Q1 Report

I implemented 2 sets of threads for students(studThreadArr)and courses(courseThreadArr) respectively which stimulate the working of students and courses respectively.

studThreadArr threads calls upon the StudentStimulater which then

- Fills in the preferences based on time
- Goes into while loop, which stimulates a student applying for a course and the deciding whether to select it or not after the tutorial is over
- In student_CourseApplication(), we check first if course is existing or not, then we check whether if tutorial of that course is ongoing or not
  If tutorial is ongoing, I wait for next tut to start using conditional variables
  If after waiting, the course is removed, then I update the preferences of the student
- In student_CourseSelection(), we calculate the probability of him choosing the course by seeing if rand()%100 < (calibre * interest) * 100
  If selected, then the student is out of simulation
  If not selected, then I update the preferences of student, if no preference left, he is out of simulation

courseThreadArr threads call upon the CourseStimulater which then

- In course_TA_Allocation(), a free TA from associated labs is selected after checking if he is eligible
- In course_size_Allocation(), the size of tutorial is decided by rand() % D where D is max slots in a tutorial of that course
- In course_start(), we start the tutorial with how many every students have registered till then.
  I also do a pthread_cond_broadcast so that waiting students can be apply for the course.

- In tut_over(), we end the tut and increase the TA's courses done and broadcast that Tutorial is over so that students can now decide whether they want to take the course or not.
- At end, we check if there are TAs left for the next tutorial of the course
  If not, then the course is out of simulation

Appropriate locking is done to increase parallelism as much as possible

Sample Output of given TC

```
Student 9 has filled in preferences for course registration
TA 0 from lab PRECOG has been allocated to course SMAI for his 1st TA ship
Course SMAI has been allocated 3 seats
Student 0 has filled in preferences for course registration
Student 2 has filled in preferences for course registration
Student 8 has filled in preferences for course registration
TA 1 from lab PRECOG has been allocated to course NLP for his 1st TA ship
Course NLP has been allocated 4 seats
TA 2 from lab PRECOG has been allocated to course DSA for his 1st TA ship
Course DSA has been allocated 5 seats
TA 0 from lab CVIT has been allocated to course CV for his 1st TA ship
Course CV has been allocated 2 seats
Student 3 has filled in preferences for course registration
Student 7 has filled in preferences for course registration
Student 5 has filled in preferences for course registration
Student 0 has been allocated a seat in course SMAI
Student 2 has been allocated a seat in course CV
Student 8 has been allocated a seat in course NLP
Student 9 has been allocated a seat in course SMAI
Student 1 has filled in preferences for course registration
Student 4 has filled in preferences for course registration
Student 6 has filled in preferences for course registration
Student 7 has been allocated a seat in course SMAI
Student 3 has been allocated a seat in course NLP
Tutorial has started for Course SMAI with 3 seats filled out of 3
Student 5 has been allocated a seat in course NLP
Tutorial has started for Course NLP with 3 seats filled out of 4
Tutorial has started for Course DSA with 0 seats filled out of 5
Tutorial has started for Course CV with 1 seats filled out of 2
TA 0 from lab PRECOG has completed the tutorial for course SMAI
TA 0 from lab RRC has been allocated to course SMAI for his 1st TA ship
Course SMAI has been allocated 2 seats
Student 4 has been allocated a seat in course SMAI
TA 1 from lab PRECOG has completed the tutorial for course NLP
Course NLP doesn’t have any TA’s eligible and is removed from course offerings
TA 2 from lab PRECOG has completed the tutorial for course DSA
```

```
TA 1 from lab CVIT has been allocated to course DSA for his 1st TA ship
Course DSA has been allocated 5 seats
Student 1 has been allocated a seat in course DSA
TA 0 from lab CVIT has completed the tutorial for course CV
TA 0 from lab CVIT has been allocated to course CV for his 2nd TA ship
Course CV has been allocated 1 seats
Student 6 has been allocated a seat in course DSA
Student 8 has selected course NLP permanently
Student 3 has selected course NLP permanently
Student 5 has selected course NLP permanently
Tutorial has started for Course SMAI with 1 seats filled out of 2
Tutorial has started for Course DSA with 2 seats filled out of 5
Tutorial has started for Course CV with 0 seats filled out of 1
TA 0 from lab RRC has completed the tutorial for course SMAI
Student 7 has selected course SMAI permanently
Student 4 has selected course SMAI permanently
Student 0 has selected course SMAI permanently
Student 9 has changed current preference from SMAI (priority 0) to NLP (priority 1)
TA 0 from lab RRC has been allocated to course SMAI for his 2nd TA ship
Course SMAI has been allocated 3 seats
TA 1 from lab CVIT has completed the tutorial for course DSA
TA 1 from lab CVIT has been allocated to course DSA for his 2nd TA ship
Course DSA has been allocated 5 seats
Student 6 has changed current preference from DSA (priority 0) to SMAI (priority 1)
TA 0 from lab CVIT has completed the tutorial for course CV
TA 2 from lab CVIT has been allocated to course CV for his 1st TA ship
Course CV has been allocated 2 seats
Student 2 has changed current preference from CV (priority 0) to NLP (priority 1)
Student 9 has changed current preference from NLP (priority 1) to CV (priority 2)
Student 9 has been allocated a seat in course CV
Student 6 has been allocated a seat in course SMAI
Student 2 has changed current preference from NLP (priority 1) to SMAI (priority 2)
Student 2 has been allocated a seat in course SMAI
Tutorial has started for Course SMAI with 2 seats filled out of 3
Tutorial has started for Course DSA with 0 seats filled out of 5
Tutorial has started for Course CV with 1 seats filled out of 2
TA 0 from lab RRC has completed the tutorial for course SMAI
TA 0 from lab RRC has been allocated to course SMAI for his 3rd TA ship
Course SMAI has been allocated 3 seats
TA 1 from lab CVIT has completed the tutorial for course DSA
TA 3 from lab CVIT has been allocated to course DSA for his 1st TA ship
Course DSA has been allocated 1 seats
TA 2 from lab CVIT has completed the tutorial for course CV
TA 2 from lab CVIT has been allocated to course CV for his 2nd TA ship
Course CV has been allocated 2 seats
Student 1 has changed current preference from DSA (priority 0) to NLP (priority 1)
Student 1 has changed current preference from NLP (priority 1) to CV (priority 2)
Student 1 has been allocated a seat in course CV
Tutorial has started for Course SMAI with 0 seats filled out of 3
Tutorial has started for Course DSA with 0 seats filled out of 1
Tutorial has started for Course CV with 1 seats filled out of 2
TA 0 from lab RRC has completed the tutorial for course SMAI
Course SMAI doesn’t have any TA’s eligible and is removed from course offerings
Student 6 has selected course SMAI permanently
```

```
Student 2 has selected course SMAI permanently
TA 2 from lab CVIT has completed the tutorial for course CV
Student 9 couldn’t get any of his preferred courses
TA 3 from lab CVIT has completed the tutorial for course DSA
TA 3 from lab CVIT has been allocated to course DSA for his 2nd TA ship
Course DSA has been allocated 1 seats
Student 1 has selected course CV permanently
Tutorial has started for Course DSA with 0 seats filled out of 1
TA 3 from lab CVIT has completed the tutorial for course DSA
Course DSA doesn’t have any TA’s eligible and is removed from course offerings
```