Unisalento Facebook App: A Window On The University Services From Facebook

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ABSTRACT

This paper reports the results of an experiment in integration and interoperability between Web services offered by the University of Salento and the most popular and branched system of social networking on the net, Facebook. This experiment aims to extend the boundaries of web services offered by the Unisalento to their students, up to "land up" on Facebook. Therefore, the main objective of this experiment is to grant to the students of the University, the opportunity to create a point of access and use of the Unisalento's web services, within his/her own homepage on Facebook. Thinking in this sense, universities are increasingly extending its boundaries up to meet the social network tools, in an attempt to open a window on its services, in the ludic-recreational context that these tools are able to offer.

Keywords: Web 2.0, Interoperability, Online Academic Services to the Student, Social networking, Facebook, Facebook App.

1. INTRODUCTION

The interest of young people to the Web 2.0 technologies (such as blogs, podcasts, wikis and social networking sites) is increasingly pervasive. In many ways, their online lives blends seamlessly with their corresponding offline world. In fact, from this point of view, Internet is playing such an important role in the social life of today young people, to be the main instrument of communication between them and the world around them, including that of academia. In this context, the social networking tools, and in particular Facebook [www.facebook.com], are increasingly becoming dominant and ubiquitous in the Internet. At the moment, in fact, social networks are able to support and / or strengthen both the social online and offline life of the students.

Thinking in this sense, universities are increasingly extending its boundaries up to meet the social network tools, in an attempt to open a window on its services, in the ludic-recreational context that these tools are able to offer. Today, especially Facebook, represents an opportunity for universities to implement and to distribute, through preferential channels, a number of applications, called Facebook Apps, whose main characteristic is to be integrated into the social networking tool itself.

In this paper we introduce the Facebook Application developed by the University of Salento [www.unisalento.it] and called *Unisalento Facebook App*, through which the university built a new access point to its information system.

The project requirements of *Unisalento Facebook App* include the creation of a web application that is fully integrated into Facebook, in order to reach as many *Unisalento*'s students as possible, first of all those who already have a Facebook account. In fact, it is precisely the context in which the application is located to represent the key aspect, translated in terms of increase of the distribution and of the use of the University services

Finally, it is worthwhile to emphasize the special attention that was paid to aspects such as flexibility and security, in managing student sensitive data, during the interactions between the Facebook App and the Unisalento's Informative System.

2. STATE OF THE ART

Most of the research works that are concerning with Facebook and the students have focus on theme like emotional effect [1], the social adaptation [2], the relationship between students and faculties [3], the adoption of the social media technologies and the daily use of Facebook [4], and the main student activities on Facebook. As we know, today students use Facebook even more; in fact, Hewitt and Forte [5] have found that the 79% of the students use Facebook. In 2007, the usage has increased to 94% [6] and up to 96% in 2012 [7]. So, it's clear that the impact of Facebook on the students cannot be neglected. Ellison, Steinfield, and Lampe have found that the 94% of the students have a Facebook account and that they remain connected on average 10-30 minutes a day. Pempek et al. have surveyed undergraduate students that claim of using Facebook for 30 minutes throughout the day. More recently, Kalpidou, Costin, and Morris [8] found that students use Facebook 60-120 minutes a day. A new study (Wheeler, 2011) has found that the rapid growth of the social networks impacts on the whole population, even if the most dramatic effects are on the students. Madge et al. [9] argue that students use Facebook to keep in touch with existing friends, they specifically join Facebook's university sites to enhance their social integration. University and institutions of higher education around the world began to focus on the benefits of Facebook for educational purposes [10]. Hewitt and Forte (2006) claimed that 33% of the students were of the opinion that their faculty should not open a

Facebook account.

Pempek et al. (2009) found that 17% of the students that have a Facebook account, use it to communicate with students from the same campus, while 50% use Facebook to communicate with off-campus friends. Raacke and Bonds-Raacke [11] found that only 10.9% use Facebook for academic purposes.

More and more educational institutions use social networks for academic purposes, there are numerous Facebook applications, but most of them are related to e-learning experiments or library catalogue.

In our opinion, only two of these are particularly interesting, and they are from the University of Leicester and the Pardue University.

The first, *MyLeicester*, is an online portal, developed for the University of Leicester by *Azorus*, a company specializing in the production of CRM (Customer Relationship Management) for the statement. *MyLeicester* is fully integrated into Facebook in the form of application, and allows students to be constantly updated on a series of user-selectable information relating to courses attended. In fact, for each update of the information the student is interested, the system generates and sends a notification message to the student account.

The second example, and perhaps most interestingly, is called *Mixable*. This project was developed at the Department of Information Technology of the U.S. Pardue University. The main objective of *Mixable* is to "mix" educational and recreational activities in one Facebook application. In particular, *Mixable* seeks to harness the enthusiasm and the ease with which people use Facebook for teaching purposes. *Mixable*, in fact, allows students to use their Facebook accounts to work with a number of online study groups, which are generated from the students who attend the same class. The system also allows students to choose between two different levels of privacy, deciding whether to connect in an active study groups or follow passively the various topics.

For both social applications considered worth dwelling on what happens in terms of security. Both case studies, in fact, use a nearly transparent user authentication mechanism: the first uses directly the Facebook authentication, while the second uses the authentication mechanism of the university.

3. APPLICATION CONTEXT

With the experiment discussed in this paper, the University has tried to play a real role in the world of social network tool. The University main intent, in fact, is to bring near the students to the traditional information systems, integrating them in a very friendly environment.

With this intent, *Unisalento Facebook App* integrates in Facebook the University's Student Career Management System, the University's Intranet and the ticketing support system (all systems are described in detail below).

Facebook

Facebook is the most popular social networking web site, and the Facebook users do not need any training on its usage.

The term Facebook application refers to a web application whose interface relates and integrates seamlessly with the environment made available by Facebook. This application is published and distributed through the web server owned by the owner's application, under his own responsibility.

In general, the integration of a Facebook application in Facebook is realized through the use of a HTML iFrame, in which is loaded and displayed the web application. Such a solution allows web browsers to manage the application in a completely detached from the additional Facebook services. In fact, the separation operated by iFrame HTML is only apparent, since it is still possible for the client application to communicate with Facebook, through a communication channel in order to benefits of all the features and capabilities that the social network offers.

Esse3 - Student Career Management System

Esse3 [http://studenti.unisalento.it] – represents the information system for managing the careers of students used in the University of Salento, and is developed in collaboration with CINECA KION [www.kion.it]. The system architecture provides a client-server application, available via terminal server, and via a web portal. While the client-server application access is restricted, in various ways, to the administrative staff, the web portal - Web Portal Esse3 - is instead accessible to teachers and students of the University, behind inserting their credentials. Among the main features that the student portal offers, it is included:

- the registration and the enrolment to the various courses of study;
- payment of tuition fees, including credit card payment;
- consultation of the calendar of exam date;
- consultation of the student's exam booklet.

For teachers, however, the most innovative features offered by the portal web Esse3 are:

- the digital signature of the records of examination results;
- the online publication of the results of the examination.

Both these features imply several positive aspects for teachers and students; in fact, through the portal Esse3, teachers have the opportunity to publish the results of the exams to students as soon as they are available. Once published, the results can be accessed via the web by the student, and simultaneously accepted / rejected up to 5 days after the date of publication.

University's Intranet

The University's Intranet [http://intranet.unisalento.it] was created using Liferay Social Office as a framework. Liferay Social Office is one of the most common Enterprise Social Collaboration management suite, that, in turn, is based on the open source web platform, called Liferay Portal. The University's Intranet allows the creation and development of a network, which is able to manage and to support the communication and the collaboration among the actors of the University. From the didactical point of view, the Intranet is the access point for the publication and consultation of the training documents, including teaching materials corresponding to each course.

Helpdesk - Ticketing system

Helpdesk [http://helpdesk.unisalento.it] is the multi-channel ticketing system adopted by the Universiy of Salento. This system is able to assist and support the entire process of management reports, or ticket, advanced by each member of the University. In particular, the University Helpdesk allows users to request support when there is a major abnormality of administrative and / or computer using the services offered by the Information System. Moreover, the *Helpdesk* system makes it possible to completely trace the life cycle of an alert using a wide range of states.

Identity and Access Management System - IAMS

With regard to the management of digital identities of the students, the University has adopted a facility called IAMS

(Identity and Access Management System) through which it's possible to centrally manage and store the students' credentials.
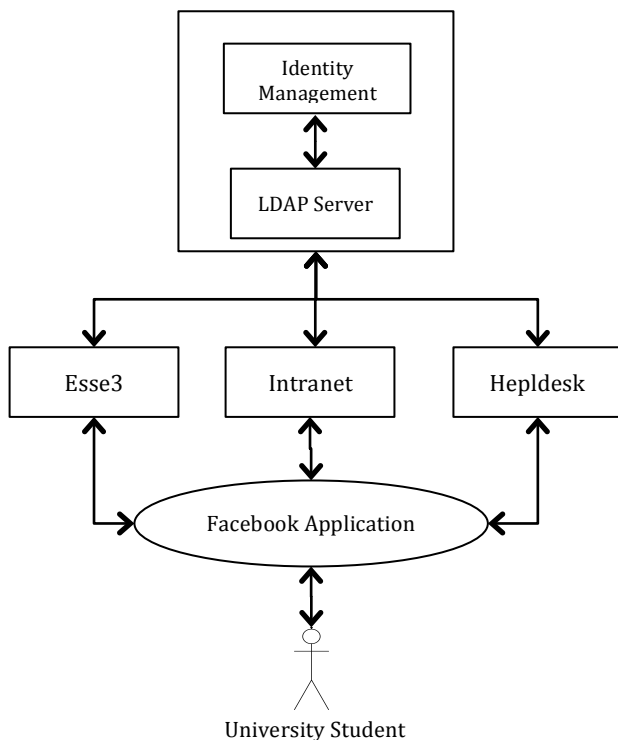
Figure 1 – Unisalento Facebook App: Authentication process

In Figure 1 is presented the general outline of such an infrastructure. To manage the authentication and authorization, *Unisalento Facebook App* uses the communication protocol called *OAuth 2.0*, which is also the Facebook platform standard. The University uses Shibboleth to implement the SSO system. This system is an open source project, created by the Internet2 consortium, useful to create a federated authentication and authorization infrastructure.

4. UNISALENTO FACEBOOK APP

Requirements

The most important requirement for *Unisalento Facebook App* is the ability to ensure to a generic student to access to the University web services, such as the exam timetable and the course notes, using a special application, which is available and integrated in an environment the more congenial possible. In this regard, it was necessary to identify precisely the environment in which to integrate this application, and our choice was been Facebook. After that, it was necessary to identify which systems and which services make available on Facebook.
After a careful analysis, also based on the percentage of use of each system by the students, we have selected the following:
- Student Web Portal Esse3
- University's Intranet
- University's Helpdesk.

Another stringent requirement for the *Unisalento Facebook App* is the access under authentication; in fact, the application is restricted to the University students, and so, no access is provided for guest users.

The login credentials that the student uses to login on the application are: the institutional email address and the corresponding password. If the authentication is successfully then the student will be simultaneously logged into all three of the above systems.

The university, in fact, has a Master Registry, based on Single Sign On, which is able to provide a centralized authentication via server LDAP. Therefore, every system of the University, whose access requires user authentication, refers to this system of Master Registry.

The student, once has properly done the login to the Facebook Application, can:
- consult the dates of exams and any related variations;
- consult the intermediate trials of examination incurred;
- decide whether to accept or reject the outcome of a test proposed by the teacher;
- access and download course materials and any information made available by the teacher on the University Intranet;
- view the FAQ relating to anomalies occurred previously on the information system, and whose solution has been prototyped;
- open a ticket on the *Helpdesk* system;
- consult the state of closure, and the eventual solution, of a previously opened ticket.

At this set of functional requirements, we have to consider other non-functional ones and related to the mode of implementation, usability and accessibility of the application. In this regard, the application must:
- be a dynamic web application;
- be written in the PHP programming language;
- be ready into 30 days;
- guarantee high levels of safety in managing of the user credentials;
- display the contents in a clear and simple way.

System Architecture

In Figure 2, we present the architecture of the implemented system. This is a usual client-server 3-tiered system.

Figure 2 – Unisalento Facebook App: System Architecture - client-server interaction

As shown in Figure 2, *Unisalento Facebook App* is installed on a Unisalento's server by the following features:
- Apache web server
- Interpreter PHP5 with *cURL* extension.

Unisalento Facebook App also uses the *cURL* utility offered by the PHP, to do the authentication on the University's Intranet. The library *cURL*, in fact, has methods that allow to:
- make calls to remote URLs;
- perform the submit fields of a form using the post method of the HTTP protocol;

- simulate the computing environment of a typical web browser, including managing web cookies and sessions.

As we said before, the University of Salento uses Shibboleth to implement the Single Sign On. At every user attempt to access to the University's various web services, Shibboleth verifies that the user login is valid using the following entities:

- **Identity Provider (IdP):** is the software module that allows the student to perform the authentication process, and which is suitably configured to be able to retrieve user information by accessing directly the University 's LDAP server;
- **Service Provider (SP):** is the software module run by the University, by which it's possible to log on to the reserved services.

Unisalento Facebook App was implemented using the open source framework *CodeIgniter* [http://codeigniter.com]. *CodeIgniter* is a toolkit designed to support the development of applications written in PHP. It makes available a set of libraries that frees the programmer from the commitment to codify the common features.

The *CodeIgniter* framework has been selected as a development tool for the following reasons:

- allows to develop code using the Model-View-Controller pattern (MVC), in order to separate the application business logic from the content presentation;
- ensures some flexibility in designing the application, offering to the programmer the opportunity to use or not the MVC model, because it could represent only unwanted complexity, compared to the option of using just the controller and the view.

Design

At the design stage, for the purposes of representation of the system requirements we have used the standard notation UML. In particular, the diagrams used for the formalization of the requirements are: Use case, Class Diagram, Activity Diagram and Collaboration Diagram. We will proceed by examining and briefly discussing the most important UML diagrams.

Use Case

The use case we will introduce are related to the management of the exams and to the management of documents, bearing in mind that, for each diagram, the following assumptions are made:

- the student has successfully authenticate on the Facebook social network;
- the student has expressly authorized the execution of *Unisalento Facebook App*; it is important to note that at the first use of *Unisalento Facebook App*, the student will be required to authenticate to each of the three university systems in the game.
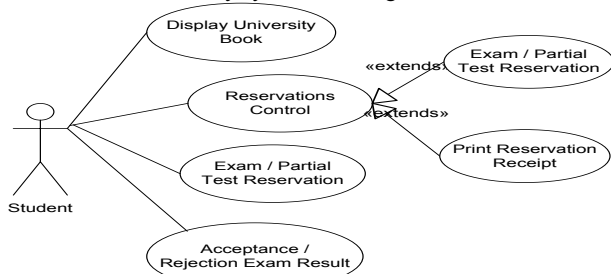
Figure 3 - Exam Management: List of the available system features

Exam Management Use Case

In the use case called Exam Management (see Figure 3), the student consults his/her university book, manages his/her reservation to the exams and accesses to the features of verbalization of his/her competence.

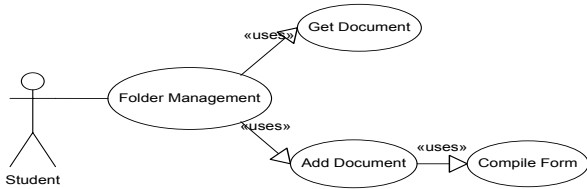| DISPLAY UNIVERSITY BOOK	
STUDENT	**SYSTEM**
1. *Precondition*: to take advantage of this feature, the student has to complete successfully authentication on *Unisalento Facebook App*.	The system displays the list of features related to the exams management.
2. The student views the menu of the available features and decides to consult his university book.	The system queries the corresponding portal page and displays the details about the university book to the student.
3. The student consults the teaching activity list presents in his study plan.	

RESERVATIONS CONTROL	
STUDENT	**SYSTEM**
1. Precondition: to take advantage of this feature, the student has to complete successfully authentication on *Unisalento Facebook App*.	The system displays the list of features related to the exams management.
2. The student views the menu of the available features and decides to consult his exam reservations.	The system queries the corresponding students portal page and displays the list of the exam reservations made by the student. At this point, the same student can access the details of each reservation.
3. The student consults his list of exam reservations, and decides whether to print a reservation receipt or to proceed with the cancellation of one or more of these.	The system, according to what is decided by the user, responds to the request by carrying out, alternatively, one of the following: • shows the receipt of reservation to the student, allowing the printing of the document; • eliminates the instance of reservation indicated by the student and reload the exam reservation board.
4. The student consults the information set of interest, with the possibility to act again on the same.	

EXAM / PARTIAL TEST RESERVATION	
STUDENT	**SYSTEM**
1. Precondition: to take advantage of this feature, the student has to complete successfully authentication on *Unisalento Facebook App*.	The system displays the list of features related to the exams management.
2. The student views the menu of the available features and decides to make a reservation to an exam or to a partial test.	The system makes a call to the corresponding portal page and displays the list of the exams / partial tests that the student can book at the current date.
3. The student selects the exam from the list, he intends to make a reservation.	The system queries the corresponding portal page and displays the information details of the exam selected by the student. At the same time, the system is ready to accept the confirmation for the reservation.
4. The student confirms the exam reservation using the dedicated button.	The system reloads the detail page of the selected exam. In the same page, the system displays the outcome of the reservation attempt.
5. The student consults the outcome of his reservation.	

ACCEPTANCE / REJECTION EXAM RESULT	
STUDENT	**SYSTEM**
1. *Precondition*: to take advantage of this feature, the student has to complete successfully authentication on *Unisalento Facebook App*.	The system displays the list of features related to the exams management.
2. The student views the menu of available features and decides to check the outcomes board.	The system queries the corresponding student portal page and displays the exams list for which the teacher has published the outcome.
3. The student selects from the list the outcome of interest.	The system queries the corresponding student portal page and displays the detail information about the selected outcome. At the same time, the system is ready to allow the student to accept or reject the outcome proposed by the teacher.
4. The student decides alternatively to leave the system without making a choice or to express his agreement / disagreement about the proposed outcome and to confirm his decision to the system.	The system saves the decision expressed by the student and reloads the updated version of the outcome board.

Document Management Use Case

In the use case called *Document Management* (see Figure 4), students can swap documents with the groups of courses of study they belong. The student for being part of a study group has to fill a form, available on the intranet of the University.

Figure 4 - Document Management: List of the available system features

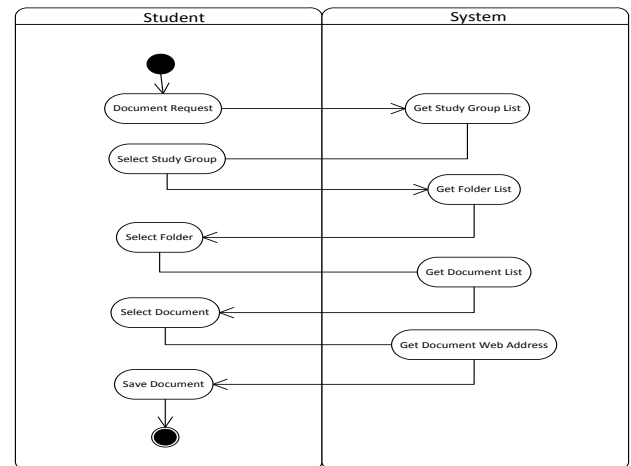| GET DOCUMENT	
STUDENT	**SYSTEM**
1. *Precondition*: to take advantage of this feature, the student has to complete successfully authentication on *Unisalento Facebook App*.	The system queries the corresponding page of the University's Intranet and displays the list of study groups the student belongs to.
2. The student consults the list of study groups and selects the one of interest.	The system queries the corresponding page of the University's intranet and displays the folder hierarchy of documents corresponding to the selected study group.
3. The student consults the contents of the folder of interest.	The system queries the corresponding page of the University's intranet and displays the contents of the folder selected by the student.
4. The student selects the file of interest.	The system queries the corresponding page of the University's intranet and returns to the student the selected file, by retrieving it from the web address where it is published.
5. The student downloads the requested file.	

ADD DOCUMENT	
STUDENT	**SYSTEM**
1. *Precondition*: to take advantage of this feature, the student has to complete successfully authentication on *Unisalento Facebook App*.	The system queries the corresponding page of the University's Intranet and displays the list of study groups the student belongs.
2. The student consults the list of study groups and selects the one of interest.	The system queries the corresponding page of the University's intranet and displays the folder hierarchy of documents corresponding to the selected study group.
3. The student consults the contents of the folder of interest.	The system queries the corresponding page of the University's intranet and displays the contents of the folder selected by the student.
4. The student decides to add a new document.	The system queries the corresponding page of the University's intranet and displays the form to upload a new document.
5. The student performs the upload of the document by giving it a title, a description and a set of possible tags. The student can also set file permissions for each user profile.	The system checks the correct filling and formatting of the form fields for uploading the document. If validation is successful, the system publishes the document on the University's intranet (step 6), otherwise the system proposes the upload form, displaying the error message (step 5).
6. The student views the outcome of the publication of the document in the selected folder.	

Activity Diagram

Once identified the application requirements and taking into account the Exam and the Document Management use case, we proceed with the introduction of some Activity Diagrams, trying to detail the sequence of activities performed by the student and by the system in order to reproduce as provided for in each use case.

Get Document Activity Diagram

The following diagram (see Figure 5) describes the alternation of operations required for the student to obtain a local copy of a document posted on the University's Intranet.

Figure 5 - Get Document: Document request process

Add Document Activity Diagram

The following diagram (see Figure 6) describes the alternation of operations required for the student to post a document on the University's Intranet.
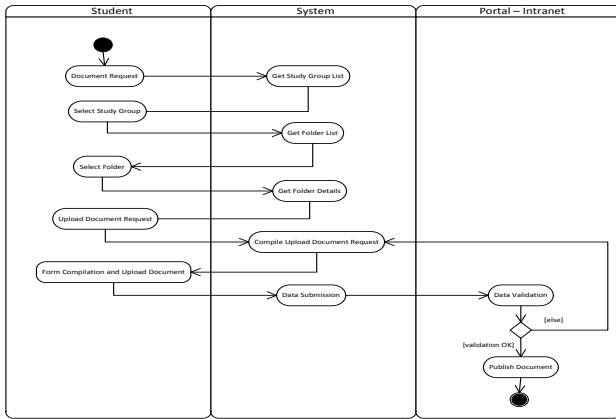
Figure 6 - Add Document: Document publication process

Class Diagram

The class diagram (see Figure 7) shows markedly the use of the *CodeIgniter* framework during the development of the application. *CodeIgniter* implements the Model-View-Controller pattern, and makes available to developers its built-in superclasses for the implementation of the application's Model and Controller, called respectively *CI_Model* e *CI_Controller*. The controller classes called *Log*, *Site*, *Exams*, *Resources* and *Helpdesk* are extensions of the *CI_Controller* superclass, while the Model classes *Membreship_model* and *Facebook_model* are extensions of the *CI_Model* superclass.

CodeIgniter defines also a set of interfaces for the application's View component, in order to simplify the implementation of the web pages to present to the user directly from the controller class.

Each controller class (except *Login*), in fact, is connected with the view interfaces of competence, through a *Realization* relationship to indicate that the responsibility of presenting the data to the client, is delegated to the View component identified by the controller.
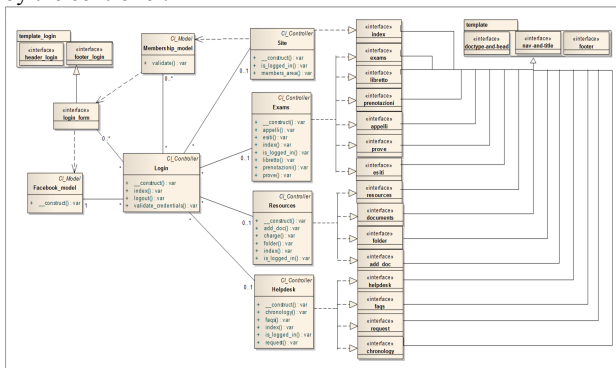

Figure 7 - Unisalento Facebook App: Class diagram

Moreover, only the *Login* controller class uses the application's Model classes; in particular, *Login* uses the *Facebook_model* class to check whether the user is logged in on Facebook, while the *Membership_model* class is used to login on the Unisalento informative system. To retrieve and validate the credentials entered by the user, the controller uses the *login_form* interface. In turn, the *login_form* class uses the *form_helper* class, which is part of the core of the *CodeIgniter* framework, to implement the utilities for handling HTML forms.
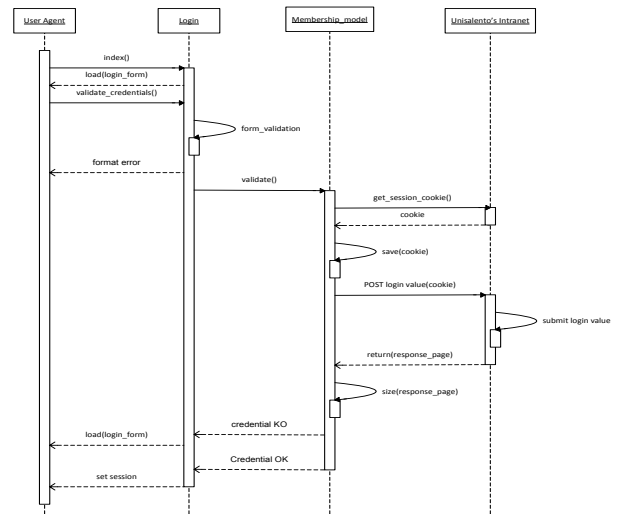

Figure 8 - Login Sequence: Authentication process

Sequence Diagram

On the basis of the class diagram discussed above, we will introduce some sequence diagrams, of the UML notation, to show how software systems work together to support the process of user authentication and to perform the required activities to get and to post a document in the University's intranet.

Login Sequence Diagram

In Figure 8 is shown the Login Sequence Diagram of the application. During the access to the *Unisalento Facebook App*, we tried to maximize the safety margins, given that the authentication process is, from this point of view, the most critical of the whole application. So, to achieve this goal we have used the following tools:

- PHP5 with *cURL* extension: *cURL* is a PHP library that supports authentication protocols client-side based on http certificate;
- *OAuth 2.0*: is the reference communication protocol of Facebook in managing the authentication and authorization process for a Facebook Application.
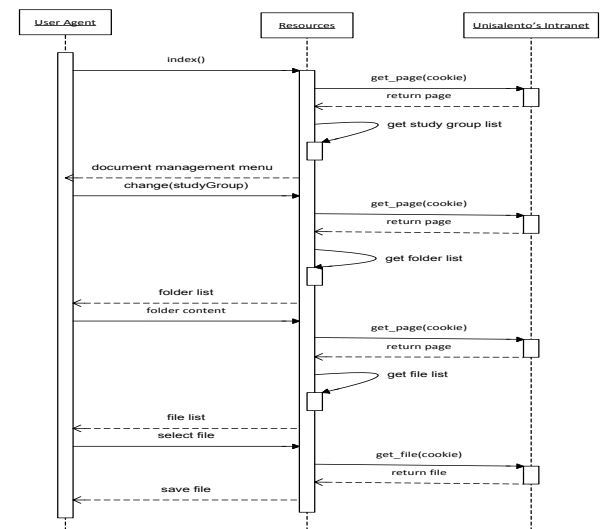

Figure 9 - Get Document: Document request sequence

Furthermore, the application requirement to use the authentication in a Single Sign On mode, has made necessary the managing of cookies during the authentication phase performed by the *Membership_model* class. This class is responsible for retrieving of the session cookie from the University's intranet and to save it locally, before proceeding with the actual login attempt.

Get Document Sequence Diagram

The following diagram, in Figure 9, shows the interactions, between the software systems, necessary to the consultation of the hierarchy of folders, in which the documents are stored in the University's intranet, in addition to the possibility to allow the student to download a document.

Add Document Sequence Diagram

The following sequence diagram, in Figure 10, shows the required interactions to upload a document on the system, in order to share it with the study groups that the student belongs. Before proceeding with the actual upload, the student has to specify a set of metadata related to the same document, including some tags that can be selected from those available, or directly editable.
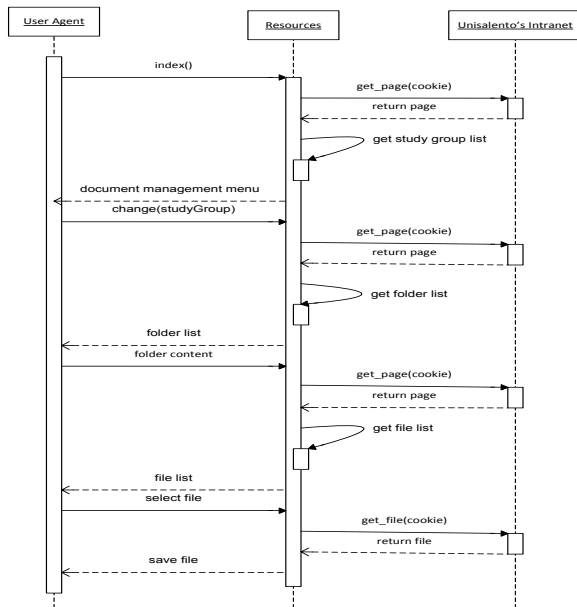

Figure 10 – Add Document: Document publication sequence

5.   A CASE STUDY

In this section, we introduce the *Unisalento Facebook App*, by presenting two screenshot of the application related with the main client scenarios. The first screenshot (see Figure 11) is related to the access to the Reservations Board, which summarizes the exam reservations conducted by the student, with the opportunity to withdraw some of them.
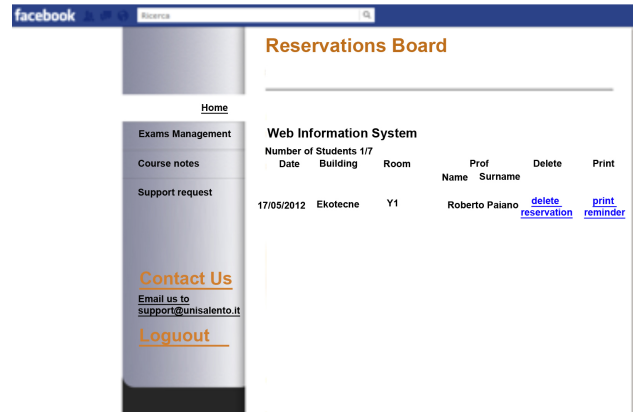

Figure 11 - Unisalento Facebook App: Reservations board screenshot

The second screenshot (see Figure 12) is related to the document upload page. As anticipated, the student in addition to indicating the file to upload, must fill a form with some document information, such as: title, description and a set of tags. Simultaneously, the student may specify a set of permissions for each user profile defined in the University's Intranet.
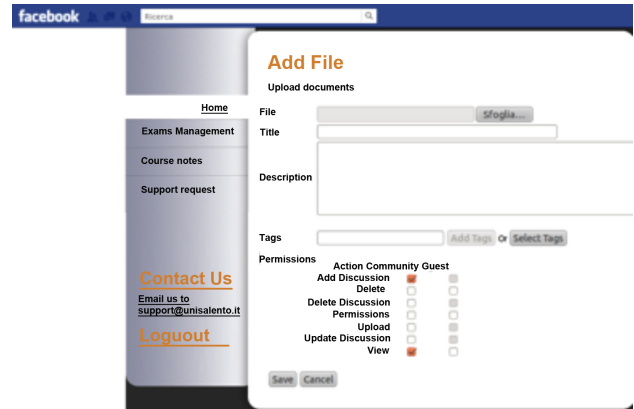

Figure 12 - Unisalento Facebook App: Add document screenshot

6.   CONCLUSIONS AND FUTURE WORKS

The experiment discussed so far, was conducted at the Faculty of Engineering of the University of Salento, and sought to improve the dissemination and effective communication between the university and its students. *Unisalento Facebook App*, in fact, has tried to 'land' Enterprise Systems, such as the University's intranet, student career management system and the ticketing system, in a well-known and more familiar context to the students, such as Facebook, the most popular social network among youth. In our view, is precisely the choice of this instrument to be the key aspect of the application, including for the success of the experiment. Most of the students, in fact, already has an account on Facebook, and has well-known procedures that are necessary to add a new Facebook App on his/her profile. Using that experience, the student is able to easily integrate our application and to interact with the information system of the University.

It is also important to note that the result of the experiment has resulted in positive implications from the University point of view; in particular, the University, through *Unisalento Facebook App*, has on the one hand increased and improved methods for providing services to students, and has on the other

received a major boost in image, as result of the good feedback that the application has raised by students. With regard to the future developments of *Unisalento Facebook App*, we find the following guidelines:

- *Technology used*: it is planned to proceed with the rewrite of the application code by using an object-oriented programming language in order to replace the existing PHP;
- *Information Content*: It is expected to increase the range of functions handled by the application, is once again drawing from the information systems already involved, through interfacing to other services of the University's information system, which eg. E-Learning platform. In the latter case, however, will be adequate and standardized the authentication mechanism specific to the infrastructure of such systems adopted by the University;
- *Service area*: *Unisalento Facebook App* will be provided of a public section, in order to allow anonymous access to the application by guest users, mainly for promotional purposes.

In essence, taking into account the amount accrued in this experiment, it's possible to take with due awareness that nowadays organizations, and universities are no exception, can not afford to neglect the advance of relentless social networking tools, in managing relationships with their users, especially if in young age. Are the young people, in fact, that find particularly compelling the opportunity to unify the serious and humorous aspects of their lives. The direct consequence of this process is advancing the increasingly subtle boundary between public and private lives of young people on the web.

7.   REFERENCES

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