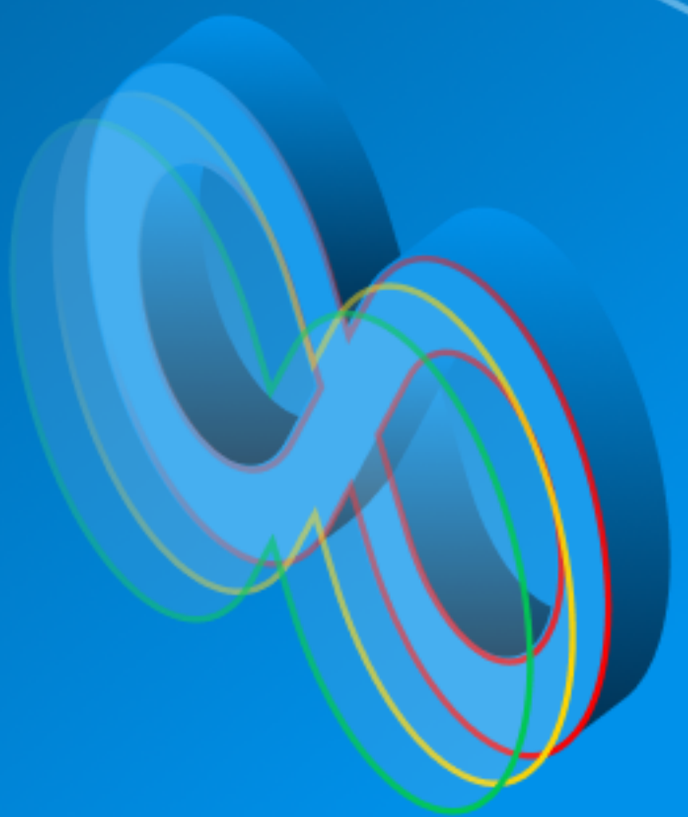
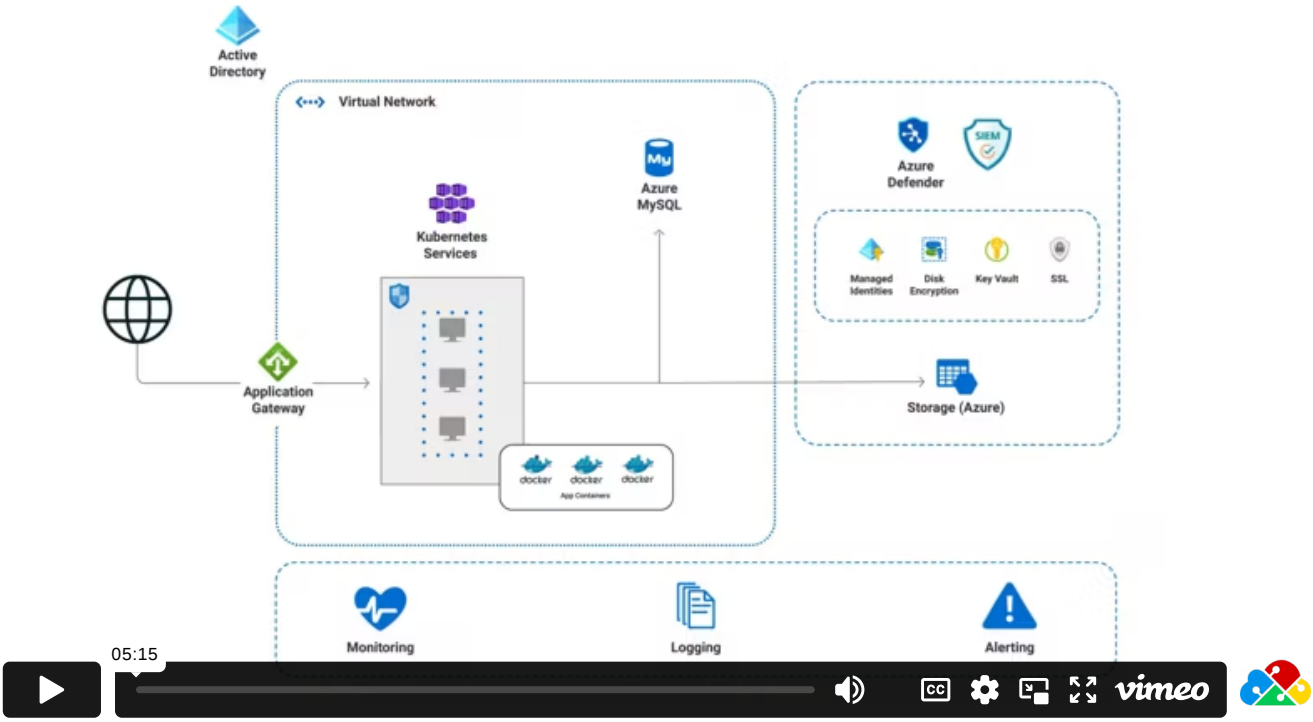
Microsoft Azure/ DuploCloud Quick Start



Quick Start

Get up and running with DuploCloud running inside a Microsoft Azure cloud environment; harness the power of generating application infrastructures.



This Quick Start tutorial shows you how to set up an end-to-end cloud deployment. You will create Azure infrastructure and tenants and by the end of this tutorial, you can view a deployed sample web application.

Estimated time to complete tutorial: 90-100 minutes.

1. Create Azure Infrastructure
2. Create a Tenant
3. Create an Azure Agent Pool
4. Create and deploy a sample app service
5. Create a Load Balancer to access the web application deployed
6. Test the sample application

Step 1: Create Infrastructure and Plan

Creating the DuploCloud Infrastructure and a Plan

Each DuploCloud Infrastructure is a Virtual Private Cloud (VPC) instance that resides in a region containing Kubernetes clusters, AKS clusters, GKE clusters, EKS clusters, or a combination of all of these. An Infrastructure can reside On-Premises (On-Prem) or in a Public Cloud.

After you supply a few basic inputs DuploCloud creates an Infrastructure for you, within Azure and within DuploCloud, with a few clicks. Behind the scenes, DuploCloud does a lot with what little you supply — generating subnets, NAT gateway, routes, and a cluster in the region.

With the Infrastructure as your foundation, you can customize an extensible, versatile Platform Engineering development environment by adding Tenants, Plans, Hosts, Services, and more.

Estimated time to complete Step 1: 40 minutes. Much of this time is consumed by DuploCloud's creation of the Infrastructure and enabling your AKS cluster with Kubernetes.

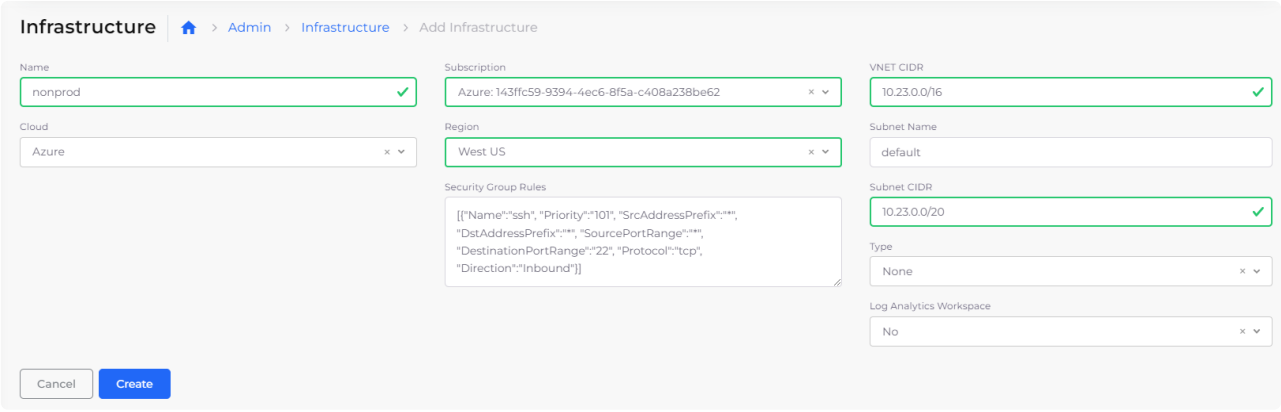
Prerequisites

Before starting this tutorial:

- Learn more about DuploCloud Infrastructures, Plans, and Tenants.
- Reference the Access Control documentation to create User IDs with the **Administrator** role. In order to perform the tasks in this tutorial, you must have Administrator privileges.

Creating a DuploCloud Infrastructure

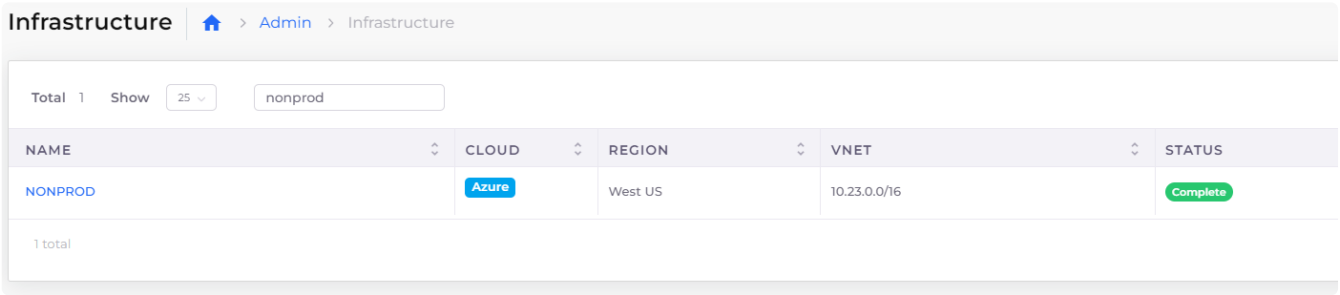
1. In the DuploCloud Portal, navigate to **Administrator** -> **Infrastructure**.
2. Click **Add**. The **Add Infrastructure** page displays.



Add Infrastructure page for creating a DuploCloud Infrastructure

3. From the table below, enter the values that correspond to the fields on the **Add Infrastructure** page. Accept all other default values for fields not specified.
4. Click **Create** to create the Infrastructure. It may take up to half an hour to create the Infrastructure. While the Infrastructure is being created, a **Pending** status displays in the Infrastructure page **Status** column, often with additional information about what part of the Infrastructure DuploCloud is currently creating. When creation completes, a status of **Complete** displays.

Add Infrastructure page field	Value
Name	`nonprod`
Subscription	*`YOUR_AZURE_SUBSCRIPTION_NAME`*
VNET CIDR	`10.23.0.0/16`
Subnet CIDR	`10.23.0.0/20`
Cloud	`Azure`
Region	*`YOUR_GEOGRAPHIC_REGION`*



Infrastructure creation with a status of **Complete**

Verifying that a Plan exists for your infrastructure

Every DuploCloud Infrastructure generates a Plan. Plans are sets of templates that are used to configure the Tenants, or workspaces, in your Infrastructure. You will set up Tenants in the next tutorial step.

Before proceeding, confirm that a Plan exists that corresponds to your newly created Infrastructure.

1. In the DuploCloud Portal, navigate to **Administrator** -> **Plans**. The **Plans** page displays.
2. Verify that a Plan exists with the name **NONPROD,** the name that you gave to the Infrastructure you created.

Enabling the AKS Kubernetes Cluster

Once your Infrastructure and Plan have been created, the final step before creating a Tenant is to enable Azure Kubernetes Service (AKS) to connect with Azure cloud management.

1. In the DuploCloud Portal, navigate to **Administrator** -> **Infrastructure**.
2. Select the **NONPROD** Infrastructure that you created, in the **NAME** column of the Infrastructure page.
3. Click the **Kubernetes** tab. The following message displays: **Kubernetes cluster is not yet enabled. Click Here to enable the Kubernetes Cluster**.
4. Click on the **Click Here** hyperlink. The **Configure AKS Cluster** pane displays.
5. Accept the default values and click **Create** to enable the AKS service for your Infrastructure.

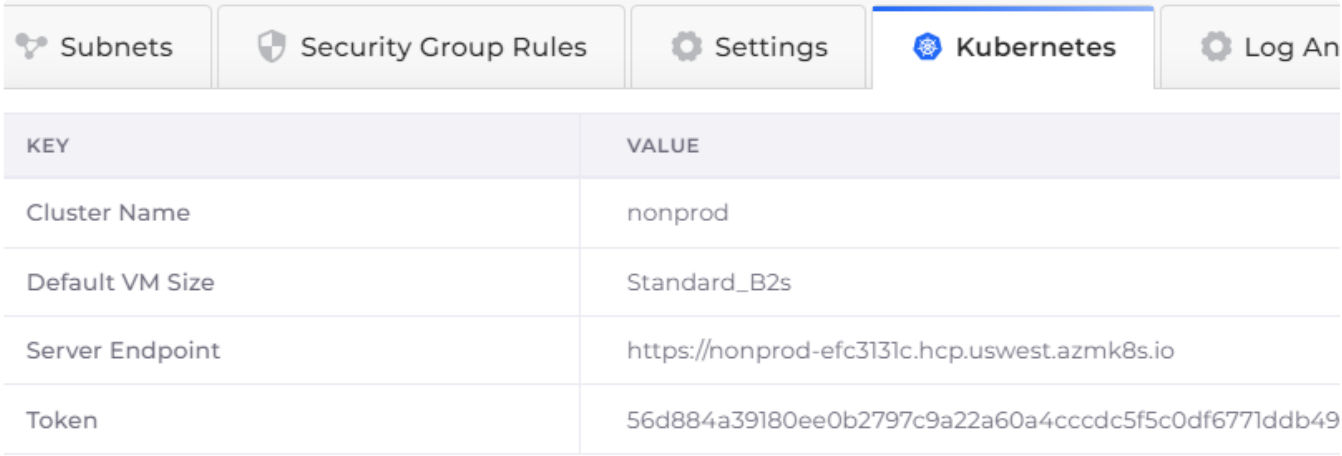
DuploCloud begins creating and configuring an AKS cluster using Kubernetes. You receive an alert message when the Infrastructure has been updated.

> It may take some time for enablement to complete. Use the **Kubernetes** card in the Infrastructure screen to monitor the status, which should display as **Enabled** when completed. You can also monitor progress by using the **Kubernetes** tab, as DuploCloud generates your **Cluster Name**, **Default VM Size**, **Server Endpoint**, and **Token**.

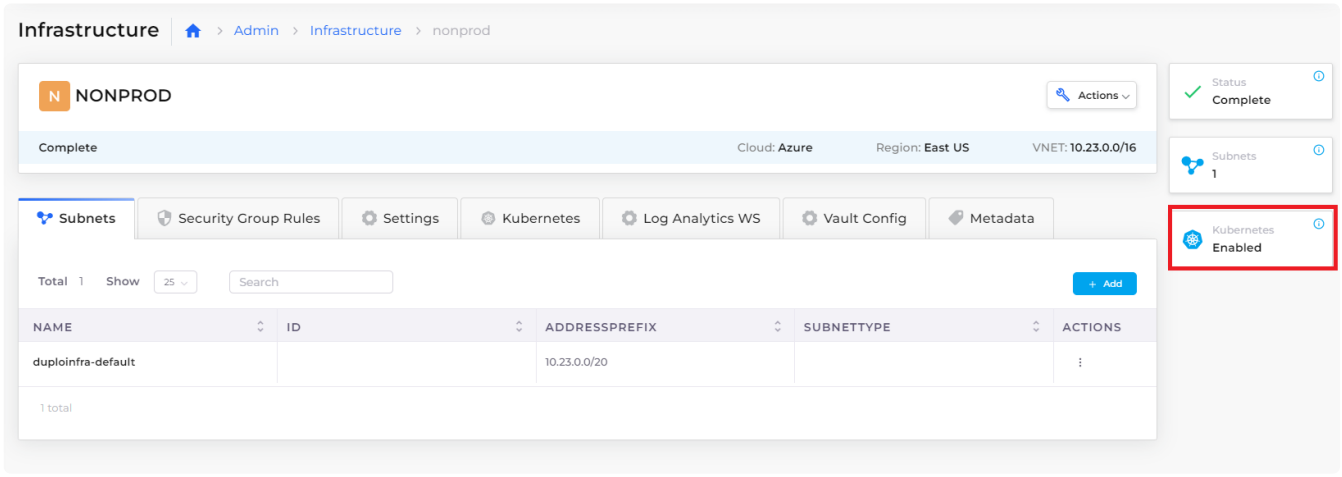
Check your work

You previously verified that your Infrastructure and Plan were created. Now verify that AKS is Enabled before proceeding to Create a Tenant.

When AKS has been **Enabled**, details are listed in the **Kubernetes** tab. The Infrastructure page also displays the **Enabled** status on the **Kubernetes** card.



Kubernetes tab in the **Infrastructure** page with details about your configured AKS cluster



NONPROD Infrastructure page with **Kubernetes Enabled** card

Step 2: Create a Tenant

Creating a DuploCloud Tenant that segregates your workloads

Now that the Infrastructure and Plan exist and AKS has been enabled, create one or more Tenants that use the configuration DuploCloud created.

Tenants in DuploCloud are similar to projects or workspaces and have a subordinate relationship to the Infrastructure. Think of the Infrastructure as a virtual "house" (cloud), with Tenants conceptually "residing" in the Infrastructure performing specific workloads that you define. As Infrastructure is an abstraction of a Virtual Private Cloud, Tenants abstract the segregation created by a Kubernetes Namespace, although Kubernetes Namespaces are only one component that Tenants can contain.

In Azure, Microsoft cloud features such as Azure resource groups, Azure managed identity, Azure application security groups (ASG), and KMS keys are exposed in Tenants, which reference these feature configurations.

Estimated time to complete Step 2: 10 minutes.

Tenant use cases

DuploCloud customers often create at least two Tenants for their production and non-production cloud environments (Infrastructures).

For example:

- Production Infrastructure
  - Pre-production Tenant - for preparing or reviewing production code
  - Production Tenant - for deploying tested code
- Non-production Infrastructure
  - Development Tenant - for writing and reviewing code
  - Quality Assurance Tenant - for automated testing

In larger organizations, some customers create Tenants based on application environments, such as creating one Tenant for Data Science applications and another Tenant for web applications, and so on.

Tenants are sometimes created to isolate a single customer workload, allowing more granular performance monitoring, scaling flexibility, or tighter security. This is referred to as a *single-Tenant* setup.

Prerequisites

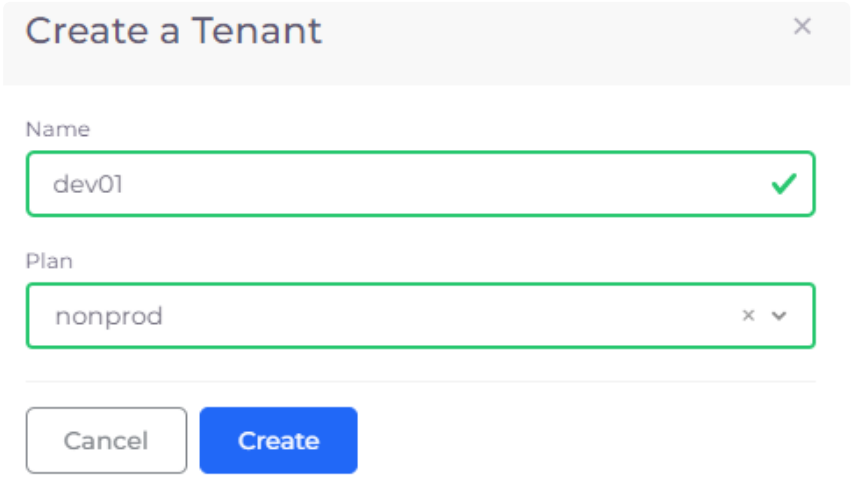
Before creating a Tenant, verify that you accomplished the tasks in Step 1 of this tutorial. Using the DuploCloud Portal, confirm that:

- An Infrastructure and Plan exist, both with the name **NONPROD**.
- The **NONPROD** infrastructure has Azure Kubernetes Service (AKS) **Enabled**.

Creating a Tenant

Create a Tenant for your Infrastructure and Plan:

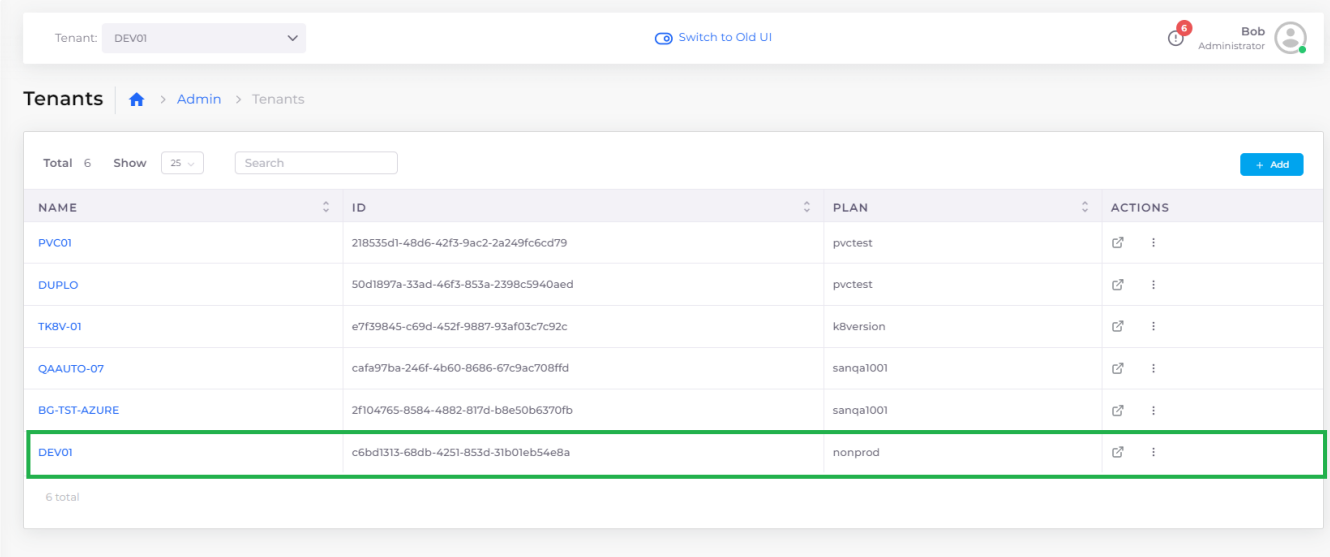
1. In the DuploCloud Portal, navigate to **Administrator** --> **Tenants.**
2. Click **Add**. The **Create a Tenant** pane displays.
3. Enter **dev01** in the **Name** field.
4. Select the **Plan** that you created in the previous step (**NONPROD**).
5. Click **Create**.



Create a Tenant pane

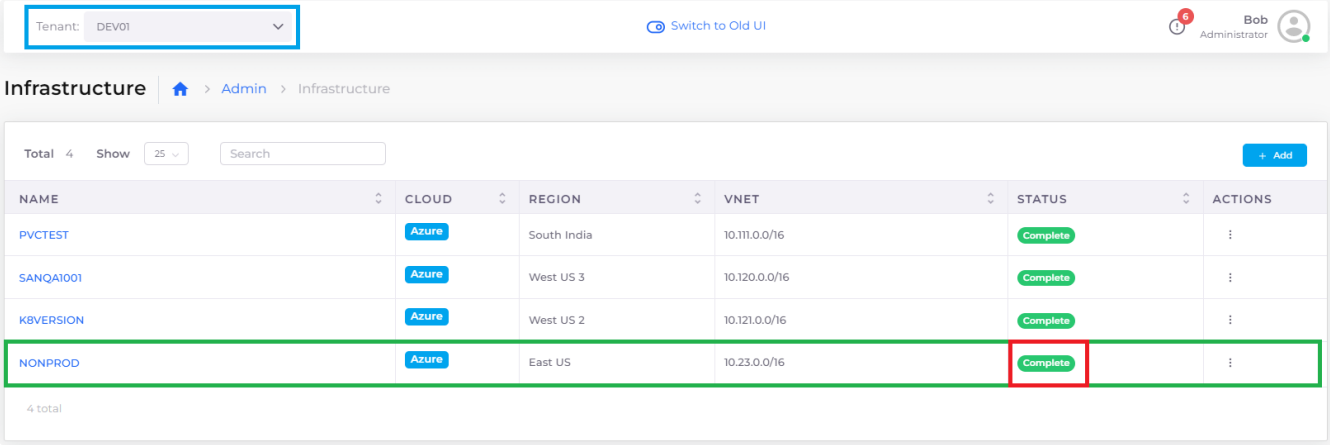
Check your work

Navigate to **Administrator** -> **Tenants** and verify that the **DEV01** Tenant displays in the list.



Tenant page with Tenant **dev01** using Plan **NONPROD**

Navigate to **Administrator** -> **Infrastructure** and select **DEV01** from the **Tenant** list box at the top left in the DuploCloud Portal. The **NONPROD** Infrastructure appears in the list of Infrastructures, indicating that the **DEV01** Tenant is associated with Infrastructure **NONPROD**.



Tenant list box with DEV01 selected; **NONPROD** Infrastructure with **Status Complete**

Step 3: Create Agent Pools

Creating Azure Agent Pools as shared resources across Tenants

So far you have created an Infrastructure, a Plan, and a Tenant. Now you need to create Agent Pools to serve computing and storage resources to your Tenants, using agents that monitor resource allocation.

Instead of managing each agent individually, agents are grouped into agent pools for maximum efficiency. You share Azure Agent Pools across workloads defined by the Tenants that you set up. Azure Agent Pools are scoped to a Host (Virtual Machine or VM) or a group of Hosts by Azure Pipeline Agents. In this tutorial, you won't be creating specific Hosts, but you will create an Azure Agent Pool to which a group of VMs has already been defined by DuploCloud.

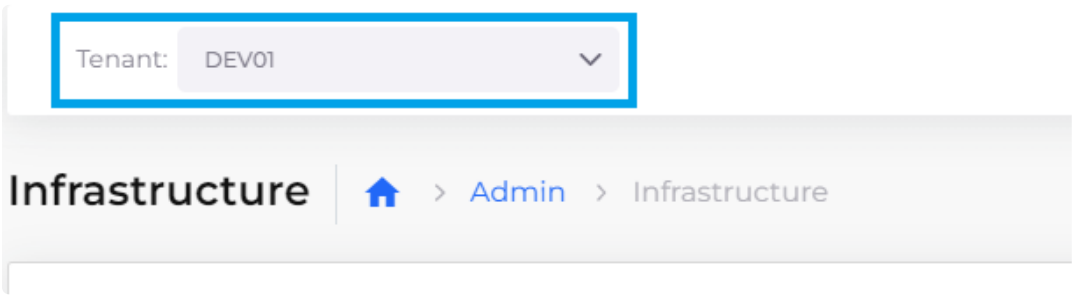
DuploCloud ensures that your application development platform conforms to Azure best practices. While you provide only high-level specifications, DuploCloud does the rest, configuring encryption, linking to managed identity, and logging you into a virtual Linux workstation to access Kubernetes constructs like Pods, Namespaces, and ConfigMaps.

Estimated time to complete Step 3: 10 minutes.

Prerequisites

Before creating Azure Agent Pools, verify that you accomplished the tasks in Step 2 of this tutorial. In DuploCloud Portal, in the **Administrator** navigation group, confirm that you have:

- An Infrastructure named **NONPROD**.
- A Plan named **NONPROD**.
- A Tenant named **DEV01**
- Selected Tenant **DEV01** in the **Tenant** list box, at the top of the DuploCloud Portal.

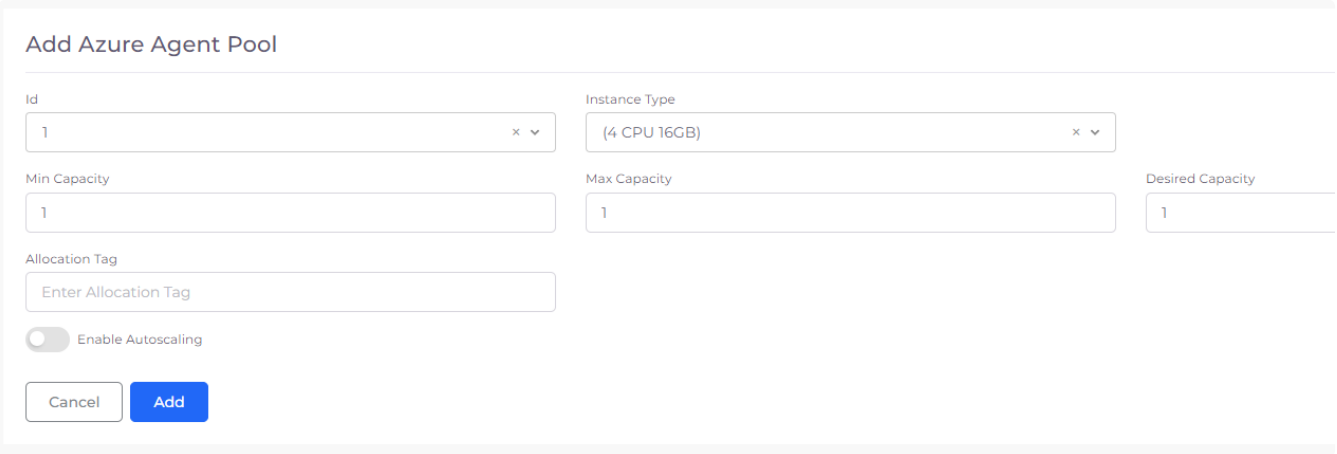


Tenant list box with Tenant **DEV01** selected

Create an Azure Agent Pool

1. In the DuploCloud Portal, navigate to **DevOps** -> **Hosts**.
2. Click the **Azure Agent Pool** tab.
3. Click **Add**. The **Azure Agent Pool** page displays.
4. From the table below, enter the values corresponding to the fields and options on the **Azure Agent Pool** page. Accept the defaults for fields that are not listed.
5. Click **Add**. After a few minutes, the Azure Agent Pool is created.

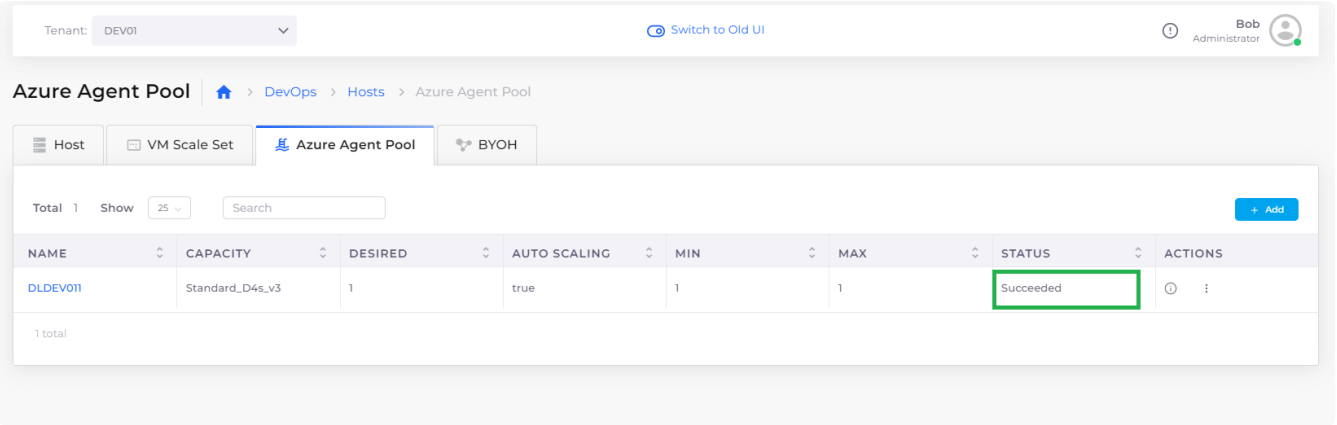
Azure Agent Pool page fields and options	Value or action
Id	1
Instance Type	(4 CPU 16GB)



Add Azure Agent Pool page

Check your work

On the **Azure Agent Pool** page, verify that the created agent pool (with a **Name** generated by DuploCloud) has a **Status** of **Succeeded**.



Successfully creted Azure Agent Pool

Step 4: Create a Service

Create a DuploCloud Service for application deployment

With all of the core components of your Duplocloud platform configured, enabled, and running, you're ready to deploy applications with Azure, using AKG and Kubernetes.

In order to deploy applications, you must first create a DuploCloud Service to connect to the Docker containers and images where your application code exists. Once you create a service from the DuploCloud Portal, you can also perform tasks that you might perform when working with a Kubernetes service. For example, you can view container logs, container state, and container shell, as well as get access to `kubectl`, which allows you to work directly with Kubernetes constructs such as Pods.

In this step, we create a service to connect a Docker container image with code that displays text on a web page. The Docker container and image name is **nginx:latest**. **nginx** is the image name and **:latest** indicates that the latest version of that image will be used.

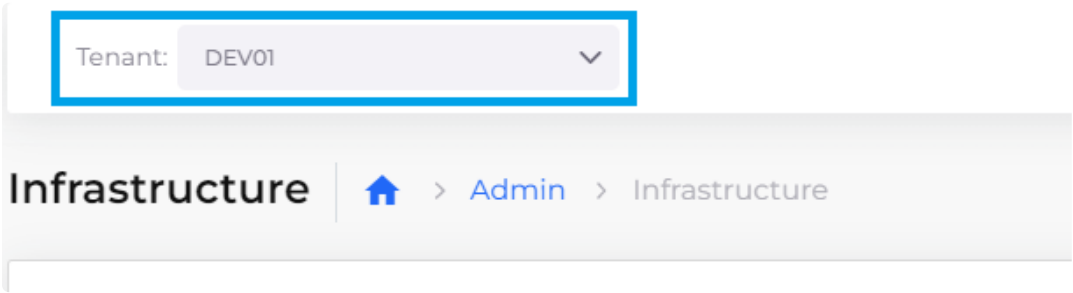
Estimated time to complete Step 4: 15 minutes.

> ⓘ See the Docker documentation for an overview of containers and images.

Prerequisites

Before creating your DuploCloud Service, ensure that:

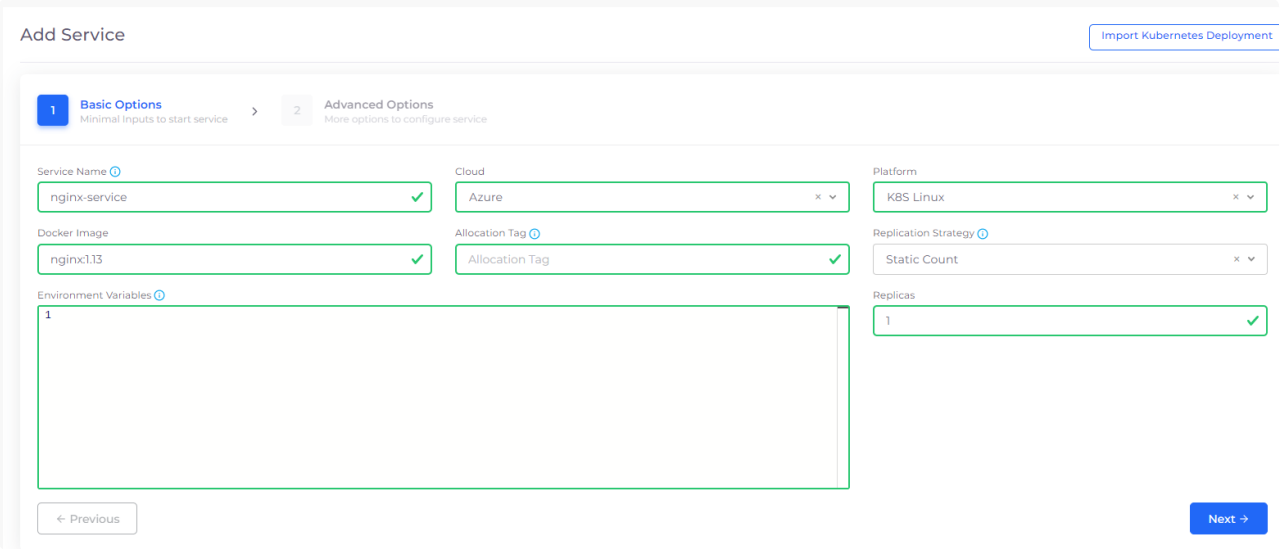
- All previous steps in this tutorial to create an Infrastructure and Plan, Tenant, Host, and Azure Agent Pool are complete.
- The AKS Kubernetes cluster is enabled.
- Tenant **DEV01** is selected in the **Tenant** list box, at the top of the DuploCloud Portal.



Tenant list box with Tenant **DEV01** selected

Creating a Service

1. In the DuploCloud Portal, navigate to **DevOps** -> **Containers** -> **AKS/Native**.
2. Click **Add**. The **Add Service** page displays.

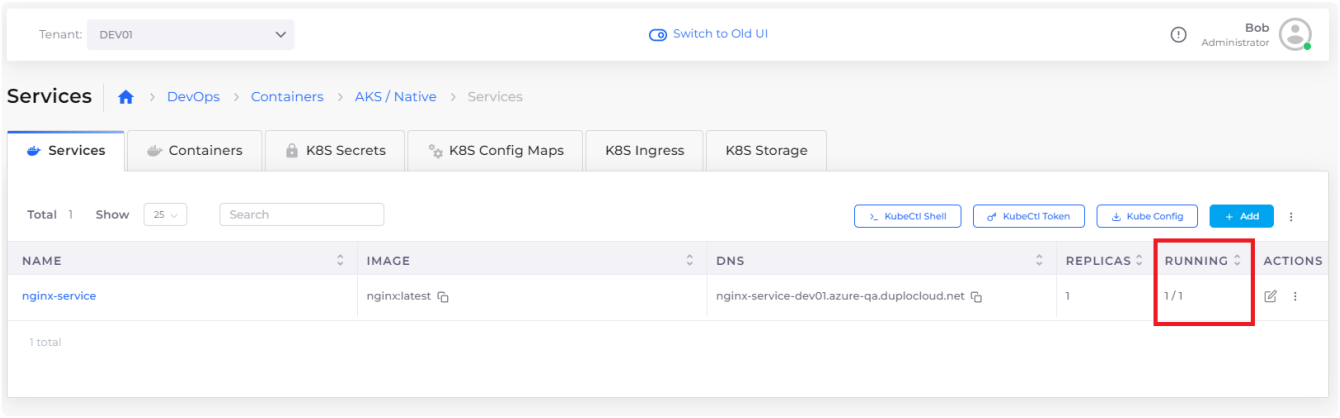


Add Service page to add **nginx-service**

3. In the **Service Name** field, enter **nginx-service**.
4. Specify the Docker image that you use to run the application. In the Docker Image field, enter **nginx:latest**.
5. Click **Next**, accepting all other defaults. The **Advanced Options** page displays.
6. Scroll down if needed and click **Create**.

Check your work

After a few minutes, the Service initializes and starts up. Shortly afterward, you can see the service and the containers running.



nginx-service page with service **RUNNING (1/1)**

Step 5: Create a Load Balancer

Create a load balancer to access your application

Now that your service is running, you have a mechanism to expose the containers and images in which your application resides.

But because your containers are running inside a private network, you also need a load balancer to listen on the correct ports in order to access the application.

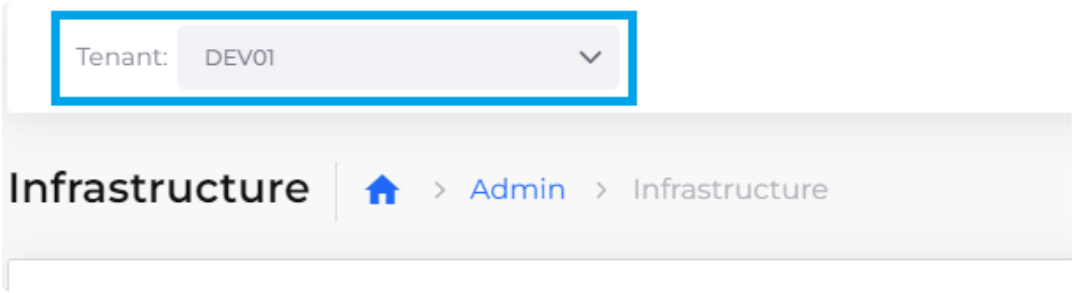
In this step, we add a Load Balancer Listener to complete this network configuration.

Estimated time to complete Step 5: 20 minutes.

Prerequisites

Before creating your DuploCloud load balancer, ensure that:

- All previous steps in this tutorial to create an Infrastructure and Plan, Tenant, Azure Agent Pool, and Service are complete.
- AKS Kubernetes cluster is enabled.
- **DEV01** is selected in the **Tenant** list box, at the top of the DuploCloud Portal.

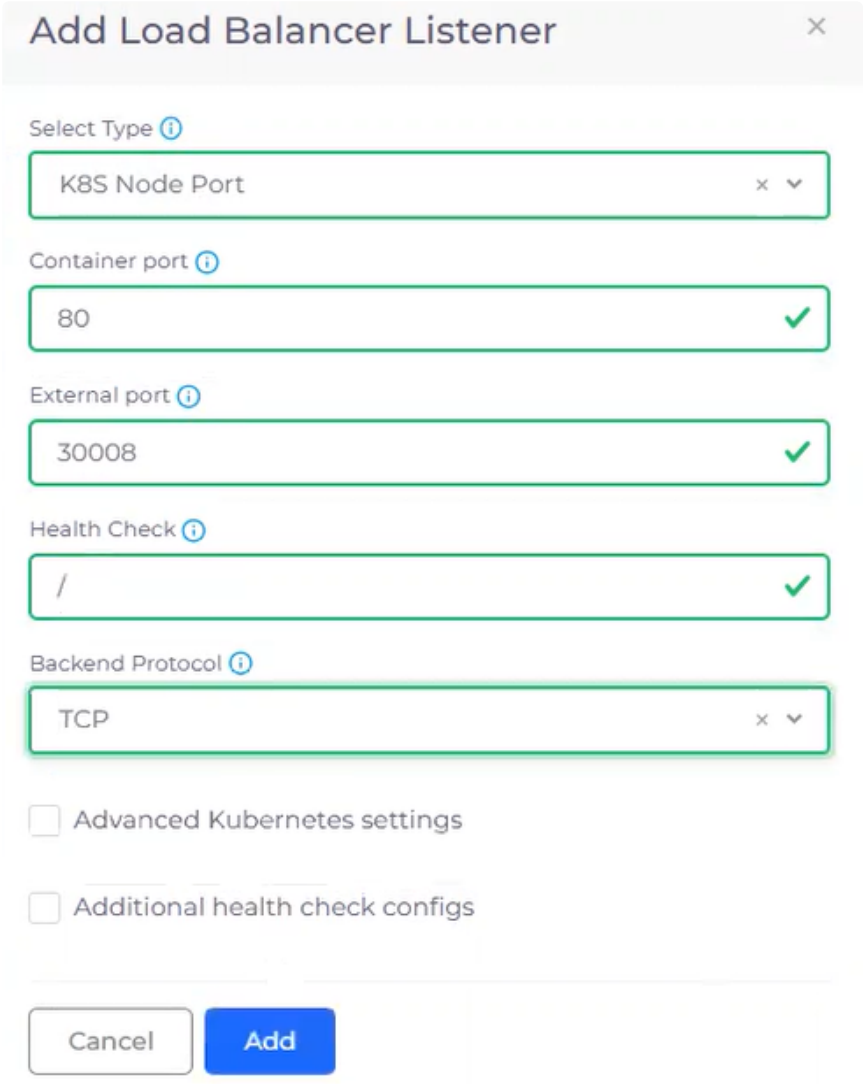


Tenant list box with Tenant **DEV01** selected

Adding and configuring a load balancer

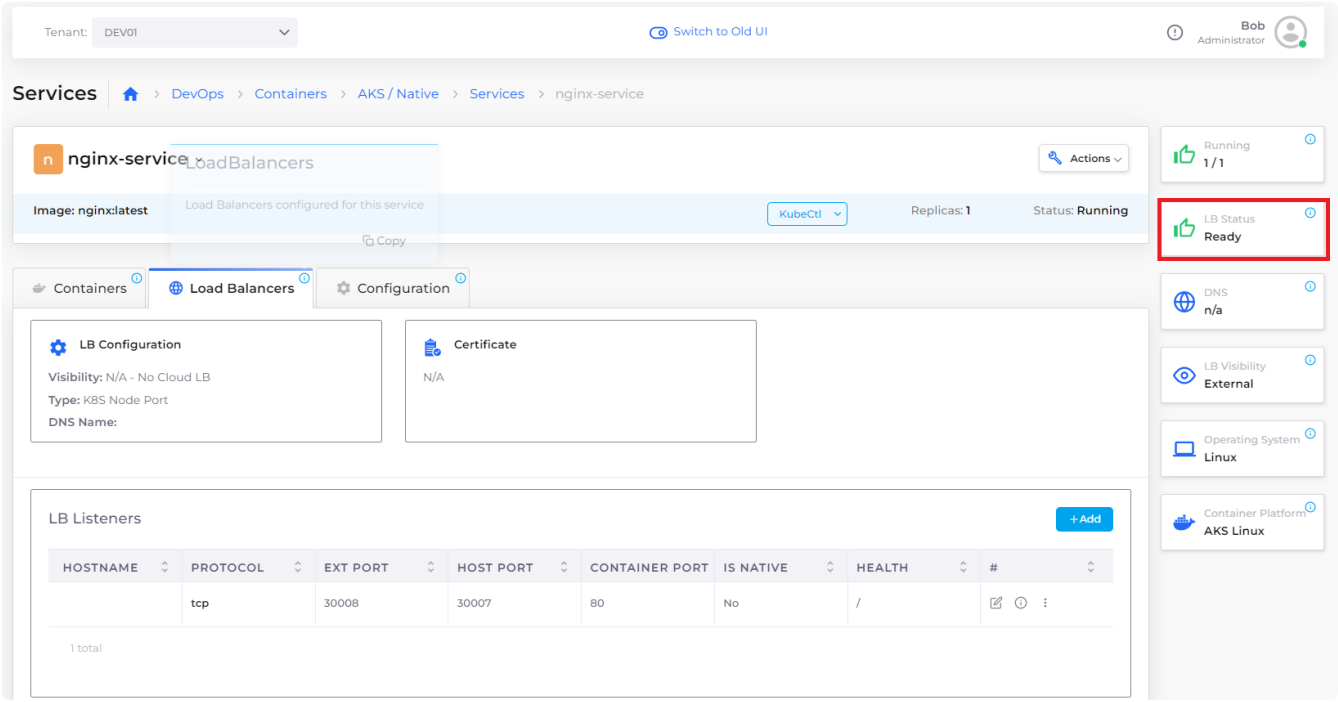
Add a load balancer for your running service that listens on port **80**:

1. In the DuploCloud Portal, navigate to **DevOps** -> **Containers** -> **AKS / Native**.
2. In the **Services** tab, select the **nginx-service** that you started when creating a service in the previous step.
3. Click the **Load Balancers** tab.
4. Click the **Configure Load Balancer** link. The **Add Load Balancer Listener** pane displays.
5. Select **K8S Node Port** from the **Select Type** list box.
6. Enter **80** in the **Container port** field.
7. Enter **30008** in the **External port** field.
8. Type **/** (forward-slash) in the **Health Check** field to indicate that the cluster we want Kubernetes to perform Health Checks on is located at the `root` level.
9. Select **TCP** from the **Backend Protocol** list box.



Add Load Balancer Listener pane using **K8S Node Port**

10. Click **Add**. The Load Balancer is created and started. After a few minutes, the **LB Status** card displays a status of **Ready**, indicating that the Load Balancer is ready for use.

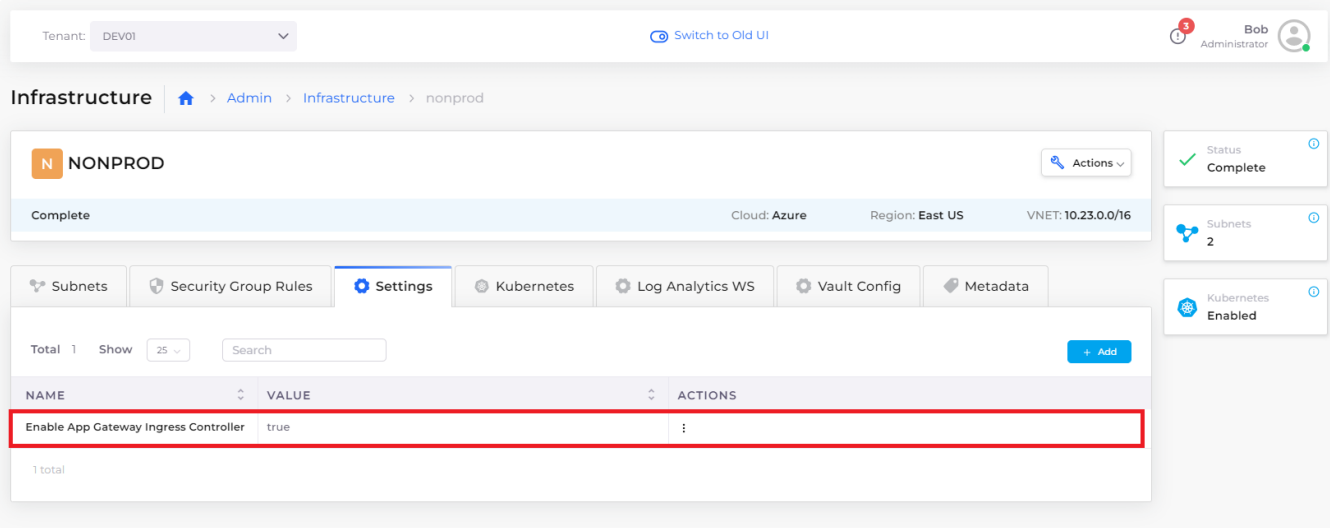


nginx-service Load Balancers tab with **LB Status Ready**

Enable the Ingress Controller

When we created the Load Balancer Listener, we used the **K8S Node Port** type. Even though the Node Port is ready, before you use it, you must enable the Kubernetes Ingress Controller to open the application gateway.

1. In the DuploCloud Portal, navigate to **Administrator** -> **Infrastructure**.
2. Select your Infrastructure from the **Name** column.
3. Click the **Settings** tab.
4. Click **Add**. The **Infra-Set Custom Data** pane displays.
5. In the **Setting Name** field, select **Enable App Gateway Ingress Controller**.
6. Click **Enable.**
7. Click **Set**. In the **Settings** tab, the **Enable App Gateway Ingress Controller** setting now contains a value of **true**.



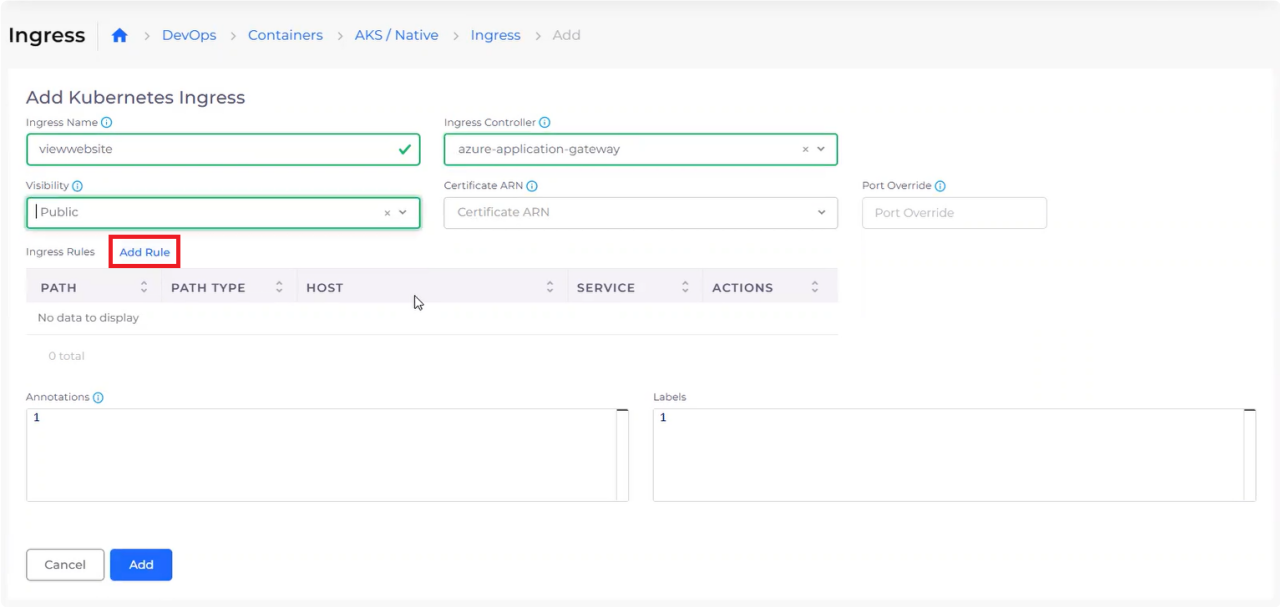
NONPROD Infrastructure page with **Enable App Gateway Ingress Controller** set to **true**

Add Kubernetes Ingress

Now that your gateway is established and opened, you add a Kubernetes Ingress to expose the backend HTTP routes from outside the cluster to your service.

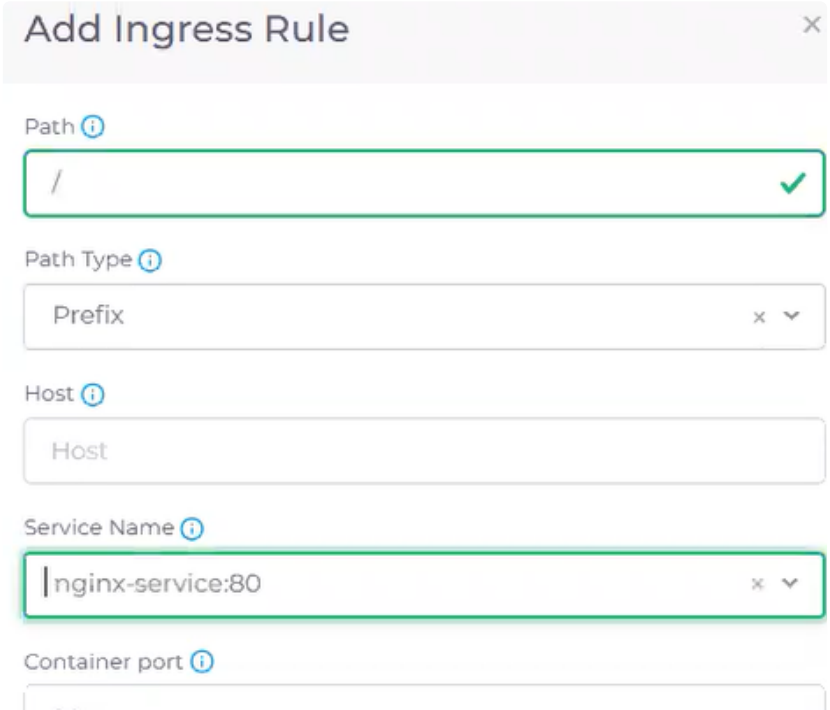
The Ingress object communicates with the Kubernetes NodePort that your Load Balancer Listener uses. Ingress objects are flexible constructs in Kubernetes, and their use here is an example of how DuploCloud leverages the power of Kubernetes constructs while abstracting away their native complexity. To manually create these components (and maintain them) in Kubernetes, takes a significant amount of developer time.

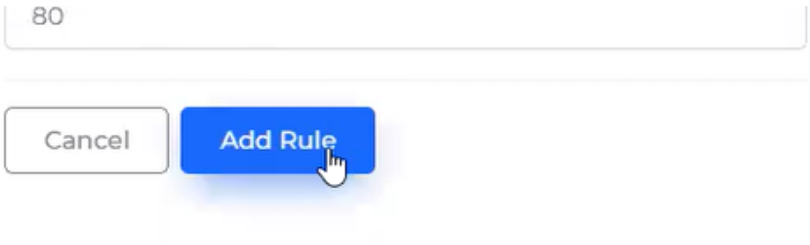
1. In the DuploCloud Portal, navigate to **DevOps** -> **Containers** -> **AKS / Native**.
2. Click the **K8S Ingress** tab.
3. Click **Add**. The **Add Kubernetes Ingress** page displays.
4. In the **Ingress Name** field, type **viewwebsite**.
5. In the **Ingress Controller** list box, select **azure-application-gateway**.
6. In the **Visibility** list box, select **Public**.
7. Click **Add Rule**. The **Add Ingress Rule** pane displays.



Add Rule option on the **Add Kubernetes Ingress** page

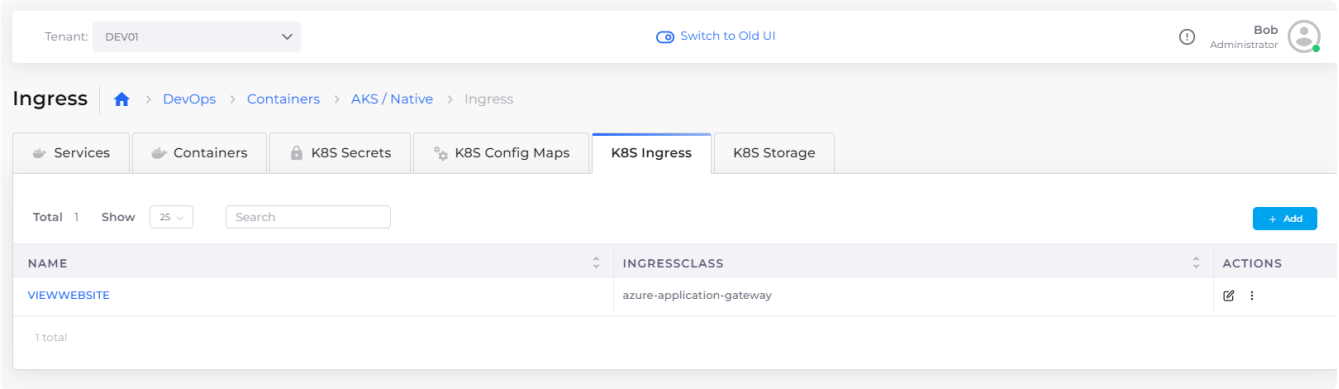
8. In the **Path** field, type **/** (forward-slash).
9. In the **Service Name** field, select **nginx-service:80**.
10. Click **Add Rule** to add the rule and to close the **Add Ingress Rule** pane. You should be back to viewing the **Add Kubernetes Ingress** page.





Add Ingress Rule pane

11. On the **Add Kubernetes Ingress** page, click **Add** to add Ingress. On the **K8S Ingress** tab, the **VIEWWEBSITE** Ingress that you defined, with an **Ingress Class** of **azure-application-gateway**, displays.



K8S Ingress tab displaying **VIEWWEBSITE** Ingress

Check your work

Before you proceed to the final step and run your application, ensure that you:

- Configured a Load Balancer Listener that uses K8S Node Port.
- Enabled the App Gateway Ingress Controller.
- Defined an Ingress and a rule for your DuploCloud Service to listen on port 80.

Step 6: Test your application

Test the application to ensure you get the results you expect

You can test the sample web page application directly from the **VIEWWEBSITE** Ingress that you created in the previous step.

Estimated time to complete Step 6 and finish tutorial: 10 minutes.

Prerequisites

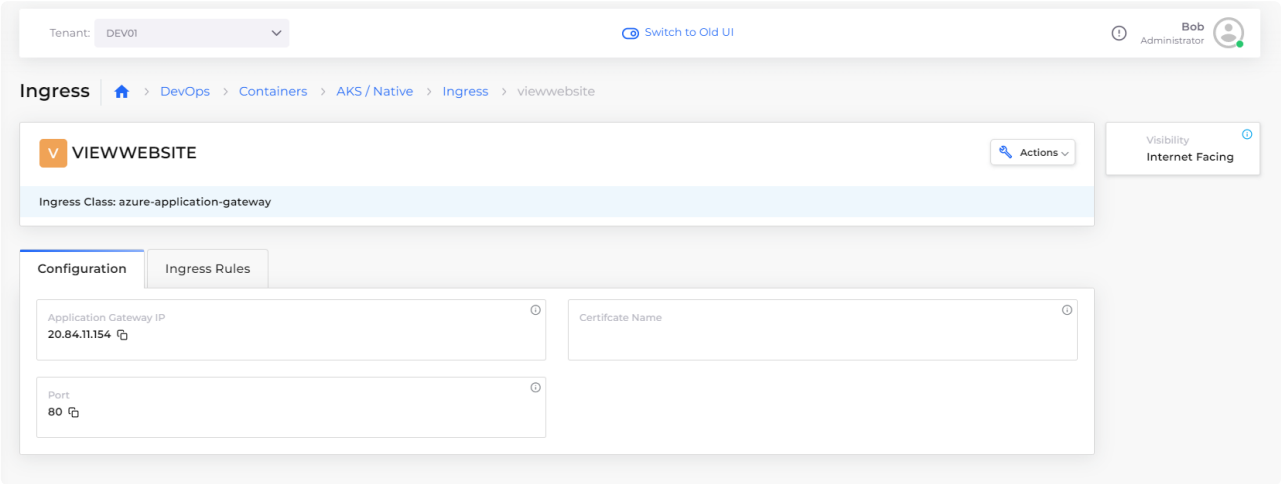
Before testing your application, ensure that:

- Previous steps in this tutorial to create an Infrastructure and Plan, Tenant, Azure Agent Pool, Service, and Load Balancer Listener are complete.
- AKS Kubernetes cluster is enabled.
- Tenant **DEV01** is selected in the **Tenant** list box, at the top of the DuploCloud Portal.
- **nginx-service** is **Running** and the **LB Status** is **Ready.**
- You defined an Ingress and a rule for your DuploCloud Service to listen on port 80, enabled the App Gateway Ingress Controller, and configured a Load Balancer Listener that uses K8S Node Port.

Testing the application

Display the web page that the application creates:

1. In the DuploCloud Portal, navigate to **DevOps** -> **Containers** -> **AKS / Native**.
2. Click the **K8S Ingress** tab.
3. Select the **VIEWWEBSITE** Ingress from the **Name** column.
4. Click the **Configuration** tab.



5. In the **Application Gateway IP** card, copy the displayed IP address to your clipboard. In this example, the IP address is **20.84.11.154**.
6. Open a web browser and paste the copied IP address in your browser's URL field.
7. Press **Enter**. Your application runs and your web page renders as shown below. Congratulations! You just launched your first web service with Azure on DuploCloud!

Reviewing what you learned

In this tutorial, your objective was to create a cloud environment to deploy an application for testing purposes, and to understand how the various components of DuploCloud work together.

The application rendered a simple web page with text, coded in JavaScript, from software application code residing in a Docker container. You can use this same procedure to deploy much more complex cloud applications.

In the previous steps, you:

- Created a DuploCloud Infrastructure named **NONPROD**, a Virtual Private Cloud instance, backed by an AKS-enabled Kubernetes cluster.
- Created a Tenant named **DEV01** in Infrastructure **NONPROD**. While generating the Infrastructure, DuploCloud created a set of templates (Plan) to configure multiple Azure and Kubernetes components needed for your environment.
- Created an Azure Agent Pool backed by pre-existing hosts (VMs), so that your application has storage resources with which to run.
- Created a Service to connect the Docker containers and associated images, in which your application code resides, to the DuploCloud Tenant environment.
- Created a Load Balancer Listener and a Kubernetes Node Port to expose your application via ports and backend network configurations. You enabled an Azure application gateway and created a Kubernetes Ingress to communicate with the node port and the AKS-enabled Kubernetes cluster in the Infrastructure.
- Verified that your web page rendered as expected by testing the IP address exposed by the Kubernetes Ingress.

Cleaning up your tutorial environment

In this tutorial, you created many artifacts for testing purposes. When you are ready, clean them up so that another person can run this tutorial from the start, using the same names for Infrastructure and Tenant.

1. To delete the **DEV01** tenant follow these instructions and then return to this page. As you learned, the Tenant segregates all work in one isolated environment, so deleting the Tenant that you created cleans up most of your artifacts.
2. Finish by deleting the **NONPROD** Infrastructure. In the DuploCloud Portal, navigate to **Administrator** -> **Infrastructure**. Click the **Action** menu icon () for the **NONPROD** row and select **Delete**.

The **NONPROD** Infrastructure is deleted and you have completed the clean-up of your test environment.

Thanks for completing this tutorial and proceed to the next section to learn more about using DuploCloud with Microsoft Azure.