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GPU Cluster Wave Propagation

Conclusion

GPU clusters represent potential for massive speedups in finite difference schemes.

Slices is likely the most reliable way of producing intuitive images.

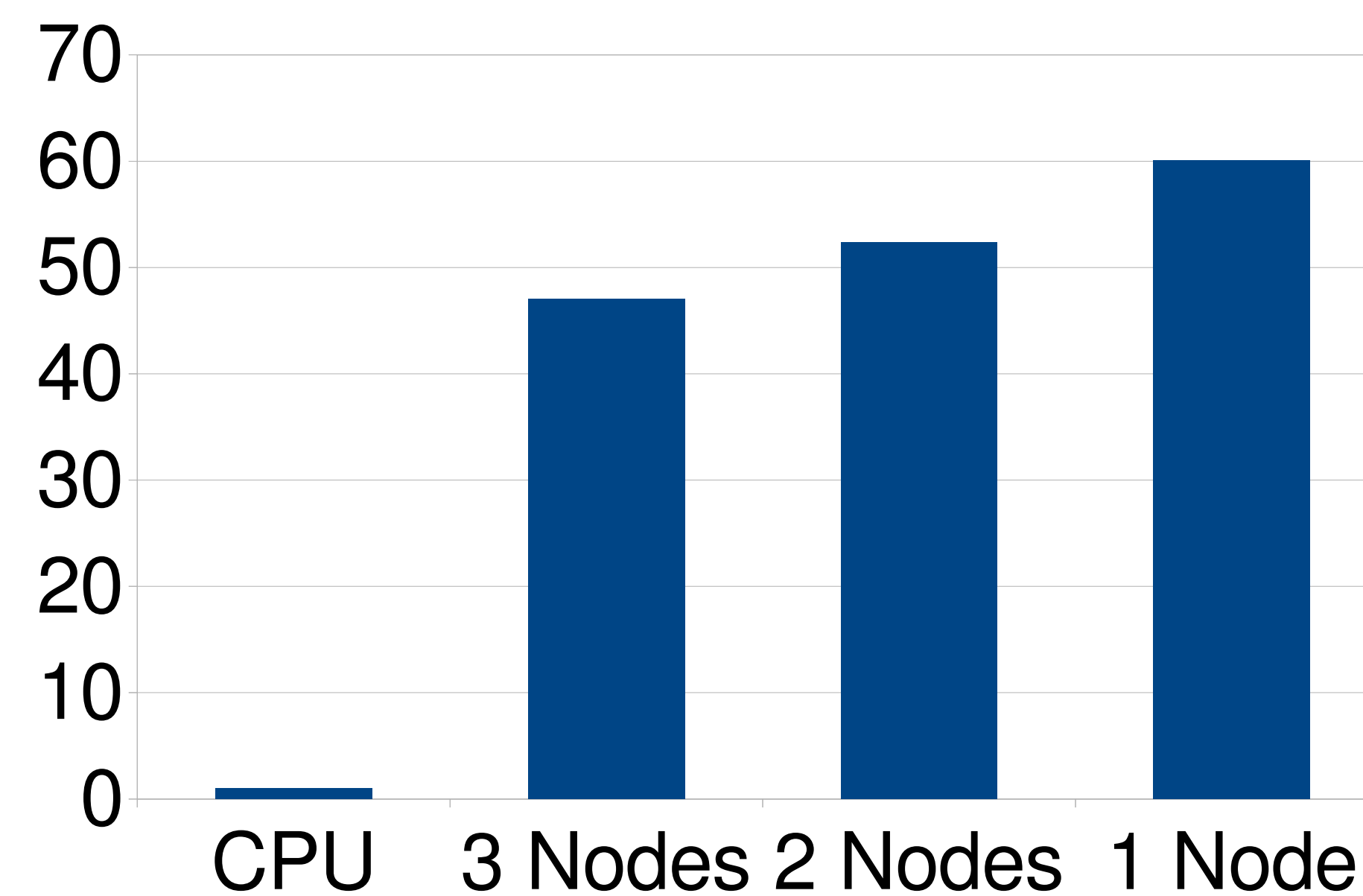
A secondary method such as oriented line segments can be used to present 3D properties.

Outline

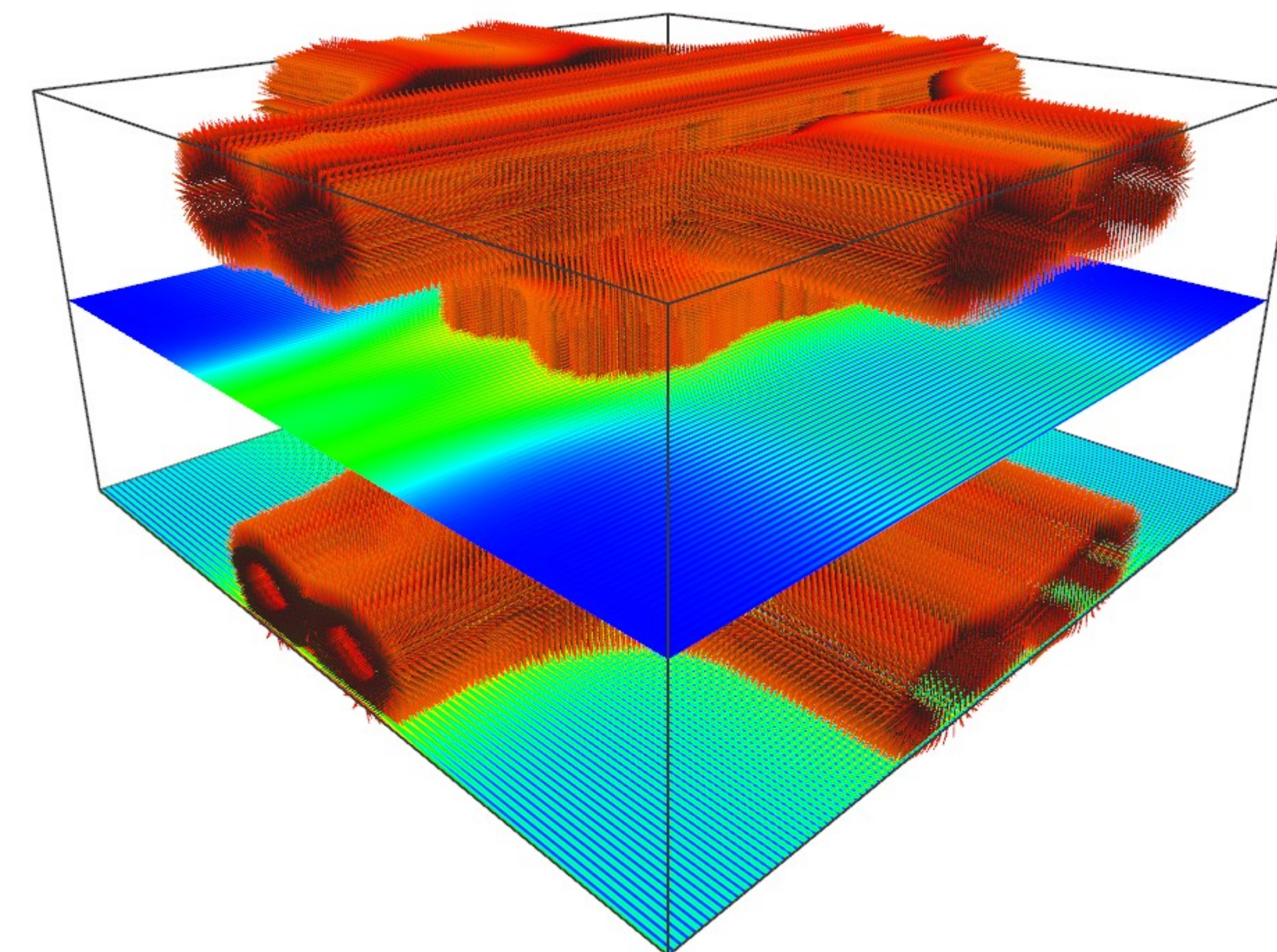
Finite difference solution of the wave equation was accelerated using a GPU cluster.

Architectural details were taken into account to increase performance.

Speedup over CPU version



Performance of GPU code on various amounts of nodes



Solution visualized using two slices together with gradient oriented line segments.

Visualization methods suitable for the solution to the wave equation were implemented and compared.

Result

The optimized version of the GPU code achieves speedups in excess of 45x over the CPU version in various configurations.

Small variations in the solution caused iso-surface extraction to perform poorly.

Direct rendering of data, slices or maximum intensity projection are better alternatives.