Versions:

Date	Version	Autor	Comments
14.12.2022	1	Deac Denisa Bianca	
23.12.2022	2	Deac Denisa Bianca	Added a new activity diagram

Analysis and Design for Study Planner and Learning Environment

Content:

Recommended: 20.11.2017	**Approved:**
Company/University Name: Address: Universitatea Tenhica Cluj-Napoca Romania	

1. General Presentation

My project, called "Study Planner and Learning Environment" represent a web application that offers an organized workspace for students to learn and work, all while providing access for the teachers to post all necessary materials.

2. Theoretical Fundamentals

This project is created as being a full system, meaning it contains both backend and frontend.

The project is based on Object Oriented Programing (OOP), so, all four principles of encapsulation, abstraction, inheritance and polymorphism, are respected for the application to work at its best parameters.

I used a layered architecture in this project such that it offers a better clarity of code. Since I am working with a large amount of data, it will be stored into a database from which all data will be extracted or modified using queries. To do that, "data access operations" are implemented using Reflexing Techniques and Generics.

The database represents the storage place of the project.

The frontend of the application represents the graphical user interface (GUI) that offers a graphic visualization of the internal code and functionalities in an intuitive approach for the user.

3. IT Technology

The technologies I chose to work with are Java and Spring Framework for all internal operations and interactions with the database and GUI, representing the backend of the system. The framework used to code in java is IntelliJ IDE.

For the frontend, I used React.js framework that created a web interface. It is actually an open-source JavaScript library, combined with HTML code.

In matters of data bases, I chose to use postgres and dataGrip application.

4. Functionalities

The functionalities of the application consist of several operations that each user can perform. These functionalities are divided into two main categories: the Study Planner and the Learning Environment category, as the title of the application suggests.

The functionalities of the Study Planner are: organizing the calendar by setting exam date, courses schedule, and deadlines for assignments, creating goals and tasks and seeing statistics about the actor's development.

The functionalities of the learning Environment are: posting lectures for courses, accessing them, taking notes, giving/receiving grades, and feedback, seeing statistics about the overall course grades.

Beside these categories, there is also the possibility of creating an account or logging into an existing one, functionalities without which any of the previous ones would be accessible.

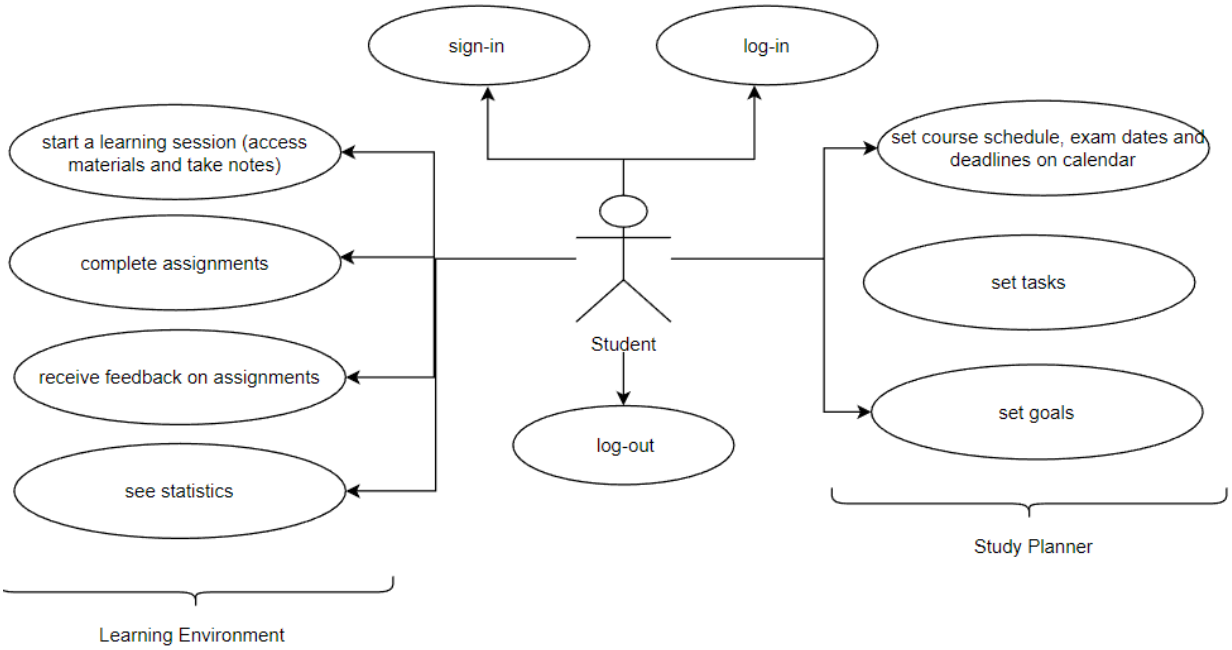
5. Actors and related access rights

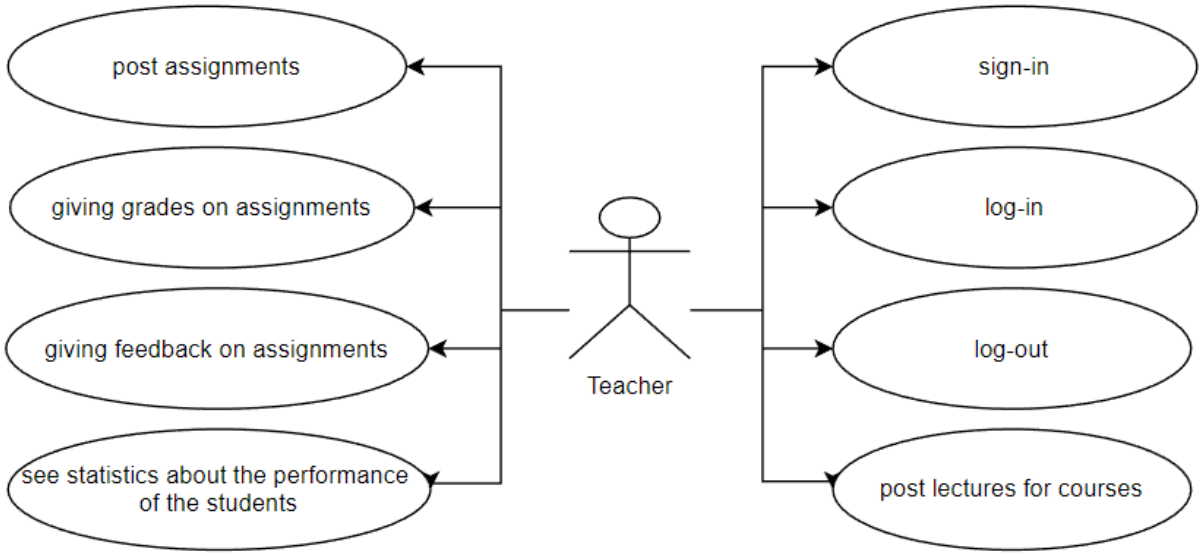
This application has two types of actors: Student and Teacher, each of them having different access to the existent functionalities.

The student has access to both the Study Planner and the Learning Environment parts of the application, but the Teacher has access only to the Learning Environment part.

Both actors have access to the log-in, log-out functionalities.

6. Use Case Diagrams





7. System Architecture

This architecture I realized for this system has the following structure:

All the important information for this system is stored in a data base. This information represents user's authentication information, courses and posted lectures, notes, calendar information.

All the data from the database is extracted in order to be used for the internal operations.

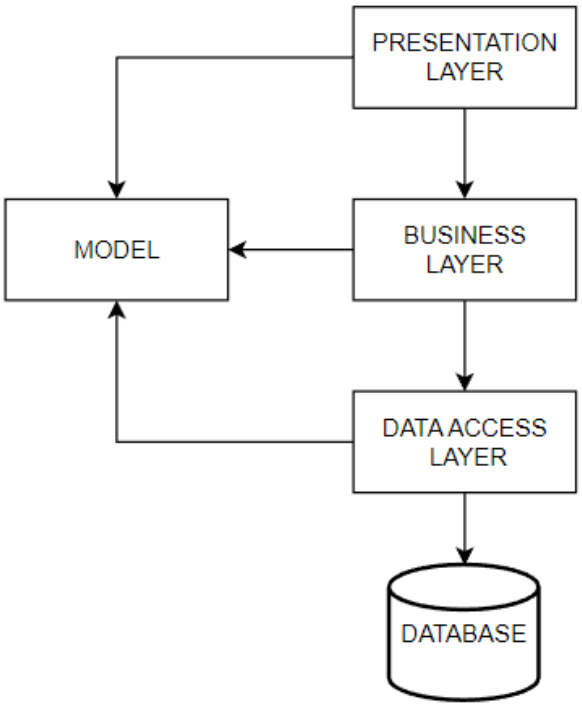
The internal structure of the system's code is divided into layers, under the form of java packages, each of them having a different role. There will be a Business Layer, Data Layer and a Presentation Layer where the connections with the graphical user interface is done. All data from the web interface is taken to be able to process the operations performed by the user and after the

processing, all required data is sent back to the interface and the modified data is stored in the interface.

8. Design (approx. 12 UML Diagrams!!!)

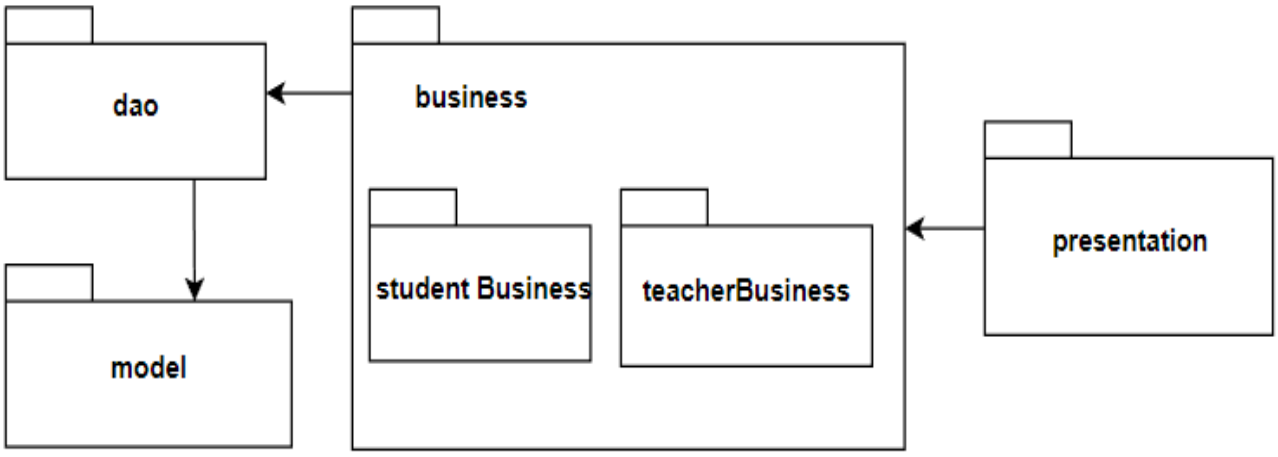
The design of this project is made in an intuitive manner in such a way that everything is modular, and each class has a well-defined purpose.

8.1. System Architecture Diagram

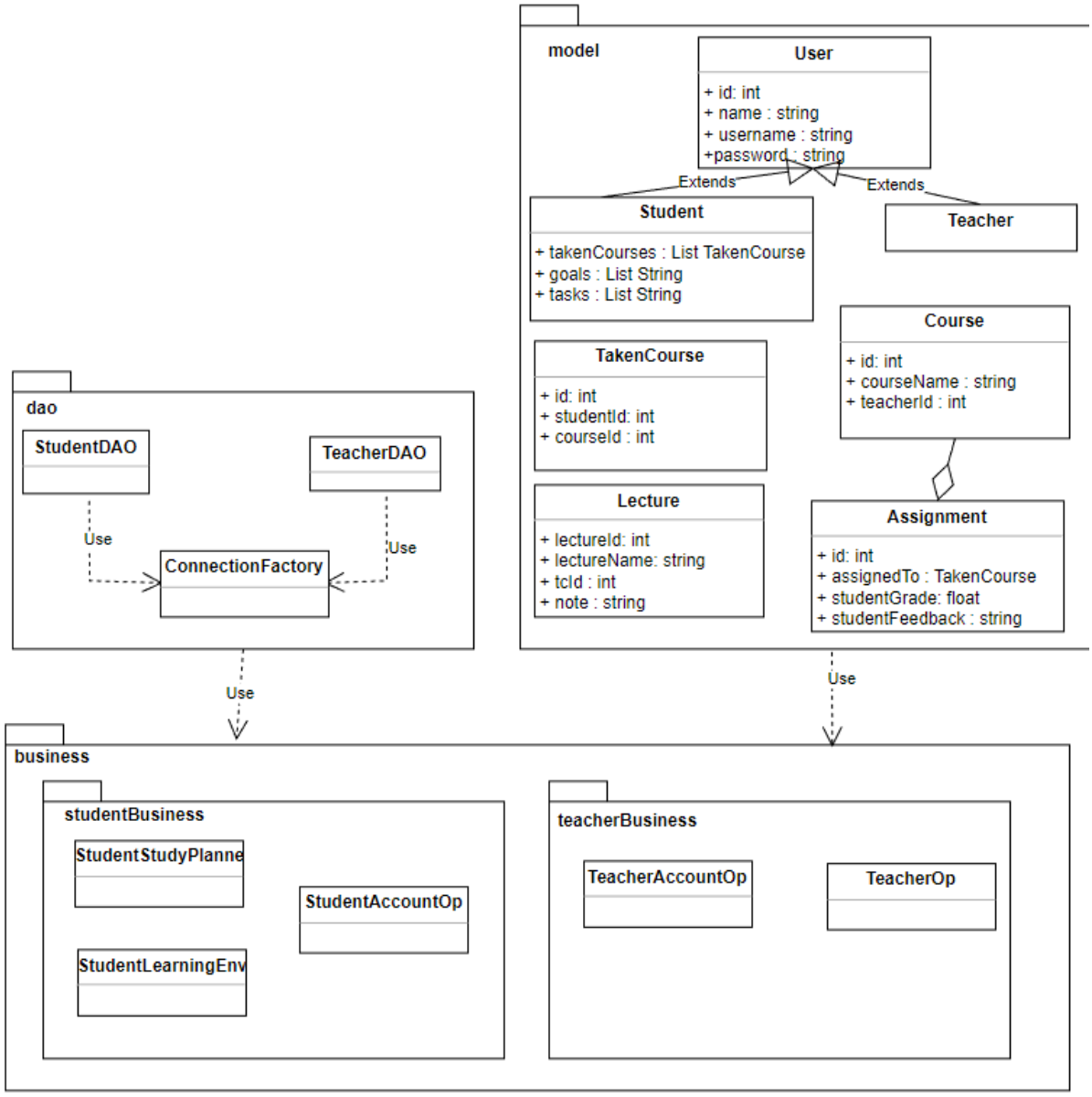


8.2. Package diagram

My application is divided into four main packages: Model(all entities), Data Access (representing all classes that work with the data base), Business (containing all the implemented functionalities of the system, for both student and teacher) and the Presentation (connection with the web user interface).

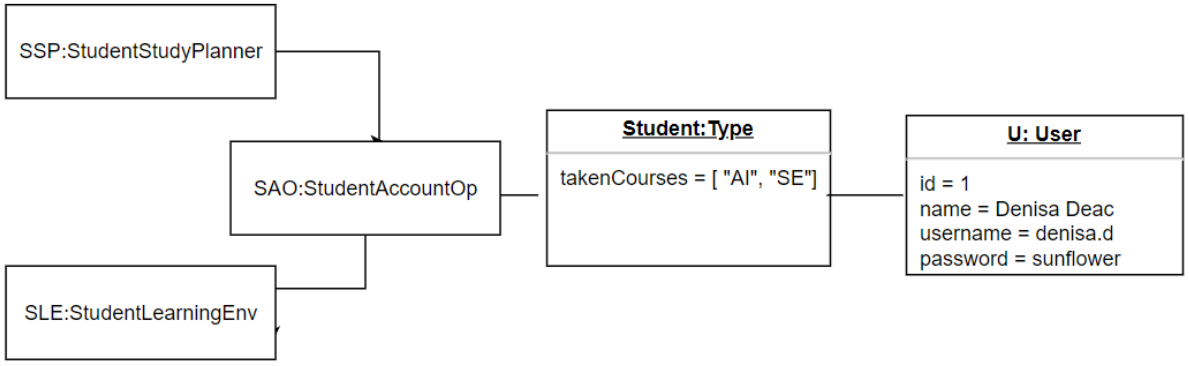


8.3. Class diagram

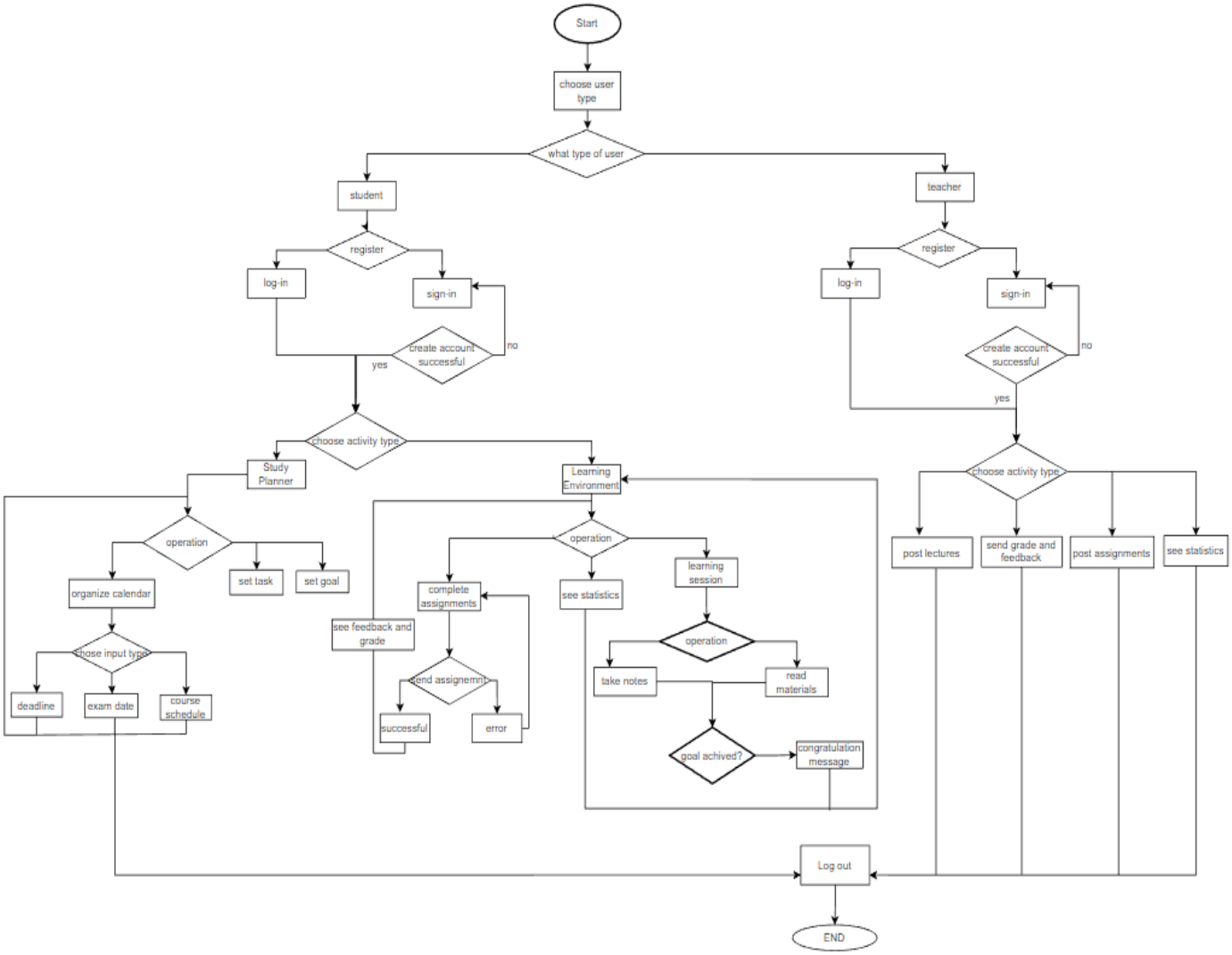


8.4. Object Diagram

- This object diagram represents an example for a given student access to Study Planner Section



8.5. Flow chart



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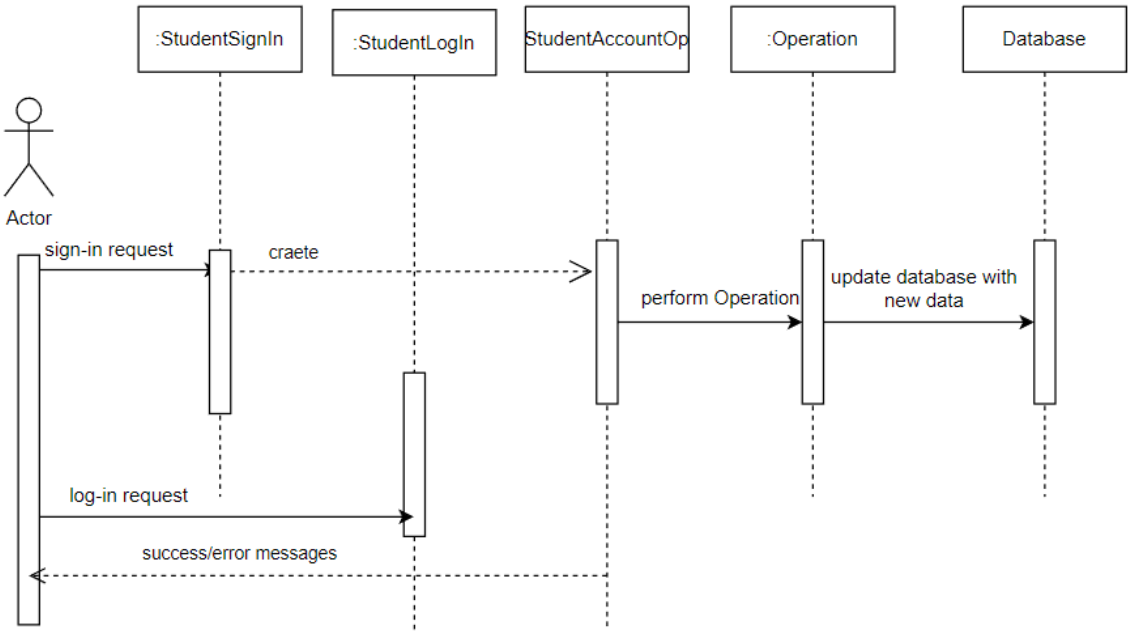
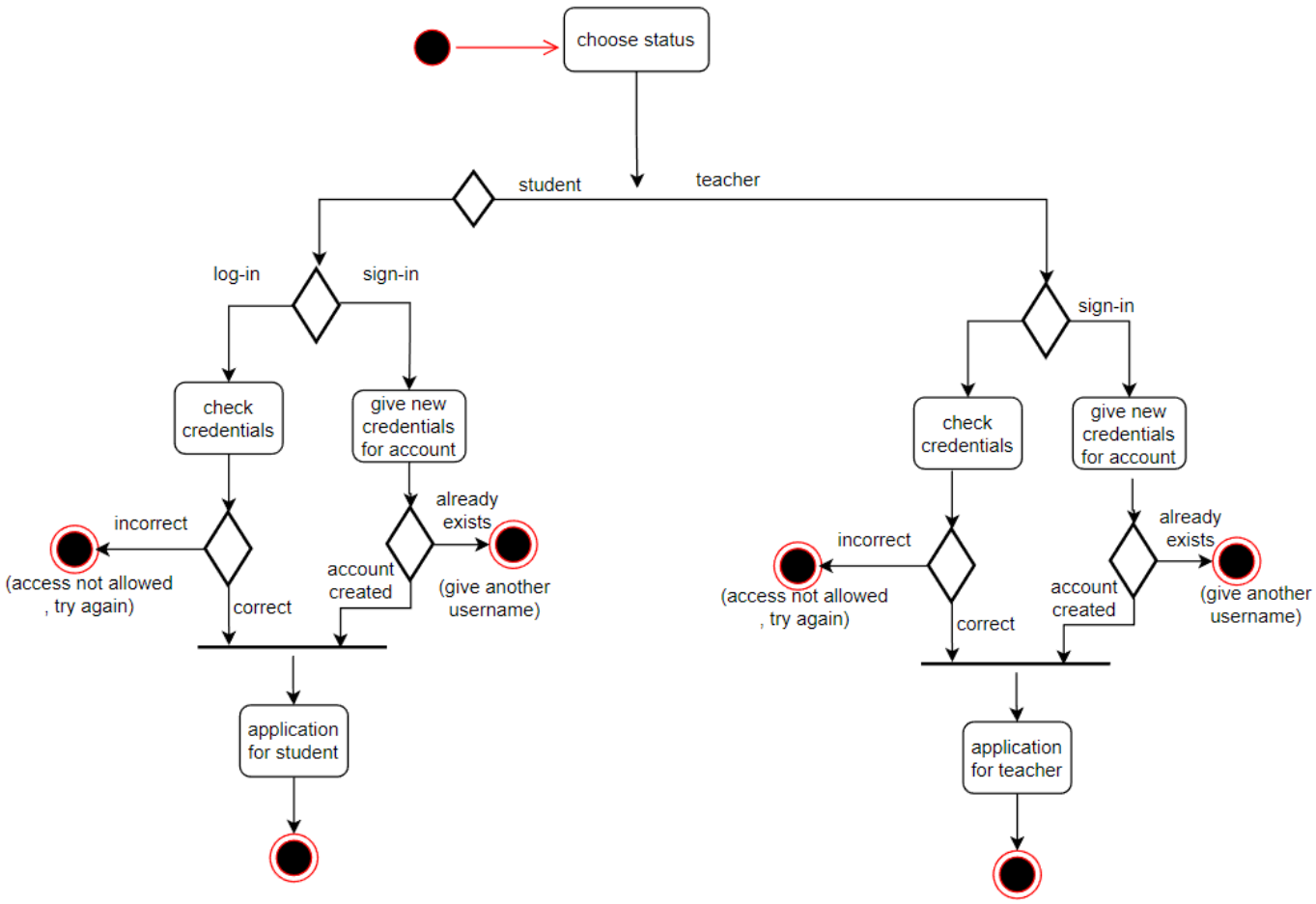
8.6. Sequence diagram

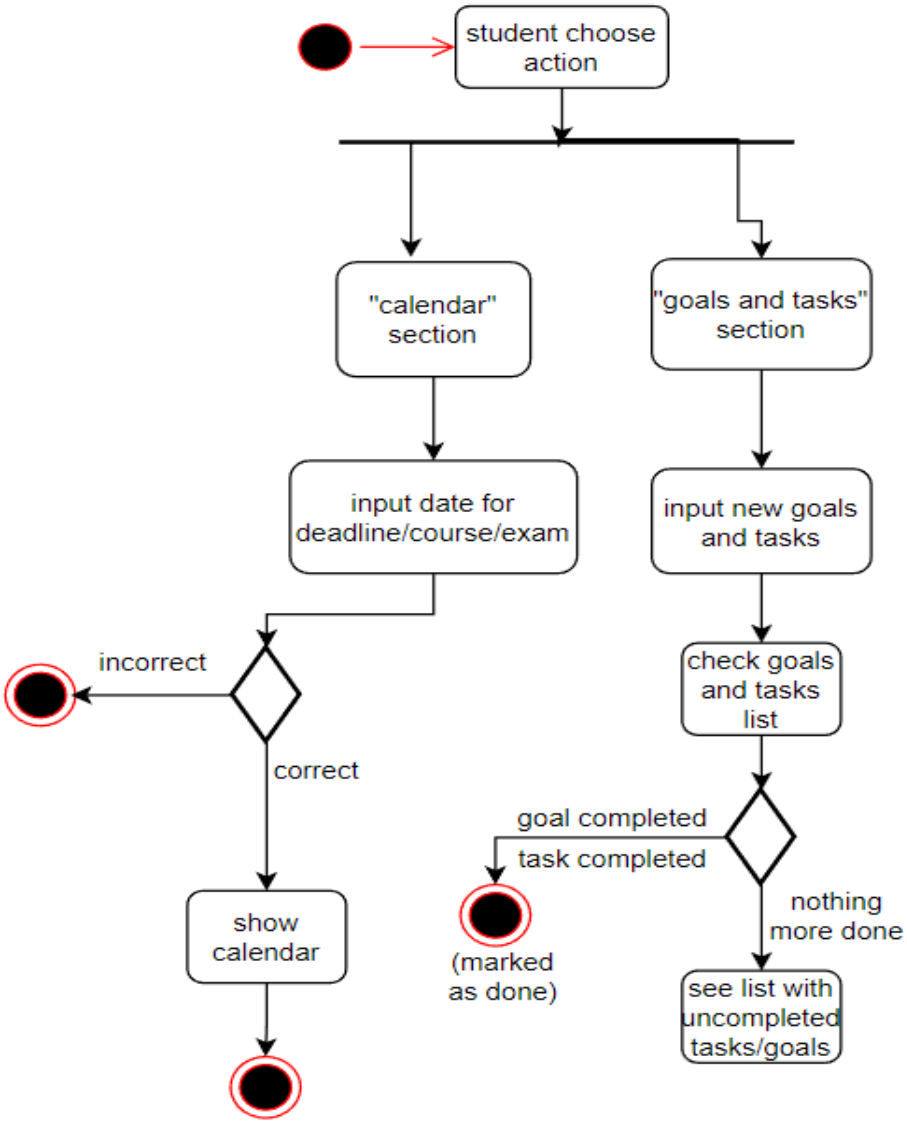


8.7. Activity Diagram

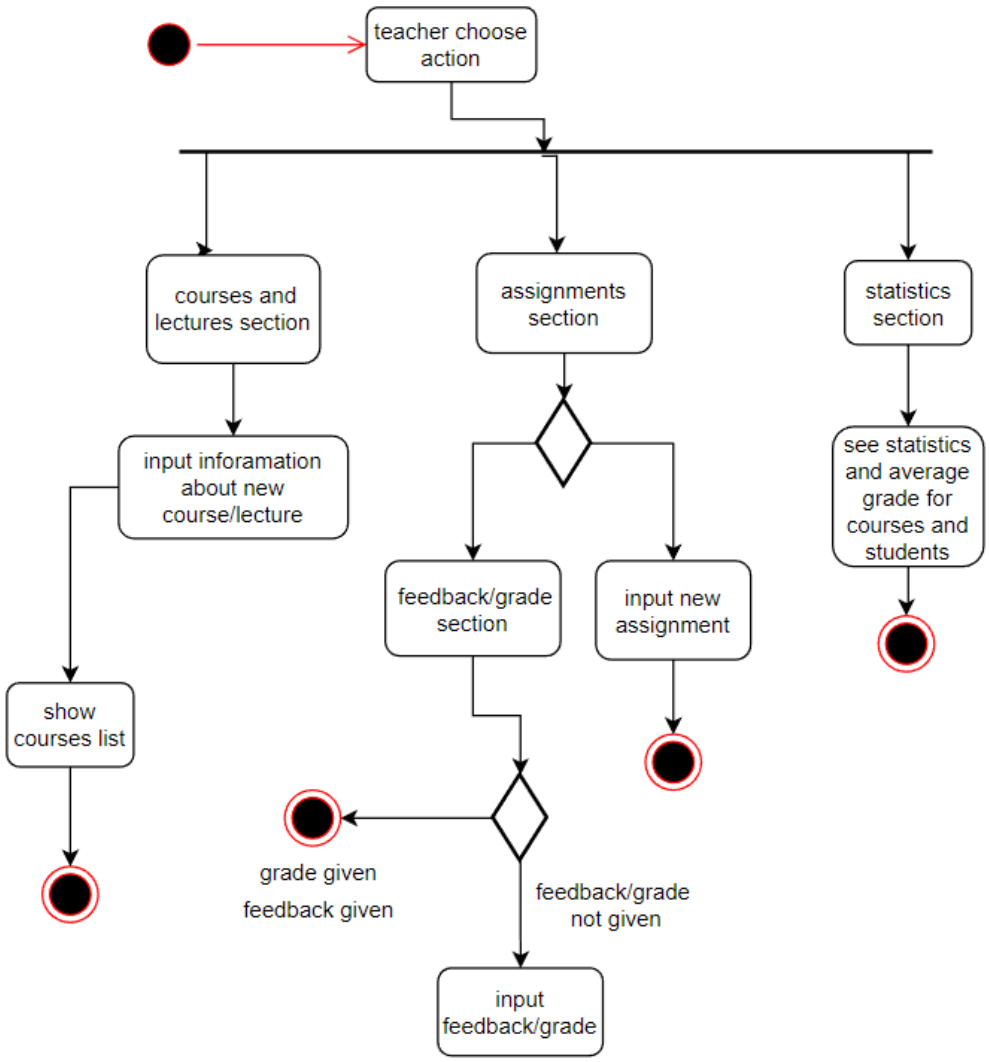
- For starting de application(logging in or signing in)



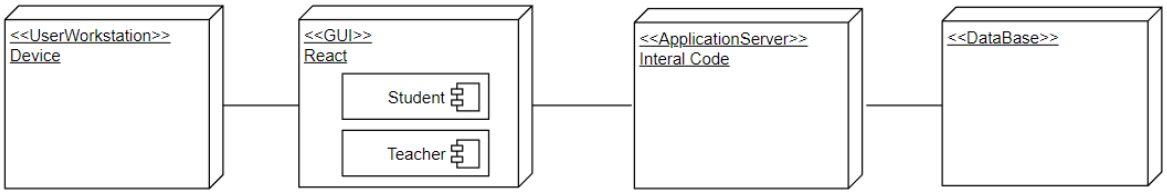
- for using the facilities provided for the student by the Study Planner Section



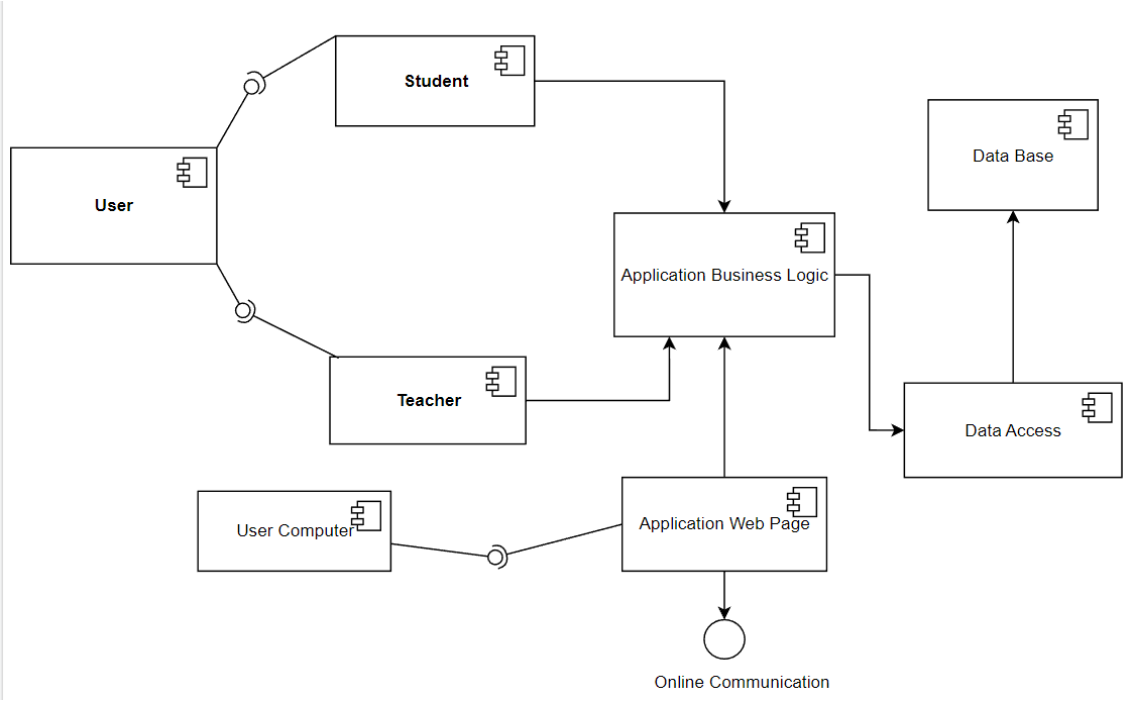
- for using the facilities provided for the teacher



8.8. Deployment Diagram

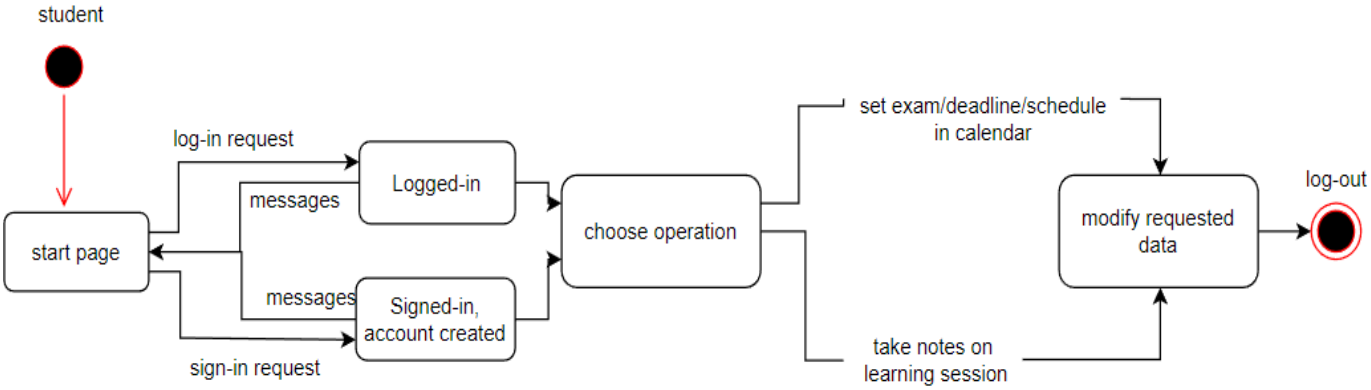


8.9. Component Diagram

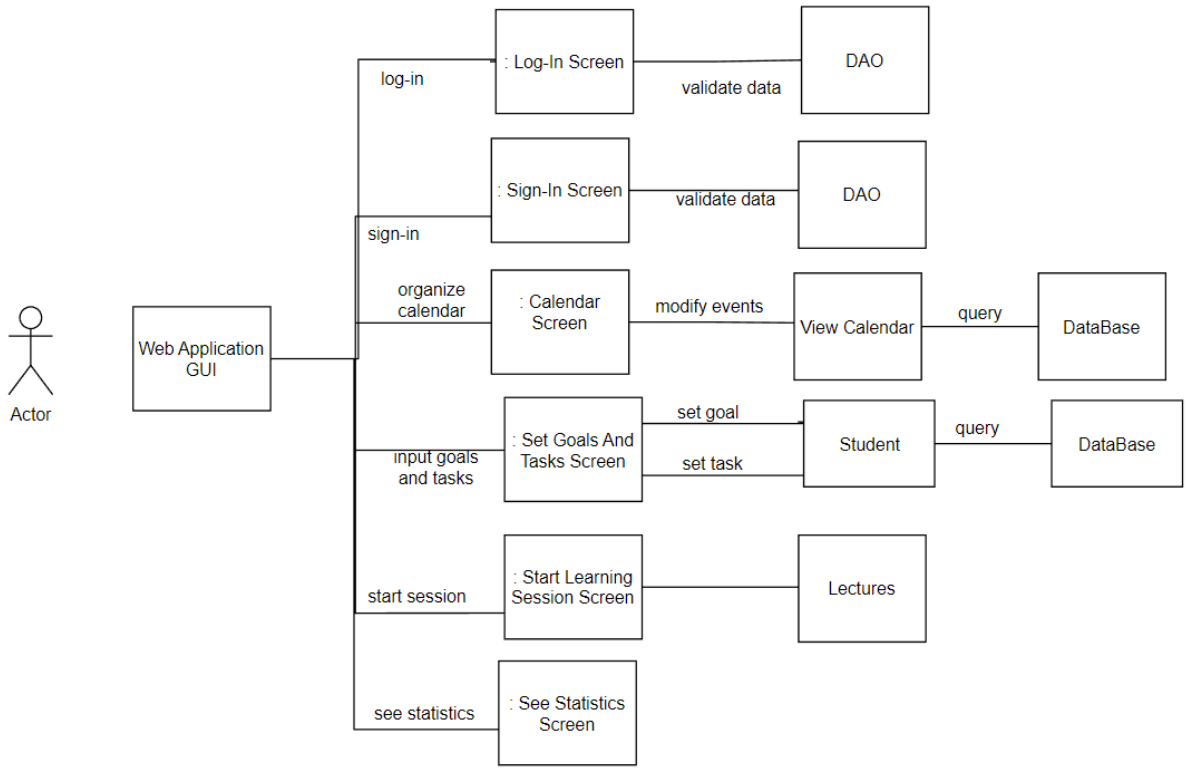


8.10. State Transition Diagram

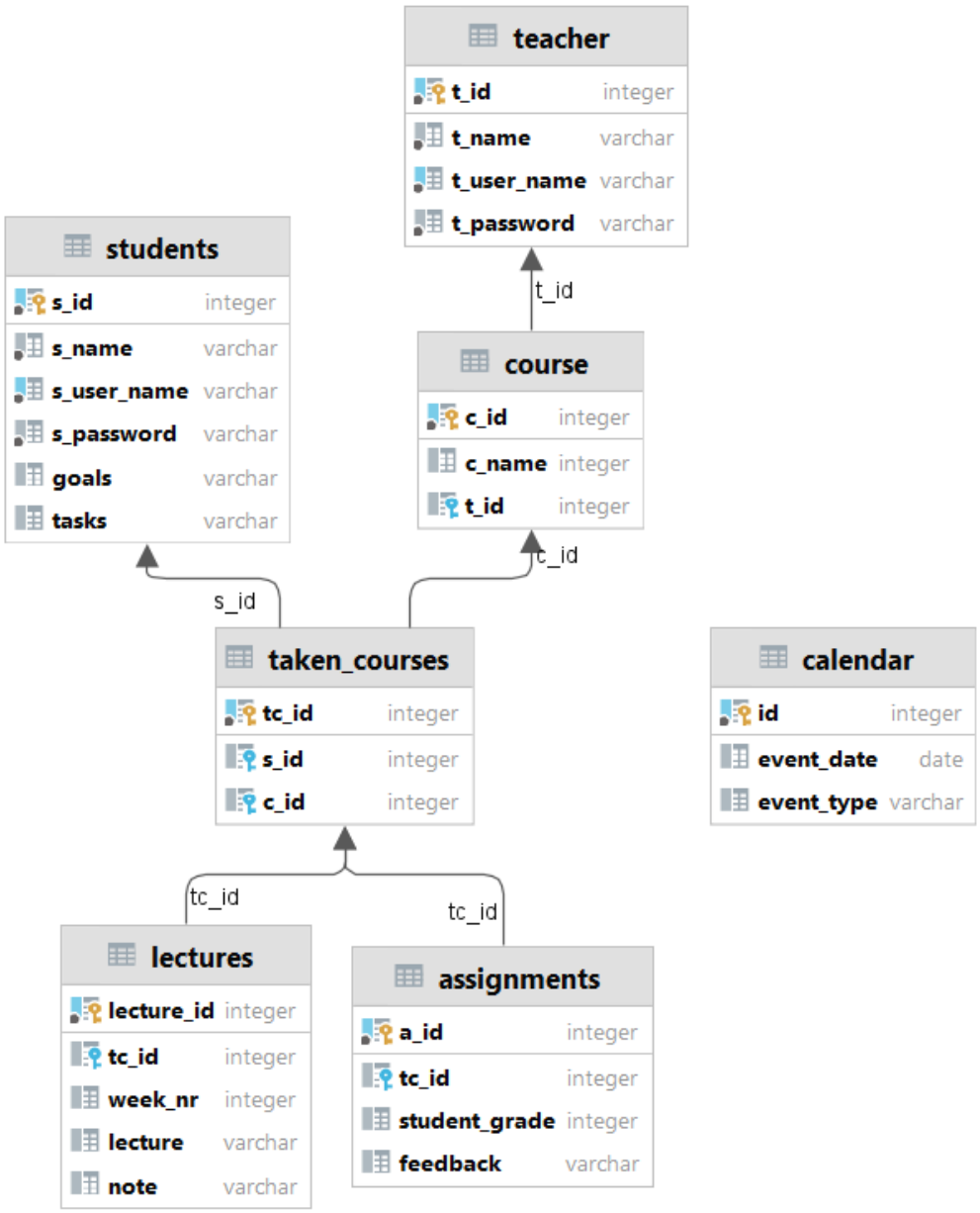
- for student activities



8.11. Communication Diagram

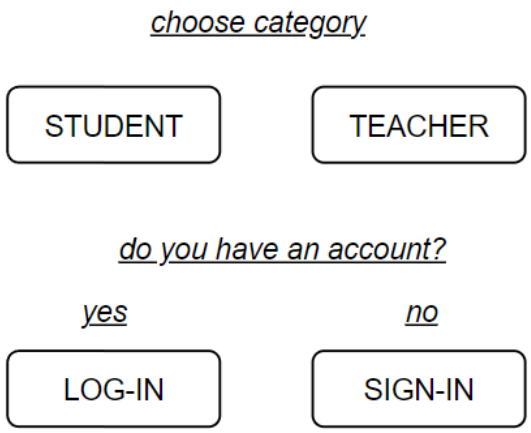


8.12. Data Base diagram



9. Operation Mode (Interactivity presentation) + screen shots (UI design)

In order to start the application the user has to open the web page and access their account. To do that, they have to choose what kind of user they are: student or teacher, and to choose to either log into an existing account or create a new one.



(start page)

From this window, one of the following two will open, depending om the chosen options.

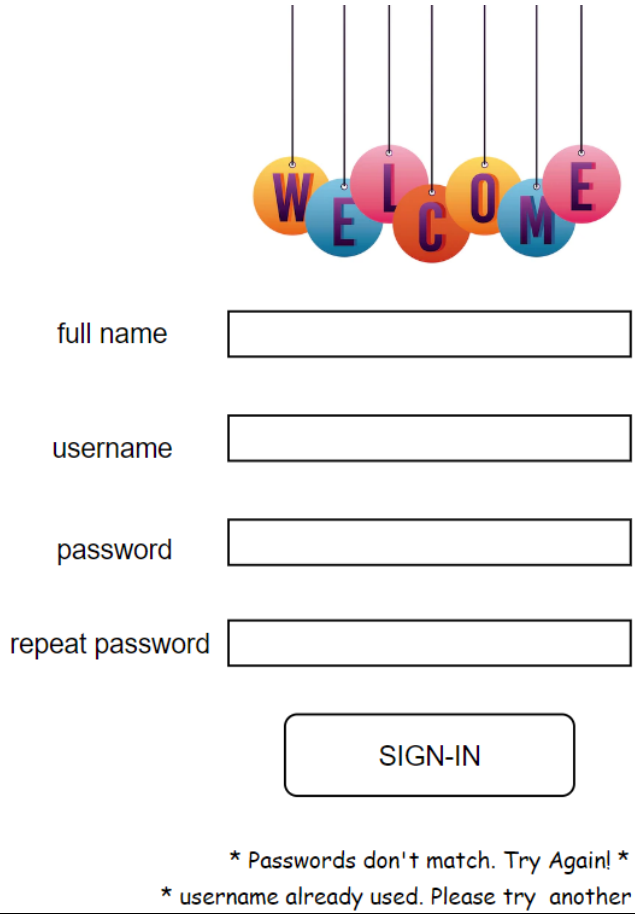
username

password

LOG-IN

* Your credentials are not correct. Please try again *

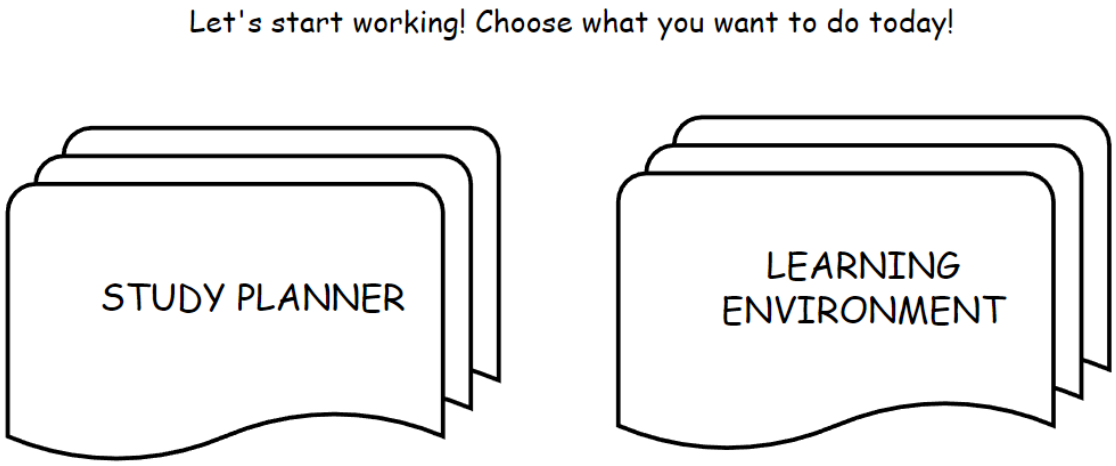
(log-in page)



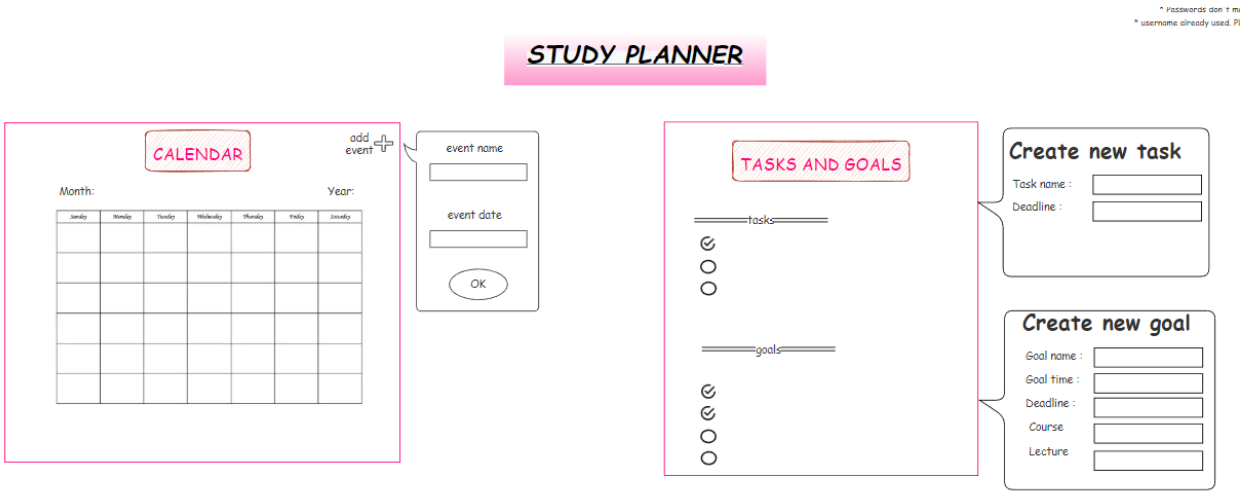
(sign-in page)

For both windows, the messages under the buttons appears in case of wrong credentials or other errors.

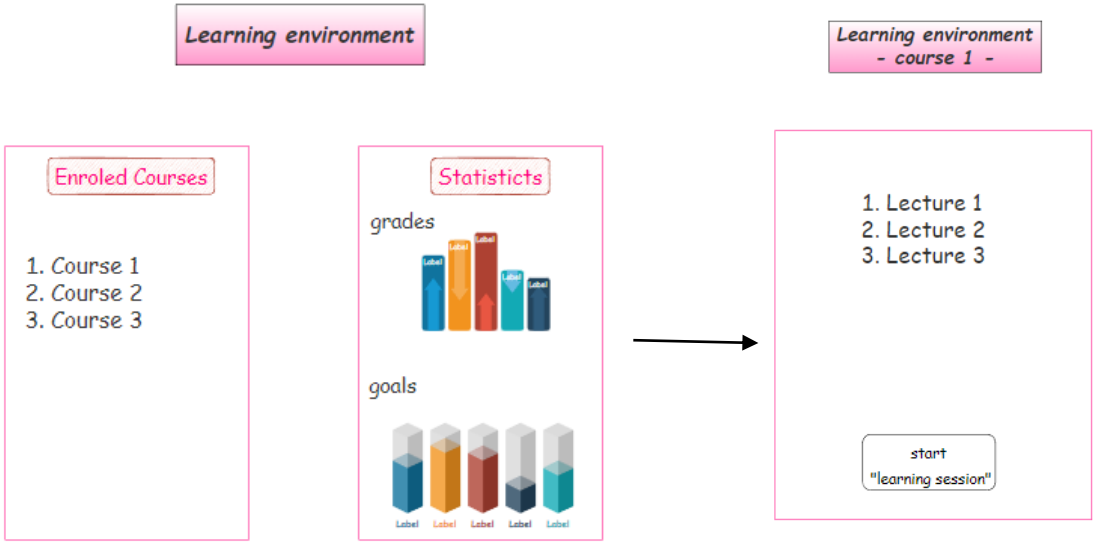
Once logged as a student, the following window will appear that will offer two main possibilities. Both represent a portal through the category mentioned, accessed by pressing the block.



First, I will show the interface for the Study Planner workspace. In the left hand size of the window is the calendar on which, by hitting the pluss button, the student can add event that he wants to organize. The name of the event and the date will pe inputed by the user and then the calendar will pe updated with the given event accessible.



For the Learning environemnt, the first things to see are the courses of the student and the overall statistic of its performance. Then, by clicking on the desired course, the list of lectures for that course will appear.



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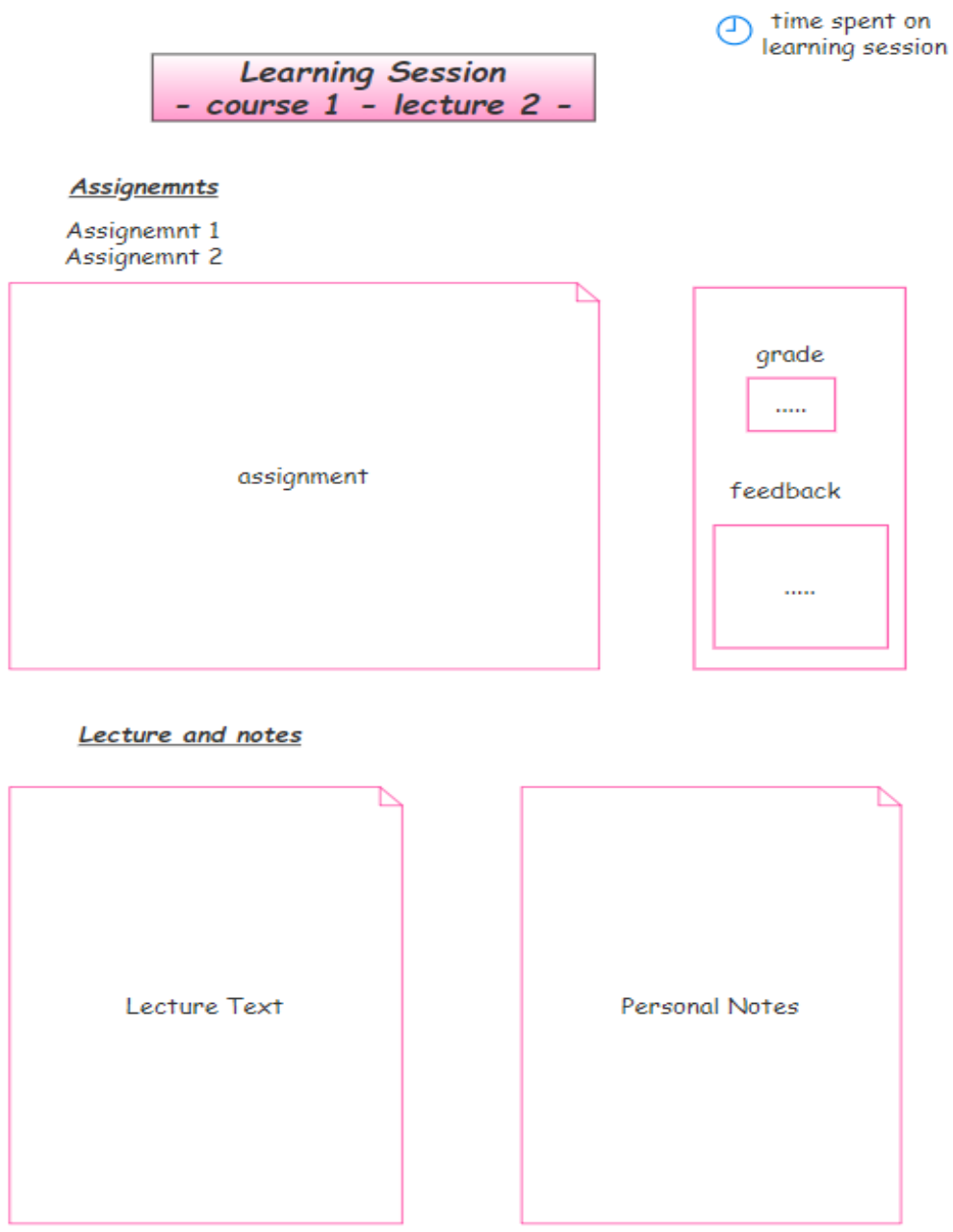
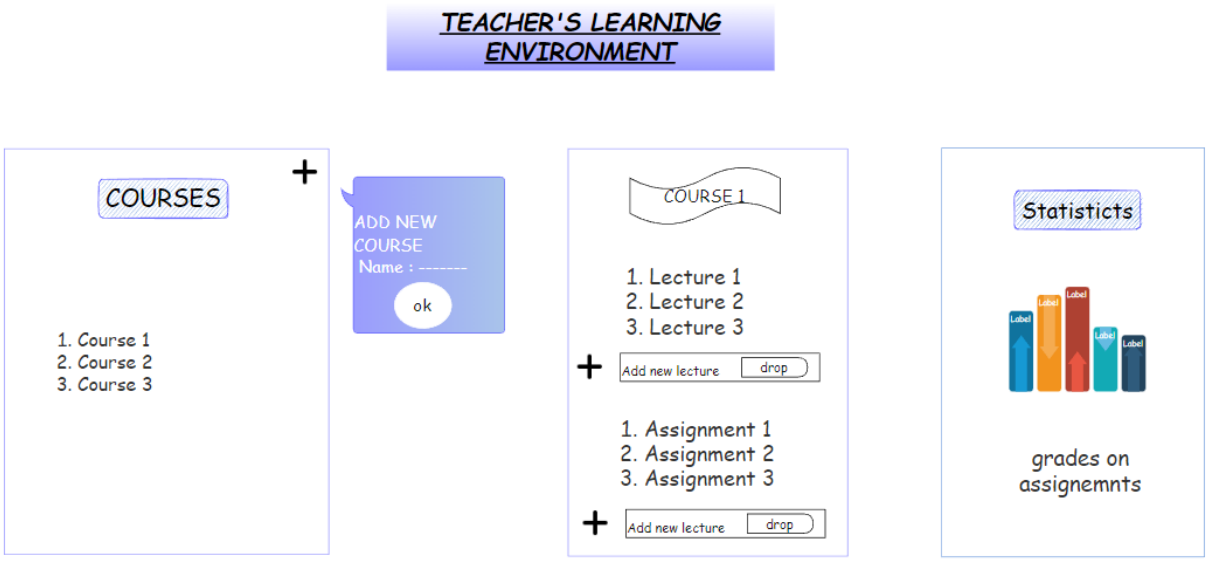
After clicking one lecture, the user will select for what lecture they want to start a learning session. A time counter counter will then register how much time the student spents on that lecture assignments, reading and taking notes on the respective lecture. It that lecture is associated with an existing goal, once the time reaches the one for the goal, a notification will apear and the goal will be marked as done.


time spent on learning session
Learning Session - course 1 - lecture 2 -
Assignemnts
Assignemnt 1
Assignemnt 2
assignment
grade
.....
feedback
.....
Lecture and notes
Lecture Text
Personal Notes

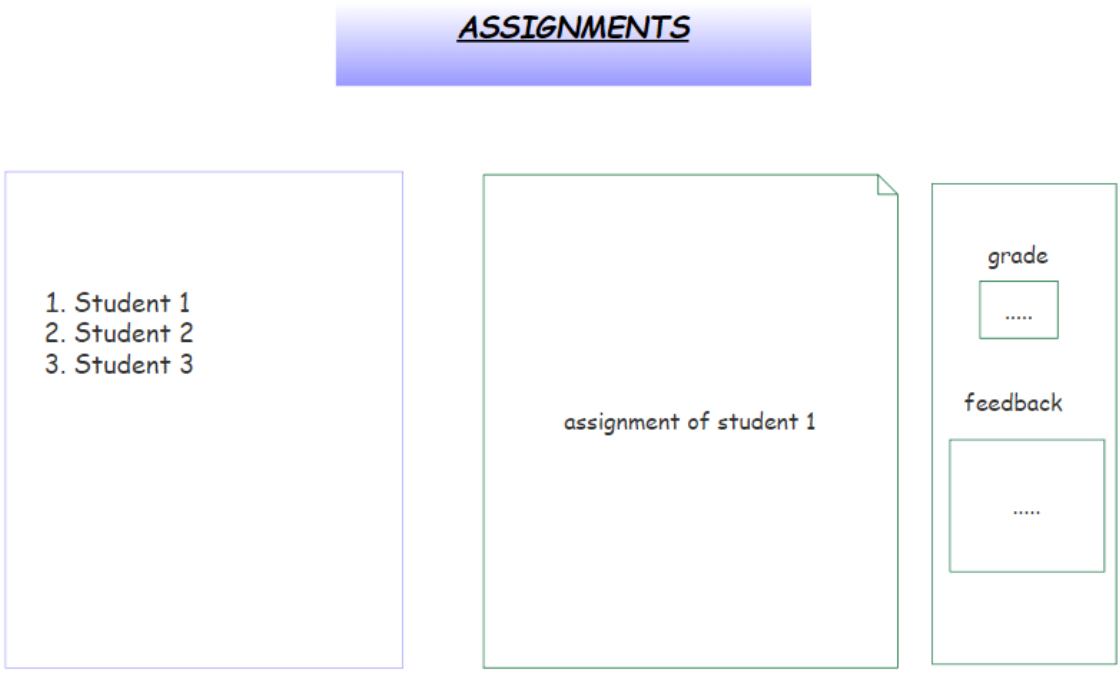
In the case of a teacher autentification, the functionalities and the page layout are diffedrent.

The teacher will be able to create a new course to which students can enrole, add lectures to those courses, assignments, give grades, feedback and see statistics.



The, by pressing on a course from the list, the content of that course is accessed, meaning lectures and assignments. Also, new ones can be added.

In a similar way, by pressing on a certain lecture assignemnt, the solutions from all the students are shown and ready to be graded and to be given a feedback.



10. Portability

Since the system is implemented in java using IntelliJ IDE, it is extremely easy to use it on another computer or to send it between users. This way, it is compatible with any device having a program that can execute java code. Regarding the operating system, the choice of working with a web interface facilitates the portability between operating systems.

By being accessible through a web browser, the portability of the application is higher than it would be for a simple singleton application.

11. Competing software

From my understanding, there are some planning applications, but mostly smart phone compatible, and a few online platforms used for educational purposes (communication student-teacher), but I didn't get to find one that combines the two concepts into one compact and easy to access application.

The "Study Planner and Learning Environment" web application provides great functionalities for the users, wrapped into an intuitive interface. Nevertheless, there is still place for improvement by adding additional functionalities.

One idea I will keep in mind for future improvements is to create a better communication between the user and the app by sending notification via email or any other easy to access method.

In conclusion, my application gives a great environments for educational purpose for both teacher and student. I consider its design appropriate and clear, with a good understanding of the main concepts.