Validation Framework for OpenUSD

Aaron Luk | ASWF USD Games WG | 23 Aug 2023

NVIDIA OMNIVERSE

OpenUSD-Native Platform for Describing, Simulating and Collaborating Across Tools

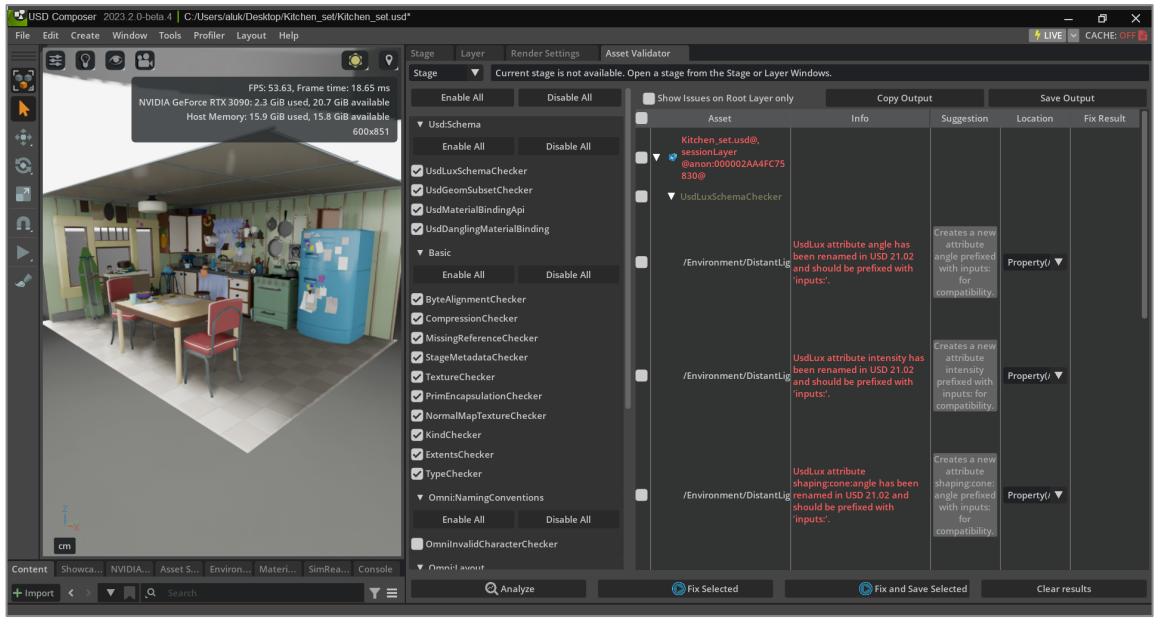
Connects World's Largest Tool Ecosystems

Built-In Physics and Generative AI

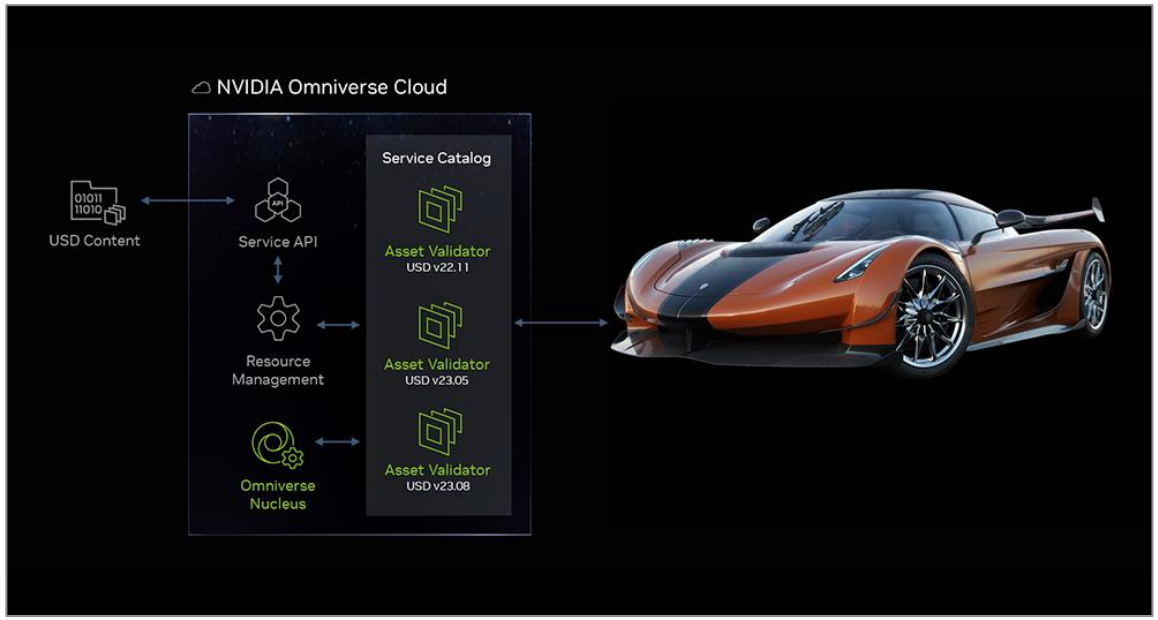
Platform for End-to-End Industrial Digitalization

OpenUSD Validation Framework

https://docs.omniverse.nvidia.com/extensions/latest/ext_asset-validator.html



Local Workstation or VM



RunUSD – Omniverse Cloud API

OpenUSD Validation Framework

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- **Compliance** – *usdchecker, usdfixbrokenpxrschemas*
  - Enforce and mitigate content incompatibilities as USD data models rapidly evolove
  - e.g., UsdLux properties now require “inputs:” prefixes to conform with UsdShadeConnectableAPI
  - e.g., UsdShade material bindings now require UsdShadeMaterialBindingAPI to be applied

- **Recommendations** – custom rules
  - Potentially site-specific
  - e.g., single concrete root prim as layer default for simplicity

Note that validation often requires context that is not available until the entire stage is composed!

Validation in Context

Enforcing Data Specifications and Recommendations

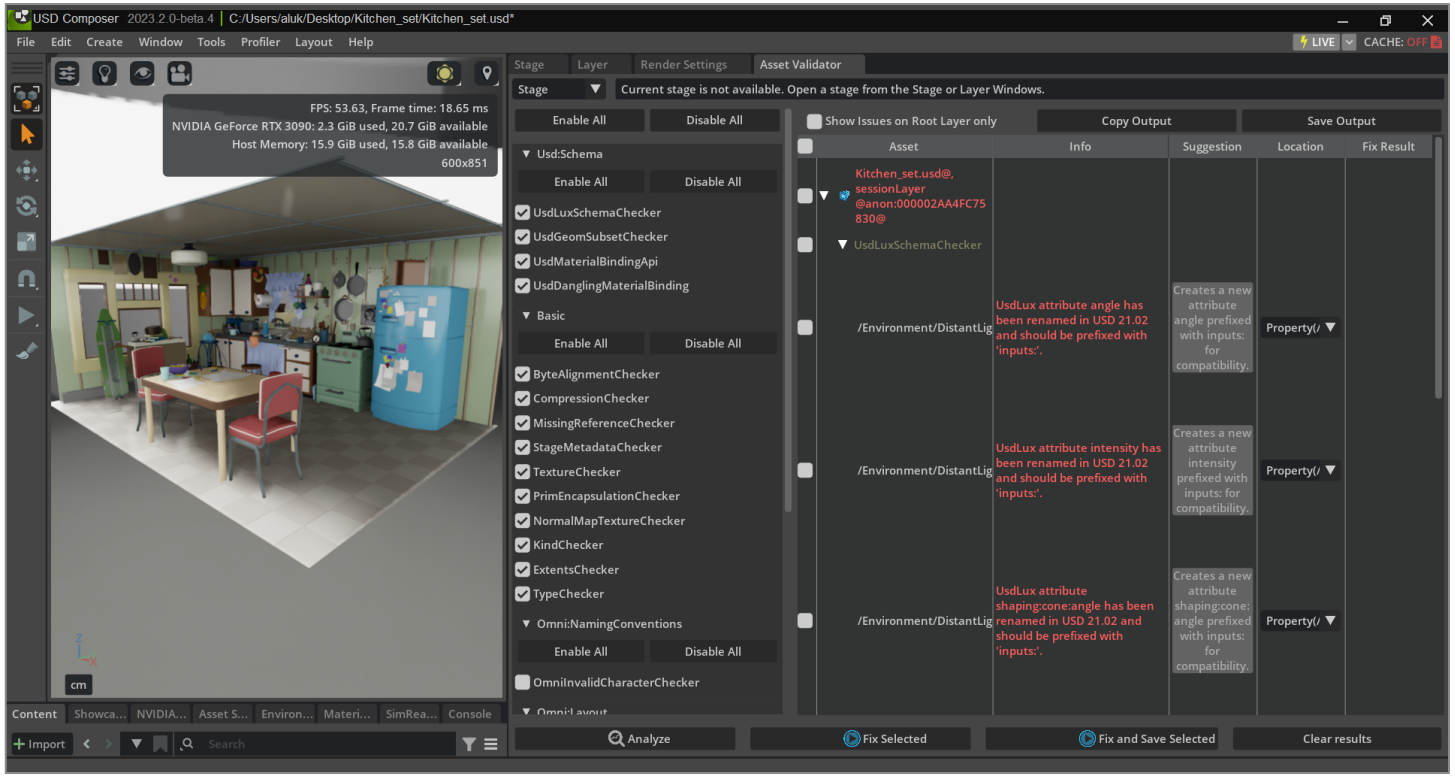
- **e.g., Nested gprims are "illegal"**
  - Not enforced at authoring time
  - Sdf and Usd API are not gprim-aware
  - Key imaging behaviors such as visibility "assume" that gprims are leaves in the composed stage hierarchy
  - Runtime behavior is not defined for nested gprims
- **e.g., Recommended Model Hierarchy via kinds**
  - kind=component as leaves
  - kind=group can only have groups and components as children
  - Ill-formed model hierarchies may prematurely prune at runtime

Validation communicates standard data specifications and recommended "best practices" in the specific context of any given dataset.

Omniverse Validation Framework

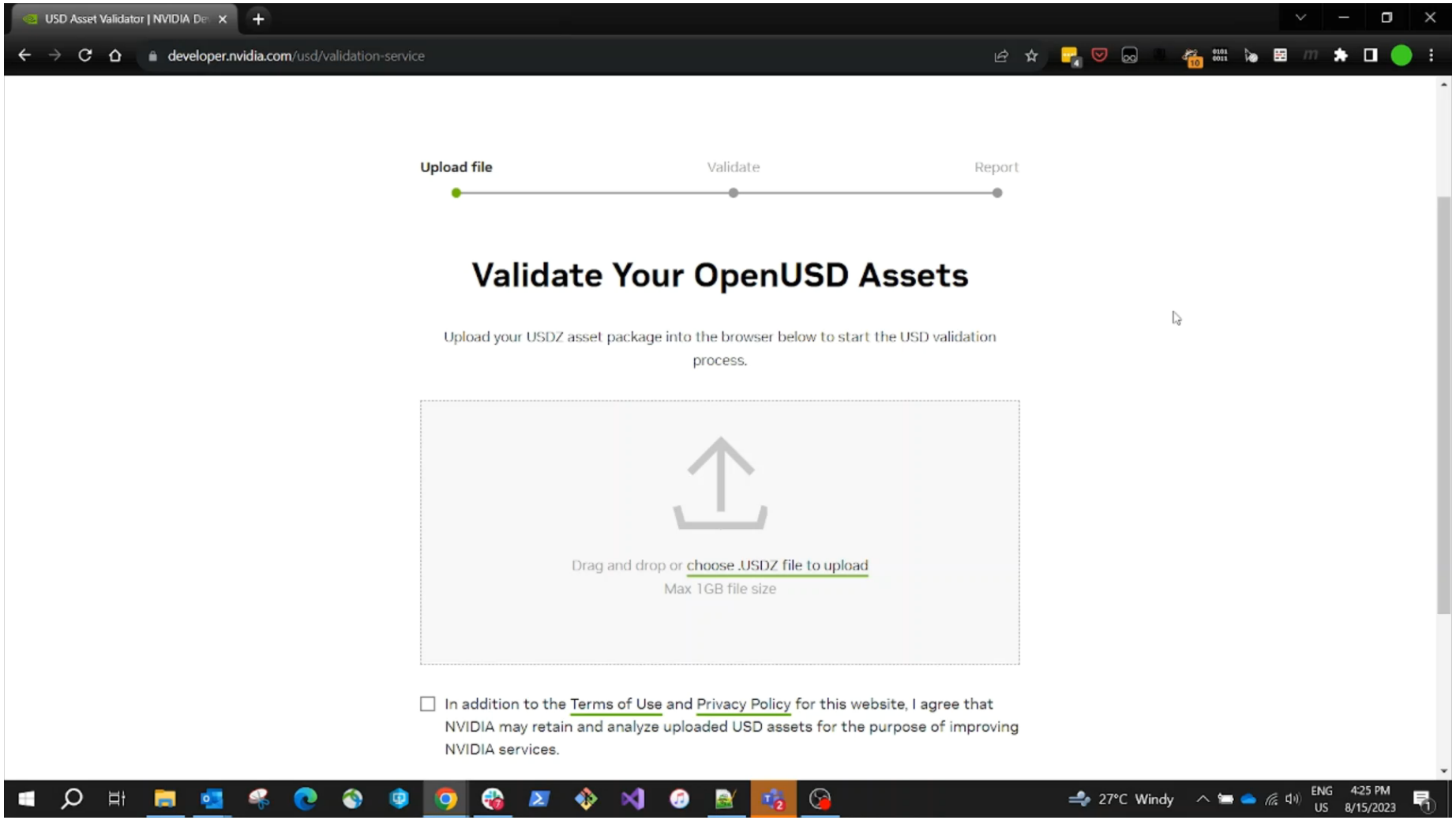
Deployments in Action

- **In-app**
  - Interactive, cf. spell-check / linting
- **In Connectors**
  - Ensure valid exports
- **In Microservices**
  - Embed or deploy into any OpenUSD experience



RunUSD

https://developer.nvidia.com/usd/validator



Validation Approaches

General Content Analysis and Mitigation

- **“Offline” / asynchronous**
  - Not enforced at authoring time
  - The general approach for OpenUSD today
- **“Debug mode”**
  - Post-authoring hooks enforce validation rules
  - Pay performance penalty to discover issues ASAP
- **Hybrids, chained with other services for content conversion and optimization…**

There are many approaches to content validation.

The key thing is to communally build up a library of “business logic” to embody rules and best practices to complement forthcoming data specifications from AOUSD.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