



Agenda

- 01 **AOUSD Update**
- 02 **USD Development Update**
- 03 **Characters at Pixar**
- 04 **Character Technology at Pixar**
- 05 **Q&A**



© 2024 Disney/Pixar. All rights reserved. | 2

AOUSD Update

Steve May

© 2024 Disney/Pixar. All rights reserved. | 3

OpenUSD

universal scene description

created by Pixar

open source framework and universal
language for describing 3D worlds

3D construction, interchange, collaboration, &
simulation at massive scale



© 2024 Disney/Pixar. All rights reserved. | 4



AOUSD

The **Alliance for OpenUSD** is an open, non-profit organization dedicated to fostering the standardization, development, evolution, and growth of OpenUSD

Founding companies: **Pixar, Adobe, Apple, Autodesk, NVIDIA**

Announced August, 2023



General Members



AOUSD Working Groups

Focus on a key area of OpenUSD's standardization and evolution, bringing together a diverse range of experts to advance interoperability and innovation in 3D technology

Core Specification

Builds core specification and presents to steering committee for ratification

Geometry

Standardizes OpenUSD surfaces, shapes, and volumes for virtual and physical worlds

Materials

Advances 3D workflows for look development

Future working groups TBD



AOUSD Interest Groups

Offer open environments for both developers and creators to engage with the OpenUSD ecosystem, discussing topics not yet ready for standardization

USD Emerging Geometry

Focuses on emerging technologies related to 3D asset representation

Architecture, Engineering, Construction, and Operation (AECO)

Examines the potential for OpenUSD in the AECO sector and provides recommendations on its adoption

Diversity, Equity & Inclusion (DEI)

Promotes diversity, equity, and inclusion across AOUSD's organization and its activities

Future interest groups TBD



USD Development Update

Florian Zitzelsberger

Recent Developments

- **Relocates:** Released in 24.08

Non-destructive edits to scenegraph hierarchy from remote layer stacks

```
#usda 1.0
(
  relocates = {
    </Factory/Room> : </Factory/AssemblyRoom>,
    </Factory/AssemblyRoom/Switch> : </Factory/AssemblyRoom/OnOffSwitch>
  }
)

def "Factory" (references = @./Building.usd@) { }
```



Recent Developments

- **UsdSkel Performance Improvements:** 24.08

Over the past year, we've made several performance improvements to UsdSkel. Hydra Storm in particular.



In Progress

- **Animation Splines:** Ts “API Preview” in 24.08
Represent time-varying attribute values using splines
- **OpenExec:** In development
System for registering computations on USD scene objects and providing computed values alongside authored values

More information at upcoming (TBD) ASWF USD WG meeting.



© 2024 Disney/Pixar. All rights reserved. | 13

Characters at Pixar

Steve May

© 2024 Disney/Pixar. All rights reserved. | 14



© 2024 Disney/Pixar. All rights reserved. | 15



© 2024 Disney/Pixar. All rights reserved. | 16



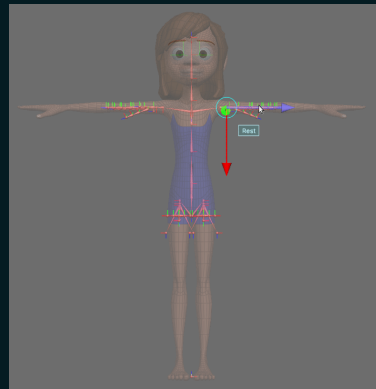
Character elements

- modeling + rigging
- groom
- garments + simulation
- props

© 2024 Disney/Pixar. All rights reserved. | 18

1. Fitting

Setting the position of our rig skeleton & pivots

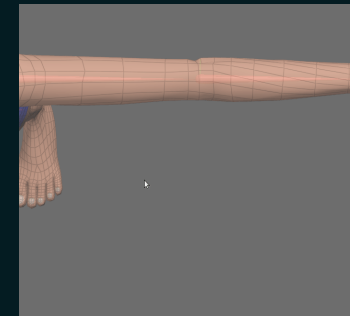


© 2024 Pixar. All rights reserved. | 19

2. Weighting

Assigning regions & influence amounts for points on the geometry

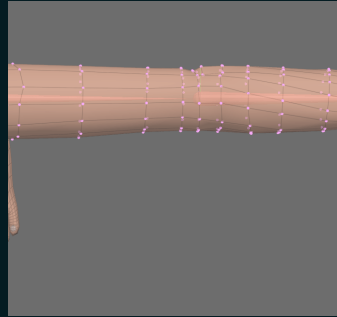
Large deformation networks



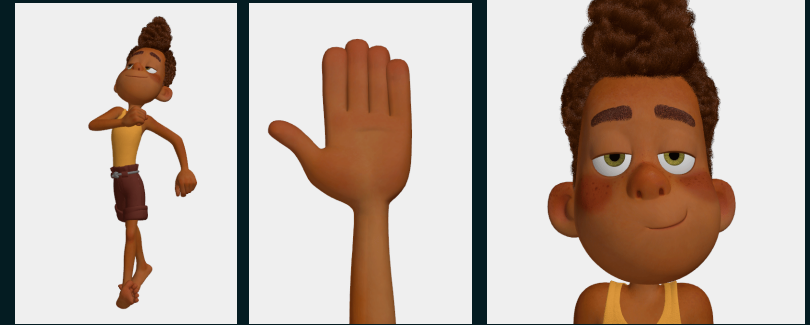
© 2024 Pixar. All rights reserved. | 20

3. Sculpting

Pose based offset shaping



© 2024 Pixar. All rights reserved. | 21



© 2024 Pixar. All rights reserved. | 22

Character Technology at Pixar

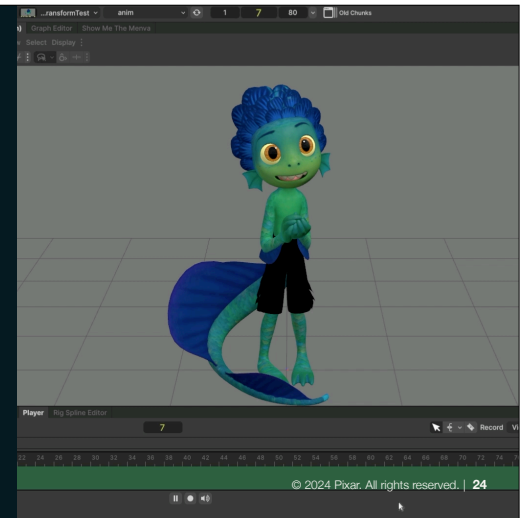
Florian Zitzelsberger

© 2024 Disney/Pixar. All rights reserved. | 23

Technologies

Presto Characters

UsdSkel

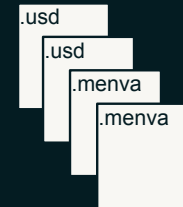


© 2024 Pixar. All rights reserved. | 24



Presto Character Asset Structure

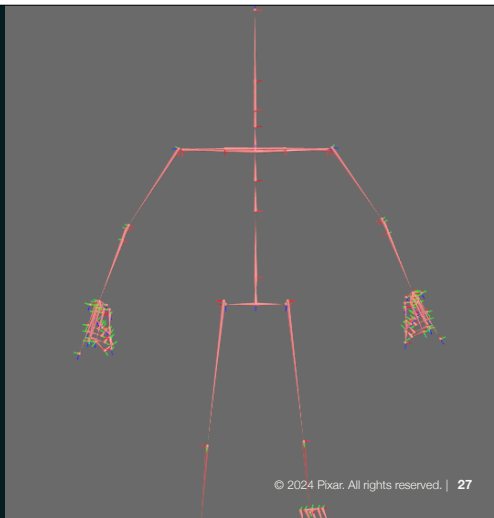
- Geometry and materials defined in USD layers
- Character rig in Menva (superset of USD) layers
- Rig components, relocates and symmetry



© 2024 Disney/Pixar. All rights reserved. | 26

Presto Rigs

- Skeletal rig deforms (invisible) skeleton
- Control system for posing skeleton can be dynamically switched



Presto Rigs

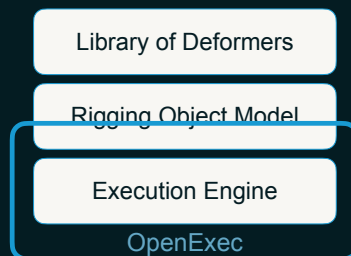
- Skin deformation with posed and rest skeletons as inputs
- Linear deformation chains authored
- Sometimes deform lower resolution geometry and project onto high res geometry late in deformation chain
- Additional deformations on high res geometry



© 2024 Pixar. All rights reserved. | 28

Presto Execution System

- Comprised of an execution engine, object model for rigging, and library of deformers
- Rigs can evolve independently of the system



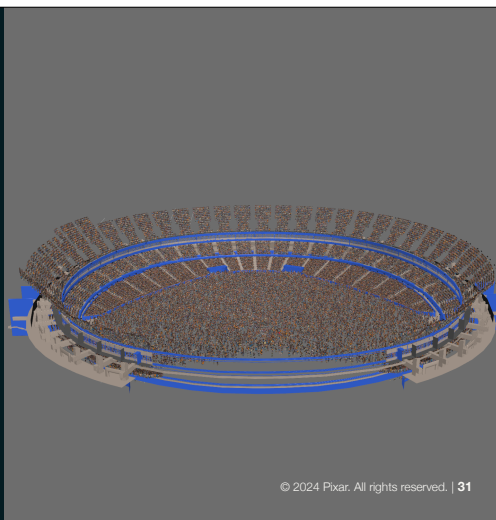
UsdSkel

- Skeletally skinned meshes and joint animations
- Ability to encode skeletons and (static) blend shapes for linear blend skinning
- Ability to pose the character



UsdSkel Crowds

- At Pixar primarily used for scalability as opposed to sparsity (e.g. crowds)



UsdSkel Future

- No builtin animation blending
- **Value clips**: Multiple animation support
- **Animation Splines**: Animate bone transformations
- **UsdPhysics** capable of expressing dynamics
 - UsdSkel and UsdPhysics not tightly integrated
 - No simulator included
- **OpenExec**: Computed behaviors on top of skeletal animation



Let's Collaborate



- github.com/PixarAnimationStudios/OpenUSD-proposals
- github.com/PixarAnimationStudios/OpenUSD
- forums.aousd.org



We're hiring!



pixar.com/careers



Q&A

