CernVM: Minimal maintenance approach to the virtualization

Content:
CernVM is a Virtual Software Appliance designed to support development cycle and execution needs of LHC experiment’s applications.

CernVM consists of three key components that differentiate our approach from more traditional Virtual Machines.

The first component is a minimal OS platform packaged in the form of virtual machine image and made available for all major commercial and open-source hypervisors.

It provides a uniform environment based on Scientific Linux 5, which can be further extended and customized for various deployment use cases specific needs of each experiment. By deploying the minimal OS we considerably reduce the frequency of subsequent OS updates.

The second component is a customized filesystem (CernVM-FS), developed specifically to support the pattern of frequent software releases. CernVM-FS decouples the system infrastructure from the application life cycle by delivering the components of LHC experiment software at execution time and caching them for possible reuse. All this is done using standard Web protocols and solutions to scale up the system to global level.

By using such file system, we avoid completely the need for frequent image updates and their distribution to the individual nodes.

The third component is an appliance agent providing a simple means to configure and integrate appliance into production infrastructure by means of a Web user interface and XML-RPC API.

CernVM incorporates automatic configuration facilities particularly crafted for easy deployment in virtualized environments. The aim is to be able to realize complex deployment of many CernVM instances relying exclusively on service discovery and role negotiation to minimize the system administrator work.

In this contribution we describe the overall architecture and present how end-to-end
systems corresponding to various HEP use cases can be realized using CernVM. Finally, we estimate and compare maintenance cost with traditional approaches that do not rely on CernVM model.

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