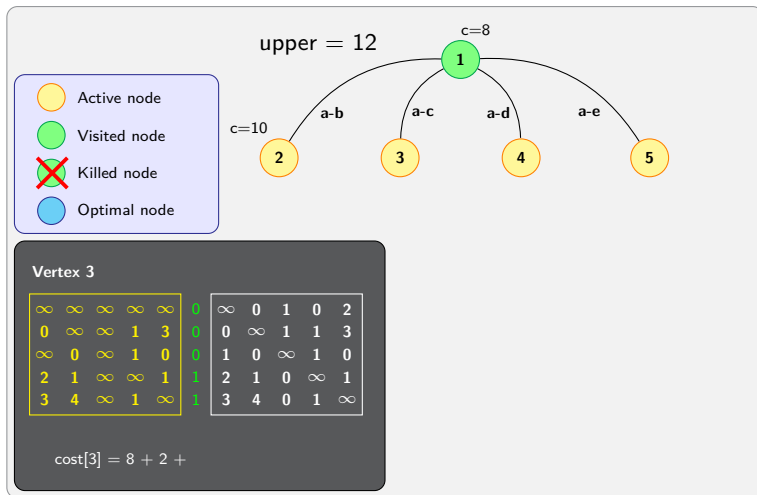
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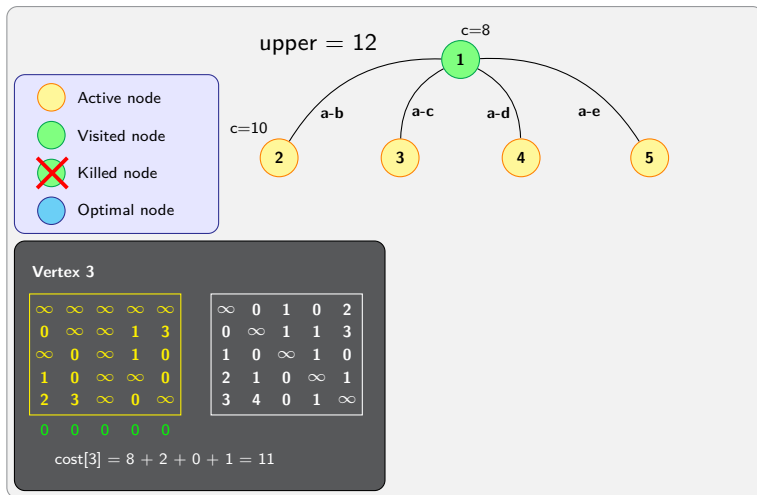
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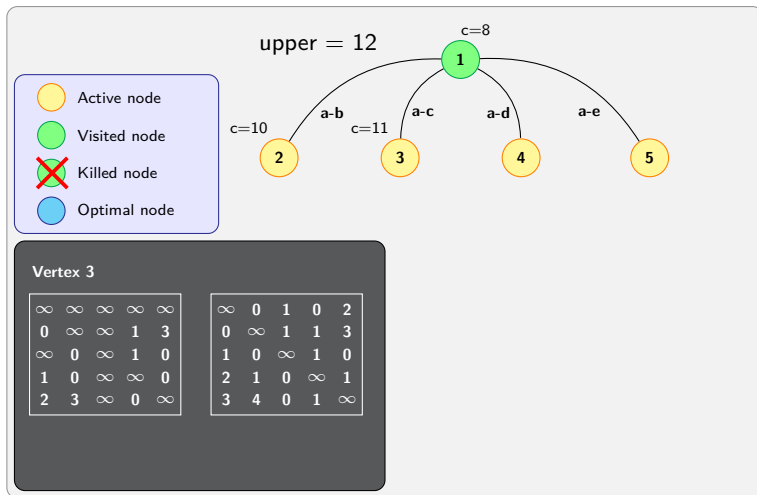
TSP in Directed Graphs



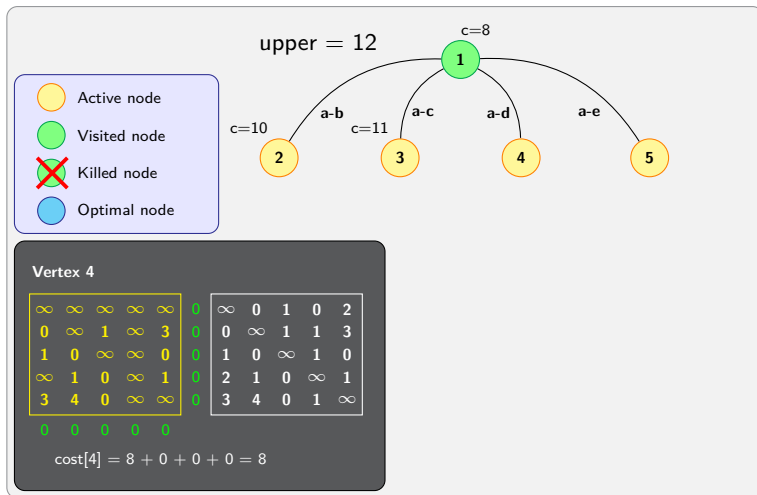
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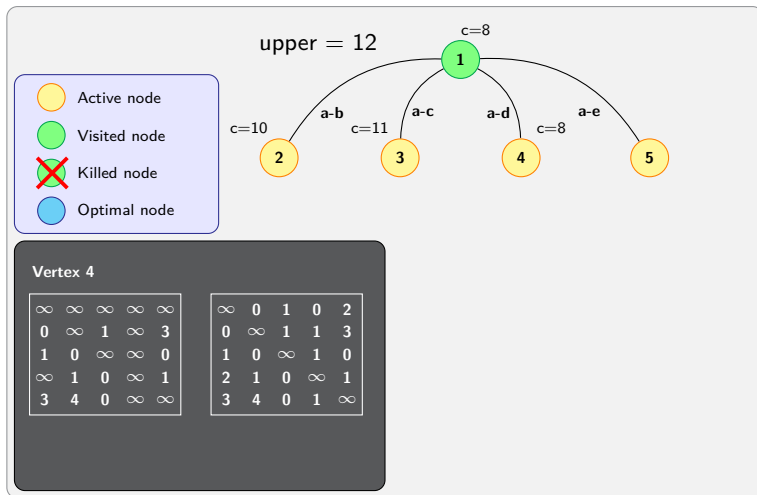
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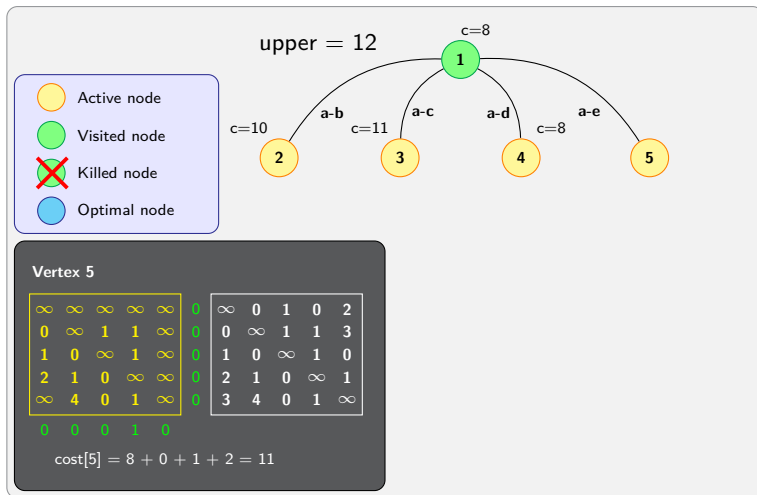
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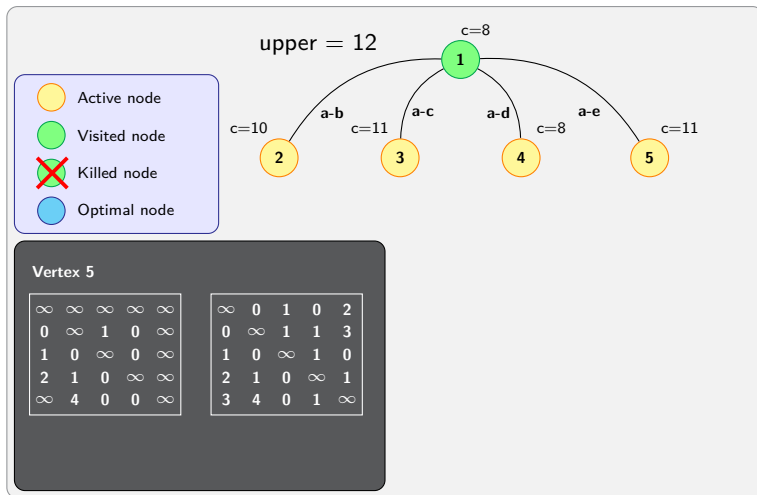
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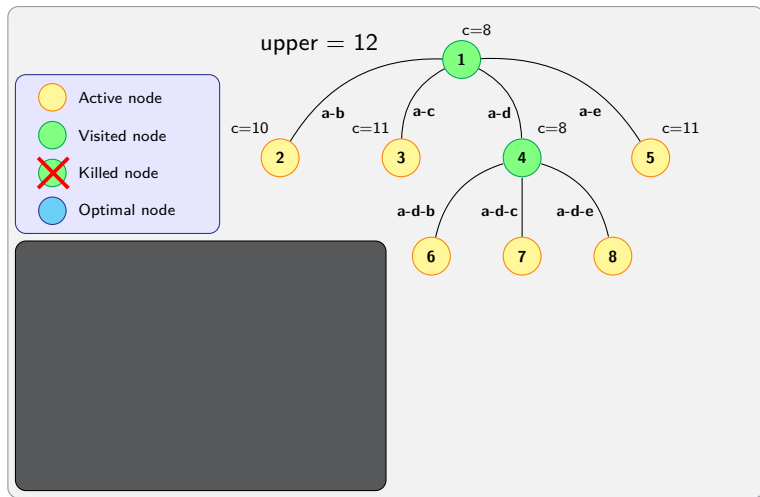
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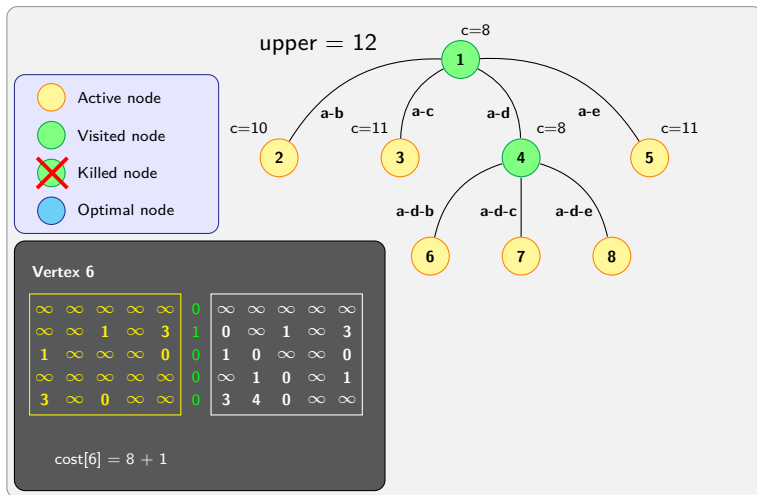
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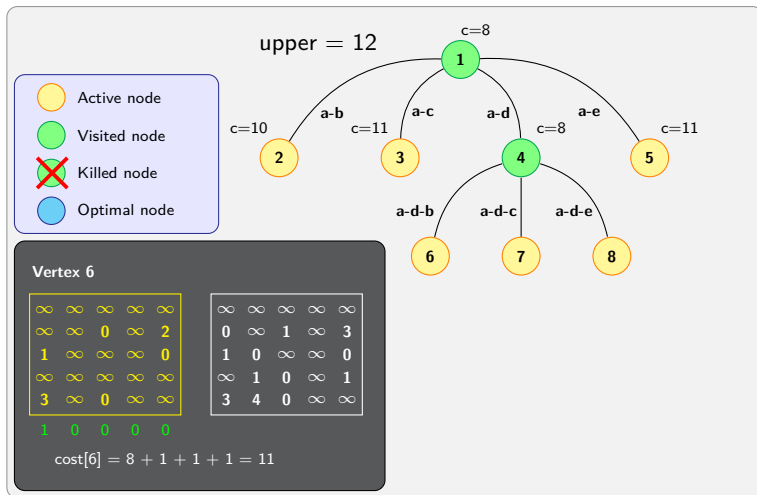
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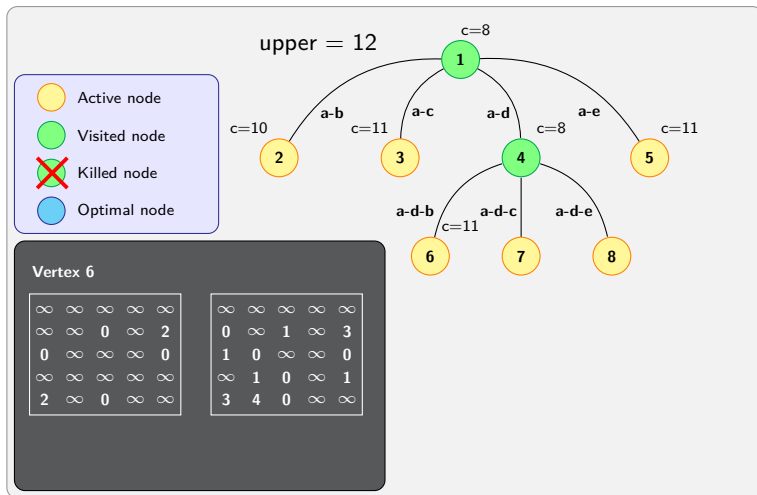
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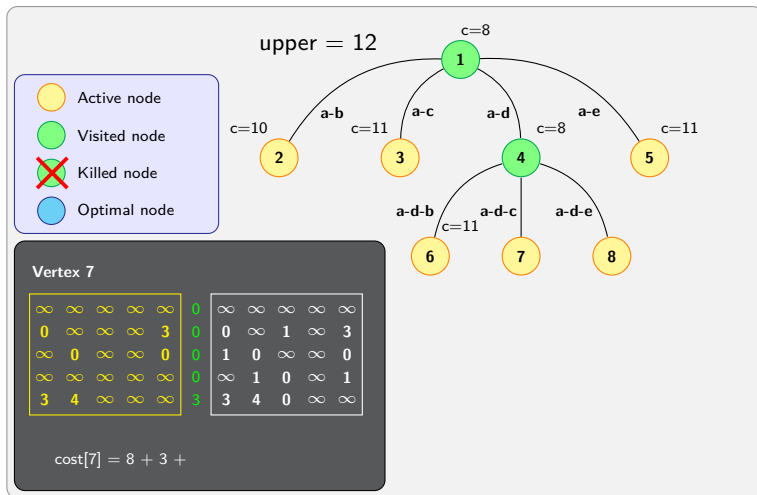
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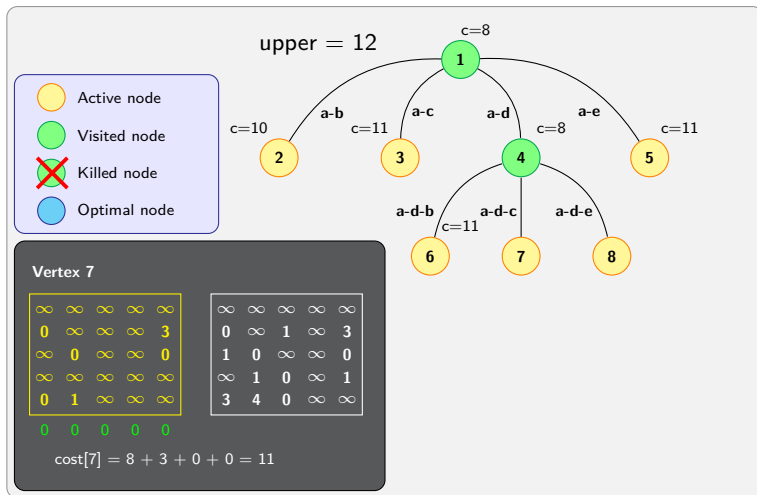
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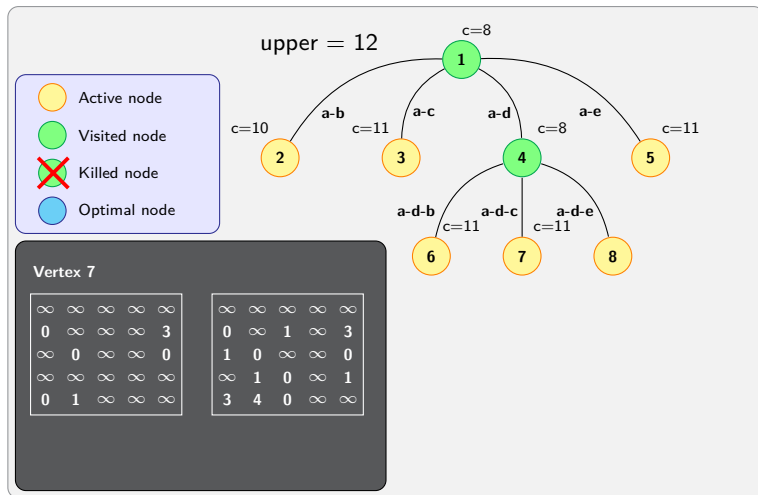
TSP in Directed Graphs



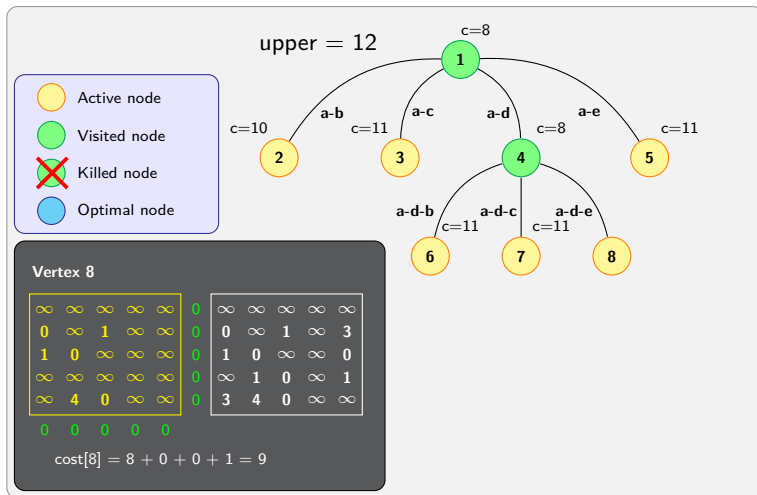
TSP in Directed Graphs



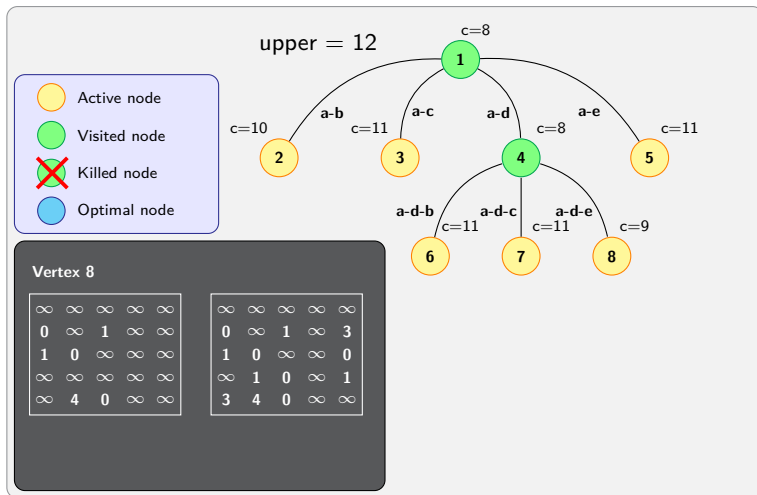
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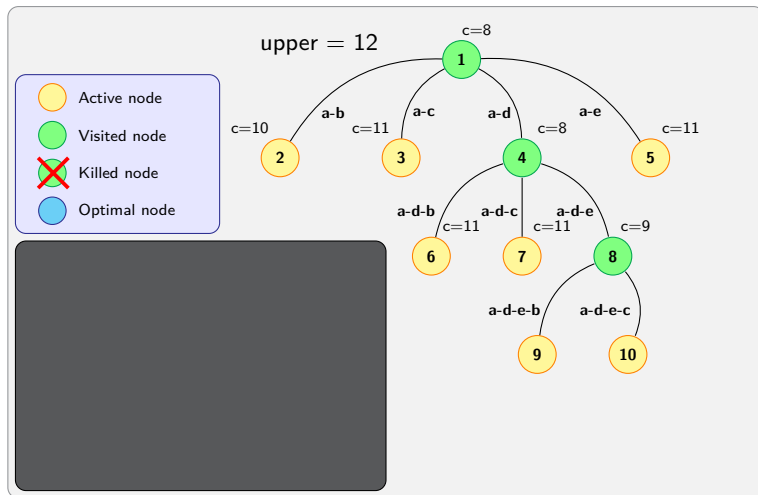
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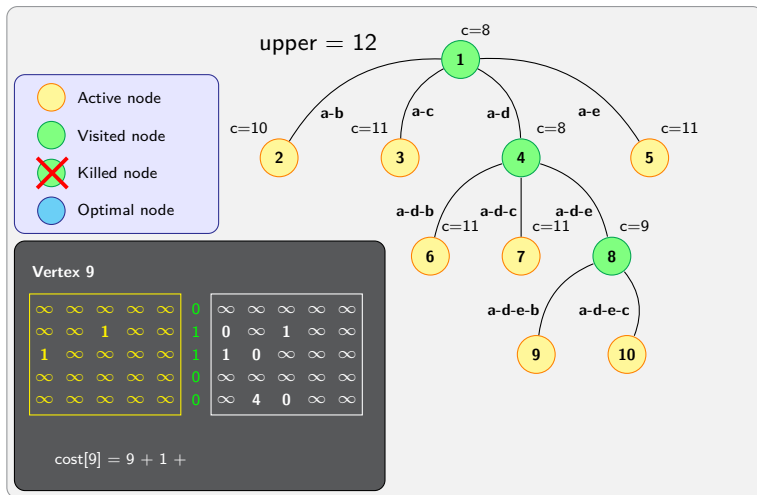
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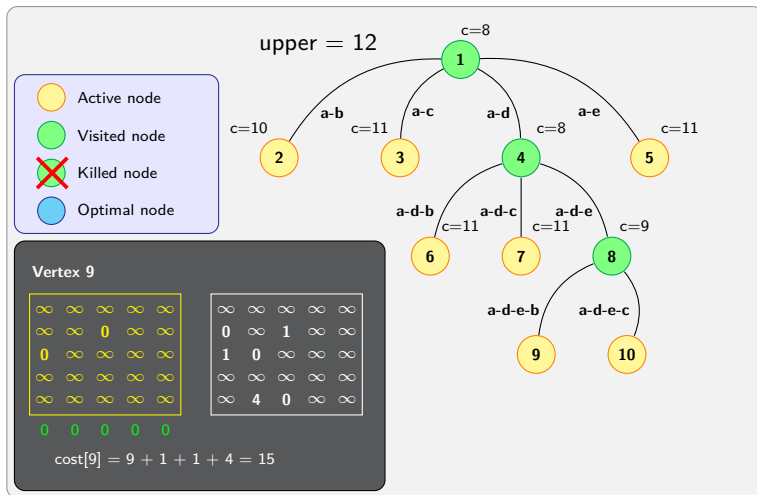
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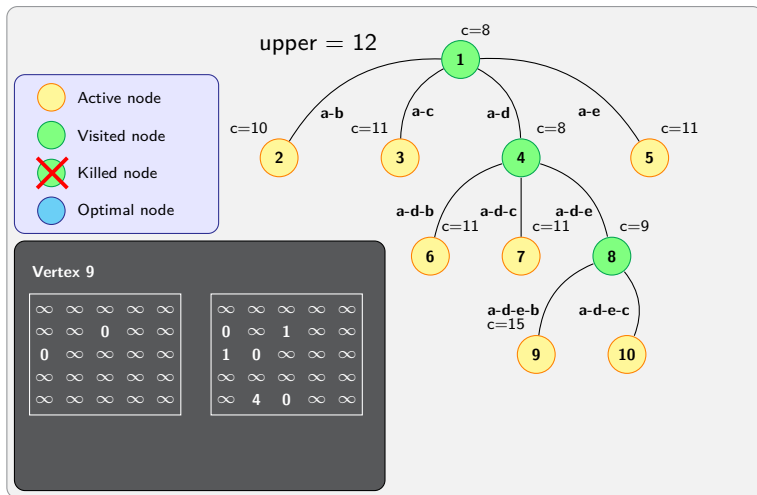
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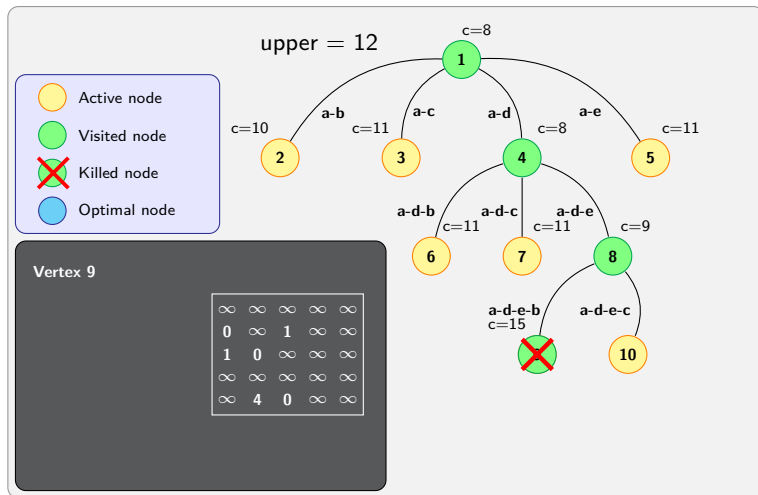
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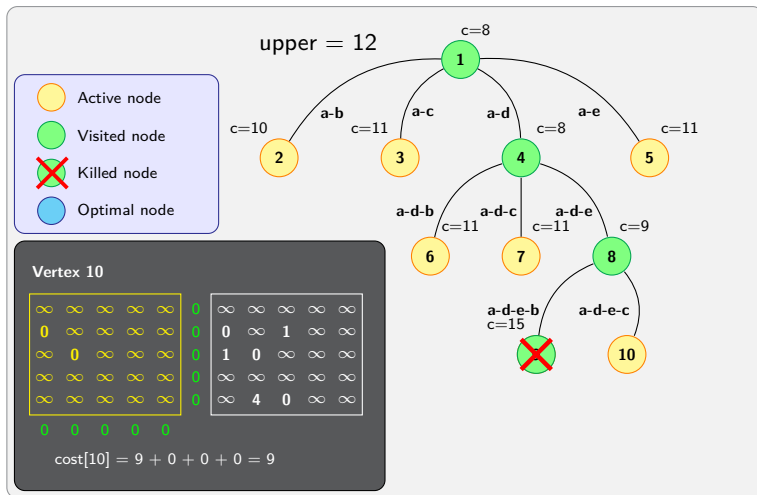
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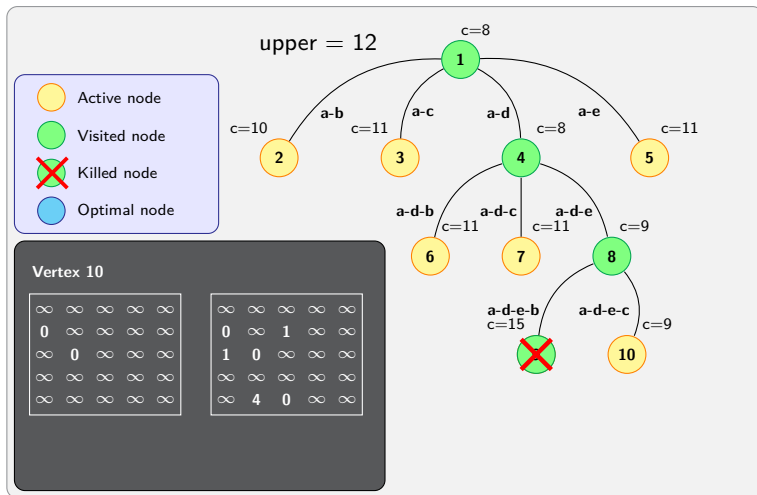
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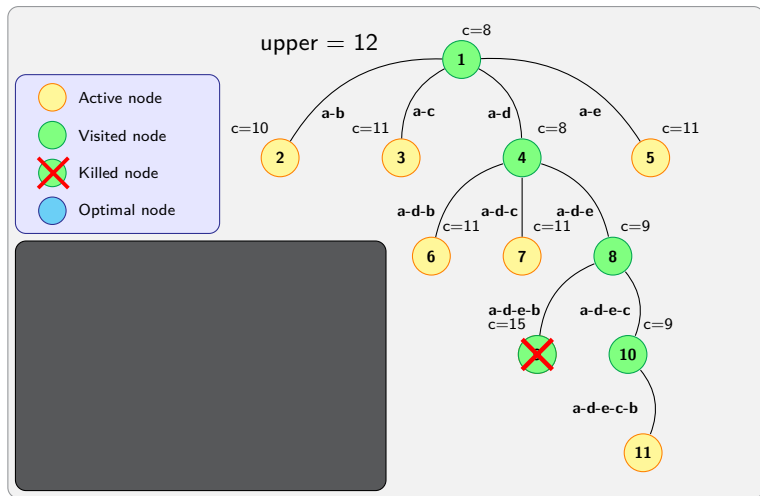
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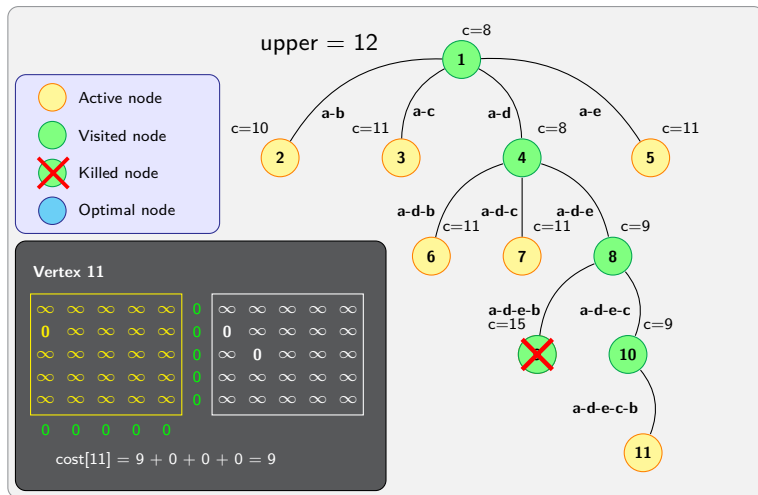
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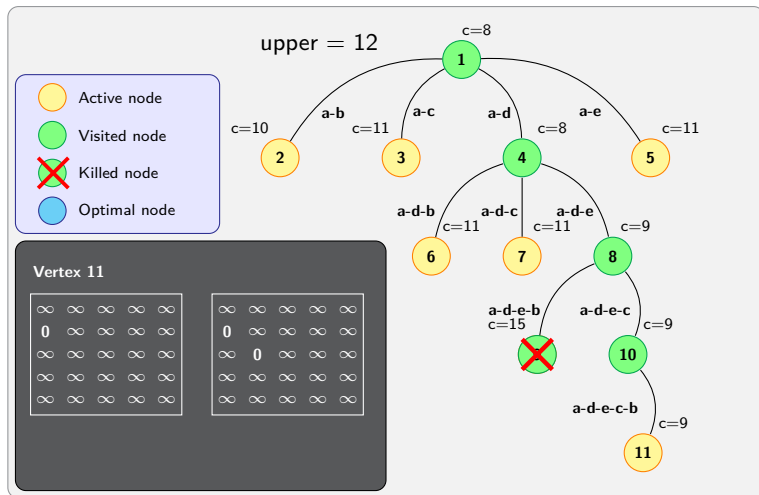
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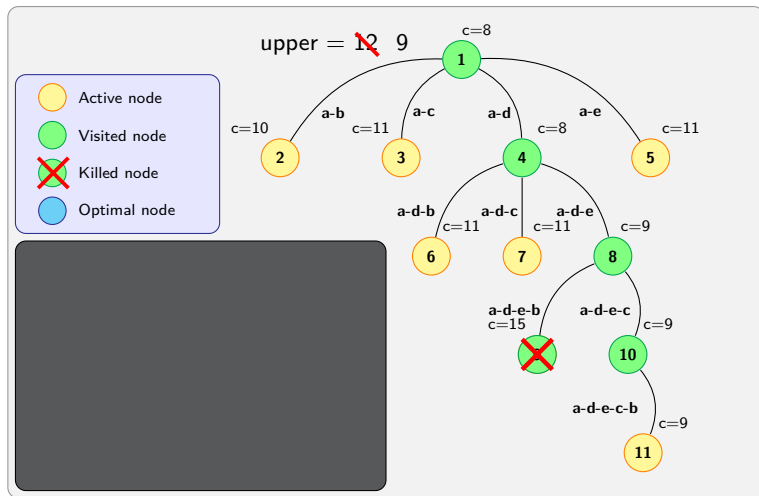
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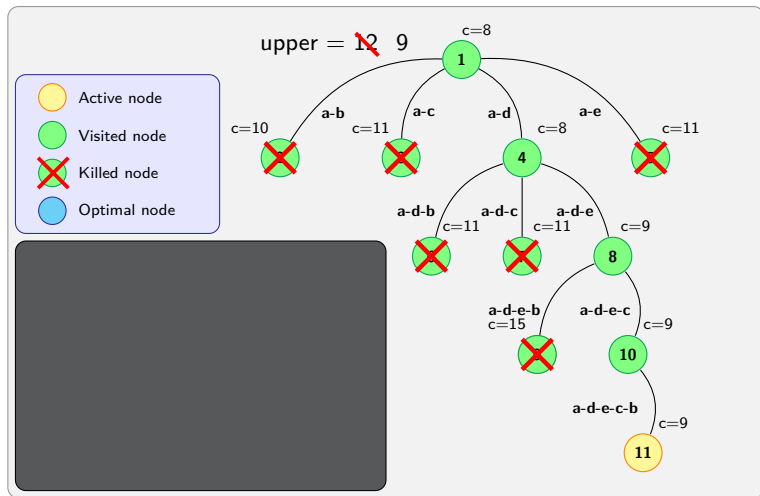
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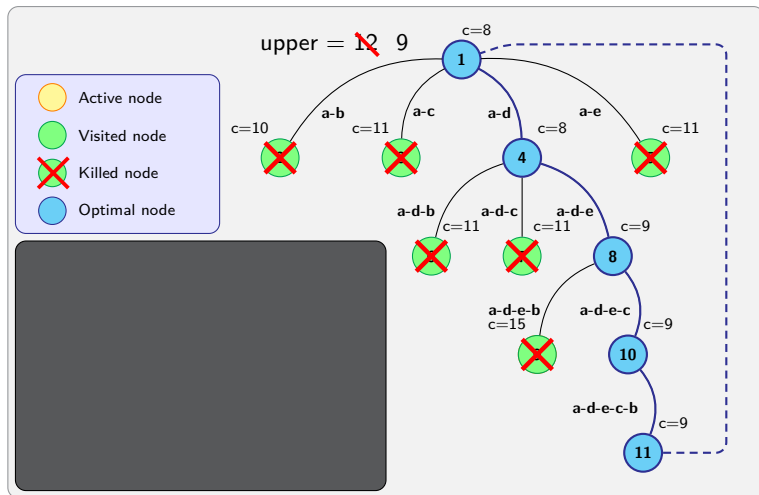
TSP in Directed Graphs



TSP in Directed Graphs



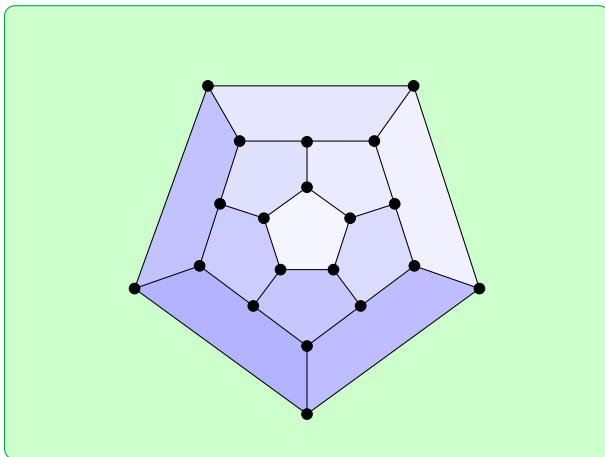
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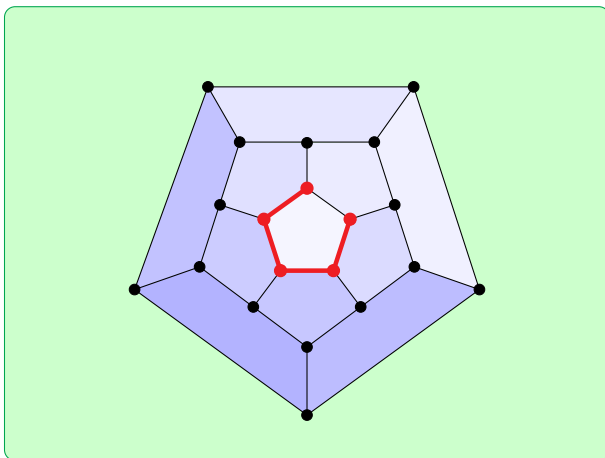
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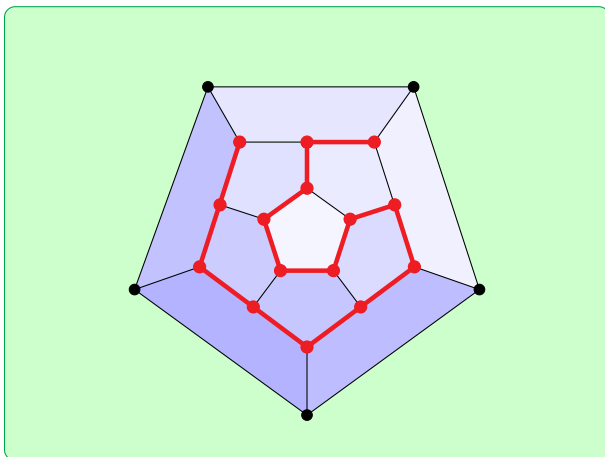
A Hamiltonian Cycle over a Dodecahedron



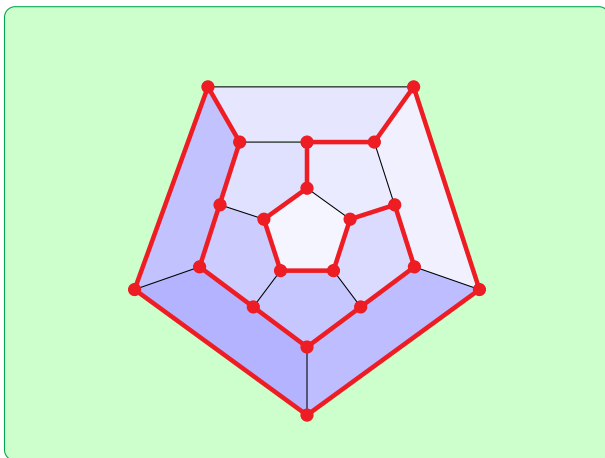
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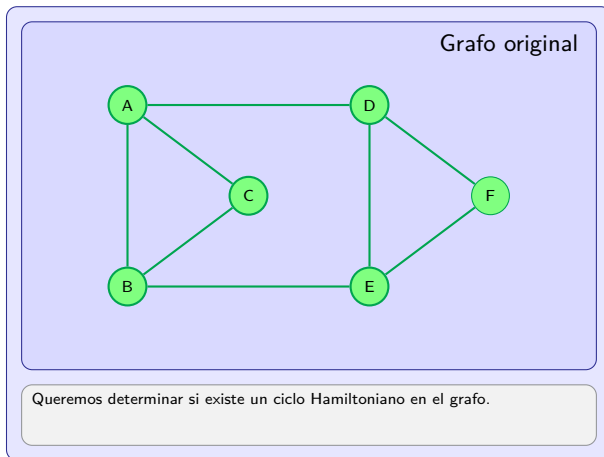
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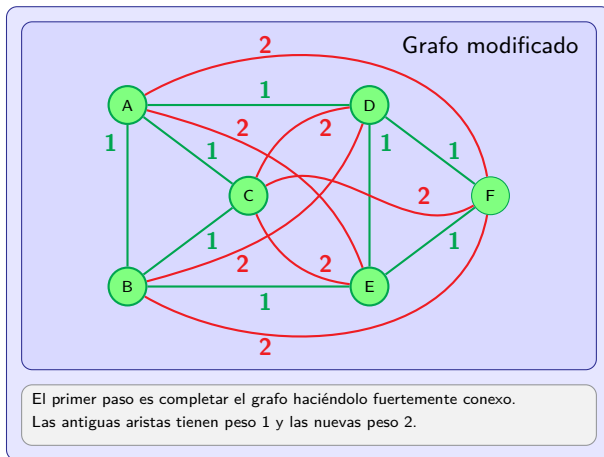
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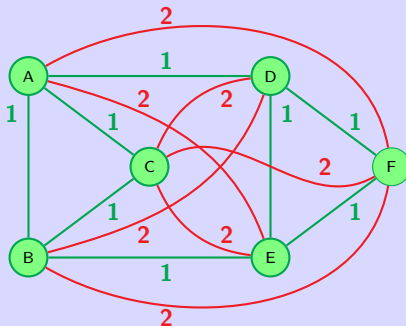
Hamiltonian Cycles and the TSP



Hamiltonian Cycles and the TSP

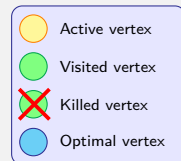


Hamiltonian Cycles and the TSP

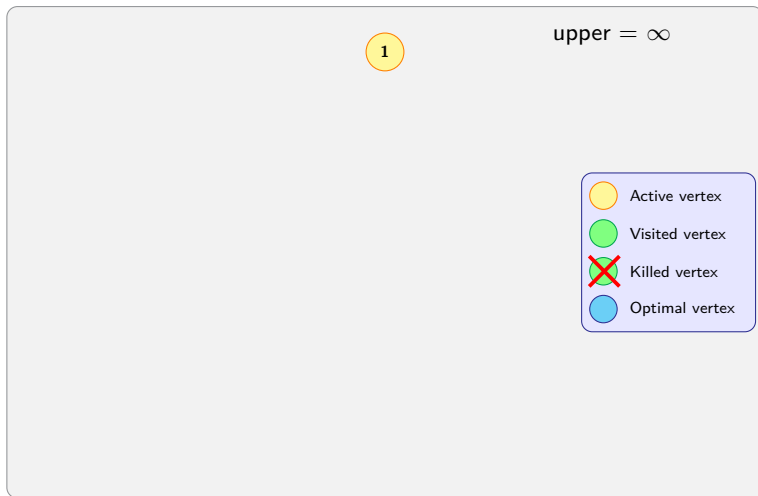


Si existe una solución para el TSP con costo $|V|$, entonces existe un ciclo Hamiltoniano en el grafo original. ¿Puede ver por qué?

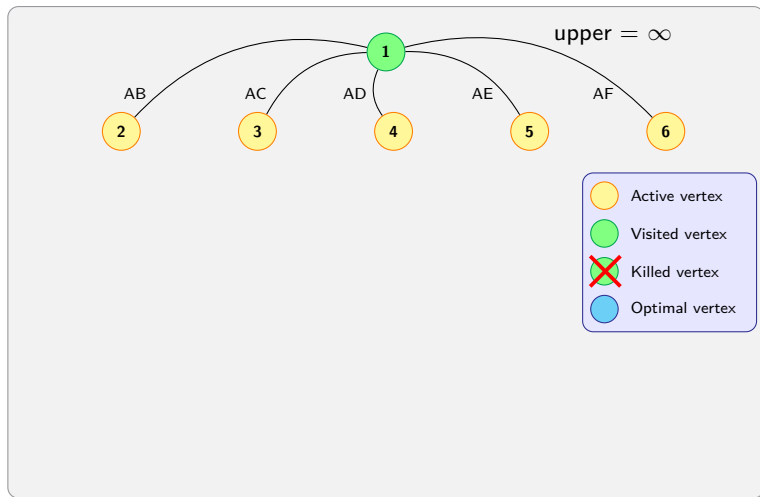
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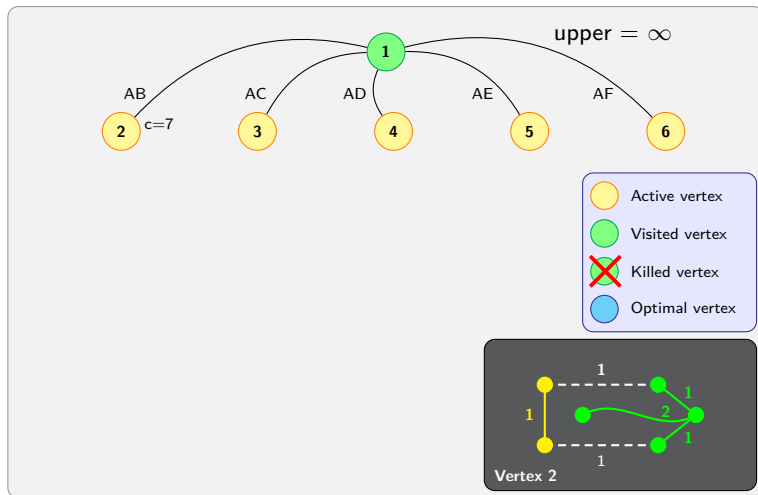
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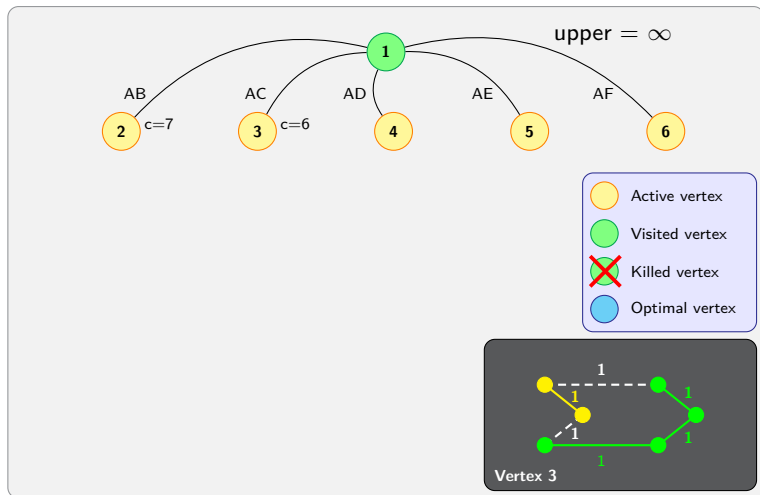
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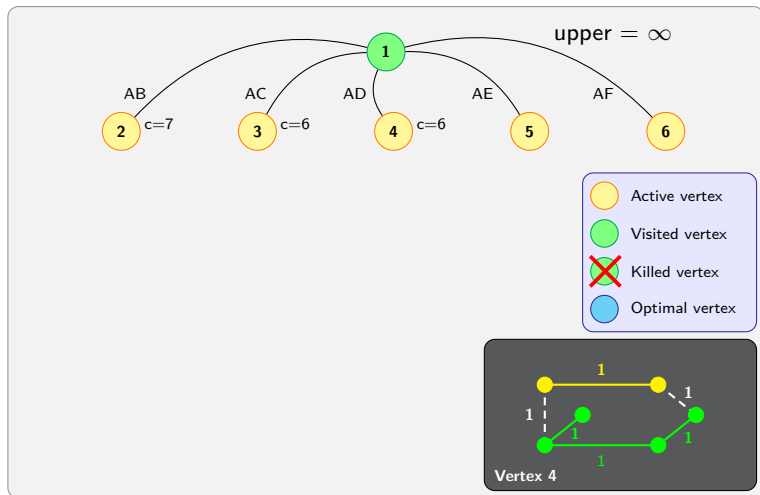
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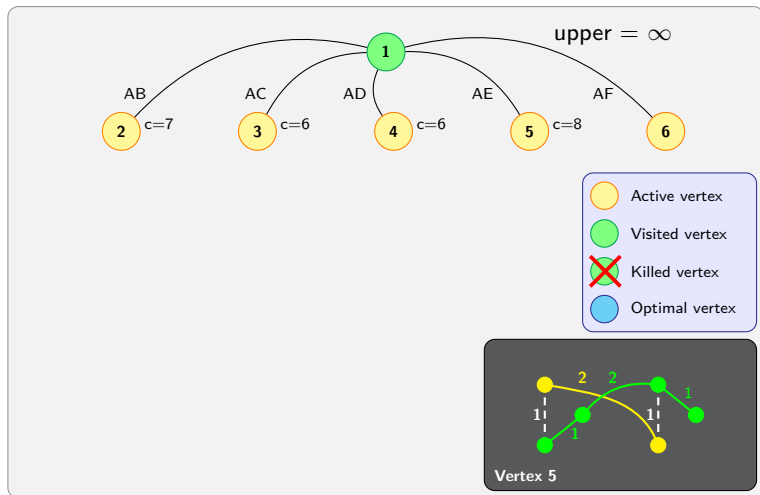
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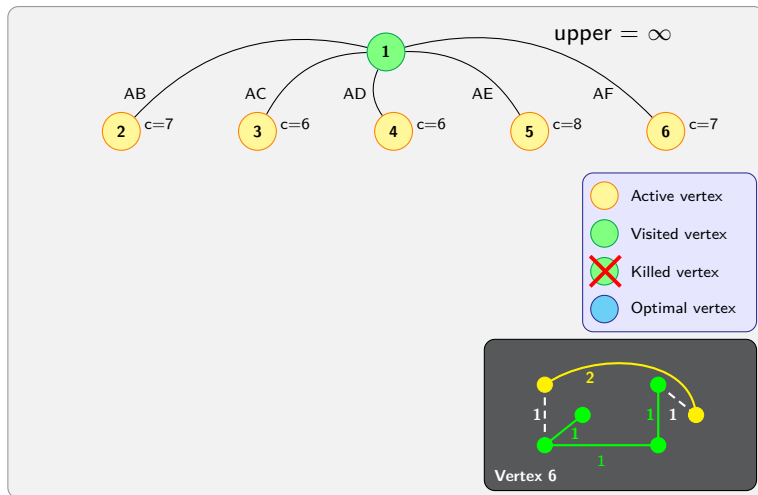
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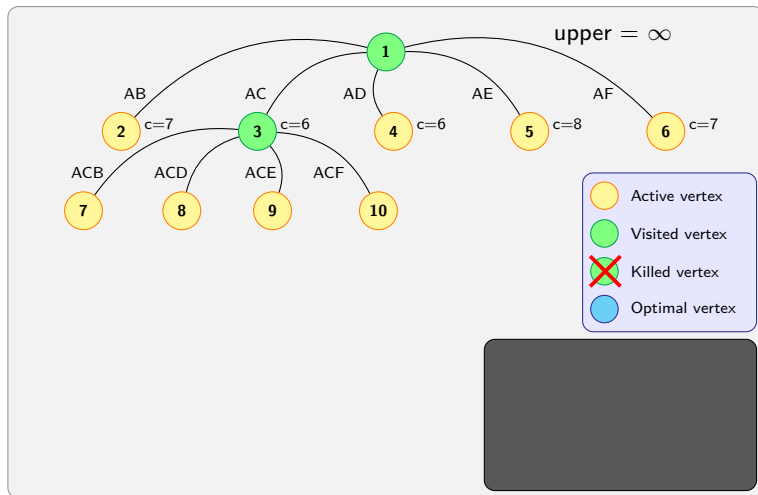
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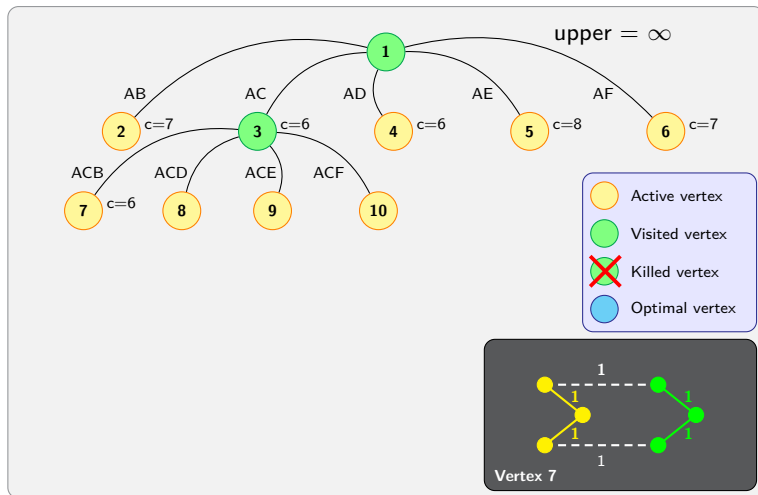
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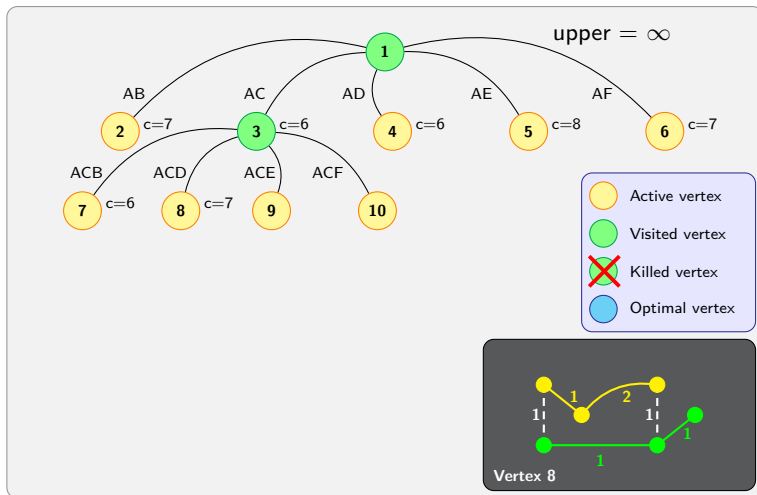
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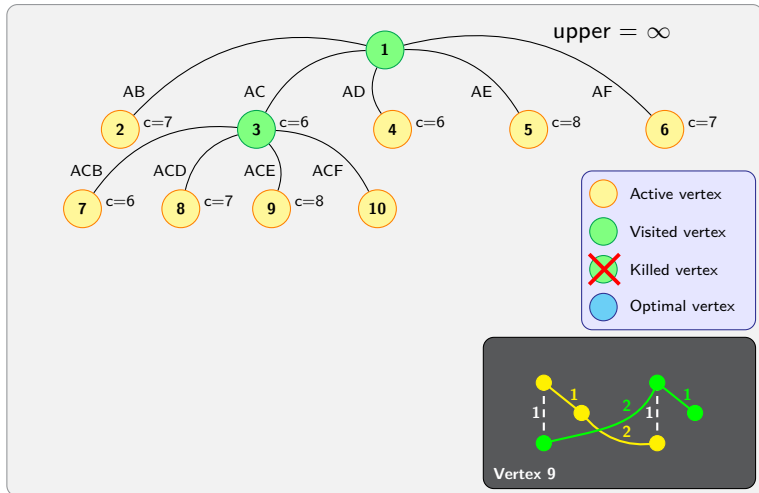
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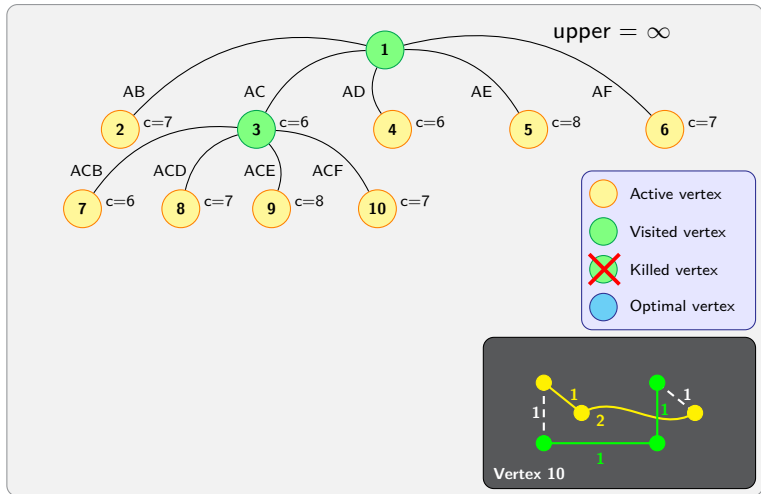
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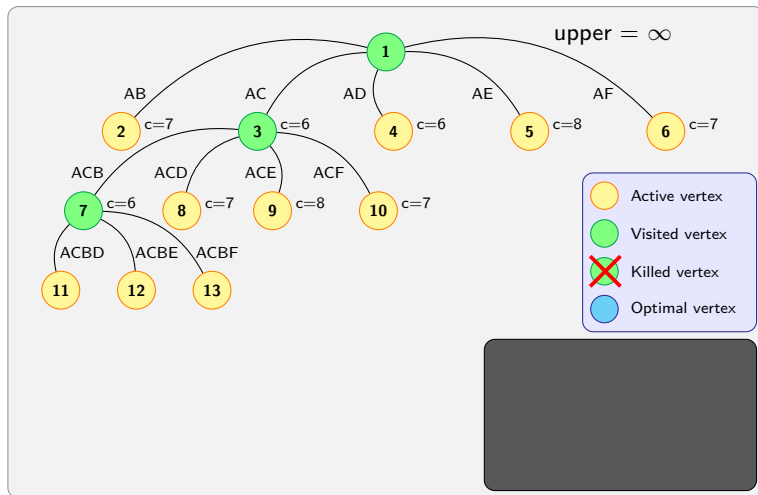
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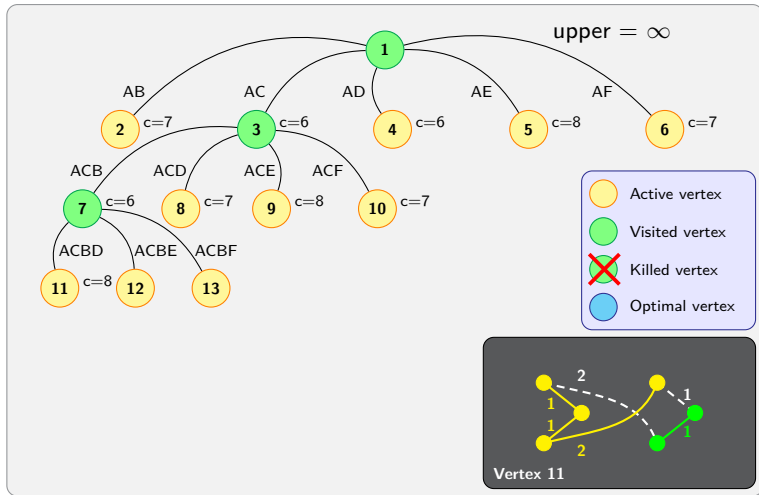
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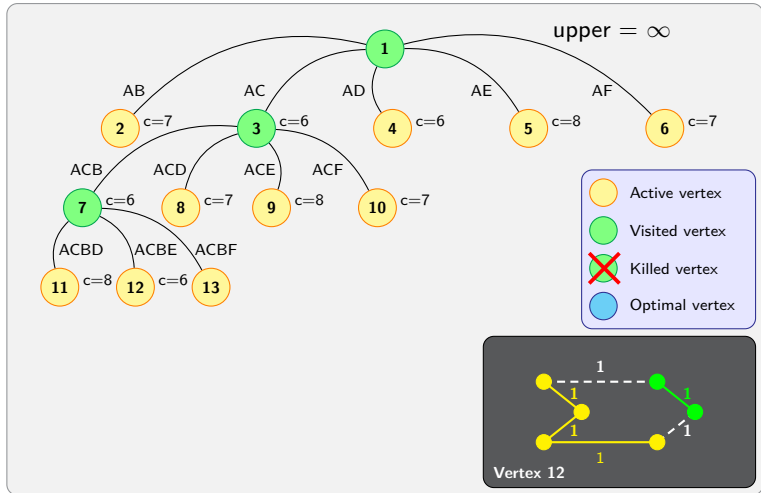
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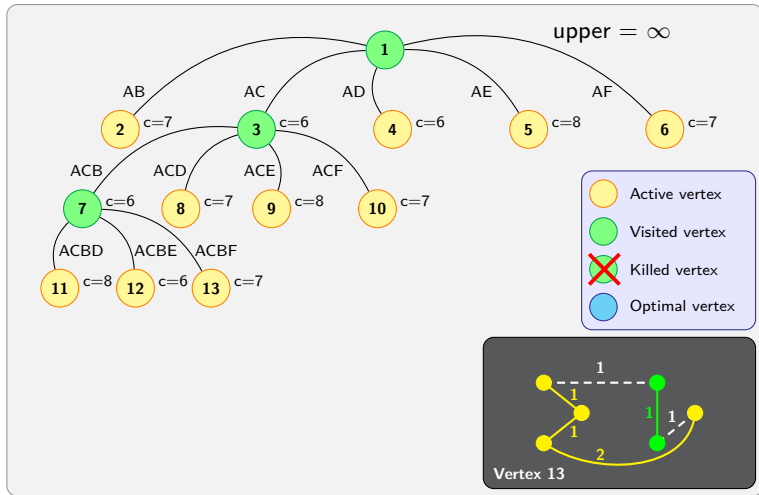
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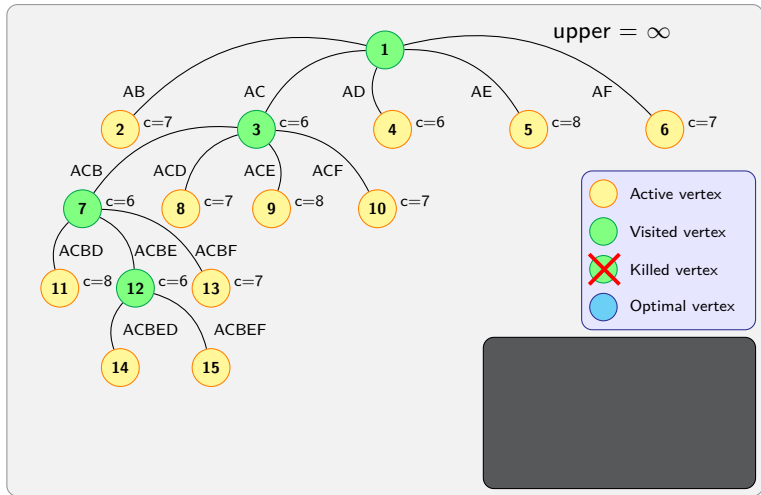
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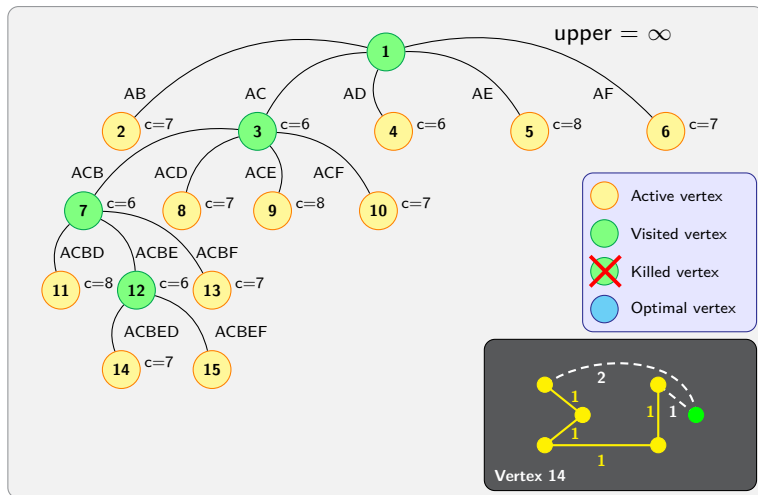
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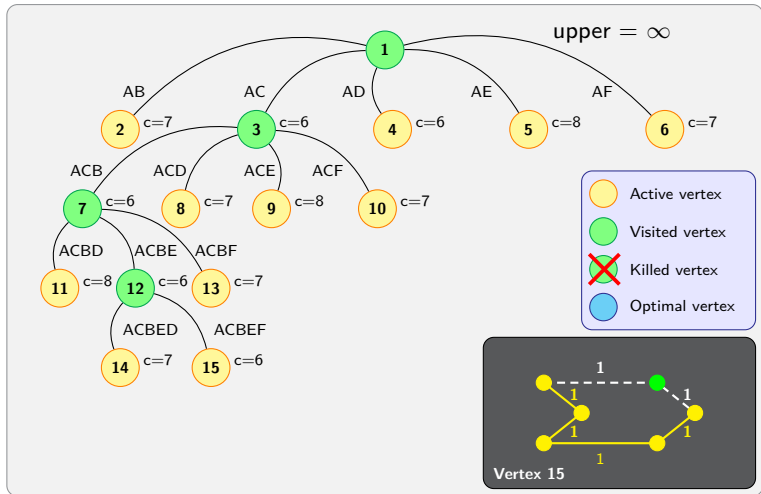
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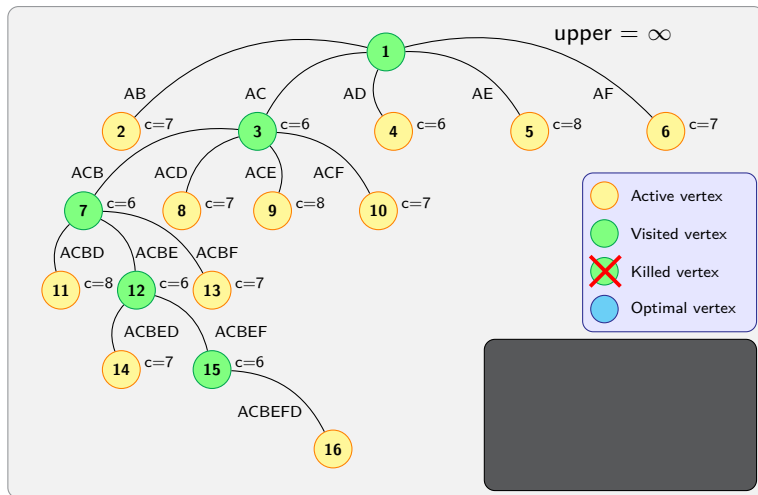
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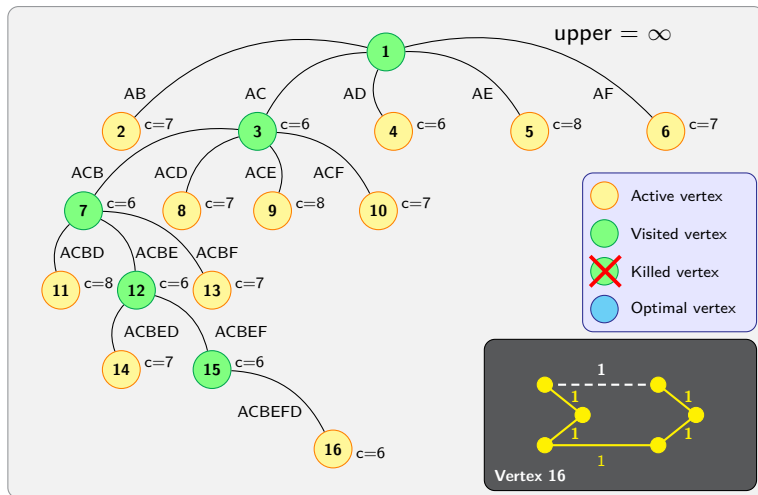
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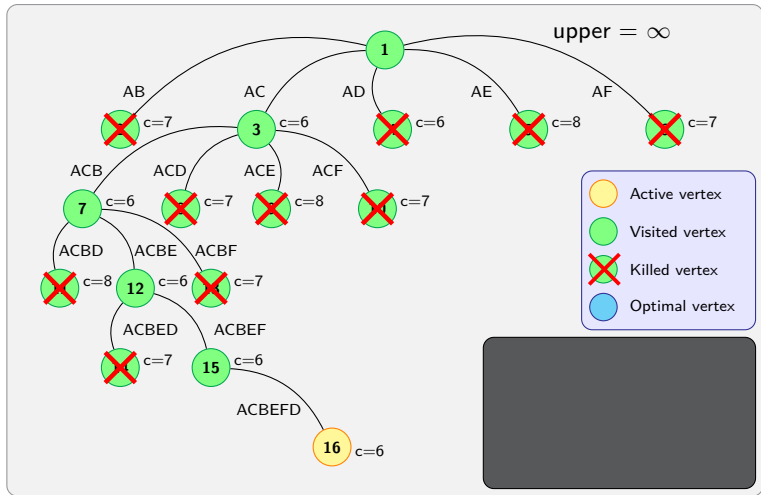
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