

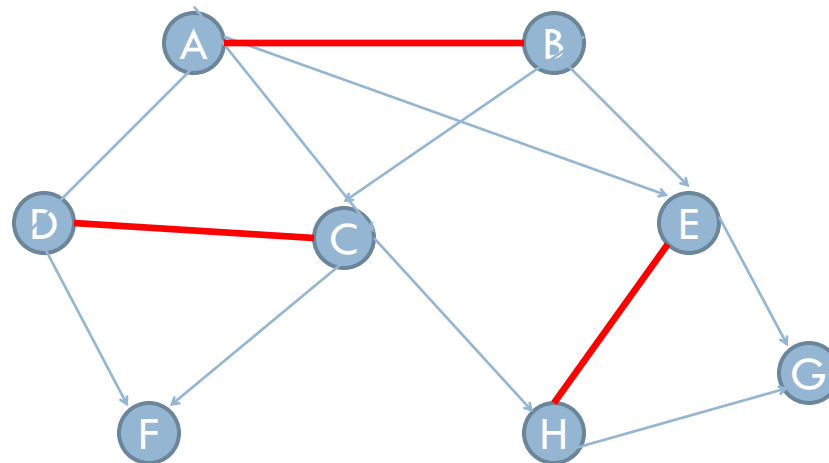
JUNCTION TREE CONSTRUCTION

Practice exercise

Example 1: Junction Tree Construction

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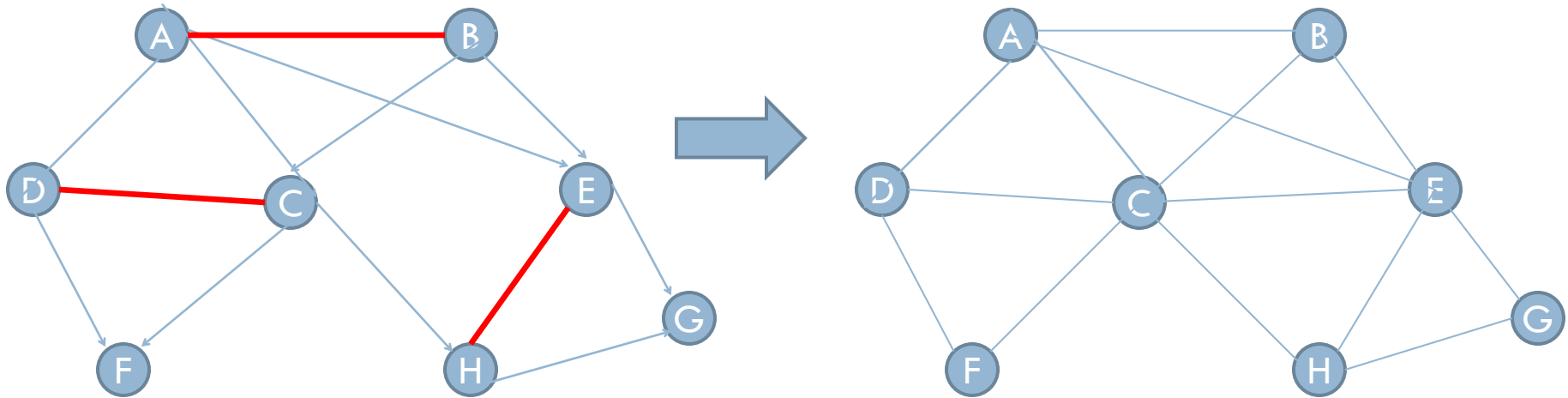
Step 1: Insert link between
parents of common child



Example 1: Junction Tree Construction

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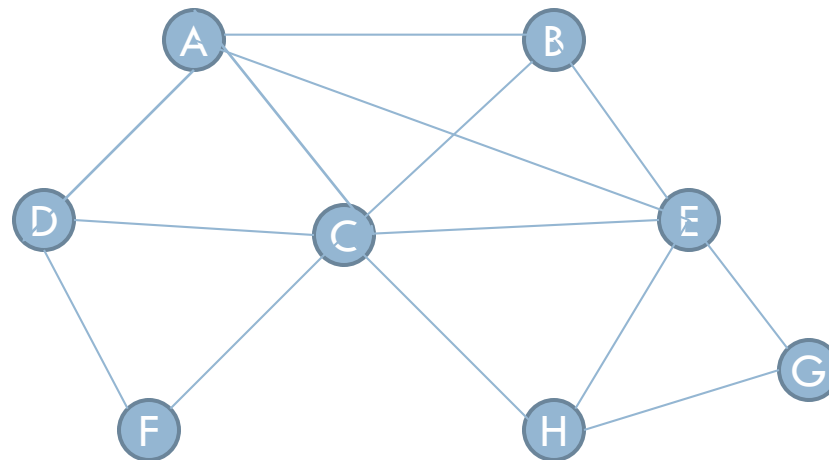
Step2: Convert into undirected graph



Example 1: Junction Tree Construction

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Step3: Triangulate a graph if it has circle of length > 3

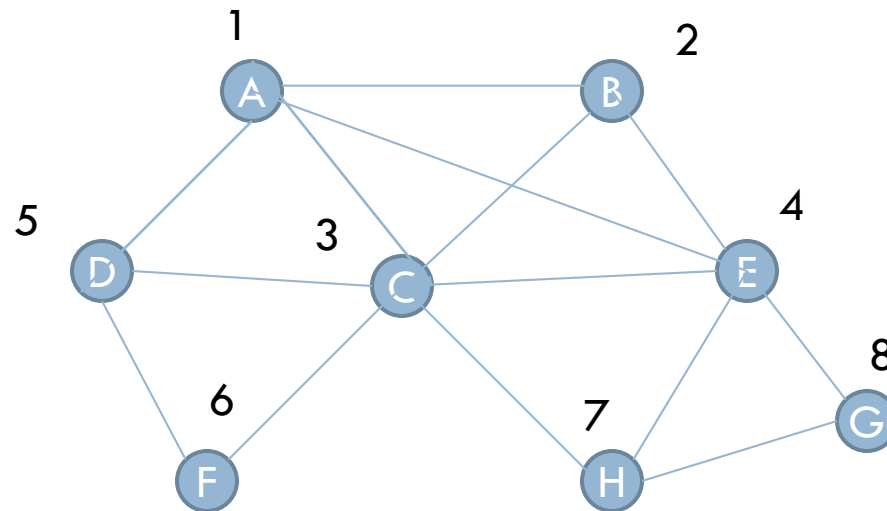


Note : No need of triangulation in this example.

Example 1: Junction Tree Construction

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Step3: Numbered the node if its numbered neighbored nodes are connected together.



Example 1: Junction Tree Construction

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Definition:

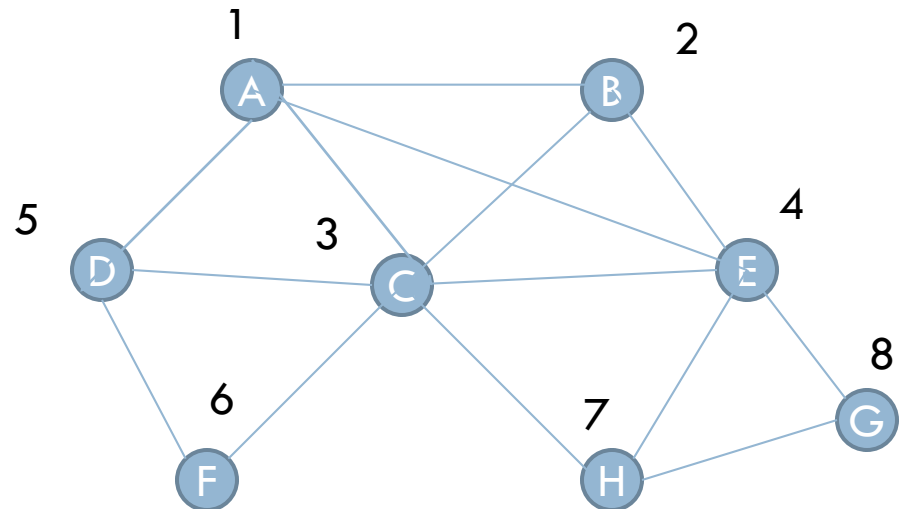
A Clique in a graph is set of adjacent vertices which is a complete graph.

Five cliques are found in Example 1:

- One clique of four nodes
- Four cliques of three nodes

ABCDE	4
ACD	5
CDF	6
CEH	7
EHG	8

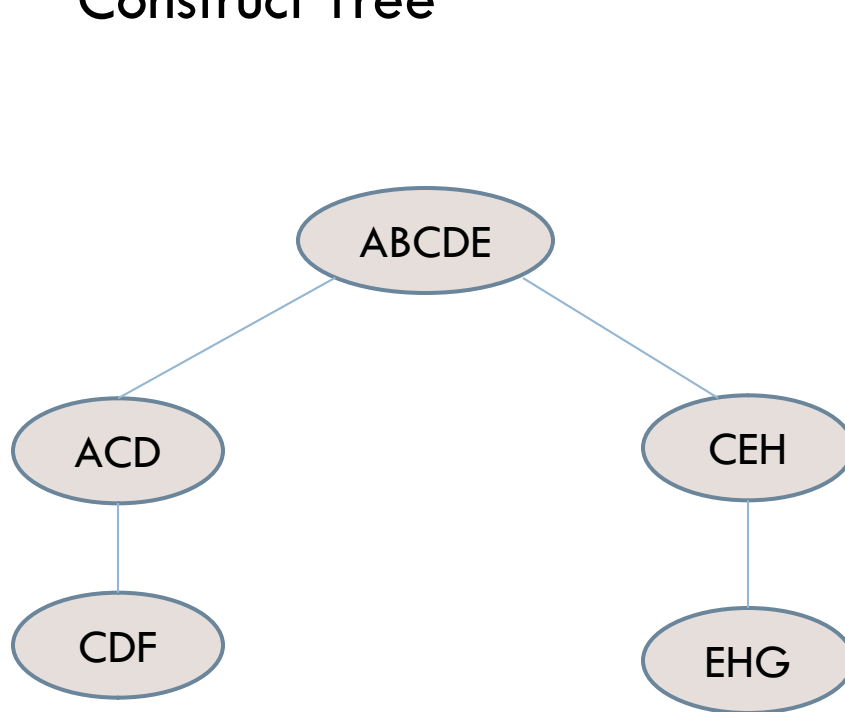
Step4: Ordered the node by max cardinality search.



Example 1: Junction Tree Construction

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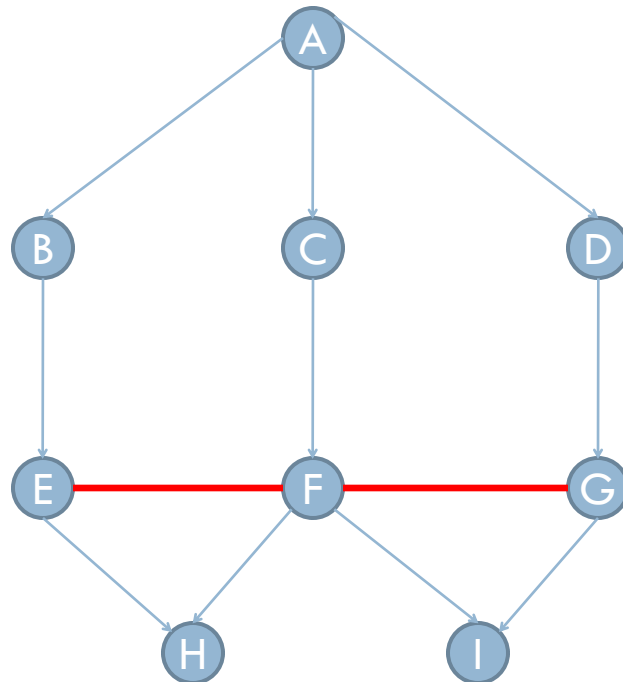
Construct Tree



ABCDE	4
ACD	5
CDF	6
CEH	7
EHG	8

Example 2: Junction Tree Construction

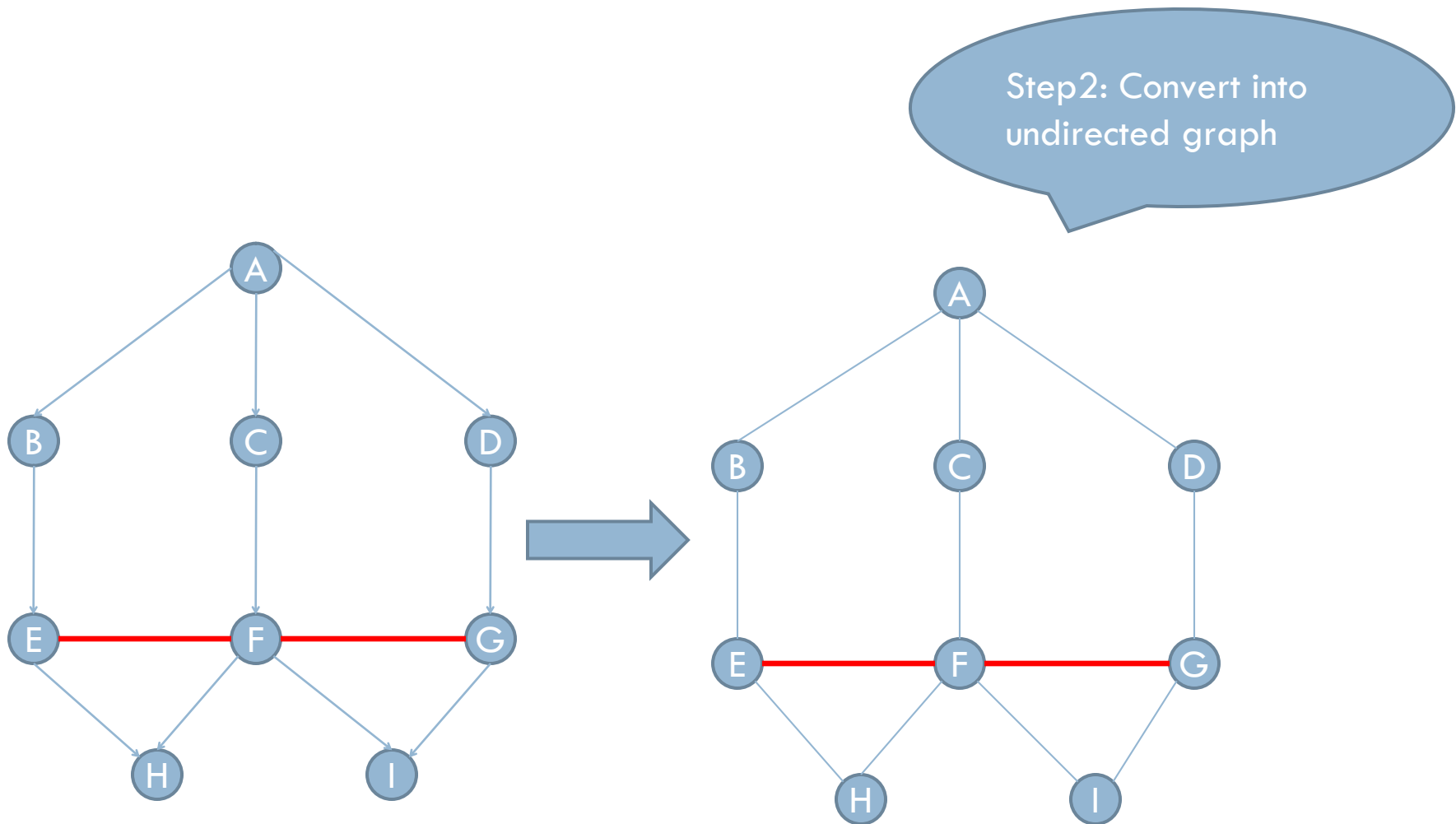
8



Step 1: Insert link between
parents of common child

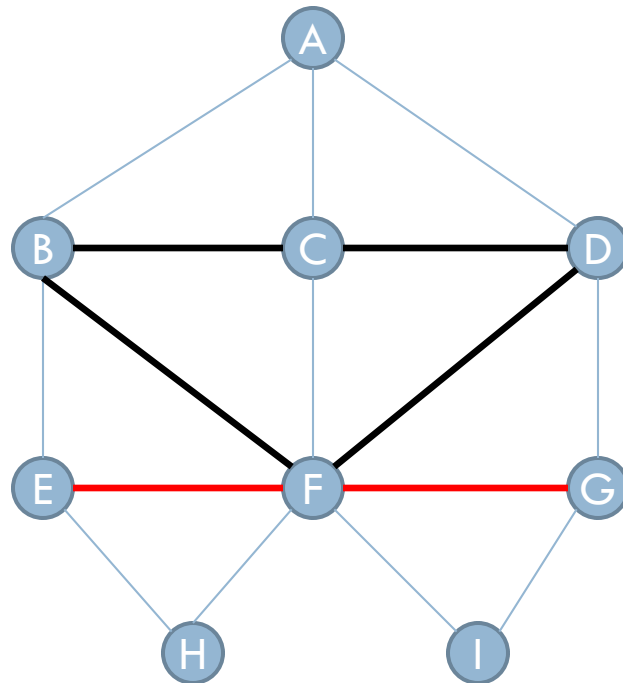
Example 2: Junction Tree Construction

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Example 2: Junction Tree Construction

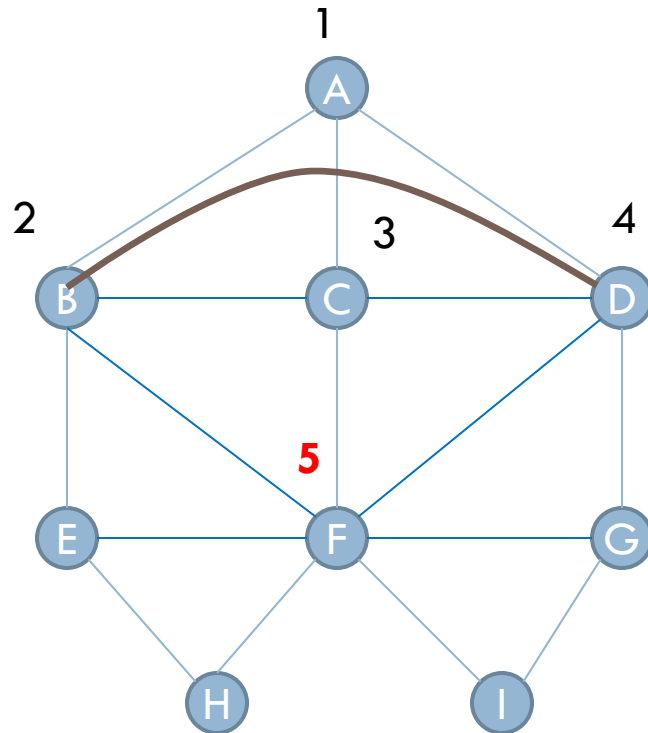
10



Step3: Triangulate a graph if it has circle of length > 3

Example 2: Junction Tree Construction

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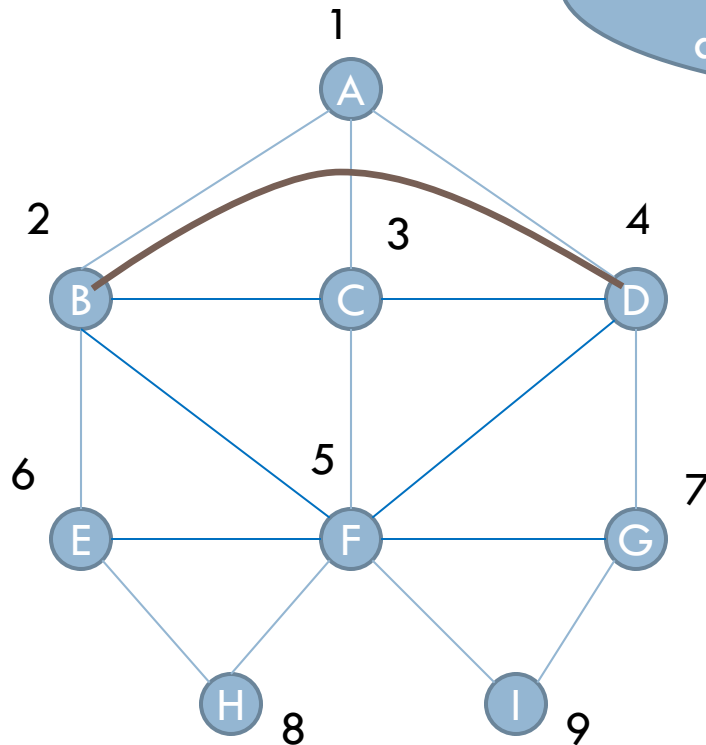


Step3: Numbered the node if its numbered neighbored nodes are connected together.

F has three numbered neighbour B, C and D where B and D are not connected therefore add link between B and D and restart numbering again from beginning.

Example 2: Junction Tree Construction

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Step3: Numbered the node if its numbered neighboured nodes are connected together.

Example 2: Junction Tree Construction

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Five cliques are found in Example 2:

- Two cliques of four nodes
- Four cliques of three nodes

<u>Clique Nodes</u>	<u>Max Cardinality</u>
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ABCD

4

BCDF

5

BEF

6

DFG

7

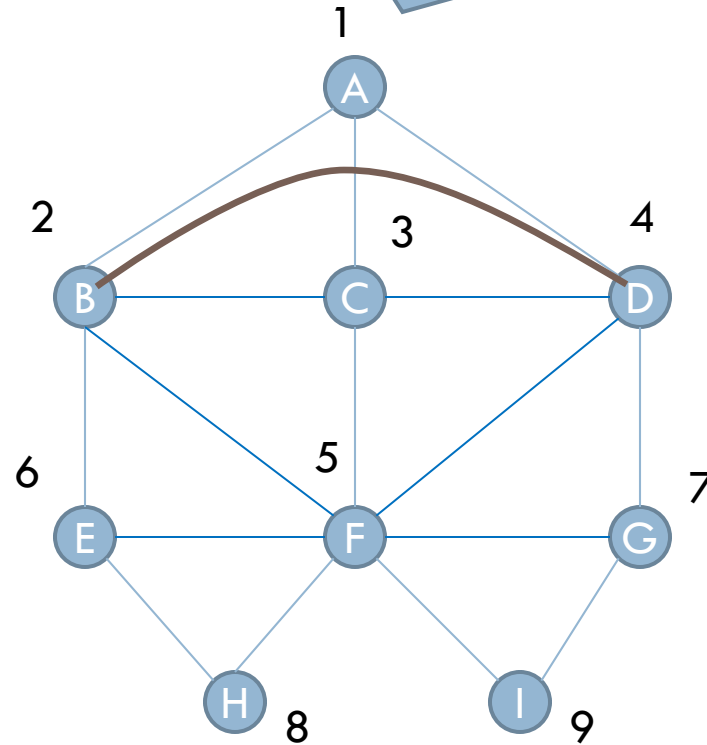
EFH

8

FGI

9

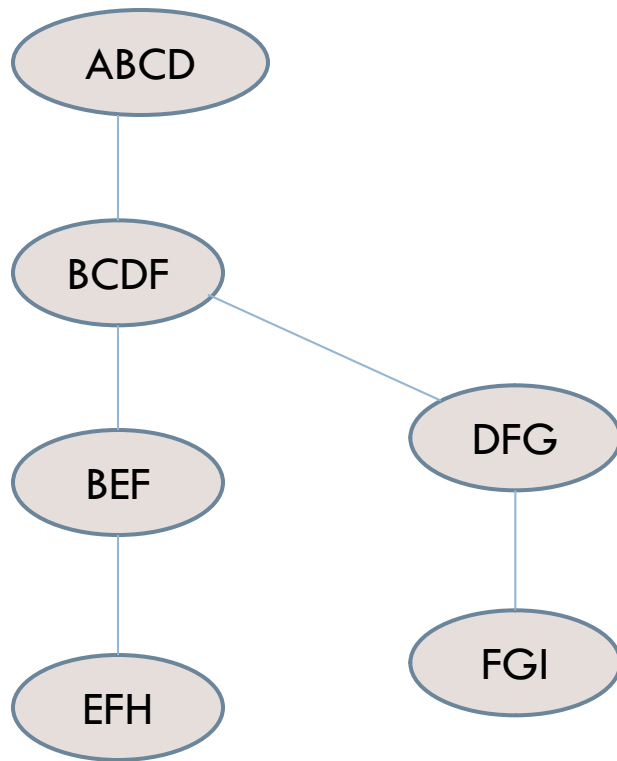
Step4: Ordered the node by max cardinality search.



Example 2: Junction Tree Construction

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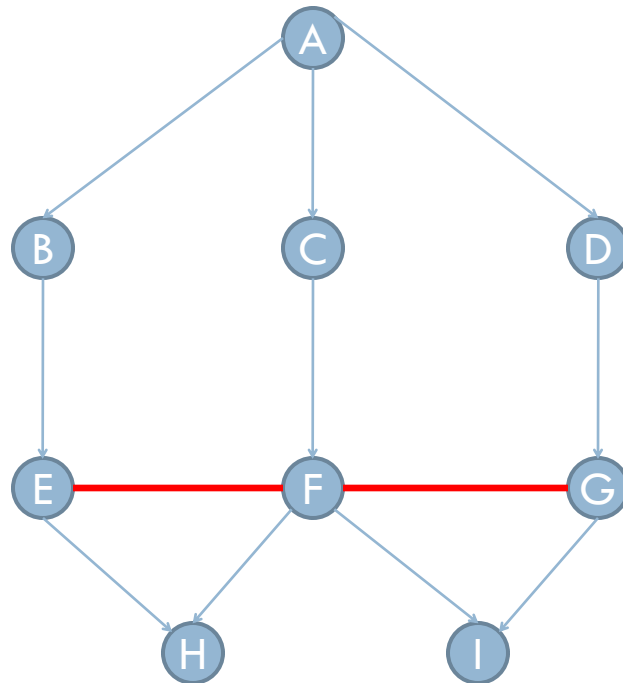
Construct Tree



ABCD	4
BCDF	5
BEF	6
DFG	7
EFH	8
FGI	9

Example 2: Junction Tree Construction (with different triangulation)

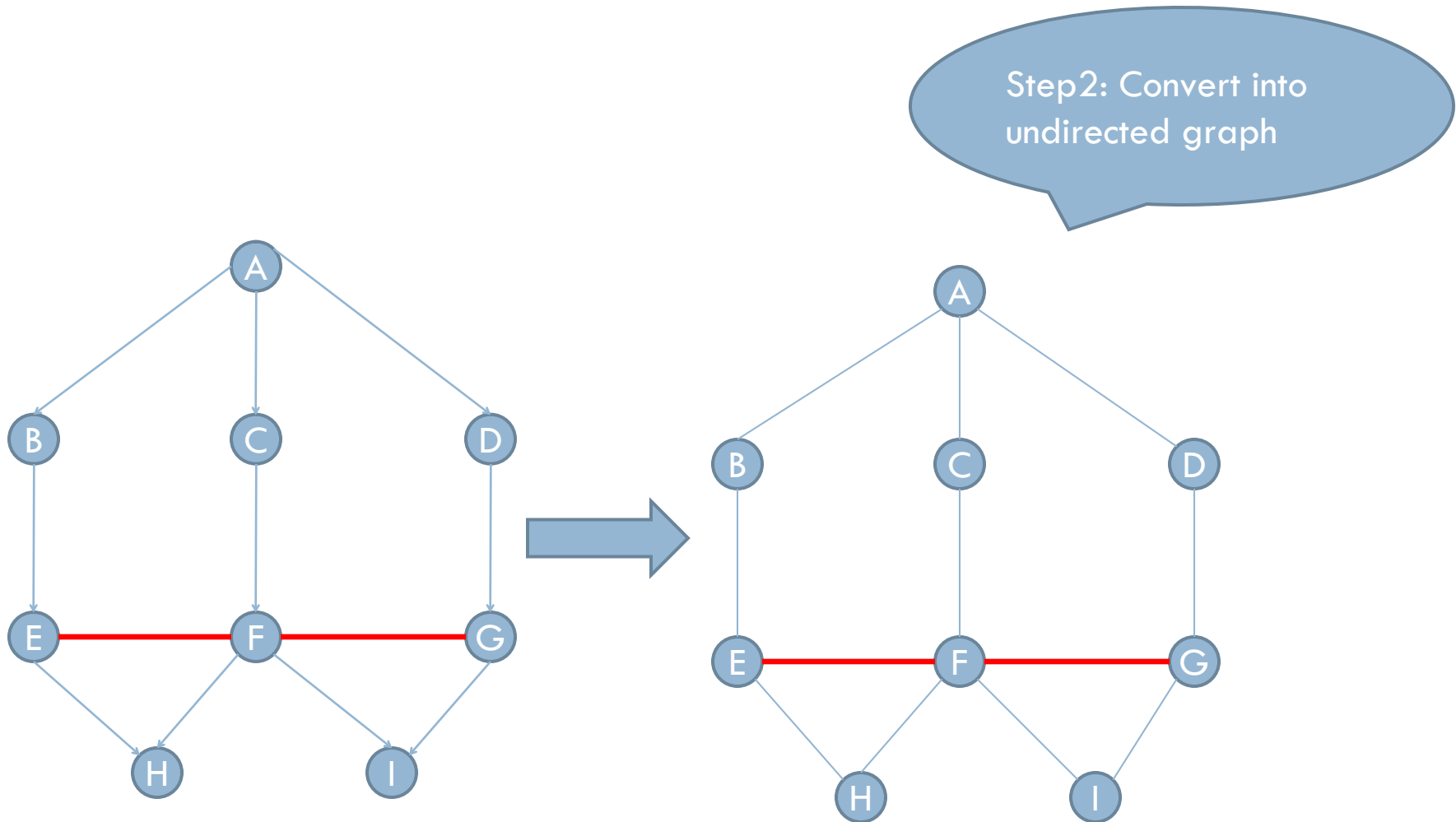
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Step1: Insert link between
parents of common child

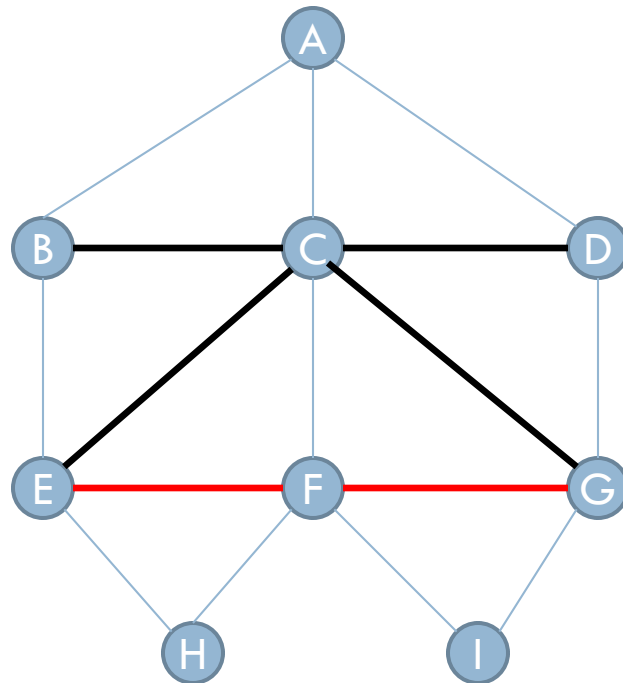
Example 2: Junction Tree Construction

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Example 2: Junction Tree Construction

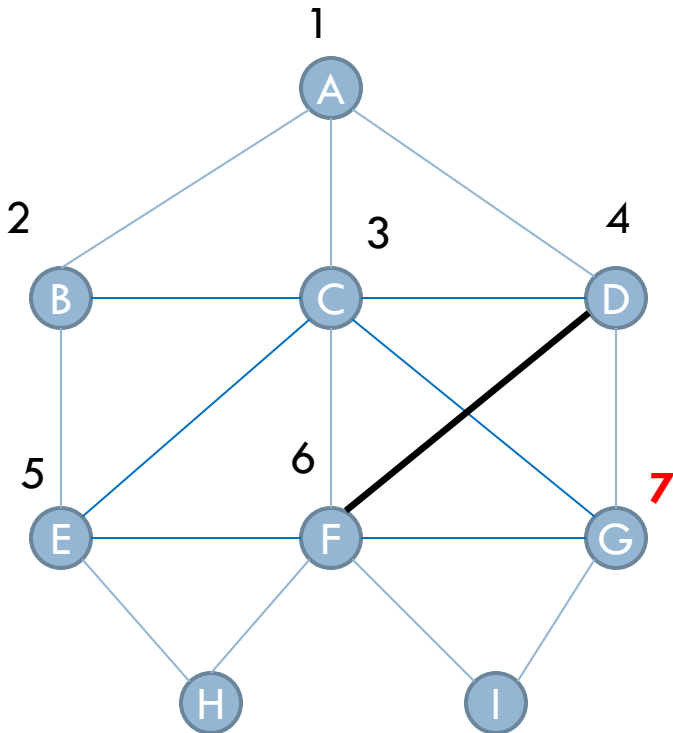
17



Step3: Triangulate a graph if it has circle of length > 3

Example 2: Junction Tree Construction

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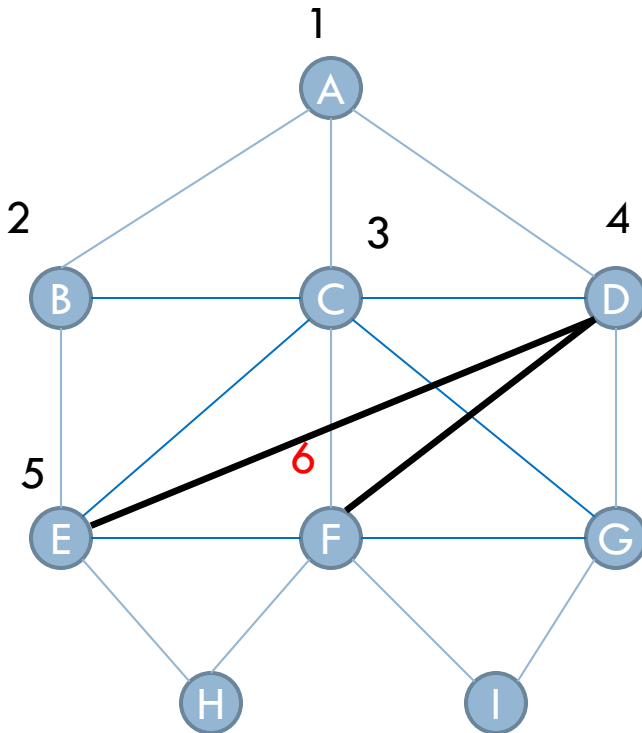


Step3: Numbered the node if its numbered neighboured nodes are connected together.

G has three numbered neighbour F, C and D where F and D are not connected therefore add link between F and D and restart numbering again from beginning.

Example 2: Junction Tree Construction

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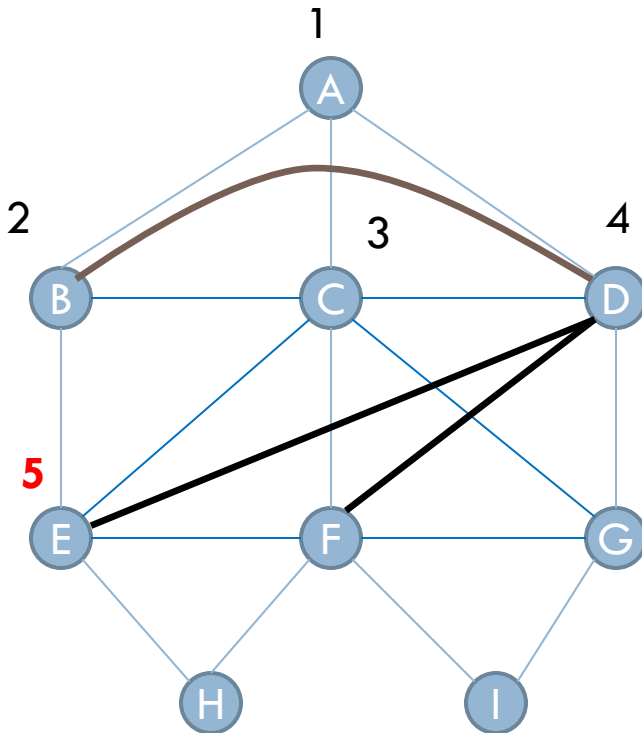


Step3: Numbered the node if its numbered neighbored nodes are connected together.

F has three numbered neighbour E, C and D where E and D are not connected therefore add link between E and D and restart numbering again from beginning.

Example 2: Junction Tree Construction

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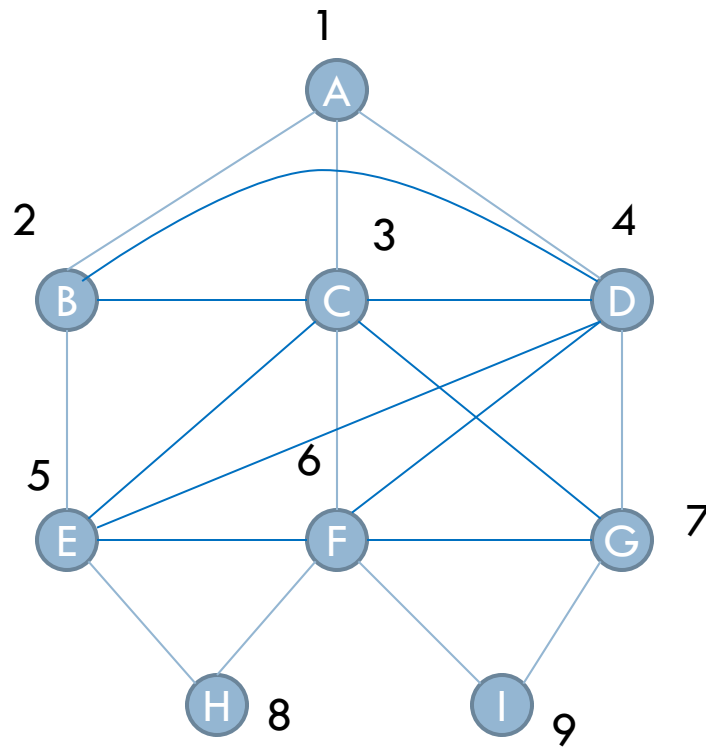


Step3: Numbered the node if its numbered neighboured nodes are connected together.

E has three numbered neighbour B, C and D where B and D are not connected therefore add link between B and D and restart numbering again from beginning.

Example 2: Junction Tree Construction

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Step3: Numbered the node if its numbered neighbored nodes are connected together.

Example 2: Junction Tree Construction

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Cliques are found in Example 2:

- Four cliques of four nodes.
- Two cliques of three nodes.

<u>Clique Nodes</u>	<u>Max Cardinality</u>
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ABCD

4

BCDE

5

CDEF

6

CDFG

7

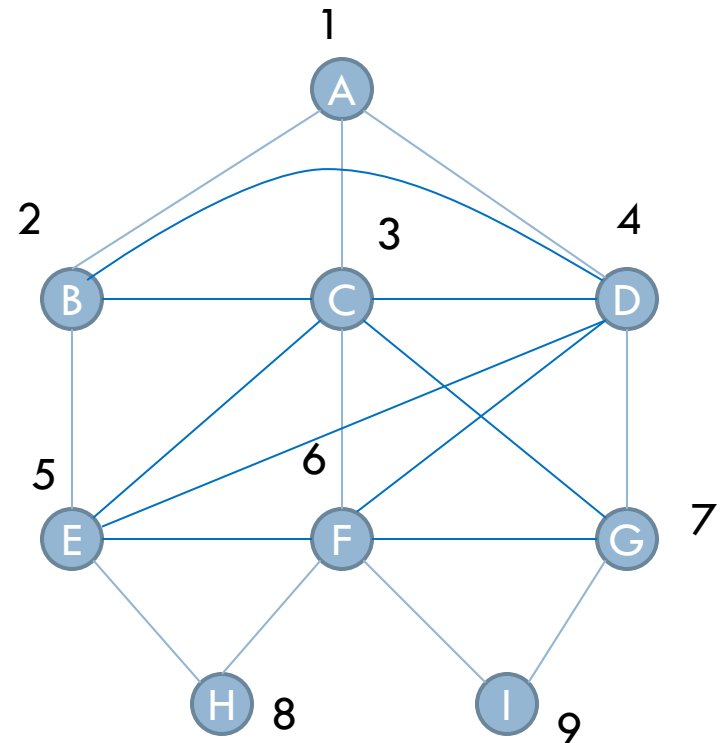
EFH

8

FGI

9

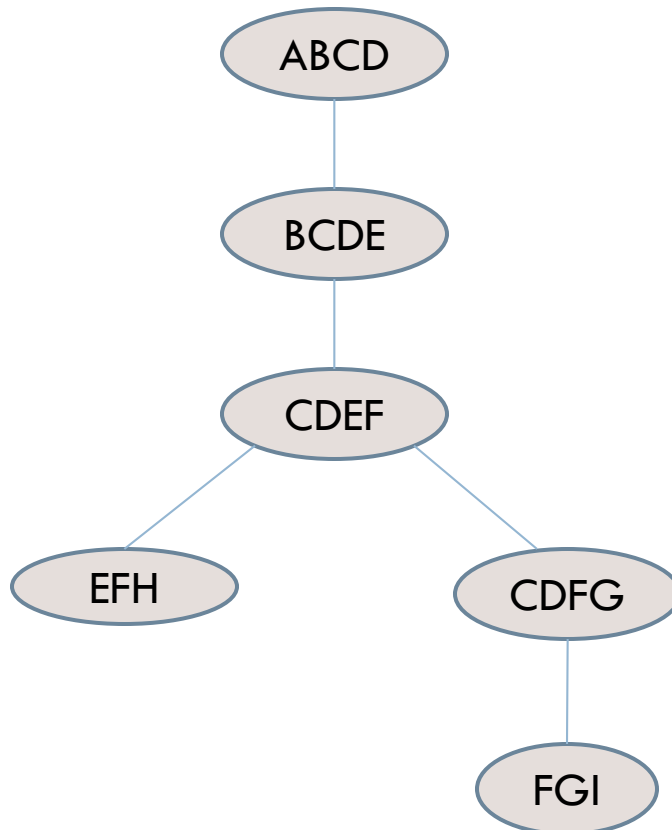
Step4: Ordered the node by max cardinality search.



Example 2: Junction Tree Construction

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Construct Tree



ABCD	4
BCDE	5
CDEF	6
CDFG	7
EFH	8
FGI	9