

Recent Highlights of the Belle II Computing

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The Belle II is the next-generation flavor factory experiment at the SuperKEKB accelerator in KEK (High Energy Accelerator Research Organization), Tsukuba, Japan. The first physics run with the full Belle II detector started in 2019, then we are now increasing the luminosity gradually. We have already exceeded the highest world record of the luminosity, which was achieved by Belle, the predecessor of our experiment. The operation will be continued until 50 times more data than Belle is collected. Such a huge amount of data allows us to explore the new physics possibilities through a large variety of analyses in quark sectors as well as in tau physics and to deepen understanding of nature.

The Belle II computing system is expected to manage the process of massive raw data, production of copious simulation and many concurrent user analysis jobs. For the Belle II is a worldwide collaboration of about 1,000 scientists working in 26 countries and region, we adopted a distributed computing model with DIRAC as a workload management system. Recently, we decided to integrate Rucio in BelleDIRAC (an extension of the basic DIRAC) system as a distributed data management (DDM) tool. We are now testing the Rucio functionality and preparing the transition from the current own made DDM to Rucio, which will happen in January 2021.

We also have established the automated procedures to transfer the Raw data from the online storage in the data acquisition system to the permanent storage at the offline computing facility located 1.5km away from the detector. In these procedures, not only the data copy but also format conversion, data validation, quality check and its performance monitoring are included. Thanks to these procedure, the Raw data is available on the KEK offline computing system within half a day after the data taking. And this allows physicists to perform the detector calibration in a timely manner.

For near future, we are planning to execute the detector calibration process on the distributed computing system to accelerate the speed of calibration performance. This also mitigates the heavy load of the KEK offline computing system. However, to realize this, we need to make the Raw data available on the Grid. We have developed an automatized Raw data registration and replication tool, so-called BelleRawDIRAC (the another extension of DIRAC) and started to use this from this year.

We will present the highlights of the recent achievements in the Belle II computing as well as the general status and plans of the Belle II experiment in this report.

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