

Data Flow Simulation of the ALICE Computing System with OMNET++

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Rifki Sadikin, Furqon Hensan Muttaqien, Iosif Legrand, Pierre Vande Vyvre for the ALICE Collaboration

The ALICE computing system will be entirely upgraded for Run 3 to address the major challenge of sampling the full 50 kHz Pb-Pb interaction rate increasing by a factor 100 times the present limit. We present, in this paper, models for data flow from detector read-out hosts to storage elements in the upgraded system. The model consists of read-out hosts, network switches, and processing hosts. We simulate storage, buffer and network behavior in discrete event simulations by using OMNET++, a network simulation tool. The simulation assumes that each read-out or processing host is a regular computer host and the event size produced by read-out hosts is set to follow ALICE upgrade requirements. The data, then, flow through TCP/IP-based networks through processing hosts to storage elements. We study the performance of the system for different values of data transfer rate and different data compression/reduction ratio. We use the simulation to estimate storage requirements and the optimal buffer size for network traffic in the upgraded system. Furthermore, we discuss the implications of simulation results for the design.

Tertiary Keyword (Optional)

Data processing workflows and frameworks/pipelines

Secondary Keyword (Optional)

Simulation

Primary Keyword (Mandatory)

DAQ

Authors: MUTTAQIEN, Furqon Hensan (Indonesian Institute of Sciences (ID)); SADIKIN, Rifki (Indonesian Institute of Sciences (ID))

Co-author: LEGRAND, Iosif-Charles (California Institute of Technology (US))

Presenter: SADIKIN, Rifki (Indonesian Institute of Sciences (ID))

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