SNAP AVF Plug-in Improvements Software Tutorial

Revision 0

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Revision History

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1. Introduction

This document provides hands-on instructions for the new features in the AVF plug-in. Below is a list of the functional requirements that describe each new feature and the sections of the tutorial which cover them.

1. The software shall include an option to "Export Template" and "Import Template" for the AVFigDefs input. This would allow a user to use a standard template for all the figures in his AVScript, and then only modify a few items on a figure-by-figure basis.

The figure template import/export feature is discussed on page 8 of section 3.

2. The software shall add "Copy/Paste" feature for the Cases, Data, Figures, and ACAP sheets in AVScript.

Cases, Data Traces, Figures and ACAP sheets can now be copied and pasted within an AV Script, between different AV Scripts and between different AVF models following standard SNAP conventions.

3. The software shall have an option to bring up a spreadsheet editor for modifying AVScripts. This is useful when trying to change all the values in a column to the same value.

The spreadsheet editor feature is documented on page 8 of section 3.

4. The software shall provide an option to open a Demux or restart/plot file and select variables via some interface (perhaps via AptPlot) for the AVDataDefs inputs.

A dialog was added to allow data channels to be selected directly from the plot records of a completed job on a Calculation Server. This selector is described in section 5.

5. The software shall display to the console and store in log files status/error messages for submitted jobs.

The console is now displayed when submitting AVF jobs. Logging status and error messages follow standard SNAP conventions by creating a screen file for the job on the Calculation Server. This is demonstrated in section 2.

6. The software shall add capability to manage persistent sets of suites whereby suites can be grouped by appropriate commonalities (e.g. separate effects problems, integral effects problems, etc.).

This feature is documented in section 6.

7. The software shall develop a Report Generator for RELAP5-3D. This Report Generator could operate on an XML file developed for a specific code (e.g. RELAP5, COBRA, etc.), producing the output summary report using the information specified in the XML file. The logic in SNAP should be prepared such that the XML file is fully extensible to other codes and such that additional parameters can be added to the summary report with no additional modifications to SNAP. Final design details for this item must be approved by the NR Program prior to implementation.

A generic report generator has been added as a feature of the AVF server plug-in. This allows report jobs to be submitted that create reports comparing pairs of regression jobs. The input formats for the AVF report generator are documented in Appendix B of the AVF Users manual.

8. The software shall add capability to run AVScripts as a submitted job from SNAP rather than running from the command line.

The AV Script submit dialog was added to allow any number of AV Script definitions to be submitted as a single AV Script job. This feature is documented in section 2.

9. The software shall give the user an option to have the code version appended to the AVScript data entry legend string.

This feature is mentioned in section 2.

10. The software shall give the user the option to re-order the AVScript cases within SNAP.

The spreadsheet editor allows Cases, Figures, Data Traces, etc. to be reordered by simply selecting the rows and pressing up or down as described in section 4.3.

2. Submitting AV Scripts

The AVF plug-in provides the capability to run AV Scripts remotely on a Calculation Server. Note that this does not run the AV Script Perl application directly, but rather the same functionality is implemented as a SNAP plug-in. This implementation offers several improvements over the legacy system, including:

- Path definitions are no longer necessary. The configuration of a Calculation Server determines where code executables, AptPlot, and other necessary resources are located. As a result, an AVF model can be moved between machines without adjusting path locations.
- When running multiple scripts, AVF can improve performance by running cases from multiple scripts concurrently.

This exercise focuses on importing the RELAP5 3D Assessment test suites, adjusting the new model to follow AVF conventions, and then submitting an AV Script job to a local Calculation Server. This exercise assumes the following:

- a) SNAP and the AVF plug-in are installed.
- b) AptPlot is installed and the installation is identified in the SNAP configuration.
- c) RELAP5 executables are defined in the SNAP configuration for each executable referenced by the RELAP5 3D Assessment suites. If the original path definitions indicated a fluid properties file for an executable, it must be specified in the executable's command line arguments.
- d) A Calculation Server is running on the local machine.
- e) A legacy TRACE or RELAP5-3D automated testing framework (ATF) distribution must be available. This tutorial assumes the RELAP5-3D developmental assessment suite is available. In addition, each valid assessment case directory must contain a .isSuiteDir file. This file may be empty.

2.1 Importing, Editing and Submitting AV Script Jobs

- 1. Open the Model Editor.
- 2. Select the **Import a New Model** option from the Welcome Screen. Select **TRACE ATF** from the list and press OK.

🛓 Select TRA	CE ATF installation directory			
Look <u>I</u> n: 📑 [DACases	• A 🗇 🗗 比 🖿		
 Assessment Common Exe MasterList Regression 		Import: Master List Regression Suites Assessment Suites Robustness Suites		
File <u>N</u> ame: Files of <u>T</u> ype:	/home/user/DACases			
		Import Cancel		

Figure 1: Import TRACE ATF Dialog

- 3. In the import dialog, make sure that only Assessment is selected.
- 4. Navigate to the directory containing the Assessment folder and press Open.

A new AVF Model will be created, with script definitions for each set of the legacy AV Script inputs.

5. The syntax used in data trace expressions for X and Y variables differs slightly from that of the legacy system. Specifically, all channel names in expressions must be enclosed in \${}. A warning message will be generated for any expression encountered during the import process. Expressions must be converted to the new syntax prior to submitting AV Script jobs.

For example the expression:

p-406010000-*p*-406020000

Should be converted to the form:

\${p-406010000}-\${p-406020000}

Note: Selecting a warning message in the message window will select the corresponding script in the Navigator.

6. If necessary, adjust the Location properties in Case and ACAP components.

These values determine where the input file is located relative to an input source. In the legacy system, most locations were relative to where the AVScript input files were stored. When systems such as the ATF required shared resources between input suites, the case would specify locations such as "..././MasterList", reaching outside the top directory. In the AVF system, all inputs must be within or underneath a single input source: the "../../MasterList" location is not appropriate. To facilitate using the existing ATF systems with the AVF plug-in, case and ACAP definition locations are adjusted automatically at import. The adjustments follow these rules:

- All locations starting with "../../" are trimmed of these first six characters.
- All locations starting with "../" replace the first three characters with the name of the directory containing the suite folder. These will be the folders "Assessment" or "Robustness" as the import is currently defined.
- All other locations are stripped of any "/" or "./" prefix. Afterwards, the two parent-directories of the inputs are prefixed to the beginning of the location.

i.e. The Location "./Data" in the Bankoff suite of the Assessment tier would be changed to "Assessment/Bankoff/Data".

By making these modifications, users can select the directory containing the Assessment, MasterList, Regression, etc. folders as the input source during an AVScript submit without modifying any of the case or ACAP locations.

7. Mount the input and output folders.

If the chosen input source from the previous step is not a mounted server folder, open JobStatus and mount it now. Also mount or create a suitable location for script output. A separate folder from the input folder is highly recommended, as it reduces the chance of accidental collisions when reading, copying, and modifying files. Close JobStatus once the folders are available.

8. Select Tools > Submit AVScript Job from the main menu.

The Submit AVScript Job dialog is displayed.

9. Set the following properties in the in the Location tab:

Server: localhost.

Input Folder: the folder defined in step 7.

Target Folder: a mounted server folder for outputs.

Figures: if enabled, clear the check box.

Name: Test

10. Set the following properties in the in the Scripts tab:

Select the script definitions to submit.

Specify the executables referenced by the selected scripts.

11. Set the following properties in the in the **Options** tab:

Make sure Run cases, Generate figures, and Run ACAP are selected.

Select Force updates.

Select JPEG.

Note: The executable label, server executable ID, or server executable description can be automatically appended to all legend entries by editing the **Append to legend entries** option.

12. Press the **Submit** button.

The job will be submitted, and a console will be opened that displays any info and error messages.

🛃 Submit AVScript Job 🥥 🔲 🗙					
Location Scripts Options					
Server Informati	on		-		
Server	localhost:5006	-	?		
Input Folder	/SCRIPT_INPUT/	S^	?		
Target Folder	/SRIPT_OUTPUT/	5*	?		
Run Options —	Run Options				
Name 🖌	Test		?		
Overwrite 🔾	Overwrite 🔾 Yes 📿 No 💿 Prompt 💡				
Priority 5					
	Submit	Can	cel		

Figure 2: Script Submit Dialog

13. Wait for the job to complete, watching for any error messages that indicate missing or incorrectly defined files.

14. Open the AV Script's "Jobs" folder in a file browser: /SCRIPT OUTPUT/Test Jobs/

Once the job is complete, use a file-browser to navigate to the location where the job was submitted (/SCRIPT_OUTPUT/ above). In this folder, there will be a folder named **Test_Jobs**. Open it. Inside of **Test_Jobs**, there will be a folder for each of the submitted script definitions.

- 15. Open one of the script folders and examine the following sub-folders:
 - Runs: all files related to running cases
 - Batch: all AptPlot batch files used to generate figures and pages
 - Figures: all generated figures and pages
 - Data: all ASCII data dumps of figure data
 - ACAP: all ACAP related files and outputs
- 16. Save the AVF model.

3. How to Use Figure Templates

Figure templates allow saving a graph configuration to a file to be imported into other figures. This exercise illustrates how to export and import figure templates.

- 1. Open the ModelEditor.
- 2. Create a new AVF model.
- 3. Expand the AV Script category.
- 4. Expand the **Scripts** category.
- 5. Create a new script component by selecting the **New** item from the right-click pop-up menu of the **Scripts** category.
- 6. Expand the newly created script.
- 7. Create a new **Figure** component in the new script by selecting the **New** item from the right-click pop-up menu of the **Figures[0]** node.
- 8. Edit the Figure's **Viewport** property. Set its values to:
 - X_{min}: .15
 - Y_{min}: **.20**
 - X_{max}: **.85**
 - Y_{max}: **.80**
- 9. Press the Export Template button in the Figure Template editor.
- 10. Choose a location for the template, and save it with the name Sample.avffig.
- 11. Create a second new Figure and select it.
- 12. Press the Import Template button in the Figure Template editor.
- 13. Select the file Sample.avffig created previously.

A dialog will be displayed that lists the values saved in the template. Note that **Viewport** displays the same values entered in a previous step.

14. De-select all values except for Viewport and press OK.

Note that the *Viewport* value is overridden by the template value.

15. Close the AVF model.

🛓 Import Template 🧕	
Select the properties to	import from Sample.avffig
🗌 Name	unnamed
🗌 Title	
Sub-title	
X-AxisLabel	
Y-AxisLabel	
AxisScaling Type	Linear X,Y
AxisBounds	[0,0,0,0]
LegendLocation	0.0, 0.0
LegendLength	1
Tick Marks	
✓ Viewport	[0.15, 0.2, 0.85, 0.8]
CharSize	1.0
SymbolSize	1.0
Page Size	11 x 8.5
ОК	Cancel

Figure 3: Import Template Dialog

4. Using the Spreadsheet Editor

The spreadsheet editor allows creating, editing, removing, and reordering all of a scripts components in a single table. By arranging the components into a tabular view, it becomes trivial to compare multiple definitions.

4.1 The Basics

- 1. Open the ModelEditor.
- 2. Create a new AVF model.
- 3. Expand the AV Script category.
- 4. Create a new **Executable** component.
- 5. Set the new Executable's name to Exec1 and its Executable Type to RELAP.
- 6. Create a new **Script** component.
- 7. Right-click the new script component and select **Open Table Editor** from the pop-up menu.

The Spreadsheet Editor window will be displayed.

- 8. Select the **Cases** tab.
- 9. Press the Add Row button to create a new Case.

The new case is represented in the editor as a new row. Looking in the Navigator, you will see that the script now has one case. Each row in the spreadsheet editor represents an element in the selected AV Script.

4	🕌 unnamed - unsaved - Table Editor 🎱 📃 🗆 🗙							
	*	* V						X
				Check	Case	Input		Restart
	Name	File	Location	Existence	Type	Type	Version	Case
	Case1	sample.inp		V	RELAP		Exec1	
	Case2	sampleRestart.inp		~	RELAP		Exec1	Case1
	🕒 Cases [2] 🛛 🖻 Figures [0] 📄 Pages [0] 🖉 Data Traces [0] 🖉 ACAP [0]							

Figure 4: Spreadsheet Editor

- 10. Make the following changes to the new row in the Spreadsheet Editor:
 - Name: Case1
 - File: sample.inp

- Case Type: select **RELAP** from the drop-down list.
- Version: select **Exec1** from the drop-down list.

Note: Opening a drop down editor may require double-clicking the table cell.

- 11. Add another row and set its values as follows:
 - Name: Case2
 - File: sampleRestart.inp
 - Case Type: select **RELAP** from the drop-down list.
 - Version: select Exec1 from the drop-down list.
 - Restart Case: Select Case1 from the drop-down list.
- 12. From the Navigator, select the new cases and observe that their properties match those defined in the Table Editor.
- 13. Back in the Table Editor, select the Figures tab and create a new row.
- 14. Name the new figure **Figure1**.
- 15. Edit the Axis Bounds column. Enter the value 1 and press the Enter key.

The value will change to [1.0, 1.0, 1.0, 1.0]

Note that the **Tick Marks** column is now enabled. Setting any value in the **Axis Bounds** to a non-zero indicates that axis boundaries and ticks are manually defined. Conversely, an all-zero axis indicates automatic bounds and tick marks.

16. In the same column, enter the value **0 2 0 10** and press the Enter key.

The value will change to [0, 2.0, 0, 10.0]. Any tuple in the Table Editor can be edited as described by the previous two steps. Furthermore, the values could also be entered as 0,2,0,10, [0 2 0 10], or [0,2,0,10].

- 17. Edit the **Page Size** value. Enter the value **8.5 11**.
- 18. In the ModelEditor main window, select the new figure and verify that its Orientation is set to **Portrait (8.5" x 11")**.
- 19. Back in the Table Editor, set the Page Size to 10 10.
- 20. In the ModelEditor main window, observe that the figure's Orientation is **Custom**, and its Page Width and Page Height both display **10.0**.

Entering the equivalent of 8.5" x 11" sets the Orientation to **Portrait**, 11" x 8.5" sets it to **Landscape**, and any other combination sets it to **Custom**.

- 21. Create a new Page definition and name it Page1.
- 22. Open the **Figures** column table editor. *This may require double-clicking the cell.*
- 23. In the editor, press the Select button.*This will display a figure selection dialog.*
- 24. Add **Figure1** to the list on the right and press **OK**. *The Figures column should now read* [1] Figure1.

Note: The remaining columns of the spreadsheet editor behave similarly to those described above.

** Leave this window open for the next exercise. **

4.2 Copy and Paste

Copy and paste is supported throughout the spreadsheet editor. More specifically, copy and paste is supported across each column. Trying to paste values from one column into another may have undesired results.

- 1. Switch to the **Cases** tab.
- 2. Select the second row and create a new case.

Notice that the new row is a copy of the selected row.

- 3. Select the **File** value in the first row. Do **not** engage the editor.
- 4. Press the copy shortcut (CTRL+*C*) to copy the contents of the **File** cell into the clipboard.
- 5. Select the File cell in the third row without engaging the editor.
- 6. Press the paste shortcut (CTRL+V) to paste the value into the cell.

** Leave this window open for the next exercise. **

4.3 Reordering Script Subcomponents

The cases, figures, pages, data traces, and ACAP definitions in a script can be reordered in the Spreadsheet Editor.

- 1. Switch to the **Cases** tab.
- 2. Select the first row.
- 3. Press the **Down** button twice.

The associated case definition is moved to the bottom of the table.

- 4. In the Navigator, verify that the case has been moved.
- 5. Press the **Up** button once.

The associated case definition is moved to the middle of the table.

6. Again, verify that the case has been moved.

5. Selecting Data Channels

The **Variable X** and **Variable Y** properties in a script Data Trace definition indicate the plotted data. Based on the referenced case type, these can be complex expressions, channel names, column indexes, etc.. The editor for these properties allows selecting channel names directly from completed runs.

The exercise will use RELAP as an example. It requires that at least one RELAP job has been completed on the Calculation Server. How the job was created is unimportant, so long as it completed and created a plot record recognized by the Calculation Server.

- 1. Open the ModelEditor, if it is not already.
- 2. Create a new AVF model.
- 3. Create a new Script component.
- 4. Create a new Case component in the new script.
- 5. Set the new Case's name to Case1 and its Case Type to RELAP.
- 6. Create a new Data Trace component in the script.
- 7. Set the data trace property Case to Case1.
- 8. Press the Select button from the Y Variable property editor.

The Select Channel dialog will be displayed.



Figure 5: Selecting a channel from an AVScript job

9. In the channel dialog, use the server-tree on the left to navigate to the location of a previously completed RELAP run.

A list of completed runs in the selected location will be displayed in the **Jobs** column.

10. Select the completed run in the Jobs (middle) column.

The dialog will pause a moment to load the job's plot file. Afterwards, a list of channels will be displayed.

- 11. Select a data channel in the right column.
- 12. Press the **OK** button.

This will enter the selected channel as the **Y** Variable property.

Note: This feature can be used to simply the creation of Data Trace definitions for an AV Script. First identify which inputs must be run and create the appropriate cases. Then, submit the script and run the cases, but do not generate figures or run ACAP. Finally, select the jobs created for running the cases to access the channels used by Data Trace components.

6. Creating Suite Sets

The AVF plug-in now allows grouping suites into arbitrary sets. At submit time, these sets can be used to control which suites are submitted. This exercise shows how suites are grouped into sets and illustrates the subtleties of selecting sets at submit time.

- 1. Open the ModelEditor.
- 2. Create a new AVF model.
- 3. Expand the **Regression** category.
- 4. Create three new Suite components and set their names to Suite1, Suite2, and Suite3.
- 5. Create a new **Suite Set** and set its name to **Set1**.
- 6. Edit the new Suites property of the new Suite Set by pressing the Select button.

This will display the Select from Suites dialog.

- 7. Add Suite1 and Suite2 to the Selected list by selecting both in the Available list and pressing the Add Selected (>) button.
- 8. Press the **OK** button to add the suites to the set.
- 9. Repeat the previous four steps to create a set named **Set2** that contains **Suite2** and **Suite3**.
- 10. Select **Tools > Submit Regression Job f**rom the main menu.
- 11. At the Model Errors Found dialog, press Yes.

The model does not need to be complete to demonstrate this functionality.

12. If no server is running, select No at the Calculation Server Inactive dialog.

A server is not necessary to demonstrate this functionality.

🛓 Submit Calculation 🎱 🔲 🗙					
Server Information					
Server		localhost 👻 🤋			
Executable		▼ ?			
Input Folder		/trunk/ S [*] ?			
Target Folder		er /output/			
Included Suites All None					
#	Submit	ID			
1		Suite1			
2		Suite2			
Suites Sets Submit Cancel					

At this point, the Regression Submit Dialog should be displayed.

Figure 6: Regression Submit Dialog

Suites and suite sets are listed in the table near the bottom of the dialog.

- 13. Press the None button to de-select all suites.
- 14. Switch to the Sets tab.
- 15. Select Set1.
- 16. Switch back to the Suites tab and observe that Suite1 and Suite2 are selected.
- 17. Press the None button to clear the selection.
- 18. Switch to the Sets and select Set2.
- 19. Switch back to the **Suites** view and observe that **Suite2** and **Suite3** are selected. Do not clear the selection.
- 20. Switch to the Sets tab and select Set1.
- 21. Switch back to the Suites tab and note that all suites are selected.
- 22. Switch to the Sets tab and de-select Set1 and notice that Set2 is also deselected.
- 23. Switch back to the Suites tab and note that Suite3 is still selected.

Sets themselves are not selected or deselected. Instead, selecting a set marks all of its referenced suites as selected, and vice versa. A set is only shown as selected if all of its referenced sets are selected. When **Set1** was deselected in the last step, **Set2** appeared as unselected because **Suite2** was removed from the list of selected sets. Sets aid the submission process by allowing rapid selection of related suites.