**R&D Document: Creating and Verifying Internal and External Load Balancers in Azure**

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**1. Introduction**

This document provides a comprehensive guide to creating and verifying both internal and external load balancers in Azure. Load balancers are essential for distributing incoming network traffic across multiple servers, ensuring high availability and reliability.

**2. Prerequisites**

* An active Azure subscription.
* Azure CLI installed and configured.
* Basic knowledge of Azure networking and virtual machines.

**3. Creating an Internal Load Balancer**

**Step 1: Create Virtual Network and Subnet**

**Azure Portal:**

1. Navigate to **Virtual networks** and click **Add**.
2. Fill in the required details (name, address space, etc.).
3. Create a subnet within the virtual network.

**Azure CLI:**

sh

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az network vnet create --name MyVnet --resource-group MyResourceGroup --address-prefix 10.0.0.0/16 --subnet-name MySubnet --subnet-prefix 10.0.0.0/24

**Step 2: Create Virtual Machines**

**Azure Portal:**

1. Navigate to **Virtual machines** and click **Add**.
2. Fill in the required details and select the virtual network and subnet created earlier.
3. Repeat to create additional VMs for the backend pool.

**Azure CLI:**

sh

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az vm create --resource-group MyResourceGroup --name MyVM1 --image UbuntuLTS --vnet-name MyVnet --subnet MySubnet --admin-username azureuser --generate-ssh-keys

az vm create --resource-group MyResourceGroup --name MyVM2 --image UbuntuLTS --vnet-name MyVnet --subnet MySubnet --admin-username azureuser --generate-ssh-keys

**Step 3: Create Internal Load Balancer**

**Azure Portal:**

1. Navigate to **Load balancers** and click **Add**.
2. Fill in the required details, select **Internal** for the SKU, and choose the virtual network and subnet.
3. Create a backend pool and associate the VMs.
4. Create a health probe.
5. Create a load balancing rule.

**Azure CLI:**

sh

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az network lb create --resource-group MyResourceGroup --name MyInternalLB --vnet-name MyVnet --subnet MySubnet --sku Basic --frontend-ip-name MyFrontendIP --backend-pool-name MyBackendPool

az network lb probe create --resource-group MyResourceGroup --lb-name MyInternalLB --name MyHealthProbe --protocol tcp --port 80

az network lb rule create --resource-group MyResourceGroup --lb-name MyInternalLB --name MyLBRules --protocol tcp --frontend-port 80 --backend-port 80 --frontend-ip-name MyFrontendIP --backend-pool-name MyBackendPool --probe-name MyHealthProbe

**Step 4: Verify Internal Load Balancer**

**Azure Portal:**

1. Connect to one of the VMs in the subnet.
2. Use curl to access the internal IP address of the load balancer to verify it's distributing traffic.

**Azure CLI:**

sh

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az network lb frontend-ip show --resource-group MyResourceGroup --lb-name MyInternalLB --name MyFrontendIP --query privateIpAddress

ssh azureuser@<Private-IP-Address-of-VM>

curl <Internal-LB-IP-Address>

**4. Creating an External Load Balancer**

**Step 1: Create Public IP Address**

**Azure Portal:**

1. Navigate to **Public IP addresses** and click **Add**.
2. Fill in the required details and create the public IP address.

**Azure CLI:**

sh

Copy code

az network public-ip create --resource-group MyResourceGroup --name MyPublicIP

**Step 2: Create Virtual Machines (if not already created)**

Follow the steps mentioned earlier to create VMs in the same or a different subnet.

**Step 3: Create External Load Balancer**

**Azure Portal:**

1. Navigate to **Load balancers** and click **Add**.
2. Fill in the required details, select **Public** for the SKU, and associate the public IP address.
3. Create a backend pool and associate the VMs.
4. Create a health probe.
5. Create a load balancing rule.

**Azure CLI:**

sh

Copy code

az network lb create --resource-group MyResourceGroup --name MyExternalLB --public-ip-address MyPublicIP --frontend-ip-name MyFrontendIP --backend-pool-name MyBackendPool

az network lb probe create --resource-group MyResourceGroup --lb-name MyExternalLB --name MyHealthProbe --protocol tcp --port 80

az network lb rule create --resource-group MyResourceGroup --lb-name MyExternalLB --name MyLBRules --protocol tcp --frontend-port 80 --backend-port 80 --frontend-ip-name MyFrontendIP --backend-pool-name MyBackendPool --probe-name MyHealthProbe

**Step 4: Verify External Load Balancer**

**Azure Portal:**

1. Get the public IP address of the load balancer.
2. Open a browser or use curl to access the public IP address to verify it's distributing traffic.

**Azure CLI:**

sh

Copy code

az network public-ip show --resource-group MyResourceGroup --name MyPublicIP --query ipAddress

curl <External-LB-IP-Address>

**5. Conclusion**

Creating and verifying both internal and external load balancers in Azure ensures efficient traffic distribution and high availability for your applications. By following the steps outlined in this document, you can successfully set up and test load balancers for your virtual machines.

**6. References**

* [Azure Load Balancer Documentation](https://docs.microsoft.com/en-us/azure/load-balancer/)
* [Azure CLI Documentation](https://docs.microsoft.com/en-us/cli/azure/install-azure-cli)