The Meta data System after HLT

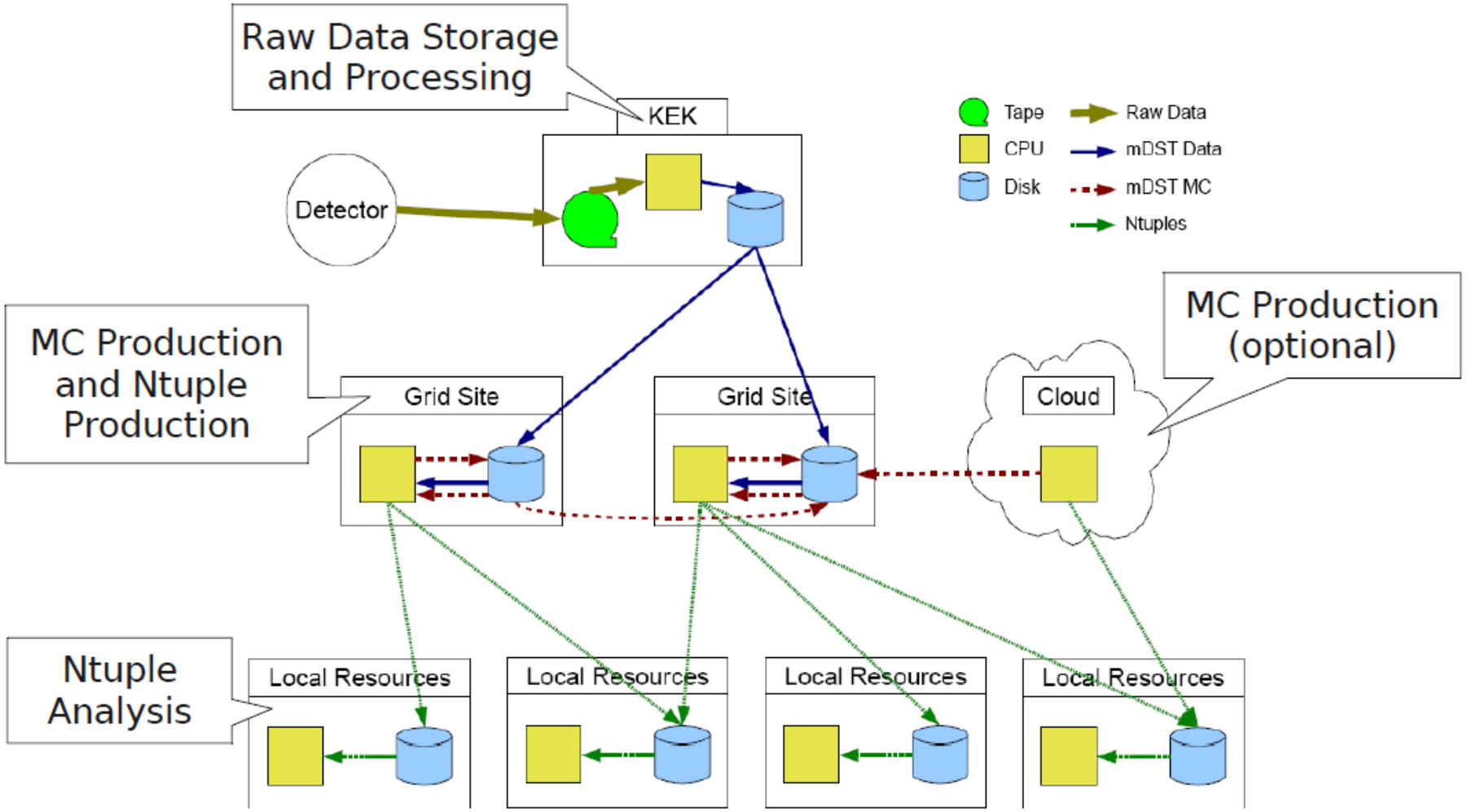
J.H. Kim*, S.I Ahn & K. Cho
(On behalf of the Belle II computing group)

High Energy Physics Team
e-Science grid IT Team
KISTI, Daejeon, Korea

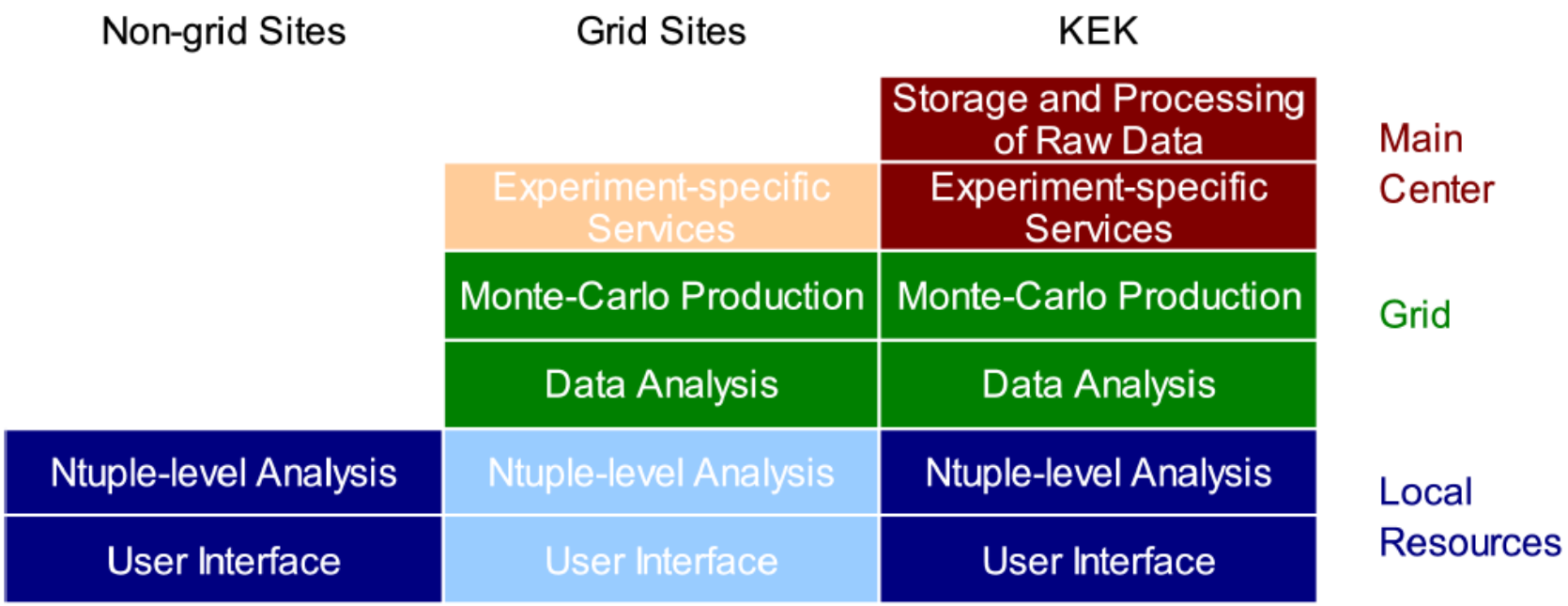
Trigger/DAQ Workshop, 2011.01.26

Contents

1. Belle II Computing model

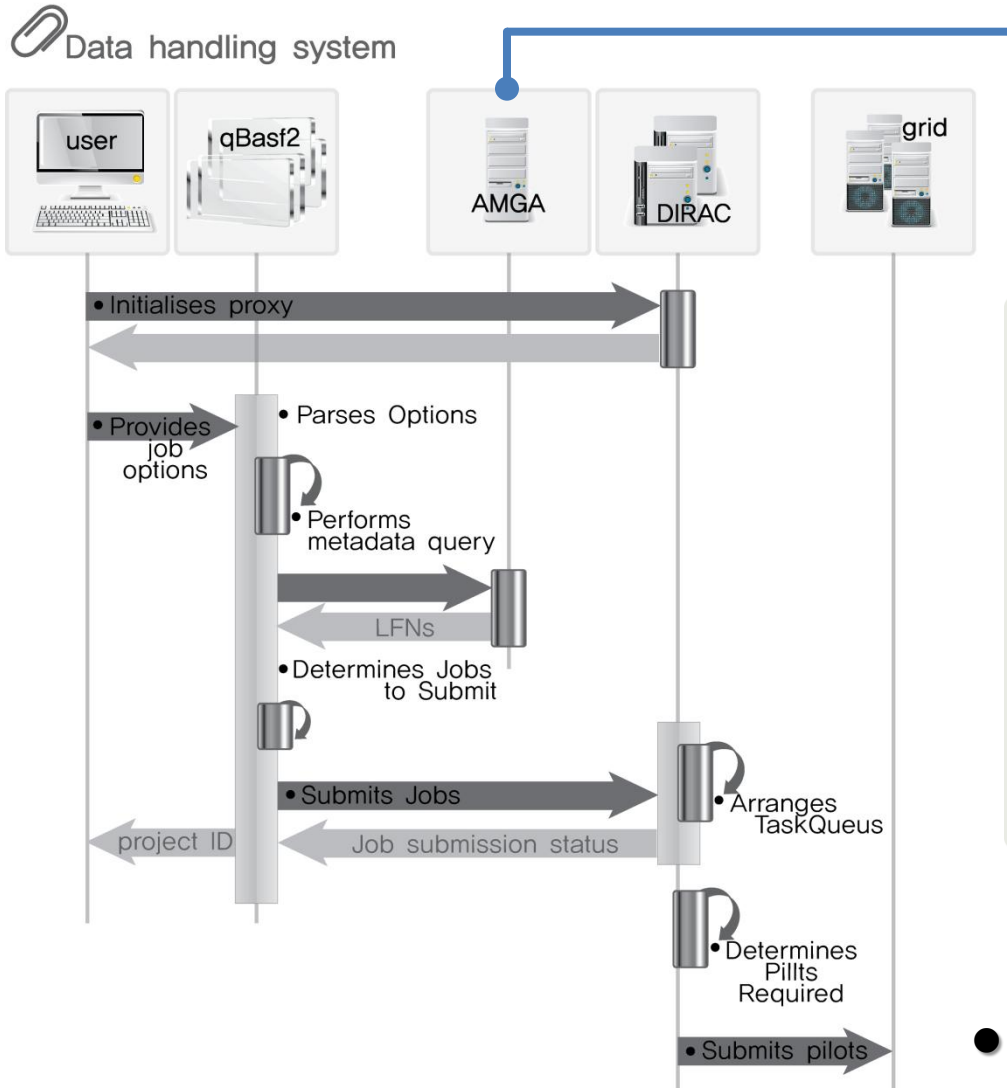


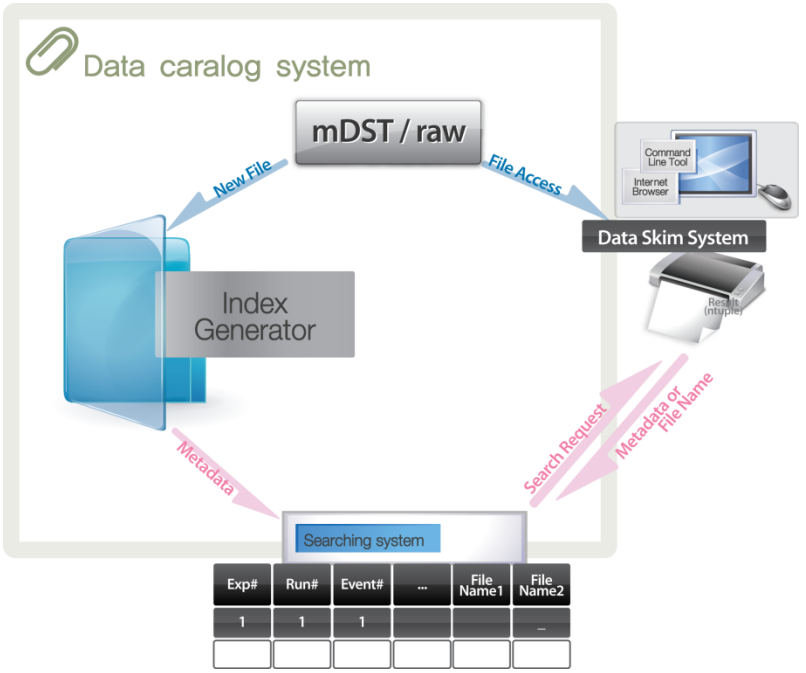
1. Belle II Computing model



2. The Data Handling Scenario

- To improve the scalability and performance
- We apply AMGA which is middle ware for gLite



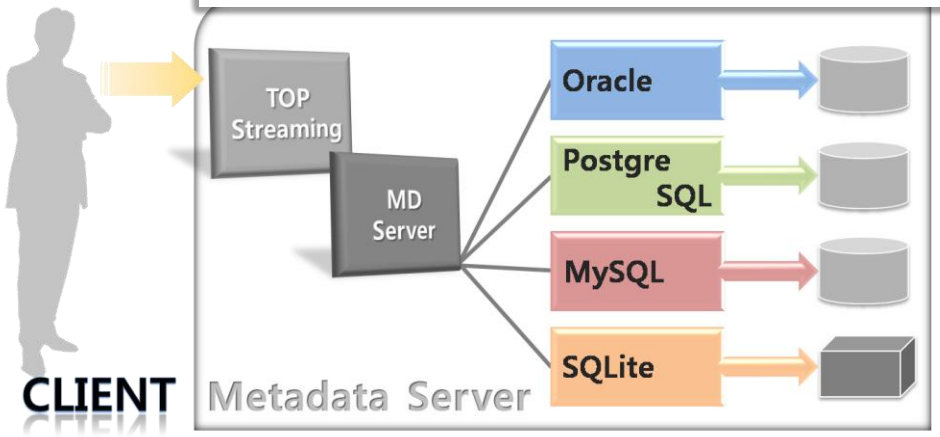


- **Constructed the DH system for Belle-II**

3. The progress of Meta data system

1) What is AMGA? (Reference:http://cern.ch/amga)

AMGA is the Meta-data catalog of EMI Middle-ware.



The AMGA functions:

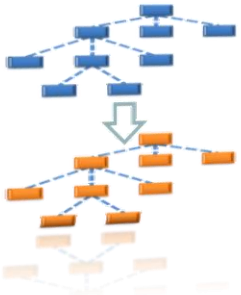
- Authentication (Grid-Proxy certificates, VOMS)
- Logging, tracing
- DB connection pooling
- Replication, Federation of Data
- Use of hierarchical table structure

..the Grid idea.

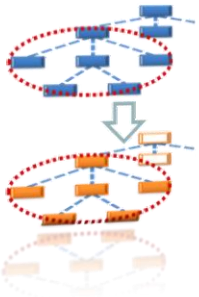
It is a solution for Good Performance and Scalability.

AMGA replication makes use of hierarchical concept:

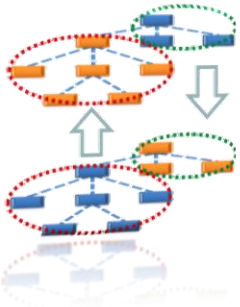
Full replication



Partial replication



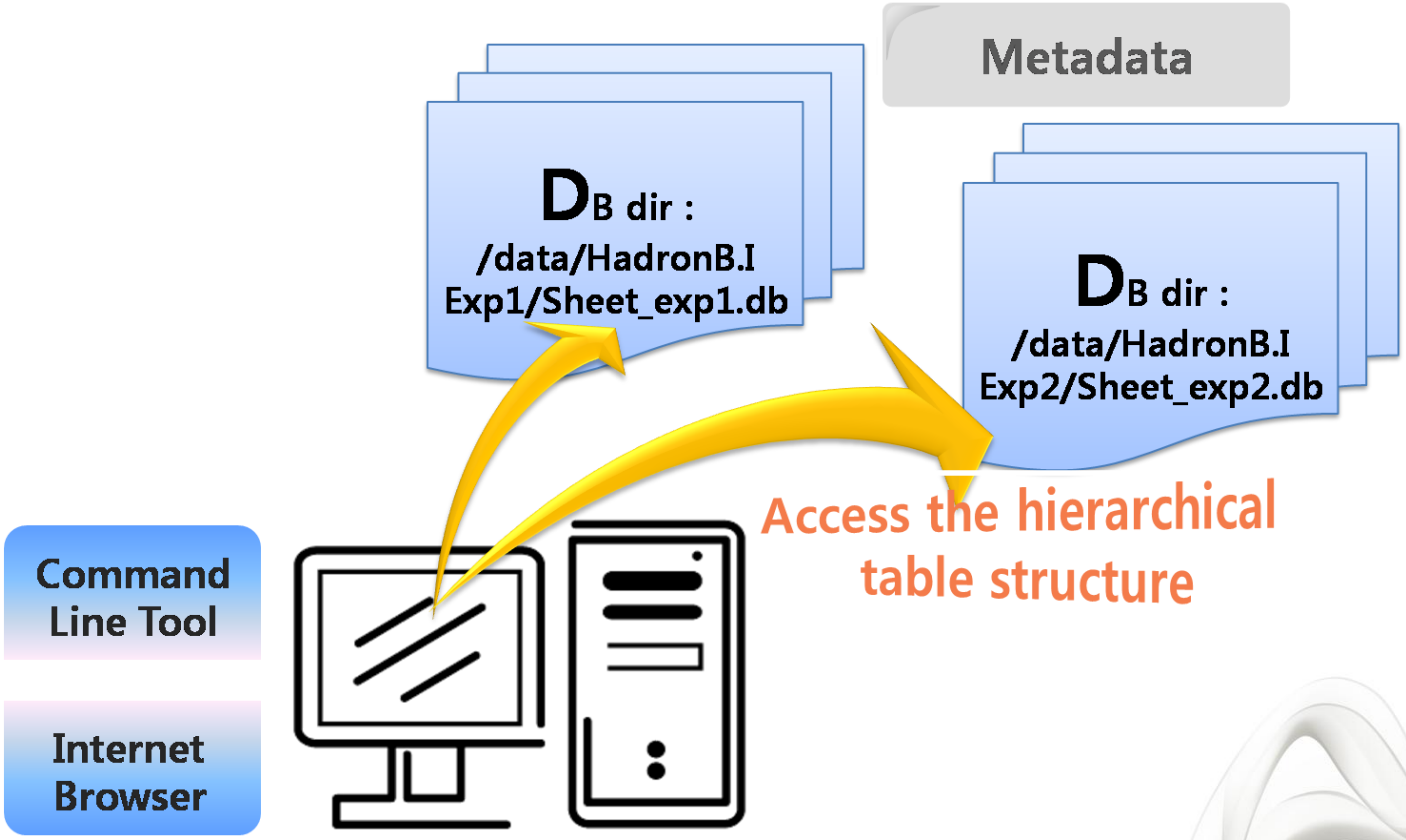
Federation



3. The progress of Meta data system

2) Development

✓ The architecture of database in AMGA

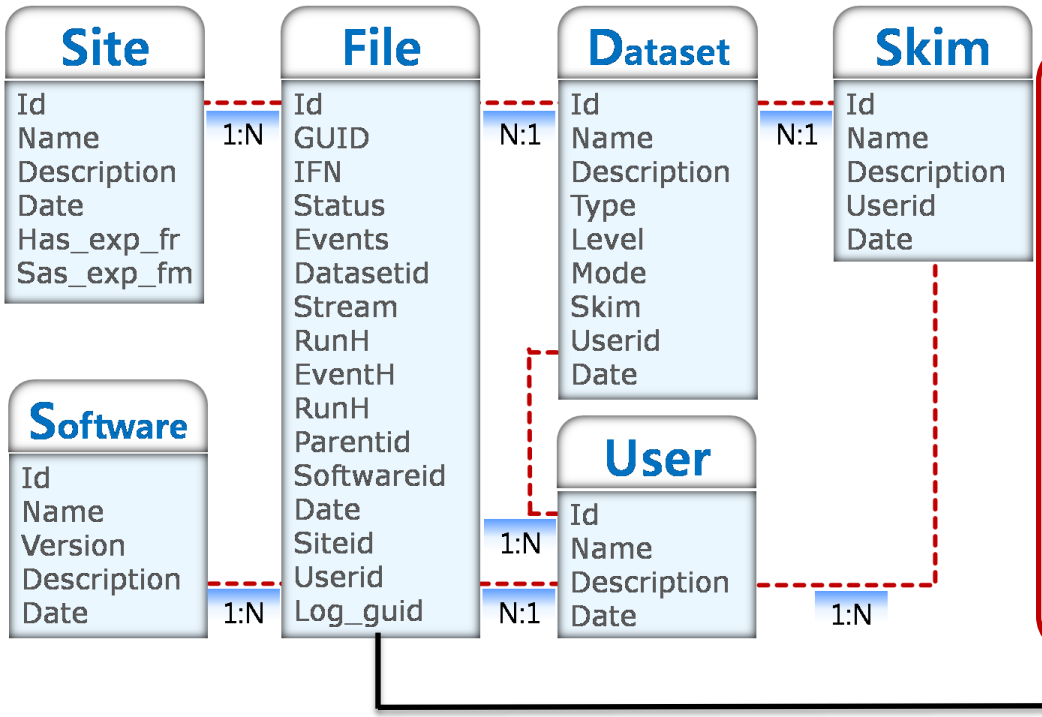


3. The progress of Meta data system

2) Development

✓ The definition of the attributes

The attributes for file level



The attributes for event level

Event

- number of+charged tracks
- number of – charged tracks
- number of K_S
- number of K_L
- R2 : 0.0 – 1.0
- skim type: (HadronB=0,fullrec =1, and so on)

Option

3. The progress of Meta data system

2) Development

✓ How to access AMGA : made by J.H Kim, SunIl Ahn

Command Line Interface
- belle_amga_access (...)

Extraction Interface:
- belle_amga_extract LFN filename

Programming API
- belle_amga_connect

(host,port,dir)
→ belle_amga_search (condition)
→ belle_amga_eot ()
→ belle_amga_fetch (variable)
→ belle_amga_write (...)
→ belle_amga_close ()

3. The progress of Meta data system

2) Development

✓ Generating meta data for scalability test.

- **Generating for reading**

  - Background: Based on TDR
    - Total # of experiments: 30
    - Total # of streams: 6
    - Total # of runs in each experiment: 800
    - Total # of runs in types: 4 (uds, charm, charged, mixed)

  - Raw data: 100M files
    - 3.3 M files in each experiment (= 100 M/30 exp)
    - 4,125 files per run (= 3.3 M/800 run)

  - real: 4.3M files
    - 143K files in each experiment (= 4.3 M/30 exp)
    - 180 files in each run (= 143K/800 run)

  - MC: 12.5M files
    - 2.1M files in each stream (= 12.5M/6 stream)
    - 70K files in each stream & experiment (= 2.1M/30 exp)
    - 17.5K files in each type (= 70K/4 type)
    - 88 files in each run (= 70K/800 run)

3. The progress of Meta data system

3) Estimation

✓ The read-write optimization for meta data

- Generating for Writing
  1 experiments = exp99, on_resonance, stream 0 → only for test
  2 Generating time : (1, 2, 10, 100) files/sec

- Performance test :
  UI : hep2.kisti.re.kr
  Meta system : (150.183.246.196)
  Prototype : belle2_amga_access
  Query type : searching all run in an experiment

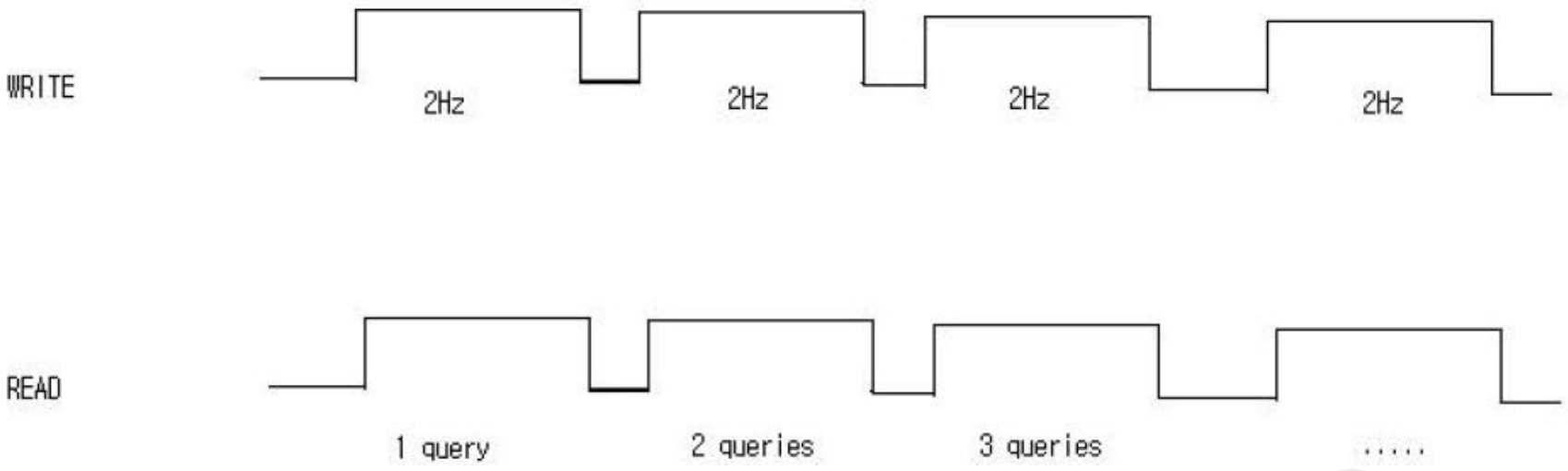
- Maximum queries : 50

- Environment: local network

3. The progress of Meta data system

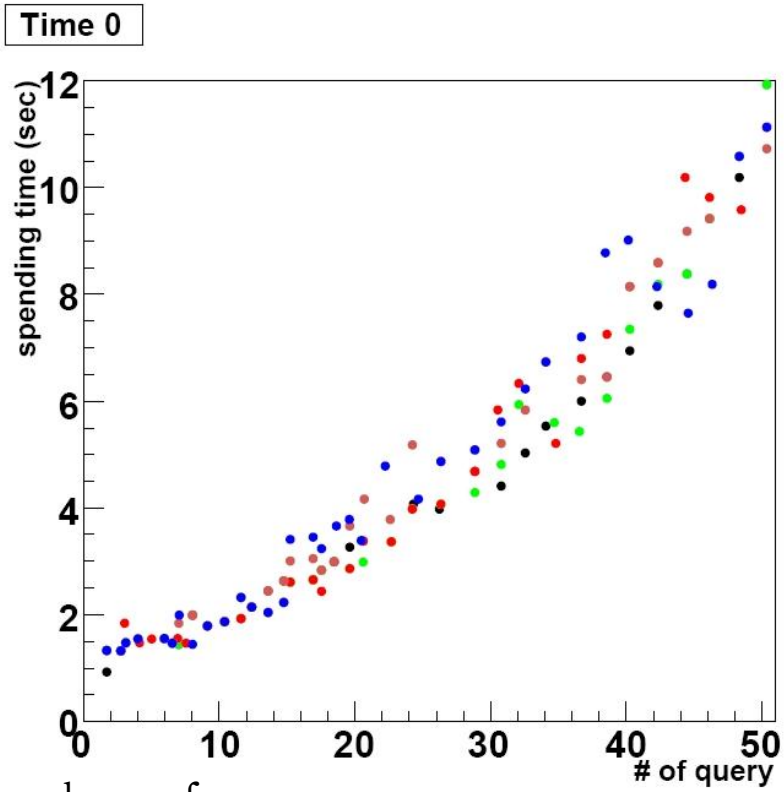
3) Estimation

- We perform independent read-write.
- We perform to test the frequency for 1Hz, 2Hz, 10Hz and 100Hz.



3. The progress of Meta data system

3) Estimation



- This test is to change the number of query.
- 0Hz ,1Hz,2Hz, 10Hz, 100Hz.
- We perform to test the frequency for 1Hz, 2Hz, 10Hz and 100Hz.

3. The progress of Meta data system

3) Estimation

✓ Frequency test

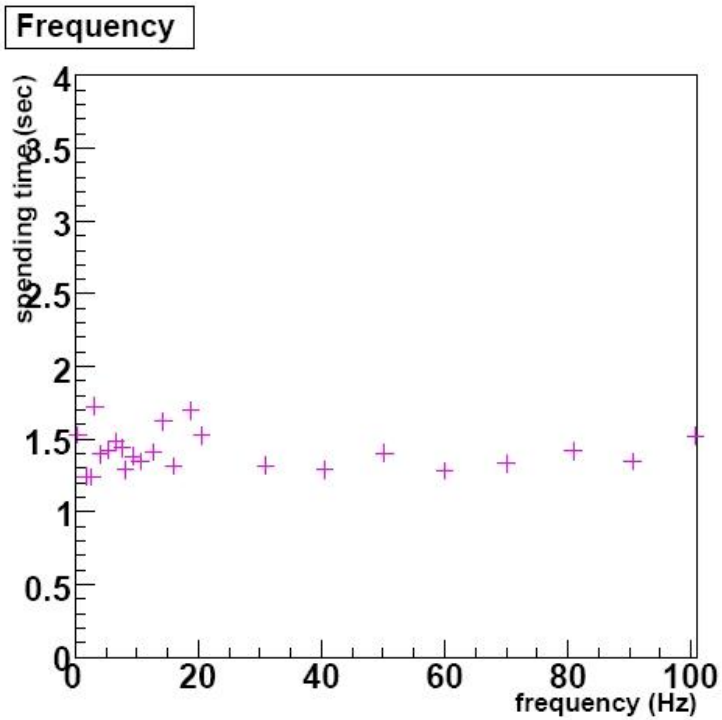
- Reading process : 5 queries per each frequency
- Generating for writing

  1 experiments = exp99,on_resonance, stream 0 → only for test

  2 Generating time : (1~100) Hz

  ◭ We perform independent read-write.

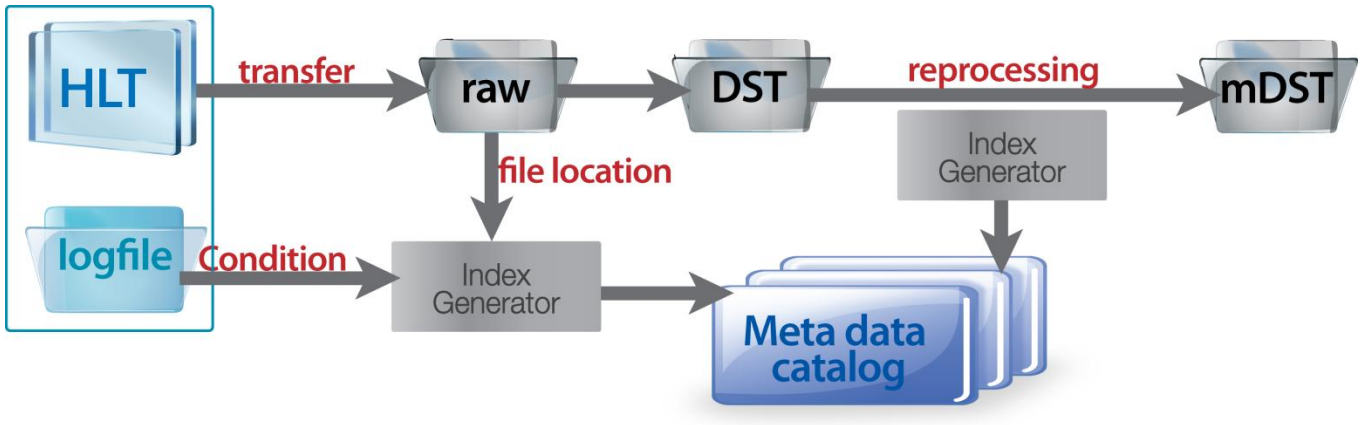
- We have the linearity from 0 to 100 Hz.
  → spending time is 1.2~2.0 (sec)
- The system have a good performance !



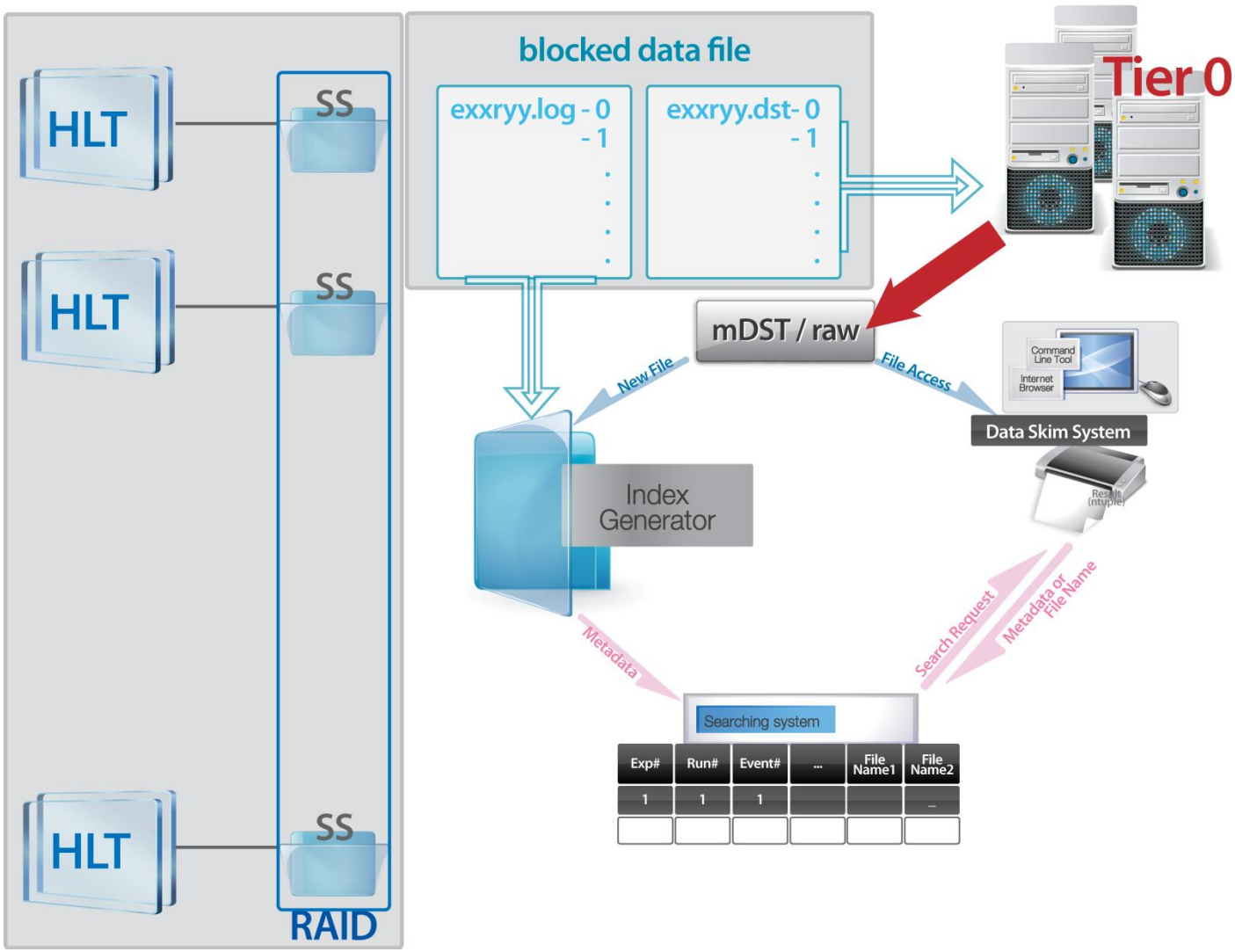
4. Handling the raw data in meta data system

DH after HLT

- We consider to make the meta data catalog of the raw data
- To make the meta data :
  - We will apply the attributes based on TDR.
    If you need more information, we can add the attributes Technically, there is no problem.
  - During transfer the raw data into Tier0,
    The system will register meta information of the raw data.
  - During converting raw data or DST to mDST,
    The system will register the meta data into AMGA master node.
- We are pleasure to get your suggestion for meta information of raw data.



4. Handling the raw data in meta data system



- We will register the meta data with the file location from Tier0 and log files from HLT.

5. Next Step and Summary

- We develpe the meta data catalog system based on AMGA
- Our system is stable in our test.
- We will develope the meta information of raw data.
- We will be able to enjoy the analysis on grid.


Thank you