

CAC and the U.S. EPA

Early Warning: Protecting the Nation's Water Distribution Systems from Terrorist Threats

How vulnerable are the nation's water distribution systems to contamination by terrorists?

Finding the Answer

CAC helped to design and install a high-performance computing system at the U.S. EPA National Homeland Security Research Center which reduced threat scenario run times from 20 hours to 30 minutes.

Early Warning

Water infrastructure protection research focuses on ways to better secure the nation's drinking water and wastewater systems against threats and attacks. Identifying drinking water threats, contaminants, and monitoring drinking water distribution systems are U.S. EPA priorities.

Improved Research

Research Metrics

- Operate high-quality research tools: Deploy the optimal HPC solution for research
- Maximize near-term usability, minimize cost: Bring a cost-effective system into production as fast as possible
- Speed: Increase the speed of simulations so that more threat scenarios run in less time

Research Challenge

Water distribution systems are large networks of storage tanks, valves, pumps, and pipes. They transport water to customers over vast areas. By their very nature, they provide multiple points for contamination.

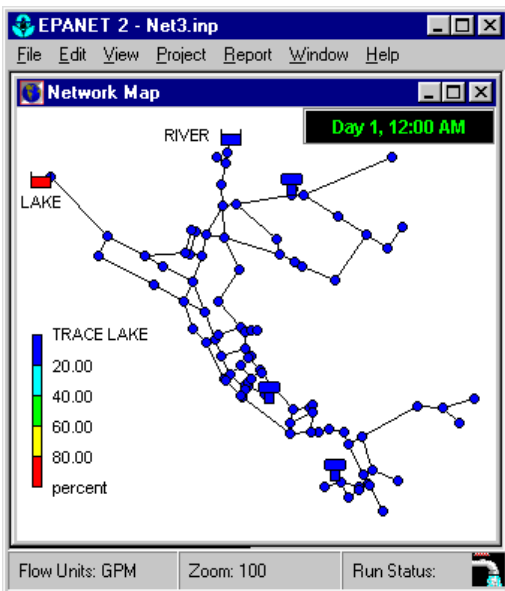
The U.S. EPA needed a vulnerability assessment tool that could adequately reflect the risk of water distribution systems to all forms of contamination. Since it is difficult to predict the characteristics of a contamination event, a methodology was needed to enable the probabilistic analysis of a large number of threat scenarios. Tens of thousands of simulations need to be computed and analyzed, a task not feasible with desktop computing.

Solution

CAC helped the EPA explore HPC options and the benefits of using industry-standard hardware and software to achieve the performance required. CAC provided consulting on Windows systems architecture, trained EPA staff, and installed the systems software on-site.

The 64-processor Dell Intel system runs the Threat Ensemble Vulnerability Assessment (TEVA) Modeling System. Complex behavior in large distribution systems can be computed, including chemical reactions, biological transformers, and interactions with the pipe wall.

TEVA will be useful in helping utilities to prepare for water security events and to minimize their consequences. Based upon the simulations, the U.S. EPA is developing guidance on isolating portions of a network, locating the contamination source, and identifying locations for confirmatory sampling.



The Client

U.S. Environmental Protection Agency

- Operates the National Homeland Security Research Center (NHSRC)
- NHSRC develops products used to prevent and respond to environmental emergencies
- R&D includes threat assessment, water infrastructure protection, and containment

The Collaborative Relationship

The U.S. EPA selected CAC because Cornell understood the research issues and had the right skills to design the best possible HPC solution and get the systems software up and running fast.

CAC has provided high-performance computing systems and application consulting to a variety of public agencies and their contractors, including the U.S. Air Force Air Mobility Command, the U.S. Marine Corps, a U.S. Navy/Department of Energy program, the State of Florida, Northrop Grumman, and a U.S. Intelligence Agency contractor.

