#### Archiver data to Root

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### pb to root

To provide archieved data root format in kekcc

Conversion takes times, so on-time data is not able to access,

but the data before yesterday could be easily seen in kekcc.

Full Process is :

- Conversion (Daily, done on b2arch1)
- Transfer ( Daily, from b2arch1 to kekcc )
- Combine (Once per 6 days, done on kekcc)

#### Conversion

Convert PB files in B2ARCH1 into Root file

- 3 steps :
  - pb2json (Provided by EPICS archiver )
  - json2csv ( JAVA )
  - csv2root (C++, based on SVD group's)

Takes about 30H~ to convert total 1 month PB

Number of pb : ~28000

Output Root file size is about

19G per 1 month PB (Jun 2019)

# Daily Converting

Converting Daily PB files into root file

- Starts every 00:10
- Expect ~30000 sec to full conversion
- (Now only few of PVs are connected)

Steps :

- 1. Make list of "yesterday's" archieved mts PVs
- 2. pb to json to root convertion
- 3. save converted root file in b2arch1

# Transfering

Move converted root files into KEKCC

- Starts every 06:10
- ( can be delayed if conversion takes more )
- Use rsync via B2stone, to KEKCC :
  - /gpfs/group/belle2/group/detector/SLOW/archiver/mts/
- Transfering is done within personal account due to ssh key issue.
- (Would this process remain untill I graduate?)

# Root Combining

•Hadd mts daily root file into Its monthly root files.

- Every 1st, 7th, 13th, 19th, 25th of the month
- Starts at 08:10
- (e.g 1,2,3,4,5,6th roots will make one lts roots)
- (e.g 7,8,9,10,11,12th roots will added to above)
- •This step is still on testing :
  - Daily files is not removed.
  - Will remove daily files after adding works perfectly.

#### Root file structure

Output root files include

• time\_msec/L : "the millisecond"

val/D : "the Value"

The TTree name is named after the each PV's first name

e.g

B2\_nsm:get:MONMW:VXD\_WL\_NC:value

→ TreeName : B2\_nsm

### Location

ghi/fs01/belle2/bdata/group/detector/

SLOW/archiver/[yyyy.mm]/root/lts/

/gpfs/group/belle2/group/detector/SLOW/archiver/[ lts , mts ]

• (Will remove old montly files due to storage size)

Also sample code can be found at detector/SLOW/archiver/Sample/

Every archived data is provided.

# Read root files

Sample code is provided at 2 loc: ghi/fs01/belle2/bdata/ gpfs/group/belle2/ group/detector/SLOW/archiver/Sample/

provides :

- 'the number of entries'
- 'starts and ends miliseconds'
- 'value of each archived points'
- 'graph of value per time'.

# Read root files

To setup the code, you should look into Line #41 and Line #94

#41 : Change the TTree Name (See above)

#94 : Set the Range

• ( automatic scaling does not work well for few PVs )

then,

\$ make

and

\$ ./bin/PB2ROOT\_hist [ input root file ]

#### Read root files



### Limits

PB Data with [Array] value cannot be converted

May some PBs could be omitted

with some reason

• In case you find omitted PB, please send me e-mail

# Conclusion

- •Convert, transfer and store archived data in kekcc with root file format
- •Anyone who need archived data in kekcc could use these data
- •Further infos (actually almost same) can be found at :
- https://confluence.desy.de/display/BI/archiver+convertion