SIT282/SIT703 Computer Forensics and Investigations

Workshop Session 9

In the previous week, you learned how to use the image steganography tools. In this session, we will practice multimedia steganography tools and the cryptool for various cipher schemes. Ubuntu VM is used in this session.

Through this session, you will learn two new tools – OpenPuff and cryptool.
By solving forensic tasks, you will be able to perform advanced encryption and decryption analysis.

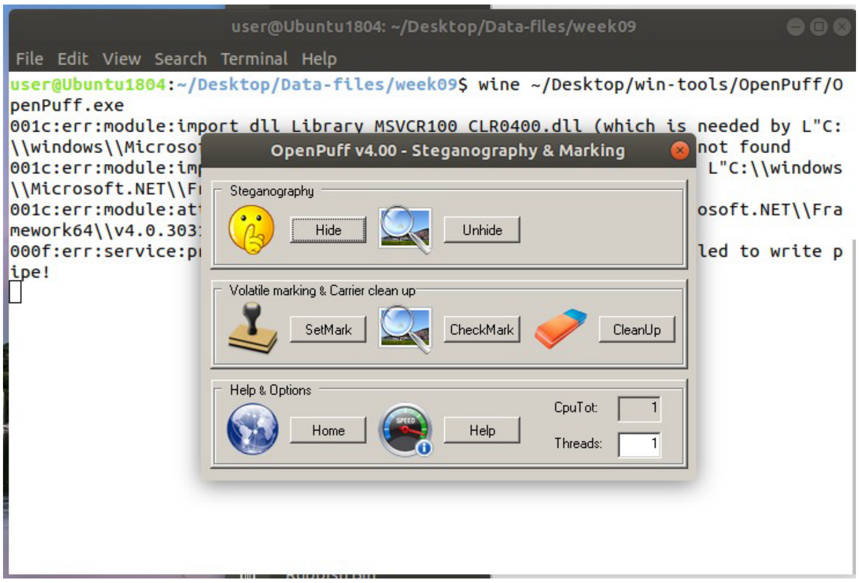
Learning Objectives

1. Practice using tools to hide and unhide steganographic content, and perform extraction of digital evidence for a case involving multimedia steganography.
2. Practice using tools to encrypt messages and decrypt cryptographic content, and perform extraction of digital evidence for a case involving cryptography.

1. Multimedia Steganography by Using OpenPuff

OpenPuff is one of the most powerful tools for performing multimedia steganography. It supports not only image files but also audio and video files. For simplicity, we use a simple example to show how it is used.

Because OpenPuff we use is a Windows executable file, we need to use the Windows emulator "wine". Change the directory to "~/Desktop/Data- files/week09", then type the command "**wine ~/Desktop/win-tools/OpenPuff/OpenPuff.exe**". You will see the following screenshot.



```
user@Ubuntu1804:~/Desktop/Data-files/week09$ wine ~/Desktop/win-tools/OpenPuff/O
penPuff.exe
001c:err:module:import dll Library MSVCR100 CLR0400.dll (which is needed by L"C:
\\windows\\Microso                                                    not found
001c:err:module:im                                                    L"C:\\windows
\\Microsoft.NET\\F
001c:err:module:at                                                   osoft.NET\\Fra
mework64\\v4.0.303
000f:err:service:p                                                   led to write p
ipe!
```

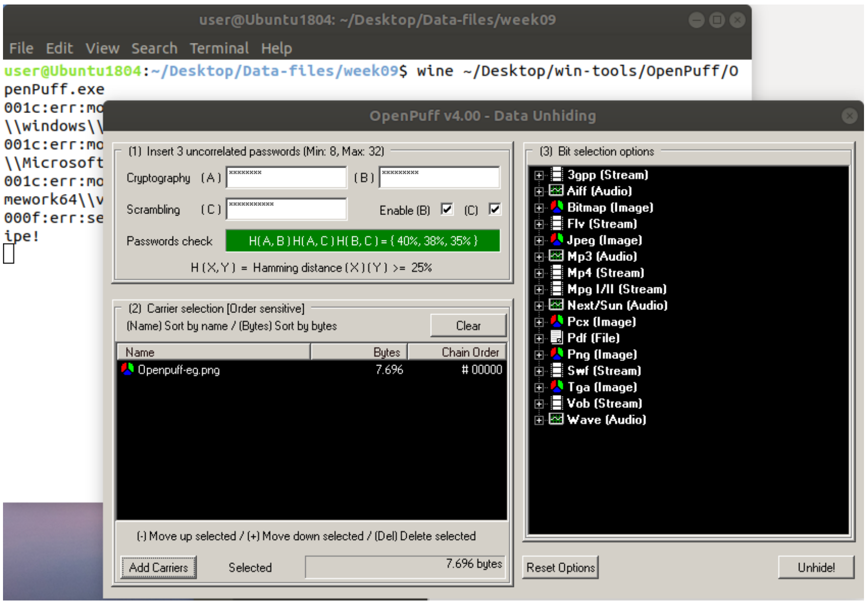
user@Ubuntu1804: ~/Desktop/Data-files/week09
File Edit View Search Terminal Help
OpenPuff v4.00 - Steganography & Marking
Steganography
Hide
Unhide
Volatile marking & Carrier clean up
SetMark
CheckMark
CleanUp
Help & Options
Home
Help

CpuTot: 1
Threads: 1

The user interface is quite straightforward. The most commonly used features are

“Hide” and “Unhide”. We will show you an example of “Unhide” which is relevant to forensic investigations. You are encouraged to try the “Hide” function yourself.

Click on button “Unhide”, then the user interface will be updated. You need to fill in three passwords as (A), (B), and (C). The passwords are: (A) as “M.Gibson”, (B) as “Schenkkan”, and (C) as “Okinawa1945”. These three passwords should be filled in the panel (1) as shown below. For panel (2), navigate to the week09 folder by clicking the “Add Carriers” button and choose the file “Openpuff-eg.png”. Leave the options in panel (3) unchanged.



```
user@Ubuntu1804:~/Desktop/Data-files/week09$ wine ~/Desktop/win-tools/OpenPuff/O
penPuff.exe
001c:err:mo
\\windows\\
001c:err:mo
\\Microsoft
001c:err:mo
mework64\\v
000f:err:se
ipe!
```

OpenPuff v4.00 - Data Unhiding

(1) Insert 3 uncorrelated passwords (Min: 8, Max: 32)

Cryptography (A) ********* (B) **********

Scrambling (C) ************ Enable (B) ☑ (C) ☑

Passwords check H(A, B) H(A, C) H(B, C) = { 40%, 38%, 35% }

H (X,Y) = Hamming distance (X) (Y) >= 25%

(2) Carrier selection [Order sensitive]

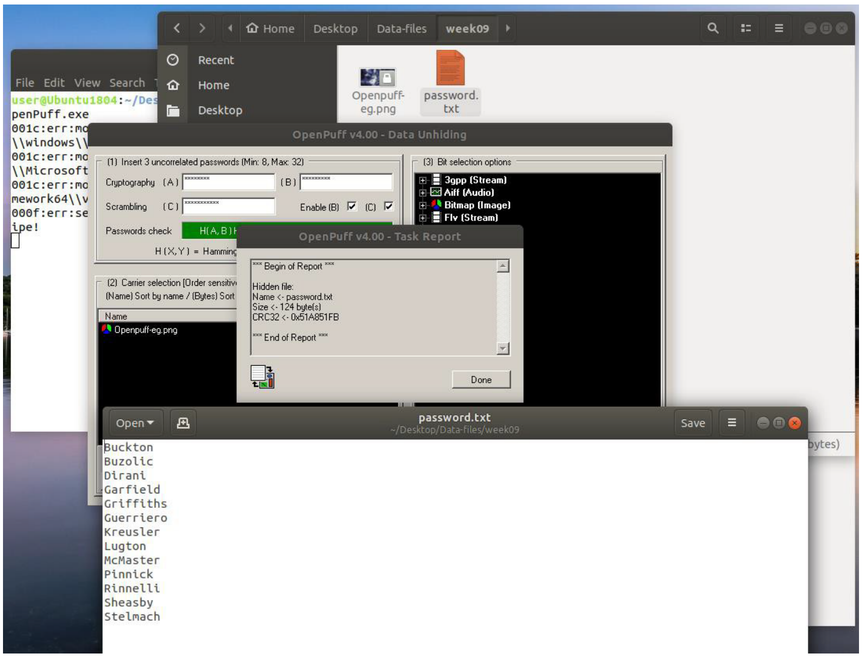
(Name) Sort by name / (Bytes) Sort by bytes

Name	Bytes	Chain Order
Openpuff-eg.png	7.696	# 00000

(-) Move up selected / (+) Move down selected / (Del) Delete selected

Selected 7.696 bytes

Click the button “Unhide!” and then choose the location for the extracted contents. We will obtain a secret password list as shown below:



OpenPuff v4.00 - Task Report

```
*** Begin of Report ***

Hidden file:
Name <- password.txt
Size <- 124 byte(s)
CRC32 <- 0x51A851FB

*** End of Report ***
```

password.txt
~/Desktop/Data-files/week09

```
Buckton
Buzolic
Dirani
Garfield
Griffiths
Guerriero
Kreusler
Lugton
McMaster
Pinnick
Rinnelli
Sheasby
Stelmach
```

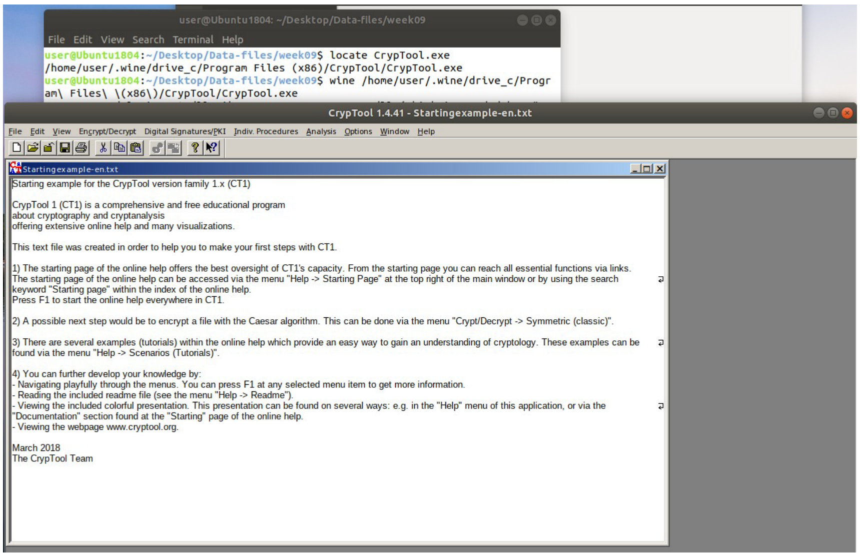
Spend at least 10 mins to try different combinations of the three keys and see whether you can reveal the same list of passwords. For your knowledge, please try to hide the secrets of your own with OpenPuff.

2. Introducing CrypTool

CrypTool is a bundle of cryptographic tools. We have installed a Windows version of CrypTool in the virtual machine. (The Java version does not offer the same level of functionalities, therefore the Windows version is chosen.) Use the Windows emulator "wine" to launch the program. As in previous workshops, the path is a little tricky to type. You need to follow the exact same path or use double/single quotes to enclose the path names with space:
"**wine /home/user/.wine/drive_c/Program\ Files\ \(x86\)/CrypTool/CrypTool.exe**",
"**wine ~/.wine/drive_c/Program\ Files\ \(x86\)/CrypTool/CrypTool.exe**", or
"wine ~/.wine/drive_c/'Program Files (x86)'/CrypTool/CrypTool.exe"

NOTE: In the command ensure there is a space:
between wine and ~
after Program\
between the back slashes of Files\ \

then you will see the following interface:



```
user@Ubuntu1804:~/Desktop/Data-files/week09$ locate CrypTool.exe
/home/user/.wine/drive_c/Program Files (x86)/CrypTool/CrypTool.exe
user@Ubuntu1804:~/Desktop/Data-files/week09$ wine /home/user/.wine/drive_c/Progr
am\ Files\ \(x86\)/CrypTool/CrypTool.exe
```

user@Ubuntu1804: ~/Desktop/Data-files/week09
File Edit View Search Terminal Help
CrypTool 1.4.41 - Startingexample-en.txt
File Edit View Encrypt/Decrypt Digital Signatures/PKI Indiv. Procedures Analysis Options Window Help
Startingexample-en.txt

Starting example for the CrypTool version family 1.x (CT1)

CrypTool 1 (CT1) is a comprehensive and free educational program
about cryptography and cryptanalysis
offering extensive online help and many visualizations.

This text file was created in order to help you to make your first steps with CT1.

1) The starting page of the online help offers the best oversight of CT1's capacity. From the starting page you can reach all essential functions via links.
The starting page of the online help can be accessed via the menu "Help -> Starting Page" at the top right of the main window or by using the search keyword "Starting page" within the index of the online help.
Press F1 to start the online help everywhere in CT1.

2) A possible next step would be to encrypt a file with the Caesar algorithm. This can be done via the menu "Crypt/Decrypt -> Symmetric (classic)".

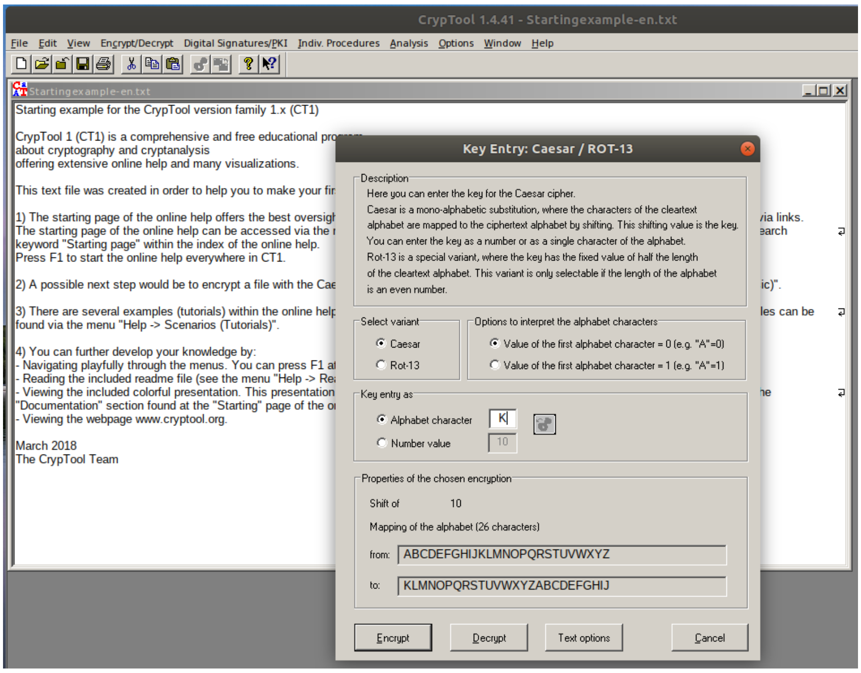
3) There are several examples (tutorials) within the online help which provide an easy way to gain an understanding of cryptology. These examples can be found via the menu "Help -> Scenarios (Tutorials)".

4) You can further develop your knowledge by:
- Navigating playfully through the menus. You can press F1 at any selected menu item to get more information.
- Reading the included readme file (see the menu "Help -> Readme").
- Viewing the included colorful presentation. This presentation can be found on several ways: e.g. in the "Help" menu of this application, or via the "Documentation" section found at the "Starting" page of the online help.
- Viewing the webpage www.cryptool.org.

March 2018
The CrypTool Team

There are many different ways of using the CrypTool. We only teach a few simple steps that are relevant to this unit. We recommend you to watch several video clips on this list https://www.youtube.com/results?search_query=cryptool+tutorial.

We will use the most famous example of Caesar cipher to show how to encrypt and decrypt a message in text. Because the readme file is loaded by default, we will encrypt it by using the Caesar cipher. Choose the menu "Encrypt/Decrypt > Symmetric (Classic) > Caesar/ROT-13" and then choose the encryption key to be the letter "K" as shown below:



CrypTool 1.4.41 - Startingexample-en.txt

File Edit View Encrypt/Decrypt Digital Signatures/PKI Indiv. Procedures Analysis Options Window Help

Startingexample-en.txt

```
Starting example for the CrypTool version family 1.x (CT1)

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```

Key Entry: Caesar / ROT-13

Description

Here you can enter the key for the Caesar cipher.
Caesar is a mono-alphabetic substitution, where the characters of the cleartext alphabet are mapped to the ciphertext alphabet by shifting. This shifting value is the key.
You can enter the key as a number or as a single character of the alphabet.
Rot-13 is a special variant, where the key has the fixed value of half the length of the cleartext alphabet. This variant is only selectable if the length of the alphabet is an even number.

Select variant
● Caesar
○ Rot-13

Options to interpret the alphabet characters
● Value of the first alphabet character = 0 (e.g. "A"=0)
○ Value of the first alphabet character = 1 (e.g. "A"=1)

Key entry as
● Alphabet character: K
○ Number value: 10

Properties of the chosen encryption

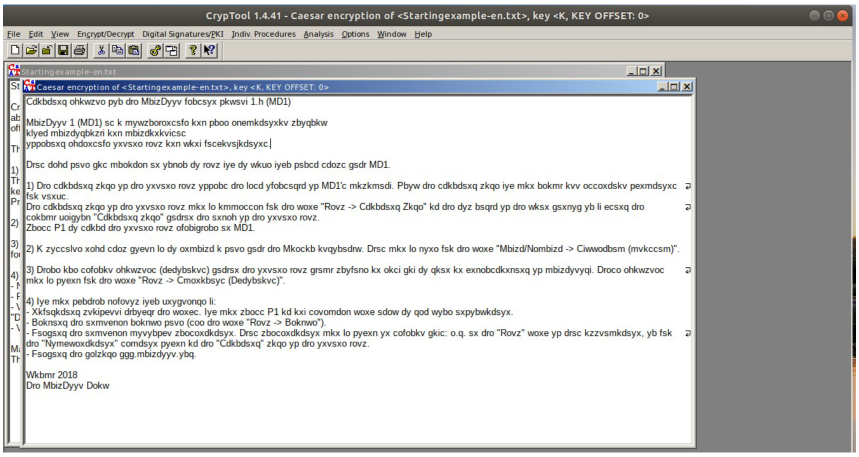
Shift of 10

Mapping of the alphabet (26 characters)

from: ABCDEFGHIJKLMNOPQRSTUVWXYZ

to: KLMNOPQRSTUVWXYZABCDEFGHIJ

Click the button “Encrypt” and you will see the following:



CrypTool 1.4.41 - Caesar encryption of <Startingexample-en.txt>, key <K, KEY OFFSET: 0>

File Edit View Encrypt/Decrypt Digital Signatures/PKI Indiv. Procedures Analysis Options Window Help
Startingexample-en.txt

Caesar encryption of <Startingexample-en.txt>, key <K, KEY OFFSET: 0>

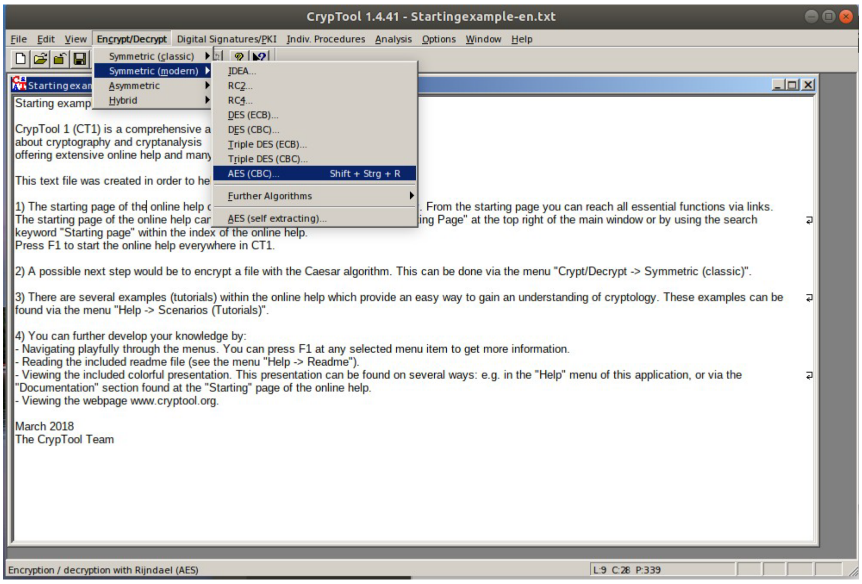
```
Cdkbdsxq ohkwzvo pyb dro MbizDyyv fobcsyx pkwsvi 1.h (MD1)

MbizDyyv 1 (MD1) sc k mywzboroxcsfo kxn pboo onemkdsyxkv zbyqbkw
klyed mbizdyqbkzri kxn mbizdkxkvicsc
yppobsxq ohdoxcsfo yxvsxo rovz kxn wkxi fscekvsjkdsyxc.

Drsc dohd psvo gkc mbokdon sx ybnob dy rovz iye dy wkuo iyeb psbcd cdozc gsdr MD1.

1) Dro cdkbdsxq zkqo yp dro yxvsxo rovz yppobc dro locd yfobcsqrd yp MD1'c mkzkmsdi. Pbyw dro cdkbdsxq zkqo iye mkx bokmr kvv occoxdskv pexmdsyxc
fsk vsxuc.
Dro cdkbdsxq zkqo yp dro yxvsxo rovz mkx lo kmmoccon fsk dro woxe "Rovz -> Cdkbdsxq Zkqo" kd dro dyz bsqrd yp dro wksx gsxnyg yb li ecsxq dro
cokbmr uoigybn "Cdkbdsxq zkqo" gsdrsx dro sxnoh yp dro yxvsxo rovz.
Zbocc P1 dy cdkbd dro yxvsxo rovz ofobigrobo sx MD1.

2) K zyccslvo xohd cdoz gyevn lo dy oxmbizd k psvo gsdr dro Mkockb kvqybsdrw. Drsc mkx lo nyxo fsk dro woxe "Mbizd/Nombizd -> Ciwwodbsm (mvkccsm)".

3) Drobo kbo cofobkv ohkwzvoc (dedybskvc) gsdrsx dro yxvsxo rovz grsmr zbyfsno kx okci gki dy qksx kx exnobcdkxnsxq yp mbizdyvyqi. Droco ohkwzvoc
mkx lo pyexn fsk dro woxe "Rovz -> Cmoxkbsyc (Dedybskvc)".

4) Iye mkx pebdrob nofovyz iyeb uxygvonqo li:
- Xkfsqkdsxq zvkipevvi drbyeqr dro woxec. Iye mkx zbocc P1 kd kxi covomdon woxe sdow dy qod wybo sxpybwkdsyx.
- Boknsxq dro sxmvenon boknwo psvo (coo dro woxe "Rovz -> Boknwo").
- Fsogsxq dro sxmvenon myvybpev zbocoxdkdsyx. Drsc zbocoxdkdsyx mkx lo pyexn yx cofobkv gkic: o.q. sx dro "Rovz" woxe yp drsc kzzvsmkdsyx, yb fsk
dro "Nymewoxdkdsyx" comdsyx pyexn kd dro "Cdkbdsxq" zkqo yp dro yxvsxo rovz.
- Fsogsxq dro golzkqo ggg.mbizdyyv.ybq.

Wkbmr 2018
Dro MbizDyyv Dokw
```

Now, spend a few minutes to decrypt the cipher text to the original texts. This is a simple encryption. We will do a more advanced encryption in Section 3.

3. Introducing AES Encryption and BASE64 Encoding

Classic ciphers are known to be weak in today’s computer systems. And they are not used in general practices other than in the educational context. One of the most robust and widely used ciphers is AES. We will learn how AES works by using CrypTool.

In CrypTool, choose the menu option “Encrypt/Decrypt > Symmetric (modern) > AES (CBC) …” as shown below:



```
Starting examp

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"Documentation" section found at the "Starting" page of the online help.
- Viewing the webpage www.cryptool.org.

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The CrypTool Team
```
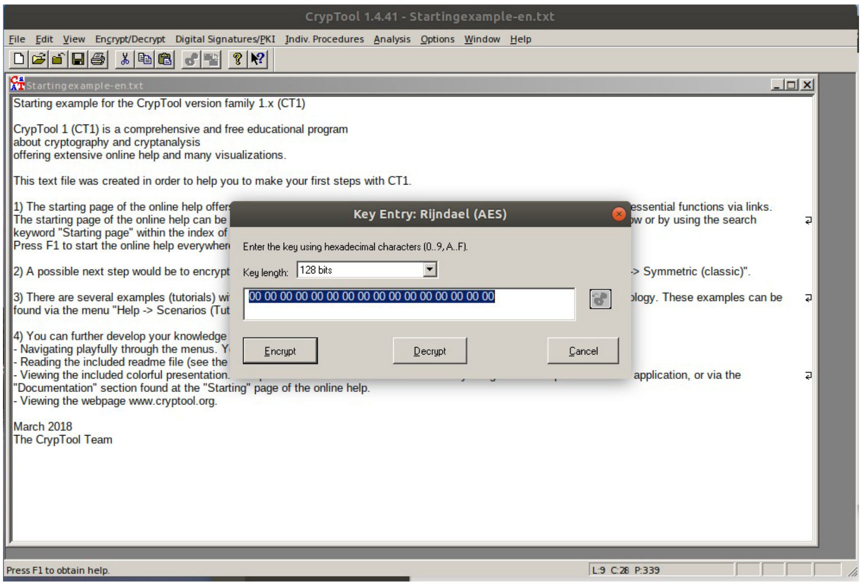

Encryption / decryption with Rijndael (AES)   L:9 C:28 P:339

Then a message box will pop up and prompt you for a password. By default, it is a 128-bit password in Hex values. Remember the Hex value. For any text passwords, you will need to convert it to its Hex value before you can proceed.


CrypTool 1.4.41 - Startingexample-en.txt
File Edit View Encrypt/Decrypt Digital Signatures/PKI Indiv. Procedures Analysis Options Window Help
Startingexample-en.txt
Key Entry: Rijndael (AES)
Encrypt
Decrypt
Cancel

```
Starting example for the CrypTool version family 1.x (CT1)

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keyword "Starting page" within the index of
Press F1 to start the online help everywhere

2) A possible next step would be to encrypt                    -> Symmetric (classic)".

3) There are several examples (tutorials) wi                    ology. These examples can be
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4) You can further develop your knowledge
- Navigating playfully through the menus. Y
- Reading the included readme file (see the
- Viewing the included colorful presentation.                    application, or via the
"Documentation" section found at the "Starting" page of the online help.
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```

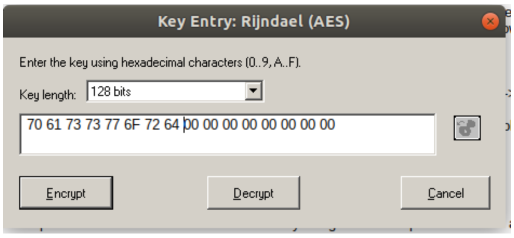
Enter the key using hexadecimal characters (0..9, A..F).

Key length: 128 bits

00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Press F1 to obtain help.   L:9 C:28 P:339

Let us choose the password with Hex values “0x70617373776F7264”. Leave the rest bits as 00s. It should be something similar to the following:

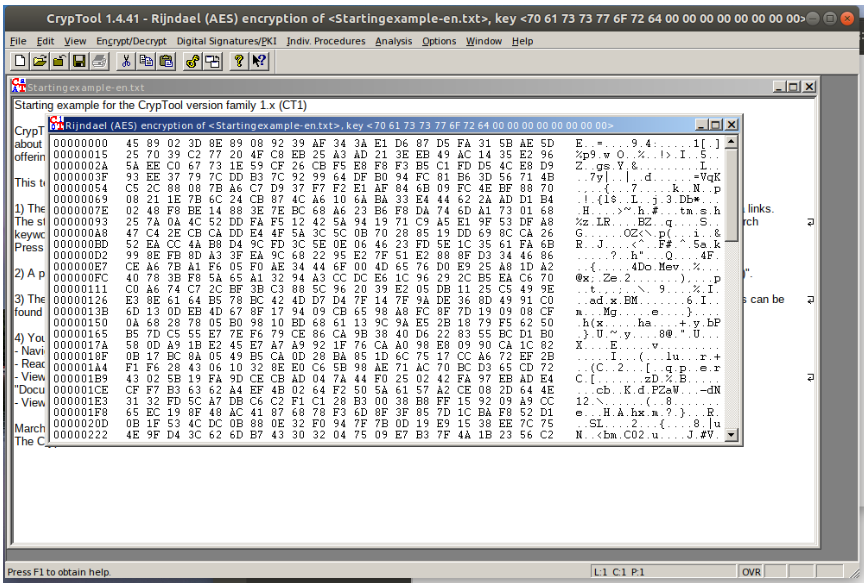


Enter the key using hexadecimal characters (0..9, A..F).

Key length: 128 bits

70 61 73 73 77 6F 72 64 00 00 00 00 00 00 00 00

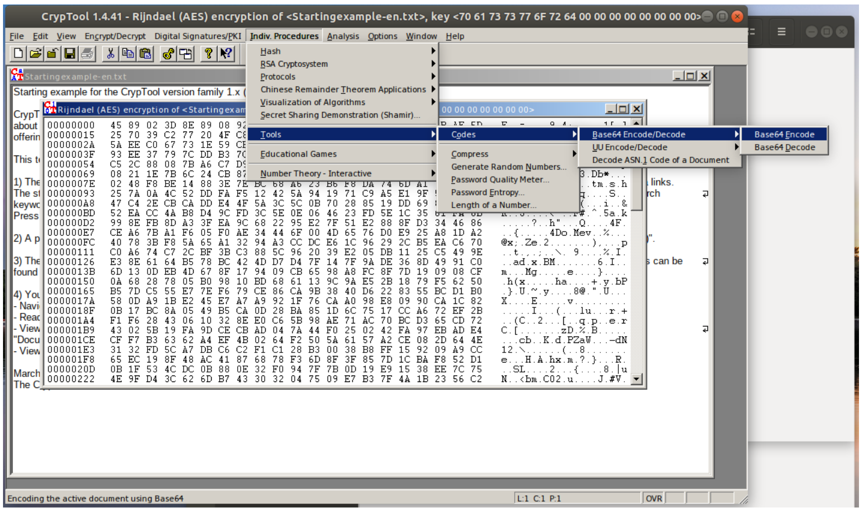
Click the button “Encrypt” and you will see that the readme document is encrypted to a binary file as shown below:


CrypTool 1.4.41 - Rijndael (AES) encryption of <Startingexample-en.txt>, key <70 61 73 73 77 6F 72 64 00 00 00 00 00 00 00 00>
File Edit View Encrypt/Decrypt Digital Signatures/PKI Indiv. Procedures Analysis Options Window Help
Startingexample-en.txt
Starting example for the CrypTool version family 1.x (CT1)
Rijndael (AES) encryption of <Startingexample-en.txt>, key <70 61 73 73 77 6F 72 64 00 00 00 00 00 00 00 00>
Press F1 to obtain help.
L:1 C:1 P:1
OVR

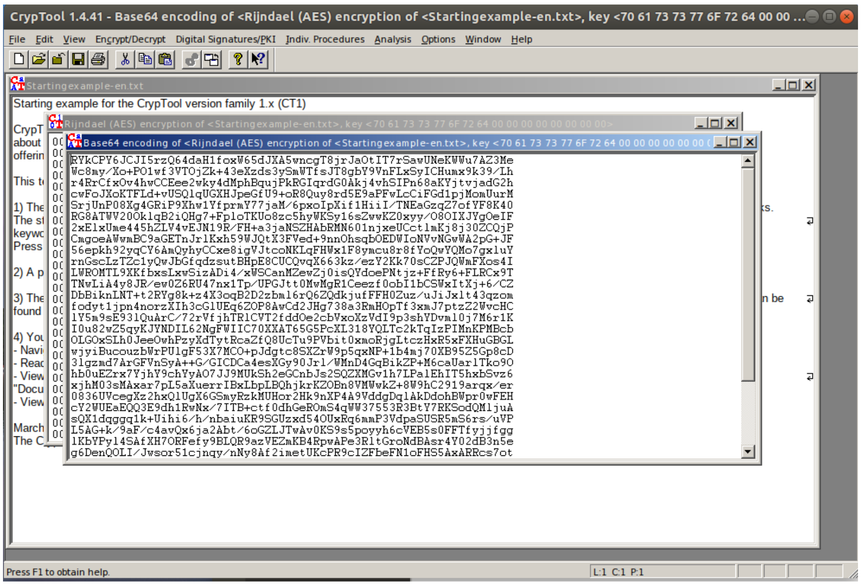
```
00000000  45 89 02 3D 8E 89 08 92 39 AF 34 3A E1 D6 87 D5 FA 31 5B AE 5D  E..=....9.4:.....1[.]
00000015  25 70 39 C2 77 20 4F C8 EB 25 A3 AD 21 3E EB 49 AC 14 35 E2 96  %p9.w O..%..!>.I..5..
0000002A  5A EE C0 67 73 1E 59 CF 26 CB F5 E8 F8 F3 B5 C1 FD D5 4C E8 D9  Z..gs.Y.&.........L..
0000003F  93 EE 37 79 7C DD B3 7C 92 99 64 DF B0 94 FC 81 B6 3D 56 71 4B  ..7y|..|..d......=VqK
00000054  C5 2C 88 08 7B A6 C7 D9 37 F7 F2 E1 AF 84 6B 09 FC 4E BF 88 70  .,..{...7.....k..N..p
00000069  08 21 1E 7B 6C 24 CB 87 4C A6 10 6A BA 33 E4 44 62 2A AD D1 B4  .!.{l$..L..j.3.Db*...
0000007E  02 48 F8 BE 14 88 3E 7E BC 68 A6 23 B6 F8 DA 74 6D A1 73 01 68  .H....>~.h.#...tm.s.h
00000093  25 7A 0A 4C 52 DD FA F5 12 42 5A 94 19 71 C9 A5 E1 9F 53 DF A8  %z.LR....BZ..q....S..
000000A8  47 C4 2E CB CA DD E4 4F 5A 3C 5C 0B 70 28 85 19 DD 69 8C CA 26  G.....OZ<\.p(...i..&
000000BD  52 EA CC 4A B8 D4 9C FD 3C 5E 0E 06 46 23 FD 5E 1C 35 61 FA 6B  R..J....<^..F#.^.5a.k
000000D2  99 8E FB 8D A3 3F EA 9C 68 22 95 E2 7F 51 E2 88 8F D3 34 46 86  .....?..h"...Q....4F.
000000E7  CE A6 7B A1 F6 05 F0 AE 34 44 6F 00 4D 65 76 D0 E9 25 A8 1D A2  ..{.....4Do.Mev..%...
000000FC  40 78 3B F8 5A 65 A1 32 94 A3 CC DC E6 1C 96 29 2C B5 EA C6 70  @x;.Ze.2.......),...p
00000111  C0 A6 74 C7 2C BF 3B C3 88 5C 96 20 39 E2 05 DB 11 25 C5 49 9E  ..t.,.;..\. 9....%.I.
00000126  E3 8E 61 64 B5 78 BC 42 4D D7 D4 7F 14 7F 9A DE 36 8D 49 91 C0  ..ad.x.BM.......6.I..
0000013B  6D 13 0D EB 4D 67 8F 17 94 09 CB 65 98 A8 FC 8F 7D 19 09 08 CF  m...Mg.....e....}....
00000150  0A 68 28 78 05 B0 98 10 BD 68 61 13 9C 9A E5 2B 18 79 F5 62 50  .h(x.....ha....+.y.bP
00000165  B5 7D C5 55 E7 7E F6 79 CE 86 CA 9B 38 40 D6 22 83 55 BC D1 B0  .}.U.~.y....8@.".U...
0000017A  58 0D A9 1B E2 45 E7 A7 A9 92 1F 76 CA A0 98 E8 09 90 CA 1C 82  X....E.....v.........
0000018F  0B 17 BC 8A 05 49 B5 CA 0D 28 BA 85 1D 6C 75 17 CC A6 72 EF 2B  .....I...(...lu...r.+
000001A4  F1 F6 28 43 06 10 32 8E E0 C6 5B 98 AE 71 AC 70 BC D3 65 CD 72  ..(C..2...[..q.p..e.r
000001B9  43 02 5B 19 FA 9D CE CB AD 04 7A 44 F0 25 02 42 FA 97 EB AD E4  C.[.......zD.%.B.....
000001CE  CF F7 B3 63 62 A4 EF 4B 02 64 F2 50 5A 61 57 A2 CE 08 2D 64 4E  ...cb..K.d.PZaW...-dN
000001E3  31 32 FD 5C A7 DB C6 C2 F1 C1 28 B3 00 38 B8 FF 15 92 09 A9 CC  12.\.......(..8......
000001F8  65 EC 19 8F 48 AC 41 87 68 78 F3 6D 8F 3F 85 7D 1C BA F8 52 D1  e...H.A.hx.m.?.}...R.
0000020D  0B 1F 53 4C DC 0B 88 0E 32 F0 94 7F 7B 0D 19 E9 15 38 EE 7C 75  ..SL....2...{....8.|u
00000222  4E 9F D4 3C 62 6D B7 43 30 32 04 75 09 E7 B3 7F 4A 1B 23 56 C2  N..<bm.C02.u....J.#V.
```

It is a binary file, but binary is difficult for us to work with in most cases. We need to convert this to a text file. Fortunately, BASE64 is a powerful algorithm that converts any binary contents to text format. And CrypTool includes BASE64.

Choose the menu option “Indiv. Procedures >Tools >Codes >Base64 Encode/Decode >Base64 Encode”


CrypTool 1.4.41 - Rijndael (AES) encryption of <Startingexample-en.txt>, key <70 61 73 73 77 6F 72 64 00 00 00 00 00 00 00 00>
File Edit View Encrypt/Decrypt Digital Signatures/PKI Indiv. Procedures Analysis Options Window Help
Hash
RSA Cryptosystem
Protocols
Chinese Remainder Theorem Applications
Visualization of Algorithms
Secret Sharing Demonstration (Shamir)...
Tools
Educational Games
Number Theory - Interactive
Codes
Compress
Generate Random Numbers...
Password Quality Meter...
Password Entropy...
Length of a Number...
Base64 Encode/Decode
UU Encode/Decode
Decode ASN.1 Code of a Document
Base64 Encode
Base64 Decode
Startingexample-en.txt
Starting example for the CrypTool version family 1.x
Encoding the active document using Base64
L:1 C:1 P:1
OVR

Then, you will see the following screen. The binary contents have been converted to text.



CrypTool 1.4.41 - Base64 encoding of <Rijndael (AES) encryption of <Startingexample-en.txt>, key <70 61 73 73 77 6F 72 64 00 00 ...
File Edit View Encrypt/Decrypt Digital Signatures/PKI Indiv. Procedures Analysis Options Window Help
Startingexample-en.txt
Starting example for the CrypTool version family 1.x (CT1)
Rijndael (AES) encryption of <Startingexample-en.txt>, key <70 61 73 73 77 6F 72 64 00 00 00 00 00 00 00 00>
Base64 encoding of <Rijndael (AES) encryption of <Startingexample-en.txt>, key <70 61 73 73 77 6F 72 64 00 00 00 00 00 00 (
Press F1 to obtain help.
L:1 C:1 P:1

```
RYkCPY6JCJI5rzQ64daH1foxW65dJXA5wncgT8jrJaOtIT7rSawUNeKWWu7AZ3Me
Wc8my/Xo+PO1wf3VTOjZk+43eXzds3ySmWTfsJT8gbY9VnFLxSyICHumx9k39/Lh
r4RrCfxOv4hwCCEee2wky4dMphBqujPkRGIqrdG0Akj4vhSIPn68aKYjtvjadG2h
cwFoJXoKTFLd+vUSQ1qUGXHJpeGfU9+oR8Quy8rd5E9aPFwLcCiFGd1pjMomUurM
SrjUnP08Xg4GRiP9Xhw1YfprmY77jaM/6pxoIpXif1HiiI/TNEaGzqZ7ofYF8K40
RG8ATWV20OklqB2iQHg7+FploTKUo8zc5hyWKSy16sZwwKZ0xyy/O8OIXJYgOeIF
2xElxUme445hZLV4vEJN19R/FH+a3jaNSZHAbRMN601njxeUCctlmKj8j30ZCQjP
CmgoeAWwmBC9aGETnJrlKxh59WJQtX3FVed+9nnOhsqbOEDWIoNVvNGwWA2pG+JF
56epkh92yqCY6AmQyhyCCxe8igVJtcoNKLqFHWx1F8ymcu8r8fYoQwYQMo7gxluY
rnGscLzTZc1yQwJbGfqdzsutBHpE8CUCQvqX663kz/ezY2Kk70sCZPJQWmFXos4I
LWROMTL9XKfbxsLxwSizADi4/xWSCanMZewZj0isQYdoePNtjz+FfRy6+FLRCx9T
TNwLiA4y8JR/ew0Z6RU47nx1Tp/UPGJtt0MwMgR1Ceezf0obI1bCSWxItXj+6/CZ
DbBiknLNT+t2RYg8k+z4X3oqB2D2zbml6rQ6ZQdkjufFFH0Zuz/uJiJxlt43qzom
fodyt1jpn4norzXIh3cGlUEq6ZOP8AwCd2JHg738a3RmHOpTf3xmJ7ptzZ2WvcHC
lY5m9sE93lQuArC/72rVfjhTRlCVT2fddOe2cbVxoXzVdI9p3shYDvml0j7M6r1K
I0u82wZ5qyKJYNDIL62NgFWIIC70XXAT65G5PcXL318YQLTc2kTqIzPIMnKPMBcb
OLGOxSLh0JeeOwhPzyXdTytRcaZfQ8UcTu9PVbit0xmoRjgLtczHxR5xFXHuGBGL
wjyiBucouzbWrPUlgF53X7MCO+pJdgtc8SXZrW9p5qxNP+1b4mj70XB95Z5Gp8cD
3lgzmd7ArGFVnSyA++G/GICDCa4esXGy90Jrl/WMnD4GqBikZP+M6caUarlTko9O
hb0uEZrx7YjhY9chYyAO7JJ9MUkSh2eGCnbJs2SQZXMGv1h7LPalEhIT5hxbSvz6
xjhM03sMAxar7pL5aXuerrIBxLbpLBQhjkrKZOBn8VMWwkZ+8W9hC2919arqx/er
0836UVcegXz2hxQlUgX6GSmyRzkMUHor2Hk9nXP4A9VddgDqlAkDdohBWpr0wFEH
cY2WUEaEQQ3E9dh1RwNx/7ITB+ctf0dhGeROmS4qWW37553R3BtY7RKSodQMljuA
sQX1dqggq1k+Uihi6/h/nbaiuKR9SGUzxd54OUxRq6mmP3VdpaSUSR5mS6rs/uVP
L5AG+k/9aF/c4avQx6ja2Abt/6oGZLJTwAv0KS9s5poyyh6cVEB5s0FFTfyjjfgg
lKbYPyl4SAfXH7ORFefy9BLQR9azVEZmKB4RpwAPe3RltGroNdBAsr4Y02dB3n5e
g6DenQOLI/Jwsor51cjnqy/nNy8Af2imetUKcPR9cIZFbeFN1oFHS5AxARRcs7ot
```

Spend a few more minutes to see the differences between the binary file and the BASE64 encoded text.

4. Forensic Tasks

The text we obtained in Section 3 is saved in file “Cry-Base64-startingexample-en.txt” in the “week09” folder. Decrypt it to the original format using the CrypTool. (Hint: The AES decryption password is the same as the encryption password.)