



➤ Resource Selection and Ranking

Surfer is an extensible framework for selecting and ranking grid resources. A resource is defined as anything that needs selecting such as compute resources, storage resources, and data resources. The user specifies the set of resource types desired, the constraints that must hold over all the resources, and the ranking function to be used to order the resources. For each request received, Surfer returns a set of resource tuples, where each tuple contains a resource instance for each resource type requested, each tuple satisfies the specified constraints, and tuples are ordered by descending values of the given ranking function. Constraints and ranking functions are Boolean and numeric expressions, respectively, using a set of built-in arithmetic, Boolean and relational operators, and a set of functions supplied by information providers, which are implemented independently of the framework and integrated into the system using a single configuration line.

Providers supply functions of arbitrary type that represent selected information such as the number of CPUs of a compute resource, free disk space of a storage resource, etc. Providers also supply queries used to generate resource sets that define the set of resources that are selectable. Information providers are invisible to the end user, who only sees the set of resource types selectable as well as the set of functions available. The frame-

work decides which provider is responsible for each function, whether to use queries or function calls, and how results are correlated.

This program was written by Paul Kolano of Advanced Management Technology for Ames Research Center. Further information is contained in a TSP (see page 1).

➤ Accident/Mishap Investigation System

InvestigationOrganizer (IO) is a Web-based collaborative information system that integrates the generic functionality of a database, a document repository, a semantic hypermedia browser, and a rule-based inference system with specialized modeling and visualization functionality to support accident/mishap investigation teams. This accessible, online structure is designed to support investigators by allowing them to make explicit, shared, and meaningful links among evidence, causal models, findings, and recommendations.

The semantic hypermedia component includes a customizable ontology that specifies various types of items such as people, places, events, causes, systems, and associated information products relevant to mishap investigations. The ontology also describes the important properties of each item, and details the potential relationships among items. Items stored in the repository are classified according to the ontology. Users can set properties for stored items, and

can associate a relevant electronic file with each one. Links between items can be established based on the relationships defined in the ontology, making the items viewable with the hypermedia browser to navigate the established links of interrelated items.

In addition to providing repository functionality, users can create and view overarching analysis models that specify causal factors, or hypothesized event sequences, leading up to the mishap. The causal models are linked to repository items that provide evidence to support or refute the hypothesized causes. The models can be viewed with linear, hierarchical, or network diagrams displayed by the user interface. The IO system was sponsored by the Engineering for Complex Systems program to address systemic challenges in NASA. It was built as a customized application of the SemanticOrganizer hypermedia system, and has been used in investigations ranging from small property damage cases to the loss of the space shuttle *Columbia*.

This program was developed by Richard Keller, Shawn Wolfe, Yuri Gawdiak, Robert Carvalho, Tina Panontin, and James Williams of Ames Research Center, and Ian Sturken of QSS Group, Inc. Further information is contained in a TSP (see page 1).

This invention is owned by NASA and a patent application has been filed. Inquiries concerning rights for the commercial use of this invention should be addressed to the Ames Technology Partnerships Division at (650) 604-2954. Refer to ARC-15073-1.