BETA
SIMULATION SOLUTIONS

physics on screen

Developments highlights

META post- processor performance enhancements

Bringing post- processing closer to reality

As simulation continues to develop in terms of accuracy and realism, CAE model size follows a constant growing trend. To support these developments BETA CAE Systems enhances the META post- processor not only with new tools but also with significant performance advancements. In this notion the developments in META bring user experience closer to reality with the aid of the implemented modern rendering techniques and the enhanced graphics performance.

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Version 18.0.0 introduced rendering materials and environment mapping capabilities as well as the option for hardware accelerated remote rendering. Version 19.0.0 extended the rendering capabilities, while version 19.1.0 followed with a complete overhaul of our graphics kernel leading to a noteworthy increase in performance.
These developments in Rendering, Graphics kernel, Hardware accelerated remote rendering, and Software Rendering, are listed in more detail below.

Rendering

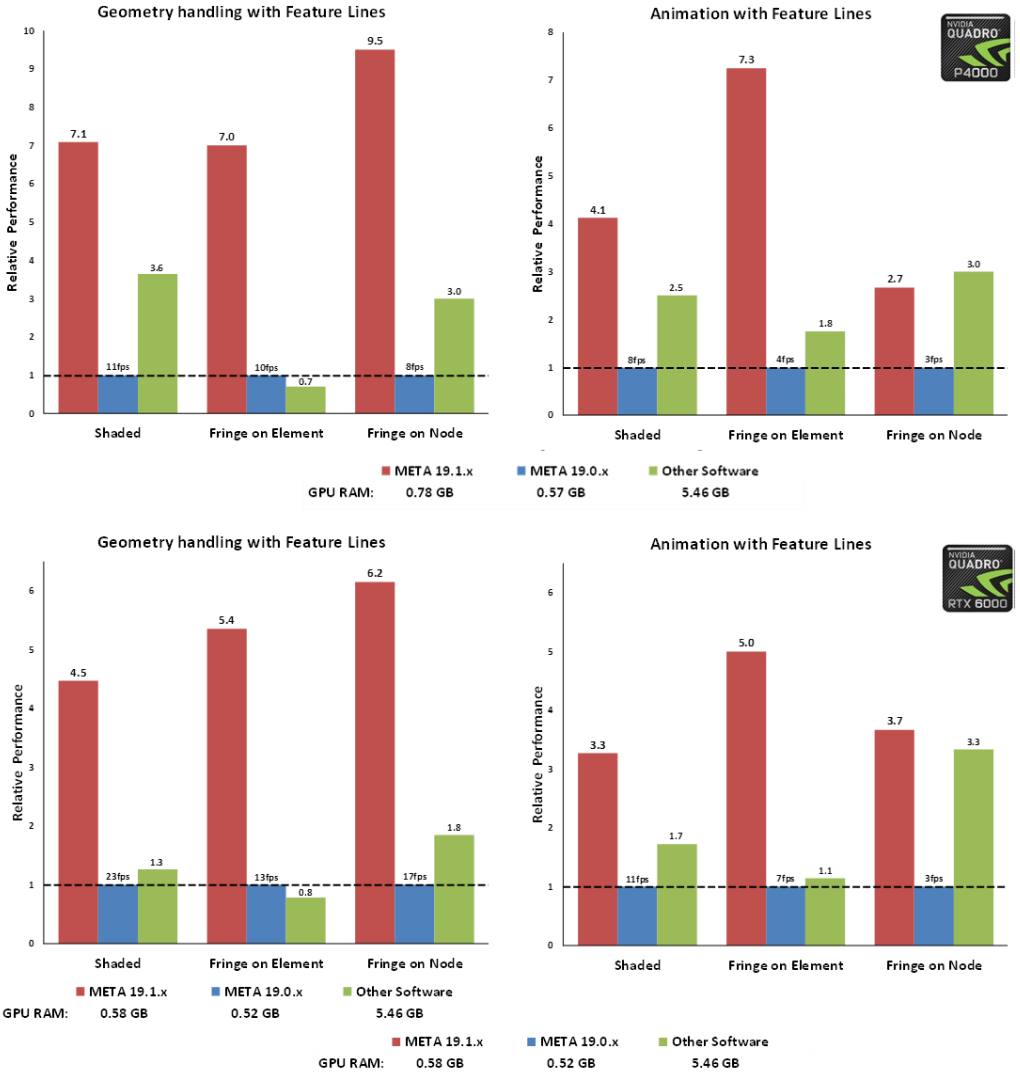
Activating OpenGL Render mode provides the capability to display materials either with physically based rendering (PBR), or as standard materials, considering their respective properties, i.e. metallic and roughness for the former and diffuse, specular and ambient for the latter. An environment image can be loaded as background. Its size and rotation can be adjusted, and the floor can be drawn realistically. Ambient light and reflections of the surrounding environment as well as user defined textures can be mapped on the materials. Ambient occlusion and multisampling anti-aliasing add further to the realism of the model and the environment.

Graphics kernel advancements

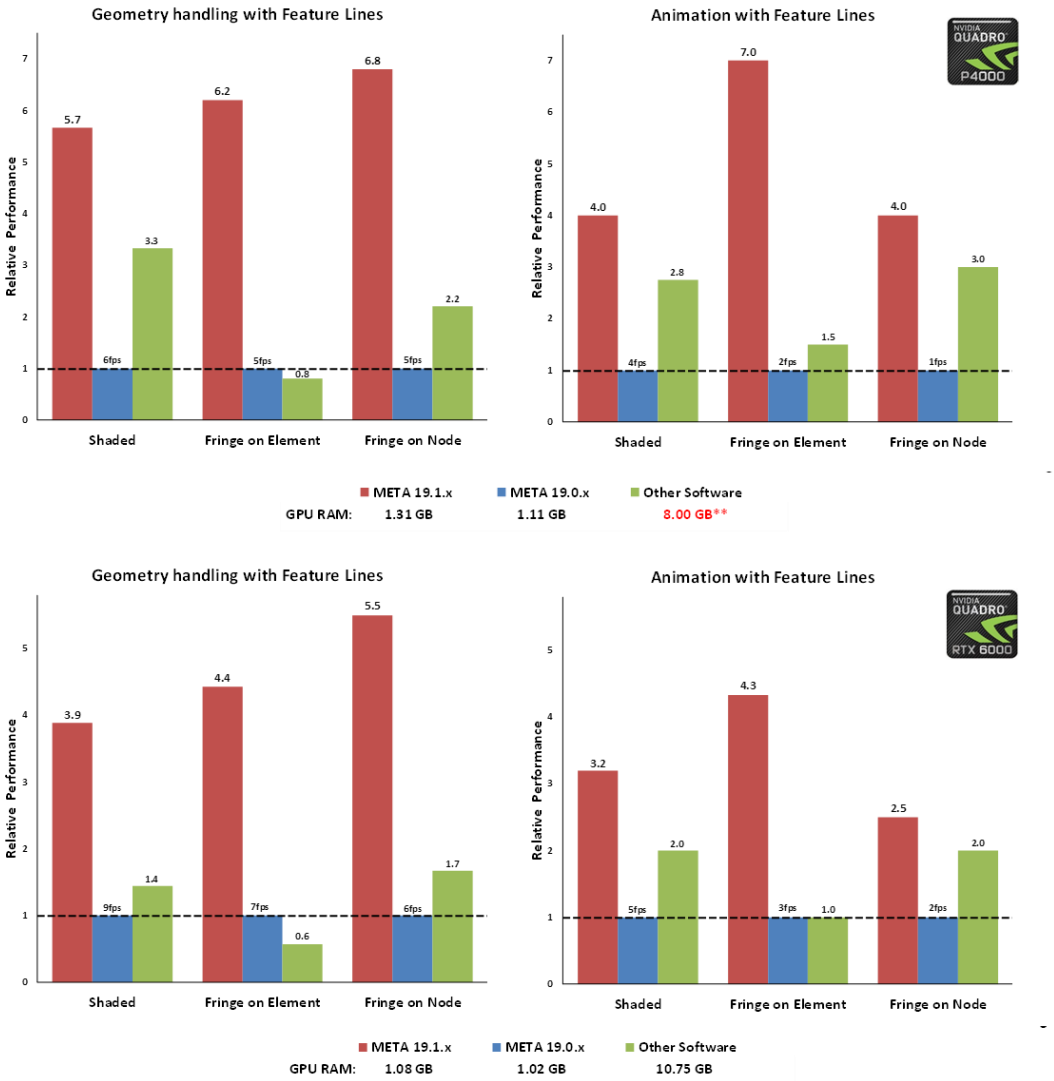
The implementation of a new graphics kernel in META, improved remarkably graphics performance for shells and solids, for all drawing modes. Models with thousands of parts are now rendered faster due to the improved GPU utilization. Animation of shells and solids

received an overhaul in how the data are transferred to the GPU for rendering, contributing to the overall speed improvement. Cases of drawing, such as corner results, top and bottom results, no-value elements, per element transparency, or coloring have been brought to the same high level of performance as simple shading. Still, the new graphics kernel does not make use of excessive GPU memory to reach this level of performance.

The table below demonstrate the performance tests made on machines with NVIDIA Quadro P4000 (8Gb RAM) and NVIDIA Quadro RTX 6000 (24Gb RAM) for two different scenarios. The performance results of version 19.1.x and of a standard FEM post-processor are compared to the results of version 19.0.x in the following images. The limited GPU memory usage of META compared to the standard FEM post-processor is also highlighted in all tested scenarios.



Scenario 1: 11 million elements - 8000 parts - Results: Plastic strain - Incl. Failed elements

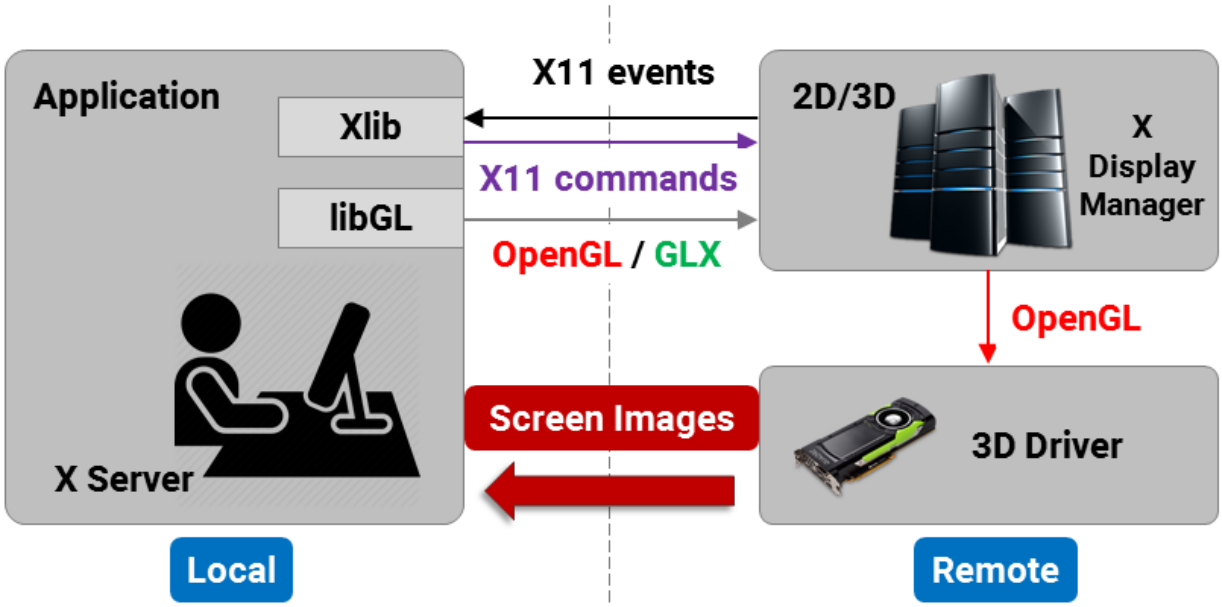


Scenario 2: 22 million elements - 16000 parts - Results: Plastic strain - Incl. Failed elements.
****Note: Required memory exceeds GPU memory limit leading to unpredictable performance.**

Hardware accelerated remote rendering

With the out of the box solution on hardware accelerated remote rendering, META allows engineers, on low spec Windows or Linux terminals, to exploit capabilities similar to a high spec Linux machine with an NVIDIA GPU. Without additional configuration and at no extra cost, engineers can significantly improve graphics performance, quality of images, and videos while passing at the same time the high CPU and GPU load only to the remote engine. Moreover,

issues such as slow rendering, bad quality due to fallbacks to software OpenGL, instabilities caused by version mismatch, as well as other security issues, have been addressed.



Software Rendering

In version 20.1.0 (19.1.0 in Linux) the mesa-llvmpipe software driver can be activated using the starting option --rasterizer mesa-llvm. For machines with outdated GPUs or servers without GPUs, this allows functionalities requiring modern OpenGL such as LIC, contour plots, rendering materials, environmental mapping, etc. to be used.

About BETA CAE Systems International AG

BETA is a simulation solutions provider, dedicated to the development of state of the art software systems for CAE. For almost 30 years, we have been developing tools and delivering services for the front-runners in numerous sectors by listening to their needs and taking up even the most demanding challenges. For more information on BETA CAE systems, our products, and our services, visit www.beta-cae.com

Headquarters

D4 Business Village Luzern, Platz 4
CH-6039 Root D4,
Switzerland
+41 415453650

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