CP- EITC

Lecture 0

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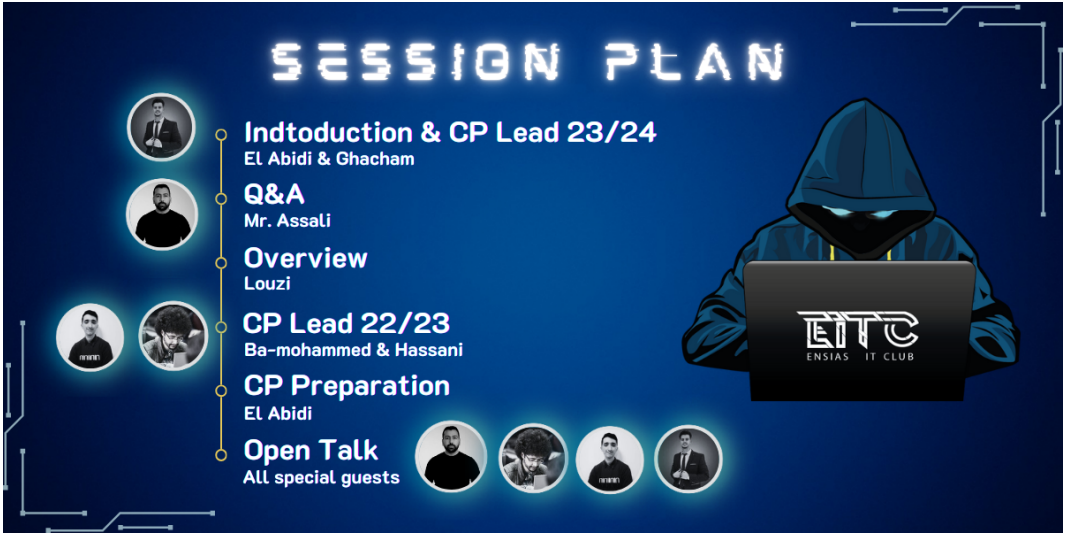
Introduction to Competitive Programming

November, 2024


SESSION PLAN
Indtoduction & CP Lead 23/24
El Abidi & Ghacham
Q&A
Mr. Assali
Overview
Louzi
CP Lead 22/23
Ba-mohammed & Hassani
CP Preparation
El Abidi
Open Talk
All special guests
EITC
ENSIAS IT CLUB

What is Competitive Programming?

Definiton:

Competitive Programming is a **mental sport** that challenges you to solve coding problems within specific constraints. It's an excellent way to refine your **analytical and logical thinking** while improving your **coding skills**. Participants compete to solve problems efficiently, often within tight time and memory limits.

What is Competitive Programming?

Definiton:

Competitive programming combines two topics: the design of algorithms and the implementation of algorithms.

- **The design of algorithms :** Involves solving problems creatively and efficiently, using mathematical or logical thinking and established techniques.
  Typically, a solution to a problem is a combination of well-known techniques and new insights.
- **The implementation of algorithms :** requires good programming skills. In competitive programming, the solutions are graded by testing an implemented algorithm using a set of test cases. Thus, it is not enough that the idea of the algorithm is correct, but the implementation also has to be correct.

Programming languages :

Currently, C++, Python, and Java are the most popular programming languages in contests. For instance, in Google Code Jam 2017, 79% of the top 3,000 participants used C++, 16% used Python, and 8% used Java, with some participants using multiple languages. C++ is often considered the best choice for competitive programming due to its efficiency and the extensive collection of data structures and algorithms available in its standard library.

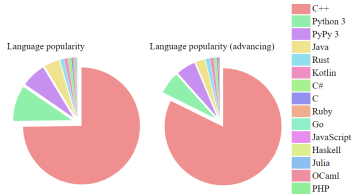


Figure 1: Google Code Jam - Round 2 2022 language statistics

Programming languages :

Language	Strengths	Weaknesses
C	Fast, fine control over memory management (e.g., pointers, dynamic allocation), lightweight	No built-in data structures, verbose, error-prone manual memory management
C++	Fast, STL provides powerful data structures, Object-oriented and generic programming, Wide community support	Manual memory management, Longer learning curve
Java	Strong libraries, cross-platform, Automatic memory management (garbage collection), strong typing	Slower than C/C++, verbose, higher memory consumption
Python	Easy to learn, rich libraries, dynamic typing, rapid development	Slow execution, higher memory usage, lacks fine control over memory

Why Should You Do Competitive Programming?

Advantages of Competitive Programming :

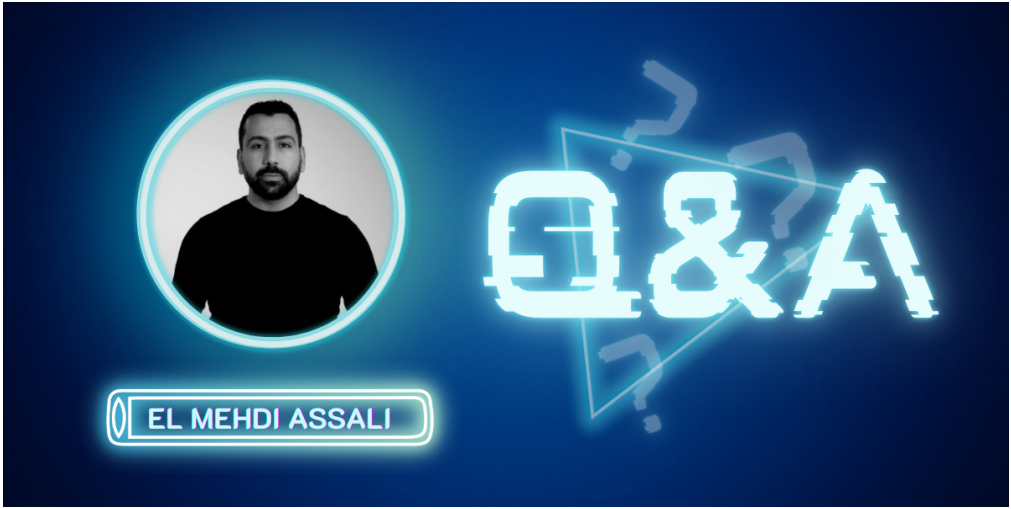
- **Mental Agility and Quick Thinking :**
  By practicing CP, you start thinking quickly and within the given timeframe and this improves your mental agility and helps enhance your thinking ability.
- **Learning Opportunity :**
  In Competitive programming, we get a wide range of variety of problems and various arithmetic concepts, data structures and algorithms.
- **Personal Growth as a Programmer :**
  It helps you get a command over problem-solving, as you ha ve to solve challenging problems within a time limit.
- **Networking :**
  Participating in various coding contests gives you a chance to be a part of communities with like-minded people.

Why Should You Do Competitive Programming?

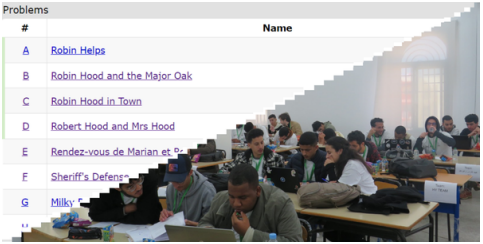
Career Prospect :

Competitive programming is very important when it comes to technical interviews for software engineering-related jobs. Many tech giants use competitive programming contests as a medium of recruitment. Companies like Google, Oracle, Meta, etc. have technical interviews based on competitive programming problems.

Figure 2: Top companies that hire Interns through CP

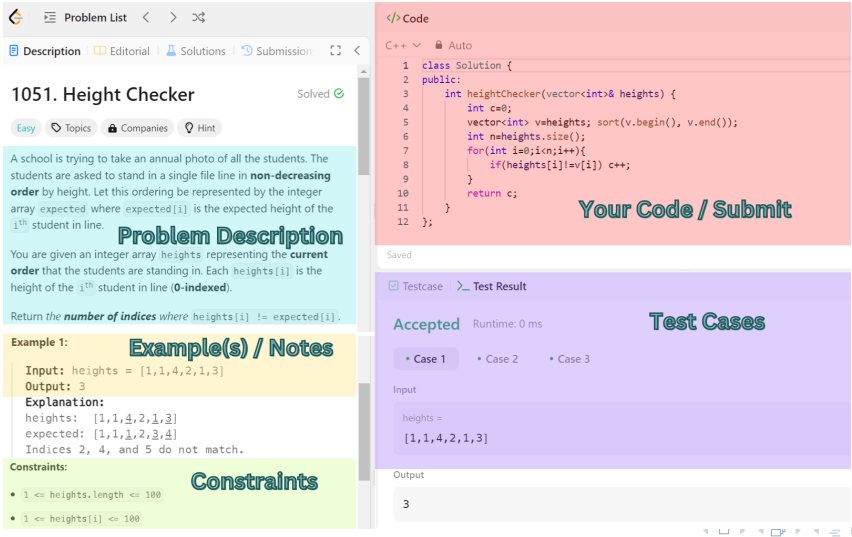

Q&A
EL MEHDI ASSALI

Contest



- A contest typically lasts several hours and consists of multiple problems.
- Each problem requires submission of code to a grader after completion.
- The grader checks the program's output against a set of predetermined test cases.
- Each problem has specific time and memory limits that the program must meet.
- Grading varies between contests; sometimes there is partial credit for passing some cases, while other times grading is all-or-nothing.

CP Problem - LeetCode



CP Problem - CodeForces

A. Stair, Peak, or Neither?

time limit per test: 1 second
memory limit per test: 256 megabytes

You are given three digits a, b, and c. Determine whether they form a stair, a peak, or neither.

- A *stair* satisfies the condition $a < b < c$.
- A *peak* satisfies the condition $a < b > c$.

Input

The first line contains a single integer t ($1 \le t \le 1000$) — the number of test cases.

The only line of each test case contains three digits a, b, c ($0 \le a, b, c \le 9$).

Output

For each test case, output "`STAIR`" if the digits form a stair, "`PEAK`" if the digits form a peak, and "`NONE`" otherwise (output the strings without quotes).

Example

input Copy

```
7
1 2 3
3 2 1
1 5 3
3 4 1
0 0 0
4 1 7
4 5 7
```

output Copy

```
STAIR
NONE
PEAK
PEAK
NONE
NONE
STAIR
```

Competitions

ENSIAS - ITHOLIC :

Competitions

INPT - JNJD :

Competitions

INSEA - GAME OF CODES :

MNPC


MNPC
2023
OVER 50,000DHS IN CASH PRIZES
AWAIT MNPC2023 VICTORS!
ALONG WITH BRAGGING RIGHTS, THE WINNERS WILL TAKE HOME
HEFTY CHEQUE REWARDS :
1ST PLACE 30.000 DHS
2ND PLACE 15.000 DHS
3RD PLACE 9.000 DHS
WHICH AMBITIOUS TEAM WILL CLAIM THE VICTOR'S CHEQUE THIS EDITION?
THE COUNTDOWN IS ON TO THE EXCITING SHOWDOWN!
CHAMPIONS
UM6P
macs

Would You Lose?

Where to train and compete online?

Some Resources:

- USACO GUIDE
- Geeks For Geeks
- W3schools
- Competitive Programmer's Handbook (CPH) - Antti Laaksonen
- The CSES problemset (now at 300 problems)
- 200+ Solutions in C++ (superj6)

Discovering Codeforces :

History of Codeforces

Codeforces is a website that hosts competitive programming contests. It is maintained by a group of competitive programmers from ITMO University led by Mikhail Mirzayanov.
As of 2018, it has over 600,000 registered users. It is available in Russian and English.

Figure 3: Mikhail Mirzayanov

Discovering Codeforces :

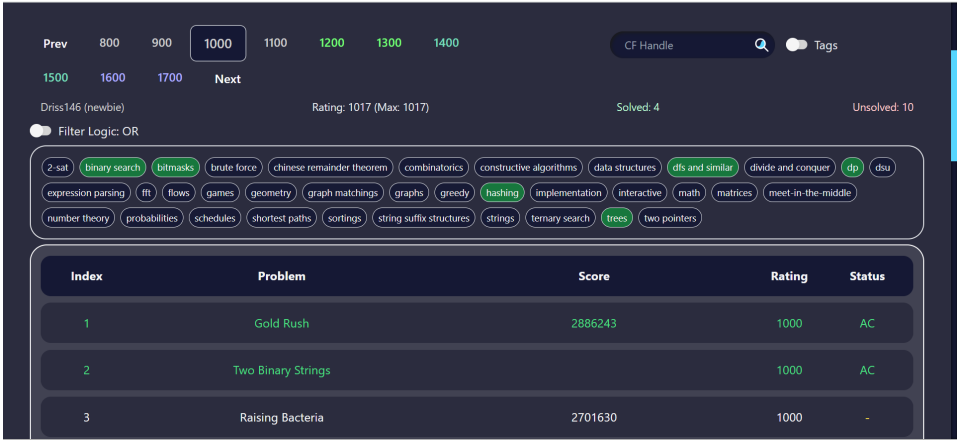
Rating range	Title	Division
≥ 3000	Legendary Grandmaster	1
2600 — 2999	International Grandmaster	1
2400 — 2599	Grandmaster	1
2300 — 2399	International Master	1
2100 — 2299	Master	1
1900 — 2099	Candidate Master	1/2
1600 — 1899	Expert	2
1400 — 1599	Specialist	2/3
1200 — 1399	Pupil	2/3/4
≤ 1199	Newbie	2/3/4

Codeforces rating system	Problems you need to solve consistently
Pupil:	Div2 A & B
Specialist:	Div2 C
Expert:	Div2 C & D
Candidate Master:	Div2 D & E or Div1 A & B
Master:	Div1 B & C
Grandmaster:	Div1 C

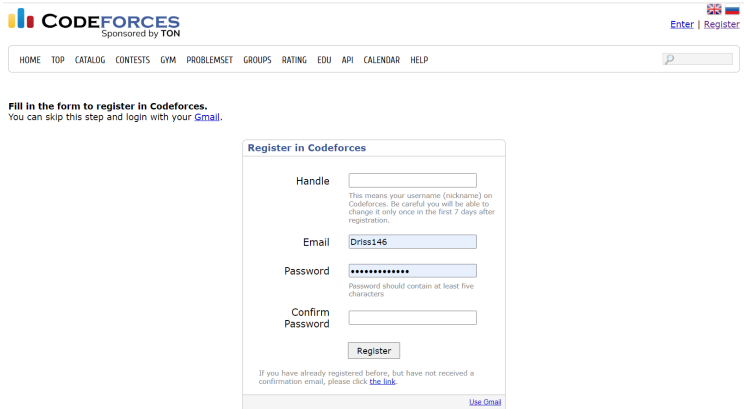
Figure 4: Codeforces rating system

A Code Daily website

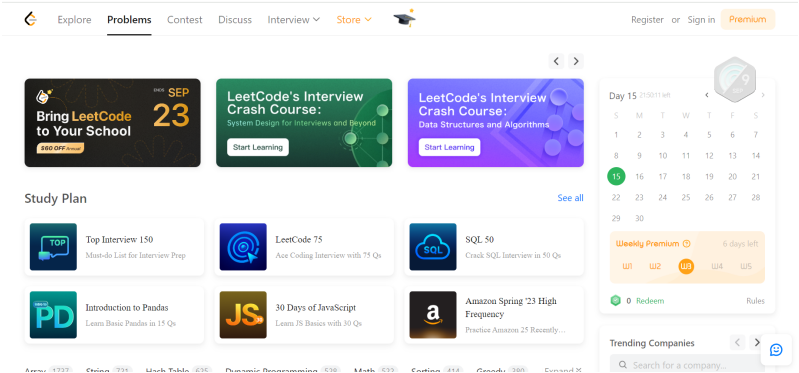
acodedaily.com



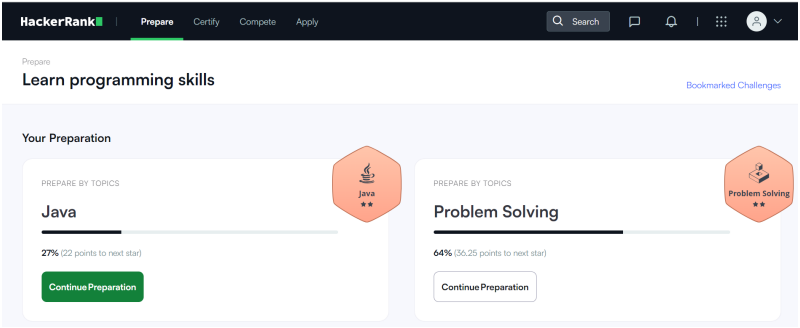
CodeForces


CODEFORCES
Sponsored by TON
Enter | Register
HOME TOP CATALOG CONTESTS GYM PROBLEMSET GROUPS RATING EDU API CALENDAR HELP
Fill in the form to register in Codeforces.
You can skip this step and login with your Gmail.
Register in Codeforces
Handle
This means your username (nickname) on Codeforces. Be careful you will be able to change it only once in the first 7 days after registration.
Email
Driss146
Password
Password should contain at least five characters
Confirm Password
Register
If you have already registered before, but have not received a confirmation email, please click the link.
Use Gmail

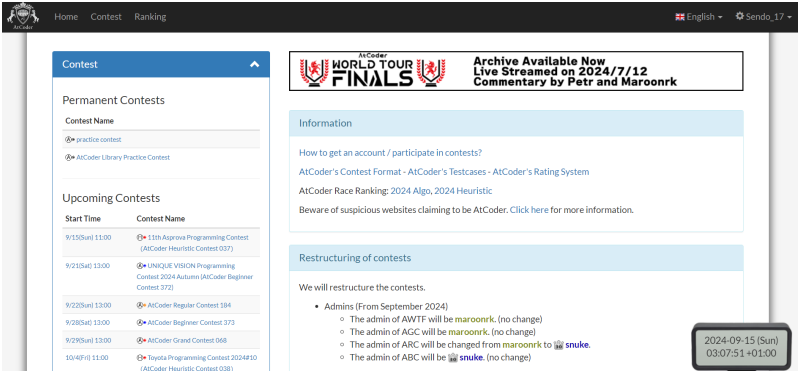
LeetCode


Explore
Problems
Contest
Discuss
Interview
Store
Register or Sign in
Premium
Bring LeetCode to Your School
SEP 23
$60 OFF Annual
LeetCode's Interview Crash Course:
System Design for Interviews and Beyond
Start Learning
LeetCode's Interview Crash Course:
Data Structures and Algorithms
Start Learning
Day 15
Study Plan
See all
Top Interview 150
Must-do List for Interview Prep
LeetCode 75
Ace Coding Interview with 75 Qs
SQL 50
Crack SQL Interview in 50 Qs
Introduction to Pandas
Learn Basic Pandas in 15 Qs
30 Days of JavaScript
Learn JS Basics with 30 Qs
Amazon Spring '23 High Frequency
Practice Amazon 25 Recently...
Weekly Premium
6 days left
Redeem
Rules
Trending Companies
Search for a company...

HackerRank


HackerRank
Prepare
Certify
Compete
Apply
Search
Prepare
Learn programming skills
Bookmarked Challenges
Your Preparation
PREPARE BY TOPICS
Java
Java
27% (22 points to next star)
Continue Preparation
PREPARE BY TOPICS
Problem Solving
Problem Solving
64% (36.25 points to next star)
Continue Preparation

AtCoder


Home
Contest
Ranking
English
Sendo_17
Contest
Permanent Contests
Contest Name
practice contest
AtCoder Library Practice Contest
Upcoming Contests
Start Time
Contest Name
9/15(Sun) 11:00
11th Asprova Programming Contest (AtCoder Heuristic Contest 037)
9/21(Sat) 13:00
UNIQUE VISION Programming Contest 2024 Autumn (AtCoder Beginner Contest 372)
9/22(Sun) 13:00
AtCoder Regular Contest 184
9/28(Sat) 13:00
AtCoder Beginner Contest 373
9/29(Sun) 13:00
AtCoder Grand Contest 068
10/4(Fri) 11:00
Toyota Programming Contest 2024#10 (AtCoder Heuristic Contest 038)
AtCoder WORLD TOUR FINALS
Archive Available Now
Live Streamed on 2024/7/12
Commentary by Petr and Maroonrk
Information
How to get an account / participate in contests?
AtCoder's Contest Format - AtCoder's Testcases - AtCoder's Rating System
AtCoder Race Ranking: 2024 Algo, 2024 Heuristic
Beware of suspicious websites claiming to be AtCoder. Click here for more information.
Restructuring of contests
We will restructure the contests.
Admins (From September 2024)
The admin of AWTF will be maroonrk. (no change)
The admin of AGC will be maroonrk. (no change)
The admin of ARC will be changed from maroonrk to snuke.
The admin of ABC will be snuke. (no change)
2024-09-15 (Sun)
03:07:51 +01:00


OPEN TALK
ABOUT CP
EITC

Thank you for listening !

Idriss El Abidi
Souhail Louzi

Special thanks to the former CP leads:
Hamza BA-MOHAMMED, Hachim Hassani Lahsinui and mohamed ghacham amrani
for their insightful review and precious remarks.