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Abstract

SAFAYA -GBMS mainly focusing on Sri Lankan gem industry and business make combined with E-world and get advantage from it .

Sri Lankans who have membership in gem cooperation they are eligible for get business membership in SAFAYA -GBMS website. Foreigners who have membership in reputed gem business companies they will also eligible for business membership in SAFAYA -GBMS. They will get different facility from web site ,as examples attend for online gem auction ,e-diary facility,informed from current gem business trends ,identify businessman in all around the world ,buyers who come Sri Lanka get better business guidance than present. People who get student membership he or she will able to educate about gem science and industry in deeply. In SAFAYA -GBMS provide online gem auction facility by using that Sri Lankan businessman will able to publish their gem on internet and get higher value for it .All the money transactions are include with secure methods with bank to bank money transaction or e-money transaction facility. Foreign gem buyers who are coming Sri Lanka,they can be members of SAFAYA -GBMS and get information about latest native gem auction areas by map location and other relevant details .As a result of that they will able to buy original gem stones which are not burn ,cut and polish .This process great support not only for foreign buyers but also native businessmen who will get high value for gem stones .SAFAYA -GBMS include with report provide facility which is relevant to gem business industry, It has responsive interface facility which is running desktop to mobile device chain. And also Gem Business Management System consist with globalization facility including different foreign languages.

As the future enhancements of SAFAYA -GBMS, author identify that web system move to mobile application. According to use technical compatibility it will be a android app. By having more communication with NGJA author expect to increase functionalities of SAFAYA -GBMS like as loose rough gem auctioning etc .Not only interact with NGJA but also interact with Sri Lanka tourist board SAFAYA -GBMS will able to make better communication with foreign buyers who willing to combine with gem business.

The main objectives of SAFAYA -GBMS are make more income from native gem stones, open international gem world for any rural places in Sri Lanka and introduce more educated younger generation for Sri Lankan gem industry.

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List of Abbreviations

SAFAYA -GBMS –Gem Business Management System.

NGJA -National Gem and Jewelry Authority

RDLC – Report Definition Language for Client Side

Chapter 01 –Introduction

1.1 Motivation

National Gem and Jewelry Authority [13]also have a web site which providing different services .In that web site include gem lots exporting details ,licenses processes ,gem related services etc. ,But there is no focus on person related which is newer business society expecting ,development with newer technology .And also howto integrate with middle and low level business men for their progress in business lives and there is no direct communication with buyers who are taking higher income for Sri Lankan gem industry .Not only focusing on business background but also SAFAYA -GBMS focusing on improving knowledge about gem science and industry .Because younger generation who are joining with this industry have low knowledge about new industry trends and gemology.

1.2 Statement of problem

Sri Lanka gem businessmen who are in different business levels, do not identify how to introduce their valuable product (ex:- cut and polish gem) for international level and make money without intermediate brokers. In international business process current businessman use very unsecure payments methods, some times that makes problems. Most of international businesses based on personal friendships and relationships. Most of gem businessmen in Sri Lanka have day to day business lives without having well planned ,even they get higher business profit ,most of them do not have idea how to invest for future and earn more profits. Another problem is current businessman have not enough knowledge about current business trends which involve with gem industry. As an example of what kind of gem type has more value in these days like that .Younger generation who are coming join with this industry have not enough knowledge about gem industry and business process, that low knowledge level making suffer them in different business problems. International businessmen come Sri Lanka every day to involve with gem business most of them have not enough guidance, that make problems not only for their business income but also native businessman who are willing to sell their gem for foreign businessmen. And it narrowly affect for Sri Lankan economy because

foreign buyers not well knowledge with gem business environment as a result of that Sri Lanka fails to get better income from them.

1.3 Aims and Objective

Key aim of SAFAYA -GBMS is promote Sri Lankan gem all over the world, motivate native business men for international business and get more income, provide correct guidance for foreign buyers, and motivate younger generation get more education about gem science and gem industry.

For Achieve that goals SAFAYA -GBMS willing to complete those goals as project objectives

- Provide international business environment for native business men and join international gem businessmen through SAFAYA -GBMS.
- Create secure registration involving with email transactions. After registration members will able to create profiles. As a result of that native businessmen able to introduce their business personalities as global characters.
- The proposed system introduce secure international gem auction process and secure payment way.
- The proposed system provide business updates by SMS alerts according to membership category.
- Provide E-facilities for foreign buyers
- Introduce native businessmen about nre global trends .
- Multi language supprot for users .
- Provide Device compaitibility(desktops and tabs)
- Provide reports include wide range process in website.

Comparing the SAFAYA -GBMS web site with the other similar web sites the below can be highlighted as some few advantages of using the SAFAYA -GBMS web site,

- By comparing to native web sites SAFAYA -GBMS provide high secure and reliable online auction service and provide valuable course for younger generation.
- It provides great facility both foreign buyers and native businessmen earn more profit by using SAFAYA -GBMS.
- Multi language support for foreigners to interact with Sri Lanka gem business.

1.4 Scope

The main focus of this project is to provide guidance and improving awareness of native gem industry and gem business. It provides the facility to register native and foreign businessmen by using NGJA membership or international company membership authorization. System will provide facility for make profiles for registered members .Native members will able to publish gem for online auction . Online SAFAYA -GBMS gem auction very secure process, businessmen for every parties who will involve with it.This online auction include with secure payment methods which has online and bank to bank transactions. If any miss payment or business problem happens system will provide category for business complains .SAFAYA -GBMS will take better business actions by using email transferring and backlit memberships .Foreign buyer members has very special identification in SAFAYA -GBMS ,System will provide daily SMS alerts about business areas , provide daily SMS alerts about gem and jewellery exhibitions ,and native gem business areas by google map locations .Student members will able to involve with different kind of courses that categorize with different areas in gem science and industry .Every details of SAFAYA -GBMS web system summarize with essential report service.

1.5 Structure of the Dissertation

Background chapter describe gem industry process ,literature review of existing systems and proposed system .Chapter three includes mainly analysis methods with target groups ,and this chapter include requirement gather with questioners and interviews techniques .Use case diagrams ,use case scenarios ,site map are some of graphical implementation of this chapter .Chapter four have feature of system ,developing tools ,high level component design and user interfaces .Evaluation and testing category in chapter five ,in testing section include with test cases with refer to reference section. For usability testing part include with evaluation question design and results .

Chapter 2: Background

2.1 Introduction

This chapter includes essential background information of reference to publish material in research papers, URLs, and magazines, articles about gem industry and business world.

National gem and jewellery authority is the well-known and allocated institute working for Sri Lanka gem industry development. There are some of newer actions get by Sri Lankan government and gem authority, establish a world-class, internationally affiliated Gemstone Testing Laboratory (GTL) for certification and research, establish a regionally recognized free-standing Gem & Jewellery Training Institute (GJTI) affiliated to a leading international training institute, launch an international sapphire promotion campaign to brand differentiate the industry in Sri Lanka through a branding programme for Ceylon Sapphire, Complete the National Gem Deposit Survey, improve the Regulatory framework – better import export and taxation procedures, better mining and land use guidelines and policy, rationalization of government provided services such as training.

In here discuss what is the business process in Sri Lanka gem business industry with interacting with international gem business world. And also discuss about promote native gem business for new global world with interacting world famous gem business companies. Online SAFAYA -GBMS gem auction very secure business for every parties who will involve with it.

2.2 Transaction Process of a Gem Trade

There are varieties of colored stone out of 200 found in the world and is among the five most important gem-bearing national of the world. Notably, Sri Lanka's major strength is the "Ceylon Sapphire" While Sri Lankan jewelry manufacturers demonstrate remarkable craftsmanship, Sri Lankan gem suppliers offer a wide range of Ceylon gems to the global gem market representing the country's breathtaking natural heritage. Among these gemstones are: Blue, pink, yellow and golden sapphires, Rubies, Padmaradchas, Star sapphires, Star rubies, Alexandrites, Cat's eyes, Spinel

2.3 Gems Stone Mining

The best known and most prolific gem producing area in the Island is the Ratnapura district of the Sabaragamuwa province, the most extensively gemmed areas being the neighborhood of Eheliyagoda, Kuruwita, Ratnapura, Pelmadulla, Balangoda, Kalawana and Rakwana. The Sabaragamuwa catchment drained by the Kalu ganga, the major river in the area, has an area of approximately 4 500 square kilometers. It is also of interest that this region is an area of heavy rainfall, and is subject to serious flooding during the wet seasons. Smaller extensions of the Sabaragamuwa gem fields are found in the Western and Southern provinces. [15]

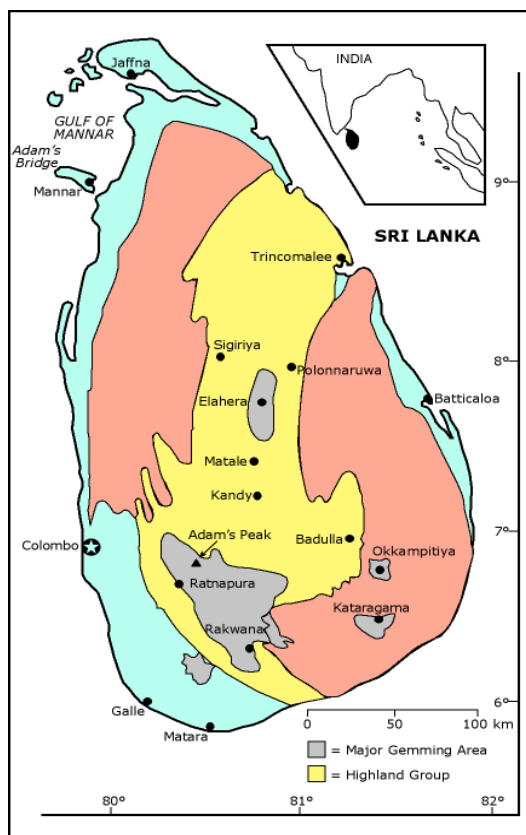


Figure 1 Gem mining areas in Sri Lanka

The traditional, environment friendly and ethical mining methods practiced under the regulatory supervision of the National Gem and Jewelry Authority (NGJA) have set many benchmarks in the international Gemstone Mining Arena. The most commonly used Gemstone mining method in Sri Lanka is Pit-Head Mining and

Tunneling, Surface Placer Mining and River Bed Dredging are the other methods used widely. Gemstone Mining Community has effectively introduced a series of industry favorable rules and regulations. Mechanisms such as life insurance policies, accidental and disability compensations including mortality and educational scholarships for children have been introduced as mandatory employment per-requisites governing the Mining Industry.

2.4 Gem and jewellery manufacturing industry

According to statistics of gem and jewelry authority, the jewelry manufacturing industry at present employees approximately 15,000 persons of which around 10,000 are registered individual craftsmen while the rest are employed in factories and workshops producing jewelry mainly for the export market. There may be around 1,500 unregistered employees working under registered craftsmen. About 60% of the jewelry workshops and craftsmen are located mainly in the rural areas of Southern and Central provinces and in pockets in the North Western, Eastern and Northern provinces. 30% and 10% of jewelry workshop are located in Suburban and Urban areas respectively. [14]The jewelry manufacturing industry in Sri Lanka mainly consists of three sectors such as manufacturing for exports, local market and tourists' trade. Sri Lanka's main markets for jewelry are China, Japan, Germany, USA, UK, Singapore and Hong Kong. During recent times, silver jewelry studded with semi- precious moonstones and mildly precious stones have gained popularity[2]

A large number of traditional jewelry have adopted themselves to produce modern designs particularly for the German market. Jewelry design and manufacturing industry of Sri Lanka has undergone numerous changes during the past few decades. The use of computer software to create modern designs and casting jewelry for bulk production has now become a standard practice in the Industry.

2.5 Sri Lanka's Competitive Advantages in the Gem Industry

Sri Lanka different varieties of advantages than other competitive countries. Some of are Long history of gem cutting – artisan culture which still sustains itself ,an educated and trainable workforce , availability of a wide variety of precious and semi-precious gem stones, availability of a wide variety of precious and semi-precious gem stones, business friendly government, with minimum of formalities providing a wide array of tax incentives, duty free imports of raw materials ,active member of International Colored Gemstone Association(ICA),ATA Carnet

system in operation in Sri Lanka and the issuing authority is International Chamber of Commerce in Sri Lanka ,Sri Lanka is a signatory to all United Nations and International Labor Organization conventions on Labor including those on Child Labor

2.6Major Export markets for Sri Lankan Gems

Sri Lanka is one of major gem exporter in the world. According to current situation Sri Lanka gem industry mainly focus on eastern Asia countries names as Hong-Kong,China ,Thailand .Not only east Asian countries UAE ,USA,Switzerland, France,India,Germany.

In current world Sri Lanka ranks with Myanmar, Brazil, South Africa and Thailand as one of the world's most important gem bearing nations.Sri Lanka has made its mark in the international market and is known for quality gemstones.Sri Lanka land rich with 70 varieties of colored stones out of 200 found in the world. By using work force people do gem mining ,there are different techniques for recovering the gemstone from the earth . In gem industry do gem mining in several ways as examples hydraulic mining, river panning, open pit mining, strip mining, mountaintop removal mining, quarrying underground mining. As a result of that people who are in gem mining get gem stones and handover to landowners, most of them are gem businessmen .They sell that gems for other businessmen for make higher profits .If someone want to make some jewelry or sell gem for foreign country he/she have to do cut and polish for add more value for gem. Professionals who are experts in gem cutting, heating, polishing now join the process add more value for gems .Sometimes well-known gem businessmen join with expensive gem deals and earn high profits ,some time that business are combing with international gem market .[8]

In figure1 shows earning from exports between time period 2014 March to 2015 March , in here focusing on different areas industrial exports, agricultural exports .mineral in mineral field gem has main character ,so according to that we can identify approximately what is the variation of earing from exports . In here table shows there is earning from exports decrease 29.8USD mn it is describing here 85.9 percentage .This showing how much gem business industry fell down this one year period even Sri Lanka land producing valuable gem we were unable to catch international market and earn from exports .[16]

Table 1: Earnings from Exports

Category	March 2014 (USD mn)	March 2015 (USD mn)	Change (%)	Jan-Mar 2014 (USD mn)	Jan-Mar 2015 (USD mn)	Change (%)
1. Industrial exports	778.7	841.4	8.0	2,114.2	2,228.6	5.4
Textiles and garments	456.7	428.2	-6.2	1,264.8	1,258.0	-0.5
Petroleum products	33.4	21.6	-35.4	96.1	112.3	16.9
Rubber products	81.0	76.1	-6.0	224.4	207.8	-7.4
Transport equipment	33.6	152.8	355.4	46.0	165.4	259.9
Leather, travel goods and footwear	11.6	14.4	24.7	31.9	40.5	27.1
Animal fodder	6.1	7.5	24.0	17.5	20.1	14.4
Other	156.5	140.8	-10.0	433.4	424.6	-2.0
2. Agricultural exports	256.7	214.1	-16.6	661.0	618.9	-6.4
Tea	155.3	113.4	-27.0	387.0	335.3	-13.3
Spices	17.7	28.9	63.3	52.3	90.8	73.8
Minor agricultural products	14.5	17.0	17.2	38.2	43.6	14.3
Sea Food	24.7	15.7	-36.5	67.4	43.4	-35.6
Other	44.5	39.1	-12.0	116.1	105.7	-9.0
3. Mineral and other	34.7	4.9	-85.9	41.2	14.0	-66.0
Total exports	1,070.1	1,060.4	-0.9	2,816.4	2,861.5	1.6

Figure 2-Earning from exports 2014-2015

Gems and jewelrariyis the third most expoerting item for USA .It has 4.5% precentage export income in Sri Lanka .(Figure 2)

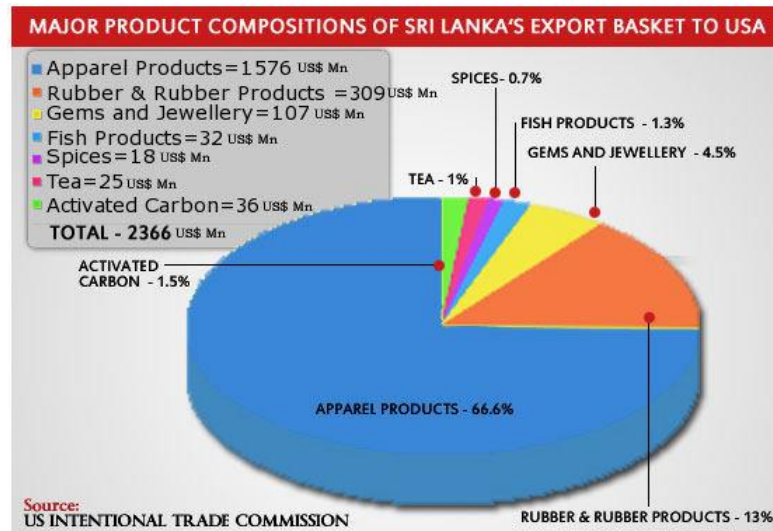


Figure 3-Major product compositions of Sri Lanka's export to USA

According to those two examples providing us how gem industry making stronger Sri Lankan economy.

2.7 Literature Review

2.7.1 National Gem and Jewellery Authority(NGJA)

NGJA –National Gem and Jewellery Authority[13] this is website of national gem and jewellery authority which is the main authorized government institute for gem and jewellery industry and business .NGJA mainly focussing on inform the people about what are the services providing by them ,Exports ,Licences, Gem related services, Jewellery related services, Mining related services ,Developments ,Enforcement Activities , Statics , are some of them . According to those category details NGJA providing very necessary details for users, but this web site providing very poor details about gem education .Even NGJA have some details of business dealers it has not include world famous Sri Lankan businessmen details .It is huge drawback in this website. This is the main official website for gem industry in Sri Lanka ,most of foreigners measure Sri Lanka gem business by refer this web site .NGJA not include any information about how to interacting with foreign buyers who are doing business in Sri Lanka . NGJA supporting two languages Sinhala and Tamil it is very important for native clients in

Sri Lanka. But not considering about globalization of website it is very big disadvantage when communication with foreign country people ex -: China, Japan, Malaysia, Thailand
NGJA include valuable details about gem dealers in Sri Lanka with their profile details., that profiles including with trading volume (stocks), trader ranking ,type of business etc .

2.7.2 GEM ROCK auctions

GEM ROCK auctions web site has very popular character certificate from gem businessmen all around the world .This web site mainly interacting with online gem auctioning .Special category in GEM ROCK auctions is they do business only with certified sellers and do secure money transaction with normal bidding process .Vast range of gem categories include this web site .GEM ROCK auctions has proper registration process with dual authentication. [6].This website mainly focusing on loose gem stone which are far from native businesses .Gem stone encyclopaedia ,holistic gemstone information ,technical information on gemstones and testimonials are some of learning categories in GEM ROCK auctions web site .

SAFAYA -GBMS get better idea about gem bid process and money transaction process not only that but also it is helping to identify what kind of gems have world market and popularity. GEM ROCK auctions provide very descriptive online auction environment ,it has searching and sorting about relevant gem and take it for shop .Searching facility include with dimensions of gem stones ,certified gem stones or not ,treatment or no treatment ,colours , price levels .when select a gem stone for auction system providing max price of it and user able to make decision according to max price .

2.7.3 GIA –Gemological Institute of America Inc.

GIA is the world's famous authority on diamonds, gem stones, and pearls. A public benefit, non-profit institute, GIA is the leading source of knowledge, standards, and education in gems and jewellery. This website provide large scale of education facility for people who are willing to learn gem ,pearls etc.This has gem education chain from kid to professional with include professional studies ,graduate studies like that .By referring this this web site get idea about how the gem education keep near with society .But GIA have not enough connection with gem market and how to make manipulation with economy .GIA only using news feedbacks and reporting facility. [4].GIA include educations programmes ,certifications ,financial assistant and scholarships ,corporate education and provide career path instructions.

This website include online certification report service and laboratory service for diamonds ,gem and pearls .English(UK),English(USA),Japanese ,Chinese language translations consisting here .

2.7.4 GASL- Gemmologists Association of Sri Lanka

GASL (Gemmologists Association of Sri Lanka)GASL include very valuable information according to SAFAYA -GBMS development. It has proper membership providing process .GASL providing diploma in gemmology which has online gem education package .GASL also consist with events category. This website not include with gem business facility and do not have international business communication [3] . Providing information about native gem dealer details and service providers is another advantage of this website .As a result of that saying it is directly help for gem buyers who are coming Sri Lanka for gem business ,even it provide that facility web site has not device compatibly that make unresponsive for mobile devices .

The main aim of this website is to inform members, Traders, and anybody related to gemstones and minerals about who there are, what they plan to do and information on gemmology ,gemstones and minerals. GASL has paper work process for getting membership has not any online secure method .

2.7.5 GRS- Gem Research Swiss lab

GRS research has focused principally on the identification and characterization of high-quality gemstones from newly discovered mines, as well as determination of origin for gems derived from classic mining regions. The next area of research focuses on the identification of gemstone imitations, synthetics and new gem treatments. Other thing is area of expertise specializes in colour grading and gemstone colour branding, such as the well-known GRS-type *Pigeon's Blood* and GRS-type *Royal Blue*. This website own by the private gemmological research company GRS (GRS Gem research Swiss lab AG) strives for new dimensions in gemmological research in taking advantage of the newly established strong ties to academic research. This website working as a information provider .Help to identify how to interact with report services and auction details .This institute has relation with Sri Lankan environment.it has branch in Colombo .So auction details in Sri Lanka also publishing there [5].

GRS gemstone reports are issued for individual loose gemstones, gemstone pairs, gemstone sets, as well as for mounted jewellery (rings, ear clips and necklaces etc.) providing the

mounting allows for adequate testing. GRS gemstone reports include the following data based upon their judgment on the day of testing. GRS providing news alerts about current trends in gem and jewellery business world, not only business world but also consist with court decisions, decisions had taken by international conferences.

2.7.6 CGA – Canadian Gemmological Association

.CGA(Canadian Gemmological Association)[1] since 1958, the CGA provided a two-tire Canadian source for gemmological training and a medium for interaction between gemmologists in Canada. The CGA offers complimentary gem identification and general commentary at Ontario Gem and Mineral shows. Our goal is to enhance people's enjoyment of gems, and help build confidence in the trade by educating about ethics and standards, and by promoting recognized professional credentials.

This website including with high level membership hierarchy and membership providing process. This web site maintaining with their association meetings and events. GA providing professional courses. Which are “Gemology Accelerated Programme”, Jewelry Associate – Gemology Specialist”, “Diamond grading”, “Colored stone grading and valuation”, that are very high level gem courses. CGA has gem selling part which has shopping cart facility. CGA has not gem auction category but other relevant parts are more useful with SAFAYA -GBMS website. GA website also device compatibility and portability.

2.7.7 Socio-Economic and Environmental impact of gem mining industry in Sri Lanka

Socio-Economic and Environmental impact of gem mining industry in Sri Lanka[9] –This is a research done by Prof H.M.S Priyanath based on Ratnapura district gem industry. This research paper talking about gem industry from gem mining to gem selling. Main topics discuss in here is decline of agricultural production, income inequality, unemployment, decline of education, decline of health, decline of living standards, water pollution, soil erosion, destruction of arecanut trees. According to SAFAYA -GBMS web application, this research providing very rare information about un education labors in gem industry according to the paper “Most of labors of the GMI do not have sufficient education. Eighty five percent of the labors have attended school up to or below grade 10 and the remaining 15 percent have attended classes beyond grade 10. on the other hand 55 percent of laborers are below 30 years of age” that statement says younger generation around the gem industry how much suffer from un education

.Another main point talking in this research paper is income inequality .Its describing how much labors and low level business men facing unfair situation in business environment.

2.7.8 Gemstonesauctions.com

This web site mainly involving with online gem auctioning .Special process in gemstones auctions is they do business only with certified sellers and do secure money transaction with normal bidding process .Vast range of gem categories include this web site . gemstonesauctions online auctions has proper registration process with dual authentication. [7].This website mainly focusing on loos gem stone which are fail from native businesses .Gem stone encyclopaedia ,holistic gemstone information ,technical information on gemstones and testimonials are some of learning categories in gemstonesauctions web site .

gemstonesauctions auctions provide very descriptive online auction environment ,it has searching and sorting about relevant gem and take it for shop .Seching facility include with dimensions of gem stones ,certified gem stones or not ,treatment or no treatment ,colures , price levels .when select a gem stone for auction system providing max price of it and user able to make decision according to max price .

2.7.9 IRoock.com

The ARKENSTONE has been a leading crystal and fine mineral specimen dealer with a variety of common and rare minerals for sale online and their galleries in Texas,Shanghai ,China .iRocks.com providing details about fine minerals and explore natural fine mineral specimens,crystals and gemstones, getting touch into schedule a private gallery and sell mineral collections .[11]

In iRock sell minerals has very complex and advance searching process search term ,species ,description ,locality specimen no ,min price max price are some of searching terms .when searching after result minerals has including with descriptive details .iRocks has special section called “The Vault”which is consist with admittedly ,pricier, specimen in context .Many of these minerals find homes with collections who not only enjoy the beauty of fine minerals ,but also treat their collections as valuable alternative investments .This web site provide facility of ordering minerals This automatically sends us an order with information on that mineral specimen and any contact information user providing ,user also receive an e-mail confirmation

with details on the specimen so you know we have received your message. This ordering process include with different payment options ,shipping ,return policy ,size classifications .But this web has not better online auction process and online payment method all communications based on system to user mail transferring .

HardAssets.com provides the answer to a highly demanded service by making it easy for people anywhere to quickly access information about Hard Assets through these online business directories.[8] These interactive pages show listings and display ads which make it possible for everyone to find information including links to featured business websites and other valuable tools. They hope that these pages will serve as your quick connection to products, services.

2.8Proposed System

In SAFAYA -GBMS mainly focusing on give promotion for native gem business industry by introducing secure and result full online gem auction and secure payment way for money transactions. In this web system people who are with gem business and gem industry will able to membership and get facility form SAFAYA -GBMS.That membership hierarchy has different levels which have different values .Native members have very low payment scale that motivate them for make involve with e-business methods for clients by using bank to bank transaction and credit card transaction .SAFAYA -GBMS provide free membership for Sri Lanka younger generation who willing to join with gem industry and gem business .They will able to get free education about gem industry and business in scientifically. Not only for younger generation but also SAFAYA -GBMS provides relevant valuable report service for members, people who are in gem industry willing update from current trends in gem industry and gem business. SAFAYA -GBMS has e-diary and daily SMS alert service for Sri Lankan businessmen to plan out their business life and SAFAYA -GBMS expecting it will help Sri Lankan businessman increase their profits for future.

SAFAYA -GBMS focus on foreign buyers who are coming Sri Lanka to do gem business. Create facility for foreign buyers by create membership under special buyer category ,as a result of that buyer will get daily SMS alerts about special business areas by providing google map locations .Not only that but also buyer will get gem and jewelry exhibitions. In their SAFAYA -GBMS direct communicating with foreign buyer and give him/her a direct e-guidance .This is

not only make facility for foreign buyer it will add great value for our native business progress and it will great influence for middle level and low level businessmen in Sri Lanka .That kind of situation (development of middle level business) will indirectly affect for professionals who are doing gem cutting, gem polishing, gem heating etc.

Main aim of project is development of Sri Lankan gem industry .In SAFAYA -GBMS looking very broad manner for that task ,it is focusing on future generation and how can they educate about gem industry .SAFAYA -GBMS expect to bind international gem business with Sri Lanka middle level and low level business get to gether.by providing wide range of reports will assist for it .Secure payment method will influence Sri Lankan businessmen to involve with international transactions .SAFAYA -GBMS consist with multi language facility ,this is use because of special reason ,Sri Lanka has strong business relationship with several countries from past ,SAFAYA -GBMS make special aid for that nations for direct business contact with by using their native languages . Buyers who come Sri Lanka for join with gem business also get great support from SAFAYA -GBMS, it will directly affect for Sri Lankan industry. Aim of SAFAYA -GBMS mainly affect not only for individuals in gem industry in Sri Lanka but also affect for great development Sri Lanka economy .

SAFAYA -GBMS system has lot of difference categories than above systems, special thing is, SAFAYA -GBMS has better communication and interaction methods with buyers who coming Sri Lanka.And also SAFAYA -GBMS has different membership facility than other systems as examples e- diary for native clients, in international auction procedures and education methods have some equalities from above systems.(Refer Appendix F for SAFAYA –GBMS process diagramme)Provide updates by SMS alerts according to membership category,,give allocated business locations for foreign buyers using google maps,update knowledge of native member businessmen about new industrial trends ,multi language support for users ,provide Device compaitibility(desktops and tabs),provide reports include wide range process in website,members able to make complaint to administrator of system.

Chapter 3: Analysis and Design

3.1 Introduction

A software system's most important measure of achievement can be estimated by inspecting whether it convinces the needs and conditions of the end users. In this chapter the author has gathered the requirements from various sources and clearly explicated in various formats as functional and non-functional requirements, prioritizations of requirement, specifying the graph formats for the importance of the requirements to help the reader understand why a requirement is needed.

Requirement analysis is the process of understanding the customer needs and expectations for proposed system. It is a most important stage in the software development life cycle. Requirements are a description of how a system should behave. It can alternatively be a statement of 'what' an application is expected to do.

This document will give a briefing on the needs assessment plan and the details of the conducted needs assessment. Further looks at the results from the needs assessment and analyze the data to come into decisions on the instructional designs for the SAFAYA -GBMS. And also analyze the functional, non-functional, prioritization of requirements and analyze the module and risks leading to the development process of the proposed system. The author has analyzed and arrived at use case diagram to recognize the user interaction of the system.

3.2 Scope

The scope of this chapter is to discuss the need analysis plan, requirement gathering and the techniques which are used to gather the requirements, requirement analysis, identifying the functional and non-functional requirements and give priority for that functional requirements that are identified and finally discuss the use case and use case descriptions.

3.3 Stakeholder Analysis

In general, a stakeholder is anyone who will make use of, develop, or have an impact on any aspect of the project. Stakeholders can be either direct or indirect. Direct stakeholders are those people (e.g.: developers, System Admin, customers) whose actions can directly have an impact

on the project - they are involved in the project life cycle, or are impacted by the project outcomes – they use the system. Indirect Stakeholders are those who have some capabilities to influence on the project or those who are interested in its outcomes. In short - stakeholders are those who have a stake in the project.

Stakeholder analysis describe the process where all the individual or groups that are likely to have an impact through their actions, are identified and then sorted according to how much they can affect the proposed solution how much the action can affect them.

3.4 Requirement Analysis

3.4.1 Use Case Model

A use case describes a service provided but the learning system as a set of events that yields visible result for some users. Users are modeled by actors. Actors initiate a use case to access the system functionality.

3.4.2 Actors of the system and use cases

- Administrator - In charge of overall administrative functions.
- Sri Lankan member – One kind of end user of the system who has membership in National Gem and Jewelry Authority.
- Foreign Member - One kind of end user of the system who has membership in well reputed and recognized company.
- Foreign Gem Buyer- Person who come Sri Lange to involve with gem business.
- Student member – Person who willing to learn gem science and industry act as student member.

3.4.3 SWOT Analysis

SWOT analysis is a business analysis process that ensures that objectives for a project are clearly defined and that all factors related to the project are properly identified. The SWOT analysis process involves four areas: Strengths, Weaknesses, Opportunities and Threats. Both internal and external components are considered when performing a SWOT Analysis, as they both have the potential to impact the success of a project or venture.

Internal Environment	Strength	Weakness
	<ul style="list-style-type: none">• Younger generation have knowledge about information technology than past time .• People in business area have great knowledge about gem industry and business .	<ul style="list-style-type: none">• People in rural areas have not enough knowledge about information communication technology.
External Environment	Opportunities	Threats
	<ul style="list-style-type: none">• More flexible access.• Join number of youngers to gem industry.	<ul style="list-style-type: none">• Problem will happen when money and gem transactions.

3.5 Need Analysis Plan

Before design the website, a need analysis should be conducted to determine whether this is the best solution to deliver the business solution.

3.5.1 Why the needs assessment is being conducted

A needs assessment involves looking at what is needed or missing, and working together to correct or improve an identified problem or service gap. A needs assessment done on a community involves looking at the community to decide what is needed to get the community the way people want or need it. Usually this means some improvement to the community. A needs assessment offers a picture of what is happening or needed in a community. It can be done on one idea or on a number of topics that involve improving the community overall.

3.5.2 The appropriate place to begin the needs assessment

At the selected groups who wish to get engage in online gem auction and who wish to newly engage with gem business .

3.5.3 The target audience

Performers: Administrators of e-learning module, buyer category handling, online auction.

Decision Makers: Foreign buyers, student members ,foreign and native businessmen .

3.6 Requirement gathering

3.6.1 Data collection methods

a) Interviews

Interviews involve asking the participants a set of question verbally. Personal interaction with a person encourages people to respond efficiently. This aspect on its own may be sufficient motivation to average interviews. However interviews are time consuming as it requires a considerable amount of time spent with each stakeholder individually. Conducting interviews is one of the methods of collecting requirements from key stakeholders. These interviews can be conducted in large groups or individually. Well planned interviews are most successful in gathering requirements. From the interviews with foreign businessmen and the native business men the author was able to gain knowledge on the subject area as well rather than merely gathering requirements. Since there were no fixed questions as the purpose was to gather as much knowledge as possible, the author found details on the requirements through the interviews than with the questionnaires. Also, it provided the opportunity to clarify doubts during the interviews. This was the most valuable advantage of using interviews for gathering requirements.

b) Questionnaires

Questionnaires are a series of questions designed to obtain specific information for requirements from a larger audience. Some questions require a simple Yes/ No answers; while others ask for choices from a set of pre-supplied answers and others ask for an elaboration on the answer or further comment. Sometimes questionnaires are sent in electronic form and sometimes it is given to the users as a hard copy.

Questionnaire sample size was 15 – 20 and was sent via-mail. Using a questionnaire was convenient to gather information and had the advantage of covering a larger geographical area with a minimum cost. The disadvantage faced by author was that it took time and the fact that there was no guarantee all the respondents will fill the questionnaire. The response from the questionnaires was encouraging however the gathered information was not sufficient to proceed with the project. Therefore the author used a second analysis mechanism to gather all the required information.

3.6.2 Specify instruments and protocols

Questionnaires (Refer Appendix B for the questionnaire)

A questionnaire is a research instrument consisting of a series of questions and other prompts prepared with the purpose of gathering information from a larger group of respondents.

Questionnaires have advantages over some other types of requirement gathering techniques such as they are cheap, does not require as much effort from the questioner as verbal or telephone surveys and as well as it is Practical, Large amounts of information can be collected from a large number of people in a short period of time and in a relatively cost effective way, Can be carried out by the researcher or by any number of people with limited affect to its validity and reliability, The results of the questionnaires can usually be quickly and easily quantified by either a researcher or through the use of a software package, Can be analyzed more 'scientifically' and objectively than other forms of research, When data has been quantified, it can be used to compare and contrast other research and may be used to measure change, Positivists believe that quantitative data can be used to create new theories and / or test existing hypotheses.

Questionnaires are a series of questions designed to obtain specific information for requirements from a larger audience. Some questions require a simple Yes/ No answers; while others ask for choices from a set of pre-supplied answers and others ask for an elaboration on the answer or further comment. Sometimes questionnaires are sent in electronic form and sometimes it is given to the users as a hard copy.

Initially a questionnaire was circulated to obtain the users view point. This questionnaire was distributed among student members as well as businessmen. Questionnaire sample size was 15 – 20 and was sent via e-mail. Using a questionnaire was convenient to gather information and had the advantage of covering a larger geographical area with a minimum cost. The disadvantage faced by author was that it took time and the fact that there was no guarantee all the respondents will fill the questionnaire. The response from the questionnaires was encouraging however the gathered information was not sufficient to proceed with the project. Therefore the author used a second analysis mechanism to gather all the required information.

Interview guides

This is another way of gathering information from the respondent's .Before conducting interviews, need an interview guide that can use to help direct the conversation toward the topics and issues you want to learn about. Interview guides vary from highly scripted to relatively loose, but they all share certain features. They help to know what to ask about, in what sequence, how to pose questions, and how to pose follow-ups. They provide guidance about what to do or say next, after your interviewee has answered the last question.

Requirement gathering is a very important and critical task, because entire project development is based on correct requirement gathering SAFAYA -GBMS used several type of requirement gathering technique were used.

Observation in working environment was one of requirement gathering technique which was used for our project. In Ratnapura city area provide how gem business environment and how it is flowing.

To get more functional understanding, with communicated with National gem and jewellery authority. That government office provided relevant legal office details and what kind of education services providing by authority.

Though requirements were captured from observation and document referencing, some requirements, activities and relations were not captured well. This difficulty was overcome by interviews. Those interviews were conducted informal way rather than formal because users could communicate with us without any stress and they were encouraged to tell true and real activates rather than talking about pre-defined stories. Gem mining labours, businessman, professional in industry gave their contribution.

3.7 Businessmen and Learners Analysis

As the goal and objectives have been defined and e-business of gem has been specified as an appropriate way to deliver the gem business web site the next mile stone is to analyze the target audience which is required to identify variation of factors that will influence the design of the web site.

Information was gathered by through distribution of questionnaires, discussions held with some businessmen and the student members.

Intended and appropriate target audience: both males and females age among 18 – 65.

3.7.1 Business Members Related Characteristics

Each members differ from each other. In gem industry members will be in different categories . As web site are prepared, these differences must be taken into consideration. In order to be successful, in the preparations of website structure designers should be aware of the characteristics of the target users.

In student member view ,It is assumed that learners are equipped with basic computer knowledge such as how to use computer for their learning purpose, how to use the Internet, how to view the video clips, how to fill the forums, and as well as how to do the registration process.

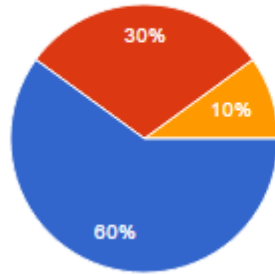
SAFAYA -GBMS focusing on mobile usability of website businessmen in native and foreign business which will provide facility for users join with his business process when he/she want .Another main thing is security and reliability of web site .Because whole process based valuable product called “gem”.

3.7.2 Content Analysis

As per the needs assessment plan, author carried out a survey to identify the requirements of the people who are gem industry and gem business world, and the content that should be covered in order to design the web site accordingly.

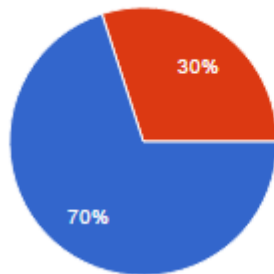
. Author gathered the business men and school leavers information through questionnaires. For this purpose author distributed an online questionnaire among 25 people .People who are involving with gem industry and gem business and other stakeholder ideas were gathered through interviews and telephone conversations which are logged for later reference. The results of the survey and the findings related to SAFAYA -GBMS web site will be summarized below.

Select your age category



20-30 years	60%
30-40 years	30%
40-60 years	10%
Teenage	0%

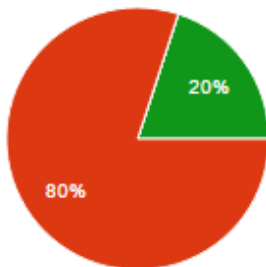
Do you like to learn about Gem Science or Business?



Yes	70%
No	30%

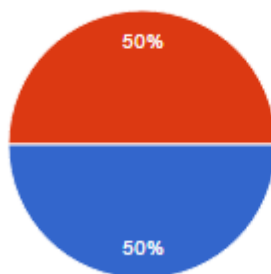
for online and face to face hard copy survey author selected 20-60 year age limit .according to second question 70% like more learn about and gem science but 30% reject that status because age limit over 50 trust about their professional and life experience about gem industry do not care about theoretical knowledge .

What is the main reason for doing/learning about gem industry?



As A hobby	0%
For earn money	80%
To learn about gem science	0%
To get industry job	20%
All of above	0%

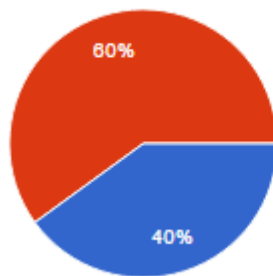
Do you think Sri Lanka get relevant profit from gem industry



Yes	50%
No	50%

Above two pie charts most of people join this industry for earn more and more money only 20% from select people join this industry as a profession because gem tester ,gem heaters in NGJA has higher status in gem industry .50 % of selected crowd they getting enough profit from gem business according to social view people who are in gem business have not enough idea how valuable their gems so they think they get enough money from it but middle layer brokers and foreign buyers get more commission from it .

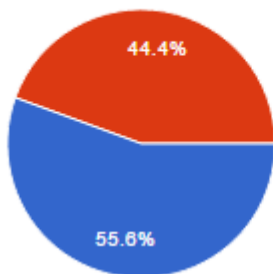
Do you think Sri Lanka provide relevant valuable information for buyers?



Yes	40%
No	60%

This result shows how interact between gem industry and tourism in Sri Lanka they have not enough guidance for involve with gem business .It directly effect for social lives economy but also economy in Sri Lanka.

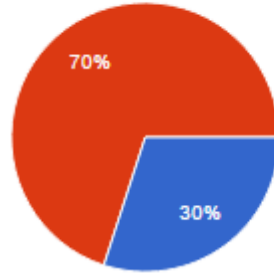
Do you think Sri Lankan Businessmen get enough advantage from e-business?



Yes	55.6%
No	44.4%

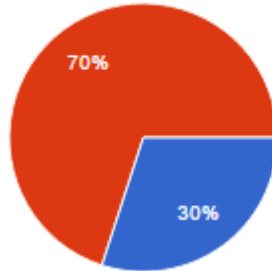
Only 55.6% believe that Sri Lankan gem business combined with e-business factor .44.4% directly saying Sri Lanka businessmen not get enough advantage from e-business .

Do you think Sri Lankan Businessmen get enough advantage from online auction?



Yes	30%
No	70%

Do you think online auction payment is secure ?



Yes	30%
No	70%

Even 70% selected people make sure about online payment method 70%selected people saying they have not enough idea about online gem auctions. This kind of situation accepting the requirement online gem auction environment experiences .

3.7.3 Functional requirements

Functional requirements indicate the intended behavior of the system. The functional requirements of proposed project are stated below. The requirements include the basic functionalities of the system, what tasks and services it is supposed to provide and user interaction facilities.

1.0 Create membership and user roles

1.1 Create membership for Sri Lankan members by using gem cooperation membership

1.2 Create membership for international members by using international company memberships

1.3 Create different kind of membership level with different valuable identification.

1.4 Member profile creation

1.5 Create E-dairy for Sri Lankan members

- 1.5.1 Daily SMS Alerts
- 1.6 Provide different kind of industrial reports.
- 1.7 Create free student membership profiles (under age 21)
 - 1.7.1 .Provide education about Gem industry and business
- 2.0 Create international auction environment
 - 2.1 Member publishes his gem.
 - 2.2 International buyers bid on it
 - 2.3 Get highest value in certified time period
 - 2.4 Make business deal after e-mail transferring
 - 2.5 Do payments
 - 2.5.1 Bank to bank transaction
 - 2.5.2 Credit card transaction
 - 2.6 Identify miss payment
 - 2.6.1 Inform to registered company by email
 - 2.6.2 Black lists the member.
- 3.0 Create facility for foreign buyers
 - 3.1 Create membership under special buyer category.
 - 3.2 Provide daily SMS alters
 - 3.2.1. Provide daily SMS alerts about business areas.
 - 3.2.2 Provide daily SMS alerts about gem and Jewelry exhibitions
 - 3.3 Provide Google map location.
- 4.0 Make globalization every category in web site.
 - 4.1 Translate website language into Thai.
 - 4.2 Translate website language into Russian.
- 5.0 Create wide range of reports

- 5.1 Membership payment report
- 5.2 Members annual and monthly report
- 5.3 Student annual report
- 5.4 Summary report of selling gems by country wise
- 5.5 Sale report of gems by international companies
- 5.6 Summary of selling gems by gem type
- 5.7 Summary report of top 10 business areas visited by buyers.

6.0 Payments

- 6.1 Calculate commission on international and native auctions
- 6.2 Calculate members annual and month payments
- 6.3 Calculate payments for additional features of student membership.
- 6.4 Calculate payments for tourist buyers.

3.7.4 Non-Functional Requirements

Non-functional requirements bear a combination of qualities and constraints of the end product.

- **Usability:** An important factor that contributes to the quality of the software is the ease of use of the system. If the system is not user-friendly it will be time consuming. Therefore easy input types are required for the system.
- **Performance:** Performance is the most important requirement in any software system. The system is made to respond faster, which shall result in the overall system running faster. Performance was identified as a requirement by most due to the need for time management at work.
- **Portability:** The software is developed on Windows platform since it reaches out to a wide range of users.

- **Accuracy:** Having all aspects of the system as accurate as possible is important. Wrong data can result in decisions that are not in the best interest of the system. They can also result in angry employees or consumers that believe they have been exploited. So in this context the author has tried to develop and maximize the accuracy of the system. This shall ensure in making correct decisions.
- **Security** -Provide high security in user logins and payments on specially all bank transaction details transferring encrypted manner. Because of that there is no threat from cyber hackers .in SAFAYA -GBMS system based on valuable products and lot of money transactions .
- **Comprehensive Documents** –SAFAYA -GBMS provide comprehensive reports which regarding various kind of industrial and business reports Membership payment report Members annual and monthly report , Student annual report, Summery report of selling gems by country wise ,sale report of gems by international companies ,summery of selling gems by gem type , Summery report of top 10 business areas visited by buyers.
- Fault tolerance
- Effectiveness Efficiency Capacity
- Privacy

3.8 Design

3.8.1 Introduction

This chapter include architectural design which providing main design architecture which is include GBSM client server architecture .Use case scenario and use case diagramme will discuss the process of GBSM web system. User interfaces will provide what is the future system will look like .GBSM code design with 3 tire coding architecture high level component design will discuss it .

3.8.2 Architectural design

The system is installed central location. User can access the system far away from the central location. Also the system can be accessed multiple users. Client server model is suitable

architecture according to above requirements. Below diagram shows our system according to client server architecture. Native users, Administrator ,Foreign member ,foreign buyer desktops,tabs,mobile phones act as client side .Architecture design consist with sql server database which are transferring data by using sql request and response .[10]

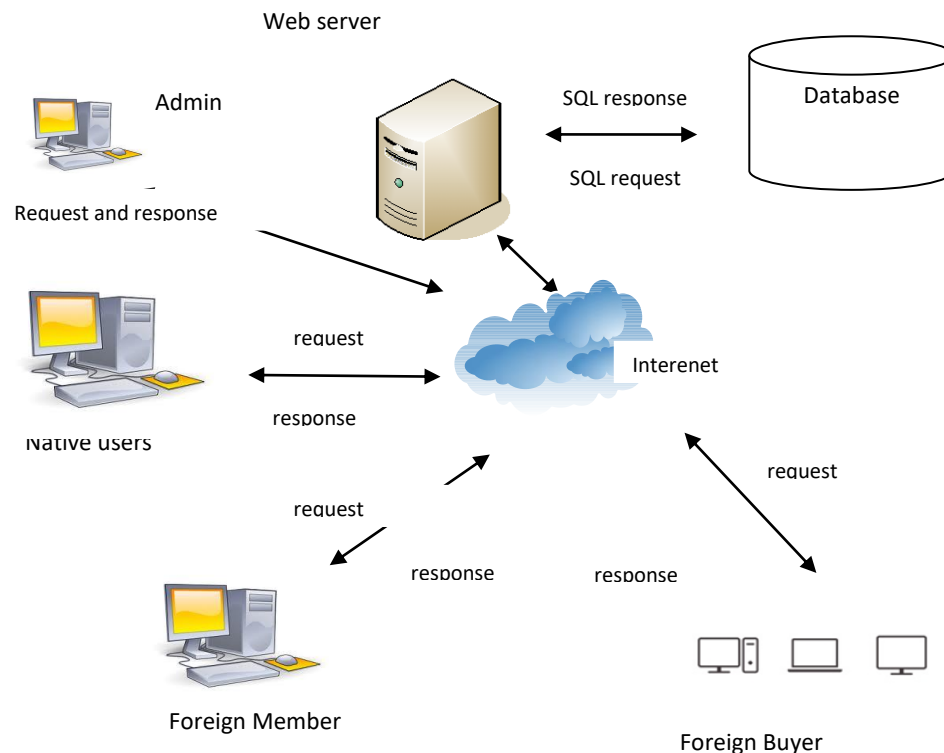


Figure 4-Architecture Design

3.8.3 Methodology

Author used the Agile methodology as model to design and develop SAFAYA -GBMS web site .SAFAYA -GBMS greatly involving with users who well known as gem businessmen . Agile approach provides a unique opportunity for clients to be involved throughout the project, from prioritizing features to iteration planning and review sessions to frequent software builds containing new features. However, this also requires clients to understand that they are seeing a work in progress in exchange for this added benefit of transparency

By using time-boxed, fixed schedule Sprints of 1-4 weeks, new features are delivered quickly and frequently, with a high level of predictability. This also provides the opportunity to release quicly get feedback from users and get quick changes according to them .ex : Make

more secure payment methods than used by SAFAYA -GBMS ,Introduce difference process for online gem auction used by SAFAYA -GBMS. By allowing the client to determine the priority of features, the team understands what's most important to the client's business, and can deliver the features that provide the most business value.

3.8.4 Use Case Scenarios

Use case scenarios for SAFAYA -GBMS website identify the users who involving with the system as examples administrators ,native users ,foriegn users ,foriegn buyers and student members are main users interact with the SAFAYA -GBMS system.Not only that by using use case scenarios provide descriptive details about action get by actors and what are the pre and post conditions of the one by one process

Use case	Create membership for Sri Lankan
Actors	Administrator,Sri Lankan person
Type	Primary
Description	Provide password from system by email. Enter to web system by username and password Create profile details and create membership.
Precondition	Provide gem cooperation number ,email ,full name and user name

Use case	Create membership for foreigner
Actors	Administrator, foreigner
Type	Primary
Description	Provide gem cooperation number ,email ,full name and user name Provide password from system by email. Enter to web system by username and password Create profile details and create membership.

Use case	Member profile creation-Native member
Actors	Native member
Type	Primary

Description	Select gem types ,select profession ,civil status ,contact details age,,professional experiences ,
-------------	--

. (Refer Appendix D for use case scenarios)

3.8.5 Use Case Diagrammes

Based on the (SAFAYA -GBMS) project, the author intends to make use of a use case diagram for the proposed system. Use case modeling is a proven method to effectively describe the behavior of a system. Use case diagrams are used to identify the functionalities of the system through a graphical representation. Since use case contains narrative text, it helps both developers and stakeholders to understand the functionalities of a system.

Online Gem Auction

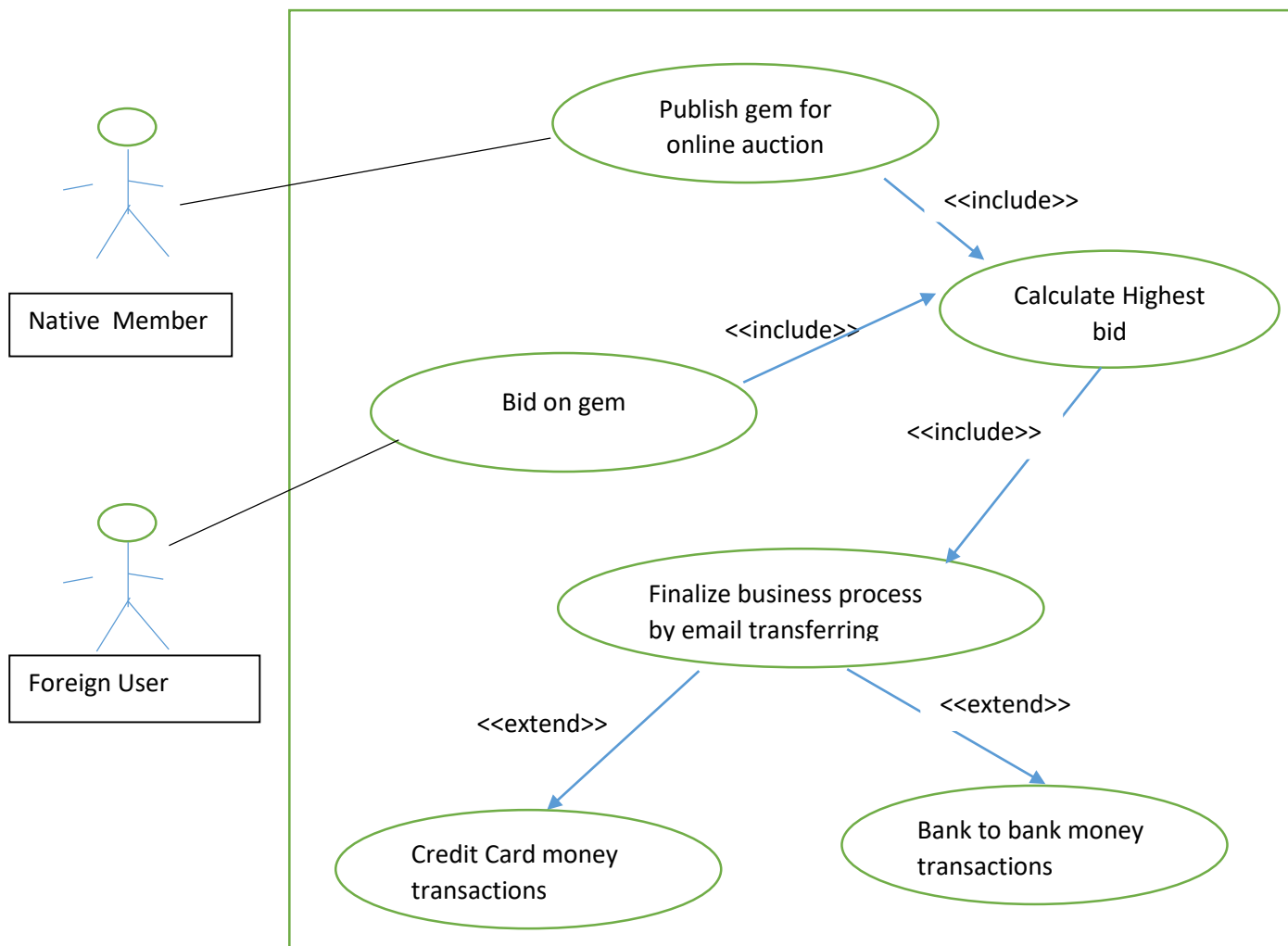
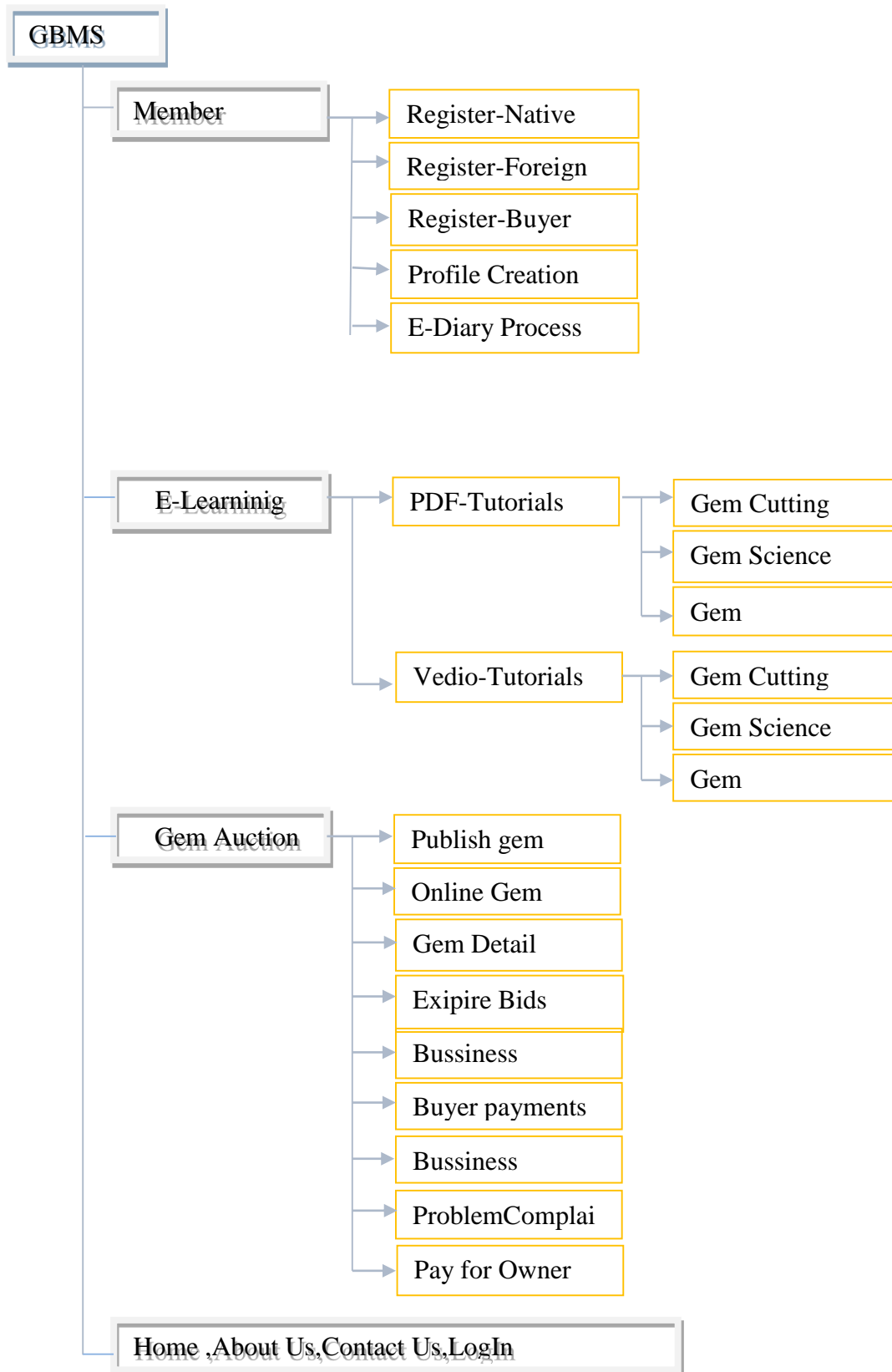


Figure 5-Online Gem Auction

(Refer Appendix E for use case scenarios)

3.8.6 Site Map

Site map of SAFAYA -GBMS categorized with what kind of processes and tasks relevant for main category and characters .Mainly it is consisting with member ,e-learning ,home ,buyer process ,system reports.SAFAYA -GBMS website menu structure mainly base on that .According to that user will easily identify categories of the website and achieve his category and fulfil his target.



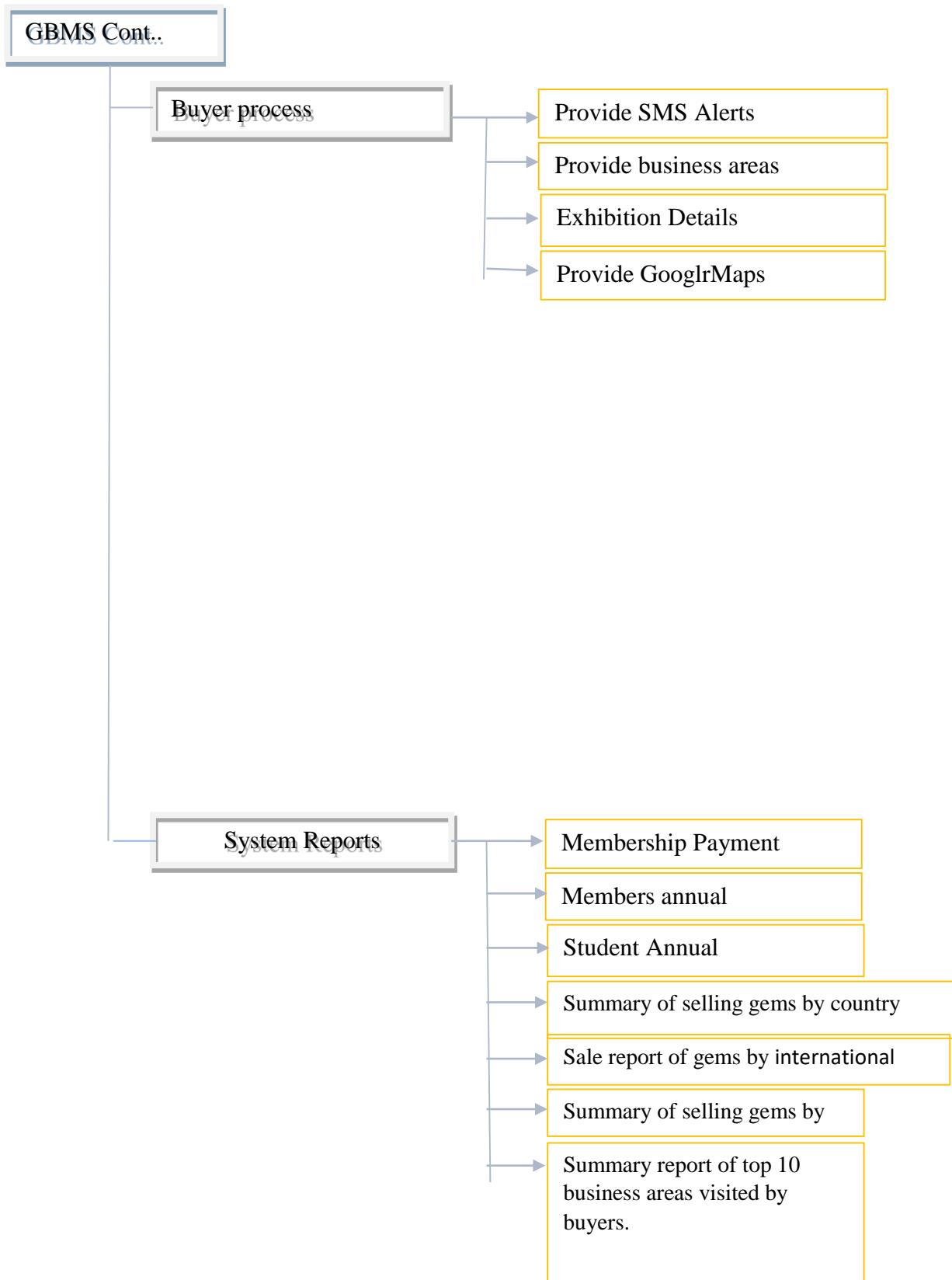


Figure 6-Site Map

3.8.7 Database Diagram

Database diagramme of SAFAYA -GBMS map all the entity of SAFAYA -GBMS website most of tables map each other by foreign key and primary keys .and several table entities alone with all table structure .Because some of table act as log tables and act as alone transactions .

(Refer Appendix E for use case scenarios)

3.8.8 Process Diagramme

Process diagramme provide graphical representation of process flowing of SAFAYA -GBMS .In here clarify the membership process of buyers, native and foreign users .This graphical representation include buyer transactions ,foreign member and native member transaction as examples daily SMS alters ,profile creation.

Author create process diagramme for main process in SAFAYA -GBMS that called online auction.

(Refer Appendix E for use case scenarios)

3.9 Chapter Summary

Analysis is significant to produce the needs and views of the key stakeholders by using requirement gathering techniques like interviews, questionnaires and research done in the area of measuring developer productivity. The basic requirements of this project once gathered are categorized according to functional and non-functional requirements. Functional requirements define the behavior of the system and non-functional requirements define the quality constraints such as accuracy, performance and security that the end users expect from the system. The functions are then prioritized based on the importance. A graphical representation of the system was depicted in the form of a use case diagram which is used to signify the identified functionalities and depict the user interaction facilities of the system.

Chapter 4: Implementation

Implementation chapter is focus on the implementation of the project. The implementation of the SAFAYA -GBMS web site is carried out using modular architecture where each module is implemented separately and later integrates each other.

The scope of this chapter is to discuss the features of the project, how each feature was developed, Use of features, possible screen shorts, code segment as well.

4.1 Features of the System

- System should member registration.
- System should validate user authentication.
- member profile creation
- Create E-dairy for Sri Lankan members with daily SMS facility
- Create international auction environment.
- Secure money transaction .
- Provide facility for foreign buyers .
- Provide google map facility .
- Make globalization every category in web site.
- Create wide range of reports
- Calculate payments .

4.2 Section of technology

After design entire author had to decide what kind of technology use for develop the system. Entire system based on .Net framework 4.5 and SQL Server 2008 .In here SAFAYA -GBMS system develop by C# .Net language with inherit ASP.Net .Visual Studio 2013 is the development tool .Because of that SAFAYA -GBMS provide comprehensive reporting facility by using RDLC reports .And SAFAYA -GBMS will able to host in local machines by using IIS tool. SQL Server 2008 provide useful date storage facility and data manipulation methods for application development .As examples coding complex stored procedures ,table structures

providing by Microsoft SQL Server tool .The main point is .Net Framework providing very developer friendly environment for SQL Server 2008 because both are include same Microsoft family .

C# Asp.net and Microsoft SQL Server provide great support three tire development architecture which method use for SAFAYA -GBMS system development .PayPal integration ,handling complex money transaction process ,flexible e-mail implementation ,SMS integrations ,image transferring (image browse from local machine and store in centred database after retrieve same image by using binary stream) are some examples get advantages from use development tools . For the report design, the author has used RDLC tool in Visual Studio 2013. Be low are some of the advantages using Crystal Report 2008; Rapid report development.can extend it to complicated reports with interactive charts, programmatically export the reports into widely used formats like .pdf, .doc and .xls

4.3 High Level Component design

This is called 3 –tier architecture which is usually use in ASP.Net web development ,in here data access layer include with database handling activity SAFAYA -GBMS using SQL Server 2008 R2 for keep its database which is include tables ,sql queries ,stored procedures ,triggers ,views and functions etc. .By using that Data Access Tire call application to SQL Database

In Business Tire include with all the C# classes with interact both front end layer and backend layer. Middle layer business logics in here.[17]

Presentation tire which can identify as frontend layer in this application presentation include with asp.net web forms and visual studio 2013 controlllers. This layer interaction with user .GBSM include with jquery,javascript ,bootstrap technologies which is providing very user friendly interaction .

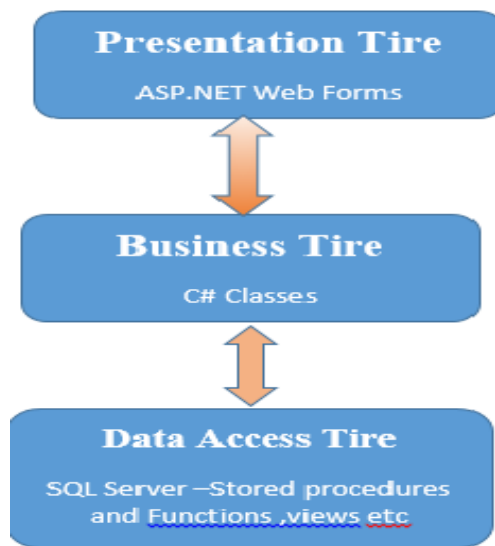


Figure 7-3 Tire Architecture

4.4 Resource Requirement

Hardware Requirement

- ❖ Personal Computer / Laptop (with 2GHz or higher processing speed)
- ❖ 1 GB or higher RAM
- ❖ Router to connect the internet

Software Requirement

- ❖ Windows 7/Windows 8.1/ Windows10
- ❖ Microsoft Office for documentation purpose
- ❖ Microsoft Project
- ❖ Rational Rose for documenting the design
- ❖ Microsoft Visual Studio 2013
- ❖ SQL Server Management Studio 2008
- ❖ Photoshop

- ❖ Windows Media Player
- ❖ Web browser (google chrome, internet explorer, Mozilla)

Note: The above software and hardware requirements are subjected to change.

4.5 Changed direction from original proposal

SAFAYA -GBMS has become more user friendly and secure than original proposal after discussed with supervisor. Some of examples are:

- Integrate secure PayPal transactions.
- Introduce encrypted details of money transactions.
- Modify E-education category.
- Modification on online gem auction –based on “E-Bay ”
- Add member comments on online gem auction
- Provide more facilities for buyer category

4.6 User Interfaces

The user interface for the software shall be compatible to any browser such as Internet Explorer, Mozilla or Netscape Navigator by which user can access to the system. And other special technique called “Bootstrap”,its providing portability for website in ex -: mobile phones interface ,tab interface ,desktop interface .There are some of interfaces in SAFAYA -GBMS ,

SAFAYA -GBMS Home page

GBSM home page include with bootstrap technological master page. Main menu has “Home”, “About Us”, “Member”, “GBSM E-learning”, Online Gem Auction ,Contact Us ,Register,Login.Home page have carasoul which include have gem images.

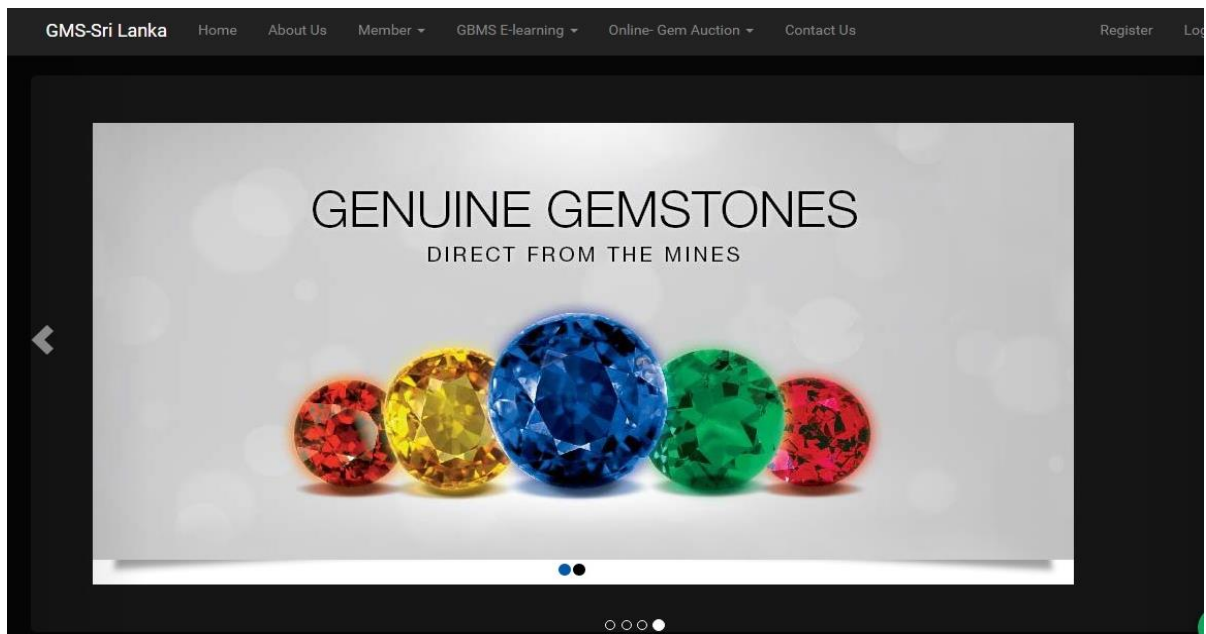


Figure 8-Home page

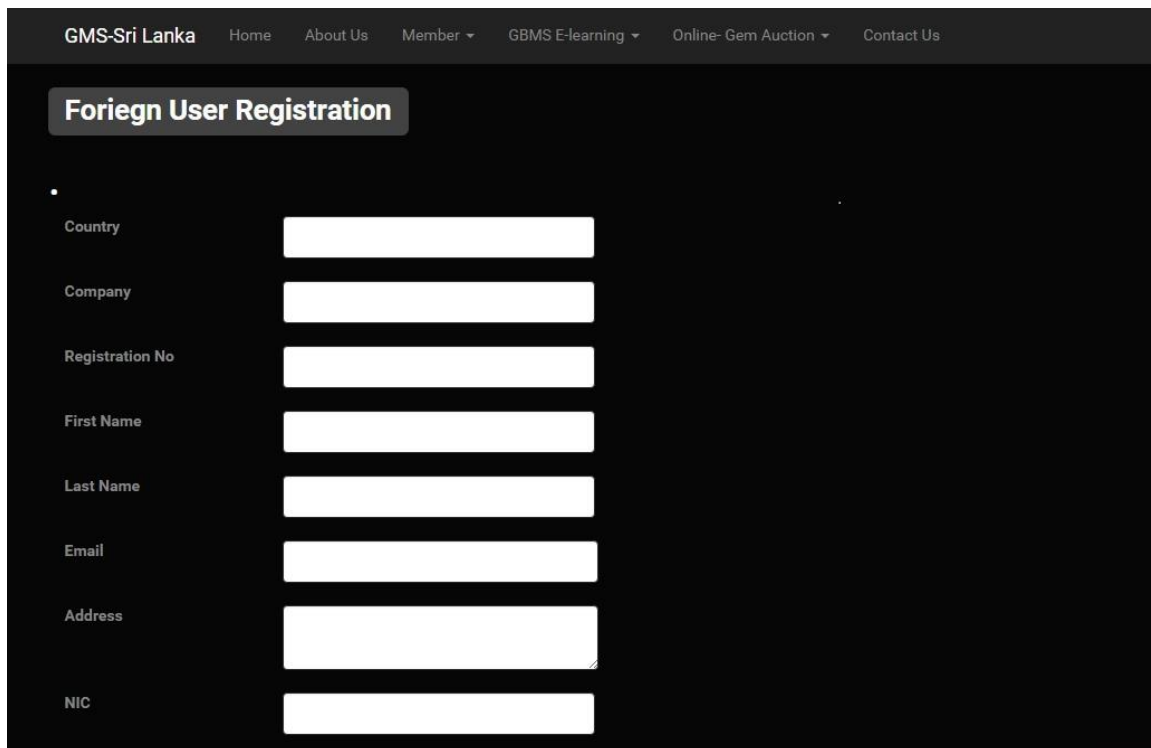
User Registration –Native User(for Sri Lankan)

Under main category of “Member “section it has sub menu of “Sri Lankan User Registration “this interface provide facility for Sri Lankans for be member here user have to enter his registration no which providing by gem cooperation of Sri Lanka.First name ,Last name ,Email, Address ,NIC,Contact Number details requiring here .

Figure 9-Sri lanka User Registration

User Registration –Foreign User(for Non -Sri Lankans)

Under main category of “Member “section it has sub menu of “Foreign User Registration “this interface provide facility for Sri Lankans for be member here user have to enter his registration no which providing by gem company of their country. Most of countries have world famous and recognize name all around the world .User will able to enter company name and country by using that system will able to validate the web application. First name, last name ,email, address ,NIC ,contact number details user have to enter this page .All the detail include required field validations and format validations .



The screenshot displays the 'Foreign User Registration' form on the GMS-Sri Lanka website. The form is set against a dark background with white text and input fields. The navigation bar at the top includes links for Home, About Us, Member, GBMS E-learning, Online- Gem Auction, and Contact Us. The form fields are as follows:

Field Label	Input Type
Country	Text Input
Company	Text Input
Registration No	Text Input
First Name	Text Input
Last Name	Text Input
Email	Text Input
Address	Text Input
NIC	Text Input

Figure 10-Foreign User Registration

Create Member profile –After getting membership

After registration native or foreign member able to login to the website ,member profile creation facility then he or she able to select interested gem type ,select job type ,those multi –choice .Then include office telephone number ,Mobile telephone number ,civil statues ,sex , age ,professional experience .By using that other members and web system able to understand what kind member he is junior or senior for gem industry and what kind of interesting he has for this gem industry.

Member Profile Creation

Select Gem Type You Interest

<input type="checkbox"/> Aquamarine	<input type="checkbox"/> Ruby	<input type="checkbox"/> BlueSapphire	<input type="checkbox"/> OrangeSapphire
<input type="checkbox"/> Padmadradcha	<input type="checkbox"/> PinkSapphire	<input type="checkbox"/> Emerald	<input type="checkbox"/> Diamond
<input type="checkbox"/> CatEye	<input type="checkbox"/> Garnet	<input type="checkbox"/> TavoriteGreen	<input type="checkbox"/> Other

Select Your Job

<input type="checkbox"/> Gem Cutter	<input type="checkbox"/> Gem Polisher	<input type="checkbox"/> Gem Shaper	<input type="checkbox"/> Broker
<input type="checkbox"/> Businessman	<input type="checkbox"/> Heat Treater	<input type="checkbox"/> Tester	<input type="checkbox"/> Other

Tel No -Office

Tel No -Mobile

Civil Status ☐ Married ☐ Single

Sex ☐ Male ☐ Female

Age

Professional Experience

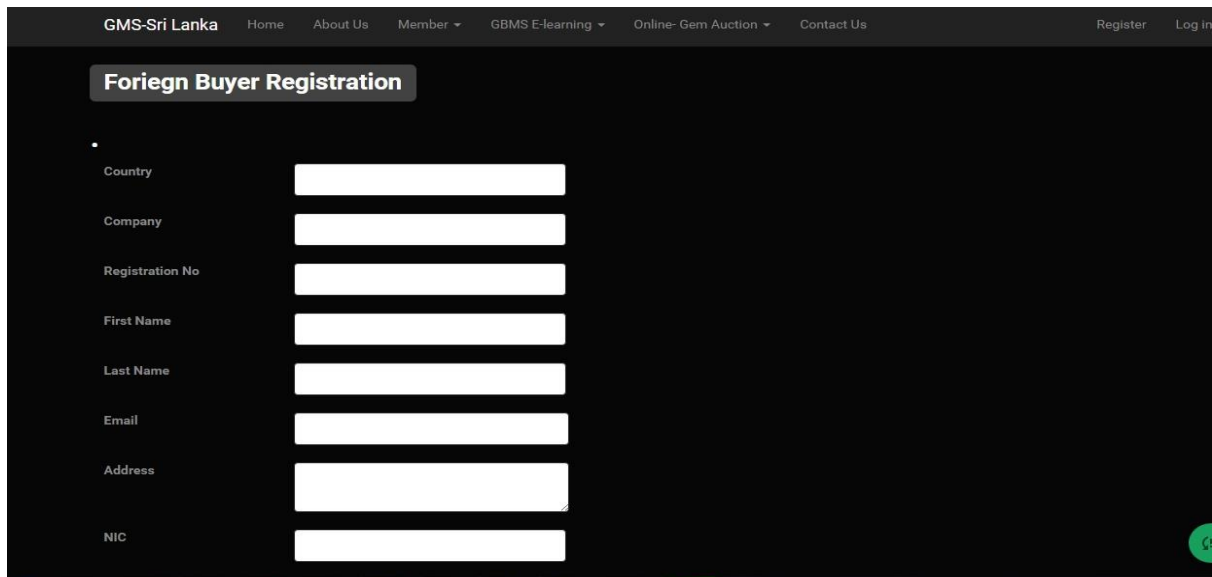
© 2015 - My ASP.NET Application

Figure 11-Member Profile Creation

Foreign Buyer- Registration

By entering country ,company details and other requiring details foreign members will get buyer membership .This use for foreigner who are willing to come or come Sri Lanka for gem business ,As a result of that SAFAYA -GBMS send daily alerts for buyer which include

native business



The screenshot shows a web browser window with the GBMS Sri Lanka website. The navigation bar at the top includes links for Home, About Us, Member, GBMS E-learning, Online- Gem Auction, Contact Us, Register, and Log In. The main content area is titled 'Foreign Buyer Registration' and contains a form with the following fields: Country, Company, Registration No, First Name, Last Name, Email, Address, and NIC. Each field is represented by a white text input box on a dark background. A green circular button is partially visible on the right side of the form.

Figure 12-Foriegn member registration

Publish Gems for online auction

This page facilitate for native users publish his for foreign buyers that why this page requiring details of locations, date ,time, gem type, and gem picture .

→ C localhost:45257/UI/PublishNativeGem

GMS-Sri Lanka Home About Us Member ▾ GBMS E-learning ▾ Online- Gem Auction ▾ Contact Us

•

Location

Date

Time

Gem Type

Gem Type No file chosen

© 2015 - My ASP.NET Application

Figure 13-Publish Native Gem

Chapter 5: Evaluation and Testing

This chapter describes the progress of the project to date, difficulties faced and the direction of the project.

5.1 Evaluation and Testing

All the business process code units will be covered with unit tests. Three interested individuals, whom are interested in deploying the application as a business, will volunteer to beta test the application.

In general, Testing is a process carried out by individuals or groups for end to end domains where requirements exist. It provides an objective, independent analysis of the software to allow understanding the risk of software implementation as well.

Testing involves the functions of a system or application under controlled conditions, it is the operation of the application with the test data but it should satisfy the method the application should work. The controlled conditions should include both normal and abnormal conditions. Testing should intentionally attempt to make scenarios go wrong to determine the things happen when it should not or things do not happen when it should. It is oriented to detection. Simply it is a process of identifying incidents prior to it taking place, this can be defined as the purpose of testing.

(Refer Appendix C for the Questionnaires)

5.2 Testing

In general, Testing is a process carried out by individuals or groups for end to end domains where requirements exist. It provides an objective, independent analysis of the software to allow understanding the risk of software implementation as well.

Testing involves the functions of a system or application under controlled conditions, it is the operation of the application with the test data but it should satisfy the method the application should work. The controlled conditions should include both normal and abnormal conditions. Testing should intentionally attempt to make scenarios go wrong to determine the things happen

when it should not or things do not happen when it should. It is oriented to detection. Simply it is a process of identifying incidents prior to it taking place, this can be defined as the purpose of testing.

5.2.1 Test Cases

This chapter discuss how testing is carried out for the SAFAYA -GBMS web system. The author has identified the errors which were encountered during system testing. While conducting testing the risks that can occur during the implementation of the project has been identified and analyzed in the phase.

(Refer Appendix A for the Test Case Document)

5.3 Evaluation

Evaluation is an important part of any project or program, which aims to bring out the value of what has been done, and help capture the learning that has taken place during the activity.

The solution, GBMS website was evaluated in the perspective people who are involving with gem industry and business. (Refer Appendix C)

During the process of evaluation, 10 evaluators were involved, among them, was one student member and the remaining 9 were businessmen . All were registered to the SAFAYA -GBMS web site and given the opportunity to go through the site and perform the existing activity as well.

5.3.1 Question Design

Most of the questions were designed based on the selection of a series of structured or closed question items, using the following methods,[18]

- ❖ Category – one option only is selected
- ❖ List – multiple items may be selected
- ❖ Scale – specifying level (strongly agree, agree, neither agree or disagree, disagree, strongly disagree)

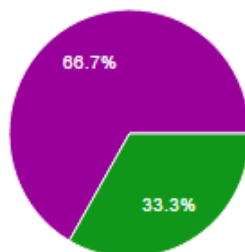
In order to obtain more details for sections that required further details, open ended questions were constructed.

5.3.2 Results

Results were analyzed separately businessmen, industrial professional and student members. The questionnaires were asked about the satisfaction of using the SAFAYA -GBMS web site and the effectiveness about the SAFAYA -GBMS web site. As a summery nearly 90 % count agree with usability of SAFAYA -GBMS system. In their totally 60% of Strongly agree usability of SAFAYA -GBMS 30 % have the status of Agree with usability of SAFAYA -GBMS web site .but SAFAYA -GBMS has comments on usability” Neither agree or Disagree” with percentage of 10 % . Online question form available at :

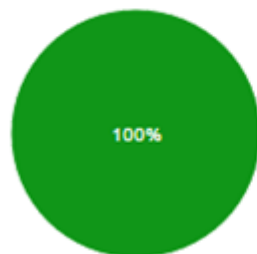
https://docs.google.com/forms/d/14vYIgW4UxsuT_kv-mlbpO7qsZHgoAlONsdo-GbBnvmU/viewform

(9).System Provide relevant training for student members



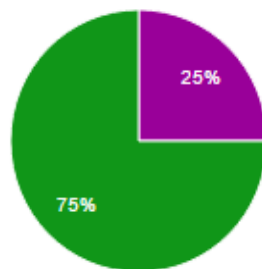
Strongly Disagree	0%
Disagree	0%
Neither Agree or Disagree	0%
Agree	33.3%
Strongly Agree	66.7%

(5).Bug free program that runs properly



Strongly Disagree	0%
Disagree	0%
Neither Agree or Disagree	0%
Agree	100%
Strongly Agree	0%

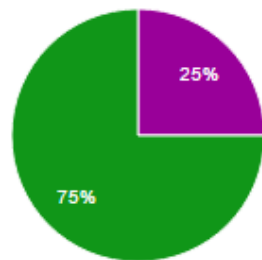
(6).Error messages and warning is helps to using certain functions or creating any difficulty



Strongly Disagree	0%
Disagree	0%
Neither Agree or Disagree	0%
Agree	75%
Strongly Agree	25%

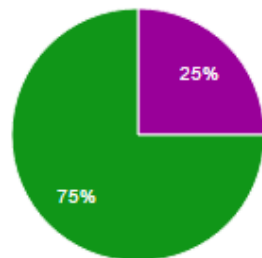
When considering evaluation of SAFAYA -GBMS online survey 100% users saying this is bug free system and 75% agree SAFAYA -GBMS providing error messages and warning is helps to certain functions or creating any difficulty and 25% strongly agree with that ,according to that SAFAYA -GBMS can satisfied about total development and deployment of system ,but even system get successful result users do not strongly agree with system bug free environment and error handling of the system .

(7).Satisfied with the functionality



Strongly Disagree	0%
Disagree	0%
Neither Agree or Disagree	0%
Agree	75%
Strongly Agree	25%

(8).System generated reports are help for decision making

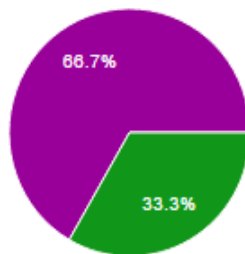


Strongly Disagree	0%
Disagree	0%
Neither Agree or Disagree	0%
Agree	75%
Strongly Agree	25%

SAFAYA -GBMS including with different range of functionalities some of them are memberships, payments ,buyer handling ,online auctions ,author had some survey function satisfaction of the web system 100 % totally agree with the system .author had relevant

requirement analysis about existing system because of that SAFAYA -GBMS have that kind of result but only 25% strongly agreed with functionality satisfaction of the web site that means target audience expecting further more functions from SAFAYA -GBMS .SAFAYA -GBMS has ten system generated reports which covers different areas of website .foreign member details ,native member details sales report of gem by country wise and country wise are some of them. According to this survey 100% agree with reports in .But only 25% strongly agree with SAFAYA -GBMS report services, that means target users will expecting further more information summarization via SAFAYA -GBMS .

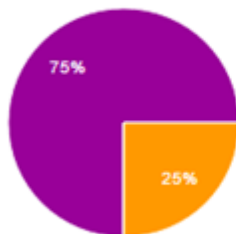
(9).System Provide relevant training for student members



Strongly Disagree	0%
Disagree	0%
Neither Agree or Disagree	0%
Agree	33.3%
Strongly Agree	66.7%

SAFAYA -GBMS has student membership category users who will to get online education about gem education .66.7% online education functionality which is saying web system may have to more care course structure and richness of it .

.System has proper speed ?



Strongly Disagree	0%
Disagree	0%
Neither Agree nor Disagree	25%
Agree	0%
Strongly Agree	75%

SAFAYA -GBMS has rich UI design which consist with bootstrap template and all the asp.net code development use mostly in sever side coding structure .that kind process give survey result like that .25% Neither agree nor disagree with SAFAYA -GBMS system that kind of result occur because some report generating getting slow when calling to huge dataset. But

using of bootstrap responsive UI and 3 tire coding architecture give 75% strongly agree result with system has proper speed .

.For more details (Refer Appendix G).

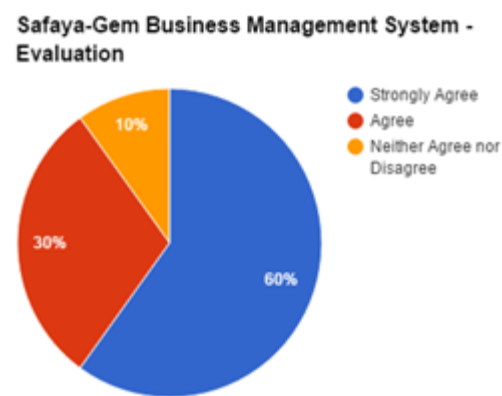
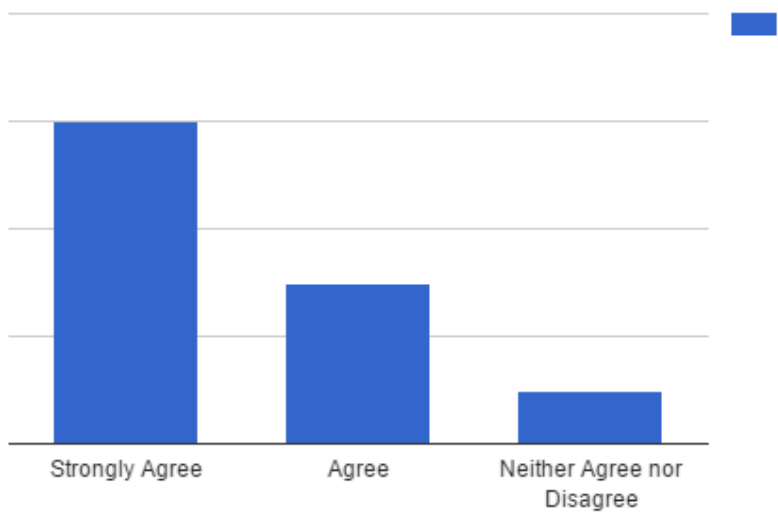


Figure 14-Evaluation Result Safya GBMS

Safaya- Gem Management Systems Evaluation



Chapter 6: Conclusion

6.1 Lessons Learnt and achievement of objectives

Goal of this project is to implement a system which will serve gem buyers, gem sellers better than existing systems. First choice of approach to identify areas which could be improved was to interview and discuss with users' of existing systems. Though at first it seemed to be a good method, later it was realized that most of those users' thinking of the original problem was limited to the options which were provided by the existing systems. To overcome this matter it is necessary to widen the user base and gather information from individuals who are familiar with gem buying and selling before the time existing systems were introduced.

- With the limited time frame it was difficult to design and develop a project this way without having proper programming knowledge on web designing. With the help of working experience gained during the placement as a .Net software engineer ASP.net helped to design a proper web application for this project.
- Generating meaningful Management Information System (MIS) reports is the main objective of this project. With this aim author decided to design reports. Reporting tools in visual studio used to design these reports.
- This application has different user levels (Admin, professional student member, buyer) at different locations. Therefore, having windows based application raised so many problems on maintaining at a centralized place. As a solution for this problem web based system was elected which can easily processed and maintain at a centralized place.
- SAFAYA -GBMS include with google map location provider for foreign buyers .As a solution call for google map api and generate wanted places
- SAFAYA -GBMS online auction expecting secure money transaction methods because of that it had integrated with pay pal money transaction method and all the bank service money transactions use with encrypted manner .

- SAFAYA -GBMS expecting with SMS method for information transfer for buyers and members .As a solution for that integrate windows service method for asp.net

6.2 How the extend the work

SAFAYA -GBMS system mainly deal with valuable product.Because of that author had to make some extends of web site which caring about more security .System login process included with data encryption , email transfer method and further more it consisted with Facebook authentication .In SAFAYA -GBMS online auction process has online payment method .So that process author had to encrypt and decrypt all the money transaction details (including bank details).When native member come to publish his gem system not give permission directly for him , system transfer him into third party gem identifier if he give authenticate it and introduce that gem as a real valued one system transfer all the gem details in to online gem auction .

6.3 Future work

- In modern world every web systems moving to mobile apps because of that we SAFAYA -GBMS will able to transform to mobile application specially on Android device application .[12]
- SAFAYA -GBMS can integrate with social networking ,specially on Facebook ,twitter etc. They will help to improve gem business involvement .join with LinkedIn professional social network it will add more professionalism for native businessmen ,it will make more influence than now for their personality.
- SAFAYA -GBMS online auction only involving with cut and polish gem only so after discussion with National Gem And Jewellery Authority ,SAFAYA -GBMS can improve online auctioning with rough gems .
- Provide more facility for foreign buyers than current system providing, and it can join with Sri Lanka tourist board provide more guidance for foreigners for their other tours .
- Provide more comprehensive reports than now with involving different areas.

- Web System can improve with more higher member profiling ,according to that SAFAYA -GBMS can introduce several level memberships and provide more feature for that (ex -:Gold member ,Silver member)
- Improve current E-dairy function than now, with include different types of features.
- Provide capability of make e-business member social network though SAFAYA - GBMS with including business ideas exchanging .

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Appendix A : Test Cases

Test Report Document					
1. Introduction					
This section includes test cases carried out for the functionality testing of SAFAYA -GBMS website					
2. Revision History					
Ver. No	Date	Created/Revised by	Sections Affected	Remarks	
0.1	20/10/2015	Ganganath Rathnasekara	All	Internal Version	
3. Test Case Details					
SL.No	Function Name	Test Case	Expected Result	Pass / Fail	Actual Result / Remarks
Common					
01	User Login	Enter the user name, password and click the login button.	Should navigate to the home page. (According to the administrator and members wise)	Pass	Navigate the related home pages.
02		Click the “Cancel” button.	Should hide the login form and enable the registration form	Pass	Hide the login form and enable the registration form.
03		Entering the invalid user name and the password.	Should display the error message	Pass	Display the error message “Invalid Login Details” and clear value of the password text box.

04	Displaying details.	Displaying the Administrator/Trainer and member based menu in the each home page.	Should display the Administrator/member and Trainee based menu according to the login	Pass	Display the related Menu.
05		Displaying the login user name.	After login to the system, login user name should be display on top of the each and every form.	Pass	Display the login user name in every form.
06	Messages	Displaying Error message and the information message.	Error message should be display in red color and information also display in green color.	Pass	Error messages are displaying in red color. Information's are displaying in green color.
07	Provide google map location	Native member provide business area detail with gem details	When registered buyer login to the system, should display daily business places	Pass	Registered buyers display daily business areas through google map locations .
08	Navigation	Menu navigation and links navigation.	When clicking the menu item or links, it should navigate to the correct pages.	Pass	Navigation is done correctly.

09		Logout from the system.	When clicking the “Logout” link, should exit from process and navigate to the Home Page.	Pass	Exit from the process and navigate to the home page.
10	Home Page	Menu navigation and links navigation.	When clicking the menu item or links in the home page, it should navigate to the correct pages.	Pass	Navigation is done correctly.
11	Data Entry	Adding new Records	When entering multiple records it should be added to the grid view.	Pass	Added multiple records to the grid view.
12	SMS Alerts	Administrator daily setup and manage messages	Enter relevant phone number details	Pass	Delivered SMS s for relevant recipients.
13	Email Transactions	Provide email notification for after registration for SAFAYA - GBMS	Registration	Pass	Delivered username and system generated password
14	Email Transaction	Provide email notification for both seller and buyer parties after business process over .	After expire four weeks’ time period and administration provide email notification	Pass	Delivered business details for relevant parties.
15	Mandatory fields	Checking Mandatory field.	If the user do not entering the mandatory fields, system should give an error message.	Pass	Shows “Mandatory field should be entered” and cursor will focus on the field.

16	Globalization	Select relevant language.	SAFAYA - GBMS should transfer relevant selected language.	Pass	SAFAYA - GBMS transfer relevant selected language.
17	Reports	Select country and get gem selling report	SAFAYA - GBMS should provide relevant report	Pass	SAFAYA - GBMS provide Summery report of selling gems by country wise.
18	Reports	Select international companies and get gem selling report	SAFAYA - GBMS should provide relevant report .	Pass	SAFAYA - GBMS provide Sale report of gems by international companies
19	Reports	Select gem type and get gem selling report	SAFAYA - GBMS should provide relevant report .	Pass	SAFAYA - GBMS provide Summery of selling gems by gem type
20	Reports	View top 10 buyer visiting's	SAFAYA - GBMS should provide relevant report .	Pass	SAFAYA - GBMS provide Summery report of top 10 business areas visited by buyers

Appendix B : Common Questioner

1. Select your age category

- ☐ 20-30 years
- ☐ 30-40 years
- ☐ 40-60 years
- ☐ Teenage

2. Do you like to learn about Gem Science or Business?

- ☐ Yes
- ☐ No

3. What is the main reason for doing/learning about gem industry?

- ☐ As A hobby
- ☐ For earn money
- ☐ To learn about gem science
- ☒ To get industry job
- ☐ All of above

4. Do you think Sri Lanka get relevant profit from gem industry?

- ☐ Yes
- ☐ No

5. Do you think Sri Lanka provide relevant valuable information for buyers?

- ☐ Yes
- ☐ No

6. Do you think Sri Lankan Businessmen get enough advantage from e-business?

- ☐ Yes
- ☐ No

7. Do you think Sri Lankan Businessmen get enough advantage from online auction?

- ☐ Yes
- ☐ No

8. If "Yes", reason?

9. Do you think online auction payment is secure ?

☐ Yes

☐ No

10. Do you think younger generation has enough education about gem industry?

☐ Yes

☐ No

11. Do you think Sri Lanka has enough guidance system for gem businessmen ?

☐ Yes

☐ No

12. Do you think Sri Lankan famous businessmen have enough world recognition ?

☐ Yes

☐ No

13. Do you think Sri Lanka Universities has enough courses for gem industry ?

☐ Yes

☐ No

14. Do you think Sri Lanka younger generation has enough sources for learn about gem science?

☐ Yes

☐ No

15. Do you think Sri Lanka government provide enough facility for gem cutting and gem polishing industry ?

☐ Yes

☐ No

16. What would you expect from an online system? (4 - Very important, 1 - not at all important) *

	1	2	3	4
Accuracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Effectiveness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User Friendliness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attractive Interface	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creative Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix C : Questionnaire for the Web Site Evaluation

The following is an evaluation form for evaluate the SAFAYA -GBMS website . In order to improve the quality of the web portal and provide a better learning experience for future students, would like to ask that you please take some time to complete the evaluation form.

Your feedback is sincerely appreciated.

Instruction:

Please select your response by checking.

- Strongly disagree - 1
- Disagree - 2
- Neither agree nor disagree - 3
- Agree - 4
- Strongly agree - 5

Question No	Question	Rating				
		1	2	3	4	5
01	The information provides by the system though reports helps for a proper analysis					
02	The system consist of user friendly interfaces with proper navigations					
03	The reports provided by the system have given great help for decision making processes .					
04	User friendliness of the application					
05	Look and feel about the application					
06	Complete and the understandable of the information					
07	System has proper speed.					
08	It is a bug free program that runs properly					
09	Error messages and warning is helps to using certain functions or creating any difficulty					

10	Is it easy to handle & easy to understand the behavior of the system?					
11	Are you satisfied with the functionality?					

12. For your experience SAFAYA -GBMS web portal is,

- ☐ Too Basic
- ☐ About Right
- ☐ Too Advanced

13. Is content was clear, appropriate and relevant?

- ☐ Yes
- ☐ No

16. If “No”, please give the reasons

17.To what extent do you agree or disagree with the following statements?

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Was well prepared					
Was interested in helping learners to learn					
Give clear explanations					
Presented information that will help to users					

18 **You're Recommendation:**Please check one

- ☐ This would be a valuable web site
- ☐ This is a beneficial system, but I have some serious reservations
- ☐ This web portal is not a valuable one.

Appendix D : Use Case Scenarios

Use case	Member profile creation-Foriegn member
Actors	Native member
Type	Primary
Description	Select gem types ,select profession ,civil status ,contact details age,professional experiences ,

Use case	Create student membership
Actors	Administrator,Sri Lankan person
Type	Primary
Description	Provide password from system by email. Enter to web system by username and password Create profile details and create membership.
Precondition	Provide gem cooperation number ,email ,full name and user name Verify age .

Use case	Create E-Dairy for Sri Lankan member
Actors	Administrator,Sri Lankan member
Type	Secondary and essential
Description	Member can schedule day today works. Get daily SMS Alerts
Precondition	Get native membership.

Use case	Create international auction environment
Actors	Sri Lankan member, Foreign member
Type	Secondary and essential
Description	Member publish his gem. International buyers bid on it . Get highest value in certified time period.

Precondition	Get native membership.
Post-condition	Make business deal after e-mail transferring

Use case	Payments for auction business
Actors	Sri Lankan member, Foreign member, Administrator
Type	Secondary and essential
Description	Bank to bank transaction Credit card transaction
Precondition	Make business deal after e-mail transferring
Post-condition	Identify miss payments.

Use case	Identify miss payment
Actors	Sri Lankan member, Foreign member, Administrator
Type	Secondary and essential
Description	Do miss payment or break site agreements
Precondition	Identify miss payments.
Post-condition	Cancel membership inform NGJA or relevant company

Use case	Buyer process –Arrive Sri Lanka
Actors	Buyer. Administrator
Type	Secondary and essential
Description	Provide daily SMS alerts about business areas. Provide daily SMS alerts about business areas.

Use case	Payment calculation -membership
Actors	Administrator
Type	Secondary and essential
Description	Calculate commission on international and native auctions Calculate members annual and month payments

	Calculate payments for additional features of student membership. Calculate payments for tourist buyers.
--	---

Use case	Provide monthly and yearly reports
Actors	Administrator
Type	Secondary and essential
Description	Membership payment report Members annual and monthly report Student annual report Summery report of selling gems by country wise Sale report of gems by international companies Summery of selling gems by gem type Summery report of top 10 business areas visited by buyers.

Appendix E : Use Case Digrammes

Create profile

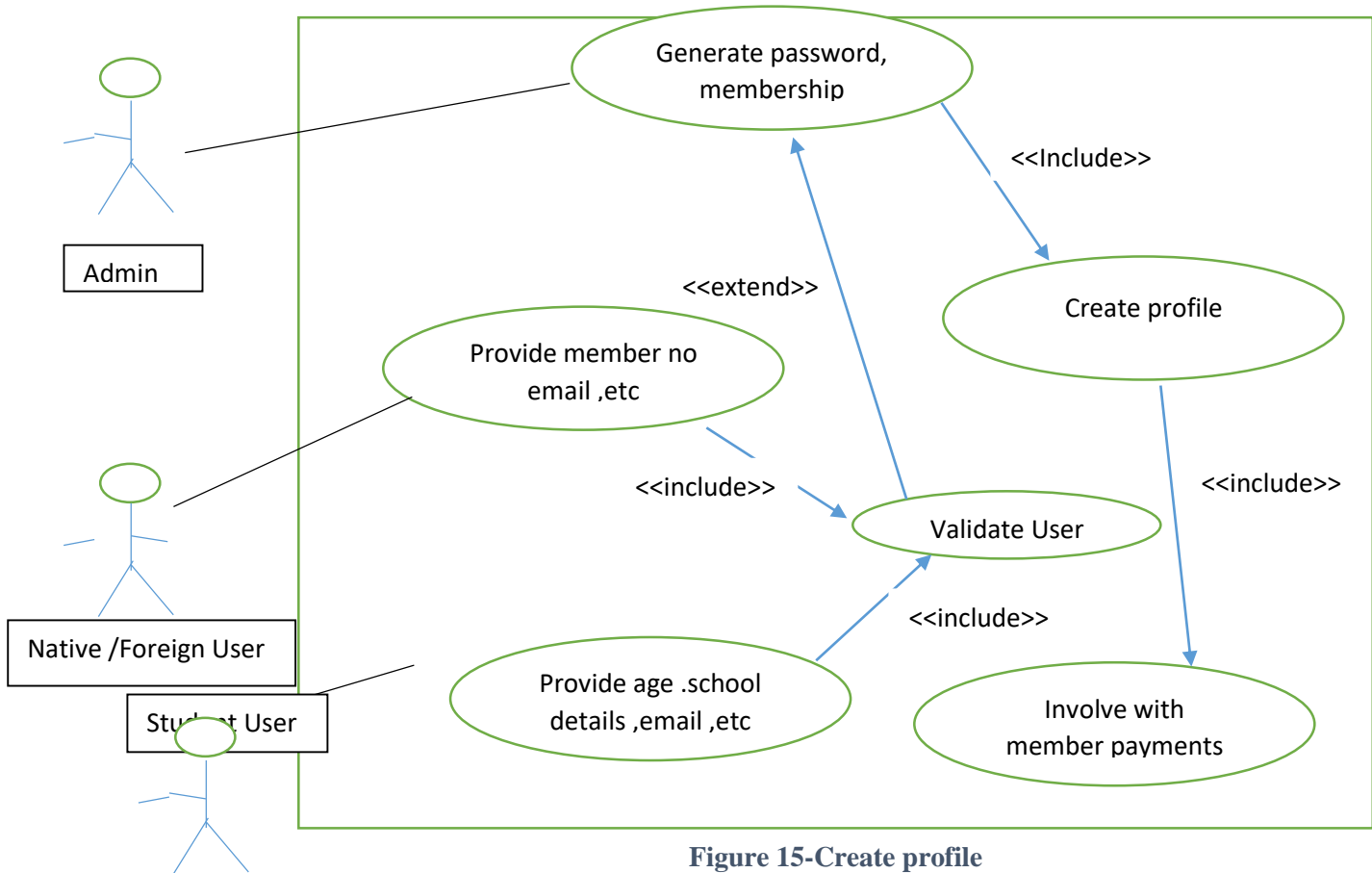


Figure 15-Create profile

Miss payment or break business rules

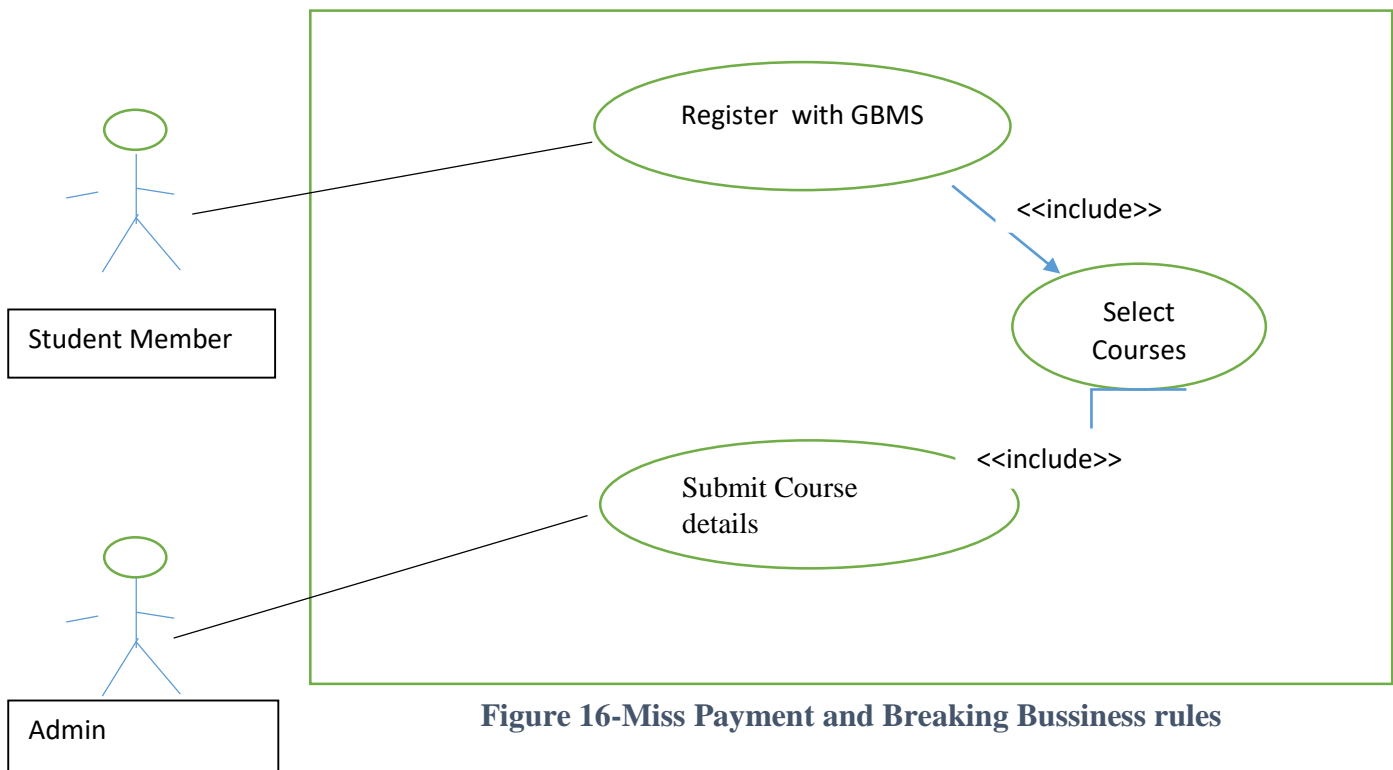


Figure 16-Miss Payment and Breaking Bussiness rules

Foreign Buyer Transaction

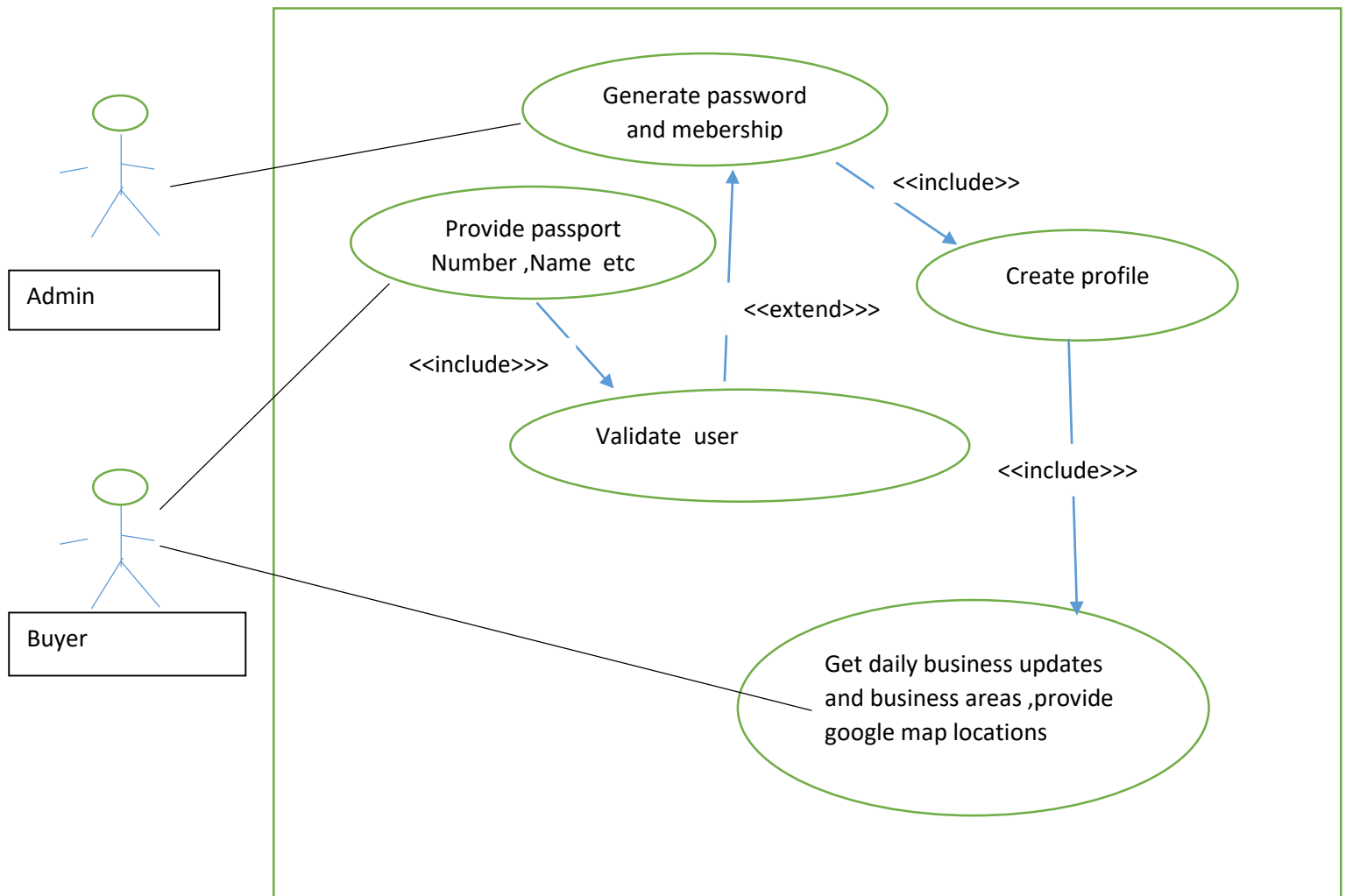


Figure 17-Foriegn buyer process

Involve with student category

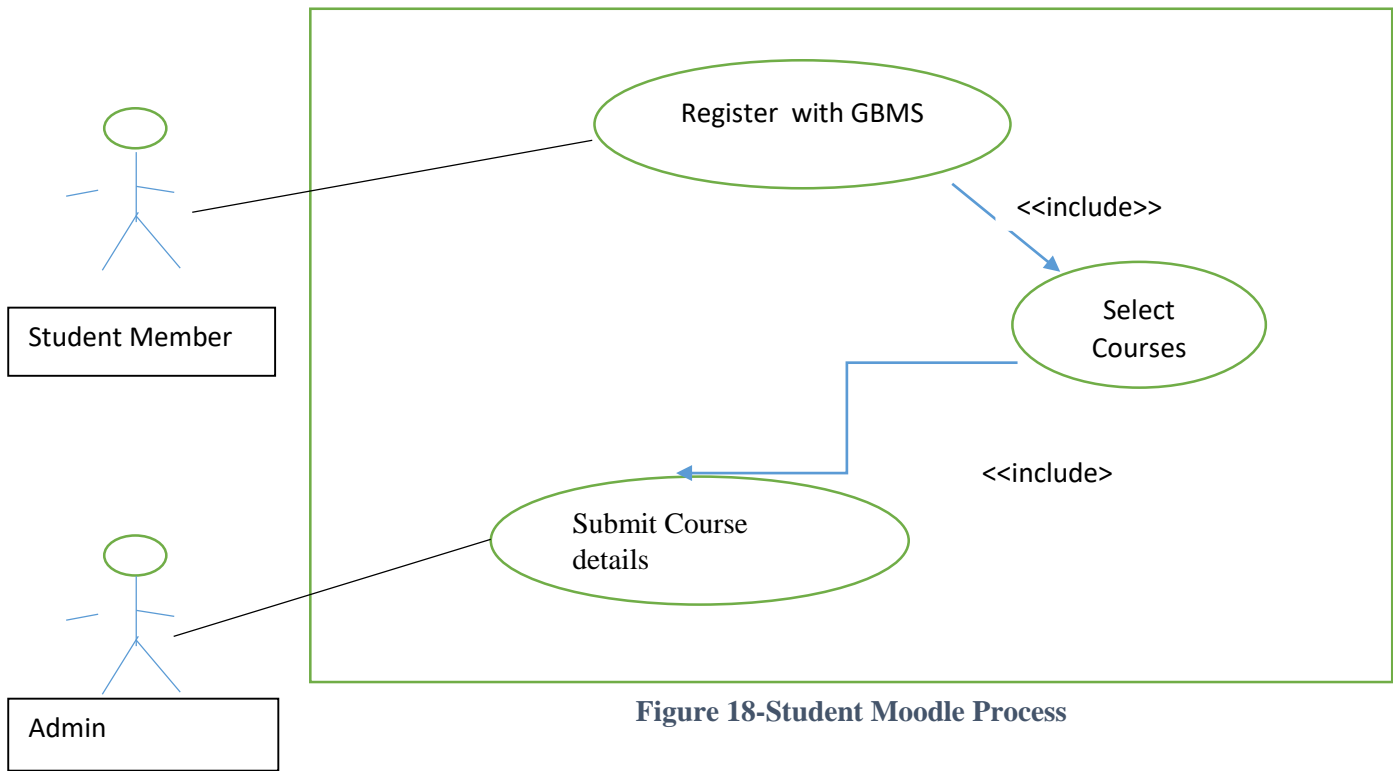
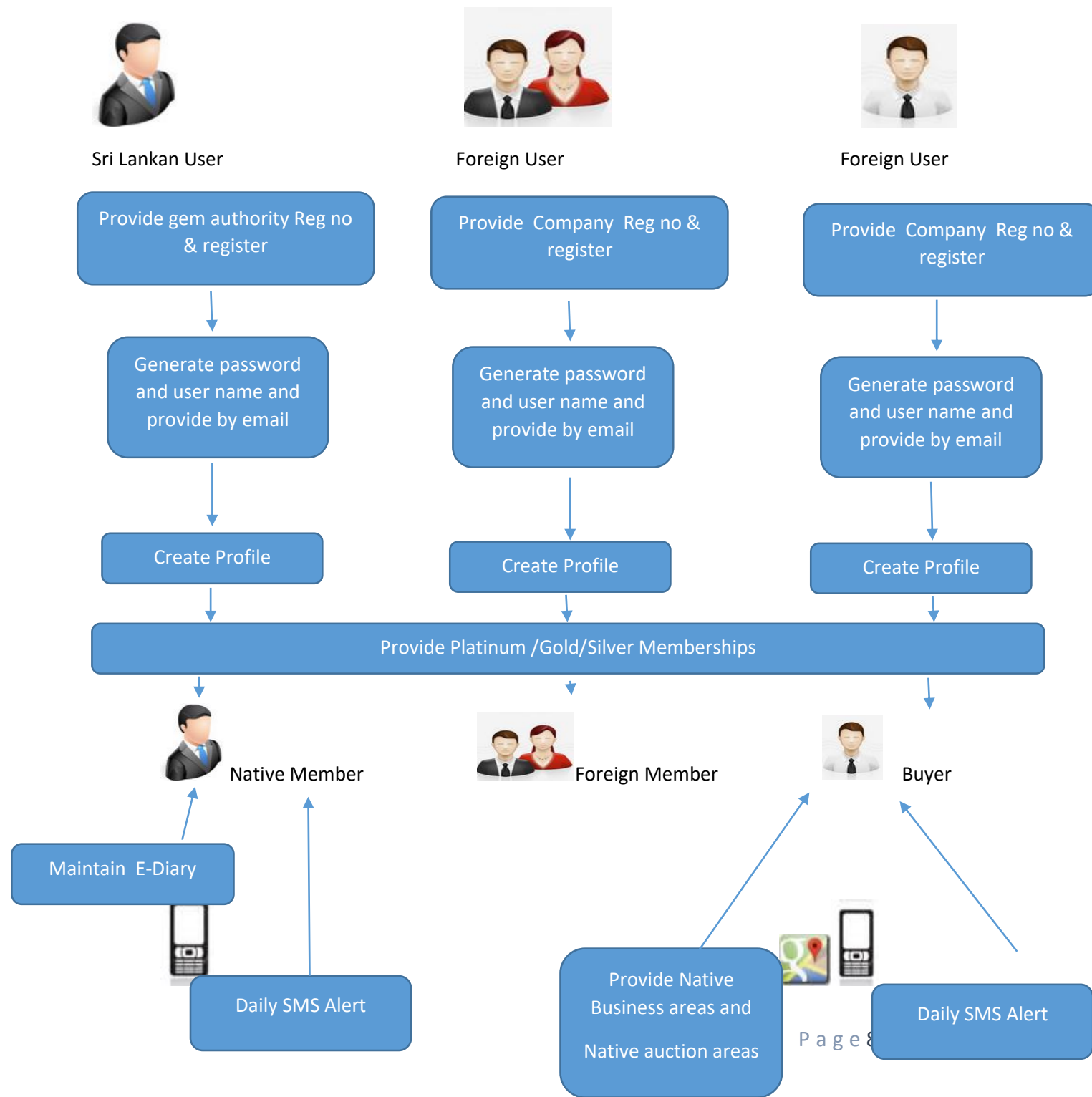


Figure 18-Student Moodle Process

Appendix F : Process Diagrams of main modules

User Registration –Membership-Profile Creation –Basic Daily processes

Figure 12



Online Auction

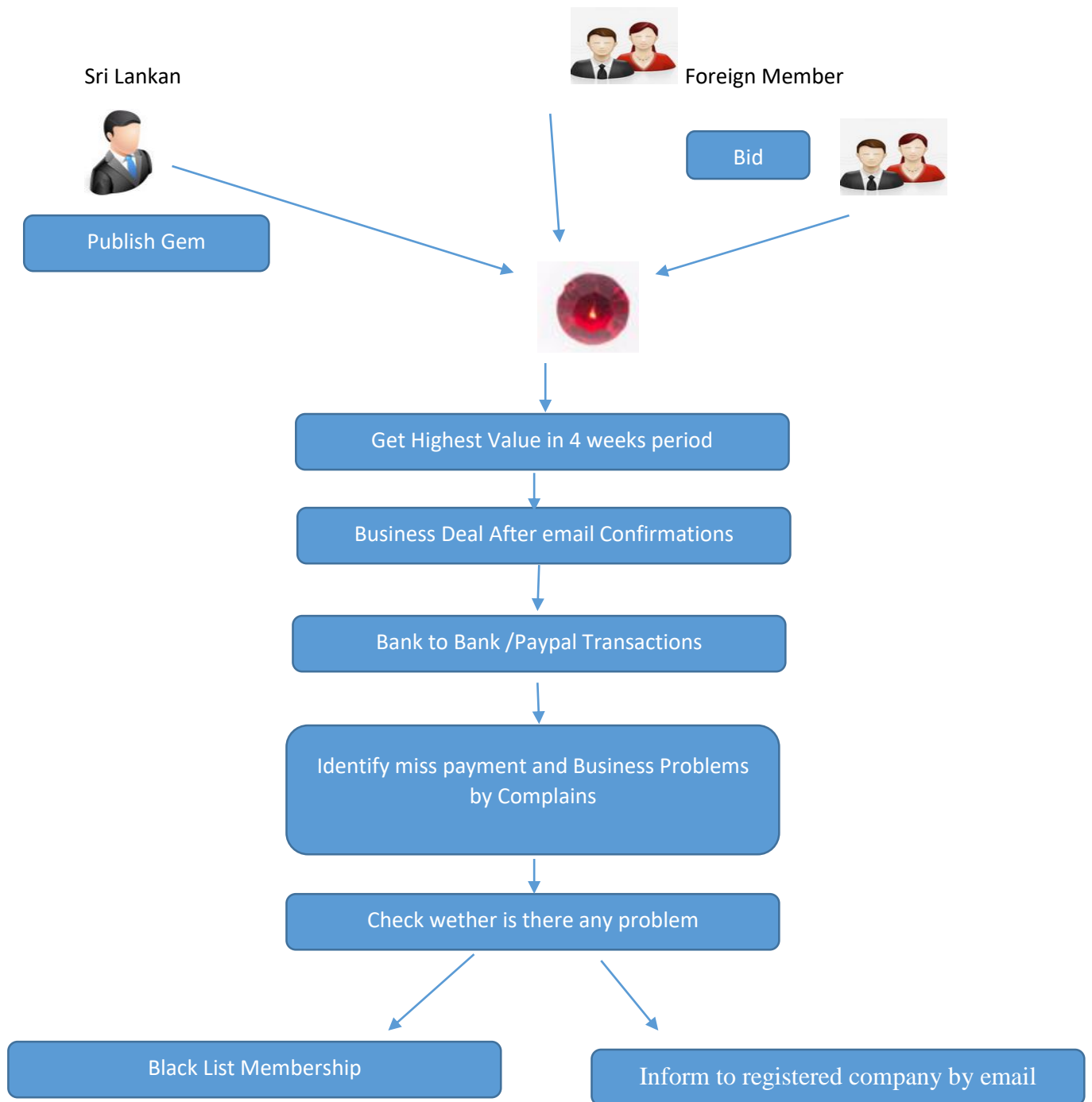
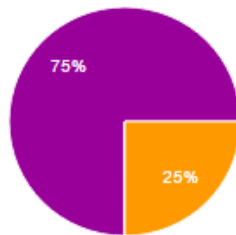


Figure 13

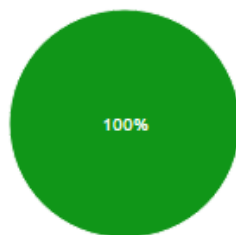
Appendix G Result sheet of online evaluation

(1) .System has proper speed ?



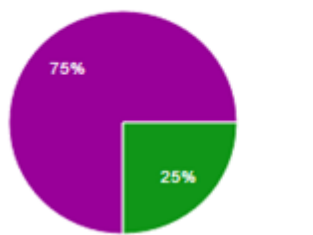
Strongly Disagree	0%
Disagree	0%
Neither Agree nor Disagree	25%
Agree	0%
Strongly Agree	75%

(2) Complete and the understandable about the information



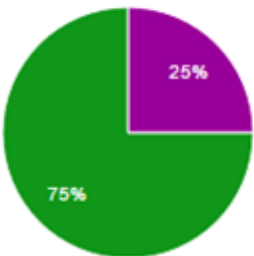
Strongly Disagree	0%
Disagree	0%
Neither Agree nor Disagree	0%
Agree	100%
Strongly Agree	0%

(3).Good look and feel about the application



Strongly Disagree	0%
Disagree	0%
Neither Agree nor Disagree	0%
Agree	25%
Strongly Agree	75%

(4). User friendly interfaces with proper navigations



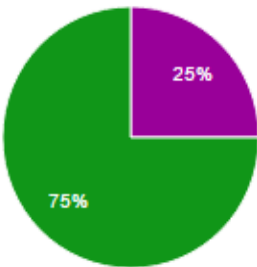
Strongly Disagree	0%
Diagree	0%
Neither Agree nor Disagree	0%
Agree	75%
Strongly Agree	25%

(5).Bug free program that runs properly



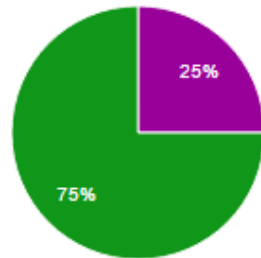
Strongly Disagree	0%
Disagree	0%
Neither Agree or Disagree	0%
Agree	100%
Strongly Agree	0%

(6).Error messages and warning is helps to using certain functions or creating any difficulty



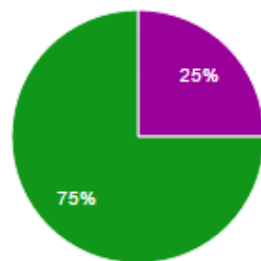
Strongly Disagree	0%
Disagree	0%
Neither Agree or Diagree	0%
Agree	75%
Strongly Agree	25%

(7).Satisfied with the functionality



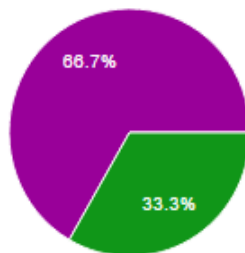
Strongly Disagree	0%
Disagree	0%
Neither Agree or Disagree	0%
Agree	75%
Strongly Agree	25%

(8).System generated reports are help for decision making



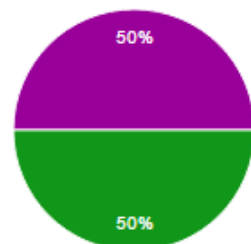
Strongly Disagree	0%
Disagree	0%
Neither Agree or Disagree	0%
Agree	75%
Strongly Agree	25%

(9).System Provide relevant training for student members



Strongly Disagree	0%
Disagree	0%
Neither Agree or Disagree	0%
Agree	33.3%
Strongly Agree	66.7%

(10).Easy to handle & easy to understand the behavior of the system



Strongly Disagree	0%
Disagree	0%
Neither Agree or Disagree	0%
Agree	50%
Strongly Agree	50%

Figure 19-System Evaluation

Appendix G : DataBase Diagram

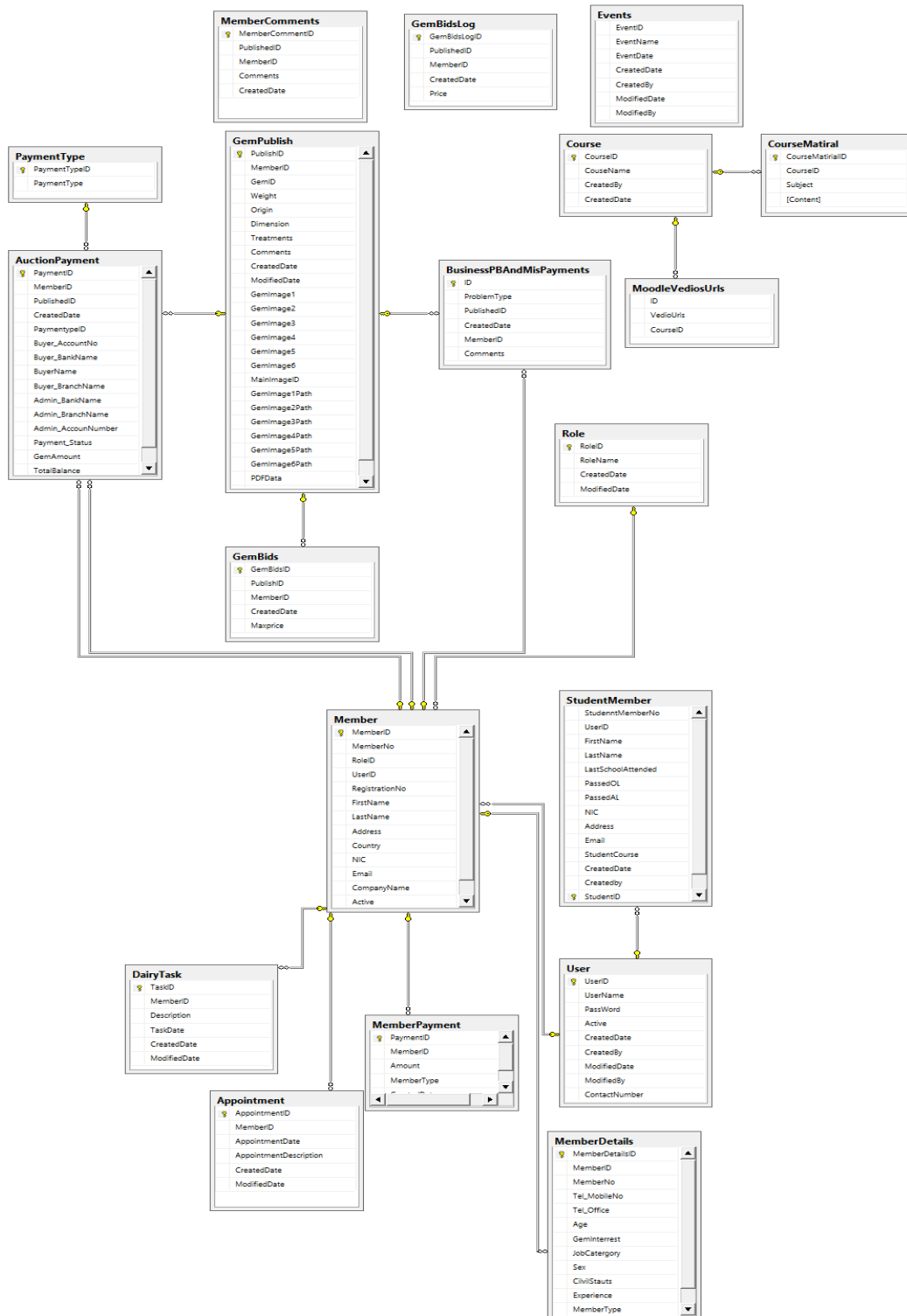


Figure 20-Database diagram

