Coding Guide

Q. How do you learn how to code? Is it too late to start learning how to code in the 3rd year?

Nishant got the basics of coding in CS1100 (1st semester, programming in C) and CAD lab (3rd semester, programming in Python). For practice sites like SPOJ (Sphere online judge) and CodeChef are excellent. He learnt DSA (Data Structures and Algorithms) on SPOJ itself. There were weekly programming assignments on SPOJ in DSA.

One must learn coding on his own. The more you practice the better you become.

No, it's not too late to start learning how to code in the 3rd year. Nishant himself leant DSA in his 4th year (he is in dual degree, if one is in B.Tech you should learn before itself).

Q. What is the level of coding required in the placement tests? How do you prepare for them?

The written tests are 1 hour long involving general puzzles which require coding in C, C++ or Java. For example, in GS test, there was a question which stated that there is a matrix of 0s and 1s and you has to find clusters of 1s. A candidate should be adapt at recognizing recursive patterns. Questions need you to think hard, and they are easy only if you have solved those type of questions before and recognize the patterns.

Apart from coding you also need to know Graph theory, probability and obviously, DSA. For example, in Flipkart written test (which was very hard), there was a question in which you had to find cliques in the graph (based on graph theory). Knowledge of probability is a must. They ask very random questions, like some famous problems, such as the Noodle problem or Buffon's needle. And you need to know all the algorithms well. Questions on DSA are asked indirectly.

Q. Which programming languages are most preferred?

C, C++ and Java. No other languages are allowed in the written tests conducted by the companies. Companies prefer object-oriented languages (C++, Java).

Companies prefer C, C++ unless you're proficient in Java because they're slightly faster than Java. Java is easier to learn if you know it from earlier. And good command of C, C++ is needed, for example, knowledge of malloc and pointers. C++ is better than C in also the fact that it has better libraries, which makes the code easier and faster.

Q. What kind of programming questions are asked in interviews?

The candidate has to solve questions, mainly explaining the algorithms. Usually standard questions are only asked. The interviewer mainly looks for the thought structure while doing the question, data structures in the programs, complexity of the code.
To prepare a lot of practice must be done, like on CodeChef/ SPOJ, etc.

Q. Does apping help?

Apping really helps in placements. It is a good addition to your resume. You resume must be made using LaTeX. Also you must have your own website, so that the admission committees can look at the student's reports, projects, work done during college. It is good backup to placements. Although it can be slightly expensive.

Q. How would you rate companies in terms of placements?

Goldman Sachs is best in placements. It deals with investment banking and quantitative trading. In GS you need coding. Companies like Google, Microsoft look for students knowing C, C++. Sites like CodeChef ranks you on the basis of your coding skills. Most coding companies give a good weightage based on these rankings. However, for top-notch companies like Google, Microsoft only this won't help. They hire students from non-CS branches only if they are very impressed.

Among the finance companies, GS is best. Then would come companies like Nomura and then consulting companies (like Mackenzie investments, BCC). Consulting companies provide an exponential growth and lots of promotions, unlike coding companies where growth gets somewhat stagnant. Consultancy companies concentrate on PORs mainly.

Q. How do you learn how to code? Is it too late to start learning how to code in the 3rd year?

2 courses are a must. DSA (Data structures and algorithms), which he learnt from Coursera and Graph theory (Maths dept.). Coursera courses are really helpful as long as you have the patience to sit through the video lectures and do all the tutorials and assignments as per the schedule.
The best sites to practice coding and do tutorials are CodeChef, topcoder, SPOJ. Saketh also did a DSA course in IIT which was taken then by prof. Nitin C.

C++ is Saketh's preferred language because it has a lot of libraries. And you need to know hashing, sorting. All this can be learnt and practiced on CodeChef.

If you are interested you should take courses in Computer science as electives. For example, Saketh took Parallel Computer Architecture (main project was for 25marks and took the whole of 2 weeks to finish; demanding but good course). It involves coding in C++. Practice on CodeChef, SPOJ.

According to Saketh you should go for clubs within campus, like openCV, webOps, analytics irrespective of whichever language they are coding in, so as to stay in touch with coding. He made many small apps himself, and started a few small startups. For example, he and few of his friends started DineService which deals with the waiting list in restaurants. Another was that you can just scan the QR code and money would be automatically credited from your account, so as to avoid the hassle of paying every time. He also temporarily worked in old institute startups like clozerr and HyperVerge. He also did some small projects like chrome extensions, and made an app for himself called ChatBot. You should not lose touch in coding.

It's not too late in the 3rd year. In fact, it's never too late. Coding is not too hard. It just involves some logic and the way you code that matters.

Q. What is the level of coding required in the placement tests? How do you prepare for them?

For placements, the only programming languages allowed are C, C++ and Java.

In GS if you ace the test the interview is just a formality. The test is divided into 2 parts- the MCQs and the written test. The MCQs are asked from all over, including linear algebra, binary tree, even JEE questions (although they always have a twist). Companies like GS, American Express ask mostly small logic puzzles. You need to be strong in probability as well.

The GS written test was divided into 3 parts:

* Probability
* DSA
* Pure computer science stuff(operating system, databases)

He mainly attempted the 1st 2 parts. There were mostly logic questions. Only the algorithms are required with some pseudo code. For example, a snakes and ladders questions. You had to g=find the least number of steps to get to the top from the bottom square. The actual solution that they were looking for ways to convert the board into a graph, the blocks become nodes and snakes and ladders are connections (this involves some knowledge of DSA). Again the most important part was the thought process.

Placement typical questions involve string manipulation and questions found on sites like geekforgeeks.com. Coding companies outsource their papers, as in they themselves don't conduct the tests but instead send some other people to do it for them (who are not so knowledgeable in programming matters) so you have to prepare for them. Prepare for the tests in a streamlined manner.

Q. What kind of programming questions are asked in interviews?

Saketh was questioned in probability and DSA. His probability was not very good (though he knew the basics well and had learnt some concepts in courses like Analog communication) so he told the interviewer this, and consequently he got asked more questions in DSA. The interviewers look for your thought process more than the actual solution.

Q. How would you rate companies in terms of placements?

GS is the best. It involves good work and is the highest paying as well. Saketh's job is basically modelling risk management and sorting out liquidity problems.

Intel is a core job. Its profile also involves coding.

Amazon pays well but the work involved is very demanding. Its written test had only 1 problem (in C, C++ or Java).

Coding Previous Questions

Goldman Sachs

Describe your internship work.

Consider bit arrays of size 8. What is the probability that the number of consecutive 1s in the bit array is at most 2? Generalize to n bit array.

Given an integer array and a value k, find if there are two numbers in the array whose sum is k. What is the time and space complexity? Can you do it in constant space?

A jar has 99 fair coins and 1 coin whose outcome is always heads. Given a sequence of heads and tails, find the probability that it came from a fair coin.

You are given a dxd matrix of numbers in spiral form. The numbers are from 1 to d^2. Given d as input, write a program to find the sum of diagonal elements.

What is the expected outcome when you toss a die? You toss a die and after seeing the outcome, and you are told that you could toss it one more time if you want, with your aim being to maximize the expected outcome. Under what circumstances would you throw the die a second

time? Similarly, what if you are given three trials? If you get 1000 such trials, what would it be?

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Which of the following is greater : pi^e or e^pi?

Given that you start with N chocolates, and every time you pick a random number of them (uniformly over the remaining), how many attempts on average are required to complete all the chocolates?

What is the expected number of trials to see 5 consecutive heads?

Given a graph, find whether it has a 3 cycle.

X and Z are two random variables. Compare (E[XZ])(E[XZ]) with E[X]E[X*(Z^2)]

You have n chocolates. You eat k chocolates at each turn ( k being equally distributed between 1 and x where x is remaining number of chocolates). Find expected number of turns it will take to finish all the chocolates.

In a square of side 2, insert 5 points. Find the upper limit on the minimum of the distances between any two points.

Given N open ended threads, you randomly pick up two free ends and tie them. Repeat the process. What is the expected number of loops formed at the end.

Given a matrix with 1s and 0s, give an algorithm to find locations and dimensions of all the rectangular matrices with all 1s in it. (part of a bigger problem)
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Given 5 envelopes and 5 letters corresponding to each envelope. You randomly insert letters into randomly selected envelopes(1 letter in 1 envelope). Find probability that at least one letter goes into the right envelope.

Two friends decide to meet between say 1pm and 2pm. Person who comes early will wait for at-most 15 mins. Both the friends arrive at random time between given 1 hr slot. What is the probability that they meet?

Given N ants on N corners of N-sided polygon. If the ants choose a random direction and start walking along the edge, what is the probability of no collision?

If you have RAM of 100Mb and memory of 1GB. Sort a file of size 1GB. (Algo)

Given an array of size N, find the longest increasing subsequence or contiguous sequence with maximum sum? Now do the same for matrix of size NxN.

http://www.geeksforgeeks.org/find-minimum-element-in-a-sorted-and-rotated-array/

Generalized version of : http://possiblywrong.wordpress.com/2011/06/27/unlocking-boxes-a-prisoner-puzzle-variant/

Problem similar to: http://en.wikipedia.org/wiki/Derangement

Given n letters and n addresses, what are the number of ways in which you can post the letters such that none of them reaches the correct address.

Questions on my Projects.

Amazon

http://www.geeksforgeeks.org/convert-an-arbitrary-binary-tree-to-a-tree-that-holds-children-sum-property/

Max overlap of ranges. (Given arrival and departure time of trains, minimum number of platforms needed)

Merge overlapping ranges.

Given a grid filled with 0s and 1s, cover all the 0s with 2x1 tiles, tell if it's possible and give the arrangement.

http://www.geeksforgeeks.org/write-a-function-to-get-the-intersection-point-of-two-linked-lists/

Variation of LIS: Given a list of people and compatibility criteria, tell what's the maximum number of people you can invite to a party such that everyone is compatible.

Finding Hamiltonian path in a graph.

Convert a given integer to its Roman representation.

Given an array of 1s and 0s, tell the size of maximum subarray which contains equal number of 0s and 1s.

Find out whether a doubly linked list is corrupted at some point or not. Give best possible solution.

Given an unsorted array, find Kth minimum element. Optimise(O(N) avg case algo). Write the code(proper code in language of your choice).

Cisco (Software Developer - day 3.2):

Why would you like to join Cisco?

There are eight coins, all identical in appearance. One of them is a fake. It either weighs less than, or more than a real coin, but you don't know which is it--less or more. Devise a procedure to identify the counterfeit in minimum weighings with a balance. (see: http://www.cut-the-knot.org/blue/weight3.shtml , http://www.cut-the-knot.org/blue/EightCoins.shtml, .. at the end there is a list of 13 weighing puzzles !)

What is an IP address? What is IPv4? Do you know how are IP addresses assigned? Why is IPv6 relevant these days? (ans: because IPv4 address space has been used up!)

A simplified routing table looks like:

destination ip	forward to following ip
10.23.0.0	<some-random-ip>
10.23.1.2	<some-random-ip>
10.23.14.56	<some-random-ip>
20.13.41.56	<some-random-ip>

Given that: if the ip destination ip is 10.23.1.2, it matches it to row two, if the ip is 10.23.14.56, it matches to row three, but if the ip is 10.23.29.124, it matches the first row becasue the last two zeros (0.0) actually imply “don’t cares”.

Say another routing table looks like:

incoming data value embedded in header	route to socket
‘abcdef’	23
‘asdfg’	7000
‘mlosd’	3128

Given the two formats of tables which might be present inside a switch/hub/router, what data structures would you use for both of them, so that look-up time is optimal. And state the time complexity for your solution.

[Ans: you use a tree like structure for the first table (the tree will always be four level deep (each of the four parts of an ip is a node)), while a hash table (since the first column is a string) for the second one. (once hashed, the look-up is O(1))]

Have you done any networking courses?

Went into deep detail about my internship. Had worked on Natural language processing and Machine Learning.

How do you implement division in a binary logic based processor?

What is an instruction set? Have you worked on microprocessors? Define “microprocessor”. What is the major difference between different instruction sets [Ans: RISC vs CISC].

You seem to know Python & C. Why would you choose one over the other? [Ans: Python is an interpreted language while C is a statically compiled language. Il’l use Python when I need to do rapid prototyping of an idea. I’ll use C when I want speed and more fine grained controls over the memory.]

What book other than textbook have you read recently?

(my project) You seem to have worked on processors. What is five-stage pipeline.? Explain in detail. Try to now implement a pipeline to do parallel work.

How will you go about identifying whether a transaction is fraudulent or not if you see a credit card transaction? Some information about the customer like age, whether he travels frequently or not, his transaction history etc is given.

If you want to open a coffee shop, how will you decide a location?

Bayes theorem Application, similar to this: https://www.math.hmc.edu/funfacts/ffiles/30002.6.shtml

Describe one project you are most proud of.

Questions on Resume

Nomura (Risk Analyst - day 1.2):

Given the joint pdf, find whether the individual events are independent.

Gave a lot of problems on Taylor Series expansion, prove chain rule using this.

Given ranges of x, y, find the double integral over a given area specified by some curves. (One of the interviewers left the room after he saw that I made a mistake of taking x = 1 on the wrong axis :P) Other guy waited until I realized it and I thankfully corrected it.

Basic DSA questions on stacks, queues, implementation.

LU decomposition to solve a system of linear equations.

X, Y, Z are random variables, and corr(X, Y) = 0.8, corr(X, Z) = 0.8, find min{corr(Y, Z)} and max{corr(Y, Z)} [You've to think of correlation coefficient as dot product.]

Given a normal distribution, find E(X|X>0).

How would you generate a random variable?

Dijkstra's algorithm (find shortest path between two nodes in a given graph).

If you badly screwed up if a project, and the deadline is in a couple of days, what would you do? How would you handle that situation?

Housing.com

Given a binary tree print the sum tree. basically sum the nodes as you do BFS or level order traversal of the tree.

Given an array with n+1 number with single number repeated twice, find the number. Also find the number if the size of array is of order 10GB.

Sort a stack (was asked twice in a day!)
http://www.careercup.com/question?id=3003

Implement a queue using two stacks. Also variations of this what if initially stacks are non empty. Test all edge cases. I implemented it by making the push operations costly. Asked can you do it any other way. Implemented it by making pop operations costly.

I mentioned about SQL in my resume. Was drilled on SQL queries. They expected you to have perfect knowledge of whatever is mentioned in the resume.

Was asked to implement a python function which takes a string as an input as return true if the string can be segmented of which some or all segments existed in a given unknown dictionary. I gave a O(n^2) approach first for finding all the substrings of the array and then do the lookup in the dictionary, but later refined it to O(nlogn) using suffix array. He was not exactly convinced but said I was on track. Never got to know the correct approach.

Find whether two linked lists end up merging or not. I yes, find the intersection point.

Given and array a and number k , find how many possible combinations a[i]+a[j]=k are possible.

Finally I would like to add that resume and what you write in it do matter. They asked a few standard puzzles like 3,4,5 litre bucket, 25

horses puzzle, power of 6 in 100!, but companies like Housing are looking for people excellent in DSA and programming. Know you data structures inside out, it helps. Also be precise in your answer don't beat around the bush.

P.S. I didn't get any offer from them, but I went through all the rounds so know this stuff. Cheers.

Citrix

Design a Peer-to Peer sharing network like torrent. What all parameters would you like to consider. Interviewer was helping me whenever I got struck.

You want to retrieve data about cricket players. Search string will be name. Also, we want first players having first 10/10000 hits. What data structures will you use to store data ?

Tell about the projects you have done.

Citicorp - Pune

Technical Round

Tell me about yourself

What is the difference between 32 bit and 64 bit OS?

Why do we need 64 bit OS?

Memory Leakage

Do you know about databases?

Different data structures

Swap two numbers without third variable

Swap 3 numbers without another extra variable - a,b,c should be c,a,b

Some basic logical questions

Why should we choose you when there are people who have done CS for 4/5/6 years?

What motivates you?

Questions on resume.

Questions on project.

a. What is pdf and CDF. Explain in layman terms.

b. Explain PCA in layman terms.

c. What is hypothesis testing?

What is the scope of your DDP.

Number of handshakes in a room.
http://www.algebra.com/algebra/homework/Permutations/Permutations.faq.question.452441.html

What is Operator overloading, Function Overloading, Polymorphism?

What is Encapsulation?

What are friend functions?

eBay

Technical Round - 1

Tell me about yourself

Given two stacks, how will you implement a queue?

Given a set of numbers, write an efficient program to find out pythogran triplets

Technical Round - 2

Given a binary tree, write a simple program to sort those numbers in descending order

Write a simple program to find the missing number out of first 10 integers, 9 numbers are given to you

Knowledge of OOPS is must along with C++/Java

What do you mean by simple and efficient program?

Honeywell

Technical Round

Tell me about yourself

How can your projects be useful in real world

Resume based questions

How well do you know programming?

Explain in detail about your project

Write a program in assembly language implement a queue

In which programming language or software are you having expertise? Why do you choose that?

Compare JAVA with other languages

How comfortable are you in embedded programming?

Ola Cabs

Merge sort algorithm . I was asked to write the entire C code on paper.

How to find out the middle element in a linked list .

2-3 puzzles in the second round of the interview.

If you are given an offer from oracle and ola cabs, which one do you choose.

1. http://www.geeksforgeeks.org
2. https://www.hackerrank.com/
3. https://www.codechef.com
4. Intro to Algorithms by THOMAS H. CORMAN
5. Digital Systems by Morris Mano

6. Basics of Elec courses like DSP, filters, analog circuit books
7. Programs in online judge coding platforms
8. GeeksQuiz.com (for objective)
9. DSA course notes
10. Online puzzles and puzzle books
11. http://www.tutorialspoint.com//
12. http://www.cplusplus.com/
13. Test your C skills by Yashavant – ebook from http://www.bookfi.org
14. Coding interview Questions by Narasimha Karumanchi