ST. XAVIER’S COLLEGE

**(Affiliated to Tribhuvan University)**

**Maitighar, Kathmandu**



**INTERNSHIP REPORT**

**ON**

**“Implementing PoP3 and IMAP Protocol**

**For Desktop Email Client”**

**AT**

**GURU INFOSYS PVT. LTD**

**Under the supervision of**

**Mr. Vishnu Kumar Rana**

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**Submitted by**

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**Submitted to**

**ST. XAVIER’S COLLEGE**

**Department of Computer Science**

**Affiliated to Tribhuvan University**

**Maitighar, Kathmandu, Nepal**

**December 28, 2016**

**Implementing PoP3 and IMAP Protocol for Desktop Email Client**

**[CSC - 452]**

An Internship report submitted in partial fulfillment of the requirement for the degree of Bachelor of Science in Computer Science and Information Technology.

Submitted by

Binaya Kharel (TU Exam Roll No. 2102/069)

Submitted to

ST. XAVIER’S COLLEGE

Department of Computer Science

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Maitighar, Kathmandu, Nepal

December 28, 2016

****

# CERTIFICATE OF APPROVAL

The undersigned certify that they have read and recommended to the Department of Computer Science for acceptance, an internship report entitled “Implementing PoP3 and IMAP protocol for desktop email client” submitted by **Binaya Kharel (TU Roll No. - 2102)** in the partial fulfillment for the degree of Bachelors of Science in Computer Science and Information Technology.

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# ACKNOWLEDGEMENT

# ABSTRACT

With its instant global reach, email has revolutionized the way we communicate with each other. As the development in technology, email is not only limited to desktop for organizations but for everyone on the planet. Easily accessible from all the devices and ability to synchronize on all devices has made email much easier and efficient. The major downside while accessing the email is the need for an internet connection every time user wants to check email.

**“Implementing PoP3 and IMAP Protocol for Desktop Email Client”** is a project that aims to deliver a desktop email client that can simply the way user access their email. The project is expected to be extremely feasible and useful in context of Nepal. The problem of slow internet connection and load shedding are major hindrance on accessing the email anytime user need. So, the desktop email client that can save all the email on the local drive of a user can be extremely useful.

The project features on improving the existing system for email exchange and how the user access them. PoP3 and IMAP are the emerging protocols that are used by various desktop email client. Desktop email clients are versatile and more secure as they are stored on user’s local system. The user can then define their own way of accessing and backup option for their email. Flexibility of the protocol such as PoP3 which allows user to keep or delete the message from the mail server is also a huge benefit for the user. Consolidating multiple mail accounts from various provider and servers into one inbox is an important feature of PoP3 and IMAP protocol. This proposed desktop mail client will definitely aid the general users and organization in their day to day business as well as other activity.

**Keywords:** Web Email Clients, Desktop Email Clients, PoP3, IMAP

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# ABBREVIATIONS

# CHAPTER 1: INTRODUCTION

## Introduction to Internship

An internship, to be succinct, is a program that allows students and recent graduates to gain practical work experience with a company or organization. Internship provides practical experience for beginners in an occupation or profession [1]. Internship programs vary widely depending on what kind of position the student holds, what type of company is hosting the internship, when and where it’s held, and what kind of compensation the student receives. The modern concept of internships essentially springs from the medieval apprenticeship, in which skilled laborers (often craftsmen) would teach a young person their trade and, in exchange, that person would agree to work for the teacher for a certain length of time [1][2]. Internships offer students a period of practical experience in the industry relating to their field of study. This experience is valuable to students as a means of allowing them to experience how their studies are applied in the "real world", and as work experience that can be highly attractive to potential employers on a candidate's CV [3].

Internships can be done in a range of sectors, including sales, marketing, engineering, graphic design, management, I.T. and many, many more. Throughout an internship you will develop a variety of soft skills, including communication skills, personal effectiveness, presentation skills, creative problem solving and influencing skills [4].

The course Bachelor of Computer Science and Information Technology under the affiliation of Tribhuvan University includes Internship program in the final year. This program has been chiefly designed to prepare the students for the current market competition. The internship is done as a partial fulfillment of requirements of the Bachelor’s degree in Computer Science and Information Technology under Tribhuvan University. The internship is assigned six credit hours (minimum of ten weeks or 180 hours long) as a part of the course requirement.

## Background

## Objective

### Internship Objective

The main objective of internship project is to get practical experience of the theoretical academic knowledge. The objectives of internship are listed below:

* To strengthen professional skills and interpersonal relationship in professional settings
* Relating theoretical knowledge with practical aspect
* To learn and understand the organizational workflow
* To prepare students for vital career related skills such as organizational and interpersonal communication skills

### Objective of Project

The task assigned to author in internship program was to design, develop and test a Desktop Email client. From this internship project following objectives are derived:

* To design a desktop email client based on PoP3 and IMAP protocol.
* To ease the process of email management such as creation and searching of email
* To save mail on local server so they can be viewed without connecting to the internet.

## Brief Introduction of Industry

The software industry has transformed the way organizations, businesses, and even people coordinate and work. Its impact on the global economy and across various industries can be gauged by the increase in innovations, technical progress, enhanced productivity, and the workforce [5]. The software industry evolved from its beginnings in the late 1960s to become an economic giant providing United States employment alone for more than four million people. The worldwide PC software market was $88 billion in 2008, representing 30% of the total packaged-software market, which was $297 billion [6]. The software industry can be separated into four main categories: programming services, system services, open source and SaaS. The following describes the categories of business software used in the industry.

**Programming Services:** This sector has historically been the largest sector and includes names such as Microsoft Corporation (NASDAQ: MSFT), Automatic Data Processing, Inc. (NASDAQ: ADP), Oracle Corporation (NYSE: ORCL) and SDC Technologies, Inc. These companies often pioneered solutions to needs by businesses to analyze data, store and organize data, or provide programs to run machinery.

**System Services:** Although programming was the largest software sector early in computer history, system services grew rapidly through the 1960s and 1970s, and then exploded in the 1980s with the rise of personal computers (PCs) and the need for an encompassing operating system such as Microsoft’s original disk operating system (DOS) that was launched in 1981 [6] [7].

**Open Source:** Programming or software engineering has become a huge in-demand profession with the growth of the Internet, cloud systems and businesses willing to venture more willingly into open-source environments such as the Linux operating system. Open source refers to a code base that was created and is free to acquire. However, most businesses require changes to be made to the code bases to suit their needs. Another open-source code base is the Android operating system.

**Software as a service:** With the rise of cloud computing and the movement of most businesses large and small to the cloud, SaaS has become more popular than system software for businesses' specific needs. This software is kept on the creators' servers and clients access the software through the Internet, also referred to as the cloud [7] [8].

## Brief Introduction of Organization

## About Organization

Guru Infosys is a registered company established by well experienced IT professionals and certified engineers in Nepal. Guru have invested a significant time in research on client need and innovation on production features and specialties. Guru Infosys is now in market with number of software products such as Guru-Sahakari (Co-operative Management System), Guru Accounts (Accounting software based on double entry system), Auto Guru and many more.

## Organization Rationale

As one of the pioneer of software development in Nepal, Guru has passion for excellence and to win with flawless execution. Customer satisfaction is placed above all at Guru Infosys. Guru responds to any of their customers all while seeking to exceed their expectations.

Teamwork is observed at its best at Guru Infosys. The company treats one another with respect and communicates openly. It fosters collaboration and maintains individual accountability. Guru encourages “anyone can do” attitude and appreciates value of multiple perspectives and diverse expertise.

## Organizational Hierarchy

## Contact Details

|  |  |
| --- | --- |
| Organization | Guru Infosys |
| Organization Type | Pvt. Ltd. |
| Location | Bafal-13, Kalanki, Kathmandu |
| Phone no | +1 4286977, 4278095 |
| Website | Guruinfosys.com |
| Email Address | info@guruinfosys.com |

Table 1: Contact Detail of Guru Infosys:

# CHAPTER 2: ANALYSIS OF ACTIVITY DONE

## Internship Placement Details

### Organization Selection

The first phase of the internship was the selection of organization for internship. Among the various criteria provided in internship prerequisite, application development was chosen. Various software companies were shortlisted and approached. Since internship provides the practical experience for the theoretical knowledge gained, selection of proper organization for the internship program was important. Selection of organization which is working in domain which is coherence with the final year project of the student is very important. Guru Infosys has been a pioneer in design and development of web based as well as desktop application.

### Placement

Application for internship was sent to various institutes, and after 2 weeks, the author was called by Guru Infosys for the interview. After selection, the author was placed under the supervision of Er. Milendra Tuladhar. The author was selected as an intern for software development in the organization.

### Duration

|  |  |
| --- | --- |
| Start Date |  |
| End Date |  |
| Total Duration | 2.5 Months |
| Position | Intern |
| Supervisor | Er. Milendra Tuladhar |
| Office Hour | 10 AM – 6 PM |

Table 2: Internship Duration

### Roles and Responsibilities

The internship at Guru Infosys involved various activities and task as per the requirement of both the organization and the project. The goal of the internship program was to develop a desktop email client using java programming. Extensive preliminary studies about mail clients, working of PoP3 and IMAP protocol.

Study of the existing system was carried out extensively during the research phase. Various papers on IMAP and PoP3 protocols are thoroughly studied. Requirement specification analysis was done after discussion with internship supervisor. Project planning, design and implementation was carried out as per the project requirement under the guidance of supervisor.

## Literature Review

## Specific Problem Analysis

Specific problem analysis is the in-depth analysis of the domain to better understand the problem and work towards its solution. It defines the degree of the problem and helps to recognize whether the problem is genuinely related to the subject matter. With the root cause of the problem analyzed, various counter measures such as developing an alternative can be taken.

### Understanding the Existing System

Various existing systems, both web based and desktop mail clients were studied. Various mail protocols were also studied for the better understanding of mail protocols. Various desktop mail clients such as Mailbird, Outlook by Microsoft, Mozilla Thunderbird were studied. The existing mail clients support various protocols and have multiple functions which user can chose from. These function make the software far more useful but complex as well. The email client proposed by the author is far simpler than the existing system and is easier to use.

### Development of Project Goals

After thorough study and having better understanding of the existing system, and analyzing the problem to be solved, the goals for the project were formulated. Following were the goals developed by the author:

* The interface design for the new system can be made simpler than existing system
* Support for both PoP and IMAP protocols are added
* Support for any mail services such as Gmail, Outlook etc

## Management Strategy

### Time Management Strategy

“Time Management” is the process of organizing and planning how to divide the time between specific activities [9]. Effective time management strategy can protect project from heading toward failure. Collecting the task in a to-do list is an effective way of remembering the thing to be done during the development of project. Estimating task and setting deadline for each of the task will avoid last minute problems. Similarly, setting priorities for the work to be done can also save a lot of time. Difficult task get the highest priorities and must be solved before moving to any other task.

### Cost Management Strategy

Cost management is the process of planning and controlling the budget of a business. Cost management is a form of management accounting that allows a business to predict impending expenditures to help reduce the chance of going over budget [10]. Development, Operational and Maintenance cost are the factors that are considered highly during the development of the project. The system is developed in java which is a free open source programming platform. Since the API used are also free and the system runs on local computer there is no additional server charges. Similarly, maintenance

### Data Collection Strategy

#### Interview

Interview is conducted with CTO of Guru Infosys on how the proposed system can be developed and what are the technologies that can be used. Various question were raised about the efficiency of Desktop based system over Web based client.

#### Questionnaire

#### Secondary Sources

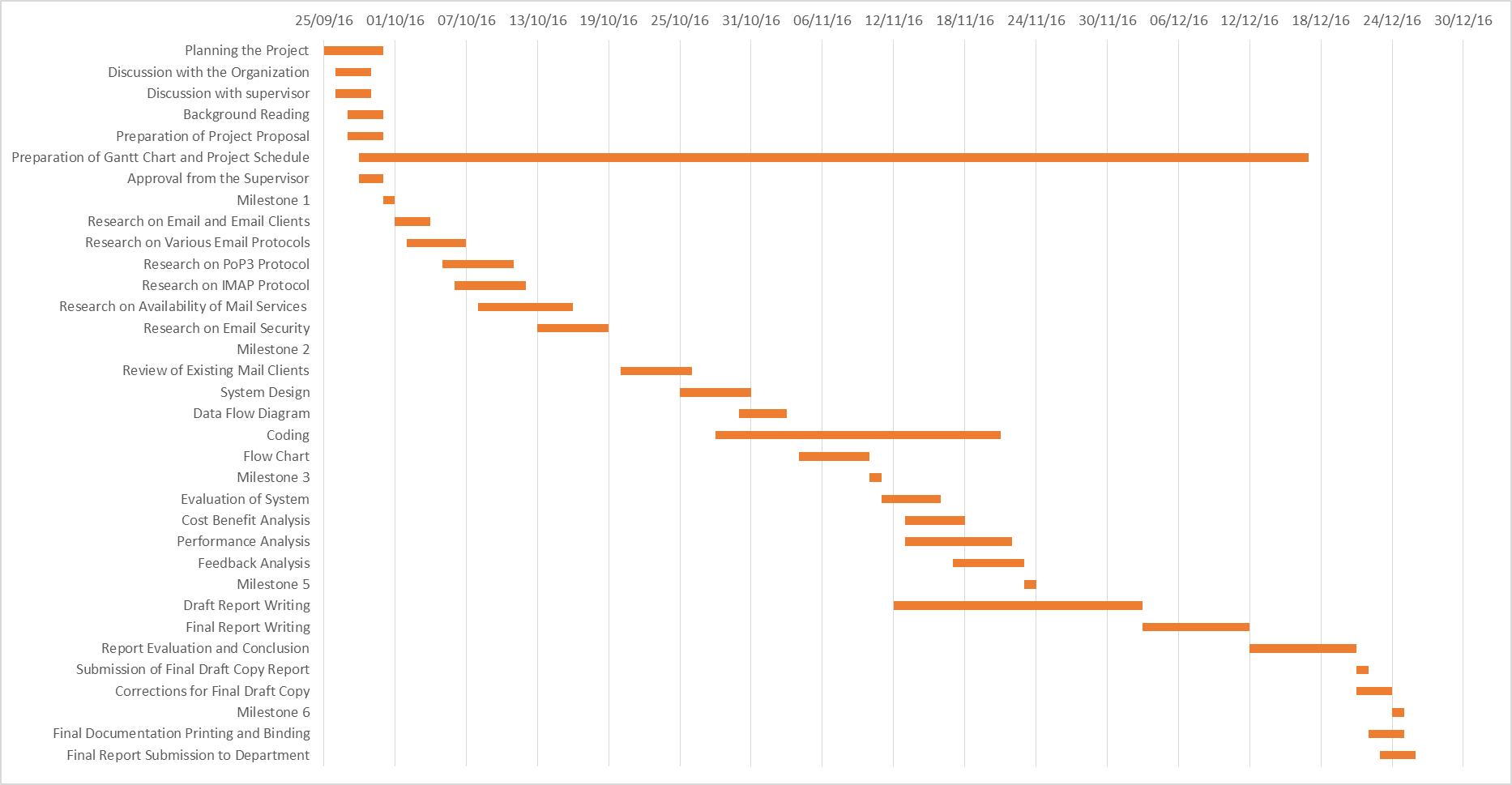
Internet was the secondary source of research for this project. The research was done on the internet to understand the system better and learn the current trends in development of desktop email clients.

## Project Schedule

### Time Schedule



### Gantt chart



# CHAPTER 3: SOLUTION DESIGN

## Project Management Plan

Project management is the discipline of using established principles, procedures and policies to manage a project from conception through completion [11]. Project management oversees the planning, organizing and implementing of a project. A project is an undertaking with specific start and end parameters designed to produce a defined outcome [12]. The overall development of the system was carefully analyzed under the proper guidance from the supervisor.

### System Analysis

Systems analysis the process of observing systems for troubleshooting or development purposes. It is applied to information technology, where computer-based systems require defined analysis according to their makeup and design [13]. The system analysis was done to check whether it would be feasible with regard to issue with technology, economy and various other aspect that may affect the system under development.

#### Feasibility Study

The main aim of the feasibility study activity is to determine whether it would be financially and technically feasible to develop the product. The feasibility study activity involves the analysis of the problem and collection of all relevant information relating to the product such as the different data items which would be input to the system, the processing required to be carried out on these data, the output data required to be produced by the system as well as various constraints on the behavior of the system [14] [15].

##### Technical Feasibility

The technical issue of the system usually raised during the feasibility stage of the investigation includes the following:

* Does the necessary technology exist to do what is mentioned?
* Is the system upgradeable?
* Is the system reliable, accurate and consistent?

The system is technically feasible, since all of the required resource are open source and available freely. Various mail API’s can be used for the development of the system. The system provides technical guarantee of accuracy, reliability and security.

##### Economic Feasibility

Economic feasibility determines whether the required software is capable of generating financial gains for an organization. It involves the cost incurred on the software development team, estimated cost of hardware and software, cost of performing feasibility study, and so on [16]. The application is built using open source platform and therefor does not require any additional hardware and software. All the development toolkit are available free of cost.

##### Legal Feasibility

The legal feasibility analyzes and deals with various legal issues and investigates if the proposed system conflicts with legal requirements like data protection acts or social media laws [17]. The legal issue in this project are none since java is an open source platform under GNU General Public License, which guarantees end users the freedom to run, study, share and modify the software.

##### Operational Feasibility

Operational feasibility is a measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development [18]. The system operates with bare minimum faults and the application being developed in java, the application can be executed in any operating platform.

##### Schedule Feasibility

Schedule Feasibility is defined as the probability of a project to be completed within its scheduled time limits, by a planned due date. If a project has a high probability to be completed on-time, then its schedule feasibility is appraised as high. In many cases a project will be unsuccessful if it takes longer than it was estimated [19]. Since the project was going accordingly to time schedule so it is feasible.

### System Design

#### Context Diagram

The Context Diagram shows the system under consideration as a single high-level process and then shows the relationship that the system has with other external entities (systems, organizational groups) [20].

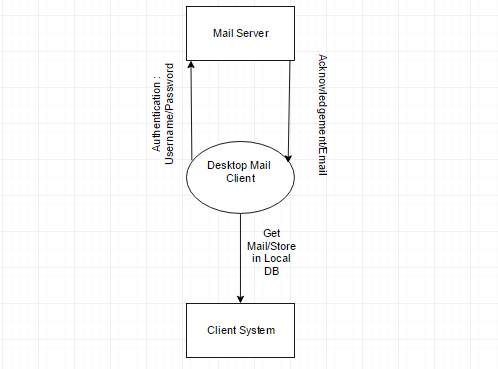


Figure 1: Context Diagram

#### Data Flow Diagram (DFD)

C:\Users\lambo\Downloads\DFD.png

Figure 2: Data Flow Diagram level 1

#### ER Diagram

#### Use Case Diagram

C:\Users\lambo\Downloads\UseCase.png

Figure 3: Use Case Diagram

#### System Sequence Diagram

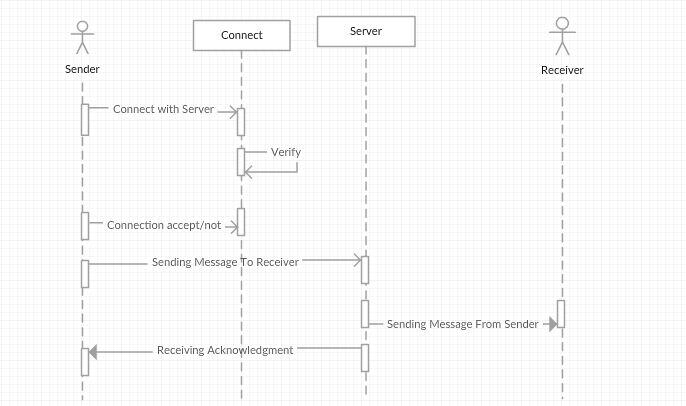


Figure 4: System Sequence Diagram

### Alternative Solution

## Technical Requirement

### Hardware Requirement

The minimum Hardware requirements are:

* Intel Pentium IV processor
* 1GB RAM
* Hard Drive 20GB
* Personal laptop/computer

### Software Requirement

* Operating System (any)
* JDK 7.0 or later
* Java Mail API

### Cross Platform Compatibility

Since the application code is written in Java, it can be hosted in any operating system. Since java is an open source cross platform compatible language all the libraries and API used in the application are supported by any operating system and devices.

# CHAPTER 4: IMPLEMENTATION STRATIGIES

## Testing Strategies

Testing is the process of evaluating a system or its component(s) with the intent to find whether it satisfies the specified requirements or not. In simple words, testing is executing a system in order to identify any gaps, errors, or missing requirements in contrary to the actual requirements [21]. Some of the testing strategies used during the development of the system are:

### Unit Testing

Unit testing is a technique using which individual modules are tested to determine if there are any issues by the developer himself. It is concerned with functional correctness of the standalone modules [22]. Various modules are tested separately during unit testing.

* Message Sending Module:

Message was sent to another email address with attachment. Message was delivered successfully.

* Setting Properties:

Username, password and SMTP port and server were set up successfully.

### Integration Testing

Integration testing is the process of bringing together all the modules to verify the combined functionality. In this project, the integration test was done to conform the interaction between Sending Module, Receiving Module and SMTP properties module. The confirmation was done by running the application in a real time scenario

### White Box Testing

This testing is based on knowledge of the internal logic of an application’s code. Also known as Glass box Testing. Internal software and code working should be known for this type of testing [23]. During this testing phase no errors were encountered.

### Black Box Testing

Black box testing is a testing technique that ignores the internal mechanism of the system and focuses on the output generated against any input and execution of the system. It is also called functional testing. In this project, the black box testing is performed with many test cases. The test data are prepared and the outputs are seen. To see how errors are handled, the wrong inputs were also given to the system. The system handled the wrong inputs safely.

### User Acceptance Testing

Normally this type of testing is done to verify if system meets the customer specified requirements. User or customer do this testing to determine whether to accept application [24]. The system was provided to number of colleagues for use. The feedback was used to improve the system performance

## Hardware Implementation

The system was implemented on the system with following specifications:

* 8 GB RAM
* Intel I5 dual Core Processor

## Software Implementation

The system was implemented on:

* Windows 10 Home
* JDK 8.0.1

# CHAPTER 5: RESULT ANALYSIS

## Result

The system is supposed to work as a desktop email client which could help the user to get their email information. The user can view the incoming email as well as send their own email using this application.

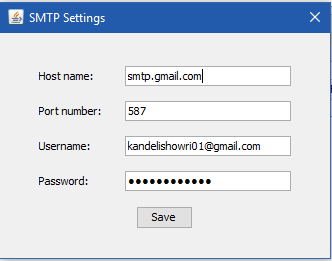


Figure 5: SMTP settings

Figure 5 shows the screenshot of the SMTP setting of the application. The SMTP setting for sending email includes a host name provided by mail service provider and port number along with username and password. The authentication is done using the information provided in above setting dialog.

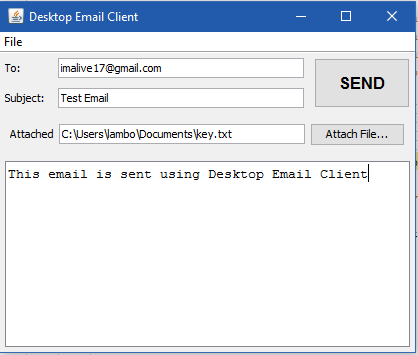


Figure 6: Sending Email

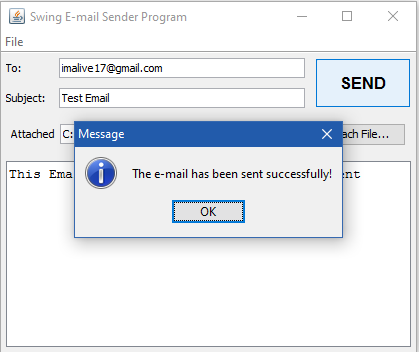


Figure 7: Mail Sent Successfully

The two figures above, Figure 6 and 7, show the sending of email using desktop email client.

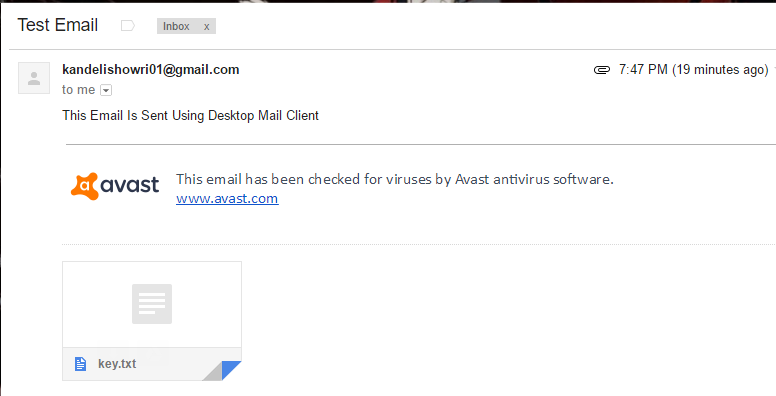


Figure 8: Email Received By Receiver

The figure 8 shows the email received by the receiving email address. Email was received along with the attachment.

## Critical Analysis

## Limitation of the System

Some functionalities provided by the web mail client are not present on the application. Some of the limitation of the system are:

* Desktop mail client lacks intelligent user interface and functionalities such as auto complete of email address while sending mail
* The UI design is primitive in contrast to modern mail clients
* Various categories such as important mail, trash, flagged mail are not available in the application
* Formatting email with font style and font size is not available

## Recommendation to the Organization

Guru Infosys has been developing both desktop and web based system using various technologies such as .NET and Java. The goal of the organization is to provide quality service to the customers

## Recommendation to the Internship Program