∞ Limfinity

User Guide

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ABOUT THIS GUIDE

Purpose of this Guide

This guide introduces you to the features and functions of LIMFINITY. Please note that LIMFINITY is a web-based Laboratory Information Management System application that allows an individual to create, structure, and manage records for various laboratory and inventory management applications. In addition to data management, LIMFINITY contains tools for workflow based project management.

Intended Audience

This guide is intended for the following personnel:

- Scientists
- Technicians
- Laboratory supervisors
- Managers
- Other Academic personnel
- IT support staff

Guide Pre-Requisites

To get most out of this guide, the following pre-requisites should be met:

- Ability to use basic word processing and spreadsheet software
- Familiarity with the main functions of Internet browser software (Chrome, Firefox, Internet Explorer, etc.)
- Basic understanding of project architecture

UNDERSTANDING LIMFINITY FEATURES

LIMFINITY User Interface Features

The LIMFINITY software system requires login credentials for access. The login credentials consist of a username and a password, both of which are case sensitive.

- ➢ **Note 1**: The LIMFINITY software system has Sign-in locking feature, which will lock the user account after three unsuccessful attempts (The number of attempts can be set in General Preferences and the maximum attempts can be set up to 6. The user has an option to disable this feature). Administrators can re-set the password to unlock the locked user account.
- ➢ **Note 2:** The LIMFINITY software system will prompt the user, when an incorrect Username or Password is entered. The user can choose 'Forgot Username' or 'Forgot Password' to get an email notification. User will have 30 minutes to re-enter the login credentials using the the email notification.

After the initial login, the LIMFINITY **Home** screen is displayed for the user.

Left side of the **Home** screen (Navigation Panel) consists of a panel with tabbed menus: Quick Links, Explorer, Search Queries, and Settings and Preferences. On the right side of the **Home** screen (View Panel) is space for default links to **My To Do List** and **User Preferences**. The **Home** screen can be customized under **Setting and Preferences → System Preferences → Homepage Options**.

The name of the user currently logged into the system and the logout option are under ![icon] "**General Actions**" icon located at the top right corner of the screen.

![icon] The General Actions icon can also be used to execute the following other actions:

- **My To-Do**
- **My Preferences**
- **Calendars**
- **Import Subjects**
- **Advanced Search**
- **Batch Search**
- **Discussion Forum**
- **Audit Records**

NOTE:

The Menu/Navigation panel on the left side of the **Home** screen can be minimized or hidden. .

To minimize the navigational panel, either click on the small arrow ![icon] located at the top of the panel or click on the arrow located in the middle of the screen divider. In order to restore the panel back to the original configuration, simply click on the arrow.

Avoid using the **Back** and **Forward** functions of the web browser to navigate through LIMFINITY. Multiple panels can be opened and the panels will be displayed as tabs above the tool bar. User can switch between panels by clicking on the tabs. When multiple panels are opened, a list icon ![icon] will appear at the top far right corner. To switch between tabs, user can click on the list icon and choose the tab from the drop down menu. All tabs contain a **Cancel** button that a user can click to close the tab.

The inactivity time period can be changed in **Settings → Settings & Preferences → General Preferences.**

Overview of LIMFINITY Main Components

Quick Links are links that can be used to direct a user to a particular **Workflow**, **Search Query**, or **Subject Type** or to perform a common function in the system.

Subject Type(s) is the main object of LIMFINITY. A **Subject Type** is an object placeholder consisting of different User-Defined Fields.

User-Defined Fields are custom fields created by the user to describe characteristics of a **Subject Type**.

Explorer contains a list of all **Subject Types** currently in use by LIMFINITY. All **Subject Types** are listed alphabetically and can be grouped into folders.

Search Queries contain saved **Advanced Searches**. A saved **Advanced Search** contains only the search parameters; the results are refreshed each time the query is run.

Audit Records are reports that contain the activities of all users. **Audit Records** can be viewed for certain time periods: All Audit Records, Today, Yesterday, Within this Week, and Within this Month, and Activity By User.

Settings and Preferences contains the configurable elements of the LIMFINITY application including Users, User Groups, Roles, Limfinity Settings (User-Defined Fields, Subject Types, etc.), System Preferences, and About Limfinity.

List View – A Common Element of LIMFINITY Components

In all components of LIMFINITY, information and data are presented in a List View. The examples are, a List of All Subject Types in **Explorer**, List of Users in **Settings and Preferences**, List of **User-Defined Fields**, etc.

The List View panel in LIMFINITY contains the following parameters:

List View presents all data in a table. The column names change based on the type of data that is presented. Up to 30 **User-Defined Fields** for a **Subject Type** can be displayed as columns in a List View. (Please refer to CONFIGURING LIMFINITY: **Subject Type for** setting up an explorer **View Option** for a subject type). Each column contains a down arrow that allows a user to sort the data (in Ascending or Descending order) if configured for sorting and Columns option to select or deselect the columns to be displayed in the List View.

To select a row in the List View, check the square box located on the left side of the subject.   Multiple subjects can be selected from a single page or from multiple pages. Double clicking on a subject in the List View opens a panel with the entire subject record.

For all List Views present in LIMFINITY, a **"Filter"** Filter 🔍 function is available for the user. The **Filter** tool is located at the top right corner of the List View. This function allows a user to filter results viewed by the Name field. To filter a list, click within the "Filter" search box and type the Name or part of the Name, then press **Enter** on the keyboard or click once on the 🔍 search icon.   Note that the entry in the **Filter** box is not case-sensitive. In order to go back to the unfiltered list, click the ⊗ icon within the filter box. **Filter** function will only be available if the "Name" column is present in the List View.   Depending on the permissions, List Views have a tool bar at the top with icons ⊕ ⊖ ✎ on

the right and Q Q on the left to Add, Delete, Edit, Open Advanced Search, and Access Permission for the subjects in the List View.

Configuring User-Specific Preferences

County Settings, Date Format, Time Format, Page Size (Records per page), Barcode Printer, and **Change Password** are configured in the **My Preferences** window, which is located in the **"General Actions."**

MANAGING USER ACCOUNTS IN LIMFINITY

Manage Users

LIMFINITY has a pre-configured administrative account that has full privileges to the system. This system-defined administrative account includes permissions to delete data owned by other users, account access should be limited to the **System Administrator**. (Limfinity requires having at least one user with full Administrator Role rights at all time).

To keep the Administrator Role secure, login to the administrative account for the first time using the Username "admin" and Password "admin". After the initial visit, change the password to something more secure and keep a record of that password in a safe place.

Adding Users

Any User in the system with a "Role" that includes the "Manage Users" role right can create a new User account in the system. Under the **Settings and Preferences** tab, select **Users**, and click on ⊕ icon to add a new User. A dialog box opens for entering **User** information. A user can be assigned to multiple roles in the system. To assign specific roles to a user, select or deselect the check boxes under the column "Granted". If selected, the check boxes under the column "Admin" will allow a user to assign these "Roles" to any other user. A user cannot grant another user the "Role" they are not assigned. Limfinity does not allow deletion of a User account. User accounts can be disabled or enabled. To disable or enable a user account, right click on the user account and select Disable User or Enable User.

The following fields are predefined when creating a new User:

- Login Name:
- Password:
- Verify Password: (must match Password)
- Full Name:
- EMail:
- Role:
- User Groups:

User can customize the "User" dialog box by adding other User-Defined fields. To add any UDFs, click on the System tool icon located at the top right corner.

Select all desired UDFs from the All Available User-Defined Fields and click on icon located at the top right middle. The added UDFs will appear on the left side of the dialog box. Click OK.

Manage User Groups

 The LIMFINITY application allows Users to be grouped into **User Groups**, if more than one user is using the application. User Group membership can be used to permit/restrict access to individual tools, entire workflows, individual records, all records of and entire **Subject Type**, etc .

To Manage a User Group

1. Open **Settings and Preferences** menu, and click on entry tab labeled "Users Groups"

2. Located at the top of the List View of the User Groups, is a toolbar ⊕ ⊖ ✎ which perform the following actions respectively:
   - **Add User Group**
   - **Delete User Group**
   - **Edit Properties** and/or **Users**

3. To create a new user group, click on the ⊕ **Add User Group** tool and a corresponding dialog box will open. The user is prompted to provide a name for the User Group, Description and the Users that will be associated with the group.

4. Once all fields are populated, click OK and the newly created User Group will be listed in the List View.

5. User can create **User Groups** using ⬇ ▾ "Import/Export" tool, located at the top right corner of the List View. To use the import feature, the import file must be formatted in JSON (JavaScript Object Notation).

6. **User Group** permissions can be configured using the ⚷ ▾ "Access Permissions" tool located at the top right corner of the List View. When selected, a System-wide Access Permissions dialog box will open to set the access permissions (screenshot below).
   ➢ The following options are available to select through "Access Permissions" tool:
      - User-Defined Fields – List of UDFs
      - Subject Types – List of Subject Types
      - Subject Tasks – List of Subject Tasks
      - Report Templates – List of Report Templates
      - Custom Reports – List of Custom Reports
      - Subjects – List of Subjects defined in the system
      - Barcode Printers – List of Barcode Printers
      - Calendars – List of Calendars

- Notebooks – List of Notebooks

Manage Roles

Different **Roles** allow users to manage LIMFINITY activities more efficiently. To access the List View of **Roles**, click on **Roles** under **Settings and Preferences** menu.

Default User Roles & Role Rights

LIMFINITY is configured with a default list of User Roles and Role Rights displayed in the following table:

Administrator	Work With Subjects Import Data Access Subjects Explorer Terminate Subjects in the Workflow Access Gantt Chart Override Workflow States Access Live Search Access Batch Search Access Advanced Search Access Audit Logs Access ToDo List Manage Report Templates Access User Preferences Manage Users Manage Users Groups Manage Roles Manage System-Wide Settings System Administration System Supervision
Manager	Work With Subjects Import Data Access Subjects Explorer Terminate Subjects in the Workflow Access Gantt Chart Override Workflow States Access Live Search Access Batch Search Access Advanced Search Access Audit Logs Access ToDo List Manage Report Templates Access User Preferences Manage Users

	Manage Users Groups Manage Roles Manage System-Wide Settings
Power User	Work with Subjects Import Data Access Subjects Explorer Terminate Subjects in the Workflow Access Gantt Chart Override Workflow States Access Live Search Access Batch Search Access Advanced Search Access Audit Logs Access ToDo List Access User Preferences
User	Work with Subjects Access Subjects Explorer Terminate Subjects in the Workflow Access Gantt Chart Access Batch Search Access Advanced Search Access Audit Logs Access ToDo List Access User Preferences
Guest	(no Role Rights in default system)

User Role Definitions

Role Right definitions are provided below:

- **Work with Subjects** allows access to Add and Edit subject records.
- **Import Subjects** allows a user to import subjects through ⊞▼ "General Actions". The Import Subject tool has the following options:
  - Import Mode:
    - All or Nothing
    - One by One
  - Strict Import: All User-Fields must be defined for the Subject Type
  - Case-insensitive Lookup: Case-insensitive lookup of Subjects, UDFs and UDF values.
  - Blank Values- if blank cells are in the import file, the system can skip blank cells or overwrite any existing values in the system
    - Overwrite
    - Skip
  - Subject Type: (choose Subject Type to import/update records)
  - File: Browse (select CSV or XLSX file to Import)
- **Access Subjects Explorer** allows a user to view subjects in Explorer View.
- **Terminate Subjects in the Workflow** allows a user to terminate a subject from a workflow.
- **Access Gantt Chart** allows user to generate Gantt chart entries and view Gantt charts.
- **Override Workflow States** allows user to manually move subjects between workflow states.

- **Access Live Search** tool will be available for the user (located next to "General Actions")
- **Access Batch Search** option will be available for the user under "General Actions".
- **Access Advanced Search** option will be available for the user under "General Actions".
- **Access Audit Logs** option will be available for the user under "General Actions".
- **Access ToDo List** option will be available for the user under "General Actions" as My To-Do
- **Manage Report Templates** allows user to Add, Delete, or Edit a report template.
- **Access User Preferences** option will be available for the user under "General Actions".
- **Manage Users** allows a user to Add, Edit, and Delete User accounts.
- **Mange Users Groups** allows a user to Add, Edit, and Delete User Group.
- **Manage Roles** allows a user to Add, Edit and Delete Roles.
- **Manage System-Wide Settings** gives user the ability to create, edit, and delete anything listed under Settings and Preferences -> Limfinity Settings.
- **System Administration** gives user the access to Settings and Preferences -> System Preferences.
- **System Supervision** gives access to create, edit, and delete Users, User Groups, and User Roles and System Preferences. Note that these rights can be given individually, as well.

Adding a User Role, Changing User Role Properties, Deleting a User Role

Located at the top of the List View of Roles, the toolbar ⊕ | ⊖ | ✎ can be used to **Add a User Role, Delete a User Role,** and view/change User Role **Properties**. To perform a deletion or property change,

select a **Role** and click ✎ to open a dialog box. Select or deselect checkboxes under column "On/Off" for each property and click OK.

NOTES:

> Role "Administrator" is a system role and cannot be modified or deleted.

> When deleting a **Role** currently in use, the user will be prompted with a message.

> The "**Filter"** function located at the top right corner is available to search with Role Name.

Subject Types

Subject Types are templates that determine the nature of **User-Defined Fields** associated with a particular **Subject record**. One example of a **Subject** is Sample (an object) or Samples (a group of objects); another example of a **Subject** is an Experimental Protocol, and yet another example is Experimental Data. **User-Defined Fields (UDFs)** are associated with a Subject are created during configuration of LIMFINITY. Additional examples are provided in the table below.

Subject Type	User-Defined Fields	Subject record	Values
Patient	DOB, Gender	Jane Doe	March 1, 1977 ; Female
Vial	Volume, Unit, Type	Vial #12345	10 ; mL ; Blood

To add, delete, or edit a **Subject Type:**

1. Expand **Settings and Preferences** menu
2. Expand the **LIMFINITY Settings**, and then select the **Subject Types** sub-menu to open the List View of the Subject Type.
3. To **Add**, **Delete**, **Edit, Duplicate** or set UDFs in **View Options** of a **Subject Type,** use the Subject Type toolbar ⊕ ⊖ ✎ ⧉ ⊞ View Options located at the top of the List View.

The **View Options** icon located inside the toolbar allows a user to configure the display option for the selected **Subject Type**. A user can select the \ order of the columns displayed for a list of **Subject records** of a particular type.

Advanced Settings tab in Subject Type dialog box contains the following options**:**

- **Subjects of this type are part of system configuration (Checkbox)**: RURO has a script tool, which allows exporting and importing Limfinity configuration between different instances. This tool is used from the command line of the Virtual Machine OS, most commonly during the development process. If system configuration checkbox is enabled for a Subject Type, all corresponding subjects will be treated as part of the configuration and included into the data generated during the export. This setting is applied to dictionary-type **Subject Types** (example: Countries). The Subject Types belong to a workflow cannot be configured as part of the system configuration.
- **GLP/CFR 21 (Checkbox)**: Checking this box requires Users to enter their password and a comment when making any change to data associated with the **Subject Type**.
- **Quick Search/Advanced Search/Batch Search**: Check each box to enable/disable search functions. This setting can also be accessed by selecting a Subject Type from the List View, right click and select appropriate setting(s).
- **Formula for Subject Name generation:** By default, the **Name** field for new records in a **Subject Type** is the name of the **Subject Type** plus an incremental integer. (Example: If the **Subject Type** is "Test", new records will be named "Test 1", "Test 2", etc.) The name field can be custom-configured here. Refer to the LIMFINITY Scripting Guide for syntax and examples

Subject Extensions tab: By default, all populated UDFs are shown in a column when viewing a single record of a **Subject Type.** View options can be configured here to control how data is viewed for individual records of the **Subject Type**. Refer to the LIMFINITY Scripting Guide for syntax and examples.

Types of User-Defined Fields

Date	Date UDFs enable a date to be associated to the specified subject type object. The year MUST be 4 digits for proper import (yyyy) when using CSV file.
Text Field	Text field UDFs enables a small text to be associated to the specified subject type object. The Text Field is limited to 255 characters
Text Area	Text Area UDFs enables a large text to be associated to a specified subject type object. The Text Area is limited to 2048 characters.
Checkbox	Checkbox UDFs are "Yes" or "No" checkboxes that stipulate if a certain parameter has been met. (Ex. Is the object active? Check if "yes")
List	List UDFs enable many values to be chosen at once and associated to the subject type object. (List of values is defined in the field "Values" separated by semicolon.)
Choice	Choice UDFs enable one value to be chosen from a list of values. (List of values is defined in the field "Values" separated by semicolon.)
Radio Button	Radio Button UDFs Field that generates checkable choices within a subject type, that stipulate if the subject type meets certain criteria
URL	URL UDFs enable a uniform resource locator to be attached to a particular subject type object
Image URL	Image URL UDFs enable an image based uniform resource locator to be attached to a particular subject type object
Advanced	Navigational tab consists of advanced UDFs: Number, Date Time, Separator, Password, HTML Editor, File, Signature Pad, Calendar, Box / Plate Map, Pedigree Tree, Discussion & Chat, Notebook. Please refer to the table Types of Advanced User-Defined Fields below
Limfinity	Navigational tab consists of LIMFINITY UDF objects: Subject, Subject Lists, Subject List of Several Types, User, Users, User Group, Subject Back Reference, Formula, User Field, and Remote Data. Please Refer to the table Types of Limfinity User-Defined Fields below
FreezerPro	(Visible only if Limfinity is integrated with FreezerPro software) Navigational tab consist of FreezerPro UDF objects: Sample, Vial (Barcode), Sample Group, Box/Plate (Barcode). Please refer to the table Types of FreezerPro fields below
ezColony	(Visible only if Limfinity is integrated with ezColony software) Navigational tab consists of ezColony UDF objects: Animal Line and Animal. Please refer to the table Types of ezColony fields below.

Types of Advanced User-Defined Fields

Number	Number UDFs capture a numerical value of data. Default Value and Display Format (e.g. number of decimal places to show) options are available .
Date Time	Date Time UDFs enable a date and time to be captured for a specific subject type object (time stamp). Auto-Populate option is available.
Separator	Separator UDFs can be used to separate a list of UDFs from other UDFs in a configurable form or dialogue box.
Password	Password UDFs enable a LIMFINITY user to create a custom password other than the Login password.
HTML Editor	HTML Editor enables a custom HTML script to be created and displayed for a particular subject type object.
File	File UDFs permit the storage of a particular file within a subject type object. Clicking on a stored filename prompts file download from the system.

Signature Pad	Signature Pad UDF will enable to capture physical signature using the mouse, or touch screen.
Calendar	Calendar UDFs permit a calendar to be associated to a particular subject type.
Box/Plate Map	Option that displays a Box/Plate Map for sample locations; the location of the samples can either be random or user specified.
Pedigree Tree	Option that creates a parent-child pedigree tree within a particular Subject Type. The will be displayed at the top of the list view on the right side. When displaying internal IDs in a pedigree tree, "?" is a prefix for ID of nodes that have no attached subjects.
Discussions & Chat	Option that allows discussion threads to be associated to a particular Subject Type (threads can be updated by any user). The will be displayed at the top of the list view on the right side.
Notebook	Option that allows the notebook to be associated to a particular Subject Type (notebook stores all gathered notes into folders which are available to users) The will be displayed at the top of the list view on the right hand side.

Types of LIMFINITY User-Defined Fields

Subject	Option for user to select a single record within a particular Subject Type specified. The Subject Type needs to be defined first before a UDF can be associated with it.
Subject Lists	Option for user to select one or more records of a particular Subject Type specified. The Subject Type needs to be defined first before a UDF can be associated with it.
Subject Lists of Several Types	Option for user to one or more records within a list of multiple Subject Types specified. The Subject Types need to be defined first before a UDF can be associated with it.
User	Option for user to select a particular user within the system.
Users	Option for user to select more or more users within the system.
User Group	Option for user to select a particular User Group that is defined in the system.
Subject Back Reference	Shows the count for all related records of a different Subject Type. The count is displayed as a hyperlink in the system- clicking the hyperlink opens a new tab showing a List View of all related records. (Example: Subject Type 'Box' might have a **Subject Back Reference** UDF to all 'Vials' in the single Box record.)
Formula	A custom script written in Ruby code to compute value(s) based on data from other UDFs in the system. Formulas can be calculated when a subject meets certain criteria or reaches a certain state or status within a project or workflow. Formula type can be Ruby code, Query Language Expression, or SQL Query. Return Type can be Text Field, Number, Date, Subject or Users. Formula results can be enabled for sorting in List View.
User Field	Is a Property type UDF, which will populate all the existing UDFs as a drop down menu.
Remote Data	A User-Defined Field that allows external information to be pulled via provided URL.

FreezerPro User-Defined Fields (available only if integrated with FreezerPro software)

Vial (Barcode)	Pulls a vial from the integrated software
Box/Plate (Barcode)	Pulls a Box/Plate from the integrated software

ezColony User-Defined Fields

Please contact Ruro Support Team for assistance.

User-Defined Field Properties

Name	Represents the name of the user-defined field
Auto Populated	Check box. Auto populates with current user or current date when a new record is created.
Sortable	Check box to enable sorting in List View.
Help Text	Represents a text that is displayed when the mouse hovers over the name of the field. This is generally used to describe the purpose behind the field.
Default Value	Represents a value that will be automatically populated into the field if the user does not enter a value.
Display Format	Enforce number format. Example: 00.00M will format 123456789 to be shown as 123.46M
Searchable (Quick/Advanced/Batch Search)	Enable/disable search options in the system to search for the user-defined field.
Grids Renderer (Experts Only)	Allows Limfinity administrators to specify the visual appearance of the user-defined field's value in explorer grids. This tool is JavaScript code. The original value will be passed into a grid's renderer function as a "val" variable. For examples, refer to the LIMFINITY Scripting Reference Guide and Grid Renderer Examples table, below.

LIMFINITY Password UDF Explained

The Password **User-Defined Field** is created and utilized to enable a secure chain of custody record. In doing so, users are assured that no further steps within the workflow are taking place without errors or by protocol. Once the Password UDF is created, user can add this password UDF to **Users**. To add the UDF to **Users**, click on **Users** tap under Settings and Preferences in the navigation panel. Select an existing user in **Users** List View and click on Properties icon located at the top left corner. In "Change User" dialog box, click on the system tool located at the top right corner. Add the password UDF from the available UDFs and click OK. Each user can be set up with a UDF password and this password will be different from the password to access LIMFINIY. Only users with 'Manage Users' role right can change this UDF password for other users.

Once, the UDF password is created, it can be associated with Subject Types in the Limfinity.

The Password **User-Defined Field** is a particular LIMFINITY subject field that enables a logged in user of the LIMFINITY application to be associated with a second password.   In addition, all progress within the workflow can be tracked, since password UDFs are utilized. The password UDF can be created using the following steps:

To configure a password UDF:

- Expand **Settings and Preferences** → **User-Defined Fields** → **Add New User-Defined Field** → **Advanced** → **Password**
- A dialog box will be generated prompting the user to name the user-defined field.

LIMFINITY User UDF Explained

The User, Users, and User Group user-defined fields are particular LIMFINITY subject fields that enable a User of the LIMFINITY application to be associated with a particular object within the application. Particularly with the User and Users user-defined fields, a user can select a name from the drop down list and select any user in the LIMFINITY application. The User Group is a composition of 1 or more users within the system. When a particular object is associated with a User Group, all users associated with the object will gain the same role and access to the object.

Special Cases: Importing subjects using User UDF

When importing subjects into the LIMFINITY application, if a LIMFINITY User UDF is present, the user login name is used in a CSV/Excel file as well as in API calls. Only within the LIMFINITY application, a full name of the user will be displayed for selection.

	A	B	C	D	E
1	Barcode	Subject Type	Volume	DNA Type	User
2	9022576	DNA	5	Plasmid	Admin

NOTE:

The User, Users, and User Groups names are case sensitive.
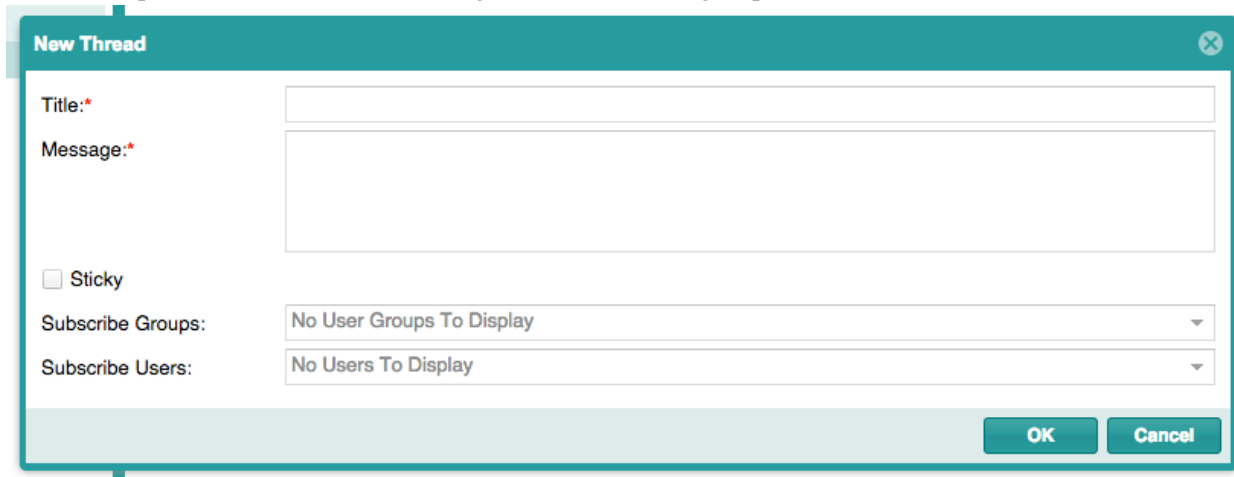
When importing by using Users as a LIMFINITY user-defined field, more than one user can be associated to a LIMFINITY object, the CSV/Excel should entail a header titled "Users" and a semi-colon should separate the values/users.

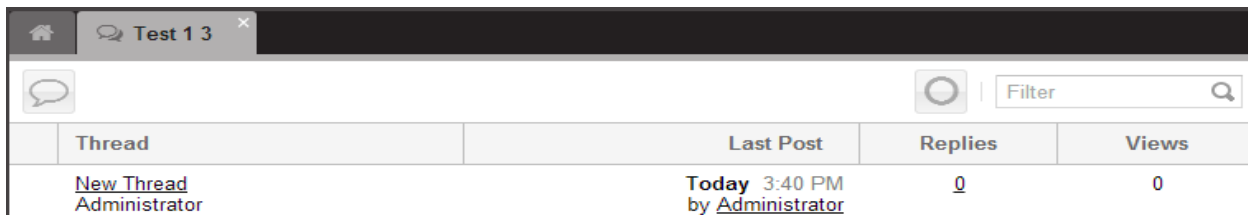|	A	B	C	D	E
1	Barcode	Subject Type	Volume	DNA Type	Users
2	9022576	DNA	5	Plasmid	Admin;Manager; User

Discussions and Chat UDF

The Discussions and Chat UDF is a LIMFINITY subject user-defined field that allows users to interact with one another for a particular subject type object. Threads can be created to stipulate an idea, comment or important notice that pertains to the Subject type object.

Clicking on the "New Thread" icon located at the top of the list view to generate the dialog box, where a user can stipulate the thread title, message, icon, subscribe groups and subscribe user.

When a thread is created, it will be visible in the List View, along with the last post, replies and views the thread has received.

If a reply is needed for a thread, clicking on the thread title and clicking on the reply icon will generate a dialog box for a reply to be entered.

NOTE:

When a thread/reply is submitted, the subscribe group/user will be notified that a thread has been updated.

Notebook UDF (ELN)

The notebook UDF gives access to a feature, which users are able to create notes for subject objects of the associated subject type. Each note has the ability to be updated as well as formatted in any way the user chooses. Changes are tracked and will be displayed (When the mouse pointer placed over the text) with the name of the user who made the change, date and time. User has an option to accept/reject all changes. Tacking will not be displayed, once user accepts the change. User can insert a link to another subject or another Note. Notebook can be shared with other users as a link.
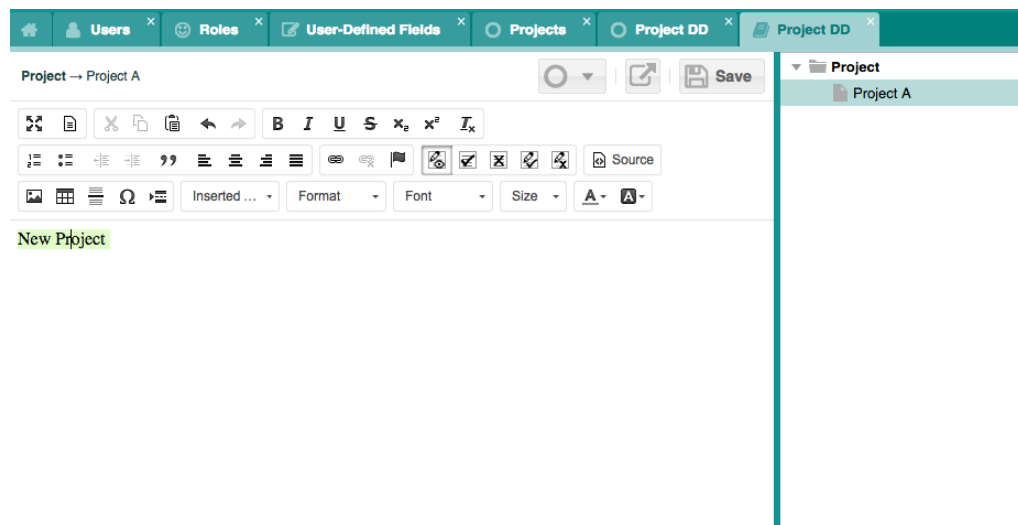
Each note can be placed into folders and there is no limit to the amount of notes or folders for a particular subject object. In addition, users have the ability to duplicate, delete, share, view subject, note versions, print, note template and sign and lock a note for security purposes.
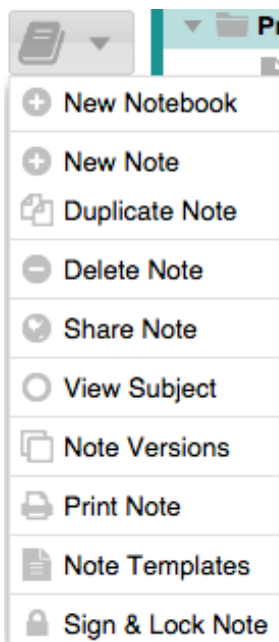
Configuring Structured Forms

LIMFINITY users can custom configure User Defined Fields placement within an Edit Subject dialog window. This Structured Form feature can be configured as a Quick Link (Run Script) or Subject Workflow Tool (Run Script). The following screenshot is an example of a **Structured Form** by using **Before** & **After Script**.

For more information about "**Structured Forms**", please refer to the "**Scripting Guide**".

IMPORTANT: To use Structured Forms, the Helper Script "udfs" is required (Refer to scripting guide). Create a new Helper Script in **Settings and Preferences → More Settings → Helper Scripts**. The Helper Script is called in the Before Script of the Run Script tool.

PII Field Setting:

Checking the PII box Field indicates that this is Personally Identifiable Information. The method *enable_pii* is called from a Helper Script at the time of login. The Helper Script can be modified to suit any criteria for granting access to PII data fields. In the example below, the Helper Script checks to see if the User belongs to the User Group "PII" and then grants access to any "PII" UDFs.

Example Helper Script to grant PII UDF access:

User.curr_user.enable_pii if User.curr_user.user_groups.include?(UserGroup.find_by_name("PII"))

Grids Renderer Examples

Making the UDF value bold	return "\<b\>" +val+"\</b\>"
Making the UDF value a clickable link (This will display RuRo as a clickable link)	return "\<a href='http://www.ruro.com' target='_blank'\>"+"RuRo"+"\</a\>"
Conditions	if (val=='Pass') return "\<span style='color:green;'\>"+val+"\</span\>" else if (val=='Fail') return "\<span style='color:red;'\>"+val+"\</span\>" else return val;

Subject Type Groups

Subject Type Groups can be defined in the LIMFINITY application. Subject Type Groups are created to pair like Subject Types, which can be used by the **Subject List of Several Types** UDF. The **Subject Type Groups** tab contains the toolbar ⊕ ⊖ ✎ that allows a user to **Create**, **Delete** and **Edit** Groups of Subject Types. When a Subject Type Group is defined in the LIMFINITY settings, a folder with a corresponding name is created inside the Explorer menu and the group **Subject Types** are contained within the folder.

SUBJECT WORKFLOWS

Subject Workflows settings

Subject Workflows are a sequence of connected steps/operations where each operation follows a pathway until the sequence reaches the end. A **Subject Workflow** can be defined in the LIMFINITY application under the **Subject Workflows** ⚙ Subject Workflows menu entry. The workflow toolbar ⊕▾ ⊖ ✎ ⎘ allows a user to **Create**, **Delete**, **Edit and Duplicate** a **Subject Workflow**. All Subject Workflows are modifiable through the **Properties** function.

When a **Subject Workflow** is created, a **Subject Type** is selected to contain the data of the process; as a **Subject Workflow** starts, a new object will be created in the **Subject Type**. To specify the default

starting state of a new subject workflow, select the workflow, click ✏️ **Properties** and specify the **Entry Point**. Additionally, to configure which UDFs must be set by the user when a new subject is created in a specific workflow, click on the actual **Subject Type** name in the dialog screen; this will display a list of fields that can be turned on, so that they are required to be populated when a new subject is introduced into the workflow.

LIMFINITY has a user-friendly interface to help Users configure **Subject Workflows**. Each rectangle denotes a **Workflow State**. Arrows (with labels) between states denote **Workflow Transitions**. Note that **Subject Workflows** are not necessarily linear. In the example below, a **Subject** record is created in the initial **Workflow State** 'Sample Requested' and the User can select to advance the record into either 'Sample request confirmation' state or 'Sample Received' state by selecting the appropriate transition. A **Subject** record can be in only one **Workflow State** at a time.
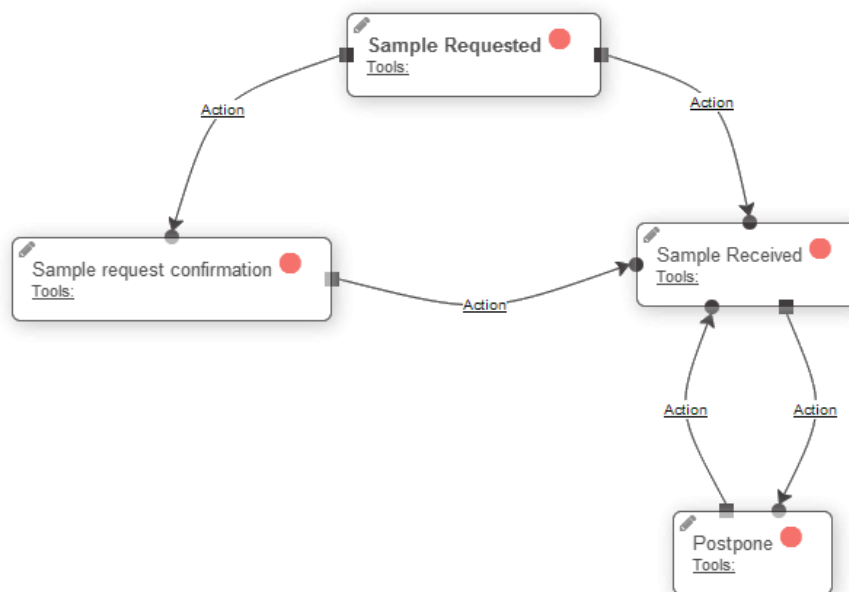
Subject Workflow States

Subject Workflow States are placeholders within the workflow to mark a **Subject** record at a certain stage of the process. The status of where the object is located will be appropriately paired and listed in the list view.

Subject Workflow Transitions

When there are numerous states in a workflow, a **Workflow Transition** can be made from one state to another, linking the two, creating a smooth "transition" to the next operation.
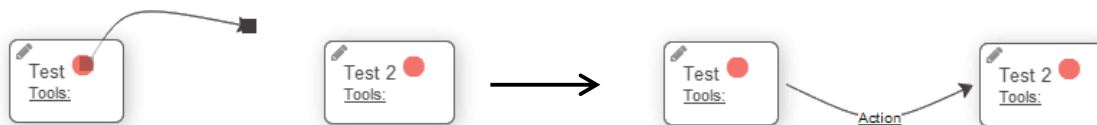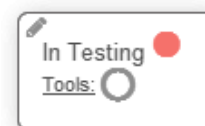
State Tools

State tools are functions that are available to the User in a specific state within a **Subject Workflow**. Each tool provides a specific functionality and each can be configured to specifications.

Workflow tools and their functions

There are numerous tools that execute different functions. An appropriate tool needs to be chosen in order to attain the correct functionality in the workflow.

Create New Subject Tool ⊕

The "**Create New Subject**" Tool permits a user to create a new object for a certain **Subject Type** in the workflow state. The subject does not need to be the same as the **Subject Type** associated with the current workflow. Creating a new subject within the workflow state will create an object in the explorer under the respective **Subject Type**.

Edit Subject Tool ○

The "**Edit Subject**" Tool permits a user in a particular state of the workflow to modify any **User-Defined Field** specified for the particular **Subject Type** linked to the workflow. The user chooses which form fields can be modified in the tools window.

Print Barcode ▥

The "**Print Barcode**" tool permits a user to print the unique barcode of the **Subject**. In addition to printing the Barcode, the user can specify and include any other **User-Defined Fields** to print on the label, such as Name, Date, etc. To print the Barcode, an appropriate barcode printer needs to be linked to the LIMFINITY application and the number of labels to be printed needs to be specified.

Display Chart ▦

The "**Display Chart**" tool allows a user to generate a chart, dependent on specific numerical values associated with the **Subject Type** used in the workflow. Chart Templates must be created before creating Chart tool in a workflow. The Chart is configured in the **Charts and Graphs** tab located in the **More Settings** folder under the **Settings and Preferences → Limifiniy Settings** tab.

Subject Report ▤

The "**Subject Report**" tool allows a user to generate a report with specific User-Defined Fields. Report Templates must be created before creating Subject Report tool in a workflow. The report template can be created and configured by selecting **Custom Reports** in **Settings and Preferences**.

Email using Template ✉

The "**Email using Template**" tool allows a user to generate and send a configured Email Template to a designated user within the LIMFINITY application. The Email Template must be created before creating Email using Template tool in a workflow. The Email Template can be created and configured by selecting Email Templates under **Settings and Preferences → More Settings**.

Excel Export ▤

The "**Excel Export**" tool allows a user to generate an Excel formatted document with specific user-defined fields. The Custom Report must be created to use in Excel Export workflow tool. The Custom Report can be configured in the **Settings and Preferences → Limfinity Settings → More Settings**.

Advanced Workflow Tools:

Group Edit Subjects ◎

The "**Group Edit Subjects**" tool permits a user in a particular workflow state to modify multiple **User-Defined Fields** specified for one or more objects of the particular **Subject Type** linked to the workflow. The user chooses which form fields can be modified when creating the workflow tool.

Subject Picker (Simple) ✎

The "**Subject Picker (Simple)**" tool will generate a list of subject enabling users to select one or more objects of a particular **Subject Type**.

Subject Picker (Advanced) ✎

The "**Subject Picker (Advanced)**" tool will generate a list view of all objects of the particular **Subject Type** and a search bar enabling users to filter the objects of the **Subject Type** and select one or more objects.

Subject Picker (Plate/Box) ✎

The "**Subject Picker (Plate/Box)**" tool enables a user to associate a Plate/Box Map User-Defined Field and associate it with a designated **Subject Type**. Before script and After script needs to be created within the tool. User can use this tool in Subject Type Box workflow to pick several objects of the designated **Subject Type** and add them to the Plate/Box Map.

Run Script ⚙

The "**Run Script**" is a versatile tool where the user can designate through certain scripts what actions are done. Examples of a few custom scripts are provided on the next page.

Explorer: Group Edit Subjects ●

The "**Explorer: Group Edit Subjects**" allows a user to create a button where the user can choose multiple objects from the list view of the **Subject Type** and edit the associated **User-Defined Fields**.

Explorer: Run Script ⚙

The "**Explorer: Run Script**" tool enables a user to create a button in the list view in which a user can choose multiple objects of the **Subject Type** and run a custom script that the user provides. Examples of a few custom scripts for the Explorer: Run Script tool are provided on the following pages.

When creating workflow tool, user can add **Before** or **After Script** to perform particular executions. (e.g. Value Validation, Permission Check, Value Required and Value Auto-Population)

WORKING WITH SUBJECT WORKFLOWS

The add **Subject Workflow** icon creates a new Subject Workflow and is accessible through the **Settings and Preferences** menu.

- Within the LIMFINITY Settings tab, the **Subject Workflows** tab is under **Settings and Preferences** menu.
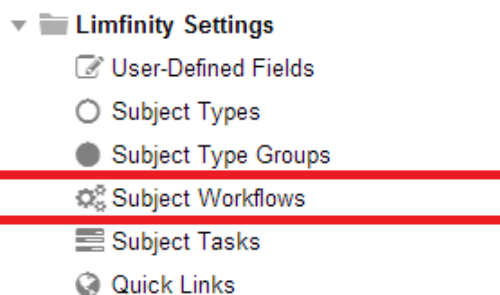
- When the add **Subject Workflow** icon is clicked, a drop-down list will appear to display all available **Subject Types**, which will be the object of the workflow. An example is presented below:
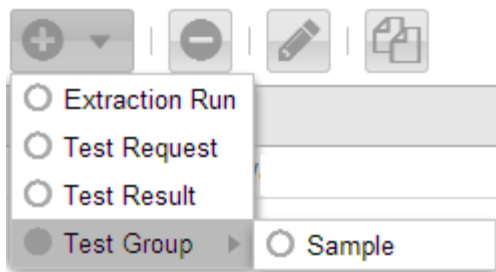
- All enabled workflows will be visible in the List View.

Populating a New Workflow

Once a new workflow has been created, user can now input the sequence of connected steps/operations where each operation follows without a delay or gap, until sequence reaches the end. Within the workflow window, each step is represented by a state, while a transition line represents every event.

To create a state:

1. Locate the new Subject workflow in the List View and double click; a blank window will be generated.
2. Left click once on the **Add State** tool, located on the top left side of the window; a dialog screen will appear requesting the Name, Allowed Duration, option to set as "Final State", Owner (This field is auto-populated with the login user, this is editable), Managers, Performers (Assign a User Group from drop-down list for both Managers & Performers fields. This can be set to auto populate in General Preferences) to be entered; Notification Options: Four different email options are available to choose. Once completed, click "OK" and a new state will appear in the window (shown below).

Tools in a state:

The "**tools**" link is a hyperlink located within the state. Click on it to bring a drop-down list with options of different types of tools desired. A comprehensive description list of available tools is provided in the appendices.
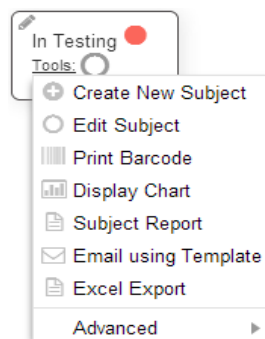
A dialog is generated when a tool is selected for a particular state. All Workflow tool dialogs contain "General", "Before Script", and "After script" tabs except "Edit Subject" tool. "Edit Subject" tool will have an additional "Form Fields" tab.

General tab: Contains three sections

    Section One: General Configuration

        ➢ **Name**: Required field (will be displayed as Tool Name)

        ➢ **Description**: Entered text will be displayed under the Tool Name.

        ➢ **Tooltip**: Entered text will be displayed when a user move the mouse over the tool.

        ➢ **Button Scale and Glyph**: Option to choose the size of the tool and the Icon to display.

        ➢ **Button Preview**: Preview of the tool button.

        ➢ **Button Order**: Option to select the order of the tool in the workflow.

        ➢ **Active**: Check box option to activate or de-activate the tool.

        ➢ **Needs Full Access Permissions**: Check box option to activate or de-activate. Once it is activated, the user needs full permission to the Subject Type to use the tool.

    Section Two: Tool Conditions

        ➢ **Add**: A drop down menu for user to select & add all the UDFs associated with the selected Subject Type.

        ➢ **Show Message**: When selected, tool condition message will be displayed.

➢ **Disable Tool Button**: Tool will be disabled if the tool condition is not met.
➢ **Hide Tool Button**: Tool will be hidden until the tool condition is met.

Section Three:

➢ Depending on the tool type. user may need to select Subject Type, select a Barcode Printer, select a Report Template, etc.

Before and After Scripts as well as "Form Fields" can be configured into a tool.

a. **Before script**: Conditions set in before script needs to be met before the tool is executed.

b. **After script**: Once the tool is executed, the after script will be enabled and executed.

c. **Form Fields**: "Edit Subject" and "Explorer: Group Edit Subject" tools will have form fields tab for the user to select the UDFs to be edited.

With a single click of a button, user can access the commonly used methods and their syntaxes from Before and After Scripts tabs of each workflow tool which supports scripting. In the following example using 'Get UDF Value' method 'subj.get_value('UDF Name') is inserted. The user needs to replace the 'UDF Name' with the desired UDF name to get the value of the UDF.
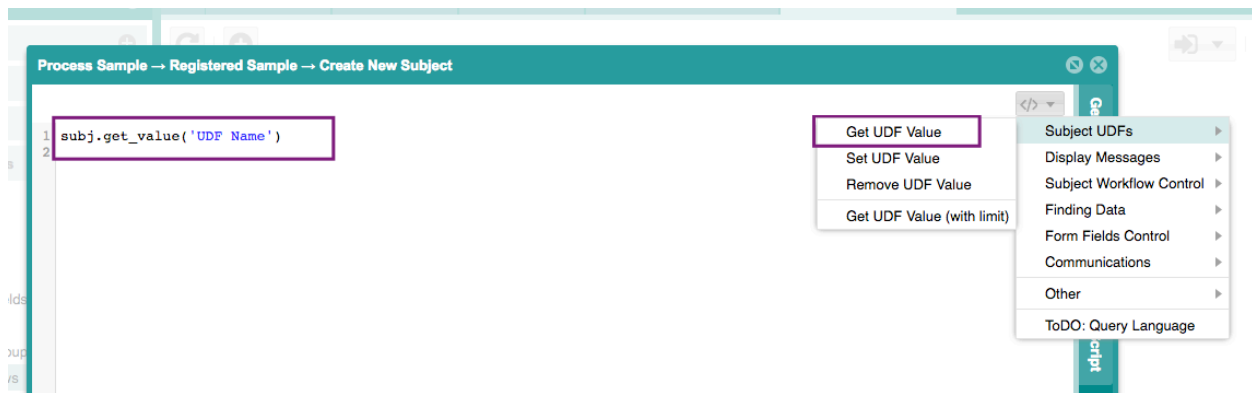
All the available methods and syntaxes are listed below:

Methods	Syntaxes
Subject UDFs	
Get UDF Value	subj.get_value('UDF Name')
Set UDF Value	subj.set_value('UDF Name', 'Value')
Remove UDF Value	subj.remove_prop('UDF Name')
Get UDF Value(with limit)	vials = subj.get_value('Vials', :limit=>10, :order=>name)
Display Messages	
Raise Exception	raise 'Exception Message'
Show Alert	show_alert('Alert Text')
Show User Message	show_message('Message Text')

Subject Workflow Control	
Start Workflow	start_workflow('Workflow Name', subj)
Advance To Workflow State	advance_workflow('Workflow Name', 'Workflow State Name', subj)
Finding Data	
Find UDF	udf = find_udf('UDF Name')
Find Subject Type	subj_type = find_subject_type('Subject Type Name')
Find User	user = find_user('Username')
Fine User Group	user_group = find_user_group('User Group')
Find Subject By UID	vial = find_subject(:uid=>uid)
Find Subjects	find_subjects({'Options Here'})
Form Fields Control	
Default Value(Numeric UDF)	params[:defaults] = { 'Concentration'=>4.5 }
Default Value (Text UDF)	params[:defaults] = { 'Comments'=>'N/A' }
Default Value (Subjects UDF)	params[:selection] = { 'From Department' => labs.map(&:id).join(',') }
Required	params[:required] = { 'Concentration'=>true }
Read Only Field	params[:read_only] = { 'Concentration (ng/uL)'=>true }
Min Value (Number UDF)	params[:minValue] = { 'Concentration (ng/uL)'=>20 }
Max Value(Number UDF)	params[:maxValue] = { 'Concentration (ng/uL)'=>120 }
Min Length (Text UDF)	params[:minLength] = { 'Description'=>50 }
Max Length (Text UDF)	params[:maxLength] = { 'Description'=>250 }
Height (Text Area)	params[:height] = { 'Comments'=>400 }

Custom Config	params[:udf_config] = {
	  'Employee' => {
	    filter: 'terminated is false and #state is Active',
	    fieldLabel: 'Active Employees'
	  }
	}

Communications	
Send Email	send_email(user , find_email_template('Email Template Name'), subj)
Send SMS	send_sms('phone number', 'demo text')
Send Fax	send_fax('fax number', params['File'])
Other	
Run JavaScript	params[:javascript] = 'alert(233)'
Copy UDF from one Subject to Another	subj.copy_properties_from(other_subj)
Regenerate Subject Name Formula	subj.send(:gen_name)
Check User Authentication	authenticate(user, password)
Report Using Template	file = run_report('med_list', subj, :csv) # :csv, :html, :pdf, :text subj.set_value('Medical Report', file)
Create User	user = create_user(username:'demo', password:'123456', fullname:'Demo User D', email:'demo@ruro.com',roles:['Manager','User'], groups:['Technicians','CPS Users'])
Set Access Permissions	set_permission(obj, user_group, Acl::READONLY) #

	Acl::NOACCESS, Acl::READONLY, Acl::READWRITE
Remove Access Permissions	remove_permission(obj, user_group) # remove all permission flags from the object for the user_group
Print Barcodes	print_subject_barcode(subject, label_count, printer_name)
Create Calendar Event	create_calendar_event(cal_or_subject, start_at, end_at, opts = {})

Create Subject	subj = create_subject('Sample', {:name=>'SPL-S1242359'}) do |v|
	  v.set_value('Volume', 1.2)
	   v.set_value('Filled Date', Time.now)
	end

NOTE:

Each tool contains a different credentials window. The required fields for each particular tool will be designated by an asterisk or bold font.

If user defined fields are needed when first entering the workflow instead of a tool, the user would highlight the desired workflow in the list view and would click on the properties button. A dialog box will appear and from there the user can click on the bold and underlined subject type name, another dialog box will appear for prompting the user to designate the user-defined fields that are needed when the workflow is initially started. Screenshot is provided below.

When a user creates a new workflow state, the workflow will be "locked" implicating that the workflow cannot be used. To use the workflow click the LOCKED function located at the top right of the window and the status will change to READY implicating that the workflow is now enabled for use.

To create a transition:

When there are numerous states in a workflow, a "transition" can be made from one state to another, linking the two, creating a smooth "transition" to the next operation. The following steps will aid in creating a transition:

2. From one state, left click on the mouse, hold and drag the mouse pointer from one colored box located within the state to the next colored box of the next state, then release the mouse button.

3. Once the "transition" is linked, the newly created transition will have an "**action**" link available. Click the "**action**" link to display a new window, so that a user can configure the button name and add parameters to log data when the button is pressed in the workflow.

Configuring Simple & Advanced Subject Pickers

The Simple and Advanced subject pickers are useful tools when more than one object of a particular subject type needs to be selected to continue onward through a workflow progression. The Simple Subject Picker enables users to select one or more objects of a single subject type contained within the LIMFINITY application. The subject picker is displayed as a list view and will only show the objects of the **Subject Type** that are specified in the script associated to the tool.

When creating a Subject Picker within a workflow, a user stipulates the associated subject type and the conditions for the subject picker in the before and after script. Please refer to Scripting Guide for examples of before and after scripts.

The Advanced Subject Picker tool contains similar functionalities as the Simple Subject Picker. However, a key feature of the advanced subject picker tool is the advanced search bar that enables users to further filter the subject picker objects.

Configuring Subject Picker (Plate/Box) tool

The plate/box Subject Picker tool is a specialized tool that enables user to select objects of a subject type and place them into a Plate/Box user-defined field. Creating a Subject Picker (Plate/Box) tool requires several parameters such as a plate map user-defined field, a subject type and a fill direction. In addition to providing the required parameters, users are allowed to add any before and after scripts that will further define how the subject picker will function. To create a Subject Picker (plate/box), a user selects the tool function located within the workflow state followed by **Advanced→ Subject Picker (Plate/Box)**.

NOTE:

The one to one assignment provides the ability to assign one subject object to one position in the plate/box map.

Box map display view can be set as Alpha-Numeric, Numeric-Alpha, and Numeric-Numeric. Please refer to Scripting Guide for more information.

Box map display color for input subject can be set to any color by script. Please refer to Scripting Guide for more information

Configuring Group Edit Subjects tool

The Group Edit tool is a specialized tool that enables a user to select one or more objects of a single subject type and edit one or more of the associated User-Defined fields. Creating a Group Edit tool requires several parameters such as the User-Defined Fields that a user is allowed to edit, and the order of the User-Defined Fields in the grid field. In addition to providing the required parameters, users are allowed to add any before and after scripts that will further define how the Group Edit activity will function. To create a Group Edit tool, a user selects the tool function located within the workflow state followed by **Advanced→ Group Edit Subjects**.

For more information about "**Group Edit Subjects**", please refer to the "**Scripting Guide**".

Example of LIMFINITY Workflow Configuration Sequence

1. Configure and save User Roles

2. Create User Groups (example "CytoGenetics Lab")

3. Configure LIMFINITY General Preferences (Settings and Preferences/System Preferences/General Preferences)

   a. User Login Setting

   b. Language (default: English; options: Chinese, Russian)

4. Configure/enable Login Message (Settings & Preferences/System Preferences/Login Message)

5. Configure/enable Home Page options (Settings & Preferences/System Preferences/Home Page Options)

6. Configure Integration Settings (Settings & Preferences/System Preferences/Integrations Settings)

7. Define Subject Types and Subject Type Groups:

     c. Create appropriate UDF's for the Subject Types

     d. Edit/Save Advanced Settings for the creates Subject Types

8. Create and save Scripts (Settings & Preferences/Helper Scripts) to be later associated with the Workflows

9. Define/Save Subject Workflows (Settings & Preferences/LIMFINITY Settings)

     e. Add States and Transitions to workflow

     f. Add tools to States within workflow

10. Create/Save Barcode Printer Profile(s)

11. Create/Save Report Templates for the Subject Types. If needed create/save Custom Report Templates

12. Create/Save Subject Alerts

13. Create/Save Charts and Graphs

14. Create/Save Email Templates

15. Create/Save LIMFINITY Calendars; Assign Access Permissions to the Calendars

16. Create Quick Links for User Groups

17. Create User Accounts associating them with the appropriate User Groups

Quick Links

Quick Links is a method to simplify the User Interface and facilitate efficient data entry and/or access to common functions. The **Quick Links** feature allows a user to add a button to the navigational panel. The new menu will contain links to the operations in LIMFINITY that are frequently used by a particular User Group.
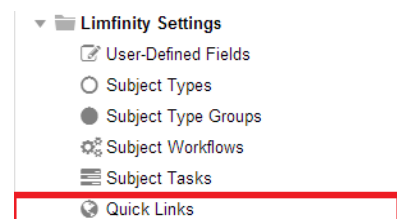
When a Quick Link is added, through the toolbar ⊕ ▾ ⊖ ✎ that is located at the top of the List View, a user can create and delete a Quick link, in addition to changing the properties of a particular Quick Link. Quick Links can be created by choosing the following
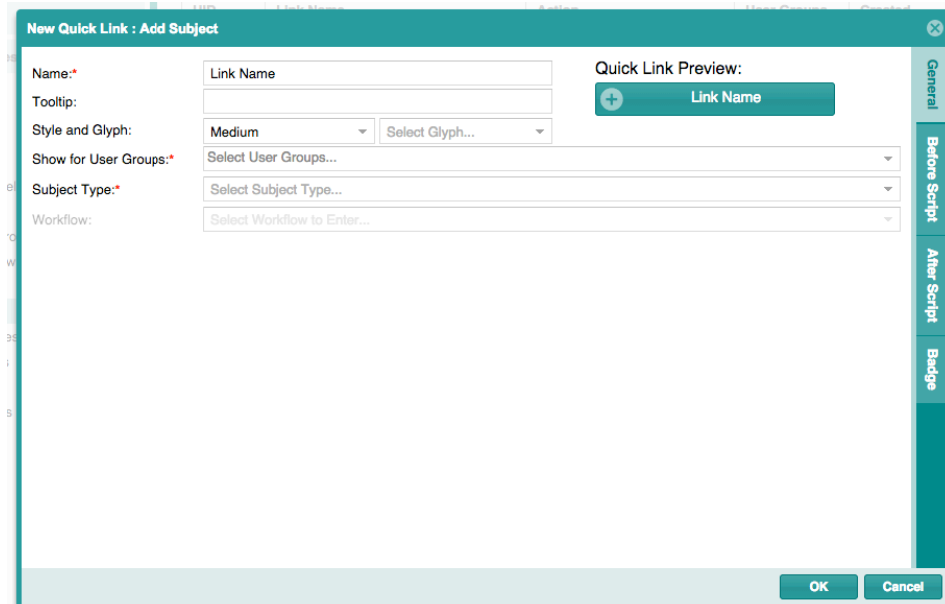
options: **Add Subject, List Subjects, Import Subjects, Batch Search, Saved Search, Barcode Search, Name Search, Dashboard, User's To-Do List, Separator and Run Script.** An example Quick Lick is displayed on the left side.

The "New Quick Link" icon ⊕ ▾ creates a new Quick Link and is accessible through the **Settings and Preferences → Limfinity Settings → Quick Links**.

- In the Quick Links List View, the toolbar contains an icon to add **New Quick Link**
- To add a new quick link, select an option from the drop-down menu.
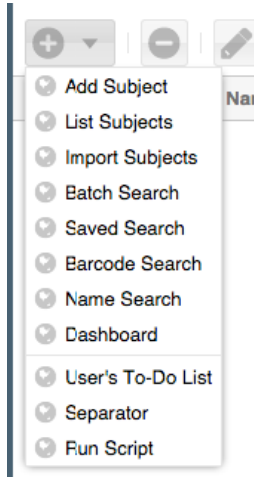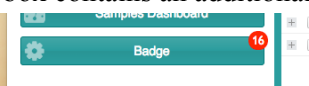

- When selected, a dialog box will be generated to enable user configuration for the quick link.

- Quick Link dialog box contains an additional tab named 'Badge'. This 'Badge' tab enables a user to set a count for subjects in a specific Subject Type. To use 'Badge', please refer to the Scripting Guide.

The "New Quick Link" icon creates a new Quick Link and is accessible through the **Settings and Preferences** tabbed menu.

Add Subject	Creates a new Subject entity of the Subject Type associated. Can be associated with a Subject Workflow to progress data collection.
List Subjects	Creates multiple new Subject entities of the Subject Type associated. Cannot be paired with a workflow.
Import Subjects	Allows import of CSV/Excel file containing Subject information for multiple Subjects of a particular Subject Type. (In Excel the date column must be formatted as date field. In CSV, Date UDFs must contain a 4-digit year, yyyy).
Batch Search	Batch Search enables users to search entirely in LIMFINITY for a group of samples.
Saved Search	Saved Search enables a user to choose between saved search queries and view the updated results of a saved search.
Barcode Search	Enables search using barcodes either by typing barcodes in or by barcode scanners.
Name Search	Enables searching in the entire LIMFINITY for certain parameters that contain certain words in the Name.
Dashboard	Enables user to link directly to a particular dashboard that is set by the Administrator.
User's To-Do List	Link that directs to a List View to display all tasks that pertain to a particular User and the status that particular task is in.
Separator	A link that separates between other Quick Links.
Run Script	Enables a custom script to be placed as a quick link and executed once the quick link has been selected in the navigational window.

For more information about Quick Link Script, please refer to the "Scripting Guide".

NOTE:

To rearrange the order of how the quick links appear, highlight and click and drag the quick link in the list view and the quick link will now appear in the navigational tab in the same order as the list view.

Once a Quick Link is created and is visible in the List View, the web browser needs to be refreshed to display the Quick Links navigational tab and all new Quick Links.

If a Quick Link is linked to a **Subject Type** and Workflow, clicking on the Quick Link will direct the user to the corresponding workflow.

If a change needs to be made to a Quick Link, highlight the Quick Link in the List View first and then click on the properties function to change any credentials. ✎

If a credential is changed within LIMFINITY, all functions associated with the Quick Link will be changed; it is recommended that once an object is created that the credentials stay the same to prevent errors.

Quick Link will be visible to users who belong to the User Group assigned in the quick link; user groups should be configured before quick links are created.

Report Templates

Report Templates allow users to specify a group of UDFs to export to csv file for any given list of Subjects. A user with LIMFINITY "Manage Report Templates" role right can create templates by clicking on the **Reports Templates** tab located under **Settings and Preferences → Limfinity Settings**. After opening the **Report Templates** menu, the user will be able to **Create, Delete,** and **Edit** a Report Template using the toolbar ⊕▾ ⊖ ✎ located at the top of the List View.

When creating a **Report Template**, the user must first select the **Subject Type** to be associated with the Report. User can select all the **User-Defined Fields** associated with the **Subject Type** and any linked

Subject Types. Once the **Report Template** is created, an icon 📄▾ will be displayed in the Explorer List View for that Subject Type.

Configuring a Report Template:

When creating a Report Template, first select the **Subject Types** within LIMFINITY to be associated with the Report. An example is as follows:
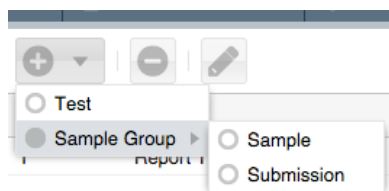
A dialog window will be generated to prompt the user to fill in certain credentials such as: Template Name. Additionally, a user can add any user defined fields associated with the **Subject Type** by clicking on the "Available Fields" button located at the top right of the dialog. An example is as follows:
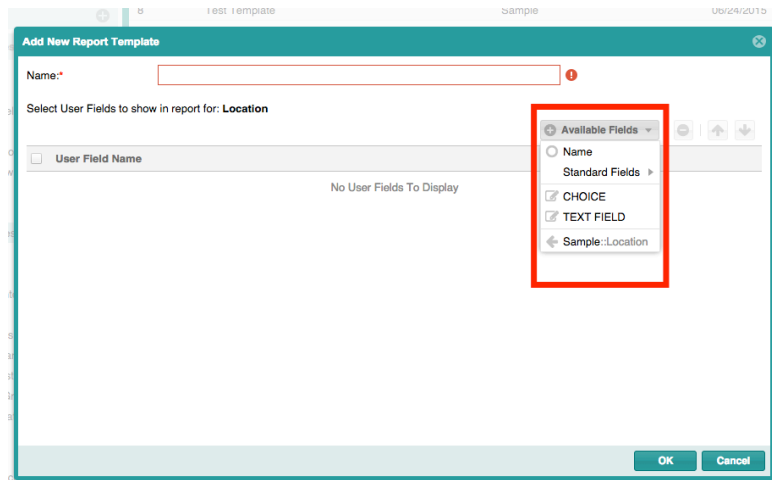
Once all credentials have been selected, the saved Report Template will be displayed in the List View

Custom Reports

Custom Reports are HTML-formatted to display data to User specifications. A user with LIMFINITY "Manage Report Templates" role right can create templates through the **Custom Reports** tab located under **Settings and Preferences → Limfinity Settings**. In the Custom Report List View, a toolbar is located at the top left corner, and provides the user the ability to **Create** a new custom report, **Delete** an existing custom report, or **Edit** any properties of an existing Custom Report.

The User must select a **Subject Type** associated with the **Custom Report**. A dialogue window opens with tools to format the **Custom Report**, including a list of all UDFs for the Subject Type and any associated **Subject Types**. Use the tool icons to apply formatting or click "Source" to view HTML code.

Custom Report has an option to choose "Takes Subject List" to print a list of values for the selected **Subject Type**. When selected, user must click on the "Source" tool and use HTML to render the list.

The following example will produce a list of selected **Subject** names.

{% for s in subjects %} {{s.name}}{% endfor %}

Once the **Custom Report** is configured and saved, it can be initiated from the workflow for the **Subject Type** by inserting a **Subject Report** tool in any **Workflow State**.
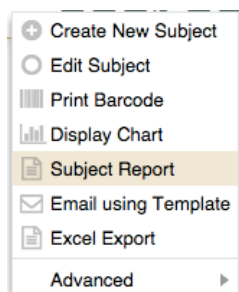
REPORTS IN LIMFINITY

When a **Custom Report** or a **Report Template** is created, the "Reports" icon will be displayed in the Subject List View of associated **Subject Type**.

The user will have the following options when running the **Report Template**:

- **Selection**:
  - All Records – report will be generated for all records
  - Selections Only – report will be generated for selected records only
- **Report Format**:
  - HTML (In New Window)
  - CSV File (Export to Excel)

The user will have the following options when running the **Custom Report**:

- **Selection**:
  - All Records – report will be generated for all records
  - Selections Only – report will be generated for selected records only
- **Report Format**:
  - HTML (In New Window)

BRICKS

BRICKS allows the user to create a copy of selected components of the system configuration and export it into a file which can be shared with others. BRICKS also allows the user to install the configuration file into a system. The following options are available for the users when creating a new BRICK

- Subject Types
- User-Defined Fields
- Subject Type Groups
- Subject Workflows
- Quick Links
- Subject Reports
- Custom Reports

- Email Templates
- Barcode Templates
- Helper Scripts
- Subject Hierarchies
- Subject Constraints
- Dashboards
- Scheduled Scripts
- Calendars

More Settings

Barcode Printers

Before a user can print barcode labels from LIMFINITY, an Administrator must configure barcode printer(s) in the system. A combination of information from a barcode printer and label is referred to as a **Barcode Printer Profile**. Multiple printer profiles corresponding to different printers and/or label formats can be created and saved in LIMFINITY. Note that LIMFINITY allows a user to configure barcode labels to contain text, linear barcodes, 2D barcodes, and RFID Tag.

Liquid Filters

Helper script named liquid_filters is generated when LIMFINITY is initiated.   Only Users with Administrator Roles can add, edit and delete **liquid_filters helper scirpt**. **Liquid Filters** created in this section are used in the **Custom Report** Templates section. The screenshot below contains two examples of the **Liquid Filters**.
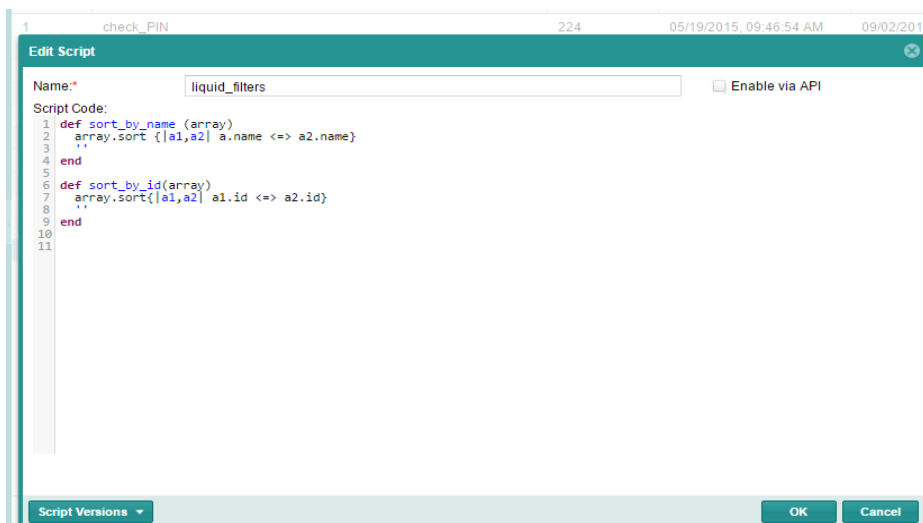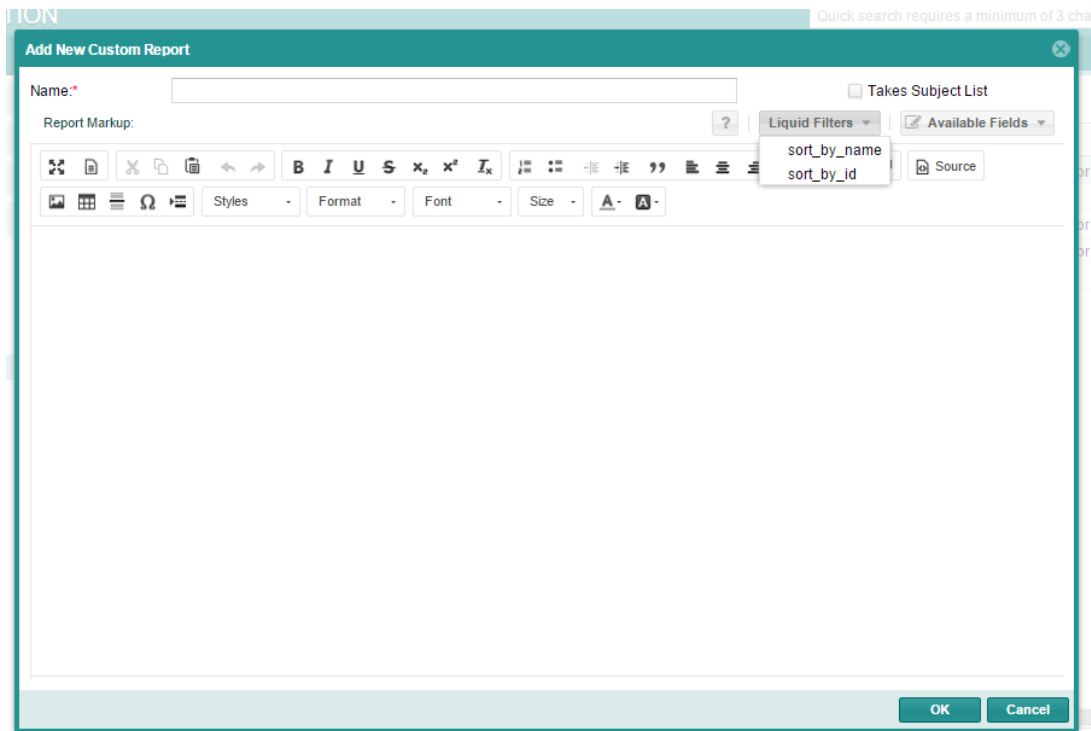

Liquid Filter syntax is:

```
def filter_name(argument)
filter script body
end
```

For additional information, visit https://github.com/Shopify/liquid/wiki/Liquid-for-Designers

The screenshot below shows a dialog box for editing **a Custom Report** Template where the available **Liquid Filters** are circled in red:

Subject Alerts

Subject Alerts are can be configured to notify Users when a particular condition is met (e.g. low stocks available, expiration date exceeded, etc.). The **Subject Alerts** feature is located under **Settings and Preferences → Limfinity Settings → More Settings**. A user with "Manage System-Wide Settings" role right can create a **Subject Alert**. Located at the top of the Subjects Alerts List View is a toolbar that contains the functions to **Create, Delete** and **Edit** a **Subject Alert**. When creating a new **Subject Alert**, select the **Subject Type** to be associated with the alert and fill out the following credentials:

- **Alert Name –** a description of the Alert.
- **Alert Scope**: Click on "New Condition" and select the UDF from the drop down and set the condition from the choice. (Ex. Equal, contains, greater than etc.).
- **Alert Condition**:

- o **Operand**: Total Subjects
- o **Condition** – choose **Equal**, **Greater Than**, **Less Than or Not Equals**
- o **Value** – integer value
- **Notify User Group:** Select the User Group to receive the Alert notification.
- **Enable** – a checkbox to activate the **Subject Alert**
- **Script – User can customize search results**.

When the **Alert** is enabled and **Subject Alert** condition is met, the selected User Group users are presented with a "Bell" icon at the top right corner of the screen. Click on the bell to open the "Active Alerts" panel. Select the **Alert** and click on "View Subjects" icon located at the top right corner to open the list of Subjects that met the Alert condition(s). User can also dismiss the Alert by clicking on "Dismiss Alert" icon located at the top, right corner of the screen.

Typical applications of **Subject Alerts** are monitoring the expiration dates of samples, monitoring maintenance intervals of instruments, etc.

Subject Hierarchies

Subject Hierarchies control the rules for the propagation of Access Permissions. When creating a Subject Hierarchy, a user is prompted to select a root subject type and then form a chain of other subject types, which will inherit the same Access Permissions as the root **Subject** record. The screenshot: Picture 1 below contains an example where "Freezer" is designated as a root (Parent Subject) with Priority set as **1**. All 'Box', 'Sample', and 'Run' generated from a particular "Freezer" inherit the same Access Permissions from the "Freezer".
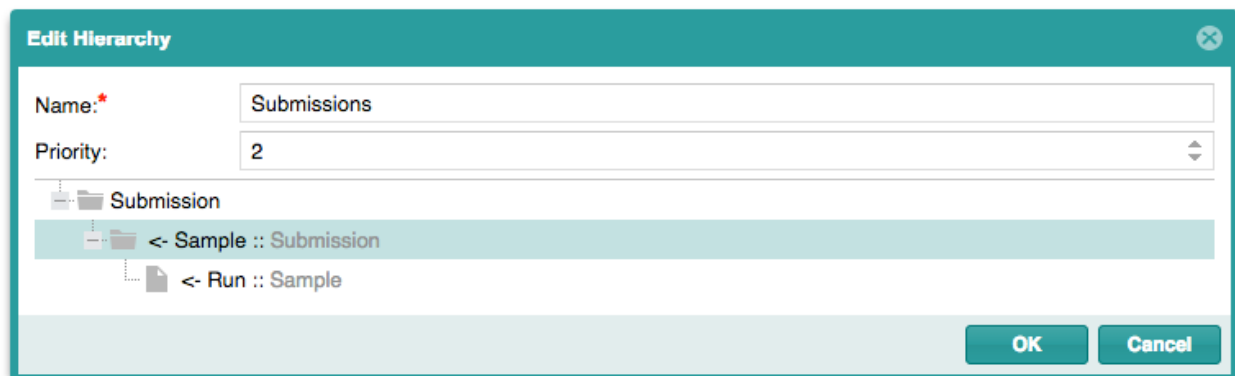
Picture 1:
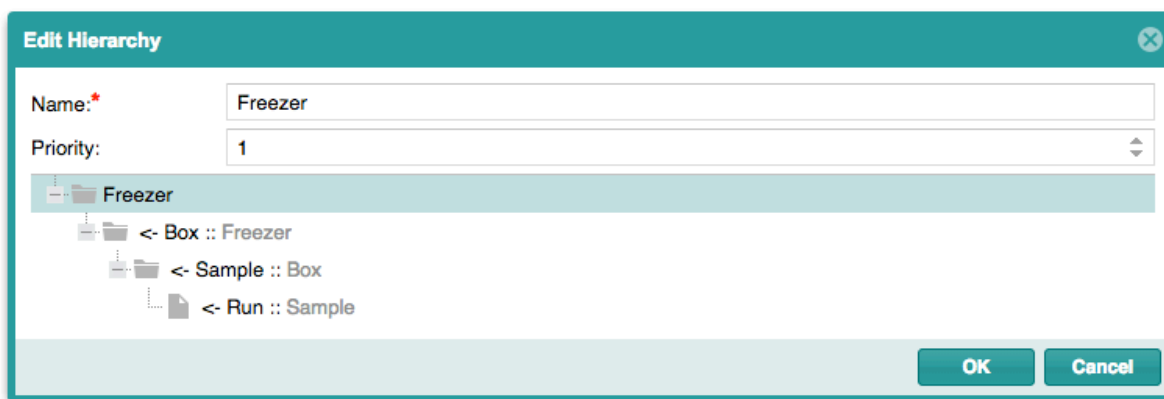
When creating two different subject hierarchies with a common subject type, the user can set the priority level to control the Access Permission. The common subject type subject record will inherit the Access Permission of the root Subject record with the higher priority level. The screenshot Picture 2 below contains an example where 'Submission' designated as a root (Parent Subject) with same
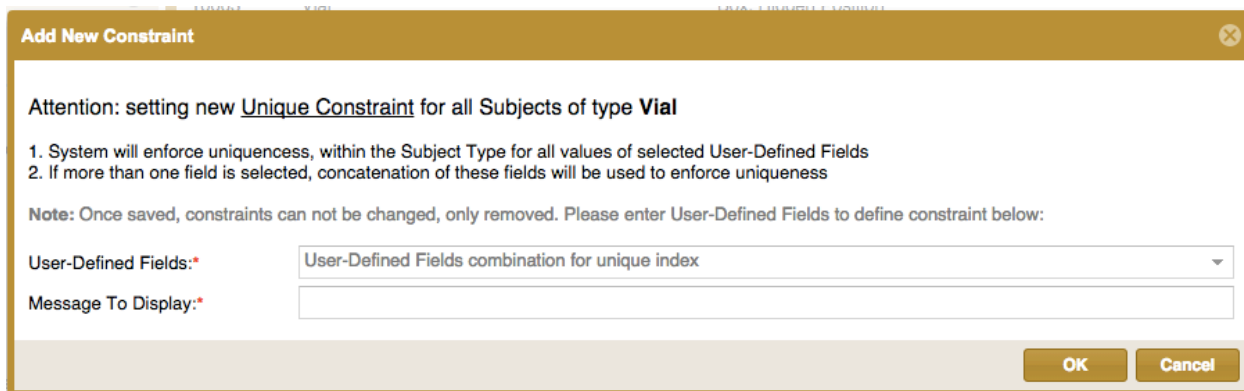
'Sample' and 'Run' subject types as path and Priority is set as 2. In this case the 'Sample' and 'Run' will inherit Access Permission from 'Submission'

Picture 2:

Subject Constraints

Subject Constraints are restrictions on a Subject Type. Subject Constraints are located under **Settings and Preferences → Limfinity Settings → More Settings.** Subject Constraints enforce individual records of the same Subject Type to be unique for any selected UDF or combination of UDFs. A User must choose a Subject Type for the Subject Constraint and then a dialogue box opens.

The system will enforce uniqueness within the selected **Subject Type** for all values in the selected UDF. If more than one UDF is selected, the system will enforce uniqueness for a concatenation of values in the UDFs. Once created, **Subject Constraints** cannot be edited, but they can be deleted.

Subject Constraints are restrictions that are particular to a single Subject Type that the user specifies. The constraints allow for individual objects of the same **Subject Type** to be unique from one another.

NOTE:

        Scenario:

Subject Type X has User-Defined Fields A, B and C.

With Subject Constraints enabled the following can happen:

Subject Type	A	B	C
Subject Type X 1	1	2	3
Subject Type X 2		2	3
Subject Type X 3	1	2	
Subject Type X 4	1		3
Subject Type X 5	1	2	3

Subject Type X 5 will yield an error since there is an existing Subject Type object that contains the same attributes.

Please contact info@ruro.com or support@ruro.com for more information.

Charts and Graphs

The **Charts and Graphs** feature, allows the generation of a Chart or Graph from numeric data stored in LIMFINITY. The **Charts and Graphs** feature is located under **Settings and Preferences → Limfinity Settings → More Settings**. To configure a new Chart and Graph Template, use the toolbar

inside the List View of all **Graphs and Charts**. Select a **Subject Type** to be associated with the template and complete the following fields:

- **Name**
- **Date Source:**
  - o Property: Select the UDF from the drop-down menu
- **Graph Settings:**
  - o Caption: Enter the Text for the Title
  - o X Axis Label: Enter the Text for the label
  - o Y Axis Label: Enter the Text for the label
  - o Chart Type: Select one of the options from the drop-down menu (Bar/Column, Line, Graph/Smoothed Line, Pie, Donut or Radar)
  - o Chart Options: 3D, Fill, Animation, Rotate Chart 90°, Place Labels Vertically

Once the Graph Template is created, an icon is displayed at the top right corner in the **Subject List View** of the associated **Subject Type**. To generate a **Chart/Graph**, select multiple **Subjects** and click on the icon.

Not all Chart Options are compatible with all Chart Types.

Configuring a new graph:

- In the list view of **Charts and Graphs** screen, select the Define New Chart Type.
- A drop-down menu will appear to display the different **Subject Types** currently in the LIMFINITY application. Select the Subject Type to be associated with the new chart/graph.
- The dialog box displayed is an example of the parameters that dictate how the chart will be displayed.
- Currently six types of Charts and Graphs are available for creation:

    - Bar/Column
    - Line
    - Graph/Smoothed Line

    - Pie
    - Donut
    - Radar

Examples of different types of graphs that can be generated by LIMFINITY:

Bar /Column Graph
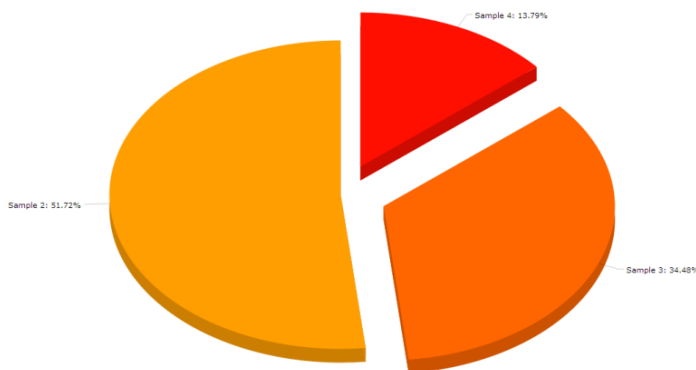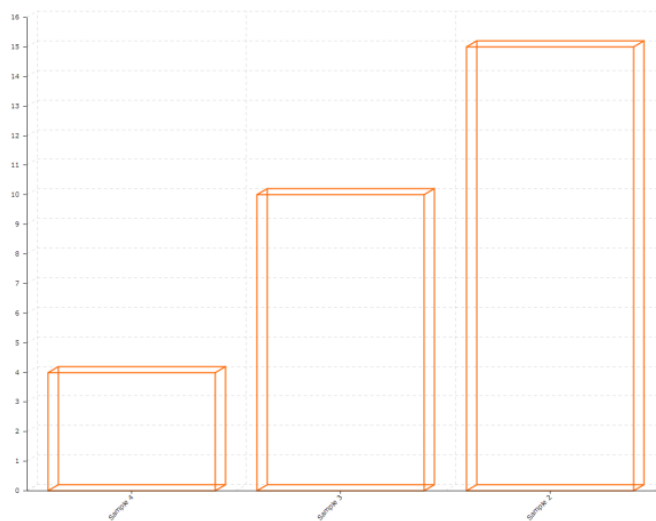
Pie Graph

NOTE:

Once created, the chart can only be used for the specified **Subject Type**. If a **Subject Type** has more than one numerical value that needs to be displayed in a chart, several charts need to be made for that particular **Subject Type**.

To modify a Chart, select the Chart in the List View and click on properties tool located at the top left corner.

Email Templates

Email Templates option is located under **Settings and Preferences** → **Limfinity Settings** → **More Settings**. The Email Templates feature is in functionality to the Subject Alerts function in functionalities. It allows the user to send an email notification to a User Group when a certain event occurs in the LIMFINITY system. Clicking on the Email Templates tab
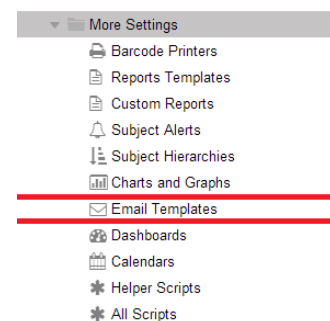
will open a list view showing all existing configured Email templates, with a toolbar located at the top to Add, Edit, and Delete an email Template. When creating a template, select the **Subject Type** to be associated with the template from the drop-down menu and complete the following fields:
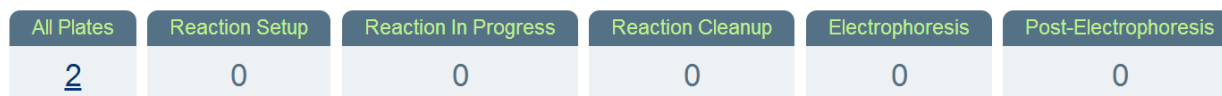
Name – Name of the Template
Click on "Available Fields" and insert UDF fields to be displayed in the email. Add any text message that needs to be displayed.

Once the Email Template is created, the template can be used with the tool "Email using Template" in the Subject Workflow.

Dashboards

The Dashboard feature permits the Administrator to create a custom dashboard, which can display different states of a particular workflow, a specified status for a Subject Type object and/or the different attributes of a Subject Type object. User can replace the welcome homepage when they login with multiple Dashboards. To enable the Dashboard as home page, a user must create a login Helper Script after creating Dashboards. To access Dashboards and Helper Script, select **Settings and Preferences** → **Limfinity Settings** → **More Settings** from navigation panel**.**

Dashboards are particular to the specifications of the end user. They can be set to monitor a specific **Subject Type** state, or **User Defined Field**.

All Plates	Reaction Setup	Reaction In Progress	Reaction Cleanup	Electrophoresis	Post-Electrophoresis
2	0	0	0	0	0

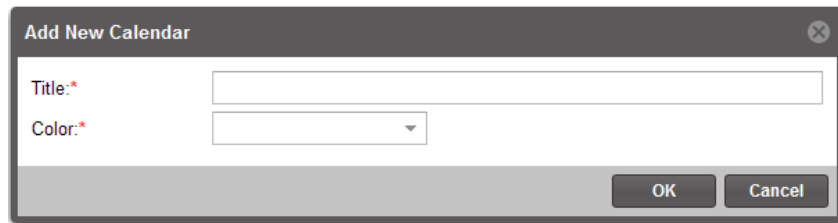Please refer to the Scripting Guide for more information on how to configure Dashboards.

Calendars

The Calendars feature permits the Administrator and Manager Role to input a calendar into the LIMFINITY application when one or more users need to schedule events that need to be shared with all other LIMFINITY users. Each Calendar is color coordinated; therefore each scheduled event can be distinguished from one another. Clicking on the "Calendars" tab will open a List View, with a toolbar located at the top to Add, Delete and Edit a Calendar. The following parameters are needed when adding a new Calendar:

> ▼ More Settings
> 🖨 Barcode Printers
> 📄 Reports Templates
> 📄 Custom Reports
> 🔔 Subject Alerts
> ⌊≡ Subject Hierarchies
> 📊 Charts and Graphs
> ✉ Email Templates
> 🕸 Dashboards
> 📅 Calendars
> ❋ Helper Scripts
> ❋ All Scripts

Name – an identifier for the system object.
Color – select a color to distinguish one calendar event from another.
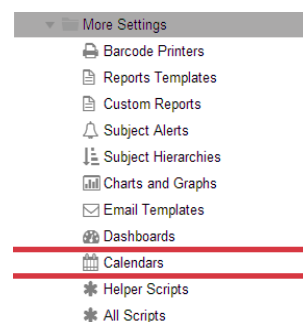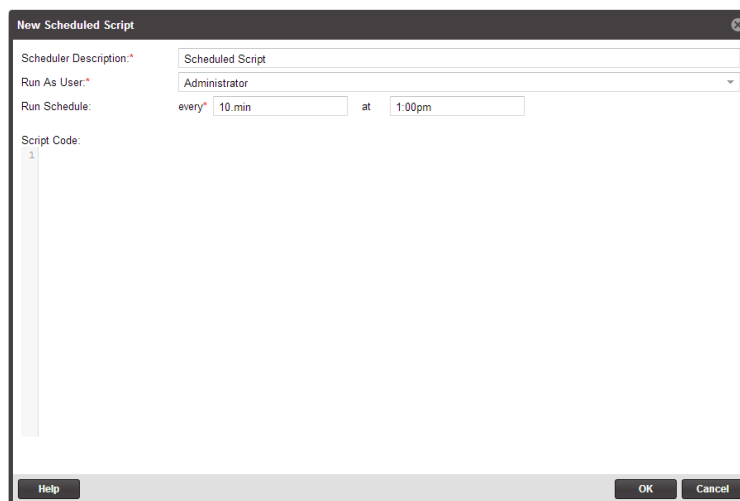
Scheduled Scripts

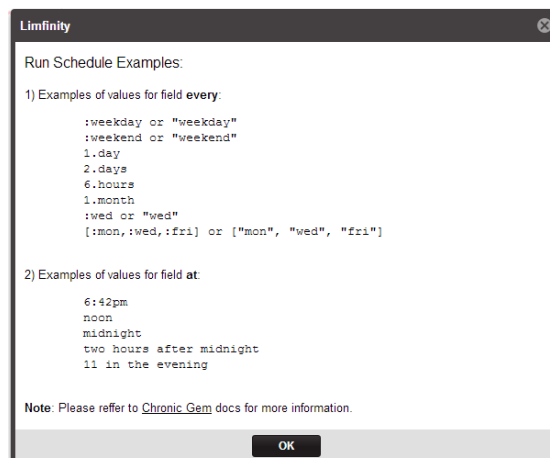Scheduled Script is a particular feature that enables Administrators to create custom scripts that will be enabled during a certain time interval.

For additional information on how to configure the scheduled script, select the **Help** button to display a dialog box with examples.

Please contact info@ruro.com or support@ruro.com for more information.

External Plugins

Within the External Plug-ins section of Limfinity, a user can create and save **External Plug-ins** (CGI scripts, for example).

A toolbar is provided at the top of the Plug-ins List View in order to **Add, Delete** and **Edit** the Plug-ins.

An **External Plug-in** is available when browsing the Subjects of a specific type in a List View. Below are the instructions for configuring an external Plug-in:

- When creating new **External Plug-In** in Limfinity, select a **Subject Type** to use.
- Plug-in will receive ID's of the selected Subjects.
- Plug-in must return a JSON object with the following:
    - success: true/false.
    - true: it was a success, Limfinity will open a list of Subjects.
    - false: it was a failure, Limfinity will roll back the transaction and show a message in the dialog box.
    - msg: optional message that is shown to user.
- The Plug-in has 10 seconds to complete, otherwise Limfinity will close the connection and show an error message.

Example of an **External Plug-in**:

```
#! /usr/bin/env ruby
require "cgi"
CGI.new.out() do
'{"success":"true", "msg":"From CGI: All done, no problem!"}'
end
```

Helper Scripts

The Helper Scripts section is a feature that permits the Administrator to create long detail scripts that can be used throughout the Limfinity system.

All Scripts

The All Scripts feature contains all existing scripts within the Limfinity system. From the list view, an Administrator can locate and edit any existing script.

System Preferences

General Preferences

To Access **General Preferences**, expand Settings and Preferences, Systems Preferences → System Preferences and click on General Preferences. **General Preferences** allows for the following settings:

- **System Name** (required)
- **Company Name** (required)
- **Minimum Password Length** (Characters)
- **Enforce Strong Password Check**
- **Incorrect Logins Before Account Lock**: (can be disabled – minimum of 3 and maximum of 6 attempts)
- **Allow Username Retrieval**: (Email Server needs to be enabled)
- **Allow Password Reset Request**: (Email Server needs to be enabled)
- **Send User Invitation Email**: (Email Server needs to be enabled)
- **Inactivity Timeout** (Hours)
- **Limfinity UI Theme**
- **Login Wallpaper URL**
- **Country Settings**
- **Date Format**
- **Time Format**
- **Default Group for All New Users**
- **Default Role for All New Users**

Strong Password Check requires the password to use at least 3 of these 4 character types: uppercase letter, lower case letter, number, and symbol. If the Strong password option is selected, user will be asked to reset their password when he/she logs in for the first time.

Click OK and refresh Browser page to apply changes.

Integration Settings

Linking LIMFINITY with other software products from RURO, Inc. (FreezerPro and ezColony) is performed in this section. In addition, all programs that are capable of integration with the LIMFINITY application will be integrated in the dialog box generated by the Integration Settings.

Homepage Options

Homepage Options allows configuration and customization to the **Home** screen to the aesthetics of the user. In this area, a user can add custom logos, pictures, etc.

Login Message

LIMFINITY has an option to display a message every time the application is opened. The tool is configured in the **Login Message** section. Clicking on the **Login Message** tab opens a dialog window, which allows the user to enable/disable the tool and to enter a message text. To change the font color, click on the down arrow next "Login Screen Font Color" and select the color. Regular text processing functions are available inside of the "Message Editing" entry area.
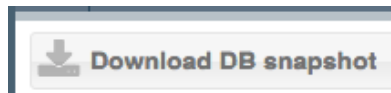
Welcome Message

LIMFINITY has an option to display a system wide message when a User logs into the application. The tool is configured in the **Welcome Message** section. Clicking on the **Welcome Message** tab opens a dialog window, and user can enter the text message and enable/disable the message.
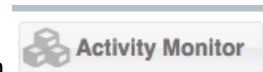
Terms of Use

LIMFINITY has an option to enter custom 'Terms Of Use' under System Preferences. Each user should accept this terms of use on their first login or when the terms of use has changed.

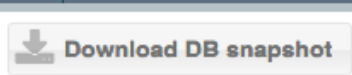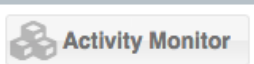### VM Console Log

Console Messages tab, contains button button and a button to refresh the console messages generated as a result of the software activities.
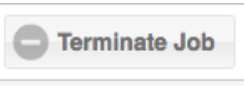
The button can be used to download database snapshot to troubleshot or save the database.

User can use the button, which will open up a tab panel (Activity Monitor) to view all background running jobs. This panel will contain all the following information related to the background running job.

- Job ID
- User
- Job Type
- Queue
- Status
- Job Submitted
- Job Finish
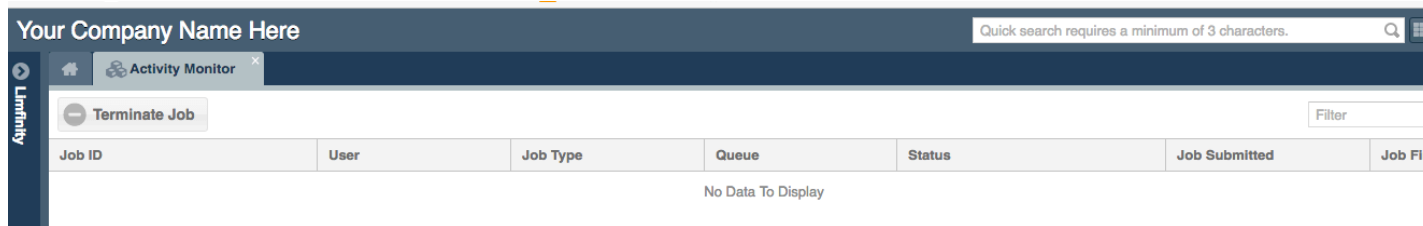
The Activity Monitor also contains [Terminate Job] button, which can be used to terminated the job.

This Console Messages window is used for troubleshooting the LIMFINITY application.

RFID Controller Log

RFID Console Message tab, contains [↻] button to refresh the script message generated as a result of the RFID controller activities. This window is used for troubleshooting the LIMFINITY application.

> Note: This RFID Controller Log will only be visible for users with RFID license.

Baseline Configuration:

A Baseline configuration is set anytime a configuration is promoted to an instance. All **User Groups, Roles, Subject Types, Subject Type Groups**, **UDFs, Workflows, Subject Tasks, Quick Links,** and most settings under the **Limfinity Settings** tab are marked with green stars, indicating their configuration is unchanged from baseline. Once anything is changed with the configuration, the star changes to red color to indicate a change from the baseline configuration.

RFID Controller, Antennas, and Readers

LIMFINITY offers RFID (Radio Frequency Identification) license enabling through VMs. Once the RFID license is purchased, the user has the ability to control RFID Controller through VM. After enabling the RFID Controller in the VM, user must set up RFID related Subject Types, User-Defined Fields, Antennas, and Readers. User must also set up several Helper Script related to RFID Controller. Please refer to the Scripting Guide for more information regarding RFID Helper Scripts.

RFID Antenna

RFID Antenna is the device that is used to detect nearby RFID tags. (User can create Dashboard to display scanned RFID tag information). When valid RFID tags are within its detection range, it will automatically pull the tags' information into the system and display it in the Dashboard.

Create Subject Types for RFID Antenna, RFID Reader, and RFID Tag.

> - Subject Type 'RFID Antenna' should have the following 'Subject Name' generation script in 'Advanced Settings'
> **"#{get_value('Reader')} - port #{get_value('Port').to_i}"**

Create the following User-Defined field.

> - Subject Back Reference (for RFID Antennas)
> - Subject (for RFID Reader)
> - Number (for Port)
> - Add 'RFID Antennas' UDF to 'RFID Reader' Subject Type.
> - Add "Port', and 'RFID Reader' UDFs to 'RFID Antenna' Subject Type and mark their 'Required' (under In Use panel) to 'Yes'

Create a subject in Explorer for RFID Reader:

- ❖ **RFID Reader Name (Name): it requires a format which is "SpeedwayR-XX-XX-XX.local"**

- ❖ **MAC: it is the information that is needed for providing the IP address, so that user's system will be linked with RFID Reader**

- ❖ MAC & RFID Reader Name: User should take the last 3 parts (separated by ":") of MAC and replace the "XX" (separated by "-") of RFID Reader Name format. For example, if MAC is "00:16:25:**10**:**E8**:**C2**", then the RFID Reader Name should be "SpeedwayR-**10-E8-C2**.local"
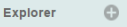
Create a subject in Explorer for RFID Antenna

- ❖ **RFID Reader (Reader): A drop down list will be available for 'RFID Reader' subject**

❖ **RFID Reader Port (Port): it is the port (#), that Reader used to connect with Antenna**

ACCESSING INFORMATION USING LIMFINITY

LIMFINITY offers several methods to access information contained in the application.

Accessing Subject Types

Click on **Explorer** tab [Explorer ⊕] and select a specific **Subject Type** to access all Subject records. Double clicking on any object displayed in the List View will open the Subject and display data associated with the record.

Searching for Data in LIMFINITY

A user can perform a Quick Search for data in LIMFINITY by entering at least 3 characters in the "**Quick Search**" field located at the top, right of the browser window. All records that contain the entered characters (in that order) will appear in a drop-down menu. Select a single Subject from the drop-down menu and click on it to see the additional details. Quick Search will not produce any results with partial entries for UIDs or Barcodes. When using **Quick Search** for UIDs or Barcodes**,** the full value must be entered.

The **Advanced Search** tool is accessible via the **"General Action"** icon located at the top right corner of the browser window. The **Advanced Search** tool allows a user to set specific parameters for a search. The parameters and the result of an **Advanced Search** can be saved as a **Search Query**.

The **Batch Search** tool is accessible via the **"General Action"** icon located at the top right corner of the browser window. The **Batch Search** tool allows a user to scan or copy/paste a list into a window to return all Subjects matching the list.

Accessing Search Queries

Click the **Search Queries** menu in the navigation panel and select an entry. Selecting an entry will open the saved **Search Query** in **Advanced Search** panel. User can edit the Advanced Search query fields to narrow down the saved search. In addition, clicking the search icon [🔍▾] located under Search Queries and selecting the subject type from the drop-down menu will open a new Advanced Search query panel.

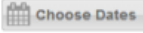## Accessing Audit Records

To Access **Audit Records**, click on the **General Actions** tool [▦ ▾] located at the top right corner of your home screen and select the desired option from **Audit Records**. The following options are available under Audit Records:

- **All Audit Records**: Reports of all the audit records for the system.
- **Today**: Reports of all the audit records within today.

- **Yesterday**: Reports of all the audit records within yesterday.
- **Within this Week**: Reports of all the audit records within current week.
- **Within this Month**: Reports of all the audit records within current month.
- **Activity By User**: This will filter the audit records for a specific user in the system. The audit records will contain the user name, what kind of actions, what kind of objects used, the subject types, the subject workflows, the specific subjects, dates and time.

Audit Records can also be accessed from the following List View:

- Standard Subject View, an Admin user can right-click on a Subject Name and select Audit Records.
- From a Subject List View, select a subject, right click and select Audit Records.
- From a Users List View, select a User, right click and select Audit Records.

When working with the **Browse Audit Log** records, user has an option to select the **Choose Dates** option [Choose Dates] . This is a tool for narrowing down the list of displayed audit records by selecting a range of dates. User also has the option to generate a report in HTML or CSV format by using **Report** icon [Report] located at the top left corner.

NOTE:

It is recommended to use the **Refresh** icon following a new data entry. The **Refresh** icon ↻ is located at the top of the tabbed menu, as well as at the bottom of the content window. When numerous users simultaneously perform actions in the LIMFINITY application, frequent use of the **Refresh** icon will insure access to the most current information.

SEARCH QUERIES IN LIMFINITY: QUICK, BATCH, AND ADVANCED SEARCH

With appropriate role rights, users have access to **Quick**, **Batch,** and **Advanced Search** functions in the LIMFINITY **Home** screen and in all List Views.

Quick Search

The Quick Search toolbar [Quick search requires a minimum of 3 characters. 🔍] is located at the top right corner of the application window. **Quick Search** in LIMFINITY is a dynamic searching method that quickly finds matching **Subjects** based on the characters entered. A **Subject Type** must be enabled for Quick Search for records to be included in search results.

To Perform a Quick Search for Subjects:

1. In the Quick Search toolbar `Quick search requires a minimum of 3 characters.` , enter at least three (3) characters associated with a **Subject Name**, **Description**, or any other **User-Defined Fields** marked for Advanced Search and hit Enter/Return key. All Subjects in the LIMFINITY database that match the characters entered will appear in a drop-down menu.
2. Click on a **Subject** entry in the search results to view **Subject** details.
3. To close the Quick Search results, click elsewhere in LIMFINITY.

Advanced Search

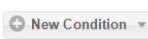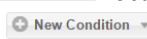To use **Advanced Search**, click on ▦ ▾ icon located at the top right corner of the application window and select the **Advanced Search** option from the drop-down menu. All Subject Types enabled for Advanced Search will be listed in a drop-down menu . **Advanced Search** allows a user to search for Subjects matching one or more specified parameters.

To build the search query, use the "New Condition" icon ⊕ New Condition ▾ located at the top left corner and select the search parameters. Select the "New Condition" icon ⊕ New Condition ▾ again to add search conditions.

Options

Lower, Upper, Length, No Function: If searching on **Subject** Name, click the down arrow next to the UDF ⊖ Name▾ to select **Lower**, **Upper**, **Length** or **No Function** options. These functions are applied to the search query characters to convert all letters to LOWER or UPPER case prior to searching to enable case-insensitive searches. **Length** specifies the number of characters in the value. **No Function** restores default conditions and the query is case-sensitive.

Operators: The comparison elements, such as: **Equals**, **Not Equals**, **Begins With**, **Contains**, **Does Not Contain**, **Ends With**, **Regular Expression**, **At Least One Of**, **Empty** and **Not Empty** can be selected in the search options field. A **Regular Expression** is a sequence of characters that define a search pattern, mainly used in pattern matching with strings. A search entry is entered following the comparison elements, while the **Search Now** button is used to perform the operation.

User can add one or more search conditions using the **New Condition** button or use the **Delete** icon ⊖ to remove search parameters. Queries are re-run each time **Search Now** is clicked.

Date field values can be selected from a calendar. Relative date options are also available: **Today, Yesterday, Tomorrow, Last week, 3 years ago,** and **In a month**.
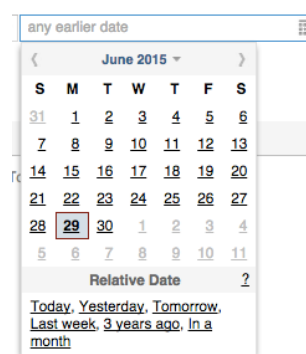
A user can also use the query bar to manually enter or modify queries in SQL Query language. For example: (name LIKE 'CPR%' OR name LIKE 'ISR%') AND #state = ('Recorded Sample' OR 'Registered Sample'). The search results will contain all Samples with names that start with 'CPR' or 'ISR' and either in workflow state 'Recorded Sample' or 'Registered Sample'.

A user can save the parameters and results of an **Advanced Search** as a **Search Query** in the left navigation bar by clicking the **Save** icon [Save]. The **Save** icon opens a dialog window to prompt a **Search Query Name** entry.

Batch Search

A **Batch Search** allows a user to type, copy & paste, or scan Subject Name, Subject Barcode, Subject ID (UID), or any other User-defined Field marked for Batch Search into a dialog box to populate a search query. To access **Batch Search,** click the **General Action** icon [icon] at top right corner of the home screen and specify the **Subject Type** within the drop-down menu of **Batch Search**. Batch Search entries must be separated by a new line.

NOTE:

Saved **Search Queries** updated each time they are run such that current entries meeting the search criteria are refreshed each time.

Inside of the **Search Query** menu, user can only see the Queries that he/she has created. Right click on a saved query to **Delete Query**, **Rename Query** or create a **New Folder.**

A Subject Type must be enabled for Search types (Quick, Batch or Advanced) before using the search options. To enable/disable search types for any **Subject Types,** go to Settings and Preferences and click on **Subject Types**. Select a **Subject Type** from the list view, right click to open the selection menu and select checkboxes within "Searchable" to enable/disable the search options.

User Authentication in LIMFINITY

Scope

This document contains a description of the user authentication schemas available in LIMFINITY software. This document is intended for the system administrators.

Overview

There are two possible configurations for the user authentication in LIMFINITY software: Internal Authentication and Authentication via LDAP. Below is a description of these software settings.

- **Internal Authentication**
  Internal Authentication for the users is a default setting of LIMFINITY Virtual Machine. With Internal Authentication enabled, the users are created using the web-interface of the software. Typically, this action is performed by the Administrator within **Settings and Preferences → Users → Add New User**. The Administrator can assign login name, password, full name, etc., Please refer to the following screenshot:

  NOTE: It is recommended to configure LIMFINITY Roles and User Groups prior to creating the users. Please refer to Roles and User Group sections for more information.

  An Administrator can reset a password for a particular user from the same software location: **Settings and Preferences → Users → Change Password**.

  A user can change his/her password in **General Actions → My Preferences → Change Password**.

It is recommended to configure the user password requirements prior to the implementation of the LIMFINITY software. It can be done in **Settings and Preferences → System Preferences → General Preferences**.

- **User Authentication via LDAP**
  Prior to enabling LDAP Authentication in LIMFINITY, it is recommended to edit build-in **User** roles. It is done in the web user interface under **Settings and Preferences → Roles → User → Edit Role**.

  User Authentication via LDAP can be enabled and configured in LIMFINITY Virtual Machine Console under **More Settings → Authentication Settings**.

  It is recommended to use free LDAP browser utility (http://www.ldapbrowser.com/) in order to obtain all necessary settings.

  Please refer to the following examples of the settings that can be entered into the LIMFINITY LDAP configuration window:

  Host: ldaps.companyname.com or IP address of LDAP server
  Port: 389
  Base DN: dc=companyname,dc=com
  Bind DN: CN=LastName\,FirstName,OU=Users,OU=CompanyName Users,DC=companyname,DC=com
  Bind Password: (entered)
  Search Attribute: sAMAccountName
  Search Filter: (objectclass=user)(objectcategory=person)
  Fullname Attribute: displayName
  Email Attribute: mail
  Use SSL/TLS: No or Yes
  Backend Library: net-ldap

  It is recommended to perform **Test Settings** in order to verify the connectivity of the LIMFINITY VM to the LDAP server. Once the LDAP User Authentication has been enabled, the Internal User Authentication Schema becomes non-applicable and disabled.

  NOTE: The **admin/admin** LIMFINITY account that was created by the system is always set to use Internal Authentication, even when the LDAP is enabled. It is recommended to edit the information associated with this account. It is not recommended to delete the **admin/admin** account.

  With configured LDAP User Authentication, the users will be able to log into the LIMFINITY with Windows credentials. When a user performs LIMFINITY login for the first time, the software will automatically create an account. This new account will be assigned to "**User**" role. This is a build-in User Role in the LIMFINITY system.

With LDAP Authentication, it is a good practice to create a LDAP OU which contains the users who have access to LIMFINITY. The LDAP OU is listed in *filter* attributes of the **Search Filter** field in LDAP configuration window in LIMFINITY VM console. This field is in standard LDAP Filter format.

Syntax example for all users allowed to log-in into LIMFINITY belongs to a particular LDAP OU: **(&(objectclass=person)(ou=Your OU))**
Syntax example for the case when allowed users belong to two different LDAP OU'S: **(&(objectclass=person)(ou=Your OU1)(ou=Your OU2))**
Syntax example for LDAP query to be used if access is restricted to a specific AD group: **(objectclass=*)(memberof=CN=groupName,OU=resourceOU,DC=domainName,DC=domain TLS)**

When Active Directory (LDAP) is selected for User Authentication in LIMFINITY software, it is the responsibility of a customer to carry out the appropriate LDAP configuration to ensure proper access to the application.

- **System Security option in LIMFINITY software**
  LIMFINITY software allows enabling SSL Encryption. It is highly recommended to use this option when secure web-access is needed for the application. SSL Encryption option is configured in the VM console.

  NOTE: SSL Certificates built into LIMFINITY are unsigned. It is recommended to purchase a signed certificate and upload it into the software. To upload certificate, go to Settings and Preferences → Users. In the Users List View, select the user, right click, and select Upload Certificate from the drop down menu.

  When enhanced system security is required, it is recommended to use LDAP for the User Authentication in LIMFINITY. It is recommended to use the LDAP options for the password strength and the password expiration date.

  NOTE: In order to have a software system with secure access, RURO Inc. recommends generating a Standard Operation Procedure (SOP) for "LIMFINITY Login/Logout".

  A web-browser is utilized for LIMFINITY User Interface. In order to maintain the required security level of the application, it is imperative for user to perform a "Logout" operation or close the browser session after the completion of a LIMFINITY session.

  SSH Server is a part of the LIMFINITY Virtual Machine. By Default, the SSH Server is in **OFF** State. The SSH Server can be turned **ON** in the VM console by using **More Settings/SSH Server** link. Following use, it is highly recommended to **STOP** the SSH Server by using VM Console. When left in the **ON** state, LIMFINITY SSH Server represents a known vulnerability of the Virtual Machine.

Scripts for LIMFINITY

Scripts are particular to the specifications of the end user. Please contact info@ruro.com or support@ruro.com for the additional Script Reference document.

Access Permissions in LIMFINITY

LIMFINITY comes with a list of User Roles and Role Rights. Manager or Administrator Role can modify the User Roles. All Users in LIMFINITY are assigned to a Role and are placed in a User Group, depending on their capabilities of access.

Each **Subject Type** and **User-Defined Field** has certain Access Permissions associated. The Access Permissions of a **Subject Type** can be accessed through the **Subject Types** tab located in the **Settings and Preferences** navigational tab.

To View and/or Change Access Permissions:

1. Locate the **Subject Type** by clicking **Subject Types** in the **Settings and Preferences** navigational tab.
2. Single left-click on the **Subject Type** to highlight and click on the Access Permissions icon ⚷.
3. A window will open to display the User Groups in the LIMFINITY application with the corresponding access associated with each one.
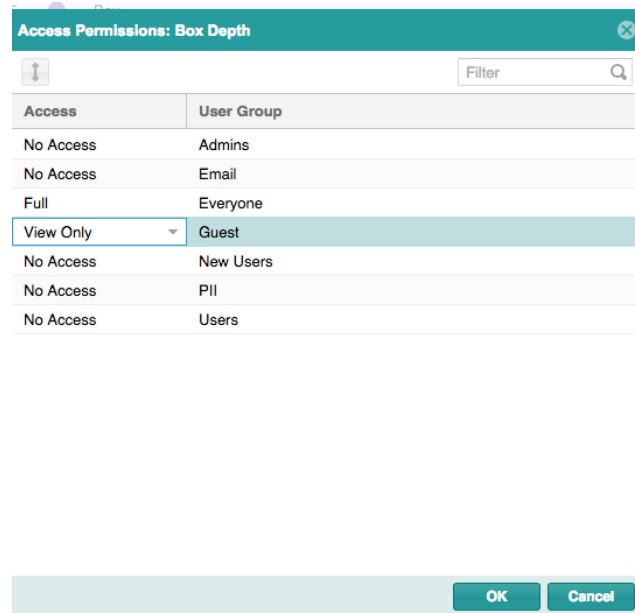
4. To change the Access Permissions, click on the down arrow and a drop-down menu will appear with three options to change the access permission: **No Access**, **View Only** and **Full**.
5. Left click the appropriate Access Permission and click the "OK" button located at the bottom of the dialog.

NOTE:

    Scenario:

    Subject type X has UDFs (UDF 1, 2, 3, and 4).

    A User is a member of Groups A and B.

    Group A has FULL access to Subject type X.

   Group B has NO access to Subject type X.

    Group A has FULL access to UDF 1 & 2 and VIEW ONLY access to UDF 3 and NO access to UDF 4.

    Group B has FULL ACCESS to UDF 1 & 4 and VIEW ONLY access to UDF 2 & 3.

    Permissions take precedence (i.e. the highest permissions are used): the user should be able to access Subject type X and have FULL access to UDF 1, 2 & 4 and VIEW ONLY access to UDF 3.
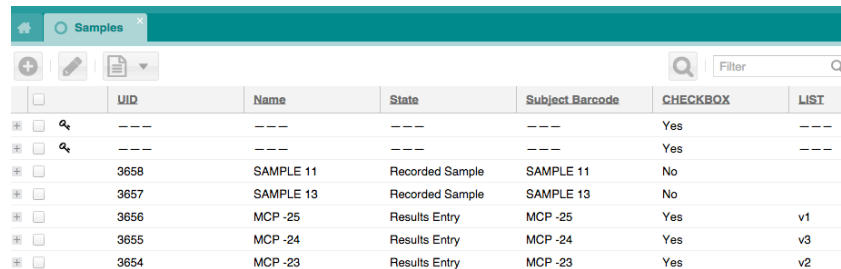
Subject-Level Access Permissions

Subject level access permissions are permissions that pertain to particular objects of a particular **Subject Type**. Similar to set access permissions to User-Defined Fields and Subject Types, **Subject Objects** have four Access Permissions: **Full, View Only, No Access** and **Inherited**.
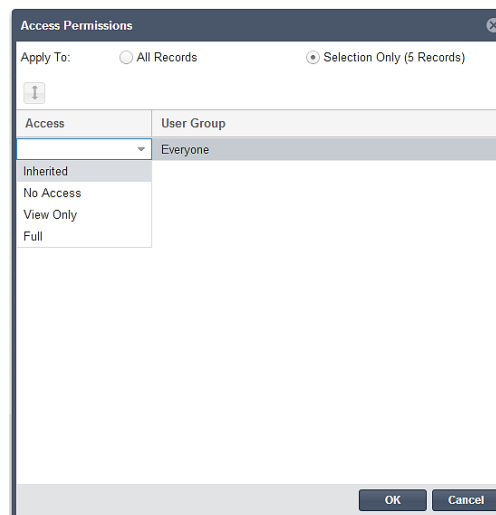
To set up Subject-Level Access Permissions:

1. Select the subject objects that will have the access permissions applied. (User can select multiple subject objects and set access permissions at once)
2. Select the Subject Access Permissions icon .

3. A window will open to display the options for applying the access permissions, along with the User Groups in the LIMFINITY application and the corresponding access associated for each one.
4. To change the Access Permissions, single left-click on the access and a drop-down menu will appear with three options to change the access permissions: **No Access**, **View Only** and **Full**.
5. Left click to select the appropriate Access Permission and click the "OK" button located at the bottom of the dialog to save changes.
6. Once the access permissions are set, the result will look like the following:

LIMFINITY Gantt Charts Explained and Task Performers

Gantt Chart

The **Gantt Chart** displays all objects that have been completed or are currently undergoing within a process. When an operation within the LIMFINITY application is started from a particular workflow, the **Gantt Chart** will log who the performer is, what operation has been taken place and on which day the process occurred. To access **Gannt Chart,** select subjects in the list view, right click and select **Gantt Chart** ☰ from the drop down menu. '**Show On Gantt/To-Do List**' option must be selected for the specific Subject Type workflow to have **Gantt Chart** option in Explorer Subject List View.
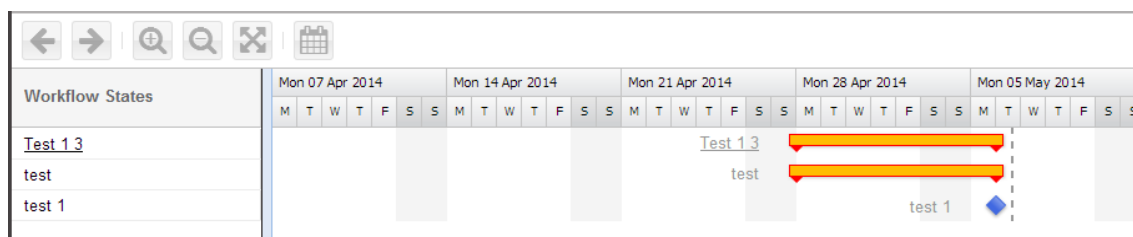
Task Performers

From the **Home Screen,** user can click on the "**My To-Do List**" link to access the tasks. Additionally, a Quick Link can be created for The To-Do list. The list is unique to all users of the LIMFINITY application, and it will only display the tasks of the user who is currently logged into the application.

Within the workflows there is a standard field that auto-populates the performers of the operations. Any operation can be re-assigned to a different performer. By selecting the status of a **Subject Type** object, a

user can set the Allowed Duration and re-assign the performer to a different user. To re-assign a workflow to a different performer, user must belong to the manager's user group for that particular workflow state.

NOTE:

Allowed Duration – the LIMFINITY application allows for a specified amount of time (in days) to be allotted to each task. The amount of time is viewable in the "to-do" list. When the time duration is exceeded, notifications are sent to the task managers.

Once an object is assigned to a particular Performer, the Performer will be able to see that object in his/her User To-Do list.

Printer Preferences

LIMFINITY works with networked barcode printers with IP address. Typically, the IP address of a networked Barcode Printer can be obtained from the Diagnostic Tool software available with the printer. The software supports all barcode printers however the preferred ones are Zebra – GX430T, the Brady BBP-11 and the RFID – Zebra RZ400.

Printer Preferences

To connect the printer with LIMFINITY:

1. Expand the printer profile name in the "**Name**" field (Example: BBP-11, 20x15, DNA Library).
2. Enter the IP address of the printer in "**IP Address**" field (Example: 108.695.2.185).
3. Enter "**9100**" in "IP Port" field.
4. Select "**Barcode Language**" and "**Resolution (DPI)**" from the drop-down menus. The list of "**Barcode Language**" includes ZPL, EPL, DPL, J-Script, SATO and Lecia (Example: Barcode Language – ZPL, Resolution – 300).
5. Press "**Calibrate**" and then barcode printer is connected to LIMFINITY. If the entered values are not correct, the message "**Error. Check Printer and Connection Settings**" will appear.

NOTE:

The language and optimal resolution depends on the manufacturer and model of the **Barcode Printer** and they can be found in the printer user manual.

Enabling the **Debug Mode** checkbox will result in a display of the EPL/ZPL commands when the print label action is performed.

Client-side printing: printer needs to be configured.

Label Preferences

This section allows the user to design a label, namely, to select the nature, size and location of the sample information to be present on the label.

To design the label:

1. Click **Edit Label** in the lower left corner of the **Label Preferences** section.
2. First, let the software know what kind of labels you will be using. Chose dimension units from the drop-down menu (mm or inches), how many labels are in a row (1-6) and left margin offset (default 0). Optionally, select "90" for "Rotate°" field if you want to print the labels vertically.
3. Click on the "Label Size" link and enter the values using the units selected in step 2
4. To add information to be printed on the label, press **Add Field** link on the top right corner of the section. A menu with several choices of pre-configured fields opens up. It includes the following items:

- **Static Text** – text that should appear on every label. Optionally, one can check the **Black Background** checkbox.
- **Text Field** – a choice of any UDF present in the system can be selected. Optionally, one can check the **Black Background** check-box.
- **Linear Barcode** – a choice of sample fields to be represented as Linear Barcode on the label. The default choice is UID. In **Options**, a user can select between several codes: Code 128, Code 39, etc.
- **2D Barcode** – a choice of sample fields to be represented as 2D barcode on the label. The default choice is UID. **Type** menu contains codes that can be used to generate 2D barcodes. You must choose a code that is compatible with your 2D barcode printer and scanner. Most common code is **Data Matrix**. Module contains a choice of numbers from 1-15 and defines the size of 2D barcode.
- **RFID tag** – a radio frequency identification with the option to set a lock tag with it.
- **Direct Command** – allows manual entry of ZPL/EPL commands. **Field** (optional) allows adding UDF to the above command.

5. Click **Print Test Label** to test if printer and label configurations are working correctly. If needed, you can edit the label template further by clicking on **Edit Label**
6. Users can **Save** a **Label Template**, which will include label size and label content information. Several **Label Templates** can be stored for the same **Barcode Printer.**
7. **Save** the barcode printer profile when the appearance of the printed label is acceptable.

NOTE:

A **Field** added to the label is represented by a green rectangle. The size of the rectangle will determine the font size of the text entry on the printed label. The rectangle is re-sized by dragging the corners or sides to desired dimensions.
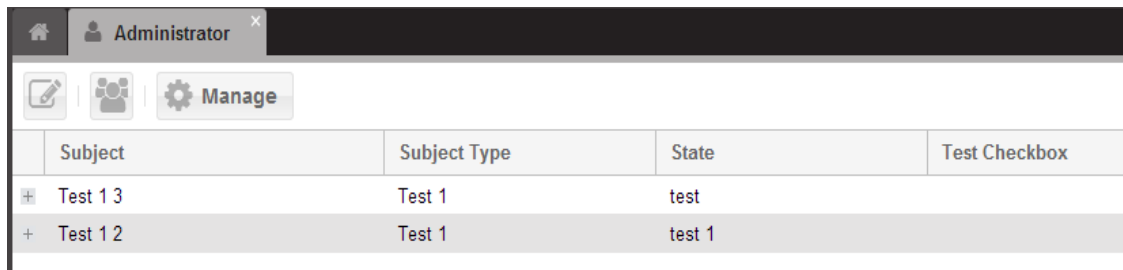
Once created, the **Field** type cannot be changed to a different type.

To remove a **Field**, press the "x" inside a black circle located at the upper left corner of the **Field.**

Only the LIMFINITY user with "Manage System-Wide Settings" Role Right can create **Barcode Printers** profiles.
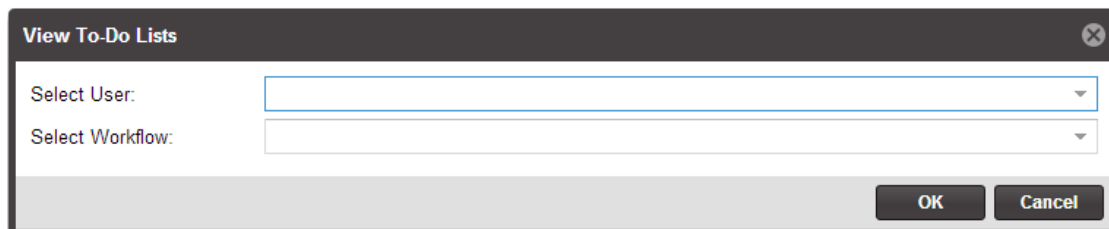
User To-Do List

The User To-Do list, the associated quick link and the managements for the To-Do list are accomplished on the generated list view, by selecting the User To-Do quick link. Within the list view of the To-Do list, there are all the objects within the software application that the user needs to address. The To-Do list will be the first to display only the items that are assigned to the particular user. An example is provided as below:

From the list view, a user can view a To-Do list of another user or view objects that need attention/action of a particular workflow. Additionally, a user can select any of the objects that are listed in the list view and click on the manage function to generate a dialog window for prompt the user to set the duration of the object (if a duration period is necessary) and designate user the object needs to be assigned to. Once the particular object is assigned, it will appear on that user's list view.
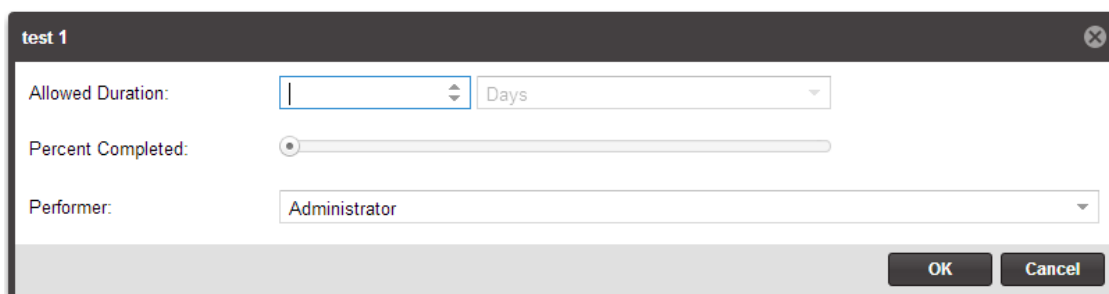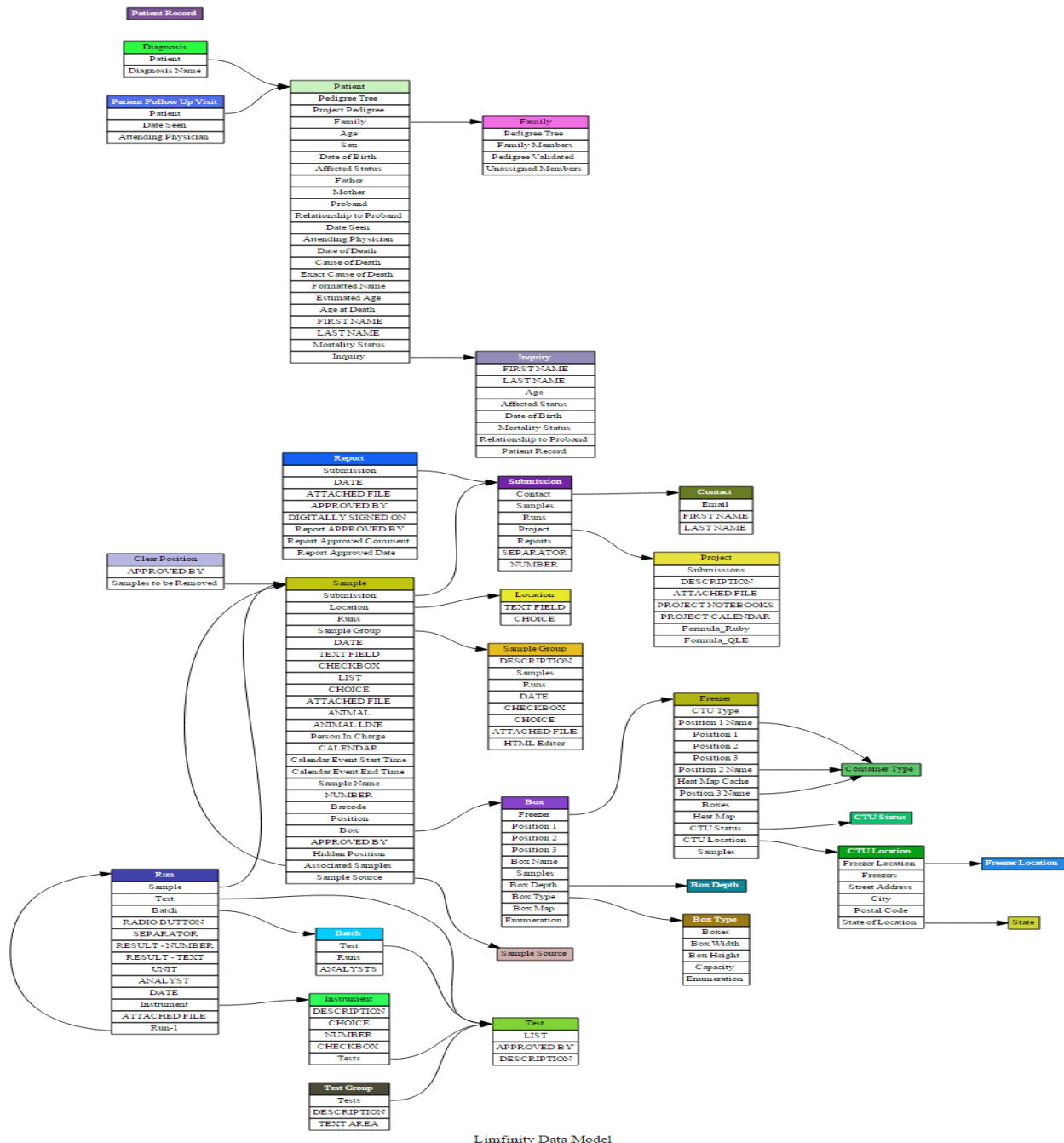
Data Model

The Data Model is a diagram of the subject types, which are currently in the LIMFINITY software application. It shows how the subject types are related to one another within the LIMFINITY through a parent-child relationship. The parent-child relationship is established in the User-Defined fields with subject back references and subject list back references. Each Subject Type is displayed in assigned color. An example of a data model is provided below:

Limfinity Data Model

LIMFINITY Subject Type Configuration

There can be multiple **Subject Types** contained within the LIMFINITY application. Name, color and different User-Defined Fields can differentiate each Subject Type. In addition, **Subject Types** can be further configured in the Advanced Settings tab of the **Subject Type** dialog screen.

In the Advanced Settings of a **Subject Type**, the user can configure several options including the Subject Name, in which a user can input a formula code to create a custom name for every new object of that particular subject type. In addition, Subject Extension tab can be used to further set parameters to a certain value that user determines. Refer to Scripting guide for information on 'Subject Name' generation and 'Subject Extension'.

GENERAL SOFTWARE INFORMATION

Regulatory Compliance

LIMFINITY is compliant with the following standards:

> ISO 9001:2008
> FDA 21 CFR Part 11
> GLP/GMP (Good Laboratory Practice and Good Manufacturing Practice)
> Section 508 Accessibility Guidelines

Supported Web Browsers

LIMFINITY supports all major web browsers including:

> Internet Explorer
> Firefox (PC, Mac, Linux)
> Safari (PC, Mac)
> Opera (PC, Mac)
> Google Chrome (PC)

For the best LIMFINITY performance, consider using Apple Safari, Google Chrome or Mozilla Firefox.

Backup/Restore Functionality

LIMFINITY v6 includes:

> Attachments backed up in the same package as the internal database
> SMB/CIFS backup storage
> Allows restoring attachments-only package

Supported Databases

LIMFINITY v6 supports the following database back ends:

> PostgreSQL, Oracle v11, and Oracle v12

Supported Languages

LIMFINITY v6 supports English, Chinese, and Russian languages. To manage your preferences in the View panel expand **Settings and Preferences→ System Preferences → General Preferences** and choose the appropriate "Country Settings". Click **Save Settings**.

TERMS AND CONDITIONS

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