- MD2 Bonus -> smooth shading

453
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(1)

- don't use add pixel!
- O2 compiler flag
- non-white/black background color

->intersect (R)

Lighting

```
calcLighting (Point p, Point n, Material c)
{
    Color c = (0, 0, 0)
    // do ambient
    color = c.ambient * AMBIENT;

    // do diffuse + specular for each light
    for ( i = 0; i < lights.size(); i++)
    {       Point l = lights.[i].pos - p;
            // check if shadowed, if so continue
        Ray shadowray = Ray (p, l);
            II info = intersect (shadowRay)
            if(info.t < 1 && info.t > 0)
                continue;

            // diffuse contribution   L = L.normalize()
            color += c.diffuse * lights[i].diffuse * max(n·L, 0)
                                R = (2(n·L)n - L).normalize
            // specular         V = (-P).normalize
            color += c.specular * lights[i].specular * (max(r·v, 0))^α
    }

    if (color.r > 1) color.r = 1
    if (color.g > 1) color.g = 1
    if (color.b > 1) color.b = 1
}
```

-> Intersect

Intersection with AA Box

Straightforward Way

- each side of box is 2 triangles
- do intersection test for all 12 triangles.
  - → save time by only doing 6 plane test (don't repeat for 2 triangles on same face)

→ MOTIVATION → Important to do this test because we can use this to speed up ray tracing of complex objects (bounding boxes).

Faster Way

Define the box

$X_{min}, X_{max}, Y_{min}, Y_{max}, Z_{min}, Z_{max}$.

6 plane equations define our box

$X = X_{min}$, $X = X_{max}$

$Y = Y_{min}$, $Y = Y_{max}$

$Z = Z_{min}$, $Z = Z_{max}$

→ Only need to check the 3 faces that are oriented toward the ray direction.

if ray.dir.x < Ø

→ test plane $X = X_{min}$ → we can re-use triangle code for this!

else if ray.dir.x > 0

→ test plane $X = X_{max}$

→ note, if ray.dir.x = 0, ray is parallel to X axis & we don't test it for those two faces

→ same thing for y & z

So if we find a point P on the plane, how do we tell if it is on the face?

For the X-plane the following must be true

$$Y_{min} \le P.Y \le Y_{max} \quad \& \quad Z_{min} \le P.Z \le Z_{max}$$

- When you find a hit on a face, return true; if not hits return false