Senior Computer Team Orientation

SCT Officers

September 2022

1 Introduction

Welcome to Senior Computer Team, one of the coolest computer science clubs at TJ! We meet every Friday A block to learn algorithms and data structures and improve our problem solving skills via programming. Our focus is on the USA Computing Olympiad (USACO), but we also attend many other college competitions throughout the year. We look forward to having a great, fun year as a team!

- Sponsor: Dr. Yilmaz

- Captain: Kevin Shan

- Co-Captains: Arnav Jain, Taein Kim

- Webmaster: Karthik Bhargav

- Statistician: Kaitlyn Lu

2 Schedule

SCT usually meets Friday A block (consider joining ICT, which meets B block). A typical block will include a lecture on a selected competitive programming topic. Every few meetings, we will have an in-house contest, which will give members a chance to practice the material taught. For a more in-depth schedule, go to https://activities.tjhsst.edu/sct/schedule, and for more information visit https://activities.tjhsst.edu/sct.

3 Contests

3.1 In-house Contests

In-house contests will be one of the most important ways to learn in SCT. We plan to have six to eight in-house contests this year on specific skills to show students weaknesses and strengths of their algorithmic programming knowledge. Each in-house contest's format will be released before each contest.

In-house contests will determine placement in our new rating system this year! Those who do well on in-houses will be selected to represent SCT in various travel competitions.

3.2 USACO

USACO, the most popular and prestigious computing contest for high schoolers in the US, is administered online through four contests in December, January, February, and ending with an US Open in March. There are four divisions: Bronze, Silver, Gold, and Platinum. Everyone starts out in the Bronze Division and top competitors are selected for USACO camp. We highly recommend everyone to do this as much of our material overlaps with it, and one can get a lot out of the contests.

3.3 Travel/Additional Contests

We also participate in a variety of other contests. Teams will be selected for UVA HSPC and VCU HSPC, which will be travel contests. Note that these contests may take place during the school day. Each contest is formatted ACM-style, with the winners solving the most problems and ties broken by time. Additional contests (most of which are held online) include:

- Google Code Jam

- Google Kickstart

- Meta Hacker Cup

- MBit

- VTech HSPC

- Stanford PROCO

- LIT

- CMIMC

- PClassic

- UCF HSPC

4 TJIOI

This year, TJIOI will be happening **in the summer** (around the end of school) so we will be needing your help making the event a success! We will be creating our own grading system and website, which will require lots of help Look in the near future for updates regarding:

- Website and server design

- Problem writing and organization

- Testing

- Contest-day help

If you want to help with TJIOI, please ask/message an officer ASAP!

5 Topics

The main focus of the lectures is to help students promote to the Gold and Platinum divisions of USACO, respectively. We plan to cover all of the commonly seen topics for those two divisions before the first contest in December. After that, we will cover more advanced, Platinum-level topics. Common USACO topics:

- Silver

  - Math and Combinatorics
  - Bitwise Operators and Bitmasks
  - Prefix Sums
  - Greedy Algorithms

- Gold

  - Dynamic Programming
  - Graphs (Djikstra's, Disjoint Set Union, Minimum Spanning Tree)
  - Fenwick Trees
  - Segment Trees

- Platinum

  - Advanced Dynamic Programming
  - Advanced Segment Trees and Ranged Queries
  - Computational Geometry
  - Convex Hull
  - Tree Decomposition

6 Changes

This year, we are implementing a few changes compared to last year's SCT club.

- We plan to attend more travel contests this year to give more people an opportunity to attend these contests. In the near future, we will be releasing a list of nearby contests (within a four-hour drive of TJ). In-house contest performance will be used in a rating system, to determine who will be selected to represent SCT in these contests.

- The requirements for running has changed, and now includes:

  - 1 guest lecture (Can be with a partner)
  - 12 SCT meetings attended

  In order to vote, you will need to attend **6** SCT meetings.

7   Resources

7.1   Contact

Make sure to join our Facebook group and Discord server! We will send out announcements for updates and contests. If you have any questions, feel free to contact us.

- Website: https://activities.tjhsst.edu/sct/

- Email: tjhsstsctcaptains@gmail.com

- Facebook Group: https://www.facebook.com/groups/tjsct

7.2   Problem Archives

Solving problems is **the most important** part to learning new concepts. We will try to showcase a few problems relevant to each lecture topic at the end of lectures, but it is important that you do more problems!

- USACO Past Contests Archives (http://www.usaco.org/)

- Codeforces (https://codeforces.com/)

- OI Checklist (https://oichecklist.pythonanywhere.com/)

- Online Judges (UVA, Kattis, CodeChef)

7.3   Competitive Programming Resources

- CP algorithms (https://cp-algorithms.com/)

- USACO Guide (https://usaco.guide/)

- CP Handbook (https://cses.fi/book/book.pdf)

- *Competitive Programming* by Steve and Felix Hamlin

- *Algorithms* by Sedgewick and Wayne