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Container-based service deployment in private and public clouds

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Container technologies are rapidly becoming the preferred way to distribute, deploy, and run services by developers and system administrators. They provide the means to create a light-weight virtualization environment, i.e., a container, which is cheap to create, manage, and destroy, requires a negligible amount of time to set-up, and provides performance equatable with the one of the host.

Containers are particularly suitable for distributing and running software following a microservice-based architecture: Complex services are broken down into fundamental applications responsible for specific tasks and running independently on the others. In this context, one container constitutes a building block of the entire architecture and hosts a single application with its dependencies, libraries, and configuration files. The final service is assembled by running and orchestrating multiple containers at the same time, each responsible for a specific application.

In this work, we introduce Boxed: A container-based version of EOS (the CERN disk/cloud storage for science), CERNBox (Cloud storage & synchronization service), and SWAN (Service for Web-based ANalysis). Boxed is available in two flavors: (i) A one-click setup for personal use where all services run on a single host; and (ii) a production-oriented deployment with the ability to scale out according to the storage and computing needs.

Boxed demonstrates how CERN core services can be deployed in diverse scenarios, ranging from desktop and laptop computers to private and public clouds. In all contexts, Boxed delivers the same fully-fledged services used daily by CERN scientists in demanding scenarios. We report on our experience in the development of Boxed, on its future evolution and large-scale testing, and on its adoption in the context of educational and outreach activities.

Primary author: BOCCHI, Enrico (CERN)

Presenter: BOCCHI, Enrico (CERN)

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