VIRTUALIZATION, CONTAINERIZATION AND INFRASTRUCTURE AUTOMATION COURSE

Introduction

This programme develops the competencies required to deploy and manage virtual machines, containerized applications and automated infrastructure environments. It examines hypervisors, virtual machine configuration, resource allocation, virtual networking, container images, Docker, Kubernetes fundamentals, infrastructure as code and configuration management. Participants learn how virtualization improves server utilization, how containerization supports consistent application deployment and how automation reduces manual errors. The course introduces container orchestration, application scaling, infrastructure provisioning and operational monitoring. Practical activities focus on creating virtual environments, deploying containerized applications, automating configurations and improving infrastructure consistency. The programme is relevant to organizations modernizing their data centres, adopting cloud-native technologies or implementing DevOps practices.

Course Objectives

- Explain virtualization, containerization and infrastructure automation.
- Deploy and manage virtual machines.
- Configure virtual computing, networking and storage resources.
- Build and manage containers using Docker.
- Explain Kubernetes architecture and orchestration fundamentals.
- Apply infrastructure-as-code and configuration management principles.
- Identify opportunities to improve infrastructure efficiency through automation.

Course Modules

> Module 1: Virtualization Fundamentals and Architecture

- Virtualization concepts, history and business applications.
- Type 1 and Type 2 hypervisors and their operating principles.
- Virtual machines, hosts, guests and resource abstraction.
- Virtualization benefits, limitations and deployment considerations.

> Module 2: Hypervisor Deployment and Virtual Machine Management
- Hypervisor installation and initial configuration.
- Creating, cloning, importing and exporting virtual machines.
- CPU, memory, storage and network resource allocation.
- Snapshots, templates and virtual machine lifecycle management.

> Module 3: Virtual Networking and Storage
- Virtual switches, network adapters and virtual network segments.
- Bridged, NAT and host-only networking concepts.
- Virtual disks, storage pools and shared storage fundamentals.
- Virtual machine backup, recovery and data protection.

> Module 4: Virtual Infrastructure Operations and Security
- Resource monitoring, capacity planning and performance tuning.
- High availability, fault tolerance and workload recovery concepts.
- Access controls, administrative security and configuration protection.
- Virtual infrastructure documentation and operational management.

> Module 5: Containerization Fundamentals
- Containers, images and the container runtime model.
- Containers versus virtual machines: architecture and use cases.
- Container registries, image repositories and image lifecycle.
- Container networking, storage and resource isolation.

> Module 6: Docker and Container Application Management
- Installing Docker and managing the container environment.
- Building, tagging, pulling and running container images.
- Docker files, environment variables and persistent volumes.
- Docker Compose, multi-container applications and troubleshooting.

> Module 7: Kubernetes and Container Orchestration
- Kubernetes architecture, control plane and worker nodes.
- Pods, Deployments, ReplicaSets and application scaling.

- Services, ingress concepts, configuration and secrets.
- Health checks, rolling updates and workload recovery

> Module 8: Infrastructure as Code and Configuration Management
- Infrastructure-as-code principles and declarative configuration.
- Terraform fundamentals and infrastructure provisioning concepts.
- Ansible fundamentals, inventories, playbooks and configuration tasks.
- Version control, reusable templates and configuration consistency

> Module 9: Automation, Monitoring and Operational Reliability
- Automated deployment workflows and repeatable infrastructure provisioning.
- Infrastructure metrics, logging and monitoring fundamentals.
- Resource utilization, scaling policies and capacity optimization.
- Security scanning, patching and configuration drift management

> Module 10: Integrated Infrastructure Modernization Project
- Designing a virtualized infrastructure for an organizational workload.
- Packaging an application into a container image.
- Deploying a containerized workload and automating configuration.
- Demonstrating monitoring, troubleshooting and infrastructure improvement recommendations.

P.O Box 7254- 01000
www.trustgatecorporateskills.co.ke
Location Thika & Nairobi