CS 367 - Introduction to Data Structures
Tuesday, April 19, 2016

Program 5

Homework 9 due 10 pm Friday, April 22nd

Last Time

Graphs

- traversals
- applications of BFS/DFS
- more terminology

Today

Graphs

- topological ordering
- Dijkstra's algorithm

Exam 2 returned

Next Time

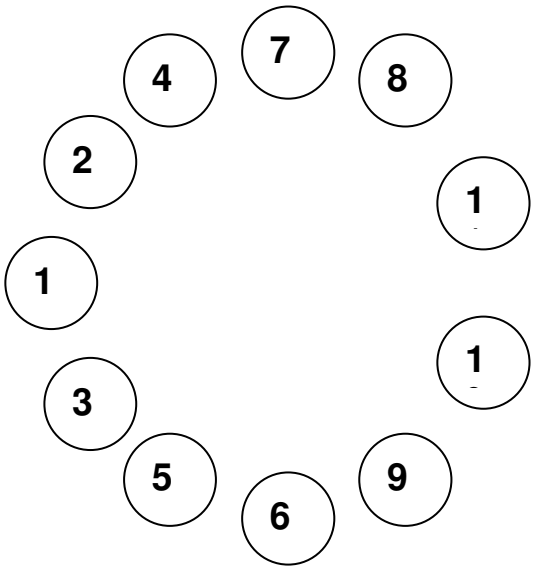
Read: continue *Hashing*

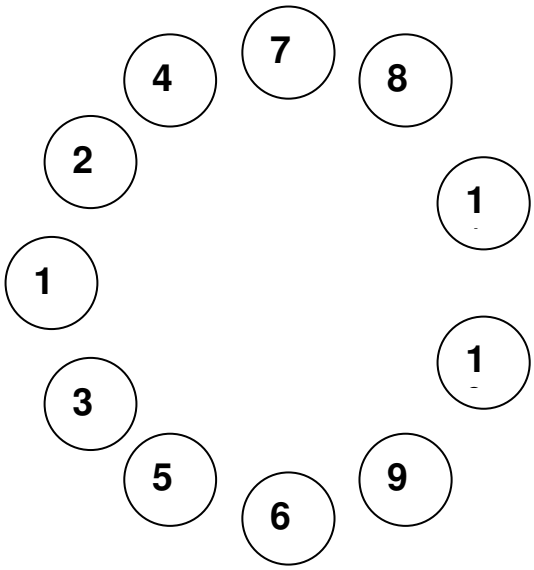
Hashing

- terminology
- designing a good hash function
- choosing table size
- expanding a hash table
- handling collisions

Topological Ordering

1. get bread
2. get jelly
3. get peanut butter
4. get butter knife
5. open jelly
6. open peanut butter
7. take bread slice 1
8. take bread slice 2
9. use knife to spread jelly on bread slice
10. use knife to spread peanut butter on bread slice
11. put slices together with spreaded sides facing each other



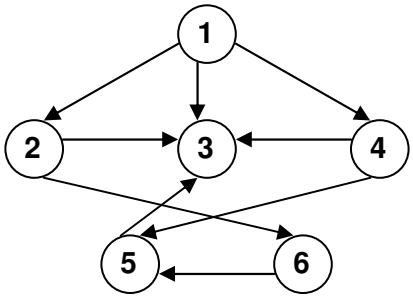


IDEA:

Topological Ordering Algorithm

Iterative Algorithm (see readings for recursive algo)

Example



Dijkstra's Algorithm

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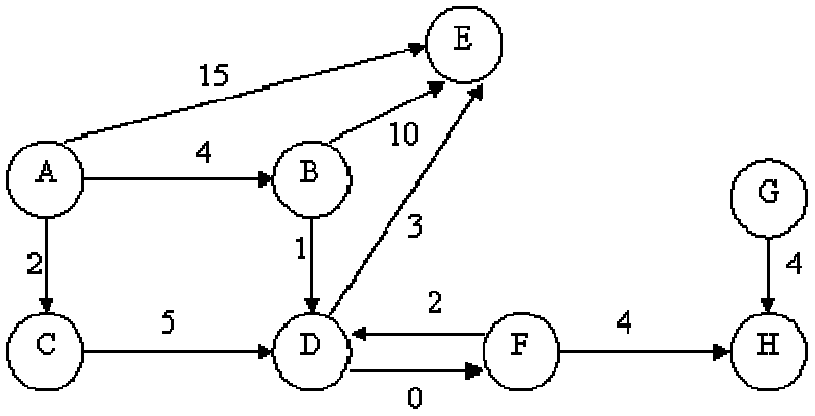
-
-
-
-

Psuedo Code

```
for each vertex V
   initialize V's visited mark to false
   initialize V's total weight to "infinity"
   initialize V's predecessor to null

set start vertex's total weight to 0

create new priority queue pq
pq.insert( [start vertex total weight,start vertex] )

while !pq.isEmpty()
    [C's total weight,C] = pq.removeMin()
   set C's visited mark to true

   for each unvisited successor S adjacent to C
      if S's total weight can be reduced
         S's total weight = C's total weight + edge weight from C to S
         update S's predecessor to C
         pq.insert( [S's total weight,S] )
        (if S already in pq we'll just update S's total weight)
```

Dijkstra's Practice



Iteration	Priority Queue (just list smallest to largest)
0	
1	
2	
3	
4	
5	
6	
7	

Vertex	Visited	Total Weight	Predecessor
A			
B			
C			
D			
E			
F			
H			
G			

Reconstruct shortest path from A to F