Problem Description:

The problem involves managing a limited number of TA (Teaching Assistant) rooms and chairs for students. The objective is to have students fill TA rooms, and if there are any remaining students, they should wait on chairs until a TA room becomes available. If a chair is available but no TA room is free, students wait on chairs. The challenge is to synchronize these processes efficiently.

Solution Overview:

To address this problem, the solution involves using semaphores for both TA rooms and chairs. Semaphores help control access to shared resources and manage the synchronization of multiple threads. The implementation utilizes Java's Semaphore class to regulate access to TA rooms (ta_semaphore) and chairs (chairs_semaphore).

Code Documentation:

Main Class (HOME):

- Instance Variables:
  - ta_semaphore: Semaphore for TA rooms.
  - chairs_semaphore: Semaphore for chairs.
- Methods:
  - initialize: Sets up the graphical user interface and event listeners.
  - main: Entry point for the application.
- Event Listener (StartBtn):
  - Initializes semaphores based on user input (TA count, chairs count).
  - Creates an array of Student objects representing students.
  - Starts threads for each student.
  - Ensures only one simulation can run at a time.

Student Class:

- Constructor:
  - Initializes semaphores and text fields for tracking counts.

- Methods:
    - updateCount: Safely updates the count displayed in a text field.
    - waitForRandomTime: Causes the thread to sleep for a random duration.
- Run Method Simulates a student's behavior:
    - Attempts to acquire a TA room.
    - If successful, works with a TA and releases the room.
    - If unsuccessful, checks for an available chair.
    - If a chair is available, waits on it, then acquires a TA room.
    - If no chair is available, waits on a chair until one becomes free.

This solution efficiently manages student access to TA rooms and chairs, providing a synchronized simulation.

	ID	الاسم
Student run method	202000823	محمد نادي محمد عبدالواحد
UI/Home	202001083	يوسف ايمن كامل عبد العاطي
Methods/constructors	202000150	امنية عصام عبدالحكم نصر
Student	202000251	حازم غانم محمود احمد
Student	202000723	محمد احمد محمد عبداللاه
Student	20160336	محمد اشرف حلمى عبدالهادي
UI	20180199	حسن مكاوى قياتي