Sleeping TA Java Project Documentation

1. Project Overview

1.1 Project Name
Sleeping TA Simulation

1.2 Project Description
The Sleeping TA Simulation is a Java-based project that simulates the interaction between a Teaching Assistant (TA), students, and teachers in an academic assistance scenario. The project utilizes Java and JavaFX to create a graphical user interface (GUI) that visually represents the dynamic nature of students seeking help from a TA.

2. What Project Actually Do

2.1 Simulation Logic
The project simulates the following key aspects:

Students arriving at random intervals and waiting for assistance.
Teaching Assistants (TA) providing help to students.
Teachers occasionally assisting students.
Visualization of the simulation progress through a GUI.

2.2 Multithreading
Multiple threads are used to simulate parallel interactions:

A TA thread manages TA activities and assists students.
Student threads simulate individual students seeking assistance.
Teacher threads assist students when available.
Progress Task updates the GUI components dynamically.
Simulation Task waits for all students to be assisted.

3. Code Documentation

3.1 Main Class: SleepingTA
Initialization: The class initializes semaphores, queues, latches, and GUI components.
GUI Configuration: The GUI components are configured and initialized using JavaFX.
Simulation Control: Buttons start and stop the simulation.
Thread Management: Threads for TA, students, teachers, and progress/simulation tasks are managed.

3.2 GUI Components

Text Fields: Display various statistics such as TA working, TA sleeping, students on chairs, and students waiting outside.
Progress Bar: Visual representation of the simulation progress.
Text Area: Displays real-time messages describing the simulation activities.
Start/Stop Buttons: Control the initiation and termination of the simulation.

3.3 Simulation Logic

Student Arrival: Students arrive randomly, acquire a chair, and wait for TA assistance.
TA Assistance: TA assists students in a simulated fashion.
Teacher Assistance: Teachers may assist students.
Simulation Progress: Progress is tracked and visualized dynamically through GUI updates.

4. Multithreading usage:

4.1 TA Thread (taThread)

Function: Simulates TA activities and assistance to students.

4.2 Student Threads (studentThreads)

Function: Simulate individual students arriving, waiting, and receiving assistance.

4.3 Teacher Threads (teacherThreads)

Function: Simulate individual teachers arriving and assisting students.

4.4 Progress Task (progressTask)

Function: Updates GUI components and progress bar during the simulation.

4.5 Simulation Task (task)

Function: Waits for all students to be assisted and finalizes the simulation.

5. Team Member Roles:

1. Code:
- Shiref Hamdy
- Hazim Khalid
- Muhamed Ezz

2. GUI:
- Ahmed Talaat
- Shiref Hamdy
- Eyad Essam

3. Simulation:
- Shiref Hamdy
- Ali Mohamed
- Mohamed Moustafa

4. Multithreading:
- Shiref Hamdy
- Eyad Essam
- Mohammed Ezz

5. Testing:
- Ahmed Talaat
- Shiref Hamdy
- Hazim Khalid

جامعة حلوان HELWAN UNIVERSITY	Operating Systems 2 (Fall 2023) Project Discussion	كلية الحاسبات والذكاء الإصطناعي Faculty of Computers & Artificial Intelligence

Project Number: 1

Project Name: The Sleeping Teacher Assistant

Team Members[1]:

	Team Member ID	Team member name (in Arabic)	Grade
1	202000435	شريف حمدي زكي مهني	
2	202000246	حازم خالد حسن على	
3	202000789	محمد عز الدين زارع احمد	
4	202000073	احمد محمد طلعت محمد	
5	201900201	اياد عصام الدين حسن	
6	201900490	على محمد فتحي عطية	
7	20210836	محمد مصطفي محمد عبدربه	

Evaluation Criteria

General Criteria

Criteria		Grade
Multithreading (5)	No multithreading (2 out of 5)	----------
	Threads in serial (3 out of 5) Correct usage of threads,and synchronization mechanisms	
	Multithreading (4 or 5 out of 5) Correct usage of threads, and synchronization mechanisms	
GUI (2)	No GUI (0 out of 2)	----------
	GUI without thread communication or real-time update (1 out of 2)	
	GUI with correct I/O and Thread communication or real-time update (2 out of 2)	
Documentation (1)		
Understanding (2)		

[1] 1st team member should be the same one in project schedule

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