Belle II Computing Resource Review

28 – 29 November 2017 at CERN

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This document presents a summary of the Belle II computing resources review meeting that took place at CERN on 28 and 29 November 2017. At the meeting, Belle II collaborators presented the status of software (T. Kuhr), computing (T. Hara), skimming (R. Cheaib) and data production (J. Bennett), as well as an extended overview of the resource requirements for the period 2019–2022 (F. Bianchi), supported by the physics motivation for the production of large simulated samples (P. Urquijo).[1]

The committee was duly impressed by the progress since the last BPAC meeting in February 2017. Significant efforts were made to speed up simulation and reconstruction software, to smoothen operation and to establish the entire chain from data taking to physics analysis. Particularly important milestones reached in 2017 were large scale production of Phase II simulation data, the first implementation of event skimming and the processing of user jobs on the grid. Joining of new institutes from the US (BNL), France and Israel brought in new computing resources and expertise. The committee takes note of the foreseen shift of computing responsibilities from PNNL to BNL, for which there seems to be a well worked out plan. It should be stressed that the transition must be smooth and timely for the Phase II operation.

The computing resource request for 2019 is to be approved at B-factory Programme Advisory Committee meeting in February 2018. The aim of the present meeting is

[1] See presentations at `https://kds.kek.jp/indico/event/26193/`.

to identify any shortcomings in the proposal before the submission of the request. As the computing model becomes more mature, the uncertainties in projections for resource requirements have reduced in comparison to previous years. The committee has no major objections to the assumptions that go into the estimates. The committee particularly appreciates the way the numbers were presented by showing the incremental impact of each change with respect to the previous estimates. In view of what was presented at the meeting, the committee has a number of requests and suggestions to be included in the final request, detailed below.

Requested, pledged and used resources for countries
In order to obtain a better overview on how forthcoming national agencies are in providing computing resources, and how efficient the collaboration is in using them, the committee would like to receive a summary of requested, pledged and used resources, for each participating country, for the year 2017. For future review meetings, the committee would be interested in receiving this information for the year preceding the meeting.

Smoothening operation
The committee notes that there were extended periods of time in which only a fraction of the requested CPU resources were actually used in 2017. In these periods the production was halted waiting for, among others, release validation and the production of the machine background simulation, which were carried out only at KEK. Care should be taken to prevent periods of inactivity. The committee would like to get a better understanding of how the problem of smoothening CPU consumption is addressed.

Backup for essential services
The committee notes that some computing services essential for production — such as the Dirac server — become unavailable during the KEK power outages. The committee suggests that a plan is developed to ensure continuity by introducing a second site.

HLT simulation
In the resource projections, simulation of the High Level Trigger (HLT) takes a non-negligible amount of CPU power. The plans for HLT simulation still seem somewhat uncertain. The committee advises that these plans be worked out ahead of resource requests beyond 2019.

Data skimming
A sizeable fraction of resources is required for skimming the data. The committee was pleased to see that a first realistic skimming model has been implemented and exercised. The current strategy is to run separately over the data for every skim. An alternative

strategy is to run over the data once with a job writing out the full set of skims. The latter strategy leads to smaller CPU resource requests as the overhead due to I/O and the creation of 'common particle lists' is smaller. The committee suggests that tests are performed to see whether the gain in CPU time warrants a change in strategy.

User jobs
Production of n-tuples from skimmed data is expected to be another considerable factor for the resource requirement in the future. As these jobs are scheduled by users rather than by the centralised production team, they may lead to extra load on the system that is hard to control, particularly in periods leading to important conferences. The committee suggests that the collaboration actively thinks about ways to organise the n-tuple production such that no bottleneck is created in the n-tuple production.