

# Design and Implementation of a Web-Based Faculty Information System

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**Abstract**— In a digitally-dominated era, the development of a web-based information system that provides a central repository of all faculty-related accreditation requirements, with fast and reliable access proves to be a big help in data organization and management. Thus, this work describes our development methodology for a web-based information system in an academic scenario which replaces the e-mail-based submission of faculty information form to college administration. This system collects data from faculty members such as personal information, academic and non-academic work experiences, community outreach engagements and most importantly the research outputs. The system is still under evaluation in terms of functionality, usability, reliability, supportability and performance. The system caters four (4) types of users: the System Administrator, Manager, Faculty and Assistant. The Faculty Information System (FIS) is currently installed in a pilot-test college for system monitoring and maintenance.

**Keywords**—*Web Development; Information Systems; DBMS; Faculty Management System*

## I. INTRODUCTION

Document collection and submissions are one of the major concerns of the De La Salle University, Institutional Accreditation and Assessment (IAA) office before and during accreditation<sup>1</sup> visits. Both the college and IAA communicate to meet these needs. They have to make sure that all documents especially the faculty records must always be available and most importantly updated. In the previous process, the IAA, the Quality Management Office (QMO), college dean, and department chairs remind each faculty member to update their Faculty Information Form (FIF) – an excel file that is preformatted according to the requirements needed by accreditation body – through email. This manual way of information submission resulted in inefficient information management, specifically, (1) confusion due to multiple copies of records submitted by the faculty through the years (2) manual consolidation and sorting of faculty information, (3) monitoring problem due to FIF are submitted thru email, (4) record conflict due to submission is sent to several administration personal e.g. department chair,

department secretary, dean, QMO and IAA, and (5) different data format like dates, country, monetary values, proper names of institutions, and others.

There are several processes which implemented web-based systems with similar objectives such as in [1] which primarily provides a central repository of faculty records in a university but differs in terms of defining sets of users, and security, in [2] which uses an open-source technology for the development of the system but differs in terms of usability, in [3] which the system can be used to create faculty's curriculum vitae but differs in format, and purpose, in [4] which aims to improve the delivery of health care by providing integrated evidence-based information system, in [5] which aims to improve utilization ratio of laboratory devices using web-based open-laboratory management system, and in [6] which replaces the paper-based and decentralized system of monitoring the community center's data.

The web-based Faculty Information System (FIS) aims to automate the collection of the faculty information to address the problem inefficient information management. The same consideration being implement by the study of [7], where the system examines three project diversity, including project size, project member diversity, technical complexity; five critical success factors, including project objective and bound, top management support, project plan and monitoring, project user involvement, project communications; and six success criteria, including time, cost, quality, information quality, information use, user satisfaction. These considerations were used as guide to achieve the formation and development of the faculty information system. The system is designed to store, to present and to generate reports needed before and during accreditation. Also, the system endeavors to ensure the availability of data that shall enable the system manager to easily consolidate and filter faculty information, and secure the stored data by identifying the calling program, and its user through the use of the Application Programming Interface (API) key.

This paper is arranged as follows: section 2 discusses the design considerations including the Logical Data Model. Then, section 3 presents the modules that resulted from these

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<sup>1</sup> Accreditation visits are periodically done on Philippine universities to ensure quality and compliance of the private schools.

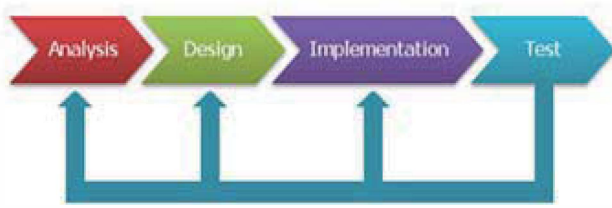


Fig. 1. Rapid Application Development (RAD)

considerations. This will be concluded by Section 4 which covers the system monitoring and maintenance.

## II. THE FIS DESIGN

The development of the web-based Faculty Information System (FIS) uses the Rapid Application Development (RAD) approach to consider system improvement while re-using the system. It includes the following phases: Analysis/Planning, Design, Implementation and Test as shown on Fig. 1.

In the analysis/planning phase, all the important information required in the old email-based system e.g. the faculty information form (FIF) from the accreditation office, the data inputs from the faculty and reports needed by the Quality Management Officer (QMO), as well as business rules are identified to conceptualize the data model to be implemented in the FIS.

These were then used to come up with a physical data

model as shown in Fig. 2. The physical data model shows how entities are mapped, and relate to other entities used in the FIS. In the model, the use of the primary keys and foreign keys are implemented to represent relationship to every entity or table created. This design is relevant to the implementation of the business rules set by the college, and are followed in storing and retrieving data.

In the design phase, the actual system is built and coding is done by using automation tools to convert process and data models into actual prototypes. Based from the defined business rules, the modules and interfaces of the system were first designed according to the needs, and roles of the faculty users. These modules and interfaces were then modified to design the roles and tasks of managers. Next to the development are the modules and interfaces for assistant's account, and lastly the administrator's account. The web interface was designed using common tools in web development, i.e. Hypertext Markup Language (HTML), Cascading Style Sheets (CSS), Javascript and Bootstrap. The Bootstrap was added to consider different browsers. Furthermore, since the FIS is considered as a dynamic website, Hypertext Preprocessor (PHP), MySQL, and Javascript Object Notation (JSON) are used for system development, database and information storage, respectively.

In the implementation phase, currently the FIS is installed in the pilot-test college for system monitoring and

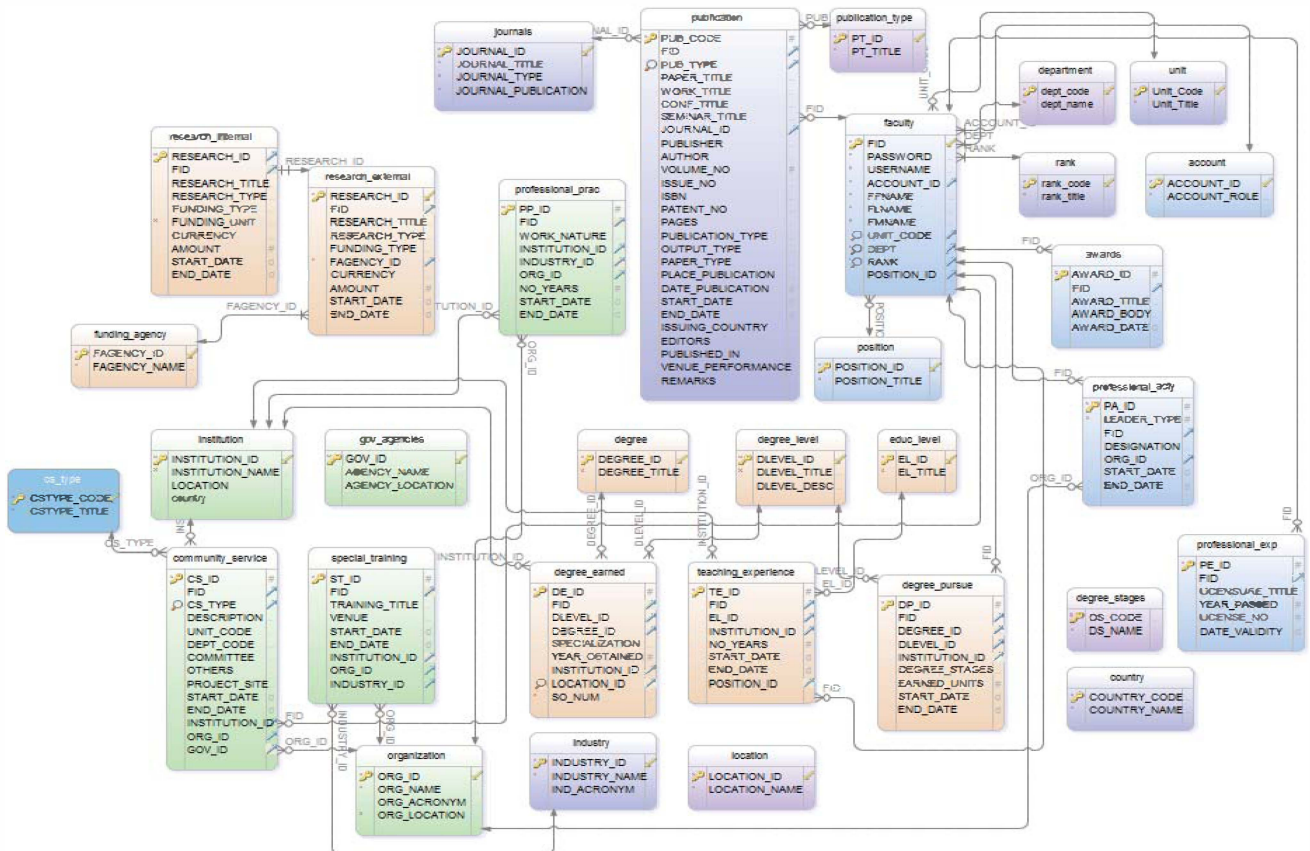


Fig. 2. Physical Data Model of the FIS

maintenance. Here, the users currently use the system while the development is still on-going to assess further improvements in terms of accessibility, usability, and security.

In the test phase, the FIS will be presented to the four identified users. They will be given guide questions to test the FIS in terms of functionality, usability, reliability, supportability and performance. The result of this test or evaluation will be used to solve issues or problems encountered while using the system.

The FIS is specifically designed for the accreditation requirements of the CCS. It serves as a central repository of all accreditation related matters of all faculty members in DLSU. It provides common interface to all users since it is web-based, and will follow uniform format of data entry such as date, country, and others.

### III. THE FIS COMPONENTS

The web-based Faculty Information System (FIS) is comprised primarily of database-driven modules designed to store, present and generate reports needed by the identified users. These users include (1) the Systems Administrator, (2) the Manager, (3) the Faculty and (4) the Assistant. To support each user type, eight (8) data modules were created for the FIS, and these are: the *user authentication module*, the *data entry module*, the *faculty personal information module*, the *degrees earned/pursue module*, the *work history module*, the *publication module*, the *grants and awards to faculty module*, and *generate reports module* as shown in Fig. 3.

#### A. System Modules

As seen in the block diagram (Fig. 3), the FIS has eight (8) modules. Each module is created and designed according to the functions described below:

1) *User Authentication Module*: This module manages connection to the Users Database and retrieve appropriate information depending on the user login credentials. The users are identified accordingly to give them access to privileged sections of the website.

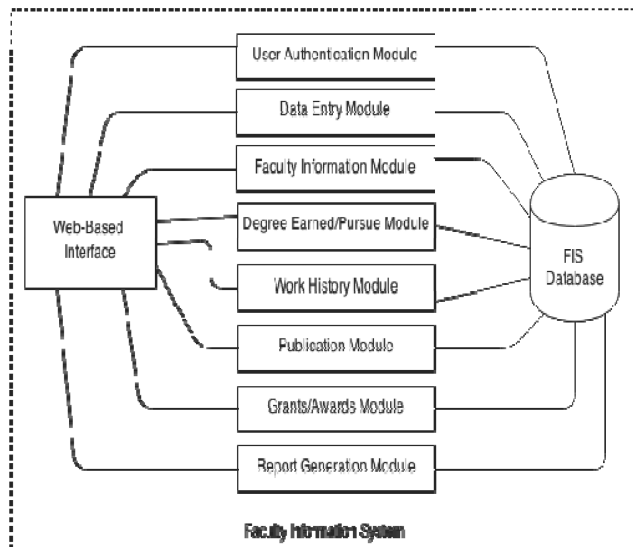


Fig. 3. Block Diagram of the FIS

2) *Data Entry Module*: This module encompasses the data entries to be done in the system. It does have the Create, Read, Update and Delete (CRUD) functions.

3) *Faculty Information Module*: Personal information for the faculty member are added and updated as per the privileges given.

4) *Degree Earned/Pursue Module*: This module links the degrees earned records of the faculty and display it to the users. Degrees Earned are those considered to be finished degree, with data such as the bachelor's degree, masters degree, doctorate degree, date/year graduated and special order number.

5) *Work History Module*: This module links the work history records of the faculty. Work history are categorized as academic experiences and industry experiences.

6) *Publication Module*: This module links to the researches, publication, conferences attended, journal, and books published by the faculty.

7) *Grants/Awards Module*: This module links the grants and awards details of the faculty and displays it to the users.

8) *Report Generation Module*: This module is used primarily whenever a user request for a report of their records. Report can be downloaded as an MS Excel format, and it can also be printed.

The FIS uses the Application Program Interface (API) key as its primary security. This technique is used to identify and authenticate users to grant access to the modules mentioned above.

#### B. User of the FIS

##### The FIS Database System and Administrator Account

The FIS database system is intended to act as the primary repository of data concerning all faculty-related information used in accreditation. Its foremost goal is to organized data according to various entities identified such as faculty, institutions, organization, degrees, units, departments, rank, community outreach, research, etc. To easily map the relationship of these entities, a physical data model was created (see Fig. 2). There are thirty-two (32) entities created and used by the FIS modules described in Fig. 3.

The physical data model that was designed is now translated into table with field names, and data types (metadata) as shown in Fig. 4. These are the initial data to be created before allowing user to access and use the system.

Thus, a system administrator is designated to manage the back-end or the database, as well as the access permissions granted to individuals that will use the system. In the front end, a pre-constructed account for the system administrator is created which will then direct the said user to the system homepage. The system homepage is designed such that the tabs and forms are arranged in a tabular format.



| #  | Name           | Type        | Collation         | Attributes | Null | Default | Extra |
|----|----------------|-------------|-------------------|------------|------|---------|-------|
| 1  | FID            | int(8)      |                   |            | No   | None    |       |
| 2  | PASSWORD       | varchar(45) | latin1_swedish_ci |            | No   | None    |       |
| 3  | USERNAME       | varchar(25) | latin1_swedish_ci |            | No   | None    |       |
| 4  | ACCOUNT_ID     | varchar(5)  | latin1_swedish_ci |            | No   | None    |       |
| 5  | FFNAME         | varchar(25) | latin1_swedish_ci |            | No   | None    |       |
| 6  | FLNAME         | varchar(25) | latin1_swedish_ci |            | No   | None    |       |
| 7  | FMNAME         | varchar(25) | latin1_swedish_ci |            | Yes  | NULL    |       |
| 8  | UNIT_CODE      | varchar(5)  | latin1_swedish_ci |            | Yes  | NULL    |       |
| 9  | DEPT           | varchar(45) | latin1_swedish_ci |            | Yes  | NULL    |       |
| 10 | C ASSIFICATION | varchar(25) | latin1_swedish_ci |            | Yes  | NULL    |       |
| 11 | RANK           | varchar(45) | latin1_swedish_ci |            | Yes  | NULL    |       |
| 12 | POSITION_ID    | varchar(5)  | latin1_swedish_ci |            | Yes  | NULL    |       |
| 13 | ACTIVE         | int(11)     |                   |            | Yes  | NULL    |       |

**Fig. 4. Metadata of the Faculty Table**

It is the administrator's task to create accounts that will be used and given to the manager, faculty, and assistant to access the system and database. A successful login allows user to add, modify, view and delete records. The scope of the system administrator's task is shown on Fig. 5. The system has no capability of uploading bulk amount of data since it was designed to enter records in a one-at-a-time basis.

#### Manager Account

The manager account is given to college administrators such as Dean, Vice Dean, Chairperson, Vice Chairperson and Quality Management Officer. It has the capability to view the records of all faculty members under his department and able to perform the CRUD functions as permitted.

The manager has the capability of managing: his/her own account, special training, teaching experiences and length of service, professional experiences, professional practices, awards, funded researches, conferences, workshops/seminar, and community service engagements. The scope of the manager account is shown on Fig. 6.

#### Faculty Account

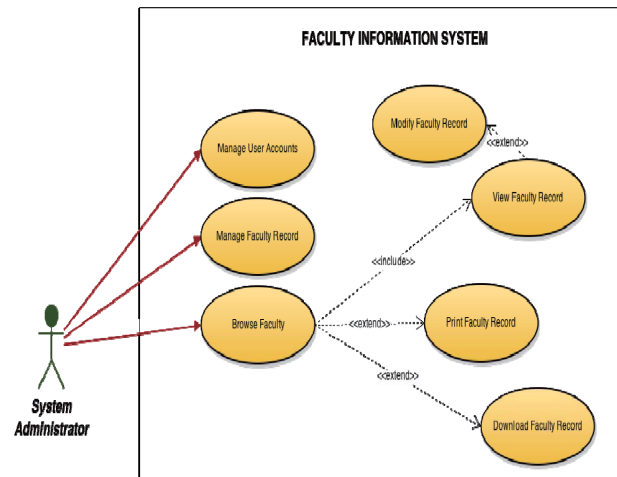
Faculty account is given to every faculty members both full-time and part-time. It is created also by the systems administrator. Its sole responsibility is to update their academic records needed for accreditation documentation.

The faculty has the similar capability as the manager's account in managing his/her records except for viewing other faculty records. The scope of the faculty account is shown on Fig. 7.

#### Assistant Account

The assistant account is defined as the non-academic employee assigned to every colleges. They are the administrative assistant, secretaries and/or technicians. The sole responsibility of the assistant account is to view and print records of the each faculty member.

Once the assistant account has been created, they have the capability of managing his/her own account like changing his/her name and password. The scope of the assistant account is shown on Fig. 8.



**Fig. 5. Use Case Diagram of the System Administrator**

The FIS as compared to other faculty information system show similarities such as user accounts, and data entries. However, these systems distinctively depict its purpose. Others are used as employee history to consolidate records from human resources department up to allowing students to view faculty profile. This FIS uniquely gather faculty information which is exclusively presented during accreditation visits only. These records are different to those records collected during hiring processes known as the 201 files<sup>2</sup>.

## IV. SYSTEM MONITORING AND MAINTENANCE

The FIS is initially deployed in the DLSU College of Computer Studies to aid in preparing faculty profile for their accreditation. The system is still under evaluation in terms of functionality, usability, reliability supportability and performance. The periodic visit of the accreditation officer allows for the system to be constantly updated and upgraded whenever a new requirement from the accreditation process and department arises, like new set of data or field to be added



**Fig. 6. Use Case Diagram of the Manager**

<sup>2</sup> 201 files contains employee personal details, government identification numbers, and other hiring requirements.

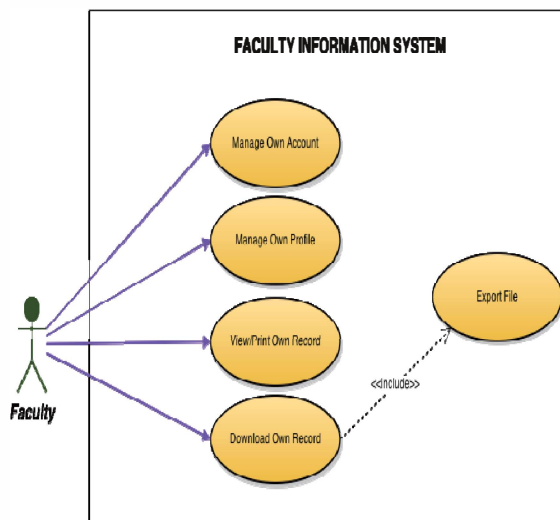


Fig. 7. Use Case Diagram of Faculty

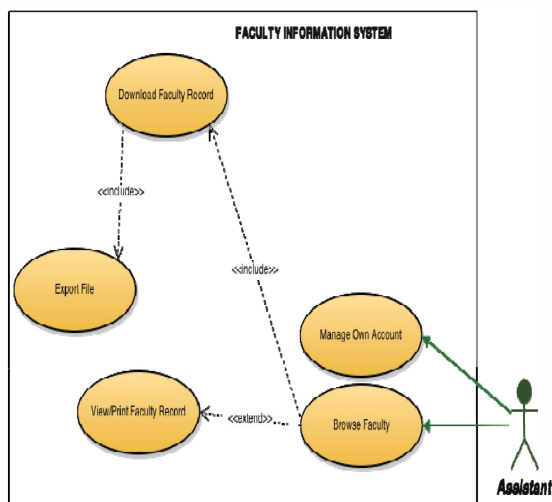


Fig. 8. Use Case Diagram of the Assistant

on to the database, identification of new potential user, new sets of generated reports, etc. Currently, the FIS is being managed by the Computer Technology department in partnership with the Quality Management Office (QMO) where they work together in enhancing and evaluating the system. The system is designed using RAD, thus, constant monitoring for possible improvement and maintenance is constantly being performed.

## V. SUMMARY AND CONCLUSION

The FIS is developed to aid the college and department in preparing faculty documents before and during accreditation. It does manage, store and retrieve faculty data needed to comply for requirements in applying and passing the accreditation process. The FIS serves as a venue to faculty, college dean, department chairs, and QMO officer to constantly update the faculty information without getting annoyed of multiple copies of files, repetitive submission, and produce reports relevant to the needs of the accrediting agency.

It is web-based, making it accessible at any given time. In a more profound sense, it is also more manageable as it places generally minimal requirements on the users' end. The system front-end offers relevant user interfaces that enable easy and dynamic user to system interaction. In the future, it may be considered that development of mobile counterparts that use widely popular mobile technologies and platforms to encourage more flexibility and function.

The FIS has eight (8) modules that are used distinctively by four (4) types of users: the System Administrator, Manager, Faculty and Assistant.

At present, the system is running on Ubuntu<sup>3</sup> server and can only be accessed within DLSU. In the future, it shall be integrated into the university's portal to allow single username/password to access and use the system.

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<sup>3</sup> Flavor of a Linux Operating System