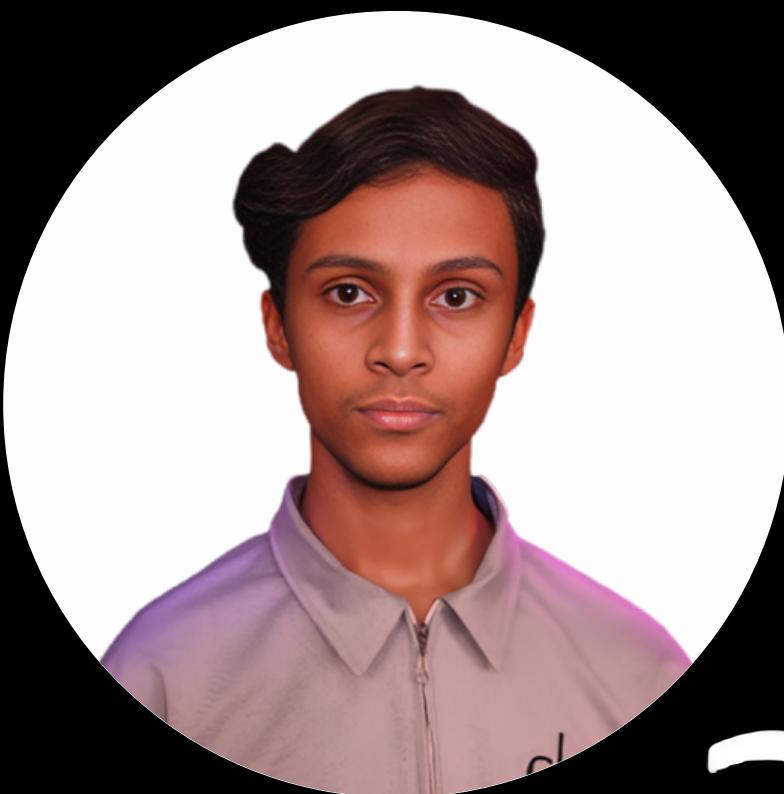


# A Comprehensive Guide on Route 53



ft. Julia F Morgado



aws  
amazon



# DNS Introduction

---

DNS, short for **Domain Name System**, acts as the internet's translation service. It **converts** human-readable **domain names** (like `google.com`) into numerical **IP addresses** that computers use to locate and connect to websites.

This **eliminates** the need to memorize **complex IP addresses** and allows for a more **user-friendly** browsing experience.

`www.google.com` => 172.217.18.36

DNS uses hierarchical naming structure:

.com  
example.com  
api.example.com  
www.example.com



Rajan Kafle

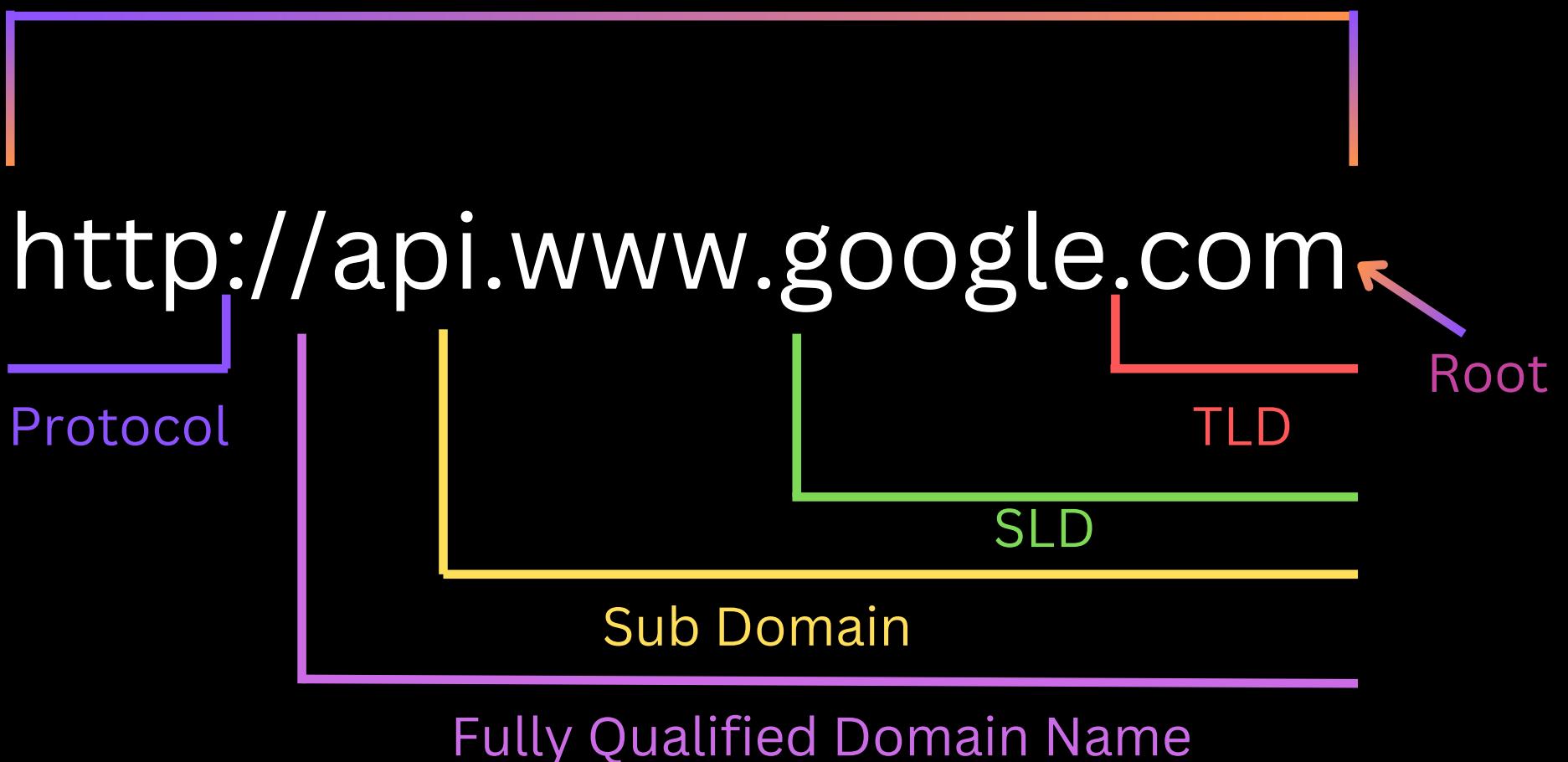
Julia F Morgado



# DNS Terminologies

- Domain Registrar: GoDaddy, Amazon Route 53, etc..
- DNS Records: A, AAAA, CNAME, NS, etc..
- Zone File: Contains DNS records
- Name Server: Resolves DNS queries (Authoritative or Non-Authoritative)
- Top Level Domain (TLD): .com, .io, .in, .gov, .org, etc..
- Second Level Domain (SLD): amazon.com, google.com, etc..

URL



Rajan Kafle

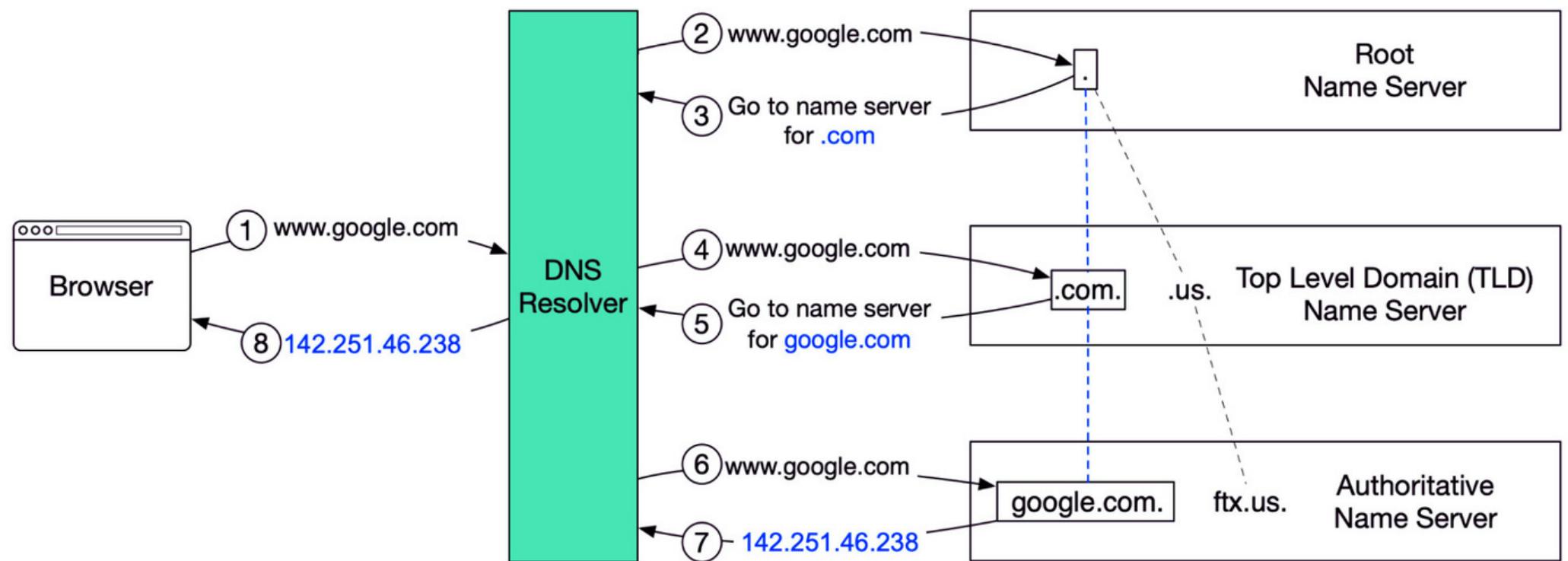


Julia F Morgado



# DNS Work Diagram

| How does DNS resolve IP



Credit: ByteByteGo



Rajan Kafle



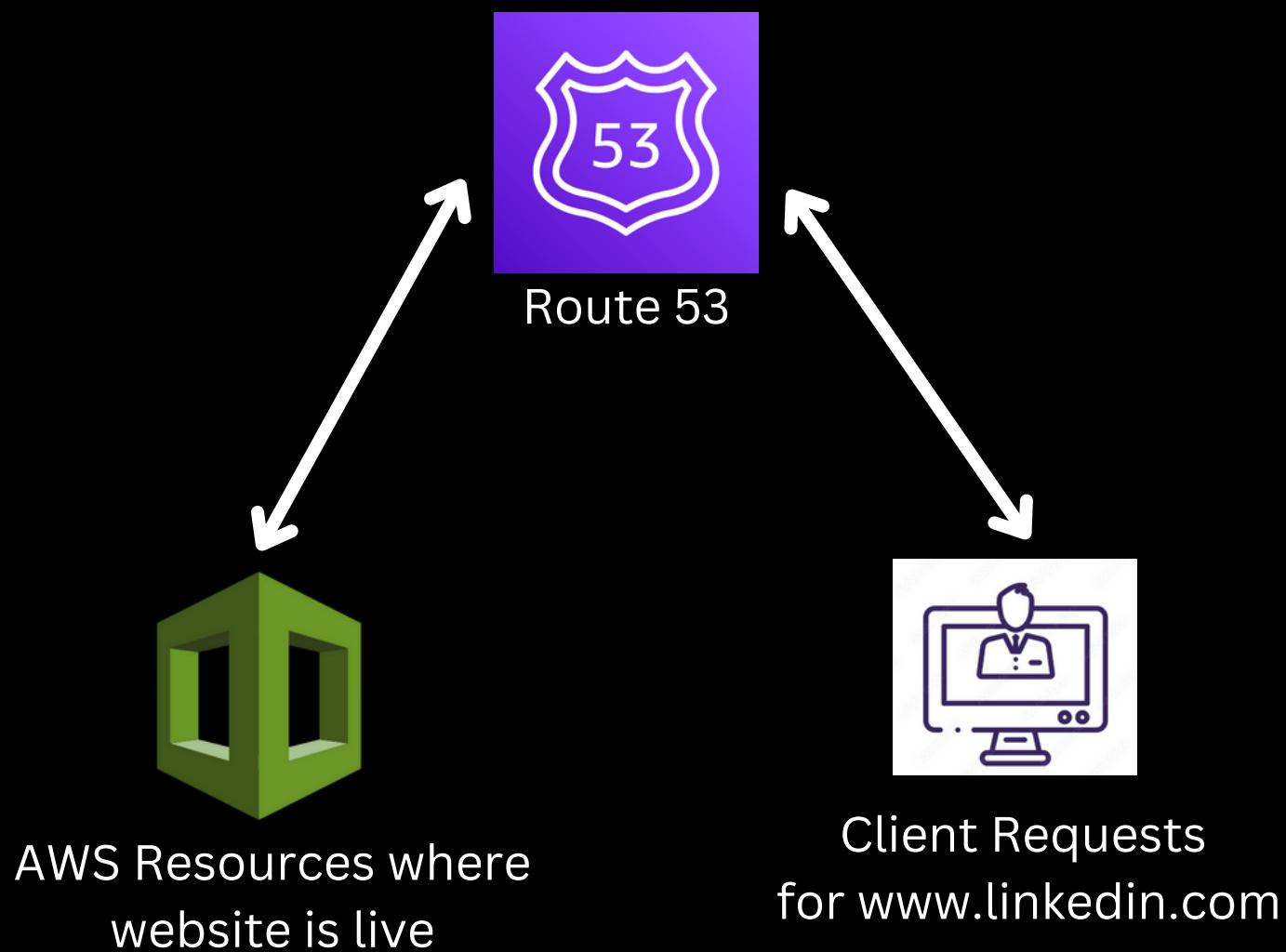
Julia F Morgado





# Amazon Route 53

Amazon Route 53 is a highly available and scalable cloud Domain Name System (DNS) web service. Route 53 is also a Domain Registrar. Using it you get the ability to check the health of your resources. It's the only AWS service that provides 100% availability SLA. You cannot use Amazon Route 53 to connect your on-premises network with AWS Cloud.



Rajan Kafle



Julia F Morgado



# Route 53: Hosted Zones

A hosted zone is a **container for records** that holds information about how you want to route traffic for a specific domain and its subdomains. It is the central configuration for managing the DNS records for your domain. Think of it as a directory that stores the DNS records (more on these later) for your domain.

**Public Hosted Zones:** It contains records that specify how to route traffic on the internet. They are publicly accessible and resolve domain names to publicly routable IP addresses on the internet. They are typically used for hosting websites, web applications, or other services that need to be accessible to users worldwide.  
Eg, app.mypublicdomain.com

**Private Hosted Zones:** It contains records that specify how you route traffic within one or more VPCs or other private networks. Unlike public hosted zones, private hosted zones are designed for internal use within an organization. With private hosted zones, you define custom domain names for your internal resources, such as applications, services, or databases, and map them to private IP addresses.

Eg, app.company.internal



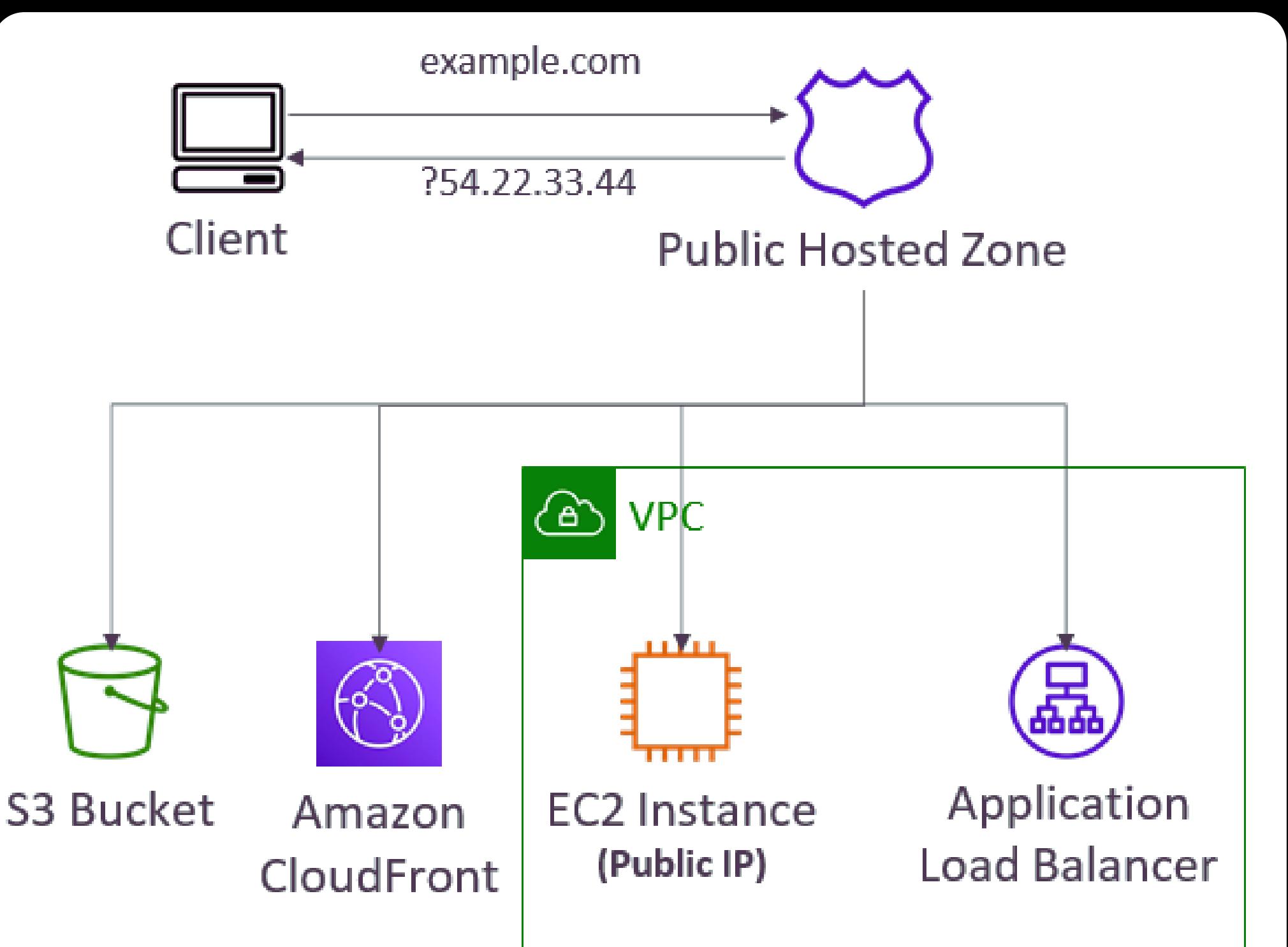
Rajan Kafle



Julia F Morgado



# Public Hosted Zone Diagram



Rajan Kafle

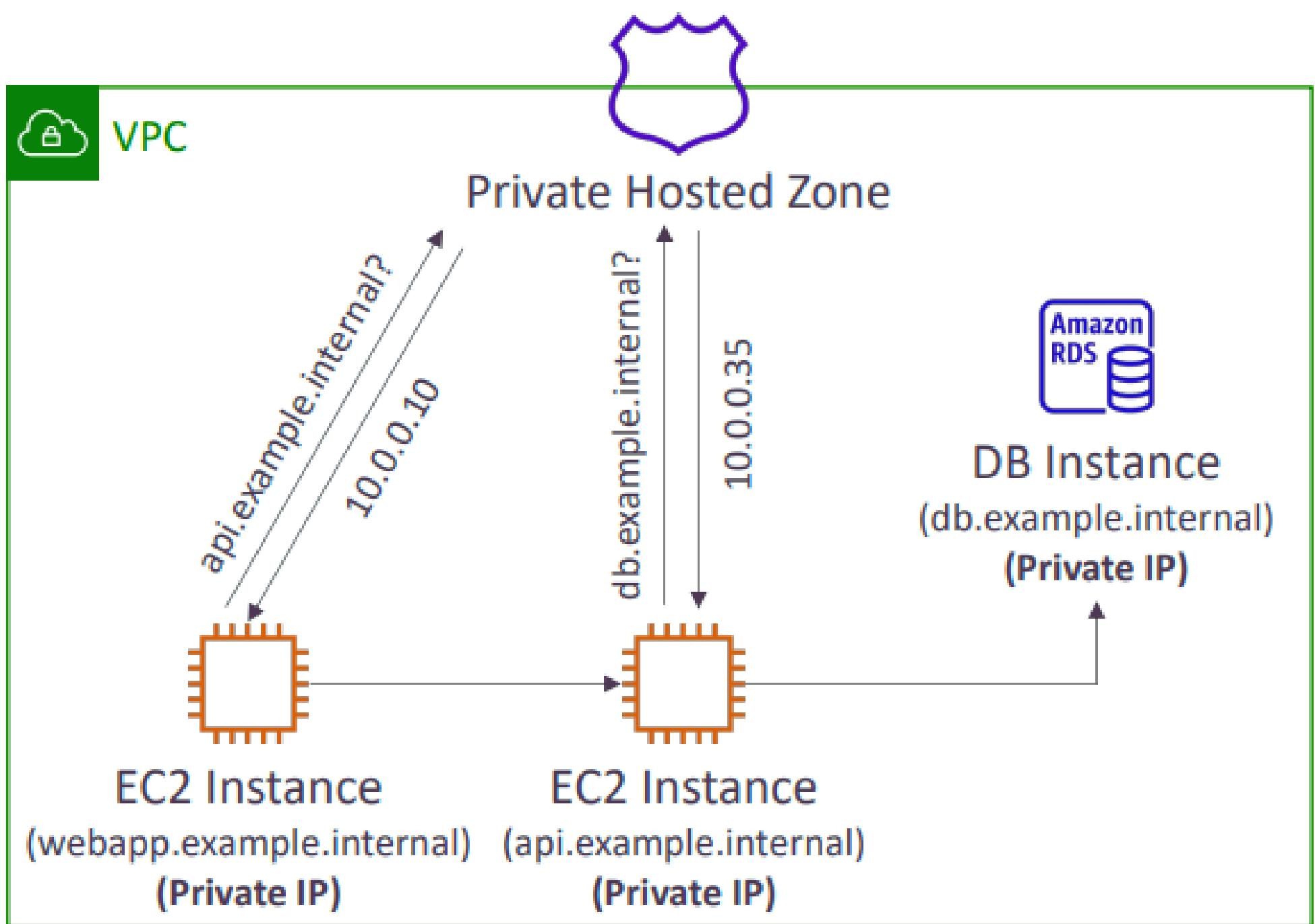


Julia F Morgado





# Private Hosted Zone Diagram



Rajan Kafle



Julia F Morgado



# Route 53: Records

Records are created to **route internet traffic** to the resources.

They are the objects present in the hosted zone which determines how the internet traffic has to be routed for a domain name so that it finally reaches the resources. The name of each record in a hosted zone must end with the name of the hosted zone.

Each record contains:

- **Domain/subdomain Name:** This specifies the location within your domain.
- **Record Type:** This defines how the domain name translates to an online resource. Common types include: A, AAAA
- **Value:** This holds the data associated with the record type. For instance, the IP address for the “A“ record, or the server name for a “CNAME“ record.
- **Routing Policy:** This determines how Amazon Route 53 (or another DNS service) handles requests for this record.
- **TTL:** This value defines how long other servers can cache this record before checking for updates.



Rajan Kafle



Julia F Morgado





# Route 53: Record Types

**A (Address Record):** It maps a domain name (e.g., [www.example.com](http://www.example.com)) to a public IPv4 address (e.g., 192.0.2.1) where your website or service resides.

**AAAA (Quad-A Record):** Similar to A records, but for the next generation of IP addresses - IPv6.

**CNAME (Canonical Name Record):** It maps a hostname to another hostname. The target is a domain name that must have an A or AAAA record. Can't create a CNAME record for the top node of a DNS namespace.

**NS (Name Server Record):** When you create a hosted zone in Route 53, it automatically generates these records. They point to the authoritative name servers that hold the DNS records for your domain

**Alias Record (Route 53 Specific):** A convenient way to connect your domain to AWS resources like Elastic Load Balancers. It automatically retrieves the latest IP addresses associated with the resource.



Rajan Kafle



Julia F Morgado





# Record Types CNAME vs Alias

CNAME Records	Alias Records
You can't create a CNAME record at the zone apex.	You can create an alias record at the zone apex. Alias records must have the same type as the record you're routing traffic to.
Route 53 charges for CNAME queries.	Route 53 doesn't charge for alias queries to AWS resources.
A CNAME record redirects queries for a domain name regardless of record type.	Route 53 responds to a DNS query only when the name and type of the alias record matches the name and type in the query.
A CNAME record can point to any DNS record that is hosted anywhere.	An alias record can only point to selected AWS resources or to another record in the hosted zone that you're creating the alias record in.
A CNAME record appears as a CNAME record in response to dig or Name Server (NS) lookup queries.	An alias record appears as the record type that you specified when you created the record, such as A or AAAA.



Rajan Kafle



Julia F Morgado





# Route 53: Alias Records Targets

- Elastic Load Balancers
- CloudFront Distributions
- API Gateway
- Elastic Beanstalk environments
- S3 Websites
- VPC Interface Endpoints
- Global Accelerator accelerator
- Route 53 record in the same hosted zone
- You cannot set an ALIAS record for an EC2 DNS name



Rajan Kafle



Julia F Morgado





# Route 53: Records TTL

A record TTL refers to the **length of time** that a DNS record is cached by DNS resolvers or clients before requesting a fresh copy from the authoritative DNS server. The TTL value is specified in **seconds** and determines how long a DNS resolver should consider the record valid before checking for updates.

**High TTL** – e.g., 24 hr

- Less traffic on Route 53
- Possibly outdated records

**Low TTL** – e.g., 60 sec.

- More traffic on Route 53 (\$\$)
- Records are outdated for less time
- Easy to change records

Except for Alias records, TTL is mandatory for each DNS record.



Rajan Kafle



Julia F Morgado





# Route 53: Routing Policies

When you create a record, you choose a **routing policy**, which **determines how** Amazon Route 53 **responds to queries**. Route 53 offers several routing policies that determine how traffic is routed to resources based on factors such as geographic location, latency, health and even routing preference.

Route 53 Supports the following Routing Policies:

- Simple
- Weighted
- Failover
- Latency based
- Geolocation
- Multi-Value Answer
- Geoproximity (using Route 53 Traffic Flow feature)



Rajan Kafle



Julia F Morgado





# Routing Policies: Simple

Simple Routing policy is the most basic routing policy which allows you to route traffic to a single resource. You can still specify multiple values in the same record but a random one will be chosen by the client. It can't be associated with Health Checks.

Diagram:



Rajan Kafle



Julia F Morgado

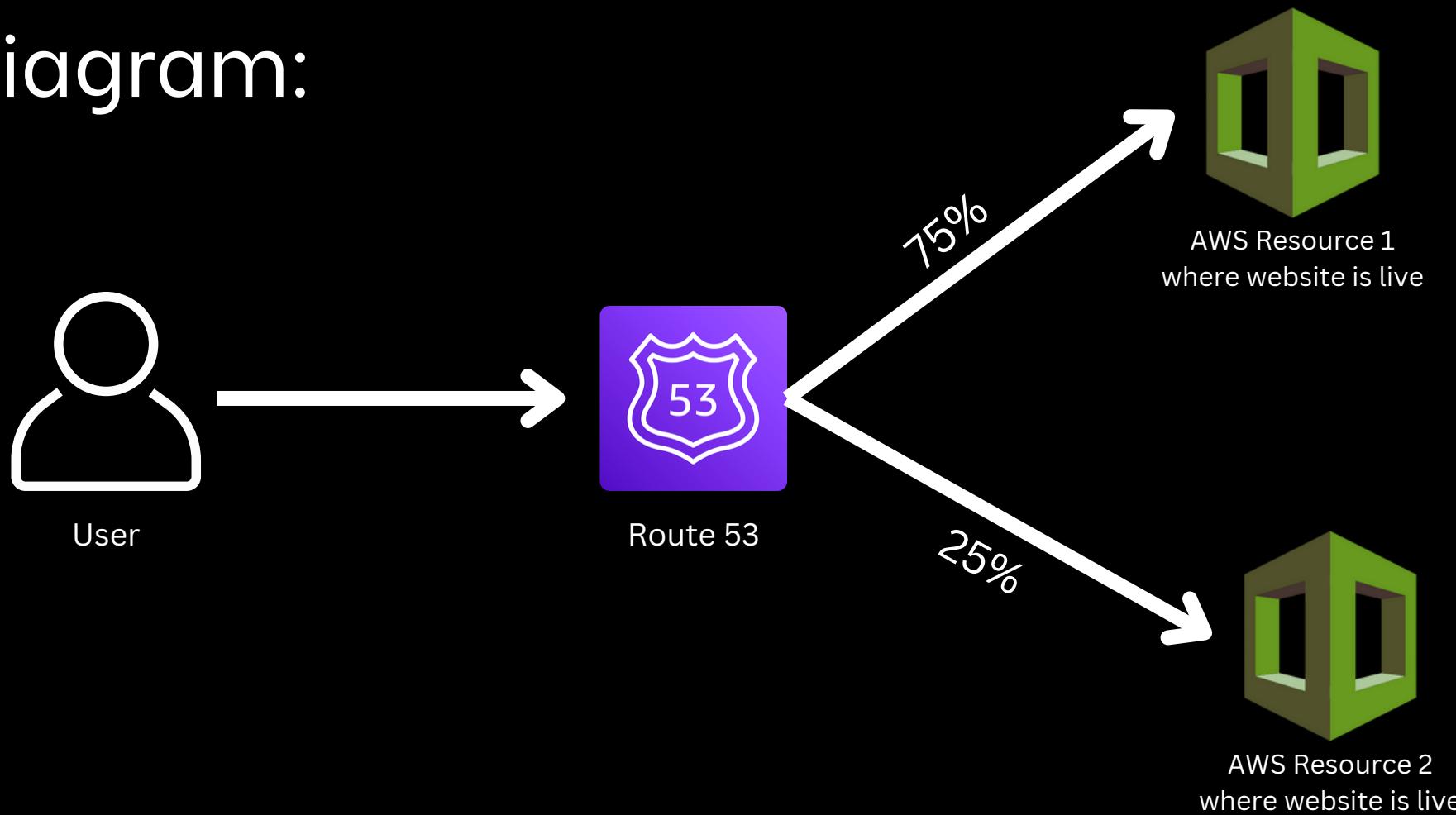




# Routing Policies: Weighted

Use the weighted routed policy when we have **multiple resources** that perform the **same function** (for example web server that serves the same websites) and we want to route traffic to those resources in the **proportion** that specifies (for example one quarter to one server and three quarters to another server).

Diagram:



Rajan Kafle

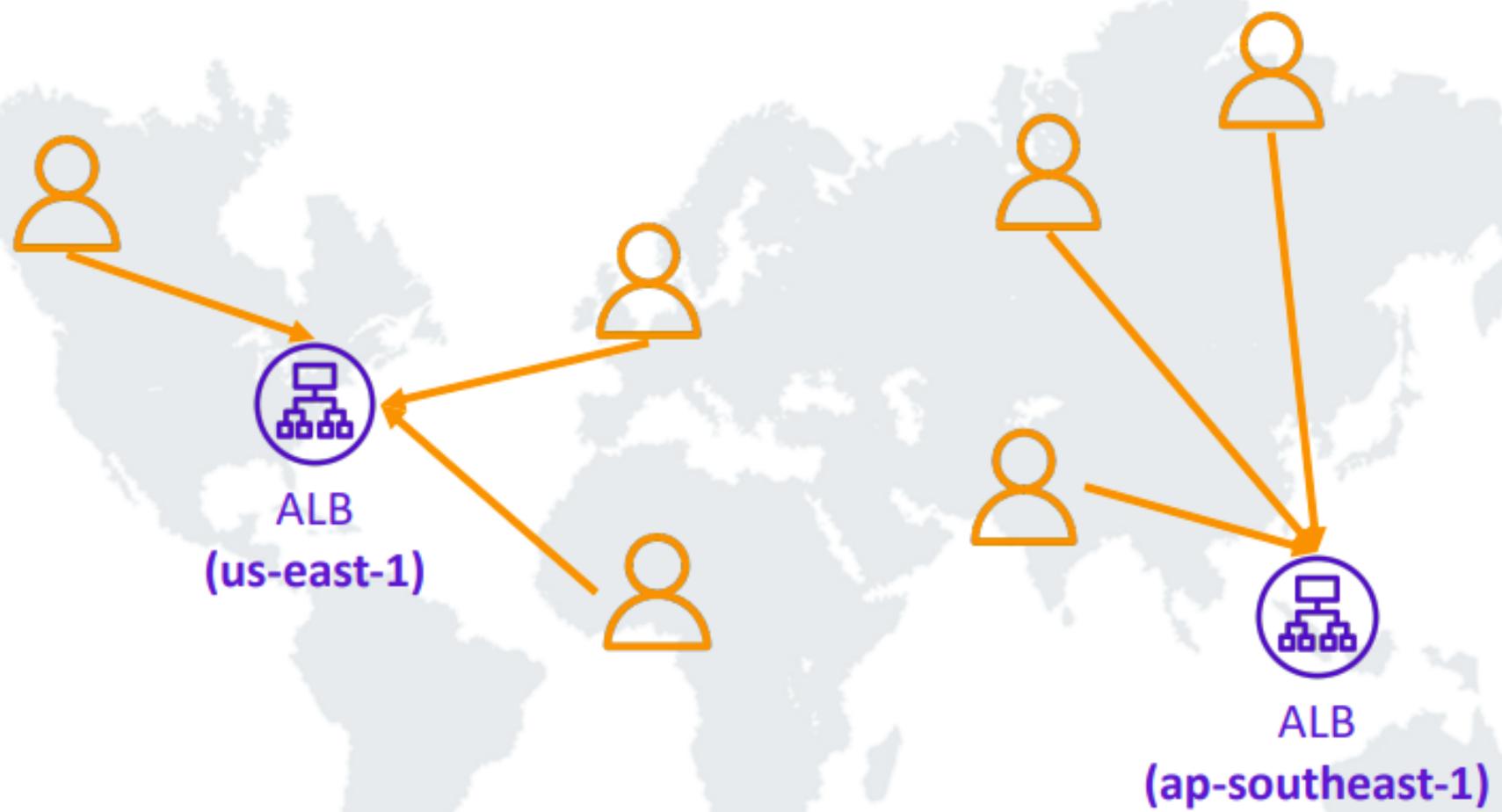


Julia F Morgado



# Routing Policies: Latency Based

This Routing policy is designed to **direct traffic** to resources in the AWS region that provides the **lowest latency** to the end user. To **improve performance** for the users, this policy helps in serving requests from the AWS region that provides the lowest latency.



Rajan Kafle



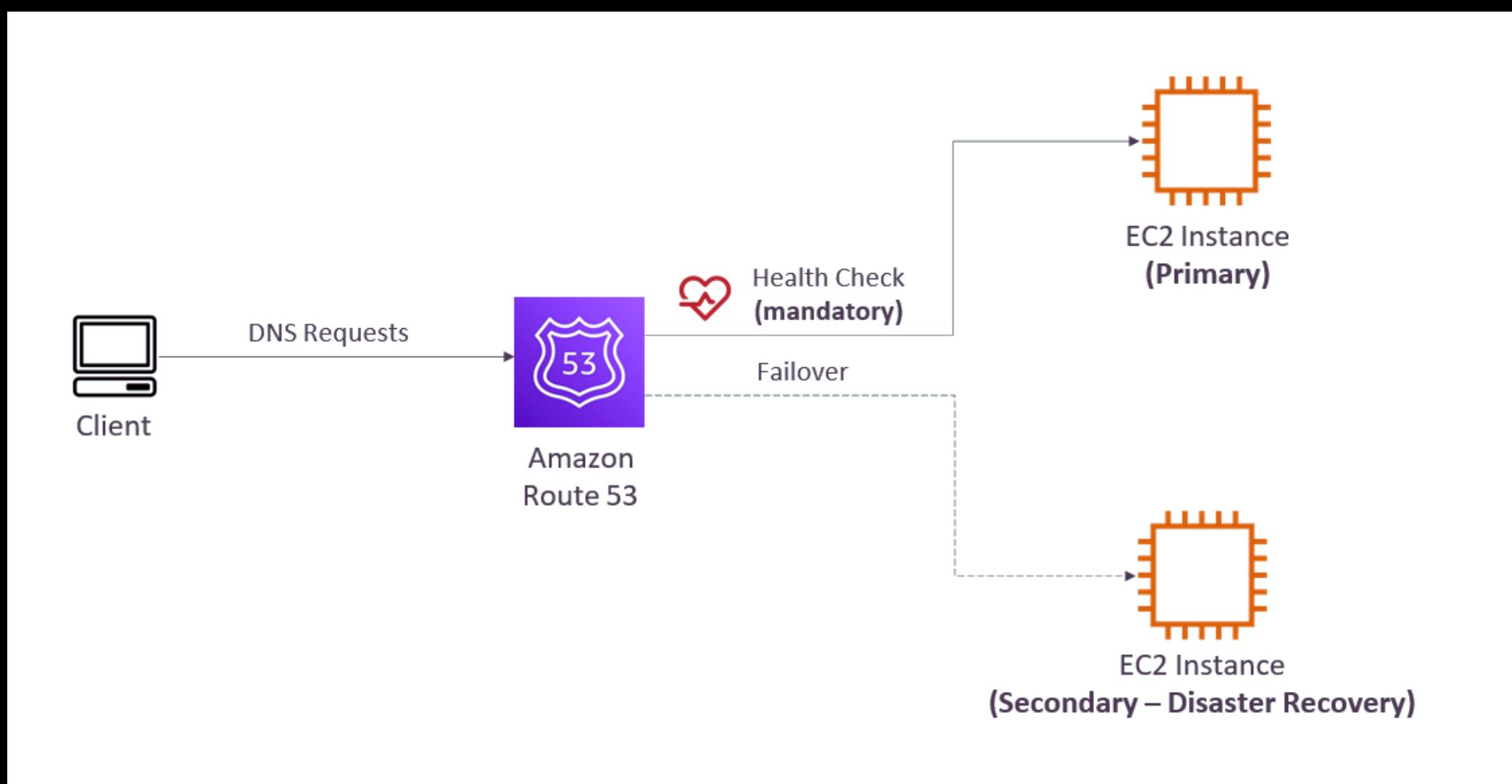
Julia F Morgado





# Routing Policies: Failover

Whenever a resource goes unhealthy, this policy allows to route the traffic from unhealthy resource to healthy resource.



Rajan Kafle



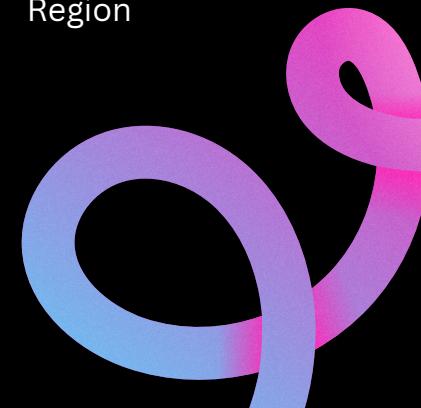
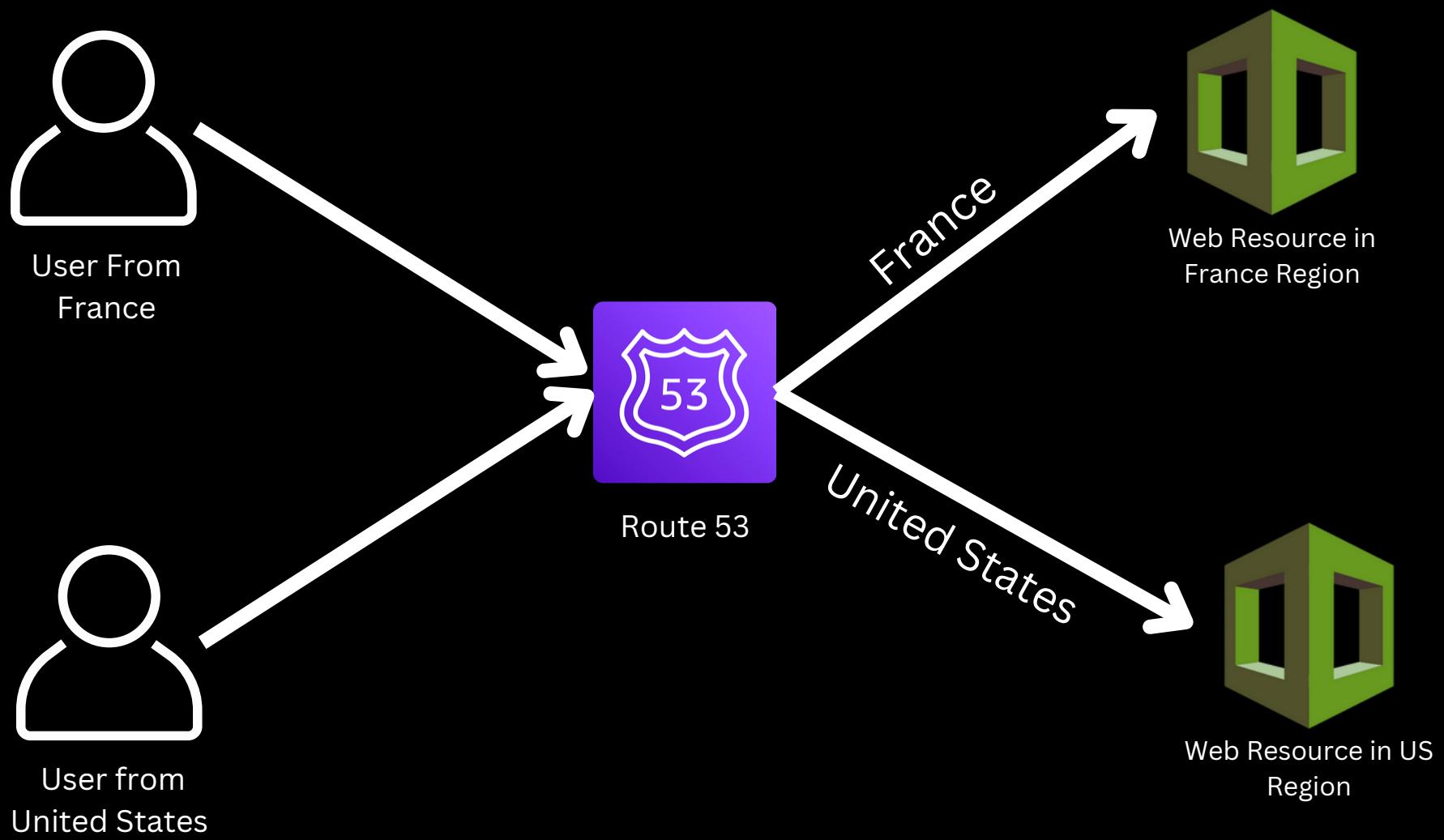
Julia F Morgado





# Routing Policies: Geolocation

This routing policy **routes** the **traffic** to resources based on the **geographic location** of the user. Geographic locations can be specified by continent, country, or state. For example; A person residing in France will be redirected to the website in the French language while a person from the US will be redirected to the website in the English language.





# Routing Policies: Geoproximity

It routes traffic based on the **geographical location** of the user and the type of **content user wants** to access. The user can optionally shift traffic from resources at one location to resource at another location. Using this policy, a user can shift more traffic to one location compared to another location by specifying a value known as bias.

To change the size of the geographic region, specify bias values:

- To expand (1 to 99) - more traffic to the resource
- To shrink (-1 to -99) - less traffic to the resource

Resources can be:

- AWS resources (specify AWS region)
- Non-AWS resources (specify Latitude and Longitude)

Must use Route 53 **Traffic Flow** to be able to use this feature.



Rajan Kafle

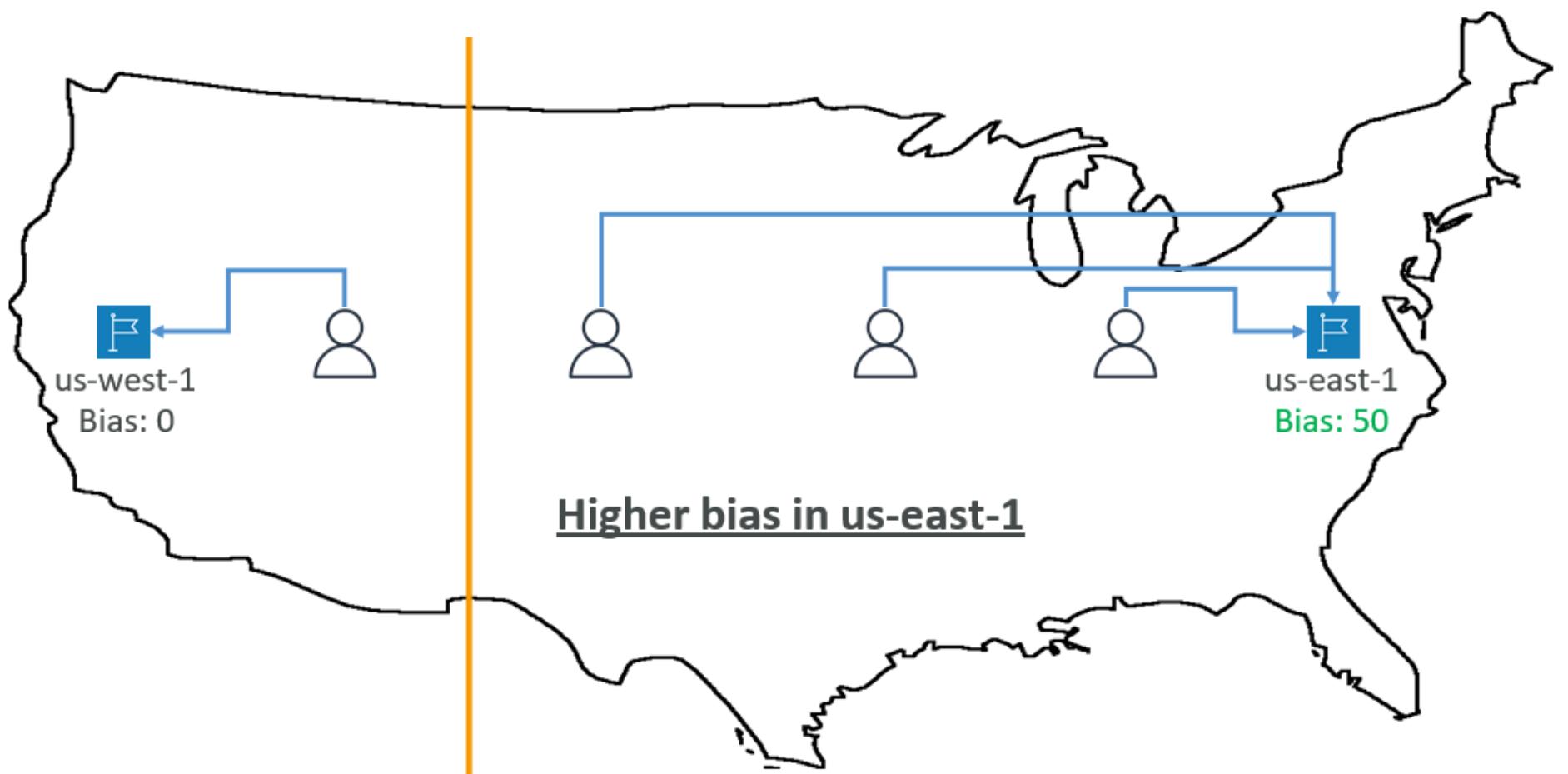


Julia F Morgado





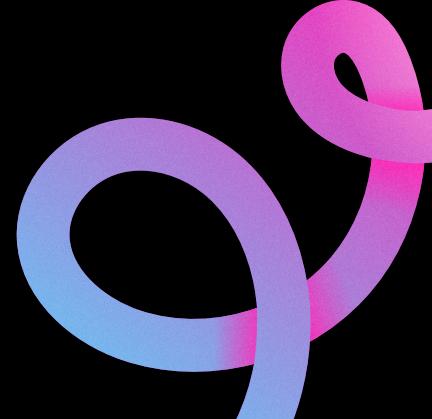
# Routing Policies: Geoproximity Diagram



Rajan Kafle



Julia F Morgado





# Route 53 Traffic Flow

Route 53 Traffic Flow is a feature within Amazon Route 53 that empowers you to **manage** how user **traffic** gets directed to your applications **across various regions** or within a **single region**.

- Simplify the process of creating and maintaining records in large and complex configurations.
- Visual editor to manage complex routing decision trees
- Configurations can be saved as Traffic Flow Policy
- Can be applied to different Route 53 Hosted Zones (different domain names)
- Supports **versioning**



Rajan Kafle



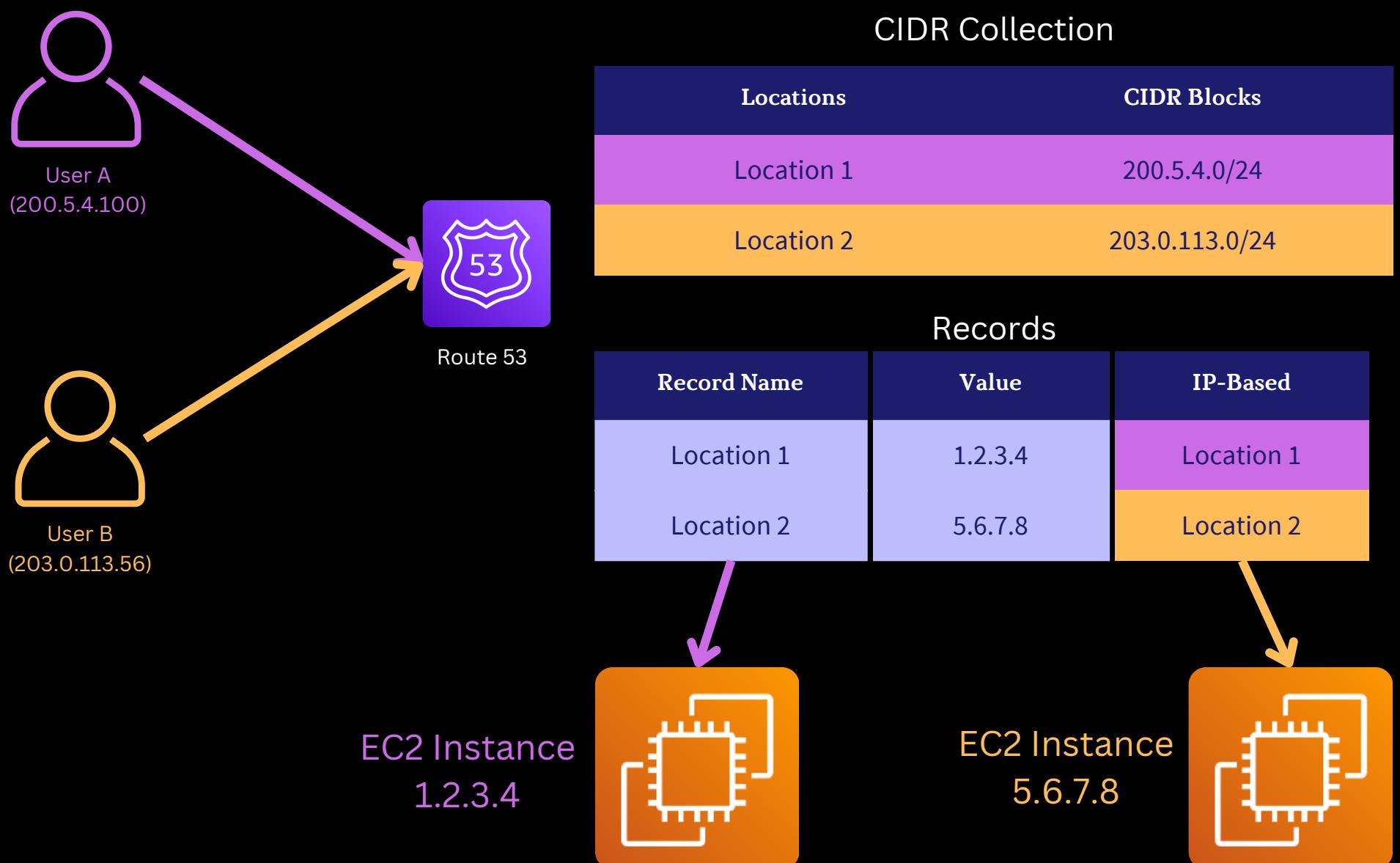
Julia F Morgado





# Routing Policies: IP-based Routing

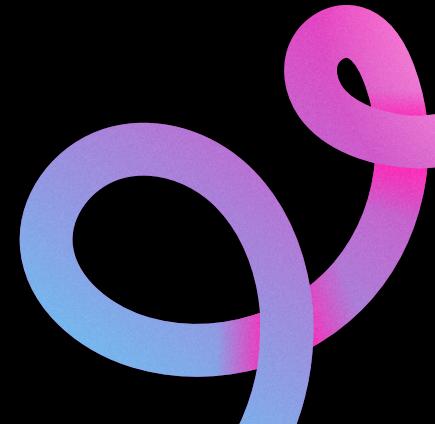
With IP-based routing in Route 53, you can fine-tune your DNS routing by using your understanding of your network, applications, and clients to make the best DNS routing decisions for your end users.



Rajan Kafle



Julia F Morgado





# Routing Policies: Multi-Value

It is used when users want Route53 to return **multiple values** in response to DNS queries. It first checks the health of resources and then returns the multiple values only for the healthy resources. Up to 8 healthy records are returned for each Multi-Value query. And Multi-Value is not a substitute for having an ELB.

Name	Type	Value	TTL	Set ID	Health Check
www.example.com	A Record	192.0.2.2	60	Web1	A
www.example.com	A Record	198.51.100.2	60	Web2	B
www.example.com	A Record	203.0.113.2	60	Web3	C



Rajan Kafle



Julia F Morgado





# Route 53 Health Checks

Create a health check and specify values that define how you want the health check to work, such as:

- The **IP address or domain name** of the endpoint that you want Route 53 to monitor.
- The **protocol** that you want Route 53 to use to perform the check: HTTP, HTTPS, or TCP.
- The **request interval** you want Route 53 to send a request to the endpoint.
- How many consecutive times the endpoint must fail to respond to requests before Route 53 considers it unhealthy. This is the **failure threshold**.

You can configure a health check to check the health of one or more other health checks.

You can **configure** a health check to check the status of a **CloudWatch alarm** so that you can be **notified** on the basis of a broad range of criteria.



Rajan Kafle



Julia F Morgado





# Health Checks: Monitoring an Endpoint

- About **15** global health checkers will check the endpoint health
- Health Checks pass only when the endpoint responds with the **2xx** and **3xx** status codes
- Health Checks can be setup to pass / fail based on the text in the first 5120 bytes of the response
- Configure your router / firewall to allow incoming requests from Route 53 Health Checkers



Rajan Kafle



Julia F Morgado





# Route 53 Monitoring

The Route 53 dashboard provides detailed information about the status of your domain registrations, including:

- Status of new domain registrations.
- Status of domain transfers to Route 53.
- List of domains that are approaching the expiration date.

You can use Amazon CloudWatch metrics to see the number of DNS queries served for each of your Route 53 public hosted zones. With these metrics, you can see at a glance the activity level of each hosted zone to monitor changes in traffic.

You can monitor your resources by creating Route 53 health checks, which use CloudWatch to collect and process raw data into readable, near real-time metrics.



Rajan Kafle



Julia F Morgado





# Route 53 Pricing

**Pay-Per-Use Model:** You only pay for what you use, with no upfront fees or commitments.

**Hosted Zones:** A monthly charge applies for each hosted zone you create. The first 25 hosted zones are \$0.40 per zone / month

**DNS Queries:** You're charged based on the number of queries your domain receives each month. There are tiered pricing structures:

- \$0.40 per million queries for 0 to 1 billion queries / month
- \$0.20 per million queries for over 1 billion queries / month



Rajan Kafle



Julia F Morgado



# FOLLOW US FOR MORE GUIDES!

---

