Assignment: TCP Rate Limiter Using Java and Redis

Deadline is 3 days from assignment date

Objective

Build a rate-limiting server over raw TCP using Java sockets and Redis.

Scenario

Clients send requests to the server, and the server decides whether to allow or deny each request based on predefined rate limits.

Functional Requirements

- Implement a TCP server using Java `ServerSocket`.
- Clients send requests in the format: `REQUEST`
- Server responds with `ALLOW` or `DENY`.
- Limit each client to **10 requests per minute**.
- Support multiple concurrent clients.

Redis Usage Requirements

- Use Redis counters for rate limiting.
- Use atomic Redis operations such as `INCR` and `EXPIRE`.
- Ensure correctness under concurrent access.

Non-Functional Requirements

- Low latency response.
- Thread-safe implementation.
- Proper resource cleanup.

Constraints

- No Spring Boot + No HTTP or REST APIs, just Raw TCP sockets only.

Bonus (Optional)

- Implement sliding window rate limiting.
- Add logging for denied requests. Support configurable rate limits.

Deliverables

Submit a **single ZIP file** containing:

- Complete source code
- Test files (unit tests and test clients)
- README.md with:
  - Setup and installation instructions
  - How to run the server and How to run the tests
  - Explanation of the rate-limiting algorithm
  - Any dependencies required