

# Real-Time Web-Based Secure Chat Application using Django

Satish Singh, Satyam Singh, Dr. Ashish Sharma

*B-Tech Computer Science And Engineering, Galgotias University, Greater Noida, India*

*B-Tech Computer Science And Engineering, Galgotias University, Delhi, India*

*School Of Computer Science and Engineering, Galgotias University, Delhi, India*

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**ABSTRACT**— The most relevant advancement in the Internet has put the whole world in our control. From information sharing to product purchases, everything is done online. The internet making the world a small circle. This project is also Internet-based. The purpose of this project is to develop a web application that will allow users to instantaneously and at the moment connect. Considering this, a chat application is a feature or a program that allows online or concurrent internet users to connect directly with one another. Focusing on the most error-free data flow possible on the web is crucial while developing chat applications. Users of chat software can communicate even when they are far apart. To stop hackers or intruders from attempting to steal data, encryption becomes a viable solution with the key exchange. As a suggestion for securing chat messages in web apps, this study suggests the N-TEA algorithm. The real-time encryption system N-TEA operates independently of the type of data being sent and operates in real-time. A real-time, reliable encryption method is supported by this algorithm. The findings of this research indicate that the avalanche effect caused by a change in plaintext character is 36.72%. Another section sees a 42.9% avalanche impact due to the change in the encryption key character. The N-TEA algorithm can securely transmit messages, as this study's findings demonstrate. This App is constructed by using Django Framework in the back end and CSS and HTML in the front end.

**Keywords**—Django, HTML, CSS

## I. INTRODUCTION

In the modern world, where everything is being replaced by technology. The means of communication are likewise evolving. Due to its user-friendly functionality and convenience for real-time communication [1], messaging has integrated itself into our daily lives [2]. There are numerous similar methods accessible today, including instant

messaging through social media, team chats in a Slack or Microsoft Team workspace, or an iOS or text message on an iPhone or Android smartphone [3] from a friend.

Despite geographical boundaries, chatting is a way to use technology to "bring individuals and their ideas together [4]." Although these technologies have been around for a while, their acceptability is relatively new. A chat application [5] is the greatest method for making it simple to send and receive messages in real-time with individuals anywhere in the world. Users of real-time chat software will be able to engage in the same vibrant and engaging dialogue as they would in person thanks to customizing messaging features. Chat applications are becoming more and more popular and vital in the software development environment. owing to this compensatory technique, it allows for flawless concurrent interaction amongst programmers. Each group member will be able to talk and work on problems with the others wherever they are at any given time thanks to the real-time interaction. The majority of chat applications are incorporated inside the development environment. The "Chat Application" was created to replace the currently in-use manual system. The difficulties that these current system encounters are intended to be eliminated, and in some case reduce the hardship faced by the existing system. Additionally, this application prevents users from searching elsewhere for a messaging solution and keeps them speaking on your platform. The addition of personalizing chat capabilities to your app can assist make sure that your users have a positive experience. Chat applications can be either private chat, group chat [6], or large-scale chat. Our project serves as an illustration of a chat application. It consists of two modules: a client module that runs on the user's computer and a server module that runs on any networked computer. The client must establish a connection to the server in order to start a conversation. Once connected, users

can practice two different kinds of chatting: Public(messages are broadcast to all connected users) and Private(between any two users alone), and at the same times as the last security measures were taken.

The N-TEA algorithm enables the maintenance of powerful encryption techniques and real-time capabilities. The foundation of the N-TEA encryption method is the dictionary or dictionary "AM," which upholds data security and data reduction. The released "AM" code was created as a framework for text compression in both versions [7][8]. The following code is used to reduce data usage in mobile email and chat programmers as well as text messaging. The N-TEA algorithm used in this research is based on the "AM" framework for encrypting digital data.

## II. LITERATURE REVIEW

Nowadays, the public has become significantly familiar with internet communication. People now communicate with one another using advanced technology rather than the telephone, cars, or mail. In actuality, chat become a form of internet technology that facilitates human-to-human [9] conversation. Web chat, for instance, becomes the latest chat. With the advancement in technology in recent times, there has massive growth in the practice of using chat for communication. Users of the chat software can communicate, send and receive messages, and play games in real-time with other users. Studies on the effects of chat apps on society have become more popular due to their increased use.

Because of work stresses, there is a positive impact of the chat. According to Hauben (1997), the user is now free to interact without having any form of fear, limitation, or apprehension through the chat because the impact or influence of the first impression has been erased. This statement identifies the primary reason for the exclusive growth in the use of chat. There is the advantage of using chat as well, which is why there are such a large number of users. Accordingly, Licklider (1997) asserted that individuals can interact online with one another if they share similar objectives, passions, and viewpoints. As a result, their lives will become happier and their interaction will get more fruitful and pleasurable. Although Licklider was actually the prophet of the net, it seems that chat really has benefits[10].

Instead of focusing on the chat's advantage, some researchers have adopted a different strategy by emphasizing its issue rather than its benefits. According to Randall (1997), for instance, some issues have actually existed. Undoubtedly, most people will not communicate using their real identities, as is common knowledge. Either they will

develop a brand-new cyber identity that is entirely distinct from their true identities. Randall asks that it be difficult for people to flip between these two identities as a result of these circumstances[11].

As a result, while chat has a positive influence on society, there are also issues present. However, these issues don't appear to be too pressing. Therefore, chat technology will continue to grow essential to our lives as long as these issues persist.

## III. METHODOLOGIES

Different Front-end and Back-end technologies that are present in today's digital age are used in this chatting software. The following is a quick discussion of the technologies employed in this project:

### A. Frontend Technologies

#### HTML

HTML is known as hypertext markup language and is the most favorable language for creating web page designs. Technologies like scripting languages and Cascading Style Sheets (CSS) like JavaScript can assist with HTML. The web browsers download the HTML files from servers or local drives and turn them into various multimedia web pages. It is used to establish the structure of a webpage semantically and it originally provides a signal for the introduction of the document created.

#### CSS

The language used to style an HTML document is called CSS (Cascading Style Sheets). CSS is used to specify how HTML elements should be presented, such as changing your content's font, color, size, and spacing, dividing it into numerous columns, or including animation and other adornments. By using CSS lots of time and work can be saved. The design of several web pages can be managed simultaneously by using CSS.

#### JAVASCRIPT

JavaScript (JS) is an interpreted, lightweight, compiled programming language. This JavaScript comes with first-class functions. The main objective to design JavaScript is for constructing network-centric applications. It is very easy to implement as it is integrated with HTML and also it's open and cross-platform.

JavaScript is a crucial component of web applications because it makes web pages interactive. Due to its high popularity in the programming world, it is a programmer's great choice. By learning JavaScript, you will be able to develop great front-end and Back-end software by the use of various

frameworks that are based on JavaScript like jQuery, and Node.JS.

### B. Backend Technologies

#### PYTHON

Python is developed by Guido van Rossum and is initially released in 1991, which is a general-purpose, object-oriented, interpreted, interactive, interpreted, object-oriented, and high-level programming language [12]. Python's design ideology places a strong emphasis on code readability through the extensive use of whitespace. Python is also a garbage-collected programming language with dynamic typing.

In this chatting app, we are using python as a backend coding language to code database parts and all the functionalities that a website can perform. Python 3.6, the most recent version is used in this project

#### DJANGO

Django (Holovaty&Kalpan-Moss, 2008) is known as a high-level Python Web Framework that promotes pragmatist design, quick development, and clean code [13]. Since Django was created by seasoned programmers, you can concentrate on creating apps without having to invent the wheel by using it to handle a lot of the hassles associated with web development. Django's main objective is to make the process of building database-driven complex, database-driven websites simpler. Less code, "pluggability", quick development, "Low coupling", quick development, and the not repeating yourself philosophy are the main objective of the Django framework. Python is utilized everywhere, including when creating data models and files. Additionally, it has an optional admin create, delete interface, read, and update that is dynamically produced using contemplation and customized using admin models.

#### MYSQL

Based on the popular language known as Structured Query Language, which is used to maintain and access database records, MySQL is RelationalDatabase Management System (RDBMS) that is open-source. For creating web-based applications, it is regarded as one of the best RDBMS.

### C. Hardware and Software Requirements

All of the functionally and non-functionally satisfying needs are mentioned to construct the project. The following is a list of the hardware and

software needed for the application to function on various devices:

#### Systems Specification

Processor Required: Intel® Core™ i5-5005U @2.00GHz

RAM: Should be 2 Gigabytes or more

System Type: Should be 32-bit/64-bit operating system, x32 or x64-based Processor.

OS Required: Windows 7/8/10/11.

#### Software Interface required:

Front End: HTML, CSS, JavaScript

Back End: Django

Local Access Link: localhost: 8000

## IV. PROPOSED METHODS

We took several steps in the development of this project. The key action is outlined here:

1. Installation of Python and adding its path to windows.
2. Creating Virtual Environment (In the command prompt, type the commands below to create a virtual environment)
  - pip install virtualenvwrapper-win
  - mkvirtualenvironmentname (give any name)
  - workonenvironmentname
3. Django Installation
  - pip install Django
4. For navigating to the destination location where you want the project to be kept, use the cd command.
5. Creation of the Project is as follows
  - django-admin startproject(name of the project)
  - cd (project name)
6. Creation of the project App as
  - django-admin startappname
  - python manage.py makemigrations
  - python manage.py migrate
7. Copy the Template Folder (if Frontend Template is downloaded) to the project folder created.
8. Run Server (localhost:8000)
  - Python manage.py runserver

The installation process for our project and the processes required in its development are illustrated in the flow chart below. Commands enclosed in brackets should be entered into the Command Prompt. On the platform that the project will be developed on, they must build up a virtual environment and operate a server. Any editor can be used to code the backend and frontend (the PyCharm Community version was used in this project).

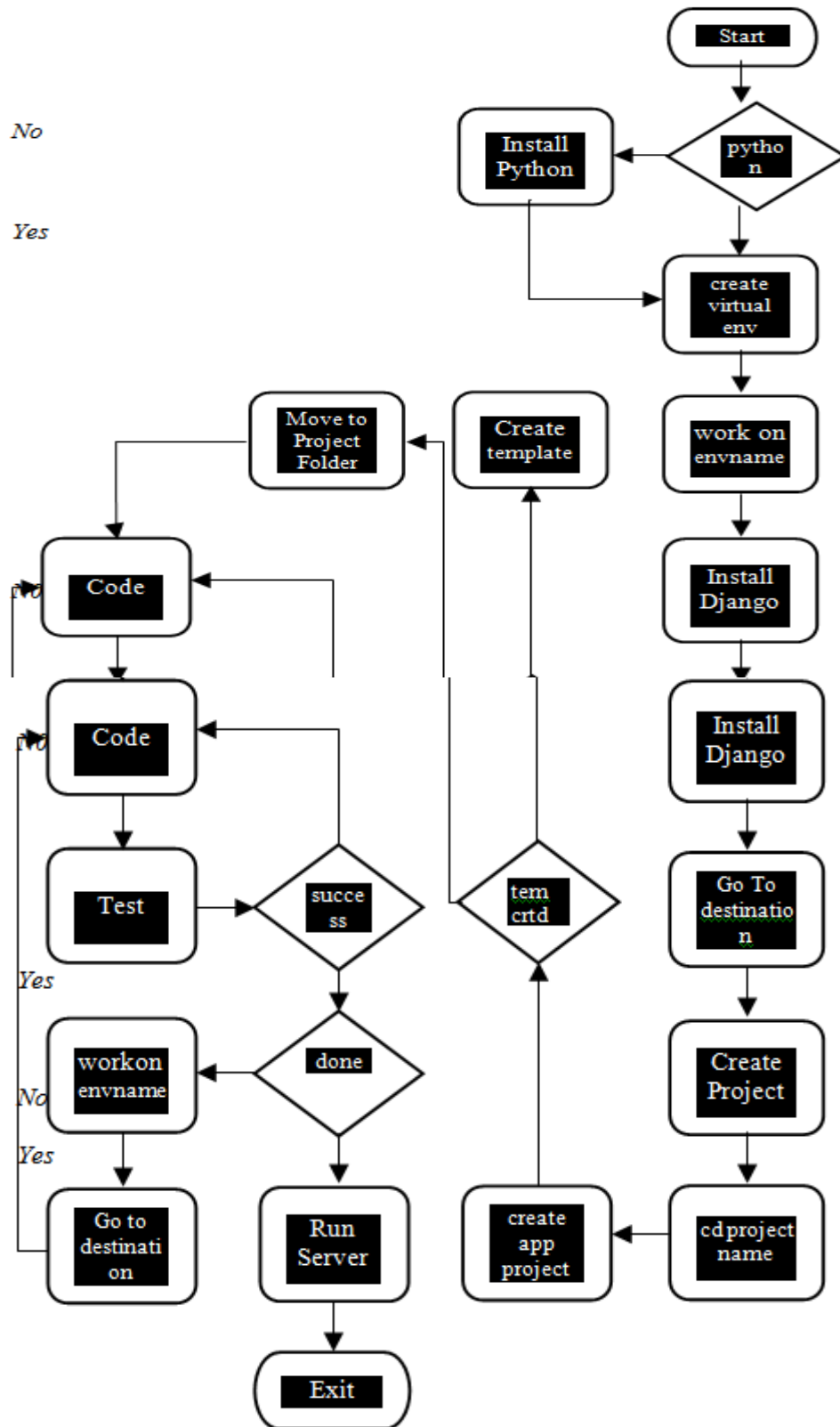


Fig. 1. Flow Chart of Methodology

### V. PROJECT DESIGN

This project's concept is about a web-based real-time chat application that offers users a platform to chat in real-time. Basically, this project consists of a login page and a chat room. Two modules for this project are listed below:

Server Modules: -

A server is a specifically configured computer linked to the internet that allows the user to

communicate with one another via written messages in real-time.

Client Modules: -

A client is a piece of software program that enables the user to connect to a chat server and engage in user-to-user communication in a chat room.

Chat Room: -

A chat room is where a user can start a real-time online conversation with other users.

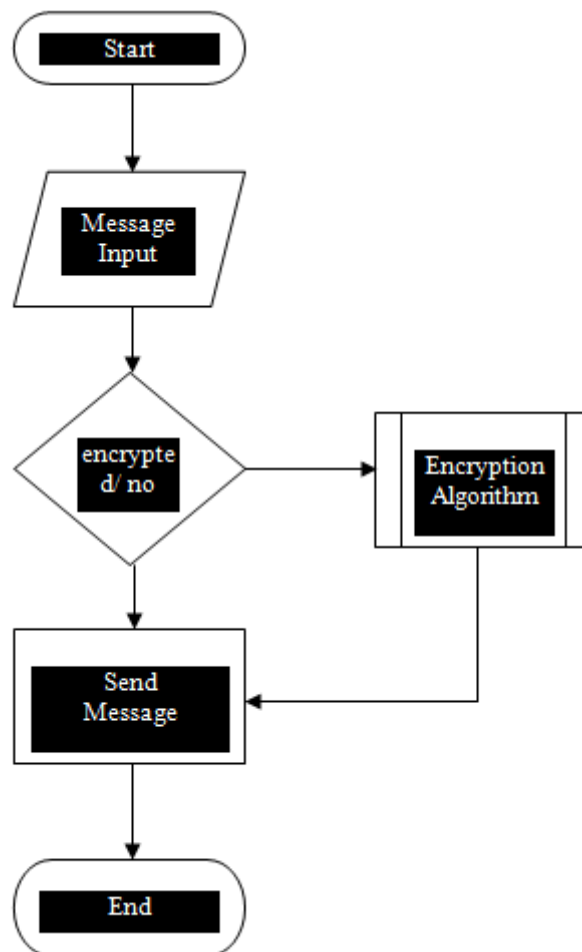


Fig. 2. Flow Chart

The flow process of this chat program begins with connecting to the server online through the internet. This application is ready once linked to the server. When a user and another user are friends, they can communicate by exchanging IDs. The message is information or data that can be read and understood. The message is sometimes referred to as plaintext. The message must be encoded into another incomprehensible form in order to render it unreadable by other unauthorized parties. Ciphertext is the name for a communication that has been

encoded. For ciphertext to be acknowledged and understood by the recipient, it must be possible to convert it back into the original plaintext.

Messaging is a part of data exchange between two entities. The entity that sends messages to other entities is known as the sender. The entity that receives the message is the recipient. The sender would want the communication to be done surely, which means that the sender is confident that the recipient cannot view the message's contents. The message must be converted into ciphertext as a fix.

An explicit communication(plaintext) is converted through the process of encryption into a random message that cannot be decoded(ciphertext). Although the decryption procedure is the opposite of encryption, it will turn the ciphertext into plain text utilizing the same crucial method and key.

The only difference between the two encryption methods is how the communication is received. If the sender encrypts the message, all received messages will be in the ciphertext and need

a key to be decrypted. On the other hand, if the sender doesn't utilize encryption, the client will automatically get a message in plaintext, which can be read immediately. Two users, A, and B, are represented in this system design fable. User A is the sender and User B is the recipient of the communication. The message is sent by the conservation, encrypted, sent, and finally decrypted a second time before being delivered to the recipient in plain text.

## VI. RESULT AND DISCUSSION

TABLE.

Data	Size	Encryption Time(sec)	Decryption Time(sec)
1	1 byte	0.34	0.82
2	2 bytes	0.41	0.94
3	3 bytes	0.47	1.23
4	1 byte	0.29	0.69
5	3 bytes	0.48	0.98
6	1 byte	0.34	0.82

Fig.3. Computation Test of Algorithm Encryption

The length of the encryption process increases with the size of the encrypted text. The encryption process takes 0.34 seconds for 1-byte text data and 0.41 seconds for 2-byte text data. The quantity of words entered determines how quickly a communication is encrypted. The process takes longer as the number of words sent increases. Longer than the encryption process is the decoding process. The encryption process for the initial text data takes 0.34 seconds. The time difference between the

encryption and decryption processes is 0.3 seconds. This algorithm is more guaranteed in terms of security. Because all the messages obtained when obtaining the message are the ciphertext and not the actual message. A message can only be opened by the recipient using a key that has been entered by the message sender. The message won't be read by the recipient if the key entered by the message recipient and the key entered by the sender is different.

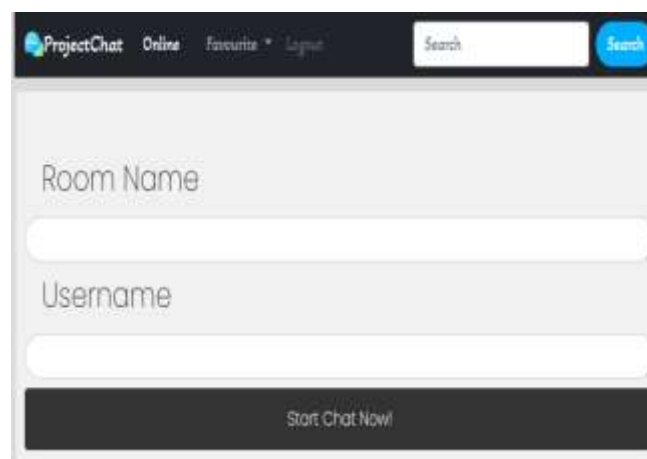


Fig.4. Login Page





Fig.5. Chat Room

## VII. CONCLUSION AND FURTHER SCOPE

No matter how well and efficiently anything is done, there is always space for improvement. However, the main crucial component ought to be adaptable enough to welcome subsequent alteration. We only use text at this moment. Chat platforms first gained popularity by providing a free, web-based alternative to SMS, but over time they transformed into multimedia hubs that provide text communication. Customers must be sure that nobody could read their communication as it is real-time and was not stored data. Further, we can extend this software to include features that will make it more comfortable to use. The feature which can be added are:

**File Sharing:** Through this software program, the user will be capable enough to transfer the file in various formats to the other user.

**Voice chat:** Voice chat will take this application to the advanced level making the user enable voice calling, just like on a telephone, for communication.

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