The Advanced Data Searching System with AMGA at the Belle-II Experiment

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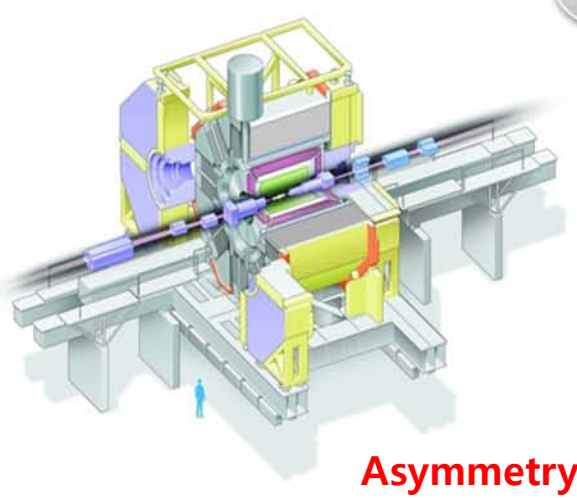
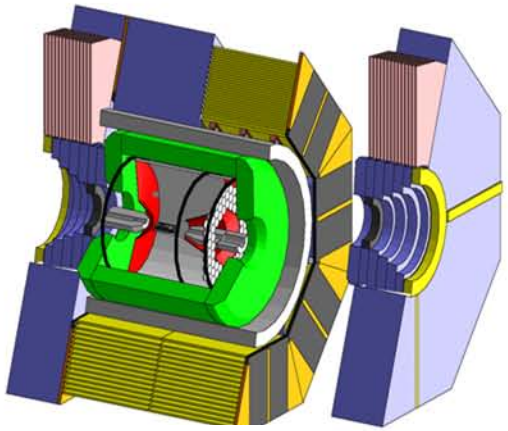
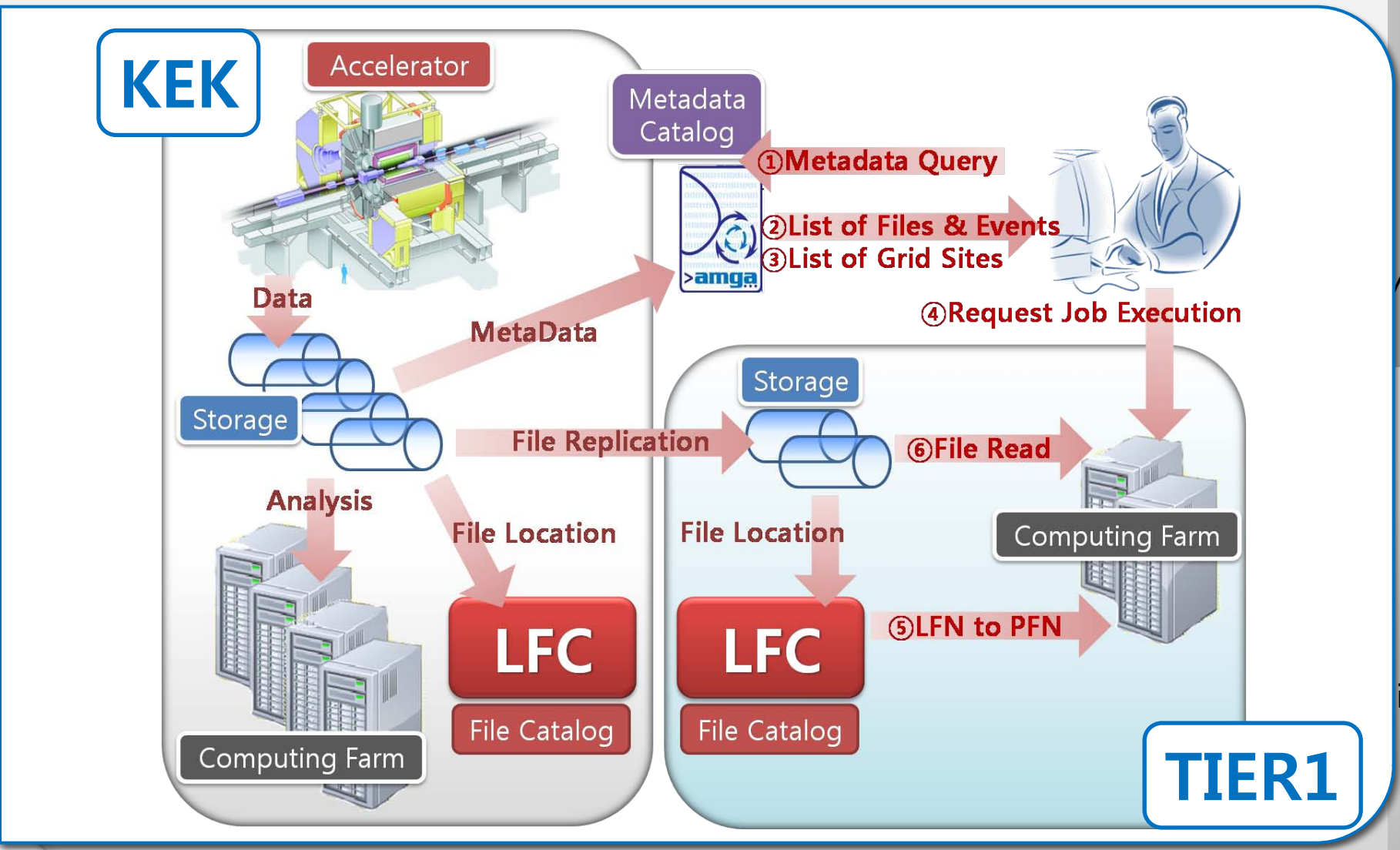
1. Comparison of Belle & Belle-II



Belle		Belle-II
~3.0Km	Circulation	
Asymmetry energy 8.0GeV(e^-) 3.5GeV(e^+) CM 10.58GeV	Beam	
1ab^{-1}	Data size	50 times more data
CP violation measurement	Goal	Precision measurement

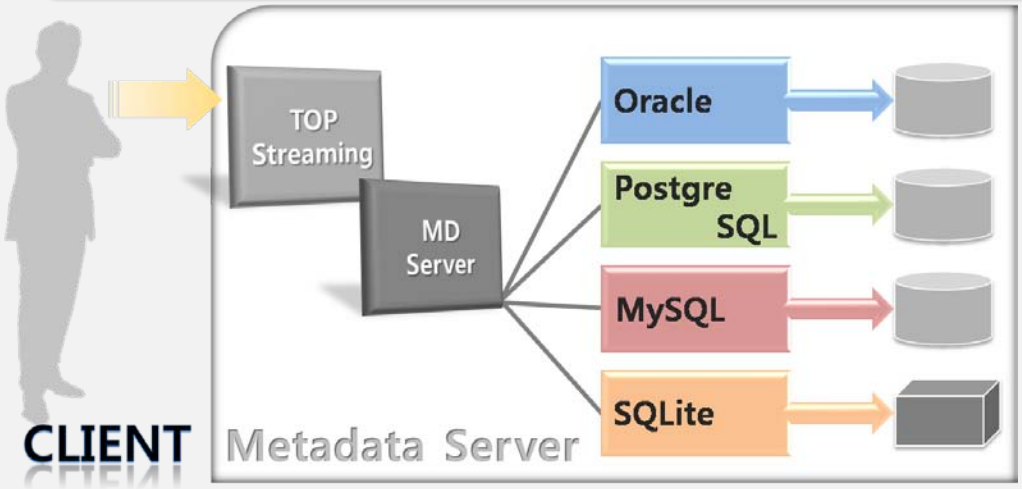


2. Coming problems at Belle-II experiment



3. What is AMGA ? (Reference : www.eu-egee.org)

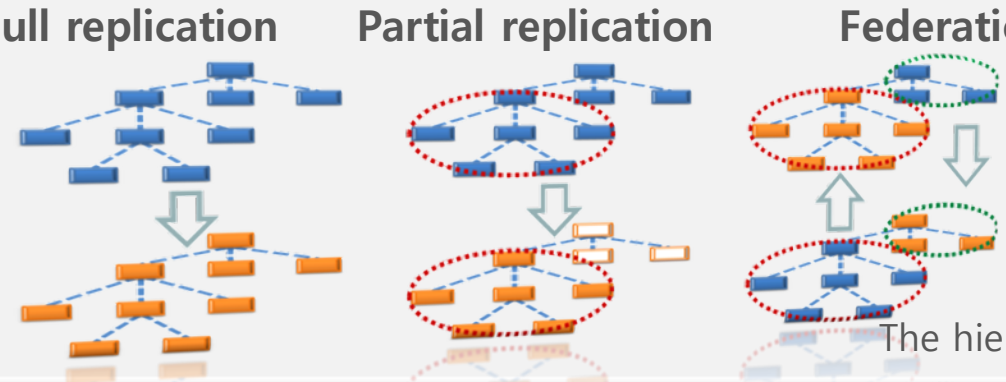
AMGA is the Meta-data catalog of EGEE's gLite 3.1 Middle-ware.



The AMGA functions:

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

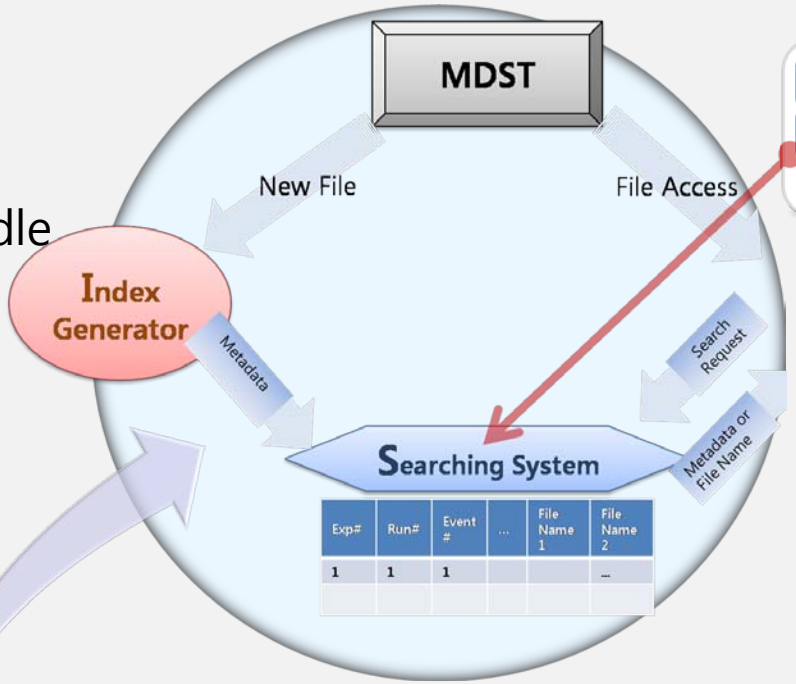
It is a solution for Good Performance and Scalability.
AMGA replication makes use of hierarchical concept:



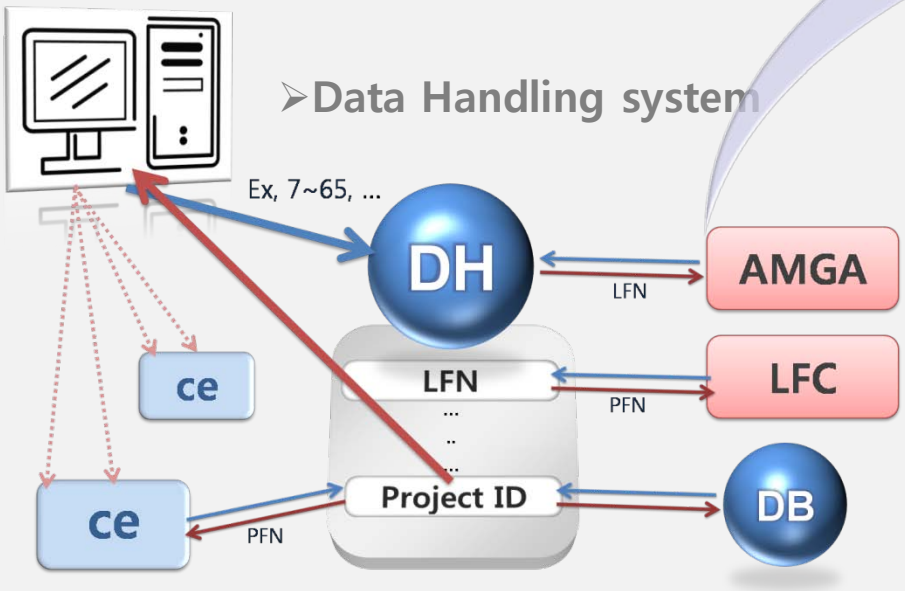
The hierarchical concepts of AMGA

4. The Data Handling Scenario

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



➢Meta catalog system



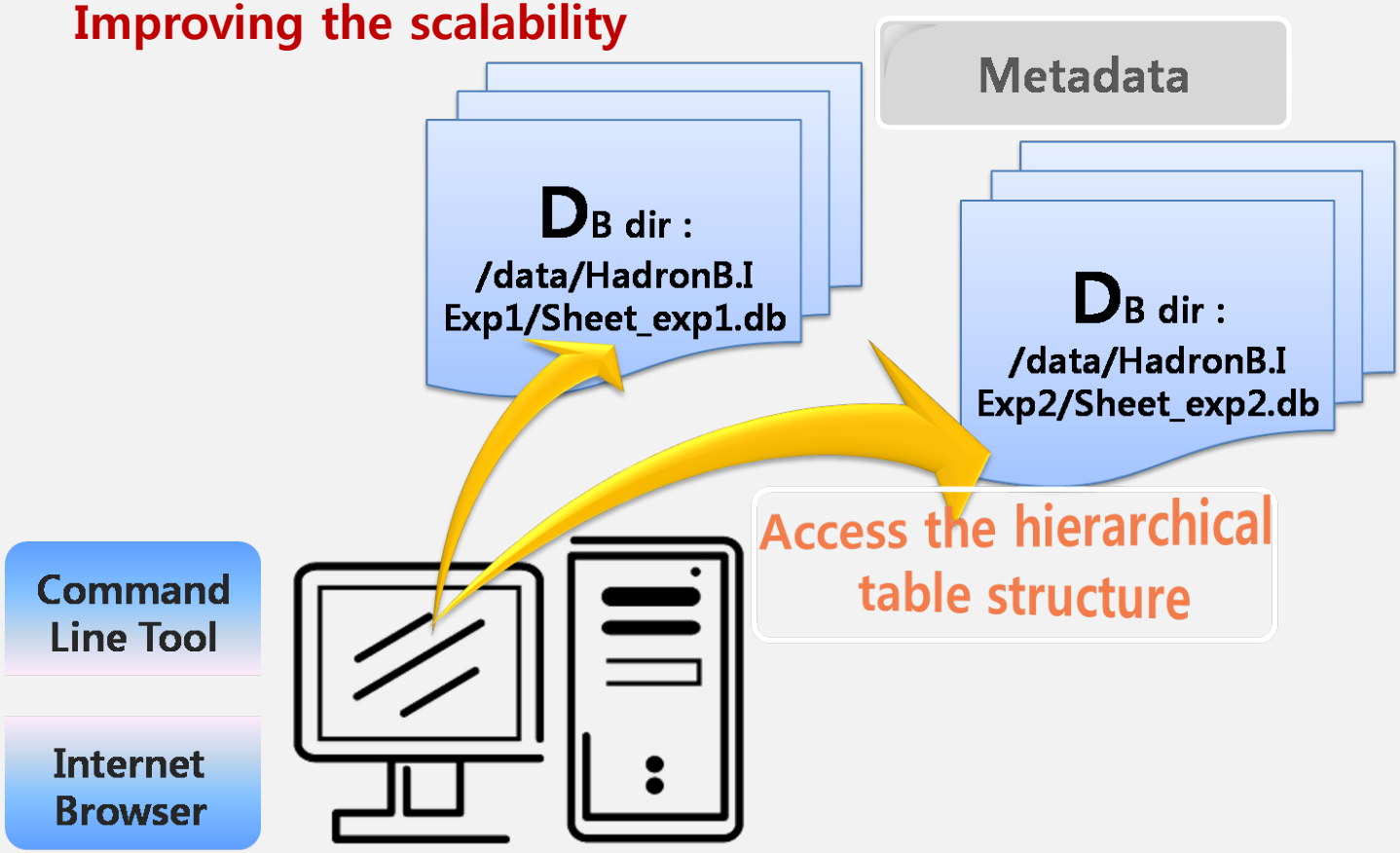
➢Data Handling system

To construct the DH system for Belle-II

5. [1/7] The progress of Belle/Belle-II Data Handling system

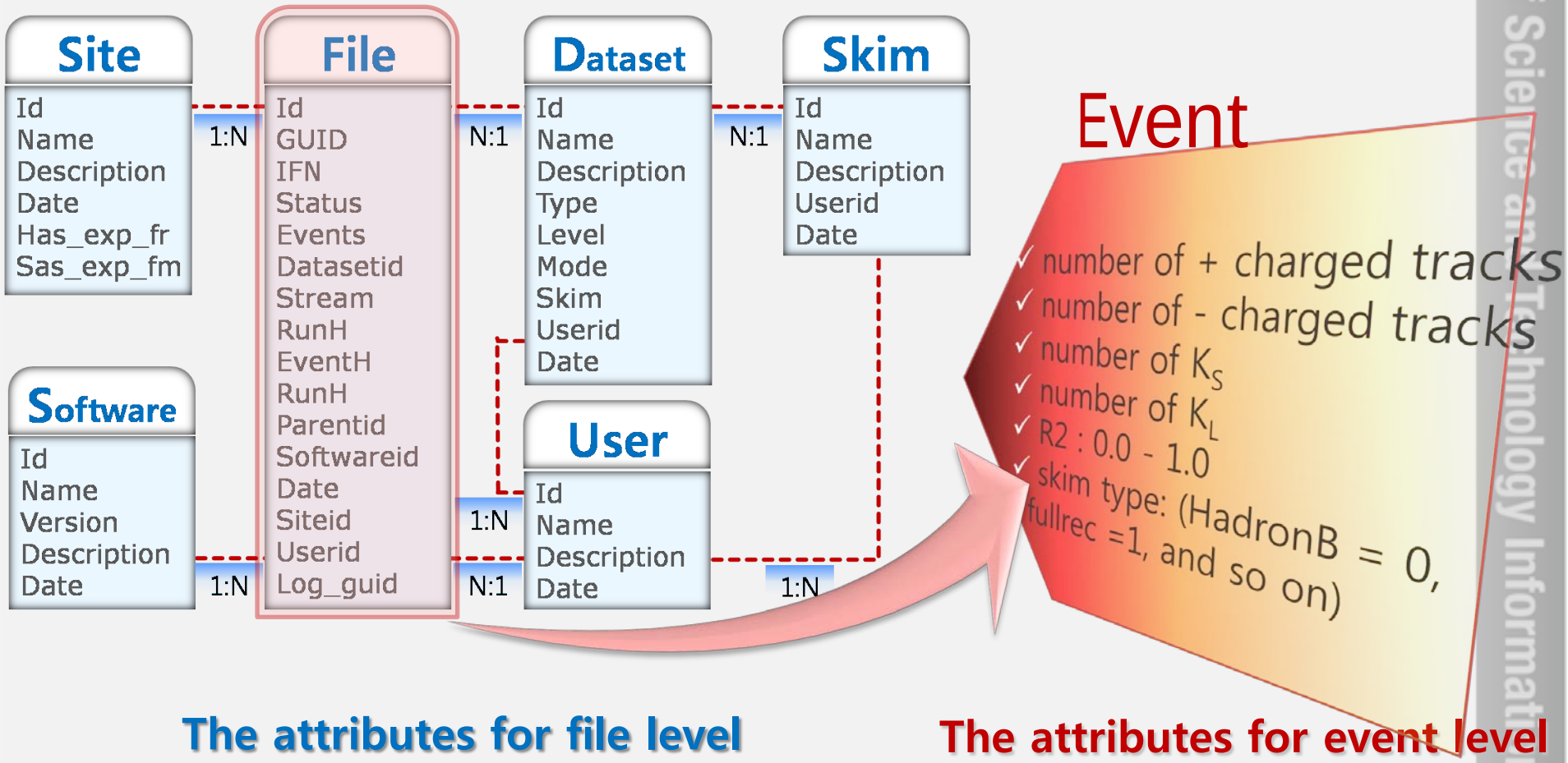
✓ The architecture of database in AMGA

Improving the scalability



5. [2/7] The progress of Belle/Belle-II Data Handling system

✓ **The definition of the attributes**



The attributes for file level

The attributes for event level

5. [3/7] The progress of Belle/Belle-II Data Handling system

✓ How to access AMGA

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 ()

5. [4/7] The progress of Belle/Belle-II Data Handling system

✓ The optimization of the meta-data

- Varying bit data-format(postgreSQL only)
- We composed of the meta data based on the Belle.
- The Belle II data will be x60 than that of Belle.

! Summary of optimization

	# of files	Size for file level	Size for event level	Size in Belle II for events
number of run in Belle	24,000	14 MB	125 GB	
number of skim types	30			
total number of real files	720,000	412MB		1.8TB
number of MC streams	10			
total number of MC files	240,000	137MB	1,988GB	
number of MC skim types	30			
total number of MC files	7,200,000	4120MB		17.4TB

Table: Reference

Sapce Occupation per file in DB	600bytes
Average number of events in a file	111,190
Sapce Occupation per event in DB	12bytes
Multiples in Belle II	60
Multiples in Belle II	60

● Reference for optimization of the mata-data

We can reduce the size of the meta-data(18TB) for Belle-II.

5. [5/7] The progress of Belle/Belle-II Data Handling system

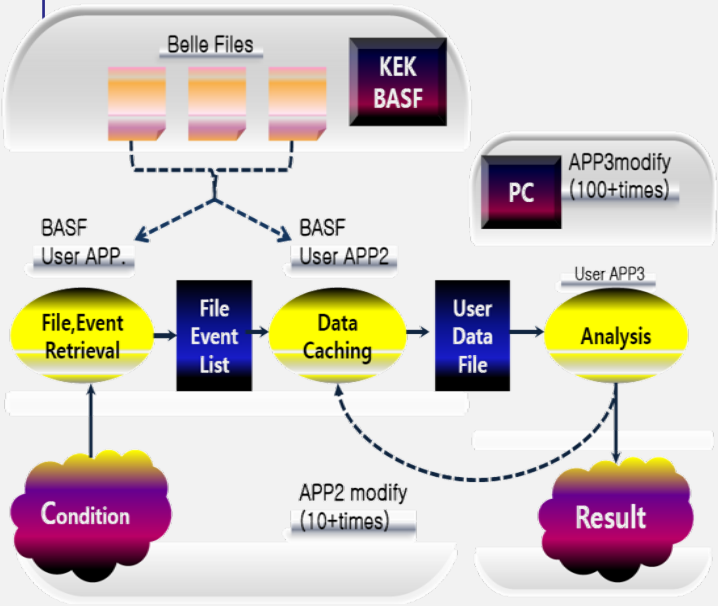
- Event size is corresponding with 12 million events
- We have the same results from both Belle and Belle-II procedure.
- The metadata take a short time for searching dramatically.
- Both the selection efficiencies are almost same.

Table: Summary

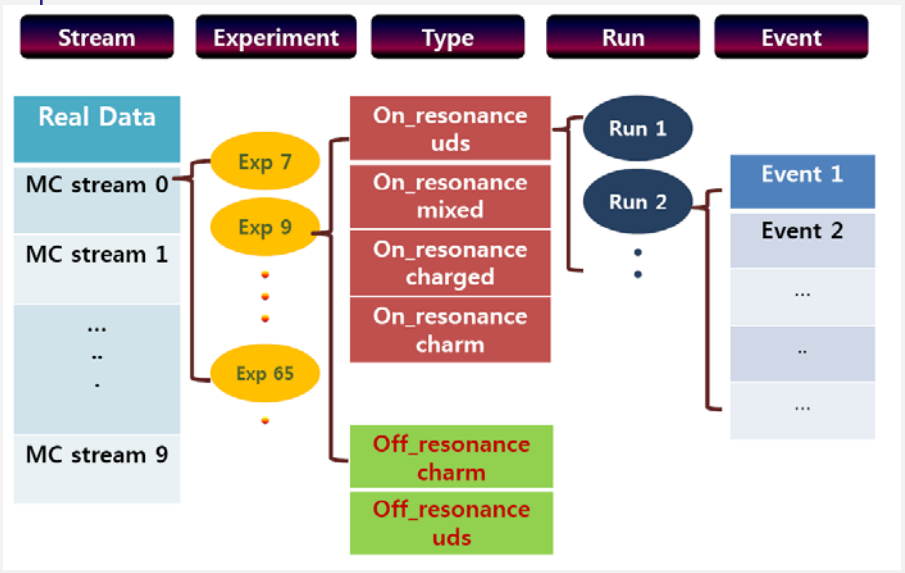
	Belle	Belle-II Meta System
CPU time	4hr15min6sec	4sec
Events	2415412	2415346
File size	25M(index)	6.7M(compression)

Evaluation of Meta system

Belle analysis workflow



Belle Data



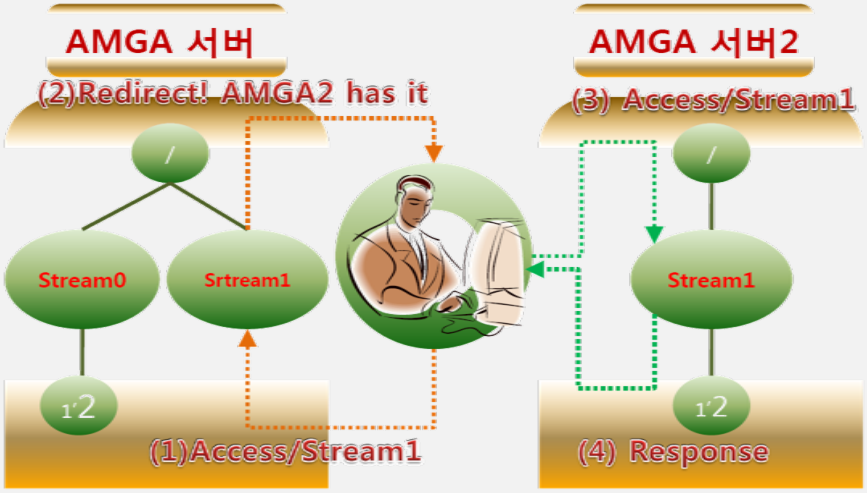
5. [6/7] The progress of Belle/Belle-II Data Handling system

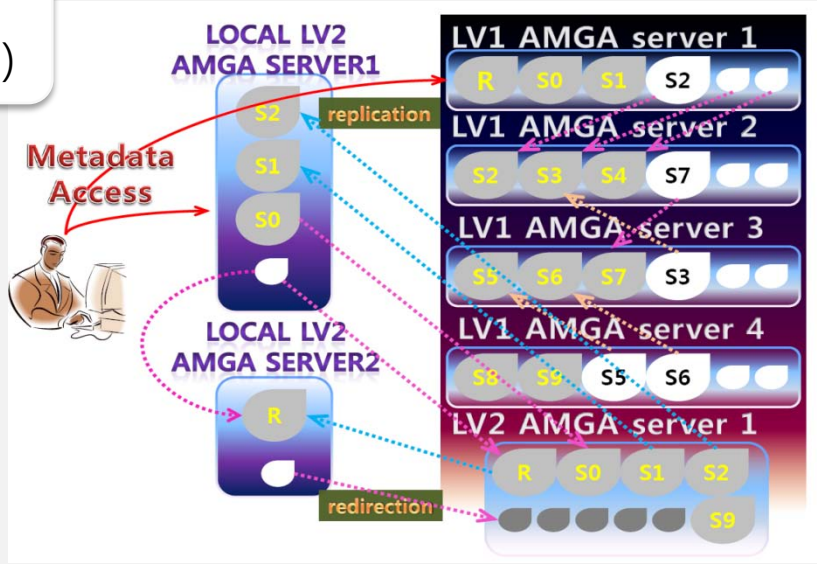
✓ The replication for meta system

We considered the sites,
KISTI(master) and **Melbourne(slave)**, for **AMGA system.**

- Melbourne-KISTI cooperated to make the master-slave for the replication of the meta-data catalog.

→Master node : 150.183.246.196(KISTI)
→Slave node: 192.231.127.47(Melbourne)





- The AMGA system for Large scale data

5. [7/7] The progress of Belle/Belle-II Data Handling system

✓ Releasing the command tool

We released the **first version of the command tool.**

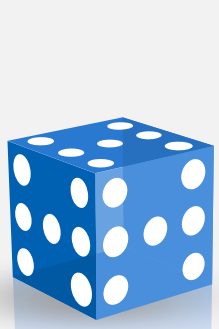
- It is based on **AMGA client-2.0.**
- We evaluated actions of searching to optimize the usage.

What is benefit to use it?

- We can choose either the file level searching or the events level searching alternatively
- We can use it at remote network with strong security (Grid-Proxy certificates, VOMS)
- The command tool have simple question for user's convenience.
- We don't need to describe as "any" or "legacy" of Belle.
- We can use it based on Grid.

6. Summary

1. We composed of the meta system for Belle-II
2. We optimized the meta system
3. The replication from KISTI to Melbourune worked well
4. We released the first version of the command tool
5. To apply the large scale data on Grid



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THANKYOU

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