Research & Development (R&D) Document

Secure Networking in Azure – NSG, ASG, IP Management & Network Interface Configuration

Summer Internship Program – Cloud Infra and Security
Submitted By: Sanskar Vishnoi
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1. Network Security Group (NSG)

What is NSG?

A **Network Security Group (NSG)** is used to **filter network traffic** to and from Azure resources within a virtual network. NSGs contain a **list of security rules** that allow or deny inbound/outbound network traffic.

Inbound vs Outbound

- **Inbound Rules:** Control incoming traffic to resources.
- **Outbound Rules:** Control outgoing traffic from resources.

NSG Rule Components:

- **Name**
- **Priority (100–4096)**
- **Source/Destination** (IP/CIDR/Service Tags/ASGs)
- **Port Range**
- **Protocol (TCP/UDP/Any)**
- **Action (Allow/Deny)**

Common Use Cases:

- Allow port 22/3389 for SSH/RDP
- Deny all outbound internet traffic
- Allow only specific IP ranges

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2. Application Security Group (ASG)

What is ASG?

An **ASG** allows you to **group VMs logically**, and apply **NSG rules** to these groups. It acts like a tag for network security purposes.

Benefits:

- No need to manage IPs manually.

- Apply security rules based on logical groupings (e.g., Web, DB).

Example:

- ASG: Web-ASG, VMs: Web-VM1, Web-VM2
- NSG Rule: Allow inbound HTTP traffic to ASG

🔷 3. Public IP Address (PIP)

📌 What is Public IP?

A **Public IP address** allows Azure resources to communicate with the Internet or other Azure regions.

Types:

Type	Description
Dynamic	Assigned when the VM is started
Static	Remains constant until manually changed or deleted

📡 IP SKUs:

- **Basic:** Zone-redundant only within region, no DDoS protection.
- **Standard:** Zone-redundant, includes DDoS protection, supports availability zones.

🔷 4. Allowing Specific IPs and Denying Internet (NSG Example)

✅ Use Case: Allow only office IP 192.168.1.10 to access VM via RDP (3389), deny all internet access

Inbound Rule:

Name	Priority	Source IP	Port	Action
AllowRDP	100	192.168.1.10/32	3389	Allow

Outbound Rule:

Name	Priority	Destination	Port	Action
DenyInternet	200	Internet	Any	Deny

🔷 5. Service Tags

📌 What are Service Tags?

Service tags represent **a group of IP address prefixes** for Microsoft services like AzureCloud, Internet, Storage, etc.

✅ **Example Usage:**

- **Allow outbound access to Azure Storage**:
    - Destination: Storage
    - Action: Allow

🔷 **6. Allocate Static IPs to All VMs**

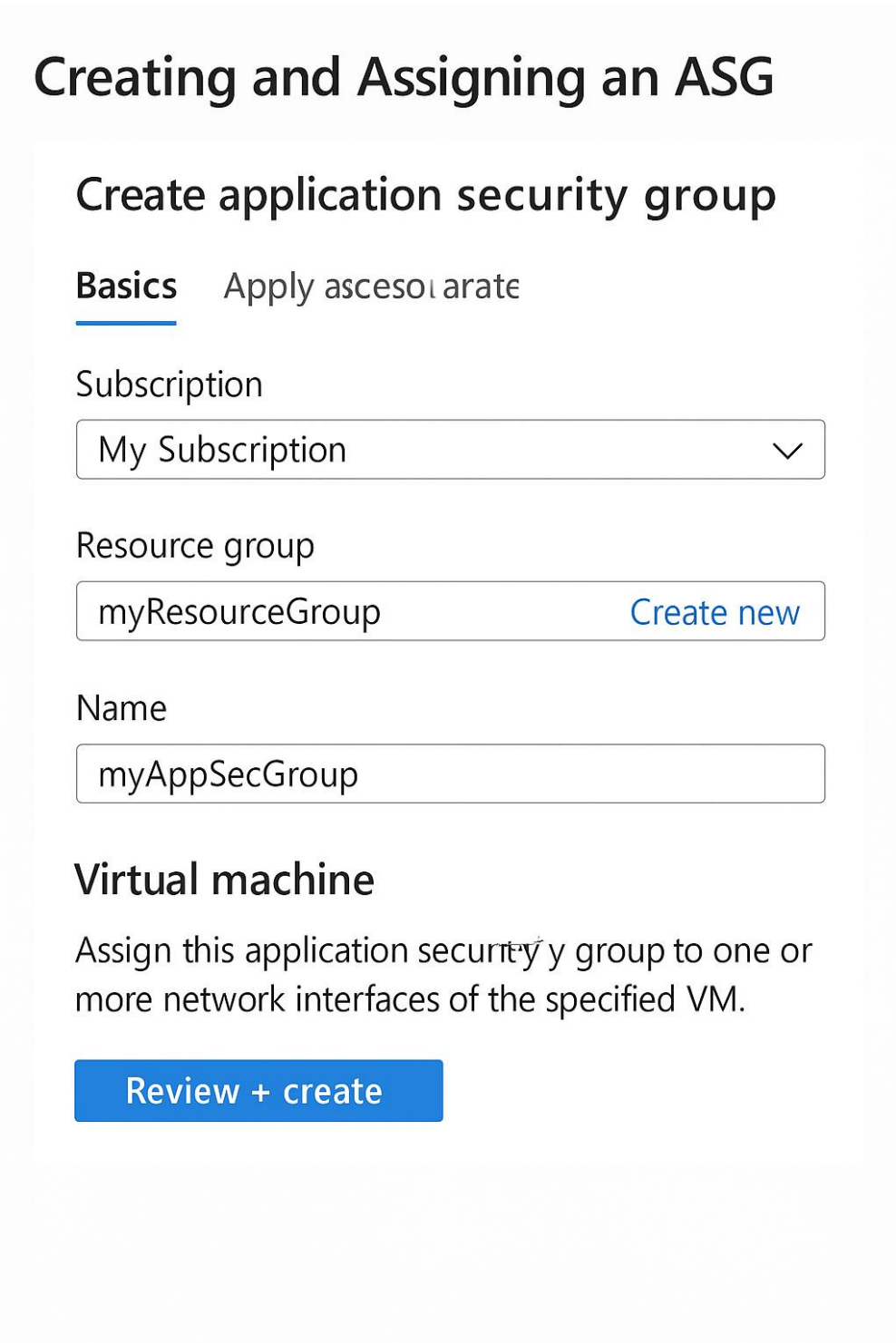
✅ **Steps:**

1. Go to VM → Networking → Network Interface
2. Click IP Configurations → Select existing IP config
3. Change assignment from **Dynamic** to **Static**
4. Save and note the reserved IP

🔷 **7. Creating a Network Security Group**

Azure Portal Steps:

1. Go to "Create a resource" → Networking → **Network Security Group**
2. Provide:
    - Name: NSG-Web
    - Resource Group: Select existing or create new
    - Region: Same as VNet
3. Click **Review + Create**



◈ 8. Creating a Public IP

Steps:

1. Go to "Create a resource" → Networking → **Public IP Address**
2. Provide:
    - Name: MyPublicIP

- SKU: Basic / Standard
- Assignment: Static or Dynamic
- IP Version: IPv4

3. Click **Create**

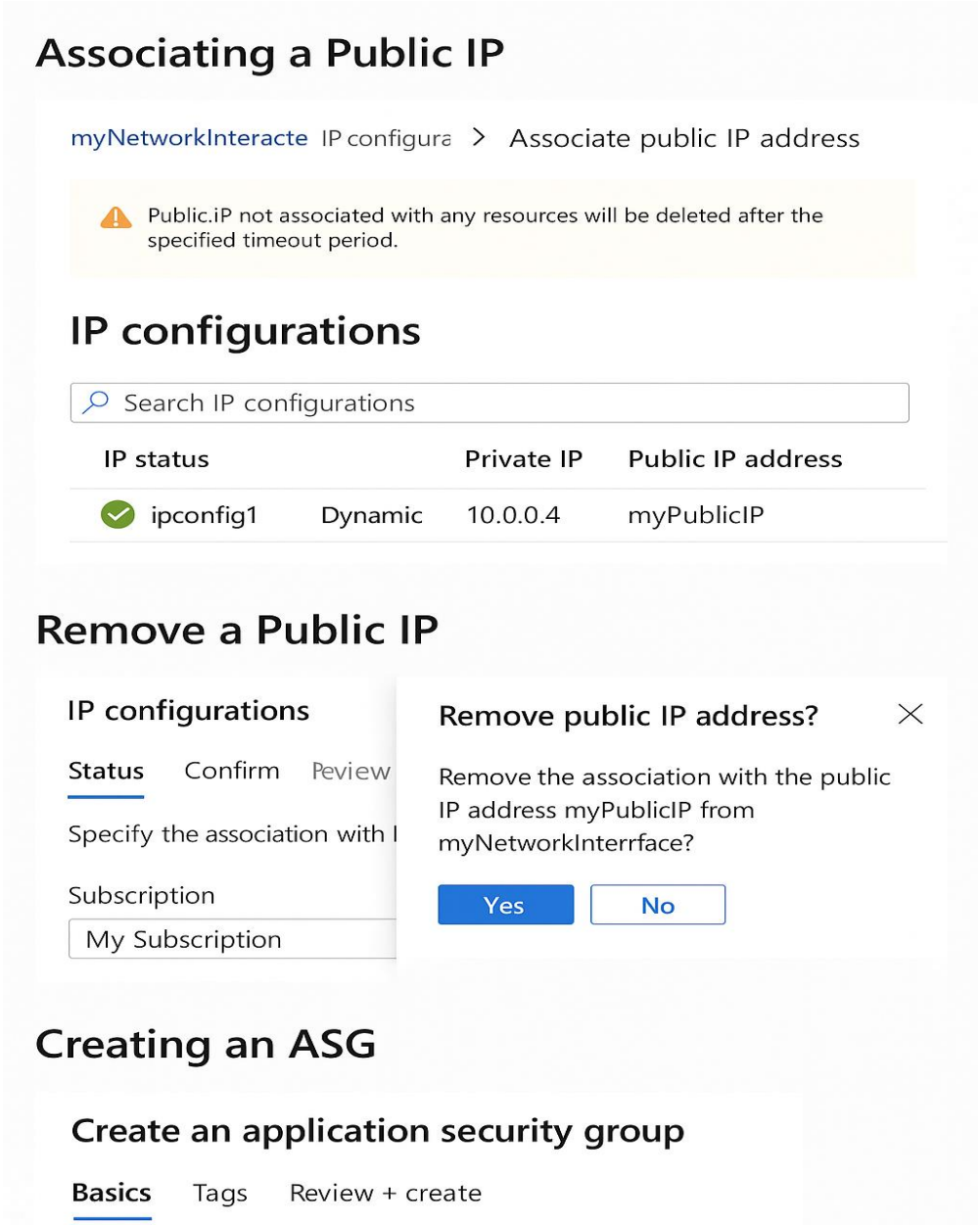
🔷 9. Associating / De-associating Public IP with VM

Associate:

1. Go to VM → Networking → Network Interface
2. IP Configurations → Select IP → Associate Public IP
3. Choose from list or create new

De-associate:

1. Go to same screen



2. Set Public IP to "None" and save

🔷 10. Creating a Network Interface (NIC)

Steps:

1. Go to "Create a resource" → Networking → **Network Interface**
2. Input:
    - Name: NIC-VM1
    - Virtual Network & Subnet: Select existing
    - Public IP: Associate if needed

- NSG: Attach if created

3. Click **Create**

Summary Table

Feature	Purpose	Portal Path
NSG	Allow/Deny traffic	Networking → NSG
ASG	Logical grouping of VMs	Networking → ASG
Public IP (Static)	Constant external access to VM	Networking → Public IP → Assignment: Static
Service Tags	Predefined IP sets for MS services	NSG Rules → Destination: Service Tag
Static IP to VM	Keep IP constant across reboots	VM → Network Interface → IP Config
Network Interface	Interface to connect VM to VNet	Create → Network Interface

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