ComputeOps

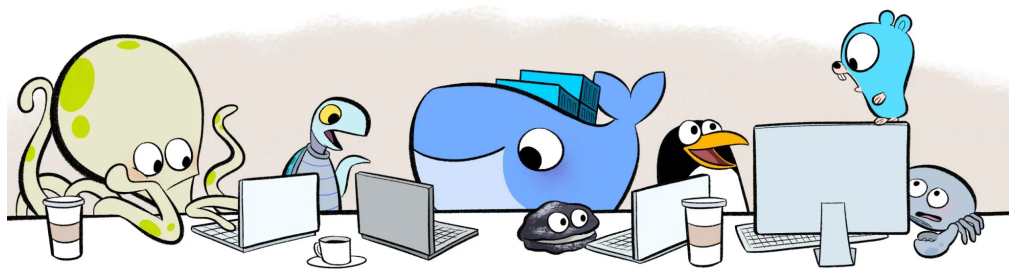
Martin Souchal et Cécile Cavet, 24 juin 2022

Background

- The main objective of the project is to study the advantages of containers for HPC applications. The sub-objectives follow from this premise: organize technology watch, training and dissemination of knowledge and know-how to the whole community (research as well as technical staff).
- Since 2018, the project is funded by master project DecaLog IN2P3 up to 7 k€ for missions and the organization of training or technical seminars.
- The project participants are staff from the institute's laboratories (APC, IJCLAB, LPC, LPNHE, LLR, IPHC, CC), external partners (IAS, INRAE, CEA, Universities, INS2I, CNES) as well as the private sector (Sylabs, INTEL).
- 1 videoconference per month, 1 face-to-face workshop per year.

Technical issues

- Compare the different container technologies (docker, rocket, lxd, udocker, singularity, shifter, apptainer): effect on performance, vectoring, access to compute gas pedals, security, ease of administration and use. Is there a decisive advantage to disdaining the dominant tool (Docker) and turning to "HPC" alternatives (Apptainer, Singularity, Shifter,...)?
- Compare the different orchestrator technologies (Kubernetes, Nomad, etc.)
- Study the interoperability of technologies. In particular, images and image reconstruction files. For example, could a user develop on his workstation in Docker, then deploy on a data center in Singularity?
- Validate the compatibility of containers with the grid.
- Study the benefits of a devOps organization in research



- Animation and coordination of an inter-institute network (consulting and testing of cloud/HTC/HPC infrastructures)
- Technology watch (training, workshops, publications...)
  - Workshops in 2018 and 2020
  - Posters and conference proceedings at CHEP 2018, 2019 and 2020
  - Singularity pool at IJ (Oct 2018).
  - Singularity training at SBAC-PAD (Sept. 2018).
  - JDEV 2017: Training transport its parallel applications with LXD and Singularity containers.
  - Docker/Singularity at FACe (Jan. 2018), Docker Workshops at APC during summer 2020
  - Containers for Computing - AI DevTalks INRIA (July 13, 2021)
  - Containers for Computing - UST4HPC Training (January 20, 2021)
  - Kubernetes for Computing - IN2P3 CC Kubernetes Day (February 19, 2020)

- Comparison of container technologies for IN2P3 computing
- Community Services
  - Singularity Hub for Research
- Containerization of pilot applications
- ~~Multi-container and multi-resource submission tool prototype~~

- The initiative of the CSAN (Comprehensive Software Archive Network) project is to offer the ESRI community a catalog of open-source scientific applications ready to use and optimized for national computing centers and mésocentres.
- The platform will allow software authors to upload their source versions
- Through integration and continuous development methods, the code will be compiled and packaged in order to make it accessible and installable without effort on different operating systems and to as many users and infrastructures as possible.
- This application catalog will be searchable through a web portal and an open API for integration into the various mésocentres.
- Multi-site platform hosted at the IPHC, the Montpellier mésocentre and the APC.

- Strengths: very attractive R&D topic
- Weaknesses: several members have left and have not been renewed.
- Opportunities: the CSAN project is part of the Open Science approach with a direct connection to Software Heritage
- Threats: the volatility of container solutions (Singularity was bought by Sylabs and then there was a fork in the open source community with Apptainer) requires constant R&D monitoring

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Background

Technical issues

Key challenges

Technical Achievements

CSAN

SWOT analysis

Perspectives

- Organization of a face-to-face workshop in 2022
- ANF Containers organization in production 2023
- Proof of Concept HPC - Kubernetes
- CSAN platform in production on shared infrastructure (INRAE, IPHC and APC)
- Increase in the number of participants
- Recruitment of a CDD EOSC for CSAN ?

Questions