Stenography Lab

Objectives

The city has been set for the exchange of the product. However, before you could get the information, your contact was compromised. You have nothing left but an email with the cryptic message "locate a line of three stars and that shall point the way" and a file attachment (included in the zip file). If you know your contact, and you do, you know your contact is lazy and will not hide the information too well. It is most likely dropped in the file somewhere in byte sized chunks.

Discussion and Deliverable

Bitmap has the following format. Information about the file is located in the first 54 bytes of the file. Then after 54 bytes, pixel information is listed for each color value. The city name is hidden somewhere in the pixel data.

Name	Size	Offset	Description
Header	14 bytes		Windows Structure: BITMAPFILEHEADER
Signature	2 bytes	0000h	'BM'
FileSize	4 bytes	0002h	File size in bytes
reserved	4 bytes	0006h	unused (=0)
DataOffset	4 bytes	000Ah	Offset from beginning of file to the beginning of the bitmap data
InfoHeader	40 bytes		Windows Structure: BITMAPINFOHEADER
Size	4 bytes	000Eh	Size of InfoHeader =40
Width	4 bytes	0012h	Horizontal width of bitmap in pixels
Height	4 bytes	0016h	Vertical height of bitmap in pixels
Planes	2 bytes	001Ah	Number of Planes (=1)
Bits Per Pixel	2 bytes	001Ch	Bits per Pixel used to store palette entry information. This also identifies in an indirect way the number of possible colors. Possible values are: 1 = monochrome palette. NumColors = 1 4 = 4bit palletized. NumColors = 16 8 = 8bit palletized. NumColors = 256 16 = 16bit RGB. NumColors = 65536 24 = 24bit RGB. NumColors = 16M
Compression	4 bytes	001Eh	Type of Compression 0 = BI_RGB no compression 1 = BI_RLE8 8bit RLE encoding 2 = BI_RLE4 4bit RLE encoding
ImageSize	4 bytes	0022h	(compressed) Size of Image It is valid to set this =0 if Compression = 0
XpixelsPerM	4 bytes	0026h	horizontal resolution: Pixels/meter
YpixelsPerM	4 bytes	002Ah	vertical resolution: Pixels/meter
Colors Used	4 bytes	002Eh	Number of actually used colors. For a 8-bit / pixel bitmap this will be 100h or 256.
Important Colors	4 bytes	0032h	Number of important colors 0 = all

The deliverable of this lab falls in three parts. First part is deciphering the bitmap format and answering the following questions. The second part is allocating space in heap and loading the file information into the space allocated. The third part is shifting through the file contents to find the rendezvous city.

Part 1: Create space in the data section for the header information. Open the file and load the information into the .data section (look at syscall 13 and 14. There is also an examples at the bottom of the syscall table in MARS Mips). Comment each section in the .asm file to explain what you're doing. Look through the .data memory to answer the following questions:

1) What is the first two bytes of the bmp file?
2) What is the file size? (note: bitmap format is in little endian) Take a screenshot of the .data memory field(s) and highlight this information
3) What is the Bits Per Pixel value for this file? Take a screenshot of the .data memory field(s) and highlight this information.

Part 2: Using the information from part 1, allocate space on heap using the size information (syscall 9) and open the rest of the file onto the heap. Comment the asm file with explanations on what the code is doing.

Part 3: Shift through the information on the heap to find the clue given. You can try to figure it out yourself or unhighlight the following to see how you can find the city: [redacted]. Again, comment the .asm file with explanations on what you're doing.

Zip your asm file and this document with part 1 filled out and turn it into FSO.

RUBRIC (Total 100 Points)

Points	Description
30	Part 1
20	Part 2
30	Part 3
20	Clear comments

FSO SUBMISSIONS

Your project source code must be zipped up and submitted (turned-in) to FSO. Labs do not require being checked off by the Lab Specialist or Course Director before submission. However, if you complete your lab before the lab period ends, then you may request check-off to leave early.

NOTE: Unless otherwise stated by the course director, labs submitted after due date are considered late.