

CIS-350 – INFRASTRUCTURE TECHNOLOGIES

SMALL GROUP ACTIVITY #2

Names of group

members: Brooklynn Taylor, Dylan Lasley, Jonathan McCarrick, Zoe Druen

Logistics

1. Get in touch with your group. (See Groups folder on Blackboard.)
2. Discuss and work **all** of the 4 assignments collectively with your group via E-mail, Discussion Forum, Blackboard Collaborate Ultra, and/or MS Teams. (Do not divide the work among group members.)
3. Choose a recorder to prepare the final copy (one per group) and submit it via the Blackboard Assignments/Small Group Activities folder.
4. Be sure all group members' names are on final copy. Do **not** add names of your group members who did not participate in the assignment or whose contribution was minimal.

Topics: Data formats, computer representation of unsigned and signed numbers (2's complement form), and decimal ranges

Assignment One

1. How would string "Best" be represented in the ASCII standard? Give the hexadecimal, decimal, and binary forms for the ASCII standard.

| | B | e | s | t |
|-------------|----------|----------|-----------|----------|
| Hexadecimal | 42 | 65 | 73 | 74 |
| Decimal | 66 | 101 | 115 | 116 |
| Binary | 01000010 | 01100101 | 011110011 | 01110100 |

2. How many bytes does the string "Best" occupy? (Do not count the double quotes.)

In ASCII: 4

In Unicode: 8 (UTF-16 standard)

Assignment Two

1. Each pixel in an image can display 256 levels of gray. What is the size (in bytes) of the video memory to store the image containing $3,440 \times 1,440$ pixels? ($3,440 \times 1,440$ is a resolution of the high-definition 34" Dell S3422DWG monitor.) You can see the monitor at the following link.

[Dell 34 WQHD Curved Gaming Monitor – S3422DWG | Dell USA](#)

When each pixel is stored 256 levels of gray, you need 1 byte per pixel. The memory of the image containing $3,440 \times 1,440$ pixels is $3,440 \times 1,440 \times 1 = 4,953,600$ bytes.

2. How many bytes would you need to store the true color image of the size $3,440 \times 1,440$ pixels?
Note: In the true color image you need 3 bytes for each pixel.

Since an image in true color needs 3 bytes for each pixel, the memory of the true color image of the size $3,440 \times 1,440$ pixels is $3,440 \times 1,440 \times 3 = 14,860,800$ bytes.

3. The Dell monitor with a high-definition resolution $3,440 \times 1,440$ pixels generates true color images at a frame rate of 144 frames/sec. How much storage expressed in GB would a 5-minute video clip displayed on this monitor consume?

Time: $5 \times 60 = 300$ seconds

Memory of a 5-minute video clip displayed on this monitor in GB: $3,440 \times 1,440 \times 3 \times 144 \times 300 \div 1024 \div 1024 \div 1024 = 597.897$ GB

Assignment Three

1. Convert this 8-bit number written in 2's complementary binary form

$(10101110)_2$

to the decimal number (-82)₁₀

Note: Because the leftmost bit (the sign bit) is 1, the number is negative! The leftmost bit 1 is worth -1×2^7 . It contributes to the sign and the magnitude of the number.

$$-1 \times 2^7 + 0 \times 2^6 + 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = -82$$

Assignment Four

Assume that some computers used a 24-bit word to store numbers. What is the decimal range for this word size for:

(a) unsigned numbers: [0, 16777215]

$$[0, 2^{24}-1] = [0, 16777215]$$

(b) signed numbers: [-8388608, 8388607]

$$[-2^{23}, 2^{23}-1] = [-8388608, 8388607]$$

What is the number of unique patterns 24 bits can store? 16777216

$$2^{24} = 16777216$$