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Experience of operation the organized grid data analysis using Hyperloop train system

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Operational experience with the Hyperloop train system is presented. This framework facilitates organized grid data analysis in ALICE at the Large Hadron Collider (LHC). Operational since LHC Run 3, the system enables efficient management of distributed computing resources via a web-based interface, optimizing workflow execution and resource utilization. Hyperloop structures analyses as modular trains composed of interconnected wagons –configurable workflows handling both user-defined tasks and expert-level services. Key features encompass automated resource estimation, testing, submission, alongside tools for version control and dataset comparison.

Based on multiple years of work as a Hyperloop operator, the role of such framework in running the organized grid-based analysis for large collaborations is highlighted, and its adaptability to other mega-science projects is discussed. Solutions for stability, validation, and user accessibility are highlighted. Furthermore, the application of this operational experience to the development of analysis train systems for the MPD experiment at the NICA collider is discussed.

Comment:

Hyperloop is a framework for the grid data analysis in ALICE. It is run 24/7 and operated by four groups by set by geographical considerations. In 2022-2024 I was chairing the team of operators from St. Petersburg State University. Member of ALICE Collaboration since 2011. In 2014-2015 Coordinator of mass Monte Carlo production in ALICE. 2021-2022 expert of PWG-CF working group of ALICE for Monte Carlo modelling. Since 2024 - responsible for grid infrastructure for LHC/NICA in St. Petersburg State University.

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