Automating the 3D Processing Pipeline: From 3D Scan to Efficient Online & AR Presentation

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A 3D-Scanned Example Asset for E-Commerce (ZEISS RealScan)
Nice... are we ready to render then?

- 3D scan output: Detailed OBJ or glTF, high-res textures, 100K polygons

- Too heavy for many cases

- Best target rate depends on the final application!

⇒ Comparable 2D Example: “From RAW image to JPEG in desired target resolution”
3D Mesh Processing, Compression

Part I: 3D Mesh Reduction
- Simplify mesh
- Unwrap & create UV atlas
- Bake maps (color, normals, RMA, …)

Part II: 3D Mesh Compression
- Draco for geometry
- KTX2/Basis for textures
Case Study: glTF with Draco + Basis via KTX2

- Goals:
  - Evaluate texture / geometry footprints
  - Encoding / decoding performance
  - Visual quality

- Offline Optimizer: DGG RapidCompact

- Online Engine & Renderer: Babylon.js
Case Study: Glove

Uncompressed Texture

KTX2 (Basis)
Case Study: Glove

ASSET SIZE (MB)

- Textures
- Geometry

<table>
<thead>
<tr>
<th></th>
<th>Textures</th>
<th>Geometry</th>
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</thead>
<tbody>
<tr>
<td>ORIGINAL OBJ</td>
<td>6.8</td>
<td>2.5</td>
</tr>
<tr>
<td>REDUCED GLTF</td>
<td>1.7</td>
<td>1.9</td>
</tr>
<tr>
<td>REDUCED GLTF, DRACO</td>
<td>0.6</td>
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<tr>
<td>REDUCED GLTF, KTX</td>
<td>1.7</td>
<td>0.94</td>
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<td>REDUCED GLTF, DRACO + KTX</td>
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</tbody>
</table>
Case Study: Flight Helmet

Asset Size (MB)

- glTF + PNG Images
- glTF + JPG Images
- glTF + KTX2 Images

[Diagram showing asset size comparison with categories: Geometry (Draco), Base Color Tex, Normal Tex, RMA Tex]
Case Study: Flight Helmet

- From ~50MB PNG to ~12MB JPG / ~6MB KTX2

- Encode time (compression + storage):
  - JPG (jpe): 1.052 sec
  - KTX*: 73.101 sec

  System: AMD Ryzen 7 2700X / 8 Cores @ 3.7 Ghz
  32 GB RAM, Windows 10 (64 bit)

- Decode time: Neglectable

*: we performed a slight modification to the KTX SDK to allow us to enable multithreaded Basis compression. The number above reflects that change and would be considerably worse without it.
DGG Case Study: 3D Automation in E-Commerce

- Sign up until **August 18, 2019**!

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- **What you provide:**
  - 1-3 of your 3D models (3D Scan or CAD)
  - Brief description: How’d you like to see them? (AR, VR, Web)
  - Feedback on the results (1 minute survey)

- **What you will get:**
  - PDF report with before/after comparisons & stats (sizes, mesh stats, processing time)
  - Web- and AR-ready versions of your data (gITF, OBJ, USDZ)
  - Embeddable 3D Web demos and AR demos
Thanks To …

- Binomial Team (Basis)
- Marc Callow & KTX Tools Team
- Microsoft Babylon.js Team
  - Gary Hsu
  - Trevor Baron
Thanks for Your Attention!

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