Domain Name System (DNS)

Route53

What is DNS?

- Worldwide network of servers that maintains domain names to IP Addresses
- DNS is used to convert human friendly domain names such as aws.amazon.com into an internet protocol address such http://54.239.31.69
- Essentially mapping friendly domain names to resources that can process the request.
- IP addresses are used by computers to identify each other on the network. Remember the analogy of a phone book.

What is DNS?

- If you look at common domain names such google.com, bbc.co.uk, etc., you notice a string of characters separated by dots (periods).
- The last word in a domain name represents the “top level domain”.
- The second word in a domain name is known as second level domain name (this is optional and depends on the domain name)
  - .com
  - .edu
  - .gov
  - .co.uk
  - .com.au

How would you read this?

aws.amazon.com

- Typically, you read a domain name from left to right as you would read text on a page.

- Consider the domain name "aws.amazon.com."
  - . =Root
  - .com=Top-level domain
  - .amazon=Second-level domain
  - aws=*Subdomain
- *Technically, all are subdomains of the root and their parents.
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- **Root Domain:** the top-most domain in the hierarchy is called the Root domain. The root is identified by a NULL character that can not be written. Instead, the separator between the top-level domain and root is used to represent the NULL character. The final period and the NULL character are generally omitted in practice. But applications add them before performing DNS resolution.

Common DNS Record Types

- A record: The value for an A record is an IPv4 address in dotted decimal notation
- Example: ipv4.example.com A 192.0.2.1
-
- AAAA record: The value for an AAAA record is IPv6 address in dotted decimal notation
- Example: ipv6.example.com AAAA 2001.0db8.85a3.0.0.8a2e.0370.7334
- NS Record: is required in every hosted zone. It identifies authoritative name server for the zone. The value for an NS record is the domain name of the name server.
- Example:
- example.com NS ns-2048.awsdns-64.com
- example.com NS ns-2049.awsdns-65.net
- example.com NS ns-2050.awsdns-66.org
- example.com NS ns-2051.awsdns-67.co.uk

Common DNS Record Types

SOA record: Required in every hosted zone. It identifies the base DNS information about the domain. Indicates name server is authoritative for the zone.

CNAME record: the value for the CNAME record is another domain name.

Example: web.example.com. CNAME prod.live.example.com

TXT record: contains one or more strings enclosed in double quotation marks

Example: text.example.com TXT "how are you"

Common DNS Record Types

- MX record: Each value for an MX record has to contain two values:
  - Priority
    - Integer that represents priority for email server
    - If you specify only one server, the priority can be any integer between 0 and 65535
    - If you specify multiple servers, the value you specify for the priority indicates which email server you want to route the email to first, second and so on.
    - The server with the lowest value for the priority takes precedence. For example, let's say you have two email servers, and you specify priority value of 0 and 20, the email always goes to server with the priority of 0 unless it is unavailable. If you specify values of 10 and 10, email is routed to the two servers almost equally.

Common DNS Record Types

Domain name: Domain name of the email server.

Example:

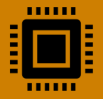
mail.example.com. MX 0 email1.example.com

mail.example.com. MX 20 email2.example.com

Resource record: Resource record (RR) has five key values

Name/owner (web.example.com) : Domain name where the resource record is found.

TTL (300) :The time in seconds. It described how long a resource record can be cached before it is to be discarded.



Class (IN): identifies protocol family of instance of the protocol. There is only one prevalent class called Internet System (IN)

Type (A): Specifies type of resource in resource record (RR)

Value/record data (1.1.1.1): Type dependent data and describe the source.

ROUTE 53
What is Route 53:

- Route 53 is a Domain management service provided by AWS
- This means that if customers put a url or domain name in their web browser and the hosted zone is set up pointing to amazon's name servers, then route 53 response to the domain name with an IP address so the web browser can connect to a server

ROUTE 53

Key features of R53 include

Domain Registration: register domain names such as juzzyk.com

DNS service:

- Translate friendly domain names such as www.juzzyk.com into ip addresses likes 192.0.2.1
- R53 response to DNS queries using a global network of authoritative DNS servers which reduces latency.

Health Checking:

- R53 sends automated requests over the internet to your application to verify that its reachable, available and functional.

ROUTE 53
Route 53 Core Capabilities

Domain Registration & Renewals

Domain Name Service to map domain names to resource

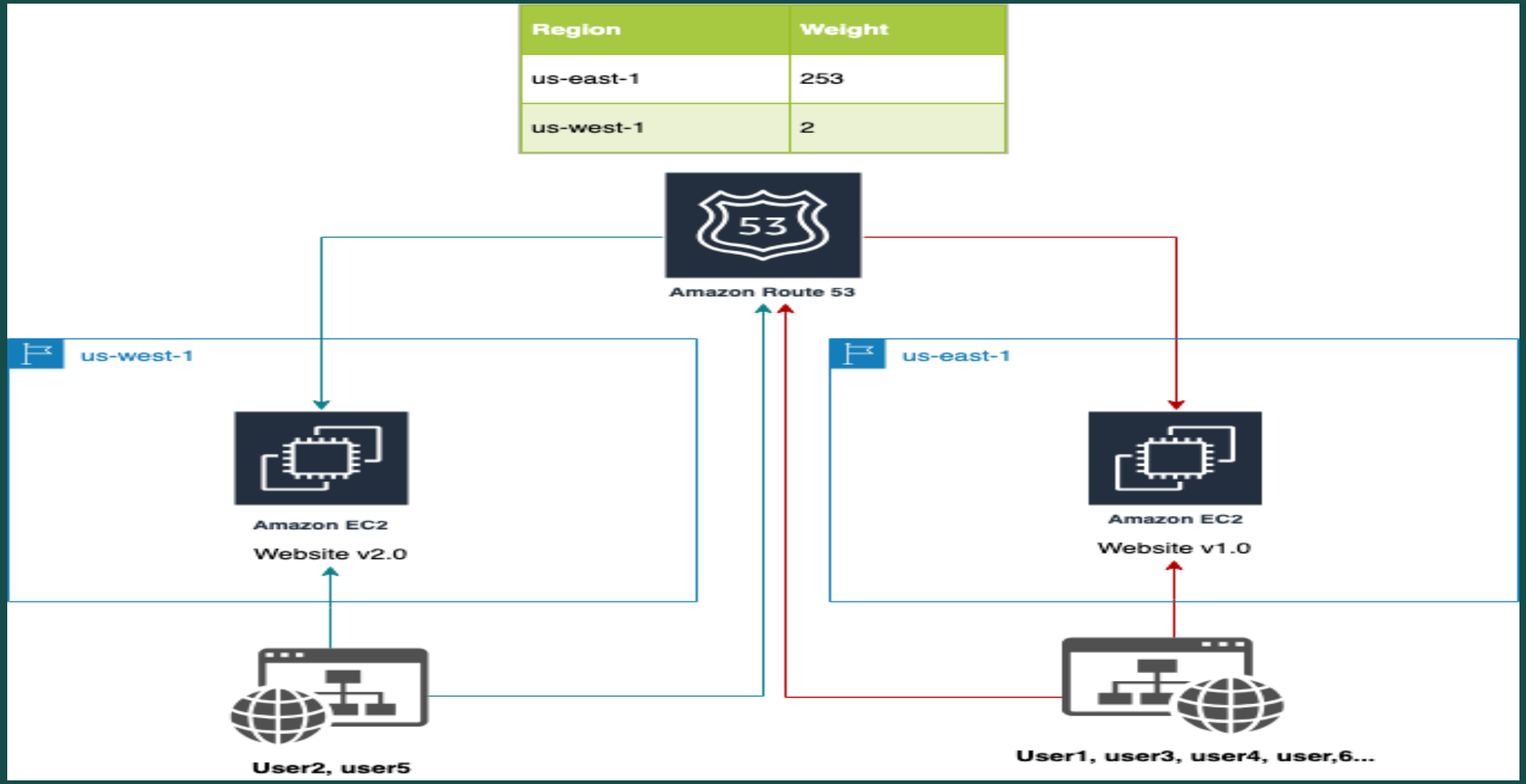
Health Check – Route traffic to healthy end points & independently monitor endpoints

Routing Policies
Weighted Routing

- Used when you have multiple resources performing similar function and you want to route traffic to resources in proportions that you specify.
- For example: Several web servers serving content, A/B testing.
- The weighted routing policy lets you split your traffic base on different weights assigned. You set 20% of traffic to go to US-east 1 and 80% to go to us-west-1.

Routing Policies
Weighted Routing

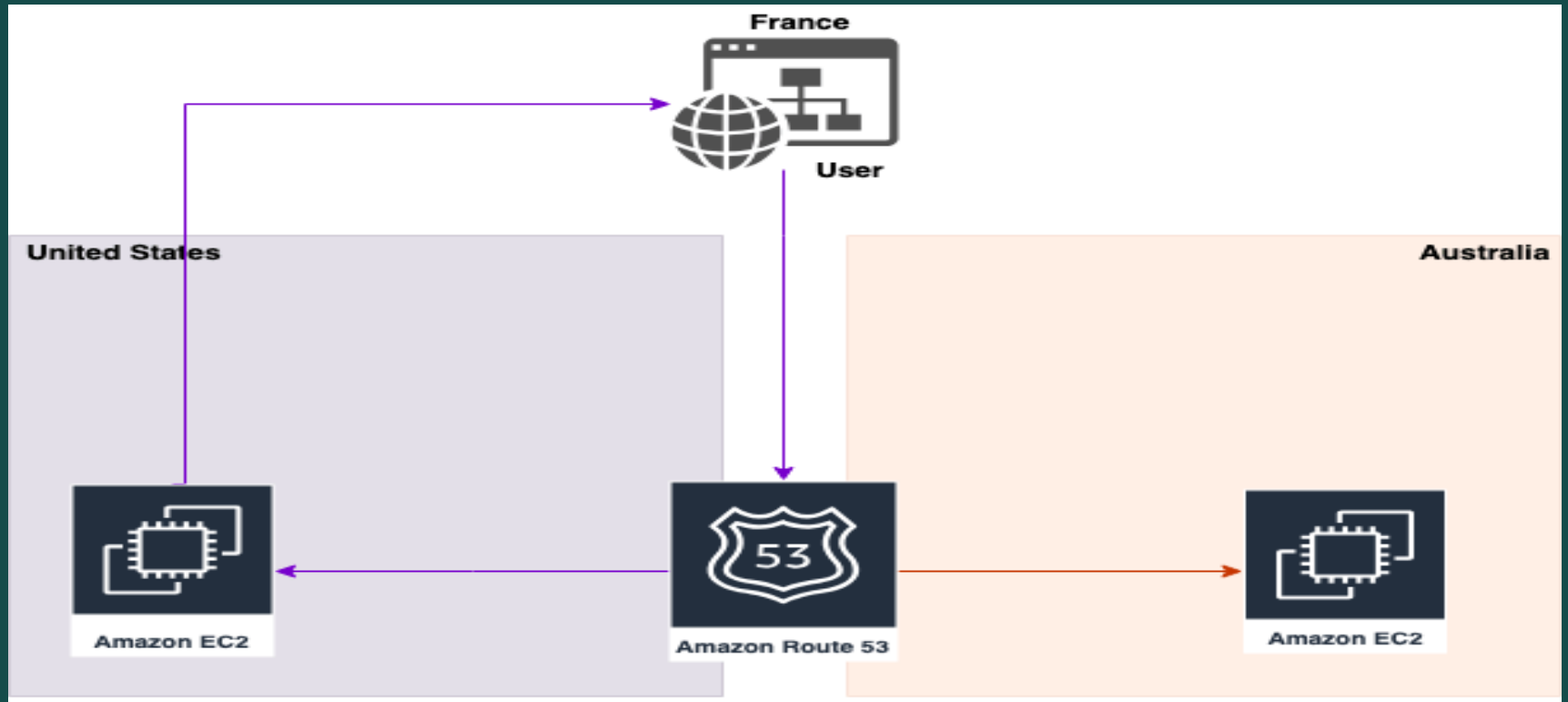
Region	Weight
us-east-1	253
us-west-1	2



Latency Routing

- Used when you have deployed your application across multiple regions and want to route customers to resources that offer best possible latency (lowest network latency for end uers); ie *which region will give them the fastest response time*.
- In this case, when AWS Route 53 receives for a query for your site, it selects the latency resource record set for the region that gives the user the lowest latency.
- For example, a Cameroon user wants to come to our website. EU-WEST-2 offers 54ms latency and US-east-1 offers 300ms latency, in this case route 53 will send the traffic to eu-west-2 because it has a much lower latency.

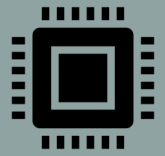
Latency Routing



User Location	Website Location	Latency
France	Australia	300 ms
France	United States	195 ms

Failover Routing

Active-Passive failover support.



All traffic is routed to Primary endpoint (known as Active).

If primary is down, then all traffic is send to Second endpoint (known as Passive)

Failover Routing

Active-Passive failover support.

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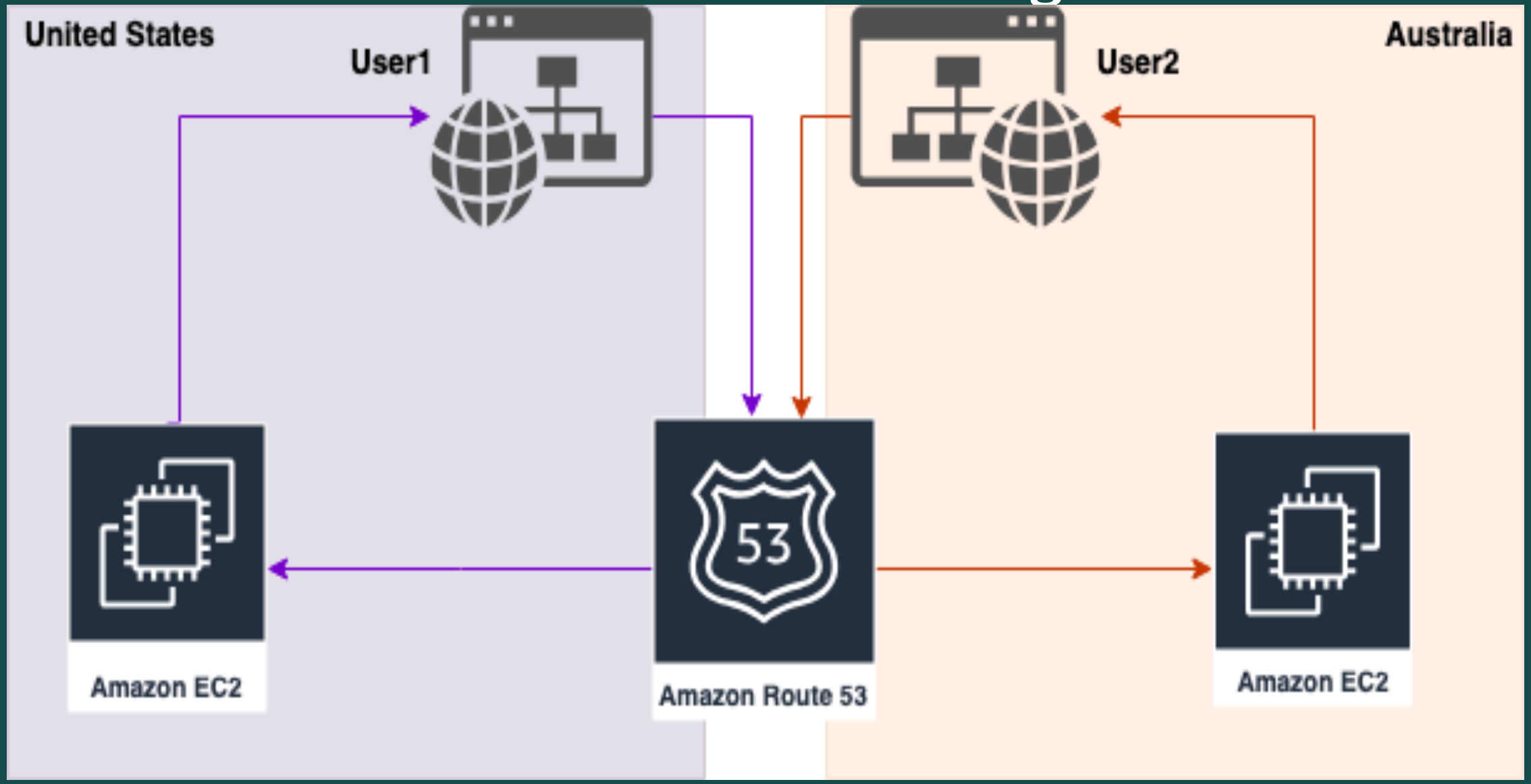
Geo location Routing

Used when you want to route traffic to resources in the same geography as your users Can be used for compliance requirements.

You can support a default record set to handle requests where you don’t have resources.

Otherwise, Route 53 will return a “No Answer” response

Geo location Routing



Simple Routing

If you specify multiple values in a record, Route 53 returns all values to the user in random order

You can only create a single record set for a domain using the simple routing policy.

Simple routing lets you configure standard DNS records, with no special Route 53 routing such as weighted or latency

With simple routing, you typically route traffic to a single resource, for example, to a web server for your website.

Simple Routing

- If you choose the simple routing policy in the Route 53 console, you can't create multiple records that have the same name and type, but you can specify multiple values in the same record, such as multiple IP addresses. (If you choose the simple routing policy for an alias record, you can specify only one AWS resource or one record in the current hosted zone.) If you specify multiple values in a record, Route 53 returns all values to the recursive resolver in random order, and the resolver returns the values to the client (such as a web browser) that submitted the DNS query. The client then chooses a value and resubmits the query

Multivalue Answer Routing

This one lets your return multiple values for each of your resources

The client or user browser randomly chooses one

Optionally you can add health checks

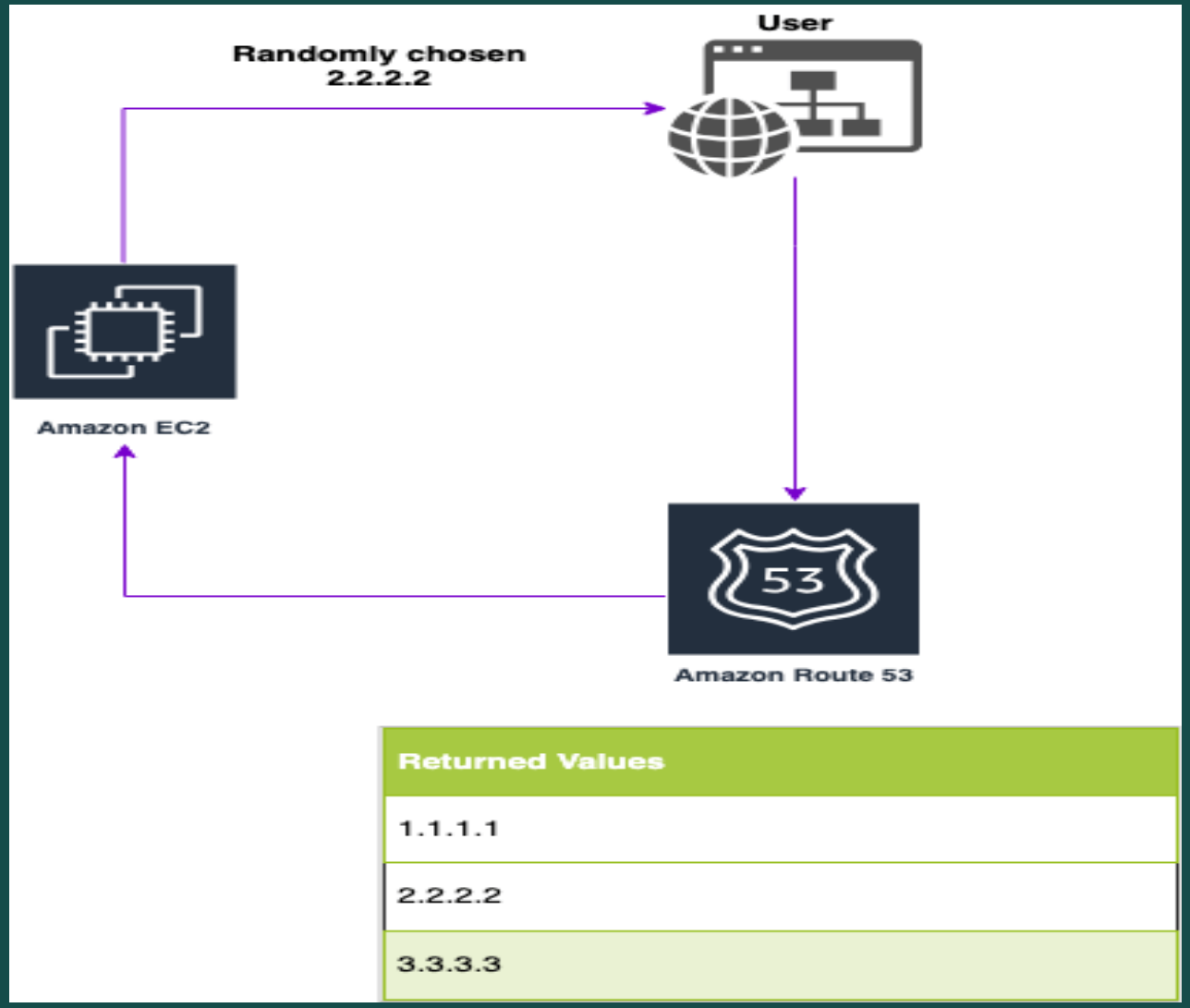
If any value becomes unhealthy then the client chooses another value to resolve

This is not an alternative solution to load balancing, it’s an enhancement.

Multivalue Answer Routing

- Allows you to have multiple record sets and can have an individual health check for each one so that if one of those goes down, you can have that automatically removed from the dns record.

Multivalue Answer Routing



Returned Values
1.1.1.1
2.2.2.2
3.3.3.3