



Procurement Management System for the University of Colombo School of Computing

**A dissertation submitted for the Degree of Master
of Information Technology**

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Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

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This is to certify that this thesis is based on the work of

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under my supervision. The thesis has been prepared according to the format stipulated and is of an acceptable standard.

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Abstract

The University of Colombo School of Computing of Sri Lanka is one of the well-established government institutions in Sri Lanka. But the management of this Procurement process is maintained by the traditional system. Computerized “Procurement Management System” will be a better option to replace with the existing traditional manual system. It will be an intranet-based system as it is limited among people who deal with Procurement. The process of procurement is carried out manually using huge paper-based documents, limited staff availability, lack of proper storage etc. Automated system implementation will be a great solution to overcome these barriers, provide more efficient transparent service and also the computerized system will simplify the maintenance of the activities of the Procurement Department.

This system has provided many facilities such as Procurement Planning, initialize projects, Appoint Committees, Evaluation of Bids, Awarding, Generate Reports, Supplier registration etc.

The procurement process management system has been developed based on the Agile framework. The system is ameliorated using apache web server as the server environment, PHP as the development language and MYSQL as the database management system to provide a low-cost efficient solution for the client. The supporting system is developed with PHP, CSS. In order to use the system efficiently, smooth and simple user interfaces and functionalities are used. The developed system is tested using several testing methods such as unit test, integration test, system test and acceptance test. The entire application could be run on any platform and any web browser.

This system provides accurate and up-to-date information regarding the processing and completed projects. All the reports are designed according to the National Procurement Guidelines.

I hope this project is going to change the management of the Procurement system into a significant level of success.

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List of Acronyms

AB	- Assistant Bursar
BOC	- Bid Opening Committee
BOQ	- Bill of Quantity
CSS	- Cascading Style Sheets
DB	- Database
MySQL	- My Structured Query Language
OPMS	- Online Procurement Management System
PC	- Procurement Committee
PHP	- Hypertext Pre-Processor
SAB	- Senior Assistant Bursar
TEC	- Technical Evaluation Committee
UML	- Unified Modelling Language

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Chapter 01

1. Introduction

1.1 What is Procurement?

Procurement is not just a procedure, it's a process or combination of procedures. Wikipedia website provides a clear answer for this.

“Procurement is the process of finding and agreeing to terms, and acquiring goods, services, or works from an external source, often via a tendering or competitive bidding process. Procurement is used to ensure the buyer receives goods, services, or works at the best possible price when aspects such as quality, quantity, time, and location are compared. Corporations and public bodies often define processes intended to promote fair and open competition for their business while minimizing risks such as exposure to fraud and collusion.”

~Wikipedia~

The procurement process is a combination of processes, such as

- Preparing of specifications
- Selecting vendors
- Establishing payment terms
- Strategic vetting
- Selections
- Negotiation of contracts
- Awarding contracts
- Actual purchasing of goods

According to Figure 1.1, to complete the procurement process, some processes are compulsory. Such as, preparing of requirement or specifications, calling quotations evaluation and awarding contracts.



Figure 1.1- Process of Procurement

Since there are at least three (03) quotations required to evaluate, at least three (03) companies will submit quotations. Hence these processes must be transparent for all companies/bidders.

There are three (03) major committees required completed these processes.

- Procurement Committee
- Technical Evaluation Committee
- Bid Opening Committee

Bid Opening Committee has no response other than opening bids. They will open the bids according to a given time frame in front of the bidders.

Technical Evaluation Team (TEC) will do the major role of the procurement. They will go through all specification and evaluate the quotations/bids. When they doing the same, they will check the samples also. First, they will choose the lowest substantial responsive bid.

Procurement committee will award the contracts based on TECs recommendation.

To do these processes in a proper way a proper system is needed. That automated system is called as “Procurement Management System (PMS)” .

1.2 What is the Procurement Management System

A procurement management system manages the evaluation, selection, and creation of formal agreements with suppliers. It also manages ongoing supplier relationships and the transactional purchasing of goods and services, working with accounts payable to complete the source-to-settle cycle by processing supplier invoices for payment.



Figure 1.2-Life Cycle of Procurement

The procurement system is a software system that manages all activities related to procurement processes. These may include approving purchase requisitions, creating purchase orders, selecting and managing vendors/supplier, collecting delivered goods, reviewing invoices, and paying for them. It handles all these activities electronically. Automated procurement management gives businesses access to view and review all purchase requests and orders, helping them ensure that nothing slips in without approval.

Online procurement systems help organizations ease down the administrative burden and improve long-term cost savings. Once it is completed successfully, it can reduce the staff and paper wastage. A heavy bundle of documents for a single process is used for the process. Once the system is automated, the output can be obtained without a mess. Since it's automated, a large number of staff is not a necessity to go through all papers. Hence, we can reduce the staff.

In a Procurement Management system, there are some specific modules to be covered.

- Vendors / Supplier registration
- Preparing of contracts/projects
- Specification
- Generate Bid documents / BOQs
- Evaluating quotations / Bids
- Provide necessary approvals
- Awarding contracts
- Record keeping

1.3 Objectives

An online Procurement Management System is proposed for the University of Colombo School of Computing (UCSC). This University was established in 2002 and there are nearly 4,000 students registering in this University to follow the various type of Degree and Master Degree programmes.

To facilitate those students, it needs lecture room facilities, laboratories, libraries and other infrastructure facilities and it needs to purchase goods and services. So, it's highly required a proper procurement system to provide the hardware components.

It's not easy to follow the procedure in manually to procure this much of equipment and services. There can be mistakes when doing this manually.

Hence, an automated system is proposed to do the above works in a proper way.

Proposed online solutions allow procurement officers to perform their tasks more efficiently and effectively. There may be several committees allocated for the procurement process.

Through the proposed online system, the efficiency and the effectiveness of the above committees are improved.

Benefits of this system include;

- Centralized data and information management
- Saving of Cost and Time
- A better relationship between Vendors and the Institute.
- Real-time control of organizational spending
- Easy to retrieve information

This online Procurement Management system uses Web-based technologies. This system initiative brings not the only a lot of opportunities but also some challenges facing both private and public sector.

There are two major areas in procurement. One is Tendering and another one is purchasing. The study focused on Tendering systems. Because tendering is a vast area to check and it supports to competitive tendering process that is regulated by the Procurement Guideline which released by the National Procurement Agency. This online procurement management system (OPMS) is designing to handle the process of tendering goods, works and consulting services electronically.

To achieve the purpose of this study, the following objectives are established

- Design the system that provides support for the tendering activities
 - To enable the transparency
 - To make the management of procurement information easier and more effective
 - To select qualified suppliers and monitor them.
- Implementation of the Tendering process

There are several components coming under tendering component in this system.

- Registering of vendors
- Update BOQs
- Evaluation
- View previous bid documents
- Awarding of contracts

1.4 Motivation

As mentioned above, Procurement is a huge process. Since there must be a proper procedure when purchasing of goods, works and consulting services. It must not be an injustice to another party who send questions.

When the Technical Evaluation Committee doing this manually, there may be some mismatches can happen. There is a lot of specification to compare when we purchase some goods. Sometimes we have to compare more than 50 fields in a BOQ. In a situation like that, this system may be very useful. This system has facilities to evaluate BOQs.

Let's assume there is a one BOQ which has 50 fields and 10 vendors sent their quotation. Then the Technical Evaluation Committee has to go through 50×10 fields that mean they have to compare 500 fields to select the best quotation.

Hence, we proposed an electronic system to do this work without any difficulties. Through this system, the Technical Committee can evaluate quotations very easily. And also, Procurement

committee can determine the lowest evaluated substantially responsive bid out of the bids received.

Since this system is a very transparent system, vendors also can see the results after the procurement process ends.

1.5 Methodology

Agile Software Development life cycle is used in this project because it can make any changes to the system very easily when required.

Since this is an online system, this study proposed web-based technology to develop the system. Through the web-based system, registered users can log in to the system through a proper web browser.

1.6 Structure of the Thesis

The major importance of this procurement management system is, it will solve the greatest impact on the procurement process which is specified above. Procurement is a huge process and also it must transparent. Since there may be several companies proceed their bids or quotations, it must transparent.

And also, there may be different procurement types, such as NCB, Shopping, Direct Purchasing, and ICB. Through a system, we are expecting to systematic all processes. And also, we are expecting to keep track of all procurement processes.

As a result of that, a web-based procurement system is designed. Log in to this system from anywhere, any time is possible with this developed system as it is a web-based system. Therefore, web-based technology is used as an infrastructure.

In this context, this study is organized as follows:

Chapter 1

Provide introductory information about the study. The methodology employed in the development of the Procurement Management System and the objectives of these studies are describing in this chapter.

Chapter 2

Beginning with the details information about the system, which is collected by literature survey. In the literature survey, similar systems are compared with the proposed system. Existing systems are picked arbitrary from local and foreign systems.

The brief information about the components of online Procurement Management System is given.

Concluded description of previous studies is provided in this chapter, and also the background of the thesis, best practices and lessons learned are included.

Chapter 3

This chapter gives information about the methodology of the proposed procurement processes. This chapter describes the System development life cycle, the system required to implement the system. The system function also will demonstrate by use-case diagrams and the details of the functions are explained in activity diagrams.

Chapter 4

Evaluation of the system will describe here. There is some common evaluation, we will follow those steps here. Especially we are following test cases. Using test cases, we will test the system step by step.

Finally, it will describe the collecting of customer feedbacks and the feedback form.

Chapter 5

In the concluding chapter, we will describe lessons and learns, our achievements, future developments, critical assessment of project etc.

In addition to the chapters, appendices are including;

- System Documentation
- User Documentation
- Evaluation results
- Test Results

The appendix will provide further details about the content of the dissertation chapter which were not included in the chapters.

Chapter 02

2. Background

2.0 Background

The aim of conducting background study is often to enable the researcher to map the assess the existing intellectual territory, and to specify a research question to develop the existing body of knowledge. This background review has therefore been undertaken in order to widely appraise the information available that relate either or the holistic subject of procurement effectiveness, or to specific elements or factors that have been determined as important to the objective of improving procurement performance.

The interrelation between the factors is important and the background review has therefore also focused on papers that identify multiple elements or factors and how those elements interact with one another.

A procurement initiative may be deemed as successful from within the procurement department as money may have been saved, although the same initiative viewed from within a manufacturing department may conclude that the initiative was unsuccessful due to an increase in quality rejects and/or a negative impact on production performance. The background has therefore also been reviewed in terms of the definition of success and the identification of success factors with associated measures of performance.

To study the background of procurement management, we will create an array as follows

- Finding related components
- Review of Suitability and evaluation

2.1 Finding related Researches / Software

The main thing about the significant area is finding similar products. While searching for similar components related documents and software made by foreign companies are found.

In Sri Lanka, it is a necessity to follow Sri Lankan Standards / Guidelines before purchasing a product or a Service.

The National Procurement Guidelines is maintaining a significant place in the procurement. Procedures of the National Procurement Guidelines have to be followed before purchasing a good or service. It has clearly declared followings.

- Types of the procurement, such as shopping, Direct contracting, NCB.etc
- Duties and responsibilities of the committees. (Procurement committees, Technical evaluation committee)
- Procedures
- Evaluation of Bids/BOQs
- Awarding contracts

Since it is generalised, national guidelines have to be followed when a system is developed for a local company.

A few similar systems are found on the internet. They are as follows.

- Cloud-based Procurement Management Solution | Oracle
- WMS Procurement System
- DeltaBid

2.1.1 Cloud-Based Procurement Solution | Oracle

In today's dynamic business environments, we need a good Procurement Management solution that can help you improve business performance and drive operational excellence across the organization. The right Procurement Management solution automates low-value, manual tasks. so we can focus on the strategic initiatives that will move your business forward. At the same time, we must leverage real-time data for predictive insights to improve our decision-making and performance management.



Cloud-Based Procurement Solution system was released by the famous Oracle Company. In this procurement management system, it manages the evaluation, selection and creation of formal agreements with suppliers. It also manages ongoing supplier relationships and the transactional purchasing of goods and services, working with accounts payable to complete the source-to-settle cycle by processing supplier invoices for payment.

Figure 2.1 will explain the life cycle of a procurement process according to the solution introduced by Oracle.



Figure 2.1 - Procurement Life cycle Diagram

Core Functions of the Cloud-Based Procurement Solution

Strategic procurement organizations are demanding integrated suites that combine supplier management, sourcing, contract management, and proactive risk management with transactional procure-to-pay capabilities. With a complete procurement solution, companies can leverage critical information when making decisions while proactively managing ongoing activities throughout the source-to-settle lifecycle. An integrated, cloud-based procurement management solution consists of the following:

- **Supplier Management**—Strategic procurement starts by qualifying suppliers before initiating negotiations. Streamline the collection and monitoring of supplier data to ensure that suppliers comply with corporate policies. Collect important supplier qualification information through internal and external questionnaires and self-service profiles. Select the best suppliers by assessing supplier qualifications, risk factors, and policy compliance. Use embedded social media to collaborate more effectively and achieve business alignment when planning and creating negotiation documents. Receive alerts when new information becomes available that might affect supplier management, capabilities, or risk factors. Suppliers and sourcing teams gain real-time full visibility into transactions as well as current and upcoming sourcing activities.
- **Sourcing**—Manually compiling and comparing supplier proposals can be time consuming and ineffective. Smarter negotiation and supplier selection leverages negotiation best practices to achieve bottom-line results. Embedded

social collaboration makes it easy to combine effort to create more effective negotiation documents. Award analysis tools allow you to quickly evaluate supplier bids based on predetermined factors—such as price, quality, and value—allowing you to arrive at the best possible award based on your unique business requirements.

- **Contract Management**—Effective contract management is critical. Contract creation is streamlined with guided authoring that uses preapproved clause libraries, standardized templates, and embedded social collaboration. A secure, searchable contract repository with complete tracking and audit history enables users to quickly locate what they need. Automated renewal management capabilities give procurement professionals early notification of expiring contracts. Analytics identify contract deviations from defined standards. Auditable workflows enforce document approvals.
- **Requisitioning**—Negotiated savings are quickly lost when buying is not properly regulated during the procure-to-pay cycle. A modern solution ensures that these savings are realized through business policies, controls, and approvals. Reduce off-contract spend by providing employees with a consumer-like buying experience. Robust search capabilities, smart forms, shopping lists, and personalized buying experiences ensure that negotiated pricing and terms are automatically enforced through supplier catalogues and configurable approval workflows designed to control spend and reduce costs.
- **Payment**—Processing supplier invoices are often manual, error-prone, and time-consuming. A complete source-to-settle solution streamlines and automates this critical function, helping you take advantage of early payment discounts and keep costs under control. This includes a robust payment management system that provides electronic transmission, “PO-flipping” from suppliers, and optical invoice scanning. Line-level invoice validation is fully automated for faster processing. Exceptions are managed through social collaboration with document sharing to speed resolution times.
- **Purchasing**—Automating routine procure-to-pay transactions, such as purchase order creation, frees you up to find new savings opportunities. Streamline the process while enforcing negotiated pricing and ensuring policy compliance. Create purchase orders from approved requisitions without manual intervention. Provide your buying professionals with insight into exceptions, status, and actions required. Communicate with your suppliers using embedded social tools.

The dashboard of the Oracle Solution will show in figure 2.3.



Figure 2.2 - UI of the Oracle Procurement System

Benefits of the Cloud-Based Procurement Solution

Advances in technology are transforming traditional business practices by disrupting supply markets, changing customer buying patterns, and adding complexity to the supply chain. Procurement organizations must respond by taking on a more strategic role in all of the activities surrounding purchasing. They need solutions that are up to the task.

By moving to the cloud, procurement management systems digitize procure-to-pay processes with embedded mobile, social, and analytic capabilities and richer, consumer-like user experience. With modern technology, such as built-in collaboration, embedded analytics, and more intuitive user experience, companies can build a more effective purchasing system to control employee spending, reduce supplier risk, and improve cost savings.

- **Support for a mobile workforce**—Today, employees and managers are using mobile devices to do their jobs. Modern cloud procurement solutions enable you to leverage these devices to streamline processes, reduce latency, and allow faster approvals.
- **Efficient collaboration**—Gain full visibility across the entire source-to-settle process and exchange documents and messages electronically with your suppliers. Integrated procurement processes facilitate real-time document authoring, reviews, and approvals. Embedded social collaboration enables teams to complete assignments faster and more effectively.
- **Embedded analytics**—Increase productivity with user-friendly dashboards that present information clearly and highlight actionable content. Interactive, role-based containers called info lets to help users quickly visualize high-level information, review relevant details, and take action. Transactional applications leverage embedded analytics in context so that users can quickly decide on the next steps in a business process.
- **Intuitive user experience**—A consumer-like user experience enforces purchasing management compliance and makes it easy for employees to find what they need. Productivity improves because users are able to focus on more value-added tasks.

2.1.2 Datex Procurement System



over thirty years, Datex has been a valued partner to industry leading manufacturers such as Zebra Technologies, Honeywell, Psion, LXE, Zebra and Intermec. Datex hardware experts listen carefully, use their knowledge of industries, best practices and similar clients to help select hardware for each client to provide the desired result and meet expectations.

Included with the procurement management system is functionality developed for complex asset management, such as of specialized equipment, and materials, including serialized inventory tracking. From fabrication to the project site, users can manage and monitor the storage and transportation of project equipment and materials and record details by serial number.

Specific to finance, the procurement module includes features developed to allow for the proper management of project cost planning and control. The system provides tools to enable users to properly administer contracts and amendments, manage specialized equipment and bulk material purchases and to provide bid and vendor analysis. Users can monitor the approval process, including revisions and purchase orders in order to ensure proper cost control.

The system allows users to manage pre-and post-award contracting activities and to assign and manage critical project resources. Project delivery features include project schedule planning and an easy to use the system for non-technical users to create their own customized reports.

The procurement management system is a specially licensed module available with Datex Footprint WMS and may not be purchased separately.

Main Functions of the system

- Purchasing
 - Manage Specialized equipment and material purchasing
 - Executive bid and vendor analysis
 - Monitor approval process
- Resource Management
 - Manage pre-award and post-award contracting activities
 - Assign and manage critical project resources
- Planning
 - Develop project estimates and establish budget controls
- Asset Management
 - Manage and monitor the storage and transportation logistics of project equipment and materials, from fabrication to project site
- Record Keeping.

Figure 2.4 will show few of above processes in datex system.

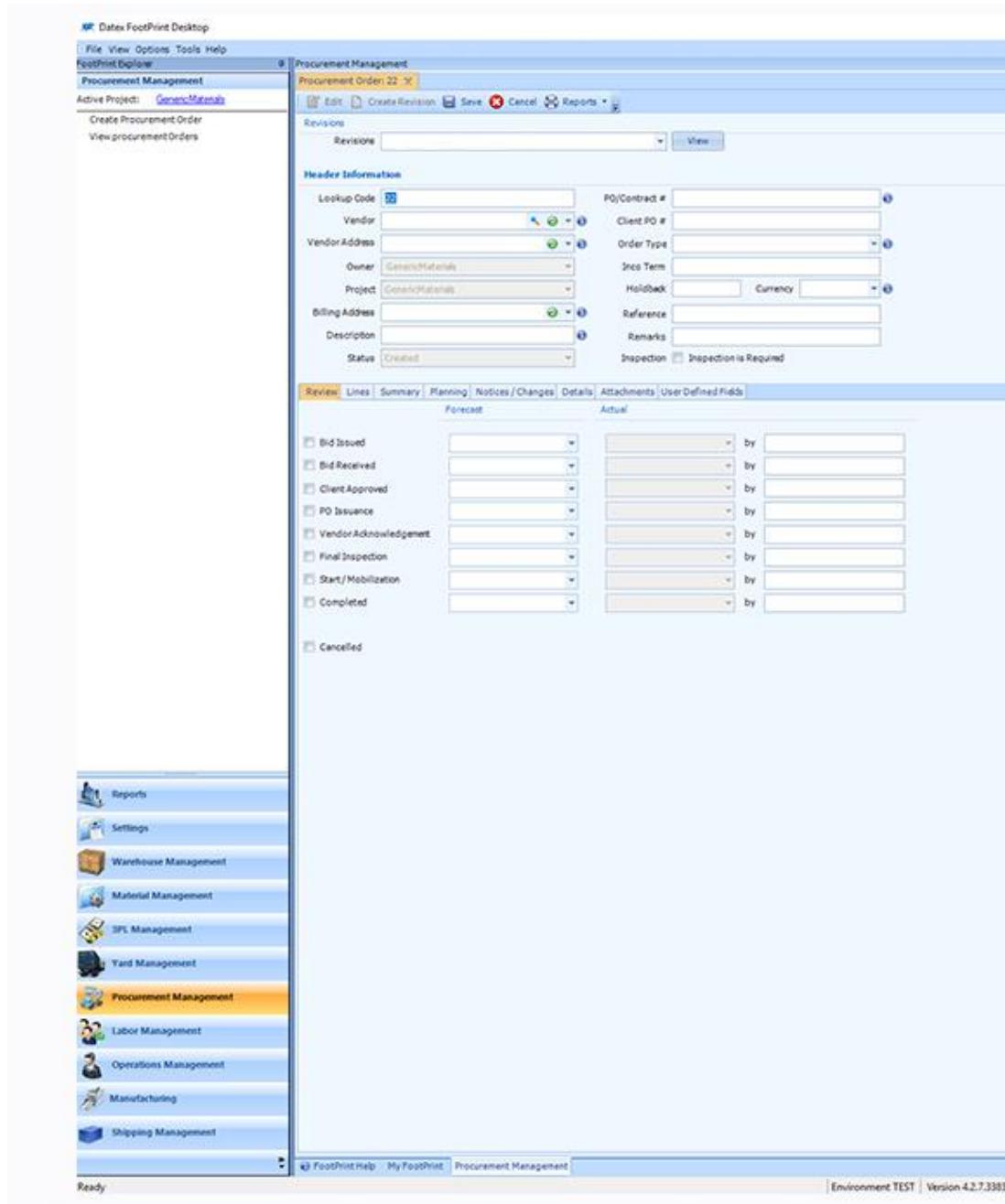


Figure 2.3- UI of the Datex Procurement system

Benefits of the Datex Procurement System

- Provides the company with the ability to make changes quickly
- IT staff can be trained to make changes, saving additional professional fees
- Creates the ability for the operation to provide a higher level of service and adapt to dynamic business conditions

All sized procurement operations, distribution centres, manufacturers, third-party logistics (3PL) providers, including those with multiple warehouse locations and virtual warehouses. Even if the company does not have an IT department, changes to workflows can be made

quickly by a Datex professional, decreasing typical professional service costs over those entailed with programming changes. Within the organization, having a configurable workflow can have a positive impact on the roles filled by the team members in finance, operations, sales, management and other departments.

2.1.3 DeltaBid – E-Procurement Software



Software AdviceTM has the authorization of this product and they are leading online service for businesses navigating the software selection process. Advisors provide free, personalized software recommendations, helping companies of all sizes find products that meet their business needs.

DeltaBid E-Procurement is a cloud-based supply chain solution that offers supplier management, procurement and strategic sourcing features. It enables users to store procurement-related information at one place which helps them control the entire process by viewing current and past requests. The solution also offers transparency into the process and increase supplier participation.

It can Manage supplier relationship on spreadsheets can be complicated. DeltaBid SRM puts all supplier information at your fingertips in one intuitive database. Label suppliers by category and pull up their information in seconds. Quickly see which suppliers are qualified and which have been blacklisted. Select qualified suppliers to participate in an RFP with just one click.

DeltaBid system has several special features.

- Procurement
- Track scheduled meetings
- Categorized supplies
- Multi-round bidding to get better quotations
- Reverse auctions if price matters

Advantage of the deltabid system is, it has more graphic charts. Through the graphic charts user can easily get and idea about the information. Figure 2.5 will show the chart views clearly.

The screenshot displays two main views of the DeltaBid system:

- Bid Summary View:** Shows a bar chart comparing bids from three suppliers: Rock Diggers (white), White Trade Corp (red), and Basic Solutions Ltd. (green). The chart indicates a potential saving of \$39,640.00.
- Dashboard View:** Shows active requests, ended requests, and under registration. Active requests include "RFQ: New corporate website design" and "Reverse auction: Next year copy paper delivery". Ended requests include "RFI: Qualification of courier service providers". Under registration includes "RFQ: Purchase of office furniture".

2.2 Review of Suitability and revaluation

There are various systems in the internet these days, but it is required to test whether these systems are satisfying our requirements or not. Hence, those systems are analysed using following criteria to check whether they matches with National Procurement Guiltiness.

1. Whether it has all the features what we are expecting

1. Whether it matches with National Procurement Guiltiness.

The problem is, “*do the foreign system follow the National (Sri Lanka) Procurement Guidelines?*”. When we go through the above systems, we notice, some systems are following global procurement theories or whatever guidelines related to their countries. But Sri Lankan standards are not compatible with foreign standards.

2. Whether it has all the features that the expected requirements

Through the system, following features are expected.

1. Finding the lowest substantial bid
2. Registration of bidders / Suppliers
3. Generate bid documents with paper advertisement
4. Evaluation of Bids
5. Awarding of contractors
6. User level Permission / Access (PS/TEC/BOC)

When the mentioned systems are studied, it is obvious that none of the studied systems do not follow the National (Sri Lanka) Procurement Guidelines issued by the Ministry of finance as above areas are mandatory.

Therefore, proposed system is develop to fulfil all the above requirement.

Chapter 03

3. Design

3.1 Introduction

In this chapter, this study mainly focuses on system Design. *i.e.* “*System Design*” and that is the most important part of the system development life cycle.

It begins with the designing and ending with the awarding of contracts.

3.2 System Development Life Cycle

The System Development Life Cycle (SDLC) describes the Planning, creating, testing and develop a system. When SDLC is followed, it is easy to identify and solve problems when occurred.

Agile SDLC is chosen as the system development methodology as it makes the product iteratively and incrementally. Since customer feedbacks are important to develop the system, Agile helps to interact with the customer all the time.

Agile Software Development can describe as “Agile software development refers to a group of software development methodologies based on iterative development, where requirements and solutions evolve through collaboration”

3.2.1 Common Values from the Agile Manifesto

1. Individuals and Interactions Over Processes and Tools

Valuing people more highly than processes or tools is easy to understand because it is the people who respond to business needs and drive the development process.

2. Working Software Over Comprehensive documentation

Historically, enormous amounts of time were spent on documenting the product for development and ultimate delivery.

3. Customer collaboration over contract Negotiation

Negotiation is the period when the customer and the product manager work out the details of delivery, with points along the way where the details may be renegotiated.

4. Responding to change over following plan

Scrum teams constantly respond to change so that the best possible outcome can be achieved.

3.2.2 Scrum Framework

- ✓ A product owner creates the prioritized wish list called a backlog.
- ✓ During sprint planning, the team pulls a small chunk from the top of that wish list, a sprint backlog, and decides how to implement those pieces.
- ✓ The team has a certain amount of time — a sprint (usually two to four weeks) — to complete its work, but it meets each day to assess its progress (daily Scrum).
- ✓ Along the way, the Scrum Master keeps the team focused on its goal.
- ✓ At the end of the sprint, the work should be potentially shippable: ready to hand to a customer, put on a store shelf, or show to a stakeholder.
- ✓ The sprint ends with a sprint review and retrospective.
- ✓ As the next sprint begins, the team chooses another chunk of the product backlog and begins working again”.

The figure 3.1 will describe the Scrum Framework clearly.

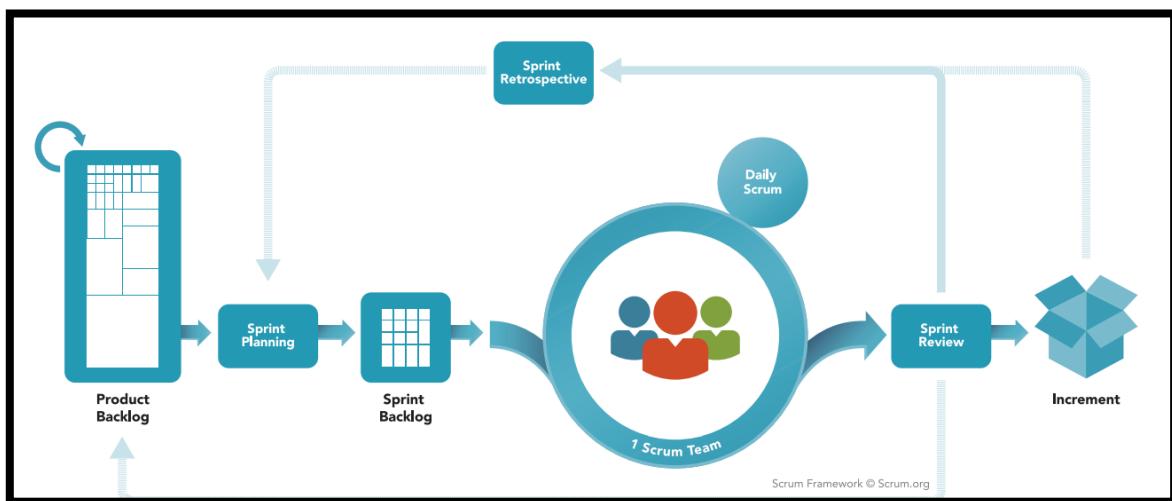


Figure 3.1: Scrum Framework

Above framework can explain in five (05) steps.

1. Product backlog

The product backlog is a list that consists of features that should be implemented during the development process. It's ordered by priority and its every item is called a User story. Every user story gets a unique ID.

Figure 3.2 will show a user story in the scrum.

ID	User Story
a-001	As a manager, I want to have the possibility to add, delete and edit tasks to manage the employees' workload
a-002	As a manager, I want to have the ability to add new tasks and change the duration and starting date of the current ones using drag-and-drop
a-003	As a manager, I want to assign two types of tasks to employees: -Part-time task -Full-time task

Figure 3.2 : Product backlog of Scrum

2. Sprint backlog

The scrum team can select the most important user stories from the product backlog. Then team members should decide how they will solve this or that task. The Sprint backlog should be created next. It consists of user stories that will be completed during the current sprint.

3. Scrum Meeting and working on scrum

Another important scrum feature is everyday Scrum meetings. These meetings' main goal is to get full and veracious information about the current project status. During these meetings, every single team member should tell about the task that he has finished, which task he will choose next and what problems he faced during his work.

4. Testing and product demonstrations

The result of every sprint is a product demonstration. The Scrum team creates a review and demonstrates the results of their work. On this basis, the stakeholders take a decision about further project changes.

5. Product Increment

The main aim is to discuss the results and determine the ways how to improve the development process on the next step.

The team should conclude what went well during the working process and what can be done better during future iteration. When the ways of improvement are defined, the team can concentrate on the next sprint planning.

3.3 Object-Oriented Analysis and Design (OOAD)

It's a structured method for analysing, designing a system by applying the object-orientated concepts and develop a set of graphical system models during the development life cycle of the software.

Main features of the OOADs are

1. Encapsulation
2. Abstraction
3. Inheritance
4. Polymorphism

Object Oriented Analysis and Design is chosen to analyses the system as it makes easy understandable the proposed system. OOAD uses a lot of diagrams and we are using few diagrams here to explain the structure and the behaviour of the system.

3.4.1 Use Case Diagram for the proposed system

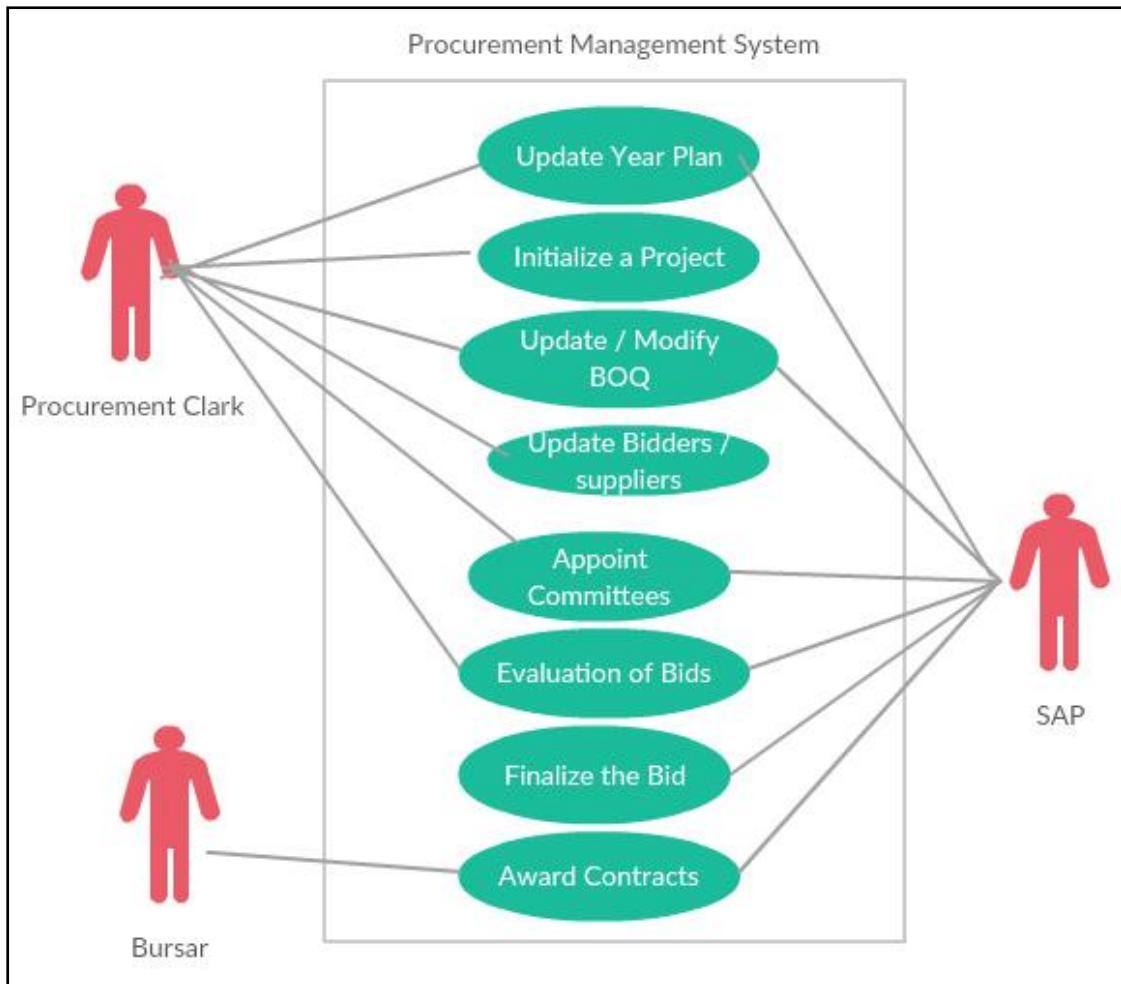


Figure 3.3- Use case diagram for the proposed system

Figure 3.3 shows the proposed system use case diagram including actors of the current system and how they would able to perform their tasks from the proposed system. Mainly there are 3 users, Procurement Clark, SAB/AB and bursar.

Since there are a lot of data to be inserted to this system, Data entry is very important in this system and also the Procurement Clark or Data entry operator has to a major role here. Hence, he/she has to create IDs, enter basic information and other relevant information which need to create bid document. But we allowed SAB/AB also to enter some data. But they have some other works to do in the system.

Compare to the Procurement Clark and SABAB, works of the Bursar will reduce here. Mainly we are providing data viewing facility to him/her and also Bursar can award contracts.

In this chapter we will provide more information about the design by explaining the use case with the use case description.

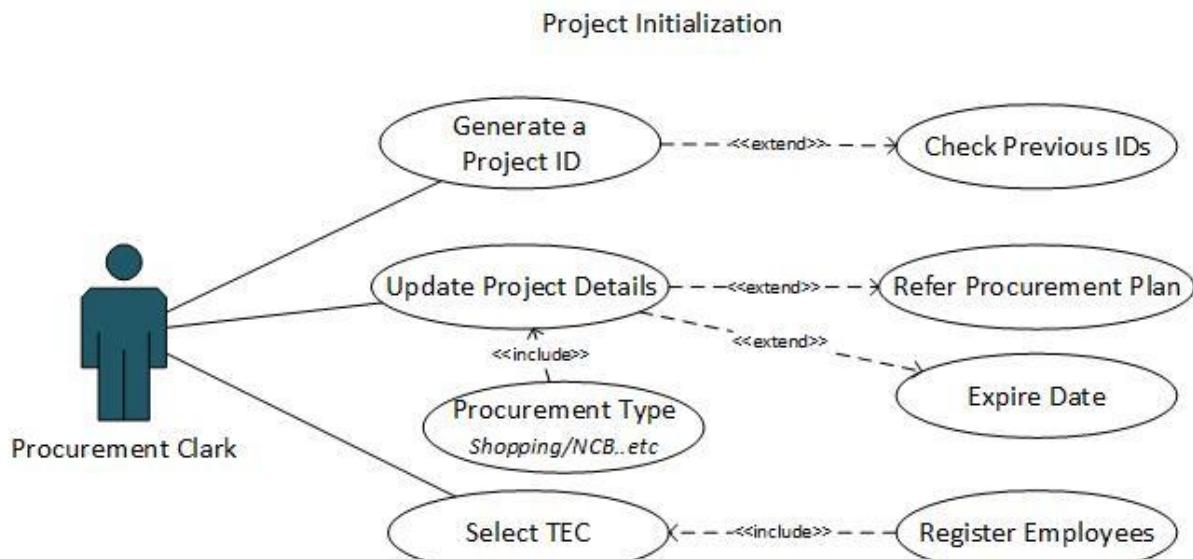


Figure 3.4 - Project Initialization

Use case name	Create Project IDs	
Actors	Procurement Clerk	
Description	Create a new project	
Pre – conditions	Login to the system	
Typical course of events	Actor action 1. Enter Project Name 2. Enter Description 3. Choose Bidding type 4. Enter Charmin of the TEC 5. Enter members of the TEC 6. Click on the “Create project” button	System Response 7. Display a successfully added message
Alternative courses		
Conclusion		
Post conditions	Data save in in the Database	

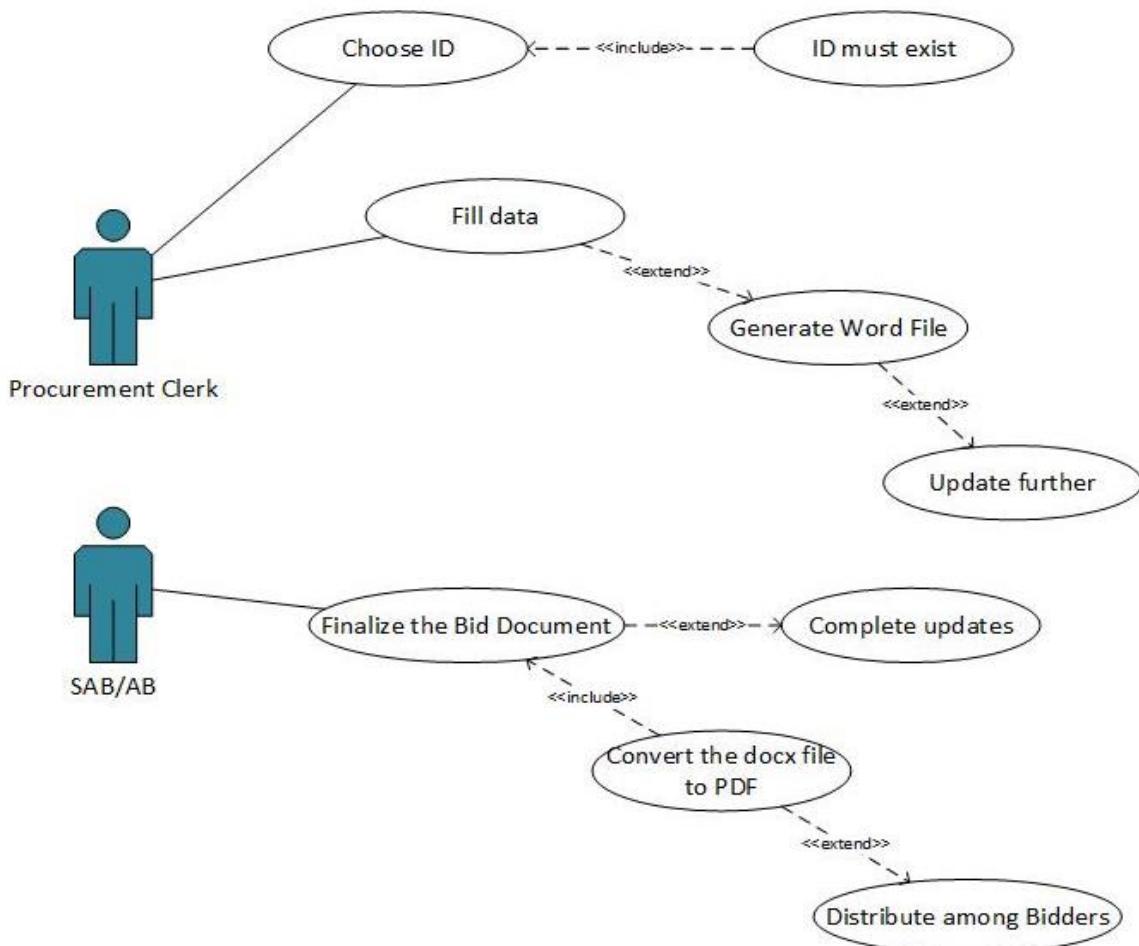


Figure 3.5 - Updating Bid document

Use case name	Create NCB Report	
Actors	Procurement Clerk , SAB, AB	
Description	Generate a Bid document	
Pre – conditions	Generate a Project ID by selecting NCB	
Typical course of events	Actor action <ul style="list-style-type: none"> 1. Fill the required information 2. Click on the “Generate Bid document” 4. Click on the “Generate advertisement” button 	System Response <ul style="list-style-type: none"> 3. Download Bid document in .doc format 5. Download Advertisement in .doc format
Alternative courses		
Conclusion		
Post conditions	Generate evaluation report	

Bid Evaluation and Awarding of Contracts

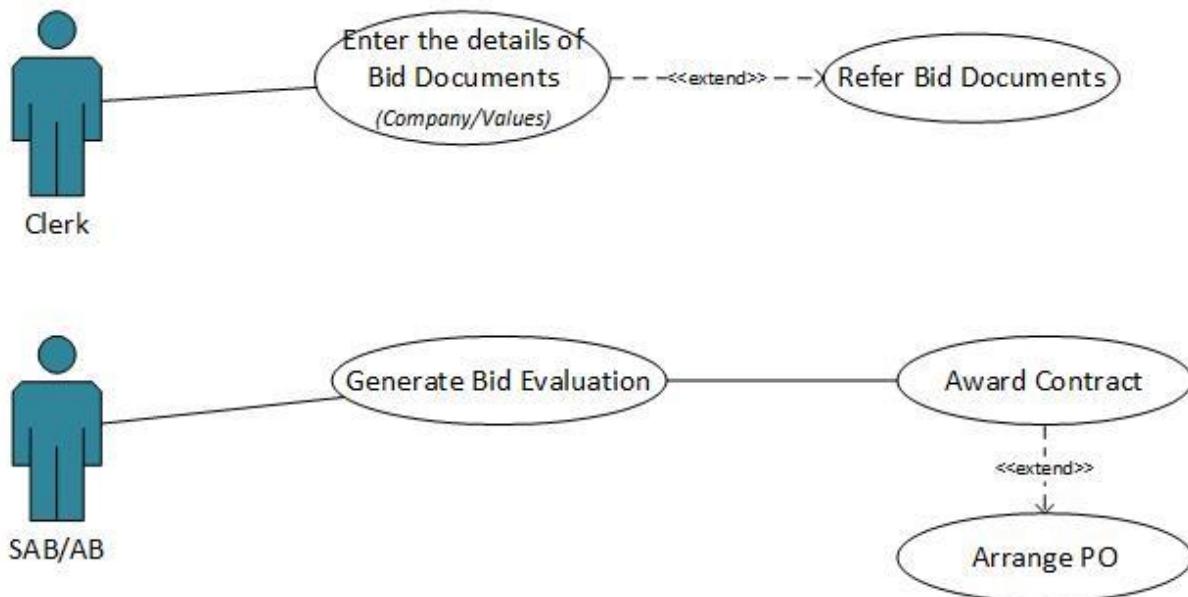


Figure 3.6 - Evaluation Process

Use case name	Bid Evaluation	
Actors	Procurement clerk, SAB	
Description	Complete bid evaluation and generate the report	
Pre – conditions	Complete bid document	
Typical course of events	Actor action	System Response
	Select the Project ID	
	Fill the form	
	Generate Report	
Alternative courses		
Conclusion	Bid Evaluation report	
Post conditions	Award Contract	

3.4.3 Activity Diagram

The diagram of the Figure 3.7 describes the process of how the system runs.

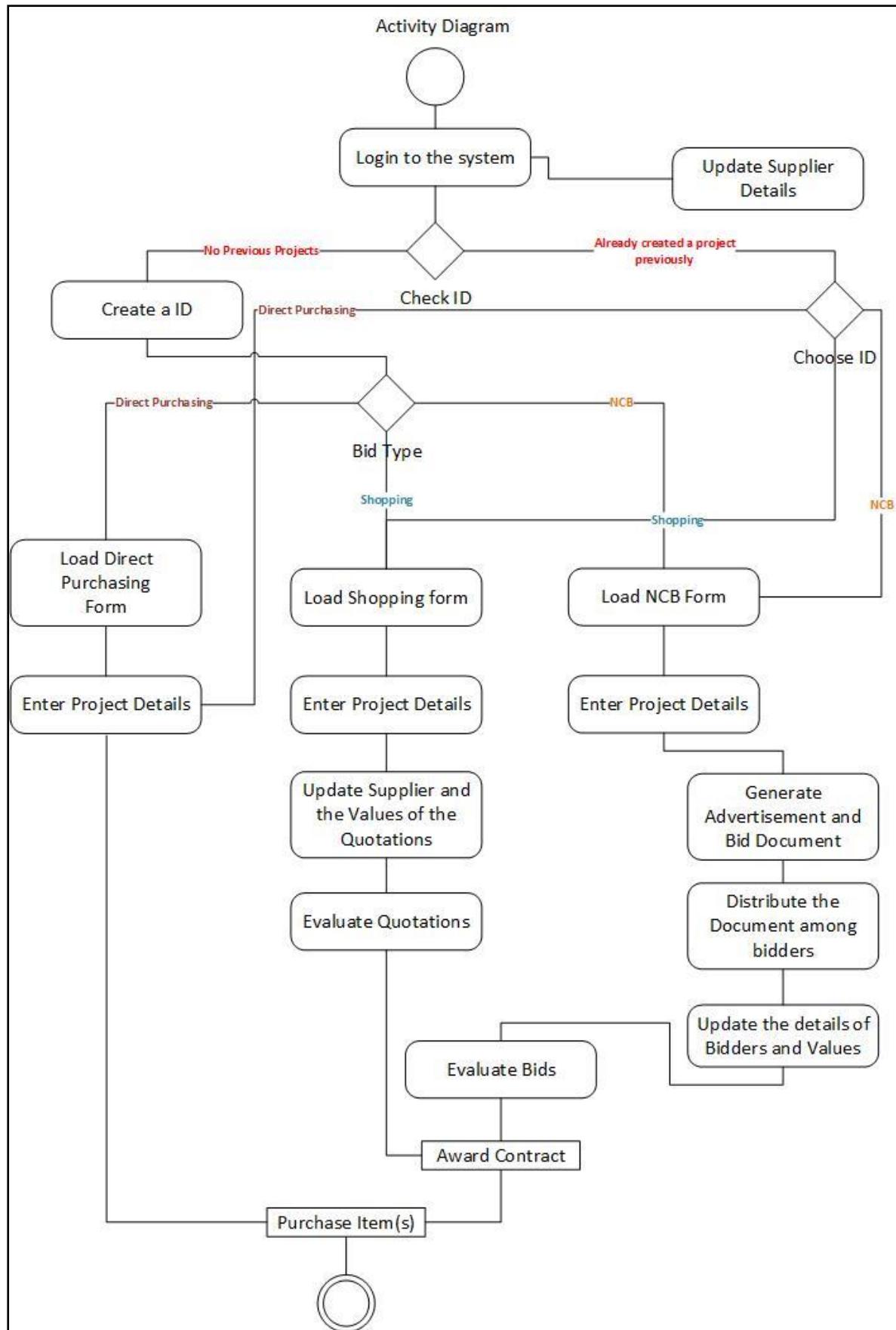


Figure 3.7- Activity Diagram of the system

Chapter 04

4. Implementation

According to the previous designs, it's very important to develop a system to fulfil the customer requirement. When a system developer develops a system, he/she must focus on the following areas.

- User friendliness
- Easiness
- Accuracy
- Errors /bugs free

We are designing OPMS to fulfil above requirement.

4.1 User Interface Design

UI design or User Interface design generally refers to the visual layout of the elements that a user might interact within a website or any other system. This could be the control buttons or the visual layout of a page. User interface designs must not only be attractive to potential users but must also be functional and created with users in mind.

In here discussed how UI is designed to increase the usability of the system. Highly User-friendly system which is not used is useless. So, the system needs to design UI well to have good Human-Computer Interaction. Usability, Accessibility, Acceptability features needed to develop in user interfaces.

3.6.1 Login Page

The user can log in to the system using their given “Username” and “Password” which shows in figure 4.1.

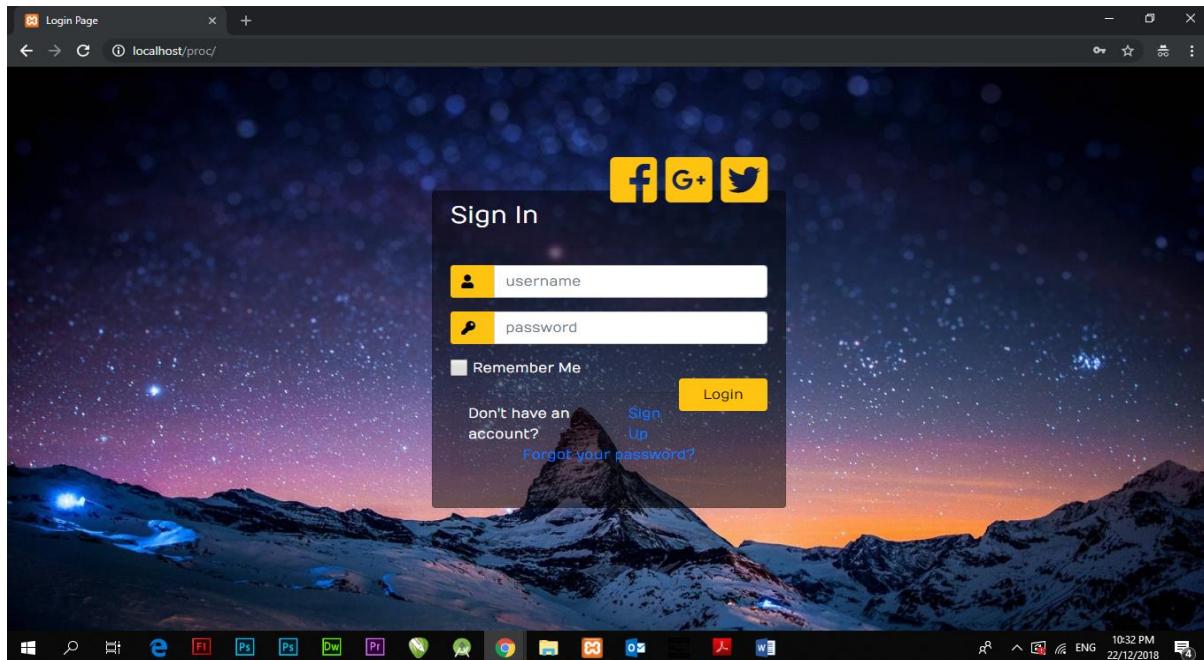


Figure 4.1- User Login Interface

Login window shown by Figure 11 facilitate nonfunctional requirements to satisfy usability, accessibility to have good human-computer interaction. The above picture shows the login window UI. System login should have nonfunctional needs satisfaction which makes good UI design.

User must enter correct username and the relevant password to the user. Otherwise, the system will show an error. If the username and password are correct, the system will load the main page alias home page.

4.1.1 Dashboard

A screenshot of a web browser window titled "Procurement Management System" from "localhost/proc/home.php". The top navigation bar includes links for Home, Initial Data, Calender, Reports, Search, Contact us, User Management, and Current User. The main content area has two sections: "Initialize Projects" and "Process Projects". The "Initialize Projects" section displays a table of initialized projects with columns: Project ID, Project Name, Bid Type, Expire Date, and Value. Two entries are listed: "UCSC|PROC|G|2019|11" with "asdgf1" and "NCB", and "UCSC|PROC|G|2019|12" with "supplying of computers" and "NCB". Below the table are search and filter fields. The "Process Projects" section is currently empty. The browser's taskbar at the bottom shows various open tabs and system icons.

Figure 4.2 -- Dashboard of Initialized projects

The screenshot shows a web browser window with the URL localhost/proc/home.php. The page is titled "Procurement Management System". It contains two main sections:

- Process Projects:** A table with columns: Project ID, Project Name, Bid Type, Expire Date, and Value. A search bar and filter buttons are at the top. Below the table, it says "No data available in table".
- Expire Projects:** A table with columns: Project ID, Project Name, Bid Type, Expire Date, and Value. The table lists five entries with the following data:

Project ID	Project Name	Bid Type	Expire Date	Value
UCSCI PROC G 2019 1	ssdf	NCB	2018-12-11 00:00:00	100.00
UCSCI PROC G 2019 10	asdfg	NCB	2019-05-02 05:08:00	12,000.00
UCSCI PROC G 2019 12	supplying of computers	NCB	2019-05-07 13:00:00	25,000.00
UCSCI PROC G 2019 2	gfdf	NCB	2018-12-31 00:00:00	15,000.00
UCSCI PROC G 2019 3	terewq	Shopping	2018-12-31 00:00:00	8,900.00

At the bottom, there are navigation links for "Previous" and "Next". The system status bar shows "10:00 PM 07/05/2019".

Figure 4.3- Dashboard of the processing and expired projects

Like what we showed in figure 4.3, Once the user logged into the system it will redirect to the home page alias dashboard. User can get an idea about the contracts which is initialized in the system but not processed or completed the bid document.

In the “process view,” it will show the contract which generates bid documents but not awarded or completed.

In the “expired projects”, it will show all completed projected in another word, it will show contract awarded projects.

4.1.2 User Registration.

Only Admins can create users. There is a special area to create users.

The screenshot shows a web browser window with the URL localhost/proc/reg.php. The page is titled "Procurement Management System" and "University of Colombo School of Computing". It features a navigation bar with links for Home, Initial Data, Calender, Reports, Search, Contact us, User Management, and Current User.

The main form consists of several input fields:

- First name:** Two input fields for First Name and Last Name, both with validation messages: "Looks good!"
- Username:** An input field for Username with a validation message: "Please choose a username."
- City:** An input field for City with a validation message: "Please provide a valid city."
- State:** An input field for State with a validation message: "Please provide a valid state."
- Zip:** An input field for Zip with a validation message: "Please provide a valid zip."
- Password:** Two input fields for Password and Confirm Password.
- Select a Department:** A dropdown menu with options like "R&D", "E&T", etc.
- Select the Committee:** A dropdown menu with options like "S&E", "F&T", etc.

At the bottom, there are "Save" and "Cancel" buttons.

Figure 4.4 - User Registration form

In here following details are required.

- ✓ Name (First and Last)
- ✓ Username and Password
- ✓ City, State and Zip code
- ✓ Department – By clicking on the Dropdown, Admin user can select the correct Department. There are 04 pre-defined departments. Those are Procurement, Finance, Administration and IT.
- ✓ Authorized Level – This filed is very important. We have defined 4 authorized levels.
 - ❖ Admin - He/she can access any area or change any information.
 - ❖ Authorized - He/ She have access only to confirm the information/Data, and also he/she has access to generate reports.
 - ❖ Data Entry - He/she have access to create Projects, Enter BOQs...Etc.
 - ❖ View only - he/she can view reports. But he/she doesn't have access to edit or enter any details to the system.

4.1.3 Initialize a Project

Before starting the work, we must create a project.

The screenshot shows a web browser window with the URL `localhost/proc/proj.php`. The page title is "Procurement Management System". The main content area contains several input fields:

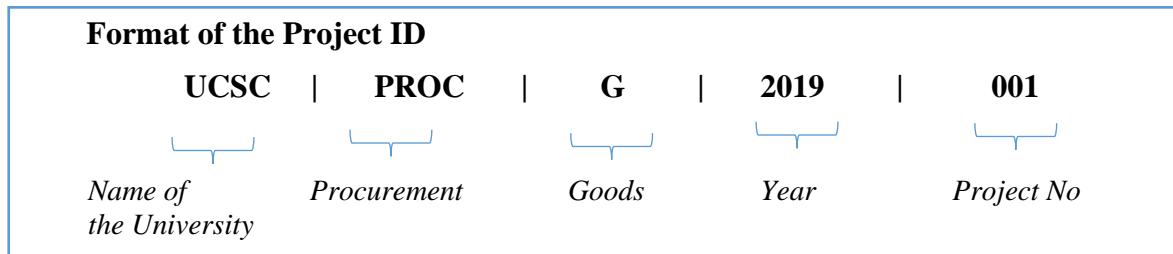
- Project Id:** An input field with a placeholder.
- Project Name:** An input field with a placeholder.
- Project Description:** A large text area for entering project details.
- Bidding Type:** A dropdown menu set to "RFQ RFT".
- Expire Date:** An input field with a calendar icon.
- and Time:** An input field for specifying the time of the bid.
- Value of the Bid Security:** An input field for entering the security value.

At the bottom of the form is a blue "Create a Project" button. The browser's address bar shows the URL, and the taskbar at the bottom displays various application icons.

Figure 4.5 : Project Initializing Page

The user must enter the following information to the system.

- ✓ Project ID - all works depend on the Project ID. The project ID is unique and it will generate automatically according to the specific format.



- ✓ Project Name
- ✓ Description
- ✓ Bidding Type - There are 4 Pre-defined Bidding types.
 - Direct Purchasing
 - Shopping
 - NCB
 - ICB
- ✓ Closing Date and Time
- ✓ Appoint TEC (Chairman and the Members)

4.1.4 Creating Bid Documents and Paper advertisement

According to the type of procurement, documents will change. If the user selects NCB it will load the form which relevant to the NCB, if the user selects direct purchasing, it will load the form relevant to the direct purchasing. Like that it will load the form to the shopping also. Since the UCSC not purchasing goods from the international market, it is irrelevant in this study.

Section II. Bidding Data Sheet (BDS)

Procurement Title

Notice: Undefined variable: \$86 in C:\xampp\htdocs\procncb_section1.php on line 233

ITB 1.1 - The name and identification number of the Contract are:

Tender No

ITB 2.1 - The source of funding is :

ITB 4.4 - Allow for Foreign bidders ?

Yes
 No

ITB 7.1 - Purchaser's address is ?

Attention

Figure 4.6- Generating a bid document

After complete all fields what we showed in figure 4.6, the user can generate bid document by clicking on the “Generate Bid Document” button. User can download this document as a Ms Word file in .doc format. If the user needs to edit further, user can do so in this file and later they need to convert this to pdf and upload the same to the system.

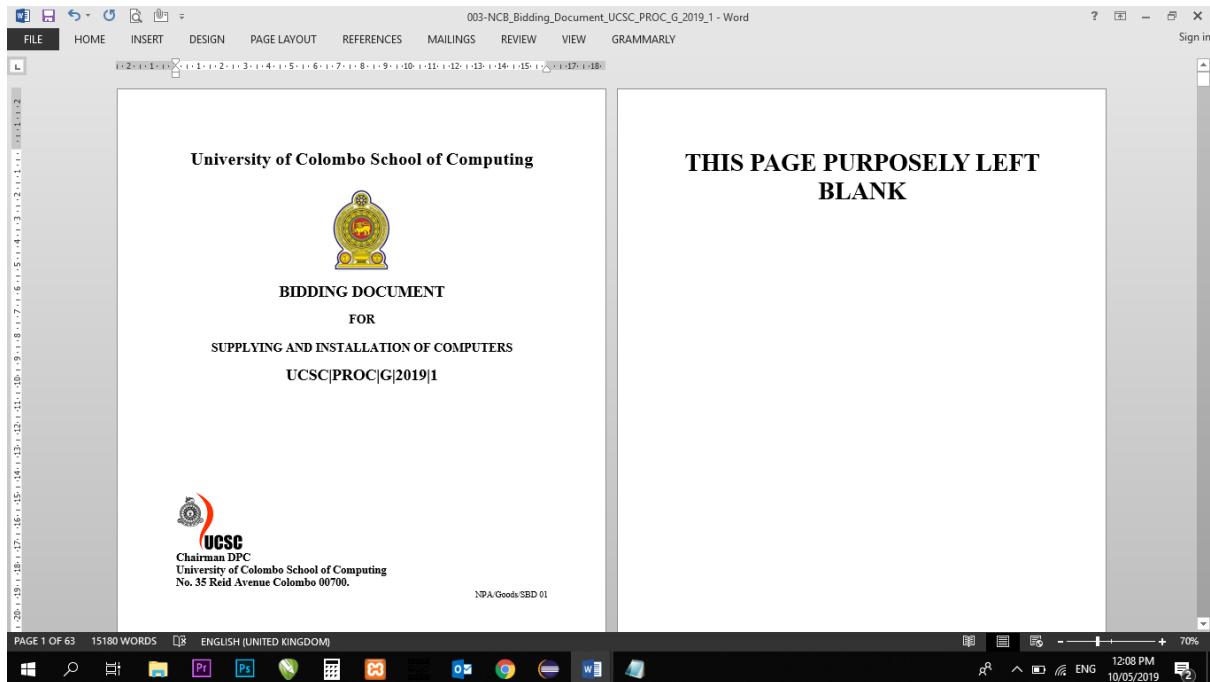


Figure 4.7 Screenshot of the Bid document (Ms Word file)

Once the document is completed, they can upload the pdf to the system. Figure 4.8 will show how to upload the bid document in pdf format.

Figure 4.8 Document upload page.

User can generate the paper advertisement through the system. Once they filled all data, user can download paper advertisement through the system. This advertisement also can generate in .doc file format.

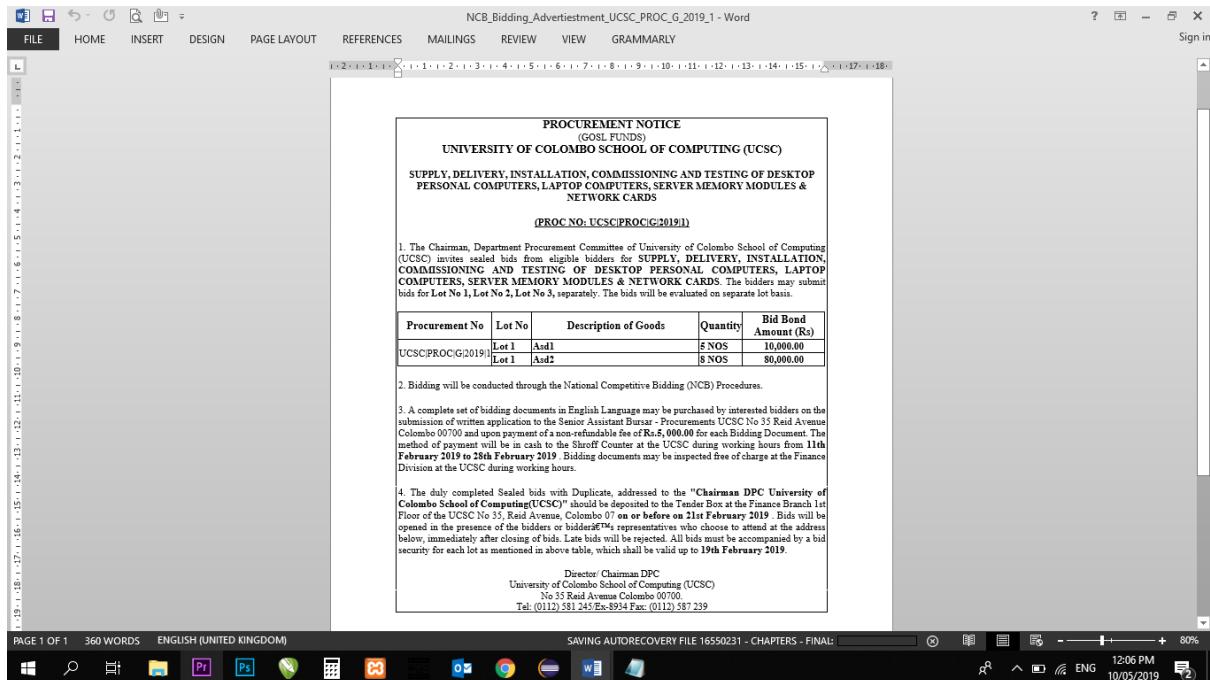


Figure 4.9 Newspaper advertisement

Bid documents and the paper advertisements can download as a Ms Word file with .doc extension. The purpose behind this is, then the user can add or change any other information to these reports which we do not facilitate in the system. Since the bid document is a very large document, sometimes they go behind the procedure and change or add some context to the relevant documents.

e.g., change a phone number of the advertisement

another advantage of this system is, we mentioned the names of the TEC in some areas to get their signatures. As we correctly know, some areas in the Bid document have to update.

e.g., Name of the project, No of Units, Bid closing dates, contact details..etc

through the system we marked the names of the TEC to in above areas. Then the TEC can go through the highlight areas and place their signatures.

4.1.5 Specification and Evaluation of Bids

Online Procurement Management System (OPMS) provided the facility to do the evaluation of BOQs. If the user required to do a comparison or an evaluation, user can do it through the system.

Specification	Minimum Requirement	Action
Processor	Intel Core i7 8th gen	Edit Delete
RAM	8 GB, DDR 4	Edit Delete
Hard Disk	1 TB	Edit Delete
VGA	2GB	Edit Delete
Monitor	18.5" LED Monitor	Edit Delete

Figure 4.10 Add/Modify Specifications

Soon after entering the bid document it can distribute among the bidders or suppliers. Once they fill it and submit, Procurement Clark can enter the values to the system.

Depending on the values and other considerations, SAB/AB can generate the evaluation report and award the contract to the most suitable person.

Committee Members			
Full Name	Designation	Department	Committee
Sajith Fernando	Accountant	Finance	Technical Evaluation Committee
Lahiru Chathuranga	Sys Admin	Procurement	None
Lahiru Kasun	DEO	IT	None
Lakshan Sandaruwan	Tec. Officer	Administration	None

The screenshot displays the bid evaluation process for two bidders: Damro Group and Unidil Packaging. The interface includes sections for Reject Bidders, Financial Evaluation, and Technical Evaluation.

Reject Bidders:

Name of the Bidder	Reject Reason	Action
Damro Group	(empty)	Reject Bidder
Unidil Packaging	(empty)	Reject Bidder

Financial Evaluation:

Name of the Bidder	Bid Price Without VAT (Rs)	Additions or Omissions	Evaluated Bid Price without VAT (Rs)	Action
Damro Group	11.00	5	8	Change
Unidil Packaging	8.00			Financial Evaluate

Technical Evaluation:

1	Damro Group	No Responsive
2	Unidil Packaging	Responsive

Post Qualification AND Qualification Requirements:

Qualification	Damro Group	Action
(empty)	(empty)	Add
asd	yes	Update
asd1	no	Update

Bidder Ranking:

Bidder	Rank	Action
Damro Group	1	Update

Recommendation Bidder:

Damro Group

[Generate TEC Report For NCB](#)

© 2019

11:41 AM 24/05/2019

Figure 4.11 - Summary of the Bid Evaluation

4.1.6 Year Planner

We have created Year planner for easy reference to the requirements. It is very easy for the user to plan their works according to the given time frame. Therefore, the user can get ready with the work in advance.

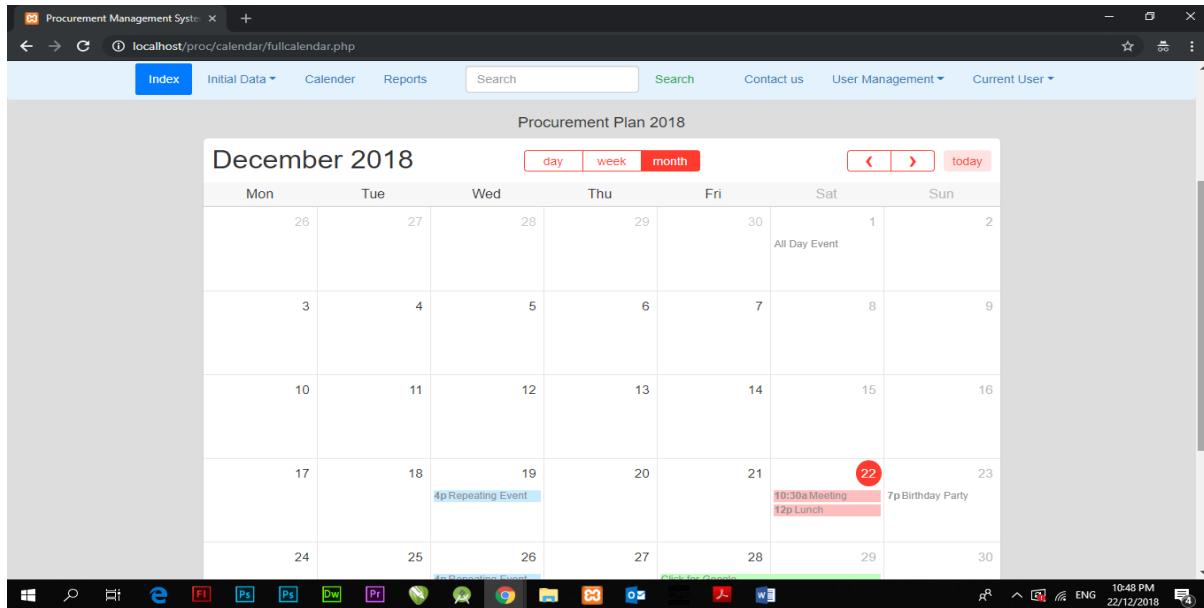


Figure 4.12 Year Planner

Once we generated the bid document through the system, there are some areas of the bid document will be changed. To increase the reliability of the document, we will mention the TECs name on those pages. Once the TEC members agree with the modified data, they will put their signature on marked areas according to Figure 4.13

ITB 35.4	The following factors and methodology will be used for evaluation: sdf
ITB 35.5	Bidders are allowed to dasf.. (Refer to Section III Evaluation and Qualification Criteria, for the evaluation methodology, if appropriate)
ITB 36	The Purchaser shall compare all substantially responsive bids to determine the lowest-evaluated bid, in accordance Section I Instructions to Bidders.
ITB 37.2	The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB Clause 18

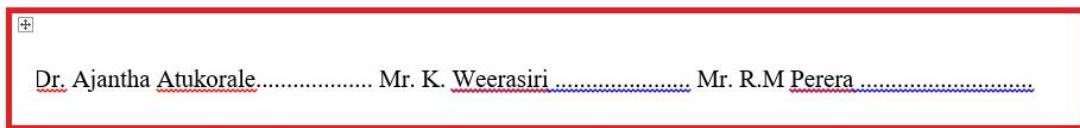


Figure 4.13 - Signatures of the TEC appear in the Bid document

4.1.7 Registration of Suppliers

There is a special area for the registration of suppliers.

The screenshot shows a web browser window with the URL localhost/proc/supplieradd.php. The page has a header with links for Home, Initial Data, Calender, Reports, Search, Contact us, User Management, and Current User. Below the header is a form for supplier registration. The form fields are:

- Registration No.:** Please Enter Supplier Name
- Supplier Name:** Please Enter Supplier Name
- Address:** Please Enter address
- TP No.:** Please Enter Tp. No
- Fax No.:** Please Enter Fax No
- Email:** Please Enter Email Address

At the bottom left is a blue "Register" button. At the bottom center is copyright information: © 2019 Procurement Management System Harshana Jayasekara. The bottom right shows the Windows taskbar with various pinned icons and the system tray indicating the date and time.

Figure 4.14 Supplier Registration Panel

4.1.8 Contact Us

If there any issue, the user can directly contact the developer using this information. The developer has mentioned his Name, Contact numbers and email addresses here. Hence, User can easily find the contact details without go through filed documents.

The screenshot shows a web browser window with the URL localhost/proc/contact.php. The page has a header with links for Home, Initial Data, Calender, Reports, Search, Contact us, User Management, and Current User. Below the header is a section titled "Procurement Management System" with the text "University of Colombo School of Computing".

Contact Us

E-mail : harshana.sanjeewa@gmail.com
Mob. +94 773 700 883

© 2018
Procurement Management System
Harshana Jayasekara

Figure 4.15- Contact us page

4.2 Implementation Environment (Hardware/Software)

The environment which the system can survive needs to be implemented in order to build a system in high performance, maintainability.

The requirement for host the system (server side)

- Processor : 1.1 GHz
- RAM : 2GB
- Capacity : 1GB
- Database : MySQL
- Apache server
- cPanel Access
- Proper network connection

The requirement to run the system in the client's side

- Processor : PIV 3.2 GHz or more
- RAM : 1 GB or more
- Internet connection : 1mbps or more
- Web browser : Google chrome, Firefox, safari, opera, Microsoft edge

4.3 Module Structure Design

4.3.1 Client-server architecture

Client-Server Architecture is a shared architecture system where loads of client-server are divided. The client-server architecture is a centralized resource system where the server holds all the resources. The server receives numerous performances at its edge for sharing resources to its clients when requested. Client and server may be on the same or in a network. The server is profoundly stable and scalable to return answers to clients. This Architecture is Service Oriented which means client service will not be interrupted. Client-Server Architecture subdues network traffic by responding to the inquiries of the clients rather than a complete file transfer. It restores the file server with the database server.

Client computers implement a bond to allow a computer user to request services of the server and to represent the results the server returns. Servers wait for requests to appear from clients and then return them. A server usually gives a standardized simple interface to clients to avoid hardware/software confusion. Clients are located at workplaces or on personal machines, at the same time servers will be located somewhere powerful in the network. This architecture is useful mostly when clients and the server each have separate tasks that they routinely perform. Many clients can obtain the server's information concurrently, and also a client computer can execute other tasks, for instance, sending e-mails.

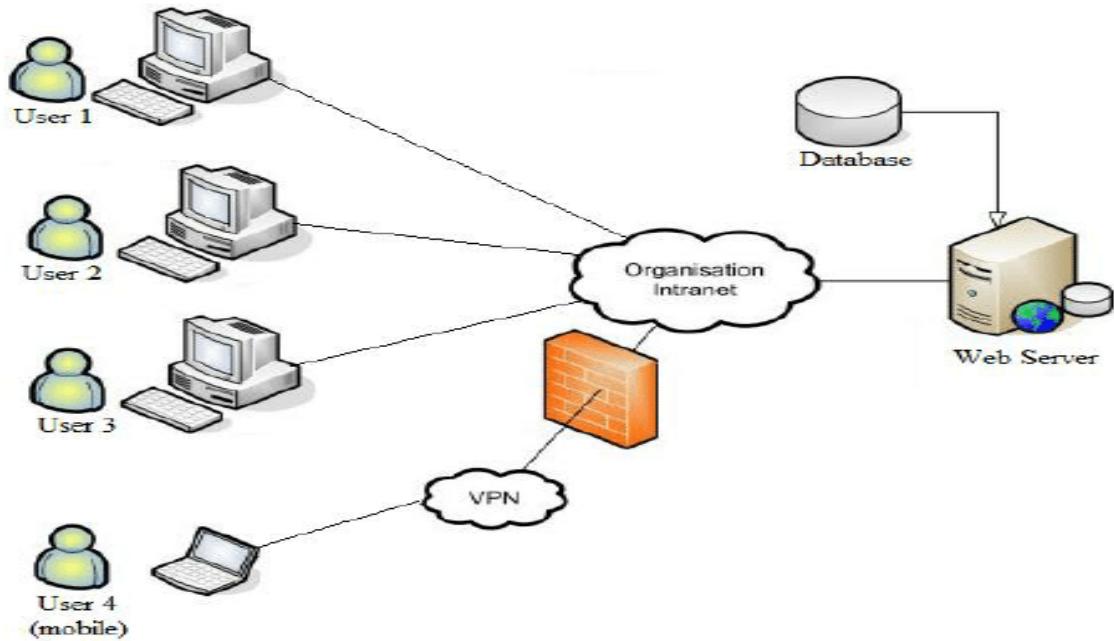


Figure 4.16- Client-Server Architecture

4.3.2 Structure

The folder structure of the procurement system is as follows.

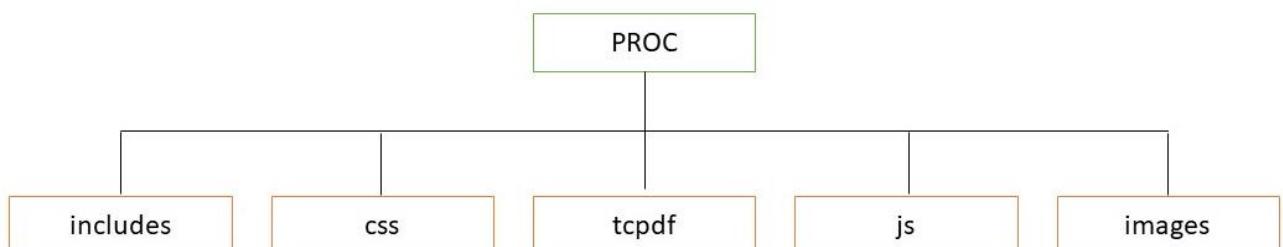


Figure 4.17- Folder Structure

Name of the mail folder is “proc”. Then we have separate another few folders such as includes, css, tcpdf, js, images..etc for easy reference.

- **includes**

In the includes folder, we have created connection files, navigation files, headers and footers, top design of the system.

- **tcpdf**

All the reports files will keep here.

- **js**

We are using JavaScript files for the calendar. Those files will keep here

- **images**

All the images, jpg files will keep here and then it will link to the system.

4.4 Development tools

XAMPP

XAMPP stands for Cross-Platform (X), Apache (A), MariaDB (M), PHP (P) and Perl (P). Since XAMPP is a simple, lightweight Apache distribution it is extremely easy for developers to create a local web server for testing and deployment purposes.

It also included MySQL databases what we are using to keep the data.

The screenshot shows the phpMyAdmin interface for the 'proc' database. The left sidebar lists various databases and their tables. The 'Tables' section displays a list of tables with columns for Action, Table, Rows, Type, Collation, Size, and Overhead. The tables listed include appoint_tec_details, boq_details, boq_evaluate_details, boq_master, ncbsec03_details, ncbsec45_bid_evaluate_details, ncbsec45_initial_item_details, ncbsec45_itemspec_details, ncbsec45_item_bid_details, ncbsec45_item_details, ncb_details, ncb_postqualification_details, ncb_postqualification_master, project_master, supplier_master, upload_documents, user_activities, and user_master. The 'Structure' tab is selected for each table.

Action	Table	Rows	Type	Collation	Size	Overhead
Browse Structure Search Insert Empty Drop	appoint_tec_details	16	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	boq_details	10	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	boq_evaluate_details	1	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	boq_master	2	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	ncbsec03_details	2	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	ncbsec45_bid_evaluate_details	2	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	ncbsec45_initial_item_details	2	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	ncbsec45_itemspec_details	20	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	ncbsec45_item_bid_details	4	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	ncbsec45_item_details	3	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	ncb_details	1	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	ncb_postqualification_details	2	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	ncb_postqualification_master	2	MyISAM	utf8_general_ci	2 KIB	-
Browse Structure Search Insert Empty Drop	project_master	12	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	supplier_master	2	MyISAM	latin1_swedish_ci	2.2 KIB	-
Browse Structure Search Insert Empty Drop	upload_documents	1	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	user_activities	6	InnoDB	utf8_general_ci	16 KIB	-
Browse Structure Search Insert Empty Drop	user_master	5	InnoDB	utf8_general_ci	16 KIB	-
Sum		93	InnoDB	latin1_swedish_ci	260.2 KIB	0 B

Figure 4.18- screenshot of the phpMyAdmin - Database panel

Notepad++

Notepad++ is a text editor and source code editor for use with Microsoft Windows. It is supporting my language such as php, css, javaScript what we are using to develop this system. And also, another advantage of Notepadd++ is it can create projects.

It will show the document map on right side. That one also an advantage.

Figure 4.20 show the project developed in Notepad ++ software

The screenshot shows the Notepad++ interface with the following details:

- File Path:** C:\xampp\htdocs\proc\documentation.php
- Code Editor:** The main window displays PHP code for a file named documentation.php. The code includes HTML, CSS, and JavaScript. It features a form for selecting a Project ID from a dropdown menu.
- Document Map:** A sidebar panel on the right shows a hierarchical map of all files in the project, including proc, css, database, images, includes, js, number_to_words, simplexml, tcpdf, upload_doc, _MACOSX, about.php, basic-sample-php-term, bidEvaluation.php, bid_process.php, boq.php, boq_ec.php, boq_ec_old.php, boq_old.php, contact.php, dashboard.php, documentation.php, finishboq.php, finishboq_ec.php, finishboq_ec_old.php, finishboq_old.php, gv.jpg, gv.png, home.php, index.php, ncb_report.php, ncb_report_advertisment.php.
- Status Bar:** Shows file length (3,329), lines (142), line number (Ln: 62), column number (Col: 1), selection (Sel: 0|0), encoding (Windows (CR LF)), and date/time (11:39 PM 09/05/2019).

Figure 4.19- screenshot of the project in Notepad++

Bootstrap

Bootstrap is a free and open source front-end toolkit for developing websites. It contains HTML and CSS as well as JavaScript. Bootstrap, originally named Twitter Blueprint, was developed by Mark Otto and Jacob Thornton. Bootstrap is used to design interfaces.

PHP

Hypertext Pre-processor (PHP) is a widely-used open-source server-side scripting language created by Rasmus Lerdorf. It is specially designed for Web development and can be embedded into HTML. In here PHP used as a development language [19].

HTML

Hypertext Mark-up Language (HTML) is the standard mark-up language for designing web pages. In here we used HTML for design interfaces.

CSS

Cascading Style Sheets (CSS) is a style sheet language. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.

Chapter 05

5. Evaluation

5.1 Introduction

This involved collecting of information and analyzing of Activities, Characteristics and the outcome. Purpose of the evaluation is to make judgments about the system, identify areas to develop further.

5.2 Testing Plan

Before we start to test the system, there should be a proper testing plan. Because evaluation needs to be done in several angles. Errors can be identified easily through this process.

The following table will describe the Testing plan in very brief.

Introduction	Test Goal	To ensure the quality of system and usability, accuracy,
	Scope	The system fulfils the client's requirement.
	Schedule	The progress of the implementation, whether the tasks are completed within the given time frame or not.
Objectives	Module Testing	Take the modules independently and test the system. It will be a white box testing.
	Integration Testing	Check each function of the system with dependencies or dependent modules/functions. This will be both white box and black box testing.
	System Testing	Check all the functions in a different environment. This will be a black box testing.
	Acceptance Testing	Check the system with the client before handed over the system. This will be a black box testing.
Required resources	Hardware	Check the hardware required to implement the system.
	Software	Procurement process management system and the software environment implementation
	Staff	Client's staff and the Supervisor

a. Test Cases

Test cases are highly required for planning and evaluate the system. Before start the testing, expected outcome has to be known. Through the Test cases, expected results are gathered.

According to that, some test cases were designed for major modules as follows.

i. Test cases for Login Modules

The test cases for the login form and the expected results are given below.

Test No	Test Description	Steps to Test	Expected Result
01	Validate User input details	Enter correct username and password Click on the Login Button	System load the Dashboard
02	Validate User Input Details	Enter wrong username or password Click on the Login Button	System redirect
03	Validate User Input Details	Click on the Login button without enter username or password	The system will show Please fill out this field in Username area
04	Validate User Input Details	Enter Username and Click on the Login button without entering a password	The system will show Please fill out this field in the password area
05	Validate User Input Details	Enter Password and Click on the Login button without entering a username	The system will show Please fill out this field in Username area

ii. Test cases for Project Initialization form

Test No	Test Description	Steps to Test	Expected Result
01	Validate Project ID	Auto-generate project ID	Project ID will generate automatically according to the given format.
02	Validation of Project Type	Select the Project type as NCB Click on the Submit button to create the Project ID	The system will load a form to enter details relevant to NCB.
03	Validate Project Type	Select the Project Type as Shopping and click on the submit button to create the Project ID	The system will load the form to enter details which relevant to the Shopping

04	Validate Project ID	Leave it blank and click on the Create a Project button	The system will show “Please fill out this field” in Project ID
05	Validate Project Name	Fill all fields and leave this field blank Click on the Create a project button	The system will show “Please fill out this field” in Project ID
06	Validate Project Description	Fill all fields and leave this field blank Click on the Create a project button	The system will show “Please fill out this field” in Project Description
07	Validate Bidding type	Fill all fields and leave this field blank Click on the Create a project button	The system will show “Please fill out this field” in Bidding type
08	Validate Date	Fill all fields and leave this field blank Click on the Create a project button	The system will show “Please fill out this field” in Date
09	Validate Value of the Bid Security	Fill all fields and leave this field blank Click on the Create a project button	The system will show “Please fill out this field” in Value of the Bid Security
10	Validate Appoint the of the TEC	Chairman is compulsory and once select the names of the chairman, it must appear to select other members of the TEC.	Must select at least 3 TEC members to proceed. Otherwise, the system will show an error.

iii. Test cases for Project Documentation

Test No	Test Description	Steps to Test	Expected Result
01	Validate Project ID	Must select a Project ID which created previously	Load the form to enter which relevant to the Project Type.
02	Validate “Proceed Section II” Button	Must fill all fields	Upload data to the database
03	Validate “ITB 11.1 (e) - No of Lots:”	Must enter how many lots need to appear in the BOQ	Not of lots entered in “ITB 11.1 (e) - No of Lots:” will appear from Section III - Post Qualification Requirements

04	Validate the “Add” button of the Items	Enter Item, Qty, Units price (without Vat), Total Price without Vat, Total Price with Vat	It will upload to the system
05	Validate “Generate Bidding Documents” Button	When at least one field in blank	If the fields are blank, the system will show black fields to enter.
06	Validate “Generate Bidding Document” button	All fields must fill properly.	It will ask to open or download the Bidding document in Ms word format. All data what filled in fields appeared in the word file.

iv. Test cases for Create specification / BOQ

Test No	Test Description	Steps to Test	Expected Result
01	Validate Project ID	Must select a Project ID which created previously	Load the form to enter which relevant to the Project.
02	Validate Supplier	Leave the Supplier area in blank	The system will show “Please fill out this field” in Date
03	Validate “Total “area	Enter the Price and Quantity	Total will calculate automatically
04	Validate “Submit a BOQ” button	Enter all fields	The system will load another field to enter another BOQ for another supplier. Have entered another supplier and proceed.
05	Validate the Finish button	Enter all BOQs	System show a summary of the entered BOQs

v. Test cases for Edit BOQ

Test No	Test Description	Steps to Test	Expected Result
---------	------------------	---------------	-----------------

01	Validate Project ID	Must select a Project ID which created previously	Load the form to enter which relevant to the Project.
02	Validate Supplier	Select a supplier	The system will load the data which entered previously.
03	Validate “Edit and next BOQ”	Click on the button	The system will show next BOQ which relevant to the BOQ to edit
04	Validate “Project Summary”	Enter all fields	System show a summary of the entered BOQs

vi. Test cases for Supplier Registration

Test No	Test Description	Steps to Test	Expected Result
01	Validate “Registration No”	Leave the field blank and click on the	The system will show “Please fill out this field” in Registration No field
02	Validate “Supplier Name”	Leave the field blank and click on the	The system will show “Please fill out this field” in the Supplier Name field
03	Validate “Address ”	Leave the field blank and click on the	The system will show “Please fill out this field” in Address field
04	Validate Submit Button	Enter all fields	The system will show a successful message

vii. User Registration form

Test No	Test Description	Steps to Test	Expected Result
01	Validate “Username”	Enter a username which entered previously	The system will show an error. Username can't be the same
02	Validate “ Password”	Enter different passwords in the password field and Confirm password	The system will show an error
03	Validate “Select department”	Leave the field blank and click on the submit button	The system will show “Please fill out this field”
04	Validate “Select the committee”	Leave the field in blank	The system will show “Please fill out this field”
05	Validate “Select Access level”	Leave the field in blank	The system will show “Please fill out this field”

06	Validate submit button	Fill all fields and click on the submit button	The system will a successful message
----	------------------------	--	--------------------------------------

4.3 User Evaluation

Need to have good communication between the client and the developer to overcome the drawbacks. User acceptance testing will fulfil this requirement. Hence, the client must get proper feedback in writing from the client before handed over the system.

The user evaluation questionnaire showed below.

Test No	Test Description	Steps to Test	Expected Result
01	Validate “Username”	Enter a username which entered previously	The system will show an error. Username can't be the same
02	Validate “ Password”	Enter different passwords in the password field and Confirm password	The system will show an error
03	Validate “Select department”	Leave the field black and click on the submit button	The system will show “Please fill out this field”
04	Validate “Select the committee”	Leave the field in blank	The system will show “Please fill out this field”
05	Validate “Select Access level”	Leave the field in blank	The system will show “Please fill out this field”
06	Validate submit button	Fill all fields and click on the submit button	The system will a successful message

Online Procurement Management System						
User Feedback form						
Name _____						
Designation _____						
No	Question	Very Good	Satisfied	Average	Weak	
1	Overall understanding about the system					
2	User creation and privileges provided to the users					
3	Easiness and the friendliness of the system					
4	Usability					
5	accuracy of the Data entering and calculations					
6	Details in the reports					
7	How much it similar to the National procurement guidelines					
8	Details provided in the supplier registration					
Form wise feedback						
1	Registration form					
2	Information in the Dashboard					
3	Project initialization form					
4	Documentation form - NCB					
5	Documentation form - Shopping					
6	Evaluation of BOQs					
7	Awarding of Contracts					
8	Reports					
9	Supplier Registration form					
10	Calendar					
Suggestion for further development _____						
Remarks _____						

Signature _____			Date _____			

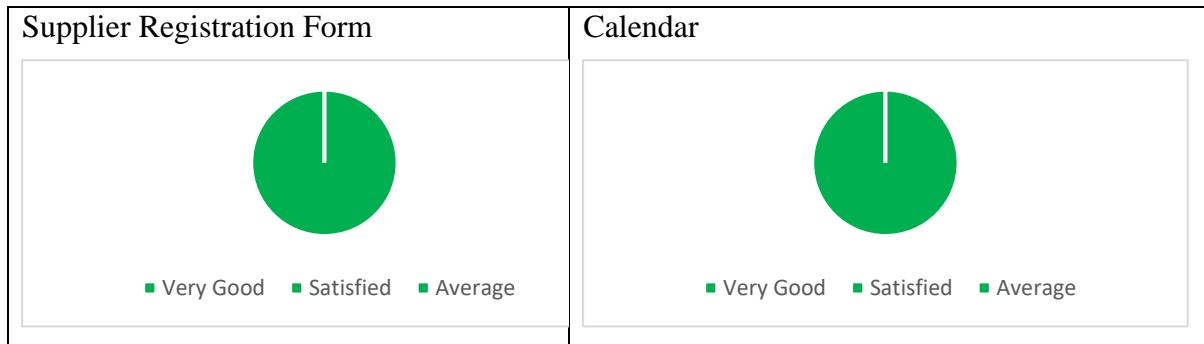
Figure 5.1 : Customer feedback form

Through this questionnaire, the developer can easily get an idea about the areas which need further developments. Finally, the developer(s) must analyse that questionnaire and work until the user satisfied with the system.

User acceptance certificate will provide accordingly.

After the development session of the system we allow several users to check the system. While they are using the system we distribute the above questionnaire among 20 users and got their comments.





These charts provide a good understanding about the user. 72% of the users have are satisfied with the output. Single person is unsatisfied with the awarding package and the feedback has to be considered when developing a good system.

Chapter 06

6. Conclusion

6.1 Introduction

University of Colombo School of Computing (UCSC) is a leading government university of Sri Lanka which provides good Degree programmes. This institute is handling many contracts. Since they are purchasing many types of equipment, furniture and building maintenance and this is a government institute, these contracts must be procured according to the National Procurement Guidelines.

The procurement of contracts is a bit of complex task as it needs to follow the government rules and regulations. And also it's a time-consuming process of

- Preparing specification / requirements
- Managing committees such as Bid Opening committee, Technical Evaluation Committee, Procurement Committee Etc.
- Process of evaluation
- Preparing documents

Due to this huge process, it directly affects the process of the institute. Hence, it will delay some tasks.

So this system will motivate the procurement team to follow the National procurement guidelines in an easy way. Since all the documents related to a particular procurement can generate through this system, it will be very easy to handle the procurement and keep track of records.

6.2 Critical Assessment of Project

As the scope of the subject is huge, we develop the system up to some extent. The scope of this project is to solve the most critical and important parts of the procurement process which need to smoother.

The area covered during this project was decided by interviewing clients. The target given by the client is to carry out the documentation with proper documentation, time-saving and maintaining records. Since the client is not technically electorate person, it's needed to covert technically things into the user-friendly thing.

Due to the discussions had has with the client was helpful to solve a lot of issues through the Procurement Management Information system. Finally, the solution has become a reality which fed up the clients by providing following facilities.

- Supplier registration
- Generating Bidding documents through the system.
- Evaluation of quotations
- Generate newspaper advertisements
- User management
- Year planner
- Dashboard

6.3 Lessons and learned

This was a tough task because procurement is a new study. Hence, the background of Procumbent has to be studied first. The supervisor and the staff of the Procurement department in the University of Colombo School of Computing was helpful in succeeding this project.

It was guided to learn,

- New techniques of the PHP based system.
- During the study period, I understood most of the companies are not following the National Procurement Guidelines. Therefore, they are generating wrong procedures and reports.
- Learned how to use reporting tools which support to PHP such as “tcpdf”
- Sometimes TEC will check the real samples physically. Those things we unable to capture in a system. In this kind of situation, we have to put their experience in another field.
- There are some huge different in Bootstrap version 4.0 and the 3.7. Especially when we create text fields, we can create text fields with any size of length but in Bootstrap version 4, it will create as a huge bar.

6.4 Achieved Objects

Procurement Management System designed to keep track of records, maintain documents in a proper and easy way. The followings are the achieved objects through this system.

- Provide
- accurate and up to date information about preparing of Bid documents, evaluations and awarding of contracts
- Provide supplier details
- Maintain and provide easy access to information regarding the documents which already processed and current projects.
- Eliminate or reduce unnecessary cost, paper works and loss of data

6.5 Future Developments

The scope bounded the system need to enhance further.

- Provide access to bidders.
 - Can provide access to bidders to update their pricing to the BOQ

- Evaluation of works
 - This system is currently limited to goods and it needs to add works also in future.
- Customer Registration
 - Planning to register online
- SMS / Email facility
 - We will provide supplier to register online and once they registered to the system and whenever its update supplier will notify through an SMS and email
 - When a new project initialized in the system, it will send an email to registered suppliers. If the supplier is interested, they can apply by following the procedure.
- Reduce the manual works
 - Need to analyze the system further and reduce manual system.

Computer systems are need to be developed from time to time. It needs to update reports, information, security features from time to time.

Above mentioned facilities will be achieved in near future.

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Appendix A. System Documentation

This documentation will show how to install or host the system. This information will be useful if the solution needs to be enhanced or develop further. The system installation described in step by step.

Implementation Environment

Before start implementation of the system, we must check whether we can fulfil the following minimum requirement.

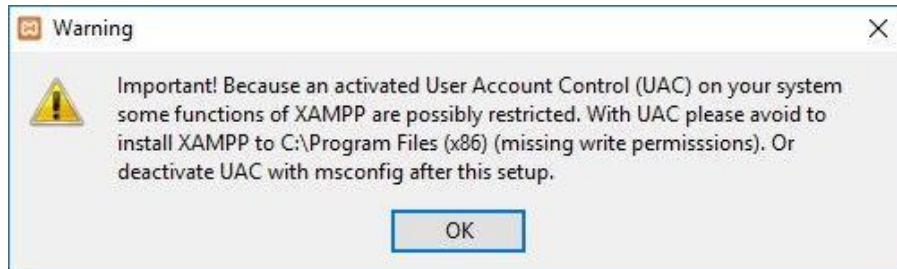
- Processor Speed : Pentium IV, 3.2 GHz
- Minimum Hard Disk Space : 10 GB
- RAM : 1 GB
- Network Card
- Internet connection
- Web browser

01. Download the XAMPP using the following path

<https://www.apachefriends.org/download.html>

02. Double click on the .exe file to run the installer.

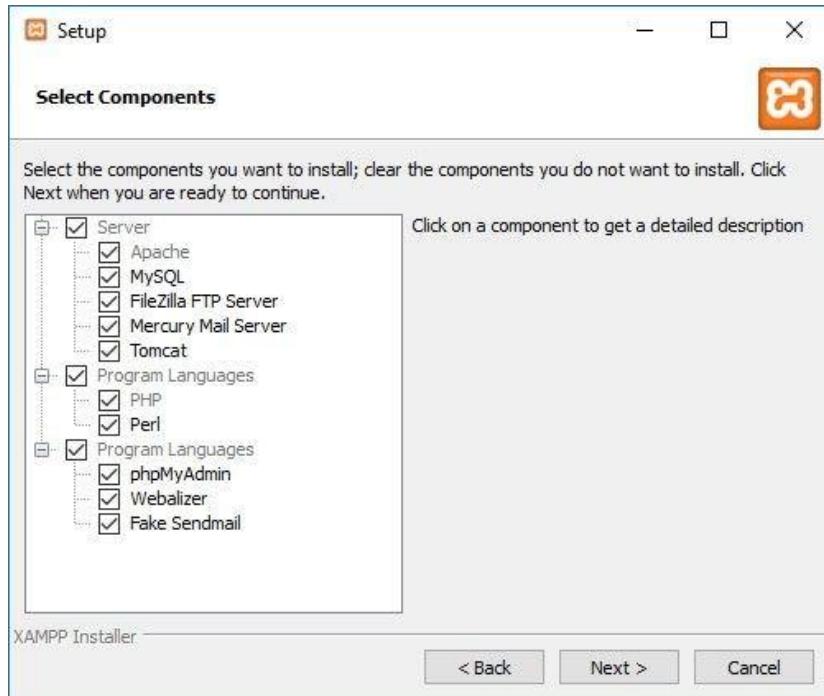
03. Click the OK button on the warning message to continue.



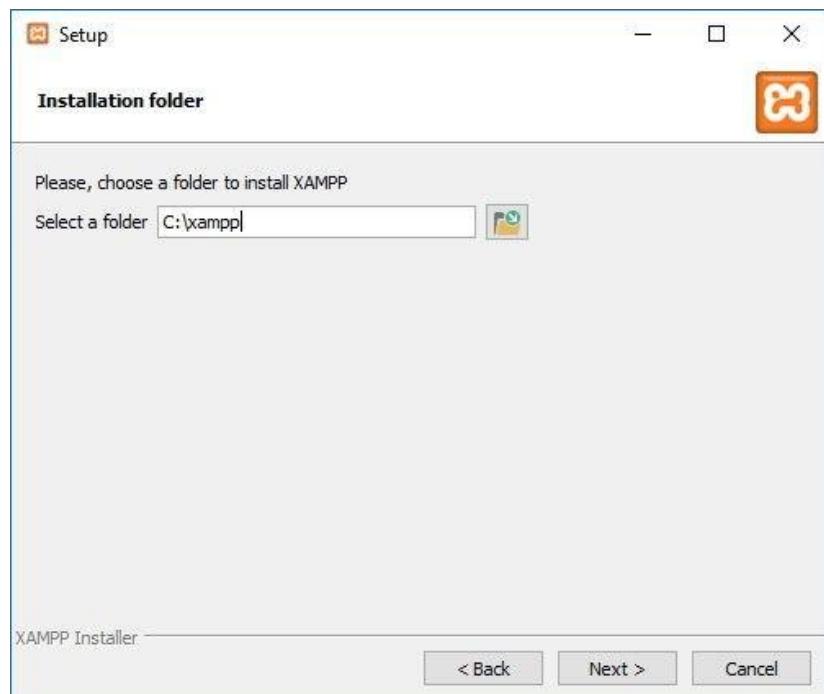
04. Click on the NEXT button to continue



05. XAMPP offers a variety of components that you can install, such as MySQL, phpMyAdmin, PHP, Apache, and more. For the most part, you will be using most of these components, as such it's recommended to leave the default options and click the Next button.



06. Use the default install location settings, or choose another folder to install the software, and click the Next button.

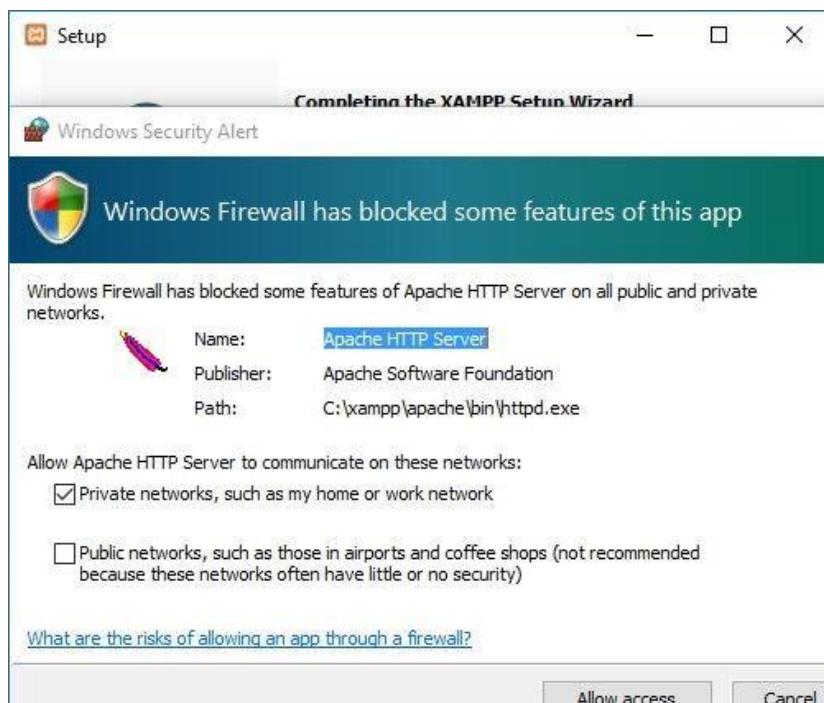


07. Clear the Learn more about Bitnami for XAMPP option.

08. Click the NEXT button



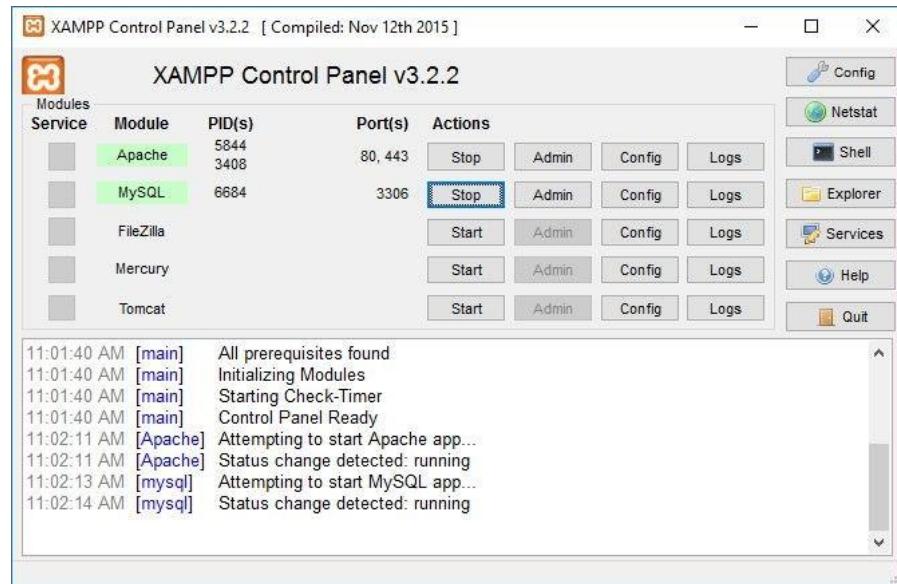
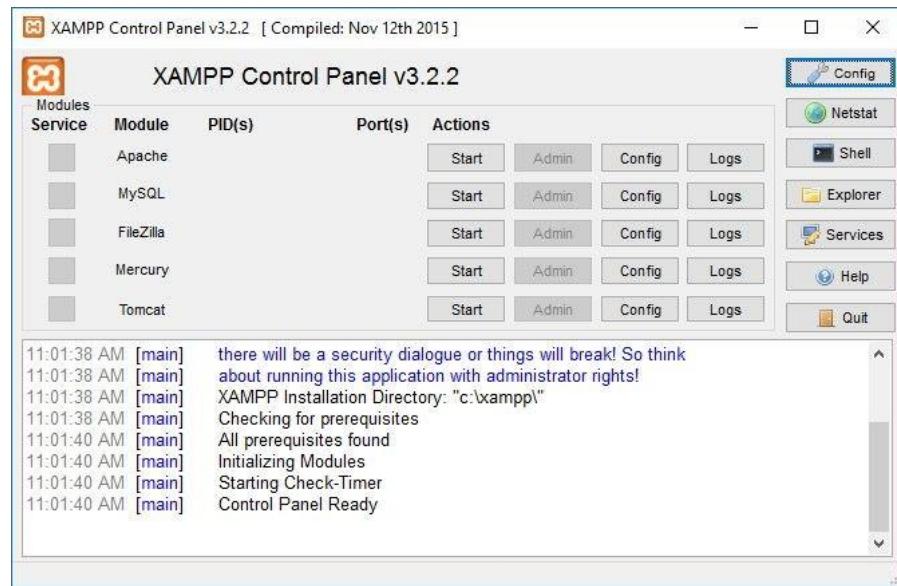
09. Click the Allow access button to allow the app through the firewall (if applicable).



10. Click the Finish button.



11. When the XAMPP runs, click on the start the Apache and MYSQL to start the services



Then we will develop the system in following folder C:\xampp\htdocs\proc

Creating a database

Login to the MySQL database using <http://localhost/phpmyadmin>

The screenshot shows the phpMyAdmin interface running in a browser window. The left sidebar lists databases: New, information_schema, mysql, okt, performance_schema, phpmyadmin, proc, and test. The main panel has two tabs: 'General settings' and 'Appearance settings'. Under 'General settings', the 'Server connection collation' is set to 'utf8mb4_unicode_ci'. Under 'Appearance settings', the 'Language' is set to 'English' and the 'Theme' is 'pmahomme'. On the right side, there are four panels: 'Database server' (server info), 'Web server' (Apache, PHP, MySQL info), and 'phpMyAdmin' (version info). The status bar at the bottom shows the URL 'localhost/phpmyadmin/index.php?lang=en#', the date '09/04/2019', and the time '10:45 PM'.

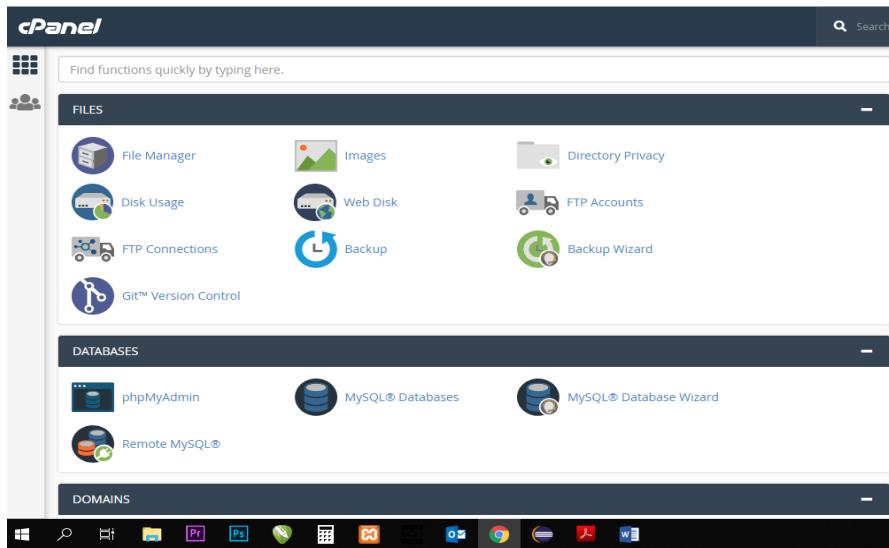
Created the database and name it as “proc”

Setup the system using cPanel

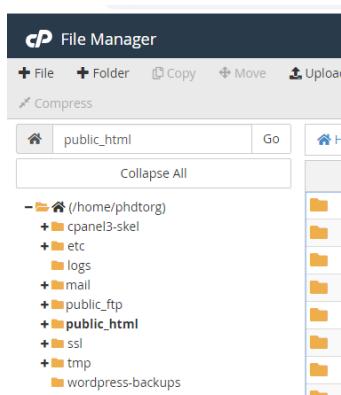
Login into the cPanel

The screenshot shows the cPanel login page. It features the 'cPanel' logo at the top. Below it are fields for 'Username' (with placeholder 'Enter your username.') and 'Password' (with placeholder '*****'). A large blue 'Log in' button is centered below the password field. To the right of the log in button is a 'Reset Password' link. At the bottom of the page, there is a horizontal menu with language options: English, العربية, Български, čeština, dansk, Deutsch, Ελληνικά, español, and more. The status bar at the bottom shows the URL 'https://2083', the date '09/04/2019', and the time '10:48 PM'.

Go to File Manager

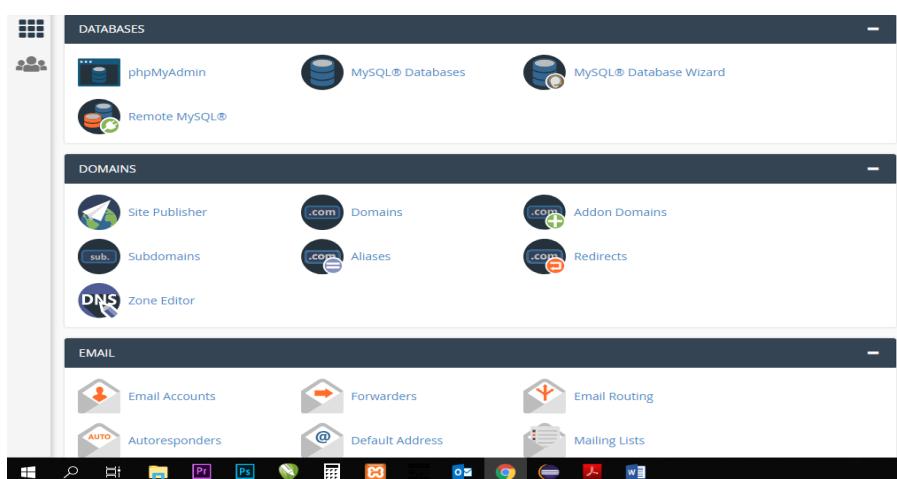


Copy the system folder to **public_html/proc**



Then create the upload the Database

Go to phpMyAdmin in cPanel and upload the Database. Then it needs to create permission.



Finally, we need to configure the **conn.php** file and it needs to mention the host, database name, Username and password.

Appendix B : User Documentation

Documentation provides a brief explanation of how the system should have executed for the desired tasks.

Users who involve in procurement process activities directly or indirectly in the organization are authorized to involve in the system. But every user should be registered in the system and need to assign user levels.

B.1. Login Page

Every valid user can log in to the system by entering their username and password correctly. If the username, password or both incorrect, the system will show an error.

B.2. Dashboard / Home page

When the user logs in to the system, it will come to the Home page/Dashboard.

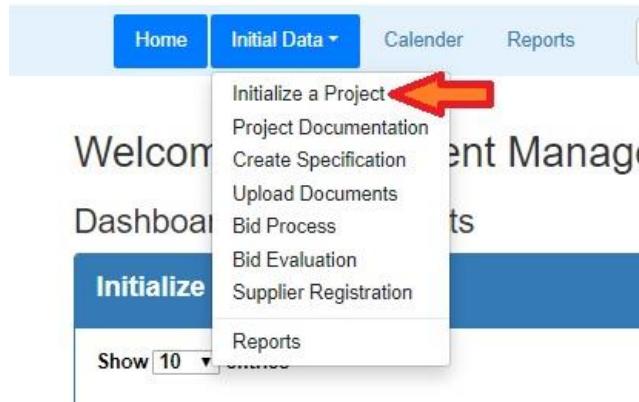
In the dashboard, the user can get a clear picture of the processing projects, completed projects.

Project ID	Project Name	Bid Type	Expire Date	Value
UCSC PROC G 2019 11	asdfg1	NCB	2019-05-22 10:12:00	134,000.00

Project ID	Project Name	Bid Type	Expire Date	Value
No data available in table				

B.3. Initialize a New Project

To start a new project user must select “Initialize a project” from the dropdown menu which shows in the below figure.



Then the system will redirect to the relevant page.

The screenshot shows a web browser window with the URL 'localhost/proc/proj.php'. The page title is 'Procurement Management System'. It has a header with Home, Initial Data, Calender, Reports, Search, Contact us, User Management, and Current User. The main content area has fields for Project Id (UCSC/PROC/G/2019/13), Project Name (Supplying Office chairs), Project Description (Supplying of 40 nos of office chairs.), and Bidding Type (a dropdown menu with options: SELECT ..., Direct Purchase, Shopping, NCB, ICB, Other, where 'Other' is highlighted). There is also a Remark field. At the bottom, there is a toolbar with various icons and a status bar showing the date and time.

Then the user must fill the required filed in this form. Project ID will generate automatically according to a predefined format. But, the user has the authority to change it before initializing the project.

All data in this form is highly required.

Bidding Type.

Bidding type is another very important area in here. Mainly there are 03 bidding types programmed here. If we select NCB as the bidding type, it will load the form which relevant to the NCB documents. If we select Direct purchase, it will load the form which relevant to Direct shopping. Likewise, it will load the relevant form once you complete the form and click on the “create project” button.

Appoint TEC

Technical Evaluation Committee will do a major role in the procurement process. There must be a chairman for this committee and few members.

In this system appoint the chairman is compulsory. Once you select a chairman from the user list only the member list will appear. You can select members one by one.

Bidding Type
SELECT ...

Expire Date dd/mm/yyyy and Time :- :- :- of the Bid:

Value of the Bid Security

Remark

Appoint TEC Chairman
Harshana Jayasekara- Sys Admin

Appoint Technical Members
Saith Fernando- Accountant

Appoint Technical Members
Please Choose.....

Create a Project

© 2019
Procurement Management System
Harshana Jayasekara

Finally, you need to click on the “Create a project” to create the project.

B.4. Generate the Bid Document

Generate a correct bid document according to the National Procurement Guideline is the major objective of this system. According to our research, most of the companies are not following procurement guidelines. Hence, we develop this system to generate these reports in an easy way.

To start generating the Bid document, the user must select the “Project Document”

Home Initial Data ▾ Calender Reports Search

Project Id UCSC|PROC|G|

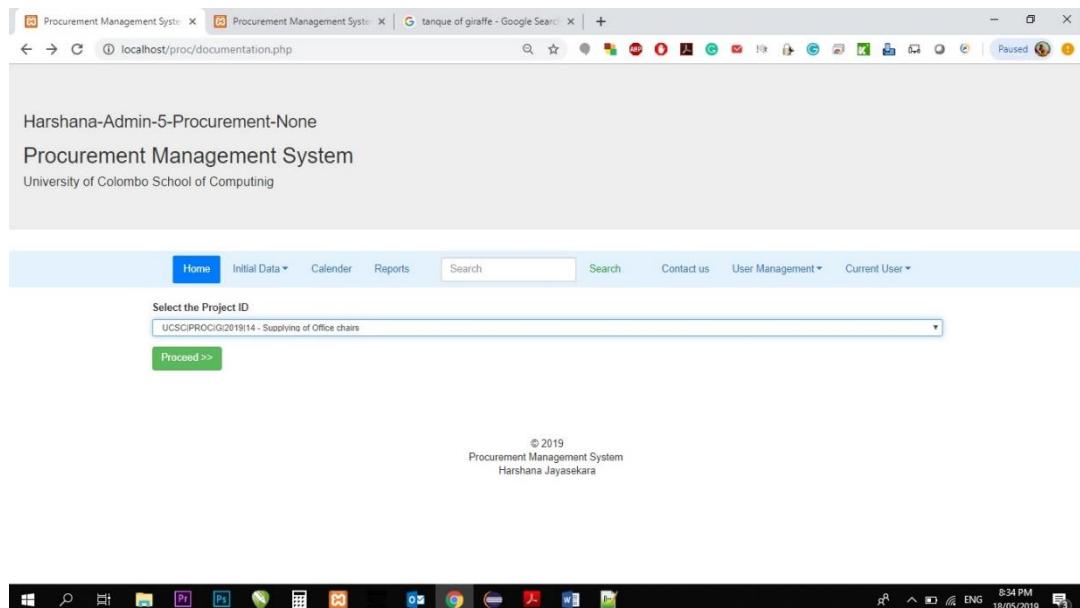
Project Name

Project Description

- Initialize a Project
- Project Documentation**
- Create Specification
- Upload Documents
- Bid Process
- Bid Evaluation
- Supplier Registration
- Reports

Once you select the Project Document it will load redirect the relevant form.

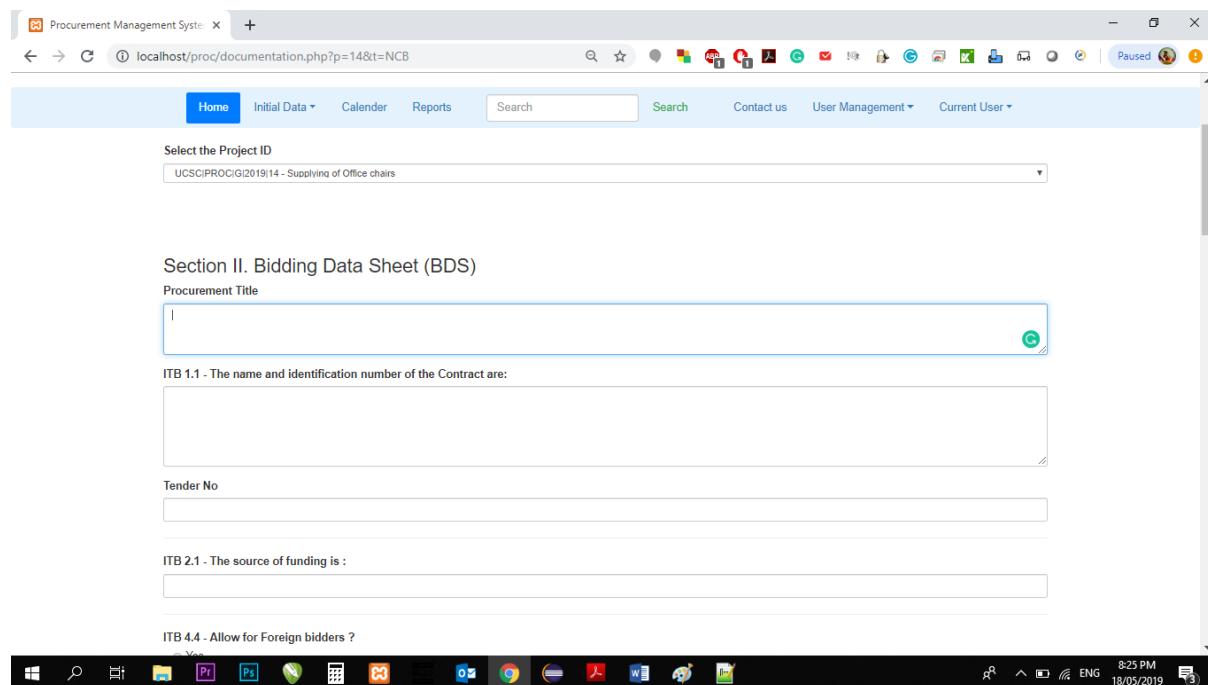
Once it redirected, the user must select the correct project ID from the given list.



According to the project id, the system will load a relevant form to fill.

E.g.1, If it is relevant to NCB, the system will load the form which relevant to NCB.

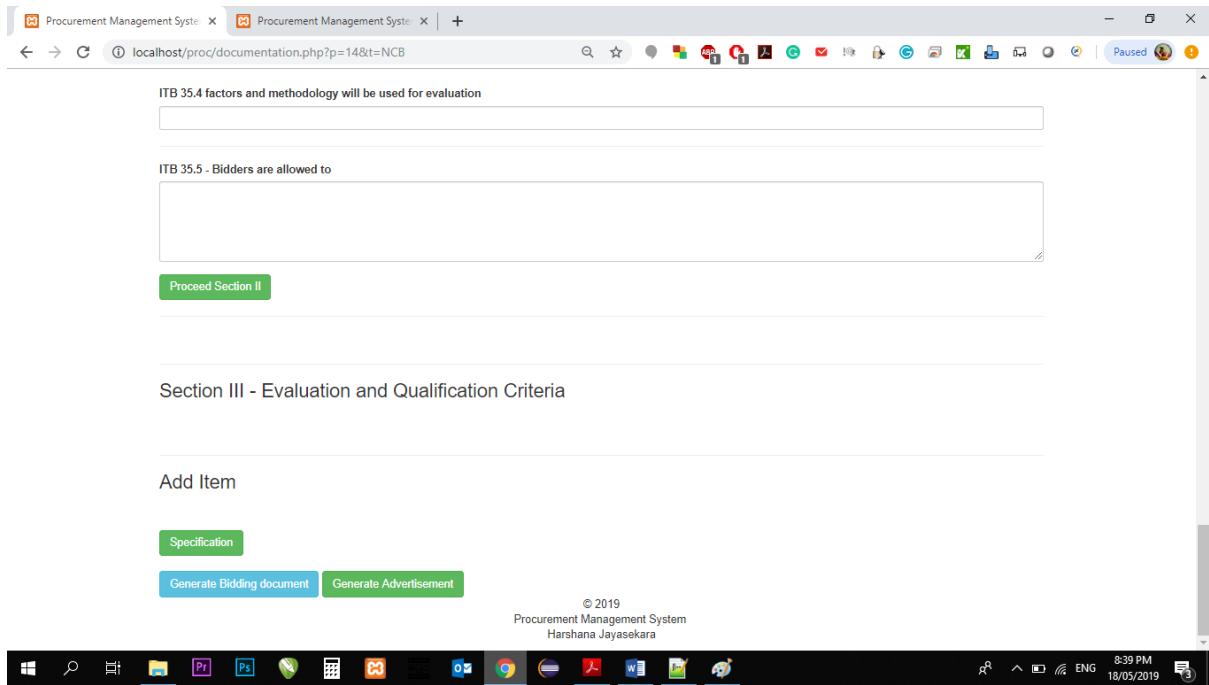
E.g.2, if it is relevant to direct purchase, the system will load the relevant form of Direct purchasing.



In NCB form, there are few fields to fill. Those fields are required to generate the final Bid document.

Procurement Clerk has the responsibility to fill this form and generate the report. Once he completed the data entry part, he or SAB/AB can generate the report.

There are a few options available in the system.

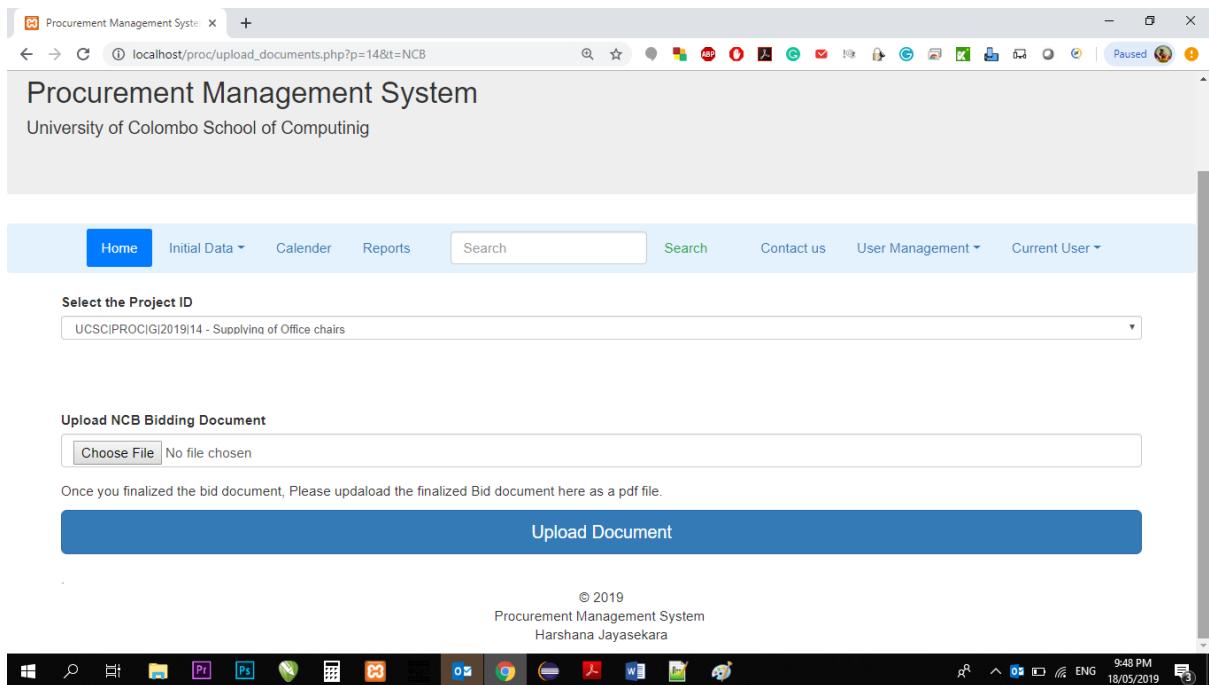


If the user clicks on the “Generate Bidding Document” button, the bid document will download as a word file in .doc format.

If the user clicks on the “Generate Advertisement button” the relevant paper advertisement will download as a word file in .doc file.

If you want to update BOQ or if you want to do a comparison of the bids, you need to click on the “Specification” button.

Since these documents are very confidential once we are recommending to keep those files in pdf format. If it is in pdf format, no one can edit the files later



In this page, the user can upload the finalized document to the system. We allow the user to download the bid document in .doc format because we allow modifying the document in certain areas with the permission of SAB/AB.

B.5 Bid Validation

In here we are expecting to store the values of each supplier by item by item.

To start this process, user must select the “Bid process” from Initial Data of the Main Menu. Then User must select a correct Project ID.

Then User must select a supplier to proceed. Once the user select a supplier from the pre-registered list, it will appear following details to fill.

Item what we identified previously will show here.

Item	Qty	Unit Price (Without VAT) In figures	Unit Price (With VAT) In figures	Total Price (Without VAT) In figures	Total Price (with VAT) In figures	Action
Monitors	40	10000	11500	400000	460000	<button>Update</button>
System Units	40	100000	115000	4000000	4600000	<button>Update</button>

Like wise we can enter the values of all supplier by selecting the supplier name from the given list.

B.6. Evaluation

The evaluation process must be very transparent. Otherwise, other parties can against for the final result. Hence, we decided to do the evaluation part in the system.

When the user select Bid Evaluation from the main mene and select the relevant project, system will show the name list of the TEC.

Bid Evaluation Form

Select the Project ID
UCSCIPROC(G)2019|1 - ssdf

Committee Members			
Full Name	Designation	Department	Committee
Sajith Fernando	Accountant	Finance	Technical Evaluation Committee
Lahiru Chathuranga	Sys Admin	Procurement	None
Lahiru Kasun	DEO	IT	None
Lakshan Sandaruwan	Tec. Officer	Administration	None

Bids Received Before Closing Time-Price Scheduled

The later system will show the value of their bids.

Then the user must select whether they have sent the relevant documents or not.

Later, if the decided a company or a bidder not suitable, TEC can mention it in the system and they can reject the bid.

Bids Received Before Closing Time-Price Scheduled

S>No	Name of the Bidder	Qty	Unit Price Without VAT (Rs)	Total Amount Without VAT
1	Damro Group	80	110,000.00	4,400,000.00
2	Hash Jay Office Automation	40	10,000.00	400,000.00

Preliminary Examination Of Bids

Post Qualification Requirements

No	Name of the Bidder	Bid Bond Guarantee	Form of Bid Filled & Signed	Price Schedule Filled And Signed	Manufacture Authorization	Acceptance for Detailed Examination	Action
1	Damro Group	<input type="checkbox"/> Yes	<input type="checkbox"/> yes	<input type="checkbox"/> yes	<input type="checkbox"/> yes	<input checked="" type="checkbox"/>	<button>Update</button>
2	Hash Jay Office Automation	<input type="checkbox"/> yes	<input type="checkbox"/> no	<input type="checkbox"/> yes	<input type="checkbox"/> yes	<input type="checkbox"/>	<button>Update</button>

Reject Bidders

Name of the Bidder	Reject Reason	Action
Damro Group	(empty)	<button>Reject Bidder</button>
Hash Jay Office Automation	No form of bids submitted	<button>Reject Bidder Reset</button>

Then the system allows to mentions the financial evaluation, Technical evaluation and bidders responsibilities.

The screenshot shows the 'Procurement Management System' interface. The main content area displays three evaluation sections: Financial Evaluation, Technical Evaluation, and Bidder Responsiveness. In the Financial Evaluation section, Damro Group's bid price without VAT is listed as 4,400,000.00, with additions or omissions at 0 and evaluated bid price at 4,000,000. In the Technical Evaluation section, Damro Group is marked as 'Accepted'. In the Bidder Responsiveness section, Damro Group is listed with a status of 'No Responsive'. Below these sections is a table for Post Qualification AND Qualification Requirements, which includes rows for 'Over 15 years experience' and 'Damro'. At the bottom of the page, there is a 'Recommendation Bidder' section identifying 'Damro Group'.

Finally, we can select the most suitable bidder as follows.

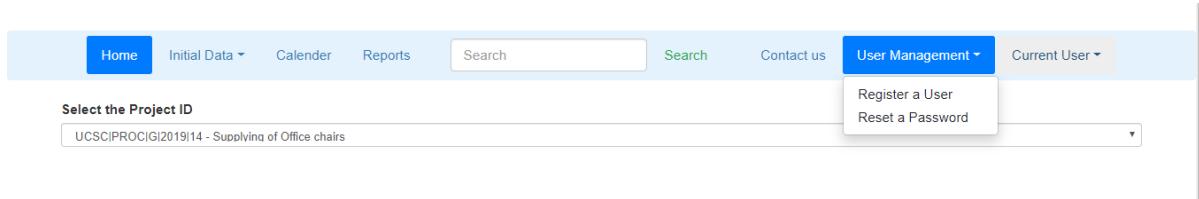
If the TEC required, they can generate a report on this by clicking on the "Create TEC report for NCB" button.

This screenshot shows the same procurement system interface as the previous one, but with a different set of data. The Bidder Responsiveness section now shows 'Damro Group' with a status of 'No Responsive'. The Post Qualification AND Qualification Requirements section includes a row for 'Over 15 years experience' with 'Damro' listed. Below these sections is a 'Bidder Ranking' table where 'Damro Group' is ranked 1. At the bottom of the page, there is a 'Recommendation Bidder' section identifying 'Damro Group' and a 'Generate TEC Report For NCB' button.

B.7. User Registration

User Registration and the resetting of passwords also available in the system. SAB/AB can create users to the system using the below path.

Main menu/ User Management/Register a User



Then the user registration form will be loaded.

The screenshot shows a registration form with fields for First name, Last name, Employee No, Designation, User Name (with 'Harshana' entered and highlighted in red), Password, Confirm Password, Select a Department (with 'SELECT...' dropdown), Select the Committee (with 'SELECT...' dropdown), and Select Access Level (with 'SELECT...' dropdown). At the bottom is a 'Register Now' button. The page title is 'Procurement Management System' and the URL is 'localhost/proc/reg.php'. The status bar at the bottom shows system information like battery level, signal strength, and date/time.

When creating the user, we can mention select the department of the new user.

Available departments : Procurement, Administration, Finance and IT

There are several user levels mentioned here.

- Admin : They have full access. They can edit any details in any circumstance.
- Data Entry : They can enter any data before finalized the data by an authorized person.
- View only : They can view data only.

If required, we can select the which committee the user is representing.

Available Committees : Procurement Committees, Technical Evaluation Committee, Bid Opening Committee or none.

B.8. Supplier Registration

Suppliers also can register in this system. Through this, we are expecting two (02) things.

1. Keep track of records of suppliers. (contact details..etc)
2. For evaluation

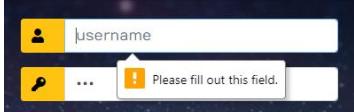
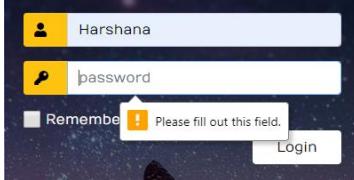
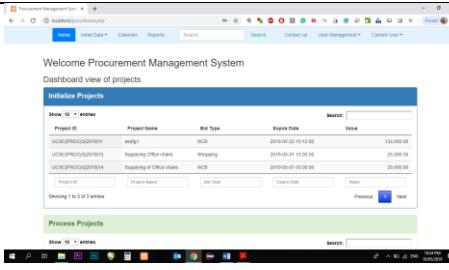
The screenshot shows a Windows desktop environment with a web browser window open to 'localhost/proc/supplieradd.php'. The browser title bar reads 'Procurement Management System'. The page header includes links for Home, Initial Data, Calender, Reports, Search, Contact us, User Management, and Current User. The main content area is titled 'Supplier Registration' and contains fields for Registration No, Supplier Name, Address, TP No, Fax No, and Email, each with a placeholder 'Please Enter [Field]'. A 'Register' button is at the bottom left. The footer displays copyright information: '© 2019 Procurement Management System Harshana Jayasekara'. The taskbar at the bottom shows various application icons and the system clock indicating '10:06 PM 18/05/2019'.

Appendix C : Test Results

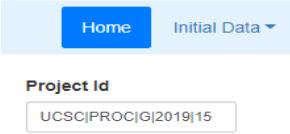
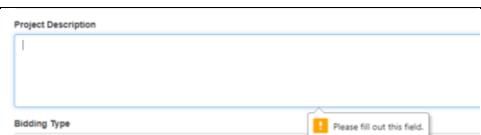
The cases described in the evaluation chapter are evaluated and results obtained are indicated below.

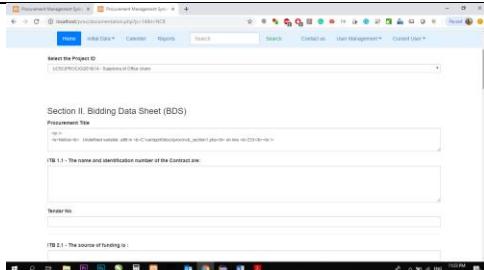
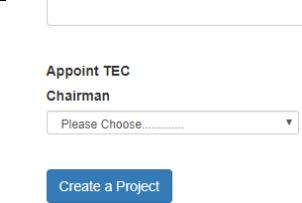
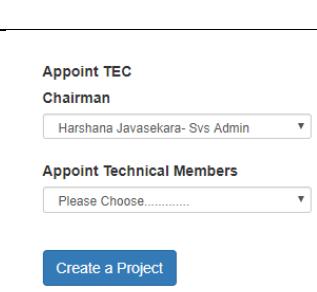
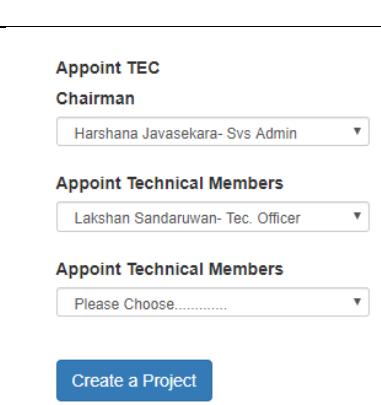
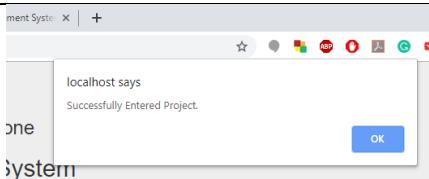
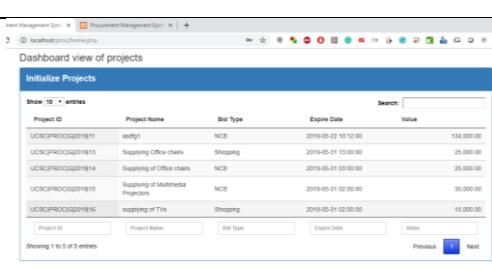
C1. Test cases for Login Modules

The test cases for the login form and the expected results are given below.

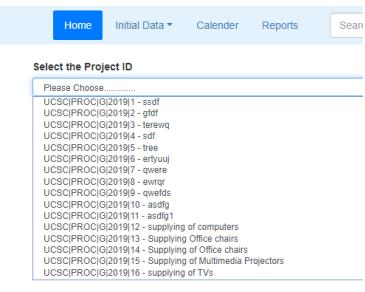
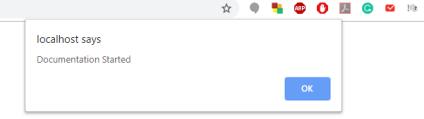
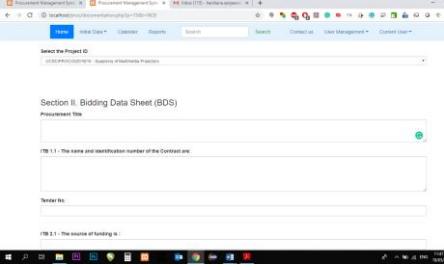
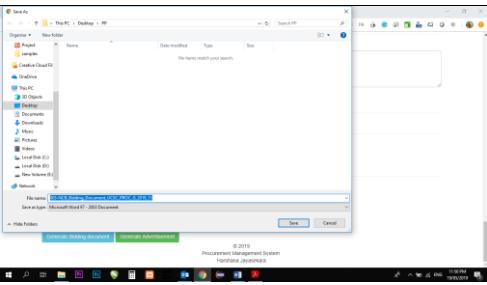
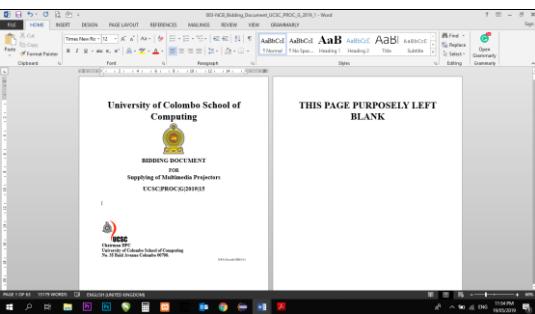
Test No	Test Description	Expected Result	Actual Outcome	Status
01	Validate Username input details	If the username field is blank, the system will show an error		✓
02	Validate password Input Details	If the password field is blank, the system will show an error		✓
05	Validate Username and password	If the username and the password correct, system will redirect to the Dashboard.		✓

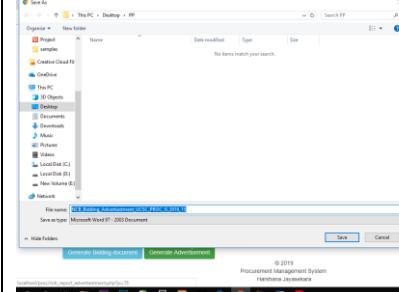
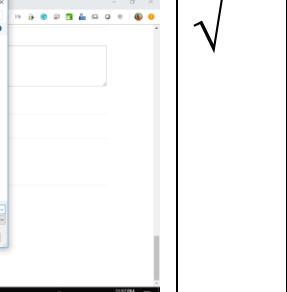
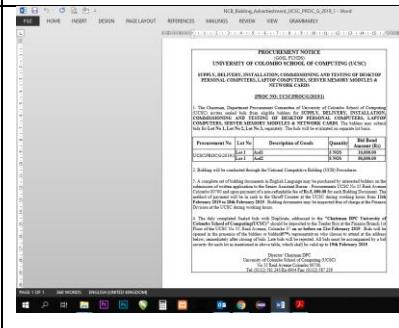
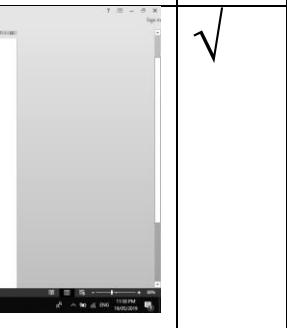
C2. Test cases for Project Initialization form

Test No	Test Description	Expected Result	Actual Outcome	Status
01	Validate Project ID	Project Id will generate automatically		✓
02	Validation of Project Name	Project name can't be empty		✓
03	Validation of Project Description	Project description can't be empty		✓
04	Validation of Project Type	It can't be empty.		✓

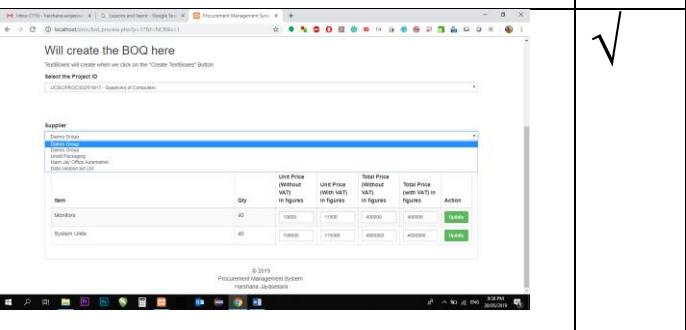
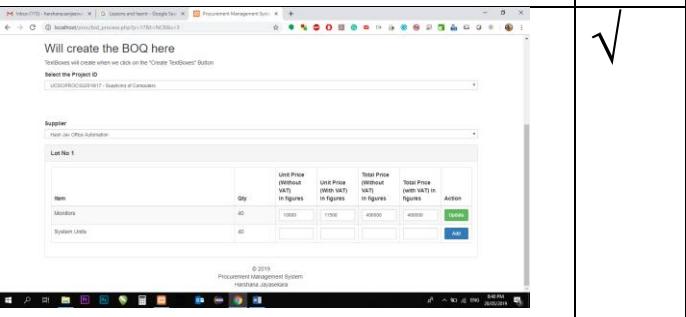
		If you select NCB it will load NCB form in next level.		
05	Validate Chairman of the TEC	Chairman of the TEC is highly required. Hence, We must select Chairman before we enter other members		✓
06	Validate members of the TEC	After select, the Chairman system will allow entering other members.		✓
07	Validate other members of the TEC	Once we selected a TEC member, the system will allow entering another member. Likewise, we can enter any no of members		✓
08	Validate Project	Once we enter all the details and click on the “Create a Project” button, the system will create a project and show a message.		✓
09	Validate projects in Dashboard	Once the project initialization is completed. It will show on the Dashboard.		✓

C3. Test cases for Project Documentation

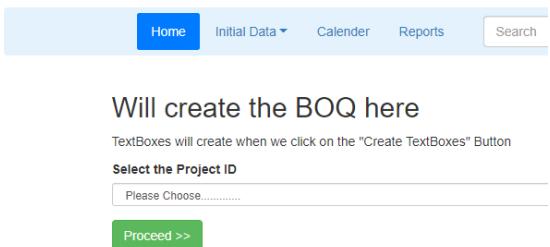
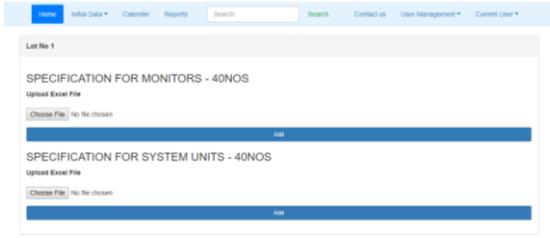
Test No	Test Description	Expected Result	Actual Outcome	Status
01	Validate Project ID	Project IDs which we create previously should appear in a drop down.		✓
02	Load successful message	Once we select the project ID and click on the “Proceed button”, relevant for will load and the system will show a message.		✓
03	Validate Project	The system will load the relevant form according to the bidding type what user selected in the initialize mode.		✓
04	Validate “Generate Bidding Document” Button	Once the user fills all details and clicks on the button, the system will download the Bid document in .doc format. Name of the .doc file will be Bidding type + Project ID		✓
05	Validate Document	All the data what we filled in the previous page will be added to the file		✓

06	Validate “Generate Advertisement “ Button	<p>Once the user fills all details and clicks on the button, the system will download the paper Advertisement in .doc format.</p> <p>Name of the .doc file will be the bidding type + Project ID. And it will mention as an Advertisement.</p>		
07	Validate “Generate Bidding Documents” Button	<p>If the fields are blank, the system will show black fields to enter.</p>		

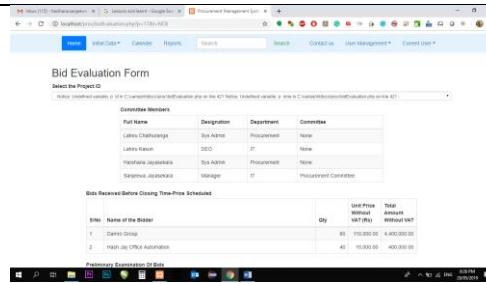
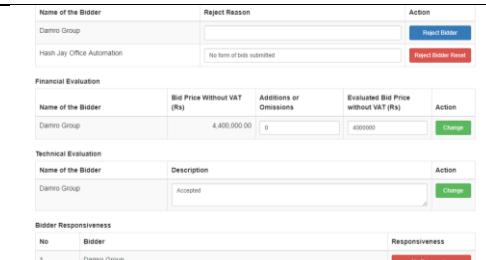
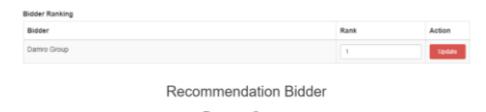
C4. Test Cases for Validate a Bid

Test No	Test Description	Expected Result	Actual Outcome	Status
01	Validate Supplier	<p>When we select a supplier, form will appear to enter their prices.</p> <p>Items will show according to the data what we entered previously.</p>		
02	Validate Supplier	<p>When we choose another supplier, it will show the fields to enter the prices of the relevant supplier.</p>		

C5. Test cases for Create specification / BOQ

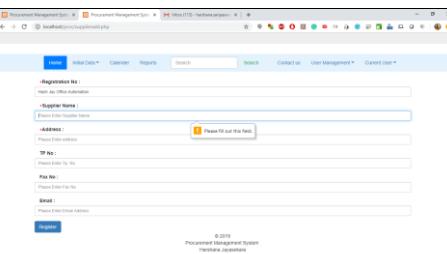
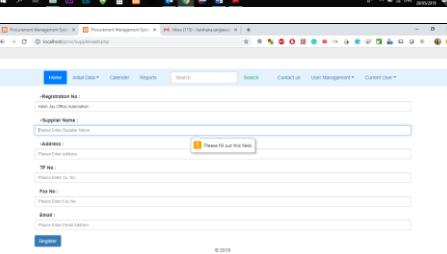
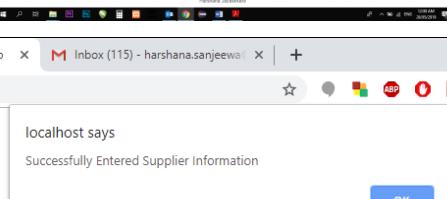
Test No	Test Description	Expected Result	Actual Outcome	Status
01	Validate Project ID	Load the form to enter which relevant to the Project.	 <p>Will create the BOQ here Text Boxes will create when we click on the "Create Text Boxes" Button Select the Project ID Please Choose..... Proceed ></p>	✓
02	Upload specification in given format	Update files to the system with given format	 <p>Lot No 1 SPECIFICATION FOR MONITORS - 40NOS Upload Excel File Choose File: No file chosen All SPECIFICATION FOR SYSTEM UNITS - 40NOS Upload Excel File Choose File: No file chosen All</p>	✓

C6. Test cases for Evaluation of Bids

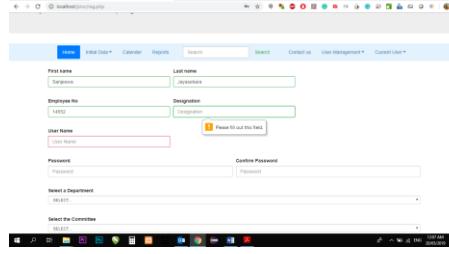
Test No	Test Description	Expected Result	Actual Outcome	Status
01	Validate Project ID	Depend on the Bidding type, it will show the relevant form. System will show the basic details such as TEC members, Supplier details.	 <p>Bid Evaluation Form Bid Received Before Closing Time Price Scheduled Name of the Bidder 1. Damro Group 2. Hash Jay Office Automation Gty Unit Price without VAT (Rs) 10,000.00 4,400,000.00 40 10,000.00 400,000.00 Preliminary Examination of Bids</p>	✓
02	Reject a Bid	Once reject a bid/quotation from the system, it will not appear further.	 <p>Name of the Bidder Damro Group Hash Jay Office Automation Reject Reason No form of bids submitted Action Reject Bidder Reject Bidder Reset Financial Evaluation Name of the Bidder Damro Group Bid Price Without VAT (Rs) 4,400,000.00 Additions or Omissions 0 Evaluated Bid Price without VAT (Rs) 4,000,000 Action Change Technical Evaluation Name of the Bidder Damro Group Description Accepted Action Change Bidder Responsiveness No Bidder 1. Damro Group Responsiveness No Response Action Change</p>	✓
03	Validate Bidding Rank	When we select the Rank No 01, System recommend that company to award the contract.	 <p>Bidding Ranking Bidder Damro Group Rank 1 Action Update Recommendation Bidder Damro Group</p>	✓

04	<p>Validate “Generate TEC report for NCB” Button</p>	<p>Once we click on this button, report should generate.</p>	
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C7. Test cases for Supplier Registration

Test No	Test Description	Expected Result	Actual Outcome	Status
01	BR No, Company name and the Address is required.	If those fields are empty, the system will show an error.		✓
02	Validate “Register” Button	BR No, Company name and the Address is required. Otherwise, the system will show empty fields.		✓
03	Validate “Register” Button	If the required fields are filled, the system will show a message,		✓

C8. User Registration Form

Test No	Test Description	Expected Result	Actual Outcome	Status
01	Validate fields	Fields are required. Otherwise, the system will show a message in empty fields.		✓
02	Validate “Register Now” Button	If all fields are filled, the system will show a message		✓

Appendix D: Evaluation forms

Online Procurement Management System <u>User Feedback Form</u>																																																												
Name (Optional) : Lahiru Chatthuranga Designation (Optional) QA																																																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No</th> <th>Question</th> <th>Very Good</th> <th>Satisfied</th> <th>Average</th> <th>Weak</th> </tr> </thead> <tbody> <tr><td>1</td><td>Overall understanding about the system</td><td>✓</td><td></td><td></td><td></td></tr> <tr><td>2</td><td>User creation and privileges provided to users</td><td>✓</td><td></td><td></td><td></td></tr> <tr><td>3</td><td>Easiness and the friendliness of the system</td><td></td><td>✓</td><td></td><td></td></tr> <tr><td>4</td><td>Usability</td><td></td><td>✓</td><td></td><td></td></tr> <tr><td>5</td><td>Accuracy of the data entering and calculations</td><td>✓</td><td></td><td></td><td></td></tr> <tr><td>6</td><td>Details in the reports</td><td>✓</td><td></td><td></td><td></td></tr> <tr><td>7</td><td>How much it similar to the National Procurement Guidelines</td><td>✓</td><td></td><td></td><td></td></tr> <tr><td>8</td><td>Details provided in the supplier registration</td><td></td><td>✓</td><td></td><td></td></tr> </tbody> </table>							No	Question	Very Good	Satisfied	Average	Weak	1	Overall understanding about the system	✓				2	User creation and privileges provided to users	✓				3	Easiness and the friendliness of the system		✓			4	Usability		✓			5	Accuracy of the data entering and calculations	✓				6	Details in the reports	✓				7	How much it similar to the National Procurement Guidelines	✓				8	Details provided in the supplier registration		✓		
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Form wise Feedback <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr><td>1 Registration form</td><td>✓</td></tr> <tr><td>2 Information in the Dashboard</td><td>✓</td></tr> <tr><td>3 Project initialization form</td><td>✓</td></tr> <tr><td>4 Documentation form - NCB</td><td>✓</td></tr> <tr><td>5 Documentation form - Shopping</td><td>✓</td></tr> <tr><td>6 Evaluation of BOQs</td><td>✓</td></tr> <tr><td>7 Awarding Contracts</td><td></td></tr> <tr><td>8 Reports</td><td>✓</td></tr> <tr><td>9 Supplier Registration form</td><td>✓</td></tr> <tr><td>10 Calendar</td><td>✓</td></tr> </tbody> </table>							1 Registration form	✓	2 Information in the Dashboard	✓	3 Project initialization form	✓	4 Documentation form - NCB	✓	5 Documentation form - Shopping	✓	6 Evaluation of BOQs	✓	7 Awarding Contracts		8 Reports	✓	9 Supplier Registration form	✓	10 Calendar	✓																																		
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Appendix E: Confirmation Letter



University of Colombo School of Computing

The force behind ICT Education in Sri Lanka

35, Reid Avenue, Colombo 00700, Sri Lanka

Procurement Branch

UCSC.

05th July 2019

TO WHOM IT MAY CONCERN:

Mr.H.P.S.D.Jayasekara, Registration No: 2016/MIT/023 is a Master of Information Technology (MIT) student who has developed a system to expedite the Procurement activities of the University of Colombo School of Computing (UCSC) as a project of his Master's degree programme.

This is to inform that I have checked and gone through the above system and it is in the usable condition to the UCSC.

Thank you,

Yours faithfully,

A handwritten signature in black ink, appearing to read "K.A.H.K.Jayarathana".

K.A.H.K.Jayarathana
Assistant Bursar
UCSC.

50 Years of Computing at University of Colombo

Tel: +94-11-2581245 Fax: +94-11-2587239 e-mail: info@ucsc.cmb.ac.lk Web: <http://www.ucsc.cmb.ac.lk>

Glossary

Bid – Formal offer of potential bidder indicating the price and other terms at which bidder agrees to provide the goods or services or execute works.

Contract – The part of work or good or consultancy service outsource to get done the task in the project.

Goods – means commodities, raw materials, products, equipment and other physical objects of every description

Procurement – obtaining goods, services or works by most appropriate means, With public funds or any other source whether local or foreign

Procurement Committee (PC) – The committee responsible for results of the procurement

Technical Evaluation Committee (TEC) – Committee who responsible to do the evaluation of bids