AML Infra Deployment using Azure Pipeline and Clone the latest code

Infrastructure Deployment



Prepared for

**Power & Utilities Forecasting Framework**

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Version 2.0

Prepared by

Microsoft Consulting Services

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Revision and Signoff Sheet

Change Record

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| --- | --- | --- | --- |
| Date | Author | Version | Change Reference |
| 01-Sep -2022 | Satya Addala | 0.1 | Initial draft |
| 09-Dec -2022 | Satya Addala | 1.0 | Updated document with latest Azure Pipeline Changes |
| 07-Jan-2023 | Pratima Reddy | 2.0 | Updated document with latest changes from 2.0 release |

Reviewers

| Name | Version Approved | Position | Date |
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# Introduction

The goal of these steps is to create uniform infra among developers, and for easy deployment. We are using Azure pipelines (YAML) for Infra creation instead of Azure Classic pipelines. This gives more flexibility to track the changes and for better customization.

**Checklist:**

The various steps to ensure the forecasting framework is ready on customer subscription are as below:

1. Service Principal Creation - Customer

2. Service connection in Devops - MS / MS Partner / Customer

3. Run the Build Infra pipeline – MS /MS Partner/ Customer

4. Add some secrets in the keyvault created during step 3 - Customer

* service principal password from step 1 as Secret in "clientsecret"
* accesskey of the storage account created during step 3 in "\*\*\*amlsakey" in the keyvault

5. Add required roles (This step is not required if the service connection had owner rights, however with contributor rights – the roles are not created hence this must be done manually) - Customer

* functionapp and webapp need contributor access on AML WS
* functionapp and webapp need contributor access on AML storage
* acrpull access needed for functionapp on the ACR

6. Run the Sql build pipeline – MS/ MS Partner/ Customer

7. Run the Sql Release pipeline - MS / MS Partner/ Customer

8. Run the Functionapp Release pipeline – MS/ MS Partner/ Customer

9. Run the Webapp Release pipeline - MS /MS Partner/ Customer

10. Run the Azure ML Release pipeline – MS/MS Pa

10. PowerBI setup to be done manually - MS / MS Partner / Customer

# Create Service Principal

Create a Service Principal on the target Subscription with Owner access and use application secret approach. – This is preferred.

However, contributor access at Resource group level can be provided too based on security requirements. Then, certain steps in the checklist (Please refer section 1) will have to be done manually

Steps to create Service Principal:

1. Sign in to azure portal and go to App Registrations
   1. Click on ‘New registration’

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1. Provide SPN name and click on Register

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Share the Display name to use in Infra Setup parameters.

1. Open newly created app registration and create a new application secret
   1. After saving the client secret, the value of the client secret is displayed. Copy this value because you won't be able to retrieve the key later. You will provide the key value with the application ID to sign in as the application. Store the key value where your application can retrieve it.

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Follow the [link](https://docs.microsoft.com/en-us/azure/active-directory/develop/howto-create-service-principal-portal) for other approaches. We are using the second option in the link.

# Create Service Connection

1. Create a Service Connection on Azure DevOps with the Service Principal.
   1. Open your Azure DevOps organization and click Project settings at the bottom left. In the menu that pops up, click Service Connections.

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* 1. Click New service connection in the top corner and select Azure Resource Manager.

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* 1. Click on Service Principal (Manual) and enter the required details including subscription details & service principal secrets.

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* 1. Enter all the values in the new connection fields and click “verify connection” to make sure everything works fine.
  2. The newly added connection will be displayed on the Service Connections once it’s successfully created.

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Follow the [link](https://docs.microsoft.com/en-us/azure/devops/pipelines/library/service-endpoints?view=azure-devops&tabs=yaml) to manage Service Connections.

# Create Azure Pipelines

This section is for creating the Azure pipelines in a new DevOps project.

First, the branch from Microsoft Repo will need to be cloned to the new DevOps project. The branch details will be provided by the Microsoft team.

Then, the YAML files inside the azure\_cicd\_pipelines will need to be used for creating pipelines.

Process for creating pipelines is :

1. To the right of devops, click on pipelines and then create a new pipeline

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1. In the Connect tab, choose Azure Repos and in the Select tab choose the repo created earlier

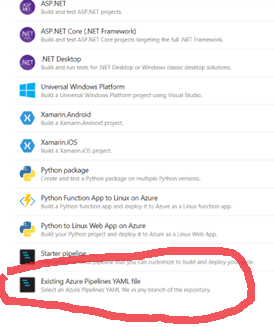
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1. In the third configure tab, look through the list for “Existing Azure Pipelines YAML file”

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1. Choose the YAML file for from the appropriate folder. I.e. builds or releases within azure\_cicd\_pipelines folder

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1. Review and **Save** the pipeline

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1. Once this is done, you can rename the pipeline based on the YAML chosen for example if it was create-environment-pipeline-arm ; the pipeline can be named build-forecasting-aml-infra

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Please note : There are two YAML for build and four in release as shown below:

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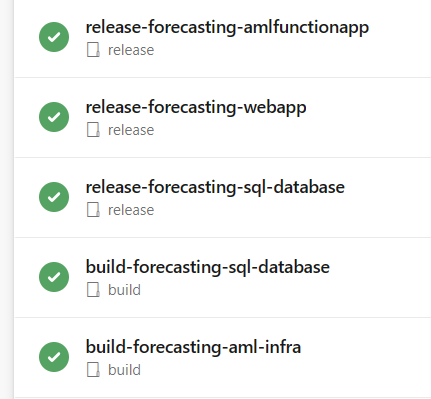
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So using these 6 YAML, 6 pipelines can be created :

1. Build-forecasting-aml-infra (create-environment-pipeline-arm.yml)
2. Build-forecasting-sql-database (azure-sql-database-build.yml)
3. Release-forecasting-sql-database (azure-sql-database-release.yml)
4. Release-forecasting-webapp (azure-webapp-release.yml)
5. Release-forecasting-amlfunctionapp (azure-aml-functionapp-release.yml)
6. Release-forecasting-aml-infra (azue-aml-environ-release.yml)



# Run Azure Pipeline to build infra

1. Open Pipelines/build-forecasting-aml-infra and click on “Run pipeline”.

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1. Select your branch and update the parameter values

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The pipeline will use base name and env name to derive resource names. Try to give small words to avoid build failure with bigger resource names since the pipeline will append additional text to these words to derive the resource names.

For the Resource group : If you already have a resource group existing, you can use that (if service connection is at resource group level) ; else you can fill in a new name like basename-environmentname-rg (incase the service connection is at a subscription level)

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The first option (DeployAzureMLEnvironment) is to complete the basic Azure ML Infra setup including acr, keyvault and storage etc.

The second option (DeployAzureSQL) is to deploy azure sql along with the database. It’ll dynamically, create a secret for sql password and store in the keyvault which was created in the previous step.

The rest of the options are for creating various other services needed for the forecasting framework. Wherever needed, options for parameters have been provided

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Make sure to give shorter names as it’ll append additional text to create compute instances.

The last option in radio buttons is for creating data stores. We have two option for authentication. One with Secret and the other with key. We can create data stores along with other resources in the first go if we go with hardcoded account key option. Otherwise, we have to first create keyvault with the first step and add storage account keys are secrets. We have to give the secret names in azure pipeline input.

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Click on “Run” once after entering all the details.

# Review Pipeline Status/Logs

Click on the running pipeline and review the Status. We have multiple steps in pipeline which includes creating resource group, AML workspace along with the dependent resources

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# Review Resources

This Azure Infra pipeline can create the following resources –

1. Resource Group
   * 1. Application Insights
     2. Key vault
     3. Azure Machine Learning
        1. Compute Instance
        2. Compute Cluster
        3. Datastore
     4. Container Registry
     5. Storage account
     6. Azure SQL
     7. Azure Function app
     8. Azure Web App
     9. AKS
     10. EventGrid

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# Run Other Azure Pipelines

* Once infrastructure deployment is done, there are various release pipelines needed for the forecasting framework.
* For the SQL database deployment, we have the **release-forecasting-sql-database** Graphical user interface, text, application

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Prerequisite for this is to run the build pipeline to build and save the required DACPAC in artifacts.

* For the function app and web app code deployment, there are two release pipelines.
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1. **release-forecasting-webapp** (Needed inputs are the service connection name and webapp name)

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1. **release forecasting-amlfunctionapp** (Apart from the service connection, this pipeline needs inputs on the Functionapp name and the ACR name – this is for the docker)

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Finally, for the AML environment creation – there is another release pipeline (release-forecasting-aml-infra)

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# Update Account Key in Key vault (Optional)

If there is a new storage account created and it must be registered as a datastore to Azure ML workspace, follow below steps:

1. Add a Secret “storage-account-key” in KeyVault with the storage account key.

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The secret name can be anything but we have to mention the same in azure pipeline when we execute it for creating datastore.

# Clone the latest code

Once the infra is set – we must use git clone to have the latest code in the workspace.

1. Open ML workspace and Notebooks

2. Select Compute Instance and clone the code

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# PowerBI Deployment

The following steps need to be done for PowerBI deployment. This can be done along with the Microsoft/Microsoft Partner team

 Open Power BI report/download power bi report from repo

 Publish Power BI

 Update the Parameters

 Update the credentials (get creds from key vault)

 Update report path in Web app config

 Restart web app