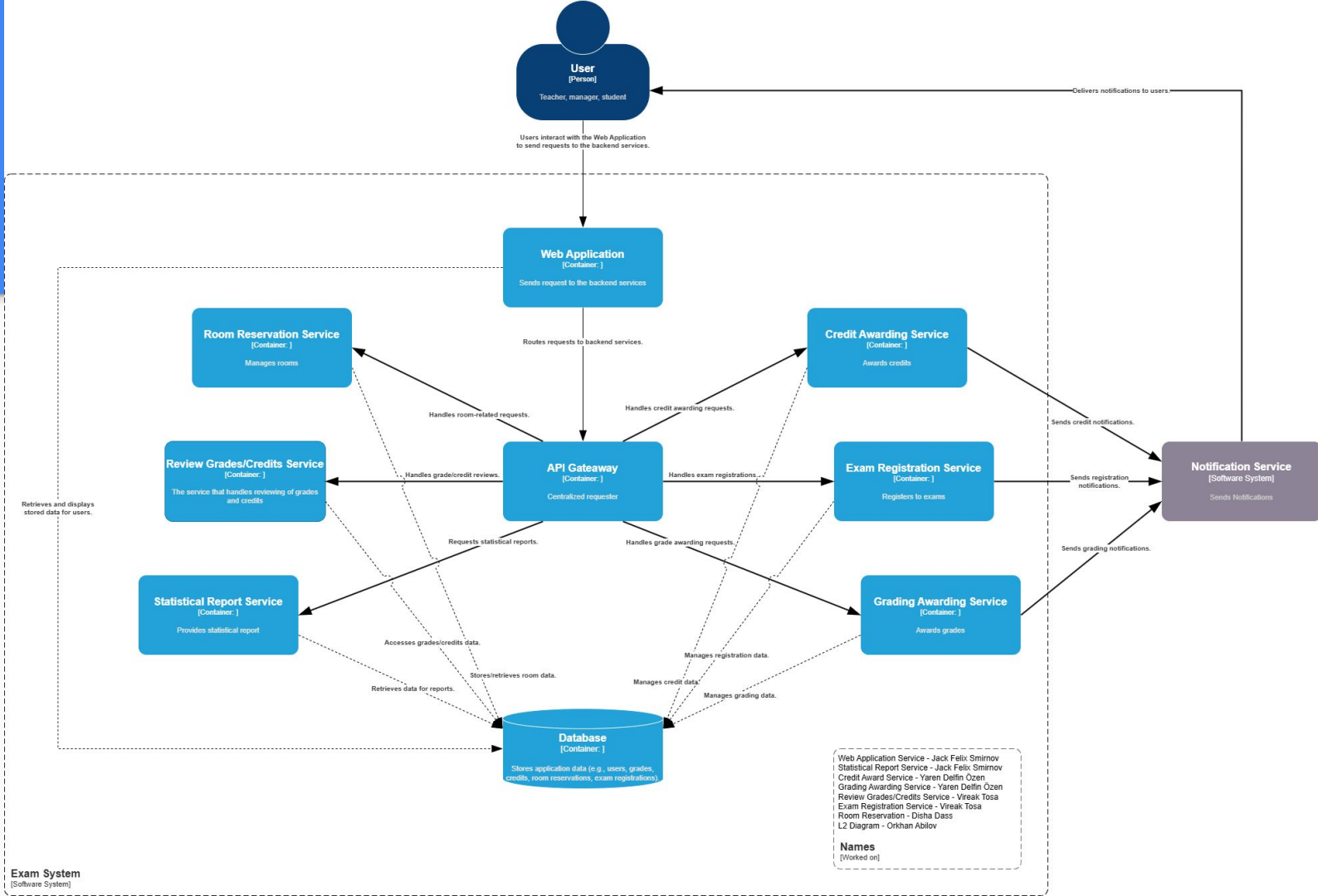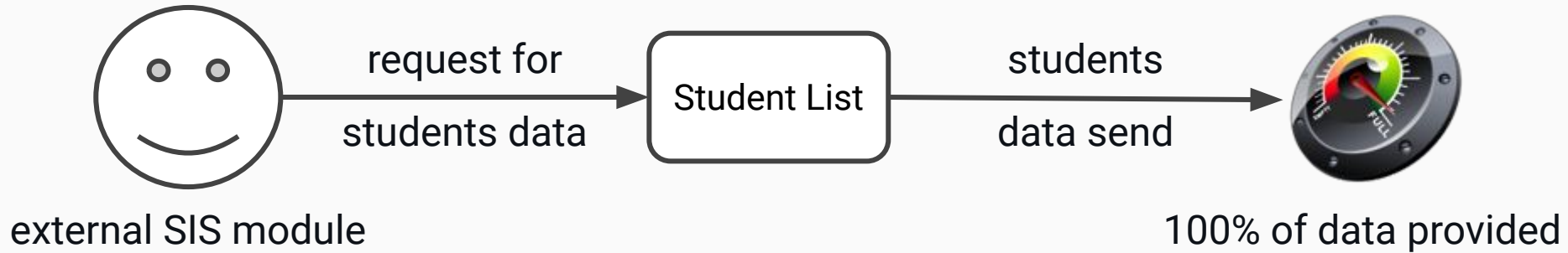# Quality Requirements

Exam Module Analysis

Schedule Module Team Members

- Holger Madsen
- Jakub Komárek
- Mikkel Kongsgaard
- Jaromír Procházka
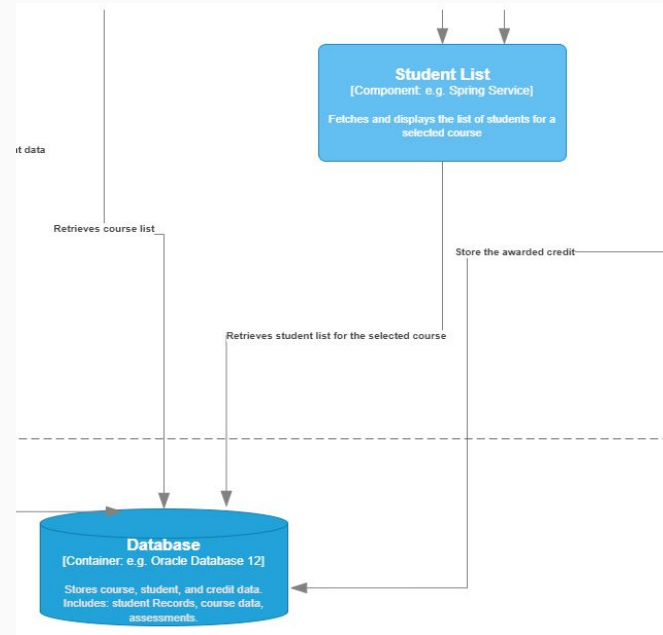- Alberto Penzo
- Jan Šimek

User
[Person]

Teacher, manager, student

Users interact with the Web Application to send requests to the backend services.

Delivers notifications to users.

Web Application
[Container:]

Sends request to the backend services

Routes requests to backend services.

Room Reservation Service
[Container:]

Manages rooms

Credit Awarding Service
[Container:]

Awards credits

Handles room-related requests.

Handles credit awarding requests.

Review Grades/Credits Service
[Container:]

The service that handles reviewing of grades and credits

API Gateaway
[Container:]

Centralized requester

Exam Registration Service
[Container:]

Registers to exams

Notification Service
[Software System]

Sends Notifications

Handles grade/credit reviews.

Handles exam registrations.

Sends credit notifications.

Sends registration notifications.

Retrieves and displays stored data for users.

Requests statistical reports.

Handles grade awarding requests.

Statistical Report Service
[Container:]

Provides statistical report

Grading Awarding Service
[Container:]

Awards grades

Accesses grades/credits data.

Sends grading notifications.

Stores/retrieves room data.

Manages registration data.

Retrieves data for reports.

Manages credit data.

Manages grading data.

Database
[Container:]

Stores application data (e.g., users, grades, credits, room reservations, exam registrations)

Web Application Service - Jack Felix Smirnov
Statistical Report Service - Jack Felix Smirnov
Credit Award Service - Yaren Delfin Özen
Grading Awarding Service - Yaren Delfin Özen
Review Grades/Credits Service - Vireak Tosa
Exam Registration Service - Vireak Tosa
Room Reservation - Disha Dass
L2 Diagram - Orkhan Abilov

Names
[Worked on]

Exam System
[Software System]

3

Interoperability scenario

external SIS module   request for   Student List   students   100% of data provided

request for students data → Student List → students data send

external SIS module

100% of data provided
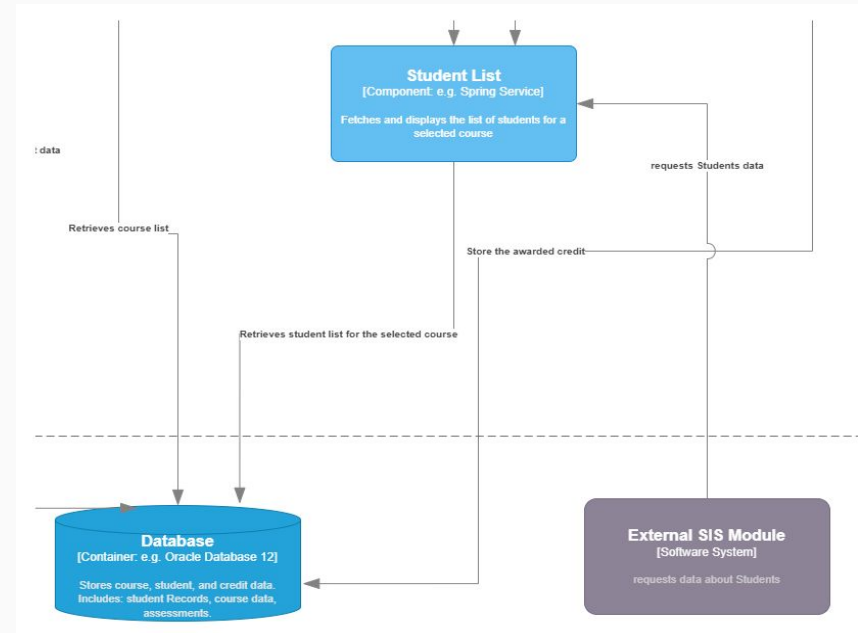
Interoperability scenario

Problem:
- Module stores data about students itself
- Module does not provide a way for other modules to access the data

Interoperability scenario
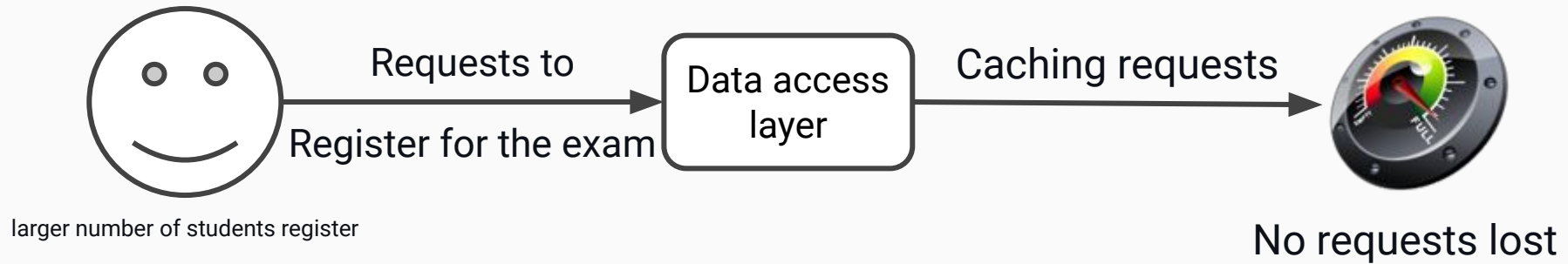
Solution:
- Add a way for the other modules to access the data

Interoperability scenario

Additional notes:
- Can be solved in different ways
- Common communication protocol needs to be defined
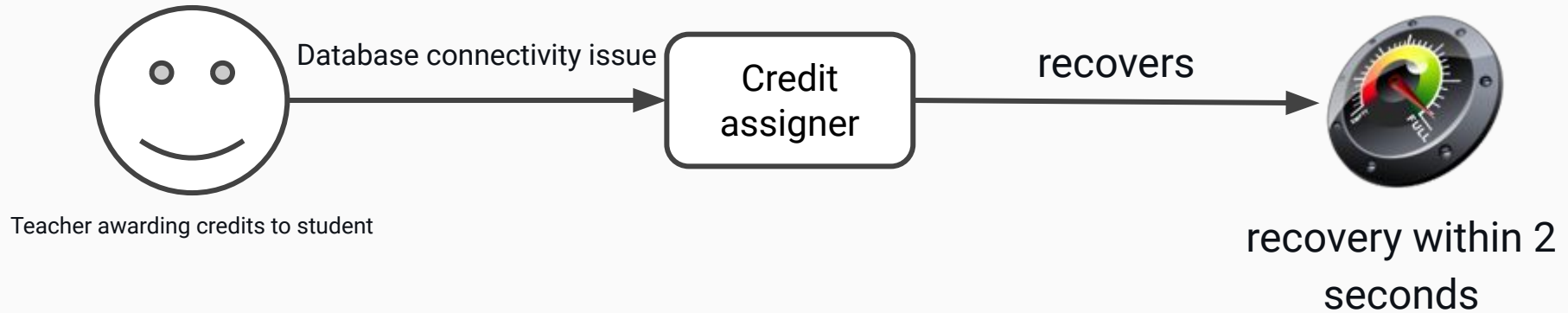- Potential security issues must be addressed

Availability scenario

Requests to

Register for the exam

larger number of students register

Data access layer

Caching requests

No requests lost

Availability scenario c4 model

L3 Diagram - Exam Registration Service
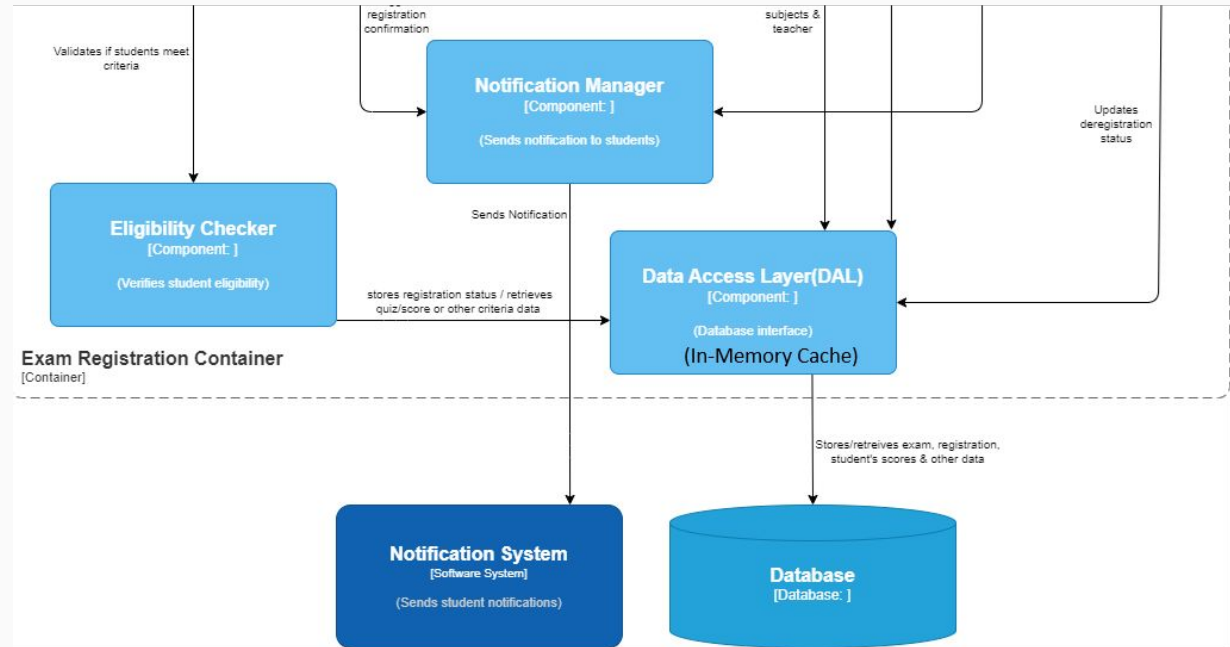
Scenario: Availability for credit assignment

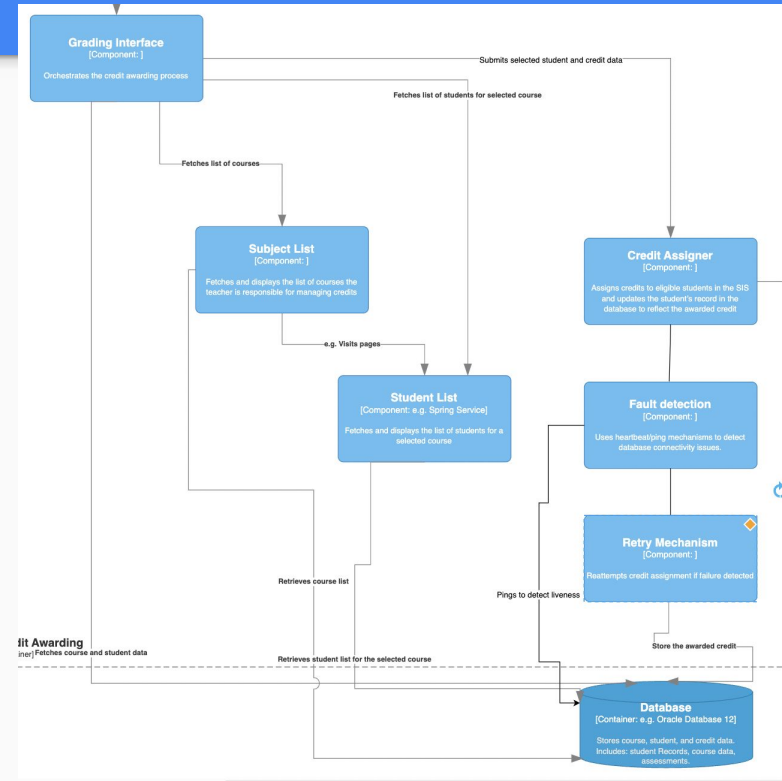Teacher awarding credits to student → Database connectivity issue → Credit assigner → recovers → recovery within 2 seconds

Worked on by Mikkel Kongsgaard

Solution: Availability for credit assignment

Fault detection:

- Ping mechanism

Retry logic:
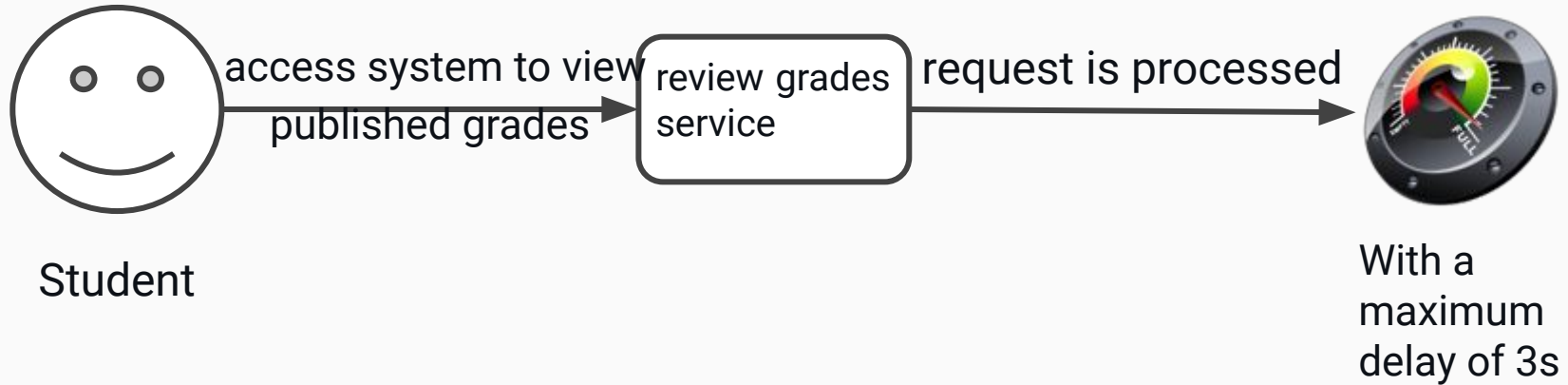
- Reattempting credit assignment

Security scenario

Maliciously changes student grades

Awarding grade service

The change is audited

Rogue teacher

The teacher must not be able to deny making the change
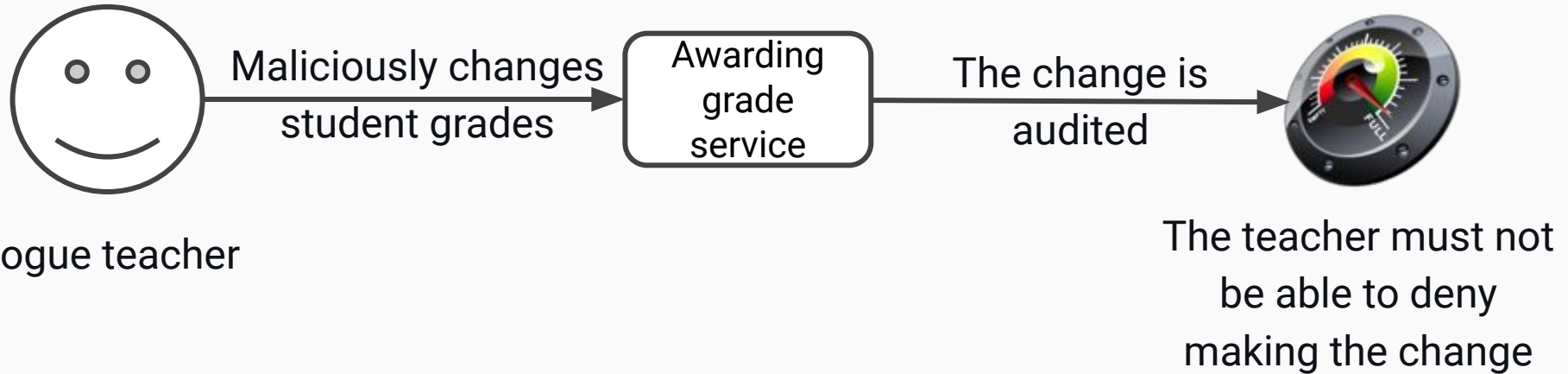
Security scenario

Problem: There is no auditing

Solution: Introduce Auditing Service as a container

Performance scenario

access system to view published grades → review grades service → request is processed
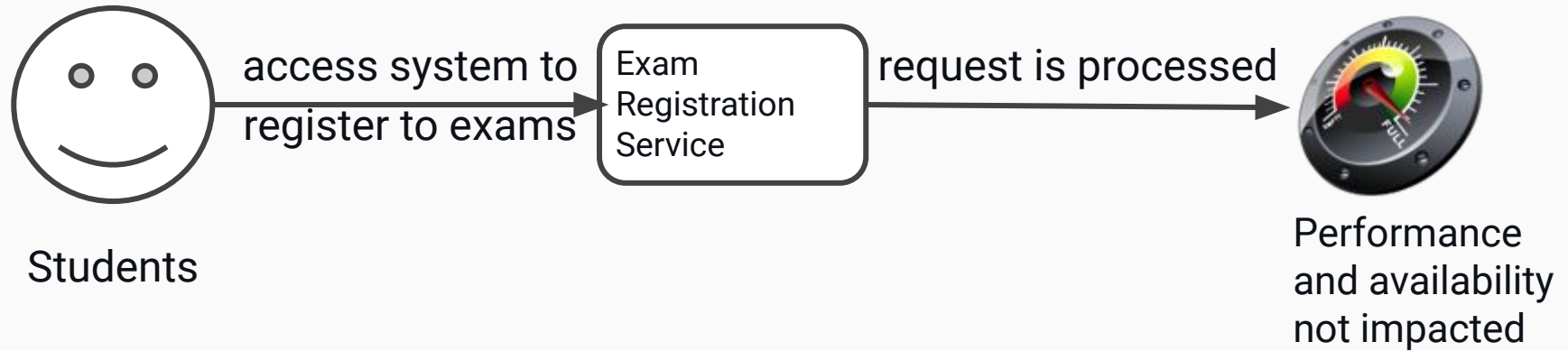
Student

With a maximum delay of 3s

Performance scenario

Problem: students simultaneously access the system to view their grades

Solutions:

- caching
- concurrency
- load balancing

worked on by Alberto Penzo

Scalability scenario

Students — access system to register to exams → Exam Registration Service — request is processed → Performance and availability not impacted

Scalability scenario

Problem: at the end of the semester, the traffic in the Exam Registration Service greatly increases and throw out the semester, it is again very low

Solutions:

- requests queuing
- horizontal scaling (already good because of Microservices)

Updated L2 diagram