How to prepare for a Software engineering interview

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what I learned from interviewing with Google, Facebook & Amazon

Agenda

- Motivation - Why should I prepare?
- My story / the process
- The Stages:
  - The Software Engineering Manager interview
  - The Coding interview
  - The System's design interview
- Quiz time!
- Next steps
- Questions

Motivation

Preparation >> Talent

Motivation

Anecdotally many Googlers
succeed after 3 or even 4 times

Motivation

Shoot for the moon and if you miss you will still be among the stars.

Les Brown

The processes

The Google process

Dear Thomas,

My name is _____ and I recruit for Google's EMEA engineering team.

I came across your details on LinkedIn and I noticed your experience with scalability and back-end development in C++.

We are actively recruiting for our engineering teams here in Google and ...

2016 August

Recruiter's call

Self evaluation

...

__Java

__Perl

__Go

__Shell Scripting (sh, Bash, ksh, csh)

Scale 0-10

8-10-reserved for those who are recognized industry experts in a field (i.e. wrote a book on the subject or invented it)
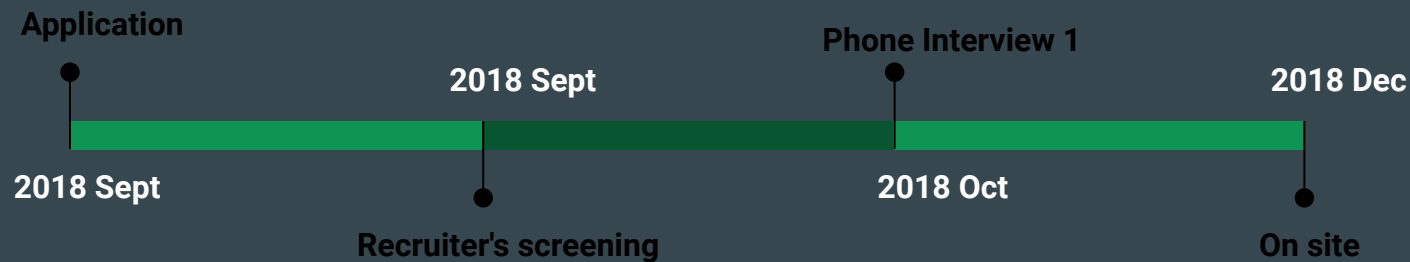
The Google interview process - Takeaways

- There are Coding interviews and only 1 System Design interview (on site)
- The final decision is taken by a "committee"
- The process can take a lot time
- They are very flexible with dates
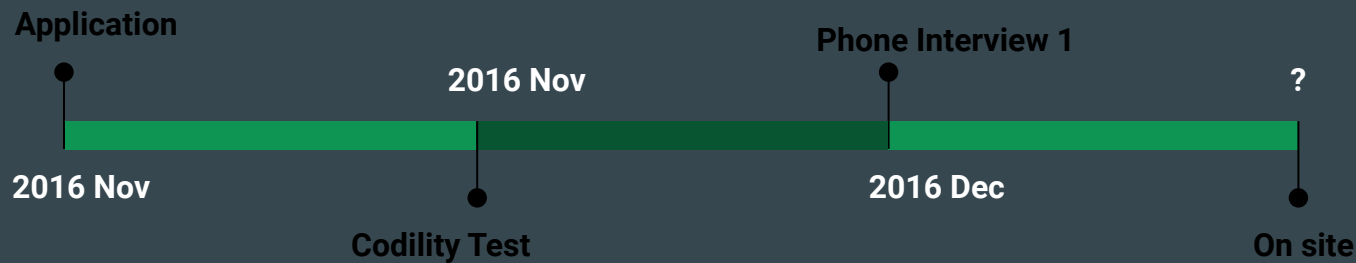
The Facebook interview process

FACEBOOK

Application

2018 Sept

Phone Interview 1

2018 Dec

2018 Sept

Recruiter's screening

2018 Oct

On site

The Facebook interview process - Takeaways

FACEBOOK

- Much more concise process than Google
- You are interviewed by a Software Engineering Manager
- You have to sign an NDA before the on site
- They are flexible with dates (but expect a shorter turnover)

The Amazon interview process

amazon.com

Application

Phone Interview 1

2016 Nov

?

2016 Nov

2016 Dec

Codility Test

On site

The Amazon interview process
Takeaways

amazon.com

- You may talk to a Software Engineering manager as part of the screening
- The Codility tests (timed automated tests) are extremely stressful
- Amazon has a very "strong" culture

The Interview stages

The Software Engineering manager interview

A.K.A.

The Behavioural interview

The "Tech Leadership" interview

The Software Engineering manager interview

Things you should exhibit:

- Good communication
- Continuous Improvement
- Conflict resolution
- Leadership
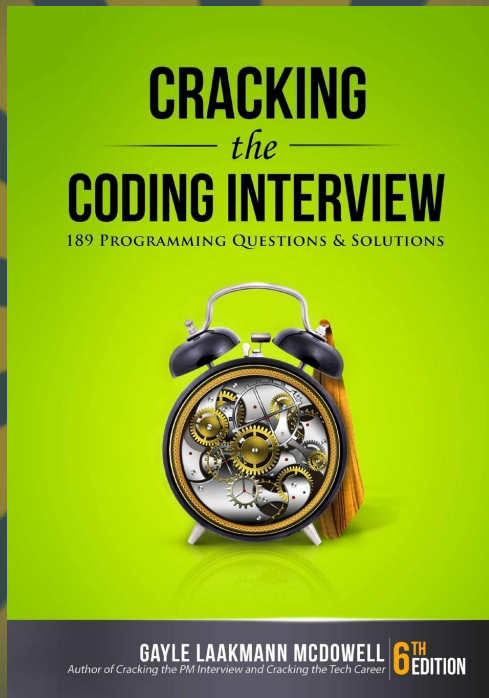- Ownership

The Software Engineering manager interview

- Most important not to raise any red flags
- You can think of your career and "self-reflect"
- Try to be precise: use the S.T.A.R. method
- Use metrics if you can
- Be genuine

The Coding Interview

The Coding Interview

- Optimal solution
- Bug free
- Come up with it fast

The Coding Interview - Preparation

The Coding Interview - Preparation

- Timed problem solving
  https://www.interviewbit.com/

  (or hackerrank etc.)

- Practice, practice, practice!
  https://www.pramp.com/

- Study (basic data structures, recursion, array/string manipulation, Time/space complexities)

The Coding Interview - During the interview

- Establish a Protocol:

  1. Questions ->

  2. Brute force ->

  3. Better solution ->

  4. Test ->

  5. Repeat steps 3 & 4

- Iterate fast - communicate your thought

- Double - triple check your code

- Show that you care about testing

The Coding Interview - Tips

- Recursion:
  ~~Dynamic programming~~ => Top down & Memoization

  Pass your state in the arguments

  You can infer the complexity of the recursive algorithm by the size of the memoization data structure

- Dijkstra
- Hash table is (almost) always a good idea
- Sorting might help too

The System Design interview

A.K.A:

- Non Abstract Large Scale Design

- The Technical Architecture discussion

___

The System Design interview

Design a real life System:
Type of storage, Load balancers, even db schemas and REST endpoints

The System Design interview

These type of interviews are intentionally vague:

a) Lead the discussion
b) Ask clarifying questions
c) Make assumptions
d) Specify functional requirements (see b)
e) Specify non-functional requirements (see c)

The System Design interview

Eg. Build an app like tinyurl

you have 50.000.000 monthly active users

50.000.000 active users -> Twice per month, colocated -> 3.333.333 req per day -> 150 req/sec -> ?? servers

The System Design interview

- Usually the differentiator for seniority
- Needs breadth and depth
- Dive deep into the things you know better

The System Design interview - things to consider

- Scalability in request handling
- Scalability in the data storage
- (almost) everything is a trade off
- Security

The System Design interview - tips

- Q. How can we store state externally?
- A. We can add a db (usually just a Postgres is fine).

The System Design interview - tips

- Q. How can we scale db reads?
- A. We can add more "slaves" - copies of the master db that are read only

The System Design interview - tips

- Q. How can we scale writes?
- A. We add sharding so that we store stuff in different machines.

  (check consistent hashing)

Quiz time!

Q: Which of the following compile/do not throw RTE ?

A.
```java
int[] array = {3, 4, 5, 10, 2, 9, 11, 1};
Integer i = array[0];
```
✔️

B.
```java
int[] arr = {12, 5, 3, 9};
List<Integer> i = Arrays.asList(arr);
```
❌

C.
```java
Integer[] arr = {12, 5, 3, 9};
List<Integer> list = Arrays.asList(arr);
list.add(1);
```
❌

Q: Which of the following statements are true?

A. `ArrayList<String>` is a subclass of `List<String>` ✔

B. `List<String>` is a subclass of `List<Object>` ✖

C. `String[]` is a subclass of `Object[]` ✔

Q: What will be returned?

```java
public static void main(String[] args) throws Exception {
    try {
        throw new Exception("try");
    }
    catch (Exception i) {
        return;
    }
    finally {
        throw new Exception("finally");
    }
}
```

A. Exception in thread "main" java.lang.Exception: try
B. No exception
C. Exception in thread "main" java.lang.Exception: finally

Q: Are the following true?

```
class parent {
    int a = 10;
}

class child extends parent {
    int a = 11;
}

child c = new child();
parent p = c;
```

A.   c.a == 11 ✔
B.   p.a == 11 ✘
C.   p == c ✔

Final Thoughts

Final Thoughts

- Probably the 1st time you will have the most chances
- If you do it once, there will be more
- Lately trend of "take-home" exercises
- Google >> all

⚠️ Disclaimer! ⚠️

- Might be outdated
- Eventually didn't succeed
- Check out what works for you

Where to next? - Useful material

Coding:

https://github.com/jwasham/coding-interview-university

General notes:

https://quizlet.com/gb/266236918/interviewing-questions-notes-flash-cards/

Advice from ex-Facebook engineer:

https://www.youtube.com/channel/UCcdCkJKXlRoXVD03eo-q8mQ

Where to next? - Useful material

System design:
https://www.youtube.com/watch?v=-W9F__D3oY4&t=1s
http://highscalability.com/blog/2012/4/5/big-data-counting-how-to-count-a-billion-distinct-objects-us.html
https://www.youtube.com/watch?v=UzLMhqg3_Wc

More coding:
https://www.geeksforgeeks.org/top-10-algorithms-in-interview-questions/

Computational complexity by MIT:
https://www.youtube.com/watch?v=UzLMhqg3_Wc

Where to next? - Go out there and apply!

- Google

https://careers.google.com/teams/

https://www.linkedin.com/in/maireadoleary/

- Facebook

https://www.facebook.com/careers/

https://www.linkedin.com/in/mariam-asif-b8658098

- Amazon

https://www.amazon.jobs/en/

Questions?

Thank you!