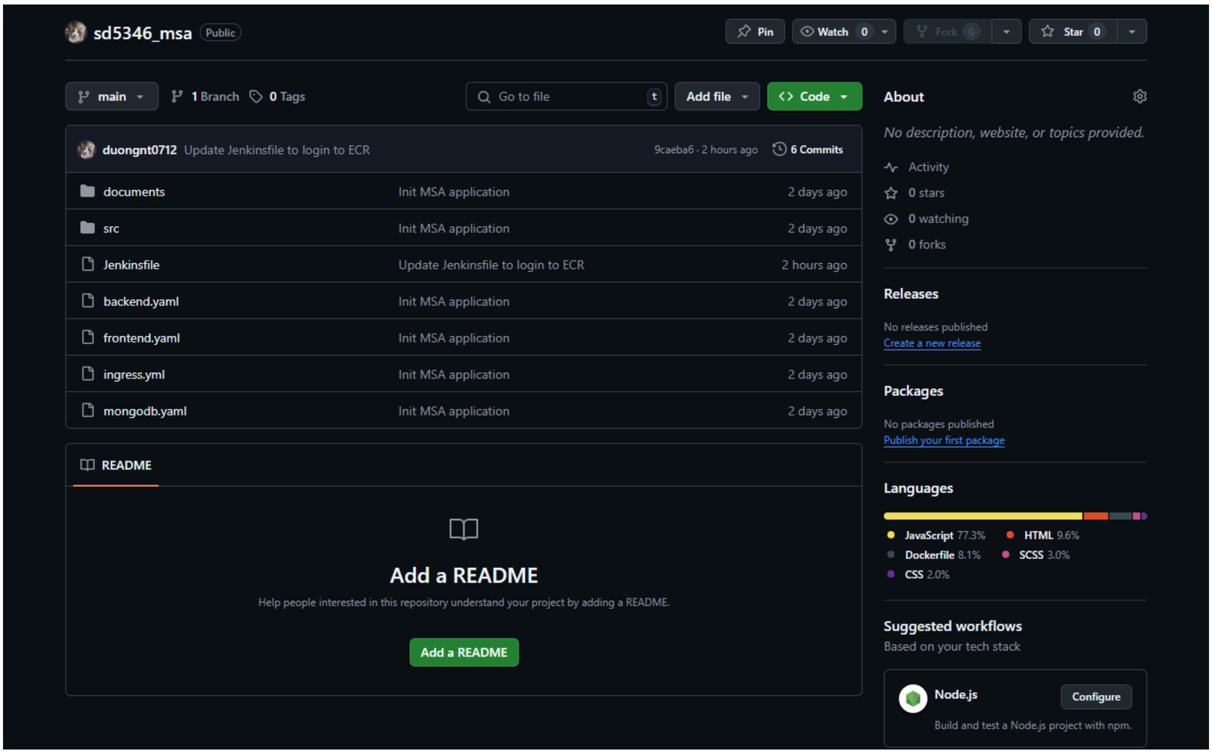
3. Setting up a CI/CD Pipeline and deploying applications on Azure AKS

1 - Source code Management

duongnt0712/sd5346_msa



sd5346_msa Public

duongnt0712 Update Jenkinsfile to login to ECR 9caeba6 · 2 hours ago 6 Commits

documents	Init MSA application	2 days ago
src	Init MSA application	2 days ago
Jenkinsfile	Update Jenkinsfile to login to ECR	2 hours ago
backend.yaml	Init MSA application	2 days ago
frontend.yaml	Init MSA application	2 days ago
ingress.yml	Init MSA application	2 days ago
mongodb.yaml	Init MSA application	2 days ago

README

Add a README

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

About

No description, website, or topics provided.

Activity

0 stars

0 watching

0 forks

Releases

No releases published

Create a new release

Packages

No packages published

Publish your first package

Languages

JavaScript 77.3% HTML 9.6% Dockerfile 8.1% SCSS 3.0% CSS 2.0%

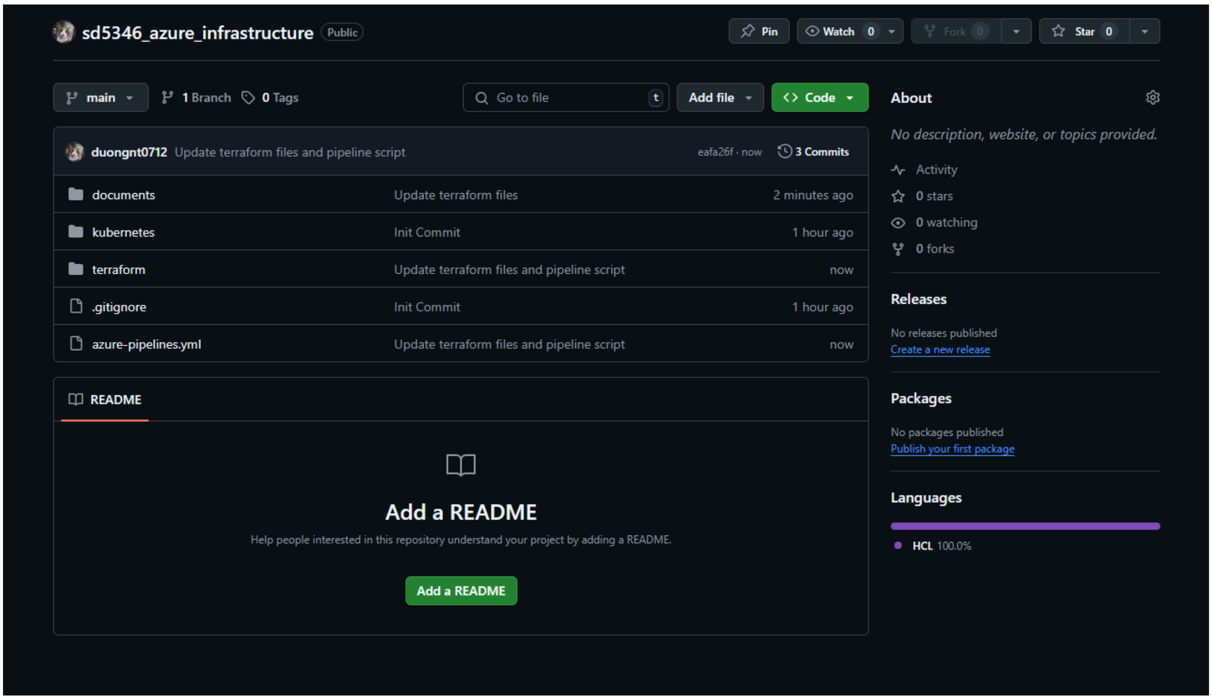
Suggested workflows

Based on your tech stack

Node.js Configure

Build and test a Node.js project with npm.

duongnt0712/sd5346_azure_infrastructure



sd5346_azure_infrastructure Public

duongnt0712 Update terraform files and pipeline script eafa26f · now 3 Commits

documents	Update terraform files	2 minutes ago
kubernetes	Init Commit	1 hour ago
terraform	Update terraform files and pipeline script	now
.gitignore	Init Commit	1 hour ago
azure-pipelines.yml	Update terraform files and pipeline script	now

README

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About

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Activity
0 stars
0 watching
0 forks

Releases

No releases published
Create a new release

Packages

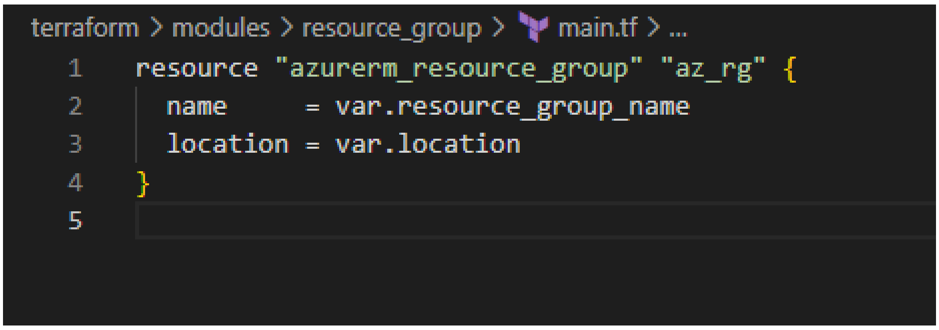
No packages published
Publish your first package

Languages

HCL 100.0%

2. Provision Azure Resources

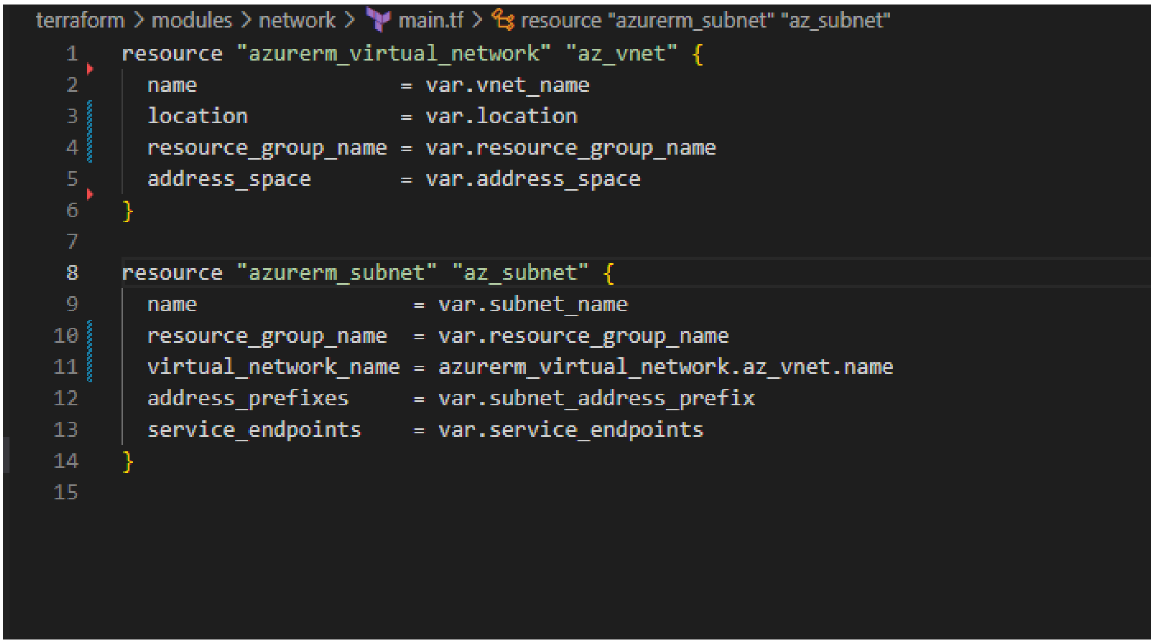
- Resource group



terraform > modules > resource_group > main.tf > ...

```
resource "azurerm_resource_group" "az_rg" {
  name     = var.resource_group_name
  location = var.location
}

```

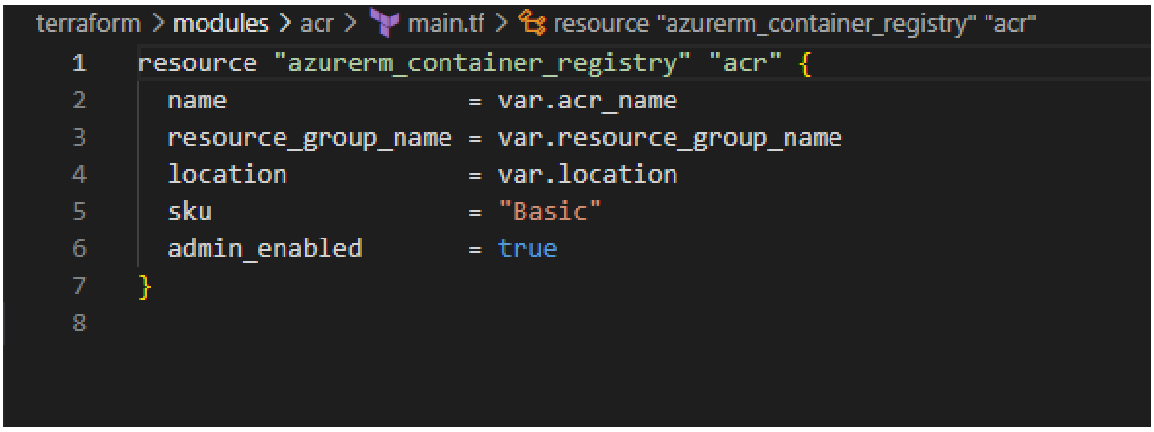
- Virtual Network



terraform > modules > network > main.tf > resource "azurerm_subnet" "az_subnet"

```
resource "azurerm_virtual_network" "az_vnet" {
  name                = var.vnet_name
  location            = var.location
  resource_group_name = var.resource_group_name
  address_space       = var.address_space
}

resource "azurerm_subnet" "az_subnet" {
  name                 = var.subnet_name
  resource_group_name  = var.resource_group_name
  virtual_network_name = azurerm_virtual_network.az_vnet.name
  address_prefixes     = var.subnet_address_prefix
  service_endpoints    = var.service_endpoints
}

```

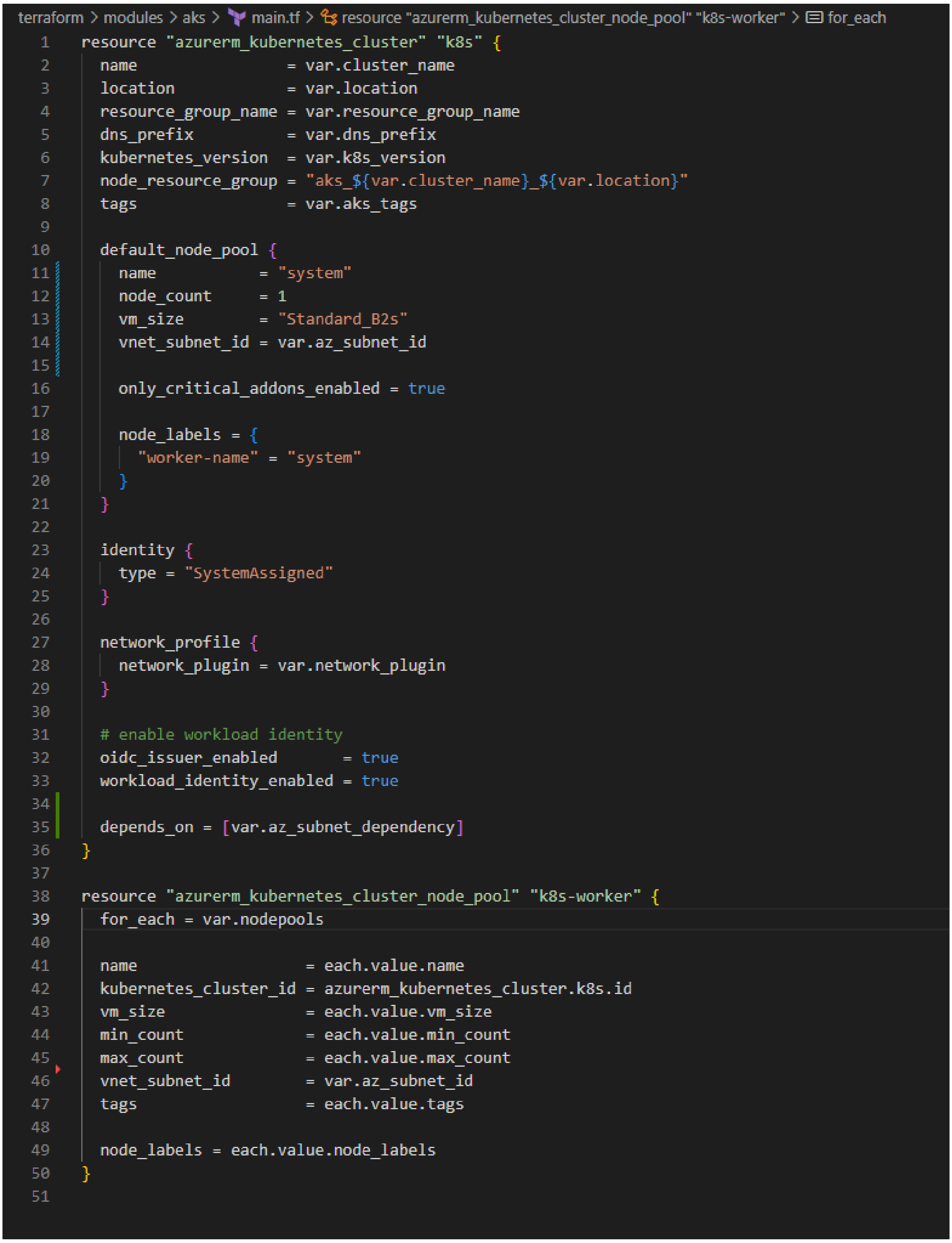
- ACR



terraform > modules > acr > main.tf > resource "azurerm_container_registry" "acr"

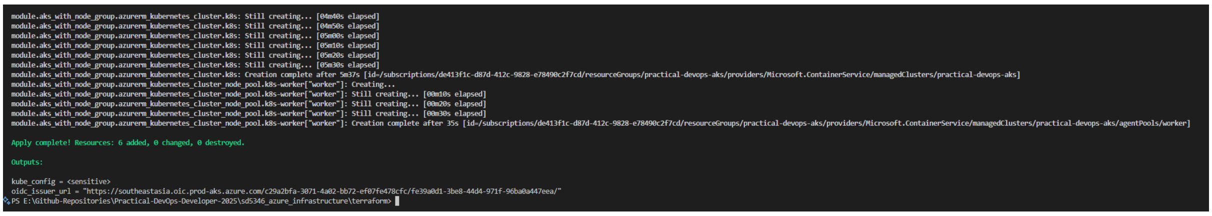
```
resource "azurerm_container_registry" "acr" {
  name                = var.acr_name
  resource_group_name = var.resource_group_name
  location            = var.location
  sku                 = "Basic"
  admin_enabled       = true
}

```

- AKS


terraform > modules > aks > main.tf > resource "azurerm_kubernetes_cluster_node_pool" "k8s-worker" > for_each

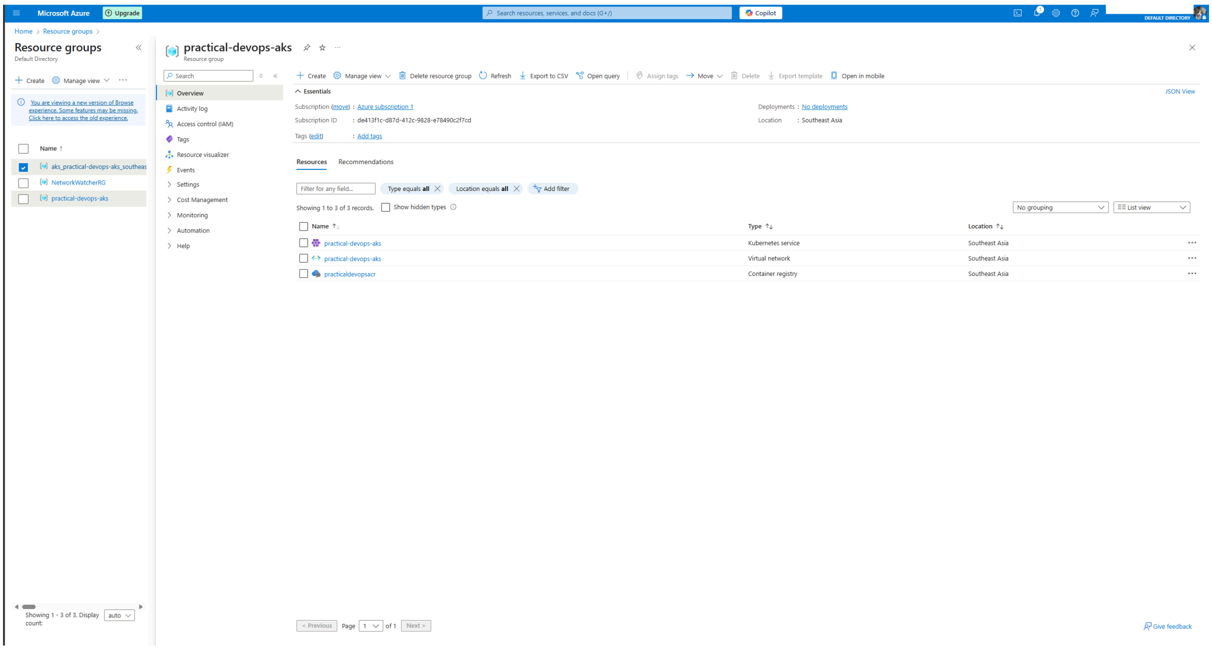
```
resource "azurerm_kubernetes_cluster" "k8s" {
  name                = var.cluster_name
  location            = var.location
  resource_group_name = var.resource_group_name
  dns_prefix          = var.dns_prefix
  kubernetes_version  = var.k8s_version
  node_resource_group = "aks_${var.cluster_name}_${var.location}"
  tags                = var.aks_tags

  default_node_pool {
    name           = "system"
    node_count     = 1
    vm_size        = "Standard_B2s"
    vnet_subnet_id = var.az_subnet_id

    only_critical_addons_enabled = true

    node_labels = {
      "worker-name" = "system"
    }
  }

  identity {
    type = "SystemAssigned"
  }

  network_profile {
    network_plugin = var.network_plugin
  }

  # enable workload identity
  oidc_issuer_enabled       = true
  workload_identity_enabled = true

  depends_on = [var.az_subnet_dependency]
}

resource "azurerm_kubernetes_cluster_node_pool" "k8s-worker" {
  for_each = var.nodepools

  name                  = each.value.name
  kubernetes_cluster_id = azurerm_kubernetes_cluster.k8s.id
  vm_size               = each.value.vm_size
  min_count             = each.value.min_count
  max_count             = each.value.max_count
  vnet_subnet_id        = var.az_subnet_id
  tags                  = each.value.tags

  node_labels = each.value.node_labels
}

```

Run terraform:



```
module.aks_with_node_group.azurerm_kubernetes_cluster.k8s: Still creating... [04m40s elapsed]
module.aks_with_node_group.azurerm_kubernetes_cluster.k8s: Still creating... [04m50s elapsed]
module.aks_with_node_group.azurerm_kubernetes_cluster.k8s: Still creating... [05m00s elapsed]
module.aks_with_node_group.azurerm_kubernetes_cluster.k8s: Still creating... [05m10s elapsed]
module.aks_with_node_group.azurerm_kubernetes_cluster.k8s: Still creating... [05m20s elapsed]
module.aks_with_node_group.azurerm_kubernetes_cluster.k8s: Still creating... [05m30s elapsed]
module.aks_with_node_group.azurerm_kubernetes_cluster.k8s: Creation complete after 5m37s [id=/subscriptions/de413f1c-d87d-412c-9828-e78490c2f7cd/resourceGroups/practical-devops-aks/providers/Microsoft.ContainerService/managedClusters/practical-devops-aks]
module.aks_with_node_group.azurerm_kubernetes_cluster_node_pool.k8s-worker["worker"]: Creating...
module.aks_with_node_group.azurerm_kubernetes_cluster_node_pool.k8s-worker["worker"]: Still creating... [00m10s elapsed]
module.aks_with_node_group.azurerm_kubernetes_cluster_node_pool.k8s-worker["worker"]: Still creating... [00m20s elapsed]
module.aks_with_node_group.azurerm_kubernetes_cluster_node_pool.k8s-worker["worker"]: Still creating... [00m30s elapsed]
module.aks_with_node_group.azurerm_kubernetes_cluster_node_pool.k8s-worker["worker"]: Creation complete after 35s [id=/subscriptions/de413f1c-d87d-412c-9828-e78490c2f7cd/resourceGroups/practical-devops-aks/providers/Microsoft.ContainerService/managedClusters/practical-devops-aks/agentPools/worker]

Apply complete! Resources: 6 added, 0 changed, 0 destroyed.

Outputs:

kube_config = <sensitive>
oidc_issuer_url = "https://southeastasia.oic.prod-aks.azure.com/c29a2bfa-3071-4a02-bb72-ef07fe478cfc/fe39a0d1-3be8-44d4-971f-96ba0a447eea/"
PS E:\Github-Repositories\Practical-DevOps-Developer-2025\sd5346_azure_infrastructure\terraform>
```

When it's done, verify Azure resources:



practical-devops-aks
Resource group

Essentials

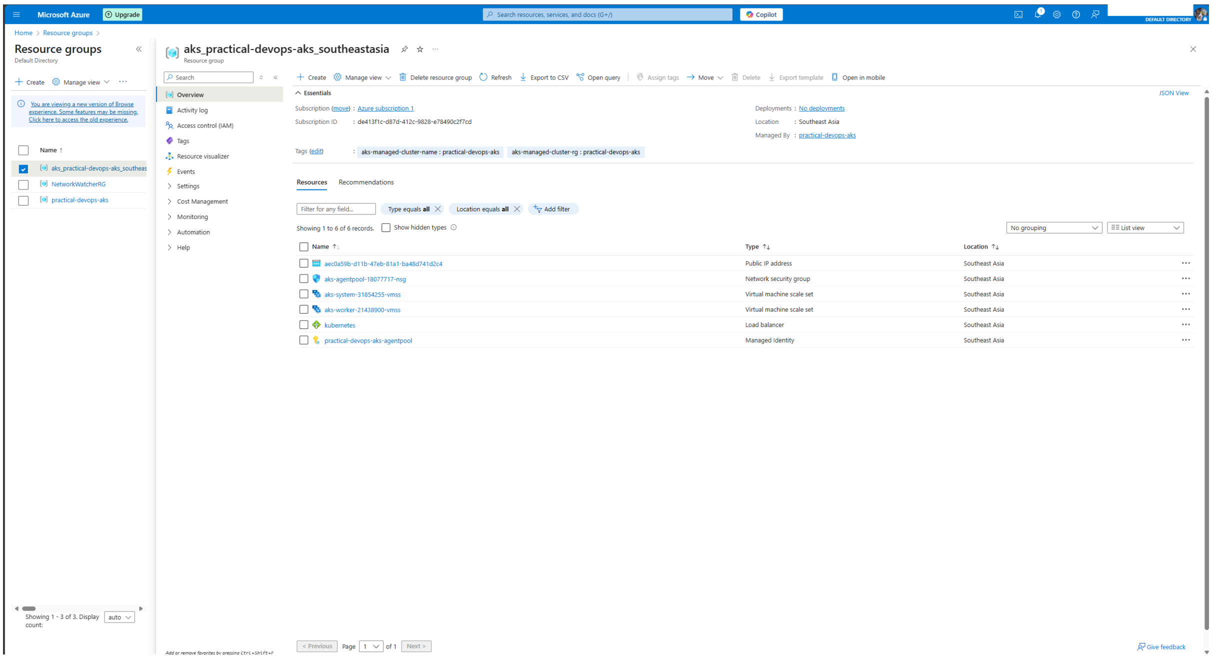
Subscription (move) : Azure subscription 1
Subscription ID : de413f1c-d87d-412c-9828-e78490c2f7cd
Tags (edit) : Add tags
Deployments : No deployments
Location : Southeast Asia

Resources | Recommendations

Filter for any field... | Type equals **all** | Location equals **all** | Add filter

Showing 1 to 3 of 3 records. □ Show hidden types | No grouping | List view

Name	Type	Location
practical-devops-aks	Kubernetes service	Southeast Asia
practical-devops-aks	Virtual network	Southeast Asia
practicaldevopsacr	Container registry	Southeast Asia



aks_practical-devops-aks_southeastasia
Resource group

Essentials

Subscription (move) : Azure subscription 1
Subscription ID : de413f1c-d87d-412c-9828-e78490c2f7cd
Tags (edit) : aks-managed-cluster-name : practical-devops-aks | aks-managed-cluster-rg : practical-devops-aks
Deployments : No deployments
Location : Southeast Asia
Managed By : practical-devops-aks

Resources | Recommendations

Filter for any field... | Type equals **all** | Location equals **all** | Add filter

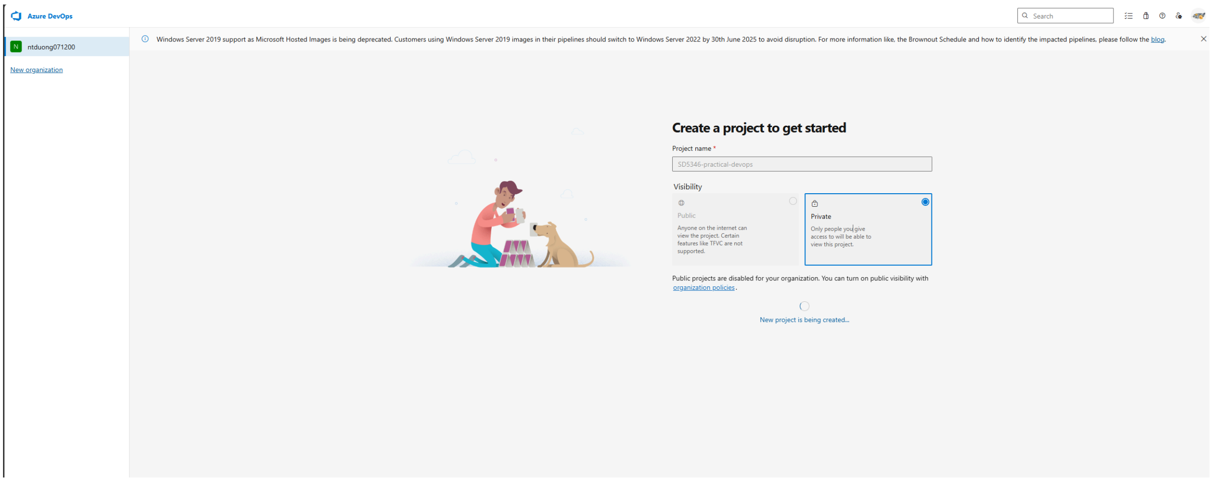
Showing 1 to 6 of 6 records. □ Show hidden types | No grouping | List view

Name	Type	Location
aec0a59b-d11b-47eb-81a1-ba48d741d2c4	Public IP address	Southeast Asia
aks-agentpool-18077717-nsg	Network security group	Southeast Asia
aks-system-31854255-vmss	Virtual machine scale set	Southeast Asia
aks-worker-21438900-vmss	Virtual machine scale set	Southeast Asia
kubernetes	Load balancer	Southeast Asia
practical-devops-aks-agentpool	Managed Identity	Southeast Asia

3. Setup Azure DevOps pipeline for CI/CD

- CI pipeline

Go to azure devops portal to create new project



Windows Server 2019 support as Microsoft Hosted Images is being deprecated. Customers using Windows Server 2019 images in their pipelines should switch to Windows Server 2022 by 30th June 2025 to avoid disruption. For more information like, the Brownout Schedule and how to identify the impacted pipelines, please follow the blog.

Create a project to get started

Project name *: SD5346-practical-devops

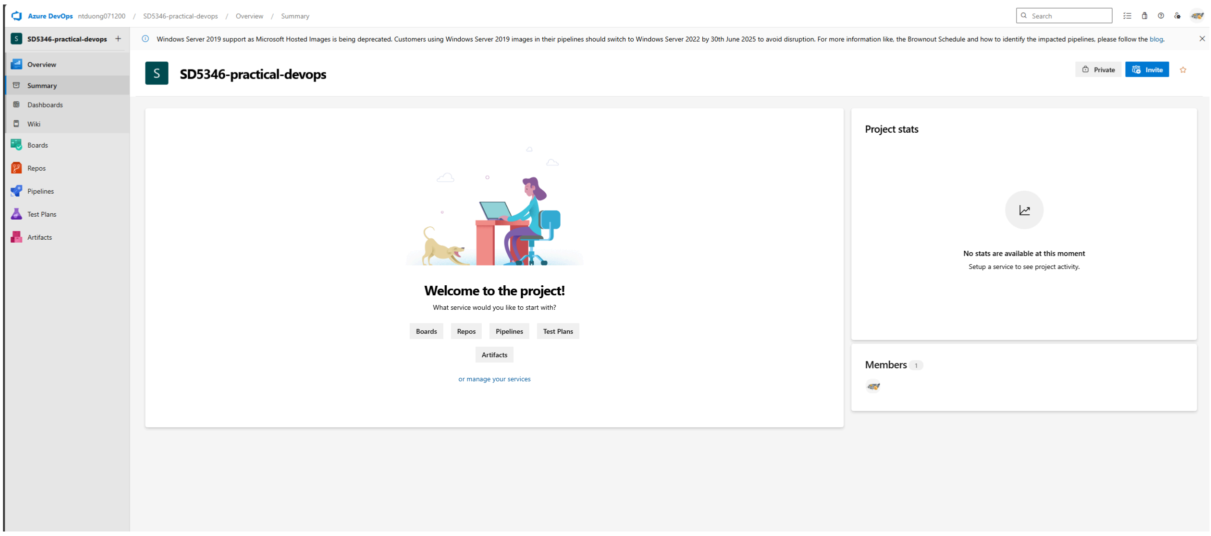
Visibility

○ Public: Anyone on the internet can view the project. Certain features like TFVC are not supported.

● Private: Only people you give access to will be able to view this project.

Public projects are disabled for your organization. You can turn on public visibility with organization policies.

New project is being created...



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SD5346-practical-devops

Welcome to the project!

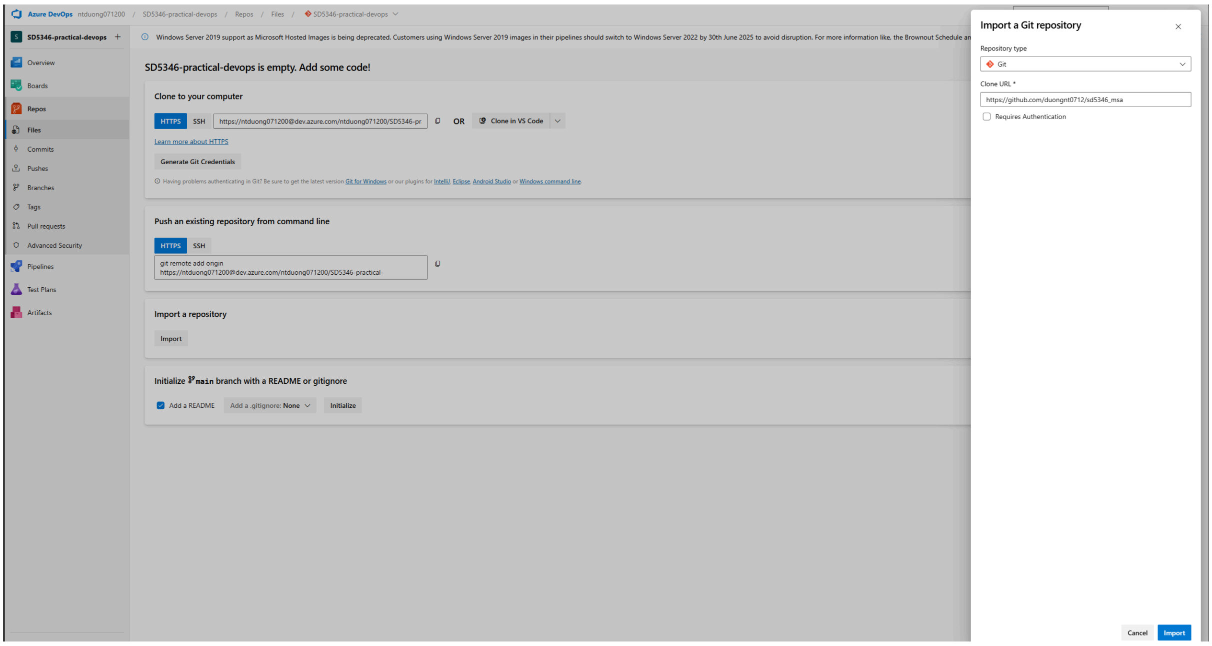
What service would you like to start with?

Project stats

No stats are available at this moment

Setup a service to see project activity.

In **Repo,** go to **i**mport a repository



Windows Server 2019 support as Microsoft Hosted Images is being deprecated. Customers using Windows Server 2019 images in their pipelines should switch to Windows Server 2022 by 30th June 2025 to avoid disruption. For more information like, the Brownout Schedule an

SD5346-practical-devops is empty. Add some code!

Clone to your computer

https://ntduong071200@dev.azure.com/ntduong071200/SD5346-pr

Having problems authenticating in Git? Be sure to get the latest version Git for Windows or our plugins for IntelliJ, Eclipse, Android Studio or Windows command line.

Push an existing repository from command line

```
git remote add origin
https://ntduong071200@dev.azure.com/ntduong071200/SD5346-practical-
```

Import a repository

Initialize main branch with a README or gitignore

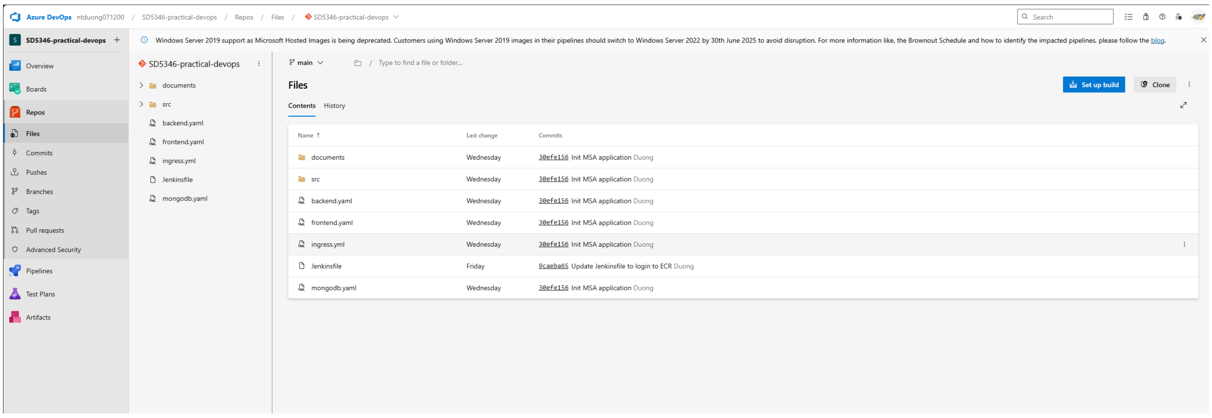
☑ Add a README   Add a .gitignore: None

Import a Git repository

Repository type: Git

Clone URL *: https://github.com/duongnt0712/sd5346_msa

□ Requires Authentication



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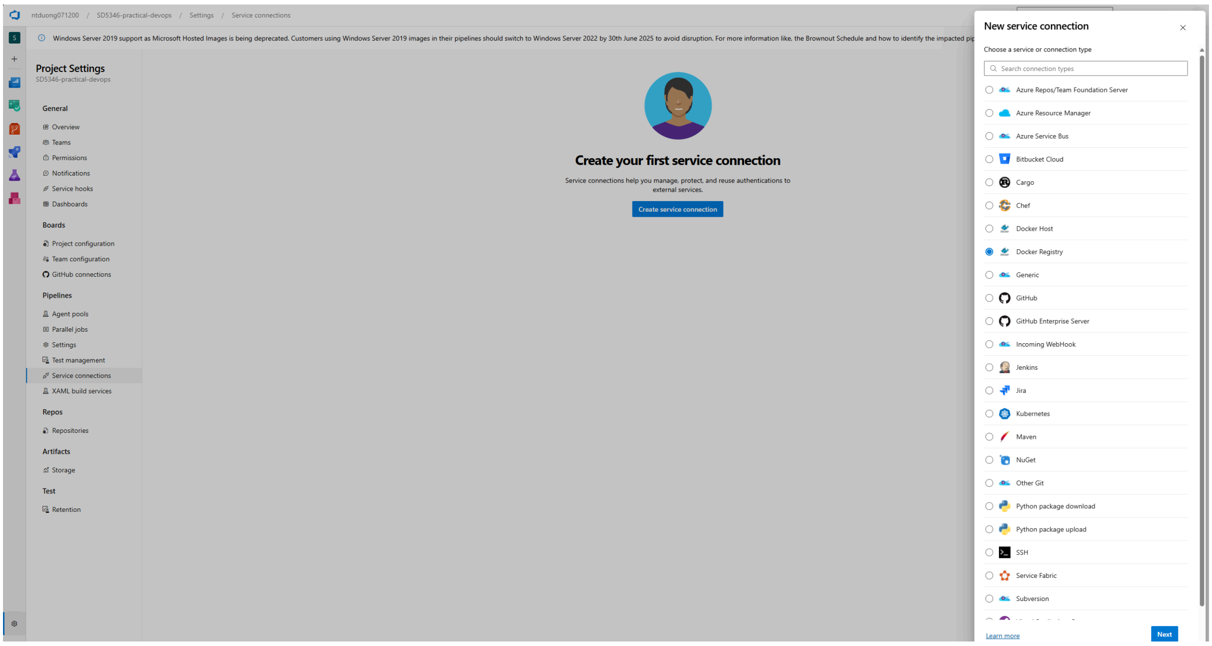
SD5346-practical-devops
- documents
- src
- backend.yaml
- frontend.yaml
- ingress.yml
- Jenkinsfile
- mongodb.yaml

Files

Name ↑	Last change	Commits
documents	Wednesday	30efe156 Init MSA application Duong
src	Wednesday	30efe156 Init MSA application Duong
backend.yaml	Wednesday	30efe156 Init MSA application Duong
frontend.yaml	Wednesday	30efe156 Init MSA application Duong
ingress.yml	Wednesday	30efe156 Init MSA application Duong
Jenkinsfile	Friday	9caeba65 Update Jenkinsfile to login to ECR Duong
mongodb.yaml	Wednesday	30efe156 Init MSA application Duong

In Project Setting/Service Connection, create new Service Connection , choose **Docker Registry**



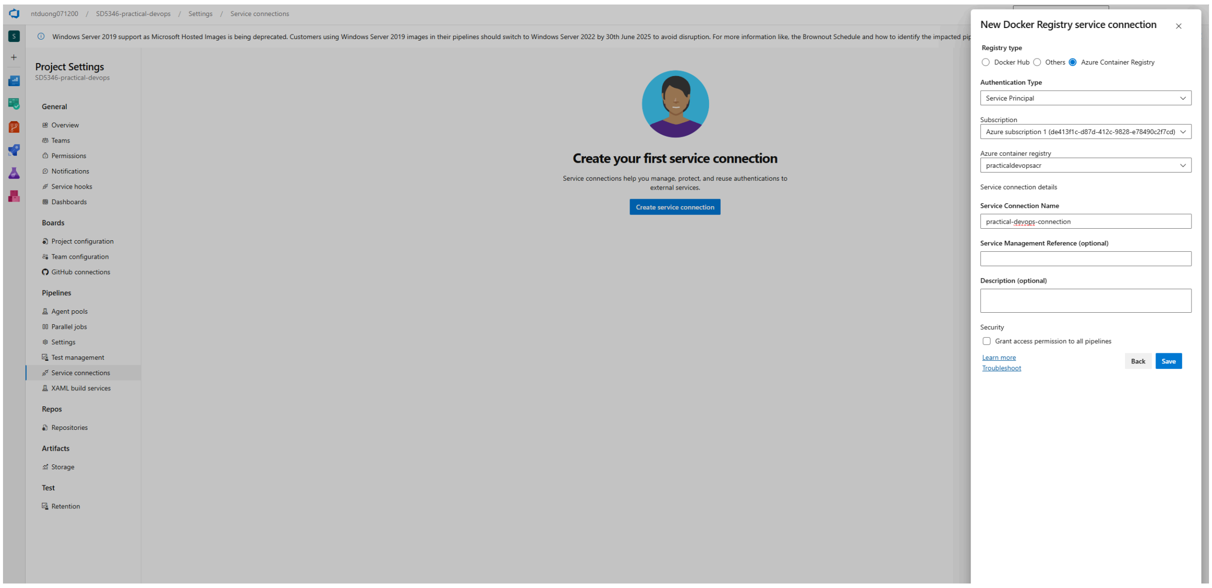
New service connection

Choose a service or connection type

Search connection types

- ○ Azure Repos/Team Foundation Server
- ○ Azure Resource Manager
- ○ Azure Service Bus
- ○ Bitbucket Cloud
- ○ Cargo
- ○ Chef
- ○ Docker Host
- ● Docker Registry
- ○ Generic
- ○ GitHub
- ○ GitHub Enterprise Server
- ○ Incoming WebHook
- ○ Jenkins
- ○ Jira
- ○ Kubernetes
- ○ Maven
- ○ NuGet
- ○ Other Git
- ○ Python package download
- ○ Python package upload
- ○ SSH
- ○ Service Fabric
- ○ Subversion

Choose **Azure Container Registry** with type **Service Principal,** and choose container registry as **practicaldevopsacr**



Windows Server 2019 support as Microsoft Hosted Images is being deprecated. Customers using Windows Server 2019 images in their pipelines should switch to Windows Server 2022 by 30th June 2025 to avoid disruption. For more information like, the Brownout Schedule and how to identify the impacted pip

Create your first service connection

Service connections help you manage, protect, and reuse authentications to external services.

New Docker Registry service connection

Registry type

○ Docker Hub ○ Others ● Azure Container Registry

Authentication Type: Service Principal

Subscription: Azure subscription 1 (de413f1c-d87d-412c-9828-e78490c2f7cd)

Azure container registry: practicaldevopsacr

Service connection details

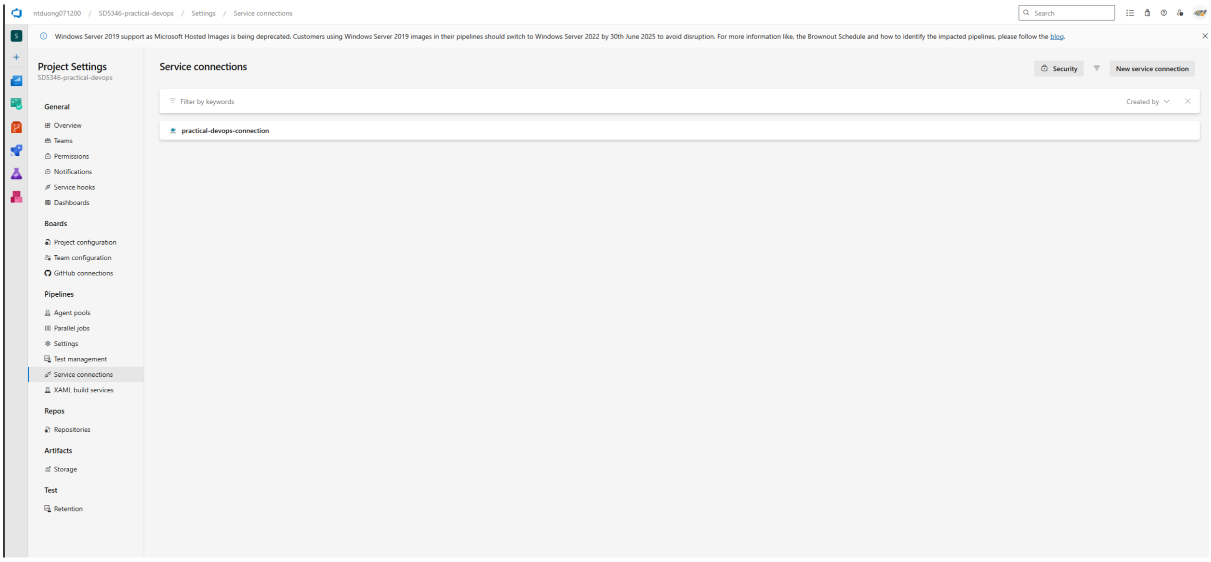
Service Connection Name: practical-devops-connection

Service Management Reference (optional):

Description (optional):

Security

□ Grant access permission to all pipelines



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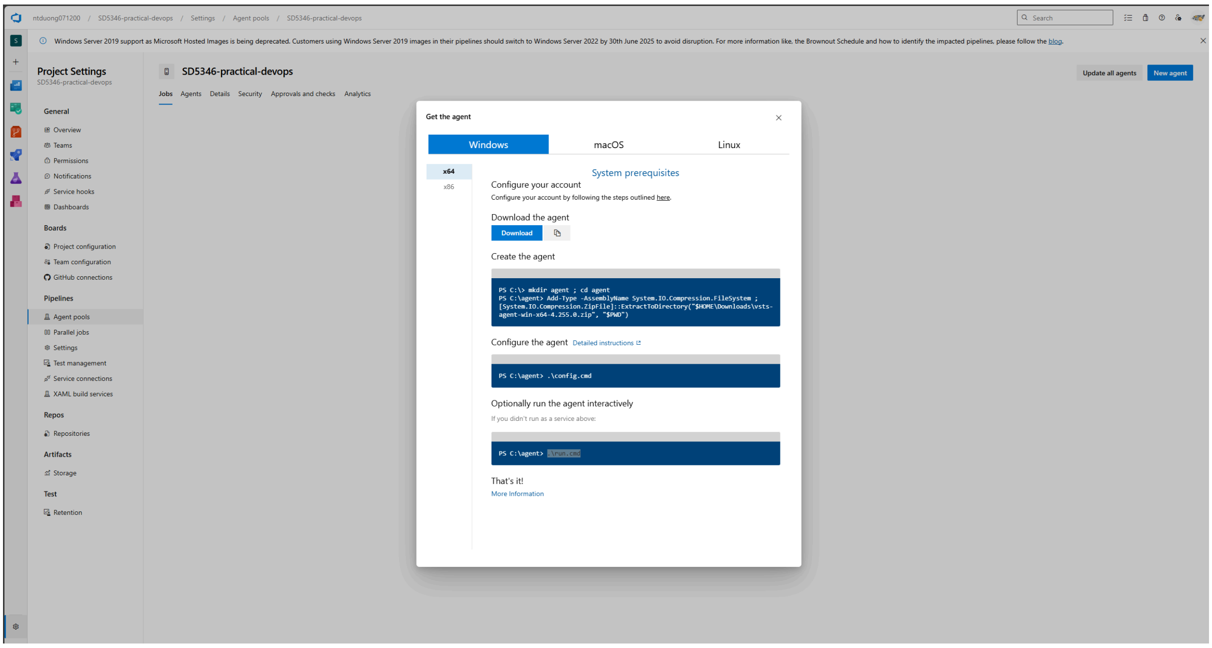
Service connections

practical-devops-connection

Move to **Agent pools**, create new agent



ntduong071200 / SD5346-practical-devops / Settings / Agent pools / SD5346-practical-devops

Windows Server 2019 support as Microsoft Hosted Images is being deprecated. Customers using Windows Server 2019 images in their pipelines should switch to Windows Server 2022 by 30th June 2025 to avoid disruption. For more information like, the Brownout Schedule and how to identify the impacted pipelines, please follow the blog.

Configure your account

Configure your account by following the steps outlined here.

Download the agent

Create the agent

```
PS C:\> mkdir agent ; cd agent
PS C:\agent> Add-Type -AssemblyName System.IO.Compression.FileSystem ;
[System.IO.Compression.ZipFile]::ExtractToDirectory("$HOME\Downloads\vsts-
agent-win-x64-4.255.0.zip", "$PWD")
```

Configure the agent Detailed instructions

```
PS C:\agent> .\config.cmd
```

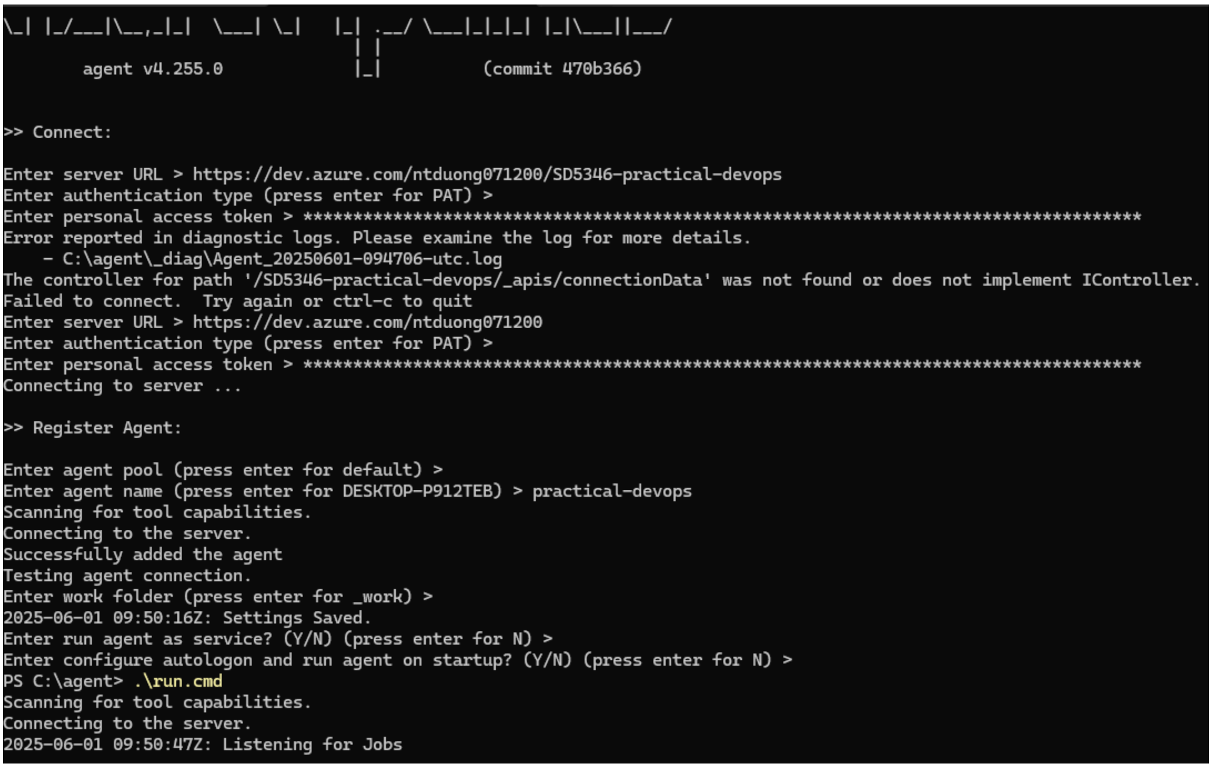
Optionally run the agent interactively

If you didn't run as a service above:

```
PS C:\agent> .\run.cmd
```

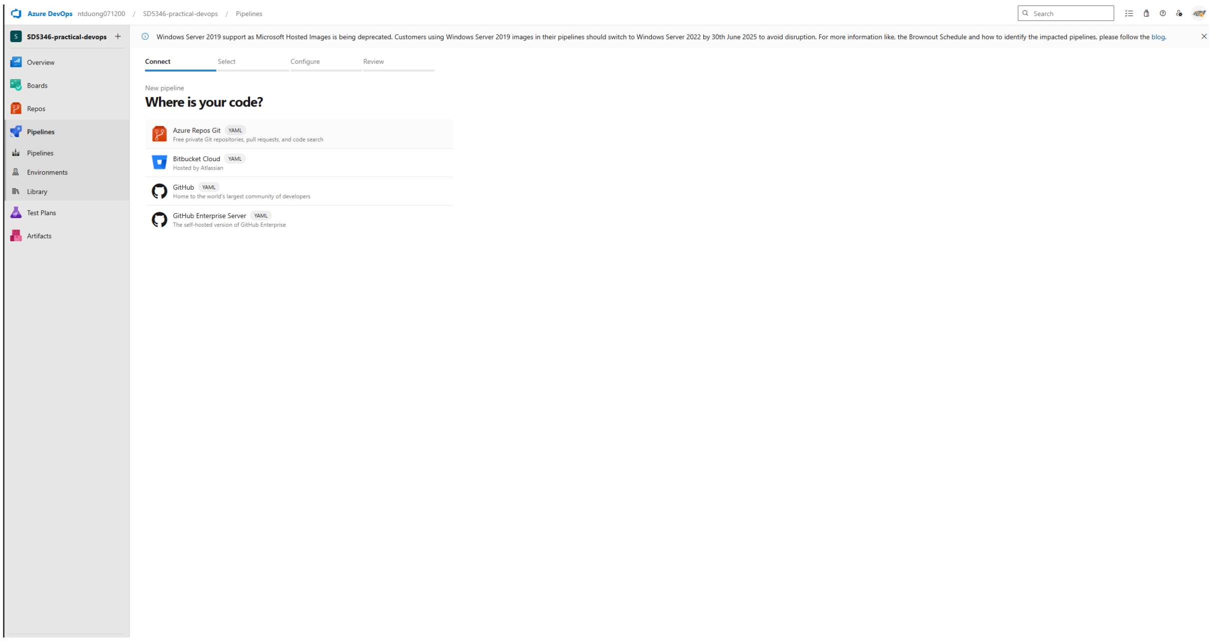
That's it!

More Information



```
\_| |_/___|\__,_|_|  \___| \_|   |_| .__/ \___|_|_|_| |_|\___||___/
                                    | |
        agent v4.255.0              |_|          (commit 470b366)


>> Connect:

Enter server URL > https://dev.azure.com/ntduong071200/SD5346-practical-devops
Enter authentication type (press enter for PAT) >
Enter personal access token > ****************************************************************************************
Error reported in diagnostic logs. Please examine the log for more details.
    - C:\agent\_diag\Agent_20250601-094706-utc.log
The controller for path '/SD5346-practical-devops/_apis/connectionData' was not found or does not implement IController.
Failed to connect.  Try again or ctrl-c to quit
Enter server URL > https://dev.azure.com/ntduong071200
Enter authentication type (press enter for PAT) >
Enter personal access token > ****************************************************************************************
Connecting to server ...

>> Register Agent:

Enter agent pool (press enter for default) >
Enter agent name (press enter for DESKTOP-P912TEB) > practical-devops
Scanning for tool capabilities.
Connecting to the server.
Successfully added the agent
Testing agent connection.
Enter work folder (press enter for _work) >
2025-06-01 09:50:16Z: Settings Saved.
Enter run agent as service? (Y/N) (press enter for N) >
Enter configure autologon and run agent on startup? (Y/N) (press enter for N) >
PS C:\agent> .\run.cmd
Scanning for tool capabilities.
Connecting to the server.
2025-06-01 09:50:47Z: Listening for Jobs
```

In **Pipelines**, create new pipeline with **Azure Repos Git** option:



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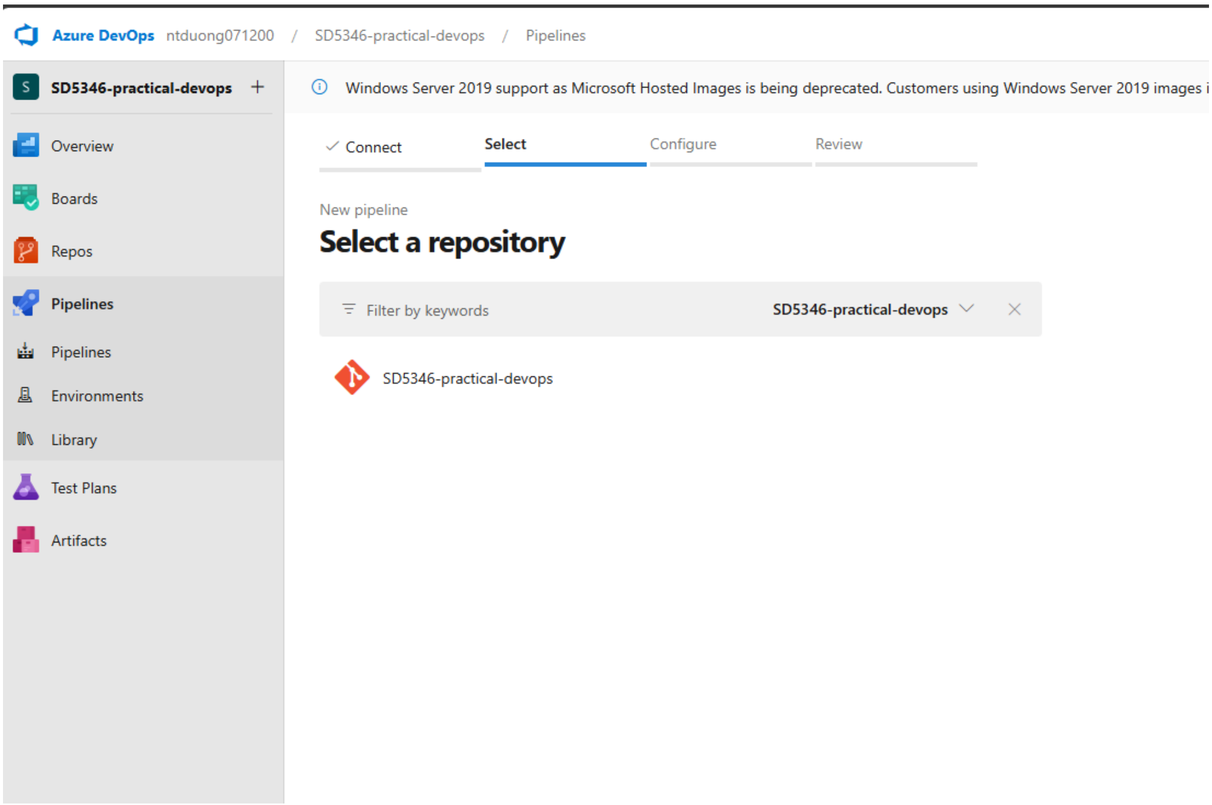
New pipeline

Where is your code?

- Azure Repos Git YAML
  Free private Git repositories, pull requests, and code search
- Bitbucket Cloud YAML
  Hosted by Atlassian
- GitHub YAML
  Home to the world's largest community of developers
- GitHub Enterprise Server YAML
  The self-hosted version of GitHub Enterprise



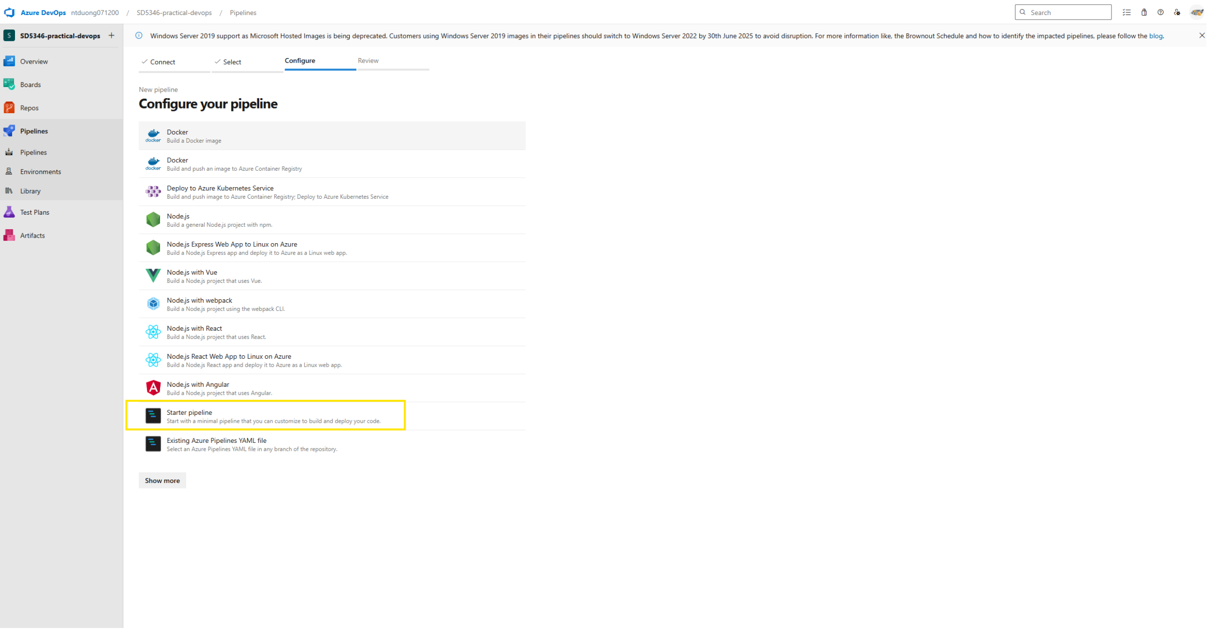
Windows Server 2019 support as Microsoft Hosted Images is being deprecated. Customers using Windows Server 2019 images i

New pipeline

Select a repository

Filter by keywords SD5346-practical-devops

SD5346-practical-devops



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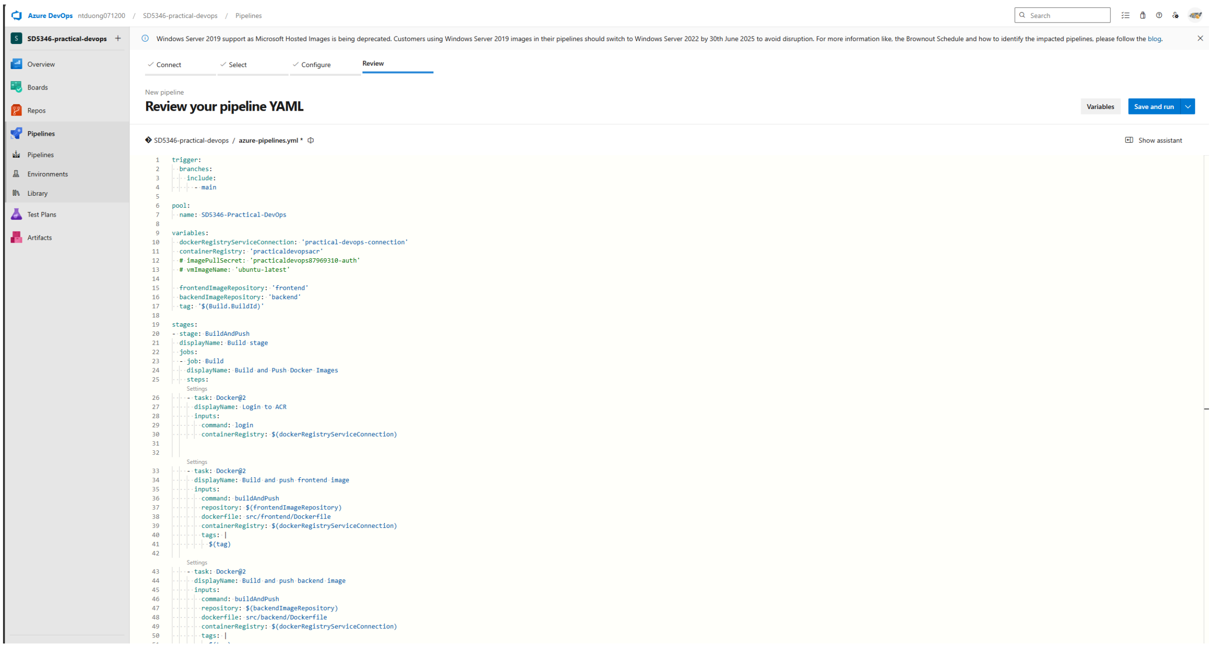
New pipeline

Configure your pipeline

- Docker
  Build a Docker image
- Docker
  Build and push an image to Azure Container Registry
- Deploy to Azure Kubernetes Service
  Build and push image to Azure Container Registry; Deploy to Azure Kubernetes Service
- Node.js
  Build a general Node.js project with npm.
- Node.js Express Web App to Linux on Azure
  Build a Node.js Express app and deploy it to Azure as a Linux web app.
- Node.js with Vue
  Build a Node.js project that uses Vue.
- Node.js with webpack
  Build a Node.js project using the webpack CLI.
- Node.js with React
  Build a Node.js project that uses React.
- Node.js React Web App to Linux on Azure
  Build a Node.js React app and deploy it to Azure as a Linux web app.
- Node.js with Angular
  Build a Node.js project that uses Angular.
- Starter pipeline
  Start with a minimal pipeline that you can customize to build and deploy your code.
- Existing Azure Pipelines YAML file
  Select an Azure Pipelines YAML file in any branch of the repository.



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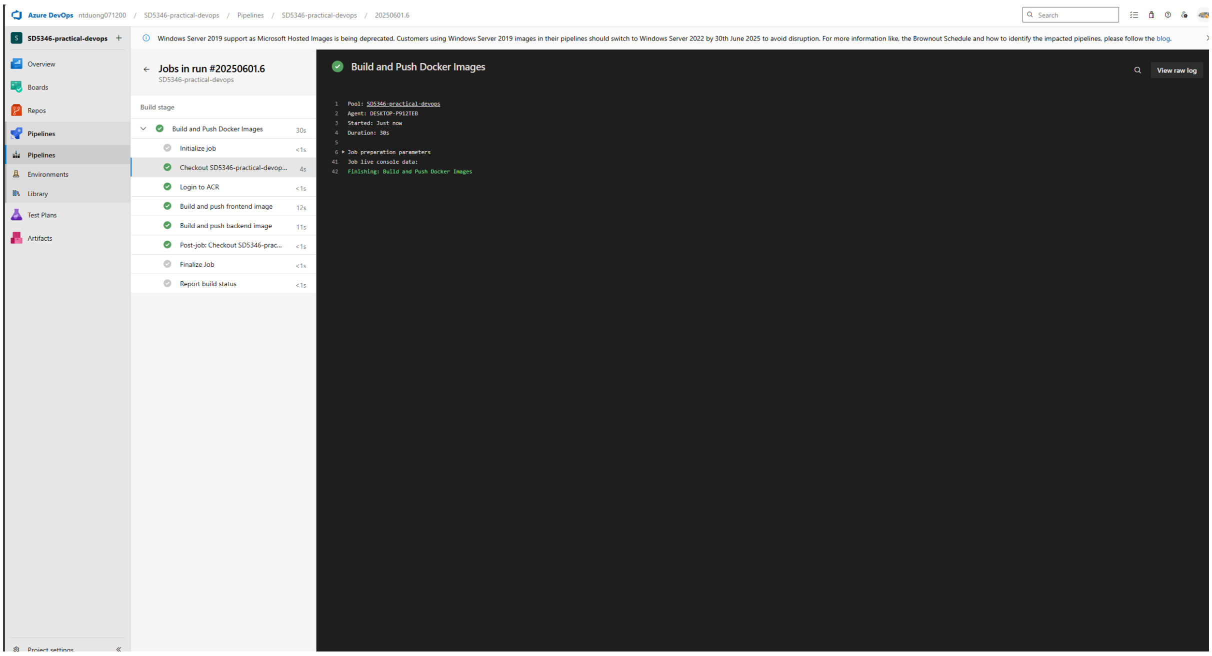
New pipeline

Review your pipeline YAML

SD5346-practical-devops / azure-pipelines.yml *

```yaml
trigger:
  branches:
    include:
      - main

pool:
  name: SD5346-Practical-DevOps

variables:
  dockerRegistryServiceConnection: 'practical-devops-connection'
  containerRegistry: 'practicaldevopsacr'
  # imagePullSecret: 'practicaldevops87969310-auth'
  # vmImageName: 'ubuntu-latest'

  frontendImageRepository: 'frontend'
  backendImageRepository: 'backend'
  tag: '$(Build.BuildId)'

stages:
- stage: BuildAndPush
  displayName: Build stage
  jobs:
  - job: Build
    displayName: Build and Push Docker Images
    steps:
    Settings
    - task: Docker@2
      displayName: Login to ACR
      inputs:
        command: login
        containerRegistry: $(dockerRegistryServiceConnection)


    Settings
    - task: Docker@2
      displayName: Build and push frontend image
      inputs:
        command: buildAndPush
        repository: $(frontendImageRepository)
        dockerfile: src/frontend/Dockerfile
        containerRegistry: $(dockerRegistryServiceConnection)
        tags: |
          $(tag)

    Settings
    - task: Docker@2
      displayName: Build and push backend image
      inputs:
        command: buildAndPush
        repository: $(backendImageRepository)
        dockerfile: src/backend/Dockerfile
        containerRegistry: $(dockerRegistryServiceConnection)
        tags: |
```



Windows Server 2019 support as Microsoft Hosted Images is being deprecated. Customers using Windows Server 2019 images in their pipelines should switch to Windows Server 2022 by 30th June 2025 to avoid disruption. For more information like, the Brownout Schedule and how to identify the impacted pipelines, please follow the blog.

Jobs in run #20250601.6
SD5346-practical-devops

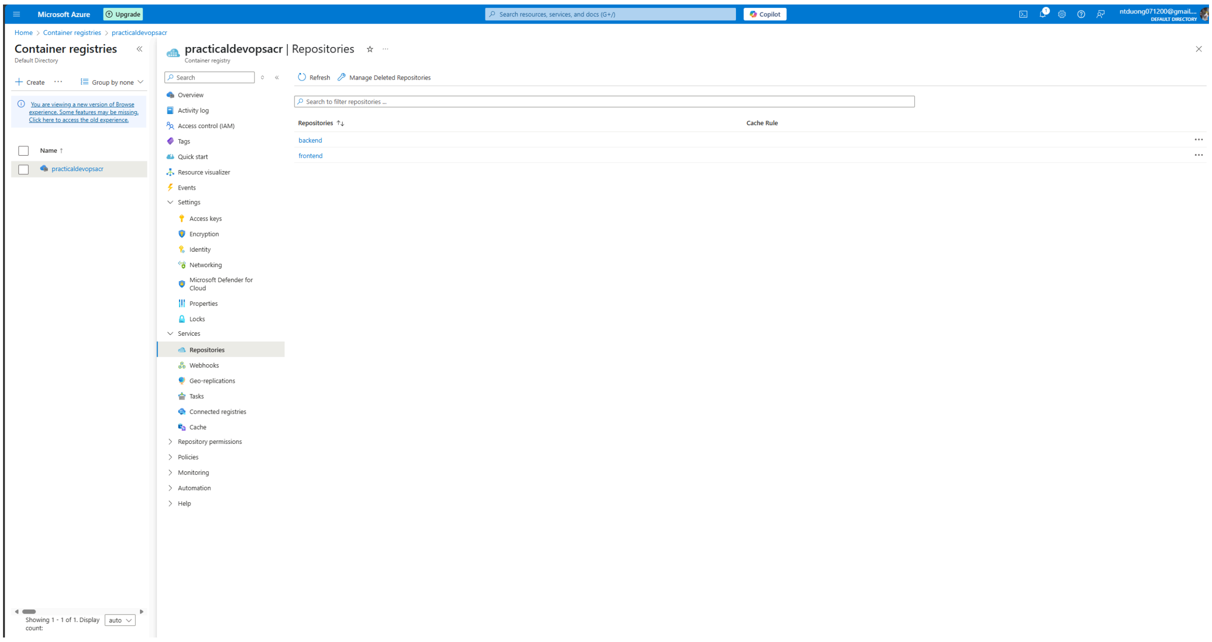
Build stage

Build and Push Docker Images	30s
Initialize job	<1s
Checkout SD5346-practical-devop...	4s
Login to ACR	<1s
Build and push frontend image	12s
Build and push backend image	11s
Post-job: Checkout SD5346-prac...	<1s
Finalize Job	<1s
Report build status	<1s

Build and Push Docker Images

```
Pool: SD5346-practical-devops
Agent: DESKTOP-P912TEB
Started: Just now
Duration: 30s

▸ Job preparation parameters
Job live console data:
Finishing: Build and Push Docker Images
```

Check the 2 images in Container Registry

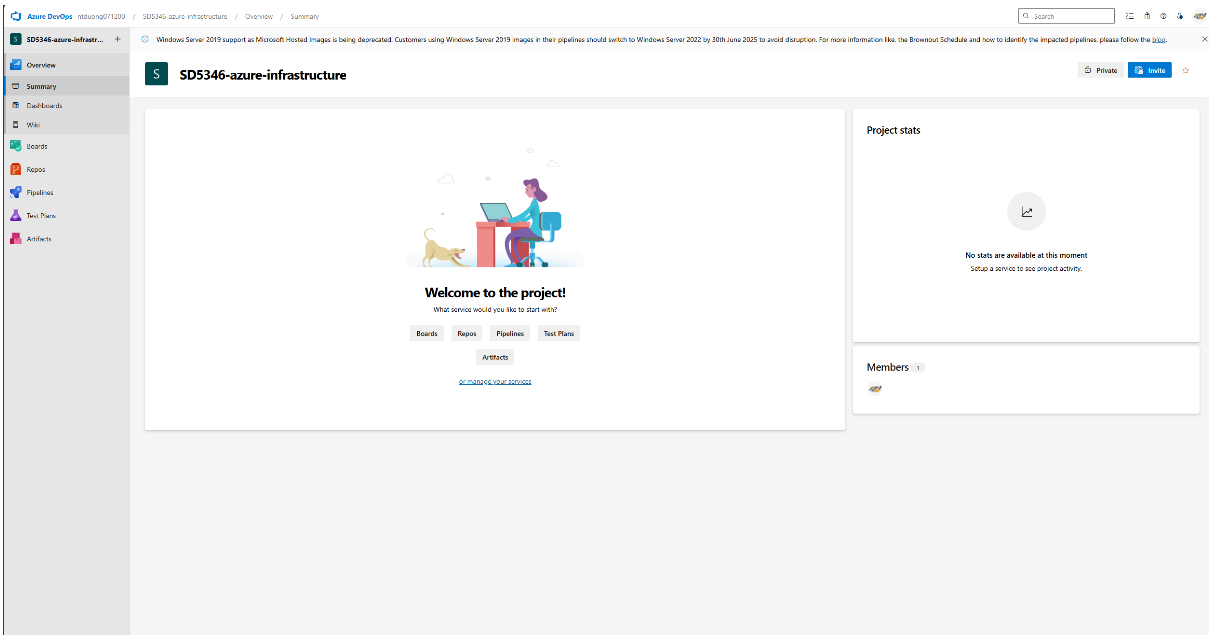


practicaldevopsacr | Repositories
Container registry

Repositories	Cache Rule
backend	
frontend	

- CD pipeline

Create new project **SD5346-azure-infrastructure**



Windows Server 2019 support as Microsoft Hosted Images is being deprecated. Customers using Windows Server 2019 images in their pipelines should switch to Windows Server 2022 by 30th June 2025 to avoid disruption. For more information like, the Brownout Schedule and how to identify the impacted pipelines, please follow the blog.

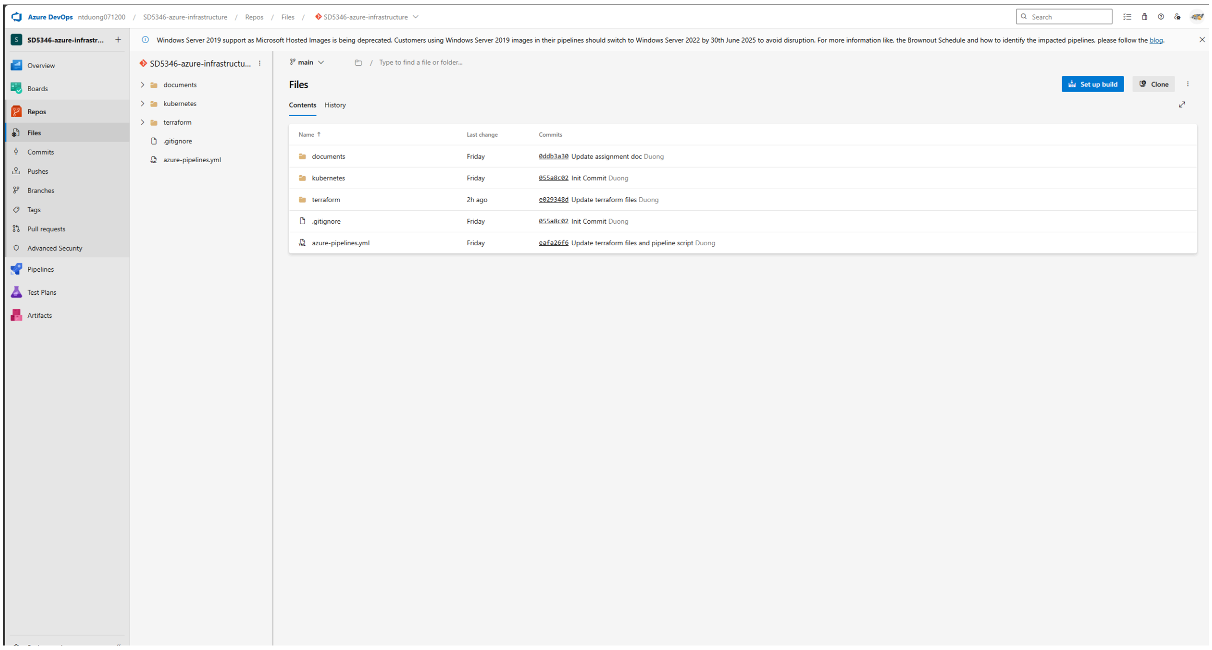
Welcome to the project!

What service would you like to start with?

No stats are available at this moment

Setup a service to see project activity.

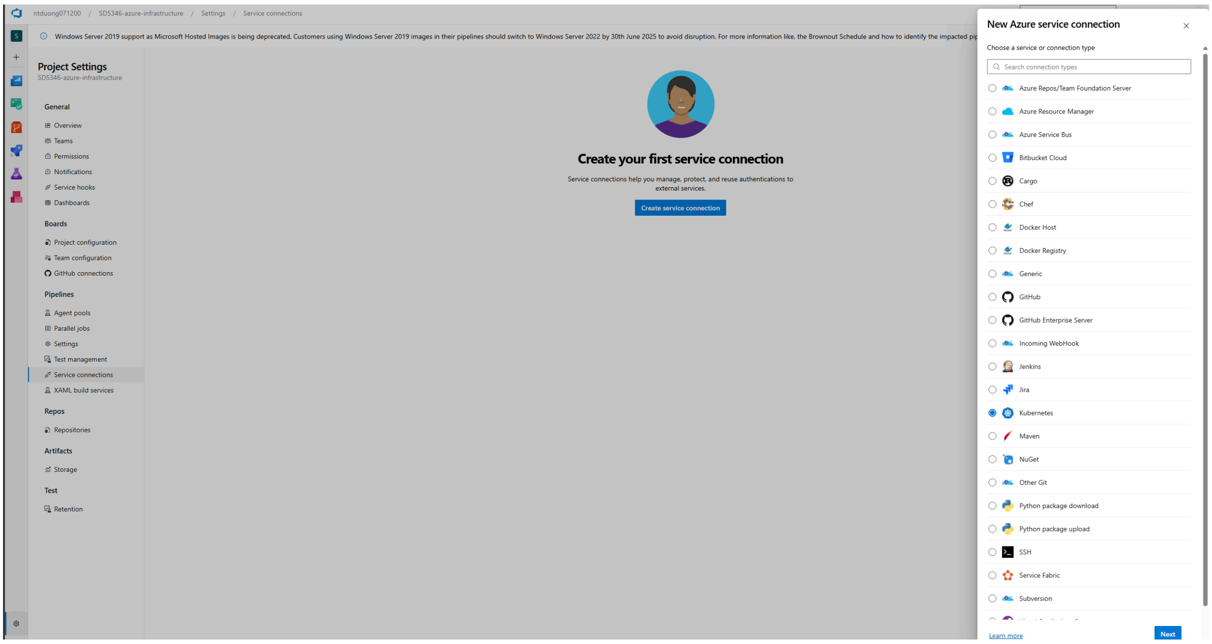
In **Repo,** go to **i**mport a repository



Windows Server 2019 support as Microsoft Hosted Images is being deprecated. Customers using Windows Server 2019 images in their pipelines should switch to Windows Server 2022 by 30th June 2025 to avoid disruption. For more information like, the Brownout Schedule and how to identify the impacted pipelines, please follow the blog.

Name ↑	Last change	Commits
documents	Friday	0ddb3a30 Update assignment doc Duong
kubernetes	Friday	055a8c02 Init Commit Duong
terraform	2h ago	e029348d Update terraform files Duong
.gitignore	Friday	055a8c02 Init Commit Duong
azure-pipelines.yml	Friday	eafa26f6 Update terraform files and pipeline script Duong

In Project Setting/Service Connection, create new Service Connection , choose **Kubernetes**



Windows Server 2019 support as Microsoft Hosted Images is being deprecated. Customers using Windows Server 2019 images in their pipelines should switch to Windows Server 2022 by 30th June 2025 to avoid disruption. For more information like, the Brownout Schedule and how to identify the impacted pip

Create your first service connection

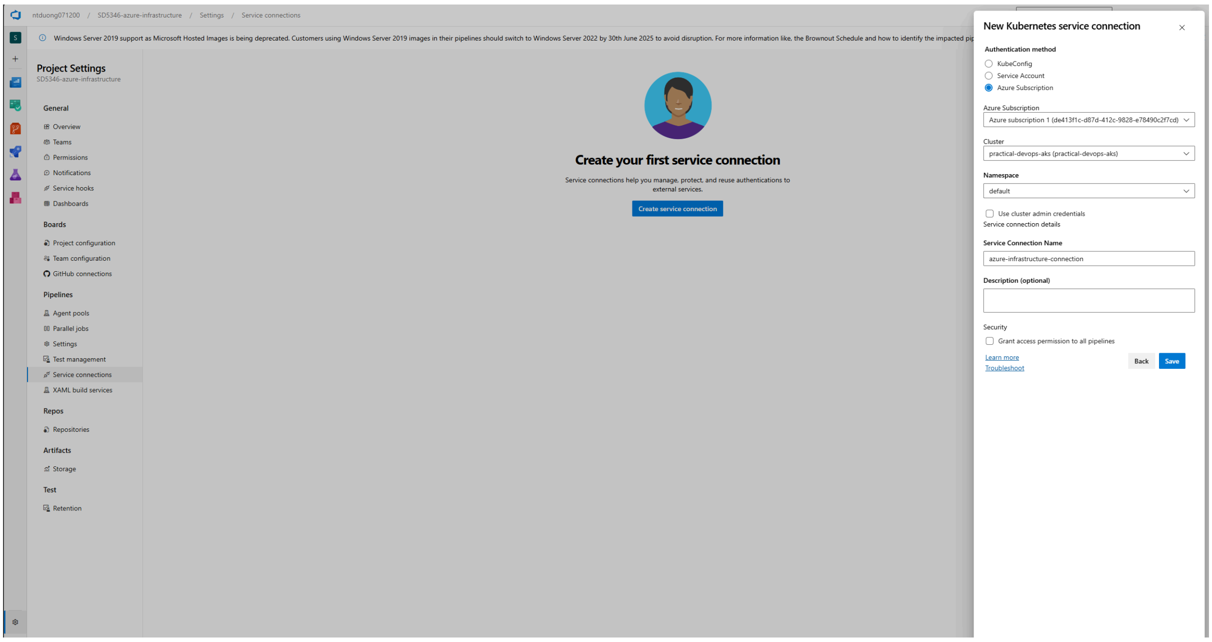
Service connections help you manage, protect, and reuse authentications to external services.

New Azure service connection

Choose a service or connection type

● Kubernetes

Choose **Azure Container Registry** with type **Service Principal,** and choose container registry as **practical-devops-aks**



Windows Server 2019 support as Microsoft Hosted Images is being deprecated. Customers using Windows Server 2019 images in their pipelines should switch to Windows Server 2022 by 30th June 2025 to avoid disruption. For more information like, the Brownout Schedule and how to identify the impacted pip

Create your first service connection

Service connections help you manage, protect, and reuse authentications to external services.

New Kubernetes service connection

Authentication method

○ KubeConfig
○ Service Account
● Azure Subscription

Azure Subscription: Azure subscription 1 (de413f1c-d87d-412c-9828-e78490c2f7cd)

Cluster: practical-devops-aks (practical-devops-aks)

Namespace: default

□ Use cluster admin credentials

Service connection details

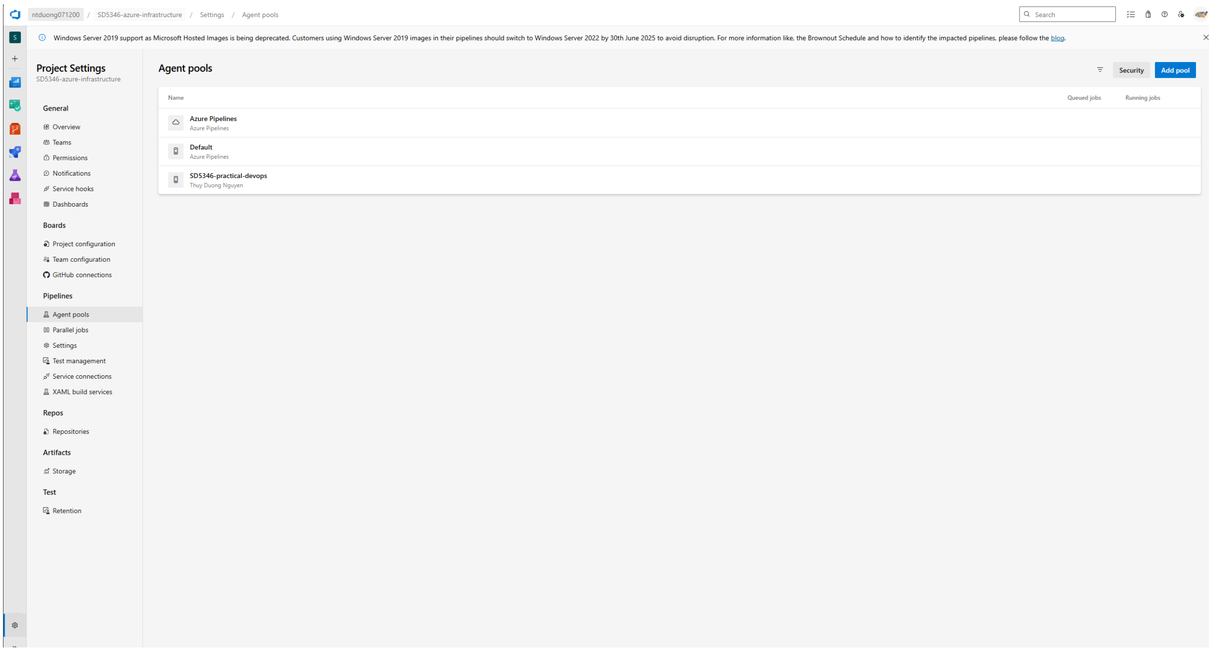
Service Connection Name: azure-infrastructure-connection

Description (optional)

Security

□ Grant access permission to all pipelines

Go to **Agent pools**, add pool **SD5346-practical-devops**



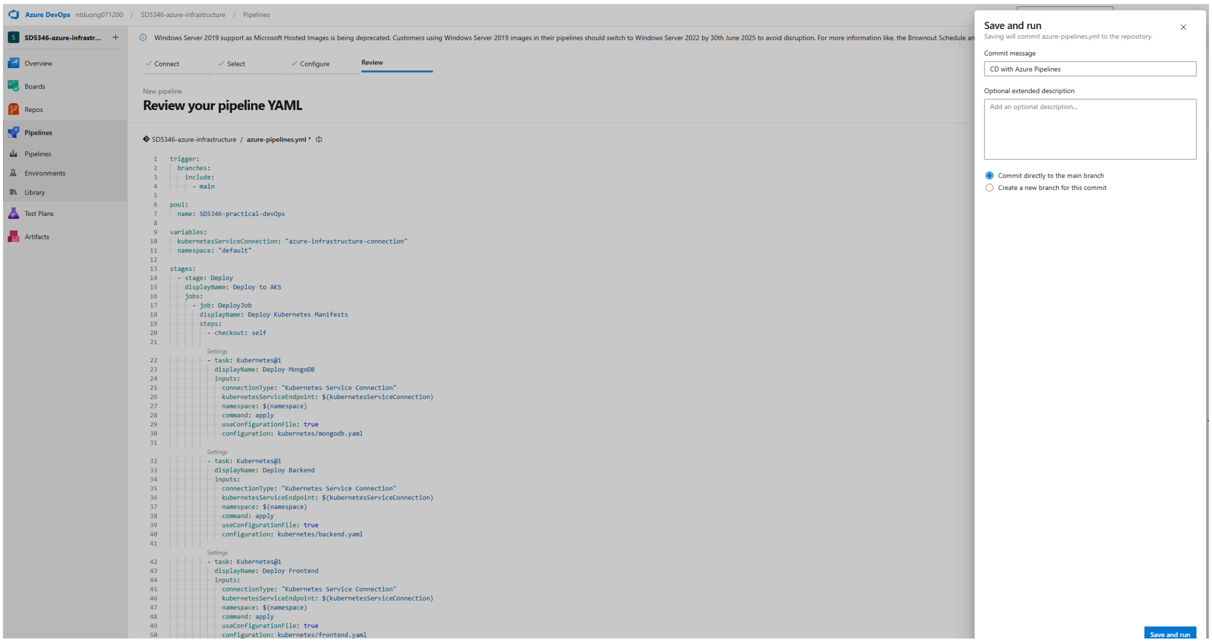
ntduong071200 / SD5346-azure-infrastructure / Settings / Agent pools
Search

Windows Server 2019 support as Microsoft Hosted Images is being deprecated. Customers using Windows Server 2019 images in their pipelines should switch to Windows Server 2022 by 30th June 2025 to avoid disruption. For more information like, the Brownout Schedule and how to identify the impacted pipelines, please follow the blog.

Agent pools

Name	Queued jobs	Running jobs
Azure Pipelines Azure Pipelines		
Default Azure Pipelines		
SD5346-practical-devops Thuy Duong Nguyen		

In **Pipelines**, create new pipeline with **Azure Repos Git** option, select **SD5346-azure-infrastructure** repo



Windows Server 2019 support as Microsoft Hosted Images is being deprecated. Customers using Windows Server 2019 images in their pipelines should switch to Windows Server 2022 by 30th June 2025 to avoid disruption. For more information like, the Brownout Schedule an

Review your pipeline YAML

SD5346-azure-infrastructure / azure-pipelines.yml *

```yaml
trigger:
  branches:
    include:
      - main

pool:
  name: SD5346-practical-devOps

variables:
  kubernetesServiceConnection: "azure-infrastructure-connection"
  namespace: "default"

stages:
  - stage: Deploy
    displayName: Deploy to AKS
    jobs:
      - job: DeployJob
        displayName: Deploy Kubernetes Manifests
        steps:
          - checkout: self

          - task: Kubernetes@1
            displayName: Deploy MongoDB
            inputs:
              connectionType: "Kubernetes Service Connection"
              kubernetesServiceEndpoint: $(kubernetesServiceConnection)
              namespace: $(namespace)
              command: apply
              useConfigurationFile: true
              configuration: kubernetes/mongodb.yaml

          - task: Kubernetes@1
            displayName: Deploy Backend
            inputs:
              connectionType: "Kubernetes Service Connection"
              kubernetesServiceEndpoint: $(kubernetesServiceConnection)
              namespace: $(namespace)
              command: apply
              useConfigurationFile: true
              configuration: kubernetes/backend.yaml

          - task: Kubernetes@1
            displayName: Deploy Frontend
            inputs:
              connectionType: "Kubernetes Service Connection"
              kubernetesServiceEndpoint: $(kubernetesServiceConnection)
              namespace: $(namespace)
              command: apply
              useConfigurationFile: true
              configuration: kubernetes/frontend.yaml
```

Save and run

Saving will commit azure-pipelines.yml to the repository.

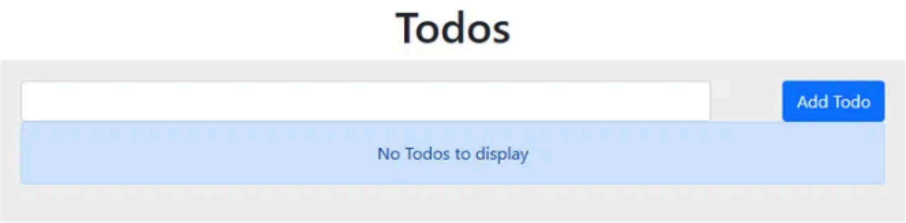
Commit message: CD with Azure Pipelines

Optional extended description: Add an optional description...

● Commit directly to the main branch

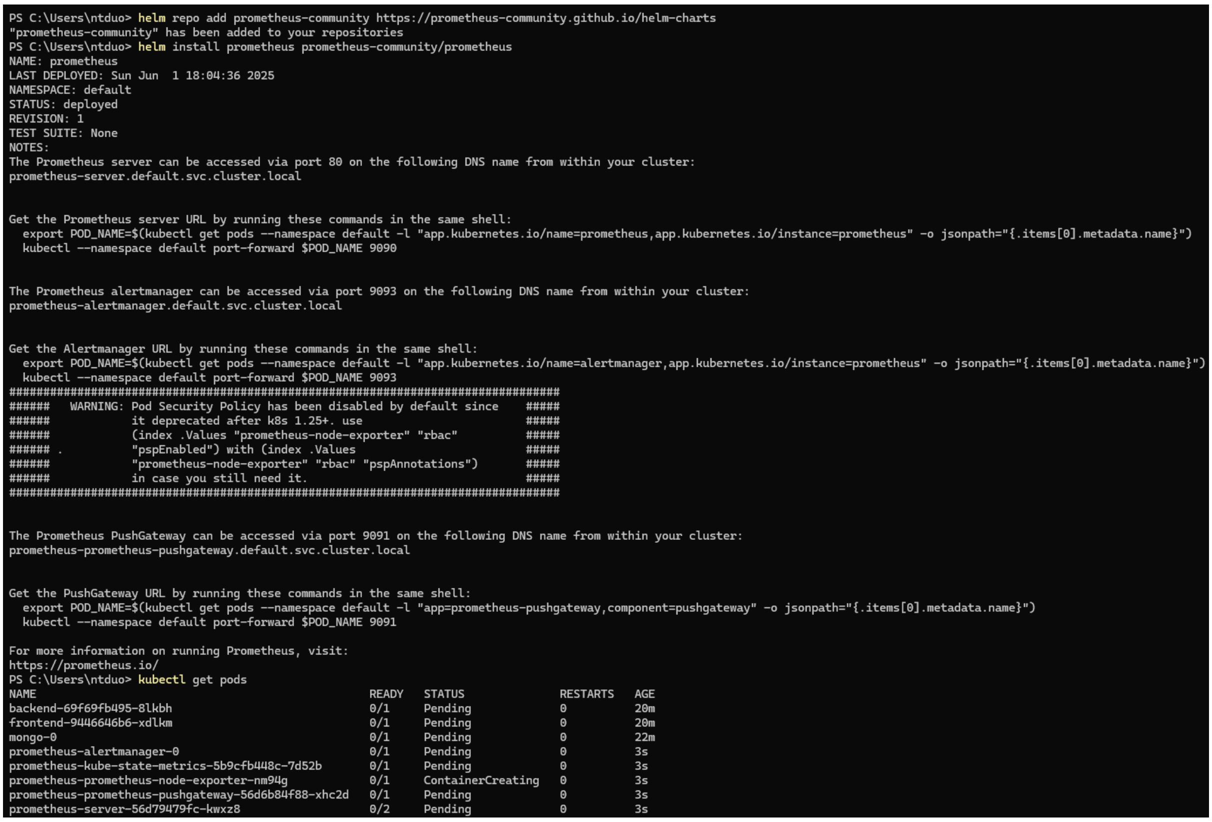
○ Create a new branch for this commit

Connect to app



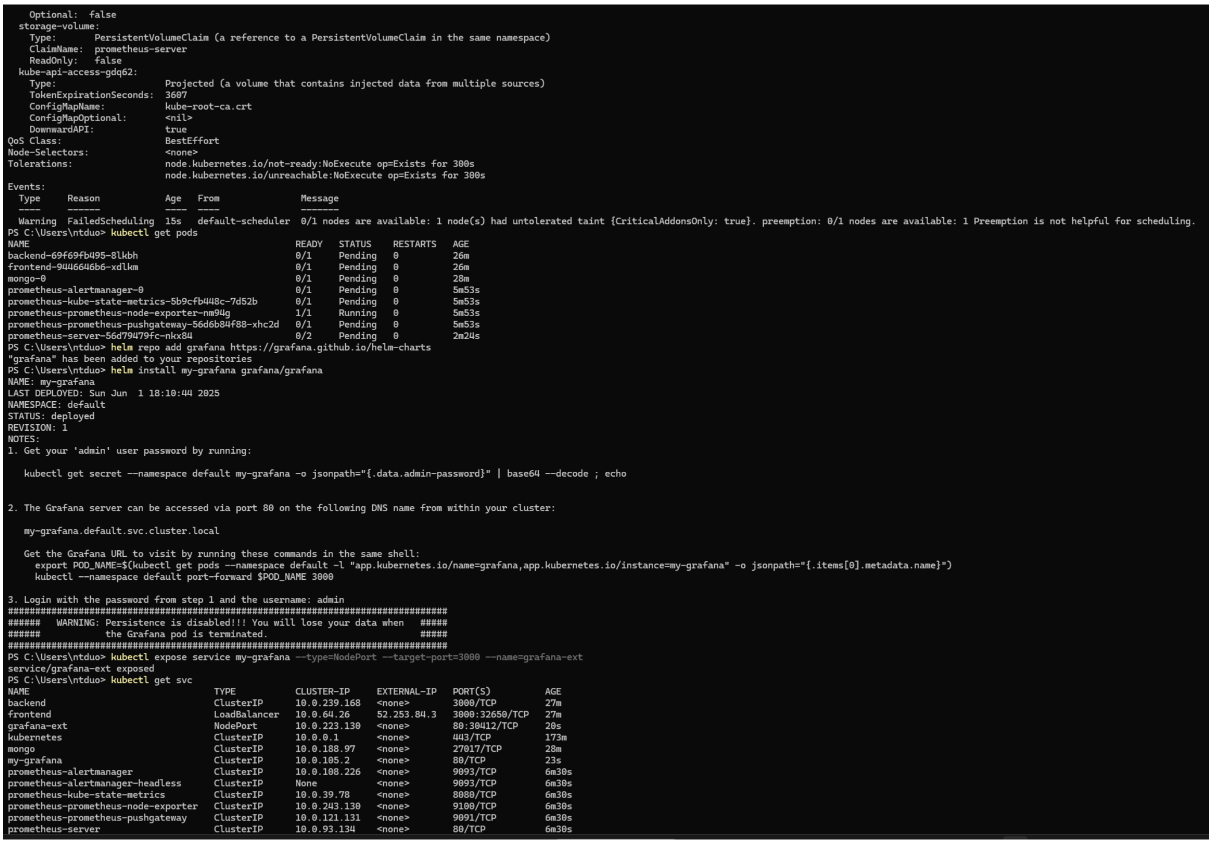
4. Monitoring by Prometheus and Grafana

Install Prometheus



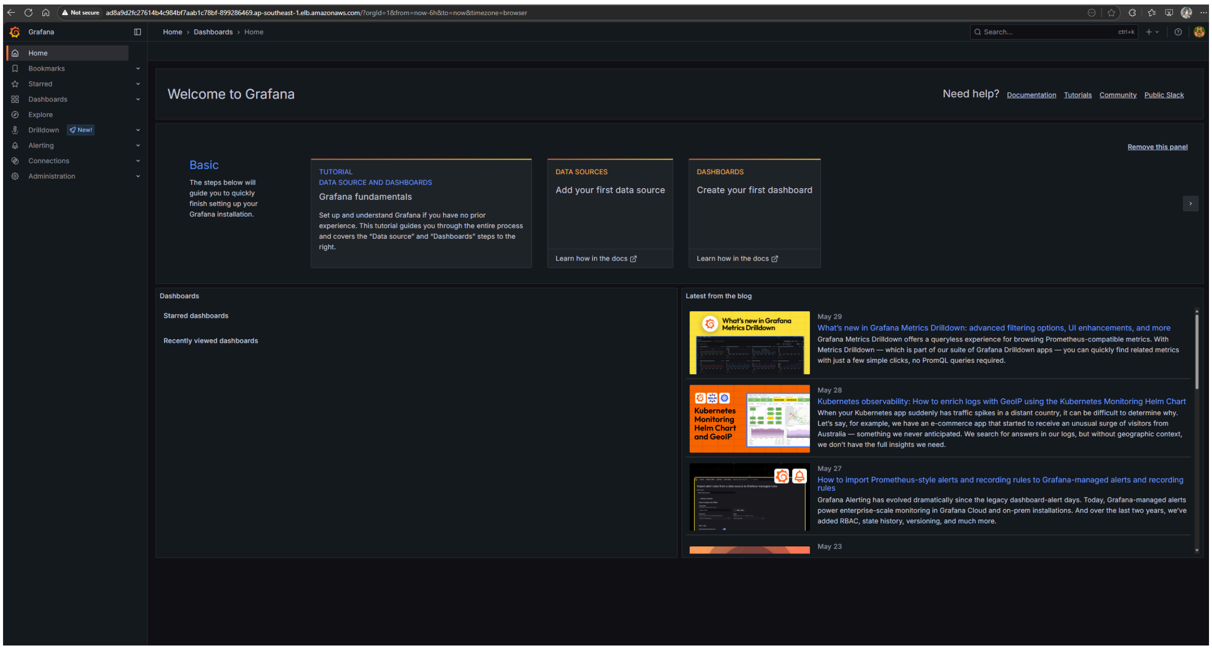
```
PS C:\Users\ntduo> helm repo add prometheus-community https://prometheus-community.github.io/helm-charts
"prometheus-community" has been added to your repositories
PS C:\Users\ntduo> helm install prometheus prometheus-community/prometheus
NAME: prometheus
LAST DEPLOYED: Sun Jun  1 18:04:36 2025
NAMESPACE: default
STATUS: deployed
REVISION: 1
TEST SUITE: None
NOTES:
The Prometheus server can be accessed via port 80 on the following DNS name from within your cluster:
prometheus-server.default.svc.cluster.local


Get the Prometheus server URL by running these commands in the same shell:
  export POD_NAME=$(kubectl get pods --namespace default -l "app.kubernetes.io/name=prometheus,app.kubernetes.io/instance=prometheus" -o jsonpath="{.items[0].metadata.name}")
  kubectl --namespace default port-forward $POD_NAME 9090


The Prometheus alertmanager can be accessed via port 9093 on the following DNS name from within your cluster:
prometheus-alertmanager.default.svc.cluster.local


Get the Alertmanager URL by running these commands in the same shell:
  export POD_NAME=$(kubectl get pods --namespace default -l "app.kubernetes.io/name=alertmanager,app.kubernetes.io/instance=prometheus" -o jsonpath="{.items[0].metadata.name}")
  kubectl --namespace default port-forward $POD_NAME 9093
#################################################################################
######   WARNING: Pod Security Policy has been disabled by default since    #####
######            it deprecated after k8s 1.25+. use                        #####
######            (index .Values "prometheus-node-exporter" "rbac"          #####
###### .          "pspEnabled") with (index .Values                         #####
######            "prometheus-node-exporter" "rbac" "pspAnnotations")       #####
######            in case you still need it.                                #####
#################################################################################


The Prometheus PushGateway can be accessed via port 9091 on the following DNS name from within your cluster:
prometheus-prometheus-pushgateway.default.svc.cluster.local


Get the PushGateway URL by running these commands in the same shell:
  export POD_NAME=$(kubectl get pods --namespace default -l "app=prometheus-pushgateway,component=pushgateway" -o jsonpath="{.items[0].metadata.name}")
  kubectl --namespace default port-forward $POD_NAME 9091

For more information on running Prometheus, visit:
https://prometheus.io/
PS C:\Users\ntduo> kubectl get pods
NAME                                                 READY   STATUS              RESTARTS   AGE
backend-69f69fb495-8lkbh                             0/1     Pending             0          20m
frontend-9446646b6-xdlkm                             0/1     Pending             0          20m
mongo-0                                              0/1     Pending             0          22m
prometheus-alertmanager-0                            0/1     Pending             0          3s
prometheus-kube-state-metrics-5b9cfb448c-7d52b       0/1     Pending             0          3s
prometheus-prometheus-node-exporter-nm94g            0/1     ContainerCreating   0          3s
prometheus-prometheus-pushgateway-56d6b84f88-xhc2d   0/1     Pending             0          3s
prometheus-server-56d79479fc-kwxz8                   0/2     Pending             0          3s
```

Install Grafana



```
    Optional:  false
  storage-volume:
    Type:       PersistentVolumeClaim (a reference to a PersistentVolumeClaim in the same namespace)
    ClaimName:  prometheus-server
    ReadOnly:   false
  kube-api-access-gdq62:
    Type:                    Projected (a volume that contains injected data from multiple sources)
    TokenExpirationSeconds:  3607
    ConfigMapName:           kube-root-ca.crt
    ConfigMapOptional:       <nil>
    DownwardAPI:             true
QoS Class:                   BestEffort
Node-Selectors:              <none>
Tolerations:                 node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
                             node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type     Reason            Age   From               Message
  ----     ------            ----  ----               -------
  Warning  FailedScheduling  15s   default-scheduler  0/1 nodes are available: 1 node(s) had untolerated taint {CriticalAddonsOnly: true}. preemption: 0/1 nodes are available: 1 Preemption is not helpful for scheduling.
PS C:\Users\ntduo> kubectl get pods
NAME                                                 READY   STATUS    RESTARTS   AGE
backend-69f69fb495-8lkbh                             0/1     Pending   0          26m
frontend-9446646b6-xdlkm                             0/1     Pending   0          26m
mongo-0                                              0/1     Pending   0          28m
prometheus-alertmanager-0                            0/1     Pending   0          5m53s
prometheus-kube-state-metrics-5b9cfb448c-7d52b       0/1     Pending   0          5m53s
prometheus-prometheus-node-exporter-nm94g            1/1     Running   0          5m53s
prometheus-prometheus-pushgateway-56d6b84f88-xhc2d   0/1     Pending   0          5m53s
prometheus-server-56d79479fc-nkx84                   0/2     Pending   0          2m24s
PS C:\Users\ntduo> helm repo add grafana https://grafana.github.io/helm-charts
"grafana" has been added to your repositories
PS C:\Users\ntduo> helm install my-grafana grafana/grafana
NAME: my-grafana
LAST DEPLOYED: Sun Jun  1 18:10:44 2025
NAMESPACE: default
STATUS: deployed
REVISION: 1
NOTES:
1. Get your 'admin' user password by running:

   kubectl get secret --namespace default my-grafana -o jsonpath="{.data.admin-password}" | base64 --decode ; echo


2. The Grafana server can be accessed via port 80 on the following DNS name from within your cluster:

   my-grafana.default.svc.cluster.local

   Get the Grafana URL to visit by running these commands in the same shell:
     export POD_NAME=$(kubectl get pods --namespace default -l "app.kubernetes.io/name=grafana,app.kubernetes.io/instance=my-grafana" -o jsonpath="{.items[0].metadata.name}")
     kubectl --namespace default port-forward $POD_NAME 3000

3. Login with the password from step 1 and the username: admin
#################################################################################
######   WARNING: Persistence is disabled!!! You will lose your data when   #####
######            the Grafana pod is terminated.                            #####
#################################################################################
PS C:\Users\ntduo> kubectl expose service my-grafana --type=NodePort --target-port=3000 --name=grafana-ext
service/grafana-ext exposed
PS C:\Users\ntduo> kubectl get svc
NAME                                  TYPE           CLUSTER-IP     EXTERNAL-IP   PORT(S)          AGE
backend                               ClusterIP      10.0.239.168   <none>        3000/TCP         27m
frontend                              LoadBalancer   10.0.64.26     52.253.84.3   3000:32650/TCP   27m
grafana-ext                           NodePort       10.0.223.130   <none>        80:30412/TCP     20s
kubernetes                            ClusterIP      10.0.0.1       <none>        443/TCP          173m
mongo                                 ClusterIP      10.0.188.97    <none>        27017/TCP        28m
my-grafana                            ClusterIP      10.0.105.2     <none>        80/TCP           23s
prometheus-alertmanager               ClusterIP      10.0.108.226   <none>        9093/TCP         6m30s
prometheus-alertmanager-headless      ClusterIP      None           <none>        9093/TCP         6m30s
prometheus-kube-state-metrics         ClusterIP      10.0.39.78     <none>        8080/TCP         6m30s
prometheus-prometheus-node-exporter   ClusterIP      10.0.243.130   <none>        9100/TCP         6m30s
prometheus-prometheus-pushgateway     ClusterIP      10.0.121.131   <none>        9091/TCP         6m30s
prometheus-server                     ClusterIP      10.0.93.134    <none>        80/TCP           6m30s
```

Login to grafana



Welcome to Grafana

Need help? Documentation Tutorials Community Public Slack

Remove this panel

Basic

The steps below will guide you to quickly finish setting up your Grafana installation.

TUTORIAL
DATA SOURCE AND DASHBOARDS
Grafana fundamentals

Set up and understand Grafana if you have no prior experience. This tutorial guides you through the entire process and covers the "Data source" and "Dashboards" steps to the right.

DATA SOURCES
Add your first data source

Learn how in the docs

DASHBOARDS
Create your first dashboard

Learn how in the docs

Dashboards

Starred dashboards

Recently viewed dashboards

Latest from the blog

May 29
What's new in Grafana Metrics Drilldown: advanced filtering options, UI enhancements, and more
Grafana Metrics Drilldown offers a queryless experience for browsing Prometheus-compatible metrics. With Metrics Drilldown — which is part of our suite of Grafana Drilldown apps — you can quickly find related metrics with just a few simple clicks, no PromQL queries required.

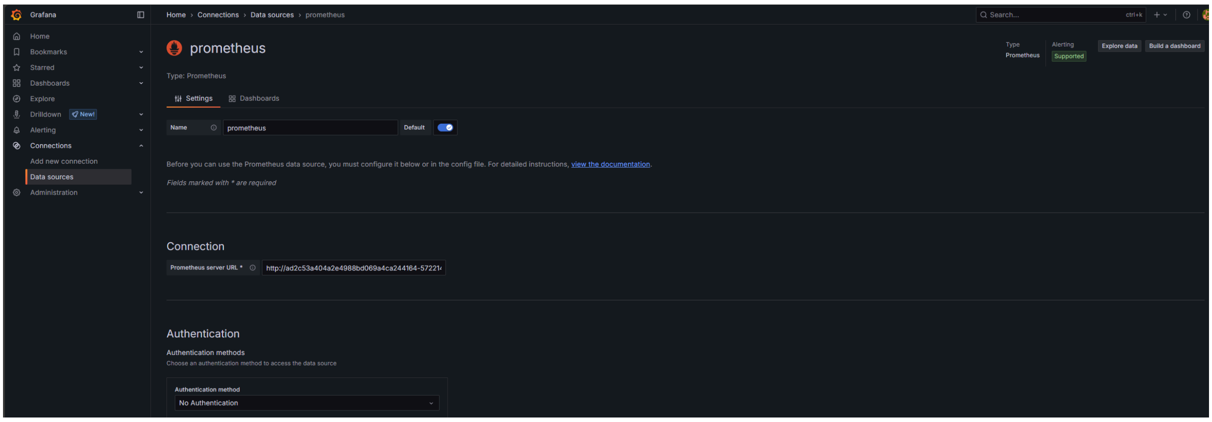
May 28
Kubernetes observability: How to enrich logs with GeoIP using the Kubernetes Monitoring Helm Chart
When your Kubernetes app suddenly has traffic spikes in a distant country, it can be difficult to determine why. Let's say, for example, we have an e-commerce app that started to receive an unusual surge of visitors from Australia — something we never anticipated. We search for answers in our logs, but without geographic context, we don't have the full insights we need.

May 27
How to import Prometheus-style alerts and recording rules to Grafana-managed alerts and recording rules
Grafana Alerting has evolved dramatically since the legacy dashboard-alert days. Today, Grafana-managed alerts power enterprise-scale monitoring in Grafana Cloud and on-prem installations. And over the last two years, we've added RBAC, state history, versioning, and much more.

May 23

What's new in Grafana Metrics Drilldown
Kubernetes Monitoring Helm Chart and GeoIP

Add data source



prometheus

Type: Prometheus

Name: prometheus — Default: on

Before you can use the Prometheus data source, you must configure it below or in the config file. For detailed instructions, view the documentation.

*Fields marked with * are required*

Connection

Prometheus server URL *: http://ad2c53a404a2e4988bd069a4ca244164-57221

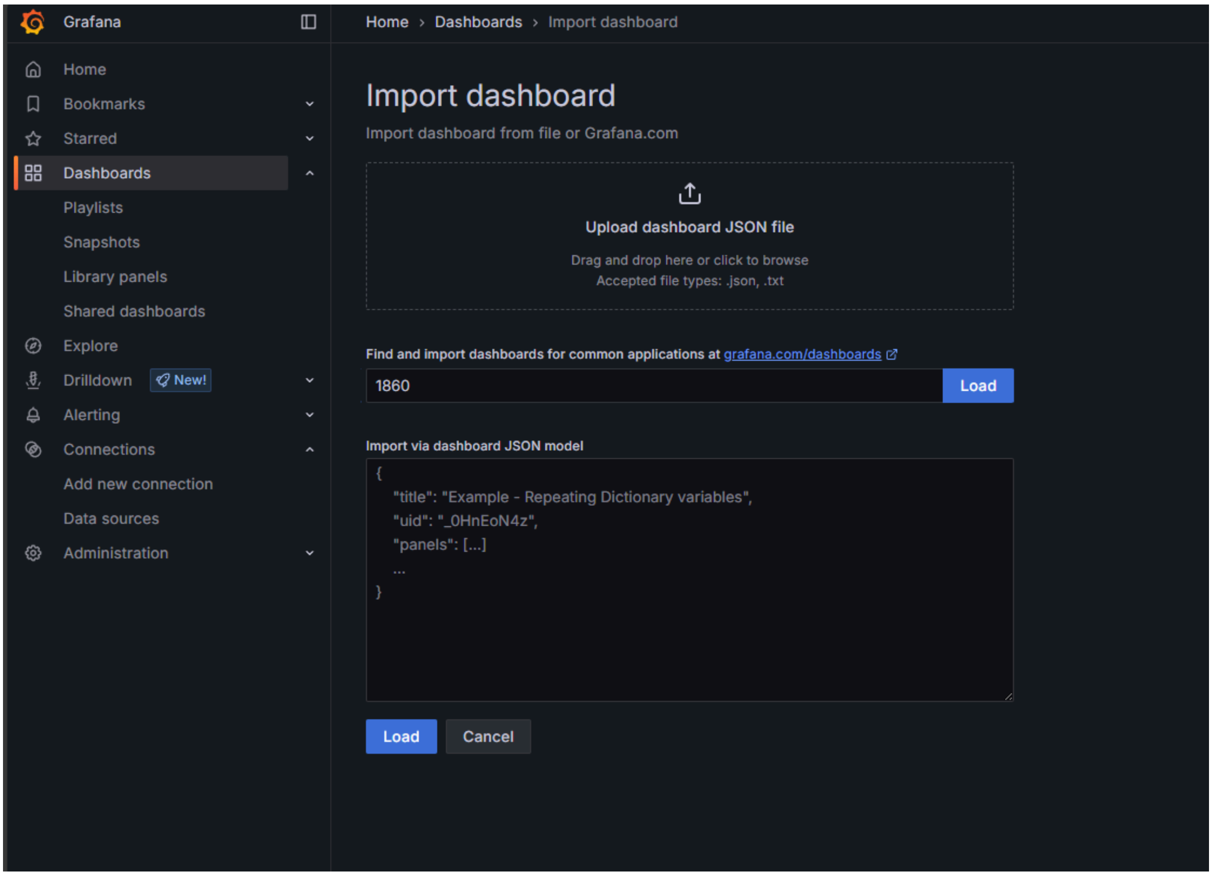
Authentication

Authentication methods

Choose an authentication method to access the data source

Authentication method: No Authentication

Import dashboard



Import dashboard

Import dashboard from file or Grafana.com

Upload dashboard JSON file

Drag and drop here or click to browse

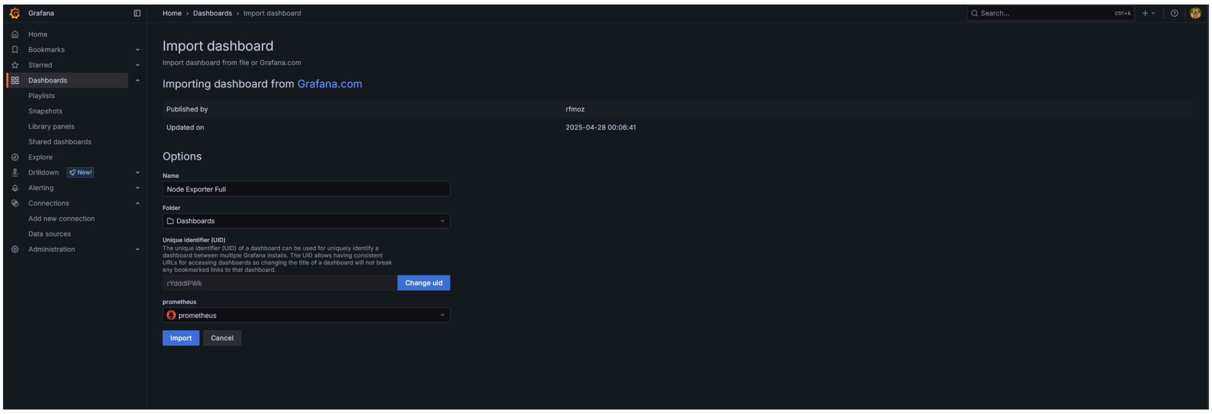
Accepted file types: .json, .txt

Find and import dashboards for common applications at grafana.com/dashboards

1860

Import via dashboard JSON model

```
{
    "title": "Example - Repeating Dictionary variables",
    "uid": "_0HnEoN4z",
    "panels": [...]
    ...
}
```



Import dashboard

Import dashboard from file or Grafana.com

Importing dashboard from Grafana.com

Published by	rfmoz
Updated on	2025-04-28 00:06:41

Options

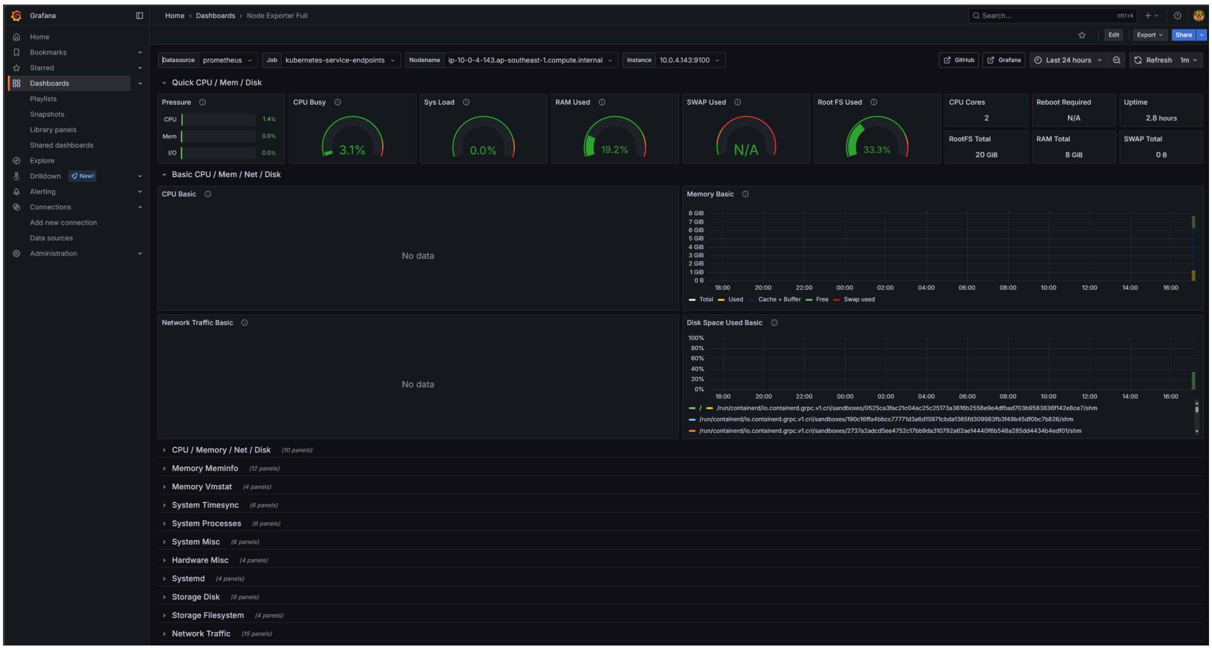
Name: Node Exporter Full

Folder: Dashboards

Unique identifier (UID)
The unique identifier (UID) of a dashboard can be used for uniquely identify a dashboard between multiple Grafana installs. The UID allows having consistent URLs for accessing dashboards so changing the title of a dashboard will not break any bookmarked links to that dashboard.

rYdddlPWk

prometheus: prometheus



Datasource: prometheus | Job: kubernetes-service-endpoints | Nodename: ip-10-0-4-143.ap-southeast-1.compute.internal | Instance: 10.0.4.143:9100

Quick CPU / Mem / Disk

Pressure: CPU 1.4%, Mem 0.0%, I/O 0.0%

CPU Busy: 3.1%

Sys Load: 0.0%

RAM Used: 19.2%

SWAP Used: N/A

Root FS Used: 33.3%

CPU Cores: 2

Reboot Required: N/A

Uptime: 2.8 hours

RootFS Total: 20 GiB

RAM Total: 8 GiB

SWAP Total: 0 B

Basic CPU / Mem / Net / Disk

CPU Basic: No data

Memory Basic

Network Traffic Basic: No data

Disk Space Used Basic

- / — /run/containerd/io.containerd.grpc.v1.cri/sandboxes/0525ca3fac21c04ac25c25173a3616b2558e9e4dfbad703b9583836f142e8ce7/shm
- /run/containerd/io.containerd.grpc.v1.cri/sandboxes/190c16ffa4bbcc77771d3a6d15971cbda1365fd309983fb3f49b45df0bc7b826/shm
- /run/containerd/io.containerd.grpc.v1.cri/sandboxes/2737a2adcd5ee4752c17bb9da310792a62ae14440f6b548a285dd4434b4edf01/shm

- CPU / Memory / Net / Disk (10 panels)
- Memory Meminfo (12 panels)
- Memory Vmstat (4 panels)
- System Timesync (6 panels)
- System Processes (6 panels)
- System Misc (6 panels)
- Hardware Misc (4 panels)
- Systemd (4 panels)
- Storage Disk (9 panels)
- Storage Filesystem (4 panels)
- Network Traffic (15 panels)