45. A local event builder for the COMET CDC with ZeroMQ

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Why do we use ZeroMQ for DAQ software?
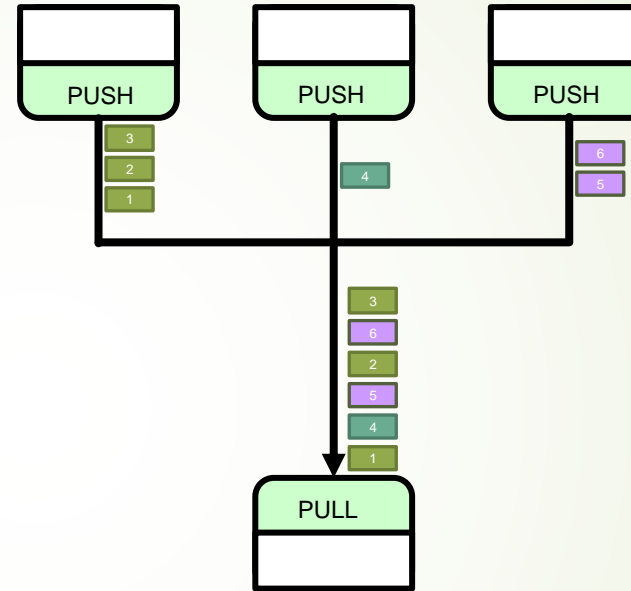
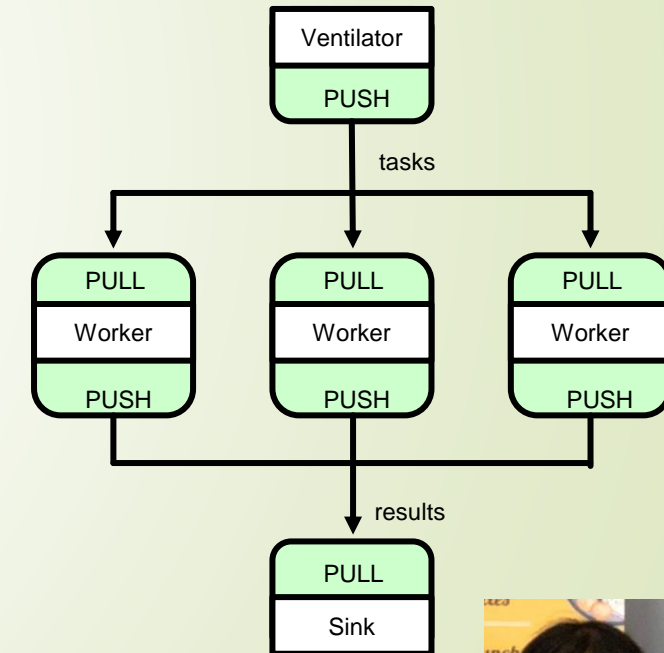ZeroMQ provides desirable functions for a network based DAQ.

Zero MQ is an asynchronous message layer

- Non-blocking interface
  - It blocks when the queue is full.
- It works on TCP/IP, UDS, inner process (inter-thread)
- A developer doesn't need to care about connecting and disconnecting the connection.
- Simple data frame with only length and payload
- A developer can forget the buffering.
  - The message queue works as a data buffer.
- Good portability, It works on many popular operating systems.
- It has useful and reliable communication models.
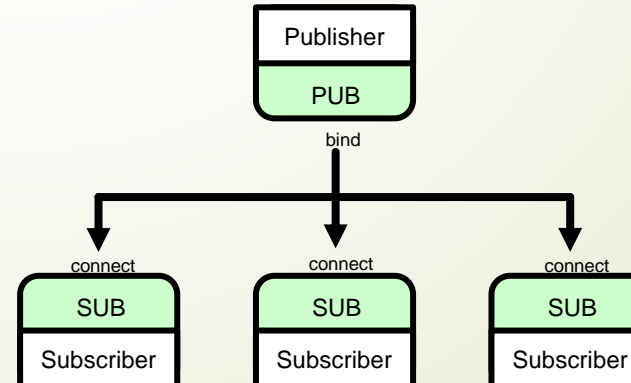- Good scalability, it can handle a large number of connections.

Fair queueing by PUSH/PULL connection
→ Event builder

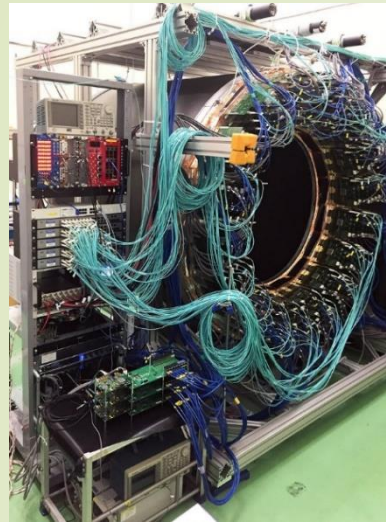Ventilator/Worker/Sink by PUSH/PULL connection
→ Online trigger

PUB/SUB connection
→ Process control

1

Structure of the local event-builder using ZeroMQ

We try to develop a local event builder using ZeroMQ to read the COMET CDC.

Front-end electronics

- Avant thread: read data from the front-end cards
- Rear thread: build the event from the ZeroMQ buffer.

Data buffering by the message que

Front-end PC

PUSH /PULL

TCP/IP

CDC

RECBE

RECBE

RECBE

Avant thread — ZMQ

Avant thread — ZMQ

Avant thread — ZMQ

ZMQ

Local Event building thread

ZMQ PUSH/PULL TCP/IP

Back-end PC

MIDAS FE ⟷ MIDAS Buffer

Local event-builder process

Reliable and robust connection by the message que