Belle II
Data Handling System

Taegil Bae
High Energy Physics Team
KISTI (Korea Institute of Science and Technology Information)
Belle II Data Handling Group

KISTI
- HEP Team
  - JungHyun Kim, Kihyeon Cho, YoungJin Kim, Taegil Bae, ...
- AMGA Team
  - Soonwook Hwang, Sunil Ahn, Taesang Huh, Geunchul Park, ...

Melbourne
- Tom Fifield, Martin Sevior, ...

Krokow
- Maciej Sitarz, Mitosz Zdybat, Rafat Grzymkowski, ...

KEK, Karlsruhe, etc...
Belle II Data Handling Group meeting

• First and Third Thursday 5:00 PM (KEK Time)
• Latest meeting – Oct. 6, 5:00 PM
Meetings

- **Belle II Data Handling Meeting**
  - August 4, 2011 5:00 PM
  - Oct. 6, 2011 4:00 PM

- **Korea Belle Analysis Meeting**
  - August 24, 2011
  - KISTI, Daejeon Korea

- **BAM/BAS Meeting**
  - Sep. 26–30, 2011
  - Lotte Hotel,
  - Jeju Island, Korea

Belle II Data Handling scenario

**Belle II computing model**

- **Remote Resources**
  - KEK
  - AMGA
  - DIRAC
  - Cloud

- **Local Resources**
  - CPU
  - Disk
  - Tape

- **Data Tools**
  - Client: gbast2
  - Data Tools: mDST Data mDST MC Ntuples

- **MC Production And Ntuple Production**

- **Ntuple Analysis**

---

**Raw Data Storage And Processing**

**MC Production (optional)**
Detecto r

KEK

AMGA system

USER

Metadata

File Location

Storage

Analysis

Computing Farm

LFC

GRID Site

Storage

File Location

LFC

Computing Farm

① Metadata Query
② List of Files & Events
③ List of Grid Sites
④ Request Job Execution
⑤ LFN to PFN
⑥ File Read

Belle II data handling scenario
Production

Published in JKPS

“The embedment of a Metadata system at Grid farms at the Belle II Experiment”

JKPS, Vol 59, No. 4, 2695 (2011.10.14)

CHEP 2012

“Belle II Data Handling System”

Abstract was submitted

Jaegil Bae
This year’s status

**File level metadata system**
- User created data set R&D => Paused (Kim, Huh, Ahn)
- Focus on Registration tool kit for Belle/Belle II => Processing (Kim, Bae, Huh)

**Event level metadata system**
- Event level DB R&D => Partially done, processing (Kim, Ahn)
- Data Cache system R&D => Not yet (Kim, Bae)
- Synchronization between Metadata system and data => Not yet (Kim, Bae)
On grid and etc.

- AMGA manager for Belle / Belle II R&D
  - Processing – Huh
  - Evaluation – Kim
- Flag system by Ahn & EMDC (Event meta Data Catalog) by Brian
  - Future plan
- Account system R&D – (Kim, Ahn, Huh) Paused
  - Issues?
Snap shot vs. Query

1. Can users create official data set?
   - Yes: 3. Snapshot-like Method
     - Up to 1.5TB/user
     - Paused by man power
   - No:
     - Partially allowed?
       - Yes: 2. Query
         - A few GB
       - No:
         - 1. Metadata Snapshot
           - Only for official data → 1.5 TB only

※ We need Belle II policy.
1. Can users create official data set?
   (ex. Grand reprocessing data)
2. Can users create data set partially?
Data Registration Tool kit

**Step 1. Using basf frame**
- Make Module (c++) => done
- Extract attribute => done
- Put into DB => working done by AMGA team (October, 2011)

**Step 2. Using basf2**
- To apply for basf2 frame work and sample Belle II data
⇒ Refer Junghyun’s talk
⇒ We get user requirements.
The procedure is for the proposed scheme as follows:

Proposed Scheme (1)

- Basf2 output module adds FileMetadata object to output root file
- FileMetadata object contains all information that is known at the file creation time

Root file

FileMetadata object

experiment, #events, run/eventL/H, time stamp, user, site, parents
### Junghyun’s code vs. Milosz’s

<table>
<thead>
<tr>
<th>Junghyun’s code</th>
<th>Milosz’s code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both extraction and registration of metadata (Automatically)</td>
<td>Contents</td>
</tr>
<tr>
<td>Registration of metadata only (Manually)</td>
<td>Code Language</td>
</tr>
<tr>
<td>C++</td>
<td>Python</td>
</tr>
<tr>
<td>basf2</td>
<td>Embedment</td>
</tr>
<tr>
<td>gbasf2</td>
<td>Software directory</td>
</tr>
<tr>
<td>gbasf2</td>
<td>data_handling</td>
</tr>
</tbody>
</table>

It is suggested to call Junghyun’s code for the extraction in metadata in Milosz’s code => Co-work needed
AMGA manager

- Showed how to access KISTI AMGA test-bed and write privilege for KISTI
- Showed how to write AMGA data on grid
- Made an directory for AMGA server for distributed computing group
- AMGA Web-service for Belle II will not be considered due to man power.
Flag system $\Rightarrow$ future plan

- Flag system suggested by Ahn
- EMDS by Brian
Account system issues?

- For the privilege of reading and writing of metadata, we need the role form DN of Belle/ Belle II VO.

- We need to decide who will write LFC metadata catalog and so on.

- Responsible persons may decide this policy.
To do list

Working on
- Stand-alone metadata registration tool kit
- To restart event level R&D

Delayed
- To move master node to KEK for making meta system for Belle II
- Snap-shot like style
- Account R&D issue?
Plan 2014

- To do metadata system on grid
  ⇒ Full service
- To do realization facility for production
- To continue supporting and upgrade
In order to handle 50 times more data of Belle, Belle II Data Handling Group works on:

- Metadata system and data cache system based on grids
- The scalability of Large Scale Data Handling
  - using Belle and Belle II data
- Full service for user friendly

⇒ Keep going on
Thank you.