SNAP Overview

Presented by

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Objective of Presentation

• 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

• 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

Property View

Views

Message Window
• 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 bookkeeping purposes
Multiple models can be open in one SNAP instance
  – Harmonica 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 place 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

- Drawing is very straightforward. 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/paste/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 initialized 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

- Cut
- Copy
- Paste/Paste Special
- Select Layer
- Find
- Pan
- Group/Ungroup Selection
- Select
- Zoom
- Connect
- Draw Tool

[Diagram of View Port Toolbar with icons and buttons]
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

• 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
Notes on Importing

- 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
Converting the Models

- MELGEN Input
  - Select Model/Options within the Navigator Tree
  - Adjust Code Flavor within the Properties View to the desired input structure

- MELCOR Input
  - Expand Cases in the Navigator Tree
  - Right click the desired MELCOR input within the Navigator Tree
  - Select Edit Case
Converting the Models

- A new Navigator Tree for the MELCOR input will be generated
- The functionality is very similar to the MELGEN input Navigator Tree
  - Select Model/Options within the Navigator Tree
  - Adjust Code Flavor within the Properties View to the desired input structure
  - Click the Save Icon near the top of the Navigator Tree (which will close the MELCOR Navigator Tree)
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

- **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
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 Status Tool Setup

- 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
Creating a Job Stream

- **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

- 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

- Performed during the workshop
Post Processing with SNAP

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

- **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.
CVH-FL Example Problem: Drawing the Wetwell

• Set the following
  – Color Maps
  – Enable Use Level Data / set the Liquid Level Data Channel
  – Specify Volume IDs
  – Max and Min Levels
  – Adjust the Upper Phase Mode to One Phase