

**ANAYLSIS, DESIGN AND IMPLEMENTATION
OF A CAREER OFFICE INFORMATION
SYSTEM**

ERISA TEROLLI

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**ANAYLSIS, DESIGN AND IMPLEMENTATION
OF A CAREER OFFICE INFORMATION
SYSTEM**

By

ERISA TEROLLI

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Dedication

To my family!!!

Abstract

Faculty of Architecture and Engineering

Advisor: Igli Hakrama

Difficulties faced by students while trying to penetrate in the market labour for finding any job, internship or other career development program, and challenges faced by Universities Career Offices when helping students build successful professional careers brought the necessity of building a medium which would bring university, student and business altogether.

This thesis provides analysis, design and implementation of a career office information system named SUB. The aim of this system was the establishment of connections between students and businesses, which may offer jobs, internships, mentorships or other career development programs to students of a particular university which may apply for any of these offers in a simple user-friendly way.

Beside that SUB makes it possible for students to show their skills, competences, achievements, works to the businesses by creation of personal areas in form of e-Portfolios. Though these areas students are allowed to introduce themselves to businesses which may use these students' data for evaluating their professional level while trying to pick the best candidate for their open free positions.

SUB system facilitate the Career Office works by enabling it to quickly access students e-portfolios , simplifying the electronic management of university activities organized by DOS and management of news and events published by this office.

A successful implementation of SUB system brings mutual benefits to students, business and university since it simplifies the process of students transitions from

university to market labour and enables the businesses to hire the most appropriate candidate for their company.

Abstrakt

Faculty of Architecture and Engineering

Advisor: Igli Hakrama

Vështirësitë që hasin studentët gjatë procesit të integritit në tregun e punës për gjëtyjen e një vendi të lire pune, stazhi ose ndonje program tjetër profesional, dhe sfidat e shumta që përballojnë të gjithë zyrat e karrierave në çdo universitet për nxitur dhe ndihmuar zhvillimin e karrierës tek studentet, kanë lindur nevojën e ndërtimit të platformave që bashkojnë në një medium të përbashkët studentët, universitetin dhe bizneset.

Në këtë tezë do të analizohet, dizajnohet dhe implementohet një sistem informacioni për një zyrë karriere i quajtur SUB. Qëllimi kryesor i këtij sistemi është krijimi i lidhjeve midis studentëve dhe bizneseve, të cilët mund të ofrojnë vende të lira pune, stazhe, mentorshipe ose mundësi të tjera për zhvillimin e karrierës tek studentët e një universiteti të caktuar duke lejuar këta të fundit të aplikuar për çdo ofertë shumë thjeshtë dhe shpejt.

Sistemi SUB do të mundësojë studentëve krijimin e e-Portfoliove në të cilin ata do të kenë mundësi të shfaqin aftësitë, kompetencat, kualifikimet, punimet e ndryshme, si dhe arritjet tek bizneset. Nepermjet e-Portfoliove studentët do të kenë mundësinë të prezantojnë veten tek bizneset të cilët mund të përdorin keto të dhëna për të vlerësuar nivelin profesional të çdo studenti duke e patur me të

lehtë procesit e selektimit të kandidatit më të pershtatshëm për kompaninë e tyre.

Në të njëjtën kohë sistemi SUB lehtëson punën e zyrës së karrierës duke ju dhënë mundësinë atyre të aksesojnë në çdo kohë portfoliot e studentëve, të menaxhojnë të gjithë aktivitetet e zhvilluara nga universiteti si dhe të menaxhojnë të gjitha lajmet dhe eventet që kjo zyre do të publikojë.

Një implementim i suksesshëm i sistemit SUB do të sjellë një perfimit të dyanshem si për studentët ashtu dhe për bizneset sepse nga njëra ana ai thjeshteson procesin e kalimit të studentit nga bankat e shkollës në tregun e punës, dhe nga ana tjetër ju jep mundësinë bizneseve të punësojnë kandidatit me të mirë pas shqyrtimit të të gjithë të dhënave që një e-Portfolio përmban.

Acknowledgements

I would like to thank my thesis advisor Mr. Igli Hakrama for his enormous help during this year.

I would like to show my infinite gratitude to Briland Hitaj for encouraging me to go beyond my limits and work hard.

Declaration

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Epoka University or other institutions.

Erisa Terolli
24 May 2013

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**List of Abbreviations / Notations / Glossary of terms Notations /
Glossary of terms**

DOS – Dean of Students

SUB – Student University Business

HTML – Hyper Text Markup Language

CSS – Cascading Style Sheet

PHP – HyperText PreProcessor

ePortfolio – Electronic Portfolio

PDF – Portable Document Format

FPDF – Free Portable Document Format

MySQL – My Structured Query Language

Chapter 1

Introduction

Higher educational studies have a utmost importance in development of economy and social life of a specific country. They lead the society to scientific research, economical improvements, social changes, innovation and professional growth. In Albania, as in other Balkan states, the number of students who are enrolled to study in any public or private university is rapidly increasing, with an overall of 50000 students enrolled each year [1].

Primary goal of students who are enrolled into undergraduate studies, master studies and especially those who have graduate from a public or private university is the successful integration into the market labour. Although, based on the study of Zaharie in 2008 about students employment [2], the entrance into job market is one of the major issues that Albanians students are facing nowadays, since approximately 29% of graduate students who has finished a bachelor or master degree are not able to find an appropriate job for themselves.

According to a survey made by Zaharie [2] on 3 undergraduate students, 24 master students, 22 graduate students and 2 PhD students, in a total of 51 students from Balkan states, on which are the most severe challenges that undergraduate and graduate students face to enter into the market labour, the results showed that youth employment is one of the most severe problems in Balkan states. The questioned candidates replied that the most serious issue that they are facing is the impossibility of showing their competences to the businesses and companies, since student don't

have established connections with these companies or businesses, which may be their future employers. Secondly they feel that companies and businesses don't prefer to hire non experienced candidates compared to those candidates who have work experience previously. Another problem that resulted from the survey is the lack of programs offered by their universities which facilitate the transition from school to market labour.

Students and alumni face tough challenges when trying to integrate themselves in the job market, through lack of information about free positions in companies and businesses. Also universities faces a lot of difficulties while trying to establish connections between them and companies, which may be future employer to their students. At the same time we are witness about the labour pain faced by universities career offices while preserving activities, projects and competences of students throughout their academic life, which will serve as a background for businesses to figure out the skills and capabilities of every student and alumni.

Growth of student's number who prefer to continue their undergraduate, master or even doctorate studies and on the other hand the lack of opportunities offered to them to make a successful transition to job market must encourage the government and all universities to create facilities to their students in helping them to reach their career goals.

A possible solution approach described in this thesis to the above problems is the development of a web application, which will try to elevate students difficulties in creating connections with companies, while trying to gain and apply for a job,

internship, mentorship or other career development conducive program and at the same time will allow students to create their electronic career portfolios where they may showcase their CVs, skills, competences, previous works, achievements, qualifications etc.

In this thesis it will be analysed, designed and implemented a web application named SUB, which stands for Student, University and Business respectively. SUB will be a system owned by the career office of a specific university and can be used by undergraduate students, master students, alumni, professors, businesses, career office staff and system administrator. All undergraduate students, master students, alumni and professors of the university will have the possibility to take advantages of this system. On the other side, only businesses that have established partnership with university can use the system, although it is career office duty to increase the number of partner businesses with university. SUB system will be composed of 2 main parts and some other additional features.

First part will be as a showcase portfolio in which undergraduate students, master students, alumni and professors will show their skills, competences, achievements, areas of interest, previous works etc. This part will serve as a resume for all above mentioned users, which especially will facilitate students/alumni in presenting their capabilities to businesses and companies. Every user may update their own resumes (profiles) user friendly. Undergraduate students, master students, alumni and professors will utilize their profiles for promoting their selves. On the other hand businesses will have the possibility to access the full career portfolio of a student in

a simple and fast way by eliminating the processes for receiving paper based CV which not always represent the complete professional level of a specific candidate.

Second part of SUB system will mainly help undergraduate/master students and alumni to be in touch with the latest free position of jobs, internships, mentorships published by university and businesses. They will immediately apply for any published job, internship and mentorship only by clicking one button and instantly the resume (portfolio) of the candidate will be visible by the business or university who offers this opportunity.

Another feature that SUB will offer to undergraduate and master students is the documentation of all activities organized by university or outside university in which he/she has participated during his/her academic life. At the same time each system's user will be informed about all upcoming events such as conferences, open forums, workshops or other activities organized by the university, which assist students in professional qualification.

In general terms SUB systems primary goal is the creation of an electronic career portfolio of a user in which he/she may showcase his/her professional level and establishment of connection between students/alumni and businesses, by facilitating the process of offering and applying for jobs, internships, mentorships or other activities which assist students/alumni in developing their professional career.

Chapter 2

LITERATURE REVIEW

This chapter provides a review made on the existing studies made on this field and summarizes some systems that offers some facilities related to the described problems. Firstly there is given a review about the solutions that researchers has proposed for the problems that youth faces while trying to enter into the market labor. Then some similar system or subsystem offering some services for facilitating those problems are being described.

Lack of established connections of undergraduate/master students and alumni with companies and businesses which may offer job opportunities, and lack of personal areas in which every undergraduate/master students and alumni shows his/her own skills, competences and achievements, which are in fully interest of businesses that want to hire new employers, are two main reasons that hamper the successful transition of educated youth into the labour market. Development of strategies that help undergraduate students, master students and alumni to find appropriate job places and achieve their career goal, must become one of the most important obligation for every university and government.

One of the proposed strategies that Zaharie has presented in her study [2] to help undergraduate and graduate students to integrate into the job market is the establishment of institutional connections between universities and companies. These connections may result beneficial for every students since companies may

offers internships and mentorships programs which enable undergraduate and graduate students to get the initial work experience needed to be hired in the company they were working as interns or in other companies of the market .

An internship program is a program offered by an employer for a undergraduate students to help him/her gain work experience by being involved in real project, learn the environment of the company and also becoming a potential candidate for particular jobs that this company may offer in the future [3]. As White and Walter have shown in their research [4] internship programs are not beneficial only for participating students, they are also profitable for companies that offer these kind of programs because they increase the worker productivity, decrease hiring risks, increase the number of potential candidates for any job offered by the company and also decreases the staff expenses for a particular time.

Becket in his work [5] has defined a mentorship program as a mutually beneficial relationship during which a more experienced person help a less experience person to achieve his/her academic and career goals. Less experience person, known as mentee, gains career advices, tips and work experience. On the other hand the mentor gains the satisfaction of training younger generations which will be the mentors of future . Based on the research of Campbell [6] about the academic performance effects of a mentorship program is seen mentorship programs effects also on the academic performance of the mentee, making them to attain a higher GPA (grade point average) of 0.2 and 0.3 of GPA compared to students who are not participating in mentorship programs.

One of the most successful web portals for finding internship and mentorship programs is the portal created by CareerArc Group with incorporation of Radford University in Virginia [7]. This portal provides free access for students who want to apply for internships and businesses who are interested in offering this kind of programs to students. Easy to use, free access, possibility in creating online resume, accessibility of a number of relevant internships based on criteria that user has put, and enormous number of internships offered are some of the advantages of CareerArc Group's web portal. However, sometimes this portal does not give relevant result with the criteria that user has entered. It has some career fields not represented enough, which means that users cannot find internships for all kind of industries. Another problem that users face this portal is that sometimes application deadline is not specified, making interested users sometimes to apply after the deadline has been expired [8]. Nevertheless this portal is considered to be the largest market place of internships around the world. Referring to its official page [7] this portal has published an approximate number of 66,254 internship programs offered 29,031 companies, which are located in 50 states.

Another strategy proposed by Zaharie [2] for facilitating the transition of undergraduate and graduate youth into job market is building of web sites in which companies will advertise free job position and students will apply for any of these jobs. Main idea is creation of platforms which will create interconnections between students and businesses. Businesses in one hand will published free job positions in the platform, and on the other hand students will have possibility to see and apply for any published free position. This platforms become beneficial to both undergraduate/graduate students and businesses, since though these kinds of

platforms students get information about the latest published free job positions and human resources managers of any company save time and decrease cost in hiring the best candidate among the applicants.

Nowadays online portals for finding job have increased enormously. Also in Albania they exist a lot of portals which advertise job vacancies in different fields and companies. Some of most well-known portals are <http://www.vend-pune.com/> , <http://duapune.com> , www.celesi.info and www.punaima.al . These portals offers a large range of job advertisements, but they only try to notify their visitors for the new available jobs. They do not allow employee to interactively apply for a job position though these portals and they do not help employee in writing CVs or consoling about their professional career. International employment portals such as FindEmployment [9] compared to Albanian portals offers more services to their visitors. FindEmployment is one of the largest employment network because it offers local and international jobs, allow users to search their jobs though industry, location, keyword and job type and also give the opportunity to apply for any published job. It offers the service of building CVs in internationally recognized format for its users. FindEmployment also provides the subscribe service, which sent to portal's users job alerts for the latest published jobs and allow user to be in current with the latest updates of the portal.

Today toward the problem of undergraduate, master students and alumni of not having a personal area in which they have the opportunity to display their skills, competences and achievements, Lorenzo and Ittelson [10] have shown that e-portfolio are being considered as the best solution. They have defined e-portfolio as

“digitized collection of artefacts, including demonstrations, resources, and accomplishments that represent an individual, group, community, organization, or institute”. Some of the most important functions of e-portfolios are recording of ones skills, achievements, competences, knowledge and also finding a job by using your e-portfolio as a full packaged resume.

According to Baur’s research [11] viewed from a student prospect an e-portfolio can be considered as a reflection e-portfolio and a showcase e-portfolio. Since portfolios are used to record every student’s works, skills, and achievements they can be used as reflection e-portfolio, which allow students to contrast their work made during a period of time and reflect on the professional growth that he/she has made in this time. This type of portfolios shows one students knowledge and professional growth prosperity. On the other hand students can use e-portfolios as showcase e-portfolios. Students can include in their e-portfolios resumes, projects, presentations, works, diplomas, activities such as seminars, conferences, open forums etc., making their portfolios a potential tool for representing their learning and competences to companies and businesses who offer job opportunities, to professors and to alumni.

On businesses perspective e-portfolios can be a suitable tool for hiring employee in the future. This results is shown by a survey made by professor Yu from Taiwan [12], who during a period of time of 6 months had been interviewing 10 human resource managers from 10 different companies of different industries. HR managers have been asked if they considered e-portfolios as a suitable tool for hiring employee and what kind of information they appreciated most in an applicant’s e-portfolio. Responses of these managers showed a high interest for using e-portfolios

as a time saving and cost effective hiring tool. HR managers replied that they appreciated most projects and works made by a students during their college, since they show one students competences and skills.

CTE EP stands for Center for Technology in Education Electronic Portfolio and is the electronic portfolio system created by John Hopkins University in 2001 [13]. It is an web applications which facilitate the process of learning, reflecting by allowing students and teacher to record information, material and work done previously, and also facilitate the transition of users into the job market using this applications as the best showcase for themselves. EP system is composed of three main interfaces. First one is the working portfolio, which is the place accessed only the portfolio owner in which he/she stores and record materials, works and evidences which will represent his/her professional growth and development during a specific period of time. Second interface is named reviewer interface and here a review team access each users portfolio for note-taking and scoring the validity of that specific portfolio. Presentation interface is the last interface of EP system. It is represented as a finished version of the portfolio which is ready to be shared with the outside world especially companies, businesses which offers jobs, internships or other programs. The best point of EP system is that each users portfolio can export any part of his/her portfolio to a unique unified resource locator (URL) enabling users to include this URL into their cards, CVs or resume.

RMIT University in Melbourne, Australia has built a single university wide e-portfolio, named PebblePad in 2008-2009 [14]. Allowing students to reflect on their professional growth and development, allowing them to advertise their skills,

competences, works, projects to businesses and companies, and most important enabling students to use their e-portfolios as a reference while being interviewed for a free job position are some of the most crucial features that PebblePad offers to students of RMIT university. Another interesting service that PebblePad offers is named CareerTrack. CareerTrack is composed of interactive activities and practices which will help students to notice and discover their skills and interest areas. It also guides students to develop their personal and professional career. Botterill, Allan and Brooks in their research about e-portfolios in education [15] have taken PebblePad as a case study. According to them receiving positive feedbacks and comments from both students and university staff has encouraged the university to focus the on-going development of system on increasing collaboration and connectivity between users of the system.

SUB system is modelled to be as a collection of all services that researchers propose as solutions for problems faced by undergraduate and graduate students, since it will serve as a personal area of every user for creating his/her own e-portfolio, will facilitate a lot the process of offering vs. applying for jobs, internships, mentorships between students and businesses, will allow user to be in touch with the latest change made to the system due to subscribe service and a lot of other services mutual beneficial to students and businesses.

Chapter 3

ANALYSIS OF REQUIREMENTS

Requirement analysis is the process of collecting services, operations, features of a system, which are generally defined after consultation with all of the users of system. This chapter provides a detailed overview of all services system is going to offer to its users. Section 2.1 gives a brief summary of the users, persons who will interact with SUB system. Section 2.2 focuses on requirement specifications which describe actions that system performs.

3.1 System's users

A user of a specific system is a person who uses (interacts with) the system. SUB system has 7 types of users. SUB system's user and their main activities are as follows:

Administrator: Person who will be responsible of administrating the system by managing users. Administration will be a full privileged user of the system. He is mainly focused on adding, editing and deleting users.

Staff: This actor will be an employee from universities career office. His main job is to update students profile with all the university activities that he/she has participated during his/her academic years. Staff will inform all system members with the upcoming events organized by the university. This actor has to launch the exchange program possibilities, volunteer works, internship, mentorship or other possibilities offered to students or alumni by the university.

Undergraduate student: Student enrolled in undergraduate studies. This actor will edit his own profile (resume), take transcript, take recommendation letter, apply for

offered jobs, internships, mentorships, volunteer works, publish his own works etc.

Master Students: Student enrolled in master studies. This actor will edit his own profile (resume), take transcript, take recommendation letters, apply for offered job, mentorship, publish his own works, offer mentorship programs etc.

Alumni Student: Persons who have been graduated from the university. This actor will be able to edit his own profile (resume), take transcript, apply for offered jobs, offer mentorship programs, publish his own works etc.

Professors: Lectures working in the university. They will be able to edit their own profile. They will be able to reply to request for recommendation letters, comment of undergraduate/master student's project, publish their own works etc.

Businesses: Partner businesses of the university which will edit their own profile, will offer jobs, internships, mentorships etc.

3.2 Requirements Specification and Visualization

Requirements are group of actions that the system is supposed to perform. They also describe how system behave with particular inputs and in particular situation. One of most well-known techniques for expressing requirements are use cases, which generally defines what a system user should do, without specifying the way he/she is going to perform that task [16].

Due to its complexity, SUB system involves a lot of use cases which may be drawn according to the main services that system is going to offer to its users. Users profile, transcript, jobs, volunteer works, mentorship programs, internships, recommendation letters, project, posters, papers, activities, events, news and exchange programs are primary services that SUB system is going to provide to its

users. The following part of this chapter will introduce the requirements represented as use cases separated according to services mentioned above and main scenario that each use case contains.

User Profiles

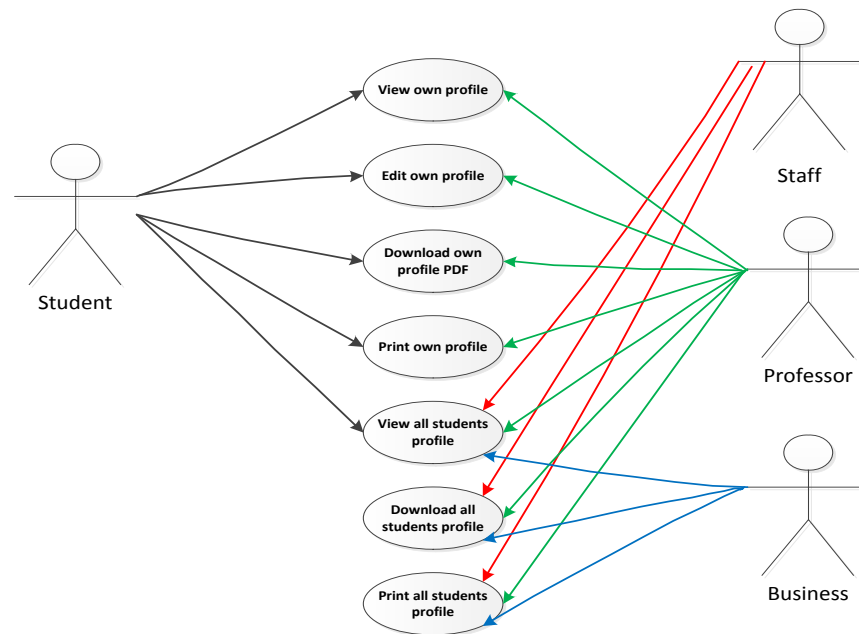


Figure 3.1 - Users Profile

This use case diagram displays all action that each actor will perform regarding the user profile section. The actors that will interact with the system in users profile section are undergraduate students, master students, alumni(all of them represented as students in the diagram), staff, professor and businesses. Students and professor will have their profiles composed in form a editable resume. They will have the possibility to view and edit they own profiles. They can download PDF version of their profile or take a printed version of their profile. All actors has the possibility to view the profiles of other students or professors. However, only staff, professor and businesses have the opportunity to download or print students profile.

Transcripts

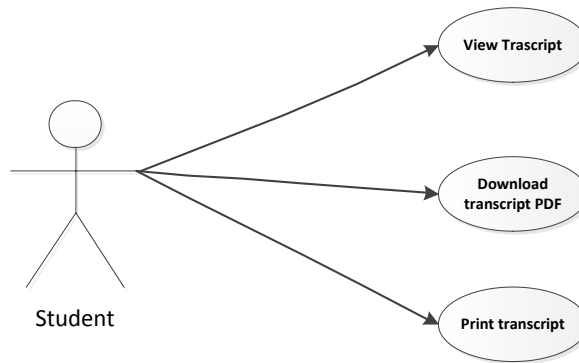


Figure 3.2 - Transcript Use Case

Transcript use case displayed above describes actions that undergraduate students, master students or alumni may perform under the transcript section of our system. Each student has access to his/her transcript, and then after accessing he/she can take his/her transcript in two formats: a PDF version or/and a printed version. Only undergraduate students, master students and alumni can have access in their own transcript, due the fact that transcript is very private and may be released only if the person him/herself may to.

Jobs

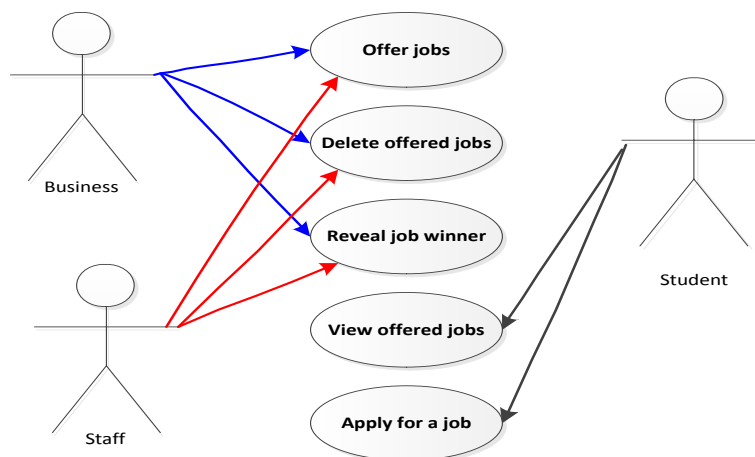


Figure 3.3 - Job Use Case

This use case explain main actions performed under the job section of SUB system. Businesses enrolled into our system and university staff publish free job position. They have the opportunity to delete offered job and also they have the opportunity to reveal the winner for a published job. On the other hand undergraduate students, master students and alumni are notified for the published jobs. They can apply for any offered job in a simple manner only by just one click on the apply button.

Volunteer works

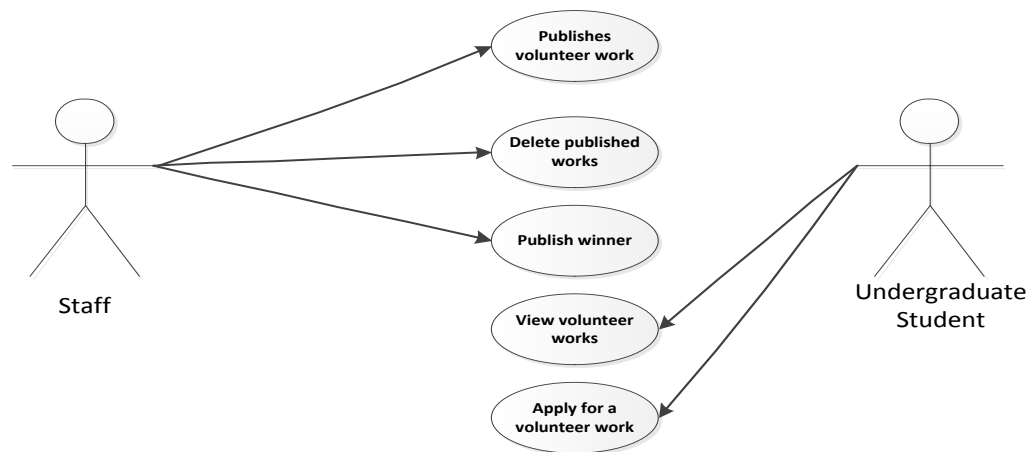


Figure 3.4 - Volunteer Works Use Case

Volunteer works are only published by the university staff and are related to university works for the undergraduate students who are willing to contribute into their university. The staff actor has the opportunity to publish and delete published volunteer works. After the apply deadline has expired staff has the possibility to publish into the system the winner of this work. Only undergraduate students are the target of volunteer works. They can view the published volunteer works and can apply for any of them.

Mentorship Programs

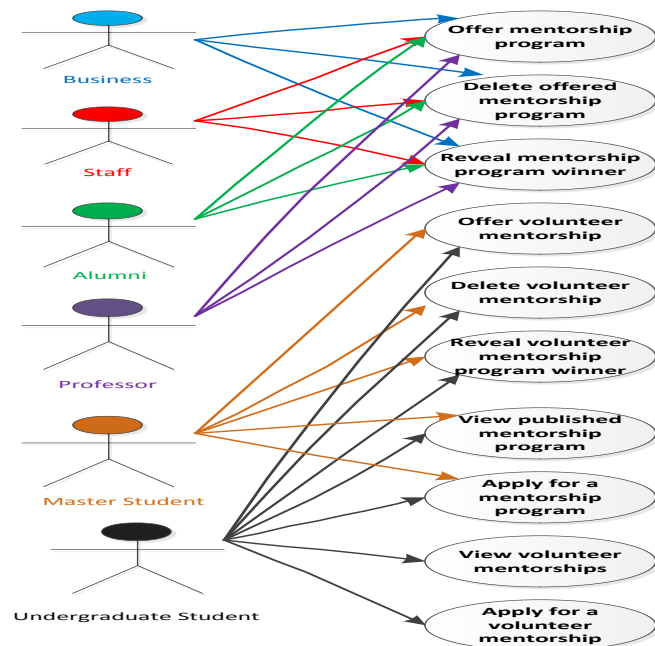


Figure 3.5 - Mentorship Use Case

One of the most complex use cases is the mentorship use case. We have two types of mentorship: normal mentorship and volunteer mentorship. A business, staff, professor or an alumni has the possibility to publish a normal mentorship program, which is available to undergraduate and master students. They also has the possibility to delete any mentorship and also they can reveal a winner for any mentorship programs that they has published earlier. Undergraduate and master students can offer volunteer mentorships programs only to students in lower grades. They also can delete their own published mentorship and can publish if they want their published mentorship's winner. On the other hand the actors who are going to benefit from the published mentorship programs are undergraduate and master students. Master students can view and apply for any normal mentorship program. Undergraduate students can not only view and apply for any normal mentorship

programs, but they can also view and apply for an volunteer mentorship program offered by students in higher grades.

Internships

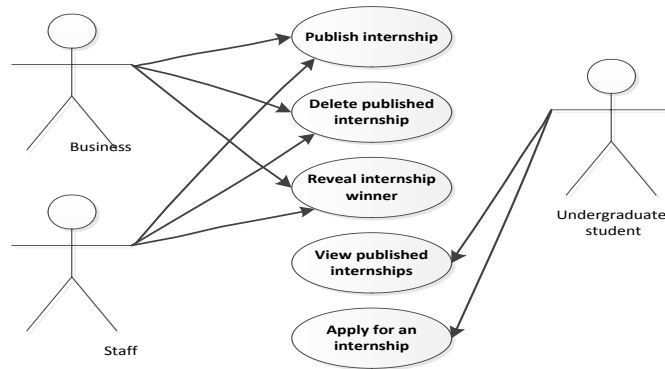


Figure 3.6 - Internship Use Case

Internship use case is composed of two main parts: publish of internship programs and application for internship programs. A business or university staff are the only ones who has possibility to offer internship programs in our system. They also can delete own published internships and reveal internship program's winner if they prefer to. Undergraduate students are the only one who can view published internships and apply for any of them by just clicking the apply button.

Recommendation Letters

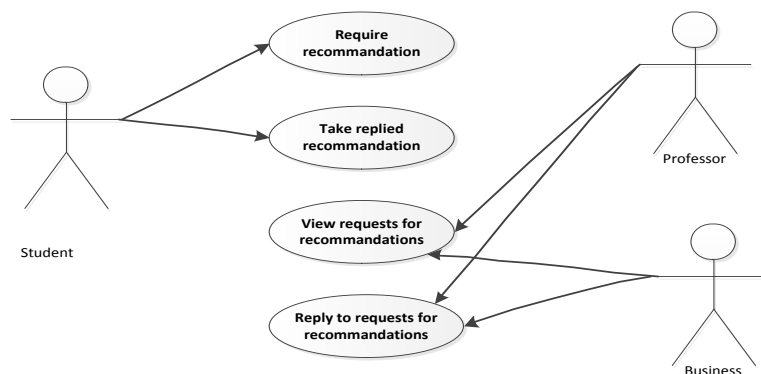


Figure 3.7 - Recommendation Use Case

Since the process of taking recommendation letters is time consuming, SUB system provides a simple manner for requesting recommendation letters to the professors and allowing them to respond fast and in a simple way. A student (undergraduate, master, alumni) performs two actions in this sections. He/she can require recommendation letter from a professor or from a business in which he/she has worked as an intern or an employee and can access the replies that professors and businesses have sent back. Professors and businesses are notified for the recommendation request sent by students and they have the opportunity to reply to them immediately and in a simple way.

Projects / Posters / Papers

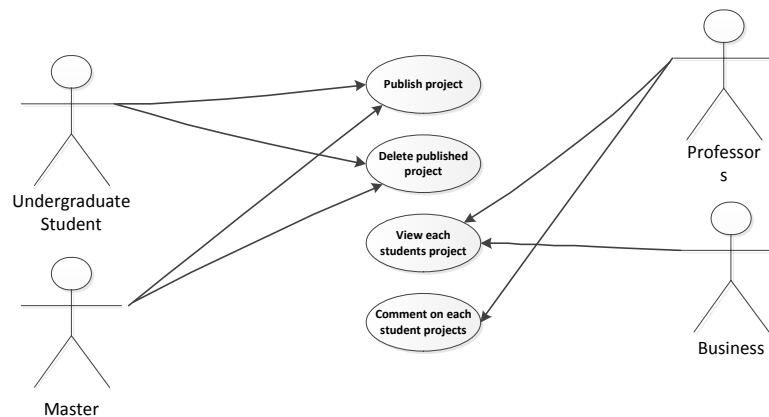


Figure 3.8 - Project Use Case

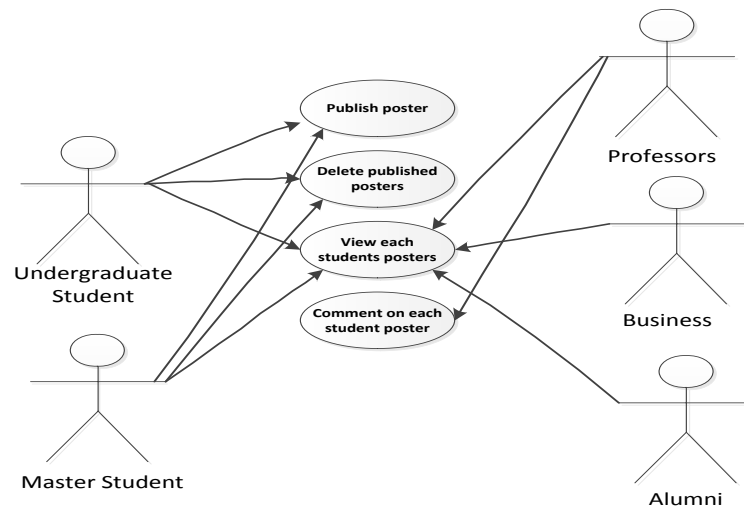


Figure 3.9 - Poster Use Case

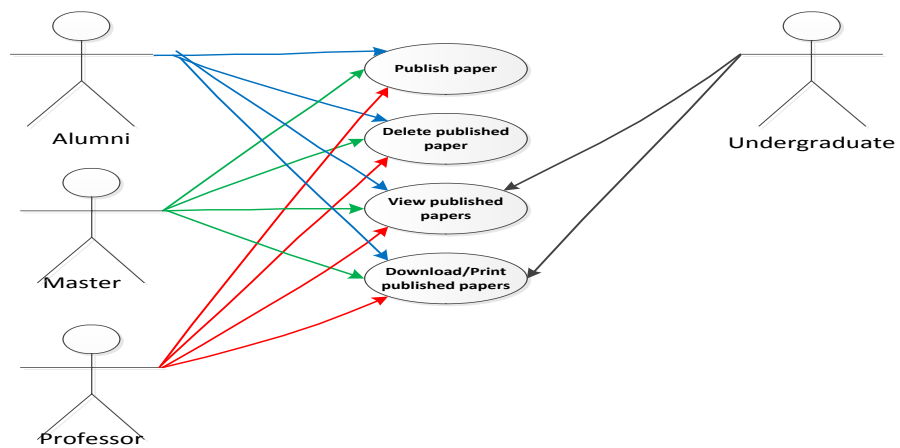


Figure 3.10 - Paper Use Case

Publishing of projects will be as part of showcase portfolio used to show an users skills, competences and professional growth. Undergraduate and master students have possibility to publish and delete project from their account. Professors and businesses can view all projects published by every undergraduate or master students and also have the possibility to comment on this projects, which may be useful feedbacks for a students for further development.

Posters published are necessary to be shown as part of a showcase portfolio, since they demonstrate the participation in national and international conferences. This use case shows that undergraduate and master students can publish posters, can delete their own posters and have a read-only access to other students posters. Professors can view all students posters published in the system and can also comment on these posters. Businesses and alumni have only access to see the posters published by any undergraduate or master student.

Publishing of papers in another important service that SUB system is going to offer. Alumni, master students and professors have the opportunity to publish into the system their own papers. They also may remove the published papers from their accounts. Undergraduate students, master students, alumni and professors may access all papers published by any user and also may download a pdf or take a printed version of any published papers.

Activities

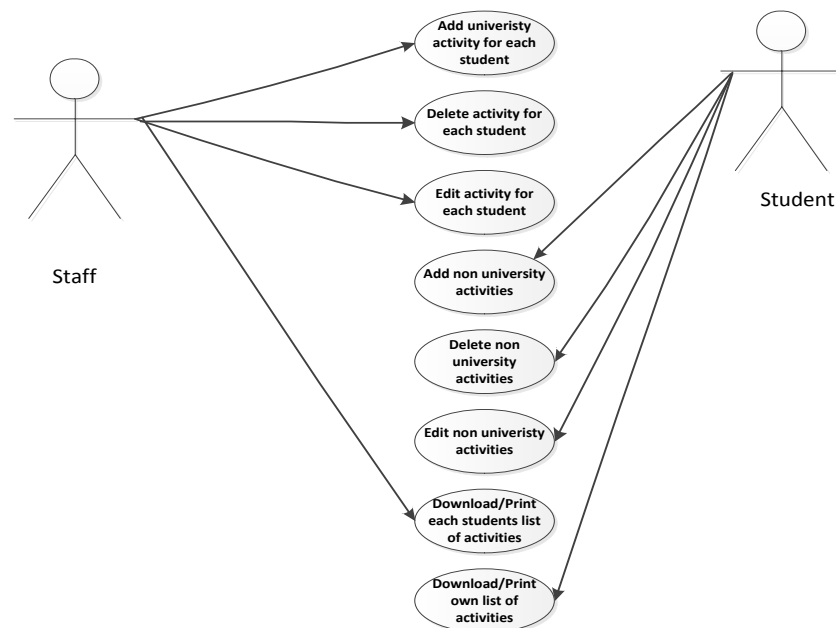


Figure 3.11 - Activity Use Case

It is important to any students to have recorded all types of activities in which he/she has participated during his/her university years. Activities organized by the university or other activities organized outside enriches a lot any students resume. In SUB system the career office staff is going to add, delete or edit the university activities in which each student has participated. A student can only add, delete or edit other activities that he/she has participated outside the university. Regarding the access of activity data, career office staff can download or print each students list of activities and students can only download or print their own list of activities.

Events/News

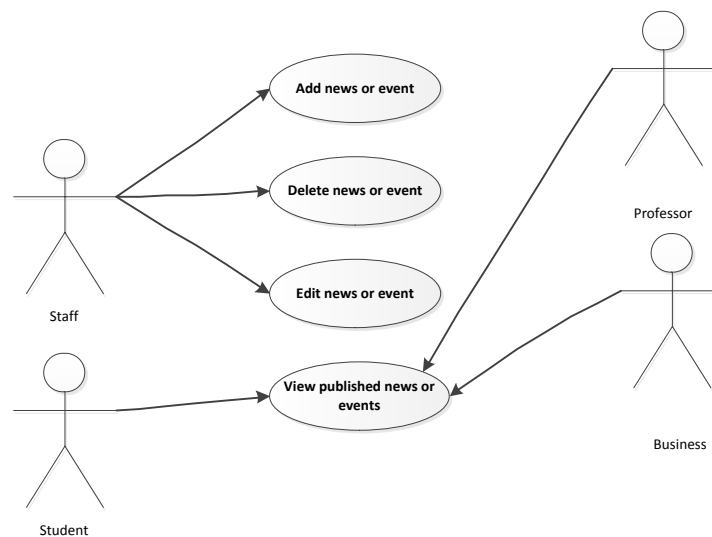


Figure 3.12 - Event News Use Case

SUB system will serve also as an advertisement area for all of news published or events organized by the university. It is career office staff job to add, delete or even edit news or events that university is going to organized. Student, professors and businesses will be informed for the recent news and upcoming events since they will have the opportunity to view published news and events.

Specifying the user requirements after consultations with persons that are going to use the system, visualizing the user requirements with Use Cases, and also defining of all services that system is going to offer to the users are some of the most fundamentals steps in building a successful system.

Chapter 4

System Modelling and Design

Unified Modelling Language (UML) is considered as one of the most well-known modelling languages for object oriented applications. UML is very rich in its diagrams and supports different types of modelling a system. However, based on the survey that Erickson and Siau had made in 2007 [17], five types of UML diagrams are enough to represent the essential part of a system. These diagrams are: use cases, activity diagrams, sequence diagrams, class diagrams and state diagrams.. Except five types of UML diagrams that represents the essentials of a system, important to be drawn are also component and deployment diagrams.

Activity diagram shown the process execution flow for a functional requirements in a use case [18]. One of the most important use cases described in chapter 3 is the user profile diagrams. Its corresponding activity diagram is shown in figure 4.1.

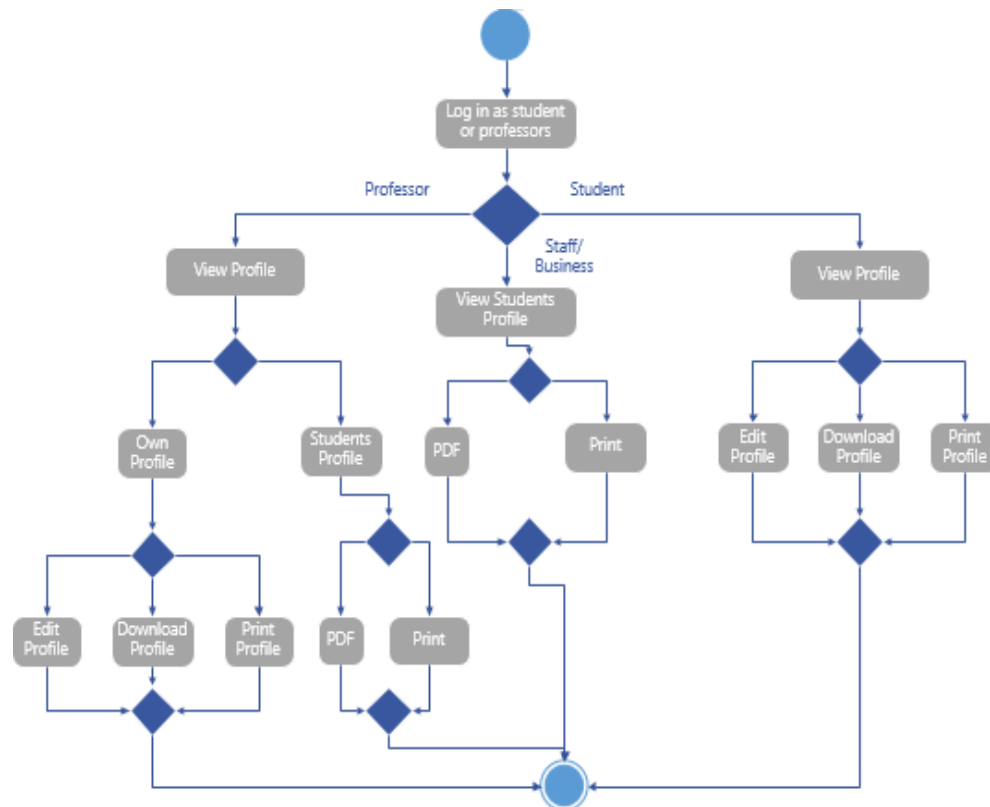


Figure 4.1 - User Profile Activity Diagram

Activity diagram shown in figure 4.1 represent the user profile activity diagram. This diagram shows the execution flow of actions that are performed when a student or professors interact with their own profile, or when a business or staff see the students profile.

Another important activity diagram is the Job/Internship activity diagram shown in Figure 4.2. A student may perform two actions under the job and internship sections: view all published jobs/internships and also apply for any job/internship. On the other hand career office staff or business will perform actions live offer job/internship, delete offered job/internships and also reveal winner of any published job or internship.

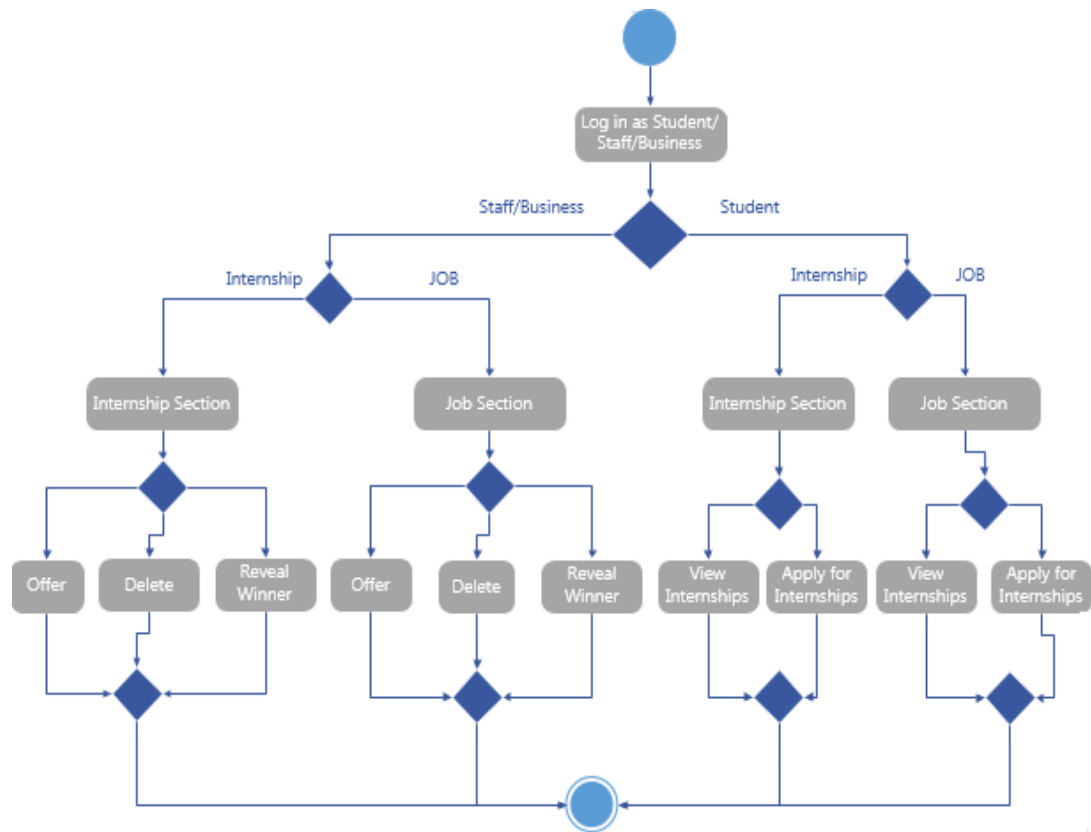


Figure 4.2 - Job Internship Activity Diagram

The other activity diagrams are shown in Appendix A.

Next UML diagram is the sequence diagram. It is mainly used to represent the interaction of an actor with an existing object of a system, and also the interaction of objects with each other. In order to show the sequence of interactions of the most important use cases drawn in chapter 3 here we draw their corresponding sequence diagrams.

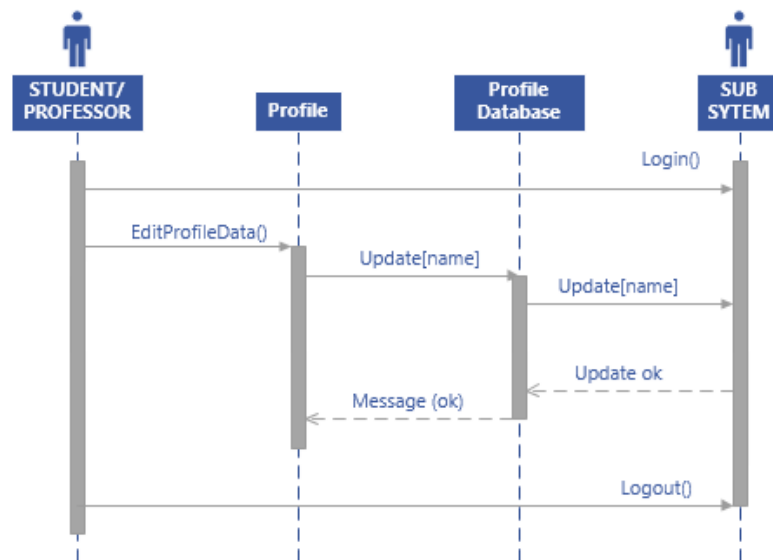


Figure 4.3 - Edit Profile Sequence Diagram

The sequence diagram in figure 4.3 shows the interaction of a student or professor with the system, while actors are editing profile data under profile section. Firstly student/professor interact with the system and login into the system. After logging in, the actor interact with the profile object by sending the editProfileData() method. Then the profile object interact with the profile database in which the profile data with be edited. Data updates in the database are made by the system, and then the actor is informed that the changes were successfully made. After the confirmation the actor logs out.

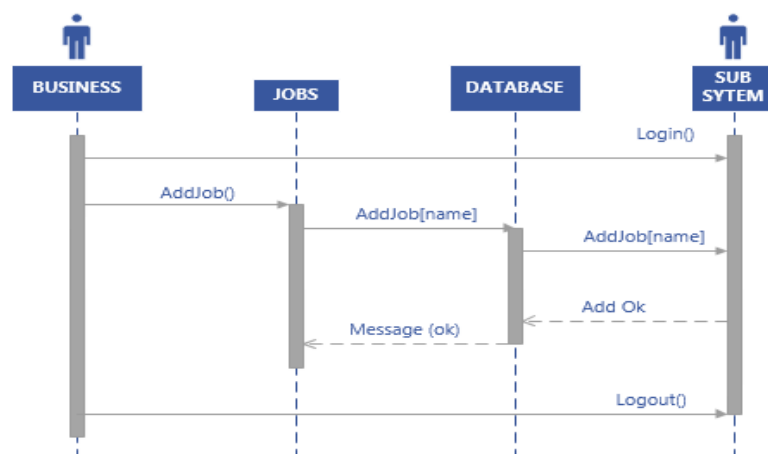


Figure 4.4 - Job Offering Sequence Diagram

Job offering sequence diagram shown in figure 4.4 represents the interaction of businesses actor while offering a job into the SUB system. Firstly business interact with the system and login into the system. After logging in, the actor interact with the job object by sending the addJob() method. Then the job object interact with the database object in which the new job will be saved. After a successful job adding by the system into the database the actor is informed that his/her operation was successfully completed. Then business can log out from the system.

The next important UML diagram used to specify the essentials of a complex system is class diagram. Figure 4.5 represent a general class diagram of our system. This class diagram is composed of fifteen classes named: Administrator, Student, Professors, Business, Staff, Job, Internship, Mentorship, VolunteerWork, Recommendation, Activity, News, Event, ExchangeProgram and Work. Each class has its own attributes, for example class named Student has id, name, surname, birthday, faculty, departmet, startingYear, graduateYear, photo, contacts, experiences, qualifications, interests, projects, posters and papers as attributes. Main actions that a class is going to perform are also called operations of that class. Some operations that Student class is going to perform are editProfile, applyJob, applyInternship, applyMentorship, applyVolunteerWork, requireRecommendation, listActivity, addExActivity, viewNews, viewEvents and viewExPrograms. Classes are connected with each other through associations. Student class is connected with the Job class through a one to many association, representing that a student can view or apply for one or many jobs. The other associations and greater details of classes are shown in figure 4.5.

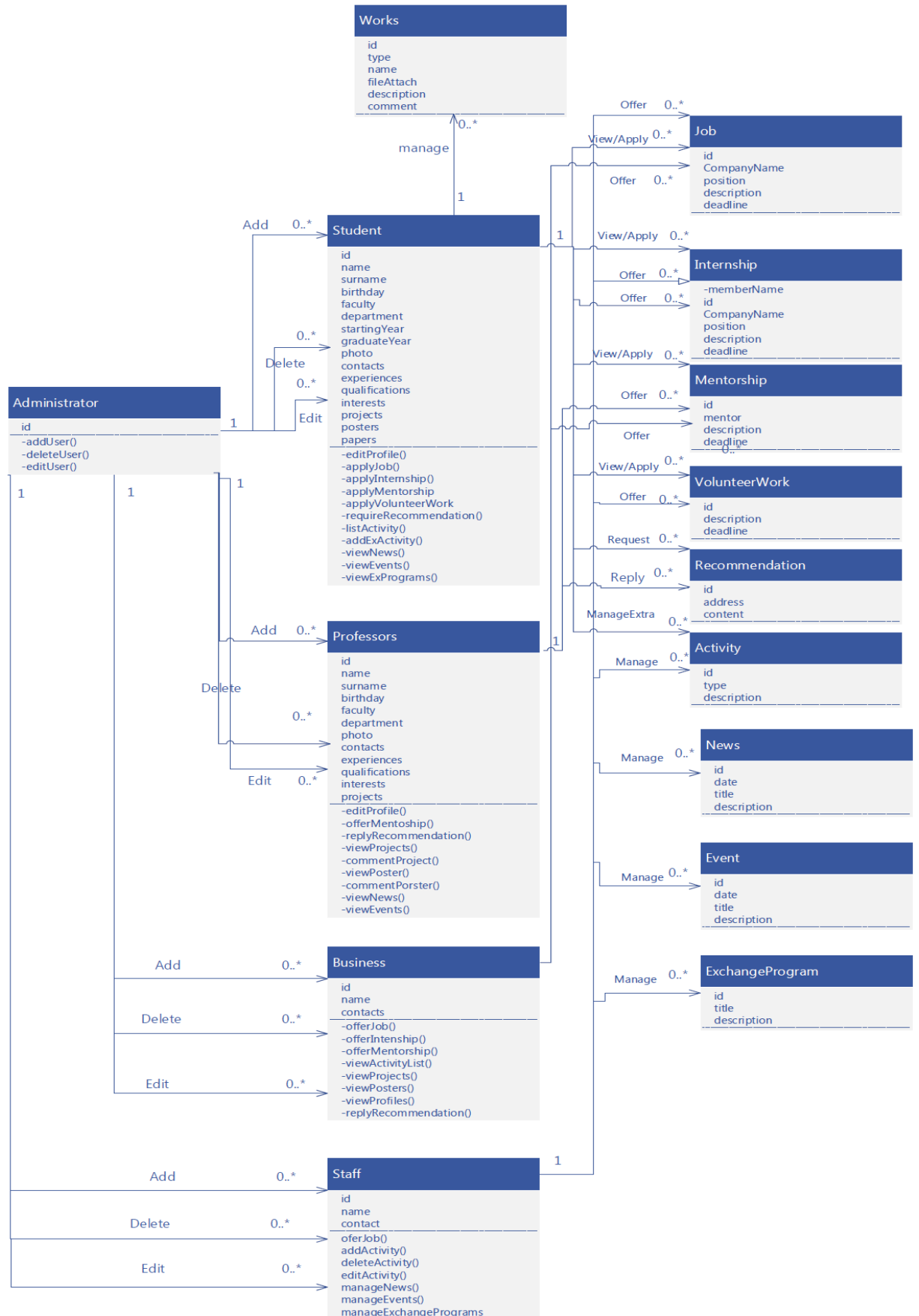


Figure 4.5 - Class Diagram

Object diagrams are the complements of class diagrams. As an example the job application object diagrams is shown in figure 4.6.

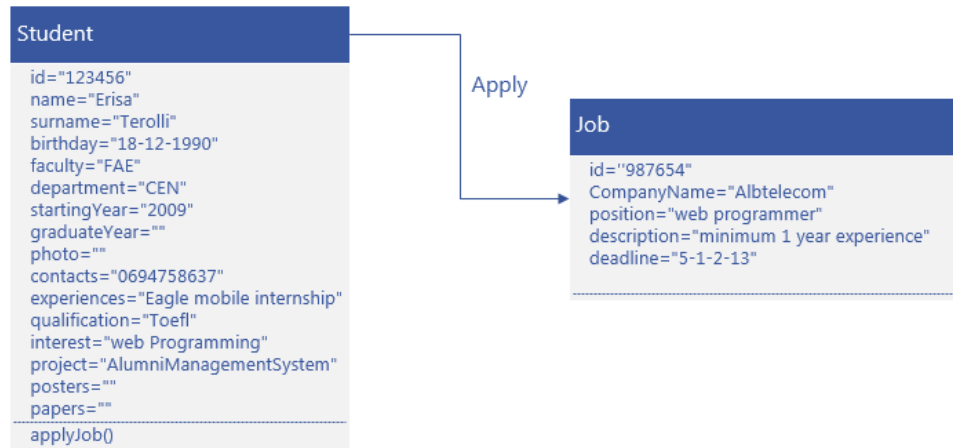


Figure 4.6 - Job Application Object Diagram

State diagrams are UML diagrams which support event-based modeling. Application state diagram is shown in figure 4.7. System initiate in an idle state, then it changes in send job request state, which will allow a system user to apply for any job offered in the system. If we have a normal exit from this state then select application state is activated, which is then confirmed and send to its destination. On the other hand if a problem occurred during send job request state the process terminates immediately.

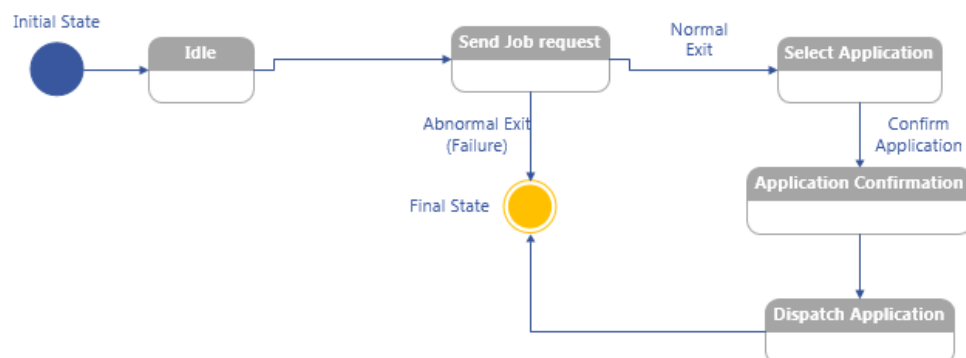


Figure 4.7 - Job Application State Diagram

A component diagram is an UML diagram used to represent the structural components of a system and relationships between these component. As shown in figure 4.8 SUB system component diagram is mainly composed of eight components. On the top of hierarchy stay SUB system which includes both Controller and User Interface. Controller/User Interface component is closely related to Administration, Job-Internship-Mentorship, Profile, Works, Activity, News/Events components which manage the member administration, job-internship-mentorship section, users profile section, users works repository, users activity, and news/events respectively. All components are related to Main Initialization component which includes the main files and configurations for database, sessions and users credentials.

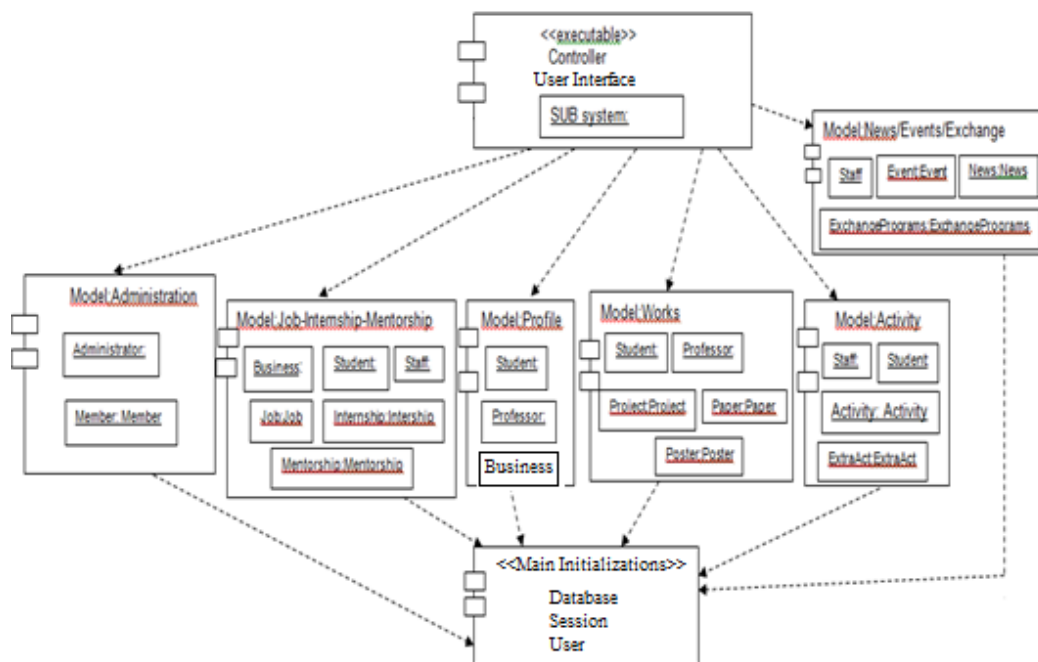


Figure 4.8 - Component Diagram

The last diagram, used to represent the distribution of Web application components, is the deployment diagram. Figure 4.9 displays the deployment diagram of SUB

system. It contains three main nodes. First one UserComputer is the user's PC, laptop, tablet or phone from where user through a web browser may be able to connect using the HTTP protocol to a Web Server in which the web application lies. SUB system inside the Web Server, second node of this diagram, communicates through a SSL protocol with the MySQL database which resides in another node named as Database Server. Communication between different node is made possible through TCP/IP protocol.

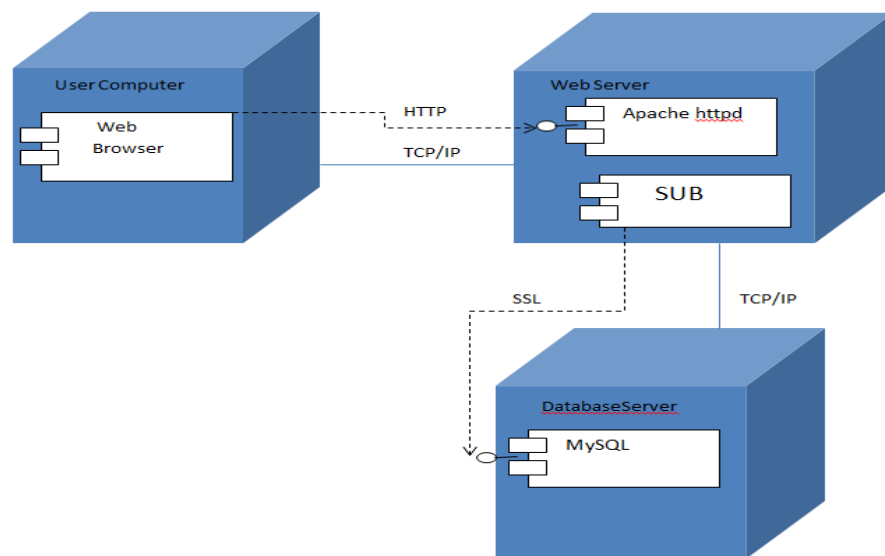


Figure 4.9 - Deployment Diagram

System modelling and system design is one of the most important steps while building web applications. Drawing of activity diagrams, sequence diagrams, class diagrams, object diagrams, state diagrams, component diagram and deployment diagram provide a detailed picture of all components of the application and how they will interrelate with each other, which are then implemented during implementation phase of software development.

Chapter 5

Implementation

5.1 Technologies Used

SUB system structure is composed of three main parts: HTML data displayed to user, client side script like JavaScript which run on the client side and server-side script like PHP which run on the server and interact with databases [19].

HTML is an easy-to-learn and powerful markup language used to create documents on the Web. Some of the advantages of HTML are: compatibility with all types of browsers, more self-explanation, quicker time to be displayed in a browser and easier access. [20]

JavaScript is a client-side general-purpose scripting language. Being a web-enhancing technology, JavaScript provides the feature of converting a static web page into an interactive and intelligent one. [21]

Dynamic scripting language PHP was started by Rasmus Lerford in 1994. According to a survey made by EvansData [22] about the top scripting languages for 500 developers and IT professionals who ranked PHP first based on features like ease of use, exception handling, extensibility, maintainability / readability, cross-platform portability, community, availability of tools, quality of tools, performance, memory management, client side scripting and security.

MySQL is one of the most used open source database software. Its main function is simplify the process of storing and retrieving data as much as possible.

5.2 SUB System Implementation

After the detailed system modelling and design made by drawing all types of UML diagrams, next phase on system development cycle is system implementation. SUB system was implemented using the OOP techniques which mainly are focused on creation of objects and interaction between them.

Based on figure 4.8, Main Initialization Component were built first. Initial work to be done was building of MySQL database tables and their attributes corresponding with the classes specified on class diagrams in figure 4.5. PHP programming started with database constants specification such as database server, database host, database password and database name, which are the only constants needed to be change in case of changing the hosting server of the application. Connection to database was enables through creation of database class, which makes possible database connection and disconnection through `open_connection` and `close_connection` methods. Filtering of user input for avoiding MySQL injection or other types of injections was realized through building of `mysql_prep()` method as shown in figure 5.1.

```
public function mysql_prep($value){
    if($this->real_escape_string_exists){
        if($this->magic_quotes_active){
            $value=stripslashes($value);
        }
        $value=mysql_real_escape_string($value);
    }else{
        if(!$this->magic_quotes_active){
            $value=addslashes($value);
        }
    }
    return $value;
}
```

Figure 5.1 - Input Filtering Database Method

Another part of Main Initialization component is process of enabling user login into the system. For this purpose User and Session PHP classes were created. Session class enables all instant objects of User class to log into the system and also log out from the system. Password encryption of users password was made as a combination of two different hashing algorithms, md5 and sha1, for increasing the security and privacy of users system credentials.

Profile component of SUB system is organized in form of a CV for undergraduate students, graduate students, alumni and professors. It will offer to system user the possibility to update their profiles instantly in a user-friendly way through use of JQuery popup, without having to be redirected into other pages as shown in figure 5.2

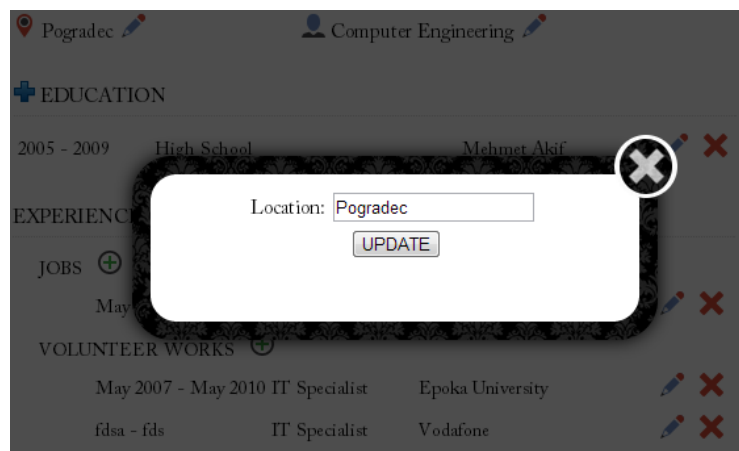


Figure 5.2 - Edit Profile

Another facility created under Profile component is the ability of converting a user's profile in PDF format simply by clicking a single button. Building users profile in a PDF format was made possible through use of FPDF, which is a free PHP class that generate PDF files by use of only PHP language [23].

Job, Internship, Mentorship components have a similar structure regarding their programming aspects. Facilities, while searching for any published job, internship or mentorship, are creating through use of filters where a user specifies the studies degrees and also the preferred departments and only offers that fulfil the user requirements are shown to him/her as shown in figure 5.3.

```
$l=explode(' ', $jb->degree);  
$d=explode(' ', $jb->departments);  
$query=mysql_query("SELECT * FROM `jobapplications` WHERE  
`jobid`='{ $jb->id }' AND `studentcode`='{ $res->ucode }'");  
$applications=mysql_num_rows($query);  
if(count  
(array_intersect($levels, $l))>0  
&& count(array_intersect($department, $d))>0  
&& $applications==0){
```

Figure 5.3 - Job Filtering

On the other side, businesses and career office are able to view all students who applied for a specific job, internship or mentorship, can access their portfolio and at the same time are able to publish any winner for their position in a simple and user-friendly manner.

Erisa Terolli Computer Engineering

Reveal Winner

Choose winner

Choose winner

Erisa Terolli

Reveal

Figure 5.4 - Applicants

Work component is composed in form of a repository for all projects, posters and papers that a particular students has worked on and want to showcase in its own portfolio. Student has possibility to publish his/her own work not only by giving a

description but also has possibility to publish up to 3 files which may be projects screenshots, source codes, different documents etc. Process of file uploading is made possible through use of multiple file uploading which enables a user to upload multiple files simultaneously saving users time and efforts.

Management of university members, university activities, news and events is made by Career Office user. Data filtering and also searching tools are built for simplifying the work of this user while dealing with thousands of students, professors and businesses data. Process of adding participating students in a specific university activity is enabled through use of a autocomplete search where Career Office user only has to enter some key in the search area and a list of corresponding students will automatically appear by simplifying a lot the users work. A screenshot of this process is shown in figure 5.5

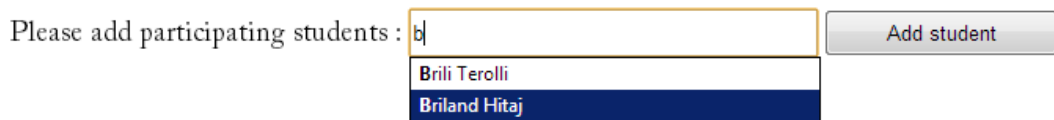


Figure 5.5 - Students autocomplete search

Creation of students showcase portfolio were enabled by combination of four different components of SUB system. Summing up students profile, recommendations, works and activities in a single portfolio and also allowing businesses and companies to access these portfolios only by clicking a single buttons simplifies a lot the bureaucratic process of students-business communication during employer's hiring.

▶ PROFILE

▶ RECOMMENDATION

▶ WORKS

▶ ACTIVITES



Erisa Terolli

 Pogradec

 Computer Engineering

EDUCATION

2005 - 2009	High School	Mehmet Akif
-------------	-------------	-------------

EXPERIENCE

JOBS

May 2007 - May 2010	Secretary	Meridian
---------------------	-----------	----------

VOLUNTEER WORKS

May 2007 - May 2010	IT Specialist	Epoka University
fdsa - fds	IT Specialist	Vodafone
Jan 2013 - Aug 2013	Minister	Government
May 2007 - May 2010	Teacher	Mehmet Akif
2005 - 2007	Director	Top Channel

INTERNSHIPS

2009 - 2010	Software Engineer	Eagle Mobile
-------------	-------------------	--------------

Figure 5.6 - Student's portfolio

In this chapter are found only some specific parts of system implementation. Other screenshots of SUB system and pieces of codes can be found on Appendix B.

Chapter 6

Conclusion and Future Works

Growth in number of students who enrol for continuing bachelor, master or doctorate studies, except their beneficial aspect have raised the challenges that students face while trying to enter into the job market. It is government, universities and everyone's responsibility to create facilities for students which are making the transition from school to market labour. Creation of institutional contracts between universities and companies is the first step of helping undergraduate, master and graduate students to enter into the job market. Partner businesses with a specific university may offer to students job opportunities, internships, mentorships or other programs that may help a student to achieve his/her own career goals. Another facility for students is the creation of a personal area in which everyone can show his/her own skills, achievements, capabilities works and areas of interest. These areas are built in form of e-portfolios are considered as a suitable hiring tool , since HR managers can find enough information inside e-portfolios to decide if a candidate is appropriate for a job place or not.

Implementation of a web application, whose main objective is to create connections between undergraduate/master students/alumni with businesses, is a significant step toward the process of facilitating the transition of student from university into the market labour. In this application student/alumni have are informed about all open positions of jobs, internships, mentorships and instantly apply for any of them; and also they have possibility to create their own profile, where to publish their works, projects, skills, capabilities to those they may be their future employers. Businesses on the other hand, may offer jobs, internships and mentorships programs and have

possibility to see a complete profile of all applications and then decide to hire the best candidate for their company.

After the web implementation of the system, in the coming years SUB is going to be implemented based on mobile technologies', since mobile application seems extremely promising for the future. Another interesting concepts that may be integrated in the future into our system, are the artificial intelligence algorithms which are going to make the system intelligent enough to pick up only candidates that are qualified enough for a specific job, internship, or mentorship offered by any company based on the criteria's specified.

Chapter 7

References

- [1] Instat, "Instat," Instituti i Statistikave, [Online]. Available: <http://www.instat.gov.al/al/themes/arsimi.aspx?tab=tabs-5>. [Accessed 10 December 2012].
- [2] M. Zaharie, "How could we improve the university graduates transition from education to labor market in Balkan States," *13th Intenational Summer School of Cervia*, 2007.
- [3] [Online]. Available: <http://www.cals.wisc.edu/careerservices/?p=37>. [Accessed 8 January 2013].
- [4] D. W. Scott and H. F. Walter, "Managing A Student Internship: Auditors Looking to Hire Temporary Help May Want to Consider Their Local College or University as a Source of Potential Candidates".
- [5] J. B. Brian, "Mentorship Is Key to Career Success," 2010.
- [6] Campbell, "Faculty/student mentor program: Effects on academic performance and retention," *Research in Higher Education*, vol. 38, no. 6, pp. 727-742, 1997.
- [7] [Online]. Available: <http://www.internships.com/student> . [Accessed 4 January 2013].
- [8] [Online]. Available: <http://internships.about.com/od/internshipsites/fr/internshipscom.htm>. [Accessed 8 January 2013].
- [9] "FindEmployment," [Online]. Available: <http://www.findemployment.com/>. [Accessed 8 January 2013].
- [10] G. Lozenzo and J. Ittelson, "An Overview of E-Portfolios," *Educause*, 2001.
- [11] R. Bauer, "Construction of One's Identity. A Student's View on the Potential of E-Portfolios," *The Potential of E-Portfolios in Higher Education*, pp. 173-183, 2009.

- [12] T. Yu, "E-Portfolio, a valuable job search tool for college," *Campus Wide Information Systems*, vol. 29, no. 1, pp. 70-76, 2011.
- [13] [Online]. Available: <http://www.cte.jhu.edu/epweb/index.htm>. [Accessed 9 January 2013].
- [14] "PebblePad," [Online]. Available: <http://www.rmit.com/browse;ID=075sqig1pgj0z>. [Accessed 10 January 2013].
- [15] M. Botterill, G. Allan and S. Brooks, "Building community: Introducing E-Portfolios in University Education," *Hello! Where Are You in the Landscape of Educational Technology*, 2008.
- [16] J. Conallen, *Building Web Applications with UML*, Addison-Wesley Professional, 2003.
- [17] J. Erickson and K. Siau, "Theoretical and Practical Complexity of Modeling Methods.," *Communications of the ACM*, pp. 46-51, 2007.
- [18] I. Sommerville, *Software Engineering*, Wokingham: Addison-Wesley Pub., 1996.
- [19] H. Gellersen and M. Gaedke, "Object-Oriented Web Application Development," *Internet Computing, IEEE*, pp. 60-68, 1999.
- [20] R. Shannon, "What is HTML?," Last Visited, 2007.
- [21] D. Goodman, M. Morrison and B. Eich, *Javascript Bible*, John Wiley & Sons, Inc., 2007.
- [22] E. D. Corporation, "Evans Data," [Online]. Available: <http://www.evansdata.com/>. [Accessed 12 January 2013].
- [23] FPDF, "FPDF," [Online]. Available: www.fpdf.org. [Accessed 15 April 2013].

Chapter 8 Appendix A

System Design UML Diagrams

Appendix A.1 will represent the other drawn activity diagrams and the remaining sequence diagrams not included in chapter 4.

A.1 Activity Diagrams

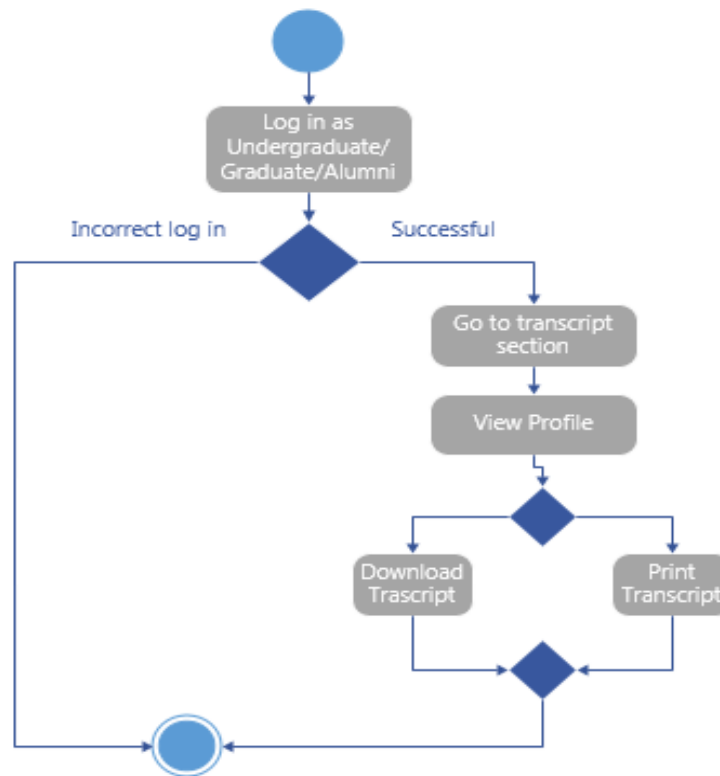


Figure 8.1 - Transcript Activity Diagram

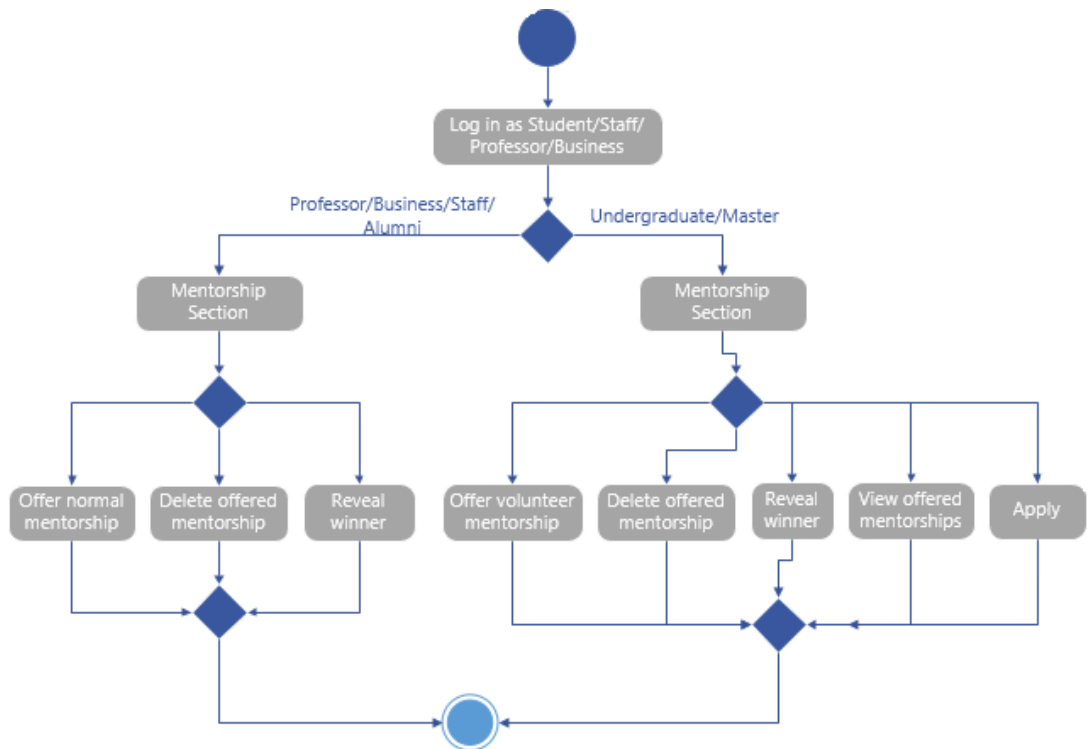


Figure 8.2 - Mentorship Activity Diagram

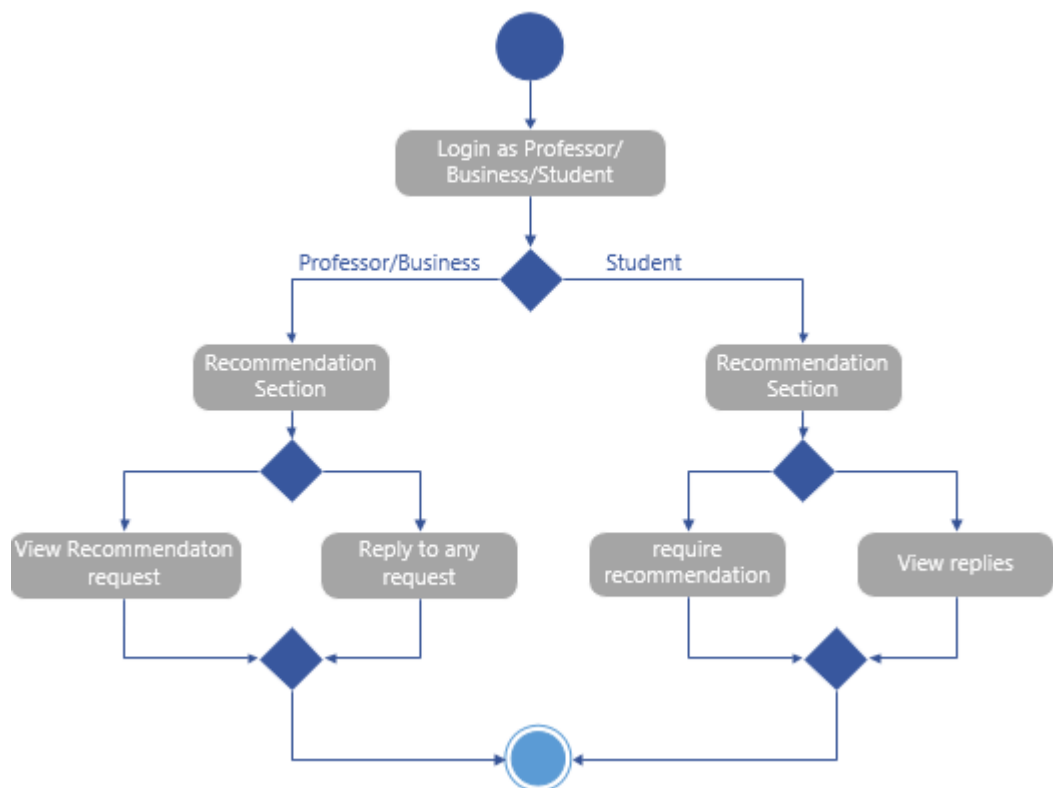


Figure 8.3 - Recommendation Activity Diagram

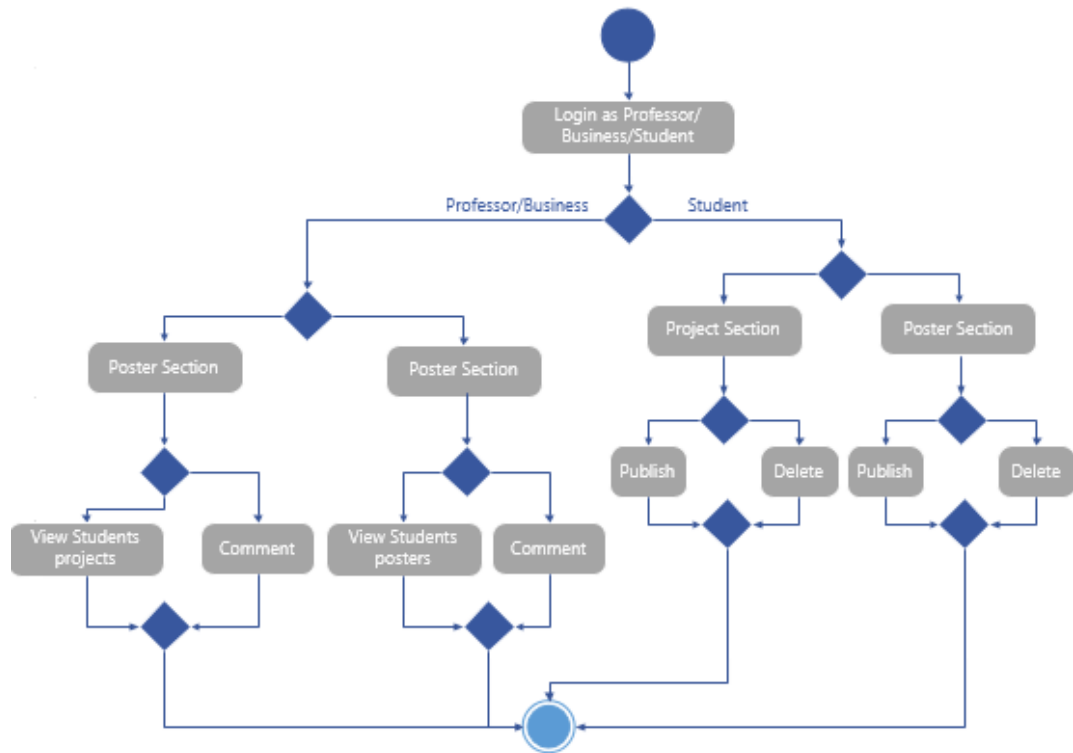


Figure 8.4 - Project/Poster/Paper

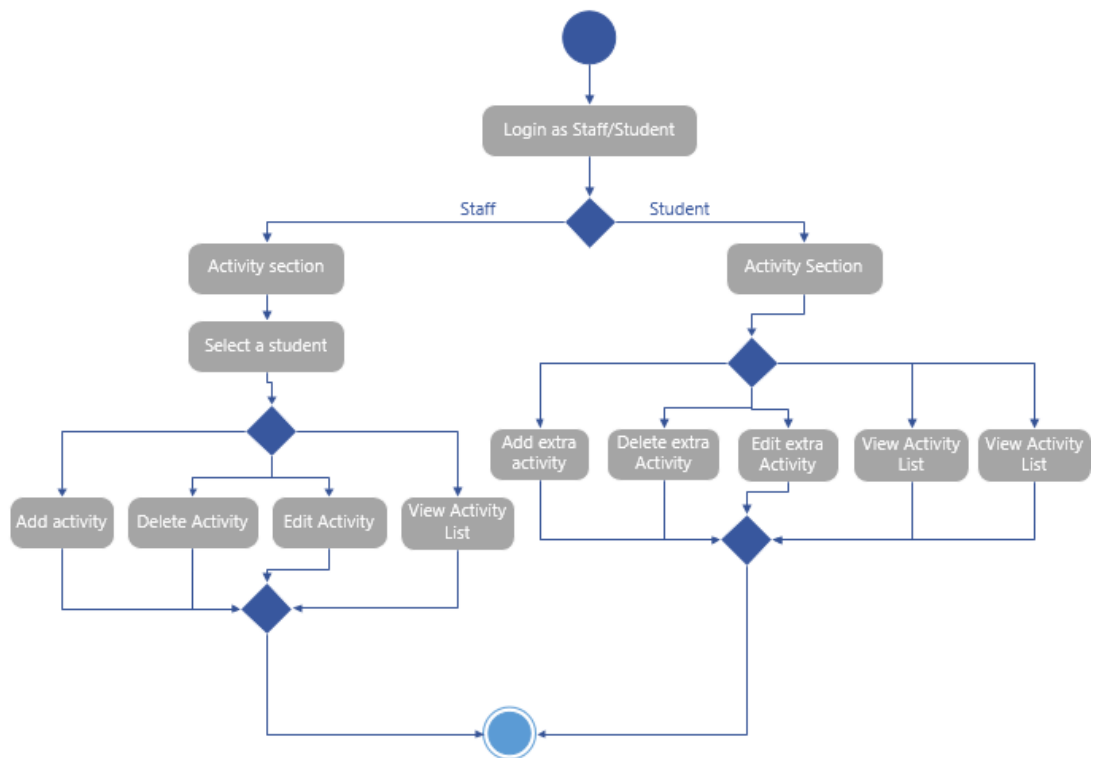


Figure 8.5 - Activities Activity Diagram

A.2 Sequence Diagrams

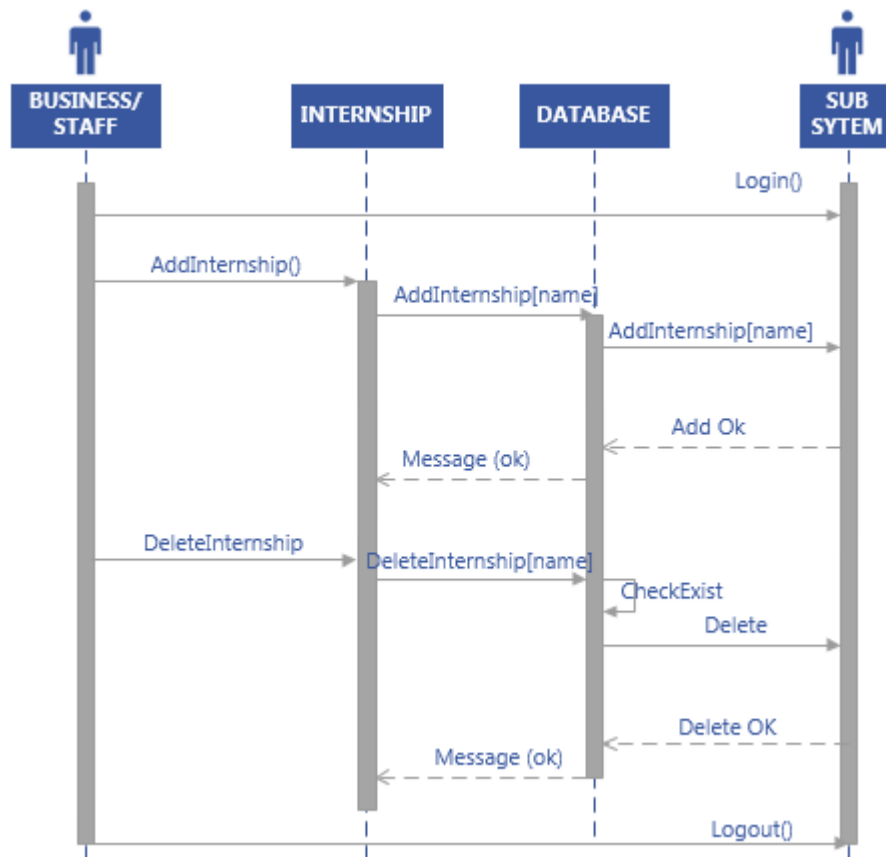


Figure 8.6 - Internship Sequence Diagram

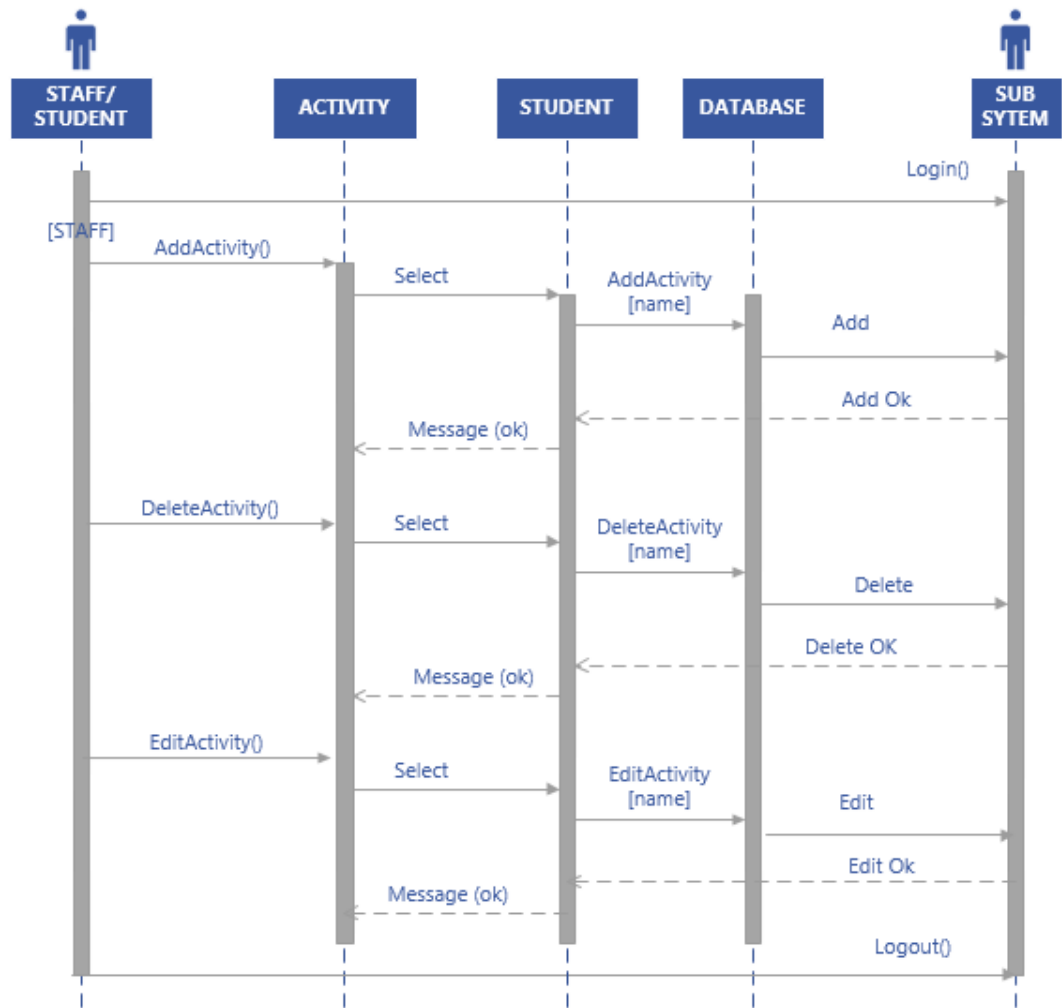


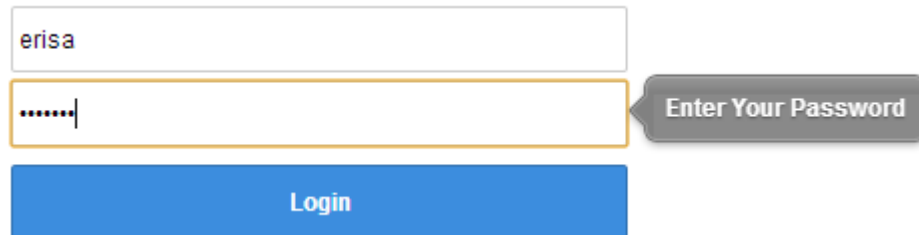
Figure 8.7 - Activity Management Sequence Diagram

Chapter 9

Appendix B

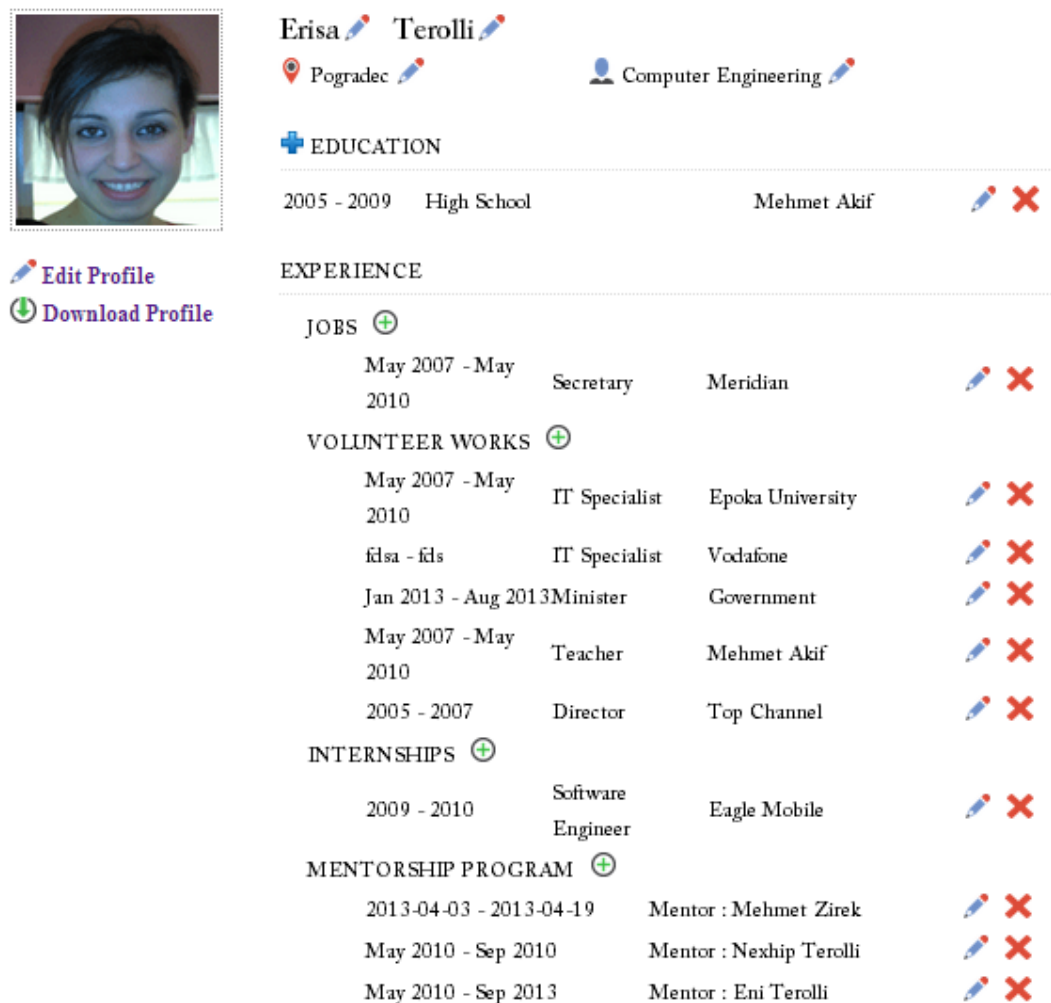
Appendix B contains screenshots taken from the implemented SUB system

B.1 System Screenshots



A login form with two input fields. The first field contains the text 'erisa'. The second field contains a masked password '.....'. To the right of the password field is a grey button labeled 'Enter Your Password'. Below the input fields is a blue button labeled 'Login'.

Figure 9.1 - Log in



The 'Edit Profile' page shows a user's profile information and a list of their work experiences. On the left, there is a profile picture of a woman and two links: 'Edit Profile' and 'Download Profile'. The main content area displays the user's name 'Erisa Terolli', location 'Pogradec', and education 'Computer Engineering'. Below this, there are sections for 'EDUCATION', 'EXPERIENCE', 'JOBS', 'VOLUNTEER WORKS', 'INTERNSHIPS', and 'MENTORSHIP PROGRAM'. Each section contains a table of data with edit and delete icons.























Erisa Terolli			
Pogradec		Computer Engineering	
EDUCATION			
2005 - 2009	High School	Mehmet Akif	 
EXPERIENCE			
JOBS			
May 2007 - May 2010	Secretary	Meridian	 
VOLUNTEER WORKS			
May 2007 - May 2010	IT Specialist	Epoka University	 
fidsa - fids	IT Specialist	Vodafone	 
Jan 2013 - Aug 2013	Minister	Government	 
May 2007 - May 2010	Teacher	Mehmet Akif	 
2005 - 2007	Director	Top Channel	 
INTERNSHIPS			
2009 - 2010	Software Engineer	Eagle Mobile	 
MENTORSHIP PROGRAM			
2013-04-03 - 2013-04-19	Mentor : Mehmet Zirek		 
May 2010 - Sep 2010	Mentor : Nexhip Terolli		 
May 2010 - Sep 2013	Mentor : Eni Terolli		 

Figure 9.2 - Edit Profile

SUB - Career Office Information System

LOGOUT

ProfileTranscriptJobsVolunteer worksProgramsRecommendationWorksActivitiesNewsEvents

Eagle Mobile / Software Engineer



Eagle Mobile want to hire a software engineer, who is willing to work on real challenging projects with strict deadlines.

Read More

NEWS

erisa Terelli
ersa

10 . 05 . 2013

Conference

Sed ut perspiciatis unde omnis iste
natus error sit voluptatem
accusantium dolor

08 . 05 . 2013

Figure 9.3 - Job Opportunities

SUB - Career Office Information System

ProfileTranscriptJobsVolunteer worksProgramsRecommendationWorksActivities

Degree

☐ Bachelor ☐ Master

Offered for Departments

☐ Banking and Finance
☐ Business Administration
☐ Economics
☐ Political Science and International Relations
☐ Finance Albanian
☐ Architecture
☐ Civil Engineering
☐ Computer Engineering
☐ Electronics

Mentorship Description

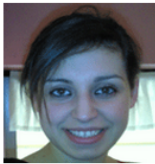
Aplication Deadline

Submit

Figure 9.4 - Offer Mentorship

SUB - Career Office Information System
LOGOUT

Users
Activities
Volunteer Works
News
Events
Students Portfolio
Internships


Photo:

 No file chosen

User Code: 1
Name: Erisa
Surname: Terolli
Location: Pogradec
Level: Master
Department: Computer Engineering
Year: 4
Faculty: Faculty of Architecture and Engineering
Phone: 673770624
Email: neo.is.back@hotmail.com
Address: Pogradec

Figure 9.5 - Edit Student

SUB - Career Office Information System
LOGOUT

Users
Activities
Volunteer Works
News
Events
Students Portfolio
Internships

Id	Ucode	Name	Surname	Location	Dep	Fac	Phone	Email	Address	Photo	Portfolio
6	1	Erisa	Terolli	Pogradec	8	1	673770624	neo.is.back@hotmail.com	Pogradec	erisa.gif	

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Figure 9.6 - Accessing Student Portfolios