

Advanced High Performance Scientific Computing at the Oak Ridge National Laboratory

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Extraordinary advances in computing technology in the past decade have set the stage for major advances in scientific computing. Within the next five to ten years, computers 1,000 times faster than today's computers will become available. These advances herald a new era in scientific computing. Using such computers, it will be possible to dramatically extend exploration of the fundamental processes of nature (e.g., the structure of matter from the most elementary particles to the building blocks of life) as well as advance the ability to predict the behavior of a broad range of complex natural and engineered systems. To exploit this opportunity, these computing advances must be translated into corresponding increases in the performance of the scientific codes used to model physical, chemical, and biological systems. The presentation will describe on-going research using advanced computational tools and algorithms that enable efficient simulation of complex phenomena on terascale to petascale computers.

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