Chapter 7
Containerization:
Containers as a Service and Container Security

Swapna Mudrakola
https://orcid.org/0000-0003-2816-6857
Matrusri Engineering College, India

Krishna Keerthi Chennam
Vasavi College of Engineering, India

Shitharth Selvarajan
https://orcid.org/0000-0002-4931-724X
Leeds University, India

ABSTRACT

Applications are developed and deployed on the specific stack of software, as virtualization creates an environment to run the designed stack of software. Virtualization requires the installation of the entire software to run the application. The environment setup time will take more than, the execution time. Memory and CPU time are not effectively utilized. The containers are replacing the drawback of installing the unnecessary services of the software, not requiring running applications. The container consists of only the required services software loaded in the container. Container security is also an important aspect of utilizing applications with portability features. Different tools are designed for different aspects of security issues.

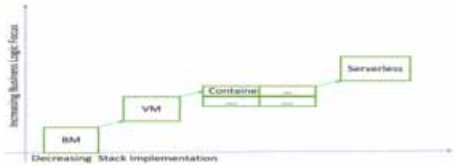
1. INTRODUCTION

Serverless computing in a cloud environment implements and runs small applications without interacting with the server regularly. The applications developed in serverless computing technology focus on developing an interactive and user-high-end technology that deploys on containers. The containers can

DOI: 10.4018/979-8-3693-1682-5.ch007

be run by the cloud service provider and manage services like operating systems, security management, monitoring systems, planning, etc as per Wen (2023).

Figure 1. Architecture environment for containers in serverless computing



1.1 Characteristics of Containers

Containers are the individual packages of resources required to run applications or services. Containers are used to deploy, run applications, and scale up services. Microservices run on containers, and containers provide the required environment to execute the application. The containers can host on Linux and specific Windows operating systems, and microservices can execute on developer workstations and also on local systems. Containers running locally will not cost, but server communication will cost only execution time and auto-scaling of services as per Ambrosino (2023). The operating system kernel is shared to run applications in containers, whereas, in virtual machines, the entire operating system is loaded to run applications. The containers can be deployed on bare metal servers or a cloud virtual machine. A single application can run multiple containers based on the required environment, like a web server, database, and application server, on different containers as per Wang (2023).

1.2 Benefits of Containerization

Containerization can run the application in different programming languages with a single operating system. It works on the principle of the microservices model. The task can be divided and run on multiple containers and operate clusters for orchestrators using Kubernetes as per Yang (2023).

Figure 2. Benefits of containerization