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**Experiment no. : 8**

**Aim:** To configure SMTP server and send mails using it

**Theory:**

### **Simple Mail Transfer Protocol (SMTP)**

Email is emerging as one of the most valuable services on the internet today. Most internet systems use SMTP as a method to transfer mail from one user to another. SMTP is a push protocol and is used to send the mail whereas POP (post office protocol) or IMAP (internet message access protocol) are used to retrieve those emails at the receiver's side.

### **SMTP Fundamentals**

SMTP is an application layer protocol. The client who wants to send the mail opens a TCP connection to the SMTP server and then sends the mail across the connection. The SMTP server is an always-on listening mode. As soon as it listens for a TCP connection from any client, the SMTP process initiates a connection through port 25. After successfully establishing a TCP connection the client process sends the mail instantly.

### **SMTP Protocol**

The SMTP model is of two types:

1. End-to-end method
2. Store-and- forward method

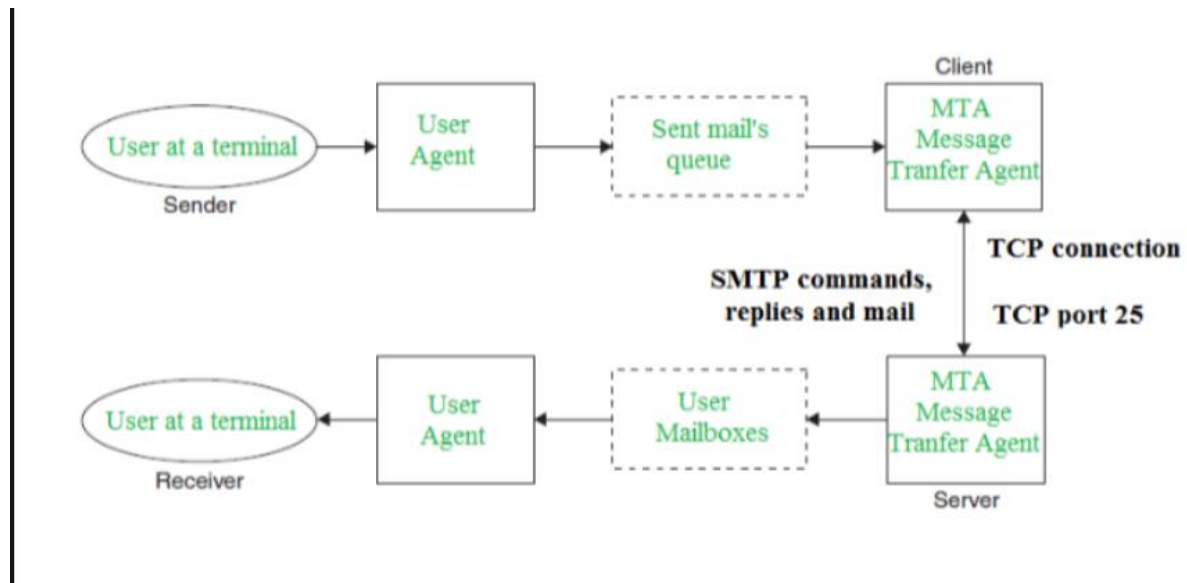
The end-to-end model is used to communicate between different organizations whereas the store and forward method is used within an organization. An SMTP client who wants to send the mail will contact the destination's host SMTP directly, in order to send the mail to the destination. The SMTP server will keep the mail to itself until it is successfully copied to the receiver's SMTP.

The client SMTP is the one that initiates the session so let us call it client- SMTP and the server SMTP is the one that responds to the session request so let us call it receiver-SMTP. The client- SMTP will start the session and the receiver-SMTP will respond to the request.

### **Model of SMTP system**

In the SMTP model user deals with the user agent (UA), for example, Microsoft Outlook, Netscape, Mozilla, etc. In order to exchange the mail using TCP, MTA is used. The user sending the mail doesn't have to deal with MTA as it is the responsibility of the system admin to set up a local MTA. The MTA maintains a small queue of mails so that it can schedule repeat delivery of mails in case the receiver

is not available. The MTA delivers the mail to the mailboxes and the information can later be downloaded by the user agents.



**Both the SMTP-client and SMTP-server should have 2 components:**

1. User-agent (UA)
2. Local MTA

#### **Communication between sender and the receiver :**

The sender's user agent prepares the message and sends it to the MTA. The MTA's responsibility is to transfer the mail across the network to the receiver's MTA. To send mails, a system must have a client MTA, and to receive mails, a system must have a server MTA.

#### **SENDING EMAIL:**

Mail is sent by a series of request and response messages between the client and the server. The message which is sent across consists of a header and a body. A null line is used to terminate the mail header and everything after the null line is considered as the body of the message, which is a sequence of ASCII characters. The message body contains the actual information read by the receipt.

#### **RECEIVING EMAIL:**

The user agent at the server-side checks the mailboxes at a particular time of intervals. If any information is received, it informs the user about the mail. When the user tries to read the mail it displays a list of emails with a short description of each mail in the mailbox. By selecting any of the mail users can view its contents on the terminal.

#### **Some SMTP Commands:**

- HELO – Identifies the client to the server, fully qualified domain name, only sent once per session
- MAIL – Initiate a message transfer, fully qualified domain of originator

- RCPT – Follows MAIL, identifies an addressee, typically the fully qualified name of the addressee, and for multiple addressees use one RCPT for each addressee
- DATA – send data line by line

#### **Advantages of SMTP:**

- If necessary, the users can have a dedicated server.
- It allows for bulk mailing.
- Low cost and wide coverage area.
- Offer choices for email tracking.
- reliable and prompt email delivery.

#### **Disadvantages of SMTP:**

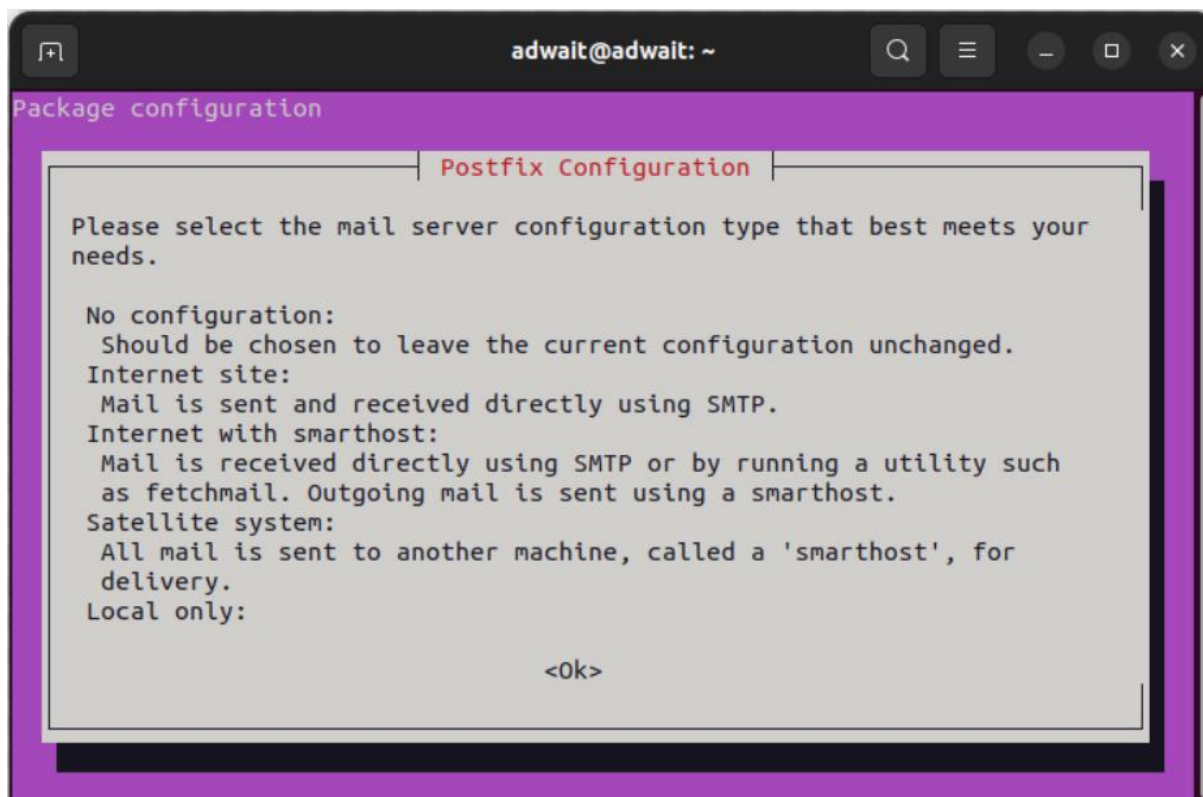
- SMTP's common port can be blocked by several firewalls.
- SMTP security is a bigger problem.
- Its simplicity restricts how useful it can be.
- Just 7 bit ASCII characters can be used.
- If a message is longer than a certain length, SMTP servers may reject the entire message.
- Delivering your message will typically involve additional back-and-forth processing between servers, which will delay sending and raise the likelihood that it won't be sent.

#### **Screenshots:**

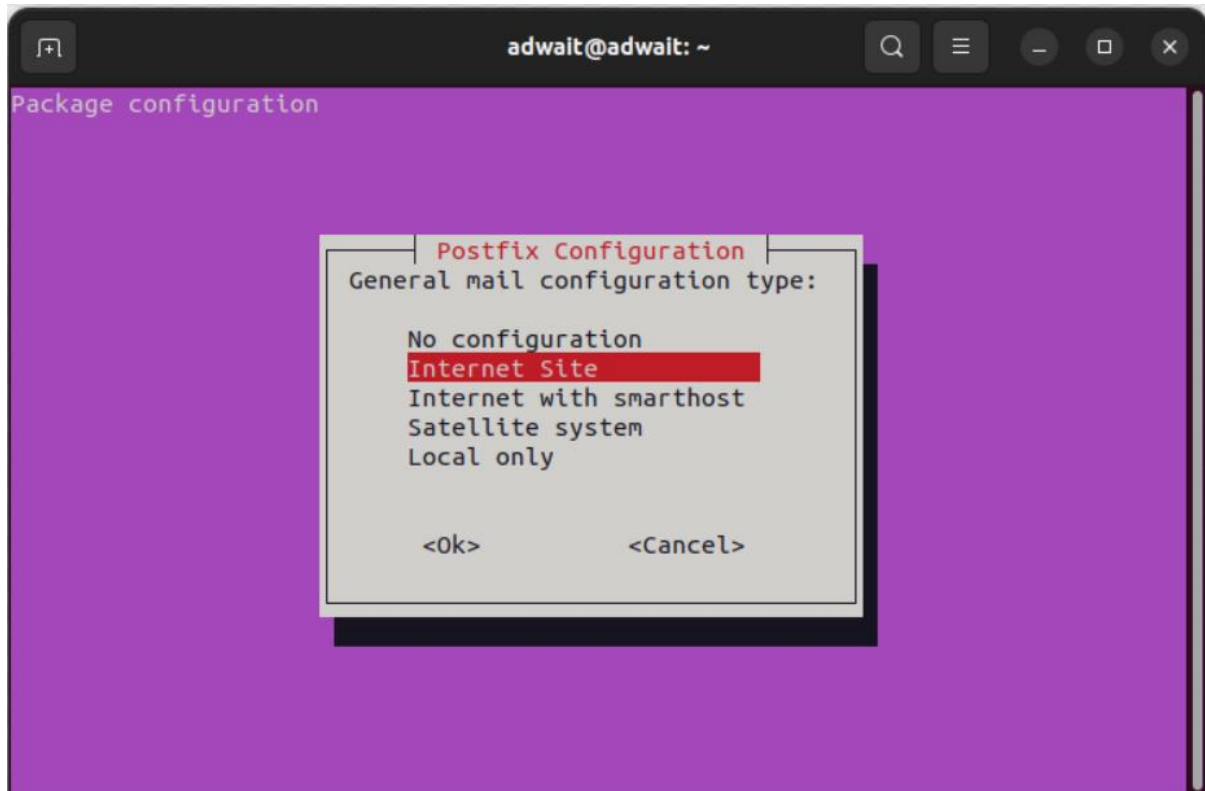
Installation of Postfix using command `sudo apt -y install postfix sasl2-bin`

```
adwait@adwait: ~  
adwait@adwait:~$ sudo apt -y install postfix sasl2-bin  
[sudo] password for adwait:  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
The following packages were automatically installed and are no longer required:  
chromium-codecs-ffmpeg-extra gstreamer1.0-vaapi i965-va-driver  
intel-media-va-driver libaacs0 libaom3 libass9 libavcodec58 libavformat58  
libavutil56 libbdplus0 libblas3 libbluray2 libbs2b0 libchromaprint1  
libcodec2-1.0 libdavid5 libflashrom1 libflite1 libftdi1-2 libgme0 libgsm1  
libgstreamer-plugins-bad1.0-0 libigdgmm12 liblilv-0-0 libllvm13 libmfx1  
libmysofa1 libnorm1 libopenmpt0 libpgm-5.3-0 libpostproc55 librabbitmq4  
librubberband2 libserd-0-0 libshine3 libsord-0-0 libsratom-0-0  
libstr1.4-gnutls libswresample3 libswscale5 libudfread0 libva-drm2  
libva-wayland2 libva-x11-2 libva2 libvdpau1 libvidstab1.1 libx265-199  
libxvidcore4 libzimg2 libzmq5 libzvbi-common libzvbi0  
linux-image-5.15.0-58-generic linux-modules-5.15.0-58-generic  
linux-modules-extra-5.15.0-58-generic mesa-va-drivers mesa-va-drivers  
pocketsphinx-en-us va-driver-all vdpau-driver-all  
Use 'sudo apt autoremove' to remove them.  
The following additional packages will be installed:  
db-util db5.3-util libsasl2-2 libsasl2-modules libsasl2-modules-db  
libsasl2-modules-gssapi-mit  
Suggested packages:
```

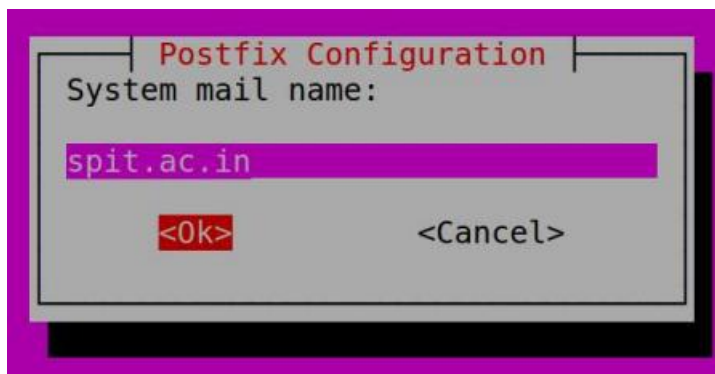
Click Ok to select the mail server configuration



During installation And Configuration Of Postfix Select Internet Site Because We Need SMTP.



Check If Domain Name Is Correct And Press Ok.



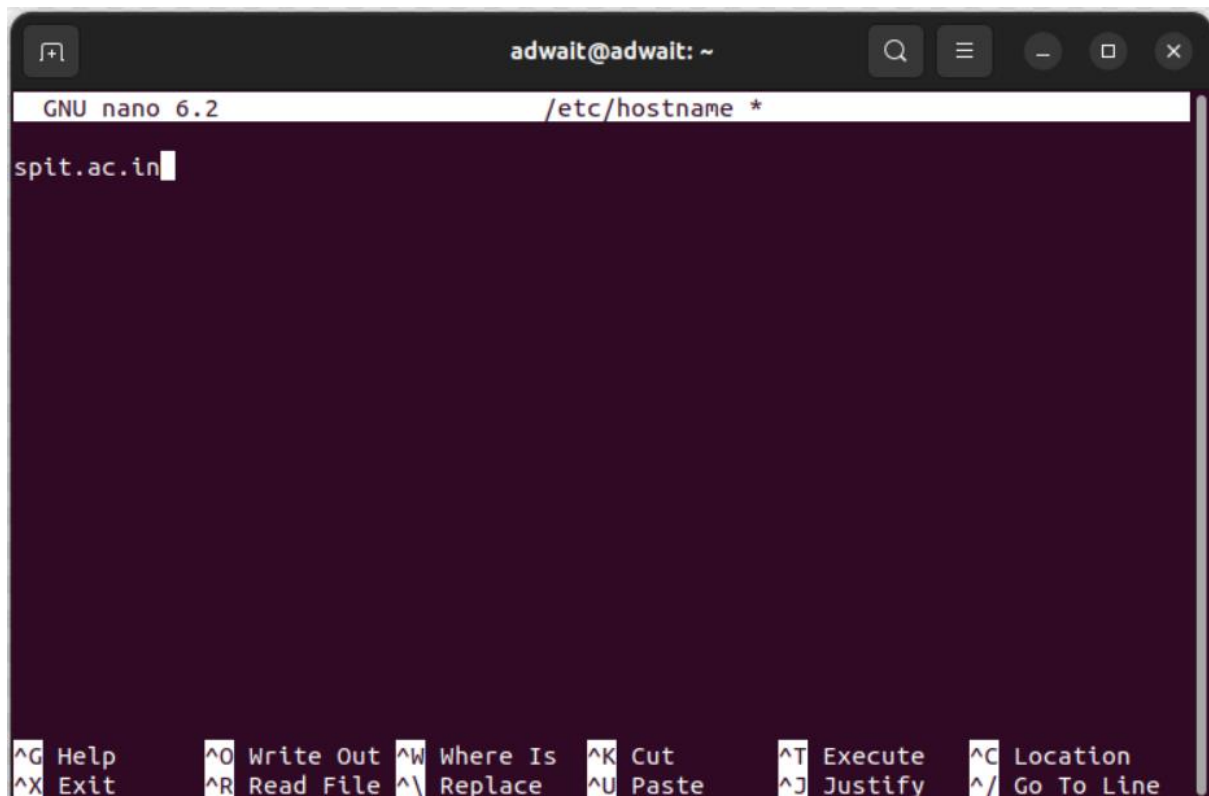
Installation and Configuration of SMTP Server:

### **Part A: Changing Hostname**

```
adwait@adwait:~$ sudo hostname spit.ac.in
adwait@adwait:~$ hostname -f
spit.ac.in
adwait@adwait:~$ sudo nano /etc/hostname
```

Run `sudo nano /etc/hostname` Command And Enter Domain And Save The File

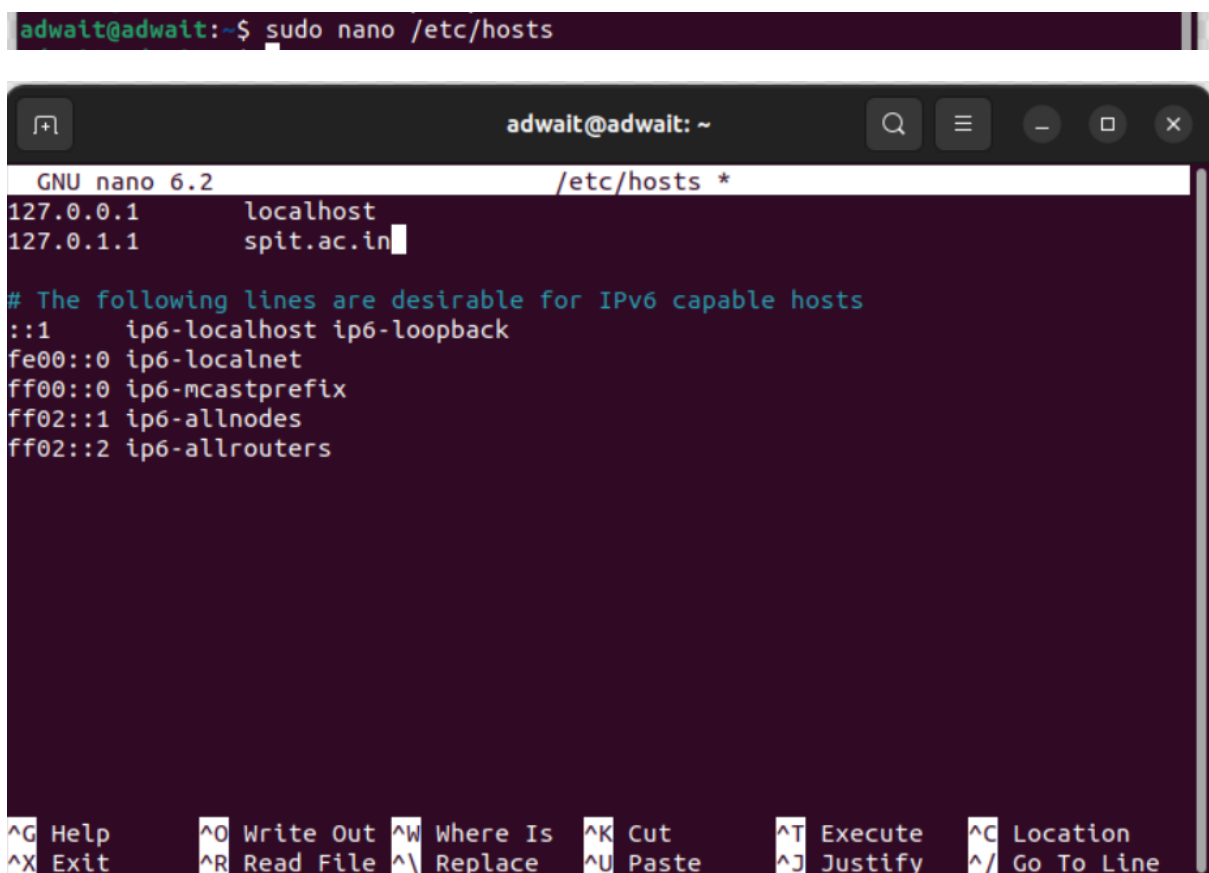
```
adwait@adwait:~$ sudo nano /etc/hostname
```



A terminal window titled 'adwait@adwait: ~' showing the GNU nano 6.2 editor editing the file /etc/hostname \*. The file contains the text 'spit.ac.in' followed by a cursor. The bottom status bar shows various keyboard shortcuts: ^G Help, ^O Write Out, ^W Where Is, ^K Cut, ^T Execute, ^C Location, ^X Exit, ^R Read File, ^\ Replace, ^U Paste, ^J Justify, and ^\_ Go To Line.

```
adwait@adwait: ~
GNU nano 6.2 /etc/hostname *
spit.ac.in
^G Help  ^O Write Out  ^W Where Is  ^K Cut      ^T Execute   ^C Location
^X Exit  ^R Read File  ^\ Replace   ^U Paste    ^J Justify   ^_ Go To Line
```

Run `sudo nano /etc/hosts` Command And Enter Domain Next To 127.0.1.1 And Save The File



A terminal window titled 'adwait@adwait: ~' showing the GNU nano 6.2 editor editing the file /etc/hosts \*. The file contains the following content: '127.0.0.1 localhost', '127.0.1.1 spit.ac.in', and a comment '# The following lines are desirable for IPv6 capable hosts' followed by several IPv6 addresses and their corresponding hostnames. The bottom status bar shows the same keyboard shortcuts as the previous image.

```
adwait@adwait:~$ sudo nano /etc/hosts
GNU nano 6.2 /etc/hosts *
127.0.0.1      localhost
127.0.1.1      spit.ac.in
# The following lines are desirable for IPv6 capable hosts
::1           ip6-localhost ip6-loopback
fe00::0       ip6-localnet
ff00::0       ip6-mcastprefix
ff02::1       ip6-allnodes
ff02::2       ip6-allrouters
^G Help  ^O Write Out  ^W Where Is  ^K Cut      ^T Execute   ^C Location
^X Exit  ^R Read File  ^\ Replace   ^U Paste    ^J Justify   ^_ Go To Line
```

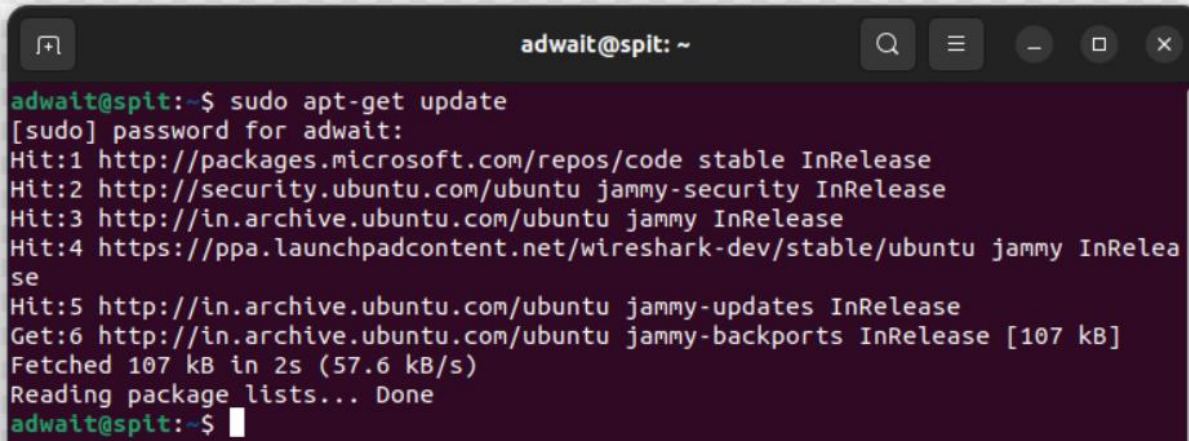


Reboot System To Save The Changes.

```
adwait@adwait:~$ reboot
```

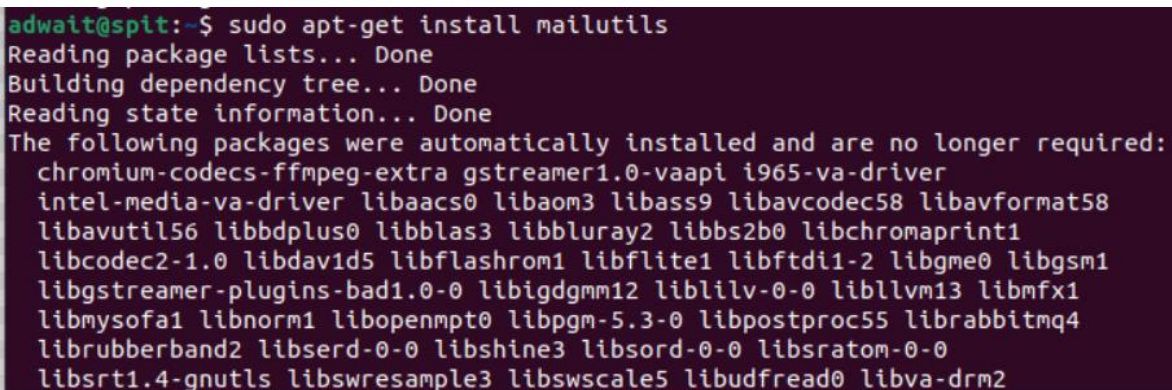
## Part B: Installation of Postfix

Step 1: Run sudo apt-get update Command to Update All Packages.

A terminal window titled 'adwait@spit: ~' with standard Ubuntu window controls. The terminal shows the execution of 'sudo apt-get update'. It prompts for a password, then lists several repository updates (Hit:1 to Hit:5) and one package download (Get:6) for 'jammy-backports'. It reports that 107 kB were fetched in 2 seconds at 57.6 kB/s, and that package lists were successfully read.

```
adwait@spit:~$ sudo apt-get update
[sudo] password for adwait:
Hit:1 http://packages.microsoft.com/repos/code stable InRelease
Hit:2 http://security.ubuntu.com/ubuntu jammy-security InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Hit:4 https://ppa.launchpadcontent.net/wireshark-dev/stable/ubuntu jammy InRelease
Hit:5 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease
Get:6 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease [107 kB]
Fetched 107 kB in 2s (57.6 kB/s)
Reading package lists... Done
adwait@spit:~$
```

Step 2: Run sudo apt-get install mailutils Command To Install Postfix Along With Other Mail Utilities.

A terminal window showing the output of 'sudo apt-get install mailutils'. It lists the packages that will be installed, including 'mailutils' and several dependencies. It also lists a large number of packages that were automatically installed but are no longer required, such as 'chromium-codecs-ffmpeg-extra', 'gststreamer1.0-vaapi', and various 'lib' packages.

```
adwait@spit:~$ sudo apt-get install mailutils
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
 chromium-codecs-ffmpeg-extra gstreamer1.0-vaapi i965-va-driver
 intel-media-va-driver libaacs0 libaom3 libass9 libavcodec58 libavformat58
 libavutil56 libbdplus0 libblas3 libbluray2 libbs2b0 libchromaprint1
 libcodec2-1.0 libdavid5 libflashrom1 libflite1 libftdi1-2 libgme0 libgsm1
 libgstreamer-plugins-bad1.0-0 libigdgmm12 liblilv-0-0 libllvm13 libmfx1
 libmysofa1 libnorm1 libopenmpt0 libpgm-5.3-0 libpostproc55 librabbitmq4
 librubberband2 libserd-0-0 libshine3 libsord-0-0 libsratom-0-0
 libstr1.4-gnutls libswresample3 libswscale5 libudfread0 libva-drm2
```

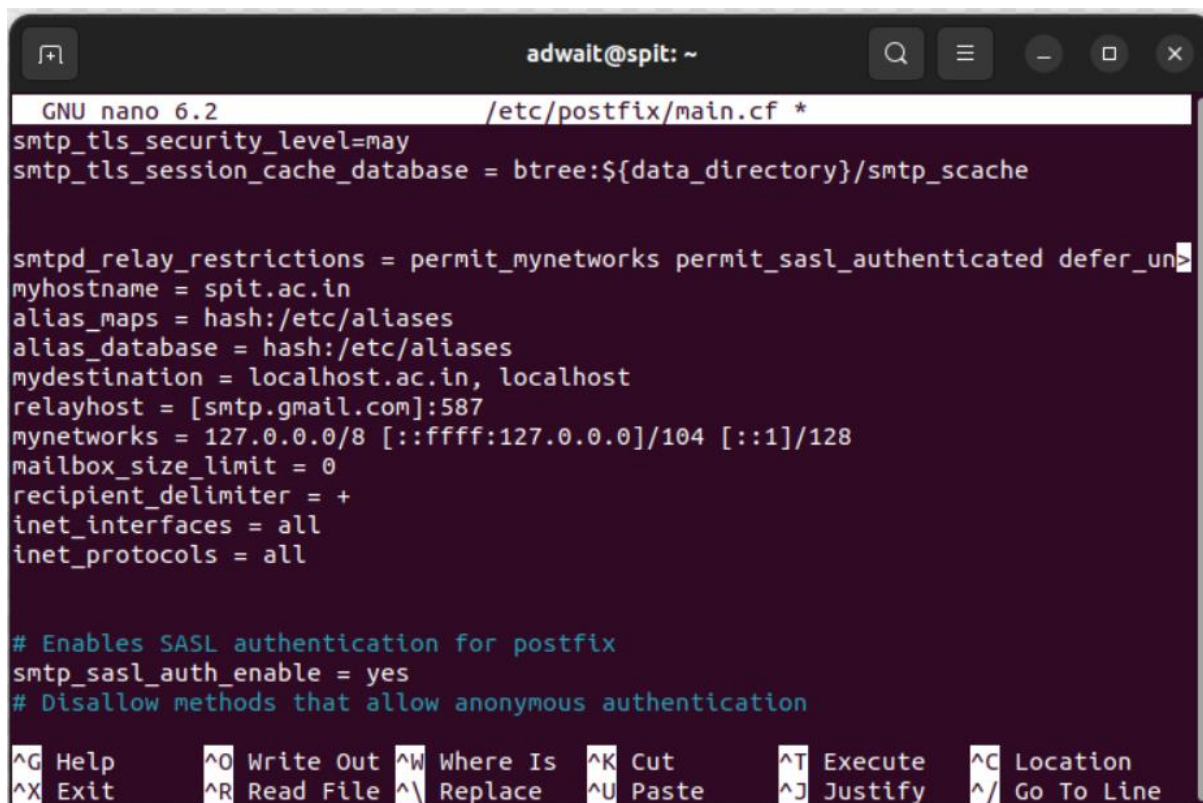
```

Setting up libntlm0:amd64 (1.6-4) ...
Setting up mailutils-common (1:3.14-1) ...
Setting up gssapi-common (1.10.0-5) ...
Setting up libgssapi7:amd64 (1.10.0-5) ...
Setting up libmailutils8:amd64 (1:3.14-1) ...
Setting up mailutils (1:3.14-1) ...
update-alternatives: using /usr/bin/frm.mailutils to provide /usr/bin/frm (frm)
in auto mode
update-alternatives: using /usr/bin/from.mailutils to provide /usr/bin/from (fro
m) in auto mode
update-alternatives: using /usr/bin/messages.mailutils to provide /usr/bin/messa
ges (messages) in auto mode
update-alternatives: using /usr/bin/movemail.mailutils to provide /usr/bin/movem
ail (movemail) in auto mode
update-alternatives: using /usr/bin/readmsg.mailutils to provide /usr/bin/readms
g (readmsg) in auto mode
update-alternatives: using /usr/bin/dotlock.mailutils to provide /usr/bin/dotloc
k (dotlock) in auto mode
update-alternatives: using /usr/bin/mail.mailutils to provide /usr/bin/mailx (ma
ilx) in auto mode
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...

```

## Part C: Configure Postfix With Gmail SMTP

Step 1: Run `sudo nano /etc/postfix/main.cf` Command And Add `relayhost = [smtp.gmail.com]:587`.



```

GNU nano 6.2 /etc/postfix/main.cf *
smtp_tls_security_level=may
smtp_tls_session_cache_database = btree:${data_directory}/smtp_scache

smtpd_relay_restrictions = permit_mynetworks permit_sasl_authenticated defer_un
myhostname = spit.ac.in
alias_maps = hash:/etc/aliases
alias_database = hash:/etc/aliases
mydestination = localhost.ac.in, localhost
relayhost = [smtp.gmail.com]:587
mynetworks = 127.0.0.0/8 [::ffff:127.0.0.0]/104 [::1]/128
mailbox_size_limit = 0
recipient_delimiter = +
inet_interfaces = all
inet_protocols = all

# Enables SASL authentication for postfix
smtp_sasl_auth_enable = yes
# Disallow methods that allow anonymous authentication

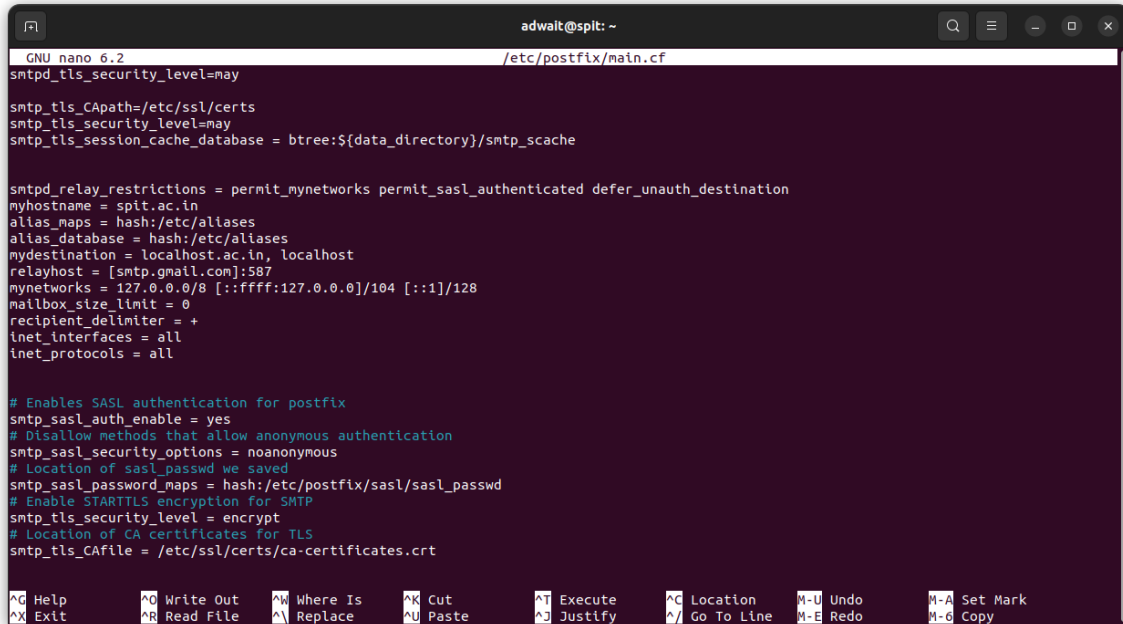
^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute  ^C Location
^X Exit      ^R Read File ^_ Replace   ^U Paste     ^J Justify  ^_ Go To Line

```

Step 2: In Above File Add Contents Of



[https://docs.google.com/document/d/1y\\_xQ9nrVT8Yf3GmhQRt-cdhcm1FwVrXf\\_L6n\\_iwz6Xc/edit](https://docs.google.com/document/d/1y_xQ9nrVT8Yf3GmhQRt-cdhcm1FwVrXf_L6n_iwz6Xc/edit)



```
GNU nano 6.2 /etc/postfix/main.cf
smtpd_tls_security_level=may

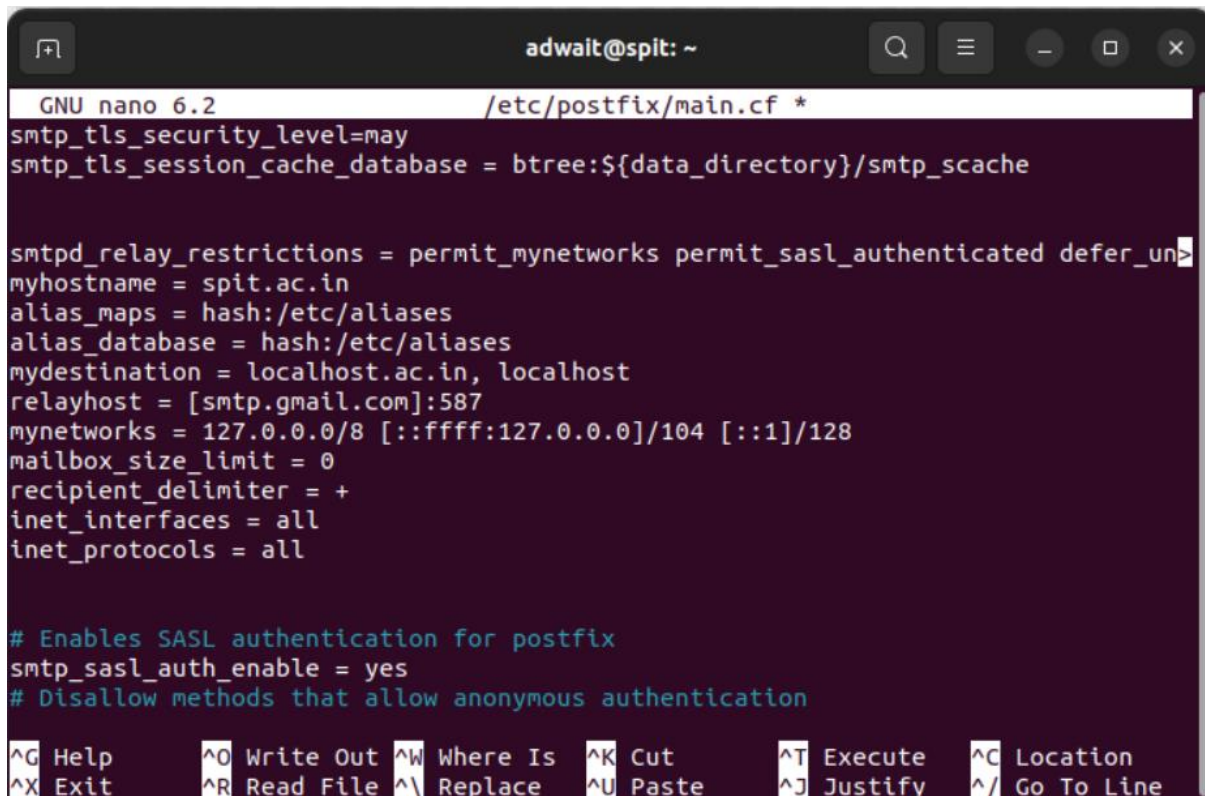
smtpd_tls_CApath=/etc/ssl/certs
smtpd_tls_security_level=may
smtpd_tls_session_cache_database = btree:${data_directory}/smtp_scache

smtpd_relay_restrictions = permit_mynetworks permit_sasl_authenticated defer_unauth_destination
myhostname = spit.ac.in
alias_maps = hash:/etc/aliases
alias_database = hash:/etc/aliases
mydestination = localhost.ac.in, localhost
relayhost = [smtp.gmail.com]:587
mynetworks = 127.0.0.0/8 [::ffff:127.0.0.0]/104 [::1]/128
mailbox_size_limit = 0
recipient_delimiter = +
inet_interfaces = all
inet_protocols = all

# Enables SASL authentication for postfix
smtp_sasl_auth_enable = yes
# Disallow methods that allow anonymous authentication
smtp_sasl_security_options = noanonymous
# Location of sasl_passwd we saved
smtp_sasl_password_maps = hash:/etc/postfix/sasl/sasl_passwd
# Enable STARTTLS encryption for SMTP
smtp_tls_security_level = encrypt
# Location of CA certificates for TLS
smtp_tls_CAfile = /etc/ssl/certs/ca-certificates.crt

^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location  M-U Undo    M-A Set Mark
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^_/ Go To Line M-E Redo    M-6 Copy
```

Step 3: In Same File Delete Everything Next To “mydestination =” Except “localhost, localhost” And Save The File.



```
GNU nano 6.2 /etc/postfix/main.cf *
smtpd_tls_security_level=may
smtpd_tls_session_cache_database = btree:${data_directory}/smtp_scache

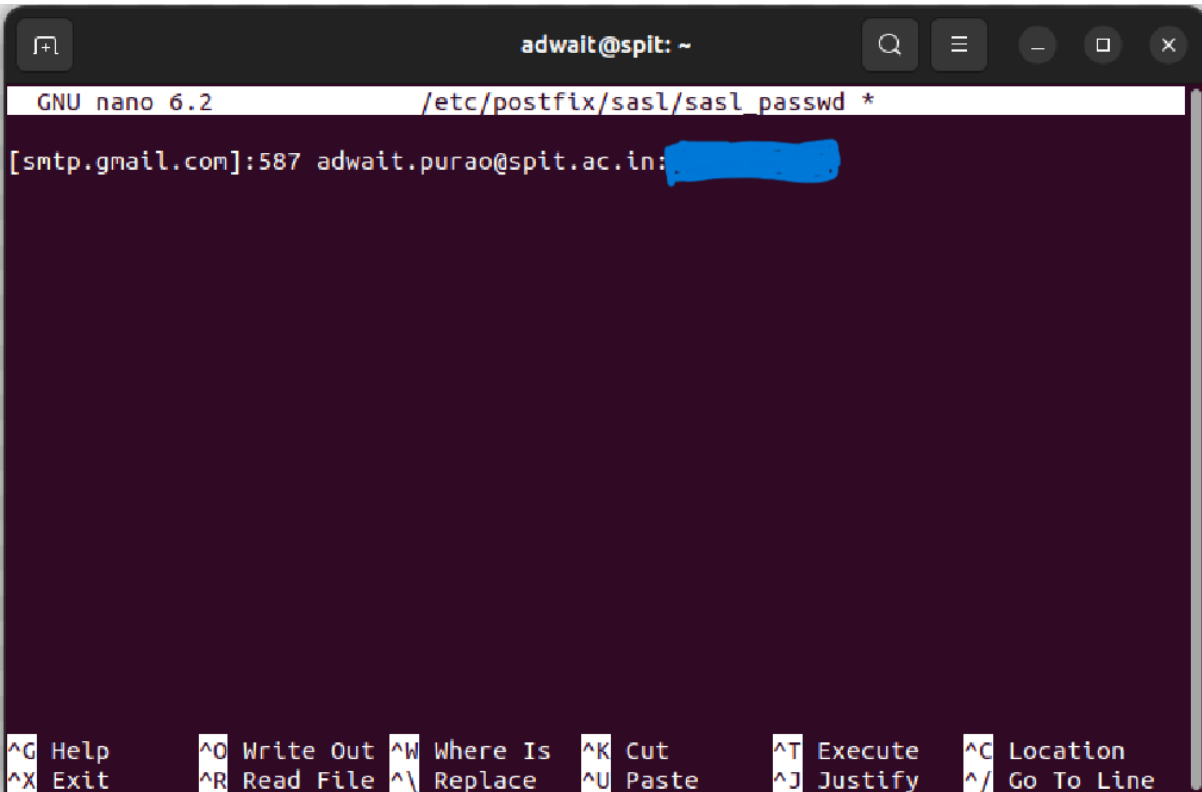
smtpd_relay_restrictions = permit_mynetworks permit_sasl_authenticated defer_unauth_destination
myhostname = spit.ac.in
alias_maps = hash:/etc/aliases
alias_database = hash:/etc/aliases
mydestination = localhost.ac.in, localhost
relayhost = [smtp.gmail.com]:587
mynetworks = 127.0.0.0/8 [::ffff:127.0.0.0]/104 [::1]/128
mailbox_size_limit = 0
recipient_delimiter = +
inet_interfaces = all
inet_protocols = all

# Enables SASL authentication for postfix
smtp_sasl_auth_enable = yes
# Disallow methods that allow anonymous authentication

^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location  M-U Undo    M-A Set Mark
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^_/ Go To Line M-E Redo    M-6 Copy
```

Step 4: Create New File Using `sudo nano /etc/postfix/sasl/sasl_passwd` Command, Add `[smtp.gmail.com]:587 email_address :password` And Save The File.

```
adwait@spit:~$ sudo nano /etc/postfix/sasl/sasl_passwd
```



Step 5: Convert The `sasl_passwd` File Into A Database File Using `sudo postmap /etc/postfix/sasl/sasl_passwd` Command.

```
adwait@spit:~$ sudo postmap /etc/postfix/sasl/sasl_passwd
postmap: warning: /etc/postfix/main.cf, line 56: overriding earlier entry: smtp_
tls_security_level=may
```

Step 6: Restart Postfix Using `sudo service postfix restart` Command.

```
adwait@spit:~$ sudo service postfix restart
```

Step 7: Change The Setting In Google Account To Allow Less Secured Non-Google Apps To Use Authentication To Send Emails Via SMTP On Your Behalf.

## ← Less secure app access

Some apps and devices use less secure sign-in technology, which makes your account vulnerable. You can turn off access for these apps, which we recommend, or turn it on if you want to use them despite the risks. Google will automatically turn this setting OFF if it's not being used. [Learn more](#)

Allow less secure apps: ON

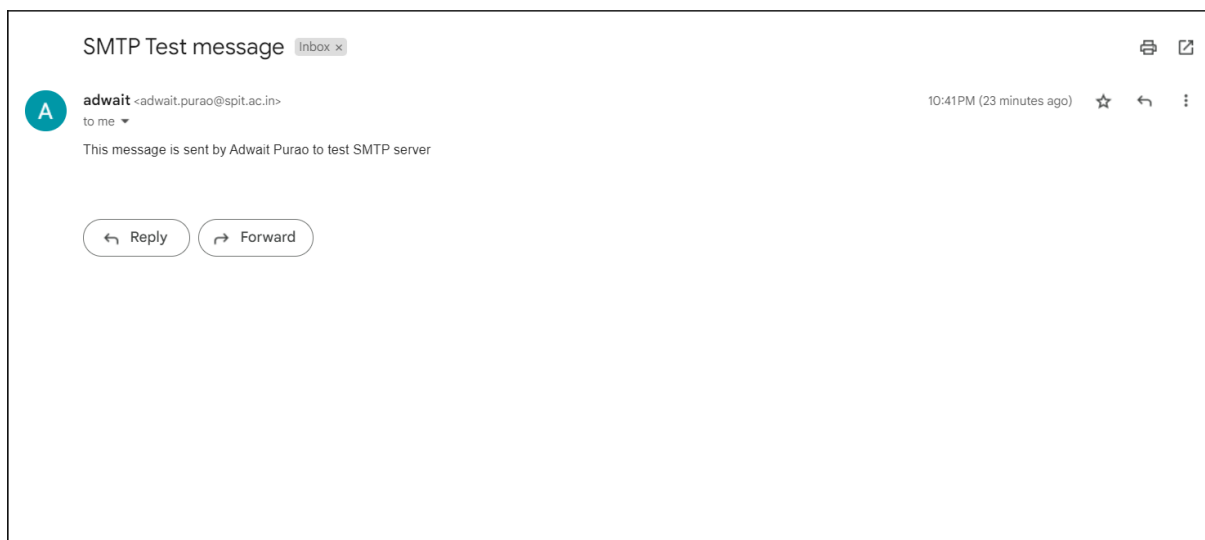


### **Part D: Sending And Receiving Mail**

Step 1: Send Email Using `echo "<Message>" | mail -s "<Title>" <email_address>` Command.

```
adwait@spit:~$ echo "This message is sent by Adwait Purao to test SMTP server" | mail -s "SMTP Test message" adwait.purao@spit.ac.in
adwait@spit:~$
```

Step 2: Open Gmail And Check The Received Mail.



### **Conclusion:**

In this experiment, we gained knowledge about the Simple Mail Transfer Protocol (SMTP) which is an application utilized by mail servers to transfer outgoing mail between senders

and receivers. We also witnessed the practical application of SMTP and learned that Postfix is the default Mail Transfer Agent (MTA) in Ubuntu.

Furthermore, we acquired knowledge on how to install and configure an SMTP Server using Postfix, which allowed us to successfully send an email. This led us to understand the process of SMTP Server Configuration using Postfix.