RO-LCG INPUT TO EUROPEAN STRATEGY FOR PARTICLE PHYSICS UPDATE

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OVERVIEW

☐ RO-LCG

Romania participates in the WLCG collaboration with the RO-LCG Tier-2 Federation, a consortium of research and academic institutions that was established in 2006 in order to coordinate and reinforce the national support provided by the experimental groups to the LHC Computing. The consortium counts today five institutions: Horia Hulubei National R&D Institute for Physics and Nuclear Engineering, the Institute for Space Science, the National Institute for R&D in Isotopic and Molecular Technologies from Cluj-Napoca, 'Alexandru Ioan Cuza' University from Iasi, and 'Politehnica' University of Bucharest. The RO-LCG staff, whose competency was built and consolidated during the last decade regarding the deployment, operation and maintenance of the local Grid infrastructure, is commited in the implementation of new technologies, together with the adoption and optimization of software tools for meeting the computing requirements of the experiments carried out at the LHC. The 8 grid centres of the RO-LCG currently provide 11,000 logical CPU cores and more than 4 Petabytes of harddisk capacity for the offline processing and data analysis of the ALICE, ATLAS and LHCb experiments, ranking 10th among the 37 Tier-2s worldwide regarding the CPU time consumed in 2017.[1]

☐ Scientific context

Due to the estimated increase by a factor of 5-10 of the average rate of collected events once the HL-LHC enters production regime, a global effort is ongoing for improving the computing models and the software used by the LHC community, in order to avoid issues regarding data accumulation and handling, such as storage resource shortage and network overloads. Because of funding and technology advances limitations, increasing the WLCG resource capacities cannot keep up with the demand[2]. Therefore, new solutions are proposed regarding the optimization of the resource usage, the coupling between the available computing and data sources, the improvement of the data transfer management and accessibility[3]. The WLCG will undergo major changes, its current infrastructure being replaced by a federated data centre consisting of a few large repositories interconnected through a private, high speed, software-defined network, and a cloud of data caching centres whose contribution to WLCG will depend on their network capabilities.

☐ Objectives

The strategic objective of the RO-LCG Federation is its transformation in an "*HEP-owned medium sized data center*"[4] of the WLCG, which will provide reliable offline computing services for the ALICE, ATLAS and LHCb experiments. It is intended that RO-LCG will maintain its current ranking among the WLCG partners with respect to the Grid production levels, and will be prepared for the future challenges generated by the HL-LHC.

☐ Methodology

Investment should continue to be made in the national Grid infrastructure in order to support the increasing data storage, handling, processing and analysis requirements. The upgrades

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[1] https://wlcg-rebus.cern.ch/apps/topology/federation/252/, https://accounting-next.egi.eu, http://alimonitor.cern.ch

[2] HSF, *A Roadmap for HEP Software and Computing R&D for the 2020s*, arXiv:1712.06982v4, 8 Jul 2018

[3] *WLCG Strategy towards HL-LHC*, WLCG-LHCC-2018-001, 2018-10-19, http://cds.cern.ch/record/2621698

[4] https://docs.google.com/document/d/1dm5vxejQrKZ19Y-pBLaqBcI_Z_yEN6S0N3Z4UonoTn8/edit

should include the bandwidth of the NREN RoEduNet's connection to GEANT, that must become of the order of 100 Gigabit/sec. Most of the additional Grid equipment will be installed in the new Centre for Advanced Computing at IFIN-HH that provides hosting capacity for minimum 20 years. The infrastructure will be adapted to the evolving requirements of the collaboration, through systematic network, processing and data infrastructure changes/upgrades for ensuring compatibility with WLCG. This will include structural changes within RO-LCG, ment e.g. to simplify data management, for reaching significant gains in efficiency and cost reduction. The duration of adoption of new technology and procedures will be considerable shortened, and redundant activities will be avoided, keeping the costs and manpower within reasonable limits. A long-term plan of measures will be implemented for the recruitment, training of new staff and maintaining the stability of qualified personnel.

☐ Readiness and expected challenges

The strategic objective is motivated by the commitment of the experimental teams to participate in the HL-LHC project, the 12-year investments in the RO-LCG infrastructure, and the existing human resources that are highly qualified in Grid and experiment-specific computing. Nevertheless, currently RO-LCG stands out in the WLCG ecosystem through the oscillating and unpredictible nature of its funding, that makes difficult the implementation of any longer term strategy. The safe funding of the consortium on the basis of a realistic flat-budget planning is necessary in order to keep the RO-LCG contribution at the level of a medium-sized centre.

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