3D Texture Mapping

Color Mapping

Color Mapping

- An object can be colored with more than one color at the same time
- Defining repeating patterns of color for your object
- The `pigment` clause allows you to define color patterns
checker

box{<-1,-0.1,-1>, <1,0,1>  
scale <6, 1, 6>  
translate <2, 0, 1.5>  
texture{
  pigment{ checker White, Blue }  
  finish{diffuse 0.6 ambient 0.4 }  
}

Why?
brick
box{<-1,-0.1,-1>, <1,0, 1>
scale <6, 1, 6>
translate <2, 0, 1.5>
texture{
    pigment{ brick White, Blue
    brick_size <2,0.5,3>
    }
    finish{diffuse 0.6 ambient 0.4}
}
}
hexagon
boxстал{<-1,-0.1,-1>, <1,0, 1>
scale <6, 1, 6>
translate <2, 0, 1.5>
texture{
    pigment{ hexagon White, Blue Red
    }
    finish{diffuse 0.6 ambient 0.4 }
}
Color maps

- You define smooth transitions of many colors that gradually change from one point to the next
- You define a pattern to follow, along with the color map

gradient

sphere {
  <0,1,2>, 2
  pigment {
    gradient x //this is the PATTERN_TYPE
    color_map {
      [0.1  color Red]
      [0.3  color Yellow]
      [0.6  color Blue]
      [0.6  color Green]
      [0.8  color Cyan]
    }
  }
  finish (ambient 0.3)
  translate 1*y
}
Gradient $y$

Sharp changes at 0.0, 1.0, 2.0

Smoother

```plaintext
pigment {
  gradient <1, 0, 0>
  color_map {
    [0.0  color Yellow]
    [0.5  color Magenta]
    [1.0  color Yellow]
  }
  scale <2,2,2>
}
```
How to do stripes?

- marble
  - Similar to gradient x
  - The difference lies on the way it blends the colors
marble

sphere {
<0,1,2>, 2
texture {
    pigment {
        marble
        color_map {
            [0.0 rgb <0.8, 0.8, 0.6>]
            [0.8 rgb <0.8, 0.4, 0.4>]
            [1.0 rgb <0.8, 0.2, 0.2>]
        }
    }
    finish (ambient 0.3)
    translate 1*y
}

gradient x

marble
marble (with turbulence)

```plaintext
sphere {
  <0,1,2>, 2
  texture {
    pigment {
      marble
      color_map {
        [0.0 rgb <0.8, 0.8, 0.6>]
        [0.8 rgb <0.8, 0.4, 0.4>]
        [1.0 rgb <0.8, 0.2, 0.2>]
      }
      turbulence 1
    }
    finish {ambient 0.3}
    translate 1*y
  }
}
```

radial

- Creates bands radiating from the y axis
radial

box{<-1,-0.1,-1>, <1,0, 1>
scale <6, 1, 6>
translate <2, 0, 1.5>
texture{
    pigment{
        radial
        frequency 10
    }
    finish{diffuse 0.6 ambient 0.4 }
}
}
bozo

- This pattern is a very smooth, random noise function that is traditionally used with some turbulence to create clouds.

```plaintext
box{<-1,-0.1,-1>, <1,0, 1>
  scale <6, 1, 6>
  translate <2, 0, 1.5>
  texture{
    pigment{
      bozo
    }
    finish{diffuse 0.6 ambient 0.4 }
  }
}
```
The agate pattern is a banded pattern similar to marble. It uses a specialized built-in turbulence function that is different from the traditional turbulence.
agate

box{<-1,-0.1,-1>, <1,0, 1>
    scale <5, 1, 6>
    translate <2, 0, 1.5>
    texture{
        pigment{
            agate
            agate_turb 1
        }
        finish{diffuse 0.6 ambient 0.4 }
    }
}

agate

cells
- Fills 3D space with unit cubes
The onion is a pattern of concentric spheres like the layers of an onion
onion

difference:
  sphere (<0.5,0.5,1.0>)
  box (<-0.5,-0.5,-1.1> <0.5,0.5,0>)
  rotate <0,40, 0>
  pigment: onion
  color_map:
    [0.0 color Red]
    [0.25 color Red]
    [0.25 color Yellow]
    [0.75 color Yellow]
    [0.75 color Green]
    [0.95 color Green]
    [0.95 color Magenta]
    [0.99 color Magenta]
  finish {ambient 0.3 diffuse 0.7}

onion

onion

onion
wood
#declare wood_log = cylinder [<0,0,0>, <0,0,4>, 1
pigment {
  wood
  //turbulence 0.1
  color_map {
    [0.0 color rgb <0.90, 0.80, 0.30>]
    [1.0 color rgb <0.50, 0.30, 0.15>]
  }
  //scale <0.1,0.1,1>
}
}

Wooden log

leopard
sphere [<0,0,0>, 2
  texture {
    pigment {
      leopard
color_map([0.1 Red]
        [0.5 White]
        [0.7 Blue]
      )
turbulence 0.5
    }
  }finish {ambient 0.3}
}
In addition to specifying blended colors with a color map you may create a blend of pigments using a pigment_map. The syntax for a pigment map is identical to a color map except you specify a pigment in each map entry (and not a color).

Pigment Map

```plaintext
pigment_map {
  [0.1 wood scale 0.2]
  [0.3 wood scale 0.2]
  [0.3 Jade]
  [0.6 Jade]
  [0.6 marble turbulence 1]
  [0.8 marble turbulence 1]
  [0.8 color rgb <.7, 0., .7>]
  [0.99 color rgb <.7, 0., .7>]
}
```
For more...

- See “textures.inc”