

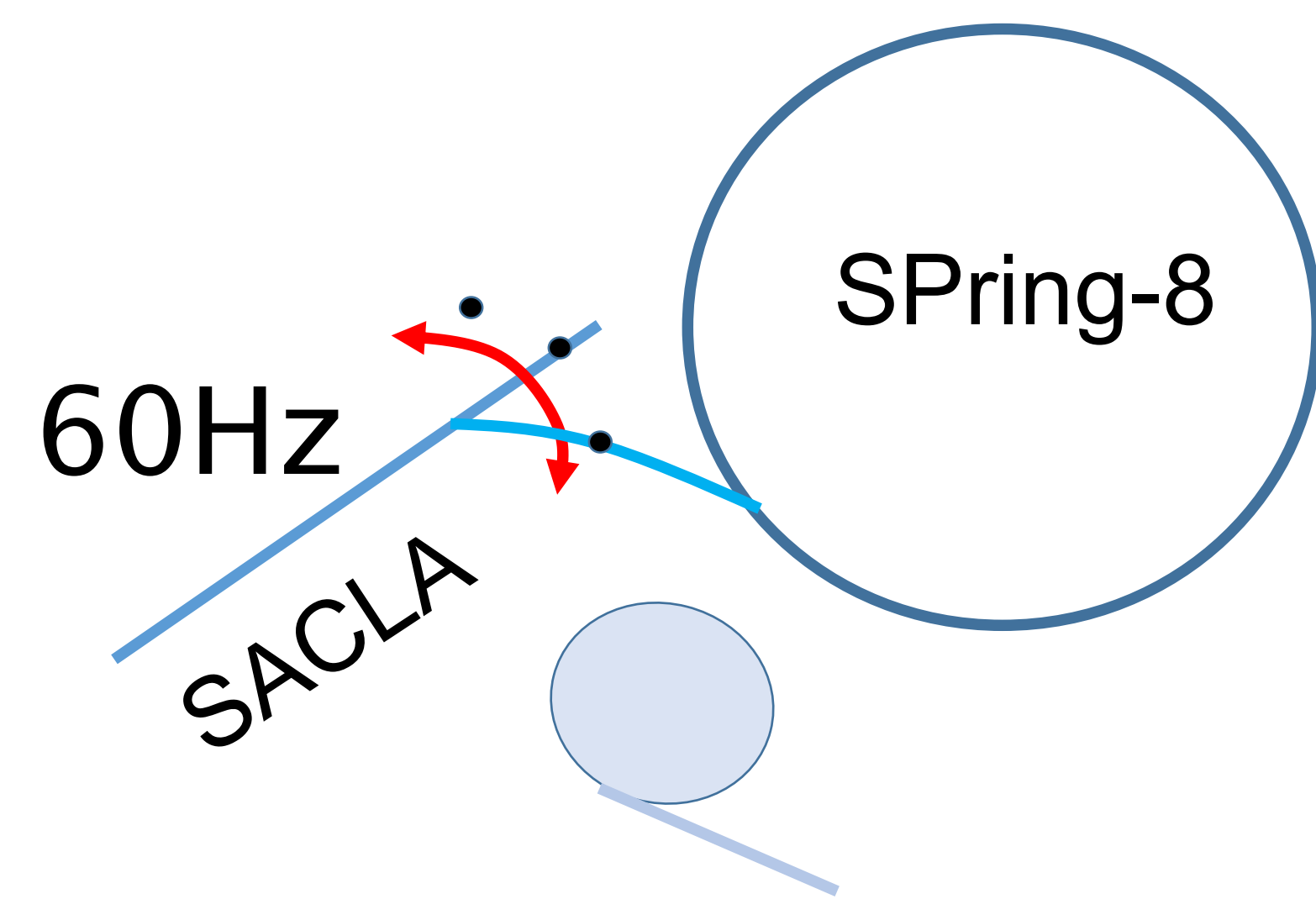
DATABASE SCHEME FOR ON-DEMAND BEAM ROUTE SWITCHING OPERATIONS AT SACLA / SPring-8

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SACLA beam route switching

SACLA(linac) → BL2,BL3,SPring-8 (storage ring)
 BL2,BL3,BLx,SPring-8-II

Route information is distributed via a reflective memory network

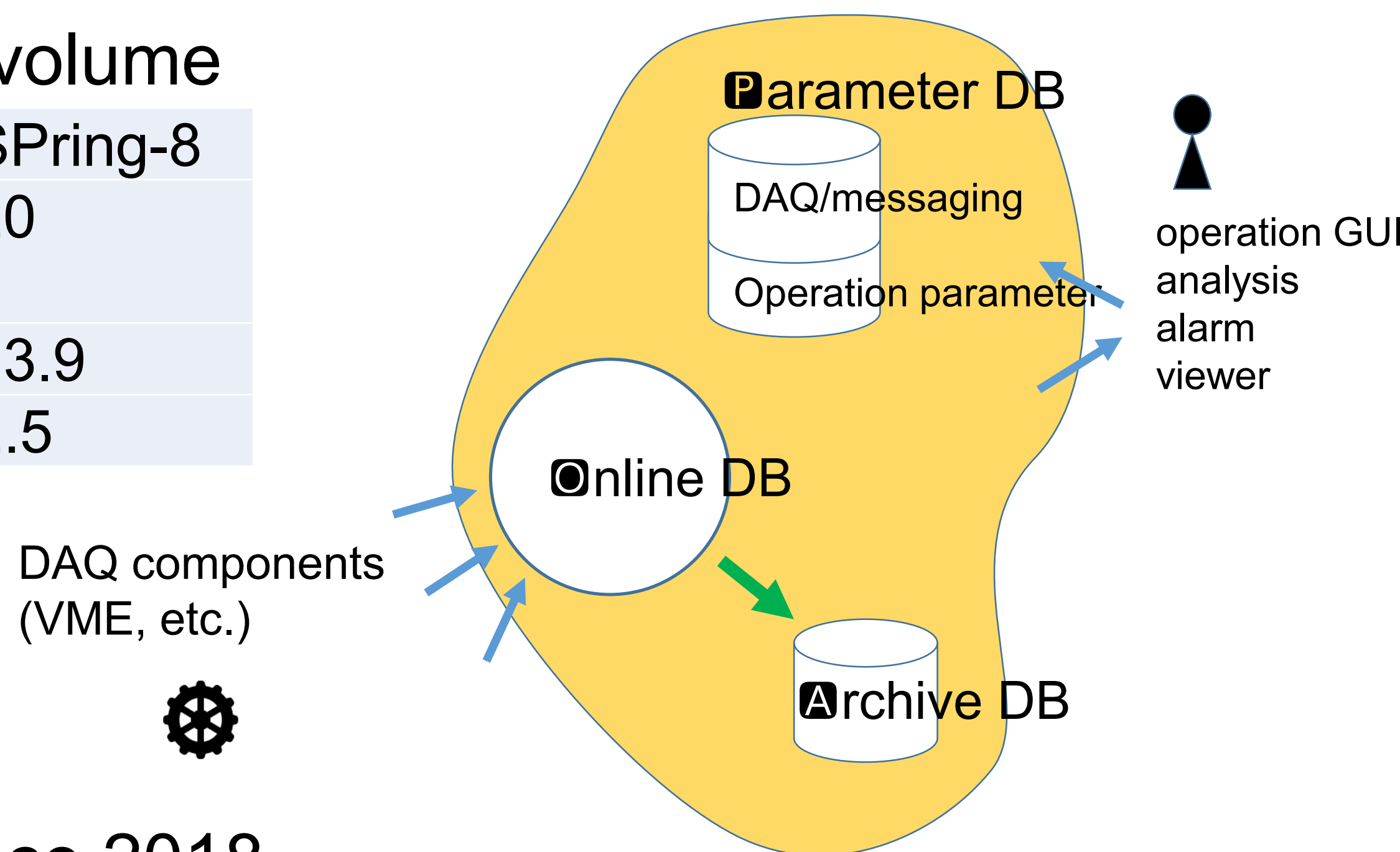


Database at the site : The key for the unified operation

Online DB spec & data volume

	SACLA	SPring-8
#Cassandra nodes	44	20
pol rate[kHz*]	18.4	13.9
sync rate [kHz*]	114.5	2.5

* $\sum_i rate_i$



Parameter DB (MariaDB 10.2.12)

signal attributes for DAQ
 alarm status
 operation parameters

Online DB (Cassandra 2.2.11)

data from DAQ "pol" and "sync"

Archive DB (MariaDB 10.2.12)

final data destination

Operational problems since 2018

Date	problems
5/12/2018	Parameter DB: TRX down + LAG setting error
12/5/2018	SACLA Cassandra node #17 hung-up
3/1/2019	SACLA Cassandra node #36 hung-up
4/30/2019	SACLA Cassandra node #40 hung-up

This fault rate itself is within expectation. But, it revealed a weakness of the DAQ logic. Detection and recovery logic were reinforced.

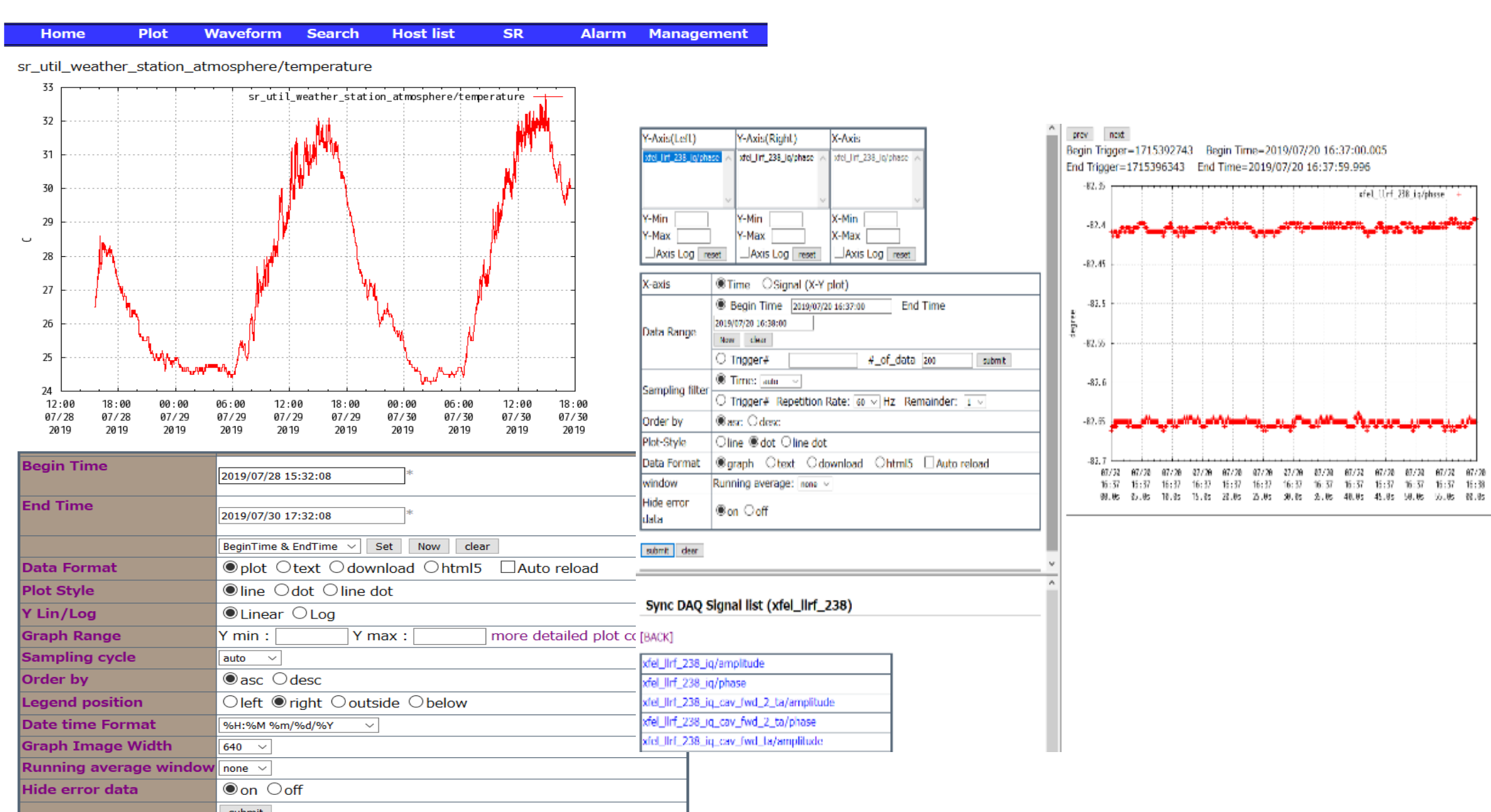
Pros of using the unified data format

Common access API:

C-library, Python, Rest-API

Applications:

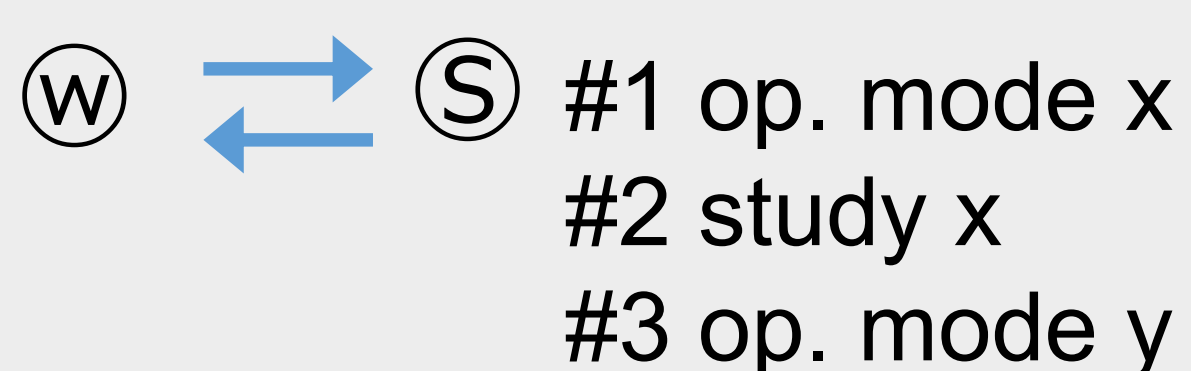
- Correlation type analysis
- Standard data viewer



- Alarm service (~5 second cycle)
- Operation parameters management

Values are simply connected to (id, key)

Work / Store area in PARAMETER DB



Toward on-demand beam switching operation

Operation parameter

pre-fixed patterns of 60 routes (1 second pack)

version id	name	set time	run time	comment
1	BL2 60Hz	2019/09/18 11:18:26	2019/09/20 15:08:35	BL2-1
2	BL3 60Hz	2019/09/18 11:20:06	2019/09/21 01:31:28	BL3-1
3	BL3 30Hz BL2 30Hz	2019/09/18 11:22:45	2019/09/26 09:16:49	BL3-1 BL2-1
4	BL3 1Hz BL2 1Hz	2019/09/18 11:25:29	2019/09/26 06:10:14	BL3-1 BL2-1
5	BL3 1Hz XSBT 1Hz	2019/09/18 11:44:21	2019/09/18 11:44:21	BL3-1 XSBT-1

No.	Name	beamroute(bit)
1	seq_1	0x704
2	seq_2	0x702
3	seq_3	0x704
4	seq_4	0x702
5	seq_5	0x704
6	seq_6	0x702
7	seq_7	0x704
8	seq_8	0x702
9	seq_9	0x704
10	seq_10	0x702
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Preparation for post processes

The route map (event # - route) is one of sync data. To build an event of a certain route, the route map data needs to be read.

Concern: performance degradation due to this additional task.

Prospect: Applied on Data viewer and Archive process. It is within the allowable range.

Conclusion and outlook

The SACLA/SPring-8 control system integrates databases in the data stream. It is ready to adapt the on-demand route switching operation.

In the fall 2019, SACLA starts to determine its route with the new scheme through the reflective memory network. In 2020, the plan is to promote SACLA to the main injector.