glTF Ecosystem
Patrick Cozzi, AGI
GDC, March 2018
glTF - Cross-Platform 3D Asset Transmission

<table>
<thead>
<tr>
<th>Audio</th>
<th>Video</th>
<th>Images</th>
<th>3D</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP3</td>
<td>H.264</td>
<td>JPEG</td>
<td>glTF</td>
</tr>
</tbody>
</table>

New market opportunities for 3D content creation and deployment!

All glTF spec development on open GitHub:
https://github.com/KhronosGroup/glTF

---

OpenGL Transmission Format
Efficient transmission of 3D scenes and assets

glTF 1.0 - Primarily for WebGL
Uses GLSL for materials
Released December 2015

glTF 2.0 - Physically Based Rendering!
Metallic-Roughness and Specular-Glossiness Materials
Rendering API independence
Released June 2017
glTF Industry Support

Publicly Stated Support for glTF
A few glTF Highlights

- **Unity** has joined the effort for the open source glTF importer/exporter
  - Plans to have a Unity package before the end of year
- **Unreal** 4.19 has experimental glTF import
- **Facebook** now supports glTF
  - Driving exporter/tool demand: FBX2glTF, Modo, ...
- **Sketchfab** has over 150K glTF models
  - Creative Commons license
- Focus on **ecosystem robustness**
  - [gltf-vscode](#) & [gltf-Validator](#)
  - [gltf-Asset-Generator](#)
  - [gltf-Sample-Models](#)
- **Vibrant open-source** community
- **Not just for the web**
glTF Momentum

Creation Tools
- blender
- MINECRAFT
- PixYZ SOFTWARE
- SketchUp
- Sony 3D Creator
- Oculus
- medium
- Paint 3D
- instant3Dhub
- SIMPLYGON
- Assimp
- Open Asset Import Library
- glTF-validator
- glTF-asset-generator
- Collada2glTF
- FBX2glTF

3D Content
- Sketchfab
- Remix 3D
- Poly
poly.google.com

150K glTF Models in Creative Commons!

Apps and Engines
- UNREAL ENGINE
- unity
- GODOT Game engine
- PLAYCANVAS
- three.js
- babylon.JS
- A-FRAME
- React VR
- CESIUM
- AUTODESK FORGE
- UX3D ENGINE
- xogl
- Windows Mixed Reality Home
- Office
Google Draco Geometry Compression Extension

- **Draco glTF Extension** released for geometry compression in February 2018
  - Draco designed and built for compression efficiency and speed - great fit with glTF!

- **Up to 12X Model Compression**
  - With no loss of visual fidelity

- **Google Draco encoders and decoders in open source**
  - C++ source code encoders | C++ and JavaScript decoders
  - [https://github.com/google/draco](https://github.com/google/draco)

- **Draco compression already in use**
  - glTF pipeline, FBX2glTF, AMD Compressor, three.js, and glTF sample models
glTF Roadmap Discussions

• Careful balance: building ecosystem vs. moving the spec forward
  - Draco filled a key missing component for mesh compression - what is next?

• Texture Transmission Extension
  - Optimized transmission format with efficient local expansion to any GPU format

• Submitted to Ratification
  - Unlit (#1163)

• Last call for feedback
  - Lights (#1223)
  - Texture Transforms (#1015)
Industry Calls to Action

- Adopt glTF in your runtime and content pipeline - don’t be left out!
  - But - keep the ecosystem robust: use validation tools and provide spec feedback

- Join the spec and extension discussions on GitHub!
  - https://github.com/KhronosGroup/glTF/issues/456

- Contribute to the open-source ecosystem and let us help you spread the word!
  - Tutorials, sample models, answering questions, etc.

- Share your roadmap priorities with us!
  - https://github.com/KhronosGroup/glTF/issues/1051

- Join Khronos!
  - Get directly involved in the glTF Working Group
Today’s glTF Speed-Round Speakers

• glTF in Unreal Engine  
  - Mike Erwin, Epic Games
• Adobe Dimension & glTF  
  - Mike Bone, Adobe
• Draco glTF 3D Compression Extension  
  - Frank Galligan, Google
• Mixed Reality with glTF  
  - Tom Mignone, Microsoft
• glTF Texture Transmission Extension  
  - Dave Wilkinson, AMD
What’s New in glTF 2.0

- Physically Based Rendering (PBR) material definitions
  - Material information stored in textures

- Graphics API neutral
  - Proven by engine implementations using WebGL, Vulkan and Direct3D
  - GLSL materials moved to extension for existing content and specialized use cases

- Morph Targets
  - Enhanced animation system

- Improvements
  - Binary glTF in core
  - Dozens of refinements for enhanced performance and a tighter, clearer specification

- Download the glTF 2.0 Reference Guide!
glTF 2.0 Scene Description Structure

- **.gltf (JSON)**
  - Node hierarchy, PBR material textures, cameras

- **.bin**
  - Geometry: vertices and indices
  - Animation: key-frames
  - Skins: inverse-bind matrices

- **.png, .jpg**
  - Textures

- **Geometry**

- **Texture based PBR materials**
glTF 2.0 Scalable, Portable PBR

- glTF 2.0 PBR Requirements
  - Simple and inexpensive to implement
    - So can be everywhere - even mobile devices
  - Scalable
    - Two combinable models - but materials continue to work even if just core supported

- Metallic-Roughness Material model
  - baseColor — base color
  - metallic — metalness
  - roughness — roughness
  - Simple to implement - mandated in core

- Specular-Glossiness Material model
  - diffuse — reflected diffuse color
  - specular — specular color
  - glossiness — glossiness
  - Slightly more resources - optional extension
glTF 2.0 PBR - Consistency Across Engines

glTF Model on Laugh Engine over Vulkan
https://github.com/jian-ru/laugh_engine

glTF Model running on Metal PBR Renderer
https://twitter.com/warrenm/status/891558755657175040

glTF Model on UX3D Engine over Vulkan
https://github.com/jian-ru/laugh_engine

glTF on WebGL Reference Implementation
http://github.khronos.org/glTF-WebGL-PBR/

glTF on View 3D over DX12
Blender glTF 2.0 Exporter

https://github.com/KhronosGroup/gltf-Blender-Exporter
Open Source Community and Robustness

Tools

Translators — glTF — Validator

Convert | Optimize

Export

Import

Apps & Engines

Export

Validator

Validate

glTF Validator
glTF Test

glTF Test Models

glTF-Asset-Generator by Microsoft

continues to grow

gltf-vscode - multi-engine viewer and
validation

gltf-validator reminder

gltf-test continues testing engines

Assimp

Open Asset Import Library

FBX2glTF

gltf Pipeline - Convert glTF 1.0->2.0

Drag and drop COLLADA -> glTF

http://cesiumjs.org/convertmodel.html

OBJ2GLTF

gltf Pipeline - Convert glTF 1.0->2.0

Drag and drop COLLADA -> glTF

http://cesiumjs.org/convertmodel.html

Blender exporter

Maya2glTF

Drag & drop to convert FBX, OBJ, GLTF, COLLADA to
glTF

GLTFKit - first Metal renderer for glTF?

Vulkan-glTF-PBR

Collada2glTF