POLYTECH®
GRENOBLE

SMART CLASSROOM

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General introduction: Smart Classroom project

Context

The aim of this project is to design a new innovative information system for the future of the classroom, by making easier and especially automating daily tasks. Although there are already four projects linked to the smart classroom and realized by ENSIMAG students, our module have to fit in well with the others in order to obtain a real innovative infrastructure.
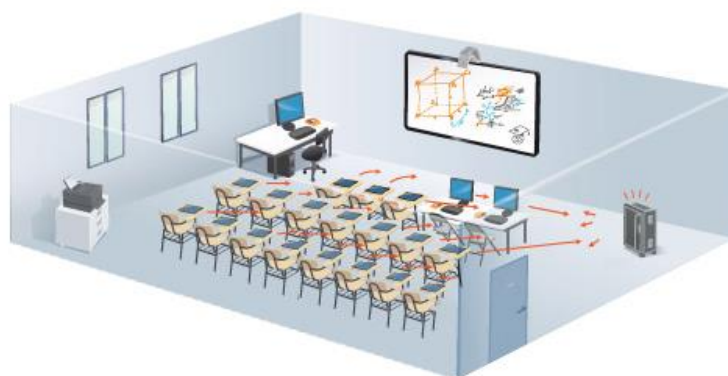
Description

Our product has to meet the following need:

Students come in class, announce their presence and get settled at their work station. The teacher does the same and accesses his platform where he can get courses and exams that he has created before. Then, the teacher can submit multiple-choice questionnaire to students. They answer to it individually before submitting their answer to the teacher. After that, he can refer to the results and publish it by theme. The teacher can start again a lesson if he sees that it hasn't been clear enough for his students. Finally, he can reorganize students by working group.

Product functions

- Individual and secured identification
- Creation of courses' constituents
- Reply to the test by the students
- Results display
- Reorganization of the students in working groups depending on their level

Product evolution

SmartClassroom project is based on a couple of storylines realized by different groups, and we are only working on one of these. Future upgrades of this environment could be put forward and implemented by other groups in charge of developing this project.

Our work

Why we chose to use Moodle?

The fact is that Moodle is already used by most of the French Universities. Lots of teachers share their courses to their students through that platform. The possibilities that Moodle provides are huge. We just had to adapt the existing project in order to obtain the desired behavior.

Tasks

In order to answer the client needs, we have defined different tasks. Our main task was to be able to connect to a Moodle account using a NFC tag. Other tasks are secondary and have been developed when first one was achieved. Furthermore, courses and exams modifications is already implements in Moodle.

- Study and understanding of the technologies we will use (CAS/LDAP, Cordova, etc.)
- Connection to Moodle account by means of the NFC tag
  - *"As a student or a teacher, I want to log in my Moodle account using a NFC tag so that I can directly access my personnal account."*
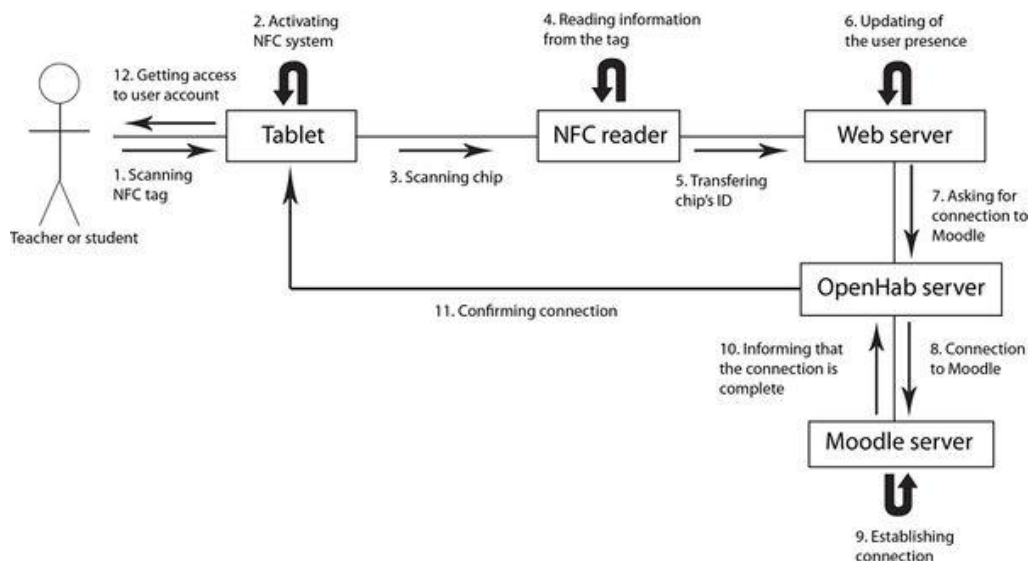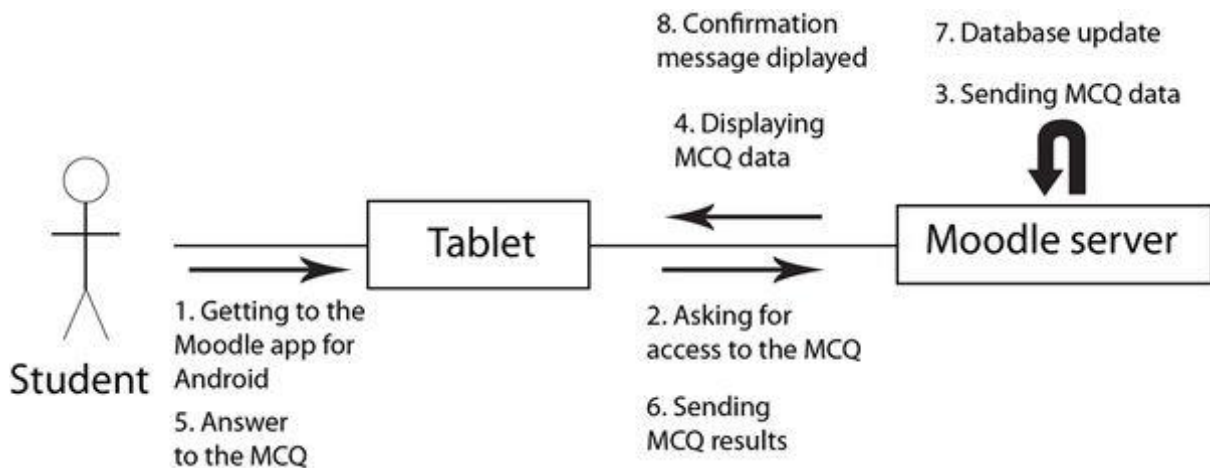
- Courses and exams modifications
  - *"As a teacher, I want to create, modify courses so I can display them on a screen or a wall."*
  - *"As a teacher, I want to create, modify and share quizzes with my students so they can answer it."*
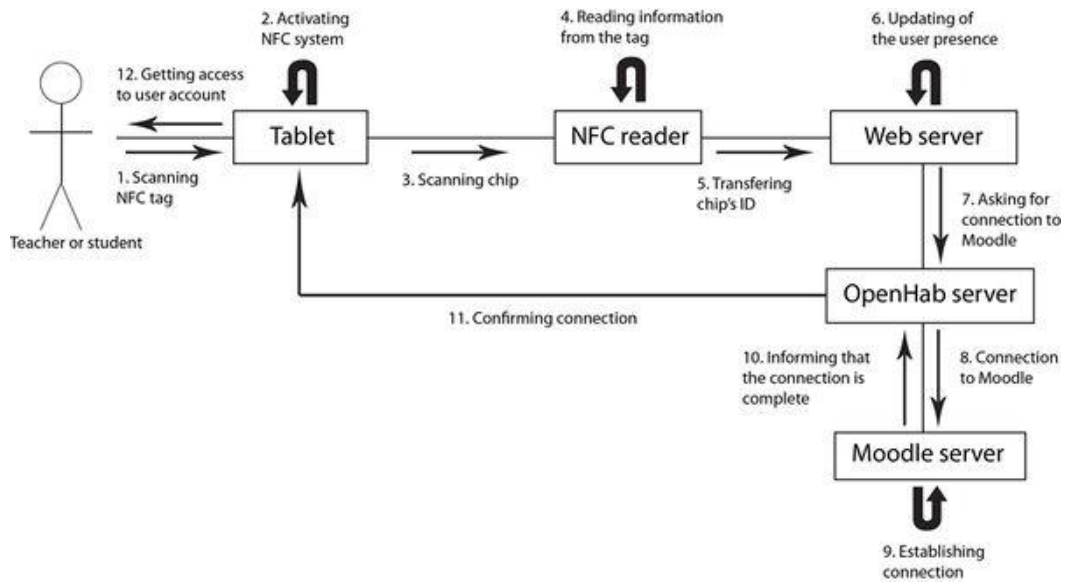
  - *"As a student, I want to be able to access the courses."*
  - *"As a student, I want to be able to answer the quizz."*

- Allow classic connection (username and password)
    - *"As a student or a teacher, I wish I could use classic connection so that I can access to my Moodle account with my username and my password.*
- Display of results for each student
    - *"As a teacher, I wish I could see the results of the quizzes."*
- Understanding actual Moodle architecture
    - *"As a teacher, I want to know which student is absent."*

- A task is finished when :
    - It responds to the associated user story
    - It has been tested by developers
    - It has been validated by the client

Sprints

- Understanding actual Moodle architecture
    - Code of mobile app and plug-in creation understanding
- CAS and LDAP understanding
    - This task was assigned to Anthony Leonard and Romain Barthelemy. They had to understand how LDAP and CAS work in order to begin the connection establishment.
- Connection establishment (4 weeks)
    - The aim is to understand which technologies are already used for Moodle connection.
    - The aim is to establish the connection to the student Moodle account while clock-in by means of the NFC tag.
- Connection optimization (1 week)
- Attendance management (2 weeks)
    - We have to think about a solution to manage attendance of the students

Because we were short on time, we couldn't make the following task:

- Results display (1 week)
    - The application has to provide tools to display results of quiz that have been answered.

Possible development

A huge improvement that can be done is to secure the system.

- IP verification, so that a student can't be recognized as present while he is at home
- NFC securing

Another thing that can be done is linking the attendance management with the students' schedule. Furthermore, the plugin which handles the auto-attendance can be modified so that we don't necessarily need to access a course resource to be marked as present.

We also hadn't enough time to implements the results display. We know that they are existing plugins that can probably be used directly, or modified to obtain the right behavior.

Encountered problems

Since we chose to work with Moodle to achieve our project we had to face some problems:

- We had to understand actual Moodle architecture (app side and server side), which consists in understanding thousands of coding lines.

- We had to understand how to implement our features in the existing server and application. On both sides, we couldn't just make a simple plugin:
  - For the Moodle mobile application, the Android manifest had to be changed in order to allow our application to start while tagging with the NFC tag. We also had to modify the existing code because we didn't want the application to keep information about past connections.
  - For the server, we changed an existing plugin in order to obtain the desired behavior. But a line has been changed so that when we connect to a Moodle account, the password is not changed with the id of the NFC tag.

Our application, based on the existing Moodle application (available on Google Play) works well, except that to access some resources we needed to connect a second time to our account. That behavior is a little bit weird because the application should automatically connect to the Moodle server. However, this was not especially specified in the technical specifications and our work is done well.

Some of the technologies we used were new for most of us. We had to document ourselves on those before using it properly.

Conclusion

We just made one small project inside the Smart Classroom. We managed to make most of the tasks we imagined and our final product meet the client expectation. There are still some improvements that can be carried out to finalize our work but we are confident that it could be implanted in the existing application. We had to face some problems but we managed to overstep them and we learned to work with different new technologies.