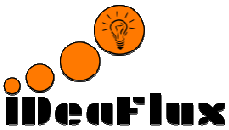
ETHERA

Multifaceted Student Industrial Placement System
Version 1.00

Project Report



Rajarata University of Sri Lanka
Faculty of Applied Sciences
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ABSTRACT

All most all the students among the Undergraduate society facing reasonable amount of challenge when they're about to leave the university for industrial training or jobs due to the fact that they have to find the right career path & right place to be. Even the academic staffs or career guidance units will not only have to process and sort huge amount of applicants, but also will need to be in communication with organizations who provide career opportunities to the students. To overcome this problem a system is been developed with ability of simplifying the process above mentioned. This system will use many novel algorithms for filtering and making decisions, web-service consuming and servings to deal with problems and offer sophisticated and multifaceted solutions.

DEDICATION

We would like to dedicate the final report of Ethera project to
Dr. Shantha Fernando and for all the ICT staff members in Rajarata University.
There is no doubt that without their continued support and counsel we could not have completed this process with this much of success.
A special feeling of gratitude to Dr. H.O.Wijewardhana for her encouragement and guidance.

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ACKNOWLEDGEMENT

We are highly indebted to Dr. Shantha Fernando and all ICT staff members of Rajarata University for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the ETHERA project with great success.

We would like to acknowledge Mr. P.S.Palliyaguruge who is the supervisor of the ETHERA project for his inspirational instruction, guidance, countless hours of reflecting, reading, encouraging, and most of all patience throughout the entire process. And also we would like to express my special gratitude and thanks to Dr. H.O.Wijewardhana for giving us such attention and time.

Finally it is appreciated and special thanks to all colleagues of group IDeaFlux in developing the project. Without the team spirit and dedication of each, we could not have completed this effort with this much of success.

PREAMBLE

1. EXCECUTIVE SUMMARY

This document is intended to assist all interested parties by providing sufficient information about the project ETHERA, a multifaceted student industrial placement system. This project would be carried out to meet the software development requirements of the ICT-3411 module conducted by the Faculty of Applied Sciences Rajarata University of Sri Lanka. The document focuses on the overview and introduction, literature exploration and research, design, implementation and testing of the project ETHERA and will also serve as a document discussing the scope, technologies used and concepts explored, testing and results obtained and also the recommendations for better functionality and future improvements. This also discusses the novelty of the project and the uniqueness of the solution. This document is composed to provide a fully awareness on the project ETHERA.

2. DOCUMENT CONVENTIONS

Heading Style	Font Size (pt)	Font Type	Font Color
Master Headings	13	Calibri	White
Sub Headings	12	Calibri	Black
Other Headings	11	Calibri	Black
Body	11	Times New Roman	Black

3. INTENDED AUDIENCE AND READING SUGGESTIONS

This report on the project ETHERA will serve as the foremost reference material by the project team assigned to the project ETHERA. This document will be used as the reference material for all the academic staff members of ICT course in Faculty of Applied Sciences for the purpose of supervising and evaluating the project. It is also intended to provide as a legal document on ETHERA project with the Career Guidance Unit. Other than above mentioned categories, it will also serve as a great resource for anyone who is interested in this project.

4. DOCUMENTATION ROADMAP

The Document Road Map will guide its reader on how this report is organized. It is intended to assist a reader with a particular interest to quickly and directly find the desired information. Sub-sections of chapters are structured as follows.

Chapter 1: Provide an Introduction and overview to the project. Chapter contains the problem identified, background and motivation factors, overview and scope of the project and requirements identified under following sub categories.

1.1. Introduction
1.2. Background and Motivation
1.3. Project scope
1.4. Project objectives
1.5. Project requirement specification
1.6. Outline of the report

Chapter 2: Contains about literature reviews done prior to design the solution research work done to identify optimal solution , the technologies explored and models and concepts identified and used in the project under following sub categories.

2.1. Literature exploration
2.2. Technologies explored
2.3. Models and Concepts explored

Chapter 3: Includes detailed project design. Concept, novelty of the solution, development methodology and approached , alternatives considered and project design using relevant UML diagrams under sub categories,

3.1. Project concept
3.2. Novelty of the project
3.3. Project development methodology and approach
3.4. Project design
3.5. Alternatives considered
3.6. Detailed project design

Chapter 4: Contains about the project implementation. Case tools and frameworks used and how the solution is implemented. The business process flow is described using relevant source code examples, diagrams and screen shots.

4.1. Use of case tools used
4.2. Frameworks Used
4.3. Business Process

Chapter 5: Testing conducted and Results obtained using specific recording method.

5.1. Testing and Results

Chapter 6: Conclusions

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6.2. Future work

CHAPTER 01

1. INTRODUCTION AND OVERVIEW

1.1. INTRODUCTION

The aim of the Faculty of Applied Sciences Rajarata University of Sri Lanka is building science graduates who have the ability to use their science knowledge and apply them precisely to solve challenging real world problems. So it makes the room to come into a clear thought that students coming out from the faculty as graduates should be skilled to apply their science knowledge in to various industrial needs. This output makes the difference between a typical science faculty and an applied sciences faculty.

Employability refers to a person's capability for gaining and maintaining employment. For individuals, employability depends on the knowledge, skills and abilities (KSAs) they possess, the way they present those assets to employers, and the context (e.g. personal circumstances and labor market environment) within which they seek work. As such employability is affected by both supply-side and demand-side factors which are often outside of an individual's control. As the supply-side, the faculty should have a proper strategy to guide undergraduates to become well employable within their context. .

For a faculty that intends to output graduates with practical knowledge, should definitely have a functional and well organized Career Guidance Unit. The Career Guidance Unit itself should have a mechanism to communicate between students and industry back and forth, rather than just using traditional communication methodologies such as telephone calls, Emails, notices etc.

Currently the career guidance unit of the faculty of Applied Sciences is practicing a manual process to select best and most suitable undergraduates to industrial training and jobs. But in the sake of efficiency and effectiveness, it is essential to have a proper way to fill up the communication gap and overcome the problems of current selection process.

ETHERA is a project that supports undergraduate industrial training allocation process by introducing a system with a series of logic. Meanwhile we'll fill up the communication gap by developing a full comprehensive message passing system including Email and SMS. The system also includes a sophisticated event management system and a event calendar for scheduling process.

1.2. BACKGROUND AND MOTIVATION

1.2.1. Background

The purpose of a Faculty of Applied Sciences is to produce most suitable people to industrial requirement. To achieve this goal the faculty should have to have a beneficial and systematic industrial training process relevant to their area of study based on their preferred career path is essential. It will be helpful to develop necessary transferable skills including attitude, motivation and skills required to deal with the industrial environment easily. Then only they can perform well and contribute to the efficient workforce. For this purpose there should be a better interaction and a better understanding among the students, industry and the Career Guidance Unit (CGU).

CGU is responsible for arranging, monitoring and evaluation of industrial training and also for planning and organizing activities in guiding students for gainful employment prospect. For that there should be a proper mechanism to interact with the industry as well as students. Whereas the CGU is the place where students and the industry meets each other. Therefore CGU is doing a critical job by acting as a bridge between industry and University which affect to the students' lives directly.

The problem which is addressed by the project Ethera arises here. There was not any better mechanism to interact students, industry, and the CGU in the faculty. Hence the main purpose of the Faculty of Applied Sciences we mentioned above is difficult to address.

The major problem we are going to address is the communication gap and the poor student selecting process for industrial training in Faculty of Applied Sciences.

In current process Career Guidance Unit tries to keep the contact with the industry using informal communication links such as personal contacts with the industry people etc. But it is not very effective way to interact with the industry because it may not helpful for the new comers to the industry to find us and also to maintain the available interactions.

When considering about current situation we can identify some weaknesses in student selection process. In current process, what Career Guidance Unit do is that they inform students by putting notice on notice boards and collect CVs from students. Then after evaluating CVs they will call for interview and select students for particular jobs.

The first weakness we identified here is that notice is not an efficient way of passing inform to students because most of the time they do not read notices.

The other drawback is that the students have no clear understanding on what they really like and capable of doing. May be they have not clearly identified the scope of their employment area. This will be a major issue when doing selection. Sometimes students might change their preference even after they have selected for a particular job. There is no way to address these issues in current process.

Another drawback of current students selecting process is that the career guidance unit does not have a proper CV evaluation criterion. Current process mostly consider about student academic performances such as GPA. But the GPA is not the sole factor to measure a student's talent and ability to perform well in the job. According to the current process the best suit may not capture. That will affect to the reputation of the faculty.

What the industry requires form a graduate of applied sciences is not only GPA but also their learnability, adaptability, employability, team spirit etc. But the current student selecting process does not support to improve students employability.

1.2.2. Motivation

The communication gap is one of the major problems identified in industrial placement process. Industry cannot directly negotiate with student until they go to the industry and the CGU cannot have a proper idea about what are the essential things industry required from a student. Since both the industry and the faculty can't testify whether a student is suitable for a particular opportunity or not, the confusion may lead to wrong decisions and it will be harmful to the reputation of the faculty.

The problem is very much familiar to us since we are internal to the problem domain. We had a good understanding about the problem due to the fact that the problem persists severely inside our degree program (Information and Communication Technology), therefore we have the highest capability to design the most suitable application to address the problem, and hence we are motivated to solve the problem.

Since our client is the CGU which is a part of the faculty, requirement gathering and communication is not difficult.

It is expected to earn very good reputation to the faculty through this project by providing a better portal to interact with industry and get more opportunities for the students of the Faculty of Applied Sciences of the Rajarata University of Sri Lanka. Since the system increase the efficiency and the effectiveness of the selection process as well as much other related functionality to student selection and employability development it is expected to select the best match for a given opportunity by considering both students' skills and extra activities. Apart from student selection system also facilitate the employability development process done by CGU, hence reduce wastage of the opportunities granted by industry.

Although the risk is there when dealing with industry and this has a direct impact on faculty reputation and its' students lives, we have the confidence to address the problem and solve it in a unique and the best way using the knowledge we have obtained so far from our ICT degree program. We also have the expectation of improving our knowledge while implementing the solution according to the requirements.

As a conclusion it should be mentioned that although the problem is identified by many parties related to student recruitment for industrial training , there is no any proper solution have been yet implemented , where the University, students and companies can interact each other and select the best suit for the vacancy. And also none of the solutions have reduced the overweight of student selection for the responsible party as well as none has considered about student preference, industry requirement and student skills and performance all together when selecting students. So a better sophisticated solution matching to the industrial recruitment process within the University is highly required. Therefore eagerness of implementing a unique solution for the first time and use the knowledge in a beneficial manner to the University can be considered as key motivation factor.

1.3. PROJECT SCOPE

ETHERA is a portal that facilitates the student industrial placement process of the faculty of Applied Sciences, by providing a better student assessing, selection and communication process in between University, industry and students.

It provides a shared space for student profiles and a portal to integrate CGU, students, industry, and staff. Ethera has an automated student grading mechanism based on both students' academic and extra performances. Ethera uses Google calendar API for event scheduling and uses e-mail and SMS services for communicate with each other.

Ethera is a highly secured, efficient and a methodical application for the student industrial placement process of the faculty of Applied Sciences.
The system is mainly focused on the student performance assessing process and the selection process in to the industry. But as results of the processed data in different stages, below outcome can be taken as additional features of the system

- Student filtering system, a component that can be specially used by the companies who offer the internships to the students. From this component, students can be filtered in various constrains such as GPA for the given set of subjects, Extra activates, Team performance, etc.
- Shopping cart like student recommendation within the student filtering system. This will provide a way to the industry personnel to pre-recommend students.
- Comprehensive student profile which will be maintained as an archive for the future even after students graduated.
- SMS and emails will be used as media for notifications. Basically sending of SMS notification will be defined to specific scenarios and email notifications can be send on-demand to desired parties of the system.
- For the automated selection process of students, a selection algorithm will be designed and used. It'll run on the facts including student GPA, student extra curriculum activity total weight, student choice of field, student selection of the companies.

Project capacity

Ethera is a web portal which is developed to overcome problems faced by the Carrere Guidance Unit of the university. Since it is addressing a problem which could be common to any university in Sri Lanka, it is carefully designed as a universally adaptable application. Each and every sub components can be changed according to different user requirements. Since Ethera is dynamic application further improvements are allowed according to future requirements. For example Ethera is applicable to a university which has about 5000 students. if anyone need to adapt the system to a university with over 20,000 of students it can be done by a small configuration change.

Ethera is using less hard coded data. It is based on dynamic data as many as possible. Hard coded data is used in few places such as for GPA calculation. Therefore Ethera is applicable to any place which has the same problem domain.

Beneficial parties

The concept of Ethera came up by experiencing the drawbacks and with the eager necessity to improve the efficiency of the student industrial placement process of the faculty. The objective of the projects was to give a superior, preferable solution to its beneficial parties who are the university, students, CGU and the industry.

Faculty CGU is the one of the major beneficial parties of the system as the client of the project and as the person who is responsible for the students' industrial placement process. CGU has to act as the intermediate party between the industry and the student. The major process of Ethera is designed to satisfy each and every needs of CGU including better communication medium, automated student selection process so on.

In students' perspective, Ethera provides them a place to interact with the industry in their own. The most important aspect of the Ethera in behalf of the student is that the consideration of their choice in the selection process. Ethera provides a facility to students to upload any number of CV's and select one of them as the active CV to view by the industry.

Industry is the other beneficial party of Ethera. It provides an open window to industry to view student's profiles and select student according to their requirements.

Various aspects address by the project

ETHERA is a portal that facilitates the students' industrial placement process by providing a better student assessing, selection and communication process in between University, industry and students. So it gives a solution for the communication gap between University, industry and student. SMS and e-mail service will help to reduce the communication gap among them.

The system would have the ability to integrate the CGU, industry, students and the staff together by providing a portal. All the necessary details for student assessment are provided in a single place in a profile after hierarchy of approvals. There will be an automated student grading mechanism with some limitations based on both academic and extra performances. Student selection process is automated in a manner that considers all student performance, preference and available opportunity. System use LinkedIn profile details to update student information.

Google calendar API is used to help event scheduling in the CGU. It can create and remove and update events in the Google calendar by using notices. After creating a notice it can be published in the Google calendar or leave it as unpublished.

1.4. OBJECTIVES

The aim of this project is to develop an application that supports the Career Guidance Unit to overcome the difficulty in student selection process for industrial training more efficiently and effectively while filling up the communication gap.

To achieve the above aim we have defied the following objectives:

Business Objectives

- Improve the student visibility to the industry and obtain more opportunities.
- Implement a system that helps all industrial training recruitment process in Universities.
- Improve productivity, efficiency & effectiveness of CGU.
- Maintain a virtual bridge between CGU, Industry & students by implementing an advanced communication methodology.
- Improve the way of assessing students by depending not only on the GPA but also several assessment factors.

Learning Objectives

- Apply the Software Engineering Principles to study the drawbacks of the current student selection process and barriers for effective communication of students and implement a system to solve the identified problems.
- Applying the knowledge in web services to integrate different types of RESTful service together.
- Using the design and analysis of algorithms knowledge to develop and tweak related algorithms which are currently in the business where necessary.
- Design a portal that opens the opportunity to examine students in an extensive way that helps industry to identify students prior to the industrial placement process.
- Evaluation of the usability of the proposed system to overcome above problems.
- Identify the required changes, fine tune them and make the best solution available to address the situation.
- Prepare final documentation with the support for further enhancement based on the additional requirements.

1.5. PROJECT NONFUNCTIONAL REQUIREMENTS

1.5.1. Product Requirements

USABILITY REQUIREMENTS

1. All system users' should be able to login into the system by entering their e-mail as the user name and their preferred password.
2. An administrator shall be able to use all the system functions after 10 hours of training.
3. CGU staff shall be able to use the given system feature after hours of training.
4. SAR office staff shall be able to use the given system features after 4 hours of training.
5. The rate of errors done by a trained system user will be an average of 2 per hour from 100 actions.
6. If a password is forgotten by a system user or a student they shall be able to recover their password using their email address within not greater than 2 minutes.

EFFICIENCY REQUIREMENTS

Performance Requirements

1. A page load time in the backend shall not be exceeded 100ms.
2. A page load time in the frontend shall not be exceeded 80ms.
3. System generated and user generated email dispatch time shall not be exceeded 200ms.
4. Database query processing time shall not be exceeded 50ms.
5. J-query lazy loading used for on demand image loading over scroll for fast page loading.

Space Requirements

1. The space provision for the document root and profile image hosting should greater than 1 GB.
2. The space provision for the database must greater than 500mb.
3. The location of the doc root directory and database must be on a LVM logical volume so that they can grow on demand.
4. The system shall remove the older CV when a new CV has been uploaded in to the same choice slot.

DEPENDABILITY REQUIREMENTS

1. System shall be up with down time not more than 1 hour per day.
2. System shall be able to deliver requested content in a 150 concurrent connections.
3. System shall be run on the apache web servers on low memory conditions below 512mb.
4. System shall generate the student GPA in a precision of 3 decimal points.
5. System shall maintain a file renaming mechanism for CVs with 4 character hash for each document that being uploaded.

SECURITY REQUIREMENTS

1. System shall use SHA-1 hashing algorithm to store password in the database.
2. System shall never grant the direct access to CV upload directories from the URL.
3. All the form in the system shall be written in a way that prevents SQL injection.
4. Use Google Re-captcha challenge response mechanism to the student registration form.
5. Enforce strong password to the student in their registration and system users to their first time login.

1.5.2 Organizational Requirements

ENVIRONMENTAL REQUIREMENTS

1. The environmental that shall be hosting the system should contain minimum hardware requirement as a workstation with AMD by or Intel or serve IA by compatible dual core processor 1024 MB of RAM and 5 GB of free hard disk space. Internal connection with 2 Mbps uplink and 1 Mbps download bandwidth.
2. The environment shall be hosting the system should contain minimum software requirement as Enterprise 6 Linux operating system. Apache web server version 2.2, PHP version 5.3, Postfix mail transport agent version 2.6
3. From the internet gateway there should be a port forwarding to the port no 80 of the system workstation IP address.
4. A Jetty/Tomcat server should host the Dialog IdeaPro SMS system which is providing an SMS API
5. LinkedIn RESTapi should be accessible to perform LinkedIn profile API queries.

OPERATIONAL REQUIREMENTS

1. There shall be an initial administrator user in the system database who can login in to the system.
2. Initial system use shall create by the administrator with a random password.

DEVELOPMENT REQUIREMENTS

1. Every development system shall contain with a GIT local repository.
2. Pre setup remote GIT repository shall be there for the collaborative coding and proper version controlling.
3. The web based system shall be implemented from PHP as the sever-side scripting language. AJAX, J-query for the validation and page enhancement. MYSQL as the database management system.
4. JetBrains PhpStrom shall be used as the development interface.

1.5.3. External Requirements

REGULATORY REQUIREMENTS

1. The system shall not disclose any personal information about members to unauthorized users or public
2. Student industry experience shall not disclose to industry.
3. Student selection is fully automated. Only use manual method when the industries ask for a specific student.
4. Academic performance is calculated through GPA based on university regulations.
5. System shall not harm any university regulation.

1.6. OUTLINE OF THE REPORT

Chapter 1: Introduction and overview of the project

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CHAPTER 02

2. LITERATURE EXPLORATION AND RESEARCH

2.1. LITERATURE REVIEW

In a University, for students, not only the theoretical knowledge but also providing an effective training relevant to their area of study based on their preferred career path is essential. It will be helpful to develop necessary transferable skills including attitude, motivation and skills required to deal with the industrial environment easily. Then only they can perform well and contribute to the efficient workforce. For a faculty of Applied Sciences it is essential to produce the most suitable people for the industrial requirement. Career Guidance Unit (CGU) is responsible for arranging, monitoring and evaluation of industrial training and also for planning and organizing activities in guiding students for gainful employment prospect. For that there should be a proper mechanism to interact with the industry as well as students. Therefore Career guidance Unit should concern both industry requirement and student preferences. Otherwise if a student is selected for a particular job or a training that he/she will never willing to do, definitely his/her performance will not be utilized into maximum. This will damage the reputation of the University and will end up with having bad impression on the industry in student's mind. Therefore CGU is doing a critical job by acting as a bridge between industry and University which affect to the students' lives directly.
Currently the CGU is conducting a manual process for industry recruitment. The coordinator of CGU keeps contacts with the companies. Once there is a opportunity or a vacancy for a job, CGU puts a notice and call for CVs. Then the students willing to apply will be interviewed and recruit to the companies. The people who got through this selection process will only be able to go for the interviews by the company. Here the whole selection process is based on academic performances, no considerable concern on extra activities. Also no proper criteria to evaluate students, most probably the skills the CGU evaluate may not what the industry require. This will end up in not selecting them by companies although recruited by CGU, which is wastage of a valuable opportunity.

The above mentioned problem is common for all Universities when recruiting undergraduates for industrial training .Our background review identified very few systems which already have tried to address the same problem domain but in different methods.

Faculty of Engineering of the University of Peradeniya has developed it as a part of a web application where students can obtain useful information to improve employability. But there is no any feature to introduce students to the industry or select best suit to the industry requirement. Since the system is not revealing further details on the industrial training recruitment process we have no clear idea about their future plans. Currently they are practicing a manual process for recruit students for training.

University of Colombo is having a web application based on the same problem domain. Though it has suggested some additional sophisticated mechanism for the industry to view students such as "Find a graduate" and a place to publish vacancies, those are not yet implemented. They also having more detailed set of articles based on employability development and provide other recourses which will be helpful for industry placement. For example company details, time planners, schedulers.

Not only in Sri Lanka but the Swinburne University of Technology in Australia also has developed a system for industry placement of undergraduates. The additional functionality they have is a student selection process where students can apply for a vacancy online. And also students can connect with the industry through that system directly. But they also have not implemented a mechanism for the industry to pre evaluate students before their interviews.

The above examples imply that not only the local but also foreign Universities face the same problem when recruiting students to the industry. But almost all the identified solutions have tried to make easy access to the information regarding industrial training student recruitment but have not touched the area of student selection in and efficient way for companies and also have not paid attention to improve the ability to recruit best student for the most suitable place.

We found a system belongs to "APPIC Internship Matching Program" which is bit closer to the solution we are suggesting for correct student selection both considering student's preference and industry requirement. Basically the concept is based on matching students for internships. The function of "matching algorithm" is as follows.

The matching algorithm uses the preferences stated on the Rank Order Lists submitted by applicants and internship programs to place individuals into positions. The algorithm starts with an attempt to place an applicant into the program that is most preferred on the applicant's list. If the applicant cannot be matched to this first choice program, an attempt is then made to place the applicant into the second choice program, and so on, until the applicant obtains a tentative match, or all the applicant's choices have been exhausted.

An applicant can be tentatively matched to a program in this process if the program also ranks the applicant on its Rank Order List, and either: the program has an unfilled position available for the applicant. In this case there is room in the program to make a tentative match between the applicant and program. The program does not have an unfilled position, but the applicant is more preferred by the program to another applicant who is currently tentatively matched to the program. In this case the applicant who is the least preferred current match in the program is removed from the program to make room for a tentative match with the more preferred applicant.

But here also consider only the industry and student preferences then based on 2 ranking lists either by students and industry, the selection process takes place. The major issue here is, there is no proper method of student evaluation, also no way for the companies to keep contacts.

The LinkedIn is one of the best solutions we have found so far. LinkedIn is obviously a great tool for professionals in transition. It help to connect professionals. Companies can view profiles and give chances to the people with the necessary skills they required. This will help the companies to select professionals according to their wish, as they can pre evaluate using the profile. It is a well designed system containing the same idea we want to develop for student recruitment process in the University. But the system we are proposing is not totally similar, but the objective of exposing students and make them visible to the industry can be achieved by a similar method used in LinkedIn. In addition to that we need automated process for student selection for industry recruitment and also an effective and efficient communication method in between industry, CGU and students.

As a conclusion it should be mentioned that although the problem is identified by many parties related to student recruitment for industrial training , there is no any proper solution have been yet implemented , where the University, students and companies can interact each other and select the best suit for the vacancy. And also none of the solutions have reduced the overweight of student

selection for the responsible party as well as none has considered about student preference, industry requirement and student skills and performance all together when selecting students. So a better sophisticated solution matching to the industrial recruitment process within the University is highly required.

2.2. RESEARCH AND DEVELOPMENT

The key issue addresses by the project Ethera is student selection in industry recruitment process. Student selection process is aided by other components to output the best set of students who satisfy requires skills and extracurricular performance. Same problem has identified and has tried to solve using various approaches but through literature exploration it was understood a complete solution was not implemented. There came the need to do a research to identify an optimized solution to the problem at hand. Algorithm is developed through research.
Numbers of alternative solutions were considered and research was done to figure out the most appropriate solution to select students by considering academic performance as well as extracurricular performance.

2.2.1. Algorithm Development Method 1

Let ***G*** be the GPA for each student, ***E*** be the extra activity mark cumulative, ***A*** be the student interested area and ***O*** be the organization

So we can define *S* where

$$S = \sum_{m}^{j=1} \sum_{n}^{i=1} G_i, E_i, (A, O)_j$$

Here ***n*** is the number of students and ***m*** is number of organizations combined with interested areas.

Given the constrains

$|A_i| \leq 3$

$\boldsymbol{G_i.W_G + E_i.W_E \leq 4}$ Where W_G and W_E are the weights given for the GPA and Extra activities respectively.

The Steps of the algorithm

Group students in to their interested areas and organization couple by the priority of their choice

1. Select students in to groups by the priority of the interested area and organization combination.

   Priority(1) => IntrestedArea(Software Engineering) , Organization (WSO2)

Id	$P = \frac{G.W_G + E.W_E}{1}$
ICT/2008/09/012	3.2
ICT/2008/09/052	3.9
.....	.....

Table1: Student Selection list on 1st priority

Priority(2) => IntrestedArea(Software Engineering) , Organization (WSO2)

Id	$P = \frac{G.W_G + E.W_E}{1}$
ICT/2008/09/025	3.4
ICT/2008/09/036	2.8
.....	.....

Table2: Student Selection list on 2nd priority

Priority(3) => IntrestedArea(Software Engineering) , Organization (WSO2)

Id	$P = \frac{G.W_G + E.W_E}{1}$
ICT/2008/09/025	2.1
ICT/2008/09/036	2.7
.....	.....

Table3: Student Selection list on 3rd priority

2. For every table, sort the students according to ***P***
   Example

```
for I = 1 to N-1
        J = I
        do while (J > 0) and (P(J) < P(J - 1)
          Temp = P(J)
          P(J) = P (J - 1)
          P (J - 1) = Temp
          J = J - 1
        end_do
end_for
```

Id	Sort_$ASC\left(P=\frac{G.W_G+E.W_E}{1}\right)$
ICT/2008/09/052	3.9
ICT/2008/09/012	3.2
…..	…..

Table4: Student Selection list in descending order

3. Fill the opportunities granted from organizations combining the interested area with these three tables starting from Priority(1) table of the group.

```
do while (opportunity(Software Engineering + WSO2)>0)
       student.selected = true
       opportunity(Software Engineering + WSO2) = opportunity(Software Engineering + WSO2) – 1
end do
```

4. Iterate this procedure for every priority group.

Problems Encountered

- More concentration on students' priority then the total mark obtained.
  Because first we consider who has selected the particular interested area and organization pair, then sort according to the marks obtained and fill the slots available.
- Problem here is there may be students who has obtained high marks and not selected to a company of his 2nd priority while low mark students may select due to their 1st priority.

2.2.2. Algorithm Development Method 2

Sort the students according to the mark(T value) they have obtained then ,consider respectively 1st priority, 2nd and 3rd .

Try to give them the 1st else 2nd or 3rd . This option is most suitable because consider students' abilities first then their interest. There may be students who have not selected to any while having high marks because all their choices are already filled(may be some available opportunities which they have not requested , therefore give them a chance to update their choices) .

The Steps of the algorithm

1. Select all students in to a groups by the priority of the interested area and organization combination.

   Example: Priority(1) => IntrestedArea(Software Engineering) , Organization (WSO2)

Id	Priority1		Priority2		Priority3	
	Area	Org	Area	Org	Area	Org
ICT/2008/09/012						
ICT/2008/09/052						
…..						

Table5: Interested area company and priority combinations of a student

2. sort the students according to ***P***
   Example

```
for I = 1 to N-1
        J = I
        do while (J > 0) and (P(J) > P(J - 1)
          Temp = P(J-1)
          P(J) = P (J)
          P (J - 1) = Temp
          J = J - 1
        end_do
end_for
```

Id	Sort_$ASC\left(P=\frac{G.W_G+E.W_E}{1}\right)$
ICT/2008/09/052	3.9
ICT/2008/09/012	3.2
…..	…..

Table6: Sorted student list based on final mark

3. Fill the opportunities granted from organizations combining the interested area .

```
do while (opportunity(Software Engineering + WSO2)>0)
      student.selected = true
      opportunity(Software Engineering + WSO2) = opportunity(Software Engineering + WSO2) – 1
end do
```

```
A→area
O→organization


  for I = 1 to N-1
          J = 3
          do while (J > 0)
          if(opportunity(Aij,Oij)>0)
          opportunity(Aij,Oij)-=1
          student.selected=true
          J=0
          if(student.selected=false)
          //send student to not selected pool
          end_do
  end_for
```

2.2.3. Algorithm Optimization

To select a maximum amount of students and the most appropriate students, Algorithm can be optimized in the context of W_G and W_E as below

W_G	W_E	S_i
trivial	*trivial*	-
trivial	*trivial*	-
….	….	….
0.6	0.4	S_x
0.7	0.3	S_y
0.8	0.2	S_z
….	….	….
trivial	*trivial*	-
trivial	*trivial*	-

Table7: Weight combinations of academic and extra activity for final marks

Where S is final selection outcome of the algorithm, $W_G + W_E = 1$ and
Out of S_i the maximum would be

$$\sum S_{max} = W_{G(max)} + W_{E(max)}$$

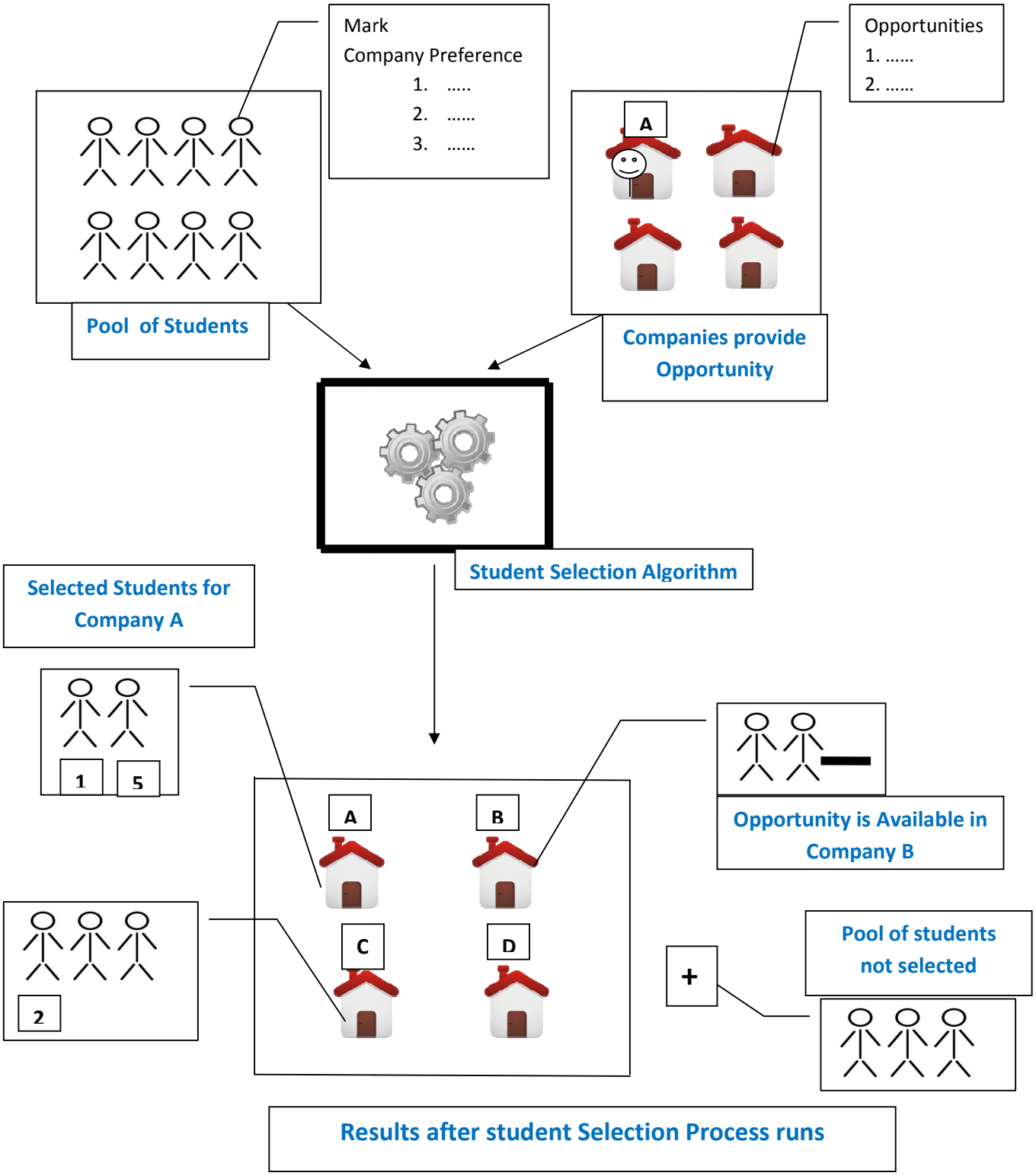


Figure 1 : Student selection process

- Student may not select, No enough opportunities
  Companies they have selected are already filled
- Some companies may have request a particular student, then he is removed from the pool and opportunities are reduce by 1(Company A have requested no 1 student)

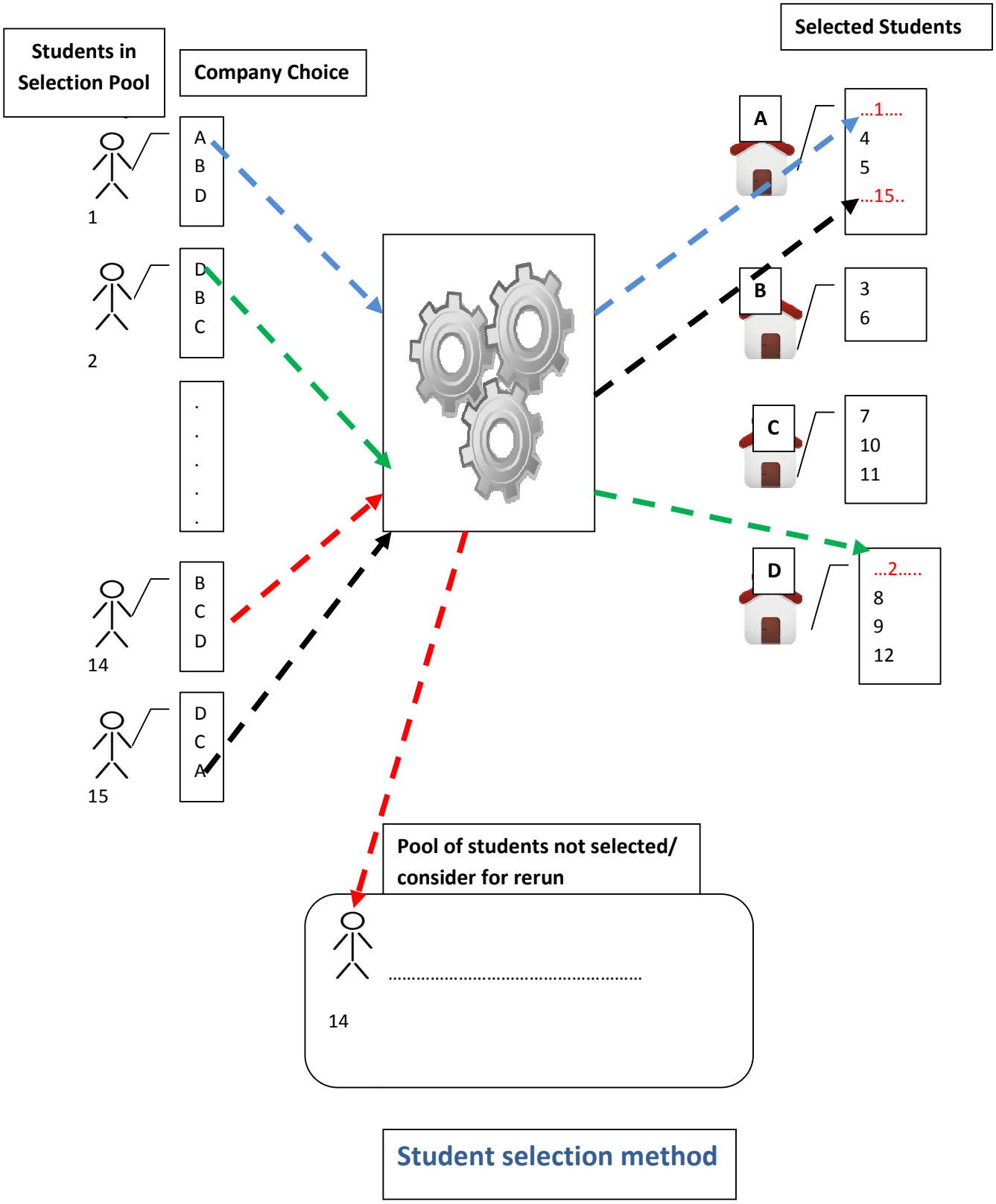


Figure 2 : Proposed student selection method

2.3. TECHNOLOGIES EXPLORED OR ADAPTED

2.3.1. RESTful Web Service

Since this is a web based project, there should be a way to consume services from other parties and offer services to the relevant parties. Beside the ideal browser interaction, web services are the best way to interact with system in a hidden but robust way. In that fact, this system consist with several web service consuming end-points and & web-service offering end-points. Using JSON, as a way of constructing and retrieving data, this system dynamically offers a set of interfaces to capture Email, Notifications, SMSes etc. Also this system utilizes services like Google API v3 for Calendar sub-API, LinkedIn API for user related data retrieval, Dialog Ideamart API (Dialog Telecom) for sending mobile terminated messages.

REST, Representative State Transfer is a way of interacting with web services and enable an optimized way of communication. The design rationale behind the Web architecture can be described by an architectural style consisting of the set of constraints applied to elements within the architecture. By examining the impact of each constraint as it is added to the evolving style, people can identify the properties induced by the Web's constraints. Additional constraints can then be applied to form a new architectural style that better reflects the desired properties of a modern Web architecture

2.3.2. Concurrent Development and Production space with Openshift & Github

As this project developed concurrently by several developers, it had to be very well integrated at all milestones. As a solution, project was implemented in primary bi-repository architecture since it's started.

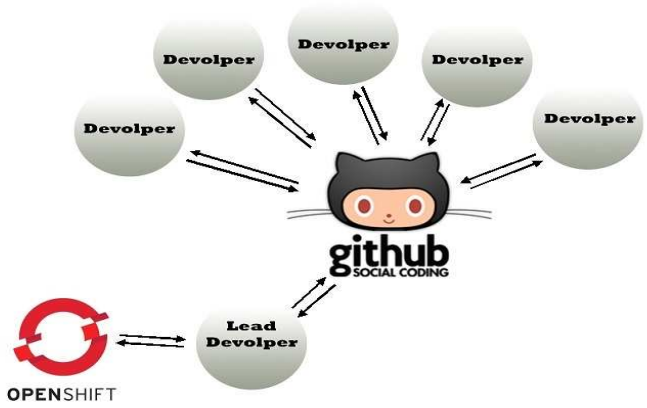


Figure 3 : Special committing architecture of Ethera project

This is a type of architecture that has few advantages over typical single repository web based project. The source code of the project has been pushed up in a Github public repository and runtime accessible copy is deployed on Red Hat's OpenShift could. The specialty is both of these repos are in sync using GIT and no need to touch even single bit of code on repository level for a change. Developer level local commit and a push will sync up all the repositories at the same time & changes will be updated real time. More-over the schema will be deployed on OpenShift using an automatically operated deploy action-hook written by developers.

2.3.3. GIT

As for the proper project version controlling, this project is developed with the help of GIT version controlling technology and Github public repository support. There are lot of advantages in Git over other version controlling systems. Some of them are,

- **Data redundancy and replication** -- Since there are multiple ***full repositories*** on multiple machines (instead of one central repository), the risk of project loss due to server failure or some other catastrophe is much lower.
- **High availability** – There in no need to worry about commit even there is no network or internet connection.
- **Only one .git directory** *per repository* -- Versus a .svn in every subfolder, which, as developer may know from painful personal experience, can lead to problems.
- **Superior disk utilization and network performance**
- **Properties such as ignores are much easier to manage than in Subversion**
- **Collaboration Friendly** -- Git makes it easy to collaborate on projects with groups of contributors. And with great services like Github, Git's collaboration friendliness is even further magnified.
- **Not just for code!** -- Git is great for all sorts of projects, not just hacking code. For example, all of Gitology's written content is managed with Git, not just it's code.

2.3.4. Linux and Apache's Httpd

For this project, all the developers were tend to use free & open-source software all the time. So all the developer system were ran on Fedora Linux (rpm) 17/19 with optimized set of tools which were needed to develop, test & run this project. Among them, Apache's Httpd, PHP5 & Java took a significant amount of attention. To run J2EE components, such as Ideamart SMS simulator, mod_jk is incorporated with Httpd.

2.3.5. File Caching

In this project, caching helps a lot when it comes to a state that system is under huge concurrent requests. Static data will be cached as gzipp compressed format and kept in a separate temporary directory with in a decided time period, a session. So that made a lot faster delivery of content rather than hitting again and again in to the web server which cosume lot of memory of hosted system.

2.4. MODELS OR CONCEPTS EXPLRED

2.4.1. ACL Concept

When there are set of users who need various levels of authority in a system, the best way to do it is implementing an ACL (Access Control List) that dynamically enforces the correct rule-set to particular users. There are many ways that developers can offer ACL in to a system. In this case the developers of project ETHERA , used the database ACL mechanism to enforce the rule in to user groups.

Access control lists, or ACL, handle two main things: things that want stuff, and things that are wanted. In ACL lingo, things (most often users) that want to use stuff are called access request objects, or AROs. Things in the system that are wanted (most often actions or data) are called access control objects, or ACOs. The entities are called 'objects' because sometimes the requesting object isn't a person - sometimes developers might want to limit the access certain controllers have to initiate logic in other parts of application. ACOs could be anything developers want to control, from a controller action, to a web service, etc.

Basically:

- ACO - Access Control Object - Something that is wanted
- ARO - Access Request Object - Something that wants something

Essentially, ACL is what is used to decide when an ARO can have access to an ACO.

2.4.2. CSRF Protection Security model

This project has lot of form fillings and submissions. So there is a big potential to expose them as vulnerable ends of the system, mostly for CSRF (Cross-Site Request Forgery) attacks. Cross-Site Request Forgery (CSRF) is an attack that tricks the victim into loading a page that contains a malicious request. It is malicious in the sense that it inherits the identity and privileges of the victim to perform an undesired function on the victim's behalf, like change the victim's e-mail address, home address, or password, or purchase something. CSRF attacks generally target functions that cause a state change on the server but can also be used to access sensitive data.

For most sites, browsers will automatically include with such requests any credentials associated with the site, such as the user's session cookie, basic auth credentials, IP address, Windows domain credentials, etc. Therefore, if the user is currently authenticated to the site, the site will have no way to distinguish this from a legitimate user request.

In this way, the attacker can make the victim perform actions that they didn't intend to, such as logout, purchase item, change account information, retrieve account information, or any other function provided by the vulnerable website.

To prevent these types of attacks, this project has a request parser with inclusion of static Security class methods. So that every post, put,delete request comes in to the Active Record core will be parsed for attacks.

2.4.3. Multiple Model Authentication with Authentication Objects

In a typical project, data-source for authentication purposes will comes from a single user/people table. But in this project there are two table entities that needed authenticated in to the system. It is bit tricky to manage sessions for two types of users at the same time. So to overcome this problem, a concept was followed known as “Multi-model Authentication”. To achieve this concept in this framework, developers were implemented AuthComponent support classes know as Authentication Objects. By those, the AuthComponent can identify the correct identity of the user and from which table that user should authenticated.

2.4.4. University student industrial training recruitment model

All the Universities does have a model to support to the recruitment of the students in to companies in their end of academics. This project follows that same model, which is typical in Sri Lankan state universities and while giving the ease of management to Career Guidance unit and even for students.

CHAPTER 03

3. PROJECT DESIGN

3.1. PROJECT CONCEPT

The third year project is the place where ICT students practically apply the knowledge they gained from the degree program for 3 years. Therefore it should be worth enough to prove that students gained the maximum benefit throughout their degree program. The problem domain we choose had to be addressable, realistic and it should have to have a large effect on the parties who are directly bond with the problem domain. So as the group IDeaFlux we worked up to find out such a problem from our own environment.
As a Faculty of Applied Sciences one of the most important features of the faulty degree programs is to produces graduates according to industry requirements. To accomplish this task there should be a good understanding between the industry and the faculty. But we noticed that there is a difficulty in negotiation between industry and the faculty and it affects very badly in faculty's students industry placement process as well as the faculty's reputation in the industry.

The problem is very much understandable to us as ICT students of the Faculty of Applied Sciences since we are a part of the problem. Our client, who is the other part of the problem who directly affected, the CGU of the faculty of applied sciences, encouraged us to address this problem in an effective manner. Since the problem is very much familiar to us and since it has a large effect on the future graduates of the faculty, we decided to make a creative, efficient and attractive solution for the problem domain.

By studying the problem domain by hard we understood that there were so many drawbacks in the existing student selection process. Major problems we identified here are the communication gap between industry and the faculty, inability to meet the industry and students outside the industry and lack of encouragement to students to enhance their employability. So we had to create such an application to solve each and every problem.

In developing the project concept we done a background research on same problem domain but we couldn't find out exactly same application we are going to develop. So we had to study the problem in to the deep to understand the nature of the expected solution. We had number of meetings with our client for requirement gathering and we came up with a better, creative and efficient solution for the problem domain of student's industry placement process of the faculty of Applied Sciences.

The problem was worth enough to choose as it was new and addressable. The knowledge gained from the degree program was highly applicable in designing the application. In order to solve the problem in the most effective manner we had to keep in touch with new techniques which are not very much familiar to us. Since it provides a chance to learn new techniques we were motivated to solve this problem.

A web application which is accessible to anyone is an open window to the faculty which provides the facilities to behold its student's capabilities. And also it will provide an image of the faculty to the outside world. Therefore it was a challenge to design such web application to keep the good image of the faculty and its students. So this was the most suitable project to choose for the third year project.

The concept of project Ethera was came up with the idea of facilitating the faculty and its students with a web portal which provides all the necessary facilities in a single one place and makes the students industry placement process easy and efficient in order to get the maximum benefits from the industry.

3.2. NOVELTY OF THE PROJECT

In our study about the problem domain we found out some applications which are strived to address the same problem. But their solutions were not exactly same to the application we implement. Our aim was to give solutions to each and every problem we identified while studying our problem domain. But most of the applications we studied were designed to solve a single problem. Some areas implemented were rear to find out and some have never implemented.

3.2.1. Unique solution for student industrial placement

There were a few solutions address the same problem domain but through the literature review it was identified a complete solution is not yet implemented for the same problem domain. Most of the applications we studied were designed to solve a single problem which is a part of the student selection process. The only example tried to reach a considerable level of success is the one with University of Colombo School of Computing (http://careers.ucsc.lk/) but it provides only the ability to view students' profile. The problem is not unique it is clear all most all the universities face the same problem when placing students for industry but none of the efforts have reached with this much of completed solution as Ethera provides.

The uniqueness of the solution is mainly due, addressing most of the problems encountered while studying the current industrial placement process. Ethera is the portal where CGU, Industry and Students can meet and hence reduces the communication gap and act as the bridge between all the three parties. This is the only solution ever provided with the sophisticated mechanism for student industrial placement where all the functionalities can be done by just a button click. Almost all the functionalities have been automated except marks insertion. Uniqueness in the project can be identified using many features.

- Phase concept facilitating students and CGU with the reconsideration ability.
- Industry and public can view profiles only with a certain standard others can be avoid through disapproval.
- Student selection algorithm is based on both academic performance and extracurricular activities.
- Priority is given to the student performance, interested areas and companies can be priorities according to student's preferences.
- Runtime GPA calculation for any number of selected subjects.
- Custom filtering mechanism provide list of students in descending order if and only if student has enrolled to the course and results should be available.
- Event management using Google Calendar.
- SMS component for instant message transfer.
- Industry's ability to request students.

- Article component facilitating the guidance for industrial placement.
- Approval phases bring all the profiles into a standard level by providing reconsideration opportunity before finalize decisions .
- High security through validation of user state.

3.2.2. Selection Algorithm

A research based algorithm which is used to select students for vacancies in order to make the students' selection process more effective, by giving priority to students' skills as well as their choices. Students are staged according to their performance on academic and other activities and considering their choices they will be selected to particular opportunities. The algorithm is developed to select maximum number of students for available opportunities by changing the given weights on their performances. This algorithm is unique to Ethera and this method is not yet used in any students' industrial placement system in Sri Lanka.

3.2.3. Students has lots of control over him/herself based on intended requirements

In Ethera student has the power to select his/her interested area and companies according to their preferences. Student selection algorithm also gives priority to student preferences. Profile maintainability solely given to student and continuous updates can be done during unfreeze. Sophisticated password change mechanism available in corporation with emails.

Phase concept accomplishes each party with the reconsideration opportunity. There are three phases in the system process and it is given a chance for the students to change their previous information.

3.2.4. SMS Service in collaboration with Dialog Ideamart

Ethera SMS service is an enterprise solution which is developed in cooperation with Dialog Ideamart. It uses to send SMS to students. Dialog Ideamart is a scalable service which is adaptable to the requirements of the application easily by changing configurations. Students have to register to the service with their registration number. CGU can send SMS to the students' mobile phones via Ideamart service. Most of the applications have an internal email services to send messages to users. But it is not effective because most of the people do not access emails regularly especially when it is an internal mailing system. As the Ethera team identified SMS is the most effective, quick and fruitful way to give a message to students in this era. Ethera is the first ever application which is implemented including an SMS service for a student's industrial placement system.

3.2.5. Event management through Google Calendar

Organizing the schedule shouldn't be a burden for CGU. With Google's free online calendar, it's easy to keep track of CGU's important events all in one place. Google Calendar is a free time-management web application offered by Google. The Ajax-driven interface enables users to view, add, and drag-and-drop events from one date to another without reloading the page. It supports view modes such as weekly, monthly, and agenda. Users can "quick add" calendar events and set time range for an event. Events are stored online; consequently, the calendar can be viewed from any location that has Internet access. The most important usage in Google calendar is it can be accessible by anyone with Google account when the calendar is public.

Ethera has integrated the Google calendar in a unique manner which allow post ,update and delete events in relation with notice creation , edit and delete. Notice creator can publish or unpublish notices accordingly update the Google calendar relates to Ethera Postmaster. It has been never implemented a application with full functionality in RESTful way using version 3 of the Google Calendar API. Version 3 is the latest in Google Calendar API which contains so many advanced and sophisticated features than version 2 . More than ninety percent of applications still use API V2 . The novelty of Ethera is that it contains an application which has implemented using Google Calendar API V3 in RESTful method.

3.2.6. Custom Filtering Mechanism

The system contains sophisticated and highly customized filtering mechanism. Students can be filtered by name, registration number and academic performance. The novelty in academic performance filter is that it calculates GPA value in runtime based on the user requirements. Students who has enrolled to a particular subject and obtained marks for that subjects are considered and auto calculate GPA and provide a list in descending order for a given subject combination. This concept is only available in this system and freshly implemented to the Project Ethera.

3.3 PROJECT DEVELOPMENT METHODOLOGY AND APPROACH

3.3.1. Agile Methodology

Agile development, in its simplest form, offers a lightweight framework for helping teams, given a constantly evolving functional and technical landscape, maintain a focus on the rapid delivery of business value. As a result of this focus and its associated benefits, organizations are capable of significantly reducing the overall risk associated with software development.

In particular, agile development accelerates the delivery of initial business value, and through a process of continuous planning and feedback, is able to ensure that value is continuing to be maximized throughout the development process. As a result of this iterative planning and feedback loop, teams are able to continuously align the delivered software with desired business needs, easily adapting to changing requirements throughout the process. By measuring and evaluating status based on the undeniable truth of working, testing software, much more accurate visibility into the actual progress of projects is available. Finally, as a result of following an agile process, at the conclusion of a project is a software system that much better addresses the business and customer needs.

3.3.2. Active Record Database Transactions

Since this project is a database centric project, it needed a way to access its primary data-source in an optimized way. Writing pure SQL queries are not a professional way to deal with this type of enterprise project and the solution was Active Record Database Transaction pattern. Prior to talk about Active Record, it is good to have an idea about ORM (Object Relational Mapping). Object-relational mapping, in the purest sense, is a programming technique that supports the conversion of incompatible types in object-oriented programming languages, specifically between a data store and programming objects. Developers can use an ORM framework to persist model objects to a relational database and retrieve them, and the ORM framework will take care of converting the data between the two otherwise incompatible states.

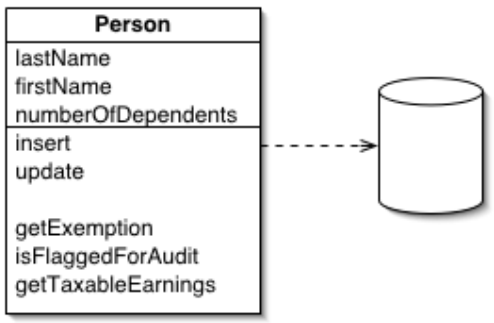


Figure 4 : Active record database transition

An object carries both data and behavior. Much of this data is persistent and needs to be stored in a database. Active Record uses the most obvious approach, putting data access logic in the domain object. This way all people know how to read and write their data to and from the database.

3.3.3. Layered Architecture using MVC

Since layered architectural style is one of the best suitable architectural styles for a web application, we tend to use it in the project. It is needed to separate presentation logic from, business logic and data access logic, MVC will come across that situation in a very systematical way. The raw mechanism done within the models, controllers and views are explained below.

Model

The Model layer represents the part of our application that implements the business logic. It is responsible for retrieving data and converting it into meaningful concepts for our application. This includes processing, validating, associating or other tasks related to handling data.

View

The View renders a presentation of modeled data. Being separated from the Model objects, it is responsible for using the information it has available to produce any presentational interface our application might need. For example, as the Model layer returns a set of data, the view would use it to render a HTML page containing it. Or a XML formatted result for others to consume.

Controller

The Controller layer handles requests from users. It's responsible for rendering back a response with the aid of both the Model and the View Layer. Controllers can be seen as managers taking care that all needed resources for completing a task are delegated to the correct workers. It waits for petitions from clients, checks their validity according to authentication or authorization rules, delegates data fetching or processing to the model, and selects the correct type of Presentational data that the client is accepting, to finally delegate this rendering process to the View layer.

Benefits of MVC architecture over Layered style

Why use MVC? Because it is a tried and true software design pattern that turns an application into a maintainable, modular, rapidly developed package. Crafting application tasks into separate models, views, and controllers makes our application very light on its feet. New features are easily added, and new faces on old features are a snap. The modular and separate design also allows developers and designers to work simultaneously.

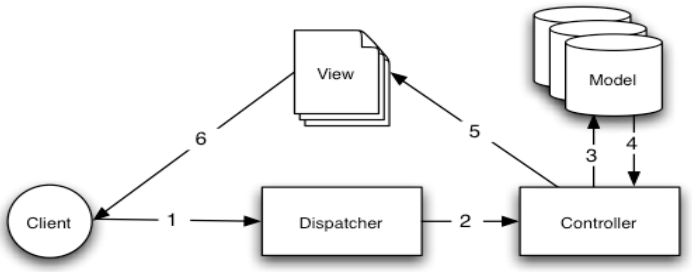


Figure 5 :The illustration of how our system MVC architecture works. Numbers represent the point of sequence.

3.3.4. Object Oriented Approach

Object-oriented architecture is a design paradigm based on the division of responsibilities for an application or system into individual reusable and self-sufficient objects, each containing the data and the behavior relevant to the object. An object-oriented design views a system as a series of cooperating objects, instead of a set of routines or procedural instructions. Objects are discrete, independent, and loosely coupled; they communicate through interfaces, by calling methods or accessing properties in other objects, and by sending and receiving messages.

Suitability for the project

Mainly the MVC style using here build on top of Object-Oriented architecture. The reason for using such an architectural style is the ease of communication between the Models, Views and controllers. As shown in figure a request from the client (a browser in most cases) will come in to a Controller via Dispatcher unit of the CakePHP framework. And then through a method controller will instruct the models to fetch relevant data from the datasources. After manipulating data, the controller again instruct to the view to render the necessary data to client. In this simple scenario the MVC will keep the interconnection through Object-Oriented style and will pass messages to communicate between them.

Benefits of using object-oriented architectural style

Understandable :- It maps the application more closely to the real world objects, making it more understandable.
Reusable :- It provides for reusability through polymorphism and abstraction.
Testable :- It provides for improved testability through encapsulation.
Extensible :- Encapsulation, polymorphism, and abstraction ensure that a change in the representation of data does not affect the interfaces that the object exposes, which would limit the capability to communicate and interact with other objects.
Highly Cohesive :- By locating only related methods and features in an object, and using different objects for different sets of features, we can achieve a high level of cohesion.

3.4. PROJECT DESIGN

Ethera systems is somewhat complex. In design, this large and complex system it has divided into manageable small components. Partitioning large systems into subsystems and components, each does a separate task , make it easy to design and develop. Therefore entire system has divided into components . Each component operates separately and use interfaces to communicate with each other.

3.4.1. High level components and their interactions

Component (Sub-System) Design

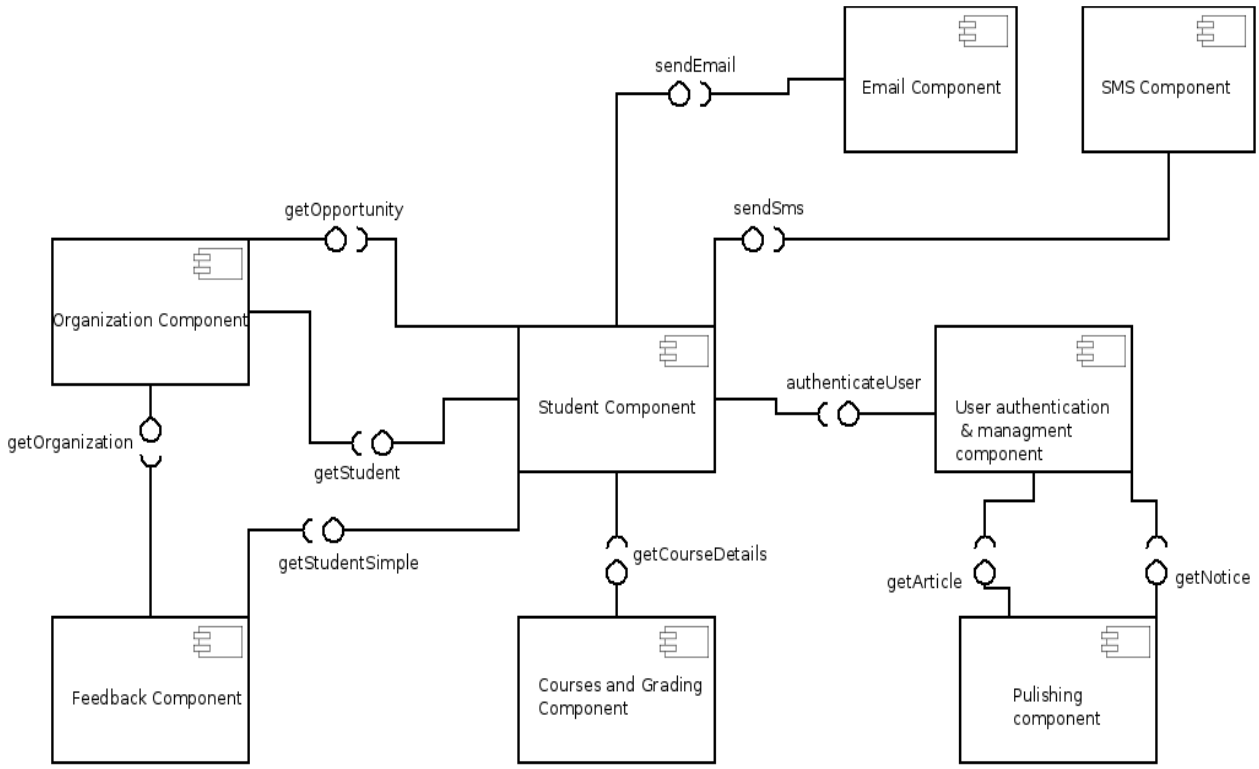


Figure6: High Level Component View

3.4.2. Components

Student component

The student component is the main subsystem that has the internal functionality of handling and managing student related data. The scientifically developed student selection algorithm is applied here. Student component is responsible for maintaining student categorization with regarding to the study programs and batches.

Organization component

In this sub-system maintains the interested areas of students and the organizations itself. Also this is the key component of the system that has the power of taking in the granting of opportunities from the organizations in to its data sources. Through the interfaces connected with student component it'll maintain the state of students' industrial placement progress.

Courses and Grading component

Basically this component is responsible for the maintenance of the subjects and its related course units. Given that a student passes from a course unit that is related to his/her program, this component will handle the grading for that particular course unit.

As an example :- For the ICT1305 Data Structures course unit will related to the Subject ICT and students who are enrolled in to ICT program can obtain a grading (A+, A, A- . . . .) for that course unit.

User authentication and management component

This component can introduce as one of the key components in the system that bears the security and group based action restriction enforcement of the whole system. For the authentication of the users, this component work as a getaway and If things will go well in the authentication part, this component will route the authenticated user in to the correct place of the application.

For the Access-Control-List part, the component uses a tree like structure which is populated in the database for the access-control-objects (ACO) and access-request-objects (ARO). From this ACL architecture, it opens the administrators the privileged of assigning very flexible permission schemes for controller actions in the MVC.

Feedback Component

Feedback sharing of students regarding organizations is handled by this component. Basically this components is relatively smaller than above explained components and does the job of interconnecting students' ideas regarding various organizations which are already there in the system with those particular organizations. Feedbacks are only visible to students who are related to the field.

Publishing Component

This component handles publishing “Notices” and “Articles”. In other words this component doing a job that small CMS or blog does. But the special thing is it capable of handling multi user posts. Also the “Notice(s)” will use Google Calendar and Event API to sync the event with very own calendar for Career Guidance Unit.

Email Component

The emailing component is responsible of the sending of single or bulk email as per request. This component services call upon the requirement of sending emails to the users who are currently registered under this system. Since an email is a must for every user, the email database field will not be a blank one for any user including system users and students. Also this component will build to support out-of-box to change between internal MTA (Mail Transport Agent), usually Postfix, and external SMTP (Simple Mail Transfer Protocol).

SMS Component

SMS component will call when there is a need to send a SMS or SMS bulk. For the SMS API, we'll use Dialog IdeaPro hosted SMS API deployed on top of Jetty Server.

3.4.3. Interfaces

Since this system implemented as tight MVC style there will be well defined interfaces between models, controllers and views. But for the sake of modularity, we'll define some interfaces to breakdown the system structure. So below defined interfaces will use all the controllers within particular component as listed under each component.

Organization Component

getOpportunity

Organization Component will serve with the services that related to the opportunities and organizations. Not only the opportunity details but also organizations incorporated with.

getOrganization

As same in the above, the component will serve organization details to the feedback component to index the feedback according to the organization.

Controllers involved:-

- InterestedAreasController
- OrganizationsController

Student Component

getStudent

From this interface all the required services related to the student can be obtained. This is one of the busy interfaces in the system that will serve data to the organization component.

getStudentSimple

This interface seems similar from the name comparing to the above. But this is not a complex interface than the "getStudent" interface. This will just serve the basic details of students while not going in to complex relationships.

Controllers Involved:-

- StudentsController
- BatchesController
- StudyProgramsController

Courses and Grading component

getCourseDetails

As its name explains this interface's soul responsibility is to serve with course details to the "Student Component". Since this sub-system is essential to hold the Grading data for each and every student, it should be implemented with high priority.

Controllers Involved:-

- SubjectsController
- CourseUnitsController
- CvsController
- ExtraActivitiesController

User authentication and management component

authenticateUser

This interface is actually does the system gatekeeper's duty by authenticating the users and routing them with necessary (ACL) access control list privilege enforced.

Controllers Involved:-

- SystemUsersController
- GroupsController

Feedback component

This component doesn't have any serving interfaces, but consuming interfaces from student component and organization component.

Publishing Component

getArticle

Basically this interface is for the article creation of system users. In provide the service for modification of articles and creations of new articles.

getNotice

Same as the "getArticle" interface, this interface does have the facility of modifying existing Notices and creating Notices which will be published on the frontend notice board. One special thing in this interface is that it'll incorporate with "getArticle" interface when extending notices with articles.

Controllers Involved:-

- FeedbacksController
- ArticlesController

Email Component

sendEmail

This is used as the postman interface for the other components. So just consuming the services from this interface, another component can initiate an email sending process.

Controllers involved:-

- EmailsController

SMS Component

sendSms

Just like the “sendEmail” interface, this will also act as a messenger interface and this will complete the SMS sending process through hosted API from Dialog IdeaPro.

Controllers Involved:-

- SmsesController

3.5. ALTERNATIVES CONSIDERED

3.5.1. Using Frameworks instead from scratch development

Ethera project has used frameworks such as CakePHP for development and Bootstrap for interface design. Foremost reason for this decision is easiness. Frameworks are adapted to well known Software Engineering principles that make easy for the system to adapt to the SE principles. Also they are really comprehensive and complex therefore allows complex processing without any hassle. Code reusability is highly admired in complex projects, ease of code reusability is provided in frameworks. Enormous online help and support is available for frameworks and make it easy for system development.
In contrast from scratch development take time and make it difficult to develop. Complex systems become more complex when develop from scratch and once any error encountered most of the time no help is available.
Considering above facts Ethera project has used frameworks instead from scratch development.

3.5.2. Using REST instead Libraries in Google Calendar API

There are two ways to invoke the API: Sending HTTP requests and parsing the responses and using client libraries. REST is a style of software architecture that provides a convenient and consistent approach to requesting and modifying data.The term REST is short for "Representational State Transfer." In the context of Google APIs, it refers to using HTTP verbs to retrieve and modify representations of data stored by Google.

REST (Representational State Transfer) calls are fast and easy than call using library functions. The Google Calendar API operations map directly to REST HTTP verbs. REST is developed with all new technologies. Also new Google Calendar API version 3 has used over conventional library set to get the experience of adapting to a latest technology.

3.5.3. Using PHP instead Java

PHP is a popular and was built to meet the requirements of web developers unlike Java. PHP is lightweight and focused on the Web - where it can solve complex problem scenarios quicker and more easily than comparable technologies.No compilation or no building in PHP.

PHP is an established server-side scripting language for creating dynamic Web pages. Therefore it has enormous amount of help available. As a language that has been designed expressly for the Web, it brings many features that commercial system developers are looking for:
- Exceptionally short learning curve
- Quick development time
- Very high performance

In addition, PHP supports all major platforms (UNIX, Windows and even mainframes), and features native support for most popular databases. All these factors make it a very good choice for develop Ethera Web application.

3.5.4. Algorithm for student selection process

The Genetic Algorithm was not considered although it has been designed to allocate students for class rooms considering several set of factures and also the biological factors of students. Since the industrial recruitment does not consider biological aspects that cannot be used in this system.
Also 2 methods have included in research section and selected the second method as it best match the requirements of the process. Therefore the solution algorithm for student selection is unique and solely a property of Ethera .

3.5.5. Using AJAX

AJAX (Asynchronous JavaScript and XML) is used to avoid page loading then to reduce number of server requests. AJAX allows web pages to be updated asynchronously by exchanging small amounts of data with the server behind the scenes. So it provides better interactivity to their users. This is due to the fact that implementing AJAX on a website does not require a page to be reloaded for dynamic content on web pages.

3.6. DETAILED PROJECT DESIGN

In the detailed design, the project was brought in to a state of planning the whole design in different perspectives. In significant focus, there were “High-level component view”, “ER diagrams and data dictionary”, “Detailed Class diagram”. Thus above design diagrams had the firm structure to start the coding of the system with proper understanding for the developers. Attached appendices in numbers, are the detailed design structures formulated at that stage.

- Figure 11: ER diagram
- Figure 12: Class Diagram

CHAPTER 04

4. PROJECT IMPLEMENTATION

4.1. CASE TOOLS USED

Computer-aided software engineering (CASE) is the application of a set of tools and methods to a software system with the desired end result of high-quality, defect-free, and maintainable software products. It also refers to methods for the development of information systems together with automated tools that can be used in the software development process.

In Ethera development process many CASE tools were used in drawing various diagrams such as class diagrams, ER diagram, activity diagrams, and sequence diagrams and in designing interfaces. The CASE tools we used are described below one by one.

4.1.1. Dia - ER Diagram and Class Diagram

Dia is a free and open source general-purpose diagramming software. It can be used to draw many different kinds of diagrams. It has special objects to help draw entity relationship diagrams, UML diagrams, flowcharts, network diagrams, and many other diagrams.

Reason for selecting : It is easy enough to learn without much hassl and flexible enough to make feel easy. It's simple and intuitive to do most tasks, layers are allowed, snapping , tons of file formats to export to. It can load and save diagrams to a custom XML format (gzipped by default, to save space), can export diagrams to a number of formats, including EPS, SVG, XFIG, WMF and PNG, and can print diagrams.

4.1.2. Rational Rose - Activity Diagrams

Rational Rose is an object-oriented programming (OOP) and unified modeling language (UML) tool to design enterprise-level software applications and components.

Reason for selecting : One of the main reason for using Rational Rose for draw activity diagrams is that it facilitates team development by providing full team support. Rose can be used at any stage during the development process, as well as using it to help uncover and prevent potential serious mistakes in the future. Changes made to a model can be made available to others by using a configuration management and version control (CMVC) system. This allows easy integration of changes into the model without interfering with any developmental stage. One of the great advantages about Rational Rose is that the user can configure the interface and tailor the application to suit to the needs.

4.1.3. Visual Paradigm for UML – Sequence Diagrams

Visual Paradigm for UML (VP-UML) is a UML design tool and UML CASE tool designed to aid software development. VP-UML supports key modeling standards such as Unified Modeling Language (UML).

Reason for selecting : Visual Paradigm's cutting edge GUI allow software analysts to capturing requirements faster, better and easier. If needed detailing use case with flow of events in use case description and subsequently sequence diagrams can be generated automatically based on the descriptions. Understanding complex business workflow and discover use cases in it also provided. Publish work in popular format such as Word and PDF make easy to get drawn diagrams .

4.1.4. Balsamiq mockups – Interface Designing

Balsamiq Mockups is a graphical user interface mockup builder application. It allows the designer to arrange pre-built widgets using a drag-and-drop WYSIWYG editor. Mockups really shines during the early stages of designing new interfaces since in design stage we can't provide screen shots of the interface.

Reason for selecting : It is simple, fast, efficient, helpful and easy to use and easy to learn. Offers the same speed and rough feel as sketching with pencil, with the advantage of the digital medium: drag & drop to resize and rearrange elements, make changes without starting over.

4.2 FRAMEWORKS

4.2.1. CakePHP

Reason for selecting : Ethera development is done using a PHP framework in order to make the development process easier. After considering features and benefits of different PHP frameworks, CakePHP is chosen as the most eligible framework. Although there were so many PHP frameworks to use, CakePHP, CodeIgniter and Symfony were the considerable frameworks according to their functionalities and as most recently developed frameworks.

CakePHP is a free, open-source, rapid development PHP framework which follows principles of MVC design pattern. It is a foundational structure for programmers to create web applications. CodeIgniter is an Application Development Framework or a toolkit with a rich set of libraries for commonly needed tasks, as well as a simple interface and logical structure to access these libraries for support people who build web sites using PHP. Symfony is a PHP web application framework for MVC applications which is works on Unix or Windows platforms with a web server and PHP 5 installed. Symfony is free software and released under the MIT license.

CakePHP has a strong Auth and ACL component library compared with CodeIgniter. CakePHP comes with Object Relational Mapping (ORM). It is a programming technique for converting data between incompatible type systems in databases and object-oriented programming languages. In CodeIgniter, it depends on third parties. Another important feature of CakePHP is application scaffolding. It is a technique supported by some MVC frameworks. A developer can define and create a basic application that can create, retrieve, update and delete objects. Scaffolding in CakePHP also allows developers to define how objects are related to each other, and to create and break those links. Ajax helpers come with CakePHP while CodeIgniter do not support for Ajax. And also CakePHP came up with console feature which allow to upgrade database when work with a team remotely. CodeIgniter do not have this feature. CakePHP has built in web services and REST. Since REST is easy to implement than XML-RPC CakePHP was more compatible with Ethera development process. Other than that CakePHP has more powerful helpers such as form helpers.

Symfony is a good PHP framework which has most of features common to CakePHP too. But it is hard to install compared with CakePHP. And also Symfony is having an overloading files and directories. Learning curve required for Symfony is too much with respect to CakePHP. In Symfony, caching cannot control every time the cache is always developing and debugging, need to do Symfony cc, Symfony rc to clear and rebuild the cache. Symfony is not very efficient in parsing configuration file templates and the process of reading, spend time a lot.

CakePHP is compatible with PHP versions 5.2.8 and greater. It is flexible in licensing since it is open-source and it has an active, friendly community.

4.2.2. TwitterBootstrapper

Reason for selecting : In this project TwitterBootstrapper (http://twitter.github.io/bootstrap/), a full comprehensive web interface design framework designed by Twitter (http://twitter.com) developers is used . This framework is very much helpful for a clean and professional design. Since this is a very popular framework and developed by a reputed company, framework documentation is well formed and there are many places that we can get help.

4.2.3. Font Awesome

Reason for selecting : Font Awesome icons have used considering its Neat Clean Modern Styling , no white edge, so work well on a variety of backgrounds. Also,

- *Fast and efficient* - one http request for all font icons in one package.
- *Scalable* - work well on high definition screens in the latest laptops and tablets, work well on mobile devices, scale well at large sizes if you want them large as well as small.
- *Versatile* - can be styled with CSS including color size etc.
- *Easy to use* - Few lines of code in overall header - and easy to insert into other pages
- *Choice* - lots of existing icon sets to chose from and it is possible to design your own and import them into an existing font icon set.

4.2.4. JQuery

Reason for selecting : It's light weight when compared to other javascript frameworks. It has a wide range of plugins available for various specific needs in Ethera date picker is such example plugin. It is easier for a designer to learn. The amount of code need to write is vastly smaller .It handles cross browser differences . Especially it makes Ajax much simpler.

4.2.5. Dialog Ideamart API vendor library

Reason for selecting : Dialog is a proprietary company to create the bridge between Dialog and the system Ethera need to deal with this library. Can keen direct contacts and enormous help is available.

4.2.6. Google App Engine

Reason for selecting : Easy and responsive to use Google App Engine than libraries. Provide developer friendly environment.

4.3 BUSINESS PROCESS FLOW

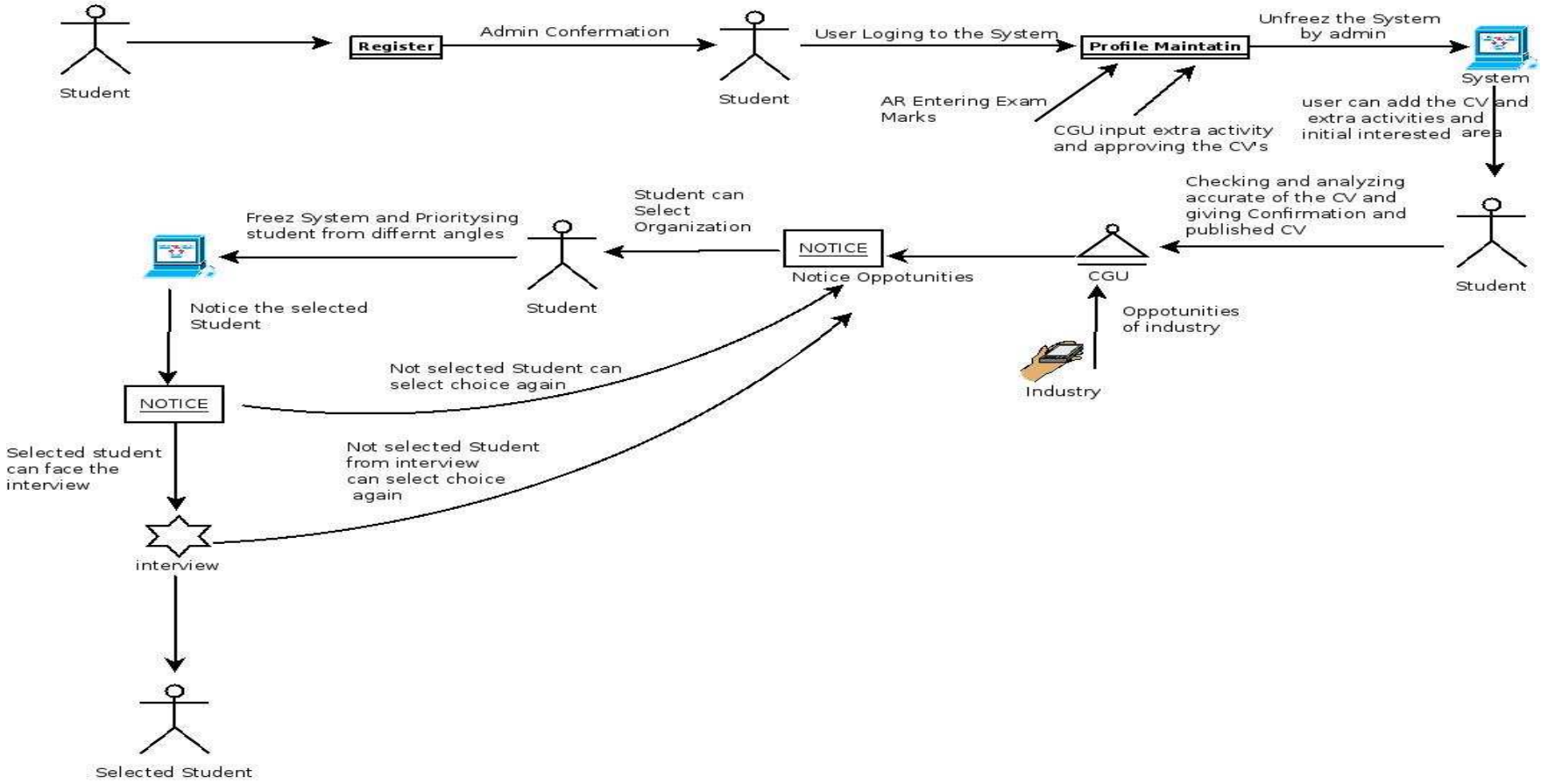


Figure 7 : Business process flow

4.4 MAJOR PROCESS FLOWS USING ACTIVITY DIAGRAMS

4.4.1. Registration Approval Process

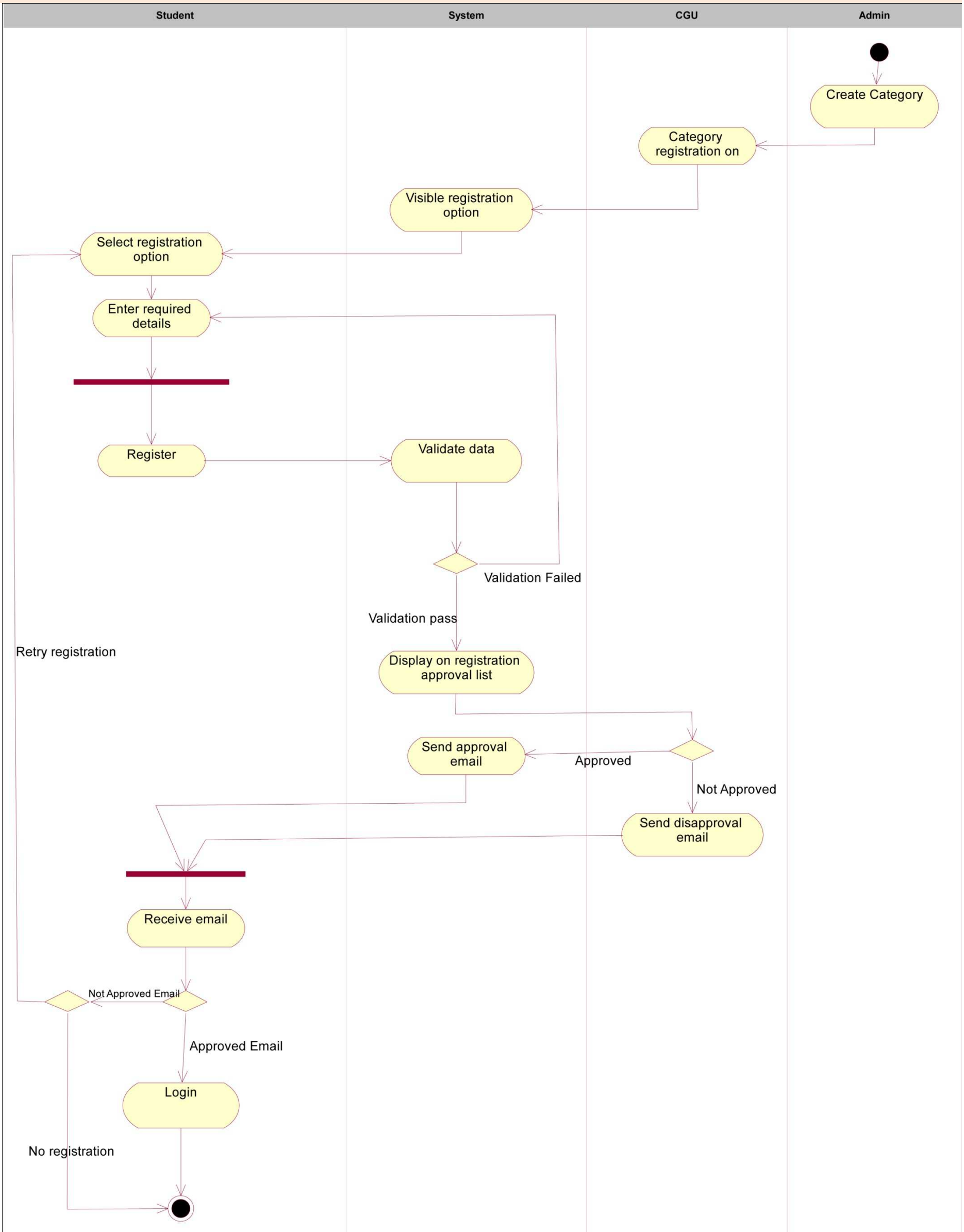


Figure 8 : Registration Approval Process Flow

4.4.2. Initial Choice Approval Process

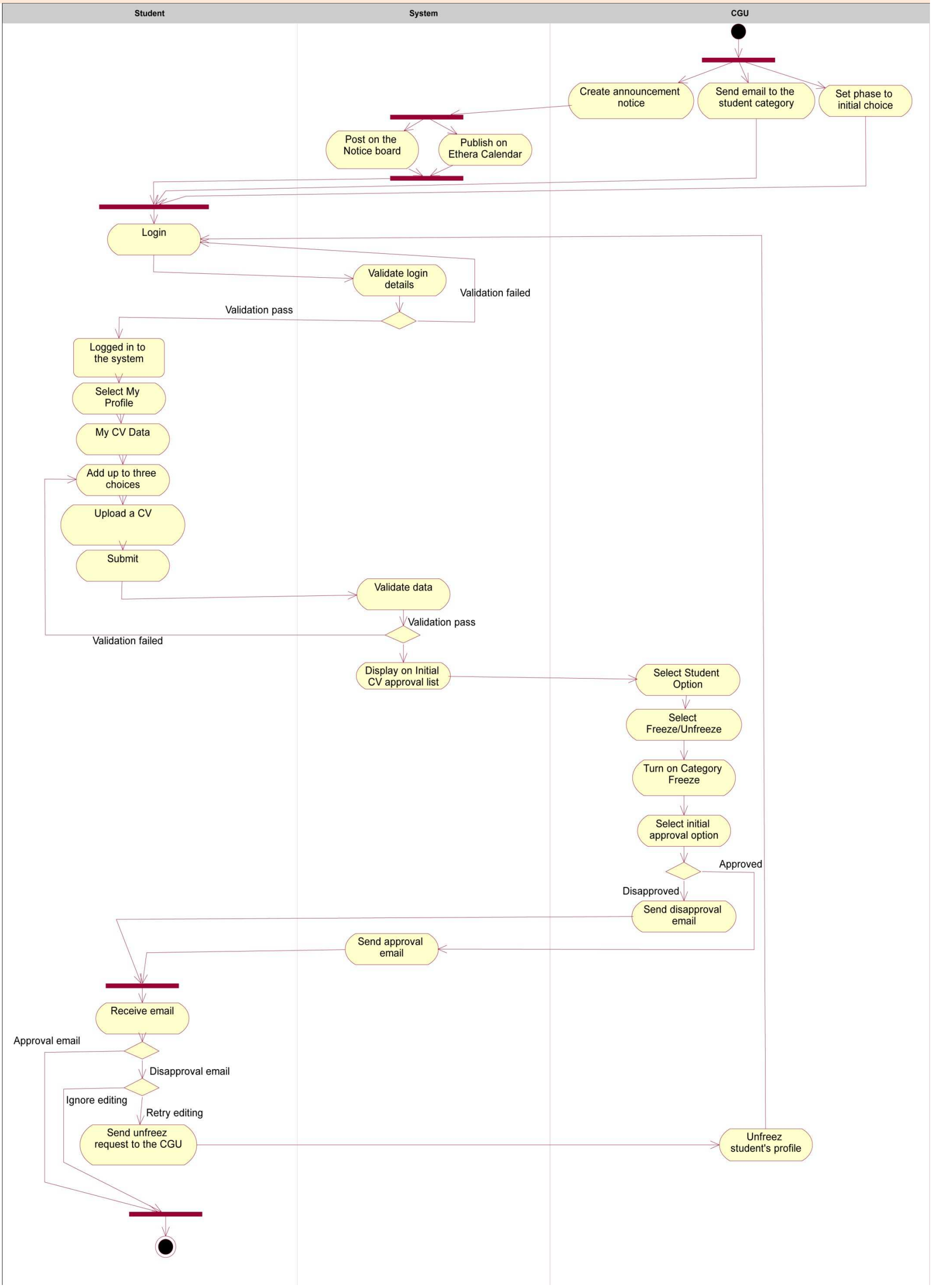


Figure 9 : Initial Choice Selection Process Flow

4.4.3.Final Approval for Selection Process

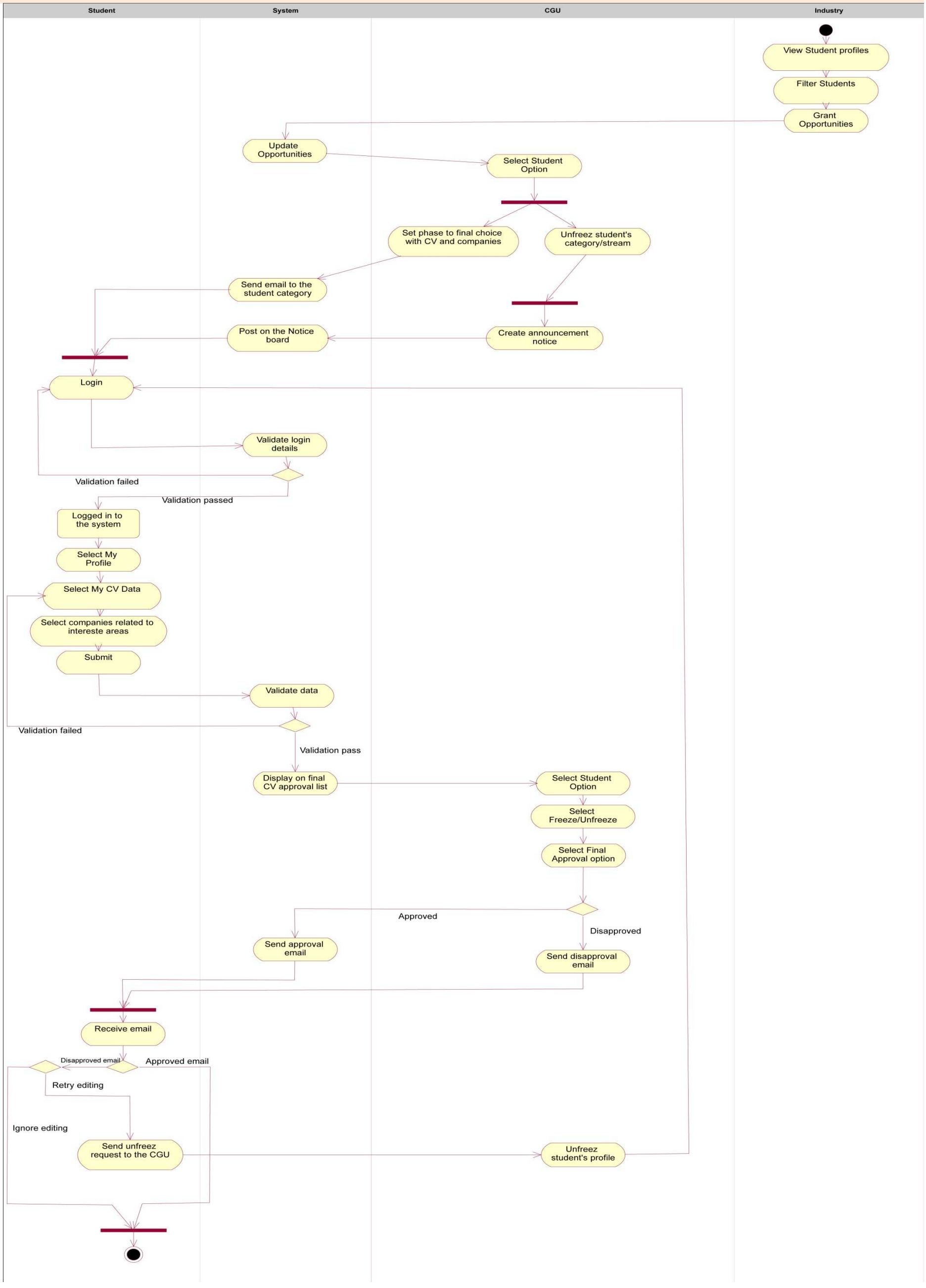
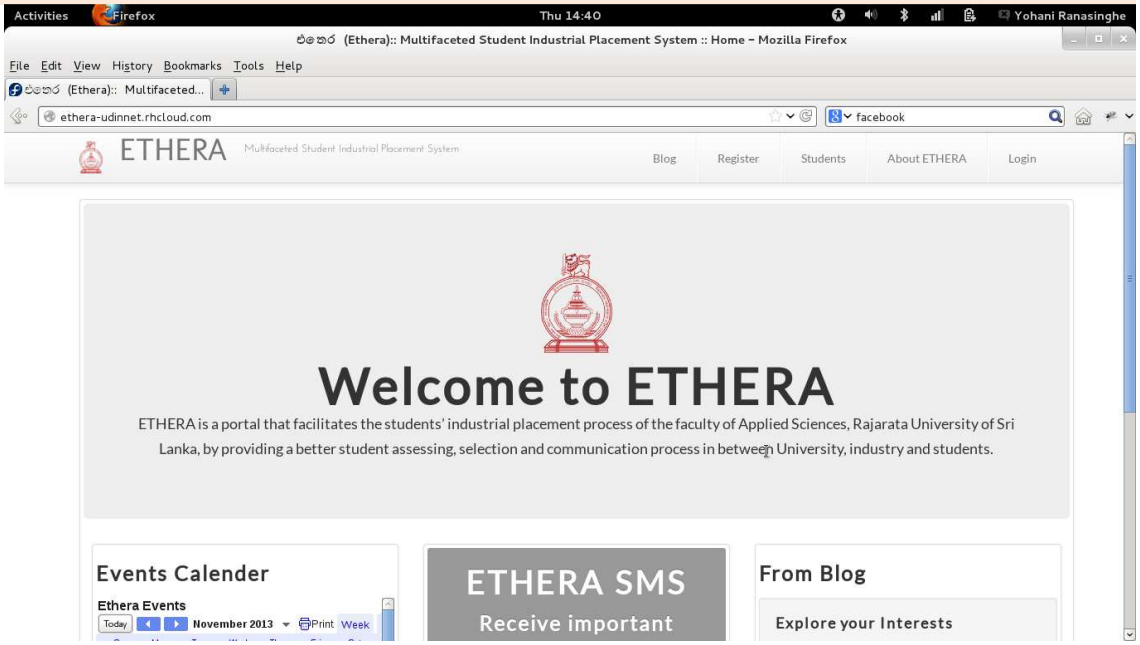


Figure 10 : Final Approval Process Flow

4.5 FRONT END APPEARANCE FOR DIFFERENT SYSTEM FUNCTIONALITIES

4.5.1. Front end appearance of the ETHERA application



ETHERA web application has designed each and every interaction, displays, and have used colours ,fonts, message dialogs , to keep the professional standard of the system. Since this is a multifaceted student management system where industry , university CGU and students incorporate it should not be fancy , it should give a simple, easy to deal with appearance.

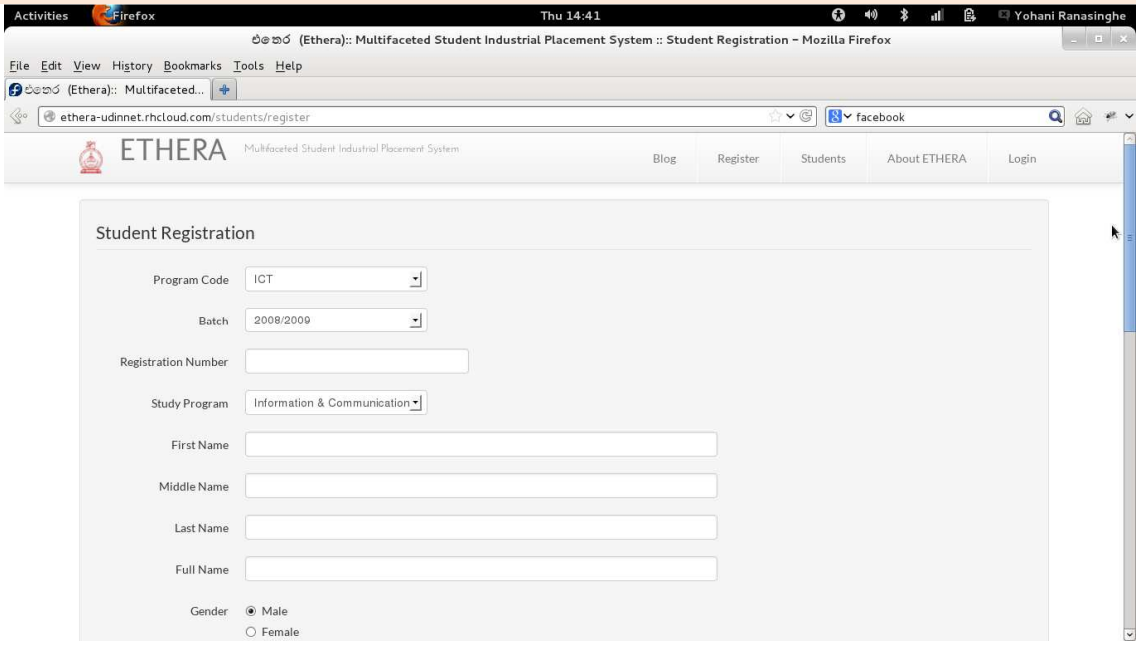
Code : Front Page Layout

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="utf-8">
  <title>
    <?php echo "එෙතර (Ethera):: Multifaceted Student Industrial Placement System
:: ".$title; ?>
  </title>
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <meta name="description" content="">
  <meta name="author" content="">
  <?php
    echo $this->Html->css('bootstrap.min');
    echo $this->Html->css('bootstrap-responsive.min');
    echo $this->Html->css('font-awesome.min.css');
    echo $this->Html->css('smoothness/jquery-ui.min');
    echo $this->Html->script('jquery.min');
    ?>
    <link href='http://fonts.googleapis.com/css?family=Lato|Josefin+Sans|Molengo'
rel='stylesheet' type='text/css'>
  <?php
  echo $this->fetch('meta');
```

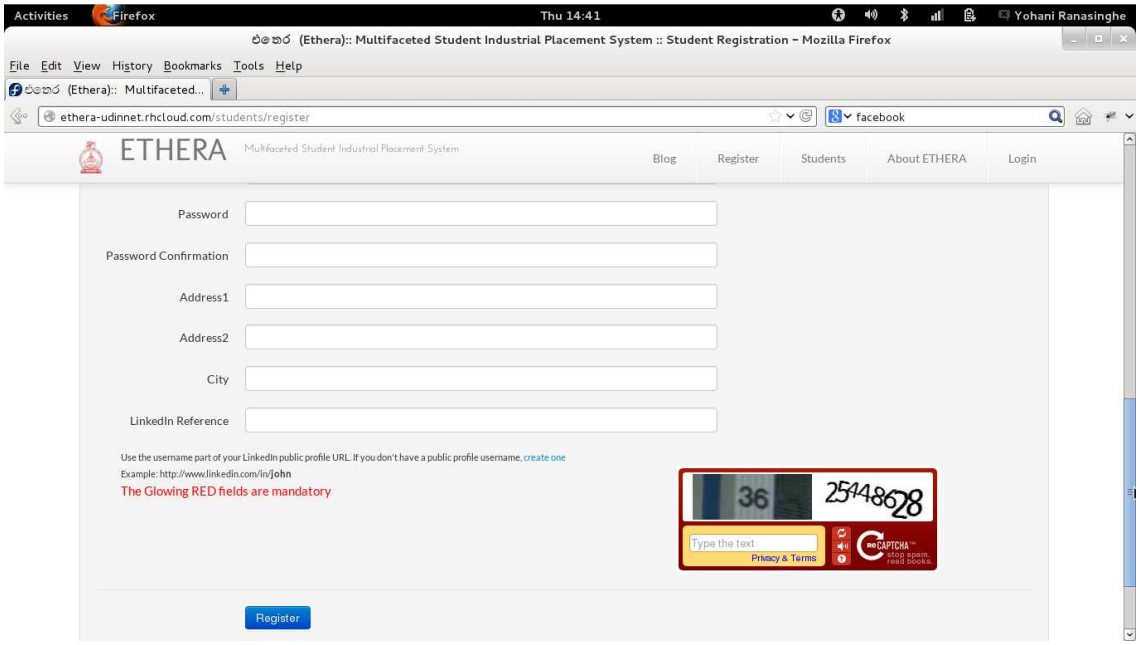
```
  echo $this->fetch('css');
  ?>
</head>

<body>
    <div id="wrap">
        <div class="navbar navbar-fixed-top">
            <div class="navbar-inner">
                <div class="container">
                    <a class="btn btn-navbar" data-toggle="collapse" data-target=".nav-
collapse">
                        <span class="icon-th-list"></span>
                    </a>
                    <div class="brand">
                        <?php echo $this->Html->image('logo_small.png', array(
                            'alt' => 'ETHERA',
                            'style' => 'margin: 0px; padding 0px;'
                        ));?>
                    </div>
                    <?php
                    $i = "<div class=\"brand\" style=\"font-family: 'Molengo', sans-serif;
font-size: 38px\">ETHERA</div>";
                    echo $this->Html->link(
                        $i,
                        array('controller' => 'homes', 'action' => 'main'),
                        array(
                            'escape' => false
                        )
                    );
                    ?>
                    <?php if(!$logged_in): ?>
                    <div class="brand" style="font-family: 'Josefin Sans', sans-serif; font-
size: 13px">Multifaceted Student Industrial Placement System</div>
                    <?php endif; ?>
                    <div class="nav-collapse collapse">
                        <ul class="nav pull-right">
                            <li><?php echo $this->Html->link('Blog',
array('controller'=>'articles','action'=>'blog'));?></li>
                            <li class="divider-vertical"></li>
                            <?php if(!$logged_in): ?>
                            <li><?php echo $this->Html->link('Register',
array('controller'=>'students','action'=>'register'));?></li>
                            <li class="divider-vertical"></li>
                            <?php endif; ?>

                            <?php if($student_link): ?>
                                <li><?php echo $this->Html->link('Students',
array('controller'=>'students','action'=>'show'));?></li>
                                <li class="divider-vertical"></li>
                            <?php endif; ?>

                            <li><?php if($logged_in && $current_user['group_id']!=4):?>
                            <?php echo $this->Html->link('Backend',
array('controller'=>'homes','action'=>'backend_router'));?></li>
                            <li class="divider-vertical"></li>
                            <?php endif; ?>
                            <li><?php if($logged_in && $current_user['group_id']==4):?>
                            <?php echo $this->Html->link('My Profile',
array('controller'=>'homes','action'=>'student'));?></li>
                            <li class="divider-vertical"></li>
                            <?php endif; ?>
                            <li><a href="#">About ETHERA</a></li>
                            <li class="divider-vertical"></li>
                            <li>
                                <?php if($logged_in): ?>
```

```
                                    <?php echo $this->Html->link('Logout',
array('controller'=>'system_users','action'=>'logout'));?>
                                <?php else: ?>
                                    <?php echo $this->Html->link('Login',
array('controller'=>'homes','action'=>'login'));?>
                                <?php endif; ?>
                            </li>
                            <li>
                                <p class="navbar-text" style="font-weight: bold">
                                    <?php if($logged_in): ?>
                                        Welcome <?php echo $current_user['first_name']; ?>
                                    <?php endif; ?>
                                </p>
                            </li>
                        </ul>
                    </div>
                </div>
            </div>
        </div>
        <div id="push80"></div>
        <div class="container">
            <?php echo $this->Session->flash();
             echo $this->fetch('content'); ?>

        </div><!-- /container -->


        <!-- Placed at the end of the document so the pages load faster -->
        <?php
            //echo $this->Html->script('jquery.min');
            echo $this->Html->script('jquery-ui.min');
            echo $this->Html->script('bootstrap.min');
            echo $this->Html->script('run_prettify');
         ?>
        <?php echo $this->fetch('script'); ?>
        <?php
        if (class_exists('JsHelper') && method_exists($this->Js, 'writeBuffer')) echo $this-
>Js->writeBuffer();
        // Writes cached scripts
        ?>
        <div id="push"></div>
    </div>

    <div id="footer">
        <div class="container">
            <p class="text-center">&copy; <a href="http://rjt.ac.lk">Rajarata University of
Sri Lanka</a>, Developed by <a href="http://ideaflux.pageshack.com">IDeaFlux</a>.</p>
        </div>
    </div>

</body>
</html>
```

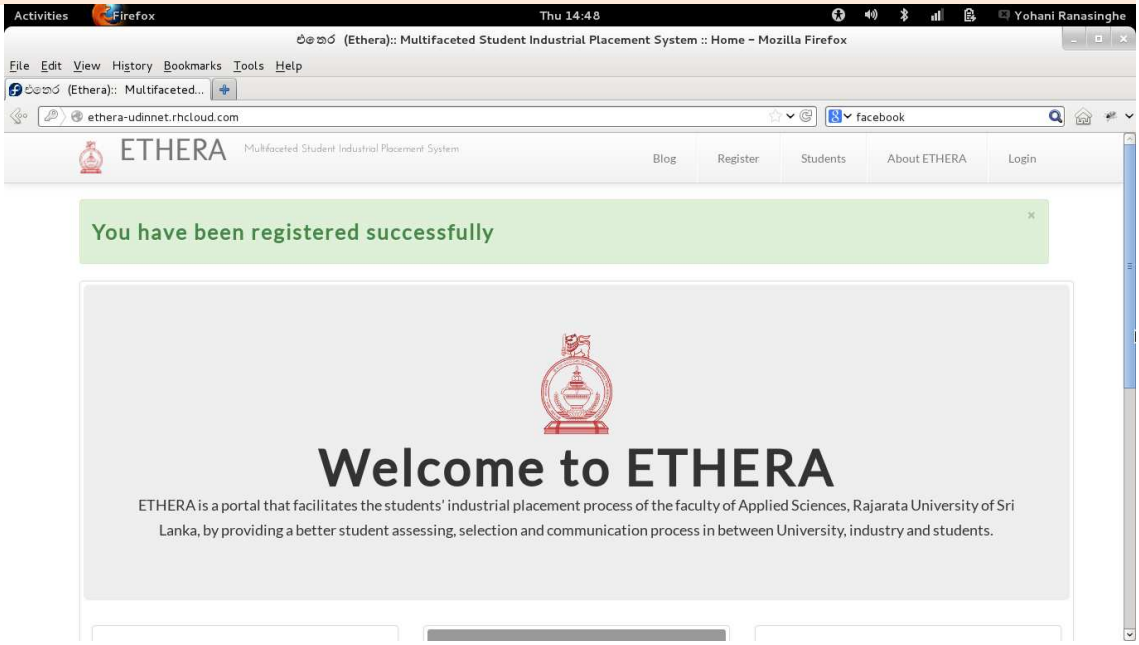
4.5.2. Student Registration



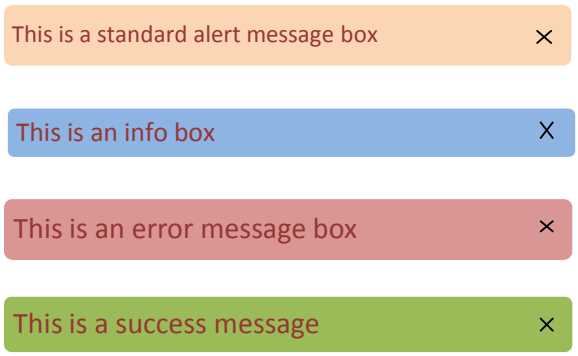
Each form is simple and to avoid unwanted registrations recapchar feature has added. Mandatory fields glow in red color.



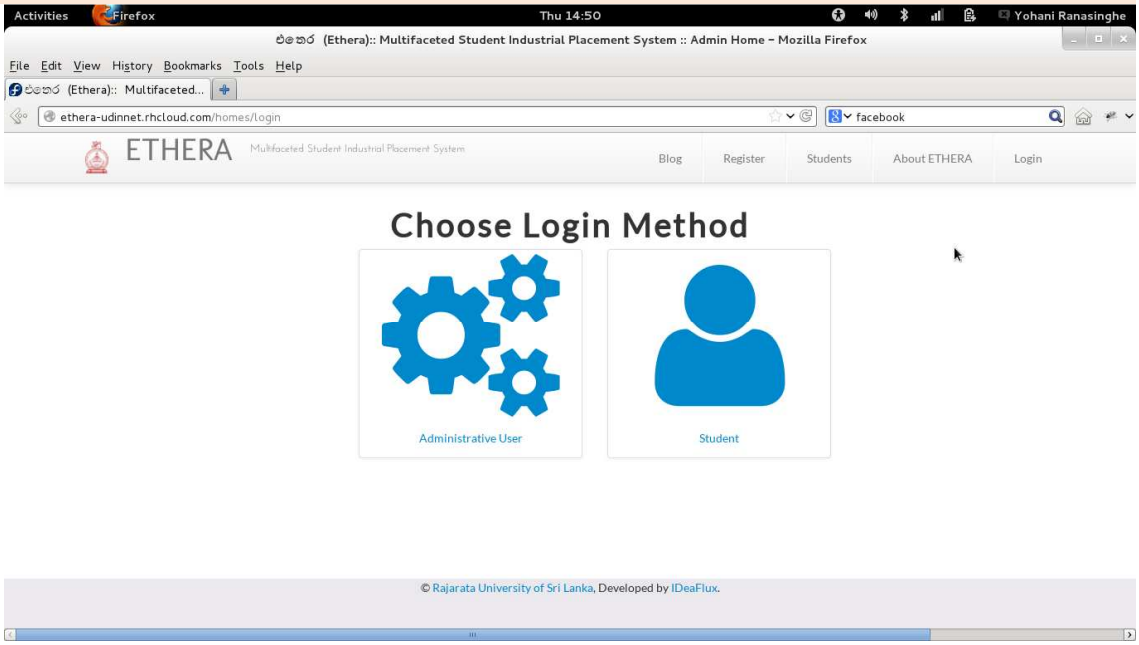
4.5.3. Alert Messages decomposition



We'll be using following type of alert scheme for all over the system. So that people who are using this system will identify the type of the message just using the color of it. Green color bar indicate success. This message box can be closed.

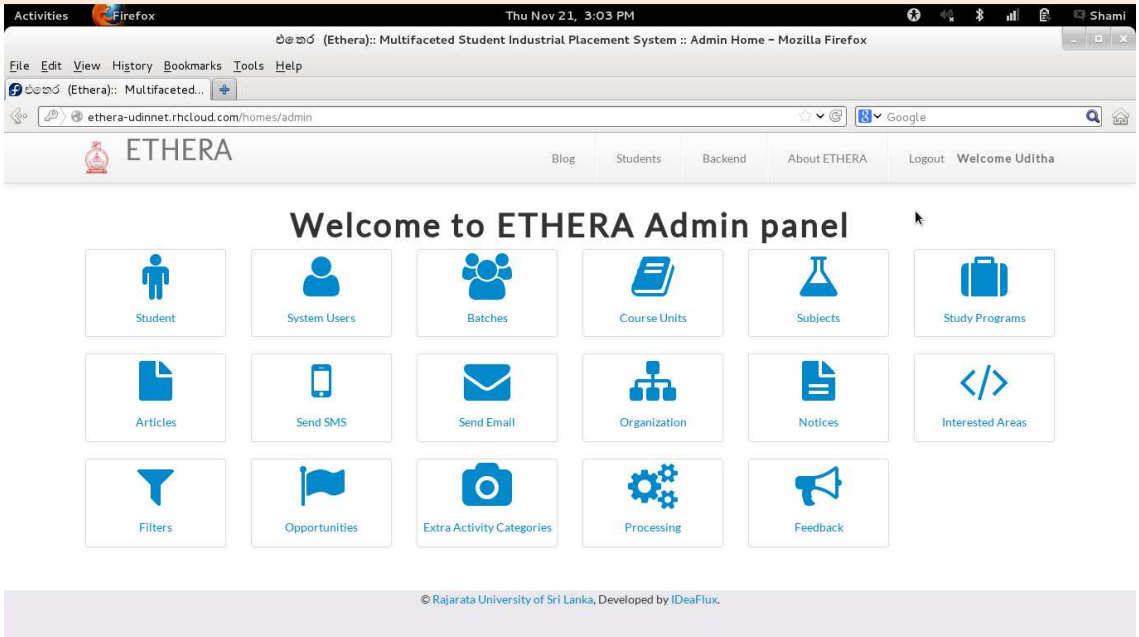


4.5.4. User Category login

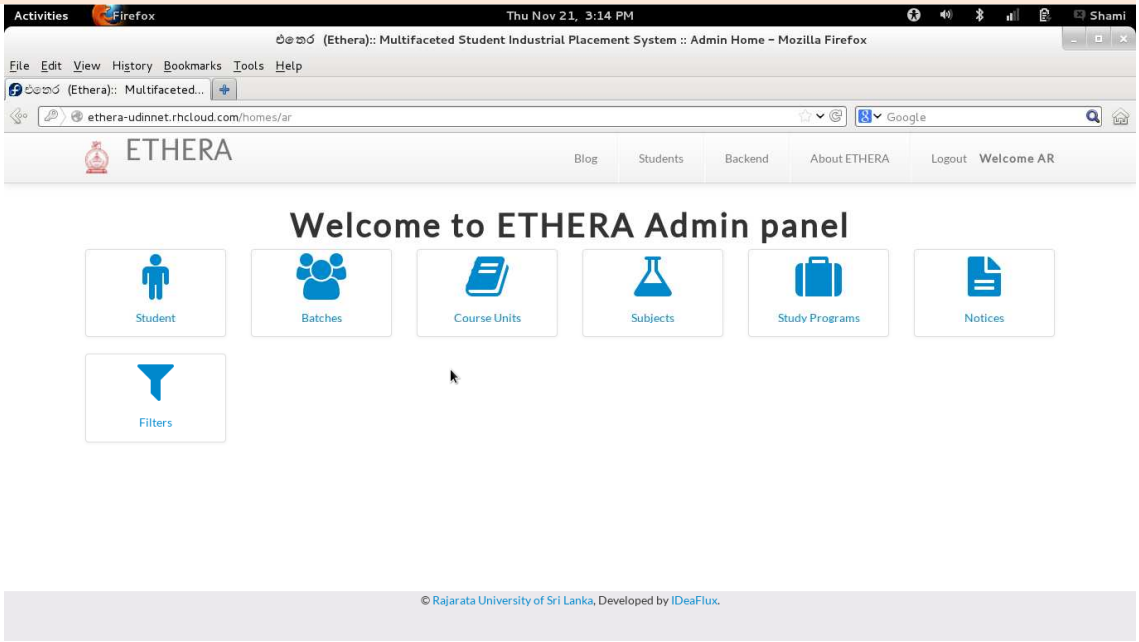


Two major user categories Administrative and Student. Administrative user has sub categories . According to the user type system view changes. Their privileges are different then the functions they can do also vary.

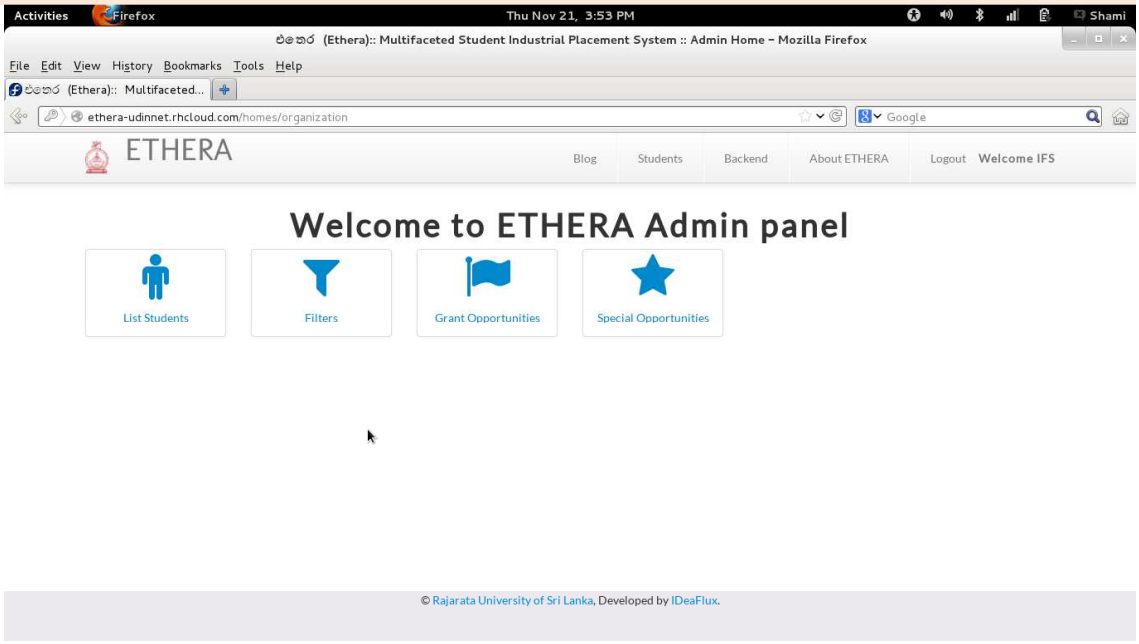
4.5.5. Admin/ CGU view



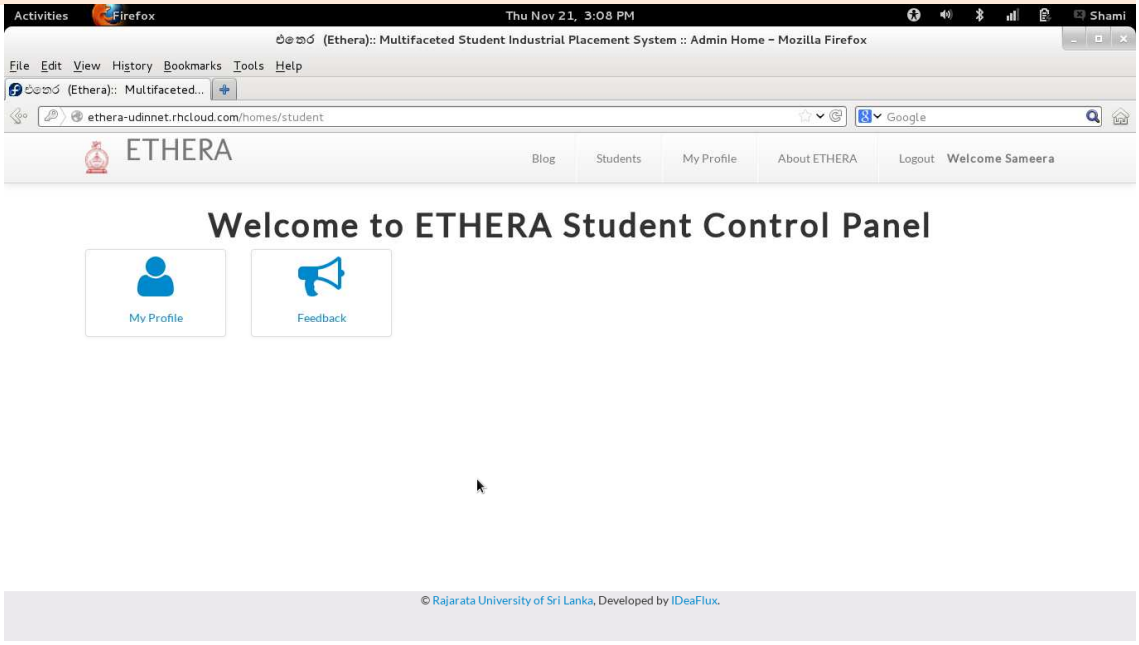
4.5.6. AR view



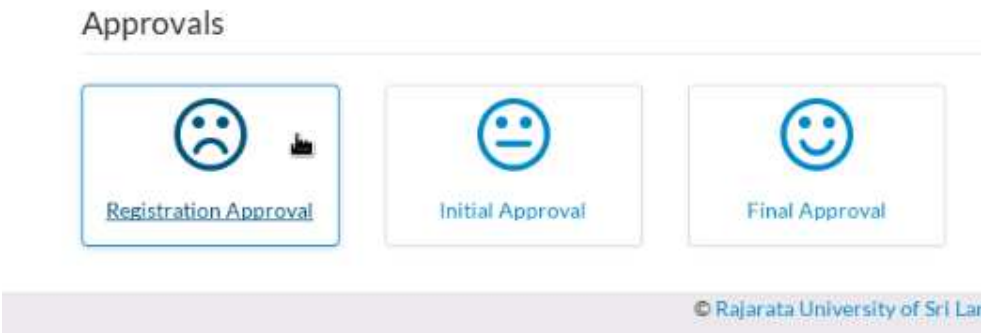
4.5.7. Industry view



4.5.8. Student view

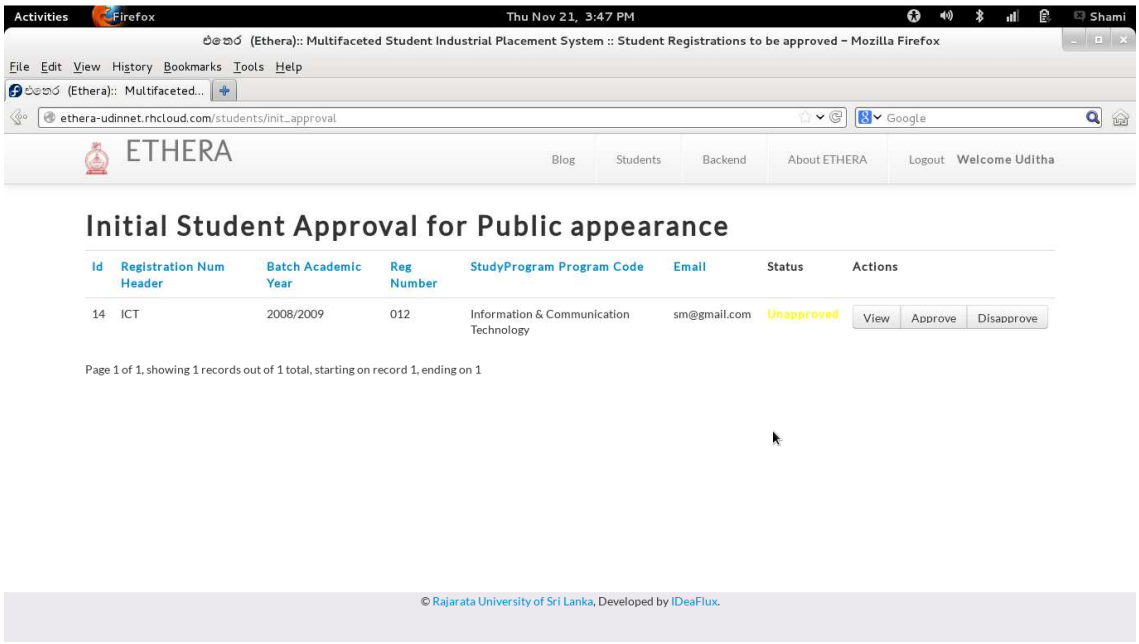


4.5.9. Approval Phases



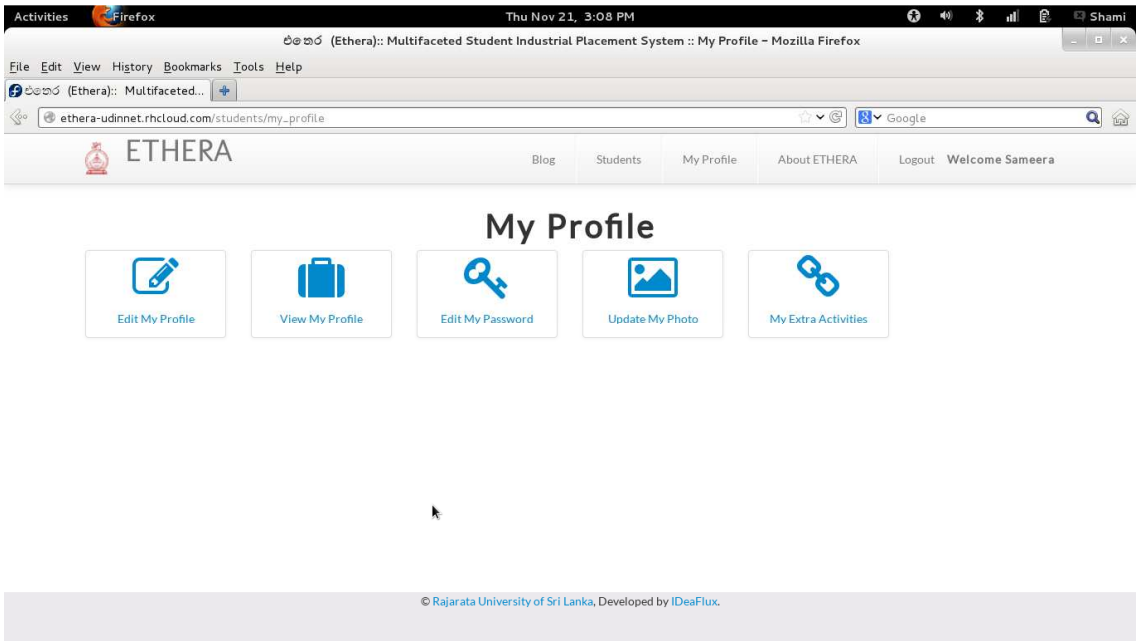
Three approval phases Registration Approval, Initial Approval , Final Approval are maintained to ensure industry and public view a profile with true details and into a particular standard.

Authorized user can view profile and then Approve or Un approve. Each action will notify to student via emails and SMS if subscribed.



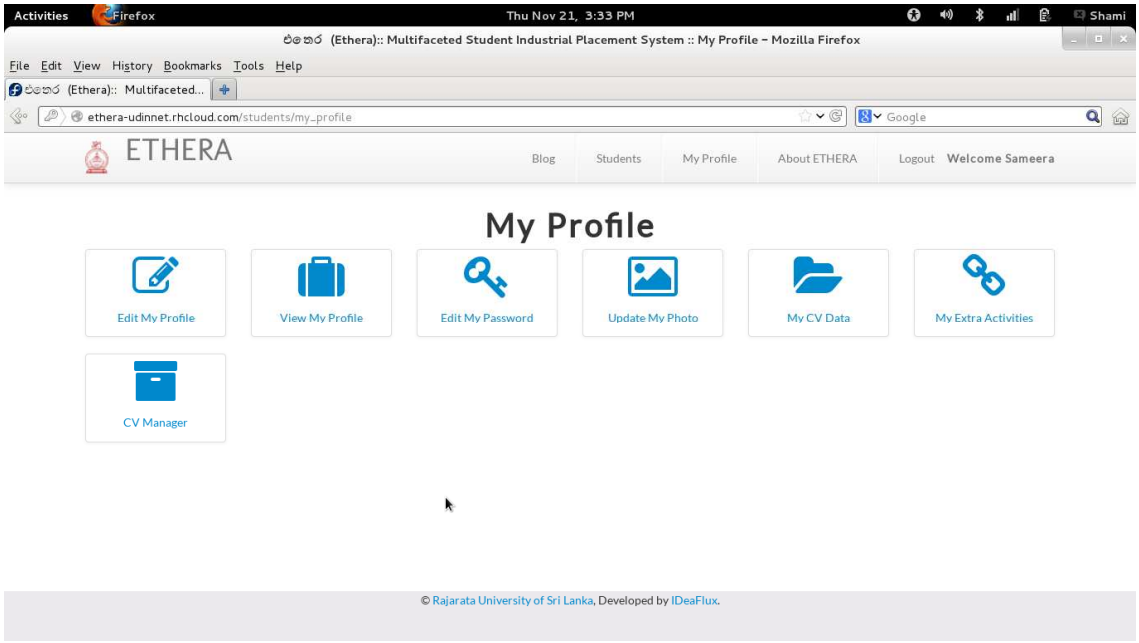
4.5.10. Students profiles features

Registration Phase



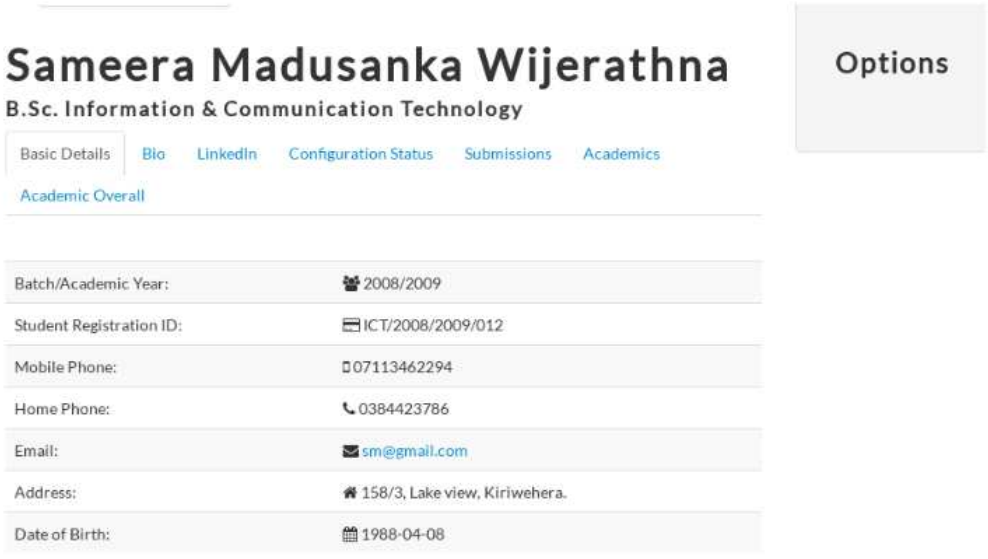
Features change according to approval phase. When approved from higher phases profile features will advance accordingly.

After Initial Choice Approval



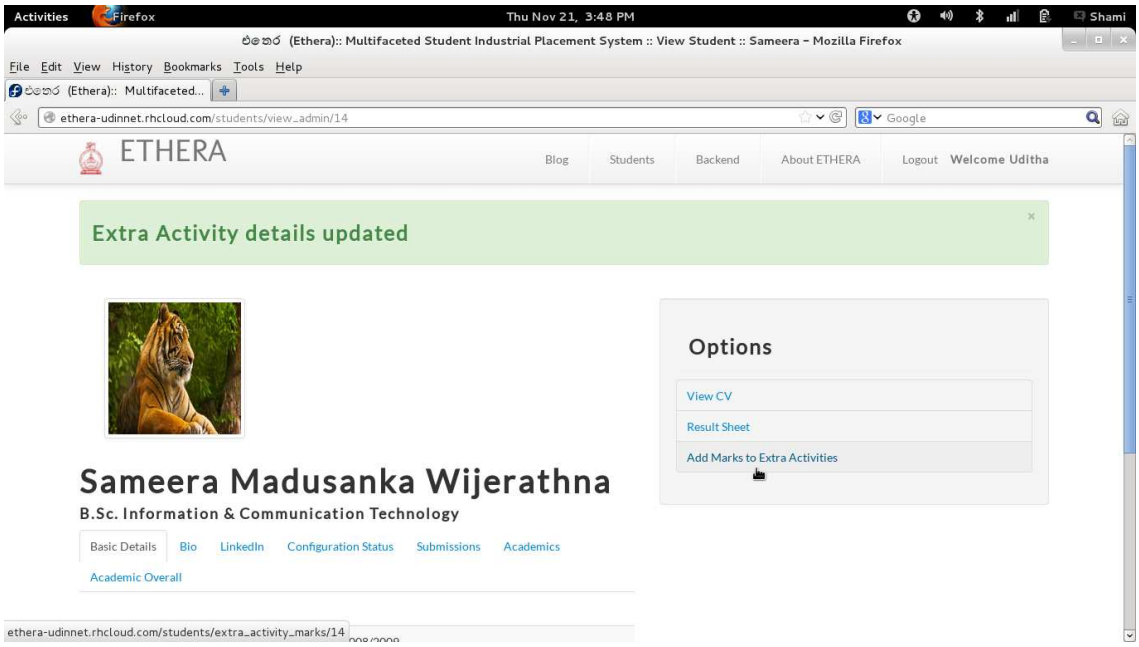
4.5.11. Student profile interface changes

General view of the student profile for students



Academic information of a student

Student profile view for Admin users



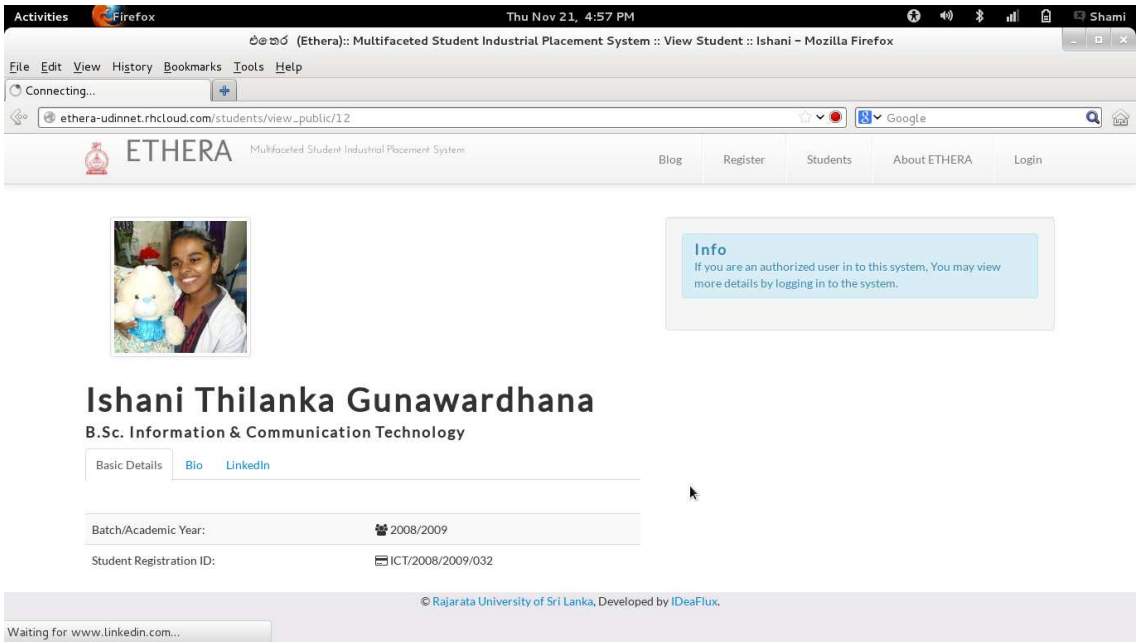
Student profile interface and its details change based on 2 factors.

- User logged in
- The phase profile is approved from

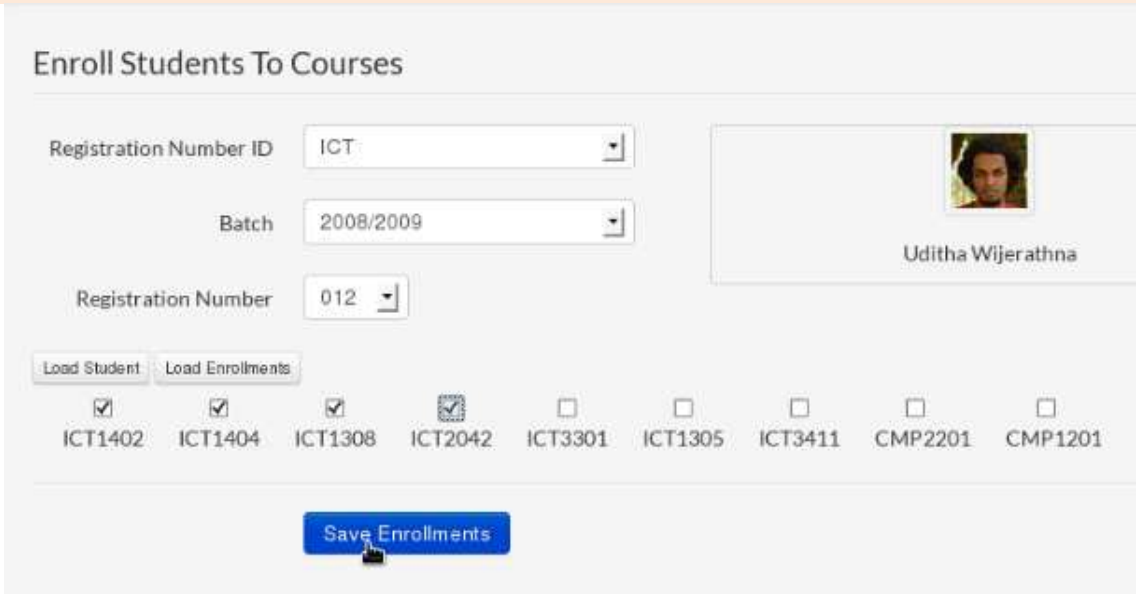
Super users like Admin ,CGU can view all the details , add additional options to add marks .
Student can view their information only.
Industry can view all details after approved form public ready. But they can't give marks.

Public also can view limited number of details.

Public view



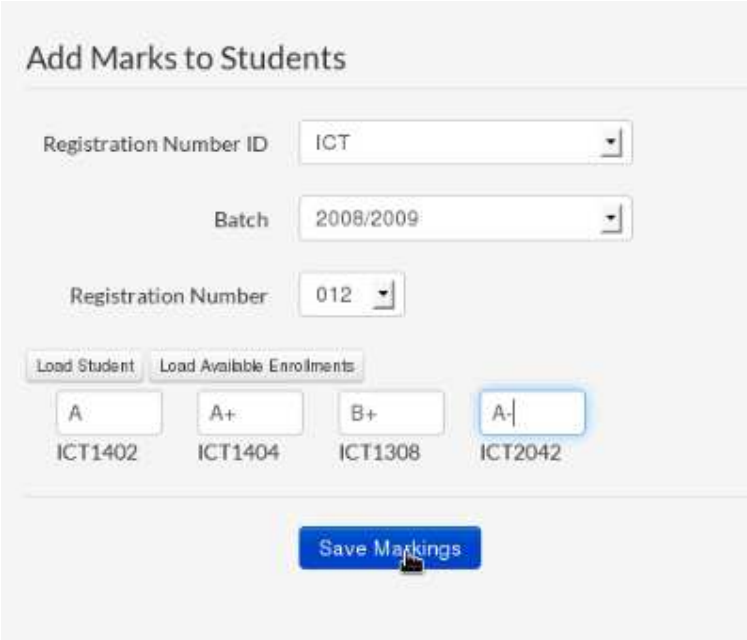
4.5.12. Student information loading



When AR need to enroll students to courses, system allows to load student details and only the courses relevant to the study program in a dynamic manner.

Code : Student Information Loading

```
public function enroll(){

        if ($this->request->is('post')) {
            if(!empty($this->request->data['Enrollment']))
            {
                $enrollments = $this->request->data['Enrollment'];
                $count = 0;
                foreach($enrollments as $enrollment){
                    if(empty($enrollment['course_unit_id'])){
                        unset($this->request->data['Enrollment'][$count]);
                    }
                    $count++;
                }
                unset($this->request->data['Student']);
                //debug($this->request->data);
            }
            $this->loadModel('Enrollment');
            $this->Enrollment->create();
            $data = $this->request->data['Enrollment'];
            if ($this->Enrollment->saveAll($data)) {
                $this->Session->setFlash(__('The student has been enrolled in to selected
subjects'),'success_flash');
                $this->redirect(array('controller'=>'students','action' => 'enroll'));
            } else {
                $this->Session->setFlash(__('The Enrollments could not be saved. Please, try
again.'),'error_flash');
            }
        }
        $registrationNumHeaders = $this->Student->RegistrationNumHeader->find('list');
        $initHeader = $this->Student->RegistrationNumHeader->find('first');
        $initHeader = $initHeader['RegistrationNumHeader']['id'];
        $studyPrograms = $this->Student->StudyProgram->find('list',array(
            'conditions' => array('registration_num_header_id' => $initHeader),
            'recursive' => -1
        ));
        $batches = $this->Student->Batch->find('list');
        $this->set(compact('groups', 'studyPrograms', 'batches','registrationNumHeaders'));
    }
```

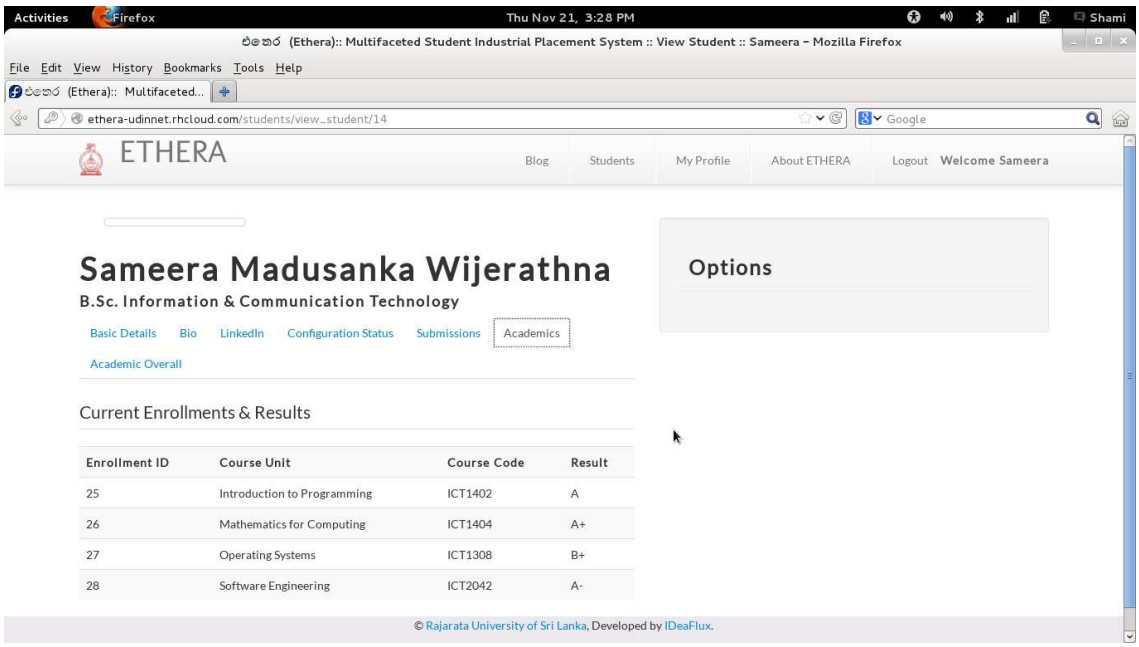


When adding marks for a particular student only the courses he/she has enrolled to will apper to add marks.

4.5.13. Student information views

Students can vies their results as soon as marks are out and system calculate GPA, Extra activity mark and Final mark in run time.

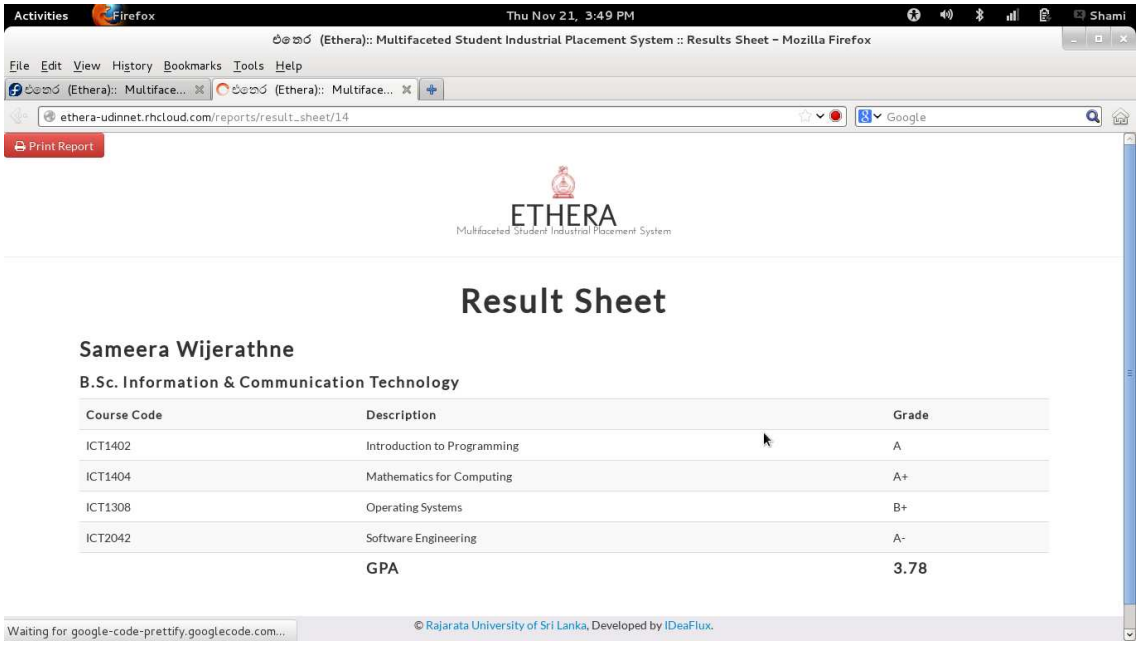
Marks obtained for each subject



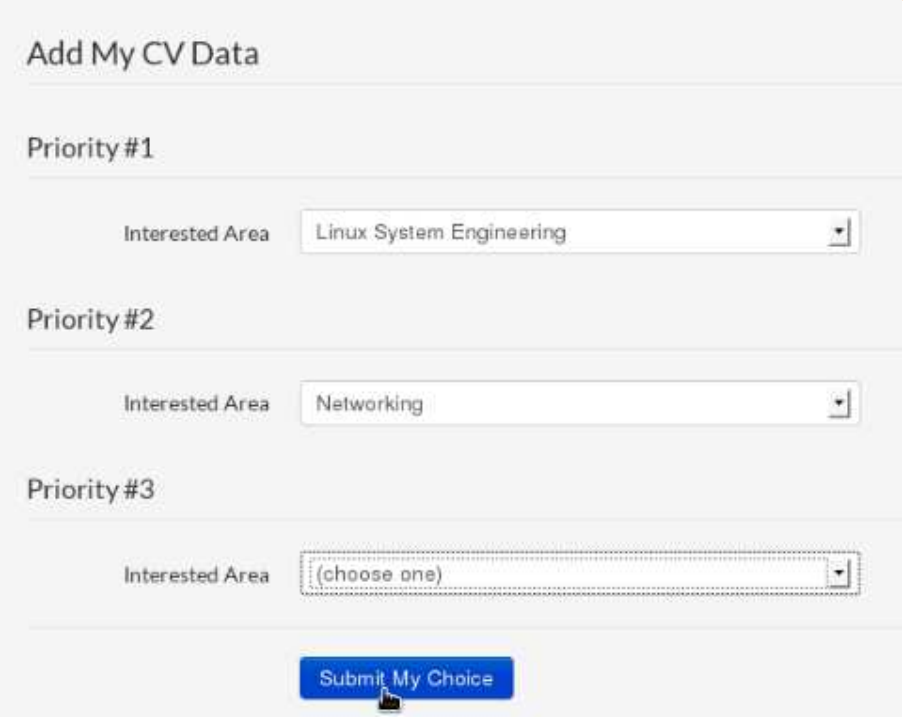
Overrall GPA, marks for extra activities and Final mark

4.5.14. Result Sheets

Result sheet can be taken using the system at any given time if student has obtained marks for a single semester. It can be printed and this feature reduce time to take result sheets from AR office in current procedures.



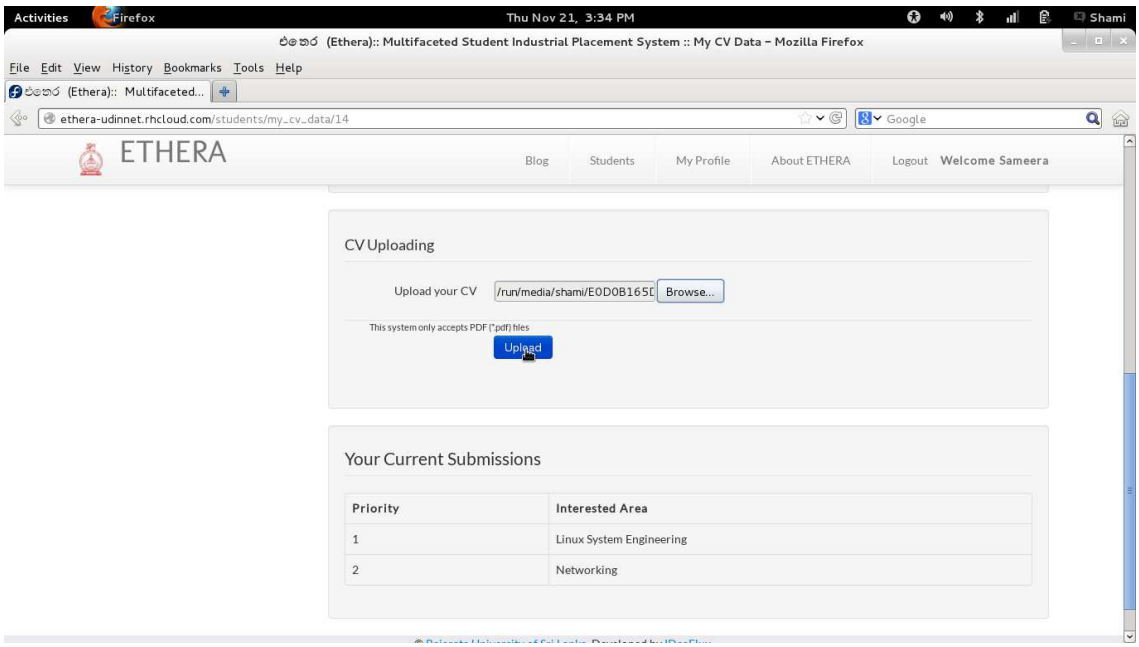
4.5.15. Students allow to add Interested areas to their preference



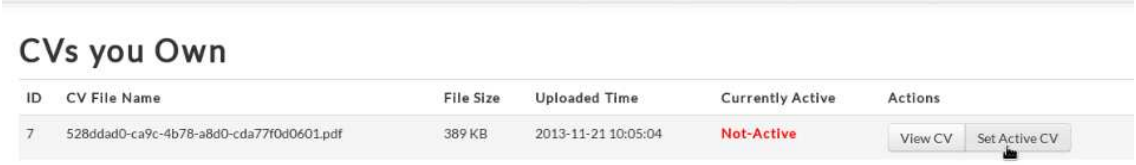
This option will appear once the CGU activate initial choice phase. Max no of choices are 3. This can't be changed unless from a special request to CGU. (Assumption made specifically to ETHERA system)

4.5.16. CV Upload

Upload CV



Activate CV



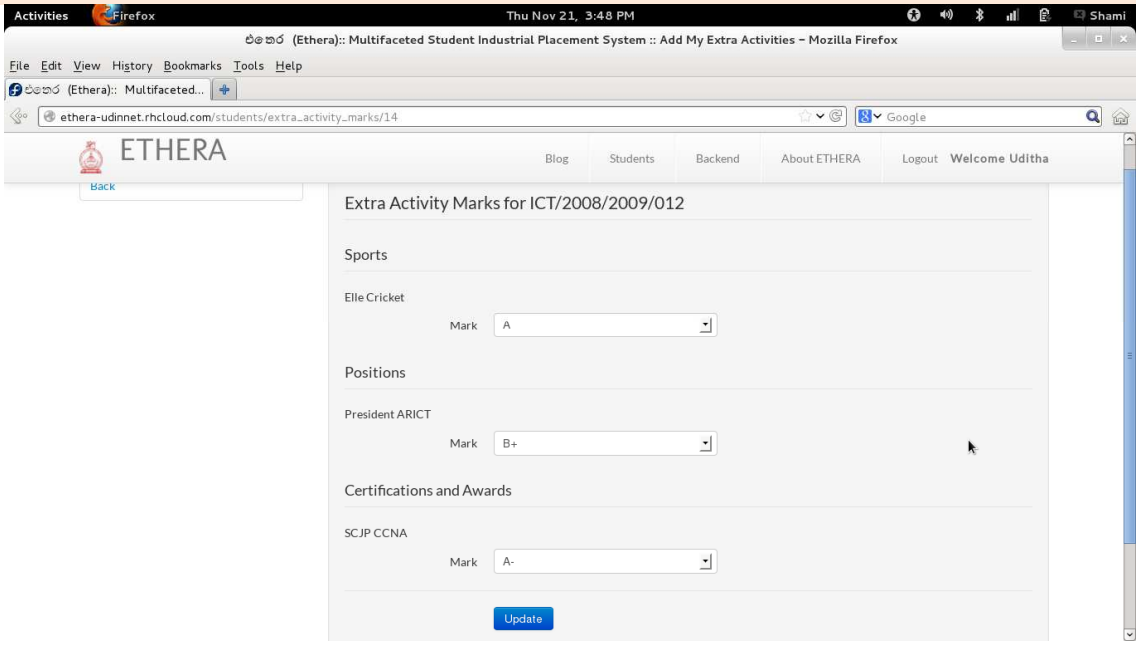
Any number of CVs can be uploaded ,only the activated CV is visible to other parties. This provide students to update CV data time to time.

Code : Upload CVs

```
public function my_cv_data($id=null) {
        $current_student = $this->Auth->user();
        if (!$this->Student->exists($id)) {
            throw new NotFoundException(__('Invalid student'));
        }
        elseif($id != $current_student['id']) {
            $this->redirect(array('action' => 'my_profile'));
        }
        elseif($current_student['approval_phase'] != 1 && $current_student['approval_phase']
!= 2) {
            $this->redirect(array('action' => 'my_profile'));
        }
        elseif($current_student['freeze_state']!=0) {
            $this->redirect(array('action' => 'my_profile'));
        }
        elseif($current_student['approval_phase'] == 2) {
            $this->redirect(array('controller' => 'students','action' =>
'my_cv_data_upl',$id));
        }

        $this->loadModel('Assignment');
        $this->loadModel('InterestedArea');
        $this->loadModel('Cv');

        $student = $this->Student->find(
            'first', array(
                'conditions' => array(
                    'Student.id' => $id
                )
            )
        );

        $interested_areas_pre = $this->InterestedArea->StudyProgram->find(
            'all',array(
                'conditions' => array(
                    'StudyProgram.id'=> $student['Student']['study_program_id']
                ),
                'contain' => array(
                    'InterestedArea' => array(
                    )
                )
            )
        );

        $current_submissions_pre = $this->Assignment->find(
            'all',
```

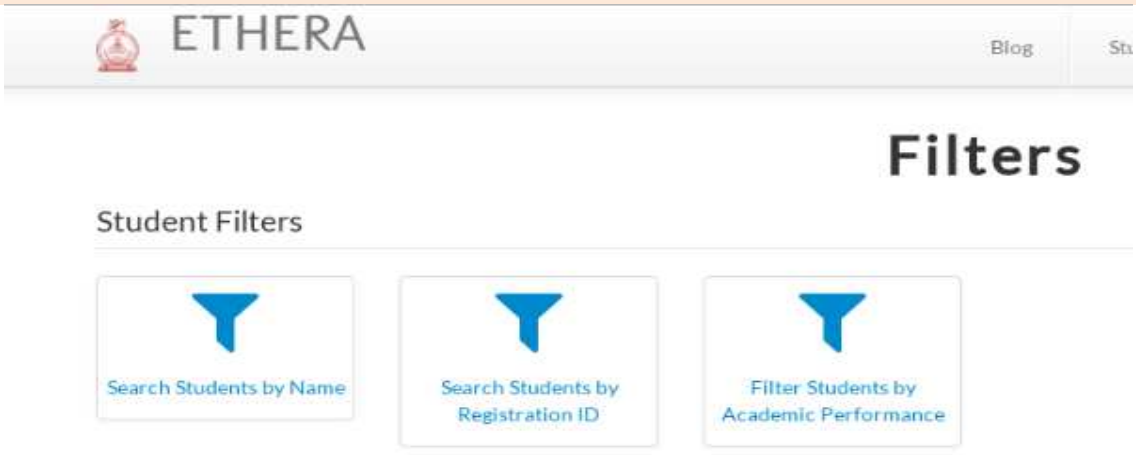
```
            array(
                'conditions' => array(
                    'student_id' => $id
                ),
                'recursive' => 1,
                'order' => 'Assignment.priority ASC'
            )
        );

        $count = 0;
        foreach($current_submissions_pre as $current_submission_pre){
            $current_submissions[$count]['name'] =
$current_submission_pre['InterestedArea']['name'];
            $current_submissions[$count]['priority'] =
$current_submission_pre['Assignment']['priority'];
            $count++;
        }

        $interested_areas_pre = $interested_areas_pre[0]['InterestedArea'];

        foreach($interested_areas_pre as $interested_area_pre){
            $interested_areas[$interested_area_pre['id']] = $interested_area_pre['name'];
        }

        $this->set(compact('interested_areas','current_submissions'));
        if($this->request->is('post')){
            $assignments = $this->request->data['Assignment'];
            $count = 1;
            foreach($assignments as $assignment){
                if(!empty($assignment['interested_area_id'])){
                    $data[$count-1]['Assignment']['interested_area_id'] =
$assignment['interested_area_id'];
                    $data[$count-1]['Assignment']['student_id'] = $id;
                    $data[$count-1]['Assignment']['priority'] = $count;
                    $data[$count-1]['Assignment']['state'] = 1;
                    if(!empty($current_submissions_pre[$count-1]['Assignment']['priority']) &&
$current_submissions_pre[$count-1]['Assignment']['priority'] == $count){
                        $data[$count-1]['Assignment']['id'] = $current_submissions_pre[$count-
1]['Assignment']['id'];
                    }
                }
                else{
                    if(!empty($current_submissions_pre[$count-1]['Assignment']['priority']) &&
$current_submissions_pre[$count-1]['Assignment']['priority'] == $count){
                        $this->Assignment->id = $current_submissions_pre[$count-
1]['Assignment']['id'];
                        $this->Assignment->delete();
                    }
                }
                $count++;
            }

            if($id){
                $std['Student']['id'] = $id;
                $std['Student']['approved_state'] = 2;
            }

            if(($this->Assignment->saveAll($data))&&($this->Student->saveAll($std))) {
                $this->Session->setFlash(__('Your CV Data updated'),'success_flash');
                $this->redirect(array('action' => 'my_profile'));
            }
            else {
                $this->Session->setFlash(__('Your CV Data update failed'),'error_flash');
                $this->redirect(array('action' => 'my_profile'));
            }       }    }
```

4.5.17. Add marks to Extra Activities



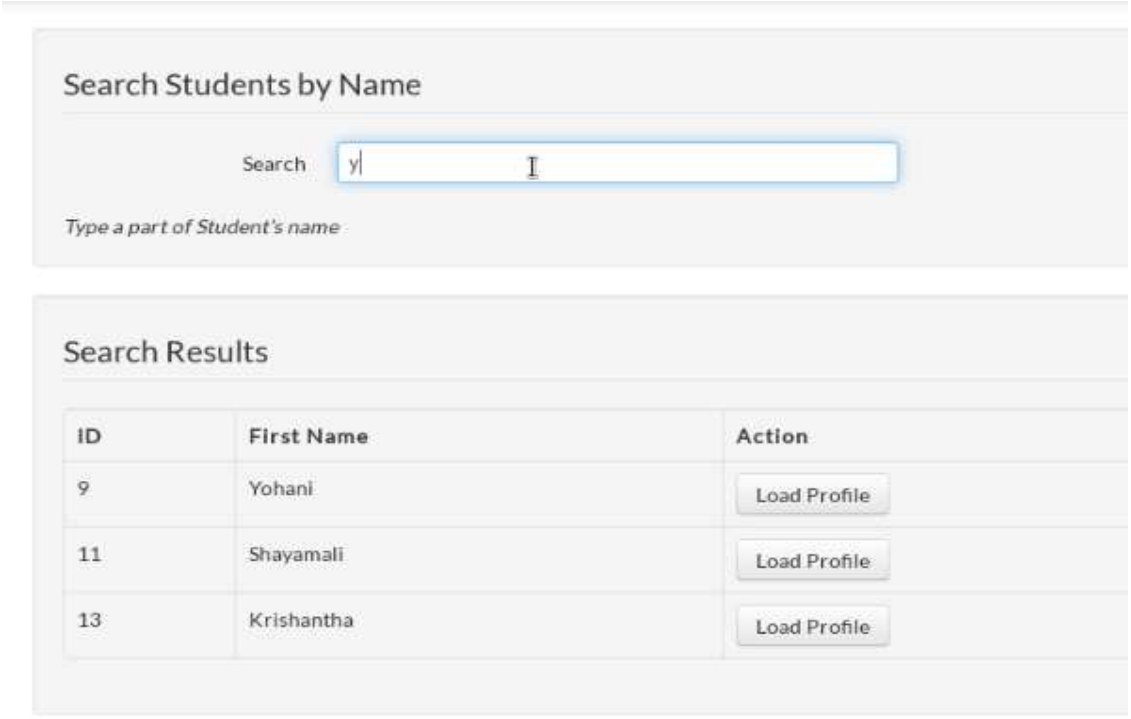
CGU can add marks for each student's extra activities by reviewing evidence. Each field obtain grade and calculate a mark similar to GPA.

4.5.18. Filters

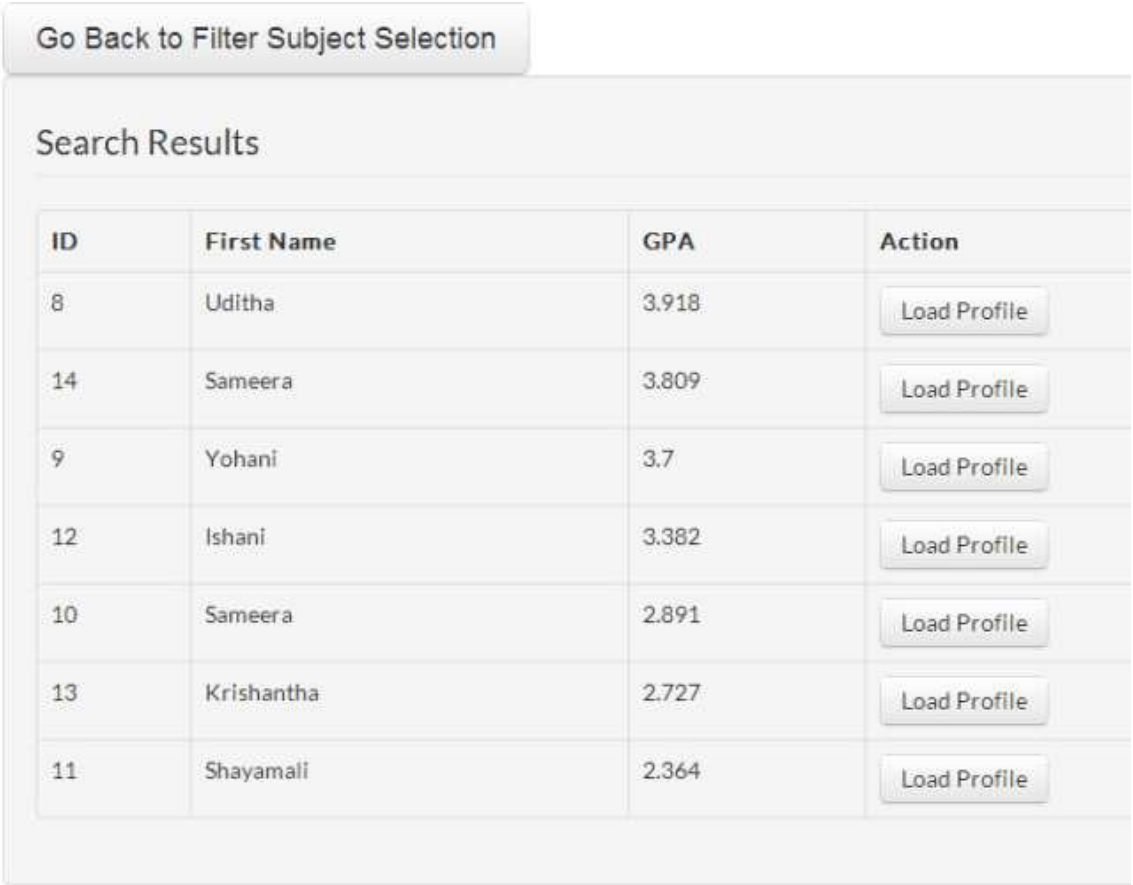


Sophisticated filters available using,

- Student name
- Registration ID
- Academic Performance



Filter by Academic Performance



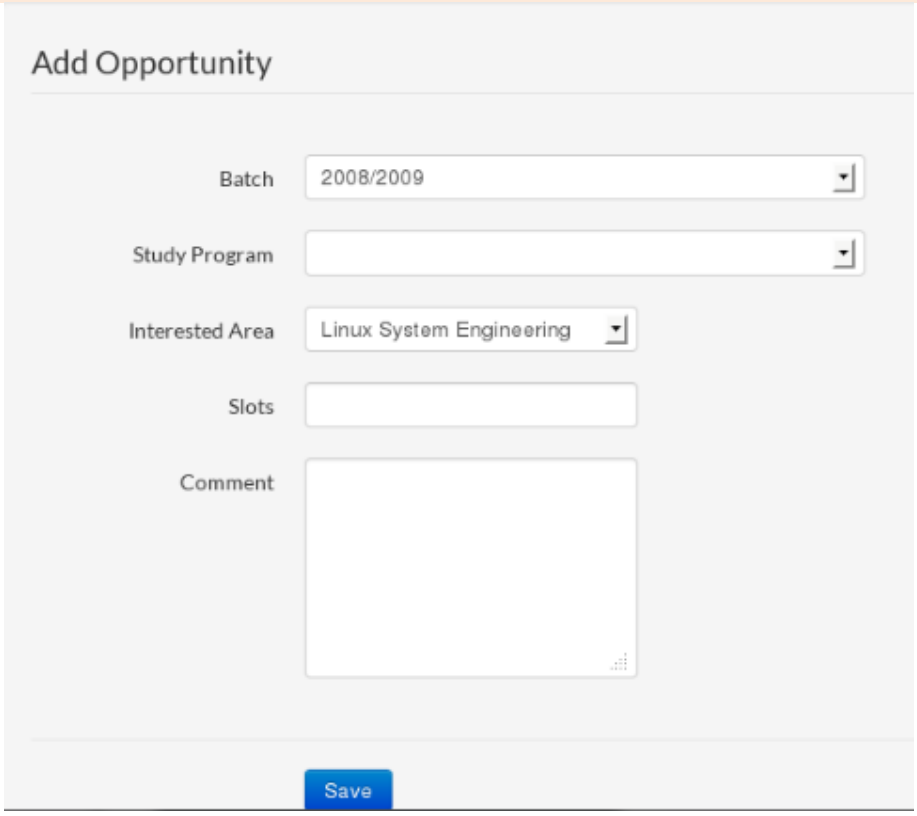
New invention to the ETHERA system. This will calculate GPA value only for selected set of subjects and sort students in descending order according to newly calculated GPA. This is the best solution if anyone need to select students who have performed well for a given subject(s).

Code : Filter By Academic Performance

```
public function filter_by_academic_performance_course_select_filtering(){
        $this->loadModel('Enrollment');
        $this->loadModel('CourseUnit');

        if($this->request->is('post')){
            if((!empty($this->request->data['CourseUnit'])) && (!empty($this->request-
>data['Batch']['id'])) && (!empty($this->request->data['StudyProgram']['id']))){
                $course_units = $this->request->data['CourseUnit'];

                $students = $this->Student->find(
                    'all',
                    array(
                        'recursive' => -1,
                        'conditions' => array(
                            'Student.batch_id' => $this->request->data['Batch']['id'],
                            'Student.study_program_id' => $this->request-
>data['StudyProgram']['id']
                        )
                    )
                );
                $student_count = 0;
                foreach($students as $student){
                    $filtering_enrollments = array();

                    $enrollments = $this->Enrollment->find(
                        'all',
                        array(
                            'recursive' => -1,
                            'conditions' => array(
                                'Enrollment.student_id' => $student['Student']['id']
                            )
                        )
                    );

                    $course_count = 0;

                    foreach($enrollments as $enrollment){
                        foreach($course_units as $course_unit){
                            if(($enrollment['Enrollment']['course_unit_id'] ==
$course_unit['id']) && (!empty($enrollment['Enrollment']['grade']))){
                                $course_count++;
                                $unit = $this->CourseUnit->find(
                                    'first',
                                    array(
                                        'conditions' => array(
                                            'CourseUnit.id' =>
$enrollment['Enrollment']['course_unit_id']
                                        ),
                                        'recursive' => -1
                                    )
                                );
                                $enrollment['Enrollment']['CourseUnit'] = $unit['CourseUnit'];
                                $filtering_enrollments[$course_count-1]= $enrollment;


                            }
```

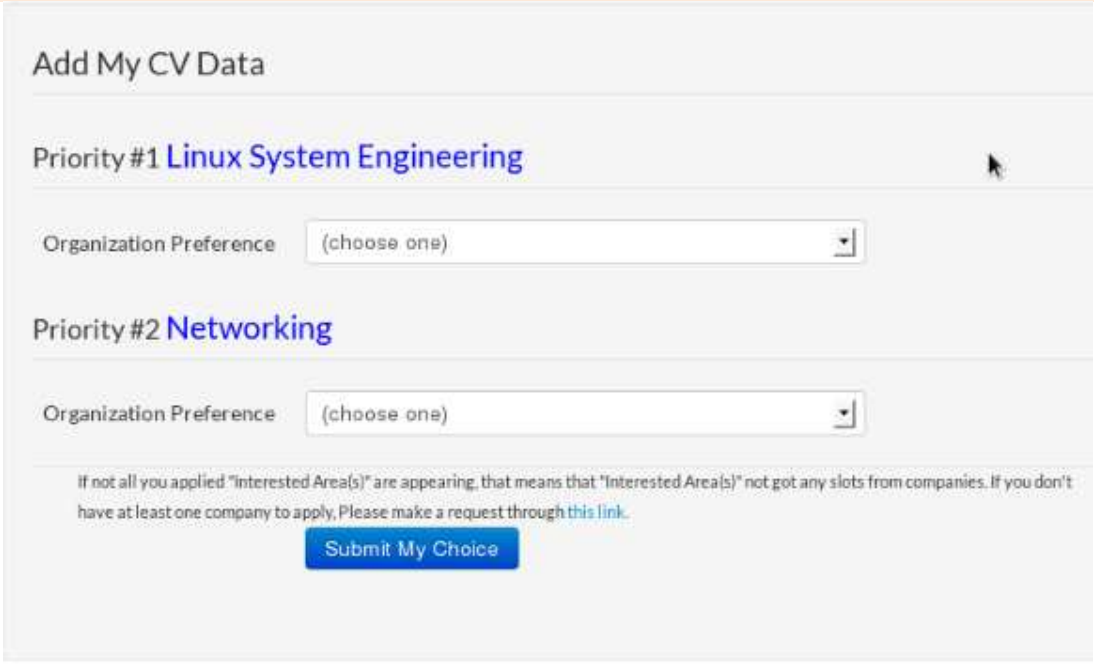
```
                        }
                    }

                    if($course_count == sizeof($course_units)){
                        $filtered_students[$student_count]['Student']['filter_gpa'] =
Calculate::GPA($filtering_enrollments);
                        $filtered_students[$student_count]['Student']['id'] =
$student['Student']['id'];
                    }
                    $student_count++;
                }

                if(!empty($filtered_students)){
                    $filtered_student_count = 0;
                    foreach($filtered_students as $filtered_student){
                        $final_students[$filtered_student_count] = $this->Student->find(
                            'first',
                            array(
                                'conditions' => array(
                                    'Student.id' => $filtered_student['Student']['id']
                                ),
                                'recursive' => -1
                            )
                        );
                        $final_students[$filtered_student_count]['GPA'] =
$filtered_student['Student']['filter_gpa'];
                        $filtered_student_count++;
                    }
                }
            }
            if(!empty($final_students)){
                $students = StudentManipulation::gpa_sort($final_students);
                $this->set('students',$students);
            }

            $this->set('return_data',$this->request->data);
        }
    }
```

4.5.19. Industry grant opportunities



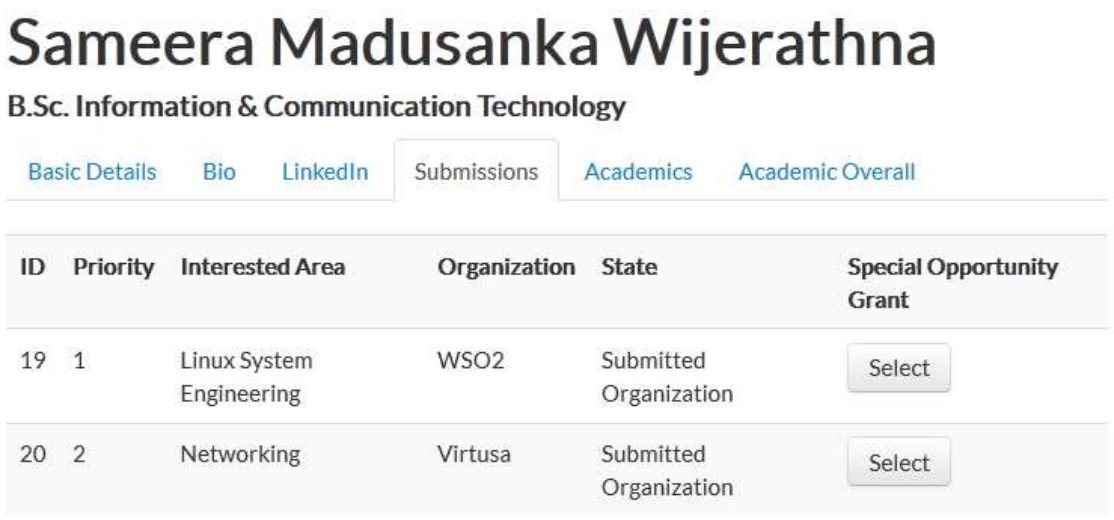
Industry can grant opportunities only for batched which have been industry ready. Else batches drop down list becomes empty.

4.5.20. Front end appearance of the ETHERA application



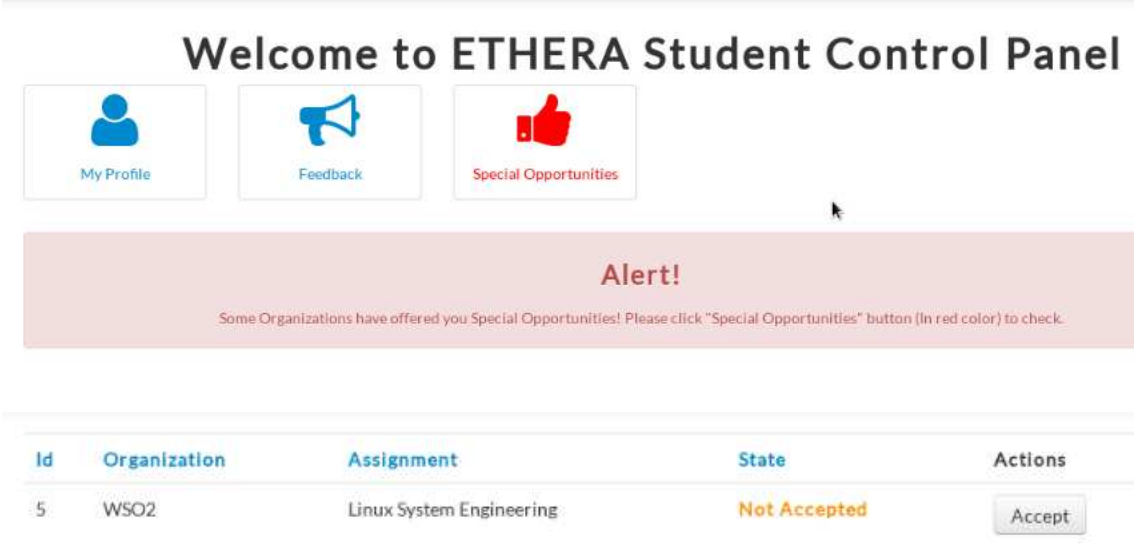
Students can select companies for their preferred area. Only the industry who has granted opportunities for a particular area will appear in the list. Student may not get all 3 priorities to select companies if any priority is not having a opportunity given by any company.

4.5.21. Industry grant special opportunity

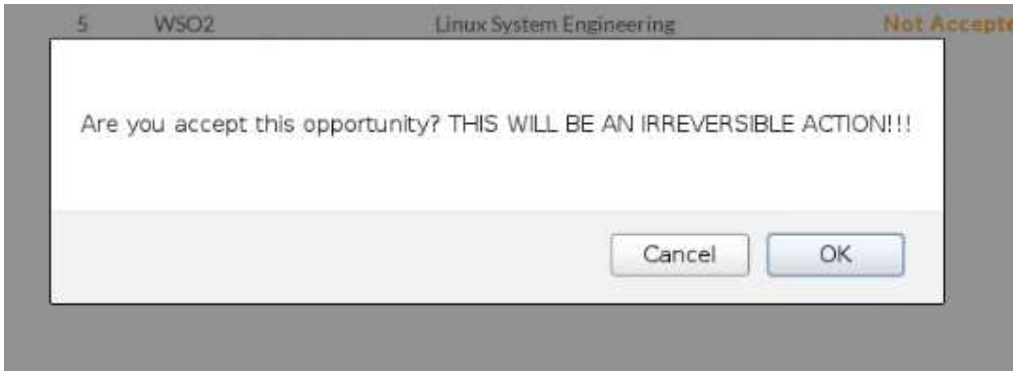


Industry can select special students and grant opportunity if and only if he has selected that company in his preferred company for a particular area. But it should be accepted by that student.

4.5.22. Student get special opportunity



Student can either Accept or Not Accept the grant. Accepting the grant is an irreversible action. If accepted that student will removed from going through processing algorithm.

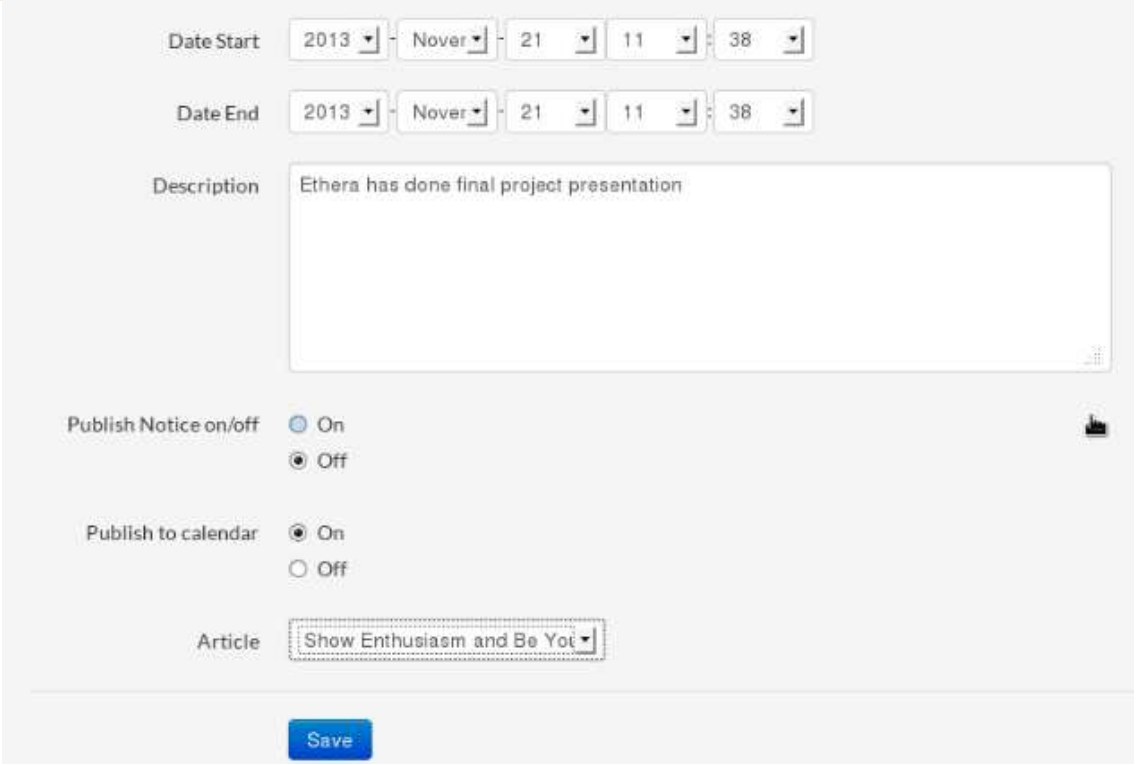


If accept the grant student profile will update with a new option to enter interview status.

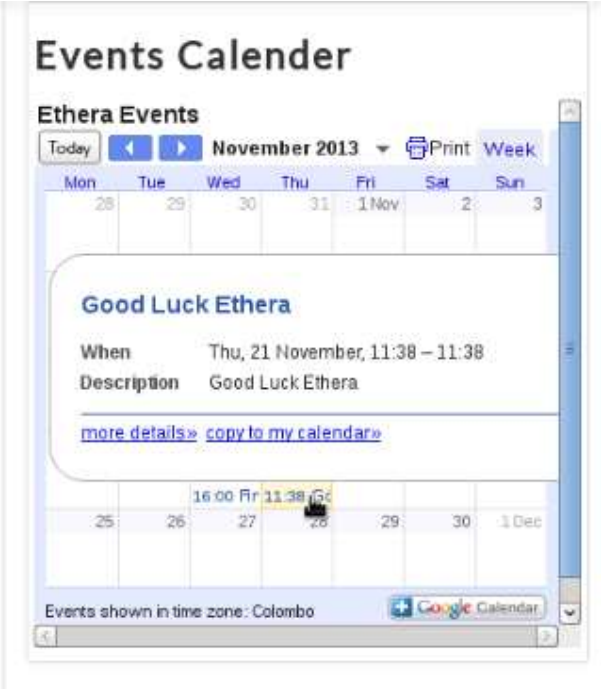
- Selected from the interview.
- Not selected
- Not yet faced for the interview.

Not selected students will again can update their areas and companies, then again go through the selection algorithm. Selected students will remove from the process.

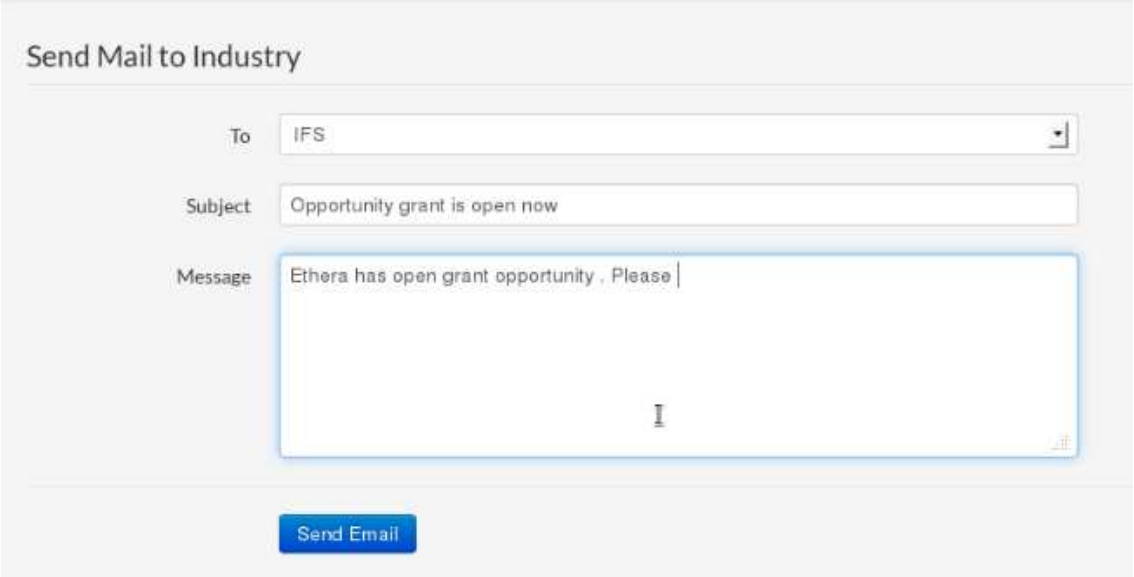
4.5.23. Event Management



Notice can be created and articles published by the logged in user can be attached to the notice for further details. Publish to calendar on/off will allow to publish the event in Google Calendar. This ia a lifetime calendar integrated with ETHERA system.



4.5.24. ETHERA POSTMASTER

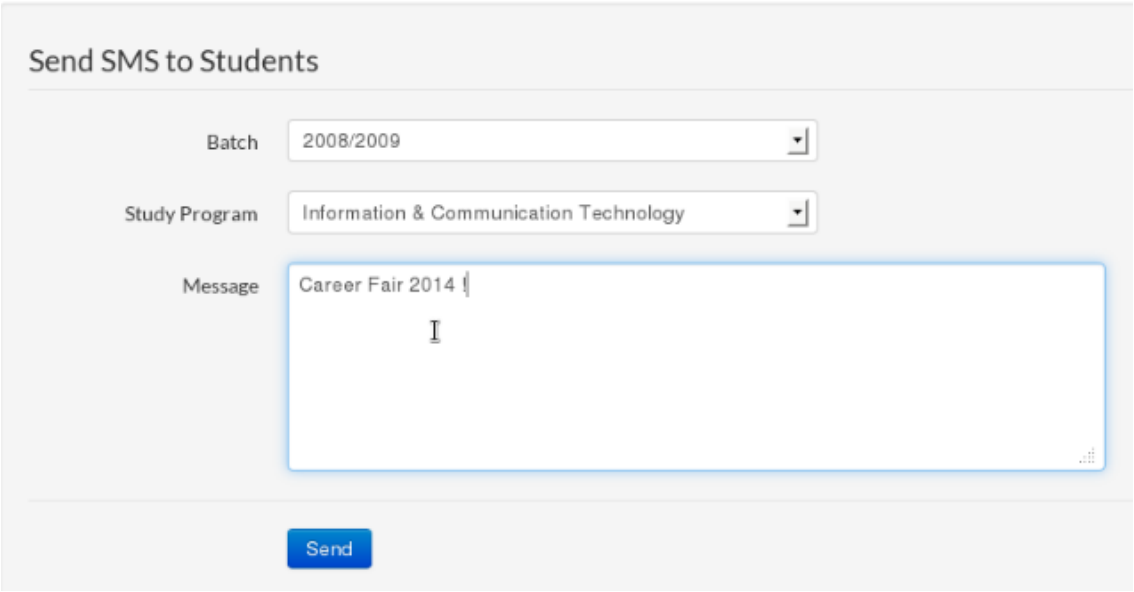


Mailing system is available to send mails to

- Industry
- Bulk emails to students

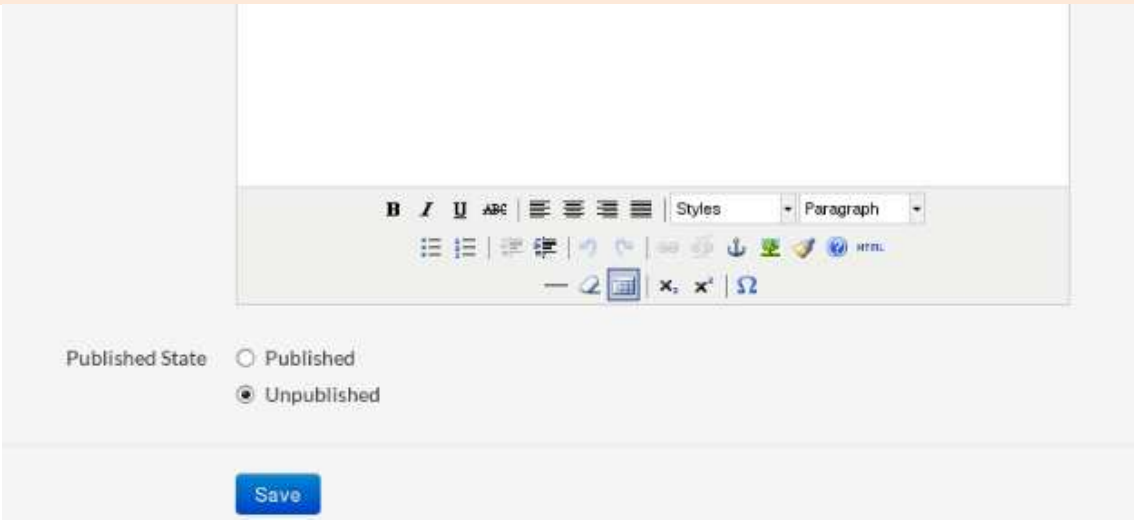
This service send mails to each ones Gmail inbox.

4.5.25. ETHERA SMS Service



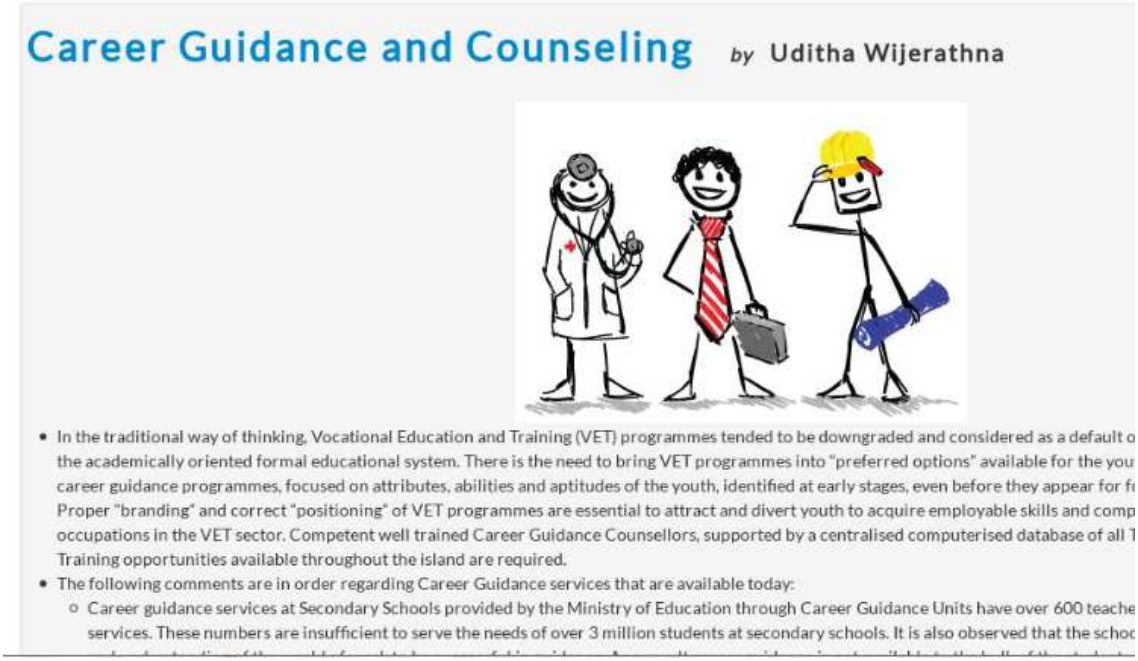
After registration approved students can get registered to ETHERA SMS service. Administrative users and CGU can send bulk SMS to study programs.

4.5.26. Article Management



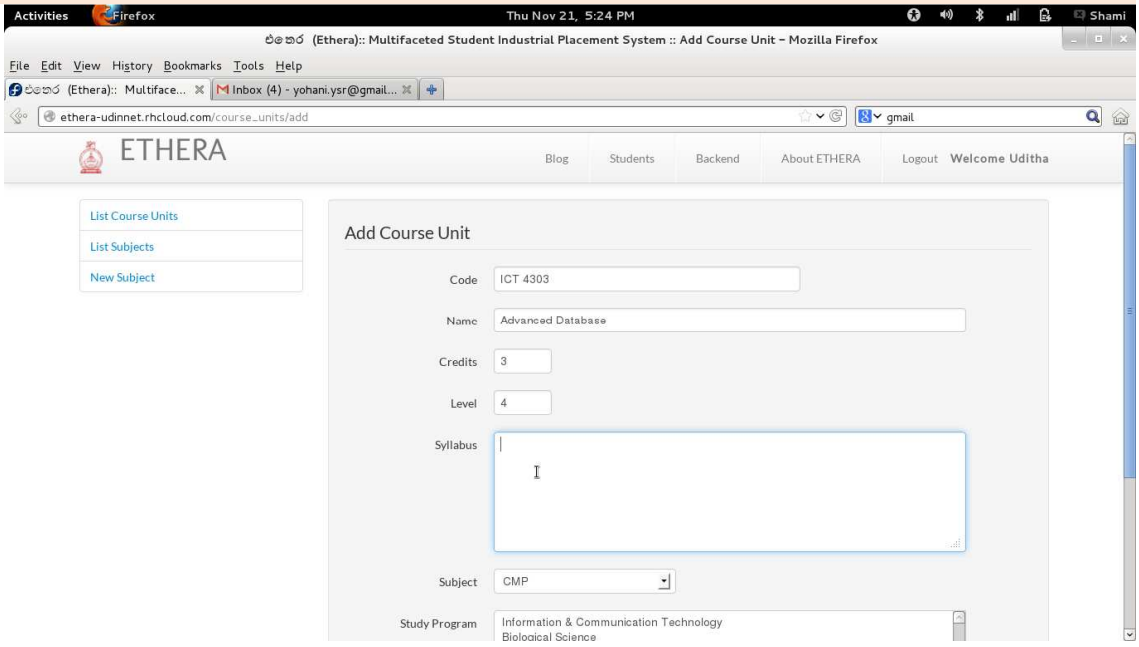
Articles can be created using WYSIWYG editor and can publish / un publish to the front panel.

4.5.27. Blog Posts



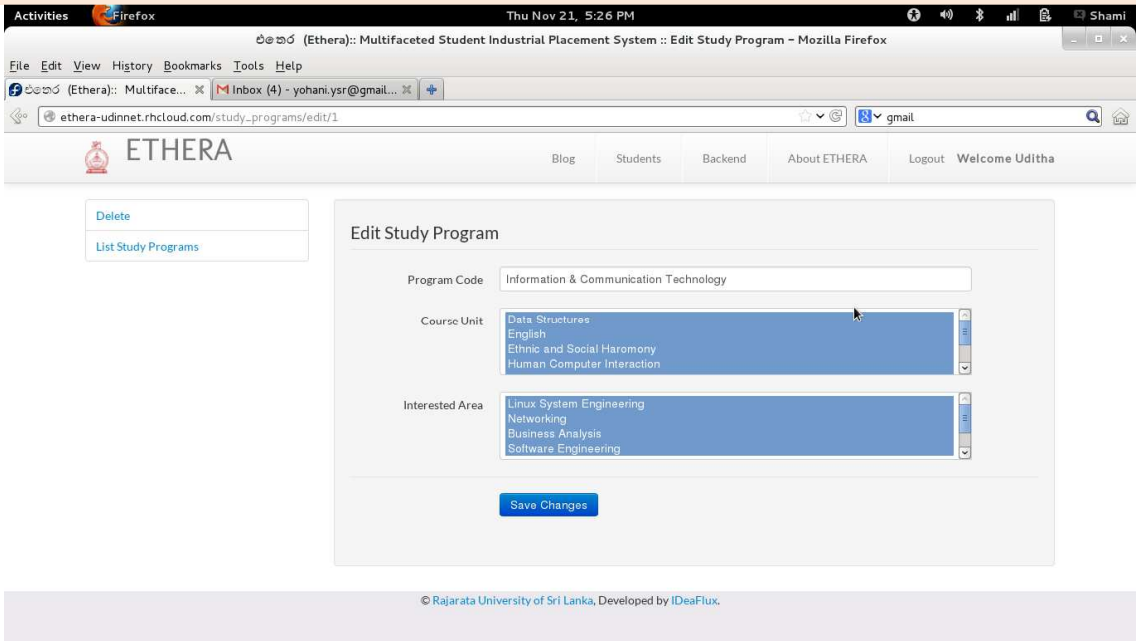
Articles can be publish in the Blog . Blog is provided for CGU to publish articles on Employability Development.

4.5.28. Create New Entry



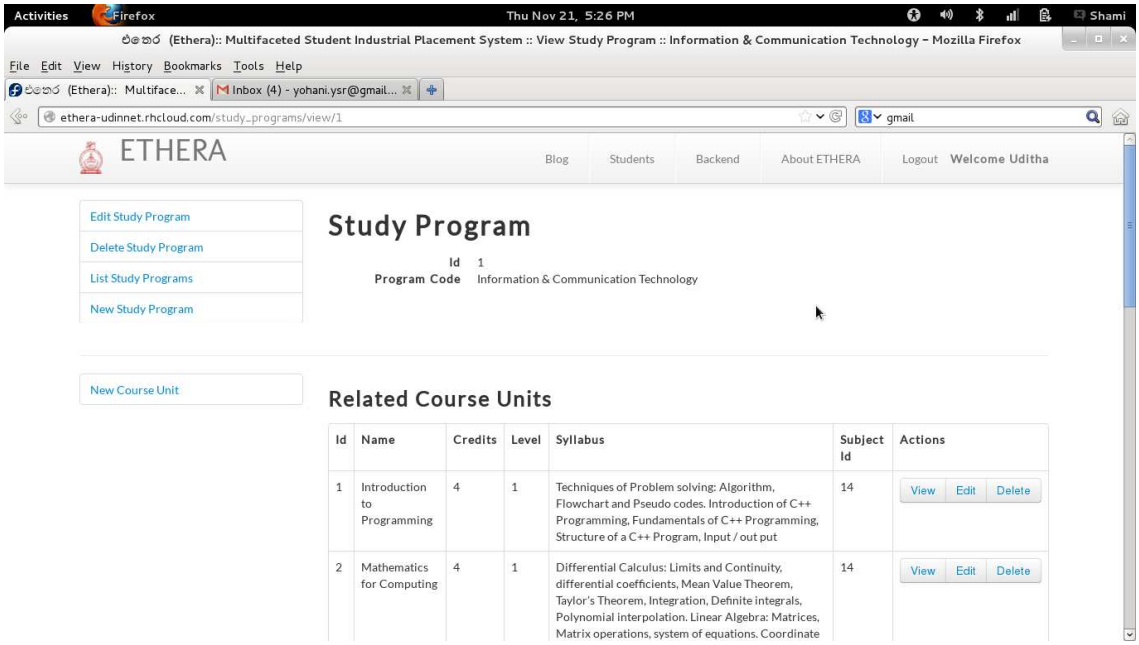
All new entry can be added to the system using a form similar to above.

4.5.29. Edit Entry



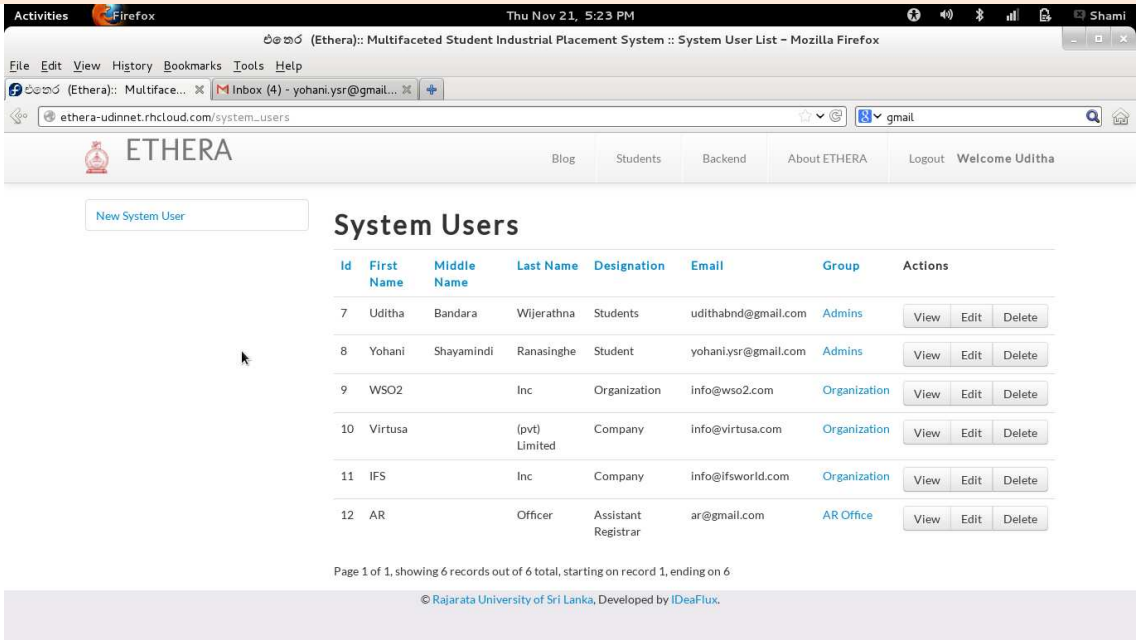
All entries can be edited to the system using a form similar to above.

4.5.30. View Entry



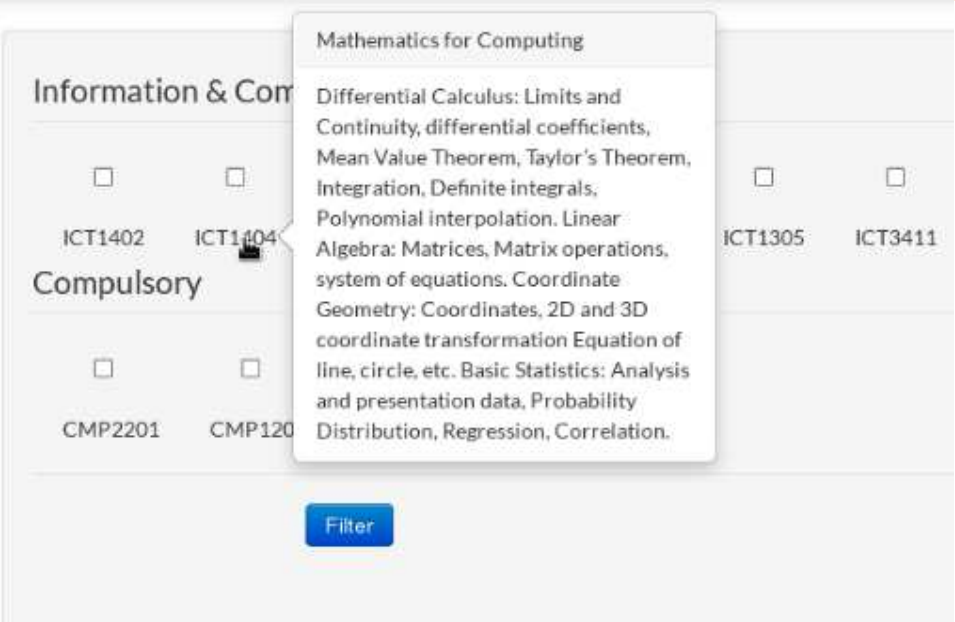
All entries can be viewed similar to above manner.

4.5.31. View List of entries



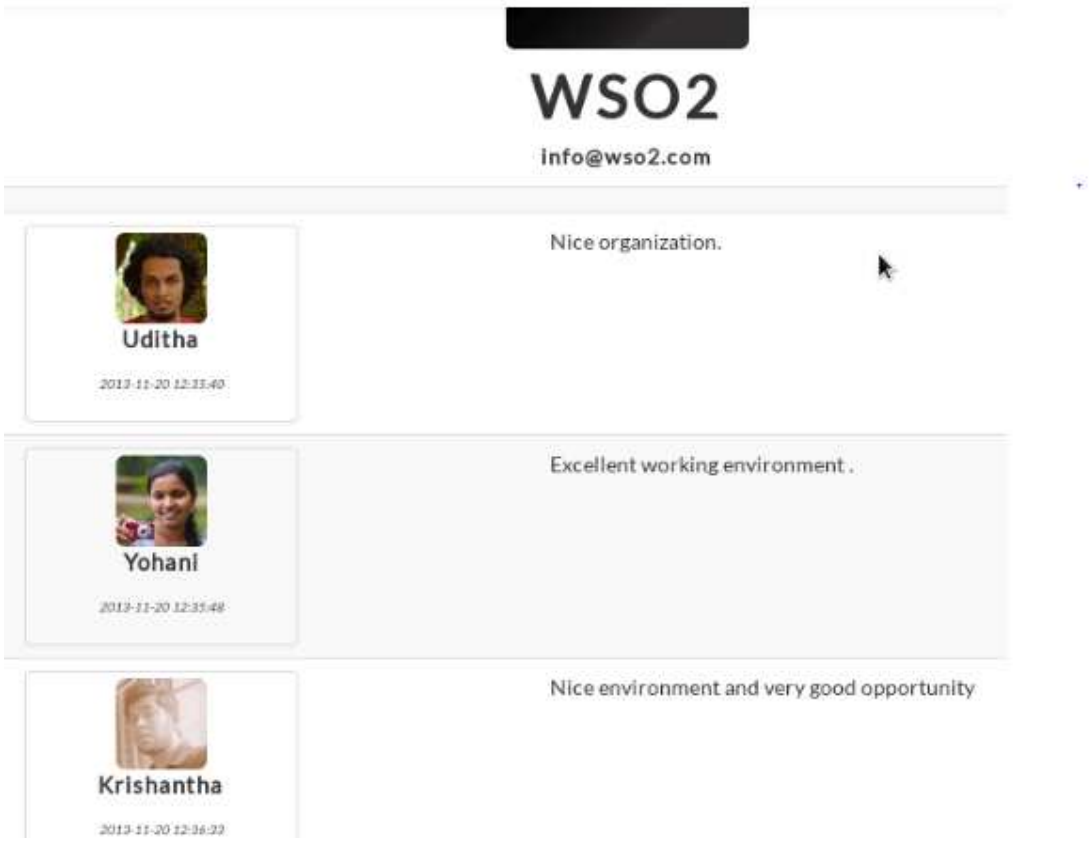
All entries can be viewed in a list similar to above manner.

4.5.32. View Details of Course Units



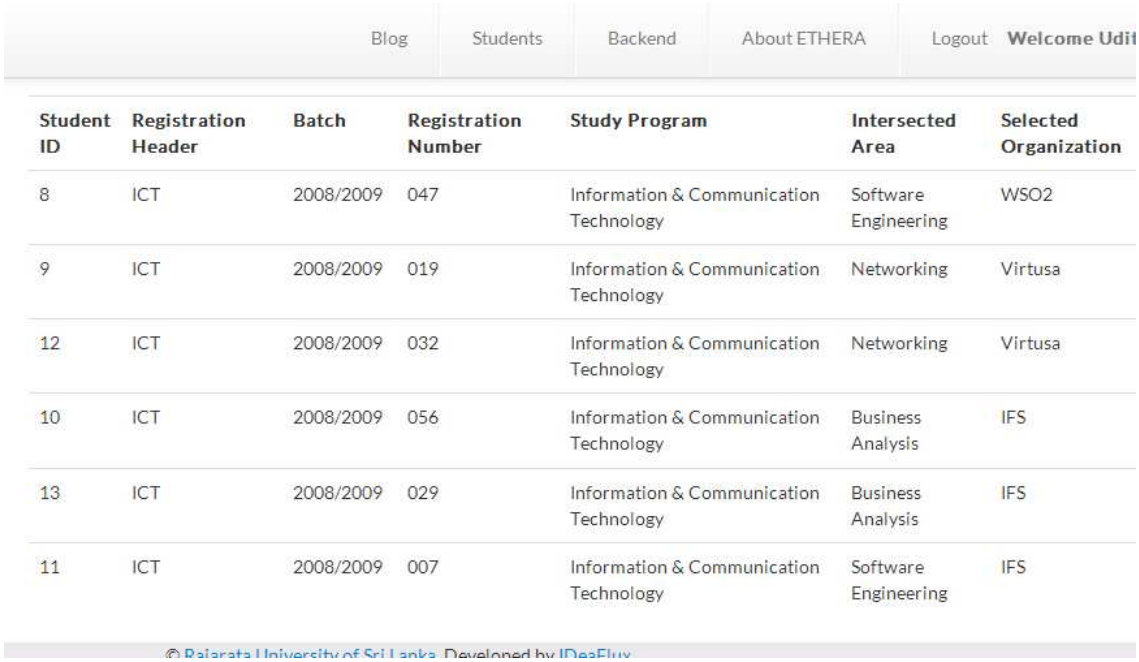
Course Unit details can be view when mouse over to the coursecode . It was done using popover technology.

4.5.33. Feedback Management



Students can add feedbacks and view feedbacks of the companies related to their stream. Only this option is visible to students. This is inserted to the system in order to get an idea about interviews and companies to the students who will go to the industry in future.

4.5.34. Results after processing



Student ID	Registration Header	Batch	Registration Number	Study Program	Intersected Area	Selected Organization
8	ICT	2008/2009	047	Information & Communication Technology	Software Engineering	WSO2
9	ICT	2008/2009	019	Information & Communication Technology	Networking	Virtusa
12	ICT	2008/2009	032	Information & Communication Technology	Networking	Virtusa
10	ICT	2008/2009	056	Information & Communication Technology	Business Analysis	IFS
13	ICT	2008/2009	029	Information & Communication Technology	Business Analysis	IFS
11	ICT	2008/2009	007	Information & Communication Technology	Software Engineering	IFS

Code : OpenShift Auto-Deployer script

```
#!/bin/bash

set -e
set -x

if [ -z "$OPENSHIFT_MYSQL_DB_HOST" ]
then
echo 1>&2
    echo "Could not find mysql database. Please run:" 1>&2
    echo "rhc cartridge add -a $OPENSHIFT_APP_NAME -c mysql-5.1" 1>&2
    echo "then make a sample commit (add whitespace somewhere) and re-push" 1>&2
    echo 1>&2
fi

if [ -z "$OPENSHIFT_MYSQL_DB_HOST" ]
then
    exit 5
fi


# Confirm database exists, if not create it
if ! /usr/bin/mysql -u "$OPENSHIFT_MYSQL_DB_USERNAME" --
password="$OPENSHIFT_MYSQL_DB_PASSWORD" -h "$OPENSHIFT_MYSQL_DB_HOST" --port
"$OPENSHIFT_MYSQL_DB_PORT" -e "select * from posts;" "$OPENSHIFT_APP_NAME" > /dev/null 2>&1
then
    echo
    echo "Database schema not found, importing 'ethera.sql' schema."
    echo
    /usr/bin/mysql -u "$OPENSHIFT_MYSQL_DB_USERNAME" --password="$OPENSHIFT_MYSQL_DB_PASSWORD"
-h "$OPENSHIFT_MYSQL_DB_HOST" --port "$OPENSHIFT_MYSQL_DB_PORT" "$OPENSHIFT_APP_NAME" <
"$OPENSHIFT_REPO_DIR/.openshift/action_hooks/ethera.sql"
    echo
    echo "done."
else
    echo "Database found, skipping import."
fi
```

Code : Processing Algorithm

```
public function processing(){
        if($this->request->is('post')){
            if(!empty($this->request->data)){
                $batch_id = $this->request->data['Batch']['batch_id'];
                $study_program_id = $this->request->data['Student']['study_program'];

                $students = $this->Student->find(
                    'all',
                    array(
                        'conditions' => array(
                            'Student.batch_id' => $batch_id,
                            'Student.study_program_id' => $study_program_id,
                        ),
                        'recursive' => 2
                    )
                );

                if(!empty($students)){
                    $student_count = 0;
                    foreach($students as $student){

                        if($student['Student']['approved_state']==5){

                            //GPA
                            $enrollments = $student['Enrollment'];

                            if(!empty($enrollments)){
                                $count = 0;
                                foreach($enrollments as $enrollment){
                                    $gpa_enrollments[$count]['Enrollment'] = $enrollment;
                                    $count++;
                                }

                                $gpa = Calculate::GPA($gpa_enrollments);
                            }

                            //EA
                            $extra_activities = $student['StudentsExtraActivity'];
                            if(!empty($extra_activities)){
                                $ea_value = Calculate::ExtraActivities($extra_activities);
                            }

                            //Overall
                            if(!empty($gpa)&&!empty($ea_value)){
                                $final_value = Calculate::FinalMark($gpa,$ea_value);
                            }

                            if(!empty($final_value)){
                                $students_selected_to_sort_asc[$student_count]['id'] =
$student['Student']['id'];
                                $students_selected_to_sort_asc[$student_count]['GPA'] =
$final_value;
                            }

                            $student_count++;
                        }
                    }

                    $students_sorted_asc =
StudentManipulation::gpa_sort($students_selected_to_sort_asc);
```

```
                    $students_after_algorithm_run = array();
                    $final_students_count = 0;

                    //debug($students_sorted_asc);
                    if(!empty($students_sorted_asc)){
                        $this->loadModel('Organization');
                        $this->loadModel('Opportunity');
                        $this->loadModel('Assignment');
                        $this->loadModel('InterestedArea');

                        foreach($students_sorted_asc as $student_sorted){
                            $assignments_for_student = $this->Assignment->find(
                                'all',
                                array(
                                    'conditions' => array(
                                        'student_id' => $student_sorted['id']
                                    ),
                                    'recursive' => 2,
                                    'order' => 'Assignment.priority ASC'
                                )
                            );

                            $student_sorted_full_details = $this->Student-
>findById($student_sorted['id']);

                            //debug($student_sorted_full_details);
                            //debug($assignments_for_student);


if(!empty($assignments_for_student)&&($student_sorted_full_details['Student']['processing_stat
e']==0||$student_sorted_full_details['Student']['processing_state']==9)){


$student_sorted['never_consider_this_student_for_next_assignment']=0;

                                foreach($assignments_for_student as $assignment){ //Level of
checking assignment 1 by 1
                                    //debug($assignment);


if($student_sorted['never_consider_this_student_for_next_assignment']!=1){


if($assignment['Assignment']['state']==2||$assignment['Assignment']['state']==9||$assignment['
Assignment']['state']==8){
                                            $applicable_organization =
$assignment['Organization'];


                                            if(!empty($applicable_organization)){
                                                //debug($applicable_organization);

                                                $opportunities_given_by_org =
$applicable_organization['Opportunity'];
                                                if(!empty($opportunities_given_by_org)){
                                                    foreach($opportunities_given_by_org as
$opportunity){
                                                        //debug($opportunity);

                                                        if(

($opportunity['batch_id']==$student_sorted_full_details['Student']['batch_id'])
                                                            &&

($opportunity['study_program_id']==$student_sorted_full_details['Student']['study_program_id']
)
```

```
                                                        &&
($opportunity['interested_area_id']==$assignment['Assignment']['interested_area_id'])
                                                        &&
                                                        ($opportunity['slots']>0)
                                                    )
                                                    {
if(($opportunity['slots']>$opportunity['consumed_slots'])){
$assignment_to_update['Assignment']['id'] = $assignment['Assignment']['id'];
$assignment_to_update['Assignment']['state'] = 3;
                                                            if($this->Assignment-
>save($assignment_to_update)){
                                                                $assignment_to_update =
array();
$opportunity_to_update['Opportunity']['id'] = $opportunity['id'];
$opportunity_to_update['Opportunity']['consumed_slots'] = $opportunity['consumed_slots']+1;
                                                                if($this->Opportunity-
>save($opportunity_to_update)){
                                                                    $opportunity_to_update
= array();
$student_sorted['never_consider_this_student_for_next_assignment']=1;
$students_after_algorithm_run[$final_students_count]['Student']['id'] = $student_sorted['id'];
$final_students_count++;
                                                                }
                                                            }
                                                        }
                                                        else{
$assignment_to_update['Assignment']['id'] = $assignment['Assignment']['id'];
$assignment_to_update['Assignment']['state'] = 9;
                                                            $this->Assignment-
>save($assignment_to_update);
                                                            $assignment_to_update =
array();
                                                        }
                                                    }
                                                }
                                            }
                                        }
                                    }
                                }

if($student_sorted['never_consider_this_student_for_next_assignment']==0){
                                    $student_to_update['Student']['id'] =
$student_sorted['id'];
                                    $student_to_update['Student']['processing_state'] = 9;
                                    $this->Student->save($student_to_update);
                                }
elseif($student_sorted['never_consider_this_student_for_next_assignment']==1){
```

```
                                    $student_to_update['Student']['id'] =
$student_sorted['id'];
                                    $student_to_update['Student']['processing_state'] = 1;

                                    $this->Student->save($student_to_update);
                                }
                            }
                        }
                    }
                    $students_to_set = array();
                    $set_count = 0;
                    if(!empty($students_after_algorithm_run)){
                        foreach($students_after_algorithm_run as $student_final){
                            $students_to_set[$set_count] = $this->Student-
>find('first',array('conditions'=>array('Student.id'=>$student_final['Student']['id']),'recurs
ive'=>2));
                            $set_count++;
                        }
                    }

                    $this->set('students',$students_to_set);
                }
            }
            else{
                $this->redirect(array('action' => 'select_processing_set'));
            }
        }
        else{
            $this->redirect(array('action' => 'select_processing_set'));
        }
    }
```

CHAPTER 05

5. TESTING AND RESULTS

5.1. TEST SCENARIOS

5.1.1. Test Case 01 : login_admin_01

Test Case Name	login_admin_01
Description	Login in to the system as an administrative user.
Preconditions	User must be added by super administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Login link 3. Select Login as Administrative User 4. Enter valid email, password and click login.
Input	Email : udithabnd@gmail.com Password : abc123
Post Conditions	-
Expected Result	After clicking login button, user should redirected in to the administration panel with control icons.
Actual Result	User is been able to log in to the system. And been redirected to the administration panel.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.2. Test Case 02 : login_student_01

Test Case Name	login_student_01
Description	Login in to the system as a student.
Preconditions	User must be registered as a student.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Login link

	3. Select Login as a student 4. Enter valid email, password and click login.
Input	Email : udithabnd@gmail.com Password : abc123
Post Conditions	-
Expected Result	After clicking login button, user should redirected in to the student panel with control icons.
Actual Result	User is been able to log in to the system. And been redirected to the atudent panel.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.3. Test Case 03 : Send_SMS

Test Case Name	Send_sms
Description	Send bulk sms to students by an administrative user.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click SMS link 3. Select Batch and Study Program 4. Enter message content and click Send.
Input	Batch: 2008/2009 Study Program: Information and Communication Technology Message: This is a test message
Post Conditions	-
Expected Result	After clicking Send button, form should refresh and the message should deliver to students mobile phones.
Actual Result	Page is refreshed and message sent to students.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.4. Test Case 04 : Send_SMS_to_students

Test Case Name	Send_email_to _students
Description	Send bulk email to students by an administrative user.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Email link 3. Click Send Mail to Students link 3. Select Batch and Study Program 4. Enter subject and message and click Send.
Input	Batch: 2008/2009 Study Program: Information and Communication Technology Subject: Test message Message: This is a test message
Post Conditions	-
Expected Result	After clicking Send button, form should refresh and the email should be sent to students
Actual Result	Page is refreshed and email sent to students.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.5. Test Case 05 : Send_email_to_industry

Test Case Name	Send_email_to _industry
Description	Send email to organizations by an administrative user.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Email link 3. Click Send Mail to Industry link 3. Select n organization 4. Enter subject and message and click Send.
Input	To: Subject: Test message Message: This is a test message
Post Conditions	-
Expected Result	After clicking Send button, form should refresh and the email should be sent to the organization
Actual Result	Page is refreshed and email sent to organization.

Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.6. Test Case 06 : Logout

Test Case Name	Logout
Description	User logout from the system.
Preconditions	User must be logged in to the system.
Steps	1.Click logout link
Input	-
Post Conditions	User can't perform any action that logged in user can perform.
Expected Result	After clicking logout user must redirect to the Ethera home page.
Actual Result	User is been redirect to the Ethera home page. And user can logged in again by clicking login link.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.7. Test Case 07 : change_password_01

Test Case Name	change_password_01
Description	Request to change the login password.
Preconditions	User must be registered to the system.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Select change my password link 3. Enter current password 4. Enter new password twice and click _ button.
Input	Current password: abc123 New password: uditha123
Post Conditions	-
Expected Result	After clicking save button, new password should be saved.
Actual Result	New password is saved.

Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.8. Test Case 08 : edit_students

Test Case Name	edit_students
Description	Edit student profile by an administrative user.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click edit student link 3. Click Send Mail to Staff 3. Update necessary fields 4. Click Save.
Input	-
Post Conditions	Updated fields should be saved in student profile.
Expected Result	After clicking Save button, updated fields should be saved.
Actual Result	Updates saved in database.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.9. Test Case 09 : Add_feedback

Test Case Name	Add_feedback
Description	Add feedbacks about companies.
Preconditions	User must be logged in as a student.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Add feedback link 3. Select company name 3. Enter the comment and click save.
Input	Organization: WSO2 Comment: excellent
Post Conditions	-
Expected Result	After clicking save button, comment should be saved in the database.
Actual Result	Comment saved in database

Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.10 Test Case 10 : Set_freeze_sate

Test Case Name	Set _freeze_state
Description	Change the unfreeze to unfreeze state of thew student by an administrative user
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click freeze/unfreeze link 3. Select batch and Study Program 4. Select freeze state and click Freeze/unfreeze
Input	Batch: 2008/2009 Study Program: Information and Communication Technology Freeze/Unfreeze: freeze
Post Conditions	Freeze state should set to 1
Expected Result	After clicking save button, category should be freeze and bit should set to 1.
Actual Result	freeze bit set to 1
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.11 Test Case 11 : Set_unfreeze_sate

Test Case Name	Set _unfreeze_state
Description	Change the freeze to unfreeze state of the student by an administrative user
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click freeze/unfreeze link 3. Select batch and Study Program 4. Select unfreeze state and click Freeze/unfreeze
Input	Batch: 2008/2009 Study Program: Information and Communication Technology Freeze/Unfreeze: unfreeze
Post Conditions	Freeze state should set to 0
Expected Result	After clicking save button, category should be unfreeze and bit should set to 0.
Actual Result	unfreeze bit set to 0
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.12. Test Case 12 : list_students

Test Case Name	list_students
Description	View the list of student belongs to a particular group.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click list student link 3. Select Batch and Study Program 4. click Load Students
Input	Batch: 2008/2009 Study Program: Information and Communication Technology
Post Conditions	-
Expected Result	After clicking load students list of 2008/2009 ICT students should be loaded.
Actual Result	A list of ICT 2008/2009 students is been loaded.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.13. Test Case 13 : Enroll_students_to_courses

Test Case Name	Enroll_students_to_courses
Description	AR enrolls particular student for courses.
Preconditions	User must be logged in as AR.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Enroll Students link 3. Select Batch, Study Program and Registration Number 4. Click load enrollments 5. Select subjects to enroll
Input	Batch: 2008/2009 Study Program: Information and Communication Technology Registration Number: 047
Post Conditions	-
Expected Result	After clicking load enrollments button list of courses must be loaded. After clicking save enrollments button enrolled courses must be saved.
Actual Result	List of courses is been loaded to select courses to enroll and selected courses are been saved.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.14. Test Case 14 : edit_system_user

Test Case Name	edit_system_user
Description	Edit system users profile.
Preconditions	User must be logged in as an administrative user.
Steps	1.Go to http://ethera-udinnet.rhcloud.com 2. Click System Users link 3.Click edit link 4. Change particular fields and click save changes.
Input	-
Post Conditions	-
Expected Result	After clicking save changes button system user profile must be updated and success flash must be displayed.
Actual Result	System user profile is updated and success flash displayed.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.15. Test Case 15 : View_system_user

Test Case Name	View_system_user
Description	View the system user profile for a particular user.
Preconditions	User must be logged in as an administrative user.
Steps	1.Go to http://ethera-udinnet.rhcloud.com 2. Click System Users link 3.Click view button
Input	-
Post Conditions	-
Expected Result	After clicking view button details of the particular system user must be loaded.
Actual Result	System user profile for the particular user is loaded.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.16. Test Case 16 : delete_system_user

Test Case Name	delete_system_user
Description	Delete a system user.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click System Users link 3. Click delete button 4. Confirm delete.
Input	-
Post Conditions	-
Expected Result	After clicking delete button a dialog box must be pops up and when confirm delete system user must be deleted.
Actual Result	Dialog box appears and when confirm delete, system user profile is deleted.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.17. Test Case 17 : view_batch

Test Case Name	view_batch
Description	View details for particular batch.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Batches link. 3. Change particular fields and click save changes.
Input	-
Post Conditions	-
Expected Result	After clicking save changes button system user profile must be updated.
Actual Result	System user profile is updated.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.18. Test Case 18 : edit_batch

Test Case Name	edit_batch
Description	Edit registration on/off state of a particular batch
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Batches link 3. Click edit button 4. Enter batch 5.Select on/off option and click save changes
Input	Batch: 2008/2009 Registration on/off: on
Post Conditions	Registration for the particular batch must be on.
Expected Result	After clicking save changes button registration for the particular batch must be on and a success flash must be appeared.
Actual Result	Registration for the particular batch is set to on state and a success flash is appeared
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.19. Test Case 19 : view_course_units

Test Case Name	view_course_units
Description	System user can view all of the available course units
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Course Units link 3. Select view option
Input	-
Post Conditions	-
Expected Result	After clicking view option list of available course units must be loaded
Actual Result	List of available course units is been loaded
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.20. Test Case 20 : edit_course_units

Test Case Name	edit_course_units
Description	System user edits available course units
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Course Units link 3. Select edit option 4. Change particular fields and click save changes button
Input	-
Post Conditions	-
Expected Result	After clicking save changes button changes done to the course unit must be saved.
Actual Result	Course unit is updated.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.21. Test Case 21 : delete_course_unit

Test Case Name	delete_course_unit
Description	Delete a course unit.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Course Units link. 3. Select delete option 3. Confirm delete.
Input	-
Post Conditions	-
Expected Result	After clicking delete button a dialog box must be pops up and when delete course unit confirm, course unit must be deleted.
Actual Result	Dialog box appears and when confirm delete, course unite is deleted.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.22. Test Case 22 : Notice_creation

Test Case Name	Notice_creation
Description	Administrative user creates notices.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click notices link 3. Click New Notice 4. Enter particular data and click save
Input	Title: Final Project Presentation Date start: 2013-11-20 08.30 am Date end: 2013-11-20 06.30 pm Description: Final project presentation for ICT 2008/2009 batch Publish Notice on/off: on Publish to calendar: on Article: -
Post Conditions	-
Expected Result	After clicking save button notice must be published and should be posted to the event calendar

Actual Result	Notice has been published and posted to the event calendar.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.23. Test Case 23 : Notice_deletion

Test Case Name	Notice_deletion
Description	Administrative user deletes notices.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click notices link 3. Click delete 4. Confirm delete
Input	-
Post Conditions	-
Expected Result	After clicking delete button notice must be deleted and a dialog box must be pop up to confirm delete. After confirming delete notice must be deleted.
Actual Result	Notice has been deleted when confirm to delete.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.24. Test Case 24 : Notice_update

Test Case Name	Notice_update
Description	Administrative user do changes notices.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click notices link 3. List Notices 4. Click edit notice 5. Do changes to the notice data 6. Save changes
Input	-
Post Conditions	-

Expected Result	After clicking delete button notice must be deleted and a dialog box must be pop up to confirm delete. After confirming delete notice must be deleted.
Actual Result	Notice has been deleted when confirm delete action.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.25. Test Case 25 : view_notice

Test Case Name	view_notices
Description	User can view notices.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click notices link 3. Click view
Input	-
Post Conditions	-
Expected Result	After clicking view button particular notice must be view with details.
Actual Result	Notice has been viewed with details.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.26. Test Case 26 : add_new_subject

Test Case Name	add_new_subject
Description	Administrative user adds new subjects
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click subjects link 3. Click new subject 4. Insert name and description and click save
Input	Name: Graphic Designing and Image Processing Description: Techniques of Problem solving: Algorithm, Flowchart and Pseudo codes. Introduction of C++ Programming, Fundamentals of C++ Programming, Structure of a C++ Program, Input / out put

Post Conditions	-
Expected Result	After clicking save button new subject must be saved and could be view by users.
Actual Result	Subject has been saved and user is been able to view subject.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.27. Test Case 27 : edit_subject

Test Case Name	edit_subject
Description	Administrative user edits existing subjects
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click subjects link 3. Click edit 4. Update particular fields and click save
Input	
Post Conditions	-
Expected Result	After clicking save button updates must be saved and could be view by users.
Actual Result	Updates has been saved and user is been able to view subject.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.28. Test Case 28 : search_student_by_name

Test Case Name	search_students_by_name
Description	User search for students by students name
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click filter 3. Select filter student by name 4. Type student name
Input	Uditha
Post Conditions	-

Expected Result	While typing the name of the student, a list of student names with same letters must be loaded and user must be able to load particular students profile by clicking load profile button.
Actual Result	Students list is been loaded while typing the part of a student's name and user is been able to view student profile.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.29. Test Case 29 : search_student_by_registrationID

Test Case Name	search_students_by_registration_id
Description	User search for students by students registration id
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click filter 3. Select filter student by registration id 4. Type student registration number
Input	ICT/2008/2009/047
Post Conditions	-
Expected Result	While typing the student registration number, a list of student must be loaded and user must be able to load particular students profile by clicking load profile button.
Actual Result	Students list is been loaded while typing the part of a students name and user is been able to view student profile.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.30. Test Case 30 : search_student_by_academic_information

Test Case Name	search_students_by_accademic_performance
Description	User search for students by students academic performance.
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click filter 3. Select filter student by academic performance 4. Select Batch and Study Program and click load courses

	5. Select courses and click filter
Input	Batch: 2008/2009 Study Program: Information and Communication Technology
Post Conditions	-
Expected Result	After clicking load courses button list of courses belongs to the student group must be loaded and when select courses a list of students ranked according to their GPA corresponding to selected courses must be loaded.
Actual Result	List of courses according to student group is loaded and when courses selected list of students is loaded.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.31. Test Case 31 : Add_feedback

Test Case Name	Add_feedback
Description	Add feedbacks about companies.
Preconditions	User must be logged in as a student.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Add feedback link 3. Select company name 3. Enter the comment and click save.
Input	Organization: WSO2 Comment: excellent
Post Conditions	Students can view the feedback and particular student can change the feedback.
Expected Result	After clicking save button, comment should be saved in the database.
Actual Result	Comment saved in database
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.32. Test Case 32 : Edit_feedback

Test Case Name	Edit_feedback
Description	Edit feedbacks about companies.
Preconditions	User must be logged in as a student.
Steps	1. Go to http://ethera-udinnet.rhcloud.com

	2. Click feedback link 3. Click Edit link 4. Select company name 5. Edit previous comment and click Save Changes.
Input	Organization: WSO2 Comment: Excellent company
Post Conditions	System updates the feedback.
Expected Result	After clicking save button, comment should be saved in the database.
Actual Result	Comment saved in database
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.33. Test Case 33 : Feedback_Management

Test Case Name	Feedback_Management
Description	Authorized person can Edit or Delete students' feedbacks
Preconditions	User must be logged in as Administrative User or Student.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click Feedback Management option 3. Select company name 4. System display all feedbacks related to that company 5. System view editable view of the feedback 6. Change the feedback or select delete option 6.1 If change the feedback and click save 6.2 If select delete option and click OK
Input	Organization: WSO2 Comment: Excellent company
Post Conditions	System updates changes.
Expected Result	After clicking save button, comment should be saved in the database OR after clicking delete option, it should delete related feedback.
Actual Result	Changes saved in database
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.34. Test Case 34 : Industry_grant_opportunity

Test Case Name	Industry_grant_opportunities
Description	Organizations granting opportunities
Preconditions	User must be logged in as an Organization.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Login as an Organization 3. Select Grant Opportunities 4. Select new opportunities 5. Select batch, study program, interested area and enter slots and comment 6. Click save
Input	Batch: 2008/2009 Study Program: Information & Communication Technology Interested Area: Business Analysis Slots: 3 Comments: -
Post Conditions	Organizations can view granted opportunities
Expected Result	After clicking save button, data should be saved in the database.
Actual Result	Given data saved in the database
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.35. Test Case 35 : Edit_industry_grant_opportunity

Test Case Name	Edit_industry_grant_opportunities
Description	Edit opportunities granted by companies
Preconditions	User must be logged in as an organization
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Login as an Organization 3. Select edit option 4. Select batch, study program, interested area and enter slots and comment 6. Click update
Input	Batch: 2008/2009 Study Program: Information & Communication Technology Interested Area: Business Analysis Slots: 5 Comments: -
Post Conditions	System updates changes done by organization
Expected Result	After clicking update button, changes should be saved in the database.

Actual Result	Changes saved in database
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.36. Test Case 36 : process_students

Test Case Name	process_students
Description	Process students and allocate them to available opportunities according to the algorithm
Preconditions	User must be logged in as an administrative user.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click processing 3. Select filter student by academic performance and select process
Input	Batch: 2008/2009 Study Program: Information and Communication Technology
Post Conditions	Processed students do not consider for the selection process again.
Expected Result	After clicking process button a list of students and their allocated opportunities must be loaded.
Actual Result	After clicking process button a list of students and their allocated opportunities is been loaded.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.37. Test Case 37 : Student_registration

Test Case Name	Student_registration
Description	Students register to the system.
Preconditions	Student should be not yet registered and not logged in to the system.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click register 3. Fill in the registration form and click register
Input	Program Code: ICT Batch: 2008/2009 Registration Number: 032

	Study Program: Information and Communication Technology First Name: Ishani Middle Name: Thilanka Last Name: Gunawardhana Full Name: S.Y.G.I.Thilanka Gender: Female Date of Birth: 1988-02-24 Phone Home: 0417911670 Phone Mob: 0777491374 Email: ishanigunawardhana@gmail.com Password: abc123 Password Confirmation: abc123 Address 1: Udahagedara Address 2: Vilayaya City: Dampahala LinkedIn Reference: igunawardhana
Post Conditions	Registered students can login to the system and access the system according to user level.
Expected Result	After clicking register button student must be saved and system must allow the student to login in to the system.
Actual Result	Student is been able to login in to the system.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.38. Test Case 38 : public_view_students

Test Case Name	public_view_students
Description	List of industry ready students viewable by public with limited information.
Preconditions	There must be an industry ready batch.
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click student link.
Input	-
Post Conditions	Industry ready student list must be viewable with limited information and an alert mentioning that authorized user can view more details must be appeared.
Expected Result	Industry tready batch is viewable publicly and an alert pops up.
Actual Result	Student is been able to login in to the system.
Status	Development System : Pass OpenShift Production Cloud : Pass
Notes	-

5.1.39. Test Case 39 : Industry_grant_opportunities

Test Case Name	Industry_grant_opportunities
Description	Organizations granting opportunities to a industry ready batch
Preconditions	User must be login as an Organization and there must be a public ready batch to select
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Click grant opportunities 3. Select new opportunity 4. Enter batch, Study program, Interested area, slots and comment 5. Click save
Input	Batch: 2008/2009 Study program: Information & Communication Technology Interested area: Networking Slots: 4 Comment: -
Post Conditions	
Expected Result	After clicking batch dropdown there must be public ready batch that is set by Admin, after entering all necessary information it must redirect again to the add opportunity page for giving new opportunities under different interested area or study program.
Actual Result	After clicking batch dropdown there is no batch to select.
Status	Development System : Fail OpenShift Production Cloud : Fail
Notes	-

5.1.40. Test Case 40 : update_interview_results

Test Case Name	update_industry_results
Description	Once selected for an interview student should update interview results
Preconditions	User must be login as a student and must be selected for a company .
Steps	1. Go to http://ethera-udinnet.rhcloud.com 2. Logged in as a student 3. Select Update Interview Results option 4. Select selected/ not selected/ not faced yet option. 5. Click save
Input	Not faced yet/ Passed the interview/Not passed
Post Conditions	
Expected Result	Passed students removed from the selection process and failed student added to a list to process again.
Actual Result	Failed students will appea again on student link.
Status	Development System : Passed OpenShift Production Cloud : Passed
Notes	-

CHAPTER 06

6. REPORT SUMMARY

6.1 CONCLUSIONS

The project Ethera was designed to make the students industrial placement process of the faculty of Applied Sciences, more effective and efficient in order to select the best suits for the best opportunities, while providing a better communication medium and an automated student selection process. Our client was the Career Guidance Unit of the Faculty of Applied Sciences. We gathered requirements from the CGU to have a better understanding about what the client needs and to decide whether we could achieve it.

The major requirement of the CGU was to provide a portal to integrate the CGU industry, students and the staff together and reduce the communication gap among them. The solution provided by the Ethera for this problem was a web portal which provides facilities to log in and access information according to the user levels and facilitate the admin users with a single place to communicate with other users using email and SMS services.

Next big problem was the inefficiency of the students' selection process. It was inefficient because it is done manually. It took lot of time to examine students CVs, check whether the information they provided are true, approve them and select the students to the most suitable opportunities according to their academic and non-academic performances. So to make the student selection process easier and more efficient Ethera came up with an automated student selection mechanism.

Inform students about available opportunities and collecting students CVs on time was another problem identified while the requirement gathering. In manual process it is done by putting a notice on the faculty notice board and asks students to hand over their CVs to the CGU. This didn't work well because most of the times students do not kindle to look at the notice board. So Ethera provided an online notice board and an events calendar on the Ethera official web site to inform students about new events.

Although the faculty's academic staff and students done so many researches and inventions there were no place to publish them to the society. In Ethera official web site there is a blog space to publish articles, research papers and other events done by the faculty's staff as an additional functionality.

Ethera is developed as the official web site for the Career Guidance Unit of the Faculty of Applied Sciences. Therefore it is carefully implemented with all the necessary functionalities that a normally a web site should have.

One of the business objectives of project was to improve the student visibility to the industry and obtain more opportunities. This was able to achieve by providing the facilities to the industry to view student's profiles. Since they can view students, they can choose most suitable students for their vacancies.

In our solution, student selection process is not depending only on students GPA but also on other curricular activities. This system will calculate a mark depend on GPA as well as extracurricular activities. Students will be ranked according to this weighted mark. It will trot out the more accurate performance of each student.

Another objective of the third year project was to practically apply the knowledge gained throughout the degree program. We used our Software Engineering knowledge to study the drawbacks of the current system. Our knowledge of web services was used to integrate different types of RESTful service together. We implemented an algorithm for the automated student selection process with our Design and Analysis of Algorithm knowledge.

Finally when we consider about all the things we done behalf of the project Ethera we can conclude that we are successfully addressed our problem domain. We have been able to achieve our aims and objectives we considered in our Project Proposal. We have been able to develop the official website for the Career Guidance Unit of the Faculty of Applied Sciences up to a considerable level. Further developments can be done according to future requirements of the faculty CGU.

6.2 RECOMMENDATIONS

- Ethera system is a novel approach to the industrial recruitment process within University.
- To avoid hassles in using the system each user group should provide with an in detail user manual, describing methods of accessing and recover from erroneous actions.

- It is recommended to thoroughly express the importance and provide awareness, on how system work and how it affect to them when industrial recruitment process is due, for each student . Then student may pay more attention and the recruitment process be more fruitful. Then students may use the system for employability development from the beginning of the university life.

- Ethera, Multifaceted Student Industrial Placement System, should introduce as necessities in the University and students should encourage to regularly update it. Then CGU can use it as the media of employability development hence, most of the CGU work become automated and easy to handle.

- Each user group should provide good training on how to operate system and should assign a system development team for each year to improve and maintain the system and make it always up and running.

- Integrate system in examination division to add marks so that AR office need not to enter marks separately for another system. Both CGU and AR office can incorporate .

- Introduce the system to industry so that University can get the benefit of getting opportunities at relevant time period. Make ease for Industry people to recruit best suits to them and even
- students can have more industry exposure.

6.3 FUTURE WORK

Ethera, Multifaceted Student Industrial Placement System is currently implemented with essential features but many more nice to have features are available to implement in future to have a more sophisticated system.

1. Training one person from each group

Since Ethera is novel and not familiar to its users and since it has a lot of functionalities it will be productive if at least one member from each group can be trained about how to use the system effectively.

2. Separate booklet for each group

Other than the training program each group can be provided with a separate booklet or a user manual. The booklet should be unique per each group where as each group has different access levels. Each group should be procuring with the information which is relevant to their user levels.

3. Official training documentation

Each and every student should be given a handbook with the prospectus at the time they register to the university describing the system and its importance. The handbook should be consisting of the importance of the system, functionalities of the system and how the system works. It should include how the student should interact with the system.

4. Industry requests for permission through the system

Ethera is implemented to register limited number of organizations which are selected by the CGU. An organization can registered to the system if they send a request for registration. But the CGU should send them a request asking to register to the system first.
As the developing team of the Ethera we recommend that it will be more effective if the system can provide a facility to the industry to view the system and request for permission to register to the system. If the CGU accept the request the organization can work with the system as a registered organization. The benefit of this improvement is that even novel organizations can register to the system and give opportunities to the students of the faculty.

5. Options to upload certificated and online certification IDs.

Current process is a manual one to check certificates to confirm extra activities. CGU has to check for hard copies or should given the certification ID to check online and then CGU put marks . System can be improved in future by giving an option for students to upload certificated and input certification IDs then CGU no need to call for certificates from students instead once they feel free they can add marks at any time.

6. Self pattern learning component.

System can improve for machine learning and add marks to extra activities . Select or propose best students for each company by considering what each company requires using a knowledge base. Thus system can be improved to a fully automated industrial recruitment system.

REFERENCES

[1] Christine Shannon, and Drew McKinney, “An Evolutionary Algorithm for Assigning Students to Courses ,” in *Florida Artificial Intelligence Research Society Conference Twenty-Fourth International FLAIRS Conference*, [online] 2011,pp. 388-393, Available: http://aaai.org/ocs/index.php/FLAIRS/FLAIRS11/paper/view/2596/3067

[2] Genetic Algorithm implementation for automatic assigning of students to class courses, geneticassigner, [online] 2011, https://code.google.com/p/geneticassigner/

[3]Cake Software Foundation , CakeBook,2.x ed, Cake Software Foundation,2013.

[4]Swinburne University of Technology Internships, Industry Engaged Learning,[online] 2013, http://www.swinburne.edu.au/iel/programs/internships.html

[5] Technical tips for proposal writing, “Project Design and Proposal Writing, Workshop”[online], http://eeas.europa.eu/delegations/philippines/documents/more_info/coop_news/twt_en.pdf

[6] The industrial training and career guidance unit, ”Facility of Engineering University of Peradeniya,”[online] 2010, http://www.pdn.ac.lk/eng/eng/itcgu/index.html

[7] Career guidance unit “Career Guidance Unit University of Colombo,"[online] http://www.cmb.ac.lk/academic/other_centers/cgu/

[8] The Matching Algorithm,” APPIC Internship Matching Program,"[online] 2013 , https://natmatch.com/psychint/aboutalg.html

[9] Citing and Referencing-IEEE style, “Citing & Referencing,”[online], http://www.ittc.ku.edu/~krsna/citing.htm#Website

[10] IEEE citation reference, “IEEE Advanced Technology for Humanity,”[online] 2013, http://www.ieee.org/documents/ieeecitationref.pdf

APPENDICES

APPENDICES A : GLOSSARY

Student profile phase	After each approval phase student profiles are given a phase ID to identify from which phase profiles are approved.
Approval phases	1.Initial approval 2.Industry preview approval 3.Approval for calculation
Initial Approval	Profiles are approved after registration
Industry preview approval	Profiles are approved after initial choice selection
Approval for calculation	Profiles are approved for send to automated selection process
Category phases	Categories are given phase ID , for each phase the content of the student profiles are different
Category phases: primary	Name, Reg No, Stream, Gender, date of birth, e-mail, Phone, Address, Photo, Skills
Category phases : initial choice	extend by adding initial choice of job areas selection part to the profile
Category phases : finalizing choice	extend by adding option to select companies for each choice
Freeze/unfreeze state	Profiles can't be edit at freeze state To edit a profile state must be set to unfreeze
Category	Special student group in an academic year Ex: AS/08/09/ , ICT/08/09 ,HPT/08/09
Study Programs	Special ID to identify separate groups under same category Ex: AS/08/09 has 2 streams ; Physical , Bio
Subject	ICT,MAA,MAP,MAT,ZOO,BIO,CHE,PHY,COM,HPT,HPF,MIB,CMP
Course unit	Courses under each subject Ex: ICT course units:- ICT1201-Introduction to Programming ICT2305-Computer Networks
Choice	Job areas
GPA	Grade Point Average; Special student academic performance calculation method
RESTapi	Representational state transfer application programming interface

APPENDICES B : ER DIAGRAM

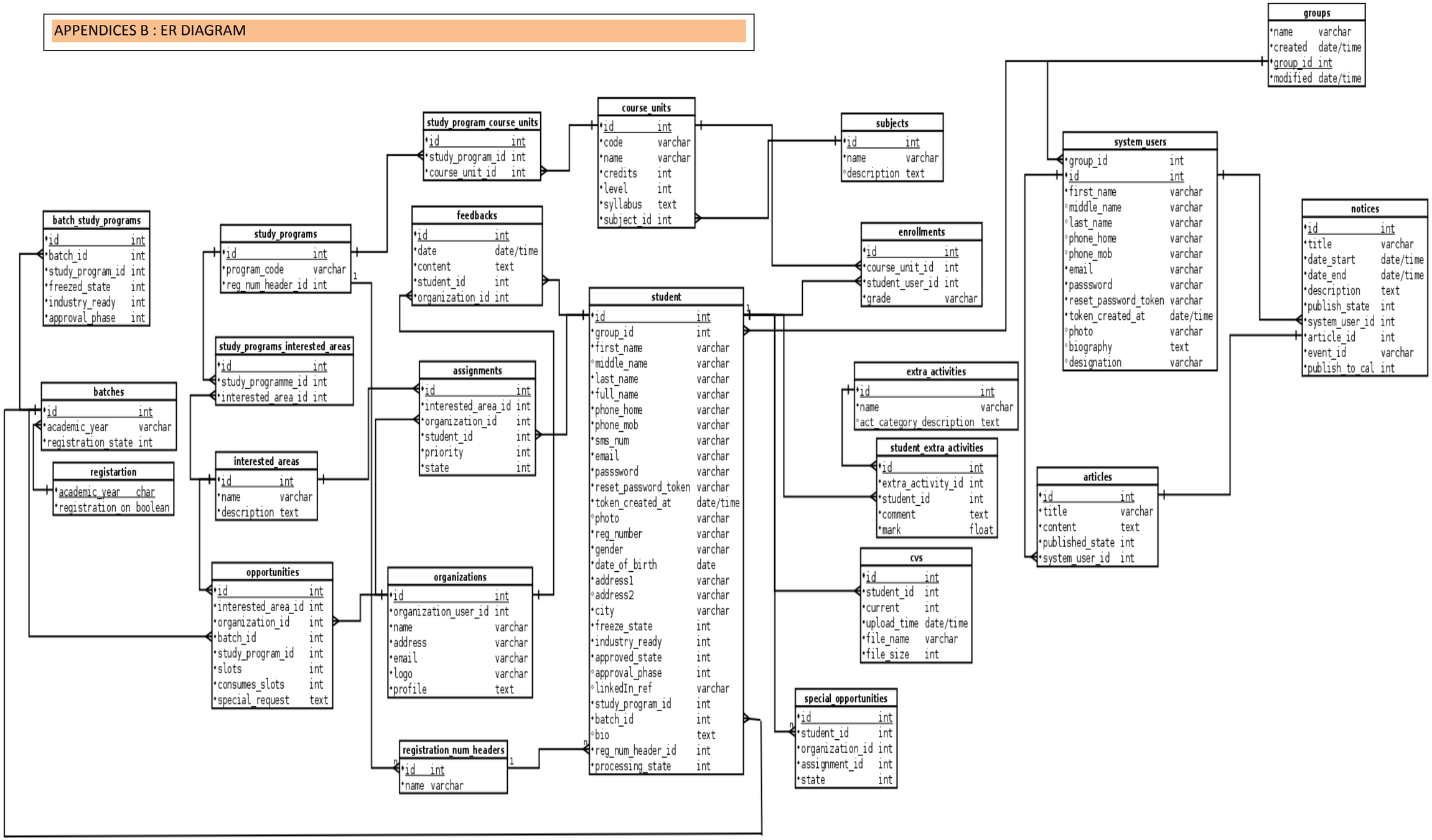


Figure 11: ER Diagram

APPENDICES C : CLASS DIAGRAM

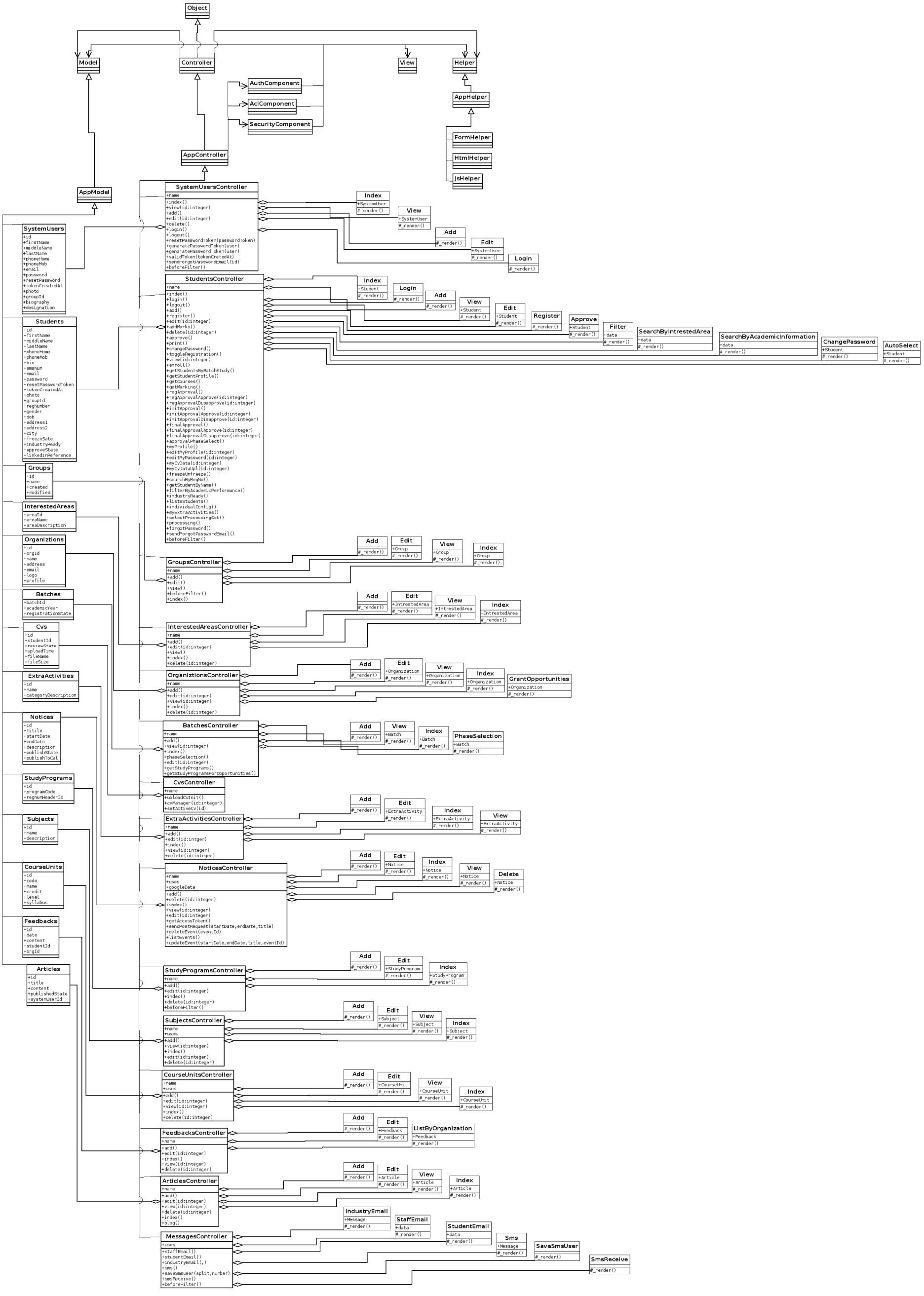


Figure 12: Class Diagram