I. INTRODUCTION

A. Background of the Problem

In a network environment, it is essential to store important information in a well-structured and readily-searchable form. A directory service stores data in a hierarchical manner and provides fast data searching. It is also useful for user authentication and access control. With the fast growing need for information, particularly over the Internet, directory has become popular among distributed applications.

Lightweight Directory Access Protocol (LDAP) is a protocol for accessing and updating information in a directory. It is widely accepted as a directory access method of the Internet and also to corporate intranets [1]. LDAP is also being implemented in various universities abroad like the Universities of Washington, Michigan, Cambridge, and others respectively.

B. Statement of the Problem

There is an LDAP directory service hosted by the Information Technology Center (ITC) of the University of the Philippines Los Baños (UPLB). The directory contains a list of basic information of both students and employees in different UPLB colleges and offices. It also contains a set of usernames and passwords used by LDAP authenticated applications like DocuTrack, UPLB Payroll and Wireless Internet Service to validate users. At present, the directory can only be viewed and accessed by the LDAP administrators via command-line interface or phpLDAPadmin.

Thus, there is a need for an interface that would allow all kind of users given their privileges, to view and modify the data in the directory.

C. Significance of the Study

With the LDAP directory, list of the basic information of people from all the colleges and departments within UPLB are stored in a single repository. LDAP directory is also used for user management of other web applications.

At present, there is an interface for adding and viewing of the user information but it is for the administrators only.

Also, students and employees who wish to have an LDAP account need to go to the ITC office to have one created. Staffs from ITC ask for the necessary information (e.g. name, student number, college, degree program) and inputs the data to the online form.

The username and password of the newly created account is then given manually to the student or employee.

NetID will enable all authorized users from UPLB to access the LDAP directory on the web. People could easily find the information related to the people, whether in their own college or other departments. NetID will allow users to change some of their own information like the email address and password. NetID will also allow a valid user to modify other accounts if needed. New students do not need to go to ITC but will automatically have their LDAP account upon registration. This will reduce the work of the administrator, redundancy of information, and possible errors.

The system will maintain an audit log that will list all the modifications made on directory. This will help tracing the changes made in the directory and who made the changes. This is useful when there are generated errors regarding the information in the directory.

The study could prompt an official UPLB directory and be integrated to the UPLB website, making it online.

D. Objectives of the Study

Generally, the study aims to design and develop an interface for the LDAP directory. The specific objectives are the following:

1. To create a module that would provide the authorized users with all the necessary functionalities of handling the directory information (i.e., view, add, modify, delete, search);

2. To create a module that would allow the administrators to add other administrators and roles to the users;

3. To create a module that would log information of transactions that modify the directory; and

4. To create a module that would generate demographics report based on the information from the directory.

E. Scope and Limitation

The study is focused on creating an interface for the LDAP directory server hosted by the ITC. The application will deal with the information of the students and employees of all the colleges and departments in UPLB. Aside from the interface, the study also allows adding of user accounts by uploading a comma-separated-value (CSV) file. Demographics reports are also generated which can either be by college, office or UPLB as a whole. This will be implemented only on intranet, preventing people outside UPLB from accessing it.

II. REVIEW OF RELATED LITERATURE

When the Internet became popular, directory service has become a trend over the Internet, in universities, and other institutes. A number of related studies were conducted and systems, using LDAP directory, were developed.

LDAP in General Studies

Gawor [2] developed the LDAP Bowser-Editor that provides a user-friendly Windows Explorer-like interface to LDAP directories. It was written in Java with the help of the JFC (Swingset) and JNDI class libraries. It focused on data management and locked of server management functionalities.

In 2005, Gaikawari [3] created an online directory that utilizes and demonstrates the features and benefits of the LDAP protocol. The system stores data using Directory Information Trees (DITs) on the LDAP server and employs security policies using Access Control Lists (ACLs). The application is developed using Java Servlet API, Java Naming Directory Interface (JNDI) API and OpenLDAP server. It provides an interface for the application to communicate with the LDAP server. In his conclusion, Gaikawari mentioned that "the LDAP protocol is very powerful, extensible, and can be used as a very effective security and data storage tool for less volatile data".

LDAP in Universities

A number of universities worldwide have implemented a directory service under the LDAP directory model.

The University of Amsterdam (UvA) Campus Directory system uses the LDAP open standard. Each student and member of staff has a record on the LDAP server(s). The homepage system for the students at the university is integrated with the directory. UvA uses the LDAP

repository for central authentication and configuration. When the students login to their mail, connect to the University Internet Service, or access the University study web, the same password is used and the LDAP directory service provides that information [4]. Other academic institutions like the Universities of Michigan [5], Tennessee [6], and Calgary [7], respectively, also use LDAP for their directory service and user authentication and authorization of their network-based services.

The UP Integrated Library System (iLib) is developed to interact with an LDAP server for login authentication. In UP Diliman, profiles of students, faculty, and staff are automatically obtained from an LDAP server [8]. Ateneo de Manila University also integrates with an LDAP server for their online directory, user authentication and account creation [9].

LDAP in Special Problems

LDAP directory has been also implemented as a special problem topic in the Institute of Computer Science (ICS), UPLB.

In 2000, San Antonio [10] developed an online directory service for the faculty and staff of Institute of Computer Science (ICS). The database is built using LDBM, a high disk based database, and Slapd which is an LDAP-based model for directory service. The interface is built using the language PERL (Practical Extraction and Report Language). The system allowed a single person that would act as administrator, to have access to the entries by having a single login and password. Certain functions such as add, search, modify, and delete were made using Net-LDAP api, which makes use of the PERL language.

Another special problem topic aimed to create a telephone directory for UPLB was developed by Manuel (2006) [11]. It is a web-based system whose main function is to search through a directory. It has a super-administrator and administrators maintaining the site. Instead

of using LDAP directory, it used MySQL (My Structured Query Language) as the back-end database. PHP (Hypertext Preprocessor) and HTML (Hypertext Mark-up Language) was used for the interface.

III. METHODOLOGY

A. Database Design

The data that used for the system will be provided by the UPLB LDAP directory server.

Figure 1 shows the directories under the directory of dc=intranet, dc=uplb, dc=edu, dc=ph. The system is generally focused on the employee and student directory under the people directory.
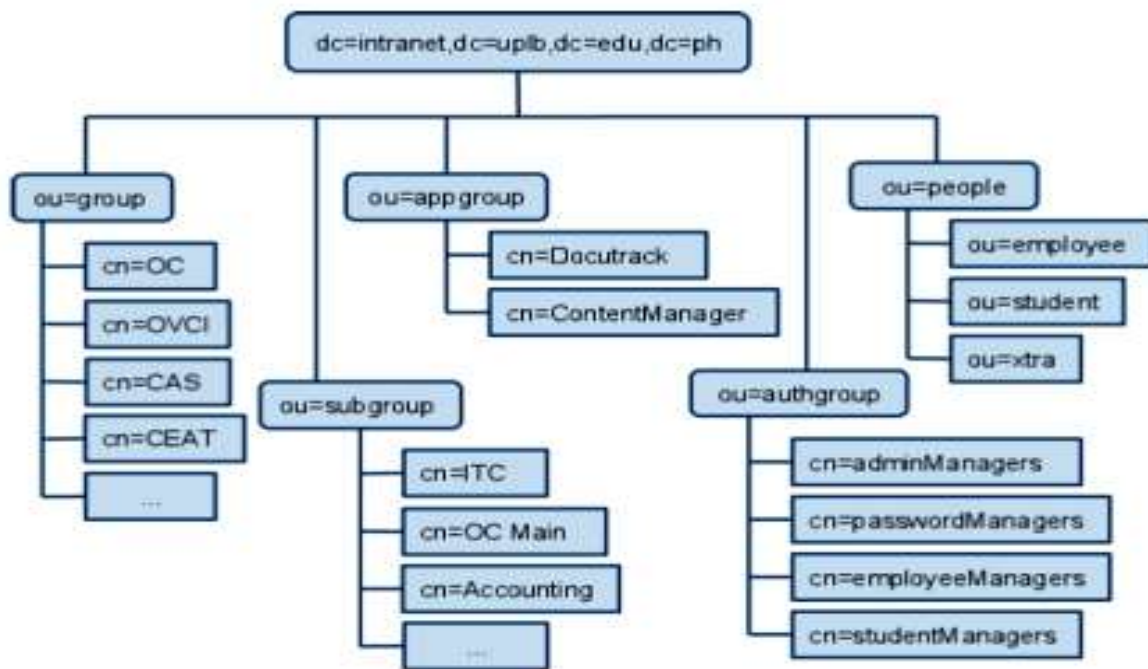

Fig 1. Directory Information Tree for UPLB

The employee directory is composed of the list of employees within UPLB. It contains the username, password, name, employee number, employee type, mail, and the organizational unit where the employees are assigned to. The student directory is composed of the list of students within UPLB. It contains the username, password, name, student number, student type, course, and mail of the students [12].

The list of main colleges, degree programs, and offices is stored in a database. The role of the user is also stored in a database. It is used to determine the access rights of the users. A user can have multiple roles (e.g., an employee can also be a student). The audit logs are also stored in a database. The system record the modifications made in the directory. The table consists of the username, access type, date, IP Address, and the user that was affected by the change that was made. Audit logs can only be viewed and deleted by the administrators.

B. Functional Requirements

The system will provide the following functionalities:

- Log in and out

  - Only users with an LDAP account can access the system.

- Change email address and password

  - Password and email address can be changed by the users. In case a user forgets his password, the administrators can reset the password for him.

- View all user accounts

  - Names of all students, faculties, and staffs can be viewed by all users in the directory page.

- View user profile

  - Own profile can be viewed by the user. Profiles of students can be viewed by the staffs from OUR and OCS. Profiles of employees can be viewed by the staffs from HRDO. All profiles can be viewed by the administrators.

- Add, edit, and delete student account

  - Student accounts can be added and deleted in the directory by the staffs from OUR and administrators. If the authorized users want to add many students at once, a CSV file can

be uploaded to input data to the LDAP directory. Student information - all information except username and student number, can be edited by the staffs from OUR and administrator.

- Add, edit, and delete faculty/staff account

  - Employee accounts can be added and deleted in the directory by the staffs from HRDO and administrators. If the authorized users want to add many employees at once, a CSV file can be uploaded to input data to the LDAP directory. Employee information - all information except username and student number, can be edited by the staffs from HRDO and administrator.

- Add and delete user role

  - Roles can be given or removed to the user account by the administrators.

- Search for user accounts

  - Other user accounts in the directory can be searched by the staffs from OCS, OUR, HRDO, and administrators.

- Email notification

  - For newly created LDAP account, an email with the username and generated password is sent to the user. An email is also sent to user when his password is changed.

- Audit logs

  - All modifications made in the directory will be recorded in a database. The audit logs can only be viewed by the administrators. All logs or logs within a defined range of date can be saved to a file.

- Demographics report

- The demographics of the students and employees within an office or college of UPLB can be viewed by the administrators. Distribution of students and employees in colleges and offices of UPLB can be viewed in pie charts.

- Add degree program

  - Degree programs can be added by the administrators to the database.

C. User Roles

The system provides a role-based security to control the access rights of users. There are six types of users, each having different levels of permissions. They are:

1. Administrator

  − Search for students and employees

  − Add student and employee accounts

  − This can be done either by uploading a CSV file or manually, through the add user online form provided by the system.

  − Edit student and employee information

  − They can edit all information except for the username and student (employee) number

  − Delete student and employee accounts

  − Give and remove roles from users

  − View and save the audit logs

  − View the demographics   count of students and employees in a degree program, office, and college

  − Add degree program

2. Student

- View own profile

- Change own email address

- Change own password

3. Employee

- View own profile

- Change own email address

- Change own password

4. Staff from the Office of College Secretary (OCS)

- View own profile

- View the short profile of students under the degree programs in their college

- Search for students

5. Staff from the Office of the University Registrar (OUR)

- View own profile and the profile of other students

- Search for students

- Add student accounts

- This can be done either by uploading a CSV file or manually, through the add user online

  form provided by the system.

- Edit student information

- They can edit all information except for the username and student number

- Delete student accounts

6. Staff from the Human Resource Development Office (HRDO)

- View own profile and the profile of other employees

- Search for employees

- Add employee accounts

- This can be done either by uploading a CSV file or manually, through the add user online form provided by the system.

- Edit student information

- They can edit all information except for the username and employee number

- Delete employee accounts

All users can view the names of all the students and employees in the directory.

D. Coding and Implementation

The system is coded using PHP (Hypertext Preprocessor), a widely-used, open source, general-purpose scripting language embedded in HTML (Hypertext Mark-up Language, MySQL (My Structured Query Language) for the backend database, and WAMP as server. LDAP functionalities are used in managing the data from the LDAP directory server. CSS and Bootstrap are also used for content management and uniform interface. Highcharts is used to generate the graphs and charts for the demographics report.

IV. RESULTS AND DISCUSSION

A. Cross-Browser Compatibility

The web application supports browsers such as Google Chrome and Mozilla Firefox 3.5+.

B. Logging in and Logging out

The system provides a form on the homepage to enable system users to log in (Fig. 1) to the system. Roles are determined upon login. Users with multiple roles are allowed to change role view without logging out (Fig. 2).

Fig. 2. Log in page

Fig. 3. Change role and Log out

C. Student and Employee Functionalities

1. *View Own Profile*
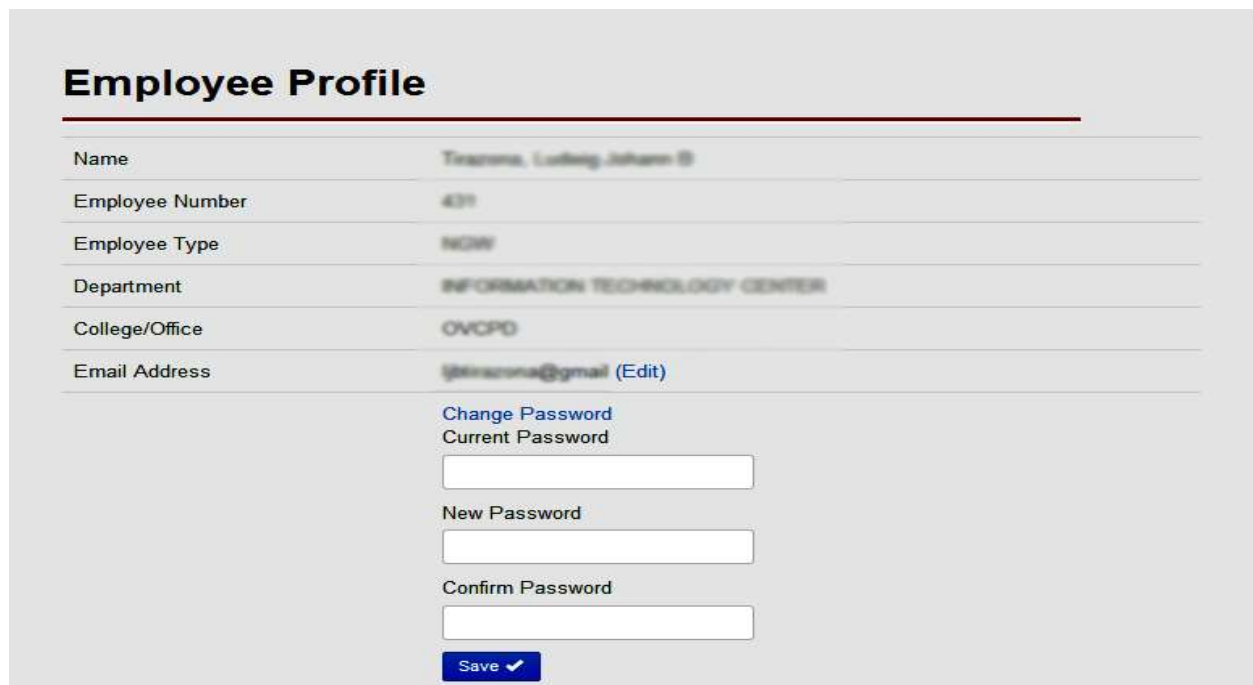
- Users with student or employee as role are allowed to view their profile only.

2. *Change Password*

- A change password form (Fig. 4) is displayed when the 'Change Password' link is clicked. A notification will pop up informing the user whether the password is changed or not. An email message (Fig.5) will be sent to the user0s email address to notify the change in password.

3. *Edit Email Address*

- An edit email form (Fig. 6) is displayed when the 'Edit' link beside the email address is clicked. The system checks if the new email address is of valid format. The system will display an error message if the email address is not valid (Fig. 6).

Fig. 4. Change password

Fig. 5. Change password email notification

Fig. 6. Edit email address

D. OCS Staff Functionalities

1. *View Short Profile of Students*

- Users who are staffs of OCS are allowed to view the short profile of students in their college. The students are grouped by degree program and can be viewed by name, student number, or email address. The OCS staff can choose the degree program of the students he wants to view. (Fig. 7).

2. *Search for Students*

- OCS Staffs are also allowed to search for student(s). The users are given a number of options on their search. Search filters are username, student number, student type, given name, last name, college, and degree program. He can also select whether his search filters contains, begins with, ends with, is not, or is the exact value of his input (Fig. 8).

Fig. 7. View list of students

Fig. 8. Search student form and Search results

E. OUR Staff Functionalities

1. *View Profile*

- Users who are staff of OUR are allowed to view the profile of all students grouped by college and degree program (Fig. 9).

2. *Edit Student Information*

- OUR Staffs are also allowed to edit student information except for the student number and username of the student. When the 'Edit' link (red box on Fig. 9) is clicked, the edit form (Fig. 10) will be displayed. The system will check for the validity of the data in the form. If any of the inputs are invalid (e.g., missing input, invalid email address format, invalid student number), an error message below the invalid input will be shown.

3. *Delete Student Account*

- OUR Staffs can delete a student account from the directory by clicking the 'Delete' link (red box on Fig. 9). The system confirms first if the OUR staff would really like to delete the student account.

4. *Add Student Account*

- OUR Staffs can add several students at once to the directory by uploading a CSV file or add one student at a time manually through the online form provided by the system (Fig. 11). The system first checks the validity of the entered information before processing the form. An error notification will be displayed next to the invalid input (Fig. 11). Also, the system does not allow duplicate usernames and student numbers in the directory. A notification (Fig. 12) will pop up informing the OUR staff if the username or student number of the account(s) to be added is already existing.

If a CSV file is uploaded to add student accounts, the system will display a page containing the list of the students added (Fig. 13). It is also indicated if the account already exists and if a notification mail is sent to the students. If the new student account is successfully created, a notification email, containing the username and password, is sent to the email address of the newly created NetID account of the student (Fig. 14).

5. *Search for Students*

- (see Search Student section under OCS Staff Functionalities)

Fig. 9. View student profile with Edit and Delete link

Fig. 10. Edit student information form

Fig. 11. Add student account form
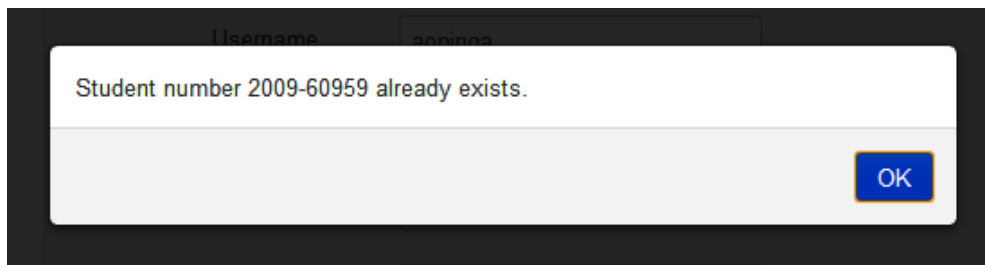
Fig. 12. Student number already exists notification

Fig. 13. Results of adding student accounts by uploading a CSV file

Fig. 14. New NetID account email notification

F. HRDO Functionalities

1. *View Profile*

- Users who are staff of HRDO are allowed to view the profile of all employees grouped by college and the main offices of UPLB (Fig. 15).

2. *Edit Employee Information*

- HRDO Staffs are also allowed to edit employee information except for the employee number and username of the employee. When the 'Edit' link (red box on Fig. 9) is clicked, the edit form will be displayed. The system will check for the validity of the data in the form. If any of the inputs are invalid (e.g., missing input, invalid d email address format, invalid employee number), an error message below the invalid input will be shown.

3. Delete Employee Account

- They can delete an employee account from the directory by clicking the 'Delete' link (red box on Fig. 9). The system confirms first if the HRDO staff would really like to delete the employee account.

4. *Add Employee Account*

- They can add several employees at once to the directory by uploading a CSV file or add one employee at a time manually through the online form provided by the system. The system first checks the validity of the entered information before processing the form. An error notification will be displayed next to the invalid input. Also, the system does not allow duplicate usernames and employee numbers in the directory. A notification will pop up informing the HRDO staff if the username or employee number of the account(s) to be added already exists.

If a CSV file is uploaded to add employee accounts, the system will display a page containing the list of the students added. It is also indicated if the account already exists and if a notification mail is sent to the employees.

If the new employee account is successfully created, a notification email, containing the username and password, is sent to the email address of the newly created NetID account of the employee (Fig. 14).

5. *Search for Employees*

- They are also allowed to search for employee(s). The users are given a number of options on their search. Search filters are username, employee number, employee type, given name, last name, college or office, and department. He can also select whether his search filters contains, begins with, ends with, is not, or is the exact value of his input.

Fig. 15. View list of employees

G. Admin Functionalities

Administrators have the functionalities of OUR and HRDO roles.

1. *Add and Delete Roles*

- The administrators can give and remove roles from users. Along with the list of users with roles is a form to add roles to users (Fig. 16). The system first look for the username entered by the administrator and displays the results in a dropdown. When the form is submitted by clicking the 'Add' button, the system confirms if the administrator would really like to add the role to the user account.

2. *Audit Logs*

- The administrators can view all the logs or logs within a specific date range. A form with two calendars (Fig. 17) will be displayed to ask for the start date and the end date of the logs that the administrator wants to view. The logs can also be saved to a file. They have the option to save all the logs to the file or just logs within a specific date range (Fig. 18). The administrator will be notified if the file is successfully saved.

3. *Demographics Report*

- The administrator can view the demographics or the count of users (students or employee) under a specific college, degree program, or office in a table format (Fig. 19) or in a graph (Fig. 20). They can view the distribution of the users in a group through the pie chart (Fig, 21). The bar graph and pie chart can be downloaded as jpeg image, png image, pdf document, or svg image format. For faster retrieval of data, the demographics table and graph are loaded from a cache file. The cache file is updated every twenty-four hours.

4. *Add and Delete Degree Program*

- The administrators can add a degree program to the database (Fig. 22). The administrator must select a college where to add the degree program. Also, the administrator can delete a degree program from the database (Fig. 22). When he selects a college, the list all the degree programs of that college will be displayed in a dropdown. He will be able to choose from the list which degree program to delete. The system confirms if the administrator would really like to delete the degree program.

Fig. 16. View, Delete, and Add roles page

Fig. 17. View audit logs page

Fig. 18. Save Logs to File

Fig. 19. Demographics of students in a Table

Fig. 20. Demographics of Students in CAS
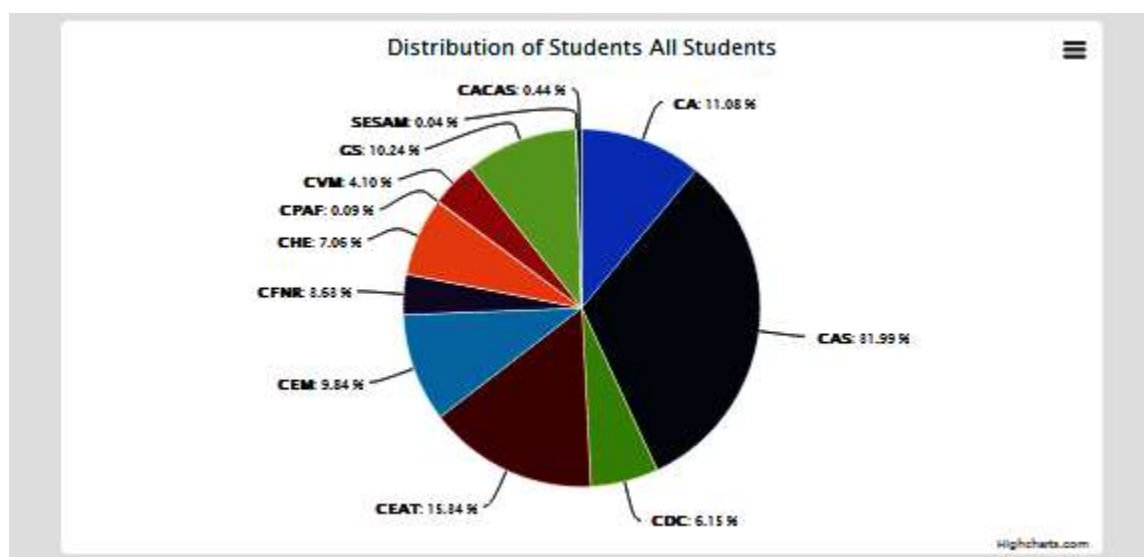
Fig. 21. Distribution of Students in CAS

Fig. 22. Add Degree Program

H. Directory

All users can view the names of all students and employees in the directory page (Fig. 23). Students are grouped by degree programs while employees are grouped by offices and colleges.
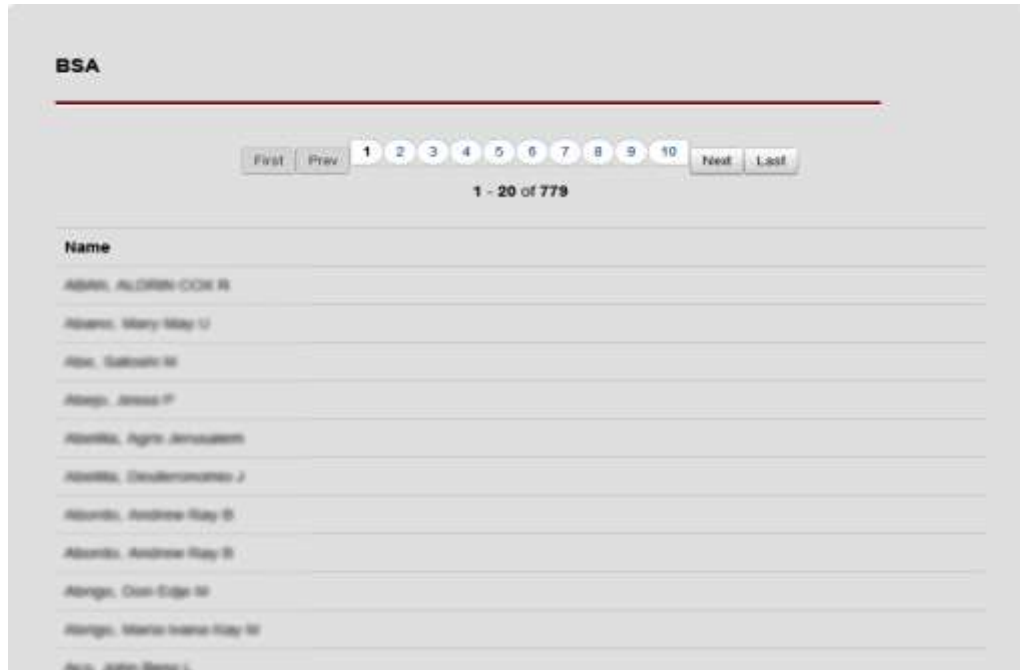
Fig. 23. Names of BSA Students in the Directory Page

VI. RECOMMENDATIONS

The system created was able to address the functionalities of each kind of users, keep track of their activities affecting the directory, view audit logs, and generate a report of the count of users in each group. With the user interface, the LDAP directory is now accessible to all users. Further suggestions and improvements can be done to the system. The author recommends the following:

- In the change password notification email sent to the user, provide a link to reset their password in case the password change was not authorized by user himself.

- Provide functionality to search - by access type, username, and user affected, in audit logs

- Provide functionality to upload picture of user that will be saved to his account in the directory

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APPENDIX

APPENDIX A

SQL COMMANDS

Database: `netid`

CREATE DATABASE netid;

Table structure for table `auditlog`

CREATE TABLE IF NOT EXISTS `auditlog` (

 `id` int(11) NOT NULL AUTO_INCREMENT,

 `username` varchar(100) DEFAULT NULL,

 `timestamp` timestamp NULL DEFAULT NULL,

 `accesstype` varchar(100) DEFAULT NULL,

 `ipaddress` varchar(200) DEFAULT NULL,

 `affecteduser` varchar(100) DEFAULT NULL,

 PRIMARY KEY (`id`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

Table structure for table `college`

CREATE TABLE IF NOT EXISTS `college` (

 `gidnumber` double NOT NULL DEFAULT '0',

 `name` varchar(100) DEFAULT NULL,

 PRIMARY KEY (`gidnumber`),

 UNIQUE KEY `name` (`name`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

Dumping data for table `college`

INSERT INTO `college` (`gidnumber`, `name`) VALUES

(1006, 'CA'), (1017, 'CACAS'), (1007, 'CAS'), (1008, 'CDC'), (1009, 'CEAT'), (1010, 'CEM'),

(1011, 'CFNR'), (1012, 'CHE'), (1013, 'CPAF'), (1014, 'CVM'), (1015, 'GS'), (1016, 'SESAM');

Table structure for table `degreeprograms`

CREATE TABLE IF NOT EXISTS `degreeprograms` (

  `gidnumber` double NOT NULL,

  `name` varchar(100) NOT NULL,

  `title` varchar(100) NOT NULL,

  PRIMARY KEY (`name`),

  UNIQUE KEY `name` (`name`,`title`),

  KEY `gidnumber` (`gidnumber`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

Dumping data for table `degreeprograms`

INSERT INTO `degreeprograms` (`gidnumber`, `name`, `title`) VALUES

(1006, 'BSA', 'BS Agriculture'),

(1006, 'BSFT', 'BS Food Technology'),

 (1006, 'BSABT', 'BS Agricultural Biotechnology'),

(1007, 'BACA', 'BA Communication Arts'),

(1007, 'BAPHLO', 'BA Philosophy'),

(1007, 'BASOC', 'BA Sociology'),

(1007, 'BSAM', 'BS Applied Mathematics'),

(1007, 'BSCS', 'BS Computer Science'),

(1007, 'BSAP', 'BS Applied Physics'),

(1007, 'BSBIO', 'BS Biology'),

(1007, 'BSCHEM', 'BS Chemistry'),

(1007, 'BSMATH', 'BS Mathematics'),

(1007, 'BSMST', 'BS Mathematics and Science Teaching'),

(1008, 'BSDC', 'BS Development Communication'),

(1009, 'BSABE', 'BS Agricultural and Biosystems Engineering'),

(1009, 'BSCE', 'BS Civil Engineering'),

(1009, 'BSCHE', 'BS Chemical Engineering'),

(1009, 'BSEE', 'BS Electrical Engineering'),

(1010, 'BSABM', 'BS Agribusiness Management'),

(1010, 'BSAECO', 'BS Agricultural Economics'),

(1010, 'BSECO', 'BS Economics'),

(1011, 'BSF', 'BS Forestry'),

(1012, 'BSHE', 'BS Human Ecology'),

(1012, 'BSN', 'BS Nutrition'),

(1013, 'MASTER OF PUBLIC AFFAIRS', 'Master of Public Affairs'),

(1013, 'MS AGRICULTURAL EDUCATION', 'MS Agricultural Education'),

(1013, 'MS COMMUNITY DEVELOPMENT', 'MS Community Development'),

(1013, 'MS DEVELOPMENT MANAGEMENT AND GOVERNANCE', 'MS Development Management and Governance'),

(1013, 'PHD EXTENSION EDUCATION', 'Ph.D Extension Education'),

(1013, 'MS EXTENSION EDUCATION', 'MS Extension Education'),

(1013, 'PHD AGRICULTURAL EDUCATION', 'Ph.D Agricultural Education'),

(1013, 'PHD COMMUNITY DEVELOPMENT', 'Ph.D Community Development'),

(1014, 'PREVM', 'Pre-veterinary Medicine'),

(1014, 'DVM', 'Doctor of Veterinary Medicine'),

(1015, 'MA', 'Master of Arts'),

(1015, 'MACA', 'Master of Communication Arts'),

(1015, 'MAG', 'Master of Agriculture'),

(1015, 'MDMG', 'Master of Development Management and Governance'),

(1015, 'MF', 'Master of Forestry'),

(1015, 'MIT', 'Master of Information Technology'),

(1015, 'MM', 'Master of Management'),

(1015, 'MPAF', 'Master in Public Affairs'),

(1015, 'MPROS', 'Master of Professional Studies'),

(1015, 'MS', 'Master of Science'),

(1015, 'MV', 'Master in Veterinary Epidemiology'),

(1015, 'PHD', 'Doctor of Philosophy'),

(1015, 'PHD by Research', 'Doctor of Philosophy by Research'),

(1015, 'Straight PHD', 'Straight Doctor of Philosophy');

(1016, 'MS ENVIRONMENTAL SCIENCE', 'MS Environmental Science'),

(1016, 'PHD ENVIRONMENTAL SCIENCE', 'Ph.D Environmental Science'),

(1017, 'BSAC', 'BS Agricultural Chemistry'),

Table structure for table `offices`

CREATE TABLE IF NOT EXISTS `offices` (

 `gidnumber` double NOT NULL DEFAULT '0',

 `name` varchar(100) DEFAULT NULL,

 PRIMARY KEY (`gidnumber`),

 UNIQUE KEY `name` (`name`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

Dumping data for table `offices`

INSERT INTO `offices` (`gidnumber`, `name`) VALUES

(1000, 'OC'), (1018, 'Others'), (1001, 'OVCA'), (1002, 'OVCCA'),

(1003, 'OVCI'), (1004, 'OVCPD'), (1005, 'OVCRE');

Table structure for table `user_role`

CREATE TABLE IF NOT EXISTS `user_role` (

 `uid` text NOT NULL,

 `role` text NOT NULL

) ENGINE=InnoDB DEFAULT CHARSET=latin1 COMMENT='Values for roles are OCS,

OUR, HRDO, and Admin only ';

Constraints for dumped tables

Constraints for table `degreeprograms`

ALTER TABLE `degreeprograms`

 ADD CONSTRAINT `degreeprograms_ibfk_1` FOREIGN KEY (`gidnumber`)

REFERENCES `college` (`gidnumber`);

1. Log-in page

1.1. How to Log-in

1.1.1 Fill in the UserID and Password fields. The user must have a NetID account in order to log-in.
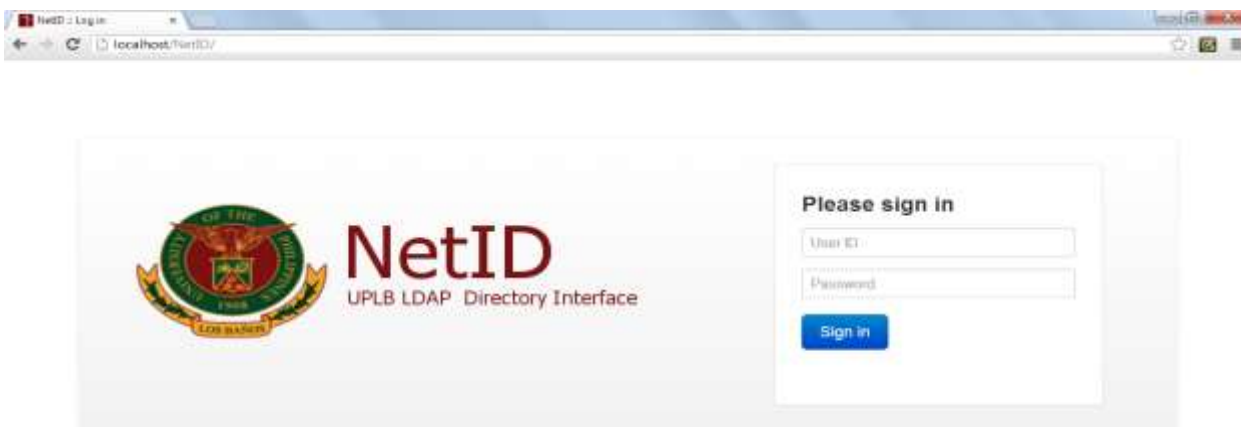
Figure. 1. Log-in Page

1.2 How to Log-out

1.2.1. Click on the role link. The list of roles, link to directory page and the log-out link will appear.

1.2.2. Click on the Log-out link.

Figure 2. Log-out

2. Student and Employee Functionalities

2.1 How to edit email address

2.1.1 Click the edit link beside the email address. The form to edit the email address will appear.

2.1.2 Enter the new valid email address.

2.1.3. Click the Save button.

Figure 3. Edit Email Address

2.2 How to change password

2.2.1 Click the change password link below the email address. The change password form will appear.

2.2.2 Enter the current password and the new password.

2.2.3 Click the Save button.

2.3.4 If the password is changed successfully, an email will be sent to the user to inform the change in password.

Figure 4. Change Password

3. OCS Staff Functionalities

3.1 How to view short profile of students

3.1.1 Click Courses on the menu.

3.1.2 Choose a degree program from the list.

3.1.3 The short profile of students in the chosen college will appear.

Figure 5. View Short Profile of Students

3.2 How to search for a student in the directory

3.2.1 Click Search Student in the menu.

3.2.2 Fill in the search student form. Not all the search fields are required.

3.2.3 Click the Search button.

3.2.4 The Search Results will appear below the search form.

Figure 6. Search Student

4. OUR Staff Functionalities

4.1 How to view profile of students

4.1.1 Click Colleges on the menu.

4.1.2 Choose a college and then a degree program from the list.

4.1.3 The short profile of students under the chosen degree program will appear.

4.1.4 To view the complete profile of a student, click the name of the student.
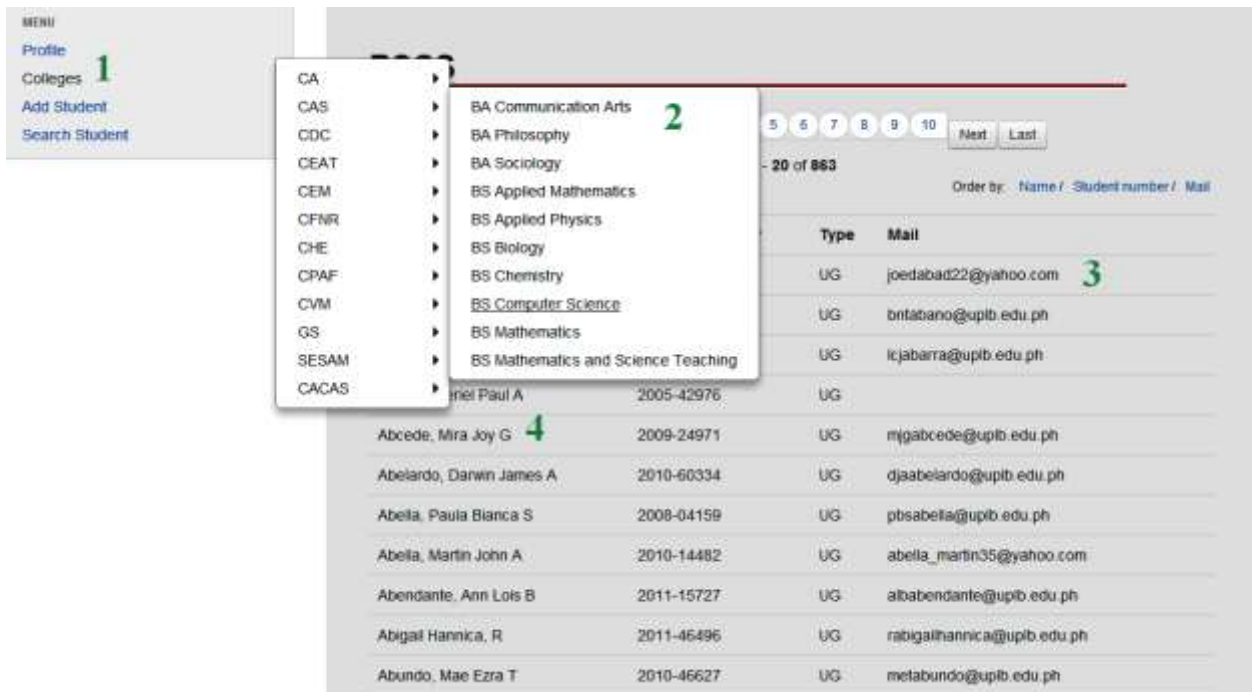
Figure 7. View Profile of Students

4.2 How to edit student information

4.2.1 Click the Edit link on the page displaying the profile of the student.

4.2.2 Fill in the Edit Student Information Form.

4.2.3 Click Save Changes button.
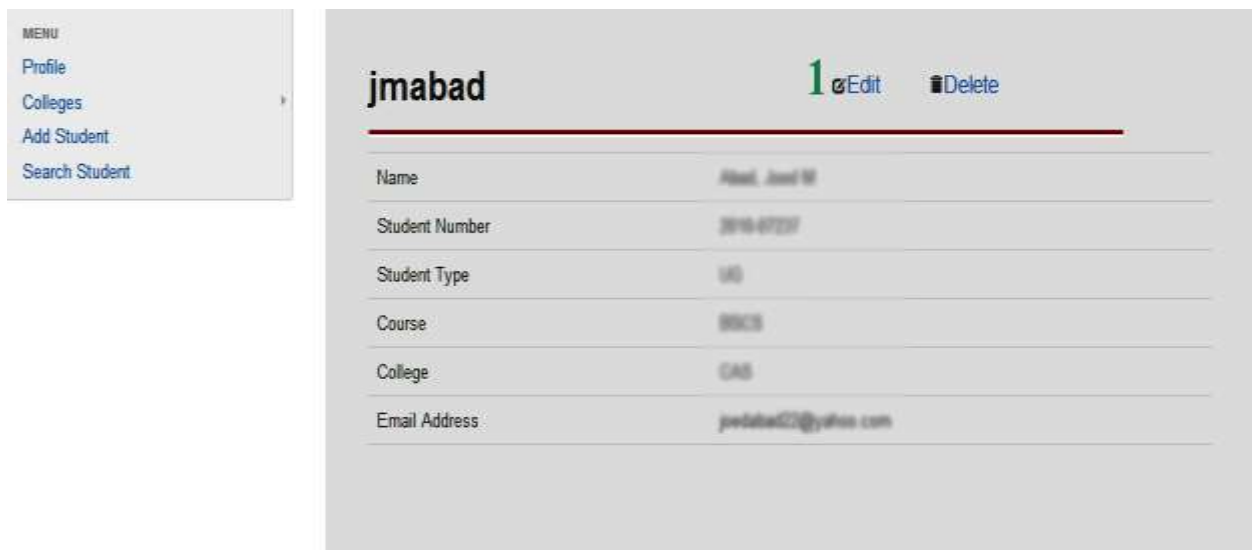
Figure 8. Edit link on the student profile page

Figure 9. Edit Student Information

4.3 How to add student account manually through the online form

4.3.1 Click Add Student in the menu.

4.3.2 Fill in the Add Student Form.

4.3.3 Click the Get Password button to generate the password.

4.3.4 Click the Save button.

4.3.5 If the student is successfully added to the directory, a notification email will be sent to the user

Figure 10. Add Student Account Manually Through the Online Form

4.3 How to add student account through uploading a CSV file

    4.3.1 Click Add Student in the menu.

    4.3.2 Click the Select File button and choose a CSV file.

    4.3.3 Click the Add button.

    4.3.4 The page containing the list of students in the CSV file will be displayed.

Figure 11. Add Student through Uploading a CSC File

Figure 12. Result Page of Adding Student through Uploading a CSV File

4.4 How to delete a student account

4.4.1 Click the Delete link on the page displaying the profile of the student.

4.4.2 A confirmation message will appear. Click the OK button to confirm delete.

Figure 13. Delete Student Account

4.5 How to search for student in the directory

See Section 3.2

5. HRDO Staff Functionalities

5.1 How to view profile of employees

5.1.1 Click Colleges (Offices) on the menu.

5.1.2 Choose a college (office) from the list.

5.1.3 The short profile of employees under the chosen college (office) will appear.

5.1.4 To view the complete profile of an employee, click the name of the employee.

Figure 14. View Employee Profile

4.2 How to edit employee information

4.2.1 Click the Edit link on the page displaying the profile of the employee.

4.2.2 Fill in the Edit Employee Information Form.

4.2.3 Click Save Changes button

4.3 How to add employee account through uploading a CSV file

4.3.1 Click Add Employee in the menu.

4.3.2 Click the Select File button and choose a CSV file.

4.3.3 Click the Add button.

4.3.4 The page containing the list of employees in the CSV file will be displayed.

4.4 How to delete an employee account

4.4.1 Click the Delete link on the page displaying the profile of the employee.

4.4.2 A confirmation message will appear. Click the OK button to confirm delete.

6. Administrator Functionalities

See Section 4 and 5.

6.1 How to add roles to users

6.1.1 Click User Roles in the menu.

6.1.2 Input a username in the add role form beside the list of roles.

6.1.3 Click the search button. The list of usernames that match the search will be displayed in the select field.

6.1.4 Select an account to add role and the role to add.
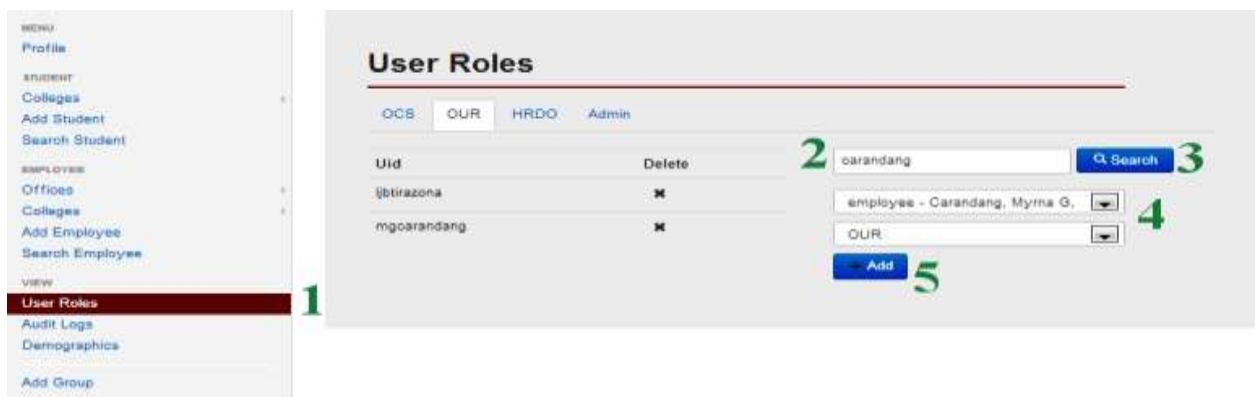
6.1.5 Click the add button.

Figure 15. Add Role to Users

6.2 How to remove roles from user

6.2.1 Click User Roles in the menu.

6.2.2 Click the delete button beside the user.

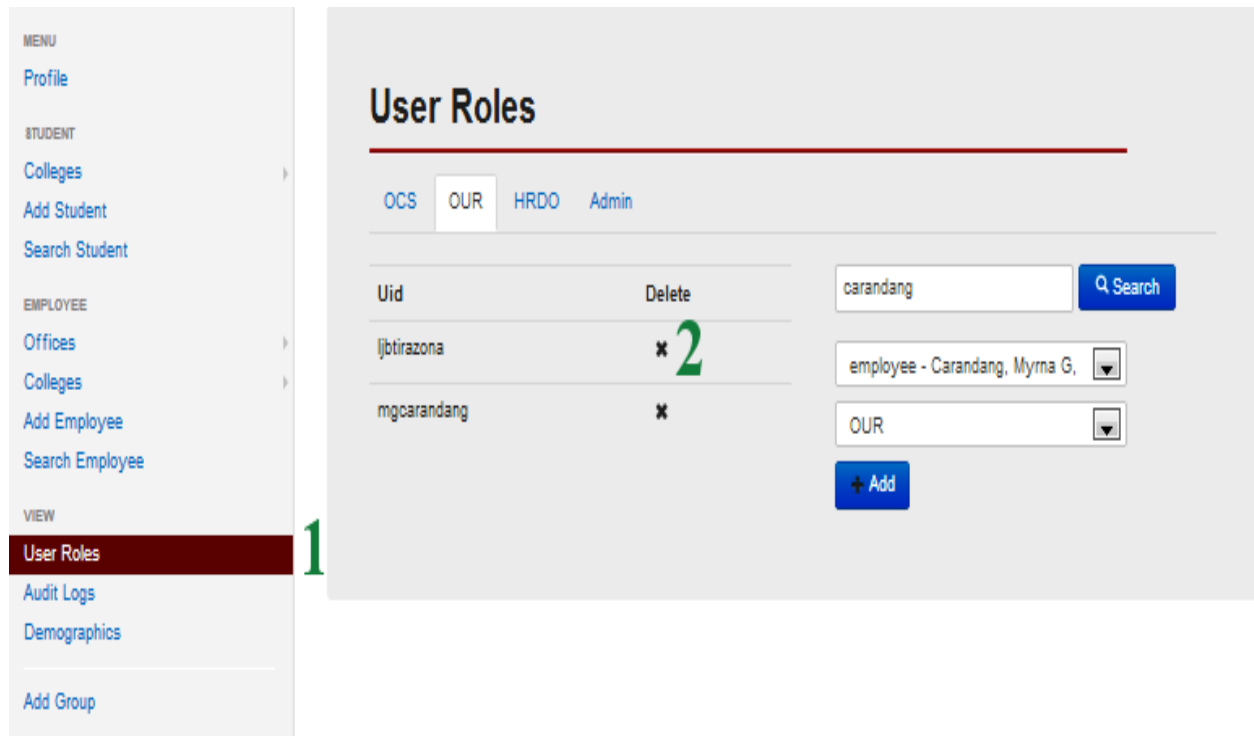6.2.3 A confirmation message will be displayed. Click OK to confirm action.

Figure 16. Remove Role from Users

6.3 How to view audit logs

6.3.1 Click Audit Logs in the menu.

6.3.2 All the audit logs will be displayed. Select start date and end date to view audit logs within a specific date range.
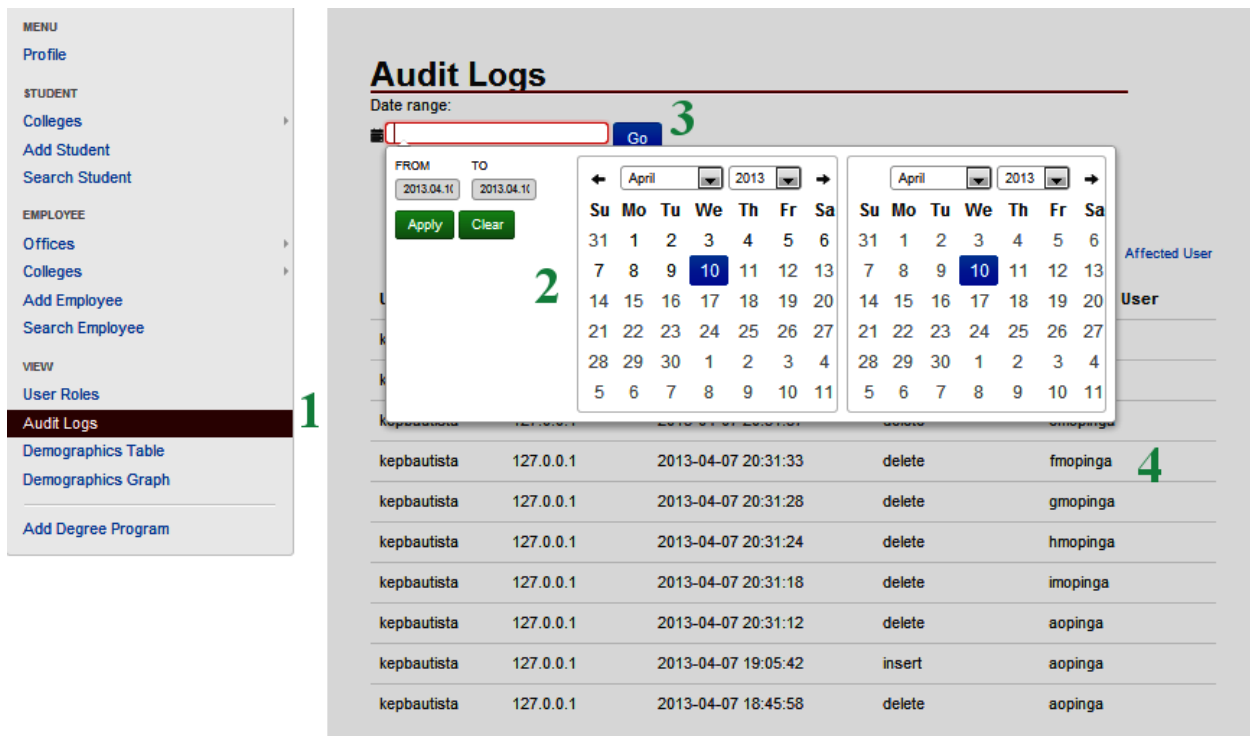
6.3.3 Click the go button

6.3.4 The list of logs from the selected date will be displayed.

Figure 17. View Audit Logs

6.4 How to save audit logs to file

6.4.1 Click Audit Logs in the menu.

6.4.2 On the Save Audit Logs form, select the start date and end date to save logs within a specific date range.

6.4.3 Click the save to file button

6.4.4 To save all the logs to the file, click save all to file button.

Figure 18. Save Audit Logs

6.5 How to view demographics reports on a table

6.5.1 Click Demographics Table in the menu.

6.5.2 Select which demographics report to view – student or employee.

Figure 18. View Demographics Report on a Table

6.6 How to view demographics reports on a table

6.6.1 Click Demographics Graph in the menu.

6.6.2 Select which demographics report to view – student or employee.

6.6.3 Select if you like to view all or by college (office).

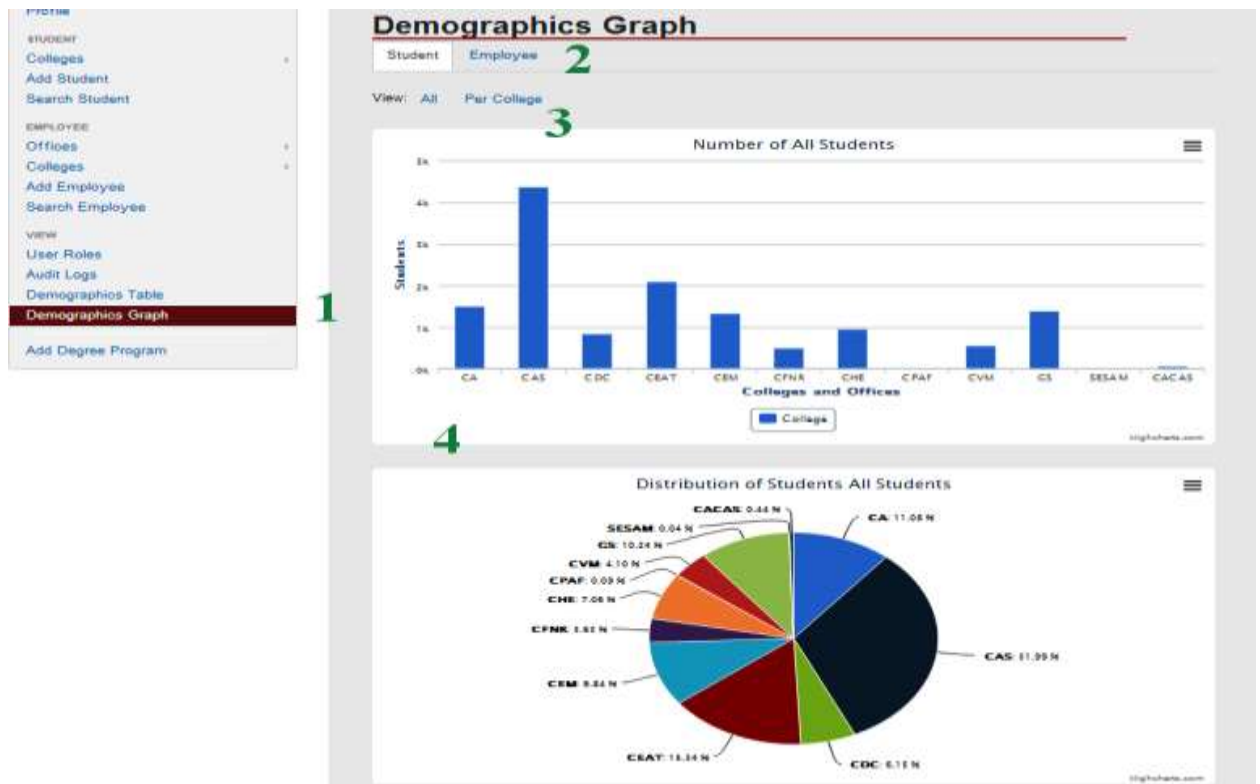6.6.4 The bar graph and pie chart of the number of students will be displayed.

Figure 19. View Demographics Report on a Graph

6.7 How to add a degree program on the database

6.7.1 Click Add Degree Program in the menu.

6.7.2 Fill in the add degree program form.

6.7.3 Click the add button.

Figure 20. Add Degree Program

6.8 How to delete a degree program from the database

6.8.1 Click Add Degree Program in the menu.

6.8.2 Select the college and the degree program you want to delete.
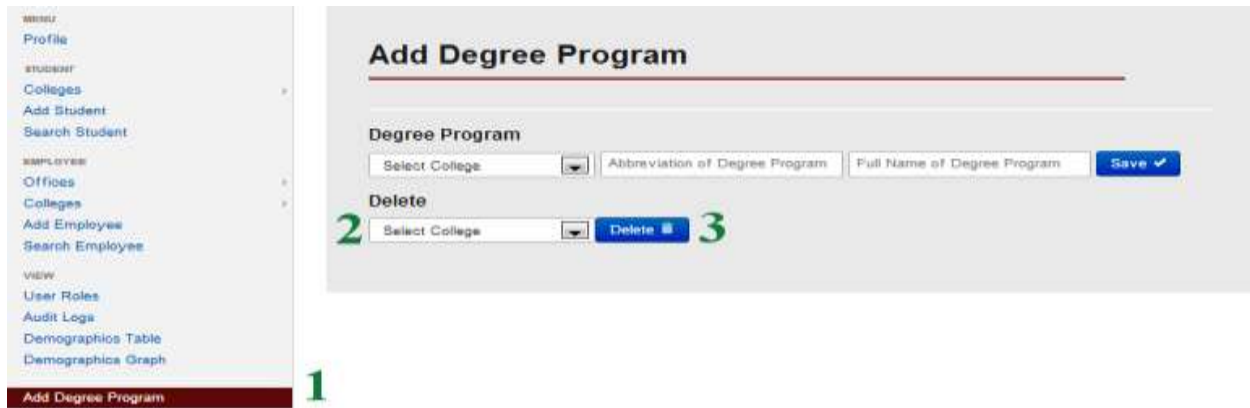
6.8.3 Click the delete button.

Figure 21. Delete Degree Program

5. Directory Page

5.1 Click the role link on the header and the directory link.

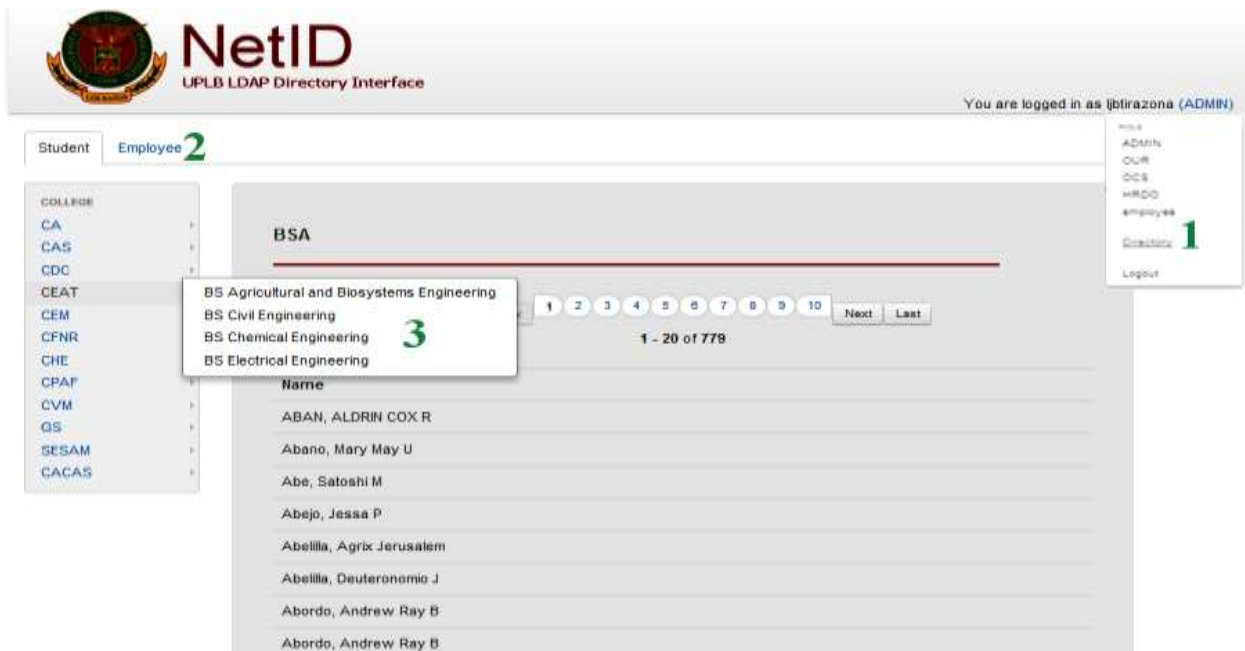5.2 Select which directory you would like to view – student or employee.

5.3 Select degree program (office).

Figure 22. Directory Page