

# Graphics Intro + Scotty 3D

- Computer Graphics Intro
- Scotty 3D UI Walkthrough
- Scotty 3D Command Line Tools
- Q&A

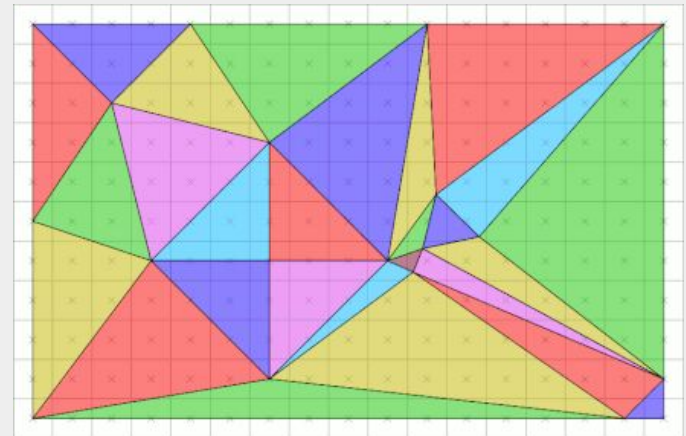
# A1 - Rasterization

# Rasterization

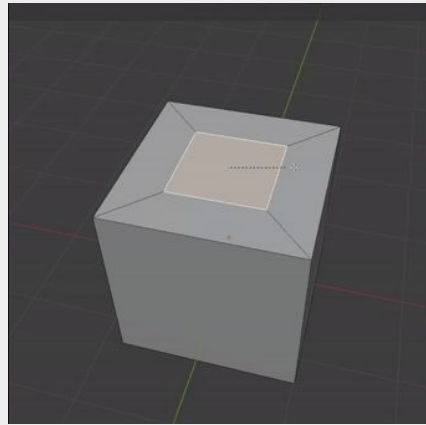
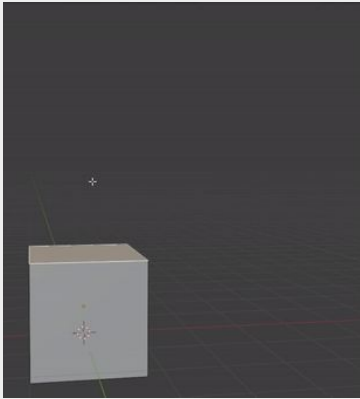


Rasterization is a easy and **efficient** way to convert geometry into shaded pixels on your screen

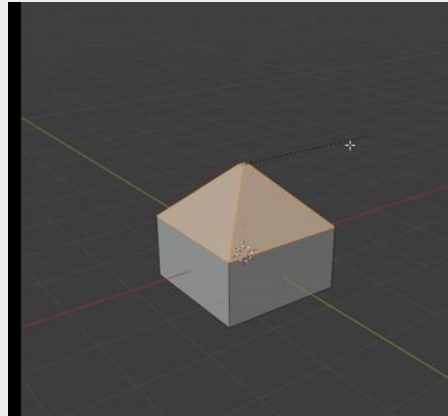
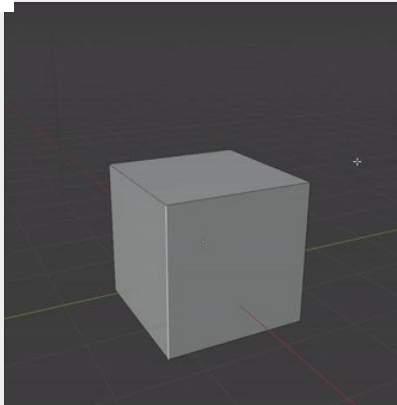
This makes it useful for real-time rendering or performance dependent applications

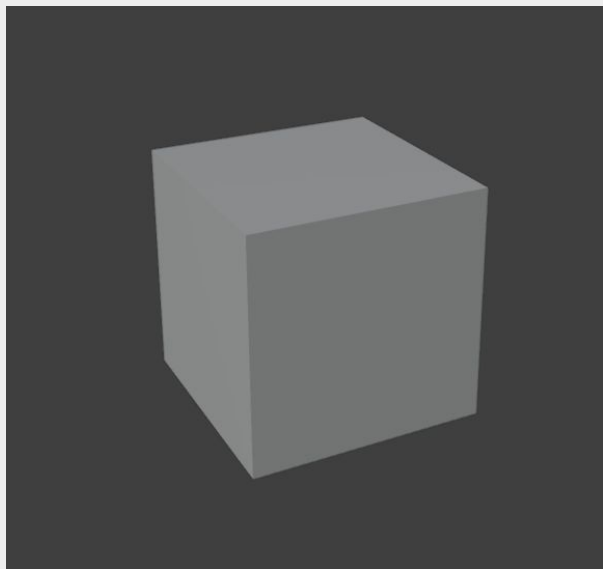


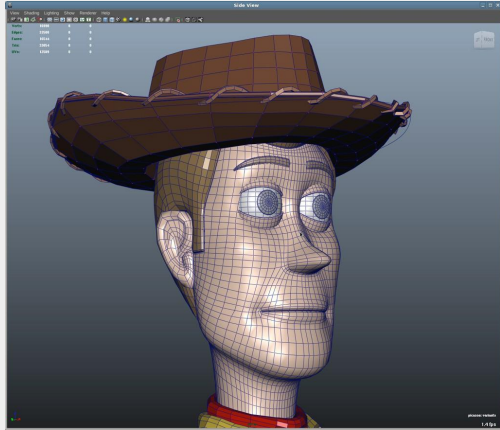
# A2 - Geometry



# Mesh Operations

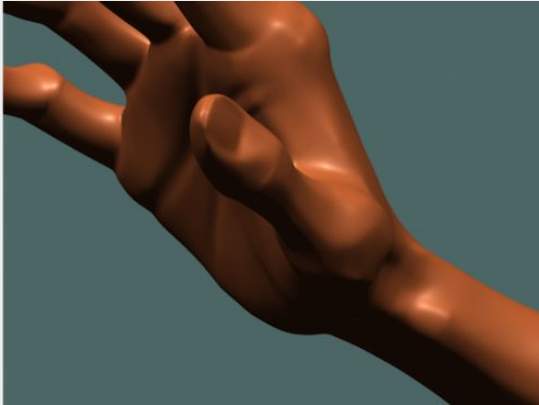
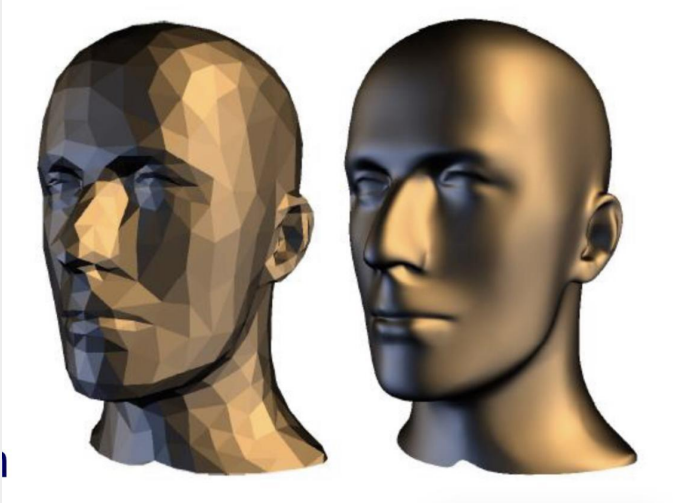






Geometric

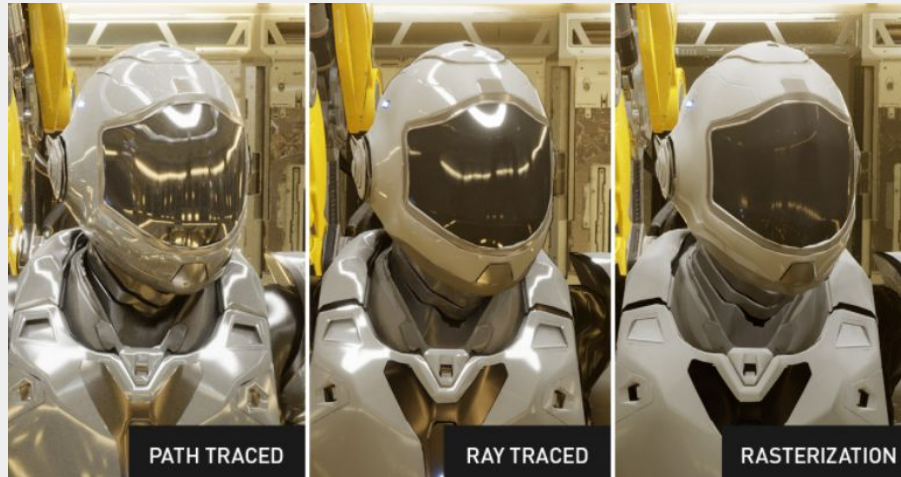
Processing



# A3 - Path Tracing

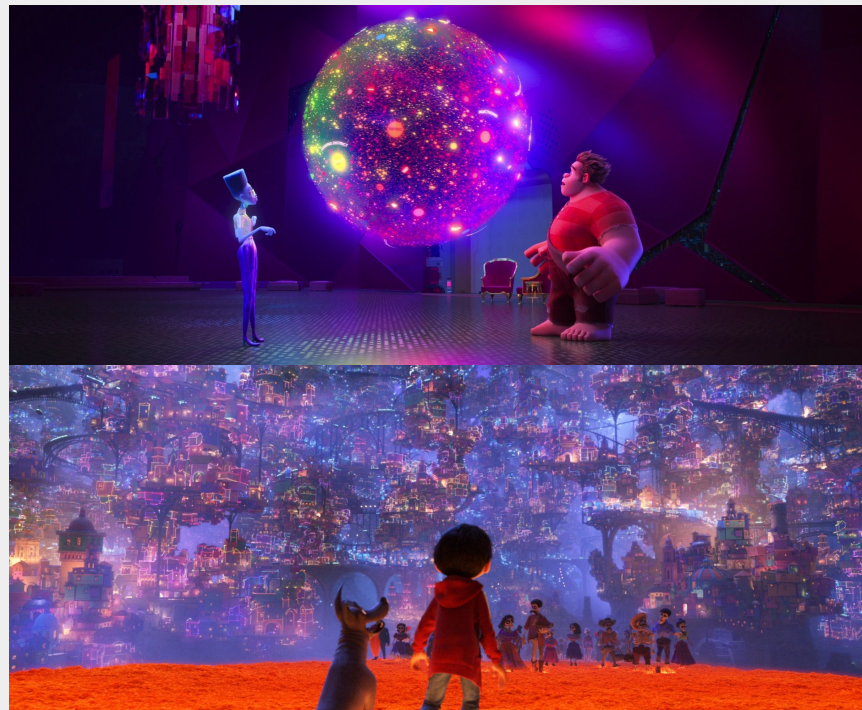
# Path Tracing

Path tracing allows us to simulate how light bounces around a scene in a physically-based way




# Realistic vs Stylized

Path tracing helps us achieve realistic lighting, but stylized/cartoon renderings often use it too to add a sense of realism to otherwise animated scenes!



# Pathtracing Jobs

- Path tracing is **really** expensive to compute
- Setting up lighting in a scene is also really tough!
- There are people whose *sole* job is setting up lighting in scenes



**LIGHTING ARTIST**  
Missions, skills, training, responsibilities

**LIGHTING ARTIST - JOB DESCRIPTION**

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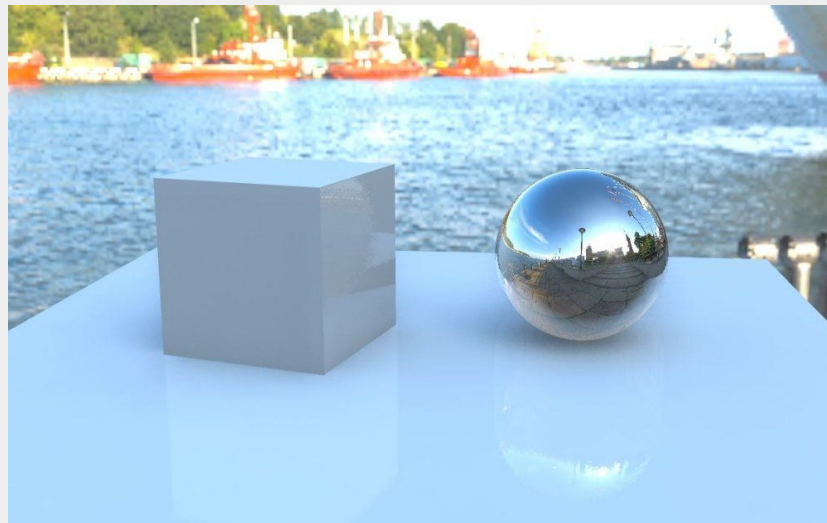
**Definition:**

The Lighting Artist creates the lighting for a pre-rendered 3D scene or a real-time video game.

They enhance characters and environments while maintaining a consistent visual style.

# Environment Mapping

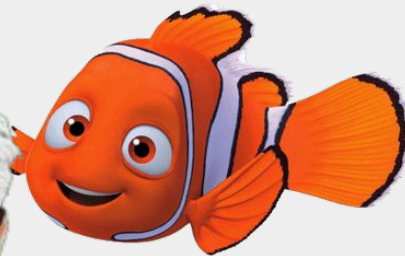
- Instead, environment mapping lets us wrap a scene with a “background” image
- We can then use this background and sample from it as if it were illuminating the scene



# A4 - Animation

# Skeletons and skinning

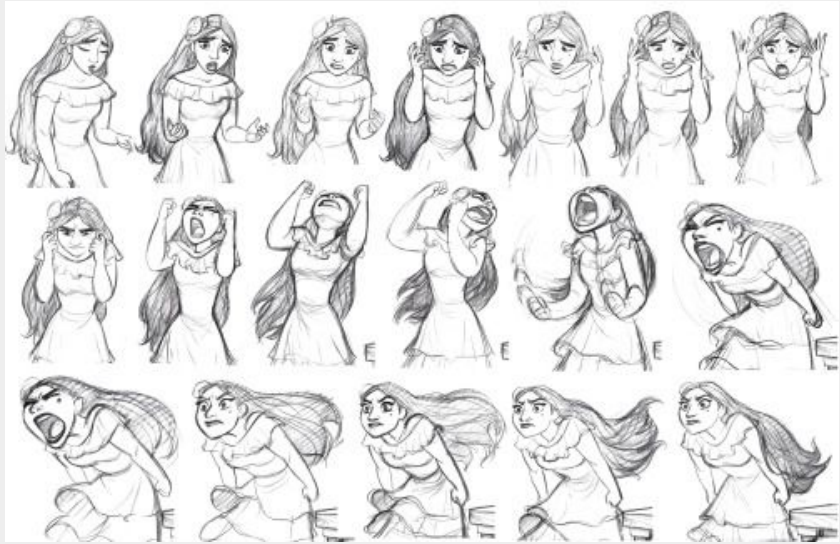
Skeletal animation and linear-blend skinning help create the exciting characters look realistic (or stylized) in movies, virtual reality, and video games



# Splines

Splines are crucial in keyframe animation, where smooth transitions between movements are necessary.

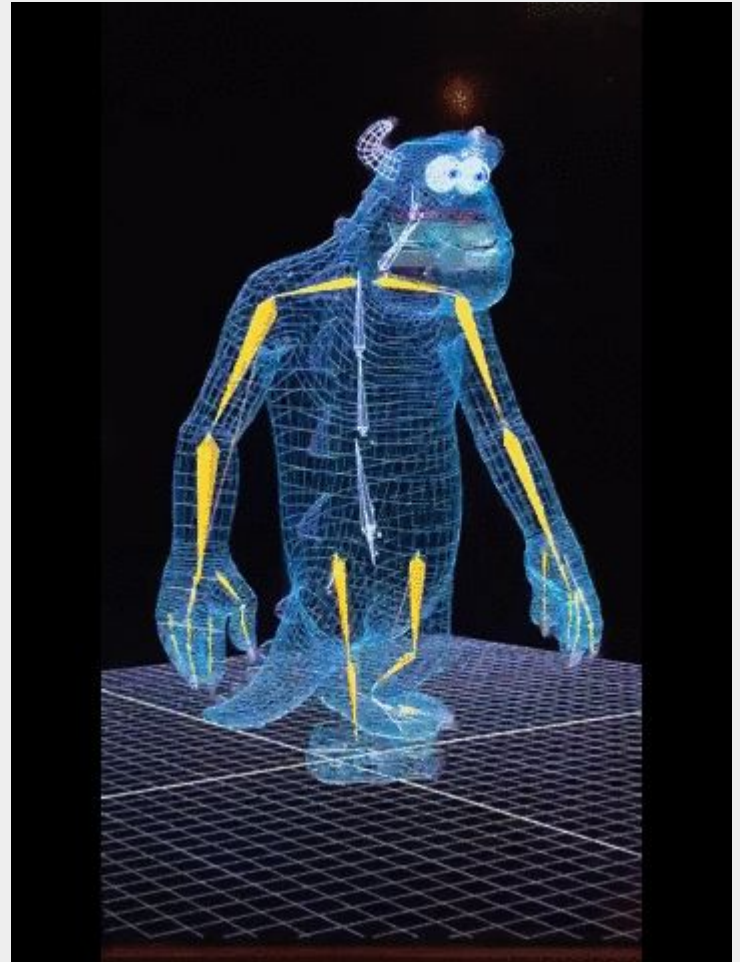
Think cameras, vehicles, or paths for objects in both movies and video games.



# Endless possibilities...

Snow castle

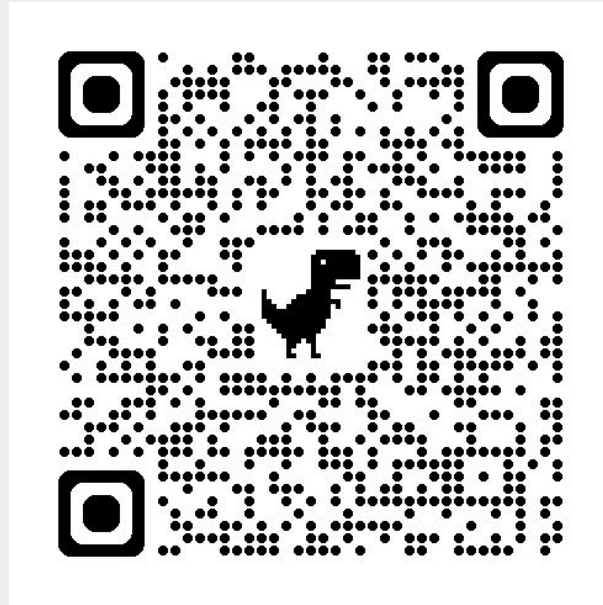
©Disney



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# Scotty3D UI Walkthrough

- [Walkthrough Doc](https://tinyurl.com/reci-s26) : <https://tinyurl.com/reci-s26>



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# Scotty3D Command Line Tools

## Building

```
node Maekfile.js
```

## Running Tests

```
./Scotty3D --run-tests __
```

```
Example: ./Scotty3D --run-tests a0.
```

## Opening a Scene

```
/Scotty3D --scene __
```

```
Example: ./Scotty3D --scene  
~/path/to/scene.js3d
```

# Scotty3D Command Line Tools Cheat Sheet

```
args.add_option("--run-tests", tests_prefix, "Run all tests starting with prefix", true);
args.add_option("-s,--scene", set.scene_file, "Scene file to load");
args.add_option("--write", write_file, "Re-save file and exit");
args.add_flag("--trace", pathtrace, "Path trace scene without opening the GUI");
args.add_flag("--rasterize", rasterize, "Rasterize scene without opening the GUI");
args.add_option("-c,--camera", camera_name, "Camera instance to render (if headless)");
args.add_option("-o,--output", output_file, "Image file to write (if headless) [for animation, can also be a directory]");
args.add_flag("--animate", animate, "Output animation frames [min_frame,max_frame] (if headless)");
args.add_option("--min-frame", min_frame, "First animation frame");
args.add_option("--max-frame", max_frame, "Last animation frame (-1 is last keyframe)");
args.add_flag("--no_bvh", no_bvh, "Don't use BVH (if headless)");
args.add_option("--exposure", exp, "Output exposure (if headless)");
args.add_option("--seed", RNG::fixed_seed, "Use fixed seed for RNG when rendering; (0 disables).");
args.add_option("--film-width", film_width, "Override camera film width (pixels)");
args.add_option("--film-height", film_height, "Override camera film height (pixels)");
args.add_option("--film-samples", film_samples, "Override film samples-per-pixel (for pathtracer)");
args.add_option("--film-max-ray-depth", film_max_ray_depth, "Override film max ray depth (for pathtracer)");
args.add_option("--film-sample-pattern", film_sample_pattern, "Override film sample pattern (for rasterizer)");
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