



Elettra Sincrotrone Trieste



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Trieste

Updates

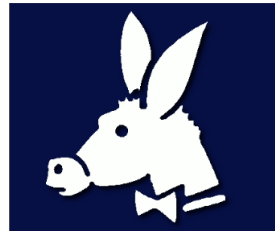


Carlos Reis

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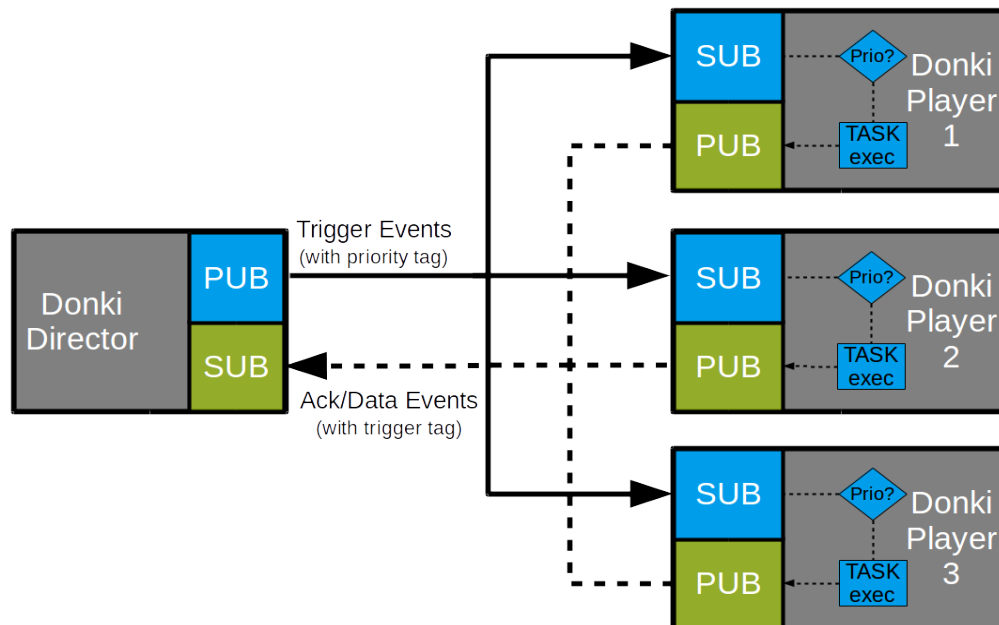
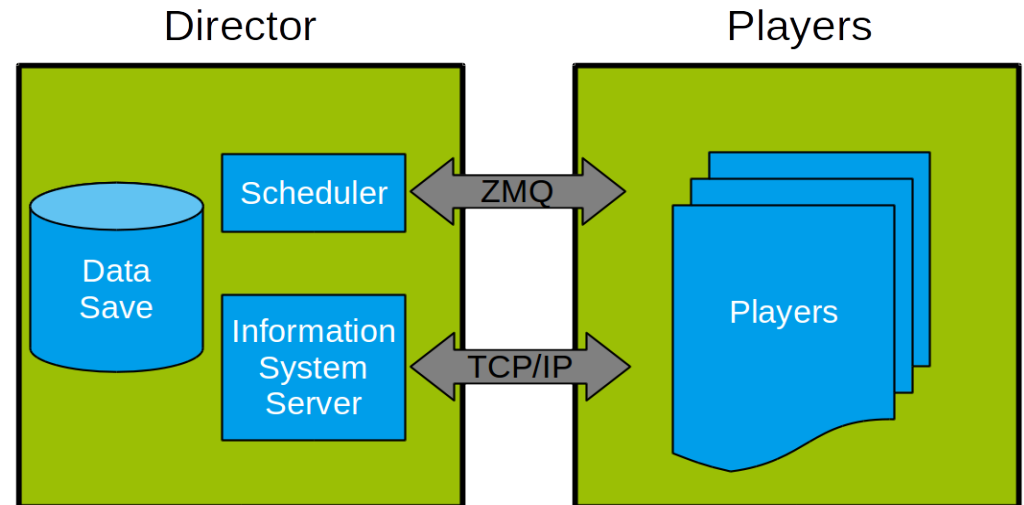
DonkiOrchestra



- ✓ **Workflow** management framework for end-station software development
- ✓ It works as a **scheduler** tool that is able to manage tasks in **parallel**, deal with concurrency and complex workflow
- ✓ DonkiOrchestra has two principal elements: **Director** and **Player**

[ref.] Borghes R., Kourousias G., “DonkiOrchestra: a scalable system for data collection and experiment management based on ZeroMQ distributed messaging”, **NOBUGS 2016**, Copenhagen

- ✓ Python (core language)
- ✓ ZMQ
- ✓ TCP/IP



- ✓ Fully configurable
- ✓ High degree of customization
- ✓ Scalable



DonkiOrchestra at WP5

Timeline

- Originally TANGO-based
- Repurposed (TANGO-free) to fit in Kafka-ESS technologies
- ESS data stream generation and processing for simulation purposes
- Integration with ESS NeXus File Writer
- Tests in high-performance hardware ...

- **DonkiOrchestra as a data stream simulator**

Data Stream	Frequency	Data Type
A	1 Hz	scalar
B	50 Hz	2D image
C	1 Hz – 1 kHz	1D spectrum
D	1 kHz	3D array
E	10 Hz	mixed

- ✓ Simulate parallel heterogeneous streams in terms of data types and frequencies
- ✓ Demonstrate simplicity of implementation

[ref.] Reis C., Borghes R., Kourousias G., Pugliese R. “A simulation system for the European Spallation Source (ESS) distributed data streaming”, **ICALEPCS 2017**, Barcelona

✓ D.O as an ESS data stream simulator

- Simulate ESS data streams - Instrument Scenarios
(<https://confluence.esss.lu.se/display/DMSC/Instrument+Scenarios>)

Data source	Type	Frequency of Data Production	Data per Production	Quantity
Detector	Event	28 Hz	60 Kb	1
Beam monitor	Event	28 Hz	600 B	3
Chopper axis	EPICS	14 Hz	16 B	3
Chopper axis	EPICS	175 Hz	16 B	2
Chopper axis	EPICS	350 Hz	16 B	4
Motorised system for guide section selection	EPICS	0.01 Hz	16 B	1
Temperature controller	EPICS	0.3 Hz	16 B	1
Goniometer	EPICS	1 Hz	16 B	1
Six-axis goniometer	EPICS	1 Hz	96 B	1

✓ Use D.O Players as Kafka producers to send data

✓ Integrate it with ESS NeXus File Writer

✓ Stress the system

- **Tests on local hardware:** We are doing the necessary arrangements to have available a high-performance hardware in order to perform tests of the system.
- **Evaluation:** By testing it under realistic conditions we are going to evaluate the system performance and scalability. Also collecting I/O metrics we believe it will help on the establishment of hardware requirements for future deployment.
- **Integration:** When the tests and evaluation are good enough we are going to add it in the current automated integration setup.
- **Usability:** We are planning to develop a graphical user interface for DonkiOrchestra, to increase its usability and facilitate future tests.

- Carlos Reis (main developer for the Elettra WP5 related tasks and reference)
- Roberto Pugliese (Vice coordinator of Elettra Sincrotrone and head of IT group)
- George Kourousias (Scientific supervision)
- Roberto Borghes (Chief software engineer – Elettra & FERMI end-station controls)
- Milan Prica (Data related EU projects)
- SysAdmin personnel and other members of the Scientific Computing team of the IT Group

Thank you!