

ID	Task	status	Comments
M01	Create prototype ERSAP configurations for INDRA and CLAS12 test systems	■	A CLAS12 example and "Hello World" example have been placed in Github. INDRA has not been done yet.
M02	Identify or capture SRO formatted data from CLAS12 and INDRA test systems with data tag/filtering capability (output data ready for further offline processing)	✓	Data was captured at various beam currents from CLAS12 on Dec. 17. INDRA data capture done using pulser inputs to SAMPA setup.
M03	Evaluate existing solutions for configuring and launching remote distributed processes	✓	see evaluations in document on EP-SCI wiki.
M04	Establish code repository(s), project site, and method of documentation	✓	This has been done here: https://github.com/JeffersonLab/SRO-RTDP
M05	Create stream splitter program for EVIO or HIPO data formatted files	✓	Created for GlueX. (See text for details on HIPO)
M06	Create stream splitter program for simulated data in PODIO for ePIC	■	Created podio streaming prototype. Large scale testing is pending.
M07	Create VTP emulator using files produced by stream splitter	■	Mostly done for raw data. Not started for simulated data.
M08	Create controller program to synchronize multiple VTP emulators	✓	Satisfied through alternate design using synchronized system clocks.

Table 1: FY24Q1 and FY24Q2 Milestones

Major Highlights:

- Poster presentation at ACAT2024
- CLAS12 Data capture data verification
- GlueX EVIO raw data files split on rocid
- EVIO stand alone event aggregator
- Continued graph visualization and configuration
- Streaming of podio ePIC data

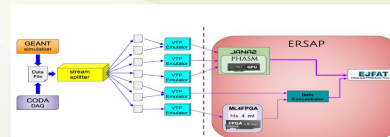
Poster presented at 22nd International Workshop on Advanced Computing and Analysis Techniques in Physics Research (ACAT2024)

RTDP: Streaming Readout Real-Time Development and Testing Platform

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MOTIVATION

Experimental Nuclear Physics is moving towards a Streaming Readout (SRO) paradigm. Complex pipelines integrating heterogeneous hardware and varied software may have interference effects. Simulation and testing of complex SRO systems is needed to assist in their design and validation. Testing of complete, integrated SRO systems at scale for future experiments requires raw tooling.

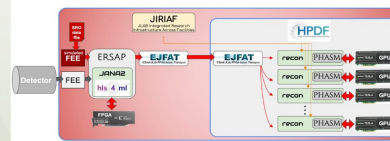


OBJECTIVE

- Deployment of a distributed (quasi) real-time SRO data processing model includes data calibration and full traditional off-line reconstruction.
- Framework optimization using GEANT-generated and archived beam-on data.
- Optimized framework validation with beam-on tests.
- Assessment of needed network and computing resources.
- Assessment of the performance for different hardware platforms.
- Identify potential issues relevant to a future HPDF in receiving and processing SRO data.

APPLICATION

- SRO Experiments requiring intricate configurations can be defined with user-friendly YAML.
- Individual components such as calibration or data transport can be represented by software simulation modules.
- Full simulation can include mixture of real and simulated components.
- Scale from fully simulated on single PC to full use of hardware in distributed system.



MEASURE OF SUCCESS

- Specific milestones and objectives of the project include:
- Ability to launch synchronized processes across multiple nodes
 - Integrated monitoring of all components in the system.
 - Ability to configure and simulate an experiment similar in size to the planned SOLID experiment at JLAB.
 - Test with 400Gbps transfer speed, at least one FPGA and at least 1 GPU component.

GOAL

- Create a platform to seamlessly process data from SRO to analysis on compute centers in various configurations
- Fully developed software platform that is capable of monitoring the components in a fully developed streaming system.
- Tools for fully simulating a real-time SRO data processing network from Front End Electronics to large compute.

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PROGRESS

- RTDP is at the early stages of development. Here are some out of many things we have worked on:
- Captured CLAS12 data, streamed across the Job campus using a 100Gbps High-speed NIC featuring hardware timestamps.
 - Captured data using synchronized streams from multiple network sources.

FUTURE WORKS

- Create stream splitter program for EVIO or HIPO data formatted files
- Create stream program for simulated data in PODIO for ePIC
- Create VTP emulator using files produced by stream splitter
- Integrate Hydra as monitoring component.

payload data extraction from CLAS12 packet capture exercise



Budget

