Azure Dev Ops Pipeline for Startups

Chad Michel

@chadmichel

https://www.linkedin.com/in/chadmichel/

https://github.com/chadmichel/HDC2021

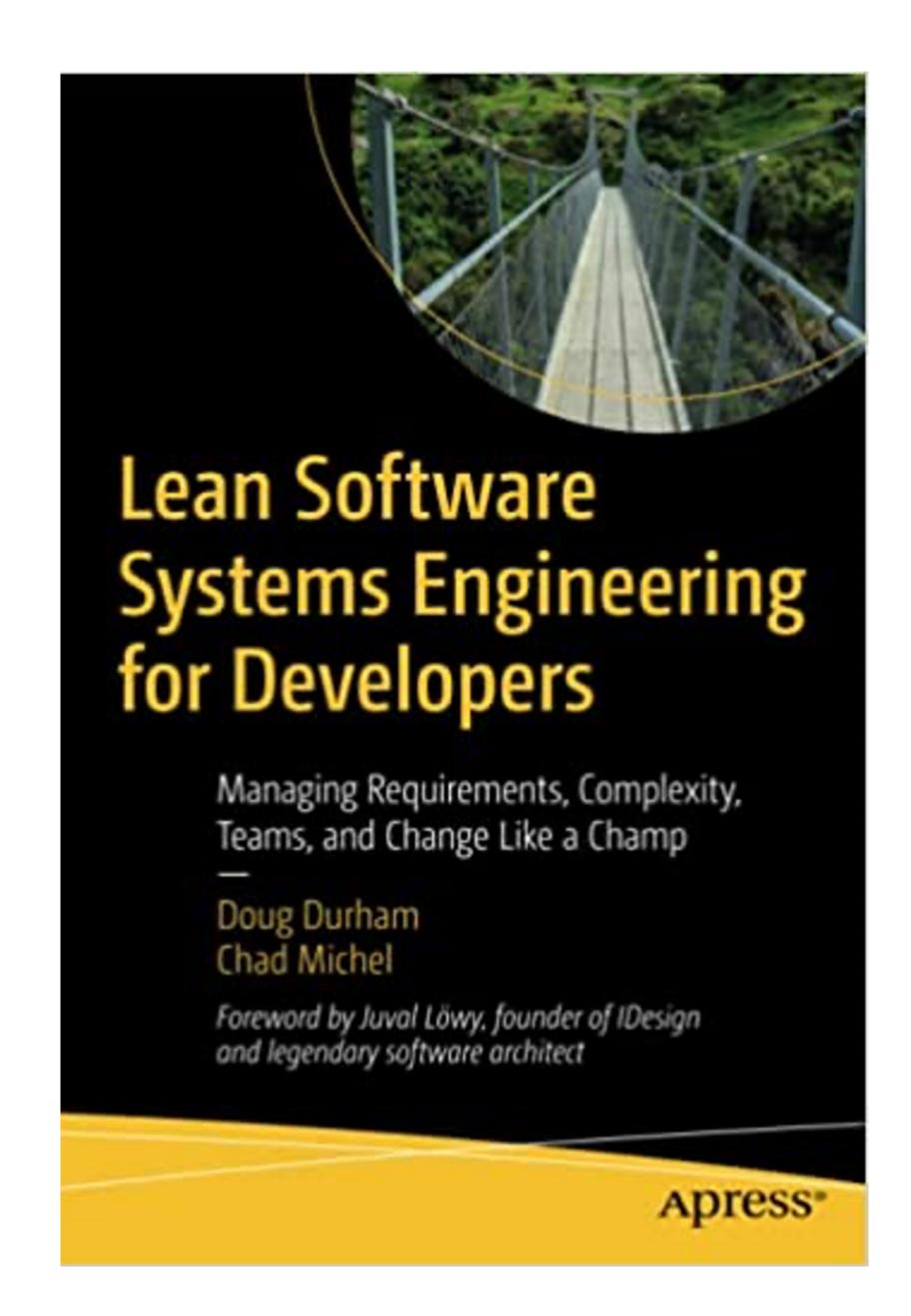# Chad Michel

Architect / Professional Services Lead

- UNL graduate

- Sr. Software Architect

- Don't Panic Labs

- Beehive

- CDN / eCommerce

- Lifelong Nebraskan

- Wife and 2 kids

- Many startups

Lean Software Systems Engineering for Developers

Managing Requirements, Complexity, Teams, and Change Like a Champ

- # Doug Durham

- # Chad Michel

Azure Dev Ops Pipeline for Startups

If builders built buildings the way programmers wrote programs, then the first woodpecker that came along would destroy civilization.

- Gerald Weinberg

Startup and Azure DevOps

Focus of presentation is not on task management

Startup and Azure DevOps

- Starting new project

  - Great time to setup processes

  - Great time to setup good release pipelines

- Potentially a bad time

  - Budget constrained

  - Unknown end game

What can you do?

- Create automated builds

  - Validate that code builds

  - Validate code passes tests

- Automatically create environments

- Automate pushing of code to environments QA | Staging | Production

Chad's Organization Maturity Model - COMM

	0	1	2	3
Project	Chaos	People have assigned tasks and put effort towards those tasks. People complete tasks as they complete work.	Project end dates and budget are predicted and managed.	Project metrics collected. Metrics analyzed periodically.
System Design	Chaos	Developers follow consistent patterns and practices.	System design is known before starting work clearly documented. Developers have a clear roadmap.	System design is periodically reviewed. Results of review are documented.
UX Design	Chaos	User experience is consistent.	User experience is designed before work is assigned to developers.	Final implementation of user experience is reviewed by UX expert. Results of review are documented.
Security	Chaos	Source code is analyzed for security threats. Environments and builds are secured.	Penetration testing periodically done against application.	Application and processes are periodically reviewed. Output of review is documented.
DevOps	Chaos	Builds and deployments are repeatable.	PRs built with tests. Releases automated.	Configuration managed and gated.

DevOps

	0	1	2	3
DevOps	Chaos	Builds and deployments are repeatable.	PRs built with tests. Releases automated.	Configuration managed and gated.

DevOps
Startup Focus

Startup? 1 to 2 devs?

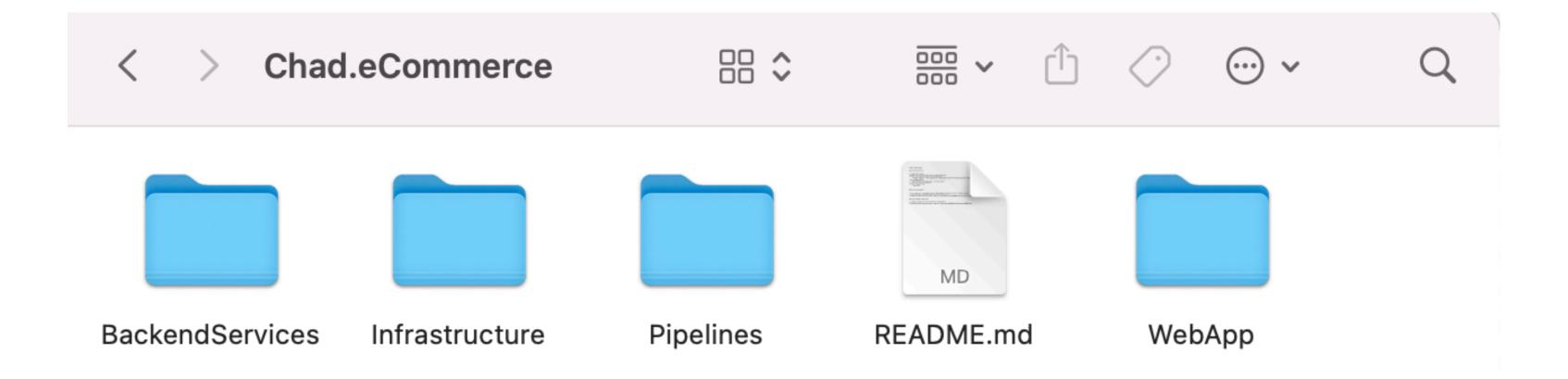|	0	1	2	3
DevOps	Chaos	Source Managed. Builds and deployments are repeatable.	PRs built with tests. Releases automated.	Configuration managed and gated.

Steps for a faster configuration
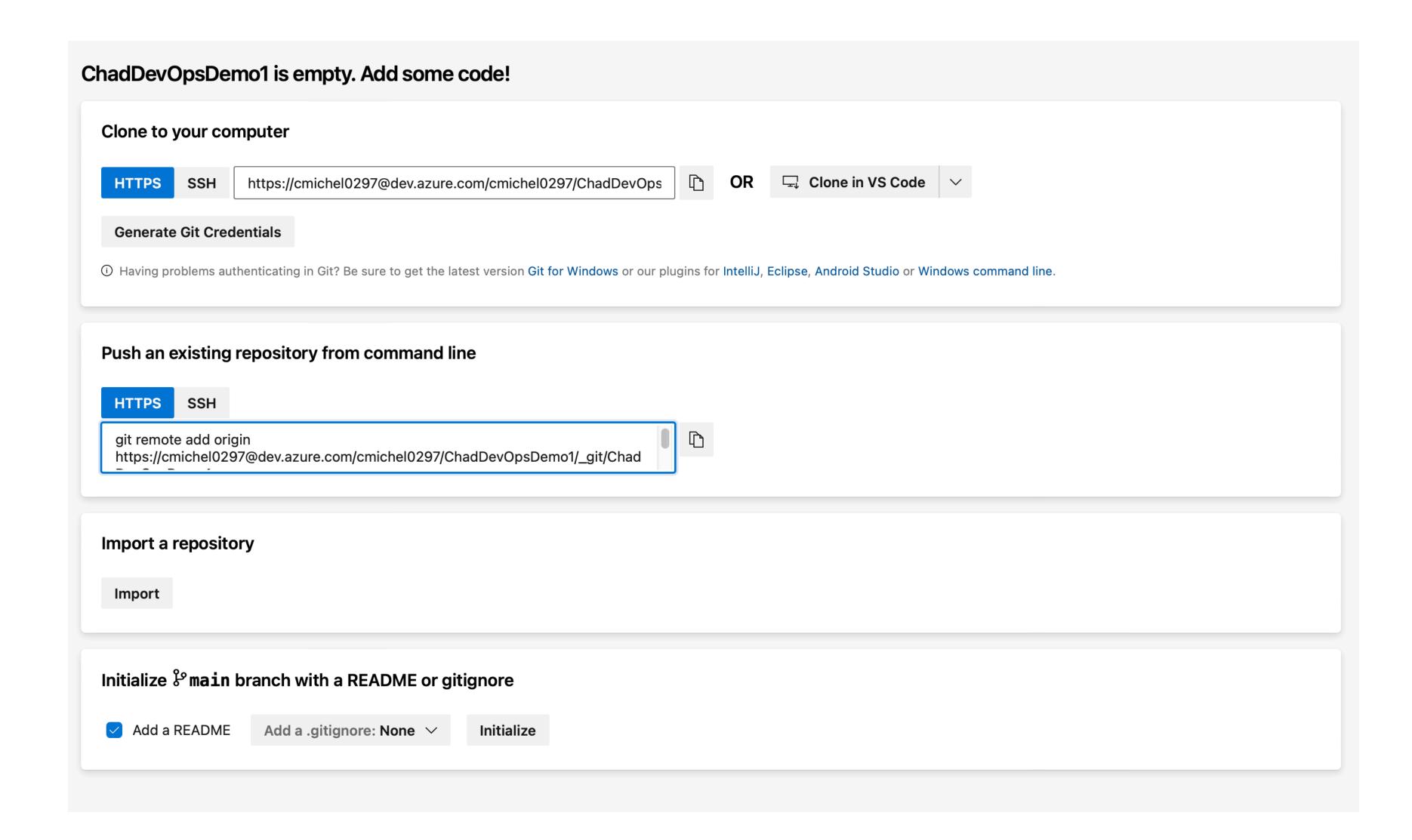
1. Setup source

2. Setup PR builds (PR Backend / PR Frontend)

3. Setup merge builds (Merge Backend / Merge Frontend)

4. Configure releases (Backend QA / Frontend QA)

5. Configure branch policies

6. …

1. Setup Source

Create new project

✕

Project name *

ChadDevOpsDemo1

✓

Description

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.

⌄ **Advanced**

ChadDevOpsDemo1 is empty. Add some code!

Clone to your computer

| HTTPS | SSH | https://cmichel0297@dev.azure.com/cmichel0297/ChadDevOps | 📋 | **OR** | 🖥 Clone in VS Code ⌄ |

Generate Git Credentials

ⓘ 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

| HTTPS | SSH |

```
git remote add origin
https://cmichel0297@dev.azure.com/cmichel0297/ChadDevOpsDemo1/_git/Chad
```

Import a repository

Import

Initialize ⑂ `main` branch with a README or gitignore

☑ Add a README   Add a .gitignore: None ⌄   **Initialize**

ChadDevOpsDemo1

> 📁 .azuredevops

> 📁 BackendServices

> 📁 Infrastructure

> 📁 Pipelines

> 📁 WebApp

📄 .gitignore

📄 README.md

Files

Set up build   Clone

Configure your pipeline

.NET Core Function App to Windows on Azure
Build a .NET Core function app and deploy it to Azure as a Windows function App.

ASP.NET
Build and test ASP.NET projects.

ASP.NET Core (.NET Framework)
Build and test ASP.NET Core projects targeting the full .NET Framework.

.NET Desktop
Build and run tests for .NET Desktop or Windows classic desktop solutions.

Universal Windows Platform
Build a Universal Windows Platform project using Visual Studio.

Xamarin.Android
Build a Xamarin.Android project.

Xamarin.iOS
Build a Xamarin.iOS project.

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 Function App to Linux on Azure
Build a Node.js function app and deploy it to Azure as a Linux function 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.
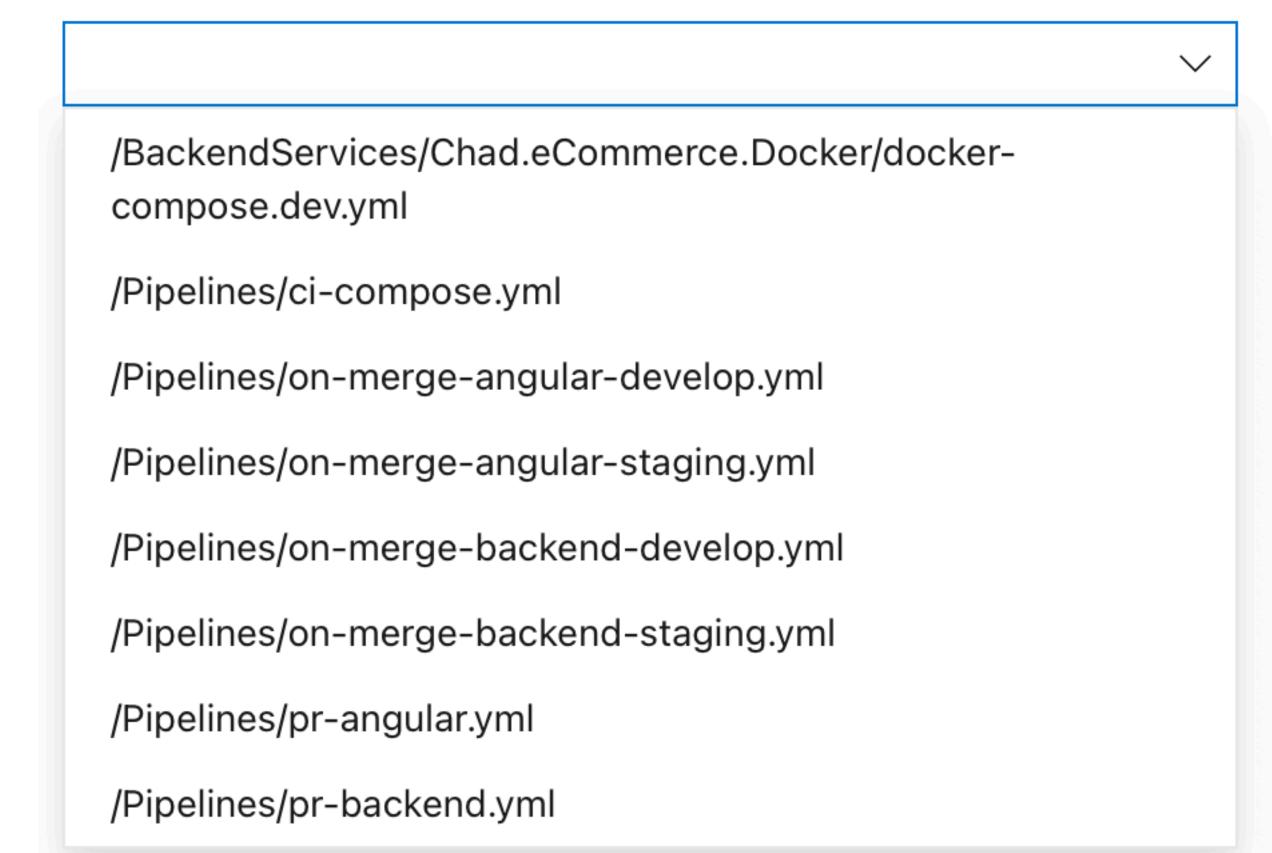
Select an existing YAML file

Select an Azure Pipelines YAML file in any branch of the repository.

Branch

⑂ master ⌄

Path

⌄

/BackendServices/Chad.eCommerce.Docker/docker-compose.dev.yml

/Pipelines/ci-compose.yml

/Pipelines/on-merge-angular-develop.yml

/Pipelines/on-merge-angular-staging.yml

/Pipelines/on-merge-backend-develop.yml

/Pipelines/on-merge-backend-staging.yml

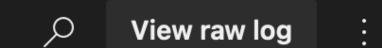/Pipelines/pr-angular.yml

/Pipelines/pr-backend.yml

```yaml
trigger:
- none

pool:
  vmImage: ubuntu-20.04

variables:
  buildConfiguration: "Release"
  slnPath: "BackendServices/Chad.eCommerce.sln"

steps:
  # Compose the containers first. They will need a few seconds to spin up.
  # Settings
- task: DockerCompose@0
  displayName: "Compose MSSQL Docker Container"
  inputs:
    containerregistrytype: "Container Registry"
    dockerComposeFile: "$(System.DefaultWorkingDirectory)/Pipelines/ci-compose.yml"
    dockerComposeCommand: "up -d"

- script: dotnet build $(slnPath) --configuration $(buildConfiguration)
  displayName: 'dotnet build $(slnPath) $(buildConfiguration)'

- script: docker exec -i mssql /opt/mssql-tools/bin/sqlcmd -S localhost -U SA -P 'DevP@ssw0rd!' -Q 'create database Chade
  displayName: "Create Chad.eCommerce database"

  # Settings
- task: PowerShell@2
  inputs:
    targetType: 'inline'
    script: |
      # Write your PowerShell commands here.

      Start-Sleep -s 5
```

Jobs

✓ ✗ Job		44s
✓ Initialize job		2s
✓ Checkout ChadDevOp...		1s
✓ Compose MSSQL D...		24s
✗ Run DbUp		15s
⊘ dotnet test Backend...		<1s
✓ PublishTestResults		<1s
✓ Post-job: Checkout ...		<1s
✓ Finalize Job		<1s
✓ Report build status		<1s

✗ Run DbUp

View raw log ⋮

```
1   Starting: Run DbUp
2   ==============================================================================
3   Task         : .NET Core
4   Description  : Build, test, package, or publish a dotnet application, or run a custom dotnet command
5   Version      : 2.187.0
6   Author       : Microsoft Corporation
7   Help         : https://docs.microsoft.com/azure/devops/pipelines/tasks/build/dotnet-core-cli
8   ==============================================================================
9   Info: .NET Core SDK/runtime 2.2 and 3.0 are now End of Life(EOL) and have been removed from all hosted agents. If you're using
10  /usr/bin/dotnet run $(YOURPROJECT_Database_Connection_String) --configuration Release
11  /home/vsts/work/1/s/BackendServices/Chad.eCommerce.Common/AmbientContext.cs(3,16): error SA1300: Element 'eCommerce' should be
12  /home/vsts/work/1/s/BackendServices/Chad.eCommerce.Common/Config.cs(4,16): error SA1300: Element 'eCommerce' should begin with
13  /home/vsts/work/1/s/BackendServices/Chad.eCommerce.Common/IServiceContractBase.cs(1,16): error SA1300: Element 'eCommerce' sho
14  /home/vsts/work/1/s/BackendServices/Chad.eCommerce.Common/ServiceContractBase.cs(5,16): error SA1300: Element 'eCommerce' shou
15  /home/vsts/work/1/s/BackendServices/Chad.eCommerce.Common/DataContracts/Todo.cs(3,16): error SA1300: Element 'eCommerce' shoul
16
17  The build failed. Fix the build errors and run again.
18  ##[error]Error: The process '/usr/bin/dotnet' failed with exit code 1
19  ##[warning].NET 5 has some compatibility issues with older Nuget versions(<=5.7), so if you are using an older Nuget version(a
20  Info: Azure Pipelines hosted agents have been updated and now contain .Net 5.x SDK/Runtime along with the older .Net Core vers
21  ##[error]Dotnet command failed with non-zero exit code on the following projects :
22  Finishing: Run DbUp
```

Configure docker DB SQL for testing

fx

Use variables to store values or
encrypted secrets separately from
your repository.

New variable

Learn about variables

← New variable

Name

YOURPROJECT_Database_Connection_String

Value

YourDbConnectionNameHere": "Server=localhost; Initial Catalog

☐ Keep this value secret

☐ Let users override this value when running this pipeline

ChadDevOpsDemo1

Select an existing YAML file

Select an Azure Pipelines YAML file in any branch of the repository.

Branch

⎇ master ⌄

Path

/Pipelines/pr-angular.yml ⌄

Select a file from the dropdown or type in the path to your file

ChadDevOpsDemo1 ⧉

✅ **PR Frontend**

✅ **PR Backend**

3. Setup Merge Builds

- Merge into develop or main

- Kick build

- Output of build will be pushed to environments as part of release process

New pipeline

Connect   Select   Configure   Review

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

Other Git
Any generic Git repository

Subversion
Centralized version control by Apache

Existing Azure Pipelines YAML file
Select an Azure Pipelines YAML file in any branch of the repository.

Select an existing YAML file ✕

Select an Azure Pipelines YAML file in any branch of the repository.

Branch

master ▾

Path

/Pipelines/on-merge-backend-develop.yml ▾

Select a file from the dropdown or type in the path to your file

ChadDevOpsDemo1 ⧉

```yaml
trigger:
  branches:
    include:
      - develop
  paths:
    include:
      - BackendServices

pool:
  vmImage: 'windows-latest'

steps:
  # Settings
  - task: UseDotNet@2
    inputs:
      version: "3.1.x"
      packageType: sdk
    displayName: "Use .NET 3.1.x"

  # Settings
  - task: DotNetCoreCLI@2
    displayName: "Publish DbUp"
    inputs:
      command: publish
      publishWebProjects: false
      workingDirectory: "$(System.DefaultWorkingDirectory)/BackendServices/Chad.eCommerce.DbUp"
      arguments: "--configuration $(BuildConfiguration) --output $(Build.ArtifactStagingDirectory)/DbUp/Application"
      zipAfterPublish: false

  # Settings
  - task: DotNetCoreCLI@2
    displayName: "Publish Functions"
    inputs:
      command: publish
      publishWebProjects: false
      workingDirectory: "$(System.DefaultWorkingDirectory)/BackendServices/Chad.eCommerce.Client.Functions"
      arguments: "--configuration $(BuildConfiguration) --output $(Build.ArtifactStagingDirectory)/Backend/Application"
      zipAfterPublish: false
```

- ✅ **On Merge Angular Develop**
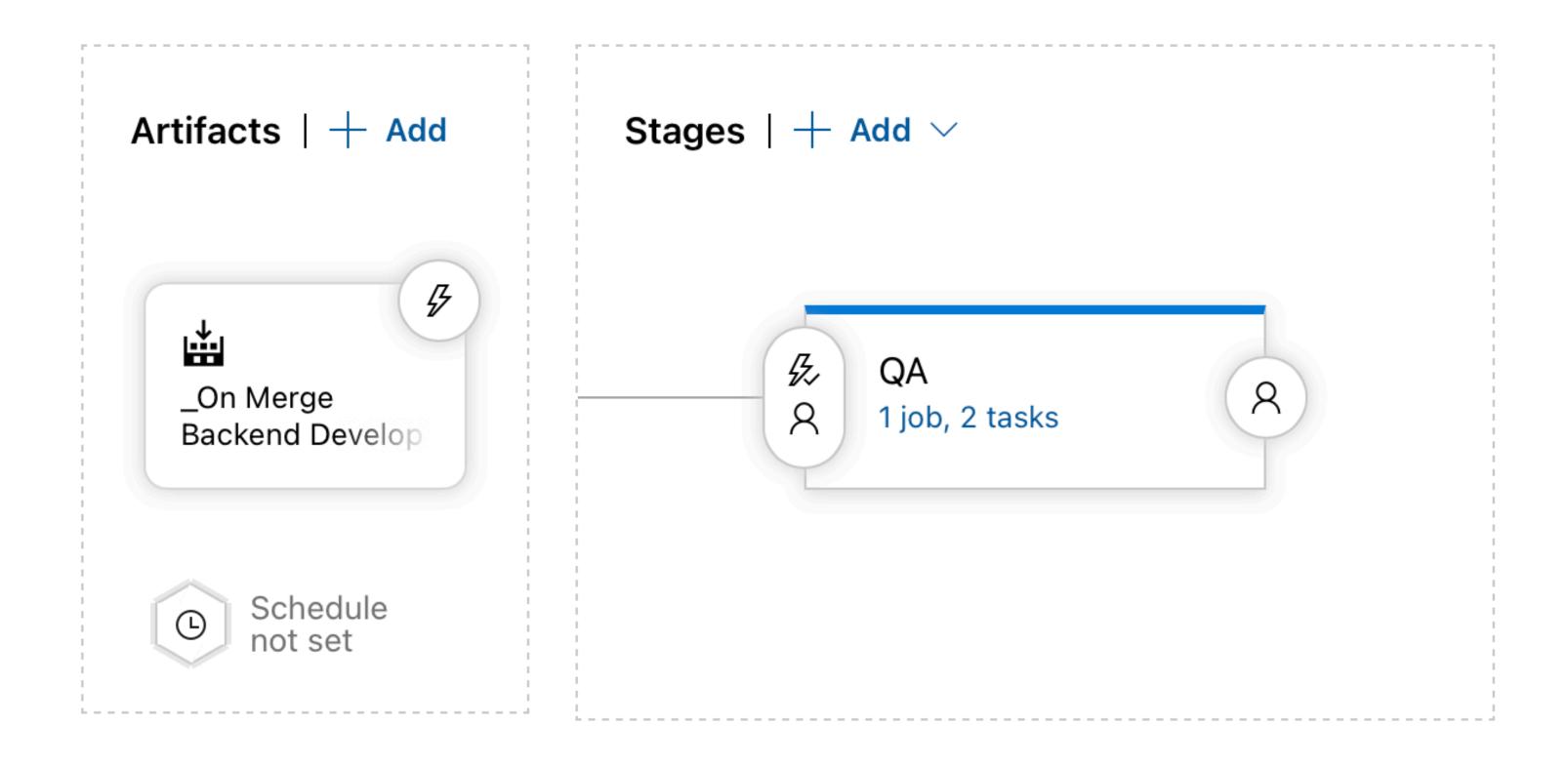
- ✅ **On Merge Backend Develop**
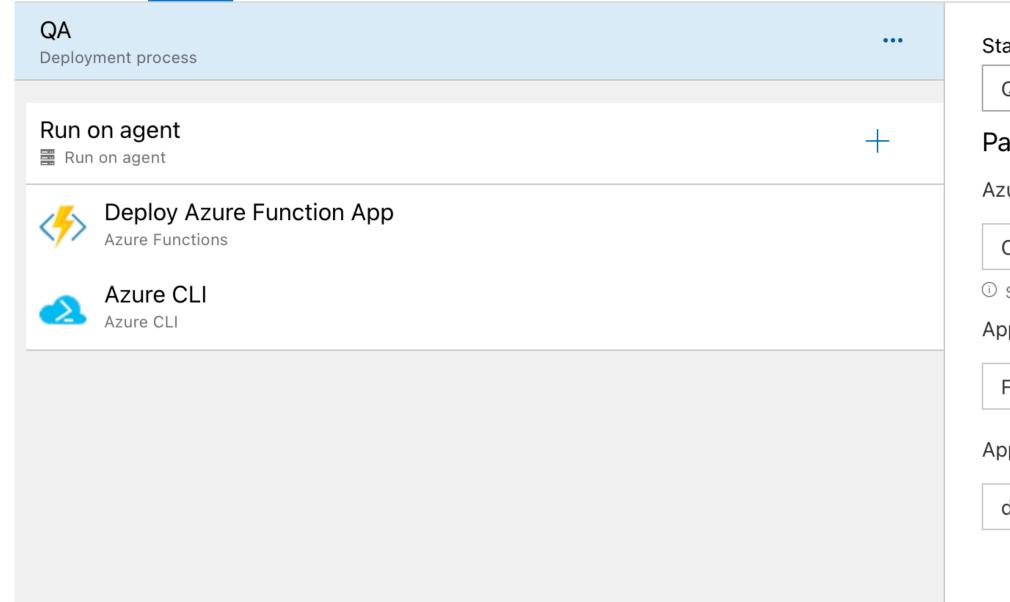
4. Configure Releases

- Deploy output of merge builds to Azure Environments

-

Pipeline Tasks ⌄ Variables Retention Options History

Artifacts | ➕ Add

Stages | ➕ Add ⌄

_On Merge
Backend Develop

🕐 Schedule
not set

QA
1 job, 2 tasks

QA
Deployment process   **...**

Run on agent   +
▤ Run on agent

⚡ **Deploy Azure Function App**
    Azure Functions

☁️ **Azure CLI**
    Azure CLI

Stage name

> QA

Parameters ⓘ | 🔗 Unlink all

Azure subscription *   🔗 | Manage ↗

> ChadMichel ███████████████████████████████ ⌄   ↻

ⓘ Scoped to subscription 'ChadMichel'

App type 🔗

> Function App on Windows   ⌄

App Service name * 🔗

> devopsdemo-ecommerce-qa   ⌄   ↻
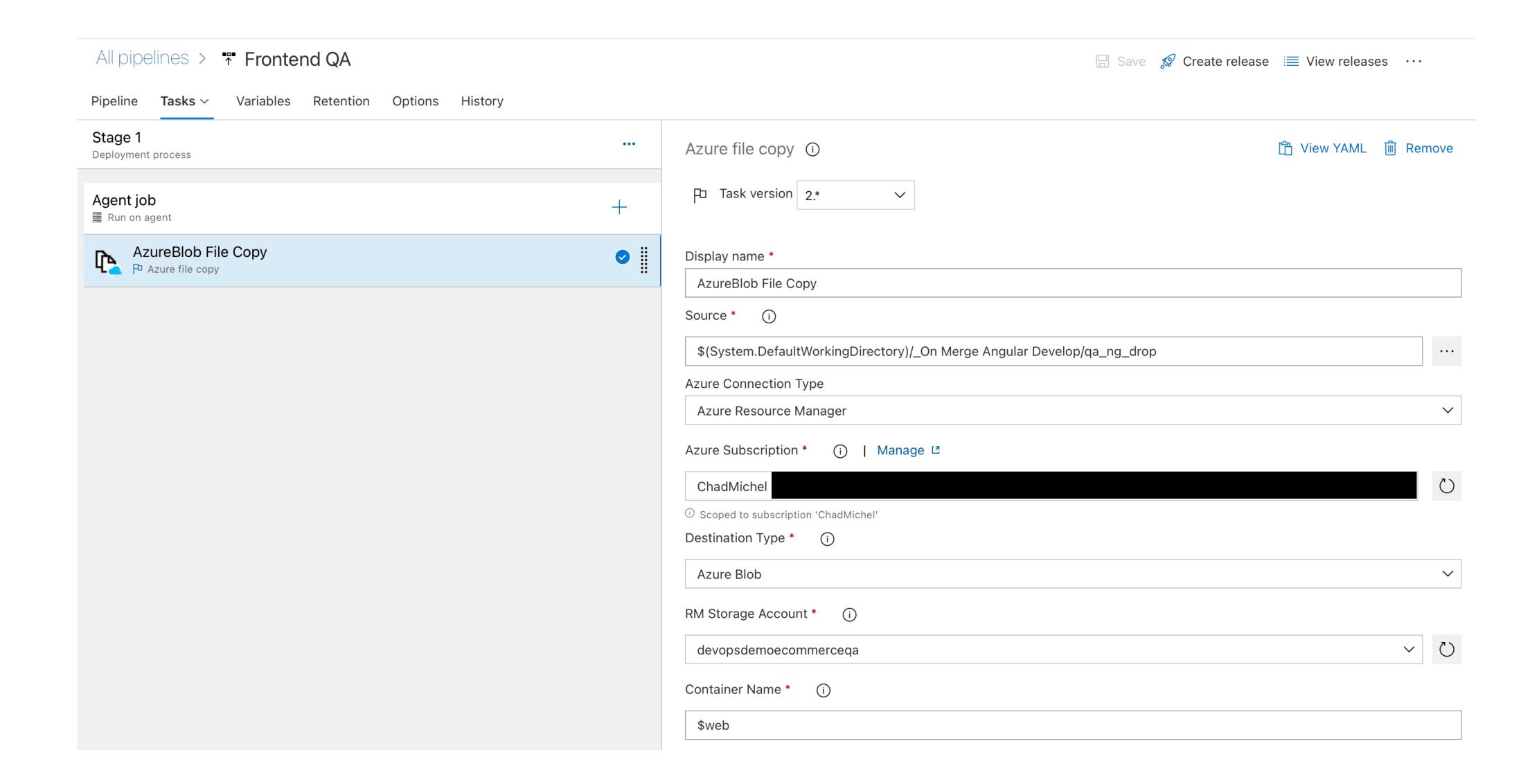
All pipelines > ᵀ Frontend QA

Pipeline | Tasks ˅ | Variables | Retention | Options | History

Artifacts | + Add

_On Merge
Angular Develop

Schedule
not set

Stages | + Add ˅

Stage 1
1 job, 1 task

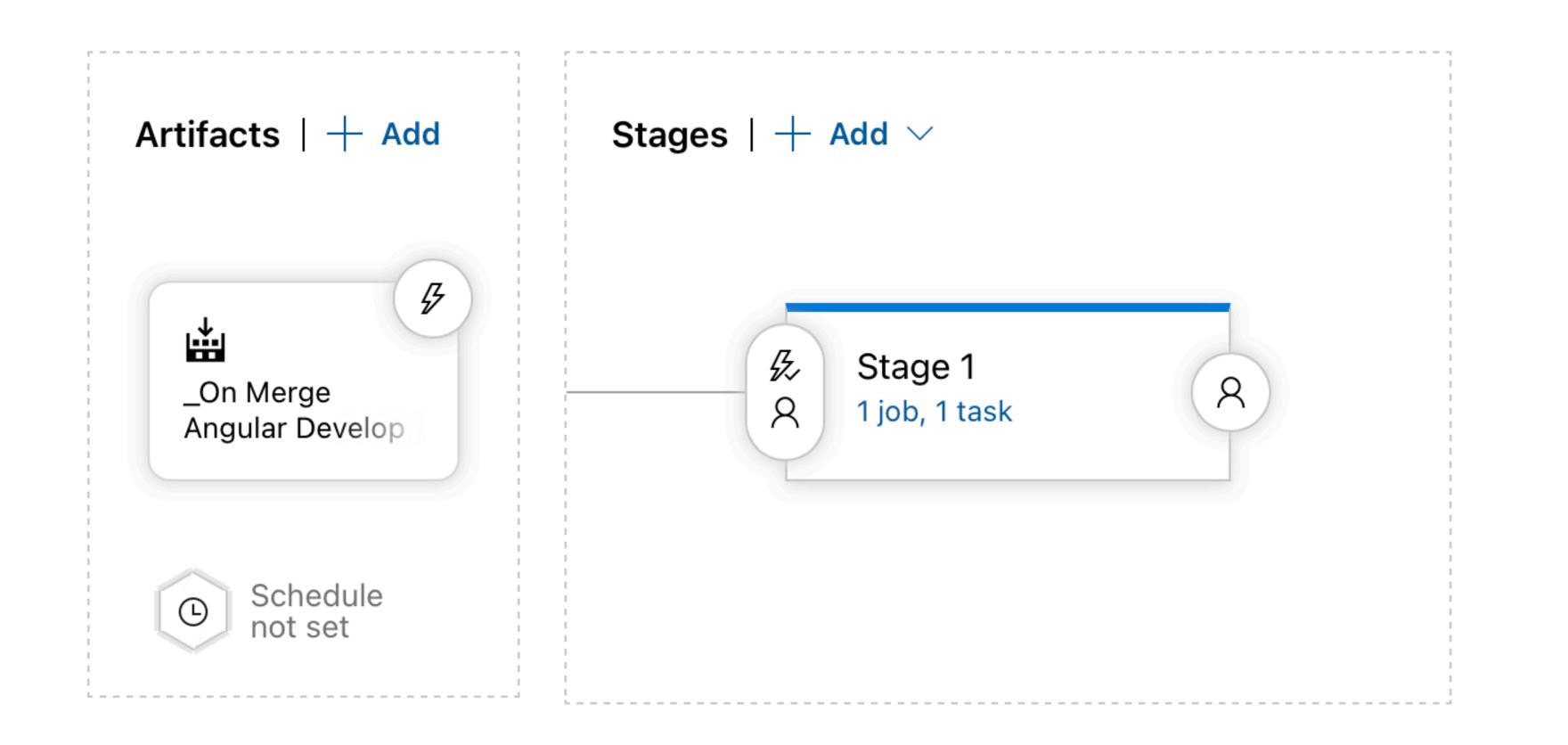Pipeline   Tasks ⌄   Variables   Retention   Options   History

Stage 1
Deployment process   ⋯

Agent job
⊞ Run on agent   +

AzureBlob File Copy
🏳 Azure file copy   ✓ ⋮

Azure file copy ⓘ   🖉 View YAML   🗑 Remove

🏳 Task version [2.* ⌄]

Display name *
[AzureBlob File Copy]

Source * ⓘ
[$(System.DefaultWorkingDirectory)/_On Merge Angular Develop/qa_ng_drop] [...]

Azure Connection Type
[Azure Resource Manager ⌄]

Azure Subscription * ⓘ | Manage ⧉
[ChadMichel ███████████████████████████] ⟳
ⓘ Scoped to subscription 'ChadMichel'

Destination Type * ⓘ
[Azure Blob ⌄]

RM Storage Account * ⓘ
[devopsdemoecommerceqa ⌄] ⟳

Container Name * ⓘ
[$web]

5. Configure Branch Policies

- Prevent merges unless

  - Builds pass

  - Reviewed

  - Task assigned

Build Validation 2

Validate code by pre-merging and building pull request changes.

 Filter

Enabled	Name ↑	Path filter	Trigger	Inheritance
🔵 On	Required		**Automatic** Expires after 12 ...	
🔵 On	Required		**Automatic** Expires after 12 ...	

1 of 2 required checks running and 1 not yet run
2 optional checks not yet run

PR Backend Build in progress

PR Frontend Build queued

View 4 checks

No merge conflicts
Last checked Just now

All required checks succeeded

View 2 checks

No merge conflicts
Last checked 4m ago

Environments???

	Name ↑↓	Type ↑↓
☐	ASP-devopsdemoecommerceqa-b115	App Service plan
☐	devopsdemo-ecommerce-qa	SQL server
☐	devopsdemo-ecommerce-qa (devopsdemo-ecommerce-qa/devopsdemo-ecommerce-qa)	SQL database
☐	devopsdemo-ecommerce-qa	Function App
☐	devopsdemo-ecommerce-qa	Application Insights
☐	devopsdemoecommerceqa	CDN profile
☐	devopsdemoecommerceqa (devopsdemoecommerceqa/devopsdemoecommerceqa)	Endpoint
☐	devopsdemoecommerceqa	Storage account

Thank you

cmichel@dontpaniclabs.com
@chadmichel
https://www.linkedin.com/in/chadmichel/
https://github.com/chadmichel/HDC2021