

EECS2011 Fundamentals of Data Structures
(Winter 2022)

Q&A - Week 2 Lecture

Thursday, January 27

Announcements

- Lecture W3 released (SLL) ✓
- Assignment 1 (requiring SLL) to be released on Monday.
- Plan of Returning In-Person (starting Feb. 14)

+ Unchanged

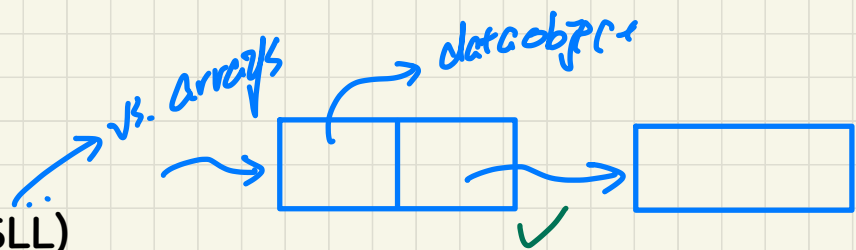
- * Pre-recorded lectures
- * Zoom Weekly Q&A and Office hours in the first instance
- * Online Programming & Written tests in the first instance

+ Changed

- * In-Person Exam

+ To be determined:

- * Some (programming and/or written) tests may be in-person, in which case you'll be notified at least one week in advance.



$$[0, n-2] = (n-2) - 0 + 1 = \boxed{n-1} \text{ iterations}$$

```

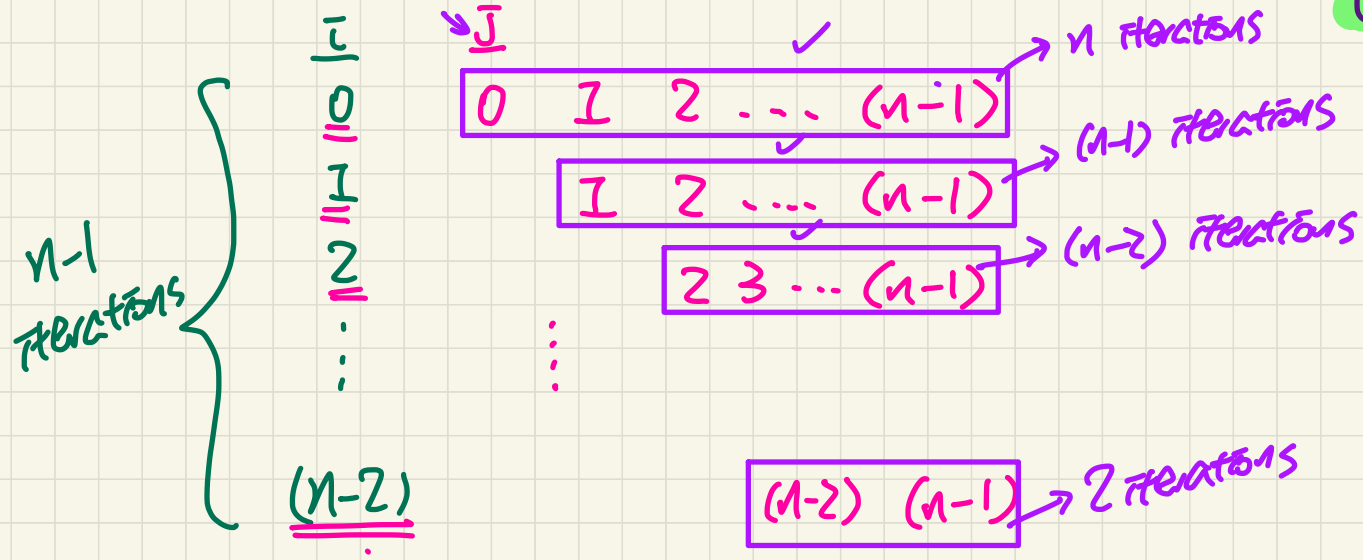
1 void selectionSort(int[] a, int n)
2   for (int i = 0; i <= (n - 2); i++)
3     int minIndex = i;  $O(1)$ 
4     for (int j = i; j <= (n - 1); j++)
5       if (a[j] < a[minIndex]) { minIndex = j; }  $O(1)$ 
6     int temp = a[i];
7     a[i] = a[minIndex];  $O(1)$ 
8     a[minIndex] = temp;

```

$$1 \cdot (\overset{\checkmark}{n} + (n-1) + \dots + \overset{\checkmark}{2})$$

$$= \frac{(n+2)(n-1)}{2}$$

$O(n^2)$



Tracing Recursive Calls

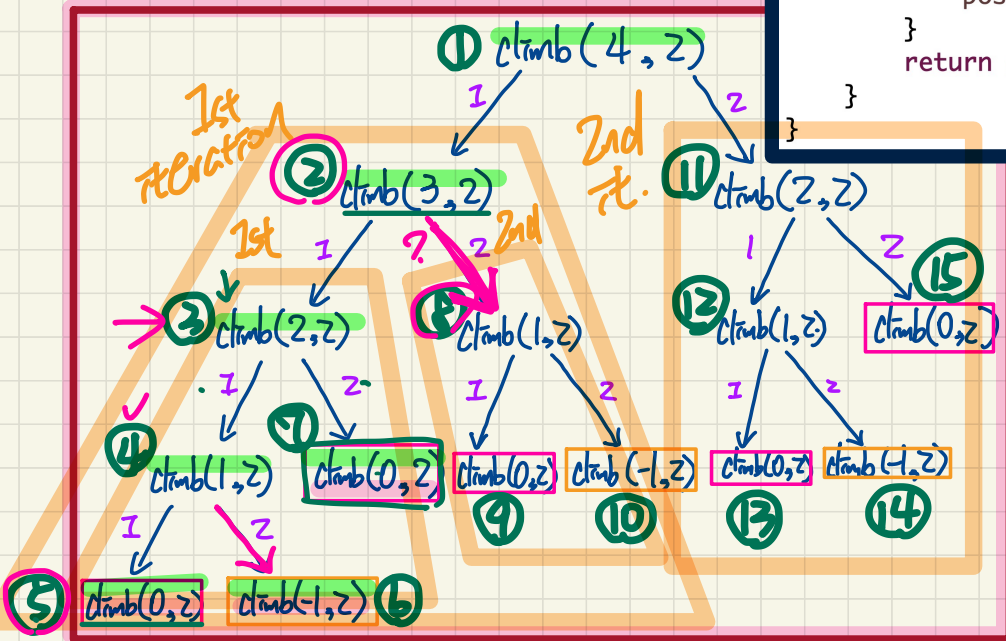
via Call Stack

pushed
 popped

post-order traversal

```

public int climb(int h, int n) {
    if(h < 0) {
        return 0;
    }
    else if(h == 0) {
        return 1;
    }
    else {
        int possible = 0;
        for(int i = 1; i <= n; i++) {
            possible += climb(h - i, n);
        }
        return possible;
    }
}
    
```



Exercise:
 Complete tracing from 8

- ~~7~~
- ~~6~~
- ~~5~~
- ~~4~~
- 3
- 2
- 1

Problem on Recursion: Strategies for Climbing Staircase

You are asked to program this method:

public HashSet<ArrayList<Integer>> climbStrategies(int h, int n)

The return value enumerates the set of all possible ways for climbing a stair of height h, while each climb is up to n steps.

Assumptions: $n \leq h$, each climb takes at least 1 step

staircase
steps
climb

e.g., climbStrategies(4, 2) returns the following set enumerating the 5 ways for climbing a stair of height 4 and each climb takes up to 2 steps.

{ [1, 1, 1, 1],

[1, 1, 2],

[1, 2, 1],

[2, 1, 1],

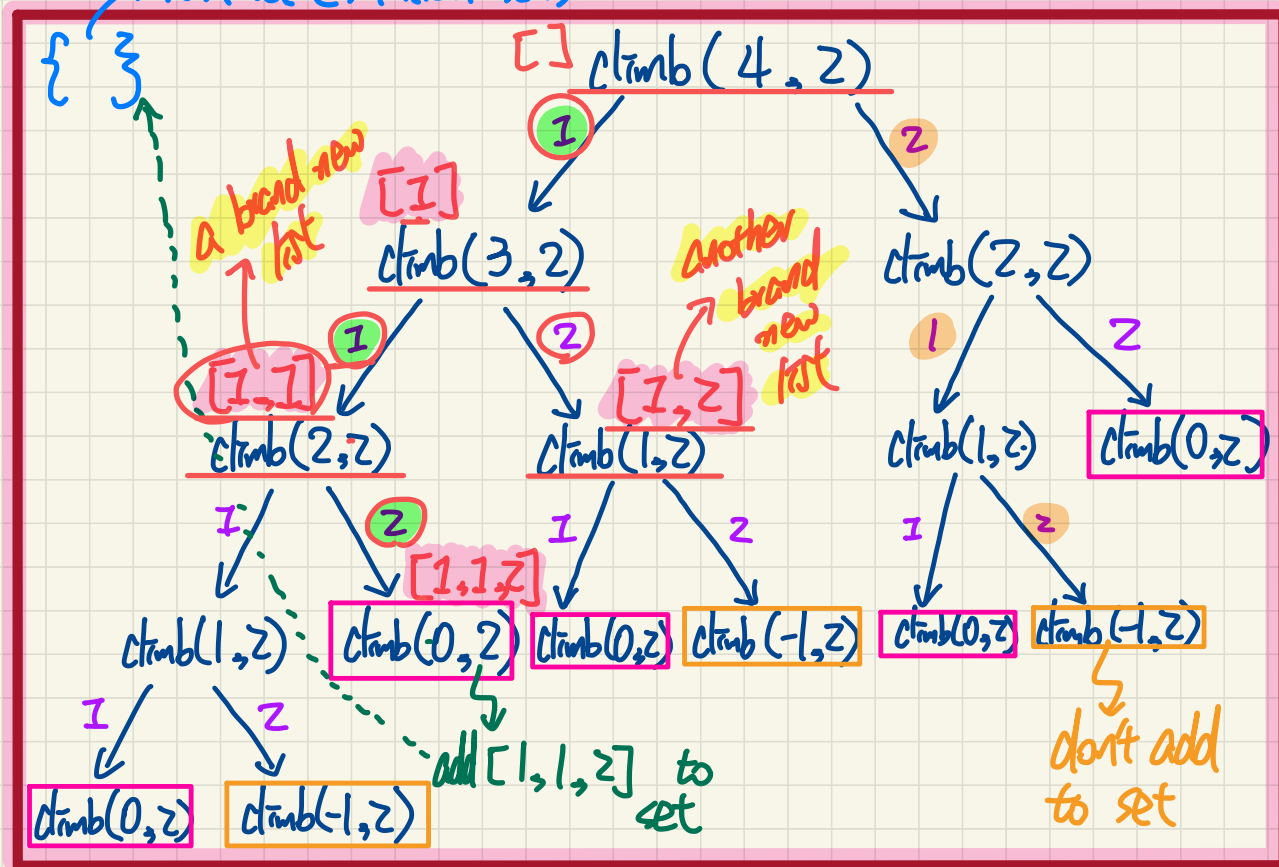
[2, 2] }

[1, 2, 2]

not a valid
strategy

Sketching climbStrategies(4, 2)

hash set (solution set)



Exercises

1. Study my solution.

2. Try alternatives

↳ Try different inputs e.g.

distinctPairs(10, 3)

↳ See what's return by my version

↳ Compare against output by your version