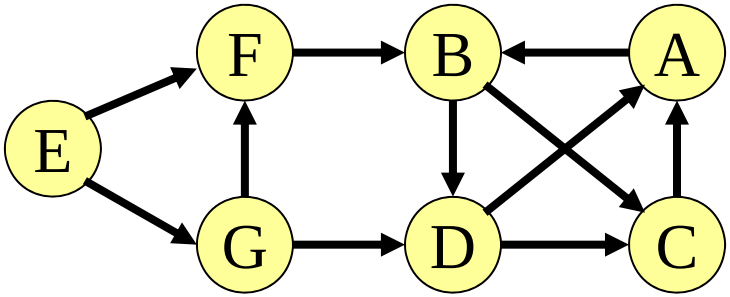
Digraphs: Depth First Search

Given G = (V, E) and all v in V are marked unvisited, a depth-first search (dfs) (generalisation of a pre-order traversal of tree) is one way of navigating through the graph

1. **select one v in V and mark as visited**
2. **select each unvisited vertex w adjacent to v - dfs(w) (recursive!)**
3. **if all vertices marked => search complete**
4. **otherwise select an unmarked node and apply dfs**

implementation: adjacency list

DFS: Example

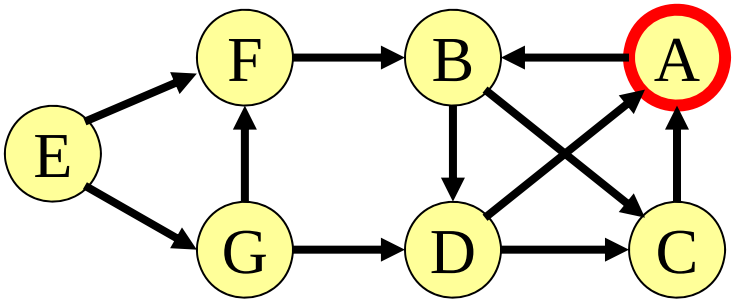


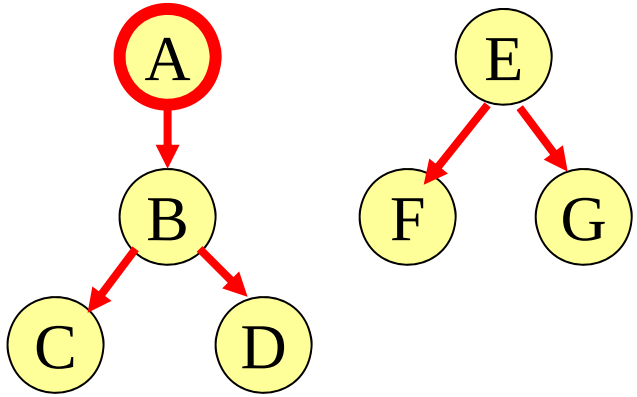
Start: A

A, B, C, D, E, F, G

A	B	
B	C	D
C	A	
D	A	C
E	F	G
F	B	
G	D	F

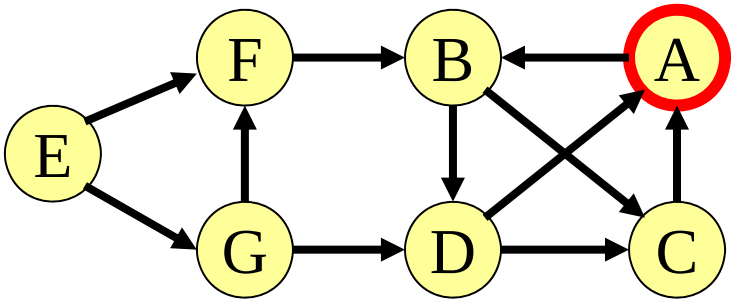
DFS: Example

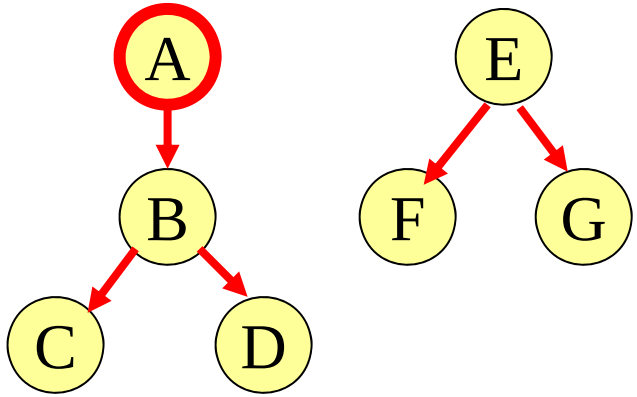




A	B	
B	C	D
C	A	
D	A	C
E	F	G
F	B	
G	D	F

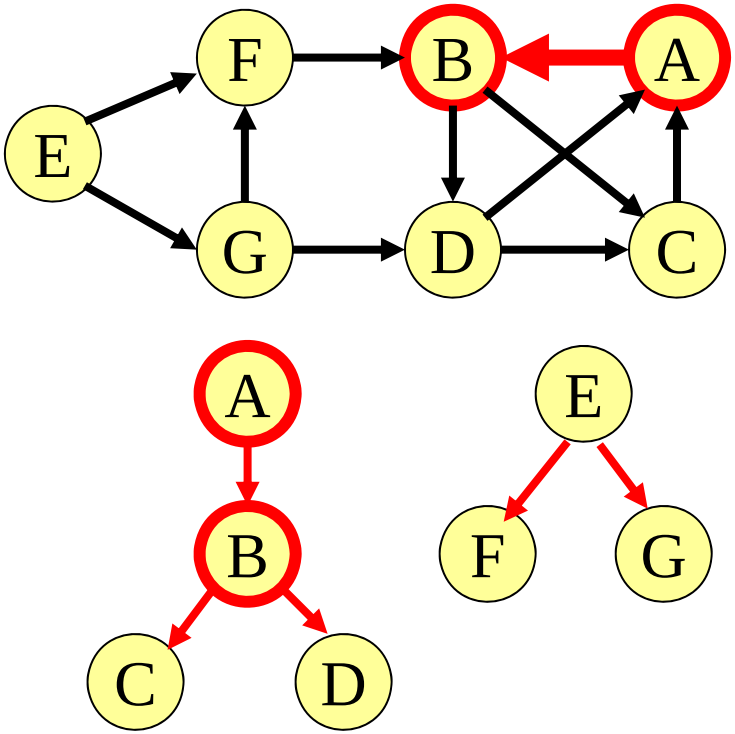
DFS: Example





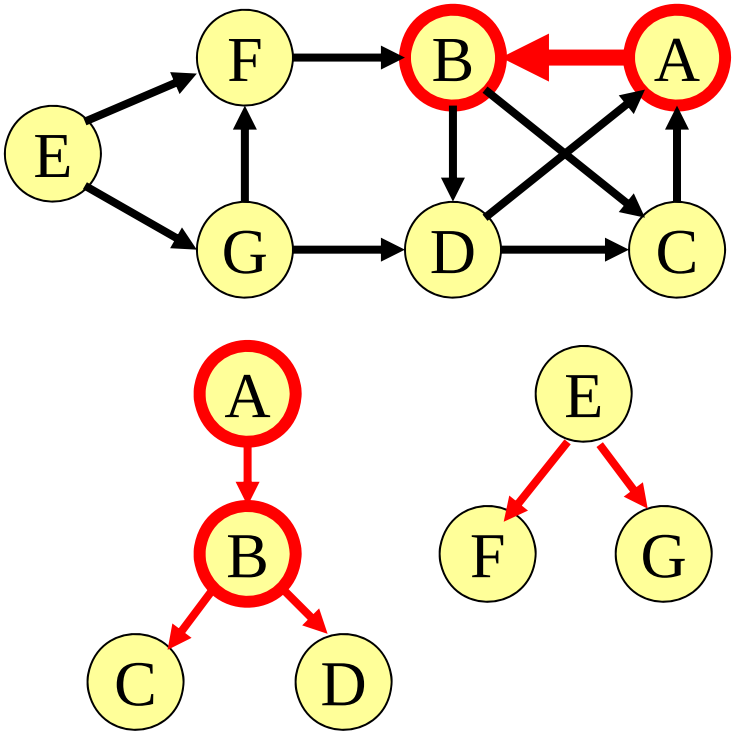
A	B	
B	C	D
C	A	
D	A	C
E	F	G
F	B	
G	D	F

DFS: Example



A	B	
B	C	D
C	A	
D	A	C
E	F	G
F	B	
G	D	F

DFS: Example



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C	A	
D	A	C
E	F	G
F	B	
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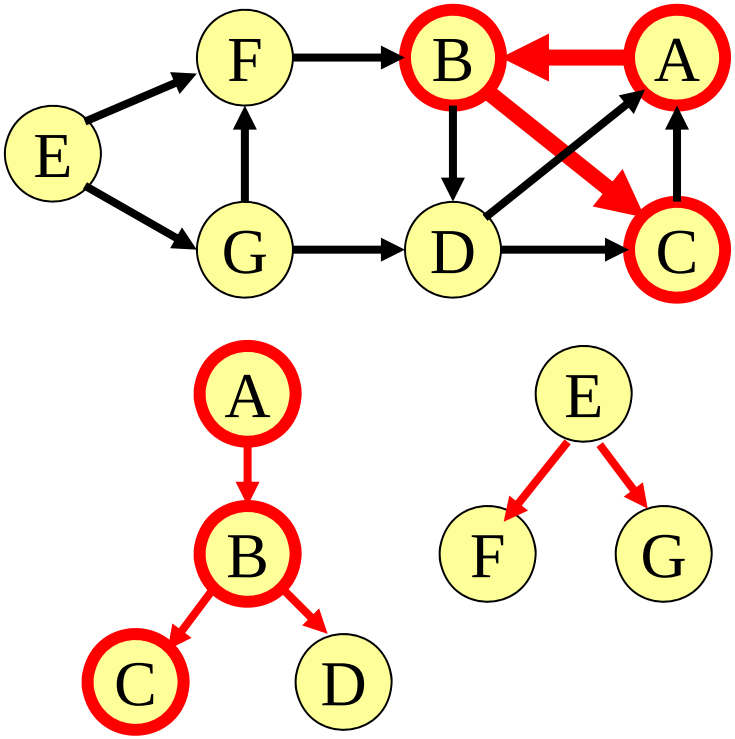
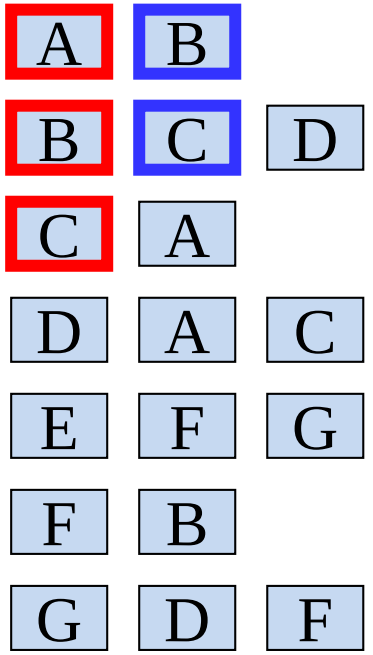
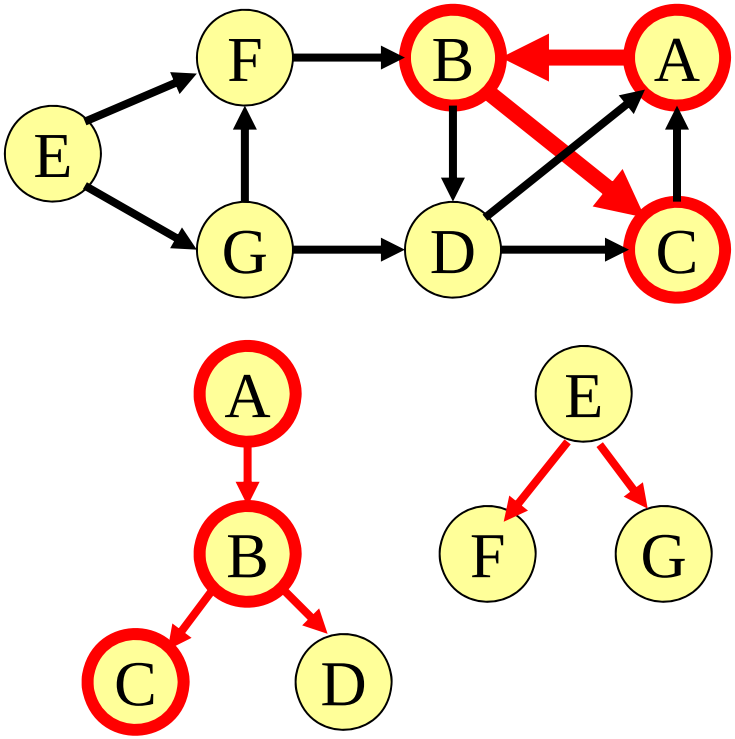
DFS: Example



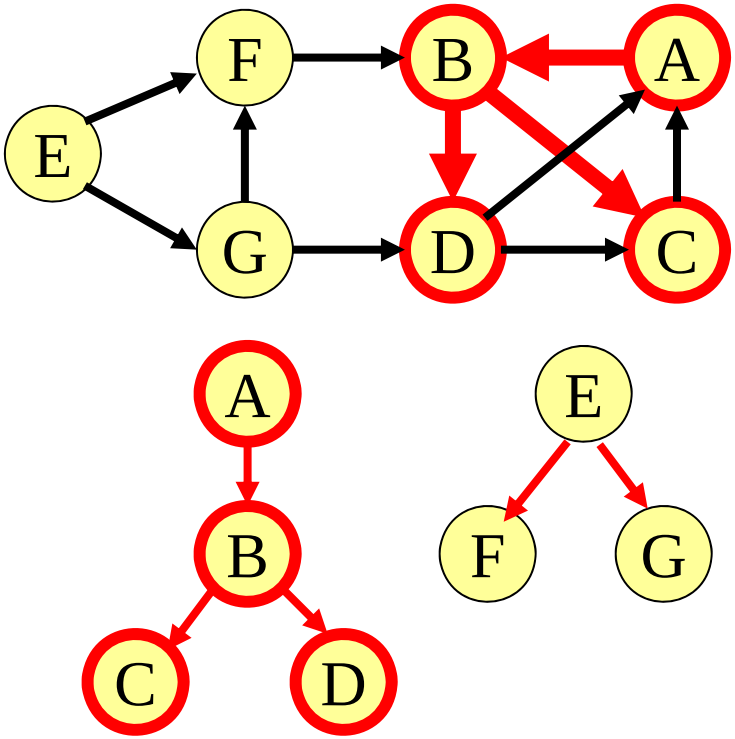


DFS: Example



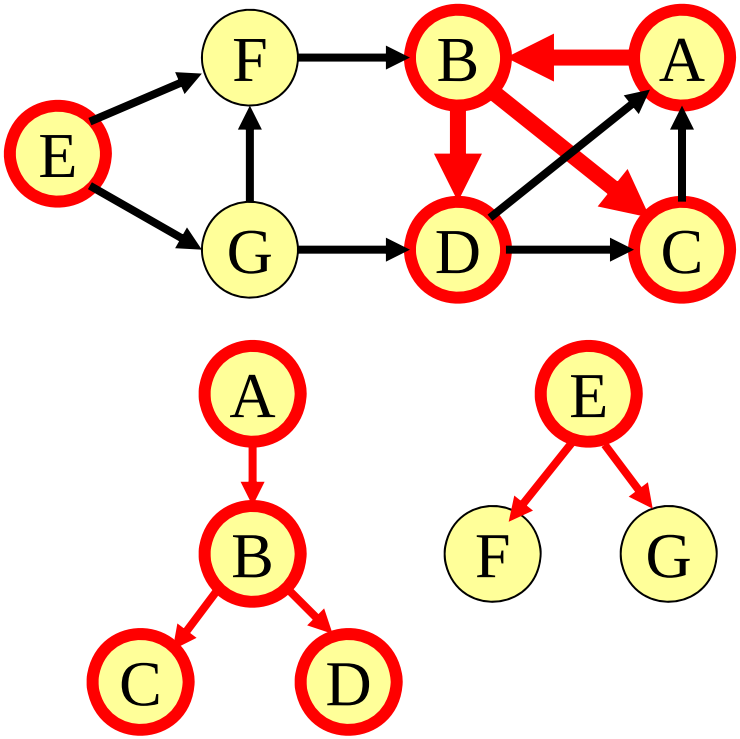
A	B	
B	C	D
C	A	
D	A	C
E	F	G
F	B	
G	D	F

DFS: Example



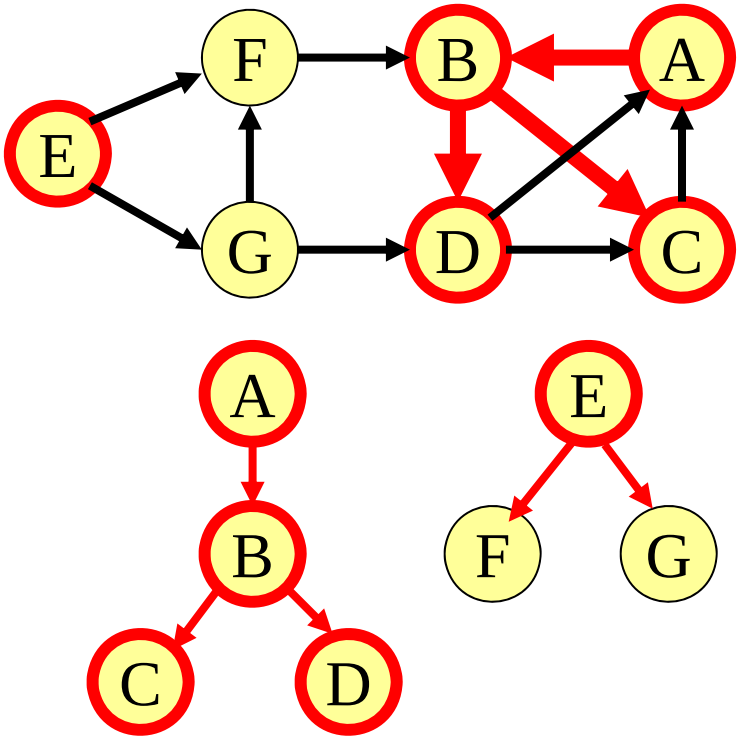
A	B	
B	C	D
C	A	
D	A	C
E	F	G
F	B	
G	D	F

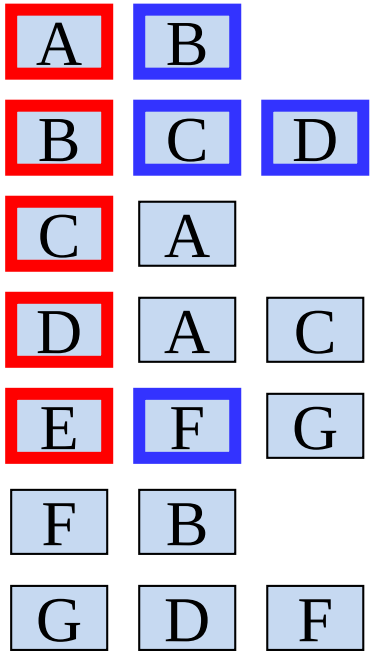
DFS: Example



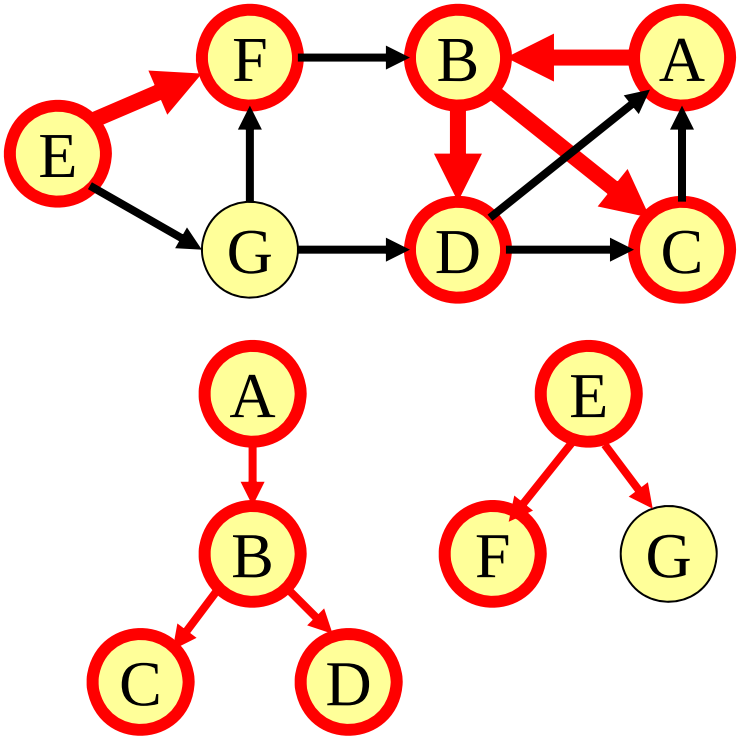
A	B	
B	C	D
C	A	
D	A	C
E	F	G
F	B	
G	D	F

DFS: Example



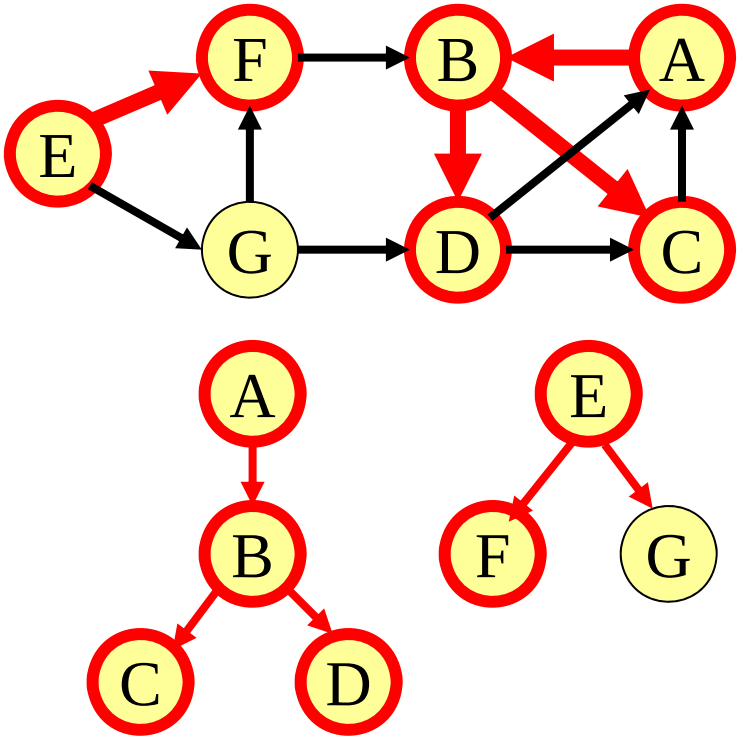


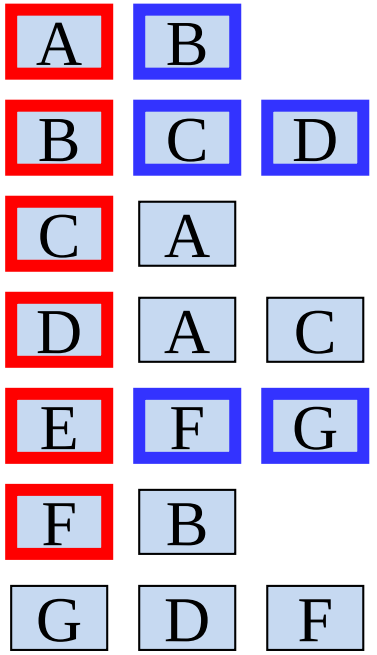
DFS: Example



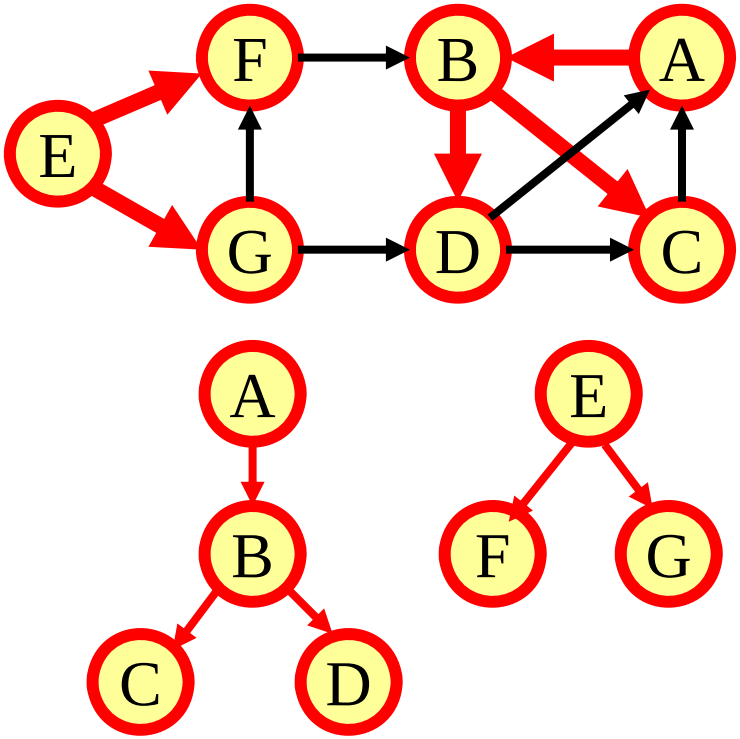
A	B	
B	C	D
C	A	
D	A	C
E	F	G
F	B	
G	D	F

DFS: Example





DFS: Example



A	B	
B	C	D
C	A	
D	A	C
E	F	G
F	B	
G	D	F