

AWS Services:

1- AWS is a comprehensive and widely used cloud computing platform. it offers a vast array of cloud computing services that enable individuals, organisations and businesses to access and utilise computing resources over the internet. AWS is known for its reliability, scalability, and flexibility, making it a popular choice for a wide range of workloads and applications. Core services include:

EC2 (Elastic compute cloud) - virtual servers for running applications

AWS Lambda - Allows you to run code in response to events without provisioning or managing servers

S3 - Scalable object storage for storing and retrieving data

EBS (elastic block store) - block level storage volumes for use with EC2 instances

RDS (Relational Database Service) - managed relational database service that supports multiple database engines like MySQL, PostgreSQL and more.

VPC (Virtual Private Cloud) - allows you to create isolated network environments within AWS

Route53 - scalable and highly available domain name system (DNS) web service

IAM (Identity and Access Management) - allows you to manage access to AWS services and resources securely

2- Key components of AWS VPC include:

VPC itself

Subnet

route tables

internet gateway

NAT gateway/NAT instance

Elastic IP addresses

security groups

NACL (network access control lists)

3- In AWS S3 data is organised into buckets which are top-level containers that store objects. Buckets are like folders at root level, objects are data which can be files of any type. S3 is designed for durability and is highly resistant to data loss, supports versioning and encryption.

Use cases for S3 buckets include:

data storage and backup, static website hosting, data distribution, big data and analytics, media streaming and streaming and data sharing.

4- AWS Lambda is a serverless compute service provided by Amazon Web Services (AWS). It enables you to run code in response to events without the need to provision or manage servers. AWS Lambda follows the serverless computing model, where you can focus on writing code and defining event triggers. Use cases include:

Event Driven execution

Function Execution

Stateless Execution

Automatic Scaling

Resource Management

Granular Billing - paying for the number of invocations and execution duration.

Integration with other AWS services

5- EC2 provides virtual machines that you install operating system, runtime and application software on.

ECS is a container orchestration service that manages docker containers. It abstracts away the underlying infrastructure and focuses on deploying, scaling and managing containerised applications. Load balancing between EC2 instances is typically configured using ELB whereas with ECS integrates seamlessly with ALB (application load balancers) or NLB (network load balancers) to distribute traffic across containers.

6- ELB is a service that automatically distributes incoming application traffic across multiple targets, such as EC2 instances, containers and IP addresses. this ensures high availability and faulty tolerance of your applications. The types of load balancers AWS offers include:

application load balancers
network load balancers
classic load balancers

7- Explain the purpose of Amazon RDS and its benefits.

RDS is an AWS database tool and due to its design from AWS it works seamlessly with all AWS cloud services providing minimal downtime, highly available and can be managed both from the EC2 console or the AWS CLI.

8- What is AWS CloudFormation, and how is it used for infrastructure as code (IaC)?

CloudFormation is a service provided by AWS to deploy VPCs. It will take requests from the internet gateway and send traffic to the EC2 instances accordingly which will be set up in availability zones in public and private subnets.

Using CodeDeploy, CodeCommit, CodeBuild and CodePipeline, it creates a CI/CD pipeline to automate changes and you do is monitor, log and troubleshoot.

9- What are AWS Identity and Access Management (IAM) roles, and why are they important?

IAM User- provides credentials for a user with a username and security key.

IAM role- this can be used inline with security groups in EC2s and VPCs and because it will have permissions attached to it, it will be more efficiently utilised by the services hosted on the EC2s.

IAM Groups- this allows you to add multiple users of a team to a group who all require the same permissions. This reduces downtime so you don't have to add the permissions every time a new member joins the team.

10- How does Amazon Route 53 facilitate DNS management in AWS?

Route53 hosts websites and allows you to assign IP address to the functions in the public or private network.

Linux Fundamentals:

Describe the Linux kernel and its role in the operating system.

A Linux kernel is the main component of the linux operating system and the core interface between a computer's hardware and its resources

Explain the differences between a process and a thread in Linux.

a process has its own memory

a thread shares the memory with the parents process and has slow communication

What is the purpose of the /etc/passwd file in Linux?

stores user account information important for the login process.

How do you set file permissions in Linux using chmod?

you can set permissions with:

chmod+rx to add

chmod-rx to remove

chmod+x filename to allow executable permission

chmod -wx filename to to remove write and execute permissions

What is the significance of the /etc/hostname file in Linux?

it maps connections between ip addresses and domain names

How can you find the IP address of a Linux machine using command-line tools?

you can find the ip address with

ip addr

ifconfig

Describe the purpose of the cron service in Linux.

cron service in linux allows you schedule tasks

What is an inode in Linux, and why is it important for file systems?

inode is a data structure that keeps track of all the files and directories in linux. they have anode numbers

How do you search for text within files in Linux using the grep command?

you do this with grep command

grep -rni "text string" /path/to/directory

Explain the concept of symbolic links (symlinks) in Linux.

a symlink is a symbolic linux link that points to another file or folder on your computer or connected file system

Bash Scripting:

What is a shebang (!) line in a Bash script, and why is it used?

a shebang defines the bash script and tells the operating system which interpreter to use to parse the remainder of a file or script

How do you declare and use variables in Bash scripts?

**you declare and use like:
(variable) = (value)**

Explain the purpose of control structures like if statements and loops in Bash.

they test a condition and execute a list of program statements if the condition is true

What is command substitution in Bash, and how is it performed?

command substitution in bash allows us to execute a command and substitute it with its standard output

How can you pass command-line arguments to a Bash script?

you can pass arguments to bash script using flags

Describe the purpose of the case statement in Bash.

much like the if-then-else statement the bash case statement is a conditional statement used to vary the flow of your shell script

What is the role of functions in Bash scripts, and how are they defined?

functions are a set of commands that be called as many times as you want and are a great way of producing reusable code.

How can you handle errors and exceptions in Bash scripts

you handle errors with -e in scripts and -x to stop the script running with errors so you can troubleshoot and repair the script

Explain the concept of environment variables in Bash.

they are special variables like \$HOME that contain information about your login session

What is process substitution in Bash, and when is it useful?

it is a feature in bash that allows you to use the output of a command or process as input for another command

AWS and Linux Networking:

How can you establish secure communication between AWS resources in different VPCs?

you use vpc peering or aws transit gateway that routes traffic between two VPCs using private IPv4 or IPv6 addresses

What is AWS Direct Connect, and how does it enhance network connectivity?

AWS direct connect is a networking service that provides an alternative to use the internet to connect to AWS

Explain the differences between AWS Network ACLs and Security Groups.

Access Control Lists are associated with subnets

Security groups is associated with and EC2 instance

How do you troubleshoot network connectivity issues in a Linux environment?

you can follow steps:

identify problem

check if network interface is up

can you reach ip address of web server

check route or default gateway settings

check for incorrect initialisation of system

check security settings

conclusion

What is an Elastic IP address in AWS, and why might you use it?

an elastic ip address is one that is associated to your account and stays the same until you release it,

Describe the purpose of the /etc/hosts file in Linux networking.

the /etc/hosts files in linux has all ip addresses of hosts name and addresses for your machine and other hosts in the internet network

How can you configure a static IP address on a Linux server?

**you need to edit etc/sysconfig/network
etc/sysconfig/network/ifcfg-eth0**

Explain the role of iptables in Linux firewall configuration.

ip tables identify packets received and uses a set of rules to decide what to do with them

What is the purpose of the AWS VPN service, and how is it set up?

AWS VPN is a virtual private network and allows you to securely access resources both on AWS and within your on-premises networks

How do you configure a network interface in Linux using the ifconfig command?

to configure an IP address for a network interface enter the command `ifconfig interface_name IP_address`

Advanced AWS Services:

What is AWS Elastic Beanstalk, and how does it simplify application deployment?

AWS beanstalk deploys and manages application in AWS cloud, handles capacity provisioning, load balancing, auto-scaling and health monitoring

Describe the features and use cases of AWS Lambda Layers.

a lambda layer works very similarly to a folder containing a library in a function code.

What is AWS Elastic Container Service for Kubernetes (EKS), and how does it differ from ECS?

EKS allows users to deploy, manage and scale containerised application using Kubernetes.

How can you set up autoscaling in AWS to handle fluctuating traffic?

create an auto-scaling group and target tracking scaling policy.

Explain the concept of AWS Elastic File System (EFS) and its advantages.

Amazon EFS is designed to be highly scalable both in storage capacity and throughout performance, growing to petabyte scale.

What is AWS CloudWatch, and how is it used for monitoring and logging?

aws cloud watch allows allows you gain visibility into your applications in three main areas infrastructure monitoring, transaction monitoring and end-to-end user monitoring.

Describe AWS Lambda@Edge and its role in serverless computing.

Lambda@edge is a feature of cloudfront that lets you run code closer to users of your application, which improves performance and reduces latency.

How can you secure AWS resources using AWS Identity and Access Management (IAM) policies?

you can secure resources with permissions, rules and policies to allow access to users with only what they need. you can also use multi-factor authentication

What is AWS Kinesis, and how can it be used for real-time data streaming?

aws kinesis is a scalable and durable real-time data streaming service that can continuously gigabytes of data from thousands of sources

How do you optimize costs in AWS using features like AWS Trusted Advisor?

you can use a trusted advisor which can recommend saving costs by analysing usage, configuration and spend

Advanced Linux and Bash Scripting:

symbolic links are not updates, hard links always refer to the source even if moved or removed.

How do you create a Bash script that runs as a daemon (background process)?

you need a background process whose parent process is init

Describe the purpose of process groups and sessions in Linux.

linux uses process groups to identify a group of processes working together in a session.

What is the purpose of the nohup command in Linux, and how does it work?

nohup (short for no hangup) is a command in linux that keeps processes running even after exiting the shell or terminal

How can you monitor system performance and resource utilization using Linux command-line tools?

you can use the sar command

What is the role of chroot in Linux, and how can it be used for security?

chroot is a linux system call that changes the root directory of the current process and all of its child processes

Explain the concept of Linux containers and containerization technologies like Docker.

they help make your applications easier to ship, develop, and run various applications inside a linux container.

How can you automate backups of critical data in a Linux environment using Bash scripts?

using crontab scheduler and `# tar -cvf backup_name.tar /home/user`

Describe the use of the rsync command for efficient file synchronization in Linux.

it is used for efficiently synchronising files and directories between different locations whether on the same machine or across the network.

How do you use regular expressions (regex) in Bash scripts for text pattern matching?

the IF clause in bash can match text patterns with regex using =~ and double square brackets [[]]. negated regex can be used to check for non-matching patterns

