



Department of Computer Science
COMP2421 (Fall Semester 2024/2025)

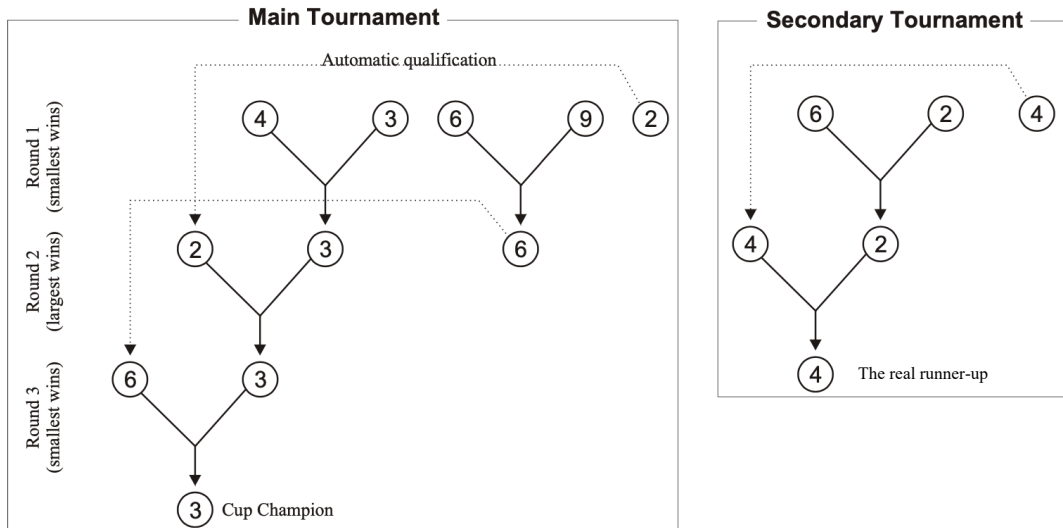
Project#1 Due Date: Wednesday (27 November 2024)

In this project, you will implement a system that determines the winner and the runner up of a football tournament. Generally, football matches are played in rounds. In the first round, every two teams play one match and only the winner qualifies to the next round. The winners of a round are reduced by half using this procedure. This continues until the final round where exactly two teams play and the winner is declared as the champion. The loser of this final match is considered the second. However, some argue that this is unfair and that the second winner of the game should be the best team of all the teams that lost against the champion of the tournament.

In this project, you will write a program to determine the winner and the real runner-up in the tournament. There are n teams denoted by n distinct integer IDs. These n teams will play in a cup manner until the champion is determined. The winner in any match is the team with the smaller ID (if the round number is odd,) or the team with the larger ID (if the round number is even.) If, at any round, the number of teams is odd, the last team in the list is qualified automatically to the next round, but is placed in the head of the next list (in the example below, team 2 qualifies automatically to round 2. Similarly, team 6 to round 3.)

When the champion is determined, there will be another tournament (the runner-up tournament) for all the teams that lost against the champion. These teams will be placed in the list in reverse order so that the team that lost to the champion in the final round is placed first, and so on. These teams will play again in another tournament with the same rules used before. The winner this time is the real runner-up.

For example, the figure below shows a tournament of five teams (IDs: 4, 3, 6, 9, and 2) compete, and team 3 is the cup champion. Teams that lost to team 3 (6, 2, and 4) play in the secondary tournament to determine the team in the second place. The real runner-up is team 4, not 6.



In this program there will be no menu. Instead, your program will run on multiple input cases to test the validity and correctness of your code.

Input format:

Your program will be tested on multiple test cases. Each test case is written on a single text line using the following format:

$n, id_1, id_2, \dots, id_n$

where n is the number of teams, and id_i is the identifier for the i^{th} team and $1 < n < 10000$ and $-10000 < id_i < 10000$.

The end of the test cases is indicated with a -9999 on a separate line.

Output format:

For each input test case you should write the id of the real runner-up of the tournament.

Example of input case:

5 4 3 6 9 2

6 10 80 30 20 15 25

-9999

The output of the given input:

4

20

The deadline of this assignment is on Wednesday 27 November 2024 before 11:59 PM. Late submissions will not be accepted for any reason. Please make sure that your application is running properly on your laptop before the lecture. Project discussions will take place in the lecture room.

Notes and submission instructions:

1. **This is individual work.** It should represent your own efforts. It is fine to discuss your work and to ask your colleagues, but you are not allowed to copy/paste the work of others or give your work to anyone else. You are not allowed to post/copy from other websites and/or social media and this will be considered as cheating. Using AI tools to assist writing the code will result in zero grade.
2. Any **plagiarized** code will not be marked.
3. **Document format.** Please submit only the code file (c file) containing the code of your project. Please rename it as follows:
“P2_YourStudentID_FirstNameLastName_SectionNo.c”.
4. **Input/output file name.** Make sure that the input/output file names are the same as in the specifications.
5. Include your full name, student ID, and section number in the beginning of your file.
6. Please do not compress the file, only the C-file is needed.
7. Files not following the convention in point 2 will not be marked.

Good luck!