

ShapeWorks Remote Client

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Overview

ShapeWorks Remote Client is a GUI application that provides a user-friendly interface to the ShapeWorks software package. The purpose of the ShapeWorks software is to compute shape statistics over a set of input datasets to parameterize the sources of their variation. It does this by first computing correspondence points on each of the input surfaces and then producing a principal components analysis over those correspondences. Because this computation can be resource- and time-intensive, it is well-suited to a client/server framework. The ShapeWorks Remote Client connects with a remote “Broker” which then matches the Client with a Server for doing the desired computation. The Client is then free to disconnect at will, and reconnect at a later time to check on the progress of the computation. Because ShapeWorks involves many parameters and several stages, visualization mechanisms are available to the user to provide feedback to their choices and analysis of the results. The data produced by the ShapeWorks pipeline can be downloaded to the user’s machine for further analysis offline.

Installation

Using the installer

For Mac and Windows users, an installer is available to simplify and expedite the installation process. This installer can be found at <http://software.sci.utah.edu>.

SVN

For Unix users and users wishing to build their own installations, the source code can be checked out using svn:

```
svn checkout --username anonymous https://gforge.sci.utah.edu/svn/swremote
```

Build instructions can be found in “Install.txt” in the src directory of the checkout.

Running

The Client application, called ShapeWorks Client, can be double-clicked or run from the command line.

Connecting to a Server

Upon startup, the user is presented with a login screen. Use of the ShapeWorks Client requires a user account on a remote system. If the user wishes to utilize servers belonging to the SCI Institute at the University of Utah (<http://www.sci.utah.edu>) then a request should be sent to shapeworksremote-support@sci.utah.edu. Once the user’s request has been fulfilled they will receive a follow-up email message detailing the Broker address and Port information for connecting to SCI’s ShapeWorks servers.

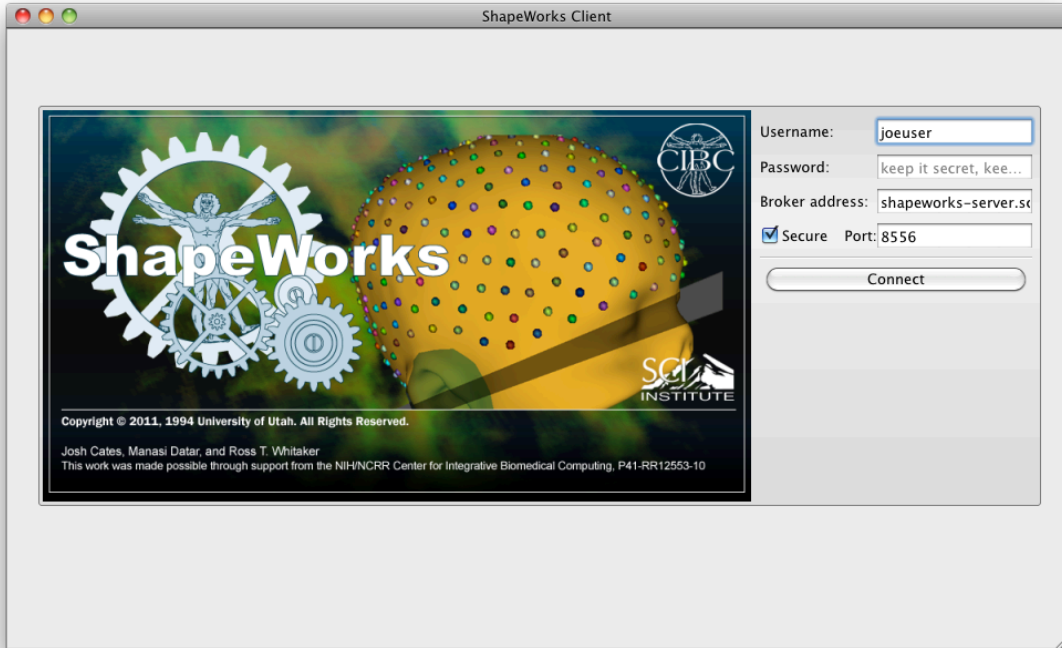


Figure 1: ShapeWorks Client Login Window

Adding a New Project

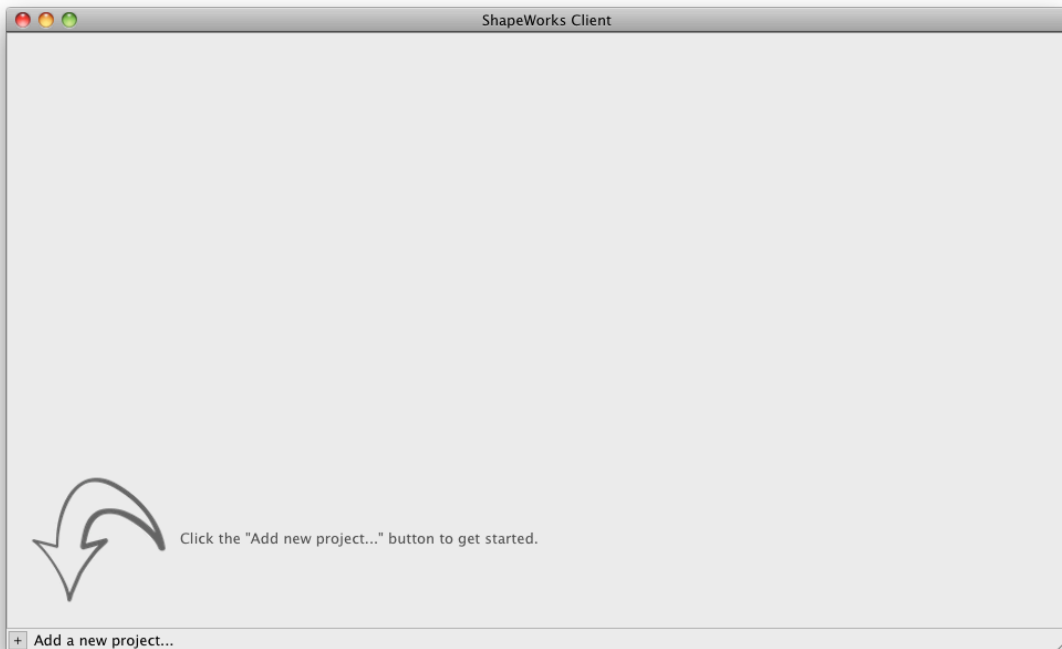
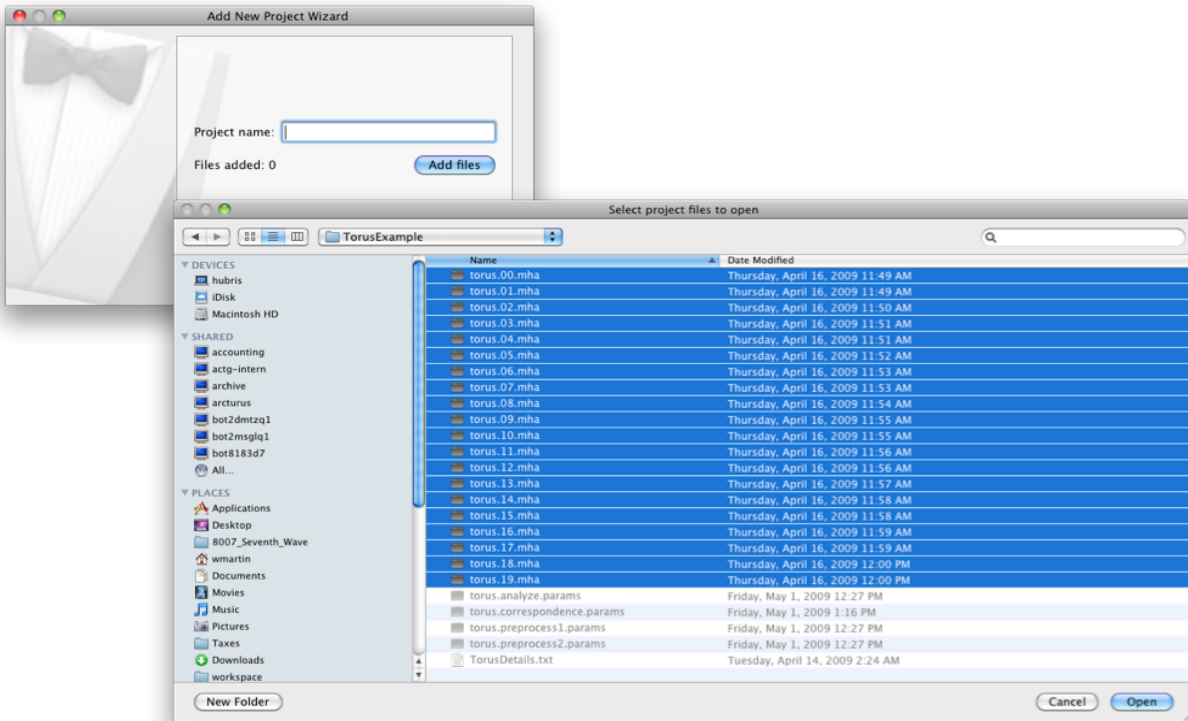


Figure 2: New Project Wizard

When logging in for the first time, a wizard provides guidance on how to create a new project. Clicking on the “plus” button presents the user with a file browser where project inputs may be selected.



Once the files have been selected, the first stage of the pipeline, labeled “Files” shows the progress of the upload to the remote system.

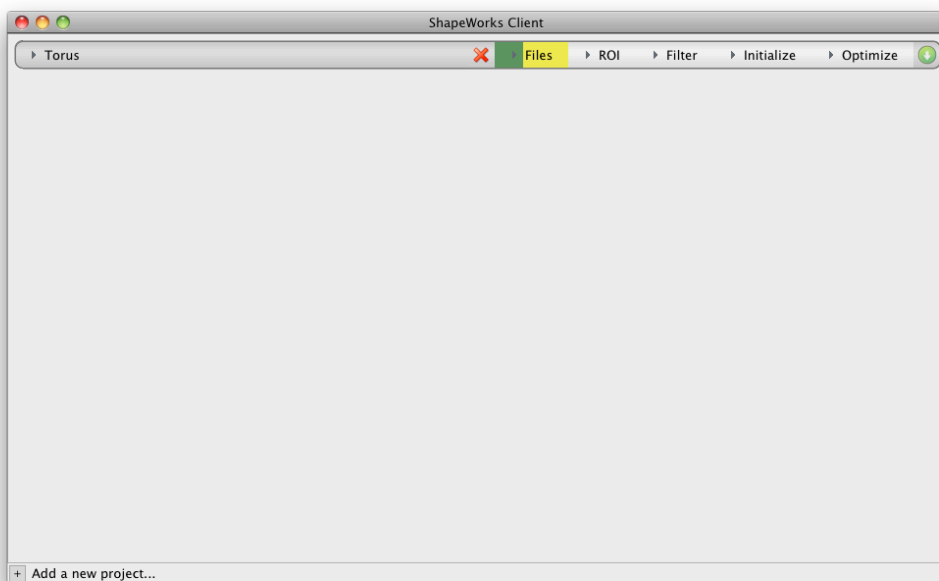


Figure 3: Uploading Files

Configuring a Project

Subsequent to the initial project file upload, the user can alter the inputs to the pipeline by clicking on the “Files” label for that project.

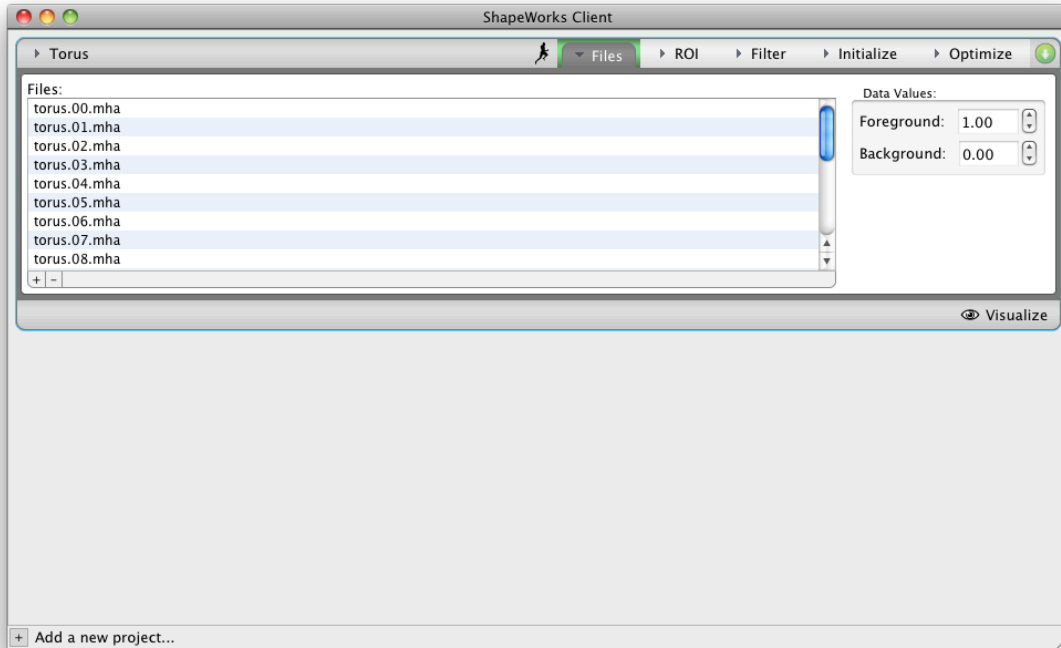


Figure 4: Files configuration menu

The ShapeWorks Remote pipeline comprises four processing stages, called “ROI”, “Filter”, “Initialize”, and “Optimize”. Each of these stages has a set of configuration options, accessible by clicking on the stage label, as shown below. The Client interface provides concise descriptions of the function of each parameter within the configuration menus. Please refer to the ShapeWorks manual for more detail.

The ROI stage provides simple tools for selecting the area of interest within a volume. Optional parameters can be enabled with checkboxes.

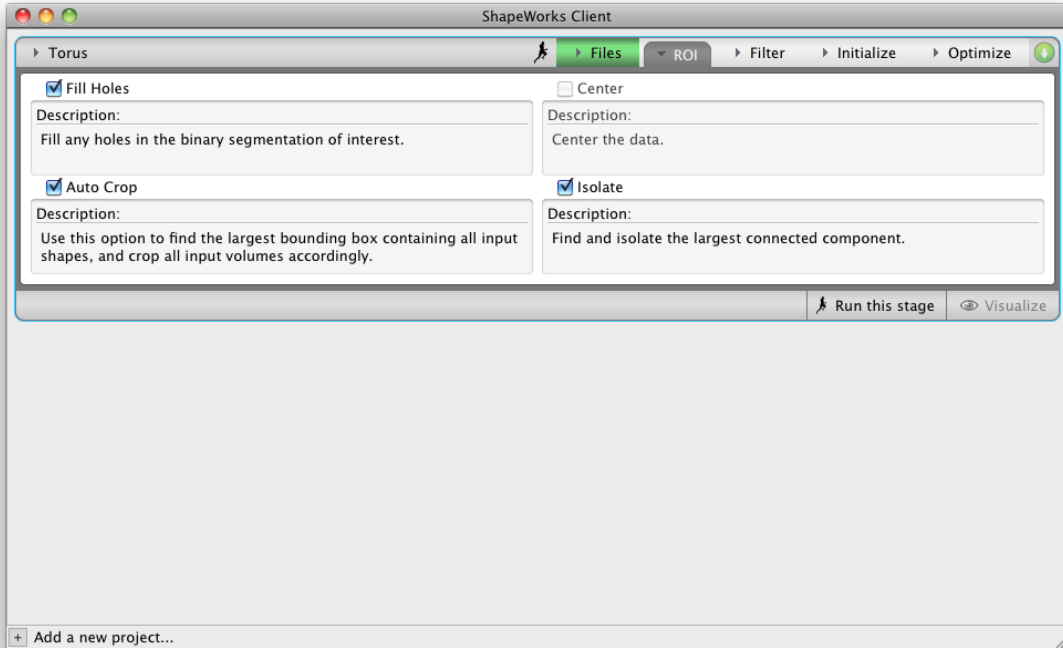


Figure 5: ROI Stage Configuration

The Filter stage provides methods for removing artifacts from the data. Filter parameters can be adjusted using the spinner widgets.

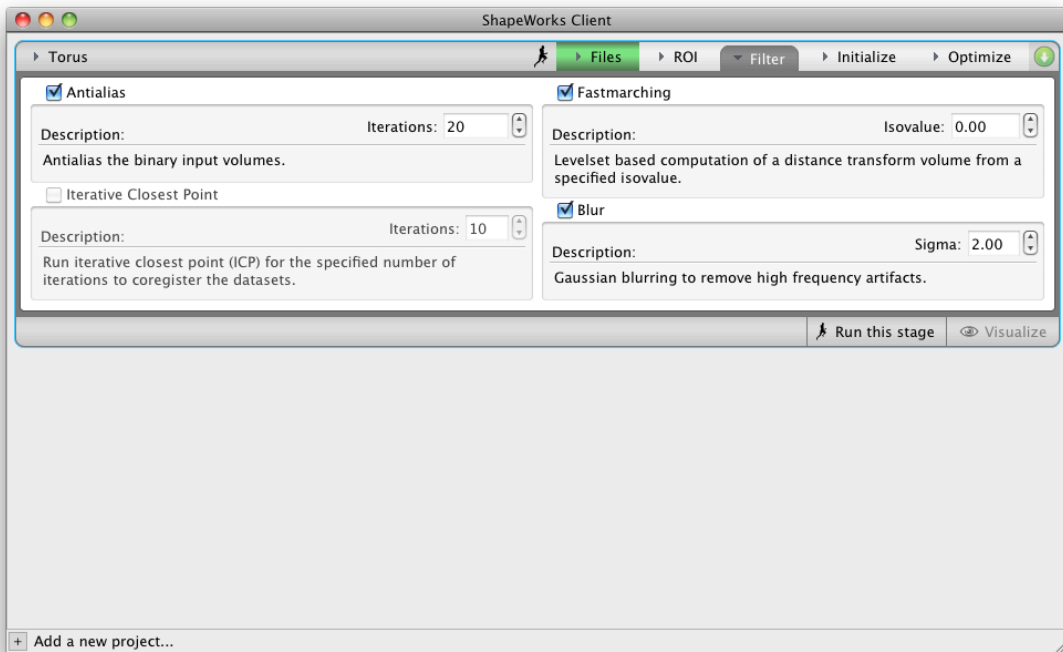


Figure 6: Filter Configuration

The Initialization stage produces the initial placement of seed points on the input shapes.

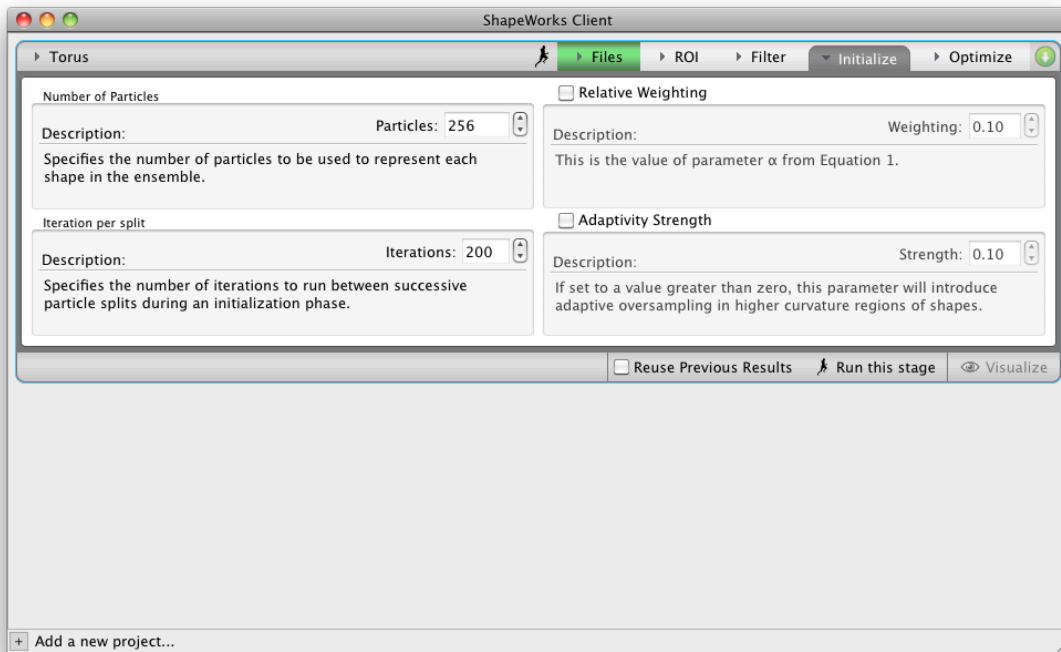


Figure 7: Initialize Configuration

The Optimization stage relaxes the particles into their final surface positions and also computes the correspondences across the input surfaces. Note that results from a previous run of this stage can be used as a starting point if more iterations are required. Simply check "Reuse Previous Results".

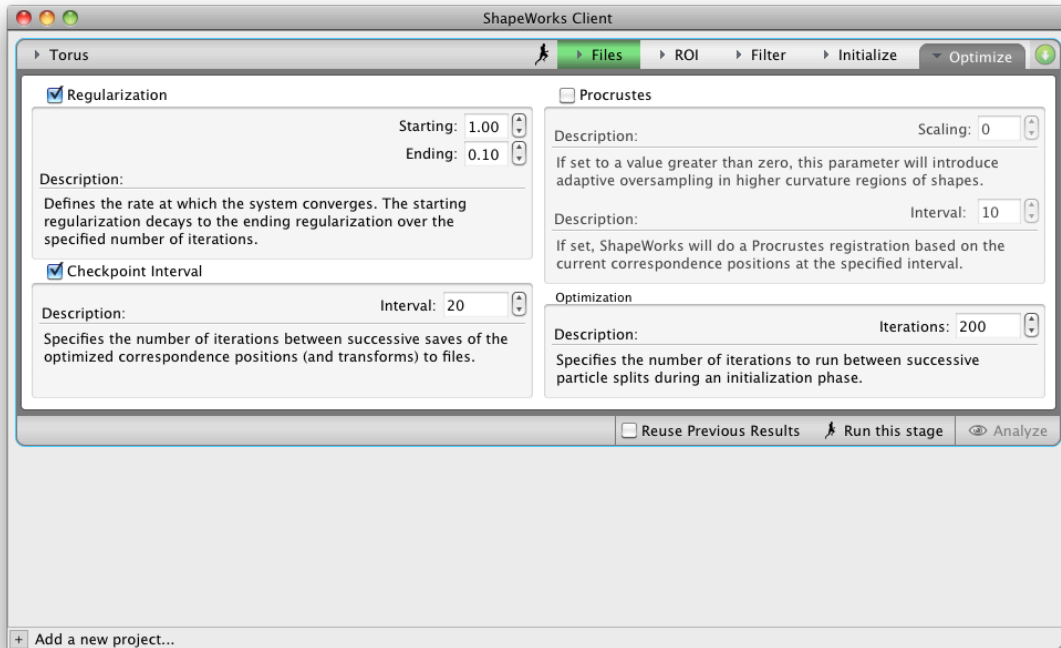
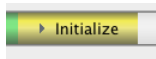


Figure 8: Optimize Configuration

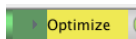
Running a Project



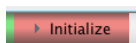
A ShapeWorks Remote project may be run in two ways. It may be run through all stages by clicking the “running man” icon to the left of the “Files” stage label. It can also be run one stage at a time by selecting the “Run this stage” button in the per-stage drop down menu. This button also provides the mechanism for forcing a successfully completed stage to be rerun *without* altering the parameters.



When a stage is running, it turns yellow.



In the case of the Files and Optimize stages, the yellow gradually fills with green indicating progress, allowing the user to gauge the time remaining.



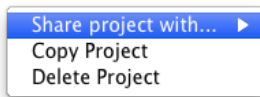
In the case of an error, the stage status indicator will turn red.

Canceling a Stage

When a stage begins to run, the “running man” icon next to the “Files” stage label is replaced with a red “X”. Clicking this button will stop the running stage and mark it as incomplete.



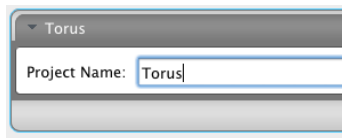
Sharing, Copying, and Deleting a Project



Right clicking on a project’s name gives the user access to the project’s edit menu. The project may be shared with other users (meaning that it becomes visible to them in their list of available projects). The project may also be copied or deleted. The former action allows a user to explore multiple simulation parameters in order to optimize the analysis. The Delete action removes all information related to the project from the remote system and cannot be undone.

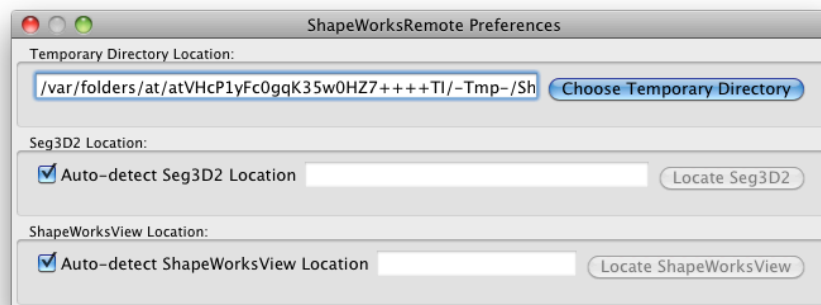
Renaming a Project

A project may be renamed by left-clicking the project name and supplying a new string.



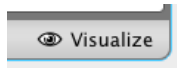
Configuring Preferences

The user can configure several preferences via the Edit>Edit User Preferences menu item. The location of the temporary directory used for downloading files for Visualizing stages can be changed. ShapeWorks Remote Client generally can locate automatically the programs used for visualization (Seg3D2 and ShapeWorksView). However, should this fail, the user can manually point the Client to these programs.



Visualizing a Stage

The outputs of each stage may be visualized to provide feedback to the user's choices. The first three stages – “Files”, “ROI”, and “Filter” – employ Seg3D2 to visualize the inputs. Visualization is available for completed stages by clicking the Visualize button under the configuration menu for each stage.



A file browser menu will appear, allowing the user to select the files they wish to visualize. A progress bar will indicate the time remaining for the download to the user's system.

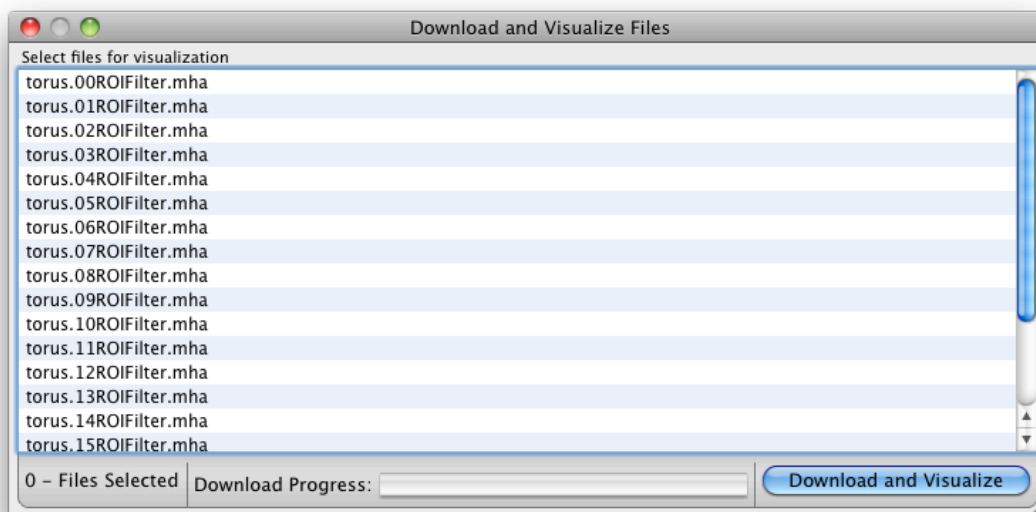


Figure 9: Selecting files for visualization

Once the Client has downloaded the selected outputs, it launches Seg3D2 to provide visualization.

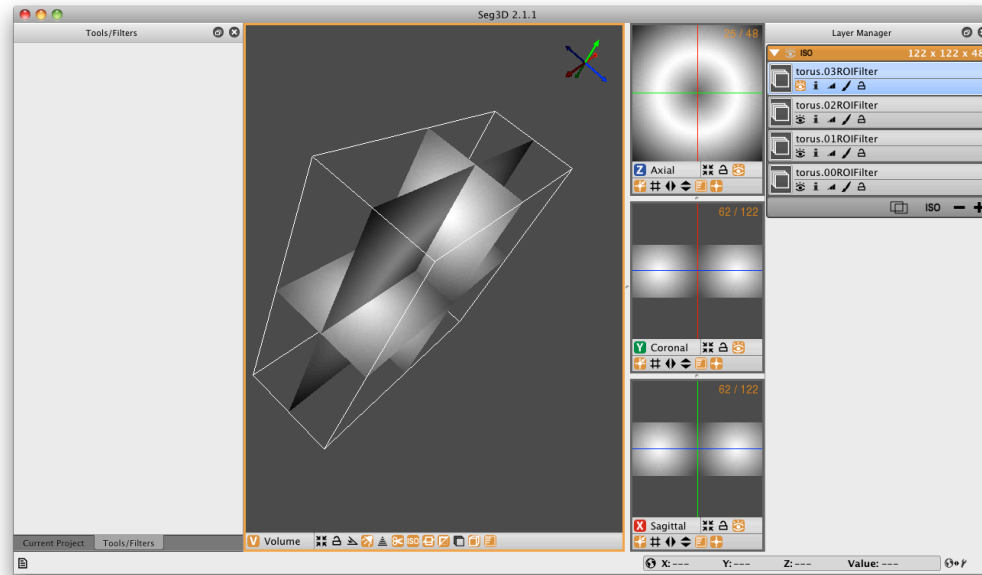
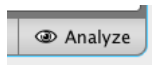


Figure 10: Seg3D2 Visualization of the Filter Stage

The final stages – “Initialize” and “Optimize” – employ ShapeWorksView for visualization. The Optimization stage provides real-time updates as the ShapeWorks software proceeds to move the points on the input surfaces in order to minimize energy. This visualization is accessed by selecting the Analyze button in the configuration menu.



After using the file browser to select the outputs to analyze, the Client will launch ShapeWorksView.

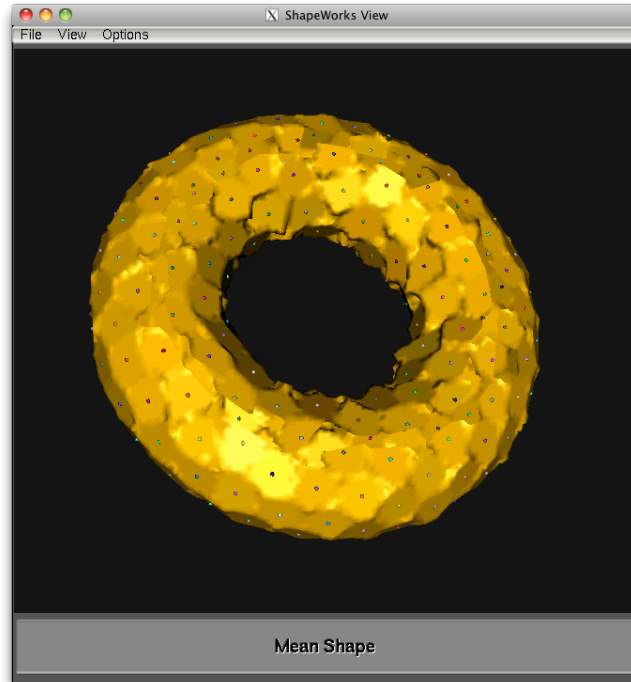


Figure 11: ShapeWorksView Visualization of the Optimization Stage

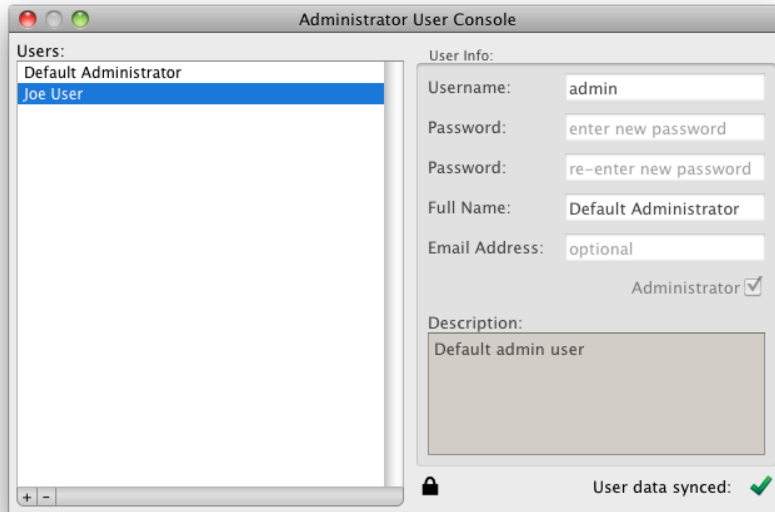
Downloading Results



Once the Optimize stage has been run for a project, the final outputs of the ShapeWorks pipeline can be downloaded by clicking on the down arrow icon to the right of the Optimize label.

User Administration

Users can be added and edited using the Edit>Edit Users menu. If a user is an administrator, they can add, delete, and edit other users. To edit a user, select the user in the left pane and click the lock icon at the bottom of the window.



Getting Help

Technical support for ShapeWorks Remote is available through shapeworksremote-support@sci.utah.edu.