

A detailed wireframe model of a particle accelerator, likely the CBM (Compact Big Bang) experiment. The model shows a large, oval-shaped ring structure with a central beam pipe, surrounded by various support structures and components. The text is overlaid on the central part of the ring.

# Online Processing (and Storage) Resources for CBM

Florian Uhlig, Mohammad Al-Turany, Thorsten Kollegger

CBM Collaboration Meeting, Lanzhou, 22. Oct 2025

FAIR strategy: one **common compute and storage system** for all FAIR pillars, supporting on- and offline operation of the experiments

- Described in FAIR Computing CDR, with significant contributions from CBM
- Operated centrally by IT
- Requires close collaboration between experiments and IT

# Green IT Cube





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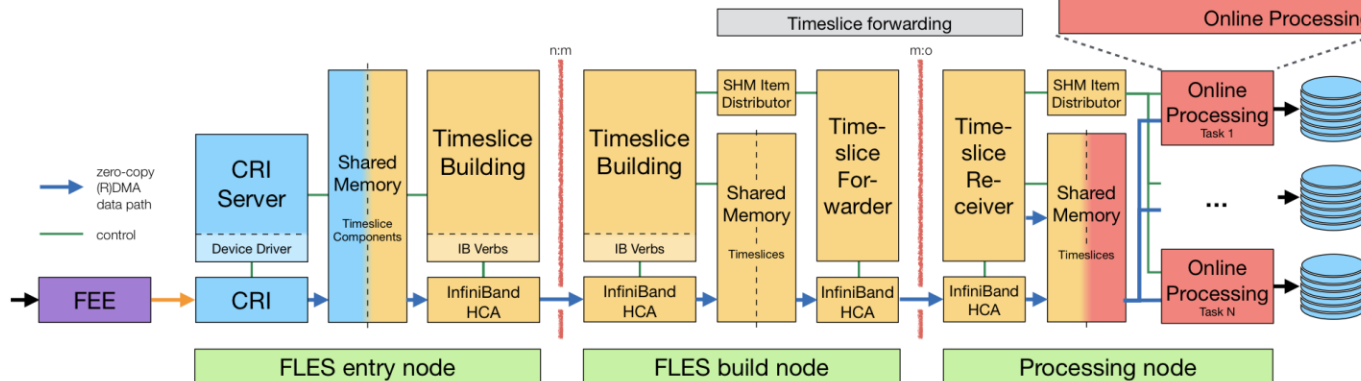
## Towards CBM online usage

- Overview/Organization (Thorsten)
- Technical Developments (Mohammad)
- Data Challenge / Demonstrators (Florian)

## Reminder: timeslice forwarding

Slide shown previously

- Envisioned architecture



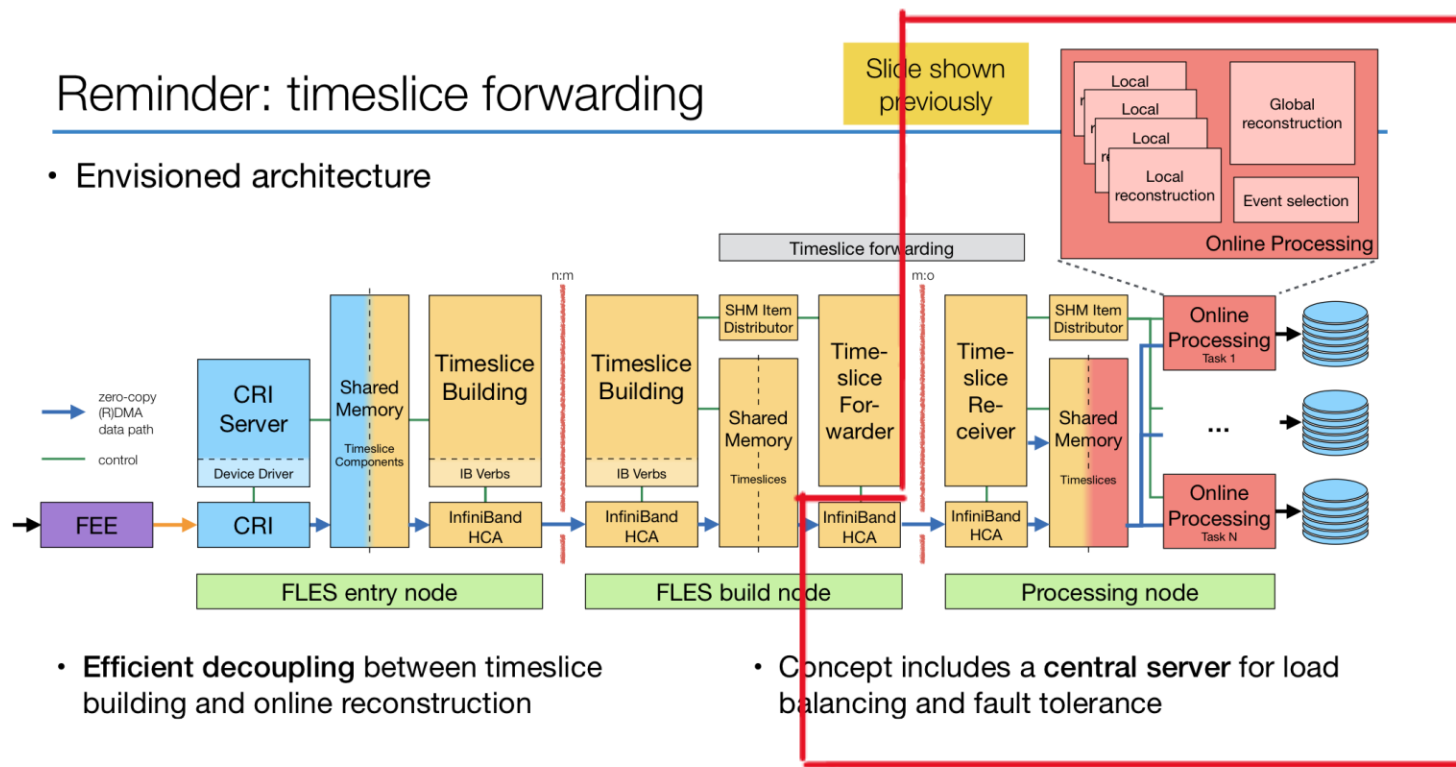
- Efficient decoupling between timeslice building and online reconstruction

- Concept includes a central server for load balancing and fault tolerance



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Jan de Cuveland – Project report: ODM – CBM Computing Board Meeting – 2025-09-23

CBM responsible for fibers to IT systems; compatible network cards and settings in the FLES nodes

## Common IT platform

- Processing nodes
- Network
- Storage and archiving systems



Reminder: CBM using parts of larger common system

- System optimized for overall FAIR operation (including CBM offline) and not only online operation
- CBM input crucial for system design by IT
- *However:* CBM specific implementations need to adopt to common system design

Process defined in „*Common Conditions for Use of Central Scientific Compute Systems by Experiments*“:

- „*IT shall consult annually with experiments about their technical requirements*“
- Guiding principle: overall optimization for FAIR



„IT **shall** furnish full compute nodes to experiments for specified, limited durations, with clearly defined commencement and termination dates.

This provision encompasses the configuration of network connectivity to the experiments and the isolation of these resources from other systems.

Access to these nodes will be facilitated in accordance with standard IT service access protocols for the cluster environment (refer to Appendix A).„

Mohammad will present in the next talk more on the actual system and it's evolution towards FAIR operation

*Assumption:* Online operation needs reserved resources during experiment data taking and commissioning

Requires careful planning and coordination

- Technical system design (see previous slides)
- Capacity planning
- Process for resource reservation
- Process for cost sharing to experiment (not covered in this presentation)

*Assumption:* Online operation needs reserved resources during experiment data taking and commissioning

Requires careful planning and coordination

- Technical system design (see previous slides) – **4 to 5 years**
- Capacity planning – **3 to 4 years**
- Process for resource reservation – **0 days to 1 year**
- Process for cost sharing to experiment (not covered in this presentation)

**Involves different timelines!**

„Experiments **shall** provide IT with a forecast of their projected reserved compute resource requirements for the subsequent three calendar years. This forecast is due no later than three months prior to the start of each calendar year.

IT **shall** then confirm the availability of the forecasted resources or **advise** on alternative options. IT **shall** provide the experiment with a non-binding forecast of the expected cost.“

## **Note timeline!**

- CBM to provide forecast for next 3 years in advance, typically in September (FAIR computing coordinator in charge)
- Capacity planning sheets to be distributed
- Initial version for 2026-2027 to be prepared together in Q1/2026
- First full version covering 2027-2029 due in September 2026



Keeping balance between short-term needs and flexibility of the experiments and needs of other users of the shared system

„a) Experiments **shall** submit resource requests via the IT-provided interface (refer to Appendix C) no later than 14 days prior to the date of first usage.

b) Under extraordinary circumstances, experiments **may** request additional resources within the timeframe of 14 days to 24 hours prior to first usage. [...]

c) Experiments **may** cancel or reduce a resource request; [...]

d) Resource requests **shall** conform to the forecast provided for the actual calendar year. Requests exceeding the forecast may not be accommodated.“

**Note last paragraph: CBM shall conform to the forecast range**

Keeping balance between short-term needs and flexibility of the experiments and needs of other users of the shared system

Due to the operational impact on IT and other users

**costs will be charged to CBM for short-term requests and cancellations**

- Can be waived in extraordinary circumstances by FAIR management

Similar process apply for storage ressource

- Technical System Design and CBM input
- Capacity Planning
- Cost Sharing

Further details in „*Common Conditions for Use of Central Scientific Compute Systems by Experiments*“

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