Software Requirement Specifications

1. Introduction

1.1 Purpose

This Software Requirements Specification describes the requirements for Postgraduate Information Management System. It explains the basic functionalities of the system such as application, registration, student's progress and finance monitoring. The system is intended to both students and staffs who will be involved in tracking all matters related to postgraduate training.

1.2 Document Conventions

- All requirements have same priorities.
- We assume that there is no existing system or SRS document for the similar system.
- This Software Requirements Specification document is written based on the general SRS template made by Karl E. Wiegers.

1.3 Intended Audience and Reading Suggestions

This document is intended to students, academic staffs, administrative staffs, system analysts and developers of the system whereby each of them have their own needs and uses of the system. Section 2 provides overall descriptions of the system, Section 3 provides external requirements, Section 4 provides features of the system and lastly Section 6 explains the non-functional requirements of the system.

Each section is divided into a number of subsections which provide useful insights about the system.

1.4 Product Scope

The PostGraduate Information Systems is the system for managing and monitoring postgraduate students and their schooling activities. The main purpose of this system is to track a student from the Application phase until she/he graduates including financial matters related to a

student.

The systems will allow the applicants to apply online and get instant feedback. Besides the online application, the system will have capabilities of performing procedures such as Admission, Registration and other matters related to Academics and Finance.

1.5 References

1 http://dotnetworkflow.onconfluence.com/display/EIDICG2011/Hardware+and+Software+Requirements

In this website, you can find the necessary information for hardware and software requirements

2 http://msdn.microsoft.com/en-us/library/ee658094.aspx [Accessed on 30th of November 2012].In this website, you can find enough iformation about software quality attributes.

3 Ian Sommerville.Software Engineering.6th Edition,2000.

2. Overall Description

For years, the College of of Information and Communication Technologies (CoICT),previously known as SICT, of the University of Dar es Salaam has been facing a problem related to the proper way of effective handling of postgraduate matters. The problem is associated with the following:

- Inefficient handling of student applications which includes instant validation and provision of automated feedback.
- Inefficient tracking of applicants' certificates for validation purposes.
- Inefficient tracking of payments (application fee, tuition fee,etc)
- Inefficient tracking of admission procedures.
- Inefficient tracking of student's progress especially during the dissertation/thesis period, something which compromises the effective implementation of college/university postgraduate training guidelines. Consequently, most of the PG students fail to graduate in time.This has resulted into an ideology whereby most of the supposedly prospective PG students do not consider our college as their highest priority when selecting institutions for their PG training.

In response to the above concerns, strategies for improvement were suggested. Among them is the development of the PG system.The system will automate the whole process of tracking and monitoring a PG student from application to graduation.The effect will be having an effective post graduate training whereby candidates will be graduating in time and hence attract more prospective students to chose CoICT as their destination for PG studies.

2.1 Product Perspective

The Postgraduate Information Systems is a new system that will work at the college level and will be later expanded to the directorate level. The system will be linked to the existing systems such as Academic Registration Information System (ARIS) which is a web-based application.

2.2 Product Functions

The PostGraduate Information System will provide the following functions:

1. Application: Advertisements and Application form to be online
2. Admission: Applicant's verification and admission process
3. Registration: Applicant's details confirmation and payments verifications
4. Academics: Student progress and Results
5. Finance: Managing fees such as application and tuition fees.

2.3 User Classes and Characteristics

Students: These users wants to track their study progress and outstanding payments. They will need basic computer knowledge.

Academic staffs: These users wants to track the postgraduate students whom they supervise. Only basic computer knowledge will be required by them.

Administrative staffs: These are the main important users of this system. They will handle online application, admissions, registrations, academics and finance matters. The basic understanding of computer will be required.

System analysts: These will analyse and design the system. They will also be involved in the system testing to see whether the system has been developed according to design specifications. Skills and knowledge on System Analysis and Design as well as System Testing will be required.

Developers: These will develop,test and deploy the system to the client. Programming knowledge and skills will be required. Advantages will be to those who have experience and use modern technologies.

2.4 Operating Environment

To be able to scale the system easily when necessary, the Postgraduate Information System will be a web based application developed on x86 basic computer using Linux Operating System. To account for portability, The system will also be able to run on Windows operating system,using

different kinds of browsers such as Mozilla Firefox, Google Chrome, Internet Explorer,etc..

2.5 Design and Implementation Constraints

- The design of the system considers the views of users who are working within the University of Dar es Salaam and particularly involved either directly or indirectly in the postgradate training activities.Also, previous, current and prospective postgraduate students at UDSM, CoICT have been taken into consideration.So the broader audience might not have been taken into consideration.However, since the flexible system architecture is expected to be produced, any new changes can be easily accomodated in the future.
- The system will be developed under limited time and schedule to meet the immediate needs.However, its flexible architecture will allow it to accommodate new changes in the future.
- The system will be developed using open source technologies for easy scaling and sustainability in the future.

2.6 User Documentation

The system will be delivered with the following documents:

1. User manual
2. Training Manual
3. Technical Manual to simplify future maintenance

2.7 Assumptions and Dependencies

Factors that can affect the requirements stated into this SRS documents are:

1. The system will be developed under Linux environment where some development tools depends on several factors to work.
2. Postgraduate procedures and regulations may not be changed.
3. The paper forms may not be easily changed unless stated otherwise by the university.

3. External Interface Requirements

3.1 User Interfaces

The system will have different interfaces. These interfaces includes Login Screen and Main Menu. The main menu will contain Application, Admission,Registration, Finance as well as Administration modules.Access to such modules will depend on privileges given to various categories of users. Each interface will be composed of buttons to facilitate updating,saving, confirming, searching, existing and some more related buttons.

3.2 Hardware Interfaces

The system will require a machine with minimum performance on the server side, while clients will need to be normal PCs.

Server machine minimum hardware requirements:

- Two Core 2 Duo, 2.4 GHz processors or higher with 4 GB RAM
  Recommended: Multiple Quad-core processors with 8GB+ RAM
- 50+ gigabytes hard drive space, SATA 7.2k RPM, 16MB cache
  Recommended: RAID, 32 MB cache
- LAN 100Mbps hardware connectivity
  Recommended: Multiple managed LAN cards at 1000Mbps
- *Recommended:* Servers with dual NICs, power supplies, RAID for fault tolerance

Client machine minimum hardware requirements:

- Core 2 Duo 2.6Ghz or equivalent CPU with 512+ MB RAM
- LAN 100Mbps hardware connectivity
- SVGA or better display resolution

3.3 Software Operational Requirements

The system will be able to run on both Linux and Window Operating Systems. For the better performance and security, we recommend the system to be installed into linux environment. Effective running of the system in the production environment will require the following software:

1. Database: PostGreSQL
2. PHP Libraries
3. Web browsers : Mozilla Firefox, Opera, Google Chrome
4. Development tools: Firebug, Web application development tools.

Client side programs (browsers) such Mozilla Firefox, Opera, Google Chrome and others will be required.

3.4 Communications Interfaces

To facilitate effective transfer of HTTP requests and responses, the system will require network or internet communication. Data will be transferred through network(s) using encryption in an

encrypted fashion.

4. System Features

The features of the Postgraduate Information System are organized into modules that will form the system. The functional requirements and services for each module are provided for better understanding of the system.

4.1 Application Module

This module will allow a user to make online application for various postgraduate programmes. Further, the user will be able to see programme advertising and an online application link.

4.1.1 Stimulus/Response Sequence

1. User Read an advertisement.
2. User create an account with username and password.
3. User login in into the system.
4. User clicks on application link.
5. Application form is displayed on the screen.
6. User fills and submits an application by clicking **submit** otherwise **save** and **exit.**
7. On submission of an application, an appropriate message will be displayed to her/him.

4.1.2 Functional Requirements

REQ-1: User must be connected to the internet and open a web browser
REQ-2: Data input verification should be done before another input can be provided
REQ-3: A user password must contain at least 8 characters with numbers
REQ-4: On application form submission, the system checks if an applicant meets minimum requirements for admission

4.2 Admission Module

This module will verify applicant's details and process admission
The system will be able to link with NECTA and UDSM to verify details submitted with applicants. When details are correct, the system will process admission and an applicant will get admission details.

4.2.1 Stimulus/Response Sequence

1. User clicks verify button.
2. A status message will be displayed.
3. In case of a valid status, the registration number will be generated.
4. Generate admission letter.

5 Send admission letter to applicants.

4.2.2 Functional Requirement
REQ-5: System must display status message to both users(successful and unsuccessful applicants)
REQ-6: NECTA and UDSM files must be in excel format.
REQ-6: Registration numbers will be assigned sequentially.
REQ-7: Admission letter should be sent to the successful applicant in pdf format.

4.3 Registration Module

This module will confirm applicant details and verify payments done by applicants.
The applicant details must be confirmed by himself/herself and system updates the information. Also the system checks that all necessary payments required have made.

4.3.1 Stimulus/Response Sequence

1 User accept admission letter by clicking the acceptance button.
2 User confirm details by clicking confirm button.
3 User enters the payment details and click submit.

4.3.3 Functional Requirements
REQ-8: System checks the payment details in comparison with the uploaded receipts.

4.4 Academics Module

This module will be linked with ARIS for tracking the academic progress for postgraduate students.
The system will be linked to ARIS to handle coursework matters. All the postgraduate students' matters such as supervision, progress reports, internal and external examination as well as graduation will be monitored by this module.

4.4.1 Stimulus/Response Sequence

4.4.1.1 Courseworks
1 User login into ARIS using a correct username and password
2 User can view and upload results.

4.4.1.2 Stundent's progress
1 User submits proposal

2 User submits proposal progress
3 User submits dissertation/thesis progress

4.4.1..3 Internal and External Examination
1 Examiners login using their credentials.
2 Examiners upload/download dissertation/thesis.
3 Examiners submit examination report.

4.4.1.4 Seminar
1 Display Seminar Calendar.
2 Post a Seminar date.
3 Register for Seminar date.

4.4.1.5 Graduation
1 User receives graduation notification.
2 The system displays the graduates list to the appropriate user

4.4.3 Functional Requirements

REQ-9: The system should be able to accept/reject documents with comments.
REQ-10: The system should be able to upload a proposal/thesis/dissertation
REQ-11: The system must track comments online
REQ-12: The system should send graduation notification automatically.

4.5 Finance Module

This module will track issues related to finance such as Application fees, Tuition Fees, Instructors' payments and Disbursements.
The module tracks application fee for applicants, Tuition fees and outstandings, payments to evening programme instructors,etc.

4.5.1 Stimulus/Response Sequence
1 Login into system.
2 On clicking Application fee payment button,display application fees status.
3 On clicking Tuition fee payment button,display Tuition fees status.
4 On clicking instructors' payment button,display Instructor payments status.

4.5.2 Functional Requirements

REQ-13: System sends notifications to students regarding outstanding fees.

REQ-14: User is granted privilege to access the finance module depending on his/her level.

4.6 Alumni Module

This module will track all graduates who went through the college postgraduate training process for the future contacts/communication. The module will inform the previous post graduate students about various events and activities related to the college.

4.6.1 Stimulus/Response Sequence

1 User receive information through using his/her email and/or mobile phone

4.6.2 Functional Requirements

REQ-15: System use updated contacts

5. Other Nonfunctional Requirements

5.1 Performance Requirements

As stated earlier, the system will run in a minimum performance machine. It will run in any operating system although we recommend Linux Operating System.

5.2 Safety Requirements

The system will be accessed by authorized users. Backup of data in the system will be done everyday to prevent data loss in case of any dangerous event. The system will be stored into the supporting hardware to be placed in server room. Audit trail will be part of the system to monitor actions by users.

5.3 Security Requirements

Users will access the system using accounts that will be created by the system administrator. The user account will contain username and password. Different privileges will be provided to users depending on user roles.

5.4 Software Quality Attributes

Quality attributes are the overall factors that affect the run-time behaviour, system design and user experience.They represent areas of concern that have the potential for application wide impact across layers and tiers. Some of these attributes are related to the overall system design, while others are specific to run time, design time, or user centric issues. The extent to which the application possesses a desired combination of quality attributes such as usability, performance,

reliability, and security indicates the success of the design and the overall quality of the software application.

Some quality attributes are obtained at the expenses of others.Thus, opting to take into consideration one quality attribute might have an impact on others.Hence it is important to analyse carefully the tradeoffs between multiple quality attributes.The importance or priority of each quality attribute differs from one system to another; for example, interoperability will be less important in a system which is not expected to exchange data with others (for example through import-export mechanism).It will be highly important in system which are involved in the data exchange processes with other systems.
The following quality attributes will be given a special attention when designing PG Information System.They are mainly categorized into four:design, run-time, system as well as user qualities.

5.4.1 Design Qualities

- **Conceptual Integrity-**This defines the consistency and the coherency of the overall design. This includes the way components or modules are designed, as well as factors such as coding style and variable naming.
- **Maintainability**- This refers to the ability of a system to be modified easily to accommodate changes which may arise in the course of use.These might be in response to errors discovered in the system or when trying to accommodate new requirements
- **Reusability-**This defines the capability for components and subsystems to be suitable for use in other applications and in other scenarios. Reusability minimizes the duplication of components and also the implementation time.

In any case, we strongly recommend an Object-Oriented approach when designing and developing the system modules.This will will simplify future enhancements and scaling of the system

5.4.2 Run-time Qualities

- **Availability-** Availability defines the proportion of time that the system is functional and working. The system downtime over a certain period of time will affect the system availability. Availability may be affected by system errors, infrastructure problems, malicious attacks, and system load. The PG Information System is expected to have a high degree of availability to address the needs of its users whenever necessary.
- **Interoperability-** Interoperability is the ability of a system or different systems to operate successfully by communicating and exchanging information with other external systems written and run by external parties. An interoperable system makes it easier to exchange and reuse information internally as well as externally. The PG system is expected to communicate with other systems within the University of Dar es Salaam;for example the Academic Records Information System (ARIS), the system which is expected to be deployed at the Directorate of Postgraduate,etc.
- **Manageability**- Manageability defines how easy it is for system administrators to manage the application, usually through sufficient and useful instrumentation exposed for use in monitoring systems and for debugging and performance tuning.
- **Performance-**Performance is an indication of the responsiveness of a system to execute any action within a given time interval. It can be measured in terms of latency or throughput. Latency is the time taken to respond to any event. Throughput is the number

of events that take place within a given amount of time.

- **Scalability**-This defines the ability of a system to either handle increases in load without impact on the performance of the system, or the ability to be readily enlarged.
- **Security**-Security is the capability of a system to prevent malicious or accidental actions outside of the designed usage, and to prevent disclosure or loss of information. A secure system aims to protect assets and prevent unauthorized modification of information.

A quality PG information system is expected to meet all of the run-time qualities which have been mentioned.

5.4.3 System Qualities

- **Supportability-**Supportability is the ability of the system to provide information helpful for identifying and resolving issues when it fails to work correctly.The use of log files, audit trails and some other mechanism will be taken into consideration when developing the PG system to account for its supportability.
- **Testability**-Testability is a measure of how easy it is to create test criteria for the system and its components, and to execute these tests in order to determine if the criteria are met. Good testability makes it more likely that faults in a system can be isolated in a timely and effective manner. To minimize the possible bugs/defects, the PG system will be tested extensive to make sure errors are isolated as much as possible.

5.4.4 User qualities

- **Usability-** Usability defines how well the application meets the requirements of the user and consumer by being intuitive, easy to localize and globalize, providing good access for disabled users, and resulting in a good overall user experience.

5.5 Business Rules

All guidelines governing postgraduate training at the the University of Dar es Salaam will be taken into account during system development and use.