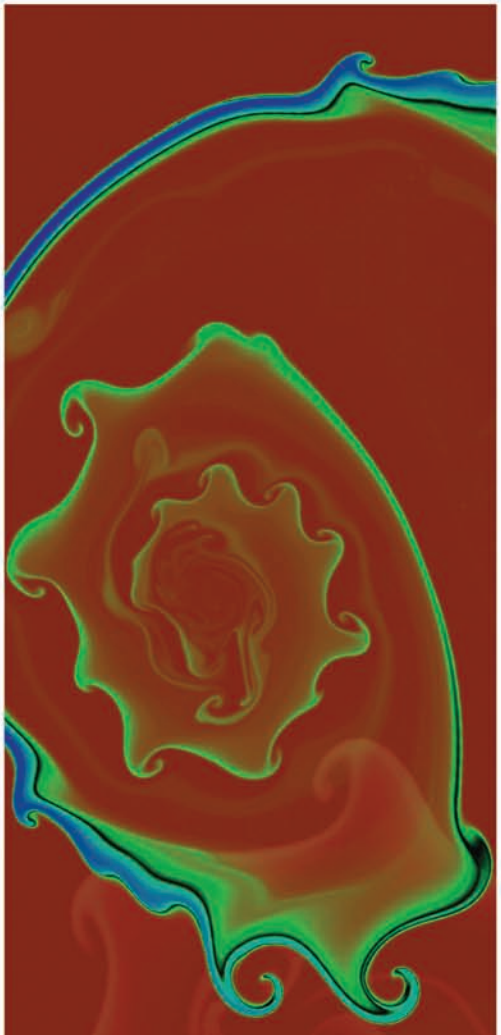
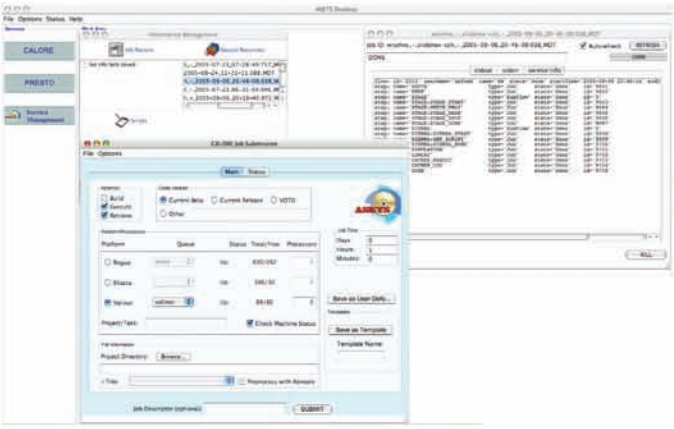


Streamlining the process of simulation execution and artifact management.

Visualize the Difference

Analysis Simulation Execution and Tasking System



ASETS is a distributed computing application framework designed to assist analysts with running simulations in a diverse computational environment. The primary requirement for the ASETS system is to reduce the amount of time taken by the analyst to perform simulation activities. Inspired by the SNL Design Through Analysis (DTA) effort, ASETS supports the end-to-end process of running simulations through metadata integration with the varying tools used in the DTA process. These upstream tools, such as Cubit, SIMBA, and the Analyst Process Coordinator (APC) pass model information to the ASETS system for use during "job submission" phase of the DTA process.

The analyst can access resources, regardless of location, from their desktop using a common interface that is a representation of the simulation environment. The user interface leverages Web services that are integrated with a task-management processor capable of executing a series of activities in support of the simulation-run process. A distributed job management (DJM) system is used to access a diverse set of computational resources through a common interface.

The goal of the ASETS graphical interface is to provide a representation of the analyst's vision of running a simulation rather than just a portal to the computational environment.

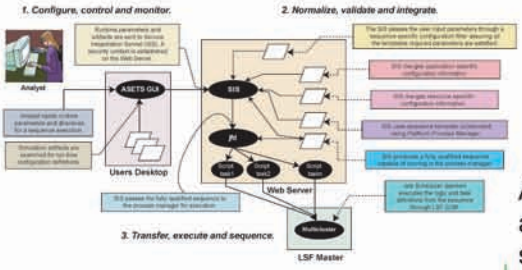
Using agile methods for rapid development, the GUI is implemented, and a process manager flow constructed to initiate and manage the running of an ASETS use-case model. In addition, resource status allows the analyst to make educated choices on where to run the simulation.

ASETS provides the capability to manage use-case models. Mesh-based simulations follow a pattern that can be reused by different simulation codes. Both the CALORE thermal code and PRESTO structural dynamics code can share a common model. The analyst may configure ASETS to perform individual model elements in support of user-defined subroutines, varying input decks, mesh decomposition, and results visualization/concatenation. Metadata are managed in support of the DTA process.

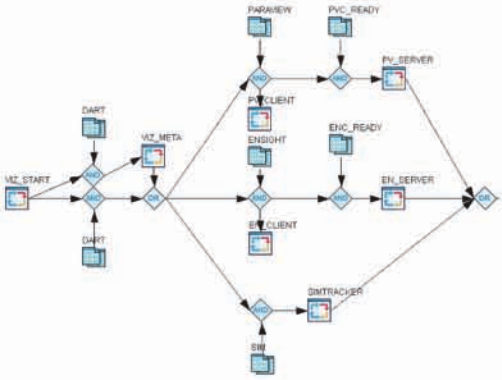
ASC™

ADVANCED SIMULATION & COMPUTING™

Task automation and resource normalization free the analyst of the computer science aspects of modeling and simulation. File transfer and artifact pre- and post-processing are done on behalf of the analyst using a common interface.

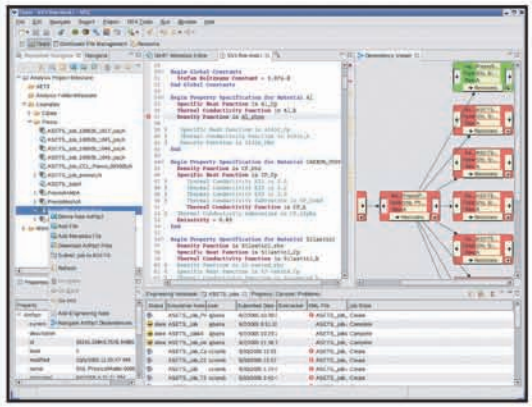


Web services enable the analyst to manipulate and process simulation artifacts in the distributed environment. Resource and application normalization eliminates the need for the analyst to maintain login configurations on each resource. Integration with the task management processor automates tasks on behalf of the analyst including security authentication and credential management for long-lived simulation runs.



Process Manager allows for constructing sequences of tasks to help realize an ASETS use-case model. Simulation-level logical constructs allow for the binding of the simulation run parameters, movement of data, preprocessing of simulation artifacts, visualization features, and results gathering. The process manager executes these activities without the need for analyst involvement. The ASETS system also examines input decks to discover parameters necessary to complete the run, eliminating the need for entering parameters multiple times.

ASETS is currently being integrated with a Design through Analysis environment to support model-model based product design. At the hub of this environment is an application called the Analysis Process Coordinator (APC), which serves as a virtual dashboard or portal of team-based analysis projects.



The APC captures analysis-derived product knowledge by vaulting and configuration management of analysis artifacts (PDM-based), capturing engineering notes in the context of analysis artifacts, providing artifact dependency tracking to assure traceability of information, and capturing metadata (e.g., material properties, simulation statistics, etc.). The APC increases analyst productivity by providing an integrated DTA environment with seamless access to model-building tools, distributed file systems for efficient file management, ASETS job submission service, and visualization tools on both local and remote systems. Finally, the APC improves analysis process management by managing analysis artifact state (WIP, in review, released, etc.), and providing support of a formal review-and-approval process.

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NNSA National Nuclear Security Administration

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