

**In the name of God**

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# **Network Flows**

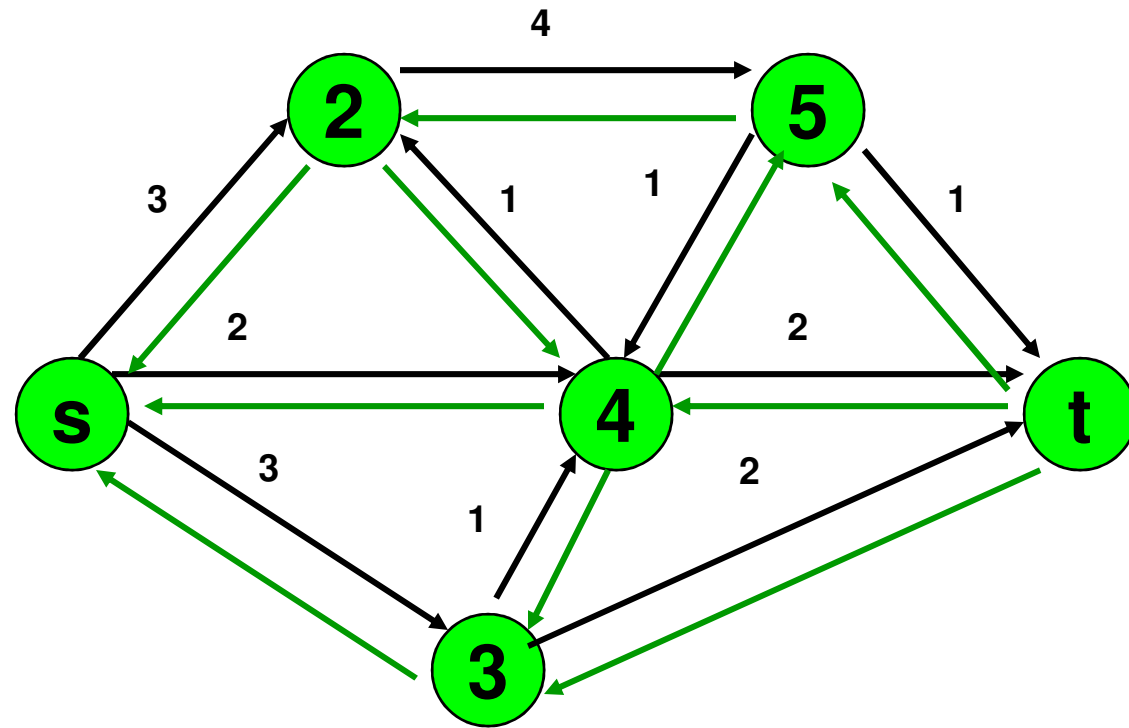
## **4. Maximum Flows**

### **4.2. Generic Augmenting Path Algorithm – An Example**

**Fall 2010**

*Instructor: Dr. Masoud Yaghini*

# Generic Augmenting Path Algorithm

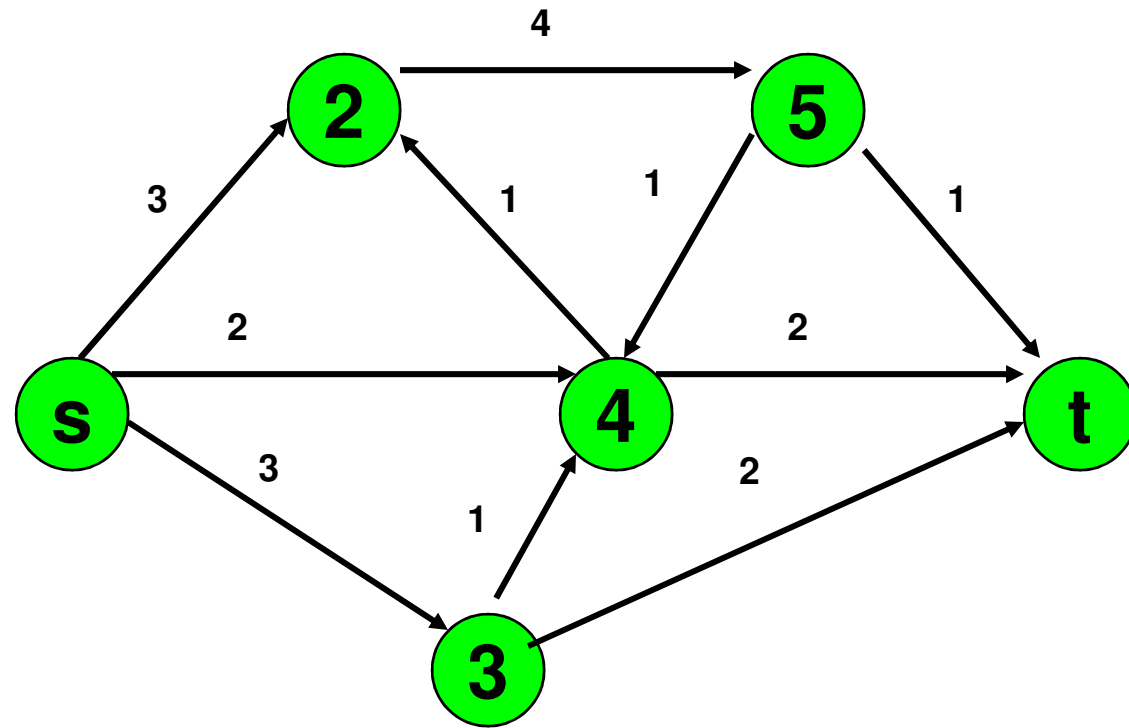


This is the original network, plus reversals of the arcs.

# Generic Augmenting Path Algorithm

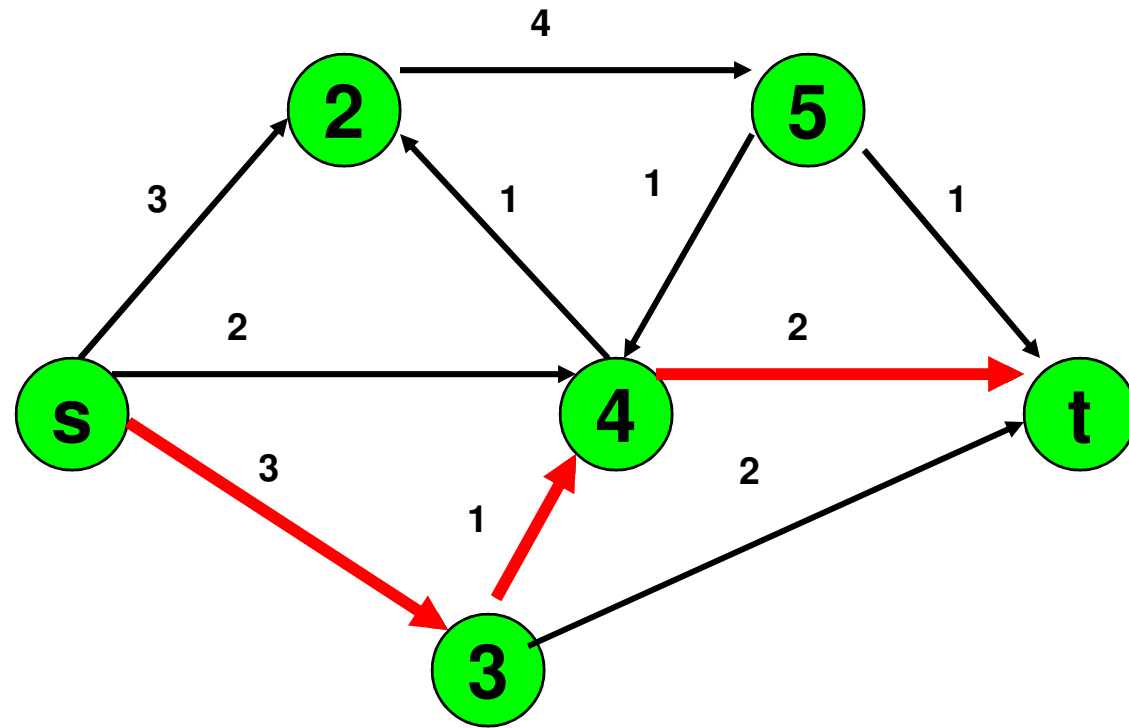
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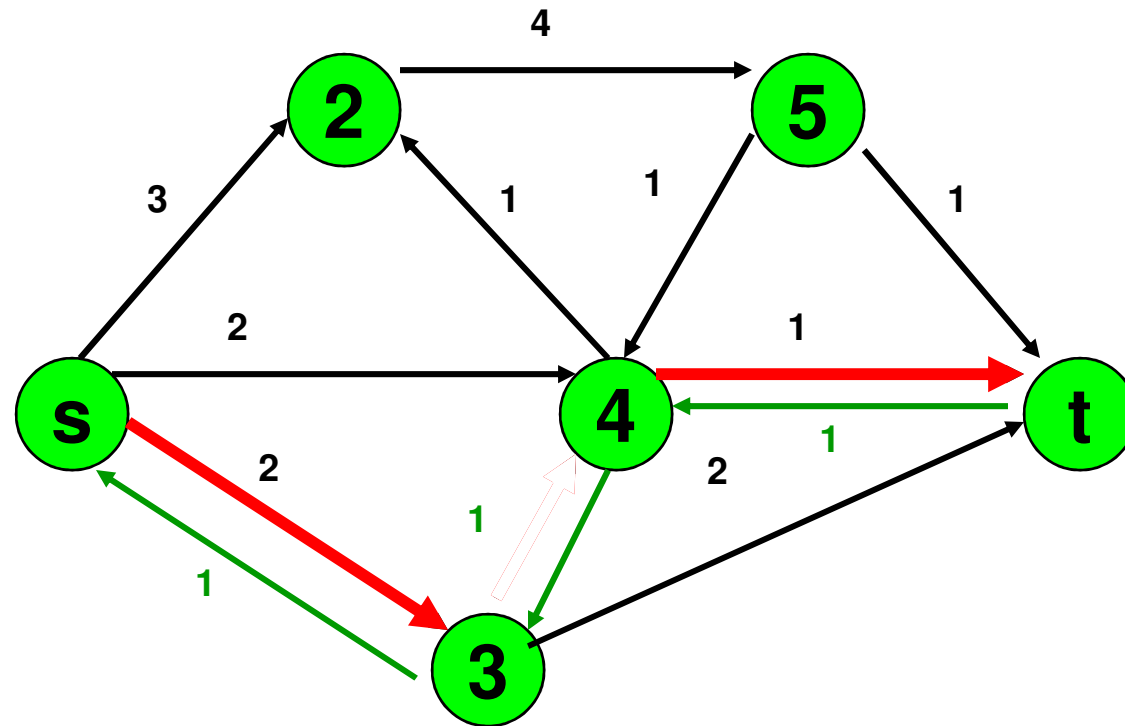
This is the original network, and the original residual network.

# Generic Augmenting Path Algorithm



Find any s-t path in  $G(x)$

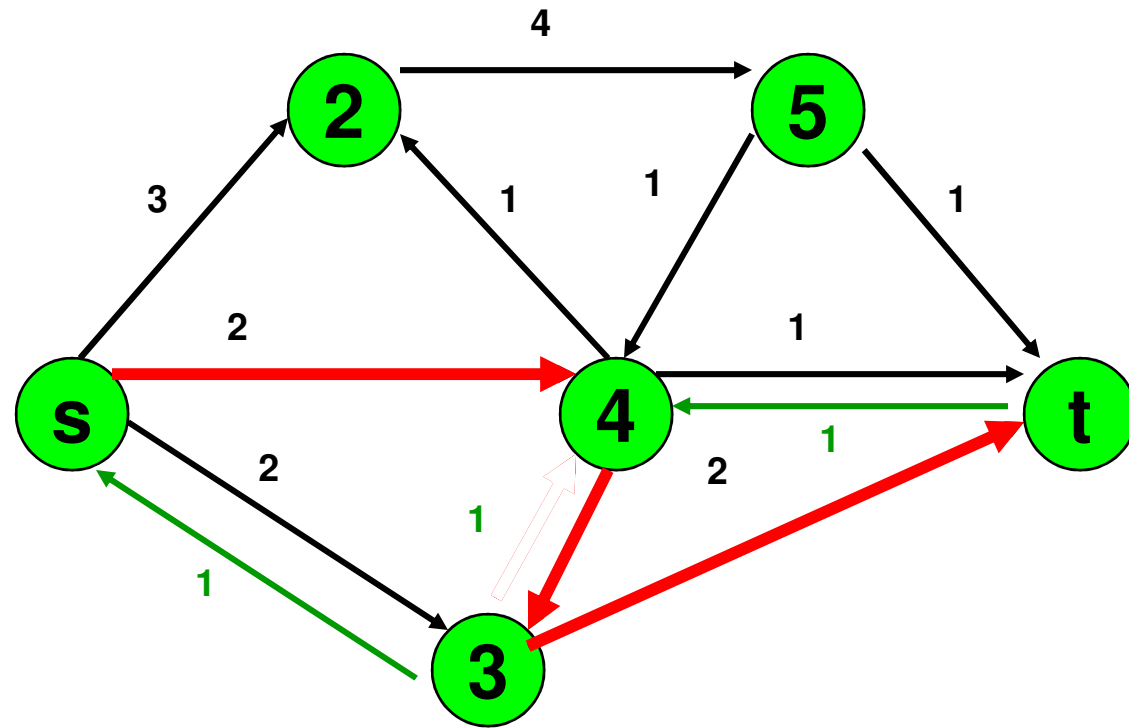
# Generic Augmenting Path Algorithm



Determine the capacity  $\Delta$  of the path.

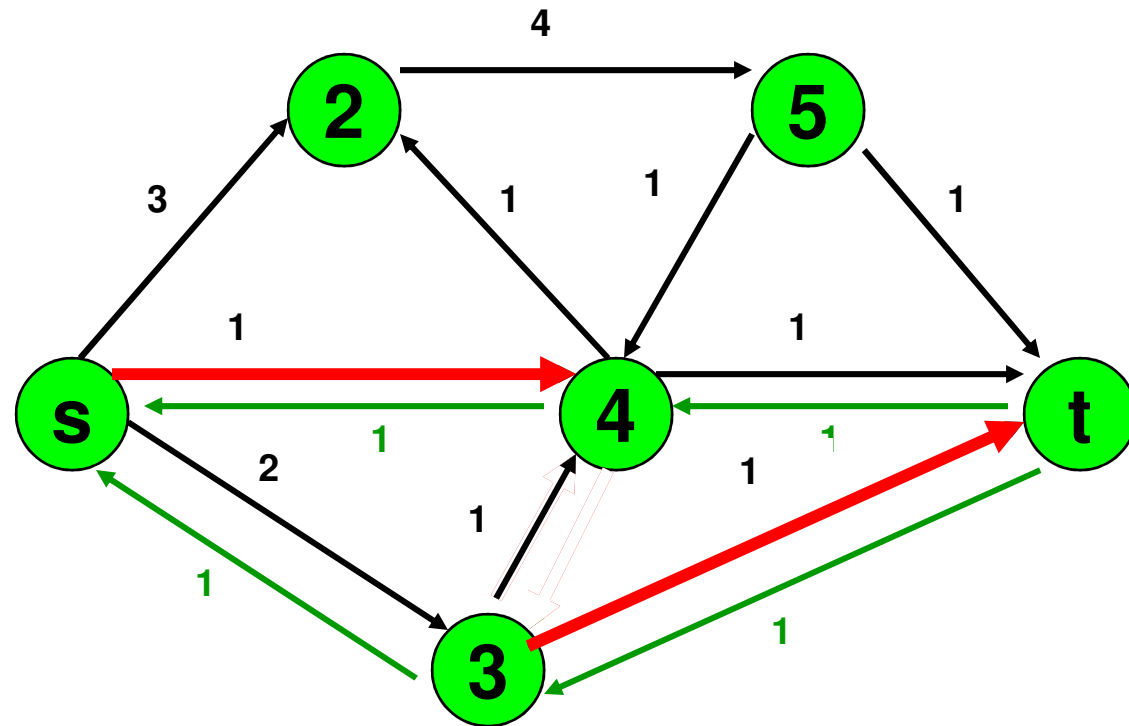
Send  $\Delta$  units of flow in the path.  
Update residual capacities.

# Generic Augmenting Path Algorithm



Find any s-t path

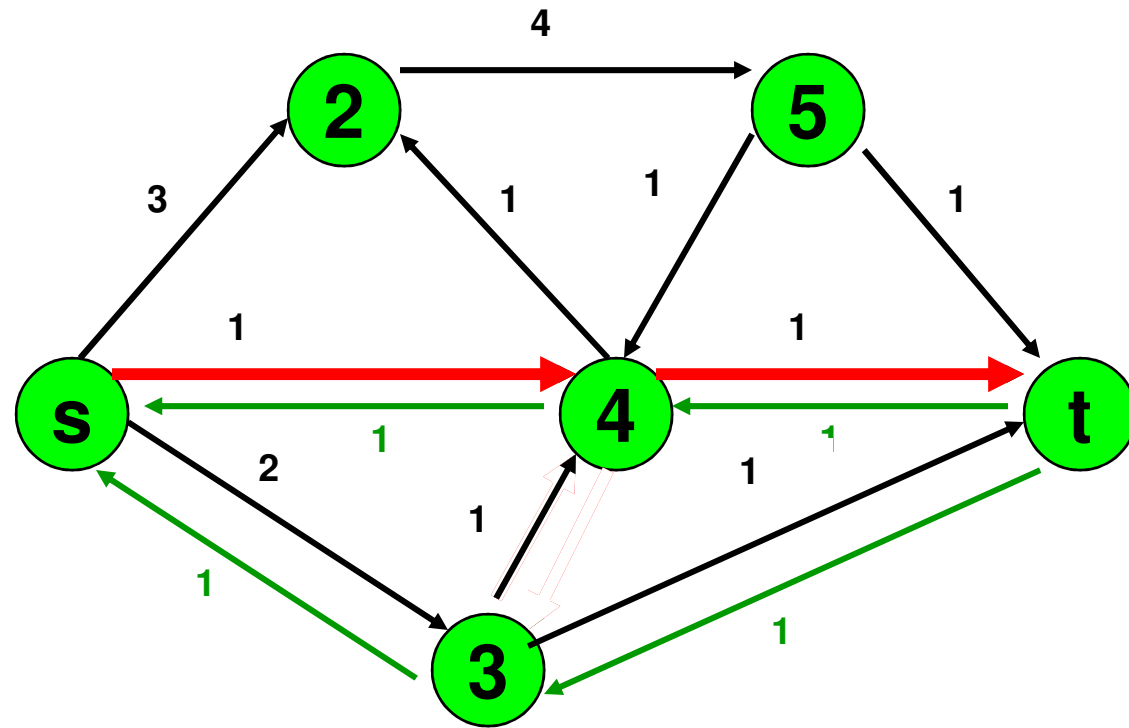
# Generic Augmenting Path Algorithm



Determine the capacity  $\Delta$  of the path.

Send  $\Delta$  units of flow in the path.  
Update residual capacities.

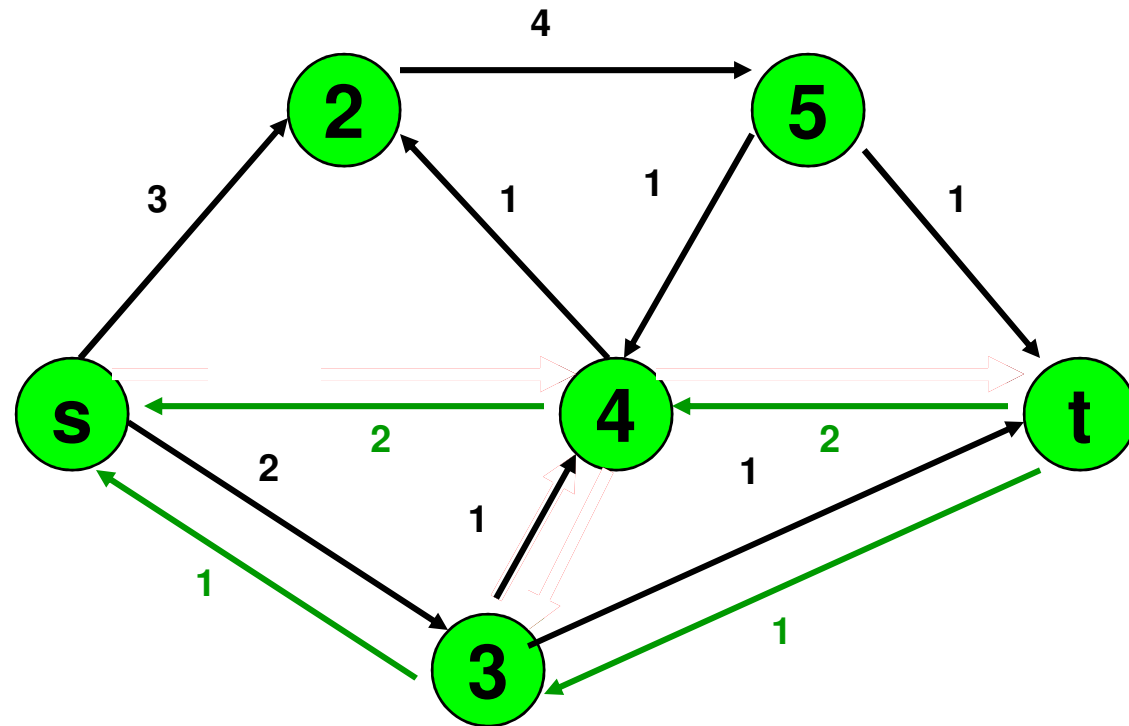
# Generic Augmenting Path Algorithm



Find any s-t path



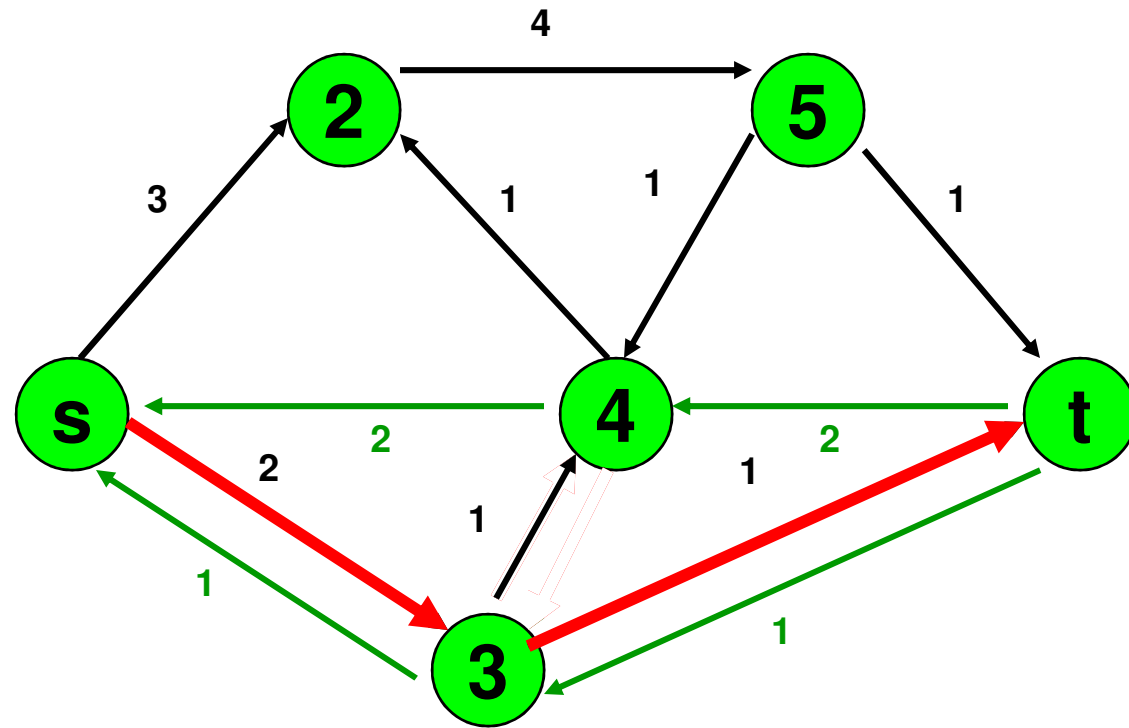
# Generic Augmenting Path Algorithm



Determine the capacity  $\Delta$  of the path.

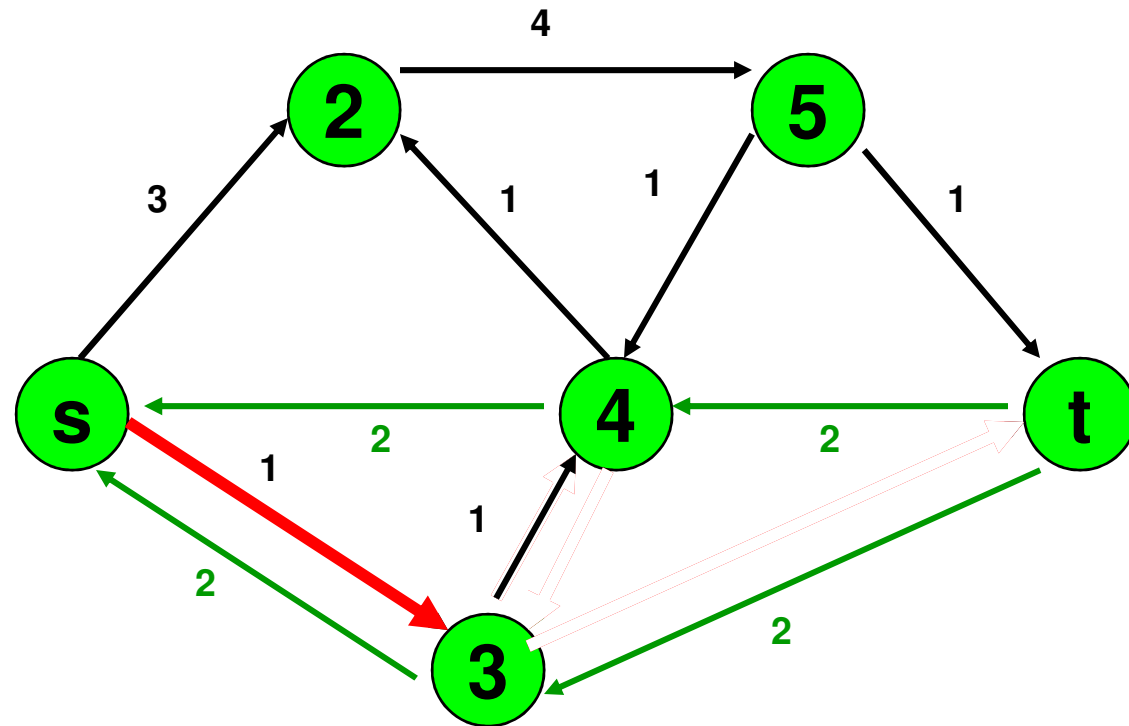
Send  $\Delta$  units of flow in the path.  
Update residual capacities.

# Generic Augmenting Path Algorithm



Find any s-t path

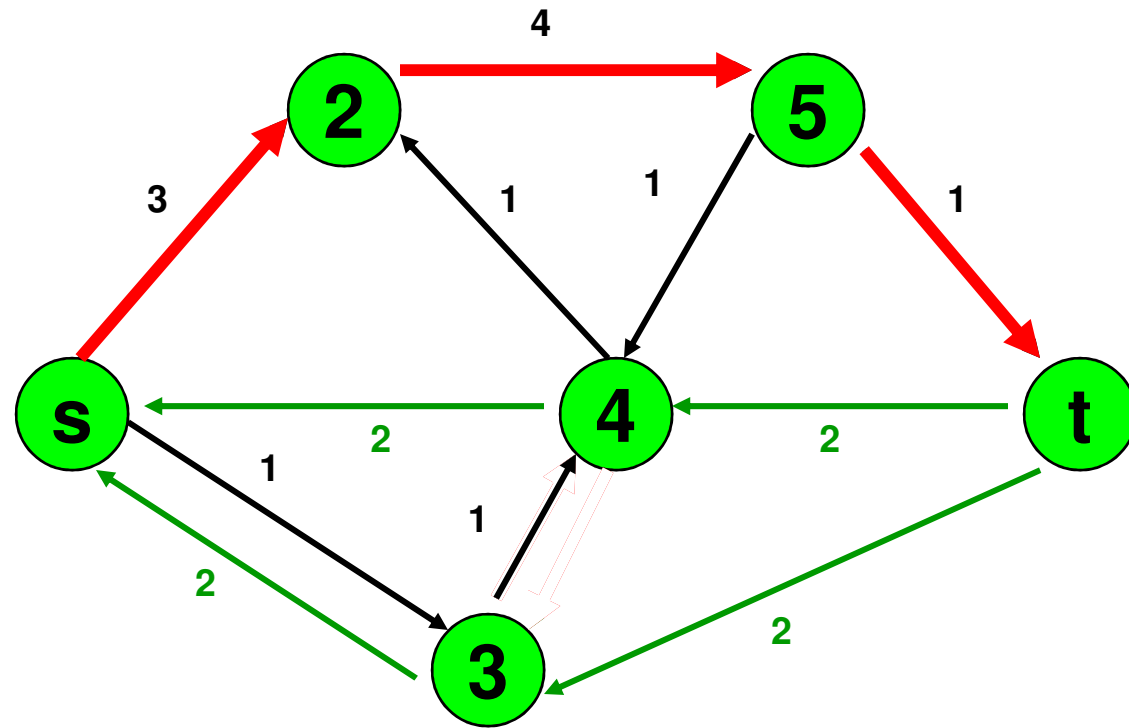
# Generic Augmenting Path Algorithm



Determine the capacity  $\Delta$  of the path.

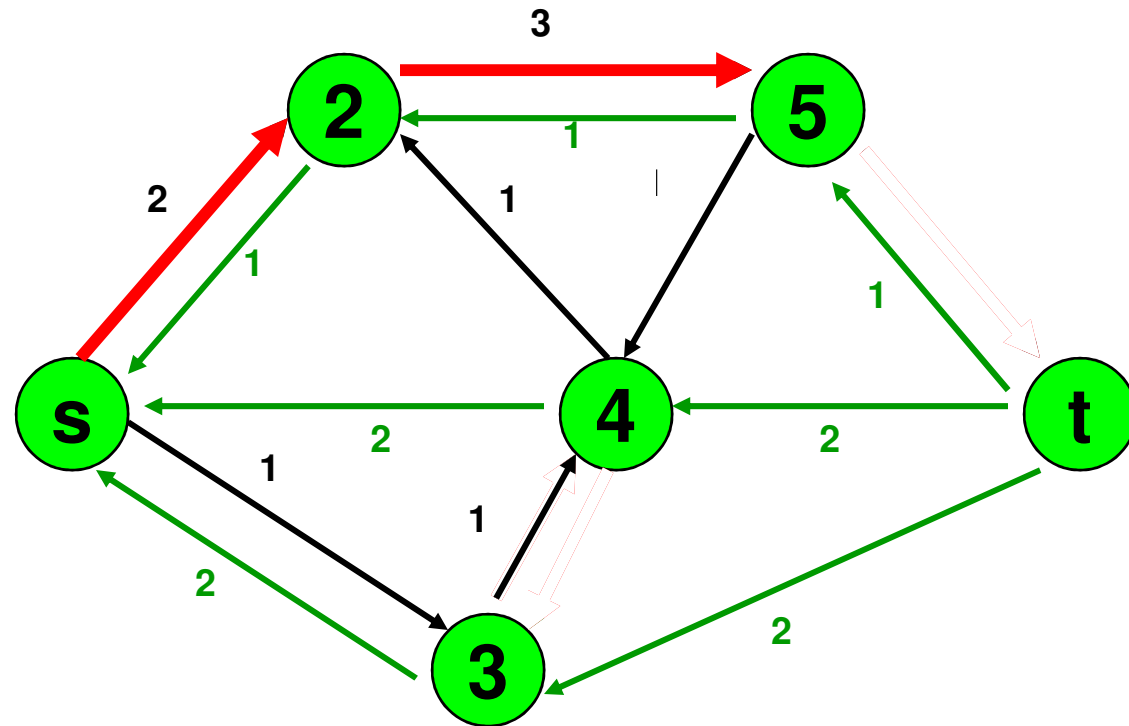
Send  $\Delta$  units of flow in the path.  
Update residual capacities.

# Generic Augmenting Path Algorithm



Find any s-t path

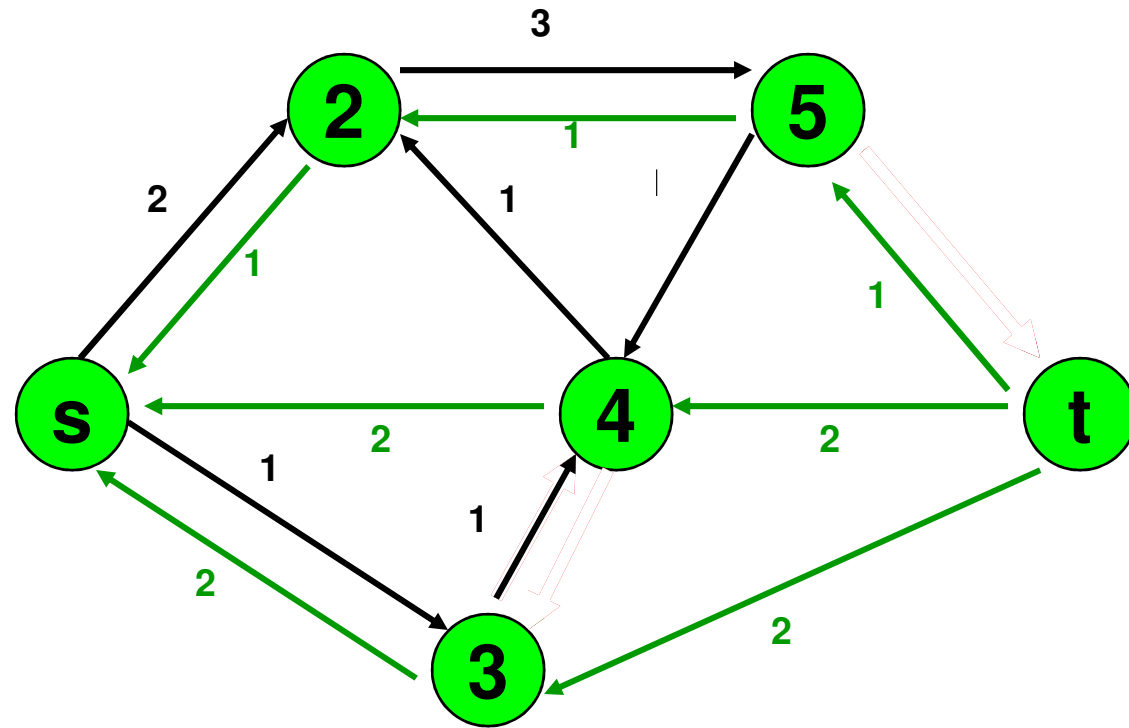
# Generic Augmenting Path Algorithm



Determine the capacity  $\Delta$  of the path.

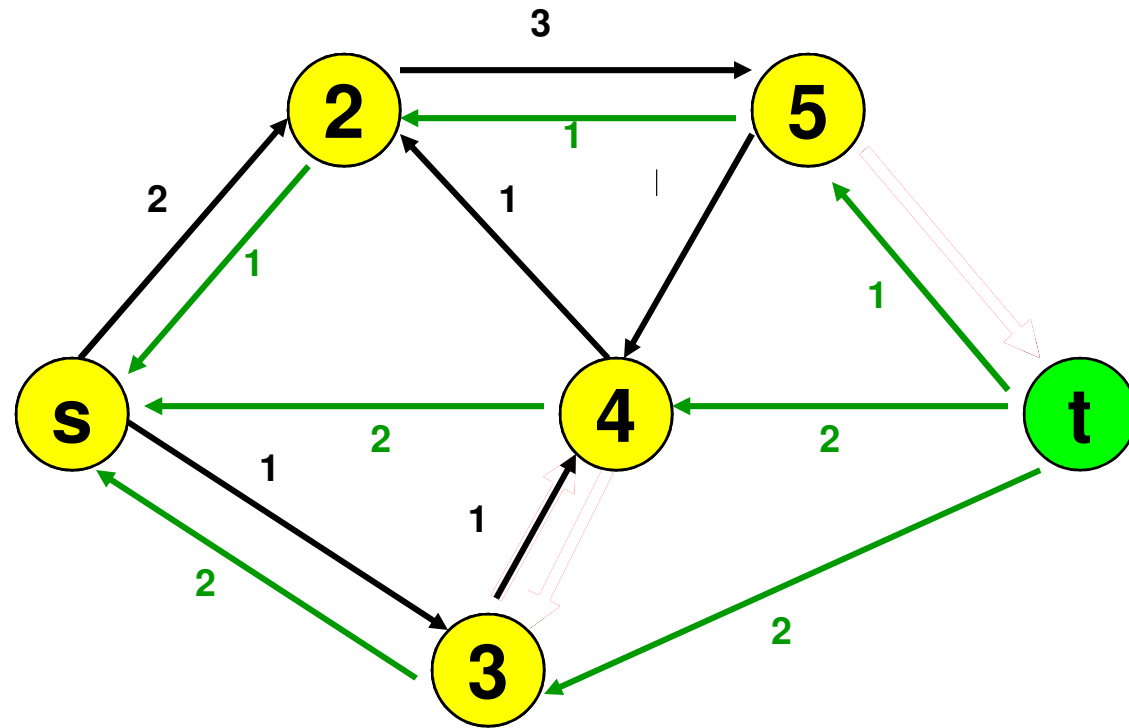
Send  $\Delta$  units of flow in the path.  
Update residual capacities.

# Generic Augmenting Path Algorithm



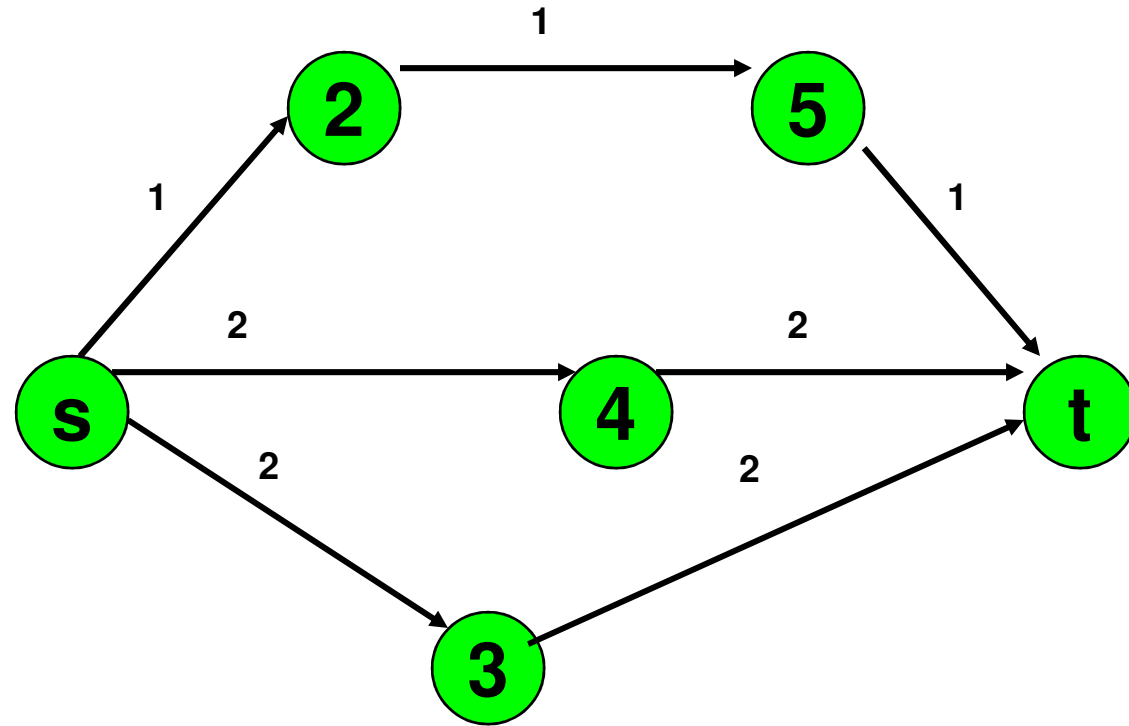
There is no  $s$ - $t$  path in the residual network. This flow is optimal

# Generic Augmenting Path Algorithm



These are the nodes that are reachable from node **s**.

# Generic Augmenting Path Algorithm



Here is the optimal flow





The End