Cheetah Quickstart

This guide will focus on giving a brief introduction to the Cheetah Data Acquisition Software. This guide is supplemental to the Cheetah Reference Guide help file. The Cheetah Reference Guide contains complete, searchable documentation of all aspects of Cheetah. If you are a new Cheetah user, you may want to review the Definition of Terms section of the Cheetah Reference Guide before reading this quickstart. The Cheetah Reference Guide is located in the Cheetah folder in the Windows Start menu, or beneath the Help menu in Cheetah.

Introduction to Configuration Files

Cheetah uses configuration files to setup everything. The configuration files contain commands that are used to control Cheetah. A complete list of commands as well as details on their usage is located in the Cheetah Reference Guide's Commands section. You should be familiar with the syntax and usage of Cheetah commands prior to editing configuration files. If you don't know what a particular command does, you can always search for it in the Cheetah Reference Guide. During the installation of Cheetah, the installer prompts for selection of the hardware system, and the number of Video Trackers (if any). Cheetah will copy default configuration files into the Configuration directory. If all of the installer options have been configured correctly, Cheetah will be ready to start. All users on the system share the same default configuration files. Any changes saved to the default files can be seen by all other users on the system.

Note: As of Cheetah 6.0.0, the default configuration files are now located in the %PUBLIC%\Documents\Cheetah\Configuration directory. In Windows 10, this is usually in C:\Users\Public\Documents\Cheetah\Configuration.

Note: If Cheetah issues an error message when trying to create an acquisition system the first time it starts, the license file is probably invalid. Contact Neuralynx for a new license file.

Selecting an electrode configuration for Cheetah to use is one of the more important aspects of Cheetah setup. The Cheetah installer will initially configure Cheetah to use 4 tetrodes (TT) and 4 continuously sampled channels (CSC). Although the configuration files and Cheetah commands are covered in more detail in the Cheetah Reference Guide, here is step by step procedure for selecting one of the pre-configured electrode configurations:.

1. Open cheetah.cfg in the Configuration directory using Notepad.
2. Find the section that says "######### ELECTRODE CONFIGURATIONS."
3. Put a # (this comments the line, telling Cheetah to ignore the command) in front of the 4tt_csc.cfg line.
4. Remove the # (this uncomments the line) in front of one and only one of the –ProcessConfigurationFile commands. The files are named using the number and type of spike channels and the number of CSC channels.
5. Save the file and close the editor.

Running Cheetah for the First Time

Double-click on the Run Cheetah icon on the desktop. Cheetah will immediately show the Startup Selection dialog:

This dialog allows you to pick a configuration to use when Cheetah starts. If this is the first time you've ever run Cheetah on this computer, the *Start Cheetah with Last Configuration* button will be unavailable. Periodically while Cheetah is running, and every time Cheetah closes, it saves the current state. This way all changes that are made while Cheetah is running are saved, and can be reloaded the next time Cheetah is started. The Cheetah.cfg file should be used the first time Cheetah is run, or on subsequent runs when a new electrode configuration is desired. Click on the *Start Cheetah with Default Configuration (Cheetah.cfg)* button to launch Cheetah. If available, pressing the ENTER key will then load the last configuration.

Once you start Cheetah using a particular configuration, you cannot load a completely new configuration by selecting *Open Configuration File* from Cheetah's *File* menu. To load a new configuration, you must close Cheetah and select the new configuration from the Startup Selection dialog the next time you run Cheetah.

The Most Important Windows

Cheetah has a lot of different windows and options, but the most used ones are the Main Window, Cheetah Reference Guide, Spike Plot Window, Time Plot Window, System Status Dialog, and the Properties dialog. Each of those windows has many options and display types, all of which are covered in the Cheetah Reference Guide.

1. **Main Window**: Contains all of the other windows in Cheetah. Closing this window closes Cheetah. There is a menu bar that allows you to perform general operations in Cheetah. The *View* menu will allow you to show the different settings windows in Cheetah. If a window is opened, and cannot be seen; clicking on the window name in the view menu will cause it to become visible.
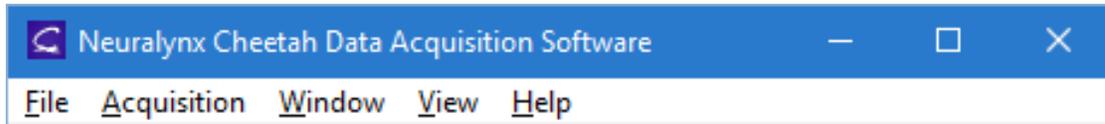
2. **Cheetah Reference Guide:** As stated previously, the Cheetah Reference Guide contains information on every aspect of the Cheetah Data Acquisition Software. To open the Cheetah Reference Guide, simply select it under Cheetah's *Help* menu:
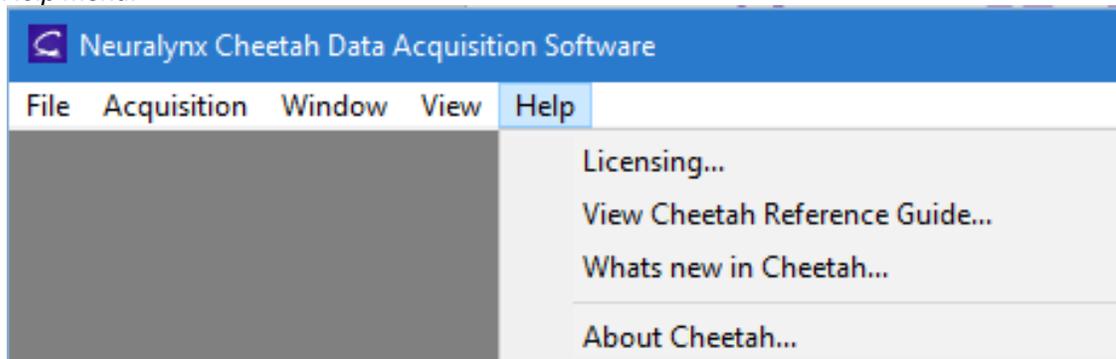
3. **System Status**: This is the control center of Cheetah. It shows the current system state, as well as any problems that may have occurred. There is a detailed view and a single line view for this dialog. This can be changed by clicking the Show Details or Hide Details button. The most important parts of the dialog for the quickstart are identified in the detailed view below:
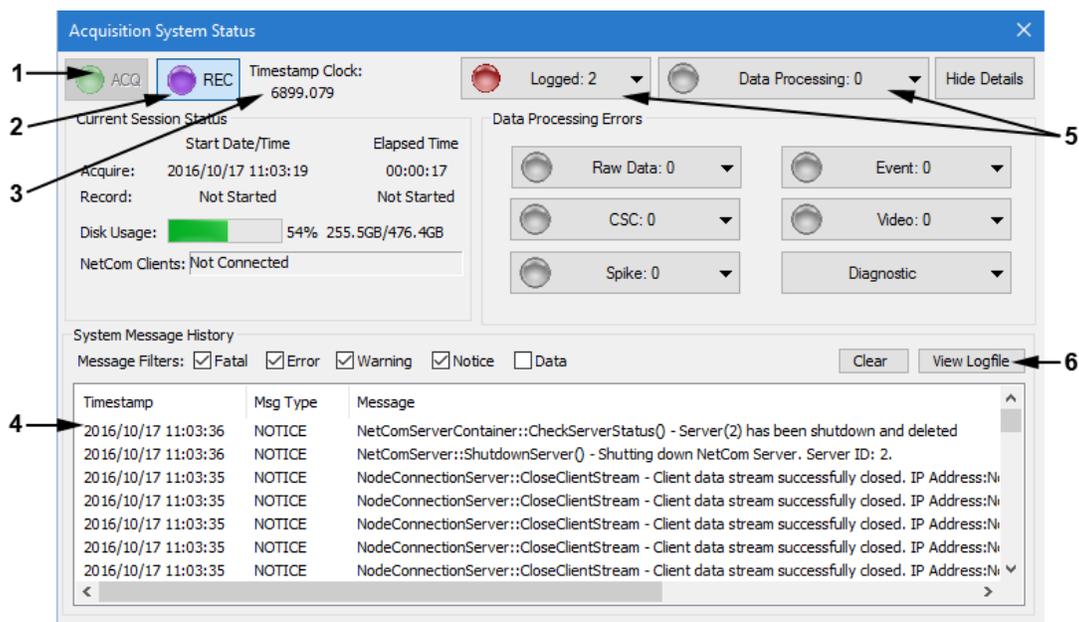
1. **ACQ**: When the button is Green, Cheetah is in Acquisition mode. Acquisition can be started or stopped by clicking on the button. The Ctrl+A hotkey will also toggle acquisition. No data is saved when Cheetah is in Acquisition mode.
2. **REC**: When the button is Purple, Cheetah is in Recording mode. The Acq button will also be Green when in recording mode. Recording can be started or stopped by clicking on the button. The Ctrl+R hotkey will also toggle recording. Data is recorded to files when Cheetah is in Recording mode.
3. **Timestamp Clock**: The current Cheetah timestamp. This number is in seconds and should always be increasing.
4. **Message History**: A listing of all of the messages saved to the logfile.
5. **Logged and Data Processing**: These buttons will turn Red when an error occurs, and the error counts will update to let you know what type of error has occurred. Clicking on the buttons will give you options for each error type.
6. **View Logfile**: Shows the current logfile. When calling Neuralynx for support, this file will aid in figuring out problems that have occurred. This can also be done by clicking on the Logged button and selecting View Logfile.

4. **Recording Options**: Recording options can be viewed by selecting the *Recording Options…* item under *Acquisition* menu. The data directory shows where all of the recorded data is saved. You can also enable raw data file recording by checking the *Write Raw Data File* check box. Raw data files save an unprocessed copy of all data received by Cheetah during recording. These files are useful if you want to be able to replay the experiment at a later time or if you want to be able to apply different filters after the initial recording.
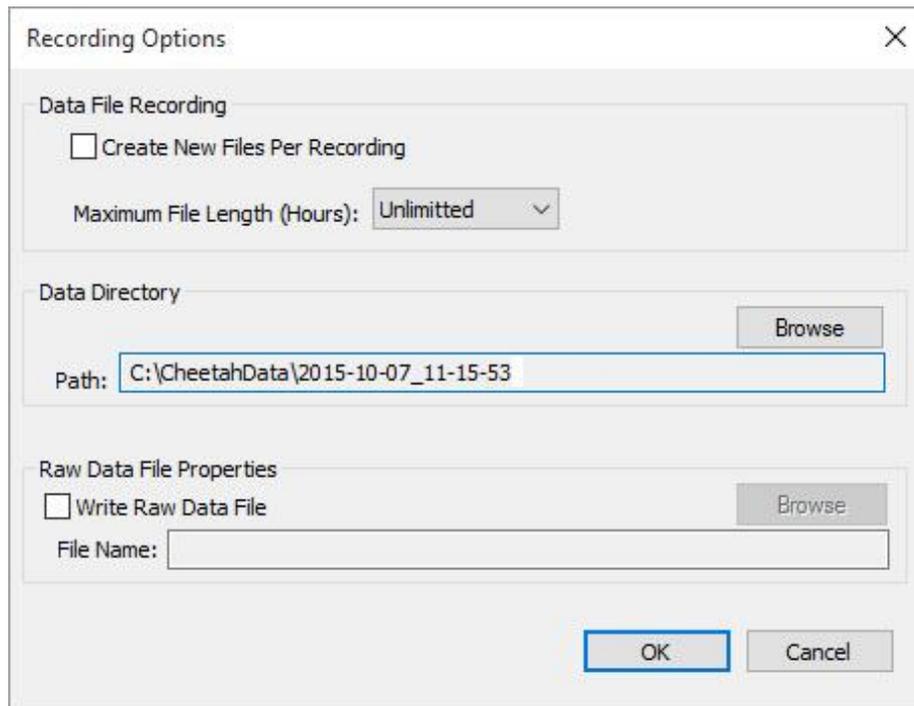
Recording Options	✕

Data File Recording

☐ Create New Files Per Recording

Maximum File Length (Hours): [Unlimitted ▾]

Data Directory

[Browse]

Path: [C:\CheetahData\2015-10-07_11-15-53]

Raw Data File Properties

☐ Write Raw Data File   [Browse]

File Name: [   ]

[OK]   [Cancel]

5. **Spike Plot and Time Plot Windows**: All of the data for spikes and CSCs will be visible in these windows. Spike windows will only contain spike acquisition entities, while time windows can contain CSC, Spike or Event acquisition entities. For a complete description of these windows, review the Spike and CSC display sections of the Cheetah Reference Guide.

Spike Window
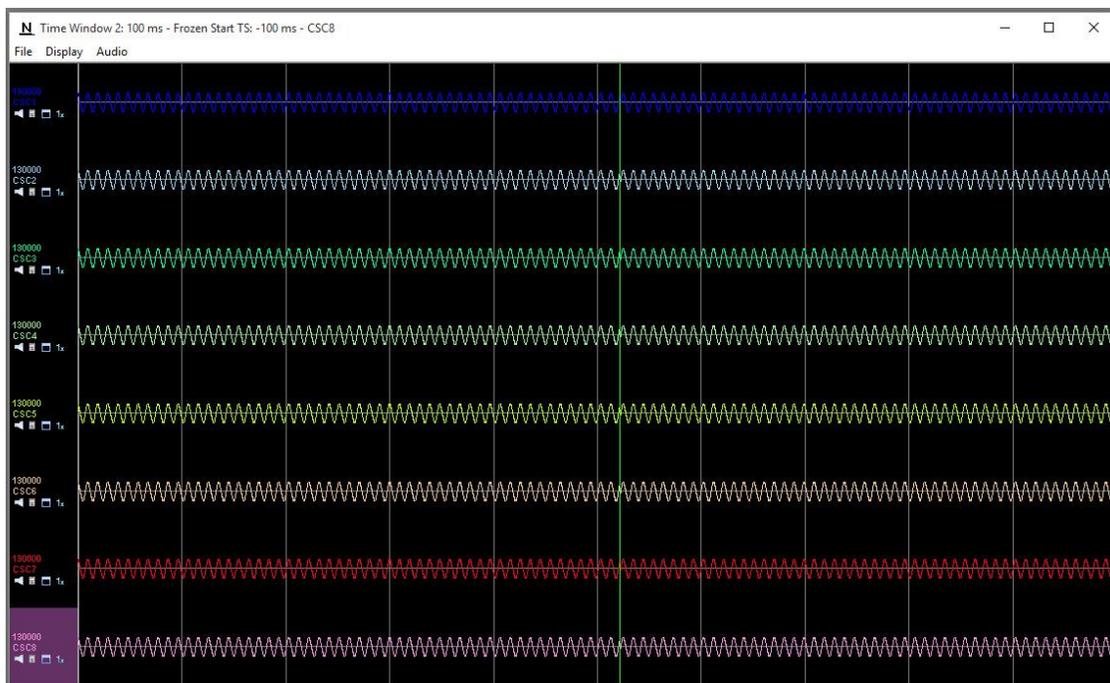
Time Window

6. **Properties Dialog**: The Properties dialog is where adjustments to the way that data is shown and processed in Cheetah are made. Clicking on the properties icon 📄 on the plot whose properties you want to edit will immediately show the properties dialog and select the plot whose icon was clicked. Important properties for plots, windows and acquisition entitles will be covered shortly. At this point the guide will focus on the tree view on the left side of this dialog.
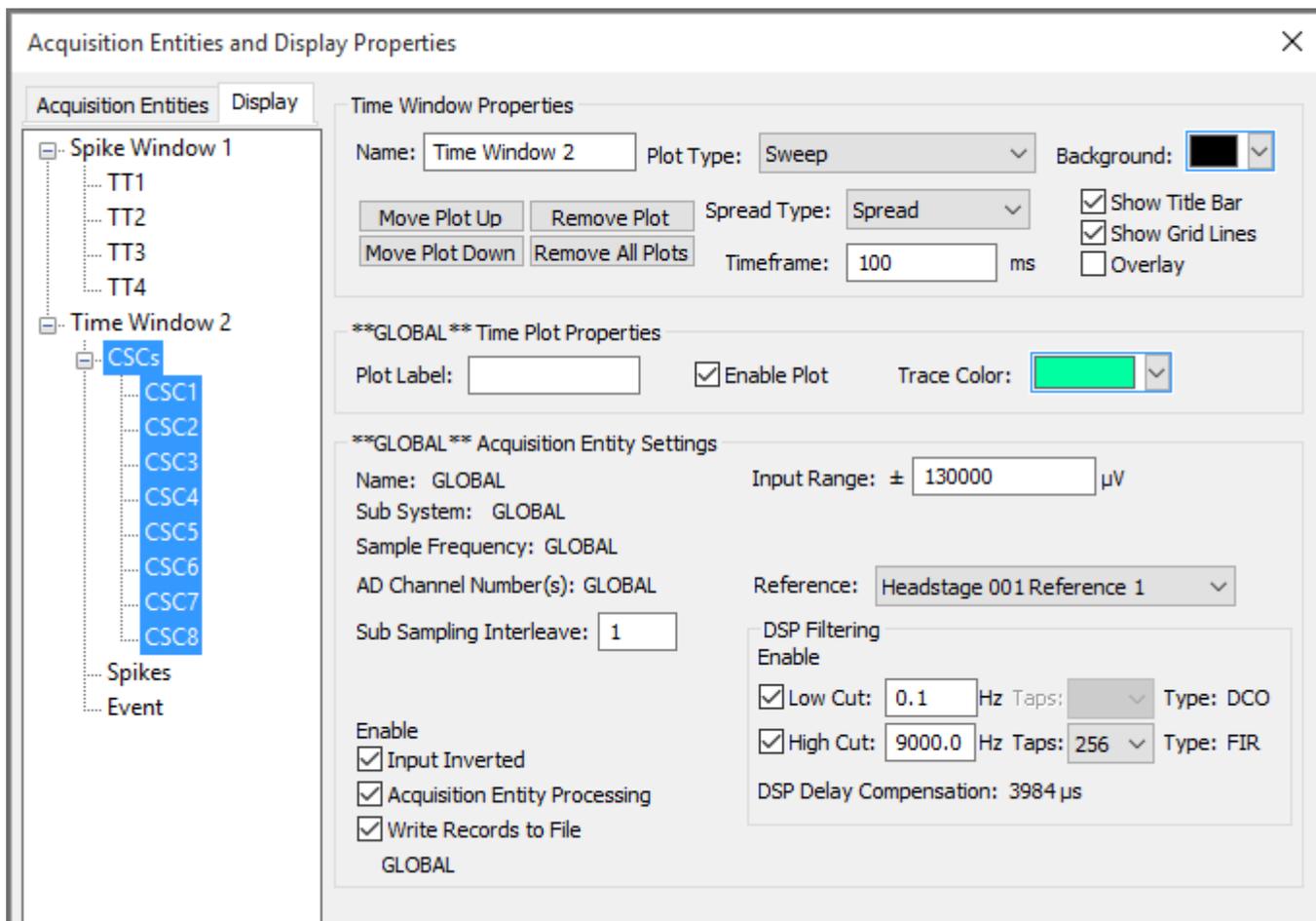
There are two tabs for the properties tree. The *Display* tab will group all acquisition entities by the windows that contain their plots. The *Acquisition Entities* tab will group all acquisition entities by their acquisition entity type. When an individual item is highlighted in the tree, the properties for that item are shown on the right side. Editing any of the properties will take effect immediately (pressing ENTER on some of the properties is necessary to change them). You can change the properties of more than one acquisition entity or plot by selecting a group item or individually selecting the items whose properties you want to change. In the above image, all CSCs in Time Window 1 will be affected by any property changes. You can tell when you are in global change mode when the word ***GLOBAL*** appears in a section heading and more than one item in the tree is highlighted, as shown above.

Acquiring Data

Connect a signal generator or some other signal to the hardware so there will be something to see on the displays. Once a signal has been connected, hold down Ctrl and press A. Data may not be visible in the plot windows. This means that the data being input is not in range for the current Cheetah settings. Adjusting of properties will be required.

The Most Important Properties

Windows, plots and acquisition entities all have separate properties that can be changed. There are three properties that will probably have to be adjusted at the start of a recording. All of the properties detailed below are available on the Properties dialog (discussed previously). These properties are:

1. **Input Range**: Sets the voltage range of the data that will be acquired by Cheetah. This value is used to scale the data so that it has the highest resolution (volts per AD count) possible within your expected voltage range. Setting this value too low can cause your data to clip, meaning you will lose any waveforms with voltage values outside the input range. Setting this value too high can cause your data to have poor resolution, meaning you may miss some details present in the original data. This value is set differently depending on the acquisition entity you select.
    a. **CSC**: Just change the value and hit ENTER.

    Input Range: ± 500 µV

    b. **Spike**: Click on the spike channel whose value is to be changed. To change the value for multiple channels, hold down the Ctrl key and click on the channels to change. Do not use the check boxes to select channels, as they will either enable (checked) or disable (unchecked) the channel. If a channel is disabled, no data will be recorded for that specific channel. After selecting the channels you wish to change, type the new value in the input range box and hit ENTER.

    Subchannel Setup

Enable	Channel	AD Channel	Threshold	Input Range	
☑	0	8	250	500	
☑	1	9	250	500	
☑	2	10	250	500	
☑	3	11	250	500	

    Threshold: 250 µV   Input Range: ± 500 µV
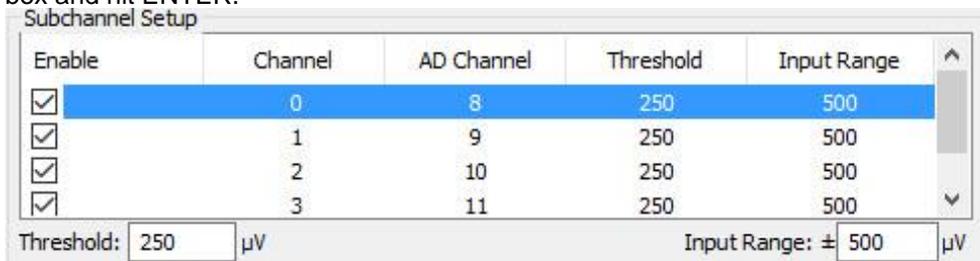
2. **DSP High Cut and Low Cut filters**: Cheetah has the ability to use DSP filtering on the incoming signals. The high cut and low cut values are the only ones that generally need adjustment. DSP filtering is applied after the signal is captured by the computer, and does not physically change the electrical signal. Checking the box enables the filter.

    DSP Filtering
    Enable
    ☑ Low Cut: 0.1 Hz Taps: ___ Type: DCO
    ☑ High Cut: 9000.0 Hz Taps: 256 Type: FIR
    DSP Delay Compensation: 3984 µs
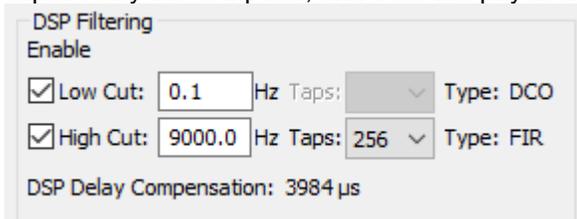
3. **Spike Thresholds**: A spike is recorded when the signal is above a threshold. There are two ways to set this threshold.
    a. **Spike Plot**: On the spike plots, there is a green indicator line ▬▬▬▬. Moving the mouse of the line will allow you to click on the line and drag the mouse to adjust the threshold. This is ideal for coarse threshold adjustments.
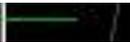
    For a finer adjustment, click the up ⬆ and down ⬇ arrows to change the threshold using a finer adjustment. The current threshold will be displayed in green on the bottom of the spike plot directly below the indicator line.

b. **Properties dialog**: Select the channels to change, the same as for the input range. Change the threshold and hit ENTER.

Enable	Channel	AD Channel	Threshold	Input Range
☑	0	8	250	500
☑	1	9	250	500
☑	2	10	250	500
☑	3	11	250	500

Subchannel Setup

Threshold: 250 μV   Input Range: ± 500 μV

Recording Data

Now that everything is adjusted so that both spikes and CSC data can be seen in the plot windows, that data can be recorded to a file for later analysis. Hold down Ctrl and press R or click on the *REC* button on the *System Status* window. As long as Cheetah is recording, all data that is seen will be written to a file in the data directory. To stop recording, hold down Ctrl and R again. Recording to the same file can be started and stopped as long as disk space is available. While the *REC* button is purple, data will be saved to a file.

Closing Cheetah

Before closing Cheetah, stop recording and acquisition. Then click the X in the upper right corner of the Main Window. All the changes made to Cheetah while it was running will be saved. The next time Cheetah is started, select *Start Cheetah with Last Configuration* and everything will be as it was when Cheetah was closed.

This guide represents a small portion of Cheetah's capabilities. For more information, see the *Cheetah Reference Guide*. Send any comments or ideas on how Neuralynx can make Cheetah better to support@neuralynx.com