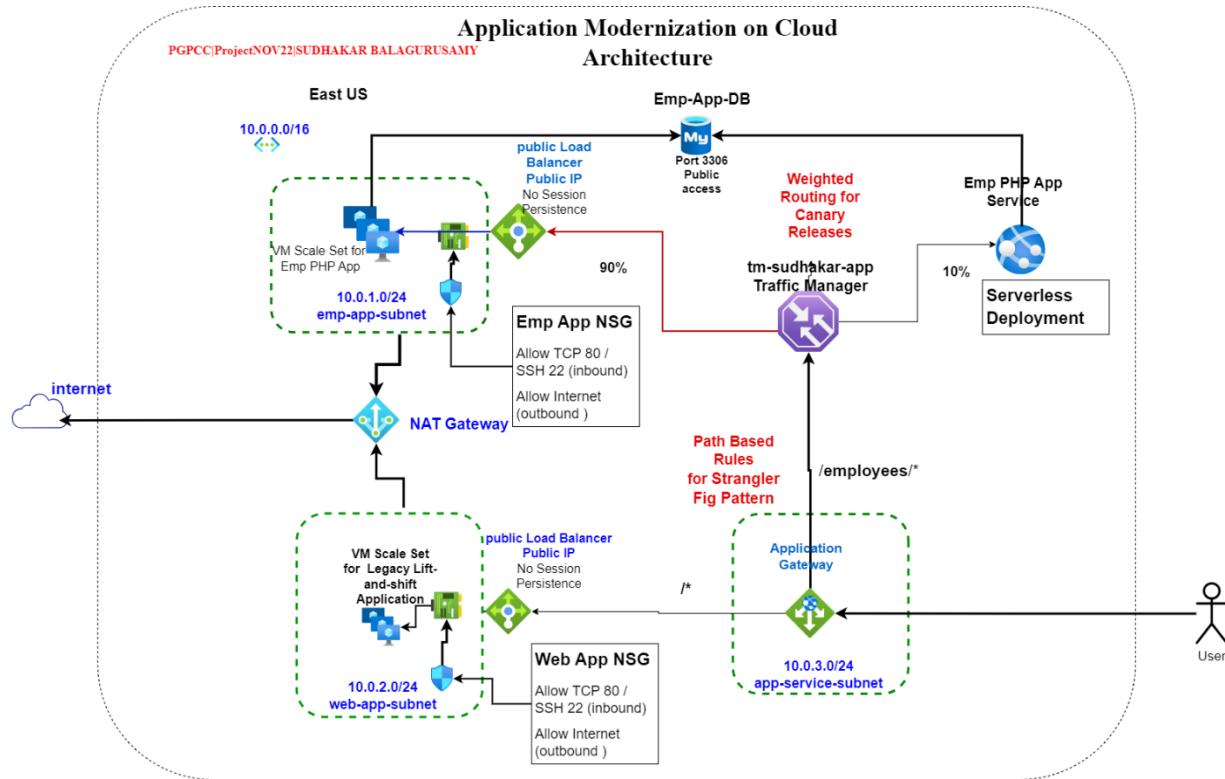


Architecture Diagram



Deployment of Application Gateway, Traffic Manager, Load Balancers, VM Scale Sets, Flexible MySQL Server database and App Service.

This project demonstrates the use of various Azure resources in implementing the following key software design patterns and ideas.

Strangler Fig Pattern	Application Gateway can be used for gradual migration from legacy systems to modern systems based on Path based Rules .
Canary Releases	Traffic manager can be used for canary releases based on weighted Routing method .
Elasticity	VM scale sets can be used to scale out /in based on loads/performance metrics.
Load Balancer	Public load balancer can be used with Traffic Manager. Both Public & Private load balancer can be used in Application Gateway. Session Affinity/persistence can be enabled or disabled.
Serverless Deployment	PHP Web Application is deployed on App Service Plans using Git Hub Workflow .
Lift And Shift Cases	Legacy applications can be run in VM Scale set with the appropriate OS and runtime binaries.

A virtual network of address prefix 10.0.0.0/16 is created with 3 subnets with the address prefixes of 10.0.1.0/24 (SNEmpApp), 10.0.2.0/24 (SNWebApp), and 10.0.3.0/24. A NAT gateway is deployed and associated with the SNEmpApp and SNWebApp subnets. A Flexible MySQL server database is created, and its firewall is configured to provide access to all sources and all Azure Services. An Ubuntu VM Scale set is deployed in the first subnet along with a public load balancer. The Employee-app Cloud-Init Script sets up a PHP web application. (<https://github.com/blue-hills/azproject2>) Another Ubuntu VM Scale set is deployed in the second subnet along with a public load balancer. The Web-App Cloud-Init Script deploys a load simulation application.

(<https://whitesnowstore.blob.core.windows.net/azproject2/simuapp2.zip>) The NSGs (assigned to VM Scale Set NIC) are configured to allow the inbound ports 80 and 22 and allow outbound internet connections.

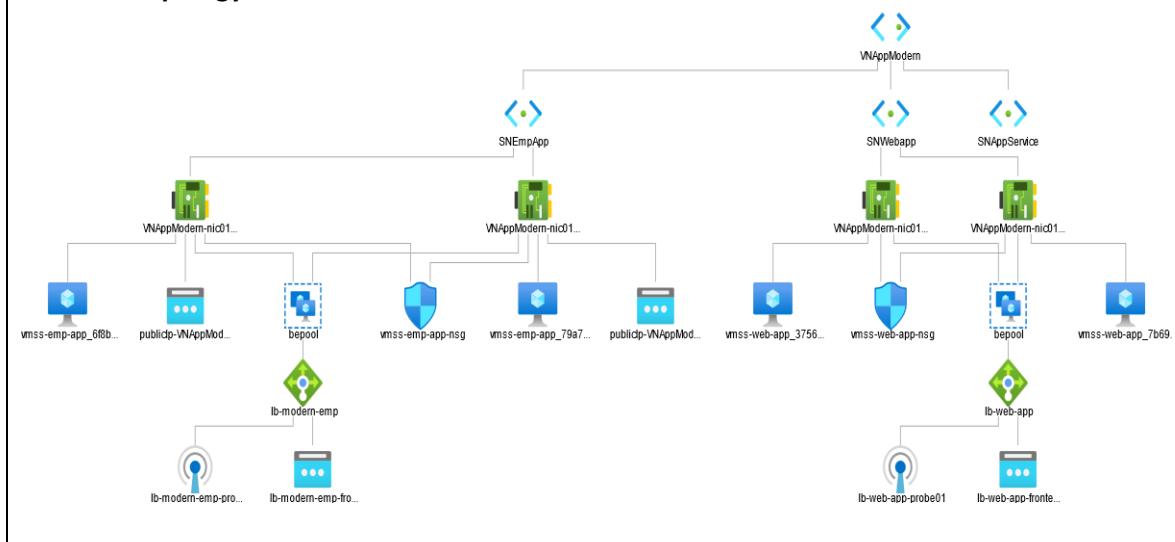
A Serverless PHP web application is deployed in an Azure App service plan using the Git Hub workflow. (<https://github.com/blue-hills/azproject2>)

A Traffic manager is deployed to route the requests to the Emp APP VM Scale set and the App Service. It is configured to use the weighted Routing method (90% to VM SS and 10% to App Service). This is useful for canary releases.

An Application Gateway is deployed in the SNAp Subnet to route the requests to the Traffic Manager and the Web-App Load Balancer based on the URL Path Based Routing Rules. This allows us to implement Fig Strangler pattern. Requests with the suffix of '/employees/*' are routed to Traffic Manager and others with the suffix of /* are routed to Web-App Load Balancer.

Subnets	Associated Azure Resources
10.0.1.0/24 – SNEmpApp	VM Scale set (vmss-emp-app), NIC, Load Balancer (lb-modern-emp) , IP address
10.0.2.0/24 – SNWebApp	VM Scale set (vmss-web-app), NIC, Load Balancer (lb-web-app) , IP address
10.0.3.0/24 – SNAp	Application Gateway

Network Topology



Workflow Steps

Step1: Create a Resource Group: RGAppModern

Using Azure Portal Create a new resource group.

The screenshot shows the 'Create a resource group' wizard in the Azure portal. The 'Basics' tab is selected. In the 'Project details' section, 'Subscription' is set to 'WhiteSnow' and 'Resource group' is set to 'RGAppModern'. In the 'Resource details' section, 'Region' is set to '(US) East US'. At the bottom, there are buttons for 'Review + create', '< Previous', and 'Next : Tags >'.

Step2: Create a VNet with the address prefix of 10.0.0.0/16

Create a Virtual Network VNAppModern with the following subnets.

Subnet	Address Range
SNEmpApp	10.0.1.0 - 10.0.1.255
SNWebApp	10.0.2.0 - 10.0.2.255
SNApplService	10.0.3.0 - 10.0.3.255

Microsoft Azure

Search resources, services, and docs (G+/-)

Home > RGAppModern > Marketplace >

Create virtual network ...

Basics Security IP addresses Tags Review + create

Azure Virtual Network (VNet) is the fundamental building block for your private network in Azure. VNet enables many types of Azure resources, such as Azure Virtual Machines (VM), to securely communicate with each other, the internet, and on-premises networks. VNet is similar to a traditional network that you'd operate in your own data center, but brings with it additional benefits of Azure's infrastructure such as scale, availability, and isolation.

[Learn more.](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * WhiteSnow

Resource group * RGAppModern

[Create new](#)

Instance details

Virtual network name * VNAppModern

Region ⓘ * (US) East US

[Deploy to an edge zone](#)

Microsoft Azure Search resources, services, and docs (G+/-)

Home > RGAppModern > Marketplace >

Create virtual network

Basics Security IP addresses Tags Review + create

Configure your virtual network address space with the IPv4 and IPv6 addresses and subnets you need. [Learn more](#)

Define the address space of your virtual network with one or more IPv4 or IPv6 address ranges. Create subnets to segment the virtual network address space into smaller ranges for use by your applications. When you deploy resources into a subnet, Azure assigns the resource an IP address from the subnet. [Learn more](#)

Add IPv4 address space | ▾

10.0.0.0/16		Delete address space	
10.0.0.0	/16 (65,536 addresses) ▾		
10.0.0.0 - 10.0.255.255 (65536 addresses)			
Add a subnet			
Subnets	IP address range	Size	NAT gateway
SNEmpApp	10.0.1.0 - 10.0.1.255	/24 (256 addresses)	-
SNWebapp	10.0.2.0 - 10.0.2.255	/24 (256 addresses)	-
SNApplService	10.0.3.0 - 10.0.3.255	/24 (256 addresses)	-

Previous Next Review + create Give feedback

Home > VNAppModern

VNAppModern | Subnets

Virtual network

+ Subnet + Gateway subnet Refresh | Manage users Delete

Search subnets

Name ↑↓	IPv4 ↑↓	IPv6 ↑↓	Available IPs ↑↓	Delegated to ↑↓	Security group
SNEmpApp	10.0.1.0/24	-	251	-	-
SNWebapp	10.0.2.0/24	-	251	-	-
SNApplService	10.0.3.0/24	-	251	-	-

Step 3: Create a NAT gateway for outbound internet traffic and attach to SNEmpApp and SNWebApp subnets.

Using the Portal, create a NAT gateway in RGModernApp Resource group and attach to SNEmpApp ,SNWebApp, SNAppService subnets

The screenshot shows the Azure portal interface for creating a NAT gateway. The top navigation bar includes 'Microsoft Azure', a search bar, and user information 'WhiteSnow@aol.com DEFAULT DIRECTORY (WHITESN...).'. The breadcrumb path is 'Home > RGAppModern > Marketplace > Create network address translation (NAT) gateway'. The main title is 'Create network address translation (NAT) gateway'. A warning message states: 'Changing Basic options may reset selections you have made. Review all options prior to creating the resource.' Below this are tabs for 'Basics', 'Outbound IP', 'Subnet', 'Tags', and 'Review + create'. The 'Basics' tab is selected. A note says: 'Azure NAT gateway can be used to translate outbound flows from a virtual network to the public internet.' with a link 'Learn more about NAT gateways.'. The 'Project details' section shows a subscription 'WhiteSnow' and a resource group 'RGAppModern'. The 'Instance details' section includes fields for 'NAT gateway name' (set to 'ngw-modern'), 'Region' (set to 'East US'), 'Availability zone' (set to 'No Zone'), and 'TCP idle timeout (minutes)' (set to '4'). The 'Outbound IP' tab is selected in the second part of the screenshot. It shows a table with one row: 'Public IP addresses' containing '(New) ip-ngw' and a link 'Create a new public IP address'. The 'Public IP Prefixes' section shows '0 selected' and a link 'Create a new public IP prefix'.

Home > RGAppModern > Marketplace >

Create network address translation (NAT) gateway

Basics Outbound IP Subnet Tags Review + create

To use the NAT gateway, at least one subnet must be selected. You can add and remove subnets after creating the NAT gateway.

Virtual network ⓘ

VNApModem
Create new

Subnets that have any of the following resources are not shown because they are not compatible:

- A load balancer with a Basic SKU
- A public IP address with a Basic SKU
- An IPv6 address space
- An existing NAT gateway
- A virtual network gateway

<input checked="" type="checkbox"/> Subnet name	Subnet address range
SNEmpApp	10.0.1.0/24
SNWebapp	10.0.2.0/24
SNApService	10.0.3.0/24

[Manage subnets >](#)

Microsoft Azure Search resources, services, and docs (G+/-) WhiteSnow@ao.cc DEFAULT DIRECTORY (WHITESNOW)

ngw-modern NAT gateway

Overview Activity log Access control (IAM) Tags Diagnose and solve problems Settings Outbound IP Subnets Configuration Properties Locks Monitoring

Resource group (move) : RGAppModern Location : East US Subscription (move) : WhiteSnow Subscription ID : 37427082-8987-4090-a942-f4eed9e71741 Tags (edit) : Click here to add tags

Virtual network : VNApModem Subnets : 3 Public IP addresses : 1 Public IP prefixes : 0

Configure outbound IP addresses Configure which public IP addresses and public IP prefixes to use for outbound connectivity.

Configure subnets Configure which subnets of a virtual network should use this NAT gateway.

Step 4: Create an Azure Database for MySQL Flexible Server

4.1 Create the database using the portal.

4.2 Disable the 'require_secure_transport' using Server Parameters link on the MySQL flexible server

4.3 Get the connection String from the MySQL server Connect Panel

Microsoft Azure Search resources, services, and docs (G+) Home Create a resource Marketplace WhiteSnow@aol.com DEFAULT DIRECTORY (WHITESN...)

Flexible server

Microsoft

High availability

Same zone and zone redundant high availability provide additional server resilience in the event of a failure. You can also specify high availability options in 'Compute + storage'.

Enable high availability

Authentication

Select the authentication methods you would like to support for accessing this MySQL server. MySQL password authentication allows you to create and use a ROLES (usernames) and use a password to authenticate. Enabling Azure Active Directory authentication allows you to create ROLES based on your Azure Active Directory accounts and generate an authentication token with which to authenticate. [Learn more](#)

Authentication method MySQL authentication only Azure Active Directory authentication only MySQL and Azure Active Directory authentication

Admin username * ✓

Password * ✓

Confirm password * ✓

Compute Sku **USD 6.21/month**

Standard_B1s (1 vCore) 6.21

Storage **USD 2.30/month**

Storage selected 20 GiB (USD 0.12 per GiB) 20 x 0.12

Backup Retention

Backup retention is billed based on additional storage used for retaining backups. [Learn more](#)

Bandwidth

For outbound data transfer across services in different regions will incur additional charges. Any inbound data transfer is free. [Learn more](#)

Estimated total **USD 8.50/month**

Prices reflects an estimates only. [View Azure pricing calculator](#). Final charges will appear in your local currency in cost analysis and billing views.

Review + create **Next : Networking >**

Microsoft Azure Search resources, services, and docs (G+) 1 Settings WhiteSnow@aol.com DEFAULT DIRECTORY \WHITESN...

Home > Create a resource > Marketplace >

Flexible server

Microsoft

Network connectivity

You can connect to your server by specifying a public IP address, creating private endpoints or from within a selected virtual network.

Connectivity method Public access (allowed IP addresses) and Private endpoint Private access (VNet Integration)

Estimated costs

Compute Sku USD 6.21/month
Standard_B1s (1 vCore) 6.21

Storage USD 2.30/month
Storage selected 20 GiB (USD 0.12 per GiB) 20 x 0.12

Backup Retention
Backup retention is billed based on additional storage used for retaining backups. [Learn more ↗](#)

Bandwidth
For outbound data transfer across services in different regions will incur additional charges. Any inbound data transfer is free. [Learn more ↗](#)

Estimated total USD 8.50/month

Prices reflects an estimates only. [View Azure pricing calculator. ↗](#)
Final charges will appear in your local currency in cost analysis and billing views.

Public access

Allow public access to this resource through the internet using a public IP address [\(1\)](#)

Firewall rules

Inbound connections from the IP addresses specified below will be allowed to port 3306 on this server. [Learn more ↗](#)

Allow public access from any Azure service within Azure to this server [\(1\)](#)

+ Add current client IP address (73.159.171.229) + Add 0.0.0 - 255.255.255.255

Firewall rule name	Start IP address	End IP address
Firewall rule name	Start IP address	End IP address

Private endpoint (preview)

Review + create [< Previous](#) [Next : Security >](#)

Microsoft Azure Search resources, services, and docs (G+) WhiteSnow@aol.com DEFAULT DIRECTORY (WHITESN...)

Home > RGAppModern > appmodern

Overview Activity log Access control (IAM) Tags Diagnose and solve problems Learning center

Settings Compute + storage Networking Databases Connect Server parameters Replication Maintenance High availability Backup and restore Advisor recommendations Locks Power Platform Power BI Security

Connect View process list Delete Reset password Restore Restart Stop Refresh Feedback

Azure Database for MySQL – Live Webinar series: Learn about the latest updates (with demos) and interact directly with product group on the 2nd Wednesday every month! [Subscribe to our YouTube channel](#) today!

Essentials

Subscription ([move](#)) [WhiteSnow](#)
Subscription ID 37427082-8987-4090-a942-f4eed9e71741
Resource group ([move](#)) [RGAppModern](#)

Status Available Location East US

Server name appmodern.mysql.database.azure.com
Server admin login name appadmin
Configuration [Burstable_B1s_1 vCore, 1 GiB RAM, 20 storage, 360 IOPS](#)
MySQL version 8.0
Availability zone 1
Created On 2023-06-28 00:53:32.746443 UTC

Tags ([edit](#)) [Click here to add tags](#)

Getting started Properties Recommendations Monitoring Tutorials

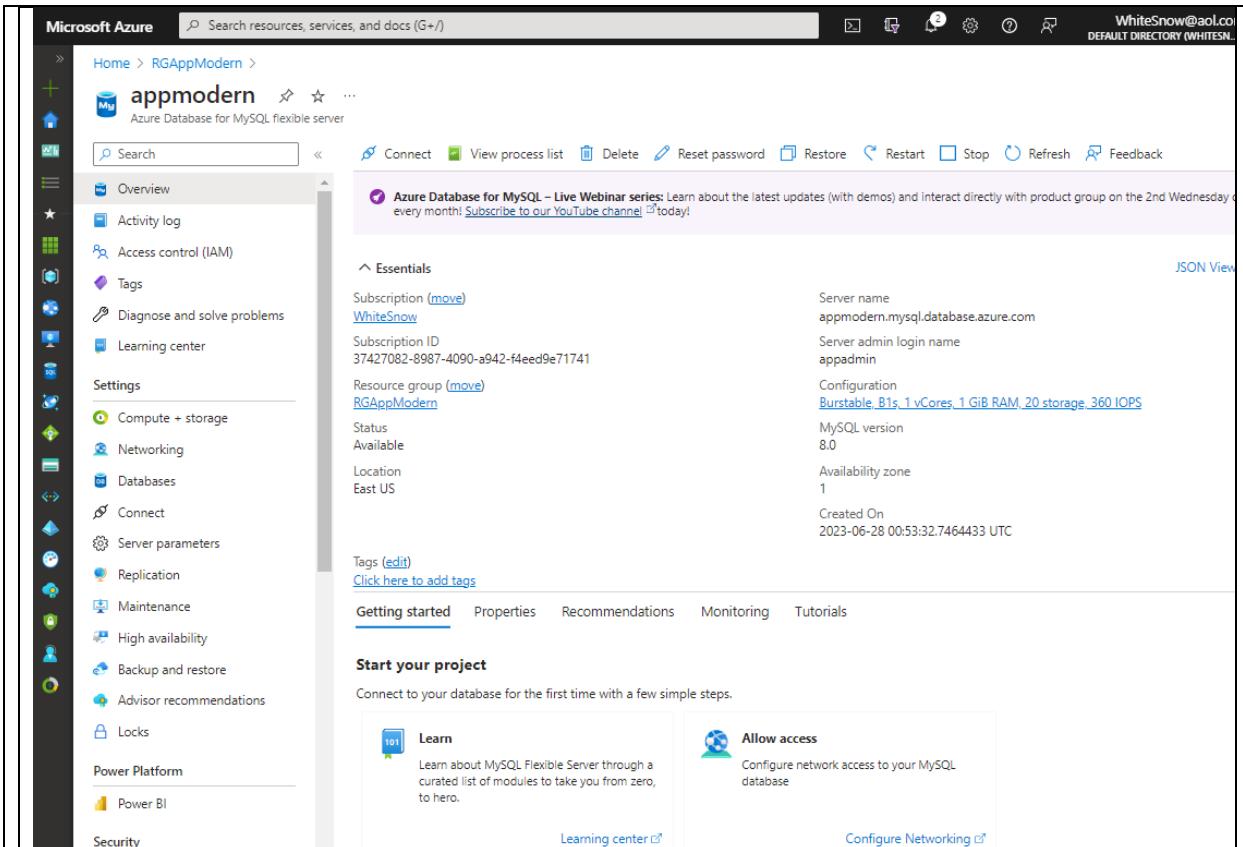
Start your project

Connect to your database for the first time with a few simple steps.

Learn Configure network access to your MySQL database

Learning center [Configure Networking](#)

JSON View



Disable require_secure_transport in Server Parameters page to relax the SSL/TLS connection restrictions

Microsoft Azure Search resources, services, and docs (G+) WhiteSnow@aol.com DEFAULT DIRECTORY (WHITESN...)

Home > appmodern

appmodern | Server parameters

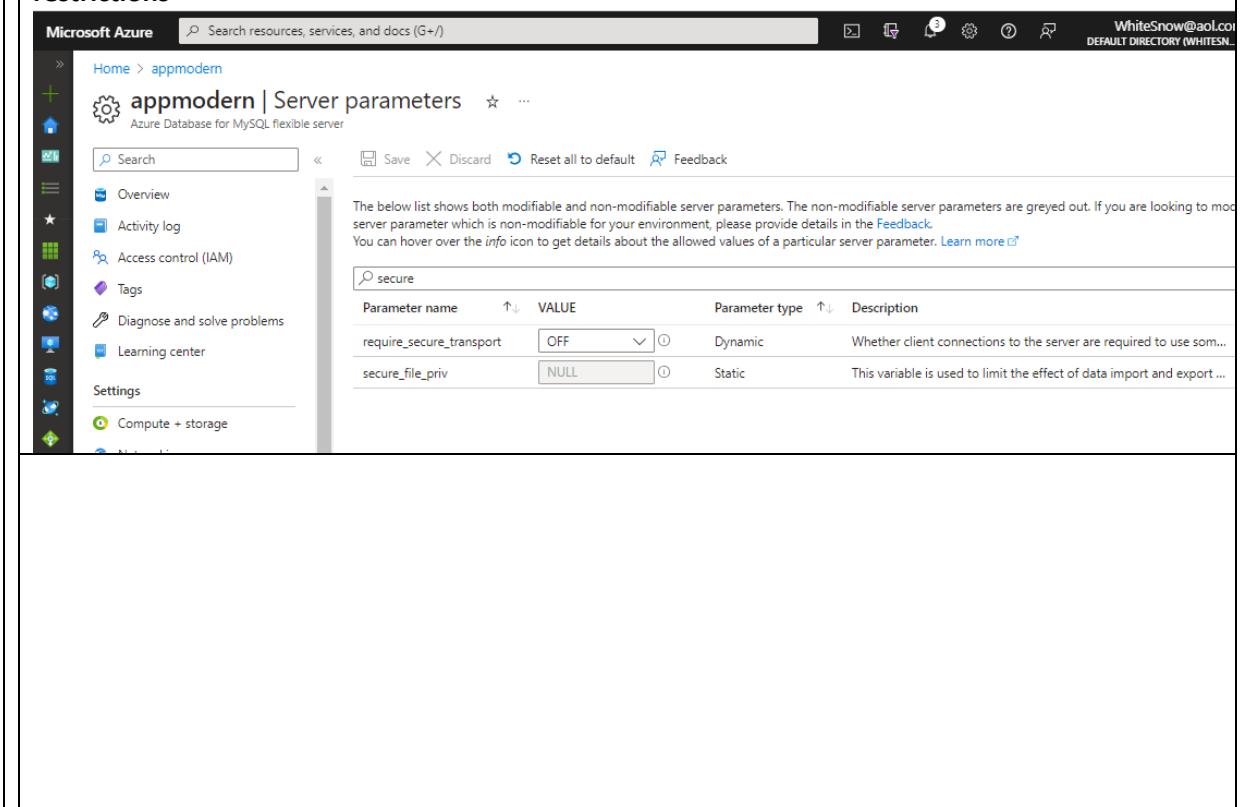
Overview Activity log Access control (IAM) Tags Diagnose and solve problems Learning center

Settings Compute + storage

Save Discard Reset all to default Feedback

The below list shows both modifiable and non-modifiable server parameters. The non-modifiable server parameters are greyed out. If you are looking to modify a server parameter which is non-modifiable for your environment, please provide details in the [Feedback](#). You can hover over the [info](#) icon to get details about the allowed values of a particular server parameter. [Learn more](#)

Parameter name	Value	Parameter type	Description
require_secure_transport	OFF	Dynamic	Whether client connections to the server are required to use som...
secure_file_priv	NULL	Static	This variable is used to limit the effect of data import and export ...



Get the connection string from connect panel. appmodern.mysql.database.azure.com

Microsoft Azure Search resources, services, and docs (G+/-)

Home > appmodern

appmodern | Connect

Azure Database for MySQL flexible server

Search

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Learning center

Settings

Compute + storage

Networking

Databases

Connect

Server parameters

Replication

Maintenance

High availability

Backup and restore

Advisor recommendations

Pre-requisites check

The most common connection methods have one or more of the requirements listed below

- Firewall rules are enabled on this server.
- Any resources that are part of the same virtual network as the private endpoint can access the server.
- SSL is disabled. [Enable SSL to secure connections.](#)
- Server is in Ready state.

Connection details

```
hostname=appmodern.mysql.database.azure.com  
username=appadmin  
password=(your-password)
```

View All Databases

Connect from browser or locally

You can connect to the MySQL server with the following command shown below using MySQL command line client or try it using Azure Cloud shell.

```
mysql -h appmodern.mysql.database.azure.com -u appadmin -p
```

MySQL Workbench

Microsoft Azure Search resources, services, and docs (G+/-)

Home > appmodern

appmodern | Connect

Azure Database for MySQL flexible server

Search

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Learning center

Settings

Compute + storage

Networking

Databases

Connect

Server parameters

Replication

Maintenance

High availability

Backup and restore

Advisor recommendations

Pre-requisites check

The most common connection methods have one or more of the requirements listed below

- Firewall rules are enabled on this server.
- Any resources that are part of the same virtual network as the private endpoint can access the server.
- SSL is disabled. [Enable SSL to secure connections.](#)
- Server is in Ready state.

Connection details

```
hostname=appmodern.mysql.database.azure.com  
username=appadmin  
password=(your-password)
```

View All Databases

Connect from browser or locally

You can connect to the MySQL server with the following command shown below using MySQL command line client or try it using Azure Cloud shell.

```
mysql -h appmodern.mysql.database.azure.com -u appadmin -p
```

MySQL Workbench

Step 5: Create the Employee Database Schemas on the MySQL server and populate them with Sample Data

Get the connection string from the MySQL server Connect Panel.
appmodern.mysql.database.azure.com

The link below has the script to create schemas and sample data.

<https://whitesnowstore.blob.core.windows.net/azproject2/employees.sql>

Run the following commands in the cloud shell.

```
DB_USER="appadmin"
DB_PASS="pi=3.14159"
DB_URL="appmodern.mysql.database.azure.com"
DATABASE="employees"
wget https://whitesnowstore.blob.core.windows.net/azproject2/employees.sql
#Login to MySQL server and create employees database
mysql -h $DB_URL -u $DB_USER -p$DB_PASS
#run the query file to populate the employees database with sample data
mysql -h $DB_URL -u $DB_USER -p$DB_PASS $DATABASE < employees.sql
```

```
Type "az" to use Azure CLI
sudhakar [ ~ ]$ DB_USER="appadmin"
DB_PASS="pi=3.14159"
DB_URL="appmodern.mysql.database.azure.com"
DATABASE="employees"
sudhakar [ ~ ]$ mysql -h $DB_URL -u $DB_USER -p$DB_PASS
mysql: [Warning] Using a password on the command line interface can be insecure.
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 28
Server version: 8.0.32 Source distribution

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> CREATE DATABASE employees;
Query OK, 1 row affected (0.03 sec)

mysql> exit
Bye
sudhakar [ ~ ]$ wget https://whitesnowstore.blob.core.windows.net/azproject2/employees.sql
--2023-06-28 01:56:34-- https://whitesnowstore.blob.core.windows.net/azproject2/employees.sql
Resolving whitesnowstore.blob.core.windows.net... 52.239.169.4
Connecting to whitesnowstore.blob.core.windows.net|52.239.169.4|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 42768688 (41M) [application/octet-stream]
Saving to: 'employees.sql'

employees.sql                                              100%[=====]

2023-06-28 01:56:35 (92.4 MB/s) - 'employees.sql' saved [42768688/42768688]
sudhakar [ ~ ]$ mysql -h $DB_URL -u $DB_USER -p$DB_PASS $DATABASE < employees.sql
mysql: [Warning] Using a password on the command line interface can be insecure.
```

Login

Create database

Download the Sample DATA

Run the query

Step 6: Create a Git Hub Repo for the PHP Employee App

The PHP application script (index.php) is checked in the following repo.

<https://github.com/blue-hills/azproject2.git>

This script will be installed on the Emp App VM Scale set and the Emp App Service. (Explained in the following sections.)

blue-hills / azproject2

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

azproject2 Public Pin Unwatch Fork Star

main Go to file Add file Code About

Branches Tags

blue-hills added host name last week 3 .github/workflows Add or update the Azure App Service build and... last week index.php added host name last week

Help people interested in this repository understand your project by adding a README. Add a README

GL Azure project2

Activity 0 stars 2 watching 0 forks

Releases

No releases published Create a new release

Contents of index.php

```
<!DOCTYPE html>
<html>
<head>
    <title>MySQL Table Viewer</title>
</head>
<body>
    <?php
    $sql="";
    if ($_SERVER["REQUEST_METHOD"] == "POST") {
        $sql = $_POST["sql"];
    }
    ?>
    <h1>MySQL Table Viewer</h1>
    <h2><?php echo "Host: " . gethostname(); ?></h2>
    <form method="post" action="<?php echo htmlspecialchars($_SERVER["PHP_SELF"]); ?> ">
        SQL: <textarea name="sql" rows="5" cols="40"><?php echo $sql; ?></textarea>
        <input type="submit" name="submit" value="Submit">
    </form>
    <?php
        // Define database connection variables
        $servername = getenv("DB_URL");
        $username = getenv("DB_USER");
        $password = getenv("DB_PASS");
        $dbname = getenv("DATABASE");

    try{
        // Create database connection
        $conn = mysqli_connect($servername, $username, $password, $dbname);
        // Check connection
        if (!$conn) {
            die("Connection failed: " . $conn->connect_error);
        }
        echo "connection failed";
        exit();
    }
    // Query database for all rows in the table
    $result = $conn->query($sql);

    if ($result->num_rows > 0) {
        echo "Number of rows:" . $result->num_rows;
        // Display table headers
    }
}
```

```

echo "<table><tr><th>ID</th><th>First Name</th><th>Last Name</th><th>Email</th></tr>";
// Loop through results and display each row in the table
while($row = $result->fetch_assoc()) {
    echo "<tr><td>" . $row["emp_no"] . "</td><td>" . $row["first_name"] . "</td><td>" . $row["last_name"] .
    "</td><td>" . $row["email_id"] . "</td></tr>";
}
echo "</table>";
} else {
    echo "0 results";
}

// Close database connection
$conn->close();
}
catch(Exception $e) {
    echo "Error executing the query";
    echo $e;
}
?>
</body>
</html>

```

Step 7: Deployment of an Ubuntu VM Scale set in the subnet: SNEmpApp

Following sub-steps are executed.

- 7.1 – Create an Ubuntu VM Scale set in the SNEmpApp subnet (10.0.1.0/24)
- 7.2 – Create an SSH Key Pair (modernapp-key)
- 7.3 – Create Network Interfaces for the VMs
- 7.4 – Create a Network Security Group to allow SSH/HTTP/Outbound Internet connections
- 7.5 – Create a public Load balancer for the scale set with Load balancing and inbound NAT rules
- 7.6 – Deploy the Emp App Init script in VM using the Cloud-Init-User-Data section
- 7.7 – Assign a Domain name (myempapp.eastus.cloudapp.azure.com) to Public IP address

The screenshots below explain the above steps.

Screenshots of VM Scale Set details & SSH Key

Home > Create a resource > Marketplace >

Create a virtual machine scale set

Basics Spot Disks Networking Scaling Management Health Advanced Tags Review + create

Azure virtual machine scale sets let you create and manage a group of load balanced VMs. The number of VM instances can automatically increase or decrease in response to demand or a defined schedule. Scale sets provide high availability to your applications, and allow you to centrally manage, configure, and update a large number of VMs.

[Learn more about virtual machine scale sets](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * WhiteSnow

Resource group * RGAppModern

Create new

Scale set details

Virtual machine scale set name * vmss-emp-app

Region * (US) East US

Availability zone Zones 1, 2, 3

Autoscaling can help you respond to an outage by scaling out new instances in another zone. Turn on Autoscaling in the [Scaling tab](#).

Orchestration

A scale set has a "scale set model" that defines the attributes of virtual machine instances (size, number of data disks, etc). As the number of instances in the scale set changes, new instances are added based on the scale set model.

[Learn more about the scale set model](#)

Orchestration mode * Flexible: achieve high availability at scale with identical or multiple virtual machine types
 Uniform: optimized for large scale stateless workloads with identical instances

Security type Standard

Instance details

Image * ⓘ [See all images](#) | [Configure VM generation](#)

VM architecture ⓘ x64 Arm64

Run with Azure Spot discount ⓘ

Size * ⓘ [See all sizes](#)

Administrator account

Authentication type ⓘ SSH public key Password

Username * ⓘ ✓

SSH public key source ↴

Key pair name * ✓

[Review + create](#) [< Previous](#) [Next : Spot >](#)

Screenshots of VMSS Networking details

Create a virtual machine scale set ...

Basics Spot Disks **Networking** Scaling Management Health Advanced Tags Review + create

Define network connectivity for your virtual machine by configuring network interface card (NIC) settings. You can control ports, inbound and outbound connectivity with security group rules, or place behind an existing load balancing solution.

[Learn more about VMSS networking](#)

Virtual network configuration

Azure Virtual Network (VNet) enables many types of Azure resources to securely communicate with each other, the internet, and on-premises networks. [Learn more about VNets](#)

Virtual network * ⓘ

VNAppModern

[Create virtual network](#)

[Manage selected virtual network](#)



Network interface

A network interface enables an Azure virtual machine to communicate with internet, Azure, and on-premises resources. A VM can have one or more network interfaces.

+ Create new nic ⌂ Delete

<input type="checkbox"/> NAME	CREATE PUBLI...	SUBNET	NETWORK SECURI...	ACCELERATED N...
<input type="checkbox"/> VNAppModern-nic01	Yes	SNEmpApp (10.0.1.0/24)	Basic	Off

Load balancing

You can place this virtual machine in the backend pool of an existing Azure load balancing solution. [Learn more](#)

Load balancing options ⓘ

None

Azure load balancer

Supports all TCP/UDP network traffic, port-forwarding, and outbound flows.

Application gateway

Web traffic load balancer for HTTP/HTTPS with URL-based routing, SSL termination, session persistence, and web application firewall.

To allow traffic from your load balancing product, please update the appropriate

[Review + create](#)

< Previous

Next : Scaling >

Screenshot of Network Interface Details

Edit network interface

Network interface

Name *

Virtual network ⓘ

Subnet * ⓘ

NIC network security group ⓘ

- None
- Basic
- Advanced

Configure network security group *

[Create new](#)

Public IP address ⓘ

Disabled Enabled

Accelerated networking ⓘ

Disabled Enabled

[OK](#)

[Cancel](#)

Screenshot of Network Security Group (to allow SSH/http inbound and internet outbound connections)

Create network security group

X

Name *

vmss-emp-app-nsg

✓

Inbound rules ⓘ

1000: default-allow-ssh

Any

SSH (TCP/22)

✓

...

1010: AllowHTTP

Any

Custom (Any/80)

✓

...

+ Add an inbound rule

Outbound rules ⓘ

100: AllowInternetOutbound

Any

Custom (Any/Any)

✓

...

+ Add an outbound rule

Load Balancer (lb-modern-emp) with Load balancer rule and inbound NAT rule

Home > Create a resource > Marketplace > Create a virtual machine scale set

Azure Virtual Network (VNet) enables many types of Azure resources to se on-premises networks. [Learn more about VNets](#)

Virtual network * [①](#)

- VNAppModern
- Create virtual network
- Manage selected virtual network

Network interface

A network interface enables an Azure virtual machine to communicate wit can have one or more network interfaces.

Create new nic			Delete
NAME	CREATE PUBLI...	SUBNET	
VNAppModern-nic01	Yes	SNEmpApp (10.0.1)	

Load balancing

You can place this virtual machine in the backend pool of an existing Azur

Load balancing options [①](#)

- None
- Azure load balancer
Supports all TCP/UDP net
- Application gateway
Web traffic load balancer termination, session persi

Select a load balancer * [①](#)

Please create a new or choose from existing load balancers.
[Create a load balancer](#)

Review + create [< Previous](#) [Next : Scaling >](#) **Create** **Cancel**

Create a load balancer

Details such as subscription and resource group will be inherited from the virtual machine that you're creating. A default IP, backend pool, and load balancer rule will be created on your behalf, though certain configurations can be changed if desired.

Load balancer name * lb-modern-emp

Type * [①](#)

- Public**
Provides outbound connections for virtua machines inside your virtual network using public load balancers.
- Internal**
Used to load balance traffic inside a virtual network. A load balancer frontend can be accessed from an on-premises network in a hybrid scenario.

Protocol * [①](#)

- TCP**
- UDP**

Rules

Rules

- Load balancer rule
- Inbound NAT rule

Load balancer rule

A load balancing rule distributes incoming traffic that is sent to a selected IP address and port combination across a group of backend pool instances. Only backend instances that the health probe considers healthy receive new traffic.

Port * [①](#) 80

Backend port * [①](#) 80

Screenshot of scaling details (initial instance count = 2)

Create a virtual machine scale set ...

Basics Spot Disks Networking Scaling Management Health Advanced Tags Review + create

An Azure virtual machine scale set can automatically increase or decrease the number of VM instances that run your application. This automated and elastic behavior reduces the management overhead to monitor and optimize the performance of your application. [Learn more about VMSS scaling](#)

Initial instance count * ⓘ

2

Scaling

Scaling policy ⓘ

Manual

Custom

Scale-In policy

Configure the order in which virtual machines are selected for deletion during a scale-in operation.

[Learn more about scale-in policies.](#)

Scale-in policy

Default - Balance across availability zones and fault domains, then delete V...

Apply force delete to scale-in operations ⓘ

 Applying force delete to scale-in operations cannot be performed on virtual machine scale sets with flexible orchestration mode.

 Scale-in policy is not supported for virtual machine scale sets with flexible orchestration mode.

[Review + create](#)

[< Previous](#)

[Next : Management >](#)

Deployment of Cloud-Init Script for the Employees App

The PHP application is stored in Git Repo. <https://github.com/blue-hills/azproject2.git>

Home > Create a resource > Marketplace >

Create a virtual machine scale set

Basics Spot Disks Networking Scaling Management Health Advanced Tags Review + create

Add additional configuration, agents, scripts or applications via virtual machine extensions or cloud-init.

Allocation policy

Spreading algorithm Max spreading Fixed spreading (not recommended with zones)

VM applications

VM applications contain application files that are securely and reliably downloaded on your VM after deployment. In addition to the application files, an install and uninstall script are included in the application. You can easily add or remove applications on your VM after create. [Learn more](#)

Select a VM application to install

Custom data and cloud init

Pass a cloud-init script, configuration file, or other data into the virtual machine **while it is being provisioned**. The data will be saved on the VM in a known location. [Learn more about custom data for VMSS](#)

Custom data

```
#!/bin/bash
# Update packages and install required software
apt-get update
apt-get install -y apache2 php mysql-client
apt install -y php-mysqli

#Download the PHP application from the git repo
```

Custom data on the selected image will be processed by cloud-init.
[Learn more about custom data for VMSS](#)

User data

Pass a script, configuration file, or other data that will be accessible to your applications **throughout the lifetime of the virtual machine**. Don't use user data for storing your secrets or passwords. [Learn more about user data for VMSS](#)

Enable user data

Performance (NVMe)

[Review + create](#) [< Previous](#) [Next : Tags >](#)

Contents of Cloud Init Script

```
#!/bin/bash
# Update packages and install required software
apt-get update
apt-get install -y apache2 php mysql-client
apt install -y php-mysqli

#Download the PHP application from the git repo
cd /opt
git clone https://github.com/blue-hills/azproject2.git
cd azproject2
sed -i "s=<body>=<body><h1>Host:${hostname}</h1>=> ./index.php"
```

```
cp index.php /var/www/html

DB_USER="appadmin"
DB_PASS="pi=3.14159"
DB_URL="appmodern.mysql.database.azure.com"
DATABASE="employees"

# Define the environment variables to be used by the PHP application
echo "export DB_USER=$DB_USER" >> /etc/apache2/envvars
echo "export DB_URL=$DB_URL" >> /etc/apache2/envvars
echo "export DB_PASS=$DB_PASS" >> /etc/apache2/envvars
echo "export DATABASE=$DATABASE" >> /etc/apache2/envvars

#define the fallback resource
echo "<Directory /var/www/html>" >> /etc/apache2/apache2.conf
echo "FallbackResource index.php" >> /etc/apache2/apache2.conf
echo "</Directory>" >> /etc/apache2/apache2.conf

# Update Apache configuration
sed -i "s/DirectoryIndex index.html/DirectoryIndex index.php index.html/" /etc/apache2/mods-
enabled/dir.conf
# Restart Apache
systemctl restart apache2
```

Screenshots of the VM Scale Set (vms-emp-app) after the successful deployment

[Home >](#)

vmss-emp-app

Virtual machine scale set

[Search](#) [Move](#) [Start](#) [Restart](#) [Stop](#) [Reimage](#) [Delete](#) [Refresh](#) [Feedback](#)

[Overview](#) [Activity log](#) [Access control \(IAM\)](#) [Tags](#) [Diagnose and solve problems](#)

[Settings](#)

- [Instances](#)
- [Networking](#)
- [Scaling](#)
- [Disks](#)
- [Operating system](#)
- [Microsoft Defender for Cloud](#)
- [Size](#)
- [Extensions + applications](#)
- [Configuration](#)
- [Upgrade policy](#)
- [Health and repair](#)
- [Identity](#)
- [Properties](#)
- [Locks](#)
- [Monitoring](#)
- [Alerts](#)
- [Metrics](#)
- [Workbooks](#)
- [Automation](#)

[Tags \(edit\)](#) : [Click here to add tags](#)

[Properties](#) [Monitoring](#) [Capabilities \(6\)](#) [Recommendations](#) [Tutorials](#)

Essentials

Resource group (move)	: RGAppModern	Operating system	: Linux
Status	: 2 out of 2 succeeded	Size	: Standard_B1s (2 instances)
Location	: East US (Zone 1, 2, 3)	Public IP address	: 20.75.168.201
Subscription (move)	: WhiteSnow	Public IP address (IPv6)	: -
Subscription ID	: 37427082-8987-4090-a942-f4eed9e71741	Virtual network/subnet	: VNAppModern/SNEmpApp
		Orchestration mode	: Flexible

Virtual machine profile

Operating system	: Linux
Image publisher	: canonical
Image offer	: 0001-com-ubuntu-server-focal
Image plan	: 20_04-lts-gen2
Capacity reservation group	: -

Availability + scaling

Availability zone	: 1, 2, 3
Proximity placement group	: -
Colocation status	: -
Host group	: -
Instance count	: 2
Scaling	: Manual
Scale-In policy	: Default
Overprovisioning	: Not enabled
Fault domain count	: 1
Single placement group	: Not enabled
Disk controller type	: SCSI

Networking

Public IP address	: 20.75.168.201
Public IP address (IPv6)	: -
Virtual network/subnet	: VNAppModern/SNEmpApp

Size

Size	: Standard_B1s
vCPUs	: 1
RAM	: 1 GiB

Disk

OS disk	: Premium SSD LRS
Encryption at host	: Disabled
Ultra disk compatibility	: Disabled
Data disks	: 0
Managed disks	: Enabled
Ephemeral OS disk	: N/A

Azure Spot

Azure Spot	: Disabled
------------	------------

Screenshot of Load Balancer

[Home > RGAppModern >](#)

lb-modern-emp

Load balancer

[Search](#) [Move](#) [Delete](#) [Refresh](#) [Give feedback](#) [JSON](#)

[Overview](#) [Activity log](#) [Access control \(IAM\)](#) [Tags](#) [Diagnose and solve problems](#)

[Settings](#)

- [Frontend IP configuration](#)
- [Backend pools](#)
- [Health probes](#)
- [Load balancing rules](#)
- [Inbound NAT rules](#)

[Tags \(edit\)](#) : [Click here to add tags](#)

[See more](#)

Essentials

Resource group (move)	: RGAppModern	Backend pool	: bepool (2 virtual machines)
Location	: East US	Load balancing rule	: lb-modern-emp-lrule01 (Tcp/80)
Subscription (move)	: WhiteSnow	Health probe	: lb-modern-emp-probe01 (Tcp/80)
Subscription ID	: 37427082-8987-4090-a942-f4eed9e71741	NAT rules	: 1 inbound
SKU	: Standard	Tier	: Regional

Configure high availability and scalability for your applications

Create highly-available and scalable applications in minutes by using built-in load balancing for cloud services and virtual machines. Azure Load Balancer supports TCP/UDP-based protocols and protocols used for real-time voice and video messaging applications. [Learn more](#)

Screenshot of Load Balancer rules (without session affinity)

lb-modern-emp-lbrule01

lb-modern-emp

A load balancing rule distributes incoming traffic that is sent to a selected IP address and port combination across a group of backend pool instances. Only backend instances that the health probe considers healthy receive new traffic.

Name *	lb-modern-emp-lbrule01
IP Version *	<input checked="" type="radio"/> IPv4 <input type="radio"/> IPv6
Frontend IP address *	lb-modern-emp-frontendconfig01 (20.75.168.201)
Backend pool *	bepool
Protocol	<input checked="" type="radio"/> TCP <input type="radio"/> UDP
Port *	80
Backend port *	80
Health probe *	lb-modern-emp-probe01 (TCP:80) Create new
Session persistence	None
Idle timeout (minutes) *	15
Enable TCP Reset	<input type="checkbox"/>
Enable Floating IP	<input type="checkbox"/>
Outbound source network address translation (SNAT)	<input checked="" type="radio"/> (Recommended) Use outbound rules to provide backend pool members access to the internet. Learn more.  <input type="radio"/> Use default outbound access. This is not recommended because it can cause SNAT port exhaustion. Learn more. 

Screenshot of VM instances

Home > Resource groups > RGAppModern > vmss-emp-app

vmss-emp-app | Instances

Instance	Computer name	Type	Status	Provisioning state
vmss-emp-app_6f8b83cc	vmss-emp-UV6WGc	VM	Running	Succeeded
vmss-emp-app_79a79226	vmss-emp-XR690M	VM	Running	Succeeded

Screenshot of Public IP Address

The screenshot shows the Azure portal interface for managing a load balancer. The top navigation bar includes 'Home', 'RGAppModern', and 'lb-modern-emp'. The main title is 'lb-modern-emp | Frontend IP configuration'. On the left, a sidebar lists navigation options: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Settings (selected), Frontend IP configuration (selected), Backend pools, Health probes, Load balancing rules, and Inbound NAT rules. The main content area displays a table for 'Frontend IP configuration' with one row:

Name	IP address	Rules count
lb-modern-emp-frontendconfig01	20.75.168.201 (lb-modern-emp-publicip)	2

Step 8: Verify the deployment of Employee PHP App and MySQL connectivity.

Open the PHP page using the load balancer public IP address: 20.75.168.201

(<http://myempapp.eastus.cloudapp.azure.com/>) and execute a query to check the database connection.

Screenshots of PHP page

Inbox (32) - s... | lb-modern-en | Application M | azproject2/in... | New Tab

Not secure | 20.75.168.201/index.php

Home std::upper_bound ... குறள்திறன் - வ... PCRE - Perl Compat... Learner Lab

Host:vmss-emp-XR690M

MySQL Table Viewer

Host: vmss-emp-XR690M

```
select * from employees where last_name like 'bal%';
```

SQL: Submit

Number of rows: 551

ID	First Name	Last Name	Email
10376	Fai	Bale	fai.bale@email.com
11340	Aris	Bala	aris.bala@email.com
11630	Heekeun	Ballarin	heekeun.ballarin@email.com
12063	Lein	Bale	lein.bale@email.com
12237	Chikara	Ballarin	chikara.ballarin@email.com
13539	Cedric	Bala	cedric.bala@email.com
14570	Chinho	Bala	chinho.bala@email.com
14713	Teresa	Ballarin	teresa.ballarin@email.com
14736	Martial	Bala	martial.bala@email.com
14797	Gonzalo	Bala	gonzalo.bala@email.com
15170	Mana	Bale	mana.bale@email.com
15714	Troy	Bala	troy.bala@email.com
15869	Guoxiang	Bala	guoxiang.bala@email.com
15977	King	Ballarin	king.ballarin@email.com
16159	Koichi	Bala	koichi.bala@email.com
16240	Bernice	Bala	bernice.bala@email.com
16294	Supot	Ballarin	supot.ballarin@email.com
17072	Richara	Bala	richara.bala@email.com
17577	Barry	Bala	barry.bala@email.com
18174	Uta	Bale	uta.bale@email.com
18409	Keiichiro	Bala	keiichiro.bala@email.com
18484	Ger	Bala	ger.bala@email.com
19588	Chinya	Ballarin	chinya.ballarin@email.com
22300	Guoxiang	Ballarin	guoxiang.ballarin@email.com
23054	Ranga	Ballarin	ranga.ballarin@email.com
23107	Susumu	Ballarin	susumu.ballarin@email.com
23496	Shigenori	Bale	shigenori.bale@email.com

Step 9: Deployment of the PHP Web App using App Service Plan

Following sub-steps are executed.

9.1 Create an App Service plan to host the PHP Web App

9.2 Deploy the PHP web app using the Git Hub Repo: <https://github.com/blue-hills/azproject2.git>

9.3 Configure the Environment variables: DB_USER,DB_URL,DB_PASS,DATABASE to be passed to the PHP App and Restart the Web App

Screenshots of Create Web APP & Service Plan (Basic Plan with 1vCPU)
--

Home > All resources > Create a resource >

Create Web App

Resource Group * ⓘ RGAppModern

Instance Details

Need a database? Try the new Web + Database experience. ↗

Name * sudhakar-app

Publish * Code Docker Container Static Web App

Runtime stack * PHP 8.1

Operating System * Linux Windows

Region * East US
Not finding your App Service Plan? Try a different region or select your App Service Environment.

Pricing plans

App Service plan pricing tier determines the location, features, cost and compute resources associated with your app.
[Learn more ↗](#)

Linux Plan (East US) * ⓘ (New) modernappservice

Pricing plan Basic B1 (100 total ACU, 1.75 GB memory, 1 vCPU)

Zone redundancy

An App Service plan can be deployed as a zone redundant service in the regions that support it. This is a deployment time only decision. You can't make an App Service plan zone redundant after it has been deployed [Learn more ↗](#)

Zone redundancy Enabled: Your App Service plan and the apps in it will be zone redundant. The minimum App Service plan instance count will be three. Disabled: Your App Service Plan and the apps in it will not be zone redundant. The minimum App Service plan instance count will be one.

Screenshot of Deployment Details (Git Hub Repo and Workflow configuration)

Workflow configuration

File path: .github/workflows/main-sudhakar-app(production).yml

```
1  # Docs for the Azure Web Apps Deploy action: https://github.com/Azure/webapps-deploy
2  # More GitHub Actions for Azure: https://github.com/Azure/actions
3
4  name: Build and deploy PHP app to Azure Web App - sudhakar-app
5
6  on:
7    push:
8      branches:
9        - main
10     workflow_dispatch:
11
12   jobs:
13     build:
14       runs-on: ubuntu-latest
15
16     steps:
17       - uses: actions/checkout@v2
18
19       - name: Setup PHP
20         uses: shivammathur/setup-php@v2
21         with:
22           php-version: '8.1'
23
24       - name: Check if composer.json exists
25         id: check_files
26         uses: andstor/file-existence-action@v1
27         with:
```

Create Web App

Basics Deployment Networking Monitoring Tags Review + create

Enable GitHub Actions to continuously deploy your app. GitHub Actions is an auto test, and deploy your app whenever a new commit is made in your repository. If your repository here and we will add a workflow file to automatically deploy your app to Ap GitHub, go to the Deployment Center once the web app is created to set up your deployment.

GitHub Actions settings

Continuous deployment Disable Enable

GitHub Actions details

Select your GitHub details, so Azure Web Apps can access your repository. You must have a repository to deploy with GitHub Actions.

GitHub account blue-hills [Change account](#)

Organization * blue-hills

Repository * azproject2

Branch * main

Workflow configuration

[Review + create](#) < Previous Next : Networking > [Close](#)

Screenshot of Networking Details

Home > All resources > Create a resource >

Create Web App

Basics Deployment **Networking** Monitoring Tags Review + create

Web Apps can be provisioned with the inbound address being public to the internet or isolated to an Azure virtual network. Web Apps can also be provisioned with outbound traffic able to reach endpoints in a virtual network, be governed by network security groups or affected by virtual network routes. By default, your app is open to the internet and cannot reach into a virtual network. These aspects can also be changed after the app is provisioned. [Learn more](#)

Enable public access * On Off

Enable network injection * On Off

Screenshot of App Service Panel (sudhakar-app) after the successful deployment

Home > **sudhakar-app** Web App

Search | Browse | Stop | Swap | Restart | Delete | Refresh | Download publish profile | Reset publish profile | Share to mobile | Send us your feedback

Activity log | Access control (IAM) | Tags | Diagnose and solve problems | Microsoft Defender for Cloud | Events (preview)

Deployment slots | Deployment Center

Settings | Configuration | Authentication | Application Insights | Identity | Backups | Custom domains | Certificates | Networking | Scale up (App Service plan) | Scale out (App Service plan) | Service Connector | Locks

App Service plan

Essentials

Resource group : RGAppModem
Status : Running
Location : East US
Subscription : WhiteSnow
Subscription ID : 37427082-e897-4090-a942-f4eed9e71741

Tags : Click here to add tags

Properties | Monitoring | Logs | Capabilities | Notifications | Recommendations

Web app

Name	sudhakar-app
Publishing model	Code
Runtime Stack	PHP - 8.1

Domains

Default domain	sudhakar-app.azurewebsites.net
Custom domain	Add custom domain

Hosting

Plan Type	App Service plan
Name	modermapservice
Operating System	Linux
Instance Count	1
SKU and size	Basic (B1) Scale up

Deployment Center

Deployment logs | View logs
Last deployment | In Progress, building your application Refresh
Deployment provider | GitHubAction

Application Insights

Name | Enable Application Insights

Networking

Virtual IP address	20.119.8.46
Outbound IP addresses	20.75.146.211, 20.75.146.221, 20.75.146... Show More
Additional Outbound IP addresses	20.75.146.211, 20.75.146.221, 20.75.146... Show More

Assign a Domain Name to the Load Balancer Public IP Address Screenshot

Home > Resource groups > RGAppModern > lb-modern-emp-publicip

lb-modern-emp-publicip | Configuration

Public IP address

Search Save Discard Refresh

Overview Activity log Access control (IAM) Tags

IP address assignment
Static IP address ⓘ 20.75.168.201

Idle timeout (minutes) ⓘ 15

DNS name label (optional) ⓘ myempapp .eastus.cloudapp.azure.com ✓

You can use the IP address as your 'A' DNS record or DNS label as your 'CNAME' record. [Learn more about adding a custom domain to this IP address](#)

Alias record sets
Create an alias record in Azure DNS. [Learn more](#) + Create alias record

Subscription	DNS zone	Name	Type
No results.			

Need help?
[Using custom domains with your IP address](#)
[Secure a web server on a Linux Virtual Machine with TLS/SSL](#)
[Secure a web server on a Windows Virtual Machine with TLS/SSL](#)

Screenshot of Application Settings Panel (to set the environment variables to be passed to PHP Web App)

The screenshot shows the Azure App Service configuration for the 'sudhakar-app' web app. The left sidebar includes links for Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Microsoft Defender for Cloud, Events (preview), Deployment (with slots and center), Settings (Configuration selected), Authentication, Application Insights, Identity, Backups, Custom domains, Certificates, Networking, Scale up (App Service plan), and Scale out (App Service plan). The main content area displays application settings and connection strings.

Application settings

Custom Error pages requires a premium App Service Plan.

Name	Value	Source	Deployment slot setting	Delete
DATABASE	employees	App Service		
DB_PASS	pi=3.14159	App Service		
DB_URL	appmodern.mysql.database.azure.com	App Service		
DB_USER	appadmin	App Service		

Connection strings

Connection strings are encrypted at rest and transmitted over an encrypted channel.

Name	Value	Source	Type	Deploym...	Delete	Edit
------	-------	--------	------	------------	--------	------

Step 10: Verify the Web App Deployment and Check the MySQL connection from the Web App (<https://sudhakar-app.azurewebsites.net/>)

Screenshot of <https://sudhakar-app.azurewebsites.net/> and the MySQL Query output

MySQL Table Viewer

sudhakar-app.azurewebsites.net/index.php

Home std::upper_bound ... குறள்திறன் - வ... PCRE - Perl Compat...

MySQL Table Viewer

Host: d7922bd1ff14

```
select * from employees where first_name like 'sud%';
```

SQL: Submit

Number of rows: 483

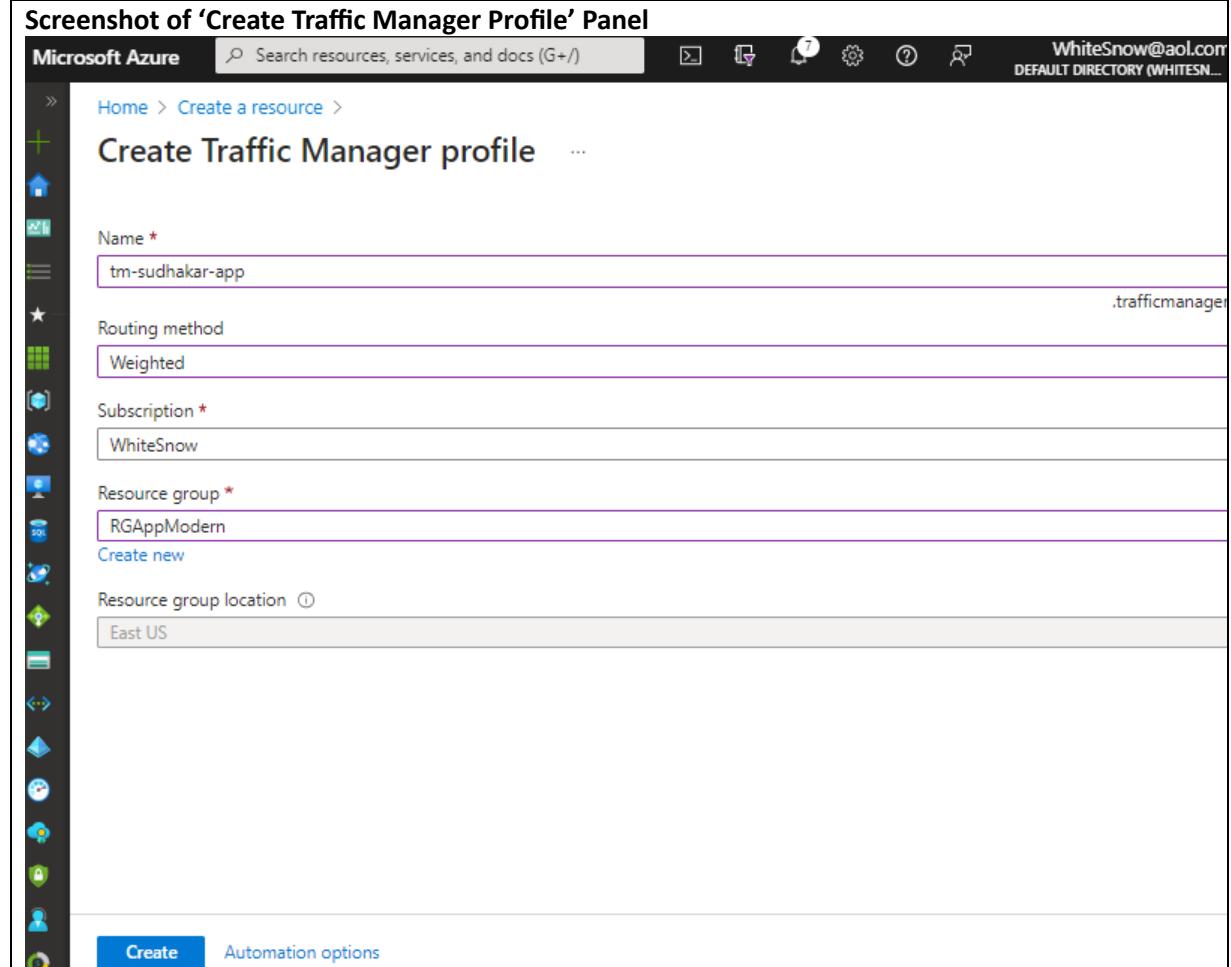
ID	First Name	Last Name	Email
10089	Sudharsan	Flasterstein	sudharsan.flasterstein@email.com
13567	Sudhanshu	Pietracaprina	sudhanshu.pietracaprina@email.com
13668	Sudharsan	Schurmann	sudharsan.schurmann@email.com
13903	Sudhanshu	Pileggi	sudhanshu.pileggi@email.com
14104	Sudhanshu	Demian	sudhanshu.demian@email.com
14242	Sudhanshu	Benaini	sudhanshu.benaini@email.com
14352	Sudhanshu	Braccini	sudhanshu.braccini@email.com
15027	Sudhanshu	Tomescu	sudhanshu.tomescu@email.com
15105	Sudhanshu	Itzigehl	sudhanshu.itzigehl@email.com
15188	Sudharsan	Weiland	sudharsan.weiland@email.com
15208	Sudharsan	Shokrollahi	sudharsan.shokrollahi@email.com
15240	Sudharsan	Rajaraman	sudharsan.rajaraman@email.com
17483	Sudhanshu	Zolotykh	sudhanshu.zolotykh@email.com
17645	Sudharsan	Steenbeek	sudharsan.steenbeek@email.com
17793	Sudhanshu	Baar	sudhanshu.baar@email.com
18749	Sudharsan	Vecchio	sudharsan.vecchio@email.com
19763	Sudhanshu	Pouyioutas	sudhanshu.pouyioutas@email.com
20692	Sudharsan	Stemann	sudharsan.stemann@email.com
20805	Sudharsan	Yoshimura	sudharsan.yoshimura@email.com
21000	Sudhanshu	Lieberherr	sudhanshu.lieberherr@email.com
21329	Sudhanshu	Czap	sudhanshu.czap@email.com
21860	Sudharsan	Detkin	sudharsan.detkin@email.com
22091	Sudharsan	Hasenauer	sudharsan.hasenauer@email.com
23183	Sudhanshu	Stiles	sudhanshu.stiles@email.com

Step 11: Deployment of Traffic Manager for the VM Scale Set Load balancer (vmss-emp-app) and the PHP Web App (<https://sudhakar-app.azurewebsites.net>)

11.1 Create a Traffic Manager with the ‘Weighted’ Routing method in RGModernApp Resource Group.

11.2

Screenshot of ‘Create Traffic Manager Profile’ Panel



The screenshot shows the 'Create Traffic Manager profile' page in the Microsoft Azure portal. The 'Name' field is filled with 'tm-sudhakar-app'. The 'Routing method' is set to 'Weighted'. The 'Subscription' dropdown shows 'WhiteSnow'. The 'Resource group' dropdown shows 'RGAppModern' with a 'Create new' option. The 'Resource group location' is set to 'East US'. At the bottom, there are 'Create' and 'Automation options' buttons, with 'Create' being the active one.

Setup an End Point for the VM scale set using the Configuration panel on the traffic manager profile. Use the VMSS Load Balancer IP Address (myempapp.eastus.cloudapp.azure.com- 20.75.168.201) for this end point.

Screen shot of the VMSS End Point Configuration

Microsoft Azure Search resources, services, and docs (G+/-)

Home > tm-sudhakar-app

tm-sudhakar-app | Endpoints

Add endpoint

Type *

Name *

Enable Endpoint

Target resource type

Public IP address *

Weight *

Custom Header settings

⚠ Do NOT input sensitive customer data in this field (i.e. APIKeys, Secrets, and Auth tokens etc).

Health Checks Enable
Health check will determine if traffic can be served to the endpoint.
 Always serve traffic
No health check will run. Traffic will be always served to the endpoint.

Add

Setup an End Point for the PHP Web App (<https://sudhakar-app.azurewebsites.net/>)

Screenshot

Add endpoint

Type * Azure endpoint

Name * appservice-endpoint

Enable Endpoint

Target resource type App Service

Target resource * sudhakar-app (East US)

Weight * 10

Custom Header settings Configure in this format, host:contoso.com,customheader:contoso

Health Checks

Enable Health check will determine if traffic can be served to the endpoint.

Always serve traffic No health check will run. Traffic will be always served to the endpoint.

Add

Screenshot of End Points with 90% and 10% weights

Essentials

Resource group (move) : RGAppModern
Status : Enabled
Subscription (move) : WhiteSnow
Subscription ID : 37427082-8987-4090-a942-f4eed9e71741
Tags (edit) : Click here to add tags

DNS name : http://tm-sudhakar-app.trafficmanager.net
Monitor status : Online
Routing method : Weighted

Name	Status	Monitor status	Type	Weight
vmss-endpoint	Enabled	Online	Azure endpoint	90
appservice-endpoint	Enabled	Online	Azure endpoint	10

Step 12: Verify the Traffic Manager Deployment

Open the traffic manager web site: <http://tm-sudhakar-app.trafficmanager.net> and execute MySQL query to check the database connection.

MySQL Table Viewer | June Vehicle Update | Google Calendar - | appservice-endpoint | Resource groups - | tm-sudhakar-app.trafficmanager.net/index.php

Not secure | tm-sudhakar-app.trafficmanager.net/index.php

Home std:upper_bound ... குறள்திறன் - வ... PCRE - Perl Compat... Learner Lab AWS-Sudhakar Google

Host:vmss-emp-UY6WGC

MySQL Table Viewer

Host: vmss-emp-UY6WGC

SQL: `select * from employees where first_name like 'ram%';`

Number of rows: 939

ID	First Name	Last Name	Email
10021	Ramzi	Erde	ramzi.erde@email.com
10245	Ramalingam	Gente	ramalingam.gente@email.com
10265	Ramalingam	Muniz	ramalingam.muniz@email.com
10548	Ramalingam	Gunderson	ramalingam.gunderson@email.com
10890	Ramzi	Furudate	ramzi.furudate@email.com
11119	Ramzi	Luga	ramzi.luga@email.com
11734	Ramya	Baezner	ramya.baezner@email.com
11943	Ramalingam	Chachaty	ramalingam.chachaty@email.com
12539	Ramachenga	Kuhnemann	ramachenga.kuhnemann@email.com
13135	Ramya	Peternell	ramya.peternell@email.com
13725	Ramalingam	Yamaashi	ramalingam.yamaashi@email.com
13774	Ramzi	Barbanera	ramzi.barbanera@email.com
13789	Ramalingam	Ranst	ramalingam.ranst@email.com
13892	Ramzi	Nastansky	ramzi.nastansky@email.com
14105	Ramachenga	Orlowski	ramachenga.orlowski@email.com
14940	Ramachenga	Showalter	ramachenga.showalter@email.com
15018	Ramalingam	Prenel	ramalingam.prenel@email.com
15414	Ramalingam	Rosti	ramalingam.rosti@email.com
15811	Ramachenga	Dayang	ramachenga.dayang@email.com
15899	Ramzi	Baba	ramzi.baba@email.com
16027	Ramalingam	Vadhan	ramalingam.vadhan@email.com

Step 13: Deployment of an Ubuntu VM Scale set in the subnet: SNWebApp

Following sub-steps are executed.

- 7.1 – Create an Ubuntu VM Scale set in the SNEmpApp subnet (10.0.2.0/24)
 - 7.2 – Create Network Interfaces for the VMs
 - 7.3 – Create a Network Security Group to allow SSH/HTTP/Outbound Internet connections
 - 7.4 – Create a public Load balancer for the scale set with Load balancing and inbound NAT rules
 - 7.5 – Deploy the Emp App Init script in VM using the Cloud-Init-User-Data section
 - 7.6 – Assign a Domain name (web-app.eastus.cloudapp.azure.com) to Public IP address
- The screenshots below explain the above steps.

Create an Ubuntu VM Scale set with the existing SSH key pair (modernapp-key)

Home > All resources > Create a resource > Marketplace >

Create a virtual machine scale set

...

Basics Spot Disks Networking Scaling Management Health Advanced Tags Review + create

Azure virtual machine scale sets let you create and manage a group of load balanced VMs. The number of VM instances can automatically increase or decrease in response to demand or a defined schedule. Scale sets provide high availability to your applications, and allow you to centrally manage, configure, and update a large number of VMs.

[Learn more about virtual machine scale sets](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription *

WhiteSnow

Resource group *

RGAppModern



[Create new](#)

Scale set details

Virtual machine scale set name *

vmss-web-app



Region *

(US) East US



Availability zone ⓘ

Zones 1, 2, 3



Autoscaling can help you respond to an outage by scaling out new instances in another zone. Turn on Autoscaling in the [Scaling tab](#).

Orchestration

A scale set has a "scale set model" that defines the attributes of virtual machine instances (size, number of data disks, etc). As the number of instances in the scale set changes, new instances are added based on the scale set model.

[Learn more about the scale set model](#)

Orchestration mode * ⓘ

Flexible: achieve high availability at scale with identical or multiple virtual machine types

Uniform: optimized for large scale stateless workloads with identical instances

Security type ⓘ

Standard



Instance details

Image * ⓘ Ubuntu Server 20.04 LTS - x64 Gen2 [See all images](#) | [Configure VM generation](#)

VM architecture ⓘ x64 Arm64

Run with Azure Spot discount ⓘ

Size * ⓘ Standard_B1s - 1 vcpu, 1 GiB memory (\$7.59/month) [See all sizes](#)

Administrator account

Authentication type ⓘ SSH public key Password

Username * ⓘ ✓

SSH public key source ▼

Stored Keys * ▼

[Review + create](#) [< Previous](#) [Next : Spot >](#)

Networking Details

Create a virtual machine scale set

Basics Spot Disks **Networking** Scaling Management Health Advanced Tags Review + create

Define network connectivity for your virtual machine by configuring network interface card (NIC) settings. You can control ports, inbound and outbound connectivity with security group rules, or place behind an existing load balancing solution.

[Learn more about VMSS networking](#)

Virtual network configuration

Azure Virtual Network (VNet) enables many types of Azure resources to securely communicate with each other, the internet, and on-premises networks. [Learn more about VNets](#)

Virtual network * ⓘ

VNAppModern
Create virtual network
Manage selected virtual network

Network interface

A network interface enables an Azure virtual machine to communicate with internet, Azure, and on-premises resources. A VM can have one or more network interfaces.

+ Create new nic ⚒ Delete

<input type="checkbox"/> NAME	CREATE PUBLI...	SUBNET	NETWORK SECURI...	ACCELERATED N...
VNAppModern-nic01	Yes	SNWebapp (10.0.2.0/24)	Basic	Off

Load balancing

You can place this virtual machine in the backend pool of an existing Azure load balancing solution. [Learn more](#)

Load balancing options ⓘ

None

Azure load balancer

Supports all TCP/UDP network traffic, port-forwarding, and outbound flows.

Application gateway

Web traffic load balancer for HTTP/HTTPS with URL-based routing, SSL termination, session persistence, and web application firewall.



To allow traffic from your load balancing product, please update the appropriate port configuration on your network security group associated with your network interface.

Review + create

< Previous

Next : Scaling >

VM Network Interface Details (Public IP address disabled)

Edit network interface

Network interface

Name *

VNAppModern-nic01

Virtual network ⓘ

VNAppModern

Subnet * ⓘ

SNWebapp (10.0.2.0/24)



NIC network security group ⓘ

- None
- Basic
- Advanced

Configure network security group *

(new) vmss-web-app-nsg



Create new

Public IP address ⓘ

- Disabled
- Enabled

Accelerated networking ⓘ

- Disabled
- Enabled

OK

Cancel

NIC Network Security Group Details

Create network security group

Name *

vmss-web-app-nsg

Inbound rules ⓘ

1000: default-allow-ssh

Any

SSH (TCP/22)

1010: AllowHttp

Any

Custom (Any/80)

+ Add an inbound rule

Outbound rules ⓘ

100: AllowInternetOutbound

Any

Custom (Any/Any)

+ Add an outbound rule

Load balancer Details (lb-web-app) with NAT inbound Load balancer rules

Home > All resources > Create a resource > Marketplace > Create a virtual machine scale set ...

[Learn more about VMSS networking](#)

Virtual network configuration

Azure Virtual Network (VNet) enables many types of Azure resources to securely connect to on-premises networks. [Learn more about VNets](#)

Virtual network * ⓘ

- VNAppModern
- Create virtual network
- Manage selected virtual network

Network interface

A network interface enables an Azure virtual machine to communicate with intern...

+ Create new nic Delete

NAME	CREATE PUBLI...	SUBNET
VNAppModern-nic01	No	SNWebapp (10.0.2.0/24)

Load balancing

You can place this virtual machine in the backend pool of an existing Azure load balancer.

Load balancing options ⓘ

- None
- Azure load balancer

Supports all TCP/UDP network traffic. Web traffic load balancer for HTTP termination, session persistence, and SSL offloading.

⚠️ To allow traffic from your load balancer, make sure your network interface has a public IP address and port configuration.
- Application gateway

Web traffic load balancer for HTTP termination, session persistence, and SSL offloading.

Select a load balancer * ⓘ

Please create a new or choose an existing load balancer. [Create a load balancer](#)

Review + create < Previous Next : Scaling >

Create a load balancer

your behalf, though certain configurations can be changed if desired.

Load balancer name * ⓘ

Type * ⓘ

- Public**

Provides outbound connections for virtual machines inside your virtual network using public load balancers.
- Internal**

Used to load balance traffic inside a virtual network. A load balancer frontend can be accessed from an on-premises network in a hybrid scenario.

Protocol * ⓘ

- TCP
- UDP

Rules

Rules

- Load balancer rule
- Inbound NAT rule

Load balancer rule

A load balancing rule distributes incoming traffic that is sent to a selected IP address and port combination across a group of backend pool instances. Only backend instances that the health probe considers healthy receive new traffic.

Port * ⓘ

Backend port * ⓘ

Inbound NAT rule

An inbound NAT rule forwards incoming traffic sent to a selected IP address and port combination to a specific virtual machine.

Create **Cancel**

Scaling Details

Create a virtual machine scale set ...

Basics Spot Disks Networking **Scaling** Management Health Advanced Tags Review + create

An Azure virtual machine scale set can automatically increase or decrease the number of VM instances that run your application. This automated and elastic behavior reduces the management overhead to monitor and optimize the performance of your application. [Learn more about VMSS scaling](#)

Initial instance count* ⓘ

2

Scaling

Scaling policy ⓘ

Manual

Custom

Scale-In policy

Configure the order in which virtual machines are selected for deletion during a scale-in operation.

[Learn more about scale-in policies](#)

Scale-in policy

Default - Balance across availability zones and fault domains, then delete V...

Apply force delete to scale-in operations ⓘ

 Applying force delete to scale-in operations cannot be performed on virtual machine scale sets with flexible orchestration mode.

 Scale-in policy is not supported for virtual machine scale sets with flexible orchestration mode.

Deployment of Cloud-Init Script

The modified simulation app is stored as a zip file in

<https://whitesnowstore.blob.core.windows.net/azproject2/simuapp2.zip>

Create a virtual machine scale set ...

Basics Spot Disks Networking Scaling Management Health Advanced Tags Review + create

Add additional configuration, agents, scripts or applications via virtual machine extensions or cloud-init.

Allocation policy

Spreading algorithm Max spreading

Fixed spreading (not recommended with zones)

VM applications

VM applications contain application files that are securely and reliably downloaded on your VM after deployment. In addition to the application files, an install and uninstall script are included in the application. You can easily add or remove applications on your VM after create. [Learn more](#)

Select a VM application to install

Custom data and cloud init

Pass a cloud-init script, configuration file, or other data into the virtual machine **while it is being provisioned**. The data will be saved on the VM in a known location. [Learn more about custom data for VMSS](#)

Custom data

```
#!/bin/bash
APP_NAME=LiftShift-Application
apt update -y && apt -y install python3-pip zip
cd /opt
wget https://whitesnowstore.blob.core.windows.net/azproject2/simuapp2.zip
unzip simuapp2.zip
```

 Custom data on the selected image will be processed by cloud-init.
[Learn more about custom data for VMSS](#)

User data

Pass a script, configuration file, or other data that will be accessible to your applications **throughout the lifetime of the virtual machine**. Don't use user data for storing your secrets or passwords. [Learn more about user data for VMSS](#)

Enable user data

Performance (NVMe)

Enable capabilities to enhance the performance of your resources.

[Review + create](#)

[< Previous](#)

[Next : Tags >](#)

Contents of Cloud-Init Script

```
#!/bin/bash
APP_NAME=LiftShift-Application
apt update -y && apt -y install python3-pip zip
cd /opt
wget https://whitesnowstore.blob.core.windows.net/azproject2/simuapp2.zip
unzip simuapp2.zip
rm -f simuapp2.zip
```

```
sed -i "s=MOD_APPLICATION_NAME=$APP_NAME=g" templates/index.html  
pip3 install -r requirements.txt  
nohup python3 simu_app.py >> application.log 2>&1 &
```

After Creating the VM Scale Set

Assign a DNS label to the Load Balancer Public IP (web-app.eastus.cloudapp.azure.com 52.150.34.30)

The screenshot shows the Azure portal interface for managing a Load Balancer Public IP. The URL in the address bar is [Home > lb-web-app-publicip](https://portal.azure.com/#blade/HubsBlade/resourceType/publicIP/resource/Lb-web-app-publicip). The main page displays the public IP address 52.150.34.30. On the left, a navigation menu is visible with options like Overview, Activity log, Access control (IAM), Tags, Settings, Configuration (which is selected and highlighted in grey), Properties, Locks, Monitoring, Insights, Alerts, Metrics, Diagnostic settings, Automation, Tasks (preview), Export template, Support + troubleshooting, and New Support Request. In the center, there's a section for 'Configuration' where the 'DNS name label (optional)' field is filled with 'web-app'. Below this, there's a table showing alias record sets with no results. At the bottom, there are help links for using custom domains and securing web servers.

Screenshots of VM Scale Set after the Successful Deployment

Microsoft Azure | portal.azure.com/#@WhiteSnow@ol.onmicrosoft.com/resource/subscriptions/37427082-8987-4090-a942-f4eed9e71741/resourceGroups/RGAppModern... Home stdupper_bound ... தமிழ்நாடு - வளர்ச்சி PCRE - Perl Compat... Learner Lab AWS-Sudhakar Google Cloud Dev... Azure NSG domi... WhiteSnow DEFAULT DIRECTORI...

vmss-emp-app Virtual machine scale set

Overview Search Move Start Restart Stop Reimage Delete Refresh Feedback

Essentials

Resource group (move)	: RGAppModern	Operating system	: Linux
Status	: 2 out of 2 succeeded	Size	: Standard_B1s (2 instances)
Location	: East US (Zone 1, 2, 3)	Public IP address	: 20.75.168.201
Subscription (move)	: WhiteSnow	Public IP address (IPv6)	: -
Subscription ID	: 37427082-8987-4090-a942-f4eed9e71741	Virtual network/subnet	: VNAppModern/SNEmpApp
		Orchestration mode	: Flexible

Tags (edit) : [Click here to add tags](#)

Properties **Monitoring** **Capabilities (6)** **Recommendations** **Tutorials**

Virtual machine profile

Operating system	: Linux	Networking	Public IP address	: 20.75.168.201
Image publisher	: canonical	Public IP address (IPv6)	-	
Image offer	: 0001-com-ubuntu-server-focal	Virtual network/subnet	: VNAppModern/SNEmpApp	
Image plan	: 20_04-lts-gen2			
Capacity reservation group	-			

Availability + scaling

Availability zone	: 1, 2, 3	Size	: Standard_B1s
Proximity placement group	-	vCPUs	: 1
Colocation status	-	RAM	: 1 GiB
Host group	-	OS disk	: Premium SSD LRS
Instance count	: 2	Encryption at host	: Disabled
Scaling	: Manual	Ultra disk compatibility	: Disabled
Scale-in policy	: Default	Data disks	: 0
Overprovisioning	: Not enabled	Managed disks	: Enabled
Fault domain count	: 1	Ephemeral OS disk	: N/A
Single placement group	: Not enabled	Azure Spot	: Disabled
Disk controller type	: SCSI		

Disk

OS disk	: Premium SSD LRS
Encryption at host	: Disabled
Ultra disk compatibility	: Disabled
Data disks	: 0
Managed disks	: Enabled
Ephemeral OS disk	: N/A

Azure Spot

Azure Spot	: Disabled
------------	------------

Screenshot of VM Instances

vmss-emp-app | Instances Virtual machine scale set

Search Start Restart Stop Reimage Delete Refresh

Instances

Instance	Computer name	Type	Status	Provisioning state
vmss-emp-app_6f8b83cc	vmss-emp-UY6WGC	VM	Running	Succeeded
vmss-emp-app_79a79226	vmss-emp-XR690M	VM	Running	Succeeded

Screenshots of NSG Inbound and Outbound Port Rules

Home > RGAppModern > vmss-emp-app

vmss-emp-app | Networking

Virtual machine scale set

[Feedback](#) [Add network interface](#) [Remove network interface](#)

VNAppModern-nic01

IP configuration

Network Interface: VNAppModern-nic01 [Topology](#)
Virtual network/subnet: VNAppModern/SNEmpApp Accelerated networking: **Disabled**

Inbound port rules **Outbound port rules** **Load balancing**

Network security group **vmss-emp-app-nsg** (attached to network interface: VNAppModern-nic01)
Impacts 0 subnets, 2 network interfaces

[Add inbound port rule](#)

Priority	Name	Port	Protocol	Source	Destination	Action
1000	default-allow-ssh	22	TCP	Any	Any	Allow
1010	AllowHttp	80	Any	Any	Any	Allow
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	Allow
65500	DenyAllInBound	Any	Any	Any	Any	Deny

VNAppModern-nic01

IP configuration

Network Interface: VNAppModern-nic01 [Topology](#)
Virtual network/subnet: VNAppModern/SNEmpApp Accelerated networking: **Disabled**

Inbound port rules **Outbound port rules** **Load balancing**

Network security group **vmss-emp-app-nsg** (attached to network interface: VNAppModern-nic01)
Impacts 0 subnets, 2 network interfaces

[Add outbound port rule](#)

Priority	Name	Port	Protocol	Source	Destination	Action
100	AllowInternetOutbound	Any	Any	Any	Any	Allow
65000	AllowVnetOutBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowInternetOutBound	Any	Any	Any	Internet	Allow
65500	DenyAllOutBound	Any	Any	Any	Any	Deny

Screenshot of Load Balancer

Home > RGAppModern >

lb-web-app

Load balancer

[Search](#) [Move](#) [Delete](#) [Refresh](#) [Give feedback](#)

Overview

Essentials

Resource group ([move](#)) : RGAppModern
Location : East US
Subscription ([move](#)) : WhiteSnow
Subscription ID : 37427082-8987-4090-a942-f4eed9e71741
SKU : Standard
Tags ([edit](#)) : [Click here to add tags](#)

Backend pool : bepool (2 virtual machines)
Load balancing rule : lb-web-app-lbrule01 (Tcp/80)
Health probe : lb-web-app-probe01 (Tcp:80)
NAT rules : 1 inbound
Tier : Regional

Frontend IP configuration

Backend pools

Health probes

Load balancing rules

Inbound NAT rules

Configure high availability and scalability for your applications

Create highly-available and scalable applications in minutes by using built-in load balancing for cloud services and virtual machines. Azure Load Balancer supports TCP/UDP-based protocols and protocols used for real-time voice and video messaging applications. [Learn more](#)

Load Balancer Frontend IP Configuration

The screenshot shows two main sections of the Azure portal:

- Frontend IP configuration:** Shows a table with one entry: "lb-web-app-frontendconfig01" with IP address "52.150.34.30 (lb-web-app-publicip)" and 2 rules.
- Load Balancer Backend Pool:** Shows a table with two entries in the "bepool" pool: "bepool" (Resource Name: "vmss-web-app_37561758", Status: Running, IP: 10.0.2.4) and "bepool" (Resource Name: "vmss-web-app_7b6912bf", Status: Running, IP: 10.0.2.5). A message indicates that the backend pool was added to a Virtual machine scale set and advises upgrading instances.

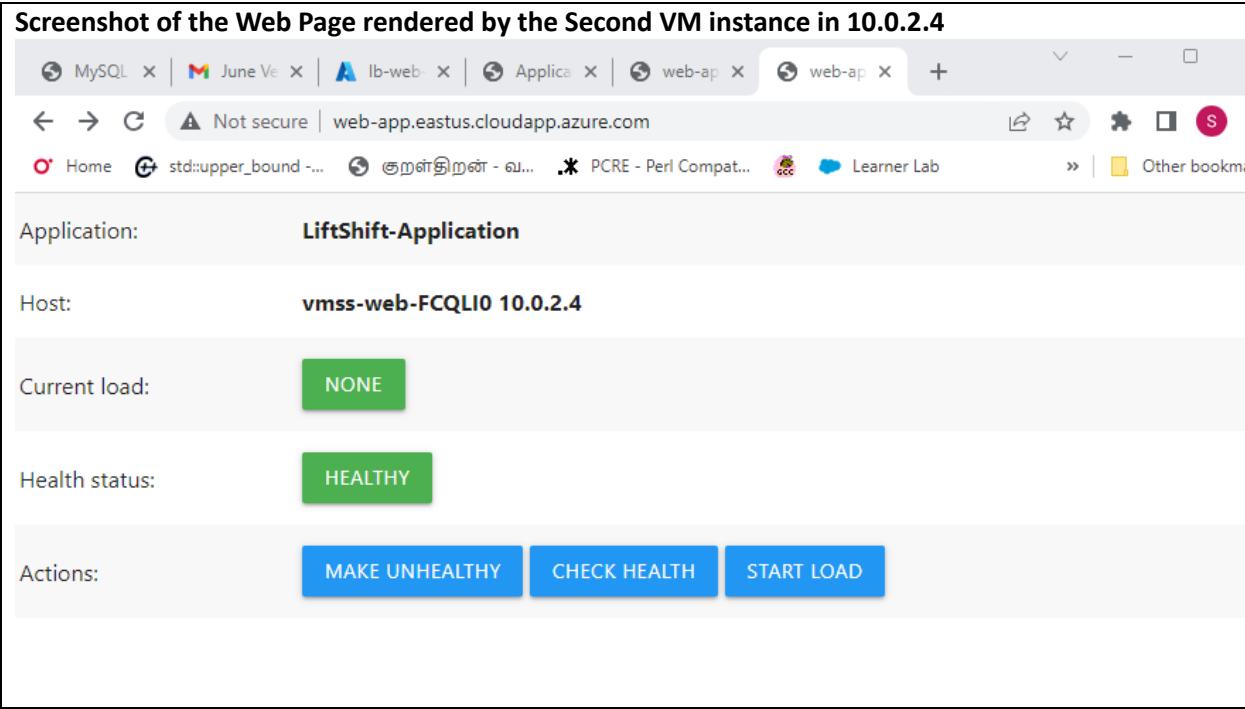
Step 14: Verify the deployment of the Web App.

Open the web page using the load balancer public IP address: 52.150.34.30
(<http://web-app.eastus.cloudapp.azure.com/>).

Screenshot of the Web Page rendered by the First VM Instance in 10.0.2.5

The screenshot shows a browser window with the following details:

- Application:** LiftShift-Application
- Host:** vmss-web-Y8PNEN 10.0.2.5
- Current load:** NONE
- Health status:** HEALTHY
- Actions:** MAKE UNHEALTHY, CHECK HEALTH, START LOAD



Step 14: Deployment of Application Gateway (app-modern) in SAppService Subnet (10.0.3.0)

Following sub-steps are executed.

14.1 Create an Application Gateway

14.2 Create a new public IP address.

14.4 Create a Listener

14.3 Create Backend Pools

14.4 Create Path Based Routing Rules

Application Gateway Details

(Standard V2, min instance count = 1, max instance count = 2, subnet : 10.0.3.0 -SAppService)

Microsoft Azure Search resources, services, and docs (G+/-)

Home > All resources > Create a resource >

Create application gateway

Basics **Frontends** **Backends** **Configuration** **Tags** **Review + create**

An application gateway is a web traffic load balancer that enables you to manage traffic to your web application. [Learn more about application gateway](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * Resource group * [Create new](#)

Instance details

Application gateway name * Region * Tier
Enable autoscaling Yes No
Minimum instance count * Maximum instance count
Availability zone
HTTP2 Disabled Enabled

Configure virtual network

Virtual network * [Create new](#)
Subnet * [Manage subnet configuration](#)

[Previous](#) [Next : Frontends >](#)

Frontend Configuration

Create a new Public IP

Home > All resources > Create a resource >

Create application gateway

⚠ Changes you make on this tab may affect any configuration you've done on other tabs. Review all options prior to creating the application gateway.

✓ Basics ✓ Frontends ③ Backends ④ Configuration ⑤ Tags ⑥ Review + create

Traffic enters the application gateway via its frontend IP address(es). An application gateway can use a public IP address, private IP address, or one of each type.[?]

Frontend IP address type: Public Private Both

Public IP address *: (New) ip-agw [Add new](#)

Create a Backend Pool (pool-web-app) for Web App

Microsoft Azure Search resources, services, and docs (G+/)

Home > All resources > Create a resource >

Create application gateway

⚠ Changes you make on this tab may affect any configuration you've done on other tabs.

✓ Basics ✓ Frontends ③ Backends ④ Configuration ⑤ Tags

A backend pool is a collection of resources to which your application gateway can send traffic. A backend pool can contain virtual machines, virtual machine scale sets, app services, IP addresses, or fully qualified domain names.

Add a backend pool

Backend pool	Targets
No results	

Add a backend pool.

Name: pool-web-app

Add backend pool without targets: Yes

Backend targets:

- 1 item
- Target type: IP address or FQDN Target: 52.150.34.30
- IP address or FQDN

Create a Backend Pool (pool-emp-app) for the emp-app served by traffic manager (tm-sudhakar-app.trafficmanager.net)

Microsoft Azure Search resources, services, and docs (G+/)

Home > All resources > Create a resource >

Create application gateway

⚠ Changes you make on this tab may affect any configuration you've done on other tabs.

✓ Basics ✓ Frontends ③ Backends ④ Configuration ⑤ Tags

A backend pool is a collection of resources to which your application gateway can send traffic. A backend pool can contain virtual machines, virtual machine scale sets, app services, IP addresses, or fully qualified domain names.

Add a backend pool

Backend pool	Targets
pool-web-app	> 1 target

Add a backend pool.

Name: pool-emp-app

Add backend pool without targets: No

Backend targets:

- 1 item
- Target type: IP address or FQDN Target: tm-sudhakar-app.trafficmanager.net
- IP address or FQDN

Add a Routing Rule (router1) with a listener on Port 80

Add a routing rule

Configure a routing rule to send traffic from a given frontend IP address to one or more backend targets. A routing rule must contain a listener and at least one backend target.

Rule name * router1

Priority * 100

Listener * Backend targets

A listener "listens" on a specified port and IP address for traffic that uses a specified protocol. If the listener criteria are met, the application gateway will apply this routing rule.³

Listener name * http80

Frontend IP * Public

Protocol HTTP HTTPS

Port * 80

Additional settings

Listener type Basic Multi site

Error page url Yes No

Add a backend setting for the backend port 80 without any override backend path

Add Backend setting

[← Discard changes and go back to routing rules](#)

Backend settings name * bes-web-app

Backend protocol HTTP HTTPS

Backend port * 80

Additional settings

Cookie-based affinity Enable Disable

Connection draining Enable Disable

Request time-out (seconds) * 20

Override backend path

Host name

By default, the Application Gateway sends the same HTTP host header to the backend as it receives from the client. If your backend application/service requires a specific host value, you can override it using this setting.

Yes No

Override with new host name

Yes No

Create custom probes

Add a Backend Target for the backend pool (pool-web-app) using the backend setting (bes-web-app)

Add a routing rule

Configure a routing rule to send traffic from a given frontend IP address to one or more backend targets. A routing rule must contain a listener and at least one backend target.

Rule name *

router1

Priority * ⓘ

100

* Listener * Backend targets

Choose a backend pool to which this routing rule will send traffic. You will also need to specify a set of Backend settings that define the behavior of the routing rule. ⓘ

Target type

Backend pool Redirection

pool-web-app

Add new

bes-web-app

Add new

Backend settings * ⓘ

Path-based routing

You can route traffic from this rule's listener to different backend targets based on the URL path of the request. You can also apply a different set of Backend settings based on the URL path. ⓘ

Path based rules

Path	Target name	Backend setting name	Backend pool
No additional targets to display			

Add multiple targets to create a path-based rule

Add a Backend Setting for the port 80 with a override path “/index.php” to route the requests to emp_app

Add Backend setting

[← Discard and back to path based rules](#)

Backend settings name *

bes-emp-app

HTTP HTTPS

Backend port *

80

Additional settings

Cookie-based affinity ⓘ

Enable Disable

Connection draining ⓘ

Enable Disable

Request time-out (seconds) * ⓘ

20

Override backend path ⓘ

/index.php

Host name

By default, the Application Gateway sends the same HTTP host header to the backend as it receives from the client. If your backend application/service requires a specific host value, you can override it using this setting.

No

Override with new host name

No

Create custom probes

Create a Path based rule to forward the '/employee/*' URL requests to the backend pool (emp-app) with the overriding backend path '/index.php' defined in the backend setting: 'bes-emp-app'

Add a routing rule

[← Discard changes and go back to routing rules](#)

Target type

Backend pool Redirection

Path * ⓘ

/employees/*

Target name *

emp-target

Backend settings * ⓘ

Add new

pool-emp-app

Backend target * ⓘ

Add new

Routing Rule Details

Add a routing rule

Configure a routing rule to send traffic from a given frontend IP address to one or more backend targets. A routing rule must contain a listener and at least one backend target.

Rule name *	router1								
Priority *	100								
* Listener	Backend targets								
Choose a backend pool to which this routing rule will send traffic. You will also need to specify a set of Backend settings that define the behavior of the routing rule. <small>[?]</small>									
Target type	<input checked="" type="radio"/> Backend pool <input type="radio"/> Redirection								
Backend target *	<p>pool-web-app</p> <p>Add new</p> <p>bes-web-app</p> <p>Add new</p>								
Backend settings *	Add new								
Path-based routing									
You can route traffic from this rule's listener to different backend targets based on the URL path of the request. You can also apply a different set of Backend settings based on the URL path. <small>[?]</small>									
Path based rules <table border="1"> <thead> <tr> <th>Path</th> <th>Target name</th> <th>Backend setting name</th> <th>Backend pool</th> </tr> </thead> <tbody> <tr> <td>/employees/*</td> <td>emp-target</td> <td>bes-emp-app</td> <td>pool-emp-app</td> </tr> </tbody> </table> <p>Add multiple targets to create a path-based rule</p>		Path	Target name	Backend setting name	Backend pool	/employees/*	emp-target	bes-emp-app	pool-emp-app
Path	Target name	Backend setting name	Backend pool						
/employees/*	emp-target	bes-emp-app	pool-emp-app						

Home > All resources > Create a resource >

Create application gateway

... [Edit](#) [Delete](#)

[Basics](#) [Frontends](#) [Backends](#) [Configuration](#) [Tags](#) [Review + create](#)

Create routing rules that link your frontend(s) and backend(s). You can also add more backend pools, add a second frontend IP configuration if you haven't already, or edit previous configurations. [?]

 Frontends + Add a frontend IP	 Routing rules + Add a routing rule	 Backend pools + Add a backend pool
Public: (new) ip-agw	 *** router1 Manage Backend settings	 *** pool-web-app pool-emp-app

Topology

```

graph LR
    A((appGwPubl...)) --- B((http80))
    B --- C((router1))
    C --- D[pool...BACKEND  
tm-sudhak...nager.net]
  
```

Screenshots after the Successful Deployment of the Application Gateway (20.51.163.72)

Microsoft Azure | Search resources, services, and docs (G+ /) | WhiteSnow@aol.com | DEFAULT DIRECTORY (WHITESNOW)

[Home](#) > Microsoft.ApplicationGateway-20230628224546 | Overview > RGAppModern >

app-modern Application gateway

Essentials

- Resource group ([move](#)) : RGAppModern
- Location : East US
- Subscription ([move](#)) : WhiteSnow
- Subscription ID : 37427082-8987-4090-a942-f4eed9e71741
- Virtual network/subnet : VNAppModern/SNAppService
- Frontend public IP address : 20.51.163.72 (ip-agw)
- Frontend private IP addr... : -
- Tier : Standard V2
- Availability zone : -

Tags ([edit](#)) : Click here to add tags

Show data for last 1 hour 6 hours 12 hours 1 day 7 days 30 days

Sum Total Requests

Time	Total Requests (Sum)
Jun 29 UTC-04:00	56

Sum Failed Requests

Time	Failed Requests (Sum)
Jun 29 UTC-04:00	0.2
Jun 29 UTC-04:00	2.2

Frontend IP Configuration

Frontend IP configurations

Type	Status	Name	IP address	Associated listeners
Public	Configured	appGwPublicFrontendIp[IPv4]	20.51.163.72 (ip-agw)	http80
Private	Not configured	-	-	-

Backend Pools

Name	Rules associated	Targets
pool-web-app	1	1
pool-emp-app	1	1

Backend Settings

Name	Port	Protocol	Cookie based affinity	Custom probe
bes-web-app	80	Http	Disabled	-
bes-emp-app	80	Http	Disabled	-

Routing Rule

Name	Type	Listener	Priority
router1	Path-based	http80	100

Step 15: Verify the Deployment of Application Gateway and its Routing Rules

Open the following links based on the Application Gateway Public IP: 20.51.163.72

http://20.51.163.72/	This will open the Lift-And-Shift Simulation Application Web Page using the WebApp Load Balancer (Domain: web-app.eastus.cloudapp.azure.com, IP: 52.150.34.30)
http://20.51.163.72/employees/abc	This will open the Emp App Web page using the Traffic Manager (http://tm-sudhakar-app.trafficmanager.net/)

Screenshot of <http://20.51.163.72/>

The screenshot shows a web browser window with the URL 20.51.163.72. The page title is "LiftShift-Application". It displays the following information:

- Application: LiftShift-Application
- Host: vmss-web-Y8PNEN 10.0.2.5
- Current load: NONE
- Health status: HEALTHY
- Actions: MAKE UNHEALTHY, CHECK HEALTH, START LOAD

Screenshot of <http://20.51.163.72/employees/abc> to validate /employees/* URL path rule.

The screenshot shows a web browser window with the URL 20.51.163.72/employees/abc. The page title is "MySQL Table Viewer". It displays the following information:

Host:vmss-emp-UY6WGC

MySQL Table Viewer

Host: vmss-emp-UY6WGC

SQL: Submit

0 results

Open <http://20.51.163.72/employees/sss> to validate /employees/* URL path rule.

MySQL Table Viewer +

Not secure | 20.51.163.72/employees/sss

Home std::upper_bound ... குறள்திறன் - வ... PCRE - Perl Compat... Learner Lab AWS-Sudhakar

Host:vmss-emp-XR690M

MySQL Table Viewer

Host: vmss-emp-XR690M

SQL: Submit

0 results

[http://20.51.163.72/ \(Simulate unhealthy\)](http://20.51.163.72/)

20.51.163.72 x +

Not secure | 20.51.163.72

Home std::upper_bound ... குறள்கிறன் - வ... PCRE - Perl Compat... Learner Lab

Application: **LiftShift-Application**

Host: **vmss-web-Y8PNEN 10.0.2.5**

Current load: **NONE**

Health status: **UNHEALTHY**

Actions: **MAKE HEALTHY** **CHECK HEALTH** **START LOAD**

Now <http://20.51.163.72/> points to the next available healthy VM (second instance)

A screenshot of a web browser window displaying application monitoring information. The URL is 20.51.163.72. The page title is "Not secure | 20.51.163.72". The main content area shows the following details:

Application:	LiftShift-Application		
Host:	vmss-web-FCQLI0 10.0.2.4		
Current load:	NONE		
Health status:	HEALTHY		
Actions:	MAKE UNHEALTHY	CHECK HEALTH	START LOAD

20.51.163.72 x +

Not secure | 20.51.163.72

Home std::upper_bound -... குறள்கிறன் - வ... PCRE - Perl Compat... Learner Lab

Application: LiftShift-Application

Host: vmss-web-FCQLI0 10.0.2.4

Current load: NONE

Health status: HEALTHY

Actions: MAKE UNHEALTHY CHECK HEALTH START LOAD

Open <http://20.51.163.72/somepage> to validate the /* URL path rule.

The screenshot shows a web browser window with the URL 20.51.163.72/somepage. The page displays monitoring information for an application named "LiftShift-Application" running on host "vmss-web-Y8PNEN 10.0.2.5".

Application:	LiftShift-Application
Host:	vmss-web-Y8PNEN 10.0.2.5
Current load:	NONE
Health status:	UNHEALTHY
Actions:	MAKE HEALTHY
	CHECK HEALTH
	START LOAD

Step 16: Export the template Before deleting the Resource Group

Click the Export Template link on the left panel of the Resource Group 'RGAppModern'

All services > RGAppModern

RGAppModern | Export template

Resource group | PREVIEW

Search Download Add to library Deploy Visualize template

7 resource types cannot be exported yet and are not included in the template. See error details. →

To export related resources, select the resources from the Resource Group view then select the "Export template" option from the tool bar.

Include parameters ⓘ

Template Parameters Scripts

> Parameters (28) Variables (0) Resources (542)

```
1  "$$schema": "https://schema.management.azure.com/schemas/2019-04-01/deploymentTemplate.json#",
2  "contentVersion": "1.0.0.0",
3  "parameters": {
4    "sites_sudhakar_app_name": {
5      "defaultValue": "sudhakar-app",
6      "type": "String"
7    },
8    "natGateways_ngw_modern_name": {
9      "defaultValue": "ngw-modern",
10     "type": "String"
11   },
12   "loadBalancers_lb_web_app_name": {
13     "defaultValue": "lb-web-app",
14     "type": "String"
15   },
16   "publicIPAddresses_ip_agv_name": {
17     "defaultValue": "ip-agv",
18     "type": "String"
19   },
20   "publicIPAddresses_ip_ngw_name": {
21     "defaultValue": "ip-ngw",
22     "type": "String"
23   },
24   "serverfarms_modernappservice_name": {
25     "defaultValue": "modernappservice",
26   }
}
```

Cost Management

- Cost analysis
- Cost alerts (preview)
- Budgets
- Advisor recommendations

Monitoring

- Insights (preview)
- Alerts
- Metrics
- Diagnostic settings
- Logs
- Advisor recommendations
- Workbooks

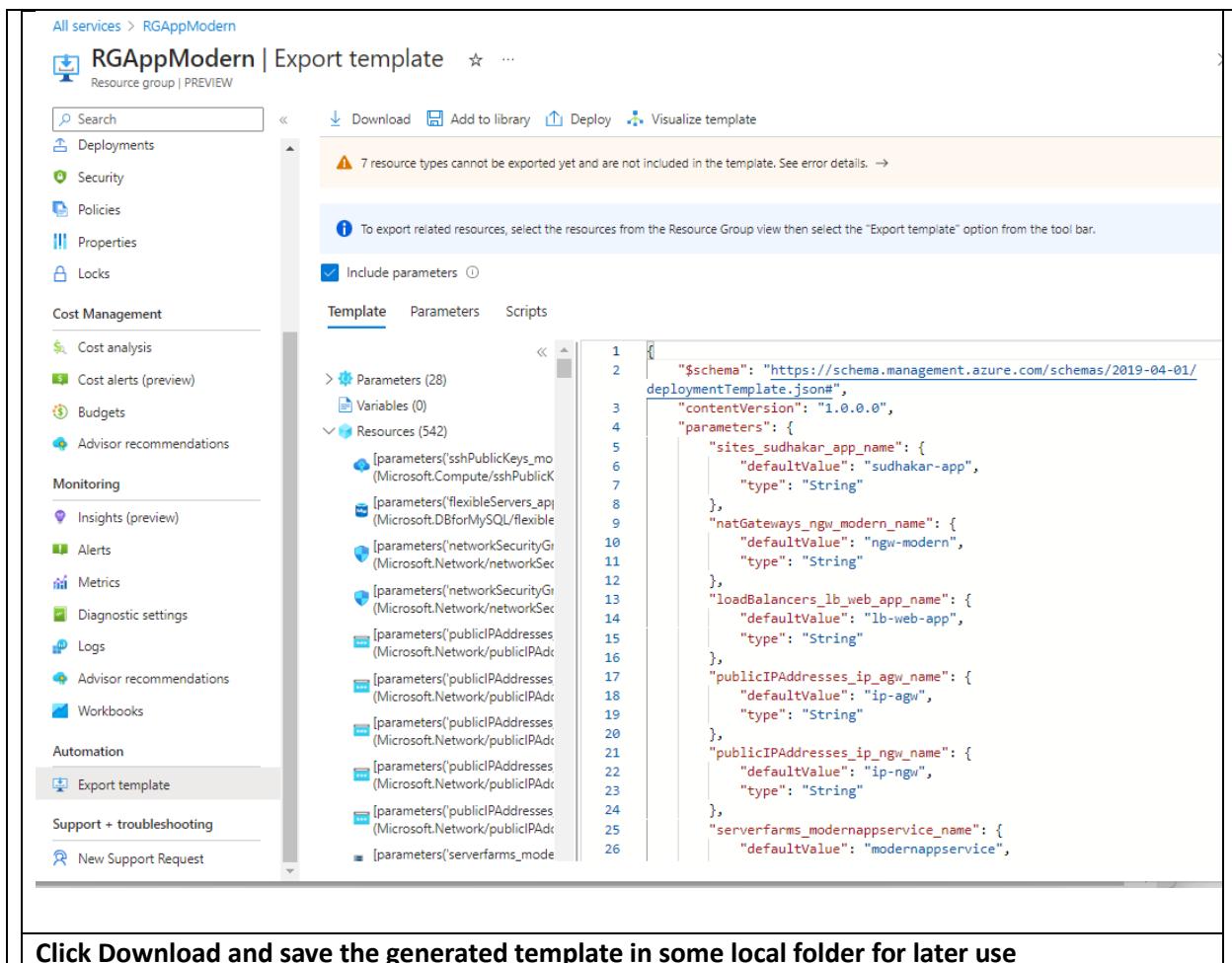
Automation

- Export template

Support + troubleshooting

New Support Request

Click Download and save the generated template in some local folder for later use



Step 17: Delete the Resource Group 'RGAppModern'

Screenshot of Delete-Resource Group

The screenshot shows the Microsoft Azure portal interface. The left sidebar is titled "RGAppModern" and lists various Azure services and management options. The main content area is titled "Delete a resource group" and displays a confirmation dialog for deleting the "RGAppModern" resource group. It lists 32 dependent resources, including an Application gateway, MySQL flexible server, Public IP addresses, Load balancers, and other Azure services like App Service plans and NAT gateways. A checkbox is checked for "Apply force delete for selected Virtual machines and Virtual machine scale sets". The URL in the browser bar is <https://portal.azure.com/#@WhiteSnow@aol.onmicrosoft.com/resource/subscriptions/37427082-8987-4090-a942-f4ee...>.

Delete a resource group

The following resource group and all its dependent resources will be permanently deleted.

Resource group to be deleted

RGAppModern

Dependent resources to be deleted (32)

All dependent resources, including hidden types, are shown

Name	Resource type
app-modern	Application gateway
appmodern	Azure Database for MySQL flexible ...
ip-agw	Public IP address
ip-ngw	Public IP address
lb-modern-emp	Load balancer
lb-modern-emp-publicip	Public IP address
lb-web-app	Load balancer
lb-web-app-publicip	Public IP address
modernapp-key	SSH key
modernappservice	App Service plan
ngw-modern	NAT gateway

Apply force delete for selected Virtual machines and Virtual machine scale sets

Enter resource group name to confirm deletion *

RGAppModern

Delete **Cancel**

Microsoft Azure Search resources, services, and docs (G+/-)

All services > RGAppModern Resource group

Overview + Create Manage view Delete resource group

Activity log Access control (IAM) Tags Resource visualizer Events

Subscription (move) WhiteSnow Subscription ID 37427082-8987-4090-a942-f4eed9e71741

Tags (edit) Click here to add tags

Resources Recommendations

Filter for any field... Type equals all

Showing 1 to 32 of 32 records. Show hidden types

Name	Resource type
app-modern	Application gateway
appmodem	API management
ip-agw	IP address
ip-ngw	IP address
lb-modern-e	Load balancer
lb-modern-e	Load balancer
lb-web-app	Load balancer
lb-web-app-publicip	Public IP address
modernapp-key	SSH key

Delete confirmation

Deleting this resource group and its dependent resources is a permanent action and cannot be undone.

Apply force delete for selected Virtual machines and Virtual machine scale sets

Enter resource group name to confirm deletion *

RGAppModern

Delete **Cancel** **Show all**

ExportedTemplate-....zip

The screenshot shows the Microsoft Azure portal interface. On the left, the 'RGAppModern' resource group is selected from the 'All services' list. The main pane displays the 'Overview' of the resource group, including a search bar, a 'Create' button, and a 'Delete resource group' button. Below this, there are sections for 'Essentials' (Subscription, Tags), 'Resources' (a table listing various Azure resources like Application gateway, API management, IP addresses, Load balancers, and SSH keys), and 'Recommendations'. A 'Delete confirmation' dialog box is open on the right, prompting the user to delete the resource group and its dependent resources. The dialog includes a checkbox for applying force delete to VMs and VMSs, an input field for confirming the deletion with the resource group name 'RGAppModern', and 'Delete' and 'Cancel' buttons. A red arrow points to the 'Delete' button in the dialog box.

The screenshot shows the Microsoft Azure portal interface. The left sidebar displays the 'RGAppModern' resource group with various navigation options like Overview, Activity log, and Settings. The main content area is titled 'Notifications' and lists several recent events:

- Deleted resource group RGAppModern (4 minutes ago)
- Saved Traffic Manager profile changes (7 hours ago)
- Updating web app settings (12 hours ago)
- Updating web app settings (12 hours ago)

A search bar at the top is set to 'Search resources, services, and docs (G+ /)'. The top right corner shows the user's email 'WhiteSnow@aol.com' and the 'DEFAULT DIRECTORY'.