Comp 352 Winter 2019

Tutorial Week 4

January 30, 2019

Outline

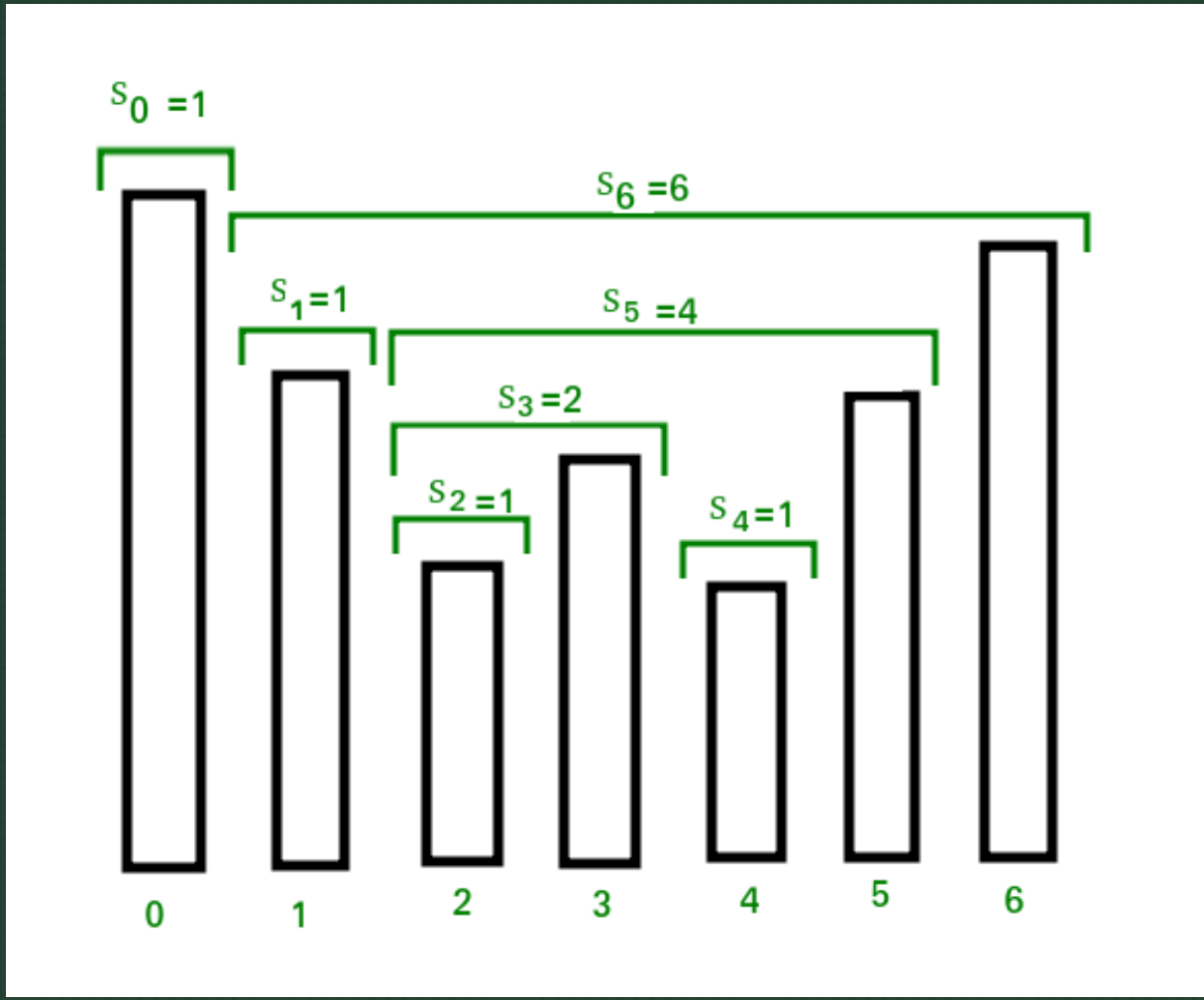
Announcement

1. Assignment 1

Stack

Last In First Out (LIFO)

Stock Span

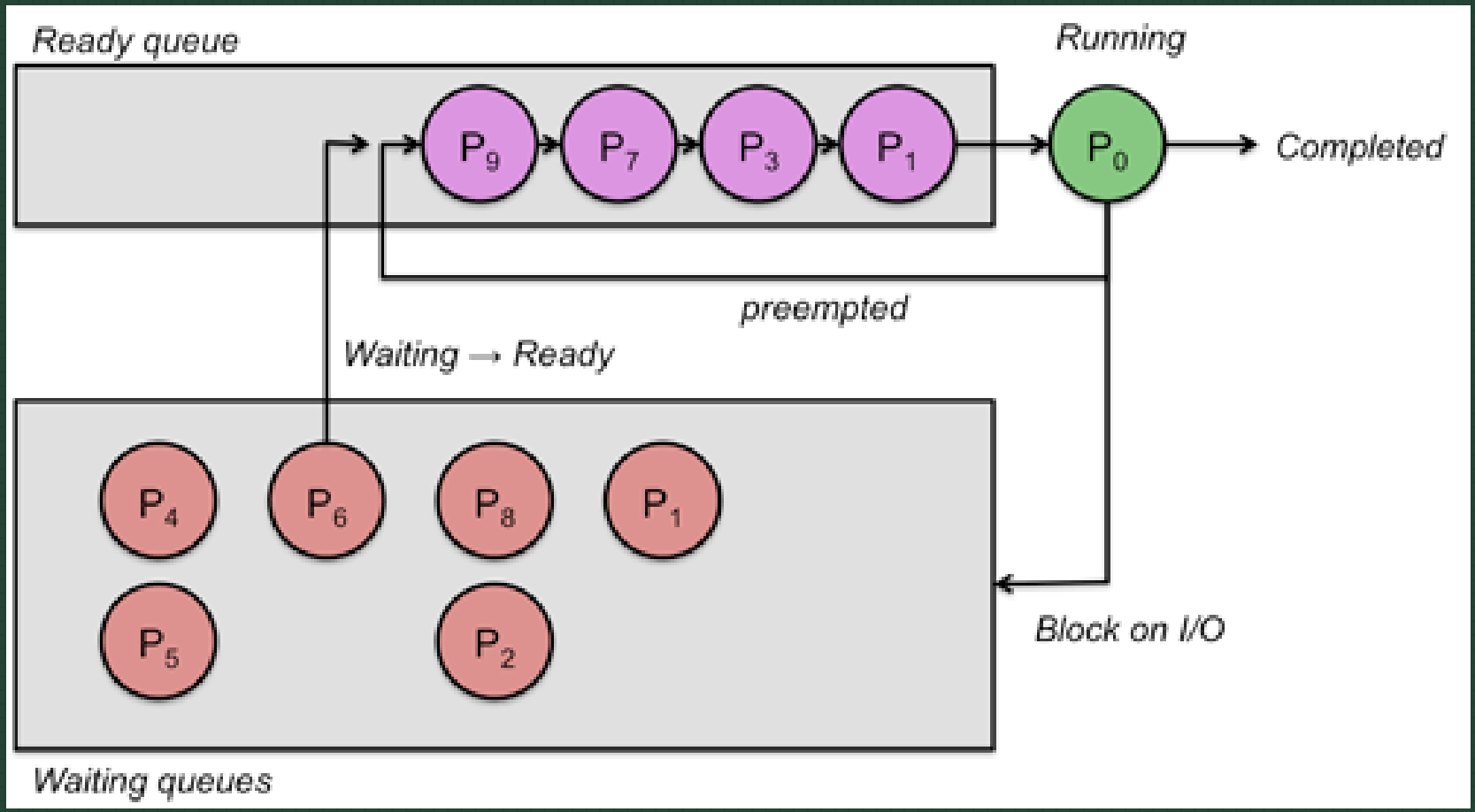


https://www.geeksforgeeks.org/the-stock-span-problem/

Queue

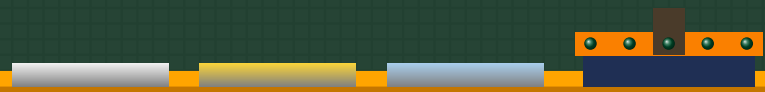
First In First Out (FIFO)

Round Robin


Ready queue
Running
P9
P7
P3
P1
P0
Completed
preempted
Waiting → Ready
P4
P6
P8
P1
P5
P2
Block on I/O
Waiting queues

R5.3

Suppose an initially empty stack S has performed a total of 25 push operations, 12 top operations, and 10 pop operations, 3 of which generated StackEmptyExceptions, which were caught and ignored. What is the current size of S?



R5.6

Give a recursive method for removing all the elements in a stack.

C5.4

Suppose Alice has picked three distinct integers and placed them into a stack S in random order. Write a short, straight line piece of pseudo-code (with no loops or recursion) that uses only one comparison and only one variable x, yet guarantees with probability $2/3$ that at the end of this code the variable x will store the largest of Alice's three integers. Argue why your method is correct.

C5.5

Describe how to implement the stack ADT using two queues. What is the running time of the $push()$ and $pop()$ methods in this case?

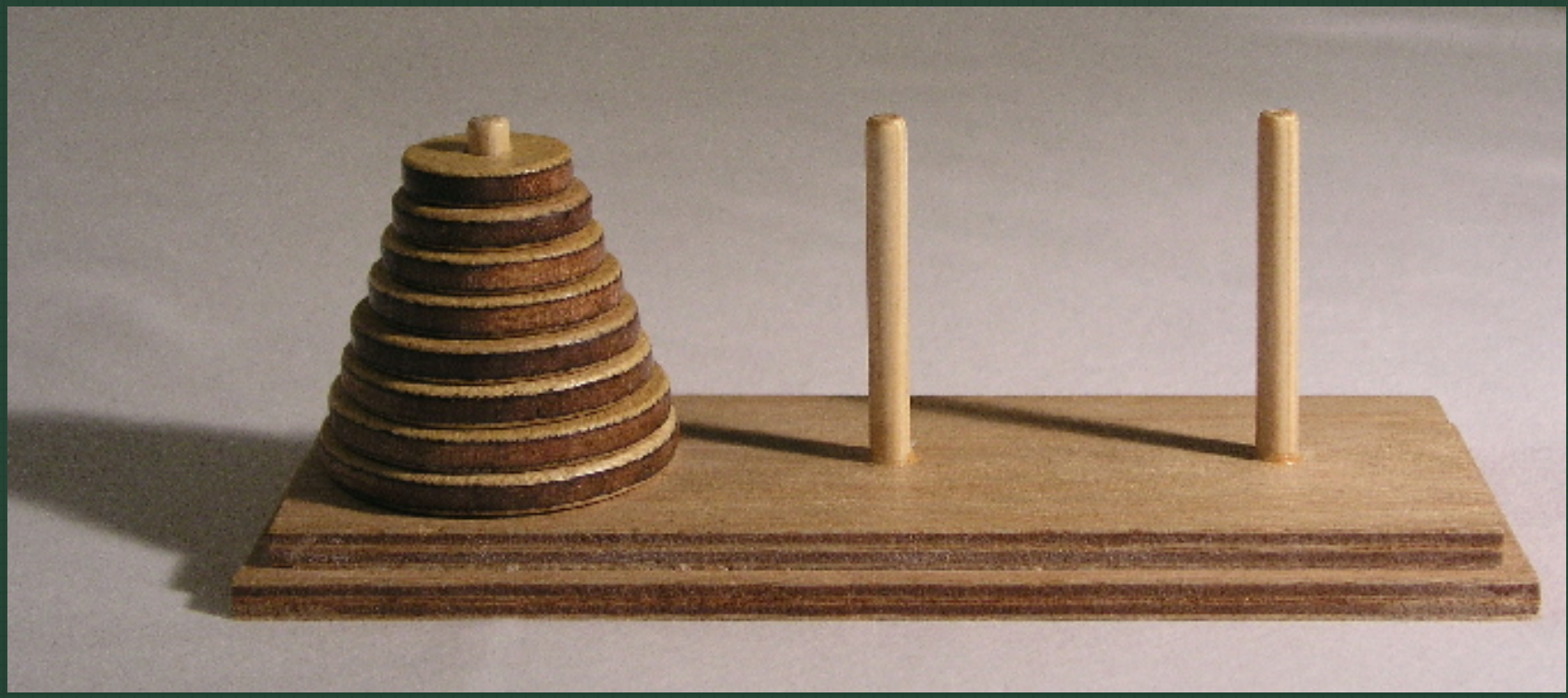
Array Definition

1. A sequenced collection
2. of variables all of the same type.
3. Each variable in an array has an index.
4. Array is a fundamental type.

List ADT

- Methods
  1. Insertion
  2. Removal
- Growth Strategy: Amortized
  1. Incremental
  2. Doubling

Tower of Hanoi



Rules:

1. Only one disk can be moved among the towers at any given time.
2. Only the "top" disk can be removed.
3. No large disk can sit over a small disk.

Tower of Hanoi

Algorithm 1 Hanoi(n, source, dest, aux)

Input: n disks

```
1: if (n == 1) then
2:     move disk from source to dest
3: else
4:     Hanoi(n − 1, source, aux, dest)
5:     move disk from source to dest
6:     Hanoi(n − 1, aux, dest, source)
7: end if
```

Credits

1. https://www.tutorialspoint.com/data_structures_algorithms/tower_of_hanoi.htm
2. https://www.mathsisfun.com/games/towerofhanoi.html
3. https://en.wikipedia.org/wiki/Tower_of_Hanoi
4. https://www.geeksforgeeks.org/the-stock-span-problem/
5. https://www.cs.rutgers.edu/~pxk/416/notes/07-scheduling.html