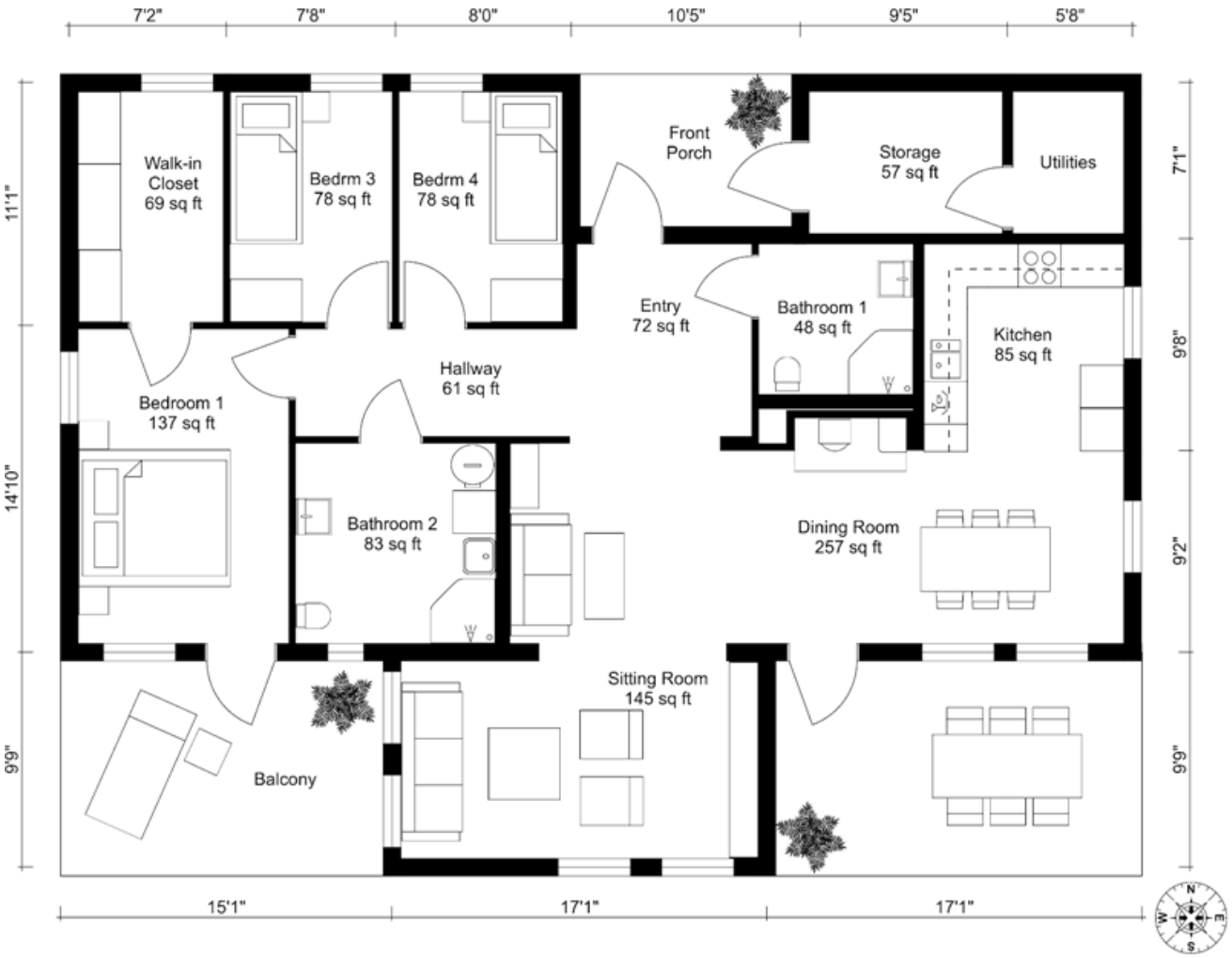
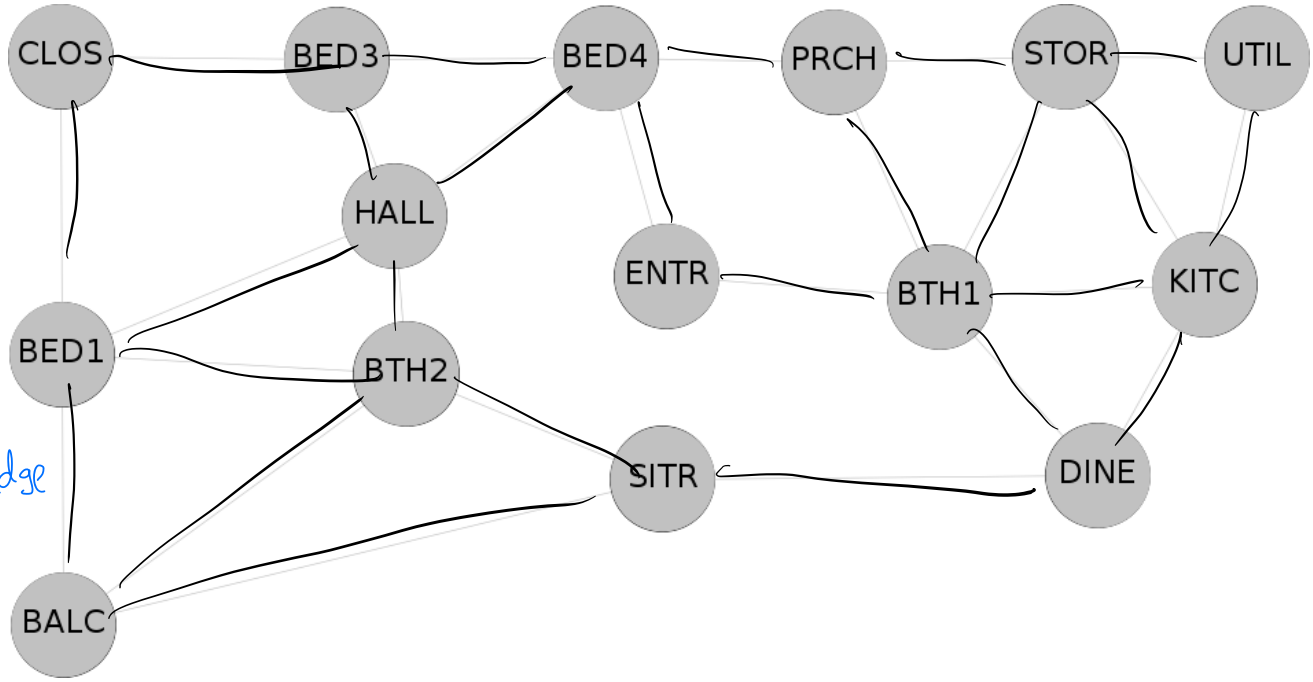
New Apartment...



Wireability Graph

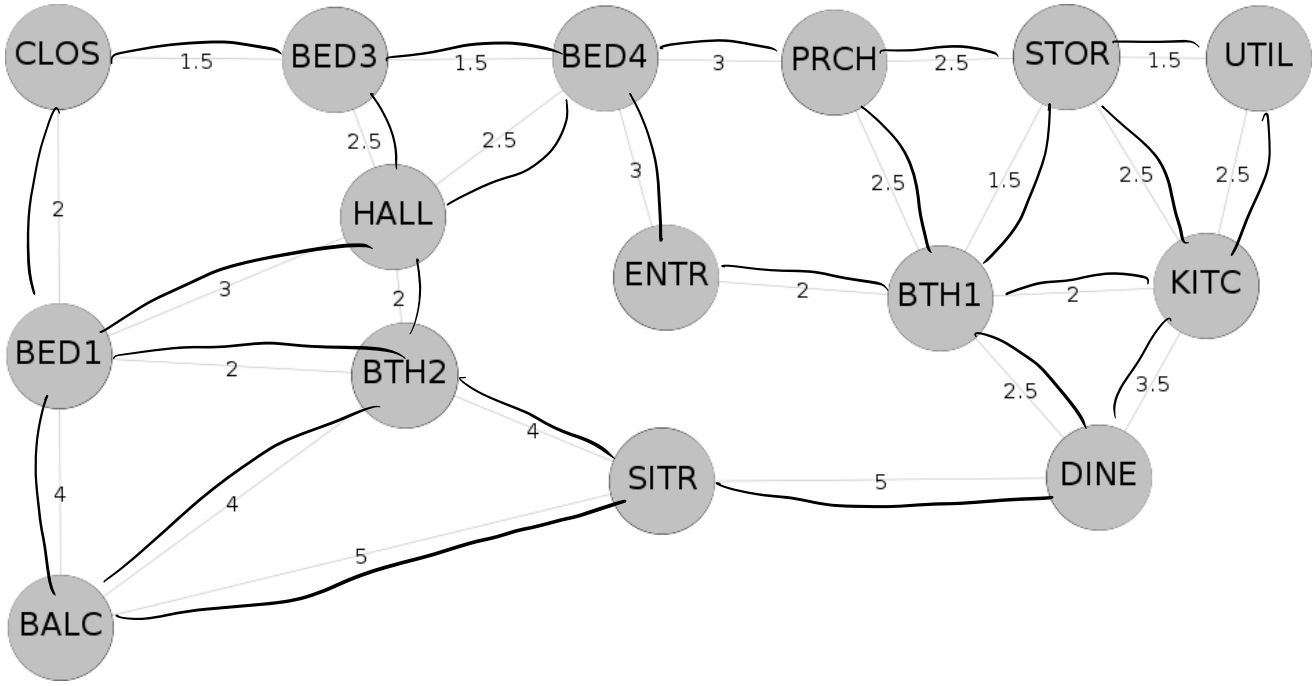


edge

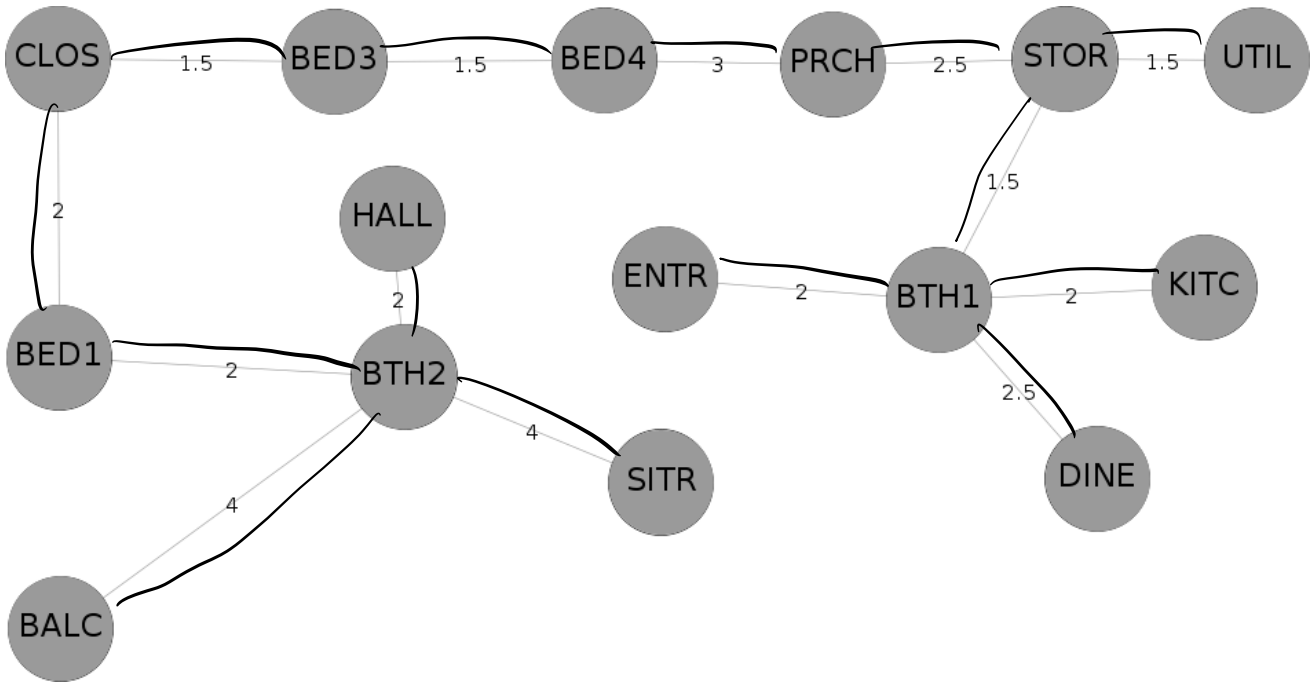
Vertex

$G = (V, E)$

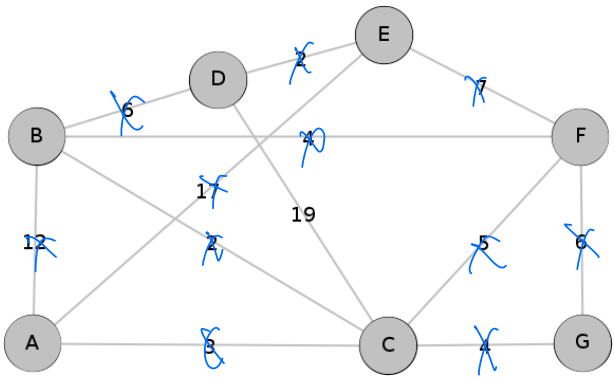
"Cost" of Wiring



Minimum Spanning Tree

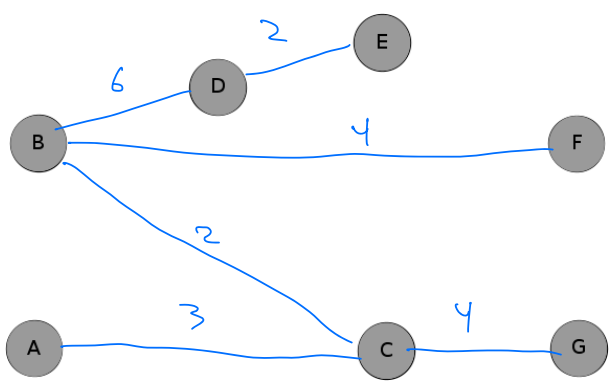


MST: Kruskal's Algorithm (1956)

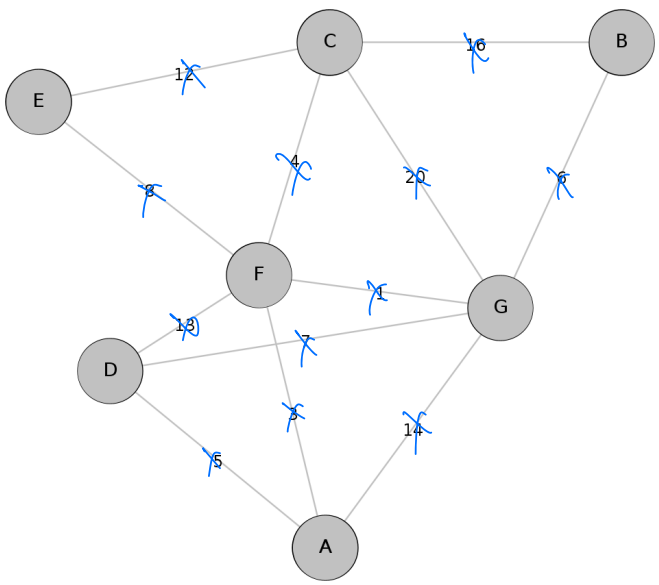


- Draw the graph without any edges (so just the vertices).
- Sort all the edges, by weight, in ascending order.
- While there are edges left and we don't yet have an MST…
  - Select the smallest edge
  - Check if adding this edge to the graph would create a cycle
  - If no cycle, then add the edge to the graph
  - Repeat for the next smallest edge

BC2 DE2 AC3 CG4 BF4 CF5 BD6 FG6 EF7 AB12 AE17 AG19



Your turn...



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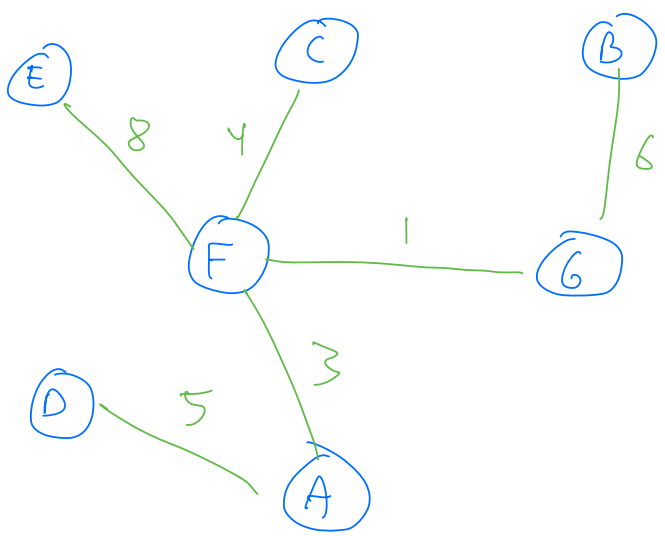
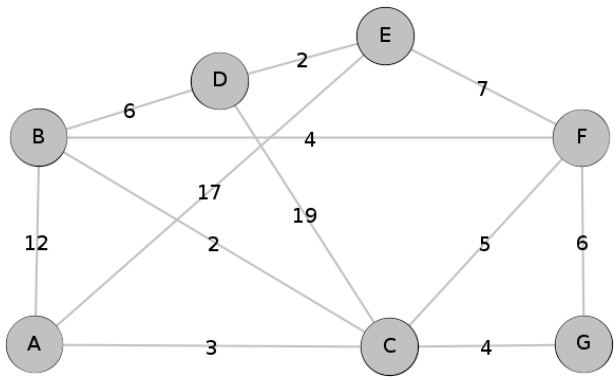
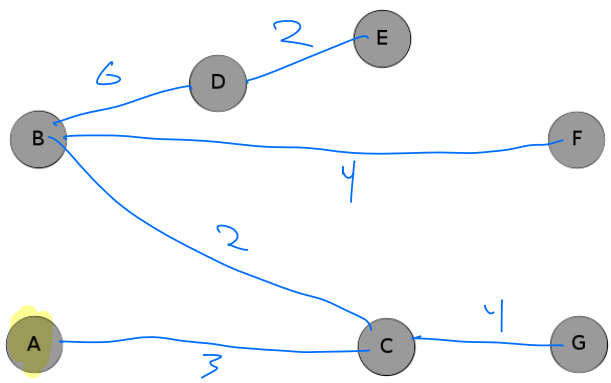
FG FA FC AD BG DG FE EC DF AG CB CG
1 3 4 5 6 7 8 12 13 14 16 20



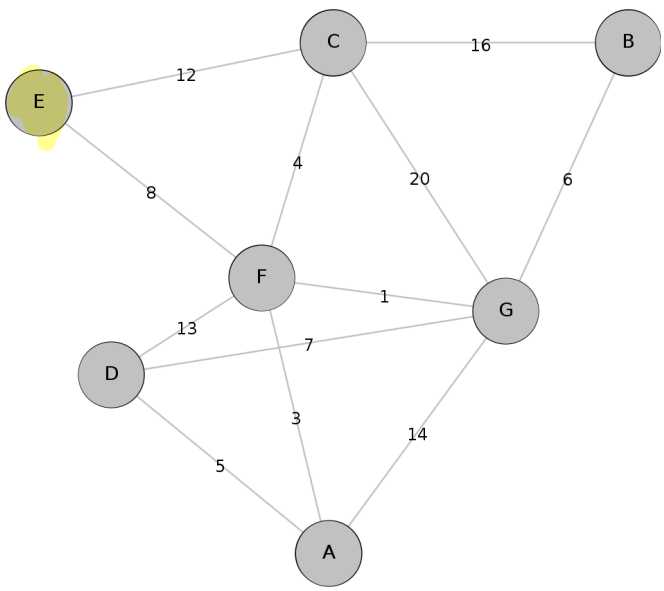
MST: Prim's Algorithm (1957)





- Draw the graph without any edges (so just the vertices).
- Choosing an arbitrary vertex, add its smallest edge.
- While we don't yet have an MST…
  - Add the edge with the shortest distance from vertices in the MST to a vertex that is not yet in the MST.

Your Turn...



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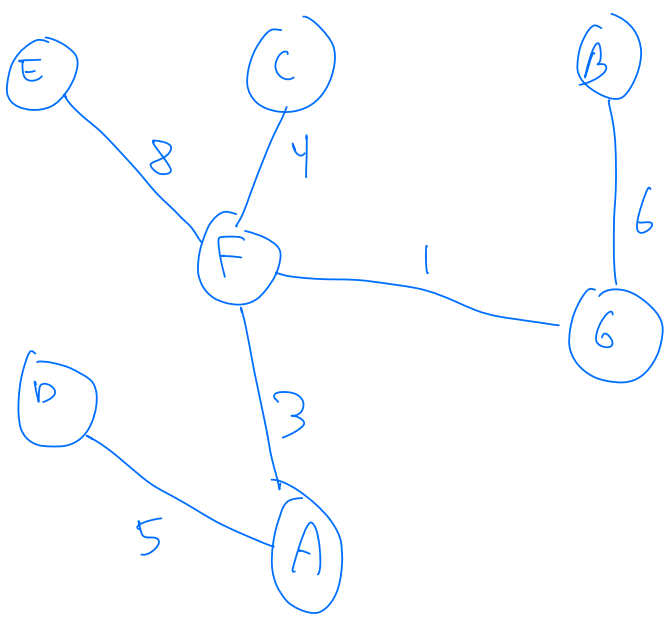
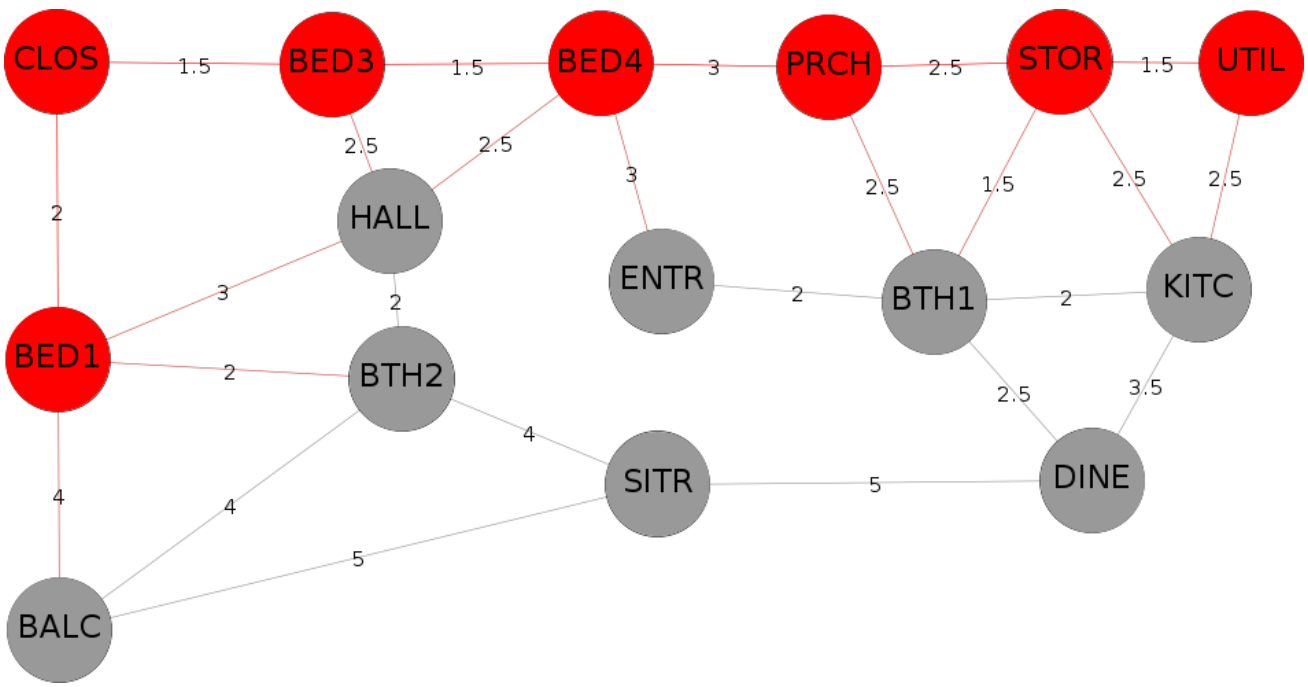
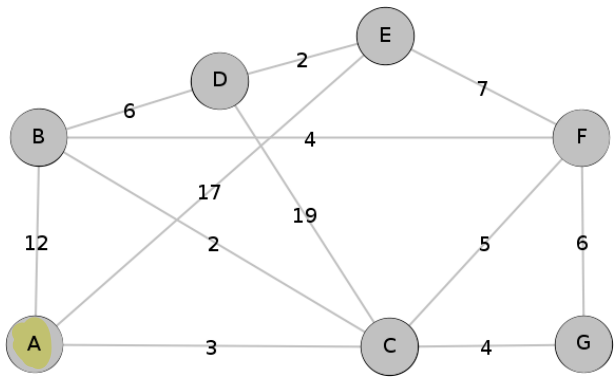
- While we don't yet have an MST…
  - Add the edge with the shortest distance from vertices in the MST to a vertex that is not yet in the MST.



Shortest - Path



Dijkstra's Algorithm



Work

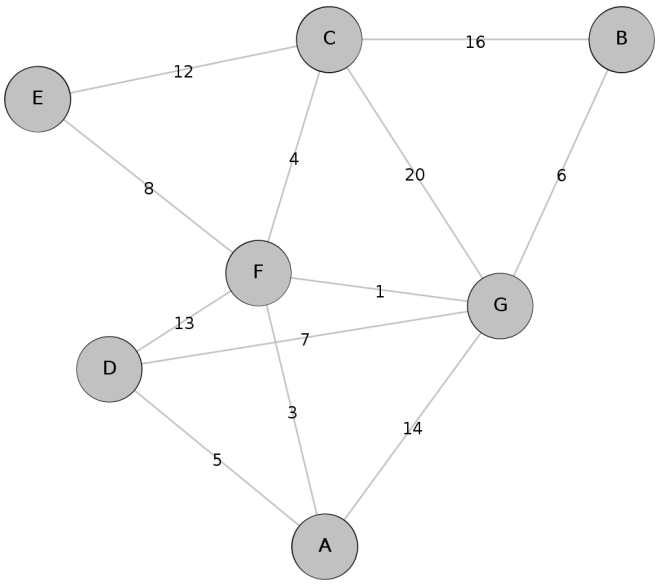
Node	Cost	Prev
A	0	
B	~~∞~~ ~~12~~ 5	~~A~~ C
C	~~∞~~ 3	A
D	~~∞~~ ~~22~~ 11	~~A~~ B
E	~~∞~~ ~~17~~ ~~15~~ 13	~~A~~ ~~F~~ D
F	~~∞~~ 8	C
G	~~∞~~ 7	C

Done

Node	Cost	Prev
A	0	
C	3	A
B	5	C
G	7	C
F	8	C
D	11	B
E	13	D

A — C — B — D — E

Your Turn...



Node	Cost	Prev

Matrix: Adjacency Matrix

	A	B	C	D	E	F	G
A							
B			12				
C		12			5		
D							
E			5				
F							
G							

Adjacency List