INDIRA GANDHI NATIONAL OPEN UNIVERSITY

PROJECT TITLE

Encryption System

by

Bhanu Pratap Mishra

Under Guidance

of

Counsellor Mcs 044

Submitted to the School of Computer and Information Sciences
in partial fulfilment of the requirements
for the degree of

Masters
of
Computer Applications

Indira Gandhi National Open University
Maidan Garhi
New Delhi – 110068.

Title of Project Report : Encryption System(AES)

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MCS-044
Mini Project Proposal
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INTRODUCTION

1.1 BACKGROUND:

As the computers and networked systems increases in the world of today, the need for increased data security also becomes necessary and important. The development of computer network system has exposed many networks to various kinds of authentication threats and with these exposures; one can see that the need for increased network and data security is vital and important in every organization.

The security may include identification, authentication and authorization of user in a network environment. Some cryptography technique may be used to solve all these problems.

Cryptography technique has reduced unauthorized access of data. Encrypted data may be stored in to file. Then authorized person are supposed to decrypt this data with the help of some keys.

1.2 OBJECTIVES

The main objective of our project is to encrypt or decrypt the any files for personal and professional security. Encryption and Decryption protects privacy of our documents and sensitive files by encrypting them using Advanced Encryption Standard (AES) algorithm to provide high protection against unauthorized data access.
In today's world the networking plays a very important role in our life. Most of the activities occur through the network. For the safe and secured exchange of information, we need to have security. The encryption has very wide applications for securing data.Encryption refers to set of algorithms, which are used to convert the documents and any files to code or the unreadable form of files, and provides privacy. To decrypt the file to receiver uses the "key" for the encrypted files.

If you want to send sensitive information via email, simply paste the encrypted text or any files into your email or attach the encrypted file.

All the recipient has to do is to decrypt your text or any file. Encryption and Decryption works with text information and any files. Just select what you want to encrypt, and Encryption and Decryption software helps you keep documents, private information and files in a confidential way.

The project has the following objectives

1) Storing important information in encrypted form ensuring security.

2) We can prevent information loss when system crashes occurred.

3) The information will be recovered from the backup data.

4) Enhancing efficiency of data retrieval.

5) File Sending.

6) Better accuracy and improved consistency.

7) Help facility will be provided.

8) To understand and improve the computer data security through encryption of data.

9) To enhance the integrity of data.

10) To develop a platform to complement physical security.

1.3 PURPOSE AND SCOPE

1.3.1 PURPOSE:

In today's world most of the communication is done using electronic media. Data security plays vital role in such communication. Hence, there is a need to protect data from malicious attacks. This can be achieved by cryptography. The earlier encryption algorithm is Data Encryption Standard (DES) which has several loopholes such as small key size and sensible to brute force attack etc. These loopholes overcome by a new algorithm called as Advanced Encryption Standard Algorithm.

1.3.2 SCOPE:

The scope of our project is presently specific. Both the sender and the receiver must have this software installed on their systems to encrypt or decrypt and compress or decompress the files transmitted between them. This includes all the users who want to interact electronically, whether it is through emails, sending a files etc.through local area network in order to keep their private information confidential.

- Each step is clearly stated and user will not face any ambiguity in using the software.
- The software provides clarity in its functionality even to naïve users.
- No complexity is involved.
- The various scope which cryptographic algorithms guarantees certain level of security, confidentiality and integrity of data.

2 SURVEY OF TECHNOLOGIES:

This project can be developed in any language as here we uses AES Encryption Algorithm and since Encryption algorithms can be encoded in any language so does this project, so languages such as Java, C++ or python anyone can be used but here **python is the best fit for this project due to certain reasons:**

1) Built In libraries for Numerical Computation:
Being an open source and platform independent python provides a greate variety of libraries for usual and complex both type of tasks, it has very effecient libraries regarding the Numerical Computations entities which gives us liberty to use them rather than buiding each thing from scratch.

2) Highly Object Oriented:
Python is one of the popular object oriented programming language in the recent past and at present also,which helps us in using the object oriented methods and concepts quite easily in this language.

3) Faster rate of Development:
Being an open source and very popular language, python is flourishing like nothing else and which provides us facilites to nuture our code and modify it to the best level, which can be easily done in this language.

4) Interpreted Than Compiled:
Since python is interpreted by its interpreter rather than compiled which makes it user friendly for the detection of errors in codes whether it would be a logical or syntax error, both can be easily rectified in this language.

3 REQUIREMENTS AND ANALYSIS

3.1 PROBLEM DEFINITION:

Project Mission

The aim of our project is to develop software named "ENCRYPTION SYSTEM". The project encrypts and decrypts the any files using Advanced Encryption Standard (AES) algorithm to maintain the security and integrity of data and information and to provide high protection against unauthorized data access.

Target

Our target is the common man who wants to interact client and server, whether it is through messages, documents and any files etc. Through network via file sending sensitive messages or documents over the network is very dangerous.So, our project helps him to interact in a safe and secure manner in order to keep their private information confidential.

Target Users

The main target users of our project are the people who transmit confidential information network via file sending sensitive messages or documentst hrough the client server interaction.

Scope and Key Elements

The scope of our project is presently specific. Both the sender and the receiver must have this software installed on their systems to encrypt/decrypt and compress/decompress the files transmitted between them. The system provides the security and integrity of data or information.

- It will provide a more clear and non-ambiguous description of the functions.
- The system is highly user friendly.
- It uses secret keys for encryption and decryption.
- The software provides clarity in its functionality even to naïve users.

Analysis is the detailed study of the various operations performed by a system and their relationships within and outside the system. System analysis is an approach to study the system and find a solution. It provides as frame work for visualizing the organizational facts that operate on a system. The aspect of analysis is defining the boundaries of the system and determining whether or not a candidate system should consider.

During the analysis the data are collected from the available resources for analysis. Information from the existing system, dataflow diagram, on site observations and interviews are the various tools used during the analysis to collect information. The natural problem solving process consists of the following steps.

1) The identification of the problem situation that needs to be solved.

2) Defining the problem.

3) Defining the desired outcome.

4) Provide possible alternative solution.

5) Identifies and selects the best one among them.

Identification of Need

This network project aims to achieve storing of most important information in encrypted form. They rely on a secret piece of information called the key. Hacker's objective is to obtain the key from the communication. The various scope which cryptographic algorithms guarantees certain level of security, confidentiality and integrity of data.

There is great need for encryption, authentication techniques, user identification and passwords. These will all protect your computer from damage or from hackers (people who gain access to your Computer and then steal your Data).

Encryption is only one method which can be used when you want to be able to protect your computer from harm and hackers. Encryption is when you put a secret key or password on your work that will then transform your data into an unreadable file if you don't have the secret key and password. It is best to encrypt something that you will transfer over the network because it has high chances of being stolen because it is rather easy when it is being transferred so much from computer to computer. Now the best way to transfer this secret key is face to face because otherwise then the secret key might be taken by someone else will you transfer it across the network. Encryption is a pretty easy thing to do but if one of your documents really needs to be encrypted for its safety it is extremely easy to find software to help you increase your security.

Feasibility study

After investigation it is essential to determine whether the project is feasible or not. In feasibility study is tested whether the system to be developed would be able to accomplish its task on the working grounds. Its impact was also found to be not adverse. It was found that the user's requirements would be met and the resources would be used in an effective manner. In feasibility study the important aspects related to the project were considered like the problem definition and the process for solution. The cost and benefit analysis was also done.Essential features involved in the feasibility analysis are:-

- Behavioral Feasibility
- Economic Feasibility

- Technical feasibility
- Operational Feasibility

Behavioral Feasibility

An estimate should be made of how strong a reaction the users is likely to have toward the development of a new system. It is common that the new system requires special effort to educate, sell and train the users. But in the case of the Virtual Drive, anyone who has a basic knowledge of computer can easily work with this system so the users do not feel any difficult with this, so they can accept the system without any willingness.

Technical Feasibility

Technical feasibility revolves around the technical support of the project. The main infrastructure of the project included the project labs in the college campus. The systems there were easily able to absorb the new software being installed. The project thus was technically feasible. The equipment and the software produced no problem. The project's technical requirements were met. The project could be made to work correctly, fulfilling its task, with the existing software and personnel.

Economic Feasibility

The project developed, Encryption and Decryption was within budget and producing the desired results. The labor or the human ware consisted of the four group members of our project. The output consisted of getting the desired results. Thus with the consideration of the inputs, the outputs were achieved successfully. The project was within limit. The inputs didn't overdo the outputs.

Operational Feasibility

Operational Feasibility aims to determine the impact of the system on the users. The system developing has an influence on its users. Our system "Advanced Encryption System" was new for them but it was simple enough for any naïve person to understand. The evolution of this new system required no special training for the users. Encryption and Decryption was found to be feasible in this regard. The system developed would be user friendly and no complexities would be involved in its functionalities.

3.2 REQUIREMENTS SPECIFICATION

The main aim of preliminary analysis is to identify the problem. First, need for the new or the enhanced system is established. Only after the recognition of need, for the proposed system is done then further analysis is possible.

Existing System

In the existing system, the encrypted key is send with the document; any user can view the encrypted document with that key. It means the security provided for the encryption is not handled properly. And also the Key byte (encrypted key) generate with random byte. Without the user interaction the Key byte is generated. As observed the current encryption/decryption software's doing the encryption and decryption task are all very complicated in their functionality. The method of encryption/decryption and key generation of current system for a new user to understand is complex in nature.

Drawbacks

Some of the drawbacks are:

1. Lack of security

2. Key byte is generated without user interaction

Proposed System

The proposed system is quiet simple to use. It is not complex in its functionalities. It is easy for a naïve user to use it.

If you want to send sensitive information via network, simply paste the encrypted file.
All the recipient has to do is to decrypt your file.Encryption and Decryption works with any information and files. Just select what you want to encrypt, and Encryption and Decryption software helps you keep documents, private information and files in a confidential way. The proposed system will help the user to reduce consuming time. The system requires very low system resources and the system will work only in network connections.

Benefits

1. Security is enhanced in well manner.
2. Users set the byte key manually.

Software Requirements Specification

Software Requirements Specification (SRS) is the starting point of the software development activity. Little importance was given to this phases in the early days of software development. The emphasis was first on coding and then shifted to design.

The purpose of this project is to demonstrate how some of the more popular encrypting algorithms. The system will allow the user to enter any files, select an encryption method, and then view the file encrypted by the selected algorithm. When an encryption method is selected, options pertaining to that specific algorithm will be displayed for the user to customize. When

the user presses the "Encrypt" button, the algorithm will then begin encrypting the files. After each calculation, a file will be displayed to the user relating to the operation that has just been performed. These files will allow the user to understand the method used in the encryption algorithm. When the algorithm is finished, the user will have the file encrypted according to the method selected and options selected.

Some of the difficulty is due to the scope of this phase. The software project is imitated by the client needs. In the beginning these needs are in the minds of various people in the client organization. The requirement analyst has to identify the requirements by tacking to these people and understanding their needs. In situations where the software is to automated a currently manuals process, most of the needs can be understood by observing the current practice.

The SRS is a means of translating the ideas in the minds of the clients (the output) into formal document (the output of the requirements phase). Thus the output of the phase is a set of formally specified requirements, which hopefully are complete and consistent, while the input has none of these properties.

Performance Requirements

The project must the end user requirements. Accuracy and fast must be imposed in the Project. The project is development as easy as possible for the sake of end user. The project has to be developed with view of satisfying the future requirements and future enhancement. The tool has been finally implemented satisfying the needs specified by the company. As per the performance is concerned this system said is performing This processing as well as tine taken to generate well reports were also even when large amount of data was used.

Security Requirements

Web application are available via network access, it is a difficult. If not possible, to limit the population of the end-user who may access the applications? In order to product sensitive connect and provide secure mode be implemented throughout the infrastructure that the supports web application and within the application itself.

Design Requirements

To create project, add base masters and masters to the project, assign behaviors to the master, create and assign behavior sets, and then apply, test and validate those behaviors. It also shows how to create and build a stencil to hold the shapes.

Quality and Reliability Requirements

A software component that is developed for reuse would be correct and contain no defects. In reality, formal verification is not carried out routinely, and defects can add to occur.However, with each reuse, defects are found eliminated, and a components qualify improve as a result. Over time the components virtually defect free.

Software reliability is defined in statically term as ”the probability of faultier-free operation of a computer program in a specified environment for specified tine”. The software quality and reliability, failure is nonconformance to software requirements. Failure can be only anything or catastrophic. One failure can be corrected within seconds while another requirements week even mouths to correct. Complicating the issue even further, the correction of the one failure may in fact result in the introduction of the errors that ultimately result in other failure.

3.3 Planning and Scheduling:

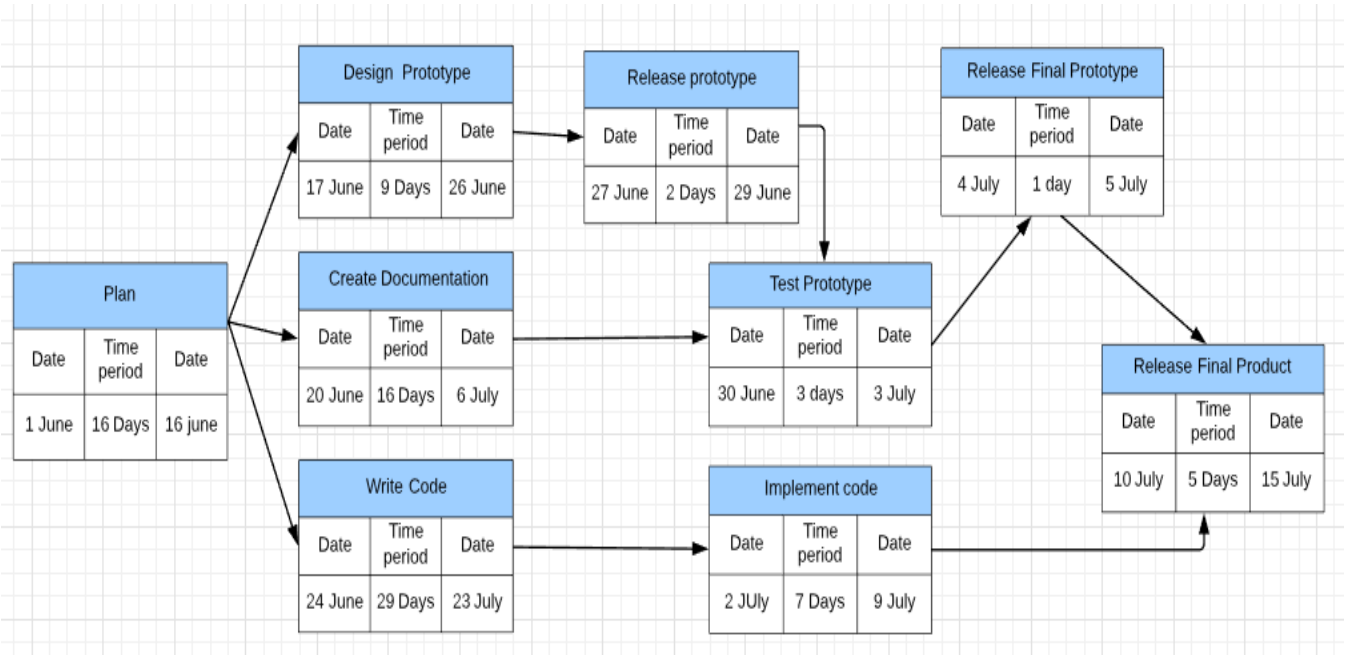
Gantt Chart

A Gantt chart is popular type of chart that illustrates a project schedule. Gantt Chart illustrates the start and finish dates of the terminal elements and summary elements of a project. Terminal element and summary comprise the work breakdown structure of the project.

Task	4Apr-30Apr	31Apr-9May	10May-12June	13June-12Jully	13Jully-18Jully	18Jully-23Jully
Develop project proposal	27 days					
Analysis		10 days				
Designing			30 days			
Coding				29days		
Unit Testing					5 days	
Implementation						5 days

Gantt Chart

Pert Chart



3.4 SOFTWARE AND HARDWARE REQUIREMENTS:

3.4.1 HARDWARE REQUIREMENTS:

Client Side	
Processor	Dual Core or above
RAM	1 GB
Disk space	500 GB
Monitor	15”
Others	Keyboard, mouse, Internet Connection

Server Side	
Processor	I3 or above
RAM	4 GB
Disk space	500 GB
Monitor	15”
Others	Keyboard, mouse, Internet Connection

3.4.2. Software Requirements:

To develop this project there are certain software requirements that needs to be fulfilled and these are as follows:

1) Anaconda Distribution 5.3.0 or higher :
This is needed to provide python version 3.6 or higher and other supporitive libraries built formachine learning and othere powerfull uses of python language.

2) Jupyter Notebook or Jupyter Lab:
It is a web based user interface, which works as an IDE for the supportive kernels, and it is needed to prepare the notes and for trying dry code runs, moreover it is a full fleged utility to work interactively with codes.

3) Visual Studio Code:
It is an Ide which is needed to help in creating effecient code files with proper extensions provided in it for python and other languages such as Html and javascript, and the whole project actual compilation would be performed here only in this project.

4) Selenium Automated Testing Suite:
This is needed for performing the Automated testing of the project developed as a whole and as well as different units of the project. Moreover for the use of selenium there is also a need of corresponding web browser driver, which is needed to bind the selenium automated testing suite to the web browser that user want to use.

5) Mathematical Computation Library 'Numpy’: They are needed for performing the task of deducing the semantic textual similarity between the two sentences and to train the developed model for the algorithims used in this project.

6) Web Browser:
This is needed to perform the testing procedure at the time of project development more specifically the elements of the web interface developed.

7) Linux OS:
since any operating system can be used for the project development but the open source linux is quite better in terms of integrating the above mentioned softwares effeciently.

8) Lucidchart:
This is a website which provides easy diagramming tool for the development UML Diagrams and other figures used in this projet at no cost.

9) Libre office:
This is an open source office package which is needed for the development of documents used in this project.

3.5 PRELIMINARY PRODUCT DESCRIPTION:

Functions

- Development of security control components for front-end systems.
- High-speed data encryption/decryption operations, password authentication, and key management for back-end system.
- For real-world applications, a complex web of software systems is required to ensure security.

Features

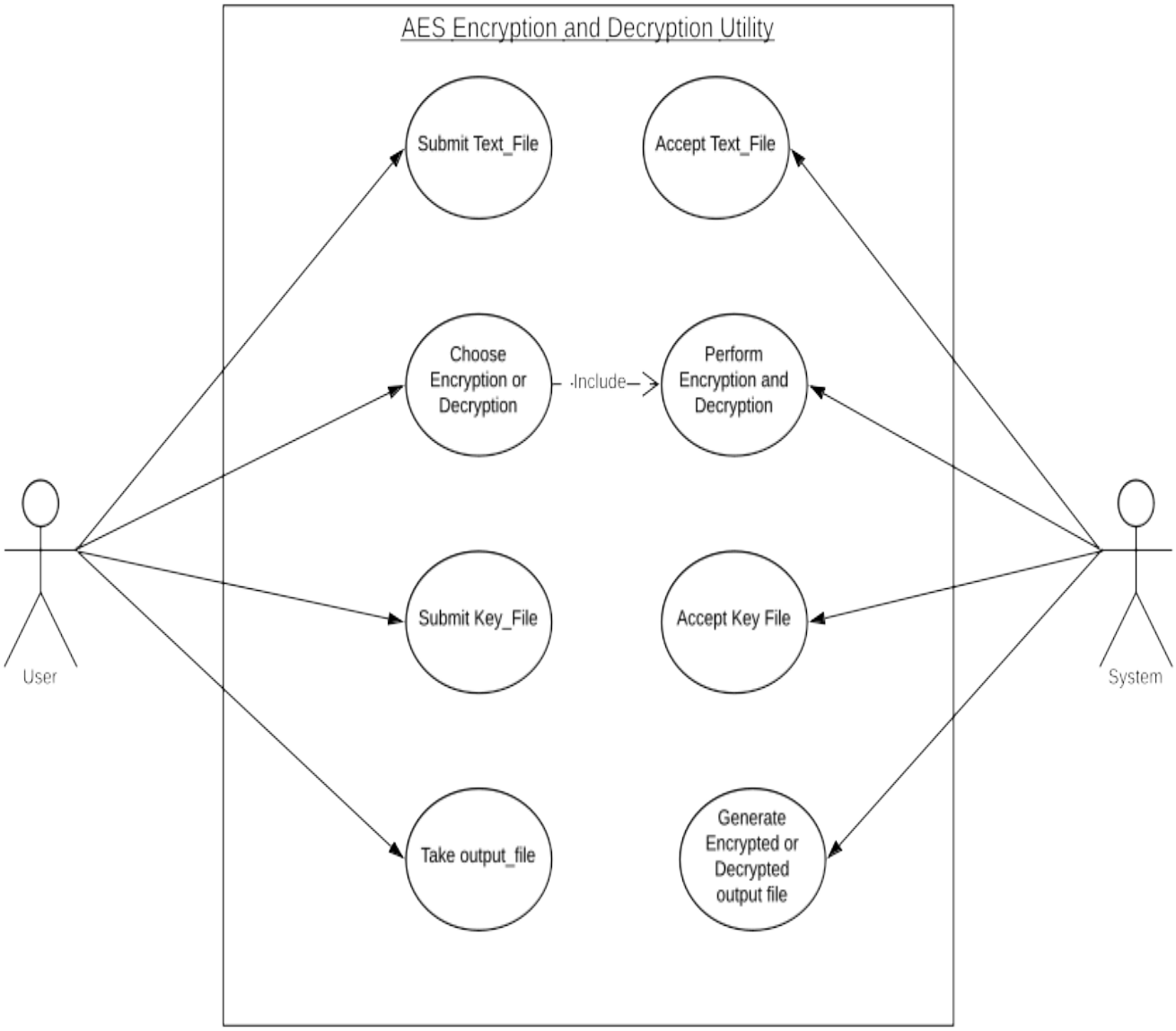
- The system is highly user friendly.
- It uses different keys (a key pair) for encryption and decryption. These algorithms are called "AES".
- The system provides security and convenience as keys never need to be transmitted or revealed to anyone.
- The system provides the integrity of data or information.
- The software provides clarity in its functionality even to naïve users.
- Network connection encryption/decryption services: Providing host encryption/decryption operations via network connection through the external security control server.
- Complete key building service: Providing complete key building and management functions, supporting multi-server key sync operations.

Benefits

In order to successfully expand the business, the security level of various application systems is enhanced to meet the requirement from authorities or organizations.

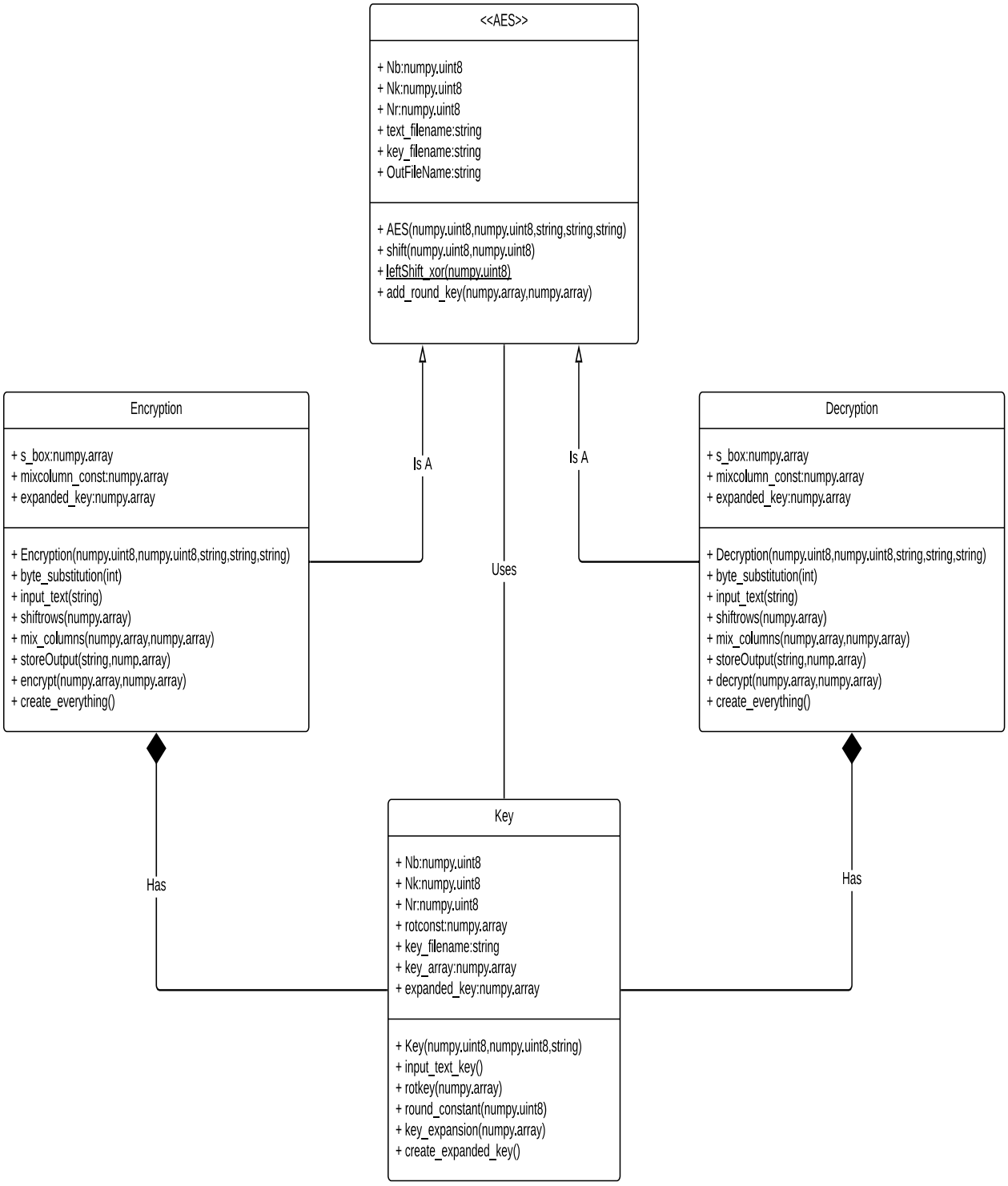
- Enhancing the security level of various application systems to prevent leakage of confidential information.
- Complying with the security specifications of various authorities and international organizations to successfully expand different businesses.

3.6 Conceptual Models:



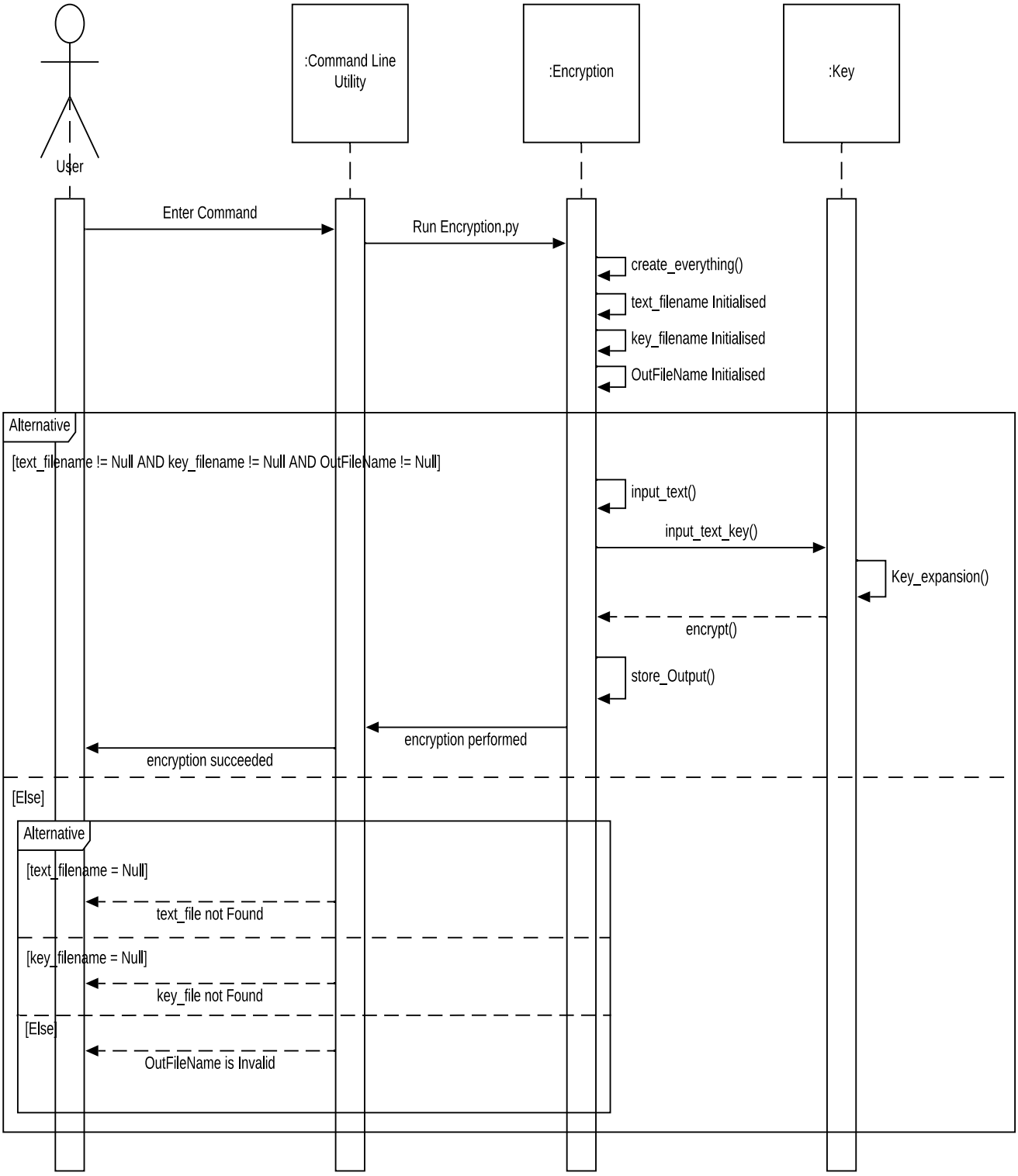
1. USE CASE DIAGRAM

Class Diagram



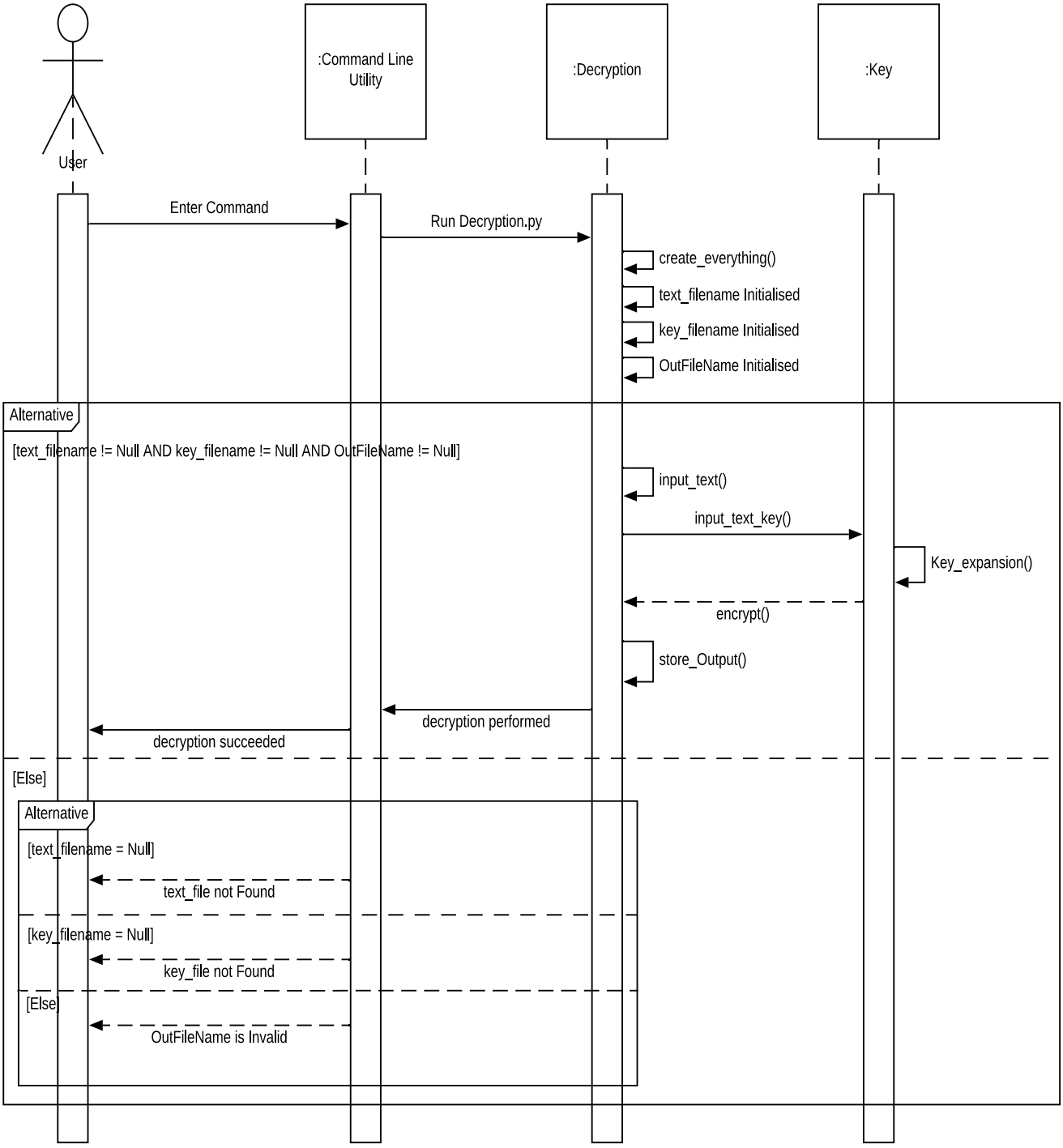
2. CLASS DIAGRAM

Encryption Sequence Diagram

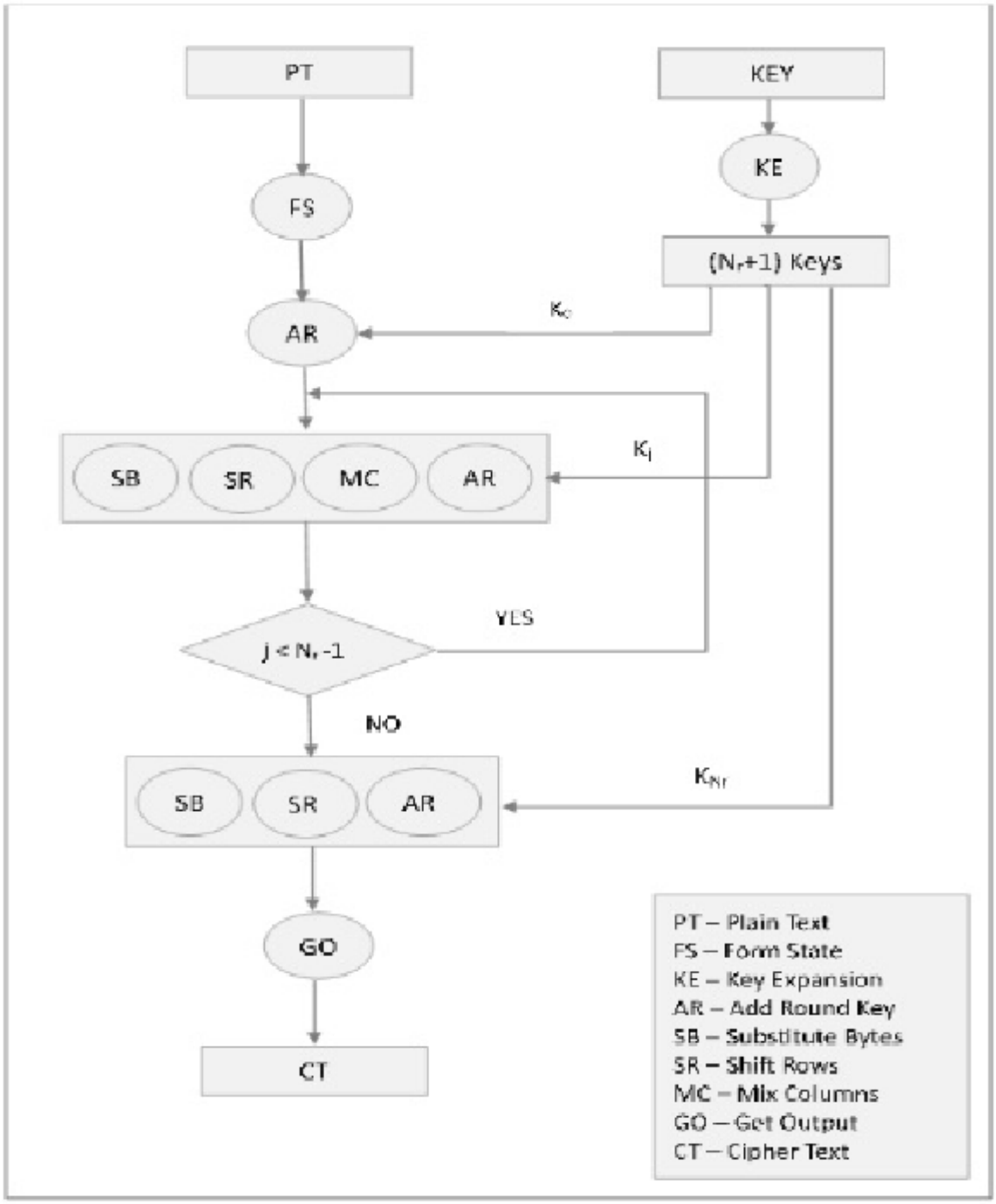


3. SEQUENCE DIAGRAM FOR FILE ENCRYPTION

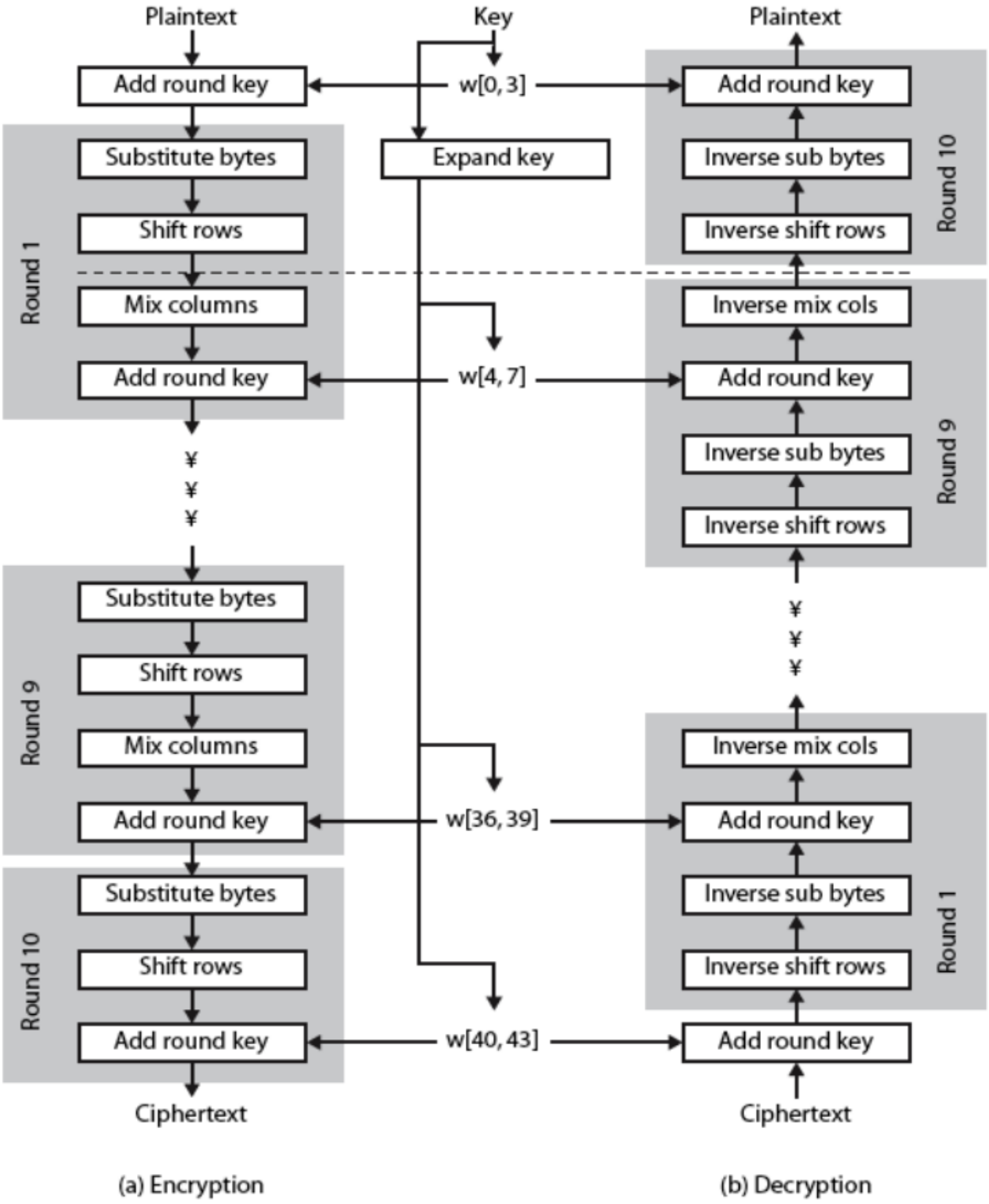
Decryption Sequence Diagram



4. SEQUENCE DIAGRAM FOR FILE DECRYPTION


PT
KEY
FS
KE
(Nr+1) Keys
AR
Kc
SB
SR
MC
AR
Ki
YES
j < Nr -1
NO
SB
SR
AR
KNr
GO
CT
PT – Plain Text
FS – Form State
KE – Key Expansion
AR – Add Round Key
SB – Substitute Bytes
SR – Shift Rows
MC – Mix Columns
GO – Get Output
CT – Cipher Text

5. FLOW CHART



6. BASIC STRUCTURE OF AES

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CERTIFICATE OF AUTHENTICATED WORK

This is to certify that the project report entitled _____ submitted to **Indira Gandhi National Open University** in partial fulfilment of the requirement for the award of the degree of **MASTER OF COMPUTER APPLICATIONS (MCA)** is an original work carried out by Mr./ Ms._____ enrolment no. _____ under my guidance. The matter embodied in this project is authentic and is genuine work done by the student and has not been submitted whether to this University or to any other University / Institute for the fulfilment of the requirement of any course of study.

…….	...…….
Signature of the Student:	Signature of the Counsellor
Date: ……..	Date: ……
Name and Address of the student	Name, Designation and Address of the Counsellor
……..	……
……..	…….
……..	……..
Enrolment No……	

ABSTRACT

The title of our project is “ENCRYPTION SYSTEM”. This project encrypts and decrypts the files by using Advanced Encryption Standard (AES) algorithm. Our aim is to develop the software named ENCRYPTION SYSTEM that encrypts and decrypts the files by using Advanced Encryption Standard (AES) algorithm. Encryption and Decryption is strong file encryption software for personal and professional security. It protects privacy of our documents and sensitive files by encrypting them using Advanced Encryption Standard (AES) algorithm to provide high protection against unauthorized data access.

In today’s world the networking plays a very important role in our life. Most of the activities occur through the network. For the safe and secured exchange of information, we need to have security. The encryption has very wide applications for securing data.Encryption refers to set of algorithms, which are used to convert the documents and any files to code or the unreadable form of files, and provides privacy. To decrypt the file to receiver uses the “key” for the encrypted files.

This project work helps you to understand what cryptography is all about and the procedures used to achieve this aim, it explains the design and implementation of computer security: data encryption and decryption and AES algorithm. The programming language used in the development of this project is python.**Python** is a general-purpose interpreted, interactive, object-oriented, and high-level programming language. It was created by Guido van Rossum during 1985- 1990. Like Perl, Python source code is also available under the GNU General Public License (GPL). This **tutorial** gives enough understanding on **Python programming** language.

ACKNOWLEDGEMENT

With all praises to the almighty God whose abundant Grace and Mercies enabled me to complete this project. I would like to express my profound gratitude to all the people who have inspired and motivated me to make this project a success.

I dedicate this project to my parents for the inspiration, strength and blessing endowed upon me.

I would like to express my sincere thanks to our Course Coordinator for his invaluable suggestion given at every step. I think him for all his encouragement, inspiring, guidance, advice and suggestion throughout my project work.

Thanks are also due to all my faculties and friends, in my college for their timely help during the tenure of the project. Once again I think one and all who have helped me directly and indirectly in the successful completion of the project work.

Thanking you

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INTRODUCTION

◆ PURPOSE:

In today's world most of the communication is done using electronic media. Data security plays vital role in such communication. Hence, there is a need to protect data from malicious attacks. This can be achieved by cryptography. The earlier encryption algorithm is Data Encryption Standard (DES) which has several loopholes such as small key size and sensible to brute force attack etc. These loopholes overcome by a new algorithm called as Advanced Encryption Standard Algorithm.

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1) Storing important information in encrypted form ensuring security.

2) We can prevent information loss when system crashes occurred.

3) The information will be recovered from the backup data.

4) Enhancing efficiency of data retrieval.

5) File Sending.

6) Better accuracy and improved consistency.

7) Help facility will be provided.

8) To understand and improve the computer data security through encryption of data.

9) To enhance the integrity of data.

10) To develop a platform to complement physical security.

◆ TECHNOLOGY AND TOOLS:

1) Jupyter notebook:

It is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text. Uses include: data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning etc. The Notebook is a server-client application that allows editing and running notebook documents via a web browser. It can be executed on a local desktop requiring no internet access or can be installed on a remote server and accessed through the internet.

In addition to displaying/editing/running notebook documents. It has a “Dashboard” (Notebook Dashboard), a “control panel” showing local files and allowing to open notebook documents or shutting down their kernels.

Jupyter Notebook (formerly IPython Notebooks) is a web-based interactive computational environment for creating, executing, and visualizing Jupyter notebooks.

It is similar to the notebook interface of other programs such as Maple, Mathematica, and SageMath, a computational interface style that originated with Mathematica in the 1980s.It supports execution environments (aka kernels) in dozens of languages. By default Jupyter Notebook ships with the IPython kernel but there are over 100 Jupyter kernels as of May 2018.

2). Python:

Python is an interpreted, object-oriented, high level programming with dynamic semantics.

Its high level built in data structures, combined with dynamic typing and binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together.

Python’s simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. It supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

Debugging Python program is easy: a bug or bad input will never cause a segmentation fault. Instead, when the interpreter discovers an error, it causes an exception. When the program doesn’t catch the exception, the

interpreter prints a stack trace. A source level debugger allows inspection of local and global variables, evaluation of arbitrary expressions, setting breakpoints, stepping through the code a line at a time, and so on.

3) Pipenv and Pyenv:

pipenv lets you easily switch between multiple versions of Python. It's simple, unobtrusive, and follows the UNIX tradition of single-purpose tools that do one thing well.

This project was forked from rbenv and ruby-build, and modified for Python.

Pyenv does...

- Let you **change the global Python version** on a per-user basis.
- Provide support for **per-project Python versions**.
- Allow you to **override the Python version** with an environment variable.
- Search commands from **multiple versions of Python at a time**. This may be helpful to test across Python versions with tox.

In contrast with pythonbrew and pythonz, pyenv does not...

- **Depend on Python itself.** pyenv was made from pure shell scripts. There is no bootstrap problem of Python.
- **Need to be loaded into your shell.** Instead, pyenv's shim approach works by adding a directory to your $PATH.
- **Manage virtualenv.** Of course, you can create virtualenv yourself, or pyenv-virtualenv to automate the process.

Pipenv is a tool that aims to bring the best of all packaging worlds (bundler, composer, npm, cargo, yarn, etc.) to the Python world. Windows is a first-class citizen, in our world.

It automatically creates and manages a virtualenv for your projects, as well as adds/removes packages from your Pipfile as you install/uninstall packages. It also generates the ever-important Pipfile.lock, which is used to produce deterministic builds.

Pipenv is primarily meant to provide users and developers of applications with an easy method to setup a working environment. For the distinction between libraries and applications and the usage of setup.py vs Pipfile to define dependencies.

The problems that Pipenv seeks to solve are multi-faceted:

- You no longer need to use pip and virtualenv separately. They work together.
- Managing a requirements.txt file can be problematic, so Pipenv uses Pipfile and Pipfile.lock to separate abstract dependency declarations from the last tested combination.
- Hashes are used everywhere, always. Security. Automatically expose security vulnerabilities.
- Strongly encourage the use of the latest versions of dependencies to minimize security risks arising from outdated components.
- Give you insight into your dependency graph (e.g. $ pipenv graph).
- Streamline development workflow by loading .env files.

4). Numpy:

NumPy, which stands for Numerical Python, is a library consisting of multidimensional array objects and a collection of routines for processing those arrays. Using NumPy, mathematical and logical operations on arrays can be performed. This tutorial explains the basics of NumPy such as its architecture and environment. It also discusses the various array functions, types of indexing, etc. An introduction to Matplotlib is also provided. All this is explained with the help of examples for better understanding.

Chapter 2

Project Management

- Project Planning
- Project Scheduling
- Risk Management

2.0. PROJECT MANAGEMENT

◆ PROJECT PLANNING

Project Planning is concerned with identifying and measuring the activities, milestones and deliverables produced by the project. Project planning is undertaken and completed sometimes even before any development activity starts. Project planning consists of following essential activities:

◆ Scheduling manpower and other resources needed to develop the system.

◆ Staff organization and staffing plans.

◆ Risk identification, analysis, and accurate planning.

◆ Estimating some of the basic attributes of the project like cost, duration and efforts the effectiveness of the subsequent planning activities is based on the accuracy of these estimations.

◆ Miscellaneous plans like quality assurance plan, configuration management plan, etc.

Project management involves planning, monitoring and control of the process, and the events that occurs as the software evolves from a preliminary concept to an operational implementation. Cost estimation is a relative activity that is concerned with the resources required to accomplish the project plan.

1.1) Project Development Approach And Justification:

A Software process model is a simplified abstract representation of a software process, which is presented from a particular perspective. A process model for software engineering is chosen based on the nature of the project and application, the methods and tools to be used, and the controls and deliverables that are required. All software development can be characterized as a problem-solving loop which in four distinct stages is encountered:

- Requirement analysis
- Coding
- Testing
- Deployment

1.2) Milestones and Deliverables:

As software is tangible, this information can only be provided as documents that describe the state of the software being developed without this information it is impossible to judge progress at different phases and therefore schedules cannot be determined or updated.

Milestone is an end point of the software process activity. At each milestone there should be formal output such as report that can be represented to the guide. Milestones are the completion of the outputs for each activity. Deliverables are the requirements definition and the requirements specification.

Milestone represents the end of the distinct, logical stage in the project. Milestone may be internal project results that are used by the project manager to check progress. Deliverables are usually Milestones but reverse need not be true. We have divided the software process into activities for the following milestone that should be achieved.

Software Process Activity	Milestone
Project Plan	Project schedule
Requirement Collection	User requirements, System Requirements
Analysis of Dataset	Choosing of appropriate dataset.
Implementation	Algorithm implementation.

Table Milestones and Deliverables

1.3) Roles and Responsibilities:

This phase defines the role and responsibilities of each and every member involved in developing the system. To develop this system there is only one person involved in working on the whole application. The same was responsible for each and every part of developing the system. Our team structure is of single control team organization as it consist of me and my guide as chief programmer organization.

1.4) Group Dependencies:

The structure chosen for the system is the chief programmer structure .In this system, Chief Programmer team structure is used because in the organization, a senior engineer provides the technical leadership and is designated as the chief programmer. The chief programmer partitions the task into small activities and assigns them to me on time deadline basis. He also verifies and integrates the products developed by me and i work under the constant supervision of the chief programmer. For this system reporting entity represents myself and the role of chief programmer is played by my internal guide.

◆ PROJECT SCHEDULING

The scheduling is the peak of a planning activity, a primary component of software project management. When combined with estimation methods and risk analysis, scheduling establishes a roadmap for project management. The characteristics of the project are used to adapt an appropriate task set for doing work.

Task	1Dec-25Dec	31Jan-10Feb	10Feb-20Feb	20Feb-30Feb	30Feb-5March	5March-10March
Develop project proposal	25 days					
Analysis		11 days				
Designing			10 days			
Coding				10days		
Unit Testing					5 days	
Implementation						5 days

Fig. shows Gant chart of this Project

◆ RISK MANAGEMENT

Risk management consists of a series of steps that help a software development team to understood and manage uncertain problems that may arise during the course of software development and can plague a software project.

Risks are the dangerous conditions or potential problems for the system which may damage the system functionalities to very high level which would not be acceptable at any cost. so in order to make our system stable and give its 100% performance we must have identify those risks, analyze their occurrences and effects on our project and must prevent them to occur.

3.1) Risk Identification

Risk identification is a first systematic attempt to specify risks to project plan, scheduling resources, project development. It may be carried out as a team process using brainstorming approach.

Technology risk: Technical risks concern implementation and testing problems.

- Dataset Enlargement
- Algorithm Output.

People Risks: These risks are concerns with the team and its members who are taking part in developing the system.

- Lack of knowledge
- Lack of clear vision.
- Poor communication between people.

Tools Risks:

These are more concerned with tools used to develop the project.

- Tools containing virus.

General Risks:

General Risks are the risks, which are concerned with the mentality and resources.

- Rapidly changing Datasets.
- Lack of resources can cause great harm to efficiency and timelines of project.
- Changes in dataset can cause a great harm to implementation and schedule of developing the system.
- Insufficient planning and task identification.
- Decision making conflicts.

3.2) Risk Analysis

“Risk analysis = risk assessment + risk management + risk communication. ” Risk analysis is employed in its broadest sense to include:

Risk assessment

Involves identifying sources of potential harm, assessing the likelihood that harm will occur and the consequences if harm does occur.

For this project It might be :- Software(Tool) Crashing.

Risk management

Evaluates which risks identified in the risk assessment process require management and selects and implements the plans or actions that are required to ensure that those risks are controlled.

Precautions taken to make risks minimal are as under:-

Keeping the software tool up to date by updating the software periodically.

Risk communication

Involves an interactive dialogue between guide and us, which actively informs the other processes.

Steps taken for risk communication is as under: -

◆ All the possible risks are listed out during communication and project is developed taking care of that risks.

Chapter 3

System Requirements Study

- User Characteristics
- Hardware and Software Requirements
- Constraints Assumptions and Dependencies

◆ SYSTEM REQUIREMENT STUDY

◆ USER CHARACTERISTICS

Admin:-

- ◆ Mange project
- ◆ Add Features

User:-

- ◆ Encrypt Text Files.
- ◆ Insert Key Text File.
- ◆ Decrypt the Encrypted Text Files.

◆ HARDWARE AND SOFTWARE REQUIREMENT SPECIFICATION

This shows minimum requirements to carry on to run this system efficiently.

1.2.1) Hardware Requirements Server side Hardware Requirement:

Devices	Description
Processor	Intel Core Duo 2.0 GHz or more
RAM	512 MB or more
Hard Disk	10 GB or more

Table Server side Hardware Requirement

1.2.2) Software Requirements

For which	Software
Operating System	Windows XP/2003/vista/7/8/10,Linux, Mac OS x
Front End	Jupyter notebook
Back End	Numpy
Scripting Language	Python

Table Software Requirements

1.2.3) Client side Requirements

For which	Requirement
Terminal	Any command line supported OS.

Table client-side Requirements

- **CONSTRAINTS**

1.3.1) Hardware Limitations

The major hardware limitations faced by the system are as follows:

If the appropriate hardware is not there like processor, RAM, hard disks

-the problem in processing requests of client

-if appropriate storage is not there our whole database will crash due to less storage because our main requirement is large storage.

1.3.2) Interfacing with other systems

There should be the compatible terminal to perfectly detect operate with the script. The functionality of the system should be such that it can be used as sub module of some larger applications.

1.3.3) Reliability Constraints

The major reliability constraints are as follows:

- The software should be efficiently designed so as to give reliable recognition of fake news and so that it can be used for more pragmatic purpose.

- The design should be versatile and user friendly.

- The application should be fast, reliable and time saving.

- The system should have universal adaptations.

- The system be compatible with future upgradation.

- **DEPENDENCIES**

The entire project depends on various libraries of python. The libraries are as follows:

NumPy: NumPy is the fundamental package for scientific computing with Python. It contains among other things:

- a powerful N-dimensional array object
- sophisticated (broadcasting) functions
- tools for integrating C/C++ and Fortran code
- useful linear algebra, Fourier transform, and random number capabilities

Python: This module implements a number of iterator building blocks inspired by constructs from APL, Haskell and SML. Each has been recast in a form suitable for Python.

Chapter 4

System Analysis

- Study of Current System
- Problem and Weaknesses of Current System
- Requirements of New System
- Feasibility Study
- Requirements Validation
- Features of New System
- Data Flow Diagram
- ER Diagram
- UML Diagrams
- Selection of Hardware and Software and Justification

◆ STUDY OF CURRENT SYSTEM

There are various encryption system available which can be used to perform encryption and decryption based AES Encryption algorithm.

They uses various approaches to perform the encryption and decryption in the various possible ways.

◆ PROBLEMS AND WEAKNESS OF CURRENT SYSTEM

The current system is undoubtedly well-designed for performing encryption and decryption but it has some following limitations:

- Lack of an awareness of this system.
- Implementation is difficult and complex
- Some security related issues may be created.
- Cost Effectiveness

◆ REQUIREMENTS SPECIFICATION

Requirements specification adds further information to the requirements definition.

3.1) Algorithm Requirements

- Dataset
- Input
- Appropriate functions
- Efficiency
- Output

3.2) System Requirements

- **Usability:**

The system should be easily able to encrypt and decrypt the text files.

- **Efficiency:**

The system should provide easy and fast response.

◆ FEASIBILTIY STUDY

An important outcome of the preliminary investigation is the determination that the system is feasible or not. The main aim of the feasibility study activity is to determine whether it would be financially and technically feasible to develop a project.

The feasibility study activity involves the analysis of the problem and collection of all relevant information relating to the product such as the different text files which would be input to the system, the processing required to be carried out on these text files, the output required to be produced by the system as well as the various constraints on the behaviors of the system.

4.1) Does the system contribute to the overall objectives of the organization?

The main aim of behind development of this system is to provide free encryption and decryption of text files that can prevent the social bullying of the persons which need it and also for the people who doesn't want to waste their time on bothering about security of their documents while transferring files over the internet.

4.2) Can the system be implemented using the current technology and within the given cost and schedule constraints?

◆ The system can be easily implemented using existing technology. The technology used is numpy and python which is user friendly and freeware. After seeing the functionality that system provides the cost of developing the application does not matter.

◆ Taking the schedule constraints in consideration the time available is approximately 1 months. The time period is enough to develop the system.

5. REQUIREMENT VALIDATION

A requirements validation is concerned to check whether the requirements actually define the system, which the customer wants? Requirements validation is important because errors in requirements document can lead to extensive rework costs when they are subsequently discovered. We have performed the following validation checks

- **Validity checks**

Check whether the information entered is in valid format

- **Consistency checks**

A requirement in a document is not conflicting.

- **Completeness checks**

The requirements document includes requirement, which define all functions, and constraints intended by the system user.

- **Realism checks**

Using knowledge of existing technology, the requirements are checked to ensure that they could actually be implemented.

- **Verifiability**

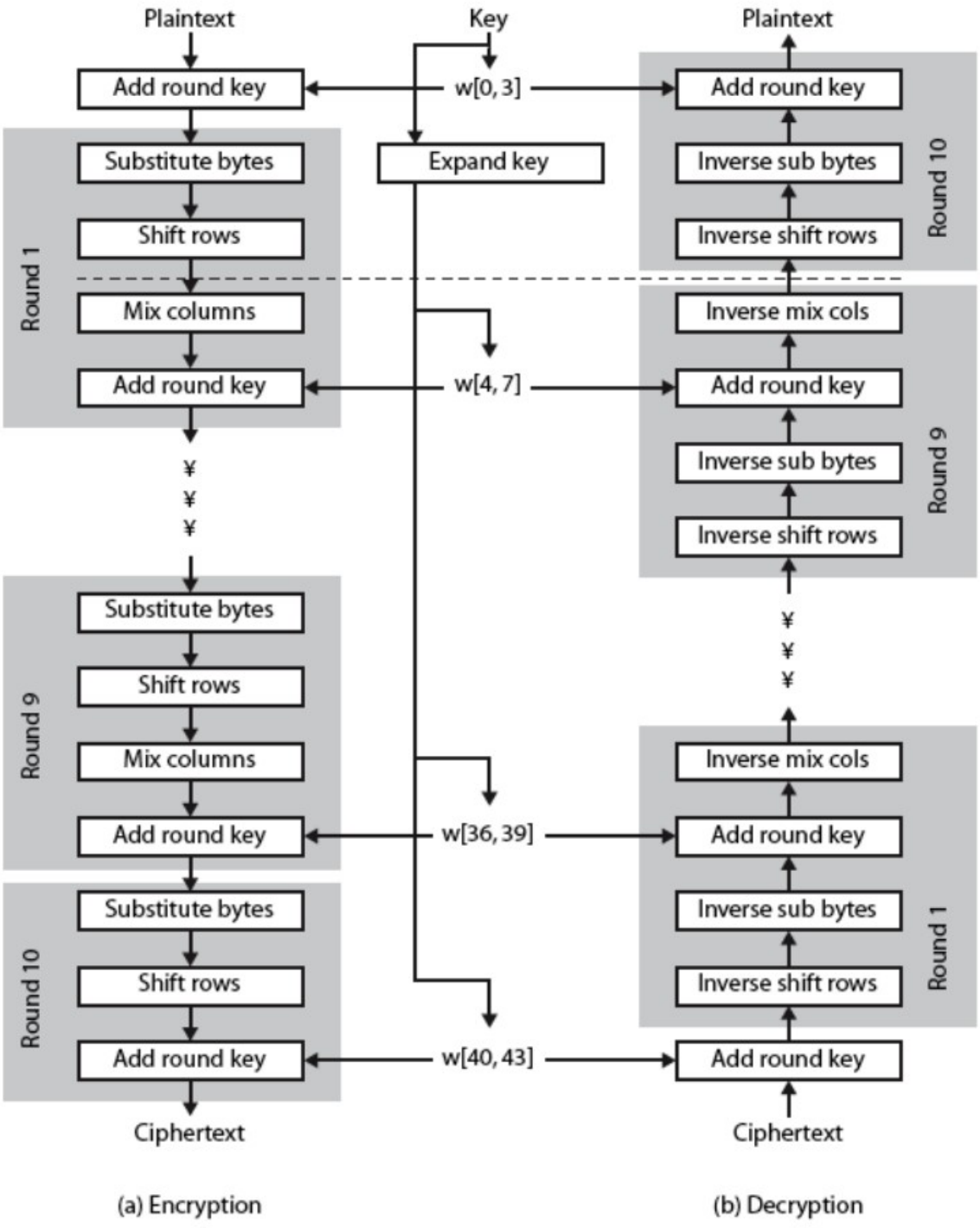
The requirements are given in verifiable manner (e.g.: Using quantifiable measures) to reduce disputes between client and developer.

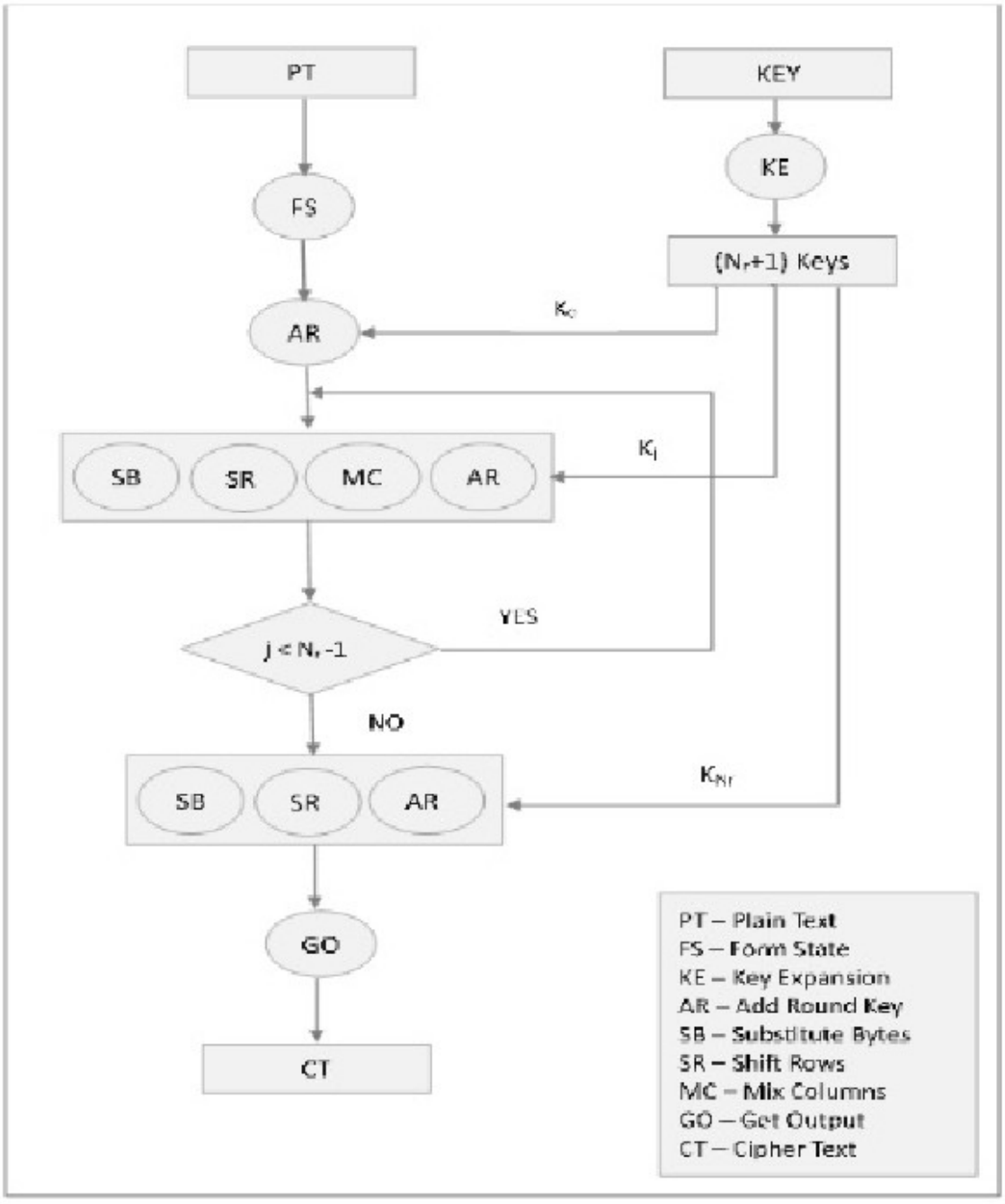
6. FEATURES OF NEW SYSTEM

We will try to develop application as follows:

- The system being available in regional languages.
- Provide the more awareness in our country India about this concept.
- User can upload his/her idea through description, team information, videos of his/her work, and the form of reward and main for which purpose he/she needed the money.
- One can pledge the money if one like the idea.
- Communication provided between innovators and investors.
- Safety for money transfer and surety of security of ideas.

7. FLOWCHART OF NEW SYSTEM:



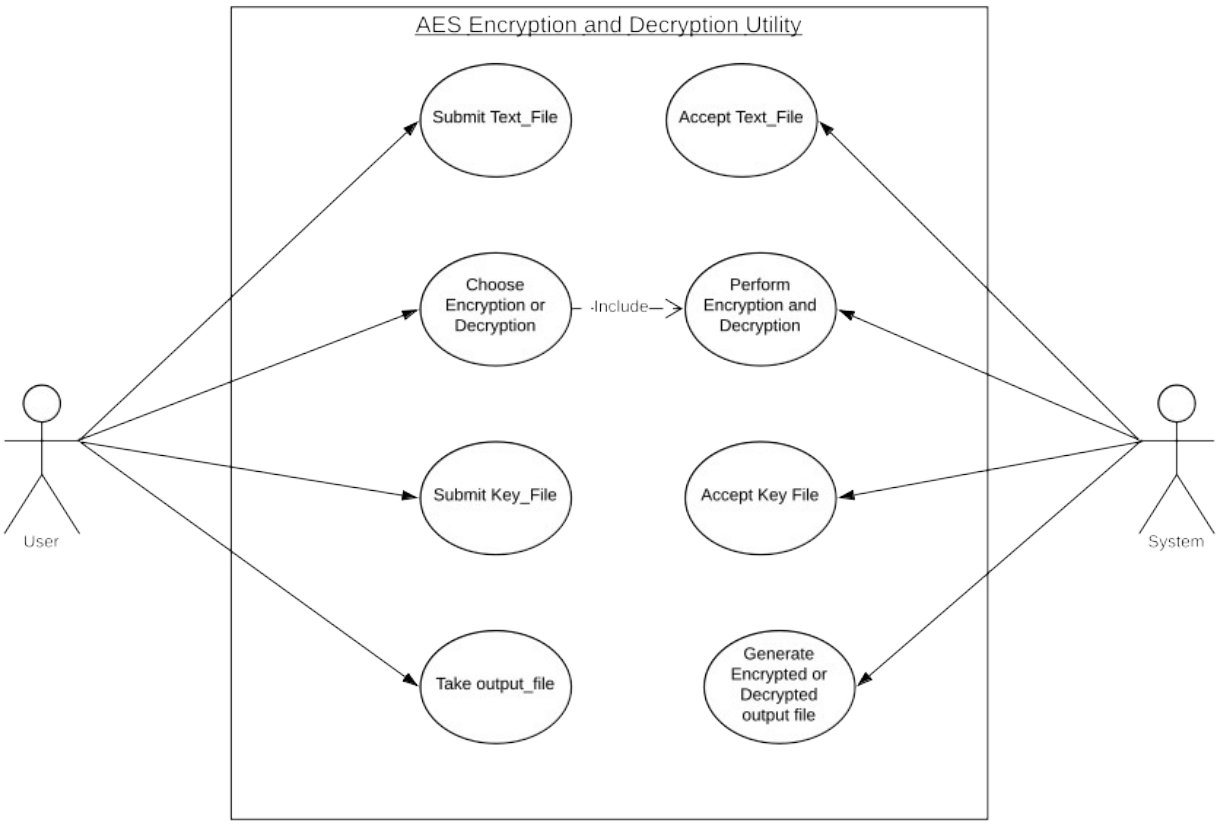


Data Flow Diagram

8. Use Case Diagrams

Following are the use case diagrams for our system that describe a set of actions (use cases) that the system should or can perform in collaboration with one or more external users of the system (actors).

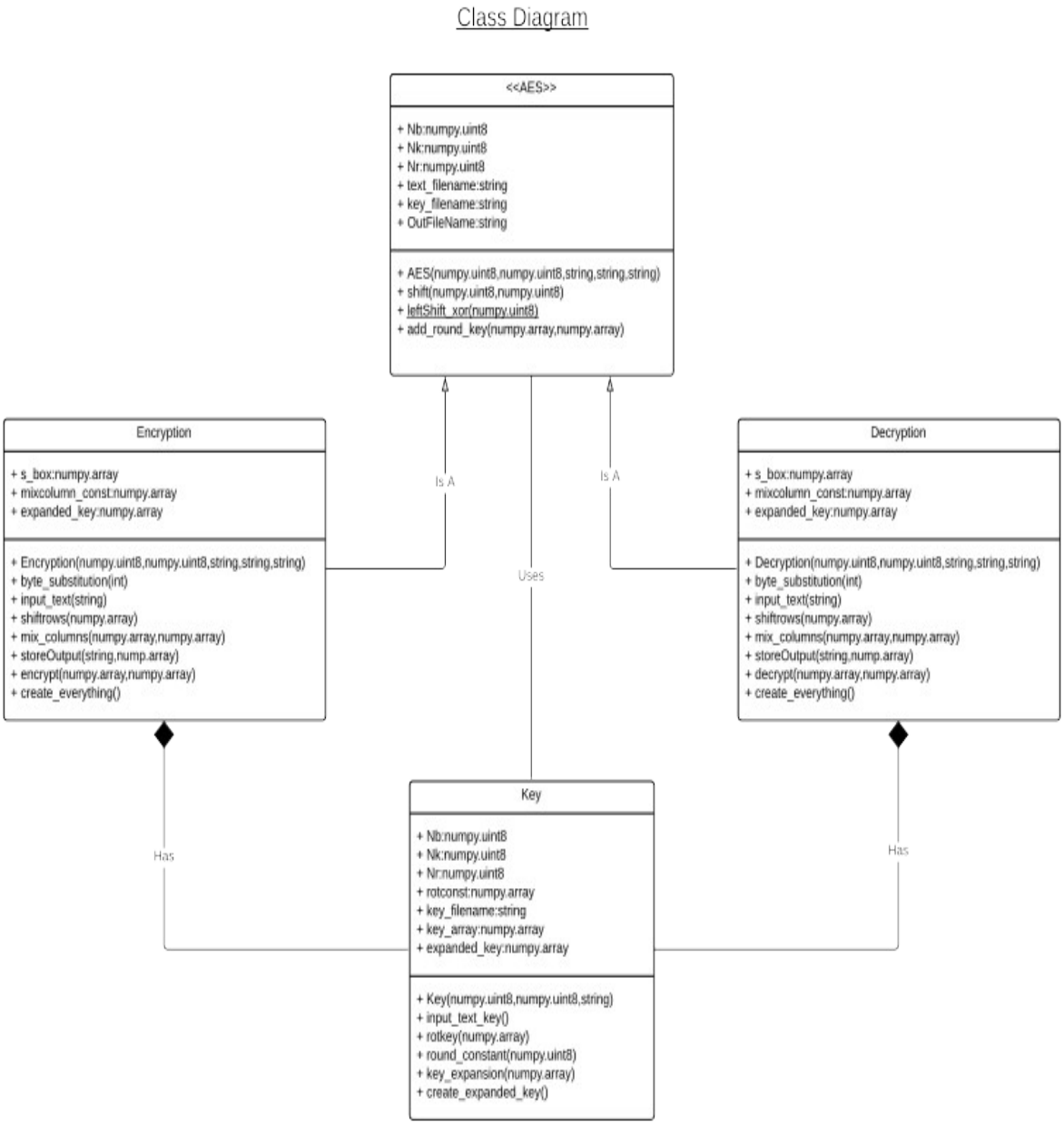
8.1 Use Case Diagram 1



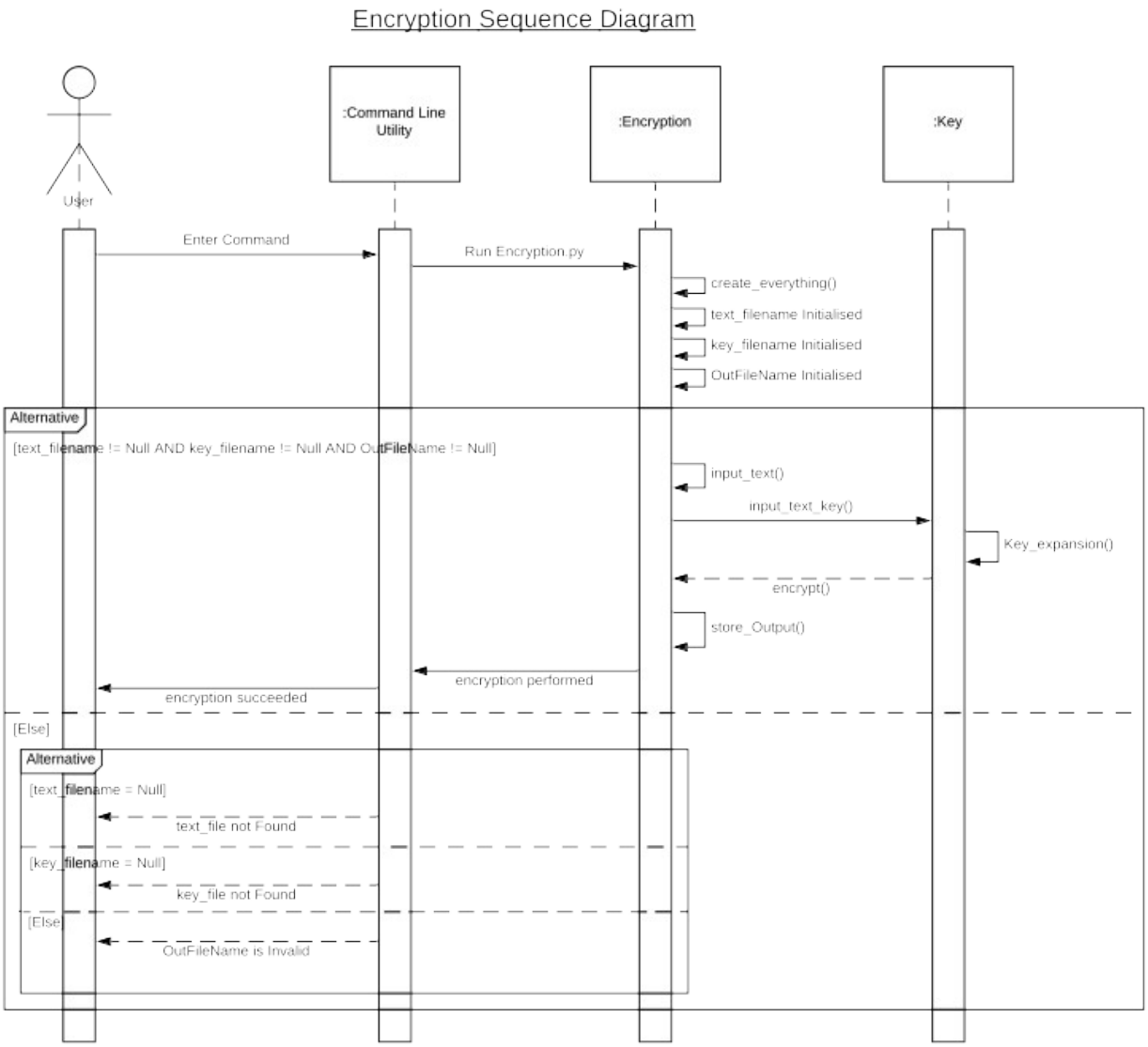
Use Case Diagram 1

This use case diagram tell the various work that should be done by the user and the software admin, and it tells that how these two entities are related with each other in the software.

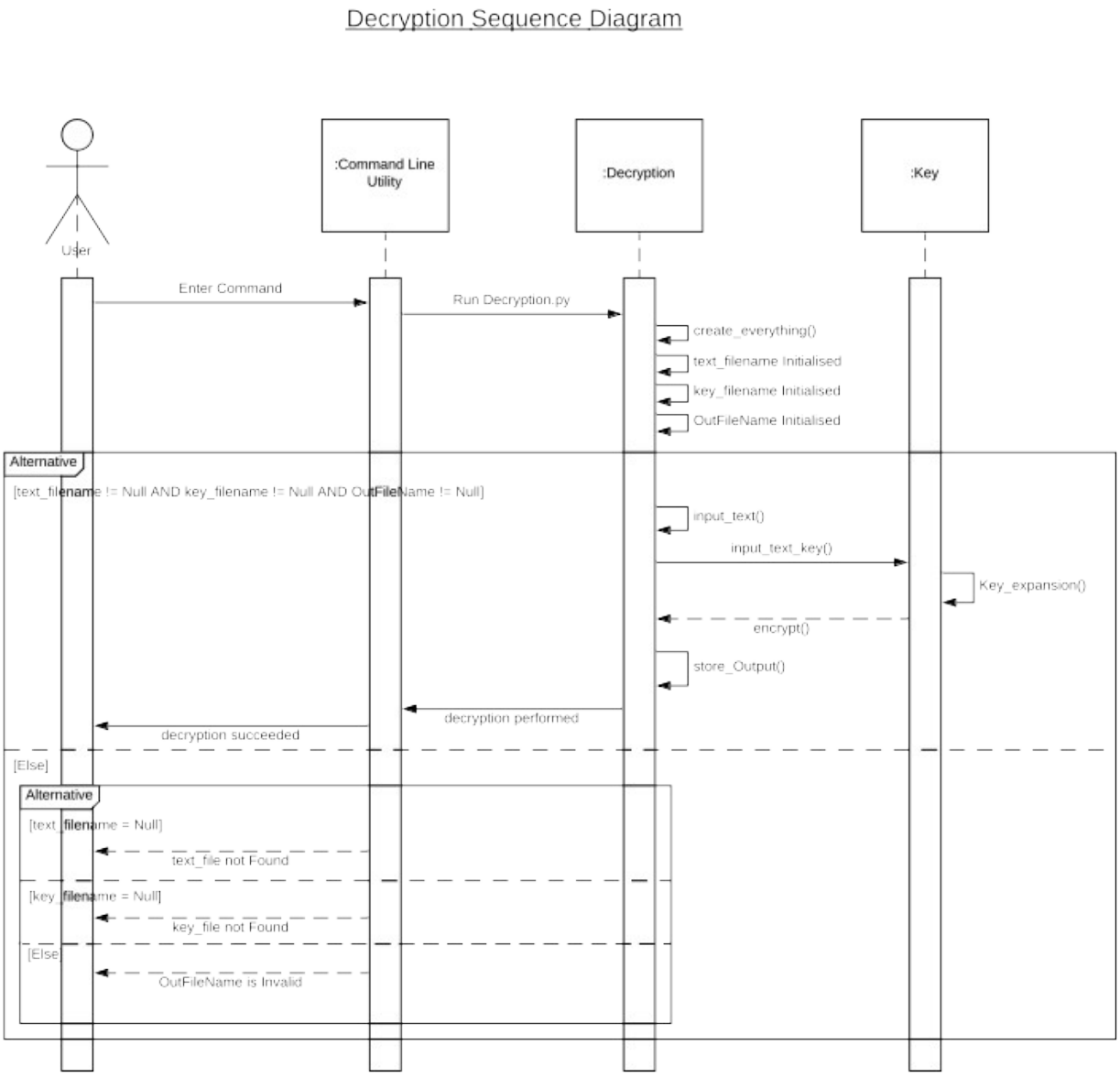
9. Class Diagram



10. Sequence Diagram for Encryption



11. Sequence Diagram for Decryption



12 SELECTION OF HARDWARE AND SOFTWARE

The Tables below give idea of the hardware and software required for the system and client side requirements.

- **Hardware Selection**

Devices	Description
Processor	Intel Core Duo 2.0 GHz or more
RAM	512 MB or more
Hard Disk	10 GB or more

Table Hardware Requirements

- **Software Selection**

For which	Software
Operating System	Windows XP/2003/vista/7/8/10,Linux, Mac os x
Front End	Jupyter Notebook
Back End	Numpy
Scripting Language	Python

Table Software Requirements

- **Client side requirements:**

For which	Requirement
Terminal	Any Compatible terminal or command line os device

Table Client Side Requirements

Chapter 5

System Design

- Overview
- Product Function
- User Characteristics
- Constraints
- User Requirements
- Performance Requirements
- Code Snippet

1. Overview

This software is fairly simple in terms of it uses, here user has been provided with two commands one for encryption and one for decryption and executing which he can perform the encryption or the decryption. The summary of overall procedure is as follows.

1. User will enter COMMAND in the command prompt or the terminal(ENCRYPTION FOR encrypting the text file and DECRYPTION FOR decrypting the already encrypted text files).

2. After entering the command the user has to enter the filename of the file to be encrypted or decrypted and the keytextfile and the file in which the user want the decrypted or encrypted file output respectively.

3. Once the process completed then user can take its output file as the encrypted or the decrypted file whatever be the case.

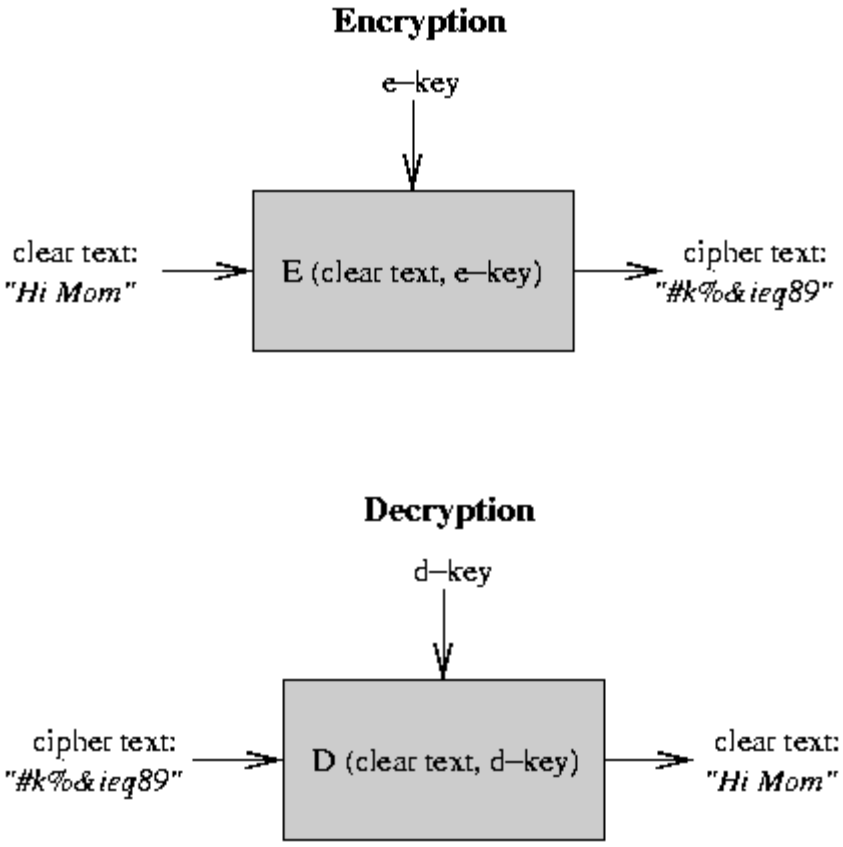


Figure Layered Architecture

2 Product Functions

1. The command for Encryption or Decryption must be entered.

2. The file need to be encrypted or decrypted must be supplied to the terminal with the respective keytxtfile.

3. AES algorithm steps are performed on the file supplied, based on the Encryption and Decryption needs.

4. Once encryption or decryption is completed the resultant data would now be written on the output file name supplied by the user.

3 User Characteristics

Administrator: Will add new features and restrictions on the software or the command line tool genrerated.

User: The main actor would be performing encryption or decryption based on its needs.

4 Constraints

1 Its is a command line tool and hence it requires user to be bit familiar with terminal or command prompt.

2 Our software will only be available in English language.

3 It can be use to encrypt and decrypt the text files only.

4 To share the file with other person user has to use the some network means on his own.

5 It can take time to encrypt or decrypt the text file based on the length of the file.

5 User Requirements

Following are the user requirements that describe what the user expects from the software to do.

5.1 External Interface Requirements

The user interface will be web based provided to user through a web browser. The screen will consist of a log in form. Upon logging in the user will presented with a dashboard. The dashboard will consist of a header, sidebar menu and body. On the top right the menu for managing user preferences

will be provided. The body will be consisting of dialogue box which will be used to get the input from user. There will be a button to submit the query entered by user in the dialogue box. Below the dialogue and button, a list of previously processed URLs with their rating from user will be displayed. Against each list item the user will be able to rate that corresponding processed URL result either good or bad.

1. Numpy: a scientific computing package generating N-dimensional array objects. As for this project, several machine learning models use Numpy as the data container; the implementation of our random tree and random forest also depends on this.

5.2 Functional Requirements

1. Take a valid file (by this we mean text file) from the user.

2. Take a valid key file(a text file) from the user.

3. Expand the key properly to be used in the encryption process or decryption process.

4. The we will convert the relevant file(that is both the text and key text file) to its corresponding UTF-8 coded file.

5. Properly encode or decode the file using the AES algorithm.

6. Properly writing the decoded or the encoded file to the output file as supplied by the user.

7. Proper execution of the commands created to execute the respective encoding or the decoding script.

6. Performance Requirements

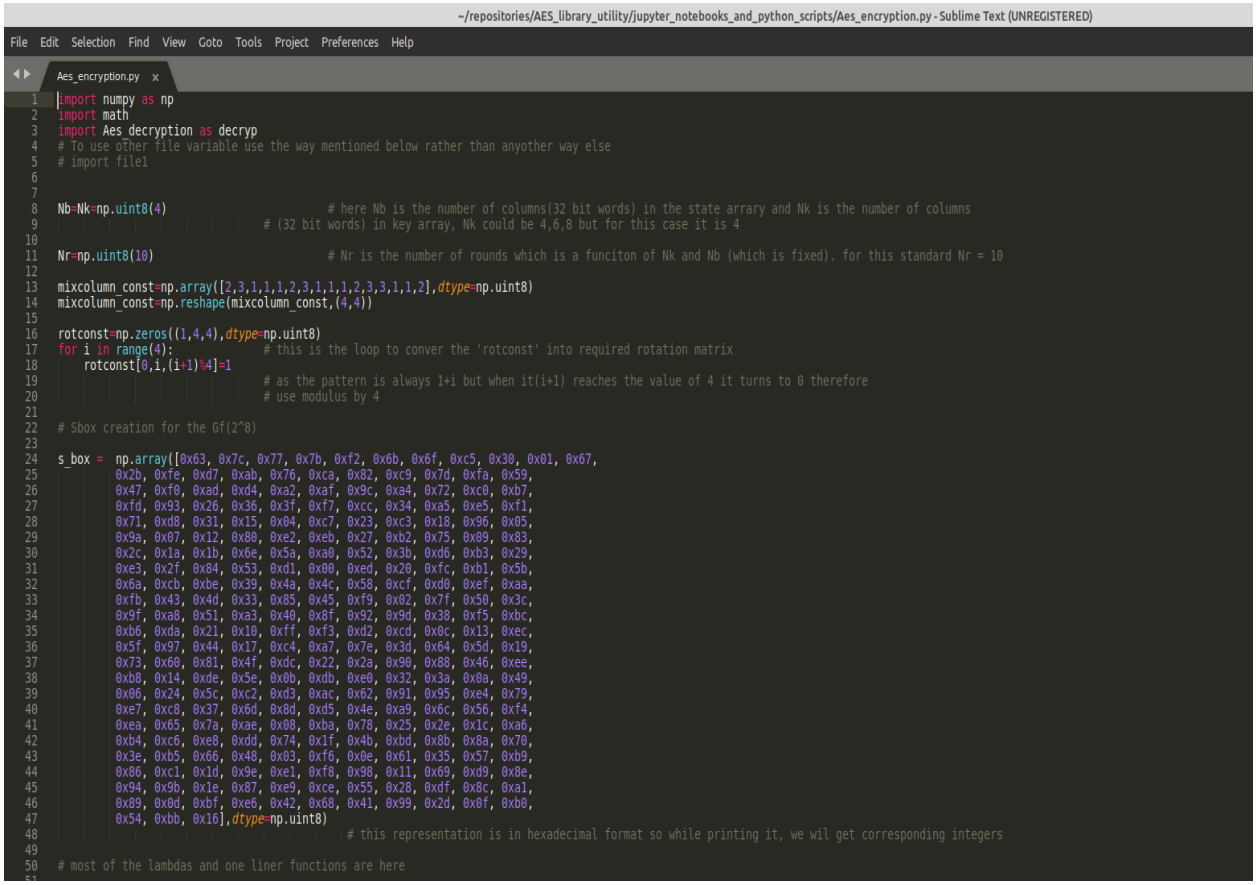
Table Performance Requirements

ID	Performance Requirement
1	Commands should called the script within one or two clock cycle.
2	Time taken by AES algorithms should be in milliseconds for average length text file.
3	System should be able to handle multiple simultaneous requests.

7. CODESNIPPET:

The Jupyter notebook will be used for implementing AES algorithm and it has many files including test text files and python notebooks which has following extensions i.e. “.tsv” “.pynb” .

We also tried to use python libraries like numpy. A small level implementation of our project is shown below.



Chapter 6

Proposed Solution and Code Implementation

- Proposed Solution
- Implementation Environment
- Program/Module Specification
- Coding Standards
- Coding

1. Proposed Solution

The solution to the problem defined in the earlier section was to create a open source utility which is reasonably fast and accurate to encode and decode the text files based on the key text files provided.

Since our code is free from the GUI implementations so it is reasonable fast as compared to the other implementations available.

1.1 Methodology

Developing an command line encryptor and decryptor based on AES algorithm was a challenging problem due to math involved in it. To make sure, that we

accomplished this task efficiently, without facing major problems, which would have caused major

redesigns and re-engineering of the software architecture, in a time and cost constrained project

environment, we started off with developing SRS (Software Requirement Specifications) and detailed

design of the system. Gantt chart and work break down structure were created in that phase to monitor the project and when a phase should start or end.

After that we started to gather research papers for proper understanding of the AES algorithm. After that we started our research on which language to choose and this results in choosing python as the language.

Further the implementation of AES using the numpy library which helps us to develop the project easily.

2. IMPLEMENTATION ENVIRONMENT

As our project is study based project and the best tool which is used at the undergraduate level is “Anaconda” . It consists of different modules in which we can code but for our project we have used Jupyter Notebook, which is used for high level python programming. Jupyter Notebook provides browser environment as it opens up in the *browser. It* can also connect to kernel and terminal.

Moreover the IDE Sublime Text and Visual Code are the tremendous helpful tool for such kind of development.

3. PROGRAM/MODULE SPECIFICATION

The naive bayes classifier algorithm is the most applicable algorithm to implement fake news detection as it works on conditional probability and other major concepts of Data mining that are used in this project and we have also studied it in 4th semester which made the understanding of code quite easy.

```
#---------------------------------------------------------------
# Naive Bayes classifier for Multinomial model
#---------------------------------------------------------------

clf = MultinomialNB()

clf.fit(tfidf_train, y_train)                        # Fit Naive Bayes classifier according to X, y

pred = clf.predict(tfidf_test)                      # Perform classification on an array of test vectors X.
score = metrics.accuracy_score(y_test, pred)
print("accuracy:   %0.3f" % score)
cm = metrics.confusion_matrix(y_test, pred, labels=['FAKE', 'REAL'])
plot_confusion_matrix(cm, classes=['FAKE', 'REAL'])
print(cm)


clf = MultinomialNB()

clf.fit(count_train, y_train)

pred = clf.predict(count_test)
score = metrics.accuracy_score(y_test, pred)
print("accuracy:   %0.3f" % score)
cm = metrics.confusion_matrix(y_test, pred, labels=['FAKE', 'REAL'])
plot_confusion_matrix(cm, classes=['FAKE', 'REAL'])
print(cm)

```

The final output is generated with the help of command line terminal and linux operating system basically linux mint 20 and sublime text for the editing in the text files.

4. CODING STANDARDS

Normally, good software development organization requires their programmers to adhere to some well-defined and standard style of coding called coding standard.

4.1 Variable Standards:

Our project implementation uses apt variable names that makes the understanding of the domain quite easy.

4.2 Comment Standards:

Comments increases readability of our code and makes it easy for the third party to understand it. We have used comments everywhere needed and also used the references of the online codes.

Every code block and the different modules start with the comments, describing in brief about the code and the details.

Comments may also be used in between and along with the lines of code to explain one specific line or lines.

In python we can use. ‘#’ to for single comment and for multiple lines we can use delimiters that is,” ‘ ‘ ‘ “ . We have used both during programming.

5. Coding

AES_Encryption.py:

```
import numpy as np
import math
import Aes_decryption as decryp
# To use other file variable use the way mentioned below rather than anyother way
else
# import file1


Nb=Nk=np.uint8(4)                    # here Nb is the number of columns(32 bit
words) in the state arrary and Nk is the number of columns
                    # (32 bit words) in key array, Nk could be 4,6,8 but for this
case it is 4

Nr=np.uint8(10)                    # Nr is the number of rounds which is a funciton
of Nk and Nb (which is fixed). for this standard Nr = 10

mixcolumn_const=np.array([2,3,1,1,1,2,3,1,1,1,2,3,3,1,1,2],dtype=np.uint8)
mixcolumn_const=np.reshape(mixcolumn_const,(4,4))

rotconst=np.zeros((1,4,4),dtype=np.uint8)
for i in range(4):          # this is the loop to conver the 'rotconst' into required
rotation matrix
   rotconst[0,i,(i+1)%4]=1
                    # as the pattern is always 1+i but when it(i+1) reaches the
value of 4 it turns to 0 therefore
                    # use modulus by 4

# Sbox creation for the Gf(2^8)

s_box =  np.array([0x63, 0x7c, 0x77, 0x7b, 0xf2, 0x6b, 0x6f, 0xc5, 0x30, 0x01,
0x67,
       0x2b, 0xfe, 0xd7, 0xab, 0x76, 0xca, 0x82, 0xc9, 0x7d, 0xfa, 0x59,
       0x47, 0xf0, 0xad, 0xd4, 0xa2, 0xaf, 0x9c, 0xa4, 0x72, 0xc0, 0xb7,
       0xfd, 0x93, 0x26, 0x36, 0x3f, 0xf7, 0xcc, 0x34, 0xa5, 0xe5, 0xf1,
       0x71, 0xd8, 0x31, 0x15, 0x04, 0xc7, 0x23, 0xc3, 0x18, 0x96, 0x05,
       0x9a, 0x07, 0x12, 0x80, 0xe2, 0xeb, 0x27, 0xb2, 0x75, 0x09, 0x83,
       0x2c, 0x1a, 0x1b, 0x6e, 0x5a, 0xa0, 0x52, 0x3b, 0xd6, 0xb3, 0x29,
       0xe3, 0x2f, 0x84, 0x53, 0xd1, 0x00, 0xed, 0x20, 0xfc, 0xb1, 0x5b,
       0x6a, 0xcb, 0xbe, 0x39, 0x4a, 0x4c, 0x58, 0xcf, 0xd0, 0xef, 0xaa,
```

```
        0xfb, 0x43, 0x4d, 0x33, 0x85, 0x45, 0xf9, 0x02, 0x7f, 0x50, 0x3c,
        0x9f, 0xa8, 0x51, 0xa3, 0x40, 0x8f, 0x92, 0x9d, 0x38, 0xf5, 0xbc,
        0xb6, 0xda, 0x21, 0x10, 0xff, 0xf3, 0xd2, 0xcd, 0x0c, 0x13, 0xec,
        0x5f, 0x97, 0x44, 0x17, 0xc4, 0xa7, 0x7e, 0x3d, 0x64, 0x5d, 0x19,
        0x73, 0x60, 0x81, 0x4f, 0xdc, 0x22, 0x2a, 0x90, 0x88, 0x46, 0xee,
        0xb8, 0x14, 0xde, 0x5e, 0x0b, 0xdb, 0xe0, 0x32, 0x3a, 0x0a, 0x49,
        0x06, 0x24, 0x5c, 0xc2, 0xd3, 0xac, 0x62, 0x91, 0x95, 0xe4, 0x79,
        0xe7, 0xc8, 0x37, 0x6d, 0x8d, 0xd5, 0x4e, 0xa9, 0x6c, 0x56, 0xf4,
        0xea, 0x65, 0x7a, 0xae, 0x08, 0xba, 0x78, 0x25, 0x2e, 0x1c, 0xa6,
        0xb4, 0xc6, 0xe8, 0xdd, 0x74, 0x1f, 0x4b, 0xbd, 0x8b, 0x8a, 0x70,
        0x3e, 0xb5, 0x66, 0x48, 0x03, 0xf6, 0x0e, 0x61, 0x35, 0x57, 0xb9,
        0x86, 0xc1, 0x1d, 0x9e, 0xe1, 0xf8, 0x98, 0x11, 0x69, 0xd9, 0x8e,
        0x94, 0x9b, 0x1e, 0x87, 0xe9, 0xce, 0x55, 0x28, 0xdf, 0x8c, 0xa1,
        0x89, 0x0d, 0xbf, 0xe6, 0x42, 0x68, 0x41, 0x99, 0x2d, 0x0f, 0xb0,
        0x54, 0xbb, 0x16],dtype=np.uint8)
                                # this representation is in hexadecimal format so while
printing it, we wil get corresponding integers

# most of the lambdas and one liner functions are here

shift = lambda r,Nb: (1 if r== 1 else (2 if r == 2 else (3 if r== 3 else (0 if r==0 else
None)))) if Nb == 4 else None

byte_substitution= np.vectorize(lambda index: s_box[index])
                                # a copy of state_array or array for which subtitution is
required should be passed in it.

# calculating the value of x^i for where x = 2 in decimal and the multiplication is
abiding the rules of galois field 2^8
lefShift_xor= lambda x : np.uint8(x<<1) if (x<128) else np.uint8(x<<1)^27
                                # this is equivalent to multiply a number here 'x' with 2
in galois field 2^8
                                # here i use np.uint8 because python integer is not of
8-bit and bit shift wouldn't work
                                # correctly and that is it would drop the bit shifted after
8 bits positions

# methods are all here
# comment for any line of code is listed just below that line at a suitable distance

def input_text(filename):

    with open(filename,'r',encoding='utf-8') as f:
        result=list(map(ord,f.read()))
```

```
                                                    # note that 'map' can work only once,
so store it result in a varaiable
    state_array= np.array(result, dtype=np.uint8)
                                                    # store them into utf-8 integer
encoding in a variable of 8-bit integer.

    length= len(state_array)
    padding= length%16
    state_array= np.append(state_array,np.zeros((16-padding)
%16).astype(np.uint8))
                                                    # since we don't adding axis here
therefore the values of the
                                                    # added array will be flattened before
use and would then be merged.

    state_array= np.array([np.reshape(i,(4,4)).transpose() for i in
np.split(state_array,len(state_array)/16)])
    return state_array

                                                    # here each element of the
'state_array' will represent a state array
                                                    # for the given text.



def input_text_key(filename):

    with open(filename,'r',encoding='utf-8') as f:
        result=list(map(ord,f.read()))
                                                    # note that 'map' can work only once,
so store it result in a varaiable
    state_array= np.array(result, dtype=np.uint8)
                                                    # store them into utf-8 integer
encoding in a variable of 8-bit integer.

    length= len(state_array)
    if length >= 16:
        state_array= state_array[:16]
                                                # here neglecting the rest of the file txt if
more than 16 characters
    else:
        padding= length%16
        state_array= np.append(state_array,np.zeros(16-padding).astype(np.uint8))
```

```
                                        # here adding the rest of characters as 0 if
have less than 16
                                        # character in the input text key file.

    state_array= np.array([np.reshape(state_array,(4,4)).transpose()])
    return state_array
                                        # reshaping the array as a 4x4 matrix and
using list to encapsulate it
                                        # into another np.array to have the
structure similar to the
                                        # state_array

def rotkey(roundkey):           # this is the method for applying the left rotation in
the given roundkey in total, column wise
    return rotconst.dot(roundkey).transpose()
                        # since the rotconst can be used to left rotate a given matrix
element column wise hence we apply
                        # multiplication of the 'roundkey' with rotconst(specifically
rotconst with roundkey)


def round_constant(i):
    roundconstant= np.uint8(1)
    for j in range(2,i+1):
                                # use i because while calling the round_constant
function, index of the array is used
                                # and which is equal to the round number itself and we
want one less than round number as
                                # as per page 19 and 20 article and sudo code given in
nist notes of AES
        roundconstant= lefShift_xor(roundconstant)

    return np.array([roundconstant,0,0,0]).reshape(4,1)


def keyexpansion(key):

    for index in range(1,11):
        key= np.append(key,np.zeros((1,4,4),dtype=np.uint8),axis=0)
        key[index,:,0]= (key[index-
1,:,0].reshape(4,1)^(byte_substitution(rotkey(key[index-
1,:,3]))^round_constant(index))).reshape(4)
        key[index,:,1]= key[index,:,0]^key[index-1,:,1]
        key[index,:,2]= key[index,:,1]^key[index-1,:,2]
```

```
        key[index,:,3]= key[index,:,2]^key[index-1,:,3]

    return key
                # returning the value here is kind of necessity because we can't use
np.append inside a function as it wouldn't
                # change the actual passed array beacause we are assigning a new
array reference to another object which is "key"
                # in this case whereas if we apply np.insert then it do make the
changes because it change the actual passed array
                # reference.

def shiftrows(element):
    temp = np.zeros(element.shape,dtype=np.uint8)
    for r in range(4):
        for j in range(Nb):
            temp[r,(Nb-shift(r,Nb)+j)%Nb]= element[r,j]
    element[:,:]=np.copy(temp)
                #  don't panic about assignment to value of 'element' reference as it is
working absloutely fine, moreover remember that
                # list are immutable and that they are called by reference in functions
and not called by value


def multiplication_for_matrix(X,Y):
    # iterate through rows of X
    rough= np.zeros((len(X),len(Y[0])),dtype= np.uint8)
    for i in range(len(X)):
        # iterate through columns of Y
        for j in range(len(Y[0])):
            # iterate through rows of Y
            for k in range(len(Y)):
                if X[i,k]==2:
                    rough[i,j] = rough[i,j]^lefShift_xor(Y[k,j])
                if X[i,k]== 3:
                    rough[i,j] = rough[i,j]^(lefShift_xor(Y[k,j])^Y[k,j])
                if X[i,k]== 1:
                    rough[i,j] = rough[i,j]^Y[k,j]

    Y[:,:]=rough[:,:]


def add_round_key(cipher,expanded_key):
    cipher[:,:]= cipher[:,:]^expanded_key[:,:]
```

```
def storeOutput(filename,state_array_out):
    char_written_length=0
    rowwritten=''
    with open(filename,'w',encoding='utf-8') as f:
        for i in state_array_out:
            rowwritten=' '.join(map(str, np.ravel(i)))
            char_written_length=char_written_length+len(rowwritten.split())
            f.write(rowwritten+' ')

    return char_written_length

# only the block of cipher should be passed that need to be ecrypted and not the
whole cipher,containing all the blocks of the cipher
def final_encryption(cipher_input,expanded_key):
    round_number= 0
    add_round_key(cipher_input,expanded_key[round_number,:,:])
                        # this has been done because 0 round_key should be added
before any processing of the input cipher
    for round_number in range(1,10):
        cipher_input= byte_substitution(cipher_input)
        shiftrows(cipher_input)
        multiplication_for_matrix(mixcolumn_const,cipher_input)
        add_round_key(cipher_input,expanded_key[round_number,:,:])
                        # one more thing that has been done here is that passing only
the necessary part of the
                        # expanded_key with no passing of round number is needed
then(also round_number variable
                        # should also be used in passing the expanded_key as follows
expanded_key[round_number,:,:])

                        # above is the process for the round 1 to round 9

    cipher_input= byte_substitution(cipher_input)
    shiftrows(cipher_input)
    round_number= 10
    add_round_key(cipher_input,expanded_key[round_number,:,:])

                        # above is the process for the round 10 only

    return cipher_input

# code for creation of state array and performing encryption on all blocks of the
cipher created
def creation_everything():
```

```
    filename= input("enter the name of the file with path that need to be encrypted
")
    encryption_key= input("enter the name of the key file with path that need to
encrypt the file, max length of file is 16 characters ")
    OutFileName= input("enter the name of the output file with path that is used to
store the encrypted output ;")
    state_array= input_text(filename)
    original_key= input_text_key(encryption_key)
    expanded_key= keyexpansion(np.copy(original_key))
    state_array_out= np.zeros(state_array.shape,dtype=np.uint8)


    for index,block in enumerate(state_array):
        state_array_out[index]= final_encryption(np.copy(block),expanded_key)

    total_char_wrote= storeOutput(OutFileName,np.copy(state_array_out))

    return
np.array_equal(decryp.encrypted_text_read(OutFileName),state_array_out),
total_char_wrote
    # below code should only be used for debugging purpose (and before return) as
it tells that whether array written to the output file
    # is same as the array read again from the output file
    #print(decryp.encrypted_text_read(OutFileName),"   \n",state_array_out)



if __name__=='__main__':

    status,total_char_wrote= creation_everything()
    print(status," ",total_char_wrote)
```

AES_Decryption.py

```
import numpy as np
import math
import Aes_encryption as encryp



Nb=Nk=np.uint8(4)                    # here Nb is the number of columns(32 bit words) in the state arrary and Nk is the number of columns
                                     # (32 bit words) in key array, Nk could be 4,6,8 but for this case it is 4


Nr=np.uint8(10)                      # Nr is the number of rounds which is a funciton of Nk and Nb (which is fixed). for this standard Nr = 10
inverse_mixcolumn_const=np.array([14,11,13,9,9,14,11,13,13,9,14,11,11,13,9,14],dtype=np.uint8)
inverse_mixcolumn_const=np.reshape(inverse_mixcolumn_const,(4,4))



# RSbox creation for the Gf(2^8)


r_s_box = np.array([0x52, 0x09, 0x6a, 0xd5, 0x30, 0x36, 0xa5, 0x38, 0xbf, 0x40, 0xa3,
                    0x9e, 0x81, 0xf3, 0xd7, 0xfb , 0x7c, 0xe3, 0x39, 0x82, 0x9b, 0x2f,
                    0xff, 0x87, 0x34, 0x8e, 0x43, 0x44, 0xc4, 0xde, 0xe9, 0xcb , 0x54,
                    0x7b, 0x94, 0x32, 0xa6, 0xc2, 0x23, 0x3d, 0xee, 0x4c, 0x95, 0x0b,
                    0x42, 0xfa, 0xc3, 0x4e , 0x08, 0x2e, 0xa1, 0x66, 0x28, 0xd9, 0x24,
                    0xb2, 0x76, 0x5b, 0xa2, 0x49, 0x6d, 0x8b, 0xd1, 0x25 , 0x72, 0xf8,
                    0xf6, 0x64, 0x86, 0x68, 0x98, 0x16, 0xd4, 0xa4, 0x5c, 0xcc, 0x5d,
                    0x65, 0xb6, 0x92 , 0x6c, 0x70, 0x48, 0x50, 0xfd, 0xed, 0xb9, 0xda,
                    0x5e, 0x15, 0x46, 0x57, 0xa7, 0x8d, 0x9d, 0x84 , 0x90, 0xd8, 0xab,
                    0x00, 0x8c, 0xbc, 0xd3, 0x0a, 0xf7, 0xe4, 0x58, 0x05, 0xb8, 0xb3,
                    0x45, 0x06 , 0xd0, 0x2c, 0x1e, 0x8f, 0xca, 0x3f, 0x0f, 0x02, 0xc1,
                    0xaf, 0xbd, 0x03, 0x01, 0x13, 0x8a, 0x6b , 0x3a, 0x91, 0x11, 0x41,
                    0x4f, 0x67, 0xdc, 0xea, 0x97, 0xf2, 0xcf, 0xce, 0xf0, 0xb4, 0xe6,
                    0x73 , 0x96, 0xac, 0x74, 0x22, 0xe7, 0xad, 0x35, 0x85, 0xe2, 0xf9,
                    0x37, 0xe8, 0x1c, 0x75, 0xdf, 0x6e , 0x47, 0xf1, 0x1a, 0x71, 0x1d,
                    0x29, 0xc5, 0x89, 0x6f, 0xb7, 0x62, 0x0e, 0xaa, 0x18, 0xbe, 0x1b ,
```

```
                0xfc, 0x56, 0x3e, 0x4b, 0xc6, 0xd2, 0x79, 0x20, 0x9a, 0xdb, 0xc0,
                0xfe, 0x78, 0xcd, 0x5a, 0xf4 , 0x1f, 0xdd, 0xa8, 0x33, 0x88, 0x07,
                0xc7, 0x31, 0xb1, 0x12, 0x10, 0x59, 0x27, 0x80, 0xec, 0x5f , 0x60,
                0x51, 0x7f, 0xa9, 0x19, 0xb5, 0x4a, 0x0d, 0x2d, 0xe5, 0x7a, 0x9f,
                0x93, 0xc9, 0x9c, 0xef , 0xa0, 0xe0, 0x3b, 0x4d, 0xae, 0x2a, 0xf5,
                0xb0, 0xc8, 0xeb, 0xbb, 0x3c, 0x83, 0x53, 0x99, 0x61 , 0x17, 0x2b,
                0x04, 0x7e, 0xba, 0x77, 0xd6, 0x26, 0xe1, 0x69, 0x14, 0x63, 0x55,
                0x21, 0x0c, 0x7d],dtype=np.uint8)
                                # this representation is in hexadecimal format so while
printing it, we wil get corresponding integers



# most of the lambdas and short methods are here


character_conversion=np.vectorize(chr)      # this is to conver a numpy uint8 array
to its unicode containing numpy array


inverse_byte_substitution= np.vectorize(lambda index: r_s_box[index])
                                # a copy of state_array or array for which subtitution is
required should be passed in it.


# all the definitions/methods are here


def encrypted_text_read(filename):


    state_array= np.loadtxt(filename,dtype=str,delimiter=" ",encoding="utf-8")[:-
1].astype(np.uint8)
                                                # store them into utf-8 integer
encoding in a variable of 8-bit integer.
                                                # here is we have no need of padding
zeroes at the end because the
                                                # filtered input from loadtxt line of
code is already in multiple of 16.
    state_array= np.array([np.reshape(i,(4,4)) for i in
np.split(state_array,len(state_array)/16)])
    return state_array
```

```
def invshiftrows(element):
    temp = np.zeros(element.shape,dtype=np.uint8)
    for r in range(4):
        for j in range(Nb):
            temp[r,(encryp.shift(r,Nb)+j)%Nb]= element[r,j]
    element[:,:]=np.copy(temp)
                #  don't panic about assignment to value of 'element' reference as it is
working absloutely fine, moreover remember that
                # list are immutable and that they are called by reference in functions
and not called by value



#inverse_multiplication_for_matrix(inverse_mixcolumn_const,cipher_input) is the
prototype for this
def inverse_multiplication_for_matrix(X,Y):
    # iterate through rows of X
    rough= np.zeros((len(X),len(Y[0])),dtype= np.uint8)
    for i in range(len(X)):
        # iterate through columns of Y
        for j in range(len(Y[0])):
            # iterate through rows of Y
            for k in range(len(Y)):
                if X[i,k]==14:
                    a=b=c=Y[k,j]
                    a= encryp.lefShift_xor(a);a= encryp.lefShift_xor(a);a=
encryp.lefShift_xor(a)
                    b= encryp.lefShift_xor(b);b= encryp.lefShift_xor(b)
                    c= encryp.lefShift_xor(c)
                    rough[i,j] = rough[i,j]^(a^b^c)


                if X[i,k]== 9:
                    a=Y[k,j]
                    a= encryp.lefShift_xor(a);a= encryp.lefShift_xor(a);a=
encryp.lefShift_xor(a)
                    rough[i,j] = rough[i,j]^(a^Y[k,j])


                if X[i,k]== 13:
                    a=b=Y[k,j]
                    a= encryp.lefShift_xor(a);a= encryp.lefShift_xor(a);a=
encryp.lefShift_xor(a)
```

```
                b= encryp.lefShift_xor(b);b= encryp.lefShift_xor(b)
                rough[i,j] = rough[i,j]^(a^b^Y[k,j])


            if X[i,k]==11:
                a=b=Y[k,j]
                a= encryp.lefShift_xor(a);a= encryp.lefShift_xor(a);a=
encryp.lefShift_xor(a)
                b= encryp.lefShift_xor(b)
                rough[i,j] = rough[i,j]^(a^b^Y[k,j])


    Y[:,:]=rough[:,:]


# the final method to store the output of the decrypted array into a passed filename
def storeOutput(filename,state_array_out):
    char_written_length= 0
    with open(filename, 'w') as f:
        for i in state_array_out:
            rowwritten= ''.join(map(chr, np.ravel(i,order='F')))
            char_written_length=char_written_length+len(rowwritten)
            f.write(rowwritten)
            #print(rowwritten)  # only for debugging purpouse


    return char_written_length




# only the block of cipher should be passed that need to be decrypted and not the
whole cipher,containing all the blocks of the cipher


def final_decryption(cipher_input,expanded_key):
    round_number= 10
    encryp.add_round_key(cipher_input,expanded_key[round_number,:,:])
                        # this has been done because 0 round_key should be added
before any processing of the input cipher
    for round_number in range(9,0,-1):
        invshiftrows(cipher_input)
        cipher_input= inverse_byte_substitution(cipher_input)
        encryp.add_round_key(cipher_input,expanded_key[round_number,:,:])
        inverse_multiplication_for_matrix(inverse_mixcolumn_const,cipher_input)
```

```
                    # one more thing that has been done here is that passing only
the necessary part of the
                    # expanded_key with no passing of round number is needed
then(also round_number variable
                    # should also be used in passing the expanded_key as follows
expanded_key[round_number,:,:])


                    # above is the process for the round 9 to round 1


    round_number= 0
    invshiftrows(cipher_input)
    cipher_input= inverse_byte_substitution(cipher_input)
    encryp.add_round_key(cipher_input,expanded_key[round_number,:,:])
                    # above is the process for the round 10 only


    return cipher_input



# code for creation of state array and performing encryption on all blocks of the
cipher created
def creation_everything():
    filename= input("enter the name of the file with path that need to be decrypted
")
    encryption_key= input("enter the name of the key file with path that need to
decrypt the file, max length of file is 16 characters ")
    OutFileName= input("enter the name of the output file with path that is used to
store the decrypted output ")
    state_array= encrypted_text_read(filename)
    original_key= encryp.input_text_key(encryption_key)
    expanded_key= encryp.keyexpansion(np.copy(original_key))
    state_array_out= np.zeros(state_array.shape,dtype=np.uint8)



    for index,block in enumerate(state_array):
        state_array_out[index]= final_decryption(np.copy(block),expanded_key)


    total_char_wrote= storeOutput(OutFileName,np.copy(state_array_out))
```

```
    # print(state_array_out)  # for debugging purouse only
    # print(encryp.input_text("Text_File.txt"))  # for debugging purouse only


    #return np.array_equal(encryp.input_text("Text_File.txt"),state_array_out),
total_char_wrote
    return total_char_wrote



if __name__=='__main__':


    total_char_wrote= creation_everything()
    print("total characters wrote is ",total_char_wrote)
```

Encryption:

python /home/bhanu/repositories/AES_library_utility/jupyter_notebooks_and_python_scripts/AES_Encryption.py.

Decryption:

python /home/bhanu/repositories/AES_library_utility/jupyter_notebooks_and_python_scripts/AES_Decryption.py.

Chapter 7

Results and Discussion

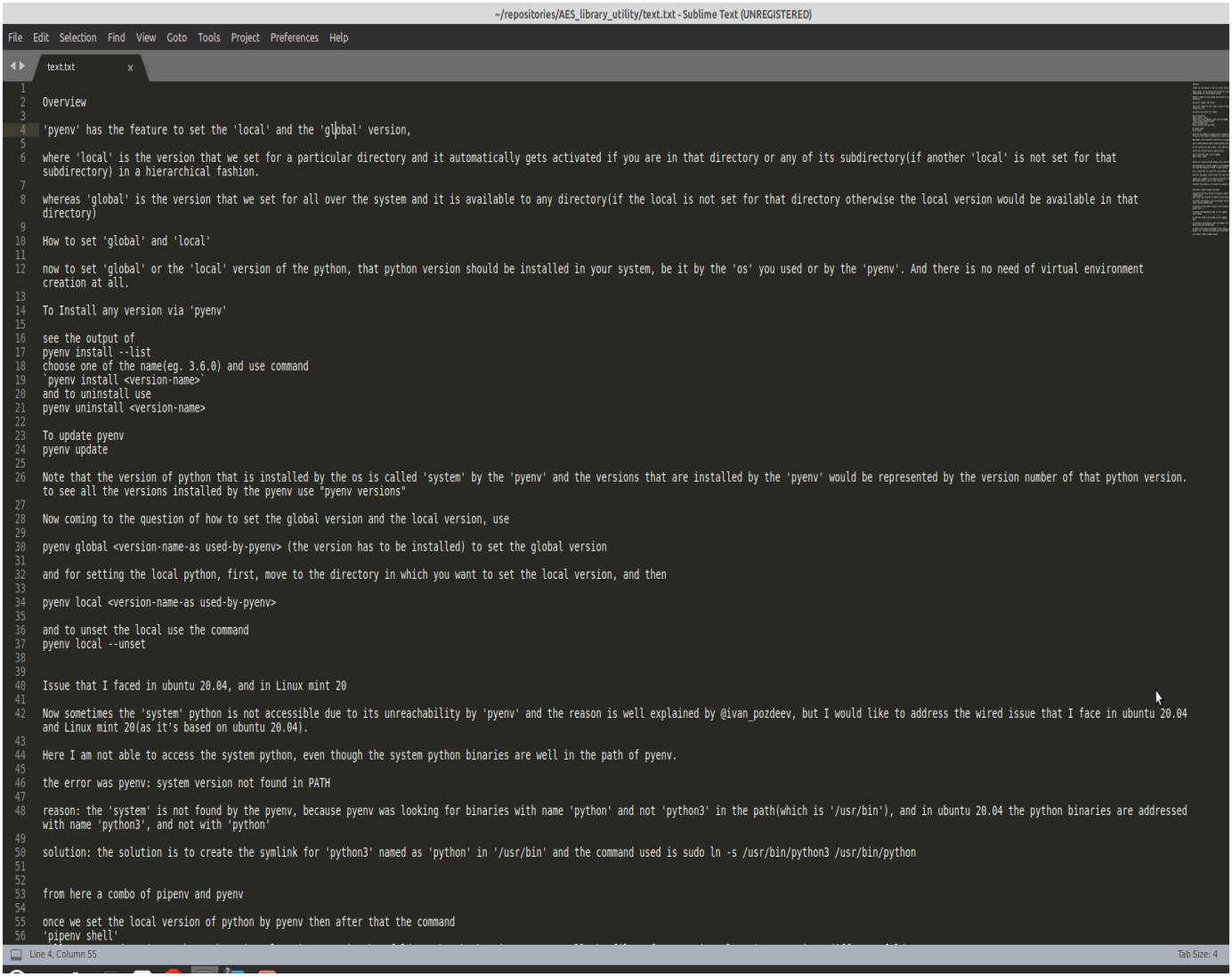
- Output and ScreenShots

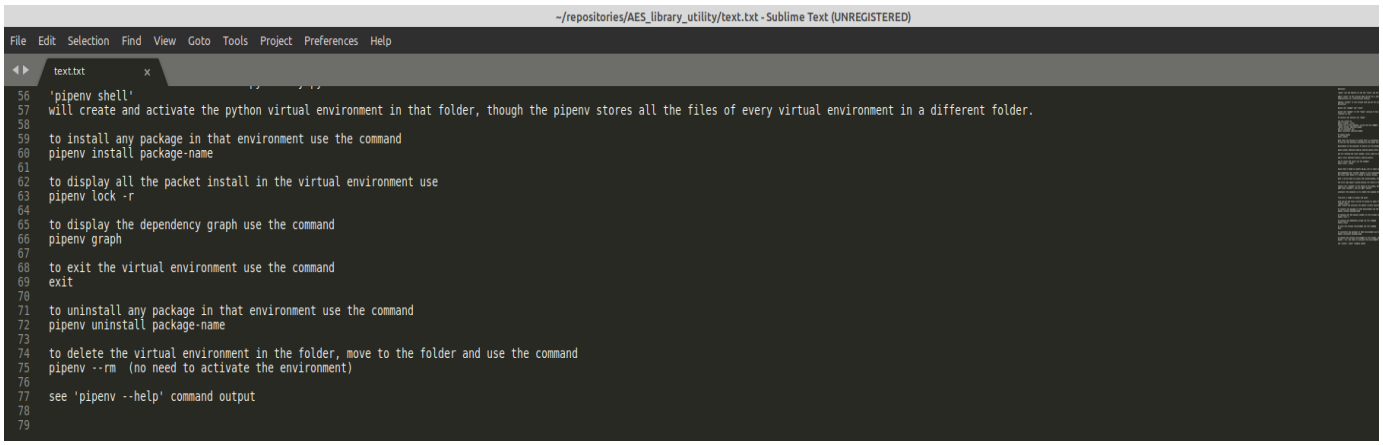
Results and Discussion

Outputs and Screenshots:

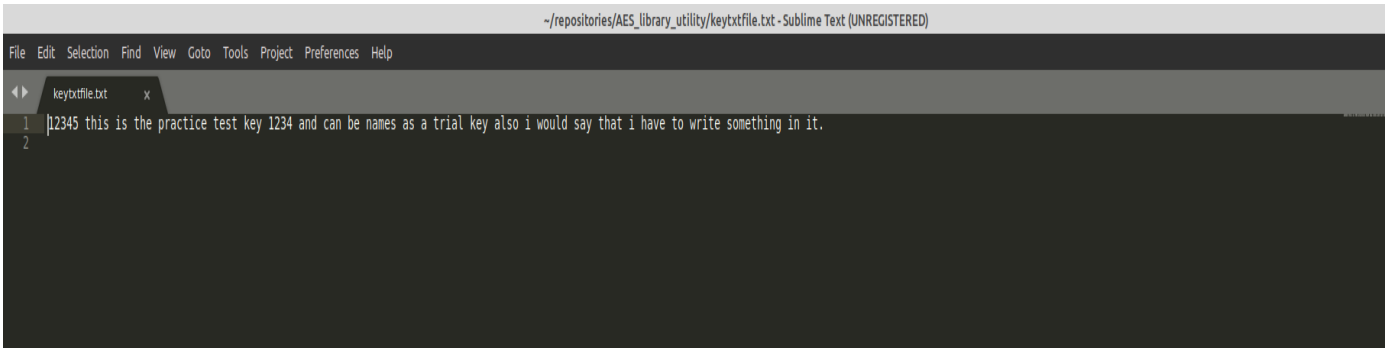
below are the outputs and the screenshots of the project:

Text File use for encryption process:

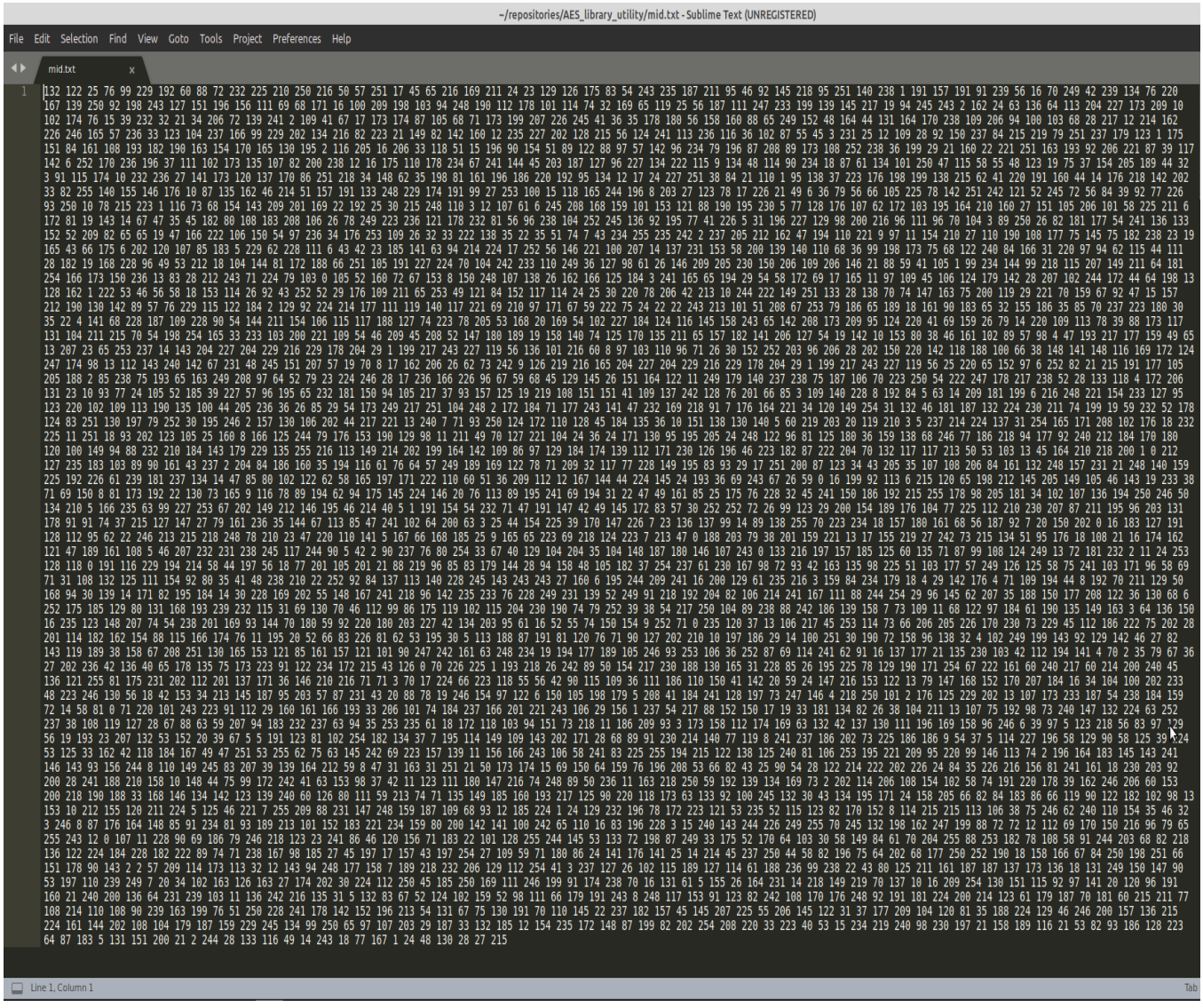




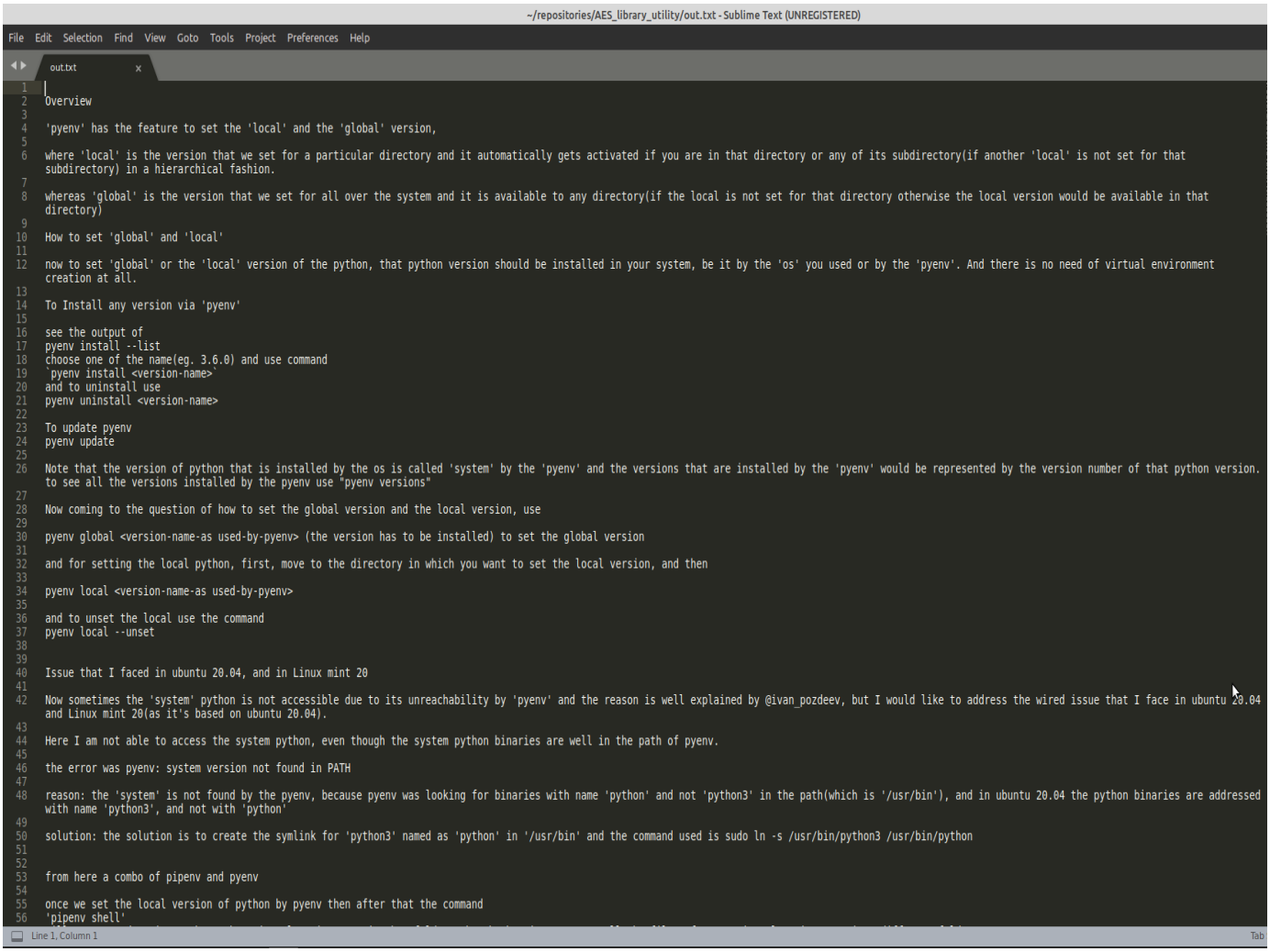
Key File use for encryption and Decryption process:

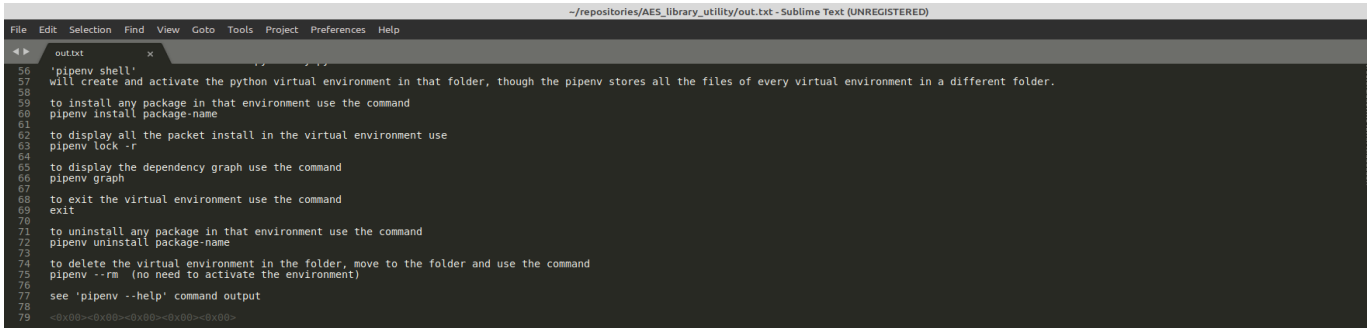


Encrypted Text File after encryption process:



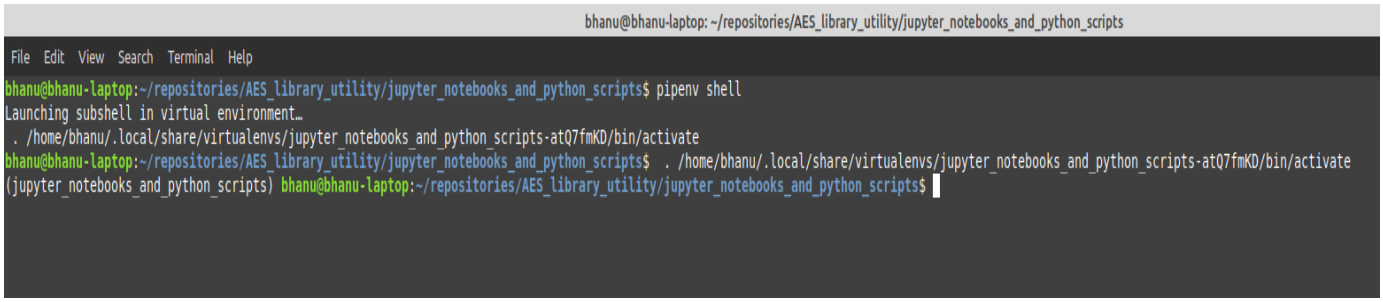
Decrypted Text File after Decryption process:



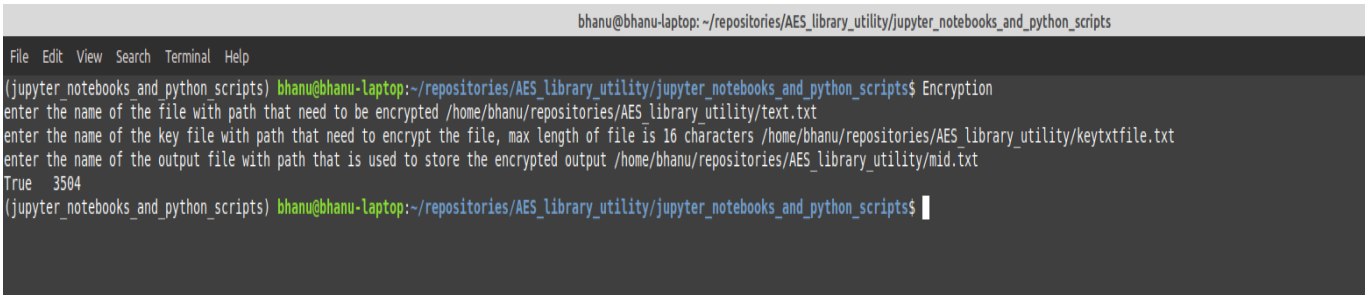


Process for Encryption :

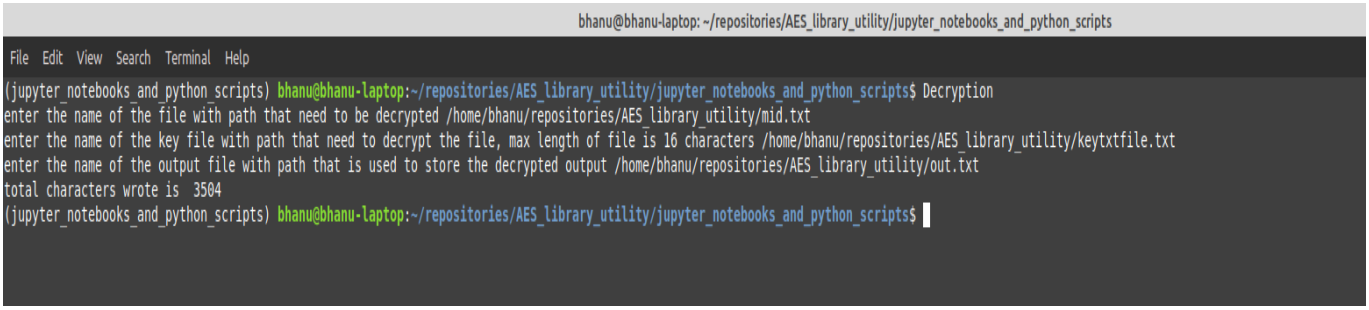
Activating the python virtual environment:



Performing Encryption:



Performing Decryption:



Chapter 8

Testing

- Testing Plan
- Testing Strategy
- Testing Methods
- Test Cases

Testing

Various parameters like implementation environment, program modules and coding standards are explained in previous chapter while this chapter is aimed to provide brief account of testing the software.

There are two principal motives of testing the software

- To rectify the error in execution
- To check the viability of software

The testing ensures that the software is according to the required specification standards and performs the task meant for it. The testing is done by our in house employee that act as novice user and test the application with all possible way to find the bugs and error as well as check validation.

1. TESTING PLAN

Testing is carried out at the following three stages :

- Design
- Implementation
- Coding

1.1 Design Testing:

The design errors are to be rectified at the initial stage. Such errors are very difficult to repair after the execution of software.

1.2 Implementation Testing:

The errors occurred at this stage can't be overlooked because such errors do not allow the further process.

1.3 Coding Testing:

The coding procedure plays significant role in software designing. The improper coding of any software can generate inconsistent results. Such errors may occur due to incorrect syntax or false logic. If the errors at coding stage remain unnoticed may give rise to grave failure of the system.

2. TESTING STRATEGY

A strategy for software testing integrates software test case design method into a well-planned series of steps that result in the successful construction of the software.

The strategy provides the roadmap that describes the steps to be conducted as a part of testing, then these steps are planned and then undertaken, and how much effort, time and resource will be required.

◆ We have tested our whole system using bottom up testing strategy.

◆ Bottom up testing involves integrating and testing the modules to the lower levels in the hierarchy, and then working up hierarchy of modules until the final module is tested.

◆ Bottom up testing strategy shows how actual testing is to be done with whole system but it does not show any detail about each module testing.

◆ When all modules are tested successfully then I will move to one step up and continue with white box testing strategy.

◆ When all modules will be tested successfully then I will integrate those modules and try to test integrated system using black box testing strategy.

Why Black Box Testing in my Project?

In my project whatever I have implemented was going to be tested by guide Mr. Rajesh Davda so there was a black box testing involve directly.

3. TESTING METHOD

3.1 Unit Testing

The unit testing is meant for testing smallest unit of software. There are two approaches namely bottom-up and top-down.

In bottom up approach the last module is tested and then moving towards the first module while top down approach reverses the action. In present work we opt for the first one.

The bottom up approach for the current project is carried out as shown in.

3.2 Integration Testing

The integration testing is meant to test all the modules simultaneously because it is possible that all the modules may function correctly when tested individually. But they may not work altogether and may lead to unexpected outcome.

3.3 Validation Testing

After the integration testing software is completely assembled as a package, interfacing error have been uncovered and corrected, and then validation testing may begin. Validation can be defined in many ways but a simple definition is what a validation succeeds when software functions in a manner.

3.4 Storage Testing

The dataset of the system has to be stored on the hard disk. So the storage capacity of the hard disk should be enough to store all the data required for the efficient running of the software.

4. TEST CASES

4.1 Purpose

The purpose of this project is to use to generate a fast utility for encryption and decryption process of the text file which is easy to used and contain only the necessary features to make the utmost important work that is encryption and decryption faster.

Chapter 9

Limitations and Future Enhancement

- Limitations and Future Enhancement

1.1 LIMITATIONS:

This project has an assumption that is both the sender and receiver must have shared some secret information before imprisonment. Pure cryptography means that there is none prior information shared by two communication parties.

Technology constraint:

The problem encountered here is searching information about computer security through Data Encryption and Key Algorithm and another problem is since the secret key has to be sending to the receiver of the encrypted data, it is hard to securely pass the key over the network to the receiver.

Time constraint:

The time giving for the submission of this project work was not really enough for the researcher to extensively carry out more research on this work.

Financial constraint:

There was not enough money to extensively carry out this work

1.2 FUTURE ENHANCEMENT:

The project “Advanced Encryption system” is designed for many future additions so that any user requirements can be made easy. Though the system is working on various assumptions it can be modified easily to a kind of requirements.

Future enhancements are possible even in specific modules as entire systems are computerized and modifiable approach. The system is flexible enough to incorporate new database to existing one. Since the entire system is developed in a modular approach, modification if necessary can be done on specific module without distributing the system.

Existing system used 128-bit scheme. It can be further improved by increases **128 bits to 192 and 256-bit scheme**. System performance can be further increased by applying pipe lines stages in between modules.

Chapter 10

Conclusion and Discussion

- Self analysis and Project viabilities
- Problem encountered and possible solutions
- Summary of project

1. SELF ANALYSIS AND PROJECT VIABILITIES

This shows a simple approach for fake news detection using naive Bayes classifier. This approach was implemented as a software system and tested against a data set of Facebook news posts. We achieved classification accuracy of approximately 74% on the test set which is a decent result considering the relative simplicity of the model. These results may be improved in several ways, that are described in the article as well. Received results suggest, that fake news detection problem can be addressed with artificial intelligence methods.

2. PROBLEM ENCOUNTERED AND POSSIBLE SOLUTIONS:

2.1 Resource Availability:

An important part of checking the veracity of a specific claim is to evaluate the stance different news sources take towards the assertion. Automatic stance evaluation, i.e. stance detection, would arguably facilitate the process of fact checking.

2.2 Requirement Understanding:

Automatic fake news detection is a challenging problem in deception detection, and it has tremendous real-world political and social impacts. However, statistical approaches to combating fake news has been dramatically limited by the lack of labeled benchmark datasets.

2.3 Problem Encountered and Possible Solutions:

Problem:

Encryption and Decryption system based on AES 128 bit algorithm.

Solution:

To Encrypt and Decrypt the text file using the AES 128 bit algorithm.

3. SUMMARY OF PROJECT

The scourge of cyberbullying has assumed alarming proportions with an ever-increasing number of adolescents admitting to having dealt with it either as a victim or as a bystander.

Anonymity and the lack of meaningful supervision in the electronic medium are two factors that have exacerbated this social menace.

Digital insecurity is a phenomenon which is having a significant impact on our social life, in particular in the political world. Encryption system is an emerging research area which is gaining interest but involved some challenges due to the limited amount of resources available.

We propose in this paper, an Encryption and Decryption system that use AES 128 bit algorithm technique. We investigate and compare other GUI based systems for encryption with our command line based Encryption system.

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