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## RTDP: Streaming Readout Real-Time Development and Testing Platform

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The Thomas Jefferson National Accelerator Facility (JLab) has created and is currently working on various tools to facilitate streaming readout (SRO) for upcoming experiments. These include reconstruction frameworks with support for Artificial Intelligence/Machine Learning, distributed High Throughput Computing (HTC), and heterogeneous computing which all contribute significantly to swift data processing and analysis. Designing SRO systems that combine such components for new experiments would benefit from a platform that would combine both simulation and execution components for simulation, testing, and validation before large investments are made. The Real-Time Development Platform (RTDP) is being developed as part of an LDRD funded project at JLab. RTDP aims to establish a seamless connection between algorithms, facilitating the seamless processing of data from SRO to analysis, as well as enabling the execution of these algorithms in various configurations on compute and data centers. Individual software components simulating specific hardware can be replaced with actual hardware when it is available.

### Significance

In the data acquisition phase, we have directly captured network packets from the high-speed Network Interface Card, that included hardware timestamps. This functionality allows us to replay the data offline as input to the platform when the beam is unavailable. Furthermore, this process also facilitates the observation and examination of potential interference between hardware components, such as buffer oscillations.

### References

[https://wiki.jlab.org/epsciwiki/images/4/41/FY24-LDRD\\_Proposal\\_SRO.pdf](https://wiki.jlab.org/epsciwiki/images/4/41/FY24-LDRD_Proposal_SRO.pdf)  
<https://link.springer.com/article/10.1140/epjp/s13360-022-03146-z>

### Experiment context, if any

The RTDP tool will be generically useful to develop and validate streaming systems for multiple experiments. These will include SoLID(Hall-A), CLAS12(Hall-B), GlueX(Hall-D), and ePIC (EIC).

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**Session Classification:** Poster session with coffee break

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