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JUNO performance evaluation and optimization on virtual platform

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JUNO (Jiangmen Underground Neutrino Observatory) is a multi-purpose neutrino experiment designed to measure the neutrino mass hierarchy and mixing parameters. JUNO is estimated to be in operation in 2019 with 2PB/year raw data rate. The IHEP computing center plans to build up virtualization infrastructure to manage computing resources in the coming years and JUNO is selected to be one of the first experiments to run on virtual platform. Before migrating, performance evaluation and optimization for JUNO software on virtual platform is necessary. With benchmark tools and current JUNO offline software, the paper will present the design of a complete set of tests to find out the best choices of virtualization infrastructures including hardware, hypervisor, memory and size of VMs, etc. To facilitate testing procedures, automatic tools have been developed. The findings during tests and the suggestions to future improvements of JUNO software will also be described in the paper. In the optimization part, we will describe the factors affecting performance and the ways we manage to improve JUNO simulation and reconstruction processes in virtual platform by 10% ~20% in multi-VM cases. Besides detailed tests in single machine, we also do the scale tests to find out performance behaviors in real application scenarios.

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