

Why Exascale Computing Will Be Slightly Less Disruptive Than the Comet that Killed the Dinosaurs

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The Cretaceous Period ended with a violent and sudden transition when an extraterrestrial impact caused the extinction of the dinosaurs. Will the arrival of an exascale computer in the next decade be a similarly catastrophic event to the diverse ecosystem of algorithms for scientific computing? The move to exascale computing is expected to be disruptive due to significant changes in computer architectures. Computational scientists will need to address new challenges in extreme concurrency, limited memory, data locality, resilience, and overall system and software complexity. Advances in applied mathematics will be necessary to realize the full potential of these supercomputers, but will these advances be incremental changes to existing methods or will exascale computing require a substantial rethinking of how we compute? Will the transition to exascale be evolutionary or revolutionary? Reflecting on the findings of the DOE Advanced Scientific Computing Research Program Exascale Mathematics Working Group, Dr. Hittinger will provide his perspective on the path to exascale and the opportunities for new applied mathematics research that will enable exascale computing.

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