First of parameter list plugin

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Chapter 1. Introduction

This document describes the *firstof* plugin. This plugin provides a SpecTcl command that generates and adds additional event processors to the Spectcl event processing pipeline.

The new event processors locate the first, or largest parameter in a list of parameters that has been assigned a value and produces two output parameters. The first output parameter is the value of the first, or largest defined parameter. The second output parameter is the index of the found parameter.

One sample use of this plugin would be to create hit/position spectra from Si strip detectors.

This document is organized in the following remaining chapters:

Installation

: Describes how to install the plugin.

Usage

: Describes how to use the plugin.

Chapter 2. Installation

While the plugin can be installed anywhere, I recommend installing it in the SpecTcl installation directory. This makes loading it easier. The plugin is installed by following the usual two step **configure** and **make install** procedure used by most Unix/Linux open source software.

The **configure** script configures the Makefiles for build and installation. It accepts the followign switches that are specific to the plugin:

`--help`

Prints out exhaustive help describing the options and variables recognized by the **configure** script.

`--prefix=`*`path`*

`path` is the top leve directory for the installation tree for the plugin. The plugin itself is installed in the `TclLibs` subdirectory of this tree and has the name `librootfilterformat.so`

`--with-tcl-header-dir=`*`path`*

The configure script searches for `tcl.h` in the most likely places. If it reports it is not able to find it, you can tell configure where it actually lives by supplying the *`path`* parameter to this option.

`--with-spectcl-home=`*`path`*

The plugin must link to the SpecTcl libraries. By default, these are assumed to be located in the same directory tree as the one specified by the `--prefix` option. If, however you choose to install the plugin elsewhere, you must specify this option and *`path`* to be the path to the top level directory of the SpecTcl installation.

Example 2-1. Building at the NSCL

```
./configure --prefix=/usr/opt/spectcl/3.2
...
make install
```

Chapter 3. Usage

3.1. Loading the plugin

The Tcl **load** command loads plugin libraries. You must specify the path to the plugin library completely. If the plugin has been installed in the SpecTcl installation, you can use the `SpecTclHome` variable to shorten the path.

The sample below shows how to load the firstof plugin if it was installed in the NSCL SpecTcl directory tree:

Example 3-1. Loading the plugin

```
% load $SpecTclHome/TclLibs/libfirstof.so
```

3.2. The firstof command

Loading the firstof filter adds a new command to SpecTcl: **firstof**. This command is used to define two new parameters for a list of input parameters. The command installs an event processor at the end of the SpecTcl analysis pipeline to compute these parameters.

By convention, the new parameters are referred to as the *value* and *firsthit* parameters. The event processor iterates through the list of the input parameters in the order in which they are specified on the command line. When it locates the first parameter that has been assigned a value, it sets the value output parameter to the value of that parameter. It sets the firsthit parameter to the index into the list of the first defined parameter.

The syntax of the **firstof** command is:

Example 3-2. Syntax of firstof

firstof *value firsthit input-list*

value

Is the name of the value output parameter. This parameter must not yet be defined in SpecTcl. The command errors out if it is.

firsthit

Is the name of the first hit output parameter. This parameter must not yet be defined in SpecTcl. The command errors out if it is.

input-list

Is a properly formatted list of parameters that are already defined in SpecTcl. These will be the list of input parameters from which the output parameters will be computed.

Let's look at a practical example. Suppose our experiment includes a double sided silicon strip detector (dsssd). The front side of the detector has 32 strips that are vertical and therefore define an x position. The backside, 32 horizontal strips that define a y position. Suppose the raw data are unpacked so that the parameters: *dssd1.x.00* ... *dssd1.x.31* and *dssd1.y.00* ... *dssd1.y.31* are defined.

The example below shows how to produce an X/Y 2-d position spectrum from these parameters using the **firstof** plugin.

Example 3-3. Making a 2-d position spectrum for a dsssd detector

```
load $SpecTclHome/TclLibs/libfirstof.so                ❶

for {set strip 0} {$strip < 32} {incr strip} {
   set stripnum [format %02d $strip]
   lappend xstrips dsssd1.x.$stripnum                  ❷
   lappend ystrips dsssd1.y.$stripnum
}

firstof dsssd1.x.e  dsssd1.x.pos $xstrips              ❸
firstof dsssd1.y.e  dsssd1.y.pos $ystrips

spectrum dsssd1.xy  2 {dsssd1.x.pos dsssd1.y.pos} {{0 31 32} {0 31 32}} ❹
sbind dsssd1.xy
```

❶ Loads the firstof plugin. This is only needed once during the SpecTcl run. It is harmless to do it more than once.

❷ Creates a pair of lists of the dsssd strip parameters. The **format** is used to turn a number like `1` into `01`.

❸ These **firstof** commands define four new parameters. *dsssd1.x.e* will be the value of the first x parameter that has been defined for an event. *dsssd1.x.pos* will be the number of that strip.

The **firstof** commands define the new parameters, making them known to SpecTcl. Event processors are also defined to compute the four new processors (one event processor, two parameters per invocation of the **firstof** command).

❹ Creates the 2-d position spectrum and binds it to the displayer so that you can view it.

Suppose we have an event where the following strips have been hit: dsssd1.x.05, dsssd1.x.07, dsssd1.y.03, dsssd1.y.30. In this case, the example above will set dsssd1.x.pos to 5, and dsssd1.y.pos to 3. Similarly, dsssd1.x.e will have the value of dsssd1.x.05 and dsssd1.y.e will have the value of dsssd1.y.03. The two dimensional position spectrum we defined will have channel (5,3) incremented.

3.3. The biggestof command

The **biggestof** command is also added, it has the same syntax as the **firstof** command but generates an event processor that returns the largest value and index of the largest value parameter in the list of parameter monitored.

An example of this that is identical to that of the **firstof** example is:

Example 3-4. Making a 2-d position spectrum for a dsssd detector using biggestof

```
load $SpecTclHome/TclLibs/libfirstof.so

for {set strip 0} {$strip < 32} {incr strip} {
   set stripnum [format %02d $strip]
   lappend xstrips dsssd1.x.$stripnum
   lappend ystrips dsssd1.y.$stripnum
}

biggestof dsssd1.x.e  dsssd1.x.pos $xstrips
biggestof dsssd1.y.e  dsssd1.y.pos $ystrips

spectrum dsssd1.xy  2 {dsssd1.x.pos dsssd1.y.pos} {{0 31 32} {0 31 32}}
sbind dsssd1.xy
```