PROT*EXPRESS*

User's Guide

NATIONAL® CANCER INSTITUTE

Center for Bioinformatics

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About This Guide

This section introduces you to the *protExpress User's Guide*. It includes the following topics:

Purpose

This guide explains how to use protExpress, a proteomics experiment and protocol data management tool that you can use to search and manage proteomics experiment and protocol data. You can also use protExpress to export stored experimental data to XAR format.

Audience

Typical User

This guide is designed for bioinformaticians at the National Cancer Institute (NCI) and its affiliated institutions who need to annotate, store, and share proteomics experimental annotation and data as part of cancer research and clinical trials .

Prerequisites

To get the most out of this guide, you should be familiar with the following topics:

- Proteomics
- CPAS
- XAR

This documentation is not intended for programmers intending to install and deploy protExpress. For installation and deployment instructions, refer to the protExpress project in Gforge.

Topics Covered

The following brief overview, which explains what you will find in each chapter and appendix.

- *Working with protExpress* on page 5 explains how to use protExpress to manage protocol and experiment data.
- *protExpress Glossary* on page 25 is a glossary of terms related to protExpress.

Additional References

For more information about protExpress, see the following references:

- Analysis and Design Documents
- protExpress Object Model
- Requirements and Use Cases
- protExpress Installation and Deployment Instructions

Text Conventions Used

This section explains conventions used in this guide. The various typefaces represent interface components, keyboard shortcuts, toolbar buttons, dialog box options, and text that you type.

Convention	***Description***	***Example***
Bold	Highlights names of option buttons, check boxes, drop-down menus, menu commands, command buttons, or icons.	Click **Search**.
URL	Indicates a Web address.	http://domain.com
text in SMALL CAPS	Indicates a keyboard shortcut.	Press ENTER.
text in SMALL CAPS + text in SMALL CAPS	Indicates keys that are pressed simultaneously.	Press SHIFT + CTRL.
Italics	Highlights references to other documents, sections, figures, and tables.	See *Figure 4.5*.
Italic boldface monospace type	Represents text that you type.	In the **New Subset** text box, enter ***Proprietary Proteins.***
Note:	Highlights information of particular importance	**Note:** This concept is used throughout the document.
{ }	Surrounds replaceable items.	Replace {last name, first name} with the Principal Investigator's name.

Credits and Resources

The following people contributed to the development of this document.

protExpress Development and Management Teams		
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CHAPTER

3

WORKING WITH PROTEXPRESS

This section includes the following topics:

Getting Started

This section includes the following topics:

Registering Users

Your system administrator can manage user registration by validating against the database stored in protExpress or *LDAP*.

If the system administrator chooses to use the protExpress database, which is the default, the protExpress home page includes links to a registration page, as shown in *Figure 3.1* on page 6.

This section explains how to add a user account to the protExpress database.

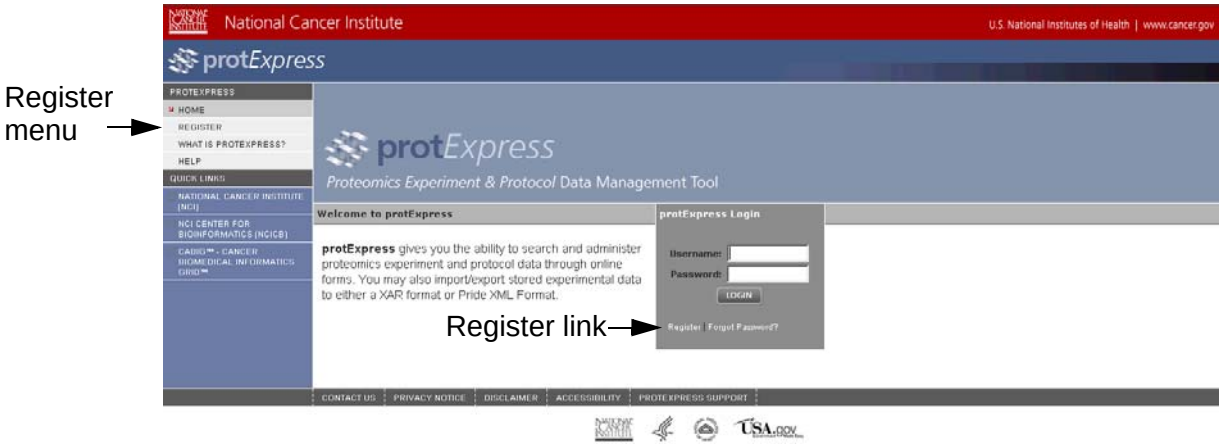

Figure 3.1 protExpress home page with registration links

To register to use protExpress

1. Click the **Register** menu in the upper left of the home page or the **Register** link in the protExpress Login area. The Registration page appears.

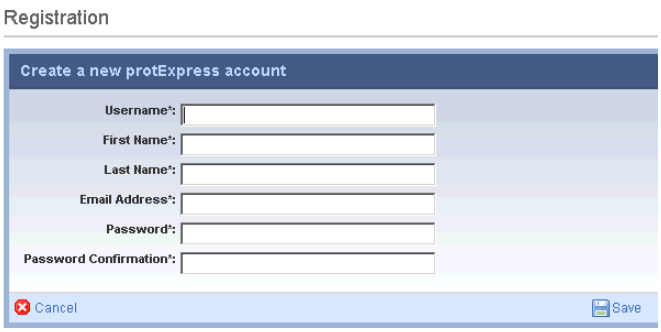

Figure 3.2 Registration page

2. In the **Username** field, enter a name for the user that is unique within the local database and follows your standard naming conventions. This is a required field.
3. In the **First Name**, **Last Name**, **Email Address**, **Password**, and **Password Confirmation** fields, enter the new user's information. All of these fields are required.
4. Click Save. If you entered all of the required information, the Registration Complete page appears.

Figure 3.3 Registration Complete message

Logging In

To log in to protExpress, enter your username and password on the protExpress home page. If you do not yet have an account, see *Registering Users* on page 5.

Figure 3.4 Login area on the protExpress home page

If you have forgotten your password, click **Forgot Password?**.

Using the Dashboard

After logging in to protExpress, you arrive at the Dashboard. To return to the Dashboard after working in other areas of protExpress, click **Dashboard** in the protExpress menu. *Figure 3.5* shows a sample Dashboard.

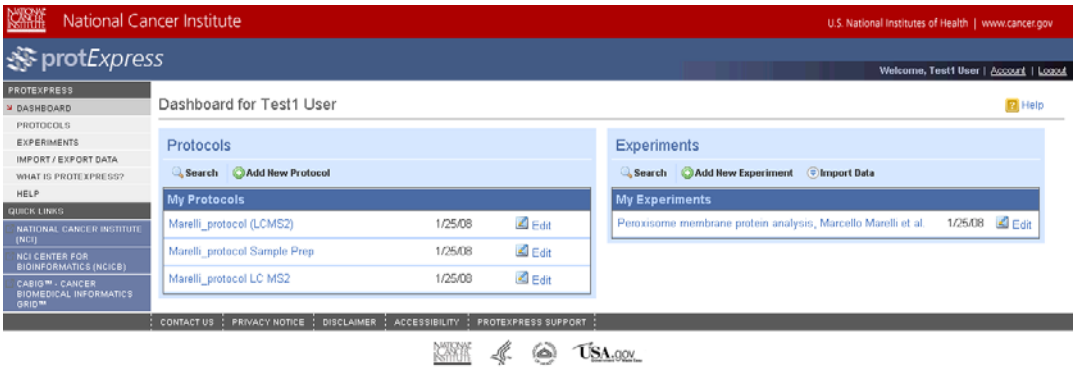

Figure 3.5 protExpress Dashboard

The protExpress Dashboard lists the three protocols and three experiments that you must recently added to protExpress, along with the dates when you added them. Only protocols and experiments that you own appear in these lists.

You can start the following tasks from the Dashboard:

- Search for a protocol or an experiment
- Add a new protocol or an experiment
- Edit a protocol or an experiment
- Import experiment data

For more information, see:

- *Searching for an Experiment* on page 12
- *Adding a Protocol* on page 9
- *Adding an Experiment* on page 13
- *Editing a Protocol* on page 10
- *Editing an Experiment* on page 15
- *Managing Experiments* on page 11
- *Importing Data* on page 23

Managing Protocols

This section includes the following topics:

- *Searching for a Protocol* on page 8
- *Adding a Protocol* on page 9
- *Editing a Protocol* on page 10
- *Deleting a Protocol* on page 11

Searching for a Protocol

The protocol you want to work with may not appear in the Dashboard, which lists only the three protocols you most recently added to protExpress. To find other protocols, you can search for them.

To search for a protocol

1. On the Dashboard, click Search in the Protocols area or select the **Protocols** menu option. The Search Protocols page appears.

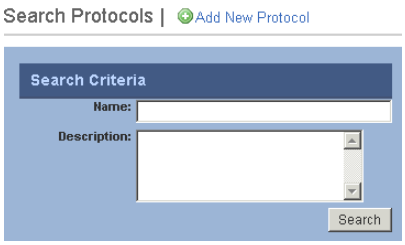

Figure 3.6 Search Protocols page

2. In the **Name** field, enter one ore more characters of the protocol name.
3. In the **Description** field, enter all or part of the actual description that protExpress is storing for this protocol.

   Note: The more characters you enter, the more precise your search and the fewer results you receive. Both search criteria are optional. If you do not enter any search criteria, all protocols in protExpress appear in the search results.

4. Click **Search**. Search results appear in a table below the search criteria. You can edit any protocol in the list that you own.

Note: You can sort any of the columns in the search results list by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has a double arrow (▾) beside the column name. The highlighted arrow represents the primary sort key.

For more information, see:

- *Editing a Protocol* on page 10

Adding a Protocol

In protExpress, a protocol is a reusable entity that can be associated with any experiment.

When you add a protocol, protExpress considers you the protocol's owner and you are the only one who can edit it.

To add a protocol

1. On the Dashboard or Search Protocols page, click Add New Protocol. The Add New Protocol page appears.

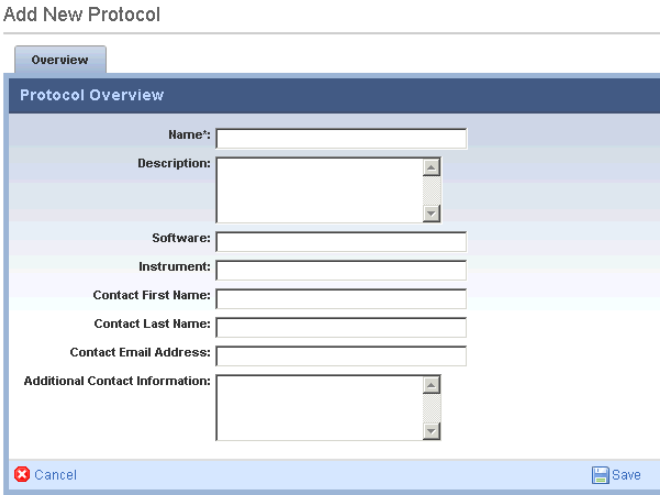

Figure 3.7 Add New Protocol page

2. In the **Name** field, enter a name for the new protocol. This is a required field.
3. Enter the protocol's description and its associated software, associated instrument, and contact information for the protocol owner in the respective fields. Entering information in these fields is optional. Note that you can use the content of the Name and Description fields in a search for this protocol later.

   Note: protExpress uses standard naming conventions to automatically generate an *LSID* for the new protocol.

4. Click Save. The Edit Protocol page appears, displaying the Overview tab, which contains the values you entered in steps *2.* and *3.*

   You can now optionally provide additional information about the protocol in the Parameters tab. For more information, see *Editing a Protocol* on page 10.

Editing a Protocol

As a protocol owner, you can edit any of the protocol's properties. Protocol properties in protExpress mirror those specified in the *XAR* format used by *CPAS*.

To edit a protocol

1. Find the protocol you want to edit by either of the following methods:
   - In the My Protocols area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
   - In the Actions column on the Search Results page, click Edit in the row corresponding with the experiment you want to edit.

   The Edit Protocol page appears.

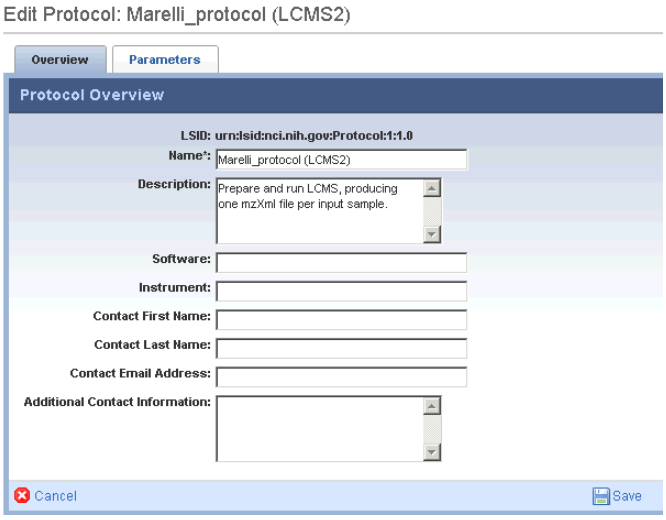

Figure 3.8 Sample Edit Protocol page

2. As needed, edit the protocol's properties that are listed in the Overview and Parameters tabs. Refer to *Table 3.1* below for more information about these properties.
3. Before moving to another tab, click Save to save your changes or click Cancel to delete them. If you do not click Save before moving to another tab, you will lose your changes.

   Note: Hover your mouse over the maroon, dotted text below to see a popup window with more information about the word.

Options Available on Each Tab	***Expected Value***
Overview Tab	
Name (required)	Protocol name
Description	Protocol description
Software	Software associated with protocol
Instrument	Instrument associated with protocol
Contact First Name	Protocol owner's first name

Table 3.1 Properties of each protocol

Options Available on Each Tab	***Expected Value***
Contact Last Name	Protocol owner's last name
Contact Email Address	Protocol owner's first name email address
Additional Contact Information	Any other unique identifier for the protocol owner
Parameters Tab	

Table 3.1 Properties of each protocol

Deleting a Protocol

You must use protExpress's search feature to delete a protocol.

To delete a protocol

1. Search for the protocol you want to delete. The Search Results page appears.
2. In the row corresponding with the protocol you want to delete, click Delete. A message appears confirming that you were successful in deleting the protocol.

Managing Experiments

This section includes the following topics:

Working with Experiments

This section includes the following procedures:

Searching for an Experiment

The Dashboard lists the three experiments you most recently added to protExpress. To find other experiments, you can search for them.

To search for an experiment

1. On the Dashboard, click Search in the Experiments area or select the **Experiments** menu option. The Search Experiments page appears.

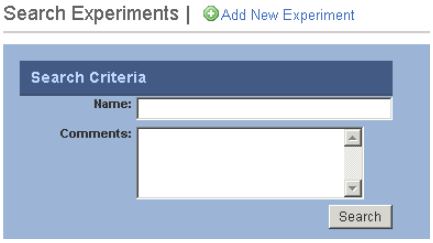

Figure 3.9 Search Experiments page

2. In the **Name** field, enter one ore more characters of the protocol name.
3. In the **Comments** field, enter all or part of the actual comments that protExpress is storing for this experiment.

   Note: The more characters you enter, the more precise your search and the fewer results you receive. Both search criteria are optional. If you do not enter any search criteria, all experiments in protExpress appear in the search results.

4. Click **Search**. Search results appear in a table below the search criteria. You edit any experiment in the list that you own.

   Note: You can sort any of the columns in the search results by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has a double arrow (▞) beside the column name. The highlighted arrow represents the primary sort key.

Adding an Experiment

When you add an experiment, protExpress considers you the experiment's owner and you are the only one who can edit it.

To add an experiment

1. On the Dashboard or Search Experiments page, click Add New Experiment. The Add New Experiment page appears.

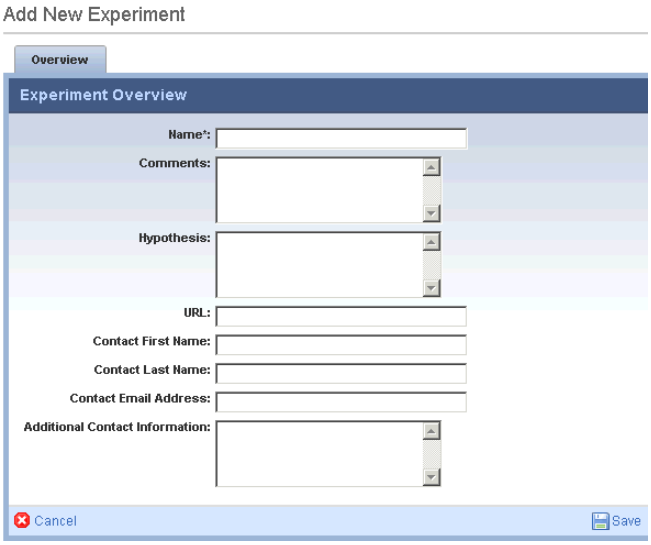

Figure 3.10 Add New Experiment page

2. In the **Name** field, enter a name for the new experiment. This is a required field.
3. Enter text into the **Comments**, **Hypothesis**, **URL**, **Contact First Name**, **Contact Last Name**, **Contact Email Address**, and **Additional Contact Information** fields. Entering information into these fields is optional. Note that you can use the information you enter in the Name and Comments fields to search for this experiment later.

   Note: protExpress uses standard naming conventions to automatically generate an *LSID* for the experiment.

4. Click Save. The Edit Experiment page appears, displaying the Overview tab, which contains the values you entered in steps *2.* and *3.* .

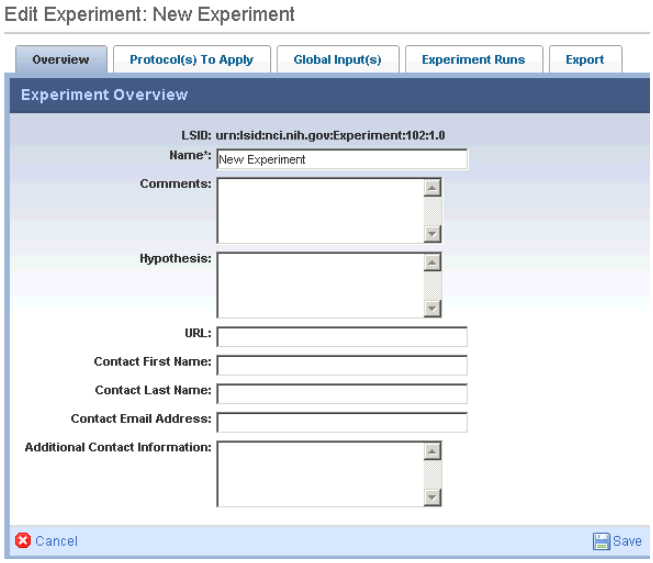

Figure 3.11 Edit Experiment page

You can now optionally provide additional information about the experiment in the Protocol(s) To Apply, Global Input(s), Experiment Runs, and Export tabs. For more information about these tabs, see *Editing an Experiment* on page 15.

Editing an Experiment

As an experiment owner, you can edit any of the experiment's properties. Experiment properties in protExpress mirror those specified in the *XAR* format used by *CPAS*.

To edit an experiment

1. Open the experiment you want to edit using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
   - After searching for an experiment (for more information, see *Searching for an Experiment* on page 12), click Edit in the row corresponding with the experiment you want to edit.
2. The Edit Experiment page appears, displaying the Overview tab.

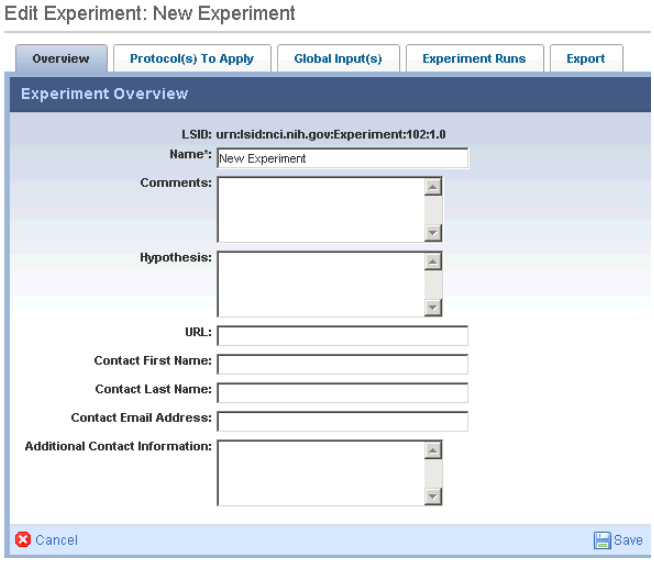

Figure 3.12 Edit Experiment page

Note: Several tabs on the Edit Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has a double arrow (▼) beside the column name. The highlighted arrow represents the sort order.

3. As needed, edit the experiment's properties that are listed in the Overview, Protocol(s) To Apply, Global Input(s), Experiment Runs, and Export tabs. Refer to *Table 3.2* on page 16 for more information about these properties.

4. Before moving to another tab, click Save to save your edits or click Cancel to delete them. If you do not click Save before moving to another tab, you will lose your edits.

Tab Field	*Expected Value*
Overview Tab	
Name (required)	Protocol name
Comments	Text comments about the experiment
Hypothesis	Hypothesis related to the experiment
URL	Web site with more information about the experiment
Contact First Name	Experiment owner's first name
Contact Last Name	Experiment owner's last name
Contact Email Address	Experiment owner's first name email address
Additional Contact Information	Any other unique identifier for the experiment owner
Protocol(s) To Apply Tab	
For more information, see *Applying Protocols to Experiments* on page 16.	
Global Input(s) Tab	
For more information, see *Working with Global Inputs* on page 18.	
Experiment Runs Tab	
For more information, see *Working with Experiment Runs* on page 21.	
Export Tab	
For more information, see *Exporting Experiment Data* on page 24.	

Table 3.2 Properties of each experiment

Deleting an Experiment

You must first search for an experiment before you can delete it.

To delete an experiment

1. Search for the experiment you want to delete. For more information on searching, see *Searching for an Experiment* on page 12. The Search Results page appears.
2. In the row corresponding with the experiment you want to delete, click Delete. A message appears confirming that you have deleted the experiment.

Applying Protocols to Experiments

You can set up an experiment to apply one or more protocols in the order you specify. Each experiment run you add to this experiment will apply the same protocols in the same order.

Note: Whenever it does not conflict with the protExpress user interface, this documentation refers to the protocol to apply as a protocol application.

You can define one or more global inputs available to each protocol you apply to the experiment. For more information, see *Working with Global Inputs* on page 18.

This section includes the following topics:

Adding a Protocol Application

When you apply a protocol to an experiment, that protocol is also applied to each experiment run.

To add a protocol application

1. If you have not yet created the experiment to which you want to add the protocol application, create it. For more information, see *Adding an Experiment* on page 13.
2. Open the experiment to which you want to apply a protocol using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
   - After searching for an experiment (see *Searching for an Experiment* on page 12), click Edit in the row corresponding with the experiment you want to edit.

   The Edit Experiment page appears.

   Note: Several tabs on the Edit Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has a double arrow (▼) beside the column name. The highlighted arrow represents the sort order.
3. Select the **Protocol To Apply tab** and then click Add Protocol To Apply. The Add Protocol To Apply page appears.

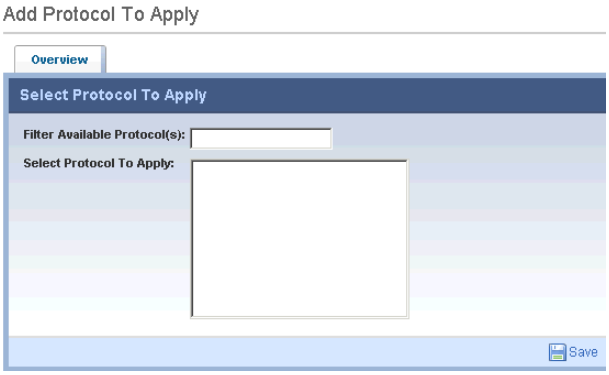

Figure 3.13 Add Protocol To Apply page

4. In the Filter Available Protocol(s) field, start entering the name of the protocol application you want to add. As you type, protExpress finds protocols that match what you have entered. If you are not sure of the protocol name, search for the protocol or enter fewer characters.

Tip: You can select any protocol to apply to a protocol action, including those that you do not own.

5. Click Save. The Edit Experiment page appears, displaying the Protocol(s) To Apply tab. protExpress assigns the protocol you selected a step number. The step number determines the sequence in which each protocols is applied to each experiment run in this experiment.

Deleting a Protocol Application

When you delete the protocol application you only delete its link to the current experiment. You do not delete the protocol itself.

To delete a protocol application

1. Open the experiment that contains the protocol application you want to delete using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment.
   - After searching for an experiment (see *Searching for an Experiment* on page 12), click Edit in the row corresponding with the experiment.

   The Edit Experiment page appears.

   Note: Several tabs on the Edit Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has a double arrow (▪) beside the column name. The highlighted arrow represents the sort order.
2. Select the **Protocol(s) To Apply** tab. All of the protocol applications for this experiment appear in a list.
3. Click Delete in the row corresponding with the protocol application you want to delete. A message appears confirming that you have deleted the protocol application.

Working with Global Inputs

You can specify data and material inputs available to all of the protocol applications across all of the experiment runs for a given experiment. protExpress refers to these inputs as global inputs.

This section contains the following topics:

Adding a Global Input

Once you add a global input to an experiment, it serves as input to each of the associated experiment runs. You can add as many global inputs as necessary for the experiment.

To add a global input

1. Open the experiment to which you want to add one or more global inputs using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
   - After searching for an experiment (see *Searching for an Experiment* on page 12), click Edit in the row of the search results that corresponds with the experiment you want to edit.

   The Edit Experiment page appears.

   Note: Several tabs on the Edit Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has a double arrow (▼) beside the column name. The highlighted arrow represents the sort order.

2. Select the **Global Input(s)** tab.

Figure 3.14 Global Input(s) tab on the Edit Experiment page

3. Click Add New Input. The Add New Input page appears.

Figure 3.15 Add New Input page

4. In the **Name** field, enter a name for the global input. This is a required field.
5. In the **Data File Name** field, enter the file name of a data file associated with the global inpu. This is an optional field. If the global input is a material, leave this field blank.

   Note: protExpress uses standard naming conventions to automatically generate an *LSID* for the global input.

6. Click Save. The Edit Input page appears.

Editing a Global Input

You can edit a global input's name and data file name. You cannot edit the *LSID.*

To edit a global input

1. Open the experiment that contains the global input you want to edit using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment.
   - After searching for an experiment (see *Searching for an Experiment* on page 12), click Edit in the row corresponding with the experiment.

   The Edit Experiment page appears.

   Note: Several tabs on the Edit Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has a double arrow (▼) beside the column name. The highlighted arrow represents the sort order.

2. Select the **Global Input(s)** tab.

Figure 3.16 Global Input(s) tab on the Edit Experiment page

3. In the Actions column, click Edit in the row corresponding with the global input you want to edit. The Edit Input page appears.

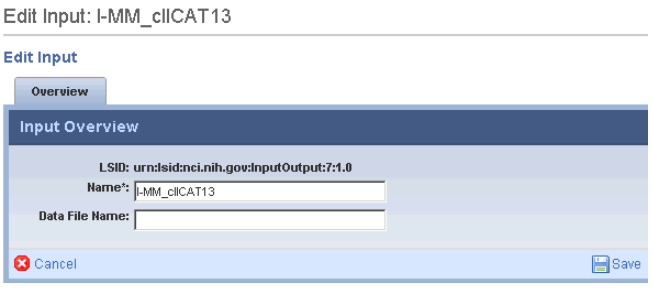

Figure 3.17 Edit Input page

4. Modify the global input's name and/or data file name.
5. Click Save.

Deleting a Global Input

You can delete global inputs that you have not applied to any active protocols. Before you can delete a global input that is an input to an active protocol, you must first delete it from that protocol.

To delete a global input

1. Open the experiment that contains the global input you want to delete using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment.
   - After searching for an experiment (see *Searching for an Experiment* on page 12), click Edit in the row corresponding with the experiment.

   The Edit Experiment page appears.

   Note: Several tabs on the Edit Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has a double arrow (⬍) beside the column name. The highlighted arrow represents the sort order.

2. Select the **Global Input(s)** tab.

Figure 3.18 Global Input(s) tab on the Edit Experiment page

3. In the Actions column, click Delete in the row corresponding with the global input you want to delete. A message appears confirming that you have deleted the global input.

Working with Experiment Runs

An experiment run is an instance of an experiment.

This section contains the following topics:

Adding an Experiment Run

To add an experiment run

1. Open the experiment to which you want to add an experiment run using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
   - After searching for an experiment (see *Searching for an Experiment* on page 12), click Edit in the row of the search results that corresponds with the experiment you want to edit.

   The Edit Experiment page appears.

Note: Several tabs on the Edit Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has a double arrow (▼) beside the column name. The highlighted arrow represents the sort order.

2. Select the **Experiment Runs** tab.

Figure 3.19 Experiment Runs tab on the Edit Experiment page

3. Click Add New Experiment Run. The Add New Experiment Run page appears.

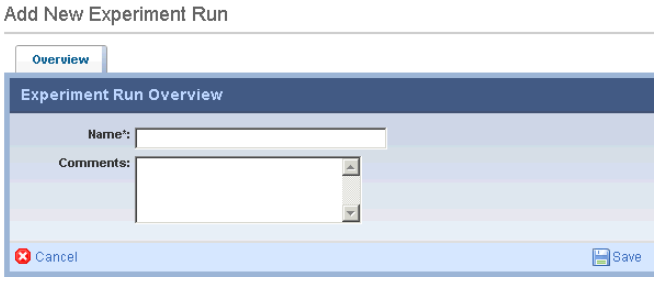

Figure 3.20 Add New Experiment Run page

4. In the **Name** field, enter a name for the experiment run. This is a required field.
5. In the **Comments** field, enter any comments relevant to this experiment run. This is an optional field.

   Note: protExpress uses standard naming conventions to automatically generate an *LSID* for the experiment run.

6. Click Save.

Editing an Experiment Run

To edit an experiment run

1. Open the experiment that contains the experiment run you want to edit using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment.
   - After searching for an experiment (see *Searching for an Experiment* on page 12), click Edit in the row corresponding with the experiment.

   The Edit Experiment page appears.

   Note: Several tabs on the Edit Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has a double arrow (▼) beside the column name. The highlighted arrow represents the sort order.

2. Select the **Experiment Runs** tab.

Figure 3.21 Experiment Runs tab on the Edit Experiment page

3. Click Edit in the row corresponding with the experiment run you want to edit. The Edit Experiment Run page appears.
4. Edit the experiment run fields as necessary.
5. Click Save.

Deleting an Experiment Run

To delete an experiment run

1. Open the experiment that contains the experiment run you want to delete using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment.
   - After searching for an experiment (see *Searching for an Experiment* on page 12), click Edit in the row corresponding with the experiment.
2. The Edit Experiment page appears.

   Note: Several tabs on the Edit Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has a double arrow (▾) beside the column name. The highlighted arrow represents the sort order.
3. Select the **Experiment Runs** tab.

Figure 3.22 Experiment Runs tab on the Edit Experiment page

4. In the Actions column, click Delete in the row corresponding with the experiment run you want to delete. A message appears confirming that you have deleted the experiment run.

Importing Data

Documentation to come.

Exporting Experiment Data

You can export experiment data from protExpress to XAR 2.2 format.

To export experiment data

1. Open the experiment containing data you want to export using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
   - After searching for an experiment (see *Searching for an Experiment* on page 12), click Edit in the row corresponding with the experiment you want to edit.

   The Edit Experiment page appears.

   Note: Several tabs on the Edit Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has a double arrow (▼) beside the column name. The highlighted arrow represents the sort order.

2. Select the **Export tab**. The Export tab appears.

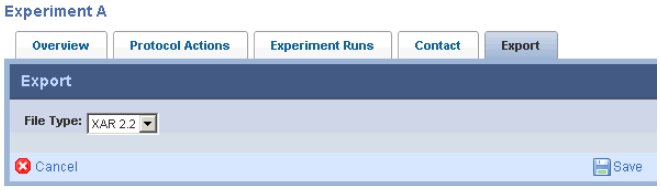

Figure 3.23 Export tab

3. At this time, the only available file type is XAR 2.2. In future releases, other file types will appear in the File Type drop-down list.
4. Click Save. A browser window opens with the all of the current experiment's data in XML format. Use your browser functions to save this window as a file on your local computer.

   Tip: Click your browser's **Back** button to return to protExpress.

APPENDIX A

PROTEXPRESS GLOSSARY

This glossary defines acronyms, abbreviations, and terminology used in protExpress.

Term	*Definition*
CPAS (Computational Proteomics Analysis System)	A web-based system built on the LabKey Server for managing, analyzing, and sharing high volumes of tandem mass spectrometry data. CPAS employs open-source tools provided by the Trans Proteomic Pipeline, developed by the Institute for Systems Biology.
Data	A data object refers to a measurement value or control value, or a set of such values. Data objects can be references to data stored in files or in database tables, or they can be complete in themselves. Data objects can be copied and reused a limitless number of times. Data objects are often generated by instruments or computers, which may make it important to keep track of machine models and software versions in the applications that create data objects.
Experiment	A grouping of experiment runs for the purpose of comparison or export. Currently an experiment run belongs to one and only one experiment, which must live in the same folder in CPAS.
Experiment Run	A series of experimental steps performed on specific inputs, producing specific outputs.
LDAP (Lightweight Directory Access Protocol)	LAn application protocol for querying and modifying directory services running over TCP/IP.
LSID (Life Science Identifier)	Persistent, location-independent, resource identifiers for uniquely naming biologically significant resources including species names, concepts, occurrences, genes or proteins, or data objects that encode information about them.

Table A.1 Glossary of terms used in protExpress

Term	Definition
Material	A material object refers to some biological sample or processed derivative of a sample. Examples of material objects include blood, tissue, protein solutions, dyed protein solutions, and the content of wells on a plate. Materials have a finite amount and usually a finite life span, which often makes it important to track measurement amounts and storage conditions for these objects.
protExpress	A proteomics experiment and protocol data management tool that you can use to search and administer proteomics experiment and protocol data through online forms
Proteomics	Large-scale study of proteins, particularly their structures and functions
Protocol	A description of how an experimental step is performed. A Protocol object describes an operation that takes as input some Material and/or Data objects, and produces as output some Material and/or Data objects. In protExpress, a protocol is a reusable entity that can be associated with any experiment.
Protocol Application	The application of a protocol to some specific set of inputs, producing some outputs. A protocol application belongs to an experiment run, whereas protocol objects themselves are often shared across runs. When the same protocol is applied to multiple inputs in parallel, the experiment run will contain multiple protocol applications object for that protocol object. Protocol applications have associated parameter values for the parameters declared by the protocol.
XAR File	A compressed, single-file package of experimental data and descriptions. A XAR file expands into a single root folder with any combination of subfolders containing experimental data and settings files. At the root of a XAR file is a xar.xml file that serves as a manifest for the contents of the XAR as well as a structured description of the experiment that produced the data.

Table A.1 Glossary of terms used in protExpress

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