

MotorStorm Apocalypse

Creating Explosive and Dynamic Urban Off Road Racing

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Figure 1 : From the barren muddy tracks of MotorStorm through the lush environments of Pacific Rift to the dynamic, ever changing races of Apocalypse

1 Introduction

Evolution has a long history of producing off road racing games. Both the World Rally Championship Series and the first two MotorStorm releases were almost completely off road. More importantly the environments and races were, in all but a few ways, extremely static. The introduction of an entire dynamic events system that covered the range of effects generated by massive earth quakes, hurricanes and almost full-on military battles required a rethink of our process and pipelines (as can be seen in Figure 1).

These requirements influenced not only our rendering solution but also our physics, run-time tools, VFX infrastructure and large areas of our asset creation pipeline. Added to this, the game had to fully support stereoscopic 3D with minimal loss in quality.

2 Stereoscopic 3D

At Evolution we, have been amongst the front runners for developing 3D games. From our first release, Pacific Rift 3D, we learnt a lot. The decision was made, before we'd even designed the renderer, to run the 2D version of Apocalypse at 1080p enabling us to have 3D running almost from the start of production. Among the various concerns for stereoscopic 3D game development, we address a particular issues relating to latency and frame tearing.

3 Renderer

To solve all the new technical and game play challenges, as well as to avoid any static lighting to dynamic lighting discontinuities, we changed the renderer from a traditional forward renderer to a pre-lighting approach. We spent time investigating a complementary light mapping solution but this was not developed further for various reasons. Instead,

dynamic lights, several real-time and full screen processes, such as our Volumetric texture augmented SSAO and SPU-based MLAA systems were added to this to give us greater flexibility in visuals and content creation.

To seat all the objects and vehicles into each distinct area within an environment, each level had a global lighting solution based on a directional sun, sky and cubemaps (for both specular and diffuse). This was blended and combined with areas defined by artist for localised cubemaps. The new light probe system that generated the cubemaps required some compromises to get the best results, especially at junctions between lighting conditions.

The VFX process needed to be upgraded to enable large amounts of lit and sorted particles, without hindering frame rate, mixed with full geometry based effects to give a rounded realistic feel especially when played in 3D. This required a number of solutions varying from an expanded particle system feature set and a substantial increase in SPU workload to bespoke effects for individual particle systems.

4 Dynamic Event Creation

In conjunction with these render improvements, the processes and generation of dynamic content required a new pipeline, especially any driveable geometry that could be blown up or could collapse. This was bedded in with new run-time tools that allowed for the compositing of animations (whether they were dynamically driven or keyed), audio, effects as well as independent playback and scrubbing on platform.

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