A **NAT Gateway** (Network Address Translation Gateway) in AWS is a managed service that allows resources in a **private subnet** to connect to the internet or other AWS services, while preventing unsolicited inbound traffic from the internet.

Think of it as a bridge: instances in a private subnet can make outbound requests (e.g., download software updates, connect to APIs), but the outside world cannot directly connect back to them.

Key Points about NAT Gateway

- It is **highly available** within an Availability Zone.

- It **scales automatically** up to 45 Gbps.

- Supports **IPv4 traffic only** (for IPv6, you use an egress-only Internet Gateway).

- Requires an **Elastic IP**.

- Must be created in a **public subnet**.

Steps to Configure NAT Gateway in AWS

1. Set up your VPC and Subnets

- Create a **VPC** (if not already created).

- Create at least:

  - **One public subnet** (with an Internet Gateway attached).

  - **One private subnet** (no direct internet access).

2. Attach an Internet Gateway

- Go to **VPC > Internet Gateways**.

- Create an Internet Gateway and **attach it** to your VPC.

- Update the **public subnet route table** to route internet traffic (`0.0.0.0/0`) to the Internet Gateway.

3. Create a NAT Gateway

- Go to **VPC > NAT Gateways**.

- Choose:

  - **Public subnet** to place the NAT Gateway.

  - **Elastic IP** to associate with it.

- Click **Create NAT Gateway**.

4. Update Route Table for Private Subnet

- Go to **Route Tables** for your private subnet.

- Add a route:

  - Destination: `0.0.0.0/0`

  - Target: **NAT Gateway ID**

- This allows outbound internet traffic from private subnet instances through the NAT Gateway.

5. Test

- Launch an EC2 instance in the private subnet.

- Ensure it has no public IP.

- Try accessing the internet (e.g., run `yum update` or `apt update`).

- It should work via NAT Gateway.

✅ **Summary**:

- Public Subnet → NAT Gateway + Internet Gateway

- Private Subnet → Route through NAT Gateway

- NAT Gateway ensures **outbound internet only** for private resources.