ENGINEERING SCIENCES WORKFLOWS FOR V&V APPLICATIONS

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The Sandia Analysis Workbench

An integrated environment for engineering analysis
Model Building

Graphical model building for many in-house codes including the Sierra suite and CTH
Job Submission

Template driven, easily user customized, makes access to heterogeneous resources uniform
Job Monitoring and Distributed File Management

Debug, track, and access jobs
Scientific Data Management

- Version control
- Access control
- Team sharing
- Repository search
Metrics show widespread adoption of SAW

SAW Usage History

Data Owners vs Active Users Each Quarter

Data are for internal Sandia users only
New Challenges

**Ensembles**

...of multi-step processes
...with constant variations
...often needing manual intervention
...running on unreliable machines
...providing high-consequence evidence
The Solution

Automated workflow... integrated with everything else in SAW
Workflow System Requirements

• Workflow engine independence
• Minimal server installation
• Flexible system architecture
  – “Everything executes anywhere”
• Low cognitive load
• Transparent and escapable
SAW Workflow Architecture

• Graphical Workflow Editor
  – Leverages some tech from Triquetrum/ESWG
  – Data-driven

• Workflow Runtime
  – “Abstract dataflow” (exoscale)
  – Integration layer for workflow engine independence
  – Highly portable
Model Building

Edit model components naturally using familiar tools.
Job Submission

Workflow executed locally or remotely using SAW job submission
Job Monitoring and Distributed File Management

Workflow status reported graphically using standard views; clicking a workflow node opens its runtime data directory.
A workflow is just a file, and it can be stored along with all the data it uses.
Benefits

– Reproducibility
  • It’s easy to make sure you’re performing the same steps
– Reliability
  • Errors handled robustly
– Reusability
  • No reinventing the wheel
– Team communication
  • Intrinsically documented processes
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www.sandia.gov/saw
Extra slides
Final Scalable Workflow Architecture Directly Connects Actions Using Any Available Comms

Descriptions of all inputs and outputs of workflow actions include available connection types. At runtime, in-situ connections are used as available. Result is distributed-area workflow containing embedded in-situ workflows.