

VERZE O

MAJOR

PROJECT

ASSIGNMENT

BY: PRERNA SIDANA

GROUP No. – CS06B2

JUNE BATCH 2020

MENTOR: ANIMESH ROY

Activity 1: PGP Encrypted Mail

1. Get the PGP package using the terminal by using the command 'sudo apt install pgp'.

```
File Actions Edit View Help
envy@kali: ~/gpa
envy@kali:~/gpa$ sudo apt install pgp
Reading package lists... Done
Building dependency tree
Reading state information... Done
Note, selecting 'pgpgpg' instead of 'pgp'
pgpgpg is already the newest version (0.13-9.1+b1).
The following packages were automatically installed and are no longer required:
  gir1.2-appindicator3-0.1 libboost-iostreams1.67.0 libboost-system1.67.0 libboost-thread1.67.0 libgdal26 libicu63
  libpython3.7-minimal libpython3.7-stdlib libqhull7 libre2-6 php7.3-mysql python3.7 python3.7-minimal ruby-did-you-mean
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 26 not upgraded.
envy@kali:~/gpa$
```

2. Generate a key pair using the command 'gpg --generate-key' & Real name & email address and then supplying the system with raw data moving the mouse pointer on the screen to generate the key.

```
File Actions Edit View Help
envy@kali: ~
envy@kali:~$ gpg --generate-key
gpg (GnuPG) 2.2.20; Copyright (C) 2020 Free Software Foundation, Inc.
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.

Note: Use "gpg --full-generate-key" for a full featured key generation dialog.

GnuPG needs to construct a user ID to identify your key.

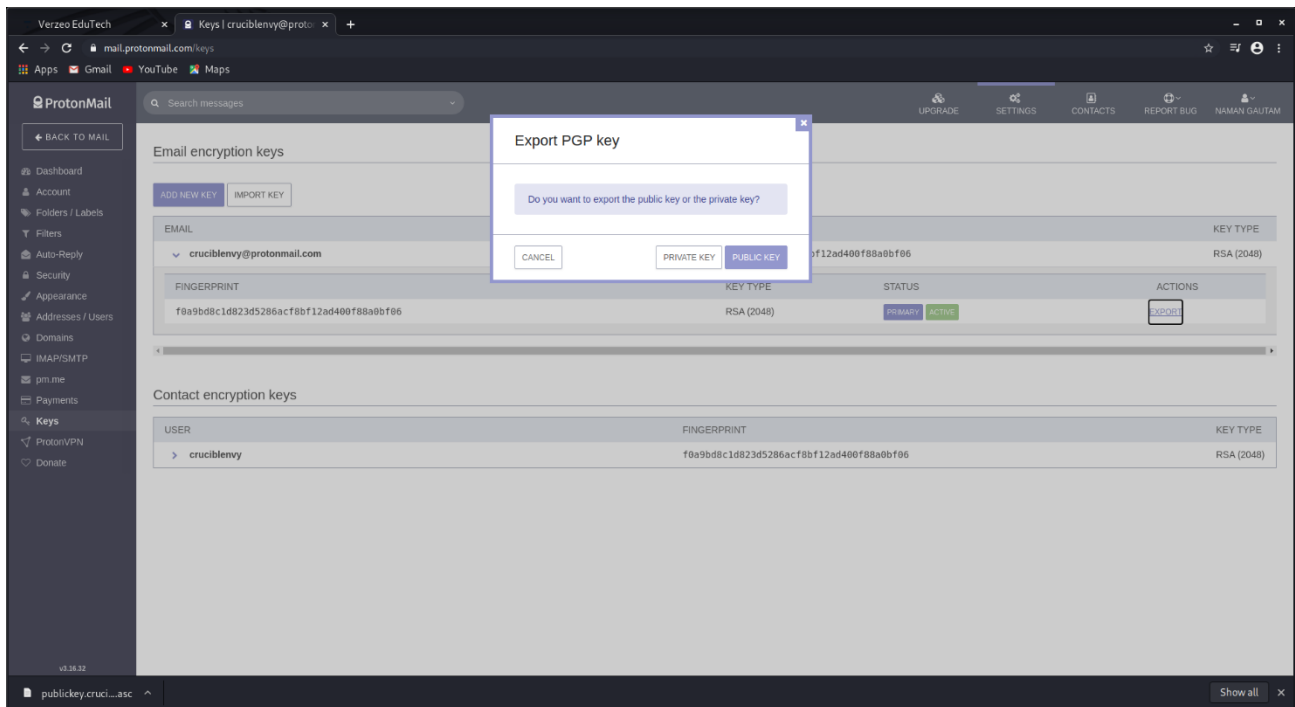
Real name: Naman
Email address: crucible@envy.world
You selected this USER-ID:
  "Naman <crucible@envy.world>"

Change (N)ame, (E)mail, or (O)kay/(Q)uit? o
```

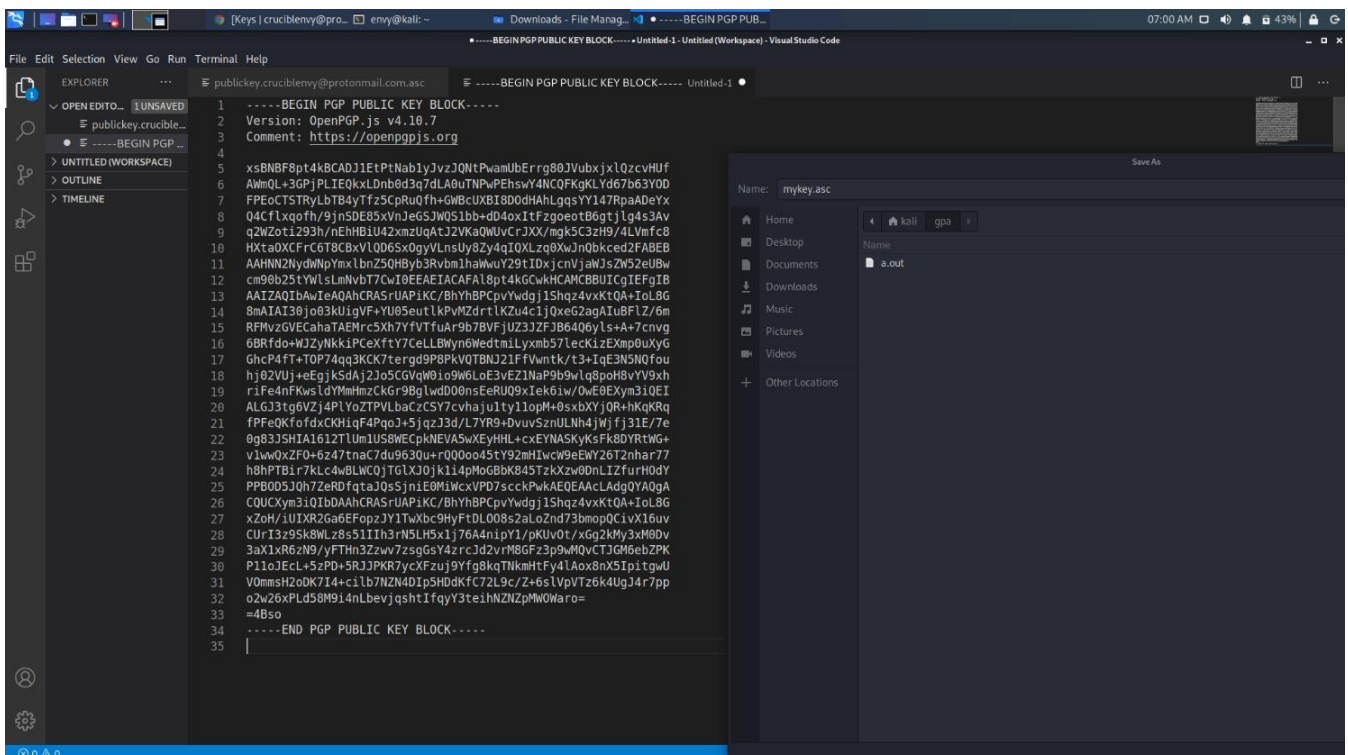
3. List all the keys in the system by using the command 'gpg --list-key'. This will display the public keys with the name and email id details.

```
File Actions Edit View Help
envy@kali: ~
envy@kali:~$ gpg --list-key
/home/kali/.gnupg/pubring.kbx
-----
pub   rsa3072 2020-08-04 [SC] [expires: 2022-08-04]
      12EF2D5770D63FAF2B21A1E6FC98D6D0F8DAFFB3
uid           [ultimate] Naman <crucible@envy.world>
sub   rsa3072 2020-08-04 [E] [expires: 2022-08-04]
envy@kali:~$
```

4. We will be using ProtonMail for this exercise as it provides a public and private key beforehand. After creating an account, export the public key from the settings of the mailbox.



5. Open the key file downloaded from ProtonMail and save it as mykey.asc for easier access to the file.



6. Navigate to the folder where you saved the file 'mykey.asc' and use the command 'gpg --import mykey.asc.' You can also use the 'gpg --list-keys' again to list the keys and see if the new key has been added to the database.

```
File Actions Edit View Help
envy@kali: ~$ cd gpa
envy@kali: ~/gpa$ ls
a.out  mykey.asc
envy@kali: ~/gpa$ gpg --import mykey.asc
gpg: key 12AD400F88A0BF06: public key "crucibleenvy@protonmail.com <crucibleenvy@protonmail.com>" imported
gpg: Total number processed: 1
gpg:          imported: 1
envy@kali: ~/gpa$ gpg --list-keys
/home/kali/.gnupg/pubring.kbx
-----
pub  rsa3072 2020-08-04 [SC] [expires: 2022-08-04]
    12EF2D5770D63FAF2B21A1E6FC98D6D0F8DAFFB3
uid  [ultimate] Naman <crucible@envy.world>
sub  rsa3072 2020-08-04 [E] [expires: 2022-08-04]

pub  rsa2048 2020-08-04 [SC]
    F0A9BD8C1D823D5286ACF8BF12AD400F88A0BF06
uid  [ unknown] crucibleenvy@protonmail.com <crucibleenvy@protonmail.com>
sub  rsa2048 2020-08-04 [E]

envy@kali: ~/gpa$
```

7. Use the vim command to create a file named 'demotxt' and enter the message which you want to send as the email. Confirm if the file has been saved properly by using the cat command.

```
envy@kali: ~/gpa$ vim demotxt
envy@kali: ~/gpa$ cat demotxt
Hello There!

Let's try to send an encrypted message.

Walter white is Heisenberg!

Regards,
Naman
envy@kali: ~/gpa$
```

8. We will encrypt the 'demotxt' file now using the public key of our ProtonMail email address by using the command 'gpg --encrypt --armor -r sample@xyz.com demotxt'. A new file 'demotxt.asc' will be created. Now read the file using the cat command and copy the contents of the file.

```
envy@kali: ~/gpa
File Actions Edit View Help
envy@kali:~/gpa$ gpg --encrypt --armor -r cruciblenvy@protonmail.com demotxt
gpg: E009E29F44420219: There is no assurance this key belongs to the named user

sub rsa2048/E009E29F44420219 2020-08-04 cruciblenvy@protonmail.com <cruciblenvy@protonmail.com>
Primary key fingerprint: F0A9 BD8C 1D82 3D52 86AC F8BF 12AD 400F 88A0 BF06
Subkey fingerprint: F002 D6DC 4C83 2915 EA1E F78B E009 E29F 4442 0219

It is NOT certain that the key belongs to the person named
in the user ID. If you *really* know what you are doing,
you may answer the next question with yes.

Use this key anyway? (y/N) y

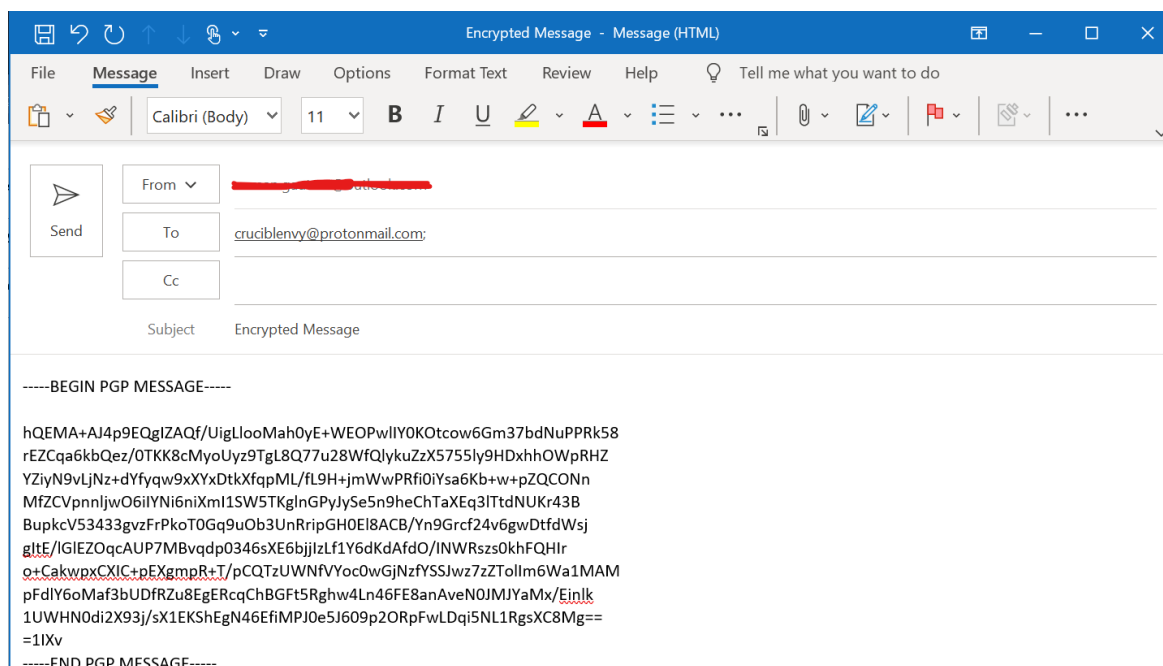
envy@kali:~/gpa$ cat demotxt
Hello There!

Let's try to send an encrypted message.

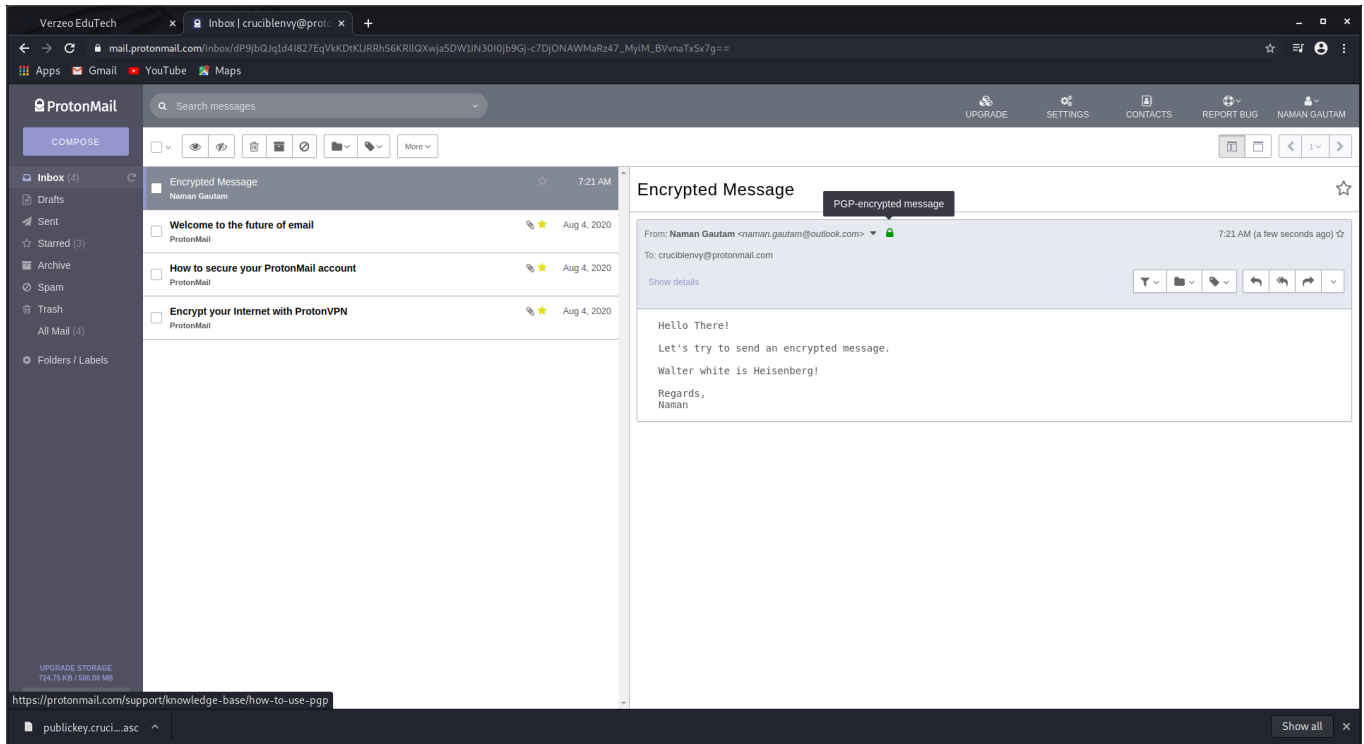
Walter white is Heisenberg!

Regards,
Naman
envy@kali:~/gpa$ cat demotxt.asc
-----BEGIN PGP MESSAGE-----
hQEEMA+AJ4p9EQgIZAQf/UigLlooMah0yE+WEOPwLIY0K0tCOW6Gm37bdNuPPRk58
rEZCqa6kbQez/0TKK8cMyoUyz9TgL8Q77u28WfQlykuZzX5755ly9HDxhhOWpRHZ
YZiY9vLjNz+dYfyqw9xXYxDtkXfqpML/fL9H+jmWwPRfi0iYsa6Kb+w+pZQCONn
MfZCvPnnljwO6iIYNi6niXmI1SW5TKgLnGPyJySe5n9heChTaXEq3lTtdNUKr43B
BupkcV53433gvzFrPkoT0Gq9uOb3UnRripGH0EL8ACB/Yn9Grcf24v6gwDtdfWsj
gItE/IGIEZOqcAUP7MBvqdp0346sXE6bjJzLf1Y6dKdAfdO/INWRsZs0khFQHlr
o+CakwpxCXIC+pEXgmpR+T/pCQTzUWNfVYoc0wGjNzfYSSJwz7zZTollm6Wa1MAM
pFdIY6oMaf3bUDfRZu8EgErcqChBGft5Rghw4Ln46FE8anAveN0JMjYmX/Einlk
1UWHN0di2X93j/sX1EKShEgN46EfIMPJ0e5J609p2ORpFwLDqi5NL1RgsXC8Mg==
=1IXv
-----END PGP MESSAGE-----
envy@kali:~/gpa$
```

9. Now we will paste the encrypted text into the message body, and we can send it from any email address to the recipient whose public key we had used for encryption.



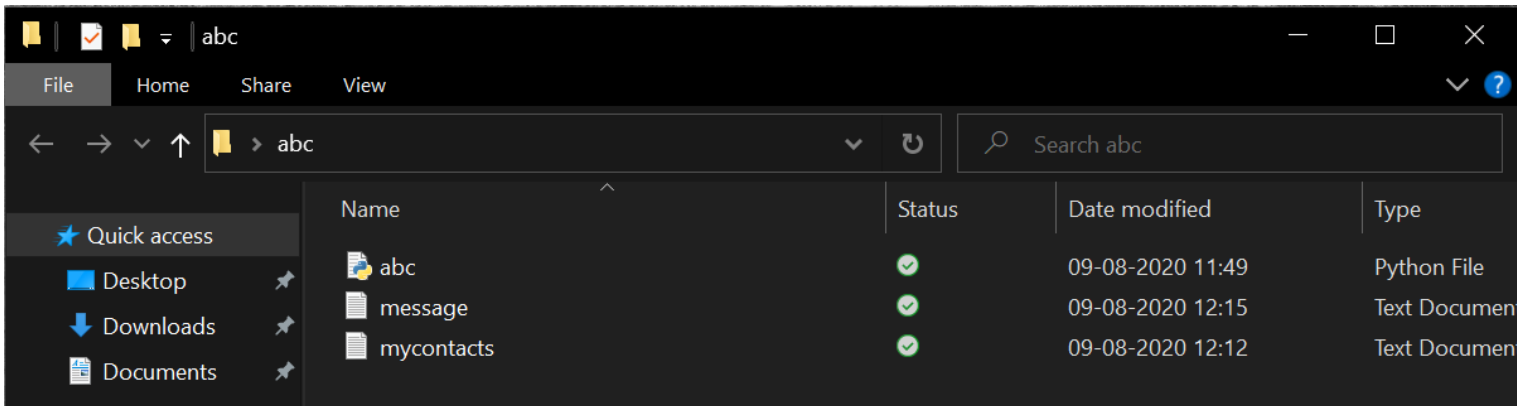
10. We can see in our mailbox that we have received the mail. As soon as we open it and read its contents, we can see that the text we encrypted is displayed as plaintext into the mail.



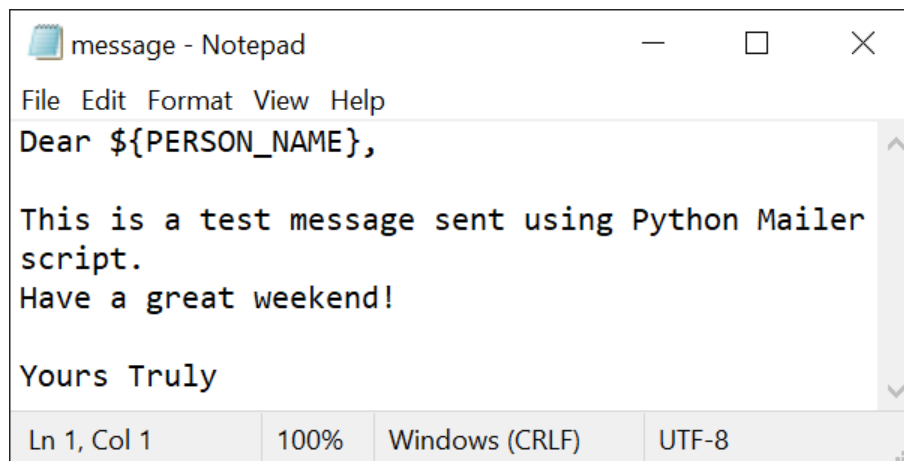
This is how we send an encrypted PGP mail.

Activity 2 : Python Mailer Script

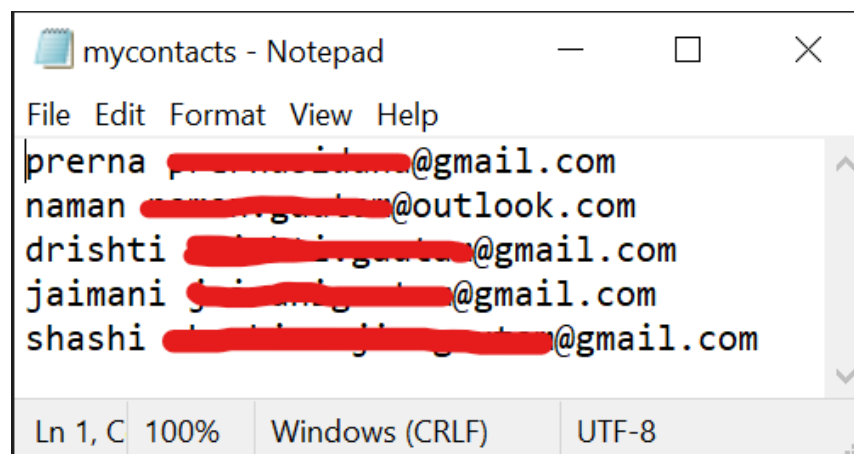
1. Create a folder in which there should be a script(abc.py), a message file(message.txt) & a contacts file.



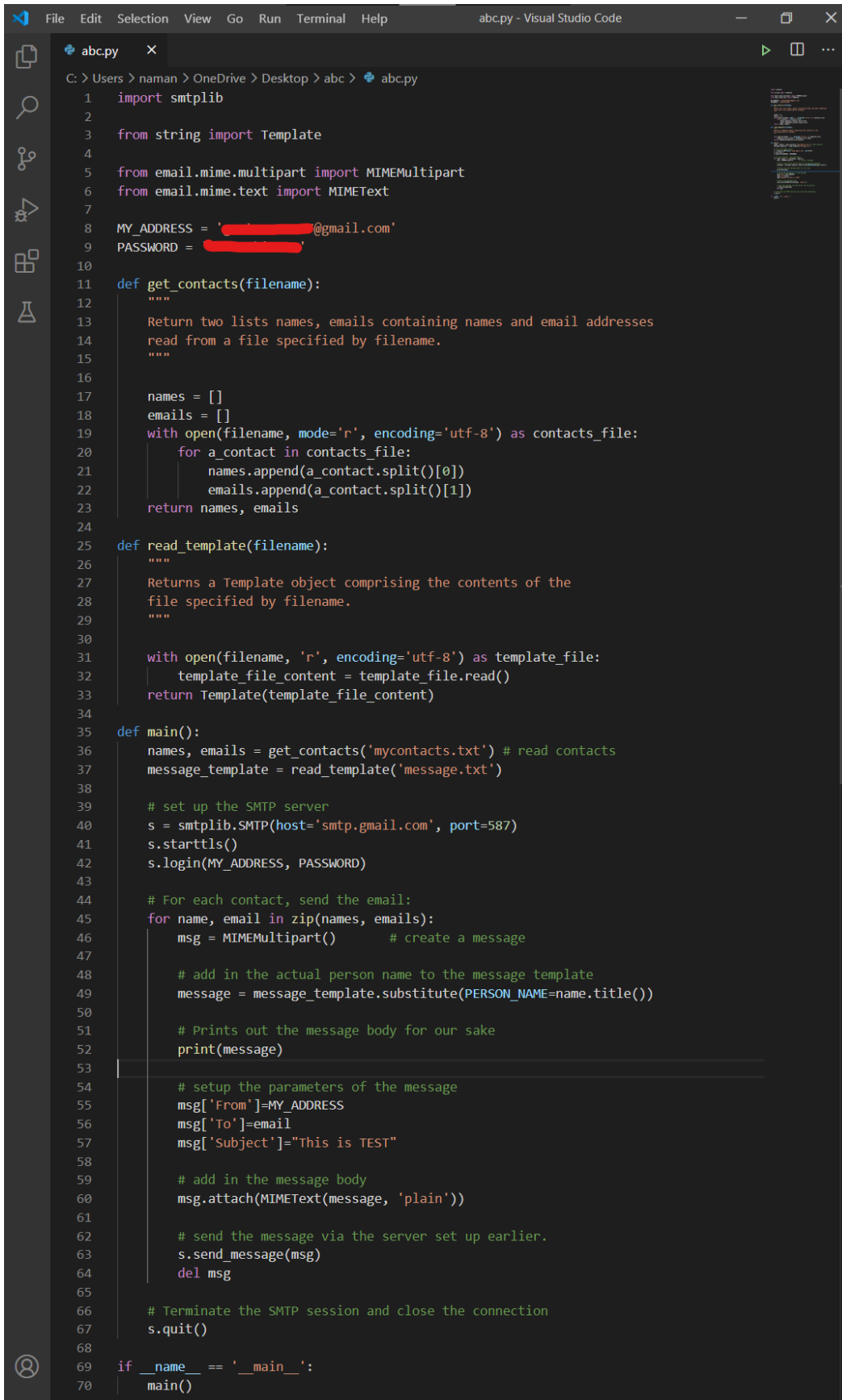
message.txt - This file will contain the email message which has to be sent to the recipient.



mycontacts.txt - This file will contain all of the Recipient names and email addresses to whom the email has to be sent.

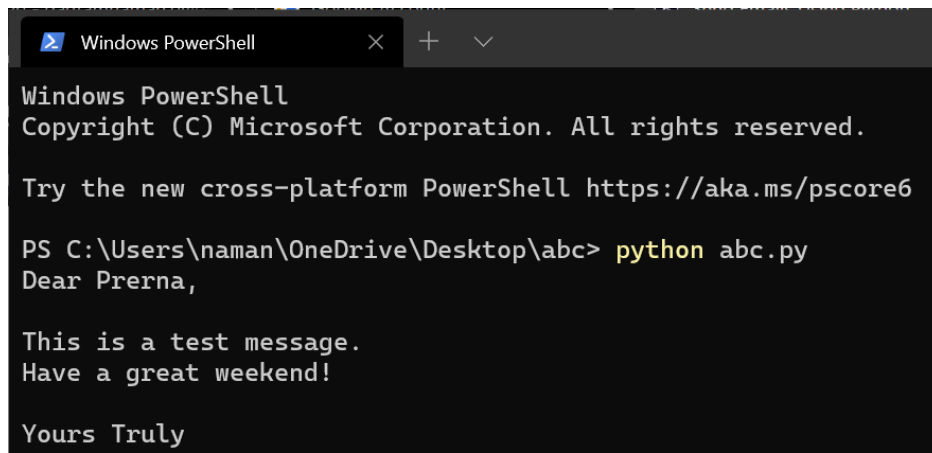


abc.py - Contains the main python script which will be executed later on for the actual activity.



```
File Edit Selection View Go Run Terminal Help abc.py - Visual Studio Code
abc.py
C: > Users > naman > OneDrive > Desktop > abc > abc.py
1 import smtplib
2
3 from string import Template
4
5 from email.mime.multipart import MIMEMultipart
6 from email.mime.text import MIMEText
7
8 MY_ADDRESS = 'redacted@gmail.com'
9 PASSWORD = 'redacted'
10
11 def get_contacts(filename):
12     """
13     Return two lists names, emails containing names and email addresses
14     read from a file specified by filename.
15     """
16
17     names = []
18     emails = []
19     with open(filename, mode='r', encoding='utf-8') as contacts_file:
20         for a_contact in contacts_file:
21             names.append(a_contact.split()[0])
22             emails.append(a_contact.split()[1])
23     return names, emails
24
25 def read_template(filename):
26     """
27     Returns a Template object comprising the contents of the
28     file specified by filename.
29     """
30
31     with open(filename, 'r', encoding='utf-8') as template_file:
32         template_file_content = template_file.read()
33     return Template(template_file_content)
34
35 def main():
36     names, emails = get_contacts('mycontacts.txt') # read contacts
37     message_template = read_template('message.txt')
38
39     # set up the SMTP server
40     s = smtplib.SMTP(host='smtp.gmail.com', port=587)
41     s.starttls()
42     s.login(MY_ADDRESS, PASSWORD)
43
44     # For each contact, send the email:
45     for name, email in zip(names, emails):
46         msg = MIMEMultipart() # create a message
47
48         # add in the actual person name to the message template
49         message = message_template.substitute(PERSON_NAME=name.title())
50
51         # Prints out the message body for our sake
52         print(message)
53
54         # setup the parameters of the message
55         msg['From']=MY_ADDRESS
56         msg['To']=email
57         msg['Subject']="This is TEST"
58
59         # add in the message body
60         msg.attach(MIMEText(message, 'plain'))
61
62         # send the message via the server set up earlier.
63         s.send_message(msg)
64         del msg
65
66     # Terminate the SMTP session and close the connection
67     s.quit()
68
69 if __name__ == '__main__':
70     main()
```


2. The script abc.py should contain the email address and the password filled out to facilitate the sending of emails from that account. Also, the server settings should be configured. In our case, we have configured the server address as 'smtp.gmail.com' & server tls port as '587'.
 3. After doing the above settings all we need to do is run the script. The script picks up the names & email addresses of the recipients and then imposes it with the template of 'message.txt'. After superimposing it, the emails are sent out.
- When we try to send it to a single recipient:



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

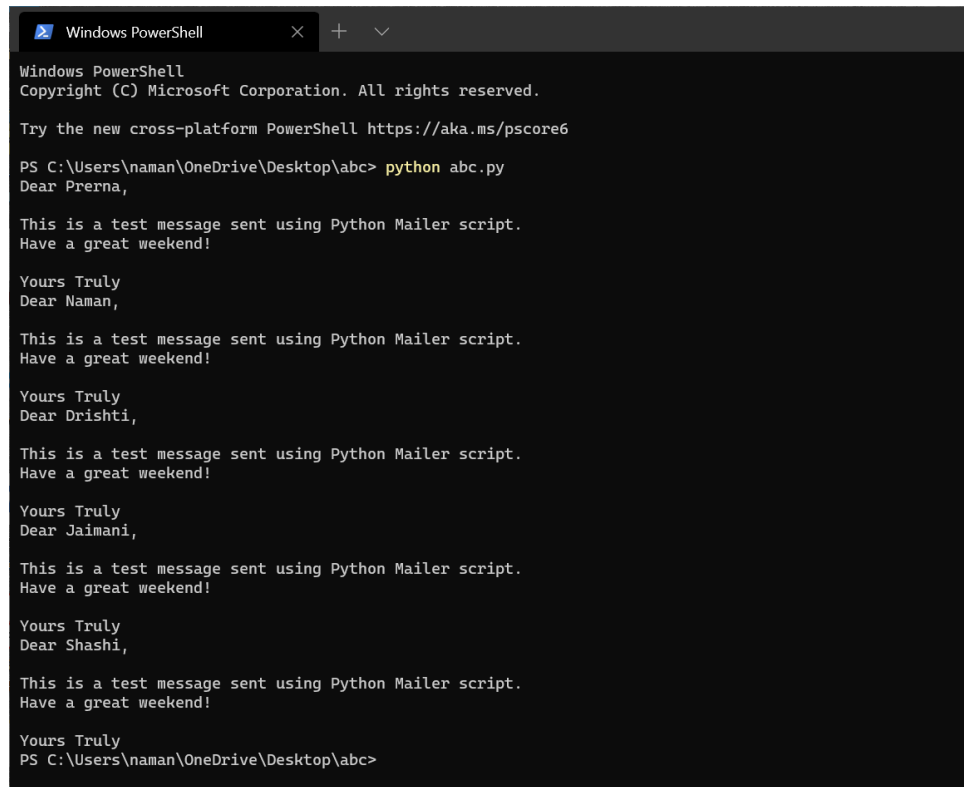
Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\naman\OneDrive\Desktop\abc> python abc.py
Dear Prerna,

This is a test message.
Have a great weekend!

Yours Truly
```

- When we try to send it to multiple addresses :



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\naman\OneDrive\Desktop\abc> python abc.py
Dear Prerna,

This is a test message sent using Python Mailer script.
Have a great weekend!

Yours Truly
Dear Naman,

This is a test message sent using Python Mailer script.
Have a great weekend!

Yours Truly
Dear Drishti,

This is a test message sent using Python Mailer script.
Have a great weekend!

Yours Truly
Dear Jaimani,

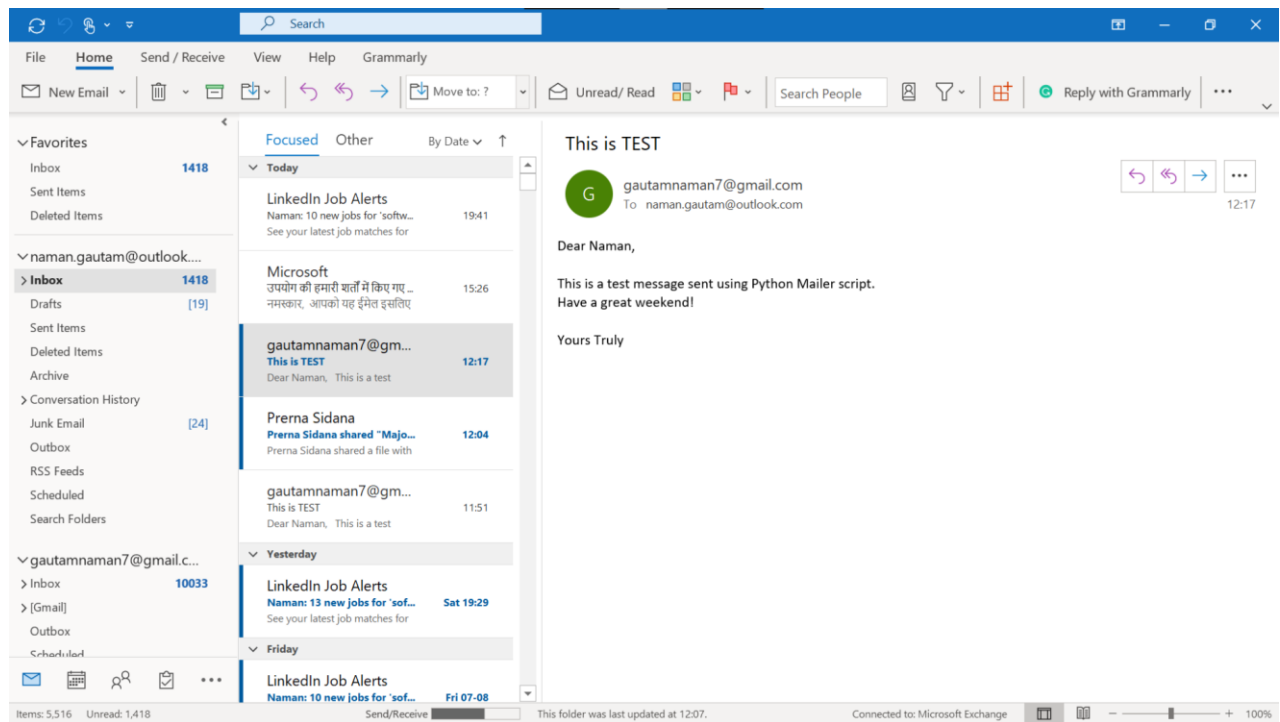
This is a test message sent using Python Mailer script.
Have a great weekend!

Yours Truly
Dear Shashi,

This is a test message sent using Python Mailer script.
Have a great weekend!

Yours Truly
PS C:\Users\naman\OneDrive\Desktop\abc>
```

4. Check-in your recipient mailbox. You will be able to see the email in it.



This is how we can use python to send out bulk emails automatically to as many people as we want. This facilitates the people to send emails when organizing a function or any event. Also, this can be used by companies to advertise their products when needed.

Assessment Questions

Q1) (a) Why do email services "read" your email? What is their goal?

Ans) Employees of an email-service providing company are not personally 'reading' your emails, they are being scanned to deliver more relevant ads and search results. It is possible to opt-out of seeing these ads, but no matter what, Gmail will be scanning the content of your emails as a security measure.

Goals:

- ✓ The automated systems of email services analyze your content to provide you **personally relevant product features, such as customized search results, tailored advertising, and spam and malware detection**. This analysis occurs as the content is sent, received, and when it is stored.
- ✓ Scanning each email is necessary **to provide a free and safe service to the public**. Example: Privacy advocates disagree, pointing out that Google scans emails from non-Gmail users who have not agreed to the company's privacy policy or Gmail terms of service.
- ✓ Email messages and files stored on their cloud platforms are also scanned if provided to the user.
- ✓ To detect spam, which can often contain harmful links, by scanning each message and analyzing it for words, phrases, and links that are often used in spam messages. Example: **Google puts these messages in a special folder called 'Spam', so you do not have to see them or interact** with them, which decreases your risk.
- ✓ It also scans each message **to look for malware**, such as attachments containing viruses, trojans, or worms, **thereby reducing phishing attempts**.

Q1) (b) How does PGP secure email differently than Gmail?

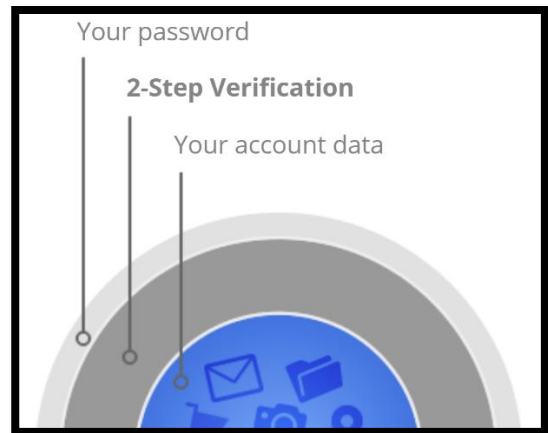
PGP SECURITY

- Pretty Good Privacy, or PGP, was developed in the early 1990s to guarantee the security and privacy of email communications over insecure networks. Its basic concept involves the use of private and public key pairs and is implemented today in secure communications tools like ProtonMail and Signal.
- When you send an email encrypted with PGP, you use your public key like a padlock to secure the contents, in addition to using your password to authenticate with your email service. The recipient then uses their private key to unlock the padlock and read the message. Public and private keys are simply long strings of text, like passwords.
- Keys can act as an email address, in that people can send emails to your public key. Some tools expose the key functionality to the user (adding complexity), while others just control your keys in the background and handle it all for you.
- PGP can be done manually without any special email tool. If an adversary does not crack your hundreds-of-characters-long password, it is one of the most secure methods.

GMAIL SECURITY

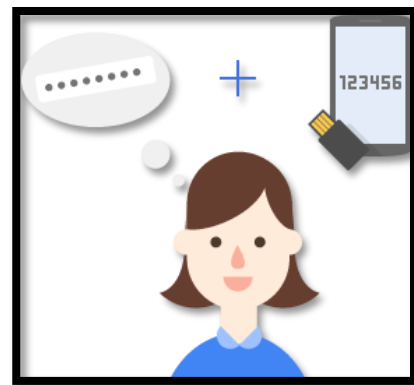
The extra layer of security

Most people only have one layer – their password – to protect their accounts. **With 2-Step Verification**, if a bad guy hacks through your password layer, he will still need your phone or Security Key to get into your account.



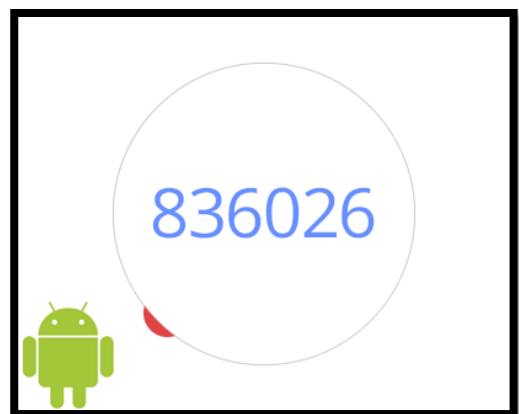
Sign-in will require something you know and something you have

With 2-Step Verification, you will protect your account with something you know (your password) and something you have (your phone or Security Key).



Verification codes made just for you

Codes are uniquely crafted for your account when you need them. If you choose to use verification codes, they will be sent to your phone via text, voice call, or our mobile app. Each code can only be used once.



✓ **Any of these common actions could put you at risk of having your password stolen:**

- Using the same password on more than one site
- Downloading software from the Internet
- Clicking on links in email messages

Q2) Why don't people use services like PGP more often?

- PGP uses encryption technologies that have evolved both technically and legally. As patents expire, for example, developers incorporated better methods into PGP. Open-source programmers also created a free version of PGP called GNU Privacy Guard, or GPG, which lacks features in the paid product, such as support for certain encryption algorithms like RSA, found in other versions of PGP.
- Compatibility Issues

Evolving versions of PGP use different methods of encryption. If you encrypt an email using PGP with one type of encryption, a recipient using PGP with a different version cannot read your message, although you may be able to decode messages sent to you.

- Complexity

The complexity and learning curve of using PGP can be intimidating. Other security schemes use symmetric encryption, which uses one key, or asymmetric encryption, which uses two. For example, when you use online banking to pay bills, your Web browser automatically sets up asymmetric encryption to protect your online session. PGP takes a hybrid approach, using symmetric encryption with two keys. It is more complex and less familiar than the traditional symmetric or asymmetric methods, so developers require more training to become effective at PGP encryption.

- No Recovery

Computer administrators frequently face emergencies involving lost or forgotten passwords. For some types of security software, an administrator can use a special program to retrieve passwords. For example, a technician who has physical access to a PC can recover forgotten log-in passwords to Microsoft Windows. PGP offers no such workaround; the encryption methods are strong, so forgotten passwords result in lost messages, lost files, or inaccessible hard drives.

Q3) What is phishing?

Phishing is an attack that cybercriminals run to get people to reveal their sensitive information unwittingly. They accomplish this by creating **fake emails and websites**, which is called spoofing.

Victims believe these spoofed emails and sites are legitimate, so they log in. As a result, the cybercriminals receive the login details, which they use to try and access other accounts across different websites. Other types of information they obtain include credit card and bank account numbers.

Q4) What is spear-phishing?

Spear phishing is a type of phishing, but more targeted. Attackers typically go after either an individual or business. As with regular phishing, cybercriminals try to trick people into handing over their credentials. However, *the goal reaches farther than just financial details.*

Instead, they aim to access sensitive company data and trade secrets. If cybercriminals can get hold of these things, they stand to make a significant amount of money by either blackmailing the organization or selling the data.