The *ReCap* User's Guide

Version 1.0 – By Amanda Hoebel, Marie Kessee, Chris Slominski; March 19, 2026

Introduction

The Restore and Compare (ReCap) application is a graphical tool that allows operators to compare and restore beam setpoints to previous states in time using historical EPICS channel data collected by the Mya archiver. The application is currently built for 64-bit x86 Red Hat Enterprise Linux 9.

Starting ReCap

ReCap launches with default settings of CEBAF as facility, with no datetimes or restore sets selected if launched from the command line. If launching from JMenu, the allsave master list of PVs will be loaded into the table. The user may choose datetimes and restore sets within the GUI or from the command line on startup. The choice of facility must be chosen on startup and cannot change one the application is launched. The user may also choose to load in a specific EPICS environment, often used for testing, or to select to use historical data for restores using dates that preceded the Mya deployment. If choosing to supply datetimes from the command line, times are optional and dates given will use the current time. If users supply only one datetime, this will automatically compare values against what is in EPICS. Named timestamps may also be used in the place of datetimes.

The command 'reCap -h' will provide a list of all command line arguments, which are all optional. The following command line options are available:

- -facility; The facility name
- -master; The allsave master file name
- -rs; Initial PVs from restore set(s)
- -file; Read in a special file
- -dt1; Initial date/time of interest. Date/times are in format YYYY-MM-DD HH:mm:SS
- -dt2; Compared date/time of interest. Date/times are in format YYYY-MM-DD HH:mm:SS
- -wrkspc; CED workspace
- -ced; CED instance
- -create; Create a Named Timestamp
- -e; EPICS environment

User Interface

The user interface consists of the toolbar, PV table, timestamp selection, search and filter functions, and save/restore selection.

The toolbar contains the following:

- Compare and Restore- where restore sets are chosen, special files are selected, PV filtering is done, and tolerances are set.
- Named Timestamps- where named timestamps are created or modified.
- Help- where Legend information can be found.

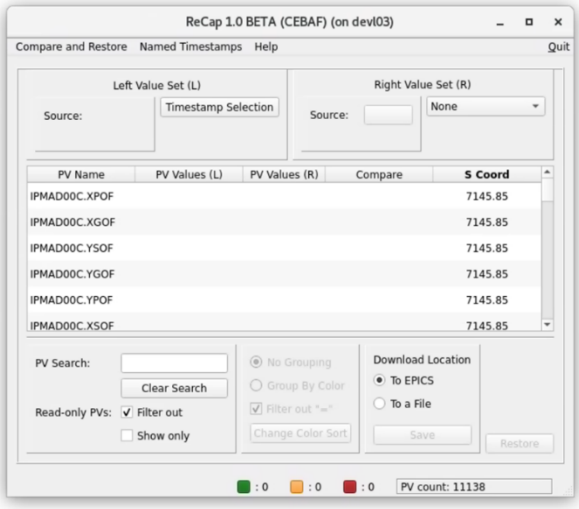

Figure 1 - The ReCap GUI

Restore Sets

The PV selection window displays the tree of restore sets within the All Save Master specific to the facility chosen on startup (CEBAF is default). These restore sets are from the MyRestore database and are defined by CED rules.

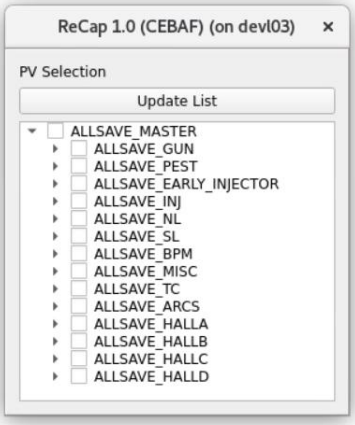

Figure 2 - The PV Selection Window

The PV selection window displays the tree of restore sets within the All Save Master specific to the facility chosen on startup (CEBAF is default). These restore sets are from the MyRestore database and are defined by CED rules.

The PV Selection window can be opened from selecting the “Choose PVs from a Restore Set” option from the Compare and Restore tab. Users would select the checkbox(s) of the PV set(s) to load in the PVs corresponding to the given zone name. Branches can be drilled down to show relative PVs for selection.

Selecting one or more PV sets and then clicking on “Update List” will populate the PV table with the selected PVs. Users can add PVs to the selection in the table by checking more boxes in the PV Selection window or remove them by unchecking the selected boxes.

PV Table

The PV Table displays the PVs from the restore sets that were selected from the PV Selection window. The columns in the table display the PV names, left PV values, right PV values, comparison values, and S coordinate values. Users can sort the rows of the table by clicking on the column headers. Clicking on the column headers will toggle the sorting between ascending and descending values. PVs that are bold are Read-Only PVs (these values cannot be changed nor included in a download to EPICS). PVs that are italicized have no recognized CED component. PVs that are both bold and italicized indicate they are both read-only and have no recognized CED component.

Timestamps

Comparisons can be made between two points in time either by selecting to compare two timestamps or a timestamp and values currently in EPICS. Users can select timestamps for the left and right values by selecting from a calendar widget corresponding to a Mya Timestamp or selecting a Named Timestamp.

Color Comparisons

The PV values for “left” and “right” are the values corresponding to the compared points in time. For example, if a user selects to compare values between a timestamp and EPICS, the values for the PVs from the timestamp will appear in the left PV values column while the values for EPICS will appear in the right PV values column. The difference between the values will appear in the comparison values column. When comparisons are made, the PV rows will display as a color corresponding to the comparison type. If the values for a PV between two points in time are the same, the PV row will display green. If the compared values are not the same, the row will display yellow. If the row is unable to compare values it will display as red. Red comparison values are alert situations such as one or both values could not be

obtained, the same PV exists more than once with different values, or that the PV appears as both read-only and not read-only. Read-only PVs will display as red if their left and right values are different, as their values cannot be restored.

A counter at the bottom of the table will display the number of PVs for each color group in the table: green/equals, yellow/non-equals, and red/alert. Green/equal PVs are filtered out by default but can be added back into the table by unchecking the “filter out =” checkbox. Read-only (RO) PVs can be filtered out as well via check-box, as their values cannot be restored. Right-clicking anywhere in the table and selecting “Remove no-value PVs” will remove all red/alert PVs with no values from the table.

PV comparisons can also be sorted into groups by selecting the “Group By Color” radio button. This will bring up a dynamic combo-box which allows the user to select what color group to display at the top of the table, followed by the middle and then the bottom.

The colors used for equals, not-equals, and alert PV comparisons can be changed in the event the user has a visual impairment regarding color. The colors can be changed by clicking on the color boxes of the PV counters at the bottom of the table.

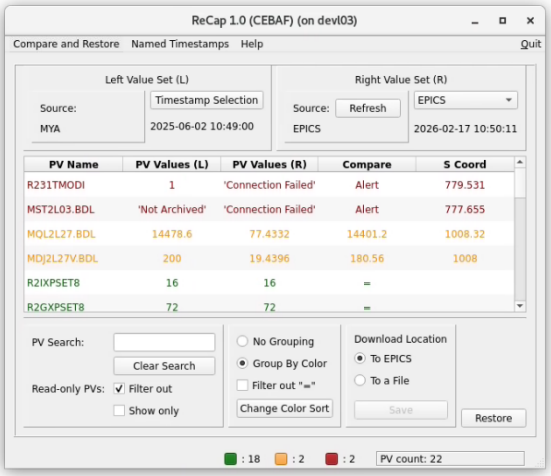

Figure 3 - Color Comparisons

Tolerances

Tolerance values are what determines PV comparisons to be considered equal or not equal. The tolerance window can be opened by selecting Set Tolerance from the Compare and Restore tab.

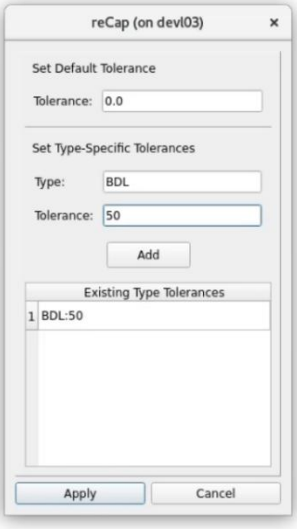

Figure 4 - The Tolerance Window

The Tolerances window allows the user to select a default tolerance and/or type-specific tolerances. Default tolerances apply to all PVs that do not have type-specific tolerances applied. Type-specific tolerances are tolerance values that apply to specific PVs that match a certain criteria. For example a user may choose to consider all comparisons equal if they fall within 5 units of each other. They would type “5” into the tolerance box at the top, under “Set Default Tolerance”, and then press the <enter> key or the Apply button at the bottom of the window.

The user can also decide to set a tolerance value for specific PVs, for example all PV names containing “BDL”. The user would type BDL in the “Type” field in the Set Type-Specific Tolerances portion of the window and would set the tolerance value in the “Tolerance” field. The Add button must be pressed to add the newly specified type-tolerance to the list of existing type tolerances. These are regular expression / tolerance pairs. For example “BDL: 50” means any PV name that contains “BDL” has a difference threshold of 50 units. Tolerances may also have ‘%’ to indicate a percentage.

The tolerances shown in that list will not be applied to the table until the Apply button is selected. Tolerance values shown in the Existing Type Tolerances list can be edited or deleted by right clicking on the value and selecting the appropriate action. No more than one tolerance value can be set for a type-specific PV.

PV Filters

Users may narrow the initial set of PVs via the “PV Filters” dialog. This dialog is not modal, so it can be kept open while interacting with the main window. The dialog allows the specification and application of PV filters. A user may choose as many filters as desired. The dialog has two panes. On the left is a tabbed pane where the user specifies filters and on the right is an accumulation of all applied filters in a list that grows downward as filters are added. Each added filter will be numbered from 1 (top) to N and have the number of PVs eliminated by the filter in parenthesis following the filter name.

Users may mouse over the listed filters in the Applied Filters pane to get a pop-up window with the details of the filter. Users may also click the button that says “PV” next to each filter to get a list of the PVs that were filtered out using that filter.

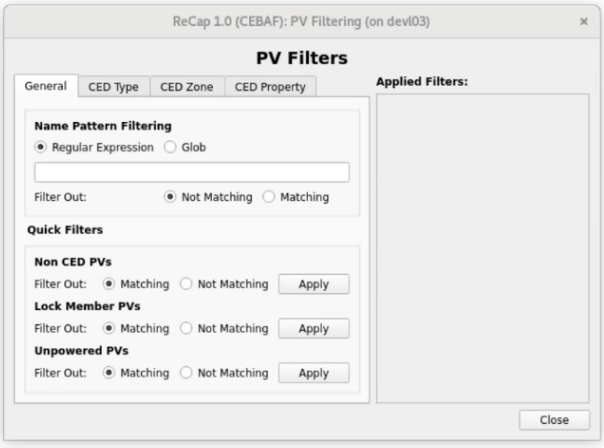

Figure 5 -The PV Filters Window

Filters can be removed by clicking the filter that has been applied to get a pop-up menu asking if the user would like to delete this filter and filters that were added after it, as all filters that were created after the deleted filter will also be deleted. The filters in the list that will be removed will be shown with strike through font. The dialog will show “Accept” and “Cancel” buttons. The user must either accept or cancel the removals. If accepted, the PV list on the main application window will be updated to reflect the removed PV Filters.

General Tab

The “General” tab can be used for name pattern filtering, either regular expression or UNIX glob. Users may make as many name pattern filters as desired, narrowing the set of PV names each time. PV names will be removed from the set if they do or do not match the pattern, depending on the state of a radio button on the dialog stating Matching or Not Matching. Pressing the <enter> key in the entry box triggers the activation of the filter and will be added to the Applied Filters pane.

Quick filters are listed under the name pattern filtering for removal of commonly filtered properties. These are non-CED PVs, lock member PVs, and unpowered elements. The “Non CED PVs” button removes PVs from the table that are not included in the CED, as there are CED related filters that can be applied to the PVs that will not affect PVs that are not included in the CED. The “Lock Member PVs” button removes all PVs that are associated with Elements that have the Lock Member property and the “Unpowered Pvs” are PVs set as “unpowered” in CED.

CED Type Tab

This tab displays a checkbox tree of all CED Element Types represented by PVs in the list. This tree is sensitive to any filtering action that may narrow the list of PVs, updating the Element Type tree accordingly. Clicking on an element in the tree will expand the branch to display elements that are considered “children” of the parent node type, following the same relation within Type elements in CED. The user will check the Types they wish to keep in the PV table or remove from the PV table, depending on radio button selection. Selecting “Apply” will activate the filter and add it to the Applied Filters pane.

CED Zone Tab

This tab allows the user to narrow the PV set to only those PVs that can be associated with CED elements that reside in one or more CED zones. The Zone Filter tab has a tree of all CED zones, similar to what is shown on the CED website. The user may choose any number of zones from the tree. All sub-zones are implicitly selected when a master zone is chosen. Filters are applied by selecting the “Apply Zone Filter” button.

CED Property Tab

This tab is used to create a filter that restricts PVs to those that correspond to recognized CED Elements having the specified property and optional value specification. See CED Property Filter documentation. There is a text entry box for typing a property expression. Pressing <enter> will apply the filter.

Named Timestamps

Named timestamps can be created or managed from the Named Timestamps tab.

Creating Named Timestamps

Named Timestamps can be created from the Create Named Timestamps window, accessible from the Named Timestamps tab on the main GUI or from the command line with the “-create” option. The timestamp will be named after the current facility with an incrementing serial number appended. For example, timestamp names of the format “CEBAF-<serial number>” are created when the facility is CEBAF.

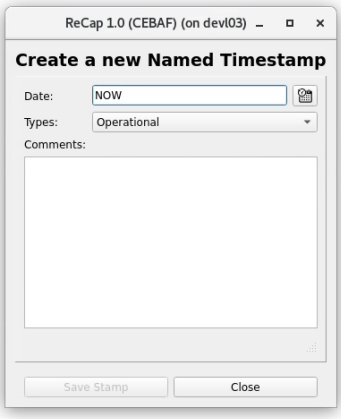

Figure 6 - Create a Named Timestamp

The date entry will be pre-populated with the word NOW, which will mean to take the timestamp associated with the moment the user presses the “Save Stamp” button; however the user may enter an arbitrary date/time string as well. The “Types” widget is a drop-down list for choosing between “operational” or “temporary” (defaulting to “operational”).

The “Comments” widget is a free format text entry box. A comment is required when creating an “Operational” Named Timestamp. The “Save Stamp” button will be disabled until a comment is provided. There is a limit to the length of the comment text and the status bar will have a temporary field that keeps the user aware of the remaining characters allowed.

The user may choose the “Save Stamp” button to create the Named Timestamp. If successful, a pop-up window will appear showing the name of the created Named Timestamp as well as the user entered comment. The user may choose to close the dialog without creating a Named Timestamp by choosing “Close”.

Managing Named Timestamps

The Manage Named Timestamps window shows information for existing named timestamps such as the stamp name, owner, timestamp, hall pass information, beam energy, dump information, and comments that were entered when creating a timestamp. The information displayed in the stamp table can be changed using the “Modify Stamp Attributes” button in the Preferences window, removing columns as desired. The Managed Named Timestamps window is accessible from the Named Timestamps tab on the main GUI.

The window will start pre-populated with the most recently created Named Timestamps for the facility. The list will display timestamps in descending order by the creation date. The order of the stamps shown can be changed by clicking on any of the columns to sort in ascending or descending order based on the clicked on column.

Users may choose to edit, clone, or delete an existing Named Timestamp. Only the creator of the Named Timestamp may edit or delete it.

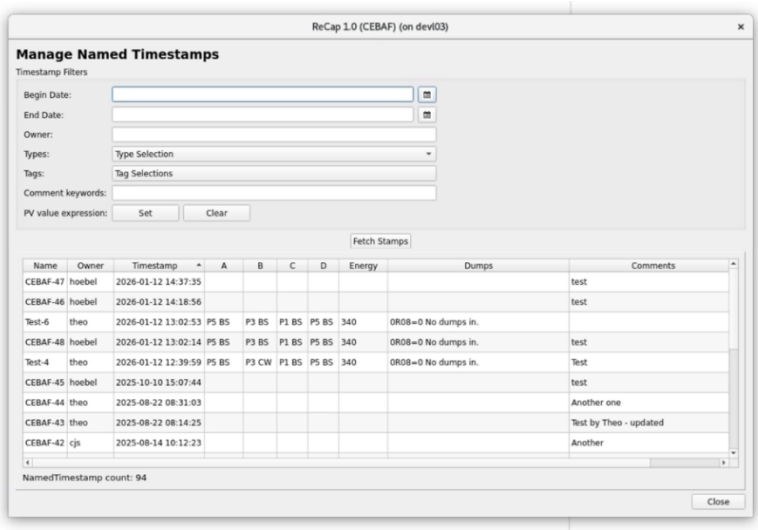

Figure 7 - Manage Named Timestamps

Users can narrow down to specific timestamps using stamp filters and PV value expression filters. Pressing the “Fetch Stamps” button will return a list of timestamps that match the search criteria.

Filtering

The user can search for timestamps that exist within a timeframe, the owner of the timestamp, the type of timestamp and with PV value expressions. Searching for timestamps with dates specified limit the displayed Named Timestamps to those that refer to dates within the range. If only a begin date is given, timestamps before that date will be excluded. If only an end date is given, timestamps after that date will be excluded. Searching by stamp owner will display an auto-completion of available names as the user types, choosing from all names of current Named Timestamp owners. Named Timestamp owners are identified by their JLab login name.

Users may also limit the listed Named Timestamps by a particular type- operational or temporary. If no selection is made, all types will be considered.

Event Search

Users may search for named timestamps that coincide with channel events in time by selecting to set a PV Value Expression. Channel events are spans of time where a channel's value meets a user-defined criteria. Users may place criteria on any number of channels.

The search criteria includes the following:

- Value is known or unknown
- Value is above or below a threshold; with threshold value included or excluded in the result.
- Value is inside or outside a range; with the range end-points included or excluded in the result.
- Value is equal or unequal to a constant.

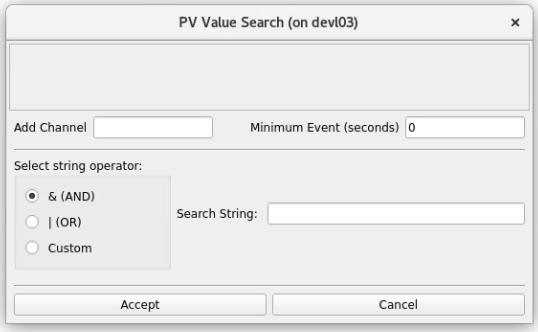

Figure 8 - PV Value Search

The chosen channel events are combined in a single search by a logical expression; using alphabetic placeholders to refer to the chosen channel events. For example, the letters 'A' and 'B' refer to the first and second channel event chosen. A radio button on the dialog lets the user select logical expressions in the following way:

1. channel events combined with logical AND (&)
2. channel events combined with logical OR (|)
3. custom expression that may combine the events with logical AND (&) and OR (|) operators; as well as parenthesis to specify evaluation order.

The logical AND of two channel events is the intersection of the spans of time where each is true.
The logical OR of two channel events is the union of the spans of time where each is true.

Users must specify the time span of interest for event searching. When very busy channels are involved, searches within a long timespan will take a long time to complete. The number of channels included in the search should be limited, as well as the timespan of interest, to keep searches from taking too long. If the estimated time it will take to process the search exceeds a threshold, a popup dialog warns the user that the search will take too long to complete and that they should provide more search parameters to narrow the search.

Edit Timestamps

Right-clicking any timestamp in the list brings up a popup menu having options of "Edit", "Clone", "Delete", "ELOG", and "Show All Info". Users must be the named timestamp creator to see the "Edit" and "Delete" options in the menu. When choosing to delete a named timestamp, a pop-up dialog will ask for confirmation to delete. If accepted, the named timestamp disappears from the list and is purged from the MyRestore database.

For "Edit" or "Clone", a modal dialog similar to the Create Named Timestamp window will appear filled in with the details of the selected named timestamp. For "Edit" the name will include the original serial number and for "Clone" the name will not include a serial number as it is yet to be determined. In either case the name cannot be modified, however any of the attributes may be modified as desired.

Selecting “Save” will either update the original or create a new one. In the case of cloning, a pop-up dialog will appear upon successful creation providing the new name and serial number.
An additional choice on the Named Timestamp context menu is the ability to launch the ELOG for a span +/- 4 hours surrounding the date/time associated with the Named Timestamp.

Special Files

Special files can be selected from the “Select A Special File” option on the Compare and Restore tab on the main GUI. The special files can be the BURT-style snap files that the previous Saver tool used or a file containing a list of PVs and values saved from ReCap. When selecting a special file, users will be taken to the default snapfiles located in the mccops/burt/download directory. Special files may be located in other directories such as if a user has a file in their home directory. Reading in special files will display the name of the snapfile and contain a button that, when clicked on, gives the BURT header information related to the snapfile. The PV names and values are loaded in the PV table.

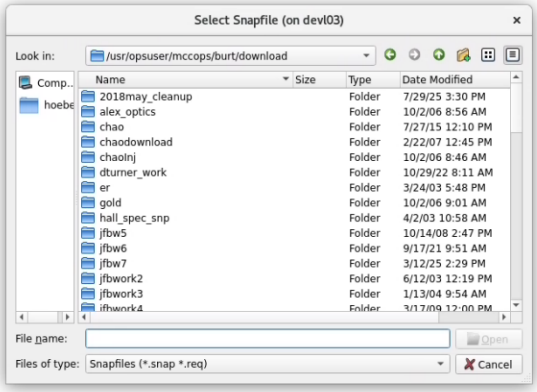

Figure 9 - The Select Snapfile dialog

Downloads

Downloading can be done either to a file or to EPICS.

To File

Downloading to a file is done by selecting the “Save” button, with the “To a File” radio button selected. This will save the PV names and associated values as shown in the PV table to a snapfile. The saved snapfile will contain a header similar to the BURT header style in older snapfiles.

To EPICS

Downloading to EPICS is done by selecting the “Restore” button, with the “To EPICS” radio button selected. Values must be present in the left column of the table in order to perform a restore. If values from a MYA datetime are compared in the left column to EPICS values in the right, a restore will only restore the PVs with the MYA datetime. In the event there are two MYA datetimes that were compared to each other, in the left and right columns, a pop-up window will ask the user to select which datetime they are wanting to use for the restore.

Restores attempt a full download first, meaning all PVs must give a successful restore status. If one or more PVs fails a restore, the user will be notified that the full restore failed and asked if they would like to perform a partial restore, where some PVs will restore successfully and some will not. A logbook entry will be created upon a restore containing the status of the PVs and an attached list of PVs that were restored successfully and those PVs that were not restored successfully.