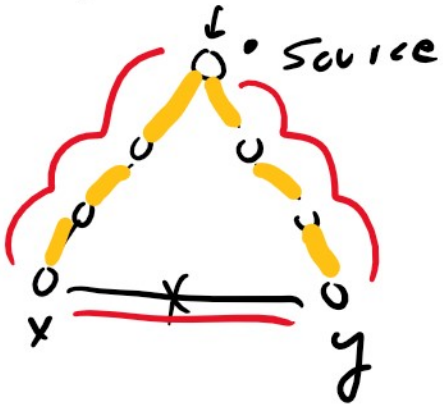
BFS & SSSP

SSSP stands for "Single Source Shortest Path

Modify BFS to Encode Paths

```
bfs(vertex v){
    Q = new Queue
    prev = empty list of vertices // Added
    visit(v)
    Q.enqueue(v)
    while(queue is not empty) {
        u = Q.dequeue()
        for(each unvisited neighbor w of u){
            visit(w)
            prev[w] = u // Added
            Q.enqueue(w)
        }
    }
}
```



Shortest paths only from single source

Recovering Shortest Paths

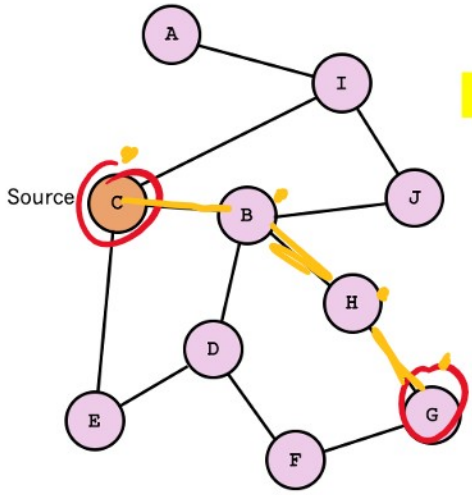
S.P FROM S TO t

```
Shortest_path(vertex s, vertex t){
    prev = list of vertices from BFS
    sp = empty list of vertices
    current = t
    while (prev[current] has a vertex){
        add current to front of sp
        current = prev[current]
    }
    if (sp.length > 0){
        add s to front of sp
    }
    return sp
}
```

EXAMPLE

S = C, t = G

<C B H G> = SP



Vertex	Prev
A	I
B	C
C	
D	B
E	C
F	D
G	H
H	B
I	C
J	B

CURRENT

~~G~~

~~H~~

~~B~~

C

↑

THIS TABLE CAN ONLY BE USED FOR S.P. FROM C