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Projects and resources relating to Pixar's Universal Scene Description

This page originated at https://github.com/vfxpro99/usd-resources/blob/master/Readme.md

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Contribute

Contributions are welcome!

## Asset Resolvers 	
 	
 • URI resolver by Luma Pictures
 • S3 URI resolver Western Digital's S3 asset store resolver
 • RodeoFX resolver RodeoFX's Replace Resolver (last commit: 2019)
 • turret_usd: Animal Logic's URI resolver for turret
 • USD Asset Resolver Reference Implementations (Part of the USD Survival Guide, implement the AR 2.0 spec):
   ○ File Resolver: A file system based resolver similar to the default resolver with support for custom mapping pairs as well as at runtime modification and refreshing.
   ○ Python Resolver: Python based implementation of the file resolver. The goal of this resolver is to enable easier RnD by running all resolver and resolver context related methods in Python. It can be used to quickly inspect resolve calls and to setup prototypes of resolvers that can then later be re-written in C++ as it is easier to code database interactions in Python for initial research.
	## Building
	
	 There are a variety of strategies for building USD.
	
	 • Official USD repo The repo includes a robust build script that pulls canonical dependency sources, and can build for all supported platforms.
	 • USD Build Club This is the most thorough and flexible method for building USD and all its dependencies for macOS and Windows. Dependencies are fetched from canonical sources.
	 • Ubuntu scripts
	 • Rez
	 • rez-cook Wrapper around rez for one-line builds of USD with any desired dependencies on Windows and Linux
	 • USD Superbuild
	 • USDPluginExamples A collection of example USD plugins and plugin build tools.
		## Distros
		
		 • linux, windows nVidia has a distro, and Python3 bindings
		 • Apple, macOS Apple has a build availble here with USDZ tools
		 • Docker Container
		 • Saturn Windows build recipes, and AppVeyor build of binaries.
		 • usd-core on PyPI USD core libraries, sans the imaging components and tools
		 • Azure build artifacts

## Engine Integrations • Unreal Unreal 4.18 includes a USD importer • Unity USD SDK Full C# bindings to the USD SDK • USD for Unity USD and Alembic importer/exporter plugin for Unity	## FileFormat plugins • usdat DreamWorks usd ASCII format with templates. usdat allows the definition of a common template layer for an asset. Properties and references can be defined at asset install time as part of the *reference* to that asset when it is added to a scene, rather than using a separate composition arc like an override or a variant. • usdStl An STL file format plugin for USD by Charles Flèche • usdFBX An FBX file format plugin by Remedy Entertainment. Related blog post: https://www.remedygames.com/northlight-openusd-workflows/	## Hydra • AMD ProRender AMD ProRender raytracing Hydra delegate • GTC 2015 Jeremy Cowles' GTC2015 presentation introducing Hydra • Hydra Cycles Tangent Animation's Hydra plugin for Blender's Cycles renderer • Hydra Houdini Dreamworks' Hydra plugin for Houdini • HydraNSI Usdview Hydra delegate for 3Delight NSI • Intel hdOSPRay Hydra + Intel's Open-Source OSPRay interactive path tracer • Aurora Autodesk's open-source path tracer with Hydra delegate • Switch Victor Yudin has built a game using Hydra as the render engine • Tutorials Tutorials on using Hydra as a stand-alone render system • USD-tests Examples for learning USD and Hydra APIs
## Houdini Upgrade Guides • Upgrading Houdini From USD 20.08 to 21.02, describing the work required to upgrade Houdini's USD library • Upgrading Houdini From USD 21.02 to 21.05, the adventure continues • Upgrading Houdini From USD 21.05 to 21.08, tl;dr: a zero-effort upgrade	## In-depth Tutorials • openusd.org Tutorials: A series of tutorials covering core concepts like composition, layering, variants, and schemas. • NVIDIA: USD Resources: The hub of USD developer resources from NVIDIA. • NVIDIA: Getting Started with the Basics of OpenUSD Authoring and Querying: An in-depth course on how to programmatically author and query USD data. • NVIDIA: USD Developer Guided Learning: Learning paths, courses, coding tutorials, and video tutorials teaching USD for developers. • USD Code Samples: Short code snippets demonstrating common tasks and features of USD. • USD Cookbook: A set of projects and tutorials by Colin Kennedy that highlight core and advanced USD features.	## Overview / Core Concepts • Book of USD: An introduction to core USD concepts from Remedy. • USD Basics for Houdini Solaris: An introduction to USD from SideFX. • Understand USD Fundamentals (video): An introduction to USD fundamentals from Apple. • Universal Scene Description (OpenUSD) for Developers (video series): Introduces 4 key features of OpenUSD and breaks them down over the course of the video series. • Working with USD (video): An introduction to USD with Apple platforms and frameworks, from Apple. • What is USD (video): An introduction to USD concepts from Robin-Yann Storm. Assets used in the video are available here.

Science and Research	Specifications	Syntax Highlighters
• Large-Scale Cinematic Visualization using Universal Scene Description Sandia National Laboratories • NoMemoryBVH No Memory BVH for ray tracing acceleration	• USD Mime type registration at iana.org	• Animal Logic VSCode Highlighting (.usd, .usda, .usdc) • Animal Logic VSCode Highlighting at VS Marketplace • Syntax Highlighting for vim, emacs & sublime (.usda) • Sublime Syntax Highlighter (.usd, .usda) • Notepad++ Highlighter (.usda) • PyCharm Plug-in (.usda) • vim-usd-complete A syntax highlighter and completion for vim by Colin Kennedy
System Integrations	**Tools**	**USDZ**
• Apple's Finder and Preview application can display USD files natively • Model I/O Apple's Model I/O brings USD to Metal • SceneKit Apple's SceneKit can read and write USD files for native rendering on all Apple platforms • USD Qt Luma Pictures has created some reusable Qt widgets to work with USD • UsdView Live coding Live Coding in USD • Windows Explorer Activision has created a deep integration of USD into Windows desktop	• gltf2usd Convert gltf 2.0 files to USD • usd_from_gltf Convert gltf to USDZ from Google • animated cubes script Generate an animated file for testing • USD Manager USD Manager by Dreamworks (hyperlinked USD file browser/editor with plugin support) • guc gltf to USD converter with MaterialX support • xpdToUsd Autodesk Xgen Xpd to Usd conversion tool	• Apple's Reality Composer exports scenes to USDZ • Sketchfab has nearly a half million USDZ files available for download • USDZ at Apple WWDC 2018 presentation • UsdSkel for Apple's ArKit • Apple News USDZ files can be embedded in Apple News articles • ARKit USDZ format assets from Apple • Samples from FusionAR USDZ format assets • GiDiOdev a few USDZ format assets

Reference

- Pixar Resources
  - openusd.org The official website
  - The History of USD, by F. Sebastian Grassia and George Elkoura
  - USD Interest Google Group
  - Introductory Videos Several video presentations by Pixar
  - UsdSkel All about skinning schemas for USD
  - USD based pipelines 2016 presentation on Pixar's use of USD in the pipeline
  - Simple Shading In USD Pixar's docs for USD preview material
- Using USD with Apple's technologies WWDC 2017 presentation
- USD at UTS Animal Logic Academy video presentations
- USD Cookbook Colin Kennedy's USD code and asset samples
- USD Survival Guide (GitHub): A practical and production oriented onboarding guide for pipeline TDs/software developers, that covers everything you need to switch your pipeline to USD.
- Dreamworks USD Integration
- Luma USD Integration Brief notes on Luma's pipeline
- Unity USD SDK
  - Unity USD SDK Presentation about the Unity USD SDK
  - Unity USD SDK Design notes on the Unity USD SDK's API
  - Unity USD SDK Details on using the Unity USD SDK
- Autodesk resources
  - Autodesk landing page for USD (includes recording of past presentations)
  - Experimenting with USD in Game Pipelines Autodesk Developer Summit, GDC 2022
- nVidia Resources
  - GPU Technology Conference (GTC - free, registration required)
    - Course: Getting Started with USD for Collaborative 3D Workflows
    - GTC 2022 Sessions (free, registration required)
      - Exploring USD: The HTML for 3D Virtual World
      - Transforming Global Film Production Workflows with Omniverse
      - Best of Both Virtual Worlds: Bridging Ignition and Isaac Sim
  - usdview documentation by nVidia at the Omniverse site
  - USD as the language of the metaverse
  - Useful USD code patterns in the Omniverse documentation
- SIGGRAPH
  - Building the Open Metaverse SIGGRAPH 2022 (slides here)

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