Andy King
Demo Reel Breakdown 2009

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Spiderman 2

Shot 1

Doc Ock climbs up building:

Created custom simulation app that takes in impact direction and impact point exported from Maya. Simulates fractures and propagations of fractures within a volume. Used in conjunction with tool to break up geometry based on convex hulls in 3D to create realistic impacts. Reimported into maya and animated brick wall being pressed into by the tentacles.

Wrote custom expressions that simulated an impulse force and gravity and timed claws releasing from the walls to trigger small brick debris falling from impact points.

Created spark effects in maya to simulate bullets hitting the metallic tentacles.

Shot 2

Doc Ock standing on Clock Tower

Used simulation app to generate realistic fracturing of stonework below Doc Ock. Some of the bigger chunks were part of the original animatic that the director liked. So reworked simulation to include animated pieces. Created custom expressions for the spread of the debris as well as the dust that surrounded the impact. All the CG replacement shots of Doc Ock used hair and cloth simulation scripts that I wrote during SP2 preproduction to drive maya cloth simulations.

Close up shot of flying debris

Because the camera'sfield of view, the physics simulation looked wrong as the debris would have to go really far away for them to stay on the screen. After simulation was baked, I manually moved and scaled the animation of the debris pieces so they looked good for the shot.

Upshot of Doc Ock as he throws clock hand pieces down

Created rock debris shader for the smashed pieces and reused the shattered debris to trigger some secondary animation of small debris falling, which added some subtle motion and tied the previous shots with this one.

Shot 3

Doc Ock and Spidey train fight

This was our R&D preproduction shot. Due to the speed of the tumbling character, it's 4 tentacles sticking out of his back, and multiple layers of clothing, maya's cloth simulation could not cope with the stress. Rigged the clothing with a lattice that conformed to Doc Ock's torso and hand animated the overall shape of the leather full length vest, and the trenchcoat tumbling on the train. After animation was baked, write a wind rippling deformation plugin in maya that would create rippling motion. Also write a cloth relaxation plugin that would smooth out problem areas with really bad pinching due to a very distorted lattice.

Shot 4

Glass shatter from inside train.

This used the same shatter simulation as shot 1 and 2 above. The glass debris was brought after the simulation into houdini to perturb the edges some more to create more organic looking parts. Maya had a tough time coping with how quickly the animated tentacles came into the train. So I wrote some custom expressions that would simulate an impact force with gravity that would make the glass fall onto the floor and bounce a few times.

Shot 5

Train impacting at the end of the line.

This shot was originally done by another artist. However, maya refused to do rigid body simulation for the amount of debris that was in this shot (around a few million) So instead, I used the impact simulation I wrote and helped the artist bake the simulation in several layers (around 7-10 layers each having 500k debris).

X2

Jean Grey Phoenix reveal.

The original brief was to use a custom fluid simulation created inhouse at Cinesite Hollywood to do this shot. I wrote particle expressions in Maya to control particle acceleration, velocity, color, and opacity. Wrote an emission shader for Cinesite's custom particle renderer that would trace curves from the current particle position back to it's birthposition. However, the system did not generate the look that the VFX Supe was looking for. So I created the entire shot again using maya's fluid effects using the 3D rotoscoped Jean Grey body as a source of emission with subtle force fields to create the 'winged angel' effect.

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Scorpion King

Ant Flocking Shot

I wrote a full featured Maya scene translator to Renderman for Centropolis FX. For this ant flocking shot, the shot existed in maya as a particle simulation. Each particle had the ant's heading and orientation. This was translated into a rib file each particle triggering a RiArchive call that would then loadup maya in during the prman rendering, load up the specific ant maya file, index the ant animation according to which frame it's supposed to be in it's walkcycle, orient and place the ant into it's proper location, assign the correct shader to the ant's geometry and then sent the relevant rib calls as a stream into prman. This allowed the rib archive to be generated on the fly and it saved a ton of disk space and memory since non of the ants' rib archive snippets had to be generated and saved on disk for each frame. Since it was a full featured lighting tool, the shot artist was able to output multiple render layers and mattes with very little overhead.

Hollowman

Sebastian transformation shot.

I was the Pipeline lead for the show. For all the transformation shots, I wrote a Prman DSO to read in maya curves with extra attributes attached at each vertex, and generate the appropriate RiCurve call for them. With this, we were able to render millions of curves within Prman for the blood vessels. During production, we noticed that there were breaks in the RiCurves. We then realized that the breaks were coming from the lack of precision as the curves were camera facing 2d polys. So when we displaced them into half cylinders, it would introduce the cracks in the segments. So I extended the curve generating DSO to generate full bezier meshes. It would still read in the curves from maya, but I would reinterpolate the curves using reference frames and create a full bezier patch with all the attributes from the curve remapped onto the surface. Since this was done in real time, it meant the workflow remained uninterrupted and the shader no longer had to displace the 2d planes into half cylinders. In addition, the cracks we were seeing were fixed.

Osmosis Jones

Freeway chase shot

For this shot and similar, I developed the traffic instancing system for the show. Within maya, each vehicle was a simple custom locator that had attributes representing what kind of vehicle it was and what palette information it contained. Each locator was animated on the road surface using a closestPointOnSurface plugin in maya that allowed the shot TD to animate the vehicles by keying the UV position on the road geometry. On scene export, the prman export process that I wrote would then read in the appropriate vehicle asset and place it at the position and orientation of each locator.

In addition, headlights and taillights would be positioned and dynamicalled scaled according to it's screensize so that they could be used to generate headlight and taillight glows on a separate compositing layer. The result was a very flexible system where the shot TD could see where all the traffic was going in maya without the extra heave geometry.

The CG hero character and the hero cars were translated using the maya scene translator system that I wrote also.

Iron Giant

Snow field shot

For this shot, I was given an animation file consisting of the various parts all animating and coming together to the beacon at the end of the shot. I created the ground plane and the snow displacement shaders necessary that procedurally modelled the snow being pushed around and squashed by the various pieces. The snow displacement was animated by creating a 2d surface for each part's path and then animating the UV parameters on the shader so the path was carved as the parts were being animated in each frame. The groundplane was a pain as it kept failing to be diced due to prman 3.3's limitations of zsplitting large flat objects intersecting the camera near clip plane.

Centropolis FX R&D

Image based renderer test

I created an image based renderer as part of the R&D to attract new projects. For this shot, we used 3 DVs syncronized and we had a fellow TD count to ten as we captured him. We measured the distance where each camera was and the focal lengths. We then took a head scan and match moved the scene with the 3 camera in maya. From there, I created a synthetic camera that moved across. On each frame, the renderer would then figure out where it was in the world, which cameras' info was the best for the point it needs to shade and blend the results together.

Personal

Global Illumination Photomap Renderer

This was written primarily to understand the underlying theories and explore different techniques of achieving better lighting and better materials using photomapping. The first image shows a subsurface scattering pass on a rhino model.

The second image shows the results of the rhino with all of the passes integrated into one image.

The third image shows the subsurface scattering working on a marble statue model.