mo-sys
VISION IN MOTION

NearTime

A fresh and unique workflow for virtual production

The Challenge

Real-time production is the fastest growing sector in content creation today. Otherwise known as 'final pixel' or 'in camera FX', it simply means that the compositing part of combining real actors with photo-realistic 3D graphics backgrounds, or foreground elements (e.g. Unreal Engine), happens during shooting, and not as would traditionally be the case, in post-production.

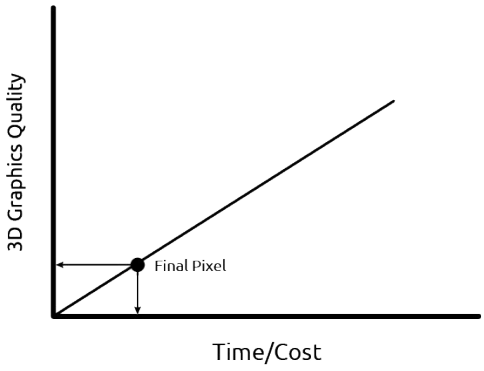
With many benefits, such as cost efficiency, reduced environmental impact and creativity advantages, it also comes with a few challenges too, one of which is time. Whilst final pixel provides the immediacy of near-finished content at the end of the shoot, this same immediacy imposes restrictions that impact the quality of the content produced.

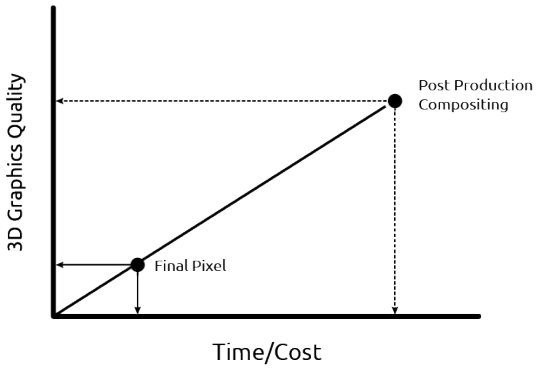
In Film & TV FX production, there are two extremes of compositing quality.

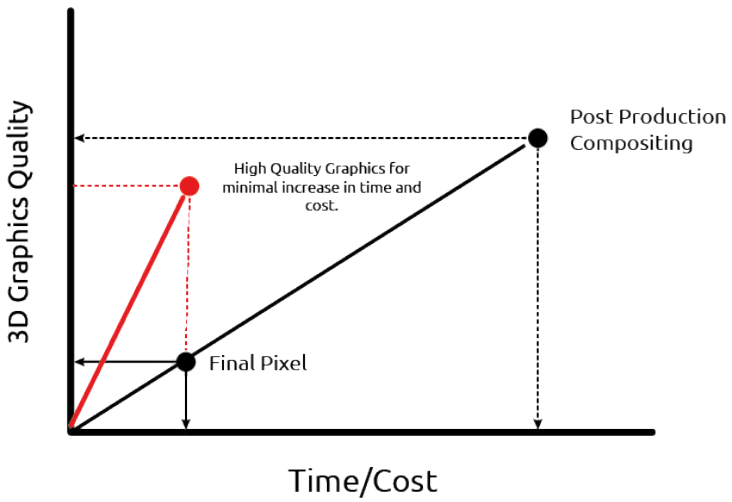
- Final Pixel – real-time performance, reduced costs (remove post compositing) but graphics quality is limited by needing to maintain playback frame rate
- Post-production compositing – non-real-time, the best quality, but it takes longer and costs more. This is why final pixel real-time compositing came about.

In final pixel you effectively trade real-time performance against graphics quality and cost.

What is needed is a system which delivers fast enough performance to fit into a production schedule, which delivers movie quality, and which minimizes the cost of post-production. Mo-Sys set out to increase the graphics quality substantially, for no increase in time, and with a minimal increase in cost.







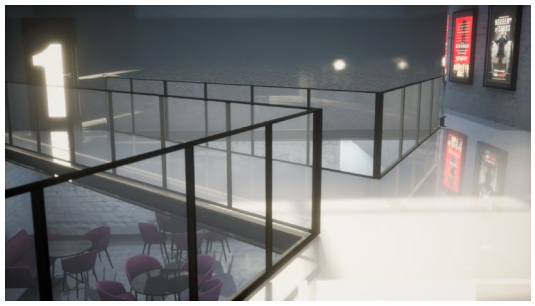
The Solution

NearTime from Mo-Sys is a fresh and unique workflow for virtual production. It meets the key requirements of cast and crew seeing the full effect of the shot on-set in real-time, and it delivers a higher-quality version of the shot, completely automated, and in a timescale which matches the practical requirements of the production. It is a "near-time" solution: it achieves results fast enough, without the complications and cost of real-time delivery.

The concept of near-time rendering uses a fully automated second rendering pipeline that runs in parallel with the real-time final pixel pipeline. This near-time rendering pipeline starts simultaneously with the final pixel shoot.

Onset

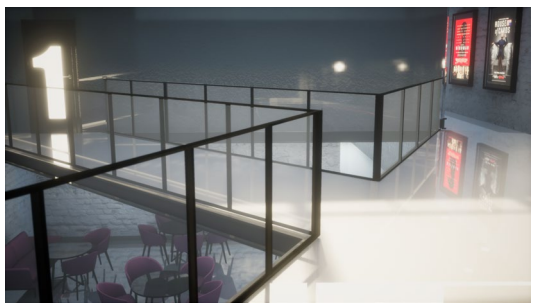
As soon as each final pixel take starts, an operator grabs 1 frame of the take and makes a hi-res key of the talent to separate them from the graphics background.



Remote

As soon as the final pixel take is captured, the near-time rendering pipeline transfers the recorded camera and lens tracking data, into the cloud – in our case that's Amazon EC2.

Here a chain of events is triggered which results in the same Unreal scene being re-rendered at much higher quality using multiple instances of Unreal Engine. The image quality improvement comes from being able to:



4K Remote

- **Turn on ray tracing –** giving improved reflections, softer shadows, refraction, and global illumination
- **Turn up anti-aliasing –** making the scene look less 'game-like' and more photo-realistic
- **Turn up motion blur –** improving shots with fast camera movement
- **Increase the resolution –** enabling 4K or higher deliverables

These changes dramatically improve fine detail (hair, fur, foliage, textures), improving the overall photo-realism of the scene. After re-rendering is complete, the near-time rendering pipeline then re-combines these higher quality graphics with the keyed talent automatically.

This workflow results in content with higher quality graphics being delivered in a timeframe that's within the final pixel delivery timescale. Why restrict render quality to real-time if you can have near-time at limitless quality/time.

The Benefits

Cost-effective, uncompromised in quality and timely without the huge overheads of real-time augmented reality, NearTime draws on the proven Mo-Sys expertise in camera tracking and live compositing, delivering a complete system in partnership with the AWS Media and Entertainment team.

By extending the rendering time – which is fully adjustable – the near-time rendering system can create graphics of much higher quality compared to adding real-time rendering to a final pixel production. In addition, because the system is automated, near-time rendering can be used on all shots, not just the shots that have high levels of detail, which ensures all shots look similar in quality.

Near-time rendering leverages the elastic nature of the cloud where many, even hundreds of Unreal Engines can be chomping through the near-time renders. When using cloud rendering, the delay in sending and receiving re-rendered frames is less important, because the re-rendered frames are not required to maintain real-time operation. This means that the processing in a near-time workflow can be completely scalable.

NearTime delivers the best quality for virtual production shoots. The crew on set can see what they are shooting, and the re-rendering is automated, and fast enough without the cost, inconvenience and quality compromises of real-time rendering. It is the right solution for practical production, all the way up to the very top end.

For more information

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