

Assignment 2: Steganography

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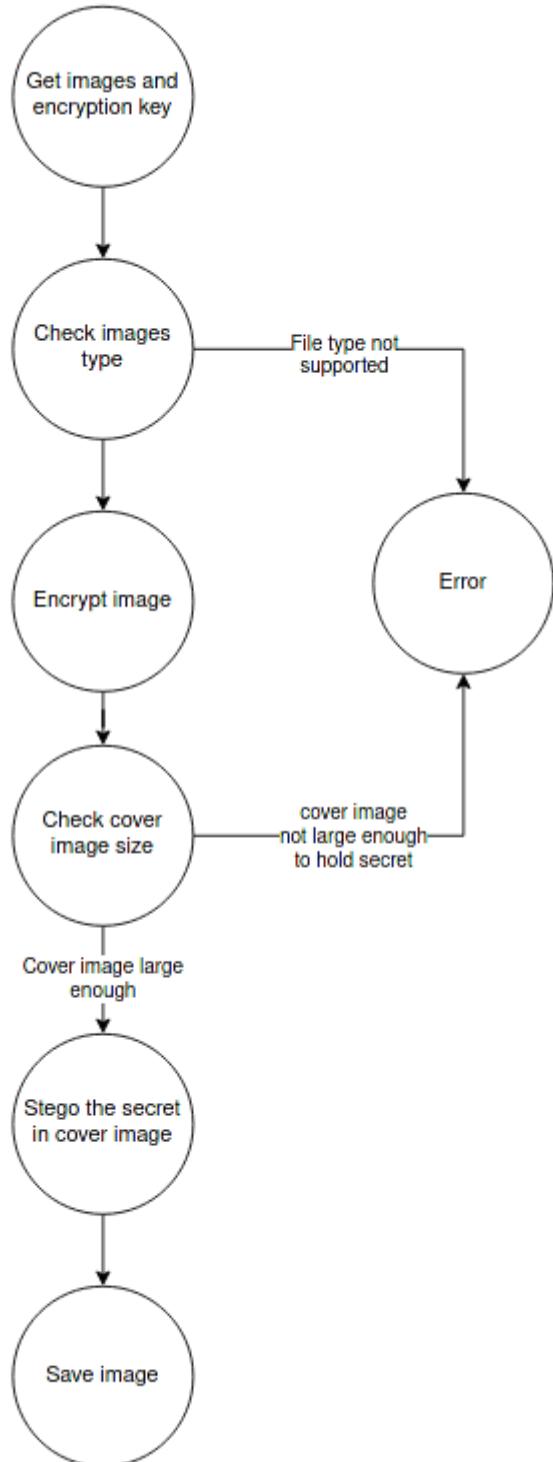
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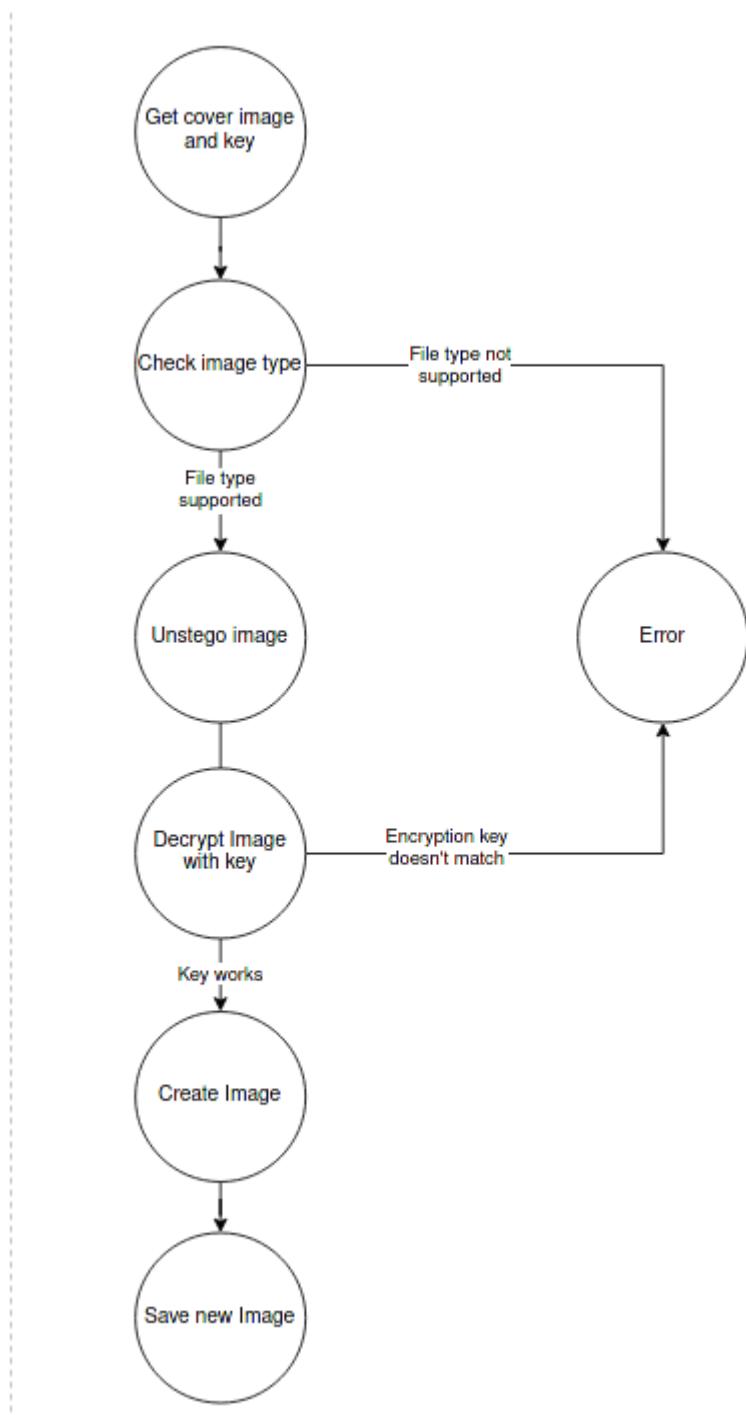
Design

State Diagram

Stego



Unstego



Pseudocode

Stego Images

```
{  
    Get secret and cover images and key  
    If Images file type not supported print Error and Exit  
  
    Encrypt secret image with key  
    If cover image size is not large enough print Error and Exit  
  
    Stego the secret image in the cover image  
    Save image  
}
```

Unstego the Image

```
{  
    Get cover image and key  
    If Images file type not supported print Error and Exit  
  
    Unstego the image  
    If key doesn't work, print Error and Exit  
  
    Decrypt Image  
    Save Image  
}
```

User Guide

Supported file types:

- BMP
- PNG

Usage flags:

```
[keng-arch Source]# ./dcstego
Stego Image:
-t stego -cm [cover image path] -sm [secret image path]

Unstego Image:
-t unstego -cm [cover image path]
```

-t : Type of task [stego, unstego]

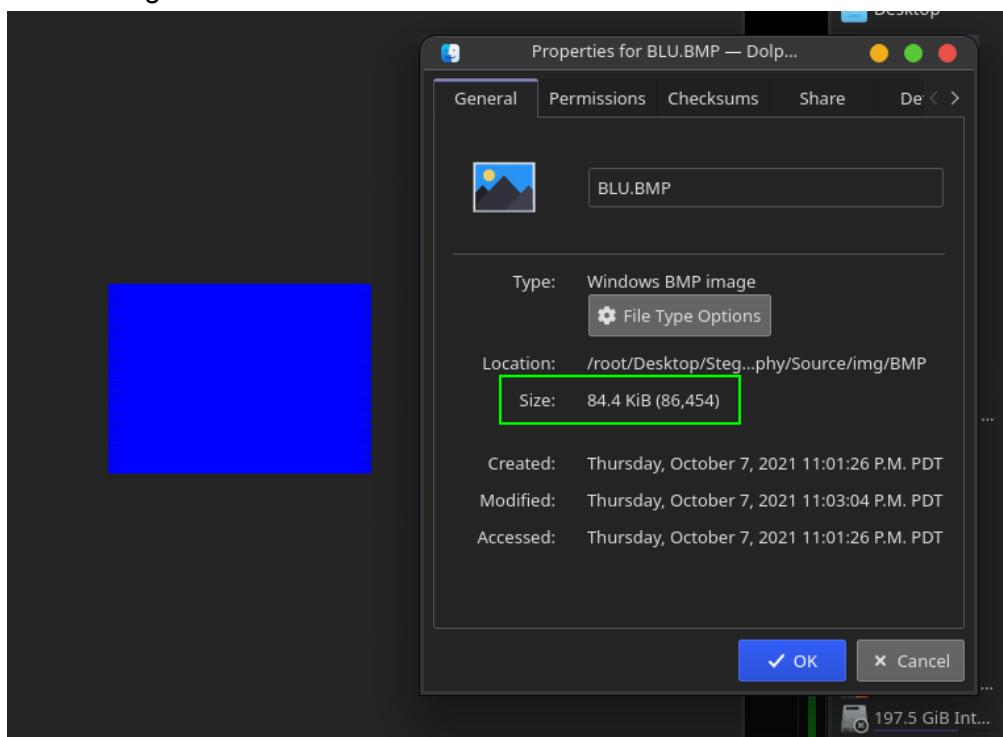
-cm : <cover image path>

-sm : <secret image path>

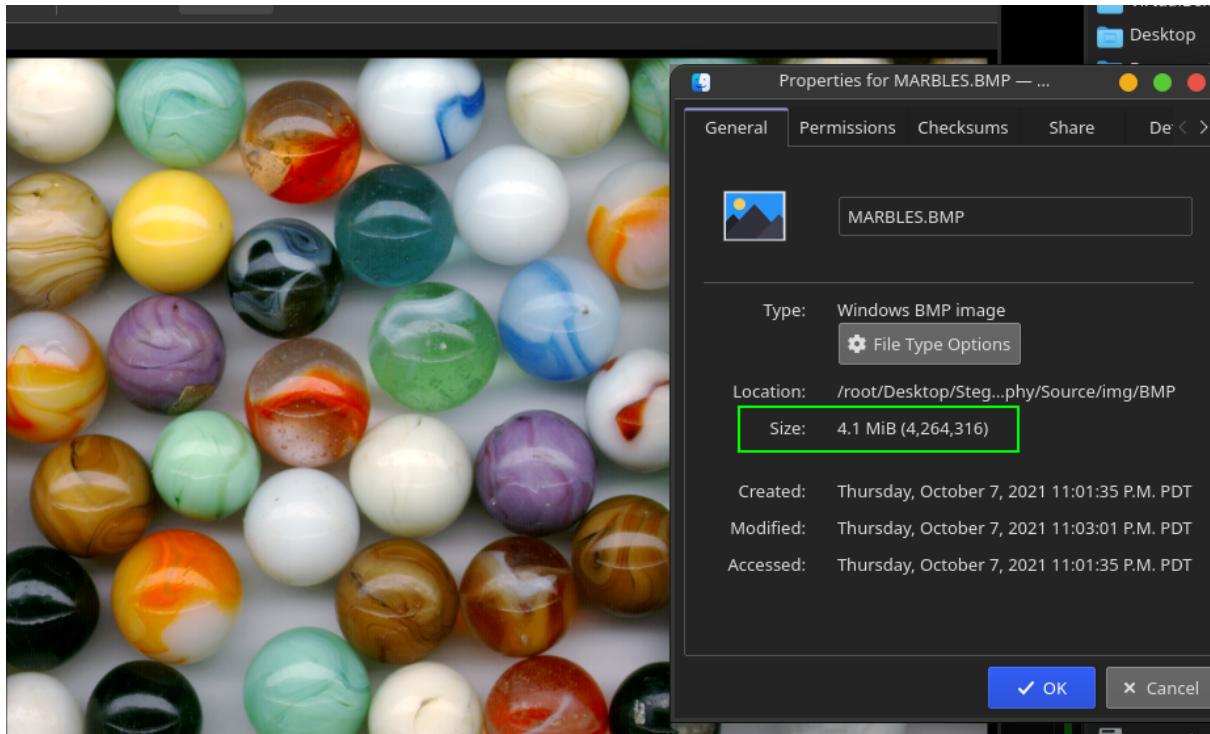
Stego Image

For this example we will be using the file type BMP. Make sure your cover image is 8 times larger than your secret image.

Secret Image:



Cover Image:



1. Open your terminal and go to the source folder and build the application using the makefile

```
[keng-arch Source]# make
gcc -Wall -g -c dcstego.c `pkg-config --cflags --libs MagickWand` -lssl -lcrypto
gcc -Wall -g -c dcimage.c `pkg-config --cflags --libs MagickWand`
gcc -Wall -g -c dcutils.c `pkg-config --cflags --libs MagickWand`
gcc -Wall -g -c helper.c `pkg-config --cflags --libs MagickWand`
gcc -Wall -g -o dcstego dcstego.o dcimage.o dcutils.o helper.o `pkg-config --cflags --libs MagickWand` -lssl -lcrypto
```

2. To start the program and immediately ask for a password key.

```
./dcstego -t stego -cm ./img/BMP/MARBLES.BMP -sm ./img/BMP/BLU.BMP
```

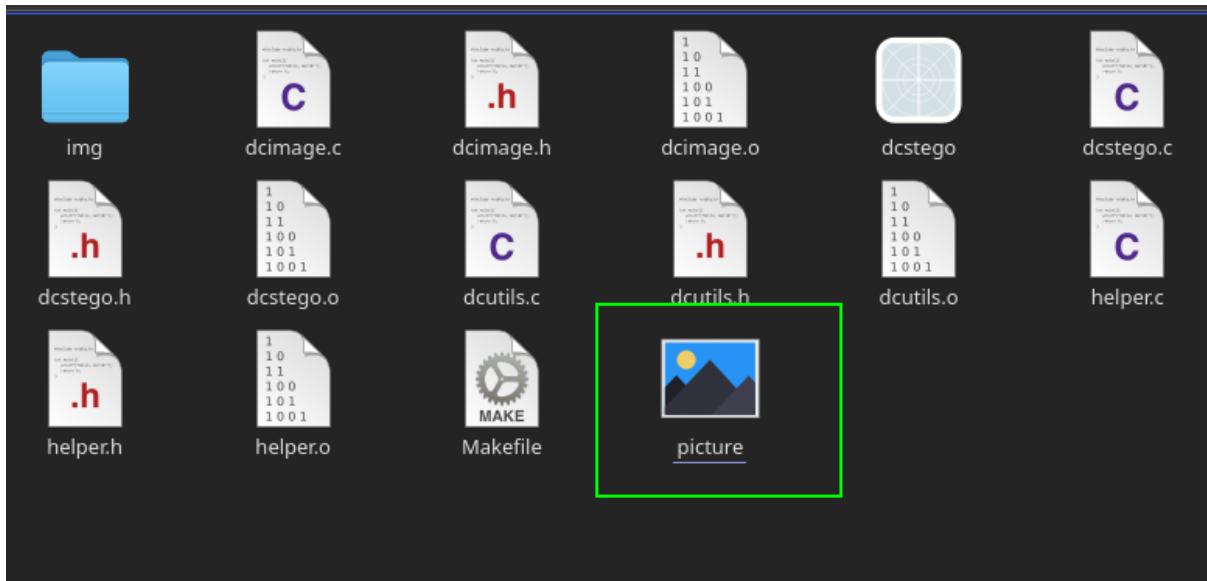
```
[keng-arch Source]# ./dcstego -t stego -cm ./img/BMP/MARBLES.BMP -sm ./img/BMP/BLU.BMP
Starting Stego Process

Enter key:
```

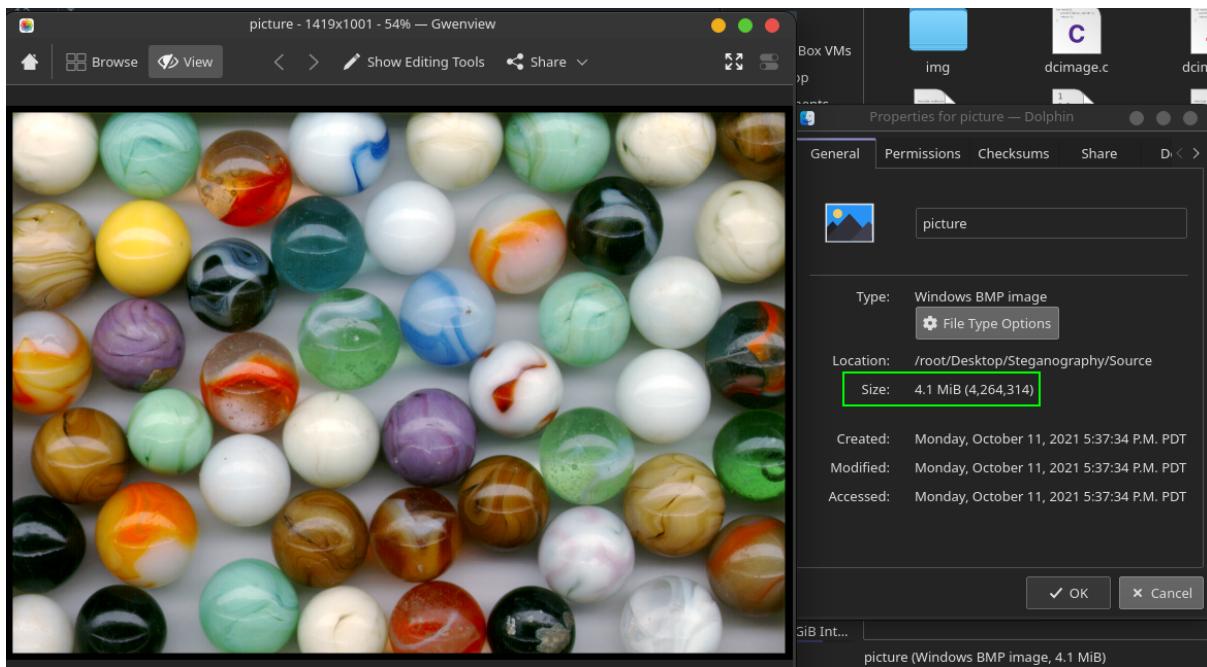
3. Enter the new name for the image created

```
-----
Unstegoing Image...
-----
Enter New Image Name: picture
Saved Image
```

It will create the new image with the inputted name



New image should look exactly like the cover image. It will also have the same size as the original



Unstego Image

- To Unstego the image, enter the following:
`./dcstego -t unstego -cm picture`

- Enter the password key

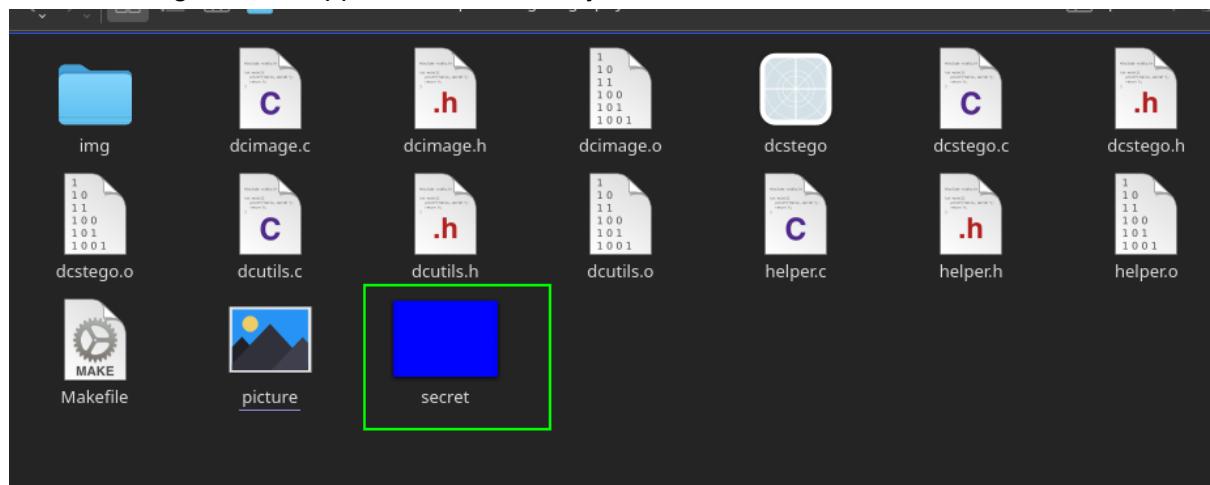
```
[keng-arch Source]# ./dcstego -t unstego -cm picture
Starting Unstego Process

Enter key:
```

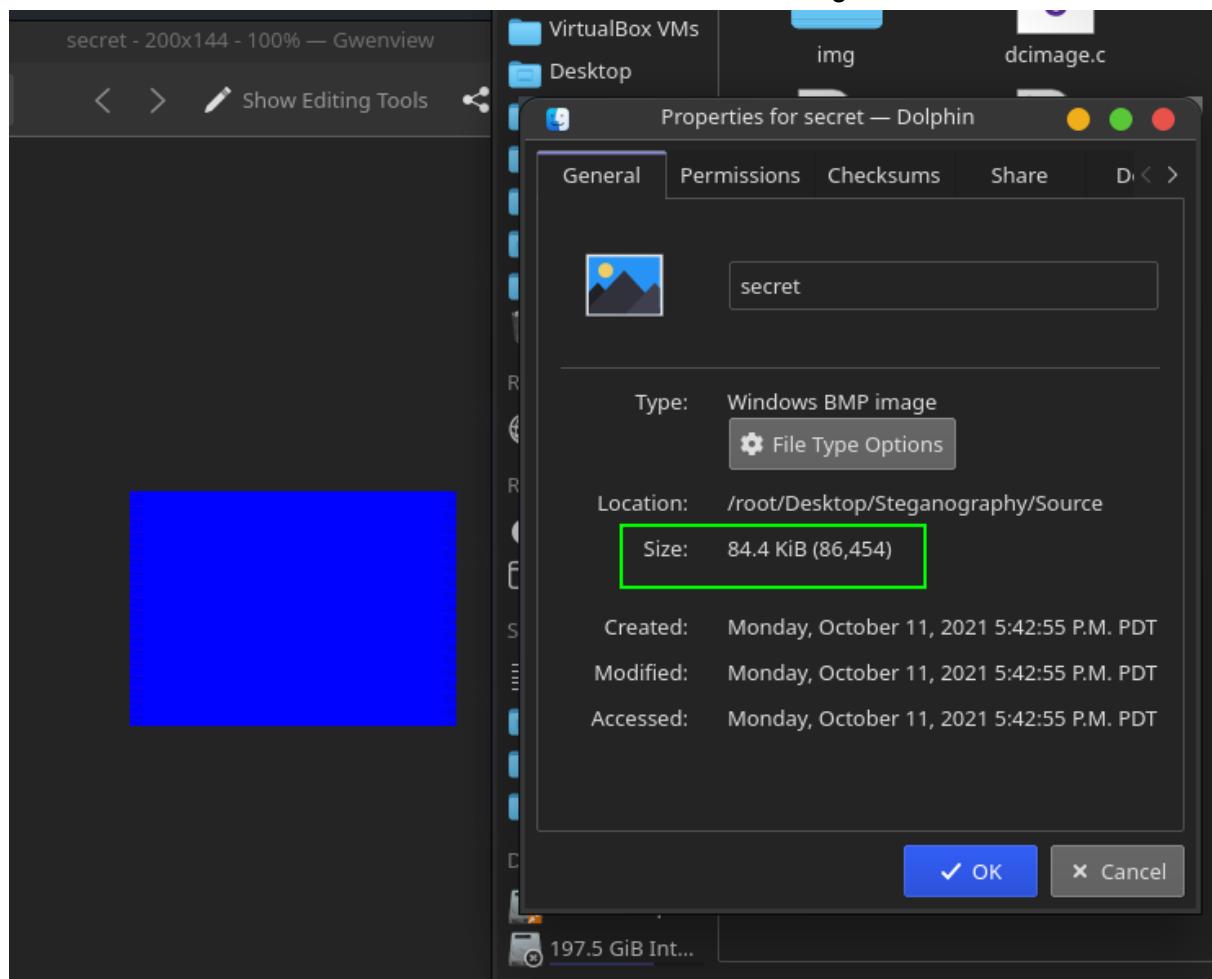
- Wait for it to unstego the image, then enter the new name for the extracted secret image

```
-----
Unstegoing Image...
-----
Enter New Image Name: secret
Done
```

The new image should appear in the directory



And it should look and have the same file size as the secret image



Test

The following table shows the summary of the test cases and its results. View the Case section below to the results in full detail.

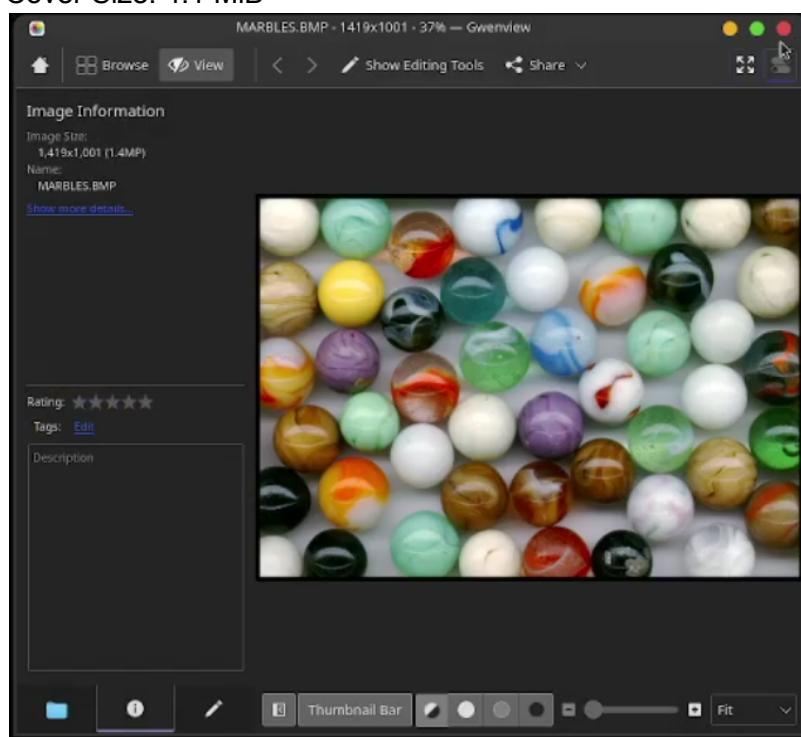
Case #	Conditions	Passed?
1	Use a supported image type (BMP), with a large enough cover image	yes
2	Use a supported image type (PNG), with a large enough cover image	yes
3	Use BMP cover image and PNG secret Image	yes
4	Use PNG cover image and BMP secret Image	yes
5	Use unsupported image type	no
6	Use small cover image	no
7	Use the wrong key	no

Case 1

Use a supported image type (BMP), with a large enough cover image

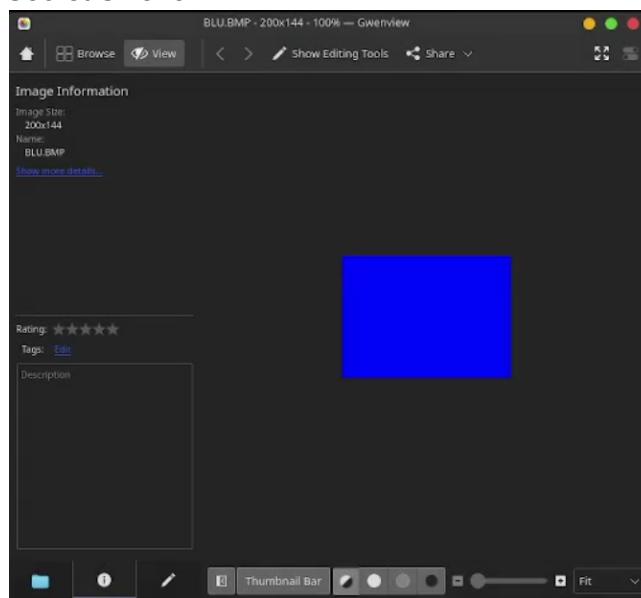
Cover Image: MARBLES.BMP

Cover Size: 4.1 MiB

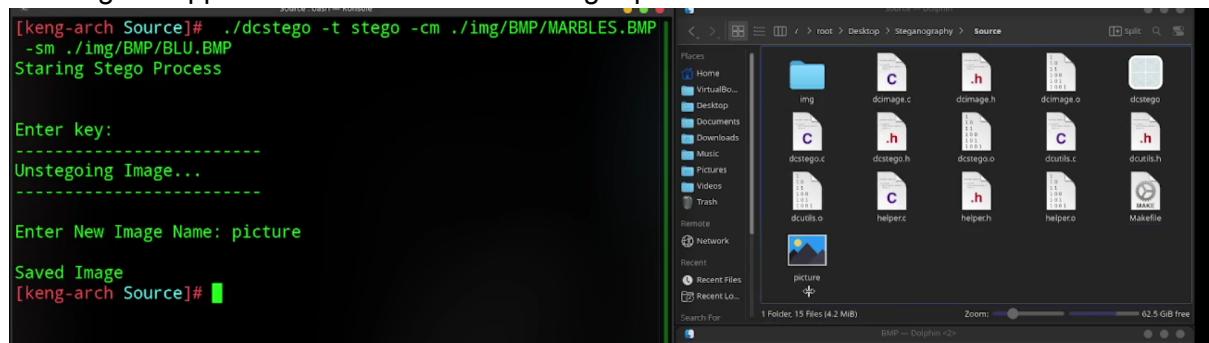


Secret Image: BLU.BMP

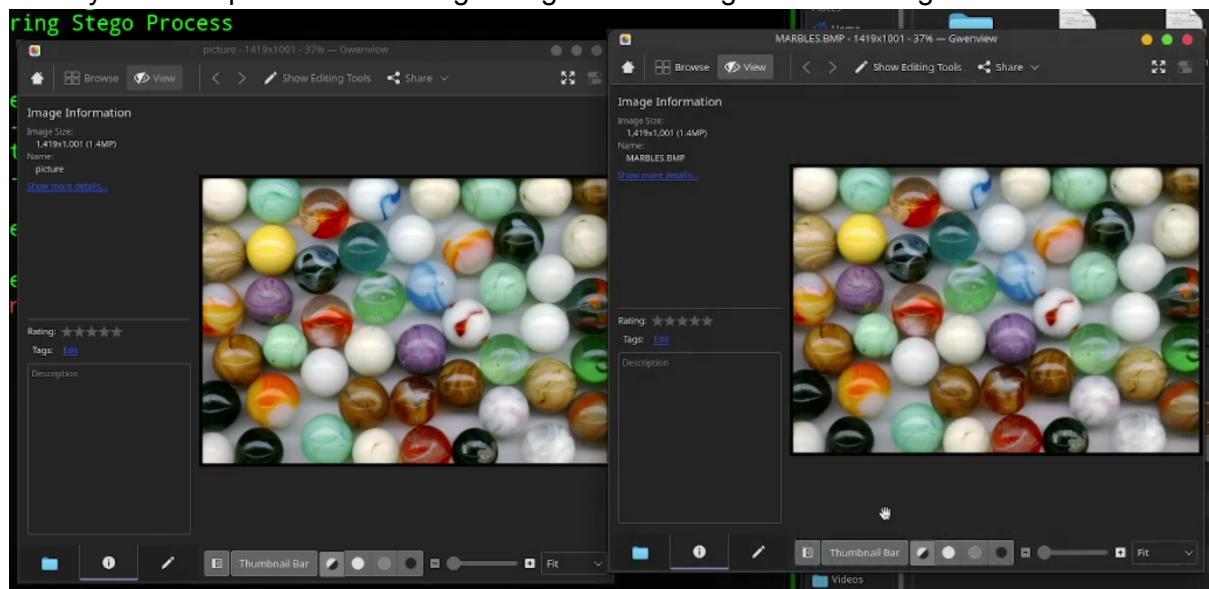
Secret Size: 84.4KiB



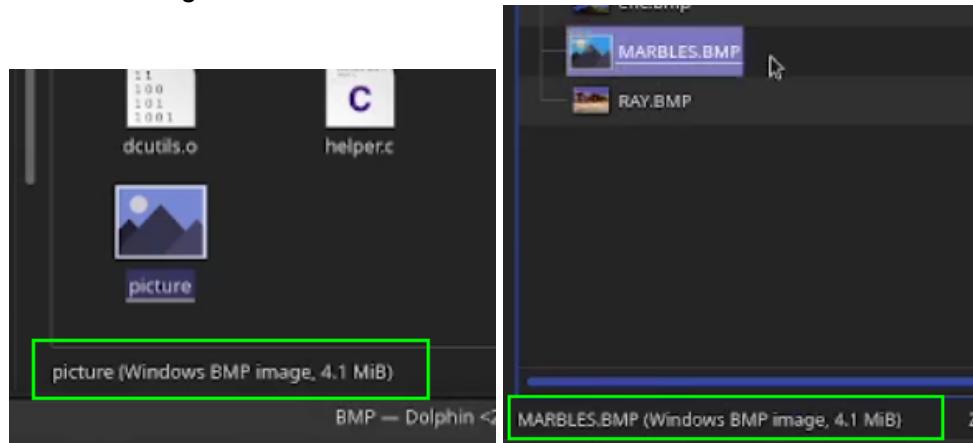
Running the application created the new image “picture”



Side by side comparison of the stego image and the original cover image.



Bothe showing the size of 4.1 MiB

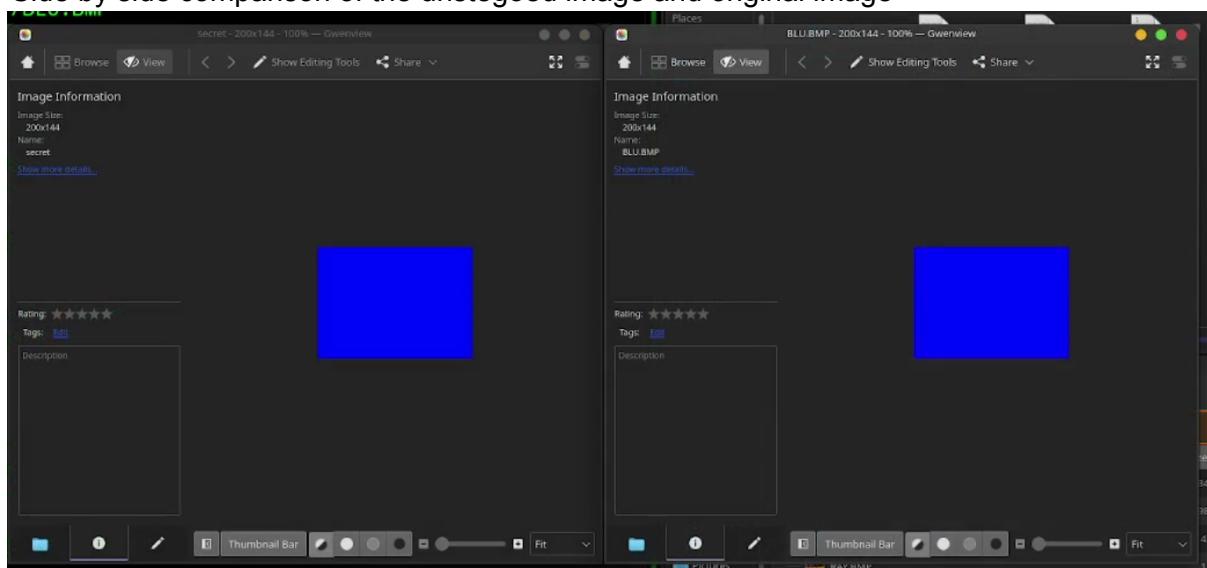


Unstegoing created the secret image

```
Unstegoing Image...
-----
Enter New Image Name: picture
Saved Image
[keng-arch Source]# ./dcstego -t unstego -cm picture
Starting Unstego Process

Enter key:
-----
Unstegoing Image...
-----
Enter New Image Name: secret
Done
[keng-arch Source]# 
```

Side by side comparison of the unstegoed image and original image



Both showing the same size of 84.4 KiB

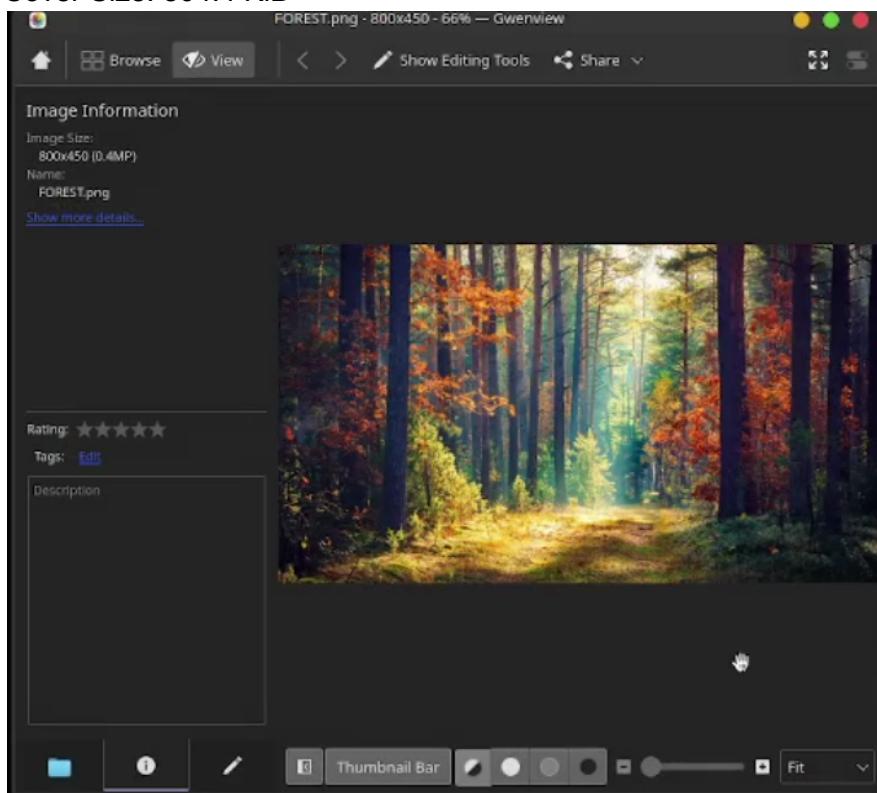


Case 2

Use a supported image type (PNG), with a large enough cover image

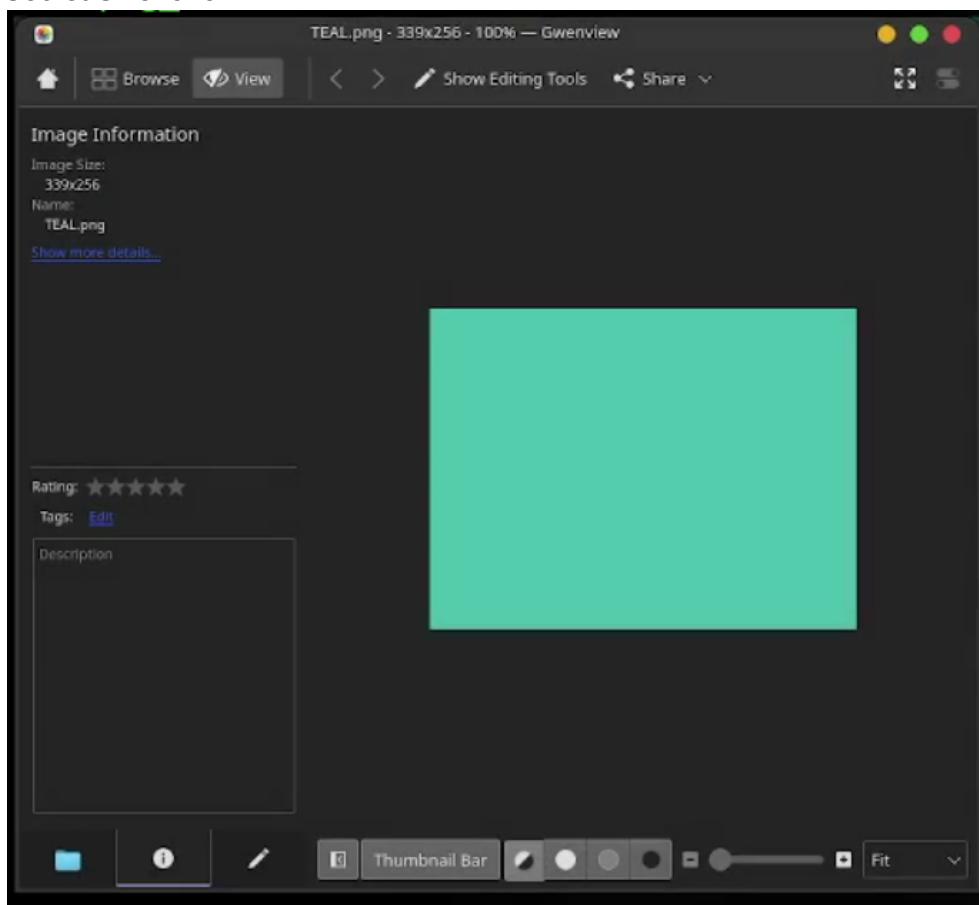
Cover Image: FOREST.png

Cover Size: 804.4 KiB



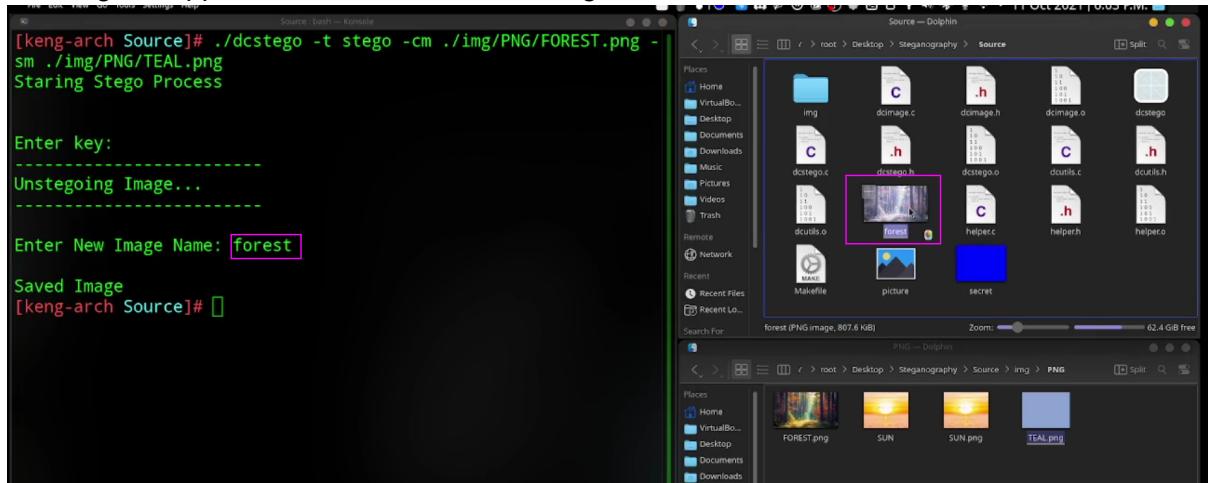
Secret Image: TEAL.png

Secret Size: 845 B

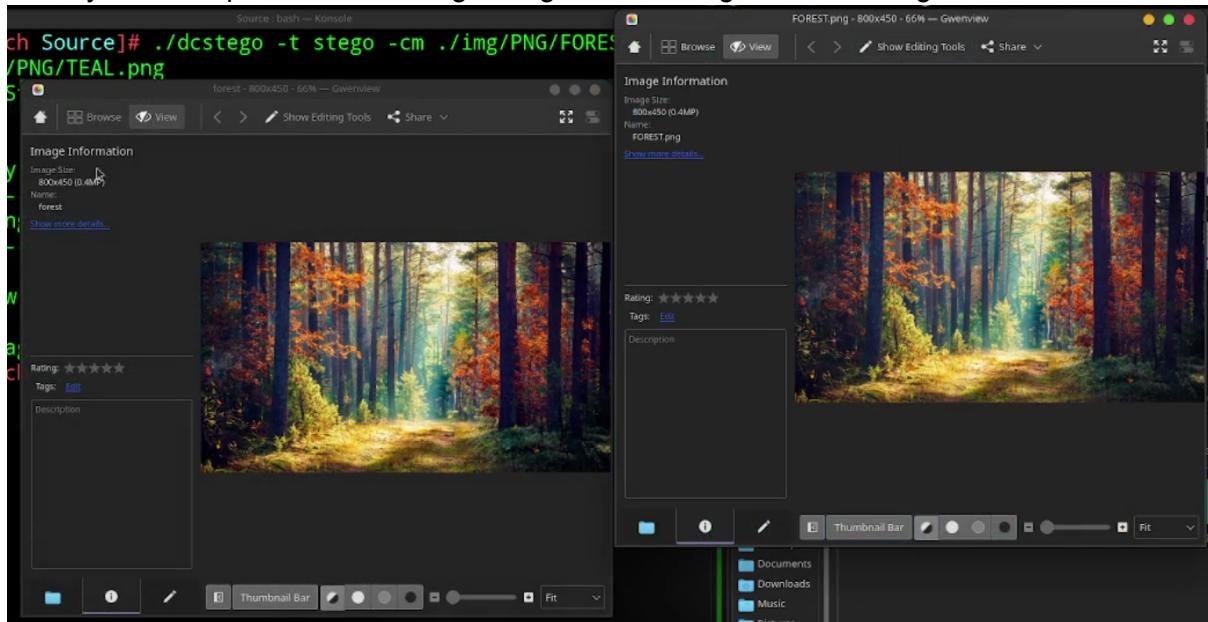


Running the application created the new image “forest”

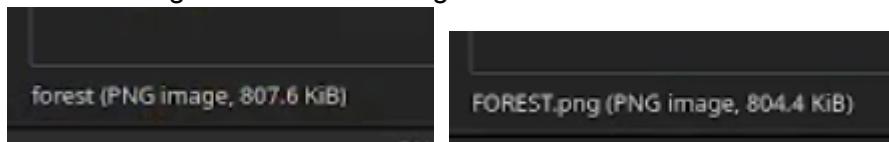
```
[keng-arch Source]# ./dcstego -t stego -cm ./img/PNG/FOREST.png  
sm ./img/PNG/TEAL.png  
Starting Stego Process  
  
Enter key:  
-----  
Unstegoing Image...  
-----  
  
Enter New Image Name: forest  
  
Saved Image  
[keng-arch Source]#
```



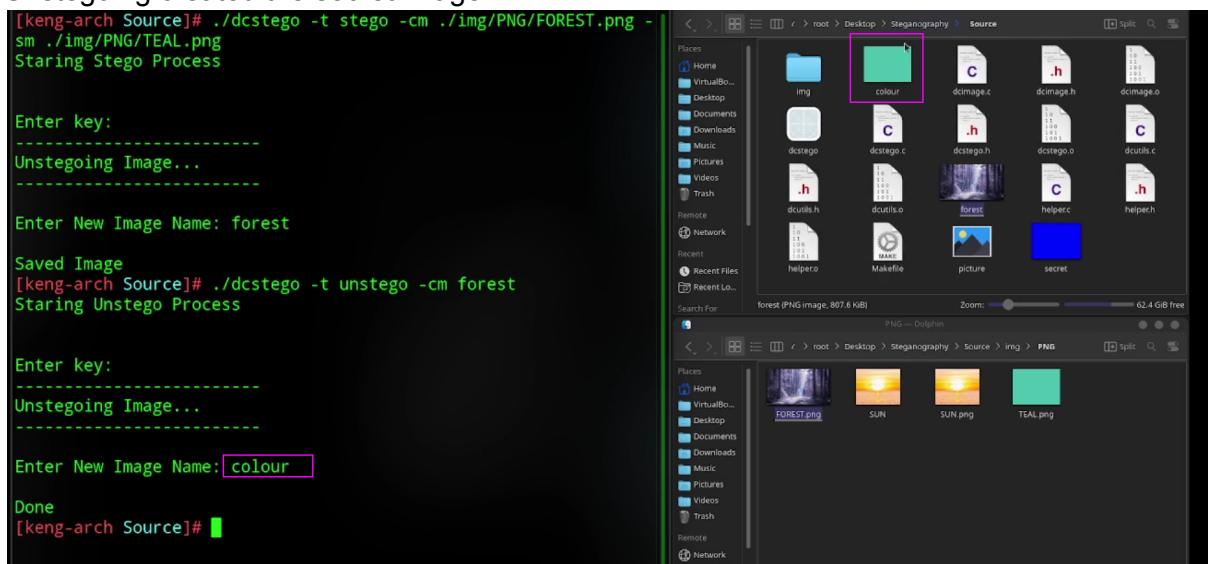
Side by side comparison of the stego image and the original cover image.



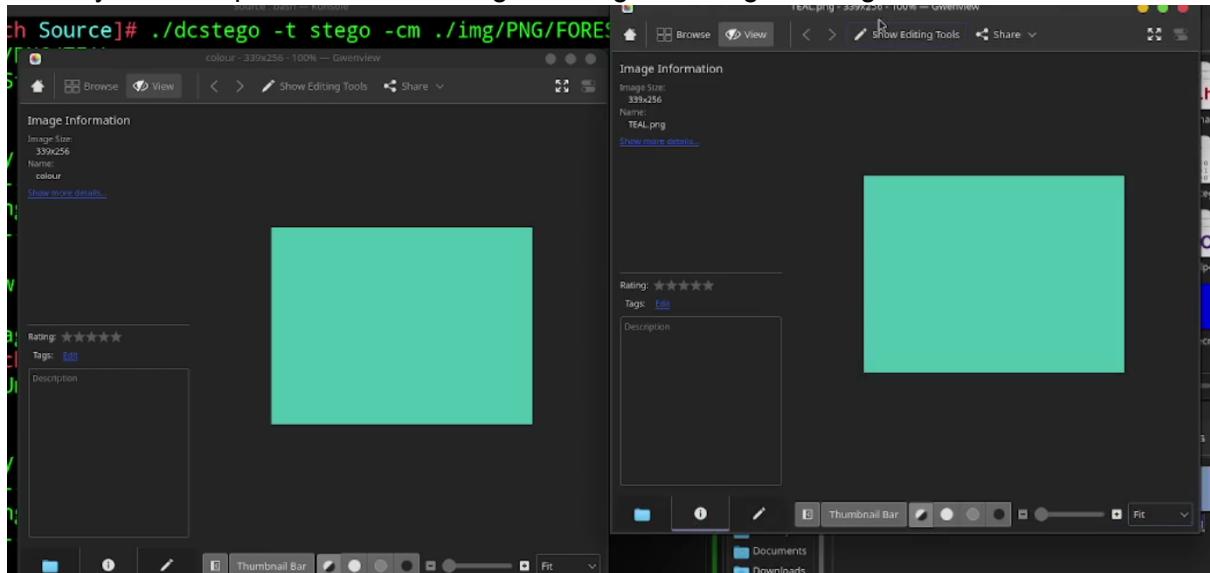
There is a slight difference in image size



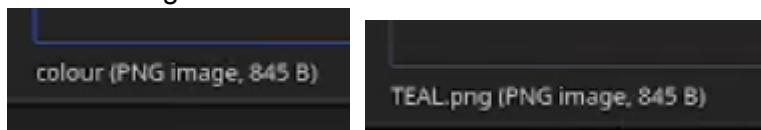
Unstegoing created the secret image



Side by side comparison of the unstegoed image and original image



Both showing the same size of 845 B

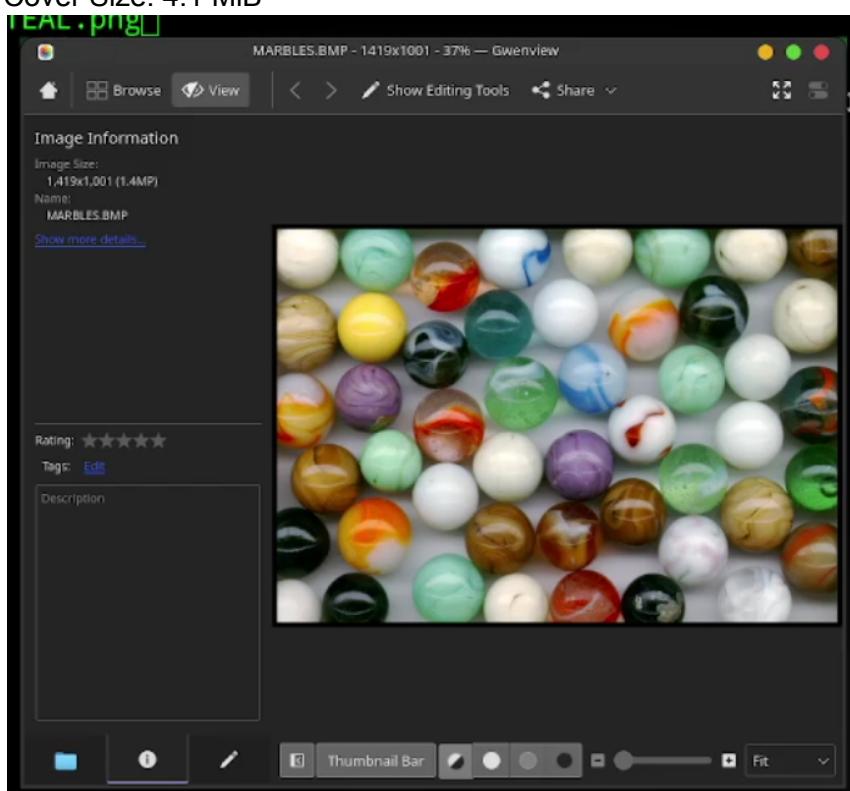


Case 3

Use BMP cover image and PNG secret Image

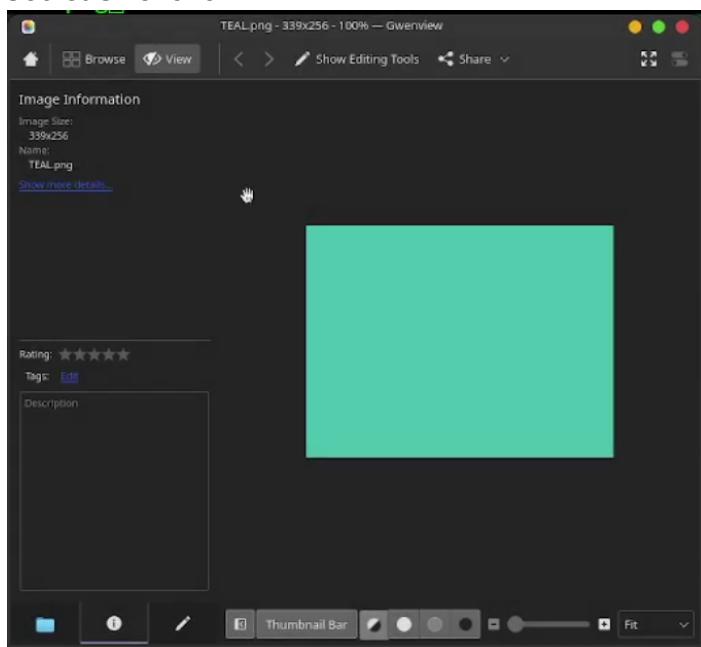
Cover Image: MARBLES.BMP

Cover Size: 4.1 MiB



Secret Image: TEAL.png

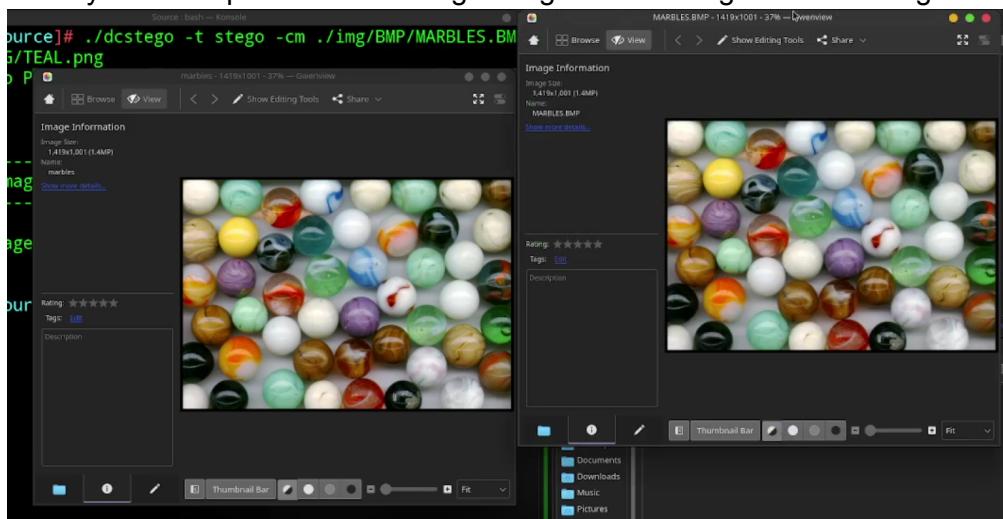
Secret Size: 845 B



Running the application created the new image “marbles”

A composite screenshot. On the left, a terminal window shows the command `./dcstego -t stego -cm ./img/BMP/MARBLES.BMP -sm ./img/PNG/TEAL.png` being run, followed by the message "Starting Stego Process". It then prompts for an "Enter key:" and shows "Unsteegoing Image...". Finally, it asks "Enter New Image Name:" and the user types "marbles". The terminal ends with "Saved Image". On the right, a file manager window titled "Source" shows a directory structure. A file named "marbles" is highlighted with a pink box. Below the file manager is another smaller Gwenview window showing the original cover image "MARBLES BMP".

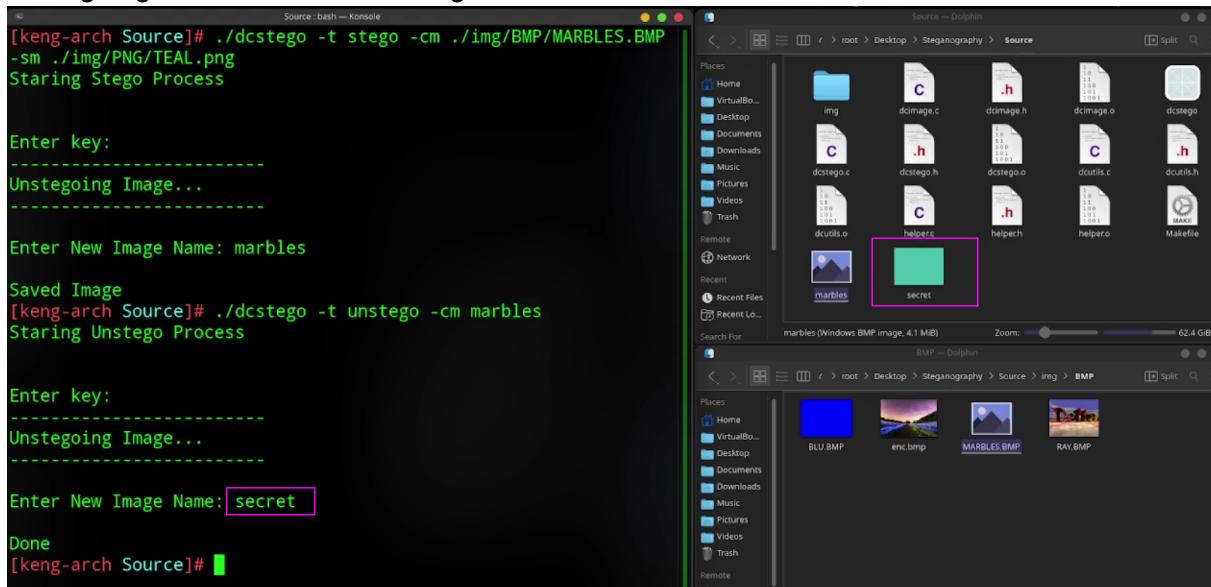
Side by side comparison of the stego image and the original cover image.



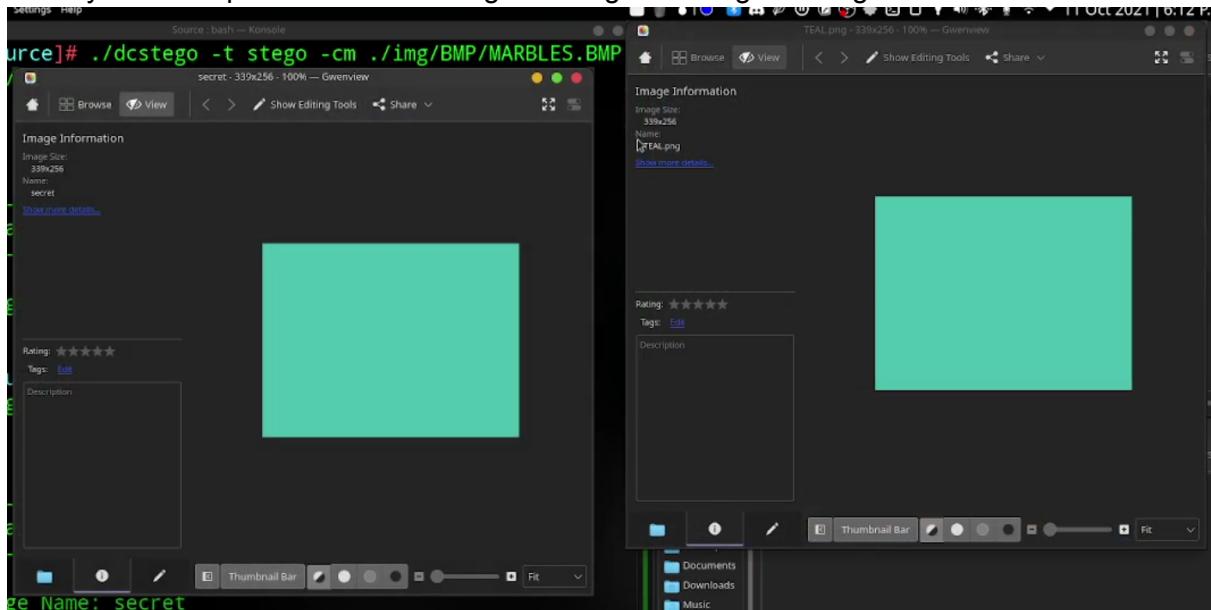
Both images has the same size



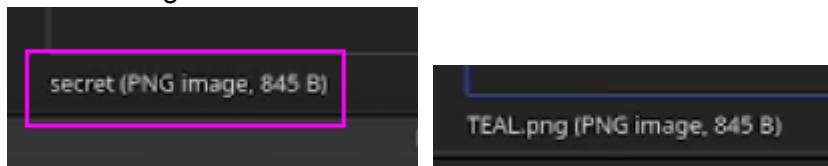
Unstegoing created the secret image



Side by side comparison of the unstegoed image and original image



Both showing the same size of 845 B

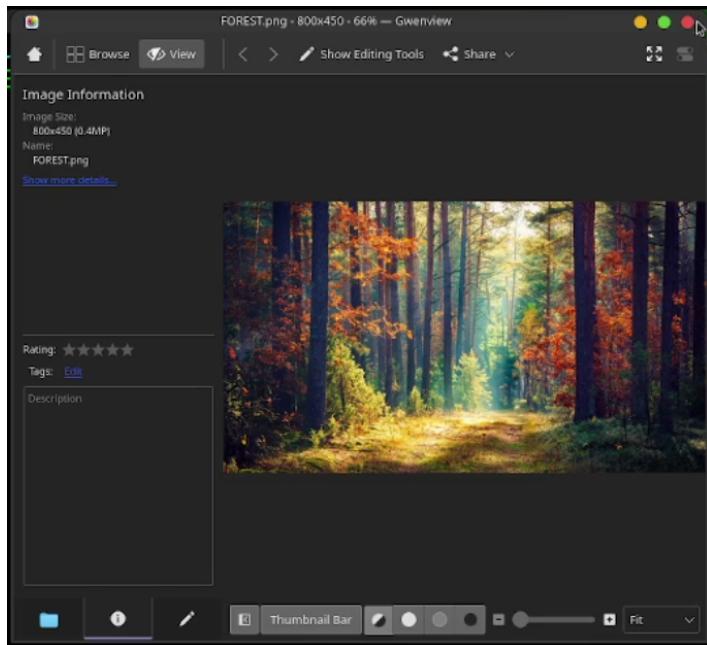


Case 4

Use PNG cover image and BMP secret Image

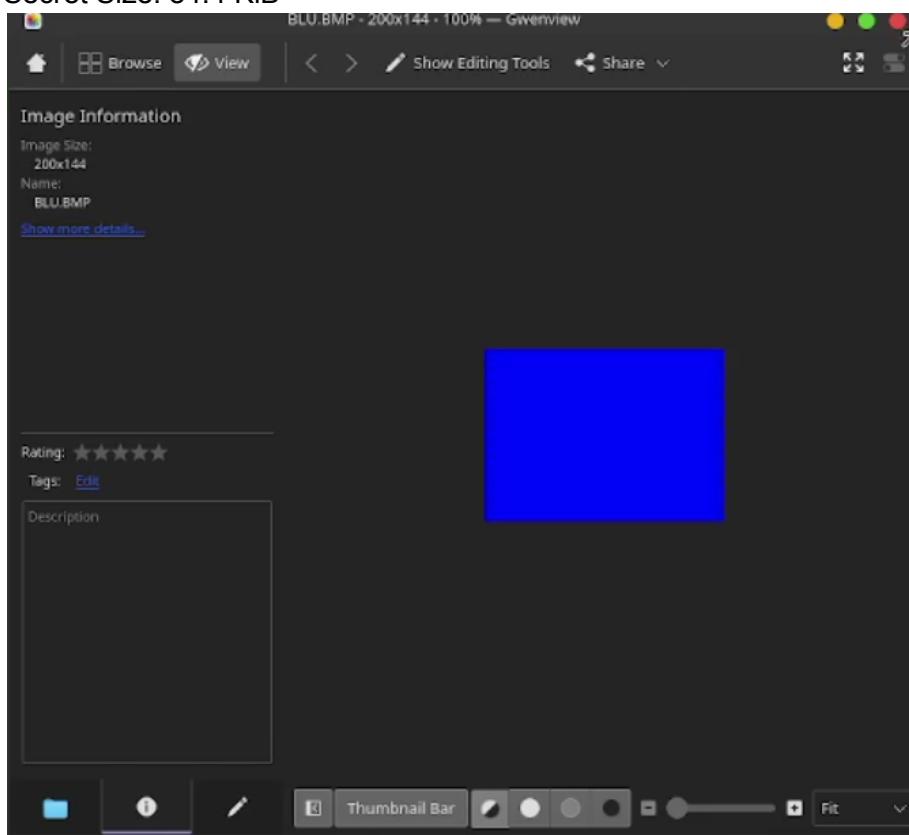
Cover Image: FOREST.png

Cover Size: 804.4 KiB

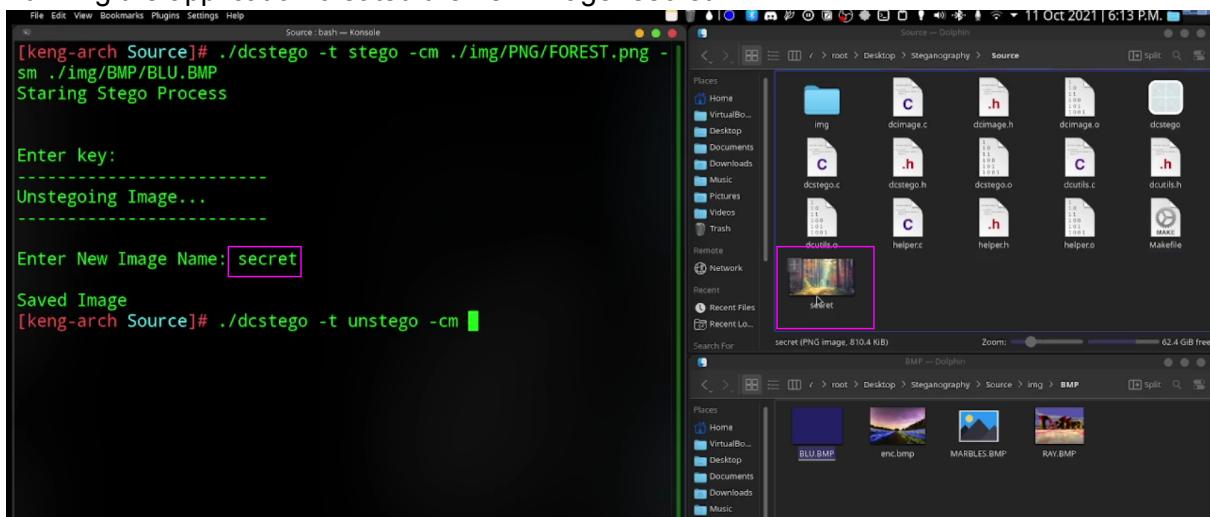


Secret Image: BLU.BMP

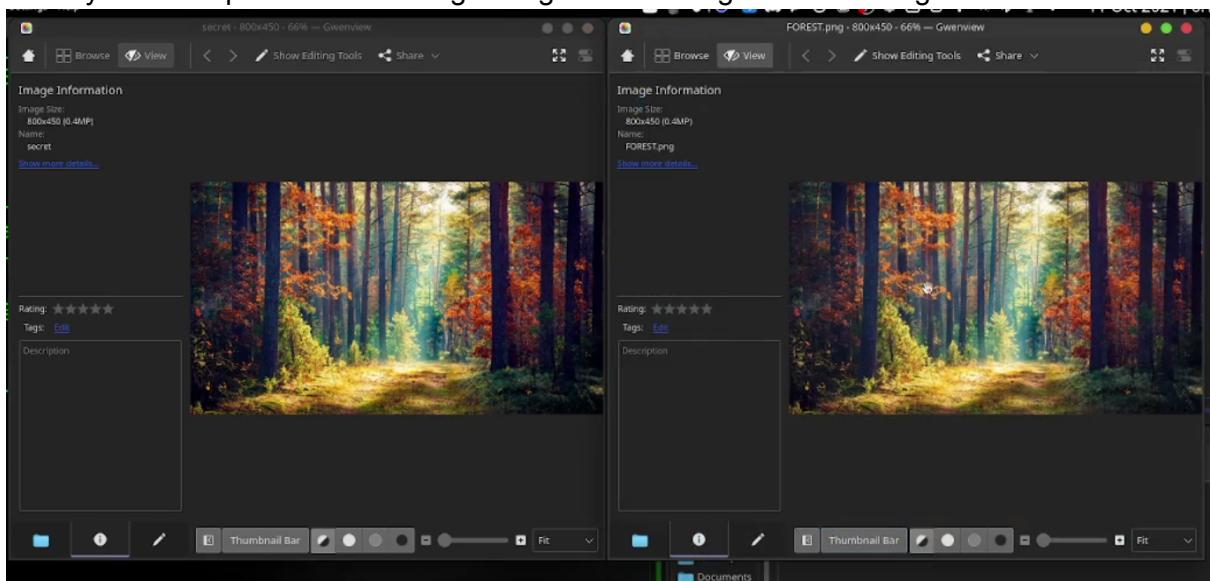
Secret Size: 84.4 KiB



Running the application created the new image "secret"



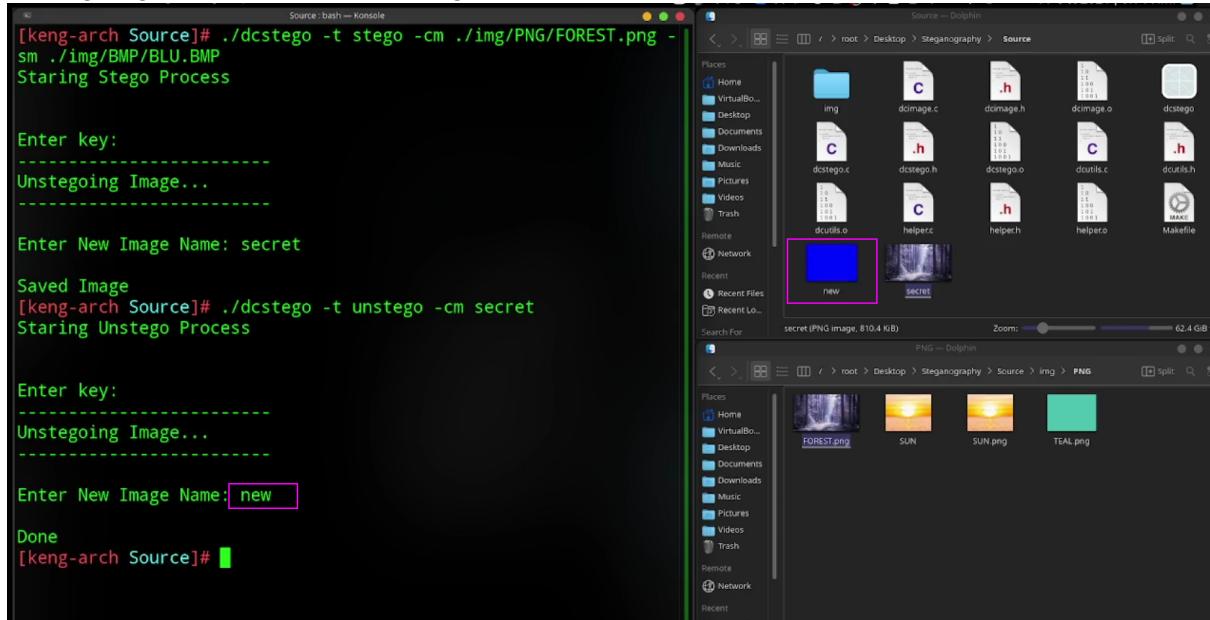
Side by side comparison of the stego image and the original cover image.



There is a slight difference in image size



Unstegoing created the secret image



```
[keng-arch Source]# ./dcstego -t stego -cm ./img/PNG/FOREST.png -sm ./img/BMP/BLU.BMP
Starting Stego Process

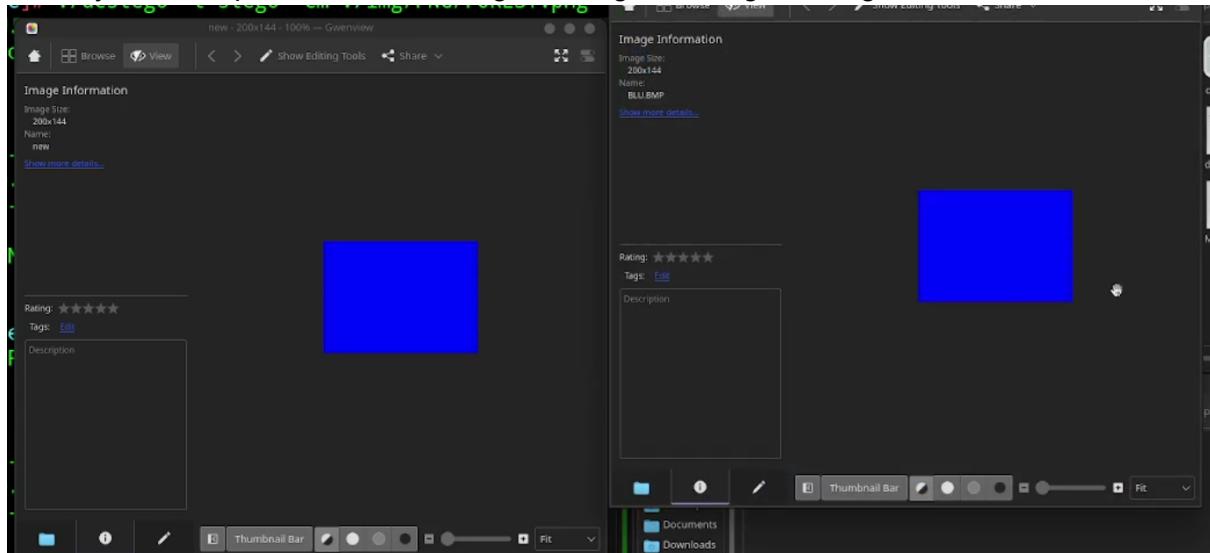
Enter key:
-----
Unstegoing Image...
-----
Enter New Image Name: secret

Saved Image
[keng-arch Source]# ./dcstego -t unstego -cm secret
Starting Unstego Process

Enter key:
-----
Unstegoing Image...
-----
Enter New Image Name: new

Done
[keng-arch Source]#
```

Side by side comparison of the unstegoed image and original image

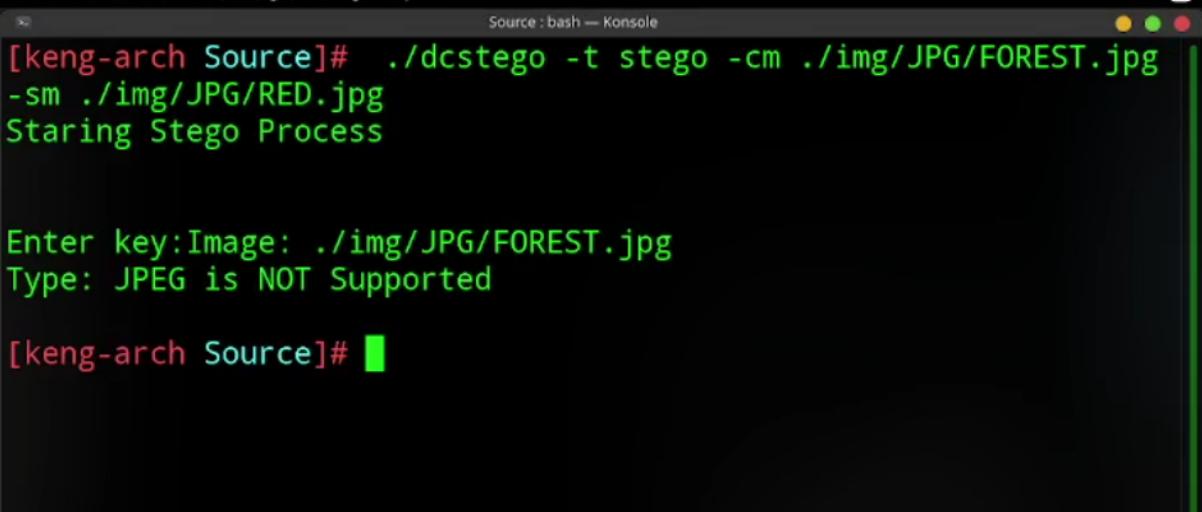


Both showing the same size of 84.4 KiB



Case 5

Use unsupported image type after entering the password key it will stop and print the error message

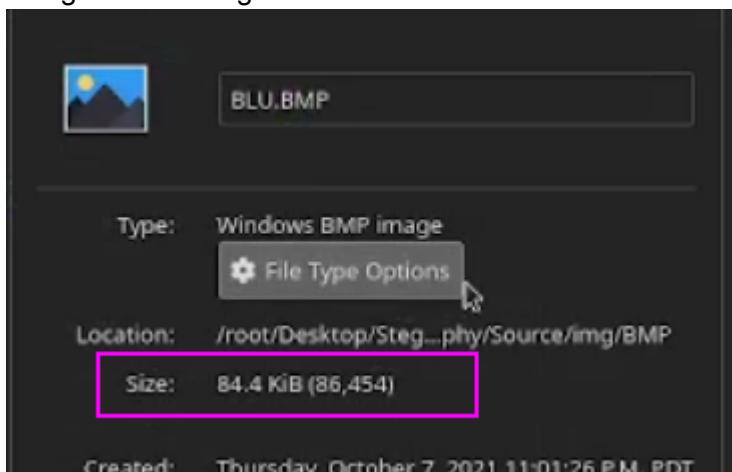


```
[keng-arch Source]# ./dcstego -t stego -cm ./img/JPG/FOREST.jpg  
-sm ./img/JPG/RED.jpg  
Starting Stego Process  
  
Enter key:Image: ./img/JPG/FOREST.jpg  
Type: JPEG is NOT Supported  
[keng-arch Source]#
```

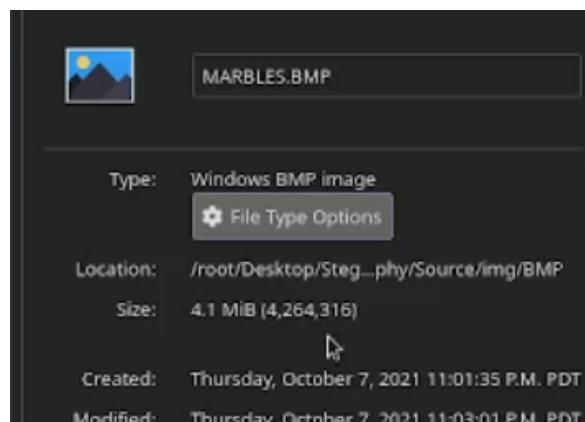
Case 6

Use small cover image

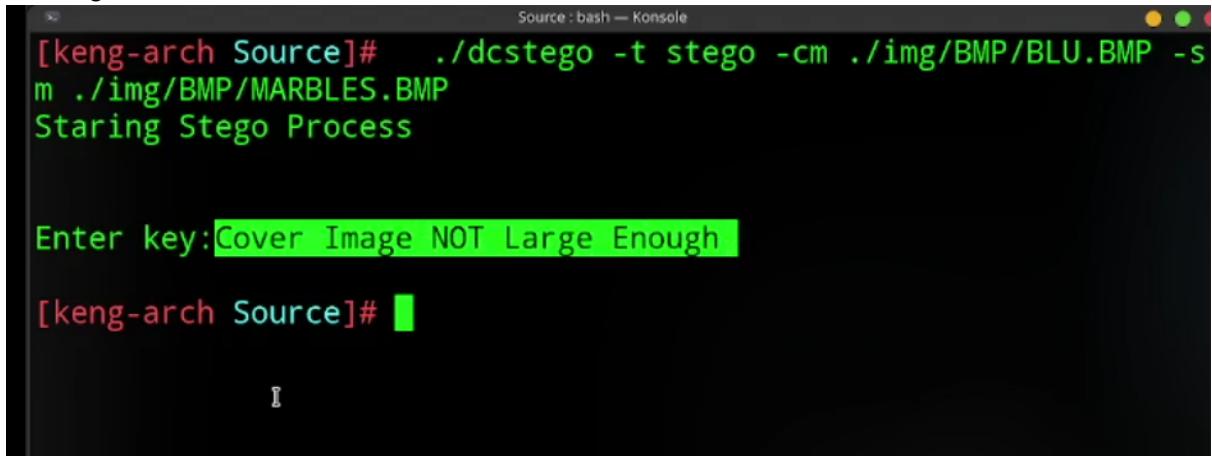
Using a cover image with size of 84.4 KiB



And secret image with size of 4.1 MiB



Use small cover image after entering the password key it will stop and print the error message

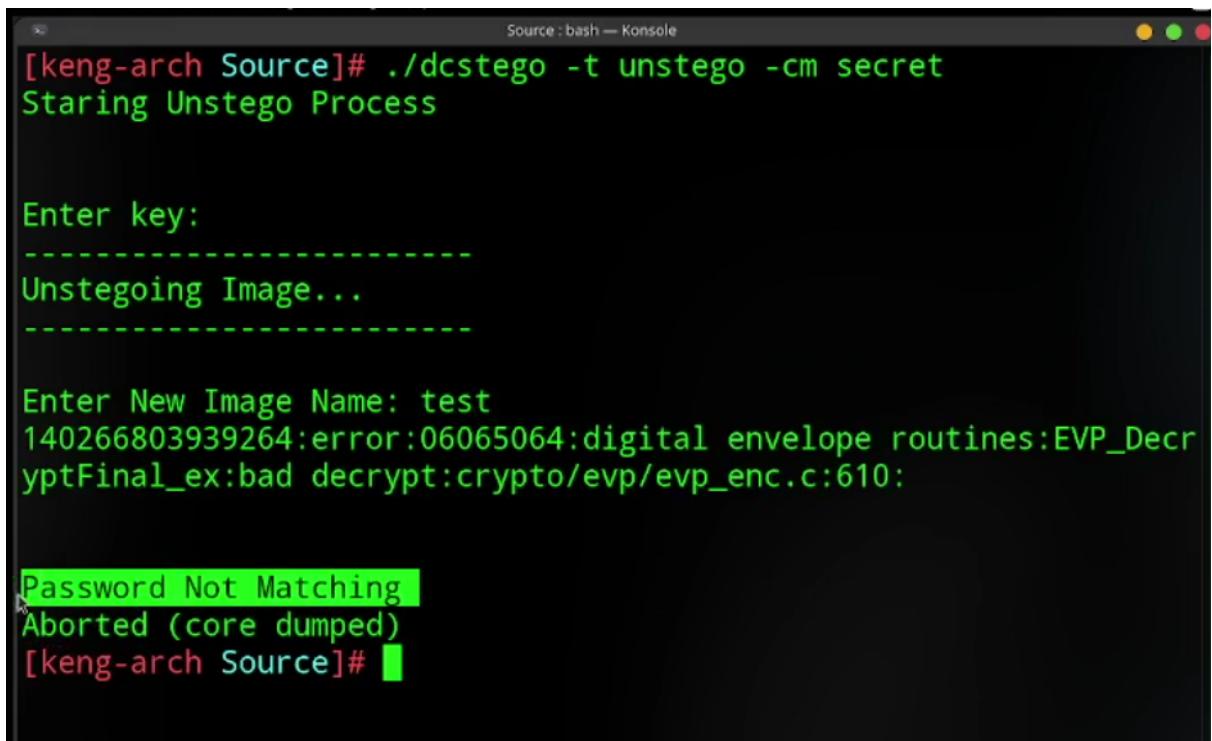


```
[keng-arch Source]# ./dcstego -t stego -cm ./img/BMP/BLU.BMP -s m ./img/BMP/MARBLES.BMP
Starting Stego Process

Enter key:Cover Image NOT Large Enough
[keng-arch Source]#
```

Case 7

Use the wrong key after entering the password key it will stop and print the error message



```
[keng-arch Source]# ./dcstego -t unstego -cm secret
Starting Unstego Process

Enter key:
-----
Unstegoing Image...
-----

Enter New Image Name: test
140266803939264:error:06065064:digital envelope routines:EVP_DecryptFinal_ex:bad decrypt:crypto/evp/evp_enc.c:610:

Password Not Matching
Aborted (core dumped)
[keng-arch Source]#
```