

nVISION 08
THE WORLD OF VISUAL COMPUTING

The Art of PhysX

A Guide to Game Creativity

© 2008 NVIDIA Corporation.



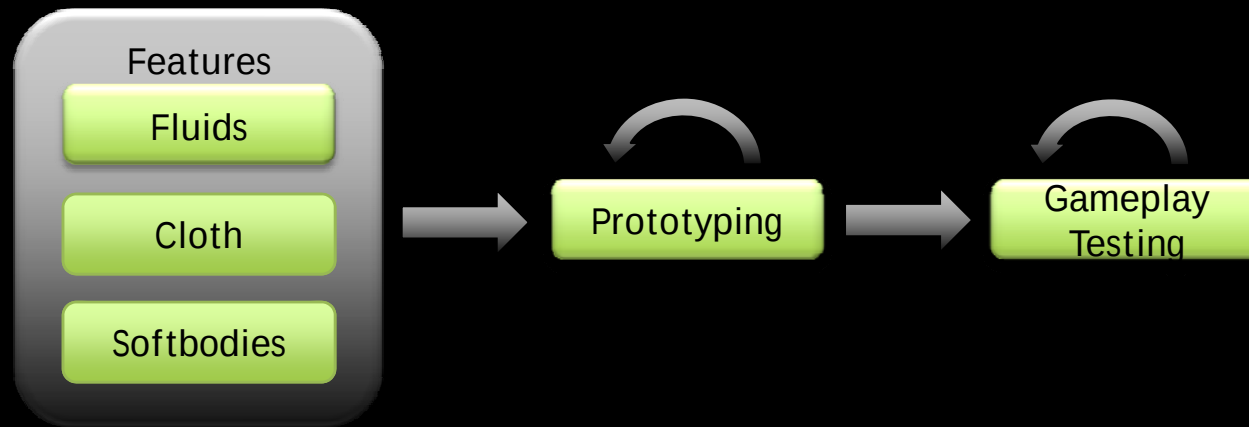


Overview

- Integrating GPU PhysX
- Case Study: The Great Kulu
- Case Study: UT3 Tornado
- Other GPU PhysX Examples
- Questions

Integrating PhysX Features

1. Select showcase features
2. Prototype concepts
3. Verify gameplay



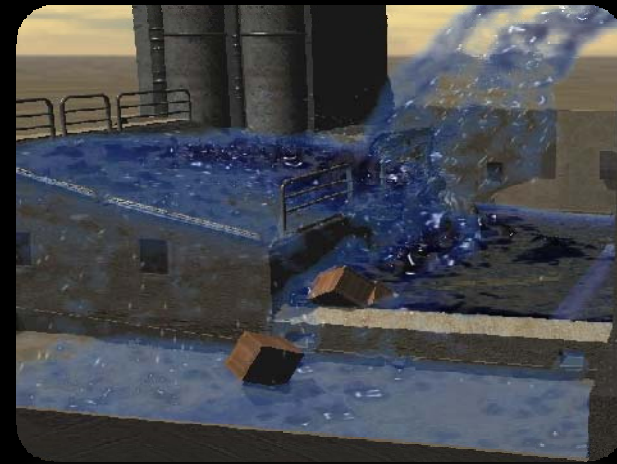
Showcasing Features

- Particles
- Cloth
- Softbodies



Maximizing PhysX Features - Particles

- Colliding or flowing over surfaces
- Reacting to forces
- Particle-Particle interaction



© 2008 NVIDIA Corporation.



Maximizing PhysX Features - Particles



Maximizing PhysX Features - Cloth

- Visualize forces
- Clothing movement
- Conforms to surrounding surfaces



Maximizing PhysX Features - Cloth



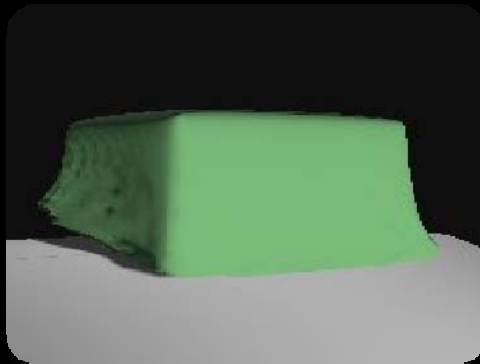
nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



Maximizing PhysX Features - Softbodies

- Compression
- Rippling Forces
- Secondary Motion



Maximizing PhysX Features - Softbodies

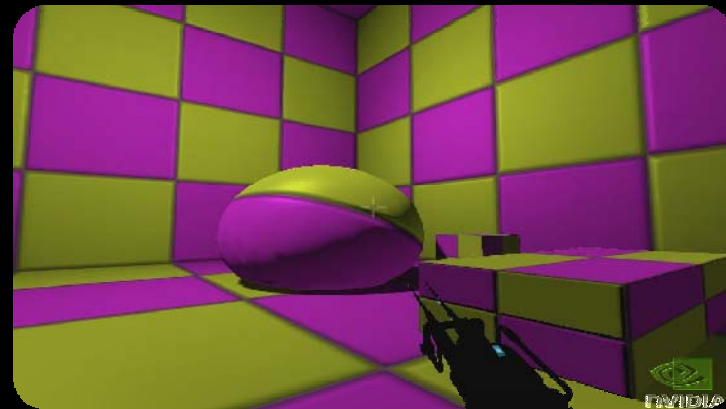
nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



Prototype Concepts

- Let the artist/level designers play
- Create test levels with physics



Gameplay Testing

- Testers should experiment
- Enhance the gameplay experience
 - Are features noticeable during gameplay?
 - Are players using the features effectively? (Destruction)

Questions

- Will interaction and interactivity enhance the experience?
- Will your feature be noticeable by the player?
- Will your feature affect gameplay?
- Does your feature need to be networked?

Case Study: The Great Kulu

- **PhysX Feature** – Softbody
- **Goal** – Illustrate softbody behaviors
- **Plan of Attack** – Create a large soft sea creature



Key Softbody Advantages

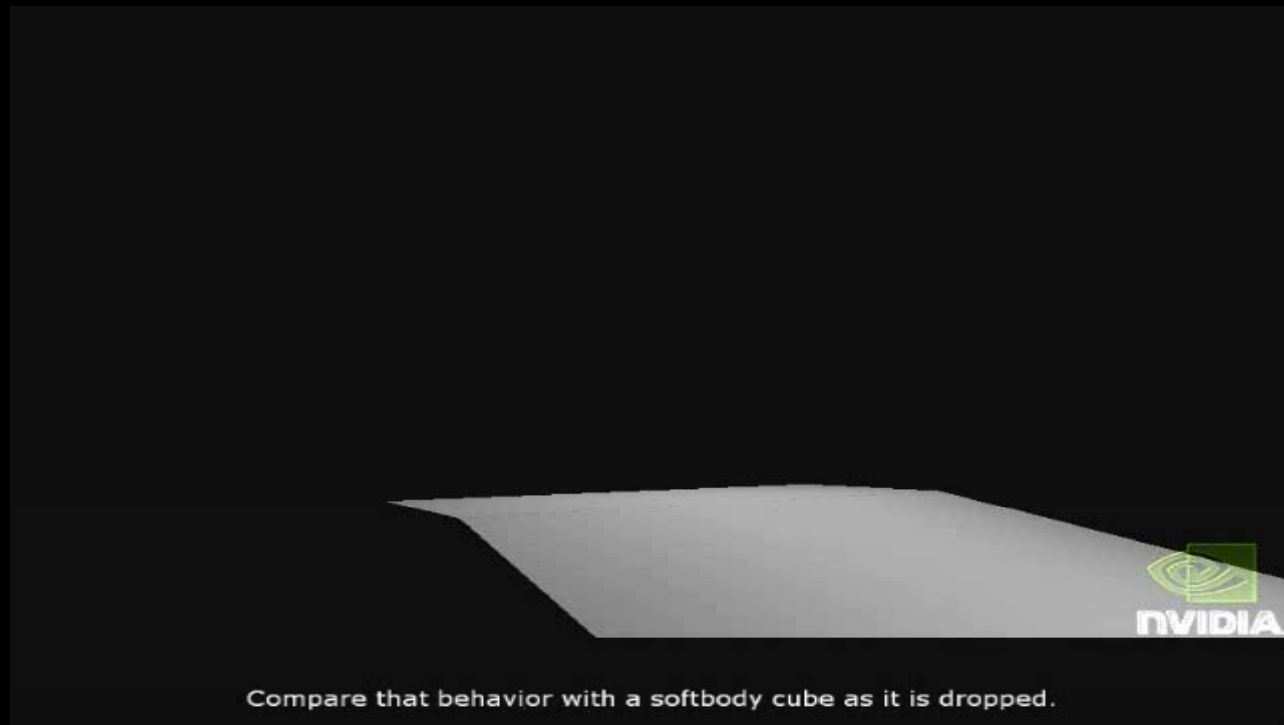
- Secondary motion from animation
- Surface interaction
- “Organic” behavior



© 2008 NVIDIA Corporation.



Basic Softbody Example



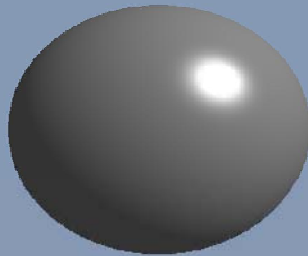
An abstract, colorful image with swirling patterns of orange, yellow, and blue, resembling a close-up of a textured surface or a microscopic view.

The Great Kulu - Prototype Features

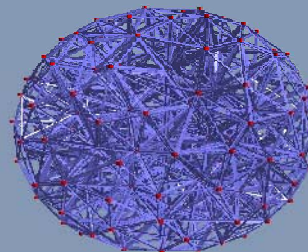
- Creature
 - First animated softbody
 - First use of softbody in a game setting
- Force Interaction

Softbody Animation Technique

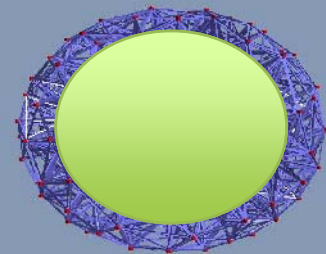
Create Model



Generate
Tetrahedrals



Attach
Vertices

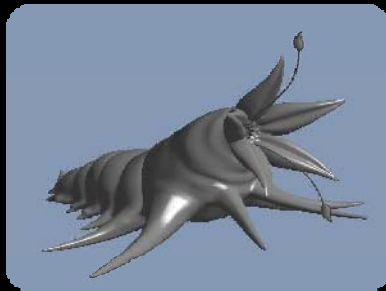


The Great Kulu - Prototype 1

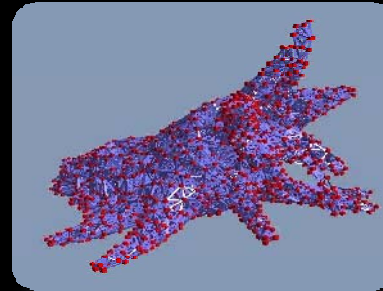


Animating the Creature

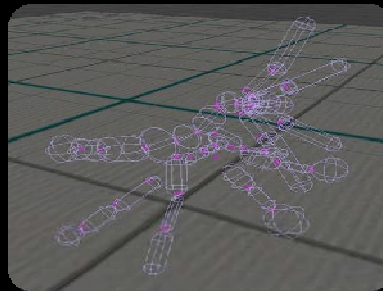
Create Model



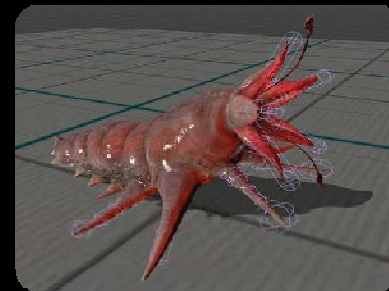
Generate Tetras



Tetra Attachment



Final Result



The Great Kulu - Prototype 2

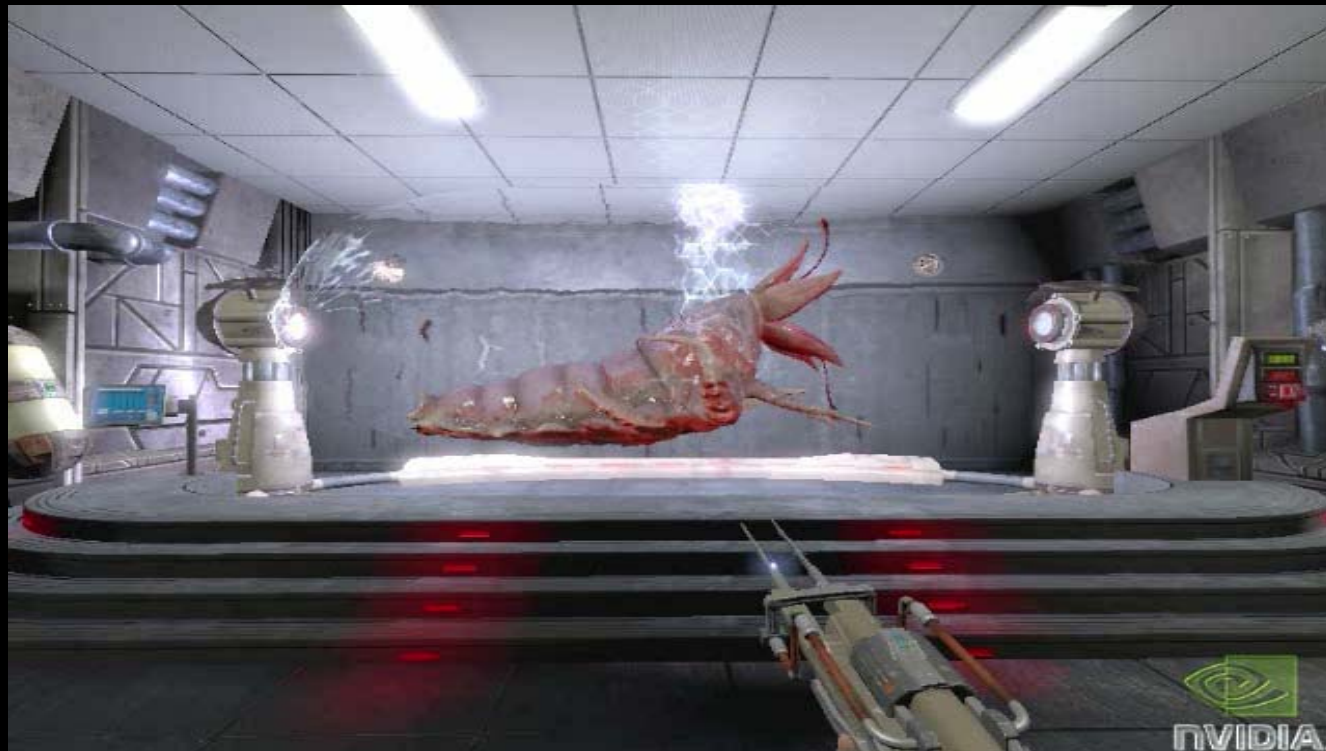


nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



The Great Kulu - Forcefield



nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



The Great Kulu - Escape



nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



The Great Kulu - Door Squeeze



nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



The Great Kulu - Eggs

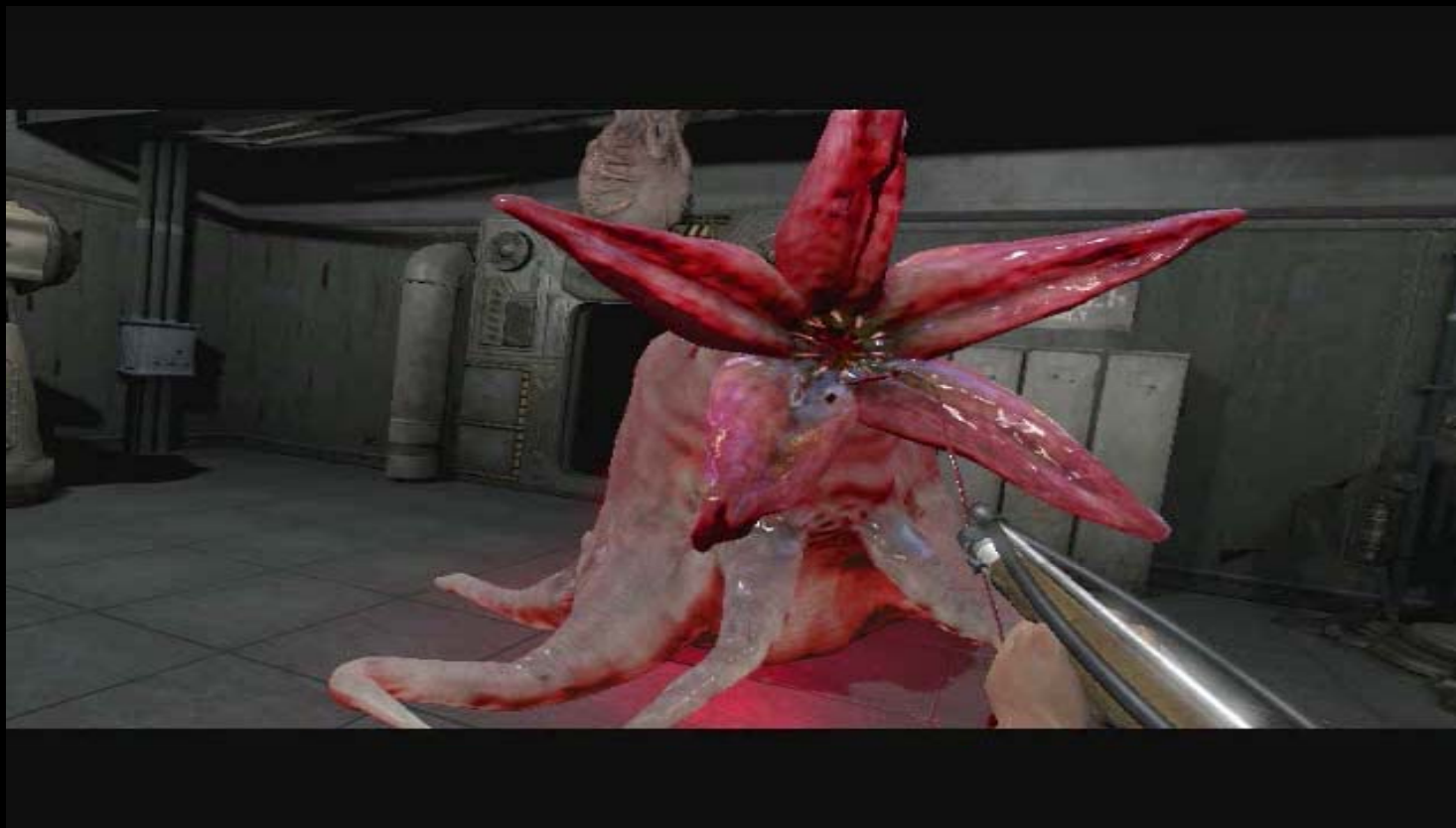


nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



The Great Kulu - Explode



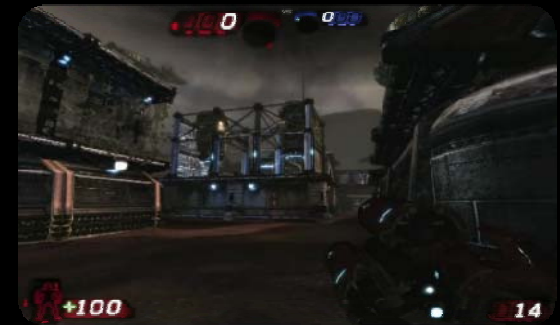
Reaction

“The Great Kulu gives us an interesting glimpse at how games could feature more "organic" objects that bend and squeeze depending on what they collide with. I can't be the only one tired of seeing rag-doll character corpses that behave like they're made of cast titanium.”

-TechReport.com

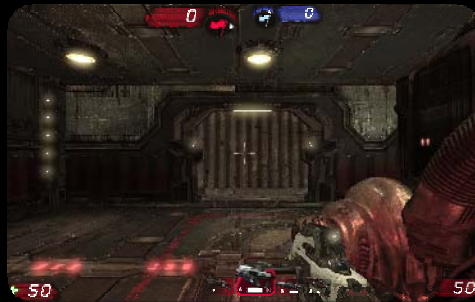
Case Study: UT3 Tornado

- Rigid Bodies Blocking Paths
- Cloth Line of Sight
- Particles Visualize Forces
- Forcefields Add Energy



UT3 Tornado - Paths

- Paths are continuously changing
 - Opening Paths
 - Closing Paths
 - Tornado itself



UT3 Tornado - Changing Environment

 The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.



nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



UT3 Tornado - Networking

- Synchronization
 - Gameplay affecting rigid bodies
 - Use state changes wherever possible



 The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.



© 2008 NVIDIA Corporation.



UT3 Tornado - Destruction

✖ The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.



✖ The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.



UT3 Tornado - Destruction



nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



UT3 Tornado



nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.





Other PhysX Integration Examples

nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



Weapon Effects: UT3



Environmental Effects



nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



Environmental Effects: GRAW 2



nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



Character Effects

- Character Animation
- Clothing/Hair
- Softbodies



Character Animation: Backbreaker

nvision 08
THE WORLD OF VISUAL COMPUTING

© 2008 NVIDIA Corporation.



Clothing: Nurien





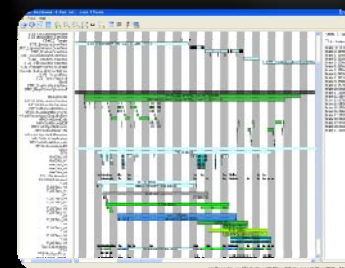
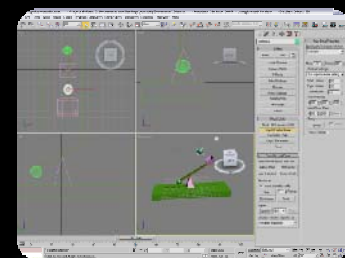
Summary

- Particles
 - Visualization of forces
- Clothing/Hair
 - Visualize character movement
- Softbody
 - Visualize organic behavior

GRAPHICS + PHYSX = MORE REALISM

PhysX Tools

- Prototype
 - Samples, Max/Maya PhysX plugin
- Scale and Author
 - Adaptive Physics Extensions (APEX)
- Debug / Optimize
 - Visual remote Debugger (VRD), agPerfmon



Questions ?



<http://developer.nvidia.com/object/physx.html>