CSU, College of Engineering and Computer Science
Department of Computer Science
CSC 153 – Computer Forensics Principles and Practice

Activity 8: Steganography with Audio Files

Objectives:
- Practice steganography with audio files.

Acknowledgement:
This hands-on activity is developed based on the product of a team project for CSC 253 in Spring 2017.

Instructions:
Part 1: Software installation.
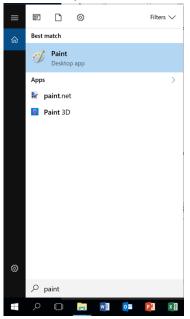Download the following software and install them on your workstation.
1. Coagula. https://www.abc.se/~re/Coagula/Coagula.html
2. Audacity. https://www.audacityteam.org/
3. Sonic Visualizer. https://www.sonicvisualiser.org/

Part 2: Create a steganography audio file.
1. Download **carrysong.wav** from Canvas or google drive and save it in your work directory. The google drive link is:
   https://drive.google.com/file/d/1p3q6BfeA10PAq2ygxPeuPMb5VPpyYGNb/view?usp=sharing
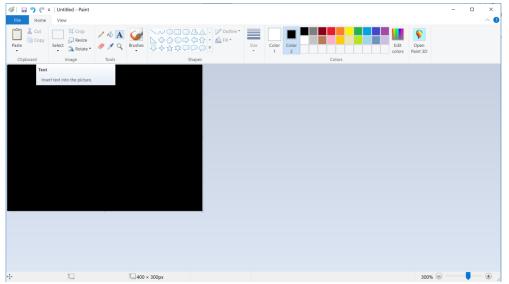
2. In Windows, click the search icon, and type in **Paint**. Open the paint application.
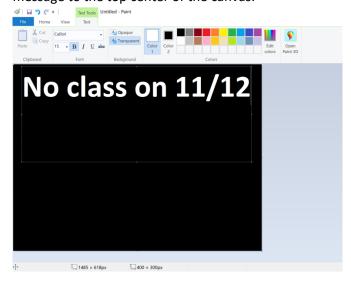

3. The original canvas is white color. To change the background color into black and front color into white, click on the **Color 2** to choose black, and click on the **Color 1** to choose white.
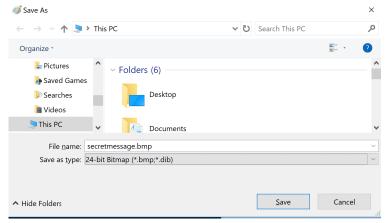
Color 2 (background color)

Click here and then select a color from the color palette. This color is used with the eraser and for shape fills.

4. Put the mouse onto the right bottom corner of original white canvas and drag it to the left-top corner to shrink the canvas size and make the canvas disappear, and then drag it to the right bottom to create a new canvas with black color.

5. Click on **File**->**Properties** to change the canvas size to 400*300. The canvas should not be too big or too small.

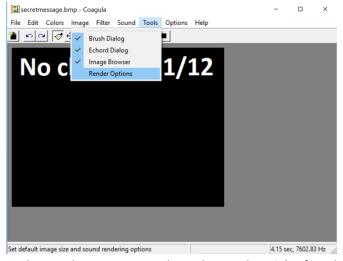6. Click on "A" to insert text onto the canvas.

7. Type the secret message on the Canvas. In this instruction, it is "No class on 11/12". Align the message to the top center of the canvas.
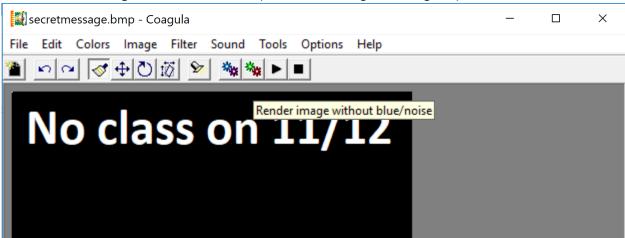
8. Click on **File**->**Save** as to save the file as "secretemessage.bmp" in your work directory. Remember to choose **24-bit Bitmap** as the type.
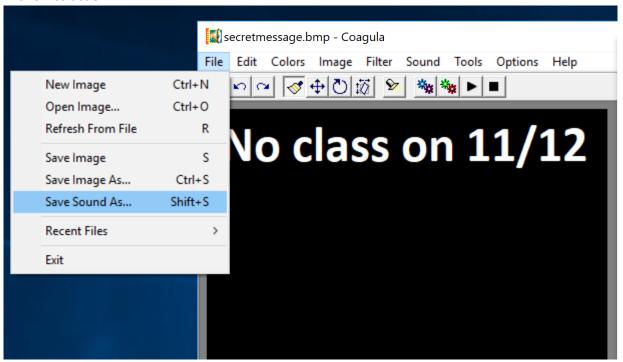

9. Navigate to the directory where the Coagula program is installed and click on Coagula to open it. Click on **File**->**Open** Image to open the file secretemessage.bmp.

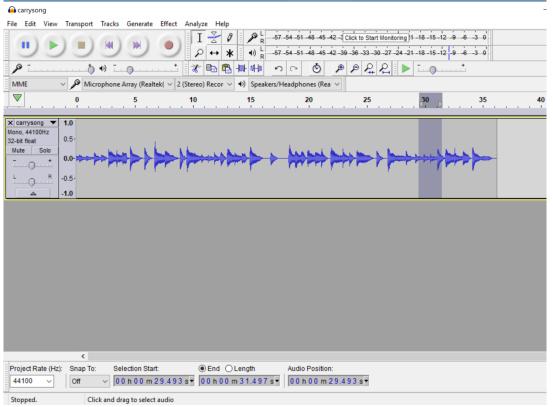10. Click on **Tools** and click on **Render Options** to open the Render Options window.

11. In the Render Options window, change the **High** of pitch range to 3000, and **Amp factor** into 0.5.

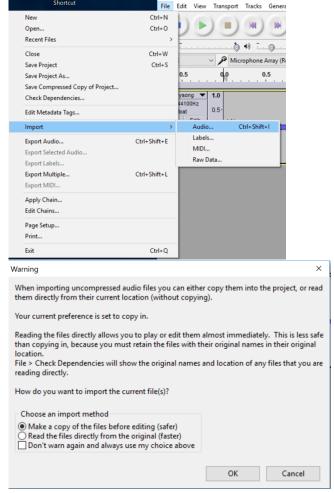12. Click on **Render Image without Blue Noise** (the button with green/red gears)

13. Click on **File**->**Save Sound As**.. to save the image as an audio file. It is saved as **secretmessage.wav** in this instruction.
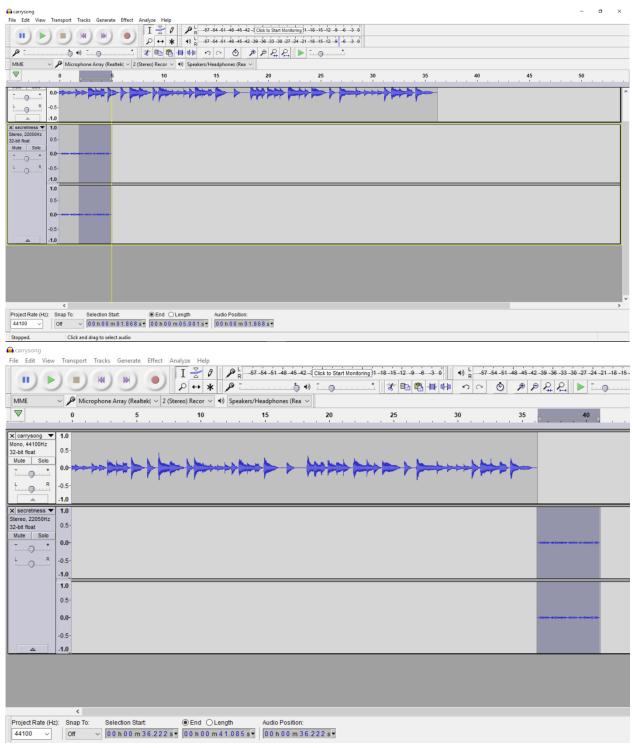

14. Click on Audacity to start the program. Click **File**->**Open** to open carrysong.wav file.
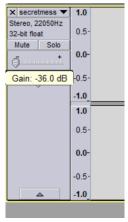

15. Click on **File**->**Import**->**Audio** to import the secretmessage.wav file. Click on **OK** for the warning window.
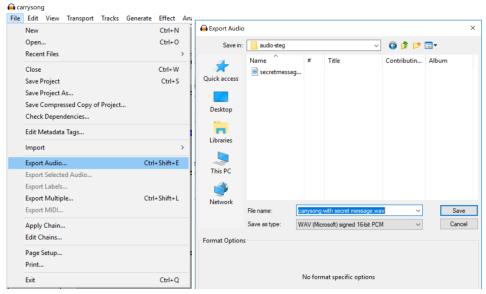
16. This step needs to move the secretmessage.wmv to the end of carrysong.m4v. Click on the right end of the secretmessage and drag to the left end to select the entire piece of the audio file, right click to cut the piece (or you can press the scissor-like button on the top menu), click the position aligned with the end of carrysong, and then paste the secretmessage there by right clicking and paste (or you can press the paste button on the top menu). You may click on the zoom in or zoom out icon to zoom in/out the audio tracks.
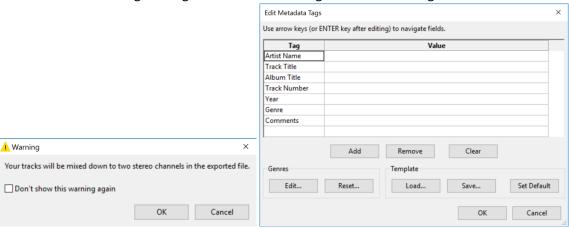
17. In the secretmessage track, below the Mute and Solo buttons, drag the bar to move it to the very left. This will change the **Gain** to -36.0 dB.

18. Click on **File**->**Export** to export the audio. Save the audio as carrysong-with secret message.wav.
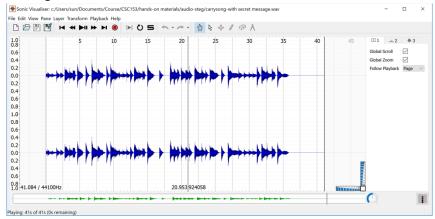

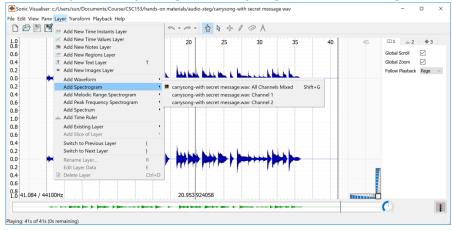19. Click **OK** on the warning message and on the following Edit Metadata Tags window.

20. You may play the carrysong-with secret message.wav file in media player.

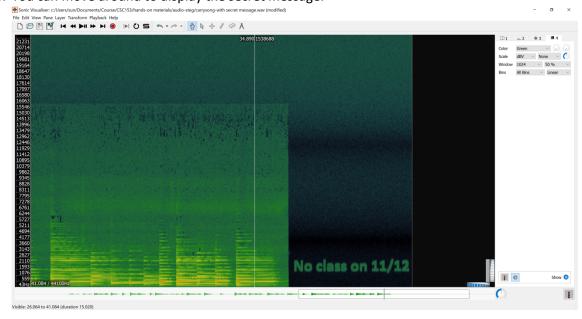**Part 3: Display the secret message in a steganography audio file.**

21. Start Sonic Visualiser program. Click on **File**->**Open** to open the carrysong-with secret message.wav file.
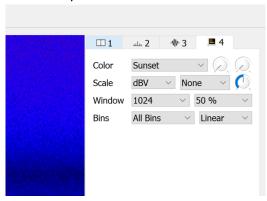

22. Click on **Layer**->**Add Spectrogram**-> **carrysong-with secret message.wav: All Channels Mixed**.

23. You can move around to display the secret message.

24. You may also choose different color theme in the right column to make the message more visible, if necessary.

Questions:

1. In Part2 step 6, why do we change the background color into black? (hint: the image is converted to audio later)
2. In part 2 step 19, why do we need to move the secretmessage to the end of carrysong?
3. Take screenshots to document what you've done in Step 13, 16, and 23.

Deliverable:

1. You need to submit a lab report to Canvas. Your lab report should *explicitly* **answer all questions one by one**. When necessary, you need to have screenshots to prove your answer. Include necessary narrative and analysis to make your report clear. The report will be evaluated based on the correctness, completeness, clarity and quality of English writing.