Container Security

Introduction

About me

Hi there, my name is Bilal and I will Welcome you to DevOps boot camp! I am thrilled to have you join us for this exciting journey of learning and discovery.

In this boot camp, we will be exploring the principles and practices of DevOps, which is a set of methodologies and tools that aims to bridge the gap between software development and operations. DevOps is an increasingly important area in the field of software engineering, as it helps organizations to streamline their processes, improve their agility, and deliver better value to their customers.

By the end of this boot camp, you will have gained a comprehensive understanding of DevOps and its key concepts, as well as practical skills in areas such as infrastructure automation, continuous integration and delivery, monitoring and logging, and more. You will be equipped with the knowledge and tools to apply DevOps principles in your own work and contribute to the success of your organization.

I am always looking to connect with other professionals in the field, share ideas and insights, and stay up to date on the latest trends and developments. I welcome the opportunity to connect with you and explore ways in which we can collaborate and support each other.

GitHub : https://github.com/BilalMaz/DevOps-Architect-BootCamp
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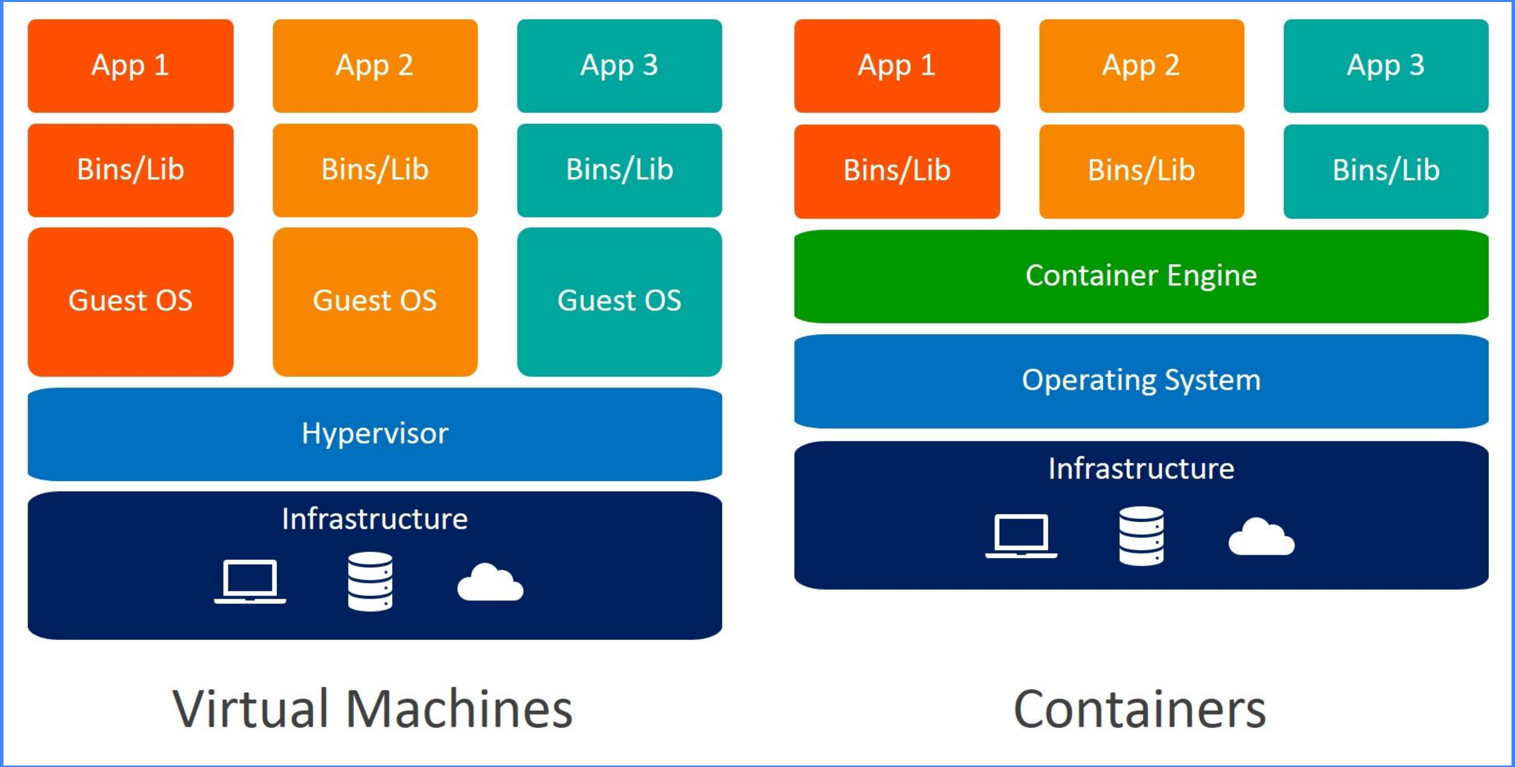
What is Container ?

→ Containers are a type of **virtualization technology** that allows you to **package** and **isolate software** applications and their dependencies into a portable and lightweight runtime environment.

→ Each container runs as an isolated process with its **own file system**, **network interfaces**, and **resources**, but shares the same **underlying operating system** kernel with the host system.

Technologies	Description
Docker	Docker is a popular containerization platform that allows you to package and deploy applications in containers.
Podman	Podman is a container engine that provides a daemonless approach to running containers.
CRI-O	CRI-O is a lightweight container runtime that is designed specifically for Kubernetes
LXC/LXD	LXC (Linux Containers) and LXD (Linux Container Daemon) are lightweight containerization technologies that are designed for running applications in isolated Linux environments.
Rkt	Rkt (pronounced "rocket") is a container runtime developed by CoreOS that is designed to be secure, composable, and efficient


App 1
App 2
App 3
Bins/Lib
Bins/Lib
Bins/Lib
Guest OS
Guest OS
Guest OS
Hypervisor
Infrastructure
Virtual Machines
App 1
App 2
App 3
Bins/Lib
Bins/Lib
Bins/Lib
Container Engine
Operating System
Infrastructure
Containers

What are Container security Risks ?

Containers are vulnerable to several types of security threats , risks and vulnerabilities. Here are some common security risks to be aware of

Risk	Description
Image Risks	Images Vulnerabilities , Images misconfiguration , Embedded Malwares , Clear text secrets , untrusted containers
Registry Risks	Insecure Connections to Registry , Staleimages in registry , Insufficient authentication and authorization restrictions
Orchestrator Riks	Unbounded administrator access , unauthorized access , poorly configuration in orchestrator
Container Risks	Vulnerabilities within runtime software , app vulnerabilities , rogue container , insecure container configurations untrusted network access towards container
Host OS Risks	Large attack surface , Shared kernel , Host OS component vulnerabilities , improper user access and its rights , Host OS file system tampering

Protecting Container Risks ?

Control	Description
Secure container images	Use trusted images from reputable sources and scan images for vulnerabilities before deployment. Regularly update images to the latest versions and remove any unnecessary components or dependencies.
Implement access controls	Use strong passwords, multi-factor authentication, and access controls to restrict access to containers. Limit access to the minimum necessary privileges to prevent unauthorized access.
Isolate containers	Use container isolation technologies such as namespaces and cgroups to prevent attackers from breaking out of the container and gaining access to the host system.
Network security	Limit network access to containers by using firewalls and network segmentation. Monitor network traffic for suspicious activity and use secure communication protocols such as HTTPS and SSL/TLS
Regularly update container	Keep containers up to date with the latest security patches and updates. Use automated tools to scan for vulnerabilities and identify outdated images and components.
Implement resource limits	Use container resource limits to prevent DoS attacks and limit resource usage. Monitor resource usage and adjust resource limits as necessary.
Data encryption	Use encryption to protect sensitive data stored in containers. Use secure data management practices to prevent data exposure and unauthorized access.
Use security best practices	Follow container security best practices such as the CIS Docker benchmark or the Kubernetes security best practices guide. Regularly review and update security policies and procedures to address new threats and vulnerabilities.