AMGA Metadata Catalog for Belle II

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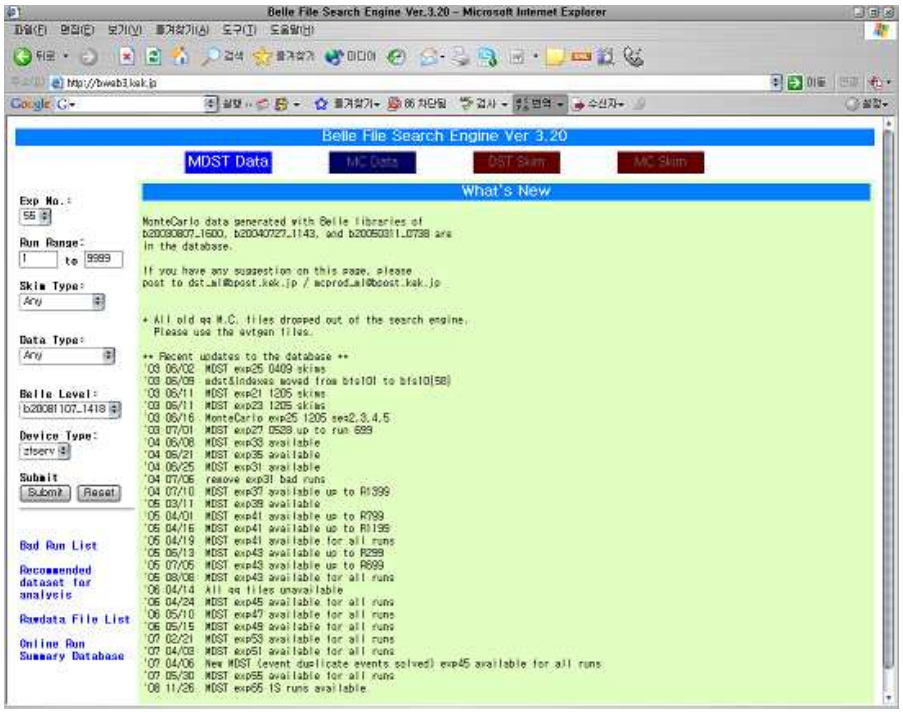
Current status in Belle

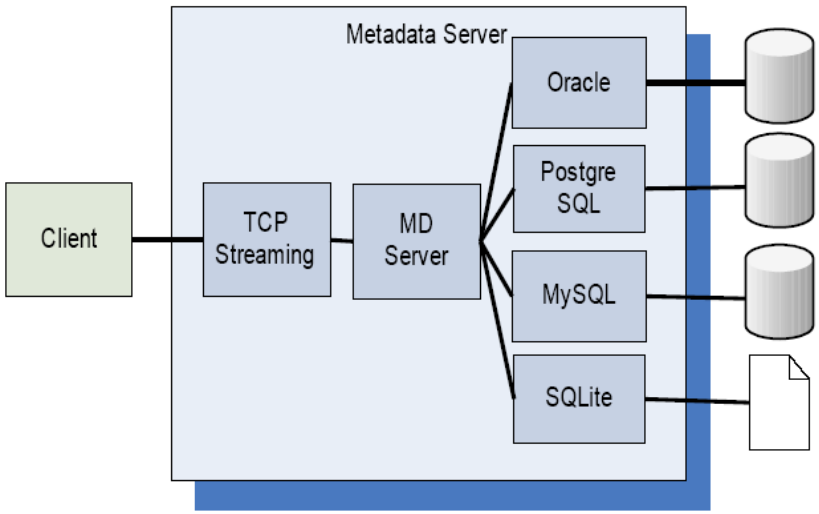
- There is the Data Handling system based on postgreSQL, PHP and HTTP in Belle
  - To find the data, the Belle users use the Belle File Searching Engine.
  - check_process_url is used for analysis based on postgreSQL.
  - The skim tool is in basf.
  - There has been already a Data Handling system in Belle.
- However, there is some problems for Belle II.
  - The postgresSQL don't have a capacity so that it control Belle data size $\times$ 50-60.
  - We consider that the system should be adapted to GRID.
  - We proposes the way to solve the problems with AMGA.
- Belle File Searching Engine



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

- AMGA is the Meta-data catalog of EGEE's gLite 3.1 Middle-ware.
  - Meta-data is relationally structured data for Grid jobs stored in databases.
- The AMGA service provides access to relational Data bases on the Grid, taking into account:

- The AMGA features:

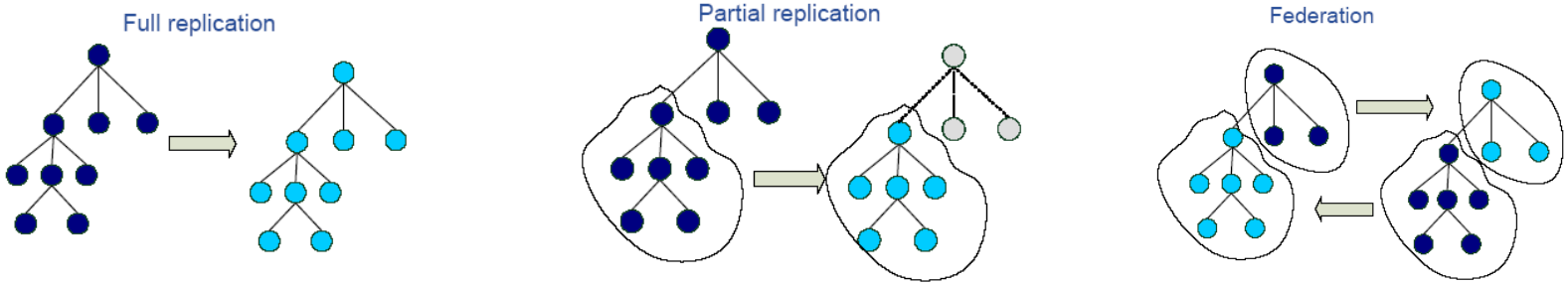


- Authentication(Grid-Proxy certificates, VOMS)
- Logging, tracing
- DB connection pooling
- Replication of Data
- Use of hierarchical table structure
- ..the Grid idea.

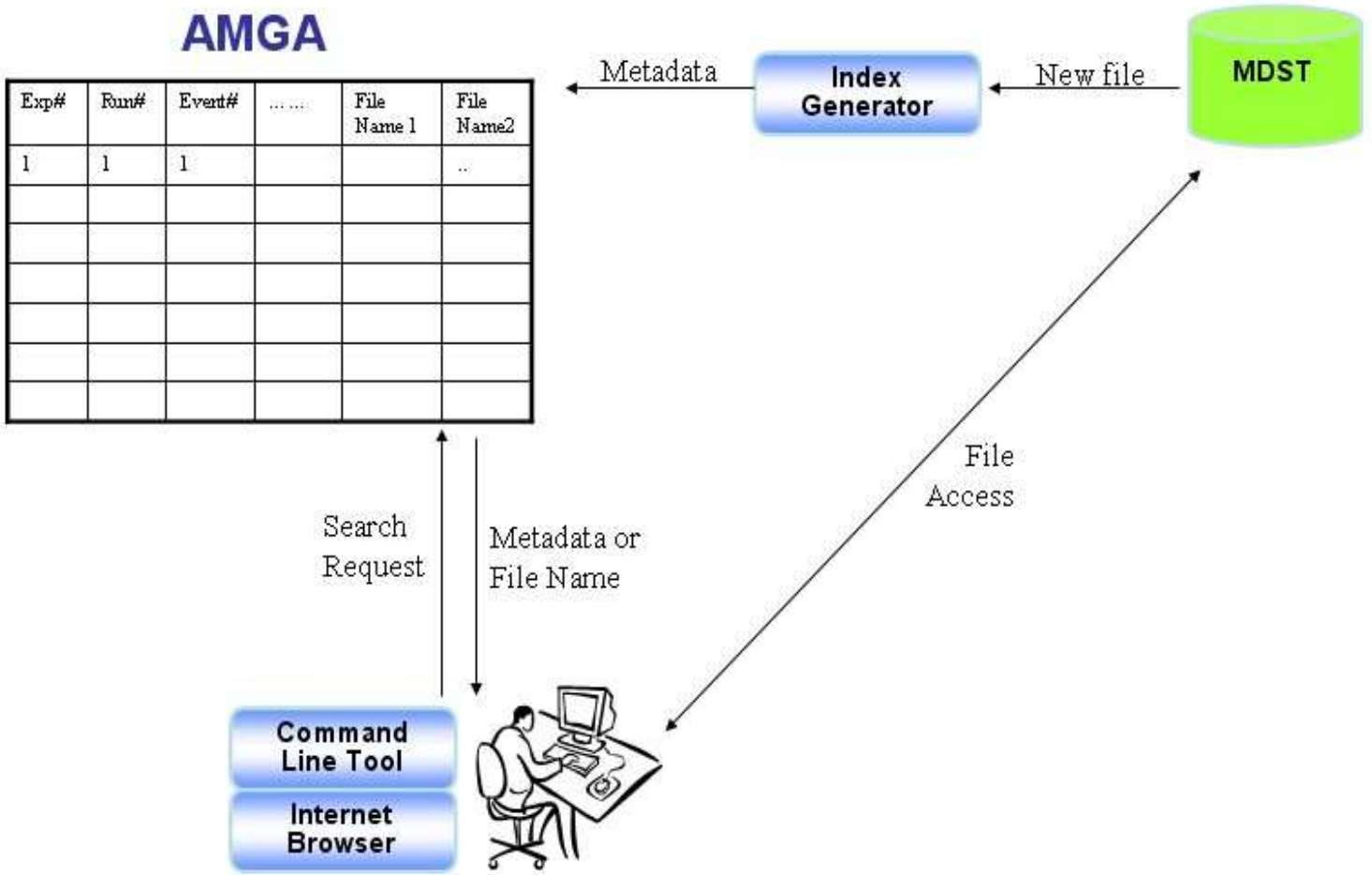
Benefit from using the AMGA in Belle II.

1. AMGA can improve the scalabily for the Data Handling system.
   - AMGA integrates replication of meta-data.
     - Asynchronous replication
     - DBs are consistent(transactions supported)
     - However, Not all DBs necessarily in same state.
   - Replication makes use of hierarchical table structure.
   - Good Performance and Scalability.
2. Belle II will support the Grid → the AMGA is included in grid middle-ware,gLite 3.1.
3. We can make the new Data Handling system of Belle II in Grid.

- AMGA replication makes use of hierarchical concept:



The Data Handling Scenario with AMGA



- We should construct the meta-data catalog of MC/data for Belle II.
- Belle II users search the data/MC from the meta-data catalog.
- We need the command line and Internet browser.

Starting Point

- We started to make the meta-data catalog with Belle.
- We will move the system to Belle II framework.
- Belle lib:

  Belle Lib : b20090127_0910
- Configuration of the AMGA : kenobi.kisti.re.kr
  - It is based on the postgreSQL.
- We extracted the parameters(attributes) from Belle lib.

To extract the attributes from the Belle data

- Extraction Interface : belle_amga_extract LFN filename
  - Based on Belle framework
  - Used on Belle data
- Output:

  mcprod-on_resonance-evtgen-uds-00-all-e000007r002865-b20030807_1600.list

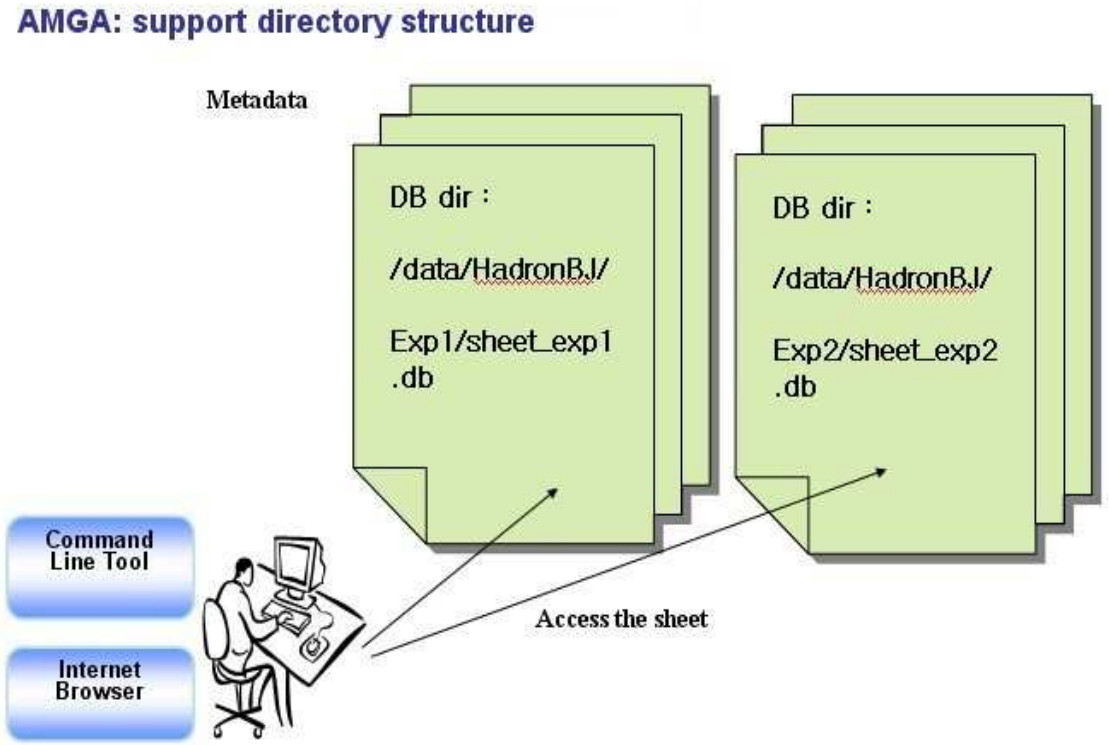
  : for Logical filename

  mcprod-on_resonance-evtgen-uds-00-all-e000007r002865-b20030807_1600.log

  - file level: 1) exp number, 2) run number, 3) event number
  - event level: 1) # of $+$ charged track, 2) # of $-$ charged track, 3) # of K_S, 4) # of K_L, 5) R2
- Flexible to attributes suggested by collaboration

The architecture in AMGA

- AMGA support the directory structure.
- The metadata sheets can be seperated with the directory structures.
- Scalability will be imppoved in AMGA



The definition of the attributes for both MC and real

- ex) sheet_real_expXX.db & sheet_MC_expXX.db
- Logical file location :
- skim type : HardronBJ, fullrec, and so on
- stream :
- exp number :
- event number :
- start run
- end run
- data type: on_resonance, off_resonance
- type: evtgen-uds, evtgen-charm, evtgen-charged, evtgen-mixed, real
- lib version

The definition of the additional attributes for events

- number of + charged tracks
- number of - charged tracks
- number of K_S^0s
- number of K_L^0s
- R2 : 0.0 - 1.0

The control of the additional attributes in AMGA

- Data
  - The biggest skimming data contain all information for events.
  - The others skimming data are the subsets of the biggest one.
  - Therefore, we don’t need to make additional sheets for all skimming.
  - To get the additional information, the meta-data size will be increased a little bit.
- MC
  - We expect the massive size for MC, but we can improve the scalability using hierarchical table structure and replicaton of meta-data in AMGA.

How to access AMGA: made by AMGA Team(Mr. SunIl An)

- Command Line Interface
  - belle_amga_access (...)
- 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 ()
- Web Interface:

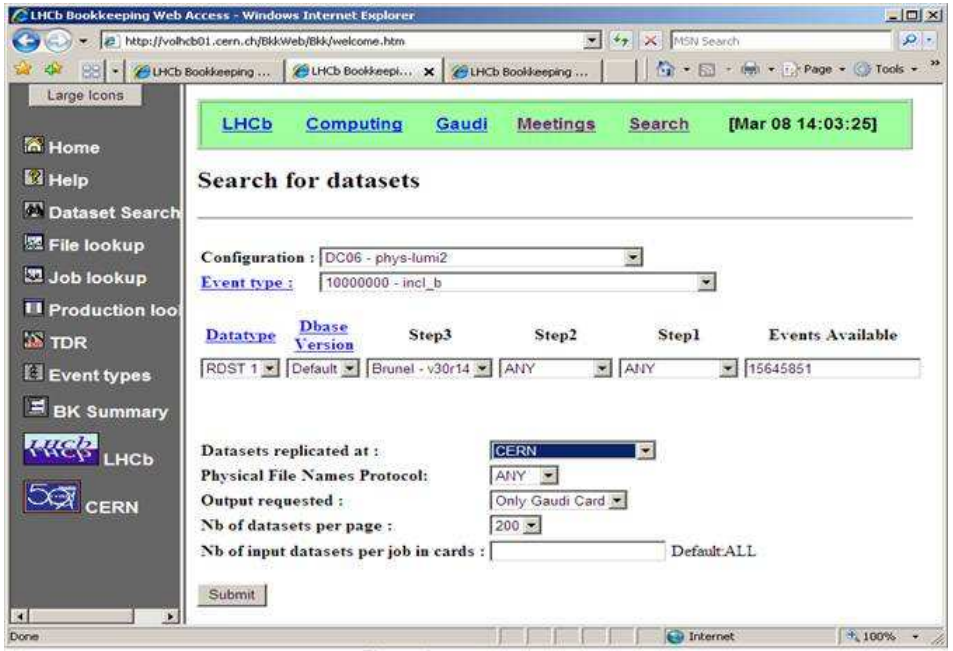


Figure 1

The usage in command line :

- Command Line Interface
  - belle_amga_access:

```
[amgadev]/home/jhkim > ./belle_amga_access
Usage : belle_access_amga [options] exp_type stream_or_skim exp_number
        -h                  help  message
        -d                  debug
        -s                  amga_server
        -p                  port
    - - start_run                   #start_run
    - - sr                      #start_run
    - - end_run                     #end_run
    - - er                    #end_run
    - - data_type                   on_resonance | off_resonance
    - - dt                    on_resonance  |  off_resonance
    - - type                    uds  |charm  |charged  |  mixed
    - - lib_version                   #version
    - - lv                    #version
```

EX) belle_access_amga - -start_run 1000 - -end_run 1200 - -type uds m 0 7

Case 1st: The usage in command line; under control in file level

- Server:150.183.250.215, client:150.183.250.215
- Output : belle_amga_access:default [same with Belle]

  [amgadev] /home/jhkim > ./belle_amga_access –start_run 1000 –end_run 1002 –type uds m 0 7

  process_event bfss06:/bdata/mcprod/dat/e000007/evtgen/uds/00/all/0807/on_resonance/10/evtgen-uds-00-all-e000007r001000-b20030807_1600.mdst 0

  process_event bfss06:/bdata/mcprod/dat/e000007/evtgen/uds/00/all/0807/on_resonance/10/evtgen-uds-00-all-e000007r001001-b20030807_1600.mdst 0

  process_event bfss06:/bdata/mcprod/dat/e000007/evtgen/uds/00/all/0807/on_resonance/10/evtgen-uds-00-all-e000007r001002-b20030807_1600.mdst 0

  [amgadev] /home/jhkim >
- If you want to use it, send to e-mail(hyun@kisti.re.kr;siahn@kisti.re.kr).

Case 2nd: The usage in command line; under control in event level

- We can ask more propertys of events.
- Output : belle_amga_access:optional [addtional attributes]

  [amgadev] /home/jhkim > ./belle_amga_access –start_run 1000 –end_run 1000 –type uds –ks=5 –kl=4 –r2==0.5 m 0 7

  process_event bfss06:/bdata/mcprod/dat/e000007/evtgen/uds/00/all/0807/on_resonance/10/ evtgen-uds-00-all-e000007r001000-b20030807_1600.mdst 7041

  process_event bfss06:/bdata/mcprod/dat/e000007/evtgen/uds/00/all/0807/on_resonance/10/ evtgen-uds-00-all-e000007r001000-b20030807_1600.mdst 2796

  process_event bfss06:/bdata/mcprod/dat/e000007/evtgen/uds/00/all/0807/on_resonance/10/ evtgen-uds-00-all-e000007r001000-b20030807_1600.mdst 5582

  process_event bfss06:/bdata/mcprod/dat/e000007/evtgen/uds/00/all/0807/on_resonance/10/ evtgen-uds-00-all-e000007r001000-b20030807_1600.mdst 4075

  process_event bfss06:/bdata/mcprod/dat/e000007/evtgen/uds/00/all/0807/on_resonance/10/ evtgen-uds-00-all-e000007r001000-b20030807_1600.mdst 514

  process_event bfss06:/bdata/mcprod/dat/e000007/evtgen/uds/00/all/0807/on_resonance/10/ evtgen-uds-00-all-e000007r001000-b20030807_1600.mdst 8747

- We should understand the File format conversion of the BASF.
- File format conversion : bfcp, dblist, dbls, mkdb
- We will control event I/O within the BASF.

Summary and Next step

1. Defined the attributes
2. constructed the architecture in AMGA
3. We made the meta-data based on Belle.
4. Is there any missing for the usage?
5. We will make fully the meta-data for Belle to test the performance.
6. We will apply the LFC to find the best location for GRID-[KEK-KISTI].
7. We will serve it for the purpose of the test and evaluation at KISTI.
   We should discuss to service with each team in KISTI.

Acknowledgement

- e-Science Grid technology Development Team:
  - AMGA software development
  - Technical Support
  - Tutorial
  - sun-Il Ahn, Soonwook Hwang

Back up