Technical Interview Prep

Presented by Career Services, ACSU

Fall 2018

Who we are

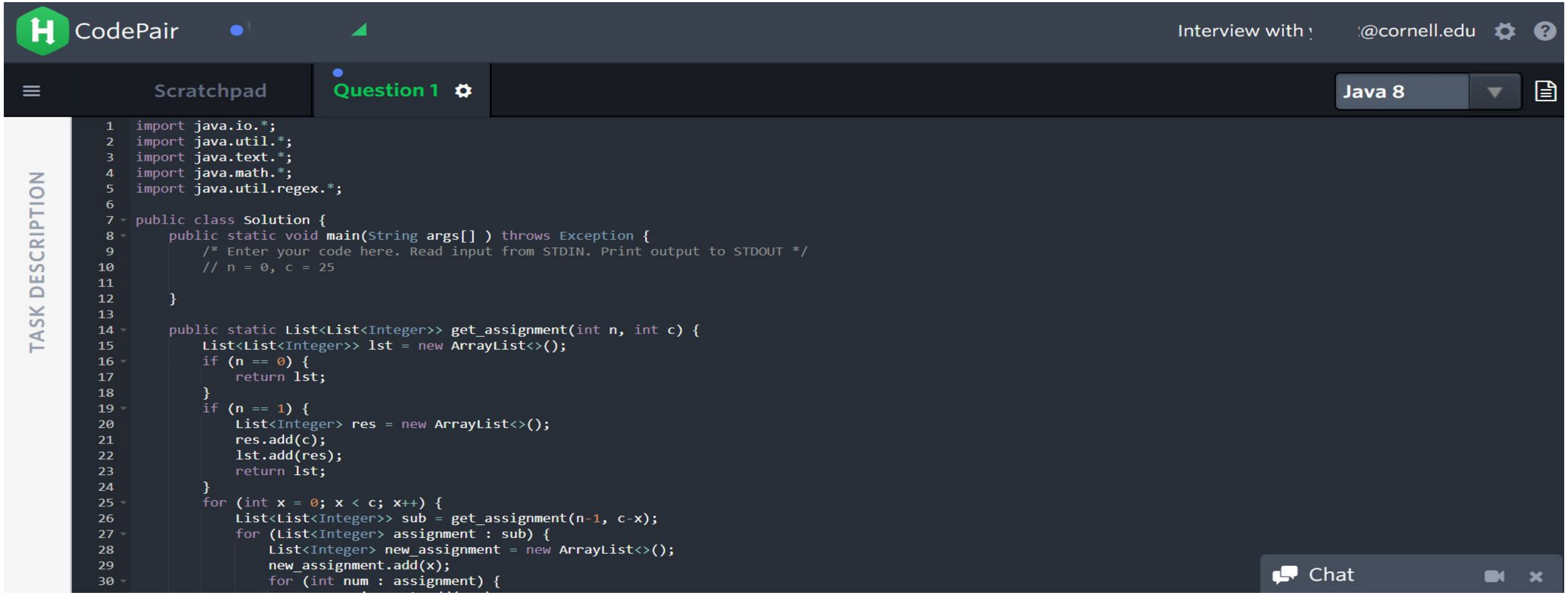
Rishi Bommasani - ACSU Academic Team

Yizhou Yu - ACSU Academic Team

Interview Overview

1. HackerRank Challenges:
    a. Standard questions testing coding proficiency, 30 minutes to 1 hour
2. Phone/Onsite:
    a. One-on-one setting, 45 minutes to 1 hour
    b. Handled using Google Doc/other 2-way text editor
    c. General structure:
        i. Introductions, glance over resume
        ii. One or more questions
        iii. Conclusion
3. After the Interview:
    a. Response within a week with information about further interviews/next steps

Text Editor UI



```java
import java.io.*;
import java.util.*;
import java.text.*;
import java.math.*;
import java.util.regex.*;

public class Solution {
    public static void main(String args[] ) throws Exception {
        /* Enter your code here. Read input from STDIN. Print output to STDOUT */
        // n = 0, c = 25

    }

    public static List<List<Integer>> get_assignment(int n, int c) {
        List<List<Integer>> lst = new ArrayList<>();
        if (n == 0) {
            return lst;
        }
        if (n == 1) {
            List<Integer> res = new ArrayList<>();
            res.add(c);
            lst.add(res);
            return lst;
        }
        for (int x = 0; x < c; x++) {
            List<List<Integer>> sub = get_assignment(n-1, c-x);
            for (List<Integer> assignment : sub) {
                List<Integer> new_assignment = new ArrayList<>();
                new_assignment.add(x);
                for (int num : assignment) {
```

Steps to approaching a coding question

1. Make sure that you **understand the question.** Go through a small **sample input / output** which can help you think about possible solutions.
2. **Ask follow-up questions!** What kind of data is being stored? How much data is there? Are there possible restrictions?
3. **Think out loud and keep talking.**These questions are not easy -- don't worry if you don't immediately know the answer.
4. **Working solution first.** You can always optimize later!
5. As soon as you're done with your code, come up with an **example** and **hand-test immediately.** This shows that you care about correctness.
6. After you get a solution, you're often given more restrictions and asked to **modify the problem.**

Question 1

Given an array of integers, find the maximal difference between any two elements, such the greater element comes later in the array.

Example

Ex1. Input: -1 4 24 -3 8 12 6 23 8 -10

Notice that neither the minimal or maximal element is used

Notice that we need not retain the pair used (assuming it is unique)

Solution 1: Brute-Force

Iterate over all pairs (2-loops)

```
def maxDiff(arr):
    arr_size = len(arr)
    max_diff = arr[1] - arr[0]

    for i in range(0, arr_size):
        for j in range(i+1, arr_size):
            if(arr[j] - arr[i] > max_diff):
                max_diff = arr[j] - arr[i]

    return max_diff
```

Solution 1

Runtime complexity: O(N^2)

Space complexity: O(1)

What is wrong with the above implementation?

Solution 2:

Maintain min seen thus far as well

```
def maxDiff(arr):
    arr_size = len(arr)
    max_diff = arr[1] - arr[0]
    min_element = arr[0]

    for i in range(1, arr_size):
        if (arr[i] - min_element > max_diff):
            max_diff = arr[i] - min_element

        if (arr[i] < min_element):
            min_element = arr[i]
    return max_diff
```

Solution 2

Runtime complexity: $O(N)$

Space complexity: $O(1)$

Question 2

Given a linked list, determine if it has a cycle in it.

Step 1

- Ask clarifying questions to understand the problem
- Work through simple examples

Step 2

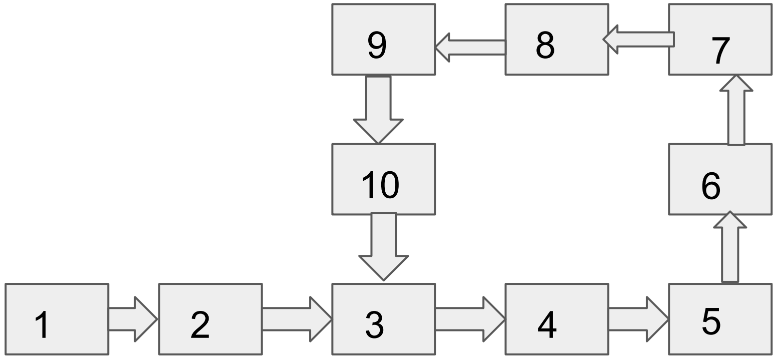
- Think out loud
- If you cannot come up with the best solution immediately: simple solution first. Optimize later
- Use more examples to understand the problem better

Step 3

- Start writing code
- Add helper functions, if necessary

```
class ListNode {
    int val;
    ListNode next;
    ListNode(int x) {
        val = x;
        next = null;
    }
}
```

Solution



```
public boolean hasCycle(ListNode head) {

          ListNode slow = head;

          ListNode fast = head;

          while (fast != null && fast.next != null) {

               slow = slow.next;

               fast = fast.next.next;

               if (slow == fast) {

                    return true;

               }

          }

          return false;

     }
```

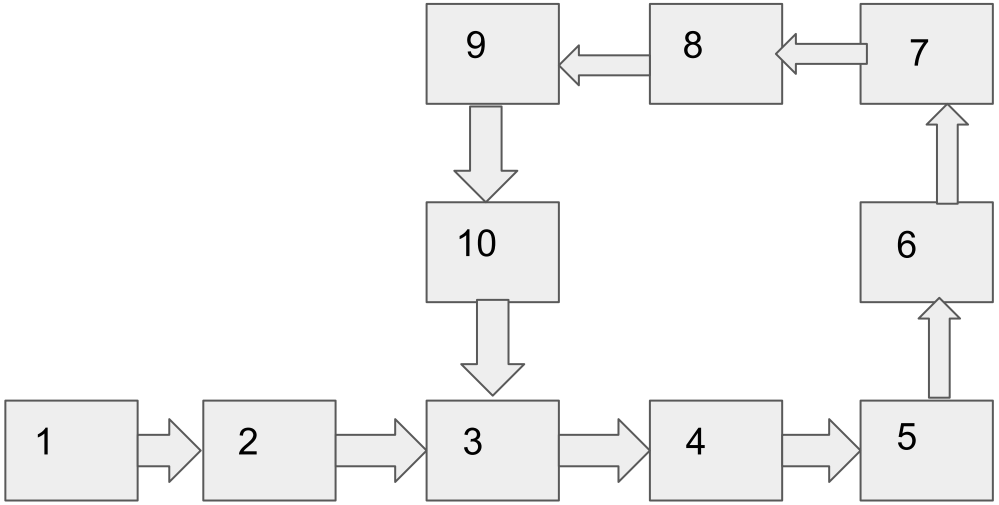
Step 4

- Consider corner cases
- Walk through code
- Time & Space Complexity
- Whether it is possible to optimize
- Maybe write some tests in main function

```
public boolean hasCycle(ListNode head) {

    ListNode slow = head;

    ListNode fast = head;

    while (fast != null && fast.next != null) {

        slow = slow.next;

        fast = fast.next.next;

        if (slow == fast) {

            return true;

        }

    }

    return false;

}
```

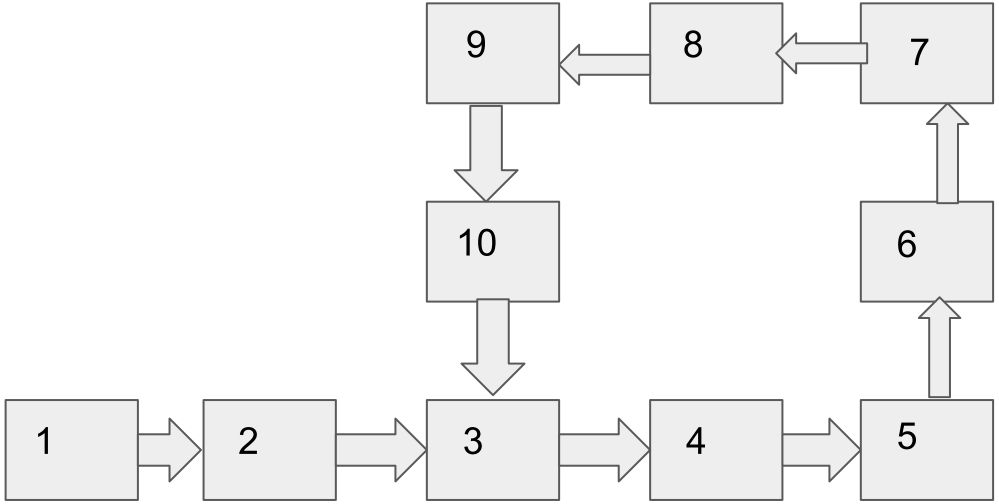
Question 2: Follow-up

Given a linked list, return the node where the cycle begins. If there is no cycle, return null.


1
2
3
4
5
6
7
8
9
10

```
public boolean hasCycle(ListNode head) {
        ListNode slow = head;
        ListNode fast = head;
        while (fast != null && fast.next != null) {
            slow = slow.next;
            fast = fast.next.next;
            if (slow == fast) {
                return true;
            }
        }
        return false;
    }
```

```
public ListNode detectCycle(ListNode head) {
        ListNode slow = head;
        ListNode fast = head;
        while (fast != null && fast.next != null) {
            slow = slow.next;
            fast = fast.next.next;
            if (slow == fast) {
                break;
            }
        }
        if (fast == null || fast.next == null) {
            return null;
        }
```



```
slow = head;

while (slow != fast) {

     slow = slow.next;

     fast = fast.next;

}

return fast;
```

Questions to ask the interviewer

- Which team are you on? What are you working on?
- What is your role at this company and how has your experience been?
- What do you like best about this company?
- Given this is a big company, how much impact do junior level engineer usually end up making to the whole product?
- How much importance do you guys give to innovation especially coming from junior people in the team?
- What are the next steps in the interview process?

Resources

- Glassdoor: Past interview questions, salary information, company reviews
- Google Style Guide: Python, Java, etc
- LeetCode/HackerRank: Practice interview questions
- Cracking the Coding Interview
- Practice with your peers!

Upcoming Events

- Interview Demo/Resume Critique (Thursday, August 30, 6:00-7:30, Gates G01)
- Mock Interviews (September 1-2, Gates Tutoring Rooms)
- Reading Groups (Wednesday, August 29, 5:00 - 5:30 Gates G01)
- Career Fair (Wednesday, September 5, Barton Hall)
- Internship-Panel (Monday, September 17th, 5:00 - 6:30 Gates G01)
- Join the ACSU Listserv! - https://acsu.cornell.edu/join.html
- Like us on Facebook!

Any questions?

Good luck with interviews!