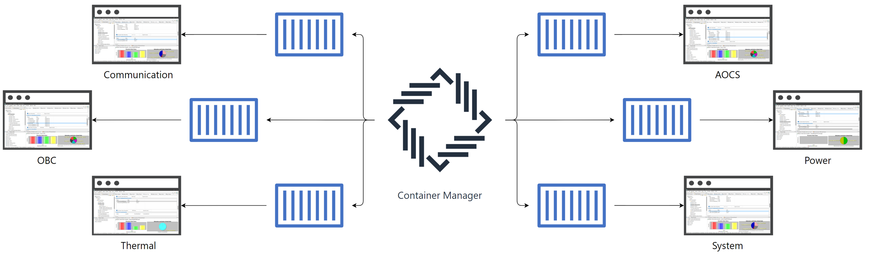
Remote Rendering of Legacy Desktop MBSE Tools for Concurrent Engineering Studies



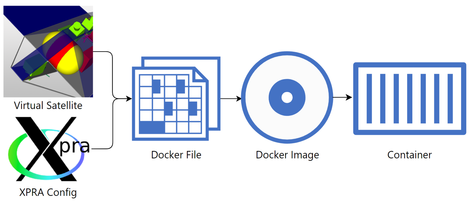
A setup for a typical concurrent engineering study. For each engineer a container instance is created which renders the MBSE tool Virtual Satellite 4 on the server. Virtual Satellite 4 is automatically setup and the container manager provides a link which can be used by a web browser to access the remotely rendered application.

Abstract

Space missions are evaluated in feasibility studies in the Concurrent Engineering Facility (CEF) at DLR. The CEF consists of a heterogeneous landscape of lab computers, DLR laptops, and external devices. Different domain tools are used to conduct a study. Some of these tools are implemented as desktop applications. Remote rendering enables a way to provide tools for any hardware architecture. To lower adoption barriers, remote rendering provides a migration path for legacy tools and their data and processes to be accessible via a web browser without the extra need of software installations.

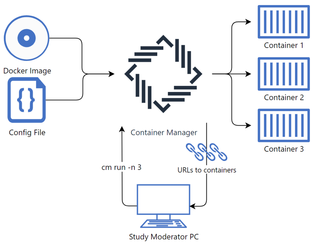
Concurrent engineering study in the CEF at DLR

Remote Rendering of a Legacy MBSE Tool



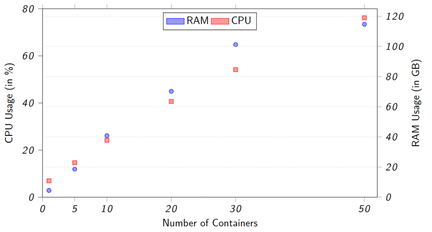
Steps to enable remote rendering of the MBSE tool Virtual Satellite 4. First an executable of Virtual Satellite 4 and an XPRA config is needed to enable remote rendering of Virtual Satellite. Via a Docker File, everything is packaged into a portable, reproducible Docker Image. The image can then be instantiated as a container.

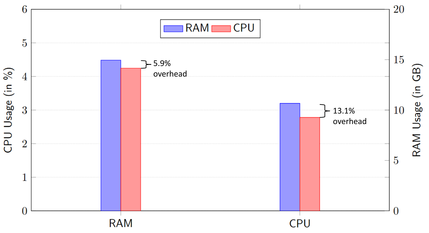
Development of an Easy to Use Container Manager



Workflow of the Container Manager. The Container Manager is accessed via the terminal. With a single command, the amount of containers can be specified and started. The Container Manager uses Docker to instantiate containers based on a Docker Image and a Config File. After starting the containers it provides a URL for each container which can be distributed across the study participants.

Results





Evaluation run on a Intel Core i9-13900K, 128 GB RAM, NVIDIA RTX A5000

+ Engineers perceived better performance vs. local execution
+ On the available machine up to 50 sessions can be hosted
+ Preparation effort for engineers and study moderator reduced
+ Updates centralized and not per machine
+ User Experience is indistinguishable from desktop version
− Remote rendering adds measurable overhead

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