



Red Storm Supercomputer Helps U.S. Navy Shoot Down Errant Satellite

Sandia National Laboratories

Defense Challenge: Successfully Shoot Down a Failed Satellite

- A satellite failed shortly after its launch, posing a potential safety hazard as its orbit deteriorated. The National Nuclear Security Administration (NNSA) utilized the Cray "Red Storm" supercomputer at Sandia National Laboratories to provide simulation support to the U.S. Navy so they could shoot down the errant satellite with a single missile strike. The successful destruction occurred in February 2008, but the role of the NNSA in the mission was classified until several months later.

Why Was This Important?

- The satellite was reentering the earth's atmosphere and posed a potential safety hazard due to the frozen hydrazine propellant that was on board.

HPC Challenge: Perform Complex Simulations to Optimize Strike

- Key challenges included determining the optimal hit point for destruction, minimizing the spread of debris, and ensuring that one missile strike would suffice.
- Hundreds of impact simulations were performed to answer critical technical questions affecting early decisions to go forward with the operation.

Cray's Contribution

- The entire Red Storm system, containing 25,920 AMD Opteron processing elements, was dedicated for about two months to the task of simulating and planning the complex missile strike. This information helped the Department of Defense (DoD) plan and execute the operation, as well as conduct follow-up analysis.
- "The architecture of the Red Storm XT system, designed and engineered in partnership between Cray and Sandia and sponsored by NNSA, was critical in facilitating the high-fidelity simulations required to provide confidence in a spectrum of scenarios to DoD," said James Peery, director of Sandia's Computer and Computation Sciences Center.

For additional information, please contact:
Neal Singer
nsinger@sandia.gov

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