USING MPPS FOR ON-LINE VISUALIZATION OF LARGE-SCALE SCIENTIFIC SIMULATIONS

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Traditionally, the results of scientific simulations have been visualized in a post-processing step. Current data set sizes make this procedure questionable if not even unfeasible. Processing the data on the spot, i.e. right on the machine where it is computed, is one alternative. Visualization is becoming worthy of massively parallel processor power itself.

Another valuable aspect of using MPPs for visualization is the possibility for on-line visualization, i.e. one can get immediate feedback about the state of a computation. This is useful for end-users of simulation tools and developers alike. End-users can quickly explore complex parameter sets or abort jobs gone awry. Developers have an additional debugging tool at hand.

The software toolbox **UG** [1] which has been used as the basis for many different simulation tools, also from the field of computational mechanics, includes a visualization subsystem that realizes some of the above-mentioned ideas.

This subsystem implements two methods for parallel visualization of 3D grids and fields. The first one is based on a list-priority algorithm which solves the hidden-surface problem by drawing from back to front. The second one follows a sort-last approach (z-buffer algorithm) that renders partial images from per processor local data in parallel and produces the final image in a composition step.

Both usability and scalability aspects of **UG**'s built-in graphical capabilities will be discussed.

References

[1] P. Bastian, K. Birken, S. Lang, K. Johannsen, N. Neuß, H. Rentz-Reichert, and C. Wieners, "UG: A flexible software toolbox for solving partial differential equations," *Computing and Visualization in Science*, v. 1, p. 27–40, 1997.