Authoring Physically Simulated Destruction with NVIDIA APEX

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Overview

- APEX and Destruction Introduction
- Authoring with PhysXLab
  - Creating chippables with cutout fracturing
  - Examples of slicing (complete fracture)
  - More features of PhysXLab
- Unreal Engine 3 Integration
  - Full workflow demonstration for Batman Arkham Asylum
- Other APEX Modules
  - Clothing, Turbulence, Vegetation, etc.
APEX – Scalable Dynamics Framework

- Vegetation
- Turbulence
- Clothing
- Destruction
APEX

Goal: easier authoring of interesting behavior

Problems:

1. Significant programmer involvement (bottleneck)
2. Content designed to min. spec.
3. Game engine performance limitations

To overcome these problems:

1. Give artists a “high-level” interface to content design, via powerful WYSIWYG authoring tools. Provide an integrate-once framework for programmers
2. Scalability
   - Content adapts to different hardware capabilities
   - Artists only need to author once for many platforms
   - Scaling parameters can be set by artists
   - The game may override any of the parameters
3. Rendering “fast path”
APEX Architecture

Authoring

- DCC Plug-In
- Standalone APEX Tools
- Destruction
- Clothing
- Vegetation
- ...

Run-time

- APEX Core
- Renderer
- PhysX SDK
- Consoles
- PC
- PC +GPU

APEX Tools

- DCC
- PhysX SDK
- Renderer
- Consoles
- PC
- PC +GPU
APEX is Artist Focused

- Artist level abstractions of dynamic systems
- “Destructible bunker” vs. “collection of bricks”
- Intuitive and easy to use
APEX Runtime Demo:  
*Dolls to the Wall*
APEX Destruction

OBJ | FBX | BMP | USER

Mesh data & Fracture Map

APEX asset file

PhysXLab Core

Destruction

APEX Core

Renderer | PhysX SDK
Destruction Authoring with PhysXLab

- Live demo
Unreal Engine 3 Integration – Batman Arkham Asylum

- Workflow
- Import / placement in game
- Game demonstration
- Asset Tuning
APEX Destruction

*Batman: Arkham Asylum*

- **Work Flow**

  - Mesh Export: FBX
APEX Destruction

Batman: Arkham Asylum

Work Flow

Mesh Export: FBX

PhysX Lab
APEX Destruction

*Batman: Arkham Asylum*

**Work Flow**

- Mesh Export: FBX
- PhysX Lab
- Fracturing
- Asset Tuning (Playground)
- Inner Material
APEX Destruction
*Batman: Arkham Asylum*

**Work Flow**

- Mesh Export: FBX
- PhysX Lab
- UE3 Import
Other APEX Modules

- Clothing
  - Authoring Pipeline
  - CCP Demos
- Turbulence
- Vegetation
  - Authoring Pipeline
  - Tool Demo
- Particles
- Force Fields
APEX Clothing
Authoring Pipeline

Mesh data & Fracture Map

APEX Asset file

APEX Core

Renderer

PhysX SDK
APEX Clothing

- Hybrid of simulated and skinned clothing
- DCC tools with preview functionality
- Level of Detail (simulation and graphics)
- Animation blending
- Clothing constraints
- Scalability

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APEX Turbulence

ESRB CONTENT RATING

www.esrb.org

TEEN

Animated Blood
Mild Language
Violence
APEX Vegetation / SpeedTree
Authoring Pipeline

APEX Vegetation / SpeedTree
Authoring Pipeline

APEX
Vegetation
APEX Core
Renderer
PhysX SDK

TGA, PNG, OBJ, STM
Images, meshes

Procedural Files
Where To Find Us

During GDC

- NVIDIA Demos and Game Technology Theater: Main Expo Area, Booth 1702
- Theater:
  - Physically Simulated Clothing By CCP Using NVIDIA APEX (Fri. 1300-1400)
  - APEX Vegetation with the SpeedTree® Modeler (Fri. 1500-1600)
- Sessions:
  - *NVIDIA’s New Game Development Environment: NVIDIA Parallel Nsight™* (Sponsored session, Room 310 South Hall, Thu. 1630-1730)
  - *Taking Fluid Simulation Out of the Box: Particle Effects in Dark Void* (Room 304 South Hall, Fri. 0900-1000)

Online

- Twitter: nvidiadeveloper
- Website: [http://developer.nvidia.com](http://developer.nvidia.com)