Spring 2025 COP 4516 Team Final Contest Summary (by Arup Guha)

The first part of the summary will be a problem-by-problem analysis of how teams did in the contest and some observations about the problems. The second part will be an analysis of the teams and how they did.

Here is the first, by problem:

Problem A: Dan the Delivery Man
Solved by: 2 out of 19 teams
First Solve: 42 minutes (Team Catch)

It seems that teams had some trouble understanding the role of the portals and the intentionally obfuscated description of a rooted tree. Team Catch didn't seem phased by those issues and solved the problem 11 minutes after their previous submission. The only other team to solve this problem in contest was Team Drop, which did so at the 1:50 mark into the contest.

Problem B: Fizz or Buzz, Cuzz
Solved by: 19 out of 19 teams
First Solve: 4 minutes (Team Drop)

This simplification on the classic problem was quickly discovered by nearly all the teams, with 18 out of 19 teams correctly solving the problem in the first 26 minutes. Team Implements, as per their strategy in previous contests, didn't start out working on the easiest problems, but eventually got to them in hour two, solving both this one and Missing Contests at the 1:19 mark

Problem C: Lighting Fuses
Solved by: 0 out of 19 teams

The confusion on the problem with the sample probably didn't help. The intention for the problem was for it to be a straight matching problem (network flow) between the fuses and fireworks, where you binary search the answer, and in each iteration of the binary search, a single network flow instance is set up. The solution sketch describes how to solve a slightly more general problem by adding one node to the straight matching network flow graph. (The problem required that a fuse on its own took less than or equal to the amount of time to burn out than if it had been paired with any firework. But the solution in the solution sketches works regardless of the relationship of the fuse burn out times alone versus when paired with fireworks.)

Problem D: Geode Slices
Solved by: 0 out of 19 teams

Many teams attempted this problem but none solved it fully. In fact, 8 teams made a total of 38 submissions on this problem. All submissions that passed the sample data but not the full judge test data. There are several implementation issues that can pop up when coding this problem. For one, longs must be used because two numbers of magnitude 10^6 can be multiplied. Next, the default convex hull code doesn't necessarily indicate "which index" the points which make up the hull are at. It's useful to know this information quickly when deleting the points as layers are formed for the geode, from the outside in. It's likely teams got tripped up on implementation details keeping straight ID numbers for the points.

Problem E: Missing Contests
Solved by: 19 out of 19 teams
First Solve: 4 minutes (Team Void)

Just like Fizz or Buzz, Cuzz, 18 out of 19 teams correctly solved the problem in the first 25 minutes. Team Implements, as per their strategy in previous contests, didn't start out working on the easiest problems, but eventually got to them in hour two, solving this one at the 1:19 mark.

Problem F: Osmosis
Solved by: 4 out of 19 teams
First Solve: 57 minutes (Team Static)

Only Team Static solved this problem in the first hour, but three more teams were eventually able to get it, including Team Catch, 14 minutes before the contest ended and Team Void, mere seconds before the contest ended! Team Drop took the prize more most submissions eventually solving this problem with 9 submissions, getting the problem at the 1:34 mark. Only two other teams had submissions on this problem and didn't solve it. Both of these two teams were on the right track with one of the teams stuck on a wrong answer and another hadn't memoized their recursive solution.

Problem G: Returning Papers
Solved by: 4 out of 19 teams
First Solve: 73 minutes (Team Goto)

This combinatorics problem was correctly solved at the 1:13 mark by Team Goto, which figured out the combinations required for the solution as well as the modular inverse, putting together those parts. Teams Transient and packageJs both solved the problem near the 2 hour mark, and then for the win, Team Static solved this problem with just 3 minutes left!

Problem H: Rhino Count
Solved by: 15 out of 19 teams
First Solve: 31 minutes (Team Catch)

After the first two questions, this was probably the next easiest question to solve and code, as the class quickly proved. By the 1:23 mark, eight teams had correctly solved this problem while no other remaining question worth 10 or more points had more than one solve. As the contest progressed, more and more teams used the sample input posted to debug and fix their solutions. Even with only 1 minute left, team import solved this problem on their sixth submission!

Contest Summary

The contest started off quickly with eight teams getting on the board within the first six minutes. All of the quick solves were on “Fizz or Buzz, Cuzz” and “Missing Contests”. In the following minute, minute seven, team Super correctly submitted both of the 5 point questions to take the lead with 2 problems solved (10 points).

Just 15 minutes into the contest 16 teams had solved the two five point questions and 1 team had a single question leaving only 2 teams not on the scoreboard. At this point, the most interesting question is which problem will be the third one solved? Based on the point values, the answer is likely to be either “Rhinoceros Count” or “Dan the Delivery Man”. By the first half hour, 18 of the 19 teams had solved the two five point problems. In fact, just one minute later at the 31 minute mark, Team Catch became the first to solve Rhinoceros Count (answering the question on the judges’ minds) jumping to the top of the leaderboard with 3 problems solved and 20 points. Three minutes later Team Void also solved Rhino Count.

At the 42 minute mark, Team Catch jumped ahead to four problems and 30 points, by being the first to solve Dan the Delivery Man. Within the first hour, 2 more teams solved Rhino Count and with 3 minutes left in the first hour, Team Static solved the 20 point question Osmosis. At the end of the first hour, in terms of points, both teams Catch and Statis had 30 points, leading the points scoreboard.

The start of the second hour saw another solution to Rhino Count (Team Transient) and a fifth new problem solved: Returning Papers by Team Goto. Other than that, the scoreboard was quiet for the first half of the second hour. Finally, at the 1:34 mark. Team Drop solved the dynamic programming problem, Osmosis on their ninth submission, vaulting them into the lead with 4 problems and 40 points. Even though Osmosis was a 20 point problem, at this point in the contest, it had more solves than both 15 point problems and one of the 10 point problems.

1:41 into the contest, Team Static solved Rhino Count, moving to 40 points and taking the lead due to a smaller number of penalty points than Team Drop. But…**not to fast**…after a difficult fight with Osmosis, Team Drop had a much easier time with Dan the Delivery Man, solving it 16 minutes after solving Osmosis at the 1:50 mark, taking the lead back from Team Static **just 9 minutes after losing the lead**. Right before the close of the second hour, at the 1:57 mark, Team Transient became the second team to solve Returning Papers. Thus, at the two hour mark, every team had solved Fizz or Buzz, Cuzz and Missing Contests and a majority of teams (13) had solved Rhino Count, and two teams had solved each of Dan the Delivery Man, Osmosis and Returning Papers. At this point in time, Team Catch had 3 incorrect submissions on Osmosis. If they were to fix their solution, they would likely get ahead of Team Drop, due to penalty points. But for the time being, Team Transient was in third place with 35 points, Team Static was in second place with 40 points and Team Drop was in the lead with 50 points.

In the third hour, things started slowly. The first solve in the third hour was Returning Papers by packageJs, moving them to 35 points. This solve moved Team packageJs to fourth place right behind Team Transient, which at that point in time had the same number of points but fewer penalty points. Then, at the 2:31 mark, the second solve of the last hour occurred with Team Goto fixing their submission to Rhino Count, moving them to fifth place with 35 points, dropping team Catch to sixth place. Even with only 15 minutes left in the competition, there were only 2 correct submissions to problems after the two hour mark. But, literally one minute later, at the 2:46 mark, Team Catch, which was previously in 6th place, vaulted into first place by solving Osmosis on the fourth attempt. At this point in time with 14 minutes left, Team Catch was in first place with 50 points, Team Drop in second place with 50 points also, and Team Static in third place with 40 points. The difference between third and fourth resided in the fourth problem solved, which for Static was Osmosis, a 20-point problem while three teams had Returning Papers as their fourth problem. In a stunning comeback, Static solved Returning Papers **with three minutes left in the entire contest** to take

first place away from Team Catch. And, last but certainly not least, Team Void solved Osmosis with less than a minute left to secure 40 points and fourth place.

Here are the team winners for the competition:

1. Static	55 points, 5 solved, 355 penalty
2. Catch	50 points, 5 solved, 318 penalty
3. Drop	50 points, 5 solved, 494 penalty

Honorable Mention goes to the following teams that solved 4 problems:

4. Void	40 points, 4 solved, 233 penalty
5. Transient	35 points, 4 solved, 198 penalty
6. packageJs	35 points, 4 solved, 275 penalty
7. Goto	35 points, 4 solved, 305 penalty

Great job everyone! Even though we think that everyone buckles under pressure, the furious finish to this contest proves otherwise as there were three correct solutions to difficult problems submitted within the last 15 minutes of the contest, which turned out to generate multiple lead changes at the very end!!!

As someone who's experienced many programming competitions as a coach, this is definitely what a real competition feels like. Hope everyone enjoyed it!

Arup