

Texture Mapping Examples Interpolation 1

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Textbook Chapter 15, 9

Some slides courtesy of M. Kim, KAIST

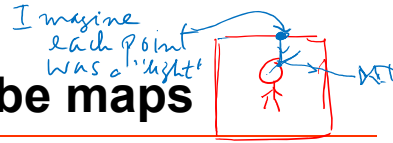
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Today

- Announcements
 - Assignment 3 due today. *Extend to Sunday Midnight*
 - Extra TA office hours in the lab today, 12:30-2:00PM.
 - Assignment 4 will be out next week.
 - Reminder: Quiz 3 will be on November 17, in class
- Review of coordinate frames
- Environment mapping
- Interpolation 1

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Environment cube maps



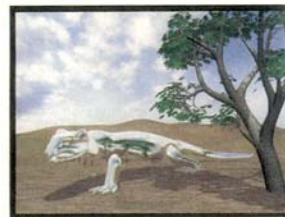
- Textures can also be used to model the environment in the distance around the object being rendered.
- In this case, we typically use 6 square textures representing the faces of a large cube surrounding the scene.



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Environment cube maps

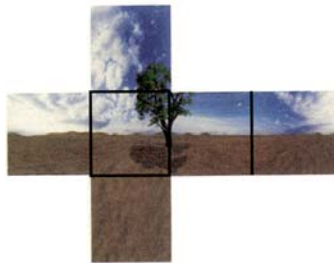
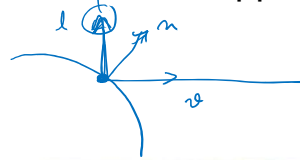
- Each texture pixel represents the color as seen along one direction in the environment.
- This is called a *cube map*. GLSL provides a cube-texture data type, `samplerCube`, specifically for this purpose.



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Environment cube maps

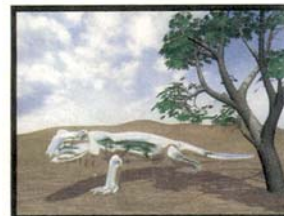
- During the shading of a point, we can treat the material at that point as a perfect mirror and fetch the environment data from the appropriate incoming direction.



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Environment map shader

- We calculated $B(\vec{v})$ in a previous lecture.
- This bounced vector will point towards the environment direction, which would be observed in a mirrored surface.
- By looking up the cube map, using this direction, we give the surface the appearance of a mirror.



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Environment map shader

- Fragment shader

```

#version 330 1.0
uniform samplerCube uTexUnit0;
in vec3 vNormal;
in vec4 vPosition;
out vec4 fragColor;

vec3 reflect(vec3 w, vec3 n){
    return n*(dot(w,n)*2.0) - w; // bounce vector
}

void main() {
    vec3 normal = normalize(vNormal);
    vec3 reflected = reflect(normalize(vec3(-vPosition)), normal);
    vec4 texColor0 = textureCube(uTexUnit0, reflected);
    fragColor = vec4(texColor0.r, texColor0.g, texColor0.b, 1.0);
}

```

B(\vec{v})

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Environment map shader

- vPosition represents the view vector \vec{v}
- textureCube is a special GLSL function that takes a direction vector and returns the color stored at this direction in the cube texture map.
- Here we assume eye-coordinates, but frame changes may be needed.

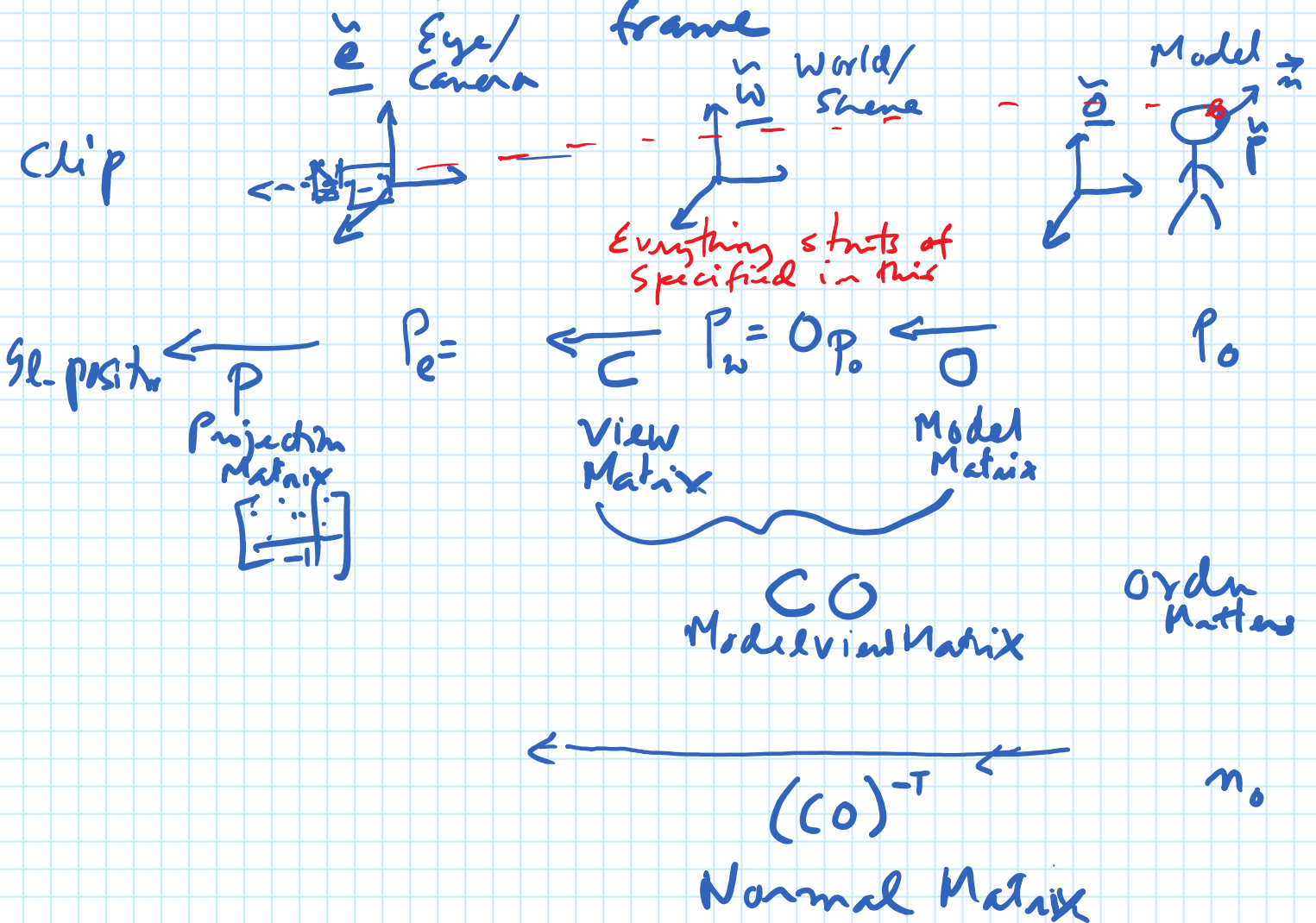


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Review of Transformation Matrices

November 3, 2017 10:21 AM

- Important frames
- Key point: Convert everything to a common frame



All lighting & shading, texture lookup still done w.r.t. the physical space e.g. using Eye Coordinates

Interpolation

November 3, 2017 10:36 AM

Motivation

Discrete/Digital representation of
Continuous/Analog data



Eg. 1D image

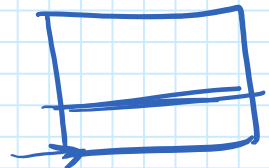
Widespread Problem.

- Audio

eg. CD quality 44.1 KHz

The coarse a sampling produces "Aliasing"

- Image \approx 2D Signal



- Computer Animation

