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Overview of Virtual Private Cloud

AWS Security Workshop

Agenda

- AWS Virtual Private Cloud
- Networking Concepts in AWS
- DNS
- Connectivity Features

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Goals

- Understand how networking is implemented in AWS
- Discover features and functionality of VPC
- Learn how to connect other networks

Virtual Private Cloud (VPC)

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What is a Virtual Private Cloud?

- Software-defined network
- Logically isolated
- Complete control
- Secure
- VPN & Internet connectivity
- Connect your on-premises IT environment

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Each AWS Region has multiple Availability Zones

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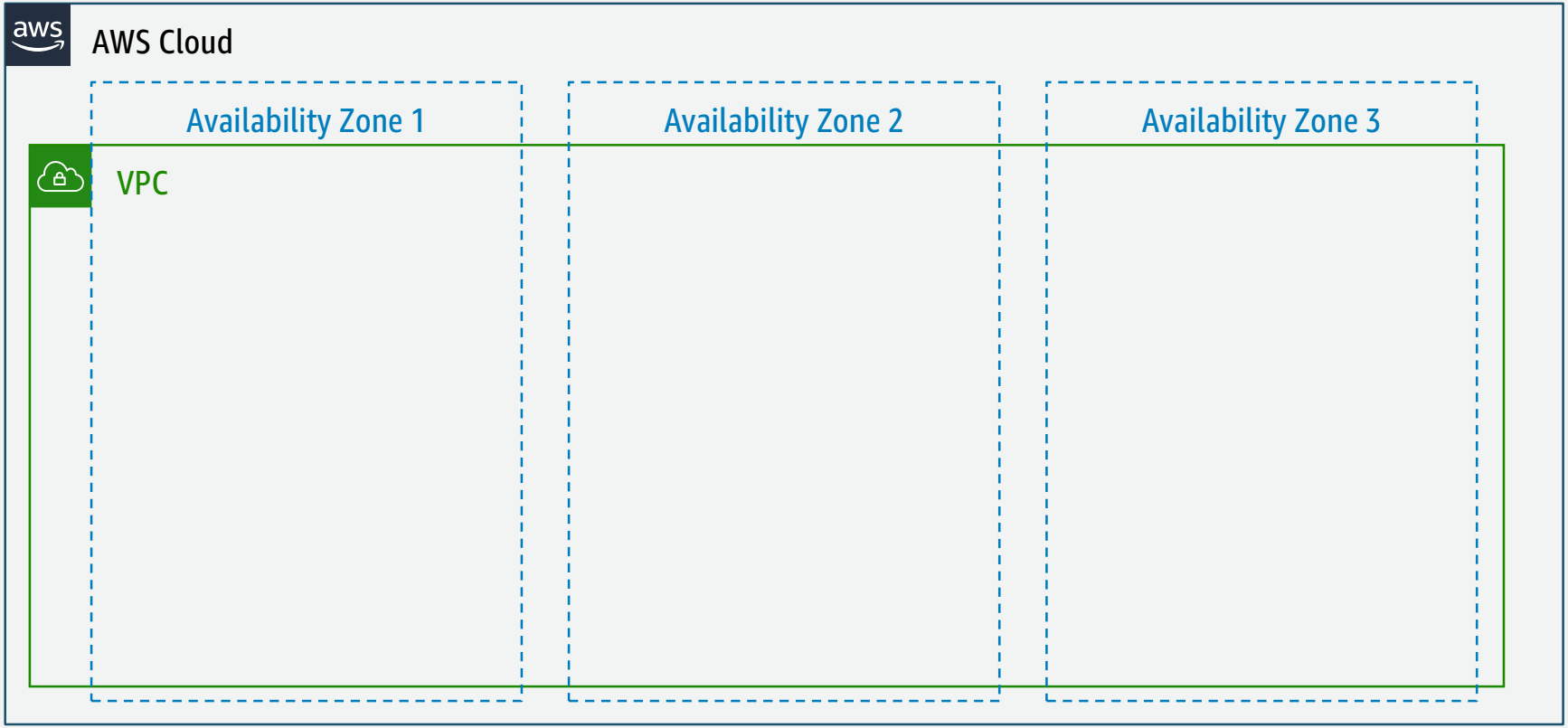
A VPC spans every Availability Zone in a Region



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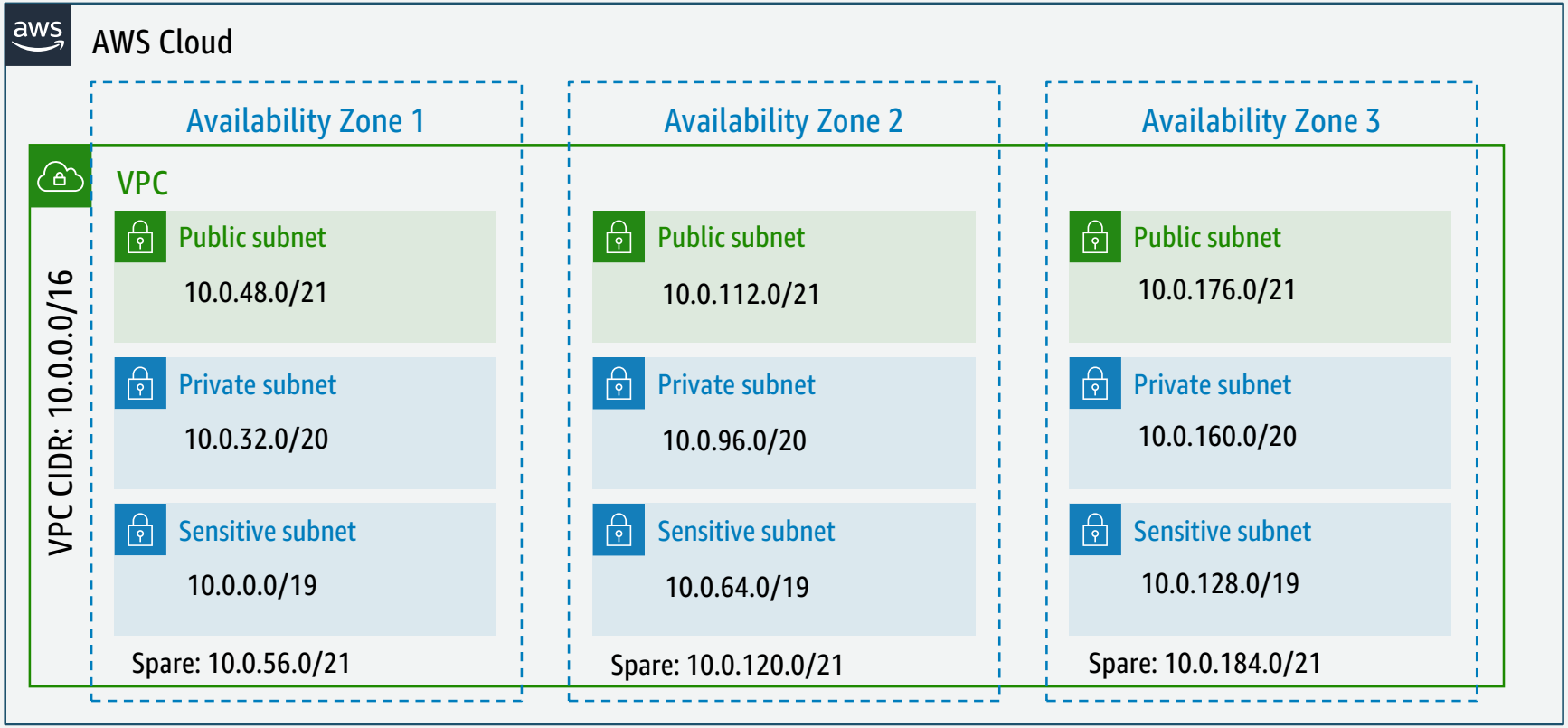
Subnets



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Customers have full control over their VPC's

AWS Cloud

Availability Zone 1

VPC

Choose your VPC address range

- Every VPC has a private IP address space (RFC1918 is recommended)
- The VPC CIDR block size can be from /16 to /28
- Can associate additional IPv4 address blocks
- Can associate IPv6 address block

Availability Zone 2

Select IP addressing strategy

- Primary VPC CIDRs cannot be modified once created, additional space can be added
- Consider address overlaps with other networks before committing to a CIDR
- Do not waste address space, but do not constrain growth either

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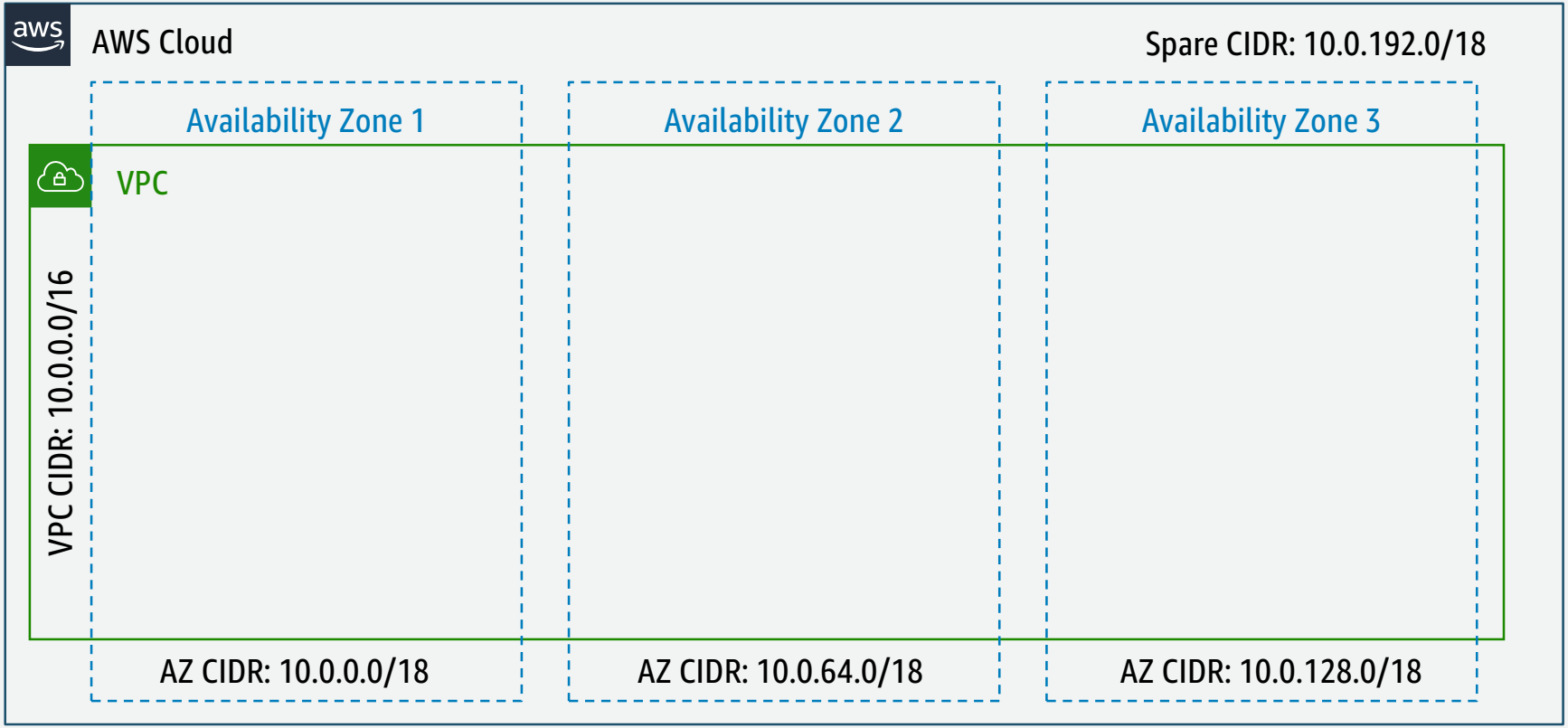
Logically allocate CIDR space for each AZ



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Security Groups

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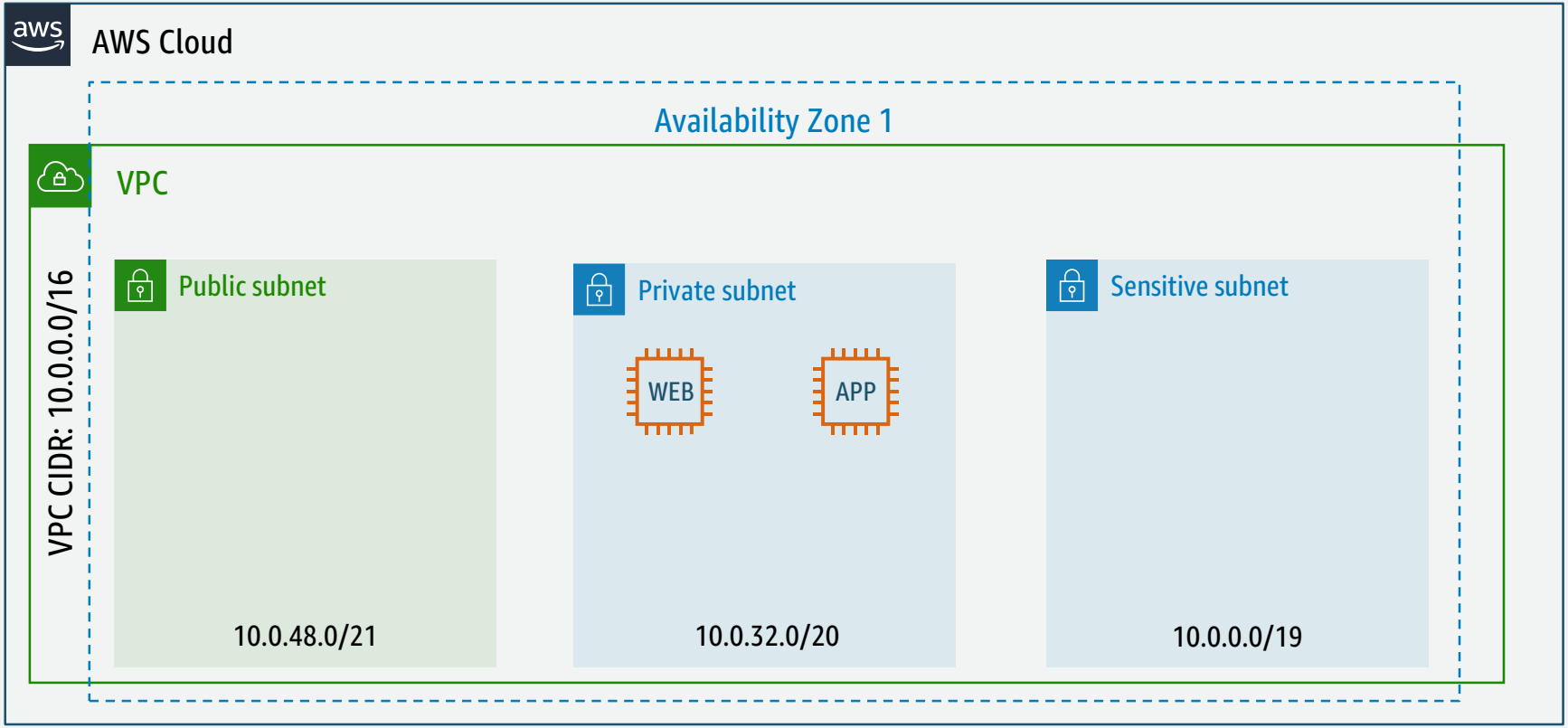
Security Groups – Stateful Firewall



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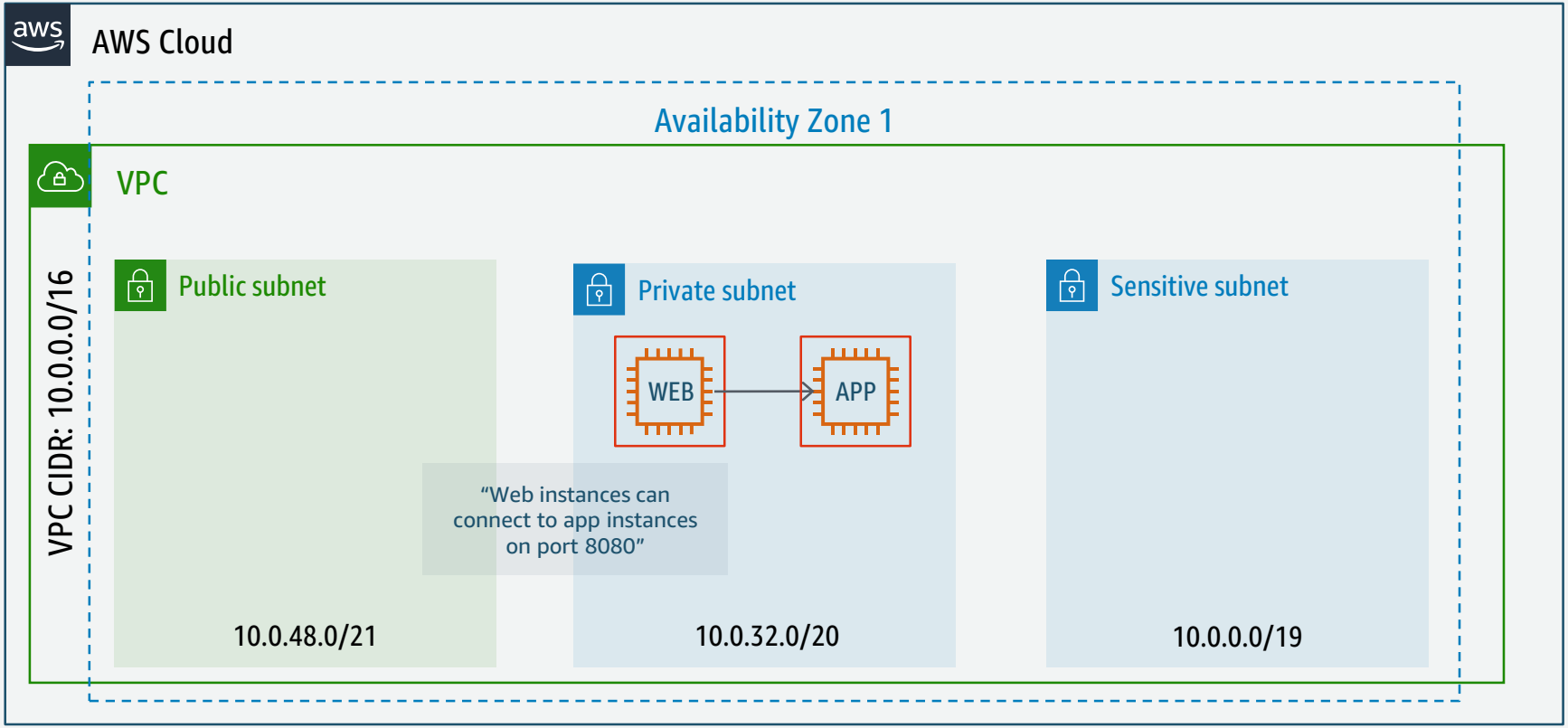
Security Groups – Stateful Firewall



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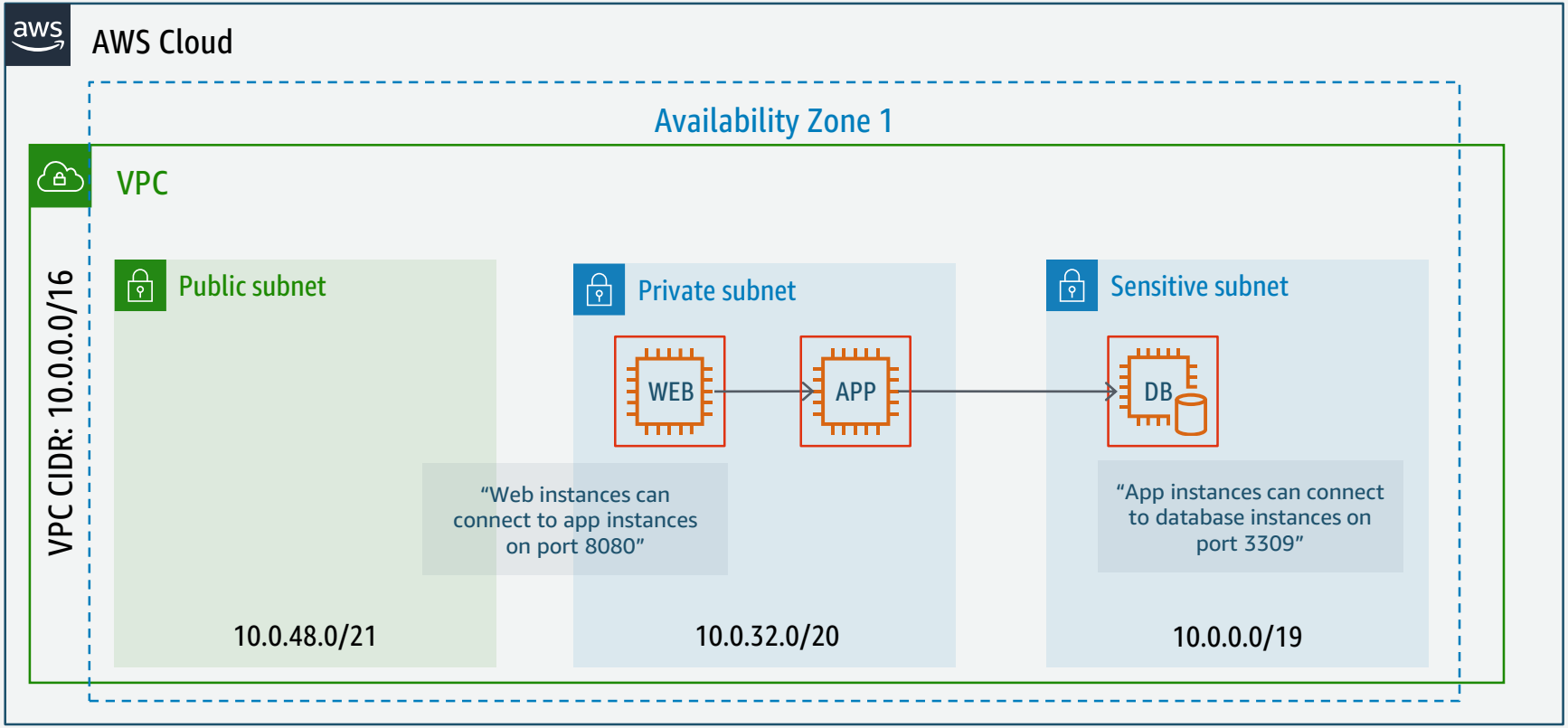
Security Groups – Stateful Firewall



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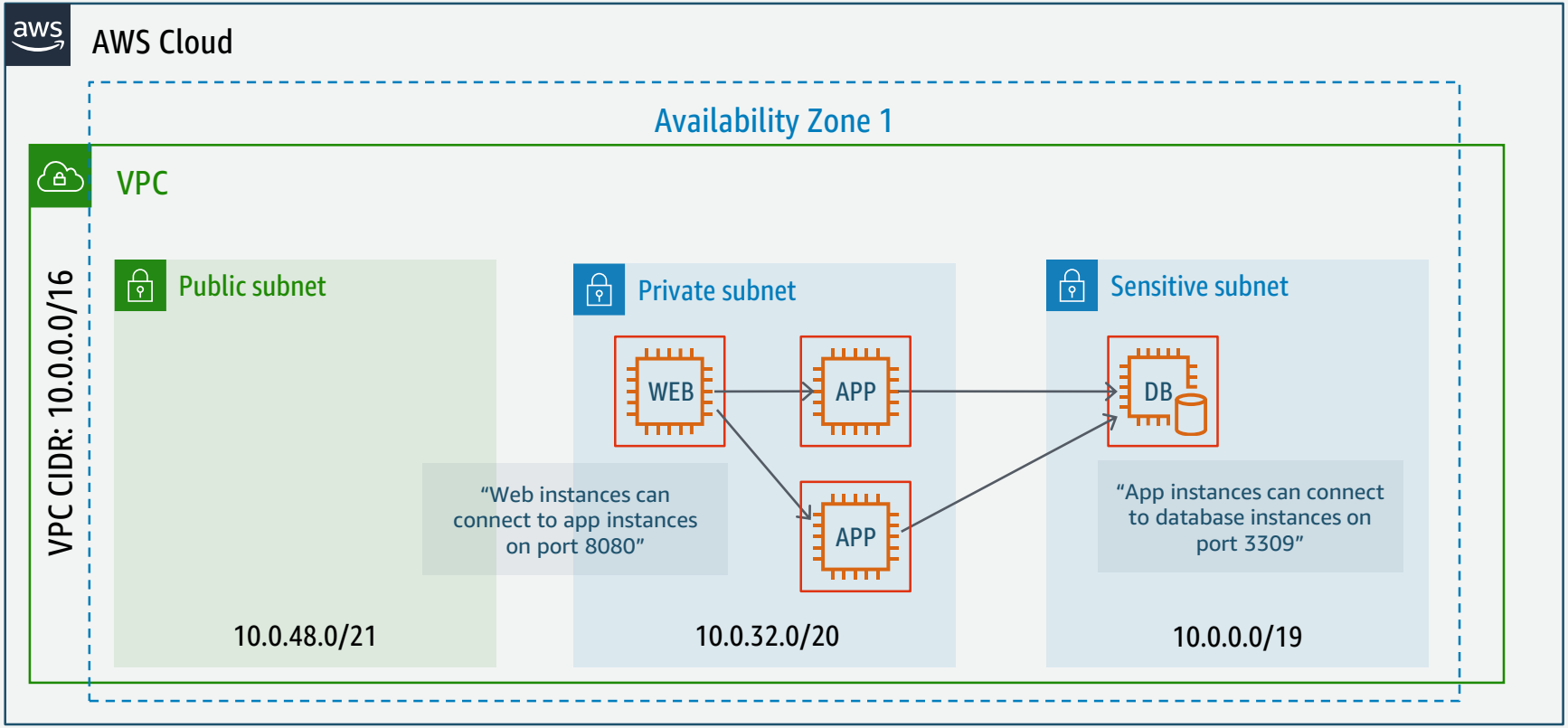
Security Groups – Stateful Firewall



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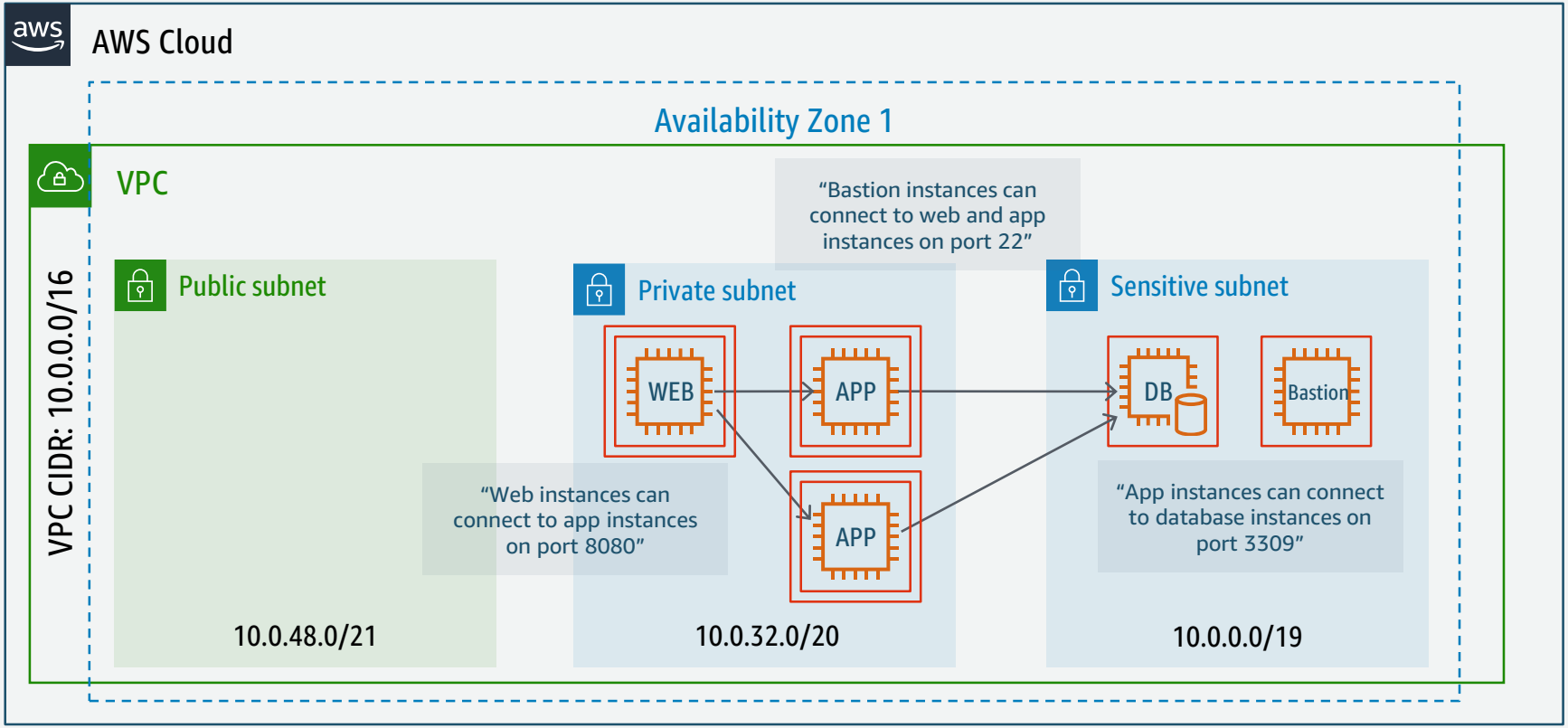
Security Groups – Stateful Firewall



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Routing, NACLs, and Load Balancing

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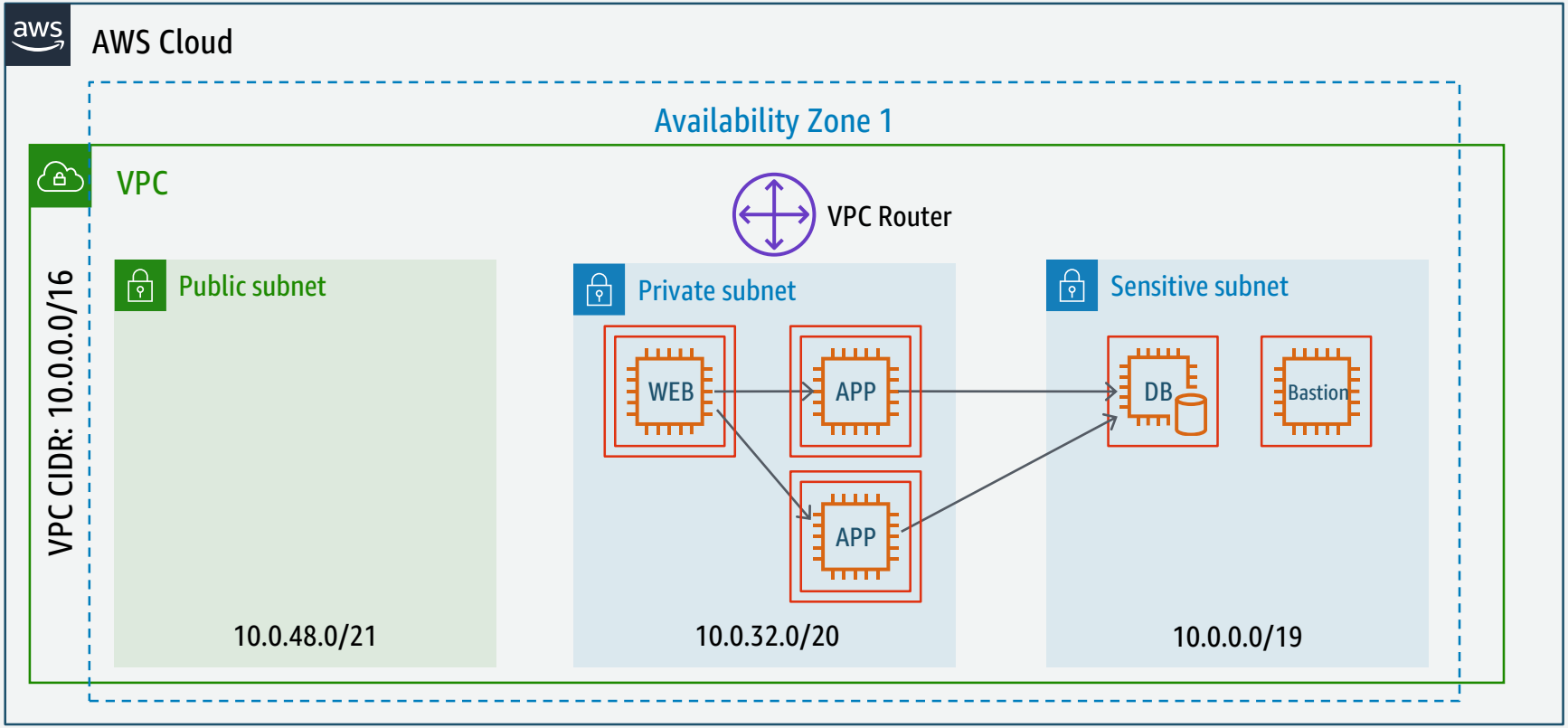
Routing



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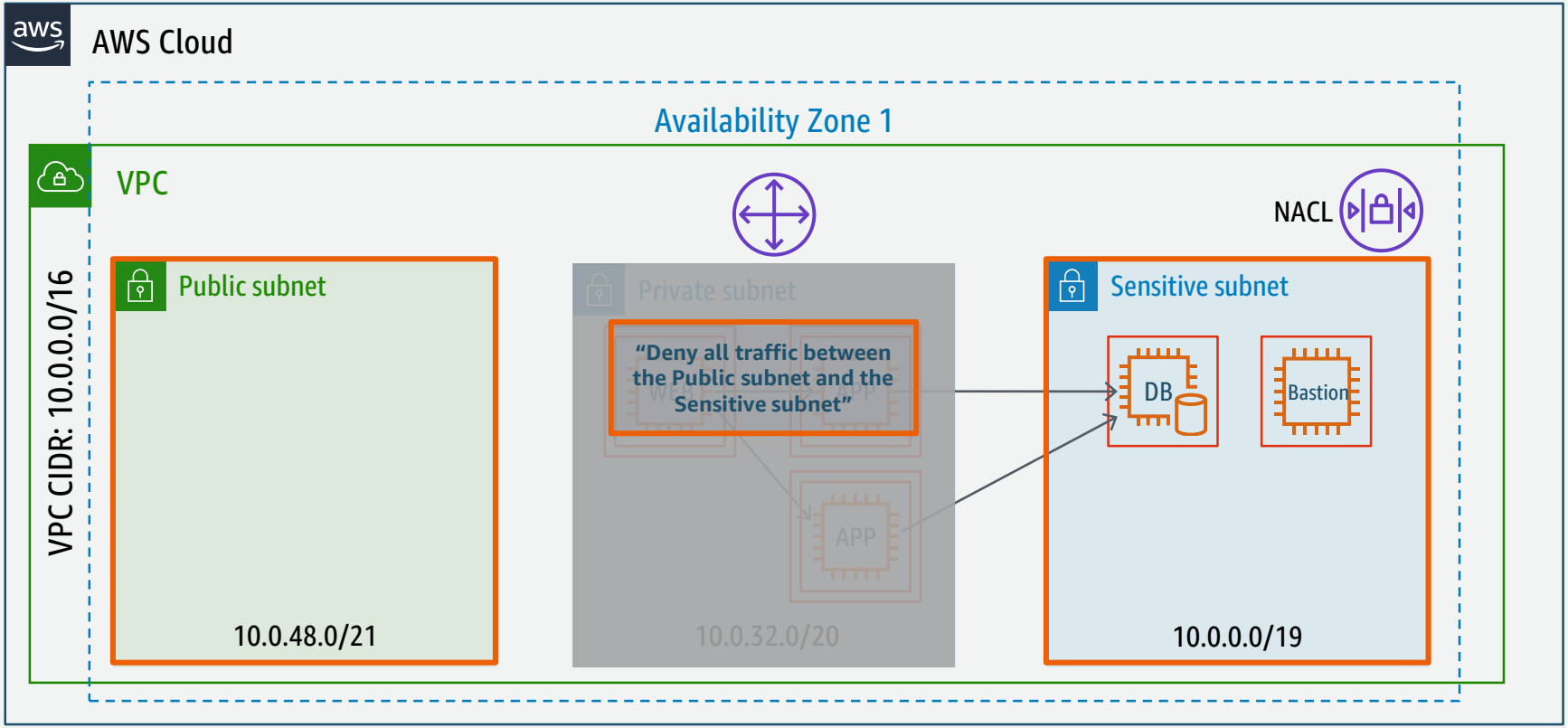
Network Access Control List (NACL)



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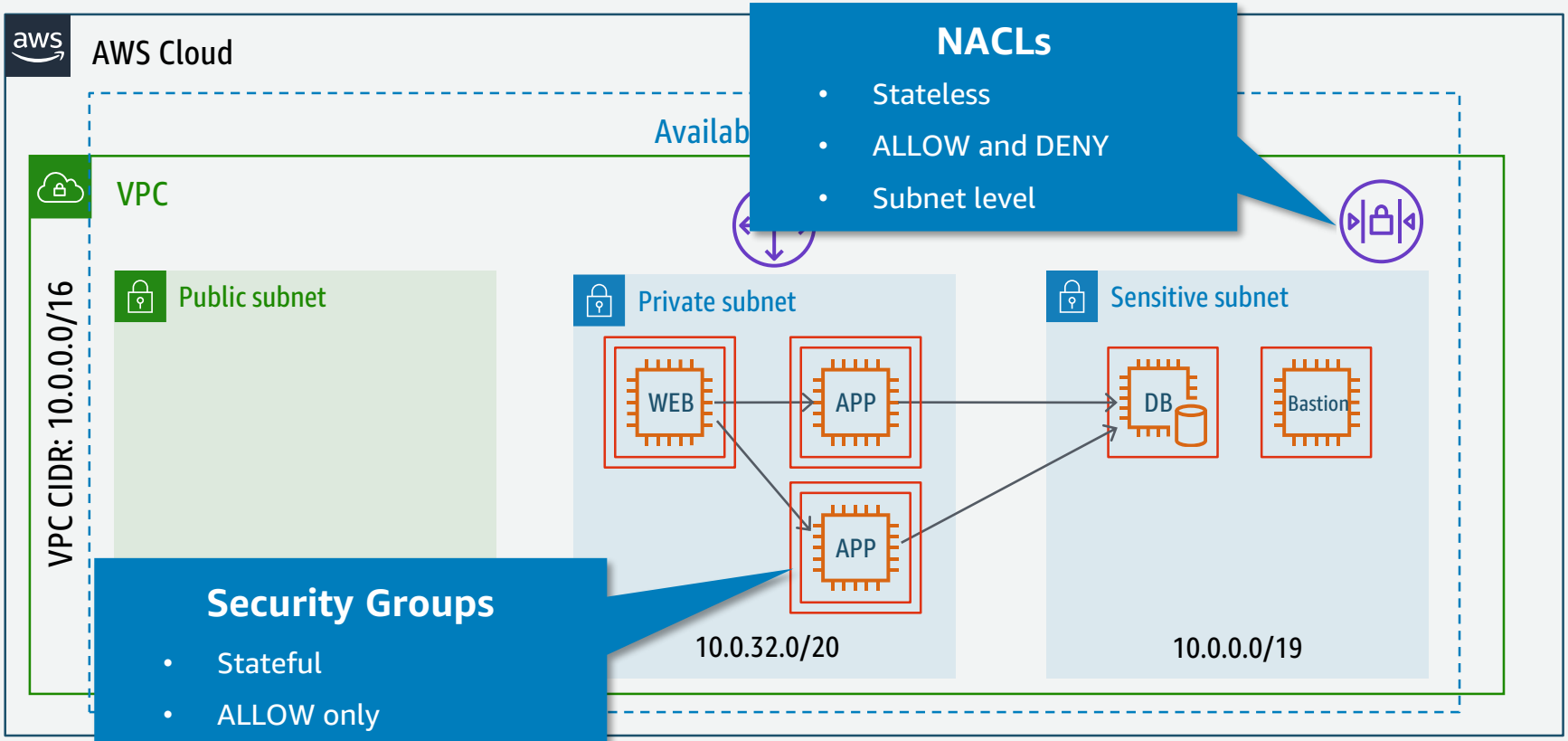
NACLs and Security Groups



NACLs

- Stateless
- ALLOW and DENY
- Subnet level

Security Groups

- Stateful
- ALLOW only
- Instance level

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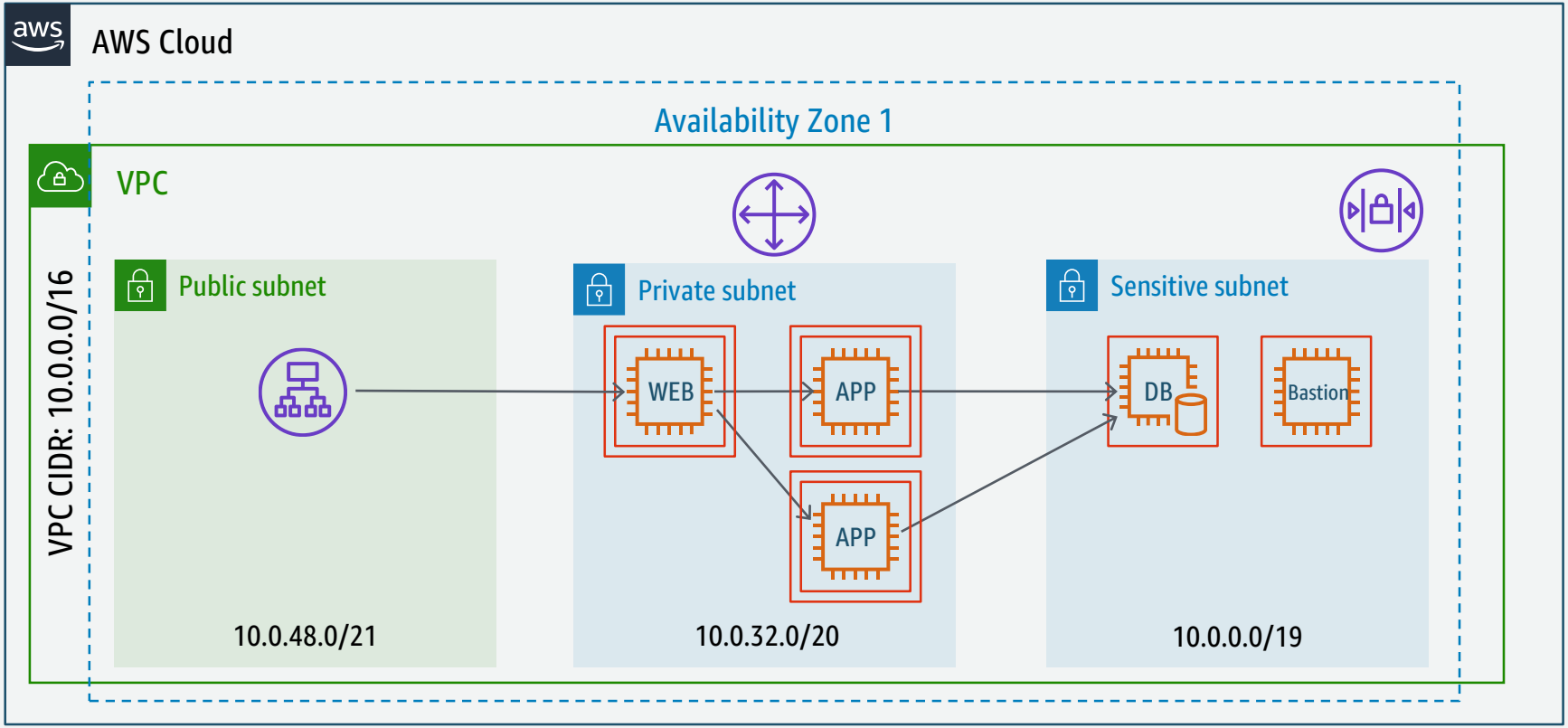
Load Balancing



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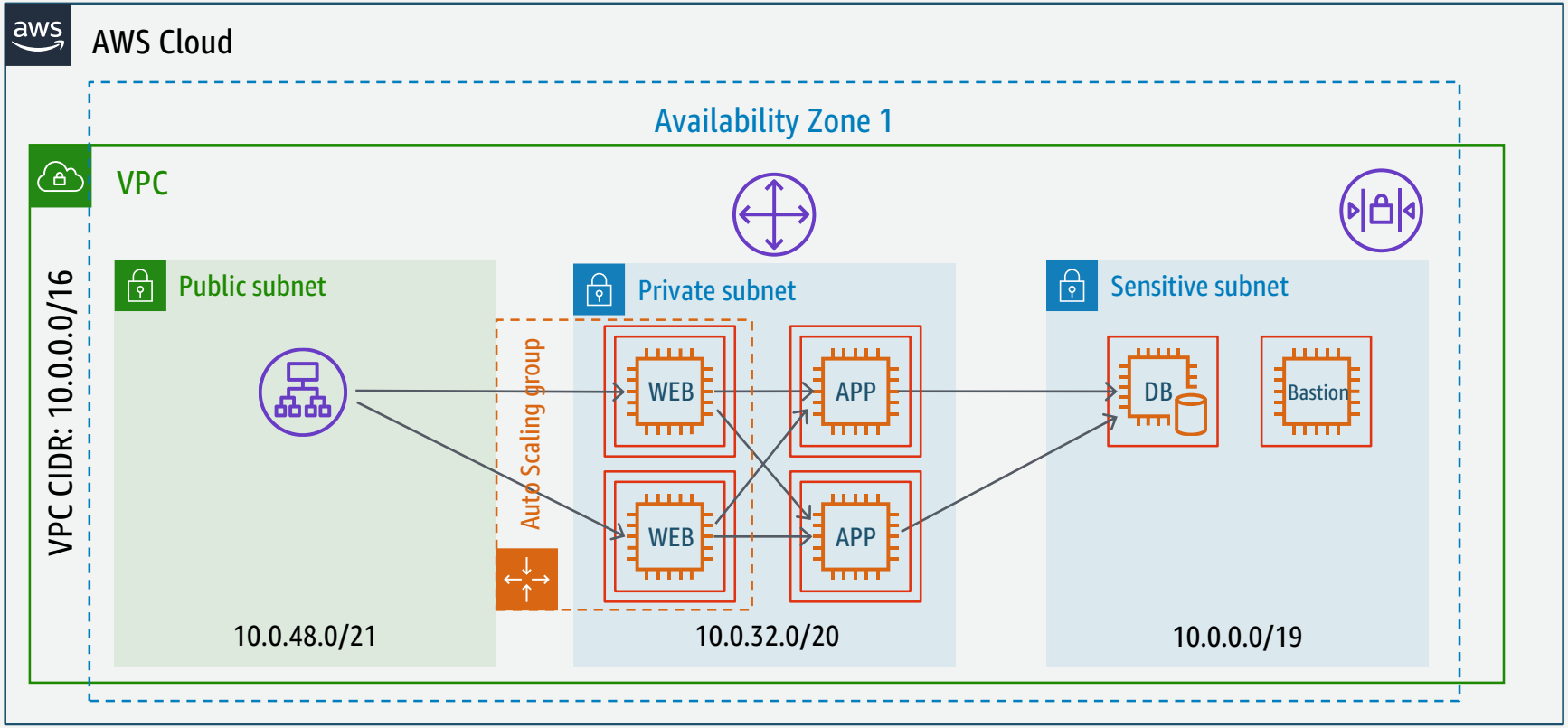
Load Balancing



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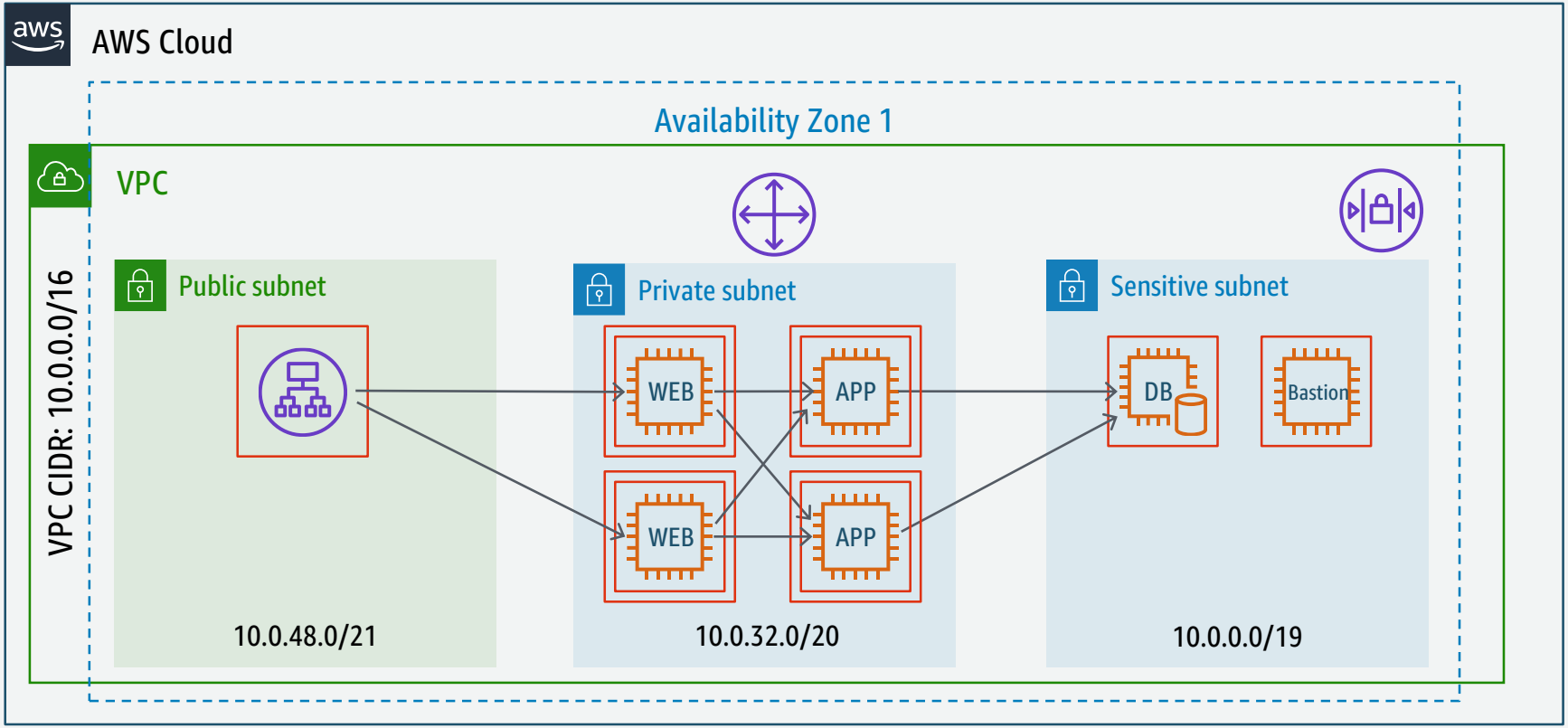
Load Balancing



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Load Balancing – ELB Types

	Classic Load Balancer	Application Load Balancer	Network Load Balancer
Protocols	TCP, SSL/TLS, HTTP, HTTPS	HTTP, HTTPS	TCP, TLS
Network Layer	L4 – L7	L7	L4
IP address as a target	✗	✓	✓
Lambda function as a target	✗	✓	✗
Server Name Indication (SNI)	✗	✓	✗
Preserve Source IP address	✗	✗	✓
Static IP	✗	✗	✓
User authentication	✗	✓	✗
Back-end TLS authentication based on public-key	✓	✗	✗

DNS

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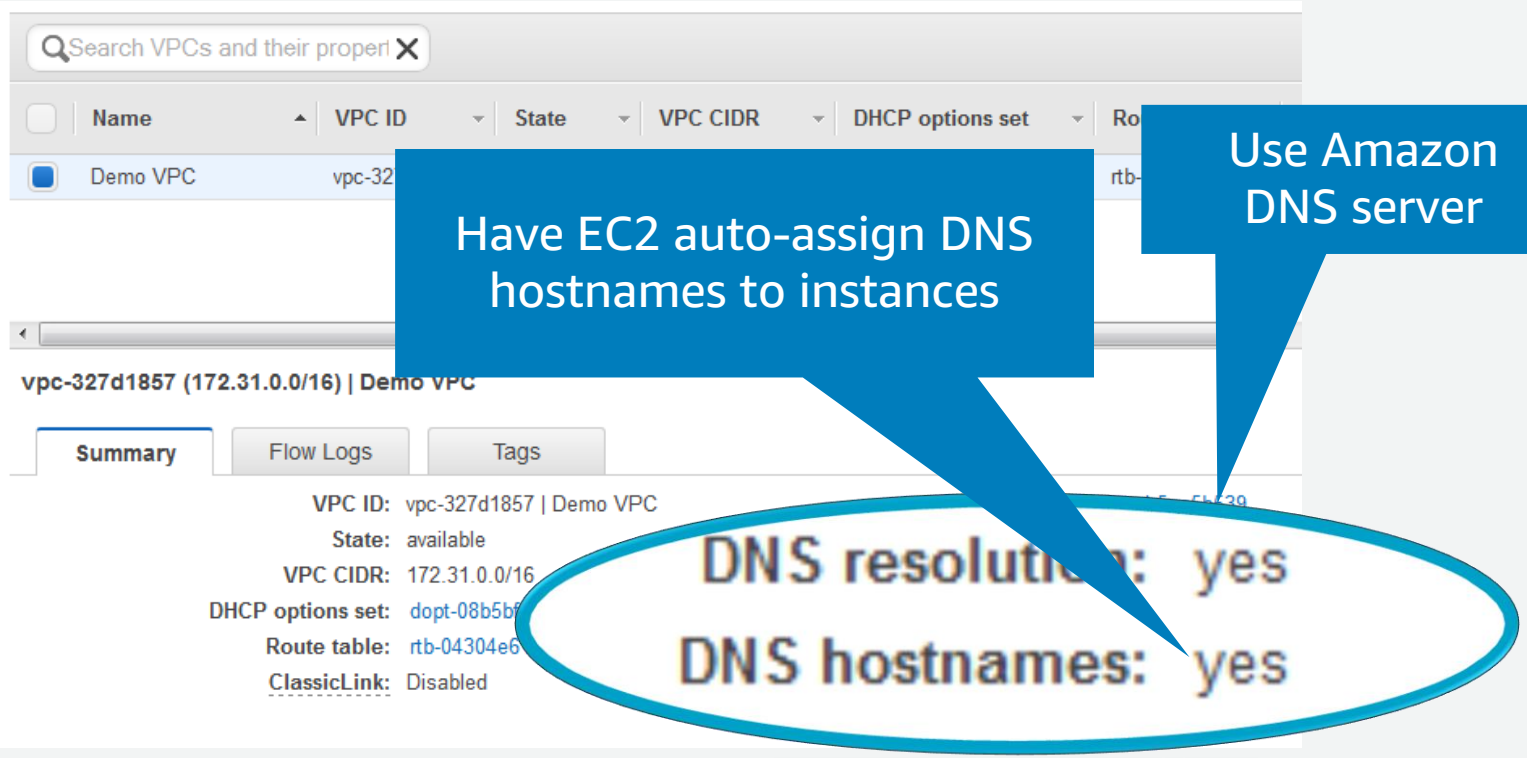
VPC DNS Options



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EC2 DNS Hostnames

External DNS name:
Resolves to…

Internal DNS hostname:
Resolves to Private IP address

.eu-west-1.compute.amazonaws.com

Description | Status Checks | M… gs

Instance ID	i-a343	Public DNS	ec2-52-19-188-57.eu-west-1.compute.amazonaws.com
Instance state	running	Public IP	52.19.188.57
Instance type	t2.micro	Elastic IP	-
Private DNS	ip-172-31-0-201.eu-west-1.compute.internal	Availability zone	eu-west-1a
Private IPs	172.31.0.201	Security groups	default . view rules
Secondary private IPs		Scheduled events	No scheduled events
VPC ID	vpc-327d1857	AMI ID	amzn-ami-hvm-2015.03.1.x86_64-gp2 (ami-e4d18e93)

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EC2 DNS Hostnames from outside the VPC

```
C:\>nslookup ec2-52-18-10-57.eu-west-1.compute.amazonaws.com

Non-authoritative answer:
Name:    ec2-52-18-10-57.eu-west-1.compute.amazonaws.com
Address:  52.18.10.57
```

Outside your VPC:
Public IP address

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EC2 DNS Hostnames from inside the VPC

```
[ec2-user@ip-172-31-0-201 ~]$ dig ec2-52-18-10-57.eu-west-1.compute.amazonaws.com

; <<>> DiG 9.8.2rc1-RedHat-9.8.2-0.30.rc1.38.amzn1 <<>> ec2-52-18-10-57.eu-west-1.compute.amazonaws.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 36622
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;ec2-52-18-10-57.eu-west-1.compute.amazonaws.com. IN A

;; ANSWER SECTION:
ec2-52-18-10-57.eu-west-1.compute.amazonaws.com. 60 IN A 172.31.0.137

;; Query time: 2 msec
;; SERVER: 172.31.0.2#53(172.31.0.2)
;; WHEN: Wed Sep  9 22:32:56 2015
;; MSG SIZE  rcvd: 81
```

Inside your VPC:
Private IP address

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Connectivity

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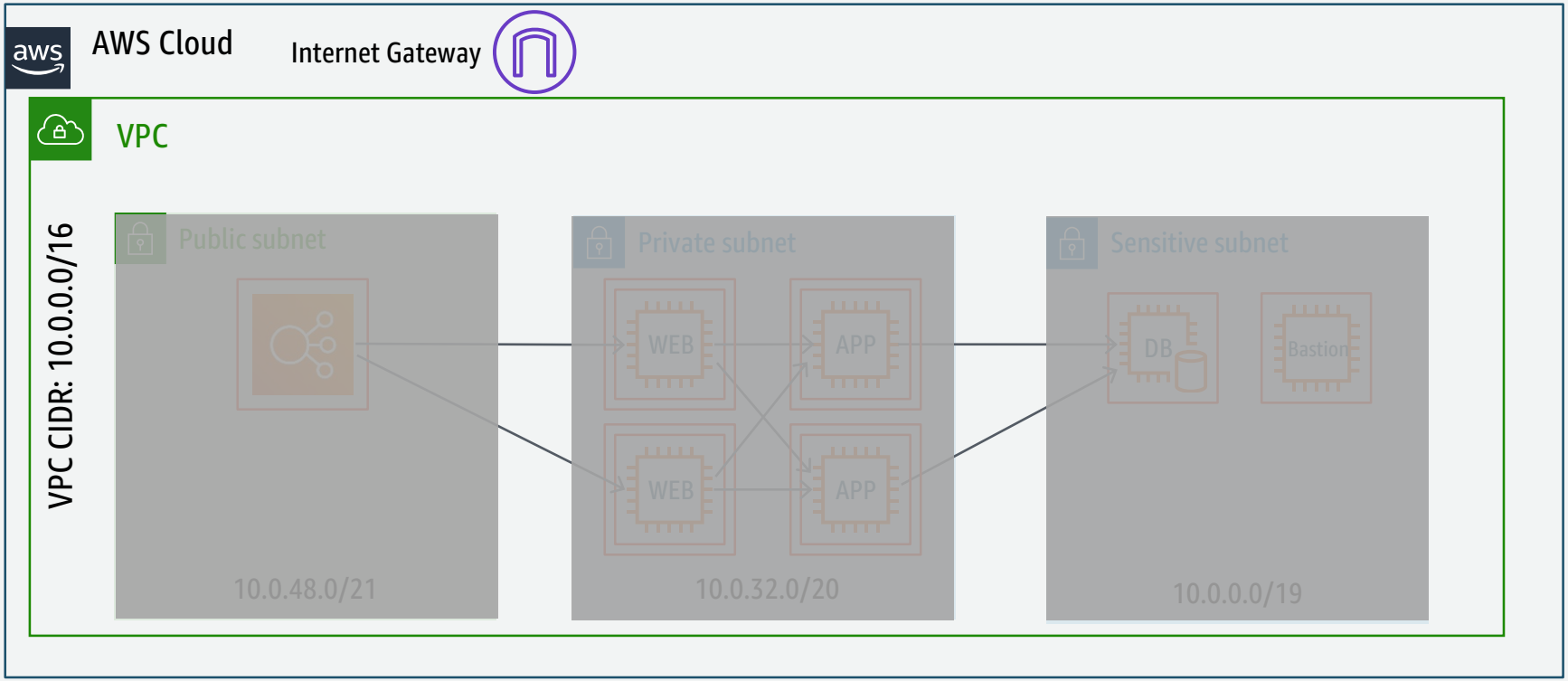
Internet Gateway



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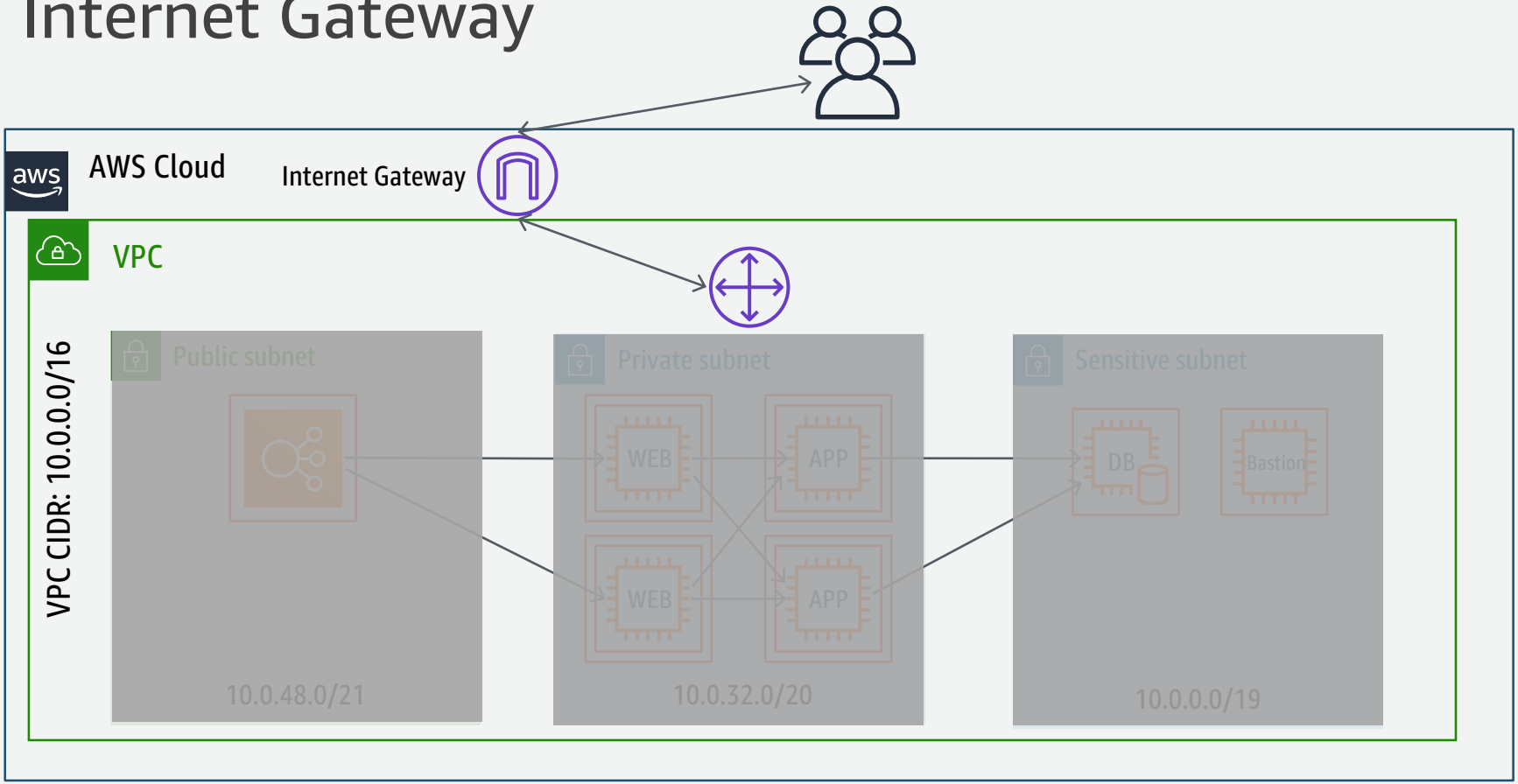
Internet Gateway



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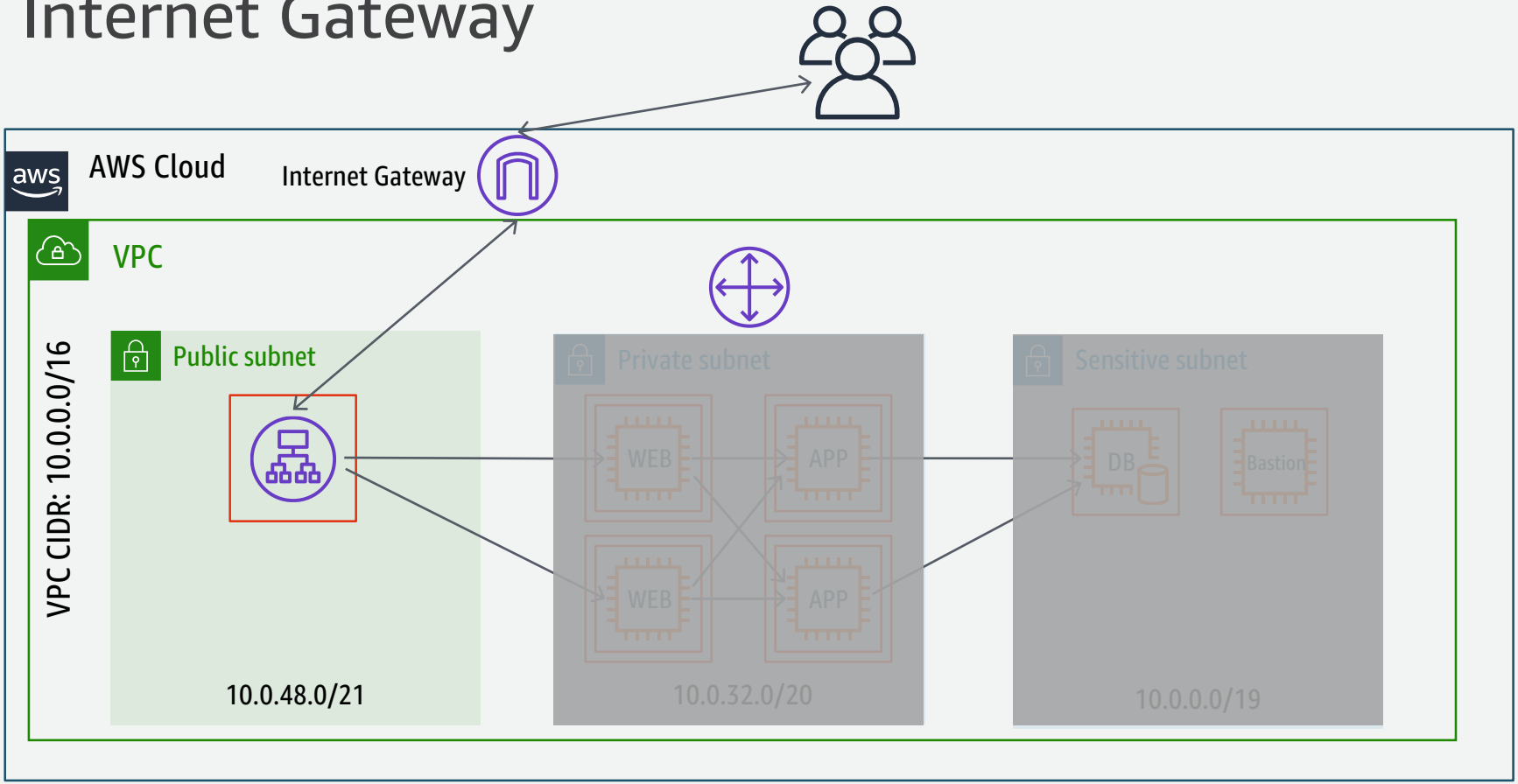
Internet Gateway



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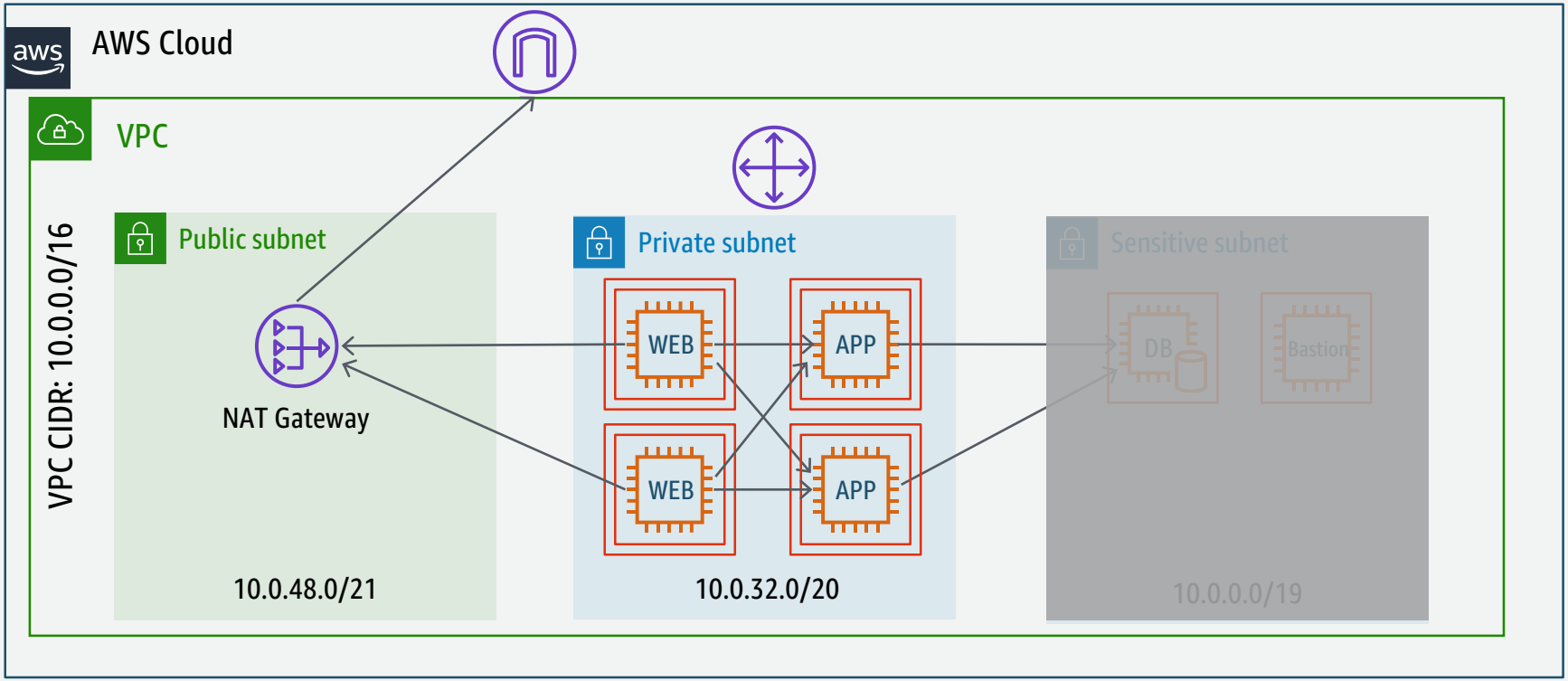
NAT Gateway



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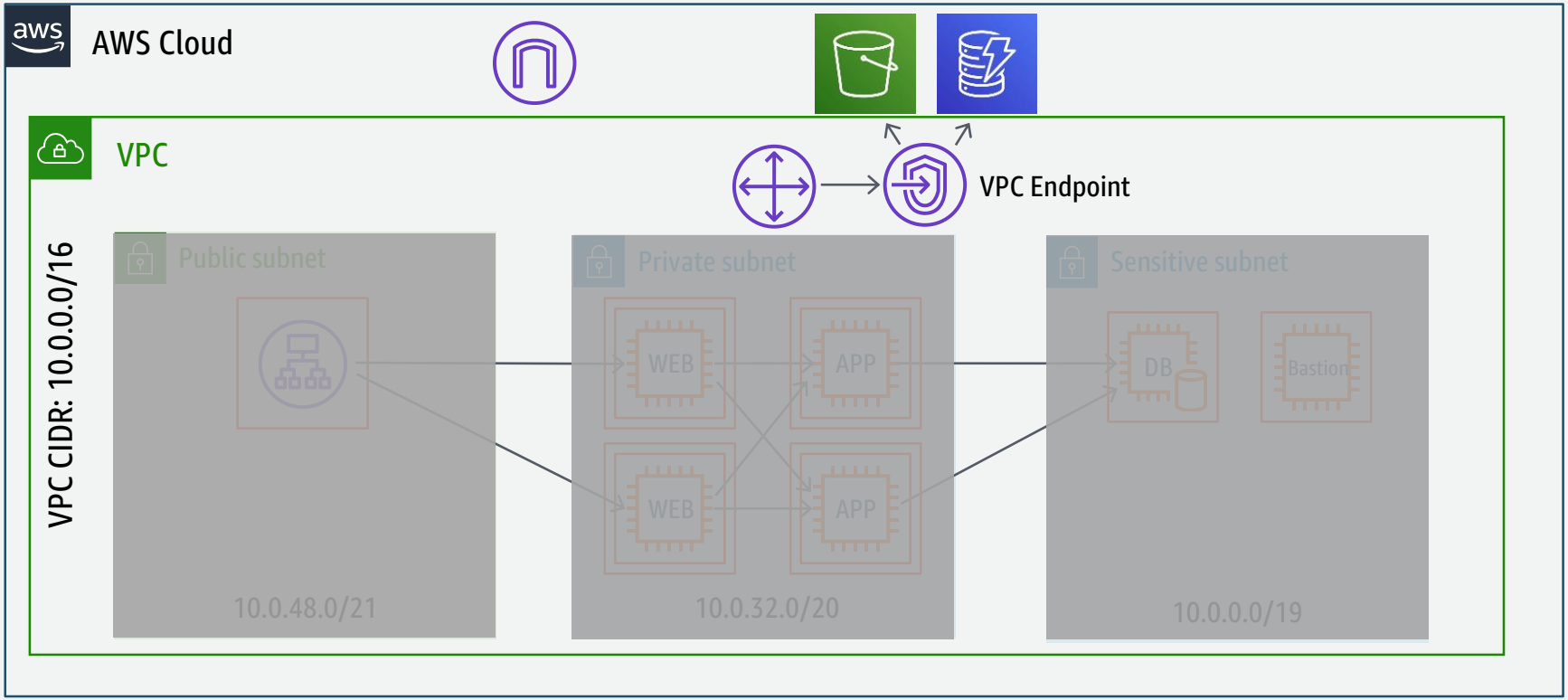
VPC Endpoints



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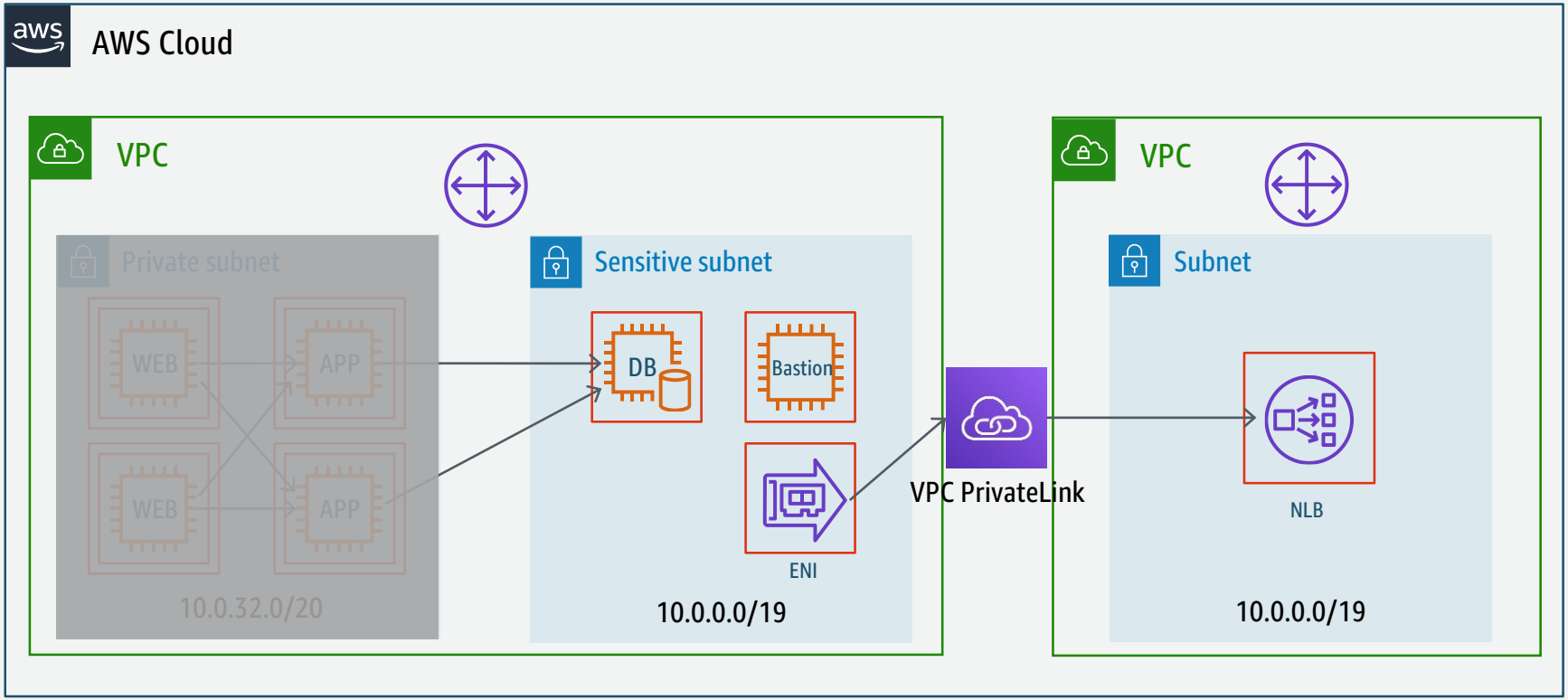
VPC PrivateLink



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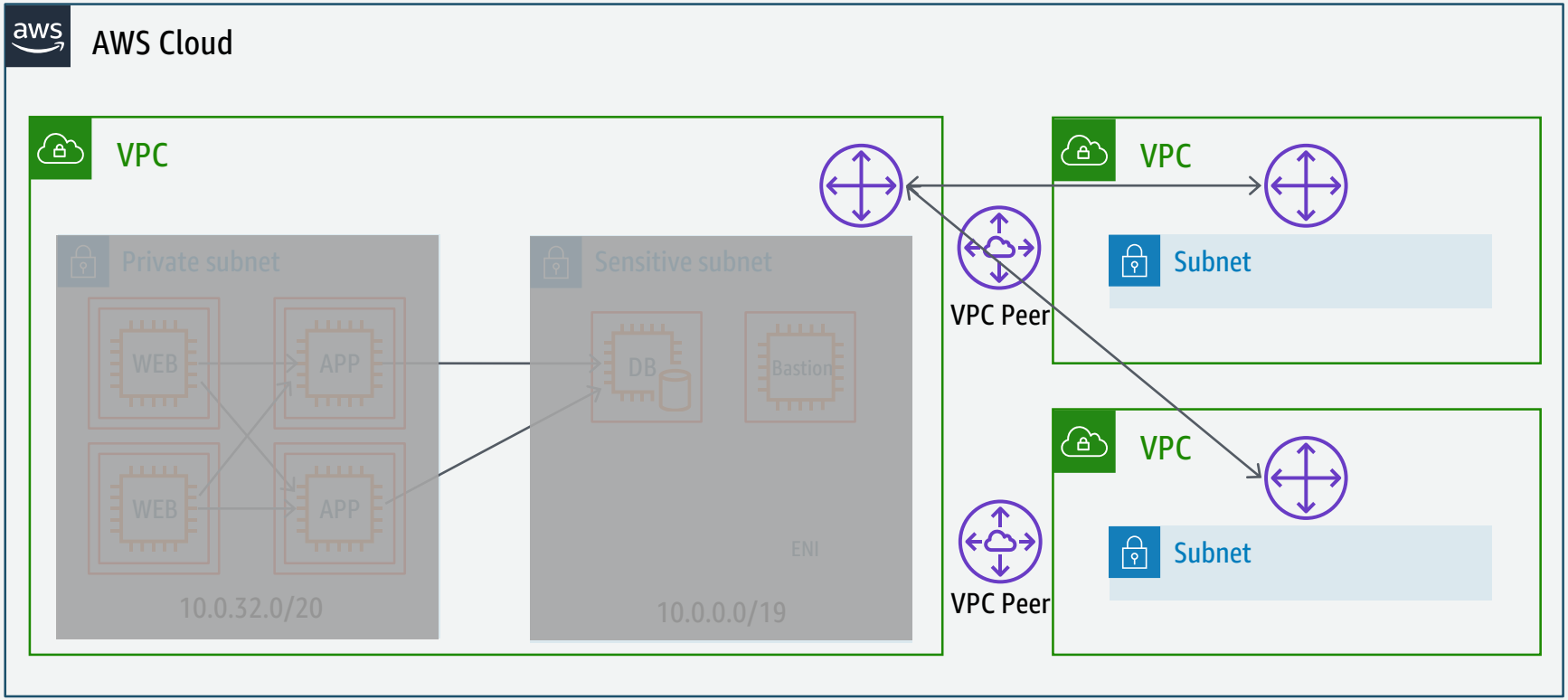
VPC Peering



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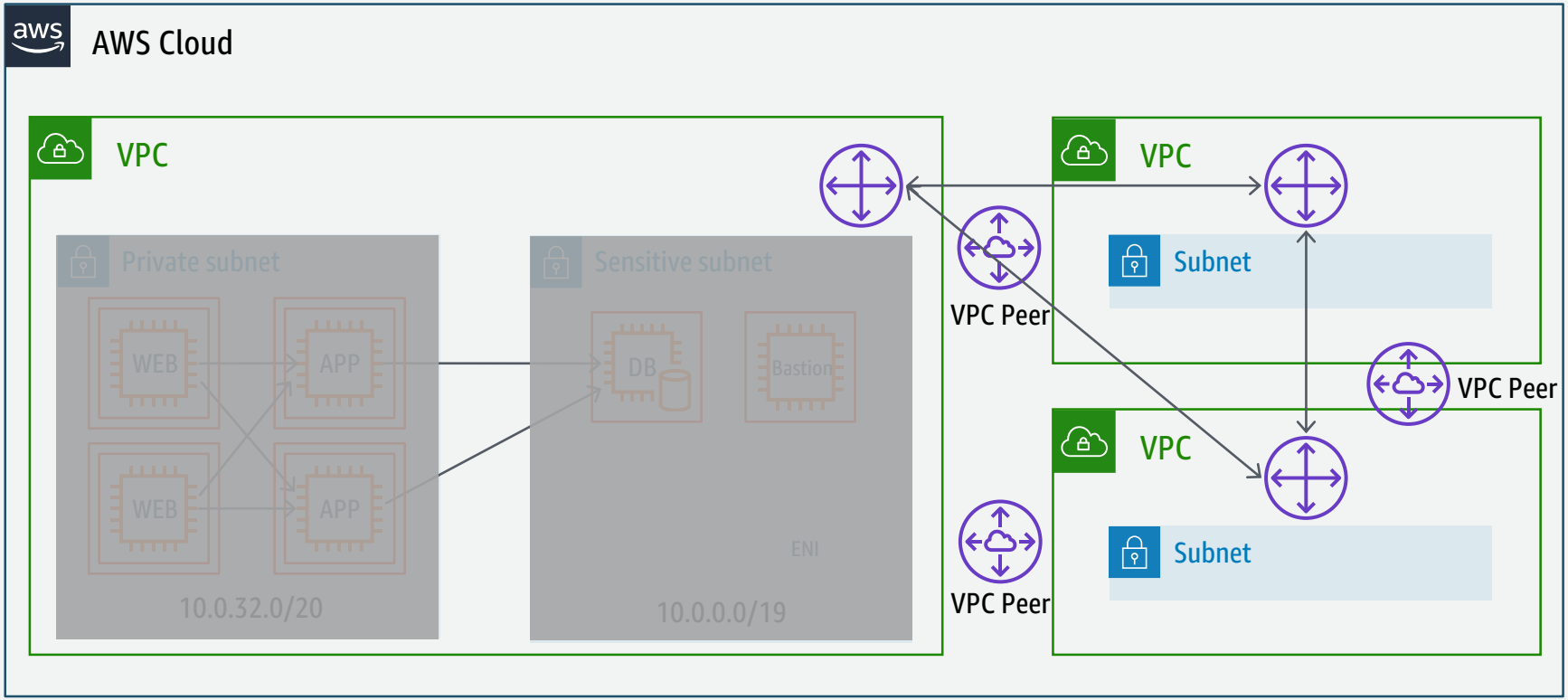
VPC Peering



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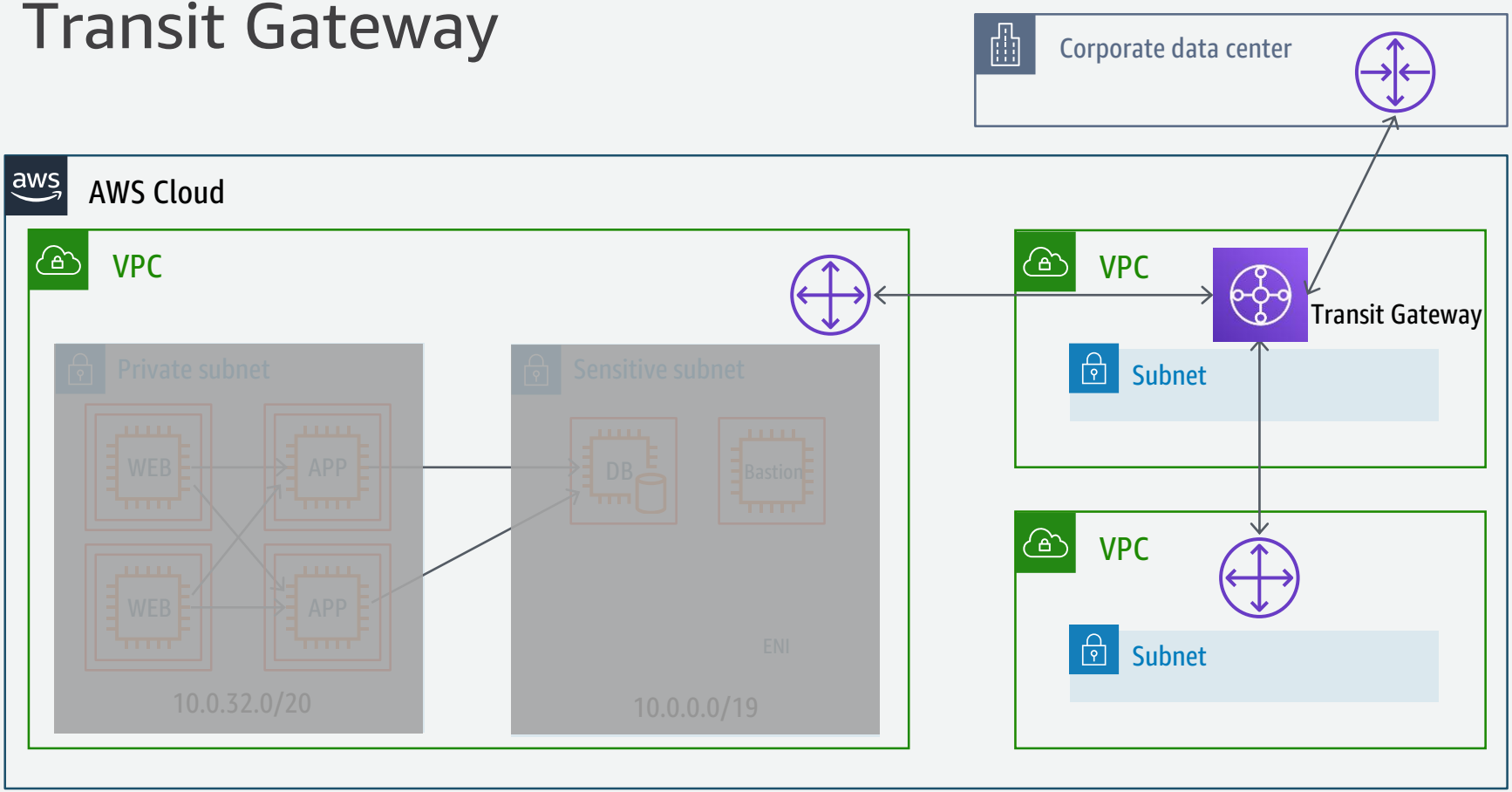
Transit Gateway



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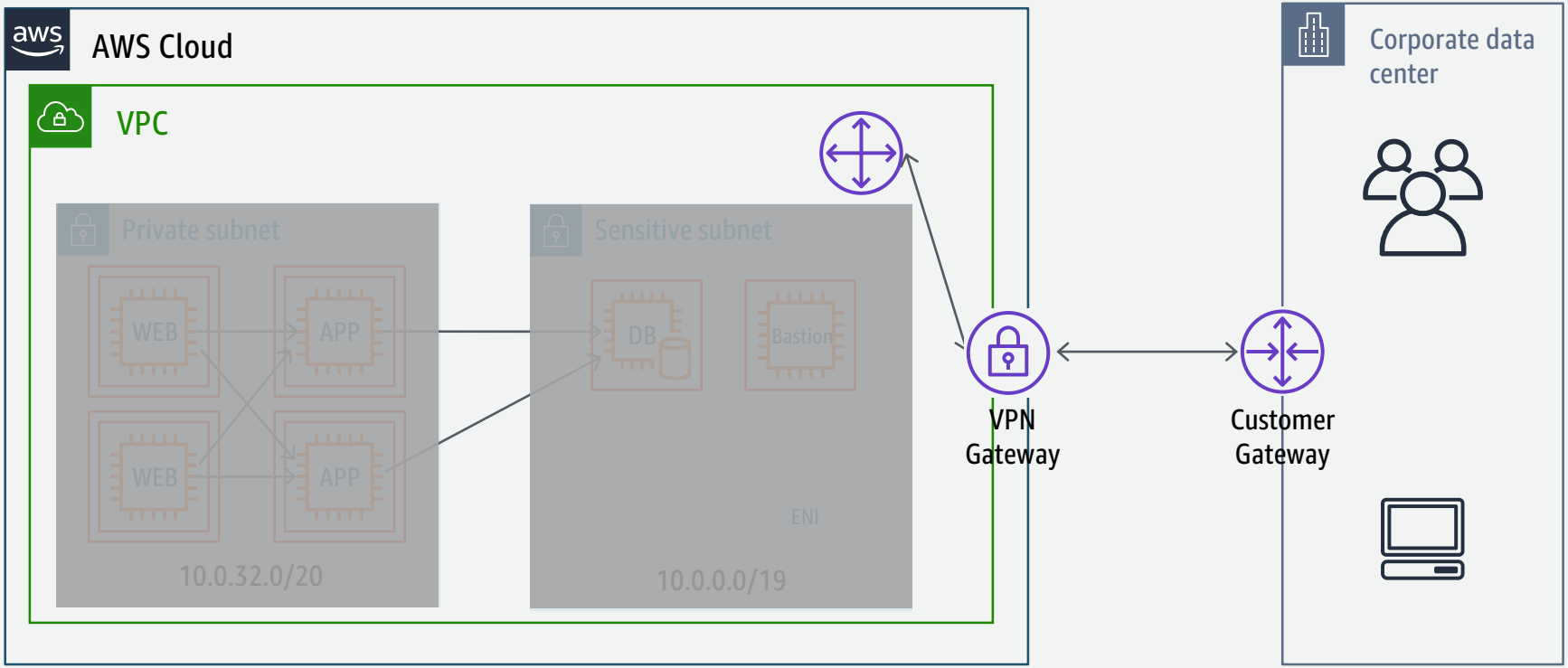
VPN



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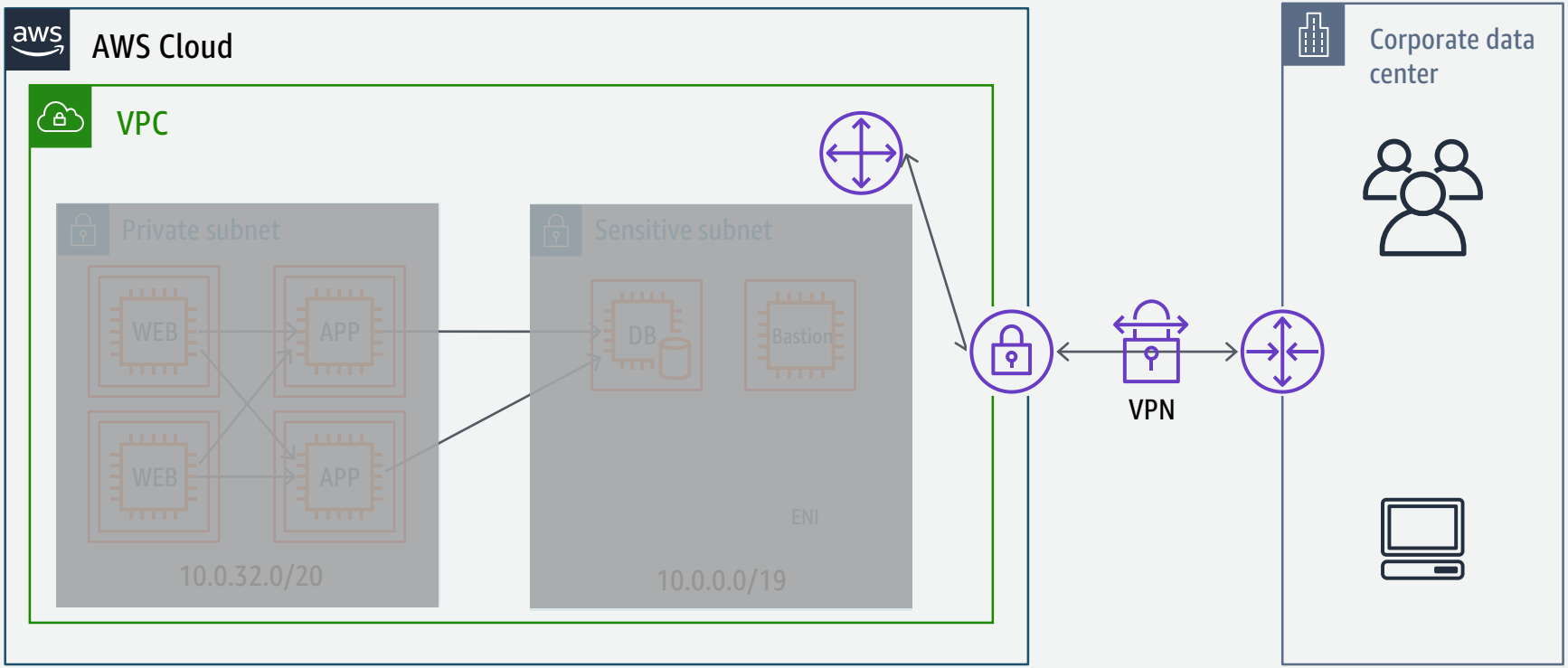
VPN



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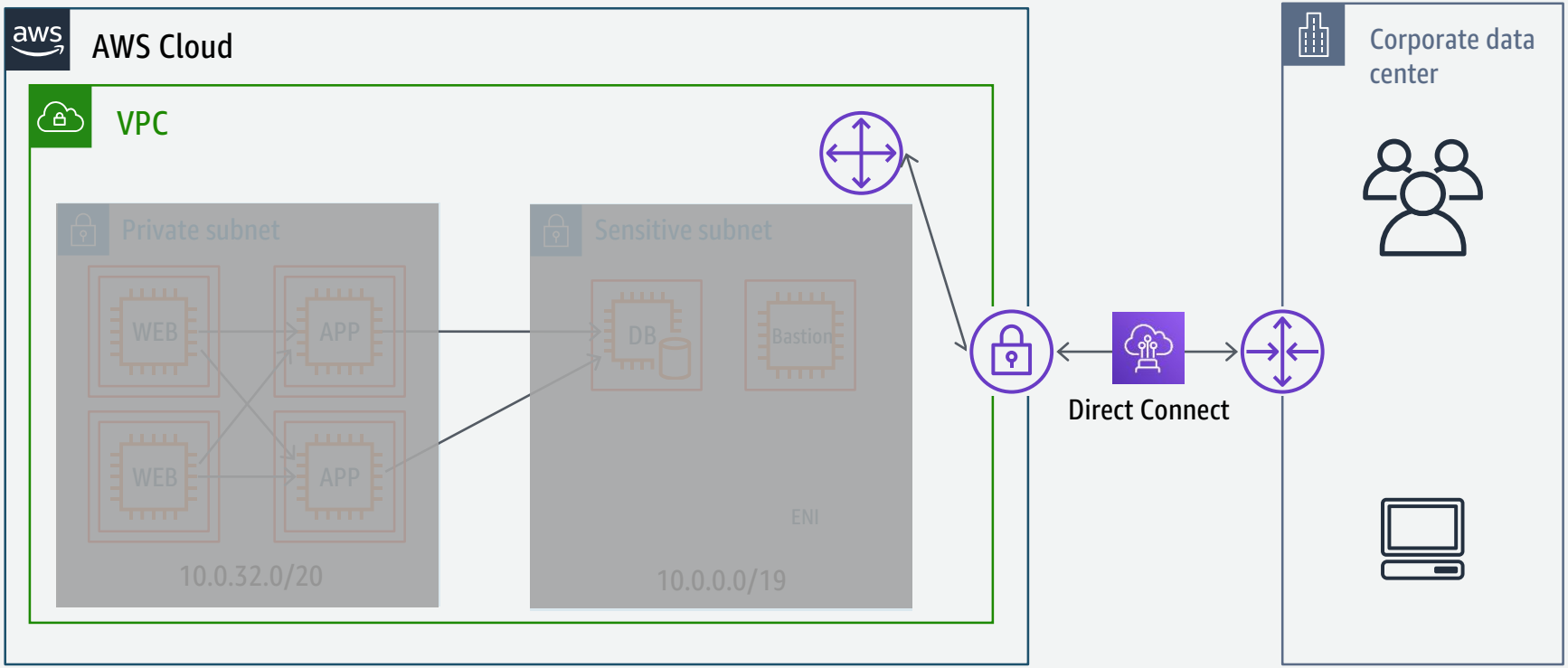
Direct Connect



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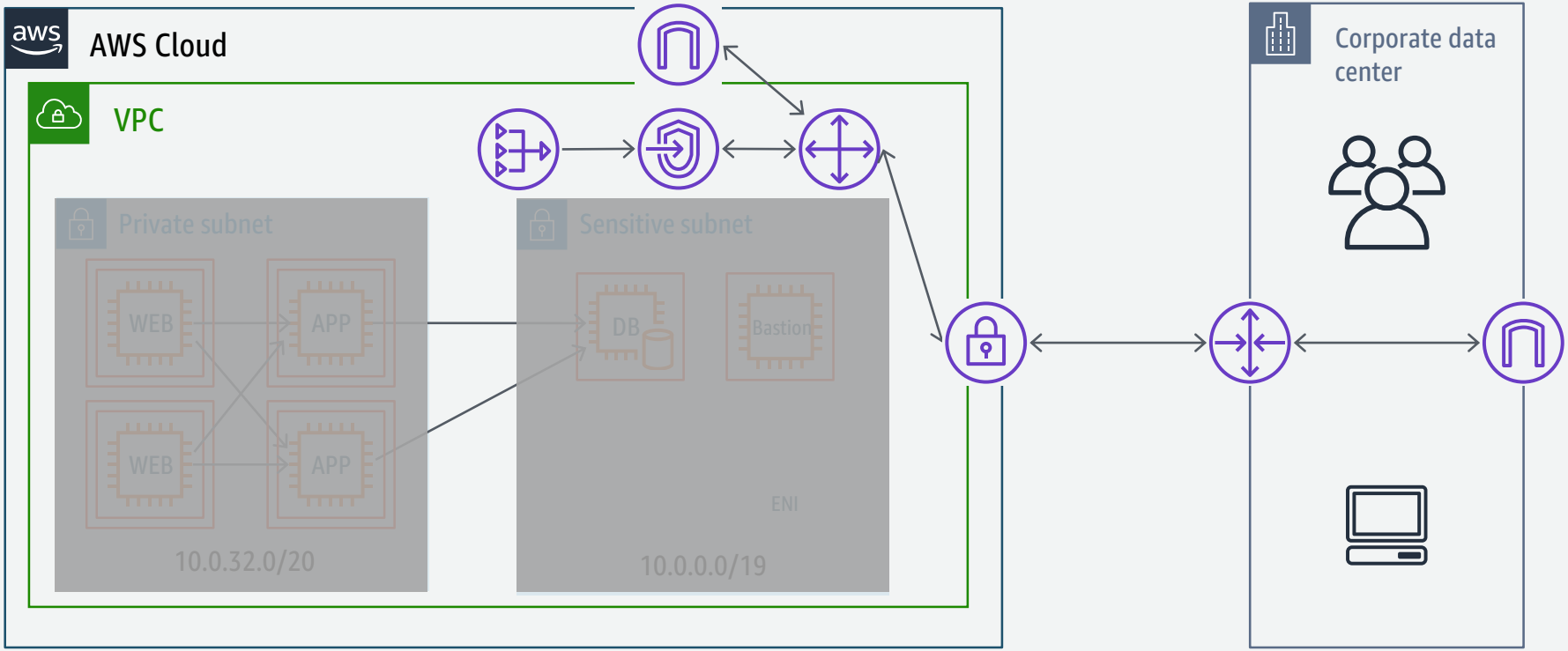
Multiple Gateways



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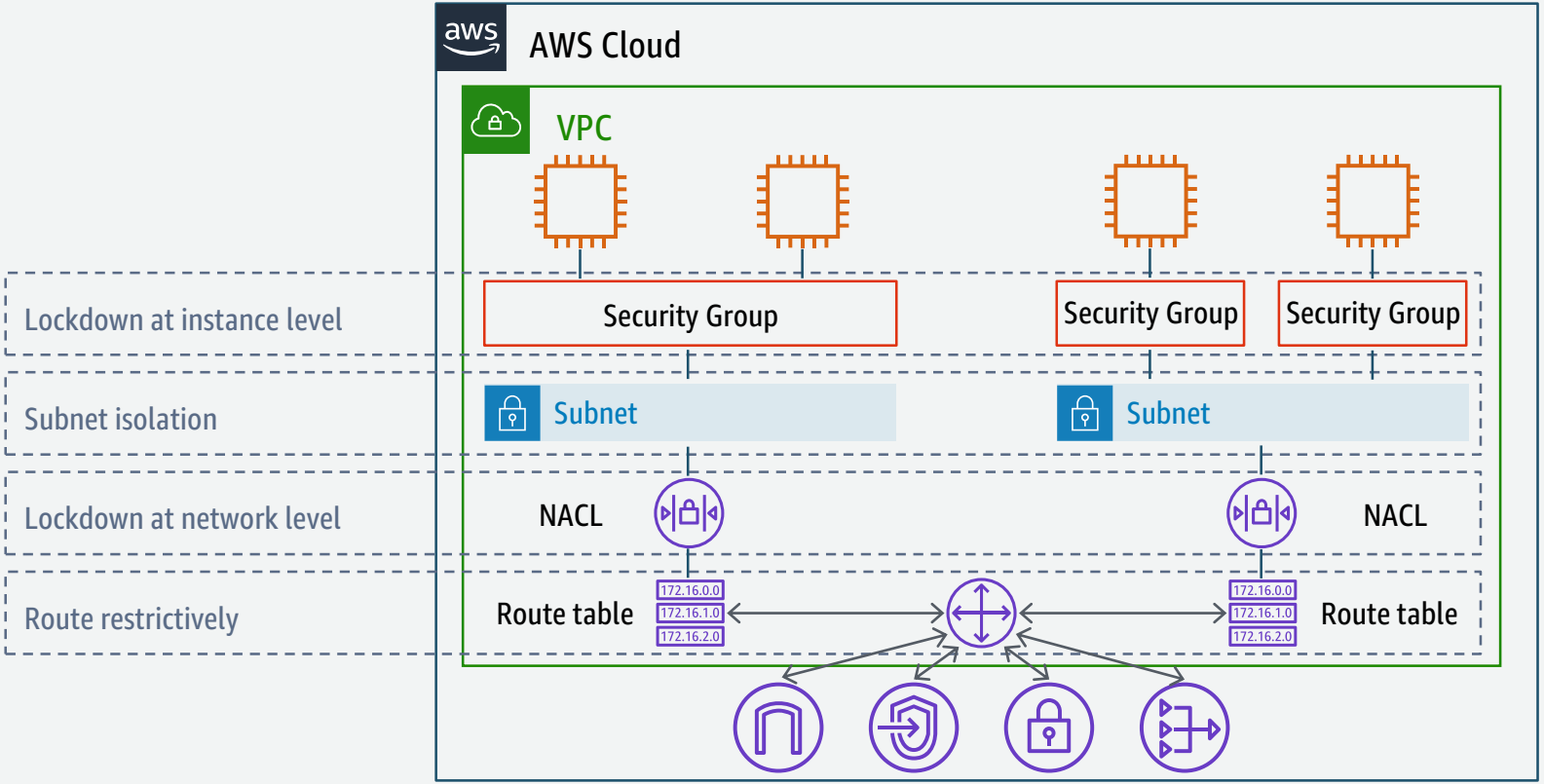
Network Defense in Depth



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Questions?

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