

"IT'S NOT VERY OFTEN YOU GET TO ENTER THE MIND OF  
A GENIUS. WHAT A THRILL!" - MIDAS BROWN

# MASTER ON

# aws

The AWS logo consists of the lowercase letters 'aws' in a dark blue, sans-serif font. Below the letters is a thick, orange curved arrow that starts under the 'a' and points to the right, ending under the 's'.

## POWERFUL MIND MAPS

EVERYTHING INSIDE OF 20 BEAUTIFUL MIND MAPS



BY BITS LOVERS'

# AWS Learning Kit



Designed to Save your Time!

Our AWS Kit Learning contains 20 of the following Mind Maps and Outlines:

- 1- VPC
- 2- Simple Storage Service (S3)
- 3- EBS and EFS
- 4- Security
  - 4.1 – AWS STS
  - 4.2 – S3
  - 4.3 – Certificate Manager
  - 4.4 – IAM
  - 4.5 – Parameter Store
  - 4.6 – Secret Manager
  - 4.7 – CloudHSM
  - 4.8 – KMS
  - 4.9 – CloudTrail
  - 4.10 – AWS Shield
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- 6- AWS Databases
  - 6.1 – DynamoDB
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- 16- Identity and Access Management (IAM)
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  - 19.1 – OpsWorks
  - 19.2 – CloudFormation
  - 19.3 – Beanstalk
  - 19.3 – System Manager
- 20-API Gateway



260 Questions/Answers PDF

# VPC

### VPC Flow Log

- Goal:** Flow Logs capture information about the IP traffic going to and from network interfaces in a VPC.
- Characteristics:**
  - data is stored using Amazon CloudWatch Logs. Flow logs can
  - You can't enable flow logs for VPCs that are peered with your VPC unless the peer VPC is in your account.
- Levels:** VPC, Network Interface, Subnet

### Transit Gateway

- Goal:** Connects VPCs and on-premises network through a central hub.
- Characteristics:**
  - It simplifies your network and puts an end to complex peering relationships.
  - Acts as a cloud router
  - Works on a Regional basis, but you can have it across multiple regions
  - You can use it across multiple AWS accounts using RAM (Resource Access Manager)
- Works with:** Direct Connect, VPN
- Goal:** Allow you to have transitive peering between thousands of VPCs and on-premises data centers

### Direct Connect

- Types:** Dedicated Connection (Physical Ethernet connection associated with a single customer), Hosted Connection (Physical Ethernet connection that an AWS Partner provisions on behalf of a customer)
- Goal:** Establish a dedicated network connection from your premises to AWS
- Goal:** Can reduce your network costs, increase bandwidth throughput, and provide a more consistent network experience than internet-based connections

### PrivateLink

- Goal:** simplifies the security of data shared with cloud-based applications by eliminating the exposure of data to the public internet.
- Goal:** provides private connectivity between VPCs, AWS services, and on-premises applications, securely on the Amazon network.
- Characteristics:** It doesn't require VPC Peering; No Route Tables, NAT Gateways, Internet Gateways, VPN
- Characteristics:** Requires a Network Load Balance on the Service VPC and ENI on Customer VPC
- Characteristics:** Redundant; uses AWS backbone

### VPC Endpoints

- Goal:** Privately connect your VPC to support AWS services
- Goal:** Not Requires: Internet Gateway, NAT Gateway, VPN, or AWS Direct Connect
- Goal:** Traffic between your VPC and other service does not leave the Amazon network
- Types:** Interface Endpoint (Use Elastic Interface with a Private IP, It's the entry point for traffic headed to a supported service), Gateway Endpoints (Similar to NAT gateways, a gateway endpoint is a virtual device. It supports connections to S3 and DynamoDB only)

### Security Groups

- Goal:** Security groups act like a firewall at the instance level.
- Characteristics:** Can only assign permit rules in a security group, cannot assign deny rules.
- Characteristics:** Responses to allowed inbound traffic are allowed to flow out, regardless of outbound rules
- Characteristics:** By default, everything is blocked
- Characteristics:** Security group members can be within any AZ or subnet within the VPC.
- Characteristics:** Up to 5 security groups can be added per EC2 instance interface.
- Characteristics:** You cannot block specific IP addresses using security groups, use NACLs instead.

### Tips

- When you create VPC:** Also Creates Security Group, ACL, Route Table
- Security Group:** The default SG can be modified, but not deleted
- ACL:** The default SG is used automatically when you don't specify an SG for your resource
- ACL:** By default allows any traffic

### VPN CloudHub

- Goal:** Hub-and-spoke model
- Goal:** it operates over the public internet, but all traffic between the customer gateway and CloudHub is encrypted
- Goal:** It provides a connection between an on-premises network and a VPC, using a secure and private connection with IPsec and TLS.
- Goal:** Link remote offices for backup or primary WAN access to AWS resources and each other
- Advantages:** Low cost and easy to manage
- Advantages:** Hourly rates plus data egress charges.

### Characteristics

- CIDR Block:** IP Range (10.0.0.0/8), Network address (10.0.0.0), For VPC Router (10.0.0.1), For DNS server (10.0.0.2), Reserved by AWS for Future Use (10.0.0.3), Network broadcast address (10.0.0.255)
- IP Reservations:** You cannot create additional CIDR blocks that overlap with existing CIDR blocks.
- Availability Zones:** Availability Zones are distinct locations that are engineered to be isolated from failures in other Availability Zones.
- IPv6 addresses:** IPv6 addresses are all public and the range is allocated by AWS.

### Subnet

- Goal:** Logically isolated and create your network
- Types:** Public (Accessible via Internet, If a subnet's traffic is routed to an internet gateway, the subnet is known as a public subnet.), Private (If a subnet doesn't have a route to the internet gateway, the subnet is known as a private subnet.)
- Characteristics:** CIDR Block (IP Range), Availability Zone (If a subnet doesn't have a route to the internet gateway, but has its traffic routed to a virtual private gateway for a VPN connection, the subnet is known as a VPN-only subnet. Each subnet must reside entirely within one Availability Zone and cannot span zones.)
- After Created Assign To:** Route Table (If not assigned, it will automatically be associate with the default network ACL), ACL (One Subnet can only be assigned to one ACL at a time)

### Route Table

- Assign to:** Subnets
- Tips:** Cannot delete the main route table. You can manually set another route table to become the main route table. Route tables also have entries to external destinations.

### ACL

- Associated To:** Multiples or a Single Subnet
- Characteristics:** Are Stateless: Responses to allowed inbound traffic is subject to the rules for outbound traffic (and vice versa). A numbered list of rules, starting with the lowest.
- Goal:** Control in and out traffic on the subnets, separately. It's another layer of Security for your VPC
- Rules:** Can block IP ranges. The rule: \* All Traffic Deny (This rule ensures that if a packet doesn't match any of the other numbered rules, it's denied. Can't modified or removed). By default denies all inbound and outbound traffic until you add a new rule

### Peering Connections

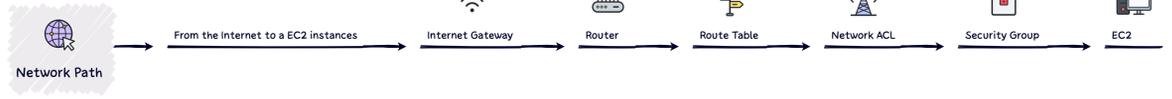
- Goal:** Create a path connection to communicate with other VPCs.
- Characteristics:** VPC from other AWS Account is supported, No Transitive Peering, Different Region are supported, Cannot have overlapping CIDR ranges.
- Tips:** Must update route tables to configure routing. Need to accept the pending access request in the peered VPC. The VPC peering connection can be added to route tables - shows as a target starting with "pcx-".

### Internet Gateway

- One per VPC**
- Assigned to a Public Subnet**
- Provide Access to the internet**
- Goal:** An Internet Gateway is a horizontally scaled, redundant, and highly available VPC component that allows communication between instances in your VPC and the internet. To perform network address translation (NAT) for instances that have been assigned public IPv4 addresses.
- Characteristics:** You cannot have multiple Internet Gateways in a VPC. IGW is horizontally scaled, redundant and HA. IGW performs NAT between private and public IPv4 addresses. IGW supports IPv4 and IPv6.

### NAT Gateway

- Goal:** Create one NAT Gateway for each AZs
- Types:** Public (To access out the Internet, Uses in Public Subnet, Uses an Elastic IP address for the public IP.), Private (Access other VPCs, using a Private IP, Using a private subnet, Private instances in private subnets must have a route to the NAT instance, usually the default route destination of 0.0.0.0/0.)
- Goal:** Enable instances in Private Subnet to connect to the internet
- Goal:** For multi-AZ redundancy, create NAT Gateways in each AZ with routes for private subnets to use the local gateway. NAT gateways are highly available in each AZ into which they are deployed.



### QUESTION 1

After being brought on as a consultant for an enterprise needing assistance moving to AWS, you discover that the application team currently runs a messaging application using Apache ActiveMQ as its message queue software. The consumer and producer applications poll the Apache ActiveMQ queues and process messages as they are found, running on virtual machines via Java runtimes. To avoid major coding changes during this initial move to the cloud, what do AWS services suggest?

(Choose 2)

- a) Break the application functions into individual AWS Lambda functions.
- b) Install the Java application on Amazon EC2 instances.
- c) Configure the producers and consumers to leverage Amazon DynamoDB for storing messages.
- d) Configure the producers and consumers to leverage Amazon SQS for messaging.
- e) Set up Amazon MQ to easily integrate Apache ActiveMQ into AWS.

### QUESTION 2

At your company, you're in charge of disaster recovery and are getting the team ready for upcoming DR drills. A vital part of the plan will be replicating the databases and their data. Since there's an aggressive Recovery Time Objective (RTO), the database needs to be synchronously replicated. What configuration would be able to meet this requirement?

- a) RDS DynamoDB
- b) AWS Lambda starts a CloudFormation to create RDS in another Region.
- c) Multi-Region MySQL
- d) RDS Multi-AZ

### QUESTION 3

You need to use social media login for a new application, and users should be able to sign up for the app using their Facebook accounts. Cognito will help you achieve this goal, but the application owner wants to know more about how user authentication works. What is the correct order to authenticate with Cognito?

- a) Step A - Access AWS services using STS credentials. Step B - Exchange tokens and get AWS credentials. Step 3 - Authenticate and get tokens.
- b) Step A - Exchange tokens and get AWS credentials. Step B - Authenticate and get tokens. Step C - Access AWS services using credentials.
- c) Step A - Exchange tokens and get AWS credentials. Step B - Access AWS services using credentials. Step C - Authenticate and get tokens.
- d) Step A - Authenticate and get tokens. Step B - Exchange tokens and get AWS credentials. Step C - Access AWS services using credentials.

**QUESTION 4**

You've been hired by a startup company to configure Identity and Access Management in their AWS account, but this team is expecting rapid growth. Promotions from within are common, which means employees will be frequently switching teams. How can you configure IAM ahead of time to prepare for this massive amount of change?

- a) To set this up, you'll need to create user accounts and a group for each department. Then, attach the right policy to each group and put users into their groups. For new team members, follow the same process. And if anyone changes departments, update their IAM group too.
- b) To organize your users, first create an account for each person. Then, make a group for every department. Assign a role to each group that goes with its permissions. Put the user accounts that belong to that department into the right group. When you create a new account for team members, remember to put them in the right group. Similarly, if an existing team member changes departments and move their account into the IAM group that goes with their new department.
- c) To set this up, you will need to create user accounts and a department group for each one. Then, attach the right policy to every group and finally put the user account into their designated department group. When onboarding new team members, create an account for them and add them to the appropriate group. If an existing team member changes departments, delete their old account and start a new one in the correct group.
- d) To set up users: 1) create accounts, 2) make a role for each department, 3) attach the right policy to each role, 4) put user accounts in their department's role. When onboarding a new team member, create their account and assign them the appropriate role. If an existing team member changes departments, update their IAM group accordingly.

### QUESTION 5

Even though a DevOps team has set up Auto Scaling groups in only one Region, at peak capacity, those groups together would include 80 EC2 instances. But you notice that the Auto Scaling groups don't use all of those instances simultaneously. Where could the problem be?

- a) You can have only 40 instances per region. You can request to increase this limit.
- b) The associated load balancer can serve only 10 instances simultaneously.
- c) You can have only 30 instances per Availability Zone.
- d) You are limited to a certain number of vCPU-based On-Demand Instances per region.

### QUESTION 6

You manage Walmart.com, so any amount of downtime could cost us dearly in revenue. That's why you set up our application to run on an Auto Scaling Group using EC2 instances backed by a Network Load Balancer. We have multiple Availability Zones for high availability, and the load balancer does health checks against an HTML file generated by a script. If, during a load test of your application, you observe in CloudWatch that the load balancer is not sending traffic to one of your EC2 instances. Why might this be happening?

- a) You have not registered this instance with CloudWatch.
- b) When load testing at a moderate traffic level, you won't need all available instances.
- c) The EC2 instance has failed the load balancer health check.
- d) The EBS volume from the EC2 instance has failed.

### QUESTION 7

If a company's Disaster Recovery drill doesn't meet the required standards, that means RTO wasn't achieved according to business needs. Oftentimes, this failure is due to how long it Restoration of proper function takes on the database side. To help avoid this issue in future disaster recovery drills, I suggest implementing synchronous data replication for RDS databases specifically. Which of these following options can perform such synchronization?

- a) AWS Replication Service
- b) AWS AppFlow
- c) AWS STS
- d) AWS RDS Multi-AZ

### QUESTION 8

The DevOps Engineer is responsible for assisting the Developers team. The application uses multiple third-party SaaS vendors to finish its workflows within the application. Currently, the team has several AWS Lambda functions for each SaaS vendor that runs daily to connect to the required vendor. The functions start a transfer of data files, varying from one megabyte up to 10 gibibytes in size. The data files we need for this project are stored in an Amazon S3 bucket. The current method to move the files from that location often out and introduces errors in the system. We would like to find a way to streamline this process. What would AWS service be the most appropriate for their solution?

- a) Amazon ECS with Fargate
- b) Amazon AppFlow
- c) Use AWS File Gateway to transfer data
- d) Adjust Auto Scaling Policies

### QUESTION 9

A fledgling company has decided to use AWS for their entire IT operation. However, they only have one AWS Solutions Architect and are finding it difficult to keep up with the demand. Therefore, the software team has been given permission to deploy Python and PHP applications on their own. By doing this, they hope to be able to take some of the load off of the infrastructure team. Which AWS service would be the best for deployments?

- a) CodeGuru
- b) Elastic Beanstalk
- c) AWS System Manager
- d) AWS MSK

### QUESTION 10

Recently, you've been experiencing issues with your dynamic application that is running on EC2 instances. These instances aren't able to keep up with the amount of traffic being sent to them, and customers are getting timeouts. Upon further investigation, there is no discernible traffic pattern for these surges. The application can be easily containerized. What can you do to fix the problem while keeping cost in mind?

- a) To avoid overloading your EC2 instances, create a second Auto Scaling group and post overflow traffic to an SQS queue.
- b) Increase the minimum and maximum counts on your EC2 Auto Scaling group to improve performance.
- c) Move the web application to S3. Make static website hosting available.
- d) Move the application onto ECS and use Fargate to manage the necessary tasks.



# Bits Lovers' AWS Learning Kit

January 4, 2023

## Answers



### **A big big thank you!**

Thank you for downloading our AWS Learning Kit and for exploring the Mind Map and Quiz. We are sure you will find it a great way to boost your skills and understanding of AWS. With our kit, you can quickly develop your AWS knowledge, no matter your level of experience. So what are you waiting for? Get started now and start learning with the AWS Learning Kit! We are sure you will love it!

Happy learning! :)

## QUESTION 1

### Design High-Performing Architectures

Correct:

b) Install the Java application on Amazon EC2 instances.

You can install and run the Java application on Amazon EC2 instances to avoid major coding changes. This most closely resembles the on-premises virtual machines.

Reference: [AWS EC2](#)

Correct:

e) Set up Amazon MQ to easily integrate Apache ActiveMQ into AWS.

Leverage Amazon MQ to more easily migrate applications to AWS that currently rely on custom messages broker services like RabbitMQ and ActiveMQ.

Reference: [Amazon MQ](#)

## QUESTION 2

### Design Resilient Architectures

Correct:

d) RDS Multi-AZ

Amazon RDS Multi-AZ deployments are the ideal solution for production database workloads; they provide improved availability and endurance to your DB instances. When you set up a Multi-AZ DB instance, Amazon RDS quickly creates a primary DB Instance and synchronously replicates data to the standby instance in an alternate Availability Zone (AZ). With this setup, you can rest assured that your data is safe and secure! Amazon RDS' Availability Zone (AZ) is physically distinct and independent, built to provide exceptional reliability. In the event of an infrastructure failure, Amazon RDS will automatically switch over to standby or read replica without your application having any manual intervention due to its constant endpoint. Therefore making it easier for you to resume database operations immediately after failover completion.

### QUESTION 3

#### Design Resilient Architectures

d) Step A - Authenticate and get tokens. Step B - Exchange tokens and get AWS credentials. Step C - Access AWS services using credentials.

Here is how authentication works in a nutshell.

### QUESTION 4

#### Design Secure Architectures

a) To set this up, you'll need to create user accounts and a group for each department. Then, attach the right policy to each group and put users into their groups. For new team members, follow the same process. And if anyone changes departments, update their IAM group too.

[https://docs.aws.amazon.com/IAM/latest/UserGuide/id\\_groups.html](https://docs.aws.amazon.com/IAM/latest/UserGuide/id_groups.html) An IAM group is a collection of IAM users. Groups let you specify permissions for multiple users, making it easier to manage the permissions for those users. For example, you could have a group called Admins and give that group the types of permissions that administrators typically need. Any user in that group automatically has the permissions that are assigned to the group. If a new user joins your organization and needs administrator privileges, you can assign the appropriate permissions by adding the user to that group. Similarly, if a person changes jobs in your organization, instead of editing that user's permissions, you can remove him or her from the old groups and add him or her to the appropriate new groups.

## QUESTION 5

### Design High-Performing Architectures

Correct:

d) You are limited to a certain number of vCPU-based On-Demand Instances per region.

Your AWS account has default quotas, formerly referred to as limits, for each AWS service. Unless otherwise noted, each quota is Region specific. You can request increases for some quotas, and other quotas cannot be increased. Remember that each EC2 instance can vary in the number of vCPUs, depending on its type and your configuration. Hence, it's always wise to [calculate your vCPU needs](#) to make sure you are going to avoid hitting quotas easily. Service Quotas is an AWS service that helps you manage your quotas for over 100 AWS services from one location. Along with looking up the quota values, you can also request a quota increase from the Service Quotas console. Reference: [AWS Service Quotas](#) Reference: [Amazon EC2 Endpoints and Quotas](#)

## QUESTION 6

### Design Resilient Architectures

Correct:

c) The EC2 instance has failed the load balancer health check.

The load balancer will route the incoming requests only to the healthy instances. The EC2 instance may have passed status checks and be considered healthy to the Auto Scaling group, but the ELB may not use it if the ELB health check has not been met. The ELB health check has a default of 30 seconds between checks and a default of 3 checks before making a decision. Therefore, the instance could be visually available but unused for at least 90 seconds before the GUI would show it as failed. In CloudWatch, where the issue was noticed, it would appear to be a healthy EC2 instance but with no traffic, which is what was observed.

<https://docs.aws.amazon.com/elasticloadbalancing/latest/classic/elb-healthchecks.html>

<https://docs.aws.amazon.com/autoscaling/ec2/userguide/as-add-elb-healthcheck.html>

## QUESTION 7

### Design Resilient Architectures

#### d) AWS RDS Multi-AZ

Amazon RDS Multi-AZ deployments provide enhanced availability and durability for RDS database (DB) instances, making them a natural fit for production database workloads. When you provision a Multi-AZ DB instance, Amazon RDS automatically creates a primary DB instance and synchronously replicates the data to a standby instance in a different Availability Zone (AZ). Each AZ runs on its own physically distinct, independent infrastructure and is engineered to be highly reliable. In case of an infrastructure failure, Amazon RDS performs an automatic failover to the standby (or to a read replica in the case of Amazon Aurora) so that you can resume database operations as soon as the failover is complete. Since the endpoint for your DB instance remains the same after a failover, your application can resume database operation without the need for manual administrative intervention.

<https://aws.amazon.com/rds/features/multi-az/>

## QUESTION 8

### Design Resilient Architectures

#### b) Amazon AppFlow

AppFlow offers a fully managed service for easily automating the exchange of data between SaaS vendors and AWS services like Amazon S3. You can transfer up to 100 gibibytes per flow, which avoids Lambda function timeouts. Reference: [What is Amazon AppFlow? Tutorial: Transfer data between applications with Amazon AppFlow](#)

## QUESTION 9

Design High-Performing Architectures

Correct:

b) Elastic Beanstalk

With Elastic Beanstalk, you can quickly deploy and manage applications in the AWS Cloud without having to learn about the infrastructure that runs those applications. Elastic Beanstalk reduces management complexity without restricting choice or control. You simply upload your application, and Elastic Beanstalk automatically handles the details of capacity provisioning, load balancing, scaling, and application health monitoring. Elastic Beanstalk supports applications developed in Go, Java, .NET, Node.js, PHP, Python, and Ruby. When you deploy your application, Elastic Beanstalk builds the selected supported platform version and provisions one or more AWS resources, such as Amazon EC2 instances, to run your application.

<https://docs.aws.amazon.com/elasticbeanstalk/latest/dg/Welcome.html>

## QUESTION 10

Design High-Performing Architectures

d) Move the application onto ECS and use Fargate to manage the necessary tasks.

This would be a perfect use case for Fargate, as the workload is unpredictable. It will automatically scale in and out based on the workload being thrown at it.

<https://aws.amazon.com/fargate/>

# **AWS**

## **Learning Kit**

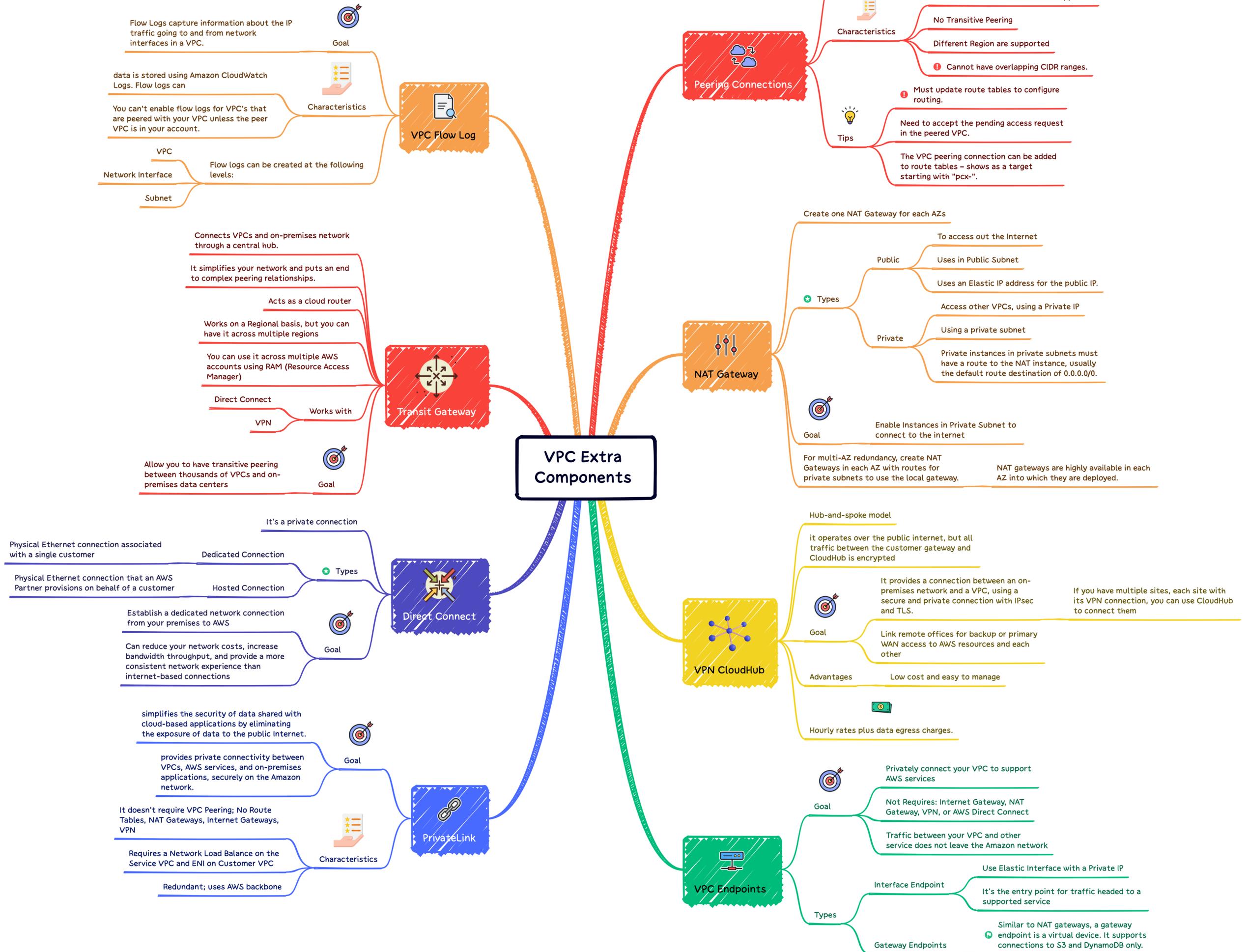
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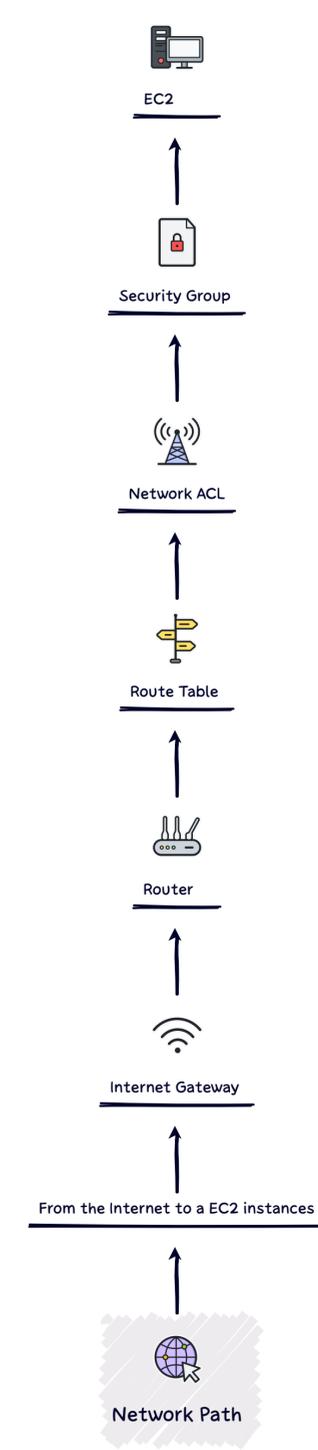
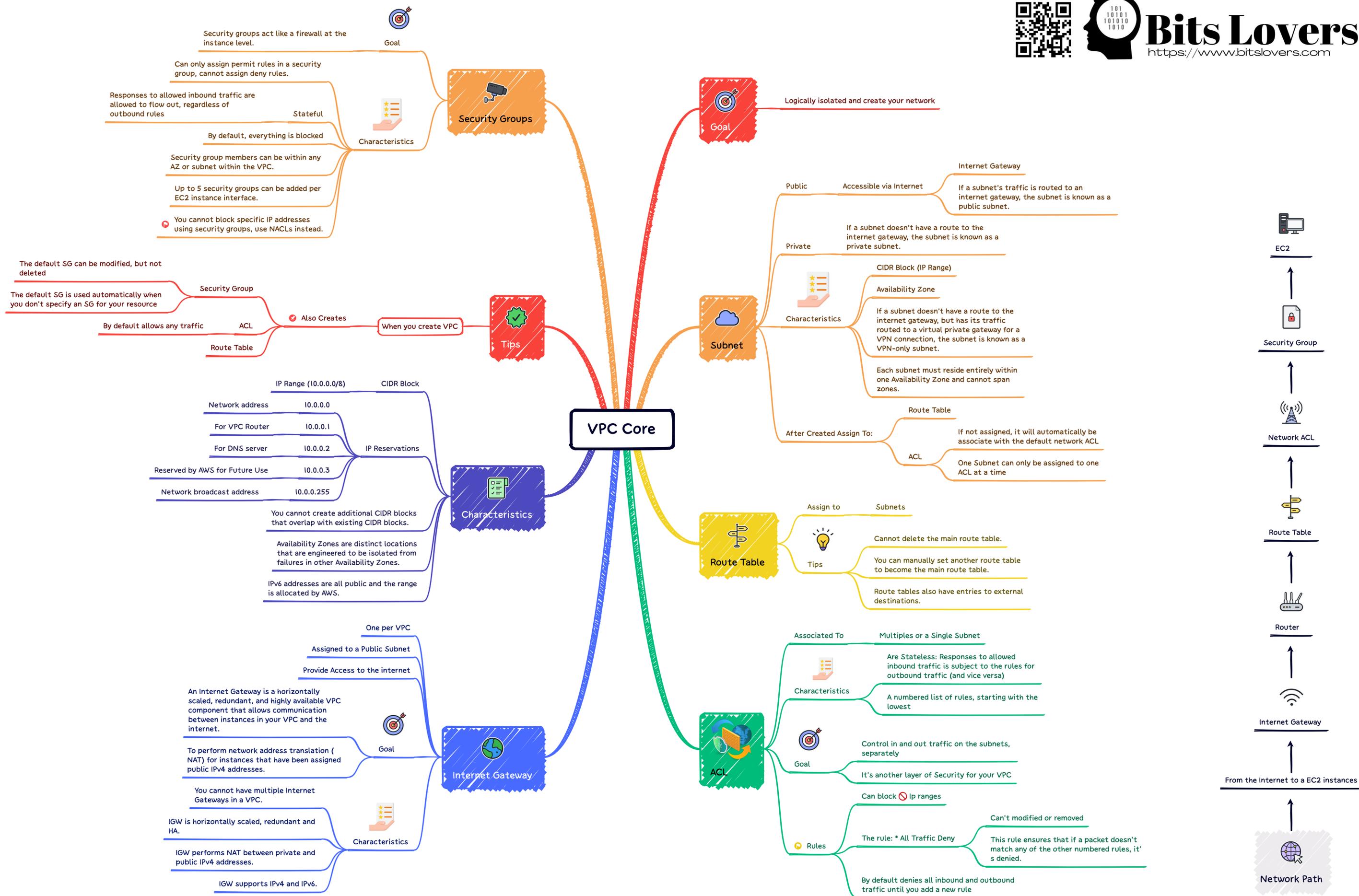


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