System Performance and Cost Modelling in LHC computing

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Abstract. The increase in the scale of LHC computing expected for Run 3 and even more so for Run 4 (HL-LHC) over the next ten years will certainly require radical changes to the computing models and the data processing of the LHC experiments. Translating the requirements of the physics programmes into computing resource needs is a complicated process and subject to significant uncertainties. For this reason, WLCG has established a working group to develop methodologies and tools intended to characterize the LHC workloads, better understand their interaction with the computing infrastructure, calculate their cost in terms of resources and expenditure and assist experiments, sites and the WLCG project in the evaluation of their future choices. This working group started in November 2017 and has about 30 active participants representing experiments and sites. In this contribution we expose the activities, the results achieved and the future directions.

1 Introduction

Explain motivations, give current extrapolations to the HL-LHC scale.

Describe history of WG, goals, participation, areas of work.

≤ 1 page.

2 Workload characterisation and metrics

Explain the need for metrics to characterise the workload.

Explain the interplay among applications, sites, resource utilisation.

Talk about the tools we use (prmon, Trident).

≤ 2 pages.

3 Resource estimation

Explain why we need a framework to calculate resource estimates.

Describe the common framework derived by Ken Bloom.

Describe the work needed to be utilised by other experiments.

≤ 1 page.

4 Site cost estimation

Explain the importance of a common method to estimate the costs for sites given the resource needs of the experiments.

Describe Renaud's model and future perspectives for this area.

≤ 1 page.

5 HL-LHC and areas of improvement

Describe the potential gains achievable on a medium-long term.

Describe the recent studies of caching as an example of an area for R&D.

≤ 2 pages.

6 Conclusions

Conclusions.

≤ 0.5 pages.

References

[1] Journal Author, Journal **Volume**, page numbers (year)
[2] Book Author, *Book title* (Publisher, place, year) page numbers