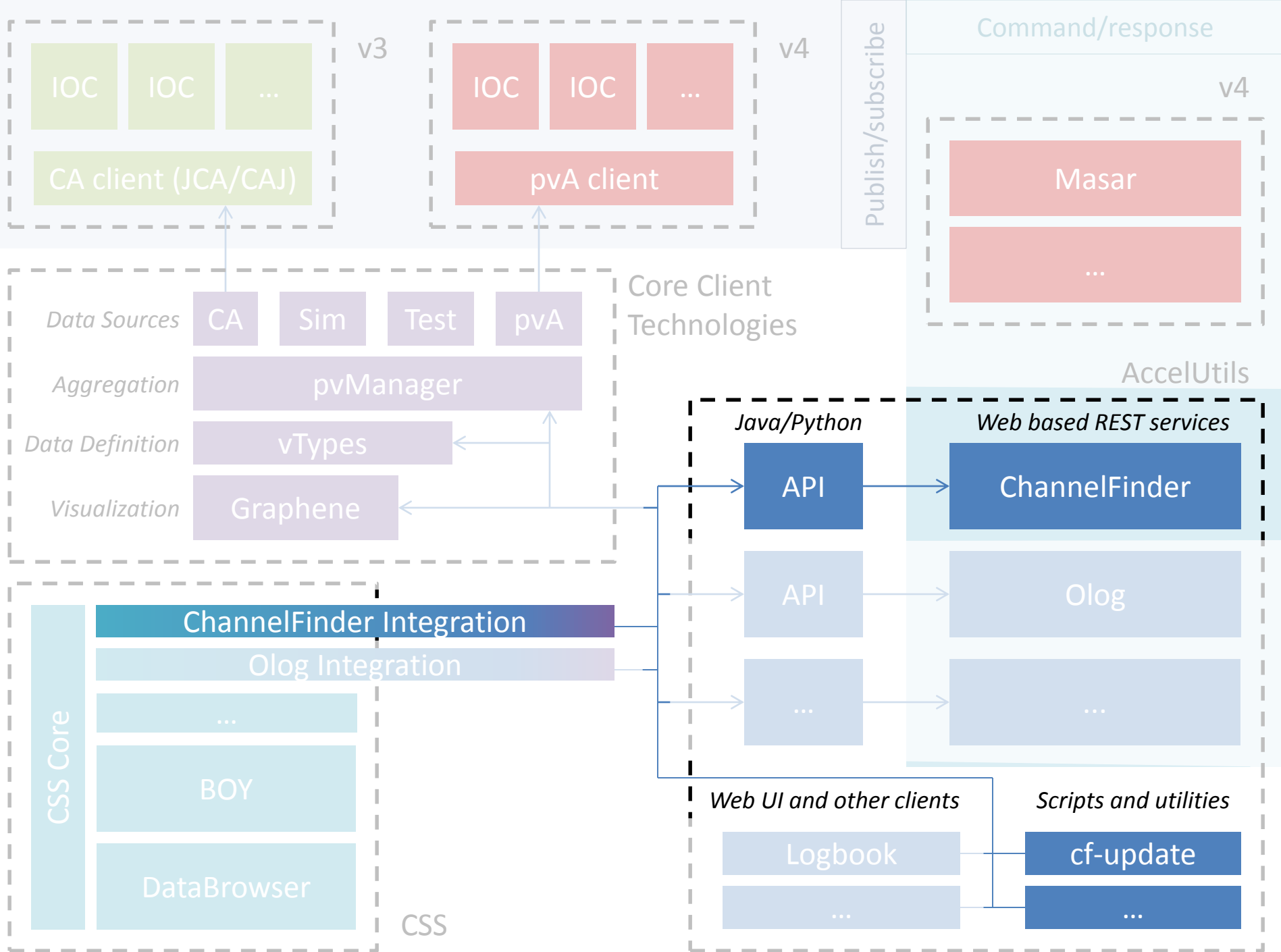


ChannelFinder:

A directory service

Motivation and Objectives

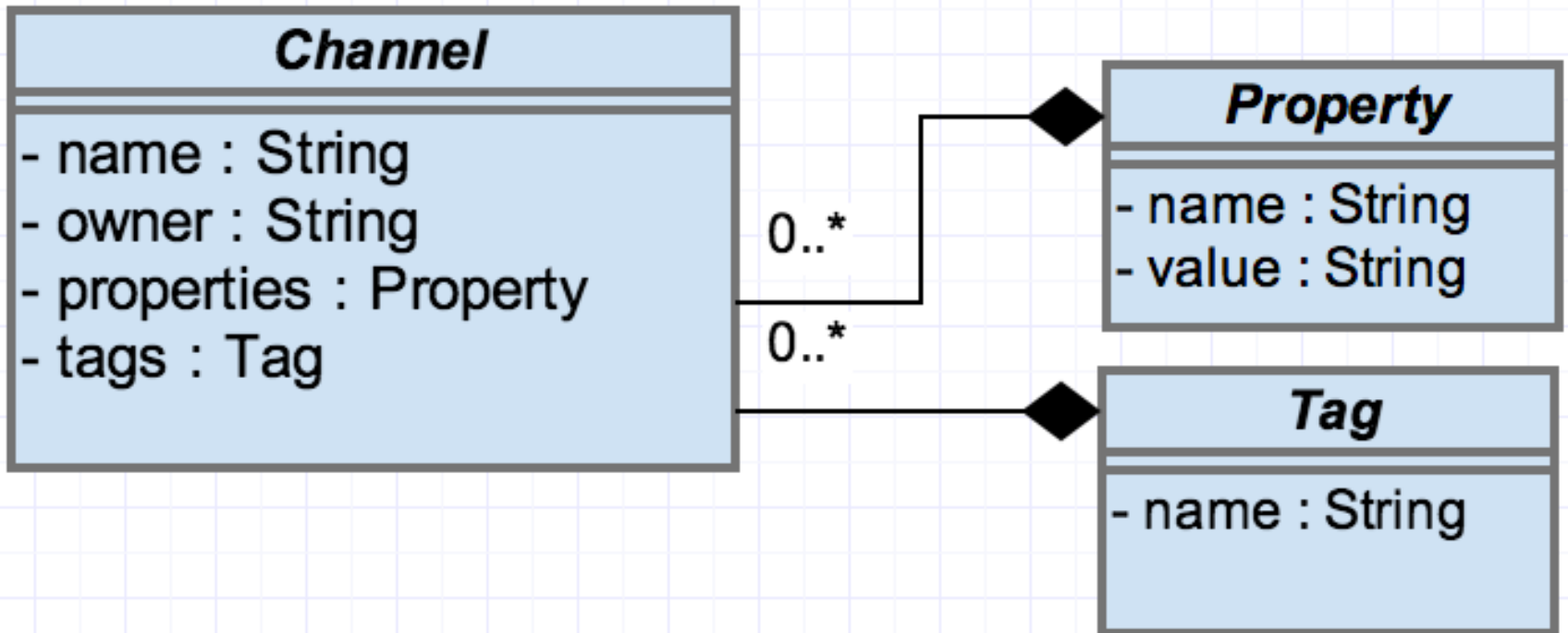
- A flat name space restricts seriously:
 - Clients need to know all channel names beforehand
 - Portable generic clients must be simple
 - Apps need full configuration or framework supplied service
- Develop a Directory Service
 - Generic
 - No dependency on installation and local conventions
 - Simple and fast (enough)
 - Use standards wherever possible
 - Provides "query-by-functionality"



ChannelFinder Data

- Set of **Channels** (unique names)
- Each Channel has an arbitrary number of **Properties** (name/value pairs) and **Tags** (names)
- Each Channel, Property, or Tag has an **Owner** (group) to allow basic access control
- All names and values are strings

Directory Data



Channel example

```
"name": "XF:31IDA-OP{Tbl-Ax:X1}Mtr",  
"owner": "train",  
"properties":  
  ["handle": "Setpoint",  
   "axis": "1",  
   "hostname": "training.org.epics",  
   "iocName": "motorsim",  
   "time": "2016-03-21"]  
"tags":  
  ["motor",  
   "sys.XF:31"  
  ]
```

Query Example

- `XF:31*IDA*`
All pvs from the insertion device 31
- `XF:31*IDA*&axis=4*`
All pvs from the insertion device 31 belonging to axis 4
- `XF:31*IDA*&axis=4*&pvStatus=active`
All pvs from the insertion device 31 belonging to axis 4 and with pvStatus active
- `XF:31*IDA*&axis=4*&tag=aphla.sys.SR`
All pvs from the insertion device 31 belonging to axis 4 with tag sys.XF:31

EXAMPLE DATA SET

device FM1G4C02A

Channel Name	SR:C02-MG:G04A{HFCor:FM1}		SR:C02-MG:G04A{VFCor:FM1}	
	Fld-I	Fld-SP	Fld-I	Fld-SP
handle	READBACK	SETPOINT	READBACK	SETPOINT
elemName	FXM1G4C02A		FYM1G4C02A	
elemType	HFCOR		VFCOR	
elemField	x		y	
devName	FM1G4C02A			
sEnd	65.5222			
cell	C02			
girder	G4			
symmetry	A			
length	0.044			
ordinal	263		264	
tags	eget	eput	eget	eput
	x		y	
	sys.SR			

device FM1G4C02A

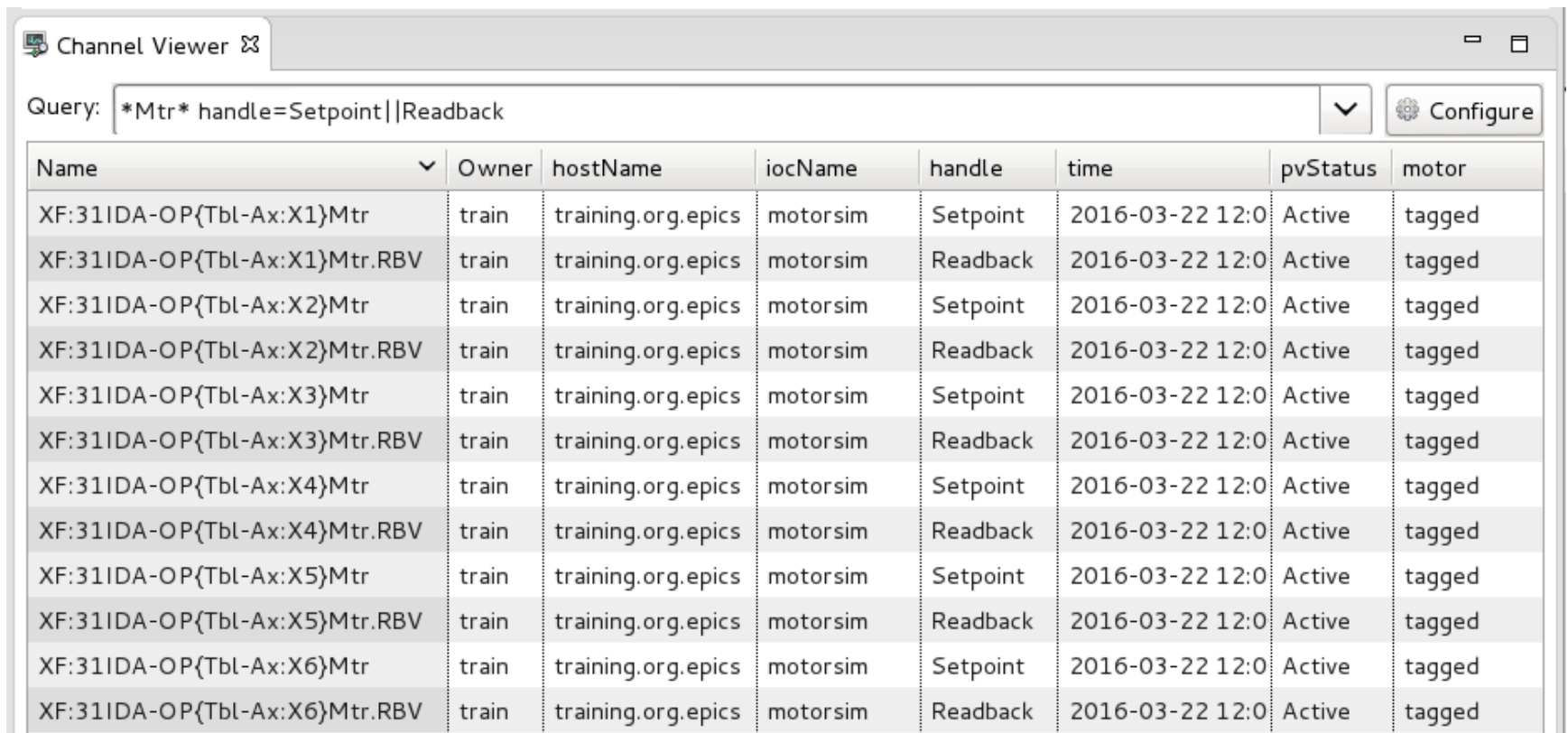
Channel Name	SR:C02-MG:G04A{HFCor:FM1}		SR:C02-MG:G04A{VFCor:FM1}	
	Fld-I	Fld-SP	Fld-I	Fld-SP
hostName	ps-psioc-c02.cs.nsls2.local			
iocName	ps-C02A			
updateTime	2015-03-13			
active	True			
Tags	archive			

Quick demo of the ChannelFinder applications

CHANNELFINDER IN CSS

ChannelViewer

- CS-Studio → Display → ChannelViewer

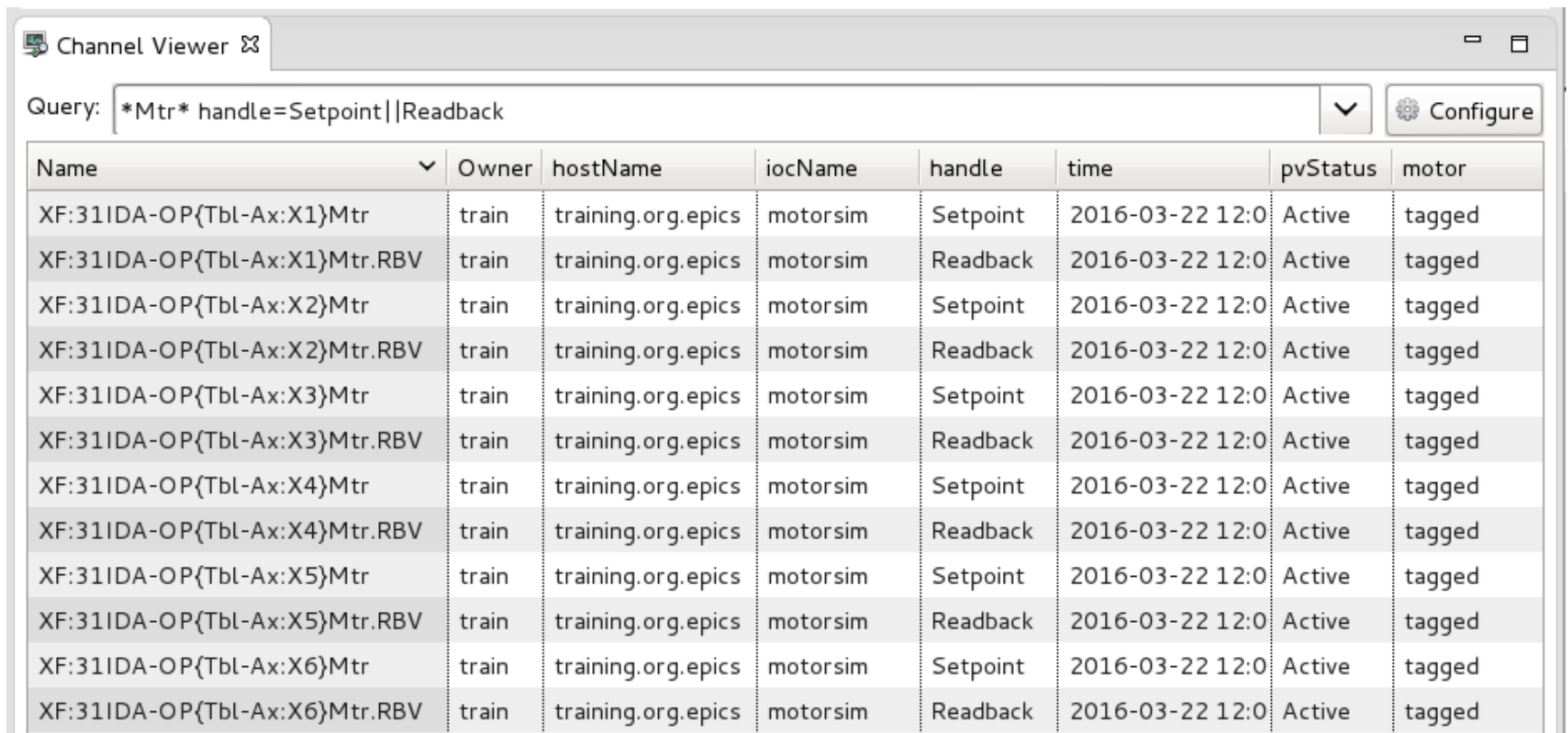


The screenshot shows the Channel Viewer application window. The title bar reads "Channel Viewer". Below the title bar is a query input field containing the text "*Mtr* handle=Setpoint||Readback". To the right of the query field is a dropdown arrow and a "Configure" button. Below the query field is a table with 9 columns: Name, Owner, hostName, iocName, handle, time, pvStatus, and motor. The table contains 12 rows of data, all showing motors from the "train" owner at "training.org.epics" with "motorsim" iocName. The handles alternate between "Setpoint" and "Readback". All motors are "Active" and "tagged".

Name	Owner	hostName	iocName	handle	time	pvStatus	motor
XF:31IDA-OP{Tbl-Ax:X1}Mtr	train	training.org.epics	motorsim	Setpoint	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X1}Mtr.RBV	train	training.org.epics	motorsim	Readback	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X2}Mtr	train	training.org.epics	motorsim	Setpoint	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X2}Mtr.RBV	train	training.org.epics	motorsim	Readback	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X3}Mtr	train	training.org.epics	motorsim	Setpoint	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X3}Mtr.RBV	train	training.org.epics	motorsim	Readback	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X4}Mtr	train	training.org.epics	motorsim	Setpoint	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X4}Mtr.RBV	train	training.org.epics	motorsim	Readback	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X5}Mtr	train	training.org.epics	motorsim	Setpoint	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X5}Mtr.RBV	train	training.org.epics	motorsim	Readback	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X6}Mtr	train	training.org.epics	motorsim	Setpoint	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X6}Mtr.RBV	train	training.org.epics	motorsim	Readback	2016-03-22 12:0	Active	tagged

ChannelViewer

- Query can be constructed for the Name, Property value, Tags associated with channels
- Wildcard character like "*", "?" can be used in the queries
- prop=val1 | val2 is equivalent to prop=val1 OR prop=val2
- prop=val1 tag=myTag is equivalent to prop=val1 AND tag=myTag



The screenshot shows the 'Channel Viewer' application window. At the top, there is a title bar with the text 'Channel Viewer' and a search icon. Below the title bar, there is a 'Query:' field containing the text '*Mtr* handle=Setpoint||Readback'. To the right of the query field is a dropdown arrow and a 'Configure' button. Below the query field is a table with 9 columns: Name, Owner, hostName, iocName, handle, time, pvStatus, and motor. The table contains 12 rows of data, all with 'train' as the owner and 'training.org.epics' as the hostName. The 'handle' column alternates between 'Setpoint' and 'Readback' for each 'Mtr' entry. The 'pvStatus' column is 'Active' for all entries, and the 'motor' column is 'tagged' for all entries.

Name	Owner	hostName	iocName	handle	time	pvStatus	motor
XF:31IDA-OP{Tbl-Ax:X1}Mtr	train	training.org.epics	motorsim	Setpoint	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X1}Mtr.RBV	train	training.org.epics	motorsim	Readback	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X2}Mtr	train	training.org.epics	motorsim	Setpoint	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X2}Mtr.RBV	train	training.org.epics	motorsim	Readback	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X3}Mtr	train	training.org.epics	motorsim	Setpoint	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X3}Mtr.RBV	train	training.org.epics	motorsim	Readback	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X4}Mtr	train	training.org.epics	motorsim	Setpoint	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X4}Mtr.RBV	train	training.org.epics	motorsim	Readback	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X5}Mtr	train	training.org.epics	motorsim	Setpoint	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X5}Mtr.RBV	train	training.org.epics	motorsim	Readback	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X6}Mtr	train	training.org.epics	motorsim	Setpoint	2016-03-22 12:0	Active	tagged
XF:31IDA-OP{Tbl-Ax:X6}Mtr.RBV	train	training.org.epics	motorsim	Readback	2016-03-22 12:0	Active	tagged

ChannelViewer

- Channel/s can be forwarded to other cs-studio applications

The screenshot shows the Channel Viewer application window. The title bar is "Channel Viewer". Below the title bar is a query input field containing the text: `*Mtr* handle=Setpoint||Readback`. To the right of the query field is a "Configure" button. Below the query field is a table with the following columns: Name, Own, hostName, iocName, handle, time, pvStatus, and mtr. The table contains 12 rows of data. A context menu is open over the first row, showing options: Channel, Process Variable, Configure..., Copy PV name to clip-board, EPICS PV Tree, Probe, PV Table, OPI Probe, Data Browser, and Name Space Search.

Name	Own	hostName	iocName	handle	time	pvStatus	mtr
XF:31IDA-OP{Tbl-Ax:X1}Mtr	train	training.org.epic	motorsim	Readback	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X2}Mtr	train	training.org.epic	motorsim	Readback	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X3}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X4}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X5}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X6}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X7}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X8}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X9}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X10}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X11}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X12}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta

ChannelViewer

- Channel/s can be forwarded to other cs-studio applications

The screenshot shows the Channel Viewer application window. The title bar is "Channel Viewer". Below the title bar is a query input field containing the text: `*Mtr* handle=Setpoint||Readback`. To the right of the query field is a "Configure" button. Below the query field is a table with the following columns: Name, Own, hostName, iocName, handle, time, pvStatus, and mtr. The table contains 12 rows of data. A context menu is open over the first row, showing options: Channel, Process Variable, and Configure... The Process Variable option is highlighted, and a sub-menu is open showing options: Copy PV name to clip-board, EPICS PV Tree, Probe, PV Table, OPI Probe, Data Browser, and Name Space Search.

Name	Own	hostName	iocName	handle	time	pvStatus	mtr
XF:31IDA-OP{Tbl-Ax:X1}Mtr	train	training.org.epic	motorsim	Readback	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X2}Mtr	train	training.org.epic	motorsim	Readback	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X3}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X4}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X5}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X6}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X7}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X8}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X9}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X10}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X11}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta
XF:31IDA-OP{Tbl-Ax:X12}Mtr	train	training.org.epic	motorsim	point	2016-03-22 12	Active	ta

ChannelViewer - editing

- Add a tag/property to a channel or a group of channels
- Remove a tag/property from a channel or a group of channels

The screenshot shows the Channel Viewer application window. The title bar is "Channel Viewer". Below the title bar is a search bar with the query "*X6*Mtr*" and a "Configure" button. The main area is a table with the following columns: Name, Owner, hostName, iocName, handle, time, pvStatus, and mo. The table contains six rows of data. A context menu is open over the first row, showing options: Channel, Process Variable, and Configure... The "Channel" option is selected, and a sub-menu is open showing: Show Channel Info, Modify Channel, Add Tag, Remove Tag, Add Property, and Remove Property.

Name	Owner	hostName	iocName	handle	time	pvStatus	mo
XF:31IDA-OP{Tbl-Ax:X6}Mtr.RBV	train	training.org.epic	motorsim	Readback	2016-03-22 12	Active	tag
XF:31IDA-OP{Tbl-Ax:X6}Mtr_vCh	train	training.org.epic	motorsim		2016-03-22 12	Active	
XF:31IDA-OP{Tbl-Ax:X6}Mtr_ableput	train	training.org.epic	motorsim		2016-03-22 12	Active	
XF:31IDA-OP{Tbl-Ax:X6}Mtr_able	train	training.org.epic	motorsim		2016-03-22 12	Active	
XF:31IDA-OP{Tbl-Ax:X6}Mtr	train	training.org.epic	motorsim	Setpoint	2016-03-22 12	Active	tag
XF:31IDA-OP{Tbl-Ax:X6}Mtr_twCh	train	train			2016-03-22 12	Active	

ChannelViewer - editing

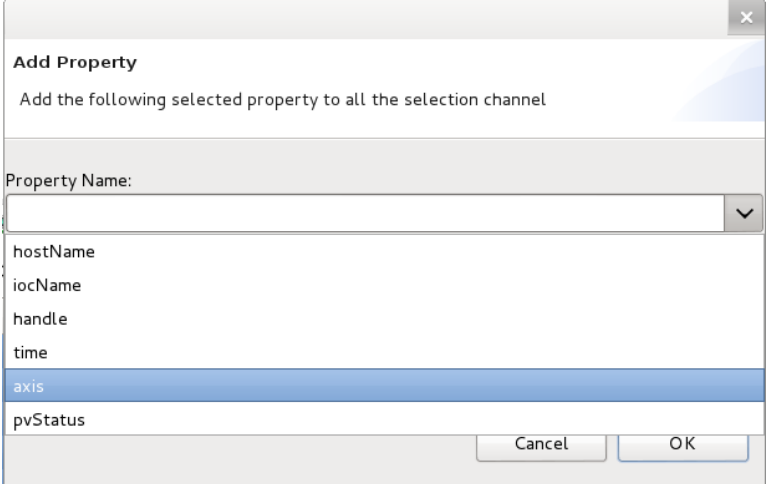
- Query *X6*Mtr to select all the channels for associated with motor6
- Select all pv's and choose "add property"

The screenshot shows the Channel Viewer application window. At the top, the title bar reads "Channel Viewer". Below it, a query input field contains the text "*X6*Mtr*" and a "Configure" button is visible on the right. The main area displays a table with the following columns: Name, Owner, hostName, iocName, handle, time, pvStatus, and mo. The table contains six rows of data, all with "Active" status. A right-click context menu is open over the first row, showing options: "Channel", "Process Variable", "Configure...", "Show Channel Info", "Modify Channel", "Add Tag", "Remove Tag", "Add Property", and "Remove Property".

Name	Owner	hostName	iocName	handle	time	pvStatus	mo
XF:31IDA-OP{Tbl-Ax:X6}Mtr.RBV	train	training.org.epic	motorsim	Readback	2016-03-22 12	Active	tag
XF:31IDA-OP{Tbl-Ax:X6}Mtr_vCh	train	training.org.epic	motorsim		2016-03-22 12	Active	
XF:31IDA-OP{Tbl-Ax:X6}Mtr_ableput	train	training.org.epic	motorsim		2016-03-22 12	Active	
XF:31IDA-OP{Tbl-Ax:X6}Mtr_able	train	training.org.epic	motorsim		2016-03-22 12	Active	
XF:31IDA-OP{Tbl-Ax:X6}Mtr	train	training.org.epic	motorsim	Setpoint	2016-03-22 12	Active	tag
XF:31IDA-OP{Tbl-Ax:X6}Mtr_twCh	train	train			2016-03-22 12	Active	

ChannelViewer - editing

- Select the property "Axis" from the listed properties.
- Enter a value for the property e.g. "X6"

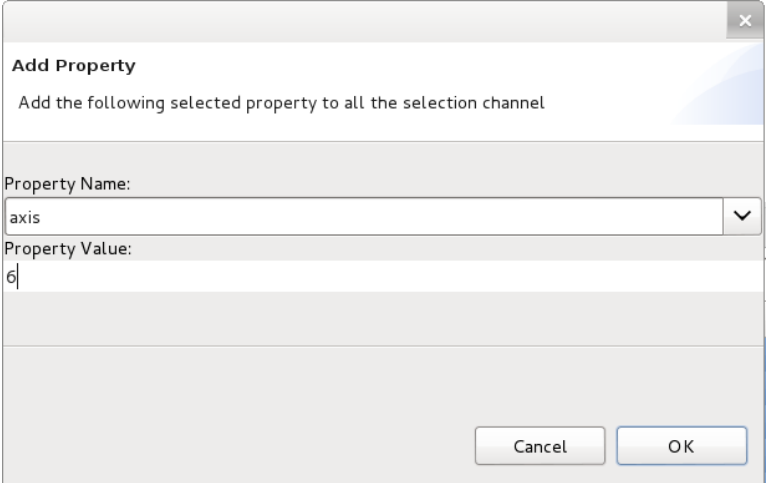


Add Property
Add the following selected property to all the selection channel

Property Name:

hostName
iocName
handle
time
axis
pvStatus

Cancel OK



Add Property
Add the following selected property to all the selection channel

Property Name:

axis

Property Value:

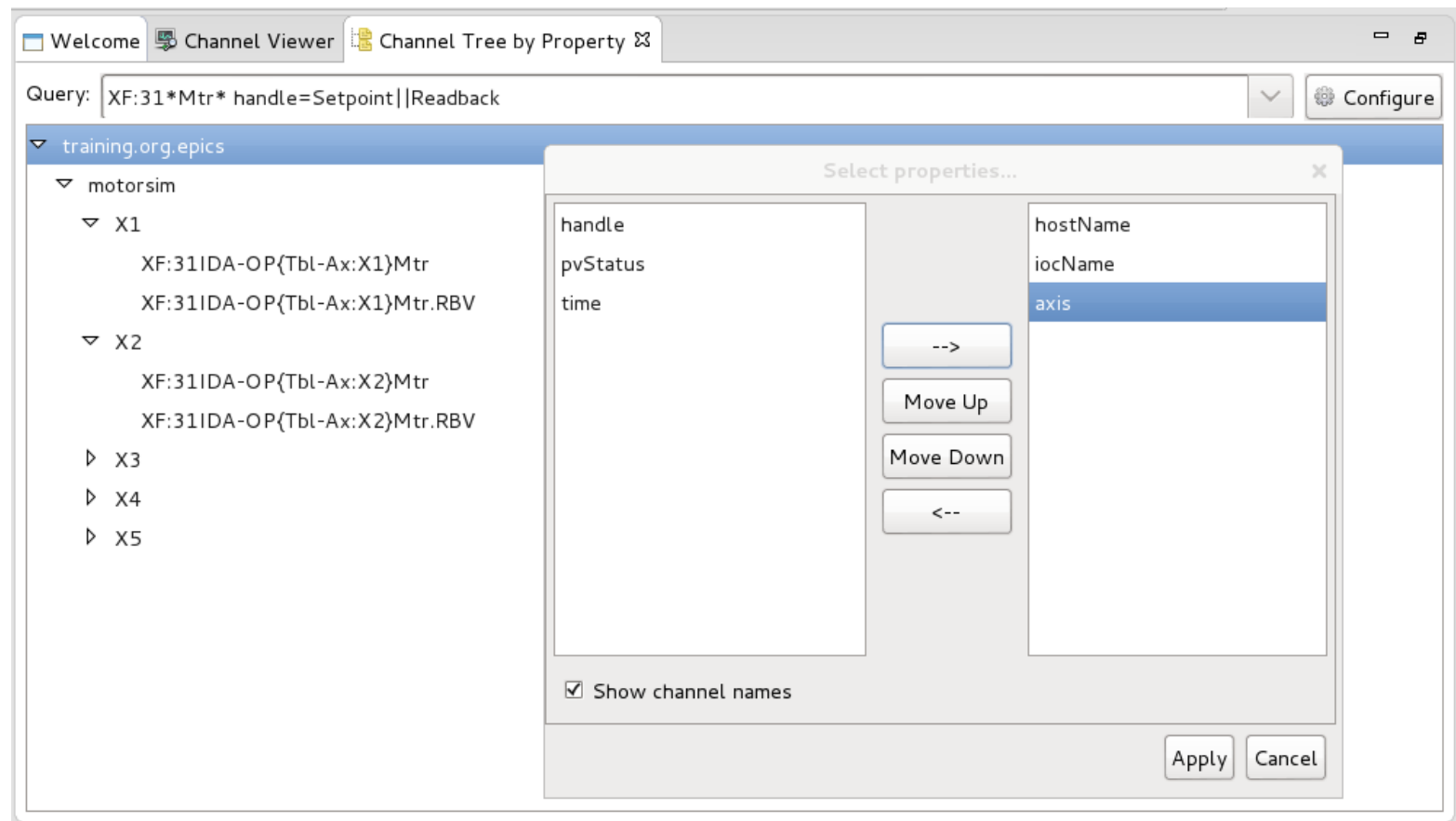
Cancel OK

Channel Tree

- Channel Tree by Property allows to create an hierarchical view of the channels by using properties and their values.

Channel Tree

- Query: XF:31*Mtr* handle=Setpoint||Readback
- Configure the tree by selecting the properties to be used to create the hierarchy (hostname, handle, axis,...)



Channel Orchestrator

- The channel orchestrator is a tool to assist in preparing and writing a group of set points

Channel Viewer Waterfall Channel Tree by Property Channel Orchestrator

Query: XF:31*Mtr handle=Setpoint

Channel	iocName	handle	axis	Min	Value	Max	Weight	Step1
XF:31IDA-OP{Tbl-Ax:X1}Mtr	motorsim	Setpoint	1	-100.0	2.0	100.0	1.0	4.0
XF:31IDA-OP{Tbl-Ax:X3}Mtr	motorsim	Setpoint	3	-100.0	0.0	100.0	1.0	2.0
XF:31IDA-OP{Tbl-Ax:X2}Mtr	motorsim	Setpoint	2	-100.0	8.0	100.0	1.0	10.0
XF:31IDA-OP{Tbl-Ax:X5}Mtr	motorsim	Setpoint	5	-100.0	0.0	100.0	1.0	2.0
XF:31IDA-OP{Tbl-Ax:X4}Mtr	motorsim	Setpoint	4	-100.0	0.0	100.0	1.0	2.0
XF:31IDA-OP{Tbl-Ax:X6}Mtr	motorsim	Setpoint		-100.0	0.0	100.0	1.0	2.0

Step Count: 1 Step Size: 2

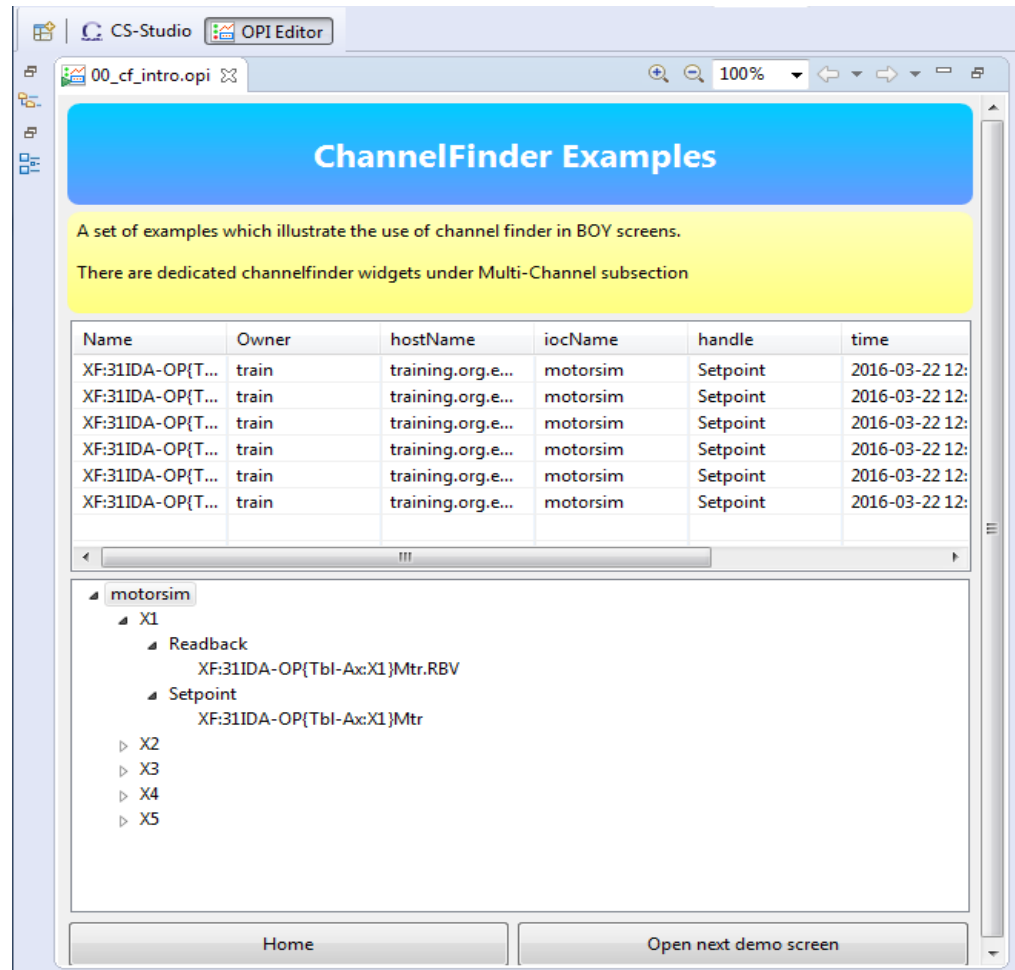
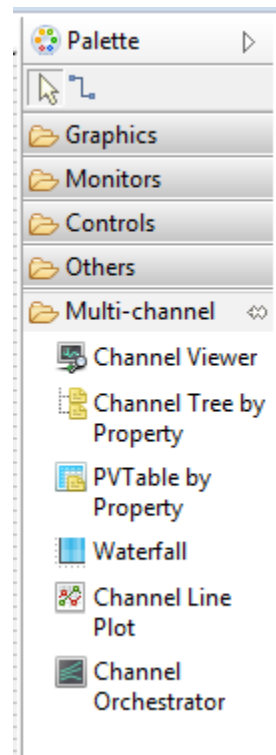
Generate Setpoints

Apply

train

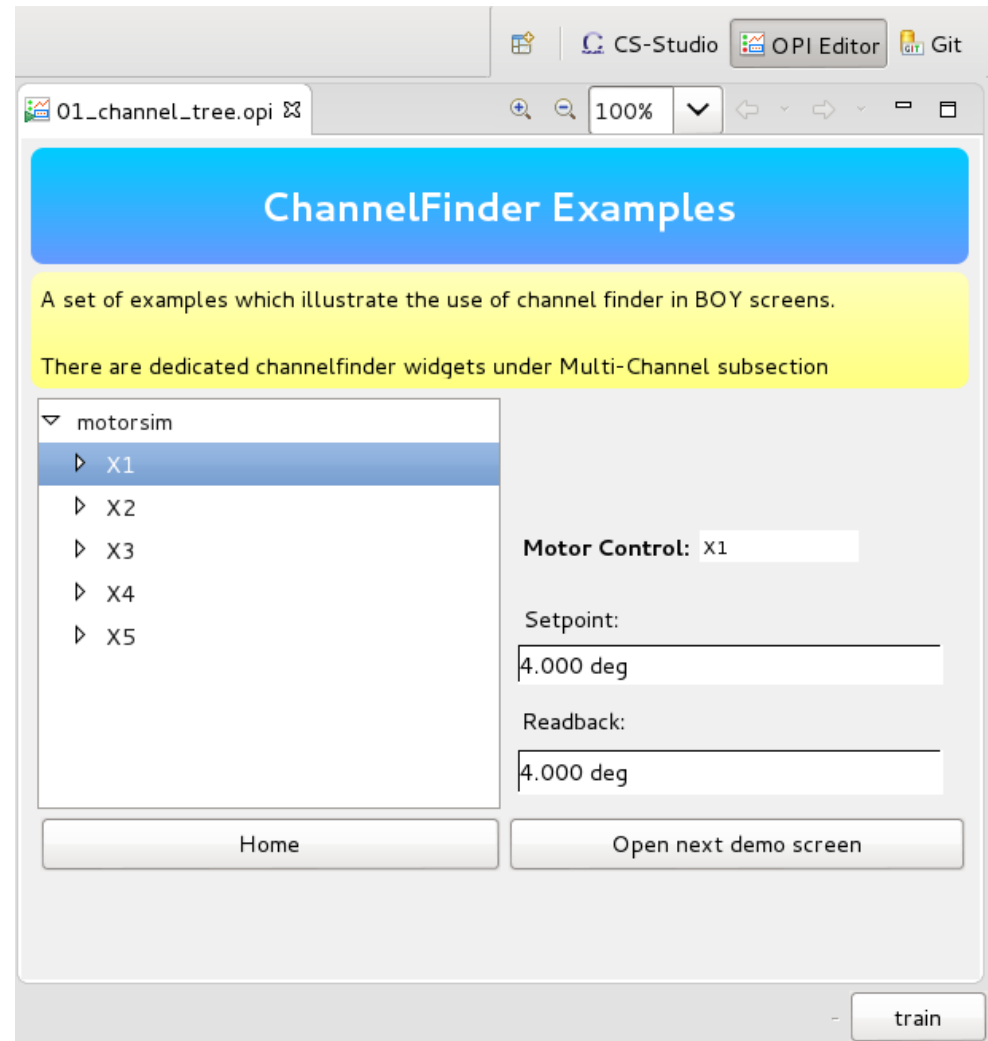
ChannelFinder & BOY

- Dedicated ChannelFinder widgets



ChannelFinder & BOY

- Embed channel tree by property widget into the opi
 - Set Channel query: “XF:31*Mtr*”
 - Tree Properties: iocName, axis, handle
 - Selection Expression: #(axis)
- Selections from this widget can be used to initialize other widgets



cfQuery

- Accessing channelfinder data in opi screens
- *=cfQuery(Vstring query) : VTable*

The screenshot shows a software interface for the `cfQuery` function. At the top, a tab displays the formula `=cfQuery("XF:31*Mtr* handle=Setpoint")`. Below this, a text box labeled "PV Formula:" contains the same formula. The main part of the interface is a table with 7 columns: Name, hostName, iocName, handle, time, axis, and pvS. The table contains 6 rows of data. Below the table, there are two text boxes: "Value:" and "New Value:", both containing the text `VTable[7x6, [Name, hostName, iocName, ...]]`. A yellow warning icon and the text "Read-only formula" are displayed below these boxes. At the bottom, a "Status:" label is followed by a box containing the text "Connected".

Name	hostName	iocName	handle	time	axis	pvS
XF:31IDA-	training.org	motorsim	Setpoint	2016-03-2	X1	Activ
XF:31IDA-	training.org	motorsim	Setpoint	2016-03-2	X2	Activ
XF:31IDA-	training.org	motorsim	Setpoint	2016-03-2	X3	Activ
XF:31IDA-	training.org	motorsim	Setpoint	2016-03-2	X4	Activ
XF:31IDA-	training.org	motorsim	Setpoint	2016-03-2	X5	Activ
XF:31IDA-	training.org	motorsim	Setpoint	2016-03-2		Activ

Value: `VTable[7x6, [Name, hostName, iocName, ...]]`

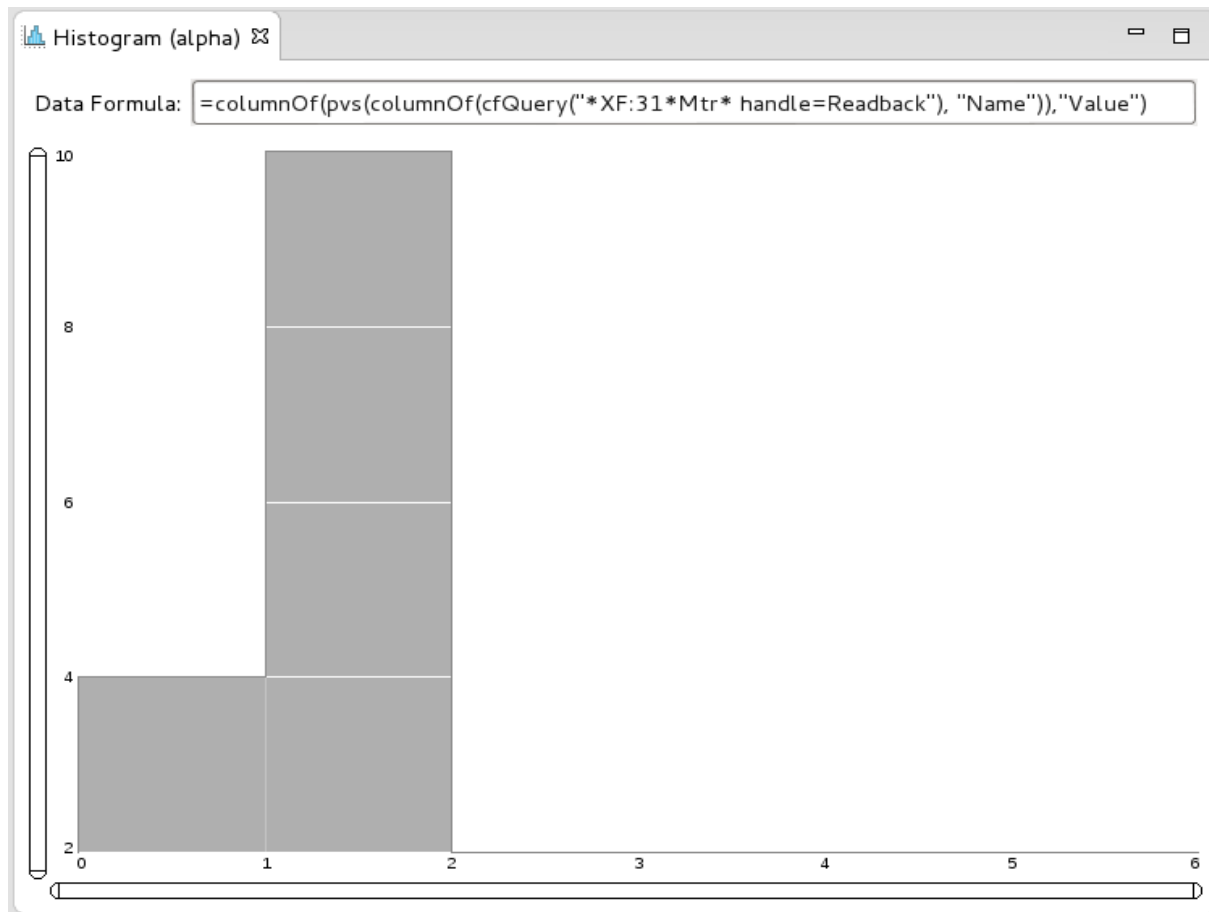
New Value: `VTable[7x6, [Name, hostName, iocName, ...]]`

⚠ Read-only formula

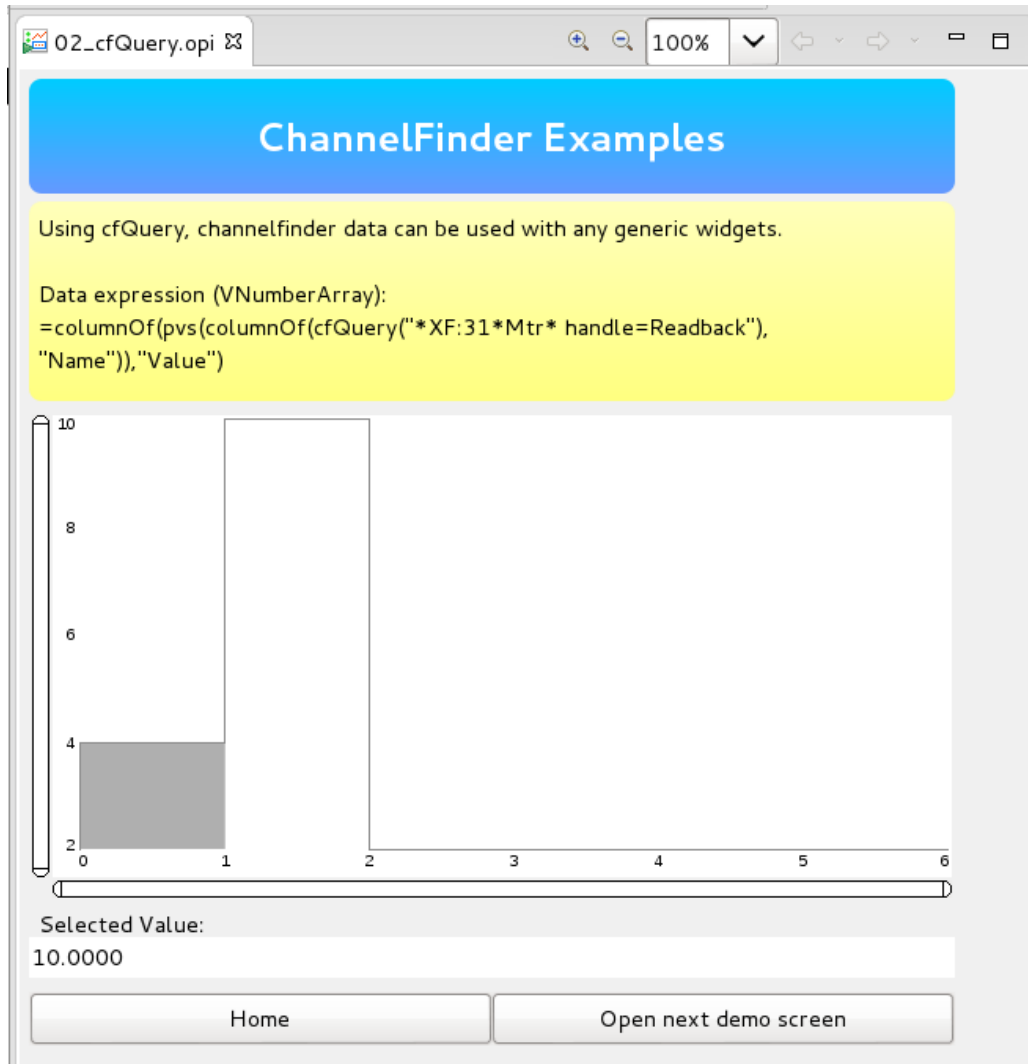
Status: `Connected`

cfQuery

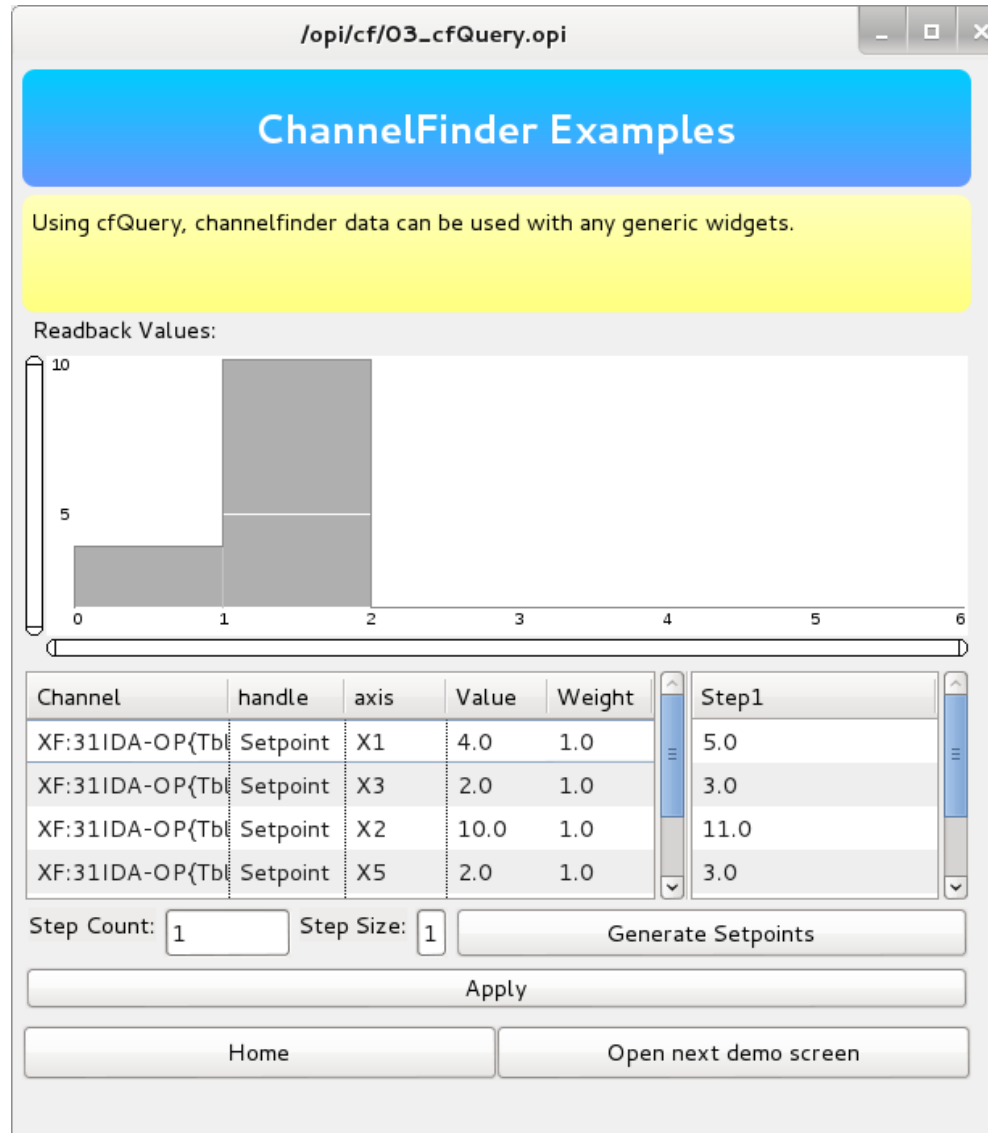
- Combining cfQuery with other formulas to create tables/arrays which can be then used with existing cs-studio widgets
- `=columnOf(pvs(columnOf(cfQuery("*XF:31*Mtr* handle=Readback"), "Name")), "Value")`



ChannelFinder & BOY



ChannelFinder & BOY



Questions