Homework #1 Tips

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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.

```c
typedef struct {
    int nx, ny;
    int bpp;
    Pixel1 *pix; /* array of pixels*/
} Picture;
```
### Pixel Values

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

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>110</td>
<td>120</td>
<td>130</td>
</tr>
<tr>
<td>200</td>
<td>215</td>
<td>230</td>
<td>245</td>
</tr>
<tr>
<td>250</td>
<td>200</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>0</td>
<td>30</td>
<td>60</td>
<td>90</td>
</tr>
</tbody>
</table>

- 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.

```c
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(pix,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.

```c
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

```c
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++)