



ARGONNE DEVELOPS ONE OF THE WORLD'S FOREMOST TOOLKITS FOR COMPUTER SIMULATIONS, WITH A WIDE RANGE OF APPLICATIONS

PETSc can be used to evaluate simulations for a range of things, including arterial blood flow (computer visualization pictured above). These models help doctors understand what happens at the molecular level and, consequently, how heart and blood diseases can be treated.

THE OPPORTUNITY

To reduce the cost, time and effort associated with the creation of prototypes, companies rely on simulation software to test products. Likewise, to reduce the cost, effort and risk associated with conducting live experiments, government agencies rely on simulation software to run potential scenarios.

As simulation research and technology has advanced, the desire/need for capabilities such as complex modeling, or in the high-performance computing (HPC) domain space, hybrid accelerators and processors, has increased.

With this comes a greater need for a software toolkit that can efficiently solve problems at an extreme scale.

THE INNOVATION

To free researchers from having to write new mathematical software each time they start a project, researchers at the U.S. Department of Energy's Argonne National Laboratory developed a software toolkit known as PETSc (Portable, Extensible Toolkit for Scientific Computation).

PETSc performs large-scale numerical simulations rapidly and efficiently, while computing many different types of scenarios. PETSc reduces user effort and speeds up the computing process, and it can be used to evaluate simulations for aerodynamics, air pollution, arterial blood flow, bone fractures, brain surgery, cardiology, dentistry, electromagnetism, materials science, ocean dynamics, oil recovery, and much more.

THE IMPACT

- Since its inception in 1991, PETSc has become one of the world's foremost software libraries for HPC science.
- More than 1,600 users – including computational scientists, engineers and physicists in the private and public sectors – use PETSc.
- Aided by PETSc, many companies have improved existing products or produced new products, and federal agencies have gained critical insights in pursuit of their respective missions.

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