NVIDIA APEX: From Mirror’s Edge to Pervasive Cinematic Destruction

Anders Caspersson, DICE
Monier Maher, NVIDIA
Jean Pierre Bordes, NVIDIA
Agenda

- Mirror’s Edge Case study  (Anders Caspersson)
  - PhysX in Mirror’s Edge

- Introduction to APEX
  - A Scalable Dynamics Framework

- APEX Destruction Module
  - In-depth Demonstration

- APEX Turbulence Module
  - Sneak Preview
PhysX in Mirror’s Edge
Background

- PC version gets pushed out
- How can we enhance it?
- Problem: The game world felt very static
- PhysX would help to bring life and immersion
Challenges

- **Time** – 5 weeks from start to 0 bugs
  - We could not get everything we wanted
- We did not want to affect the game play
  - We had to restrict ourselves to visual enhancements
- Matching the static lighting
  - We ended up lighting each asset individually in separate lighting channels
- The art direction
  - Everything should be stylish and clean
The glass sculpture
The glass sculpture
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Particles summary

- Huge number of mesh or sprite particles
- Full physical interaction with world and player
- Edited as usual in Unreal Cascade
- Used for
  - Impact effects
  - Glass destruction
  - Trash
  - Smoke
“Heat” Level
“Heat” Level
“Heat” Level
Cloth summary

- 1000 – 1500 vertices
- Tearing
- Skeletal meshes created in Max, Maya
- Edited in Unreal AnimSet Editor
- Used for
  - Tarp
  - Plastic sheets
  - Plastic curtains
  - Banners
  - Paper stuck in vents
Conclusions

- PhysX enabled us to quickly enhance the visuals of the game and make the world come alive.
- The user immersion was greatly enhanced.
- Could have played a bigger part if implemented earlier.
- Scaling would have helped.
  - We had to tune the effects for low spec hardware.
  - We could have had even more detail on high end machines.
- We wish APEX had been available.
Introduction to APEX
Pervasive Cinematic Destruction: UT3 + APEX
Scalable Dynamics Content

APEX Destruction

APEX Vegetation

APEX Clothing

APEX Turbulence
APEX is a “Scalable Dynamics Framework”

- **Scalable**: Content adapts to different hardware capabilities
- **Dynamics**: The way things move and interact
- **Framework**: A structured environment

APEX consists of two major components:

- **Authoring**:
  - High-level authoring of dynamic systems
  - DCC plugins, standalone tools, and game engine plugins

- **Runtime**:
  - A modular SDK – minimal integration into game engine
  - Leverages PhysX for simulations
APEX Architecture

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

- **Run-time**
  - APEX Core
  - Renderer
  - PhysX SDK

- **Platforms**
  - 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 Solves Problems

• Requirement for significant programmer involvement limits artists’ productivity

• APEX Solution: Provide a “high-level” interface to artists which allows for turnkey content creation

• Customizing content to different platforms is expensive

• APEX Solution: All modules provide built-in content scaling

• Cross-functional issues can severely limit the amount of dynamic content

• APEX Solution: Framework provides rendering “fast path” and manages complex dynamic content
APEX is easy to integrate

- Already integrated into leading game engines
  - UE3, Gamebryo, Hero Engine, ...

- APEX modules are Plug & Play
  - Clothing, Vegetation, Destruction
  - More modules in development

- APEX is already used for AAA content
  - Licensed by major publishers
  - NVIDIA developed APEX modules are free for PhysX developers
PhysX Lab
Authoring - Fracture Maps
UE3 Testlevel – Various Destruction
UE3 Testlevel – Wooden Fence
UE3 Testlevel – Complex Buildings
Scalability: “Low Setting”
Scalability: “High Setting”
APEX Turbulence Module
Sneak Preview
SPH Particle Smoke

- Already in games, e.g. Mirror’s Edge
- Integrated into UE3
APEX Turbulence

- High definition Turbulence
  - Residual dust from destruction
  - Smoke Grenades and other weapon effects
  - Supernatural effects – e.g. ghost like
  - Snow storms or snow trails
  - Exhaust smoke from car or spinning/braking tires
APEX Turbulence – Live Demo
APEX Summary

- APEX is a Scalable Dynamics Framework
- APEX is artist focused
- APEX is easy to use
- APEX is modular
- APEX solves problems
- APEX is easy to integrate
- APEX is already used to create AAA content

Start using APEX now:
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During GDC
- Expo Suite 656, West Hall
- Developer Tool Open Chat, 1:30 to 2:30 pm (25th-27th)
- Come to our special session on APEX:
  - *Wednesday, March 25th, 6:00 – 8:00 p.m.*

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