Dubna approach to a ROOT-based analysis framework

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Why do we need one more framework?

- **In each analysis we have to process at least several Tb of BESIII data**
- **It can be done using BOSS (as of today)**
- **But ...**
  - **BOSS is complicated and not easy to learn**
  - **Performance issues**
  - **BOSS development cycle will slow down. Updates of the analysis code will be permanent**

To detach analysis tools from the BOSS to a separate lightweight framework sounds as a good idea

Design guidelines

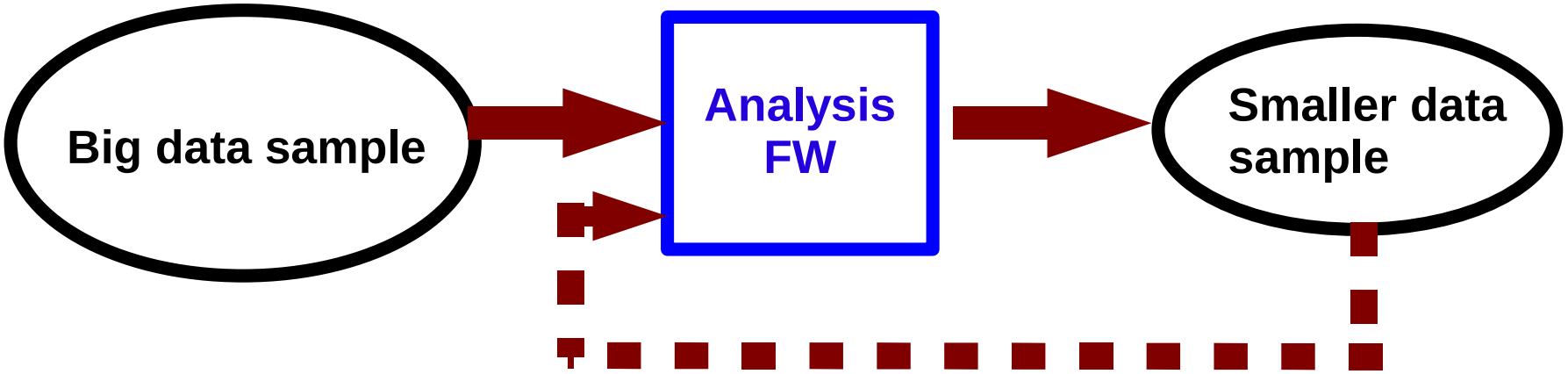
- **Capable to analyze the full data sample**
  - iterative event filtration is absolutely necessary
- **Input data are the BESIII DSTs**
- **Should it be interactive? Rather not ...**
- **Migration of existing analyses must be easy**
  - otherwise we have to support several analysis frameworks
- **Easy to learn, easy to use**
- **Fast. Job splitting is desirable.**
- **Optimized for standalone use**

The Dubna proposal

- **We propose to develop non-interactive ROOT-based analysis framework, detached from the BOSS software**
- **Input format == Output format == BESIII DST**
- **RootEventData classes as an event model**
- **The framework has to provide common functionality (histogram and, optionally, user-defined tree booking and storing)**
- **Event processing loop is fully defined by the user**
- **It should be possible to use existing analysis tools**

ROOT IO

- **Input format == Output format == BESIII DST**
- **The framework works internally with RootEventData classes — no conversion is needed**
- **User-defined histograms and, optionally, a ROOT tree can be stored in a separate file**
- **Event filtration is easy:**



Data analysis algorithm

1. Edit files UserEvent0.cc, UserEndOfRun0.cc and UserEndOfJob0.cc, according to you analysis
2. Type *make*
3. Run the program
4. Check the output histograms, think, and modify your analysis
5. Repeat steps 1-4, until your results are perfect
6. Make final plots and write a paper

DST refinement

- **To make user's life easier, we should provide a way to transit smoothly from Gaudi analysis to the new framework**
- **A good solution is to assure, that RootEventData classes have the same access methods as the Gaudi ones**
  - **only pointer type will change in the original user's code**
- **Necessary to review and modify (mostly, cosmetically) the RootEventData classes: the DST scheme might change**

Analysis tools

- Kinematic Fit
- Particle ID
- VertexFit
- BesDChain
- Standard π^0, η reconstruction
- anything else ??

All these exists already in the BOSS software

No need to re-invent

Database issue

- **Currently, analysis jobs use the database**
  - ***luminosity, vertex parameters, etc.***
- **Ideally, DST should contain all information necessary for the data analysis**
- **Shall we put these numbers into the DSTs as well?**
- **If not, to implement a database interface in the analysis framework is not a problem**
  - ***Sqlite might be handy***

Current status

- **A prototype exists *(thanks to Yuri Nefedov)***
  - ***ROOT IO, which can read and write BESIII DSTs***
  - ***Event selection/filtration capability***
  - ***Central booking and writing of histograms and (optional) user-defined tree***
  - ***User defined event loop***
- **On the next step we are going to interface kinematic fit and PID, and come up by the next BESIII meeting with a minimum necessary functionality**
- **To interface other analysis tools will require more (collaborative) efforts**

Summary

- **Detaching analysis tools from the BOSS to a separate framework would speed up BESIII data analysis and help to have more people involved**
- **A prototype of non-interactive ROOT-based analysis framework has been developed by Dubna group**
- **Without your suggestions and feedback we hardly can make anything handy and useful**

Summary

- **Detaching analysis tools from the BOSS to a separate framework would speed up BESIII data analysis and help to have more people involved**
- **A prototype of non-interactive ROOT-based analysis framework has been developed by Dubna group**
- **Without your suggestions and feedback we hardly can make anything handy and useful**

Your opinion is VERY important!

Thank you!