Object-Oriented Programming and Design - Monsoon 2025
Assignment 4 – Templates and Threads

Arani Bhattacharya

This assignment carries a total of 200 marks. There are five questions. Additional instructions given at the end of this question need to be followed. The concepts of data abstraction, data hiding and abstraction MUST be used wherever necessary.

1. Assume that you are creating an ERP for a university. The ERP needs to keep track of all students (with names and roll numbers), the branch they are enrolled in, starting year, the courses they are taking and the previous courses taken along with the grades. However, a major challenge is that the data type of many of the above fields can differ depending on the university. Some universities prefer roll numbers to be strings, whereas others them to be unsigned integers. Similarly, a few universities identify courses using a specific type of course code, whereas others only utilize the acronym of course name. Write a single class that can be used to accommodate all the above cases irrespective of the type of fields for the above cases.

2. Write a program that keeps track of students of the OOPD course of IIIT-Delhi, by creating objects of the above class/classes. An interesting aspect of IIIT-Delhi is that its students are all eligible to take courses of IIT-Delhi. IIT-Delhi has a different system of course naming structure, where course numbers are integers. Ensure that your program can handle both types of course numbers.

3. Now, consider a situation where you have to straightaway get a total of 3000 students enrolled, to bootstrap the system. You need to read these 3000 records from a CSV file. Write a program to allow parallel sorting of the above records. You should use at least two threads for sorting. Note that there should be no race conditions present. Log the amount of time taken by each thread to finish the sort.

4. For each of the above cases, without copying the whole data, show the records in the order in which they were entered, and in the sorted sequences. You will need to use different types of iterators for each case.

5. Assume that a company that comes for placement wants a few students who have got a grade of 9 or above in a specific course. Ensure that you have a data structure that allows you to quickly make such requests, without you needing to do a full linear search.

What and How To Submit

- The C++ and Makefile.

- Private github repository with the timestamps before the submission deadline. The repository should not have binary or library files committed at any stage; nor should they be added to the zip upload.

- A readme text file, describing the assignment and technique of building.

- Make the assigned TA the admin of the github repository, **and** submit the same code in zipped form on Google Classroom by the due date.