

EPICS Tools and Services

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CS-Studio Collaboration

17+ sites actively packing a site-specific CS-Studio products or Participating in the development of one or more of the EPICS services

(NSLS2, SNS, ESS, FRIB, ALS, ITER, DLS, ISIS, CEA, NSRCC, KEK, FZB, DESY, CSNS, LNL, ROAN, JLAB,...)

12+ sites/labs/institutions using prepackaged products

Additionally, many users who do not create their own products.

Meet Our Team

Eric Berryman

Community Manager

Facility for Rare Isotope Beams (FRIB) at MSU



Kay Kasemir

Site Representative

Spallation Neutron Source (ORNL)



Kunal Shroff

Site Representative

National Synchrotron Light Source II (NSLSII) at BNL



Will Rogers

Site Representative

Diamond



Nadine Utzel

Site Representative

ITER



Dominic Oram

Site Representative

ISIS



Charles-Henry Patard

Site Representative

GANIL/Spiral2



Joerg Penning

Site Representative

DESY



Yongxiang Qiu

Site Representative

CSNS



Xinyu Wu

Site Representative

CSIRO



Claudio Rosati

Site Representative

European Spallation Source (ESS)



Gustavo Ciotto Pinton

Site Representative

Laboratório Nacional de Luz Síncrotron (LNLS)



손창욱 (C.W. Son)

Site Representative

Korean Heavy Ion Accelerator (RAON)



Wesley Moore

Site Representative

Jefferson Lab (JLab)



EPICS Tools
Phoebus
CS-Studio

EPICS Service
Archiver, ChannelFinder
Save Restore, Olog,
Alarm
...

EPICS
TUU

EPICS Tools and Services

- EPICS java core:
Consists of Channel Access and PVAccess client libraries, utility libraries
- EPICS middle layer Services:
Archiver, Alarm, Save Restore, Channel Finder, Olog, ...
- EPICS tools:
CS-Studio & Phoebus

Release 4.7

- EPICS core, services, and tools version 4.7.x was released on Aug 19th, 2022
- The release is published to maven central <https://search.maven.org/search?q=org.phoebus>
- Simplified and standardized release process*
mvn release:prepare
mvn release:perform



Apache Maven

maven.apache.org

```
<dependency>  
  <groupId>org.phoebus</groupId>  
  <artifactId>core-pv</artifactId>  
  <version>4.7.0</version>  
</dependency>
```

EPICS Core: Channel Access (CAJ)

- Switch to GitHub Actions for CI
- Additional CAJ properties to configure channel access echo timeout & minimum search interval
- Improvements in error messages and logging
- Agreements on the roadmap for CAJ/JCA and CA support
 - Mostly bug fixes, emphasizing stability
 - New features will go into PVA

EPICS Core: PVAccess

- PVA (core-pva)
 - IPv6 Support
 - EPICS_PVA_NAME_SERVERS for TCP-only name lookups
- Prototype for NameServer using the core-pva PV Server lib
 - Listens to name searches via UDP or TCP, IPv4 or IPv6
 - Replies with TCP address & port of actual PVA server
 - For now, manual config, plan to eventually use e.g. Channel Finder

maven.apache.org

```
<dependency>  
  <groupId>org.phoebus</groupId>  
  <artifactId>core-pva</artifactId>  
  <version>4.7.0</version>  
</dependency>
```

EPICS Core: Type definitions

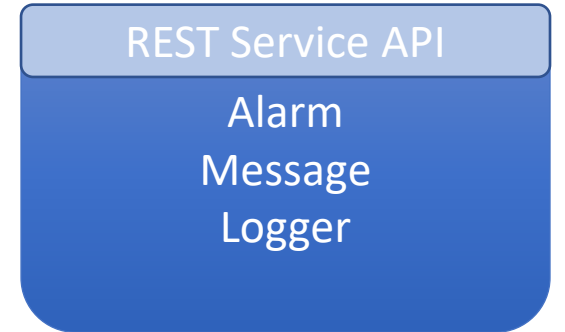
- Expanding EPICS VTypes
 - Support additional fields in the VImage meta data
 - x & y offset
 - reversed flag
 - Add “description” field to all VTypes, PVAccess clients receive description updates
 - Range’s support expanded to allow cases where only part of the range limits are defined

Epics services

- EPICS middle layer services
 - Reactive Services
 - Adoption of modern solutions and technologies (e.g. springboot, kafka, elastic, mongoDB, ...)
- Services which have been redesigned/refactored
 - ChannelFinder
 - Olog
 - Alarm Services (Alarm Server, Alarm Message Logger, Alarm Configuration Manager)
 - Save Restore
 - Scan Engine
 - ...
- Standardize the release process
- Migration from elastic 6 → 8
 - Migration of data

EPICS Services: Alarm logger

- Developed a REST service for the Alarm Logging Service
 - Optimization of Queries
 - Clients are unaffected with changes to backend
- Migrate from elastic 6 -> 8



Config	PV	Severity	Message	Time	Message Time	Current Severity	Current Message
state:/DTL/SKID/CWM-CWS0...	CWM-CWS04:WtrC-PT-025:...	UNDEFINED	Disconnected	2022-09-15 01:01:24.638	2022-09-20 20:37:47.558	MINOR	LOW_ALARM
state:/DTL/SKID/CWM-CWS0...	CWM-CWS04:WtrC-PT-025:...	UNDEFINED	Disconnected	2022-09-15 01:01:24.638	2022-09-20 20:27:42.556	OK	NO_ALARM
state:/DTL/SKID/CWM-CWS0...	CWM-CWS04:WtrC-PT-025:...	UNDEFINED	Disconnected	2022-09-15 01:01:24.638	2022-09-20 20:26:59.556	MINOR	LOW_ALARM
state:/DTL/SKID/CWM-CWS0...	CWM-CWS04:WtrC-PT-025:...	UNDEFINED	Disconnected	2022-09-15 01:01:24.638	2022-09-20 20:16:54.555	OK	NO_ALARM
state:/DTL/SKID/CWM-CWS0...	CWM-CWS04:WtrC-TT-402:...	UNDEFINED	Disconnected	2022-09-15 01:01:24.637	2022-09-20 20:04:20.750	MINOR	LOW_ALARM
state:/DTL/SKID/CWM-CWS0...	CWM-CWS04:WtrC-TT-402:...	UNDEFINED	Disconnected	2022-09-15 01:01:24.637	2022-09-20 20:04:20.552	OK	NO_ALARM
state:/DTL/SKID/CWM-CWS0...	CWM-CWS04:WtrC-PT-025:...	UNDEFINED	Disconnected	2022-09-15 01:01:24.638	2022-09-20 18:18:06.536	MINOR	LOW_ALARM
state:/DTL/SKID/CWM-CWS0...	CWM-CWS04:WtrC-PT-025:...	UNDEFINED	Disconnected	2022-09-15 01:01:24.638	2022-09-20 18:08:01.536	OK	NO_ALARM
state:/DTL/SKID/CWM-CWS0...	CWM-CWS04:WtrC-PT-025:...	UNDEFINED	Disconnected	2022-09-15 01:01:24.638	2022-09-20 18:07:18.536	MINOR	LOW_ALARM
state:/DTL/SKID/CWM-CWS0...	CWM-CWS04:WtrC-PT-025:...	UNDEFINED	Disconnected	2022-09-15 01:01:24.638	2022-09-20 17:57:13.533	OK	NO_ALARM
state:/DTL/SKID/CWM-CWS0...	CWM-CWS04:WtrC-TT-402:...	UNDEFINED	Disconnected	2022-09-15 01:01:24.637	2022-09-20 17:21:33.929	MINOR	LOW_ALARM
state:/DTL/SKID/CWM-CWS0...	CWM-CWS04:WtrC-TT-402:...	UNDEFINED	Disconnected	2022-09-15 01:01:24.637	2022-09-20 17:21:33.524	OK	NO_ALARM

EPICS Services: ChannelFinder

- Channel Finder improvements/maintenance
 - Publish “ENGINEER”, “LOCATION” or configurable env. vars from IOC
 - Improve error reporting and add display errors to GUI tools
 - Refresh GUI when editing channel data
- Migrate from elastic 6 -> 8
- Ongoing effort to develop a NameServer using the core-pva PV Server lib, which uses the Channel Finder directory service

EPICS Services: pvInfo

- pvInfo web project
 - Displays ChannelFinder information
 - Adds live data from PV web socket
 - Adds history data from Archive Appliance

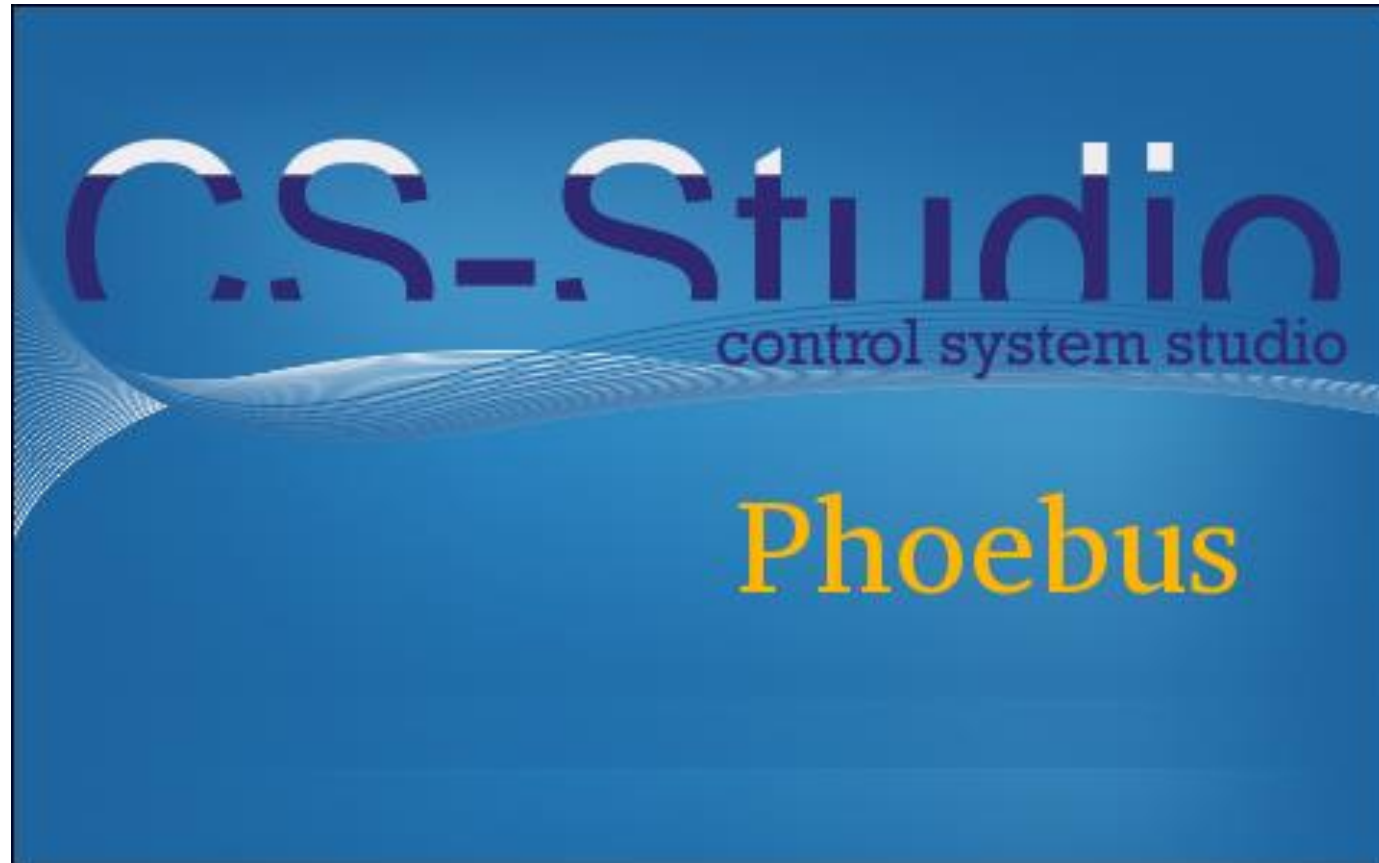
- Check out “Phoebusgen & PV Info” talk

EPICS Services: Save Restore

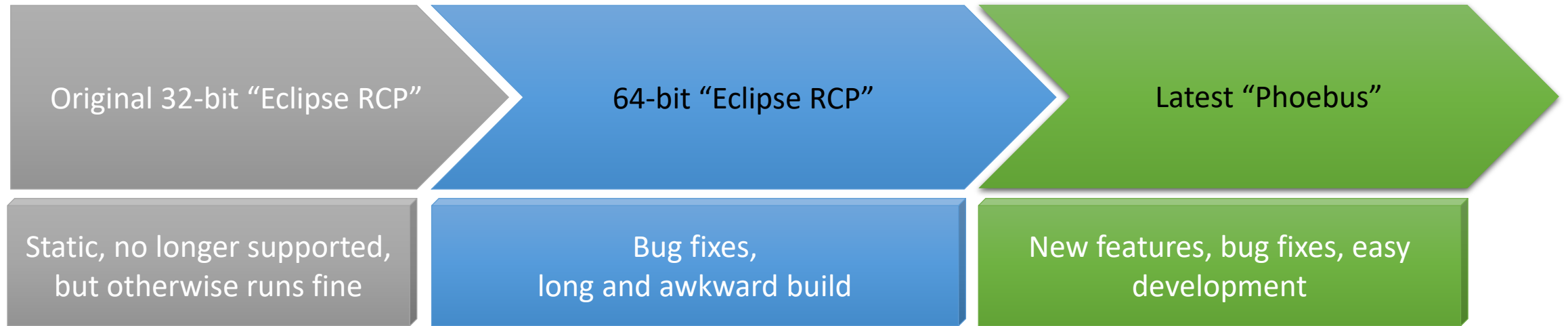
- Based on the MASAR Epics middle layer service
- These can be used to
 - create and manage save sets (aka configurations) and snapshots
 - retrieve and compare snapshots
 - restore settings from snapshots
- REST services using the SpringBoot framework
`java [options] -jar service-save-and-restore-.jar`
- Documented the REST service API of the new Save Restore service
- Ongoing effort to migrate to a NoSQL backend with a simplified REST services API and data model

EPICS tools

- CS-Studio (eclipse based and Phoebus)



Status of individual sites



- SNS Accelerator

- DLS
- ITER
- ISIS
- FRIB (partially)
- NSLS-II (accelerator)
- ...

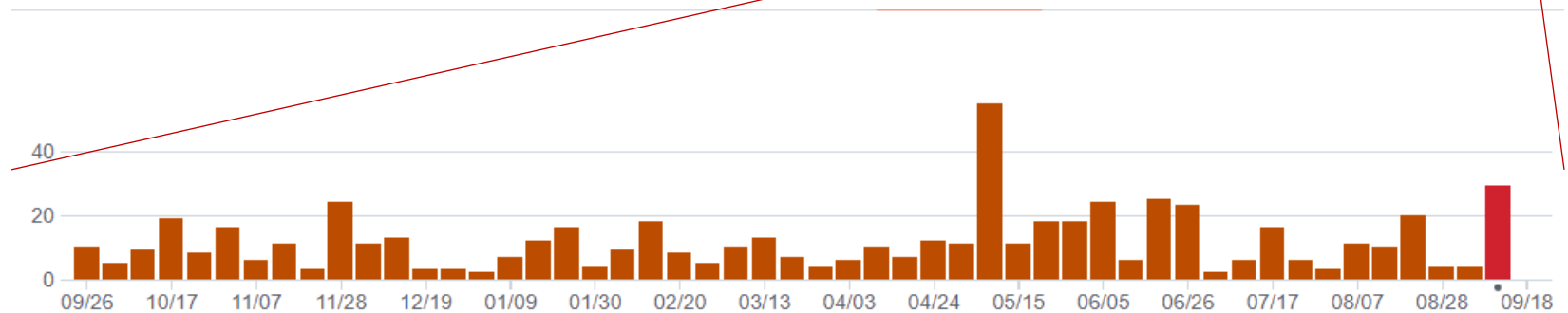
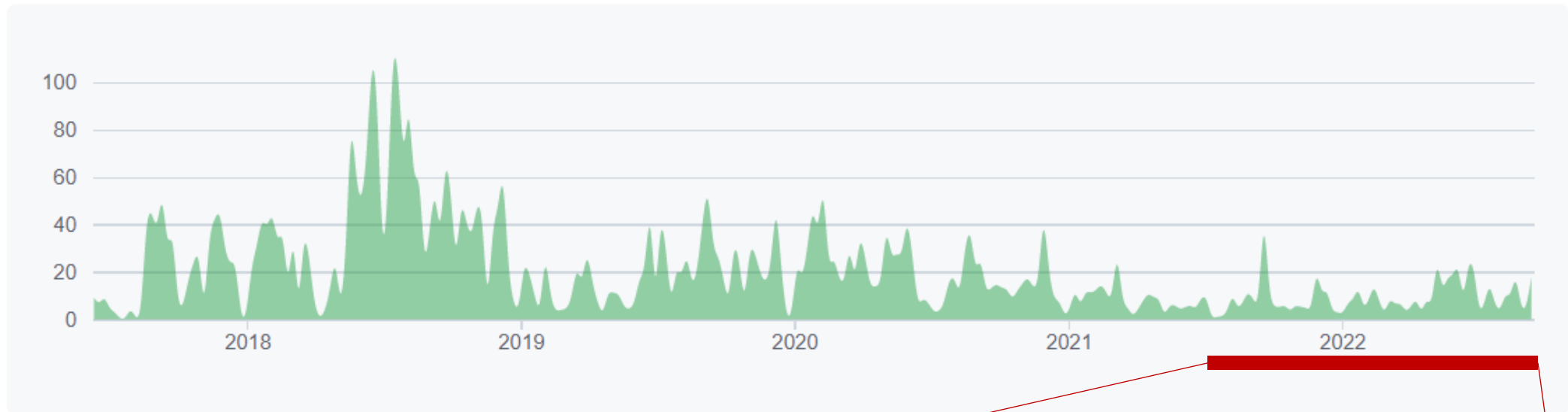
- SNS Beam Lines
- ESS
- ALS
- FHI
- FRIB (partially)
- NSLS2 (some beamlines)
- ...

CS-Studio Collaboration Status (Phoebus)

Jun 11, 2017 – Sep 15, 2022

Contributions: Commits ▾

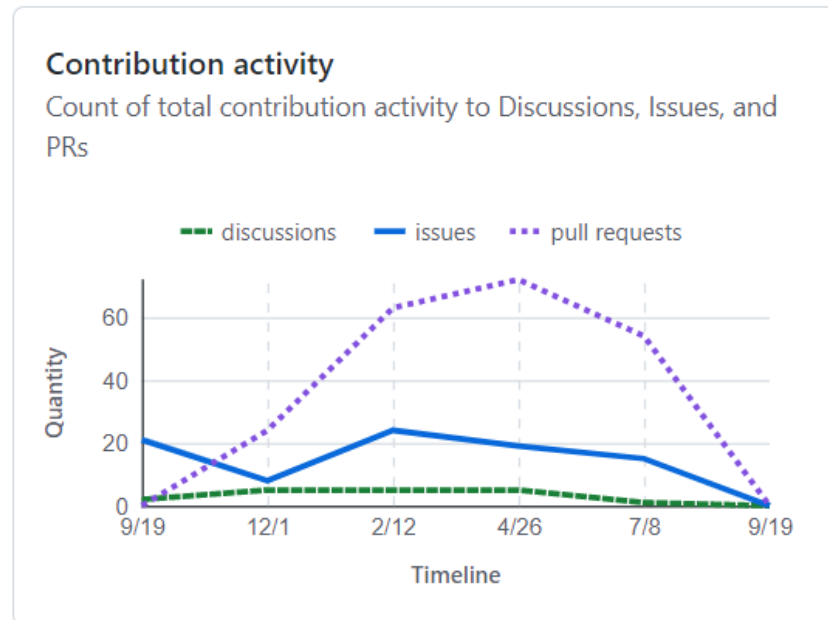
Contributions to master, excluding merge commits and bot accounts



CS-Studio Collaboration Status (Phoebus)

- 128 Issues closed 35 new issue still open
- 344 Closed PR's

Community insights



91 Open ✓ 604 Closed

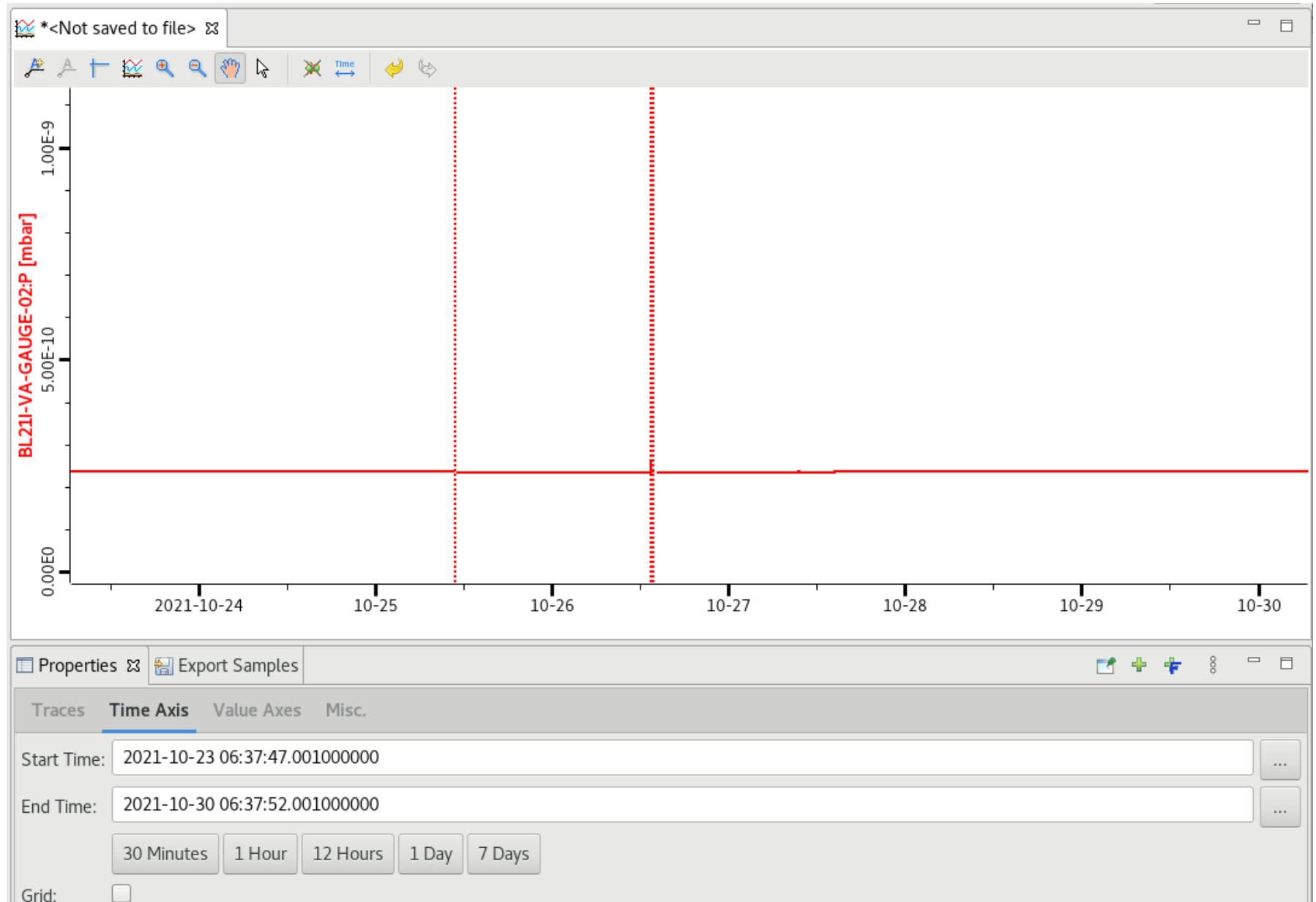
<input type="checkbox"/>	Author	Label	Projects	Milestones	Assignee	Sort		
<input type="checkbox"/>	<input checked="" type="checkbox"/>						closeAllTabsKeyCombination Breaks UI Tests #2377 by lorenzo-gomez-windhover was closed 6 days ago	2
<input type="checkbox"/>	<input checked="" type="checkbox"/>						CSSTUDIO-1338: ScaledSlider and Scrollbar Widgets Reflect Incorrect PV Value When Dragged Outside Limits #2376 by cjenksybercom was closed 5 days ago	14
<input type="checkbox"/>	<input checked="" type="checkbox"/>						inaccurate archived data for MySQL #2368 by L-Roussel was closed 11 days ago	4
<input type="checkbox"/>	<input checked="" type="checkbox"/>						Clean up existing selections #2360 by shroffk was closed 1 minute ago	
<input type="checkbox"/>	<input checked="" type="checkbox"/>						discussion - have complete settings.ini in target #2353 by tynanford was closed 3 days ago	9
<input type="checkbox"/>	<input checked="" type="checkbox"/>						PV Table -> Right click -> Insert Row doesn't work with empty table #2348 by tynanford was closed on Aug 9	
<input type="checkbox"/>	<input checked="" type="checkbox"/>						XYPlot widget: Support "On Right" for value axes #2343 by kasemir was closed on Aug 5	1
<input type="checkbox"/>	<input checked="" type="checkbox"/>						app-alarm-ui Automated Actions Gui enhancement suggestion #2335 by katysaintin was closed on Jul 26	6
<input type="checkbox"/>	<input checked="" type="checkbox"/>						...	4

CS-Studio Collaboration Status (Eclipse)

- CS-Studio eclipse release 4.6
 - Upgraded to use eclipse 2020-12
 - Upgraded to build and run with JDK11
 - Will be supported till October 2024
 - Ongoing work to upgrade to JDK17 (should significantly extends the support deadline... but please consider migrating to CS-Studio Phoebus)

DataBrowser Improvements

Show in the databrowser the events where the archiver appliance disconnected from a PV.



Save Restore

Save And Restore ×

http://jmasar.tn.esss.lu.se

- ▶ CM-TS2
- ▶ DTL-010
- ▶ LLRF-RFQ
- ▶ LLRF-TS2-1
- ▼ LLRF-TS2-2
 - LLRF_TS2_2_1
 - StableOperation
- 2021Jan25
Mon Jan 25 19:13:37 CET 2021 (gabrielfedel)
- 2021Fev10
Wed Feb 10 15:35:21 CET 2021 (gabrielfedel)
- 2021Mar02
Tue Mar 02 14:15:09 CET 2021 (gabrielfedel)
- 2021jun09
Wed Jun 09 14:20:15 CEST 2021 (operator)
- ▶ test1
- ▶ MEBT-BPM
- ▶ Migration 2019-11-07 15:35:25
- ▶ RFLPS-RFQ
- ▶ RFLPS-TS2
- ▶ RFQ_Cond
- ▶ SRF-TS2
- ▶ Test

2021Jan25 ×

Snapshot name:

Snapshot date:

Created by:

Comment:

Restore

Take Snapshot

Save Snapshot

Preserve selection after Filter:

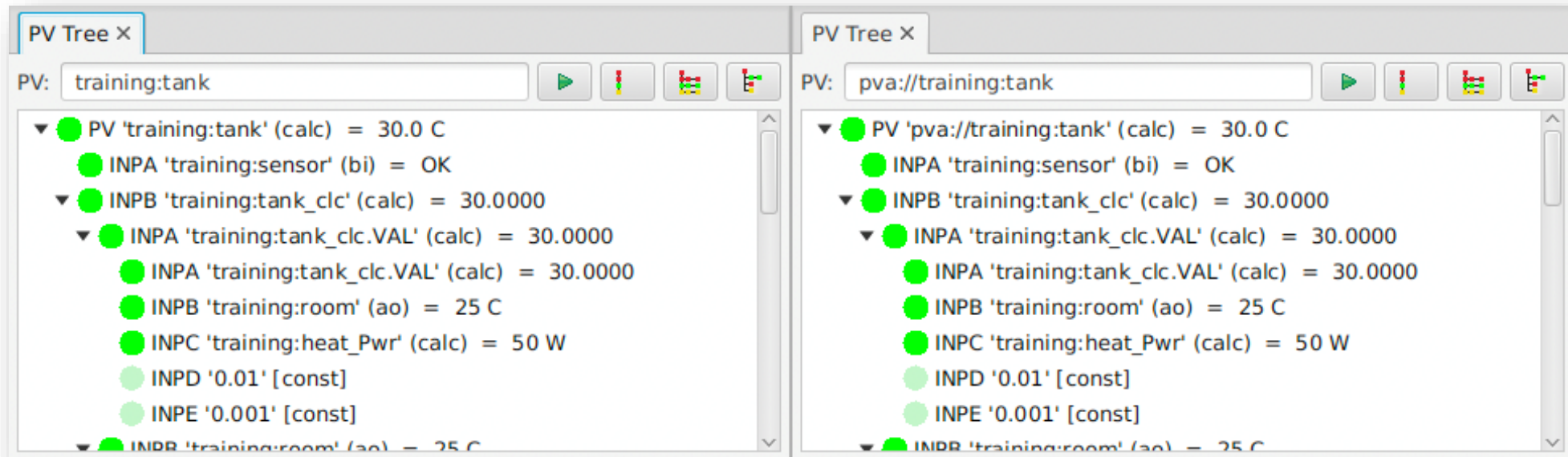
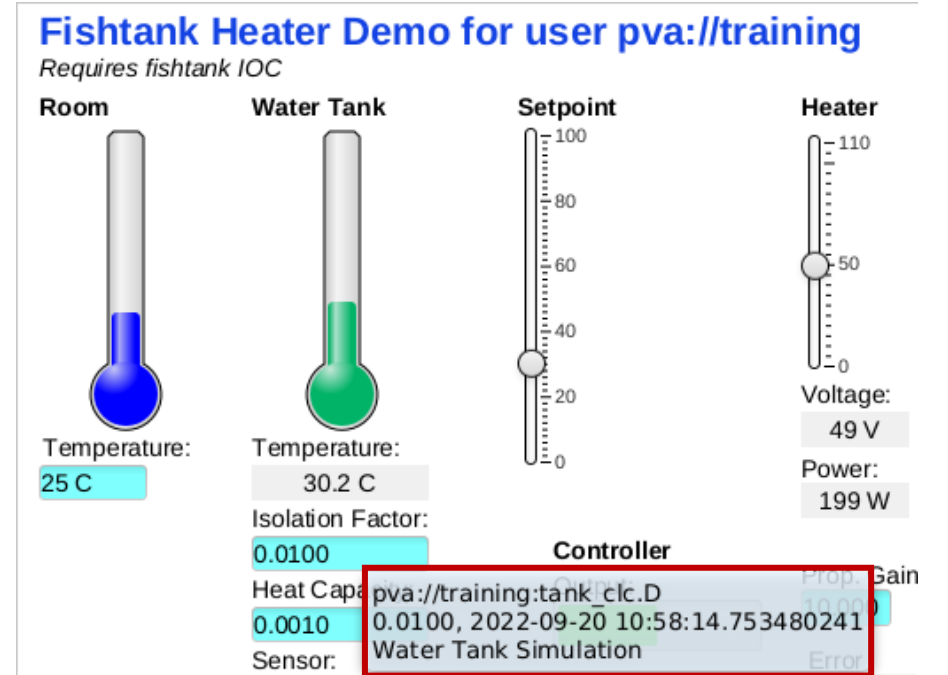
Δ Threshold (%)

Restore with scale

	#	PV Name	Timestamp	Status	Severity	Stored Setpoint		Live Setpoint
						Stored Setpoint	Δ Live Setpoint	
<input checked="" type="checkbox"/>	1	TS2-020:RFS-DIG-1...	13:05:54.236 Jan 19 2021	NONE	NONE	[47, 104, 111, 109, 10...	---	[47, 104, 111, 109, 10...
<input checked="" type="checkbox"/>	2	TS2-020:RFS-DIG-1...	13:05:54.231 Jan 19 2021	NONE	NONE	Non-Linear	Non-Linear	Non-Linear
<input checked="" type="checkbox"/>	3	TS2-020:RFS-DIG-1...	13:05:54.237 Jan 19 2021	NONE	NONE	[47, 104, 111, 109, 10...	! NOT EQUAL	[47, 111, 112, 116, 47, ...
<input checked="" type="checkbox"/>	4	TS2-020:RFS-DIG-1...	13:05:54.231 Jan 19 2021	NONE	NONE	Non-Linear	Non-Linear	Non-Linear
<input checked="" type="checkbox"/>	5	TS2-020:RFS-DIG-1...	13:05:54.237 Jan 19 2021	NONE	NONE	[47, 104, 111, 109, 10...	! NOT EQUAL	[47, 111, 112, 116, 47, ...
<input checked="" type="checkbox"/>	6	TS2-020:RFS-DIG-1...	13:05:54.232 Jan 19 2021	NONE	NONE	Non-Linear	Non-Linear	Non-Linear
<input checked="" type="checkbox"/>	7	TS2-020:RFS-DIG-1...	13:05:54.238 Jan 19 2021	NONE	NONE	[47, 104, 111, 109, 10...	! NOT EQUAL	[47, 111, 112, 116, 47, ...
<input checked="" type="checkbox"/>	8	TS2-020:RFS-DIG-1...	13:05:54.233 Jan 19 2021	NONE	NONE	Non-Linear	Non-Linear	Non-Linear
<input checked="" type="checkbox"/>	9	TS2-020:RFS-DIG-1...	13:05:54.239 Jan 19 2021	NONE	NONE	[47, 104, 111, 109, 10...	! NOT EQUAL	[47, 111, 112, 116, 47, ...
<input checked="" type="checkbox"/>	10	TS2-020:RFS-DIG-1...	13:05:54.234 Jan 19 2021	NONE	NONE	Non-Linear	Non-Linear	Non-Linear
<input checked="" type="checkbox"/>	11	TS2-020:RFS-DIG-1...	12:45:01.347 Jan 25 2021	NONE	NONE	Disabled	! Disabled	Enabled
<input checked="" type="checkbox"/>	12	TS2-020:RFS-DIG-1...	13:05:54.248 Jan 19 2021	NONE	NONE	0.03	! +0.03	0.0
<input checked="" type="checkbox"/>	13	TS2-020:RFS-DIG-1...	13:05:54.247 Jan 19 2021	NONE	NONE	0.18	! -0.8200000000...	1.0
<input checked="" type="checkbox"/>	14	TS2-020:RFS-DIG-1...	13:22:09.367 Jan 25 2021	NONE	NONE	[0.0, 2.5896259141...	! NOT EQUAL	[0.0, 1.5334205419...
<input checked="" type="checkbox"/>	15	TS2-020:RFS-DIG-1...	11:23:26.451 Jan 18 2021	NONE	NONE	Enabled	Enabled	Enabled
<input checked="" type="checkbox"/>	16	TS2-020:RFS-DIG-1...	17:26:51.948 Jan 15 2021	NONE	NONE	Disabled	Disabled	Disabled
<input checked="" type="checkbox"/>	17	TS2-020:RFS-DIG-1...	13:22:09.368 Jan 25 2021	NONE	NONE	[0.0, 0.0403747558...	! NOT EQUAL	[0.0, 0.0304565429...

PVAccess

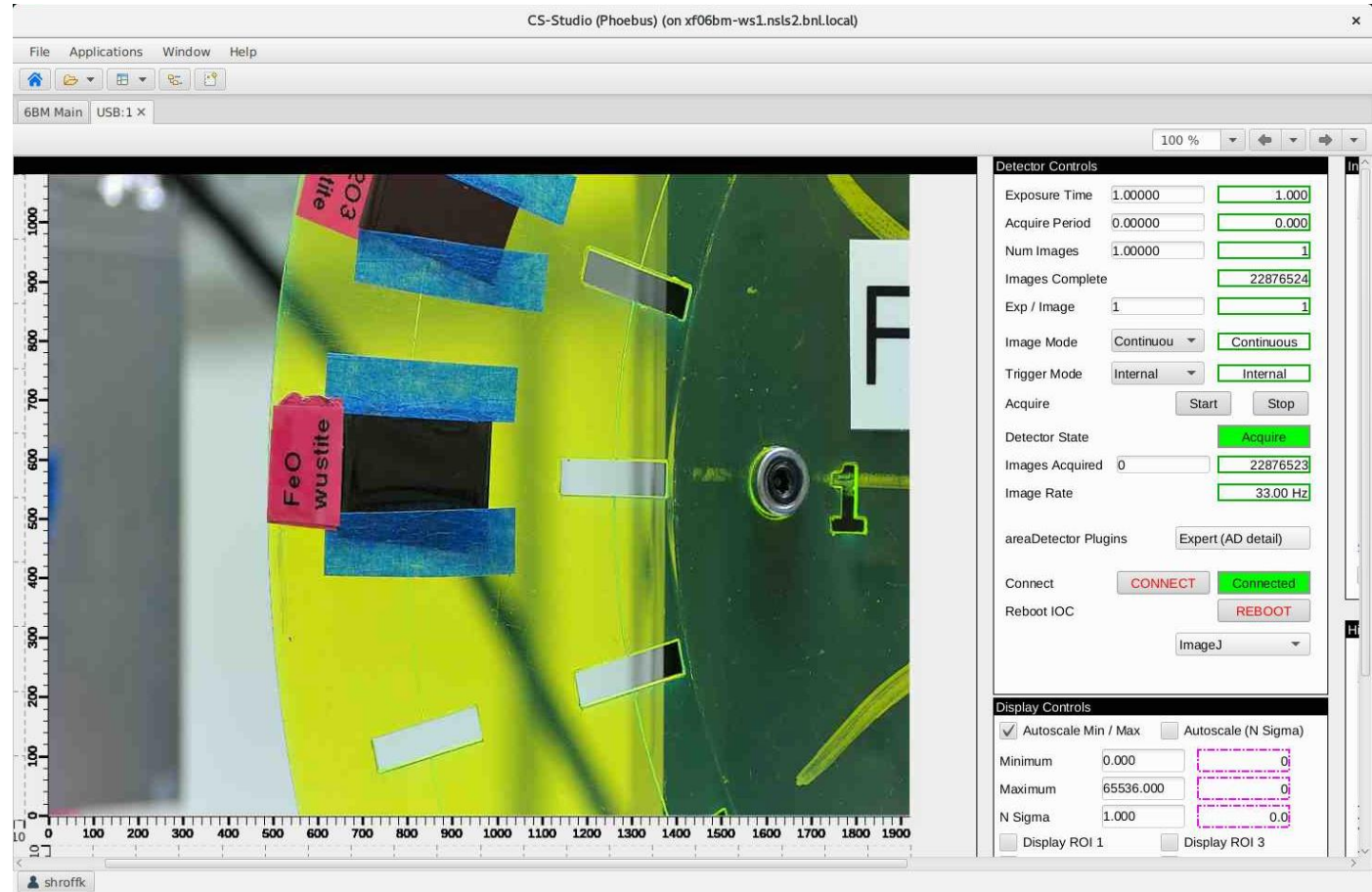
- Pvaccess supported by all applications (probe, pvtree, alarm, display builder, ...)
- *Use pva://... prefix to select PV Access*
- *Set default in phoebus settings.ini*



PVAccess & VImage

pva://my_ad_image

- The Image MetaData and Image data are packaged together in the NTNDArray



PVAccess & VImage

pva://my_ad_image

Support for

- x & y offset
- reversed
- compressed

Area Detector Demo (PVA)

Detector

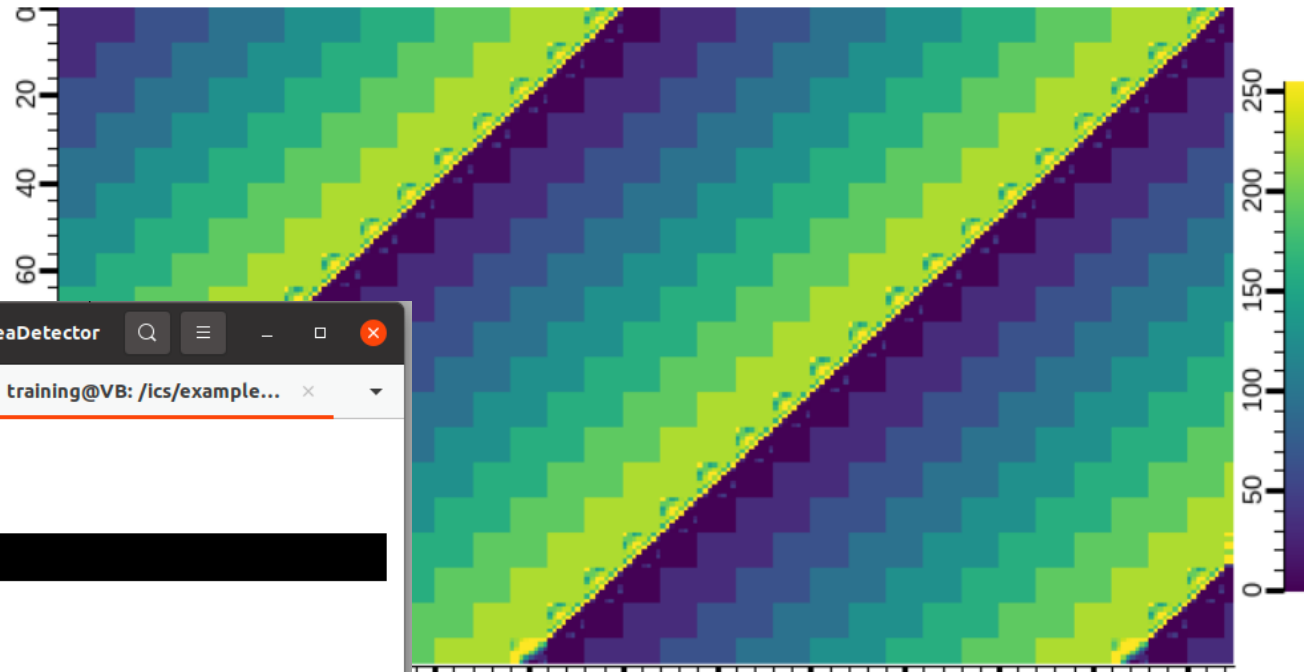
Plugins

- 1) cd /ics/examples/AreaDetector
./start_sim_ioc.sh
- 2) Open Detector page
- 3) Press Connect.. "Start"
- 4) Open Plugins.. "All" and "Enable" the NDPluginPVA

Start

Stop

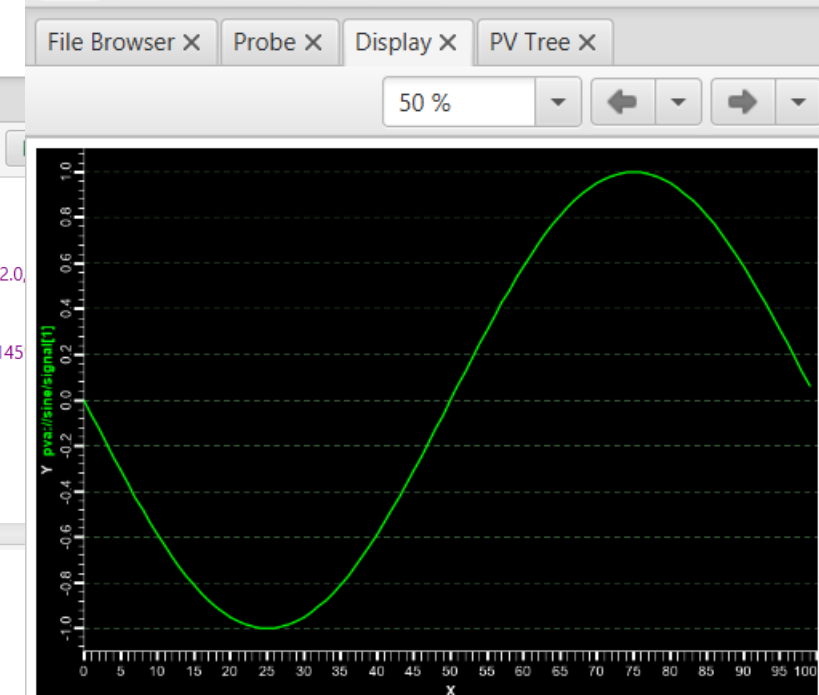
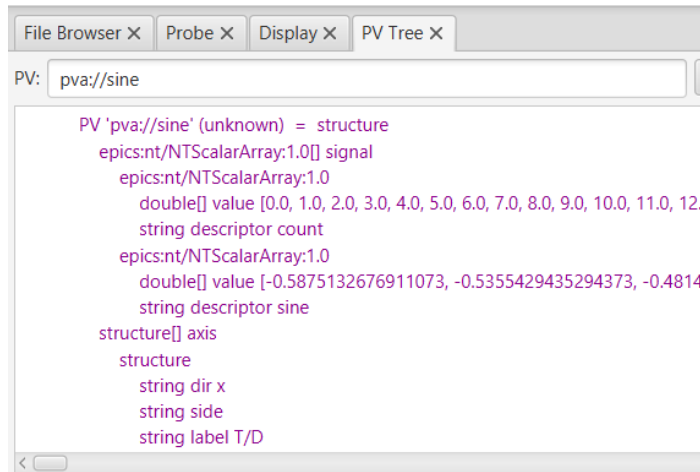
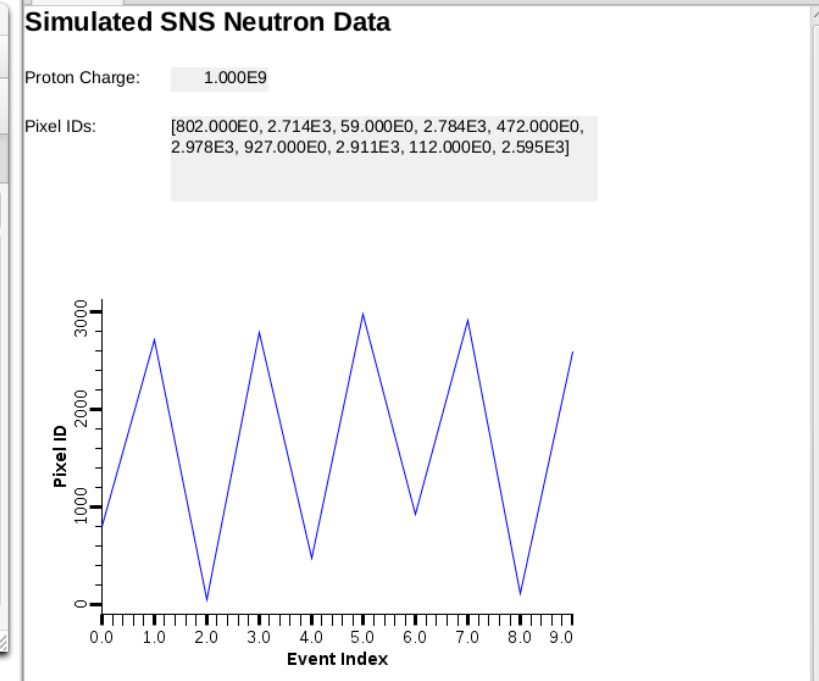
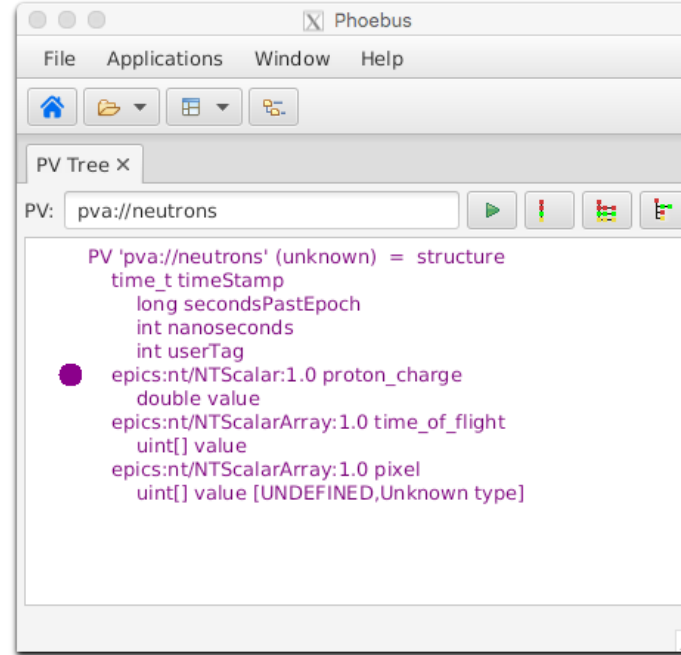
Enable



```
training@VB: /ics/examples/AreaDetector
training@VB: /ics/example... x training@VB: /ics/example... x
0,62,60,58,56,54]
codec_t codec
  string name lz4
  any parameters
  int 5
long compressedSize 753
long uncompressedSize 10000
dimension_t[] dimension
  dimension_t
    int size 100
    int offset 0
    int fullSize 100
    int binning 1
    boolean reverse true
  dimension_t
    int size 100
```














PVAccess

- Handling custom PVStructure
 - `pva://neutrons/pixel`
- Reference a field/subfield
 - `pva://sine/signal[1]`



Phoebus framework

- Framework 4.7 release
- Cleanup of Selection Services and Adapter Services
- Preferences framework
 - Severity Colors use preferences for local adjustments
- Additional Launch parameters
 - Phoebus launchers allows launching individual apps, resources, or combination of both
 - Launch layouts
 - Launch in a target window with specific dimensions and position

- ▷  org.phoebus.framework.adapter
- ▷  org.phoebus.framework.autocomplete
- ▷  org.phoebus.framework.jobs
- ▷  org.phoebus.framework.macros
- ▷  org.phoebus.framework.nls
- ▷  org.phoebus.framework.persistence
- ▷  org.phoebus.framework.preferences
- ▷  org.phoebus.framework.rdb
- ▷  org.phoebus.framework.selection
- ▷  org.phoebus.framework.spi
- ▷  org.phoebus.framework.util
- ▷  org.phoebus.framework.workbench

-resource 'file:/abs/path/file?app=display_runtime&MACRO=value&target=window@800x600'

Useful links

<https://controlsystemstudio.org/>
<http://phoebus.org>

- Fork us on github
<https://github.com/ControlSystemStudio>
- ChannelFinder
<http://channelfinder.github.io/>
- Olog
<https://github.com/Olog>
- SaveRestore, Alarm Services, Scan Server
<https://github.com/ControlSystemStudio/phoebus/tree/master/services>

Developers meeting

- EPICS developers meeting in 24th to 28th Oct, 2022

<https://github.com/epics-base/epics-base/wiki/EPICS-Developers-Meeting-Oct,-2022>

- Session
 - EPICS tools and services
 - EPICS base
 - EPICS build and deployment