International Journal of Innovation, Creativity and Change. www.ijicc.net
Volume 8, Issue 7, 2019

A Decision Support System for Academic Ranking, Classification and Promotion for the Faculty of Universidad de Zamboanga

Neil Mark Z. Bacasong[a], Dante D. Dinawanao[b], [a]Universidad De Zamboanga, [b]Mindanao State University-Iligan Institute of Technology, Email: [a]neilmark.bacasong@uz.edu.ph, [b]dante.dinawanao@g.msuiit.edu.ph

This study focuses on the development of a Decision Support System (DSS) for Universidad de Zamboanga in faculty ranking in its aim of promoting quality educators. Since faculty ranking appointment is a position based on hierarchy, there were four phases that were considered in the development of the project: first is modelling of the academic problem, the second is translating the modelled academic problem to prologue notations for generating facts, rules and queries for the ranking process; third is developing a system through prototyping and fourth is the testing and evaluation of the DSS. The DSS uses the technique of First Order Predicate Logic (FOPL) which is translated to prologue rules, facts and queries as a knowledge base in generating academic rank of a specific faculty based on the academic minimum requirements or points acquired. These rules, facts and queries are created through web-based interface by user inputs that is stored in a database using MySQL. Prologue was used as an inference engine to give the actual result wherein a set of data fields is asked by the system to be filled by the user. The DSS handles in the creation of academic ranks and points that makes it dynamic. The DSS generates reports as the actual rank of a faculty member based on minimum requirements or points as accumulated from the score sheet which has ranking criteria and percentage weights.

Key words: *Ranking, First Order Predicate Logic (FOPL), Prototyping, Decision Support System (DSS).*

Introduction

Any organisation, particularly academic institutions that gives premium to its employees' promotion and career advancement instils in its employees a sense of being cared for and the employees in return, perform better and gain confidence in their daily tasks; as shown by compelling evidence in a number of research studies. Needless to say, employee promotion is vital for an organisation to function efficiently and to achieve its mission, goals and objectives. But, not all employees can be promoted at once, according to Heathfield (2015), it is the responsibility of the organisation to come up with a decision in an employee promotion.

Decision making, is the concept of identifying and choosing alternatives based on the values and preferences of the decision maker. Making a decision implies that there are alternative choices to be considered and does not only identify as many of these alternatives as possible, but chooses the one that best fits with the goals, objectives, desires and values set by the organisation (Harris 2012). Thus, making a good decision will help the organisation face the challenges and focus on the futures demand. The organisation then has to utilise an established method in decision making.

A Decision Support System (DSS) is one effective method that helps the organisation in decision making. A DSS is specifically designed to allow end-users to perform their own computer-generated data analyses (Pondal and Tucker 2002). Therefore, DSS generates decisions in an instant based on the given data, an intelligent system like DSS will help provide rapid support in the decision making of an organisation.

In the Manual of Regulations for Private Higher Education (MORPHE), the Article VIII, Section 38, for faculty classification and ranking states that "Academic teaching positions shall be classified in accordance with academic qualifications, training and scholarship, preferably into Professor, Associate Professor, Assistant Professor, and Instructor, without prejudice to a more simplified or expanded system of faculty ranking, at the option of the institution. An academic teaching personnel, who does not fall under any of the classes or ranks indicated in the preceding paragraph shall be classified preferably as professorial lecturer, guest lecturer, or any other similar academic designation on the basis of his qualifications." (MORPHE 2008). With that, the Universidad de Zamboanga (UZ) established a policy regarding the said regulation as mandated by the Commission on Higher Education (CHED) for private institutions as well as the Technical Education and Skills Development Authority (TESDA).

Faculty appointments are classified according to rank. Ranking is a position in a hierarchy. This rank is stated on MORPHE 2008 in Article VIII, Section 38 for faculty classification and ranking. The importance of having the rank is for a faculty to be classified and be granted

tenure. The parameters of ranking, classification and promotion of faculty members are the following: Educational Qualification and Professional License, Scholarly Achievements and Research, Teaching Effectiveness, Work Experiences and Trainings Attended and lastly, Professional Affiliations, Community Extension Services and Awards.

The importance of ranking, promotion and classification is to maintain the university status and at the same time it would help the institution to promote quality education through quality educators and boost the teacher's morale (ARCPG 2014).

At present, The University comprises of two (2) high schools the Arturo Eustaquio Memorial Science High School (AEMSHS) and UZ-Technical High School (UZ-THS), six (6) colleges, Including School of Allied Medicine (SAM), School of Education, Arts and Sciences (SEAS), School of Business and Management (SBM), School of Criminal Justice, School of Engineering and Information, Communication and Technology (SEICT), Graduate School and the Institute of Technical (ITE). The total population of faculty for the school year 2015-2016 is about 220. The Universidad de Zamboanga processes academic ranking, promotion and classification based on the manual system. Every faculty member must submit documents through the Academic Ranking, Classification and Promotion Committee (ARCPC). Hence, the manual computation of weights for each faculty member for classification, ranking and promotion may lead to error and as the desired ranks get higher, the ranking process gets longer due to the bulk of credentials to be verified as the basis for the ranking process. According to the ARCPC chairman, it takes a minute to an hour to evaluate a faculty member with the bulk of credentials submitted and sometimes it leads to human error if not verified during the ranking process.

To eradicate the observed problem, the advancement in technologies is seen to be of help. The machine can solve the problem or carry out processes that are time consuming or repetitive enough, which may lead to errors. Humans are prone to error due to the fatigue that humans may suffer (Bourbakis, N. G. 1992).

Framework of the Study

Figure 1.1. Conceptual Framework of the study

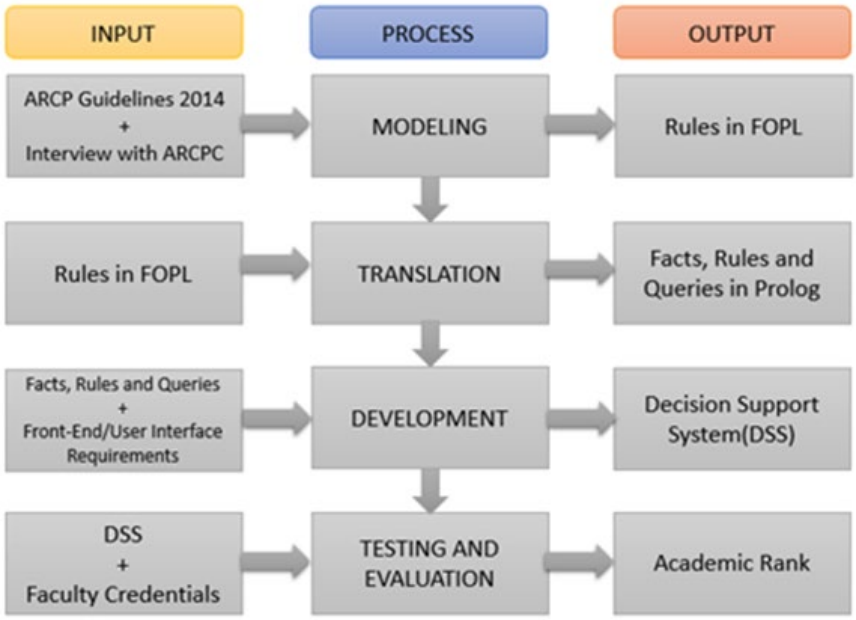


Figure 1.1 defines the development process of the prototype, each process representing the flow on the development of the prototype. In every layer of the process requires inputs to proceed to the next process, from modelling to testing and evaluation that resulted in an academic rank of the faculty members.

Objectives of the Study

General Objective

To develop a decision support system for academic ranking, classification and promotion for the faculty members of Universidad de Zamboanga is based on the academic classification and promotion guidelines from 2014.

Specific Objectives

The specific objectives of the study include the following:

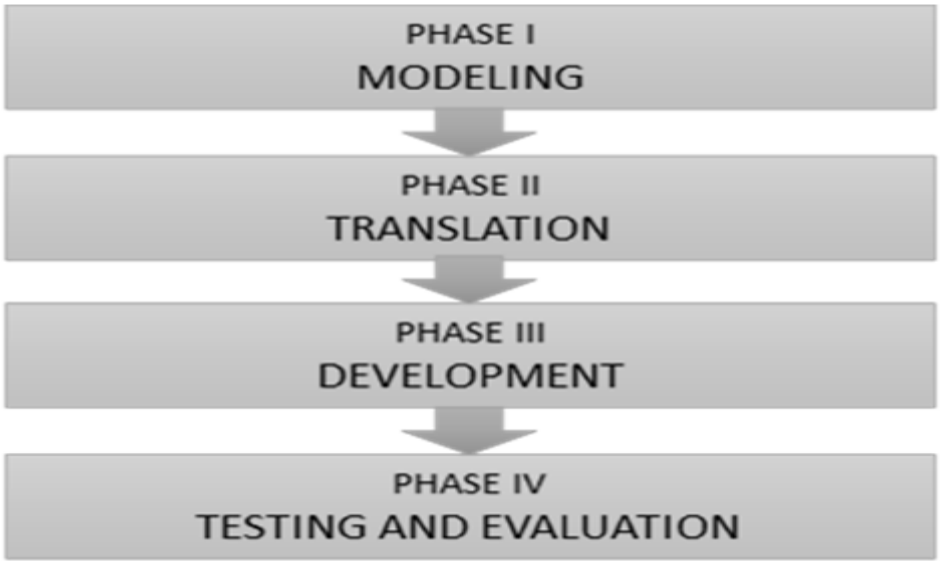
1. To understand the existing policies for academic ranking, classification and promotion of faculty members.
2. To express the academic ranking, classification and promotion problem in First-Order Predicate Logic and to create a translator for its corresponding facts, rules and queries in a logic programming language.
3. To design the system architecture of the proposed decision support system.

4. To implement the different subsystems of the proposed Decision Support System using web and database technologies and logic programming.
5. To test and validate the Decision Support System using synthetic employee data.

Methodology

This chapter discusses the methodology used in the study. This includes four different phases. Phase I is the Modelling Phase which includes the data gathering, data analysis and modelling the academic rank; Phase II is the Translation Phase which includes the translation of the modeled academic rank to logic programming language; Phase III is the Development Phase which follows the software methodology prototyping; and Phase IV is the Testing and Evaluation of the prototype which includes initialisation of the system and use case scenario testing.

Figure 1.2. Project Methodology Flowchart



Phase 1: Modelling

This phase discusses the process of acquiring information through data gathering followed by data analysis in modelling the academic ranking problem.

An actual oral interview with the ARCPC, was conducted in order to gather information. There was brainstorming among the interviewer, ARCPC chairman and the staff for clarification on how the project will run for development. As part of the data gathering process, documents were requested for analysis concerning academic ranking and promotion of the faculty members.

Document Analysis was performed for the ranking process in the Universidad de Zamboanga for School of Engineering and Information Communications Technology following the ARCP Guidelines 2014 that was forwarded to the researcher for modelling the academic problem.

Modelling Academic Problem to FOPL

First-Order Predicate Logic (FOPL) is a set of rules which can be applied as an aid in decision making (Chen 2000). FOPL is a predicate logic, which takes only one individual as an argument and quantifier to only bind individual variables (Lu and Mead 2013). First-order Predicate logic models the world in terms of Objects, Properties, Relations and Functions (Russell & Norvig 1995). In modelling an academic problem, consider an example of academic rank University Professor 3, equation 1 is the conversion from English to FOPL Model.

English

University Professor 3 who has the minimum requirements of the Relevant Doctorate degree and published book or acquired points range from 98 to 100.

FOPL

Phase 2: Rules

$$\exists x \exists y[(universityprofessor3(x,y) \Rightarrow (has(x,relevantdoctorate) \wedge has(x,publishedbook)) \vee (y \geq 98 \wedge y \leq 100))]. \quad (1)$$

Translation

This phase describes the way how to translate the academic problem from FOPL model to logic programming syntax.

Expressing the Academic Problem in FOPL

The decision support system model was expressed in the form of first order predicate logic notation. As mentioned by McCluskey, L. (1997), in an online lecture, a set of rules applying the concept of First Order Predicate Logic can be converted to Prologue rules since the syntax is quite similar.

Since academic problem can be a model in FOPL and FOPL can be converted to prologue syntax. Which will serve as an introductory approach in expressing academic ranking, classification and promotion problem to FOPL. The Syntax in equation 2 shows the model

for University Professor 3 who has the minimum requirements of the Relevant Doctorate degree and published book or acquired points range from 98 to 100 in FOPL and express in Prologue as shown in equation 3.

FOPL

$$\exists x \exists y[(universityprofessor3(x,y) \Rightarrow (has(x,relevantdoctorate) \wedge (has(x,publishedbook)) \vee (y \geq 98 \wedge y \leq 100))]. \quad (2)$$

PROLOGUE

```
universityprofessor3(Faculty,Points):-                    (3)
 has(Faculty,relevantdoctorate),
 has(Faculty,publishedbook);
 Points 98, Points =<100.
```

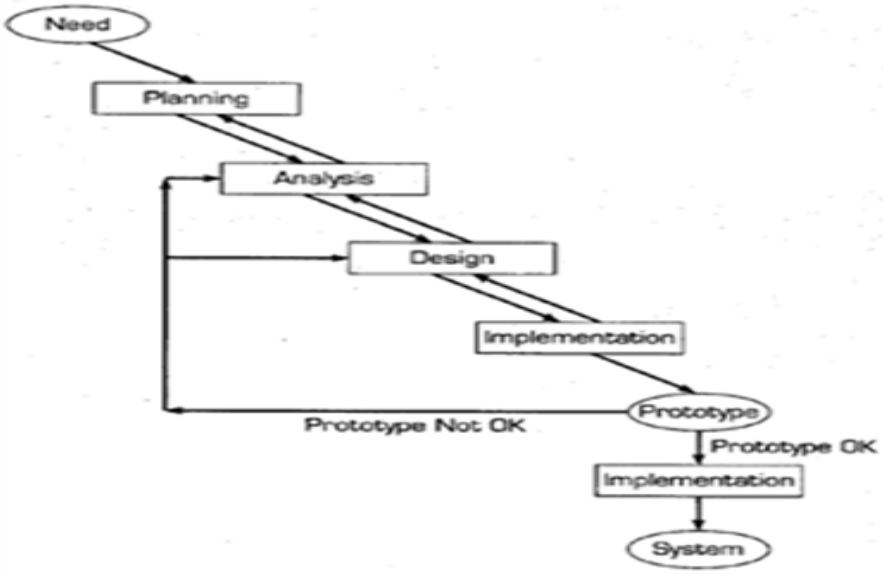
Phase 3: System Development

This phase describes the process on the development of the system following the software methodology prototyping.

Prototyping

The project was developed with the use of prototyping as one of the methodologies in the application development. Prototyping performs planning, analysis, design and implementation as phases can perform concurrently upon development. The Figure 3.2 shows how prototyping works (Turban, Aronson, & Liang, 2005). The researcher decided to use this model due to its advantages in terms of phases that can be performed concurrently.

Figure 1.3. Prototyping (Turban, Aronson, & Liang, 2005)



Planning and Analysis

In these phases, the ideas were scrutinised based on the project that was developed. Gathering of information was followed to determine the functional and non-functional requirements and user requirements of the project.

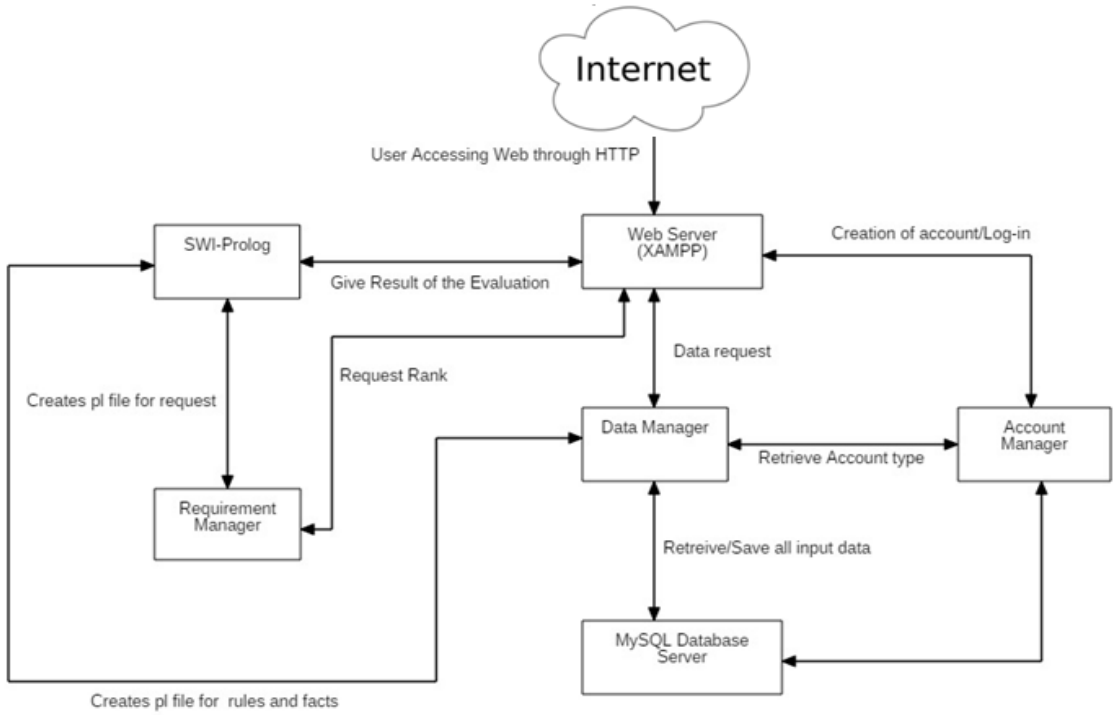
Design

This phase discusses the system architecture, database design and the prototype design.

System Architecture

The Server Architecture of ARCProS is composed of three main Servers, Namely; SWI-Prologue, XAMPP and MySQL database Server. The major functions of ARCProS is to interact with these servers, the three main modules are considered; Requirement Manager, Data Manager and Account Manager.

Figure 1.4. ARCProS Server Diagram



Account Manager

This controls the different users of the system. The admin and staff are the two user checklists for users' privileges. The admin account has the power to control the overall functionalities of the system while the staff account may have the same access with the admin account but it cannot create user accounts. These accounts are responsible for the creation of the major data input for the system to generate output.

Data Manager

This module provides interaction between the user and the system to access the database. It has the capability of data management through the account manager's request of data for requirements in translation of rules, facts and queries for academic ranking process as well as storing important data from the account manager. All data are saved to the database.

Requirement Manager

This module manipulates the translation of minimum requirements and points of an academic rank. The requirements are requested through data manager which is involved in getting important data in the generation of rules, facts and queries, and these data are created and saved through a prologue (.pl) file. Once the user requests for the translation of the minimum

requirements and points of the academic rank, the requirement manager will generate facts, rules and queries for SWI-Prologue and vice versa capture the actual result that would be generated. The prologue (.pl) file is not saved to the database and will be deleted after the academic rank was determined.

SWI-Prologue

The facts, rules and queries are organised through Requirement Manager that will be analysed by SWI-Prologue to perform decision making that would satisfy the user's needs.

Web Server (XAMPP)

XAMPP is used as its web server in the system, where it supports PHP programming language that handles connections on SWI-Prologue as well as phpMyAdmin for the database.

MySQL Database Server

PhpMyAdmin as bundled on the webserver stores important data in the system like user accounts, ranks, minimum requirements and points. In the translation of facts, rules and queries, data are captured in the database.

Database Design

Database and tables are available from the Human Resource Department which were taken for the creation of points, minimum requirements, score sheet points and translation of facts, rules and queries for ranking a faculty member.

Prototype Design

A web-based prototype was developed using PHP: Hypertext Preprocessor. HIPO represents the hierarchy of modules in the software system, it is a tool for planning and/or documenting a computer program (Rodney, 2012).

Implementation

The system was developed using Hypertext Preprocessor (PHP), JavaScript, Cascading Style Sheet (CSS), Notepad++, Apache, and SWI-Prologue. The mentioned tools are open source.

Results and Discussion

Modelling

In this phase general policies and guidelines for academic ranking, classification and promotion system were identified and modelling the academic guidelines into a notation.

General Policies and Guidelines (ARCPG, 2014)

A newly appointed faculty member is required to accomplish an application form for ranking or classification form immediately upon receiving the job offer. The classification happens every first semester and second semester and re-classification happens yearly. The newly appointed faculty member or a faculty member for classification will submit credentials as part of the process in ranking and classification. A faculty member may qualify for a higher position if the educational requirement corresponding to the ranks is complied with, and he/she has earned the total points needed for the next higher rank as referred to the Conversion Table.

Ranking a Faculty Member

The conversion table provided by the ARCP Guidelines 2014 can be seen in table 1.1. The minimum requirements or points of the specific academic rank are then used for initialisation of the system. Which means a faculty member may have an academic rank based on the minimum requirements or points acquired.

Table 1.1: ARCP Guidelines 2014 Conversion Table

Academic Rank	**Minimum Requirements**	**Points**
University Professor 3	Relevant Doctorate degree with book published	98-100
University Professor 2	Relevant Doctorate degree with book	95-97
University Professor 1	Relevant Doctorate degree with book	92-94
Professor 4	Relevant Doctorate with research published in accredited/ referred journals	88-91
Professor 3	Relevant Doctorate with research	86-87
Professor 2	Relevant Doctorate with research	83-85
Professor 1	Relevant Doctorate degree Full-fledged	80-82
Associate Professor 5	Passed comprehensive exams (Relevant Doctorate Degree)	76-79
Associate Professor 4	Complete Academic Requirements (Relevant Doctorate Degree)	72-75
Associate Professor 3	Complete Academic Requirements (Non-relevant Doctorate Degree)	68-71

Associate Professor 2	Relevant Master's Degree earned with research	64-67
Associate Professor 1	Non- Relevant Master's Degree earned with research	60-63
Assistant Professor 5	Relevant Master's Degree Full-fledged	55-59
Assistant Professor 4	Relevant Master's Degree (Comprehensive Exam Passed)	50-54
Assistant Professor 3	Relevant Master's Degree (CAR)	45-49
Assistant Professor 2	Non- Relevant Master's Degree Full-fledged	40-44
Assistant Professor 1	Non- Relevant Master's Degree (Comprehensive Exam Passed)	35-59
Instructor 4	Non- Relevant Master's Degree (CAR)	30-34
Instructor 3	With MA/MS units (at least 15 units)	25-29
Instructor 2	Bachelor's with license	20-24
Instructor 1	Bachelor's degree	15-19

Acquisition of Points

The percentage weights in acquiring points for each faculty member. This weight percentage is computed based on the credentials submitted. A breakdown of points for each item (ranking criteria) is computed via summary score sheet where a maximum of 100 points is multiplied on the percentage weights of each item to determine the total points of all the items acquired by the faculty member.

Table 1.2: ARCP Guidelines Ranking Criteria and Percentage Weights

Ranking Criteria	Percentage Weights
Educational Qualification and Professional License	35%
Scholarly Achievements and Research	20%
Teaching Effectiveness	15%
Work Experiences and Training Attended	20%
Professional Affiliations, Community Extension Services and Awards	10%
Total=	100%

First-Order Predicate Logic (FOPL) is a set of rules that can be applied as an aid in decision making (Chen 2000). FOPL is a predicate logic which takes only one individual as arguments and quantifiers that only bind individual variables (Lu and Mead 2013). First-order Predicate logic models the world in terms of Objects, Properties, Relations and Functions (Russell & Norvig 1995).

The solution was to define the rank as a problem that needs a certain minimum requirements or points. The rank was then expressed to FOPL:

FOPL: $\exists x \exists z[(rank(x) \Rightarrow (has(x,z)]$ (4)

This means that for every **employee *x***, ***x*** has ***z***.

FOPL: $\exists x \exists y[(rank(x,y) \Rightarrow y \geq$ *to some positive INTEGER(a)* $\wedge y \leq$ *to some positive INTEGER(b))],* $a \leq b$. (5)

This means that for every ***employee x*** and ***points y***, ***y*** has a value ranges ***a to b*** for some positive integer.

FOPL: $\exists x \exists y \exists w \exists m[(parameterpoints(x,y,w) \Rightarrow (m*0.35,has(x,y,w),m) \wedge w=sum\_of\_all(m))]$. (6)

This means that ***parameterpoints w*** is obtained by the summation of ***m*** *and* multiplied by 0.35 for parameter 1**.**

FOPL: $\exists x \exists y \exists w \exists m[(parameterpoints(x,y,w) \Rightarrow (m*0.25,has(x,y,w),m) \wedge w=sum\_of\_all(m))]$. (7)

This means that ***parameterpoints w*** is obtained by the summation of ***m*** *and* multiplied by 0.25 for parameter 2**.**

FOPL: $\exists x \exists y \exists w \exists m[(parameterpoints(x,y,w) \Rightarrow (m*0.15,has(x,y,w),m) \wedge w=sum\_of\_all(m))]$. (8)

This means that ***parameterpoints w*** is obtained by the summation of ***m*** *and* multiplied by 0.15 for parameter 3**.**

FOPL: $\exists x \exists y \exists w \exists m[(parameterpoints(x,y,w) \Rightarrow (m*0.15,has(x,y,w),m) \wedge w=sum\_of\_all(m))]$. (9)

This means that ***parameterpoints w*** is obtained by the summation of ***m*** *and* multiplied by 0.15 for parameter 4**.**

FOPL: $\exists x \exists y \exists w \exists m[(parameterpoints(x,y,w) \Rightarrow (m*0.10,has(x,y,w),m) \wedge w=sum\_of\_all(m))]$. (10)

This means that ***parameterpoints w*** is obtained by the summation of ***m*** *and* multiplied by 0.10 for parameter 5**.**

Translating

The basis in the creation of rules in SWI-Prologue is from the representation of FOPL, as mentioned by McCluskey, L. (1997). First Order Predicate Logic is a generalisation of Propositional Logic and Logic program is written into a sub-language of FOPL. Prologue as described by Endriss (2013) defines the world by simply stating the facts.

FOPL: *∃x∃z[(rank(x)⇒(has(x,z)]* (11)
PROLOGUE:*instructor1(Faculty):-*
has(Faculty,bachelors).

This means that a Faculty is instructor 1 in rank if they have bachelor's degree

FOPL: *∃x∃y[(rank(x,y)⇒y≥to some positive* (12)
INTEGER(a)∧y≤to some positive
INTEGER(b))],a≤b.
PROLOGUE:instructor1(Faculty,Points):-
Points>=15,Points =<19.

This means that a Faculty is instructor 1 in rank if they have acquired points from the range of 15 to 19.

FOPL: *∃x∃y∃w∃m[(parameterpoints(x,y,w)* (13)
*⇒(m*0.35,has(x,y,w),m)∧*
w=sum_of_all(m))].
PROLOGUE:*pointsA1(Idfaculty,Parameter,P):-*
*findall(Points*0.35,has(Idfaculty,Parameter,Points),Points),tota*
l_points(Points,P).

This means that parameterpoints A1 is obtained by the summation of Points and multiplied by 0.35 for parameter A1.

FOPL: *∃x∃y∃w∃m[(parameterpoints(x,y,w)* (14)
*⇒ (m*0.25,has(x,y,w),m)∧*
w=sum_of_all(m))].
PROLOGUE:*pointsB1(Idfaculty,Parameter,P):-*
*findall(Points*0.25,has(Idfaculty,Parameter,Points),Points),total*
_points(Points,P).

This means that parameterpoints B1 is obtained by the summation of Points and multiplied by 0.25 for parameter B1.

FOPL: $\exists x \exists y \exists w \exists m[(parameterpoints(x,y,w) \Rightarrow (m*0.15,has(x,y,w),m) \wedge w=sum\_of\_all(m))]$. (15)

PROLOGUE:
```
pointsC1(Idfaculty,Parameter,P):-
findall(Points*0.15,has(Idfaculty,Parameter,Points),Points),total
_points(Points,P).
```

This means that parameterpoints C1 is obtained by the summation of Points and multiplied by 0.15 for parameter C1.

FOPL : $\exists x \exists y \exists w \exists m[(parameterpoints(x,y,w) \Rightarrow (m*0.15,has(x,y,w),m) \wedge w=sum\_of\_all(m))]$. (16)

PROLOGUE:
```
pointsD1(Idfaculty,Parameter,P):-
findall(Points*0.15,has(Idfaculty,Parameter,Points),Points),total_
points(Points,P).
```

This means that parameterpoints D1 is obtained by the summation of Points and multiplied by 0.15 for parameter D1.

FOPL : $\exists x \exists y \exists w \exists m[(parameterpoints(x,y,w) \Rightarrow (m*0.10,has(x,y,w),m) \wedge w=sum\_of\_all(m))]$. (17)

PROLOGUE:
```
pointsE1(Idfaculty,Parameter,P):-
findall(Points*0.10,has(Idfaculty,Parameter,Points),Points),total_
points(Points,P).
```

This means that parameterpoints E1 is obtained by the summation of Points and multiplied by 0.15 for parameter E1.

Development

Prototyping performs planning, analysis, design and implementation as phases can perform concurrently upon development (Turban, Aronson, & Liang, 2005).

The system was developed using Hypertext Preprocessor (PHP), JavaScript, Cascading Style Sheet (CSS), Notepad++, Apache, and SWI-Prologue. The mention tools are open source.

System Testing and Evaluation

Testing of the system is done locally by running the Apache web server (XAMPP) and accessing the url http://localhost/arcpros. The system undergoes several tests to check the stability of the actual output through observation. The ARCP Guidelines 2014 of Universidad de Zamboanga are initialised through a web-based interface for easy setup of facts, rules and queries for ranking processes. A sample faculty member dummy data was evaluated to test how the academic rank was generated based on the minimum requirements or points acquired.

Initialisation of the System

ARCP Guidelines 2014 for the School of Engineering and Information Communications Technology of Universidad de Zamboanga was used as the basis for the creation of an academic rank with its minimum requirements or points and store in the database, See Conversion Table 1.1.

Figure 1.5. Adding of Rank with its minimum requirements and points User Interface

Figure 1.6. Adding of Points User Interface

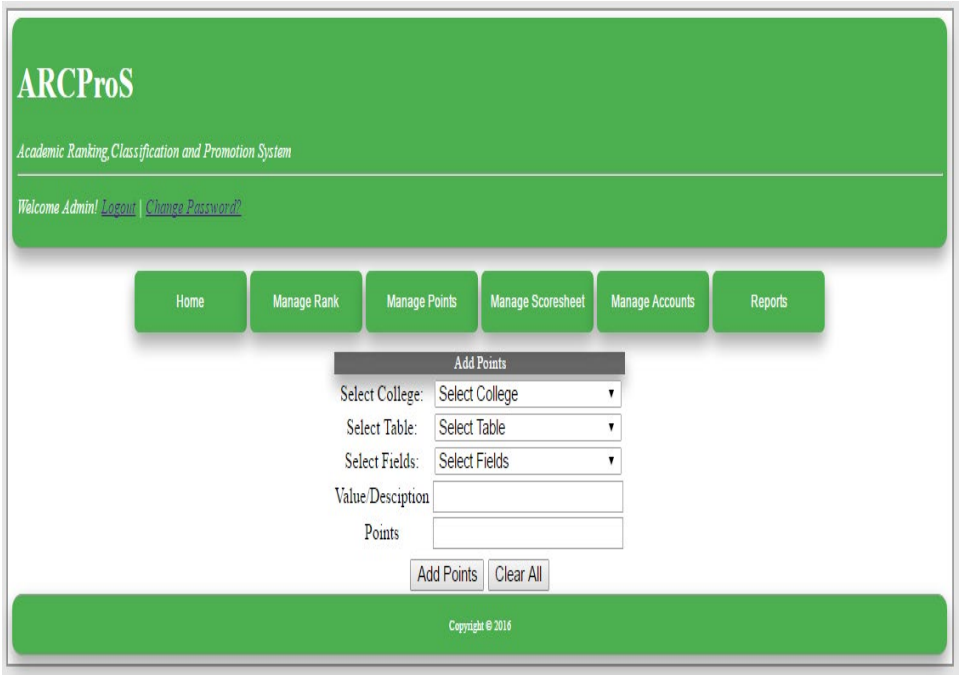


Figure 1.5 and Figure 1.6 show the user interface for the data entry of the important information in ranking process. The user input the details on the fields and saved these to the database.

Evaluating a Faculty Member (Academic Ranking)

A scenario test case was performed and testing was done using a dummy data of a faculty member with id number 34172890 which was loaded on the database for faculty ranking process.

Figure 1.7. Scenario test case for Employee ID 34172890

PARAMETERS/ CRITERIA	MAX POINTS	DESCRIPTION	POINTS EARNED
A. EDUCATIONAL QUALIFICATION & PROFESIONAL LICENSES (35%)			
A.1 Highest Educational Attainment	90	Doctorate Degree (Full-fledged) (Relevant) - 90pts	90
A.2 Professional Licenses	10	Civil Engineering Examination (Board Exam)	10
A.3 Plus Factor	10	Masters of Engineering at WMSU 1995 (Masters) - 4pts BS Civil Engineering at UZ 1990 (Bachelor) - 3pts	7
	100		100 (35%)

B. SCHOLARLY ACHIEVMENTS AND RESEARCH (25%)			
B.1 Research Study Completed	30	Research on Building Design for DRRM 2016 (Single Author) - 15pts Research on Road Construction 2017 (Single Author) - 15pts Engineering Research For Building Foundation Solution(Co-author) 2015 (Co-Authorship) - 7pts Engineering Research For Urban Planning(Co-author) 2015 (Co-Authorship) - 7pts	30
B.2 Book Written and Published	25	The Concepts Building Desin 2013 (Single Author) - 12.5pts The Road Construction and Safety 2013 (Single Author) - 12.5pts	25
B.3 Instructional Materials Produced	15	Module for Basic AUTOCAD 3D Modelling - 5pts Module for Construction and Material - 5pts Module for OHS - 5pts	15
B.4 Articles Published In Journal	10	Research Article in Urban Planning - 5pts Research Article in Building Design - 5pts Research Article in Building Design for Disaster Ready - 5pts	10
B.5 Paper Presentation in Forum	10	Japan International Paper Presentation 2015 - 5pts PICE National Paper Presentation - 4pts ARC Conference-Regional - 2pts	10
B.6 Resource Speaker	10	National Seminar on Bridge Construction and Development - 4pts National Speaker on PICE Society - 4pts In-House Basic On AUTOCAD 3D Modelling - 1pts In-House Seminar on Surveying - 1pts	10
	100		100 (25%)
C. TEACHING EFFECTIVENESS (15%)			
	S.Y. 2016 - 2017: 1st: 96, 2nd: 99 / S.Y. 2015 - 2016: 1st: 99, 2nd: 98 / S.Y. 2015 - 2014: 1st: 99, 2nd: 97		
	100		98 (14.7%)

D. WORK EXPERIENCES & TRAININGS ATTENDED (15%)			
D.1 Teaching Experience	40	FT Teaching in UZ (18 yr(s)) - 2pts/yr FT Teaching in other Schools (1 yr(s)) - 1pts/yr PT Teaching in UZ (1 yr(s)) - 0.75pts/yr PT Teaching in other Schools (1 yr(s)) - 0.5pts/yr	38.25
D.2 Trainings Attended	20	National OBE Training for Engineering - 5pts National OHS Training - 5pts Local AutoCAD Training - 3pts	13
D.3 Managerial Experience	20	Dean for 3yr(s) - 15pts Department Head for 4yr(s) - 12pts Level Adviser for 14yr(s) - 10pts	20
D.4 Institutional Services	20	Adviser Student Supreme Council - 5pts Adviser UNYAP - 5pts Adviser of Club(PICE)- UZ Chapter - 5pts Research Adviser- BSCE - 4pts SEICT BASEBALL-COACH - 2pts	20
	100		91.25 (13.69%)
E. PROFESSIONAL AFFILIATIONS, COMMUNITY EXTENSION SERVICES & AWARDS (10%)			
E.1 Participation in CES	50	School Organizer-Gift Giving for Community - 15pts Mass Blood Donation 2011-School Initiated - 10pts School Organizer-Life Skill Training for Adopted barangay - 15pts Mangrove Planting-Community Participant - 5pts Feeding Program-Community Participant - 5pts	50
E.2 Involvement in Religious, Civic, Cultural & Professional Organizations	20	PICE-International Member - 10pts UZ-COOP OFFICER - 2pts GRAND MASON-National Member - 5pts Faculty Club Officer-Local - 2pts UZ-ARCP Local Member - 1pts	20
E.3 Awards Received	20	PICE Awardee for Faculty-National - 3pts Bridge Prototype Competition Champion-National - 3pts National PRISAA- Baseball Champion - 3pts PICE Awardee -National - 3pts National QUIZ BOWL(PICE) Challenge Champion - 3pts National Statistics Quiz Bowl-Champion - 3pts ARC Conceference Best Paper-Regional - 2pts	20
E.4 Academic Honors Received	10	Summa cum Laude at UZ 1990 - 10pts	10
	100		100 (10%)

RECAPITULATION	
RANKING CRITERIA	TOTAL POINTS EARNED
A. EDUCATIONAL QUALIFICATION & PROFESSIONAL LICENSES	35%
B. SCHOLARLY ACHIEVMENTS AND RESEARCH	25%
C. TEACHING EFFECTIVENESS	14.7%
D. WORK EXPERIENCES & TRAININGS ATTENDED	13.69%
E. PROFESSIONAL AFFILIATIONS, COMMUNITY EXTENSION SERVICES & AWARDS	10%
GRAND TOTAL	98.39%

Back-end Result

A prologue file generated at the back-end for ranking a faculty member based on points acquired and minimum requirements. This is where the generation of rank based on the points acquired and based on the minimum requirements by the faculty member can be viewed.

Figure 1.8. Facts, Rules and Queries Generated for Minimum Requirements Ranking

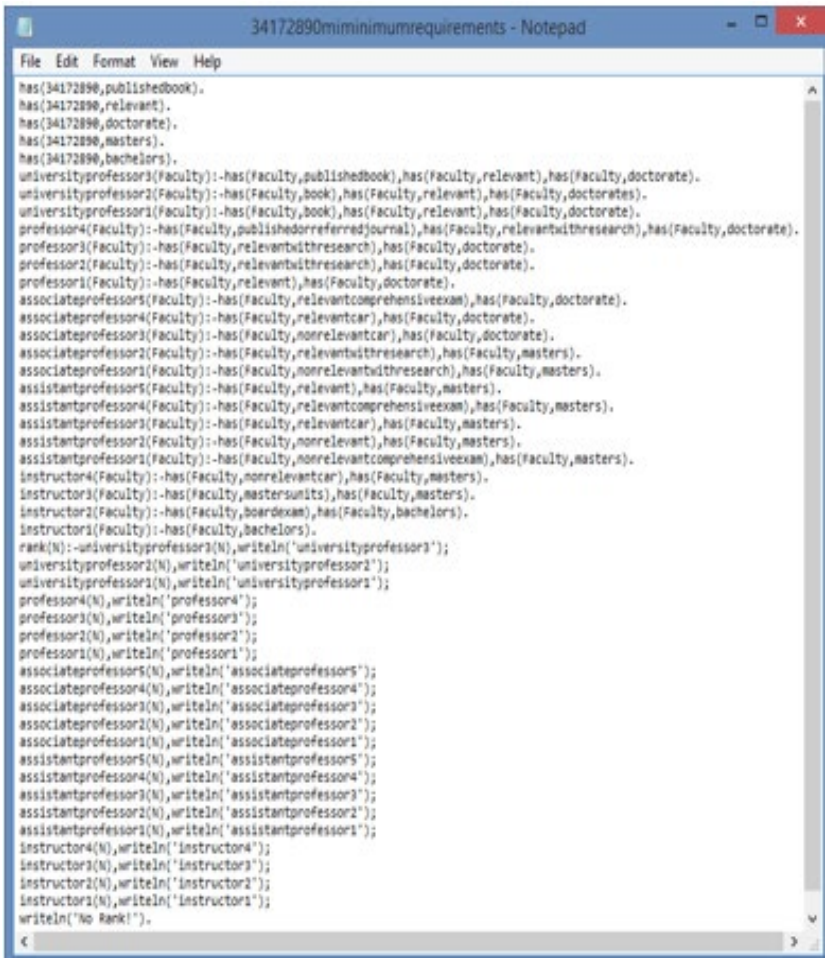


Figure 1.8 shows a prologue file generated at the back-end of the DSS for ranking a faculty member based on the minimum requirements.

Figure 1.9. Facts, Rules and Queries Generated for Points Ranking

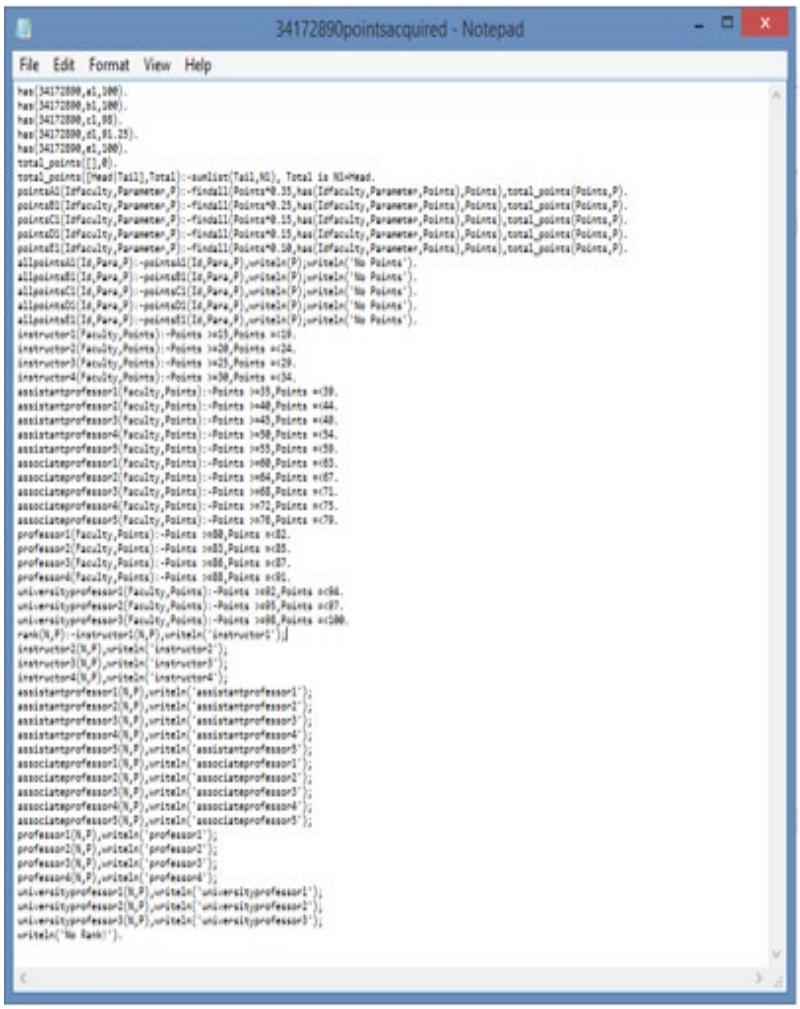


Figure 1.9 shows a prologue file generated at the back-end for ranking a faculty member based on points acquired. This is where the generation of rank based on the points acquired by the faculty member can be viewed.

Front-end Result

Figure 1.10. Result of the ranking process viewed in front-end

Validation from the Generated Result

Ten (10) random samples of faculty dummy data (credentials) were used for testing on the DSS prototype to generate rank on different credentials as shown on the Table 1.3. The faculty credentials were inputted on the database such as Educational Qualification, Professional License, Scholarly Achievements and Research, Teaching Effectiveness, Work Experiences, Training Attended, Professional Affiliations, Community Extension Services and Awards.

Table 1.3: Validation of the results based on scenario test

Faculty ID	Points Acquired from testing	Generated Rank from test	Generated Rank from Prototype
34172890	98.39	University Professor 3	University Professor 3
29928401	92.6	University Professor 1	University Professor 1
42172342	88.07	Professor 4	Professor 4
39172603	80.48	Professor 1	Professor 1
20123594	76.04	Associate Professor 5	Associate Professor 5
28982005	62.49	Associate Professor 1	Associate Professor 1
23344206	58.59	Assistant Professor 5	Assistant Professor 5
29183007	38.66	Assistant Professor 1	Assistant Professor 1
20180208	31.24	Instructor 4	Instructor 4
20172009	18.75	Instructor 1	Instructor 1

The basis of validation of ranking process is in accordance with the academic ranking, classification and promotion guidelines from 2014. Each scenario test was checked manually and validated from the generated score sheet and academic rank.

Conclusions

The Academic Ranking Classification Guidelines 2014 of Universidad de Zamboanga was used as basis in the development of the ARCProS prototype. The academic rank of the faculty member was evaluated through its corresponding minimum requirements and points acquired from the ARCPG 2014.

The problem of academic ranking, classification and promotion was modelled in First Order Predicate Logic and translated to logic programming language. The ARCProS can dynamically generate facts, rules and queries out of the data that were entered by its user. These rules correspond to the rank, its minimum requirements, and points which will then evaluate to an academic rank.

Based on the testing and evaluation, the system prototype was able to deliver the requirements of the ARCP Committee to generate the ranks of faculty members who will be

subjected for evaluation. However, there are still areas of the prototype that need improvement.

Acknowledgments

The researcher wishes to extend his most sincere and warmest gratitude to the following important people and institutions behind his success:

CHED (Commission on Higher Education) for the scholarship grant awarded to the researcher;

Project adviser, **Prof. Dante D. Dinawanao,** for his time and effort, remarkable encouragement and support to the very end of this study;

The Dean of School of Computer Studies, **Dr. Adrian P. Galido,** The Dean of School of Graduate Studies **Dr. Alita T. Roxas** and **Prof. Orven E. Llantos**, SCS Graduate Coordinator, for their guidance and intellectual support;

Prof. Rabby Q. Lavilles, **Prof. Alquine Roy Taculin** and **Prof. Erik Louwe R. Sala** for their motivation and intellectual contribution to the entire study;

Universidad de Zamboanga, for the valuable motivation and encouragement given to the researcher;

The Vice President for Academic Affairs of Universidad de Zamboanga**, Dr. Bashiruddin A. Ajihil**, for the support to his entire studies in MSU-IIT and the Dean of the School of Engineering, Information and Communications Technology (SEICT) and Institute of Technical Education(ITE);

Dr. Hataie O. Adjok and **Ms. Yolynne N. Medina**, for their trust and confidence in the ability of the researcher to pursue the project;

Dr. Charina F. Paragas, **Ms. Delia Ruxana B. Ismael** and **Mr. Jan Michael A. Sacro** for their intellectual critiquing and ideas that substantially enhanced the content and forms of this study;

The Head of Human Resource Department of Universidad de Zamboanga, **Ms. Pamela A. Santos**, for her acceptance to conduct this study;

Panel Member, **Dr. Cenie M. Vilela-Malabanan,** for her guidance and support, encouragement and sharing her intellectual support to this study;

References

Heathfield, S. M. (June 2015). A Promotion Rewards an Employee for Work Contributions, Retrieved May 14 ,2015, from http://humanresources.about.com/od/glossaryp/g/promotion.htm.

Harris,R. (June 2012). Introduction tp Decsion Making.http://www.virtualsalt.com/crebook5.htm Ponedal,S., & Tucker,M.(2002). Understanding Decision Support Systems. https://www.researchgate.net/publication/240628976_Understanding_Decision_Support_Systems

CHED-MORPHE (2008). Manual of Regulations Private HEIs, Published by Jyro Triviño on www.srcibed.com, October 12, 2013.

Bourbakis, N. G. (1992). Artificial intelligence methods and applications. Singapore: World Scientific.

Chen, Z. (2000). Computational intelligence for decision support. Retrieved from http://cdn.preterhuman.net/texts/science_and_technology/artificial_intelligence/ Computational Intelligence for Decision Support - Chen.pdf

Lu, J., & Mead, J. J. (2013). Prologue A Tutorial Introduction. Retrieved March 18, 2016, from www.cs.ukzn.ac.za/~hughm/ai/readings/PrologueIntro.pdf

Russell S.J., & Norvig P. (1995). Artificial intelligence : a modern approach. http://stpk.cs.rtu.lv/sites/all/files/stpk/materiali/mi/artificial%20intelligence%20a%20modern%20approach.pdf

McCluskey, L. (November 1997). A Brief look at First Order Predicate Logic and Prologue. Retrieved March 25, 2016, from https://helios.hud.ac.uk/scomtlm/cam326/logic/node2.html#SECTION00020000000000000000

Turban, E., Aronson, J. E., & Liang, T. (2005). Decision support systems and intelligent systems. Retrieved from http://dl.lux.bookfi.org/genesis/785000/fddd23bb6a87e93be735921ca07d0512/_as/[Efraim_Turban_,Jay_E._Aronson_,Ting_Peng_Liang]_D(BookFi.org).pdf