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Containerization technologies: taxonomies, applications and challenges

Ouafa Bentaleb[1,2,3] · Adam S. Z. Belloum[3] · Abderrazak Sebaa[4,5] ·
Aouaouche El-Maouhab[1]

Abstract
Modern scientific research challenges require new technologies, integrated tools, reusable and complex experiments in distributed computing infrastructures. But above all, computing power for efficient data processing and analyzing. Containers technologies have emerged as a new paradigm to address such intensive scientific applications problems. Their easy deployment in a reasonable amount of time and the few required computational resource make them more suitable. Containers are considered light virtualization solutions. They enable performance isolation and flexible deployment of complex, parallel, and high-performance systems. Moreover, they gained popularity to modernize and migrate scientific applications in computing infrastructure management. Additionally, they reduce computational time processing. In this paper, we first give an overview of virtualization and containerization technologies. We discuss the taxonomies of containerization technologies of the literature, and then we provide a new one that covers and completes those proposed in the literature. We identify the most important application domains of containerization and their technological progress. Furthermore, we discuss the performance metrics used in most containerization techniques. Finally, we point out research gaps in the related aspects of containerization technology that require more research.

✉ Ouafa Bentaleb
  ouafabentaleb@gmail.com

Extended author information available on the last page of the article