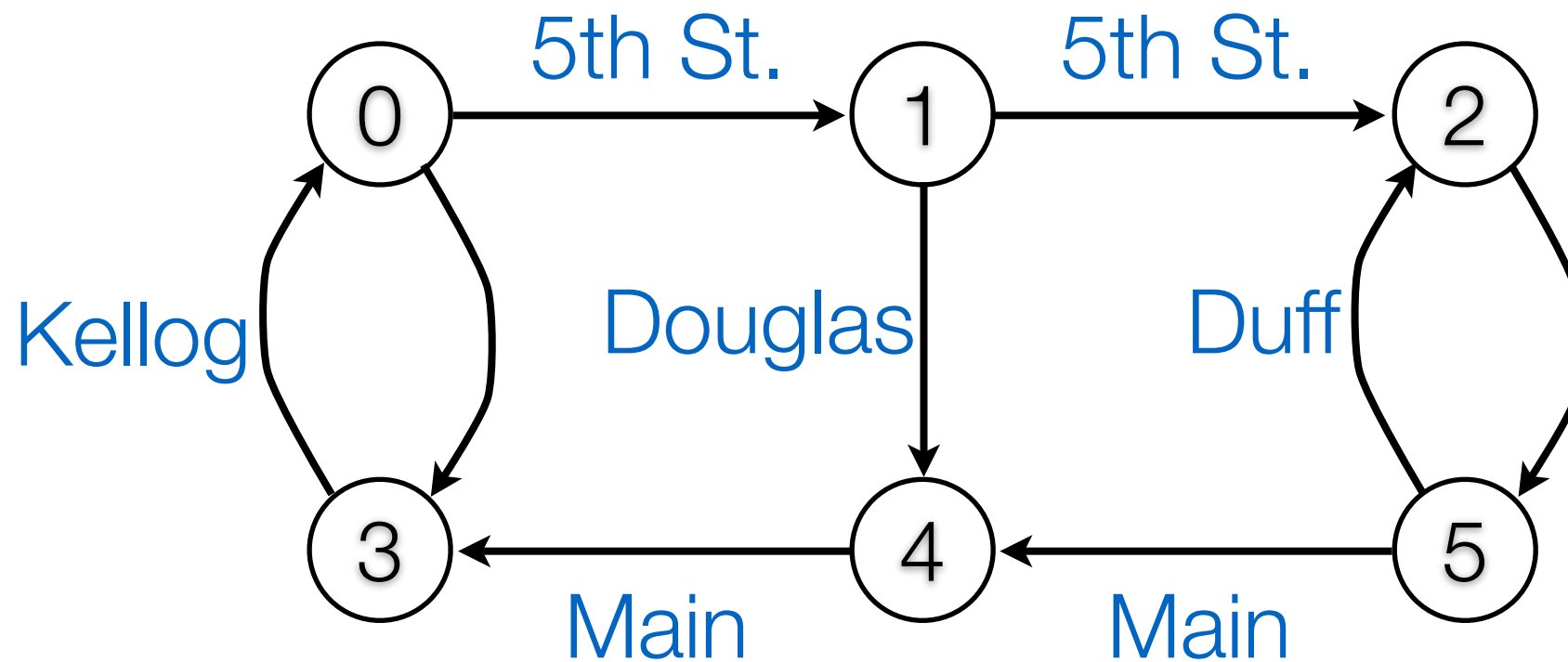
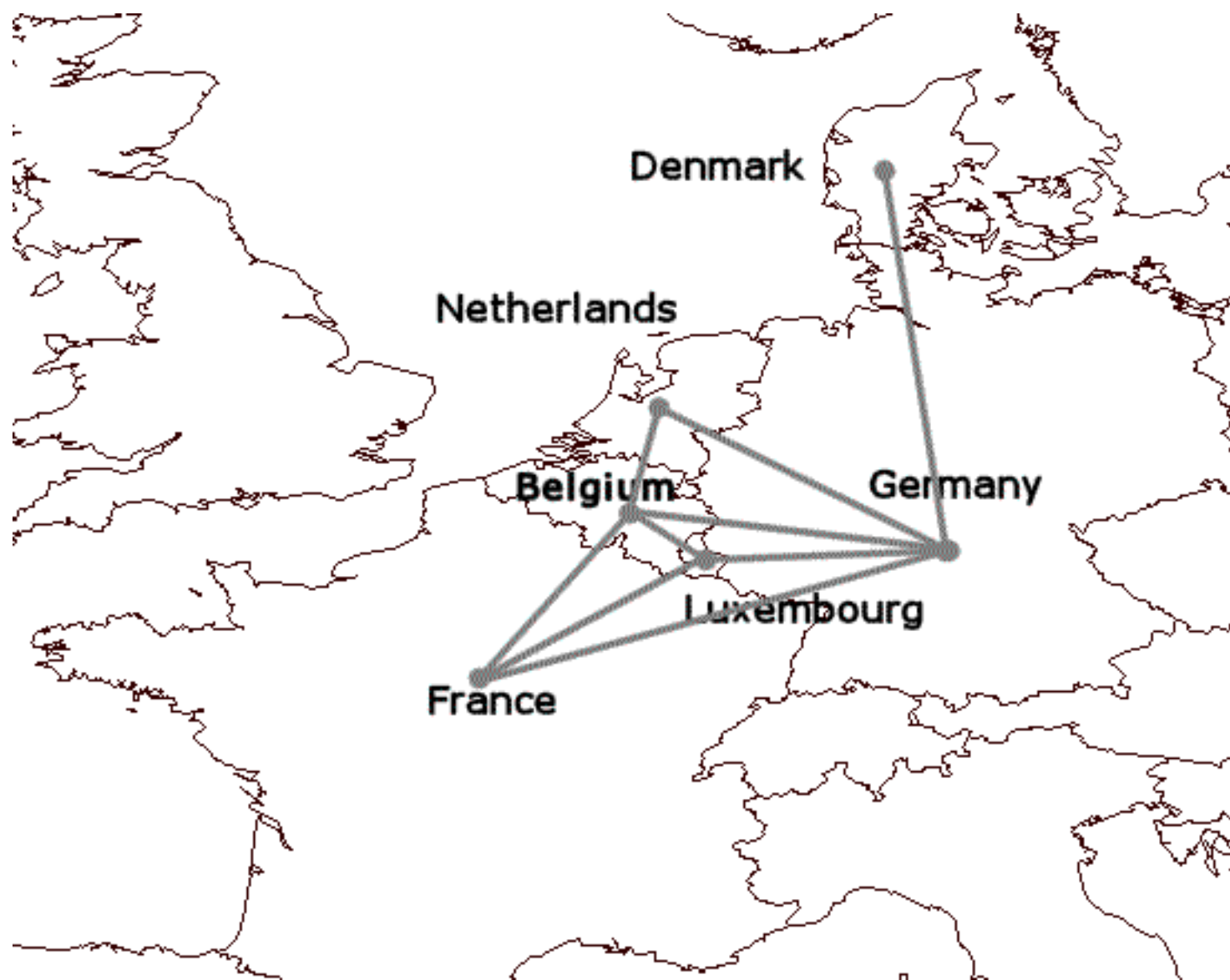


Some Graphs

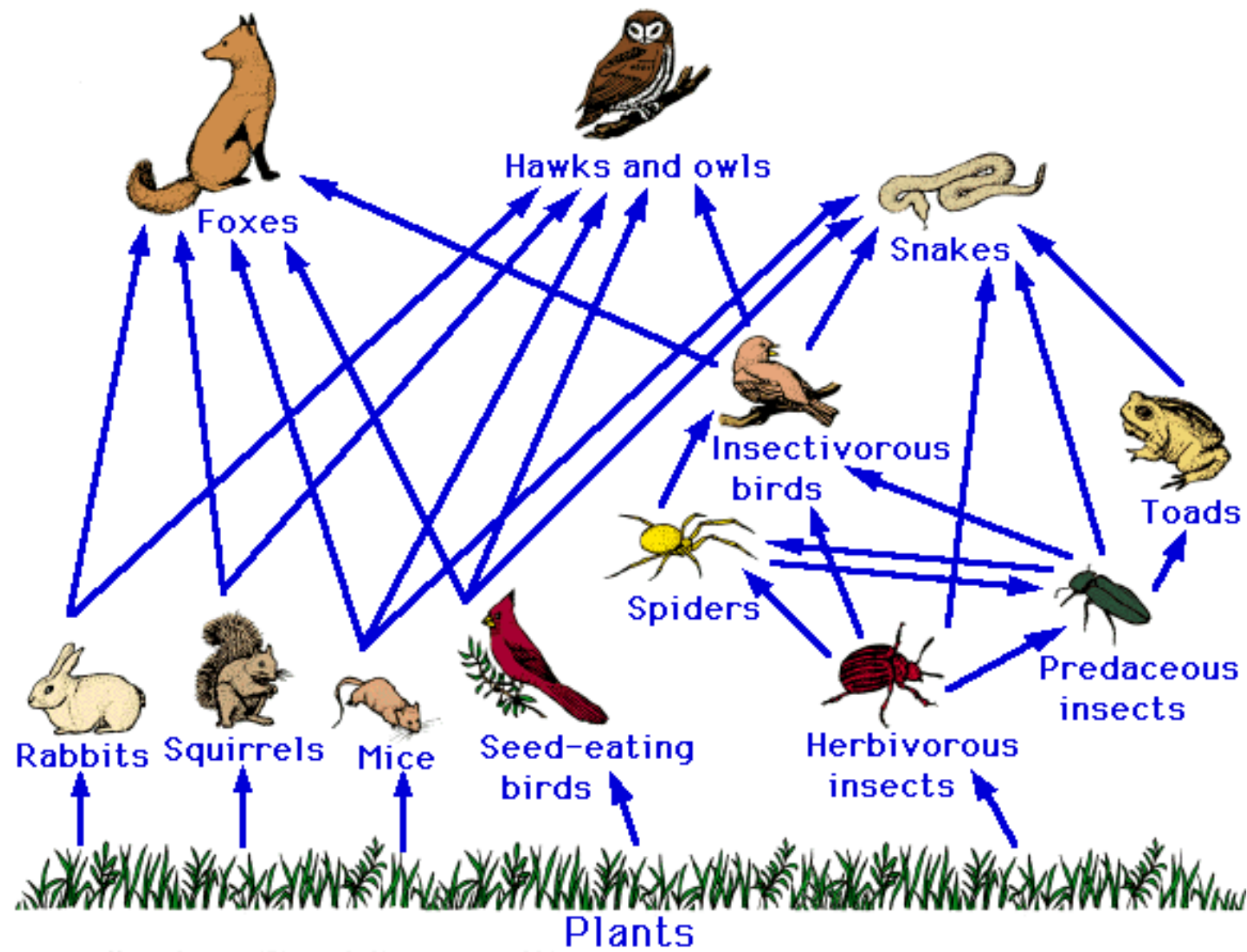
Street Maps



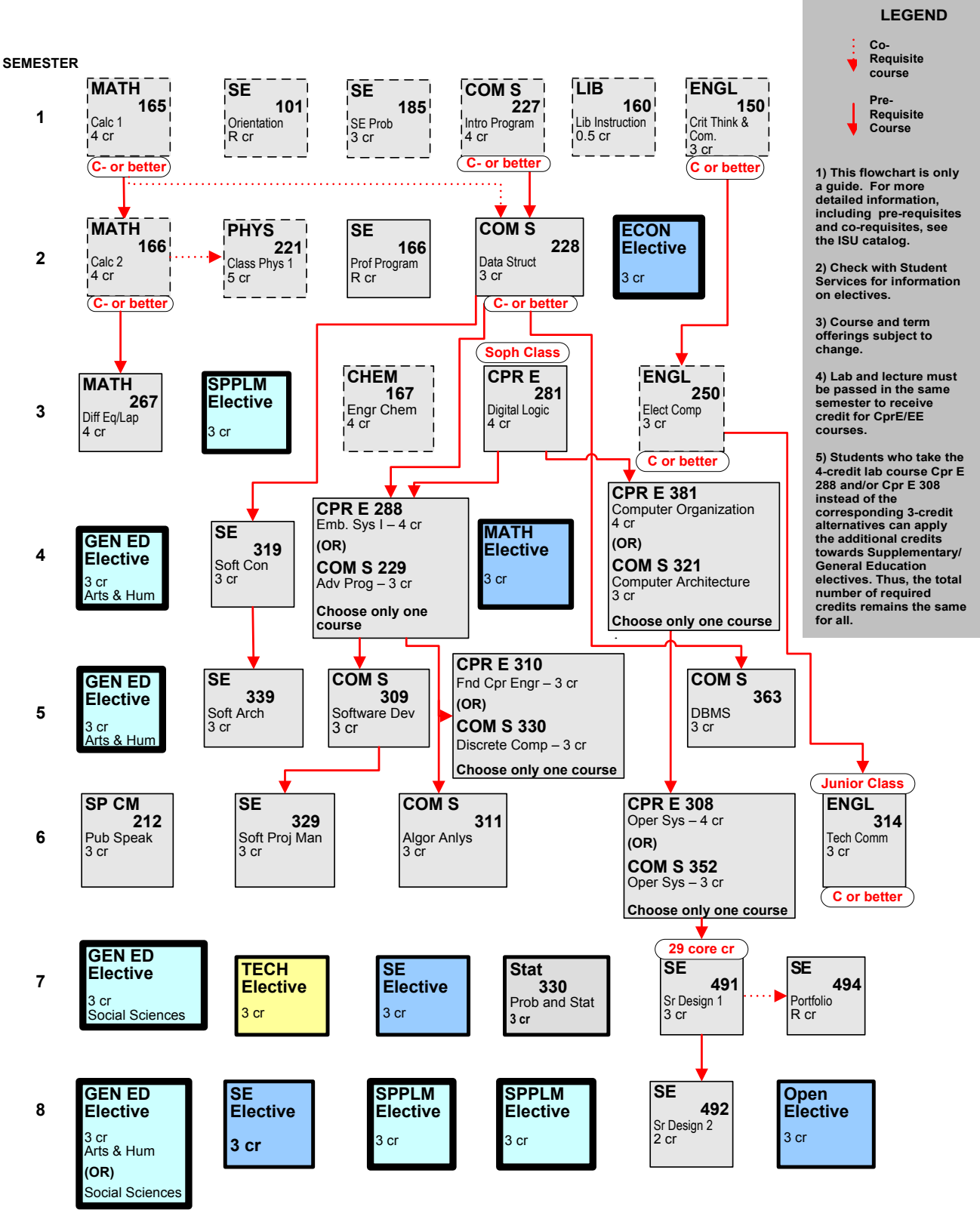
Maps



Food Chain

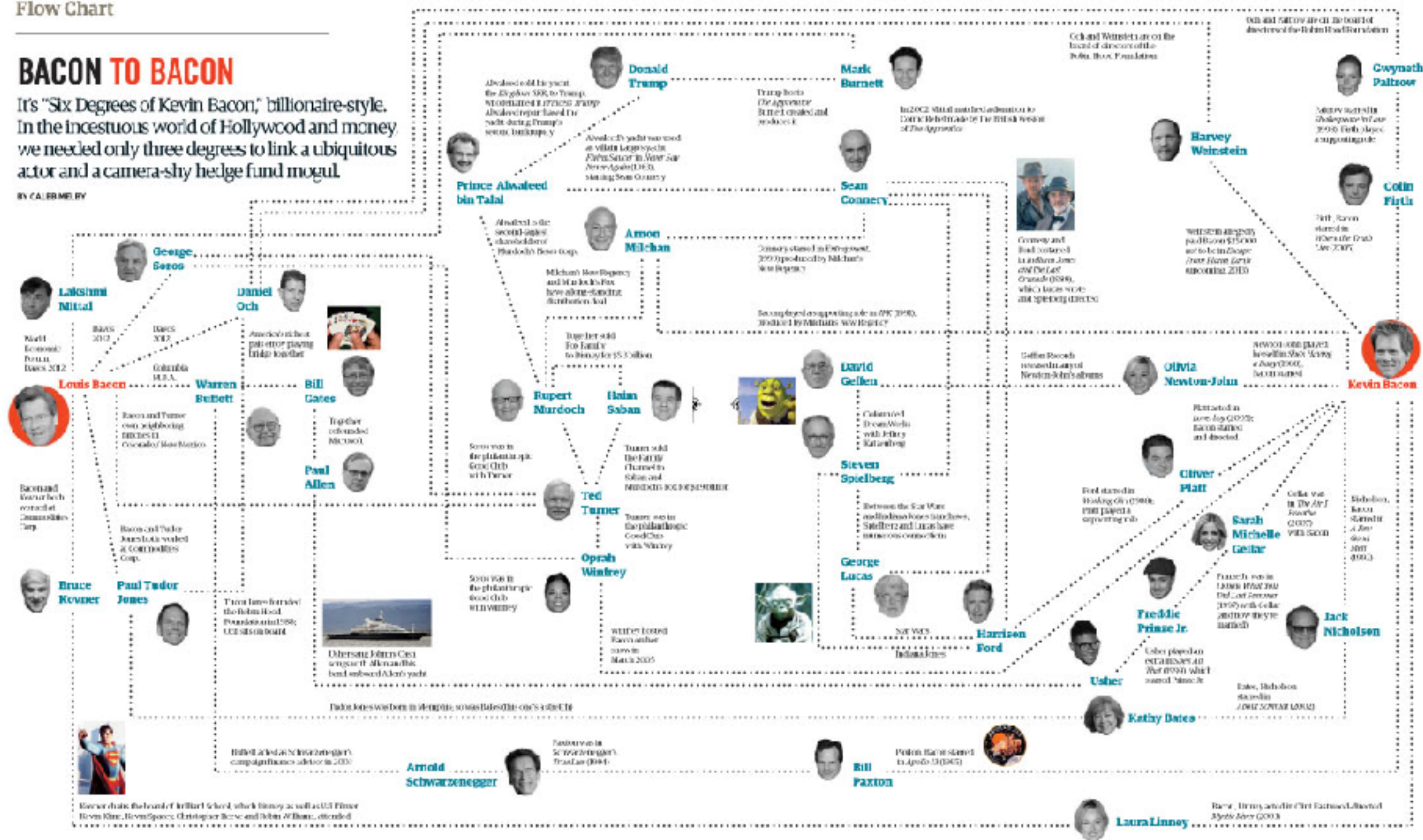


SOFTWARE ENGINEERING FLOWCHART, 2011- 2012 CATALOG (124.5 credits)

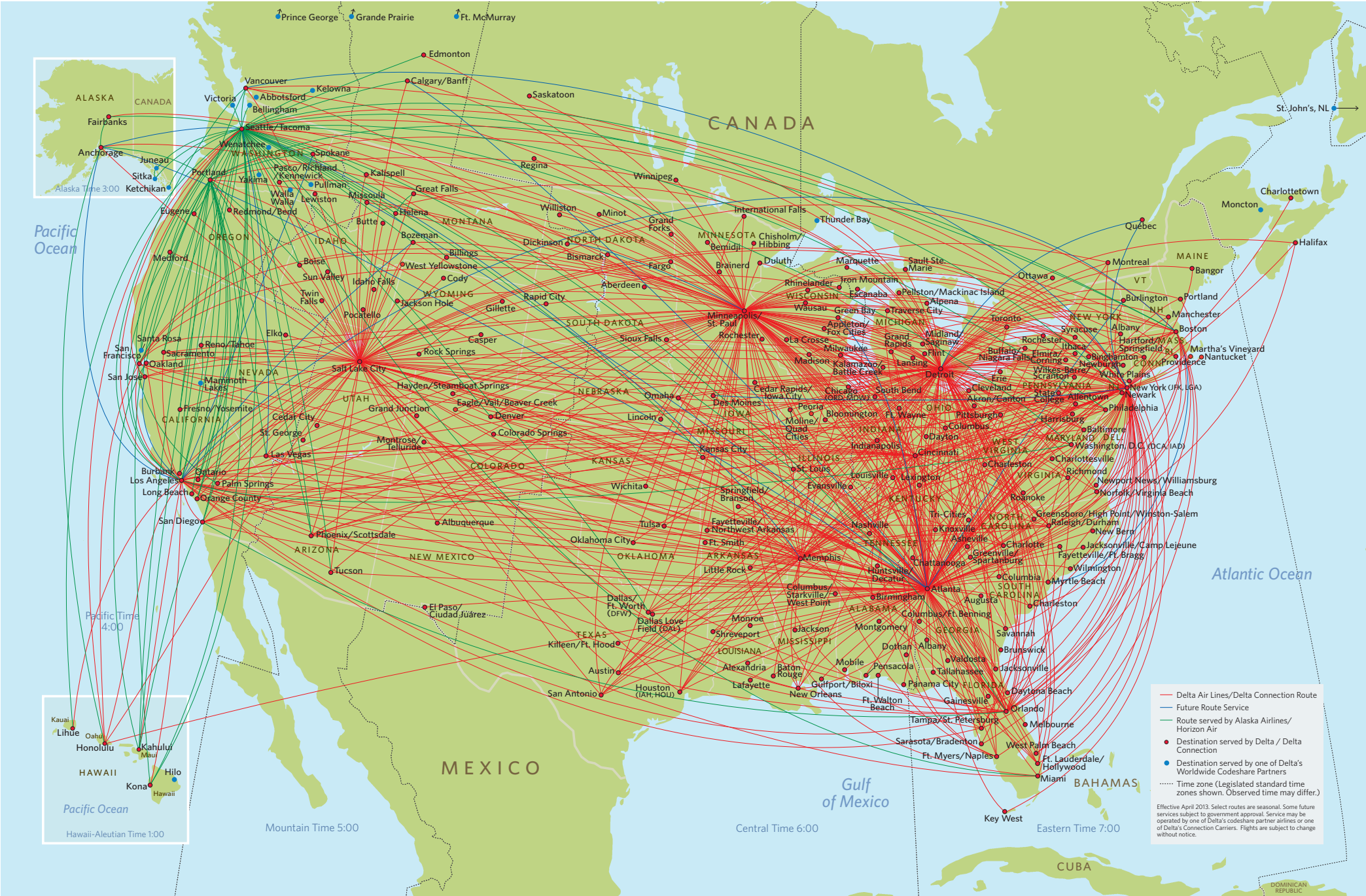


It's "Six Degrees of Kevin Bacon," billionaire-style. In the incestuous world of Hollywood and money we needed only three degrees to link a ubiquitous actor and a camera-shy hedge fund mogul.

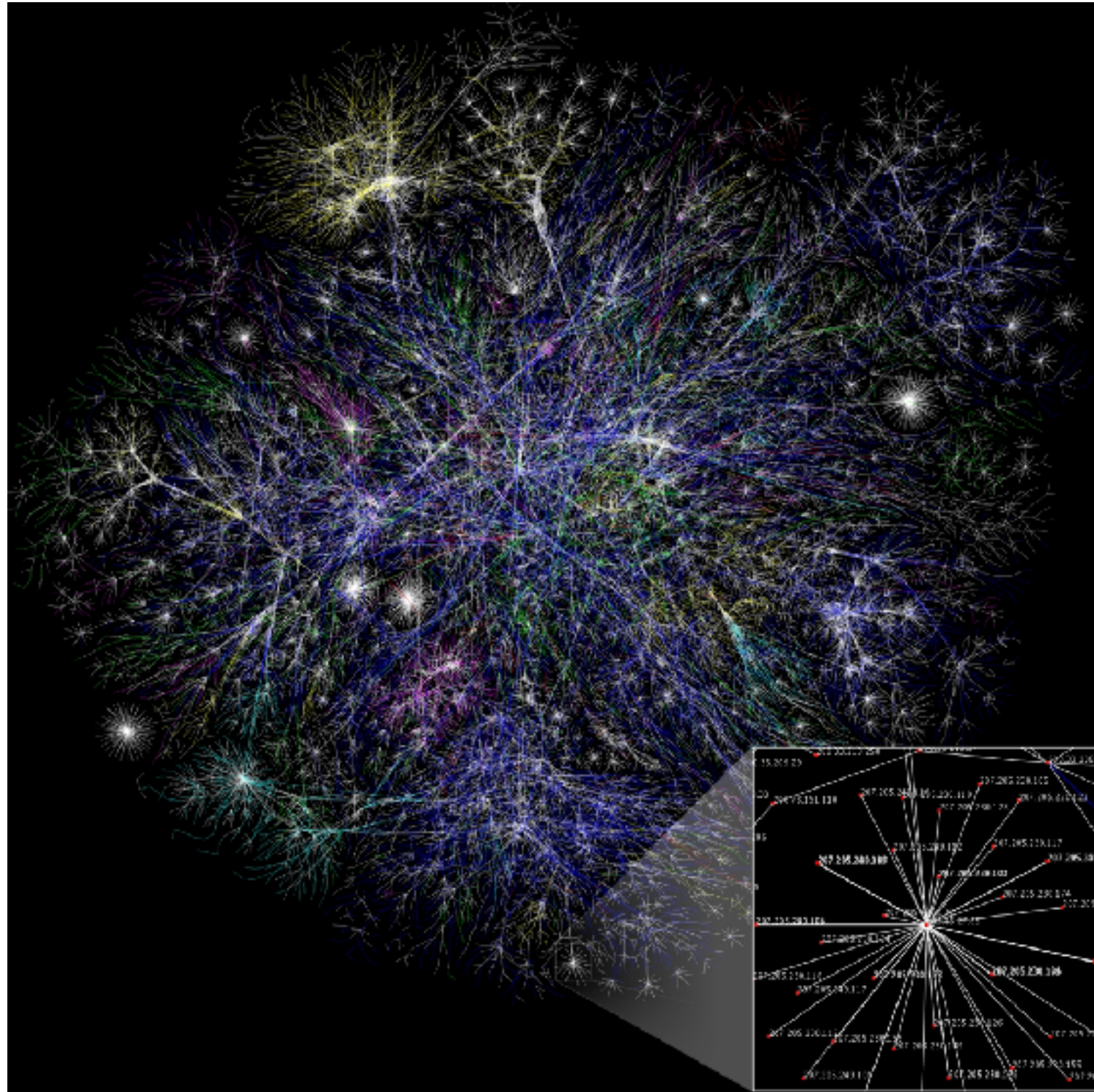
BY CALIFORNIA



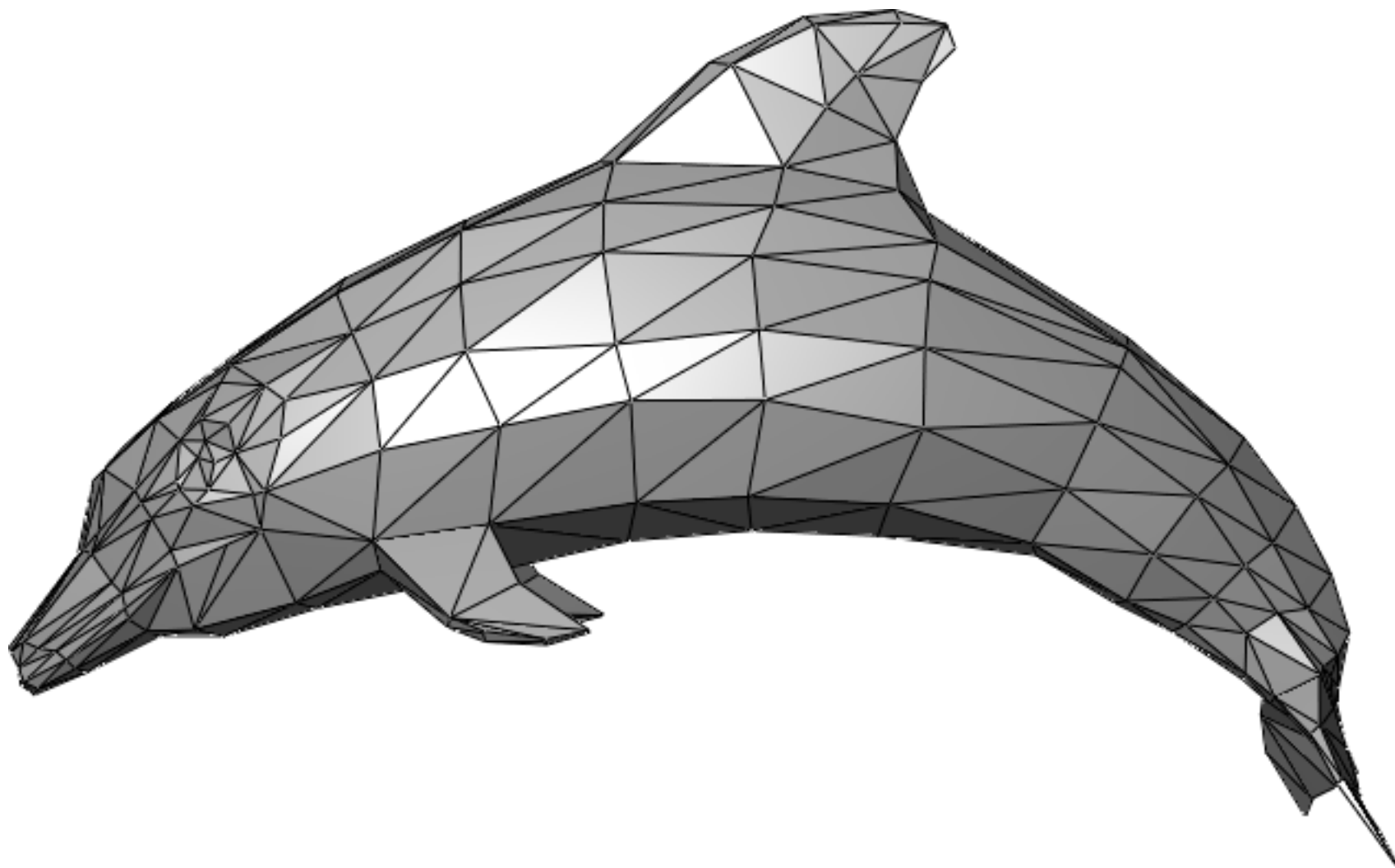
Route Map



The Internet



Polygon Meshes



http://en.wikipedia.org/wiki/Polygon_mesh

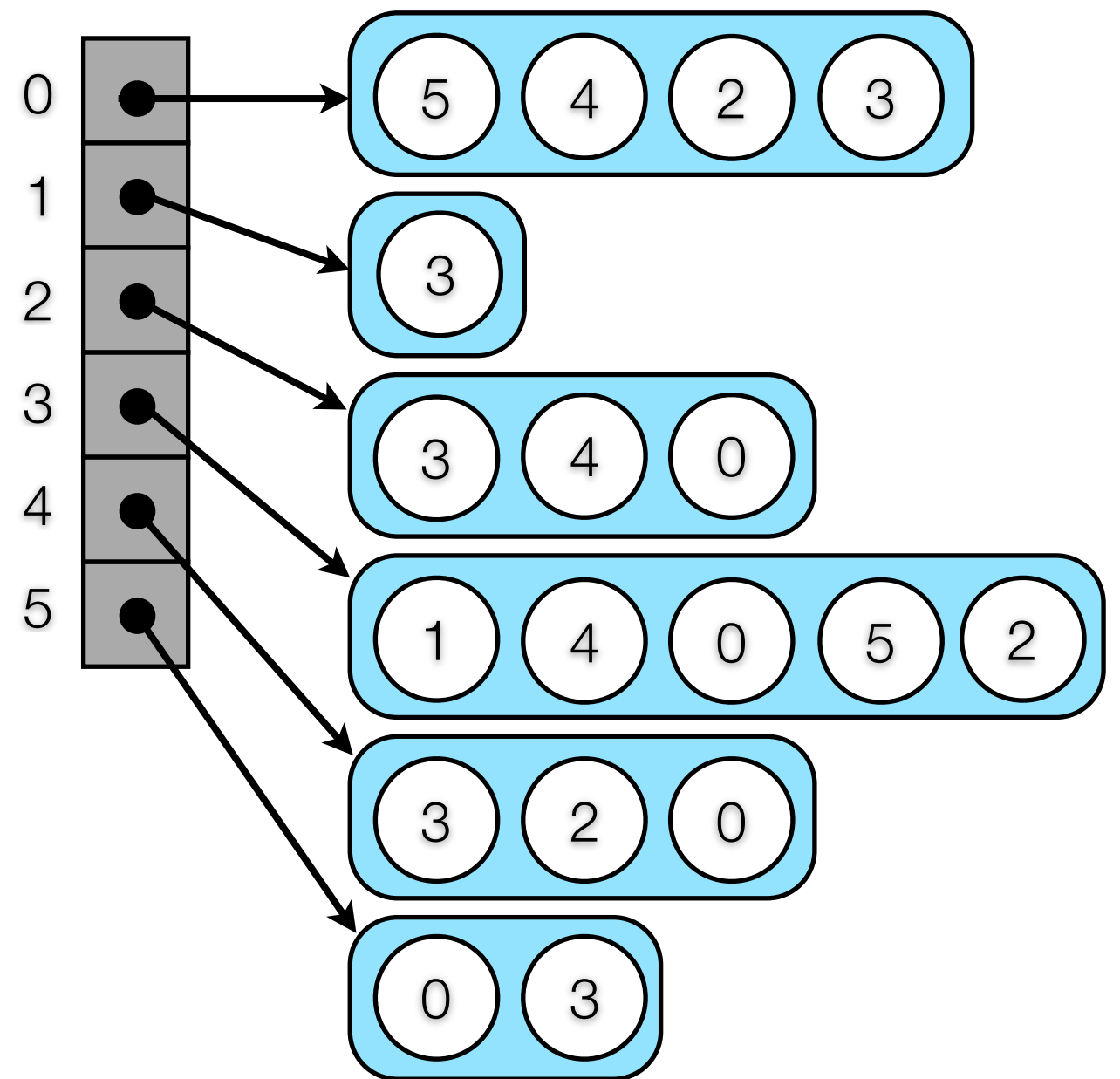
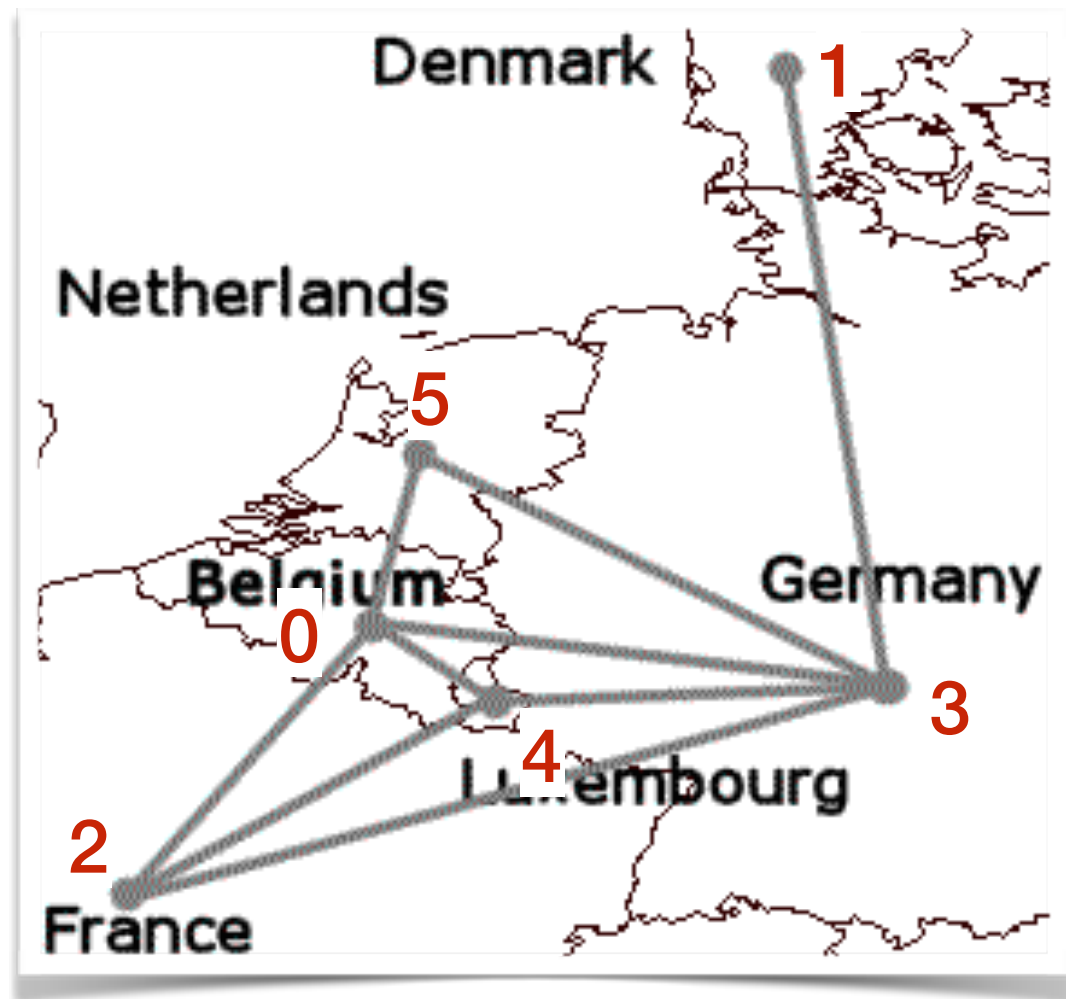


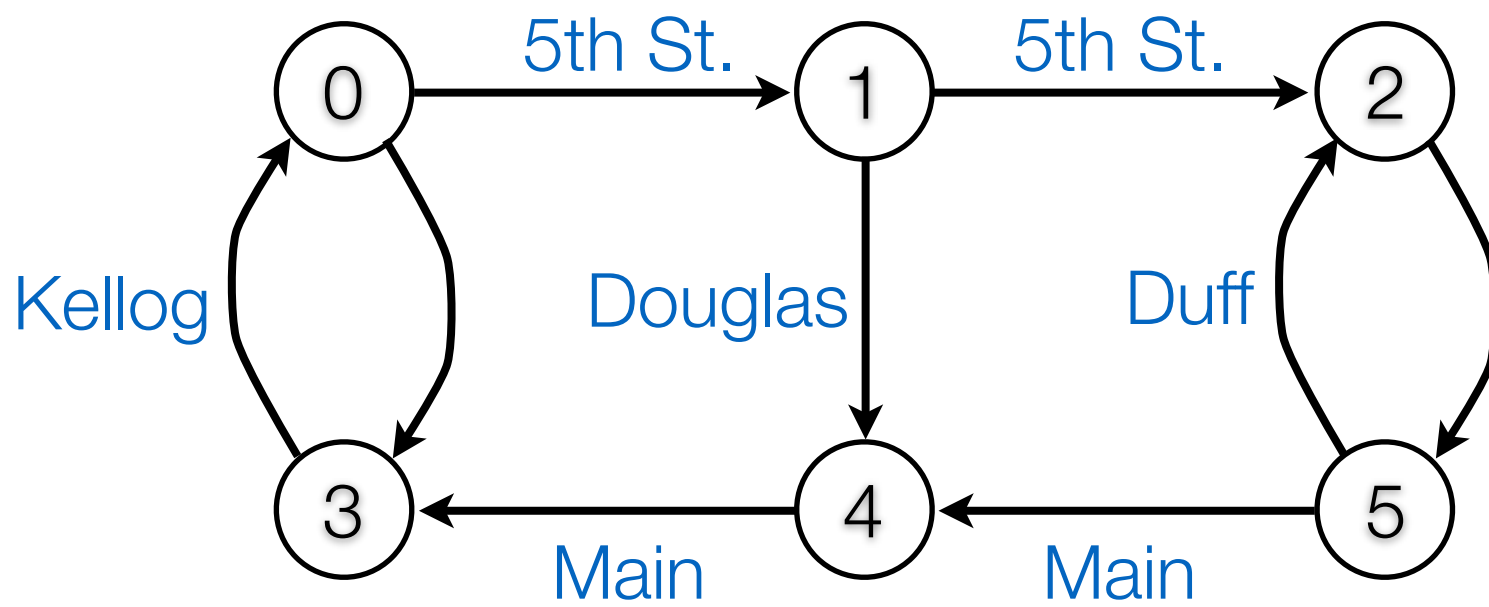
"Visualizing Friendships" by Paul Butler

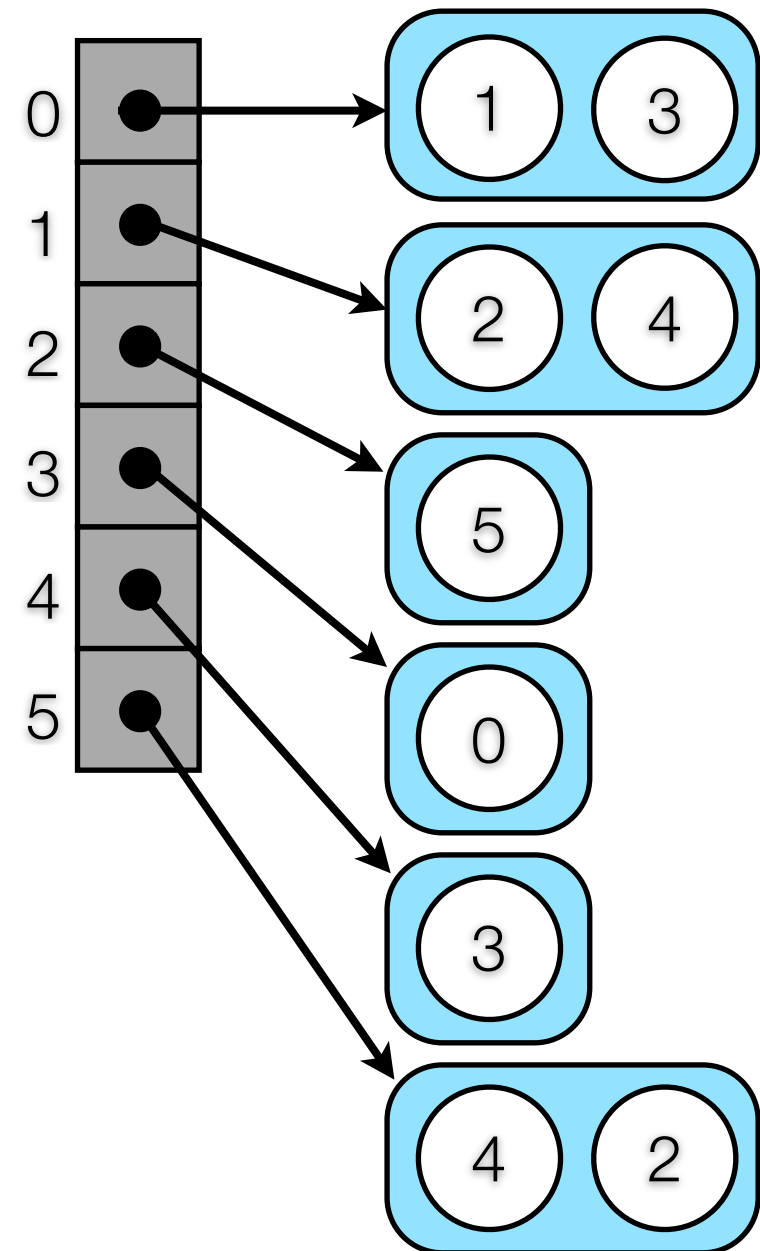
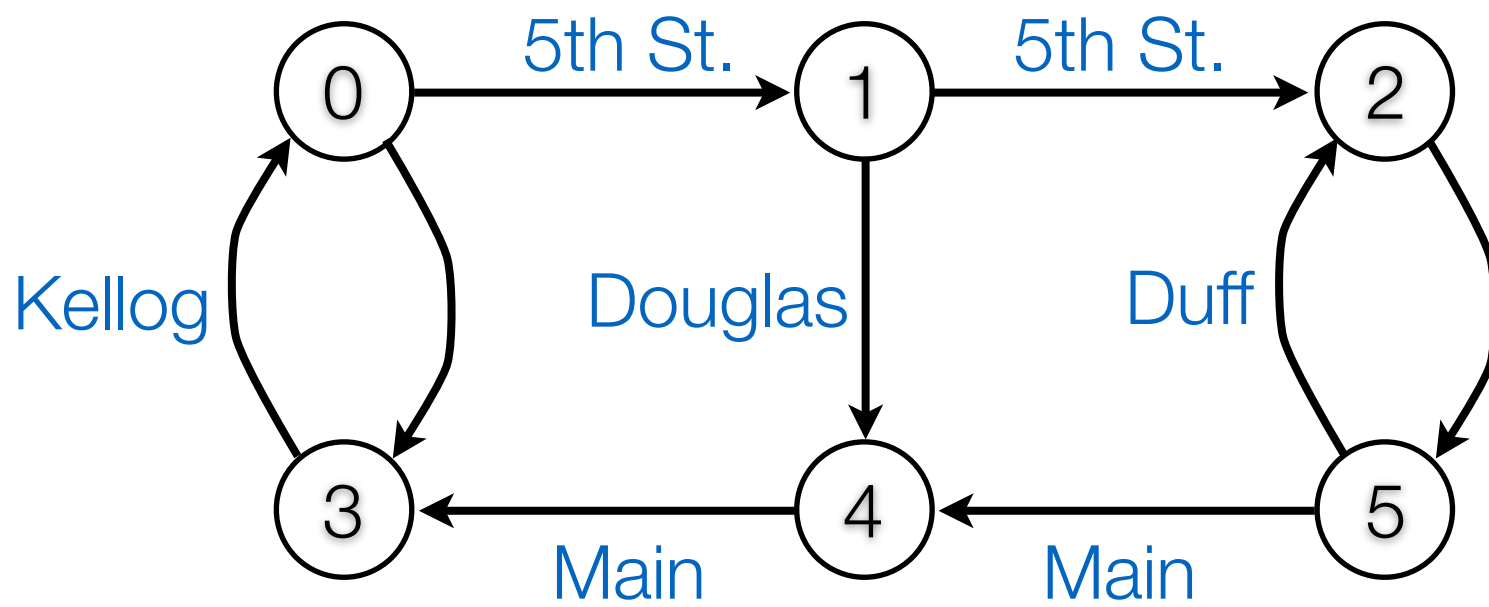
Representing Graphs

Adjacency Lists

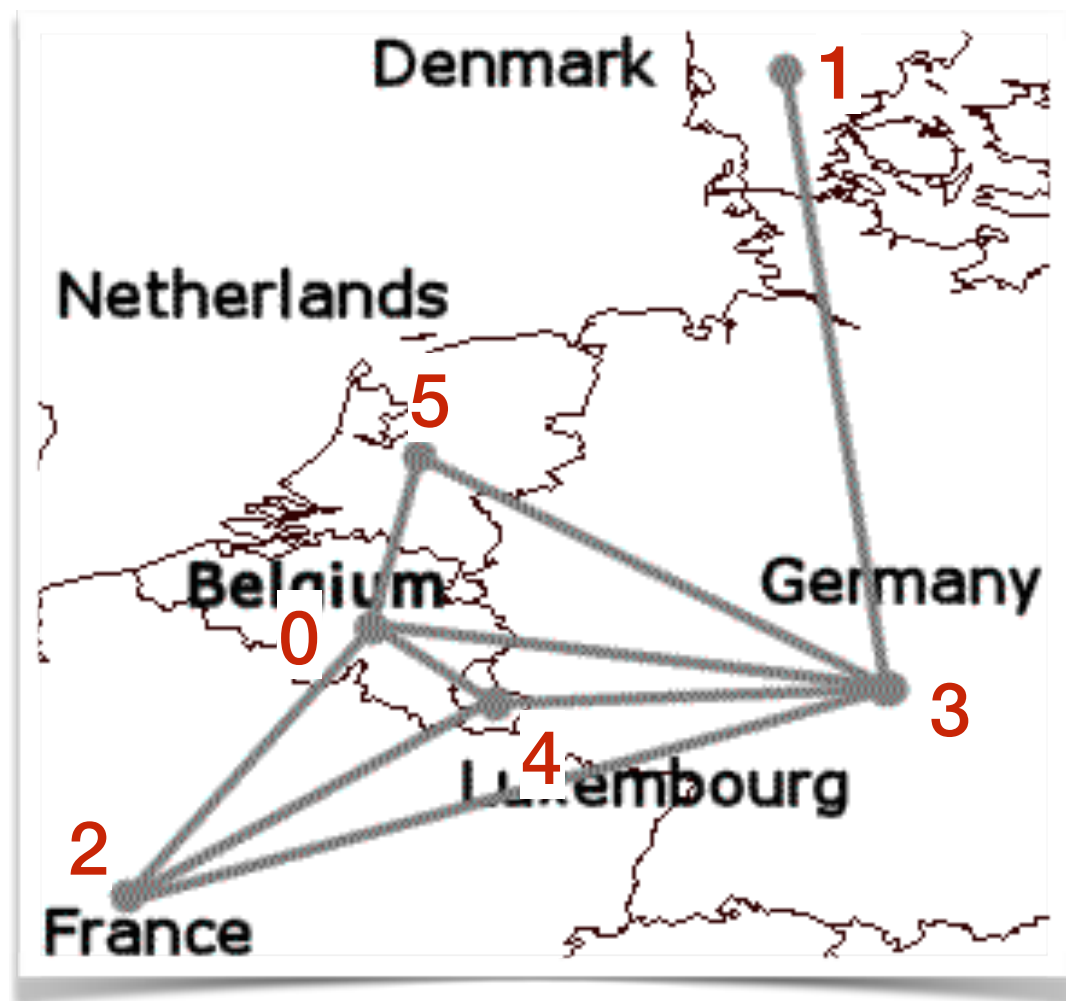


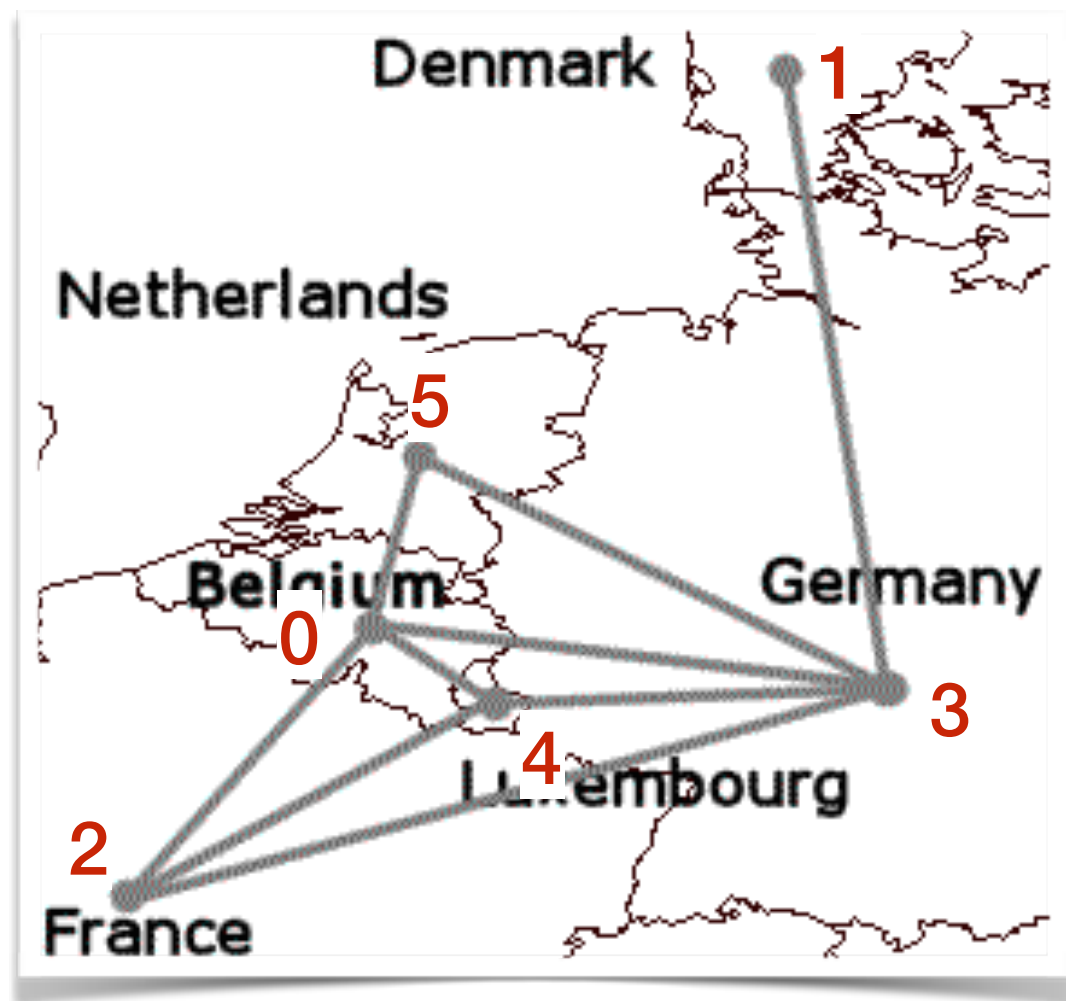




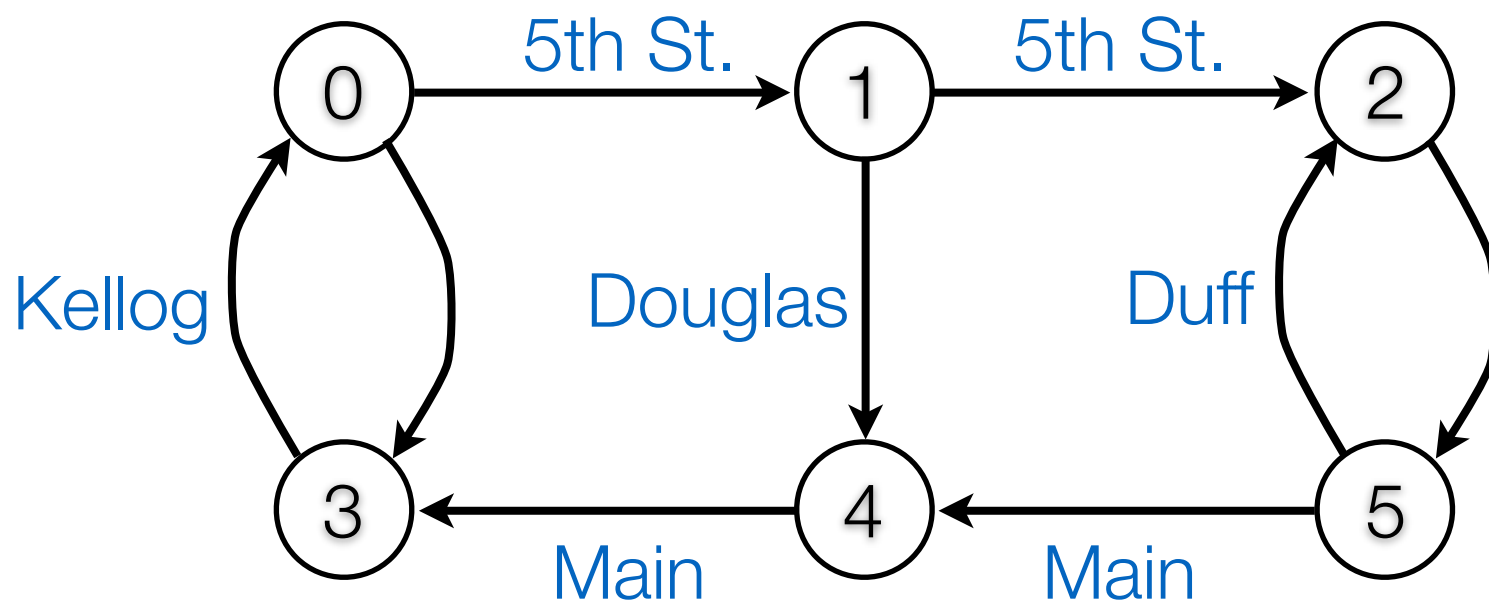


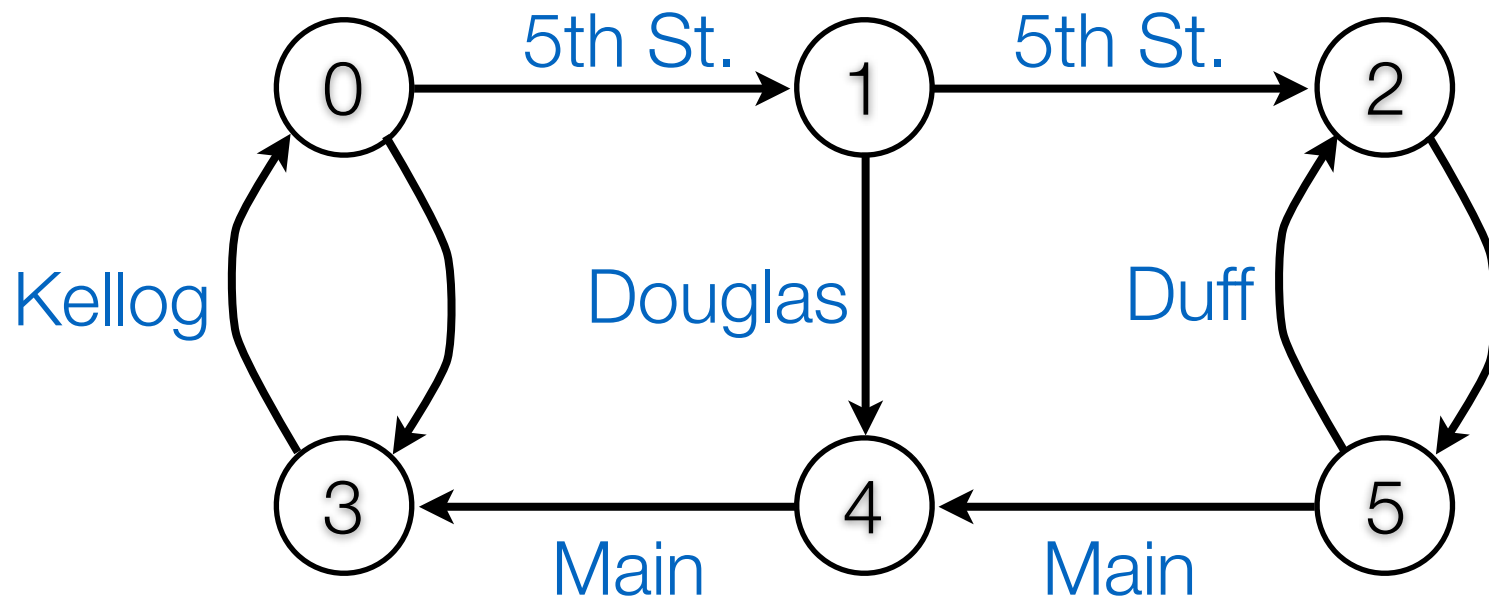
Adjacency Matrices





	0	1	2	3	4	5
0	0	0	1	1	1	1
1	0	0	0	1	0	0
2	1	0	0	1	1	0
3	1	1	1	0	1	1
4	1	0	1	1	0	0
5	1	0	0	1	0	0

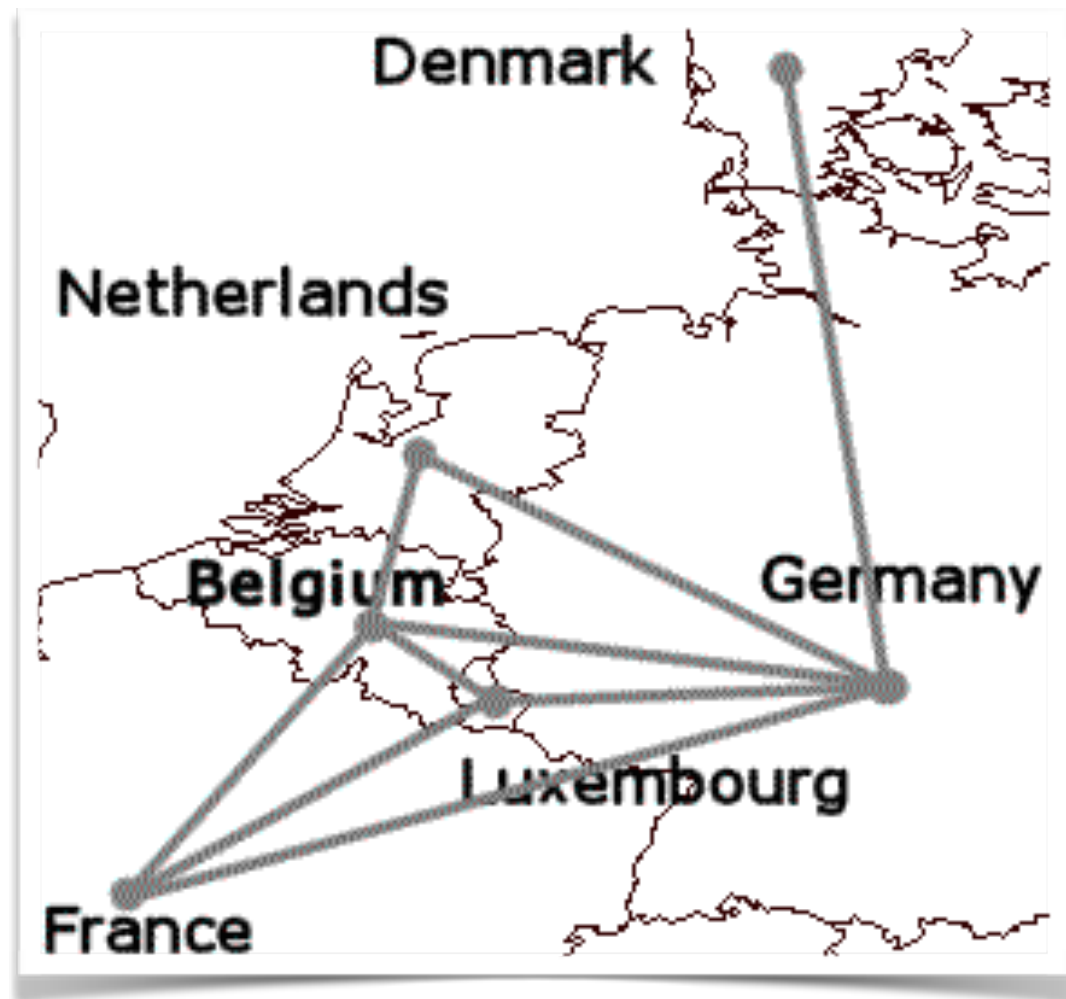




	0	1	2	3	4	5
0	0	1	0	1	0	0
1	0	0	1	0	1	0
2	0	0	0	0	0	1
3	1	0	0	0	0	0
4	0	0	0	1	0	0
5	0	0	1	0	1	0

HashMap/HashSet





Keys



Values

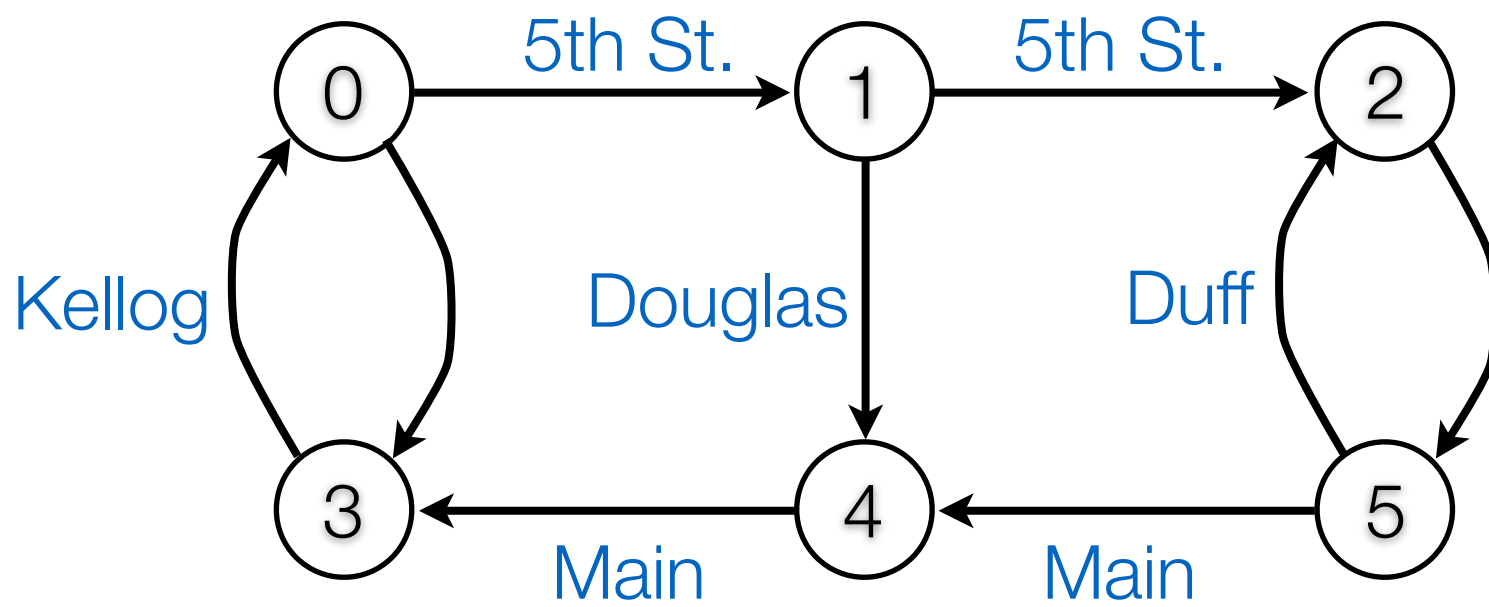
France Luxembourg
Germany Netherlands

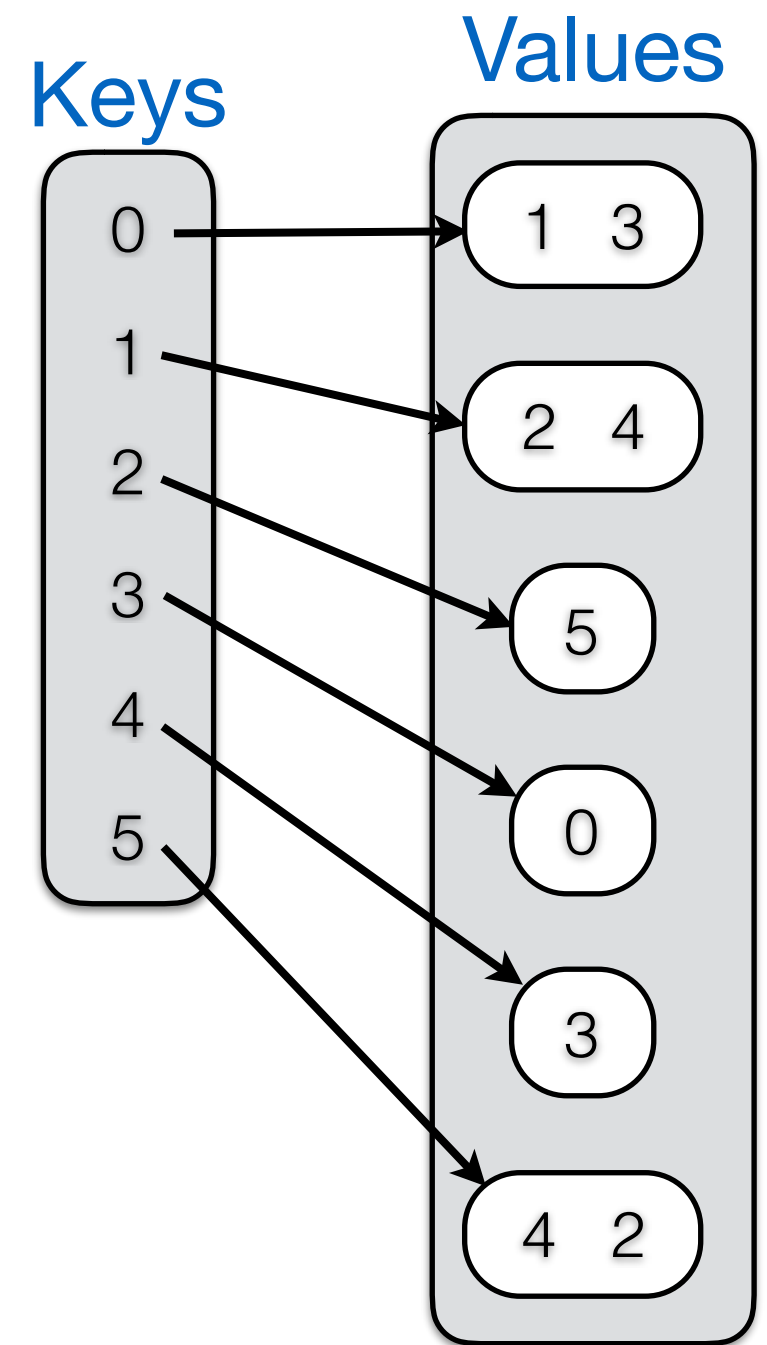
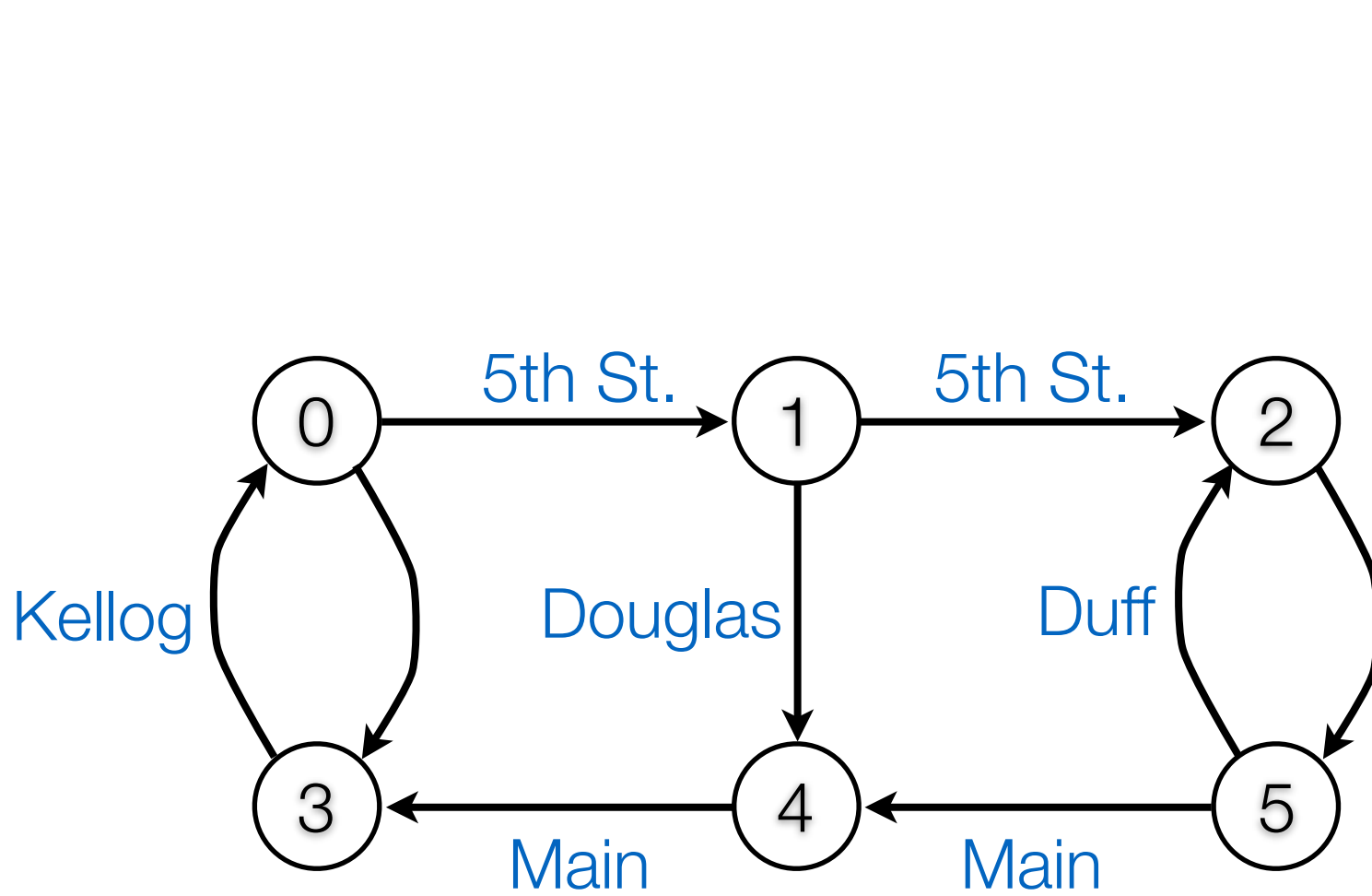
Germany

France Luxembourg
Germany Belgium
Netherlands

France Germany
Belgium

Germany Belgium





Time/Space

Operation	Adjacency matrix	Adjacency List	HashMap/ HashSet
Scanning neighbors of u	$O(V)$	$O(\deg(u))$	$O(\deg(u))^{\dagger}$
Testing if u and v are neighbors	$O(1)$	$O(\min(\deg(u), \deg(v)))$	$O(1)^{\dagger}$
Space	$O(V^2)$	$O(V+E)$	$O(V+E)^{\dagger}$

[†]Under standard hashing assumptions