# VPC

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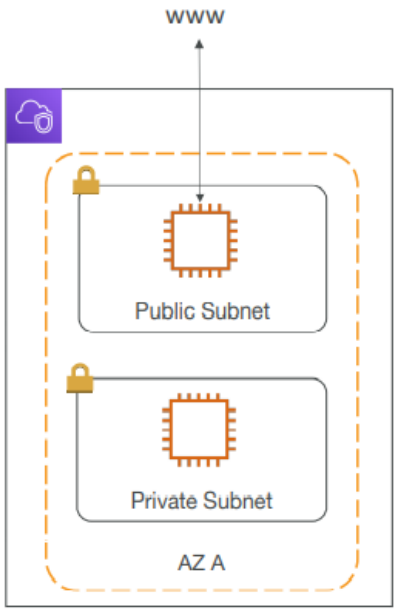
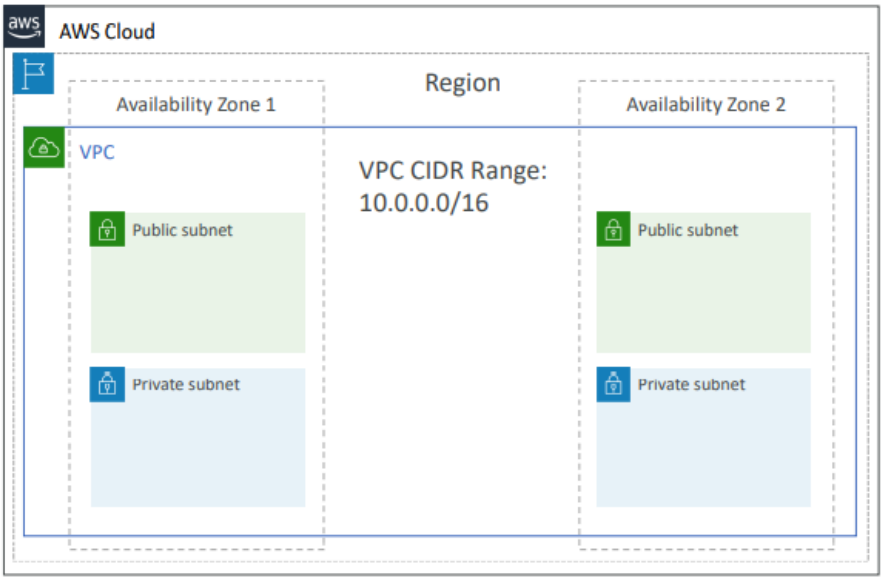
## VPC & Subnets Primer

- **VPC**: private network to deploy your resources (regional resource)
- **Subnets** allow you to partition your network inside your VPC (Availability Zone resource)
- A **public subnet** is a subnet that is accessible from the internet
- A **private subnet** is a subnet that is not accessible from the internet
- To define access to the internet and between subnets, we use **Route Tables**.

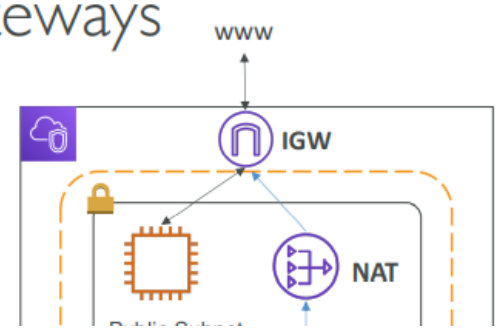



## VPC Diagram

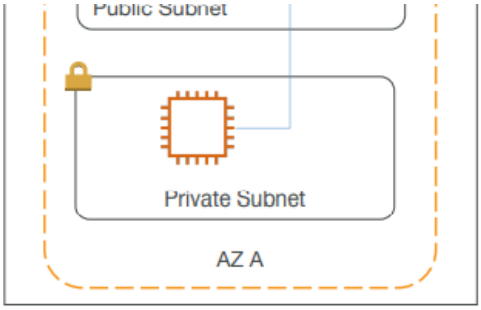



## Internet Gateway & NAT Gateways

- **Internet Gateways** helps our VPC instances connect with the internet
- Public Subnets have a route to the internet gateway.

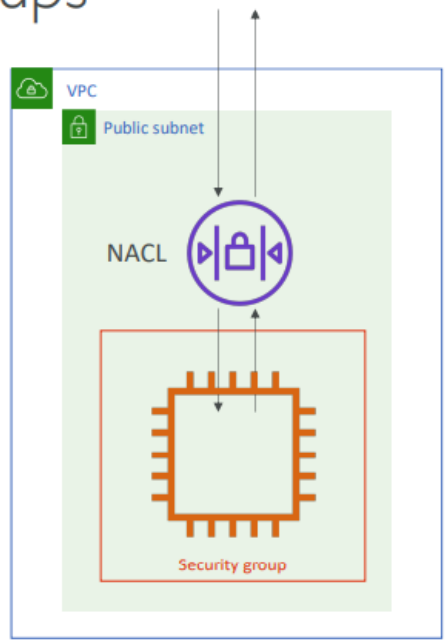


- **NAT Gateways** (AWS-managed) & **NAT Instances** (self-managed) allow your instances in your **Private Subnets** to access the internet while remaining private




# Network ACL & Security Groups

- **NACL** (Network ACL)
  - A firewall which controls traffic from and to subnet
  - Can have ALLOW and DENY rules
  - Are attached at the **Subnet** level
  - Rules only include IP addresses
- **Security Groups**
  - A firewall that controls traffic to and from **an ENI / an EC2 Instance**
  - Can have only ALLOW rules
  - Rules include IP addresses and other security groups




# Network ACLs vs Security Groups

| Security Group | Network ACL |
|---|---|
| Operates at the instance level | Operates at the subnet level |
| Supports allow rules only | Supports allow rules and deny rules |
| Is stateful: Return traffic is automatically allowed, regardless of any rules | Is stateless: Return traffic must be explicitly allowed by rules |
| We evaluate all rules before deciding whether to allow traffic | We process rules in number order when deciding whether to allow traffic |
| Applies to an instance only if someone specifies the security group when launching the instance, or associates the security group with the instance later on | Automatically applies to all instances in the subnets it's associated with (therefore, you don't have to rely on users to specify the security group) |

https://docs.aws.amazon.com/vpc/latest/userguide/VPC_Security.html#VPC_Security_Comparison

# VPC Peering

- Connect two VPC, privately using

AWS' network

- Make them behave as if they were in the same network
- Must not have overlapping CIDR (IP address range)
- VPC Peering connection is **not transitive** (must be established for each VPC that need to communicate with one another)