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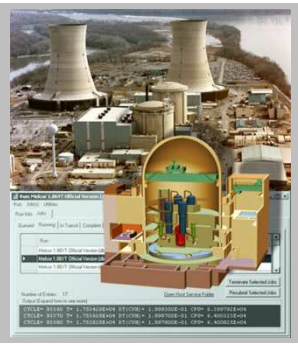

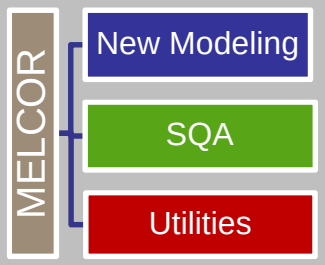

SNAP Overview

Presented by Jesse Phillips

jphill@sandia.gov

U.S. DEPARTMENT OF ENERGY | NNSA

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Objective of Presentation

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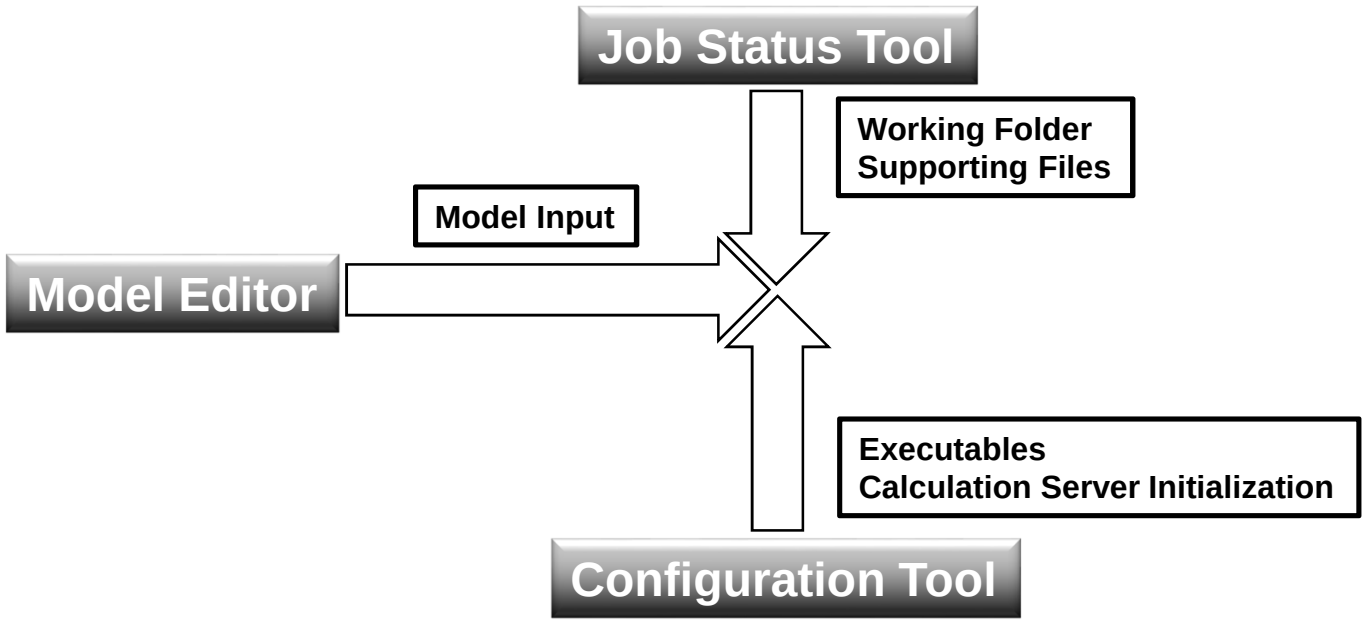
- Introduce SNAP
  - A breakdown of the Model Editor Graphical User Interface (GUI)
  - Discuss the various tools (Job Status, Configuration Tool)
  - General discussion of functionality regarding MELCOR
- Demonstrate user input workflow
  - MELGEN and MELCOR
    - General “Packages” are maintained
    - General User Guide information is accessible
- Demonstrate job submittal
- SNAP is a very feature rich suite
  - Therefore we’ll focus on using it solely to create MELCOR input and perform calculations

Simplistic Idea on Information Flow for Job Submittal

- From a simple user's understanding of information flow



SNAP Model Editor

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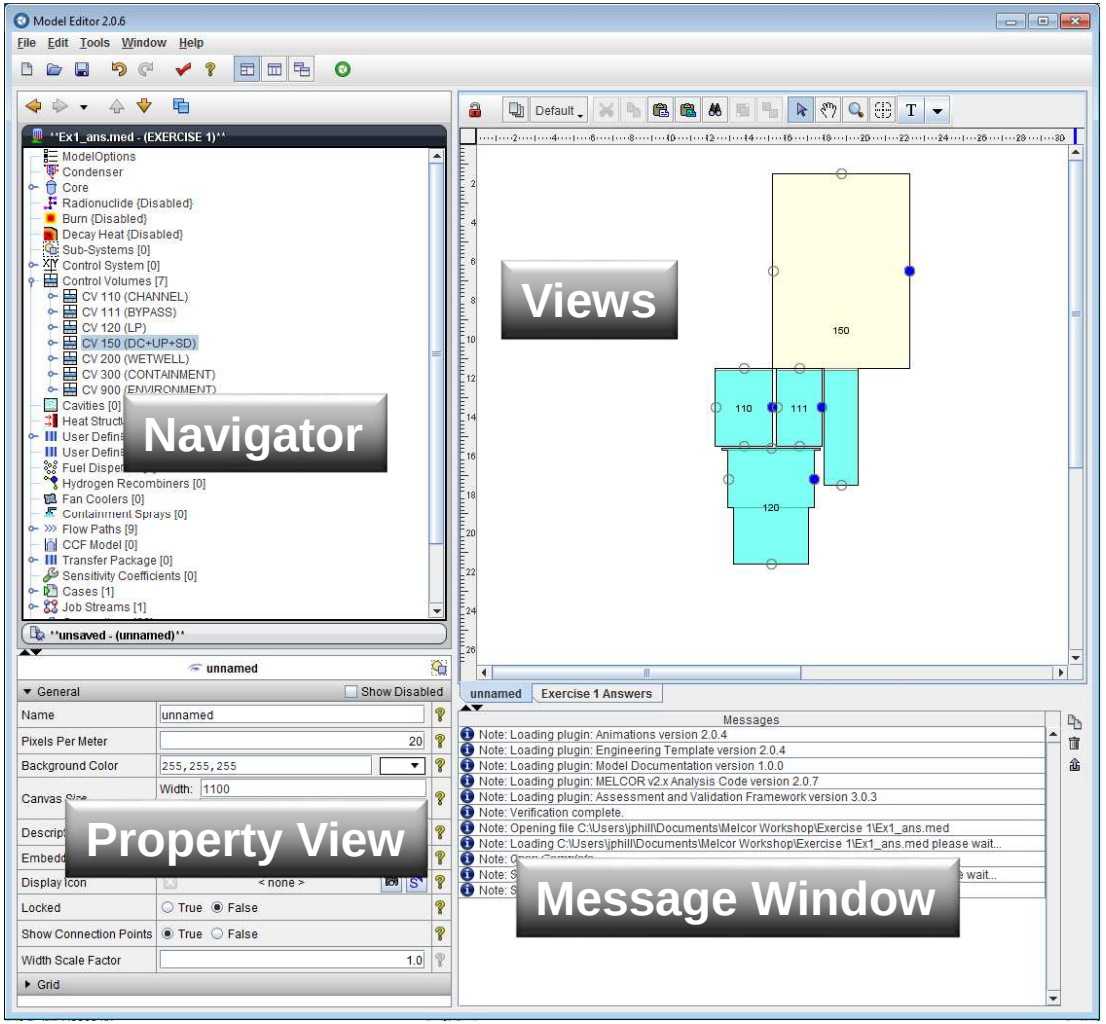
- Model Editor
  - Unique plug-ins handle specific model details for a given code (MELCOR, RELAP, etc.)
  - Stores both MELGEN and/or MELCOR user input
  - Can convert older MELGEN/MELCOR 1.86 input to 2.x
  - Submits input processed by executables (i.e. job submittals)
  - Can create an Animation Model for post processing output
- Model Editor Advanced
  - User Defined Numerics
  - Engineering Template
  - Automated Validation Framework
  - And more….

Model Editor Interface



Navigator View

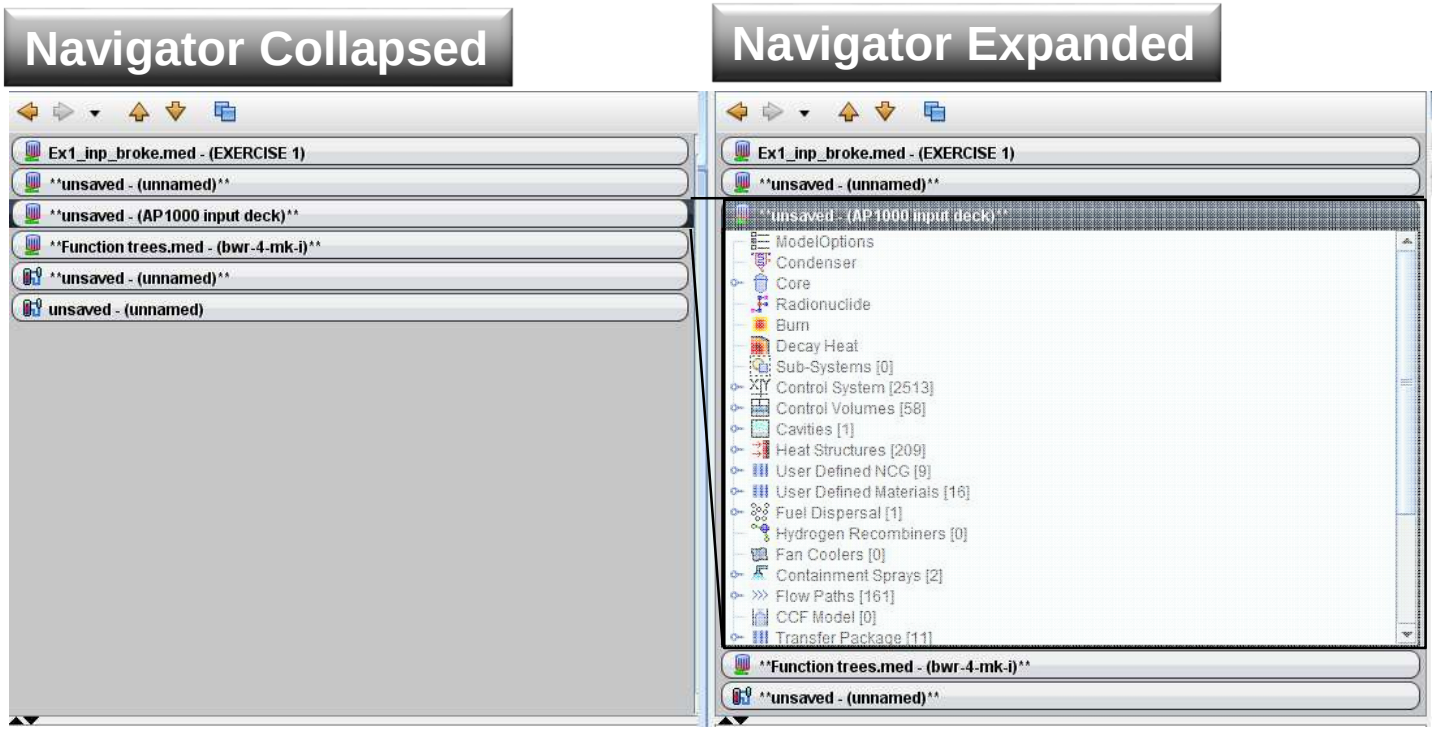
- Nodal based tree for each package
  - Blue node can be clicked to expand the tree 
  - Select the MELCOR component to view its properties in the Property view (Components can be selected in either the Navigator or the View port.)
  - Packages with different names
    - Model/Options == EXEC package
    - Control Systems == CF/EDF/TF packages
  - Internal Controls
    - Cases – Where the MELCOR input is treated
    - Job Streams – Identifies MELCOR input files and executables using an information flow map
    - Connections – list component dependencies
    - Numerics – user defined substitutions to input
    - Views – List of views available in the View port

Sub-Systems

- Sub-Systems allows user input to be grouped logically into system sets
  - Components can be added to a sub-system from the currently available component
  - Exporting a text files will maintain sub-systems in independent files (a typical practice for MELCOR file organization where components are stored in unique files)
    - Example
      - RHR components may include
        - » Pumps, reservoir water sources, heat exchangers, etc.
        - » Their associated flow paths, controls volumes, controlling logic are often kept primarily in one input file for book-keeping purposes

Navigator View

- Multiple models can be open in one SNAP instance
  - Accordion Display



Properties and Message View

- Properties View
  - Where all user input is accepted
    - Both MELCOR and/or SNAP components
  - Editable fields
  - Drop down menu
  - Editable window pop-ups
  - Selectable elements
  - Model notes
  - User guidance
- Message
  - Where error messages associated with SNAP are placed.
  - MELCOR error messages are still written to the MELCOR files
    - Message file, diagnostic file, output file, etc.

View Port

- New Views are created in the Navigator tree
  - Right click View, select new to create a new view component
- View components have several internal drawing methods for various components
  - Components can be placed in the view by right clicking on the component in the navigator tree and selecting add to view
  - Control Volumes utilize the CV_VAT information (Volume and Altitude Table) when determining the depiction
  - Flow paths utilize Connections (see Navigator tree) to determine which Control Volumes to connect. Location of the connecting line is taken from the FL_FT record versus the CV_VAT input
  - Core, Control Functions, Database Variables, etc.

Drawing in the View Port

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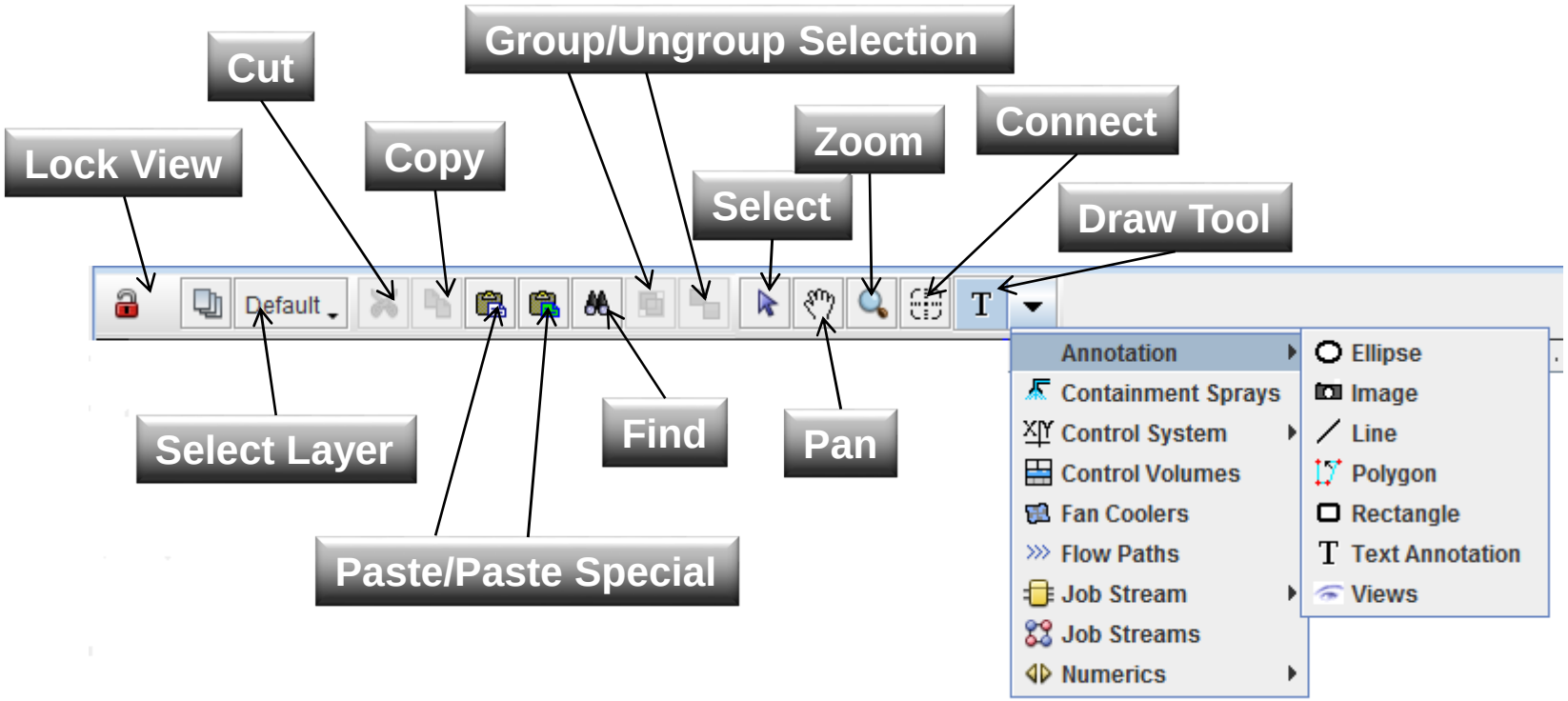
- Drawing is very straight forward. Experiment to learn
  - Tools available
    - Layers
      - Drawn components are assigned to a given layer
      - Layers can be made visible or invisible making editing easier
    - Docking
      - View can be detached from the view port and moved about the desktop
        - » Right click the view in the Navigator>Undock View
    - Standard copy/cut/past/zoom/pan controls
      - CNT+C / CNT+X / CNT+P / CNT+MouseWheel / MouseWheel(Shift+MouseWheel)
    - Grouping components, found in tool bar
    - Lasso select (left click hold and drag)

(Continued)

Drawing in the View Port

- Tools available (continued)
  - Connection Tool
    - Components (Control Volumes, Flow Paths, and a few others can be initiated in the view port, likewise connections can be created between such components with the connection tool)
  - Drawing Tools
    - Annotate
      - » Add text, lines, shapes, etc.
    - MELCOR components
      - » Sprays, Control Volumes, Flow Paths, etc.
    - Job Stream information flow maps
- Toolbar

View Port Toolbar



View Port Notes

- Interactive elements can only be selected from the View Port if the view is locked
  - This is to prevent accidental interactions while editing the view components
- If the screen is locked you cannot edit any of the components
- Individual layers can be locked to prevent editing certain components
- Connections can only be made in the View Port for the following
  - Flowpaths to Control Volumes, Sprays to Control Volumes, and Fan Coolers to Control Volumes

Example: Import MELGEN File

- Importing a pre-existing MELCOR model
  - File > Import > MELGEN 2X
    - Make sure the Code Version is correct
    - Select the root file
      - Note R*I*F or INCLUDE files are read with regard to their hosting file not the main root file. (MELCOR performs these functions with regard to the root file only.)
        - » Hosting file is the file with the R*I*F or INCLUDE file location
        - » Root file has the main MELGEN or MELCOR block
    - Name options can be specified by the user
      - Preserve existing component names as reasonable (16 character limit and repeated names will have an _# appended to the end of the name)
      - Generate with number
        - » With package prefix i.e. CV###
        - » Without prefix i.e. #####

Example: Import MELCOR File

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- Within the Navigator Tree
  - Add a Case if none exists (right click case select new)
    - This will create a MELCOR Case
  - Right Click the newly created MELCOR Case and select Import Case
  - Navigate to file location
    - If error Messages are overwhelming
      - The “Code Version” didn’t match the file type
        - » 1.86 vs 2.x mismatch

Example: Importing MELGEN/MELCOR Input

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Notes on Importing

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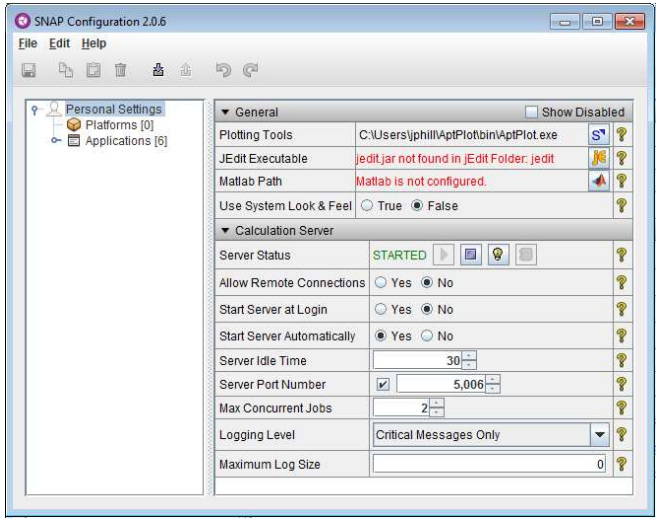
- Review the Message View for import errors
  - May require some corrections
  - Once again if the error messages are overwhelming
    - 1.86 vs 2.x mismatch likely occurred
- Import the MELCOR case BEFORE changing the “Code Flavor” i.e. from 1.86 to 2.x or reverse
  - SNAP is anticipating like versions

Configuration Tool

- General Use
  - Lets SNAP know where the executables are located
    - MELGEN/MELCOR
    - APT Plot (Not necessary but useful for Post Processing)
  - Initiates the Calculation Server
    - Calculation Server is where the calculations are performed
    - By default your current machine is assumed to be the calculation server
      - Therefore if your machine is the one to perform the calculations you will not need to adjust this setting



Configuration Tool Setup

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- Personal Setting
  - APT Plot location can be specified
    - As well as other tools if so desired
  - Server Status
    - Click the play button, there are several other user actions that can start the Server.
- Applications
  - Right click Applications > New > MELGEN > location of MELGEN
  - MELCOR (same as MELGEN)
  - Specify the Server
    - If your machine will perform the calculations no further work is necessary

Example: Setting Up the Configuration Tool

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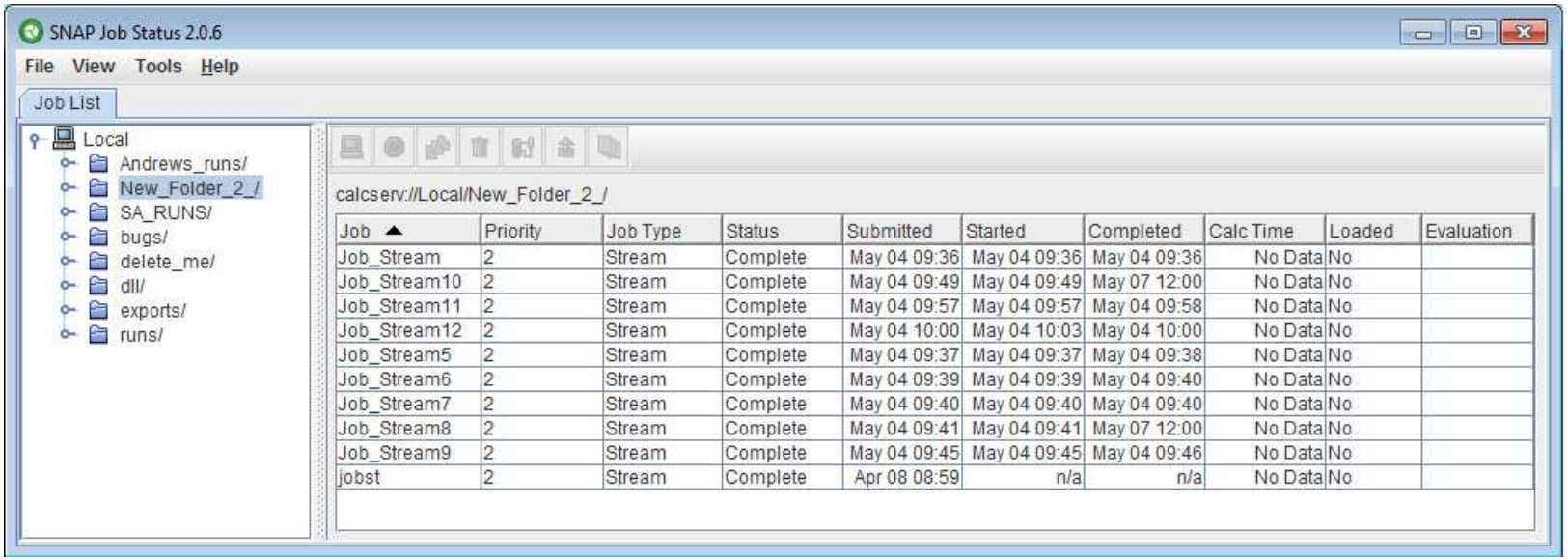
Job Status Tool

- Job Status Tool
  - Keeps track of prior performed jobs
  - Only displays the folder list and jobs when the Calculation Server has been started



Job	Priority	Job Type	Status	Submitted	Started	Completed	Calc Time	Loaded	Evaluation
Job_Stream	2	Stream	Complete	May 04 09:36	May 04 09:36	May 04 09:36	No Data	No	
Job_Stream10	2	Stream	Complete	May 04 09:49	May 04 09:49	May 07 12:00	No Data	No	
Job_Stream11	2	Stream	Complete	May 04 09:57	May 04 09:57	May 04 09:58	No Data	No	
Job_Stream12	2	Stream	Complete	May 04 10:00	May 04 10:03	May 04 10:00	No Data	No	
Job_Stream5	2	Stream	Complete	May 04 09:37	May 04 09:37	May 04 09:38	No Data	No	
Job_Stream6	2	Stream	Complete	May 04 09:39	May 04 09:39	May 04 09:40	No Data	No	
Job_Stream7	2	Stream	Complete	May 04 09:40	May 04 09:40	May 04 09:40	No Data	No	
Job_Stream8	2	Stream	Complete	May 04 09:41	May 04 09:41	May 07 12:00	No Data	No	
Job_Stream9	2	Stream	Complete	May 04 09:45	May 04 09:45	May 04 09:46	No Data	No	
jobst	2	Stream	Complete	Apr 08 08:59	n/a	n/a	No Data	No	

Job Status Tool Setup

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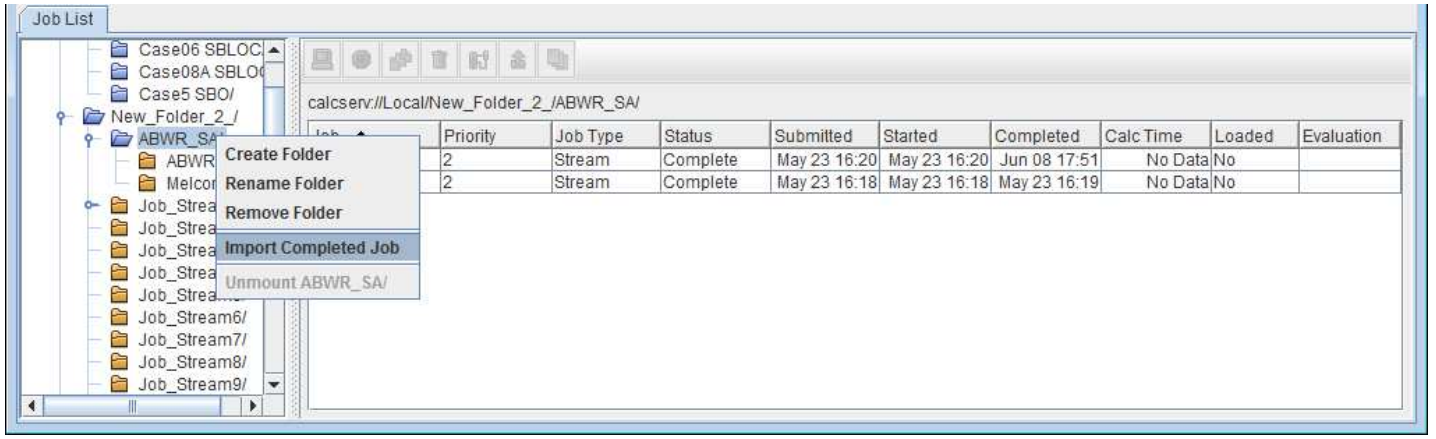
- User will need to create a working folder
  - Right click Local > Mount Root Folder
  - Specify the working folder
- Job Streams can be submitted to any mounted root folder
  - The files submitted and produced by MELGEN and MELCOR will be located in \Root Folder\Job Stream Name
- From an existing Job
  - Files associated with the run can be viewed with the Job Status Tool
  - Data can be plotted with APT Plot from the Job Status Tool
  - Jobs viewable from the Job Status Tool will be available for post processing with an Animation Model from the Model Editor

Importing a Standalone Job with the Job Status Tool

- The Job must reside in a folder within the working directory of a mounted Root Folder
- Navigate down to the folder where the Job files reside
- Right click the folder>Import Completed Job
- Select the applicable application
- Click Next then input a Job Name if desired
- Click Next then select the location of all desired files



Example: Mounting a Root Folder and Importing a Completed Job Plotfile

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Creating a Job Stream

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- Job Stream
  - Created within the Model Editor
  - Performs MELGEN and/or MELCOR runs
    - Can be either or both
  - Submits the input files to the MELGEN/MELCOR executables and specifies the folder where the results will be placed
  - Produces a new Job within the Job Status Tool
  - Can specify the post processing tool to generate a set of plots
  - Has several default Job Streams which can be selected to simplify the setup process

Setting Up a Job Stream

- Checklist before setting up a Job Stream
  - MELGEN/MELCOR executables setup in the Configuration Tool
  - Calculation Server started
  - Root Folder present in the Job Status Tool where the resulting files will be located
- Set-up
  - In the Navigator right click Job Streams>New
  - Select Basic Stream
  - Select calculation type (Two-Step)
  - A new View will be created containing an information flow diagram
    - The MELGEN input and MELCOR input will be present
    - A MELGEN and MELCOR executable will be selected from the Configuration Tool automatically

Job Stream

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- Independent files can be specified in the Job Stream
  - Restart Files, ASCII Input Files, etc.
- Sensitivity cases can be performed
  - If a Numeric has been included in the model it can be used to perform various like calculation where the Numeric value is varied
    - Create a new numeric by expanding Numeric tree and right clicking desired Numeric type
    - Create a Numeric Job Stream and edit the Parametric Properties
    - Edit the Parametric Tasks

Example: Continuation of Import Example with Job Stream Creation

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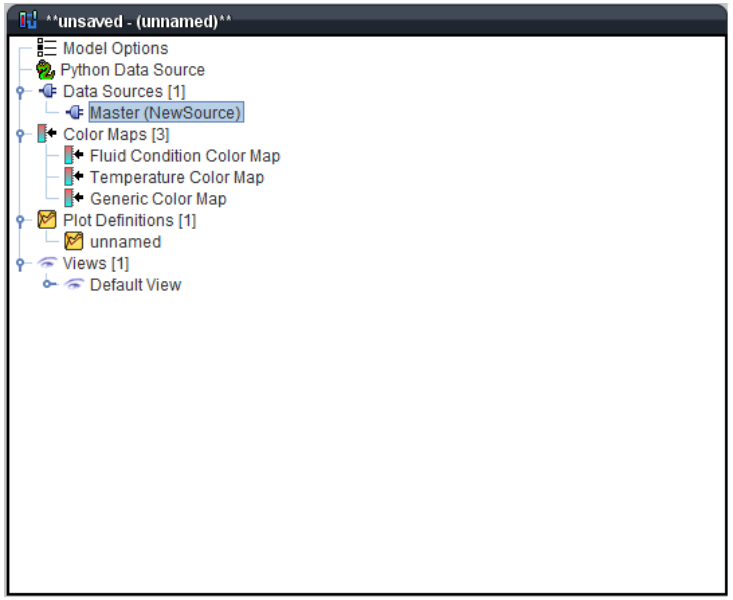
Post Processing with SNAP

- Animation Model is a separate model from the MELCOR model
  - File>New select Animation model



Creating a Basic Animation Model

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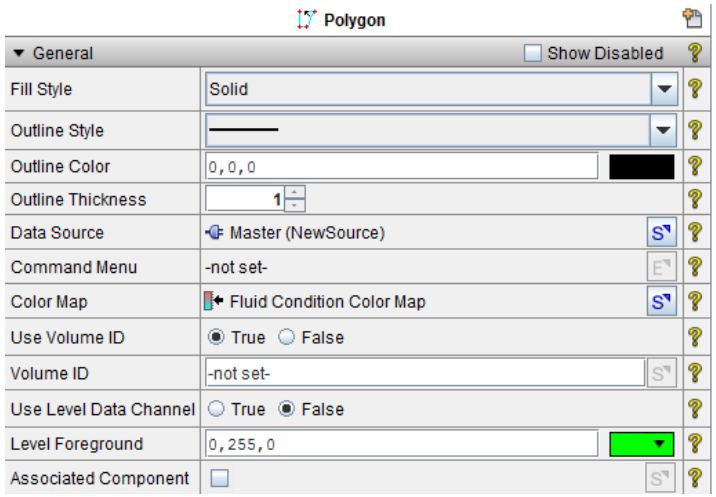
- Attaching a plotfile
  - Two Steps
    - Click on Master in the Data Source Tree in the Navigator and set the Source Run URL in the Properties to a completed Job
    - Click the Data Connector Icon
- Create a Color Map
  - Three steps
    - Right Click Color Maps in the Navigator>New
    - Right Click the new Generic Color Map>Add To View
    - Adjust some Properties
      - Set Color Map Type to Generic
      - Specify Dynamic as True
      - Set Channel Name Pattern to MELCOR “CVH-P_%V”
        - » Review the MELCOR User’s Guide to see all the available plot channels
        - » %V is a place holder for the components Control Volume number (see notes for a detailed description on its use)

Creating a Basic Animation Element

- Creating a Polygon
  - Select Polygon from the Annotation section of the View Port Toolbar (review earlier slides if you can't remember what the Toolbar looks like)
  - Start clicking in the View port and the drawing logic will become clear (left click to set a point, right click to remove the last point)
  - If you click on top of an old point it will close the polygon and the instance will be complete.



User Examples:

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