XTC Explorer Tutorial

- Introduction
- Set up environment
- Exercise 1: Start xtcexplorer and select the XTC file
- Exercise 2: Explore XTC file content and make configuration file
- Exercise 3: Run pyana with existing configuration file from command line
- Currently implemented pyana/psana modules
- · What to use pyana or psana?
- References

Introduction

XTC Explorer is a GUI-based tool to explore interactively the XTC data files;

This application opens a Python GUI which helps to prepare configuration file for **pyana** or **psana** and launch it. The **pyana** or **psana** framework modules access, accumulate, and plot data from XTC file.

- Data is extracted using the LCLS framework pyana or psana.
- GUI is implemented on PyQt,
- · visualization of data uses matplotlib,
- data processing algorithms are accelerated by NumPy and SciPy libraries.

Based on selections made in the GUI, xtcexplorer writes out pyana configuration files with names xb_pyana_XXXX.cfg, where XXXX is a random four-digit number. You can use them to run pyana directly from the command line. But they accumulate, so you might want to remove these regularly...

Naming conventions:

- project name: XTC Explorer
- package name: XtcExplorer
- · executable name: xtcexplorer

Authors:

- Ingrid Ofter implemented everything for pyana
- Joseph Barrera began to add option to run python modules on psana
- Andy Salnikov latest maintenance, fixing bugs, complete integration with psana.

Latest tags:

2012-Aug-20 ofte V00-01-37

2013-Mar-14 salnikov V00-03-00

This tutorial follows to the Manual XTC Explorer - Old, shows how to set up environment, start **xtcexplorer**, explore content of the xtc file, interactively create/edit configuration file for pyana/psana, run it interactively and in the command line, etc.

Set up environment

- See for details Analysis Workbook. Account Setup
- Log onto any machine of the interactive pools **psananeh** (for AMO, XPP, SXR data) or **psanafeh** (for XCS, CXI, MEC data):

```
ssh -Y pslogin
ssh psananeh
or
ssh psanafeh
```

- Once per session execute one of the following scripts
 - o for **bash** shell:
 - . /reg/g/psdm/etc/sit_env.sh
 - o or for csh shell:

```
source /reg/g/psdm/etc/sit_env.csh
```

• You should always run this application from your own release working directory:

```
newrel ana-current my_tutorial_release;
cd my_tutorial_release;
sit_setup;
```

At this point you are ready to go.

Optional: if something need to be changed in code, check out the latest version of package and "compile":

```
addpkg XtcExplorer HEAD
scons
```

Exercise 1: Start xtcexplorer and select the XTC file

Application GUI can be started by the command

```
xtcexplorer
```

To proceed the xtc file name should be pointed using one of four methods:

1. use command line parameter

```
xtcexplorer /reg/d/psdm/XPP/xpptut13/xtc/e308-r0008-*.xtc
or
xtcexplorer /reg/d/psdm/SXR/sxrtut13/xtc/e306-r0366-*.xtc
```

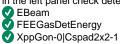
- 2. use Instrument-Experiment-Run number-Load buttons in GUI
- 3. use file browser
- 4. type-in the file name

Once a file or more has been connected, another GUI will pop up (possibly after a short delay while the file(s) content is being investigated). This GUI displays information about the file content and help with further processing of the data in pyana.

Exercise 2: Explore XTC file content and make configuration file

In the Psana Control Center window

- set desired parameters in section General Settings
- in the left panel check detectors which you want to monitor, for example





In case of selection

Epics Process Variables

separate window Available Epics PVs will show up. Desired PVs need to be checked.

Click on Write configuration to file button.

After that the configuration file with name xb_pyana_XXXX.cfg is ready and can be edited clicking on Edit configuration to file or executed

• click on button Run pyana or Run psana and confirm in the pop-up box that you want to run command line like

```
pyana -c xb_pyana_XXXX.cfg
```



and enjoy observing your data in plots

Exercise 3: Run pyana with existing configuration file from command line

Use 1s command, select one of existing configuration files created by the xtcexplorer in current directory and run psana/pyana by the command line:

pyana -c xb_pyana_XXXX.cfg

observe the same results as in Exercise 2.

Currently implemented pyana/psana modules

Framework module name	Functionality
XtcExplorer/src/pyana_bld.py	display of Beam-line data
XtcExplorer/src/pyana_epics.py	display of Epics PV data
XtcExplorer/src/pyana_scan.py	display of motor scan data
XtcExplorer/src/pyana_encoder.py	display of encoder data
XtcExplorer/src/pyana_ipimb.py	display of diode data from IPIMB and PIM
XtcExplorer/src/pyana_waveform.	display of waveform data
XtcExplorer/src/pyana_image.py	display of camera image data
XtcExplorer/src/pyana_plotter.py	plotter module to control the event display

These modules can be used in configuration file with parameters described in XTC Explorer - Old#The pyana modules.

What to use pyana or psana?

Now you are familiar with general concept of how to launch pyana or psana in the **xtcexplorer** or command line for existing modules. But you need in more data processing and would like to get data in your code in the framework module. What framework should you prefer **pyana** or **psana**?

- We strongly encourage people to use psana, which covers everything what is available in pyana and has more features, which are not available in pyana
- Pyana still works in ana-0.9.15 release. Upcoming modifications in pdsdata may force to drop further maintenance of pyana.
- psana is going to be supported in future for both C++ and Python modules for batch and interactive mode.

Framework interfaces in **pyana** and **psana** modules are slightly different, that is explained in Migration from pyana to psana



psana should be your preferable choise!

References

XTC Explorer - Old HDF5 Explorer - Old Pyana User Manual Migration from pyana to psana

Python PyQt matplotlib NumPy SciPy