CRYPTOGRAPHY

By

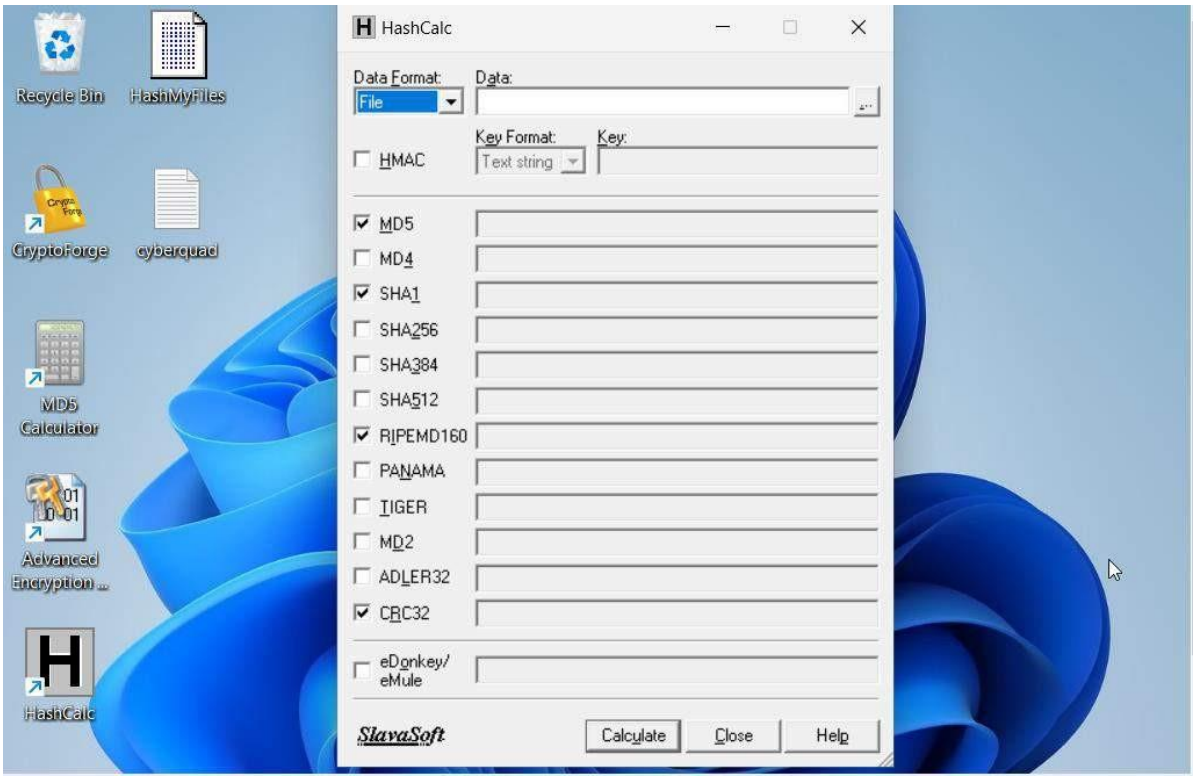
DEWTON KIPROP

JJJJ

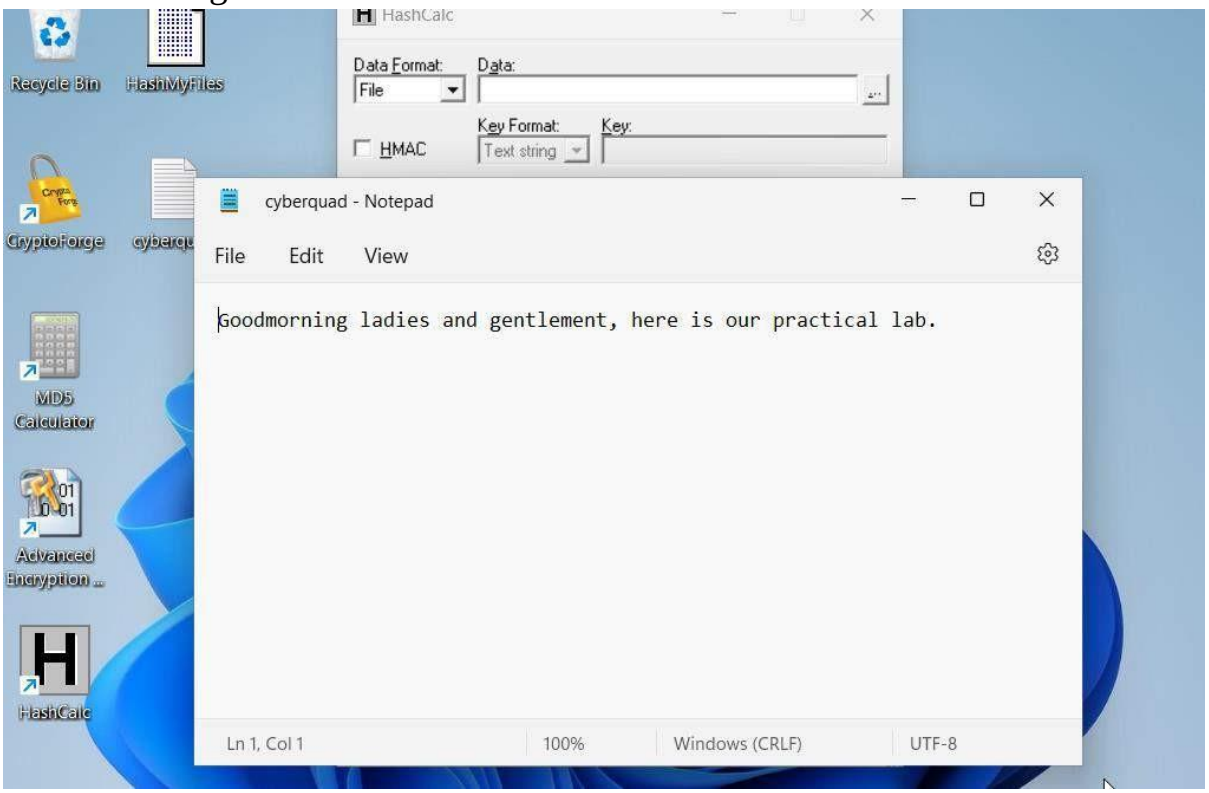
LAB 1

Task 1: Calculating one-way Hashes using HashCalc

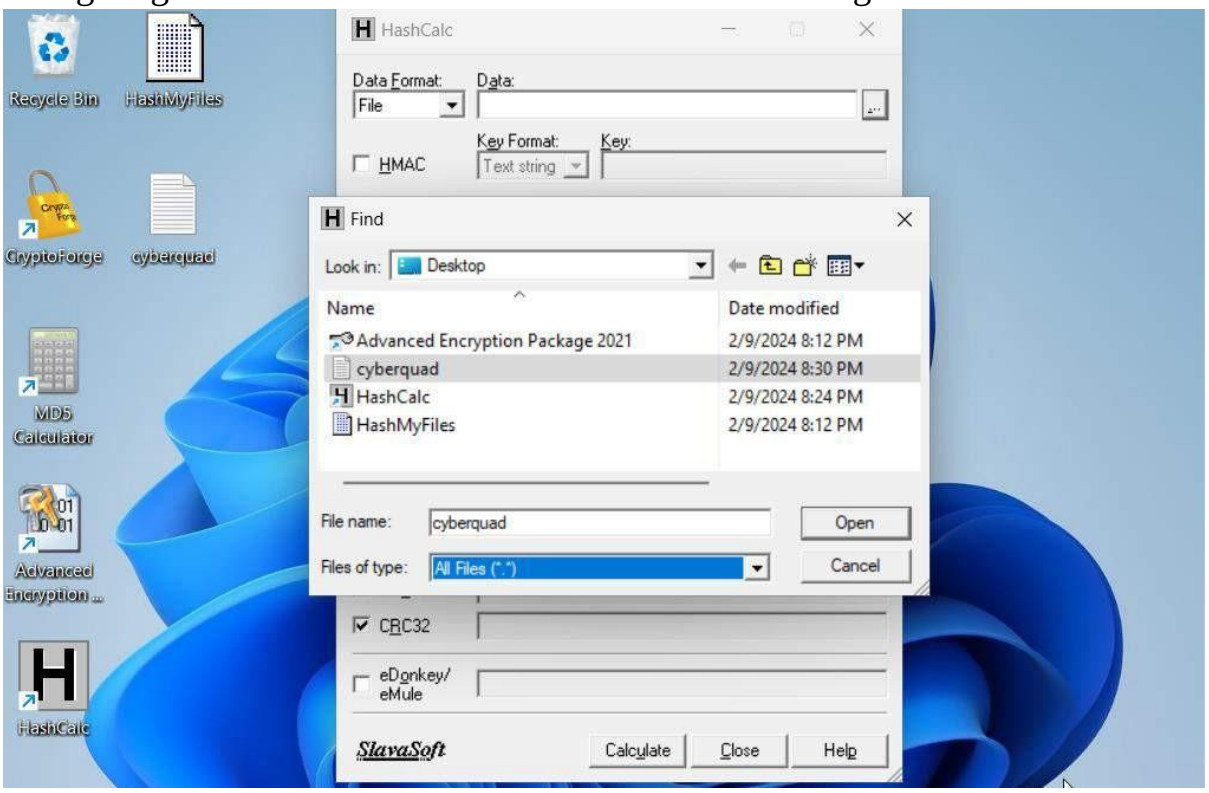
- Launching HASHCALC.



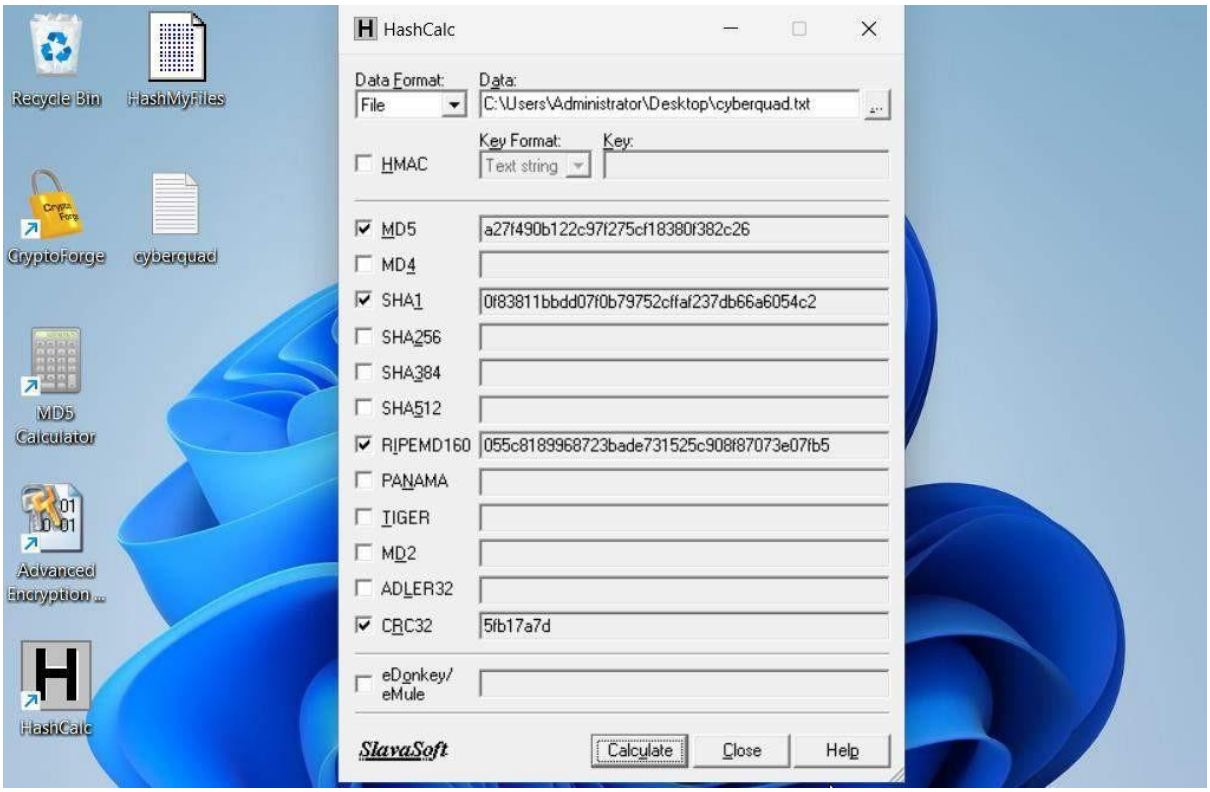
- Creating a text file



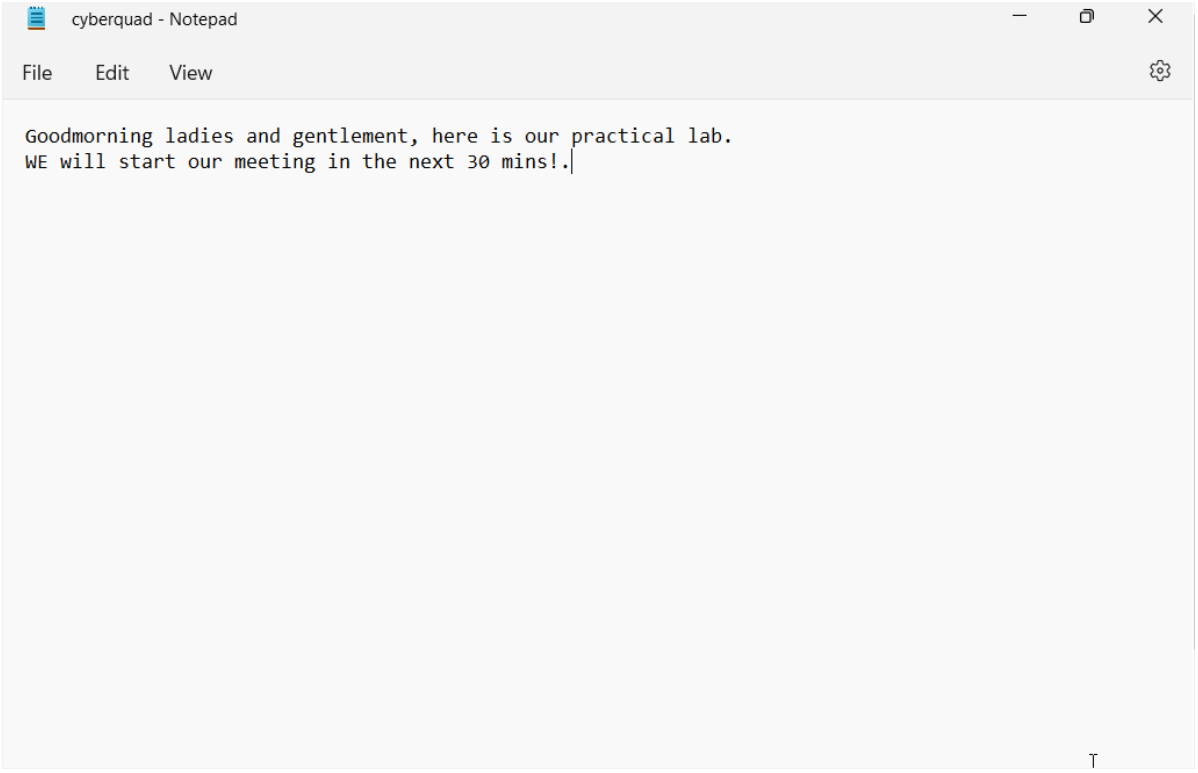
- Navigating to the location where the txt file is saved using HashCalc



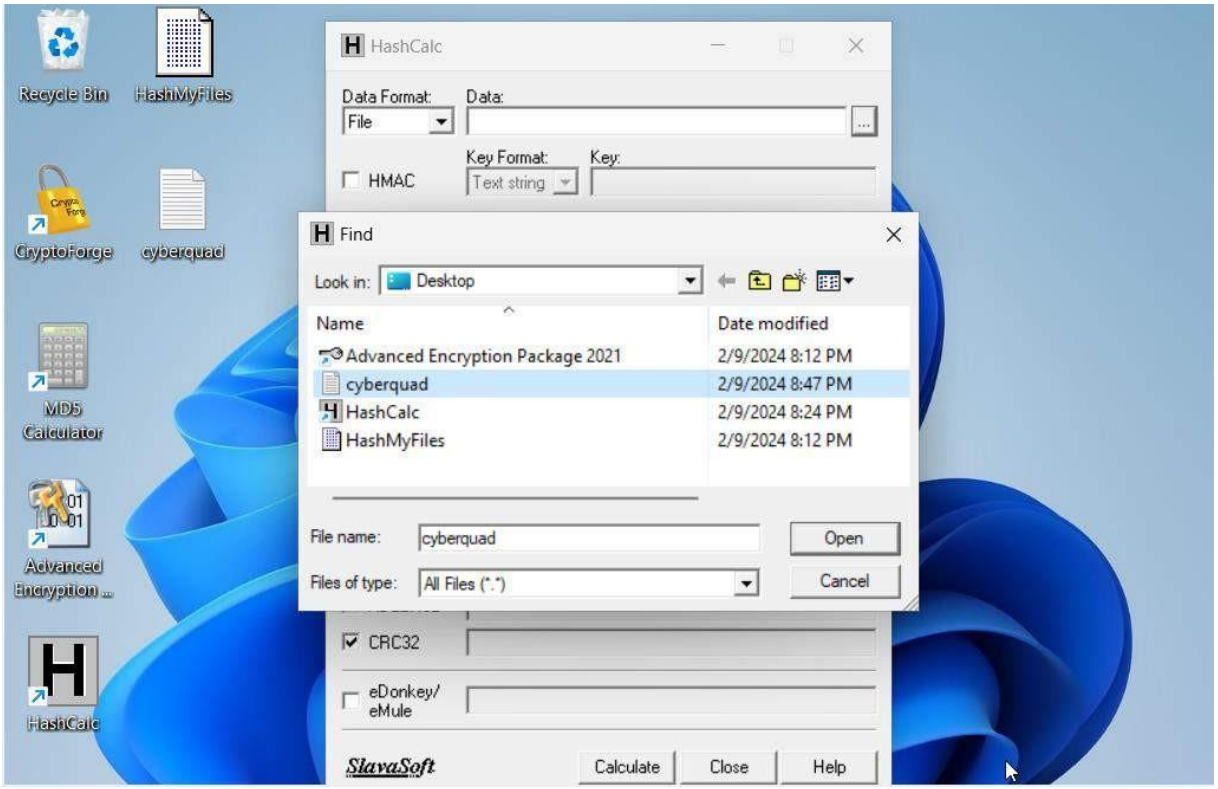
- Selecting Hash functions; MD5, SHA1, RIPEMD160, CRC32 and Calculate.

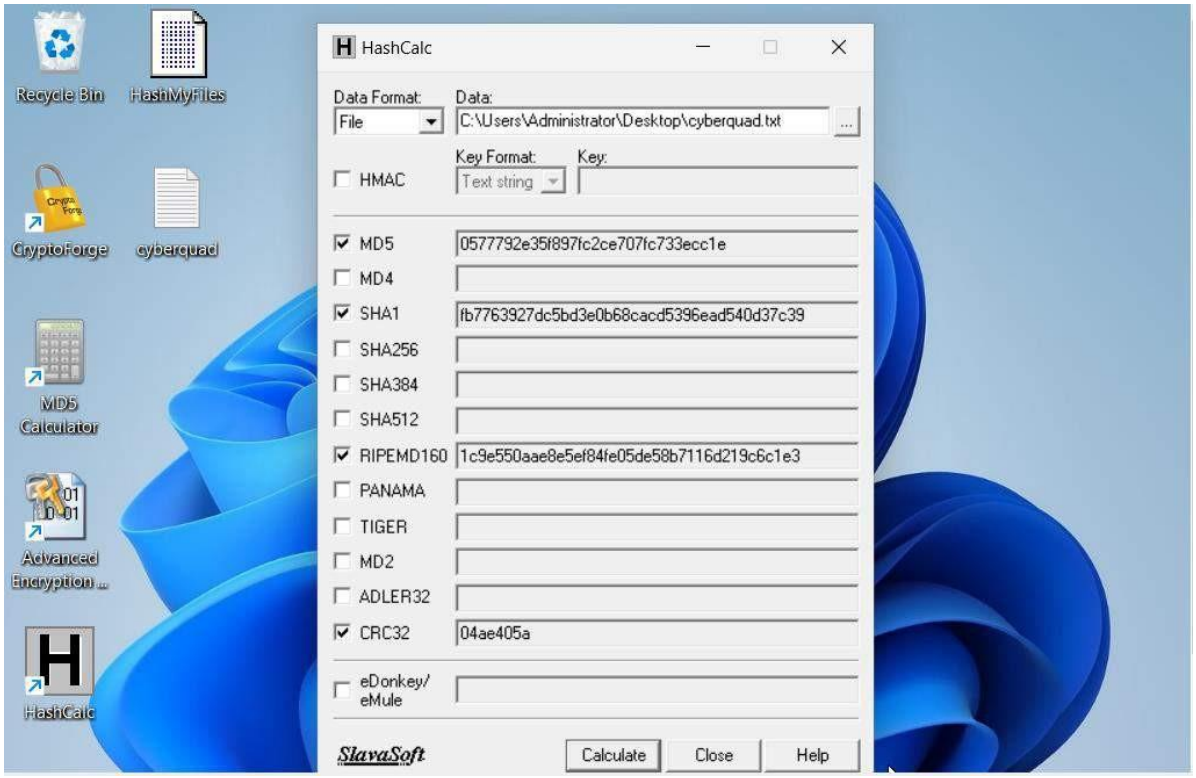


- Reopening the txt file and modify it by writing some text.

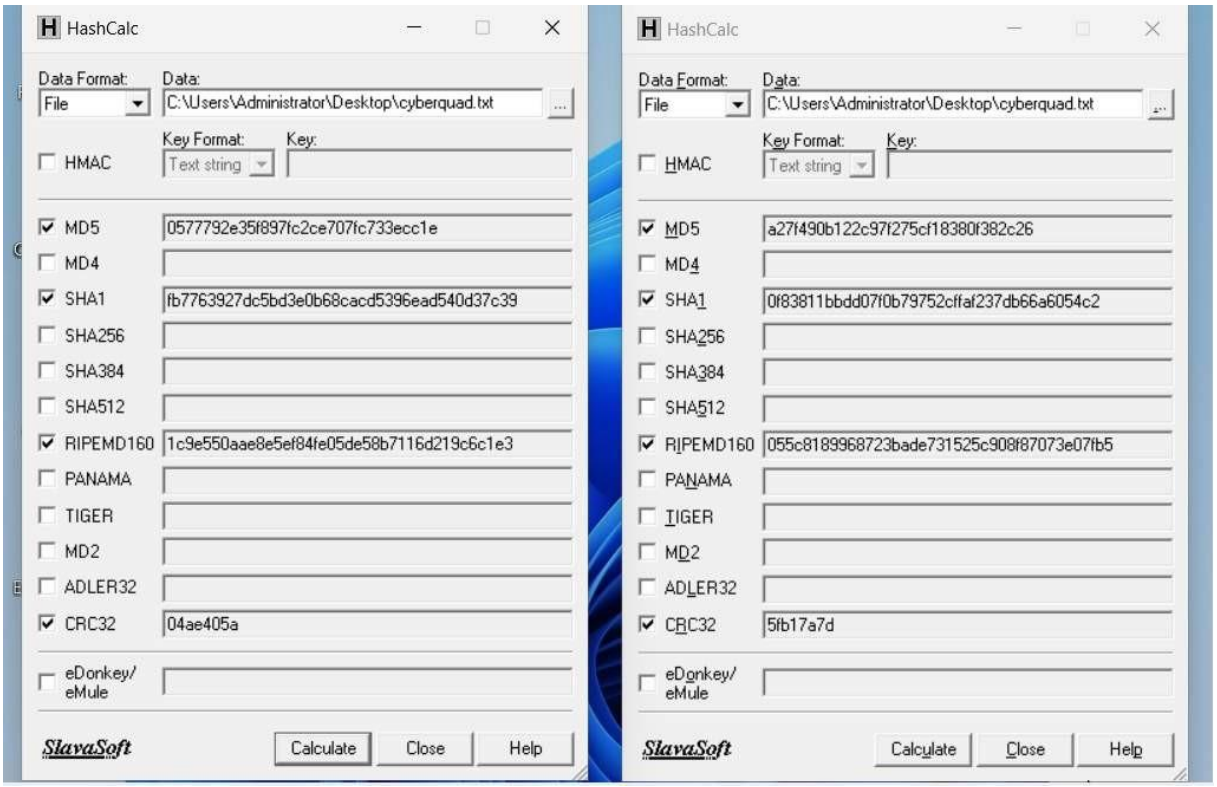


- Launching another HashCalc, Repeating the initial procedure.





- Comparing the both outcomes of the hash values before and after modification.



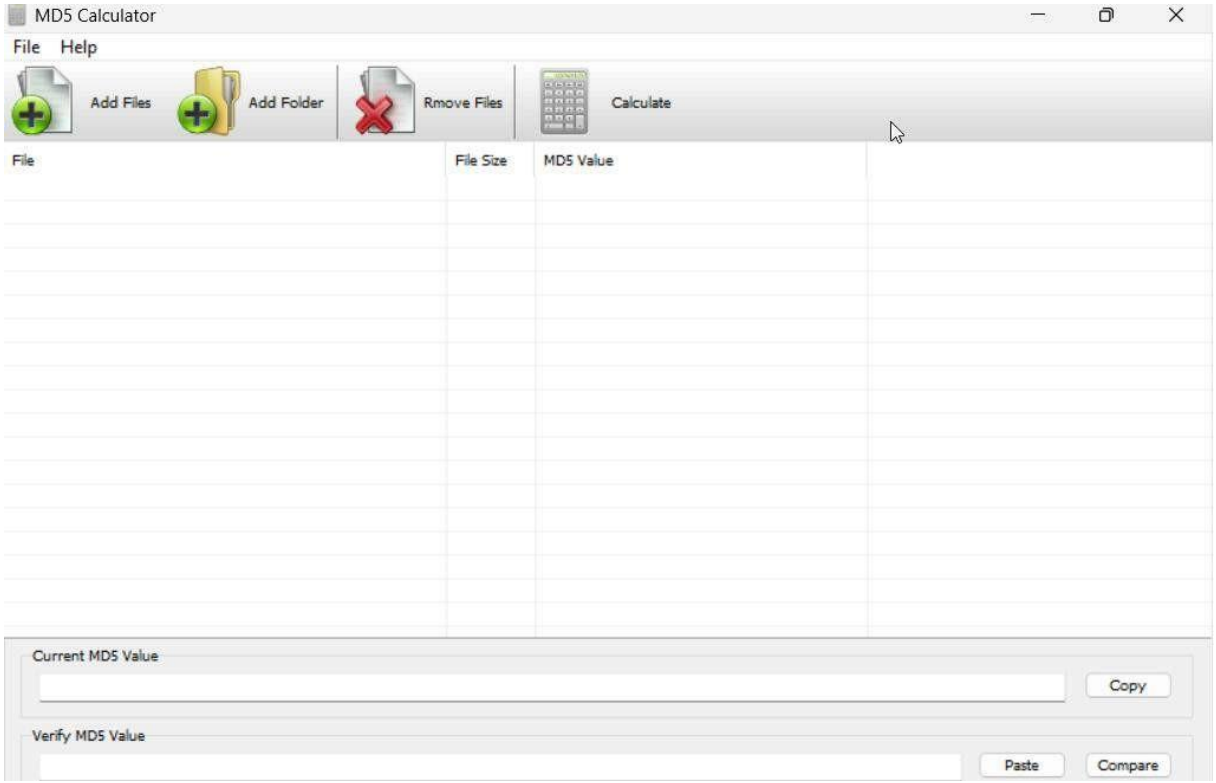
Conclusion

- In the Calculating One-Way Hashes Using HashCalc practical, the group learned to generate one-way hashes for data sets using HashCalc software. They discovered the advantages of one-way hashing, like efficient data integrity verification and secure password storage, alongside limitations such as hash collisions and irreversibility. Overall, the session provided valuable insights into data security.

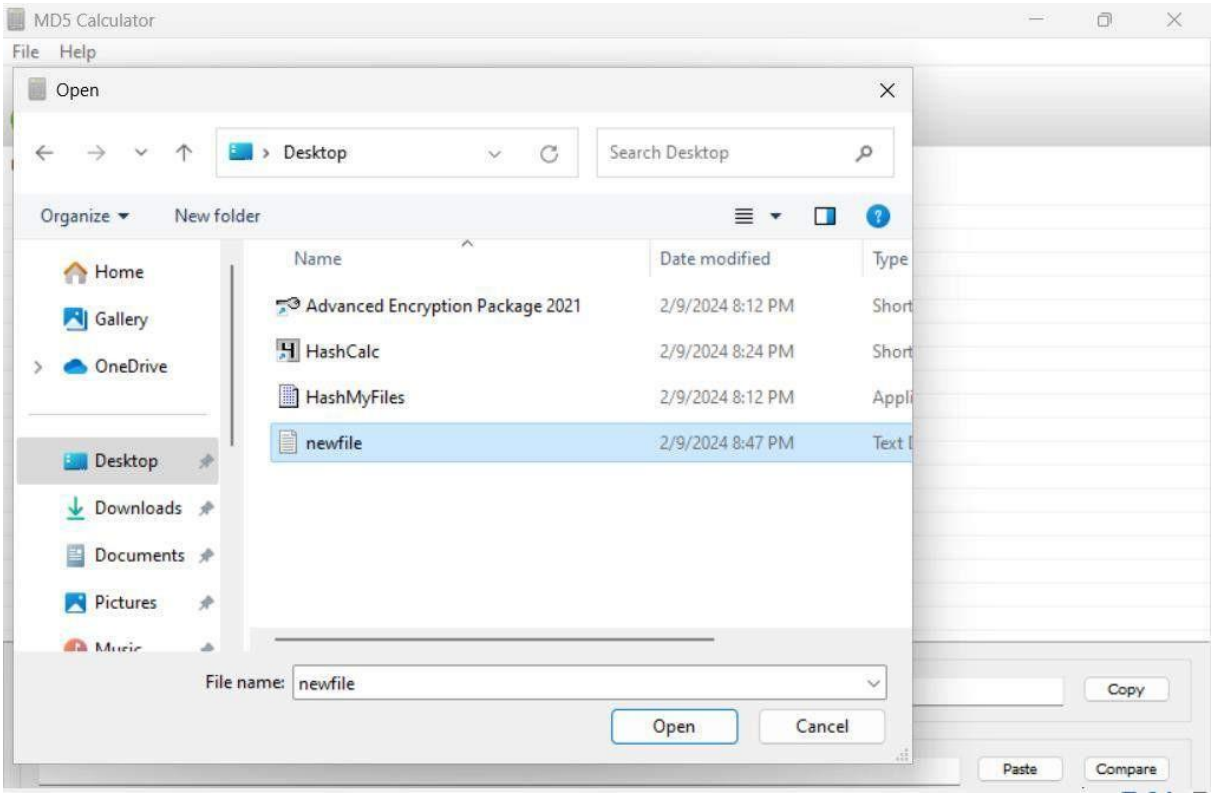
Task 2

: **CALCULATING MD5 HASHES USING MD5 CALCULATOR**

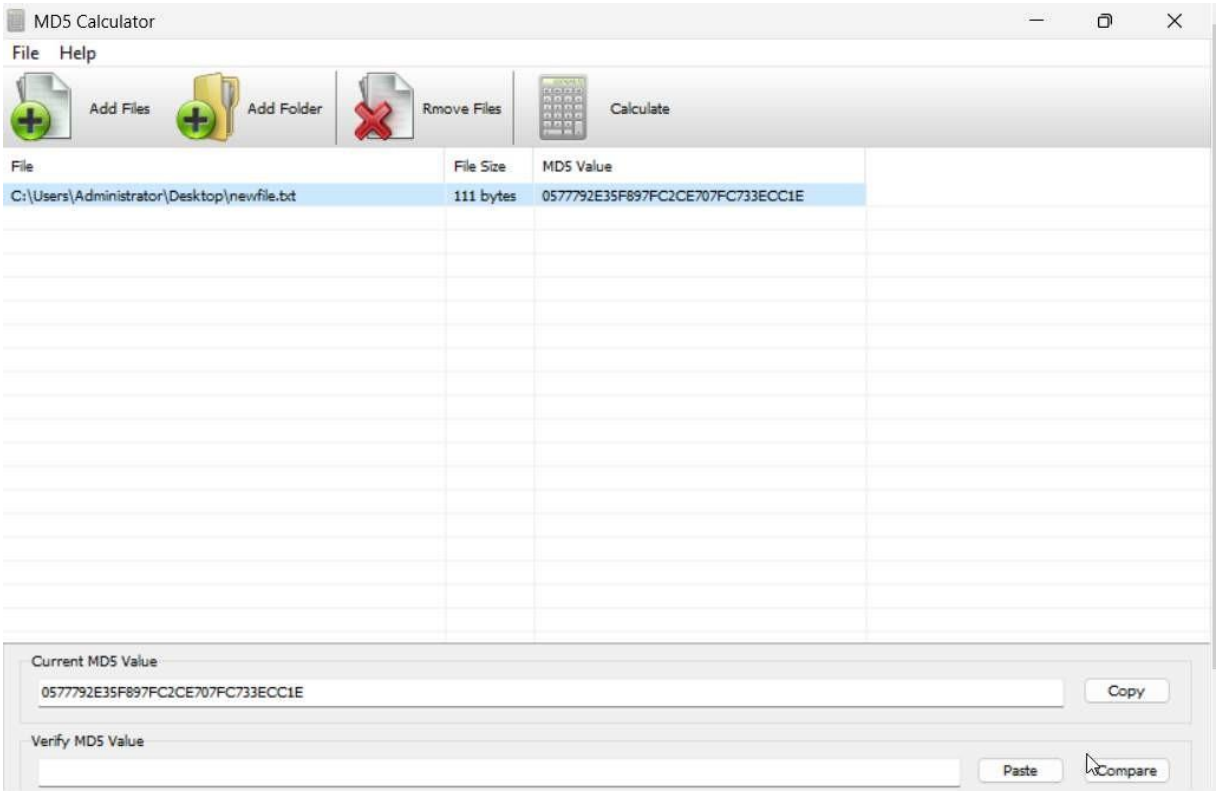
- Launching MD5 calc



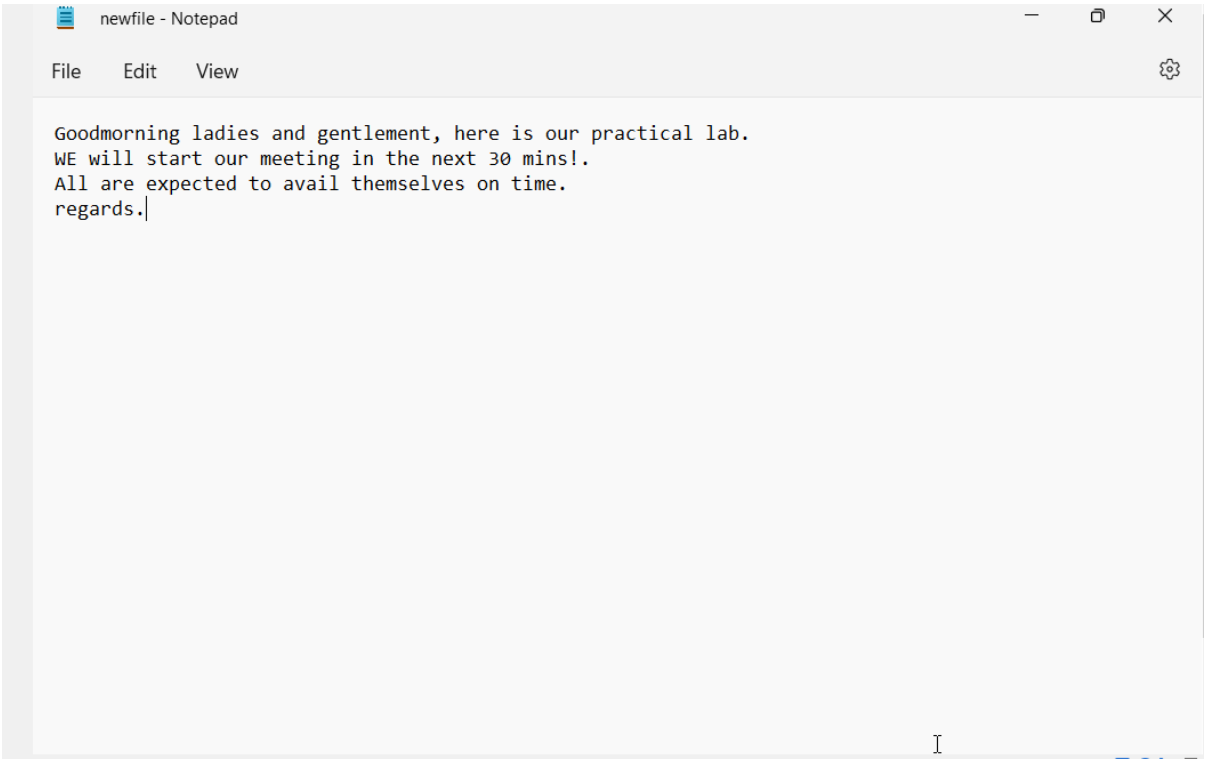
- Adding A file in MD5cal window



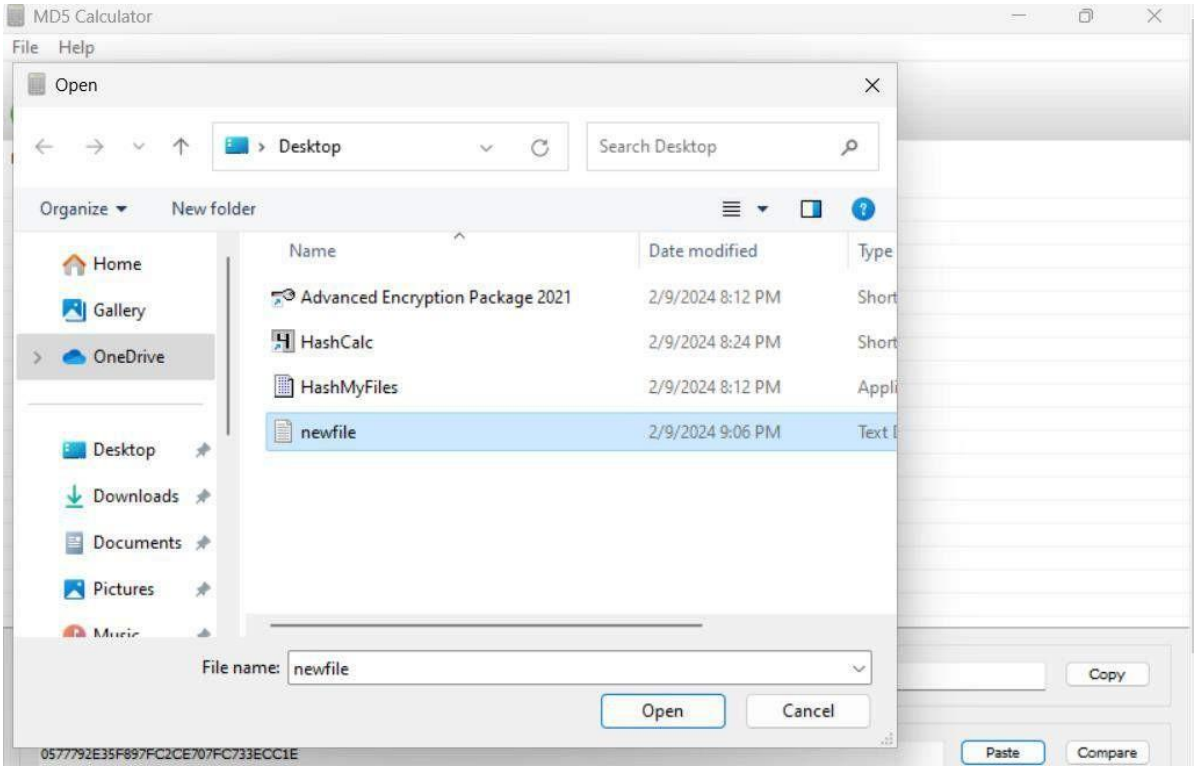
- Calculating the Hash value on MD5 Calc

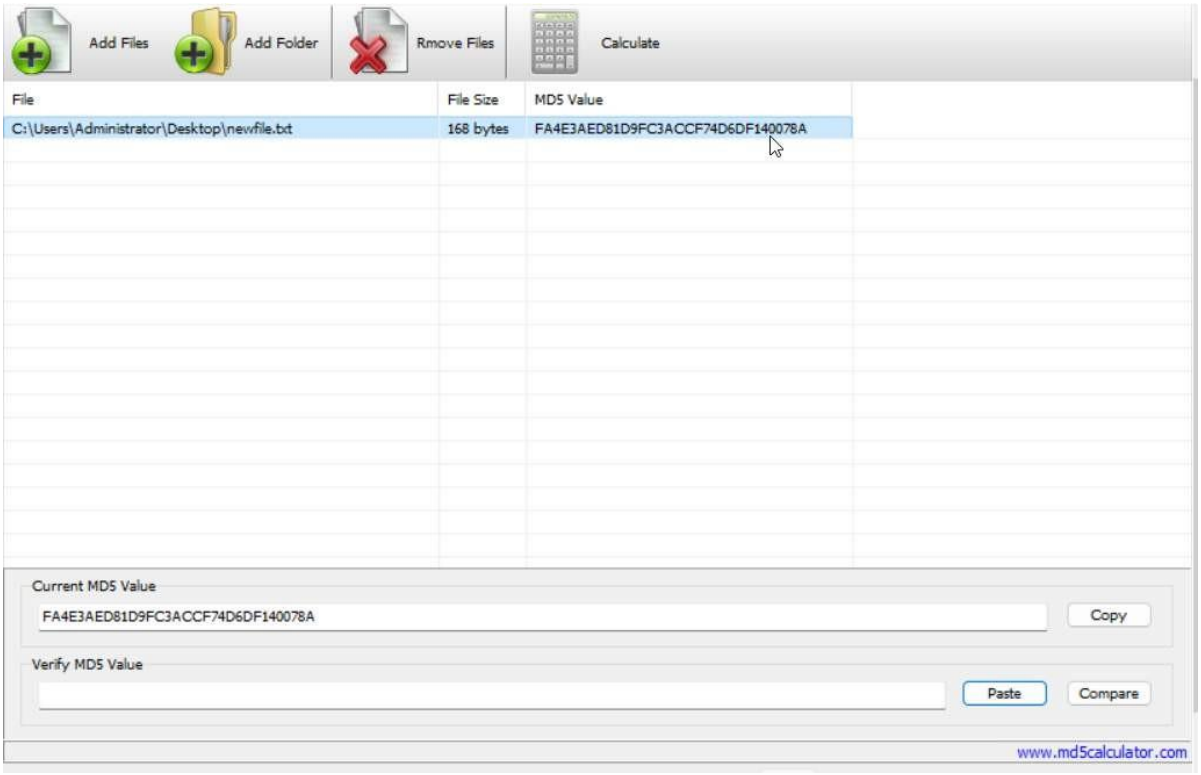


- Coping the calculated hash value and removing file from the MD5 calc.
- Open and modify the text file.

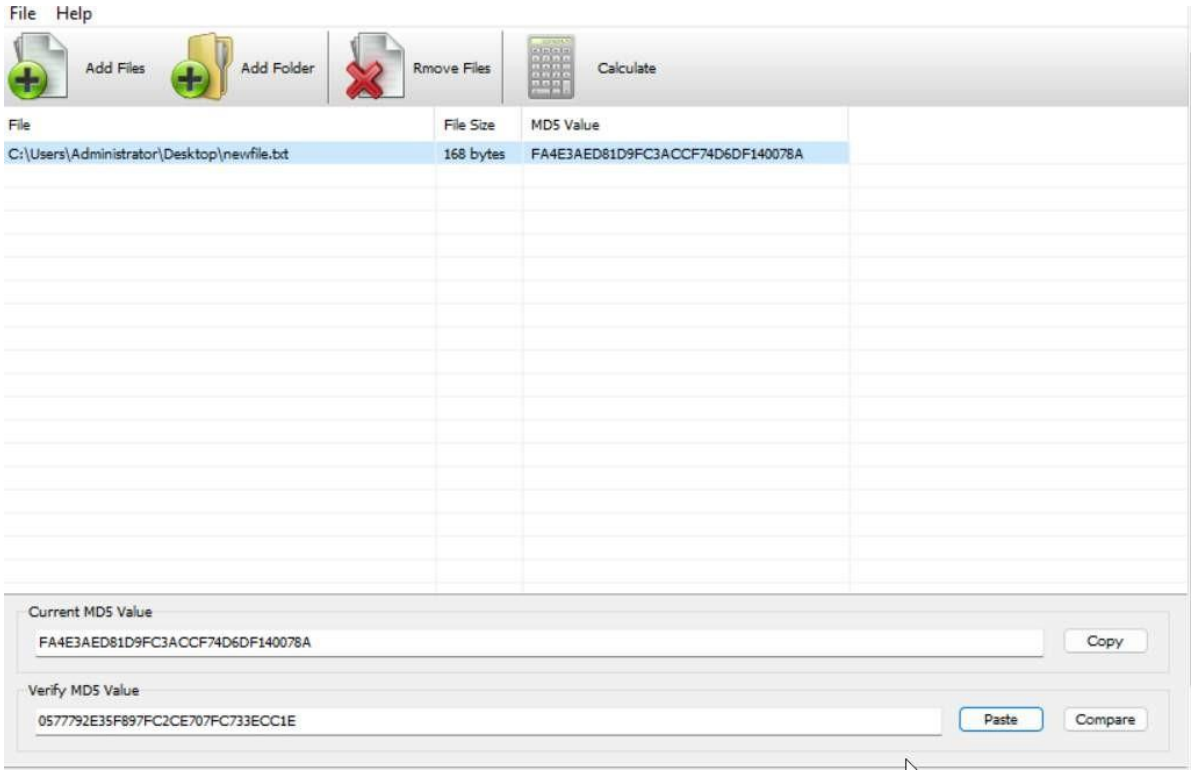


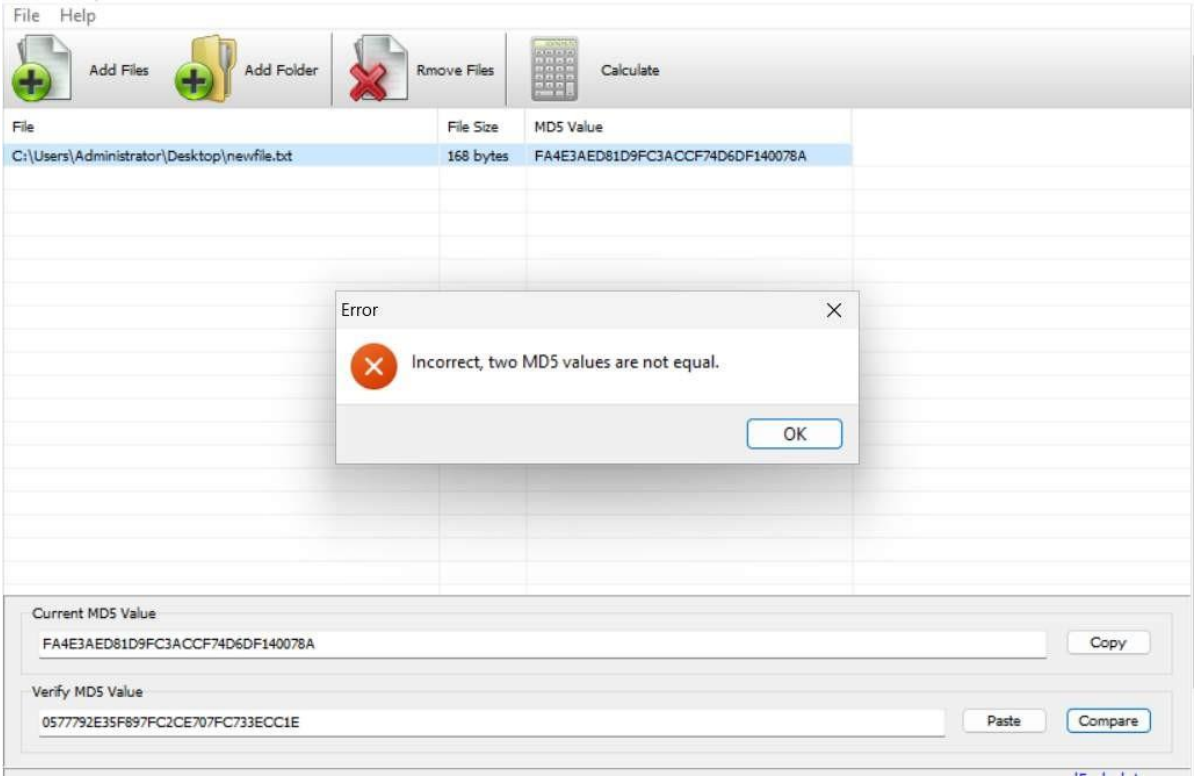
- Perform the previous steps.





- Comparing the previous and current generated hash values in the MD5 calculator.




File Help
Add Files
Add Folder
Rmove Files
Calculate
File
File Size
MD5 Value
C:\Users\Administrator\Desktop\newfile.txt
168 bytes
FA4E3AED81D9FC3ACCF74D6DF140078A
Error
Incorrect, two MD5 values are not equal.
OK
Current MD5 Value
FA4E3AED81D9FC3ACCF74D6DF140078A
Copy
Verify MD5 Value
0577792E35F897FC2CE707FC733ECC1E
Paste
Compare

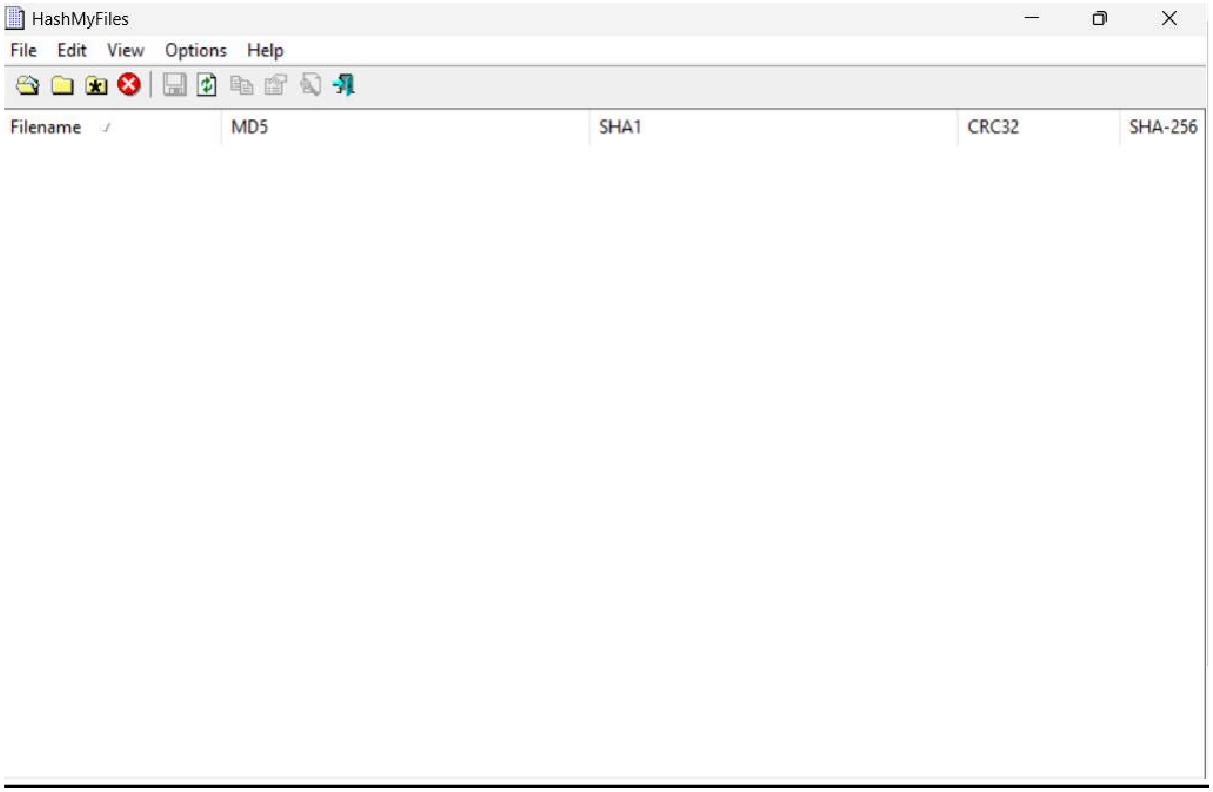
CONCLUSION

- In the Calculating MD5 Hashes Using MD5 Calculator practical, the group explored the generation of MD5 hashes using specialized MD5 Calculator software. Participants grasped the benefits of MD5 hashing, including fast data integrity verification and password security, while also recognizing potential downsides such as vulnerability to hash collisions. This session offered concise insights into the application of MD5 hashing for data security and authentication.

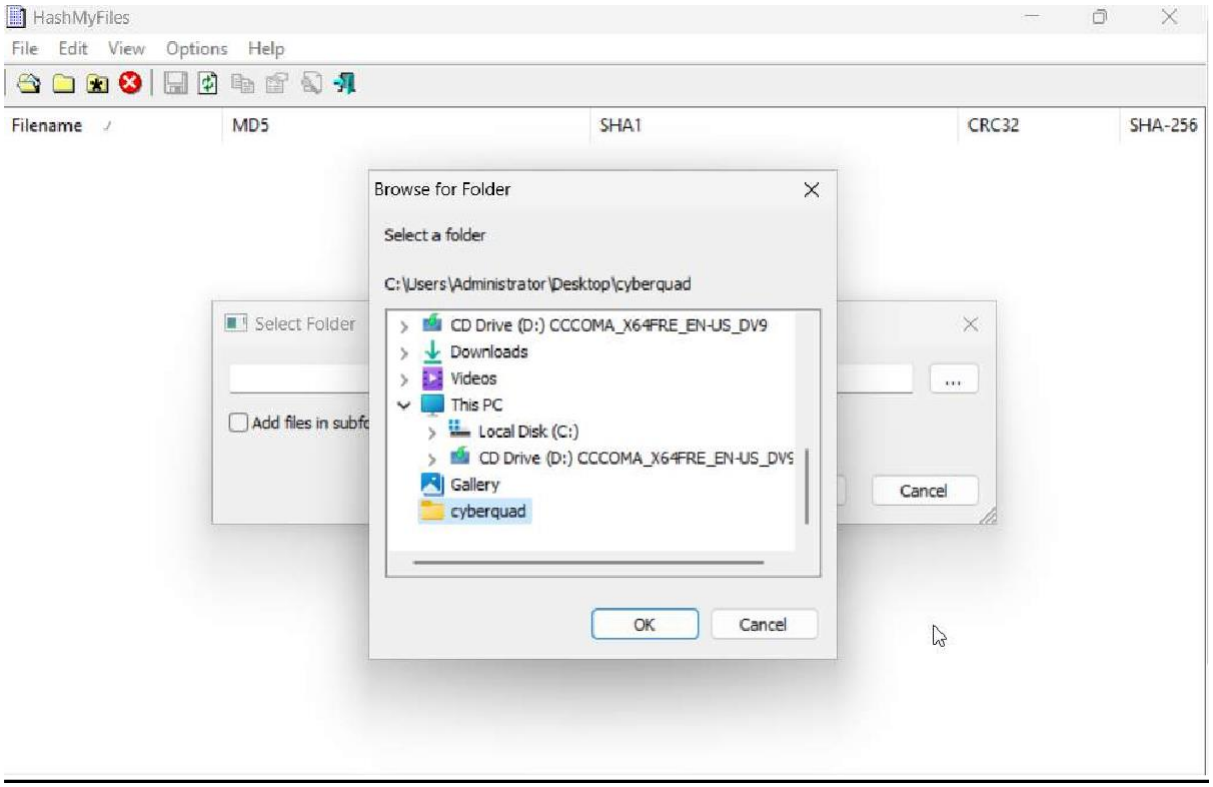
Task 3

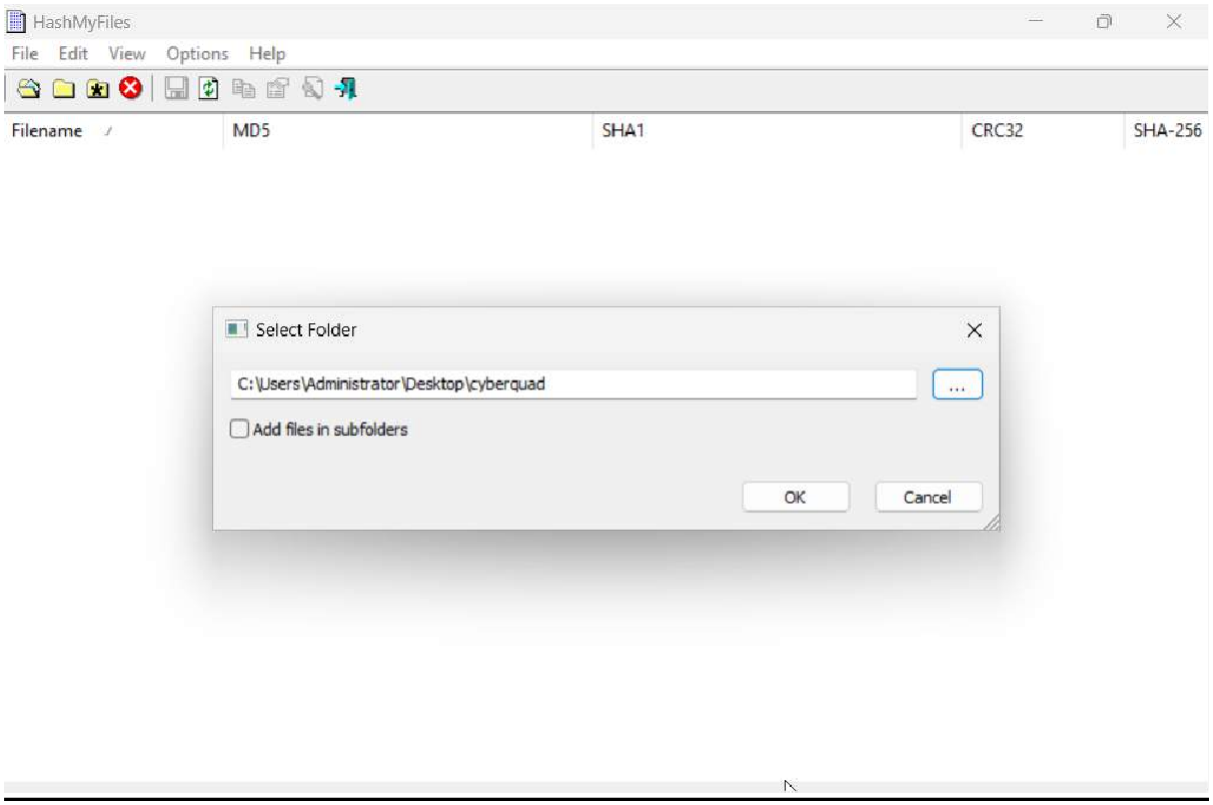
:Calculating MD5 hashes using HashMyfile

- Launching HashMyfile

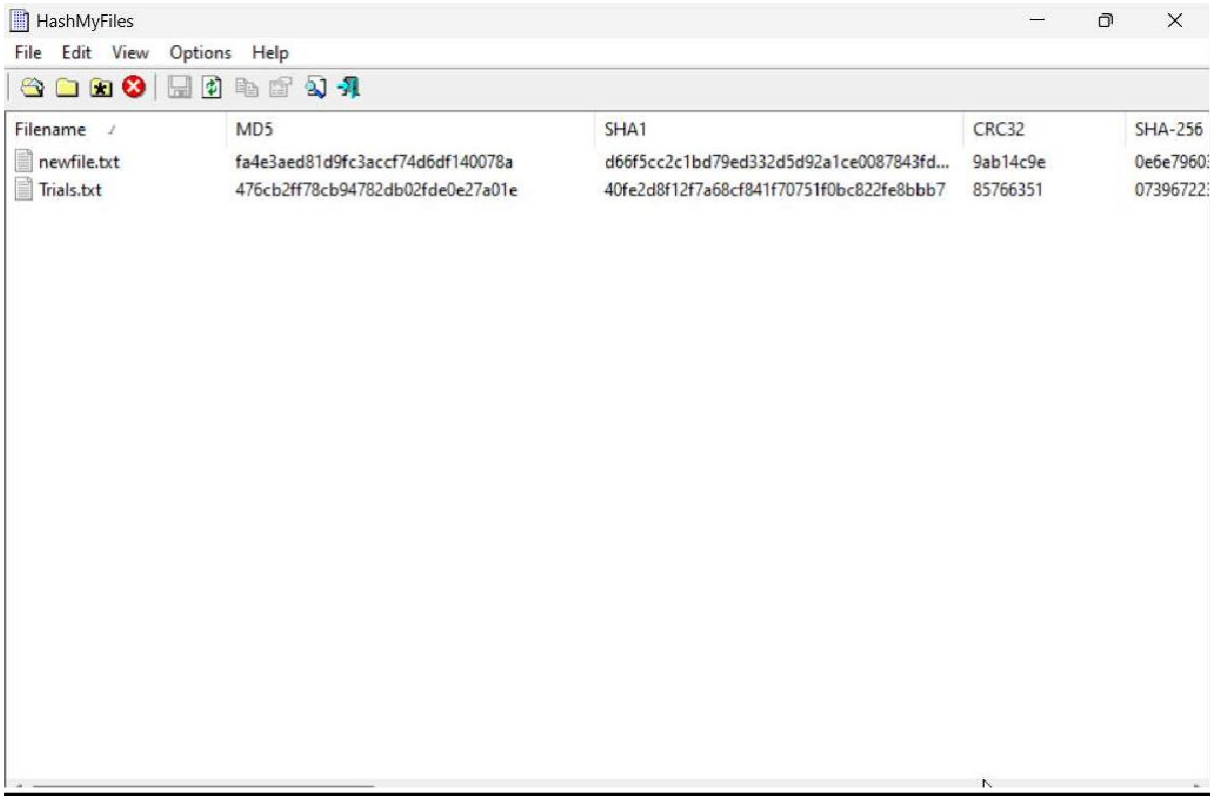


- Navigating the folder to encrypt through HashMyfile

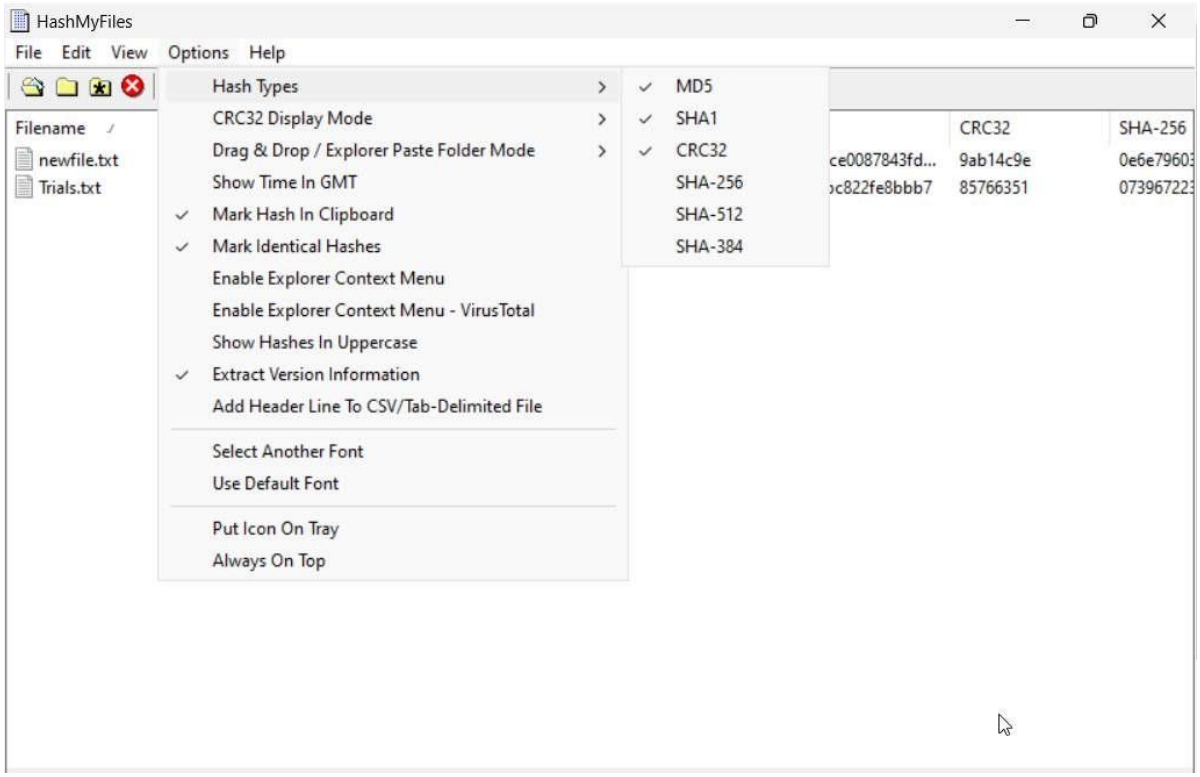




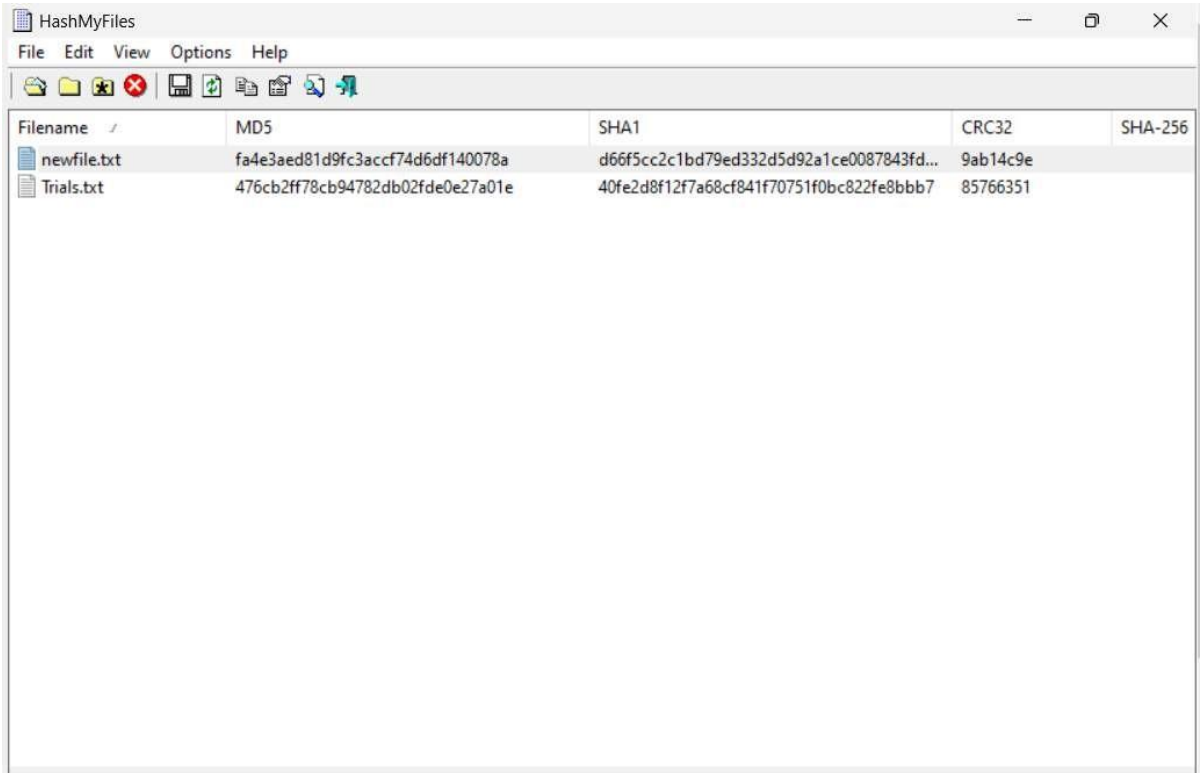
- Files from the folder appears along with their corresponding hash values.



- Choosing hash types from HashMyfile.



- Click refresh option from the menu
- Hash values of the selected hash types are displayed.



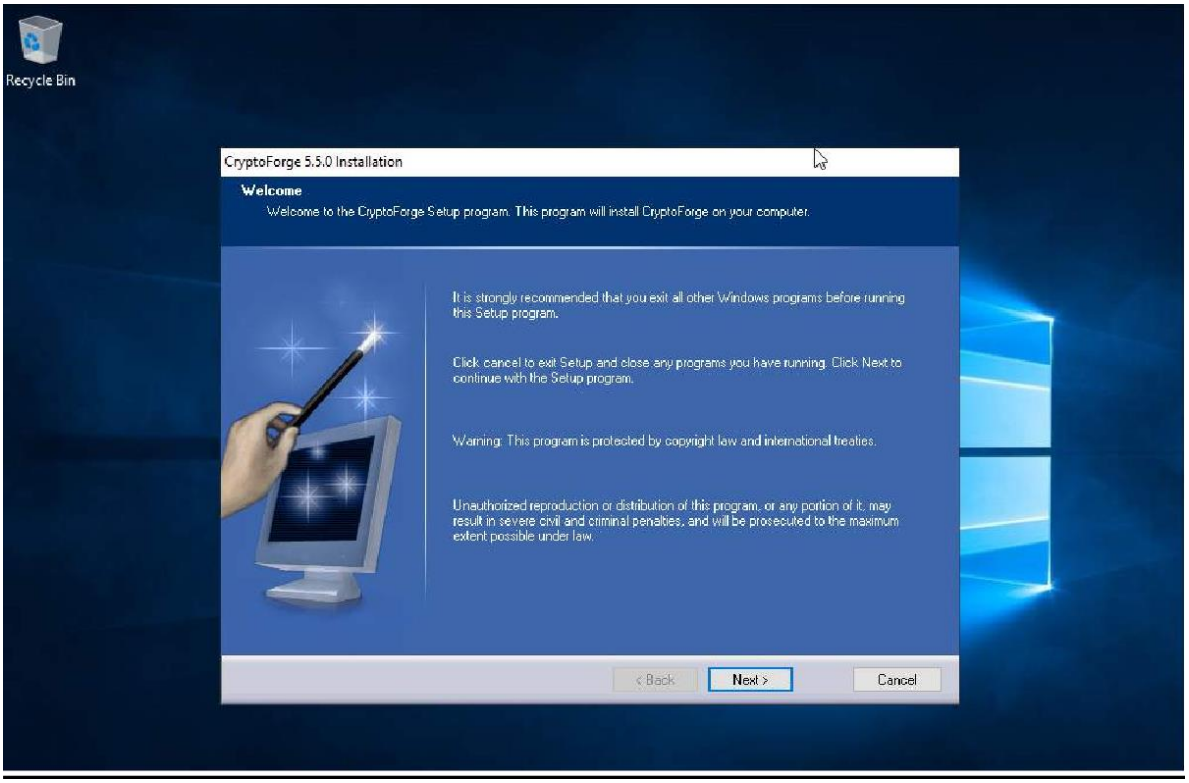
Conclusion

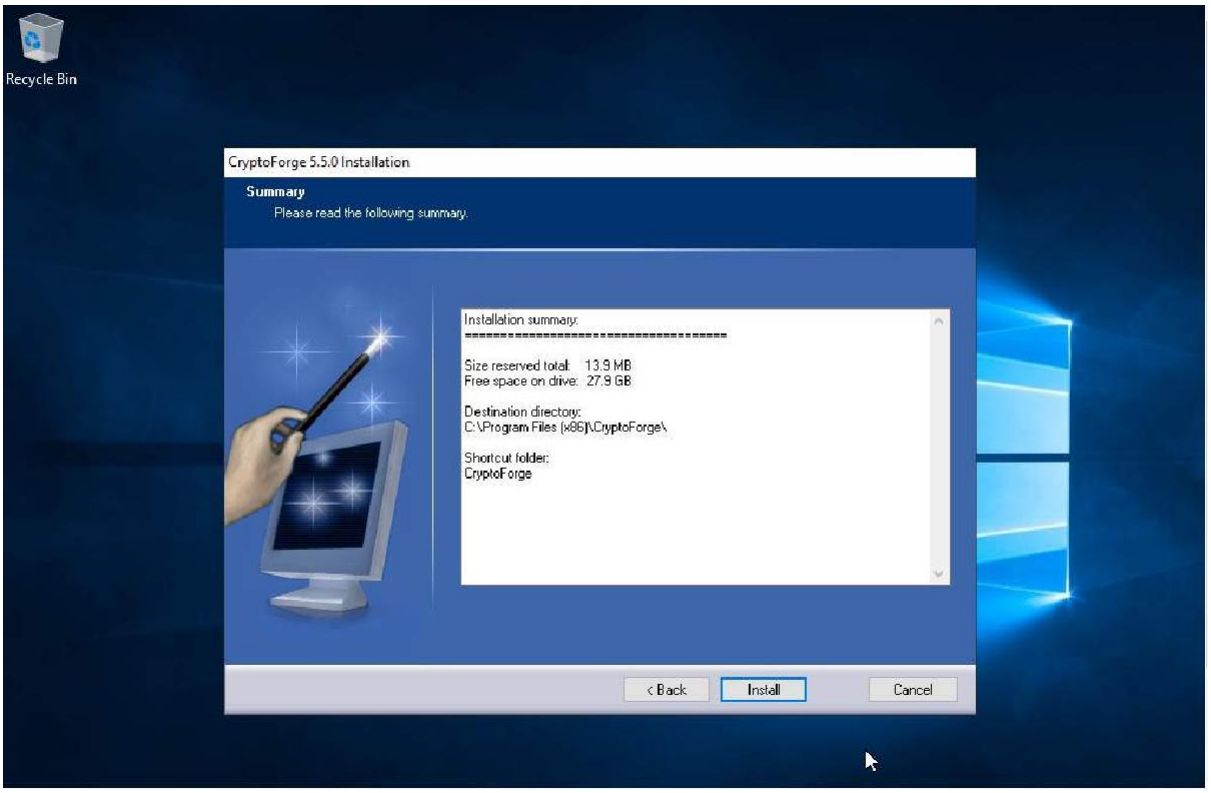
- Casting focus on Calculating MD5 Hashes Using HashMyfile, participants delved into the practical realm of MD5 hashing. By employing HashMyfile software, the group learned to compute MD5 hashes for given data sets. This session illuminated the efficiency of MD5 hashing in verifying data integrity and securing information. However, participants also recognized potential vulnerabilities such as susceptibility to collision attacks. In essence, the session offered a concise exploration of MD5 hashing's strengths and weaknesses, enriching participants' understanding of cryptographic practices.

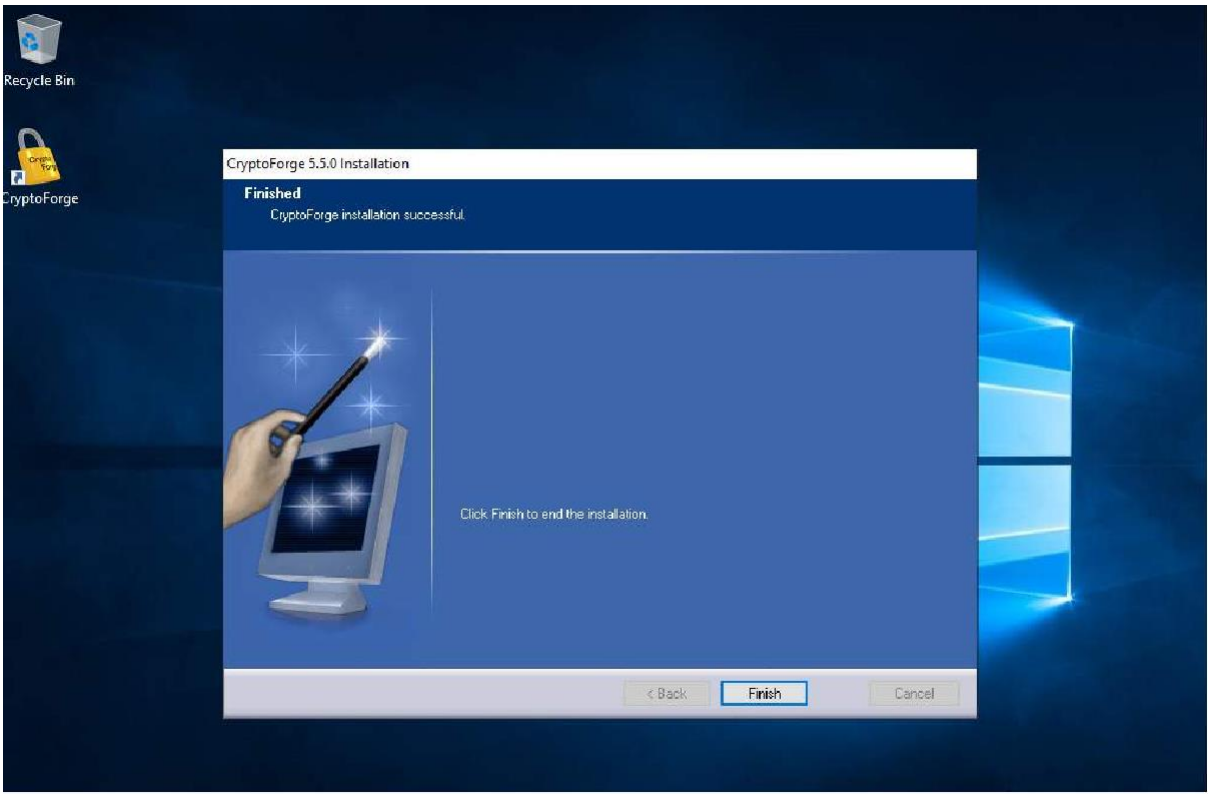
Task 4

:PERFORMING FILE AND TEXT MESSAGE ENCRYPTIONUSING CRYPTOFORGE

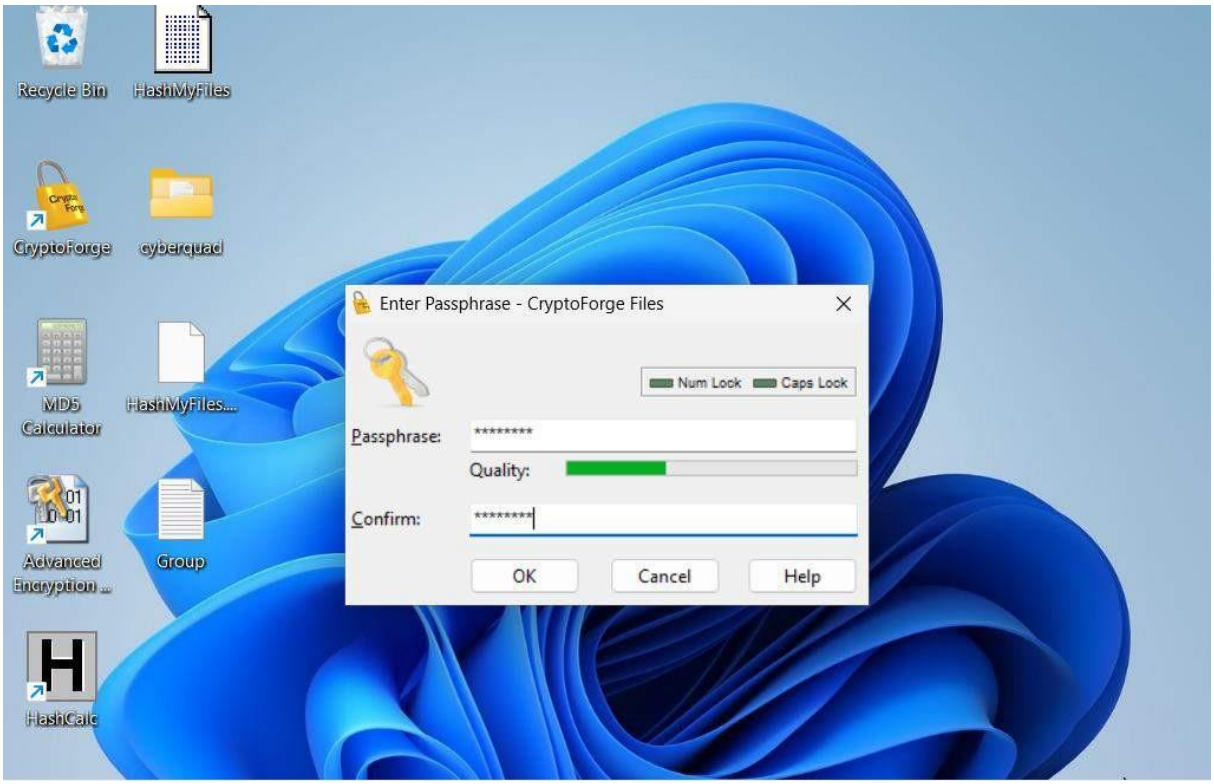
Installing cryptoforge in both windows 11 and windows server virtual machines







- Encrypting a txt file from widows 11 vm



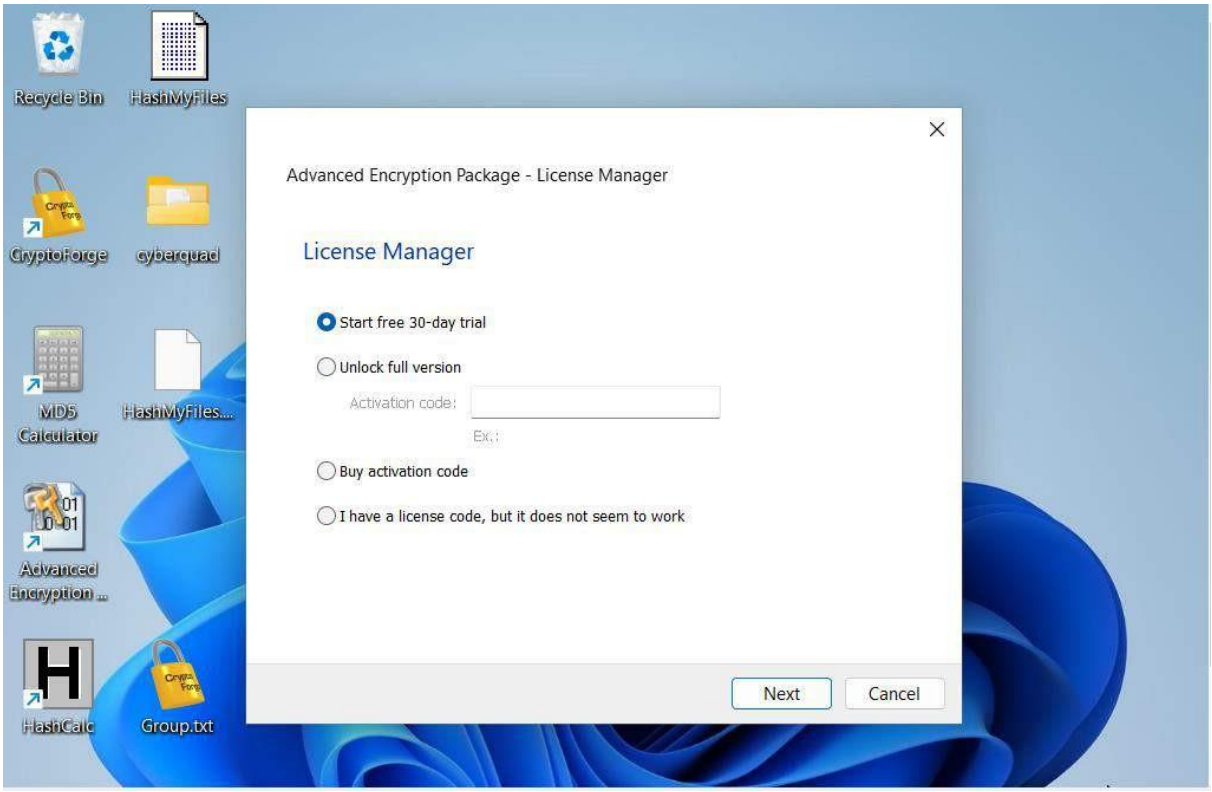
CONCLUSION

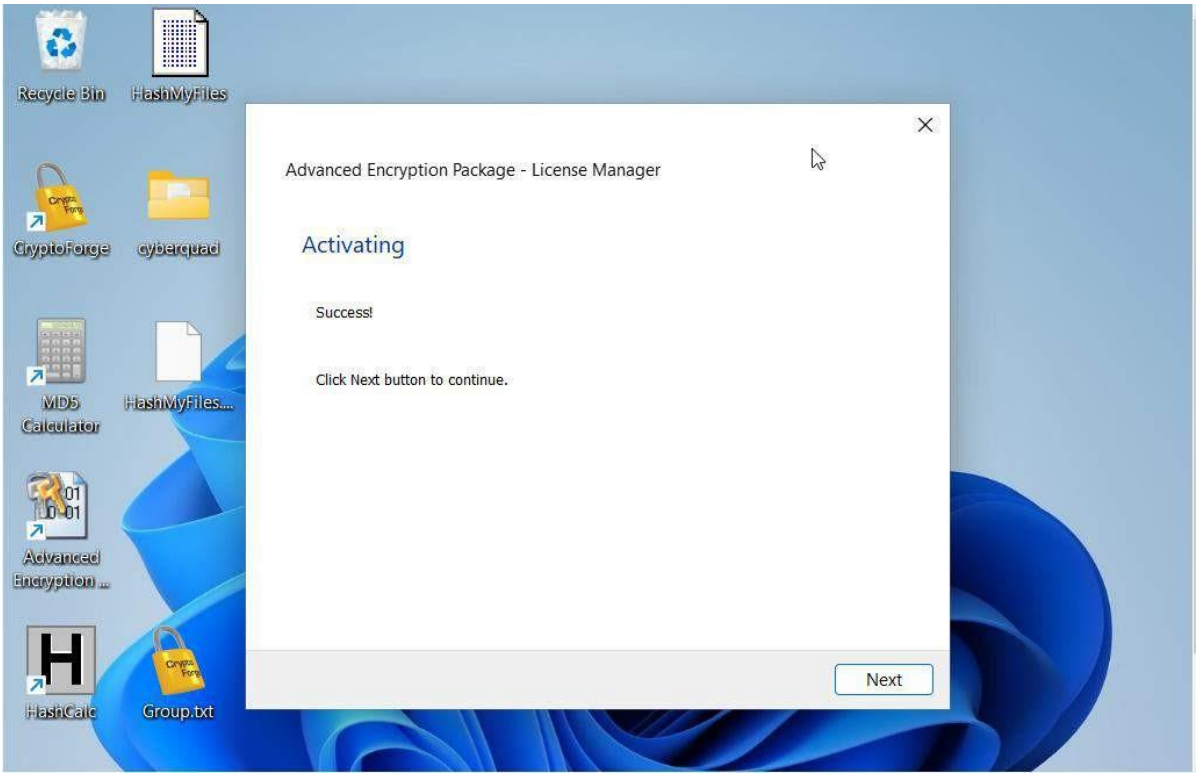
- In the practical session focusing on 'Performing File and Text Message Encryption using Cryptoforge,' the group delved into encryption techniques using CryptoForge software. Through interactive exercises, participants acquired skills in encrypting both files and text messages, gaining a profound understanding of data security principles. They uncovered the benefits of encryption, such as safeguarding confidentiality and ensuring data integrity. Nevertheless, attendees acknowledged the complexities associated with key management and the necessity of secure transmission channels. Overall, the session provided invaluable hands-on experience in leveraging encryption tools to bolster data protection measures.

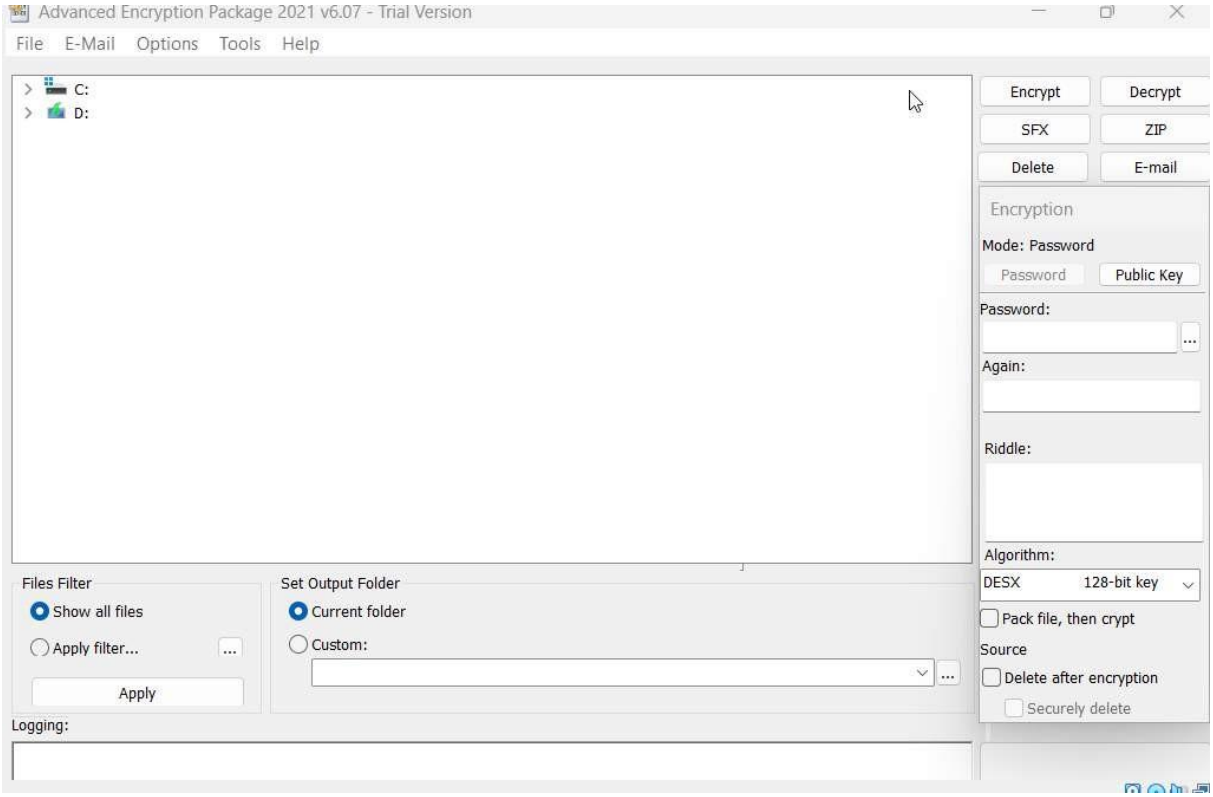
TASK 5

: ENCRYPTION USING ADVANCED ENCRYPTION ADVANCED PACKAGE

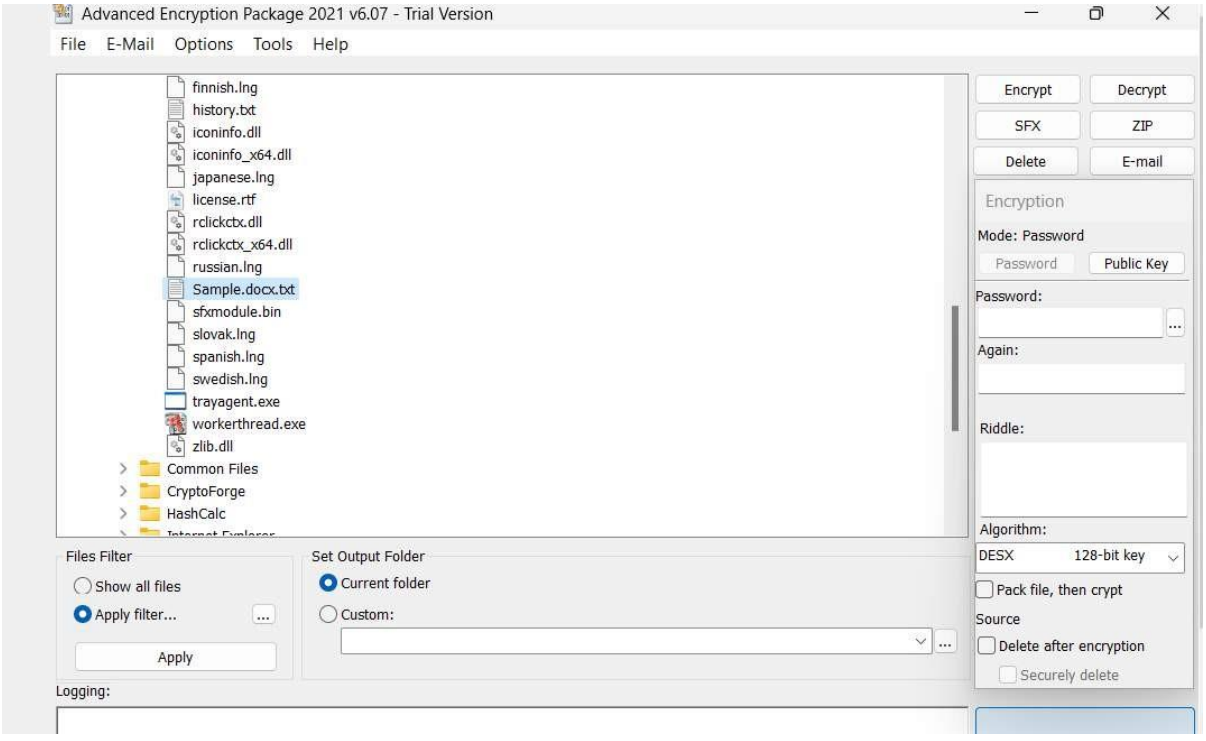
- Installing Advanced encryption Package

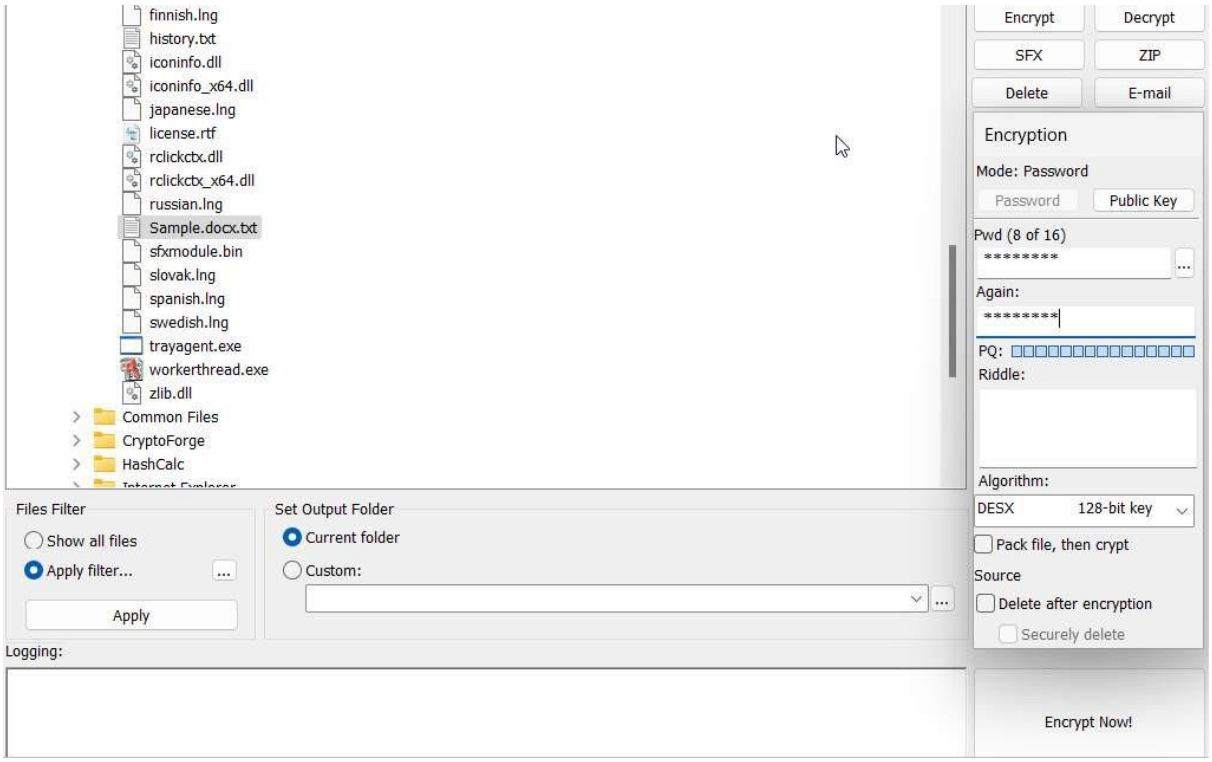


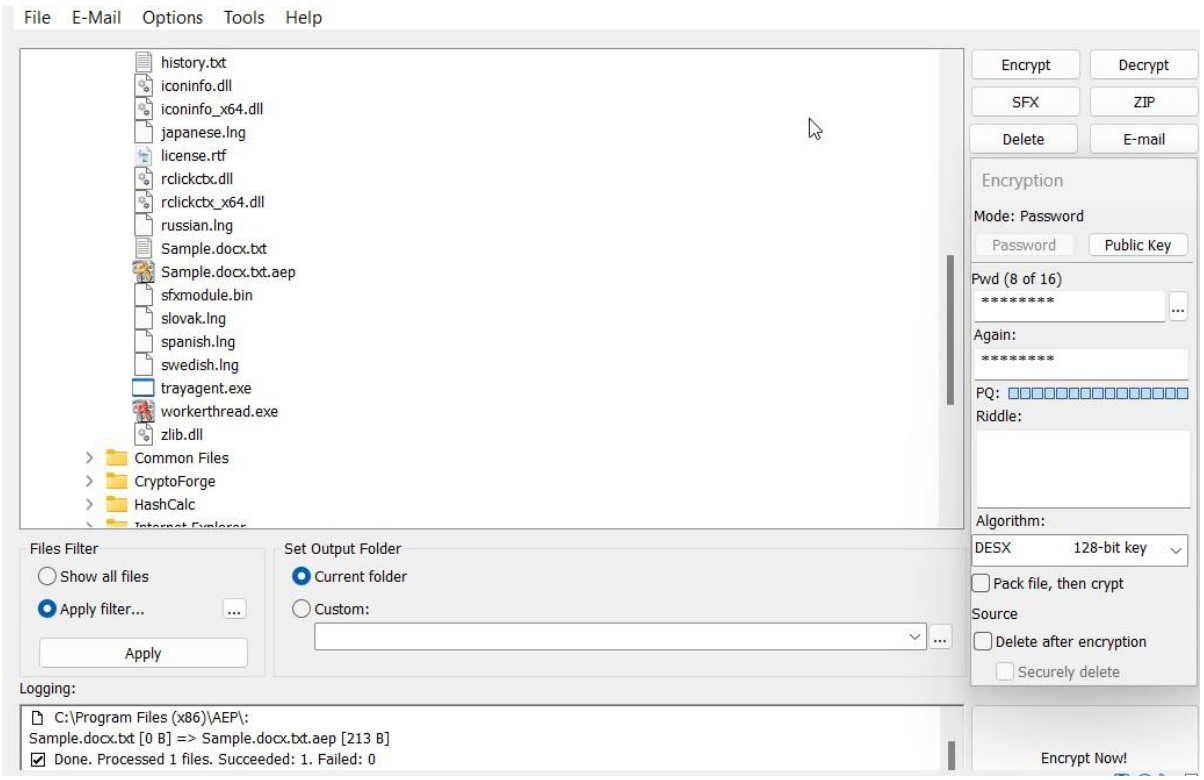




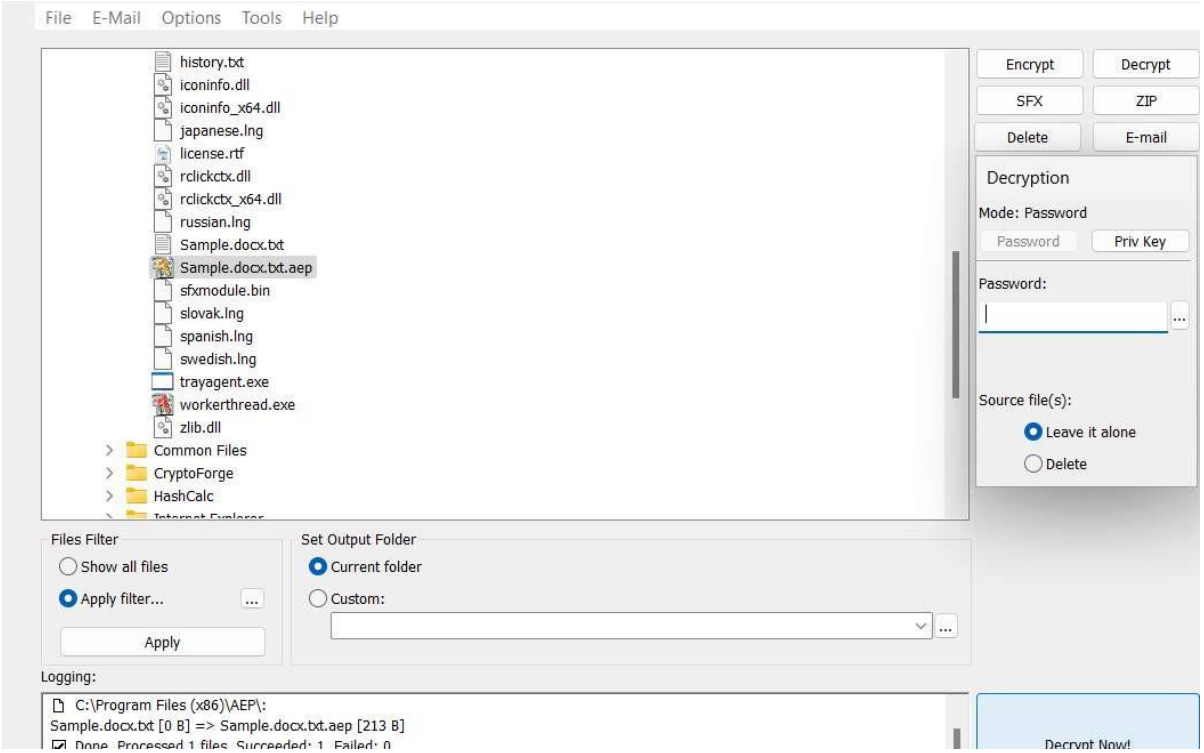
- Encrypting a sample file using Advanced Encryption Package.

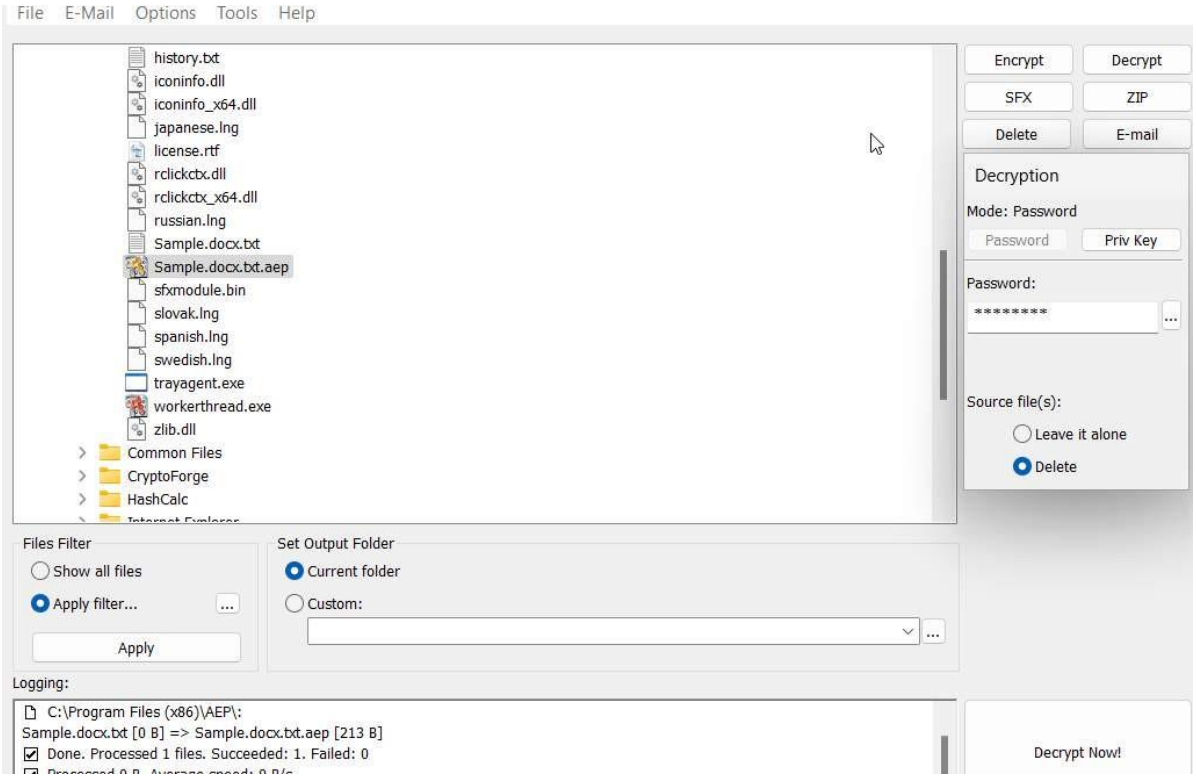


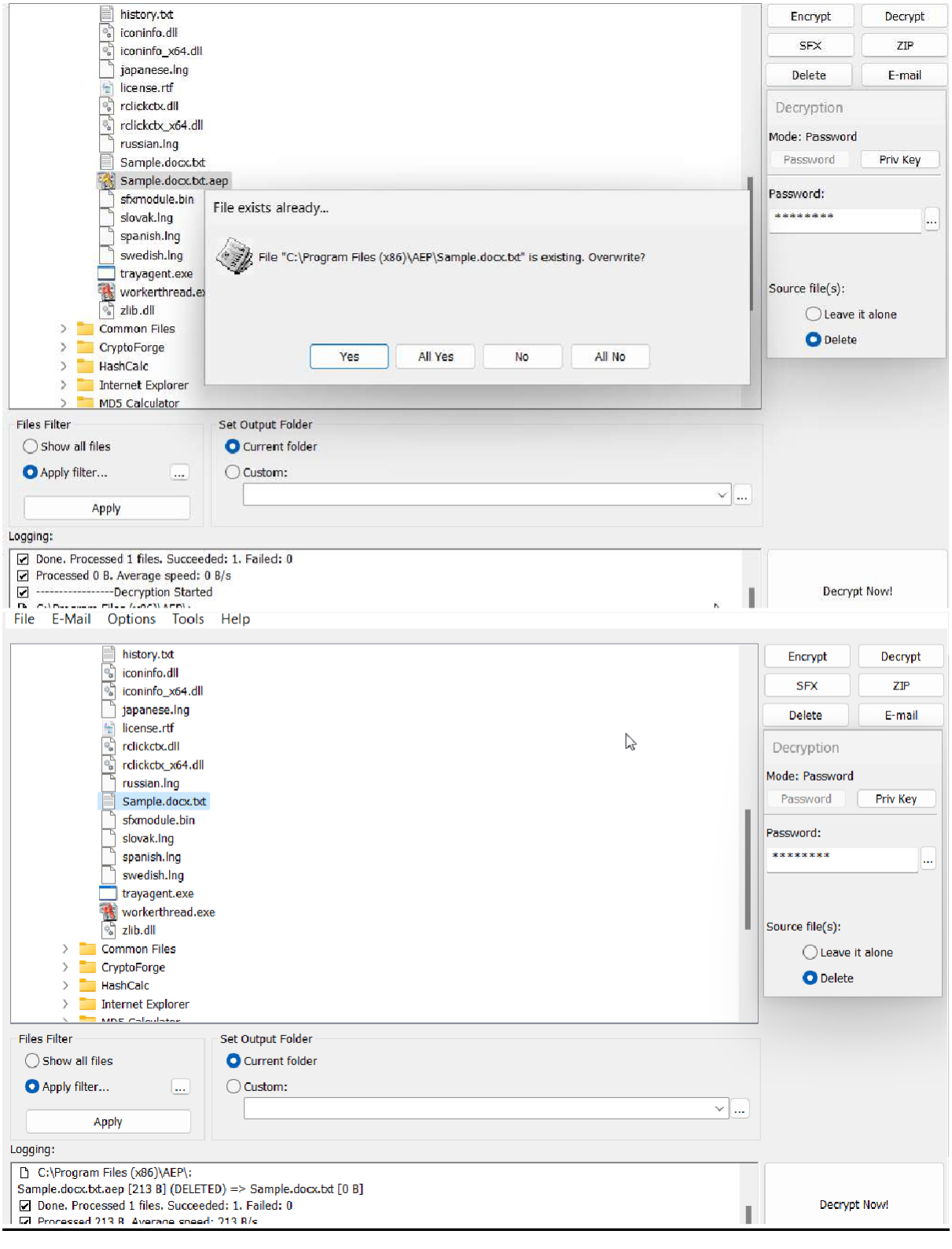

finnish.lng
history.txt
iconinfo.dll
iconinfo_x64.dll
japanese.lng
license.rtf
rclickctx.dll
rclickctx_x64.dll
russian.lng
Sample.docx.txt
sfxmodule.bin
slovak.lng
spanish.lng
swedish.lng
trayagent.exe
workerthread.exe
zlib.dll
Common Files
CryptoForge
HashCalc
Encrypt
Decrypt
SFX
ZIP
Delete
E-mail
Encryption
Mode: Password
Password
Public Key
Pwd (8 of 16)
Again:
PQ:
Riddle:
Algorithm:
DESX
128-bit key
Pack file, then crypt
Source
Delete after encryption
Securely delete
Files Filter
Show all files
Apply filter...
Apply
Set Output Folder
Current folder
Custom:
Logging:
Encrypt Now!


File
E-Mail
Options
Tools
Help
history.txt
iconinfo.dll
iconinfo_x64.dll
japanese.lng
license.rtf
rclickctx.dll
rclickctx_x64.dll
russian.lng
Sample.docx.txt
Sample.docx.txt.aep
sfxmodule.bin
slovak.lng
spanish.lng
swedish.lng
trayagent.exe
workerthread.exe
zlib.dll
Common Files
CryptoForge
HashCalc
Encrypt
Decrypt
SFX
ZIP
Delete
E-mail
Encryption
Mode: Password
Password
Public Key
Pwd (8 of 16)
Again:
PQ:
Riddle:
Algorithm:
DESX
128-bit key
Pack file, then crypt
Source
Delete after encryption
Securely delete
Files Filter
Show all files
Apply filter...
Apply
Set Output Folder
Current folder
Custom:
Logging:
C:\Program Files (x86)\AEP\:
Sample.docx.txt [0 B] => Sample.docx.txt.aep [213 B]
Done. Processed 1 files. Succeeded: 1. Failed: 0
Encrypt Now!

- Decrypting the Encrypted sample file






history.txt
iconinfo.dll
iconinfo_x64.dll
japanese.lng
license.rtf
rclickctx.dll
rclickctx_x64.dll
russian.lng
Sample.docx.txt
Sample.docx.txt.aep
sfxmodule.bin
slovak.lng
spanish.lng
swedish.lng
trayagent.exe
workerthread.ex
zlib.dll
Common Files
CryptoForge
HashCalc
Internet Explorer
MD5 Calculator
File exists already...
File "C:\Program Files (x86)\AEP\Sample.docx.txt" is existing. Overwrite?
Yes
All Yes
No
All No
Encrypt
Decrypt
SFX
ZIP
Delete
E-mail
Decryption
Mode: Password
Password
Priv Key
Password:
****
Source file(s):
Leave it alone
Delete
Files Filter
Show all files
Apply filter...
Apply
Set Output Folder
Current folder
Custom:
Logging:
Done. Processed 1 files. Succeeded: 1. Failed: 0
Processed 0 B. Average speed: 0 B/s
----------Decryption Started
Decrypt Now!

File
E-Mail
Options
Tools
Help
history.txt
iconinfo.dll
iconinfo_x64.dll
japanese.lng
license.rtf
rclickctx.dll
rclickctx_x64.dll
russian.lng
Sample.docx.txt
sfxmodule.bin
slovak.lng
spanish.lng
swedish.lng
trayagent.exe
workerthread.exe
zlib.dll
Common Files
CryptoForge
HashCalc
Internet Explorer
Encrypt
Decrypt
SFX
ZIP
Delete
E-mail
Decryption
Mode: Password
Password
Priv Key
Password:
****
Source file(s):
Leave it alone
Delete
Files Filter
Show all files
Apply filter...
Apply
Set Output Folder
Current folder
Custom:
Logging:
C:\Program Files (x86)\AEP\:
Sample.docx.txt.aep [213 B] (DELETED) => Sample.docx.txt [0 B]
Done. Processed 1 files. Succeeded: 1. Failed: 0
Decrypt Now!

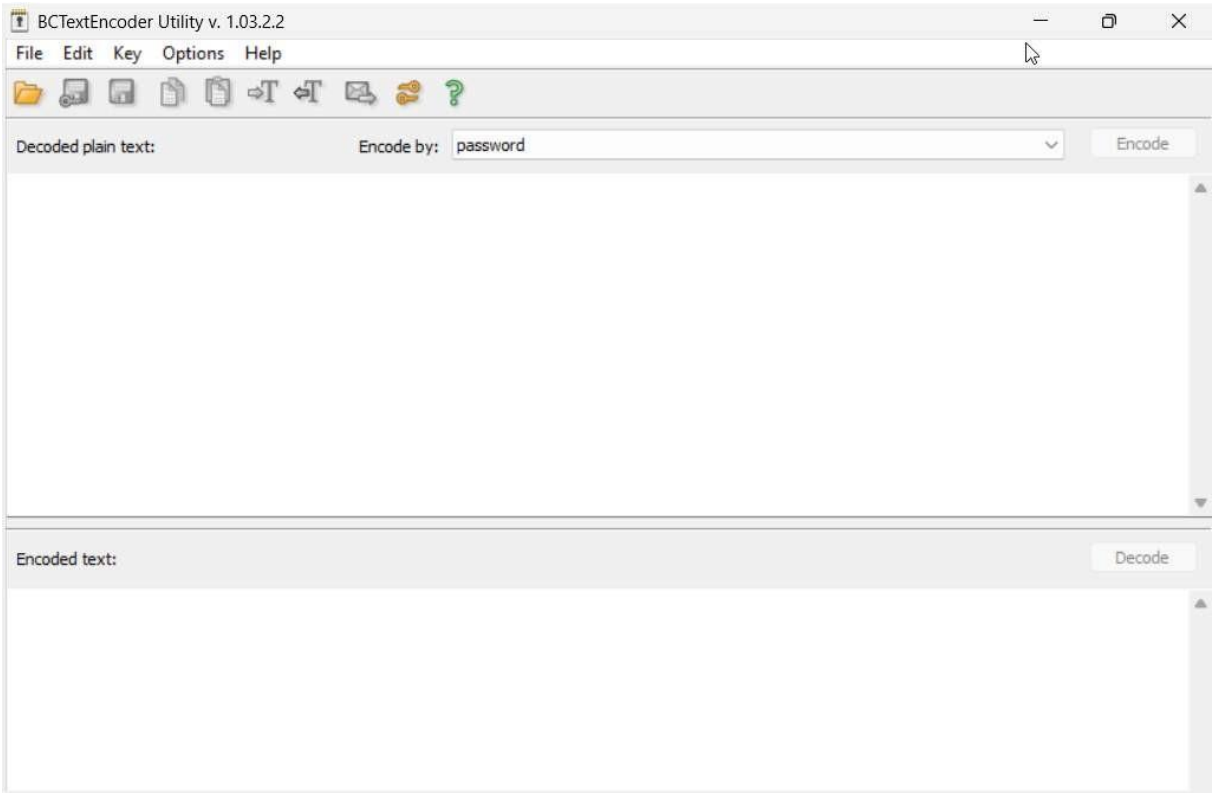
CONCLUSION

- In the 'Encryption Using Advanced Encryption Advanced Package' practical, participants immersed themselves in data encryption techniques employing the Advanced Encryption Advanced Package. Through hands-on exercises, the group mastered encryption and decryption processes, appreciating its pivotal role in data security. The session underscored encryption's ability to safeguard sensitive information, ensuring confidentiality and integrity. Participants recognized the advantages of advanced encryption, such as robust protection against unauthorized access and sophisticated attacks. However, they also acknowledged challenges like key management complexity and potential performance overheads. Despite these considerations, the practical highlighted the necessity and effectiveness of advanced encryption in modern cybersecurity, offering valuable insights into its implementation and benefits.

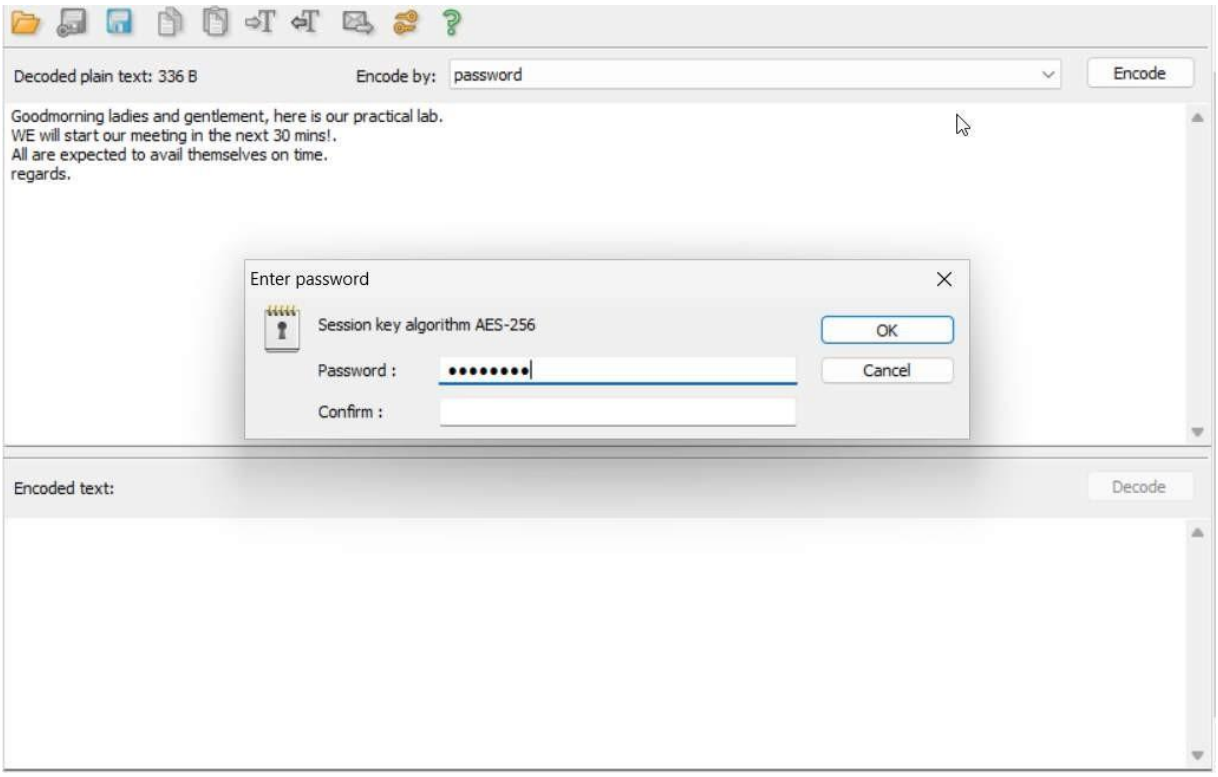
TASK 6

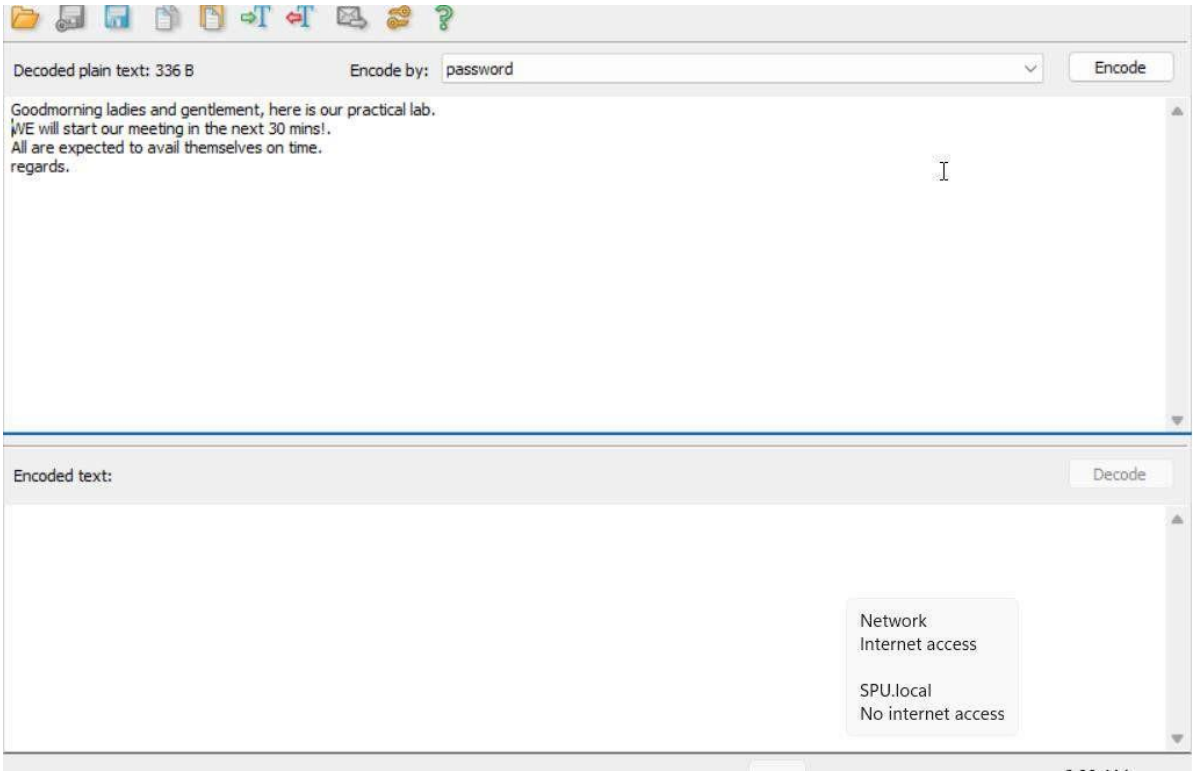
:Encrypt and Decrypt data using BCTextEncoder

- BCTextEncoder appears as shown when opened

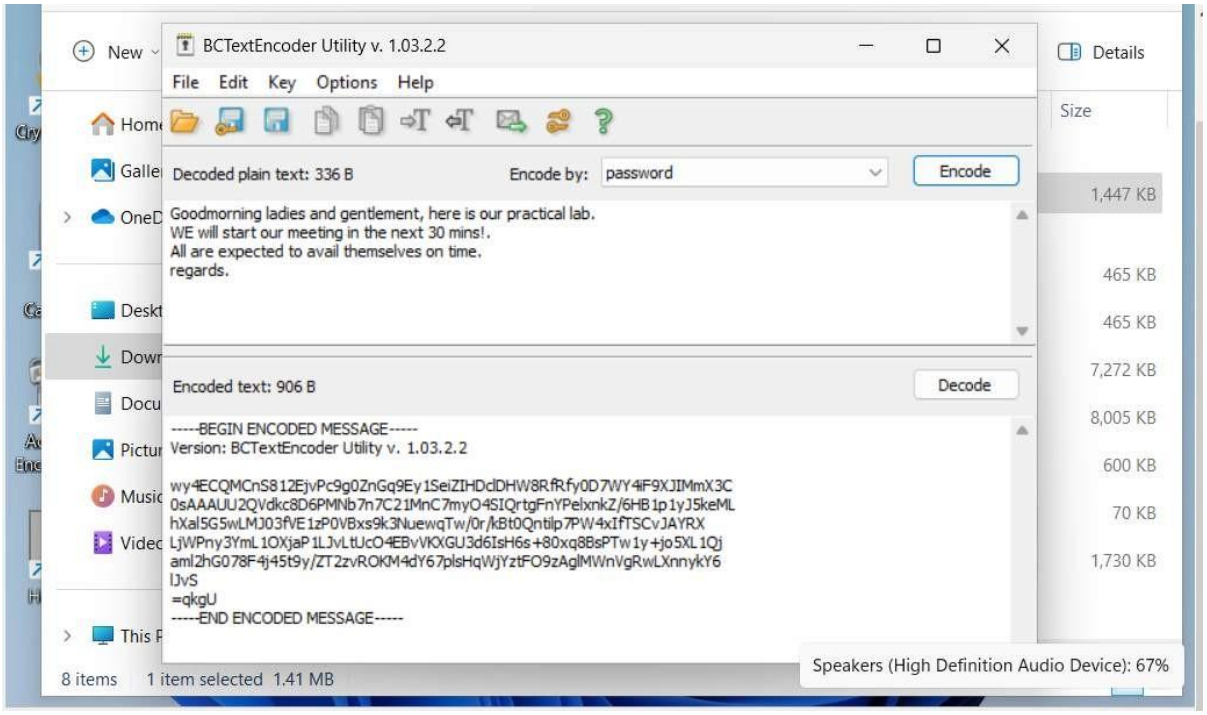


- Insert a text on the clipboard to encrypt, ensure the password tab is selected
- click on encode and input your password to encode the text.

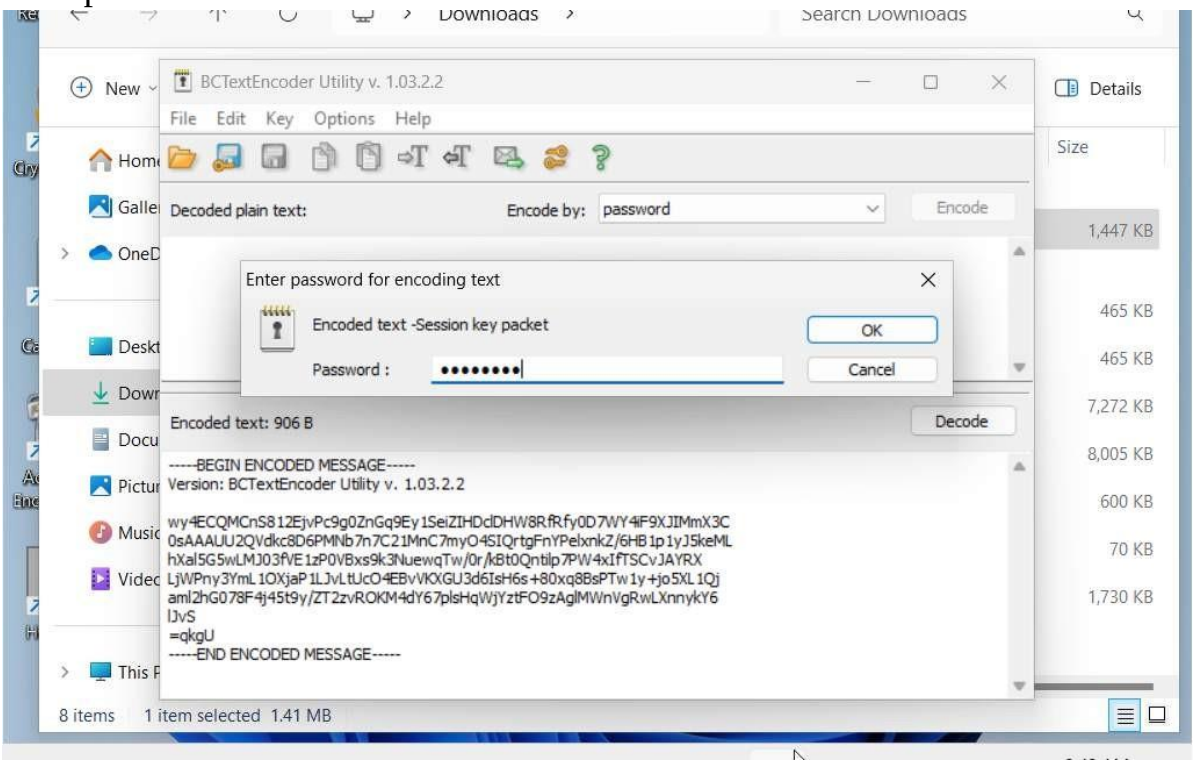

Decoded plain text: 336 B
Encode by:
password
Encode
Goodmorning ladies and gentlement, here is our practical lab.
WE will start our meeting in the next 30 mins!.
All are expected to avail themselves on time.
regards.
Enter password
Session key algorithm AES-256
OK
Password :
Cancel
Confirm :
Encoded text:
Decode


Decoded plain text: 336 B
Encode by:
password
Encode
Goodmorning ladies and gentlement, here is our practical lab.
WE will start our meeting in the next 30 mins!.
All are expected to avail themselves on time.
regards.
Encoded text:
Decode
Network
Internet access
SPU.local
No internet access

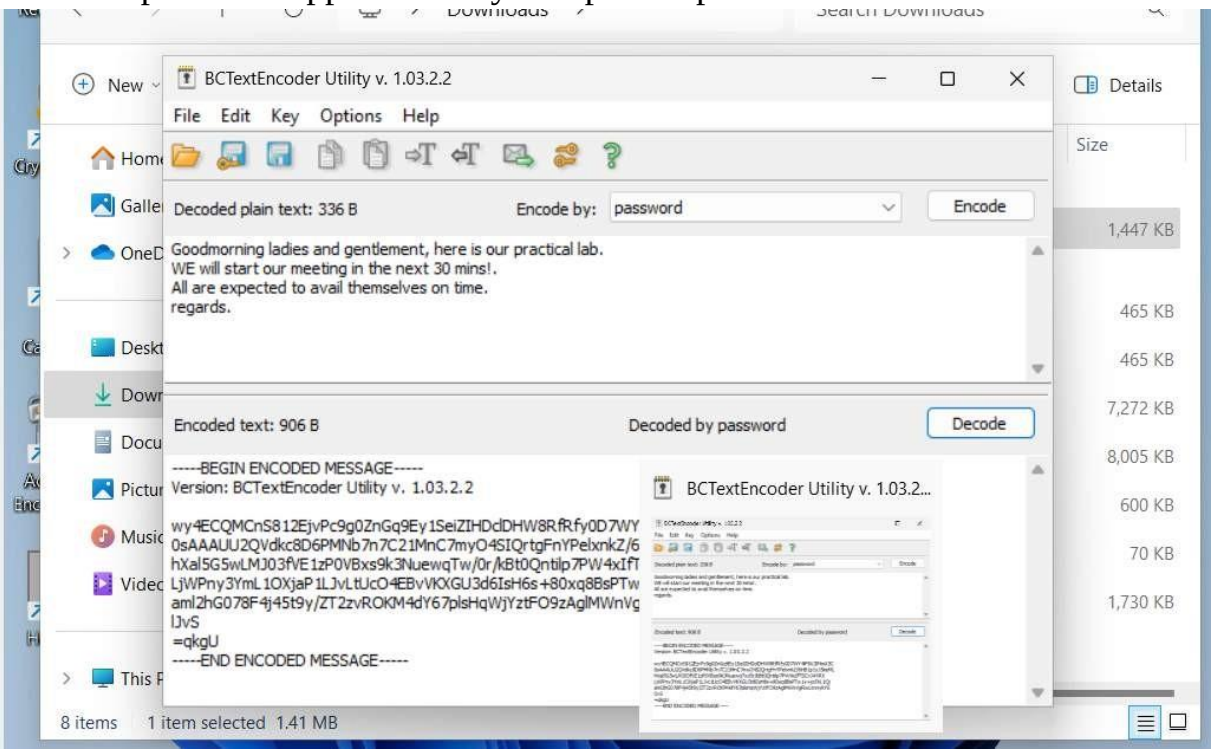
- The encode context is shown



- Decrypting the encoded text, you first need to clear the plain text, then click on the decode tab to decode the cipher text.
- A fill in your password message will pop, enter the password to decode the cipher text.



- Decoded plain text appears after you input the password.



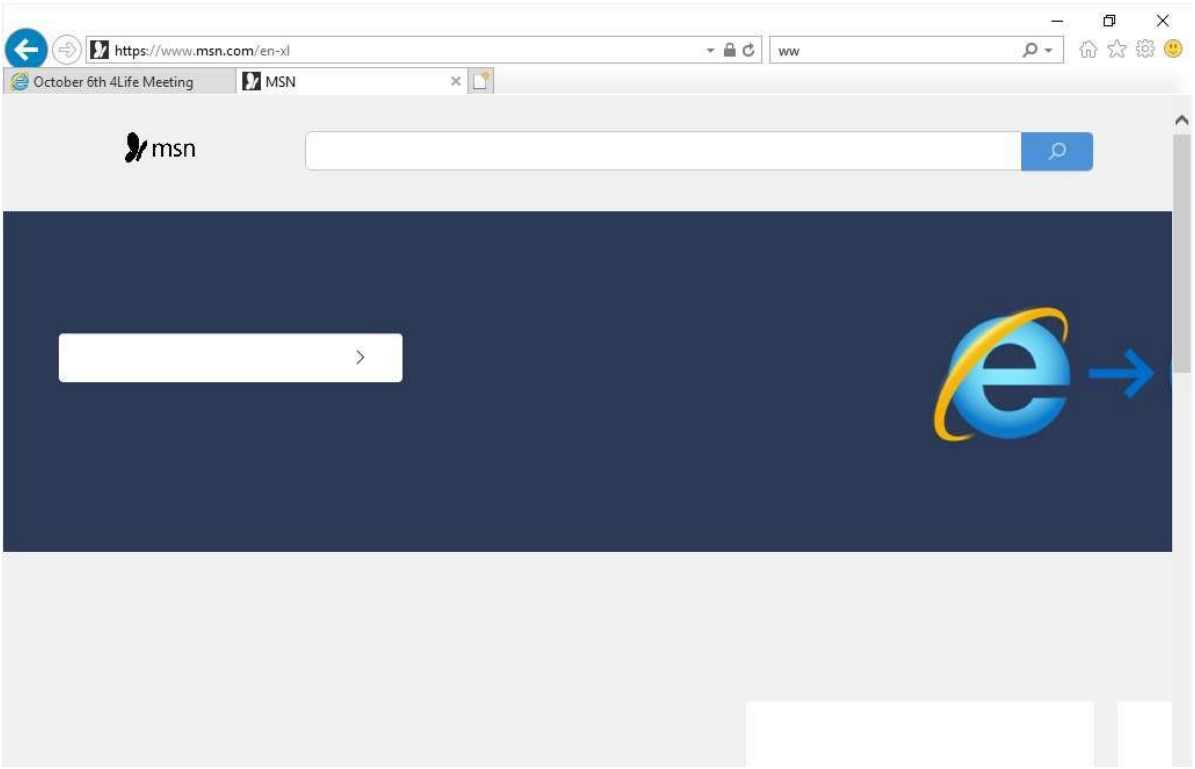
CONCLUSION

- In the 'Encrypting and Decrypting Data Using BCTextEncoder' practical, participants explored the process of encrypting and decrypting data using BCTextEncoder software. Through hands-on exercises, the group learned how to encode sensitive information for secure transmission and storage. They discovered the benefits of encryption, such as protecting data confidentiality and ensuring privacy. However, they also recognized the importance of securely managing encryption keys to prevent unauthorized access. Overall, the session provided valuable insights into the practical applications of encryption technology in enhancing data security.

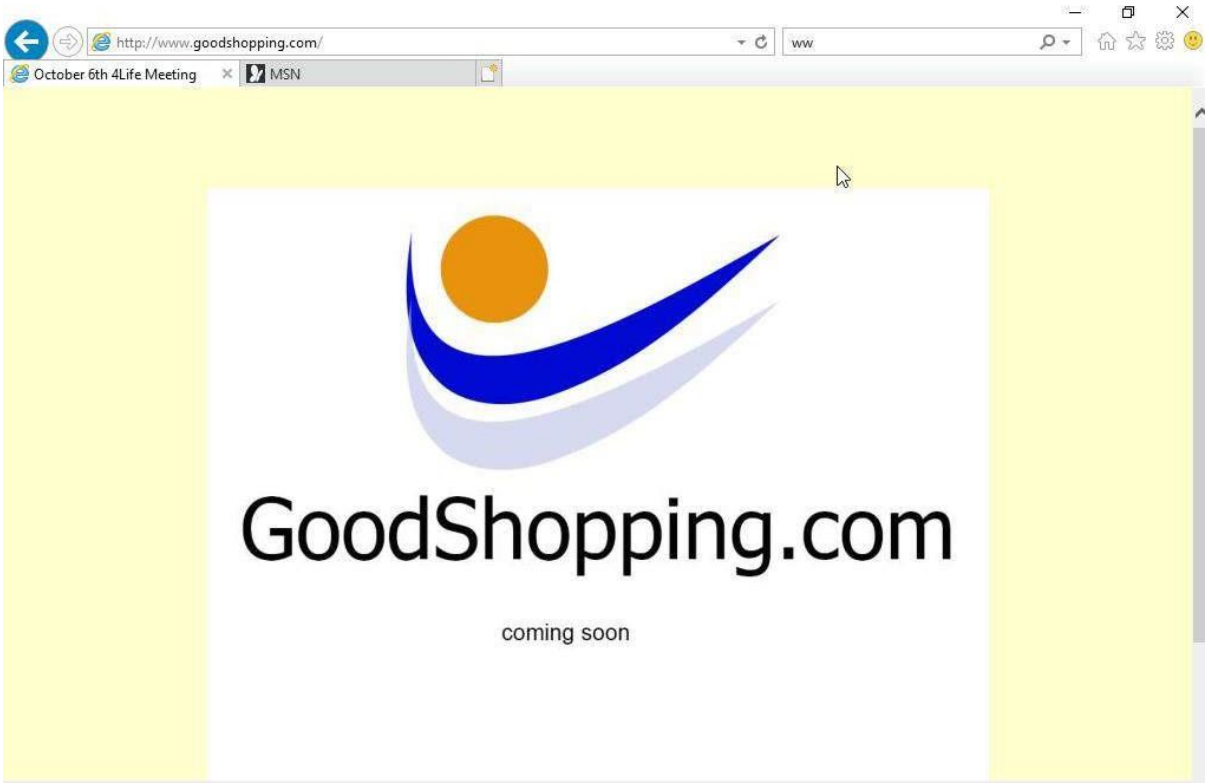
LAB 2

: CREATING A SELF SIGNED CERTIFICATE

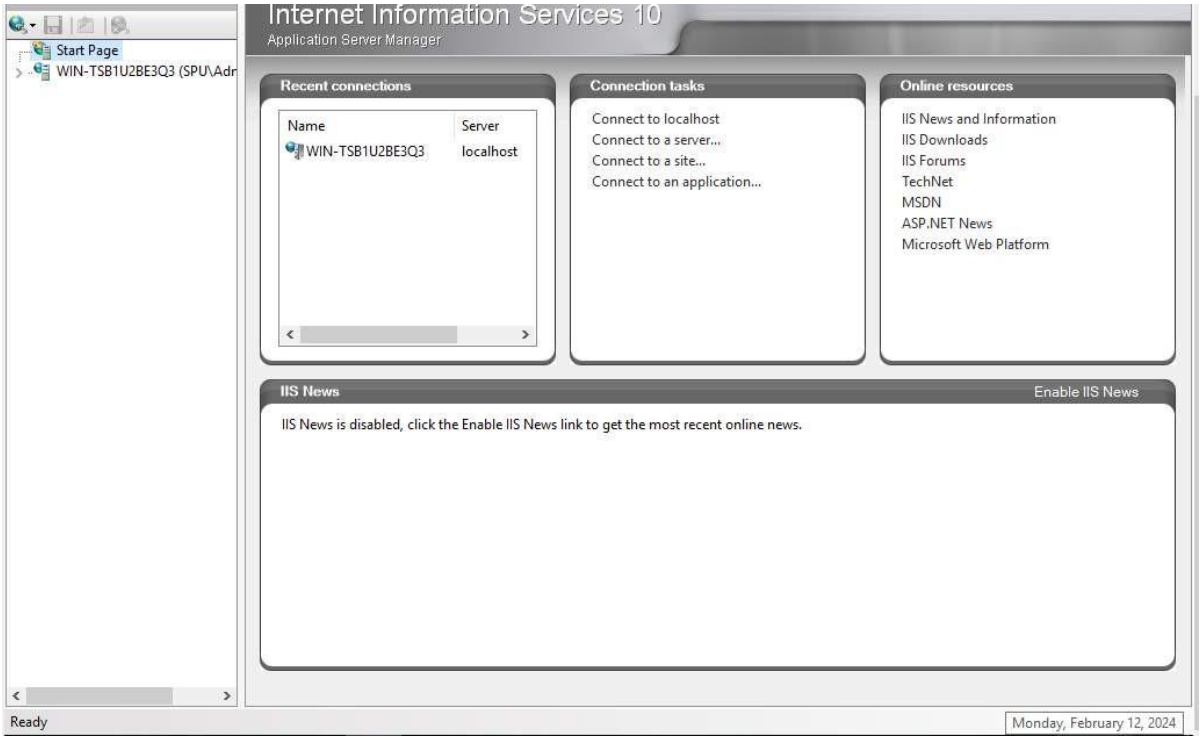
- Open your browser



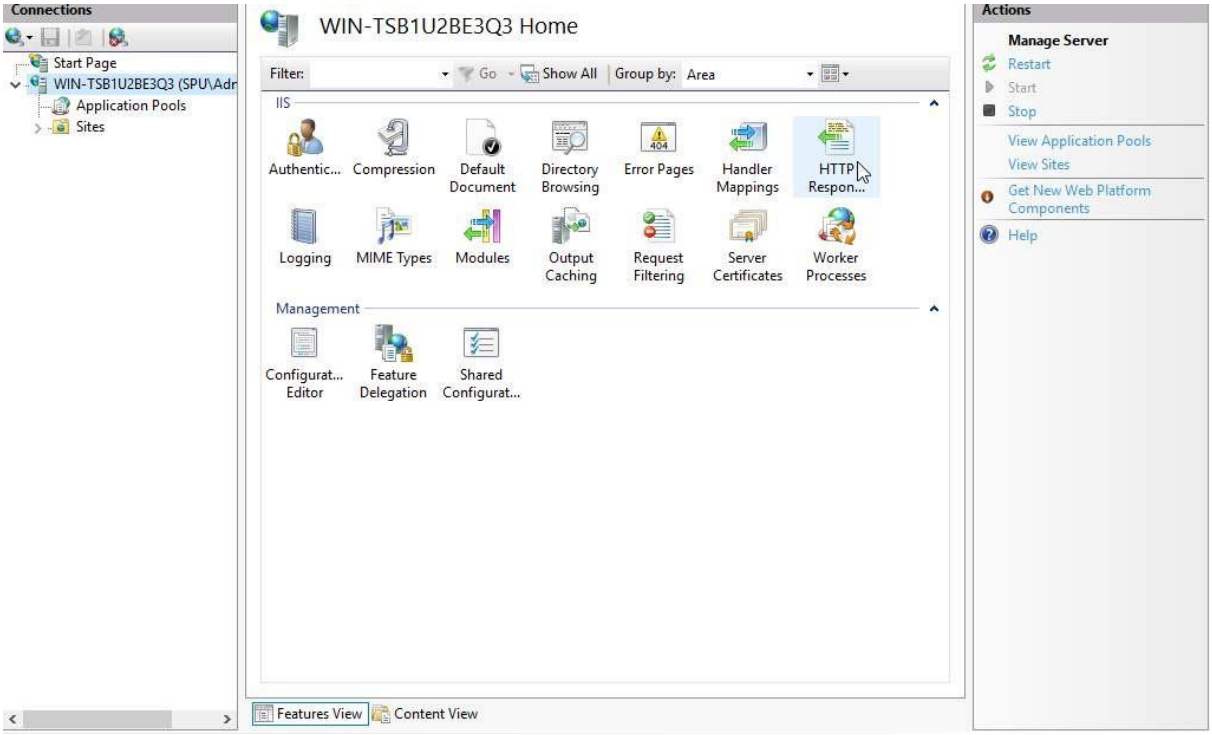
- Navigate to www.goodshopping.com



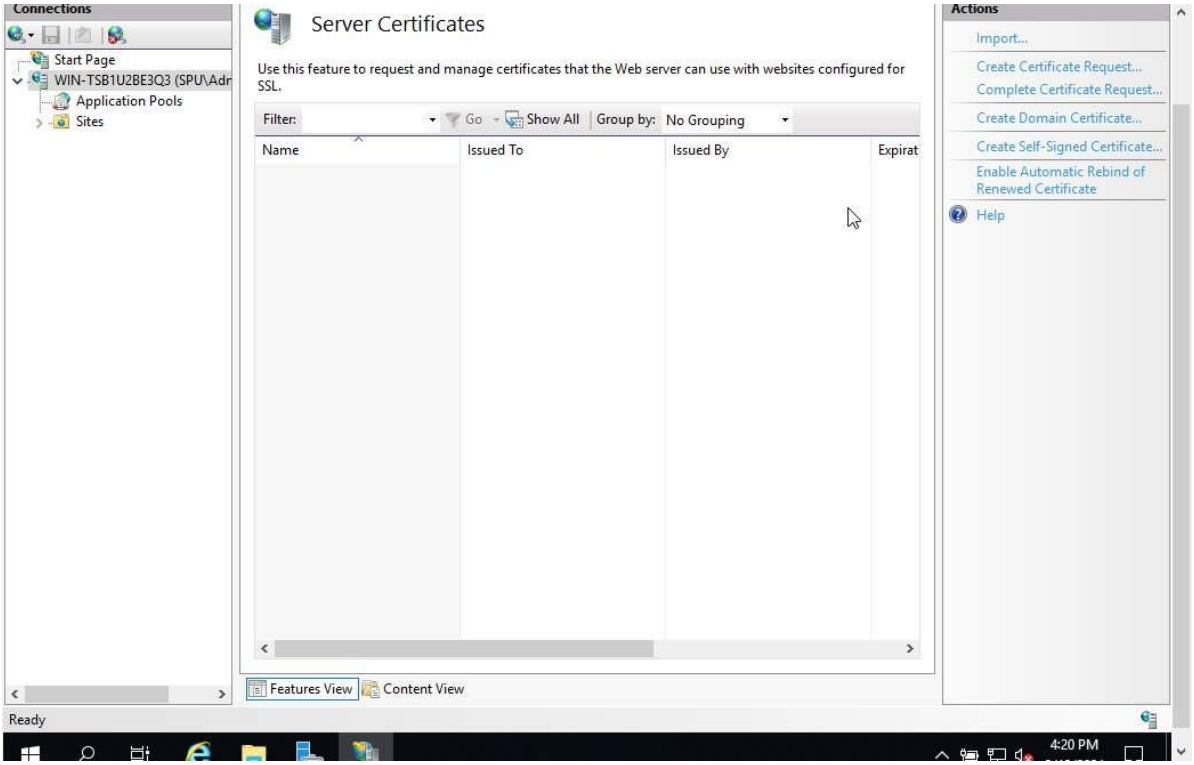
- Access the IIS manager



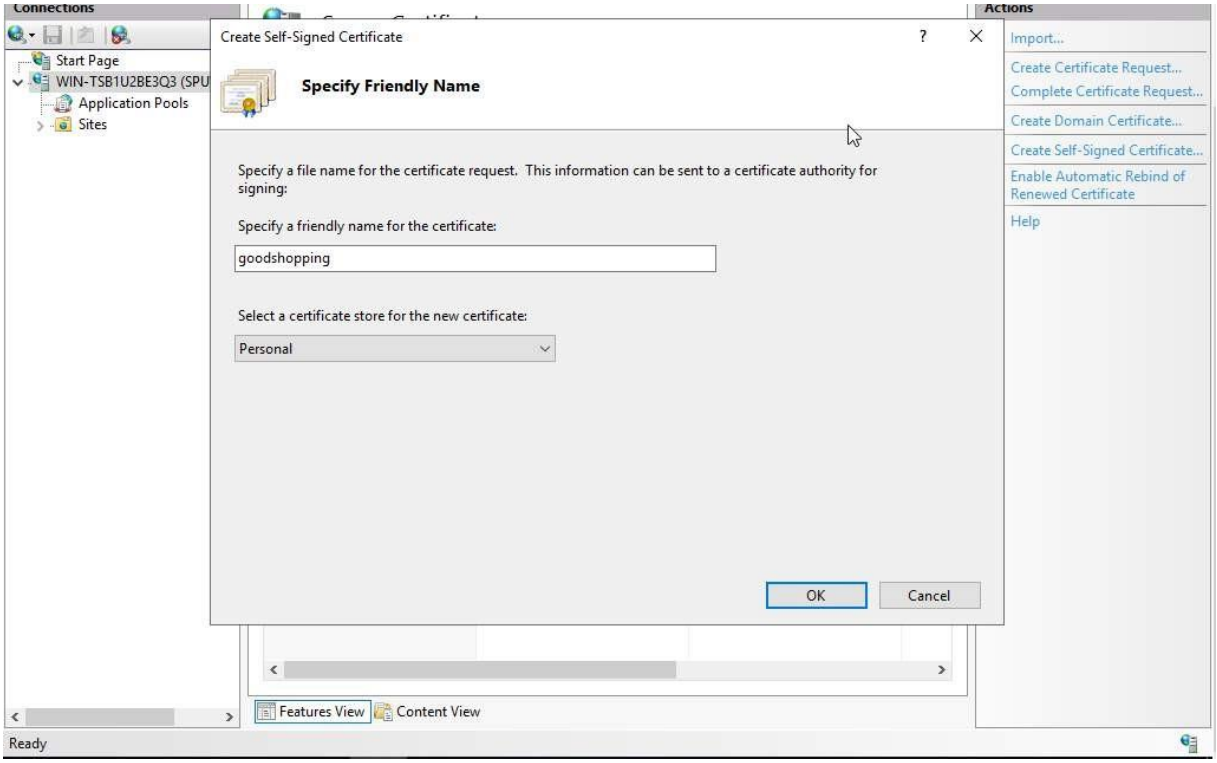
- Double click on the server certificate in the IIS section.



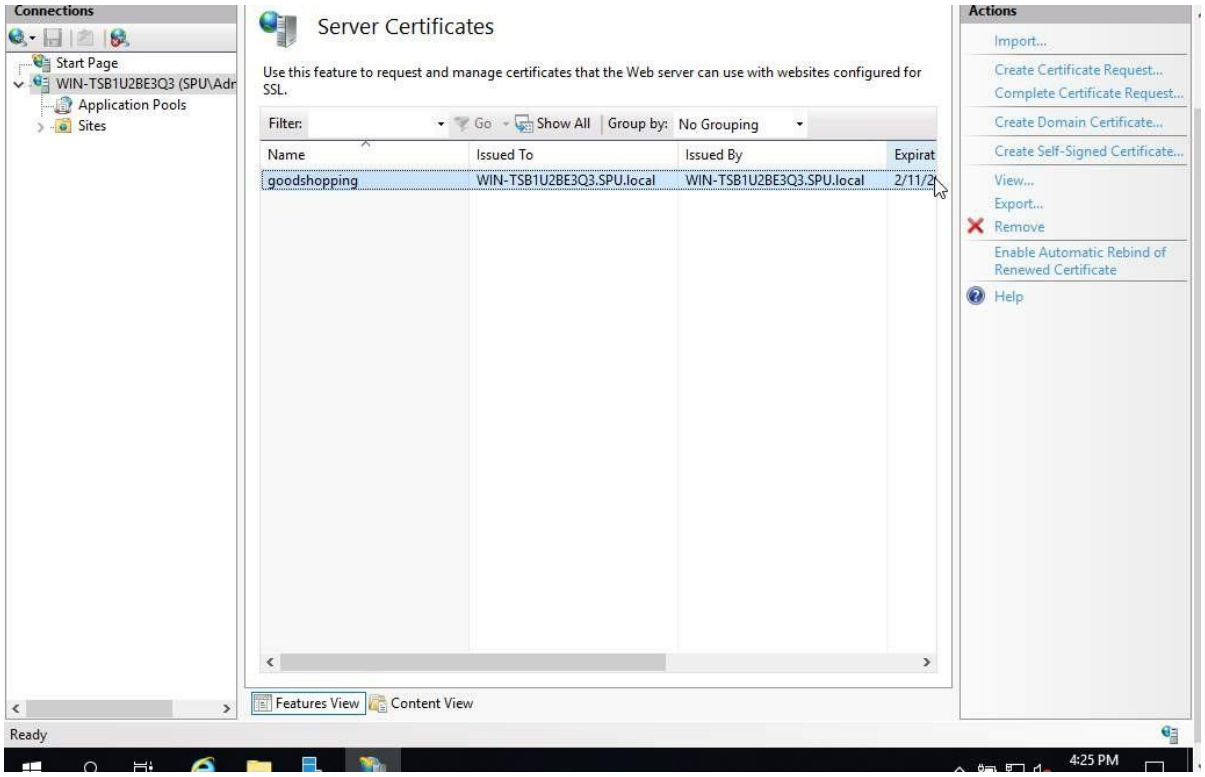
- Creating a self-signed certificate.



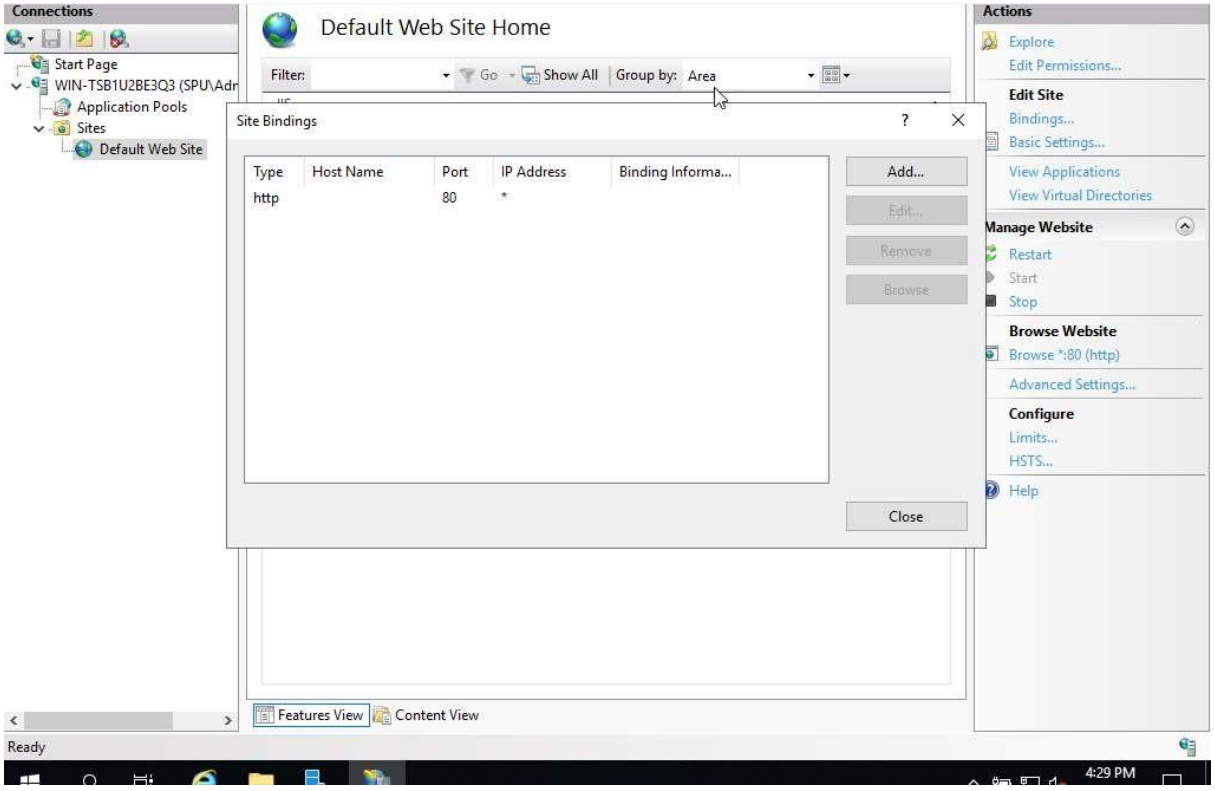
- Click on create signed certificate tab
- Specifying the details of the signed certificate



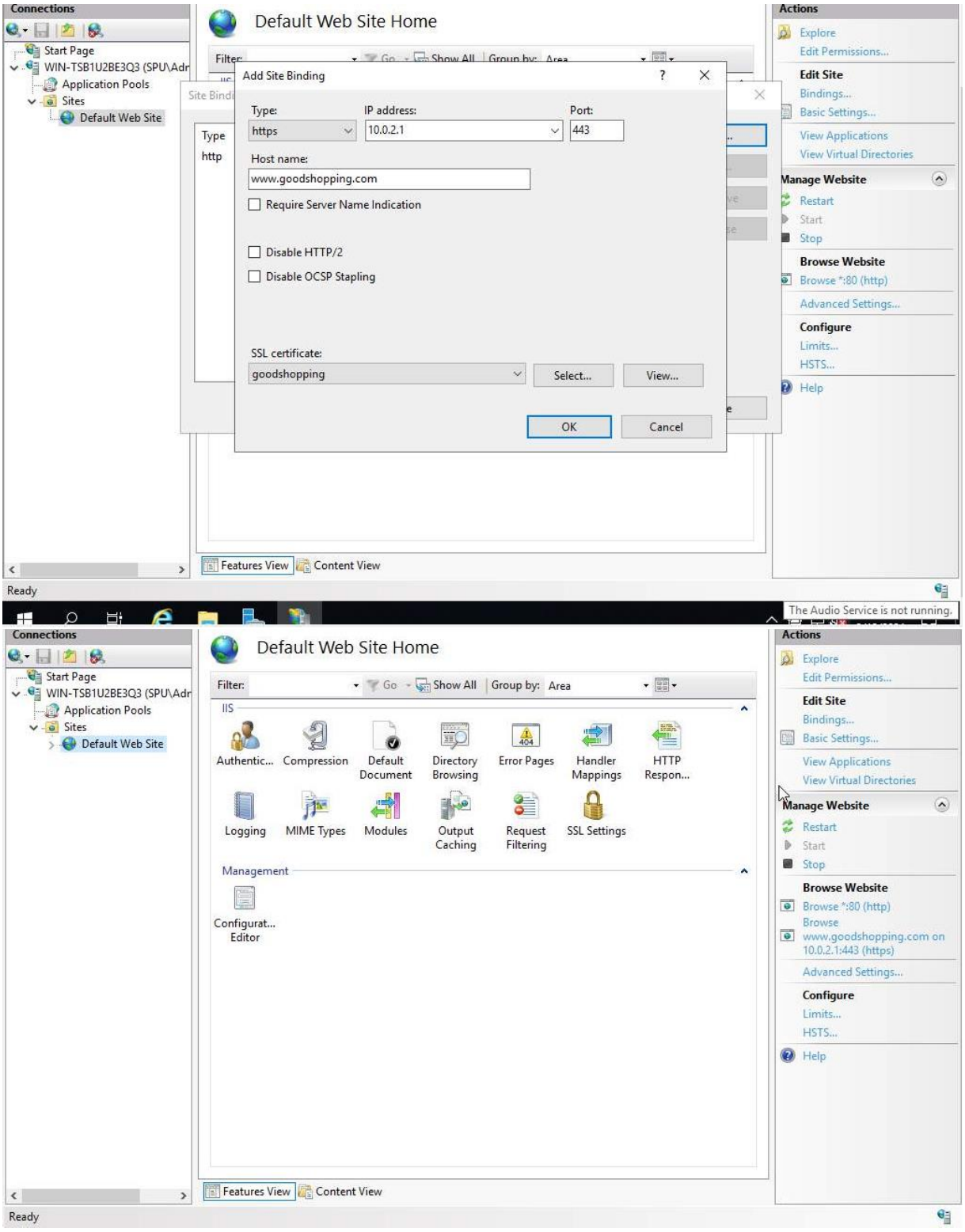
- The new created certificate



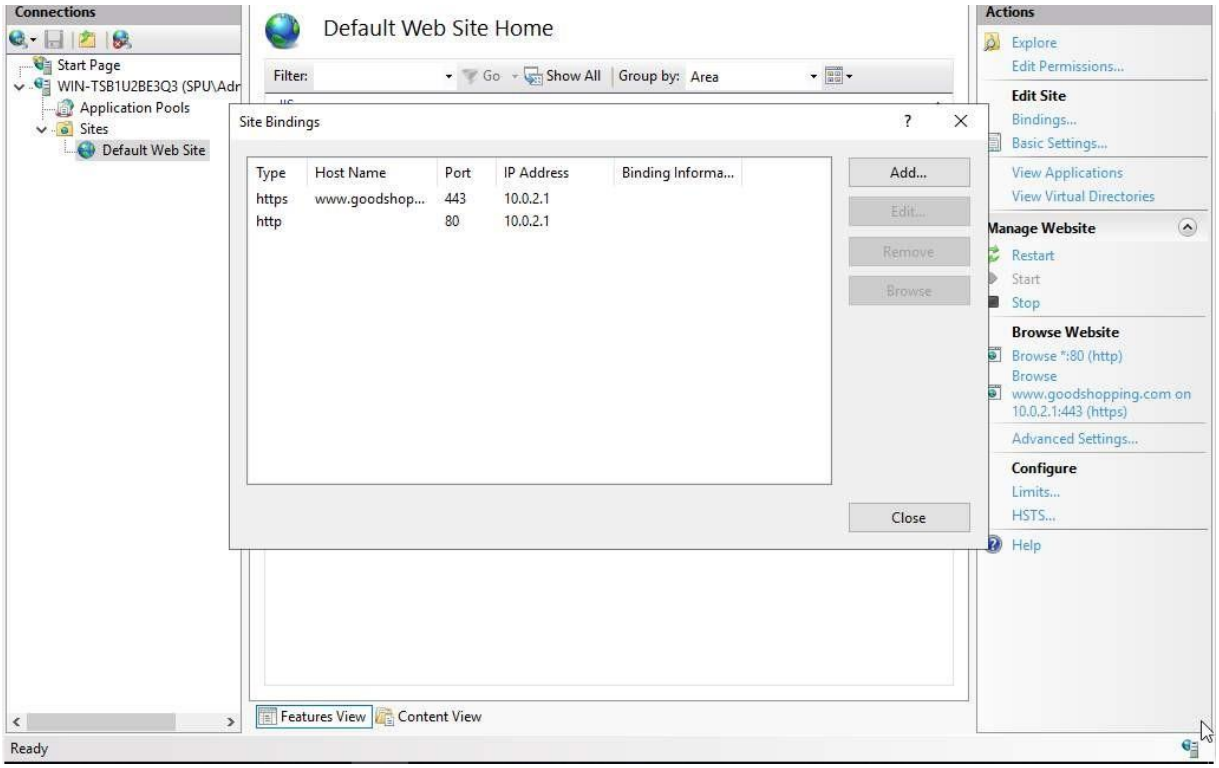
- Biding the newly created self-signed certificate



- Choose ip address on which the site is hosted
- Under Host name field type www.goodshopping.com and click ok



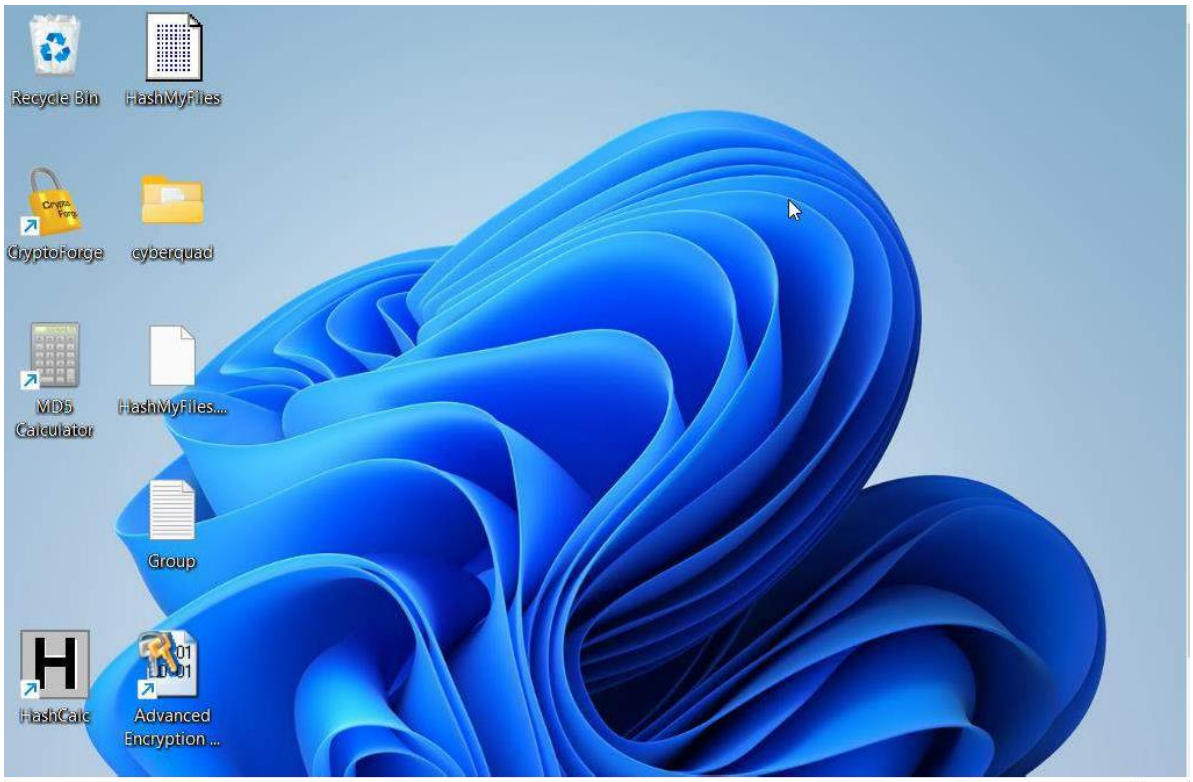
- The newly created certificate reflects

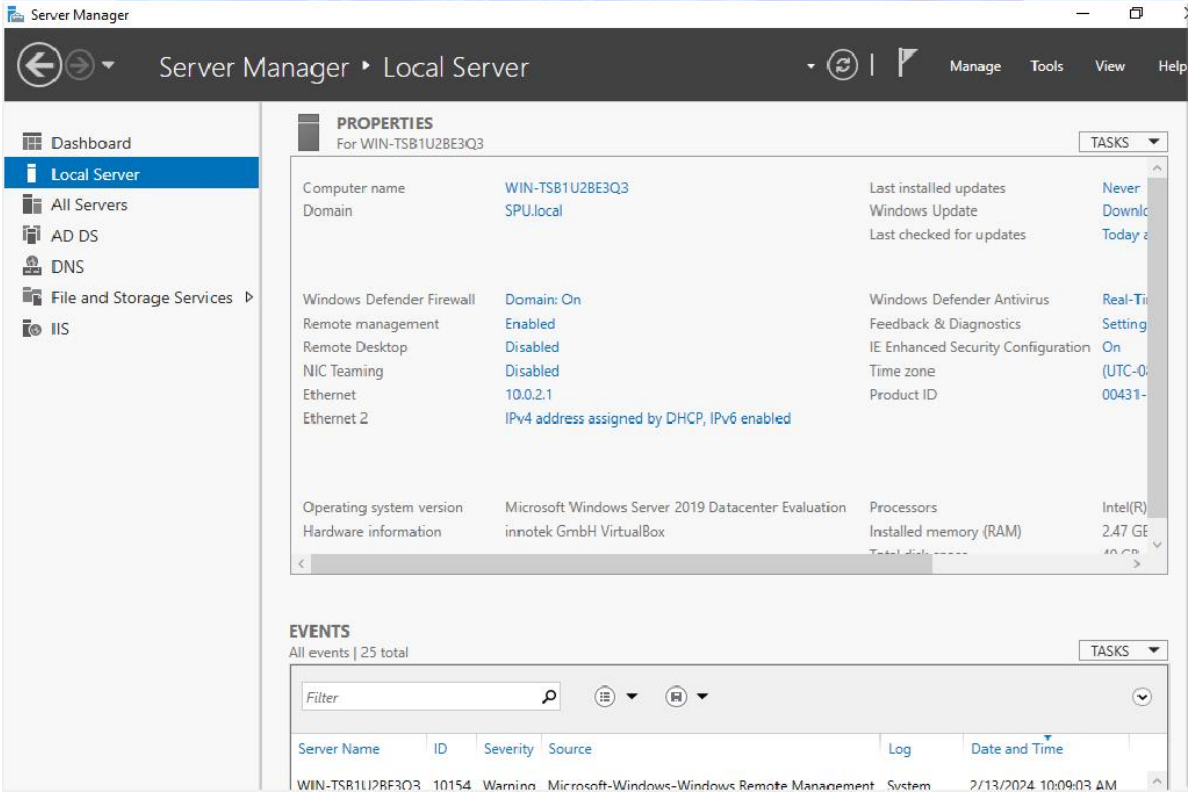


- Now navigate to the www.goodshopping.com site

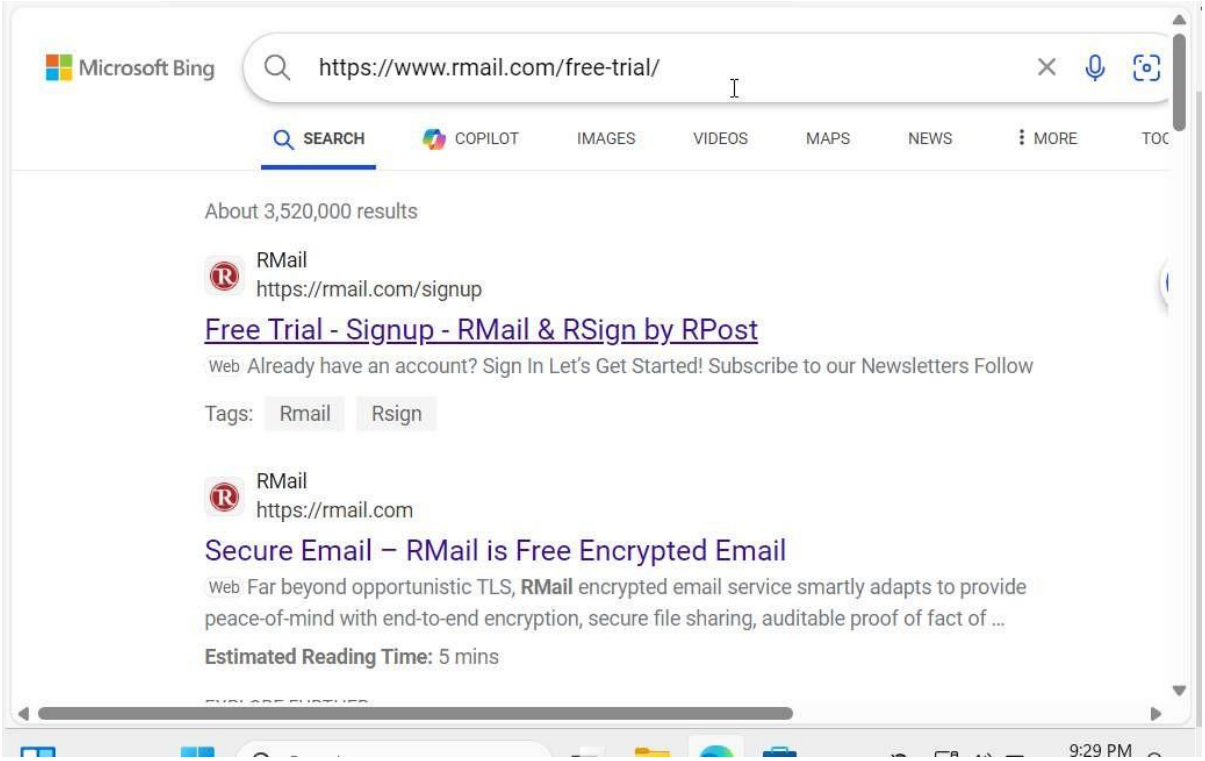
LAB 3
TASK 1
PERFORM EMAIL ENCRYPTION USING RMAIL

- Switch on both windows' server 2019 and windows 11 virtual machine

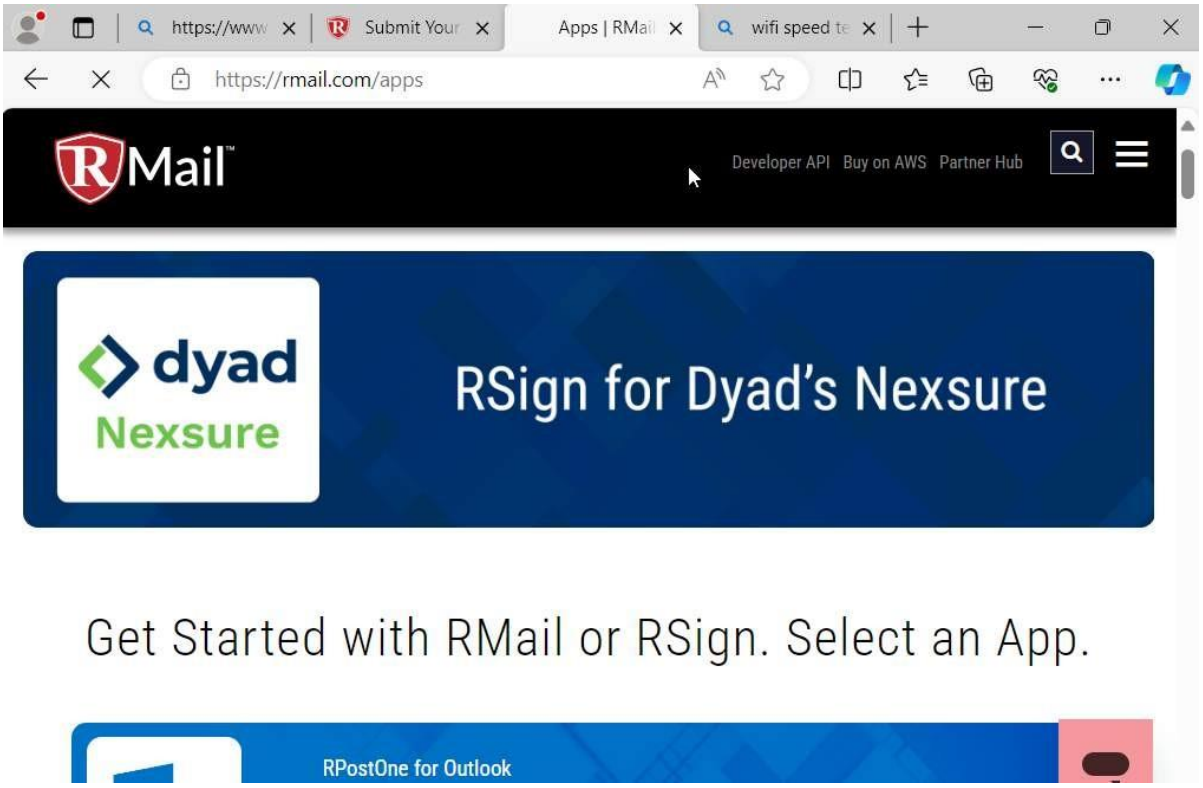




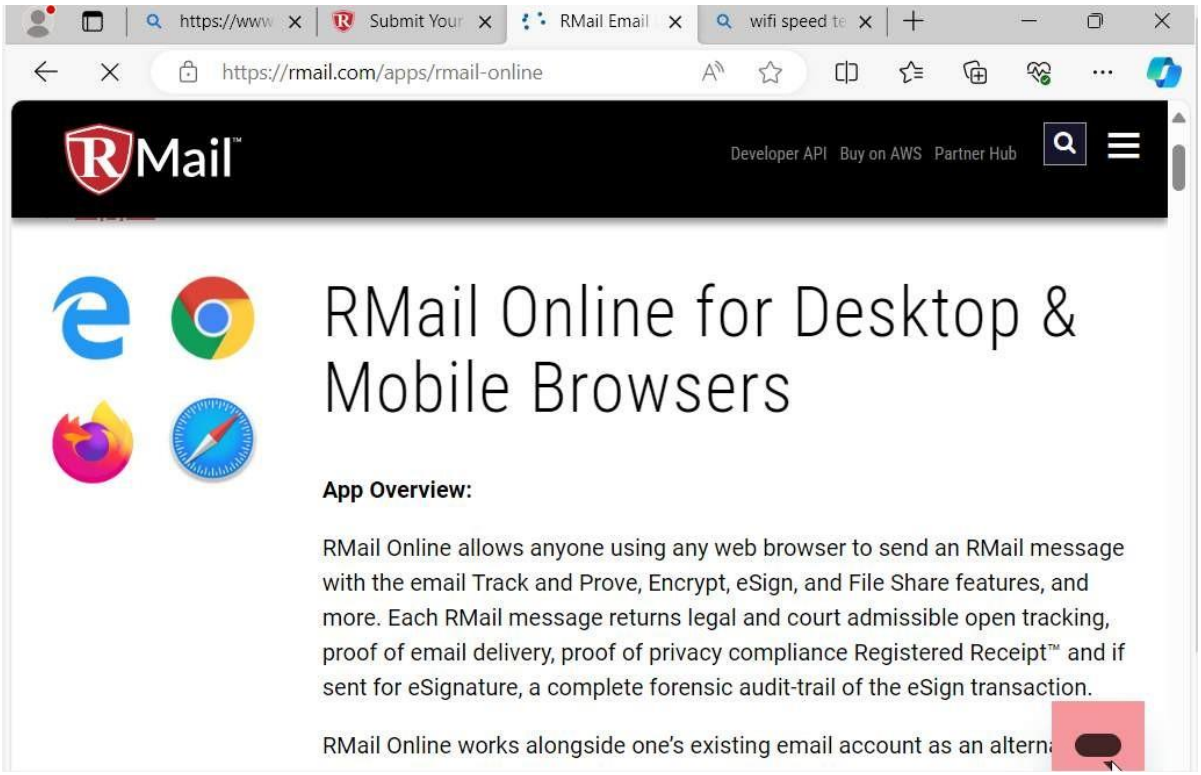
- Launch your browser and place the cursor in the address bar, type and press enter.



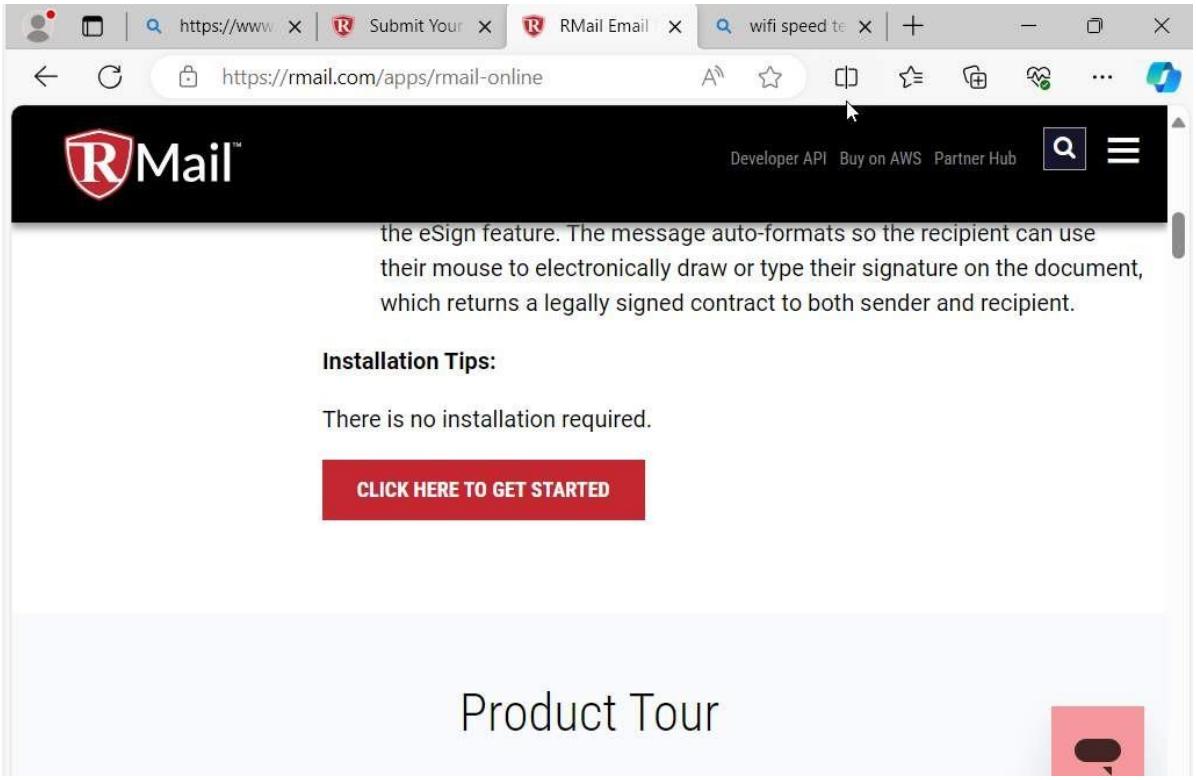
- Free trial window appears



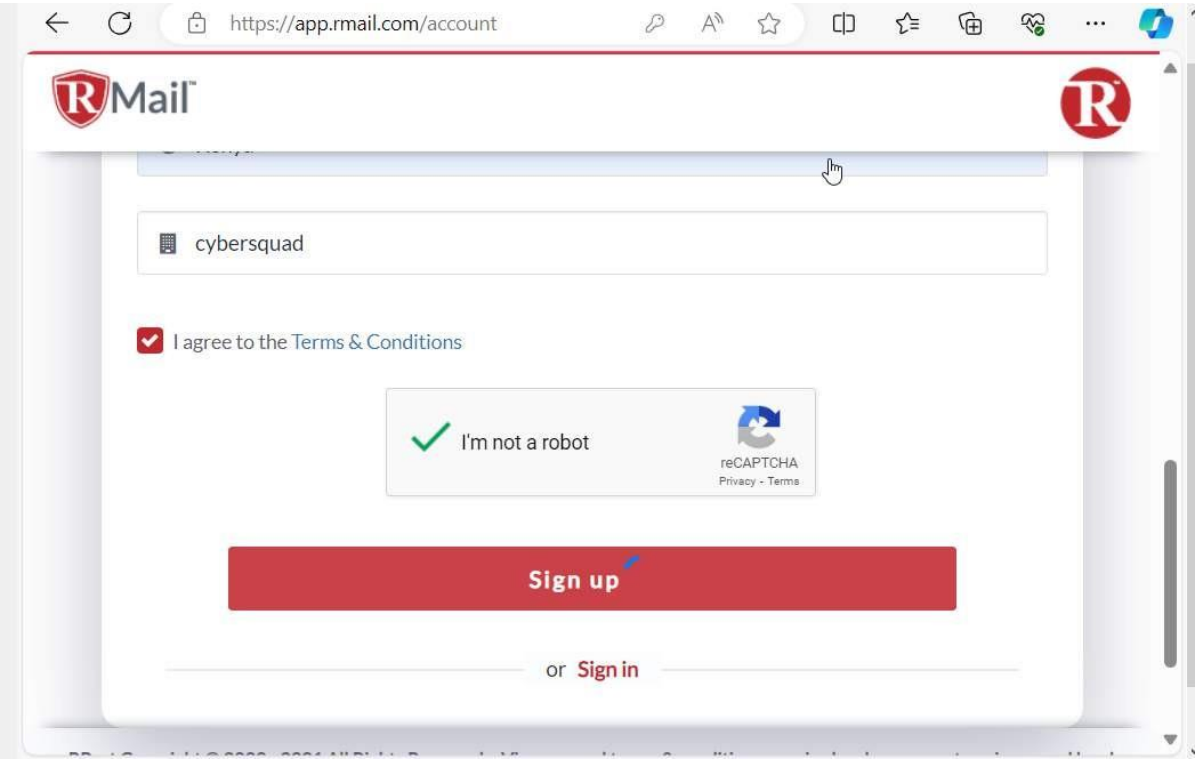
- On the app page, scroll down and click on Rmail online



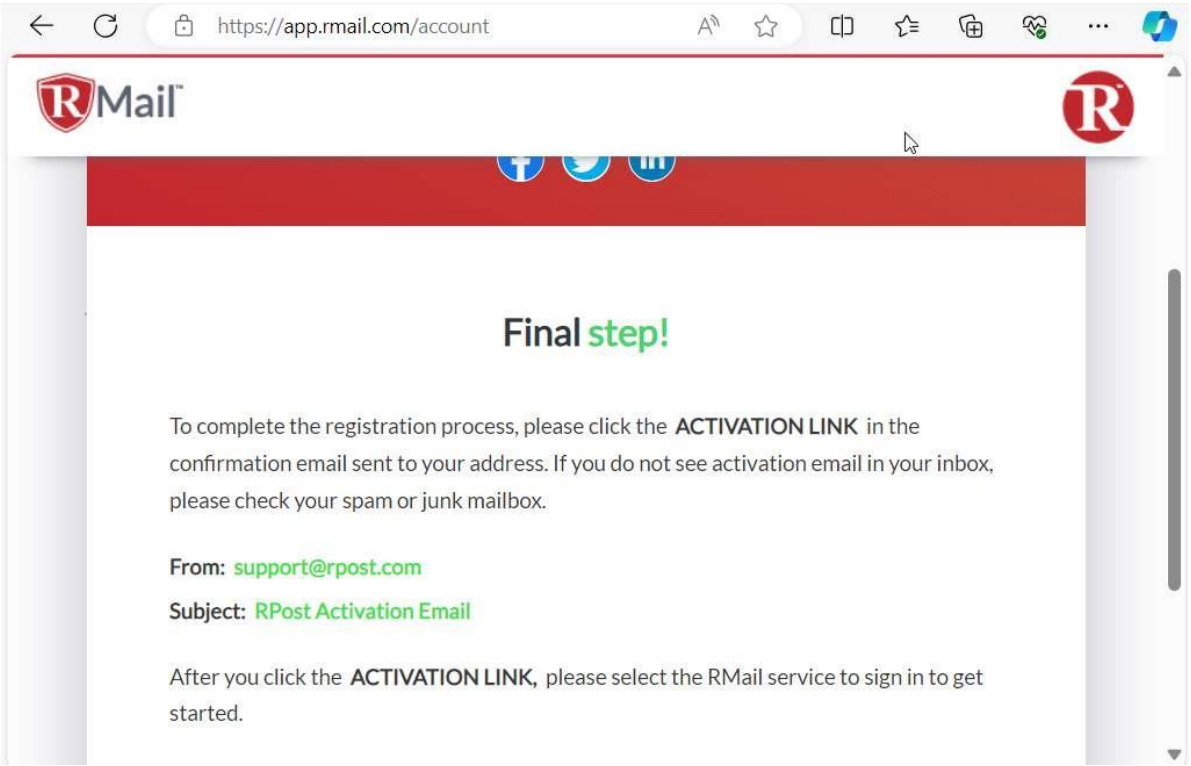
- Navigate through the page and clock on Click here to get started.



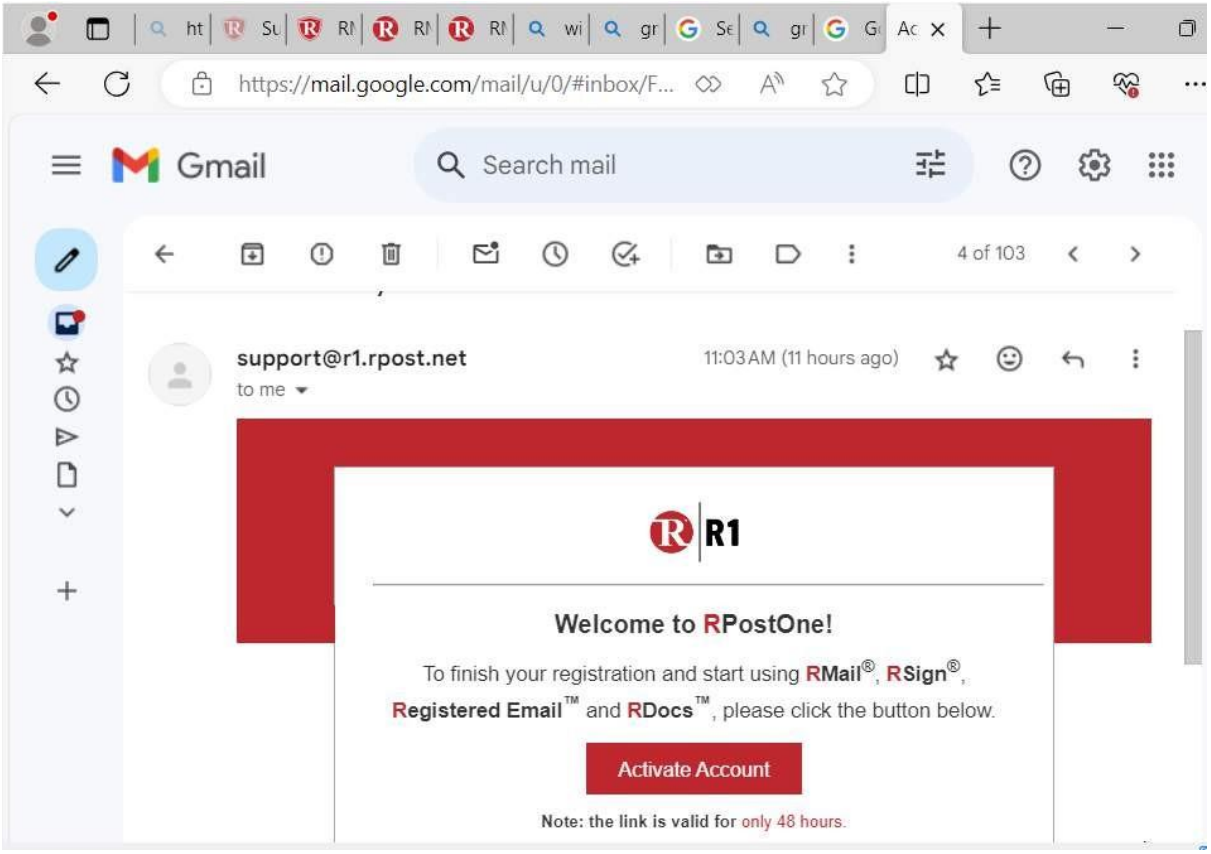
- Click on create an account on the Rmail webpage
- Get started page appears, fill in the required Infor and click sign up



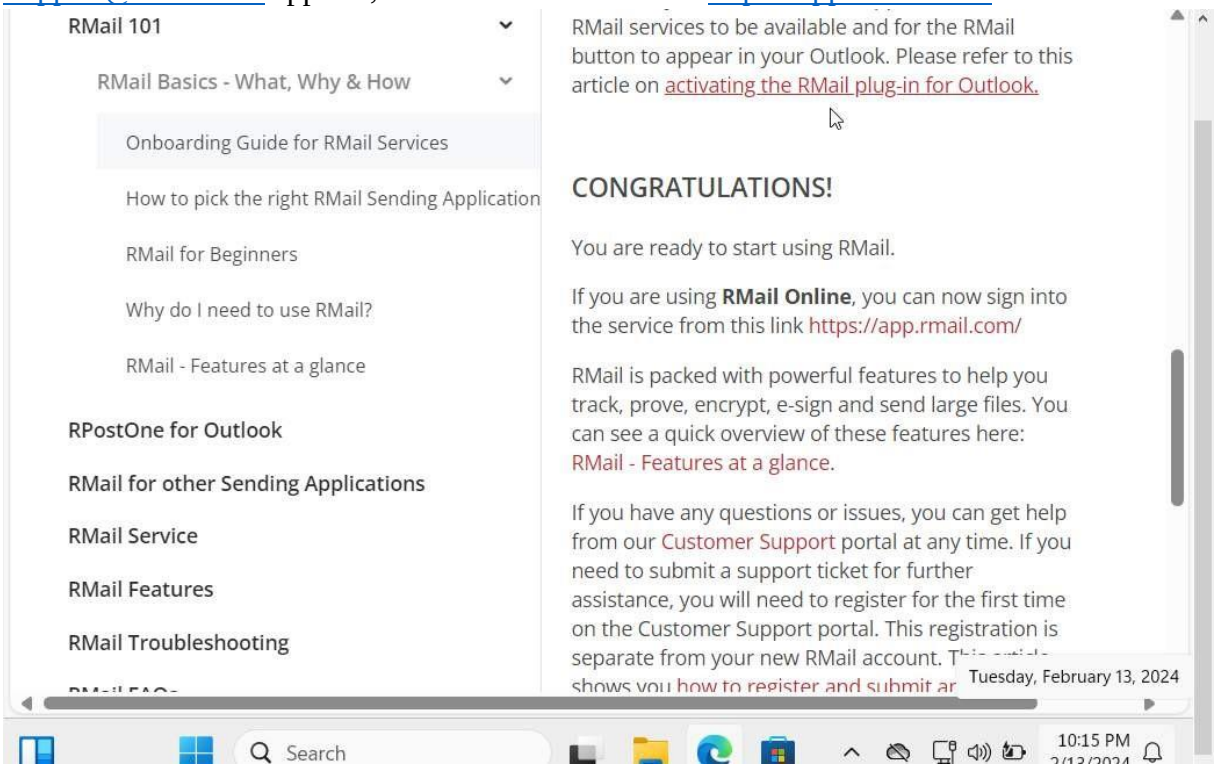
- Final step appears displaying that the activation link has been sent to the registered email address.



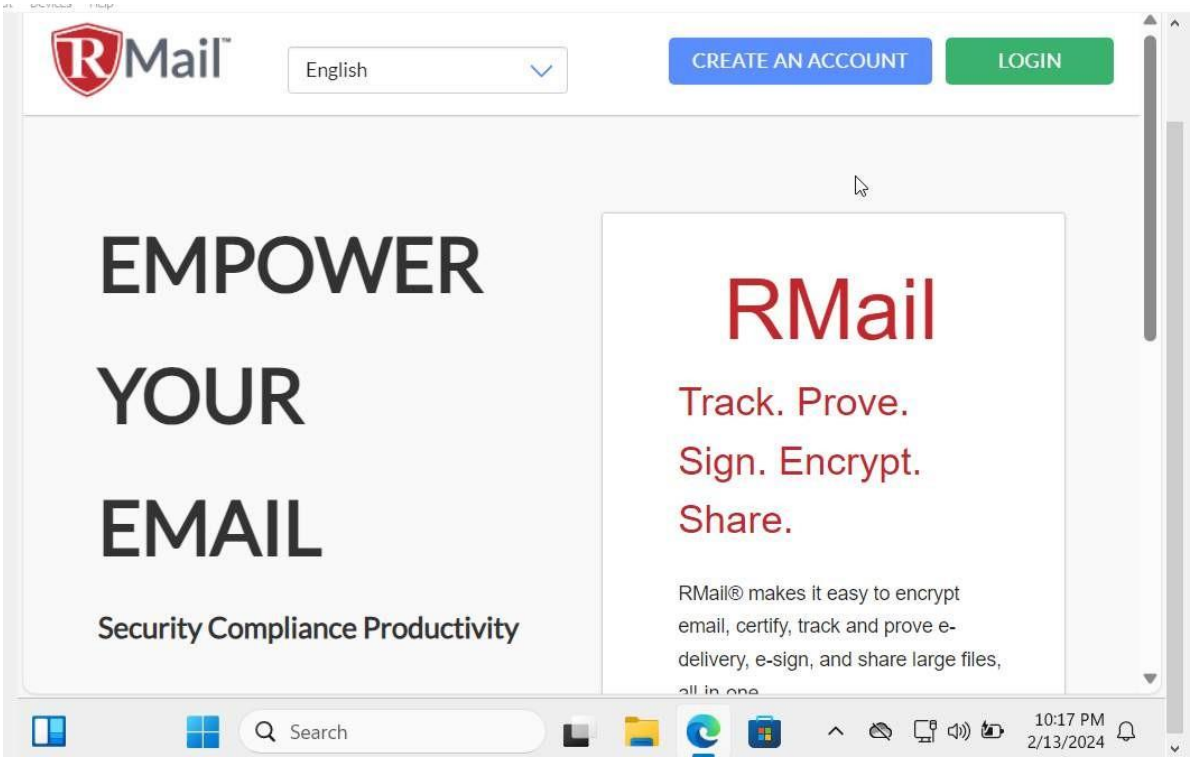
- Open Gmail mail webpage on a new tab, on you Gmail account, click on support@rpost.com and then click on activation link to activate the account.



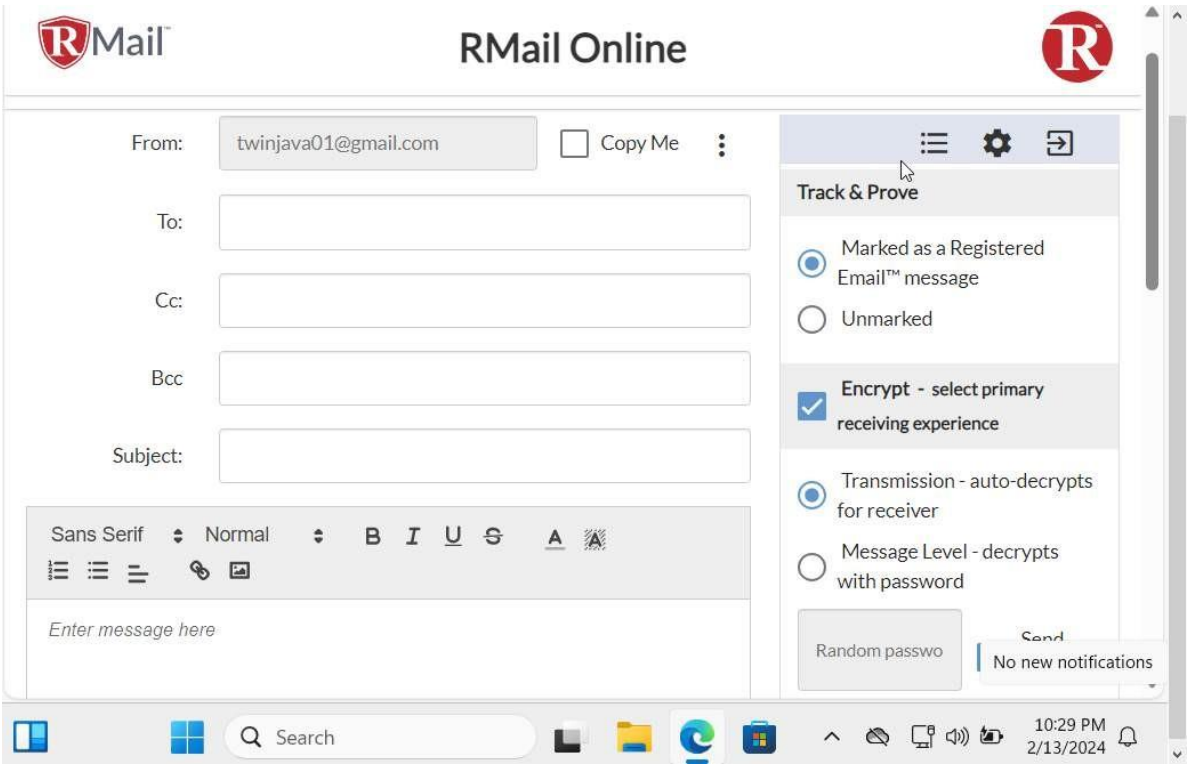
- Support@rmail.com appears, scroll down and click on https://app.rmail.com/ link



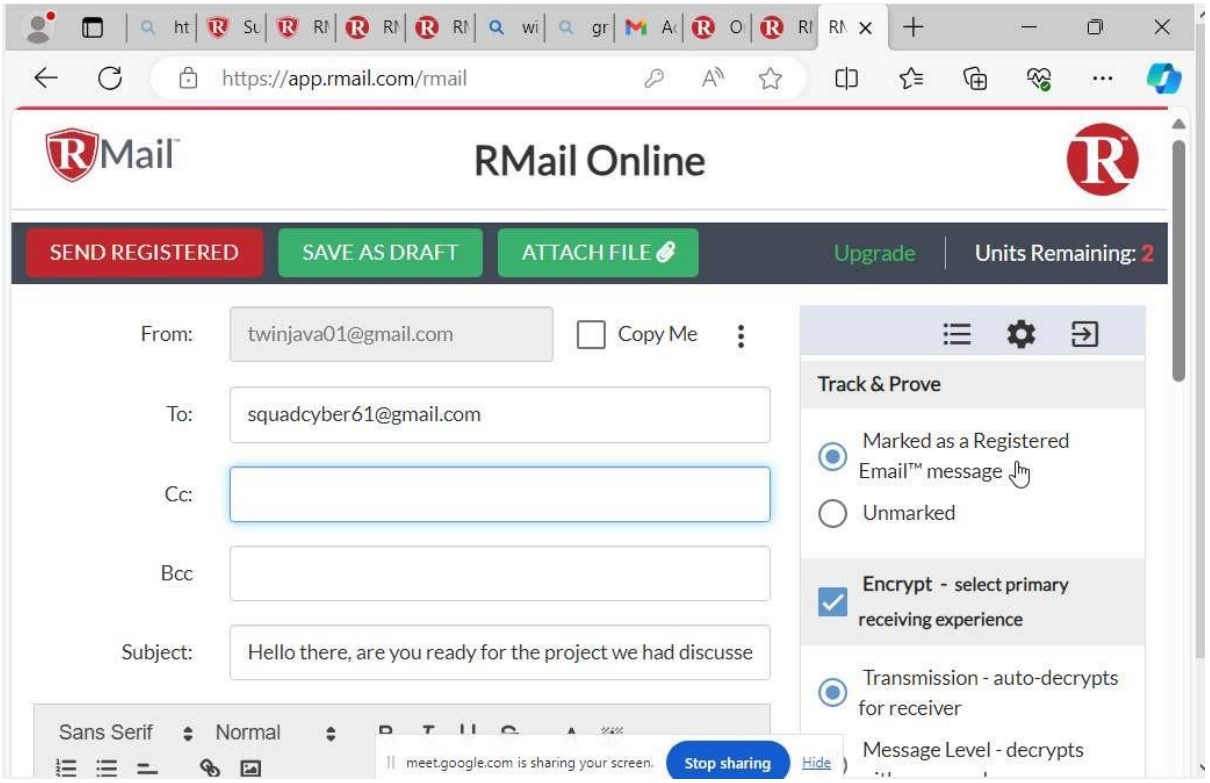
- When the app.rmail.com appears, click on login



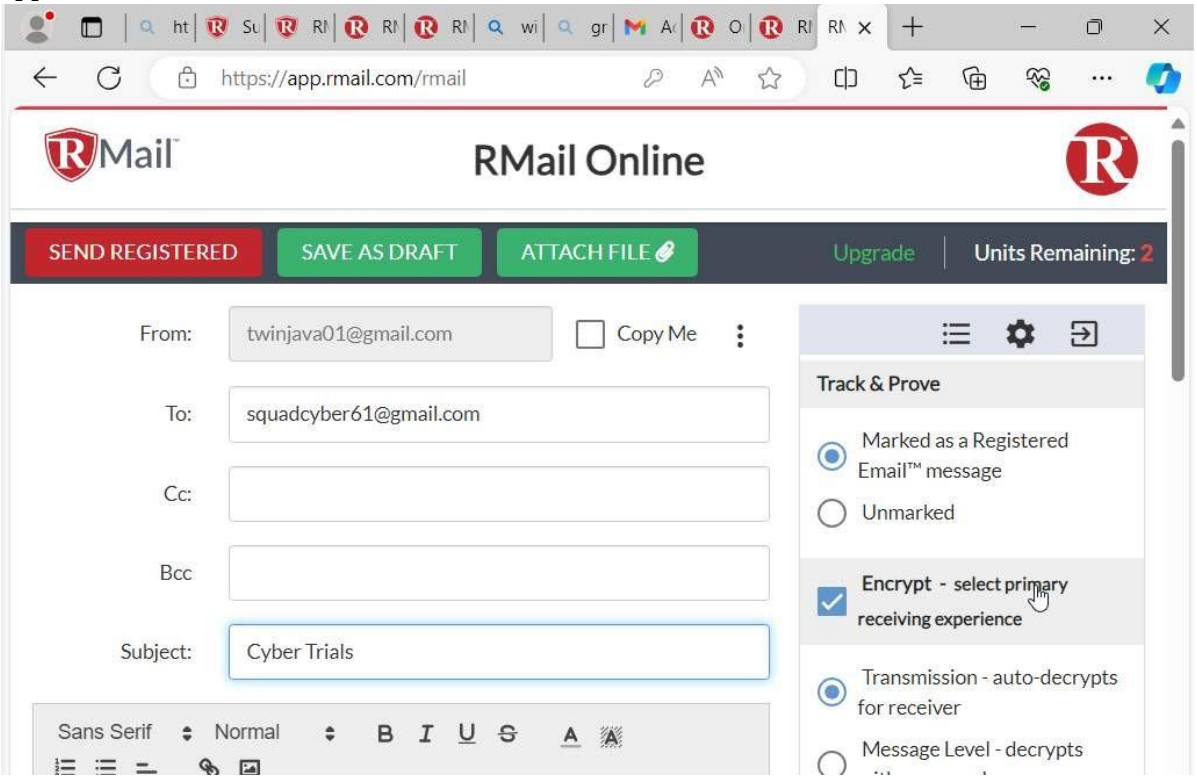
- The Rmail web page appear, enter recipient address and ensure that
    i. Marked as is selected under track & prove section
    ii. Check the encrypt select primary encrypt receiving experience option
    iii. Ensure that the transmission-auto decrypt for receiver radio button is selected
    iv. Ensure that E-sign – send for signature checkbox is checked.
    v. Ensure that web sign radio button is selected



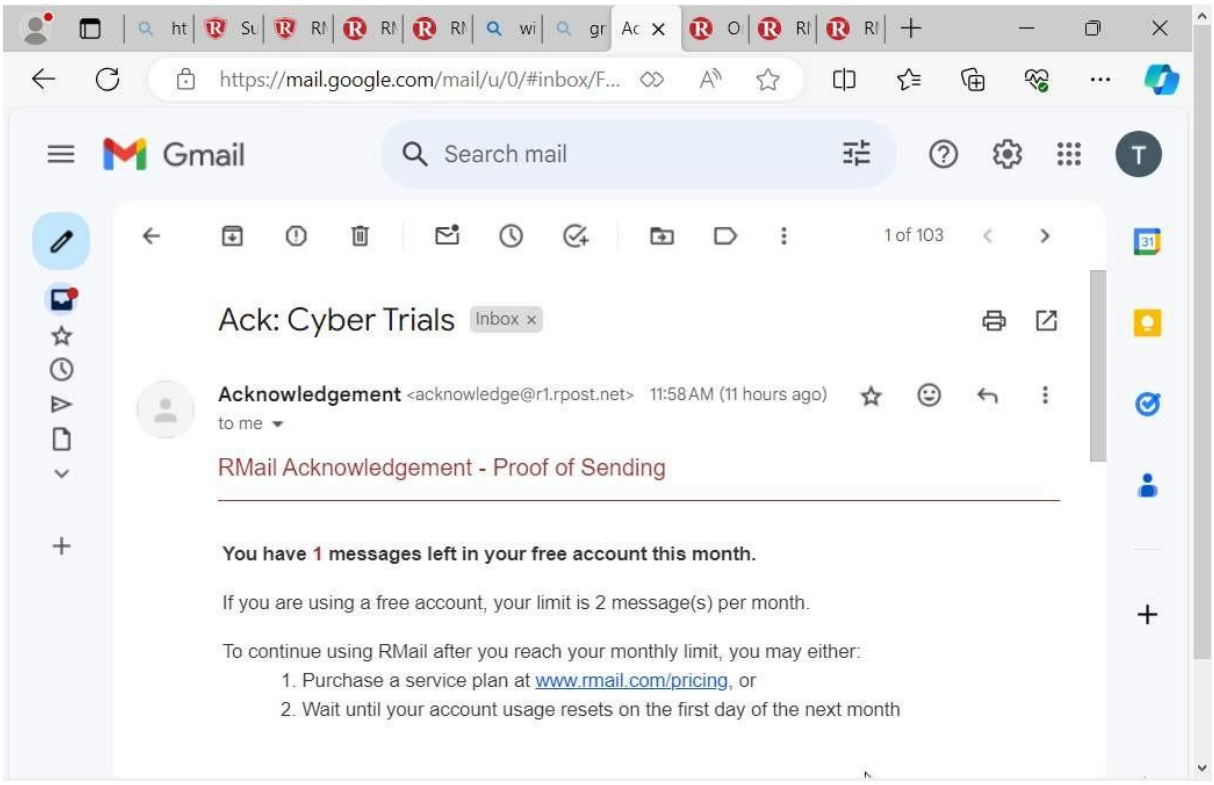
- Enter message to be sent to the recipient



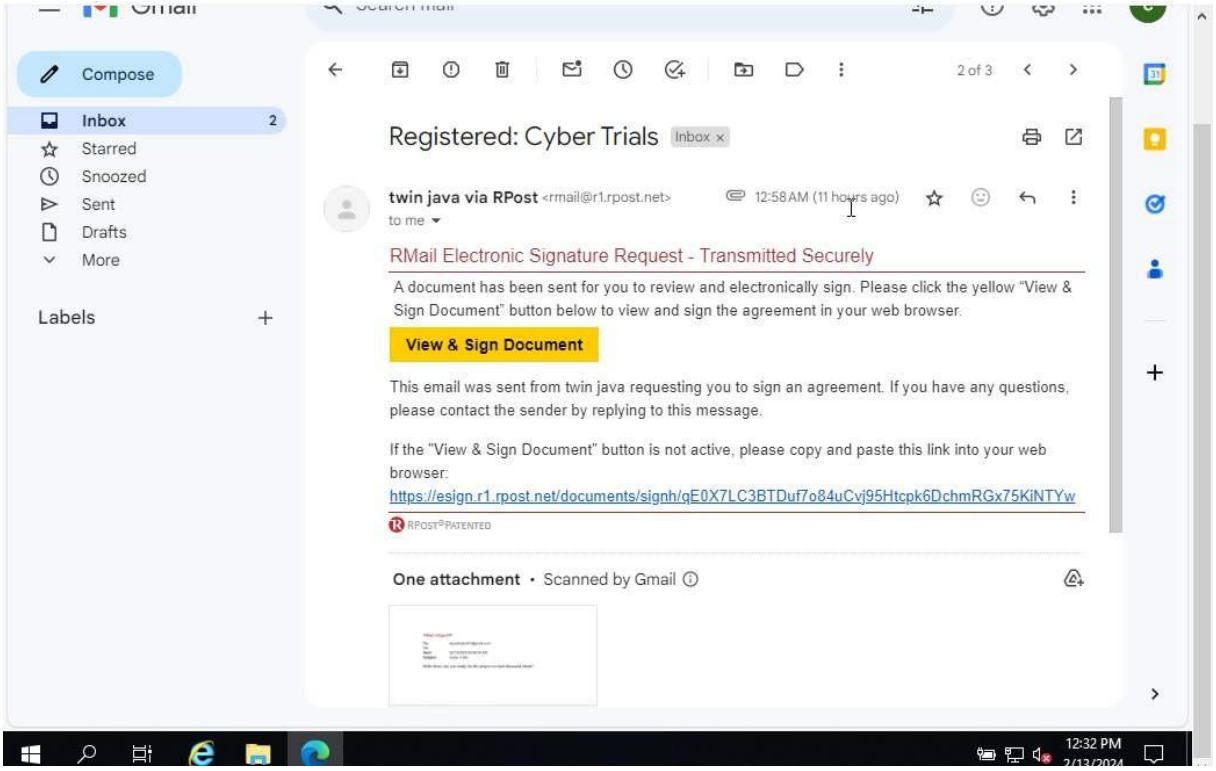
- After writing your message, click on sendregisterd tab, email sent pop up message appears.



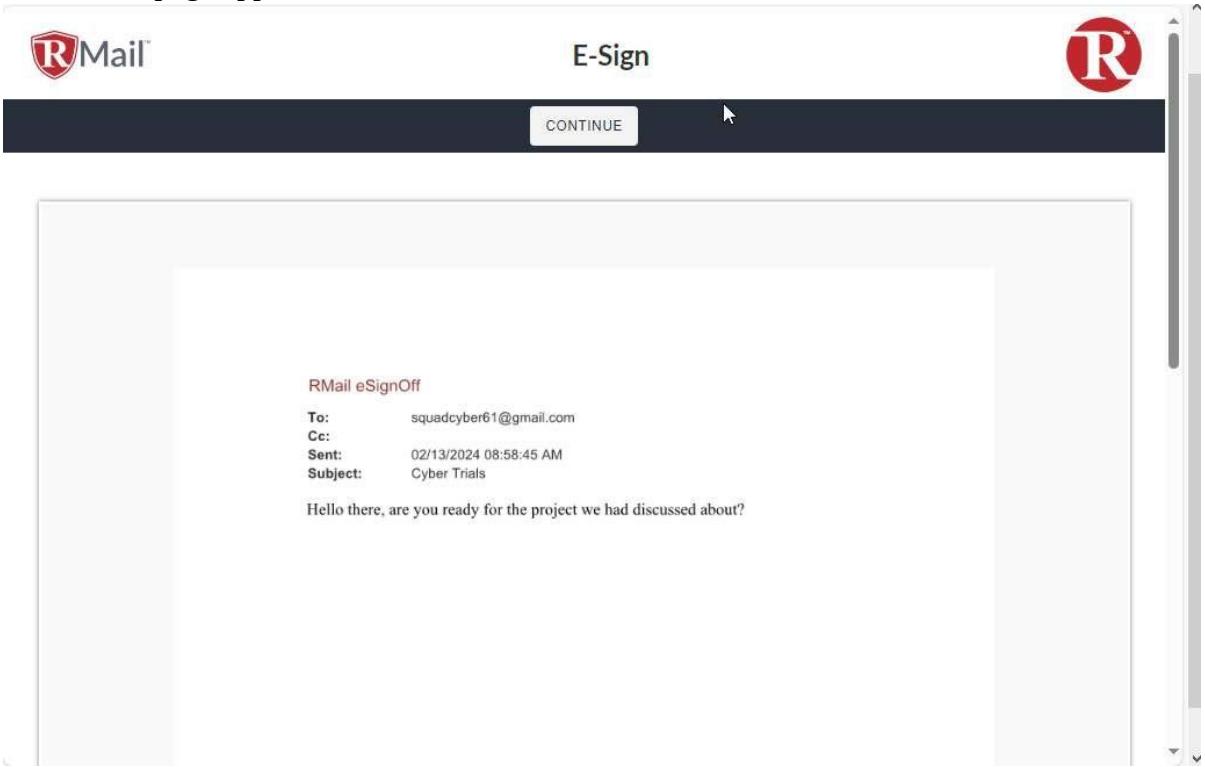
- You can observe acknowledgement email with proof of sending in Gmail



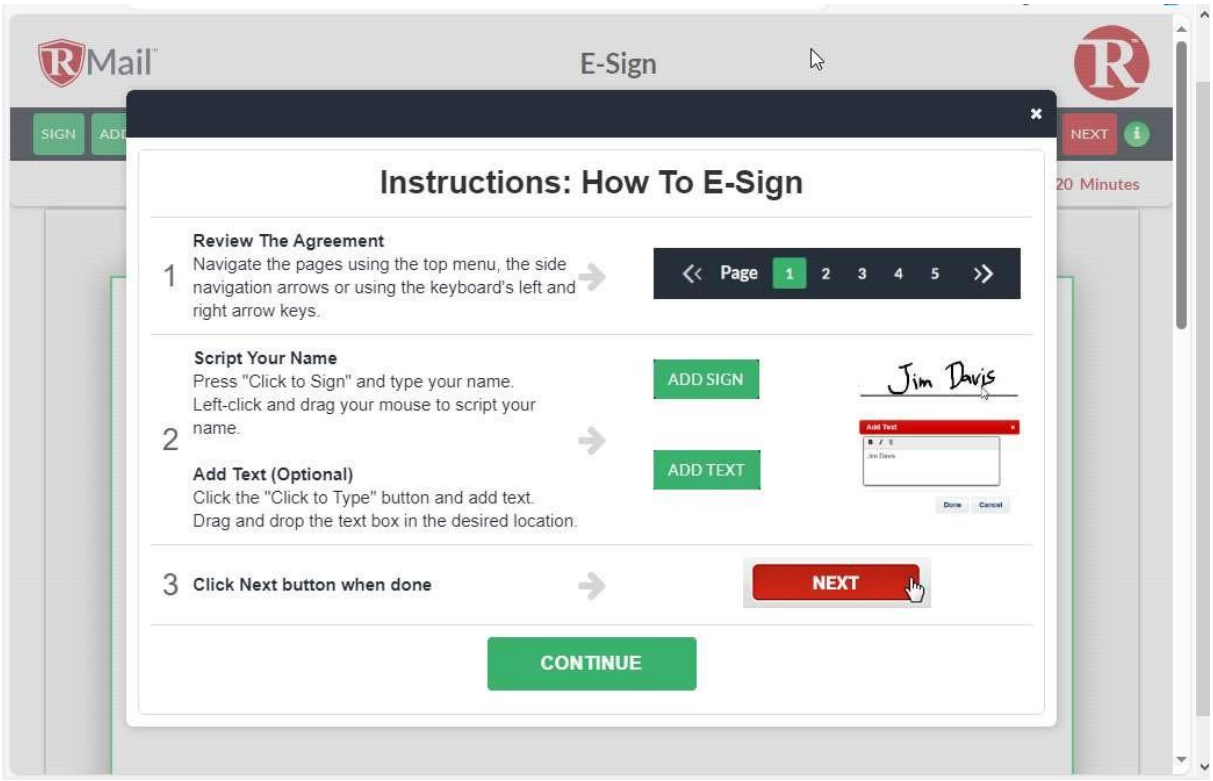
- Switch to your windows server 2019 vm machine, open your browser and navigate to the recipient Gmail account.
- Open the email from the sender
- You will observe that the email received is tagged as registered email, the recipient should review the document and electronically sign to confirm the identity.



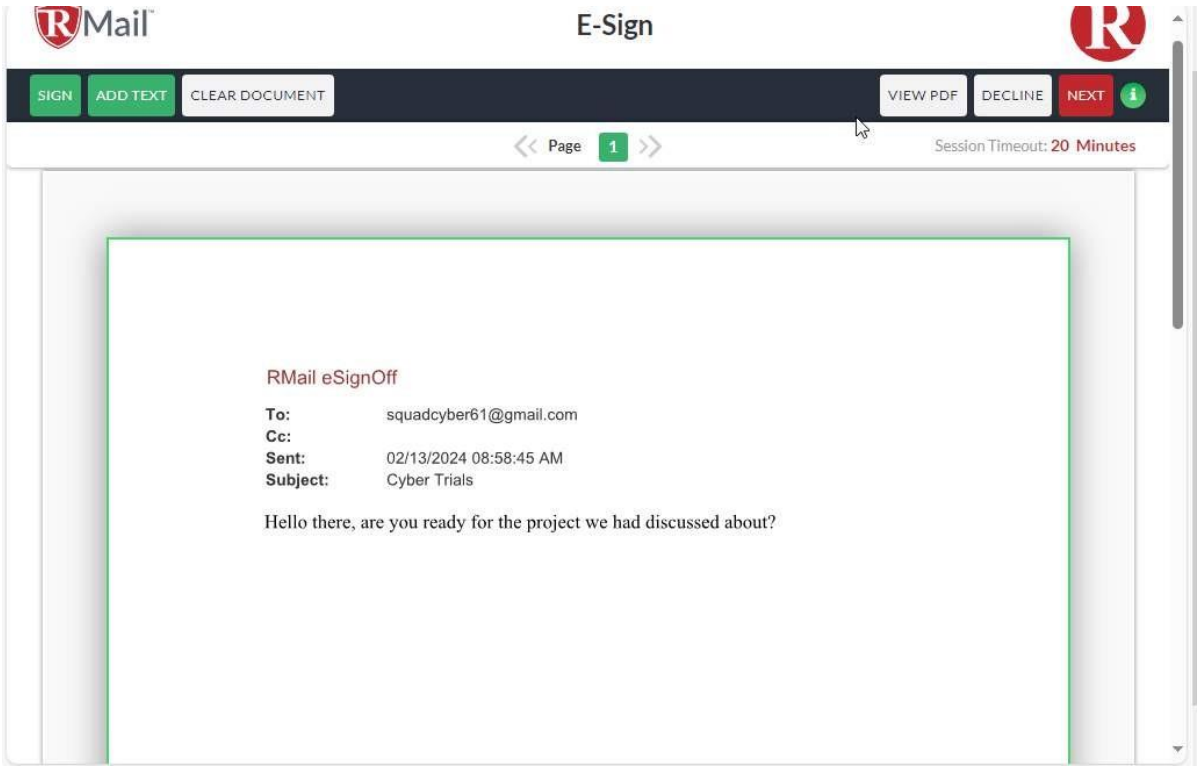
- Click on view and sign document button to sign an agreement.
- A new web page appears, click continue



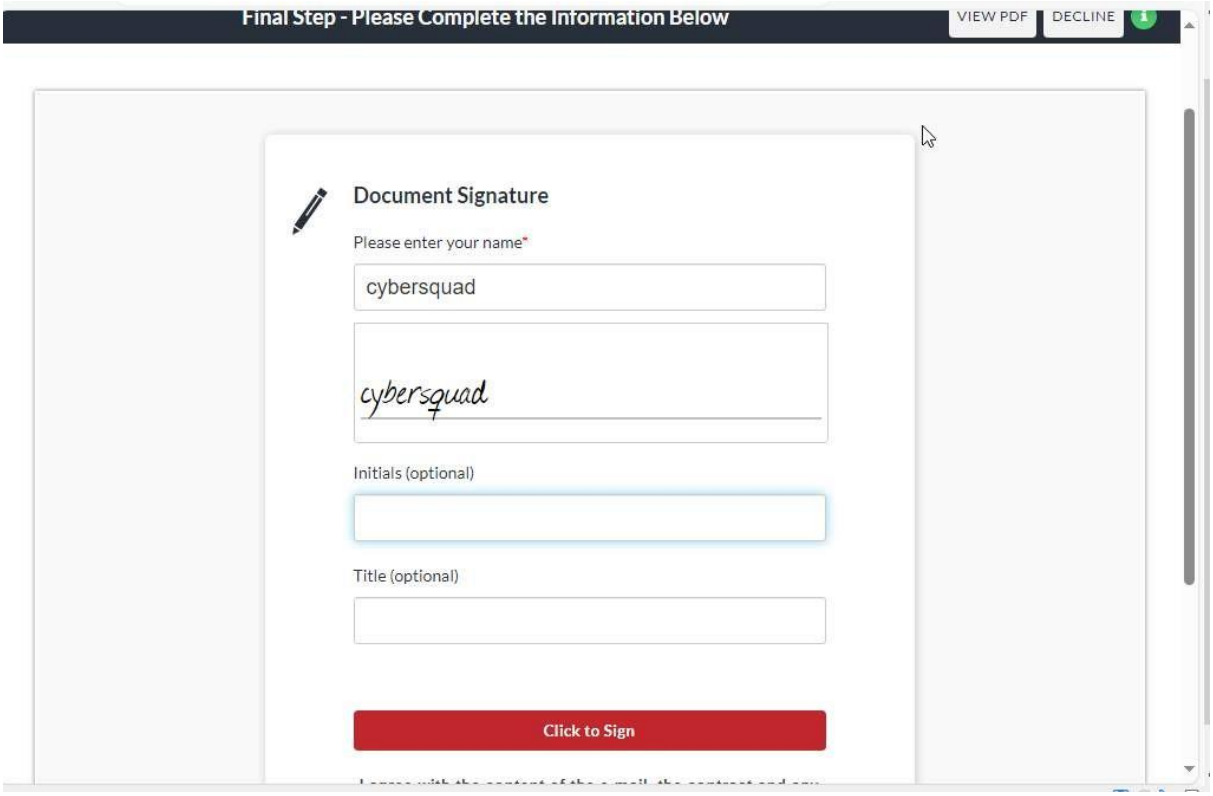
- The instructions: how to E-sign page appears, read the instructions carefully and click continue.



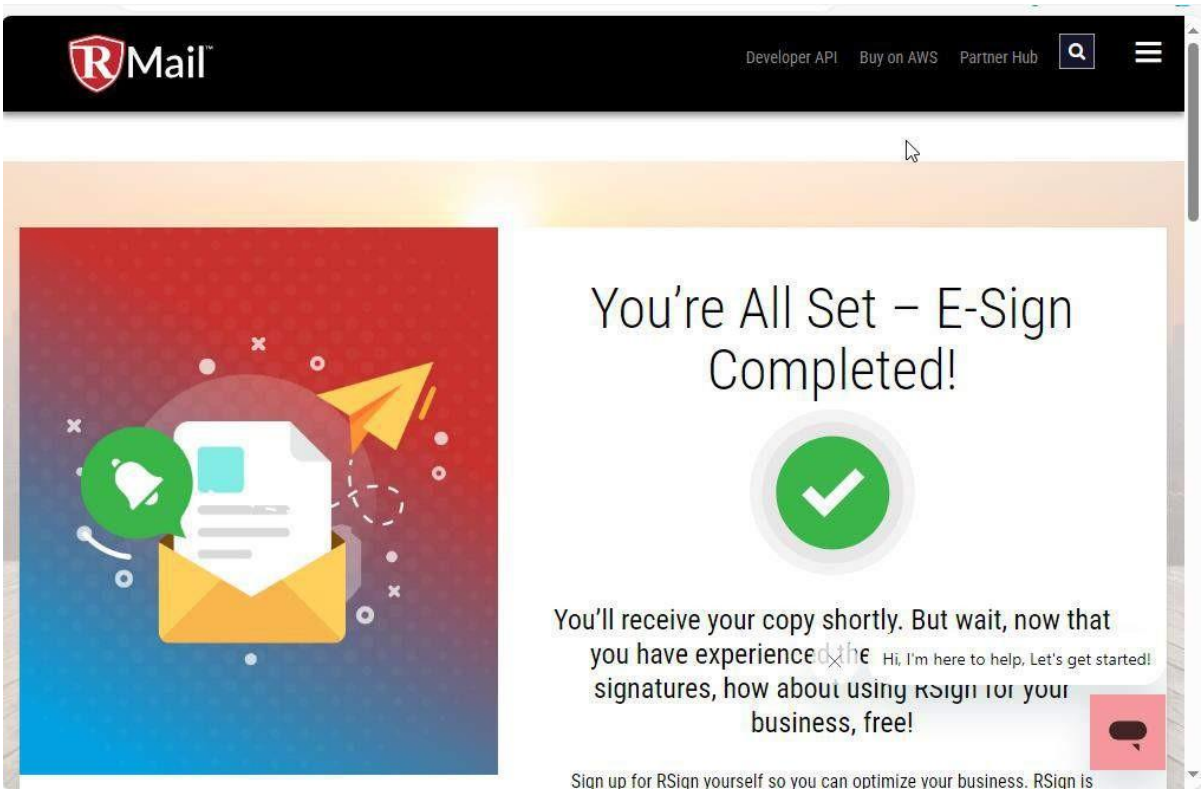
- Click next after viewing the email contents



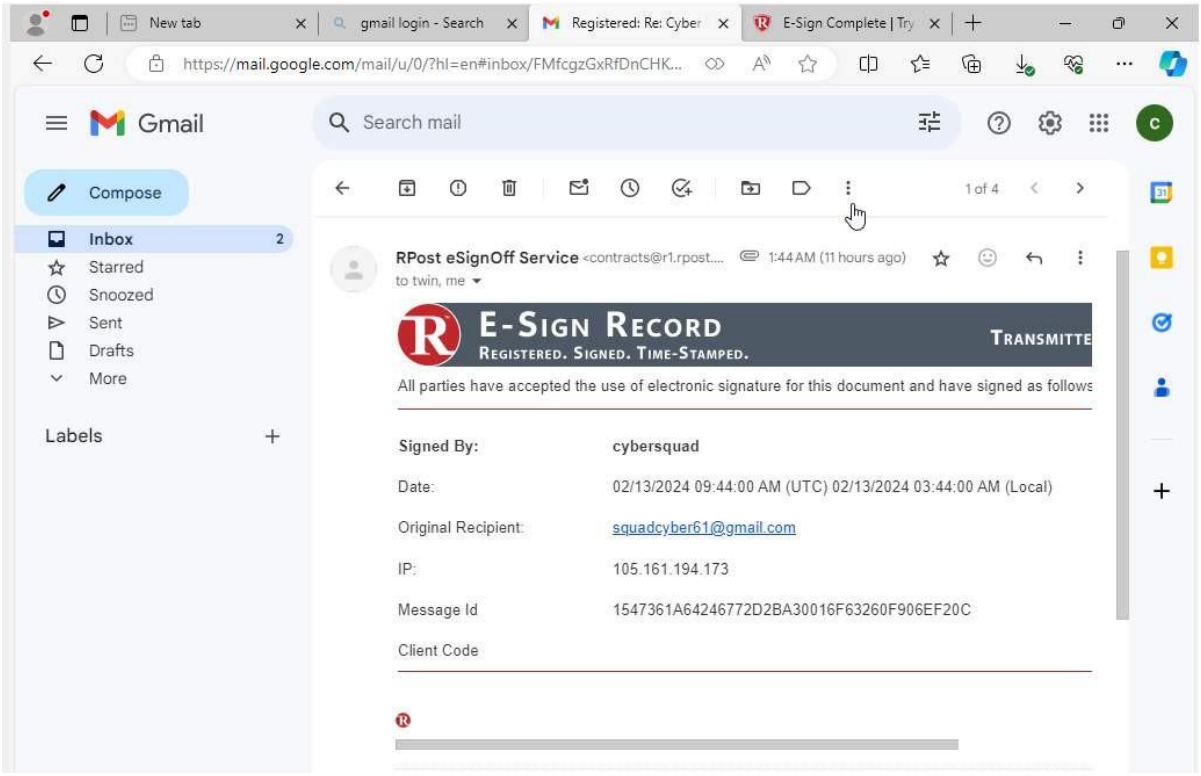
- Document signature form appears, in the enter your name field, enter your name, and click to the sign in button.



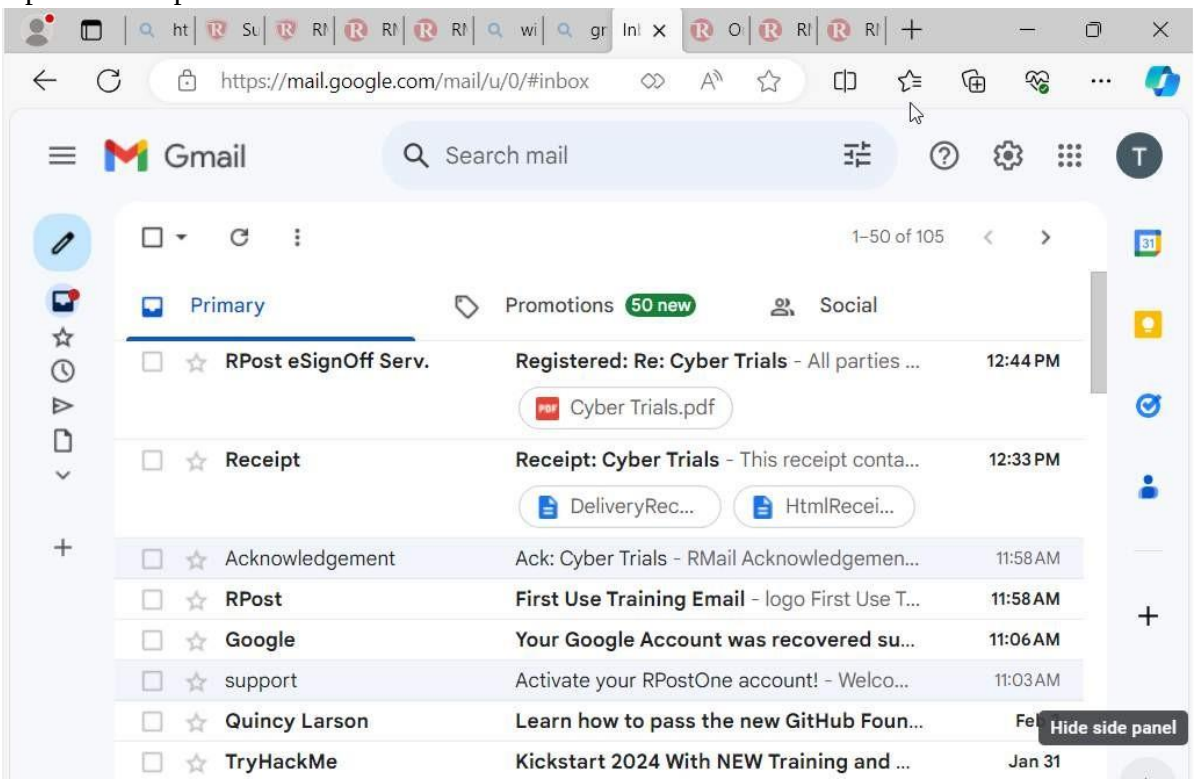
- E sign completed tab appears, close the current tab and return to the opened email.

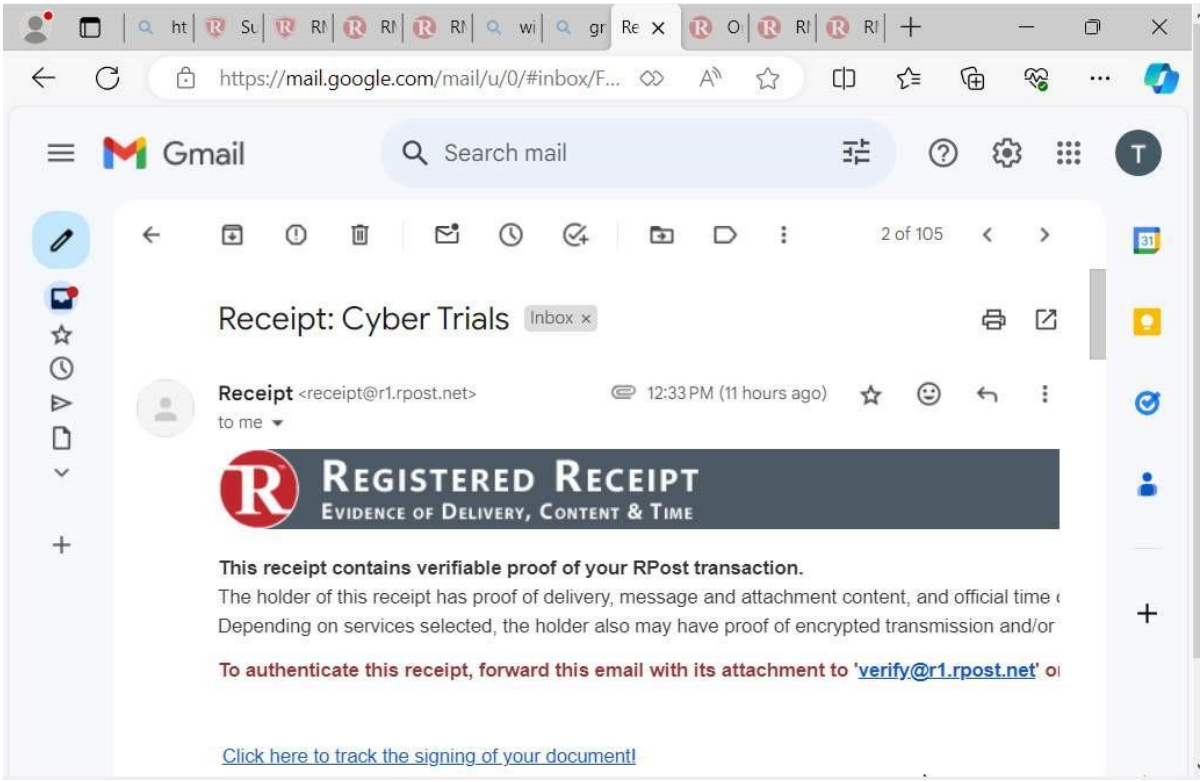


- Open an email from Rpost esignoff service, you can observe that is acknowledgement email from Rpost.



- Now switch to windows 11 virtual machine, to the senders Gmail account.
- You can observe two messages Recipient mails and Rpost eSignoff Service.
- Open the recipient email.

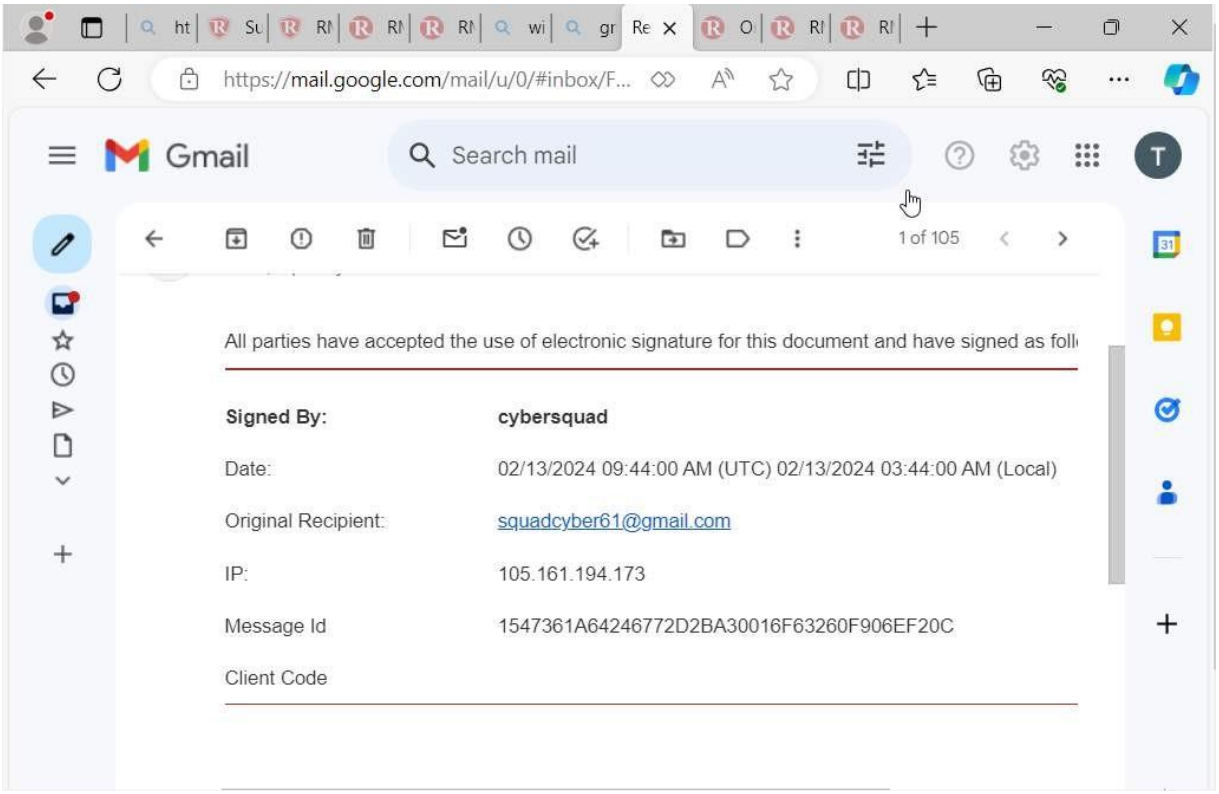




- Navigate back to the inbox and open Rpost eSignoff Services

NOTE!

- This email contains the same information as the email received Rpost eSignoff Services by the recipient



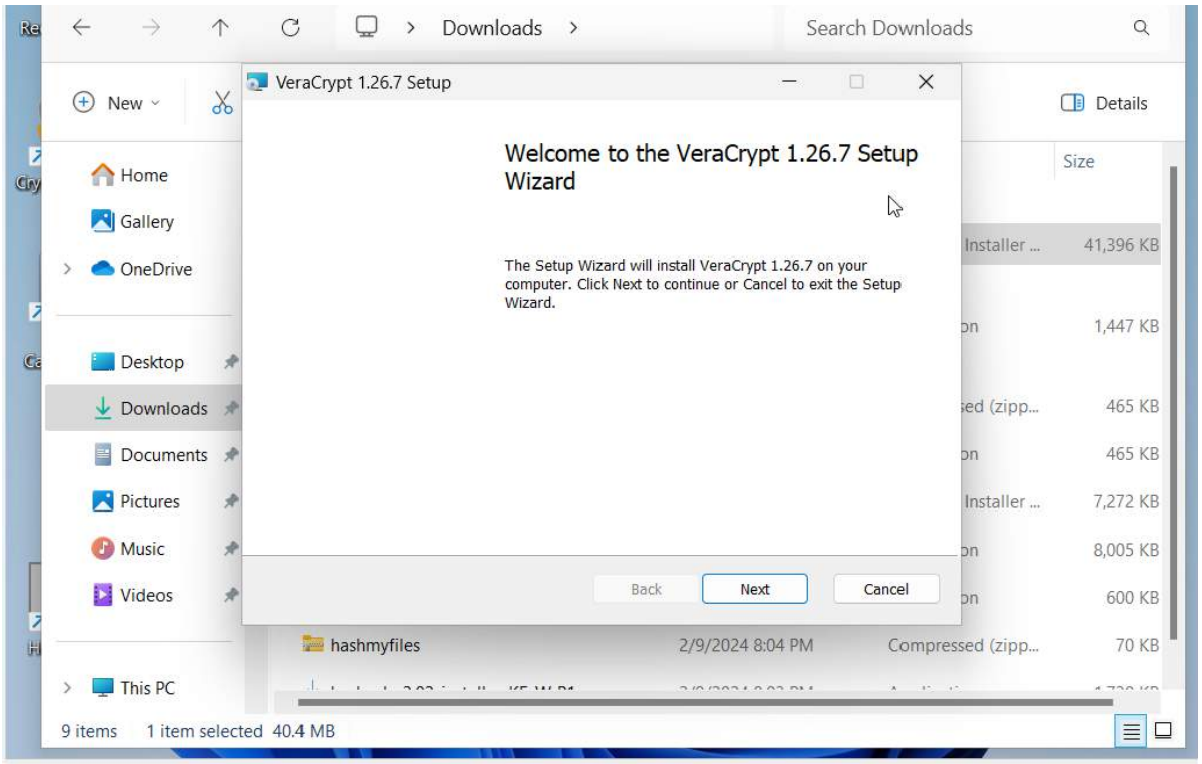
Conclusion

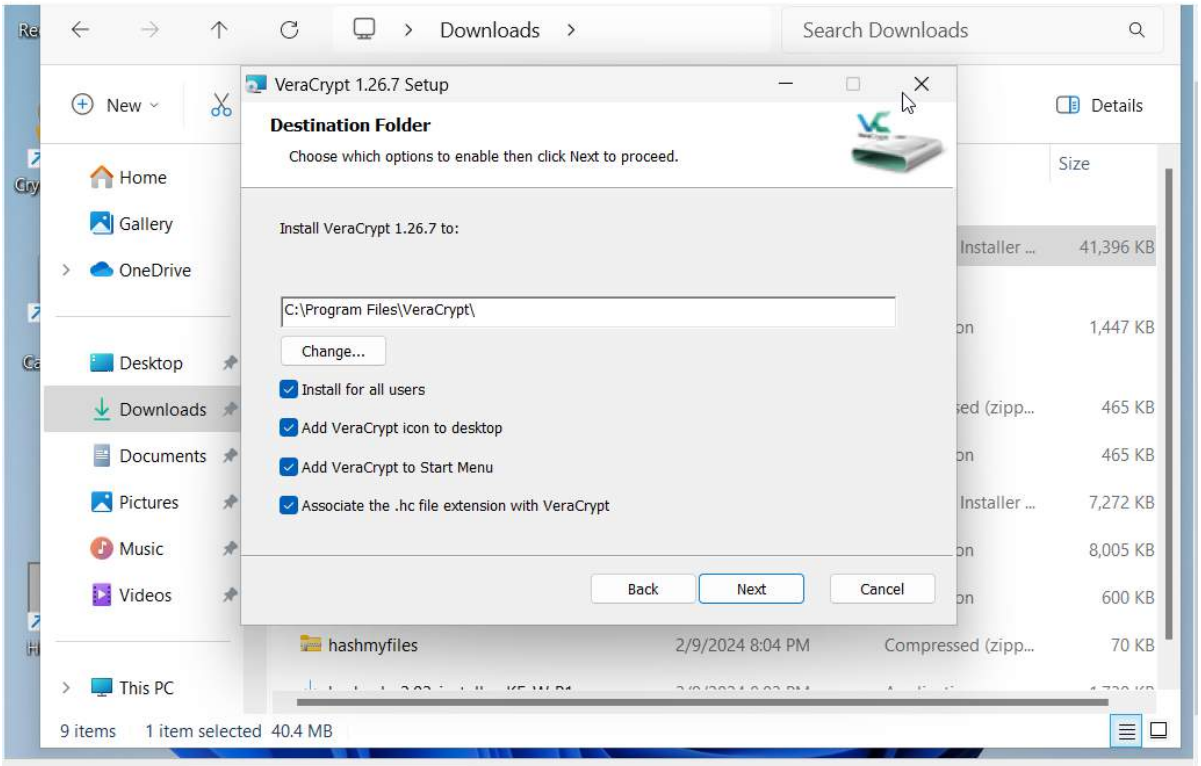
- In the immersive workshop on Revolutionizing Email Security through RMail Encryption, our team delved into the dynamic realm of email encryption. With RMail as our compass, we navigated the intricacies of safeguarding electronic communications. The session illuminated the transformative power of email encryption, unveiling a cloak of security for confidential exchanges. Our journey revealed the perks, from fortified data transmission to compliance with stringent privacy standards. Yet, amidst the digital encryption dance, the group embraced the challenge of key management and recipient authentication as essential partners in this cybersecurity waltz. Ultimately, this session served as a compass guiding us through the uncharted waters of cutting-edge email security, promising a future where our digital correspondences stand resilient against the tides of cyber threats.

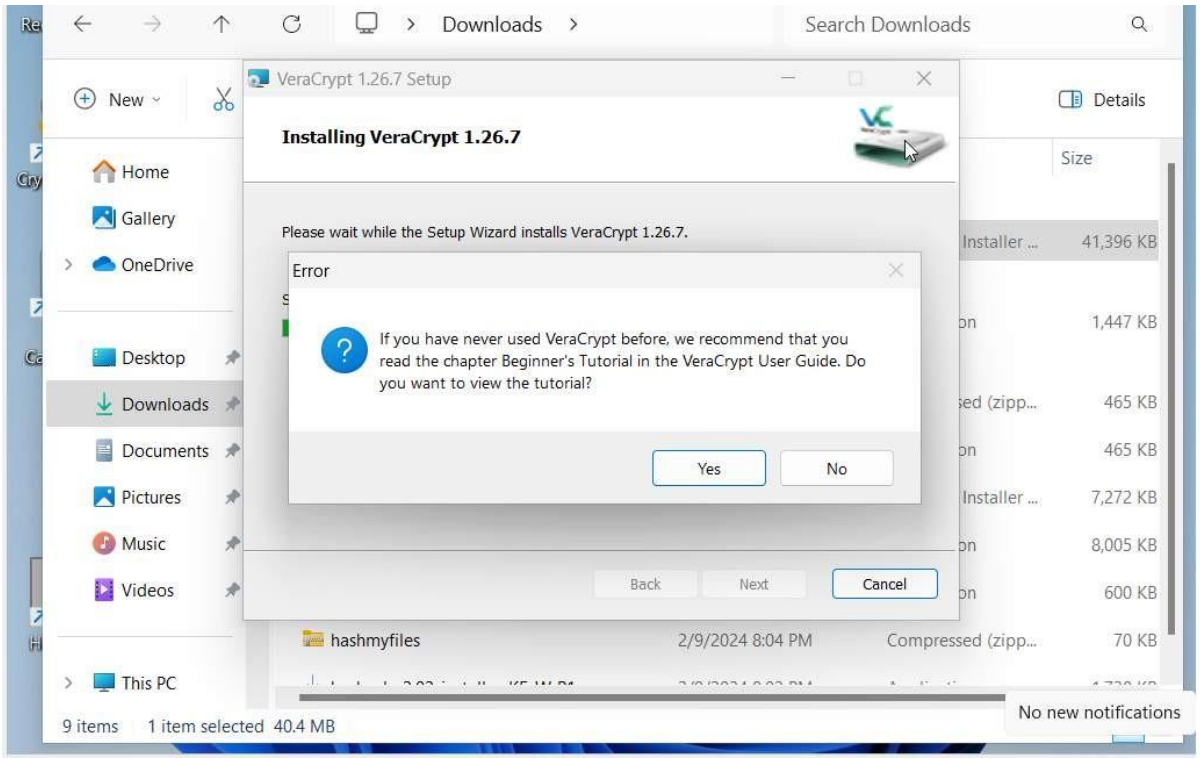
LAB 4:

TASK 1: Perform disk encryption using VeraCrypt.

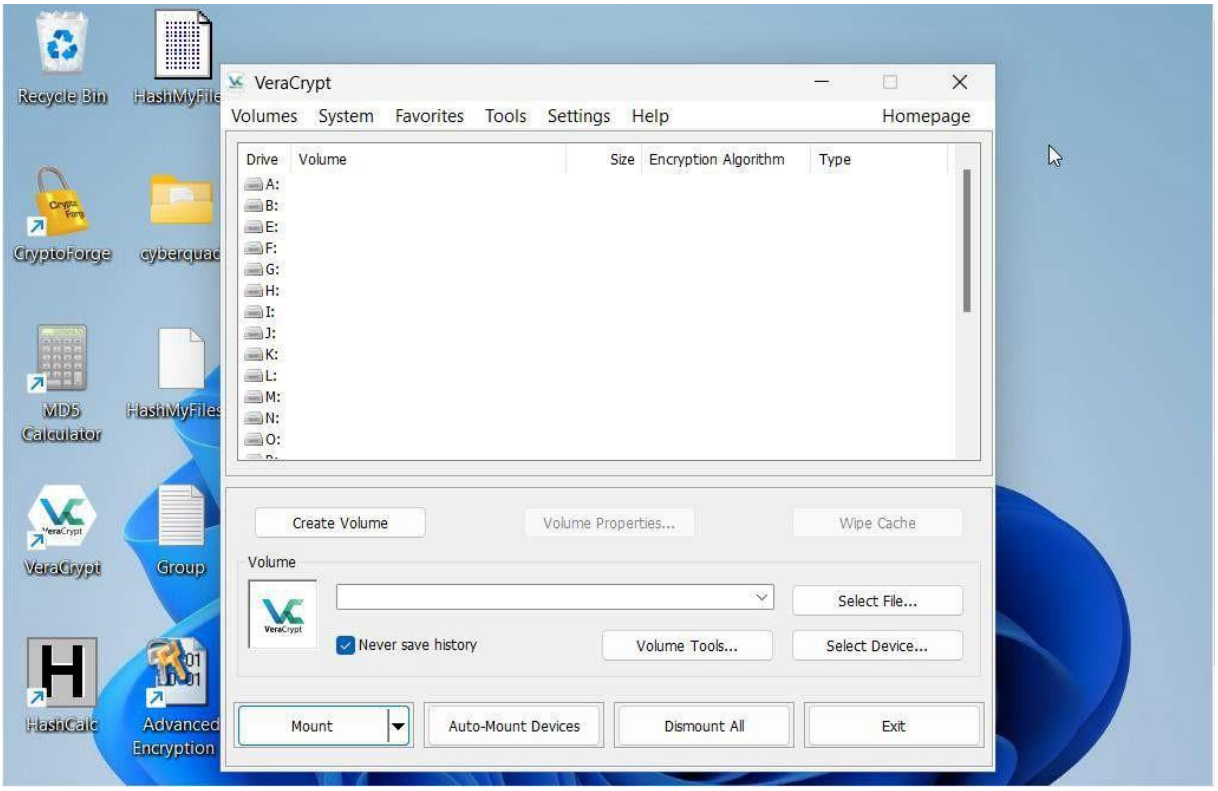
- Installation of VeraCrypt





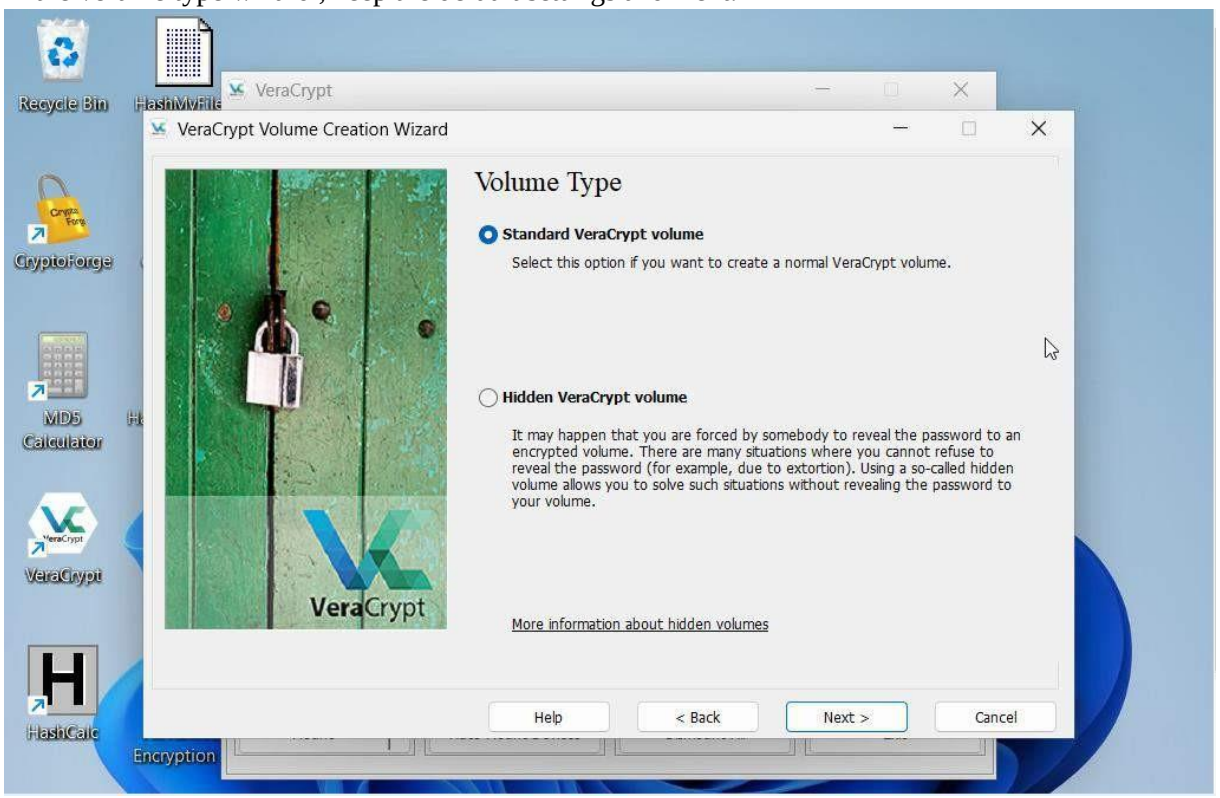

Downloads
Search Downloads
New
Details
VeraCrypt 1.26.7 Setup
Installing VeraCrypt 1.26.7
Please wait while the Setup Wizard installs VeraCrypt 1.26.7.
Error
If you have never used VeraCrypt before, we recommend that you read the chapter Beginner's Tutorial in the VeraCrypt User Guide. Do you want to view the tutorial?
Yes
No
Back
Next
Cancel
Home
Gallery
OneDrive
Desktop
Downloads
Documents
Pictures
Music
Videos
This PC
Size
Installer ... 41,396 KB
1,447 KB
465 KB
465 KB
Installer ... 7,272 KB
8,005 KB
600 KB
hashmyfiles 2/9/2024 8:04 PM Compressed (zipp... 70 KB
9 items 1 item selected 40.4 MB
No new notifications

- After installation and launching, VeraCrypt windows appears as shown.

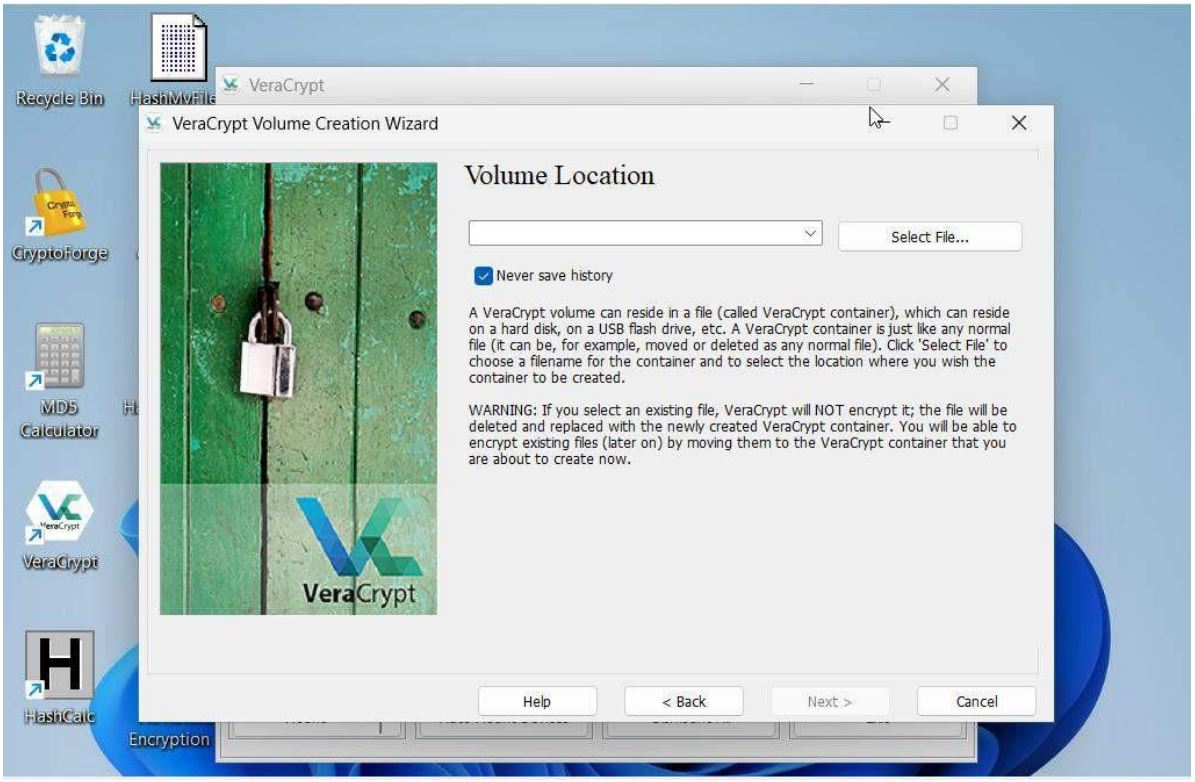


- Disk encryption process starts by clicking, create volume button.
- VeraCrypt Volume Creation Wizard appears, make sure you check on create an encrypted file container and click next.

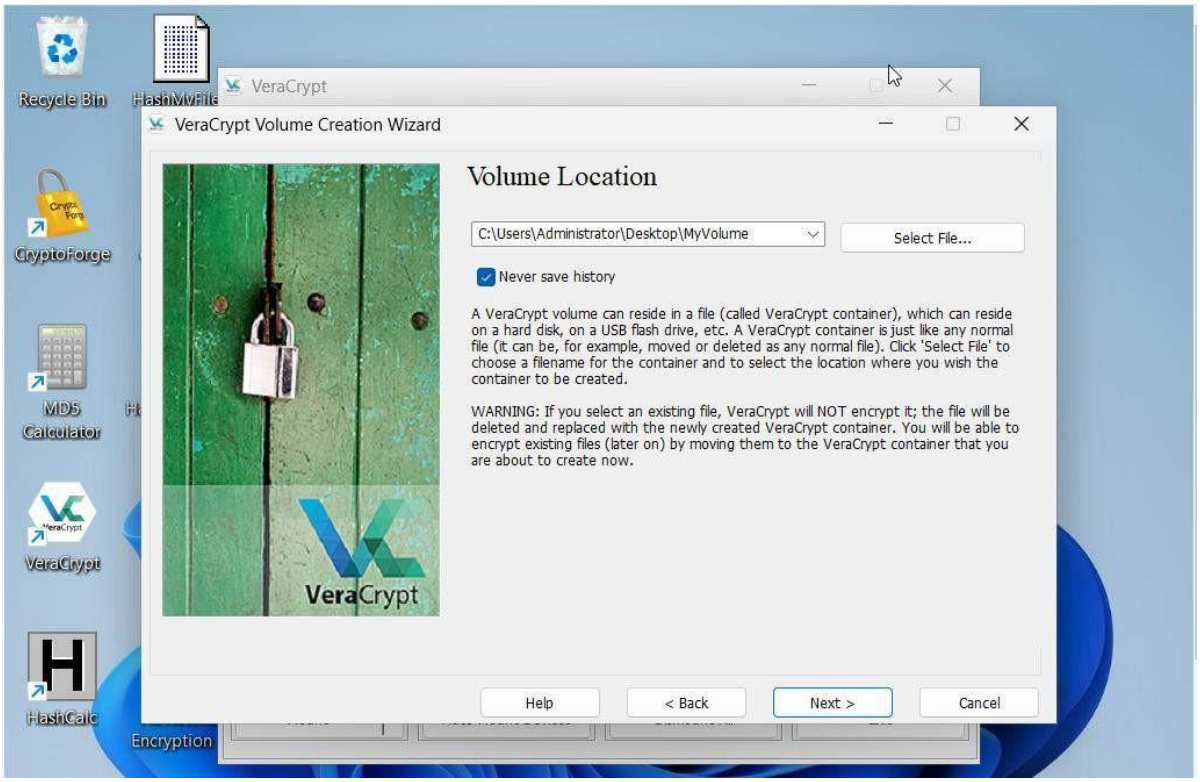
- In the volume type wizard , keep the default settings and Next.



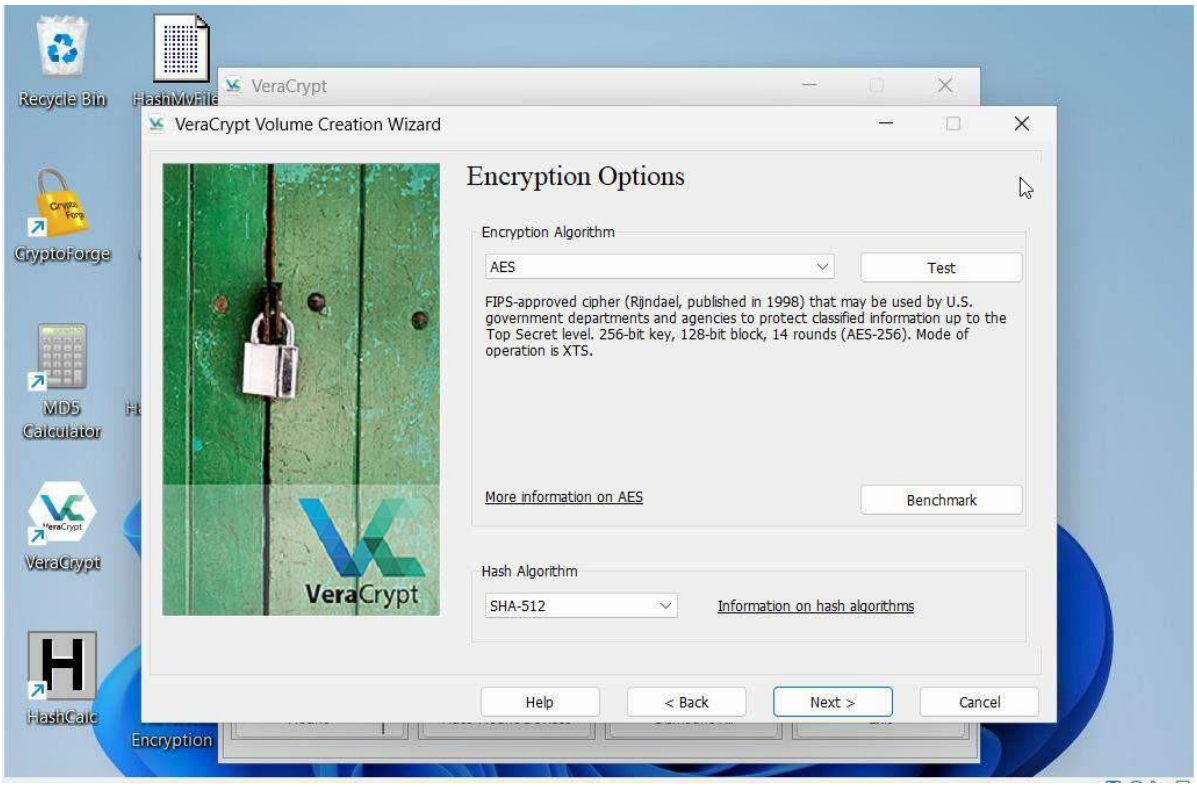
- In the Volume location wizard, click select file



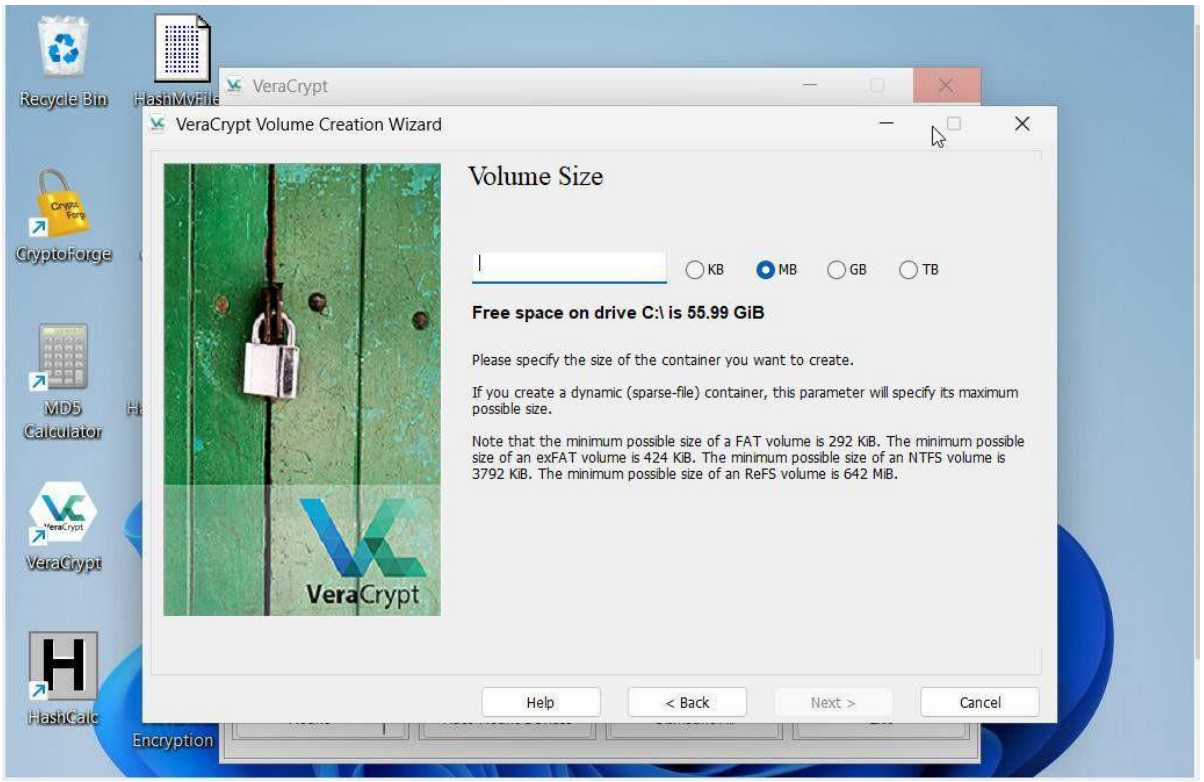
- Specify path and file windows appears, navigate to the desired location (Desktop), Provide the file name as My volume and click save
- The location of the file containing the VeraCrypt volume appears under the volume location field, Click next.

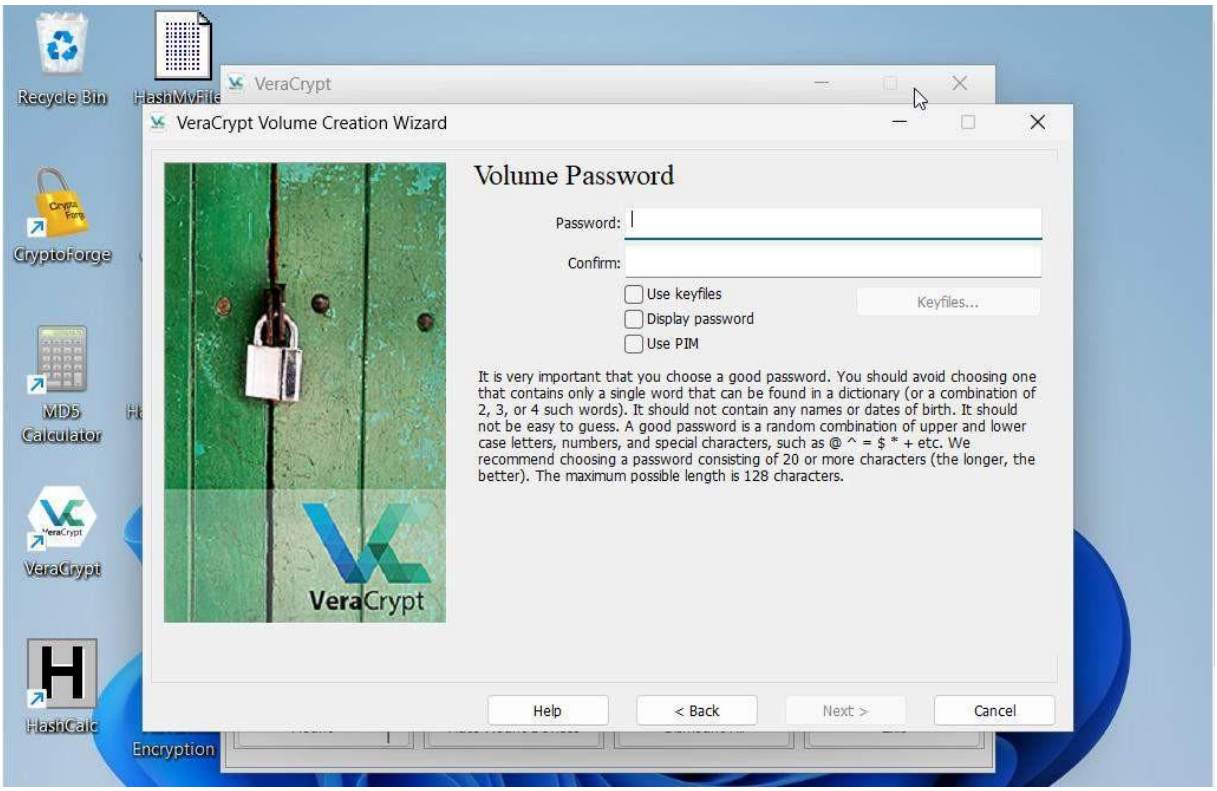


- In the Encryption Options, keep the default settings and click next.



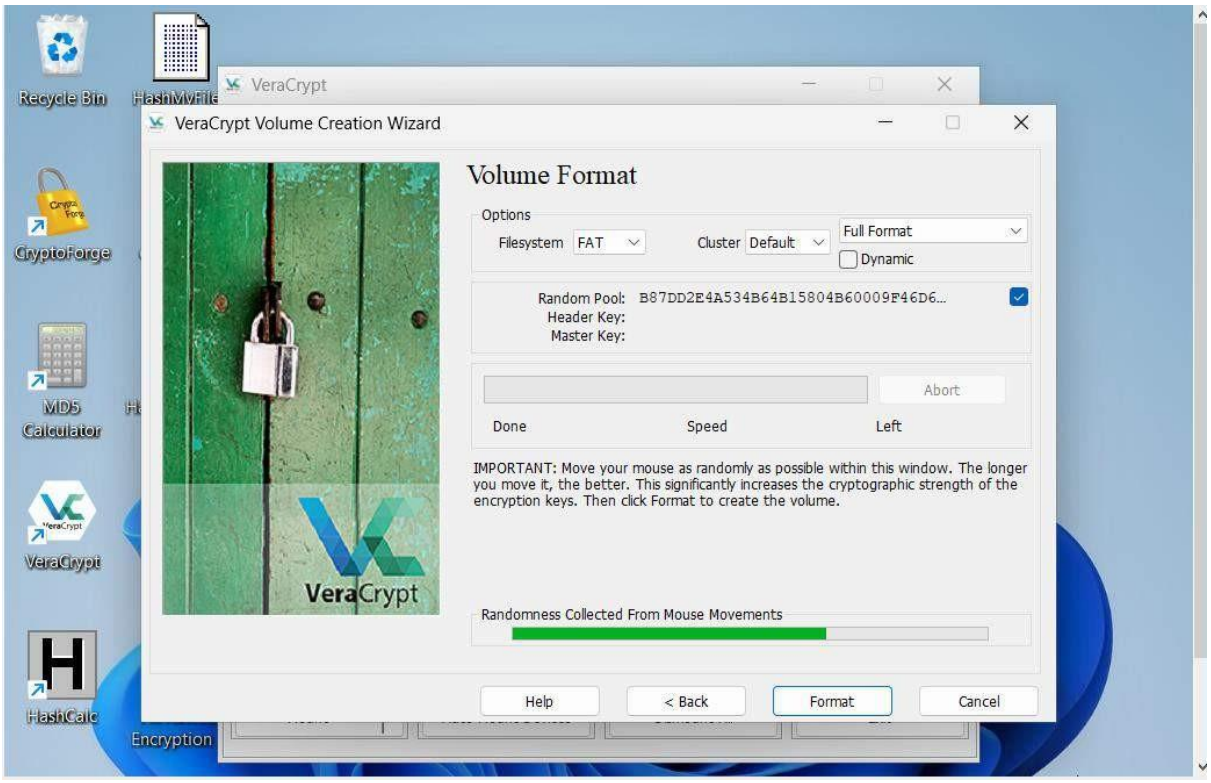
- In the Volume Size wizard, ensure that the MB radio button is selected and specify the size of the VeraCrypt container as 5, Click next



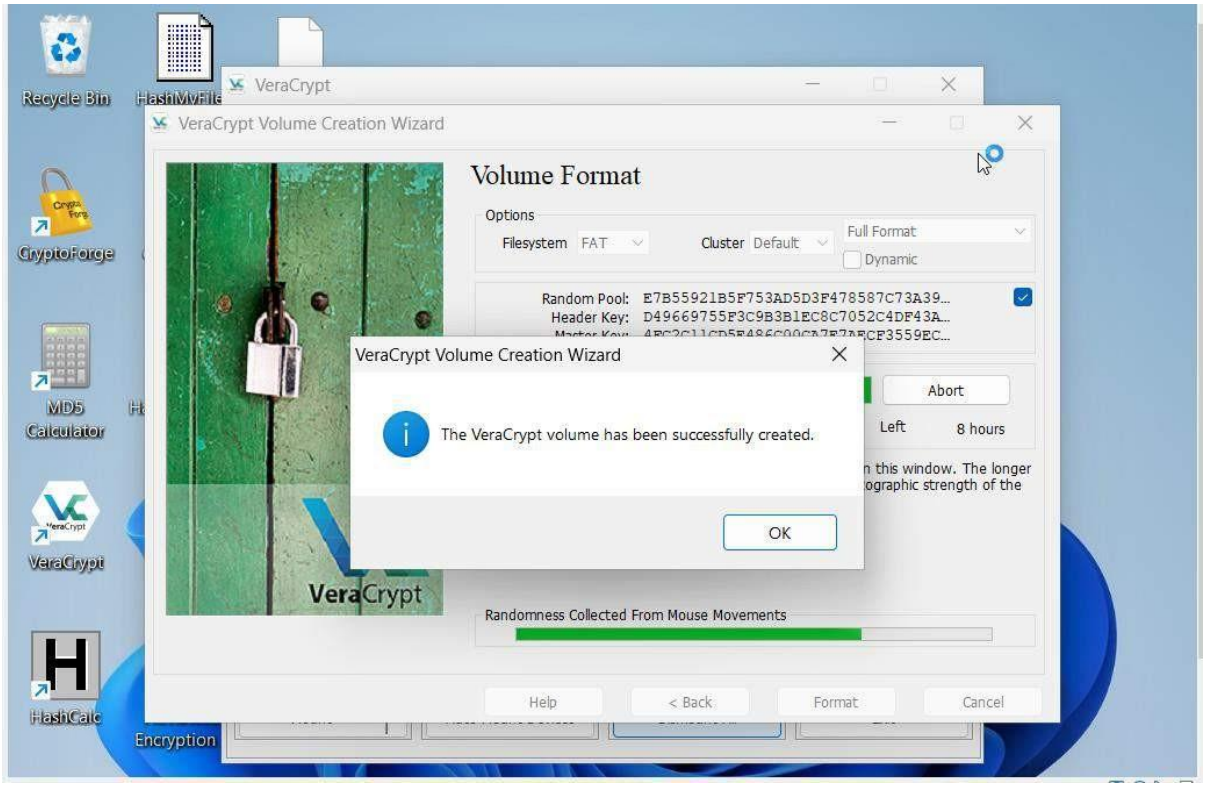


- In the Volume Password wizard, enter a strong password of your choice and click next
- A VeraCrypt Volume Creation wizard appears, Click Yes.

- Check the check box under the Random pool, Header key and Master key section.
- Move mouse for 30 sec, within the Volume Creation Wizard and click the format button

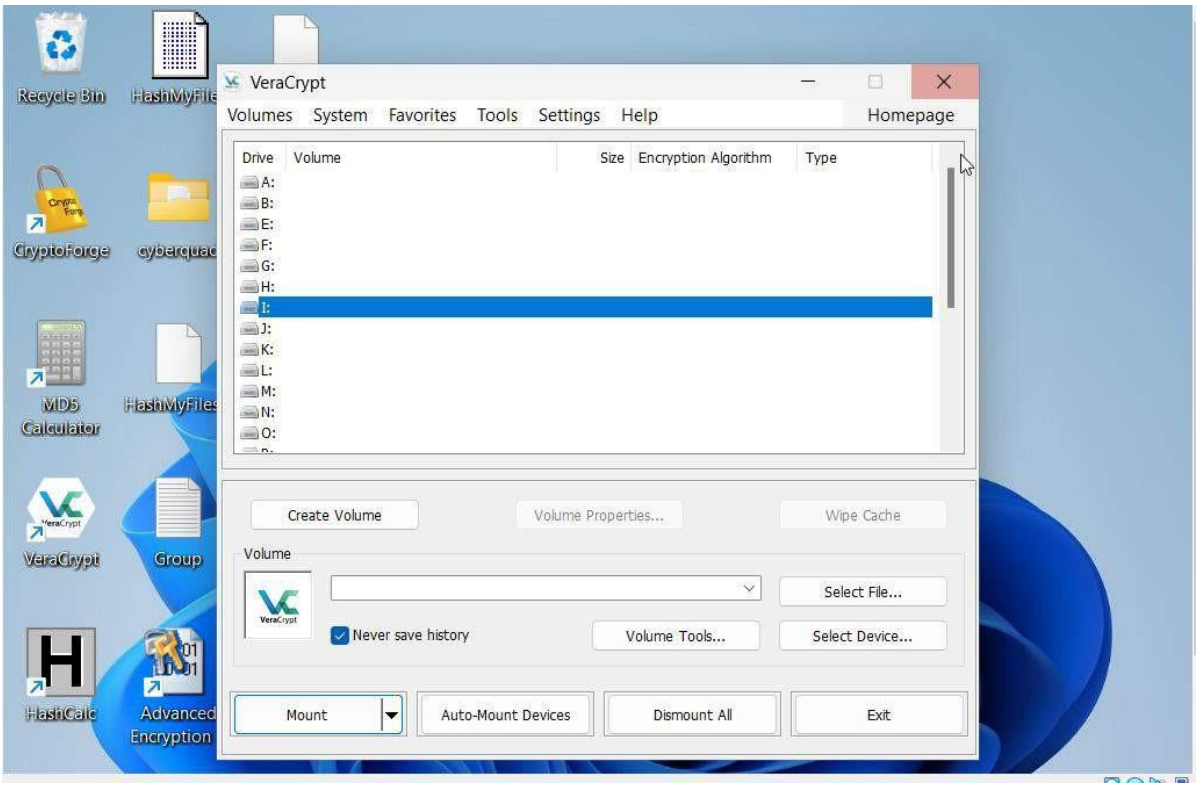


- Once the volume is created a VeraCyrpt Volume Creation Wizard dialog box appears, click okay.

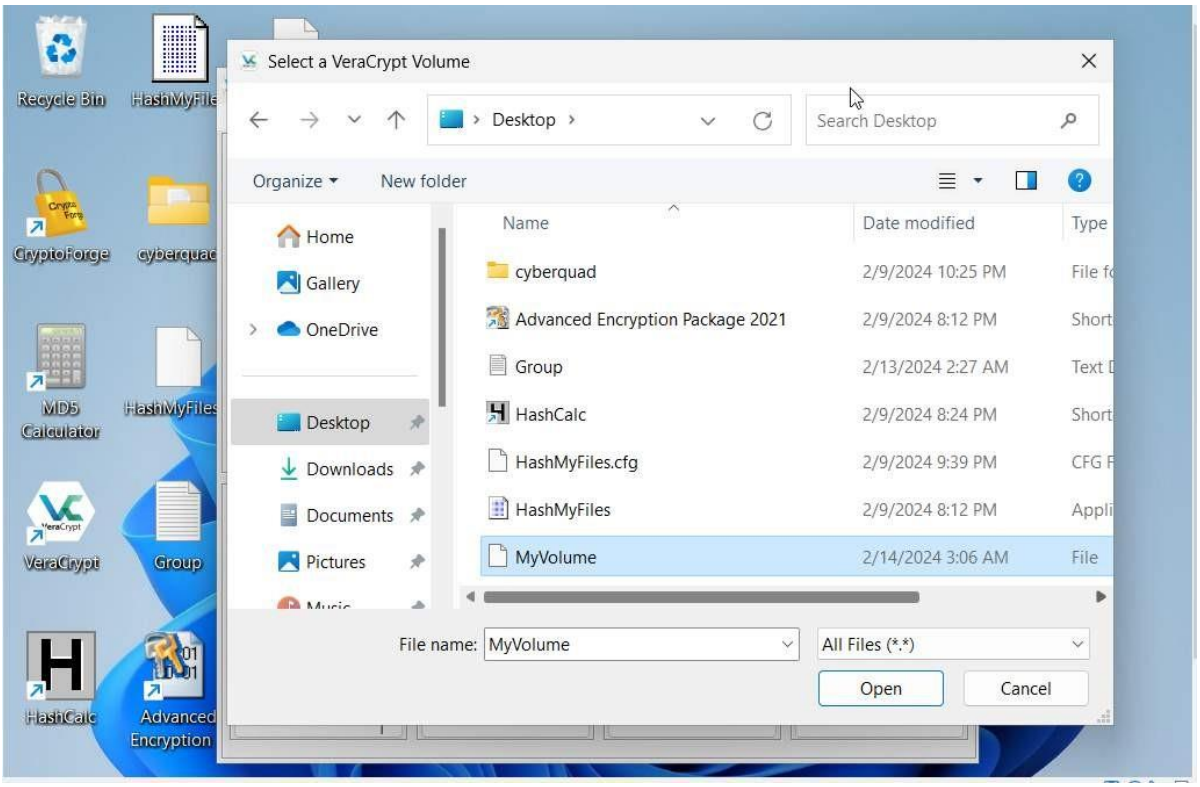


- Click exit on the Volume Created message that appear.

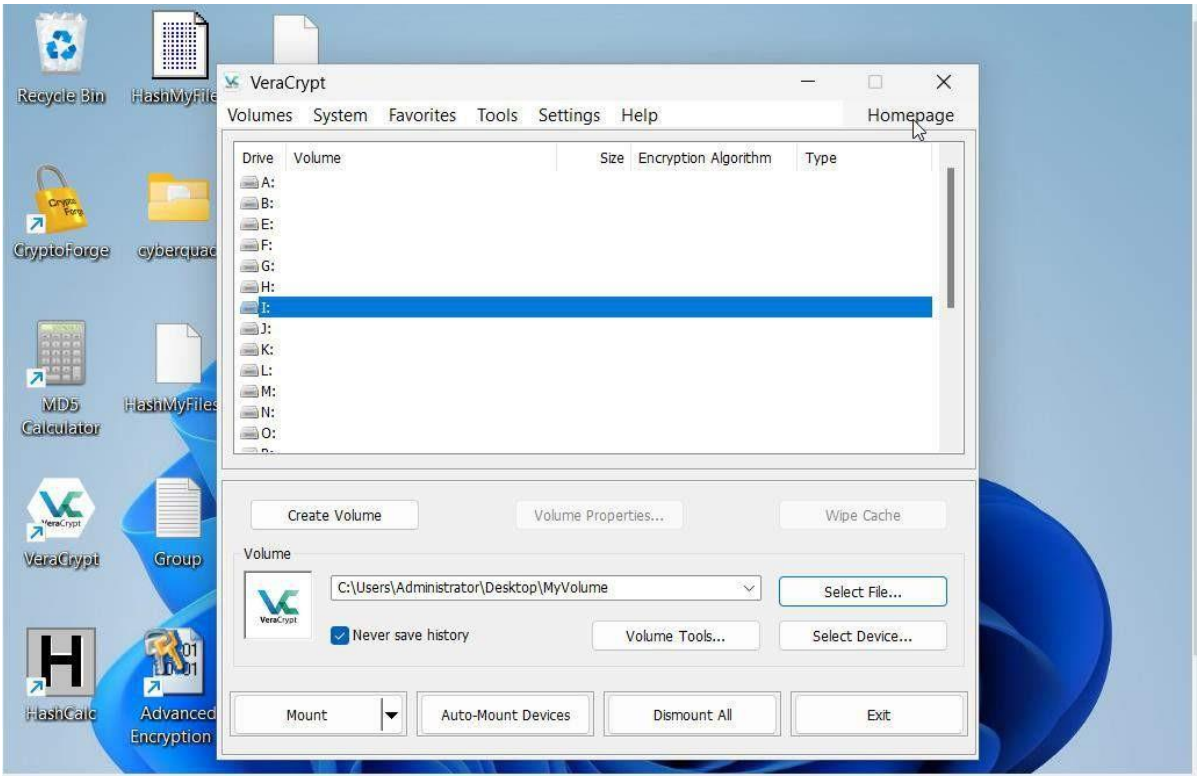
- Select a Drive I and click select file.



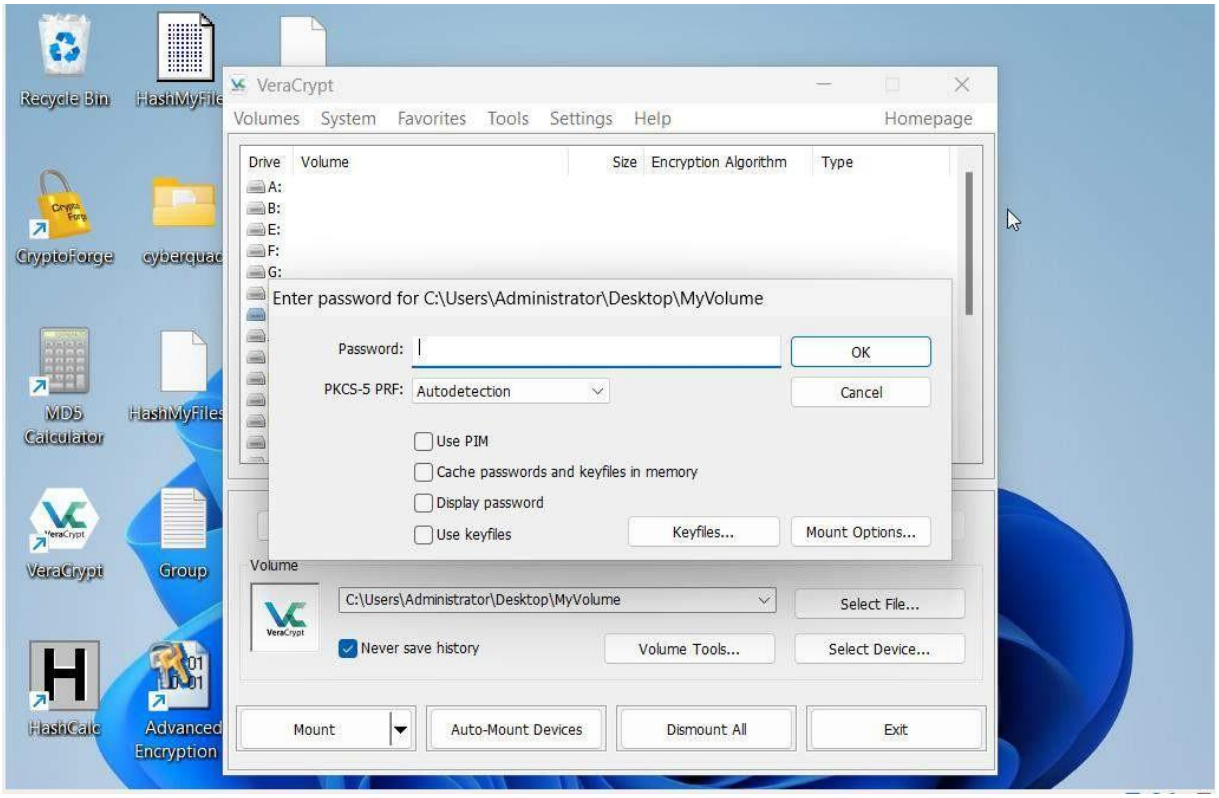
- Navigate to desktop, click MyVolume and click open

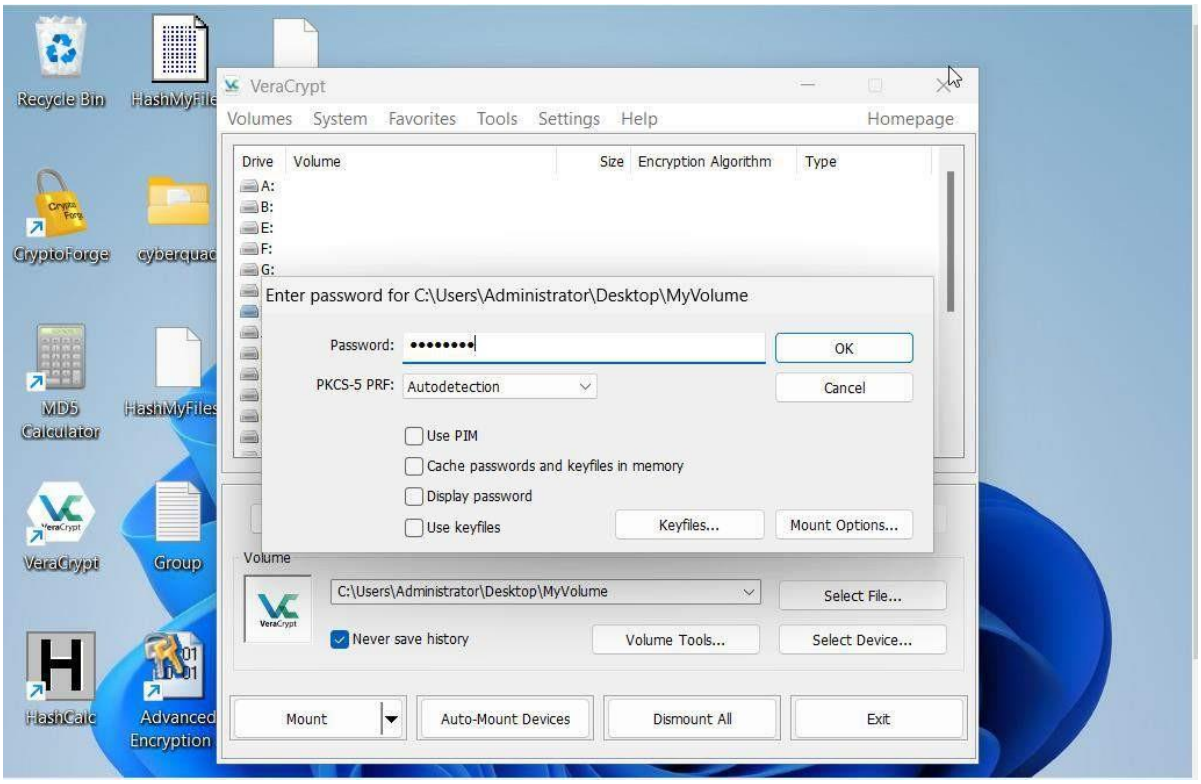


- VeraCrypt window appears displaying the location of the selected volume under the volume field then click mount.

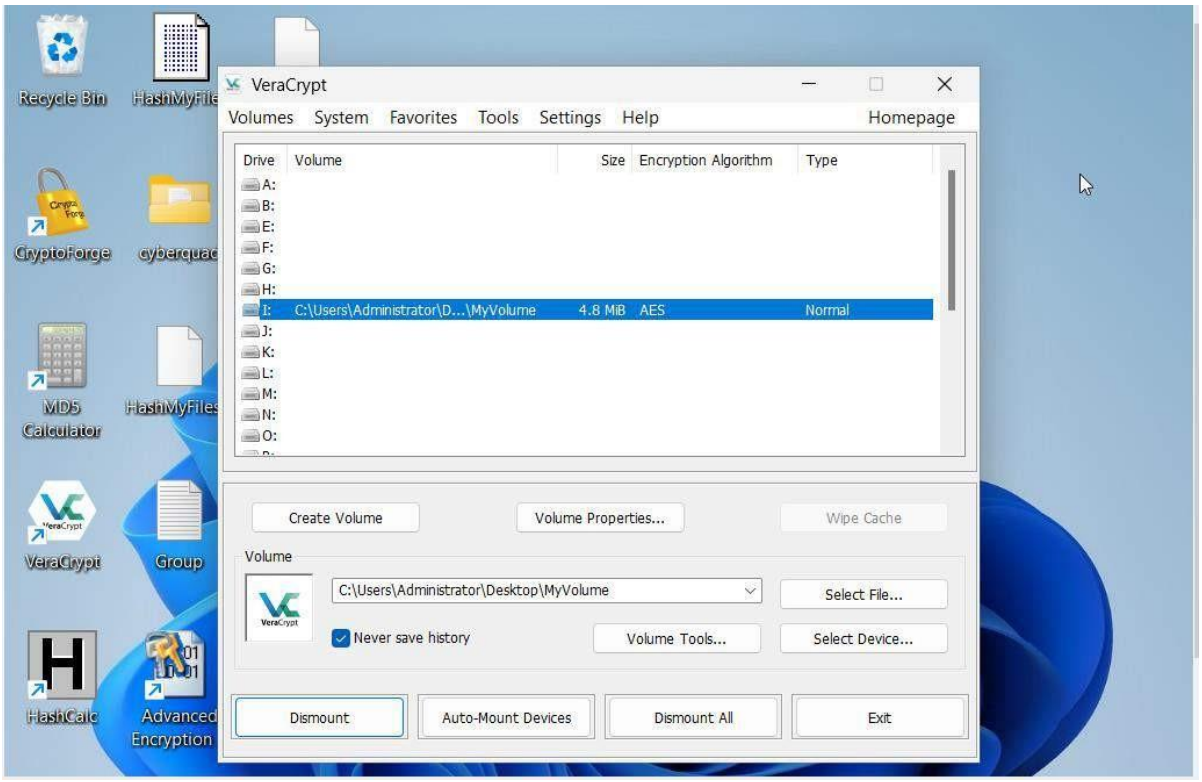


- Type the password you specified in the Volume password then click okay

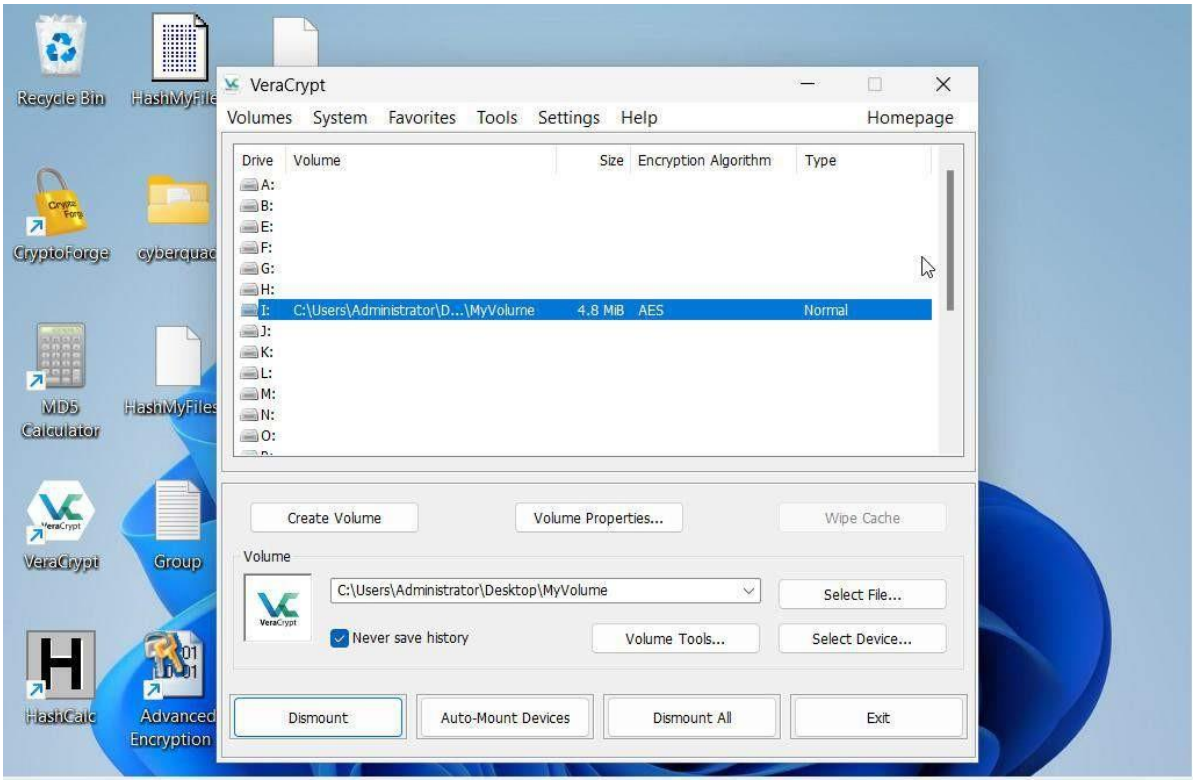




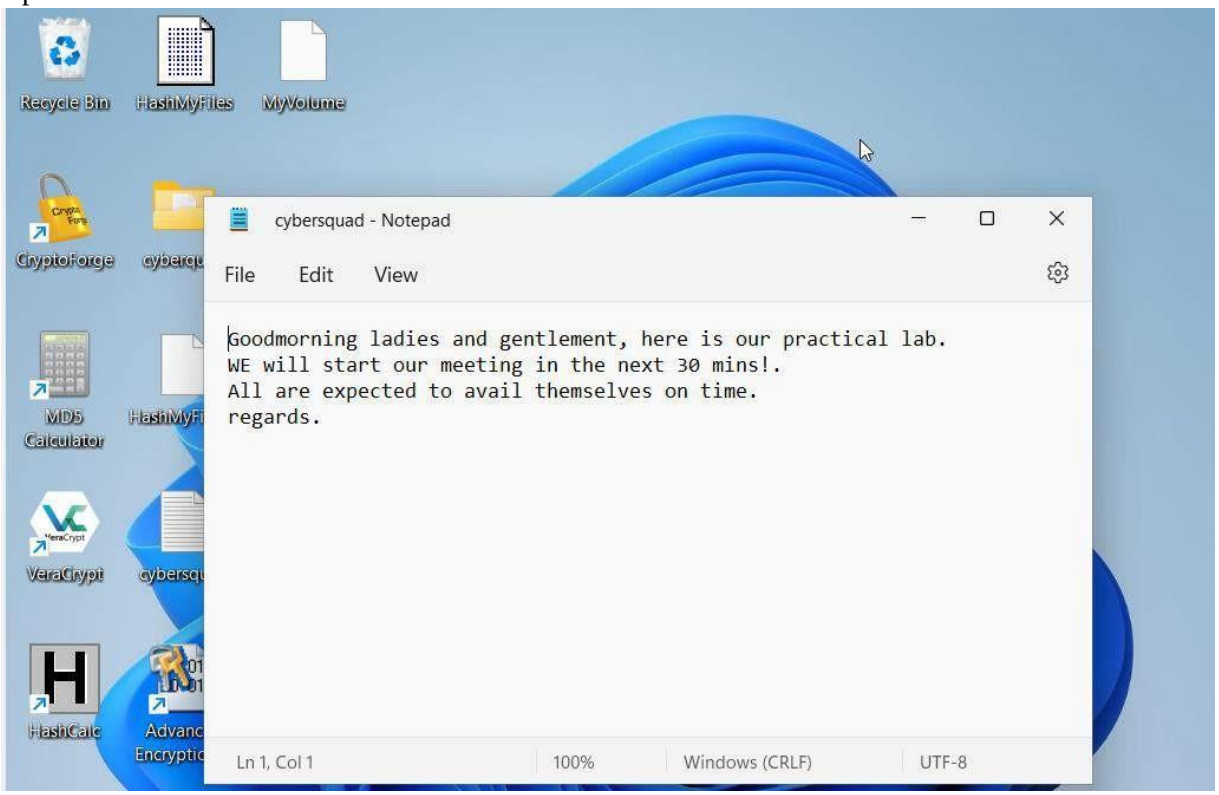
- VeraCrypt will mount the volume in Drive I



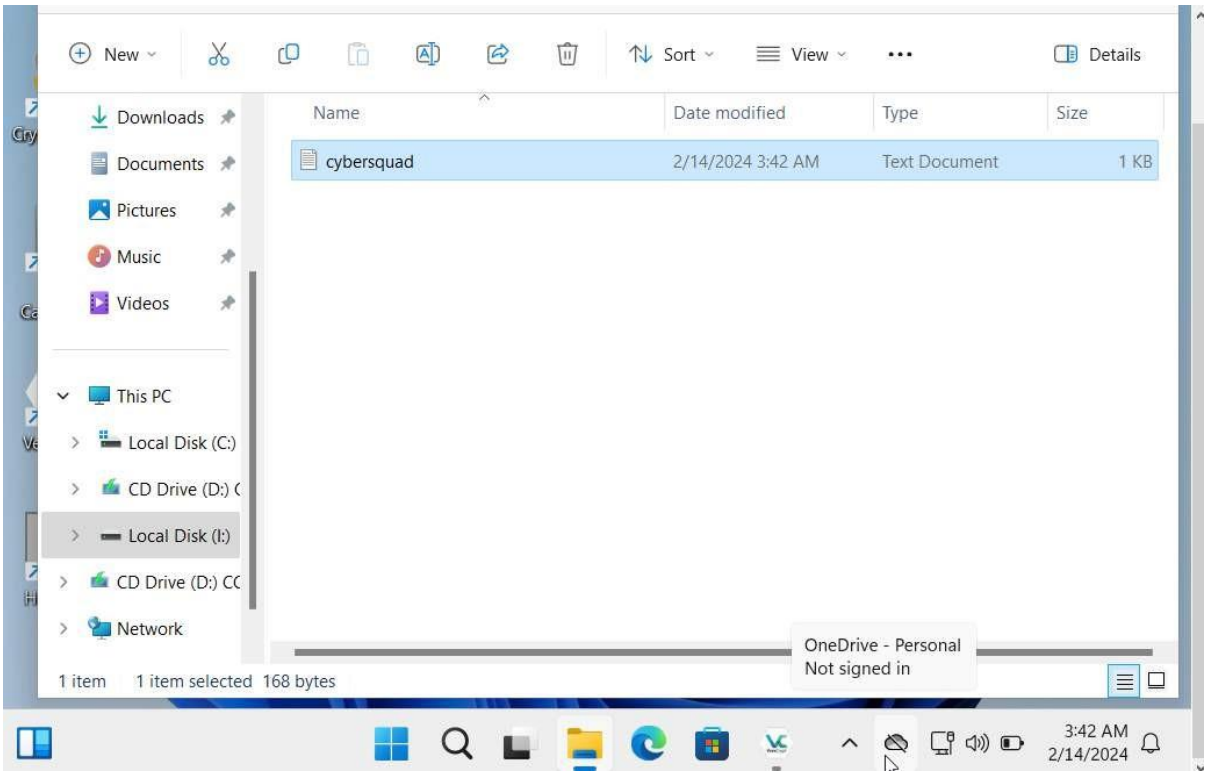
- MyVolume has been successfully mount as a virtual Disk I (entirely encrypted), and behave similarly to a real disk. You can copy or move files to this virtual disk for encryption.



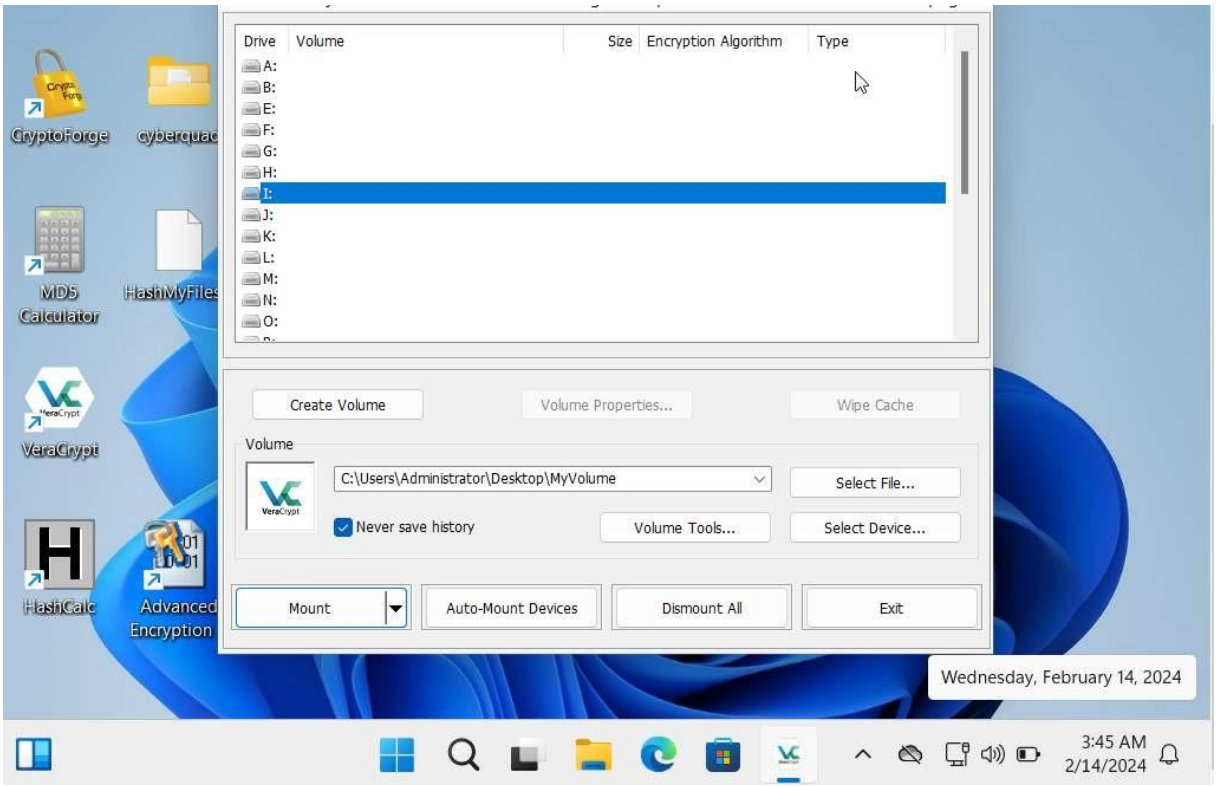
- Create a text file in the desktop and name it Cybersquad.
- Open the text file and insert text and save.



- Copy the file to the Desktop and paste to Local Disk and close the window.



- Switch to the VeraCrypt window, click dismount and then click exit.



- The Drive I located in Disk C disappears.

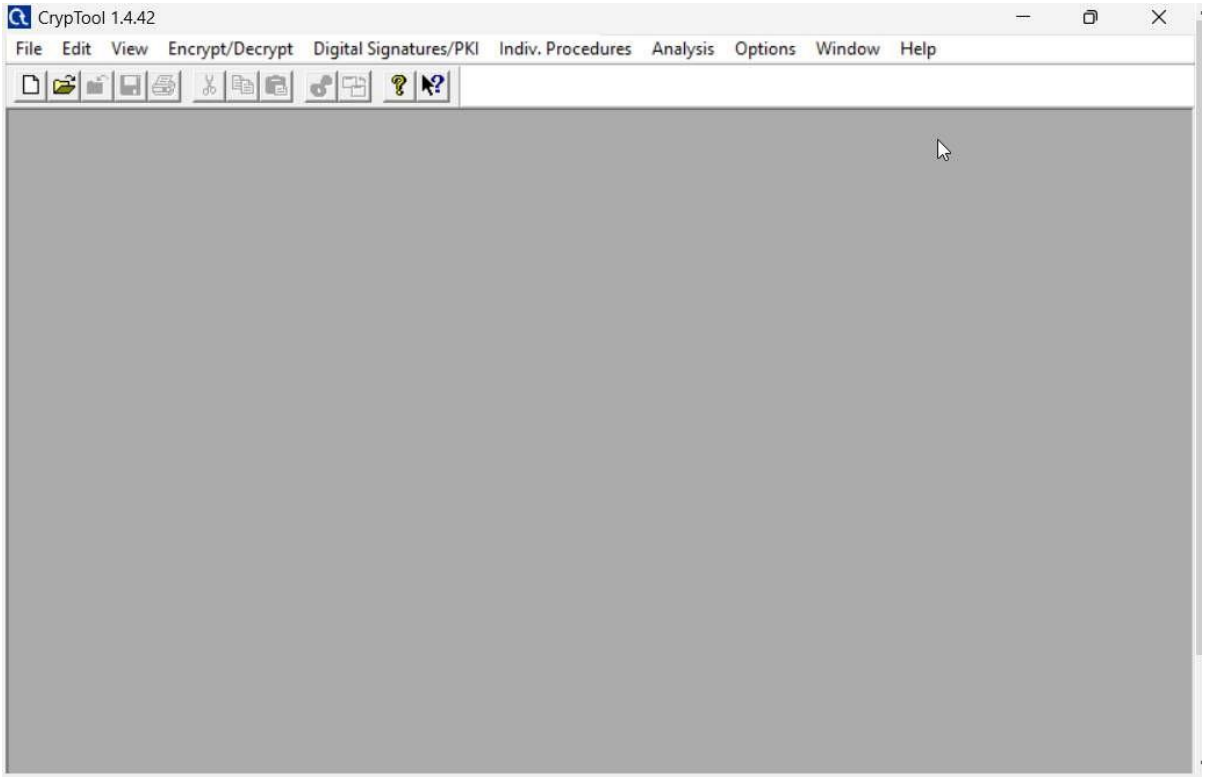
Report/conclusion

- In the practical session focused on 'Performing Disk Encryption Using VeraCrypt,' participants delved into the process of encrypting data on disks using VeraCrypt software. Through hands-on exercises, the group learned to create encrypted volumes, store sensitive information securely, and manage encryption keys effectively. This session underscored the importance of disk encryption in protecting sensitive data from unauthorized access. Participants discovered the benefits of VeraCrypt, including its user-friendly interface and robust encryption algorithms, while also acknowledging considerations such as key management and the importance of password security. Overall, the practical provided valuable insights into disk encryption techniques, empowering participants to enhance their data security practices.

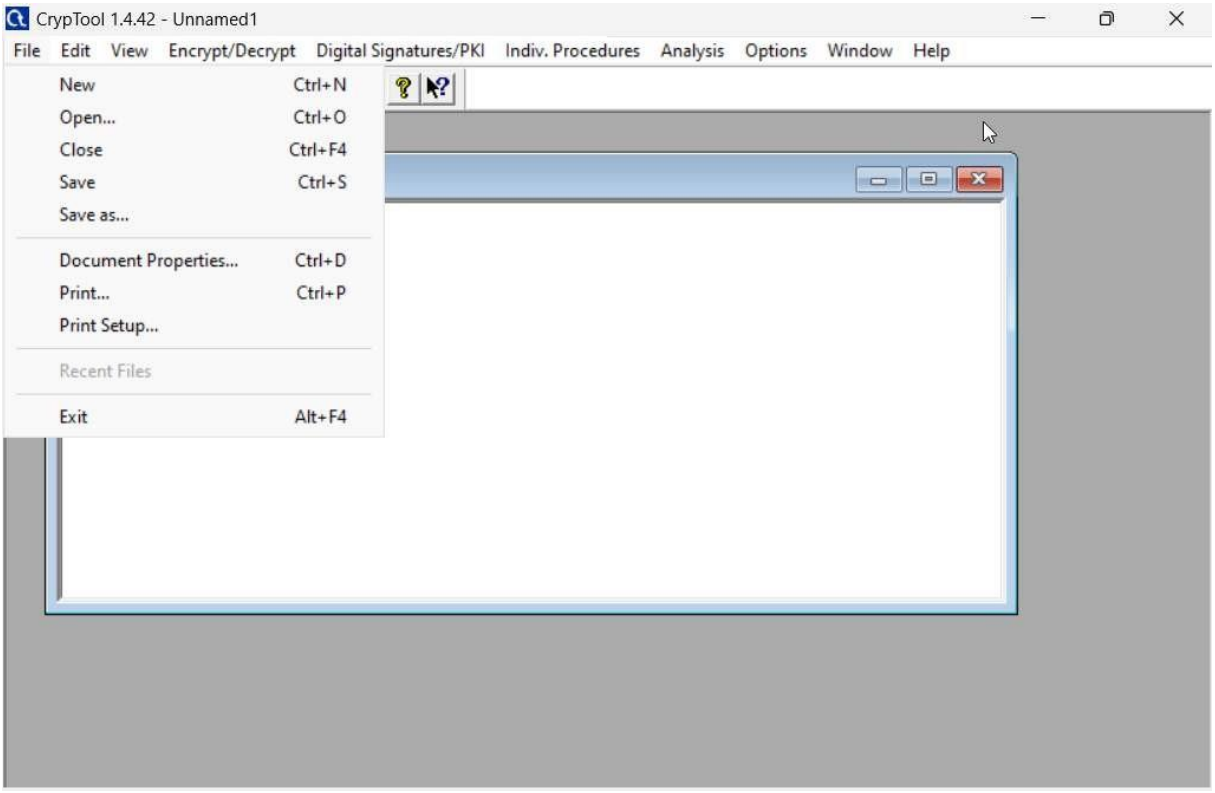
Lab 5

Task 2: Perform Crypto Analysis using CrypTool

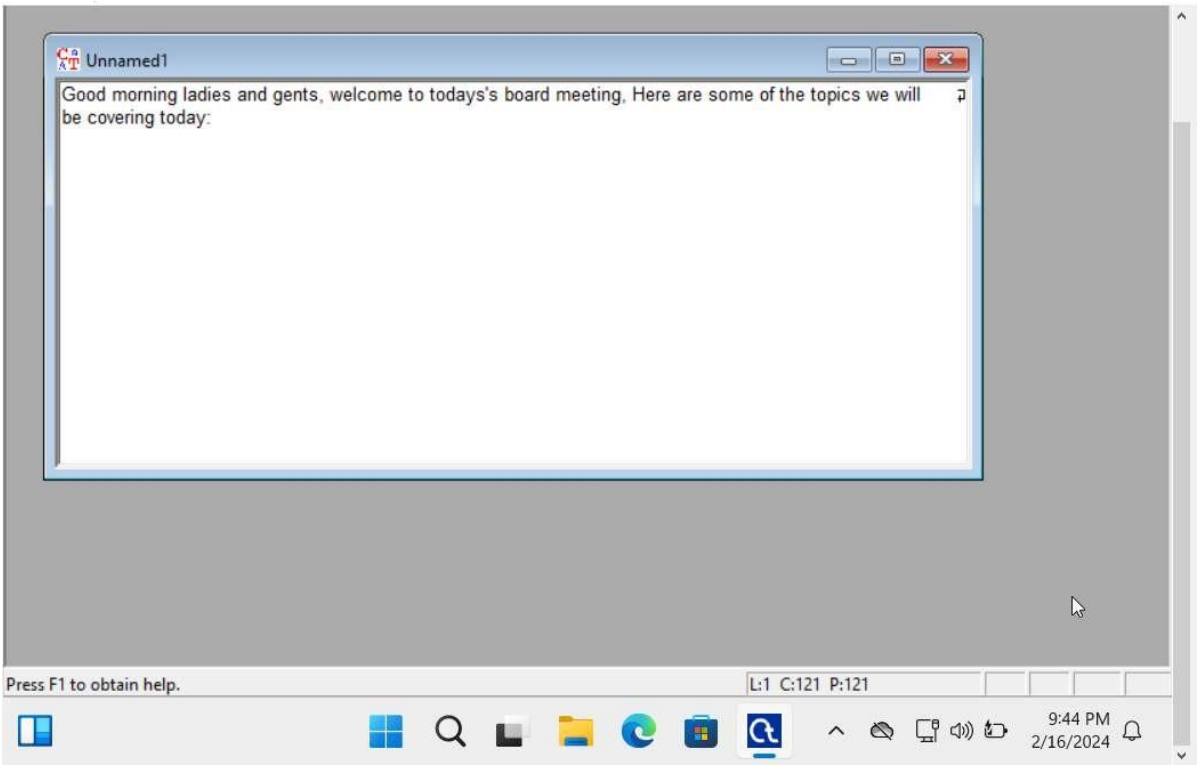
- **Launching CrypTool**



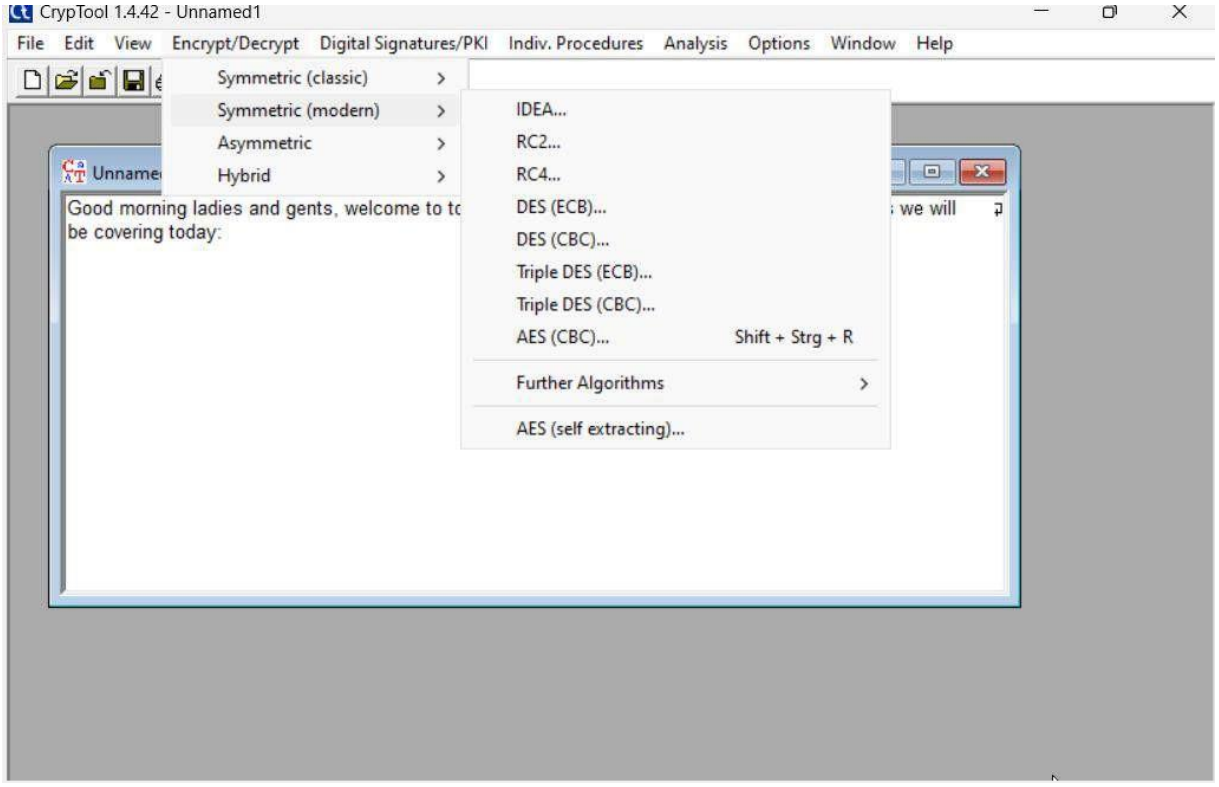
- **Click the file tab and select New to create encrypted data.**



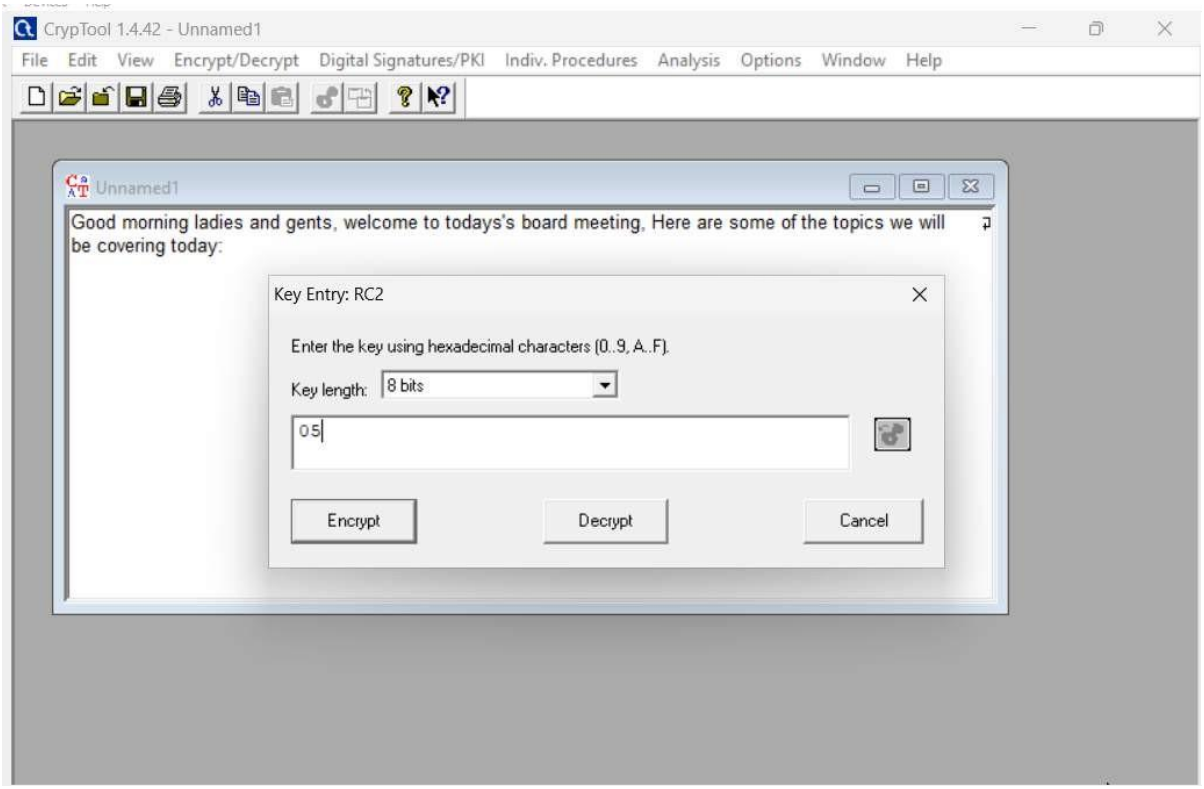
- **Insert some text into the file, you will be encrypting this content.**



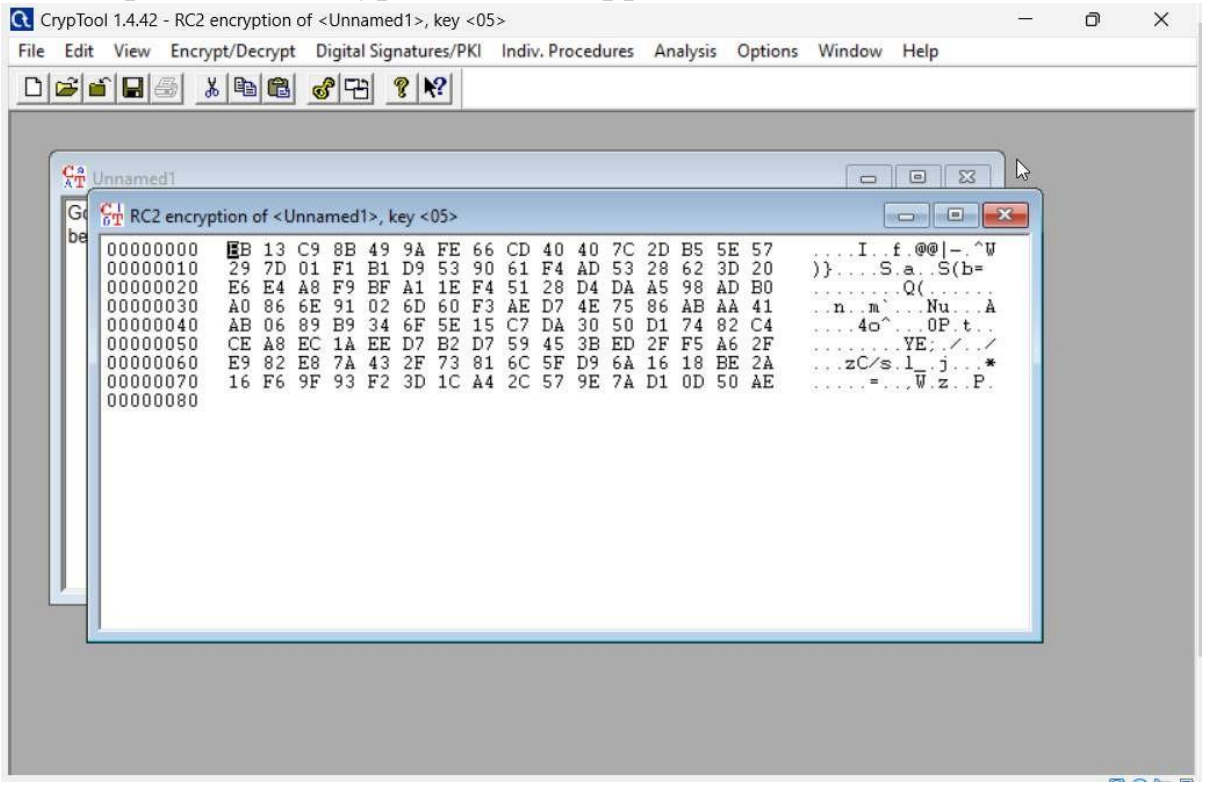
- **From the menu bar, click Encrypt/decrypt and navigate to symmetric (modern), RC2.**



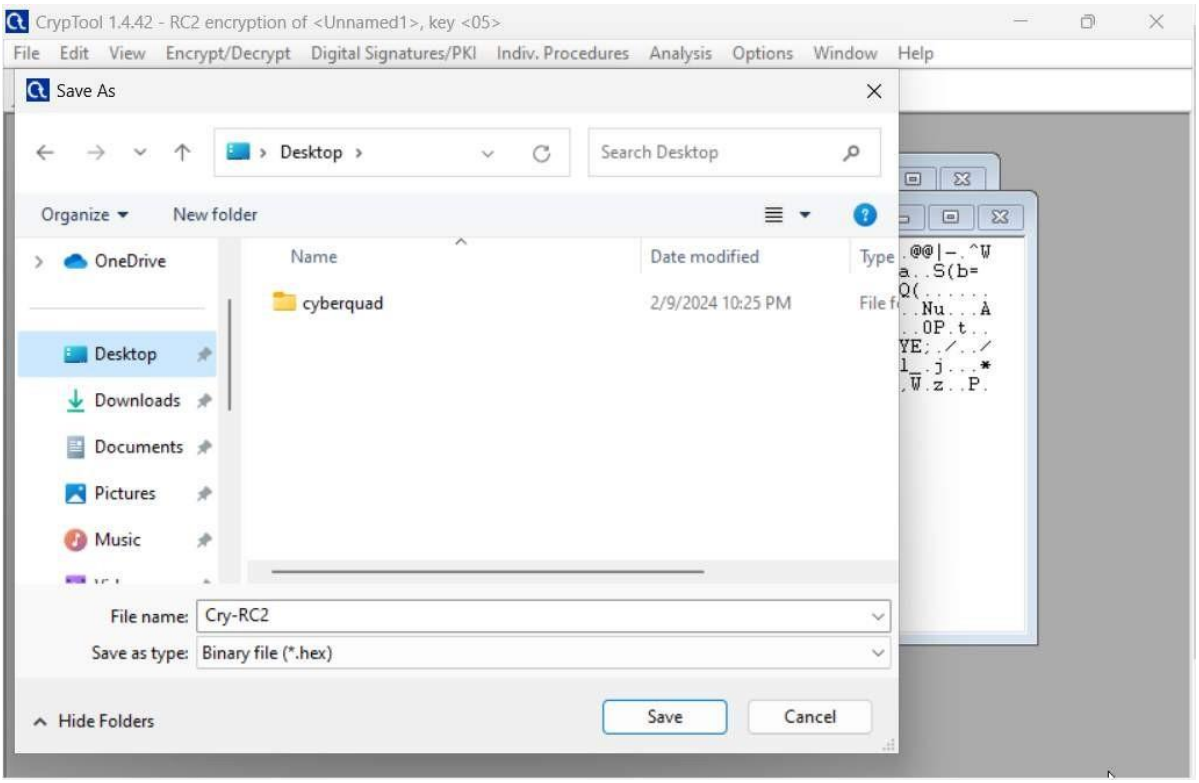
- **Keep the key length to default (8bits), then below the key length, enter 05 as hexadecimal characters and click encrypt.**



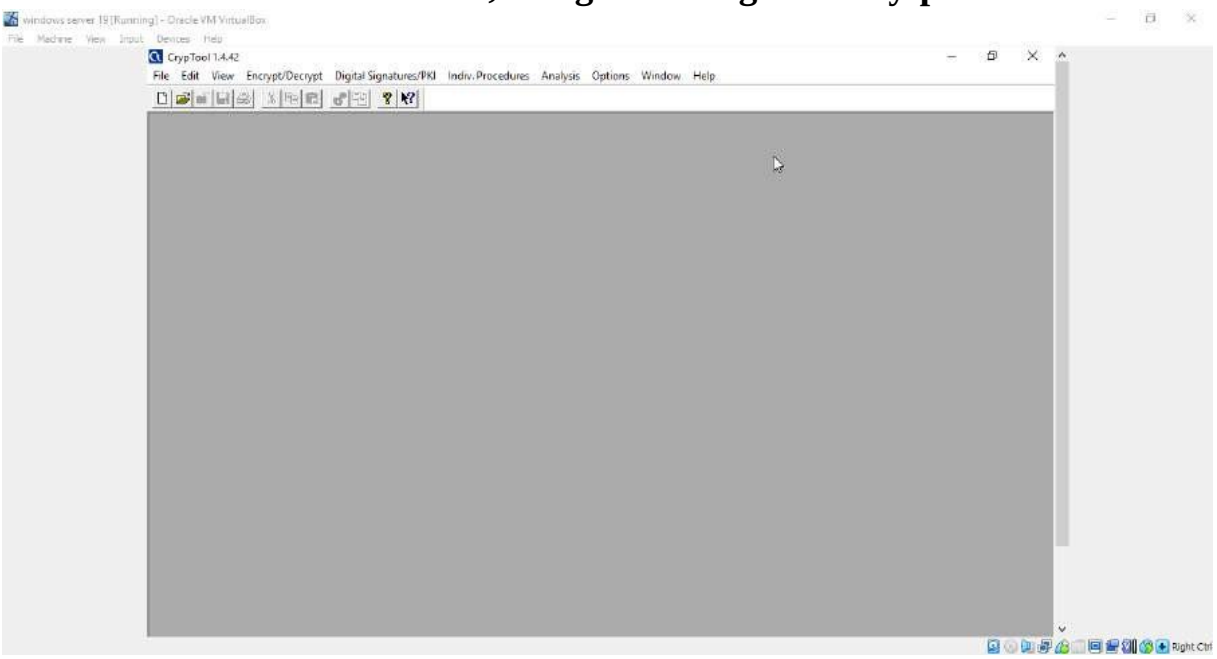
- **The output of the encrypted content appears.**



- **Save the cypher text by clicking file on the menu bar and click save.**

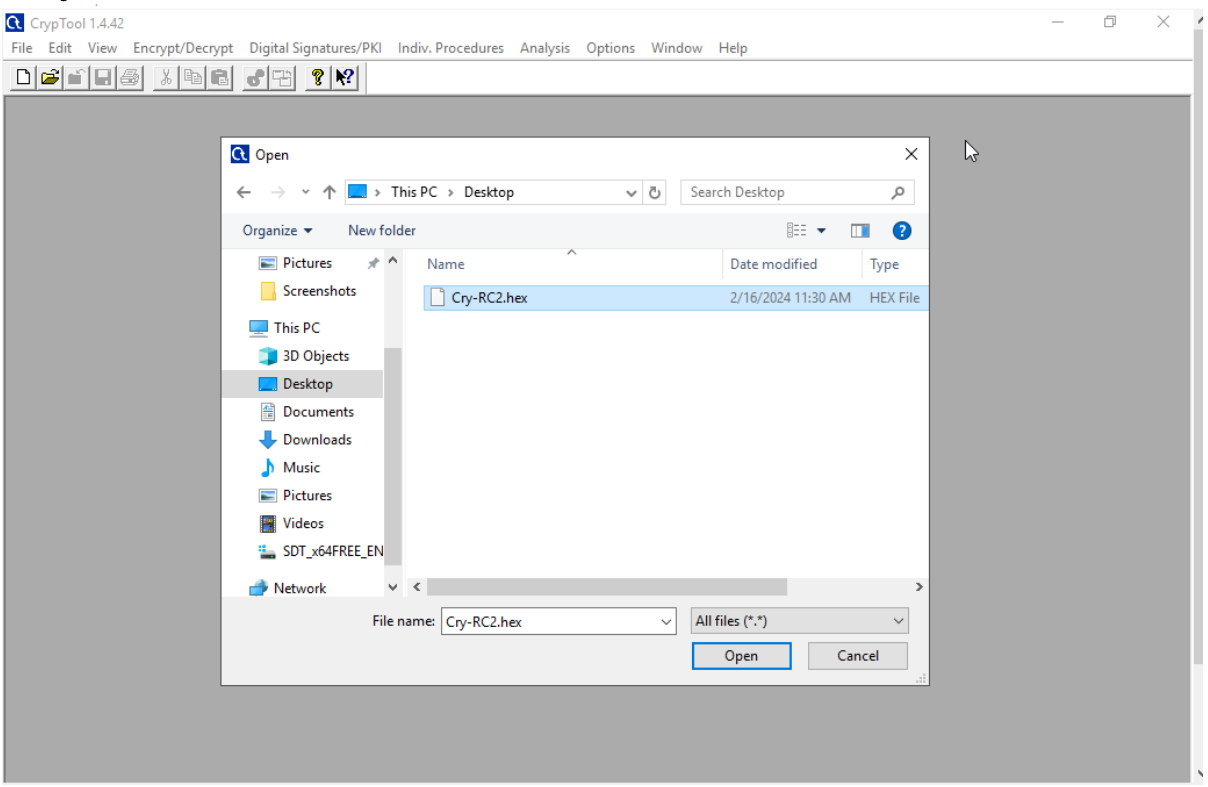


- **To share the file, copy the encrypted file (Cry-RC2) from Desktop.**
- **Switch to windows server 2019, navigate through the CrytpTool**

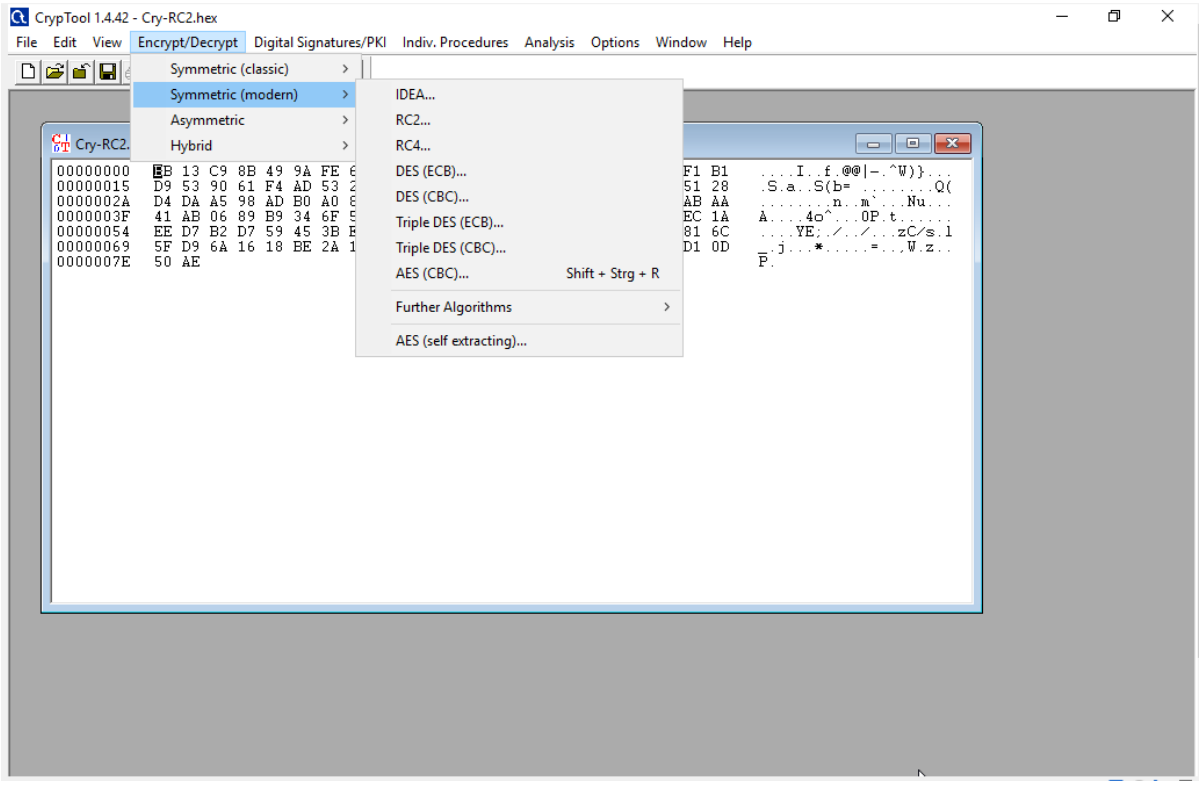


- **In the cryptool window, click file tab and select open**

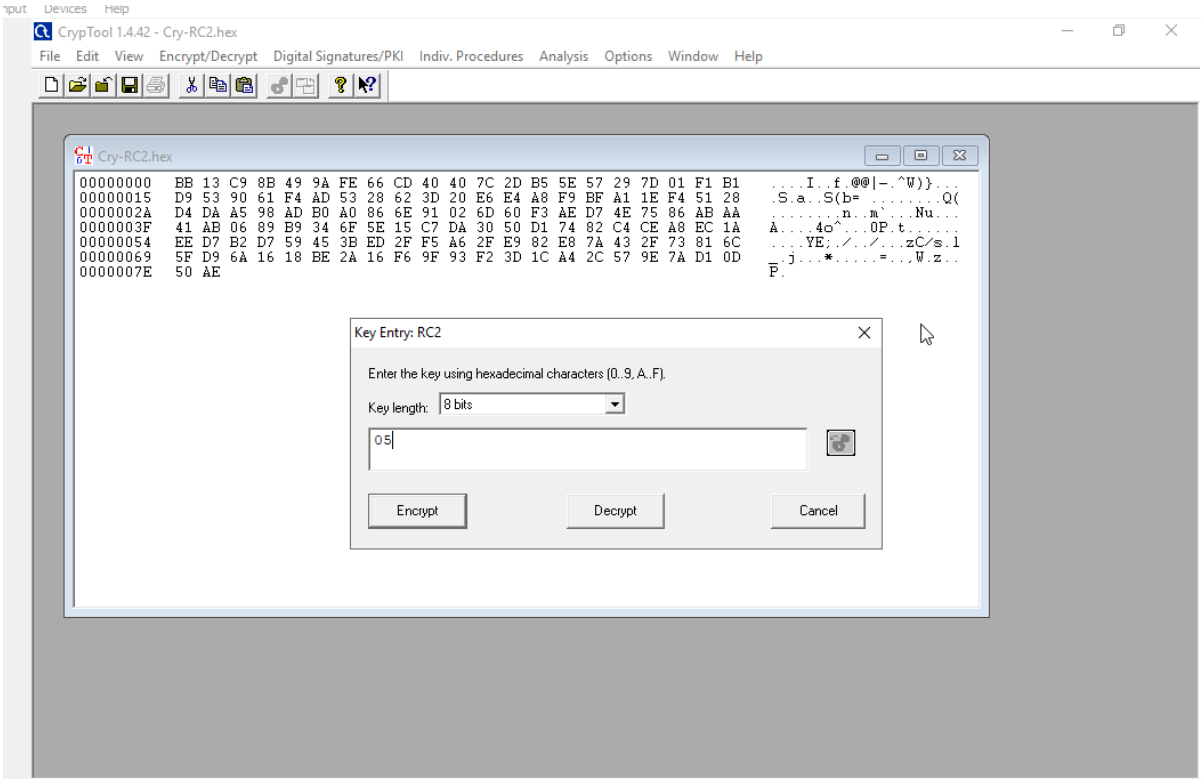
- **Navigate to the file location of the encrypted file (Desktop) and click okay.**



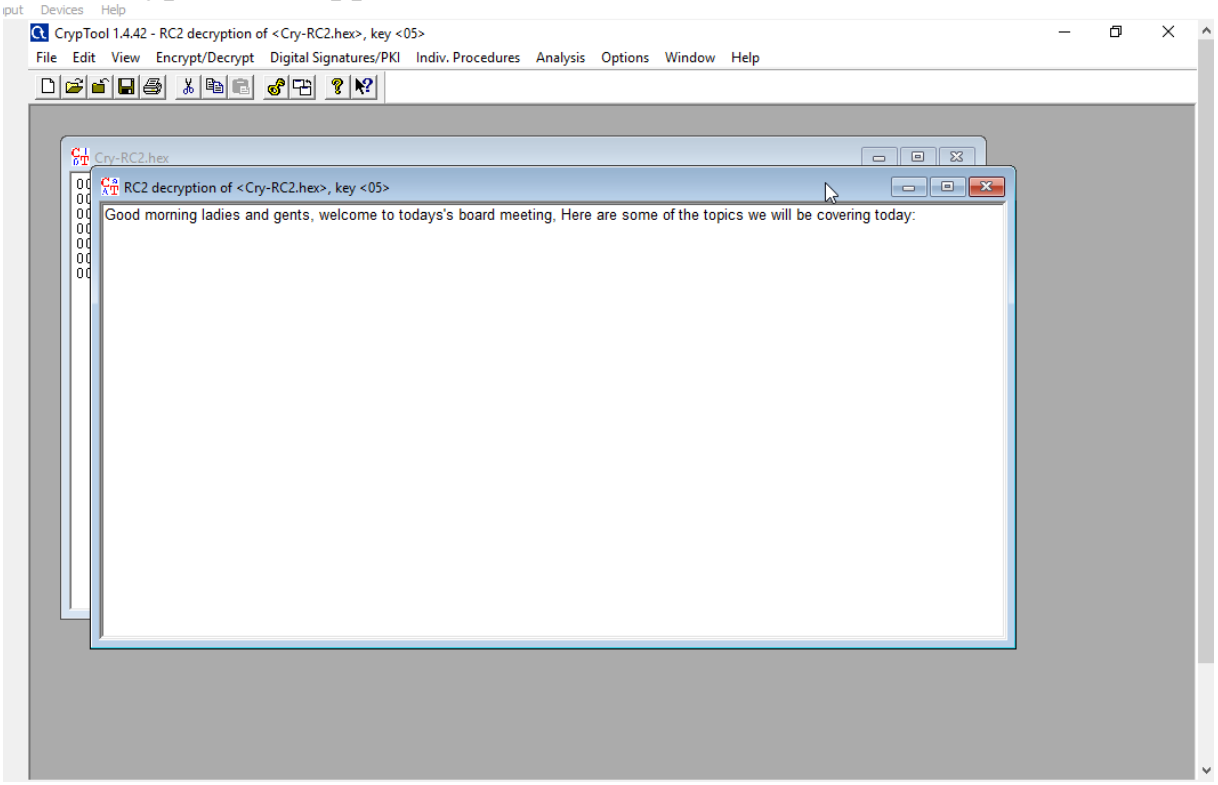
- **From the file bar select Encrypt/Decrypt and navigate to the symmetric(modern) RC2.**



- **The key entry:RC2 dialog box appears leave the key Lenth set do default, in the text field below, key Lenth enter04 as hexadecimal character and click decrypt.**



- **The decrypted text appears**



CONCLUSION

- In the 'Performing Crypto Analysis Using CrypTool' practical, participants explored cryptographic analysis techniques using CrypTool software. Through hands-on exercises, the group learned to analyze encryption algorithms, decipher ciphertexts, and evaluate cryptographic strengths and weaknesses. They gained practical insights into cryptographic principles, including encryption, decryption, and cryptanalysis. This session provided valuable experience in assessing the security of cryptographic systems, highlighting both their strengths and vulnerabilities. Overall, the practical offered a comprehensive exploration of cryptographic analysis, equipping participants with essential skills for evaluating and enhancing data security.