Cloud Infra and DevOps

Freshers Training Curriculum

August 2021

High Level Agenda

Sr. No	Topics	Days
1	Cloud Fundamentals - AWS	1
2	AWS Administration	4
3	Azure Administration	5
4	DevOps Overview	8
5	Terraform in AWS & Azure	4
6	Certified Kubernetes Administrator	2
7	Running Containers on Amazon Elastic Kubernetes Service (Amazon EKS)	2
8	Running Containers on Azure Kubernetes Services (AKS)	2
9	Google Cloud Platform	2
Total Days		30 Days

1	Cloud Fundamentals - AWS		1 Day
1.1	**Introduction** o Learning Objectives o Why Cloud Services? o Infrastructure-as-a-Service (IaaS), Container-as-a-Service (CaaS), Platform-as-a-Service (PaaS), Function-as-a-Service (FaaS) and Software-as-a-Service (SaaS) o Public, Private, and Hybrid cloud models o Understand general cloud computing concepts	1.2	**Core AWS Services** o Core AWS architectural components o Regions, Availability zones, Local Zones, Wavelength, Edge Locations o Core AWS Services and Products o AWS Solutions o AWS management tools
1.3	**Security, Privacy, Compliance and Trust** o Access AWS services (Portal, CLI and SDKs) o Securing network connectivity in AWS o Core AWS Identity services o Security tools and features o Shared Service responsibility Model o Monitoring, reporting and other management tools in AWS o Privacy, Compliance and Data Protection standards in AWS	1.4	**AWS Pricing, SLA, and Lifecycle** o AWS account – AWS Organizations, Management account, member account o Planning and managing costs o Service lifecycle in AWS o Understand pricing and service lifecycle models available with AWS
2	AWS Administration		4 Days

| 2.1 | Identity and Access Management

o   Root account and its best practices
o   AWS IAM
o   Users and Groups
o   IAM Roles – Cross account, service to service, federation | Lab | AWS IAM

o   Implement and manage users and groups.
o   Attach policies to users and groups
o   Creating and managing IAM roles
o   Policy simulator |

	o IAM Policies		
2.2	**Governance and Compliance** o Organization unit – Core OUs and Custom OUs o Overview about control tower o Service control policies (SCPs) and its uses	Lab	**Manage Governance via AWS SCPs, OUs** o Implement and manage AWS Organizations o Implement AWS SCPs, including custom policies. o Use OUs to group accounts
2.3	**AWS Administration** o AWS Portal o AWS Cloud Shell o AWS CLI and PowerShell o AWS CloudFormation Templates	Lab	**AWS resources by Using the AWS Portal, AWS CloudFormation Templates, AWS PowerShell, AWS CLI** o Leverage AWS services to organize resources. o Use the AWS Portal, CLI and Cloud Shell o Use AWS CloudFormation Templates to deploy resources.
2.4	**Networking** o Virtual Private Cloud (VPC) o IP Addressing -CIDR allowed ranges – Primary and Secondary o Security groups and Network ACLs o Internet gateways o NAT Gateways and NAT instances o Route tables	Lab	**Implement Networking** o Implement VPC and subnets. o Configure public and private subnets o Configure ACLs and security groups. o Configure AWS Firewall.
2.5	**AWS EC2 – Elastic Compute cloud** o EC2 Instance types and families o Amazon Machine Images (AMI) o ENI – Elastic network interface o Elastic Block Store – Volumes and types o User data o EC2 Lifecycle – Shutdown and termination o Public and Elastic IPs o Autoscaling groups	Lab	**Manage EC2** o Plan for EC2 implementations o Create EC2 o Use user data
2.6	**Network Connectivity** o VNet Peering o VPN Gateway Connections o Direct Connect o AWS Transit Gateway o Client VPN endpoints o Service Endpoints	Lab	**Implement Connectivity** o Configure VNet Peering. o Configure VPN gateways. o Choose the appropriate Inter-site connectivity solution.

2.7	**Network Traffic Management** o AWS – Application load balancer, network load balancer, Gateway Load balancer o Route 53 o CloudFront o Health checks	Lab	**Implement Traffic Management** o Configure EC2 Autoscaling groups o Configure an AWS Application Load Balancer o Configure private and public DNS zones
2.8	**AWS Storage** o Types of Storage o S3-Object storage o S3 Lifecycle management, tiering / ACLs o Elastic file share and FSx o Elastic Block store – Disk types	Lab	**AWS storage** o Create and configure AWS storage services o Static website hosting on S3 o Upload files to S3 o Create and map file shares.
2.9	**Containers and Serverless Computing** o AWS Elastic beanstalk o Elastic Container Services overview o Elastic container registry o Elastic Kubernetes Service -Pods, networking o AWS Lambda-Serverless computing o Overview of AWS Farqgate	Lab	**Implement Web Apps, Elastic Kubernetes Service** o Create a web app on beanstalk o Implement Elastic Kubernetes Service o Create lambda functions
2.10	**Migration and Data Protection** o AWS Backups and snapshots o AWS Application Migration service or CloudEndure	Lab	**Implement Data Protection** o Configure AWS Backups
2.11	**Database services** o AWS RDS – MySQL, MSSQL, Oracle and PostgreSQL o Read replicas and automated backups o AWS Dynamo DB o Overview about other database offerings - Aurora	Lab	**Implement Monitoring** o Create and configure AWS RDS - MySQL
2.12	**Monitoring and other services** o AWS CloudWatch o Log groups o AWS CloudTrail o Network flow logs o AWS Cost monitoring o EC2 Instance purchasing models o SNS, SQS and SES	Lab	**Implement Monitoring** o Use AWS CloudWatch and create dashboards o Create AWS alerts.

	Assessment - 1		
3	Azure Administration		5 Days
3.1	Identity o Azure Active Directory o Users and Groups	Lab	Manage Azure Active Directory Identities o Secure and manage identities with Azure Active Directory. o Implement and manage users and groups.
3.2	Governance and Compliance o Subscriptions and Accounts o Azure Policy o Role-based Access Control (RBAC)	Lab	Manage Governance via Azure Policy, Subscriptions and RBAC o Implement and manage Azure subscriptions and accounts. o Implement Azure Policy, including custom policies. o Use RBAC to assign permissions.
3.3	Azure Administration o Azure Resource Manager o Azure Portal and Cloud Shell o Azure PowerShell and CLI o ARM Templates	Lab	Manage Azure resources by Using the Azure Portal, ARM Templates, Azure PowerShell, Azure CLI o Leverage Azure Resource Manager to organize resources. o Use the Azure Portal and Cloud Shell. o Use Azure PowerShell and CLI. o Use ARM Templates to deploy resources.
3.4	Virtual Networking & Security o Virtual Networks o IP Addressing o Network Security groups o Azure Firewall o Azure Key Vault o Azure Security Center o Azure DNS	Lab	Implement Virtual Networking, Azure Security Centre & Key Vault o Implement virtual networks and subnets. o Configure public and private IP addressing. o Configure network security groups. o Configure Azure Firewall. o Implement Azure Key Vault including certificates, keys, and secretes. Implementing Secure Data by setting up Always Encrypted. o Implement Azure Security Center including policies, recommendations, and just in time virtual machine access. o Configure private and public DNS zones.
3.5	Intersite Connectivity o VNet Peering o VPN Gateway Connections o ExpressRoute and Virtual WAN	Lab	Implement Intersite Connectivity o Configure VNet Peering. o Configure VPN gateways.

			o Choose the appropriate Intersite connectivity solution.
3.6	Network Traffic Management o Network Routing and Endpoints o Azure Load Balancer o Azure Application Gateway	Lab	Implement Traffic Management o Configure network routing including custom routes and service endpoints. o Configure an Azure Load Balancer. o Configure and Azure Application Gateway.
3.7	Azure Storage o Types of Storage Accounts o Blob Storage o Storage Security o Azure Files and File Sync o Managing Storage	Lab	Manage Azure storage o Create Azure storage accounts. o Configure blob containers. o Secure Azure storage. o Configure Azure files shares and file sync. o Manage storage with tools such as Storage Explorer.
3.8	Azure Virtual Machines o Virtual Machine Planning o Creating Virtual Machines o Virtual Machine Availability o Virtual Machine Extensions	Lab	Manage virtual machines o Plan for virtual machine implementations. o Create virtual machines. o Configure virtual machine availability, including scale sets. o Use virtual machine extensions.
3.9	Serverless Computing o Azure App Service Plans o Azure App Service o Container Services o Azure Kubernetes Service	Lab	Implement Web Apps, Azure Container Instances, Azure Kubernetes Service o Create an app service plan. o Create a web app. o Implement Azure Container Instances. o Implement Azure Kubernetes Service.
3.10	Data Protection o File and Folder Backups o Virtual Machine Backups	Lab	Implement Data Protection o Backup and restore file and folders. o Backup and restore virtual machines.
3.11	Monitoring o Azure Monitor o Azure Alerts o Log Analytics o Network Watcher	Lab	Implement Monitoring o Use Azure Monitor. o Create Azure alerts. o Query using Log Analytics. o Use Network Watcher.
	Assessment - 2		
4	DevOps Overview		8 Days

4.1	Introduction to DevOps (8 Hours) o Define DevOps o What is DevOps o SDLC models, Lean, ITIL, Agile o Why DevOps? o DevOps Goals & Benefits o DevOps CI/CD Process o DevOps Tools o Source Code Management o Purpose of Build & Release process o Configuration management o Monitoring – Significance and how to o What is DevSecOps	Quiz	o Q & A session
4.2	GIT: Version Control (8 hours) o Introduction o What is Git o About Version Control System and Types o Difference between CVCS and DVCS o GIT Basics o GIT Command Line o Branching & Merging Strategies o Different type of GIT based tools	Lab	Git Hands On o Creating repository o Cloning, check-in and committing o Fetch pull and remote o Branching o Creating the Branches, switching the branches, merging the branches.
4.3	Jenkins - CI/CD Orchestration (16 Hours) o Understanding Continuous Integration Vs Continuous Delivery Vs Continuous Deployment o Introduction about Jenkins o Jenkins Architecture o Build Cycle - Java o Jenkins – Plugins o Pipeline as Code – Declarative Vs Scripted	Lab	Jenkins hands on o Creating Jobs o Running the Jobs o Setting up the global environments for Jobs o Adding and updating Plugins o Disabling and deleting jobs
4.4	Ansible - Config Management (8 Hours) o What Is Ansible o Why Ansible o Basic Ansible Terminology o Infra as Code o Introduction to Playbooks o Playbook Structure o Introduction to Modules o Variables and Facts o Ansible Configuration Hierarchy o Ansible in the Cloud	Lab	Ansible o Creating an Ansible Home Base o Setting up Test Environment o Creating Playbooks o Jenkins integration o Trigger playbooks form Jenkins

4.5	Docker– Containers (8 hours) o Introduction o What is a Docker o Understanding the Docker components o Platforms for Docker	Lab	Docker o Create different environments with Docker o Build Containerized pipeline using Docker for Sample Web application

	o Dockers vs. Virtualization o Docker Architecture o Use case of Docker		
4.6	**DevOps with Azure (8 Hours)** o Azure Pipelines o Azure Repos o Azure Test Plans Azure Boards o Azure Artefacts o Azure Extensions Marketplace o Implement CI/CD in Azure DevOps	Lab	**Azure DevOps in Action** o Azure Pipelines o Azure Repos o Azure Test Plans o Azure Boards o Azure Artefacts o Azure Extensions Marketplace o Implement CI/CD in Azure DevOps
4.7	**DevOps with AWS (8 Hours)** o AWS Code commit o AWS Code pipeline o AWS Code Build o AWS Code star o Implement CI/CD in AWS DevOps	Lab	**AWS DevOps in Action** o Create pipeline using AWS DevOps services
5	**Terraform in AWS & Azure**		**4 Days**
5.1	**Getting Started with Terraform** o Introduction to Terraform o Authentication o Terraform Overview o Running Terraform	Lab	**Terraform Hands-on** o Install Terraform o Install AWS and Azure CLI o Running Basic Terraform Templates
5.2	**Variables, Interpolation** o Variables o Syntax o Dependencies	Lab	**Lab** o Use of Variables and Syntax o Interpolation
5.3	**Conditionals, Terraform State** o Conditional Blocks and Use cases o Terraform State in S3 o AWS Resource providers o Azure Market Place Images o Azure Hardware Models		
5.4	**Iteration, Functions** o Iteration o Functions, using count, using for-each o Controlling Resource Creation o Logging and Troubleshooting	Lab	**Lab** o Functions, using count, using for-each o Controlling Resource Creation o Logging and Troubleshooting

5.5	CloudFormation Templates o Introduction to AWS CloudFormation Templates o Components of AWS CloudFormation o Design and Review AWS CloudFormation templates in AWS o AWS CloudFormation template structure o AWS CloudFormation template - best practices o Automated rollbacks and IAM roles	Lab	Lab o Deploy AWS CloudFormation template
5.6	Nested CFN stacks and Deployment o AWS template parameters o Nested AWS CloudFormation Templates o AWS template deployment modes	Lab	Lab o Deploy nested AWS CloudFormation Templates o Automate AWS IaaS deployments o Automate AWS PaaS deployments
5.6	Arm Templates o Introduction to Azure ARM Templates o Components of Azure ARM templates o Review Azure ARM template in Azure portal o Understanding Azure ARM template components o Azure ARM template structure o Azure ARM template - best practices	Lab	o Deploy Azure ARM template
5.7	Nested ARM Templates and Deployment o Azure ARM template parameters o Nested Azure ARM templates o Azure ARM template deployment modes o PaaS Azure ARM template	Lab	o Deploy nested Azure ARM templates o Deploy Azure storage account with Azure ARM template o Automate Azure IaaS deployments o Automate Azure PaaS deployments o Deploy PaaS Azure ARM template
	Assessment - 3		
6	Certified Kubernetes Administrator		2 Days
6.1	Cluster Architecture, Installation & Configuration o Manage role-based access control (RBAC) o Use Kubeadm to install a basic cluster o Manage a highly available Kubernetes cluster o Provision underlying infrastructure to deploy a Kubernetes cluster o Perform a version upgrade on a Kubernetes cluster using Kubeadm o Implement etcd backup and restore		

6.2	**Services & Networking** o Understand host networking configuration on the cluster nodes o Understand connectivity between Pods o Understand ClusterIP, NodePort, Load Balancer service types and endpoints o Know how to use Ingress controllers and Ingress resources o Know how to configure and use CoreDNS o Choose an appropriate container network interface plugin	
6.3	**Workloads & Scheduling** o Understand deployments and how to perform rolling update and rollbacks o Use ConfigMaps and Secrets to configure applications o Know how to scale applications o Understand the primitives used to create robust, self-healing, application deployments o Understand how resource limits can affect Pod scheduling o Awareness of manifest management and common templating tools	
6.4	**Storage** o Understand storage classes, persistent volumes o Understand volume mode, access modes and reclaim policies for volumes o Understand persistent volume claims primitive o Know how to configure applications with persistent storage	
6.5	**Troubleshooting** o Evaluate cluster and node logging o Understand how to monitor applications o Manage container stdout & stderr logs o Troubleshoot application failure o Troubleshoot cluster component failure o Troubleshoot networking	
7	**Running Containers on Amazon Elastic Kubernetes Service (Amazon EKS)**	2 Days
7.1	AMAZON EKS FUNDAMENTALS o Introduction to Amazon EKS	

	o Amazon EKS control plane o Amazon EKS data plane o Fundamentals of Amazon EKS security o Amazon EKS API		
7.2	BUILDING AN AMAZON EKS CLUSTER o Configuring your environment o Creating an Amazon EKS cluster o Demo: Configuring and deploying clusters in the AWS Management Console o Working with eksctl		o Building an Amazon EKS Cluster
7.3	DEPLOYING APPLICATIONS TO YOUR AMAZON EKS CLUSTER o Configuring Amazon Elastic Container Registry (Amazon ECR) o Demo: Configuring Amazon ECR o Deploying applications with Helm o Demo: Deploying applications with Helm o Continuous deployment in Amazon EKS o GitOps and Amazon EKS		o Deploying App
7.4	CONFIGURING OBSERVABILITY IN AMAZON EKS o Configuring observability in an Amazon EKS cluster o Collecting metrics o Using metrics for automatic scaling o Managing logs o Application tracing in Amazon EKS o Gaining and applying insight from observability		o Monitoring Amazon EKS
7.5	BALANCING EFFICIENCY, RESILIENCE, AND COST OPTIMIZATION IN AMAZON EKS o The high level overview o Designing for resilience o Designing for cost optimization o Designing for efficiency		
7.6	MANAGING NETWORKING IN AMAZON EKS o Review: Networking in AWS o Communicating in Amazon EKS o Managing your IP space o Deploying a service mesh		o Exploring Amazon EKS Communication

7.7	**IMPLEMENTING SECURE WORKFLOWS** o Securing cluster endpoint access o Improving the security of your workflows o Improving host and network security o Managing secrets		o Securing Amazon EKS
7.8	**MANAGING UPGRADES IN AMAZON EKS** o Planning for an upgrade o Upgrading your Kubernetes version o Amazon EKS platform versions		
8	Running Containers on Azure Kubernetes Services (AKS)		2 Days
8.1	**AKS FUNDAMENTALS** o Introduction to Azure AKS o AKS Cluster o AKS Identity o AKS Storage and Disk o AKS Network and Security		
8.2	**BUILDING AN AZURE AKS CLUSTER** o Configuring your environment o Creating an Azure AKS cluster o Demo: Configuring and deploying clusters in the Azure Portal o Working with kubectl		Building an Azure AKS Cluster
8.3	**DEPLOYING APPLICATIONS TO YOUR AZURE AKS CLUSTER** o Configuring Azure Container Registry (ACR) o Deploying applications with Helm o Demo: Deploying applications with Helm o Continuous deployment in Azure AKS o GitOps and AKS		o Deploying App
8.4	**CONFIGURING OBSERVABILITY IN AKS** o Configuring observability in an AKS cluster o Collecting metrics o Using metrics for automatic scaling o Managing logs o Application tracing in AKS o Gaining and applying insight from observability		o Monitoring AKS

8.5	**BALANCING EFFICIENCY, RESILIENCE, AND COST OPTIMIZATION IN AMAZON EKS** o The high level overview o Designing for resilience o Designing for cost optimization o Designing for efficiency		
8.6	**MANAGING NETWORKING IN AZURE AKS** o Networking in AKS o Managing your IP space o Ingress Controllers o Network Policies o Deploying a service mesh		o Exploring AKS Communication
8.7	**IMPLEMENTING SECURE WORKFLOWS** o Securing cluster endpoint access o Improving the security of your workflows o Improving host and network security o Managing secrets using Azure Key Vault		o Securing AKS
8.8	**MANAGING UPGRADES IN AKS** o Planning for an upgrade o Upgrading your Kubernetes version o Azure AKS platform versions		
8.9	**AZURE DISK** o Azure Disk - Dynamic o Azure Disk - Static o Azure Files - Dynamic o Azure Files - Static o NFS Server - Static		
	Assessment - 4		
9	Google Cloud Platform		2 Days
	Introduction to Google Cloud o Understanding the fundamentals of Google Cloud Platform o The Google Global infrastructure o Products for storage, compute, networking, Machine Learning, and more o Availability zones o Different projects running on the GCP infrastructure, including Google projects		

	Google Cloud Services		
	o Introduction to Google Cloud services o Managing Google services using command-line tools, app, and console o Installing and configuring SDK o Deploying Cloud Shell for GCP environment management o Deploying Gsutil		
	Google Computing Services		
	o Understanding Google computing services o Creating and managing virtual machines in Google Cloud o Launching VMs on-demand using Google Compute Engine o Choosing the right computing solutions based on the workload like memory or CPU o Important actions with Compute Engine o Balancing the load		
	Google Storage Services		
	o Various storage services offered with Google Cloud o The process of storing and retrieving data o Rich content management o Hosting a website o Choosing the right storage options o Integrating on-premises with the cloud storage environment o Nearline and Coldline storage o Cloud Datastore o Managing cloud storage using Gsutil		
	Google Cloud APIs		
	o Deploying Google Cloud for developing applications and for debugging and monitoring purposes o Choosing the right data storage for application data o Automating infrastructure o Managing the API o Cloud source o Functions and special APIs o Implementing and configuring Cloud Launcher and Deployment Manager o Application deployment using Cloud Engine		

	Google Networking Services o Introduction to Google networking o Setting up the Google network o Connecting various Google Cloud Platform resources o Isolation using firewalls and network policies o Creating and managing of Virtual Private Network o Working with cloud routers and interconnecting networks		
	IAM & Security Services o Different security and identity and access management (IAM) services o Various roles in IAM o Creating and managing Google resources permissions o IAM APIs o The creation of custom roles o Sharing resources and isolation o Deploying penetration testing, auditing, and security controls		
	Migrating to Google Cloud o Understanding how to migrate to Google Cloud o Various criteria to be considered o Choosing the right options as per the specific needs o Managing a hybrid cloud model o Complete migration from the on-premises model to the cloud o Choosing an automation framework for resource provisioning		
	Final Assessment with all above Topics		