

**CONTAINERIZATION TASK**

**[CSC 2101](https://elearning.utamu.ac.ug/course/view.php?id=1980" \o "J25.CSC 2101 - Operating Systems/CS 201 Operating Systems) OPERATING SYSTEMS**

**SEP23BCS/3472U/F NABATANZI GORRET**

**Explain the concept of containerization.**

**Containerization** isa software deployment process that bundles an application’s code with all the files and libraries it needs to run on any infrastructure. It is a lightweight virtualization technique that allows applications to run in isolated environments called containers.

**What are the key use cases of containerization**

The following are some use cases of containerization.

**Cloud migration**

Cloud migration, or the lift-and-shift approach, is a software strategy that involves encapsulating legacy applications in containers and deploying them in a cloud computing environment. Organizations can modernize their applications without rewriting the entire software code.

### **Adoption of micro-service architecture**

Organizations seeking to build cloud applications with microservices require containerization technology. The microservice architecture is a software development approach that uses multiple, interdependent software components to deliver a functional application. Each microservice has a unique and specific function. A modern cloud application consists of multiple microservices. For example, a video streaming application might have microservices for data processing, user tracking, billing, and personalization. Containerization provides the software tool to pack microservices as deployable programs on different platforms.

### **IoT devices**

Internet of Things (IoT) devices contain limited computing resources, making manual software updating a complex process. Containerization allows developers to deploy and update applications across IoT devices easily.

**Explore different containerization technologies such as Docker, Podman, and**

**Kubernetes. How do they differ from Virtual Machines?**

**Docker (Docker Engine),** is a popular open-source container runtime that allows software developers to build, deploy, and test containerized applications on various platforms. Docker containers are self-contained packages of applications and related files that are created with the Docker framework.

**Podman,** is a daemonless alternative to Docker with rootless support

### **Kubernetes** is a popular open-source container orchestrator that software developers use to deploy, scale, and manage a vast number of microservices. It has a declarative model that makes automating containers easier. The declarative model ensures that Kubernetes takes the appropriate action to fulfil the requirements based on the configuration files.

**A virtual machine (VM)** is a digital copy of the host machine's physical hardware and operating system. A host machine might have several VMs sharing its CPU, storage, and memory. A hypervisor, which is software that monitors VMs, allocates computing resources to all the VMs regardless of whether the applications use them.

**Containerization compared to virtual machines**

**Containerization** is a similar but improved concept of a VM. Instead of copying the hardware layer, containerization removes the operating system layer from the self-contained environment. This allows the application to run independently from the host operating system. Containerization prevents resource waste because applications are provided with the exact resources they need.