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Symbolic Nuclear Analysis Package (SNAP)

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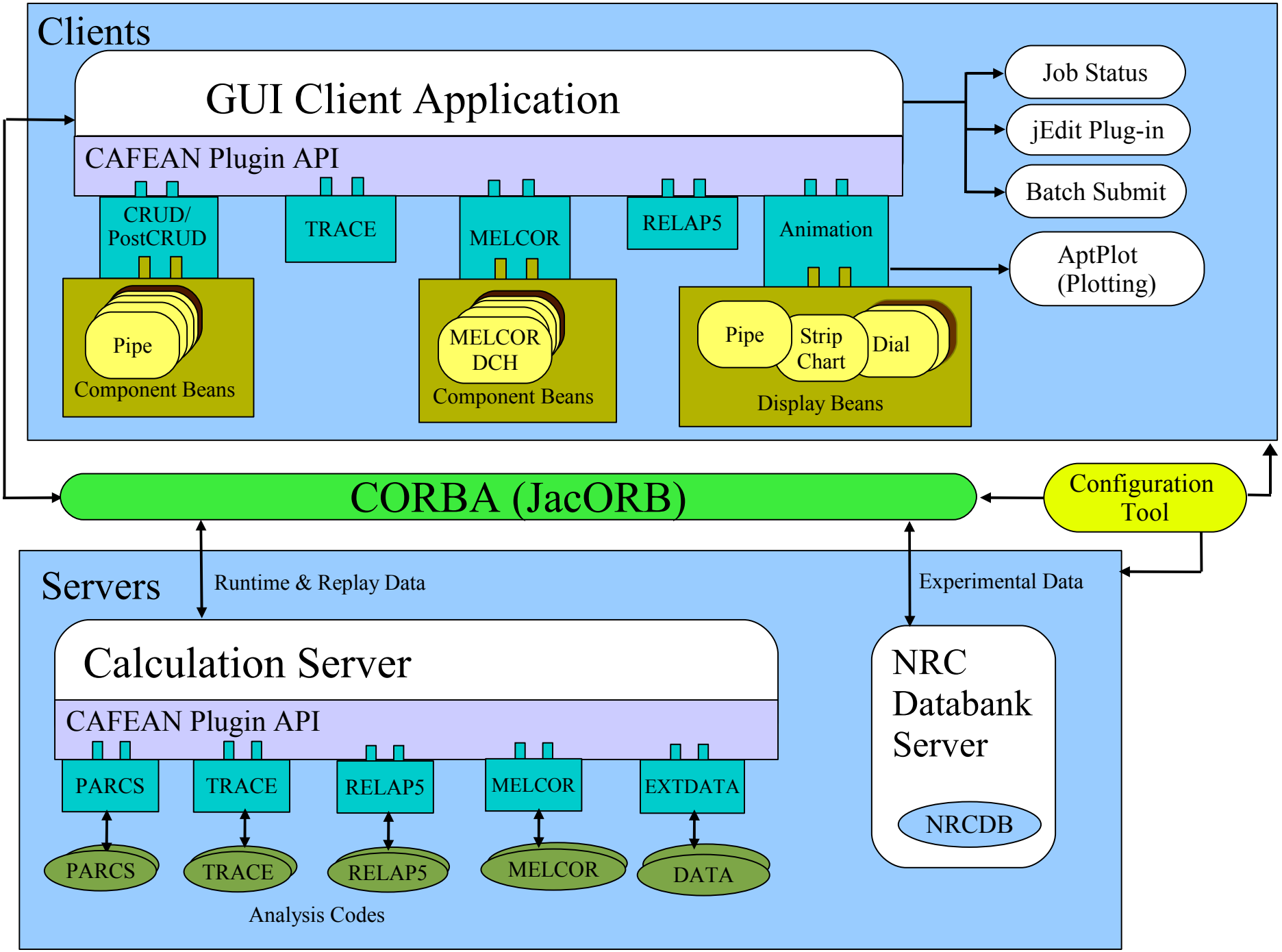
Outline

- Brief Overview of System Architecture
- Extensibility
- GUI Features
- SNAP Demo

SNAP System Architecture



Design Features

- Platform Independent
  - Java 1.5 or newer
  - Supported on: Windows, MAC OS X, Linux, Solaris, HP-UX, etc...

- Common Environment for Performing Engineering Analysis
  - An Interface for constructing and editing input models
  - A Tool for visualization of code outputs and data
  - Runtime Job Control
  - Job organization features; keeps track of your input and output files
  - Easy access to analytical code documentation

- Highly Extensible and Flexible
  - Framework provides a support for many different types of analytical codes
  - Plug-in based architecture allows for extensibility to new/other analytic codes
  - No Modification of the Base Code Required
  - Python Scripting:
    - User Defined Functions – Calculate Model Input
    - Python Data Channels – Post-Processing Calculations, Animations

Plug-ins

- A SNAP “code” plug-in is a program unit that encapsulates all user interface, input, output, and run-time features for a particular analytic code.

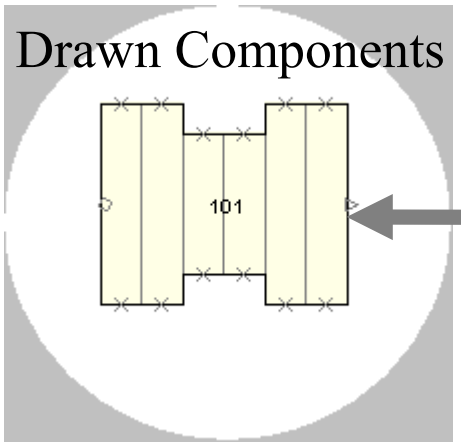
- SNAP Code Plug-ins (Partial List)
  - TRACE
  - RELAP5 (MOD 3.3 & RELAP5-3D©)
  - CONTAIN
  - MELCOR 1.8.6
  - PARCS
  - COBRA

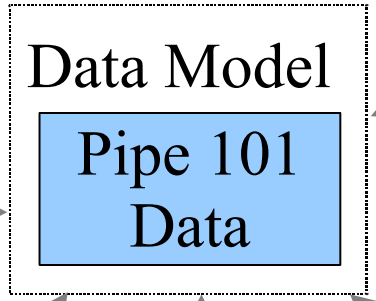
- A SNAP plug-in can also implement a “feature” or extended capability that may or may-not be related to a specific analytic code.
  - Animation Model Plug-in
  - RELAP5 to TRACE Model Conversion Plug-in
  - Model Documentation Plug-in

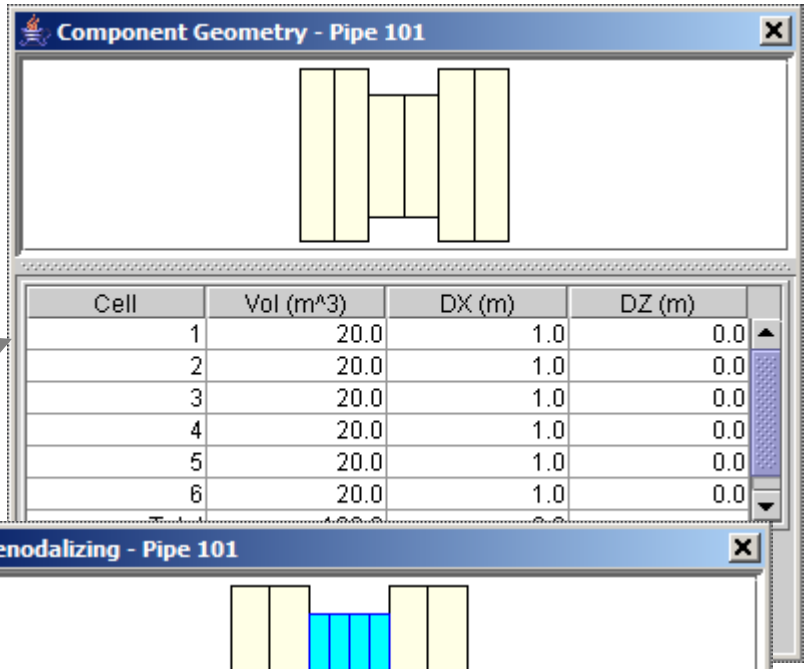
- Plug-in API for Adding New Analysis Codes & New Features
  - available at: http://www.nrcsnap.com/snap

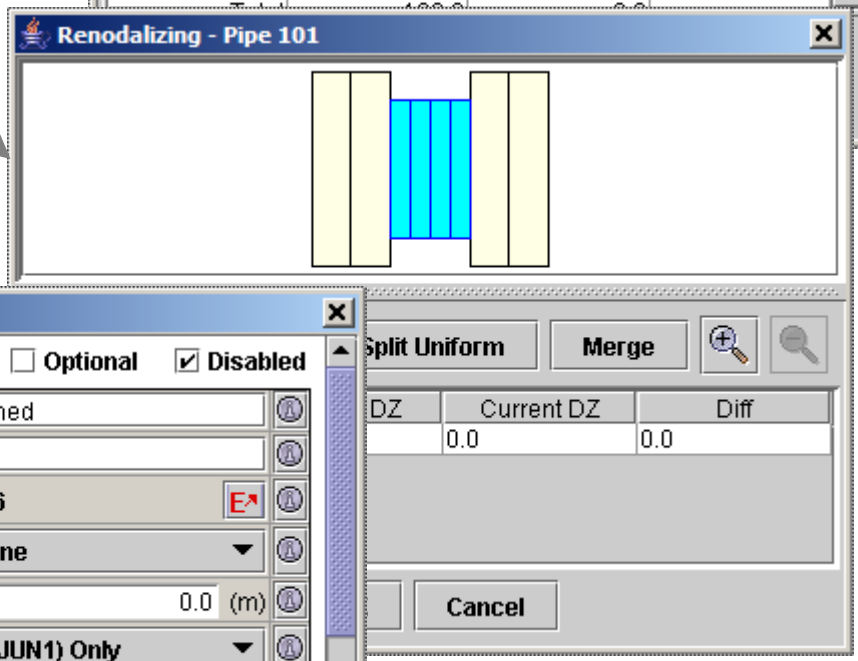
Component Data Model

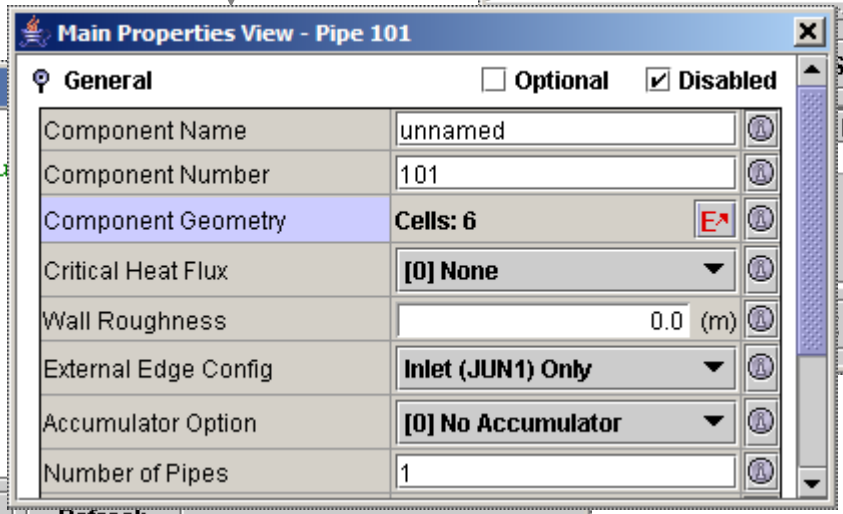
- All Component Data is Declared Private
- Views Implement a ComponentListener Interface
- Changes to Component Data are Automatically Reflected in all Views.



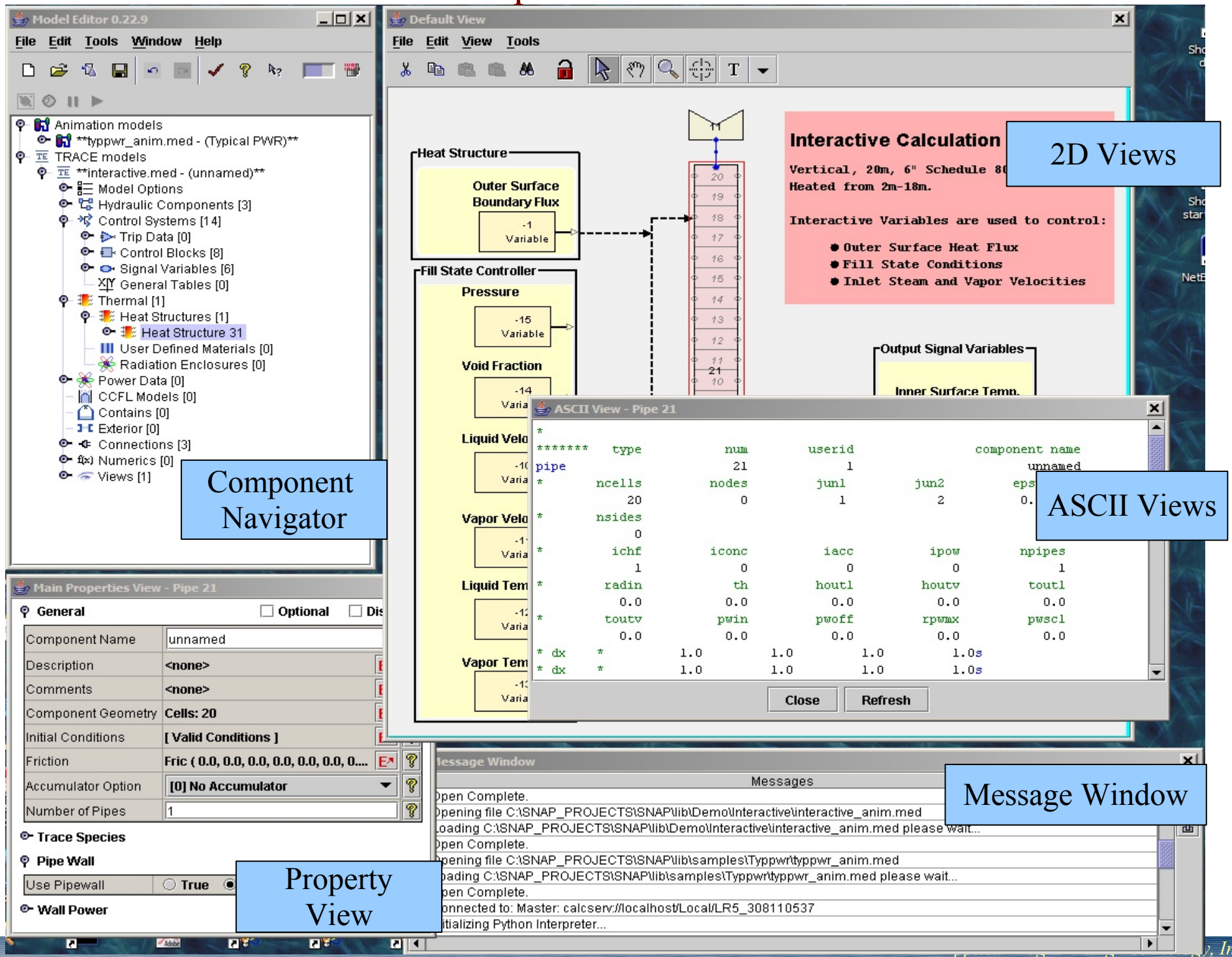




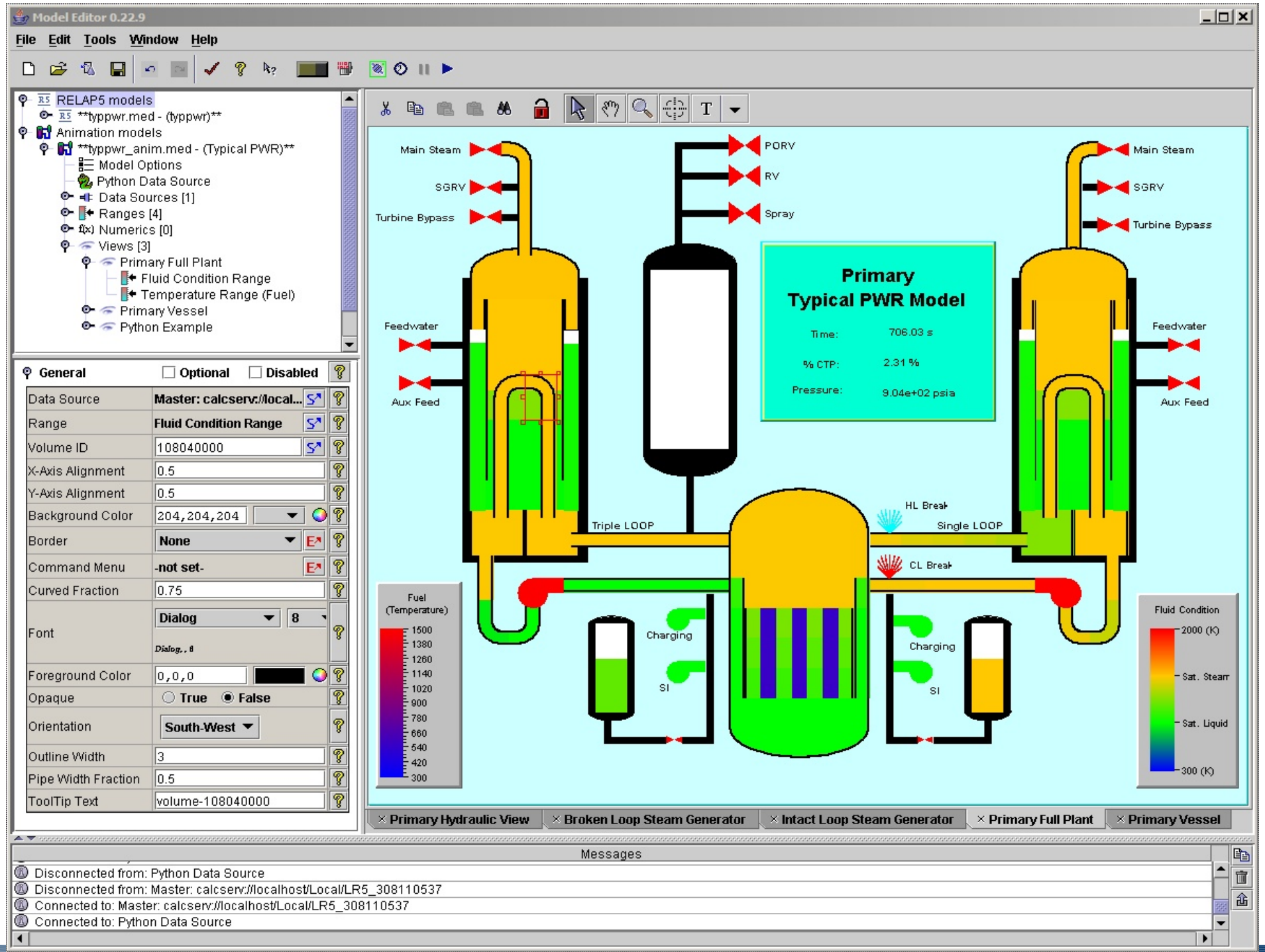




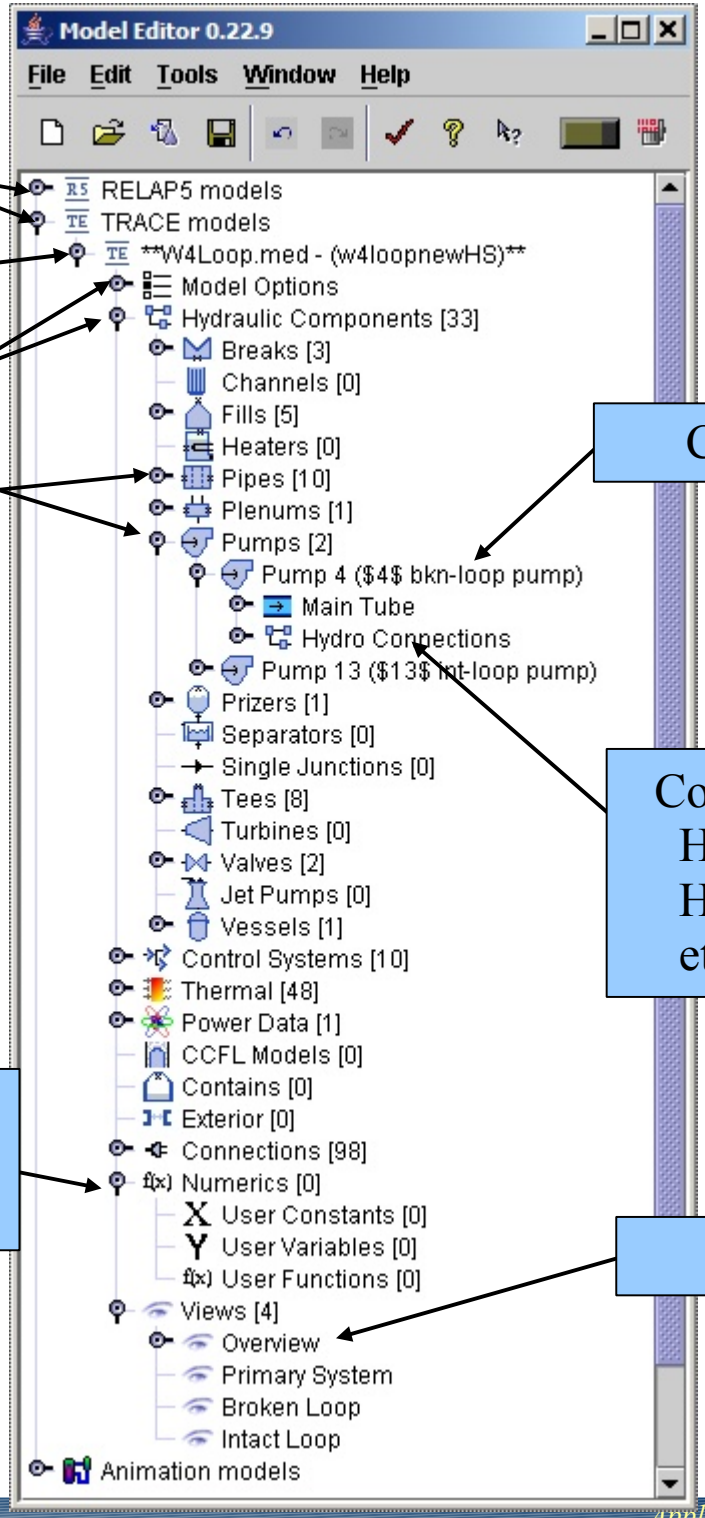
Multiple-Window Mode



Single-Window Mode



Component Navigator



Plug-in Nodes

Model Node

Main Categories

Sub-Categories

Components

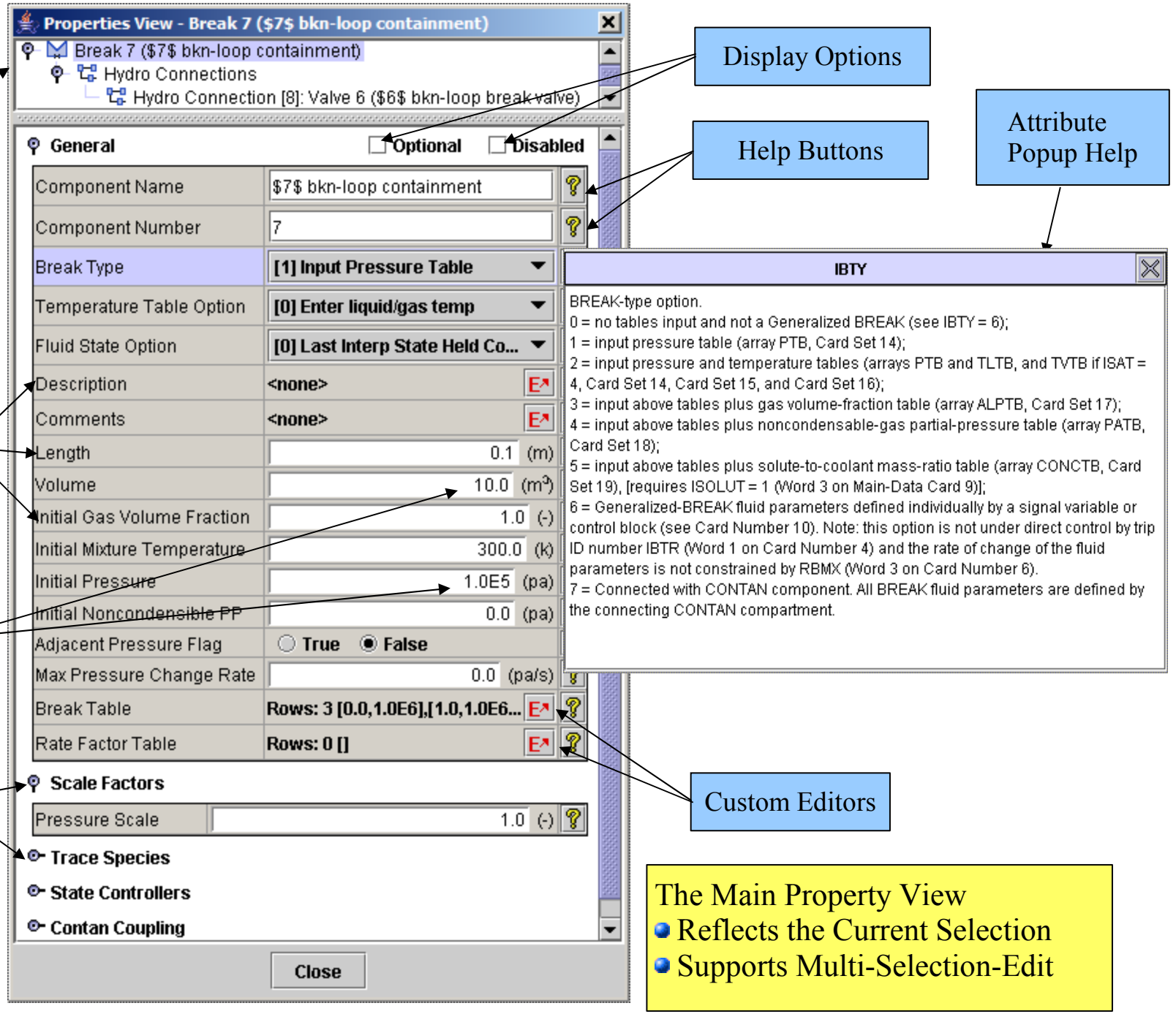
Connections:
Hydraulic.
Heat Structures,
etc.

User Defined
Constants &
Equations

Views

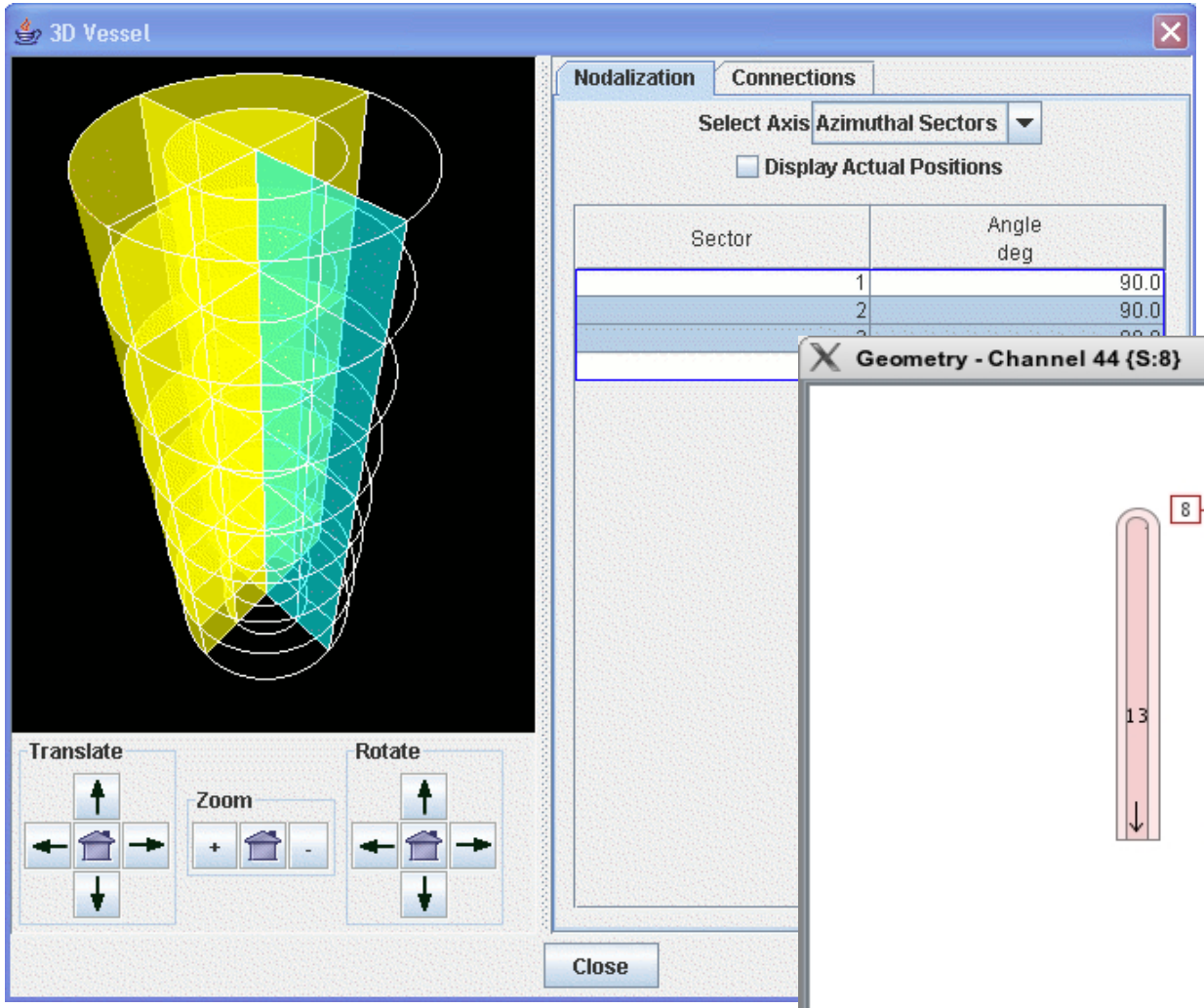
- Logical Representation of Model
- All Model Data / Views
- Create, Edit, Delete Components
- Create 2D&3D Views

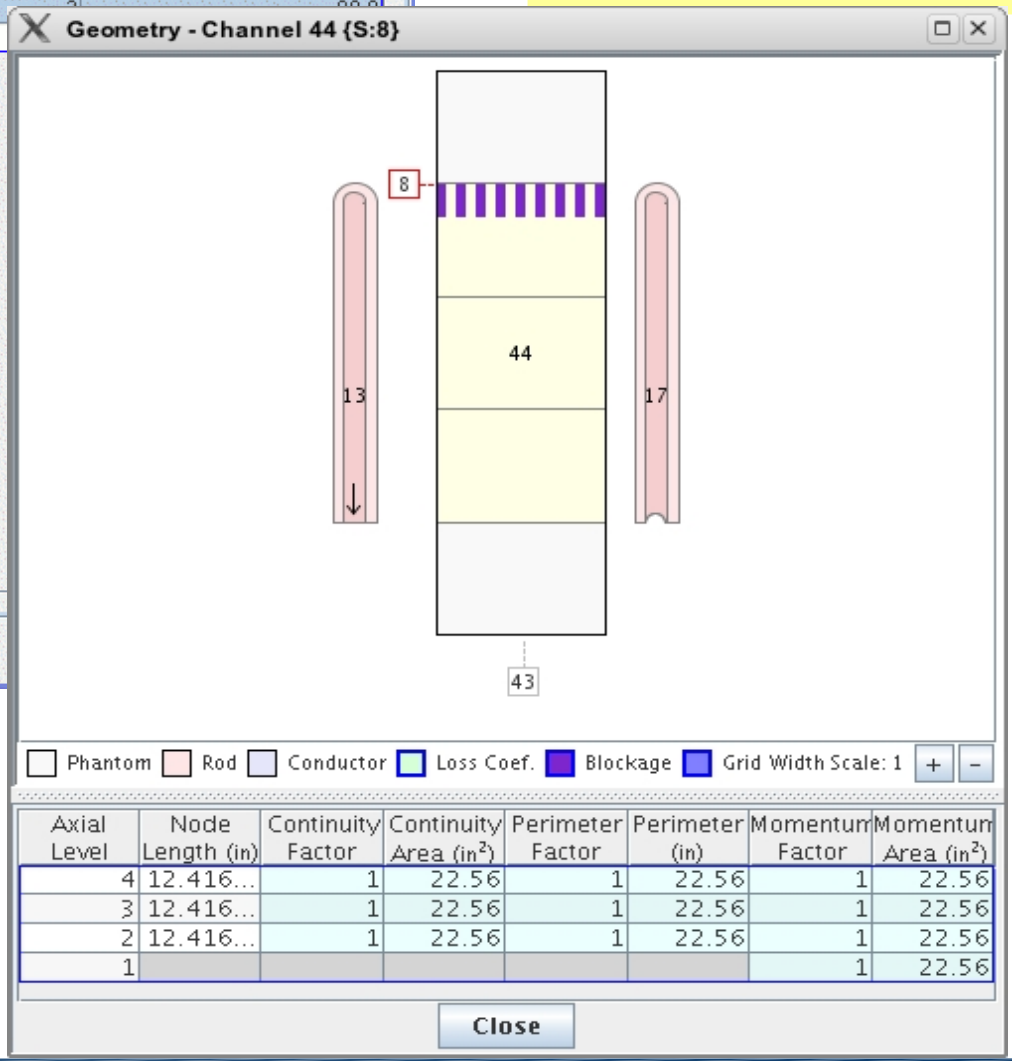
Properties View



The Main Property View
- Reflects the Current Selection
- Supports Multi-Selection-Edit

Custom Editors

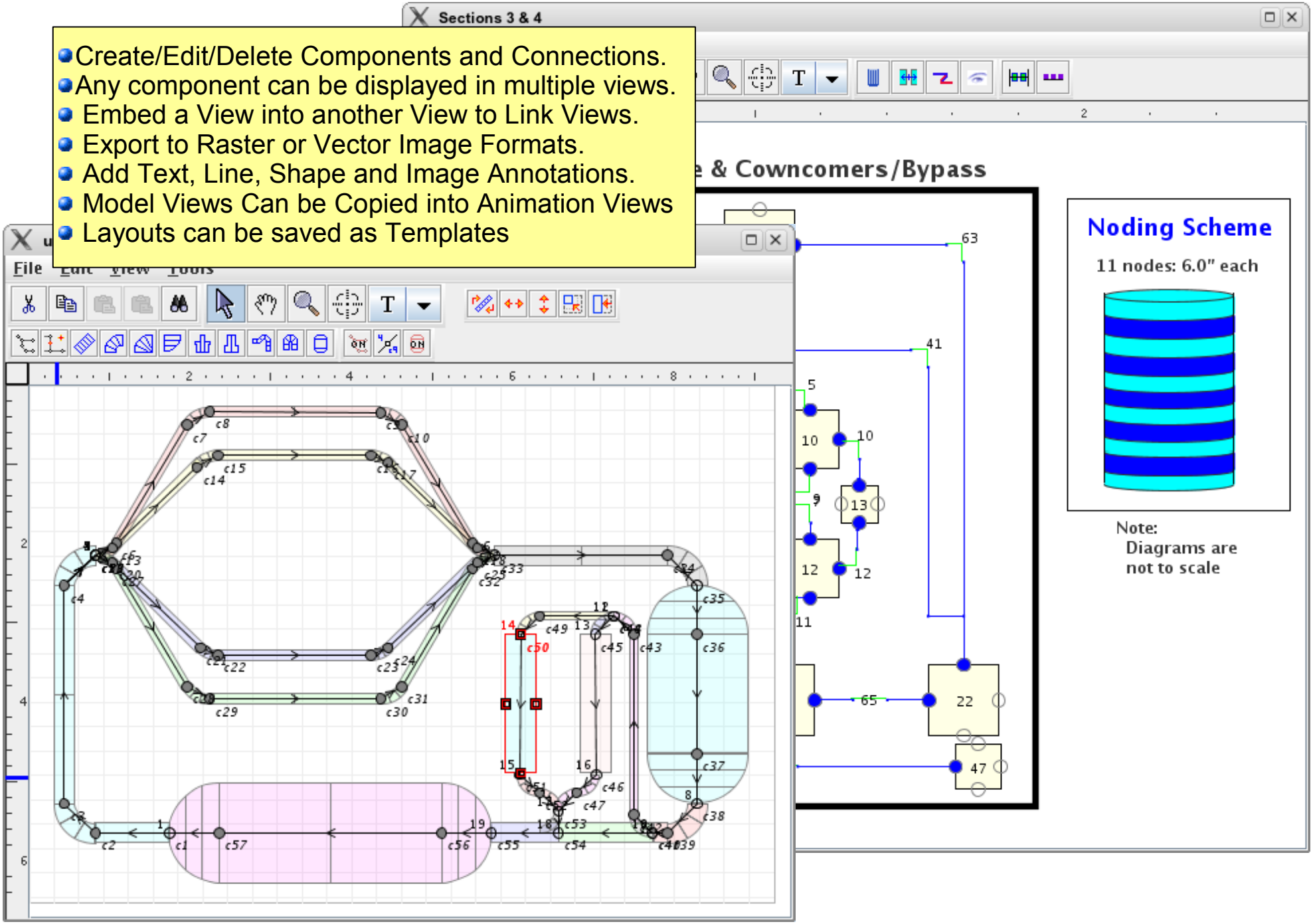




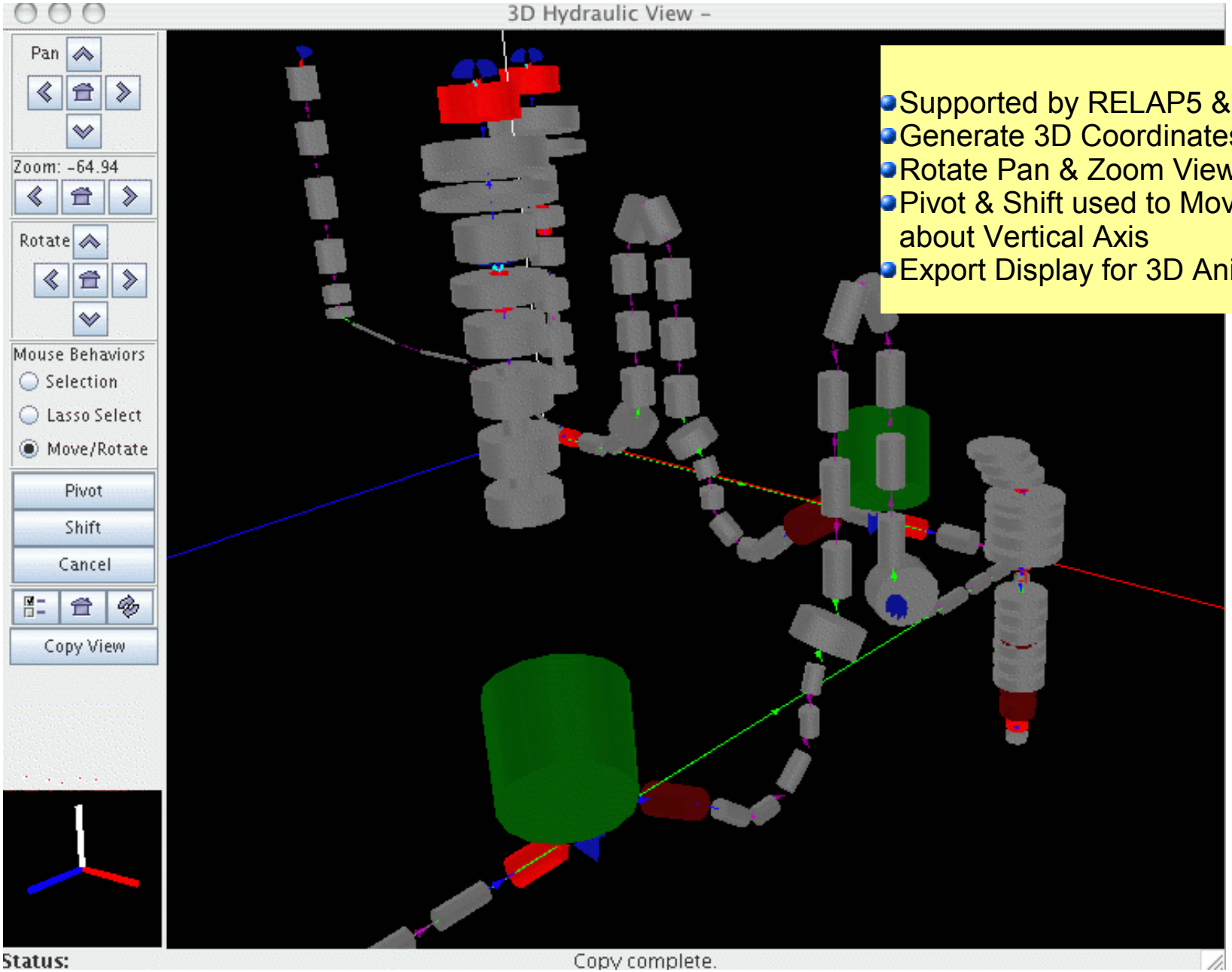
- Used to Provide Intuitive Interface for Editing Complex Data
- Table Data can be Copied to/from Spreadsheet Apps

2D Model Views

- Create/Edit/Delete Components and Connections.
- Any component can be displayed in multiple views.
- Embed a View into another View to Link Views.
- Export to Raster or Vector Image Formats.
- Add Text, Line, Shape and Image Annotations.
- Model Views Can be Copied into Animation Views
- Layouts can be saved as Templates



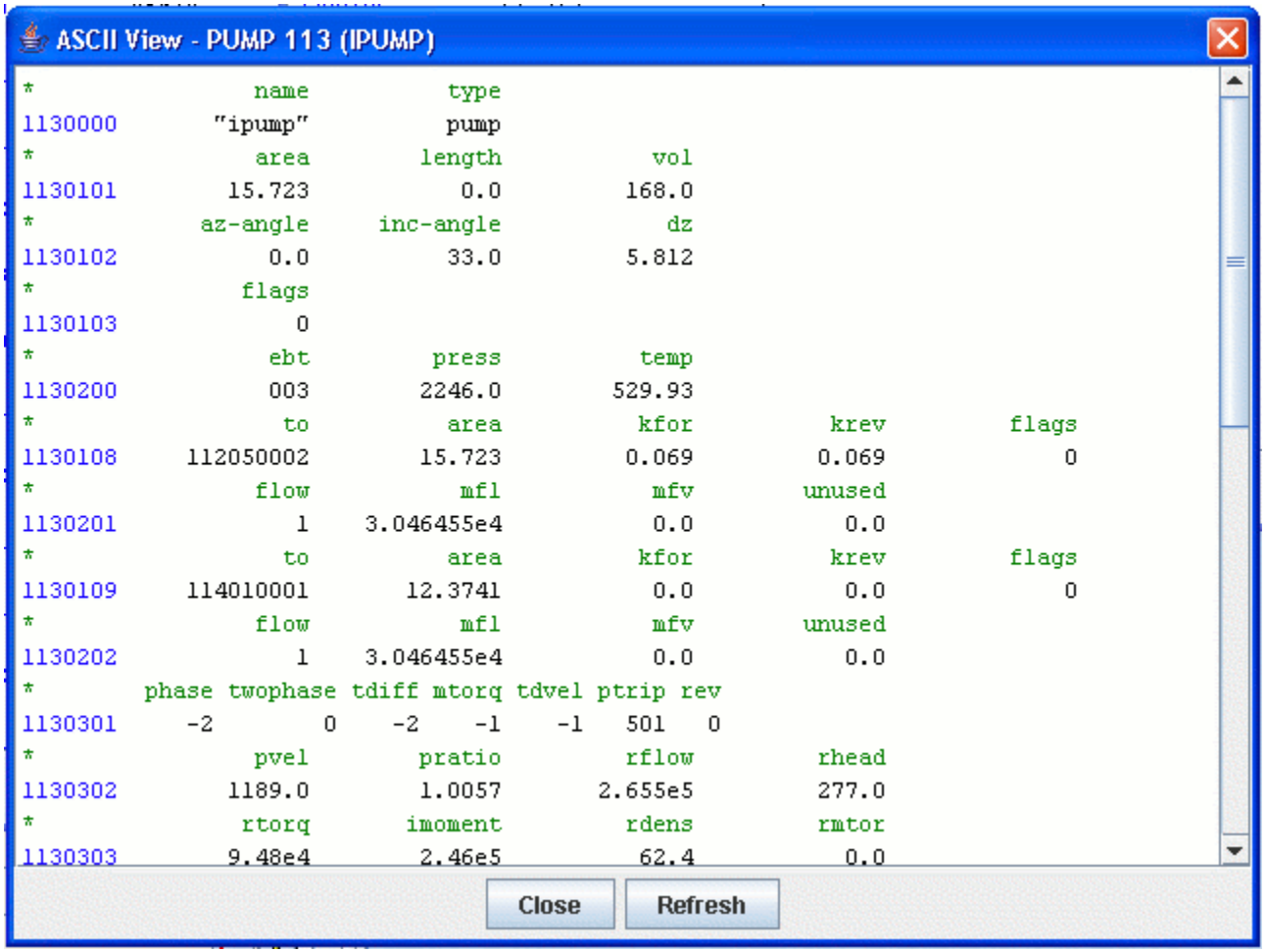
3D Visualization



- Supported by RELAP5 & TRACE Plugins
- Generate 3D Coordinates
- Rotate Pan & Zoom View
- Pivot & Shift used to Move Components about Vertical Axis
- Export Display for 3D Animation

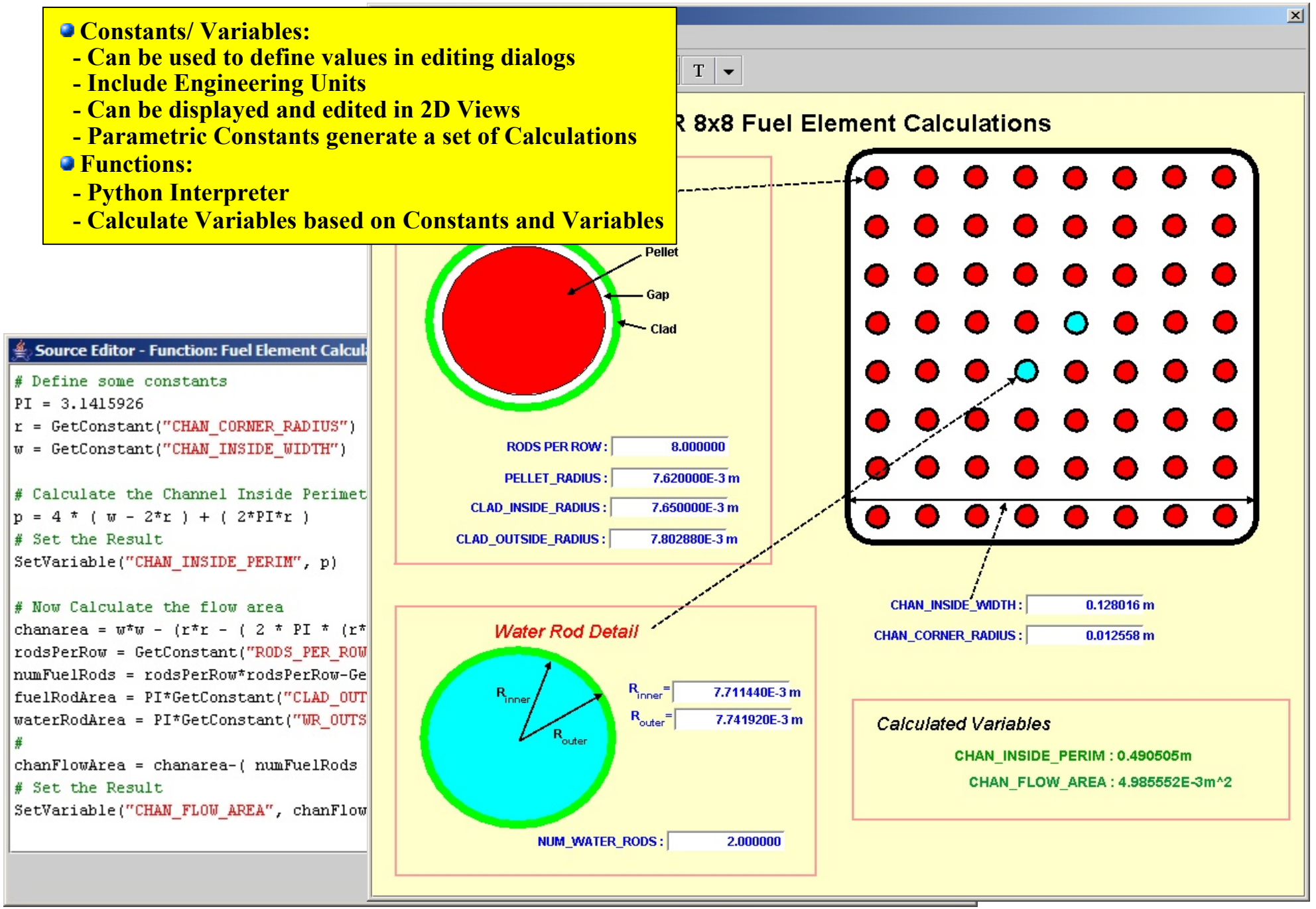
ASCII Views

- Component “Show ASCII” Menu Item
- Automatically Updates When Component Data Changes
- Syntax Highlighting



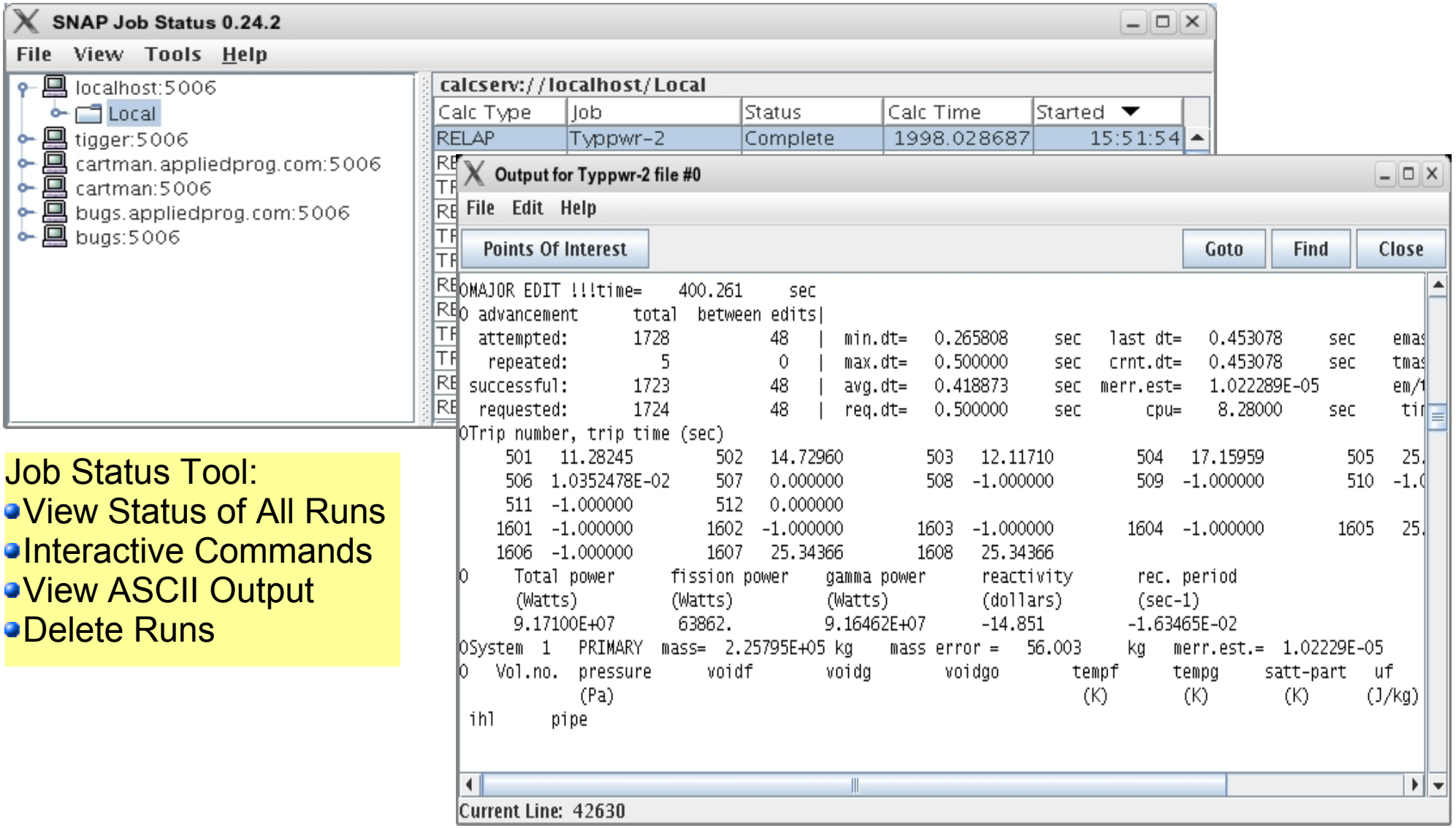
User Defined Functions

- **Constants/ Variables:**
  - **Can be used to define values in editing dialogs**
  - **Include Engineering Units**
  - **Can be displayed and edited in 2D Views**
  - **Parametric Constants generate a set of Calculations**
- **Functions:**
  - **Python Interpreter**
  - **Calculate Variables based on Constants and Variables**



Runtime & Post-processing

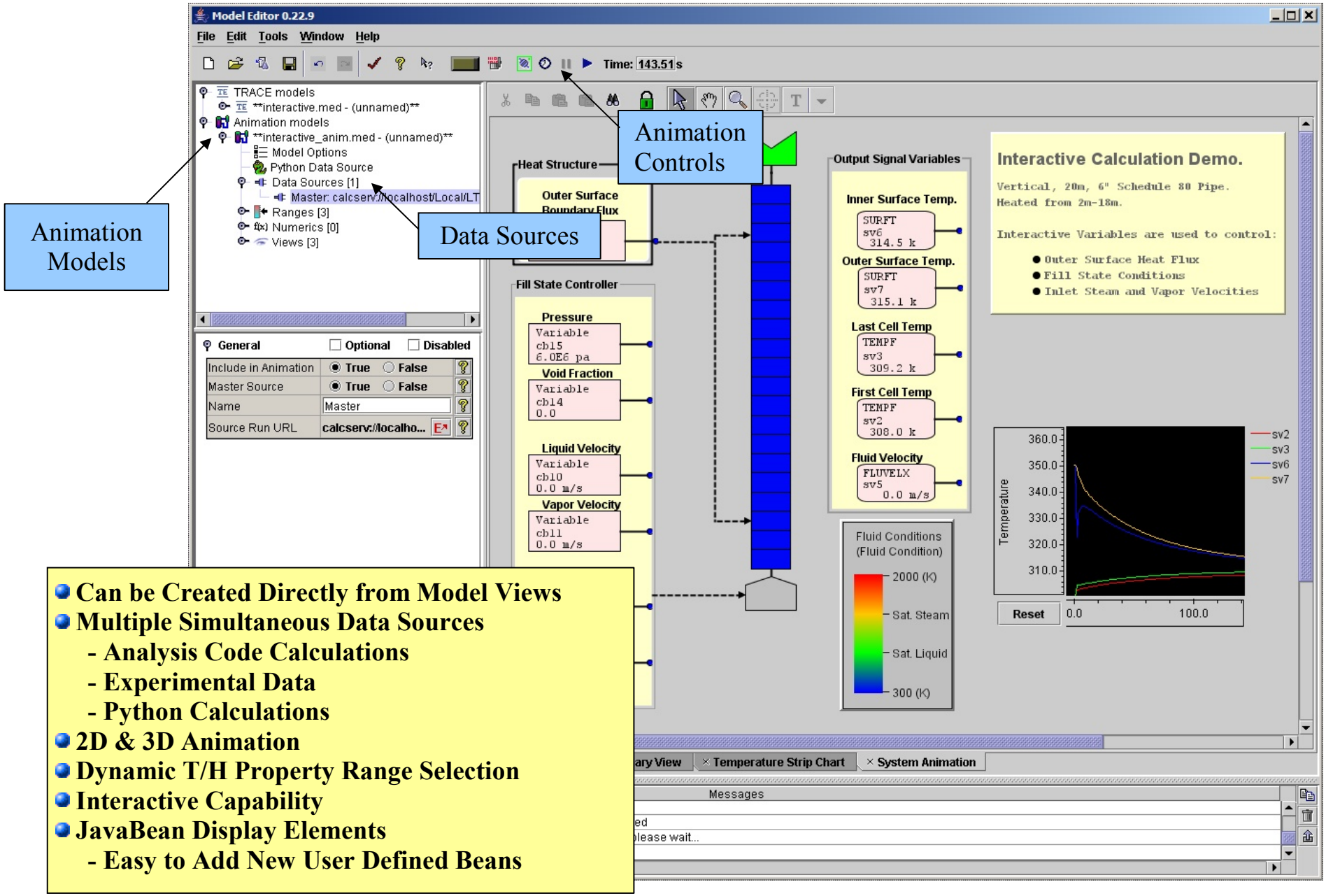
- Support for Interactive and Batch Modes as well as Importing Completed Runs
- Provides Access to Plot Data for Client Applications (Animation & Plotting)



Job Status Tool:

- View Status of All Runs
- Interactive Commands
- View ASCII Output
- Delete Runs

Animation Models



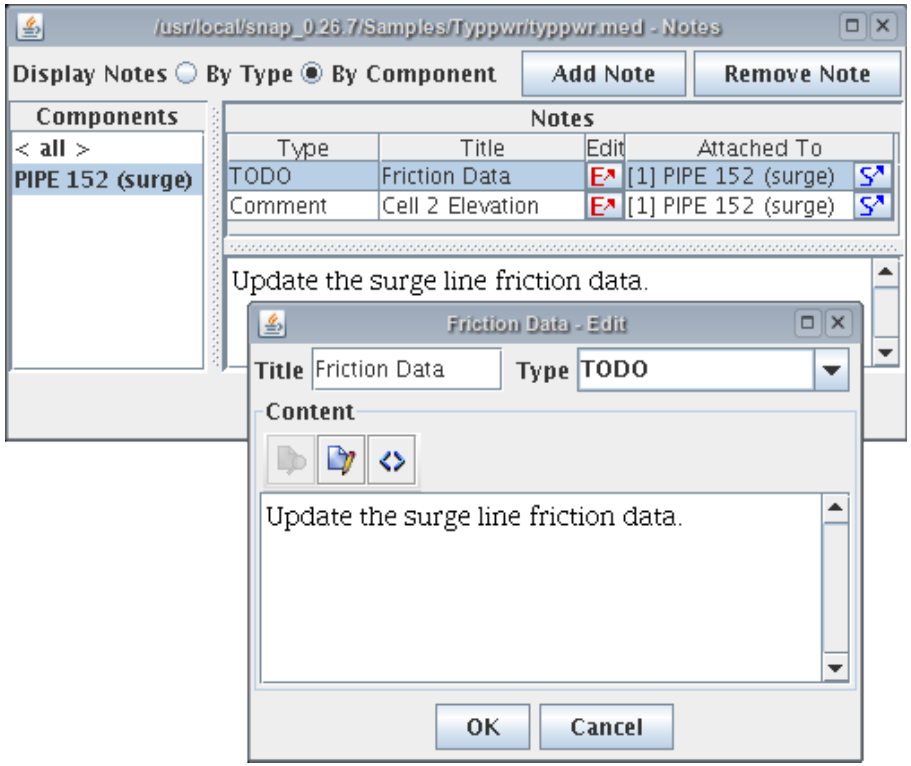
- **Can be Created Directly from Model Views**
- **Multiple Simultaneous Data Sources**
  - **Analysis Code Calculations**
  - **Experimental Data**
  - **Python Calculations**
- **2D & 3D Animation**
- **Dynamic T/H Property Range Selection**
- **Interactive Capability**
- **JavaBean Display Elements**
  - **Easy to Add New User Defined Beans**

Recent UI Improvements

- Improved Table Editors
  - More Intuitive Multi-Cell Editing
  - Copy/Paste between Editors and Spreadsheets
  - Plot Selected Data Directly to AptPlot
- New Modes for Drawn Connections
  - Single Line - A single segmented line to represent a connection between two components.
  - Source Marker - A "marker" connected to the source component that displays a short description of the target side.
  - Target Marker - A "marker" connected to the target component that displays a short description of the source side.
  - Source & Target - Both source and target markers.
- Component Grouping added to 2D Views.
- Horizontally and vertically constrained dragging in 2D Views
- "Open Recent" file menu was updated to include sub-menus for each of the available plug-ins.
- "View Files" button was added to the Run Console to allow the Output Viewer to be launched directly from the console.

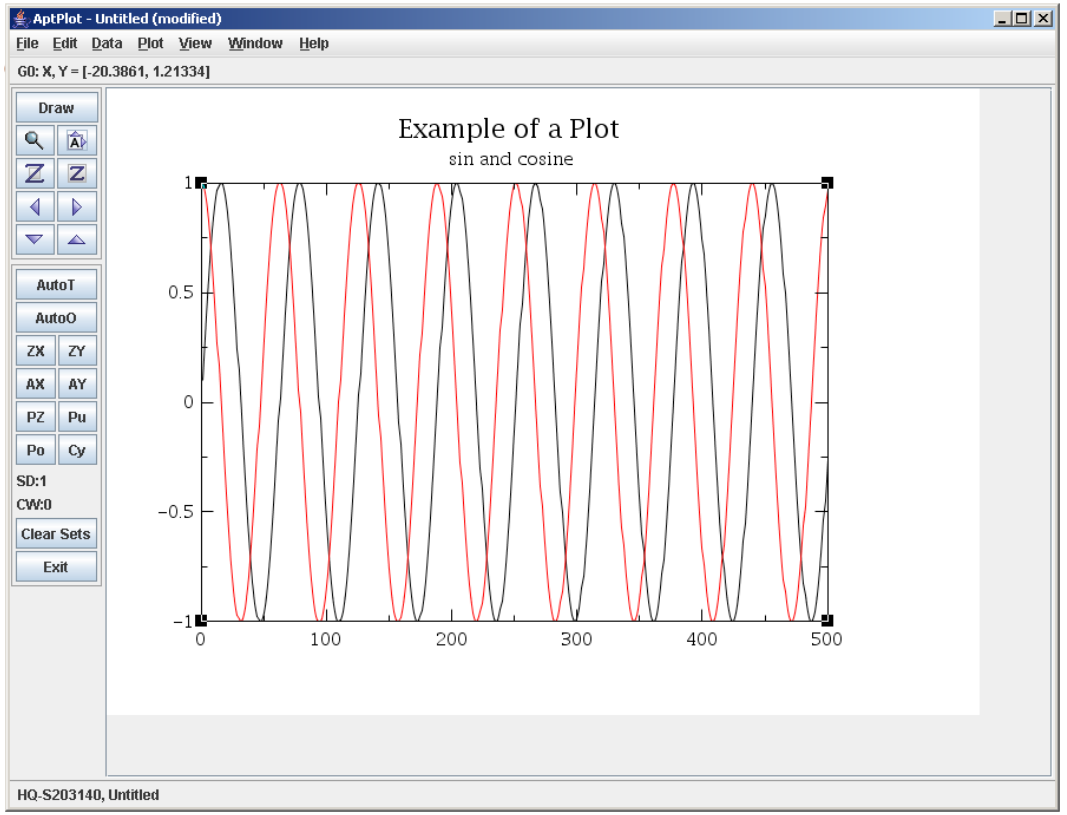
Model Documents (MDOCS) Feature Plug-in

- Add a note to one or more components.
- HTML formatting can include hyperlinks to external documents.
- Flexible note types: TODO, Comment, User-specified.
- Sort by type or component.
- Works for all new and existing plug-ins automatically Saved with the model.
- Notes can be added programmatically by other plug-ins.



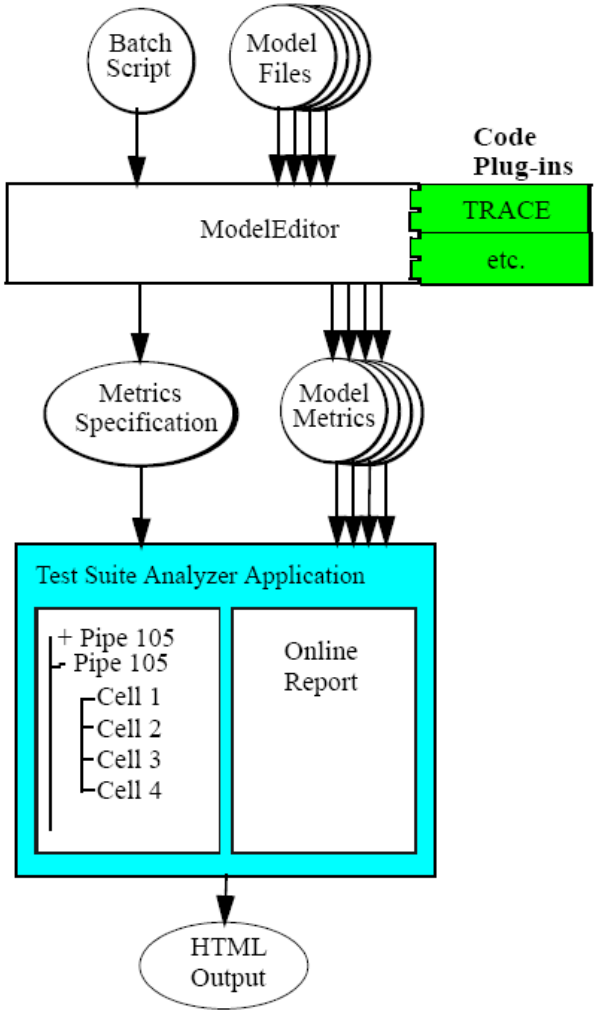
AptPlot Plotting Package

- Pure-Java replacement for Xmgr5 & AcGrace
- Extensive batch capability.
- Produces publication quality output (postscript, PDF, SVG, etc…)
- Java based plot files demultiplexers for RELAP5, TRACE, MELCOR, etc...
- AptPlot can be integrated with SNAP



Test Suite Analyzer (TSA)

- Collect and Analyze Model Metrics
- Identify Holes in the Test Suite
- Generate summary and detailed reports.
- Embedded SQL Database (DERBY)
- Custom and free-form queries may be used to explore the data.



Contacts

Websites:

http://www.nrcsnap.com (SNAP)
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