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ScienceBox as Deployment Model for CS3MESH

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Docker containers are the de-facto standard to package, distribute and deploy applications on cloud-based infrastructures. Commercial providers and private clouds expand their offer with container orchestration engines (e.g., Kubernetes, Docker Swarm, Apache Mesos), making the management of cloud resources and container-based applications tightly integrated.
A key feature of container orchestration consists in decoupling the container images from the runtime configuration. This simplifies the release management of containerized software (i.e., developers provide a single, immutable image that is uniquely identified by a tag) and also the customization of services to the specific deployment context (i.e., local administrators only maintain the configuration parameters), ultimately enabling the re-usage of one container image in different scenarios.

In this context, CERN Storage provides ScienceBox: An integrated software bundle with distributed storage and computing services for general purposes and scientific use. ScienceBox features 1. EOS, the CERN storage technology for physics data and users' files, 2. CERNBox, the cloud synchronization and sharing platform for science, 3. SWAN, the Jupyter notebook service at CERN, and 4. CVMFS, the software distribution service used by the worldwide computing grid. ScienceBox can run on a single machine with Docker Compose or scale-out across multiple hosts when used jointly with Kubernetes.

ScienceBox is evolving into a modular and fully customizable bundle where each service component can be deployed through Helm charts. This provides all-round configuration flexibility and allows each site part of the CS3MESH to install on-premise the complete stack of ScienceBox services or only a subset to be further integrated with pre-existing services. The ease of deployment provided by container technologies and the modular architecture of ScienceBox aim at fostering the distribution of open-source scientific software across multiple institutions to increase the interoperability beyond the borders of single clouds and support a collaborative work environment for scientific research.

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