



Building a WebVR Content Pipeline

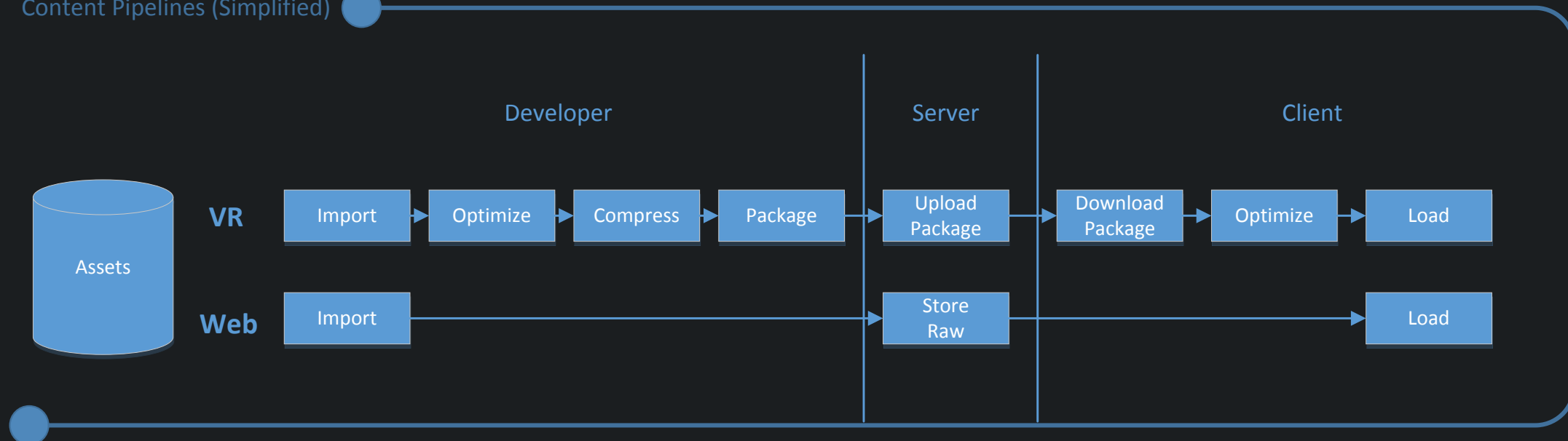
Preparing, Streaming and Optimizing for VR



WebVR Content Pipeline Challenge

- Web Developers are only recently adopting Build Systems
- VR Content is Highly Complicated - Meshes, Textures, Shaders, Skins
- Game Industry Tools Exist as Potential Insights for new Web Tools

Content Pipelines (Simplified)





Developer – Build, Optimize, Package

- Existing Build Technologies are Heavily focused on Large 2D Site Problems
 - Webpack, Browserify
 - Plugins can help
- Packaging Not the Ideal Solution
 - Requires a large download, install like behavior
 - Hurts iterative development
- Many Native tools for VR Need Repackaging/Wrapping
- More Content Export Tools with Web Targets
- glTF Evolution, not a Silver Bullet, but a real Common Ground



Server – CDN, Cors, Beyond URLs

- Smart Servers/CDNs can Offload Optimization from the Developer
 - Device+Size Optimizations – Power of 2 Textures, MIP Levels
 - Compression -
 - Usage of Texture Compression Formats (GPU friendly)
 - Decode in GPU (System Memory friendly)
- Widely Available High Quality Content
 - Large Collection of Useful, Freely Addressable Content on CORS
 - Another plug for glTF, but also needs textures/external resources
- Cross URL/CDN Hash Addressable Content
 - Hash based, Client Verifiable
 - Cacheable across different URLs, protocols, etc...
- HTTP/2 Optimizations – More Server Push



Client – Progressive Enhancement

- Our Foreseeable Future is Mobile VR Devices
 - Gear VR, Daydream & even Cardboard
- The VR Web is a no Install, no Long Download, no Wait environment
- Progressive Texture Loading + Vertex Color Fallback,
 - (Off)White+Blurry Clouds+Crisp photo of clouds better than seconds of Black
- Service Workers
 - Predict, Prefetch and Cache
 - Client Sends User Location Information, Orientation
- Best Practices and Libraries for Defined App Types
 - 360 Photos – There is a “best” way
 - 360 Videos – There are some “good to great” evolving models



More, moar, MOAR! (But this a Lightning Talk)

- Web Application Manifests
- Client Native Access to Texture/Image Optimization
 - WebAssembly – Maybe...
- glTF – HTTP/2 Server Push Model (order optimized, fully predicted)
- Position Aware Cube Maps –
 - The Instant SkyBox Problem
 - ... or Why we should maybe data-uri encode initial scene data ...
- Meta Tags and HTTP Headers for Content Hinting