COMP220: Graphics & Simulation

1: Introduction to Graphics and Simulation

Learning outcomes

By the end of this week, you will be able to:

- **Understand** the context of computer graphics and simulation in games.
- **Recall** some of the main areas of interest in graphics and simulation.

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Computer graphics

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  - Enhancing the image - **post processing**

Modelling

Image courtesy of Framestore

Modelling

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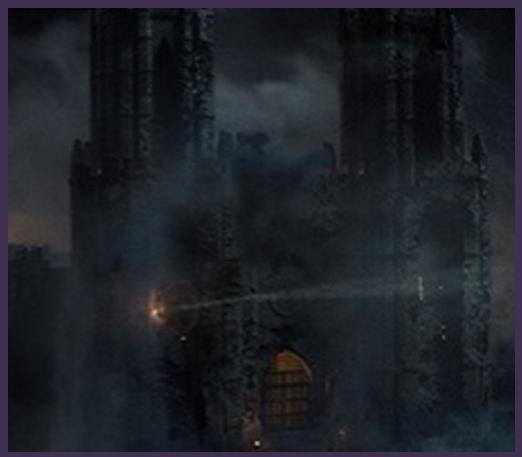
- Algorithms can be used to reduce model complexity without compromising appearance

Shading and rendering



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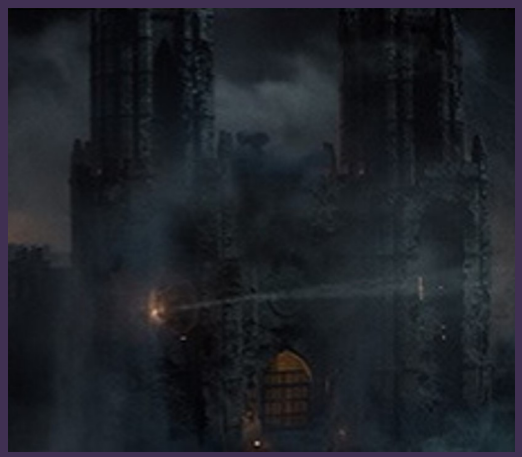

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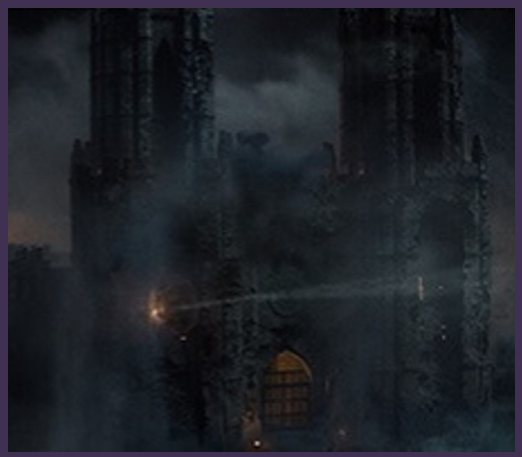

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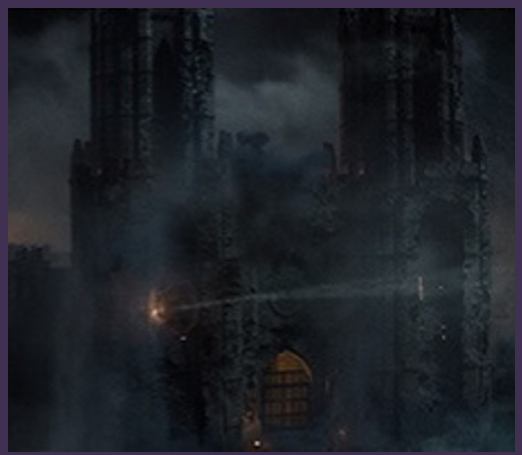

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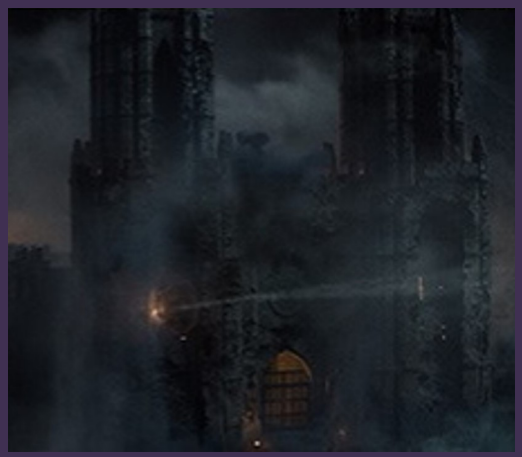

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- Generate an image using **projection**

Post processing

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- Can use the **frame buffer** to implement fast techniques for lighting effects, e.g. shadows, reflection etc.

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Simulation

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  - Automating aspects of manual animation processes - e.g. **inverse kinematics (IK)**

Particle simulation

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- Can be used for fluid-like effects such as smoke

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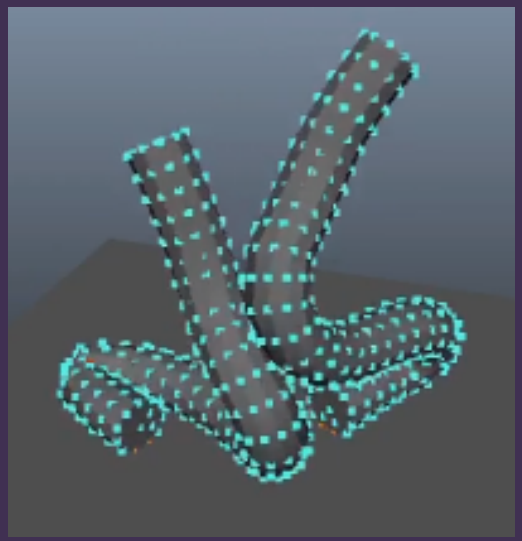
- Commonly used for destruction sequences

Soft body dynamics



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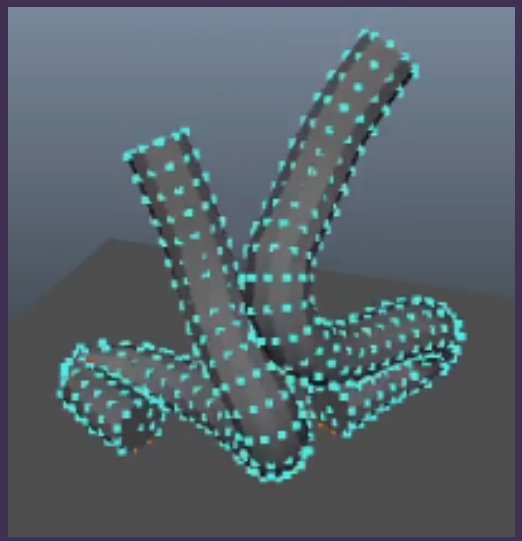

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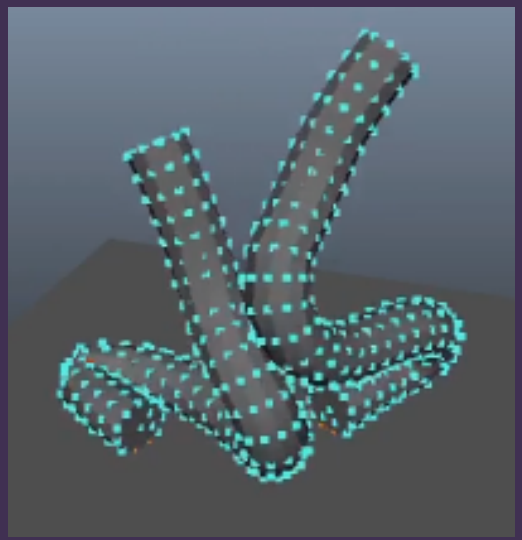

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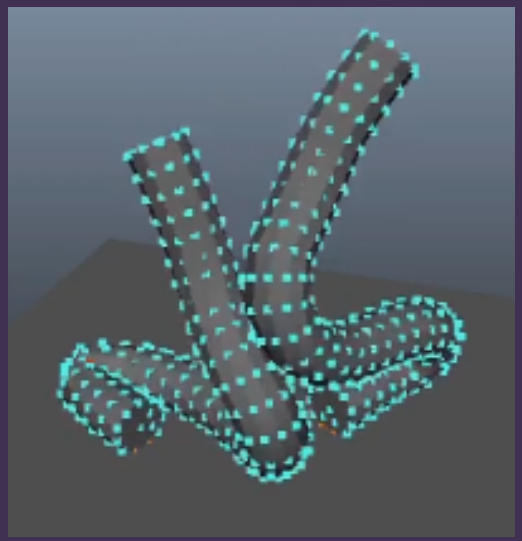
Soft body dynamics



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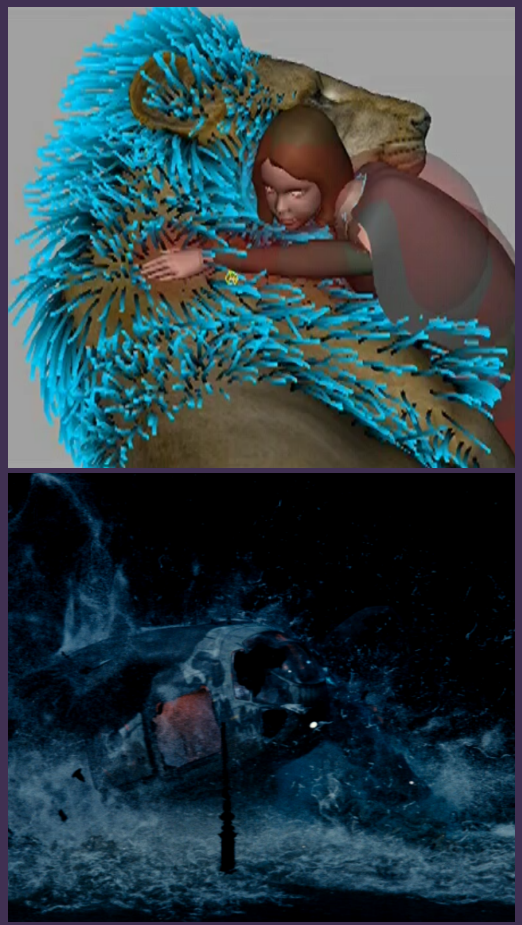
- Often approximated using **constrained rigid bodies** and other techniques

Other types of dynamic simulation



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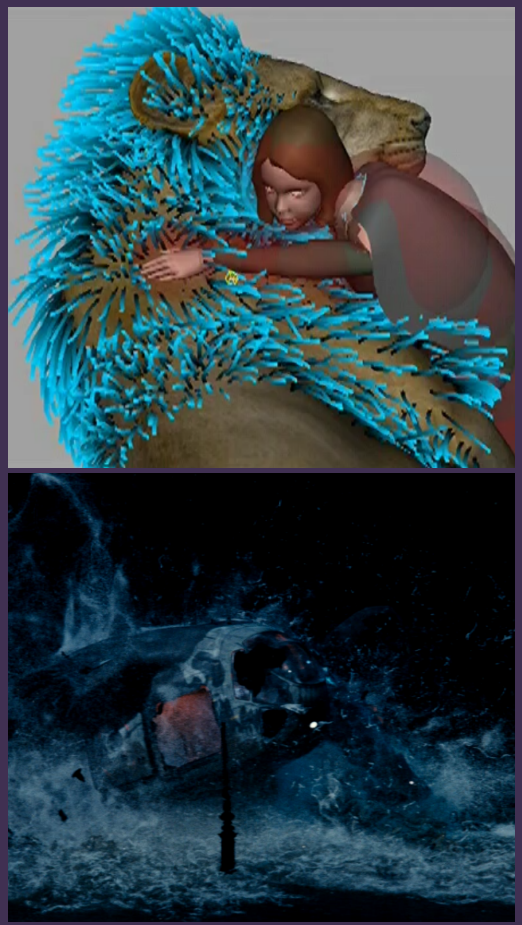

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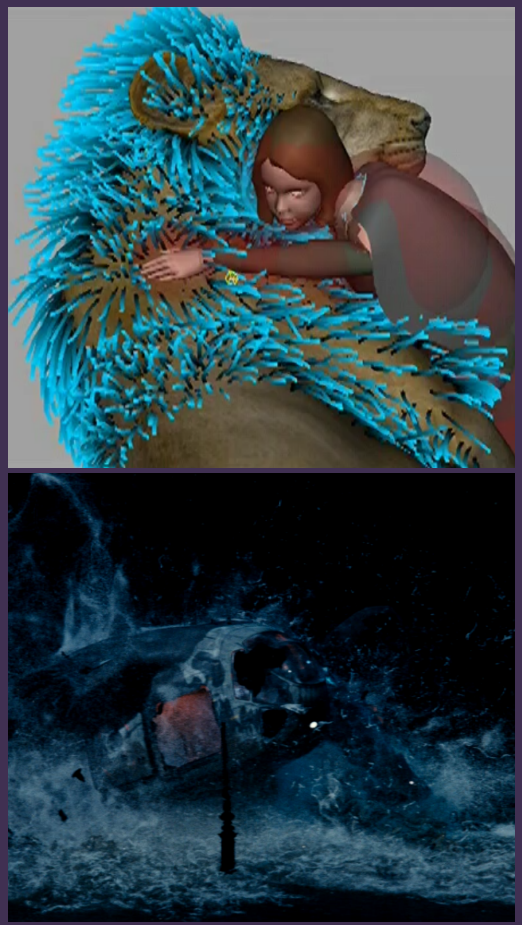

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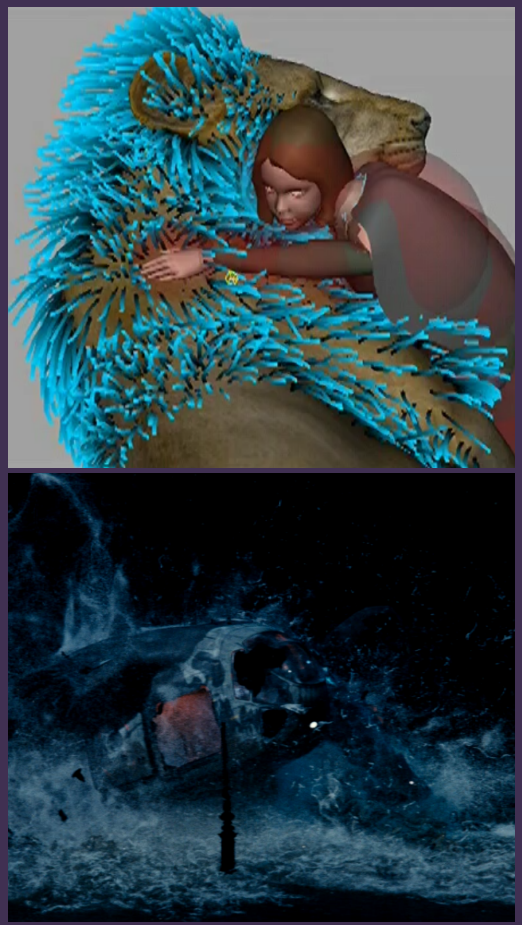

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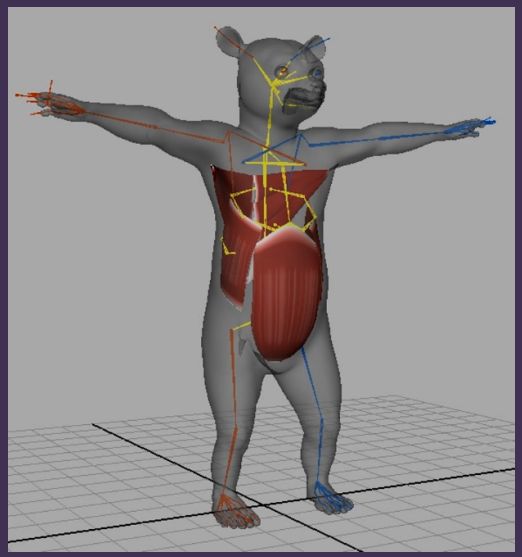
- Beyond the scope of this module!

Rigging and animation



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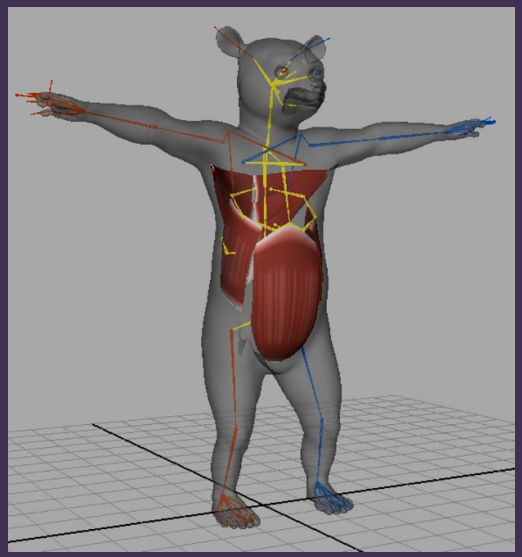

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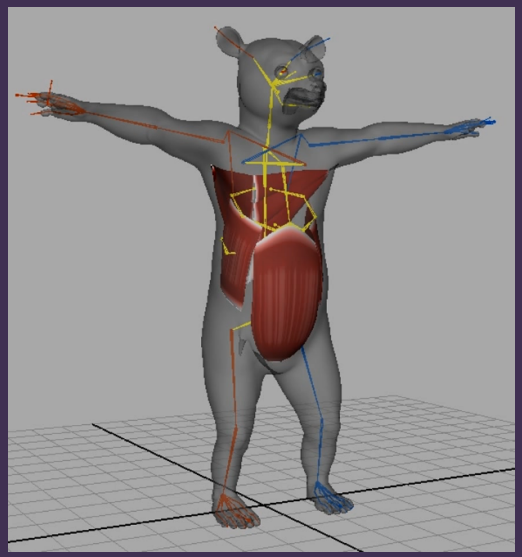

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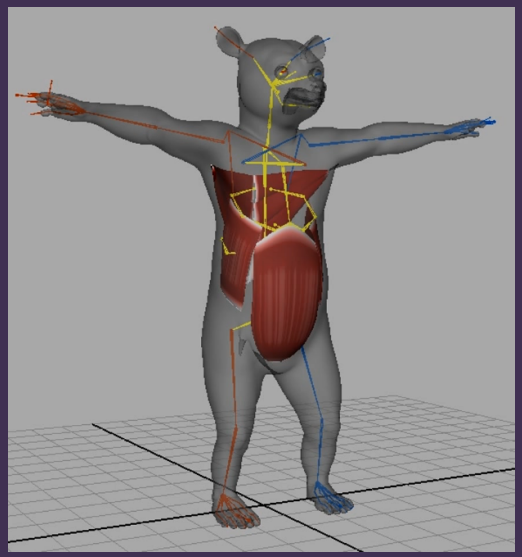

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- Positioning each joint would be a laborious process...
- Techniques such as Inverse Kinematics (IK) have been developed to automate certain aspects.

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Context and applications

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  - statistical or experimental results

Applications

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- Optimisations are possible at each stage of the graphics pipeline
- Different applications require different balances of trade-offs; in games, speed is paramount (but detail is desirable!)

Next steps

Now you have a general idea of what graphics and simulation is about, and the factors to bear in mind whilst implementing the techniques,

- **Review** content from COMP270 on the graphics pipeline.
- **Research** the main topics within graphics and simulation to decide which areas you'd like to focus on for your artefact.