The PSI Web Interface to the EPICS Channel Archiver

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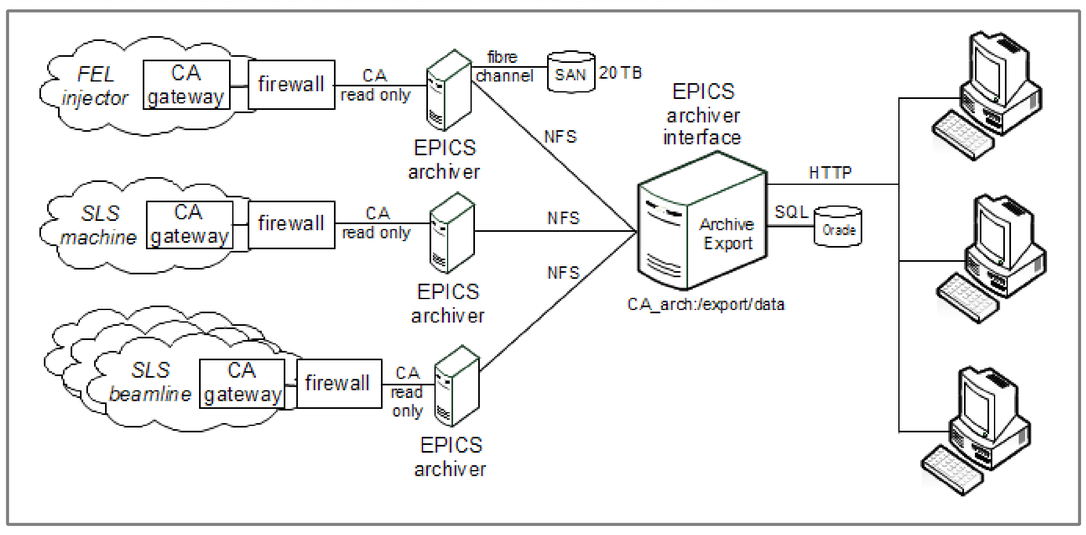
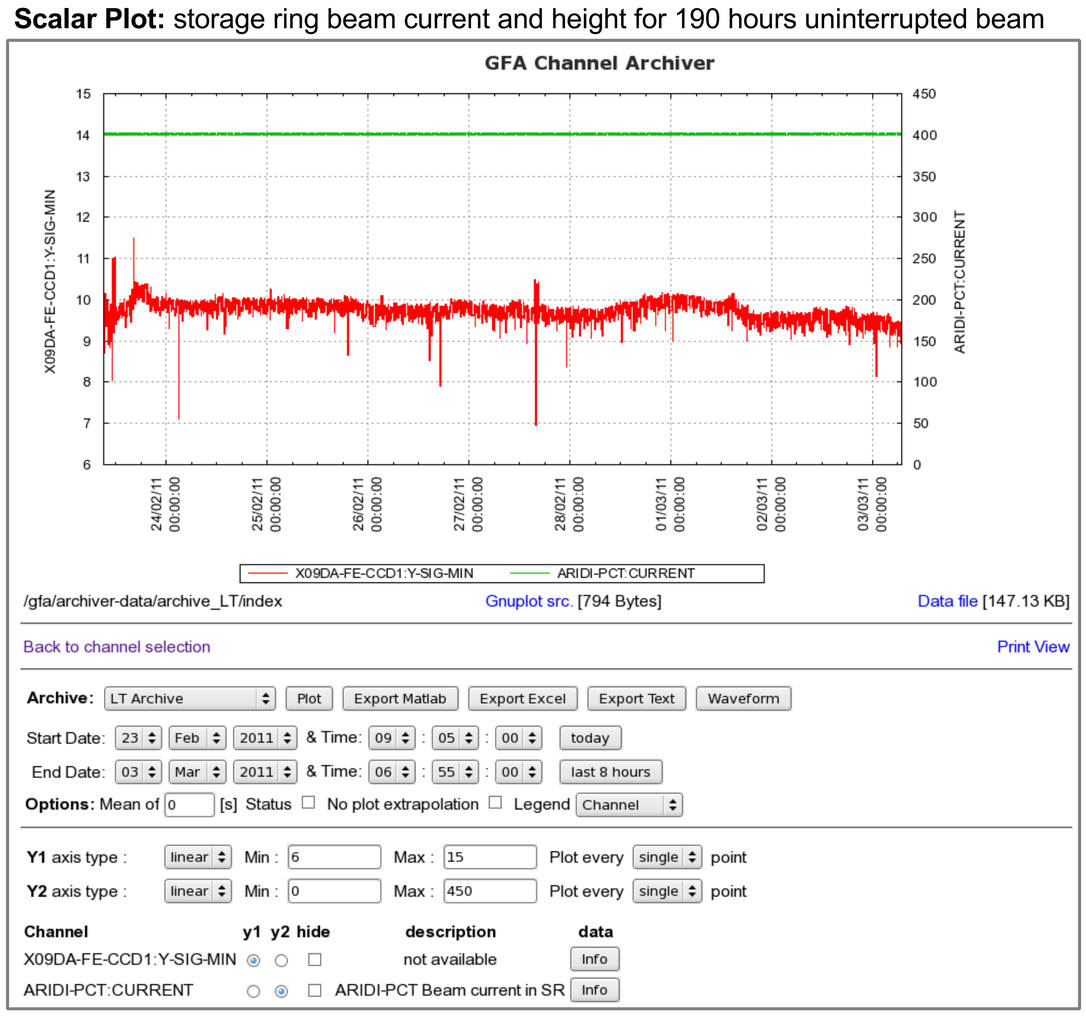
ABSTRACT

The EPICS channel archiver is a powerful tool to collect control system data of thousands of EPICS process variables with rates of many Hertz each to an archive for later retrieval. Within the package of the channel archiver version 2 you get a Java application for graphical data retrieval and a command line tool for data extraction into different file formats. For the Paul Scherrer Institute (PSI) we wanted in addition a possibility to retrieve the archived data from a web interface, similar to the CGIExport that was part of the channel archiver version 1. It was desired to have flexible retrieval functions and to allow interchanging data references by e-mail. This web interface has been implemented by the PSI controls group and has now been in operation for several years. We will highlight the special features of the PSI web interface to the EPICS channel archiver.

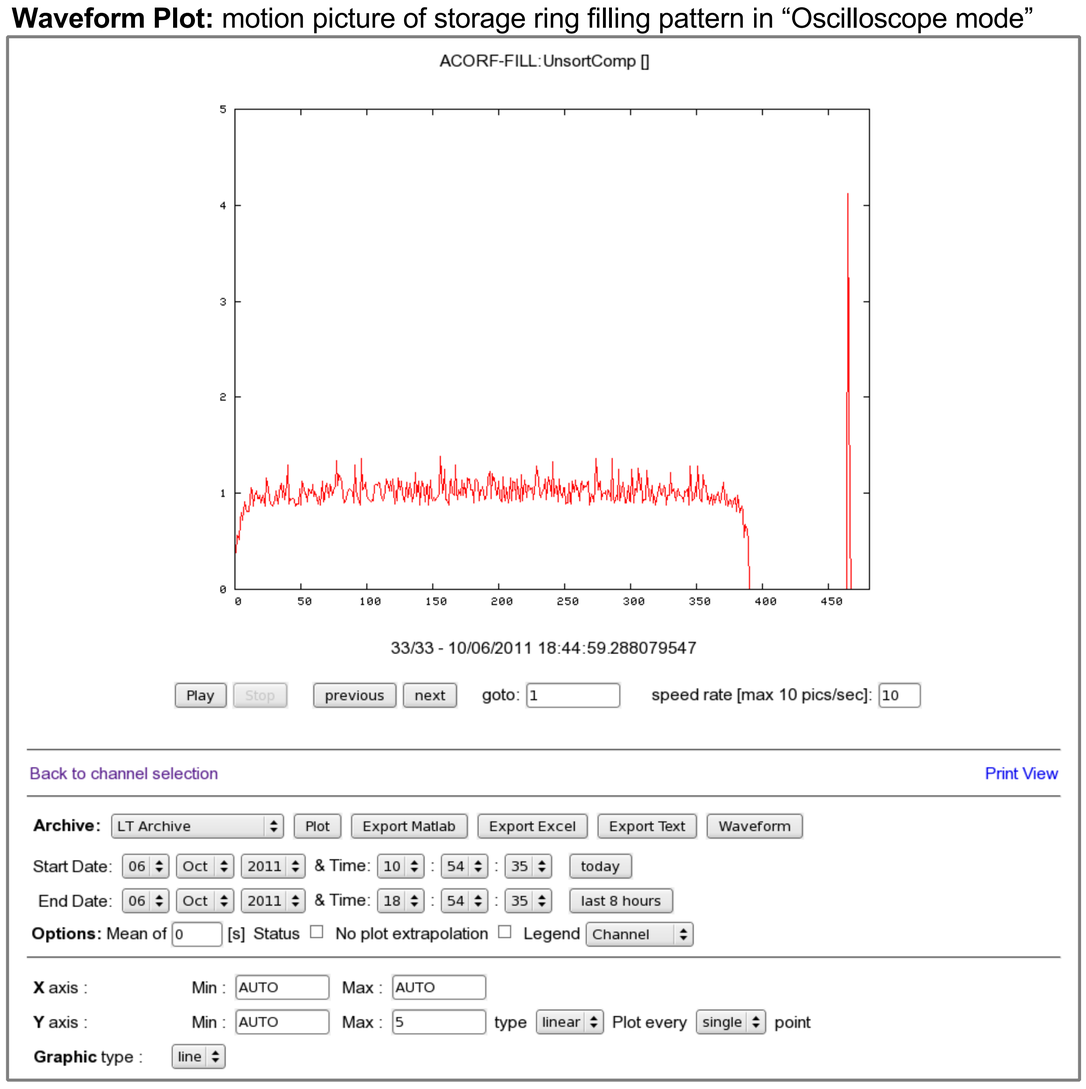
Overview of the EPICS channel archiver realisation at PSI



Scalar Plot: storage ring beam current and height for 190 hours uninterrupted beam



Waveform Plot: motion picture of storage ring filling pattern in “Oscilloscope mode”



UNIFIED RESOURCE LOCATOR

- All functions encoded in URL
  - Selected channels
  - Time range
  - Plot type and format
  - Axis scales
  - Channel assignment to y-axis
- Default: reuse last time range
- Enables data references
  - Bookmarks for favoured plots
  - Exchange plot URL by email
- Page with frequently used plots:
  - “Predefined views”
- Created data references
  - Other web applications can create links to specific data for a defined time range
  - Used for the “Operation Event Logging System” to document beam failures

DATA EXPORT

- Three data export formats
  - Text
  - EXCEL spreadsheets
  - Matlab data format
- Data export encoded in URL
  - HTTP data retrieval possible
- Matlab export by C library
  - Open source matio-1.3.4
  - No Matlab license needed
  - Faster conversion

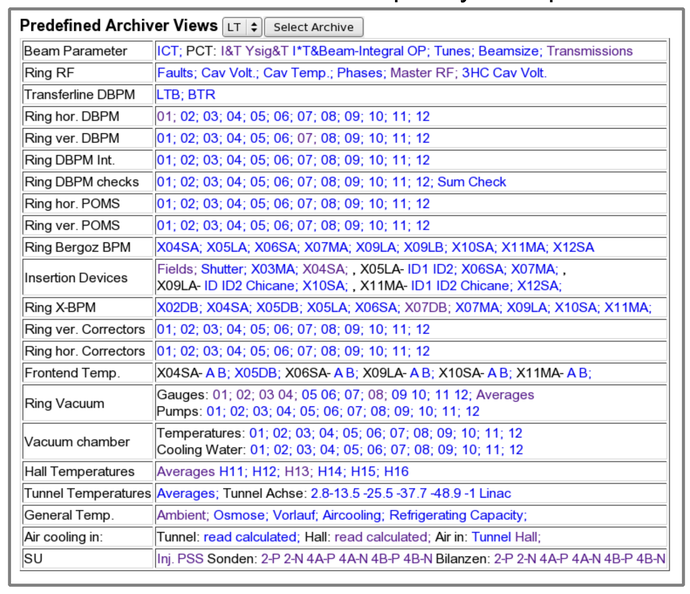
SCALAR PLOTS

- Plots up to 100 channels
- Select from channels database
  - Search channel names or
  - Channel description
- Assign channels to one of two axis
- Automatic or manual axis scaling
- Plotted data can be exported
- Plot legend can show either
  - Channel names or
  - Channel descriptions

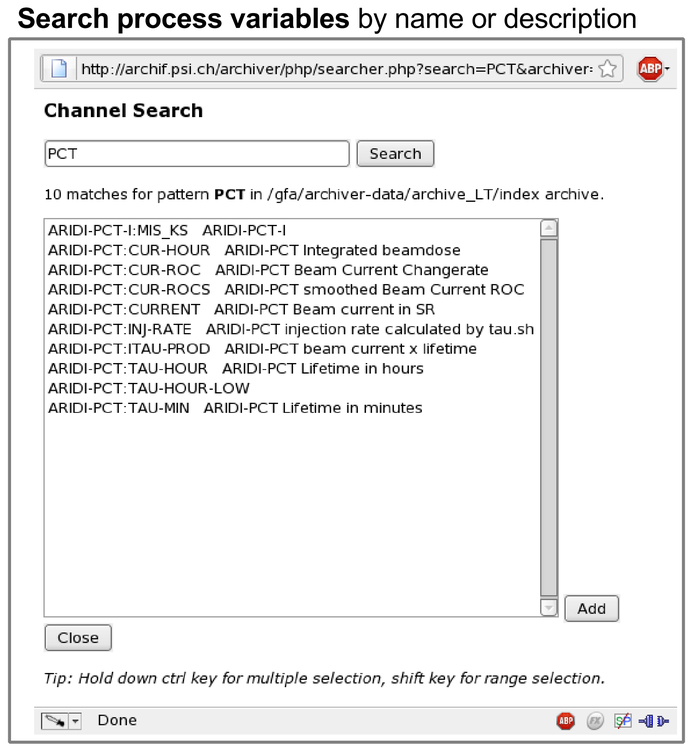
WAVEFORM PLOTS

- Display as motion picture
  - Like an oscilloscope
  - One to 10 plots per second
  - “Bar” or “Line” plot
  - Play mode or single steps
- Javascript implementation
  - No special client software
  - Runs in normal web browser

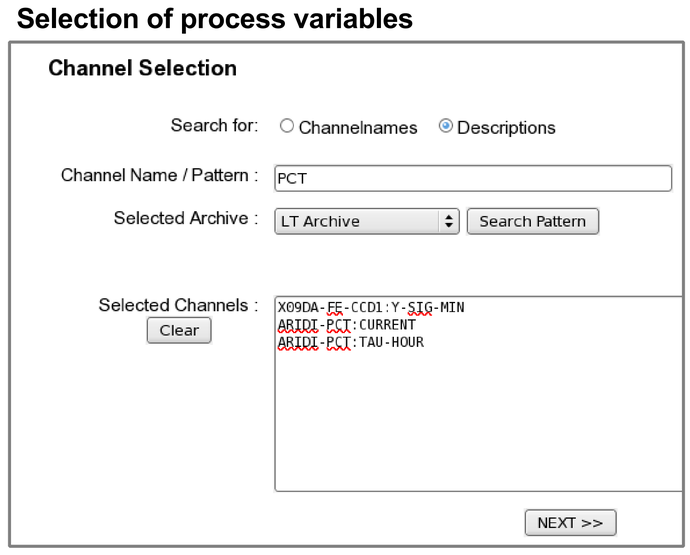
Predefined views: links to frequently used plots



Search process variables by name or description



Selection of process variables



TECHNICAL REALISATION

Hardware

Using the web server solution to retrieve channel archiver data imposes a powerful hardware. The server hosting the web interface to the channel archiver is a HP BI460c G6 Proliant Blade Server with 2x quad-core E5506 @ 2.13GHz CPU, 24GB RAM and 1GB/s network. The data are stored on a hardware raid connected with a 4 GB/s fibre channel connection.

Software

The operating system of the server is Scientific Linux SL release 5.1 (Boron). We choose the development environment Eclipse Galileo, used with the Zend Engine v2.1.0 and Xdebug v2.0.5. The web server is an Apache 2.2.3, PHP used to develop and run the archiver interface has version 5.1.6. JavaScript is used to perform the control of the waveform output on the client side. The export of data into Matlab format is performed without using the Matlab program. We used the matio-1.3.4 C library to program the Matlab export function. Calling this c module inside PHP enhances the conversion speed remarkably.

SUMMARY

The PSI archiver web interface for the EPICS channel archiver has proven to be a reliable, efficient and effective tool for the access and display of the archived control system data. It is easy to use; it does not depend on other client software than a normal web browser and it provides high flexibility to retrieve the data. Many useful applications derive from its ability to encode all retrieval and display parameters in a URL. This allows other web applications to reference specific data views of the archiver web interface, instead of implementing their own archiver data display.