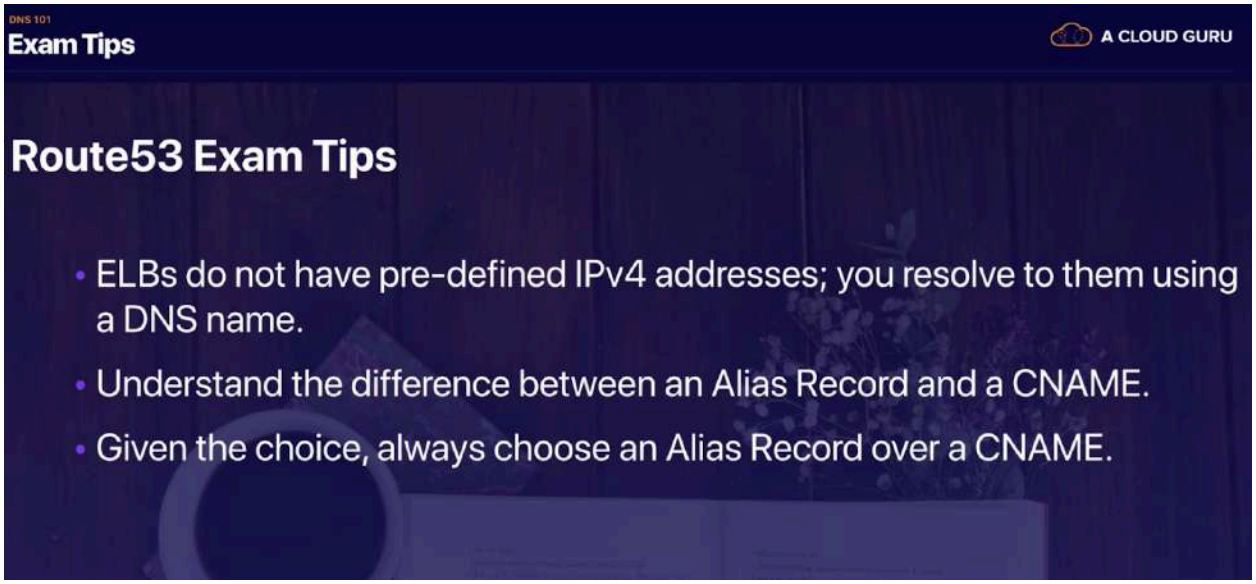
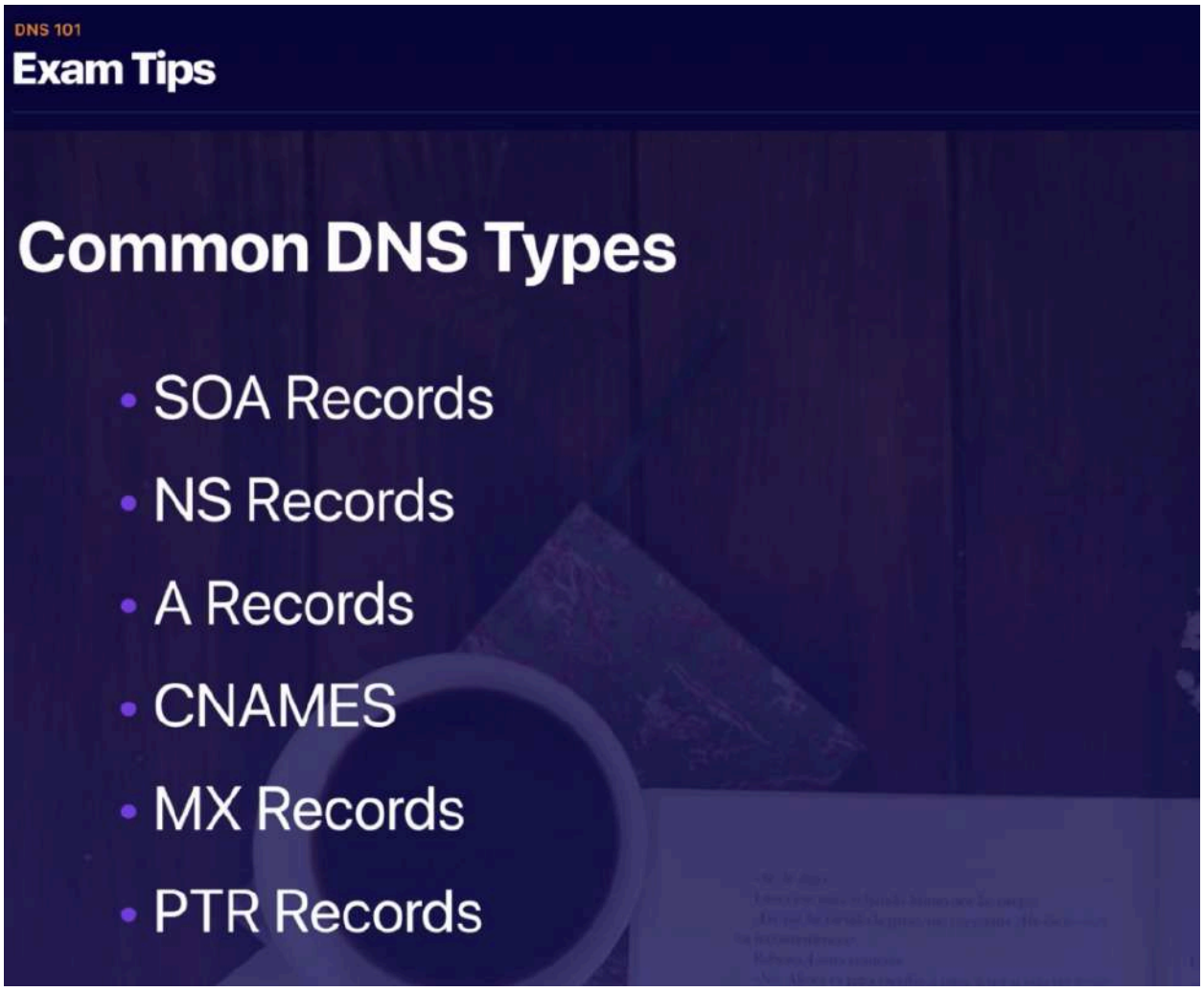
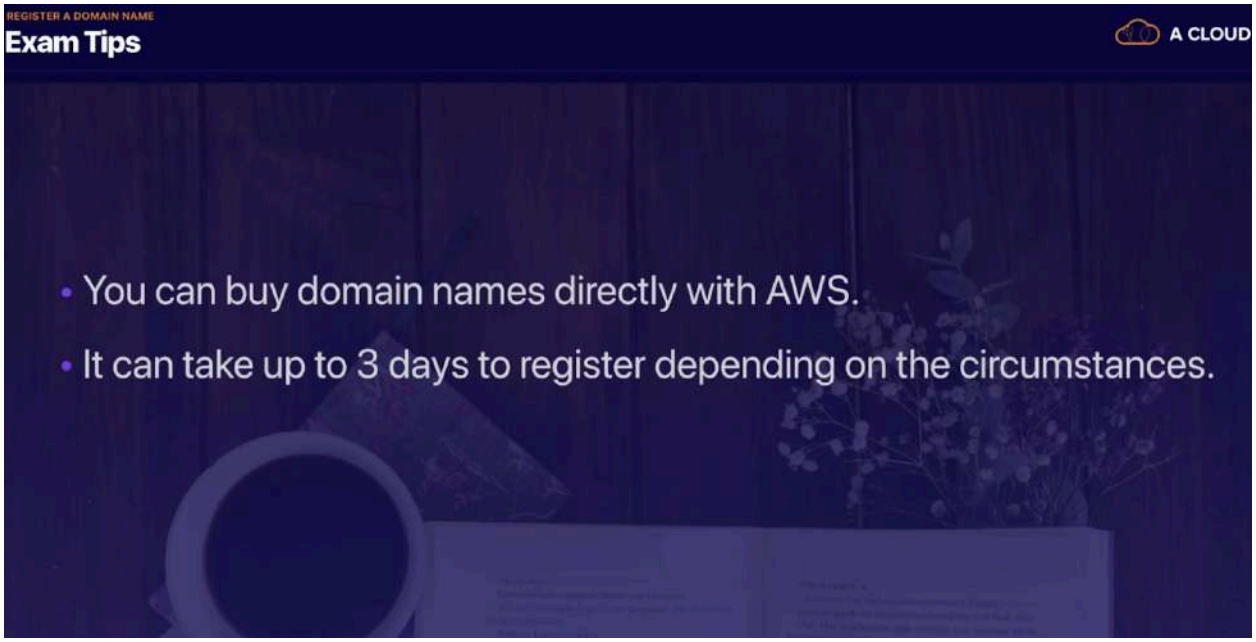
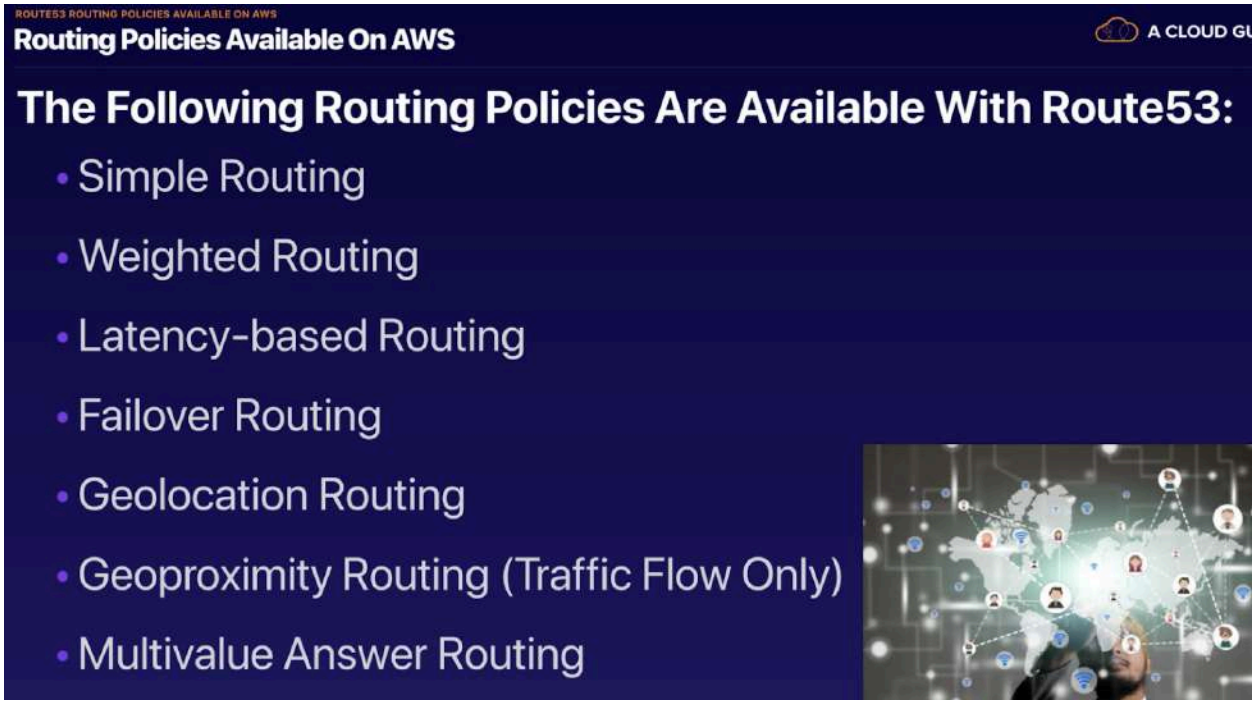




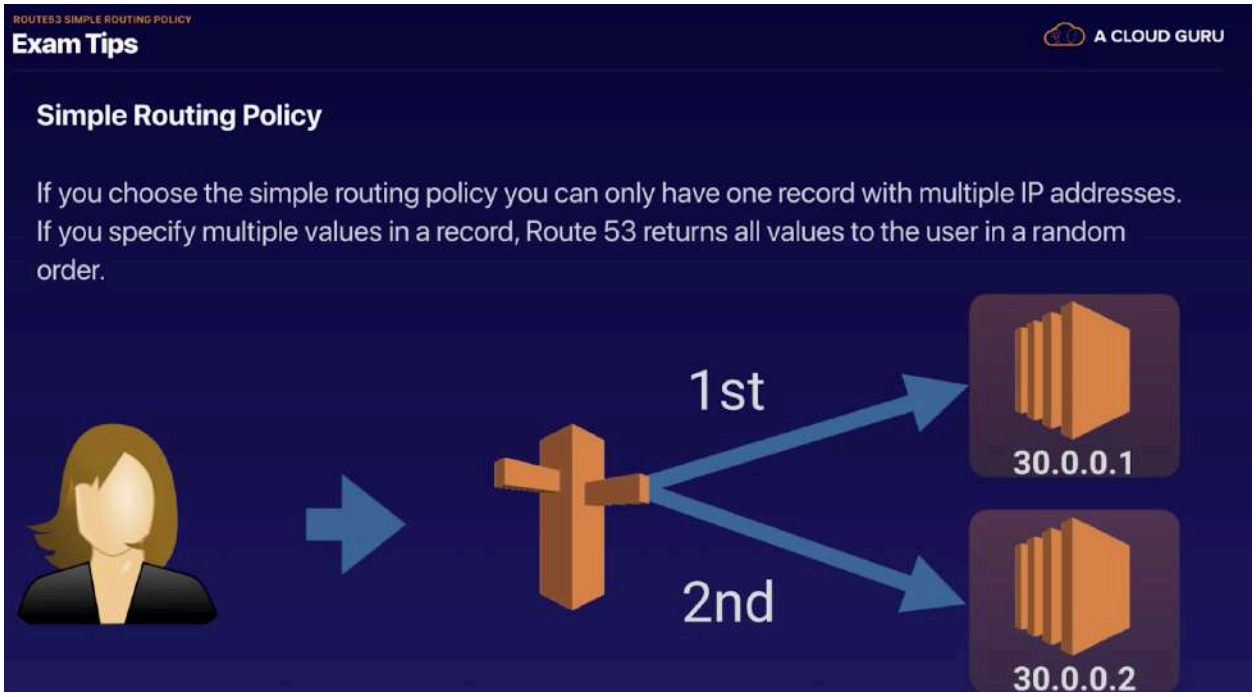
Route53 - Register A Domain Name Lab

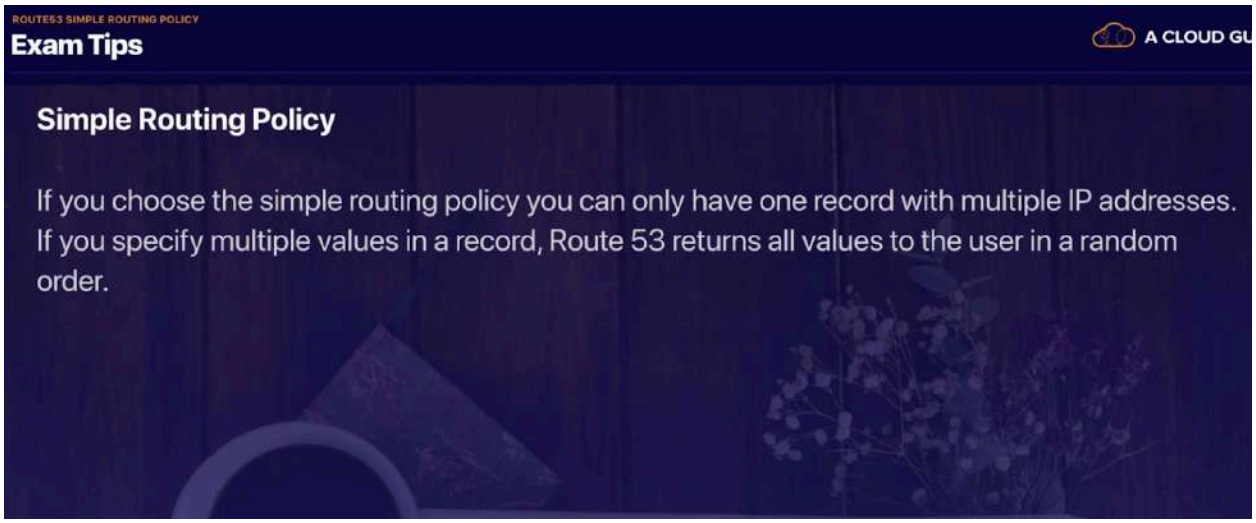


Route53 Routing Policies Available On AWS



Simple Routing Policy Lab



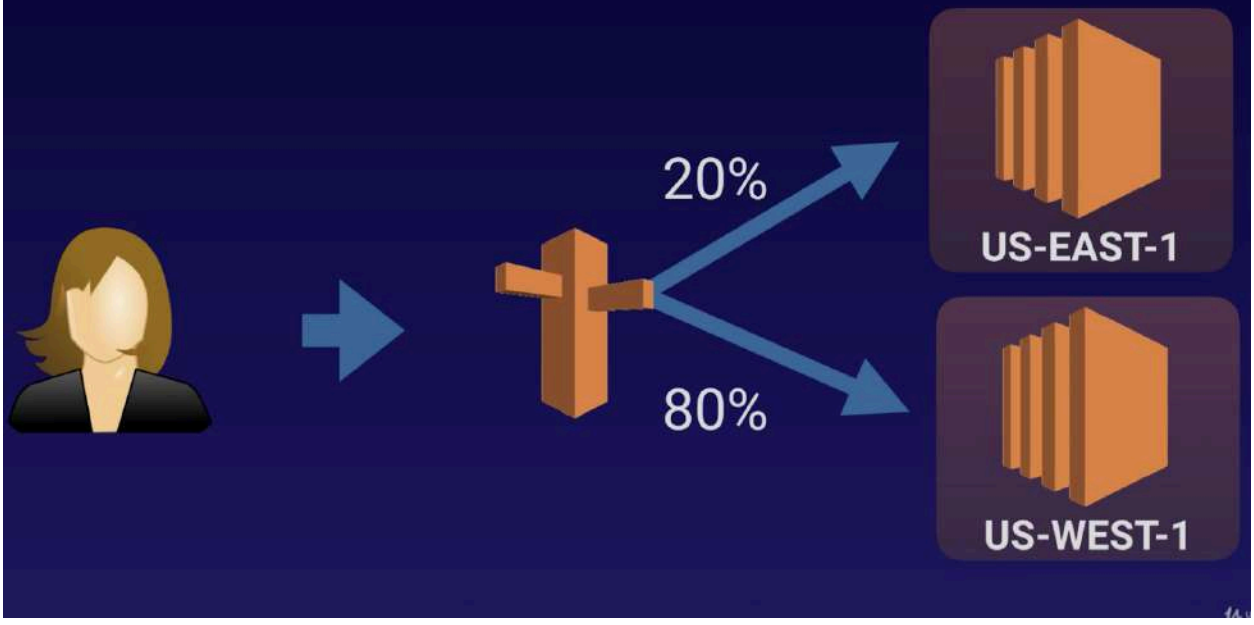


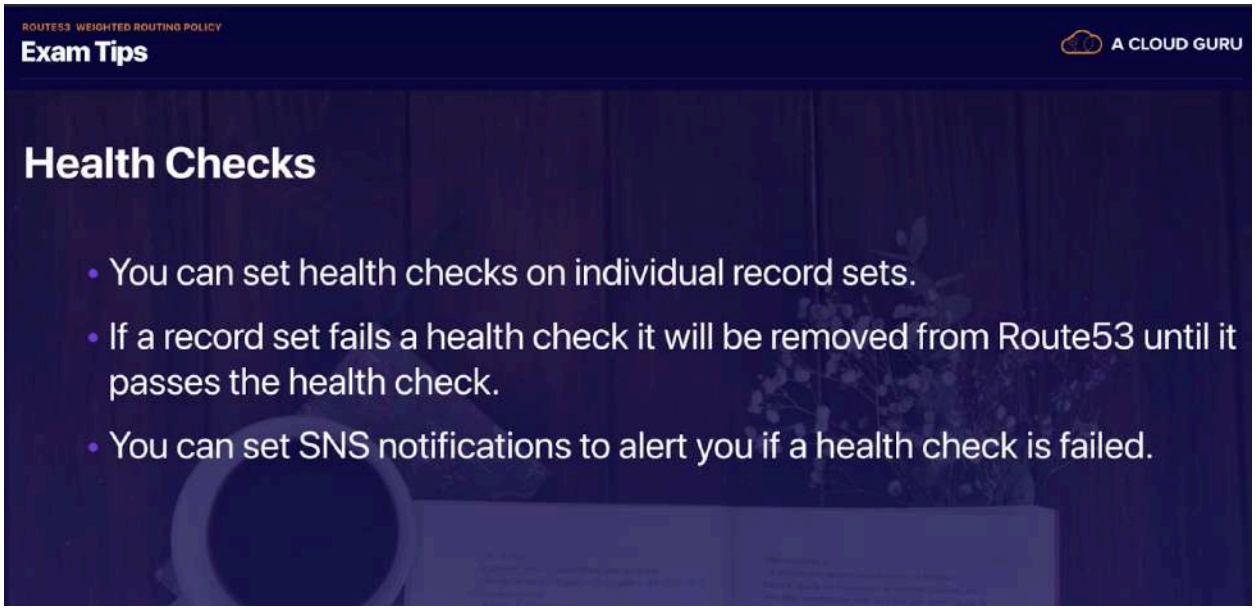
Weighted Routing Policy Lab

Weighted Routing Policy

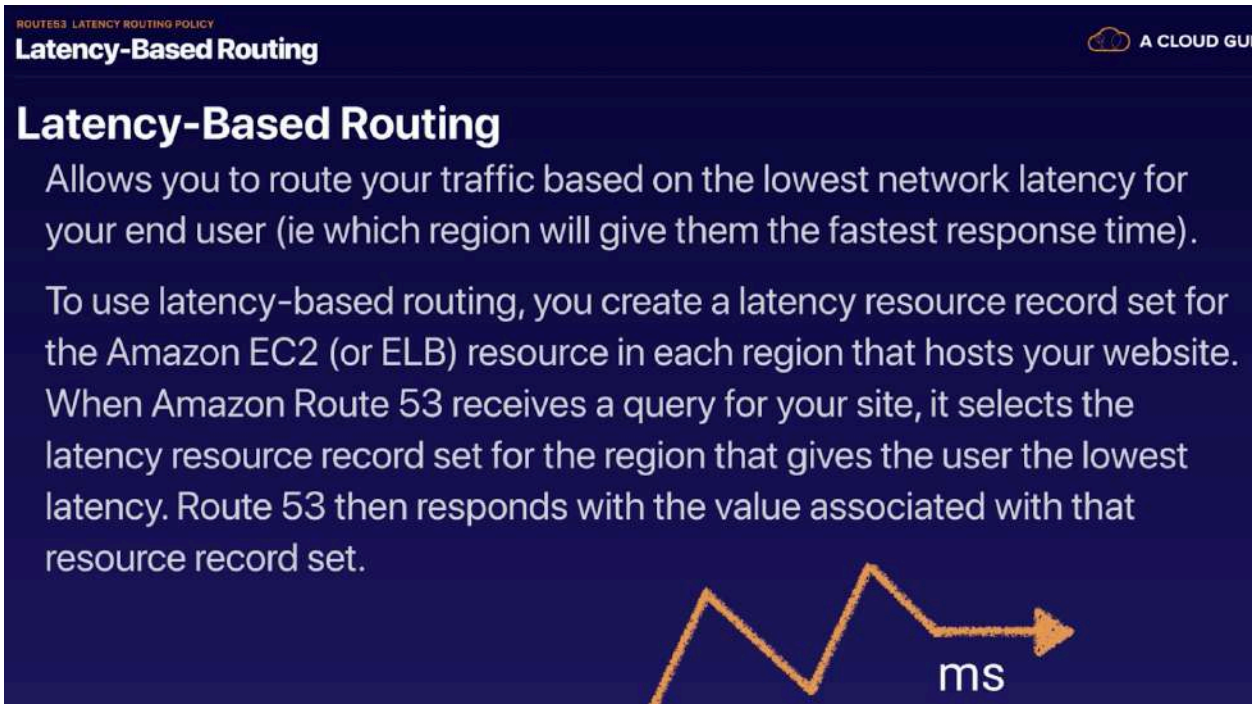
Allows you split your traffic based on different weights assigned.

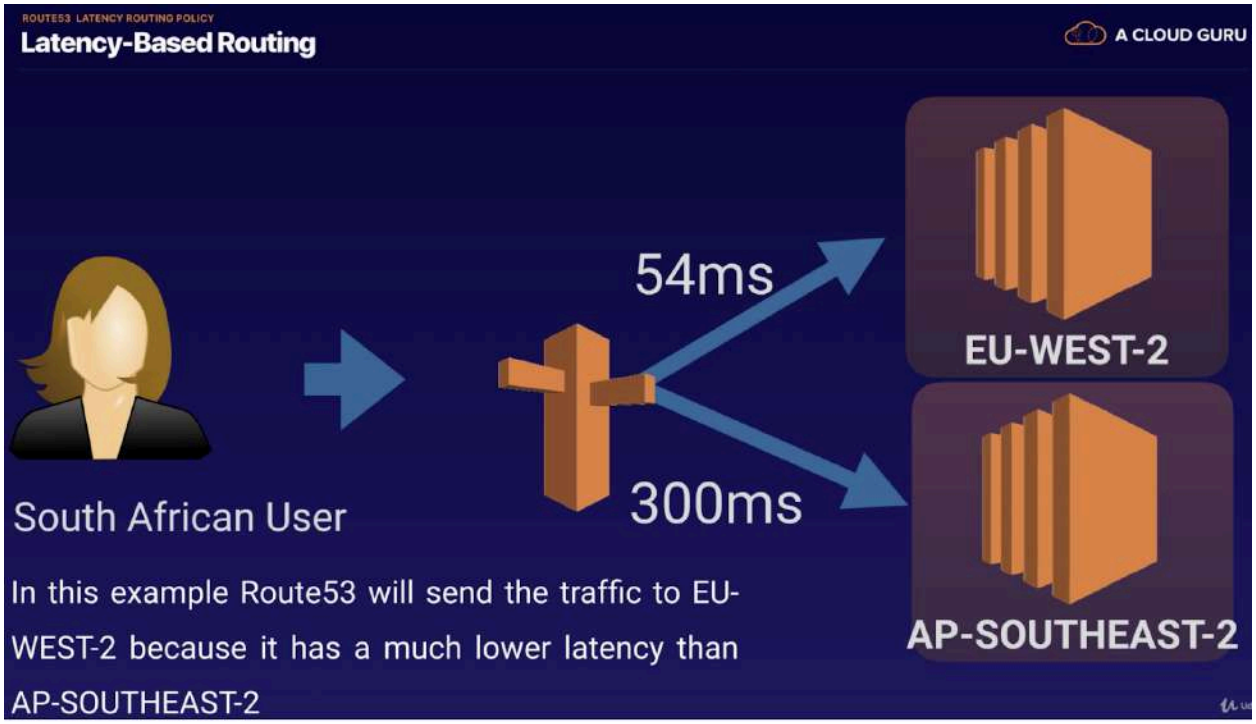
For example, you can set 10% of your traffic to go to US-EAST-1 and 90% to go to EU-WEST-1.



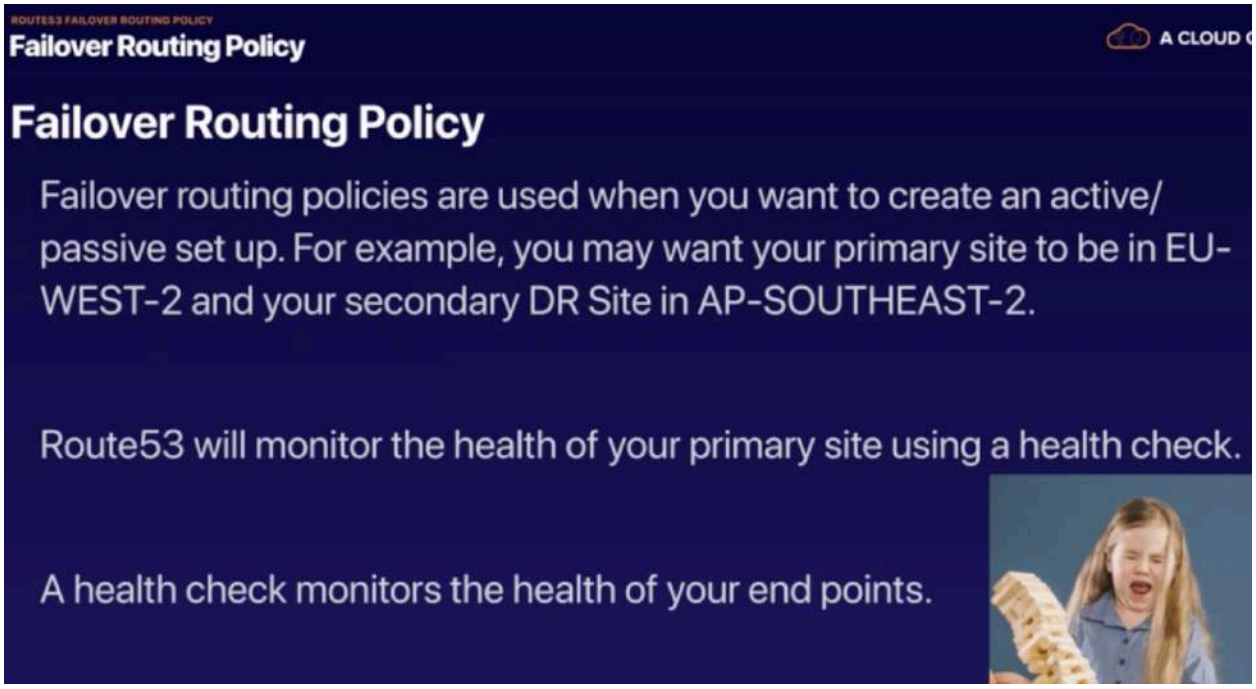


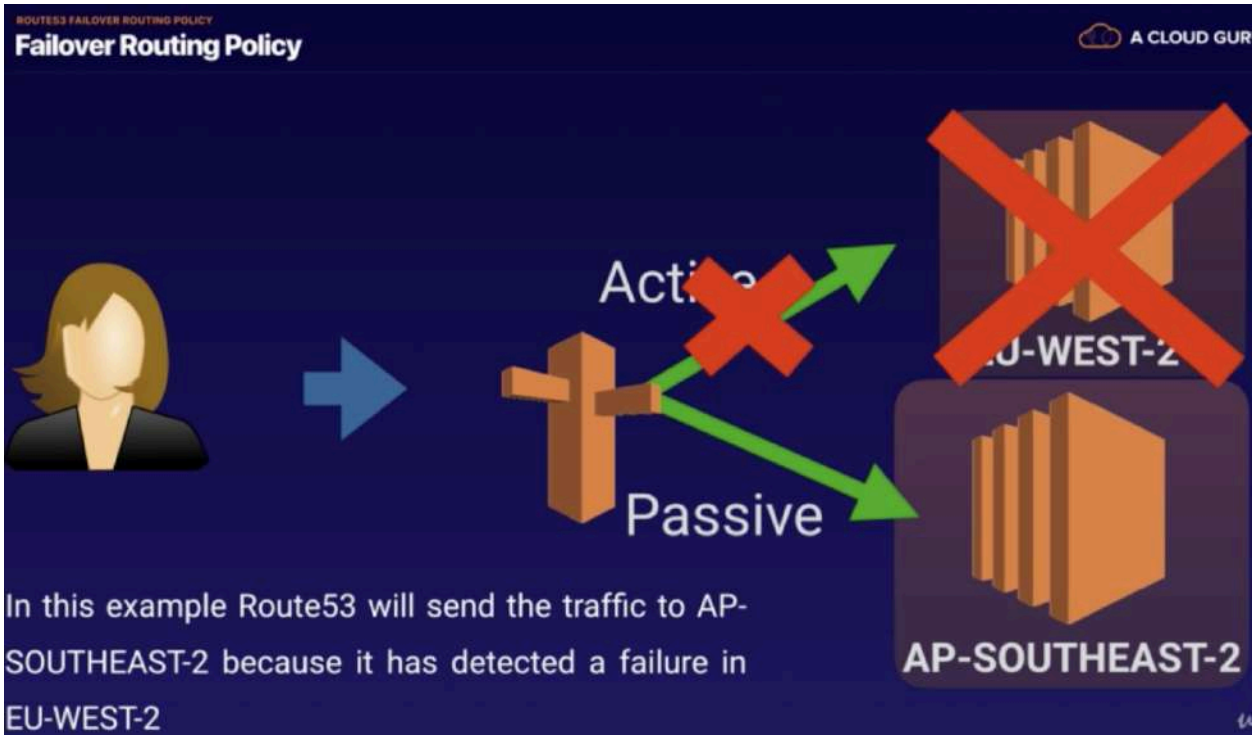
Latency Routing Policy



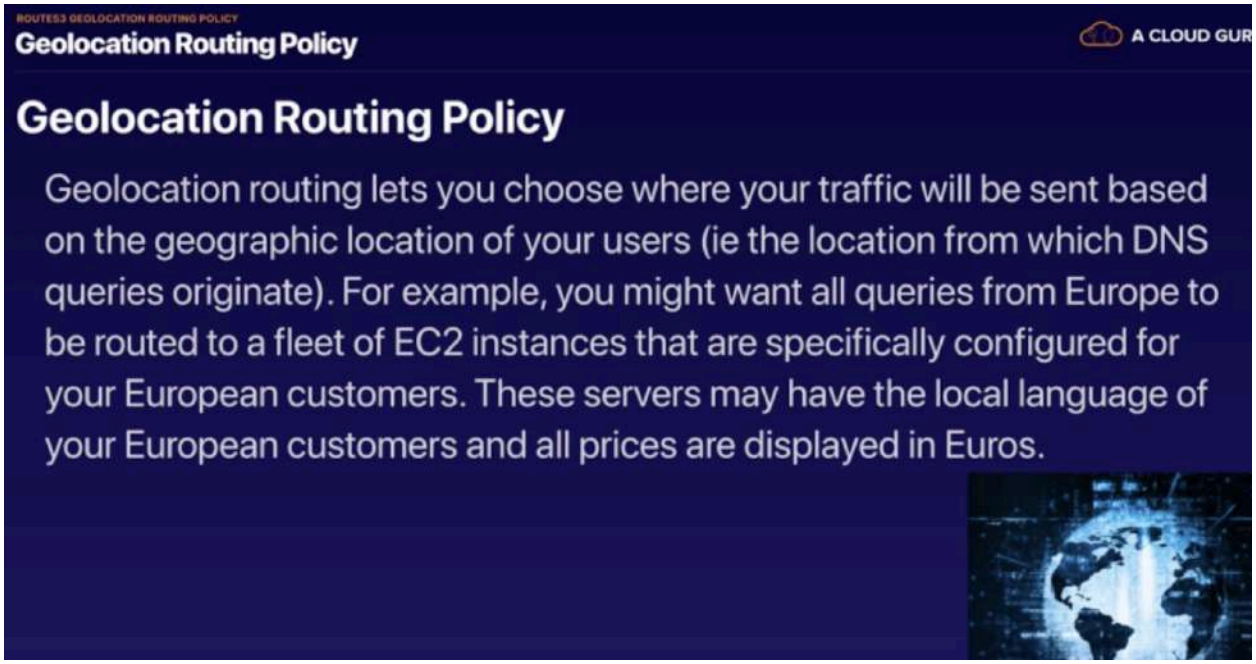


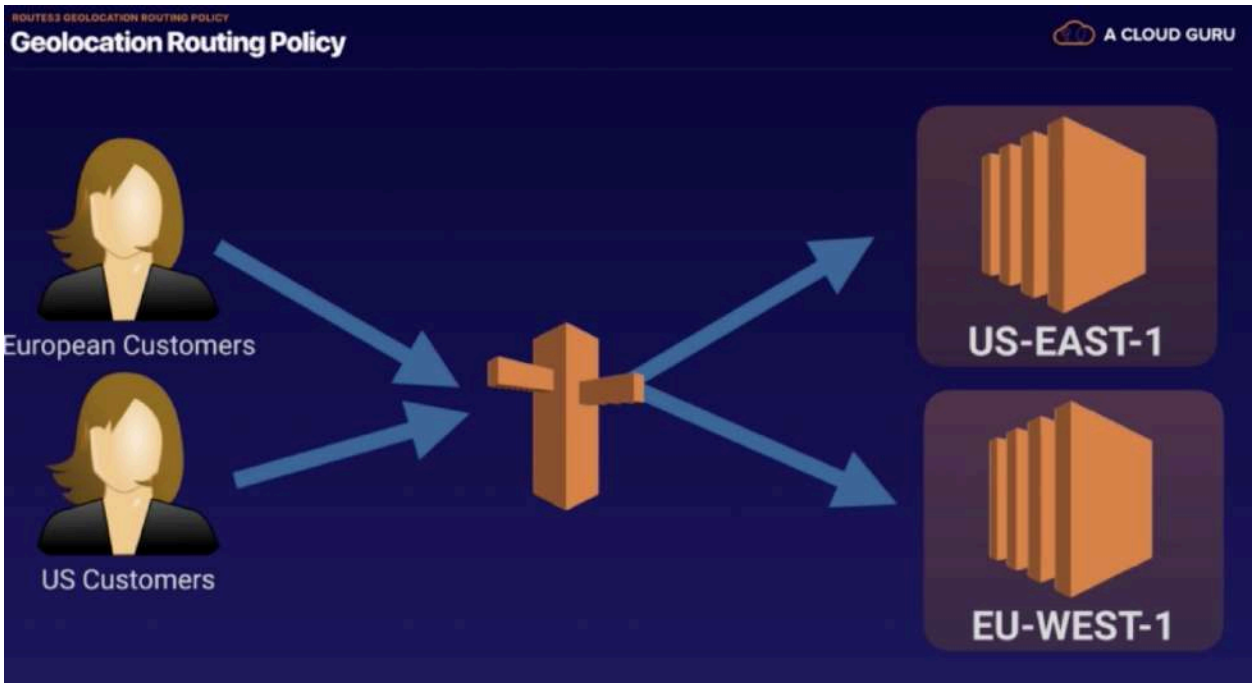
Failover Routing Policy



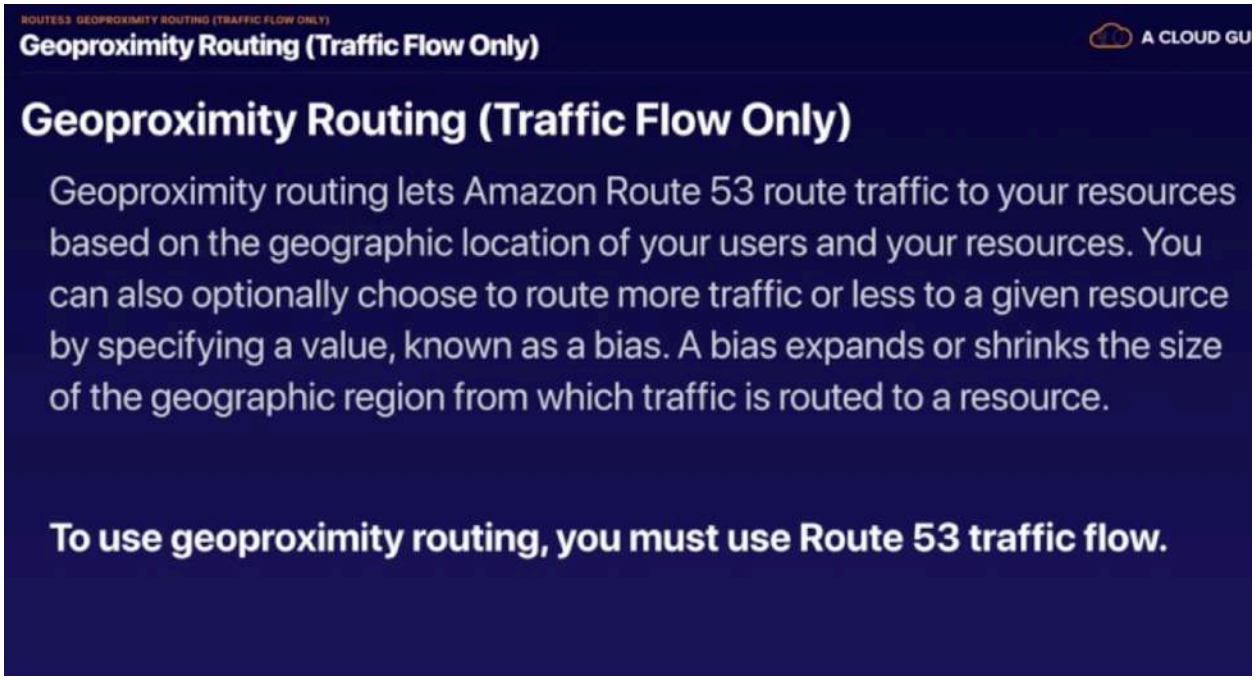


Geolocation Routing Policy

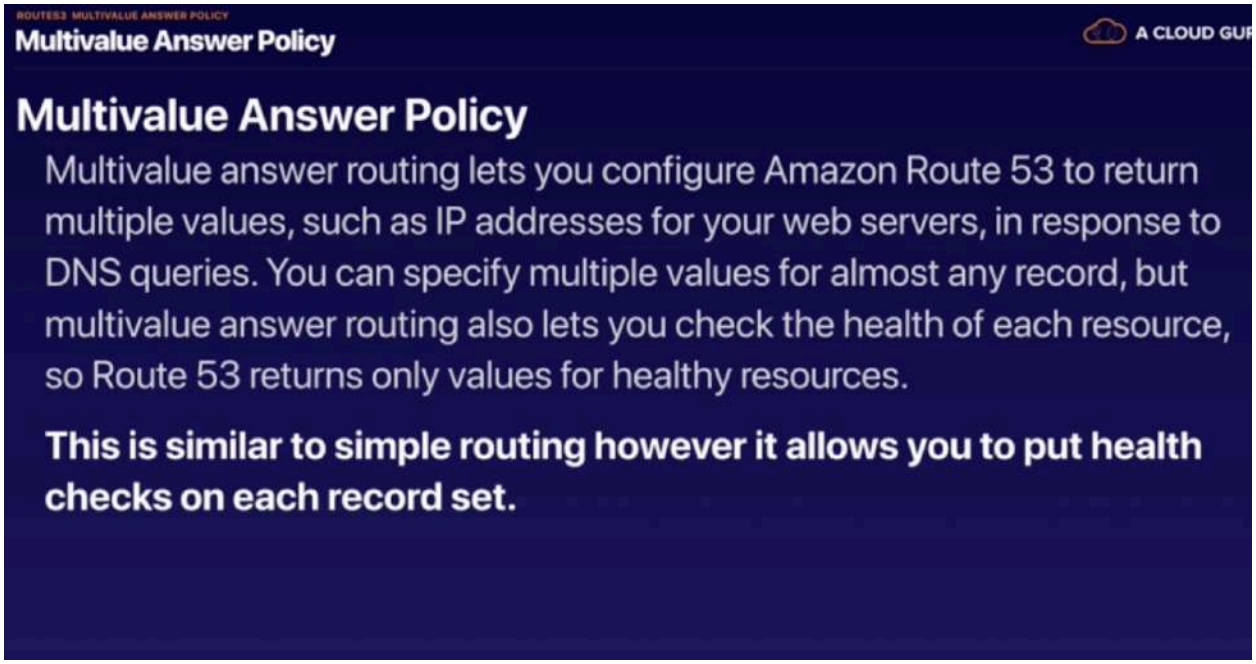




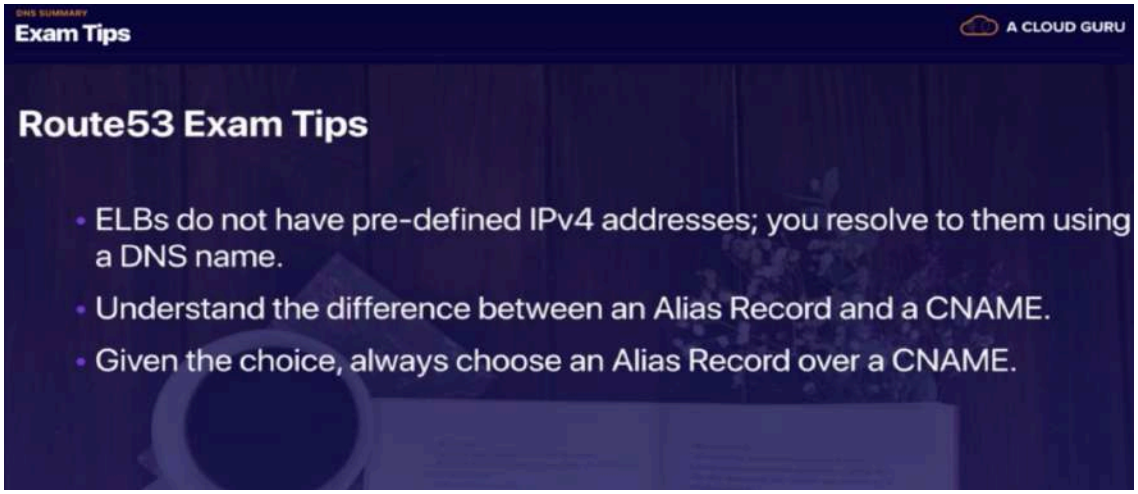
Geoproximity Routing Policy (Traffic Flow Only)

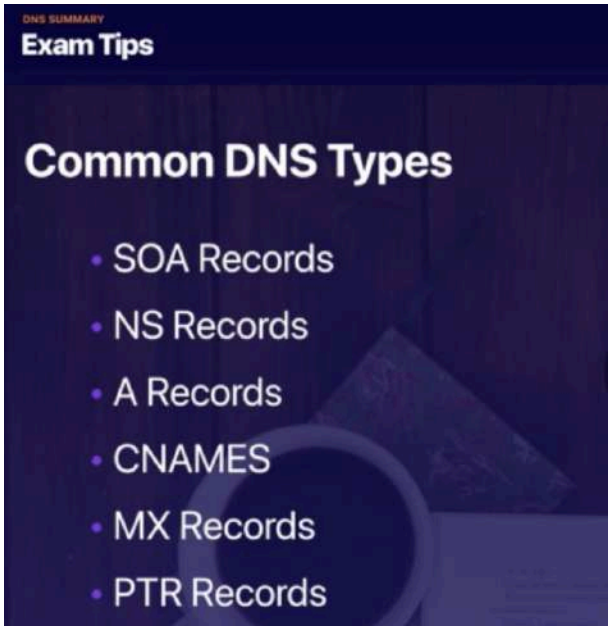


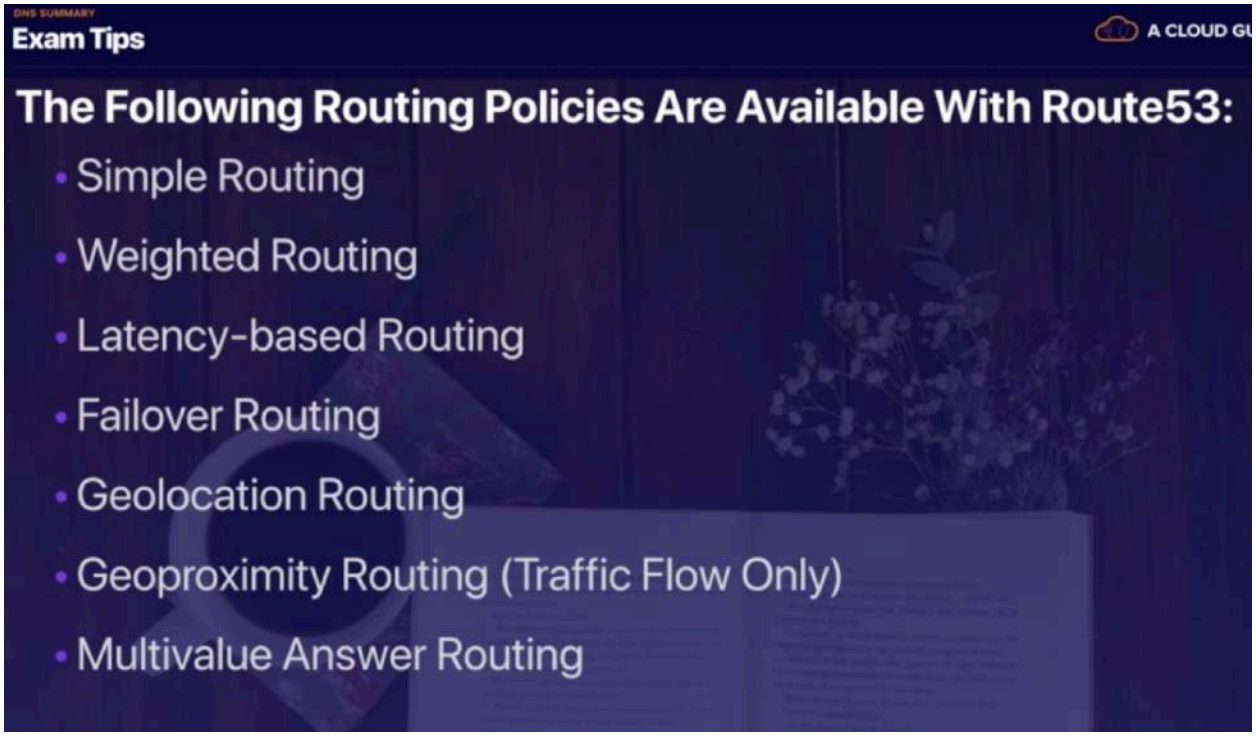
Multivalue Answer



Route53 Summary




DNS SUMMARY
Exam Tips
Common DNS Types
• SOA Records
• NS Records
• A Records
• CNAMES
• MX Records
• PTR Records


DNS SUMMARY
Exam Tips
A CLOUD GU
The Following Routing Policies Are Available With Route53:
• Simple Routing
• Weighted Routing
• Latency-based Routing
• Failover Routing
• Geolocation Routing
• Geoproximity Routing (Traffic Flow Only)
• Multivalue Answer Routing

DNS SUMMARY

Exam Tips

A CLOUD GURU

Health Checks

- You can set health checks on individual record sets.
- If a record set fails a health check it will be removed from Route53 until it passes the health check.
- You can set SNS notifications to alert you if a health check is failed.

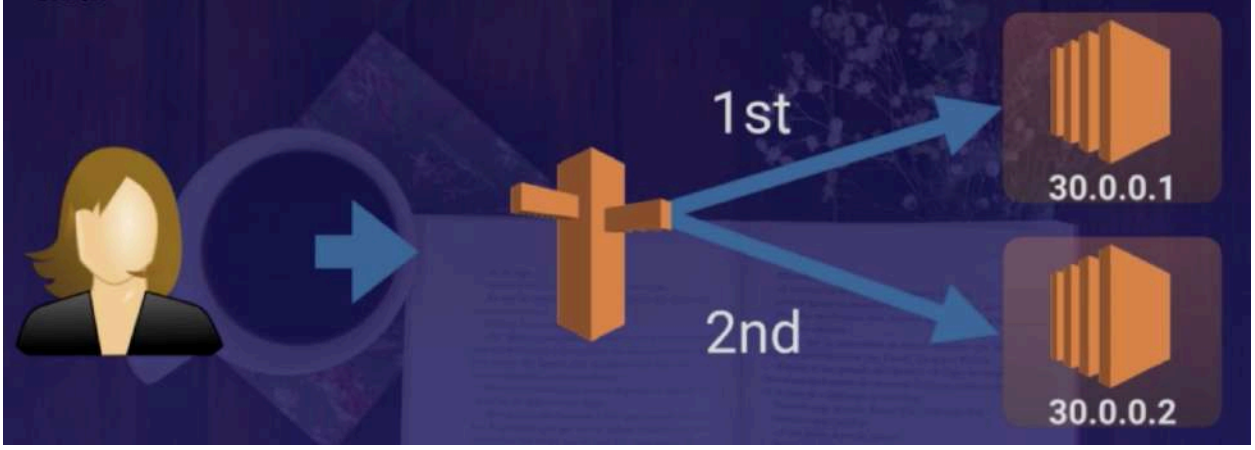
DNS SUMMARY

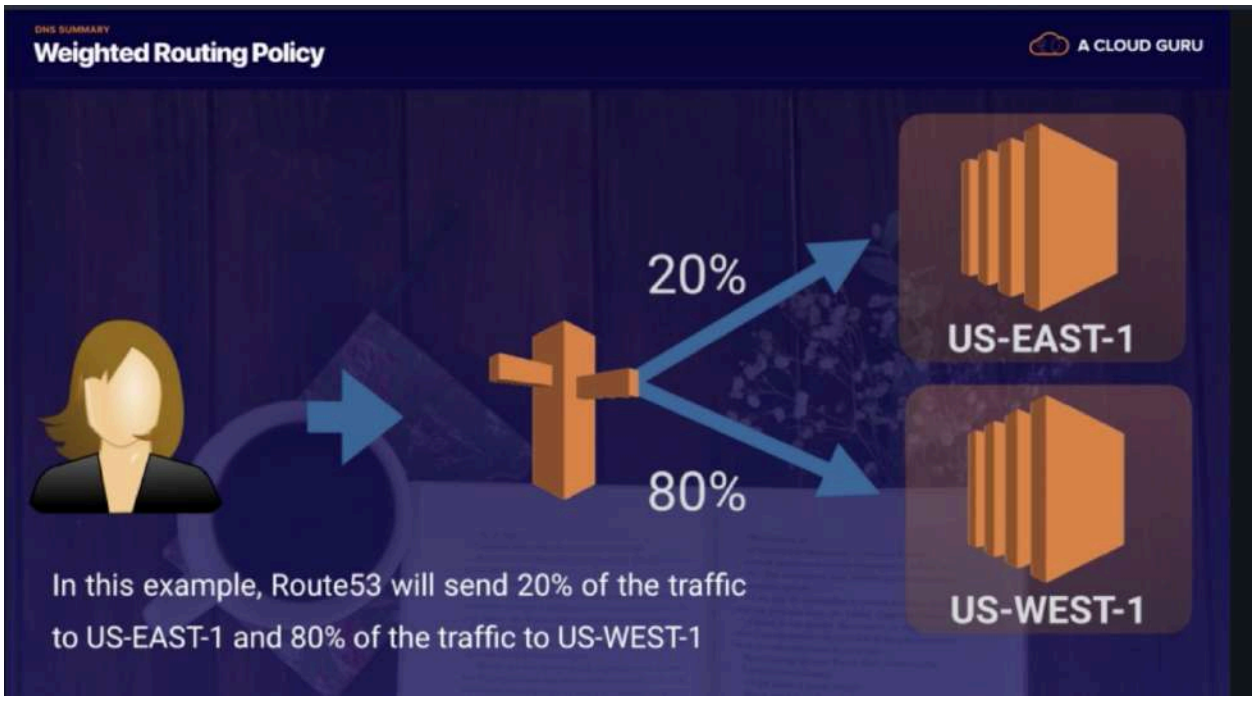
Simple Routing Policy

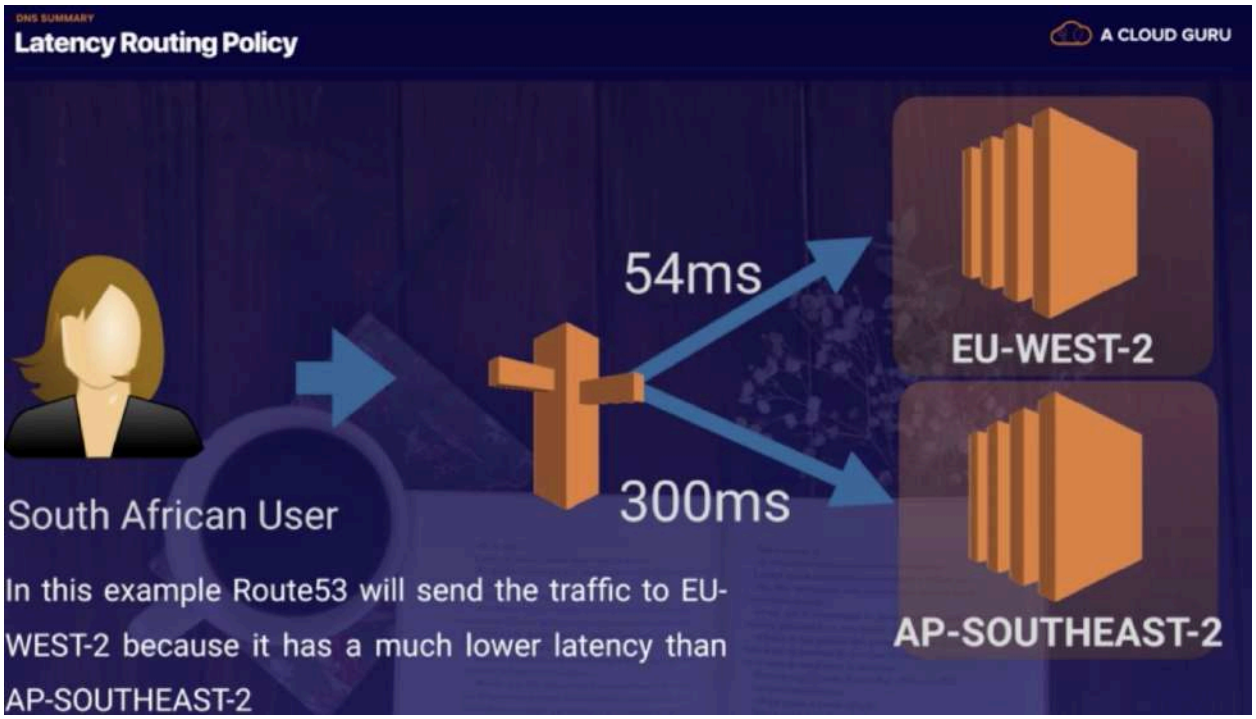
A CLOUD GUR

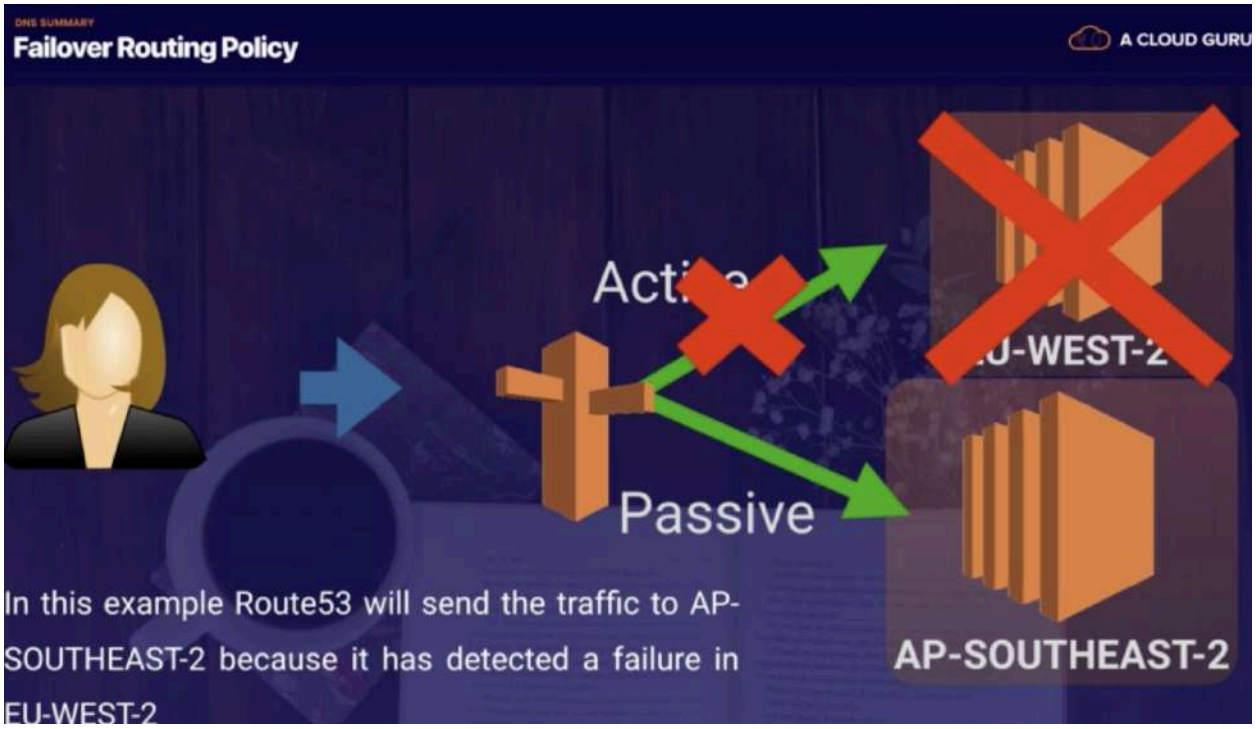
Simple Routing Policy

If you choose the simple routing policy you can only have one record with multiple IP addresses. If you specify multiple values in a record, Route 53 returns all values to the user in a random order.

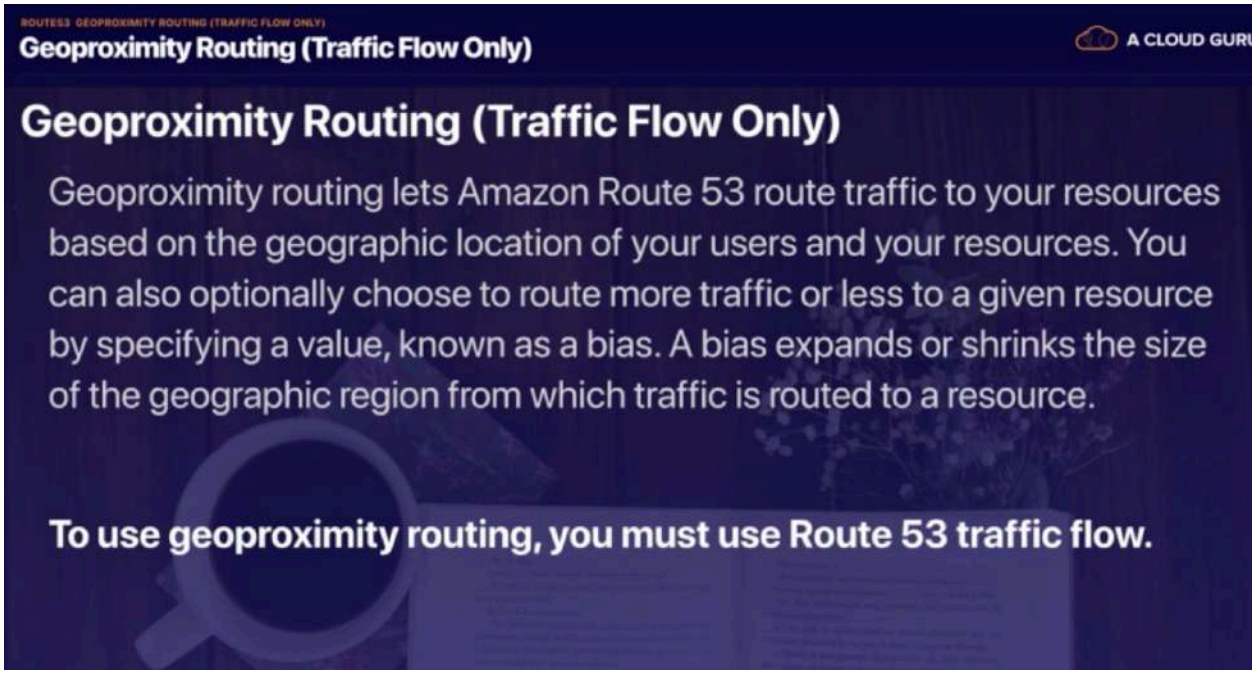


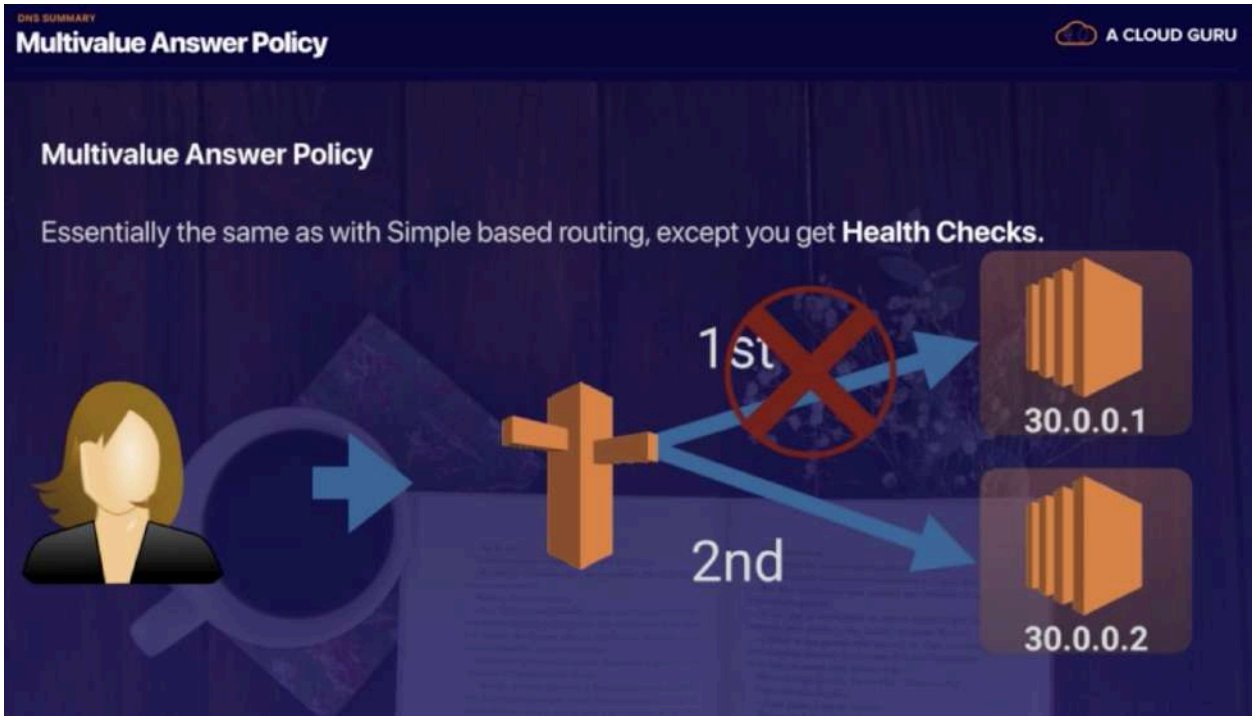

DNS SUMMARY
Weighted Routing Policy
A CLOUD GURU
20%
80%
US-EAST-1
US-WEST-1
In this example, Route53 will send 20% of the traffic to US-EAST-1 and 80% of the traffic to US-WEST-1


DNS SUMMARY
Latency Routing Policy
A CLOUD GURU
54ms
300ms
EU-WEST-2
AP-SOUTHEAST-2
South African User
In this example Route53 will send the traffic to EU-WEST-2 because it has a much lower latency than AP-SOUTHEAST-2


DNS SUMMARY
Failover Routing Policy
A CLOUD GURU
Passive
AP-SOUTHEAST-2
In this example Route53 will send the traffic to AP-SOUTHEAST-2 because it has detected a failure in EU-WEST-2


DNS SUMMARY
Geolocation Routing Policy
A CLOUD GURU
European Customers
US Customers
US-EAST-1
EU-WEST-1
In this example, Route53 will send the European customers to EU-WEST-1 and the US customers to US-EAST-1





Quiz on Route53

Good job!

Failover Routing and Latency-based Routing are the only two correct options, as they consider routing data based on whether the resource is healthy or whether one set of resources is more performant than another. Any answer containing location based routing (Geoproximity and Geolocation) cannot be correct in this case, as these types only consider where the client or resources are located before routing the data. They do not take into account whether a resource is online or slow. Simple Routing can also be discounted as it does not take into account the state of the resources.

Question 1:

Which of the following Route 53 policies allow you to a) route data to a second resource if the first is unhealthy, and b) route data to resources that have better performance?

- Failover Routing and Simple Routing
- Geoproximity Routing and Geolocation Routing
- Geolocation Routing and Latency-based Routing
- Failover Routing and Latency-based Routing

Good job!

Question 2:

Route 53 is Amazon's DNS Service.

- (●) TRUE
- ( ) FALSE

Good job!

Question 3:

Route 53 is named so because _____.

- ( ) It was invented in 1953.
- ( ) Route 66 was already registered with Microsoft.
- (●) The DNS Port is on Port 53 and Route 53 is a DNS Service.
- ( ) Beats me – only people in marketing can tell you the reason behind its name.

Good job!

Question 4:

You have created a new subdomain for your popular website, and you need this subdomain to point to an Elastic Load Balancer using Route53. Which DNS record set should you create?

- A
- AAAA
- MX
- CNAME

Good job!

Question 5:

True or False: There is a limit to the number of domain names that you can manage using Route 53.

- True. There is a hard limit of 10 domain names. You cannot go above this number.
- True and False. With Route 53, there is a default limit of 50 domain names. However, this limit can be increased by contacting AWS support.
- False. By default, you can support as many domain names on Route 53 as you want.

Good job!

Multivalue answer routing lets you configure Amazon Route 53 to return multiple values, such as IP addresses for your web servers, in response to DNS queries. Route 53 responds to DNS queries with up to eight healthy records and gives different answers to different DNS resolvers. The choice of which to use is left to the requesting service effectively creating a form or randomization.

Question 7:

Your company hosts 10 web servers all serving the same web content in AWS. They want Route 53 to serve traffic to random web servers. Which routing policy will meet this requirement, and provide the best resiliency?

- Simple Routing
- Weighted Routing
- Multivalue Routing
- Latency Routing

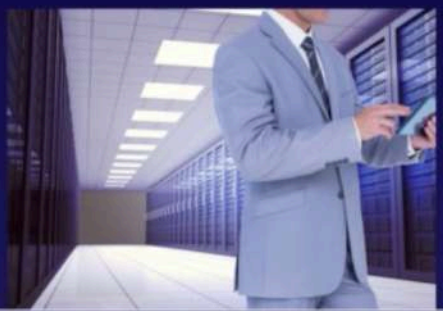
VPC

VPC OVERVIEW

What Is A VPC?

A CLOUD GU

Think of a VPC as a virtual data centre in the cloud.



VPC OVERVIEW

What Is A VPC?

A CLOU

Amazon Virtual Private Cloud (Amazon VPC) lets you provision a logically isolated section of the Amazon Web Services (AWS) Cloud where you can launch AWS resources in a virtual network that you define. You have complete control over your virtual networking environment, including selection of your own IP address range, creation of subnets, and configuration of route tables and network gateways.

VPC OVERVIEW

What Is A VPC?

You can easily customize the network configuration for your Amazon Virtual Private Cloud. For example, you can create a public-facing subnet for your webservers that has access to the Internet, and place your backend systems such as databases or application servers in a private-facing subnet with no Internet access. You can leverage multiple layers of security, including security groups and network access control lists, to help control access to Amazon EC2 instances in each subnet.

VPC OVERVIEW

What Is A VPC?

A C

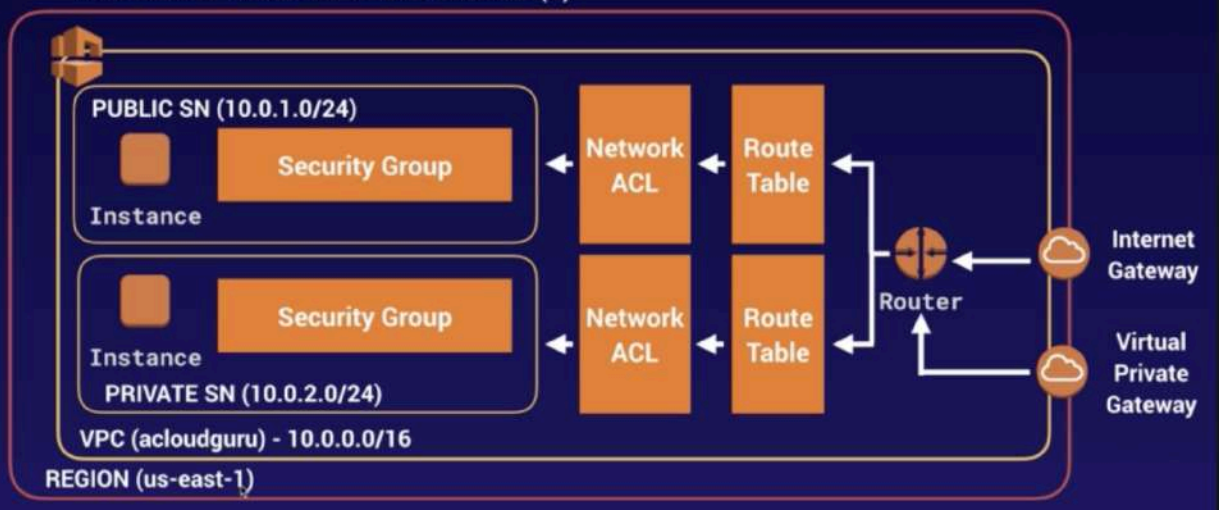
Additionally, you can create a Hardware Virtual Private Network (VPN) connection between your corporate datacenter and your VPC and leverage the AWS cloud as an extension of your corporate datacenter.

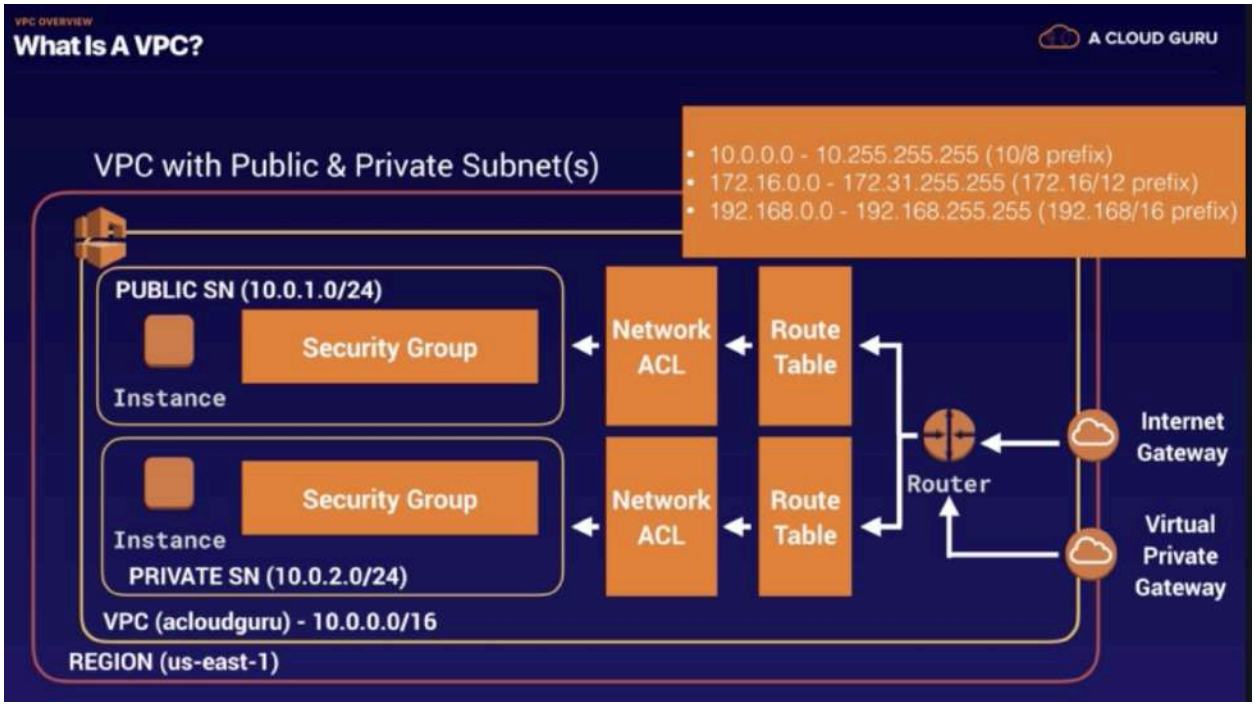
VPC OVERVIEW

What Is A VPC?

A CLOUD GURU

VPC with Public & Private Subnet(s)




VPC OVERVIEW
What Is A VPC?
A CLOUD GURU
VPC with Public & Private Subnet(s)
• 10.0.0.0 - 10.255.255.255 (10/8 prefix)
• 172.16.0.0 - 172.31.255.255 (172.16/12 prefix)
• 192.168.0.0 - 192.168.255.255 (192.168/16 prefix)
PUBLIC SN (10.0.1.0/24)
Security Group
Instance
Network ACL
Route Table
Router
Internet Gateway
Security Group
Instance
Network ACL
Route Table
Virtual Private Gateway
PRIVATE SN (10.0.2.0/24)
VPC (acloudguru) - 10.0.0.0/16
REGION (us-east-1)

`


VPC OVERVIEW
VPC Features
A CLOUD GURU
What can we do with a VPC?
• Launch instances into a subnet of your choosing
• Assign custom IP address ranges in each subnet
• Configure route tables between subnets
• Create internet gateway and attach it to our VPC
• Much better security control over your AWS resources
• Instance security groups
• Subnet network access control lists (ACLS)

VPC OVERVIEW

VPC Features

A CLOUD GUR

Default VPC vs Custom VPC

- Default VPC is user friendly, allowing you to immediately deploy instances.
- All Subnets in default VPC have a route out to the internet.
- Each EC2 instance has both a public and private IP address.

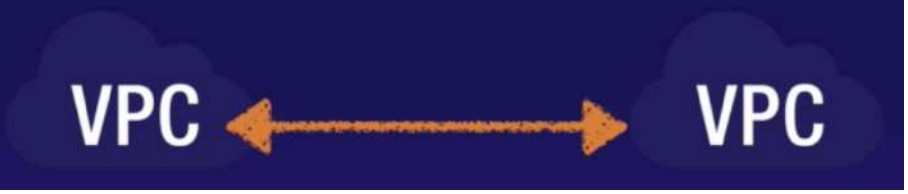
VPC OVERVIEW

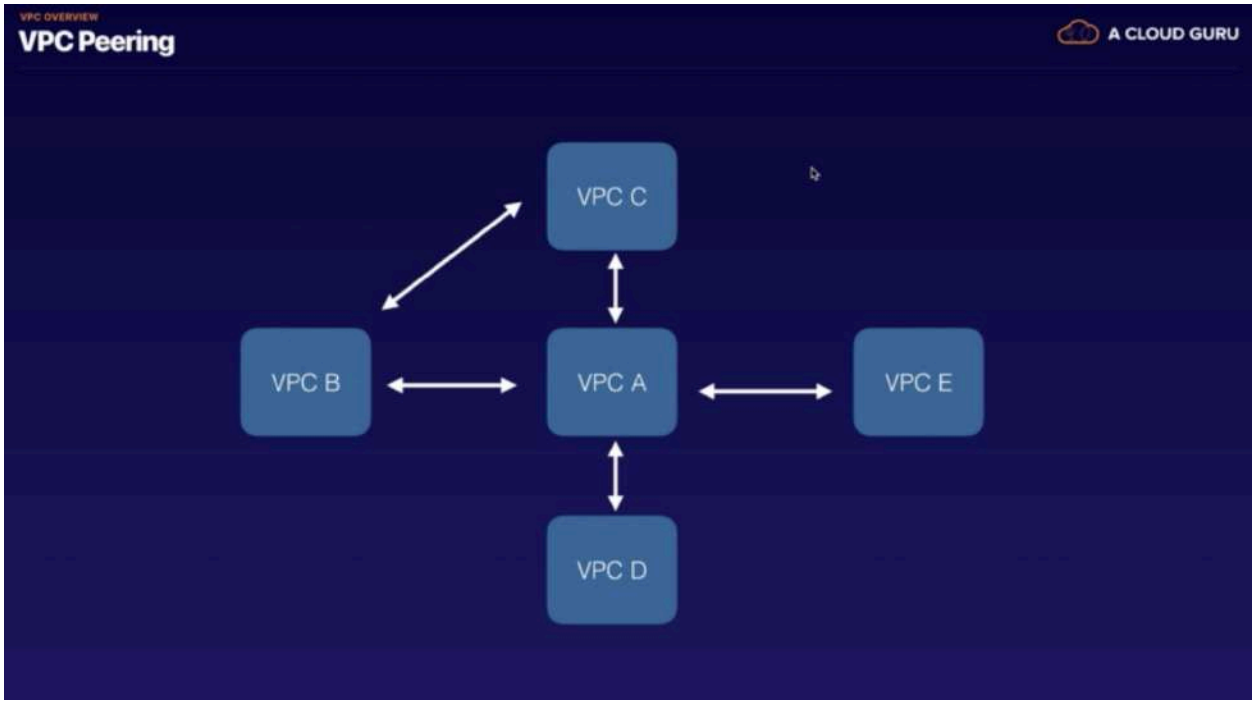
VPC Features

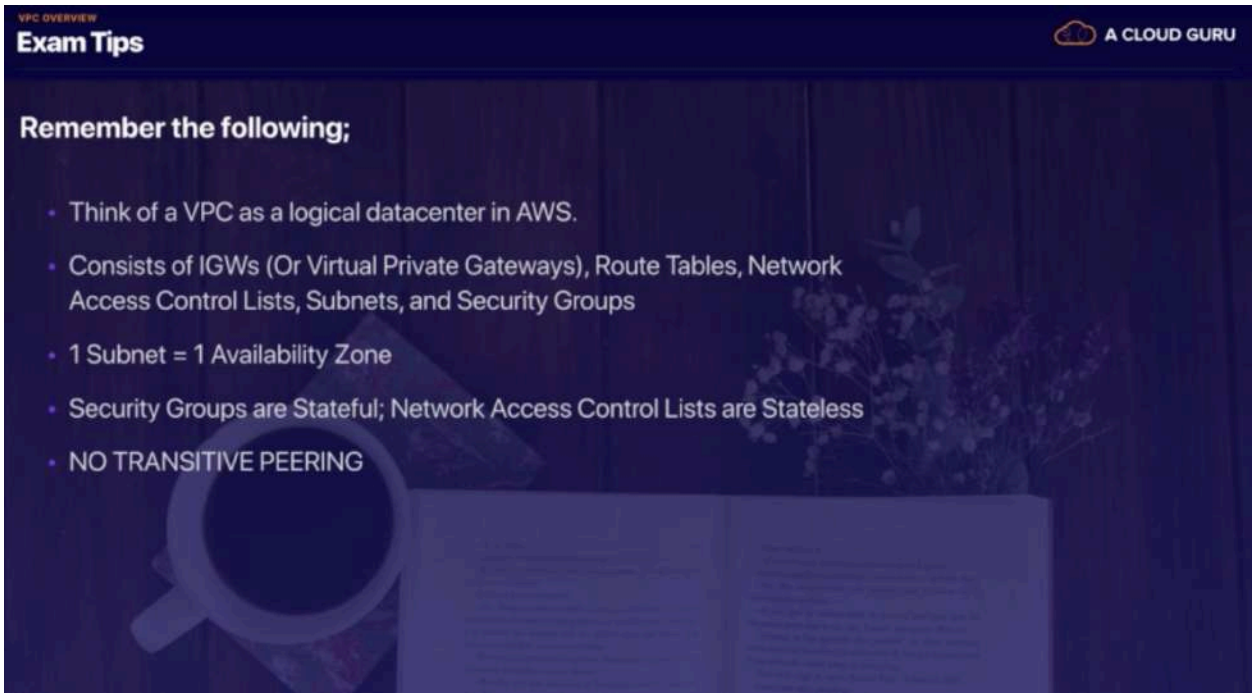
A CLOUD GURU

VPC Peering

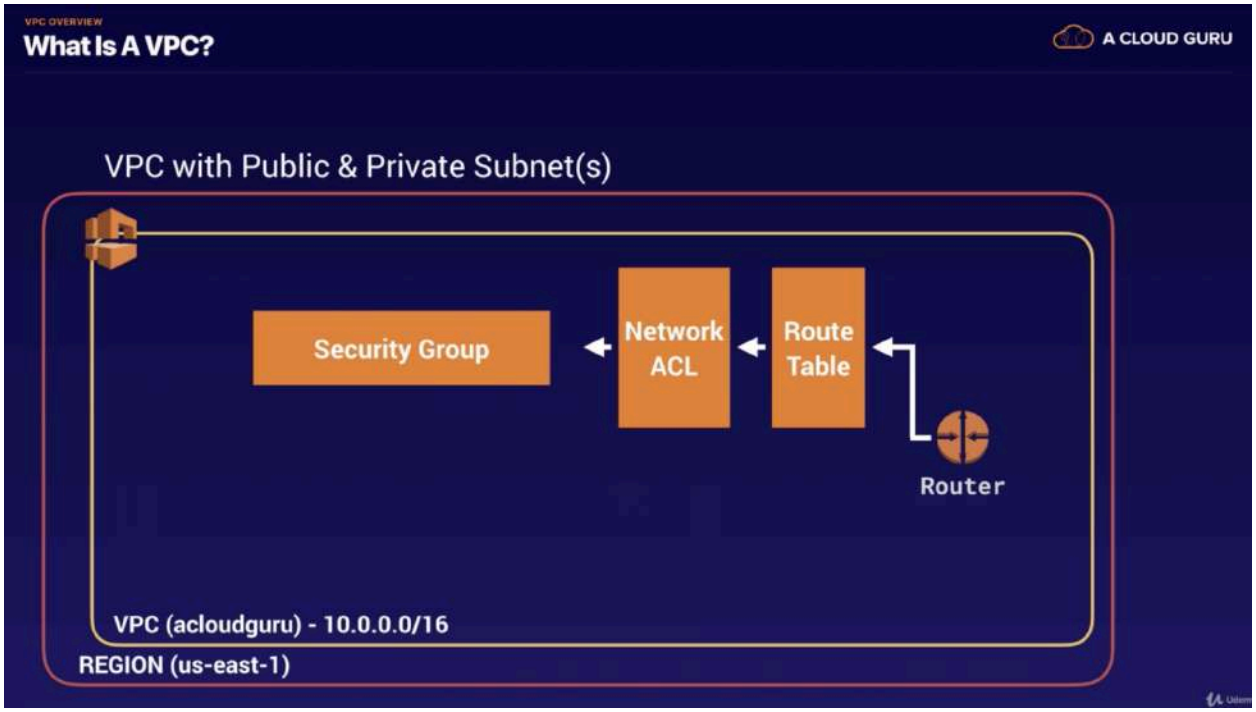
- Allows you to connect one VPC with another via a direct network route using private IP addresses.
- Instances behave as if they were on the same private network
- You can peer VPC's with other AWS accounts as well as with other VPCs in the same account.
- Peering is in a star configuration: ie 1 central VPC peers with 4 others. NO TRANSITIVE PEERING!!!

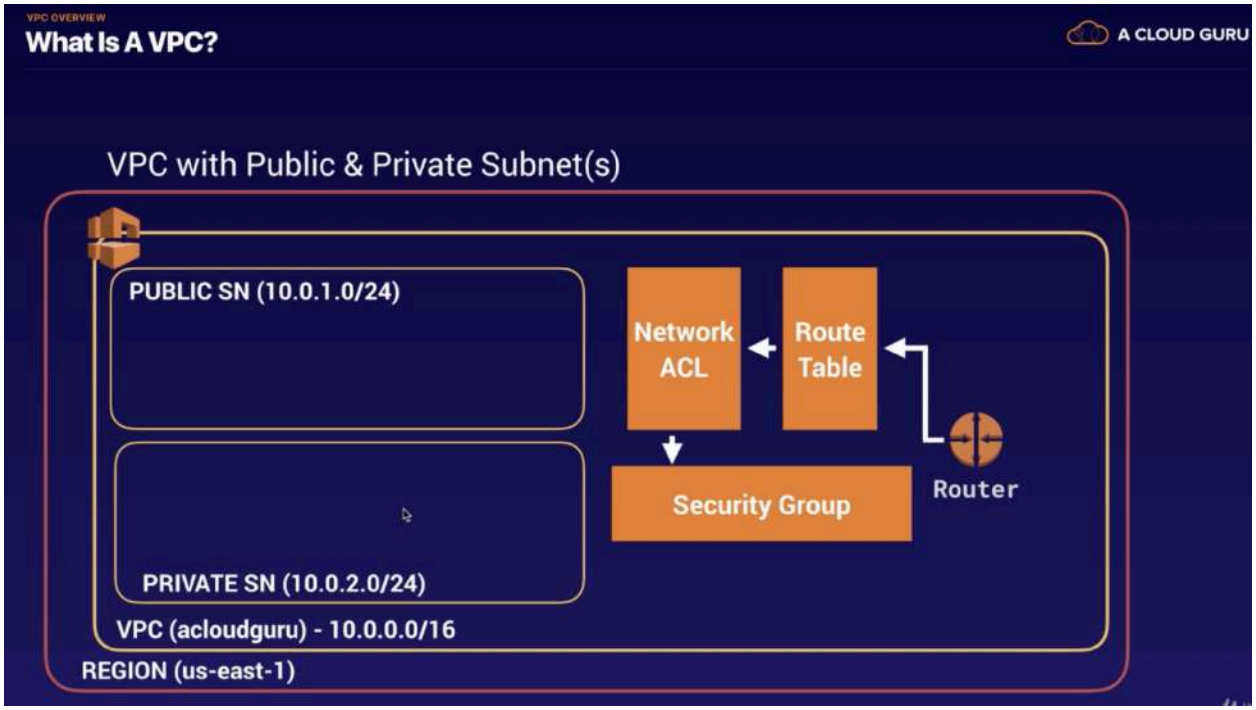


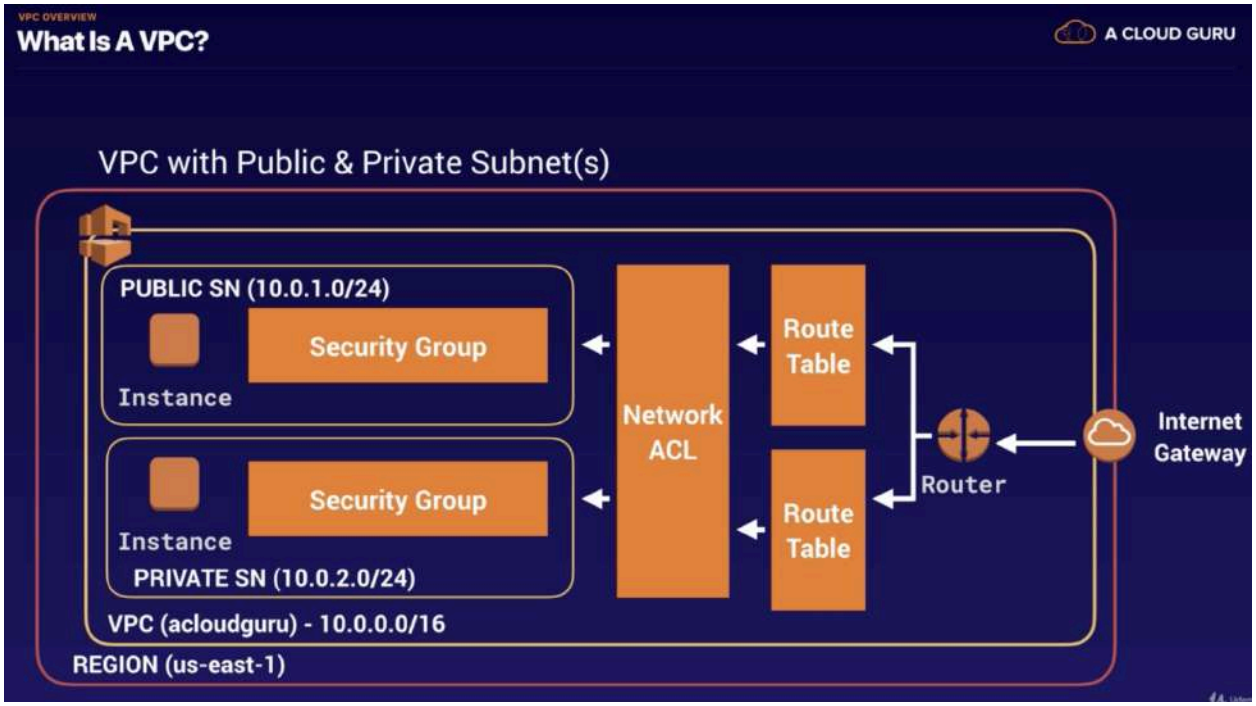

VPC OVERVIEW
VPC Peering
A CLOUD GURU
VPC C
VPC B
VPC A
VPC E
VPC D

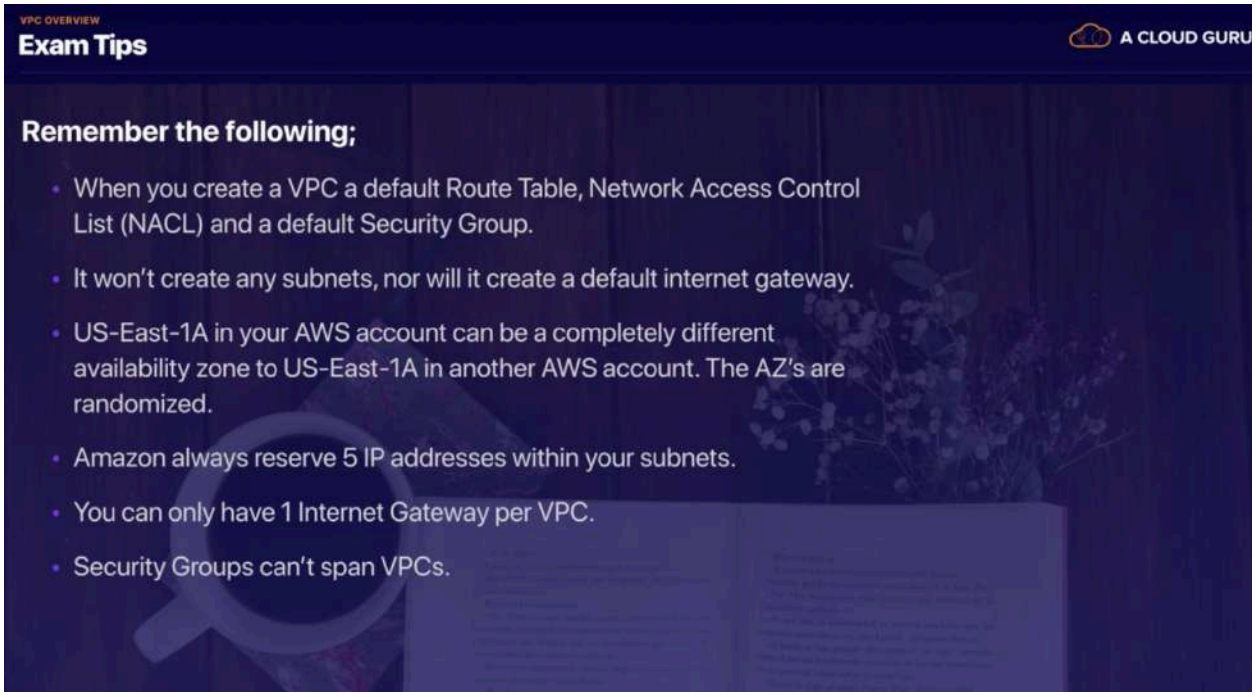

VPC OVERVIEW
Exam Tips
A CLOUD GURU
Remember the following;
Think of a VPC as a logical datacenter in AWS.
Consists of IGWs (Or Virtual Private Gateways), Route Tables, Network Access Control Lists, Subnets, and Security Groups
1 Subnet = 1 Availability Zone
Security Groups are Stateful; Network Access Control Lists are Stateless
NO TRANSITIVE PEERING

VPC-Lab


VPC OVERVIEW
What Is A VPC?
A CLOUD GURU
VPC with Public & Private Subnet(s)
Security Group
Network ACL
Route Table
Router
VPC (acloudguru) - 10.0.0.0/16
REGION (us-east-1)


VPC OVERVIEW
What Is A VPC?
A CLOUD GURU
VPC with Public & Private Subnet(s)
PUBLIC SN (10.0.1.0/24)
PRIVATE SN (10.0.2.0/24)
Network ACL
Route Table
Router
Security Group
VPC (acloudguru) - 10.0.0.0/16
REGION (us-east-1)



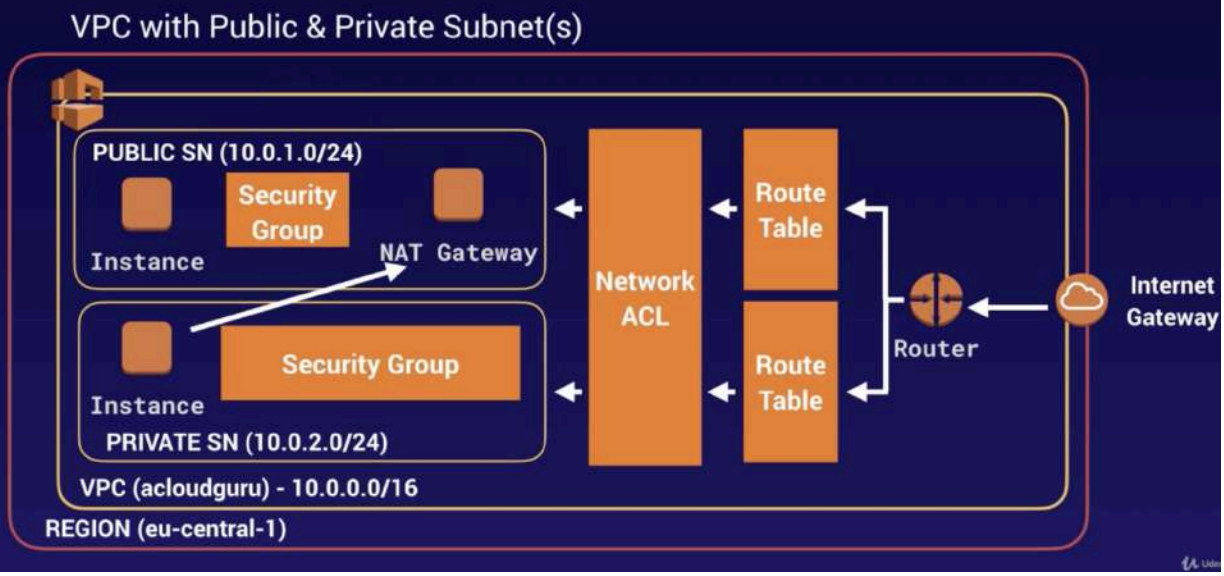


NAT Instances VS NAT Gateway

NAT INSTANCES & NAT GATEWAYS

NAT Gateways Explained

A CLOUD GURU



NAT INSTANCES & NAT GATEWAYS

Exam Tips

A CLOUD GURU

Nat Instances Exam Tips

- When creating a NAT instance, Disable Source/Destination Check on the Instance.
- NAT instances must be in a public subnet.
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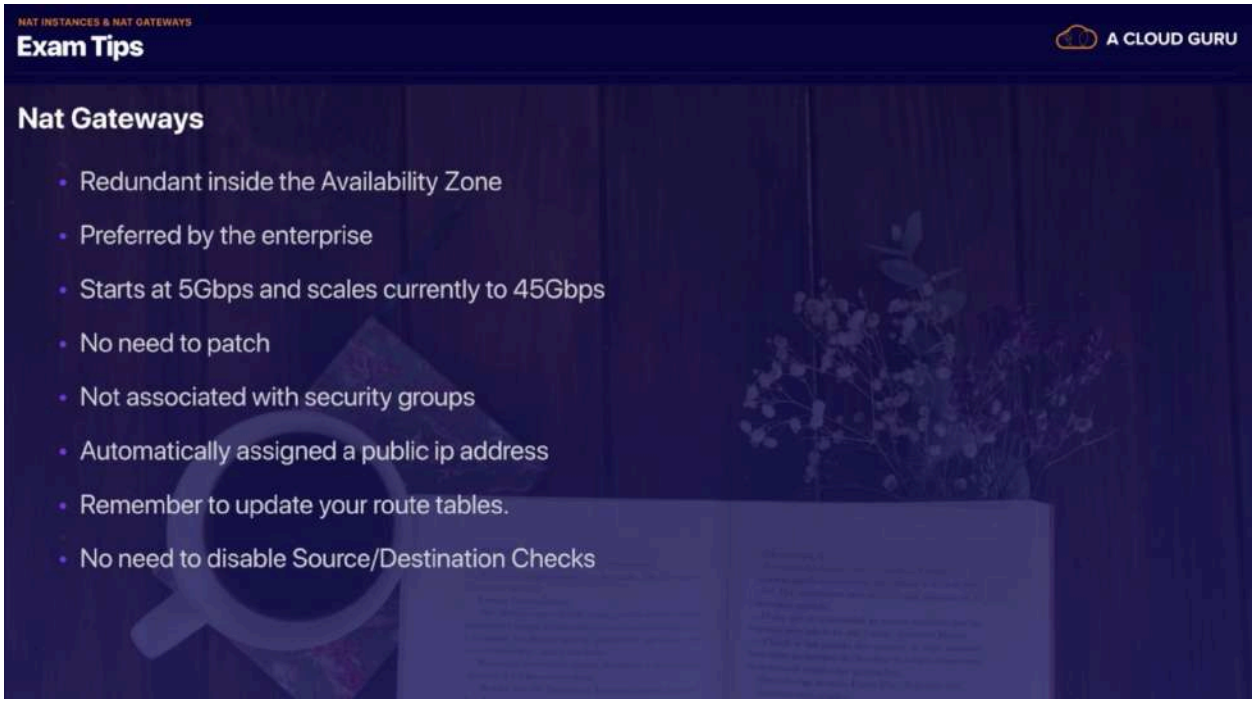
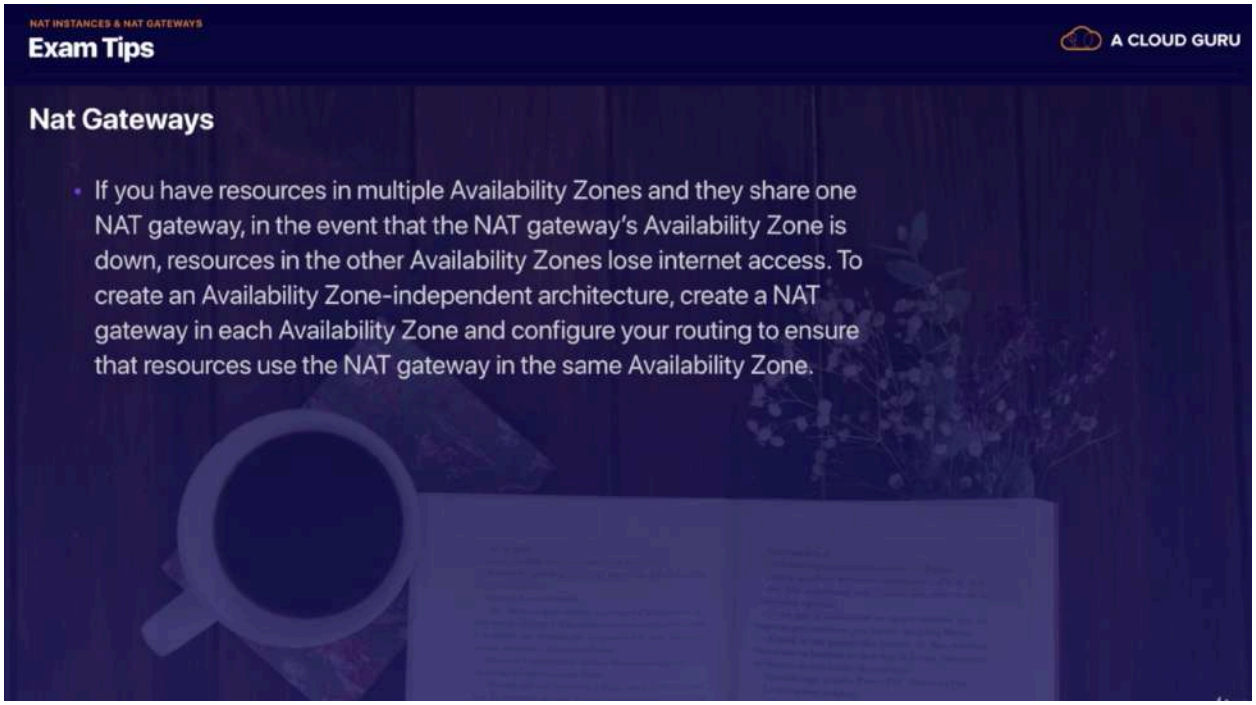


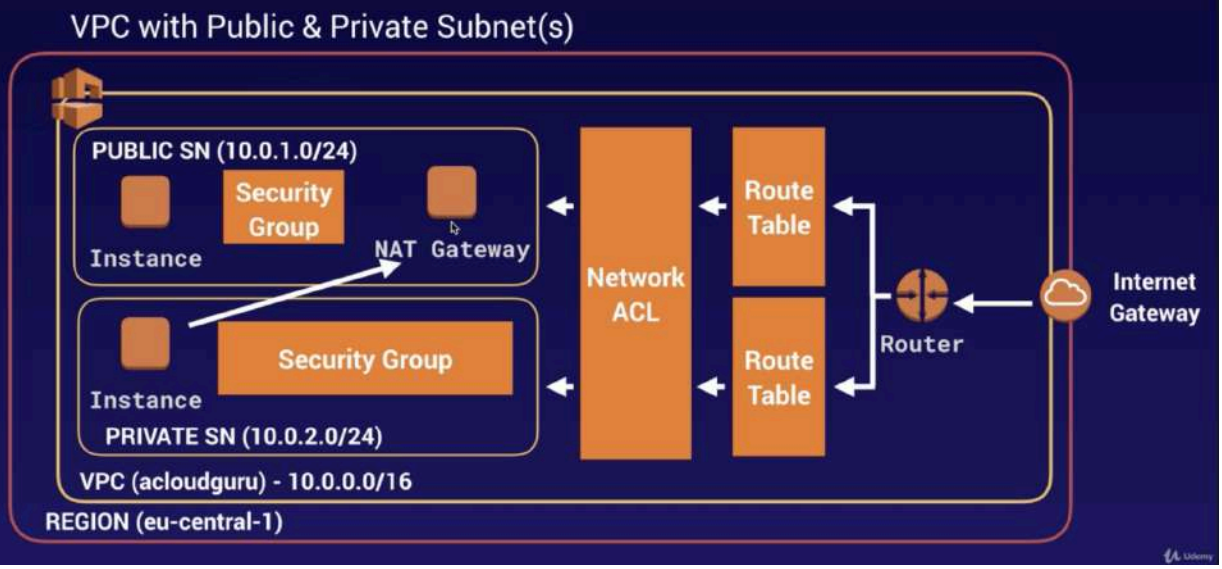


Access Control Lists (ACL)

NAT INSTANCES & NAT GATEWAYS

NAT Gateways Explained

A CLOUD GURU



NETWORK ACCESS CONTROL LISTS VS SECURITY GROUPS

Exam Tips

A CLOUD GURU

Remember the following for your exam;

- Your VPC automatically comes with a default network ACL, and by default it allows all outbound and inbound traffic.
- You can create custom network ACLs. By default, each custom network ACL denies all inbound and outbound traffic until you add rules.
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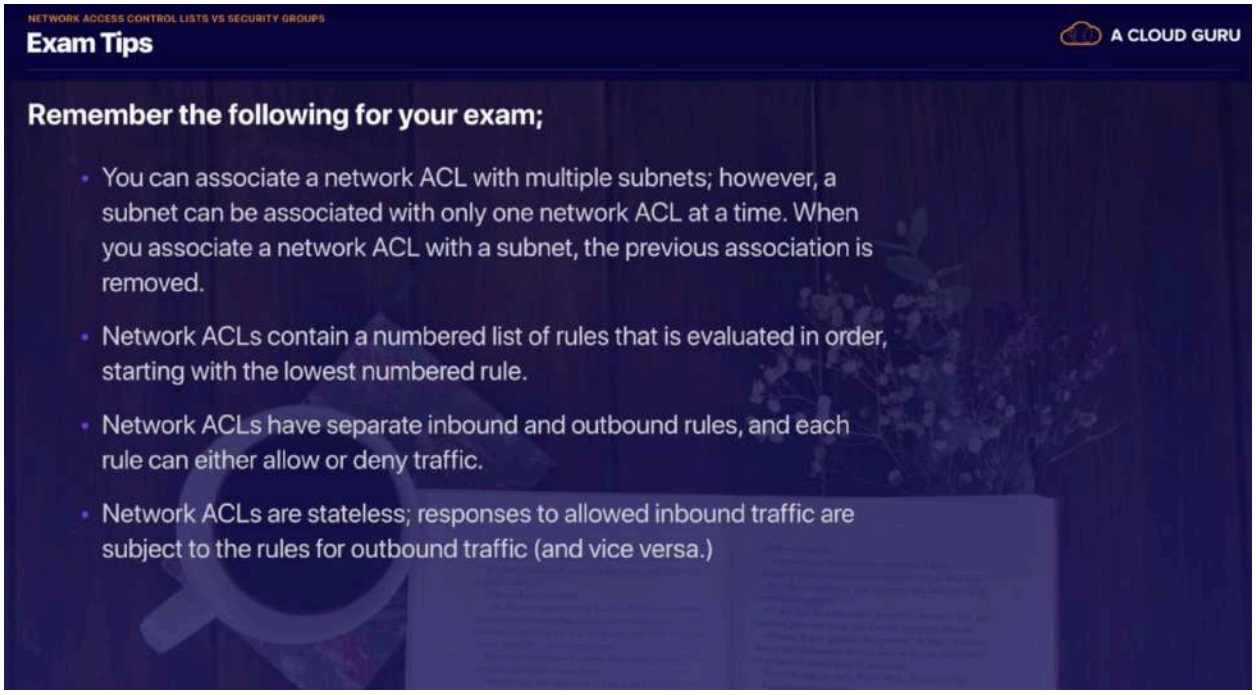
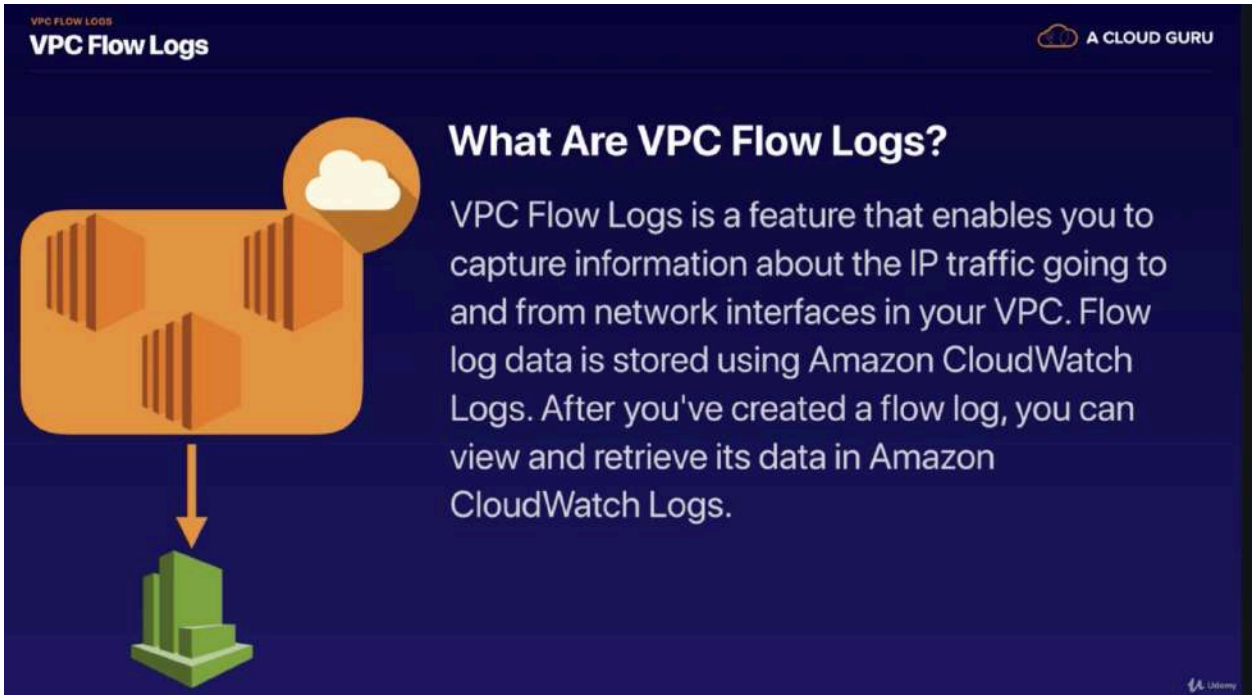
- Block IP Addresses using network ACLs not Security Groups



VPC Flow Logs



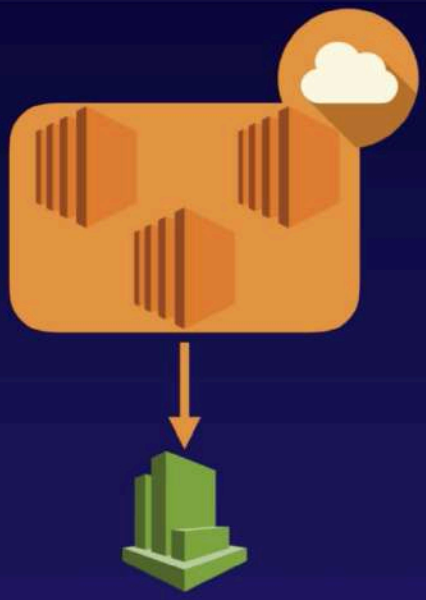
VPC FLOW LOGS

VPC Flow Logs Levels

A CLOUD GURU

Flow logs can be created at 3 levels;

- VPC
- Subnet
- Network Interface Level



VPC FLOW LOGS

Exam Tips

A CLOUD GURU

Remember the following;

- You cannot enable flow logs for VPCs that are peered with your VPC unless the peer VPC is in your account.
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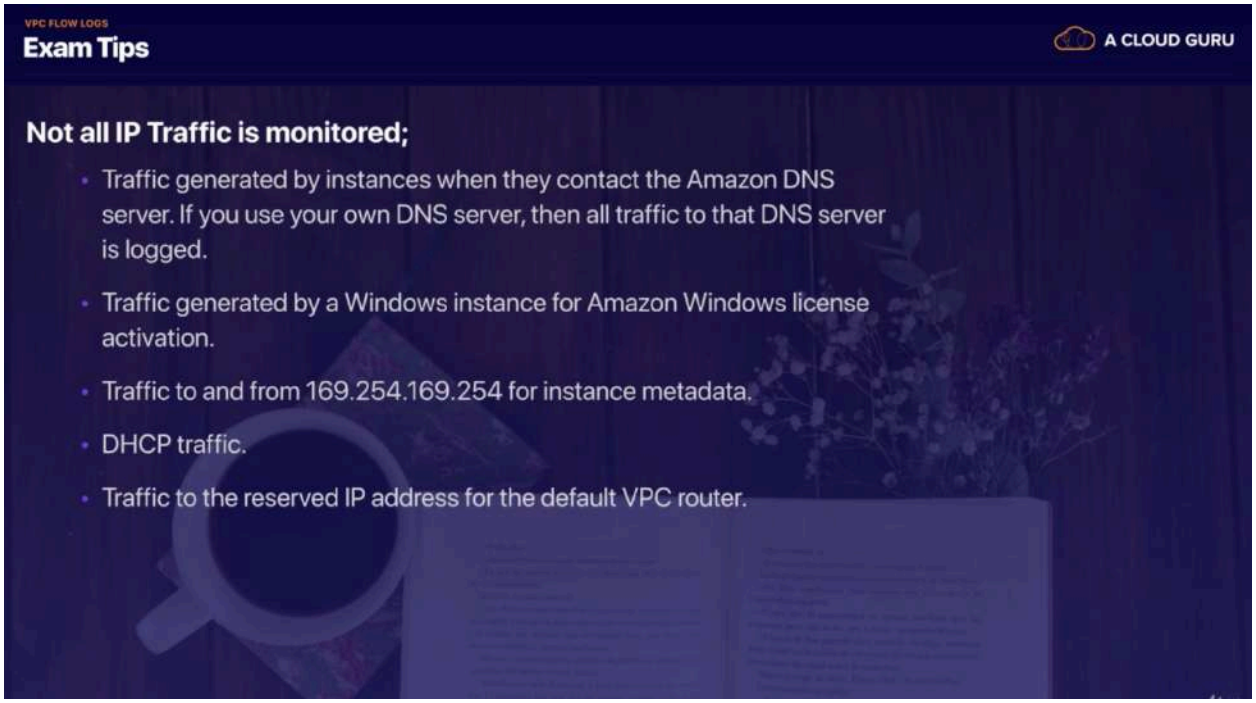
- After you've created a flow log, you cannot change its configuration; for example, you can't associate a different IAM role with the flow log.


VPC FLOW LOGS
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A CLOUD GURU
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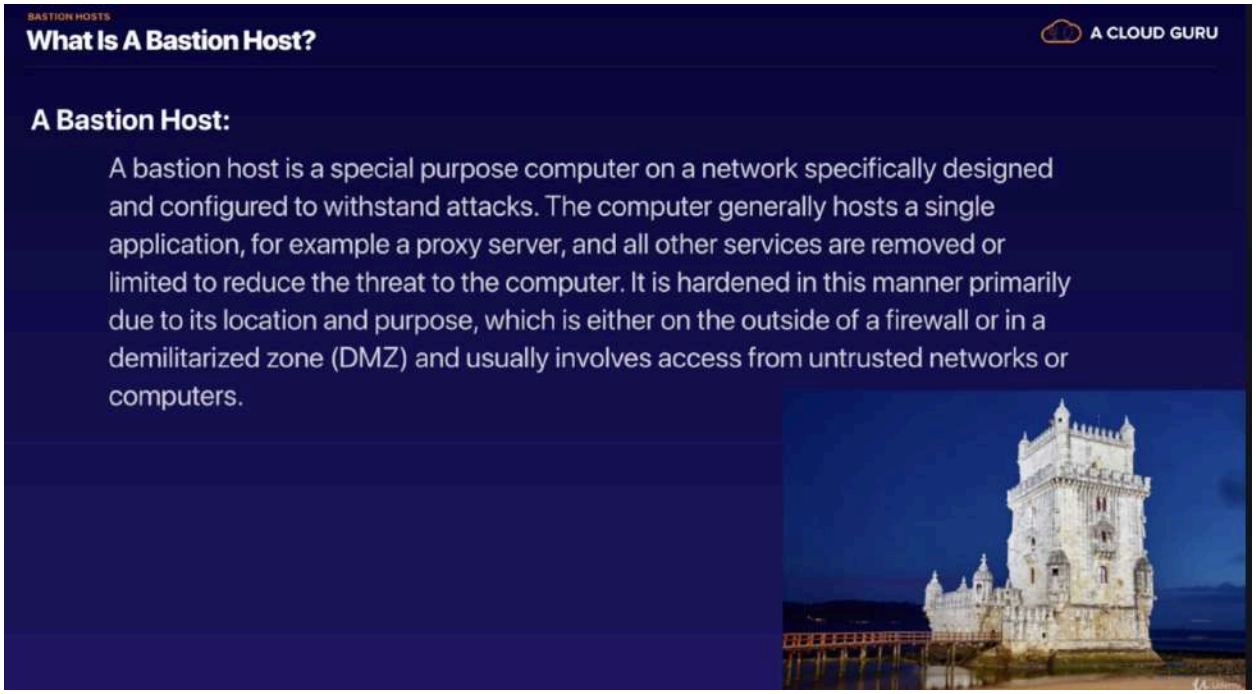
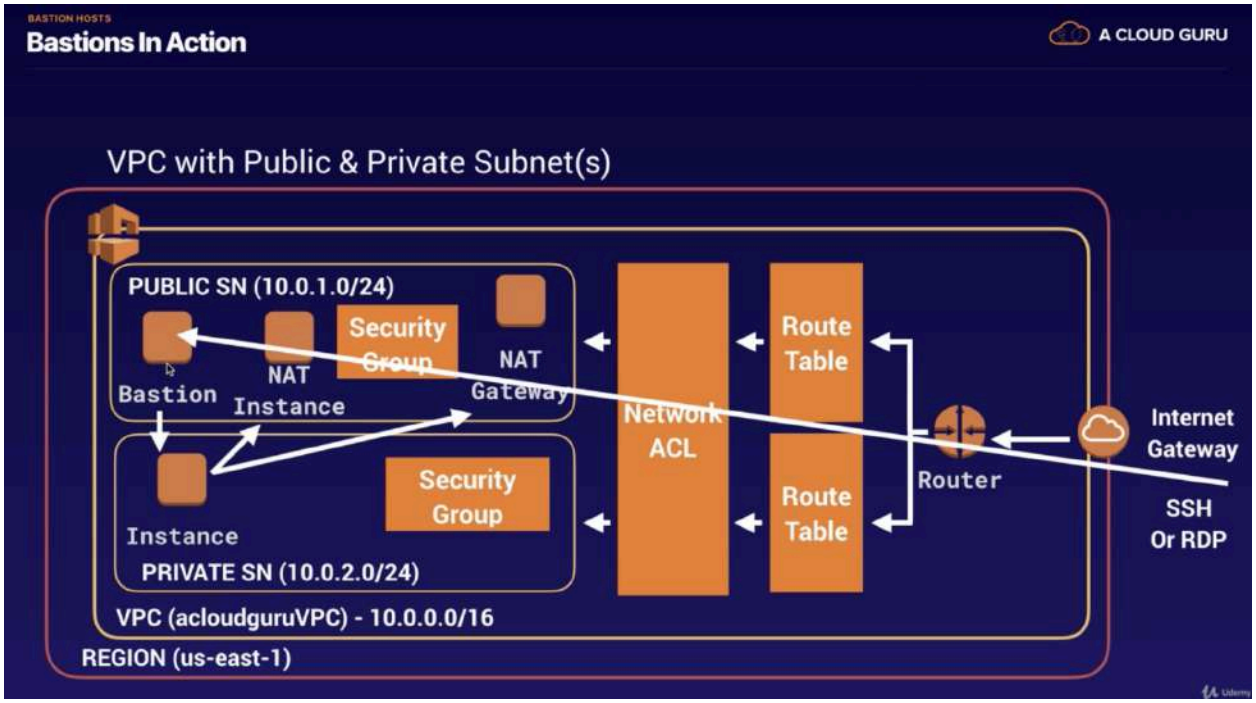
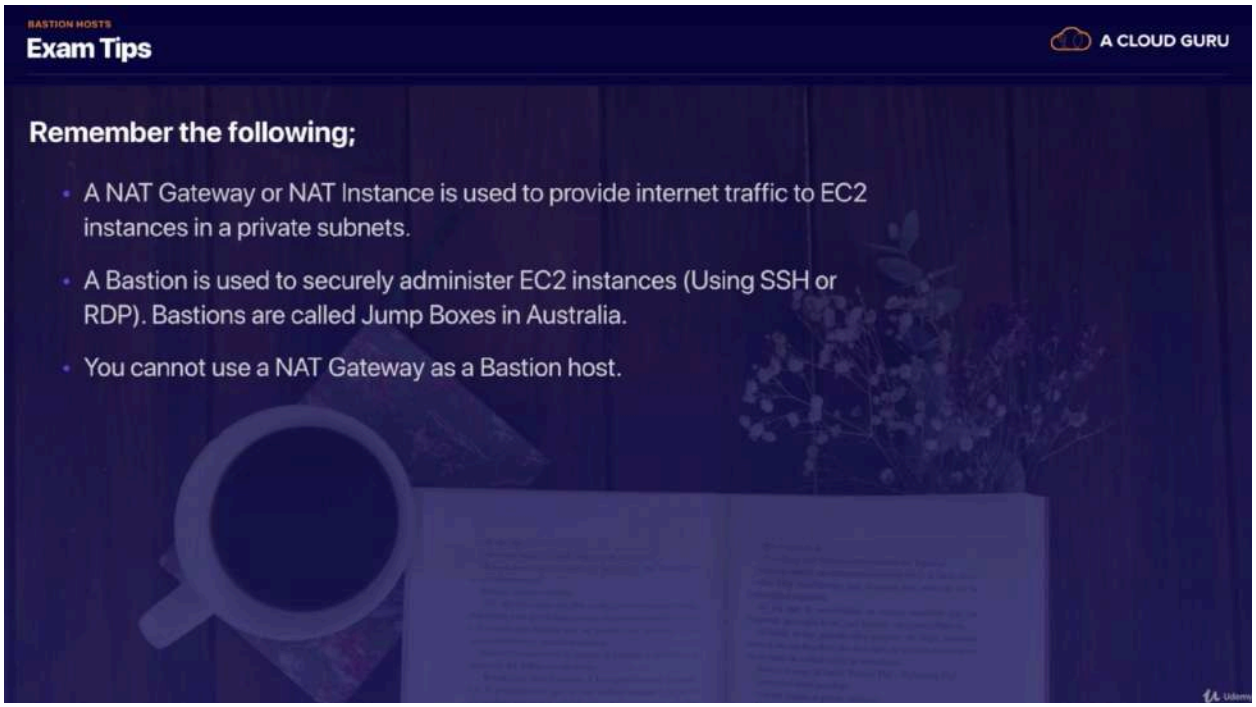
Traffic generated by instances when they contact the Amazon DNS server. If you use your own DNS server, then all traffic to that DNS server is logged.
Traffic generated by a Windows instance for Amazon Windows license activation.
Traffic to and from 169.254.169.254 for instance metadata.
DHCP traffic.
Traffic to the reserved IP address for the default VPC router.

Bastion


BASTION HOSTS
What Is A Bastion Host?
A CLOUD GURU
A Bastion Host:
A bastion host is a special purpose computer on a network specifically designed and configured to withstand attacks. The computer generally hosts a single application, for example a proxy server, and all other services are removed or limited to reduce the threat to the computer. It is hardened in this manner primarily due to its location and purpose, which is either on the outside of a firewall or in a demilitarized zone (DMZ) and usually involves access from untrusted networks or computers.





Direct Connect

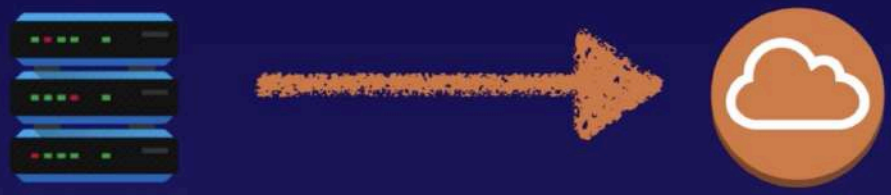
DIRECT CONNECT

What Is Direct Connect?

A CLOUD GURU

Direct Connect

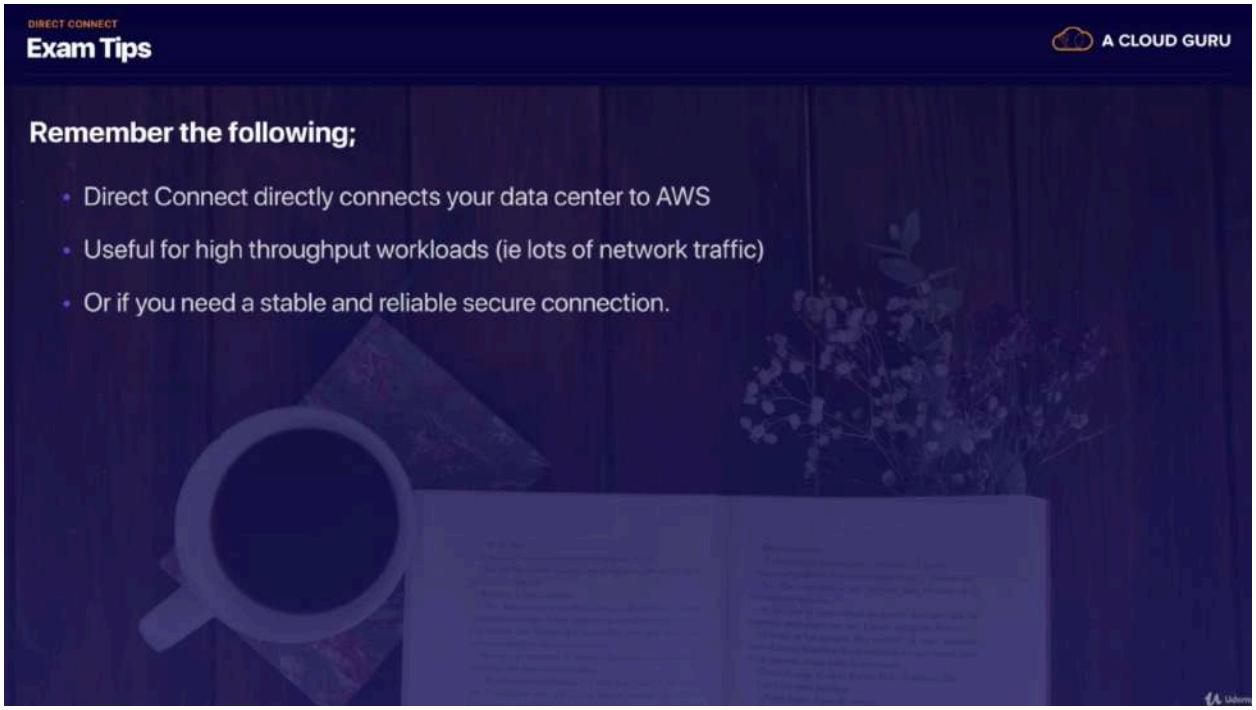
AWS Direct Connect is a cloud service solution that makes it easy to establish a dedicated network connection from your premises to AWS. Using AWS Direct Connect, you can establish private connectivity between AWS and your datacenter, office, or colocation environment, which in many cases can reduce your network costs, increase bandwidth throughput, and provide a more consistent network experience than Internet-based connections.



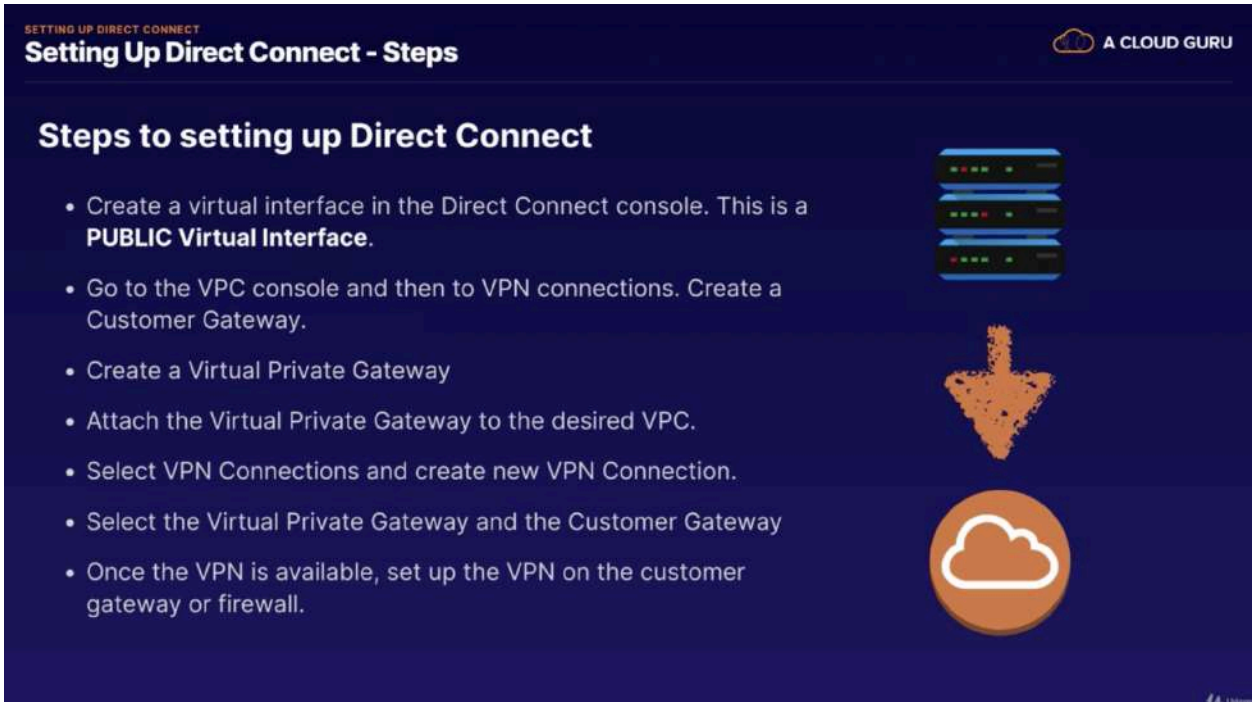
DIRECT CONNECT

Direct Connect In Action

A CLOUD GURU



Setting up Direct Connection



https://www.youtube.com/watch?v=dhpTTT6V1So&feature=youtu.be

Global Accelerator

A CLOUD GURU

AWS Global Accelerator is a service in which you create accelerators to improve availability and performance of your applications for local and global users.

Global Accelerator directs traffic to optimal endpoints over the AWS global network. This improves the availability and performance of your internet applications that are used by a global audience.

A CLOUD GURU

By default, Global Accelerator provides you with two static IP addresses that you associate with your accelerator.

Alternatively, you can bring your own.

AWS GLOBAL ACCELERATOR

AWS Global Accelerator Components

A CLOUD GURU

AWS Global Accelerator includes the following components

- Static IP addresses
- Accelerator
- DNS Name
- Network Zone
- Listener
- Endpoint Group
- Endpoint

GLOBAL ACCELERATOR

Global Accelerator Components

A CLOUD GURU

Static IP addresses

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Or, you can bring your own.

1. 1.2.3.4
2. 5.6.7.8

GLOBAL ACCELERATOR

Global Accelerator Components

A CLOUD GURU

Accelerator

An accelerator directs traffic to optimal endpoints over the AWS global network to improve the availability and performance of your internet applications.

Each accelerator includes one or more listeners.

GLOBAL ACCELERATOR

Global Accelerator Components

A CLOUD GURU

DNS Name

Global Accelerator assigns each accelerator a default Domain Name System (DNS) name - similar to **a1234567890abcdef.awsglobalaccelerator.com** - that points to the static IP addresses that Global Accelerator assigns to you.

Depending on the use case, you can use your accelerator's static IP addresses or DNS name to route traffic to your accelerator, or set up DNS records to route traffic using your own custom domain name.

GLOBAL ACCELERATOR

Global Accelerator Components

A CLOUD GURU

Network zone

A network zone services the static IP addresses for your accelerator from a unique IP subnet. Similar to an AWS Availability Zone, a network zone is an isolated unit with its own set of physical infrastructure.

When you configure an accelerator, by default, Global Accelerator allocates two IPv4 addresses for it. If one IP address from a network zone becomes unavailable due to IP address blocking by certain client networks, or network disruptions, client applications can retry on the healthy static IP address from the other isolated network zone.

GLOBAL ACCELERATOR

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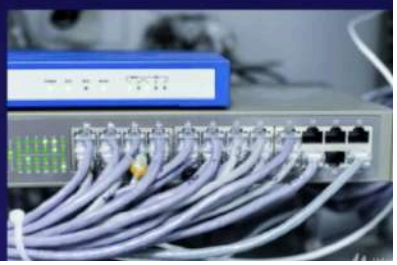


GLOBAL ACCELERATOR

Global Accelerator Components

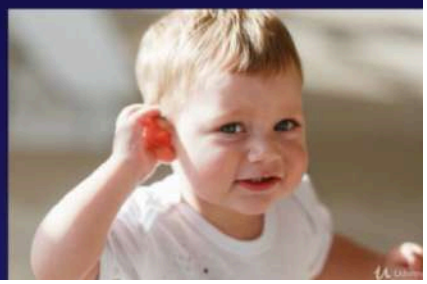
A CLOUD GURU

Listener

A listener processes inbound connections from clients to Global Accelerator, based on the port (or port range) and protocol that you configure. Global Accelerator supports both TCP and UDP protocols.

Each listener has one or more endpoint groups associated with it, and traffic is forwarded to endpoints in one of the groups.

You associate endpoint groups with listeners by specifying the Regions that you want to distribute traffic to. Traffic is distributed to optimal endpoints within the endpoint groups associated with a listener.



GLOBAL ACCELERATOR

Global Accelerator Components

A CLOUD GURU

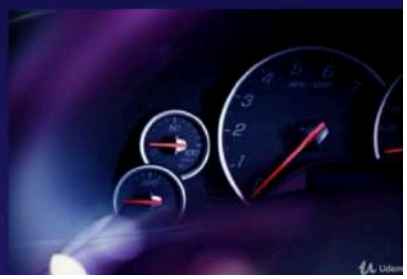
Endpoint group

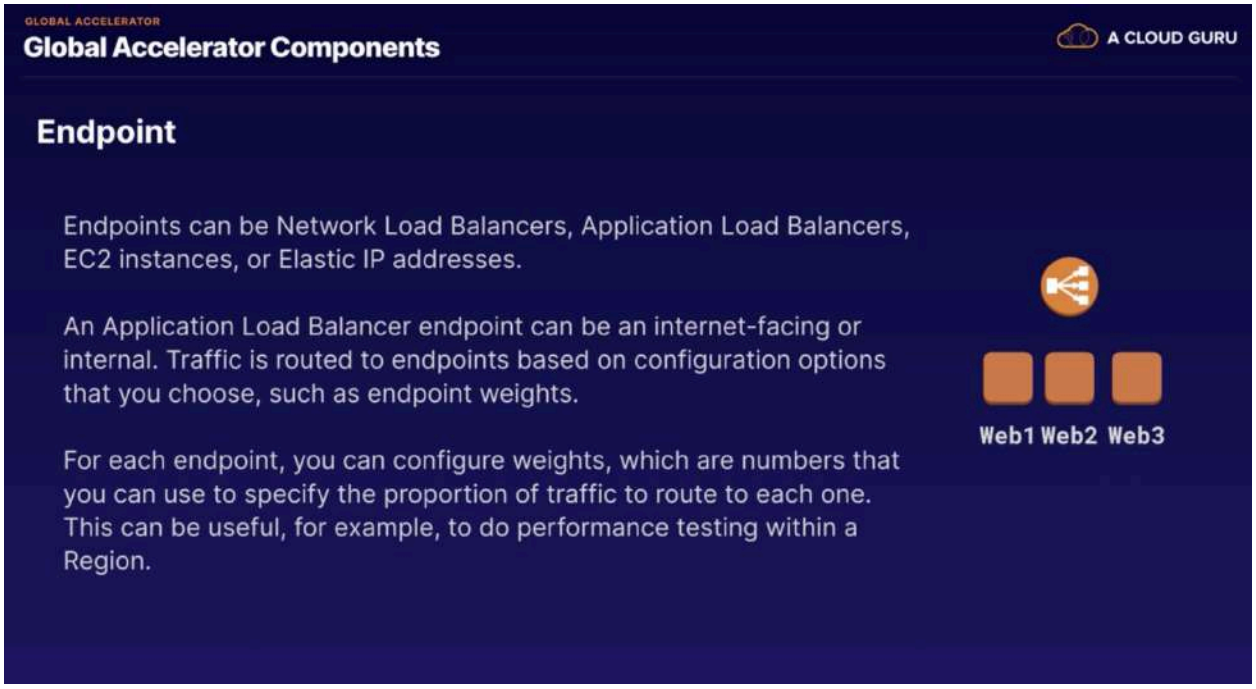
Each endpoint group is associated with a specific AWS Region.

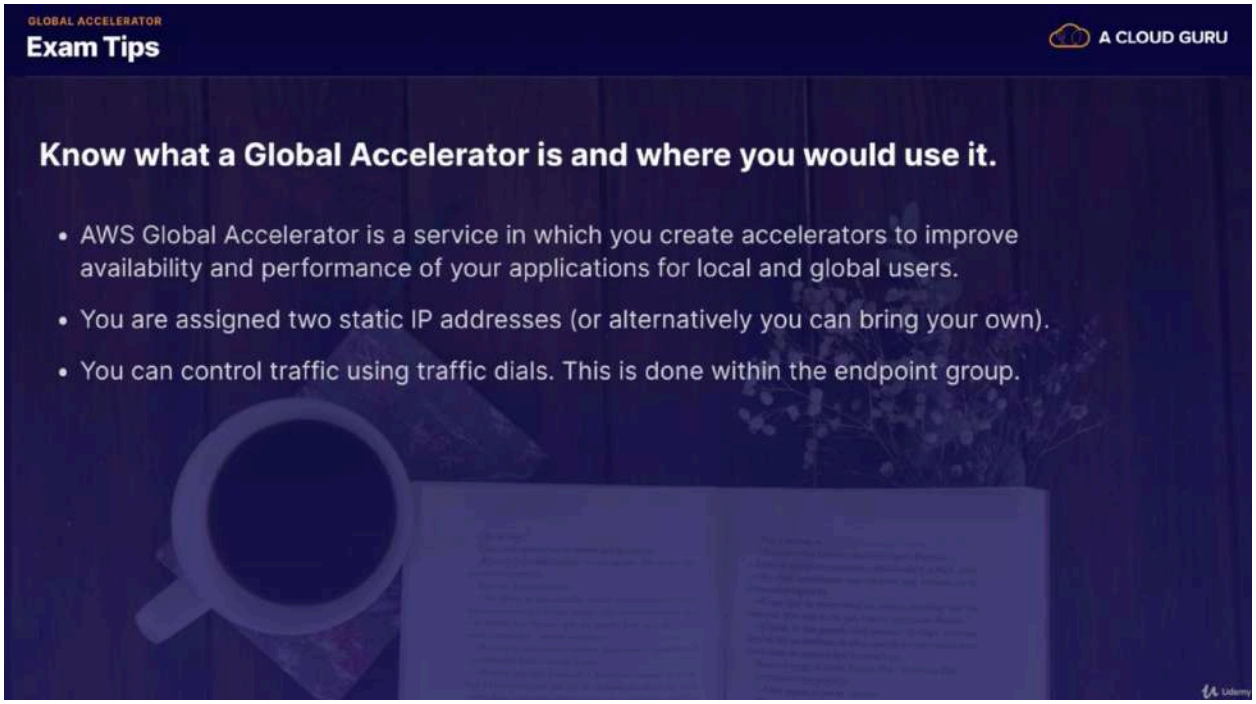
Endpoint groups include one or more endpoints in the Region.

You can increase or reduce the percentage of traffic that would be otherwise directed to an endpoint group by adjusting a setting called a **traffic dial**.

The traffic dial lets you easily do performance testing or blue/green deployment testing for new releases across different AWS Regions, for example.







VPC Endpoint

VPC ENDPOINTS

What Is A VPC Endpoint?

A CLOUD GURU

A VPC Endpoint:

A VPC endpoint enables you to privately connect your VPC to supported AWS services and VPC endpoint services powered by PrivateLink without requiring an internet gateway, NAT device, VPN connection, or AWS Direct Connect connection. Instances in your VPC do not require public IP addresses to communicate with resources in the service. Traffic between your VPC and the other service does not leave the Amazon network.

Endpoints are virtual devices. They are horizontally scaled, redundant, and highly available VPC components that allow communication between instances in your VPC and services without imposing availability risks or bandwidth constraints on your network traffic.

VPC ENDPOINTS

Exam Tips

A CLOUD GURU

There are two types of VPC endpoints:

- Interface Endpoints
- Gateway Endpoints

VPC ENDPOINTS

Exam Tips

A CLOUD GURU

An interface endpoint is an elastic network interface with a private IP address that serves as an entry point for traffic destined to a supported service. The following services are supported:

- Amazon API Gateway
- AWS CloudFormation
- Amazon CloudWatch
- Amazon CloudWatch Events
- Amazon CloudWatch Logs
- AWS CodeBuild
- AWS Config
- Amazon EC2 API
- Elastic Load Balancing API
- AWS Key Management Service
- Amazon Kinesis Data Streams
- Amazon SageMaker and Amazon SageMaker Runtime
- Amazon SageMaker Notebook Instance
- AWS Secrets Manager
- AWS Security Token Service
- AWS Service Catalog
- Amazon SNS
- Amazon SQS
- AWS Systems Manager
- Endpoint services hosted by other AWS accounts
- Supported AWS Marketplace partner services

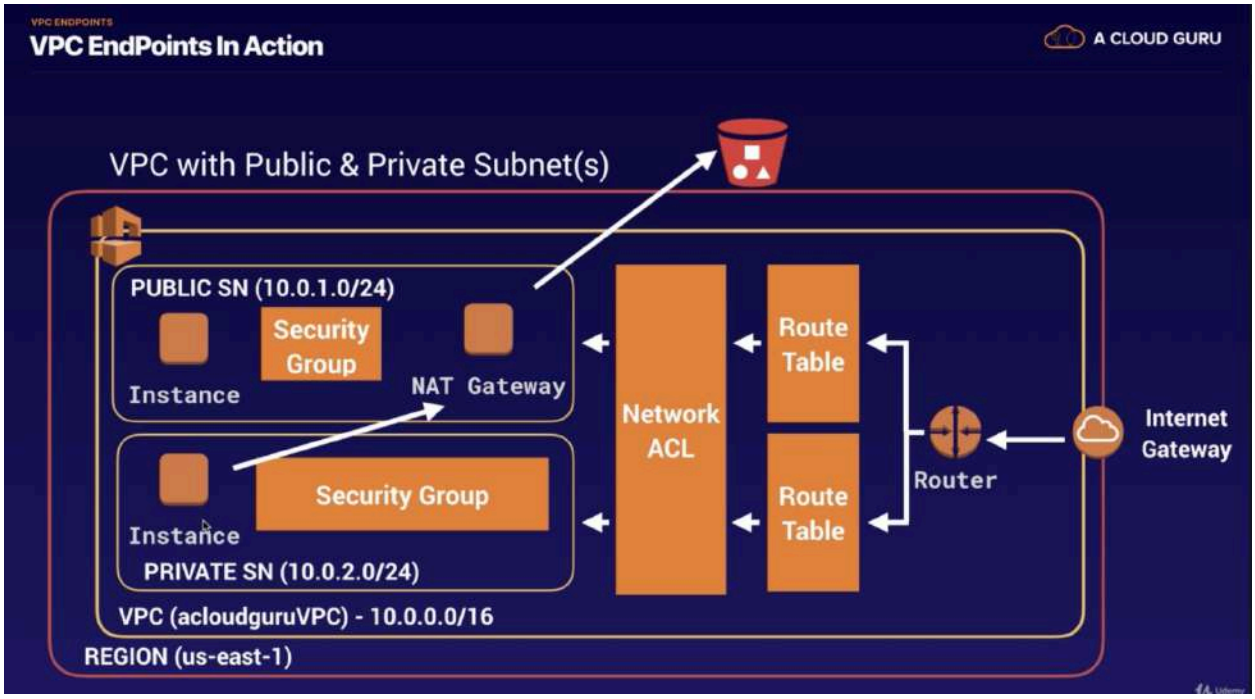
VPC ENDPOINTS

Gateway Endpoints

A CLOUD GURU

Currently Gateway Endpoints Support

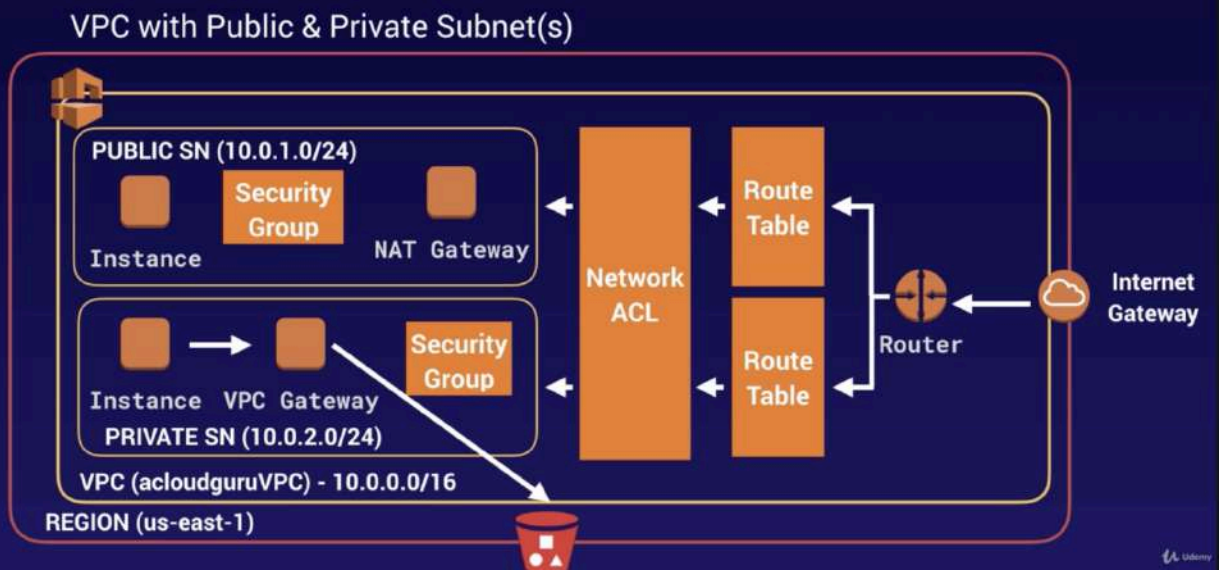
- Amazon S3
- DynamoDB


VPC ENDPOINTS
VPC EndPoints In Action
A CLOUD GURU
VPC with Public & Private Subnet(s)
PUBLIC SN (10.0.1.0/24)
Security Group
Instance
NAT Gateway
Network ACL
Route Table
Route Table
Router
Internet Gateway
Security Group
Instance
PRIVATE SN (10.0.2.0/24)
VPC (acloudguruVPC) - 10.0.0.0/16
REGION (us-east-1)

VPC ENDPOINTS

VPC EndPoints In Action

A CLOUD GURU



VPC ENDPOINTS

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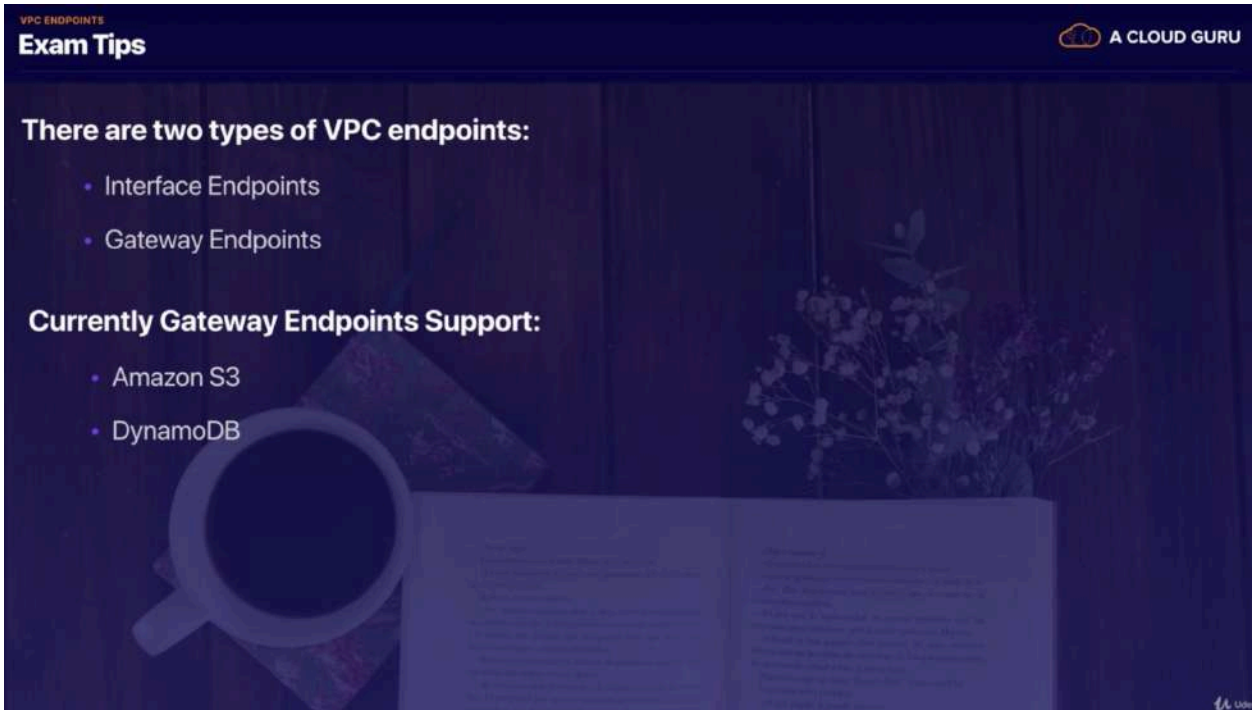


Summary of VPC

VPC SUMMARY

VPC Overview

A CLOUD GURU

Remember the following;

- Think of a VPC as a logical datacenter in AWS.
- Consists of IGWs (Or Virtual Private Gateways), Route Tables, Network Access Control Lists, Subnets, and Security Groups
- 1 Subnet = 1 Availability Zone
- Security Groups are Stateful; Network Access Control Lists are Stateless
- NO TRANSITIVE PEERING

VPC SUMMARY

Building Our VPC

A CLOUD GURU

Remember the following;

- When you create a VPC a default Route Table, Network Access Control List (NACL) and a default Security Group.
- It won't create any subnets, nor will it create a default internet gateway.
- US-East-1A in your AWS account can be a completely different availability zone to US-East-1A in another AWS account. The AZ's are randomized.
- Amazon always reserve 5 IP addresses within your subnets.
- You can only have 1 Internet Gateway per VPC.
- Security Groups can't span VPCs.

VPC SUMMARY

NAT Instances vs NAT Gateways

A CLOUD GURU

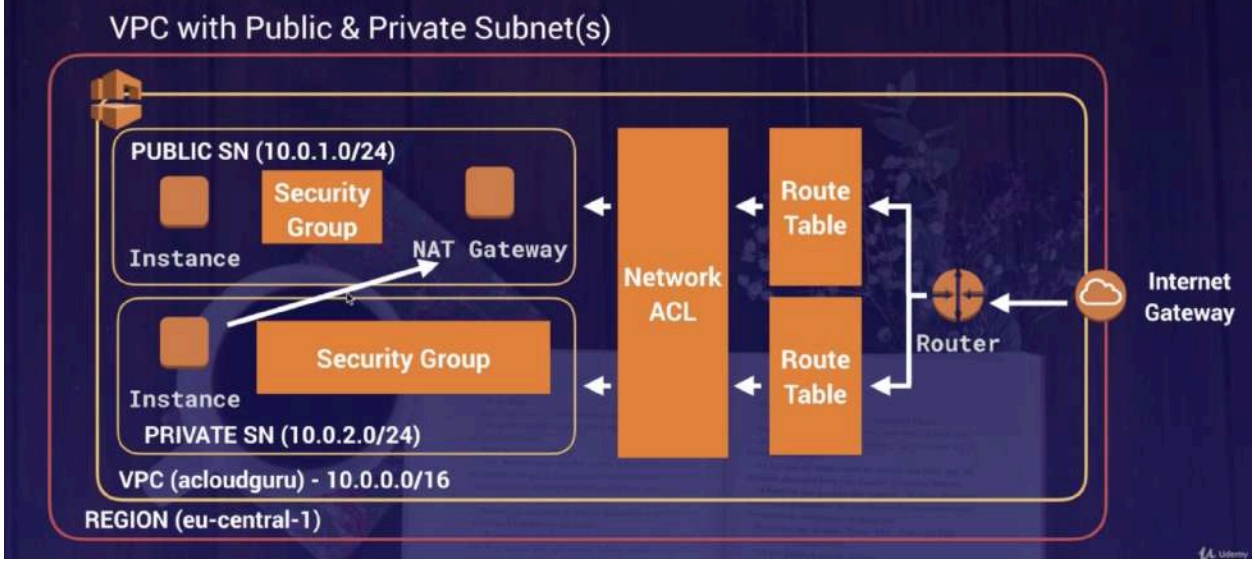
Nat Instances Exam Tips

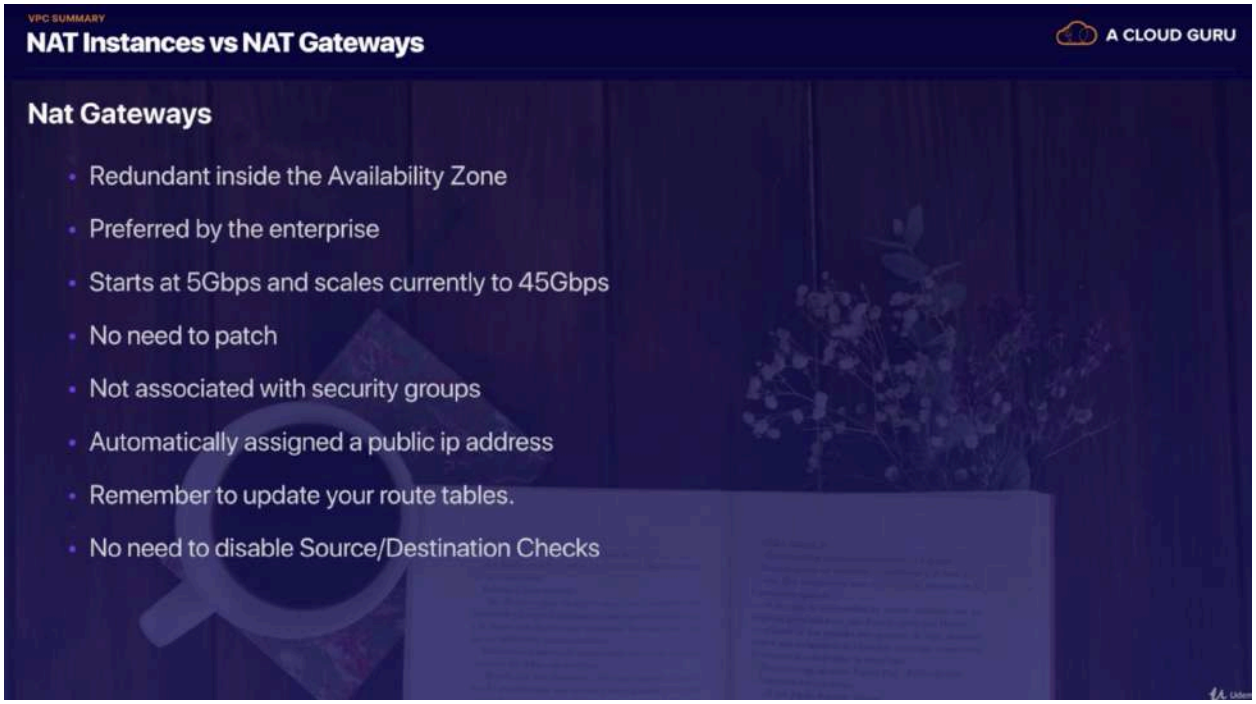
- When creating a NAT instance, Disable Source/Destination Check on the Instance.
- NAT instances must be in a public subnet.
- There must be a route out of the private subnet to the NAT instance, in order for this to work.
- The amount of traffic that NAT instances can support depends on the instance size. If you are bottlenecking, increase the instance size.
- You can create high availability using Autoscaling Groups, multiple subnets in different AZs, and a script to automate failover.
- Behind a Security Group.

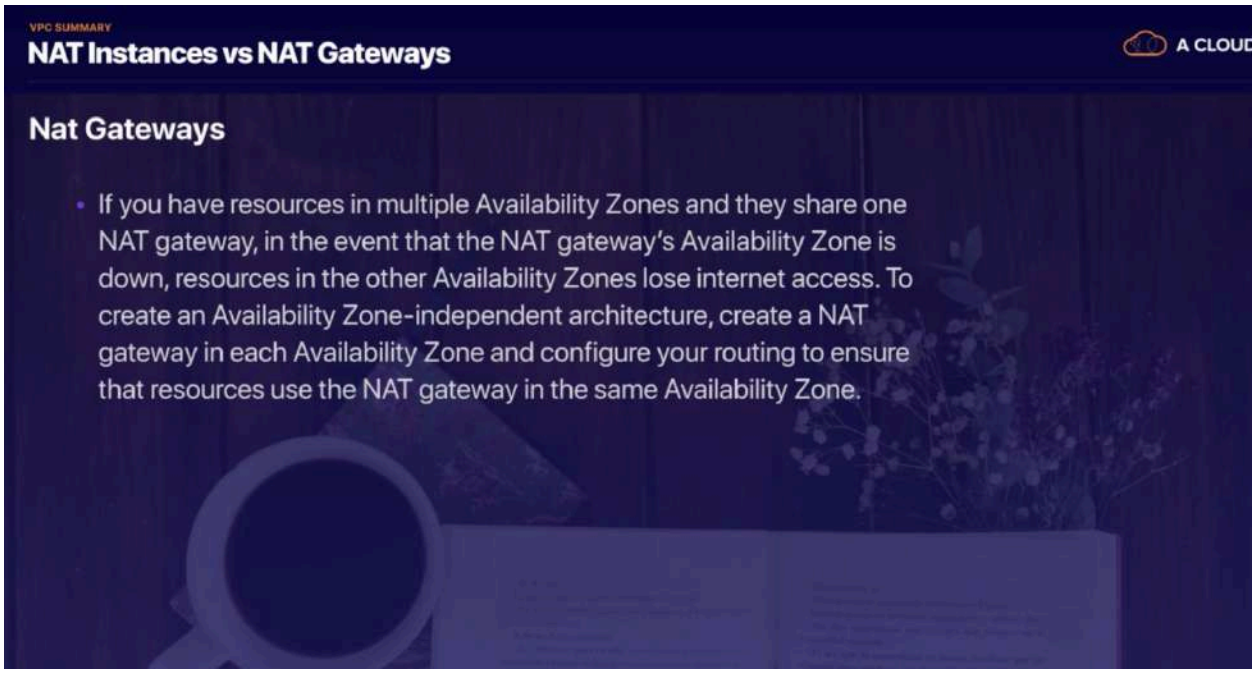
VPC SUMMARY

NAT Gateways Explained

A CLOUD GURU




VPC SUMMARY
NAT Instances vs NAT Gateways
A CLOUD GURU
Nat Gateways
Redundant inside the Availability Zone
Preferred by the enterprise
Starts at 5Gbps and scales currently to 45Gbps
No need to patch
Not associated with security groups
Automatically assigned a public ip address
Remember to update your route tables.
No need to disable Source/Destination Checks


VPC SUMMARY
NAT Instances vs NAT Gateways
A CLOUD
Nat Gateways
If you have resources in multiple Availability Zones and they share one NAT gateway, in the event that the NAT gateway's Availability Zone is down, resources in the other Availability Zones lose internet access. To create an Availability Zone-independent architecture, create a NAT gateway in each Availability Zone and configure your routing to ensure that resources use the NAT gateway in the same Availability Zone.

VPC SUMMARY

Network ACL's

A CLOUD GURU

Remember the following for your exam;

- Your VPC automatically comes with a default network ACL, and by default it allows all outbound and inbound traffic.
- You can create custom network ACLs. By default, each custom network ACL denies all inbound and outbound traffic until you add rules.
- Each subnet in your VPC must be associated with a network ACL. If you don't explicitly associate a subnet with a network ACL, the subnet is automatically associated with the default network ACL.
- Block IP Addresses using network ACLs not Security Groups.

VPC SUMMARY

Network ACL's

A CLOUD GURU

Remember the following for your exam;

- You can associate a network ACL with multiple subnets; however, a subnet can be associated with only one network ACL at a time. When you associate a network ACL with a subnet, the previous association is removed.
- Network ACLs contain a numbered list of rules that is evaluated in order, starting with the lowest numbered rule.
- Network ACLs have separate inbound and outbound rules, and each rule can either allow or deny traffic.
- Network ACLs are stateless; responses to allowed inbound traffic are subject to the rules for outbound traffic (and vice versa.)

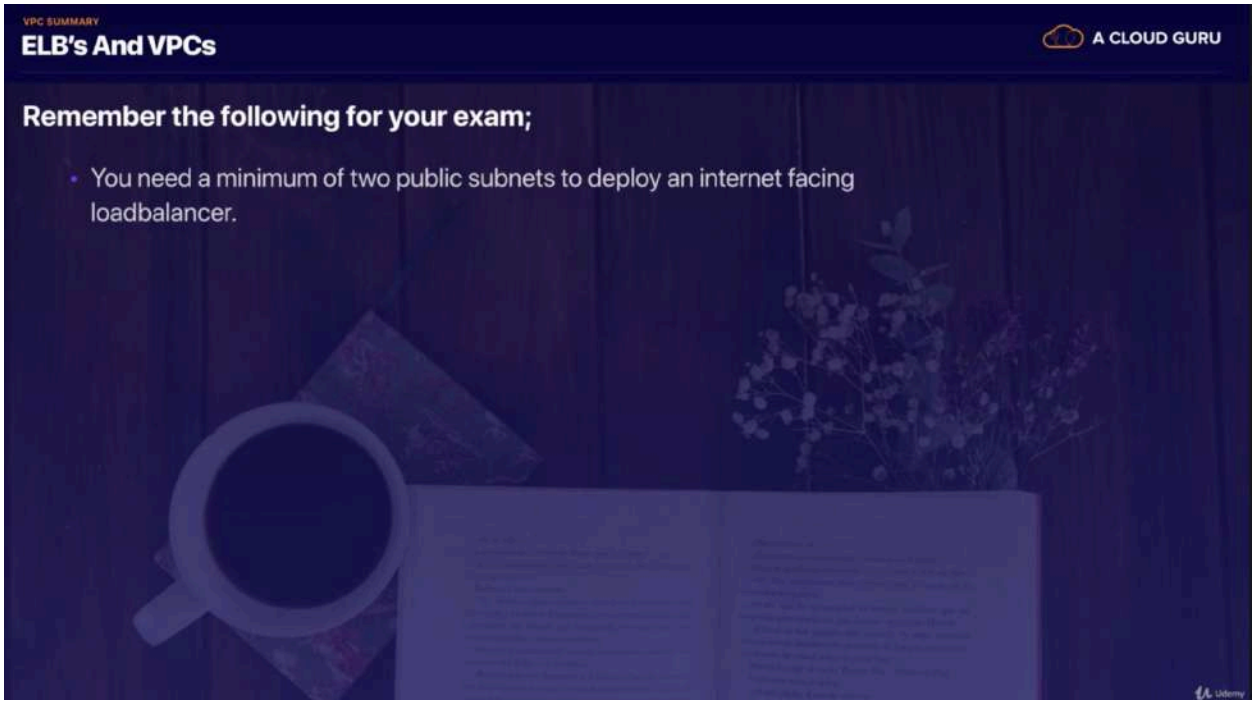
VPC SUMMARY

ELB's And VPCs

A CLOUD GURU

Remember the following for your exam;

- You need a minimum of two public subnets to deploy an internet facing loadbalancer.



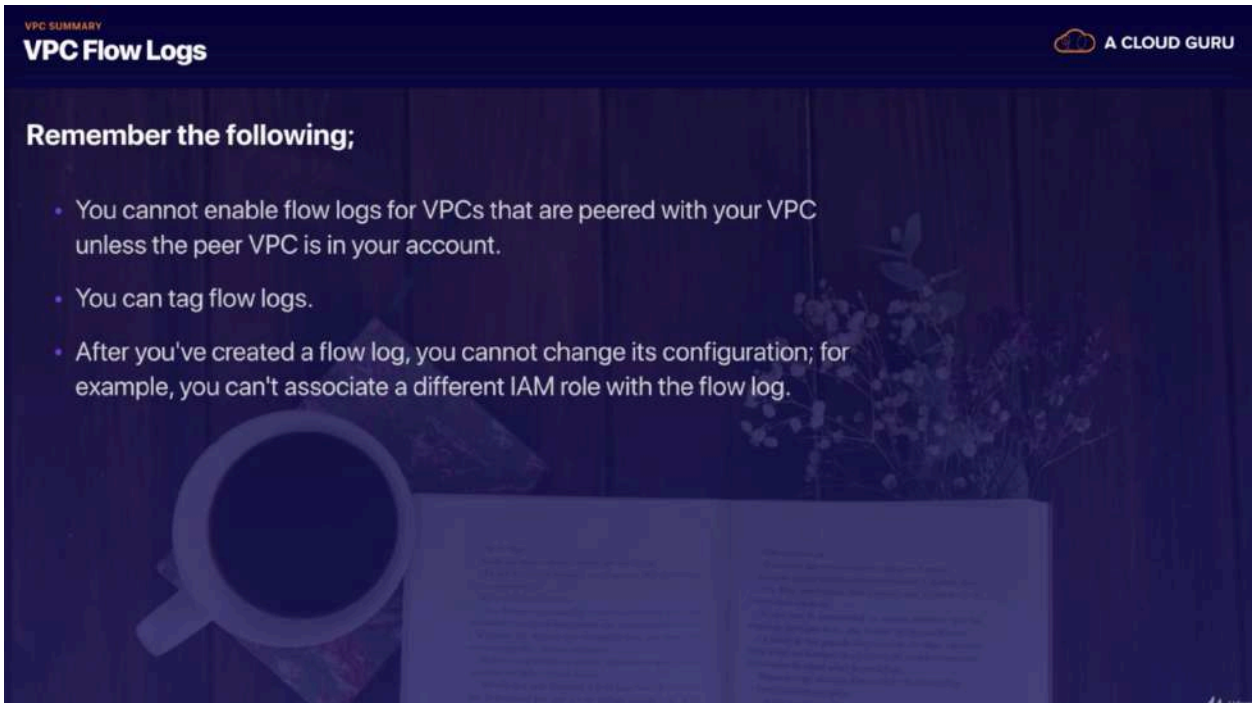
VPC SUMMARY

VPC Flow Logs

A CLOUD GURU

Remember the following;

- You cannot enable flow logs for VPCs that are peered with your VPC unless the peer VPC is in your account.
- You can tag flow logs.
- After you've created a flow log, you cannot change its configuration; for example, you can't associate a different IAM role with the flow log.



VPC SUMMARY

VPC Flow Logs

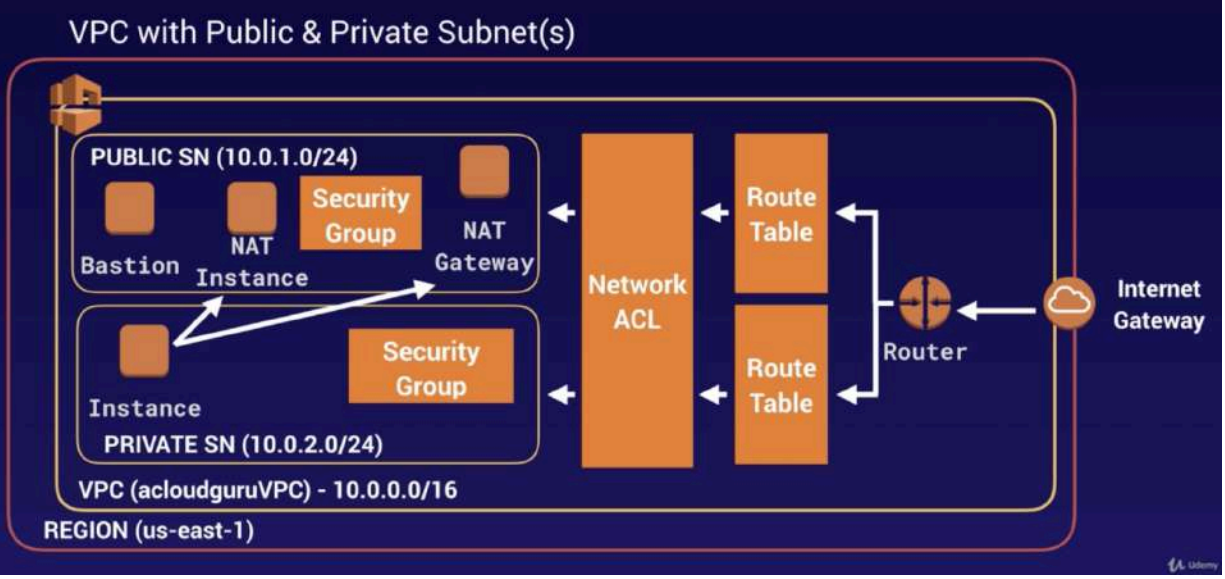
Not all IP Traffic is monitored;

- Traffic generated by instances when they contact the Amazon DNS server. If you use your own DNS server, then all traffic to that DNS server is logged.
- Traffic generated by a Windows instance for Amazon Windows license activation.
- Traffic to and from 169.254.169.254 for instance metadata.
- DHCP traffic.
- Traffic to the reserved IP address for the default VPC router.

VPC SUMMARY

Bastions In Action

A CLOUD GURU



VPC SUMMARY

Bastions In Action

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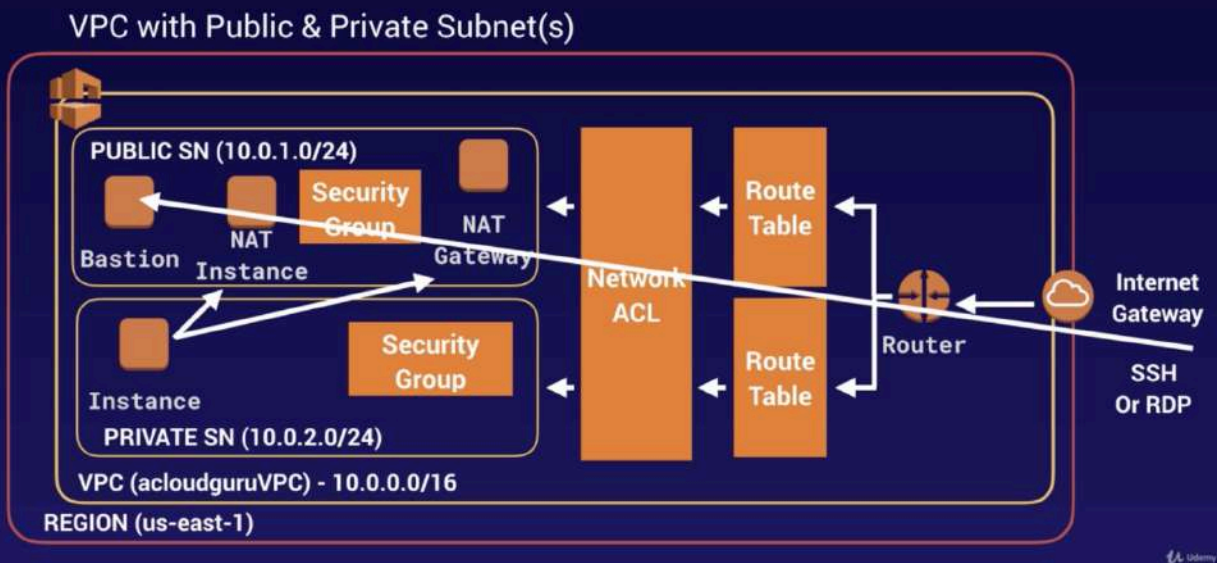


VPC SUMMARY

Bastions vs NAT Gateways/Instances

A CLOUD GURU

Remember the following;

- A NAT Gateway or NAT Instance is used to provide internet traffic to EC2 instances in a private subnets.
- A Bastion is used to securely administer EC2 instances (Using SSH or RDP). Bastions are called Jump Boxes in Australia.
- You cannot use a NAT Gateway as a Bastion host.

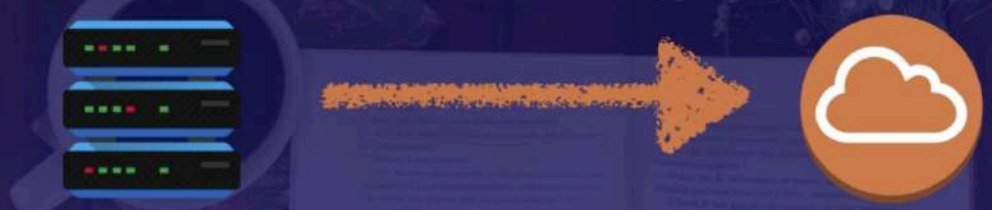
VPC SUMMARY

Direct Connect

A CLOUD G

Remember the following;

- Direct Connect directly connects your data center to AWS
- Useful for high throughput workloads (ie lots of network traffic)
- Or if you need a stable and reliable secure connection.



SETTING UP DIRECT CONNECT

Direct Connect - Exam Tips

A CLOUD GURU

Remember the Steps to Creating a Direct Connect Connection.

- Create a virtual interface in the Direct Connect console. This is a PUBLIC Virtual Interface.
- Go to the VPC console and then to VPN connections. Create a Customer Gateway.
- Create a Virtual Private Gateway
- Attach the Virtual Private Gateway to the desired VPC.
- Select VPN Connections and create new VPN Connection.
- Select the Virtual Private Gateway and the Customer Gateway
- Once the VPN is available, setup the VPN on the customer gateway or firewall.

GLOBAL ACCELERATOR

Exam Tips

A CLOUD GURU

Know what a Global Accelerator is and where you would use it.

- AWS Global Accelerator is a service in which you create accelerators to improve availability and performance of your applications for local and global users.
- You are assigned two static IP addresses (or alternatively you can bring your own).
- You can control traffic using traffic dials. This is done within the endpoint group.
- You can control weighting to individual end points using weights.

VPC SUMMARY

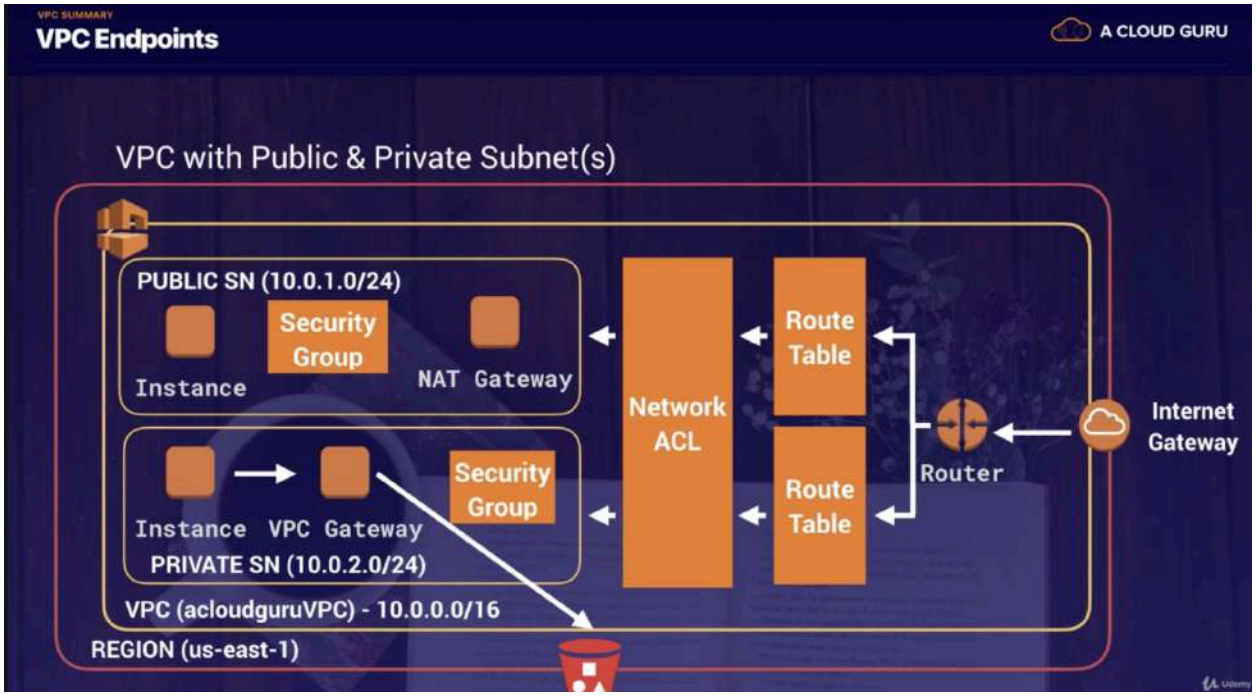
VPC Endpoints

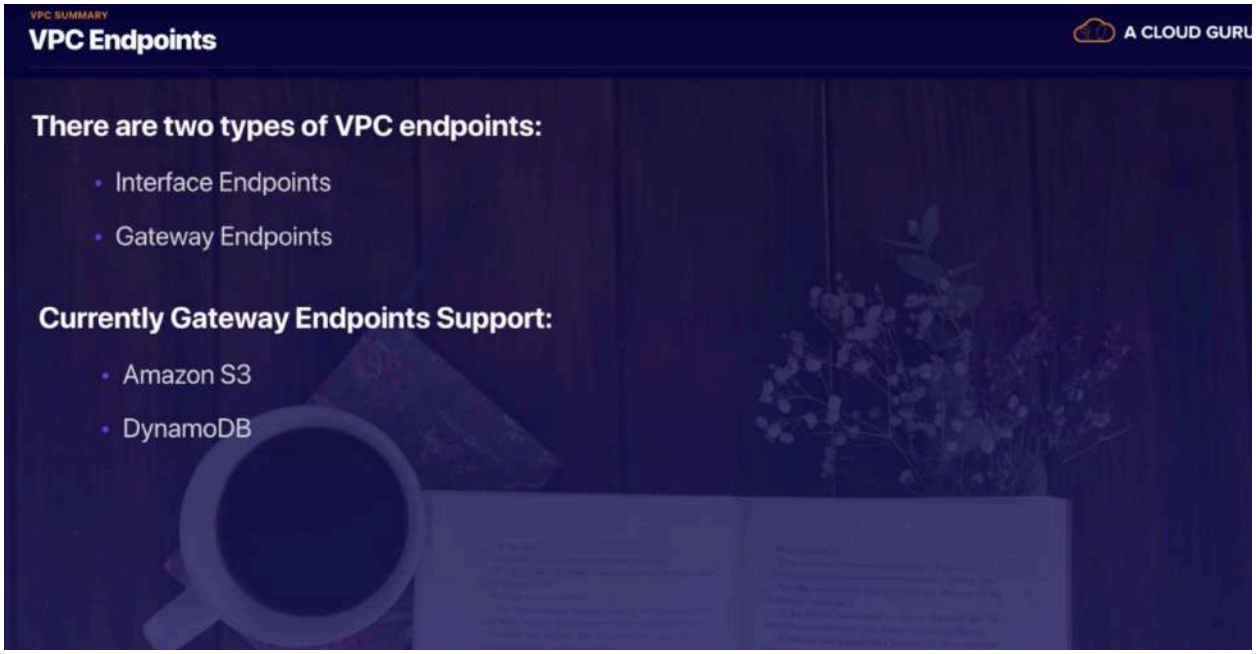
A CLOUD GURU

A VPC Endpoint:

A VPC endpoint enables you to privately connect your VPC to supported AWS services and VPC endpoint services powered by PrivateLink without requiring an internet gateway, NAT device, VPN connection, or AWS Direct Connect connection. Instances in your VPC do not require public IP addresses to communicate with resources in the service. Traffic between your VPC and the other service does not leave the Amazon network.

Endpoints are virtual devices. They are horizontally scaled, redundant, and highly available VPC components that allow communication between instances in your VPC and services without imposing availability risks or bandwidth constraints on your network traffic.





Databases on AWS

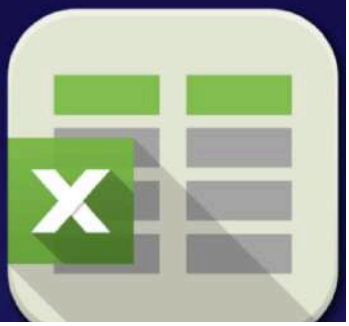
DATABASES 101

What is a relational database?

A CLOUD GURU

Relational databases are what most of us are all used to. They have been around since the 70's. Think of a traditional spreadsheet:

- Database
- Tables
- Row
- Fields (Columns)



DATABASES 101

Relational Databases

A CLOUD G

Relational databases on AWS;

- SQL Server
- Oracle
- MySQL Server
- PostgreSQL
- Aurora
- MariaDB

Microsoft SQL Server · ORACLE · MySQL · PostgreSQL · Amazon Aurora · MariaDB

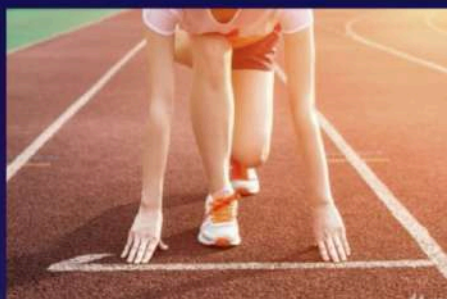
DATABASES 101

Multi-AZ vs Read Replicas

A CLOUD GURU

RDS has two key features;

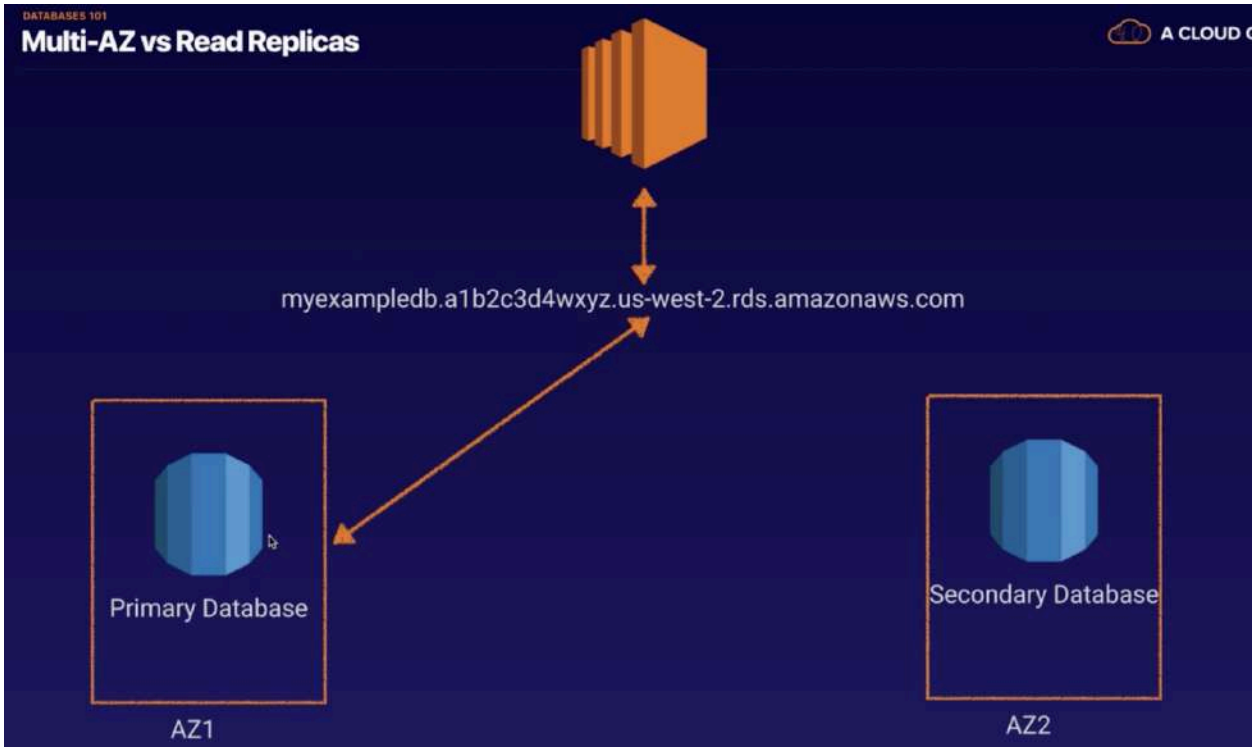
- Multi-AZ - For Disaster Recovery
- Read Replicas - For Performance

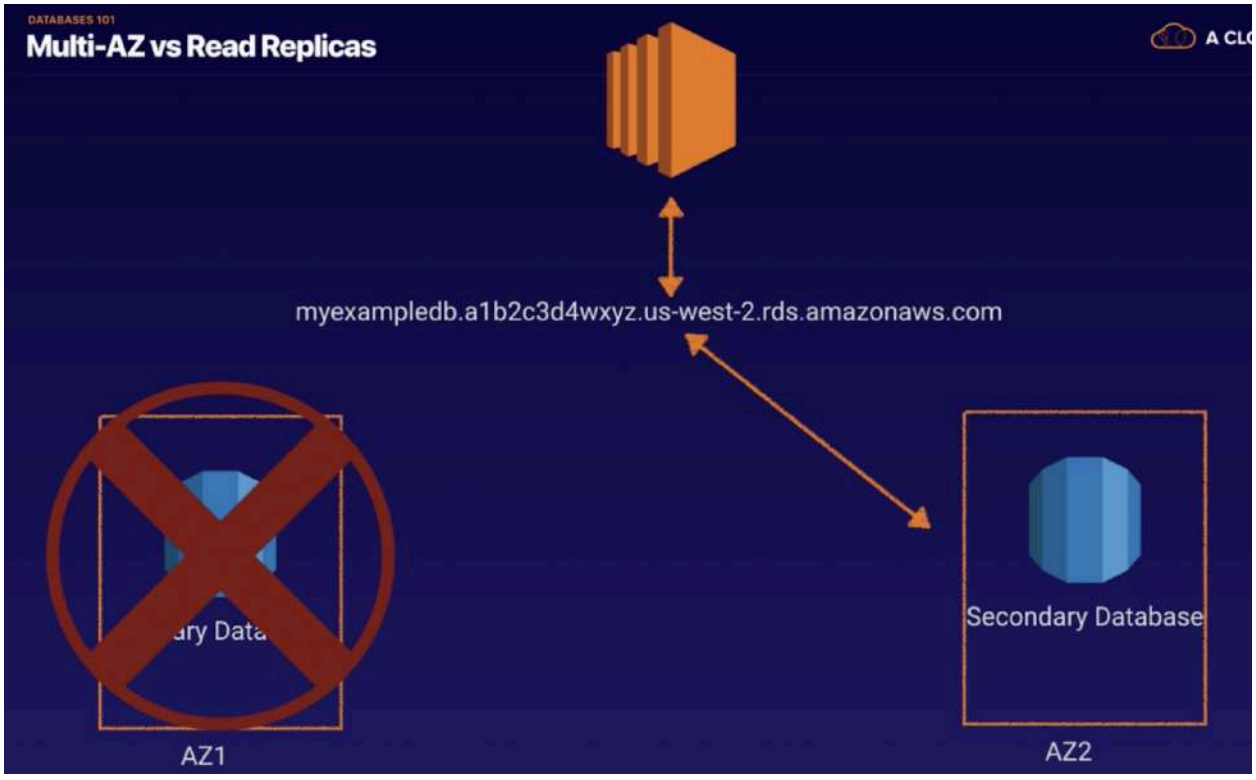


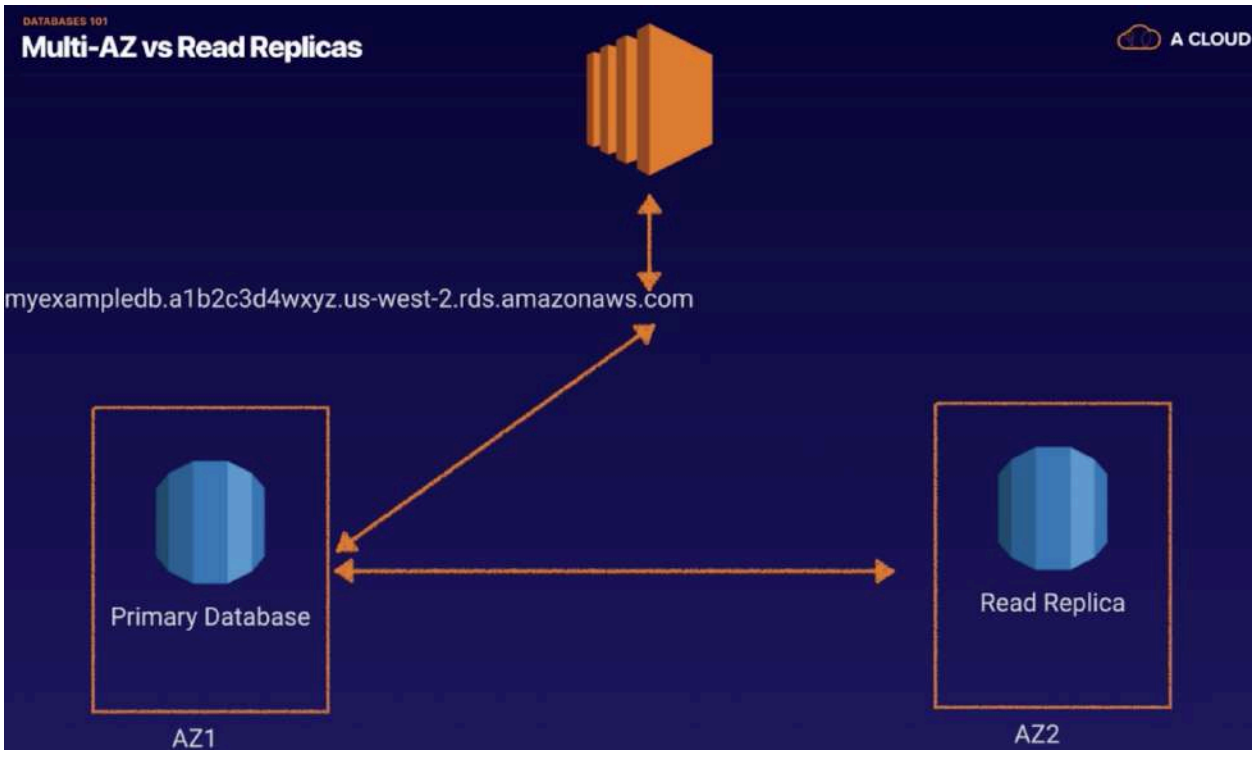
DATABASES 101

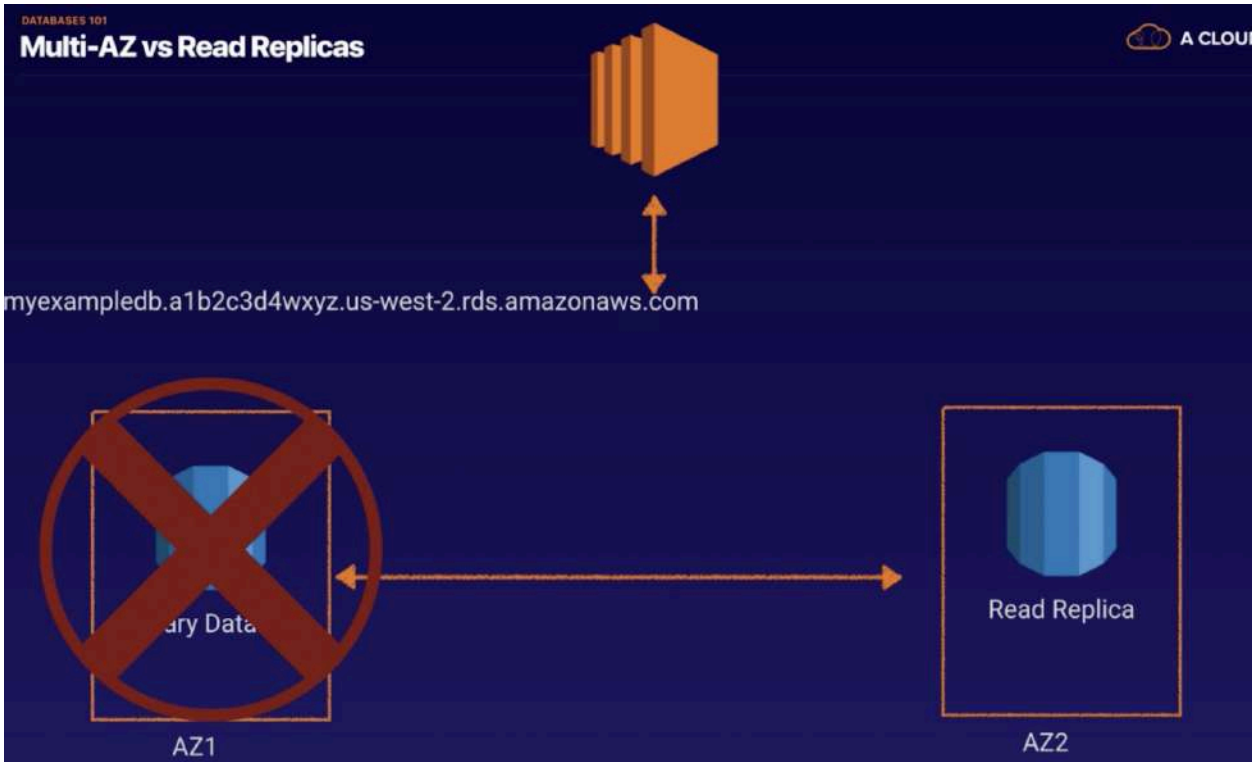
Multi-AZ vs Read Replicas

A CLOUD G




DATABASES 101
Multi-AZ vs Read Replicas
A CL
myexampledb.a1b2c3d4wxyz.us-west-2.rds.amazonaws.com
Secondary Database
AZ1
AZ2


DATABASES 101
Multi-AZ vs Read Replicas
A CLOUD
myexampledb.a1b2c3d4wxyz.us-west-2.rds.amazonaws.com
Primary Database
Read Replica
AZ1
AZ2


DATABASES 101
Multi-AZ vs Read Replicas
A CLOU
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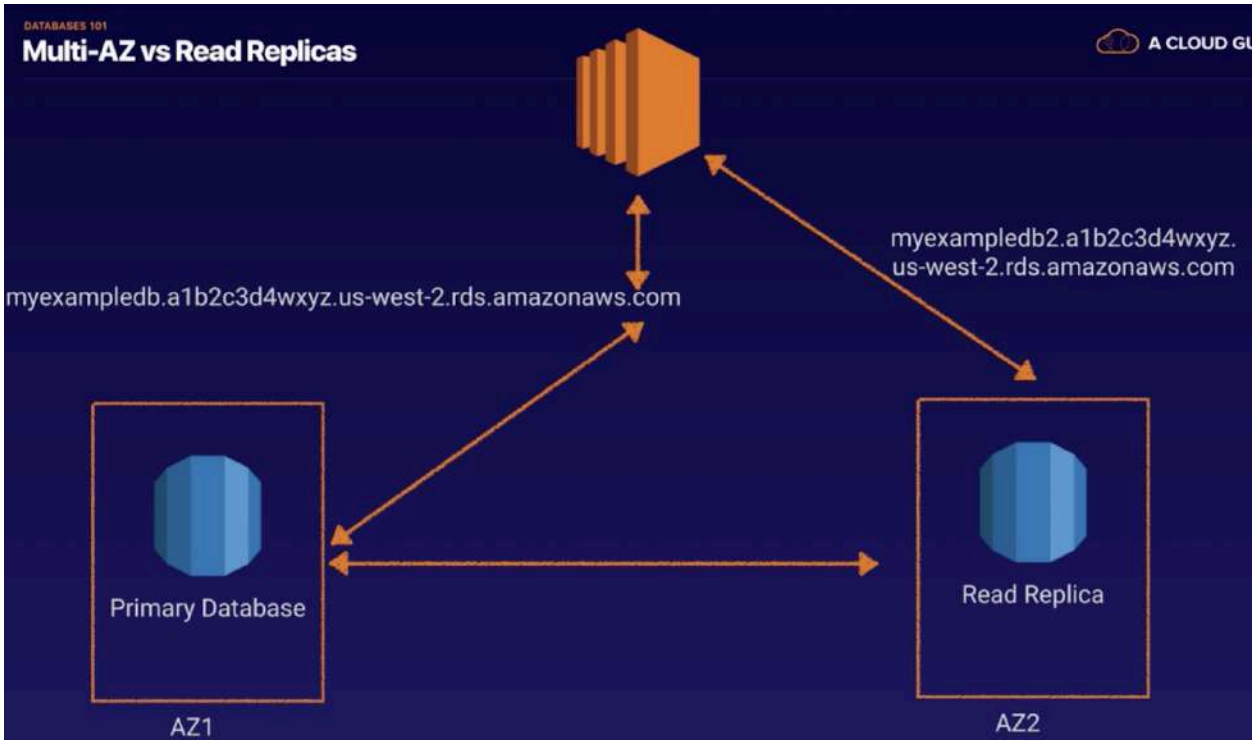
ary Data
AZ1
Read Replica
AZ2


DATABASES 101
Multi-AZ vs Read Replicas
A CLOUD GU
myexampledb.a1b2c3d4wxyz.us-west-2.rds.amazonaws.com
myexampledb2.a1b2c3d4wxyz.
us-west-2.rds.amazonaws.com
Primary Database
Read Replica
AZ1
AZ2

DATABASES 101

Non Relational Databases

A C

Non Relational Databases are as follows;

- Collection = Table
- Document = Row
- Key Value Pairs = Fields

DATABASES 101

JSON/NoSQL

A CLOUD GURU

```
{
"_id" : "51262c865ca358946be09d77",
"firstname" : "John",
"surname" : "Smith",
"Age" : "23",
"address" : [
{"street" : "21 Jump Street",
 "suburb" : "Richmond"}
      ]
}
```

DATABASES 101

What is Data Warehousing?

A CLOUD GURU

Used for business intelligence. Tools like Cognos, Jaspersoft, SQL Server Reporting Services, Oracle Hyperion, SAP NetWeaver.

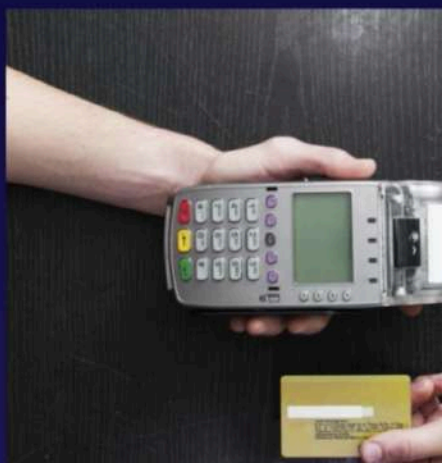
Used to pull in very large and complex data sets. Usually used by management to do queries on data (such as current performance vs targets etc)

DATABASES 101

OLTP vs OLAP

Online Transaction Processing (OLTP) differs from OLAP Online Analytics Processing (OLAP) in terms of the types of queries you will run.

OLTP Example:
Order number 2120121
Pulls up a row of data such as Name, Date, Address to Deliver to, Delivery Status etc.



DATABASES 101

OLTP vs OLAP

A C

OLAP transaction Example:
Net Profit for EMEA and Pacific for the Digital Radio Product.
Pulls in large numbers of records

Sum of Radios Sold in EMEA
Sum of Radios Sold in Pacific
Unit Cost of Radio in each region
Sales price of each radio
Sales price - unit cost.

DATABASES 101

OLTP vs OLAP

A CLOUD GURU

Data Warehousing databases use different type of architecture both from a database perspective and infrastructure layer.

DATABASES 101

OLTP vs OLAP

A CLO

Data Warehousing databases use different type of architecture both from a database perspective and infrastructure layer.

Amazon's Data Warehouse Solution Is Called Redshift

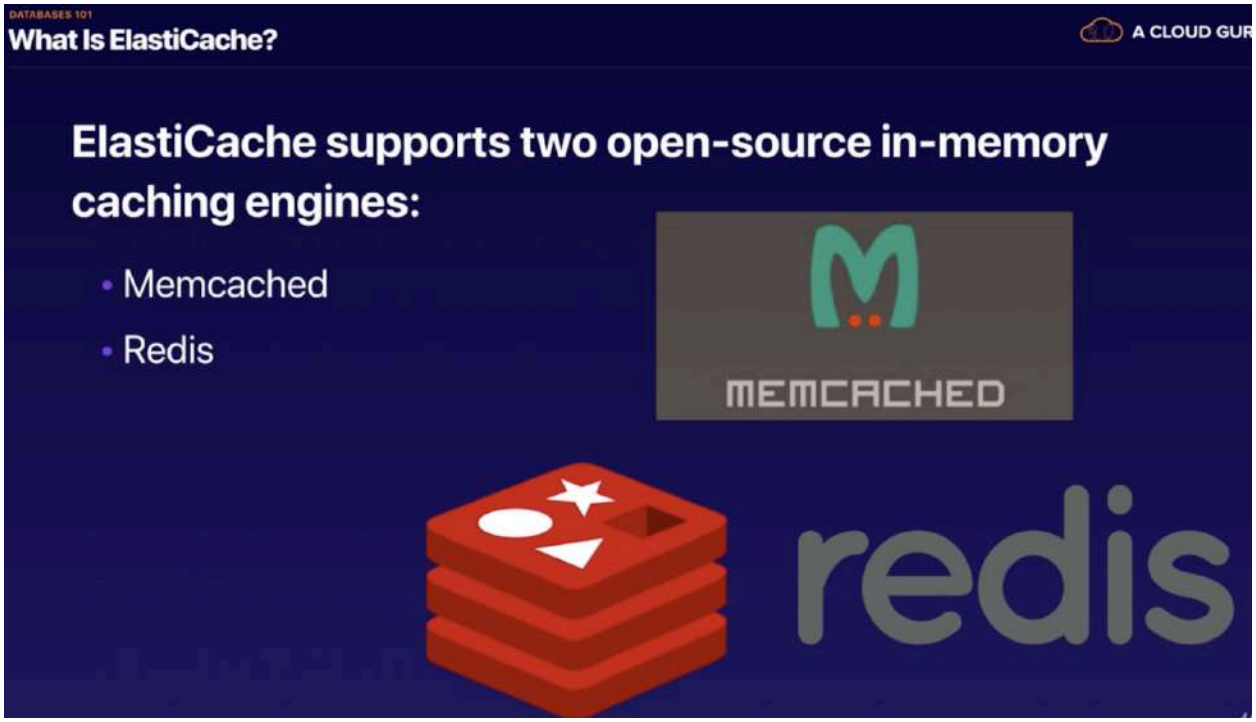
DATABASES 101

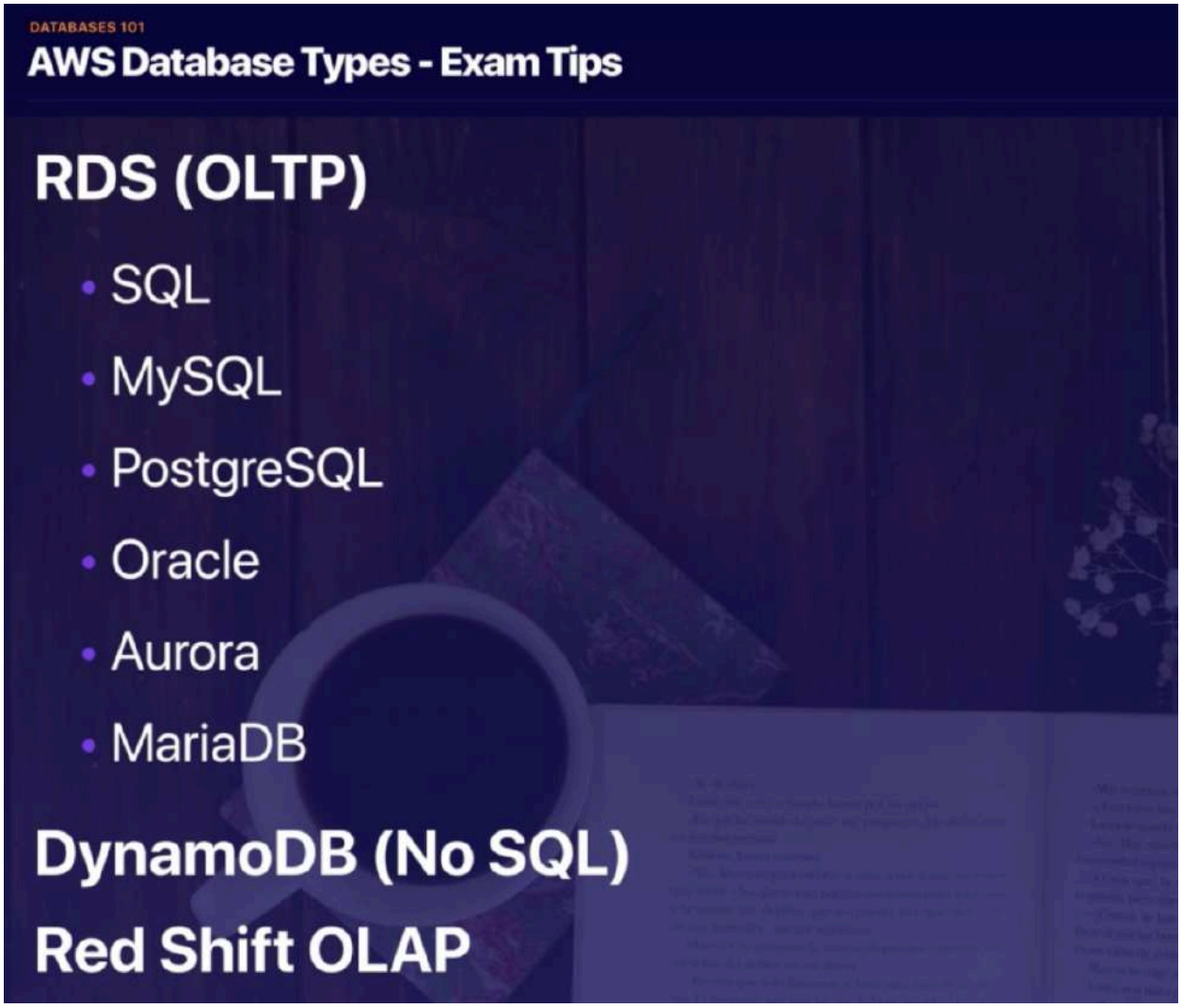
What Is ElastiCache?

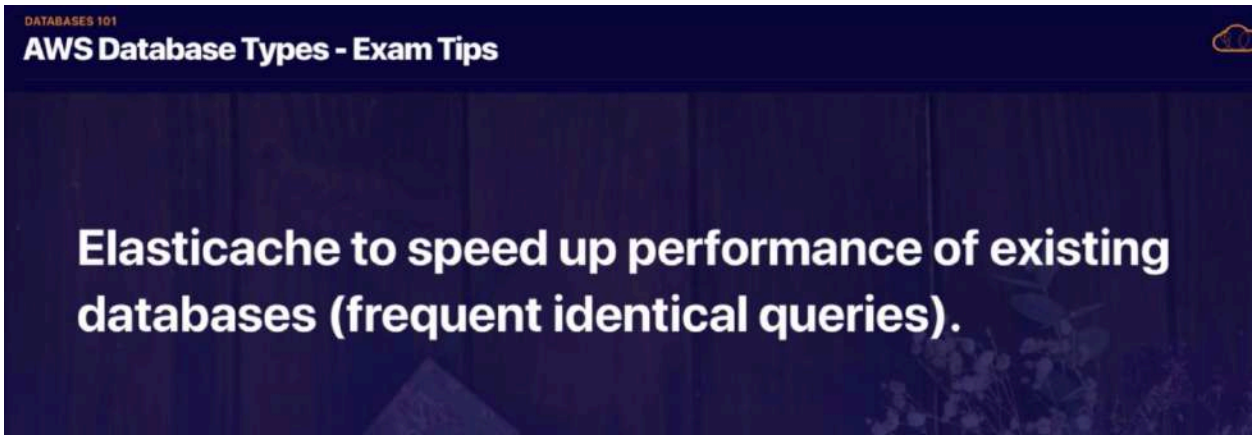
A C

ElastiCache is a web service that makes it easy to deploy, operate, and scale an in-memory cache in the cloud. The service improves the performance of web applications by allowing you to retrieve information from fast, managed, in-memory caches, instead of relying entirely on slower disk-based databases.

ElastiCache supports two open-source in-memory caching engines:


DATABASES 101
What Is ElastiCache?
A CLOUD GUR
ElastiCache supports two open-source in-memory caching engines:
• Memcached
• Redis
MEMCACHED
redis


DATABASES 101
AWS Database Types - Exam Tips
RDS (OLTP)
SQL
MySQL
PostgreSQL
Oracle
Aurora
MariaDB
DynamoDB (No SQL)
Red Shift OLAP


DATABASES 101
AWS Database Types - Exam Tips
Elasticache to speed up performance of existing databases (frequent identical queries).

RDS

DATABASES 101

Relational Databases

A CLOUD GURU

Remember the following points;

- RDS runs on virtual machines
- You cannot log in to these operating systems however.
- Patching of the RDS Operating System and DB is Amazon's responsibility
- RDS is NOT Serverless
- Aurora Serverless IS Serverless

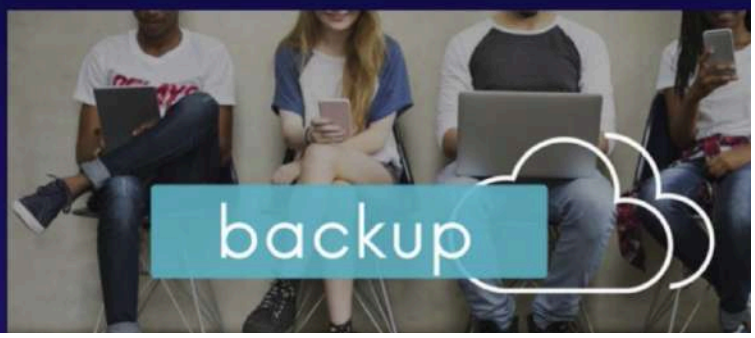
RDS - BACK UPS, MULTI-AZ & READ REPLICAS

Back Ups With RDS

A CLOUD

There are two different types of Backups for RDS:

- **Automated Backups**
- **Database Snapshots**



RDS - BACK UPS, MULTI-AZ & READ REPLICAS

Automated Backups

A CLOUD GURU

Automated Backups allow you to recover your database to any point in time within a "retention period". The retention period can be between one and 35 days. Automated Backups will take a full daily snapshot and will also store transaction logs throughout the day. When you do a recovery, AWS will first choose the most recent daily back up, and then apply transaction logs relevant to that day. This allows you to do a point in time recovery down to a second, within the retention period.

RDS - BACK UPS, MULTI-AZ & READ REPLICAS

Automated Backups

A CLOUD

Automated Backups are enabled by default. The backup data is stored in S3 and you get free storage space equal to the size of your database. So if you have an RDS instance of 10Gb, you will get 10Gb worth of storage.

Backups are taken within a defined window. During the backup window, storage I/O may be suspended while your data is being backed up and you may experience elevated latency.

RDS - BACK UPS, MULTI-AZ & READ REPLICAS

Database Snapshots

A CLOUD GU

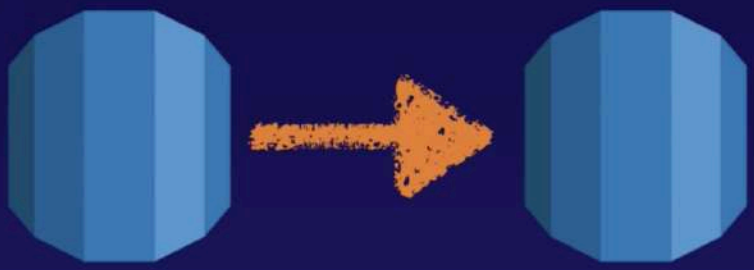
DB Snapshots are done manually (ie they are user initiated.) They are stored even after you delete the original RDS instance, unlike automated backups.

RDS - BACK UPS, MULTI-AZ & READ REPLICAS

Restoring Backups

A CLOUD GUR

Whenever you restore either an Automatic Backup or a manual Snapshot, the restored version of the database will be a new RDS instance with a new DNS endpoint.



original.eu-west-1.rds.amazonaws.com

restored.eu-west-1.rds.amazonaws.com

RDS - BACK UPS, MULTI-AZ & READ REPLICAS

Encryption At Rest

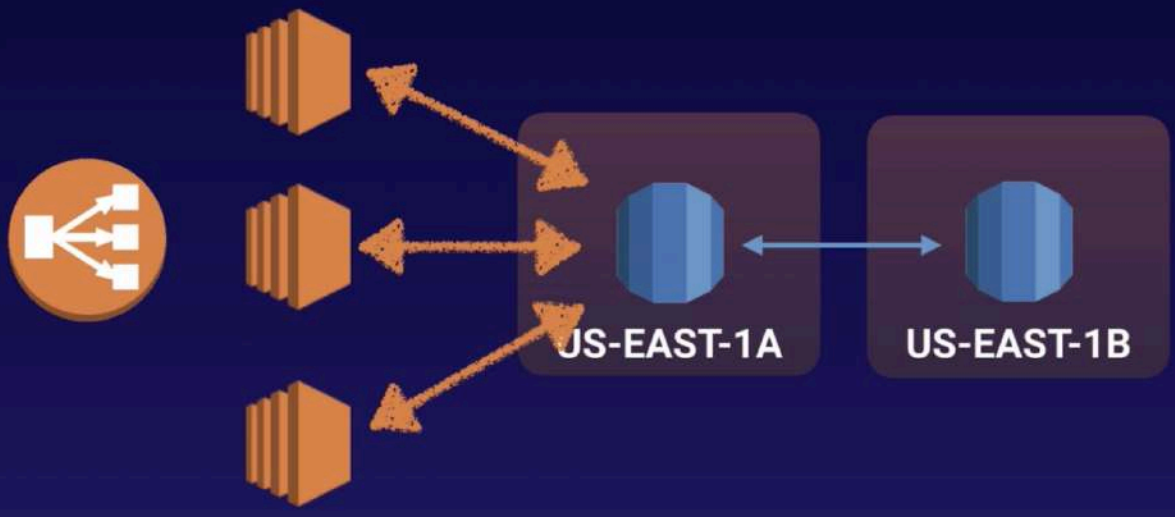
A CLOUD GURU

Encryption at rest is supported for MySQL, Oracle, SQL Server, PostgreSQL, MariaDB & Aurora. Encryption is done using the AWS Key Management Service (KMS) service. Once your RDS instance is encrypted, the data stored at rest in the underlying storage is encrypted, as are its automated backups, read replicas, and snapshots.

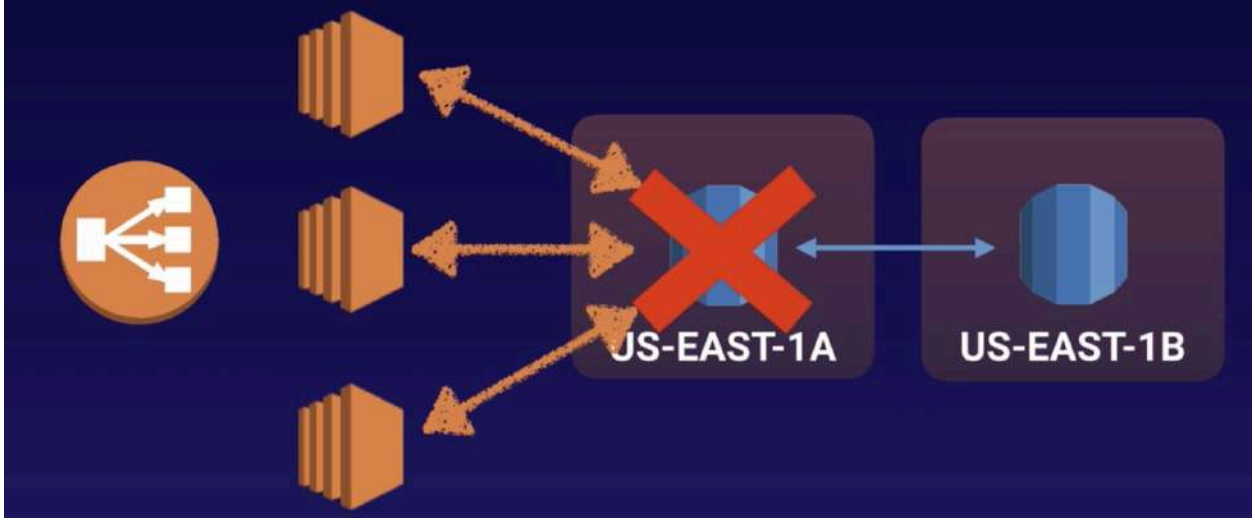
RDS - BACK UPS, MULTI-AZ & READ REPLICAS

What Is Multi-AZ

A CLOUD GURU



What Is Multi-AZ



RDS - BACK UPS, MULTI-AZ & READ REPLICAS

What Is Multi-AZ

A CLOUD GURU

Multi-AZ allows you to have an exact copy of your production database in another Availability Zone. AWS handles the replication for you, so when your production database is written to, this write will automatically be synchronized to the stand by database.

In the event of planned database maintenance, DB Instance failure, or an Availability Zone failure, Amazon RDS will automatically failover to the standby so that database operations can resume quickly without administrative intervention.

RDS - BACK UPS, MULTI-AZ & READ REPLICAS

What Is Multi-AZ

A CLOUD GURU

Multi-AZ is for Disaster Recovery only

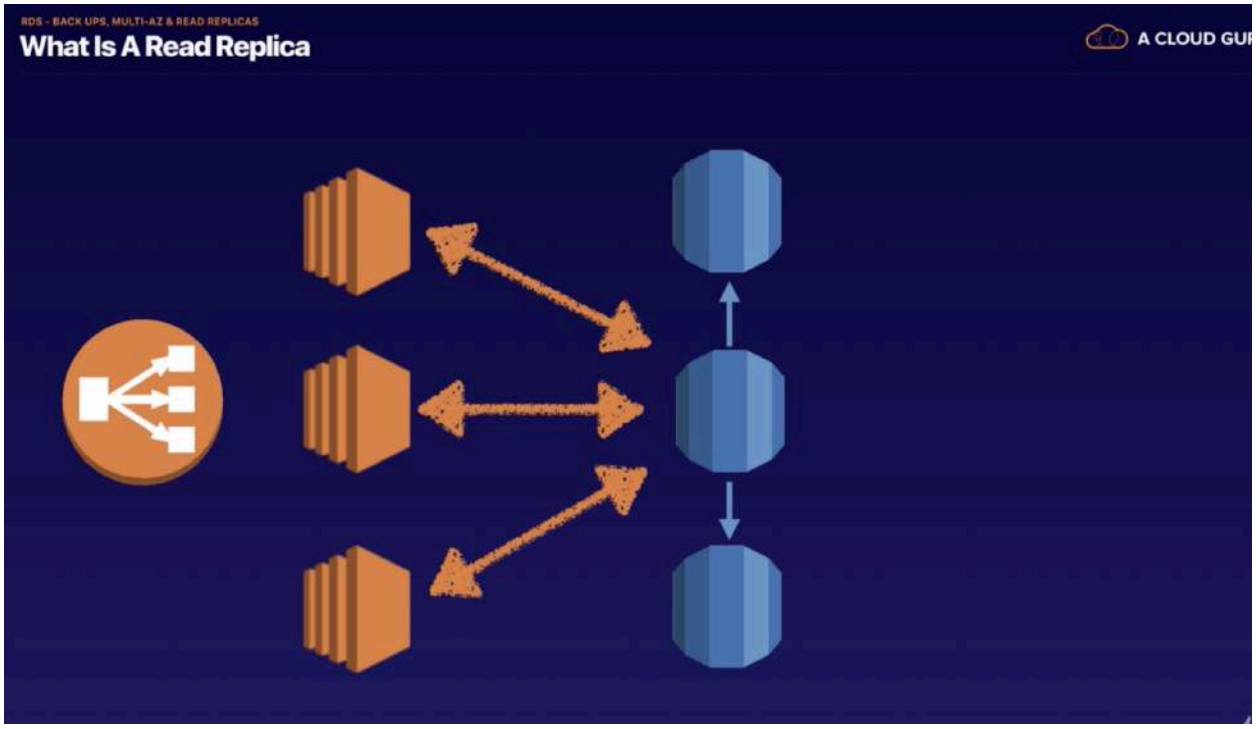
It is not primarily used for improving performance. For performance improvement, you need Read Replicas.

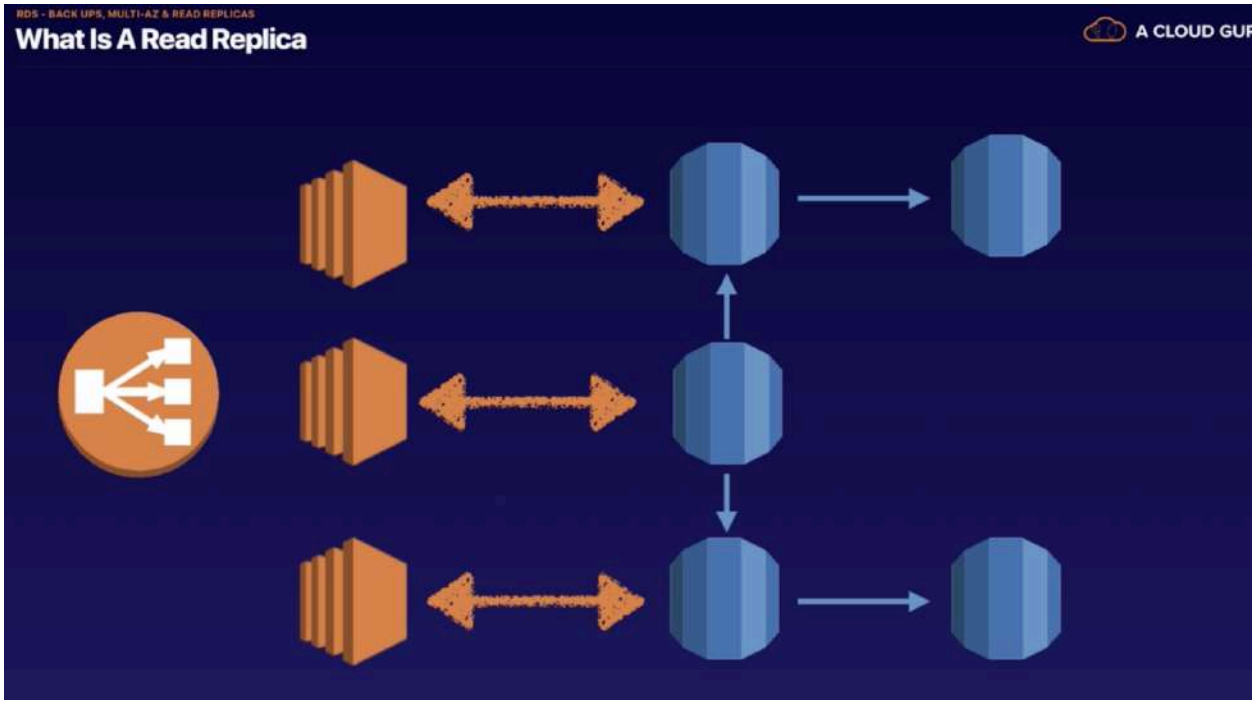
RDS - BACK UPS, MULTI-AZ & READ REPLICAS

Multi-AZ Support

Multi-AZ is available for the following databases

- SQL Server
- Oracle
- MySQL Server
- PostgreSQL
- MariaDB


RDS - BACK UPS, MULTI-AZ & READ REPLICAS
What Is A Read Replica
A CLOUD GU

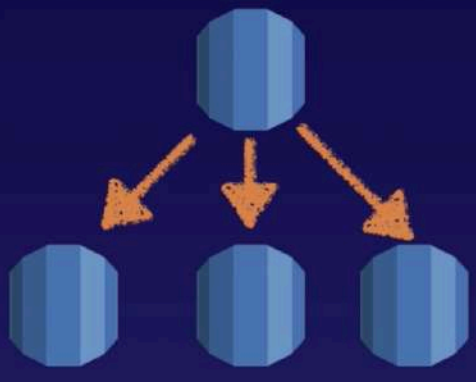

RDS - BACK UPS, MULTI-AZ & READ REPLICAS
What Is A Read Replica
A CLOUD GU

RDS - BACK UPS, MULTI-AZ & READ REPLICAS

What Is A Read Replica

A CLOUD GURU

Read replicas allow you to have a read-only copy of your production database. This is achieved by using Asynchronous replication from the primary RDS instance to the read replica. You use read replicas primarily for very read-heavy database workloads.



RDS - BACK UPS, MULTI-AZ & READ REPLICAS

Back Ups With RDS

A CLOUD

Read Replicas are available for the following databases

- MySQL Server
- PostgreSQL
- MariaDB
- Oracle
- Aurora

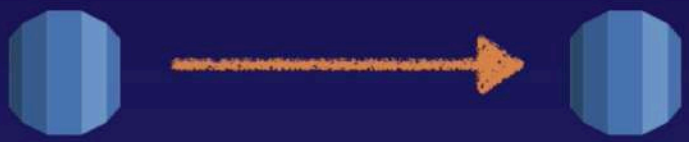
RDS - BACK UPS, MULTI-AZ & READ REPLICAS

Back Ups With RDS

A CLOUD G

Things to know about Read Replicas;

- Used for scaling, not for DR!
- Must have automatic backups turned on in order to deploy a read replica.
- You can have up to 5 read replica copies of any database.
- You can have read replicas of read replicas (but watch out for latency.)



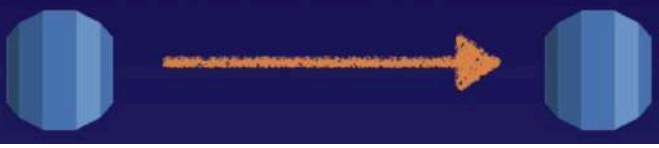
RDS - BACK UPS, MULTI-AZ & READ REPLICAS

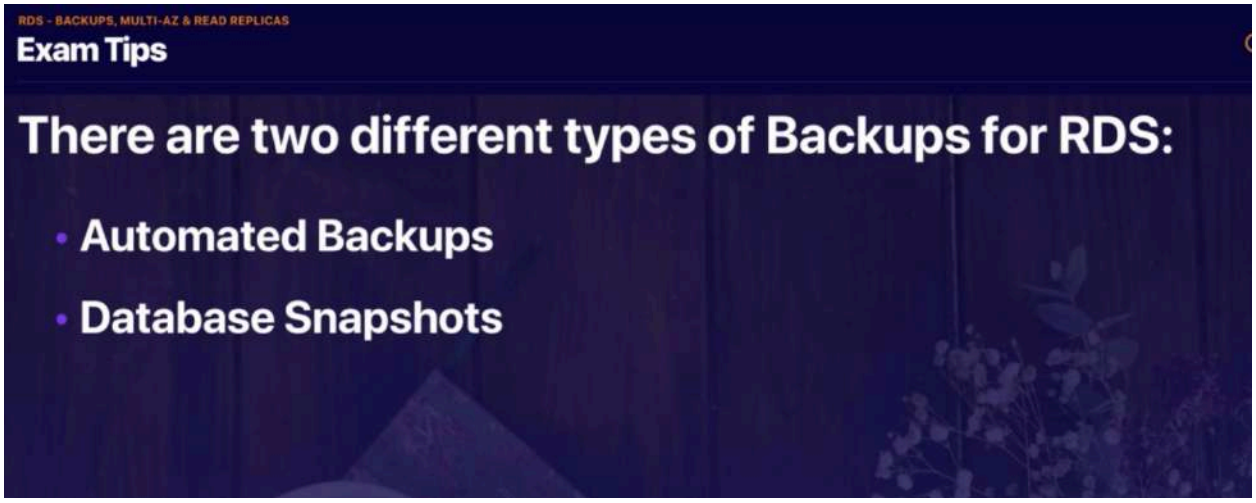
Back Ups With RDS

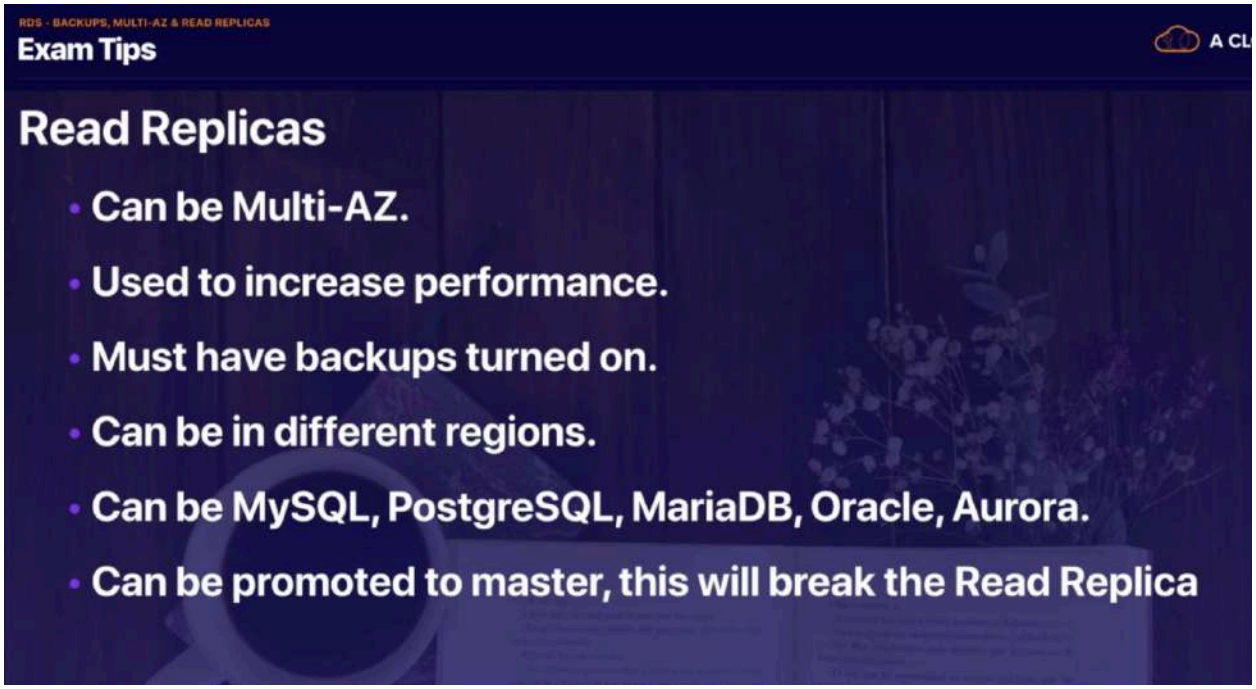
A CLOUD GURU

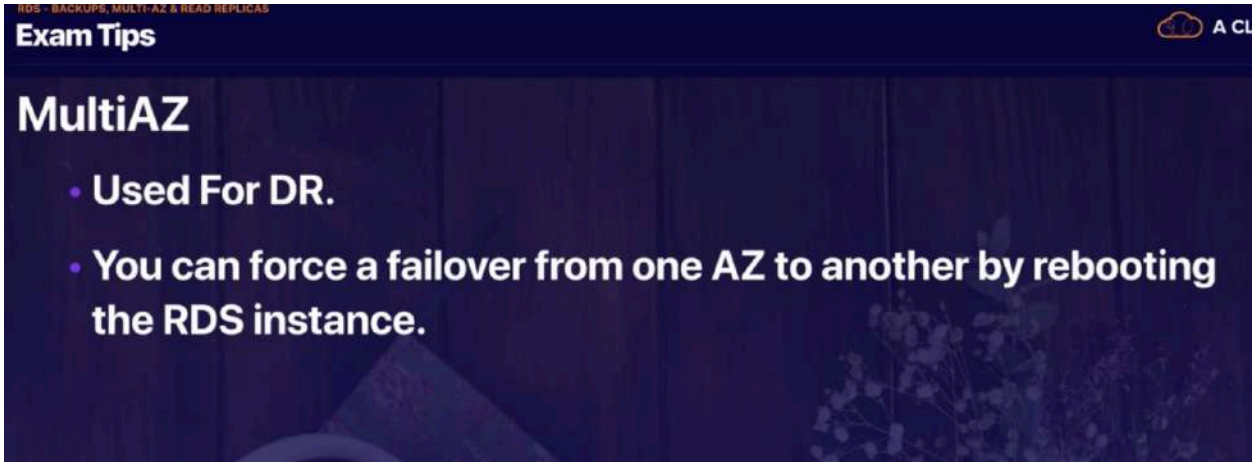
Things to know about Read Replicas;

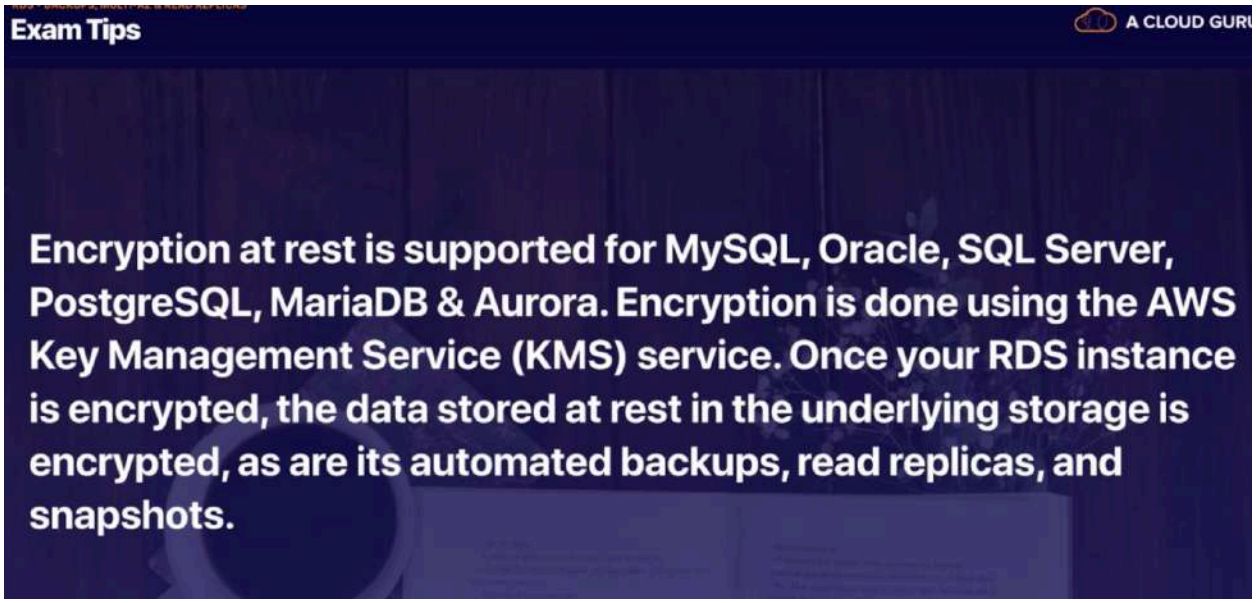
- Each read replica will have its own DNS end point.
- You can have read replicas that have Multi-AZ.
- You can create read replicas of Multi-AZ source databases.
- Read replicas can be promoted to be their own databases. This breaks the replication.
- You can have a read replica in a second region.




RDS - BACKUPS, MULTI-AZ & READ REPLICAS
Exam Tips
There are two different types of Backups for RDS:
• Automated Backups
• Database Snapshots


RDS - BACKUPS, MULTI-AZ & READ REPLICAS
Exam Tips
Read Replicas
• Can be Multi-AZ.
• Used to increase performance.
• Must have backups turned on.
• Can be in different regions.
• Can be MySQL, PostgreSQL, MariaDB, Oracle, Aurora.
• Can be promoted to master, this will break the Read Replica


RDS - BACKUPS, MULTI-AZ & READ REPLICAS
Exam Tips
A CL
MultiAZ
• Used For DR.
• You can force a failover from one AZ to another by rebooting the RDS instance.


Exam Tips
A CLOUD GURU
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DynamoDB

DYNAMODB

What Is DynamoDB?

A CLO

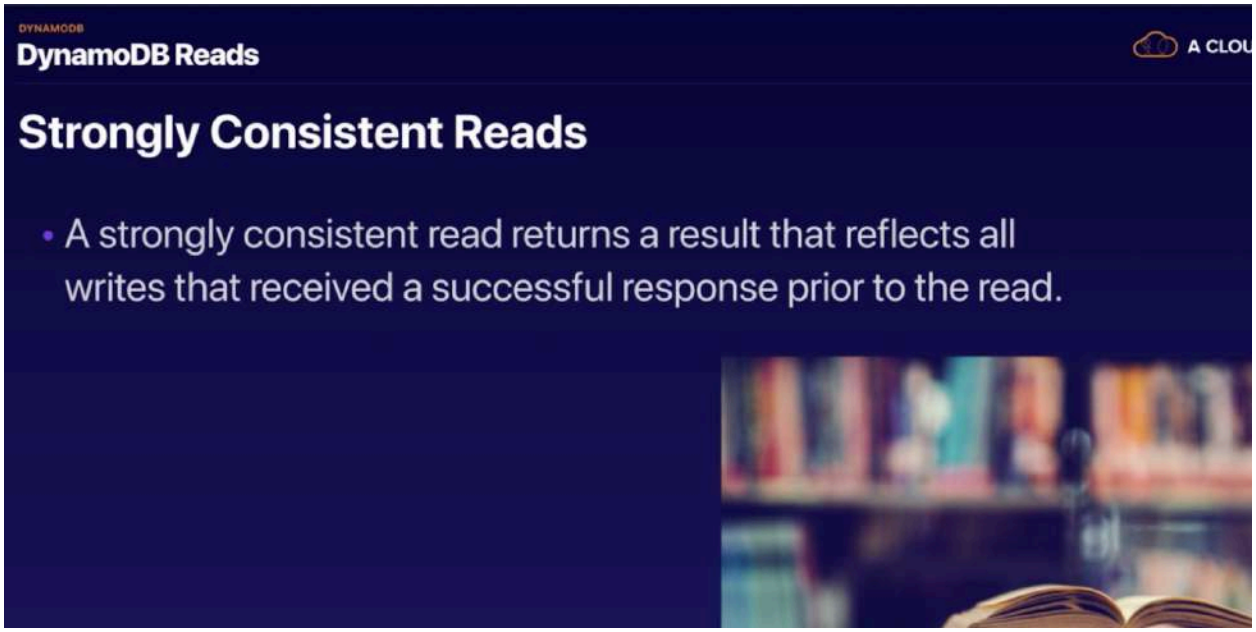
Amazon DynamoDB is a fast and flexible NoSQL database service for all applications that need consistent, single-digit millisecond latency at any scale. It is a fully managed database and supports both document and key-value data models. Its flexible data model and reliable performance make it a great fit for mobile, web, gaming, ad-tech, IoT, and many other applications.

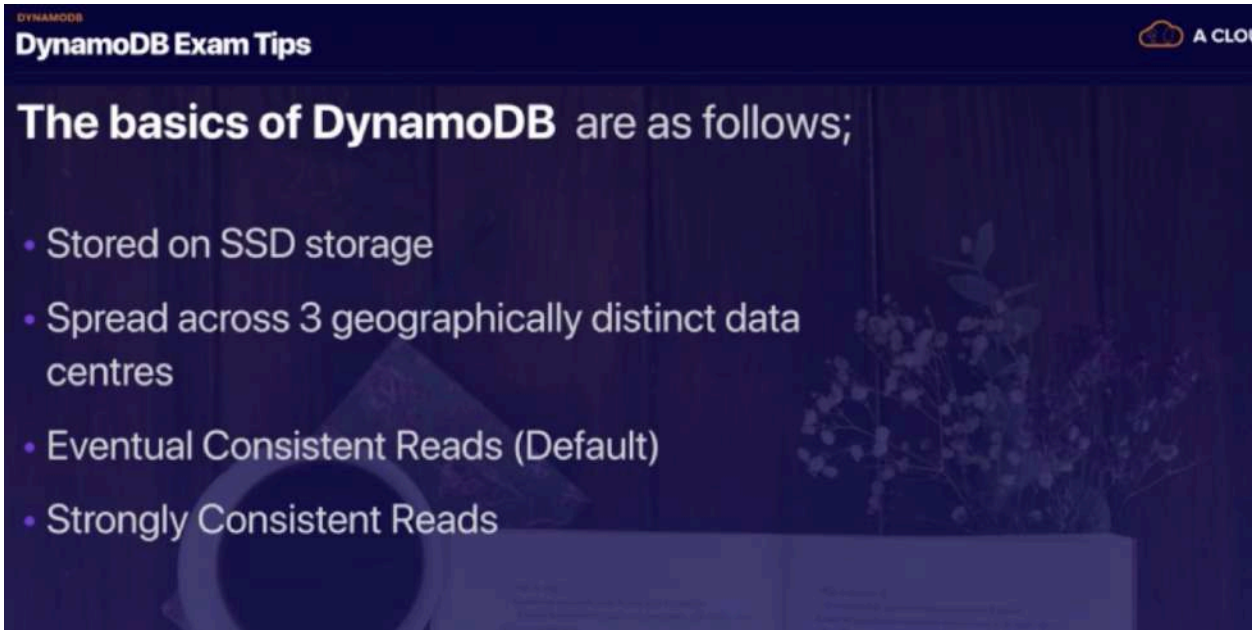
DYNAMODB

DynamoDB Reads

Eventual Consistent Reads

- Consistency across all copies of data is usually reached within a second. Repeating a read after a short time should return the updated data. (Best Read Performance)


DYNAMODB
DynamoDB Reads
A CLOU
Strongly Consistent Reads
• A strongly consistent read returns a result that reflects all writes that received a successful response prior to the read.


DYNAMODB
DynamoDB Exam Tips
A CLO
The basics of DynamoDB are as follows;
• Stored on SSD storage
• Spread across 3 geographically distinct data centres
• Eventual Consistent Reads (Default)
• Strongly Consistent Reads

Redshift

REDSHIFT

Redshift

A CLOUD GURU

Amazon Redshift is a fast and powerful, fully managed, petabyte-scale data warehouse service in the cloud. Customers can start small for just $0.25 per hour with no commitments or upfront costs and scale to a petabyte or more for $1,000 per terabyte per year, less than a tenth of most other data warehousing solutions.

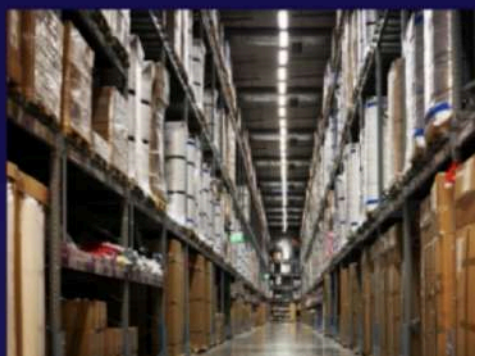
REDSHIFT

OLTP vs OLAP

A CLOU

OLAP transaction Example:
Net Profit for EMEA and Pacific for the Digital Radio Product.
Pulls in large numbers of records

Sum of Radios Sold in EMEA
Sum of Radios Sold in Pacific
Unit Cost of Radio in each region
Sales price of each radio
Sales price - unit cost.



REDSHIFT

OLTP vs OLAP

A CLOU

Data Warehousing databases use different type of architecture both from a database perspective and infrastructure layer.

Amazon's Data Warehouse Solution Is Called Redshift

REDSHIFT

Redshift Configuration

Redshift can be configured as follows

- Single Node (160Gb)
- Multi-Node
  - Leader Node (manages client connections and receives queries.)
  - Compute Node (store data and perform queries and computations). Up to 128 Compute Nodes.

`

REDSHIFT

Redshift

A CL

Advanced Compression:

Columnar data stores can be compressed much more than row-based data stores because similar data is stored sequentially on disk. Amazon Redshift employs multiple compression techniques and can often achieve significant compression relative to traditional relational data stores. In addition, Amazon Redshift doesn't require indexes or materialized views, and so uses less space than traditional relational database systems. When loading data into an empty table, Amazon Redshift automatically samples your data and selects the most appropriate compression scheme.

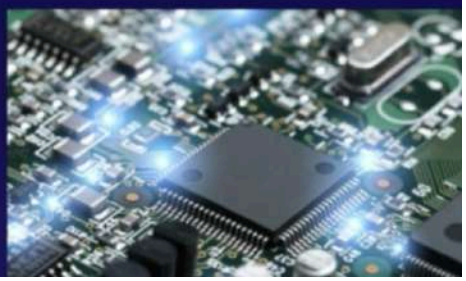
REDSHIFT

Redshift

A CLOU

Massively Parallel Processing (MPP):

Amazon Redshift automatically distributes data and query load across all nodes. Amazon Redshift makes it easy to add nodes to your data warehouse and enables you to maintain fast query performance as your data warehouse grows.

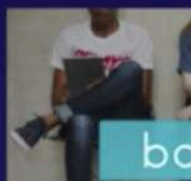


REDSHIFT

Redshift Backups

Backups

- Enabled by default with a 1 day retention period.
- Maximum retention period is 35 days.
- Redshift always attempts to maintain at least three copies of your data (the original and replica on the compute nodes and a backup in Amazon S3).
- Redshift can also asynchronously replicate your snapshots to S3 in another region for disaster recovery.



REDSHIFT

Redshift Pricing

Redshift is priced as follows;

- Compute Node Hours (total number of hours you run across all your compute nodes for the billing period. You are billed for 1 unit per node per hour, so a 3-node data warehouse cluster running persistently for an entire month would incur 2,160 instance hours. You will not be charged for leader node hours; only compute nodes will incur charges.)
- Backup
- Data transfer (only within a VPC, not outside it)

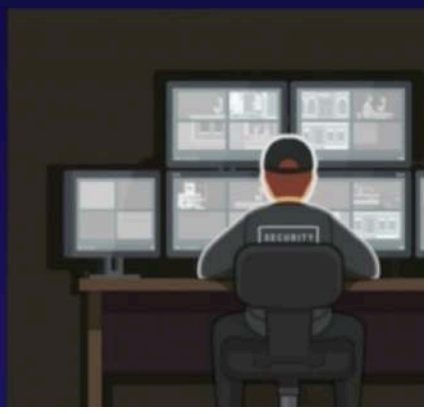
REDSHIFT

Redshift Security

A CLOU

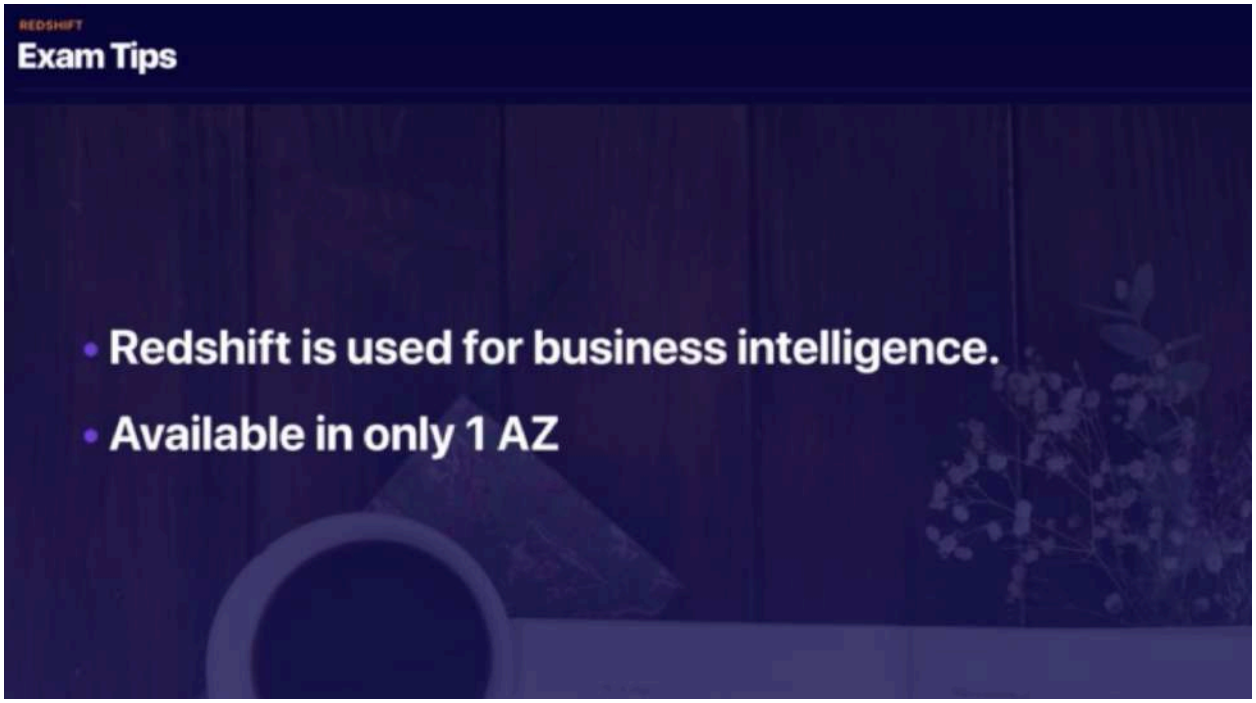
Security Considerations:

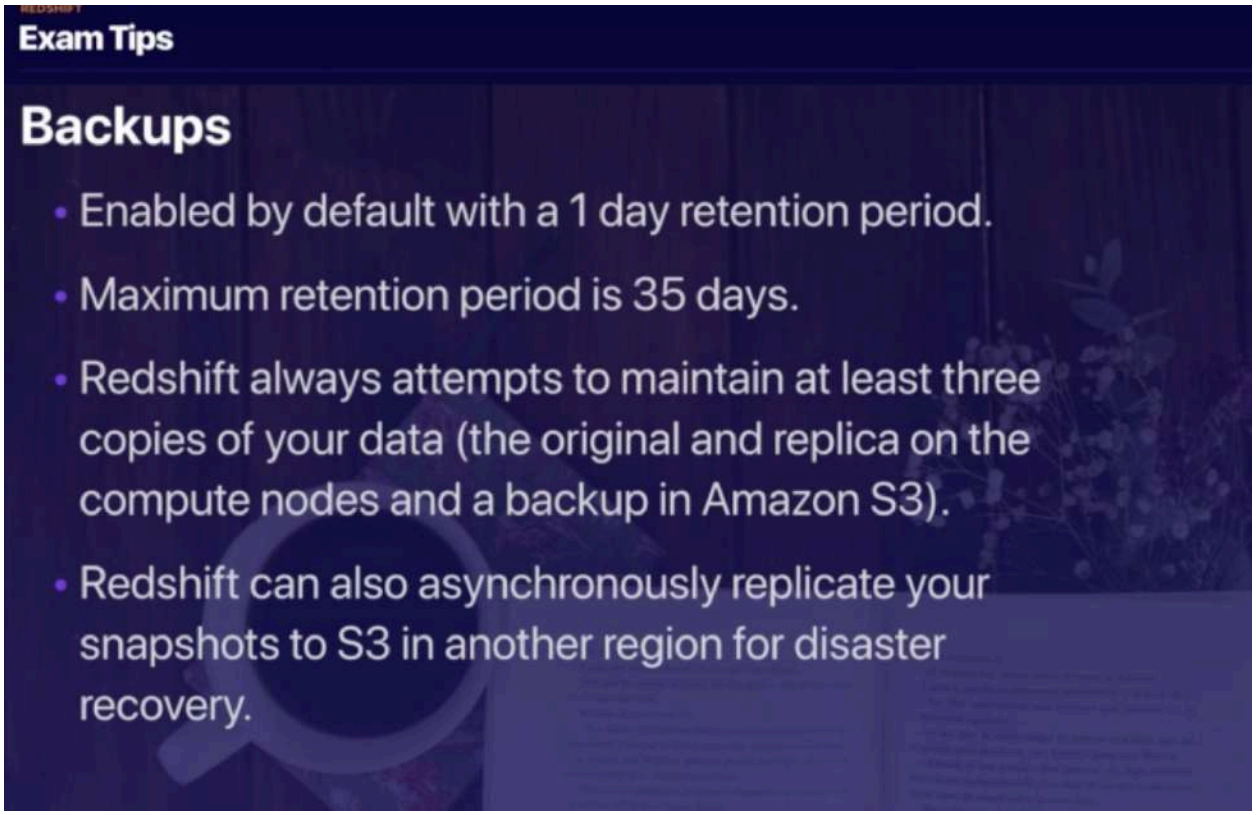
- Encrypted in transit using SSL
- Encrypted at rest using AES-256 encryption
- By default RedShift takes care of key management.
    - Manage your own keys through HSM
    - AWS Key Management Service



Redshift Availability:

- Currently only available in 1 AZ
- Can restore snapshots to new AZs in the event of an outage.


REDSHIFT
Exam Tips
• Redshift is used for business intelligence.
• Available in only 1 AZ


REDSHIFT
Exam Tips
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Aurora

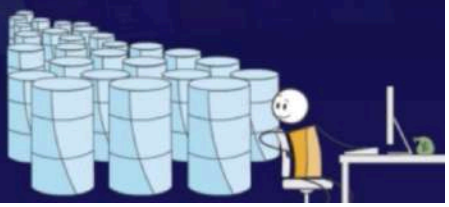
A CLOUD GURU

What is Aurora?

Amazon Aurora is a MySQL and PostgreSQL-compatible relational database engine that combines the speed and availability of high-end commercial databases with the simplicity and cost-effectiveness of open source databases.

A CLOUD GURU

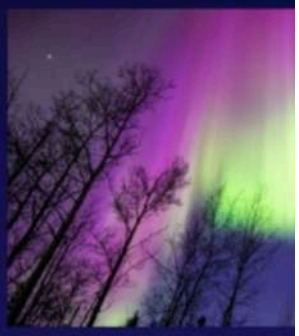
Amazon Aurora provides up to five times better performance than MySQL and three times better than PostgreSQL databases at a much lower price point, whilst delivering similar performance and availability.



A CLOUD GURU

Things to know about Aurora

1. Start with 10GB, Scales in 10GB increments to 64TB (Storage Autoscaling)
2. Compute resources can scale up to 32vCPUs and 244GB of Memory.
3. 2 copies of your data is contained in each availability zone, with minimum of 3 availability zones. 6 copies of your data.



A CL

Scaling Aurora

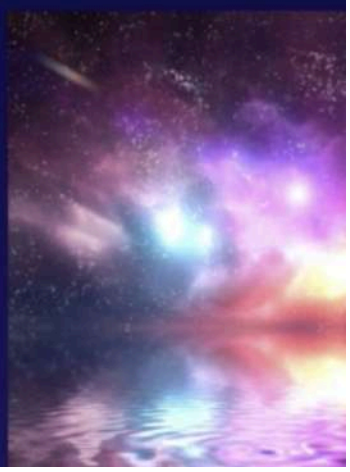
- Aurora is designed to transparently handle the loss of up to two copies of data without affecting database write availability and up to three copies without affecting read availability.
- Aurora storage is also self-healing. Data blocks and disks are continuously scanned for errors and repaired automatically.

AURORA

The Basics of Aurora

Three Types of Aurora Replicas are available:

- Aurora Replicas (currently 15)
- MySQL Read Replicas (currently 5)
- PostgresQL (currently 1)



AURORA

The Basics of Aurora

A CLOUD GURU

Feature	Amazon Aurora Replicas	MySQL Replicas
Number of replicas	Up to 15	Up to 5
Replication type	Asynchronous (milliseconds)	Asynchronous (seconds)
Performance impact on primary	Low	High
Replica location	In-region	Cross-region
Act as failover target	Yes (no data loss)	Yes (potentially minutes of data loss)
Automated failover	Yes	No
Support for user-defined replication delay	No	Yes
Support for different data or schema vs. primary	No	Yes

AURORA

The Basics of Aurora

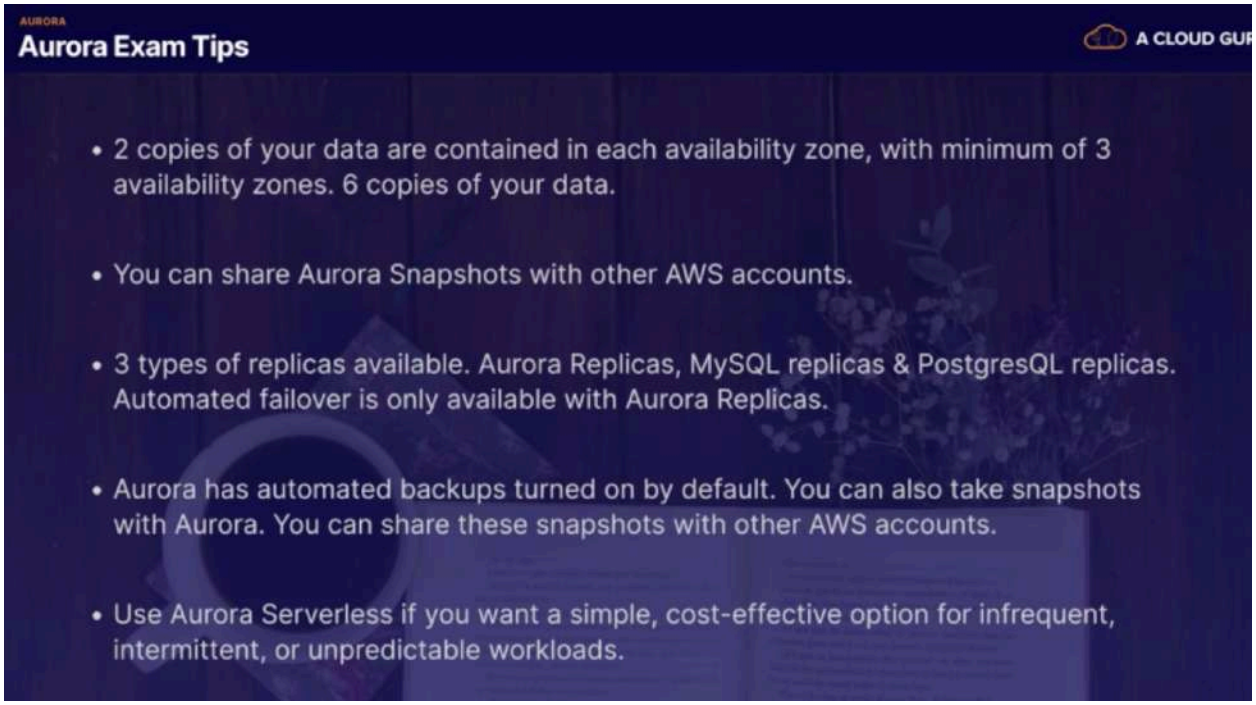
A CL

BACKUPS WITH AURORA

- Automated backups are always enabled on Amazon Aurora DB Instances. Backups do not impact database performance.
- You can also take snapshots with Aurora. This also does not impact on performance.
- You can share Aurora Snapshots with other AWS accounts.

A CLOUD GURU

Amazon Aurora Serverless is an on-demand, autoscaling configuration for the MySQL-compatible and PostgreSQL-compatible editions of Amazon Aurora. An Aurora Serverless DB cluster automatically starts up, shuts down, and scales capacity up or down based on your application's needs.



Elasticache

ELASTICACHE

What Is ElastiCache?

A CLOU

ElastiCache is a web service that makes it easy to deploy, operate, and scale an in-memory cache in the cloud. The service improves the performance of web applications by allowing you to retrieve information from fast, managed, in-memory caches, instead of relying entirely on slower disk-based databases.

ELASTICACHE

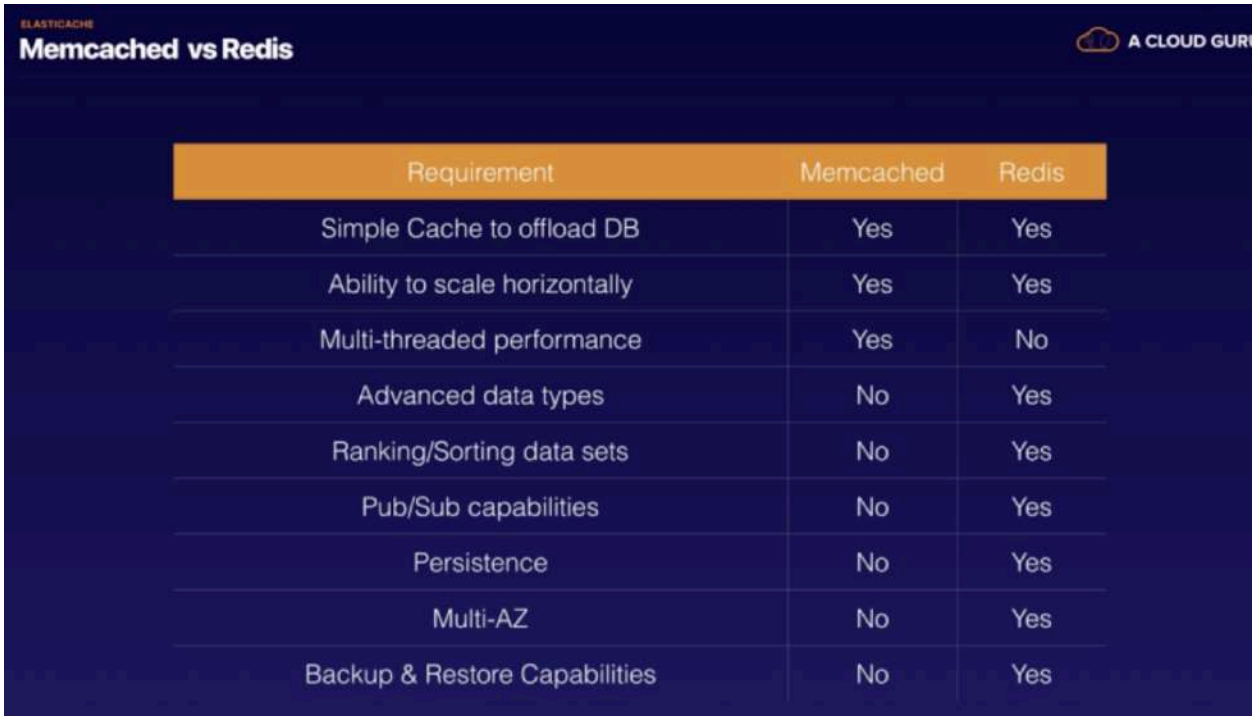
What Is ElastiCache?

A C

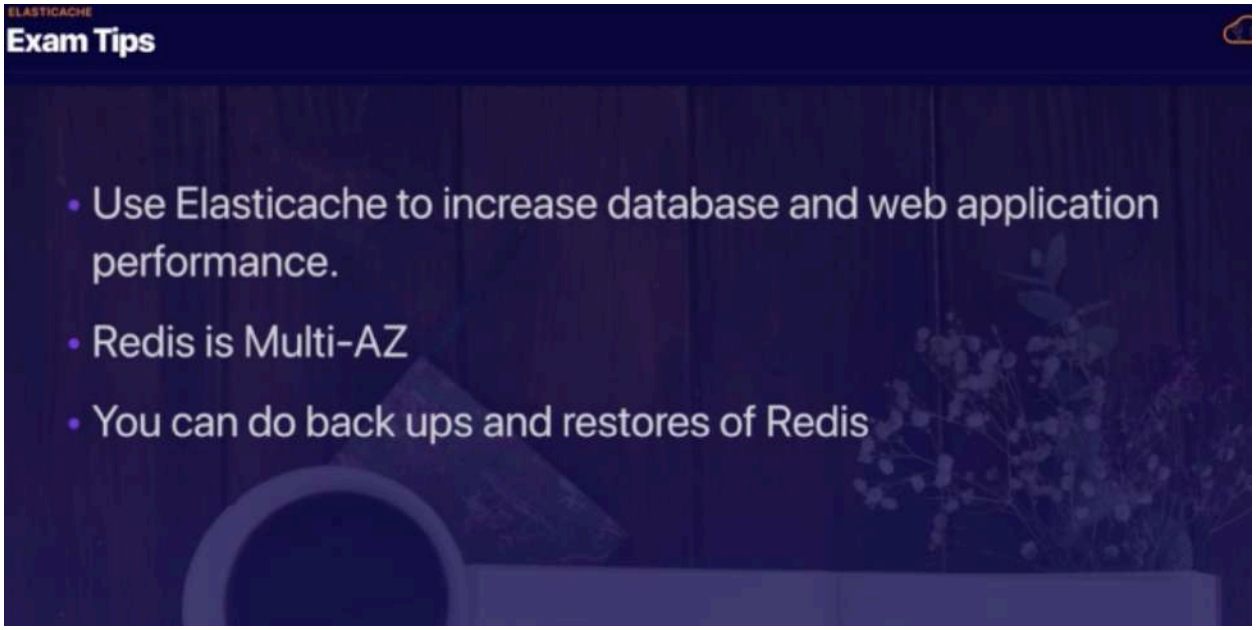
ElastiCache supports two open-source in-memory caching engines:

- Memcached
- Redis

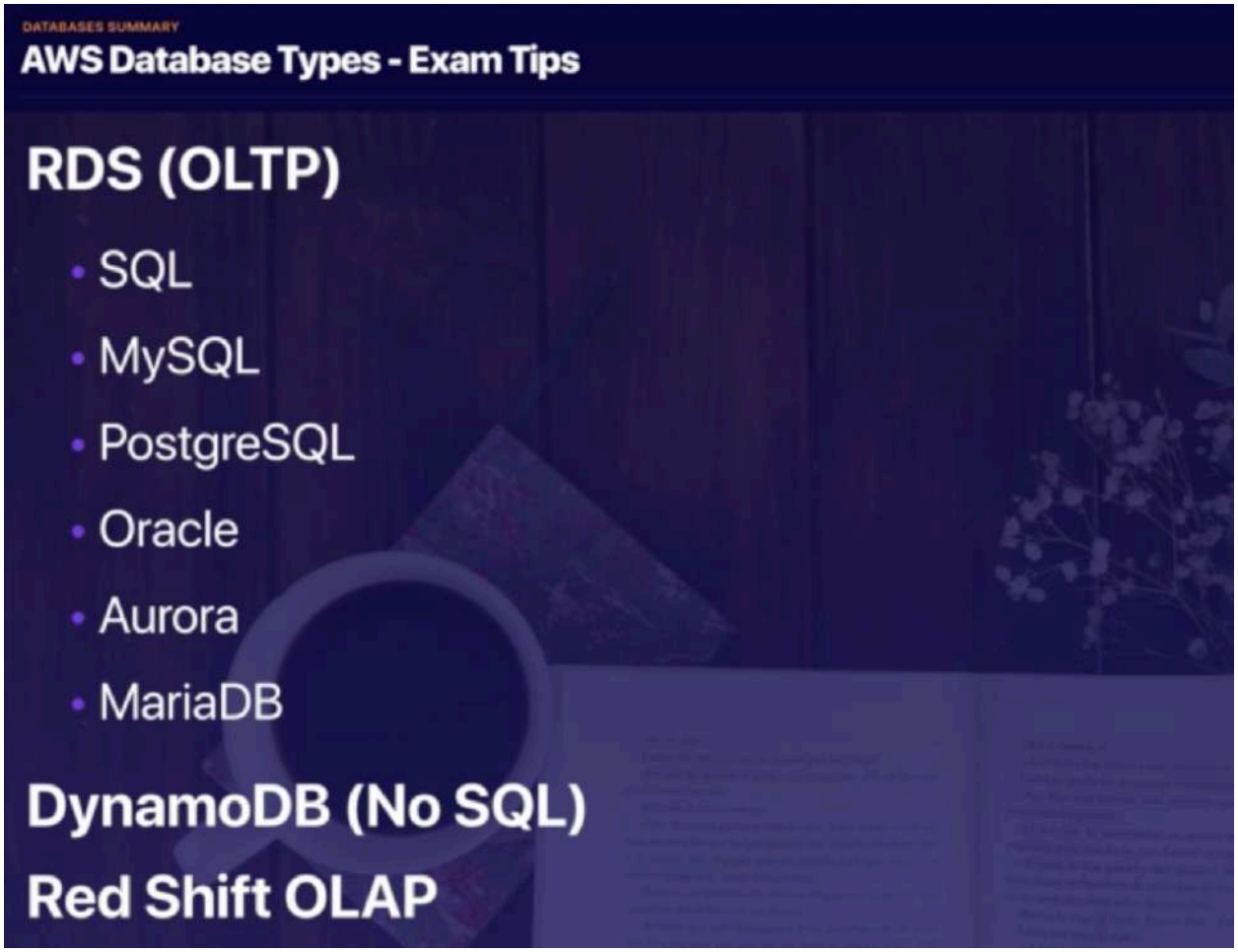
redi



Requirement	Memcached	Redis
Simple Cache to offload DB	Yes	Yes
Ability to scale horizontally	Yes	Yes
Multi-threaded performance	Yes	No
Advanced data types	No	Yes
Ranking/Sorting data sets	No	Yes
Pub/Sub capabilities	No	Yes
Persistence	No	Yes
Multi-AZ	No	Yes
Backup & Restore Capabilities	No	Yes



Database Summary


DATABASES SUMMARY
AWS Database Types - Exam Tips
RDS (OLTP)
SQL
MySQL
PostgreSQL
Oracle
Aurora
MariaDB
DynamoDB (No SQL)
Red Shift OLAP

DATABASES SUMMARY

AWS Database Types - Exam Tips

Elasticache

- Memcached
- Redis

DATABASES SUMMARY

Relational Databases

A CLOUD GURU

Remember the following points;

- RDS runs on virtual machines
- You cannot log in to these operating systems however.
- Patching of the RDS Operating System and DB is Amazon's responsibility
- RDS is NOT Serverless
- Aurora Serverless IS Serverless