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PETSc: High-Performance Software Library for Engineering and Science Simulation

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Portable, Extensible Toolkit for Scientific Computation (PETSc) is a suite of data structures and routines for the scalable (parallel) solution of scientific applications. Due to its solid mathematical grounding, careful software design, and most importantly, evolution resulting from the usage of many users in various application areas, PETSc is enabling engineers and scientists to solve large scale problems, with previously unreachable resolution, in areas as diverse as groundwater contamination, cardiology, fusion, nuclear energy, astro-physics, and climate change.

As a PETSc developer, I will give an overview of the PETSc, and briefly introduce its basic use in algorithmic research, numerical production simulation and parallel performance evaluation. As an example, I will present our recent simulation of the U.S. river systems on extreme-scale computers.

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