

Shortest Paths 1

October 8, 2008

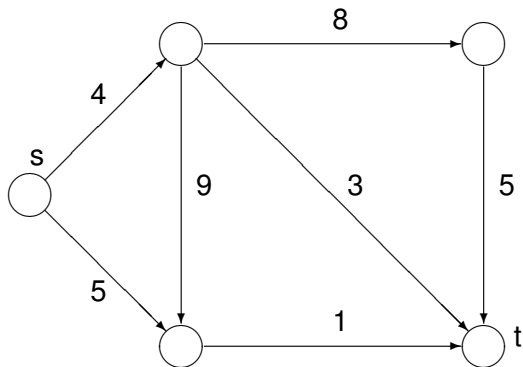
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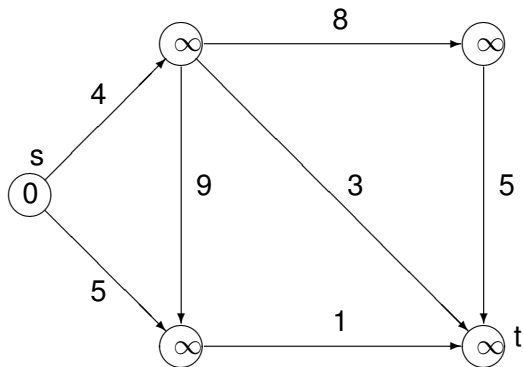
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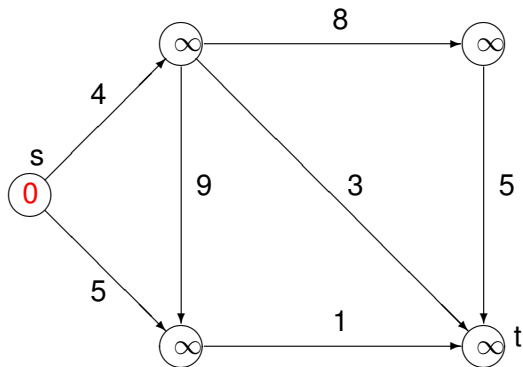
Dijkstra - reminder



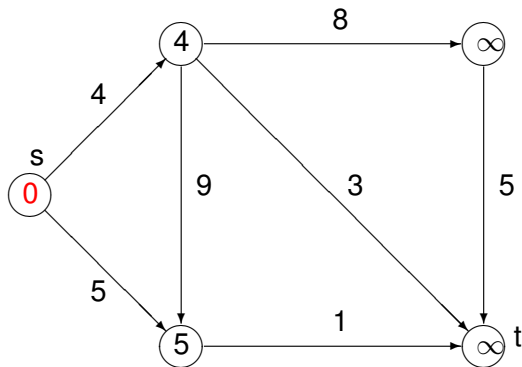
Dijkstra - reminder



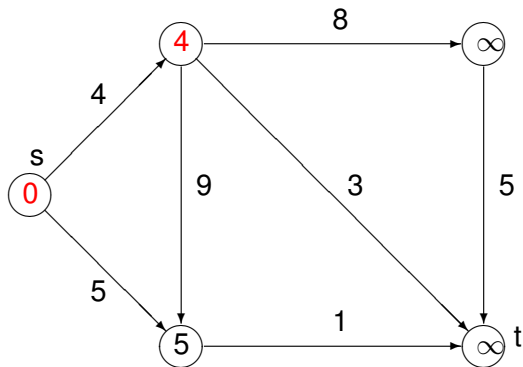
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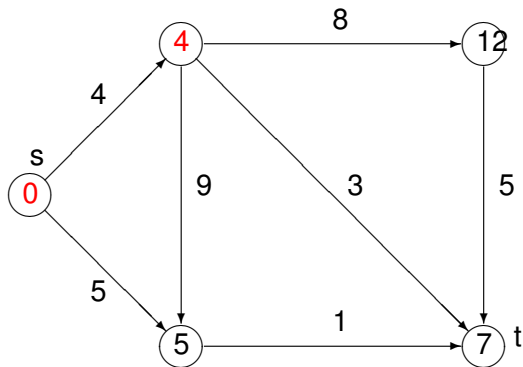
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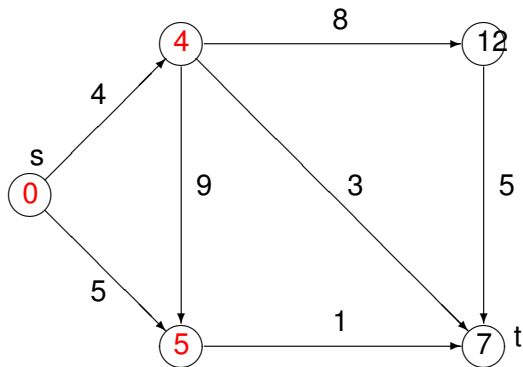
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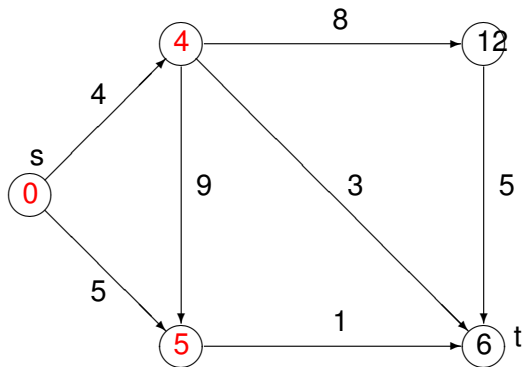
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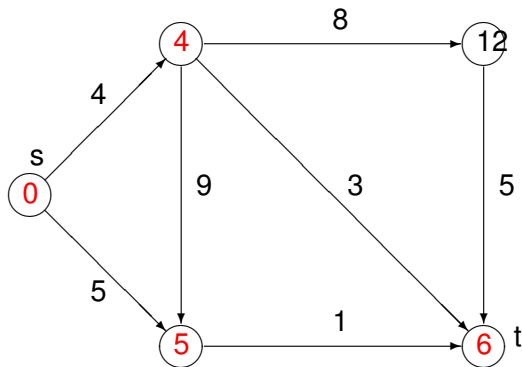
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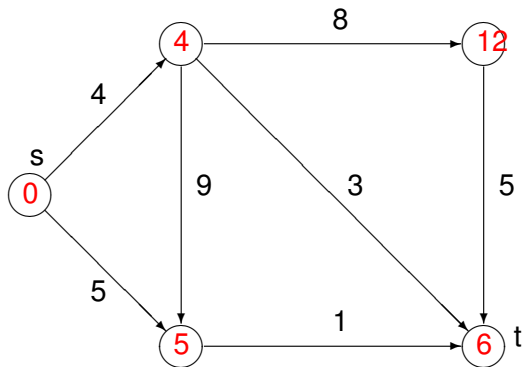
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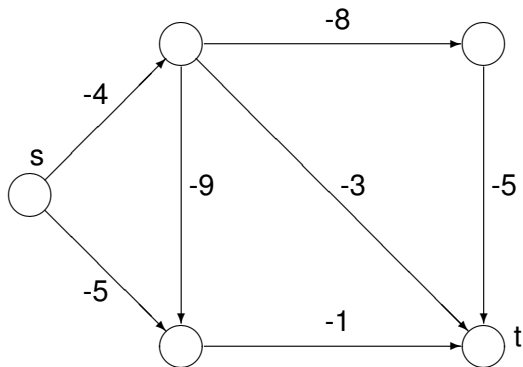
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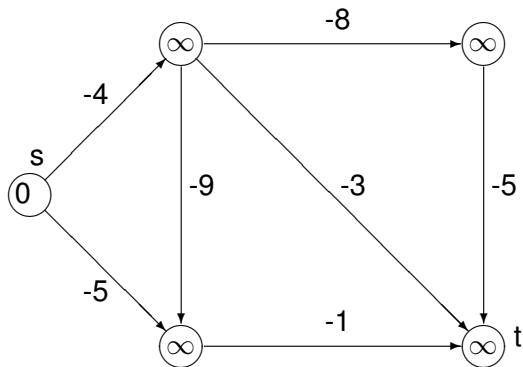
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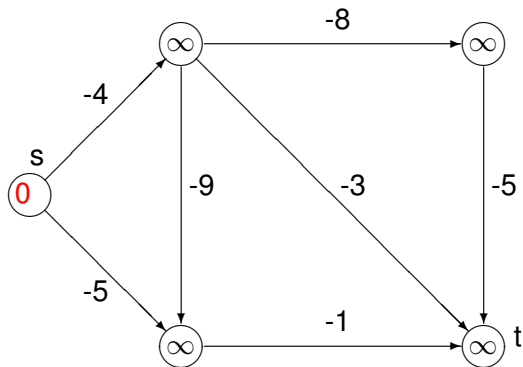
Dijkstra - another example



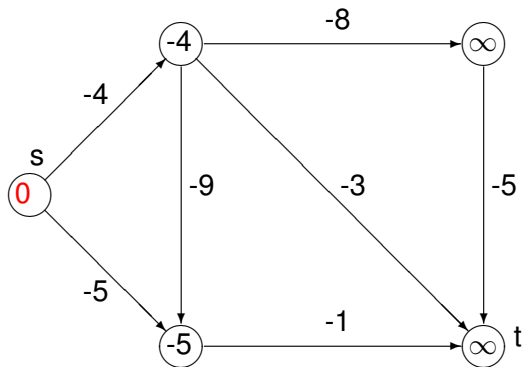
Dijkstra - another example



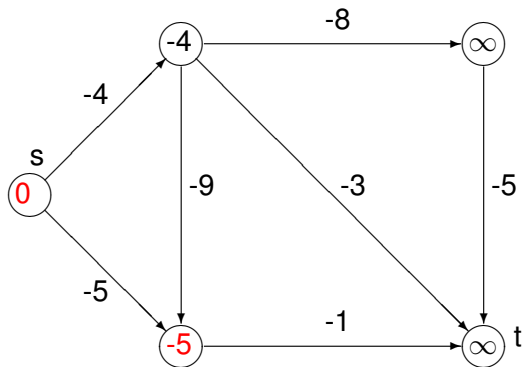
Dijkstra - another example



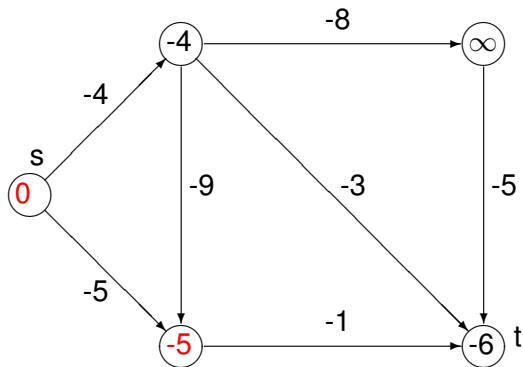
Dijkstra - another example



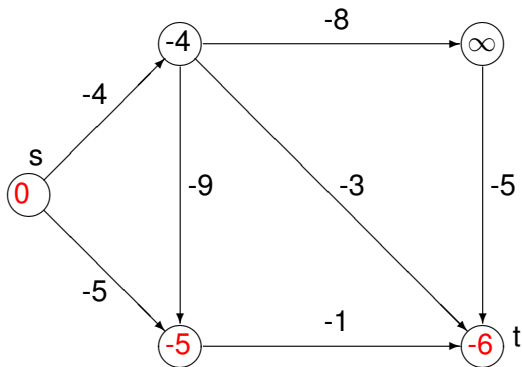
Dijkstra - another example



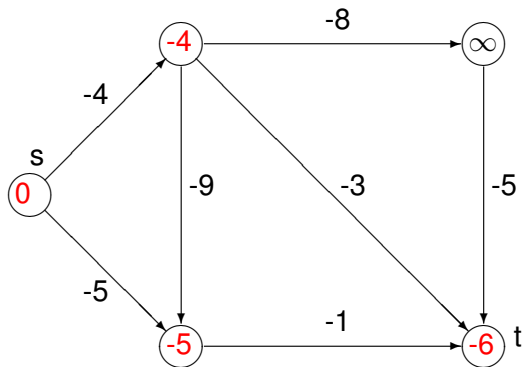
Dijkstra - another example



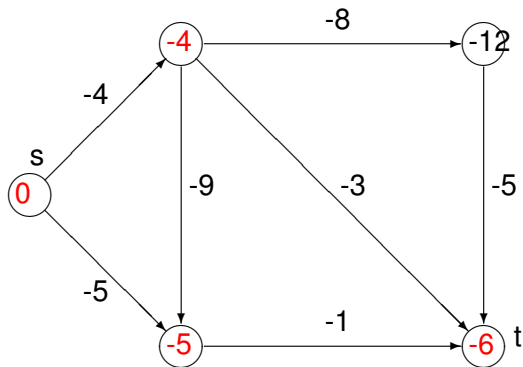
Dijkstra - another example



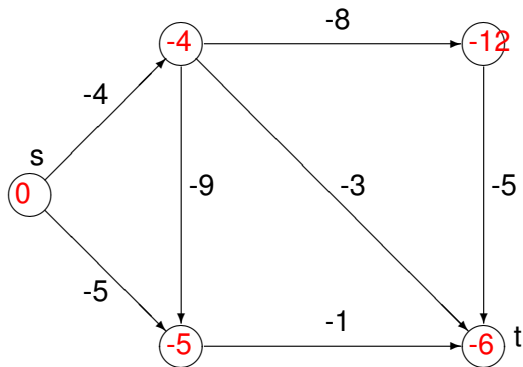
Dijkstra - another example



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Dijkstra's Algorithm is only guaranteed to find the shortest path if there are no negative costs.

There are algorithms which work for networks with negative cost arcs. We will look at two of these.

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Topological Ordering

Definition

A **topological ordering** of the nodes of a directed graph (N, A) is any naming of the nodes with the integers $1 \dots |N|$ such that for any arc (i, j) in the graph $i < j$

Proposition

Any acyclic graph has a topological ordering.

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Using a Topological Ordering

In Dijkstra's Algorithm, we choose the node with the lowest label and make it permanent.

In the Reaching Algorithm, we choose the node with the lowest name and make it permanent.

DOES NOT WORK IN CYCLIC GRAPHS

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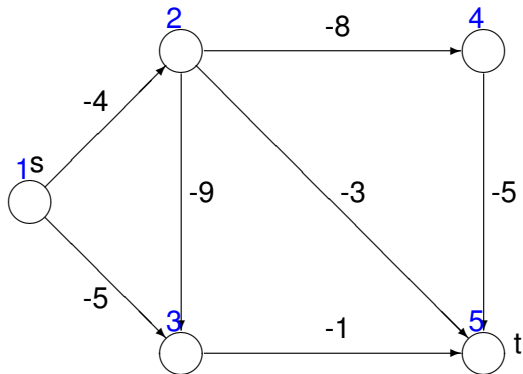
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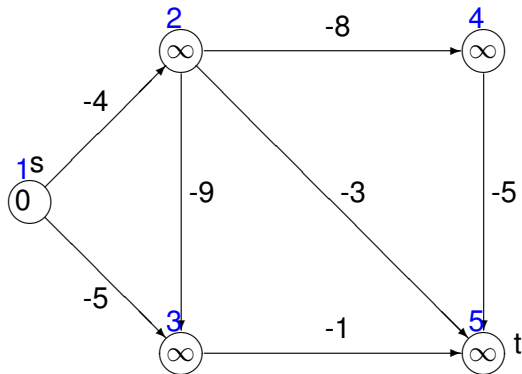
In the Reaching Algorithm, we choose the node with the lowest name and make it permanent.

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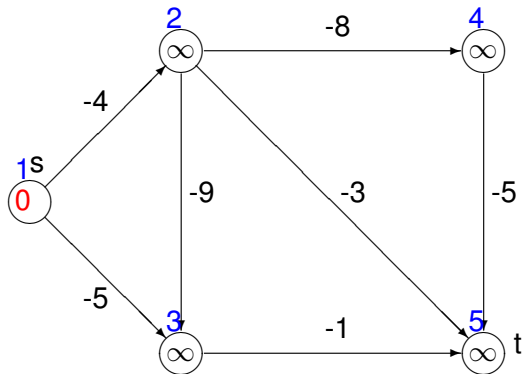
Reaching Algorithm



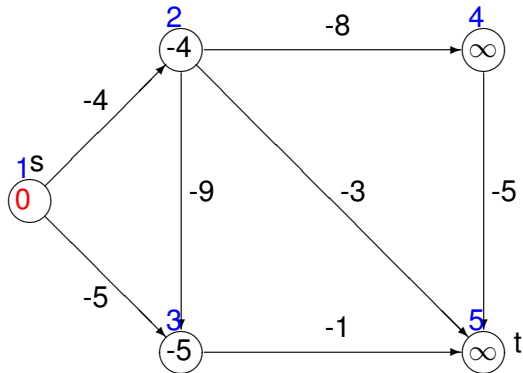
Reaching Algorithm



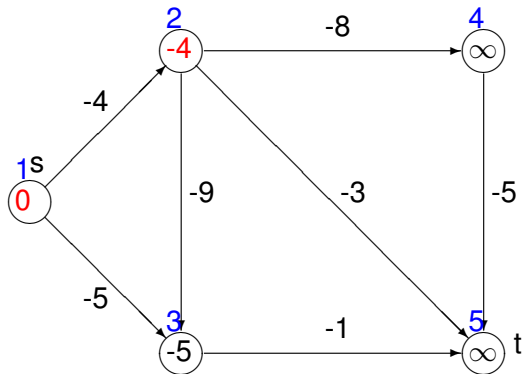
Reaching Algorithm



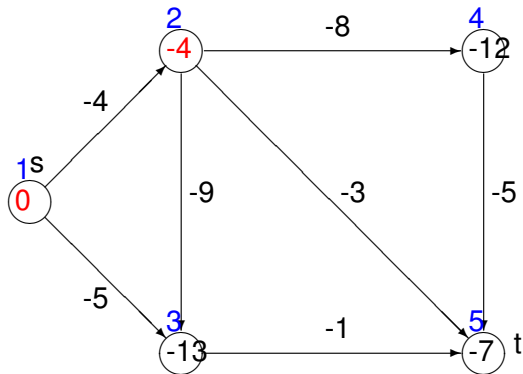
Reaching Algorithm



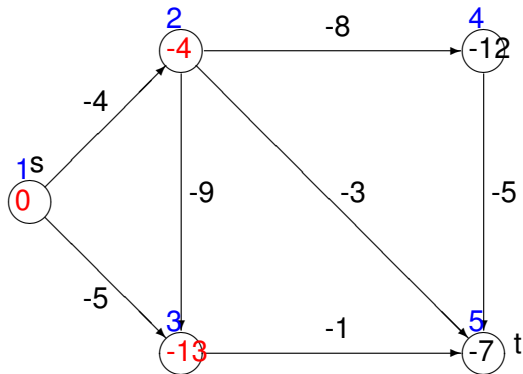
Reaching Algorithm



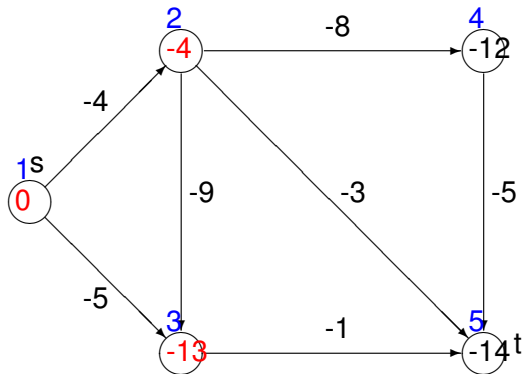
Reaching Algorithm



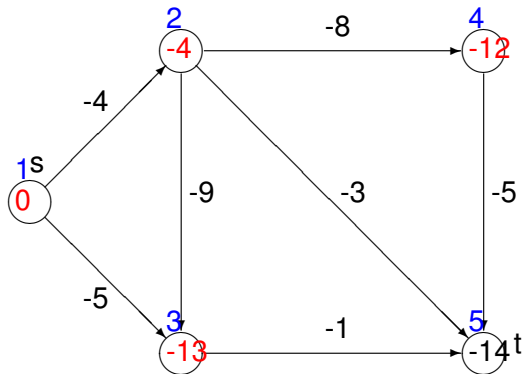
Reaching Algorithm



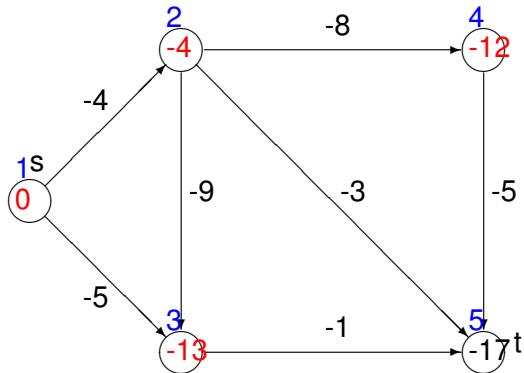
Reaching Algorithm



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