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Phenomenology Tools on a OpenStack Cloud Infrastructure

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Impact

We have implemented a new computing environment for particle physics phenomenology that can easily be translated to other branches of science. It is based on a IaaS cloud deployed with OpenStack services.

The setup of OpenStack and the development of the self-instantiation mechanism has been clearly appreciated by the researchers doing this type of computations. The solution frees the user from complex code installation or machine availability and allows to create reproducible software setups for recovering scientific results.

We found no excesive penalty due to virtualization: degradation in performance was on the order of 3% for the tested applications.

The possibility of accessing resources in a more flexible way, the time that researchers spare using the new environment on software configuration compensates largely the usage of virtualized resources for the codes under investigation.

Summary

We present a new environment for computations in particle physics phenomenology using a cloud computing model. On this environment users create and manage virtual machines which get contextualized in an automated way with the phenomenology codes/tools needed for their computations. We analyze the performance of the virtual machines versus the utilization of real physical hardware.

Description

We have deployed a new environment for computations in particle physics phenomenology on a OpenStack-based IaaS cloud resources. We have created a contextualization service that frees users from the overhead of installation and set-up of the codes, thus offering a ready to use computing environment with all the software packages required for the calculations, each of them with their particular idiosyncrasies regarding compiler versions, dynamic libraries, etc. The service is accessible through a user friendly web interface integrated in the OpenStack web dashboard.

We have analyzed two representative use cases of particle physics phenomenology with performance evaluations of the virtualization against the physical hardware. In this way we provide a qualitative result for the influence of the host operating system on the performance of a representative set of applications for phenomenology calculations.

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