LIGHTING IN MAYA

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OVERVIEW

- Six Types of Light Sources
- Attributes of Lights
- Shadows
- Shading
- Lighting Tips and Tricks
SIX TYPES OF LIGHT SOURCES

- Ambient
- Directional
- Point
- Spot
- Area
- Volume
SIX TYPES OF LIGHT SOURCES

- Ambient
- Directional
- Point
- Spot
- Area
- Volume

- Brightens all parts of the scene uniformly
- Useful for: Simulating a combination of direct and indirect lighting
SIX TYPES OF LIGHT SOURCES

- Ambient
- **Directional**
- Point
- Spot
- Area
- Volume

**Even illumination of a scene using parallel rays of light**
- Useful for: Extremely far away sources
- Ex. Sunlight
SIX TYPES OF LIGHT SOURCES

- Ambient
- Directional
- Point
- Spot
- Area
- Volume

• Light radiates in all directions from a single point
• Ideal for: Omni-directional sources
• Ex. Lightbulb
SIX TYPES OF LIGHT SOURCES

- Ambient
- Directional
- Point
- Spot
- Area
- Volume

- Creates a cone of light in one direction
- Useful for: Beams of light
- Ex. Flashlight, Lighthouse
SIX TYPES OF LIGHT SOURCES

- Ambient
- Directional
- Point
- Spot
- Area
- Volume

**2D rectangular light sources**
**Useful for:** Windows, Ceiling Lights
**Longer render time**
SIX TYPES OF LIGHT SOURCES

- Ambient
- Directional
- Point
- Spot
- Area
- Volume

- Light fills a 3D shape (sphere, cylinder, etc.)
- Useful for: A visual representation of the extent of the light
THREE POINT LIGHTING

- **Key Light** – main source illuminating the object
- **Secondary (Fill) Light** – highlights details of the object
- **Back Light** – distinguishes the object from the background

ATTRIBUTES OF LIGHT

- Intensity
- Fall-off/decay
- Cone Angle
- Penumbra Angle
- Drop-off
- Color
ATTRIBUTES OF LIGHTS

- **Intensity** - how much light emitted from the light source.
- **Decay** - how much light diminishes away from the source light (fall-off)
- **Cone Angle** - width of the lights cone of influence - area outside cone not illuminated
- **Penumbra Angle** - fall off at edge of cone angle - more gives a softer edge to the light cone
- **Drop-off** - how much the light diminishes at the outer edges
- **Colour** - set an RGB colour for the light - affects colour of scene
LIGHT CONTROLS

- Aim From/Aim At
- Fall-off Rate
- Cone Radius
- Penumbra/Umbra control
- Non-linear fall-off
- All In One Control
AIM FROM/AIM AT
FALL-OFF RATE
CONE RADIUS
PENUMBRA/UMBRA CONTROL
NON-LINEAR FALL-OFF
GOOD WAYS TO USE LIGHTS

- Look to photographers for good techniques
- Think in terms of balance.
- Avoid the overly dramatic.
- Look at natural lighting.
- Avoid saturated lights and hues.
- Normally only need a few lights.
- Avoid disco colors and effects.
Light Intensity from too dark to too bright.
TWO TYPES OF SHADOWS

- Depth Map
- Raytrace

CHANGING LIGHT ATTRIBUTES
TWO TYPES OF SHADOWS

- Depth Map
- Raytrace

- Under light shape attribute editor
- Less accurate shadows
- Faster render time
TWO TYPES OF SHADOWS

- Depth Map
- Raytrace

- Less accurate shadows
- Faster render time
TWO TYPES OF SHADOWS

- Depth Map
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- Under light shape attribute editor
- More accurate shadows
- Longer render time
TWO TYPES OF SHADOWS

- Depth Map
- Raytrace

- Slight difference from Depth Map shadows
- More accurate shadows
- Longer render time
THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
- Fall-out
THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
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- Default shadow option
- Faster render time
THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
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- Under *Depth Map Shadow Attributes*, increase *Filter Size*
THREE TYPES OF SHADOW EFFECTS

- **Hard Shadows**
- **Soft Shadows**
- **Fall-out**

- Creates soft, more realistic faded edges around shadow
- Longer render time
THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
- Fall-out

- More natural looking shadows
- Select checkered box by *Shadow Color*
- Select *Ramp*
THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
- Fall-out

- Remove middle color (green) by selecting [X] on right
- Select top color to be white
- Select bottom color to be black
THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
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• Invert bottom and top colors by selecting colored dots on the left
THREE TYPES OF SHADOW EFFECTS

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- Invert bottom and top colors by selecting colored dots on the left
SHADOW EFFECTS

THREE TYPES OF SHADOW EFFECTS
- Hard Shadows
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• Acts like a color gradient
• Shadow becomes lighter at top of shadow
SHADOW EFFECTS

THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
- Fall-out

- Can also change softness of light from top attributes
  - Penumbra angle
  - Dropoff

![Shadow Effects Control Panel](image)

- Decay Rate: No Decay
- Cone Angle: 54.498°
- Penumbra Angle: 3.028°
- Dropoff: 14.036°
SHADOW EFFECTS

THREE TYPES OF SHADOW EFFECTS

- Hard Shadows
- Soft Shadows
- Fall-out

• Makes spotlight softer and more realistic
Shading is a combination of the basic material of an object and any textures that are applied to it.

In our presentation, we will discuss Materials. Textures will be covered by the Modeling group.
MANY TYPES OF MATERIALS

- Blinn
- Lambert
- Phong
- Etc.

Go to:
Windows->Rendering Editors->Hypershade
SHADING

USING HYPERSHADE

Select desired Material type from left-hand panel or from the Create -> Materials menu.
Double click on the Shader to open Attribute Editor

Modify attributes such as color, transparency, shine, etc.

Factors beyond these basic attributes that determine the appearance of an object’s surface are defined by textures (discussed in the Modeling presentation)
MANY TYPES OF MATERIALS

- **Blinn**
- **Lambert**
- **Phong**
- **Etc.**

- Simulates diffuse reflection and soft specular highlights
- Takes into account viewing angle for specular highlight (Phong does not)
- Used for: metallic surfaces
MANY TYPES OF MATERIALS

- Blinn
- Lambert
- Phong
- Etc.

SHADING

• Simulates diffuse reflection, no specular highlights
• Used for: matte surfaces
Many types of materials

- Blinn
- Lambert
- Phong
- Etc.

- Simulates diffuse reflection and hard specular highlights
- Faster render time than Blinn
- Used for: shiny surfaces
ASSIGNING A MATERIAL

Select desired object from scene, hold right-click on modified material, and select Assign Material To Selection.
TIPS AND TRICKS : LIGHTING IN MAYA

- Placing Lights
- IPR Rendering
- Going Beyond Slider Values
- Breaking Connection
- Light Glow
- Lens Flare
- Light Fog
- Decay Regions
- Color Mapping
- Intensity Mapping
- Point Light Fog – Force Field
PLACING LIGHTS AND CAMERAS

- Create a new camera or light from Create drop menu
- Panels > Look Through Selected
- Panels > Perspective > persp
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Use IPR rendering to get quick feedback on changes to fine tune effects
Pictures will be rendered according to selected camera
You can manually enter values outside the range of the slider.

Examples:
- Softer shadows: filter size > 5
- Negative lights: intensity < 0
BREAKING CONNECTIONS

- Click “Keep Image” to store pictures
- Lighting/Shading -> Break Light Links
- Lighting/Shading -> Break Shadow Links
Click “Keep Image” to store pictures

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- Click “Keep Image” to store pictures
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BREAKING CONNECTIONS

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- Lighting/Shading -> Break Light Links
- Lighting/Shading -> Break Shadow Links
In Light Effects, under Light Fog, you can add Light Glow – only seen when looking into light.
Once you enable Light Glow, you will be able to edit attributes – like adding lens flare.
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LIGHT FOG

- Add Light Fog under Light Effects
- Fully extend range by scaling up the light
- Can change color, intensity and many other attributes – use IPR rendering for quick results
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Fully extend range by scaling up the light

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Decay Regions

- Use Decay Regions

- Control over what areas the fog light is active

- Display -> Camera/Light Manipulator -> Decay Regions

- Display -> Show -> Light Manipulators
Decay Regions

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Decay Regions - Use Decay Regions

Control over what areas the fog light is active

Display -> Camera/Light Manipulator -> Decay Regions

Display -> Show -> Light Manipulators
COLOR MAPPING

- For color mapping – click the checkered square and choose an option – can be user created file
- Can be black and white or a full color picture
- Can map intensity like color
- Example: Fractal
Can map intensity like color

Example: Fractal
Map “Clouds” to Point Light Fog Intensity
Map “Clouds” to Point Light Fog Intensity

http://www.youtube.com/watch?v=_qwR_ouvY6c&context=C366c118ADOEgsToPDskJEFh6huYqR_06ZkDMvX6bX
USEFUL RESOURCES

- **Light types** -
  [http://accad.osu.edu/~aprice/courses/752/light_types.html](http://accad.osu.edu/~aprice/courses/752/light_types.html)

- **Lighting tutorials** -

- **Lighting special effects** -
  [http://accad.osu.edu/~aprice/courses/752/light_fx.html](http://accad.osu.edu/~aprice/courses/752/light_fx.html)

- **Maya Help pages**