

Fall 2014

CSCI 420: **Computer Graphics**

Homework #1 Tips



Hao Li

<http://cs420.hao-li.com>

Common Questions

- How are height values represented?
- How is the data stored in 'pix'?
- What does the PIC_PIXEL macro do?
- What are tri-strips?
- How to turn pixel rows into tri-strips?
- I need help regarding C errors.

Height Values

- Heights are specified as grayscale, 8 bits/channel.
- Each height value is simply an 'unsigned char' (0 - 255).
- The pixel values are held in the 'pix' array in the 'Pic' data structure.

```
typedef struct {  
    int nx, ny;  
    int bpp;  
    Pixel1 *pix; /* array of pixels*/  
}
```

Pixel Values

- Consider the following 4 X 4 (16 Pixel) Image:

```
100 110 120 130
200 215 230 245
250 200 150 100
0 30 60 90
```

- The data would be laid out in 'pix' in "row major" order:

```
100 110 120 130 200 215 230 245 250 200 150 100 0 30 60 90
```

Accessing Pixel Values

- To access a pixel value at any (x,y) [eg. at (2,3)], use the 'PIC_PIXEL' macro definition (defined in pic.h, with function signature PIC_PIXEL(pic, x, y, chan)), with chan=0.

```
for(int i=0;i<pic->ny;i++) {  
    for(int j=0;j<pic->nx;j++) {  
        // chan=0, since we're accessing the first/only channel  
        unsigned char heightVal = PIC_PIXEL(pic,j,i,0);  
        // use heightVal..  
    }// next pixel in current row  
}// next row
```

Tri-Strips

- We can turn pairs of pixel rows ("scanlines") into tri-strips.

```
for(int i=0;i<pic->ny-1;i++) {  
    OGL_initialize tri-strip creation  
    for(int j=0;j<pic->nx;j++) {  
        indx0 = (j, i, z from PIC_PIXEL()) // 'top' vertex  
        indx1 = (j, i+1, z from PIC_PIXEL()) // 'bottom' vertex  
        // sequential top,bottom vert pairs generates a tri-strip  
        OGL_specify() vertex with z=indx0  
        OGL_specify() vertex with z=indx1  
    }// next pixel in current row  
    OGL_end current tri-strip  
}// next row
```

Creating Filenames

- There's a good way to create filenames with 4-digit-padding

```
char myFilenm[2048];  
  
for (int i=0;i<1000;i++) {  
    sprintf(myFilenm, "anim.%04d.jpg", i);  
    // myFilenm will be anim.0001.jpg, anim.0002.jpg.....anim.0999.jpg  
    // ..  
}
```

C Errors

- Here is a guide for catching C errors. (Particularly helpful for those students whose 'first language' is not C/C++)

<http://www.drpaulcarter.com/cs/common-c-errors.php>