

E-GOVERNMENT: MUNICIPALITY
SERVICES ONLINE

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**E-GOVERNMENT: MUNICIPALITY
SERVICES ONLINE**

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DEDICATION

I dedicate this thesis to my parents, my two brothers and Renato for their never-ending support in every step of my life

ABSTRACT

Faculty of Economics and Administrative Sciences

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Over the past few years, there has been a tremendous change in our lives, and the reason to this transition is the technology. The way technology is being used, is affecting our day-to-day live changing how we think and how we act. It has had many positive effects as well as negative ones. What should be done is to try our best to benefit from its usage.

Government Services, especially Municipality Services are part of every person, be it young or old.

A document is sometimes needed and the process to get it, is struggling. The process will be driven from an office to another, time will be wasted, fights may arise with the boss for coming back too late (although there might be a very good reason for that), time waiting in long waiting lines may increase, you will be pissed of, and you won't want to hear the words: "Documents, Government, Municipality" ever again.

So why not make this process easy, simple and enjoyable?

For all the reasons mentioned above, it was decided to implement an e-government application focused on the Municipality services, to provide an optimal solution in the most efficient and effective way.

MSO is a web application, which manages all the document requests from their initial state to their completion and delivery. The system offers to the citizens the possibility to request a document by entering the necessary information. Also the Municipality service team will use the product to generate the required documents and update the information in the program as necessary. The product also will serve

to the staff in the delivery zone to deal with the process of distributing the documents in order to make the process as efficient as possible and to reduce the queues and waiting lines. The system is also a helpful tool for the administrator in managing the staff shifts, which will relate with minimizing the labor costs.

The system may serve also to other Government Structures, but the implementation of that part, if requested, has been let as a future work. For now, the implementation of the system is focused on simple and low priority documents.

Keywords: Technology, e-Government, Municipality, Services online, Documents, Waiting lines, Albania

ABSTRAKT

Fakulteti i Ekonomisë dhe Shkencave Administrative

Udhëheqës: Igli Hakrama

Nëqoftëse hedhim një sy gjatë viteve të kaluara, vëmë re një ndryshim të jashtëzakonshëm në jetët tona dhe arsyeja për këtë tranzicion është teknologjia. Mënyra se si e përdorim teknologjinë po ndikon në jetën tonë të përditshme duke ndryshuar se si ne mendojmë ose sillemi. Ajo ka pasur shumë efekte positive ashtu si edhe negative. Ajo çfarë ne duhet të bëjmë është të japim më të mirën tonë që të përfitojmë nga përdorimi i saj.

Shërbimet qeveritare, dhe vecanërisht shërbimet e Bashkise janë pjesë e cdo njeriu, qoftë i ri apo i vjetër.

Të gjithëve na nevojitet ndonjëherë një dokument dhe procesi për ta marrë atë është mundues dhe i lodhshëm. Gjithmonë të drejtojnë nga një zyrë në tjetrën, koha do të shpenzohet, ti mund të bëhesh pjesë e një debati me shefin tënd për vonesën në punë (pavarësisht se ti mund të kesh një arsye të fortë për këtë gjë), ty do të të duhet të presësh në rradha të gjata pritjeje, do të acarohesh dhe nuk do të duash ti degjosh fjalët “Dokument, Qeveri, Bashki” kurrë më.

Kështu që pse mos ta bëjmë këtë proces të thjeshtë, të lehtë dhe argëtues ?

Për të gjitha arsyet e sipërpërmendura, unë vendosa të implementoj një aplikacion e-Government i fokusuar në shërbimet e bashkisë, për të mundësuar një zgjidhje optimale në mënyrën më eficiente dhe efektive të mundshme.

MSO është një aplikacion web-i, i cili menaxhon të gjitha dokumentet e kërkuara nga statusi i krijimit deri në plotësim dhe dërgim. Sistemi i ofron qytetarëve mundësinë për të aplikuar për një dokument duke vendosur informacionin e nevojshëm. Gjithashtu stafi i shërbimeve të bashkisë do ta përdorë këtë produkt për

të përpunuar dokumentet e kërkuara dhe për të ndryshuar informacionin në program spas nevojës. Produkti gjithashtu do të jetë në shërbim të stafit në zonën e shpërndarjes për tu marrë me procesin e tërheqjes së dokumentave me qëllim efikasitetin më të lartë të mundshëm dhe për të reduktuar rradhët e pritjes. Sistemi gjithashtu i vjen në ndihmë dhe administratorit në menaxhimin e turneve të stafit të shpërndarjes e cila do të lidhet me minimizimin e kostos së fuqisë punëtore.

Sistemi gjithashtu mund t'i shërbejë edhe strukturave të tjera qeveritare, por implementimi i asaj pjese, nëse kërkohet, është lënë si një punë e ardhshme. Për momentin, implementimi i sistemit është fokusuar në dokumenta me prioritet të thjeshta dhe të ulëta.

Fjalët kyçe: Teknologji, e-Government, Bashkia, Shërbimet Online, Dokument,

Rradhë pritjeje, Shqipëri

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Epoka University or other institutions.

Marsona Bezhani

21 June 2014

Table of Contents

| | |
|---|-------------|
| DEDICATION..... | iii |
| ABSTRACT..... | iv |
| ABSTRAKT | vi |
| ACKNOWLEDGEMENTS..... | viii |
| DECLARATION | ix |
| LIST OF ABBREVIATIONS..... | xii |
| Chapter 1 Introduction..... | 1 |
| Why e-government? | 1 |
| What is MSO?..... | 3 |
| Chapter 2 Analysis of e-Government in Sweden, UK and Albania | 5 |
| Local e-Government in Sweden - Municipality..... | 6 |
| Public services through e-Government in UK..... | 9 |
| E-Government development in Albania | 11 |
| Chapter 3 Queueing Theory..... | 16 |
| Chapter 4 Software Analysis and Design..... | 20 |
| 4.1 System Analysis | 20 |
| 4.2 Functional Requirements..... | 21 |
| 4.2.1 Usability Requirements | 22 |
| 4.2.2 Performance Requirements..... | 23 |
| 4.2.3 Security Requirements..... | 23 |
| 4.2.4 Interface Requirements..... | 23 |
| 4.2.5 Functions..... | 24 |
| 4.3 Non-Functional Requirement..... | 25 |
| 4.3.1 Hardware Requirements..... | 25 |
| 4.3.2 Supportability Requirements..... | 25 |
| 4.3.3 Security Requirements..... | 25 |
| 4.3.4 Availability Requirements | 25 |
| 4.4 System requirements..... | 26 |
| 4.5 UML diagrams..... | 27 |
| 4.5.1 Behavioural Diagrams | 27 |
| 4.5.1.1 Use case diagram | 27 |
| 4.5.1.2 Activity diagrams..... | 29 |
| 4.5.1.3 State diagram..... | 30 |
| 4.5.1.4 Sequence diagram | 32 |
| 4.5.2 Structural Diagrams | 34 |
| 4.5.2.1 Class diagram | 35 |
| 4.5.2.2 Component diagram..... | 36 |
| 4.5.2.3 Deployment diagram..... | 37 |
| Chapter 5 Implementation..... | 38 |
| 5.1 Technologies used | 38 |
| 5.2 Database Structuring | 38 |
| 5.3 Demonstration | 41 |
| Chapter 6 Conclusion and future work..... | 48 |
| References:..... | 50 |
| Appendix A | 53 |

List of figures

Figure 1 The communication channel between citizens and businesses and Public administrators of e-Government..... 6

Figure 2 The development stages of e-Service 13

Figure 3 Basic queueing system 17

Figure 4 Excel queueing theory solution 19

Figure 5 Use case diagram 28

Figure 6 Activity diagram - Administrator 29

Figure 7 State diagram – Administrator 31

Figure 8 Sequence diagram - Administrator 33

Figure 9 Class diagram 35

Figure 10 Component diagram 36

Figure 11 Deployment diagram..... 37

Figure 12 Main Interface 42

Figure 13 Document application interface 43

Figure 14 Login interface 43

Figure 15 Administrator interface 44

Figure 16 Approve documents interface 44

Figure 17 Delivery staff interface 45

Figure 18 Staff Member interface 45

Figure 19 Delivery staff interface 46

Figure 20 Activity diagram - login..... 53

Figure 21 Activity diagram - Customer 54

Figure 22 Activity diagram - Staff Member 55

Figure 23 State diagram - login..... 56

Figure 24 State diagram - Customer..... 57

Figure 25 State diagram - Staff Member 58

Figure 26 State diagram - Administrator 59

Figure 27 Sequence diagram - Login 60

Figure 28 Sequence diagram - Customer 60

Figure 29 Sequence diagram - Staff Member 61

Figure 30 Sequence diagram - Staff Member 62

Figure 31 Sequence diagram - Administrator 63

Figure 32 Sequence diagram - Administrator 64

Figure 33 Collaboration diagram - Administrator 65

Figure 34 Collaboration diagram 65

Figure 35 Data flow diagram 66

Figure 36 Entity relationship diagram 67

Figure 37 Object diagram 68

List of tables

Table 1 G2C and G2B Services..... 14

Table 2 Delivery Table..... 39

Table 3 Members Table 39

Table 4 Upload Table 39

Table 5 Requests Table 40

LIST OF ABBREVIATIONS

| | |
|-------|--|
| MSO | Municipality Services Online |
| JSON | JavaScript Object Notation |
| MySQL | My Structured Query Language |
| OS | Operating System |
| PC | Personal Computer |
| IT | Information Technology |
| UI | User Interface |
| XML | Extensible Mark-up Language |
| HTML | HyperTextMarkup Language |
| PHP | HypertextPre-processor |
| CSS | Cascading Style Sheet |
| | Business-to-consumer (or business-to-customer). |
| B2C | Activities of businesses serving end consumers with products and/or services. |
| B2B | Business-to-business. Refers to commerce transactions between businesses. |
| G2C | Government-to-citizen. The communication link between a government and private individuals or residents. |
| G2B | Government-to-business. Online non-commercial interaction |

| | |
|--------------------------|--|
| | between local and central government and the commercial business sector. |
| Servers | Number of employers at delivery zone |
| λ | Mean arrival rate (expected number of arrivals per unit time) |
| μ | Mean service rate for overall system (expected number of customers completing service per unit time) |
| Poisson arrivals | Distribution is discrete, the number of arrivals must be an integer |
| Exponential service time | Exponential distribution with parameter $\mu = 1/\lambda$ |

Chapter 1

Introduction

Working with people requires double attention and hard work. It is important that people understand each other well enough in order to increase productivity and satisfaction from both sides: the side which offers the service and the side which benefits from it. That is why it is important to try and find how to transform difficult and costly interaction into simple and economical ones. With the new everyday changing innovations, people need transparency and integrated boundaries. They need to know what is happening around them and how to benefit from all these commodities.

Documents are a struggle for almost everybody. Imagine how much a person would have to go through for a simple document. He/she will face the long queues to apply and you may not be well informed of what information you need to submit. He/she may be driven from one office to another one, other necessary documentation may be expensive thus all these steps will waste time, energy and also increase costs. E-government uses the wide area of information and communications technologies and especially the Internet to radically transform how government or other public institutions deliver services to citizens.[1] The main objective of the usage of e-government is to improve service to people. An improved service delivery and simultaneously an improved social welfare will produce a social benefit to people and companies.

Why e-government?

A better question would be, why not? There must be at least something beneficial about it since its usage is increasing over the past years and continues to grow. Online services mostly remain cost effective and provide a good benefit to cost ratio.

The implementation of e-government applications in different countries has shown a huge improvement in different aspects.[2] The service through these systems is obtained much faster and the process is much easier. Due to the decrease of the turnaround times and sometimes-even decrease of the direct costs for that particular service, the quality of the service has increased too. As I said, people benefit as much as businesses or companies, which use this product. Advanced technology and unlimited access make it easier finding needed information, help in better decision-making, and improve service quality for the client. Convenience is increased and time wasted in long queues has decreased. Online services also allow higher accessibility and availability by providing online service 24/7.

Also many companies, be they private or public, have seen the opportunities that e-government offers. As an improved service, firms consider also the declining of the cost of the delivery channels and the efficiency of the resources. One of the biggest challenges of companies nowadays is to decrease cost as much as possible to maximize profit.

Furthermore, the business process is improved and other costs such as: advertising, printing materials (helping also in an increased production of oxygen due to less trees being cut), labor costs become lower and lower.[3] Considering the case for the public or state institutions, e-government increases their relevance in the eyes of the citizens and businesses.

The reason I have chosen to develop this product is to give people in Albania the possibility to benefit from such service. E-government software is not widely spread in Albania, so there are so many places for improvement.

What is MSO?

Municipality Service Online, shortly MSO is an e-government application. The scope of implementing this model is to enhance the access to and delivery of government services to benefit citizens, business partners and employees and especially focusing on the Municipality services. The product offers to the citizens the possibility to request a document needed by entering the necessary information. Also the municipality service team will use the product to generate the required documents and update the information in the program as necessary. The product also will serve to the staff in the delivery zone to deal with the process of distributing the documents in order to make the process as efficient as possible and to reduce the queues and waiting lines. The model will try to simplify the relationship between B2C, B2B, G2C and G2B activities.

The system will serve to the customers and the staff of the Municipality to complete requests. The system allows the user to use the program to apply for a document request and can check the documents that the system supports. The supported documents checking will be simple, providing the user with the appropriate information. At the moment the customer will apply for a document request, different requirements are requested like: basic contact information, when the customer is available to come and withdraw it and also the time required to process that document is displayed. If the application form will be filled in correctly the request will be created in the database of the system, it will be assigned to it a unique ID and the ID will be displayed to the customer. If the application form is not filled in correctly, a message will be displayed to the customer to fill in the form correctly. At the moment the request is created it will be assigned to the appropriate department and active member according to FIFO approach, to start working on the

first request handled. The member of the department has the right to edit and update request. The member can attach to the request the document file or in case of multi-process documentation, show its location in the database where all the documents lie. When the member processes a request and the document is ready to be delivered to the user, the member updates the status of the process and the requested document is sent to the administrator for approve. If the administrator approves the document, a notification SMS or email is sent to the customer to notify him / her that the document is ready and when and where to withdraw it. When the customer comes and withdraws the document, the delivery staff processed the delivery and the request status is updated and the request is removed from the request database and sent in the archive. If the administrator does not approve the document, the request is send again to the staff member associated with respective notes about the reason of not approving it. Also the administrator is responsible for managing the privileges of the members, in which department they will work and can add a new member. The administrator has full access in approving, deleting or archiving document requests and also can check the shifts of the employees in the delivery zone, which are generated by the system using microeconomic and product management concepts.

Chapter 2

Analysis of e-Government in Sweden, UK and Albania

It is clear as crystal that nowadays the usage of web application and online services has an upward slope. The number of people using IT and Internet has increased, and with that has increased also the need and desire to simplify whatever is possible, in order to make life easier. E-Government gives people a possibility to use all these unlimited resources to do that. As mentioned above the benefits of using such services are infinite, such as: greater choice, information accessibility, higher convenience, faster delivery and improved efficiency. But in order for people to use and benefit from this opportunity, they need trust and they need to be 100% sure that their time or physical and mental investment in using these systems will be worth it.[4]

Along with all the benefits that e-Government offers there are also some challenges and obstacles that should be taken care for a successful system. These challenges and obstacles are viewed from different perspectives: Technical, which includes one of the most important steps-IT infrastructure construction, promotion of security mechanism, integrity and secure mechanism. Another main challenge of e-Services and especially e-Government comes from the fact that these systems include human psychological factor. So any mistake done related with the people can cause the failure of the system. Such cultural obstacles may include: lacked confidence from user, privacy issues, authority and responsibility issues etc. And also one of the challenges that every business or company faces: Political and Legal impacts. There are many political and legal issues that should be taken in consideration such as: policy propagation, service providing, standardization of the service, network crime, lack of IT law etc. So to avoid fatal errors that might cause big problems, and to compare our plan with

a living plan, I am going to analyse the implementation of such service in Sweden, especially focused on Municipality Services.

Local e-Government in Sweden - Municipality

In 2009, in Sweden a “Special Commission on e-Government” was established with the goal to promote the development and use of e-Government in the public sector. The main goal of this commission was to obtain a simple, open, accessible, effective and secure e-Government.[5]

E-Government takes advantage of ICT in combination with organizational changes and new competencies. In Sweden more and more e-Government applications are being implemented in Swedish municipalities and other public institutions and the possibilities to learn from such experiences has increased. IT has been a very helpful tool by mediating communication between different units in different geographical locations.

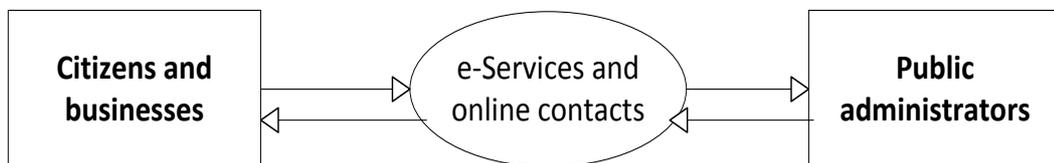


Figure 1 The communication channel between citizens and businesses and Public administrators of e-Government

According to Grant and Chau there are three core activities of e-Government:[6]

High quality, seamless and integrated public services

Effective relationship management

Support economic and social development goals of the society and from local until international levels.

Along with the benefits mentioned above which have been also a result of such systems implementation in Sweden, e-Government has faced some issues too. There has been a socioeconomic gap between the group of people who have access to computers, IT and Internet and those who do not. Also there is a difference between those who have access to quality, digital content and technical skills and those who don't. Internet also favours individuals with greater access to financial resources and education.

Sweden has based its e-Government application in three levels: local, regional and national, but municipalities supply mainly most of citizen-oriented services, since the services offered by the municipality are part of every day live services to customers and also because municipal administration in Sweden covers 70% of public administration. [7]

During the implementation and development of the e-Government application focused in Municipality services, there have been some obstacles, which we should consider.

Financing. It is important to have a well-planned budget for every pop up event that might occur for a successful e-Government application implementation. Also municipality must be able to perform business development and should take care if there is any IT system environment. These obstacles should be taken care before their solving becomes costly and time consuming.

In order to find out how these systems have affected businesses and citizens, interviews have been held and information is gathered. These statistical analysis will help us find out where to focus, what mistakes to avoid and help us decide if implementing such a system will be a beneficial tool for our society.

Before going and interviewing citizens, initial interviews took place with different categories and policy makers.

After gathering all the information from the interviews, the data was analysed and final results were obtained.

The feedback from citizens and institutions lead to the following conclusions:

With the implementation of e-Government systems, the work for the back office public administrator has changed. Now they can handle more work since they will not be disturbed while dealing with important tasks for simple issues, since now the latter are being handled by e-Government. The system also offers easier contact for citizens to contact the municipality.

Adapting this system to municipality has lead to an increased number of issuer from citizens for the public administrators to handle, but this fact may also lead in a budget problem related with higher labor demand, thus increasing the labor cost.

Always new technology tends to increase the usage of computers, digital tools and artificial intelligence in order to decrease costs, by decreasing also the labor factor and injecting fear of losing work tasks or jobs to the back office public administrators, but fortunately no administrator has been dismissed because of the implementation of e-Government. Another benefit that e-Government has offered is passing from focusing on internal process administration into focusing on the needs of citizens, working towards a more citizen-centred perspective. However an obstacle during the usage of such e-Service system was the anchoring of the implementation and reorganization for the e-Government. Also the demands for integrity, security and competence are not so easy to deal with in practice as they are in theory.

Still e-Government for Municipality has a lot of benefits. Citizens are very pleased having full accessibility to the municipal services 24/7, which has increased thanks to e-Government. People enjoy very much the designing of simple tasks or choices, especially the elderly. When there are a lot of choices, people get confused and become uncomfortable, while this system offers a simple and easy experience to everybody. IT system gives us the possibility to register all the issues of the citizens in a database via digital registration, showing the citizen centred aspect of the program and also enabling the production of statistical data used to support other e-Services. The implementation of e-Government makes it obvious and easier for us to understand what citizens need and helps us localising the public service.

After the analysis of the study, the results show that the implementation and development of e-Government and especially in the case of municipality produce efficient public services, introducing market mechanisms and customer orientation approach.

Public services through e-Government in UK

The implementation of e-Government programs in UK dates back over a decade period that coincides with the shift of political power to the Welsh and Northern Irish Assemblies and the Scottish Parliament. Considering its early adoption of e-Government and complex political aspect, this system has evolved with many corrections arriving at a stage of developing e-Services, e-Government and its information society as a whole. The raising of a professional IT staff and government and improving the management of ICT product, have allocated the need for excessive waste reduction within the public sector. [8]

The implementation of e-Government systems in the public sector has provided different benefits also in the case of UK. As also mentioned in our example of

Sweden, the access of information and advice online is one of the most important benefits. There is a wide range of information, which can now be accessed easier and quicker. The e-Service gives the possibility to people to interact virtually with departments of public sector to receive the service that they need. They can ask for and receive a service totally on-line avoiding the need to go through a long process. And also there is a huge benefit for the government and public institutions as there is a lot of space for improvements in the operational efficiency of different departments. The usage of electronic and digital systems has decreased the need for labor and thus decreased the labor cost for the institution. But in order to achieve and maintain these benefits it is important to manage some risks that may arise. The case of e-Government in UK gives us some advice on what to manage carefully during the implementation of e-Services. Take care of citizen take up: these risks include the risk that groups of people might be excluded from benefits of the system, for example: people who have no access on computers and Internet cannot access on-line services and so take up is low. We should also consider the supply side barriers, the risk that departments may not provide wanted or needed services or risks that we may fail to deliver the intended service to all necessary requirements. It is important to do a well-prepared research to get to know better all the needs that people have. Therefore departments must have a good understanding of the needs and requirements that users have for services, especially since there are different needs.

New innovations always bring doubt. People are often suspicious of IT due to the lack of familiarity with on-line services or privacy issues, since they do not know how their information might be used.

In order for all people to benefit and take advantage of such service, institutions or departments should take in consideration that citizens will require the ability and confidence to use IT when designing the system. The program should tend to be as simple and easy as possible.

If we want the system to be used by almost all citizens, we should also consider some incentives to encourage them to access services on-line. Examples used in UK have been: lower fees and charges for services, reduced waiting times and shorter waiting lines, a more personalized service and free access to information.

However, the development of IT projects in the past in UK has encountered technological and managerial problems which have increased costs of the project or even worse resulted in total failure of the system. So it is important to have a well thought and designed plan in order to achieve the benefits that e-Government offers.

Despite the number of risks that should be taken care of, the use of e-Government in UK sees the added value of knowledge, innovation and services as a crucial step in the development of an intelligent economy and development of services B2C, B2B, G2C and G2B.

E-Government development in Albania

Albania is a middle-income country and has undergone over some dramatic shifts over the last decade. Before the global financial crisis, Albania was one of the fastest growing economies in Europe. Except the economic aspect, there has been also a fast growing usage of the Internet and technology.[9] More than half of the population in Albania uses the Internet and this number is growing day to day. In developing countries such as Albania, the development of digital services is a crucial factor in achieving an advanced development. Even though the development of ICT and e-Government is not in the same level as other countries of the region compared with

Albania, the number of e-Government services has increased. In the developing countries, according to Richard Heeks, most ICT programs such as e-Government fail with 35% being classified as total failures and 50% partial failures. This high possibility of failure comes from the fact that there is a huge gap between the current reality conditions such as physical, cultural, economic and other and the design of ICT programs. As this gap increases, also the probability of failure increases.

Still, in Albania the implementation of e-Government services and public administration require a great streamlining of data gathering, exchange and integration.[10] Even though Albania is in its initial steps of entering the area of e-Services systems, there have been made important steps to improve the communication on-line of the relationships G2C and G2B.

Governments tend to use the potential of e-Services in order to achieve the following goals:

- Disseminate information
- Improve service delivery
- Increase transparency
- Decrease corruption
- Widen democratic participation

Most e-Government applications start with a web presence and then emigrate into a platform for transactions of government services. The figure below shows this evolution of the process of e-Government in Albania, moving from a passive model towards direct services delivered on-line.

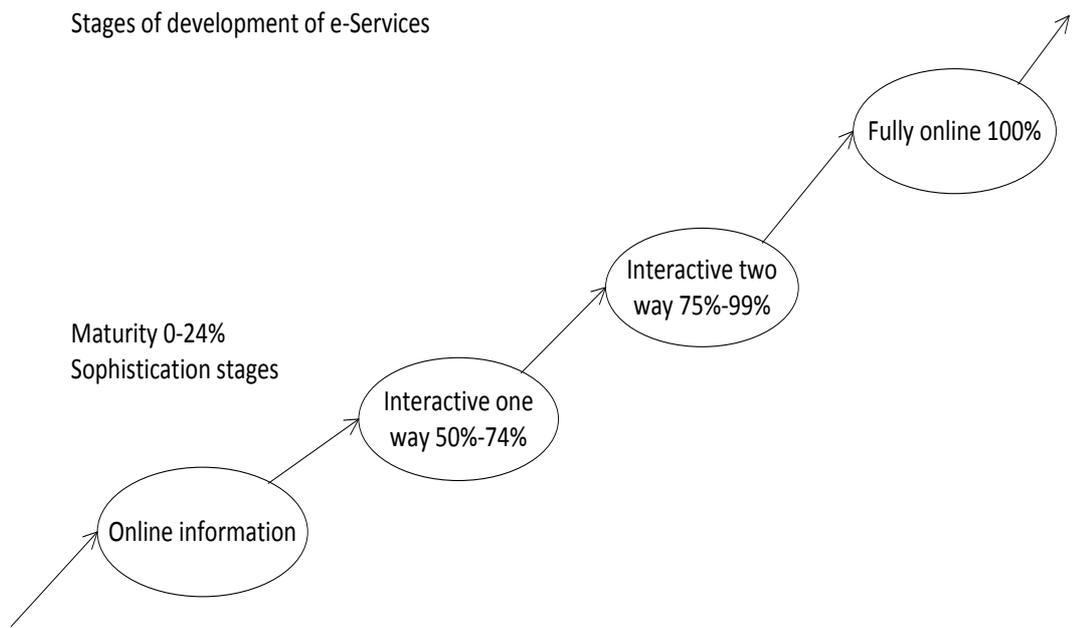


Figure 2 The development stages of e-Service

There are also existing services offered by e-Government applications separated in two basic types of services: G2C and G2B.

| G2C | G2B |
|---|------------------------|
| Taxes on income | Staff social insurance |
| Job searches and applications | Taxes for corporations |
| Social security | VAT |
| Personal documents | e-Business |
| Car registration | Statistical data |
| Construction license application | Custom declaration |
| Public libraries | Public procurement |
| e-Education | e-Trade |
| e-Health | Public finance |
| e-Culture | |

Table 1 G2C and G2B Services

All these services are under the e-Government portal of Albania, e-Albania.al.[11] This portal enables citizen-oriented, transparent, accountable, effective, efficient and empowering governance. The reason to put all e-Government services under this portal is to simplify the process and turn it to one-stop online access point to all government services with interactive and transactional e-Services. As we have seen in the above-mentioned cases of e-Government in Sweden and UK, also in Albania the main aim is integrated delivery of all government and public administration services to the society. This system allows users to get information on the requirements needed to obtain a particular service, including also information related to fees and charges, location of the offices and contact information. [12]

The development of such systems in Albania is a non-stopping process, which will continue, and aims to enrich the content and on-line services offered to citizens and businesses.

As a conclusion the analysis of the e-Government and e-Services in Sweden, UK and their development in Albania help us to understand the overall process of implementing, developing and maintaining a successful e-Government system.

MSO is designed by taking into account all the risks that may arise and obstacles or challenges that need to be taken care, but always focusing on the benefits that the users expect to get from using this system.

Chapter 3

Queueing Theory

Queues are a part of everyday life. We all wait in queues (waiting lines) to buy a movie ticket, make a bank deposit, pay for groceries, mail a package etc. We have become accustomed to considerable amounts of waiting, but still unusually long waits annoy us, but these long queues or waiting lines are not just a part of personal annoyance. Studies have shown that the amount of time that a nation's population wastes by waiting in queues is a major factor in both the quality of life there and the efficiency of the nation's economy. A solution to this problem has been generated using the Queueing theory.[13]

Queueing theory is the study in waiting in all various guises. It uses queueing models to represent the various types of queueing models. Formulas for each model indicate how the corresponding queueing system should perform, including the average amount of waiting that will occur, cost minimization that can be done under a variety of circumstances.[14] Queueing theory is used to develop more efficient queueing systems that reduce customer wait times and increase the number of customers that can be served.

In the MSO system, the queueing theory has been implemented with the purpose of eliminating waiting lines as much as possible and more important determining the number of employees needed in the delivery zone as to minimize as much costs as possible and to increase efficiency of the overall system.[15] Given the intensity of competition today, a customer waiting too long in line is potentially a lost customer. Understanding the nature of lines or "queues" and learning how to manage them is one of the most important areas in operations management.

The basic process assumed by most queueing model is the following:

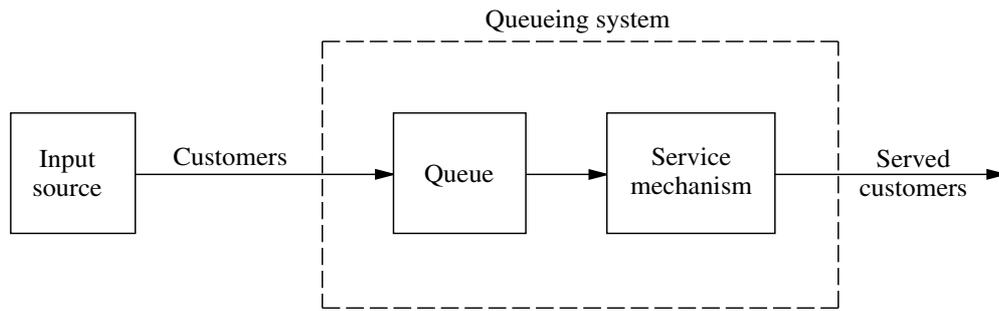


Figure 3 Basic queueing system

Customers are generated over time by an input source, enter the queueing system and join the queue. The required service is performed for the customer by the service mechanism, after which the customer leaves the queueing system, hopefully happy.

In terms of the analysis of queuing situations the types of questions in which we are interested are typically concerned with measures of system performance and might include:[16]

1. How long does a customer expect to wait in the queue before they are served, and how long will they have to wait before the service is complete?
2. What is the probability of a customer having to wait longer than a given time interval before they are served?
3. What is the probability that the system is fully used or not used at all?
4. What is the average length of the queue?
5. What is the probability that the queue will exceed a certain length?
6. What is the expected utilisation of the server and the expected time period during which he will be fully occupied?

Servers in our case represent the delivery staff employers, which obviously cost us money so we need to keep them busy.[17] Also by assigning costs to factors such as customer waiting time, server idle time, balking customers and servers cost we can investigate how to design a system at minimum total cost.

In the MSO system we will implement a finite capacity queue system. A finite capacity queue is a multi-server system with a limit to the length of the waiting line. This model assumes Poisson arrivals, exponential service time, identical servers in parallel, and newly arriving customers who balk when the queue is full. [18]

Such model are labelled as follows:

M/M/m models

First M: exponential distribution of interarrival times;

Second M: exponential distribution of service times;

m: number of servers.

MSO system fortunately provides us with full information about the customers that will come thus our mainly focus remains on the fact on how to distribute the labor at the delivery zone in order to minimize costs as much as possible and at the same time reduce waiting lines to gain a competitive advantage for the company, our case for Municipality and increase efficiency of the system. Given the information that the system provides, we are able to calculate important notations in order to achieve our desired conclusion. We are given ready from the system: μ , λ , the capacity of the queue, cost per server and servers in our disposition. With all these information, the system has been implemented to calculate the probability that system is fully utilised, the probability that no task is assigned to the system, utilization of the server, balking, average number of persons waiting in the queue, average waiting time and after having all these information collected, we calculate the costs for each combination of servers possible and we provide to the administrator with the information which minimizes the cost and reduces the waiting lines as much as possible.[19]

The problem solution can also be solved using Excel like in the picture below but MSO makes it easier for the user by giving direct information reducing the need for hand-made calculations:

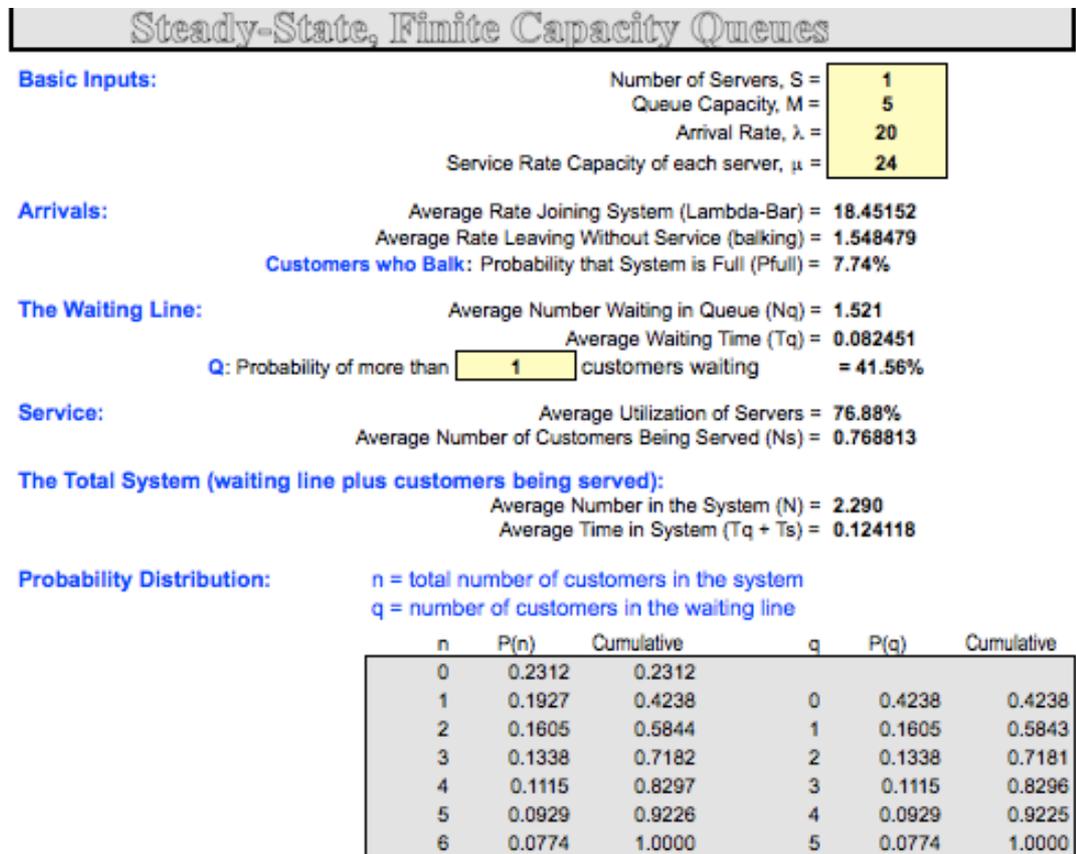


Figure 4 Excel queueing theory solution

Considering all the benefits that queueing theory provides, I decided to implement it in the production of my product.

Queueing systems are prevalent throughout society and their adequacy can have an important effect on the quality of life and productivity.[20]

Chapter 4

Software Analysis and Design

4.1 System Analysis

The MSO system will serve to the customers and the staff of the Municipality to complete requests.

The system allows the user to use the program to check the documents that the service provides and to apply for a document request. At the moment the customer will apply for a document request, according to the type of document different requirements are requested, like: basic contact information, when the customer is available to come and withdraw it and also the time required to process that document is displayed.

If the application form will be filled in correctly the request will be created in the database of the system. If the application form is not filled in correctly, a message will be displayed to the customer to fill in the form correctly. At the moment the request is created it will be assigned to the appropriate department and active member according to FIFO approach, to start working on the request.

The member of the department has the right to edit and update request as also search for a request. The member will attach to the request the document file according to each request. When the member processes a request and the document requested is ready to be delivered to the user, the member updates the status of the process and the document is sent to the administrator for confirmation. In case that the administrator approves the document to be in order a notification e-mail is sent to the customer to notify him / her that the document is ready and when and where to withdraw it and the request is passed to the delivery staff.

Otherwise, if the administrator disapproves the document, he will send the request back to the member associated with appropriate notes to be taken in consideration for improvement.

When the customer comes and withdraws the document, the delivery staff is responsible for proper delivery of the requested document. Then the request status is updated and the request is send in the archive from where it can be deleted only by the administrator.

Also the administrator is responsible to manage the privileges of the members, in which department they will work and can add a new member as well as managing the delivery staff.

To protect the data, there will also be a backup server, which will back up the system every 24 hours.[21]

4.2 Functional Requirements

Identifying the functional requirements of our system helps us to describe what a software system should do, what are the inputs necessary to provide an output. This definition helps us to provide enough information for the system.

- Customer functionality
 - Check supported documents
 - Apply for a document request
- Staff member functionality
 - Member login
 - Edit request
 - View all request information
 - Upload document requested
 - Change password

- Administrator functionality
 - Administrator login:
 - The administrator can log in with the username administrator and a password.
 - He has full privileges that allow him to directly access the database
 - Add or remove staff member
 - Update staff member
 - Approve or disapprove requests
 - Delete requests
 - Check the archive
 - Check the shifts of the delivery staff
- Each request for a document will be addressed a unique ID once the request has been sent.
- For each request processed and terminated, the status of the request will be updated and when the document requested is approved the client will be notified with an email when and where to withdraw the document required.
- The MSO will be a web application, which can be accessed in the persons personal computer or laptop.

4.2.1 Usability Requirements

- The GUI must be friendly and easy understandable for beginners.
- Error messages must be relevant on how to proceed
- Undo should be available for most of actions

4.2.2 Performance Requirements

- The MSO (Municipality Services Online) will respond to the user in the highest speed possible.
- SMS-s should be sent with a latency of no greater than 2 hours from such an activity.

4.2.3 Security Requirements

- The customer cannot access the database
- The staff members and delivery staff will log in to the system if a matching pair of username and password is submitted.
- In case the member or delivery staff forgets his/her password, the administrator provides a solution.

4.2.4 Interface Requirements

- When a customer has accessed the system or a staff member is logged in to the system, the corresponding interfaces will be provided.

4.2.5 Functions

The main functions of MSO web application are:

| | |
|-----------------------|--|
| Log in | Log the user into the system |
| Log out | Log the user out of the system |
| Edit Request | Edit submitted requests |
| Upload document | Upload document requested |
| Download document | Download document requested |
| Search | Search for a specific request |
| Approve request | Approve the document requested |
| Notes | Send notes for improvement to staff member |
| Send email | Send an email to a user |
| Delete request | Delete requests from the archive |
| Archive | View all requests which have been completed successfully |
| Deliver request | Complete the delivery process of a requested document |
| Add member | Create a staff member |
| Delete member | Delete an existing staff member |
| Update member | Edit staff member's information |
| Delivery staff shifts | View the shifts of the delivery staff |

4.3 Non-Functional Requirement

Non-functional requirements place constraints on how the system will perform its activities. These requirements have no effect on how the system operates but they give a clear view of the qualities of the product that are not directly related to functionality.

4.3.1 Hardware Requirements

- A server is necessary to hold the database with the necessary information about document requests that need to be accessed by the staff members to be processed.

4.3.2 Supportability Requirements

- Interfaces and menus will be simple in order to decrease the user's effort to understand it.
- A PDF file will be kept by the administrator holding the description of functions, classes, and tasks.

4.3.3 Security Requirements

- In case the member forgets his/her password, the administrator provides a solution.

4.3.4 Availability Requirements

- The system should handle multiple requests at the same time. o The system should be able to respond to user's request 24/7.
- The availability of MSO is 99.999 %.

4.4 System requirements

- Each request for a document will be addressed a unique ID identifying the document required and adding it in the database of the requests.
- When a new document request is created, it will notify the administrators for the new request to deal with.
- After each request is processed a message is sent to the client notifying him that the document is ready, where to withdraw it and when.
- After the request will be managed and will go through all the steps and the document will be withdrawn, the entry of the document will be removed from the database. [22]

4.5 UML diagrams

4.5.1 Behavioural Diagrams

4.5.1.1 Use case diagram

Use case diagram

In this use case diagram a general view will be displayed on how each actor that interacts with the system is related to the others. There are four important actors of the system: the customer (guest), the staff member, the delivery staff and the administrator. This module allows the customer to apply for a document by creating a document request. The staff member is the one who deals with the requests. The staff member should login to access his/her functionalities; he/she can have access to his/her profile where he/she can change the password. He/she is allowed also to access the request information and upload the document requested. After performing the necessary actions and the job is done the staff member should logout from the system. This module allows the delivery staff to access the documents by downloading the document requested and marking them as done in case of successful delivery. Also he/she can search for a request using the ID for higher efficiency. There is also the administrator who is allowed to manage members by adding, updating or deleting the staff members. Also this module allows the managing of configurations. The administrator has the most privileges, since he/she can access all the requests and download requests, approve requested document or disapprove them, accessing the archive and deleting requests from the archive. Also the administrator can check the delivery shifts where he/she can see the number of people required for the effective and cost minimization delivery at the delivery zone for a specific day that he/she can choose. To access any functionality the

administrator should be logged in the system, and after the job is done he/she can log out.

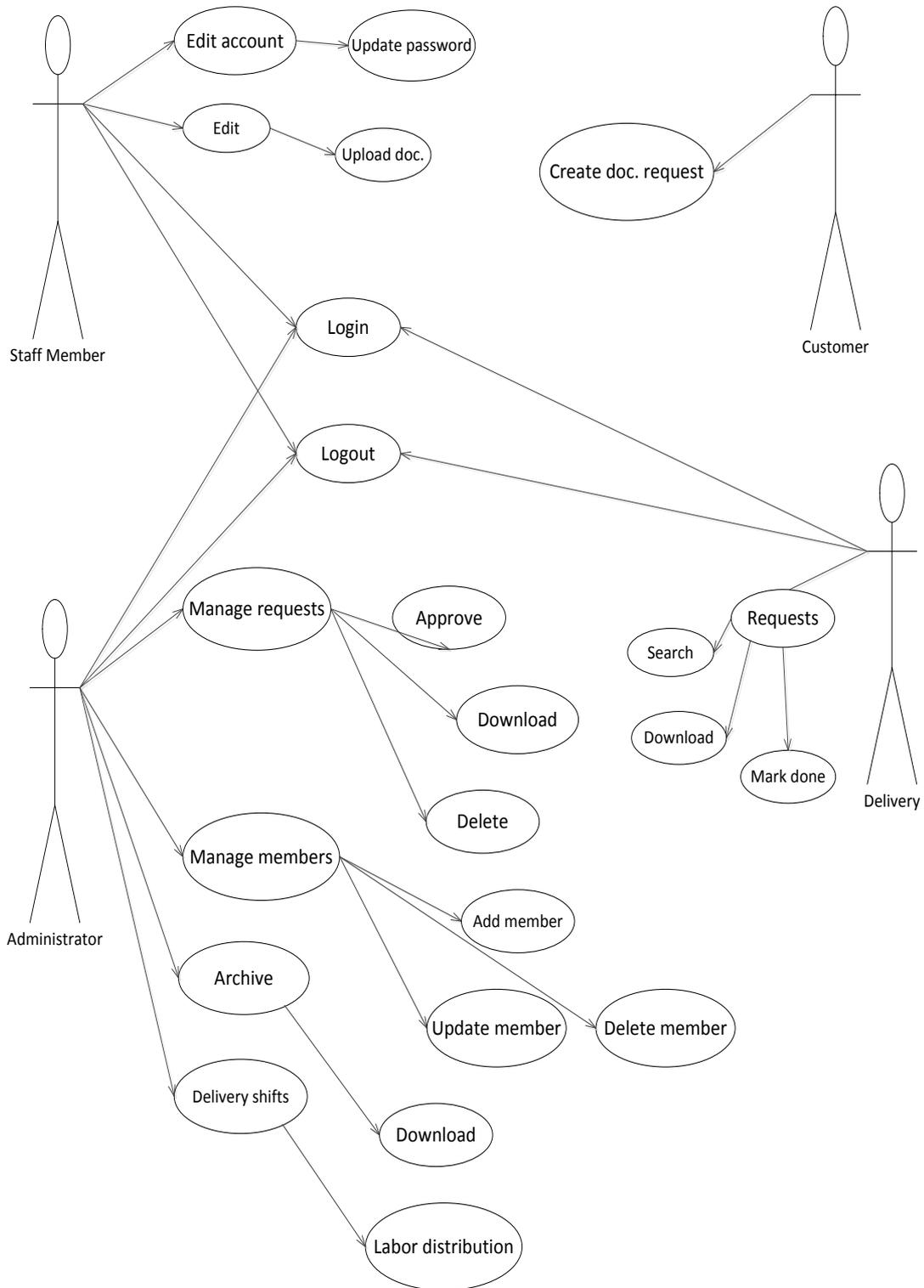


Figure 5 Use case diagram

4.5.1.2 Activity diagrams

Activity diagram (Administrator)

The administrator activity diagram explains the functions of the administrator. The administrator can select between manage members, manage requests, archive and delivery shifts tab. He/she can add, delete or update a member, can approve or disapprove requests, can access the archive and download document requested and also is allowed to access the delivery shifts where he/she can check the number of people required for the effective and cost minimization delivery at the delivery zone for a specific day that he/she can choose. The other activity diagrams are provided in the Appendix A.

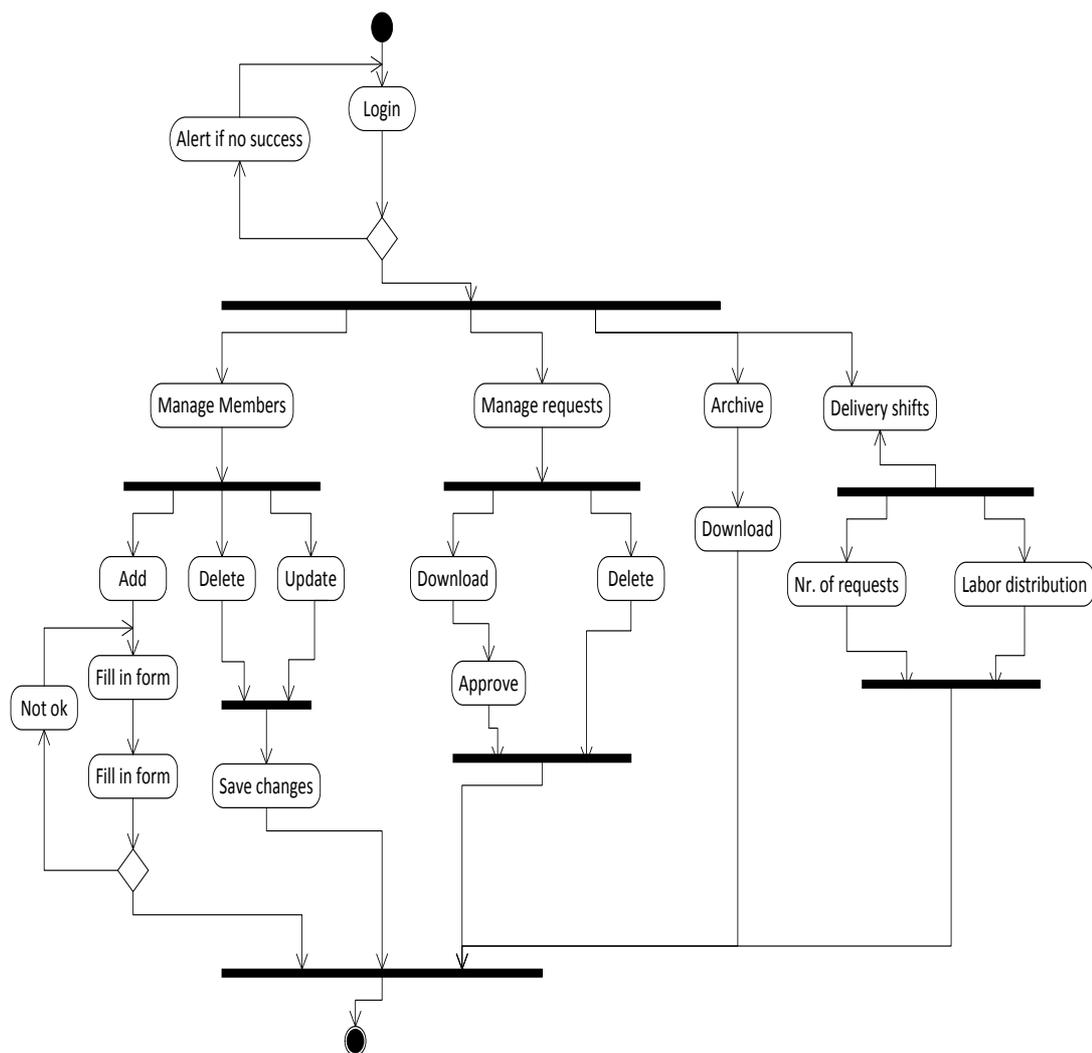


Figure 6 Activity diagram - Administrator

4.5.1.3 State diagram

Next I will provide a state machine diagram, which provides us different states under which the system undergoes while performing the user's functions. This will help us, better understand how the user, be it the customer, the member staff, the delivery staff or the administrator is expected to do with the system.

State diagram (Administrator)

The next state diagrams are related with the advantages that the administrator of MSO has. He can manage the staff members by adding, deleting or updating them, can access the archive and download document requested and also is allowed to access the delivery shifts where he/she can check the number requested for the upcoming seven days and the distribution of the labor of the delivery staff at the delivery zone for the same period. The other diagrams are provided in the Appendix A.

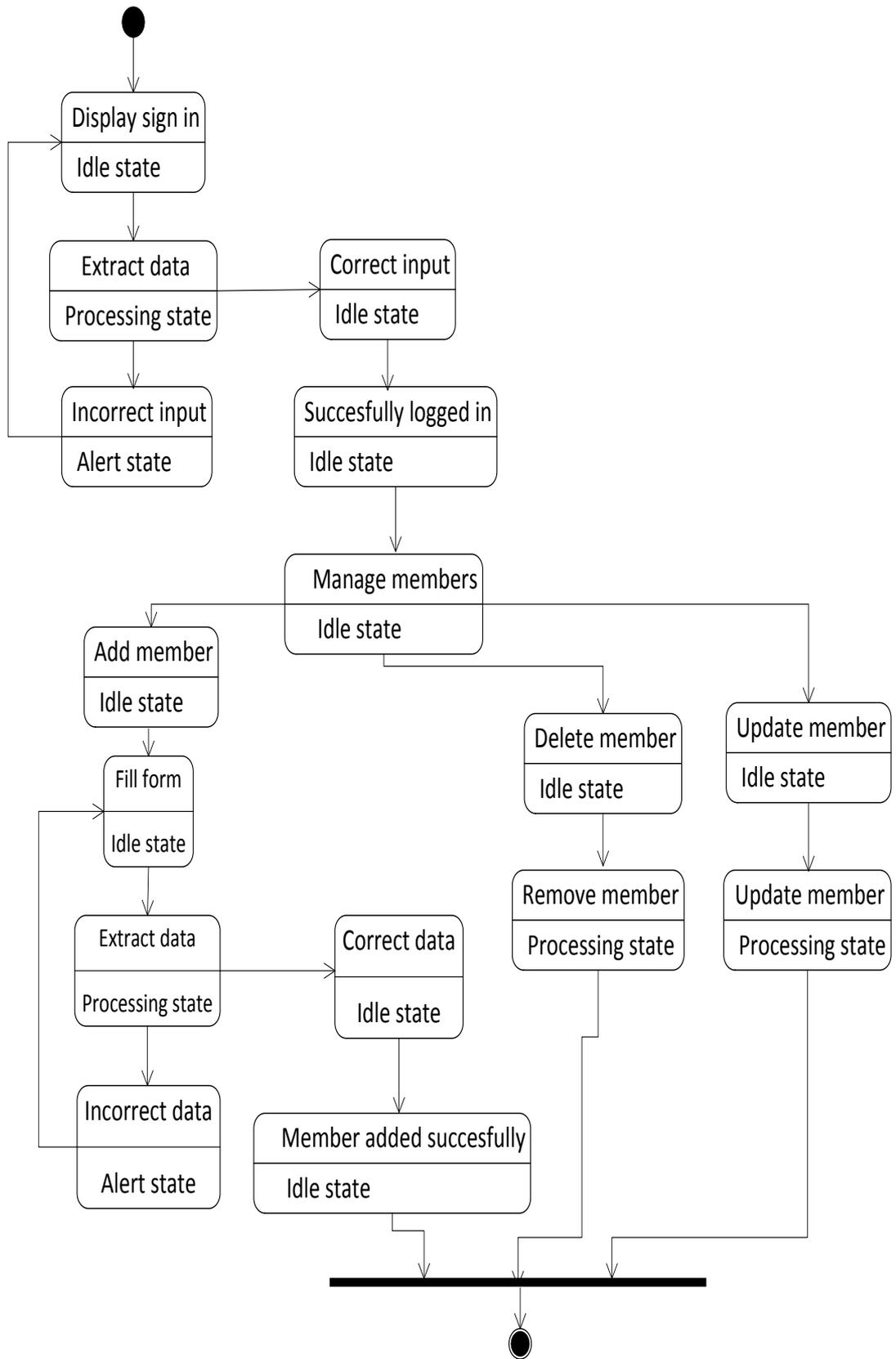


Figure 7 State diagram – Administrator

4.5.1.4 Sequence diagram

Sequence diagrams represent the sequence of actions during the performance of a specific task. A sequence diagrams shows the interactions between objects and methods used to get or return data.

Sequence diagram (Administrator)

The sequence diagram below is related with the advantages that the administrator of MSO has. He can manage the staff members by adding, deleting or updating them, can access the archive and download document requested and also is allowed to access the delivery shifts where he/she can check the number requested for the upcoming seven days and the distribution of the labor of the delivery staff at the delivery zone for the same period. The other sequence diagrams are provided in the Appendix A.

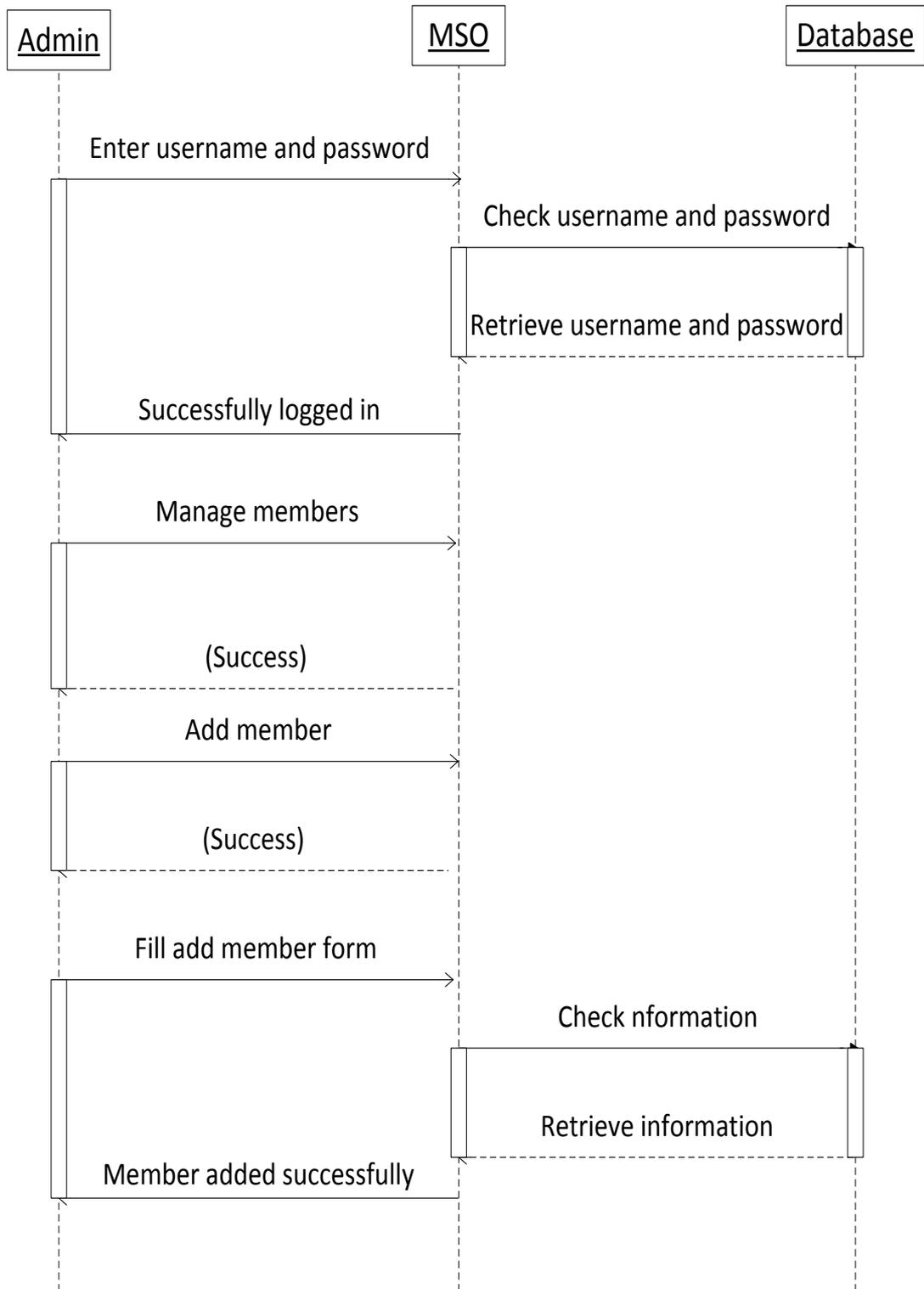


Figure 8 Sequence diagram - Administrator

4.5.2 Structural Diagrams

4.5.2.1 Class diagram

Class diagram is a static structure diagram that describes the structure of a system by showing the attributes, operations (or methods), and the relationships among customer, staff member, administrator and requests. The class diagram gives a general view of system classes are going to interact with one another. In this figure there are the MainInterface class, MainMenu, Login, User class, Administrator, Staff Member, Delivery Staff and many other classes. Together with each class, there are given the attributes and methods that it will have and also the interactions and dependencies that each class has. In the diagram are shown also classes and relations aimed to be created in order to make the system fully functional.

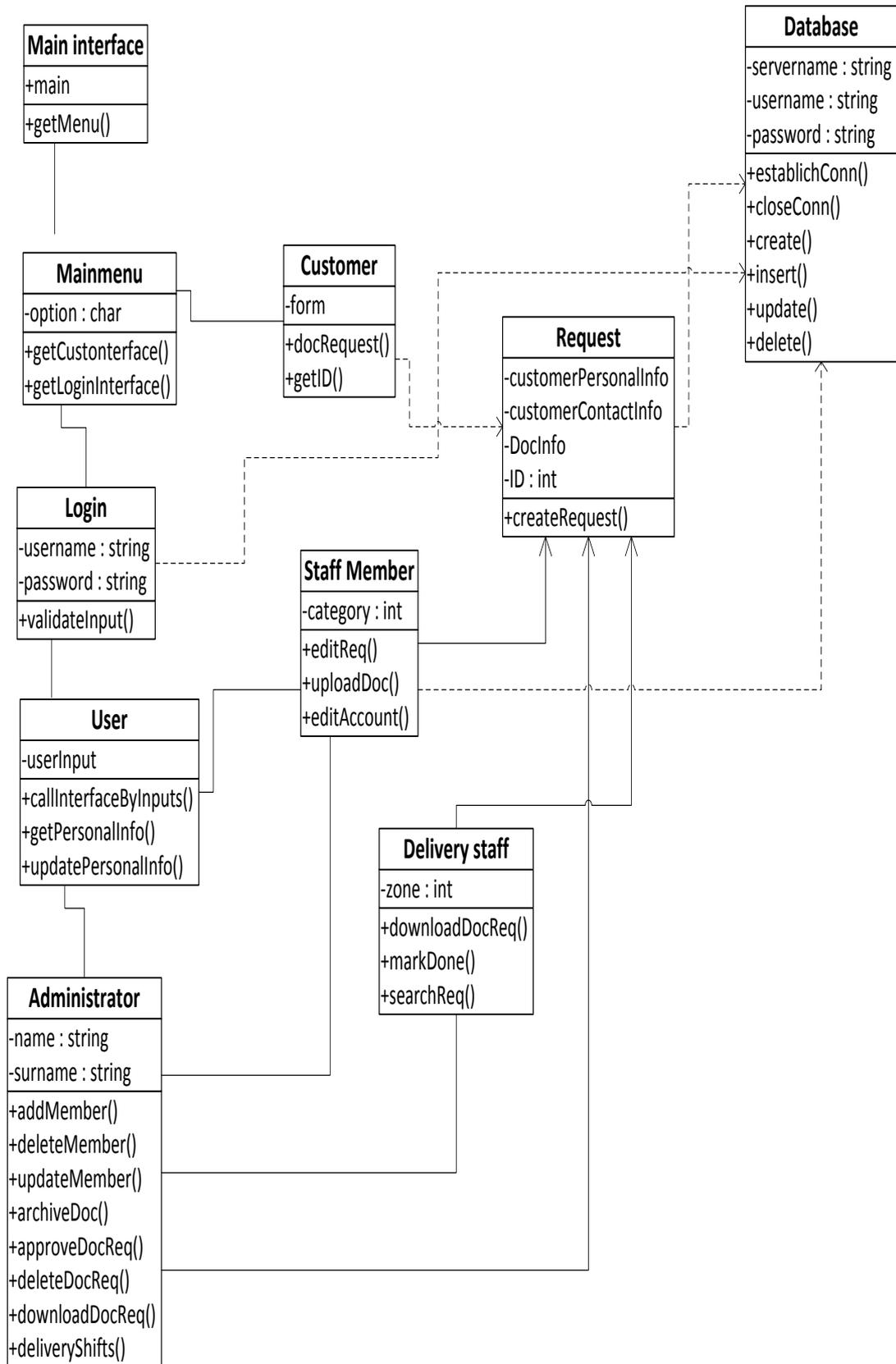


Figure 9 Class diagram

4.5.2.2 Component diagram

The component diagram's main purpose is to show the structural relationships between the components of a system. Component diagrams help us in building high level software systems. In the diagram below are shown all the components needed and also the interfaces on each component necessary to make the application work properly. For example, the system needs two interfaces, the request administration interface, which will contain the requests and document requested menus and members management interface, which will select interfaces according to user's credentials. The other components also contain information for requests and staff members or delivery staff respectively. In the backend there are the interfaces necessary to provide the parsing of information, security and persistence.

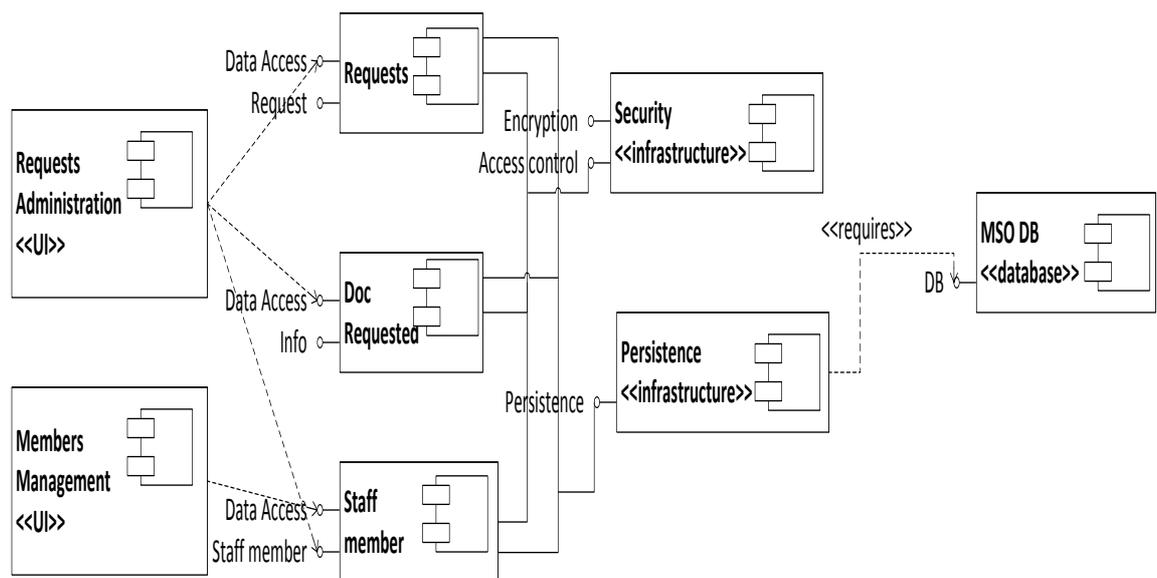


Figure 10 Component diagram

4.5.2.3 Deployment diagram

Deployment diagram gives an overview of the architecture of the system and the way in which the software components are related with each part of the system. Below is shown the deployment diagram of the MSO. It will consist of the user's device, the web server and the database server that holds information about the requests and all users of the system. The user's device will be the device displaying the website, so as it can be deduced, and its interfaces considering the system is a web based application. The system DB will contain the MySQL databases in order to parse the requests, staff member or delivery staff requested information.

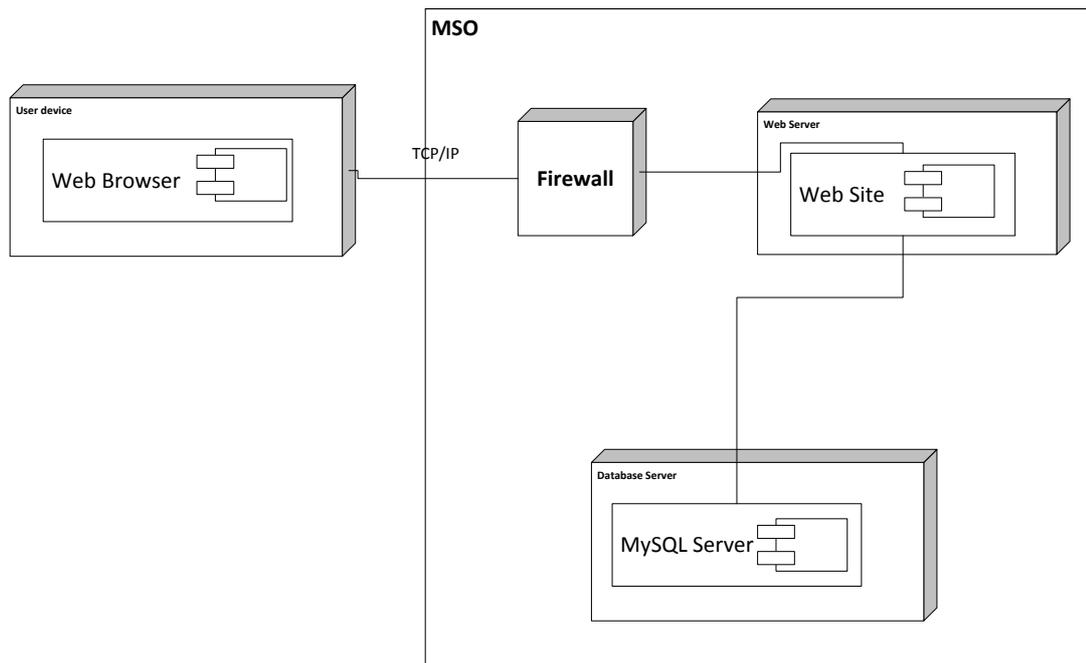


Figure 11 Deployment diagram

Chapter 5

Implementation

5.1 Technologies used

In order to bring up a successful project, proper and adequate technologies should be used, since they play an important role in the development of the system. Municipality Service Online system is web application software. Almost all of the programming work is done using PHP since it provides high flexibility, a lot of functionalities and possibilities to the user. Also PHP results in faster site loading speeds, most tools are open source software and is one of the most used programming languages.

For the implementation of this program I have also used: html, css, javascript, xml and MySQL. In order for the user to access the system, the user should have a computer or laptop and Internet connection. Also for the design of the diagrams UML has been used. Unified Modelling Language (UML) is considered as one of the most well known modelling languages for object-oriented applications. UML is very rich in its diagrams and supports different types of modelling a system. The tool used to create the UML diagrams is Microsoft Visio 2010.[23]

5.2 Database Structuring

Databases are the core of nowadays systems. Data and information, which are the most important part of the application for the end-user, are stored there. Based on this, database structuring is a task, which should be done carefully and in a detailed manner. If not done so, the entire system performance and usability will be greatly affected, resulting in unsatisfied end-users. For the storage of information used by the system, I have created a database, which holds four important tables: requests

(holding information of all requests), upload (holding all documents requested), members (holding information for all staff members) and delivery (holding information about delivery staff).

| Column | Type | Collation | Attributes |
|----------------|-------------|-------------------|------------|
| id | varchar(30) | latin1_swedish_ci | |
| pass | varchar(30) | latin1_swedish_ci | |
| name | varchar(30) | latin1_swedish_ci | |
| surname | varchar(30) | latin1_swedish_ci | |
| pcode | int(6) | | |

Table 2 Delivery Table

| Column | Type | Collation | Attributes |
|-----------------|-------------|-------------------|------------|
| ID | varchar(30) | latin1_swedish_ci | |
| pass | varchar(50) | latin1_swedish_ci | |
| name | varchar(50) | latin1_swedish_ci | |
| surname | varchar(50) | latin1_swedish_ci | |
| category | int(2) | | |

Table 3 Members Table

| Column | Type | Collation | Attributes |
|----------------|-------------|-------------------|------------|
| id | int(11) | | |
| name | varchar(30) | latin1_swedish_ci | |
| type | varchar(30) | latin1_swedish_ci | |
| size | int(11) | | |
| content | mediumblob | | BINARY |

Table 4 Upload Table

| Column | Type | Collation |
|-----------------|-------------|-------------------|
| id | int(11) | |
| name | varchar(30) | latin1_swedish_ci |
| lname | varchar(30) | latin1_swedish_ci |
| address | text | latin1_swedish_ci |
| pcode | int(30) | |
| city | varchar(30) | latin1_swedish_ci |
| phone | varchar(20) | latin1_swedish_ci |
| email | varchar(50) | latin1_swedish_ci |
| category | int(2) | |
| cardno | varchar(30) | latin1_swedish_ci |
| pno | varchar(30) | latin1_swedish_ci |
| pbirth | varchar(30) | latin1_swedish_ci |
| dbirth | date | |
| wdate | date | |
| whour | int(2) | |
| status | int(11) | |
| notes | text | latin1_swedish_ci |

Table 5 Requests Table

```

<?php
class Database
{
    var $host;
    var $user;
    var $pass;
    var $data;
    var $con;
    var $table;
    var $table2;
    var $db;
    var $currentDate;

    public function controls()
    {
        $this->host="localhost";
        $this->user="mso";
        $this->pass="msomarsona";
        $this->data="thesis_mso";
        $this->currentDate = date("Y-m-d");
    }

    public function connection()
    {
        $this->con = mysql_connect($this->host,$this->
user,$this->pass);
    }
    public function tablename()
    {
        $this->table=mysql_query("INSERT INTO requests
(id,name,
lname,address,pcode,city,phone,email,category,cardno,pno,pbir
th,dbirth,wdate,whour,status ) VALUES (
        '$_SESSION[random]',
        '$_SESSION[fname]',
        '$_SESSION[lname]',
        '$_SESSION[address]',
        '$_SESSION[pcode]',
        '$_SESSION[city]',
        '$_SESSION[phone]',
        '$_SESSION[email]',
        '$_SESSION[category]',
        '$_SESSION[cardno]',
        '$_SESSION[pno]',
        '$_SESSION[place]',
        '$_SESSION[birthday]',
        '$_SESSION[wdate]',
        '$_SESSION[whour]',
        '0'
        )");
    }
    public function databaseconnection()
    {

```

```

        $this->db=mysql_select_db($this->data,$this->con);
    }
}
$name=new Database();
$name->controls();
$name->connection();
if(!($name->con))
{
    echo 'Error: ' . mysql_error();
}

$name->databaseconnection();
$name->tablename();

echo "<h2>The document application was submitted
succesfully!</h2><br />";
echo "<h2>The ID of your request is:
".$_SESSION[random]."</h2><br />";
?>

```

5.3 Demonstration

When MSO is loaded the user can choose between login or document.



Figure 12 Main Interface

If the user selects the tab Apply for a document the window below will be prompted requesting the user to fill in the form with all the requirements to successfully apply for a document.

Welcome to MSO document application category

Please fill in the requirements in the right way.

| | | | |
|--------------|----------------------|--------------------|----------------------|
| Name: | <input type="text"/> | Lastname: | <input type="text"/> |
| Address: | <input type="text"/> | Phone : | <input type="text"/> |
| Postal code: | <input type="text"/> | E-mail : | <input type="text"/> |
| City: | <input type="text"/> | Select a category: | <input type="text"/> |



Figure 13 Document application interface

If the user will click on the Log in tab a login form where requires the user to enter the username and password will be displayed.

Username:

Password:



Figure 14 Login interface

After a successful login, depending on the user credentials, the proper window will be displayed.



Figure 15 Administrator interface

When selected Manage Members, there are three possibilities: the administrator can add a member, can delete a member or update an existing member's information. If the administrator wants to manage requests, he/she can approve the requests that require his attention and delete requests that are now in archive. The archive holds all the requests, whose process has been completed successfully, from the document creation until they have been delivered.

| Document Requests to be approved | | | |
|---|------------------------|-------------------|---|
| ID | File | Category | |
| 67892 | Test now.docx | Copy of Death Act |    |
| 16789 | Test now.docx | Copy of Death Act |    |
| 65348 | BALANCE SHEET (1).docx | Copy of Death Act |    |

Figure 16 Approve documents interface

Also the administrator has a special tab: Delivery staff where he/she can check the distribution of the labor at the delivery zone, of a selected date by him/her taking in

consideration cost minimization models and waiting lines reduction, as a result of the implementation of the queueing theory.

Enter date to check delivery staff requirements:



Delivery Staff requirements for 2014-06-19

| Withdrawing hours | Number of staff required |
|-------------------|--------------------------|
| 08:00 - 10:00 | 1 |
| 10:00 - 12:00 | 0 |
| 12:00 - 14:00 | 1 |
| 14:00 - 16:00 | 1 |
| 16:00 - 18:00 | 1 |

Figure 17 Delivery staff interface

When a staff member is logged in, he/ she can access all he requests requiring his/her attention and edit them to upload the document requested.

Welcome dear Staff Member.
Welcome to our MSO system for Staff Members.

[Requests](#) [Edit my account](#)

Requests requiring your attention

| ID | Category | Notes | |
|-------|-------------------|----------|---|
| 16789 | Copy of Death Act | regdffid |  |

Figure 18 Staff Member interface

| | |
|------------------------|----------------|
| ID | 1234 |
| Name | Marsi |
| Surname | Bezhani |
| Address | Dervish Hekali |
| Postal Code | 1001 |
| City | Tirana |
| Card Number | hbfre8hje |
| Personal Number | |
| Place of Birth | Tirana |
| Date of Birth | Tirana |

Choose File No file chosen

A staff member can also edit his/her account but only changing his/her password.

Document Requests to be delivered



| ID | File | |
|------|--------------------|---|
| 7891 | BALANCE SHEET.docx |   |

Figure 19 Delivery staff interface

In case that delivery staffs has been logged in, he/she can access only requests that should be delivered. The user can download the document of a specific request and

mark it as delivered in case of successful delivery. Also the user can search for a request in order for quicker and simpler access.

Chapter 6

Conclusion and future work

This paper summarizes all the efforts done to provide an e-Government service for the Municipality. The main goal of this web based application is to provide a high quality service to citizens, increase customer satisfaction and through that, increase the number of loyal customers and minimizing the costs for both the citizens and the company, in our case the Municipality, in order to maximize profit. It is important to mention that in Albania, no such service has been implemented for the Municipality. There exist e-Services as mentioned earlier, but not providing the services that MSO does. In order to generate as effective and efficient system as possible, I analysed some cases of other countries, which use e-Government applications, but none has functionalities as MSO. I decided to implement this system, for national and international usage, since a program like this one is missing. MSO system is willing to help not only government and citizens but also small and large business willing to use this system matching their requirements. MSO is not just a simple web application system; it is for the people, to help them, increasing their welfare and also the nation's productivity. Another feature implemented in this application is the queueing theory, part of the operations management of a company, which helps in minimizing costs, maximising profit, increasing efficiency, reducing waiting lines, making customers happy and increase the number of loyal customers.

Also in the future, I expect to develop the system and adapt it, for other governmental services and other public and private institutions. Also I plan to develop MSO in the mobile technology area so people can access MSO from their smartphones.

When I firstly thought about e-Government I was sceptical, I wasn't sure if what I wanted to do could be done and implemented in a completely useful system. But hard work and a lot of research made this system possible.

It is not just a diploma thesis; I am planning to take it to the next step. This small system today may be the basis of a huge system used tomorrow from all citizens, offering to them real benefits that earlier could not even be imagined. The more the application develops, the higher the number of benefits our society gets.

References:

- [1] E-government Benefits Study. Canberra: NOIE, 2003. E-GOVERNMENT BENEFITS STUDY. Apr. 2003. Web. (<http://workspace.unpan.org/sites/internet/documents/B6AU03%20E-government%20Benefits%20Study.pdf>)
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oOYmh4gSR5IDQBQ&usg=AFQjCNFPxy36M1SwEVkfQzdqFiZyKjj7EQ
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Appendix A

Activity diagram (Log in)

This activity diagram shows the process of logging onto the website of all the significant users of the system: the staff member, the administrator and the delivery staff. If the username or password entered does not match, the system suggests entering data again. If both of the data entered are correct, the user gains access to system functionalities according to its privileges.

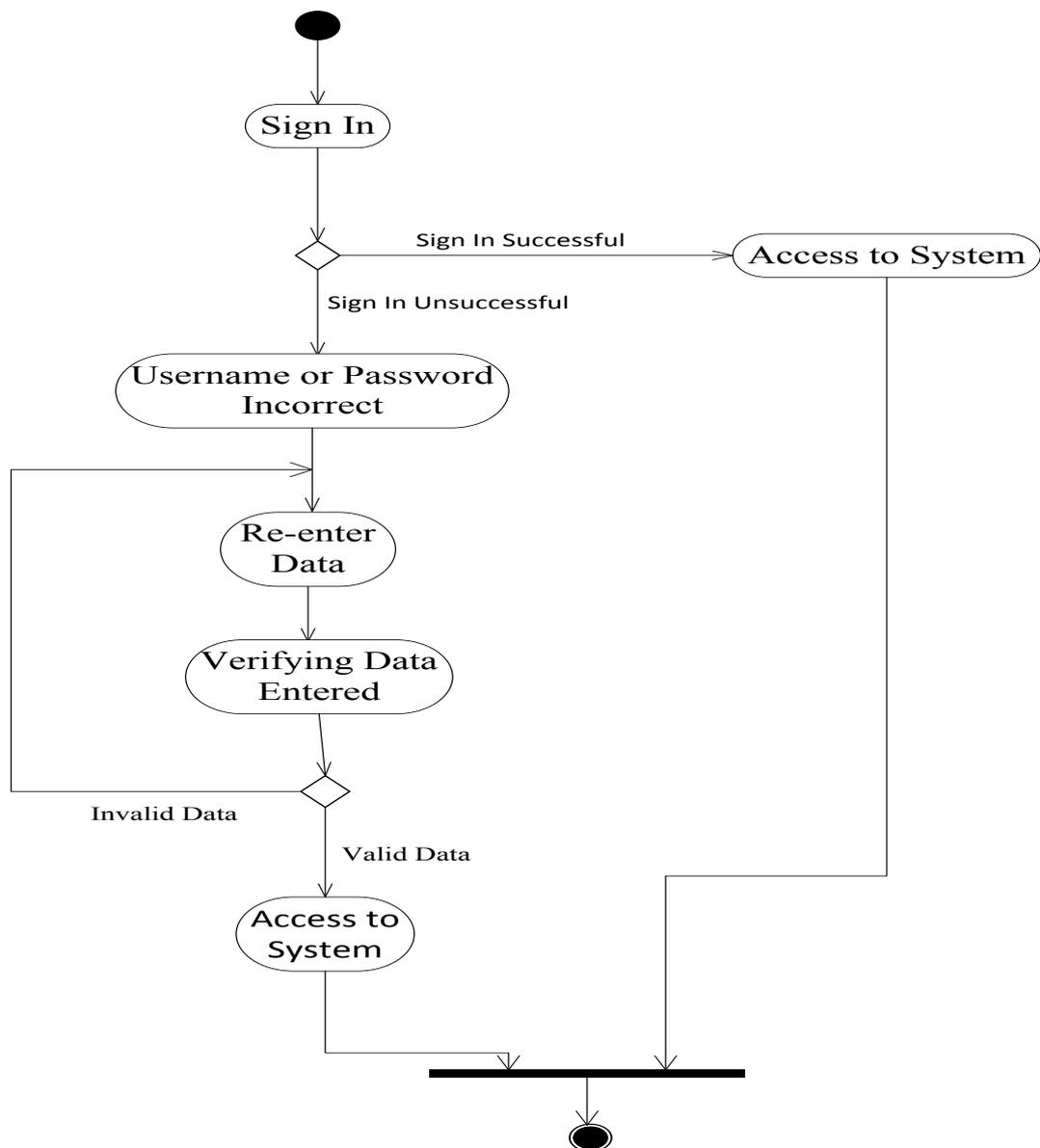


Figure 20 Activity diagram - login

Activity diagram (Customer / Simple user)

In the picture below is shown the customer activity diagram. The diagram explains how a document request is processed. Firstly the customer fills in a form. If the form is submitted with all the requirements, the request is created and the ID is provided to the customer, otherwise the request is not created.

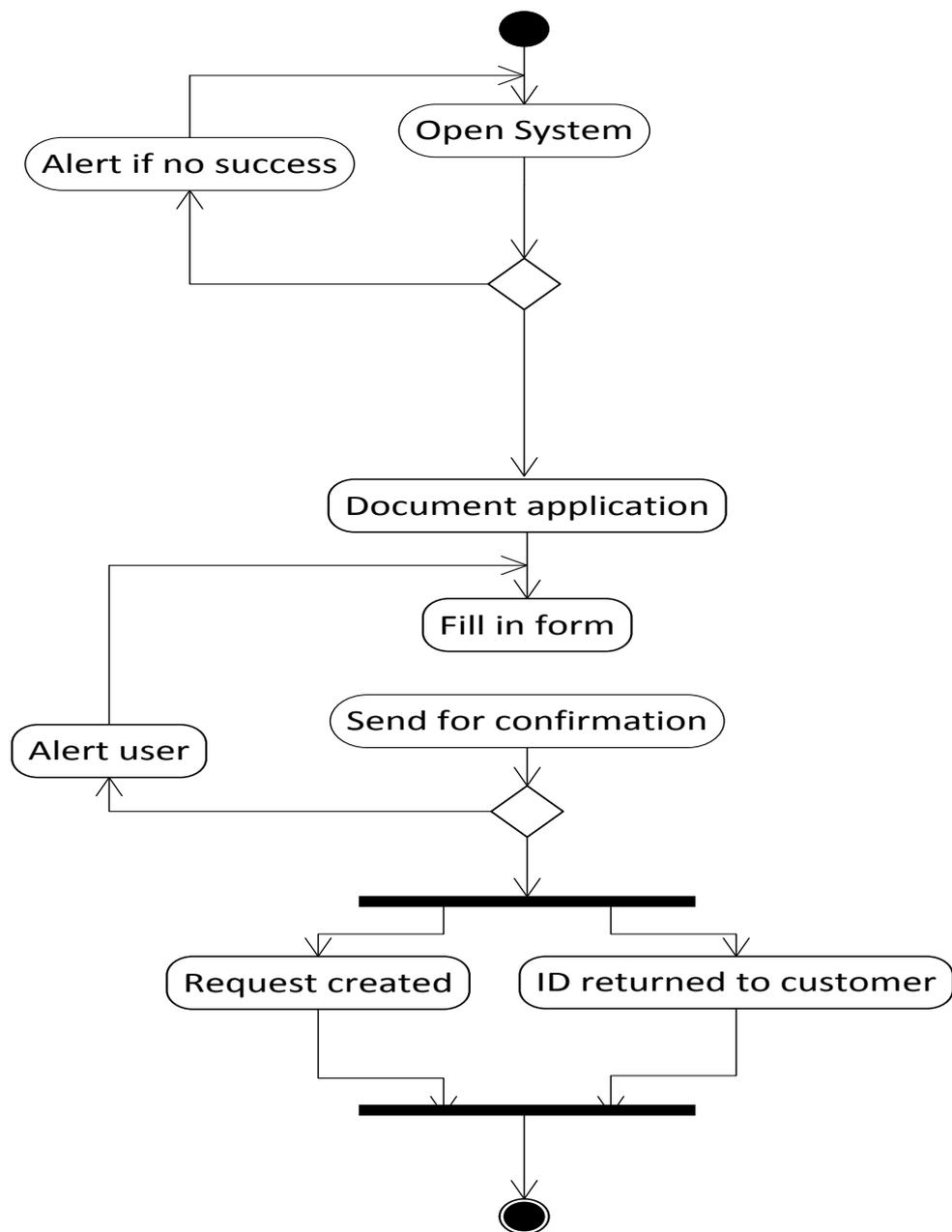


Figure 21 Activity diagram - Customer

Activity diagram (Staff Member)

Below is shown the staff member activity diagram. The diagram explains how a document request is handled and how the other methods of the member are processed. Firstly the member logs in. The member can edit his/her account or view requests. He/she can update the password of its account and can access all the requests. He can view the information of the request and upload the document requested.

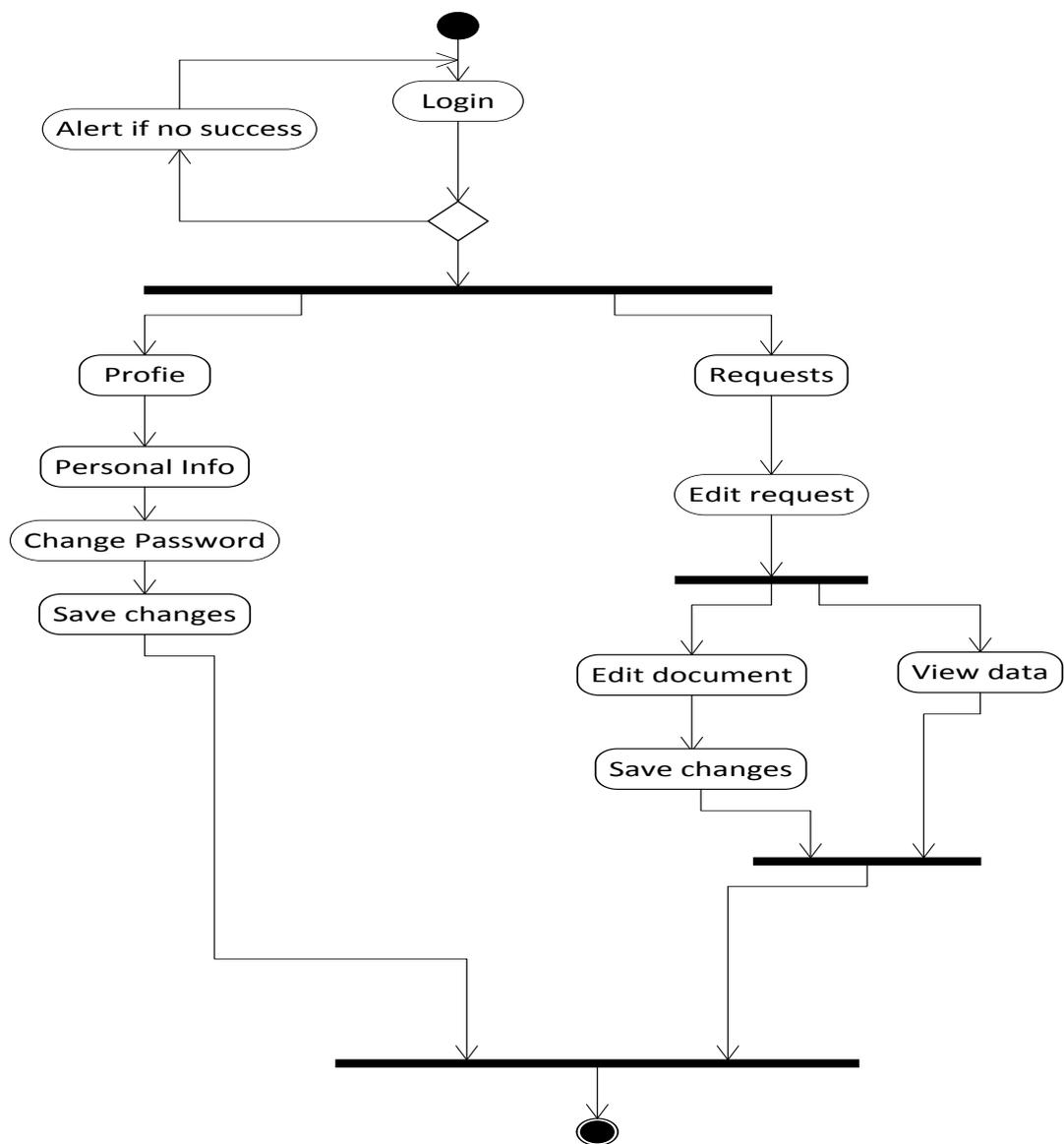


Figure 22 Activity diagram - Staff Member

State diagram (Log in)

The state diagram below represents different states that the system passes while the user is logging onto the system.

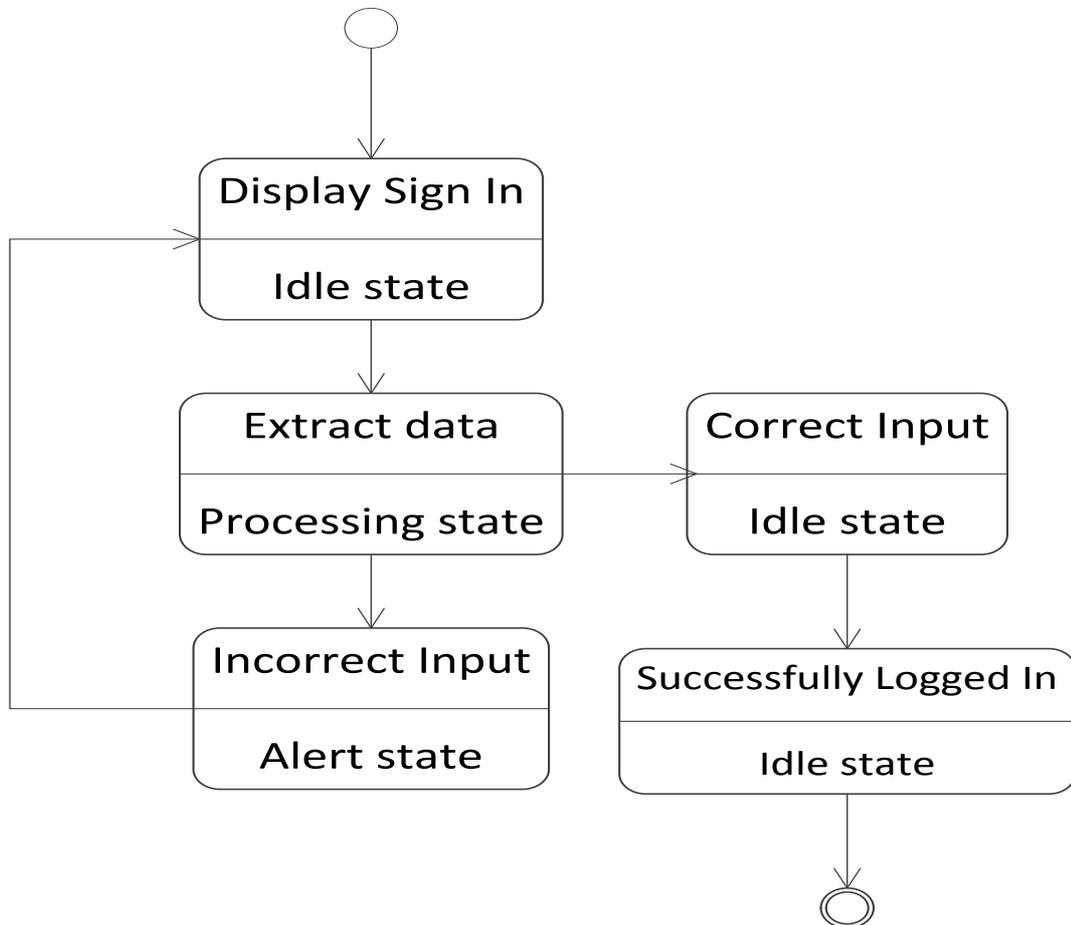


Figure 23 State diagram - login

State diagram (Customer / Simple user)

The next state diagram is related with the activity of applying for a document. The user should provide all the information in the required format and then submit his/her request. After that he/she can retrieve the ID of the request, which will be provided by the system.

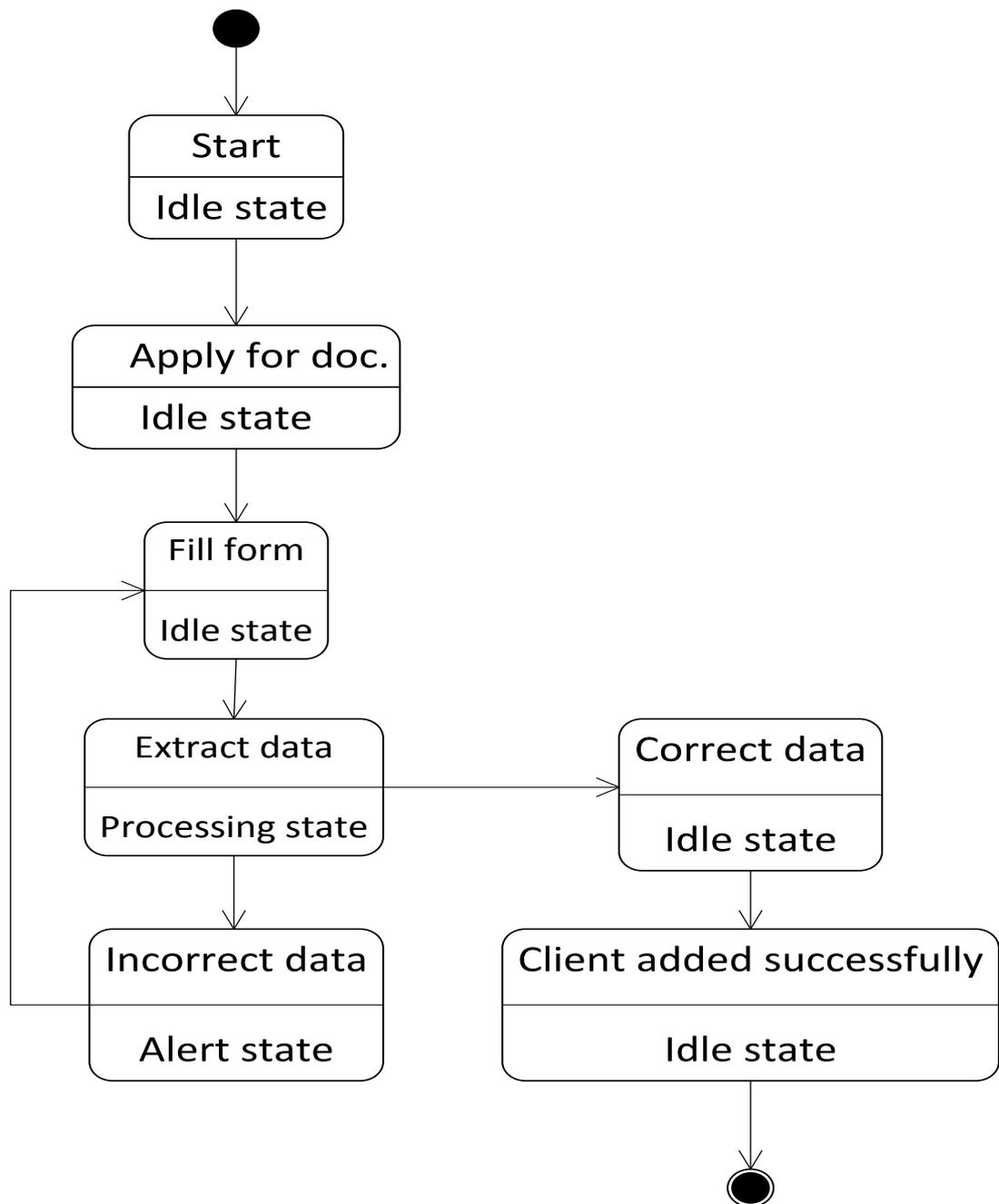


Figure 24 State diagram - Customer

State diagram (Staff Member)

The next state diagram is related with the advantages that the staff member of MSO has. He can view online, few clicks away, all the requests requiring his/her attention. He can view all the data for a specific request, which he/she chooses and upload the document requested from that request and the staff member has also the possibility of updating his password account.

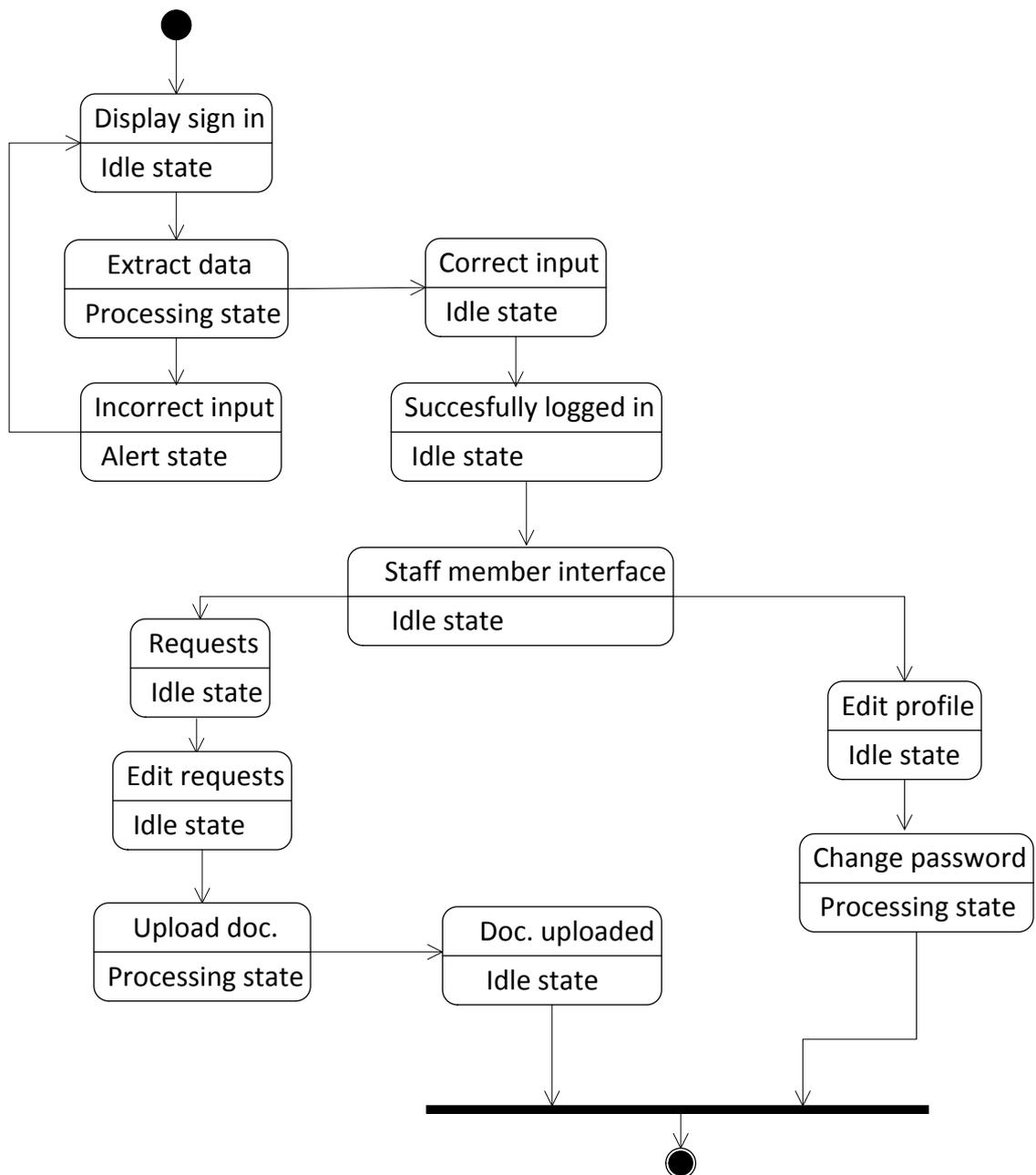


Figure 25 State diagram - Staff Member

State diagram (Administrator)

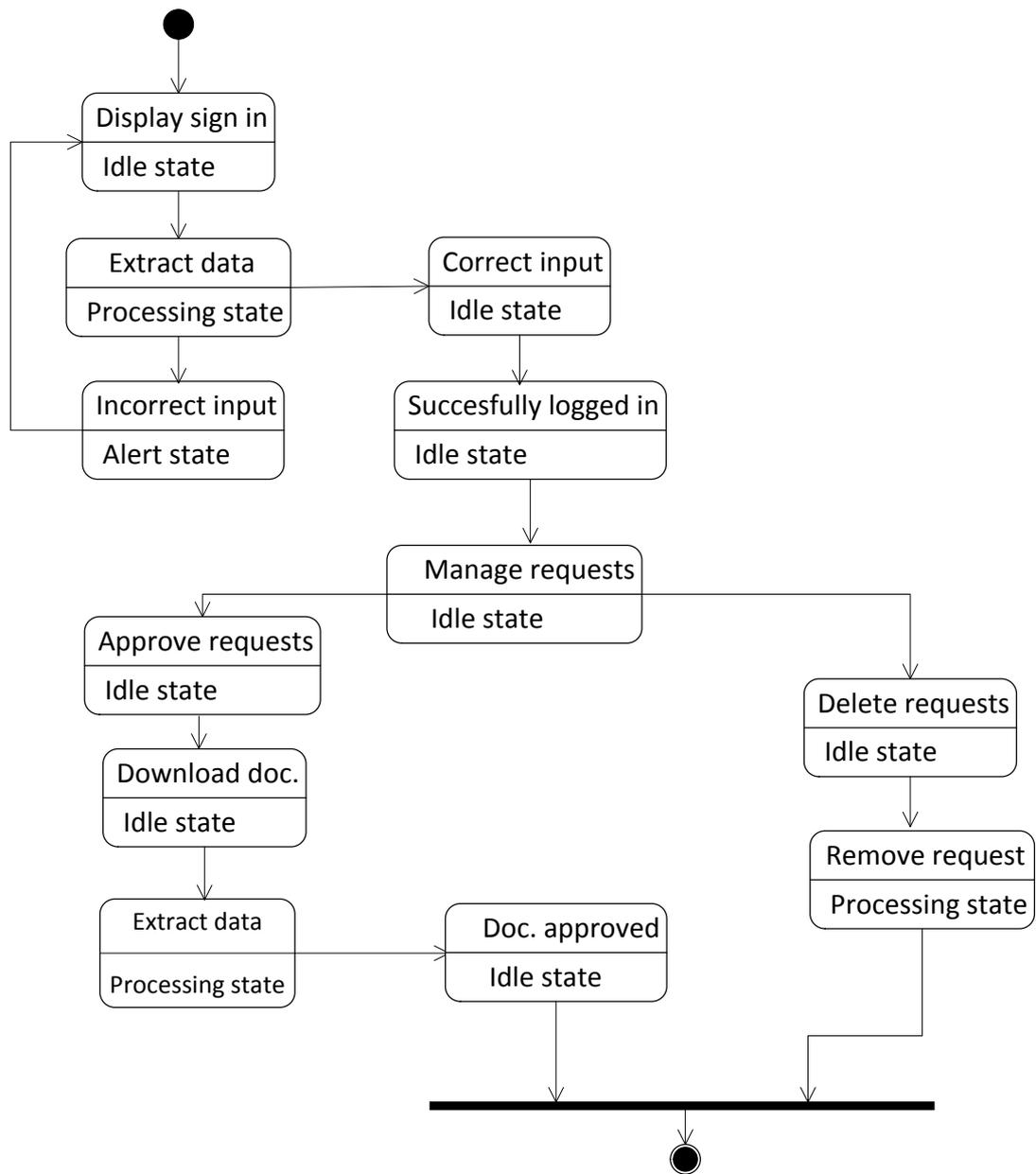


Figure 26 State diagram - Amdinistrator

Sequence diagram (Log in)

The following sequence diagram represents the actions taken by a user of the system that wants to log in onto the website. The user enters the username and password. If both of them are valid, the administrator has access to the system, and if it is not, he has to re-enter the username and password to have access to the system.

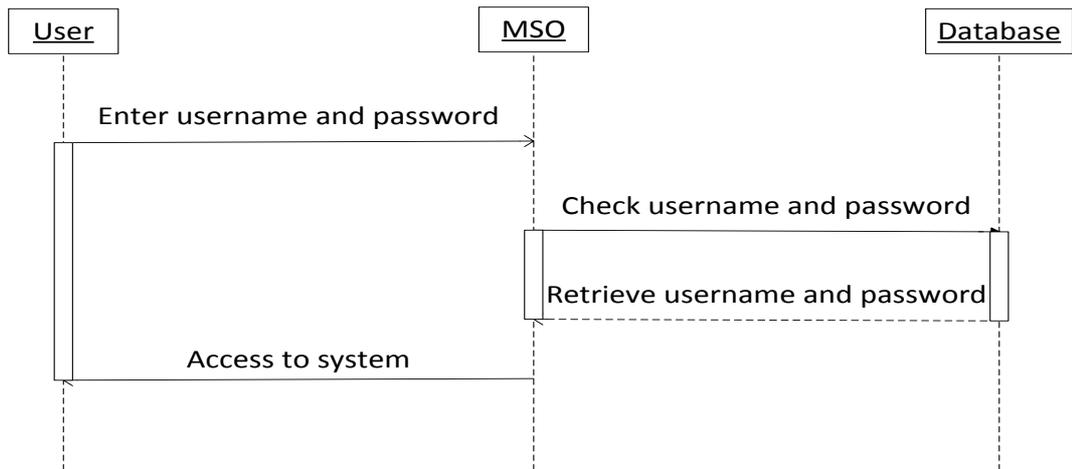


Figure 27 Sequence diagram - Login

Sequence diagram (Customer / Simple user)

The next sequence diagram is related with the actions taken during the application for a document.

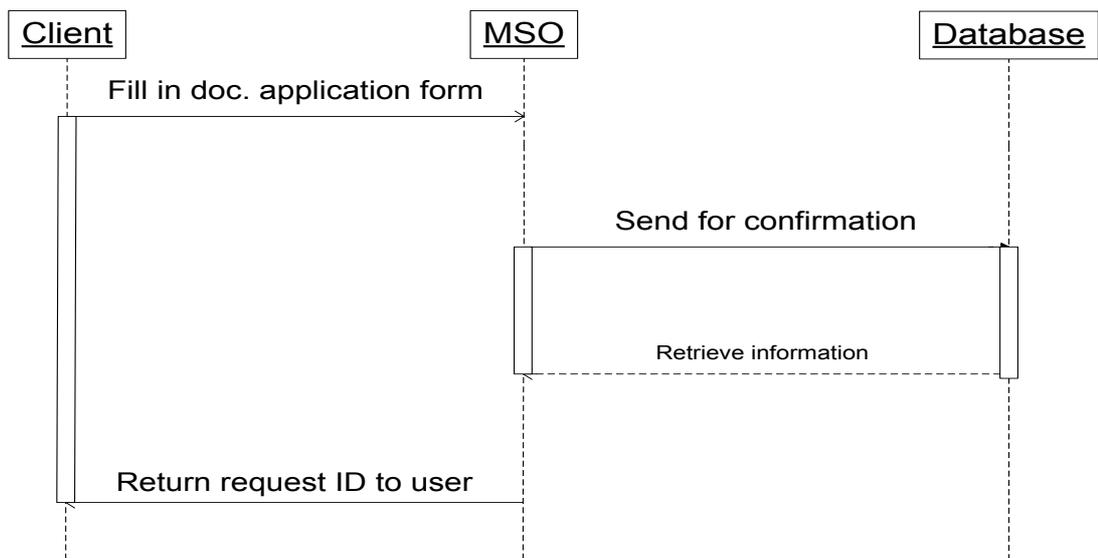


Figure 28 Sequence diagram - Customer

Sequence diagram (Staff Member)

The next sequence diagram is related with the advantages that the staff member of MSO has. He can view online, few clicks away, all the requests requiring his/her attention. He can view all the data for a specific request, which he/she chooses and upload the document requested from that request and the staff member has also the possibility of updating his password account.

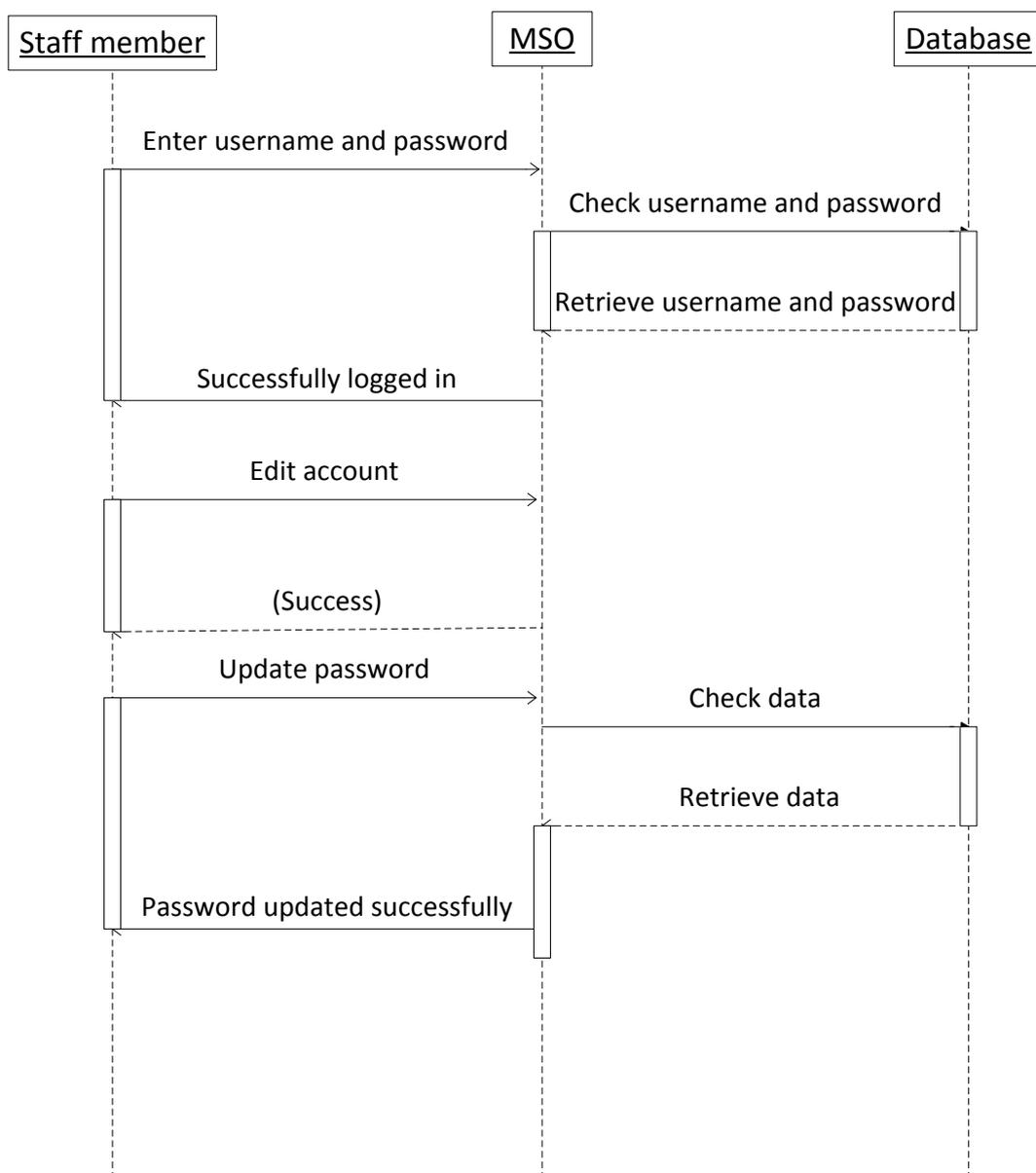


Figure 29 Sequence diagram - Staff Member

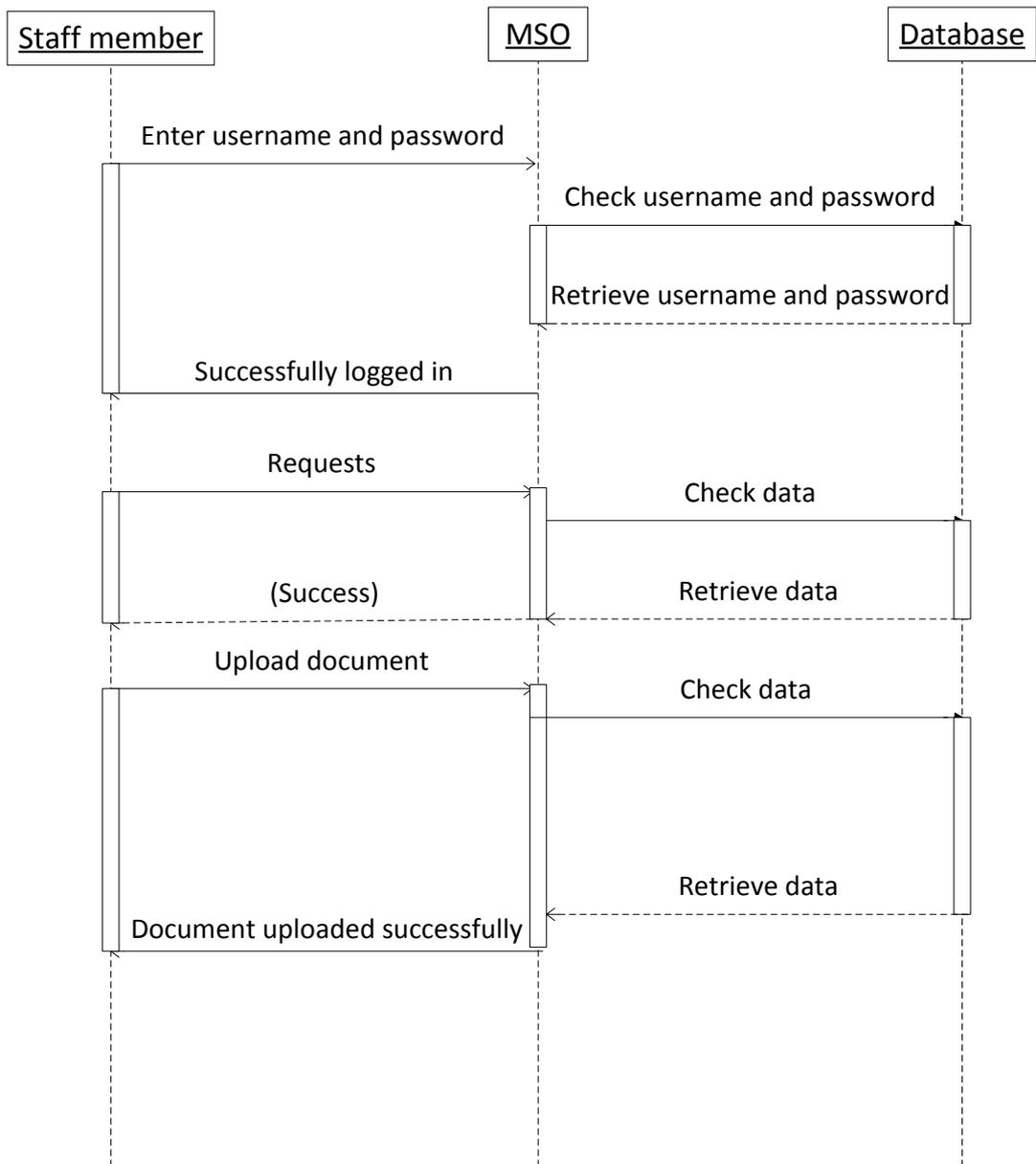


Figure 30 Sequence diagram - Staff Member

Sequence diagram (Administrator)

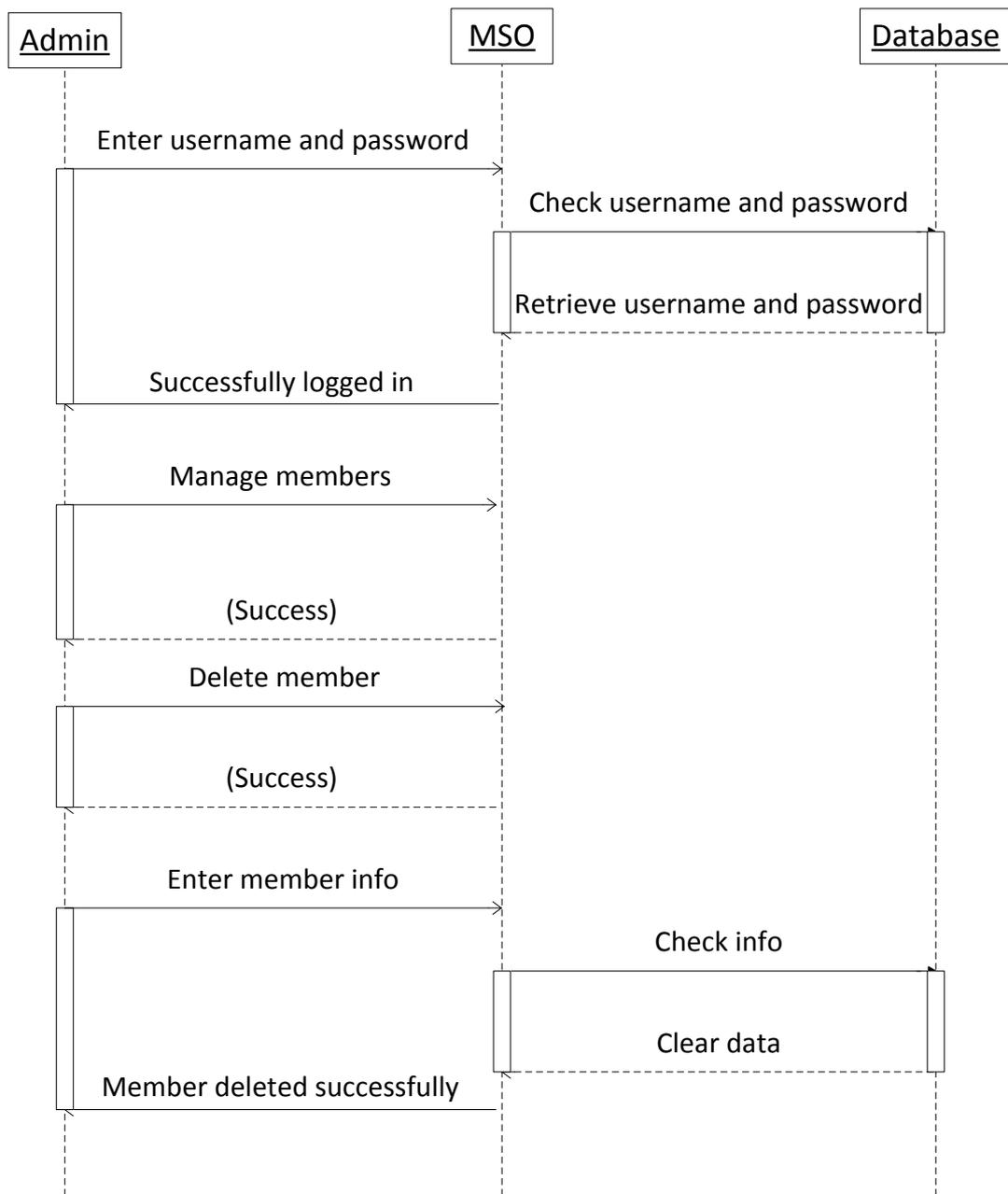


Figure 31 Sequence diagram - Administrator

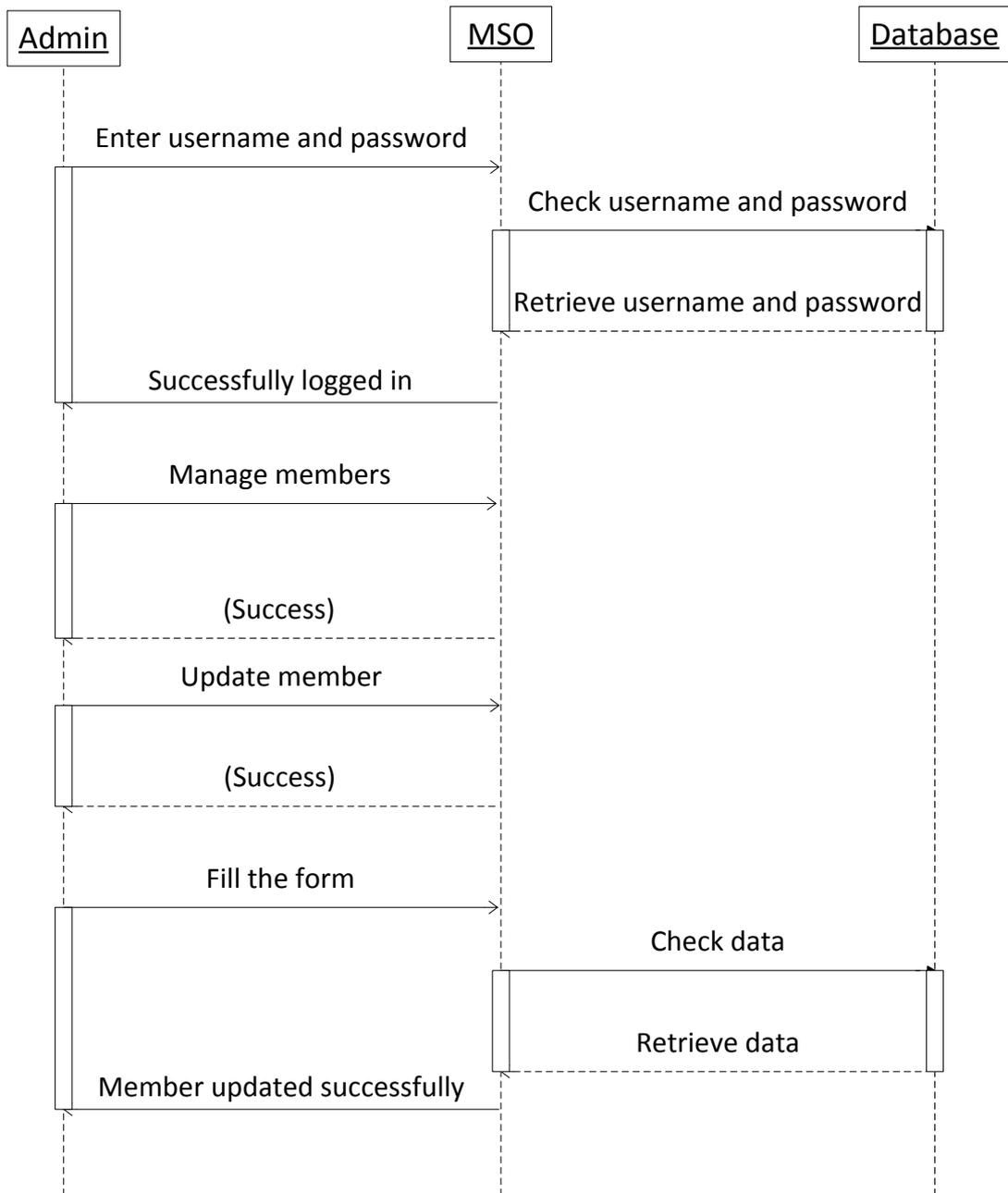


Figure 32 Sequence diagram - Administrator

Collaboration diagram (Administrator)

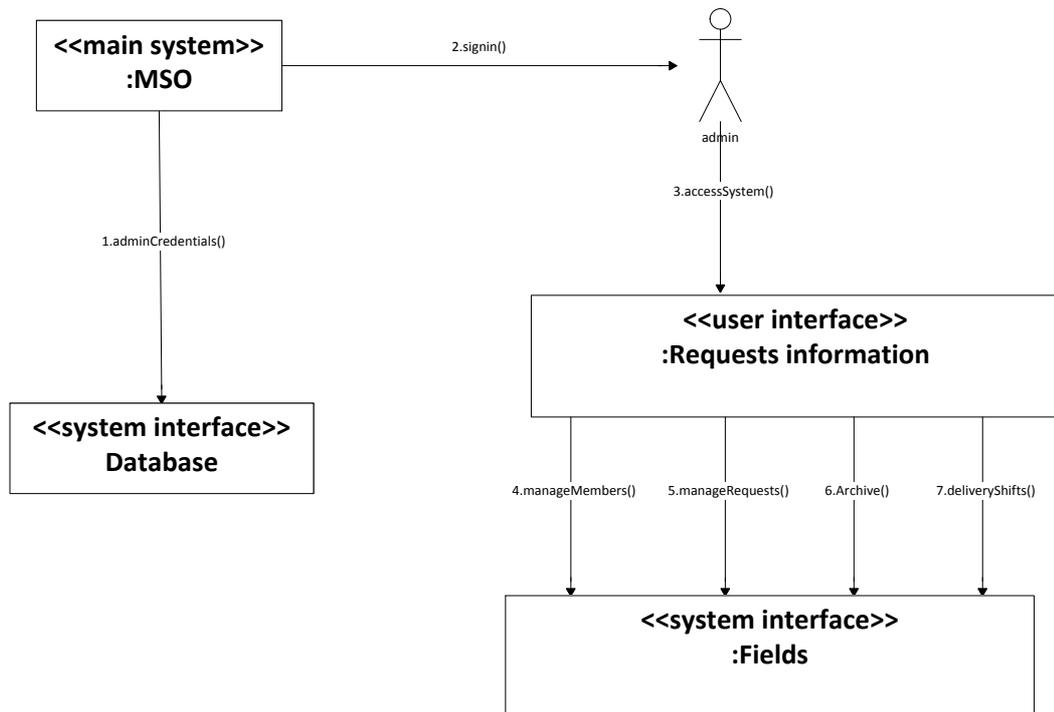


Figure 33 Collaboration diagram - Administrator

Collaboration diagram (General)

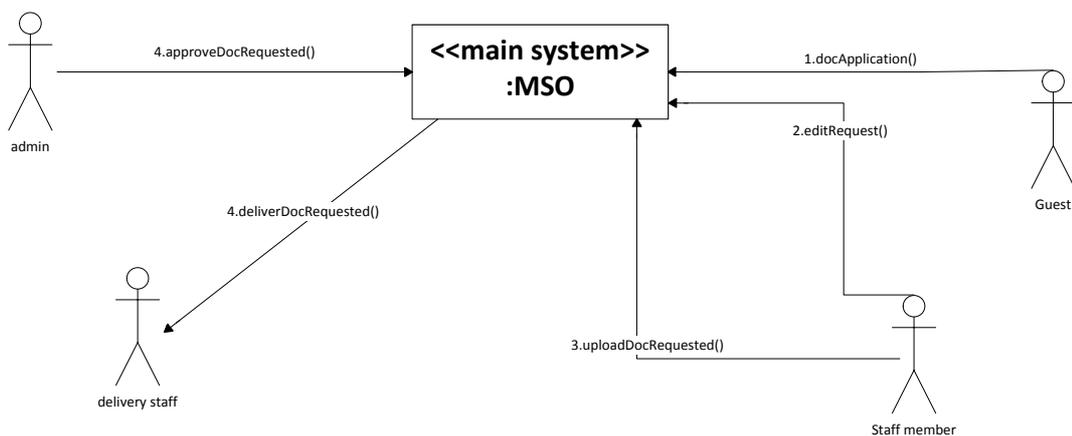


Figure 34 Collaboration diagram

Data flow diagram

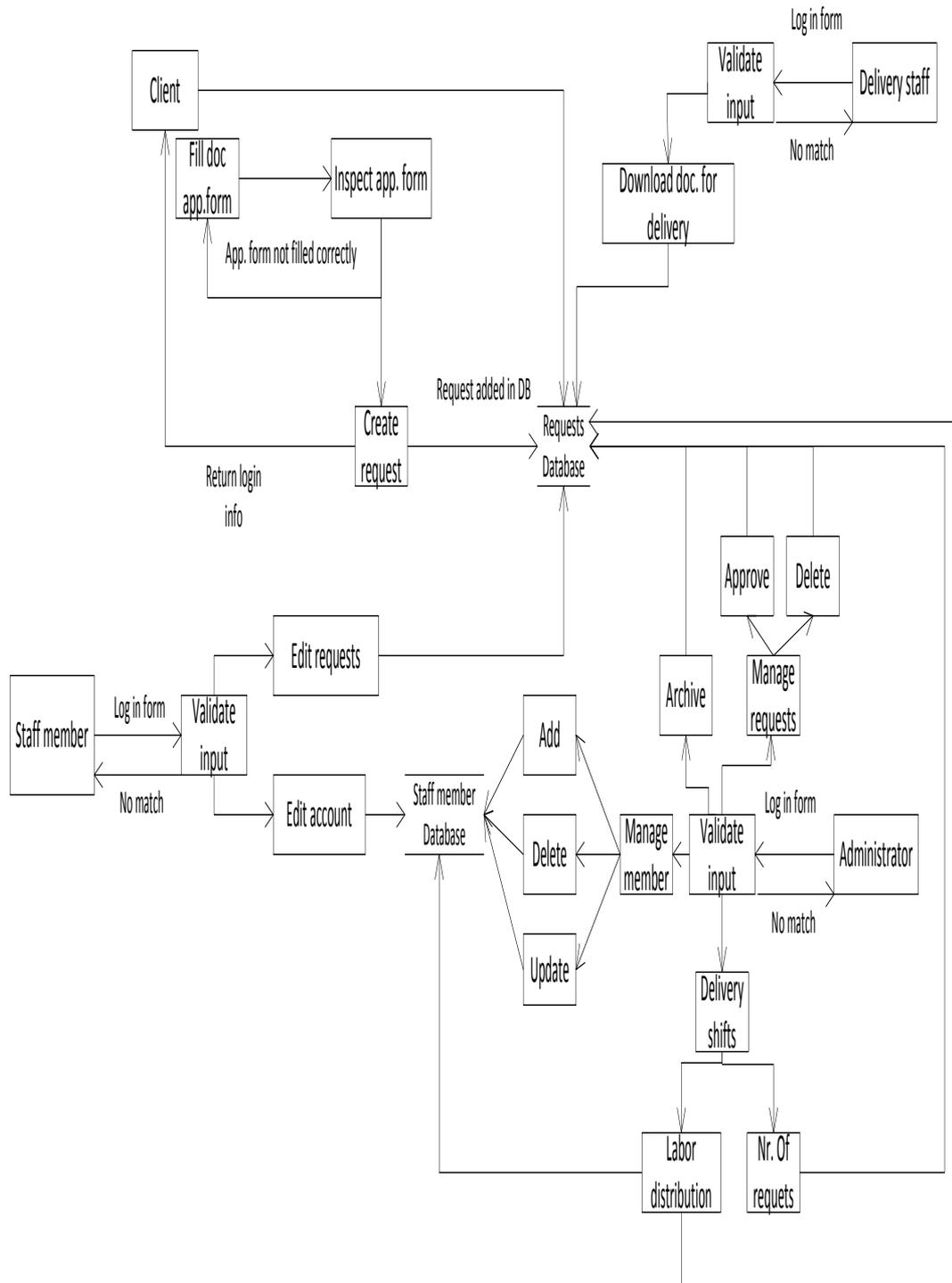


Figure 35 Data flow diagram

Entity relationship diagram

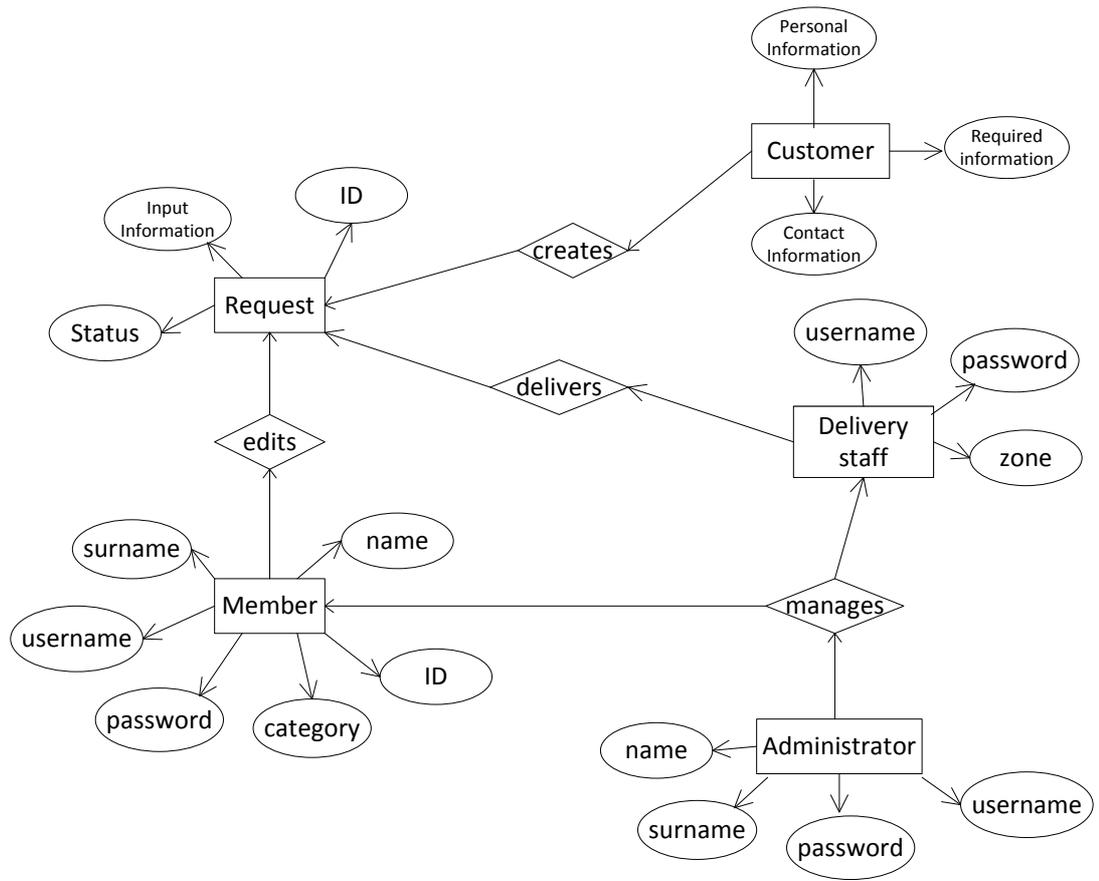


Figure 36 Entity relationship diagram

Object diagram

An object diagram enables the reader to have an overview of how the system is going to work in real-time environment and how the objects are going to interact with one another.

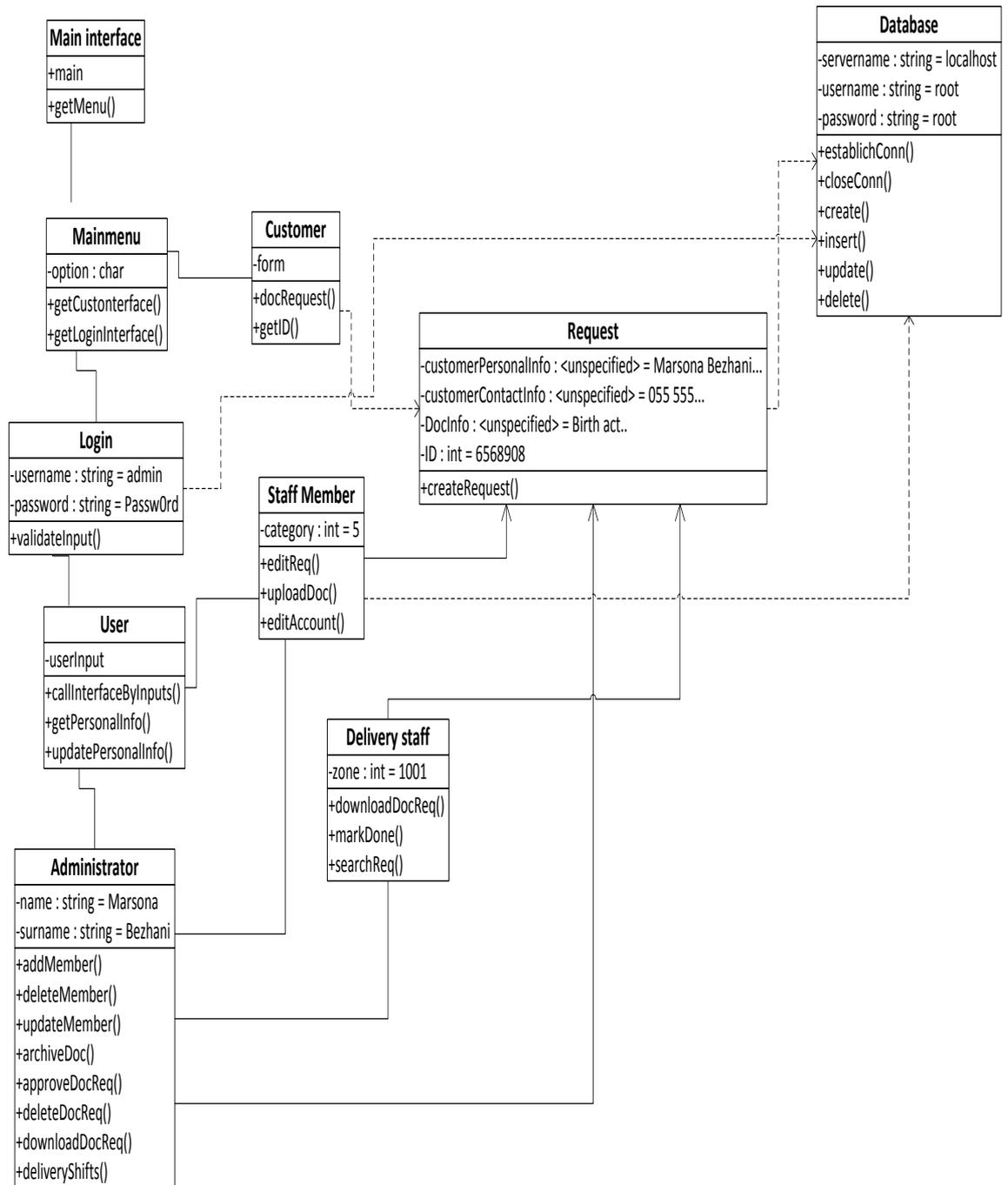


Figure 37 Object diagram