



Texturing in GLSL




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Texturing.pptx
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2D Texturing

Vertex shader:

```
#version 330 compatibility
out vec2 vST;


void
main()
{
    vST = gl_MultiTexCoord0.st;
    gl_Position = gl_ModelViewProjectionMatrix * gl_Vertex;
}
```



Fragment shader:

```
#version 330 compatibility
in vec2 vST;
uniform sampler2D uTexUnit;

void
main()
{
    vec3 newcolor = texture( uTexUnit, vST ).rgb;
    gl_FragColor = vec4( newcolor, 1. );
}
```


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2D Texturing in the OpenGL API

Fragment shader:

```
#version 330 compatibility
in vec2 vST;
uniform sampler2D uTexUnit;

void
main()
{
    vec3 newcolor = texture( uTexUnit, vST ).rgb;
    gl_FragColor = vec4( newcolor, 1. );
}
```

```
glGenTextures( 1, &TexName );
int nums, numt;
Texture = BmpToTexture( "filename.bmp", &nums, &numt );
glBindTexture( GL_TEXTURE_2D, TexName );
glTexParameterf( GL_TEXTURE_2D, GL_TEXTURE_WRAP_S, GL_REPEAT );
glTexParameterf( GL_TEXTURE_2D, GL_TEXTURE_WRAP_T, GL_REPEAT );
glTexParameterf( GL_TEXTURE_2D, GL_TEXTURE_MAG_FILTER, GL_LINEAR );
glTexParameterf( GL_TEXTURE_2D, GL_TEXTURE_MIN_FILTER, GL_LINEAR );
glTexImage2D( GL_TEXTURE_2D, 0, 3, nums, numt, 0, GL_RGB, GL_UNSIGNED_BYTE, Texture );
...
Pattern->Usef();
glActiveTexture( GL_TEXTURE6 ); // use texture unit 6
glBindTexture( GL_TEXTURE_2D, TexName );
Pattern->SetUniformVariable( "uTexUnit", 6 );
```


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2D Texturing in glman

Fragment shader:

```
#version 330 compatibility
in vec2 vST;
uniform sampler2D uTexUnit;

void
main()
{
    vec3 newcolor = texture( uTexUnit, vST ).rgb;
    gl_FragColor = vec4( newcolor, 1. );
}
```

Texture2D 6 worldtex.bmp
...
Program World **uTexUnit 6**


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The OsuSphere Has Sensible s,t Coordinates Assigned




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The GLUT Teapot Doesn't




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What if You Want to Use Two Textures in One Shader? 7

C++ Program:

```

// In Display():
Pattern->Use();
glActiveTexture( GL_TEXTURE5 );
glBindTexture( GL_TEXTURE_2D, TexName0 );

glActiveTexture( GL_TEXTURE6 );
glBindTexture( GL_TEXTURE_2D, TexName1 );

Pattern->SetUniformVariable( "uTexUnit0", 5 );
Pattern->SetUniformVariable( "uTexUnit1", 6 );

<< draw something >>
Pattern->UnUse();

```

Fragment shader:

```

#version 330 compatibility
in vec2 vST;
uniform sampler2D uTexUnit0;
uniform sampler2D uTexUnit1;

void
main()
{
    vec3 newColor0 = texture( uTexUnit0, vST );
    vec3 newColor1 = texture( uTexUnit1, vST );
    gl_FragColor = ...
}

```

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Why Might You Want to Use Two Textures in One Shader? 8

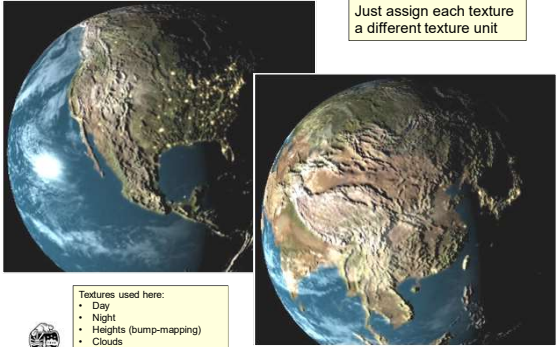
Once the RGBs have been read from a texture, they are just numbers. You can do any arithmetic you want with the texture RGBs, other colors, lighting, etc. Here is an example of blending two textures at once:



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Shaders Can Combine More than Two Textures 9

Just assign each texture a different texture unit



- Day
- Night
- Heights (bump-mapping)
- Clouds
- Specular highlights

Visualization by Nick Gebbie

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