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DAKOTA JAGUAR 3.0 User's Manual

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Abstract

JAGUAR (JAva GUi for Applied Research) is a Java software tool providing an advanced text editor and graphical user interface (GUI) to manipulate DAKOTA (Design Analysis Kit for Optimization and Terascale Applications) input specifications. This document focuses on the features necessary to use JAGUAR.

CONTENTS

FIGURES

1: Introduction

JAGUAR (JAva GUi for Applied Research) is a Java software tool for automatically rendering a graphical user interface (GUI) from a structured input specification. The dynamically-generated interface enables users to create, edit, and externally execute analysis application input files and then view the results. JAGUAR is built on top of the Eclipse Framework as an Eclipse Rich Client (http://wiki.eclipse.org/Rich_Client_Platform/FAQ) product, providing it the look, feel, and features of Eclipse Applications.

JAGUAR serves as a GUI for DAKOTA (Design Analysis Kit for Optimization and Terascale Applications). It parses a DAKOTA NIDR (New Input Deck Reader) input specification and presents the user with linked graphical and plain text representations of problem set-up and option specification for DAKOTA studies. After the data have been input by the user, JAGUAR generates one or more input files for DAKOTA; it can also execute DAKOTA, capturing and (eventually) interpreting the results.

JAGUAR 3.0 is available in 32- and 64-bit platforms for Windows, Mac (Intel processors), and Linux. JAGUAR's core source and binary distributions are under the Eclipse Public License 1.0.

Feature changelog

Jaguar 3.0

- Added support for DAKOTA 5.3
- DAKOTA study wizard using aprepro variable parameterization. Job submission integration on select JAGUAR distributions.
- Visualize tabular graphics file through graphical charts and exporting to Excel
- Outline views allows easy reordering of sections and grammar view for quick lookup
- Expanded online and local support for DAKOTA documentation location

Jaguar 2.1

- Added support for DAKOTA 5.2
- Synchronized autocompleting text and hierarchical graphical editors with error checking
- Cheatsheets to demonstrate the flow of creating an input deck from scratch
- Templates for the most common DAKOTA studies
- Sensitivity analysis wizard to quickly generate a screening study
- Ability to launch DAKOTA to check input decks or perform complete studies
- Help links to the DAKOTA reference manual for most keywords
- Automatic updating to work with your installed version of DAKOTA (5.0 or newer)

2: Downloading and Installing JAGUAR

A short description of the steps for downloading and installing JAGUAR is provided here; however the most current information can usually be found on the download pages.

- **Install supporting JAVA software** (if needed). JAGUAR requires a Java Runtime Environment (JRE) version 6.0 or above.

  If a Java Runtime Environment is not already installed on your machine, you will need to download and install a 6.0 JRE from: http://www.oracle.com/technetwork/java/javase/downloads/jre6downloads-1902815.html

- **Download JAGUAR**. JAGUAR is available from the DAKOTA website `http://dakota.sandia.gov/download.html`. Register to be redirected to the download page, which you may then bookmark directly.

  Download the JAGUAR package appropriate for your platform: Windows/OSX/Linux, 32/64-bit.

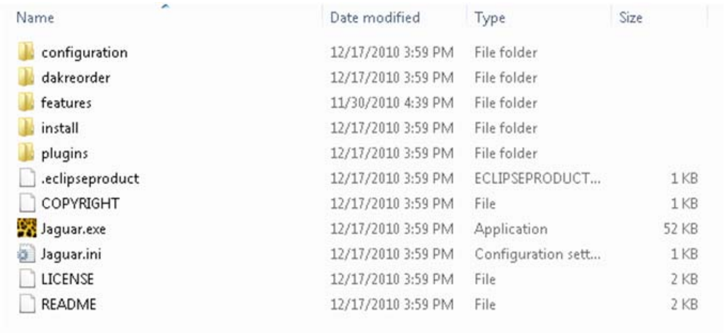
  ATTENTION: for proper operation you should match the JAGUAR and Java architectures. For example, 32-bit JAGUAR should be used with a 32-bit JRE, similar for 64-bit JAGUAR with 64-bit JRE. We recommend also matching the operating system architecture, but have had success with running 32-bit JAGUAR and JRE on 64-bit Linux.

- **Install JAGUAR.**

  1. **Windows users:** We provide an installer that will automatically install JAGUAR. Double-click the installer to start installing and follow the instructions. After installation, JAGUAR can be found in the Start menu or at the installed folder.
  2. **Mac users:** We provide a dmg file (Mac OSX disk image) installer for quick installation. Double-click the installer and the installer will be mounted automatically. Drag the Jaguar folder into the Applications shortcut folder. JAGUAR can now be found under Applications.
  3. **Other users & manual installation:** We provide the JAGUAR package as a zipped archive file. Windows and Mac users should be able to double-click on the file's icon from a file system browser to perform the extraction. Linux users can use the `unzip` utility to unzip the archive from their command-line console. The JAGUAR installation package is self-contained, so JAGUAR can be directly run immediately after extracting the archive. (See Figure 1). Take note

of where you installed as you may want to create a shortcut or link to the installed JAGUAR executable.

- **Important!** If you have a previous version of JAGUAR installed it is recommended to move your personal JAGUAR workspace directory to a different location or remove it (this directory can be found in your home directory or User_folder >Jaguar_workspace) to prevent corruption of the workspace when running JAGUAR.



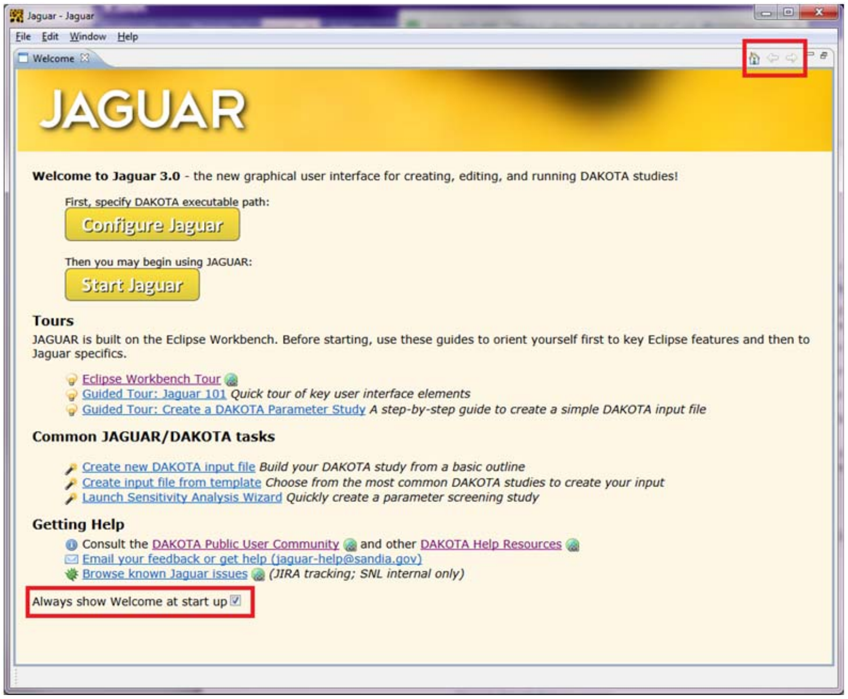
Name	Date modified	Type	Size
configuration	12/17/2010 3:59 PM	File folder	
dakreorder	12/17/2010 3:59 PM	File folder	
features	11/30/2010 4:39 PM	File folder	
install	12/17/2010 3:59 PM	File folder	
plugins	12/17/2010 3:59 PM	File folder	
.eclipseproduct	12/17/2010 3:59 PM	ECLIPSEPRODUCT...	1 KB
COPYRIGHT	12/17/2010 3:59 PM	File	1 KB
Jaguar.exe	12/17/2010 3:59 PM	Application	52 KB
Jaguar.ini	12/17/2010 3:59 PM	Configuration sett...	1 KB
LICENSE	12/17/2010 3:59 PM	File	2 KB
README	12/17/2010 3:59 PM	File	2 KB

Figure 1: File listing for JAGUAR installation package

3: Running JAGUAR for the First Time

When starting JAGUAR for the first time, you should see a “Welcome” screen. As shown in Figure 2, the Welcome screen provides quick navigation to many JAGUAR features. This screen can be closed at any time by clicking on the “X” located on the Welcome tab and returned to at anytime via the JAGUAR help menu (**File → Welcome**). The welcome screen always appears in front of, i.e., it hides the entirety of the user interface and must be dismissed to use the principal GUI.

To note, there is a checkbox option at the bottom to toggle showing the welcome screen at startup. There are also navigation buttons in the top right corner to navigate between Welcome screen content pages (Figure 2). Welcome options include the following.



Welcome to Jaguar 3.0 - the new graphical user interface for creating, editing, and running DAKOTA studies!

First, specify DAKOTA executable path:

Then you may begin using JAGUAR:

Tours

JAGUAR is built on the Eclipse Workbench. Before starting, use these guides to orient yourself first to key Eclipse features and then to Jaguar specifics.

- Eclipse Workbench Tour
- Guided Tour: Jaguar 101 *Quick tour of key user interface elements*
- Guided Tour: Create a DAKOTA Parameter Study *A step-by-step guide to create a simple DAKOTA input file*

Common JAGUAR/DAKOTA tasks

- Create new DAKOTA input file *Build your DAKOTA study from a basic outline*
- Create input file from template *Choose from the most common DAKOTA studies to create your input*
- Launch Sensitivity Analysis Wizard *Quickly create a parameter screening study*

Getting Help

- Consult the DAKOTA Public User Community and other DAKOTA Help Resources
- Email your feedback or get help (jaguar-help@sandia.gov)
- Browse known Jaguar issues *(JIRA tracking; SNL internal only)*

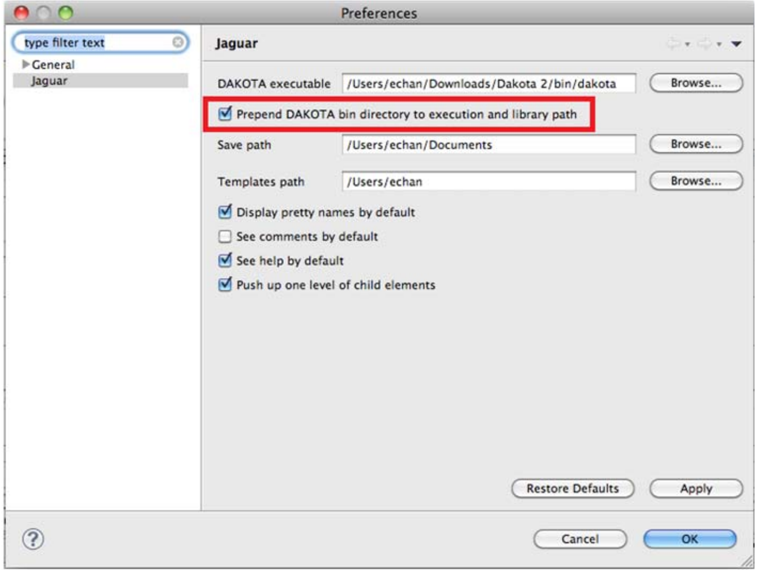
Always show Welcome at start up ☑

Figure 2: JAGUAR Welcome screen

- **Configure JAGUAR.** JAGUAR settings need to be configured to run correctly
- **Start JAGUAR.** This closes the Welcome screen and proceeds to the regular JAGUAR view.

It is advised to configure JAGUAR with the DAKOTA executable path at a minimum. You may also optionally specify the save and template paths. Lastly, there are preference settings affecting toolbars described in Chapter 5: Graphical Editors.

Note: Highlighted in red in Figure 3, Mac/Linux users may notice a setting to prepend the DAKOTA bin directory to their execution & library paths. This is typically necessary for DAKOTA to run correctly without affecting your global environment.



DAKOTA executable: /Users/echan/Downloads/Dakota 2/bin/dakota

☑ Prepend DAKOTA bin directory to execution and library path

Save path: /Users/echan/Documents

Templates path: /Users/echan

☑ Display pretty names by default

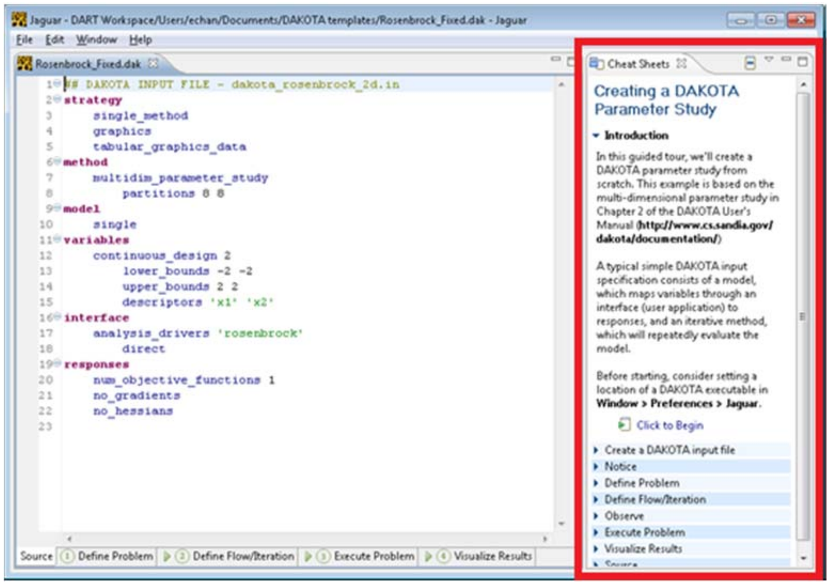
☐ See comments by default

☑ See help by default

☑ Push up one level of child elements

Figure 3: Preferences for file locations and user interface behavior

- **Tours.** The Tours section offers guides for beginning users. As JAGUAR is built on the Eclipse Workbench, new users will benefit from the *Eclipse Workbench Tour*, a quick online reference for Eclipse framework features like Views, Perspectives, etc. The following two tours are the *Guided Tours*, which are presented in the form of Cheat Sheets (See Figure 4).



```
## DAKOTA INPUT FILE - dakota_rosenbrock_2d.in
strategy
    single_method
    graphics
    tabular_graphics_data
method
    multidim_parameter_study
        partitions 8 8
model
    single
variables
    continuous_design 2
        lower_bounds -2 -2
        upper_bounds 2 2
        descriptors 'x1' 'x2'
interface
    analysis_drivers 'rosenbrock'
        direct
responses
    num_objective_functions 1
    no_gradients
    no_hessians
```

Creating a DAKOTA Parameter Study

Introduction

In this guided tour, we'll create a DAKOTA parameter study from scratch. This example is based on the multi-dimensional parameter study in Chapter 2 of the DAKOTA User's Manual (**http://www.cs.sandia.gov/dakota/documentation/**)

A typical simple DAKOTA input specification consists of a model, which maps variables through an interface (user application) to responses, and an iterative method, which will repeatedly evaluate the model.

Before starting, consider setting a location of a DAKOTA executable in **Window > Preferences > Jaguar**.

Click to Begin

- Create a DAKOTA input file
- Notice
- Define Problem
- Define Flow/Iteration
- Observe
- Execute Problem
- Visualize Results
- Source

Figure 4: A sample JAGUAR cheatsheet.

JAGUAR Cheat Sheets are a useful mechanism for quickly learning how to perform important JAGUAR operations such as opening and saving files. They utilize an interactive step-by-step approach to guide new users through JAGUAR. Cheat Sheets usually dock on the side of the application so as to not obstruct user interactions, and can always be accessed from the JAGUAR help menu (**Help → Cheat Sheets**).

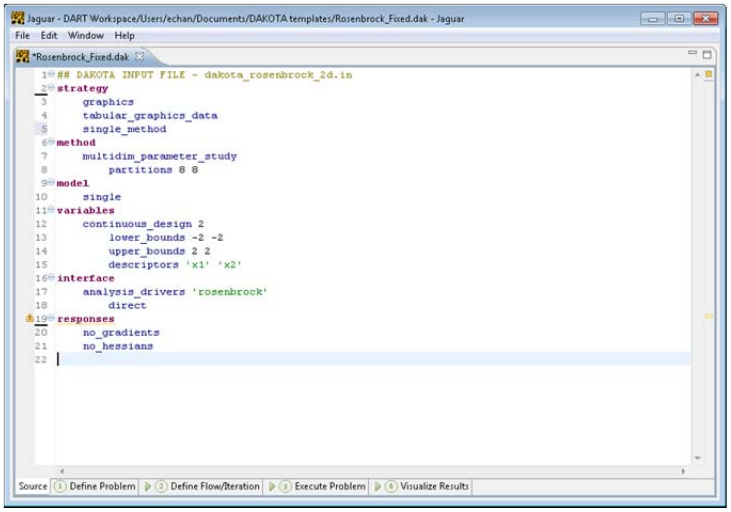
- **Common Tasks**
  - **Create new input file.** This link creates an empty DAKOTA input file. New input files can also be created by selecting **New → DAKOTA input file** from the File menu. Users must enter a file name for newly-created input files when saving them for the first time.
  - **Create new input file from template.** This links creates a new input file from existing DAKOTA templates. Users must also enter a file name when saving these newly-created input files. This action can also be accessed from the File menu by selecting **New → DAKOTA input file from template**.

Sensitivity Analysis Wizard. See “Chapter 8: Sensitivity Analysis Wizard”.

- **Getting Help.** The remaining links are used for DAKOTA references, sending an email to the JAGUAR developers, and viewing existing JAGUAR bugs.

4: Text Editors

Figure 5 shows an example DAKOTA input file in the JAGUAR text editor. The text editor interface is the first of two primary interfaces that JAGUAR contains for creating and modifying DAKOTA input files. For text-based editing, the “Source” tab toward the bottom of the JAGUAR window reveals the raw DAKOTA input file text (likely only comfortable for experienced DAKOTA users). Refer to the DAKOTA User’s Manual Section 2.3 “DAKOTA Input File Format” for a better understanding of how input files are structured.



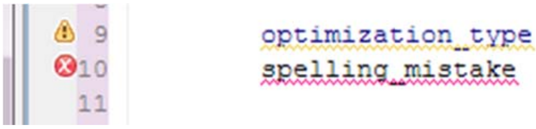
```
## DAKOTA INPUT FILE - dakota_rosenbrock_2d.in
strategy
    graphics
    tabular_graphics_data
    single_method
method
    multidim_parameter_study
        partitions 8 8
model
    single
variables
    continuous_design 2
        lower_bounds -2 -2
        upper_bounds 2 2
        descriptors 'x1' 'x2'
interface
    analysis_drivers 'rosenbrock'
        direct
responses
    no_gradients
    no_hessians
```

Figure 5: JAGUAR text editor

The JAGUAR text editor supports:

- **Advanced syntax highlighting** of errors and warnings with the ability to mouse over keywords for additional details.
- **Auto-completion** of keywords using Ctrl-Space.
- **Text formatting**

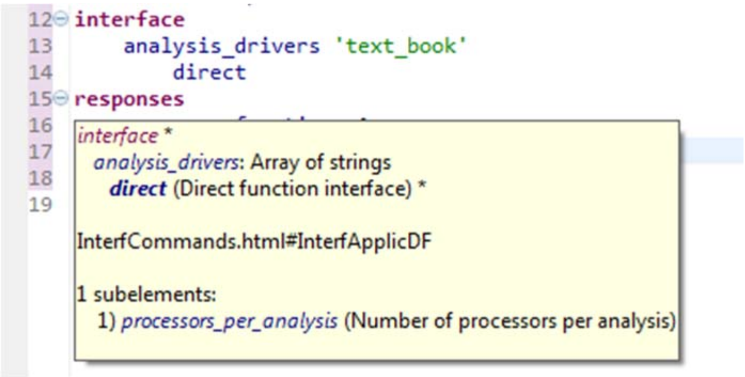
JAGUAR 2.1 introduced highlighting keyword errors and warnings (See Figure 6).   Keywords with warnings (i.e. invalid values) are decorated with yellow squiggly lines (and a yellow warning icon on the left).   Keywords that are not recognized are decorated with red squiggly lines (and a red error icon on the left).   For additional information, mouse over either the squiggly lines or icons.



```
optimization_type
spelling_mistake
```

Figure 6: Warnings and errors in the text editor

JAGUAR automatically color codes main keywords in purple, regular keywords in blue, comments in yellow, string values in green and the rest (including values and unrecognized keywords) in black. Additionally, when the cursor is over any keyword, a tooltip with relevant information is shown (see Figure 7).



```
interface
    analysis_drivers 'text_book'
        direct
responses
```

interface *
  analysis_drivers: Array of strings
    direct (Direct function interface) *

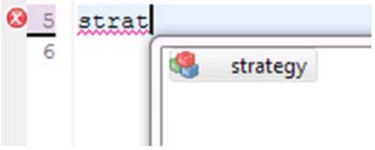
InterfCommands.html#InterfApplicDF

1 subelements:
  1) *processors_per_analysis* (Number of processors per analysis)

Figure 7: Keyword tooltip example

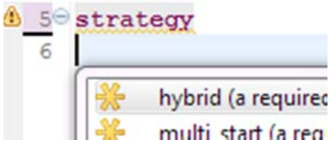
Autocomplete is triggered by pressing Ctrl-Space to show suggestions and then double-clicking to select the desired keyword. However, there are two modes to be aware of:

1) **Autocomplete an incomplete keyword** (See Figure 8): valid keyword completions are suggested.
2) **Autocomplete from scratch** (Figure 9): all keywords valid at the current position will be suggested.



```
strat
```

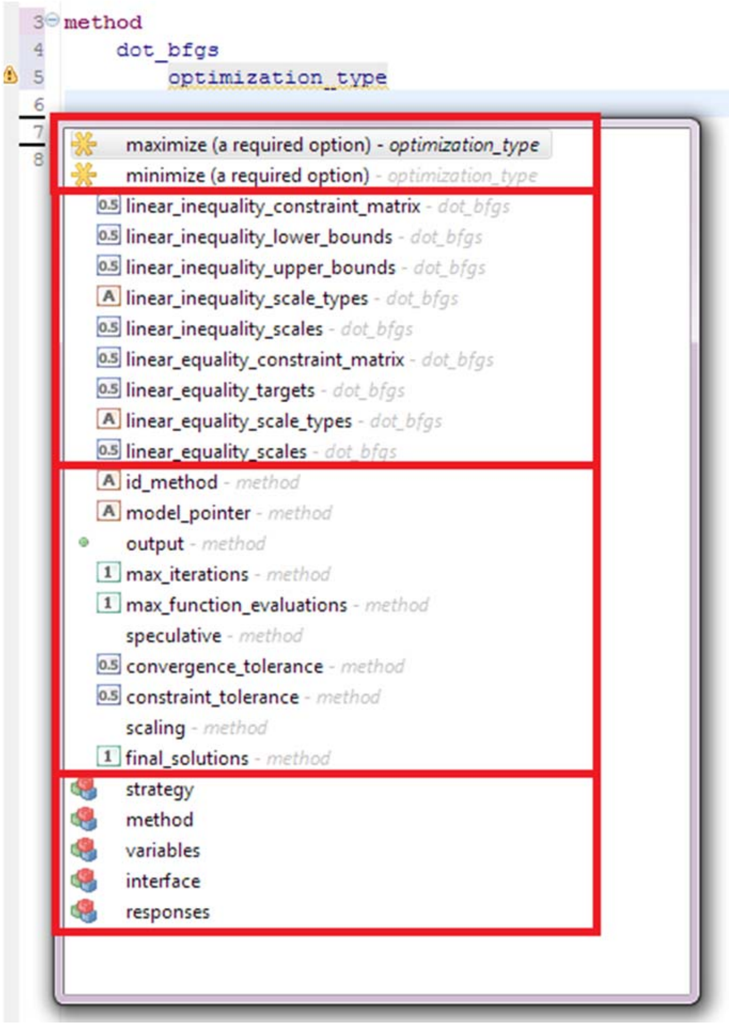
Figure 8: Autocompleting an existing keyword



```
strategy
```

Figure 9: Autocompleting from scratch

Let’s look into the suggestions. There are times when many valid keyword suggestions will be possible, potentially at different ‘levels’. For example in Figure 10, we see all the available keywords available for autocompletion after the keyword *optimization_type*:



```
method
    dot_bfgs
        optimization_type
```

maximize (a required option) - optimization_type
minimize (a required option) - optimization_type
linear_inequality_constraint_matrix - dot_bfgs
linear_inequality_lower_bounds - dot_bfgs
linear_inequality_upper_bounds - dot_bfgs
linear_inequality_scale_types - dot_bfgs
linear_inequality_scales - dot_bfgs
linear_equality_constraint_matrix - dot_bfgs
linear_equality_targets - dot_bfgs
linear_equality_scale_types - dot_bfgs
linear_equality_scales - dot_bfgs
id_method - method
model_pointer - method
output - method
max_iterations - method
max_function_evaluations - method
speculative - method
convergence_tolerance - method
constraint_tolerance - method
scaling - method
final_solutions - method
strategy
method
variables
interface
responses

Figure 10: Keywords valid at different levels

Four groups of suggestions are presented in order of decreasing locality. Let’s take a closer look:

1. **First group** (*optimization_type in trailing gray*)

   The first thing to notice is the trailing keyword in italicized grey (‘*optimization_type*’) which indicates the originator or parent, and is also highlighted in the text prior. The asterisk on the left indicates one of these required options should be selected (but currently none is selected).

2. **Second group** *(dot_bfgs in trailing gray*)

These are keywords that are valid and derived from *optimization_type*'s originator, *dot_bfgs.* Notice the type icons on the left, e.g., '1', '0.5', and 'A', indicating that integer, real, and string values respectively are valid.

3. **Third group** (*method in trailing gray*)

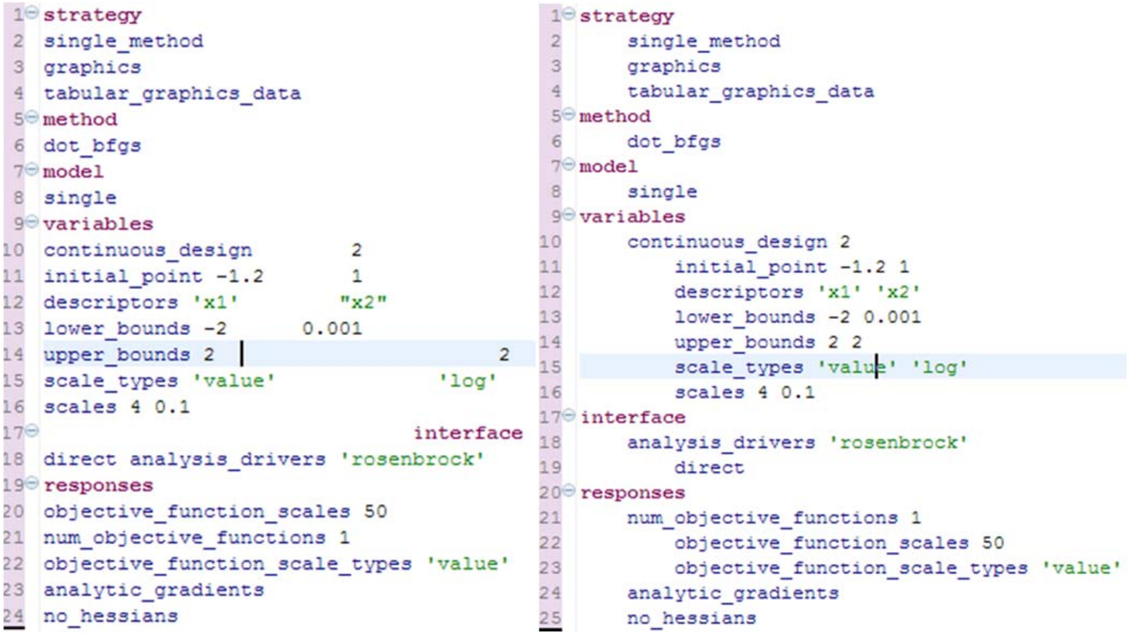
   These are keywords that are valid directly in a *method* specification. Notice some have no type icons, representing keywords that do not require an associated value. The keyword *output* has a green dot icon, representing it has derived (child) keywords.

   Since *method* is a top-level section keyword, all remaining section options appear in the fourth group.

4. **Fourth group** (*section*)

   These are the top-level DAKOTA input sections (*strategy, method, variables, interface, responses*) that are applicable at the current context. Since main sections can be inserted anywhere, these are usually available for autocompletion, though DAKOTA syntax may restrict the number of them that can be created.

JAGUAR allows automatic formatting of the text using **Edit → Format** or Ctrl-Shift-F (See Figure 11). JAGUAR will auto-indent the keywords and clean up the specification. For example, double quotes are replaced with single quotes, extra spaces are removed, and keywords are sorted in the order defined by the DAKOTA grammar.

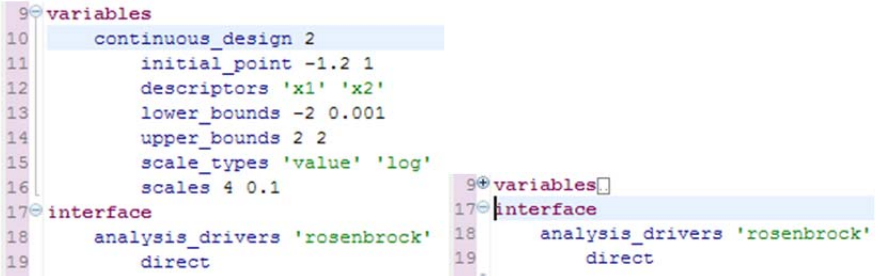


```
strategy
single_method
graphics
tabular_graphics_data
method
dot_bfgs
model
single
variables
continuous_design         2
initial_point -1.2        1
descriptors 'x1'         "x2"
lower_bounds -2      0.001
upper_bounds 2                               2
scale_types 'value'              'log'
scales 4 0.1
                               interface
direct analysis_drivers 'rosenbrock'
responses
objective_function_scales 50
num_objective_functions 1
objective_function_scale_types 'value'
analytic_gradients
no_hessians
```

```
strategy
    single_method
    graphics
    tabular_graphics_data
method
    dot_bfgs
model
    single
variables
    continuous_design 2
        initial_point -1.2 1
        descriptors 'x1' 'x2'
        lower_bounds -2 0.001
        upper_bounds 2 2
        scale_types 'value' 'log'
        scales 4 0.1
interface
    analysis_drivers 'rosenbrock'
        direct
responses
    num_objective_functions 1
        objective_function_scales 50
        objective_function_scale_types 'value'
    analytic_gradients
    no_hessians
```

Figure 11: Effect of automatic text formatting

Top-level specification section blocks can be compressed/uncompressed as seen in Figure 12 by clicking the -/+ buttons to the left of a section title.



```
variables
    continuous_design 2
        initial_point -1.2 1
        descriptors 'x1' 'x2'
        lower_bounds -2 0.001
        upper_bounds 2 2
        scale_types 'value' 'log'
        scales 4 0.1
interface
    analysis_drivers 'rosenbrock'
        direct
```

```
variables
interface
    analysis_drivers 'rosenbrock'
        direct
```

Figure 12: Compacting top-level sections

5: Graphical Editors

JAGUAR's graphical editors are the second primary interface for creating and modifying DAKOTA input files. A distinguishing feature of JAGUAR is that the graphical user interface for these editors is dynamically generated from the NIDR input specification for DAKOTA. When your locally installed version of DAKOTA is updated, you can point JAGUAR to the new version and it will re-render to match.

Graphical-based editing is conveniently separated into "Define Problem" and "Define Flow/Iteration" sections; see the appropriate tabs toward the bottom of the JAGUAR window depicted in Figure 13. "Define Problem" is where the problem to iterate on is defined in terms of models, which map variables through interfaces to responses. "Define Flow/Iteration" is where a method or methods and possibly a strategy are specified.

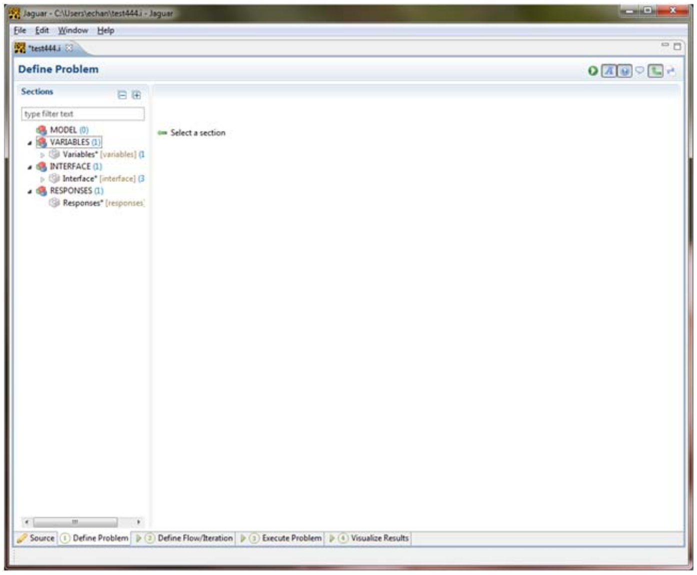


Figure 13: "Define Problem" portion of the JAGUAR graphical editor

Each pane in the graphical view has two components. On the left is the tree hierarchy, which offers navigation across the structured input file. The right side of the view is where content is displayed, selections made, and data entered. As an example, see Figure 14.

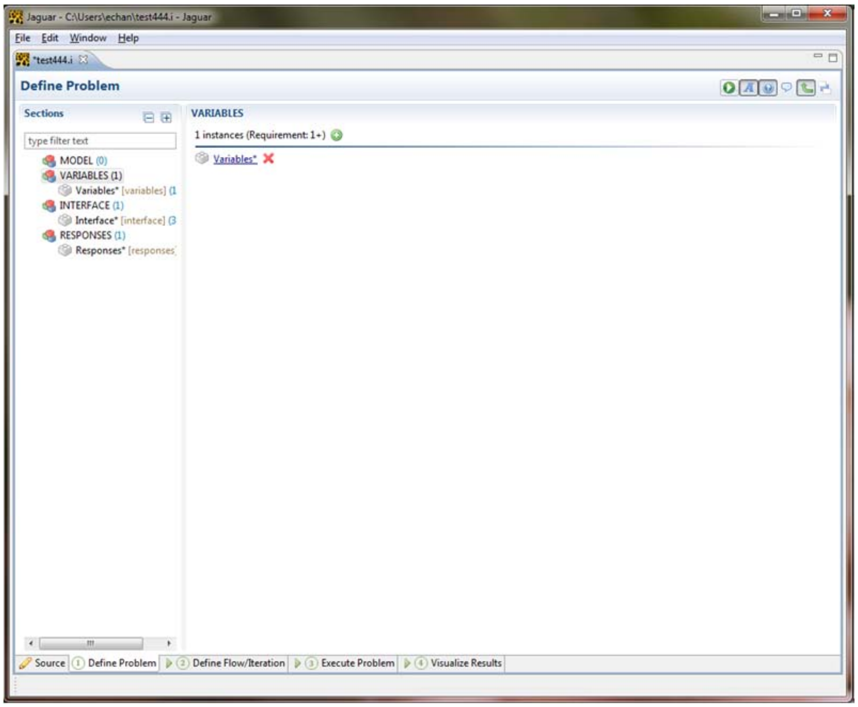


Figure 14: Content selected from left is displayed on the right

Top-level groups (i.e., MODEL, VARIABLES, INTERFACE, RESPONSES, STRATEGY, or METHOD), represented by multi-colored bricks, organize active instances of each type of top-level specification.   When such a group is selected, the right pane will display an overview of the selection. From this page, certain top-level elements will show instance restrictions for a valid input file, allow the user to create a new instance, and to go directly to or delete an existing instance.

Within each top-level group lie unique instances (each represented by a gray brick). An instance contains many possible configurable settings, which are all organized according to their hierarchy as shown in Figure 15. We call these “elements.”

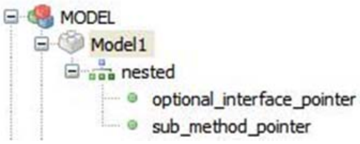
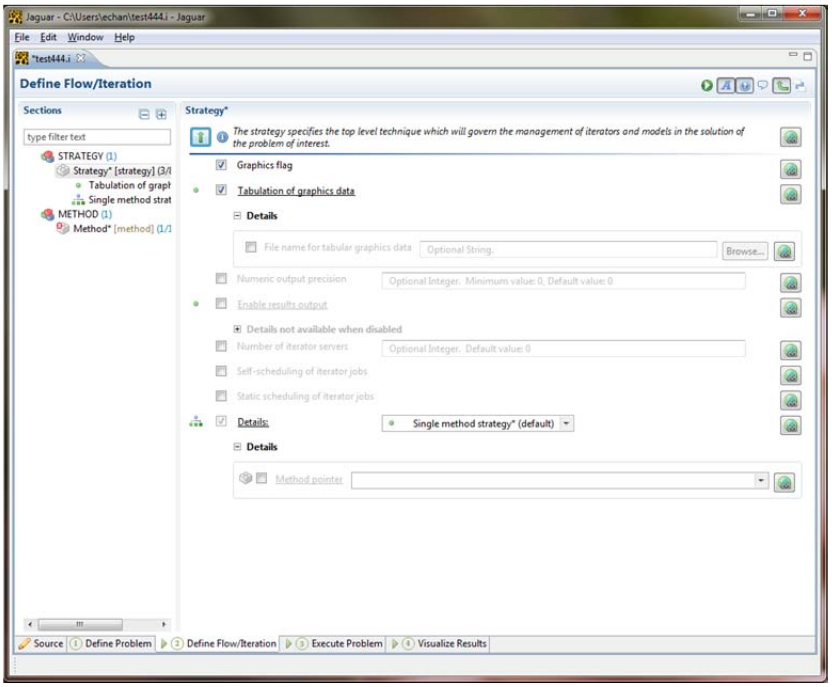


Figure 15: A hierarchy of possible configurable settings for MODEL.

When an instance is selected, its elements are displayed in the right content pane (see Figure 16). Note that some elements have nested elements, which are not immediately displayed in the content pane. To view these child elements, select the element in the left hierarchy tree or select/expand the element in the right pane.



Define Flow/Iteration

Strategy*

The strategy specifies the top level technique which will govern the management of iterators and models in the solution of the problem of interest.

☑ Graphics flag

● ☑ Tabulation of graphics data

⊟ Details

□ File name for tabular graphics data — Optional String. — Browse...

□ Numeric output precision — Optional Integer. Minimum value: 0, Default value: 0

● □ Enable results output

⊞ Details not available when disabled

□ Number of iterator servers — Optional Integer. Default value: 0

□ Self-scheduling of iterator jobs

□ Static scheduling of iterator jobs

☑ Details: — ● Single method strategy* (default)

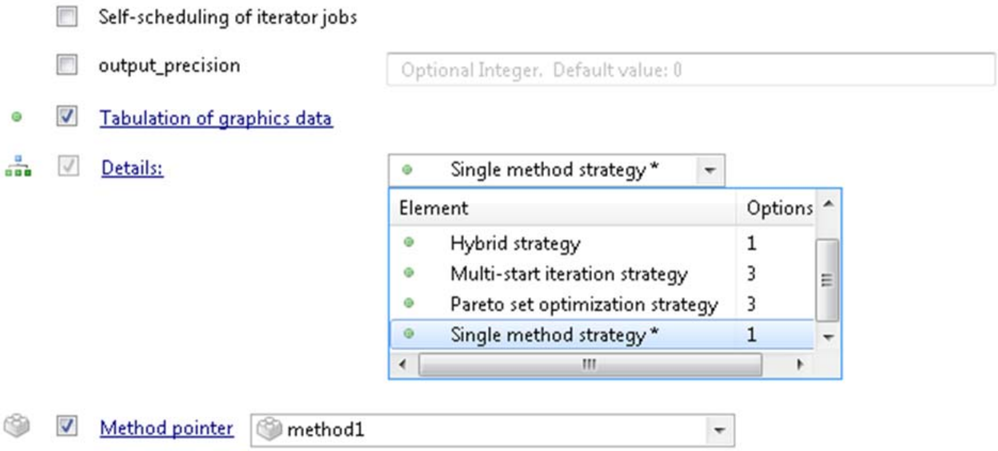
⊟ Details

□ Method pointer

Figure 16: Display of elements from a selected strategy instance.

There are five basic types of elements in JAGUAR.

1. **Element without a value.** In Figure 17, notice the checkbox to the left of the element; this allows the user to enable and disable the element. Only enabled elements are represented in the text input file, which can be viewed in the "Source" representation (JAGUAR text editor). Required elements cannot be disabled.



□ Self-scheduling of iterator jobs

□ output_precision — Optional Integer. Default value: 0

● ☑ Tabulation of graphics data

☑ Details: — ● Single method strategy *

Element	Options
● Hybrid strategy	1
● Multi-start iteration strategy	3
● Pareto set optimization strategy	3
● Single method strategy *	1

☑ Method pointer — method1

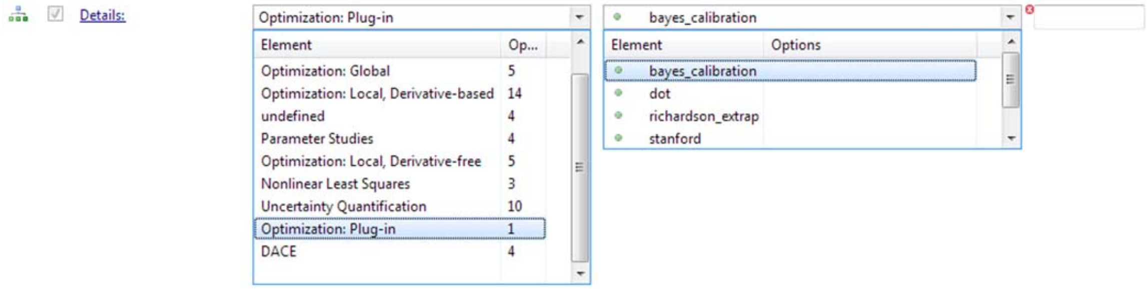
Figure 17: Different element types in JAGUAR.

2. **Element with a value** allows users to set values of type Integer, Real, String, or a space-delimited list of any of these.

3. **Nested elements** supported in JAGUAR are indicated by a green bullet and the presence of a hyperlink. Selecting a hyperlink is one way to view the nested element in the right-side content pane.

4. **Drop-down lists** are indicated by a choice icon. When the list is selected, it behaves like one of the former three element types. The first element of a drop-down list functions as a header text to guide the user's selection of an appropriate element below. Asterisks also indicate the default list element.

   - Some drop-down lists have categories which organize the many possible options (See Figure 18). The left drop-down categories narrow down the keywords presented in the right list.



Optimization: Plug-in

Element	Op...
Optimization: Global	5
Optimization: Local, Derivative-based	14
undefined	4
Parameter Studies	4
Optimization: Local, Derivative-free	5
Nonlinear Least Squares	3
Uncertainty Quantification	10
Optimization: Plug-in	1
DACE	4

bayes_calibration

Element	Options
bayes_calibration	
dot	
richardson_extrap	
stanford	

Figure 18 Method category drop down list and corresponding method choices

5. Pointer elements allow reference to other existing elements. Hyperlinks follow pointers to quickly display that instance in the content pane. When an unrecognized instance name is manually entered in a pointer element, JAGUAR automatically creates that new instance.

The JAGUAR toolbar. Figure 19 shows (from left to right) quick access buttons for running DAKOTA input files, displaying pretty names instead of keywords, toggling help text, displaying comments, and toggling push-up elements (the display of one level of children in the present right pane).

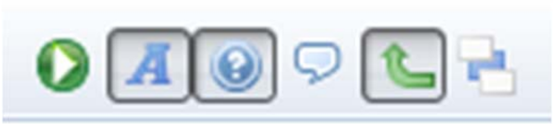


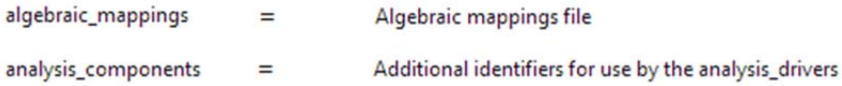
Figure 19: JAGUAR toolbar for running DAKOTA or toggling several options

DAKOTA check

A quick way to invoke DAKOTA to check the input deck for errors. This is equivalent to running 'Check' via the Execute Problem tab (see Chapter 6: DAKOTA Execution)

Pretty name

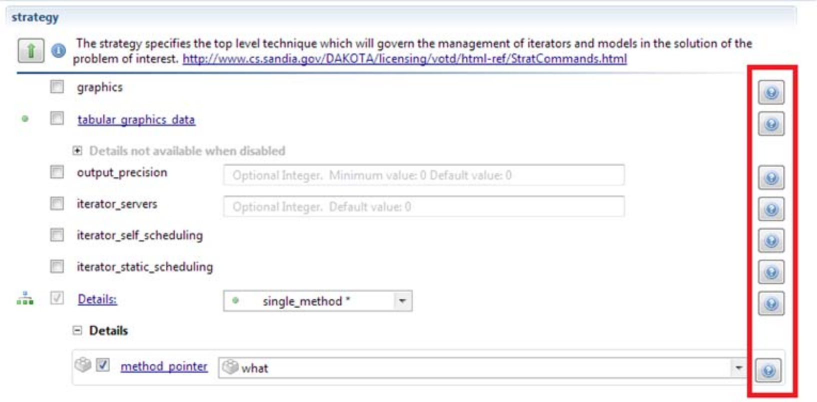
Each element in the grammar has a ‘name’ and a ‘pretty name’. The ‘name’ is the actual text used in the input deck (formal DAKOTA keyword), whereas the pretty name is a user-friendly description of the element.



algebraic_mappings	=	Algebraic mappings file
analysis_components	=	Additional identifiers for use by the analysis_drivers

Online reference

Each element usually has a description, often with a hyperlink to the documentation. This is visible in the GUI on the right side when the online reference button is selected:



strategy

The strategy specifies the top level technique which will govern the management of iterators and models in the solution of the problem of interest. http://www.cs.sandia.gov/DAKOTA/licensing/votd/html-ref/StratCommands.html

□ graphics

□ tabular graphics data

Details not available when disabled

□ output_precision — Optional Integer. Minimum value: 0 Default value: 0

□ iterator_servers — Optional Integer. Default value: 0

□ iterator_self_scheduling

□ iterator_static_scheduling

☑ Details: single_method *

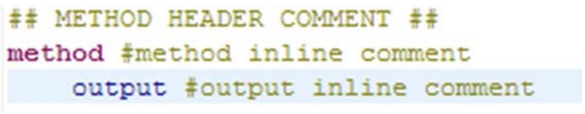
Details

☑ method pointer — what

Figure 20: Documentation/Reference

Comments

In this following example, we see the comments in the source view:



```
## METHOD HEADER COMMENT ##
method #method inline comment
    output #output inline comment
```

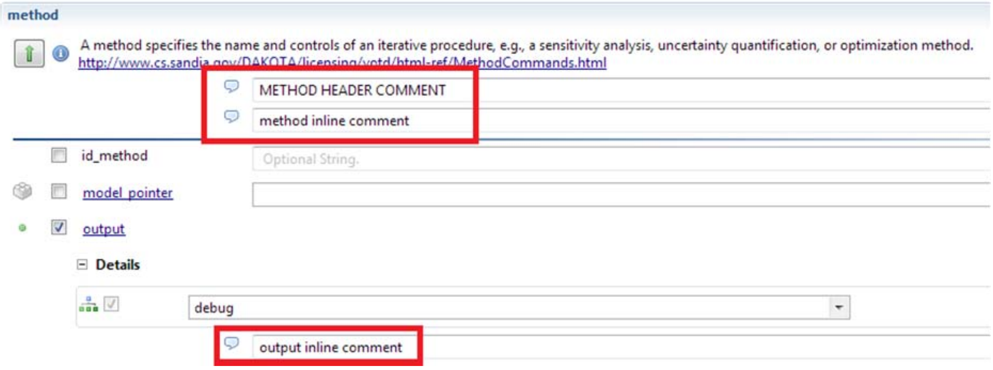
Figure 21: Example of whole line and trailing comments in the source view

It should be noted there are 2 types of comments the above example:

1. Inline (on the same line as a keyword)

2. Before (standalone comments, multiple counts allowed)

Currently comments can be rendered and edited in the GUI (See Figure 22), but new comments can only be added from the source view.



method

A method specifies the name and controls of an iterative procedure, e.g., a sensitivity analysis, uncertainty quantification, or optimization method. http://www.cs.sandia.gov/DAKOTA/licensing/votd/html-ref/MethodCommands.html

METHOD HEADER COMMENT

method inline comment

□ id_method — Optional String.

□ model_pointer

☑ output

⊟ Details

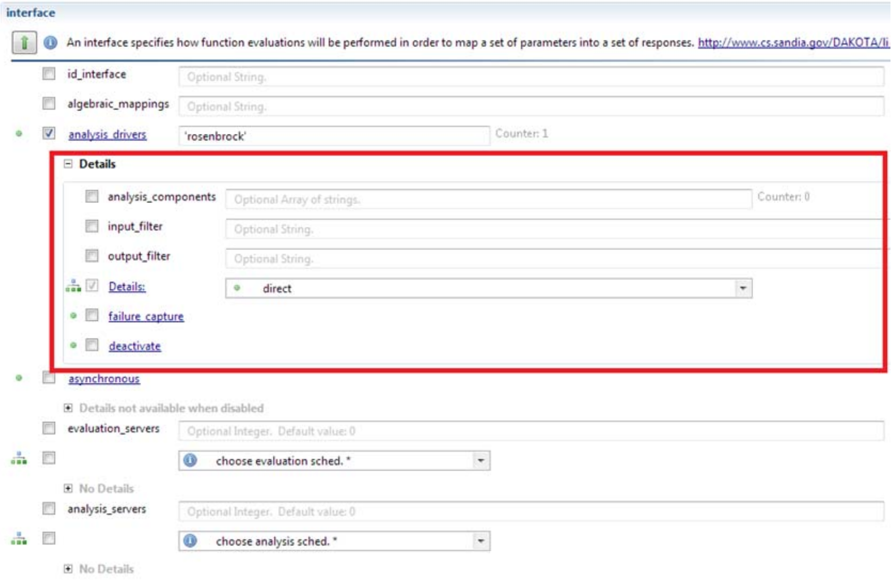
☑ debug

output inline comment

Figure 22: An in-line comment rendered in GUI

Push up

The JAGUAR GUI is simplified by pushup elements. These elements can be displayed in the current pane instead diving deeper in the tree to see them. This helps show the larger context in one view. Pushup elements can be collapsed by clicking on *'Details'*. Figure 23 and Figure 24 show JAGUAR with push-up elements on (default) and off, respectively.



interface

An interface specifies how function evaluations will be performed in order to map a set of parameters into a set of responses. http://www.cs.sandia.gov/DAKOTA/li

□ id_interface — Optional String.

□ algebraic_mappings — Optional String.

☑ analysis_drivers — 'rosenbrock' — Counter: 1

⊟ Details

□ analysis_components — Optional Array of strings. — Counter: 0

□ input_filter — Optional String.

□ output_filter — Optional String.

☑ Details: — direct

□ failure_capture

□ deactivate

□ asynchronous

⊞ Details not available when disabled

□ evaluation_servers — Optional Integer. Default value: 0

□ choose evaluation sched. *

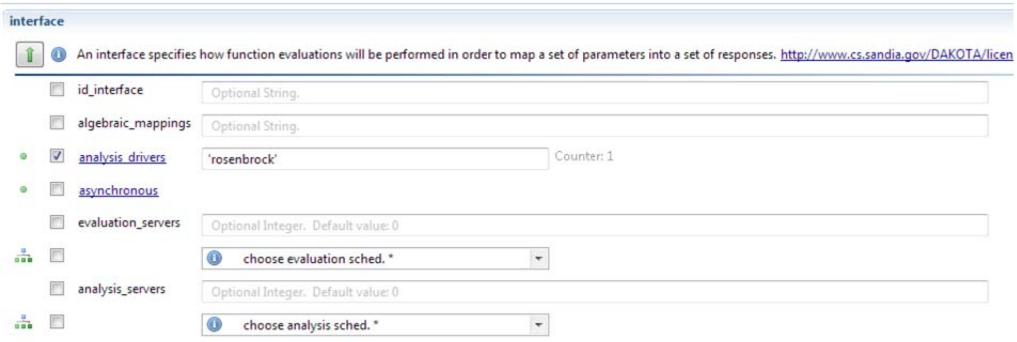
⊞ No Details

□ analysis_servers — Optional Integer. Default value: 0

□ choose analysis sched. *

⊞ No Details

Figure 23: JAGUAR with push-up elements enabled (default)



interface

An interface specifies how function evaluations will be performed in order to map a set of parameters into a set of responses. http://www.cs.sandia.gov/DAKOTA/licen

□ id_interface — Optional String.

□ algebraic_mappings — Optional String.

● ☑ analysis drivers — 'rosenbrock' — Counter: 1

● □ asynchronous

□ evaluation_servers — Optional Integer. Default value: 0

□ — choose evaluation sched. *

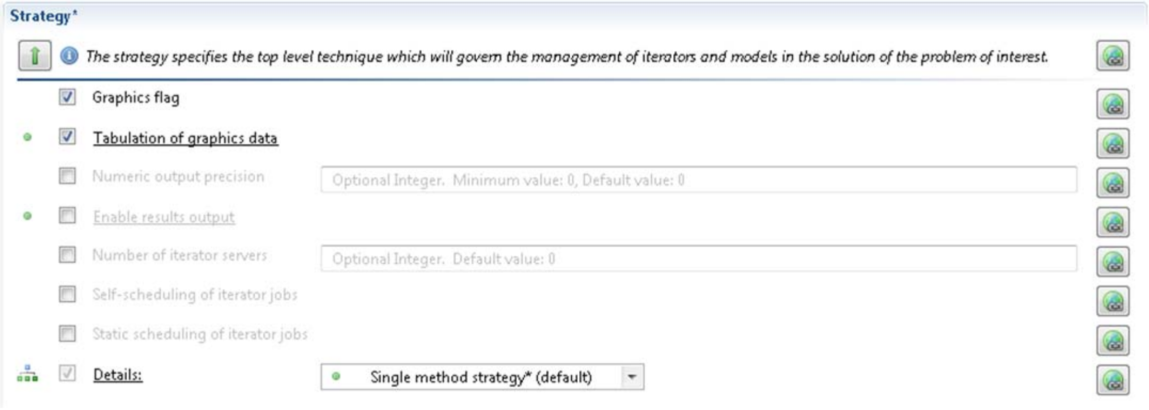
□ analysis_servers — Optional Integer. Default value: 0

□ — choose analysis sched. *

Figure 24: JAGUAR with push-up elements disabled

Hiding disabled elements

To reduce the clutter by only showing the current elements, this toggle hides all disabled elements.



Strategy*

The strategy specifies the top level technique which will govern the management of iterators and models in the solution of the problem of interest.

☑ Graphics flag

● ☑ Tabulation of graphics data

□ Numeric output precision — Optional Integer. Minimum value: 0, Default value: 0

● □ Enable results output

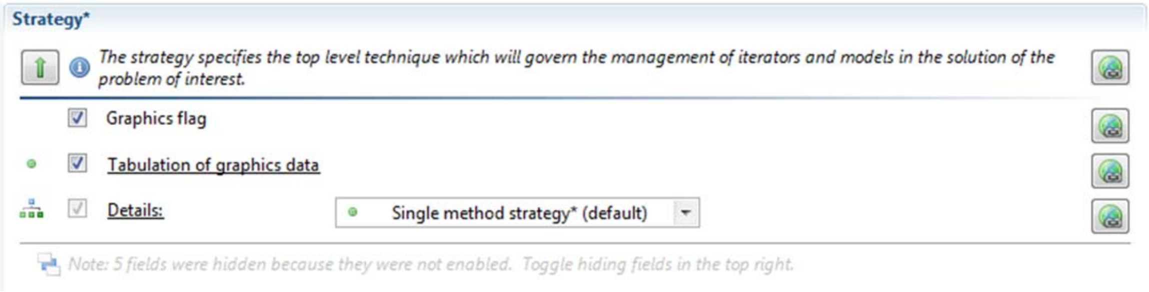
□ Number of iterator servers — Optional Integer. Default value: 0

□ Self-scheduling of iterator jobs

□ Static scheduling of iterator jobs

☑ Details: — ● Single method strategy* (default)

Figure 25: JAGUAR not hiding disabled elements



Strategy*

The strategy specifies the top level technique which will govern the management of iterators and models in the solution of the problem of interest.

☑ Graphics flag

● ☑ Tabulation of graphics data

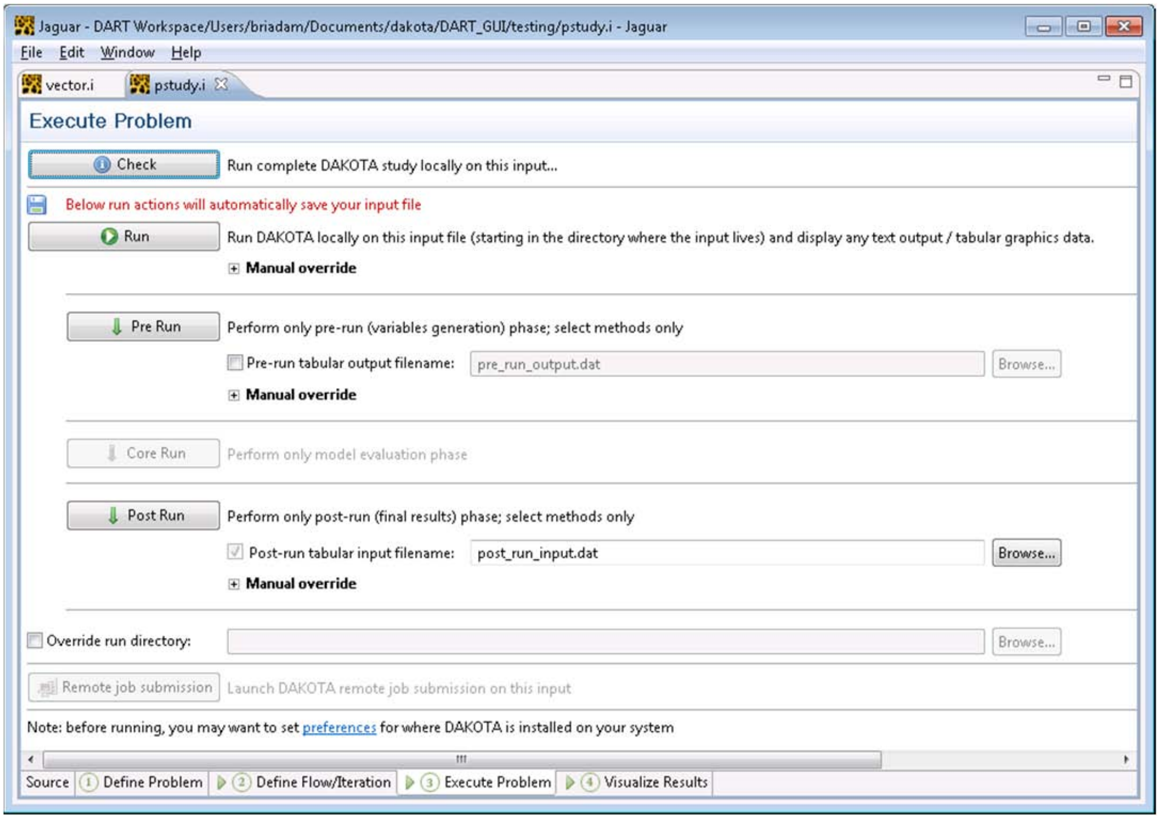
☑ Details: — ● Single method strategy* (default)

Note: 5 fields were hidden because they were not enabled. Toggle hiding fields in the top right.

Figure 26: JAGUAR hiding disabled elements

6: DAKOTA Execution

The **Execute Problem** tab permits executing DAKOTA in various modes on the active input file, as shown in Figure 27. The execute options all require a locally installed `dakota` or `dakota.exe` executable, the path to which can be set via **Window → Preferences → Jaguar**.



Execute Problem

Run complete DAKOTA study locally on this input...

Below run actions will automatically save your input file

Run DAKOTA locally on this input file (starting in the directory where the input lives) and display any text output / tabular graphics data.

⊞ Manual override

Perform only pre-run (variables generation) phase; select methods only

□ Pre-run tabular output filename: pre_run_output.dat

⊞ Manual override

Perform only model evaluation phase

Perform only post-run (final results) phase; select methods only

☑ Post-run tabular input filename: post_run_input.dat

⊞ Manual override

□ Override run directory:

Launch DAKOTA remote job submission on this input

Note: before running, you may want to set preferences for where DAKOTA is installed on your system

Figure 27: The JAGUAR "Execute Problem" tab for running DAKOTA.

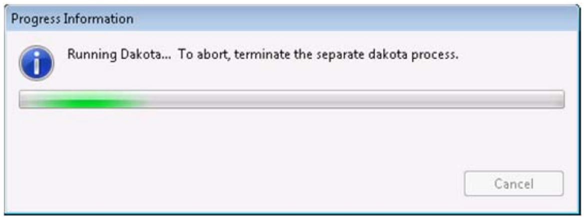
Currently four modes of DAKOTA execution are supported:

- **Check:** While JAGUAR includes considerable input validation, the Check button uses DAKOTA's input parser to perform additional validation, ensuring that the study input is ready to run. To validate the active input file (via `dakota -check`), select the Check button and view the console output on the Visualize Results tab. You should see a message indicating that the check completed and should see no errors:

  ```
  Input check completed successfully (input parsed and objects instantiated).
  ```

  If you observe errors, return to the editor to correct them.
- **Run:** Selecting the Run button will execute DAKOTA on the local machine using the active input file.   Execution will take place in the same directory as the input file, so any

necessary driver scripts and data files must be present. To abort the DAKOTA run, use the operating system's task management features to kill the separate DAKOTA process.



Running Dakota... To abort, terminate the separate dakota process.

Figure 28: Running DAKOTA

After running, view the DAKOTA output in the console window:

```
<<<<< Function evaluation summary: 81 total (81 new, 0 duplicate)
...
<<<<< Iterator multidim_parameter_study completed.
<<<<< Single Method Strategy completed.
```

- **Pre Run:** Pre-run is a step in the overall DAKOTA run process. For select analyzer methods only (currently parameter studies, DACE, and sampling methods) DAKOTA supports a pre-run mode (`dakota -pre_run`), which will generate the set of points at which DAKOTA would evaluate the computational model and write them to a space-separated tabular file. The optional checkbox **Pre-run tabular output filename** permits overriding the default filename. A successful pre-run will terminate with a message:

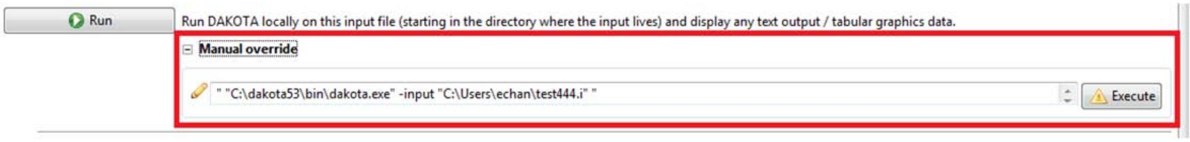
  ```
  Pre-run phase complete: variables written to tabular file pre_run_output.dat.
  ```

- **Post Run:** After the pre-run variables file has been augmented with user-supplied columns for function evaluation data (responses), DAKOTA can post-process it and generate statistics, for example, to compute final statistics in a screening study. This is the analysis counterpart complementing Pre Run. The Post Run mode permits specification of the variables/response data file. Executing it will generate final results output similar to Run mode:

  ```
  Post-run phase initialized: variables / responses read from tabular file
  post_run_input.dat.
  ...
  <<<<< Function evaluation summary: 0 total (0 new, 0 duplicate)
  <<<<< Best parameters          =
                       -2.0000000000e+000 x1
                       -1.0000000000e+000 x2
  <<<<< Best objective function  =
                        1.0000000000e+000
  <<<<< Best data captured at function evaluation 19
  ```

For additional information on the Pre Run and Post Run modes (which are central to JAGUAR's Sensitivity Analysis Wizard), consult the DAKOTA User's Manual. Results from any execute option are displayed on the **Visualize Results** tab as shown in Section 7: Visualization.

For all problem execution modes under **Run**, a **Manual override** option (See Figure 29) allows modification of the command issued to execute the `dakota` program. In future JAGUAR releases we hope to support the **Core Run** and **Remote job submission** execute modes, including facilitating remote DAKOTA job submission to a compute cluster and job status monitoring.



Run DAKOTA locally on this input file (starting in the directory where the input lives) and display any text output / tabular graphics data.

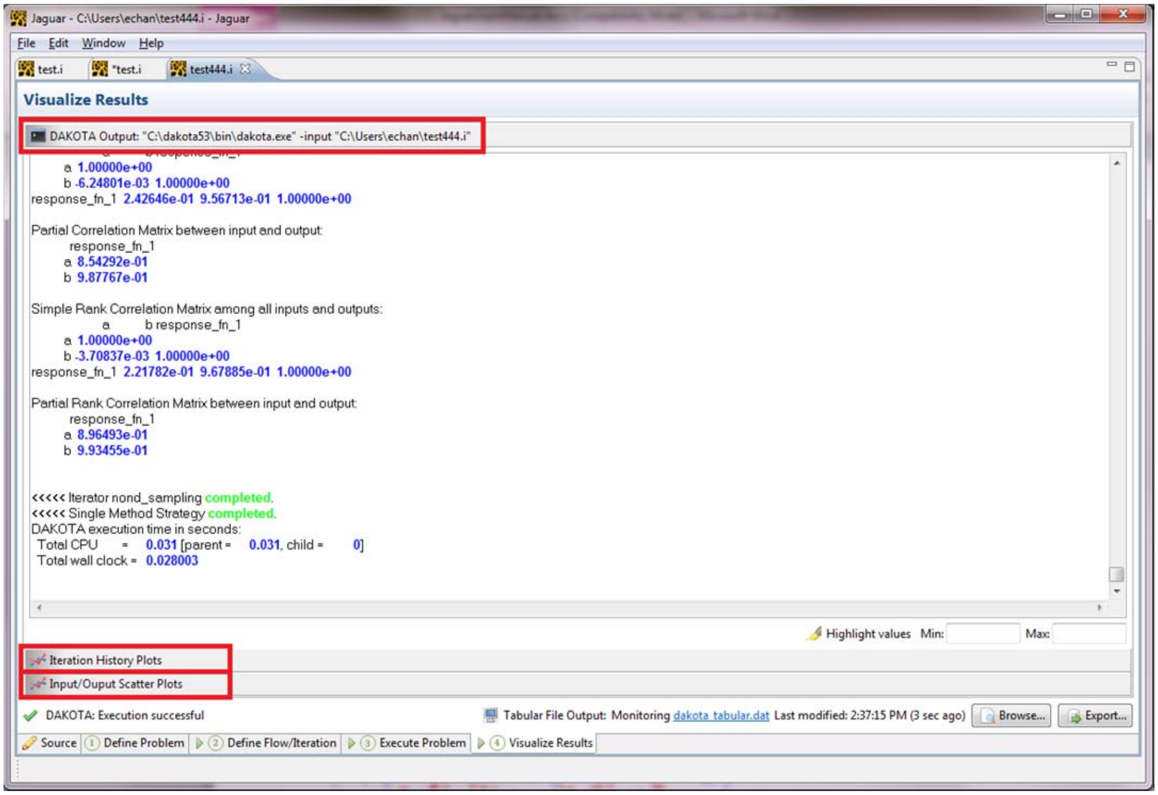
⊟ Manual override

```
" "C:\dakota53\bin\dakota.exe" -input "C:\Users\echan\test444.i" "
```

Figure 29: Manual override DAKOTA command

7: Visualization

The **Visualize Results** tab in Figure 30 displays the result from executing DAKOTA under various run modes.



DAKOTA Output: "C:\dakota53\bin\dakota.exe" -input "C:\Users\echan\test444.i"

```
        a 1.00000e+00
        b -6.24801e-03 1.00000e+00
response_fn_1  2.42646e-01 9.56713e-01  1.00000e+00

Partial Correlation Matrix between input and output:
          response_fn_1
        a 8.54292e-01
        b 9.87767e-01

Simple Rank Correlation Matrix among all inputs and outputs:
                a          b response_fn_1
        a 1.00000e+00
        b -3.70837e-03 1.00000e+00
response_fn_1  2.21782e-01 9.67885e-01  1.00000e+00

Partial Rank Correlation Matrix between input and output:
          response_fn_1
        a 8.96493e-01
        b 9.93455e-01


<<<<< Iterator nond_sampling completed.
<<<<< Single Method Strategy completed.
DAKOTA execution time in seconds:
  Total CPU      =     0.031 [parent =     0.031, child =         0]
  Total wall clock =  0.028003
```

DAKOTA: Execution successful

Tabular File Output: Monitoring dakota_tabular.dat Last modified: 2:37:15 PM (3 sec ago)

Figure 30: Visualize DAKOTA output results and charts

Additionally, plots are graphically generated when strategy→tabular_graphics_data is turned on to generate the default *dakota_tabular.dat* file. Iteration history plots in Figure 31 show the progression of input variable values (x axis) against iteration number (y-axis) as well as the output response (x axis) against iteration number (y-axis). The first gives a running visual illustration of where Dakota has evaluated each input; the second provides an output check. This can be especially helpful for optimization problems.

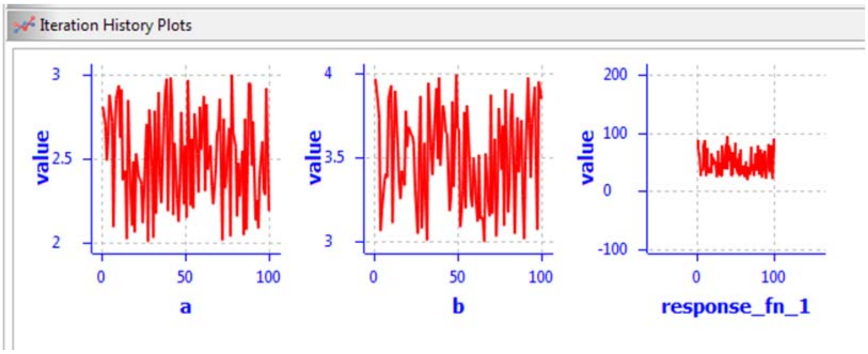


Figure 31: Iteration History Plots

Input/output scatter plots in Figure 32 show the set of all inputs and outputs plotted against each other in 2D.

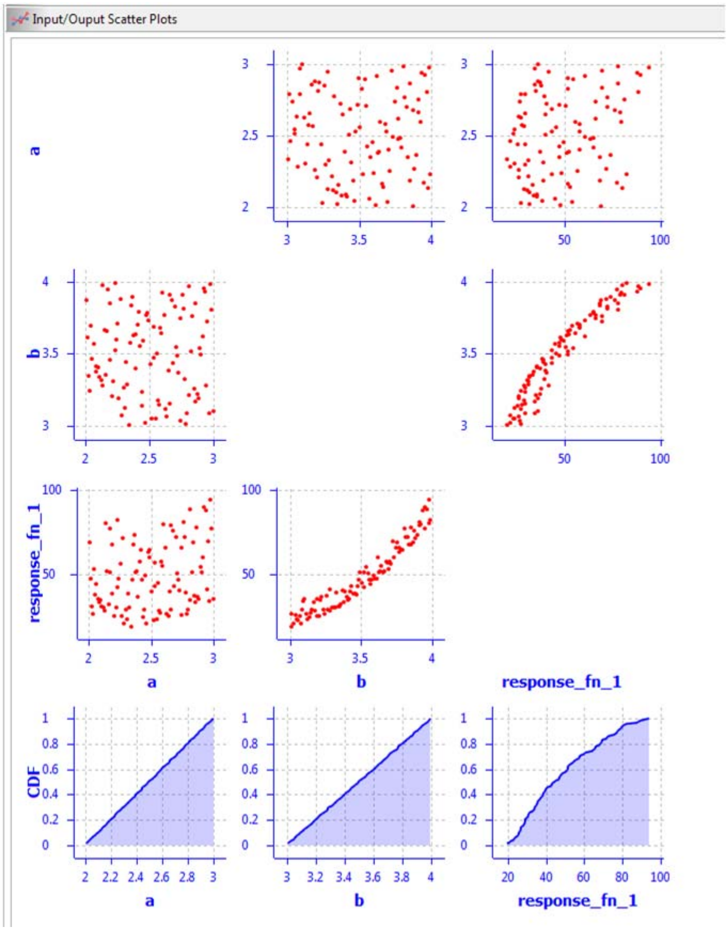
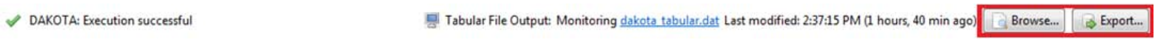


Figure 32: Input/Output Scatter Plots

The graphical charts can be saved by selecting the “Save Plot…” button in the bottom right corner.

Below the plots is the status bar (Figure 33), showing the DAKOTA run status on the left, the raw tabular graphic file in the middle, and option to specify an existing tabular file to plot, and to export the tabular file to Excel.



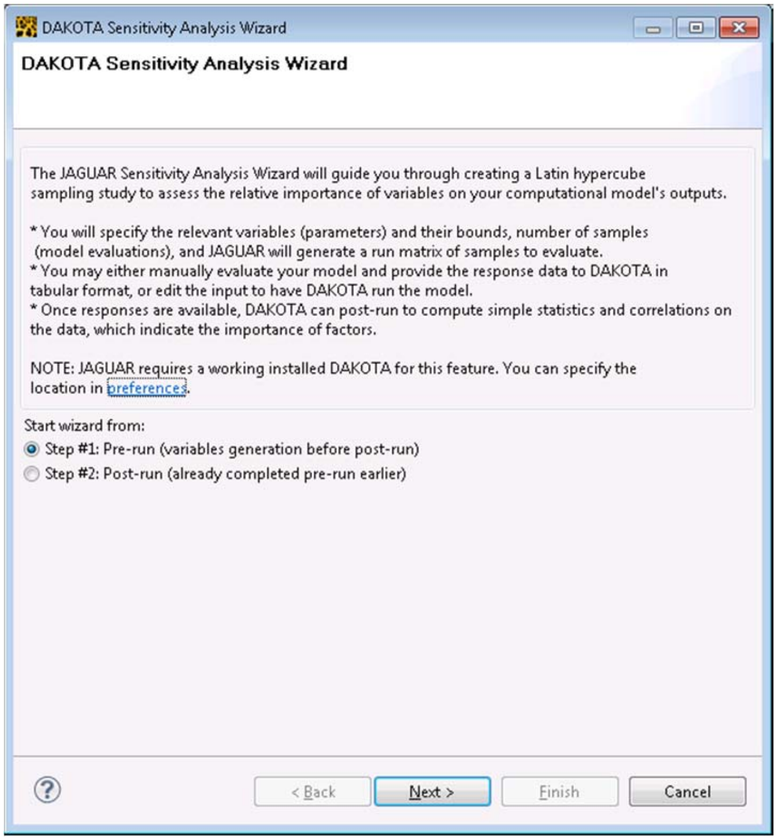
✓ DAKOTA: Execution successful

Tabular File Output: Monitoring dakota_tabular.dat Last modified: 2:37:15 PM (1 hours, 40 min ago)

Figure 33: DAKOTA run status, tabular graphic file and export options

8: Sensitivity Analysis Wizard

Future JAGUAR versions will include a suite of "wizards" for creating DAKOTA input files for common analysis tasks such as optimization, parameter estimation, and uncertainty quantification. Presently, one such wizard exists for creating a Latin hypercube sampling-based sensitivity analysis (SA or screening) study. It creates a DAKOTA input file based on user-specified problem characteristics and optionally allows running DAKOTA in pre-run mode to generate a table of variable realizations. The SA Wizard also allows running DAKOTA in post-run mode as described above to analyze user-provided tabular response data. The SA Wizard is accessible from the Welcome screen and the menu **File → New → Sensitivity Analysis Wizard**. Upon launching, select either the variables definition (pre-run) phase or analysis (post-run) phase as shown in Figure 34.



DAKOTA Sensitivity Analysis Wizard

DAKOTA Sensitivity Analysis Wizard

The JAGUAR Sensitivity Analysis Wizard will guide you through creating a Latin hypercube sampling study to assess the relative importance of variables on your computational model's outputs.

* You will specify the relevant variables (parameters) and their bounds, number of samples (model evaluations), and JAGUAR will generate a run matrix of samples to evaluate.
* You may either manually evaluate your model and provide the response data to DAKOTA in tabular format, or edit the input to have DAKOTA run the model.
* Once responses are available, DAKOTA can post-run to compute simple statistics and correlations on the data, which indicate the importance of factors.

NOTE: JAGUAR requires a working installed DAKOTA for this feature. You can specify the location in preferences.

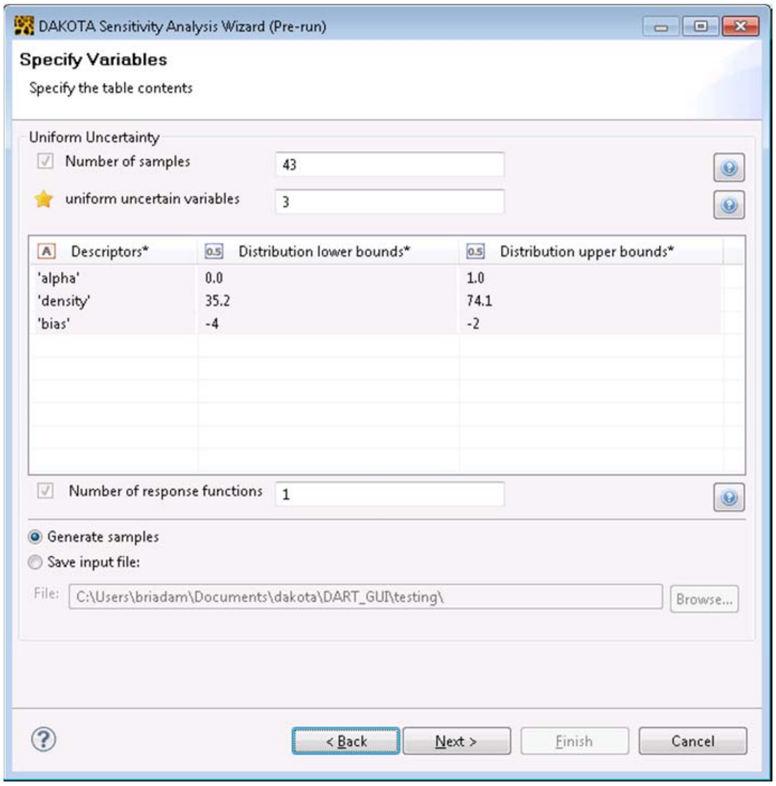
Start wizard from:

● Step #1: Pre-run (variables generation before post-run)

○ Step #2: Post-run (already completed pre-run earlier)

Figure 34: The splash page for the JAGUAR Sensitivity Analysis Wizard.

Figure 35 shows the **Specify Variables** page of the SA wizard, where the problem characteristics are entered. The number of samples, uncertain (uniformly-distributed) variables, and responses must be specified. For each specified variable, lower and upper bounds are required; there are also optional fields for specifying descriptors for each variable. Once complete, one may generate the LHS samples in the form of a run matrix using the **Generate samples** option, and/or save the input file for the LHS study using the **Save input file** option and specifying a location for the input file. (Saving the input file at this step will end the wizard and open the generated input file in the JAGUAR editor.)



DAKOTA Sensitivity Analysis Wizard (Pre-run)

Specify Variables

Specify the table contents

Uniform Uncertainty

☑ Number of samples: 43

uniform uncertain variables: 3

Descriptors*	Distribution lower bounds*	Distribution upper bounds*
'alpha'	0.0	1.0
'density'	35.2	74.1
'bias'	-4	-2

☑ Number of response functions: 1

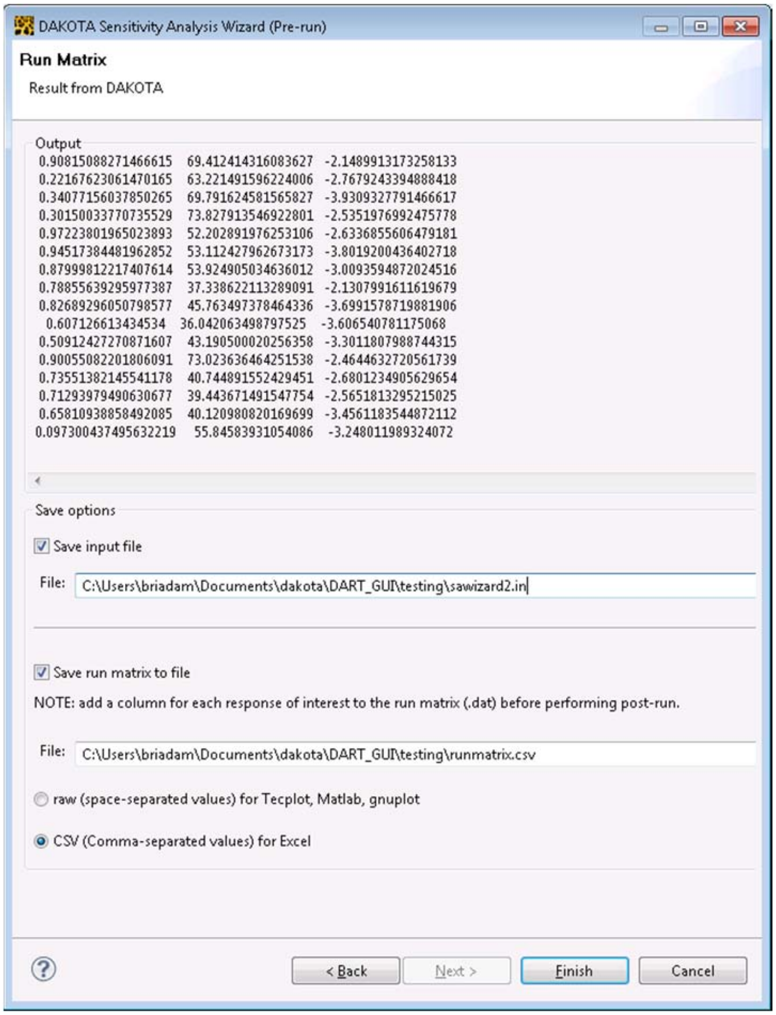
● Generate samples

○ Save input file:

File: C:\Users\briadam\Documents\dakota\DART_GUI\testing\

Figure 35: Pre-run phase: variables specification

Figure 36 shows an example of the **Run Matrix** (final) page of the pre-run wizard containing the generated run matrix if the “Generate samples” option is selected. Note that this option executes the locally-installed version of DAKOTA (in pre-run mode) to generate the run matrix. The page also provides options for saving both the input file and the generated run matrix.



Run Matrix

Result from DAKOTA

Output

```
 0.90815088271466615  69.412414316083627  -2.1489913173258133
 0.22167623061470165  63.221491596224006  -2.7679243394888418
 0.34077156037850265  69.791624581565827  -3.9309327791466617
 0.30150033770735529  73.827913546922801  -2.5351976992475778
 0.97223801965023893  52.202891976253106  -2.6336855606479181
 0.94517384481962852  53.112427962673173  -3.8019200436402718
 0.87999812217407614  53.924905034636012  -3.0093594872024516
 0.78855639295977387  37.338622113289091  -2.1307991611619679
 0.82689296050798577  45.763497378464336  -3.6991578719881906
  0.607126613434534  36.042063498797525  -3.606540781175068
 0.50912427270871607  43.190500020256358  -3.3011807988744315
 0.90055082201806091  73.023636464251538  -2.4644632720561739
 0.73551382145541178  40.744891552429451  -2.6801234905629654
 0.71293979490630677  39.443671491547754  -2.5651813295215025
 0.65810938858492085  40.120980820169699  -3.4561183544872112
0.097300437495632219   55.84583931054086   -3.248011989324072
```

Save options

☑ Save input file

File: C:\Users\briadam\Documents\dakota\DART_GUI\testing\sawizard2.in

☑ Save run matrix to file

NOTE: add a column for each response of interest to the run matrix (.dat) before performing post-run.

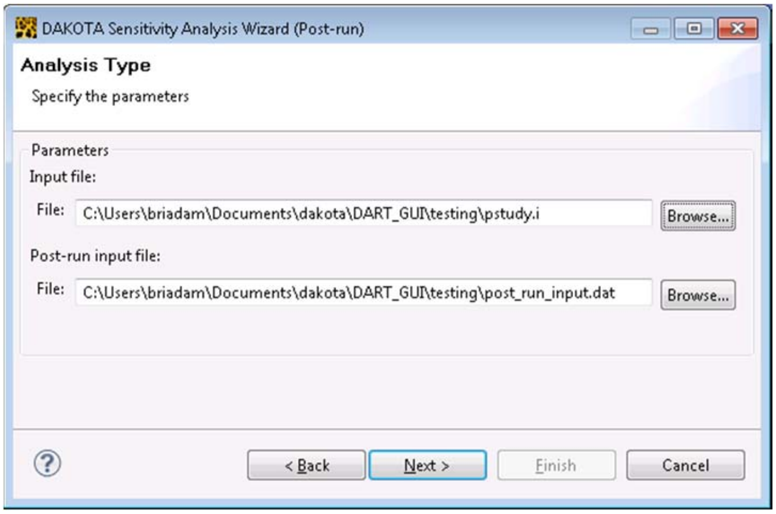
File: C:\Users\briadam\Documents\dakota\DART_GUI\testing\runmatrix.csv

○ raw (space-separated values) for Tecplot, Matlab, gnuplot

● CSV (Comma-separated values) for Excel

Figure 36: Pre-run phase: run matrix and save options

After creating a samples file (run matrix), one may add columns for response data to the file, then return to the SA Wizard's post-run mode. Figure 37 shows specification of the saved input deck from pre-run and the location of the data file containing the variables and response data to analyze.   Selecting Next will run DAKOTA in post-run mode, generating any statistics or other final results.



DAKOTA Sensitivity Analysis Wizard (Post-run)

Analysis Type

Specify the parameters

Parameters

Input file:

File: C:\Users\briadam\Documents\dakota\DART_GUI\testing\pstudy.i

Post-run input file:

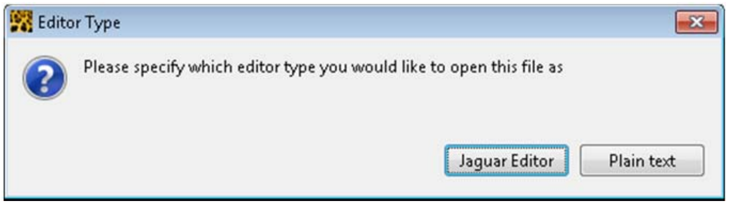
File: C:\Users\briadam\Documents\dakota\DART_GUI\testing\post_run_input.dat

Figure 37: Specifying the DAKOTA input file and data file for post-run mode.

9: DAKOTA Study Wizard

The DAKOTA Study Wizard simplifies the preparation of files necessary for a DAKOTA study.

Open a file in plain text from the menu: **File → Open As**, and choosing "Plain text" when prompted in Figure 38.

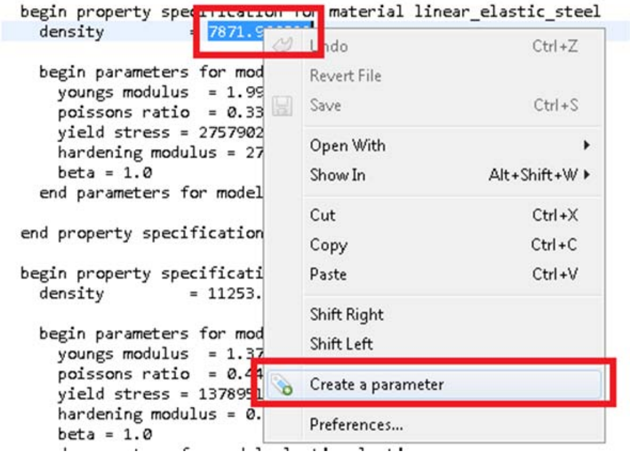


Editor Type

Please specify which editor type you would like to open this file as

Figure 38: Open As Plain Text

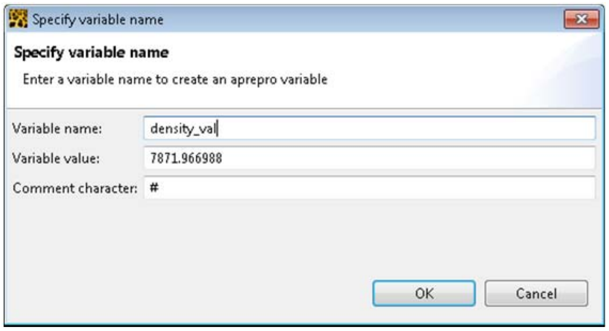
In the text editor, highlight the value you would like to parameterize, and right click to "Create a parameter" in Figure 39.



```
begin property specification for material linear_elastic_steel
  density          = 7871.9

  begin parameters for mod
    youngs modulus  = 1.99
    poissons ratio  = 0.33
    yield stress = 2757902
    hardening modulus = 27
    beta = 1.0
  end parameters for model

end property specification

begin property specificati
  density          = 11253.

  begin parameters for mod
    youngs modulus  = 1.37
    poissons ratio  = 0.4
    yield stress = 137895
    hardening modulus = 0.
    beta = 1.0
```

Figure 39: Creating parameter from file

Specify a name for this parameterization in the dialog (Figure 40).



Specify variable name

Specify variable name

Enter a variable name to create an aprepro variable

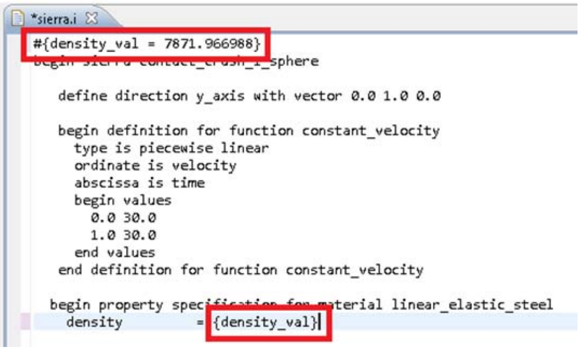
Variable name: density_val

Variable value: 7871.966988

Comment character: #

Figure 40: Specifying parameter name

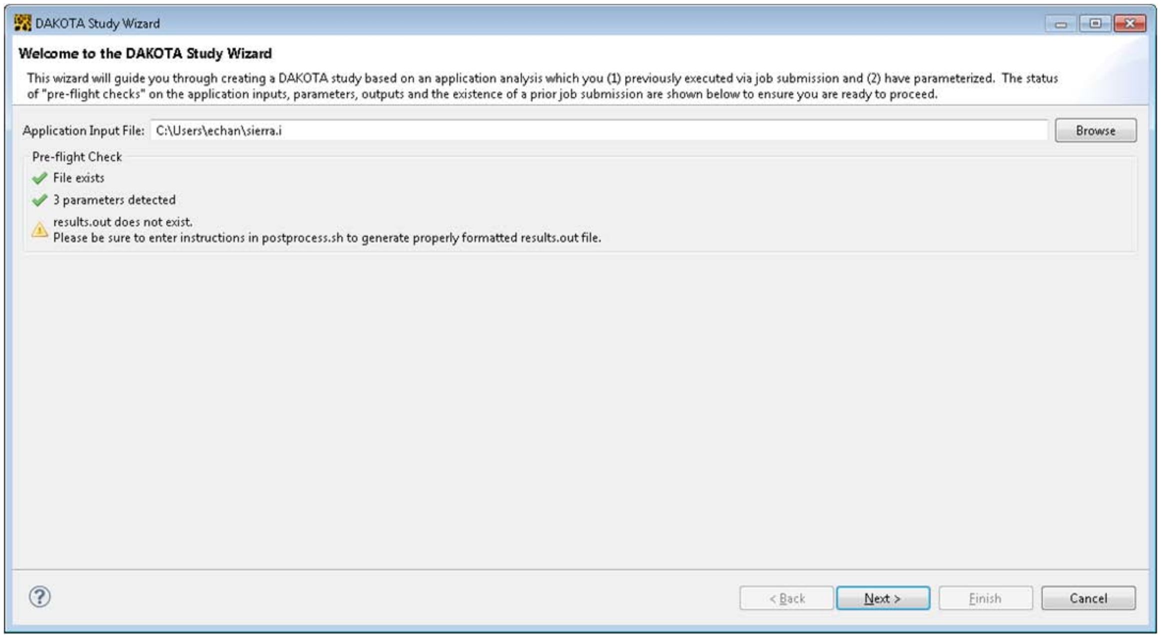
Notice the file in Figure 41 has been modified with the parameterized field with the original values in comments at the top of the page. By default this conforms to APREPRO syntax.



```
#{density_val = 7871.966988}
begin sierra contact_crush_1_sphere

   define direction y_axis with vector 0.0 1.0 0.0

   begin definition for function constant_velocity
     type is piecewise linear
     ordinate is velocity
     abscissa is time
     begin values
       0.0 30.0
       1.0 30.0
     end values
   end definition for function constant_velocity

  begin property specification for material linear_elastic_steel
    density          = {density_val}
```

Figure 41: Parameter replacement

Once all parameterization has been set (a file may have more than one), run the DAKOTA Study Wizard via **New → Dakota Study**. In Figure 42, the wizard makes necessary checks before continuing.



DAKOTA Study Wizard

Welcome to the DAKOTA Study Wizard

This wizard will guide you through creating a DAKOTA study based on an application analysis which you (1) previously executed via job submission and (2) have parameterized. The status of "pre-flight checks" on the application inputs, parameters, outputs and the existence of a prior job submission are shown below to ensure you are ready to proceed.

Application Input File: C:\Users\echan\sierra.i

Pre-flight Check

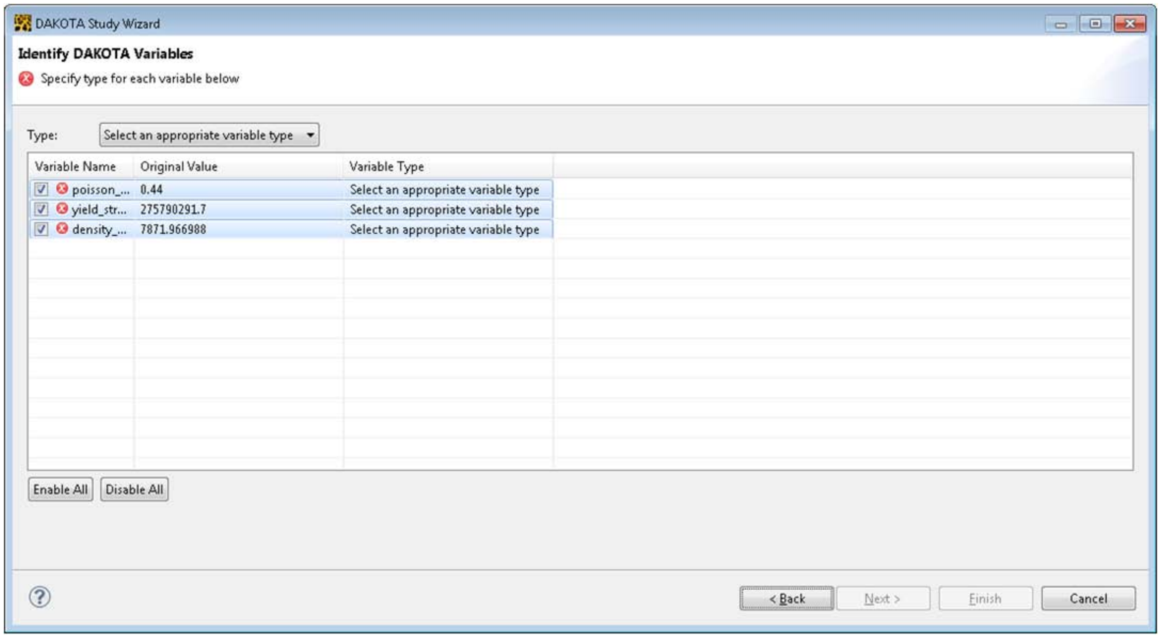
✓ File exists

✓ 3 parameters detected

⚠ results.out does not exist.
Please be sure to enter instructions in postprocess.sh to generate properly formatted results.out file.

Figure 42: DAKOTA study wizard

The next step is to specify an appropriate variable type in the ‘Variable Type’ column (Figure 43). You may disable variables not applicable in the study by unchecking them on the left.


DAKOTA Study Wizard

Identify DAKOTA Variables

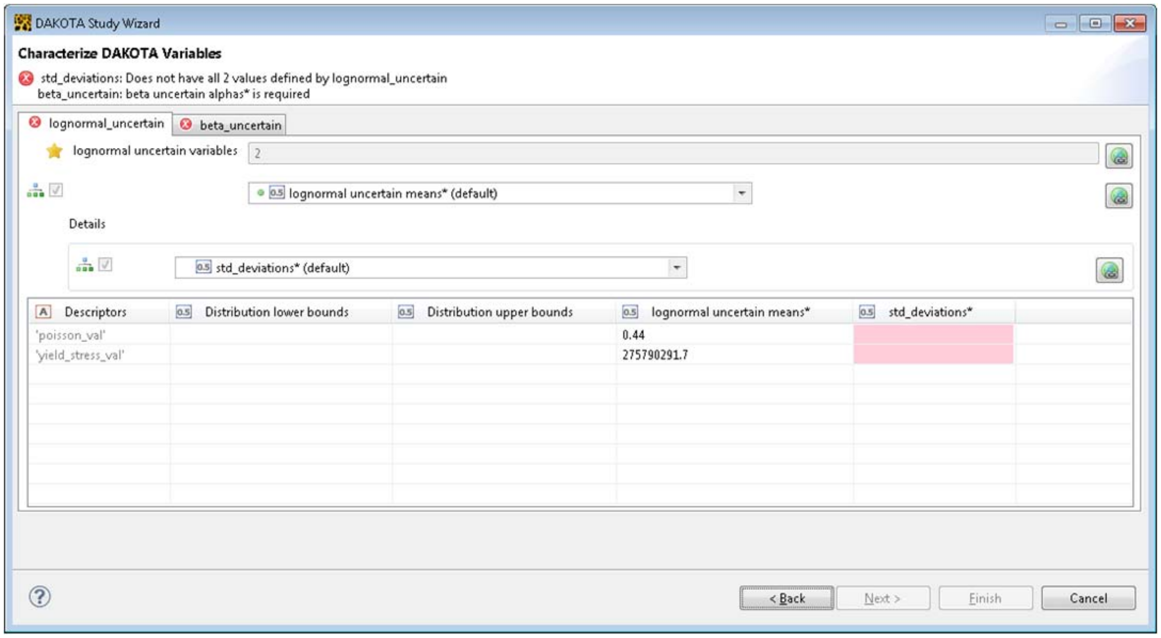
Specify type for each variable below

Type: Select an appropriate variable type

Variable Name	Original Value	Variable Type
☑ poisson_...	0.44	Select an appropriate variable type
☑ yield_str...	275790291.7	Select an appropriate variable type
☑ density_...	7871.966988	Select an appropriate variable type

Figure 43: Specifying the variable types

Once all the parameters have their respective variable type defined, they can be characterized in Figure 44.


DAKOTA Study Wizard

Characterize DAKOTA Variables

std_deviations: Does not have all 2 values defined by lognormal_uncertain
beta_uncertain: beta uncertain alphas* is required

lognormal uncertain variables: 2

lognormal uncertain means* (default)

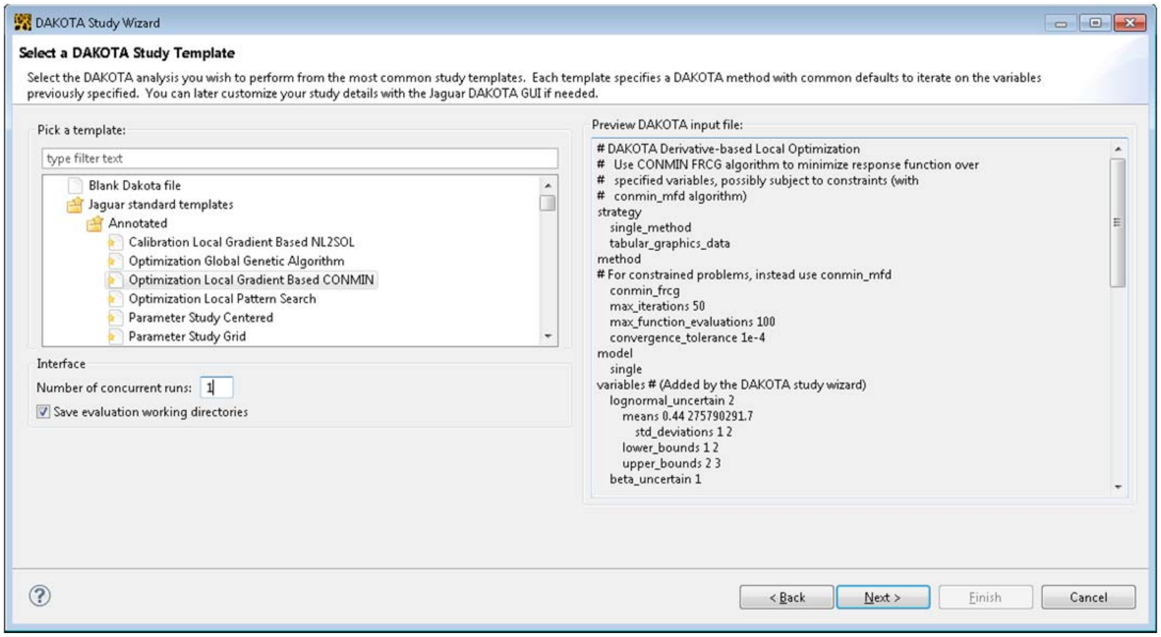
Details

std_deviations* (default)

Descriptors	Distribution lower bounds	Distribution upper bounds	lognormal uncertain means*	std_deviations*
'poisson_val'			0.44	
'yield_stress_val'			275790291.7	

Figure 44: Characterizing variables

An appropriate analysis template can be specified in Figure 45 to iterate over the variables, as well as the number of concurrent runs defined in the interface.



Select a DAKOTA Study Template

Select the DAKOTA analysis you wish to perform from the most common study templates. Each template specifies a DAKOTA method with common defaults to iterate on the variables previously specified. You can later customize your study details with the Jaguar DAKOTA GUI if needed.

Pick a template:

type filter text

- Blank Dakota file
- Jaguar standard templates
  - Annotated
    - Calibration Local Gradient Based NL2SOL
    - Optimization Global Genetic Algorithm
    - Optimization Local Gradient Based CONMIN
    - Optimization Local Pattern Search
    - Parameter Study Centered
    - Parameter Study Grid

Interface

Number of concurrent runs: 1

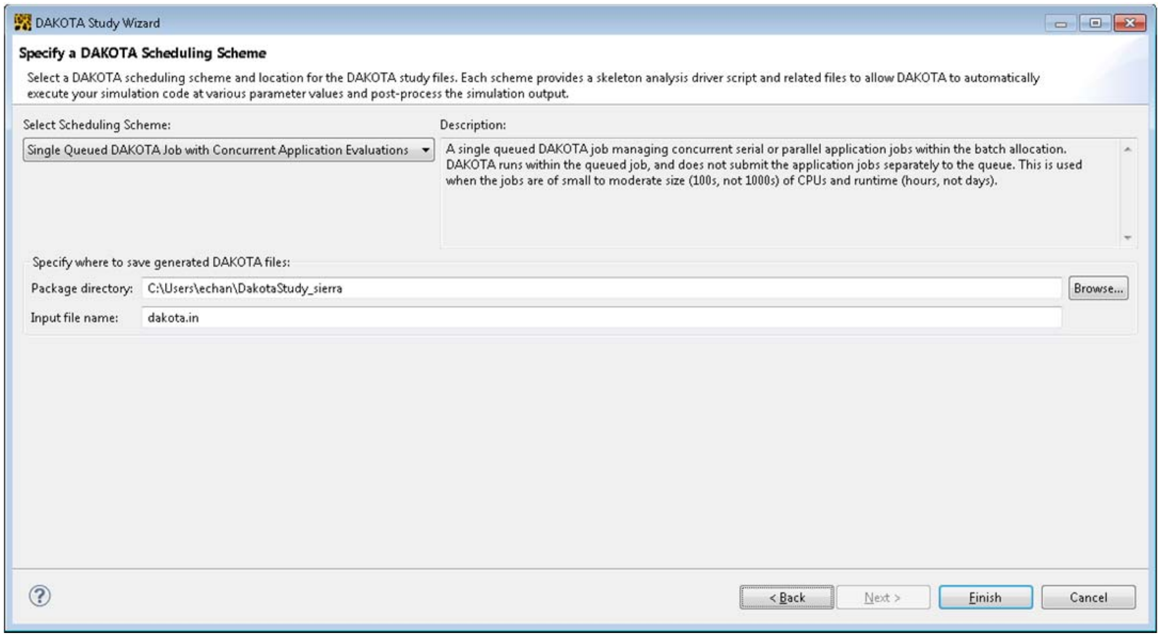
☑ Save evaluation working directories

Preview DAKOTA input file:

```
# DAKOTA Derivative-based Local Optimization
#   Use CONMIN FRCG algorithm to minimize response function over
#   specified variables, possibly subject to constraints (with
#   conmin_mfd algorithm)
strategy
   single_method
   tabular_graphics_data
method
# For constrained problems, instead use conmin_mfd
   conmin_frcg
   max_iterations 50
   max_function_evaluations 100
   convergence_tolerance 1e-4
model
   single
variables # (Added by the DAKOTA study wizard)
   lognormal_uncertain 2
      means 0.44 275790291.7
         std_deviations 1 2
      lower_bounds 1 2
      upper_bounds 2 3
   beta_uncertain 1
```

Figure 45: DAKOTA Study Template

The last step in Figure 46 is to specify the scheduling scheme and location for the DAKOTA study.



Specify a DAKOTA Scheduling Scheme

Select a DAKOTA scheduling scheme and location for the DAKOTA study files. Each scheme provides a skeleton analysis driver script and related files to allow DAKOTA to automatically execute your simulation code at various parameter values and post-process the simulation output.

Select Scheduling Scheme: Single Queued DAKOTA Job with Concurrent Application Evaluations

Description: A single queued DAKOTA job managing concurrent serial or parallel application jobs within the batch allocation. DAKOTA runs within the queued job, and does not submit the application jobs separately to the queue. This is used when the jobs are of small to moderate size (100s, not 1000s) of CPUs and runtime (hours, not days).

Specify where to save generated DAKOTA files:

Package directory: C:\Users\echan\DakotaStudy_sierra

Input file name: dakota.in

Figure 46: Scheduling Scheme

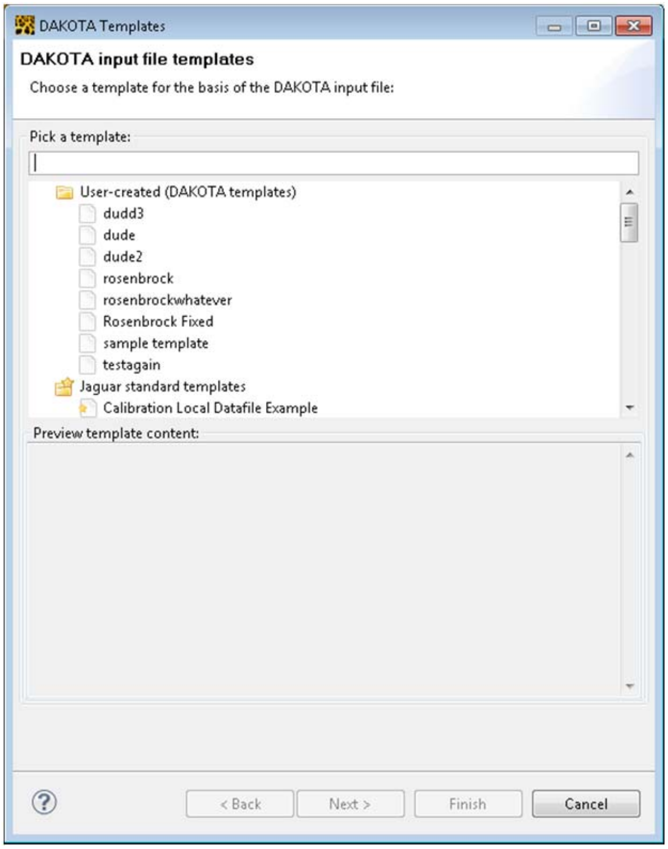
When finished, the wizard creates the folders and files necessary for the DAKOTA study.

10: Generating Input Files from Templates

DAKOTA (and consequently JAGUAR) includes many example input files that users can build on, customizing their own studies from these templates. JAGUAR also supports User-created templates (see Figure 47). To specify the location in which user templates are saved, go to **Window → Preferences → Jaguar → Templates Path** and define the template path. Whether you want to access the standard templates library or the User-created templates to generate a new DAKOTA input files, you can do so in two ways:

1. from the Welcome screen
2. from the main File menu (**New → DAKOTA input file from template**).

After selecting a template upon which the new input file will be based, specify a location in which to save the new input file (see Figure 48). Also, at any time, you can save an input file or template as your own custom template with **File → Save → Save As Template** (see Figure 49). By default templates are saved in the default directory specified in preferences and the default template extension is `.dak`.

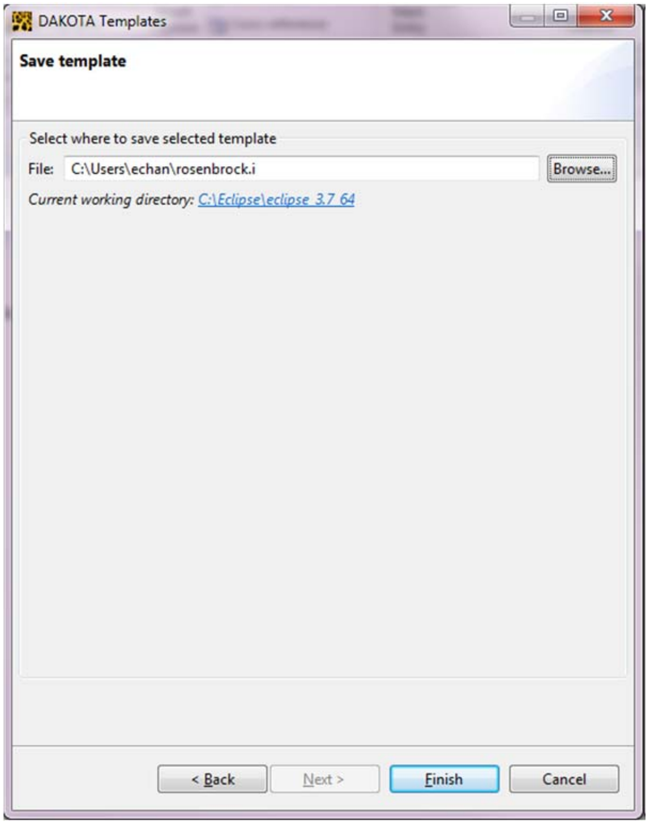


DAKOTA input file templates

Choose a template for the basis of the DAKOTA input file:

- User-created (DAKOTA templates)
  - dudd3
  - dude
  - dude2
  - rosenbrock
  - rosenbrockwhatever
  - Rosenbrock Fixed
  - sample template
  - testagain
- Jaguar standard templates
  - Calibration Local Datafile Example

Figure 47: A list of DAKOTA input file templates available in JAGUAR.



DAKOTA Templates

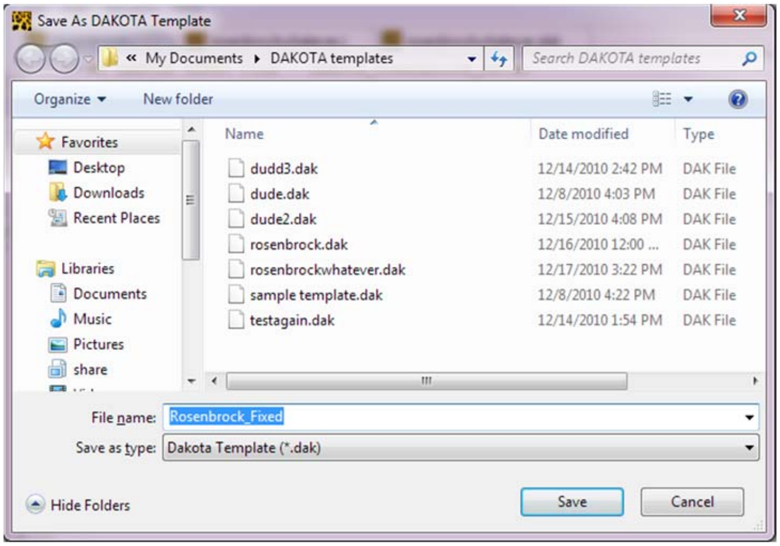
Save template

Select where to save selected template

File: C:\Users\echan\rosenbrock.i

Current working directory: C:\Eclipse\eclipse_3.7_64

Figure 48: Specifying a location for saving an input file generated from a template.



Save As DAKOTA Template

« My Documents ▸ DAKOTA templates

Name	Date modified	Type
dudd3.dak	12/14/2010 2:42 PM	DAK File
dude.dak	12/8/2010 4:03 PM	DAK File
dude2.dak	12/15/2010 4:08 PM	DAK File
rosenbrock.dak	12/16/2010 12:00 ...	DAK File
rosenbrockwhatever.dak	12/17/2010 3:22 PM	DAK File
sample template.dak	12/8/2010 4:22 PM	DAK File
testagain.dak	12/14/2010 1:54 PM	DAK File

File name: Rosenbrock_Fixed

Save as type: Dakota Template (*.dak)

Figure 49: JAGUAR Save As Template window.

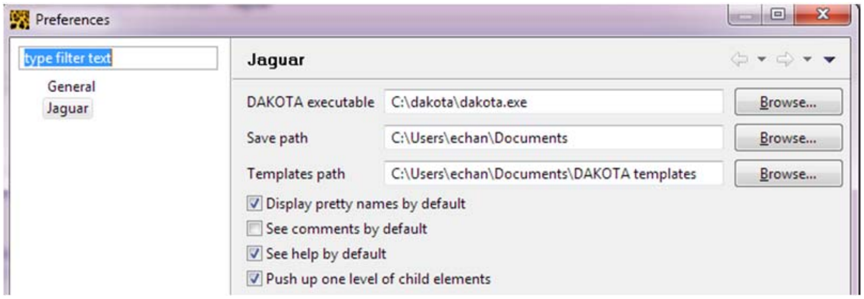
11: JAGUAR Brief Usage Tutorial

To quickly familiarize yourself with JAGUAR's basics, follow the steps here which refer to the simple dakota input file example `dakota_rosenbrock_2d.in` found in the `examples/tutorial` directory of a DAKOTA distribution.

Start JAGUAR.

In the Welcome screen, select "Configure Jaguar" or click **Window → Preferences → Jaguar** (see Figure 50).

- Under JAGUAR options, provide your paths for "DAKOTA executable" (this is the full path for the dakota or dakota.exe executable file you will use to run DAKOTA), "Save path" (this is the full path for the directory you wish to save your input files in) and "Templates path" (this is the full path for the directory you wish to save your own DAKOTA Templates in).
- Select "OK".



DAKOTA executable: C:\dakota\dakota.exe

Save path: C:\Users\echan\Documents

Templates path: C:\Users\echan\Documents\DAKOTA templates

☑ Display pretty names by default

☐ See comments by default

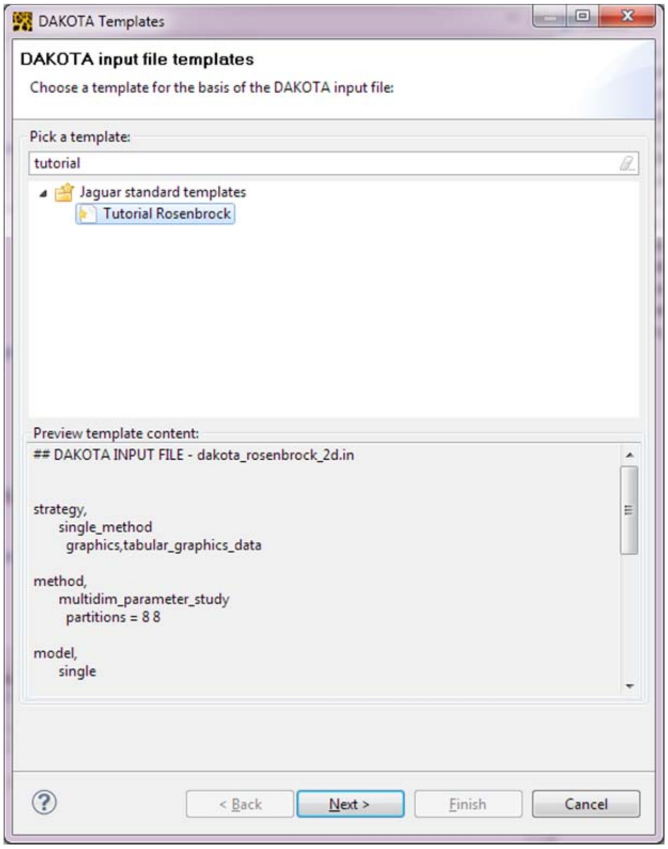
☑ See help by default

☑ Push up one level of child elements

Figure 50: Sample JAGUAR Preferences for tutorial.

Select **File → New → DAKOTA input file from template**

- Do either of the following:
  1. Type "tutorial" in the quick search bar to filter the templates and select "Tutorial Rosenbrock".
  2. Navigate down and select "Tutorial Rosenbrock".
- A preview of the template file should be visible, as shown in Figure 51.
- Select "Next".
- Specify a filename such as "rosenbrock.i".
- Select "Finish".

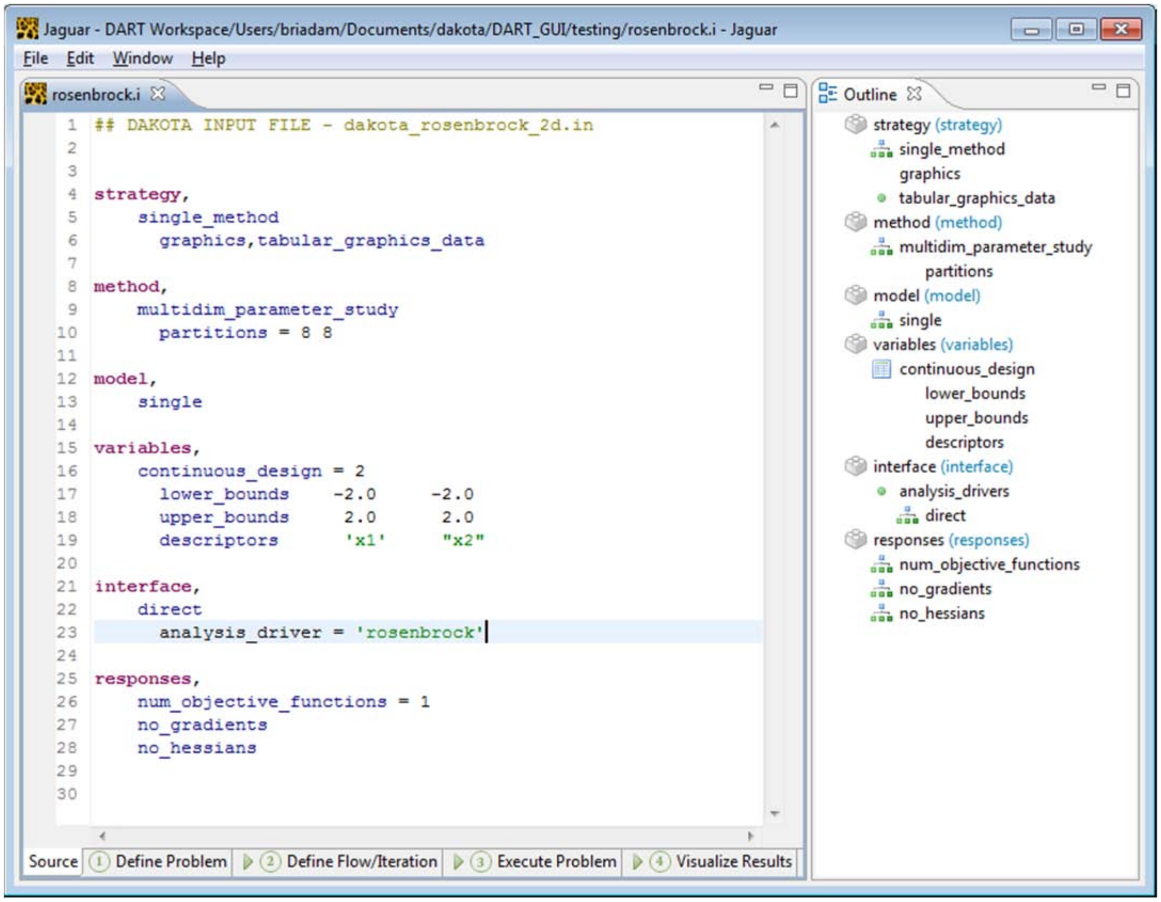

DAKOTA Templates
DAKOTA input file templates
Choose a template for the basis of the DAKOTA input file:
Pick a template:
tutorial
Jaguar standard templates
Tutorial Rosenbrock
Preview template content:
< Back
Next >
Finish
Cancel

```
## DAKOTA INPUT FILE - dakota_rosenbrock_2d.in


strategy,
    single_method
     graphics,tabular_graphics_data

method,
    multidim_parameter_study
     partitions = 8 8

model,
    single
```

Figure 51: Filtered list of DAKOTA input file templates

The input will be displayed in JAGUAR as shown in Figure 52. Try some of the following:

- Introduce errors into the input, notice error decorators, and mouse over them to see the tooltip errors.
- Mouse over keywords to see additional information.
- To run the advanced parsing engine and auto-format the text, press Ctrl-Shift-F or **Edit** → **Format**. Observe the updated rosenbrock_2d template input file depicted in Figure 53.
- You can always Undo (Ctrl-Z or **Edit** → **"Undo Typing"**) and Redo (Ctrl-Y or **Edit** → **"Redo Typing"**) to compare.

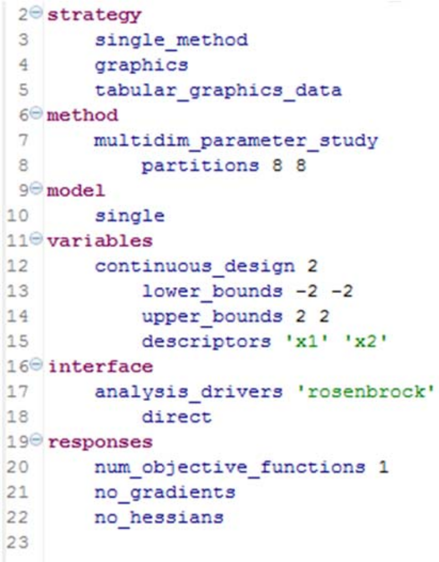


```
## DAKOTA INPUT FILE - dakota_rosenbrock_2d.in


strategy,
    single_method
      graphics,tabular_graphics_data

method,
    multidim_parameter_study
      partitions = 8 8

model,
    single

variables,
    continuous_design = 2
      lower_bounds     -2.0      -2.0
      upper_bounds      2.0       2.0
      descriptors       'x1'      "x2"

interface,
    direct
      analysis_driver = 'rosenbrock'

responses,
    num_objective_functions = 1
    no_gradients
    no_hessians


```

Figure 52: rosenbrock_2d input file

In Figure 53 notice the following:

- cleaner look (extra spaces and newlines removed);
- `analysis_driver` replaced with `analysis_drivers` (the DAKOTA default keyword);
- `direct` now a sub-element of `analysis_drivers` (ordered according to the DKAOTA input specification syntax); and
- double quoted “x2” replaced with single quoted ’x2’ (uniformity).



```
 2 strategy
 3     single_method
 4     graphics
 5     tabular_graphics_data
 6 method
 7     multidim_parameter_study
 8         partitions 8 8
 9 model
10     single
11 variables
12     continuous_design 2
13         lower_bounds -2 -2
14         upper_bounds 2 2
15         descriptors 'x1' 'x2'
16 interface
17     analysis_drivers 'rosenbrock'
18         direct
19 responses
20     num_objective_functions 1
21     no_gradients
22     no_hessians
23
```

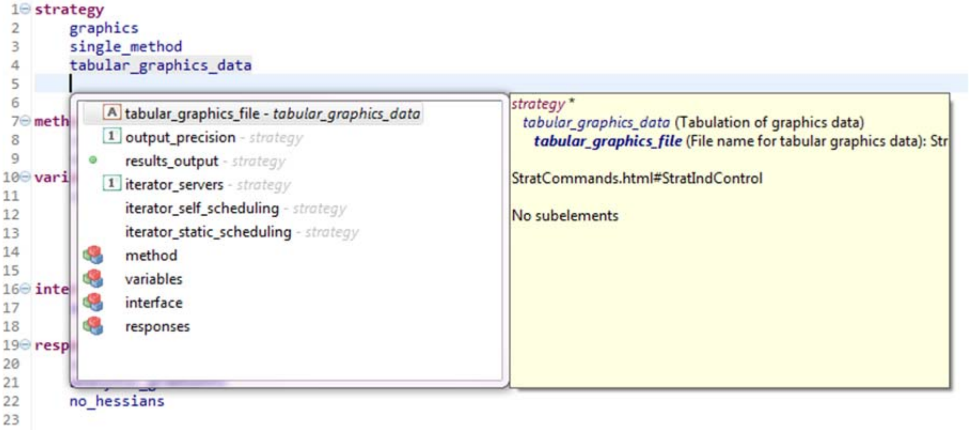
Figure 53: "Updated" rosenbrock_2d template input file after using the format option

To execute DAKOTA to perform this two-dimensional parameter study, select the tab "(3) Execute Problem" at the bottom (see previously in Figure 27). Click "Check". Notice the following output (for reference see Figure 30**Error! Reference source not found.**):

- actual DAKOTA command (in green) that just ran, followed by.
- output of DAKOTA's check mode.

Now go back to the Source (1st tab):

- Find *tabular_graphics_data* (around line 5), create a new line below and press Ctrl-Space. Notice a list of potential keywords are listed in a dropdown, see Figure 54.
- Press up or down arrows to navigate.
- Navigate to "*output_precision*" but DO NOT press Enter.



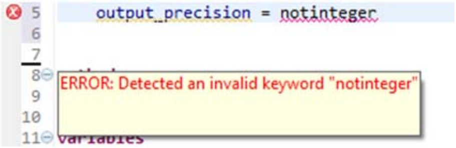
```
 1 strategy
 2     graphics
 3     single_method
 4     tabular_graphics_data
 5     |
 6
 7 meth
 8
 9
10 vari
11
12
13
14
15
16 inte
17
18
19 resp
20
21
22     no_hessians
23
```

tabular_graphics_file - tabular_graphics_data
output_precision - strategy
results_output - strategy
iterator_servers - strategy
iterator_self_scheduling - strategy
iterator_static_scheduling - strategy
method
variables
interface
responses

```
strategy *
  tabular_graphics_data (Tabulation of graphics data)
    tabular_graphics_file (File name for tabular graphics data): Str

StratCommands.html#StratIndControl

No subelements
```

Figure 54: Ctrl-Space Auto-completing keywords in the text editor.

- Notice that strategy is highlighted in the text, and also listed next to output_precision. Auto-completing keywords are reverse sorted, so that keywords at the top are the closest context-matching keywords. This helps you discover relevant keywords.
- Select *output_precision* by double clicking.
- Notice auto-complete types in an equal "=" for you to remind you to enter a value and a yellow triangle with exclamation appears indicating missing data.
- Type in "notinteger" for the value of output_precision.   A red circle with X and red underline appear to indicate an error. Mouse over it (as in Figure 55) to see the reason for the error.



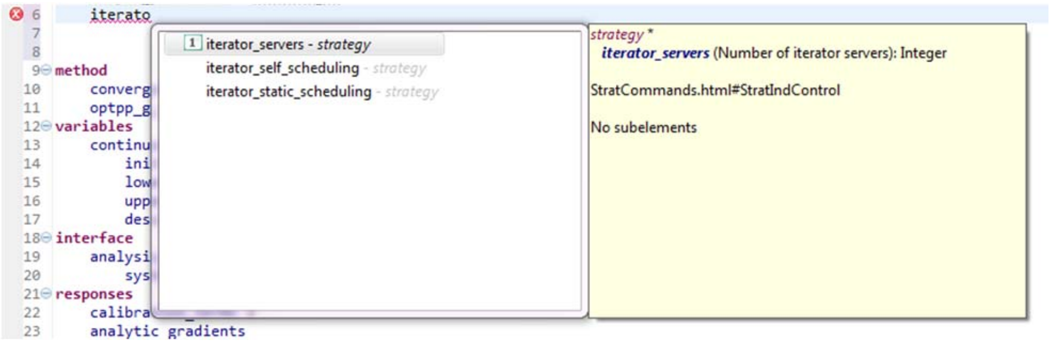
```
    output_precision = notinteger
```

ERROR: Detected an invalid keyword "notinteger"

```
variables
```

Figure 55: Text error detailed message.

- Correct by replacing it with a valid integer, such as 9, and notice error marker disappears.
- On the next line, type in "iterato", then right after the "o" in "iterato", press Ctrl-Space.
- Notice auto-completion can also finish off half-completed keywords. Pick one (see Figure 56).



```
    iterato


method
    converg
    optpp_g
variables
    continu
        ini
        low
        upp
        des
interface
    analysi
        sys
responses
    calibra
    analytic gradients
```

iterator_servers - *strategy*
iterator_self_scheduling - *strategy*
iterator_static_scheduling - *strategy*

strategy *
iterator_servers (Number of iterator servers): Integer

StratCommands.html#StratIndControl

No subelements

Figure 56: Text editor auto-completion of partial words.

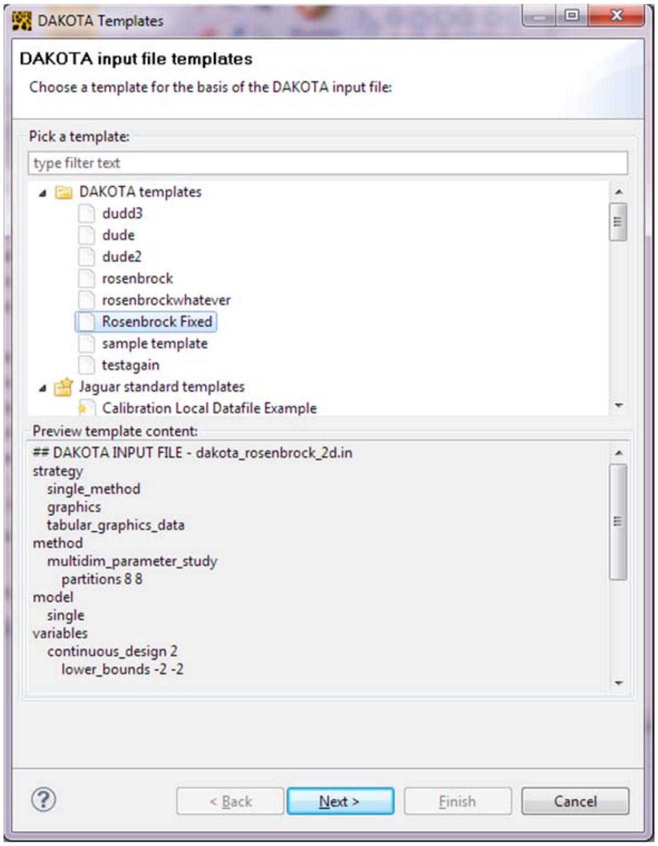
Save this edited rosenbrock file as your own template (see Figure 49): **File → Save As Template**

- Notice: the default save location is that specified earlier in the Jaguar Preferences.
- Name it "Rosenbrock Fixed".
- Click "Save".

Close all files (Ctrl-Shift-W) or **File → "Close All"**. No need to save changes.

Click on **File → New → DAKOTA input file from template.** Notice that both JAGUAR and User-created templates are available.

- Do either of the following:
    1. Type “Fixed” in the quick search bar and select “Rosenbrock Fixed”.
    2. Navigate down and select “Rosenbrock Fixed”.



DAKOTA input file templates

Choose a template for the basis of the DAKOTA input file:

Pick a template:

type filter text

- DAKOTA templates
    - dudd3
    - dude
    - dude2
    - rosenbrock
    - rosenbrockwhatever
    - Rosenbrock Fixed
    - sample template
    - testagain
- Jaguar standard templates
    - Calibration Local Datafile Example

Preview template content:

```
## DAKOTA INPUT FILE - dakota_rosenbrock_2d.in
strategy
  single_method
  graphics
  tabular_graphics_data
method
  multidim_parameter_study
    partitions 8 8
model
  single
variables
  continuous_design 2
    lower_bounds -2 -2
```

Figure 57: Rosenbrock Fixed DAKOTA Template.

- Notice in Figure 57 that:
    1. This time we are creating an input file from a user-created template.
    2. User-created templates do not have stars on them and are listed at the top.
- A preview of the template file should be visible.
- Select “Next”.
- Specify a filename such as “rosenbrock_fixed.i”.
- Select “Finish”.

This completes the basic tutorial showing a few features of JAGUAR.

12: Troubleshooting

In case of unresolvable errors, review the current JAGUAR FAQ linked from the download page and the DAKOTA web pages. The most common troubleshooting options are excerpted here for convenience:

1. Check for sufficient Java version: In a terminal or Command Prompt type "java -version". You should have at least Java 1.6.
2. If there exists a corrupted JAGUAR workspace, remove the workspace (User_folder > Jaguar_workspace) and configuration (User_folder > .jaguar-configuration).
3. If some window views are missing or if they are incorrectly positioned, restore the default view by selecting: **Window→Reset** Window Layout
4. Enable Error Log: **Window→Show View→Error Log** (see Figure 58). This view will provide detailed logging of anything that went wrong inside JAGUAR.

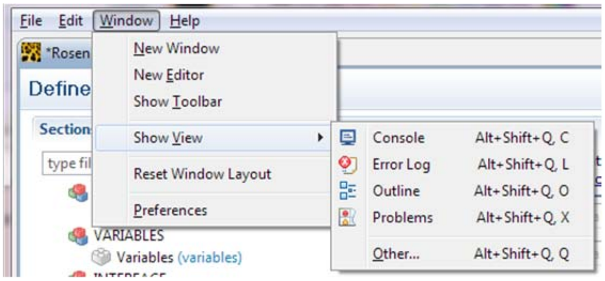


Figure 58: Enabling JAGUAR Error Log.

Send any errors listed to our support email jaguar-help@sandia.gov.

Distribution

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