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Back-end and data storage: PSI

New concepts in ultra fast data acquisition, 10.4.2018











Acknowledgments Joint effort of multiple groups

- SLS Detector Group (led by Bernd Schmitt)
- High Level Tools and DAQ (led by Simon Ebner)
- High Performance Computing (led by Leonardo Sala)
- Multiple beamlines...
- Credits and contacts:

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Stream components (1/5) Detector





Stream components (2/5) Backend





Stream components (3/5) Writer





Stream components (4/5) Storage





Stream components (5/5) Stream preview





Control components (1/2) Detector client





Control components (2/2) Detector integration API





User interaction





User interaction









• HTTP





- HTTP
- TCP/UDP





- HTTP
- TCP/UDP
- ZMQ









• No global state.





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- Zero knowledge about the experiment.





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- Zero knowledge about the experiment.
- Zero beamline specific logic.





• Base components same for all deployments.





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- Beamline customizations in separate repositories.





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- Backend customization
 - On the fly corrections.
 - Image manipulation.



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API server customization

- State machine.
- Configuration validation.



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Deployment strategy (1/3) Anaconda





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• Everything is an Anaconda package.





Deployment strategy (2/3) Docker

- Everything is an Anaconda package.
- Components can be run inside docker containers.





Deployment strategy (3/3) Puppet

- Everything is an Anaconda package.
- Components can be run inside docker containers.
- Setup servers with Puppet.





Scalability (1/2) Large setups





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• Distribute the backend.





Scalability (1/2) Large setups

- Distribute the backend.
- Distribute the writer.





Scalability (1/2) Large setups

- Distribute the backend.
- Distribute the writer.
- Transparent to the user.





Scalability (2/2) Small setups







• All DAQ components on one server.







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- Multiple DAQ systems on one server.







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 - FDR (56 Gb/s) Infiniband.



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- Provide a stable and generic API.



- Isolate the user from your architecture.
- Provide a stable and generic API.
- A good versioning and deployment strategy is key.





- Stream protocol
 - <u>https://github.com/datastreaming/mflow</u>
 - <u>https://github.com/datastreaming/htypes</u>
- Detector client
 - <u>https://github.com/slsdetectorgroup/slsDetectorPackage</u>
- Writer
 - <u>https://github.com/paulscherrerinstitute/lib_cpp_h5_writer</u>
- API server
 - <u>https://github.com/datastreaming/detector_integration_api</u>

Interested in joining our efforts? We are hiring! <u>https://www.psi.ch/pa/job-opportunities/1740</u>



Questions?