

Fast Feedback with Pull Request Deployments



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About me:

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Our Products:

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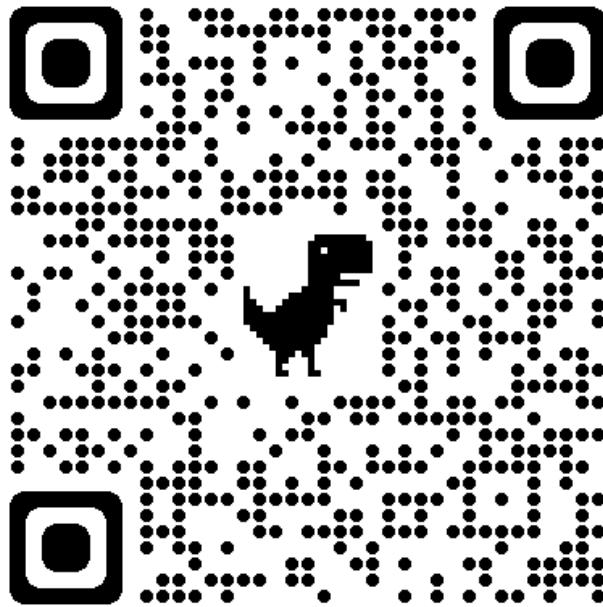
www.proauth.net

Enterprise Application Framework for .NET



www.reafx.net

Slide Download



<https://www.4tecture.ch/events/bastaspring2024prdeployment>

Demo

PR Deployment



dev.azure.com/4tecture-demo/k8sDemo/_git/DevFun/pullrequest/259

Azure DevOps 4tecture-demo / k8sDemo / Repos / Pull requests / DevFun

Search

k8sDemo +

Demo feature 01

Active 1259 Marc Müller feature/demofeature01 into master All comments resolved

Overview Files Updates Commits Conflicts

All required checks succeeded

View 6 checks

At least 1 reviewer must approve

No merge conflicts Last checked 1h ago

Description

Show everything (6) ▾

Add a comment...

Marc Müller pushed 1 commit 1h ago

Updated general_BuildVersioning.yml 62647890 Marc Müller Today at 9:20 AM

Approve Set auto-complete

Reviewers Add

Required No required reviewers

Optional No optional reviewers

Tags +

No tags

Work items +

No work items

Project settings

Agenda

- Why PR Deployments?
- Azure Pipelines PR Deployments
- Azure Pipelines PR Deletion
- Database Deployments
- Target Environment
- Container Jobs and Service Containers
- Q&A



A close-up, low-angle shot of several rowers in a racing shell. They are wearing blue and red athletic gear. Their oars are extended, dipping into the water. The background is blurred, showing the motion of the water. The overall atmosphere is one of teamwork, precision, and speed.

Fast feedback with pull request deployments

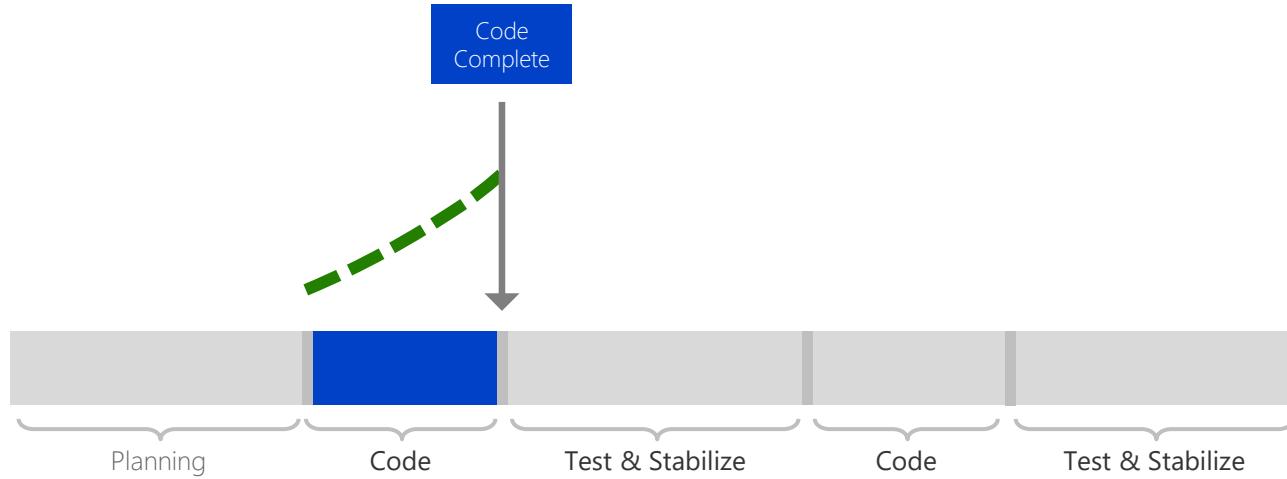
PR Deployments - Why?

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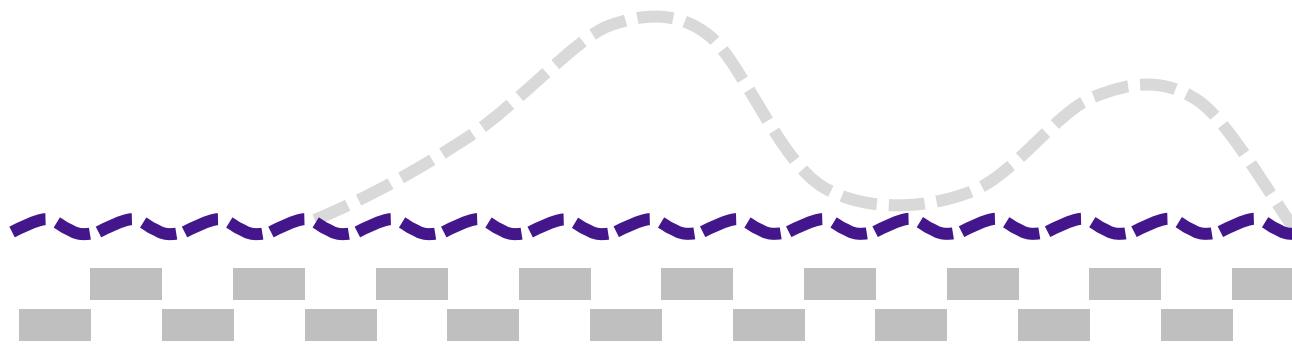


Fail fast!

Before



After



Shift left

Move the testing process to the left

- Integrate testing into the sprint / pull request
- Fast detection and fix
- Testers are part of the team

Continuous Testing

- Effective and continuous integration
- No Bulks of tests / bug-fixing

Without shift left context-switching is expensive / lowers throughput drastically

Shift Left Benefits

- Reduced costs involved in dev/test
- Early bug detection – better quality
- Effective resolution of bugs
- Massive time and effort saved





If it
hurts, do
it more
often!

Test Automation

- Reduce test time
- Have regression tests
- Focus on test design and management, rather than manual repetitive tasks

There is no better
place than
production!

Production-like environments

- Integration is important
- Real scenarios with real tests
- Test how it will be used in production
- Real flows, delays, latency, retries, etc.
- Reduction of no-repro bugs

Conclusion

- No “shift left” only strategy
Combination of shift left and system testing on target system recommended
- Reducing or avoiding long circle times is crucial
- “There is no place like production”

A close-up, low-angle shot of several rowers in a boat. Their hands are gripping yellow and black oars, which are angled downwards. The water is visible at the bottom, creating a sense of motion. The rowers are wearing blue and red athletic gear.

Fast feedback with pull request deployments

Prerequisites

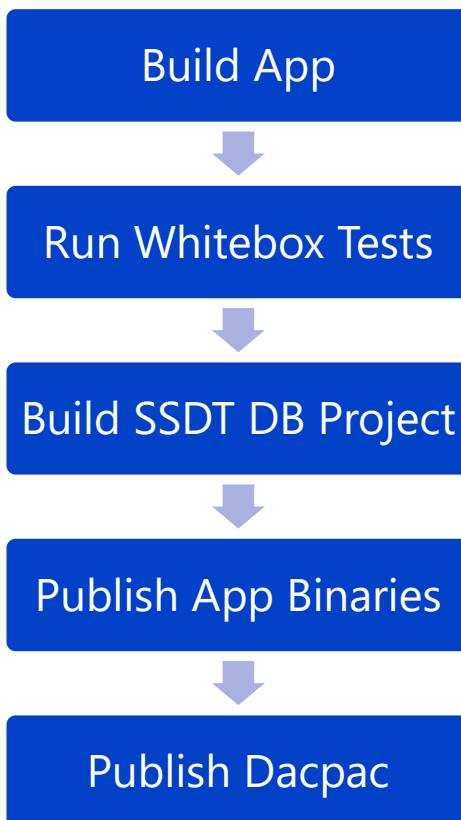
Automated Deployment

- CI which produces all needed artifacts
- Build Versioning
- Application bundle to rollout code and database structure
- Test data
- Base infrastructure to take care of routing and environment isolation

Test Automation

- Deployment verification
- Functional system / component integration tests
 - API tests
 - UI Test

Azure DevOps CI Build



Stages Jobs

| Stage | Jobs | Time | Status |
|-----------------------|--|--------|--------|
| Build | 3 jobs completed 100% tests passed 6 artifacts | 7m 15s | Green |
| Run Integration Tests | 2 jobs completed 100% tests passed | 4m 59s | Green |

Artifacts

Published

| Name |
|---------------------------|
| clients |
| Code Coverage Report_2976 |
| dacpacs |
| DevFun.DB.Build.dacpac |
| DevFun.DB.Build.deps.json |
| DevFunApi |
| SystemTests |
| TestDatalinitializer |
| linux |
| windows |

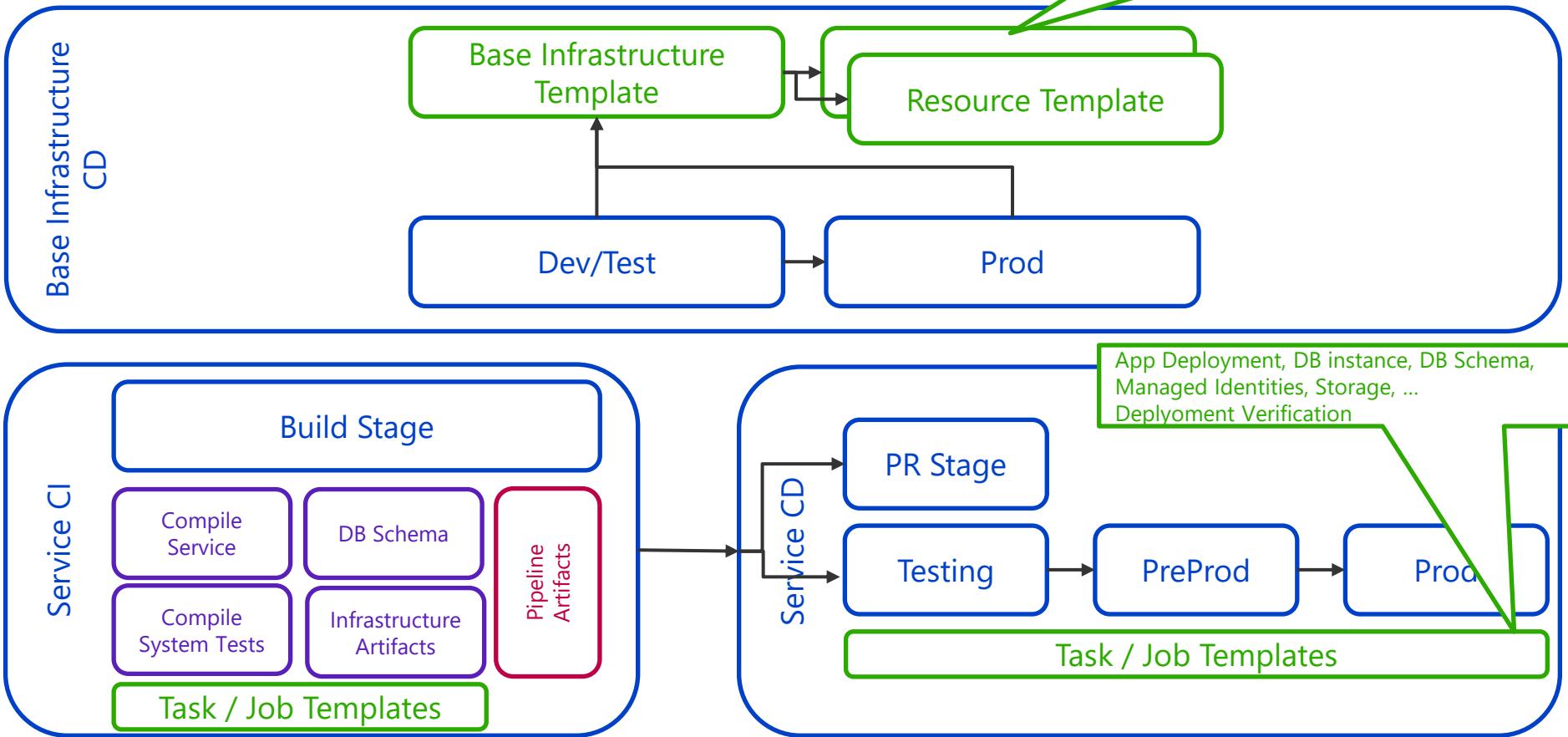
A close-up, dynamic shot of several rowers in a team boat. They are wearing blue athletic gear and are captured in mid-stroke, with water splashing around their oars. The perspective is from the stern of the boat, looking forward, showing the rowers' legs and the oars extending into the water.

Fast feedback with pull request deployments

Azure Pipelines PR Deployment

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Best Practices



Pull Request Status and Comments

- Status checks perform automated verification
- PR deployment should be added as PR status (as required policy)
 - Only deployable apps / services should be integrated
 - System integration tests should be part of the PR deployment
- Automated comments guide the reviewers and product owners

Demo feature 01

Active | 259 | Marc Müller feature/demofeature01 into master

[Overview](#) [Files](#) [Updates](#) [Commits](#) [Conflicts](#)2 of 4 required checks running now
2 optional checks not yet run[DevFunApi-CI Build in progress](#)[DevFunWeb-CI Build in progress](#)[View 6 checks](#)[At least 1 reviewer must approve](#)[No merge conflicts](#)
Last checked 13m ago

Description

[Show everything](#)

Add a comment...

Checks

Required

[DevFunApi-CI](#)
Build in progress[DevFunWeb-CI](#)
Build in progress[Secret Scan](#)
Secret Scan succeeded[Re-queue](#)[Comments must be resolved](#)
Succeeded

Optional

[Coverage status check queued for DevFunApi-CI](#)
Waiting[Coverage status check queued for DevFunWeb-CI](#)
Waiting

K k8sDemo +

- Overview
- Boards
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- Pushes
- Branches
- Tags
- Pull requests
- Pipelines
- Test Plans
- Artifacts

Project settings

Demo feature 01

Active | 259 | Marc Müller feature/demofeature01 into master

[Overview](#) [Files](#) [Updates](#) [Commits](#) [Conflicts](#)

2 of 6 required checks running now

[Deploy DevFun API](#)[Deploy DevFun Web](#)[View 6 checks](#)[At least 1 reviewer must approve](#)[No merge conflicts](#)

Last checked 21m ago

[Description](#)

Add a comment...



Marc Müller pushed 1 commit

Require a successful deployment for every changed service

Checks

Required

[DevFunApi-CL](#) Build succeeded

Re-queue

[DevFunWeb-CL](#) Build succeeded

Re-queue

[Secret Scan](#) Secret Scan succeeded

Re-queue

[Deploy DevFun API](#) Running[Deploy DevFun Web](#) Running[Comments must be resolved](#) Succeeded

K k8sDemo +

- Overview
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- Artifacts

Project settings <>

Demo feature 01

Active | 259 | Marc Müller feature/demofeature01 into master All comments resolved

Overview Files Updates Commits Conflicts

All required checks succeeded

View 6 checks

At least 1 reviewer must approve

No merge conflicts
Last checked 40m ago

Description



Add a comment...



Project Collection Build Service (4ecture-demo) • 13m ago

The application has been deployed to: <https://web.devfun.pr-259.aksdemo.4ecture.ch/>

Write a reply

Reactive

Checks

Required

✓ DevFunApi-CL Build succeeded

Re-queue

✓ DevFunWeb-CL Build succeeded

Re-queue

✓ Secret Scan Secret Scan succeeded

Re-queue

✓ Deploy DevFun API Succeeded

Re-queue

✓ Deploy DevFun Web Succeeded

Re-queue

✓ Comments must be resolved Succeeded

Re-queue

Additional security scans



K k8sDemo +

- Overview
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- Branches
- Tags
- Pull requests
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- Artifacts

Project settings <<

Overview Files Updates Commits Conflicts

Add a comment...

Project Collection Build Service (4ecture-demo) • 12m ago
The application has been deployed to: <https://web.devfun.pr-259.aksdemo.4ecture.ch/>

Write a reply... Resolve

Project Collection Build Service (4ecture-demo) • 14m ago
The application has been deployed to: <https://api.devfun.pr-259.aksdemo.4ecture.ch/>

Write a reply... Resolve

Marc Müller pushed 1 commit
39m ago

Update devfunapi-ci.yml for Azure Pipelines
6c246971 Marc Müller Today at 11:43 AM

Marc Müller pushed 1 commit
1h ago

Update devfunapi-ci.yml for Azure Pipelines
434520db Marc Müller Today at 11:18 AM

Marc Müller created the pull request
1h ago

Frontend deployment

Backend deployment

Branch Policies

- Guard before integration
- Pull request cannot be completed without fulfilling required policies
- Policies
 - Reviewer
 - Pipeline (CI)
 - Traceability
 - Custom Policies (Security, Deployment, etc.)

4tecture-demo / k8sDemo / Settings / Repositories

Search

Project Settings

k8sDemo

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Pipelines

- Agent pools
- Parallel jobs
- Settings
- Test management
- Release retention
- Service connections
- XAML build services

Repos

All Repositories

Filter by keywords

- DevFun
- GreeterDemo
- Infrastructure

Settings Policies Security

Reserved names

Maximum path length

Maximum file size

Branch Policies

feature

- addvscodedebugsupport
- allnewfancycolours
- campdemo
- demofeature01
- managedIdentity

on-hold

- auto-delete-pr

master Default Compare

This screenshot shows the 'Repositories' section of the 'k8sDemo' project settings in Azure DevOps. The 'Policies' tab is selected. A red box highlights the 'DevFun' repository in the list. Another red box highlights the 'master' branch in the 'Branch Policies' section. The 'feature' and 'on-hold' sections are also visible.

4ecture-demo / k8sDemo / Settings / Repositories

Search

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k8sDemo

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Repos

Repositories

← DevFun +

Filter by keywords

feature

- addscodedebugsupport
- allnewfancycolours
- campdemo
- demofeature01
- managedIdentity

on-hold

- auto-delete-pr
- master

Default Compare

master

Branch Policies

Note: If any required policy is enabled, this branch cannot be deleted and changes must be made via pull request.

Require a minimum number of reviewers

On

Require approval from a specified number of reviewers on pull requests.

Minimum number of reviewers

1

Allow requestors to approve their own changes

Prohibit the most recent pusher from approving their own changes

Allow completion even if some reviewers vote to wait or reject

When new changes are pushed:

- Require at least one approval on the last iteration
- Reset all approval votes (does not reset votes to reject or wait)
- Reset all code reviewer votes

Check for linked work items

On

Encourage traceability by checking for linked work items on pull requests.

Required

Block pull requests from being completed unless they have at least one linked work item.

Optional

Warn if there are no linked work items, but allow pull requests to be completed.

Check for comment resolution

On

4tecture-demo / k8sDemo / Settings / Repositories

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Repos

Repositories

DevFun

Filter by keywords

- feature
 - addscodedebugsupport
 - allnewfancycolours
 - campdemo
 - demofeature01
 - managedidentity
- on-hold
 - auto-delete-pr
 - master

Default Compare

Build Validation 3

Filter

+ Add repository

Reset all code reviewer votes

On

Check for linked work items

Encourage traceability by checking for linked work items on pull requests.

Required
Block pull requests from being completed unless they have at least one linked work item.

Optional
Warn if there are no linked work items, but allow pull requests to be completed.

On

Check for comment resolution

Check to see that all comments have been resolved on pull requests.

Required
Block pull requests from being completed while any comments are active.

Optional
Warn if any comments are active, but allow pull requests to be completed.

On

Limit merge types

Control branch history by limiting the available types of merge when pull requests are completed.

Allowed merge types:

- Basic merge (no fast-forward)
Preserves history exactly as it happened during development
- Rebase and fast-forward
Creates a linear history by replaying the source branch commits onto the target without a merge commit
- Squash merge
Creates a linear history by condensing the source branch commits into a single new commit on the target branch
- Rebase with merge commit
Creates a semi-linear history by replaying the source branch commits onto the target and then creating a merge commit

4tecture-demo / k8sDemo / Settings / Repositories

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Repos

Repositories

DevFun

Filter by keywords

- feature
 - addvscodedebugsupport
 - allnewfancycolours
 - campdemo
 - demofeature01
 - managedIdentity
- on-hold
 - auto-delete-pr
- master
 - Default
 - Compare

Build Validation

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

| Enabled | Name ↑ | Path filter | Trigger | Inheritance |
|---------|--------------------------|---|--|-------------|
| On | DevFunApi-Cl Required | /DevFun.Api/*; ./azure-pipelines/devfunapi... | Automatic Expires when code changes | |
| On | DevFunWeb-Cl Required | /DevFun.Web/*; ./azure-pipelines/devfun... | Automatic Expires when code changes | |
| On | Secret Scan Required | | Automatic Expires after 12 hours | |

Status Checks

Require other services to post successful status to complete pull requests.

| Enabled | Name ↑ | Path filter | Inheritance |
|---------|---|--|-------------|
| On | pull-request-utils/deploy-devfunapi Required | /DevFun.Api/*; ./azure-pipelines/devfunapi-ci.yml... | |
| On | pull-request-utils/deploy-devfunweb Required | /DevFun.Web/*; ./azure-pipelines/devfunweb-ci.y... | |

Automatically included reviewers

Designate code reviewers to automatically include when pull requests change certain areas of code.

No automatic reviewer policies found, but you can use the add button to create one!

Rebase and fast-forward
Creates a linear history by replaying the source branch commits onto the target without a merge commit

Rebase with merge commit
Creates a semi-linear history by replaying the source branch commits onto the target and then creating a merge commit

4ecture-demo / k8sDemo / Settings / Repositories

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Repos

Repositories

← DevFun +

Filter by keywords

- feature
 - addvscodeDEBUGsupport
 - allnewfancycolours
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 - demofeature01
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- on-hold
 - auto-delete-pr
- master
 - Default
 - Compare

Edit build policy

Enabled On

Build pipeline *

DevFunWeb-Cl (DevFun)

Path filter (optional)

/DevFun.Api/*; ./azure-pipelines/devfunapi-ci.yml; ./azure-pipeline

Trigger

Automatic (whenever the source branch is updated)

Manual

Policy requirement

Required

Build must succeed in order to complete pull requests.

Optional

Build failure will not block completion of pull requests.

Build expiration

Immediately when master is updated

After [] hours if master has been updated

Never

Display name

Save Cancel

Rebase and fast-forward

Creates a linear history by replaying the source branch commits onto the target without a merge commit

Build Validation 3

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

| Enabled | Name ↑ | Path filter |
|--|--------------------------|---|
| <input checked="" type="checkbox"/> On | DevFunApi-Cl Required | /DevFun.Api/*; ./azure-pipelines/devfunapi-ci.yml; ./azure-pipeline |
| <input checked="" type="checkbox"/> On | DevFunWeb-Cl Required | /DevFun.Web/*; ./azure-pipelines/devfunweb-ci.yml; ./azure-pipeline |
| <input checked="" type="checkbox"/> On | Secret Scan Required | |

Status Checks 2

Require other services to post successful status to complete pull requests.

| Enabled | Name ↑ | Path filter |
|--|---|---|
| <input checked="" type="checkbox"/> On | pull-request-utils/deploy-devfunapi Required | /DevFun.Api/*; ./azure-pipelines/devfunapi-ci.yml; ./azure-pipeline |
| <input checked="" type="checkbox"/> On | pull-request-utils/deploy-devfunweb Required | /DevFun.Web/*; ./azure-pipelines/devfunweb-ci.yml; ./azure-pipeline |

Automatically included reviewers 0

Designate code reviewers to automatically include when pull requests change certain files.

No automatic reviewer policies found, but you can use the add button to create one!

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Repos

Repositories

DevFun

Filter by keywords

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 - addscodedebugsupport
 - allnewfancycolours
 - campdemo
 - demofeature01
 - managedidentity
- on-hold
 - auto-delete-pr
- master
 - Default
 - Compare

Build Validation

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

| Enabled | Name ↑ | Path filter | Trigger | Inheritance |
|---------|--------------------------|---|--|-------------|
| On | DevFunApi-Cl Required | /DevFun.Api/*; ./azure-pipelines/devfunapi... | Automatic Expires when code changes | |
| On | DevFunWeb-Cl Required | /DevFun.Web/*; ./azure-pipelines/devfun... | Automatic Expires when code changes | |
| On | Secret Scan Required | | Automatic Expires after 12 hours | |

Status Checks

Require other services to post successful status to complete pull requests.

| Enabled | Name ↑ | Path filter | Inheritance |
|---------|---|--|-------------|
| On | pull-request-utils/deploy-devfunapi Required | /DevFun.Api/*; ./azure-pipelines/devfunapi-ci.yml... | |
| On | pull-request-utils/deploy-devfunweb Required | /DevFun.Web/*; ./azure-pipelines/devfunweb-ci.y... | |

Automatically included reviewers

Designate code reviewers to automatically include when pull requests change certain areas of code.

No automatic reviewer policies found, but you can use the add button to create one!

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DevFun

Filter by keywords

- feature
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 - demofeature01
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- on-hold
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 - master Default Compare

Build Validation

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

| Enabled | Name ↑ | Path filter |
|--|--------------------------|---|
| <input checked="" type="checkbox"/> On | DevFunApi-CI Required | /DevFun.Api/*; ./azure-pipelines/devfunapi-ci.yml |
| <input checked="" type="checkbox"/> On | DevFunWeb-CI Required | /DevFun.Web/*; ./azure-pipelines/devfunweb-ci.yml |
| <input checked="" type="checkbox"/> On | Secret Scan Required | |

Status Checks

Require other services to post successful status to complete pull requests.

| Enabled | Name ↑ | Path filter |
|--|---|---|
| <input checked="" type="checkbox"/> On | pull-request-utils/deploy-devfunapi Required | /DevFun.Api/*; ./azure-pipelines/devfunapi-ci.yml |
| <input checked="" type="checkbox"/> On | pull-request-utils/deploy-devfunweb Required | /DevFun.Web/*; ./azure-pipelines/devfunweb-ci.yml |

Automatically included reviewers

Designate code reviewers to automatically include when pull requests change certain files.

No automatic reviewer policies found, but you can use the add button to create one!

Edit status policy

Enabled On

Status to check *

pull-request-utils/deploy-devfunapi

Policy requirement

Required
A status of "succeeded" is needed to complete pull requests.

Optional
A status of "failed" will not block completion of pull requests.

Advanced

Authorized identity

Any identity can post this status

Only the following identity can post this status

No one selected

Reset conditions

Reset status whenever there are new changes

Path filter (optional)

/DevFun.Api/*; ./azure-pipelines/devfunapi-ci.yml; ./azure-pipelines/devfunweb-ci.yml

Policy applicability

Apply by default
Apply unless "Not Applicable" status is posted to the pull request.

Conditional
The policy is applied only after a status is posted to the pull request.

Save Cancel

CI Pipeline

- Version
- Build the application / service
- Run white-box tests
- Create artifacts
- Publish Artifacts

K k8sDemo +

- Overview
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- Pipelines**
- Environments
- Releases
- Library
- Task groups
- Deployment groups
- Test Plans
- Artifacts

Project settings ⟲

← DevFunApi-CI

Edit

Run pipeline



Runs Branches Analytics

Description

Stages

#0.1.47-pullrequest0259-0009 Demo feature 01
PR automated for 259 12b31fc0



#0.1.47-pullrequest0234-0006 New fancy red
PR automated for 234 b6d460e4



#0.1.46 Merged PR 258: Data Initializer Update Packages Demo Prep 2022 06
Manually triggered for master 88ddf4de



1m ago
18m 42s

12h ago

#0.1.46 Merged PR 258: Data Initializer Update Packages Demo Prep 2022 06
Individual CI for master 88ddf4de



#0.1.45 Merged PR 257: Demo Prep Container 2022 06
Individual CI for master 3a1f2e41



Jul 1
15m 50s

PR Version

Release Version

K k8sDemo

← DevFunApi-Cl

master DevFun / .azure-pipelines/devfunapi-ci.yml

```
57
58 stages:
59 - stage: Build
60   jobs:
61     - job: CI_Build
62       displayName: 'Build the Api'
63       pool:
64         vmImage: 'ubuntu-latest'
65         name: Default
66       variables:
67         DockerFile: DevFun.Api/DevFun.Api/Dockerfile
68         DockerFileDbMigrationCli: DevFun.Api/DevFun.DbMigration.Cli
69         BuildContext: DevFun.Api
70         ChartPath: DevFun.Api/DevFun.Api/charts/devfunapi
71         ArtifactSourceFolder: DevFun.Api/DevFun.Api
72         ArtifactName: DevFunApi
73         steps:
74           - template: templates/general_BuildVersioning.yml
75             Validate
76           - template: templates/docker_BuildAndPublishImage.yml
77             parameters:
78               buildContext: $(BuildContext)
79               azureSubscription: $(AzureSubscription)
80               azureContainerRegistry: $(AzureContainerRegistry)
81               dockerFile: $(DockerFile)
82               patProductsFeed: $(PatProductsFeed)
83               patDemoFeed: $(PatDemoFeed)
84               buildId: $(Build.BuildId)
85               imageName: $(ImageName)
86               buildNumber: $(Build.BuildNumber)
87               defaultWorkingDirectory: $(System.DefaultWorkingDirectory)
88               extractAndPublishDacpac: true
89               extractAndPublishClient: true
90               extractAndPublishTestResults: true
91             Validate
```

```
1 steps:
2 Settings
3 - task: BuildVersioning@0
4   displayName: 'Build Versioning'
5   inputs:
6     versionSource: 'gitversion'
7     doInstallGitVersion: true
8     GitVersionToolInstallation: 'global'
9     doUseLatestGitVersionInstallerVersion: true
10    paramAssemblyVersion: '7'
11    paramAssemblyFileVersion: '7'
12    paramAssemblyInformationalVersion: '6'
13    paramOverwriteFourthDigitWithBuildCounter: false
14    paramVersionCode: '2'
15    doAssemblyInfoAppendSuffix: false
16    doConvertAssemblyInfoToLowercase: true
17    buildNumberVersionFormat: '3'
18    buildNumberAction: 'replace'
19    doReplaceAssemblyInfo: false
20    doReplaceNuspec: false
21    doReplaceNpm: true
22    filePatternNpm: '**\package.json'
23    paramNpmVersionType: '2'
24    doReplaceDotNetCore: true
25    filePatternDotNetCore: |
26      **\*.csproj
27      **\*.props
28      **\*.targets
29    paramDotNetCoreVersionType: '3'
30    doReplaceAndroid: false
31    doReplaceiOS: false
32    doReplaceCustom: true
33    filePatternCustom: '**\*.targets'
34    paramCustomSearchRegex: '(\d+\.\d+\.\d+(?:\.\d+)?)'
35    paramCustomReplaceRegex: '$(BuildVersion.VersionInfo)'
```

- K k8sDemo +
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⚙️ Project settings «

← DevFunApi-CI

Variables Save ⋮

master DevFun / .azure-pipelines/devfunapi-ci.yml *

Show assistant

```
1  name : DevFunApi-CI
2 > trigger: ...
10
11  variables:
12 > - name: ImageName ...
13 > - name: ImageNameDbMigration ...
14 > - name: containeredbname ...
15 > - name: containerdbuser ...
16 > - name: containerdbpassword ...
17 > - name: containerdbserver ...
18 > - name: DacpacFile ...
19
20 > resources: ...
54
21
22  stages:
23    - stage: Build
24      jobs:
25        - job: CI_Build ...
26
27        - job: DataInitializer_Build ...
28
29        - job: SystemTest_Build ...
30
31    - stage: IntegrationTests ...
32
33    - stage: PullRequest ...
34
35
```

Service and
DB Schema

Testdata

Automated
system tests

k8sDemo



← DevFunApi-Cl

Variables

Save



master DevFun / .azure-pipelines/devfunapi-ci.yml *

Show assistant

```
213
214 - stage: PullRequest
215 | displayName: 'Update Pull Request'
216 | dependsOn: IntegrationTests
217 | condition: and(succeeded(), eq(variables['Build.Reason'], 'PullRequest'))
218 pool:
219   vmImage: 'ubuntu-latest'
220   #name: Default
221   #name: LocalAgents
222 jobs:
223 - job: UpdatePullRequest
224   displayName: 'Update the pull request with policies'
225   steps:
226     - checkout: none
      Settings
227       - task: PullRequestStatus@0
228         displayName: 'Initialize status'
229         inputs:
230           - name: 'deploy-devfunapi'
231             action: 'Create'
232             state: 'pending'
233             description: 'Deploy DevFun API'
234
235
```

Identify PR Context

Add PR status check which is used as policy



CD Pipeline

- Configure / create infrastructure
(web host, routing, database, security)
- Deploy the application
- Deploy the database schema
- Initialize test data / restore backup

Azure DevOps 4ecture-demo / k8sDemo / Pipelines / DevFun / DevFunApi-CD

Search

☰ ☰ ? 🔍

k8sDemo +

← DevFunApi-CD

Edit Run pipeline ⋮

Runs Branches Analytics

Description Stages

#0.1.47-pullrequest0259-0009-1 Merge pull request 259 from feature/demofeature01 i...
Automatically triggered for 259 12b31fc0

#0.1.47-pullrequest0234-0006-1 Merge pull request 234 from feature/allnewfancycolo...
Automatically triggered for 234 b6d460e4

#0.1.46-1 Merged PR 258: Data Initializer Update Packages Demo Prep 2022 06
Automatically triggered for master 88ddf4de

#0.1.44-1 Merged PR 253: Updated cloud resource naming
Automatically triggered for master 6ac09221

#0.1.38-1 Merged PR 239: Secrets and Templates
Automatically triggered for master 7845cc3b

PR Version

Release Version

Build Version + Deployment Attempt

Project settings

Azure DevOps 4tecture-demo / k8sDemo / Pipelines

Search

Variables Run

k8sDemo

Overview Boards Repos Pipelines Pipelines Environments Releases Library Task groups Deployment groups Test Plans Artifacts

Project settings

← DevFunApi-CD

master DevFun / .azure-pipelines/devfunapi-cd.yml

Show assistant

```
1 name : DevFunApi-CD
2 trigger: none
3 resources:
4   pipelines:
5     - pipeline: CIBuild
6       source: DevFunApi-CI
7       trigger:
8         branches:
9           include:
10             - master
11             - feature/*
12             - pull/*
13             - refs/pull/*
14   containers:
15     - container: worker
16       image: 4taksdemoacr.azurecr.io/linuxworker:latest
17       endpoint: 4taksdemoAcr
18
19 variables:
20 - group: GlobalSecrets
View template
21 - template: templates/common_variables.yml
View template
22 - template: templates/common_variables-cd.yml
23 - name: dbservernamefqdn
24   value: $(dbservername).database.windows.net
25 - name: dbuser
26   value: dbadmin
27 - name: ElasticPoolName
28   value: dev-sql-4tadbserver-pool
29 - name: HelmReleaseName
30   value: devfunapi-$(k8sNamespace)
31 - name: ImageName
32   value: $(AzureContainerRegistry)/devfunapi
33 - name: IngressHostName
34   value: api.devfun.$(k8sNamespace).aksdemo.4tecture.ch
```

CI pipeline as resource
(trigger and artifacts)



K k8sDemo +

Overview

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Artifacts

← DevFunApi-CD

Save

master

◆ DevFun / .azure-pipelines/templates/general_ReleaseInitialization.yml

Template

Show assistant

```
1 steps:
2 - pwsh:
3   - Get-ChildItem Env: | Format-Table -AutoSize
4     displayName: 'Show all environment variables for demo'
5 - pwsh:
6   - Write-Host "##vso[build.updatebuildnumber]$(RESOURCES.PIPELINE.CIBUILD.RUNNAME)-$(ReleaseRevision)"
7     displayName: 'Set Release Build Number'
```

Calculate release number
CI version + release revision

k8sDemo +

Overview

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Deployment groups

Test Plans

← DevFunApi-CD

Variables

Save

...

master DevFun / .azure-pipelines/devfunapi-cd.yml *

Show assistant

```
70 deployment: PullRequestDeployment
71 displayName: 'Deploy DevFun API to the PR environment'
72 environment: devfun-api-pr
73 pool:
74   vmImage: 'ubuntu-latest'
75   #name: Default
76   container: worker
77   strategy:
78     runOnce:
79       deploy:
80         steps:
81           - download: CIBuild
82             displayName: 'Download artifacts'
83             View template
84             - template: templates/pr_DefineApiPrVariables.yml
85             View template
86             - template: templates/pr_SetupK8sPrEnvironment.yml...
87             View template
88             - template: templates/az_CreateManagedIdentity.yml
89             parameters: ...
90             View template
91             - template: templates/az_CreateManagedIdentity.yml
92             parameters: ...
93             View template
94             - template: templates/sql_CreateAzureSqlDatabaseManagedIdentity.yml...
95             View template
96             - template: templates/k8s_DeployHelmPackage.yml...
97             Settings
98             - task: Bash@3
99             inputs:
100               targetType: 'inline'
101               script: |
102                 chmod +x $(Pipeline.Workspace)/CIBuild/TestDataInitializer/linux/DevFun.DataInitializer
103                 $(Pipeline.Workspace)/CIBuild/TestDataInitializer/linux/DevFun.DataInitializer --service https://$(IngressHostName)
104               displayName: 'Run DataInitializer'
105             job: ApiTests
```

Deploy service

Initialize test data

Calculate PR specific variables

Setup PR environment (k8s namespace, database, identities)

K k8sDemo



← DevFunApi-CD

Variables

Save



master DevFun / .azure-pipelines/devfunapi-cd.yml *

Show assistant

```
135     displayName: 'Run DataInitializer'
136   - job: ApiTests
137     displayName: "Run API System Test"
138     dependsOn: PullRequestDeployment
139     steps:
140       - checkout: none
141       - download: CIBuild
142       - artifact: SystemTests
143         displayName: Download the SystemTests artifact
144       - download: CIBuild
145       - artifact: TestDataInitializer
146         displayName: Download the TestDataInitializer artifact
147       - template: templates/pr_DefineApiPrVariables.yml
148         View template
149       - template: templates/test_runapitests.yml
150         parameters:
151           SystemTestArtifactLocation: $(Pipeline.Workspace)/CIBuild/SystemTests
152           DatainitializerArtifactLocation: $(Pipeline.Workspace)/CIBuild/TestDataInitializer
153           ApiUrl: https://$(IngressHostName)
154           RunSettingsFileName: k8s.runsettings
155     job: UpdatePullRequest
156     displayName: 'Update the pull request with policies'
157     dependsOn:
158       - PullRequestDeployment
159       - ApiTests
160     condition: always()
161     pool:
162       vmImage: 'ubuntu-latest'
163       #name: Default
164       #name: LocalAgents
165     variables:
166       DeploymentResult: $[dependencies.PullRequestDeployment.result]
167       SystemTestResult: $[dependencies.ApiTests.result]
168       steps:
169         - checkout: none
```

Run system tests
in PR
environment



← DevFunApi-CD

Variables Save

```
master DevFun / .azure-pipelines/devfunapi-cd.yml *
```

```
145 - artifact: TestDataInitializer
146   - displayName: Download the TestDataInitializer artifact
     View template
147   - template: templates/pr_DefineApiPrVariables.yml
     View template
148   - template: templates/test_runapitests.yml
149   - parameters:
150     SystemTestArtifactLocation: $(Pipeline.Workspace)/CIBuild/SystemTests
151     DatainitializerArtifactLocation: $(Pipeline.Workspace)/CIBuild/TestDataInitializer
152     ApiUrl: https://\$\(IngressHostName\)
153     RunSettingsFileName: k8s runsettings
154 - job: UpdatePullRequest
155   displayName: 'Update the pull request with policies'
156   dependsOn:
157     - PullRequestDeployment
158     - ApiTests
159   condition: always()
160   pool:
161     vmImage: 'ubuntu-latest'
162     #name: Default
163     #name: LocalAgents
164   variables:
165     DeploymentResult: $[dependencies.PullRequestDeployment.result]
166     SystemTestResult: $[dependencies.ApiTests.result]
167   steps:
168     - checkout: none
       View template
169     - template: templates/pr_DefineApiPrVariables.yml
       View template
170     - template: templates/pr_UpdateStatus.yml
       View template
171     - parameters:
172       Name: 'deploy-devfunapi'
173       Description: 'Deploy DevFun API'
174       DeploymentResult: $(DeploymentResult)
175       SystemTestResult: $(SystemTestResult)
176       PullRequestId: $(prId)
177
```

Update PR status
(collect deployment and test results)



k8sDemo



← DevFunApi-CD



```
master ◇ DevFun / .azure-pipelines/templates/pr_UpdateStatus.yml * Template  
1 parameters:  
2 - name: Name ...  
3 - name: Description ...  
4 - name: PullRequestId ...  
5 - name: DeploymentResult ...  
6 - name: SystemTestResult ...  
7  
8 steps:  
9 - pwsh:  
10 - $deploymentSuccess = "${{ parameters.DeploymentResult }}" -contains "Succeeded"  
11 - $testSuccess = "${{ parameters.SystemTestResult }}" -contains "Succeeded"  
12 - $overallSuccess = $deploymentSuccess -and $testSuccess  
13 - Write-Host "##vso[task.setvariable variable=PrDeploymentSuccess;]$overallSuccess"  
14 - if($overallSuccess){  
15 -     Write-Host "##vso[task.setvariable variable=PrPolicyStatus;]succeeded"  
16 - }  
17 - else{  
18 -     Write-Host "##vso[task.setvariable variable=PrPolicyStatus;]failed"  
19 - }  
20 - displayName: 'Calculate success state'  
21  
22 settings:  
23 - task: PullRequestStatus@0  
24 - displayName: 'Update PR deployment status success'  
25 - inputs:  
26 -     name: '${{ parameters.Name }}'  
27 -     action: 'Update'  
28 -     state: ${PrPolicyStatus}  
29 -     description: '${{ parameters.Description }}'  
30 -     useDefined: true  
31 -     pullRequestId: ${parameters.PullRequestId}
```

Show assistant

Calculate the overall status

Update the PR status



K k8sDemo



← DevFunApi-CD

Save



master

◆ DevFun / .azure-pipelines/templates/k8s_DeployHelmPackage.yml Template

Show assistant

```
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
```

```
- pwsh: |
  $output =
  @"
  $(helmDeployment.helmOutput)
  @@
  $output -match "Get the application URL by running these commands:\s*(https://\S*)"
  Write-Host "##vso[task.setvariable variable=hosturl;isOutput=true]$($matches[1])"
  name: extractUrl
  condition: and(succeeded(), ne('${{ parameters.pullRequestId }}', ''))
```

Extract deployment URL (PR specific)

```
  - task: PullRequestComments@0
    displayName: 'Post a pull request comment'
    inputs:
      content: 'The application has been deployed to: $(extractUrl.hosturl)'
      status: 'Active'
      type: 'system'
      skipIfCommentExists: true
      pullRequestId: '${{ parameters.pullRequestId }}'
      useDefined: true
      commentId: '${{ parameters.releaseName }}'
    condition: and(succeeded(), ne('${{ parameters.pullRequestId }}', ''))
```

Only run for PR

Add a PR comment with deployment info



Azure DevOps Extensions used in demo

- **Pipeline / Artifact Versioning**

<https://marketplace.visualstudio.com/items?itemName=4tecture.BuildVersioning>

- **Tokenizing Configuration Files**

<https://marketplace.visualstudio.com/items?itemName=4tecture.Tokenizer>

- **PR API Integration (Checks, Comments)**

<https://marketplace.visualstudio.com/items?itemName=joachimdalen.pull-request-utils>

- **Code Scanning**

<https://marketplace.visualstudio.com/items?itemName=Foxholen1.Gitleaks>

- **Visualize Code Scanning Results**

<https://marketplace.visualstudio.com/items?itemName=sariftools.scans>

Azure DevOps Api used in demo

- **Pull Request Status**

<https://docs.microsoft.com/en-us/rest/api/azure/devops/git/pull-request-statuses?view=azure-devops-rest-6.0>

- **Pull Request Comments**

<https://docs.microsoft.com/en-us/rest/api/azure/devops/git/pull-request-thread-comments?view=azure-devops-rest-6.0>

A close-up, low-angle shot of several rowers in a racing shell. Their legs and the oars are visible, with motion blur on the oars creating a sense of speed. The rowers are wearing blue and red athletic gear.

Fast feedback with pull request deployments

Azure Pipelines PR Deletion

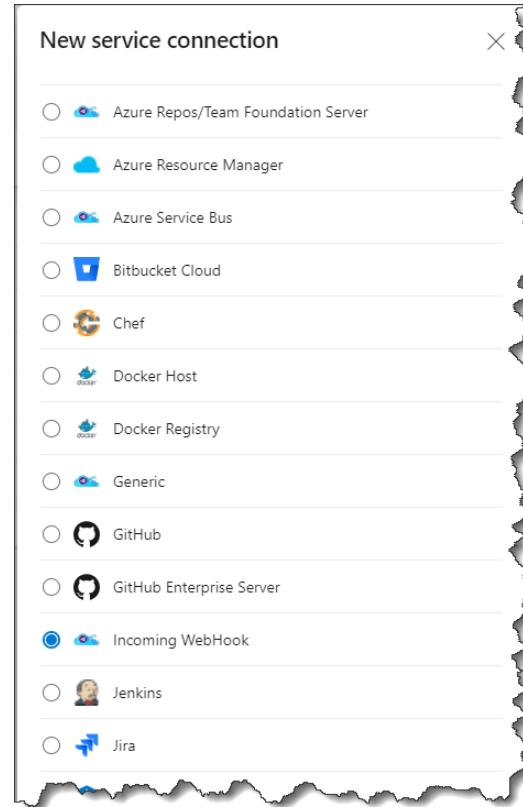
4tecture®
empower your software solutions

Trigger

- Main triggers are repository / code related
- Many automation scenarios trigger from other events
 - Work Item Update
 - Pull Request Update

Incoming Webhook Service Connection

- Incoming webhook can be defined as service connection
- Generic webhook trigger in pipelines
- Payload can be filtered



Pipeline Resource

- Azure DevOps creates webhook endpoint based on alias
- Pipeline resource triggers pipeline
- Filters can be applied to trigger

```
1  trigger: none
2
3  pool:
4    - vmImage: ubuntu-latest
5
6  resources:
7    - # https://dev.azure.com/4tecture-demo/_apis/public/distributedtask/webhooks/prupdated?api-version=6.0-preview
8    - webhooks:
9      - webhook: PRUpdated ..... ## Webhook alias
10        connection: PREventsConnection ... ## Incoming webhook service connection
11        filters:
12          - path: eventType
13            value: git.pullrequest.updated
14          - path: publisherId
15            value: tfs
16          - path: resource.repository.name
17            value: DevFun
18
19  variables:
20    - template: templates/common_variables.yml
21      View template
22
23  workfolders:
24    - name: variables-cd
25      View template
```

Service Hook & Incoming Webhook

- Service hooks can trigger webhooks for many Azure DevOps Events

- Build completed
- Code pushed
- Elastic agent pool resized
- Pull request commented on
- Pull request created
- Pull request merge attempted
- Pull request updated
- Release abandoned
- Release created
- Release deployment approval completed
- Release deployment approval pending
- Release deployment completed
- Release deployment started
- Run stage approval completed
- Run stage state changed
- Run stage waiting for approval
- Run state changed
- Work item commented on
- Work item created
- Work item deleted
- Work item restored
- Work item updated

The screenshot shows the 'Edit Service Hooks Subscription' dialog box divided into two main sections: 'FILTERS' on the left and 'SETTINGS' on the right.

Trigger on this type of event: Pull request updated

FILTERS:

- Repository: DevFun
- Target branch: [Any]
- Change: Status changed
- Requested by a member of group: [Any]
- Reviewer includes group: [Any]

SETTINGS:

- Action:** Post via HTTP
- This action posts a JSON object representation of the event to the specified URL.
- URL:** /_apis/public/distributedtask/webhooks/prupdated?api-version
- Accept untrusted SSL certificates:**
- Basic authentication username:**
- Basic authentication password:**

At the bottom are buttons for Previous, Next, Test, Finish, and Cancel.

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k8sDemo

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New service connection

Choose a service or connection type

 Search connection types  Azure Classic  Azure Repos/Team Foundation Server  Azure Resource Manager  Azure Service Bus  Bitbucket Cloud  Chef  Docker Host  Docker Registry  Generic  GitHub  GitHub Enterprise Server  Incoming WebHook  Jenkins  Jira  Kubernetes



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Filter by keywords

4taksDemoAcr

4tecture (MPN)(340488b2-0580-488a-8b5d-2e5d723bd628)

4tectureregistry

aksDemoCanary-dev-aksDemo-aks-dev-1606772543573

Azure DevOps 4tecture-demo

Microsoft Azure Sponsorship

PREventsConnection

ProductsFeed

New Incoming WebHook service connection

Authentication

WebHook Name

PRUpdated

Name of the WebHook

Secret (optional)

Optional secret for the webhook. WebHook service will use this secret to calculate the payload checksum

Http Header (optional)

Http header name on which checksum will be sent
Details

Service connection name

PREventsConnection

Description (optional)

Security

 Grant access permission to all pipelines[Learn more](#)[Troubleshoot](#)[Back](#)[Save](#)

4tecture-demo / k8sDemo / Settings / Service hooks

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k8sDemo

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Service Hooks

Integrate with your favorite services by notifying them when events happen in your project.

EDIT SERVICE HOOKS SUBSCRIPTION

Trigger

Select an event to trigger on and configure any filters.

Trigger on this type of event: Pull request updated

Remember that selected events are visible to users of the target service, even if they don't have permission to view the related artifact.

FILTERS

Repository: DevFun

Target branch: [Any]

Change: Status changed

Requested by a member of group: [Any]

Previous Next Test Finish Cancel

| Owner | 7 Day Status | State |
|-------------|--------------|---------|
| Marc Müller | 0 attempted | Enabled |

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Service Hooks

Integrate with your favorite services by notifying them when events happen in your project.

EDIT SERVICE HOOKS SUBSCRIPTION

Action

Select and configure the action to perform.

Perform this action

Post via HTTP

Owner: Marc Müller

7 Day Status: 0 attempted

State: Enabled

https://dev.azure.com/4ecture-demo/_apis/public/distributedtask/webhooks/prupdated?api-version=6.0-preview

including any authentication headers
[more about Webhooks](#)

SETTINGS

URL required

Accept untrusted SSL certificates

Basic authentication username optional

Basic authentication password optional

Previous Next Test Finish Cancel

Sources

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Test management

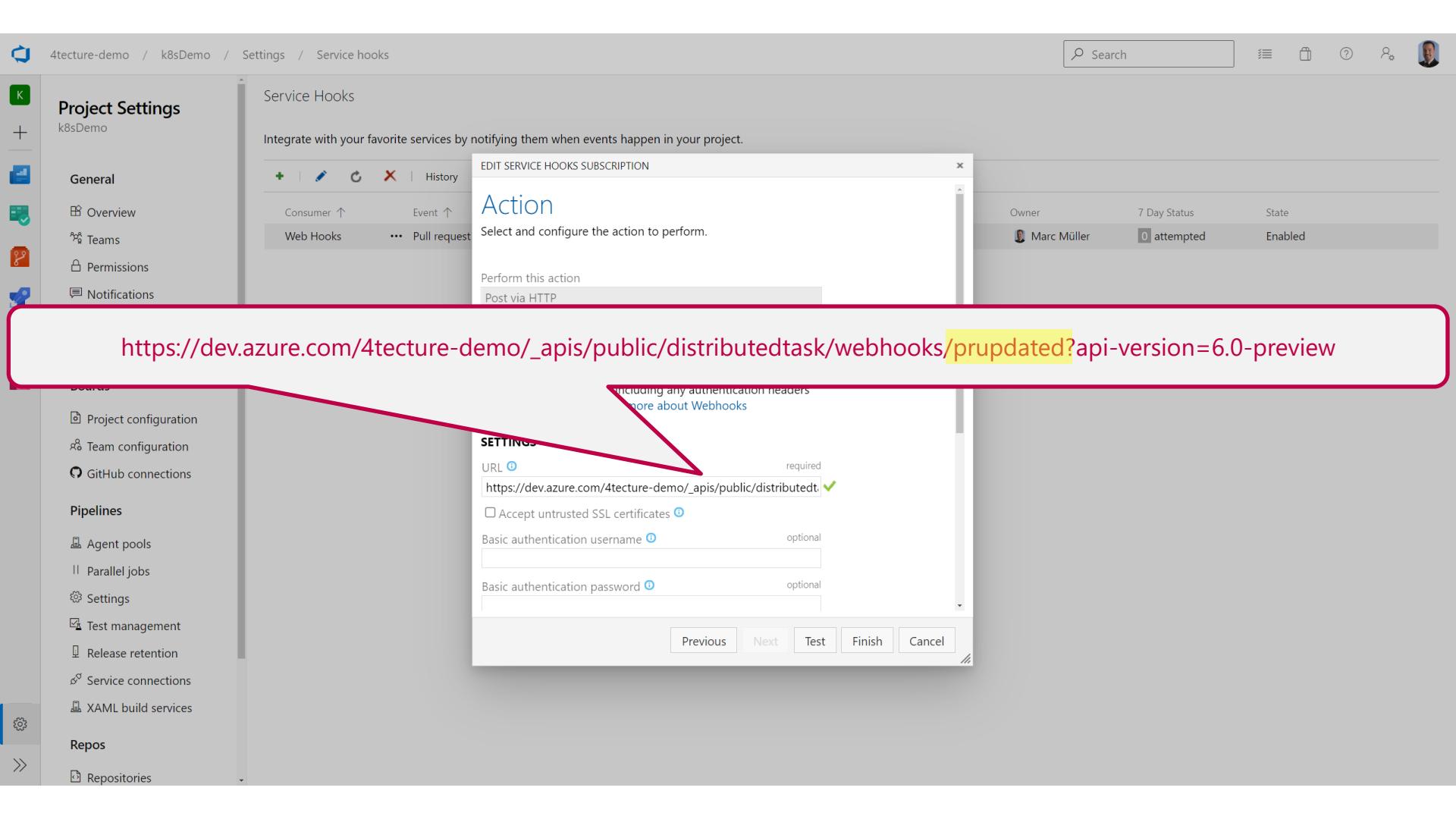
Release retention

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Service Hooks

Integrate with your favorite services by notifying them when events happen in your project.



Consumer ↑ Event ↑

Web Hooks ... Pull request

EDIT SERVICE HOOKS SUBSCRIPTION

https://dev.azure.com/4ecture-demo/_apis/public/distributedtask/v4/subscriptions/1 ✓

 Accept untrusted SSL certificates ⓘ

Basic authentication username ⓘ optional

Basic authentication password ⓘ optional

HTTP headers ⓘ optional

Resource details to send ⓘ optional

All

Messages to send ⓘ optional

All

Detailed messages to send ⓘ optional

All

RESOURCE VERSION

1.0

[Previous](#) [Next](#) [Test](#) [Finish](#) [Cancel](#)

| Owner | 7 Day Status | State |
|-------------|--------------|---------|
| Marc Müller | 0 attempted | Enabled |

Sample event payload

```
Method: POST
URI: https://dev.azure.com/4tecture-demo/_apis/public/distributedtask/webhooks/prupdated?api-version=6.0-preview
HTTP Version: 1.1
Headers:
{
  Content-Type: application/json; charset=utf-8
}
Content:
{
  "subscriptionId": "1de80ac8-b9a7-42d0-a2fe-5441c2b7ffc2",
  "notificationId": 14,
  "id": "af07be1b-f3ad-44c8-a7f1-c4835f2df06b",
  "eventType": "git.pullrequest.updated",
  "publisherId": "tfs",
  "message": {
    "text": "Jamal Hartnett marked the pull request as completed",
    "html": "Jamal Hartnett marked the pull request as completed",
    "markdown": "Jamal Hartnett marked the pull request as completed"
  },
  "detailedMessage": {
    "text": "Jamal Hartnett marked the pull request as completed\r\n\r\n- Merge status: Succeeded\r\n- Merge commit: eef717(https://fabrikam.visualstudio.com/DefaultCollection/\_apis/git/repositories/4bc14d40-c903-45e2-872e-0462c7748079/commits/eef717f69257a6333f221566c1c987dc94cc0d72)>eef717</a></li>\r\n- Merge status: Succeeded</li>\r\n- Merge commit: <a href="https://fabrikam.visualstudio.com/DefaultCollection/\_apis/git/repositories/4bc14d40-c903-45e2-872e-0462c7748079/commits/eef717f69257a6333f221566c1c987dc94cc0d72>eef717</a>></li>\r\n- Merge status: Succeeded\r\n- Merge commit: [eef717](https://fabrikam.visualstudio.com/DefaultCollection/\_apis/git/repositories/4bc14d40-c903-45e2-872e-0462c7748079/commits/eef717f69257a6333f221566c1c987dc94cc0d72)",
    "html": "Jamal Hartnett marked the pull request as completed\r\n\r\n- Merge status: Succeeded\r\n- Merge commit: [eef717](https://fabrikam.visualstudio.com/DefaultCollection/\_apis/git/repositories/4bc14d40-c903-45e2-872e-0462c7748079/commits/eef717f69257a6333f221566c1c987dc94cc0d72)",
    "markdown": "Jamal Hartnett marked the pull request as completed\r\n\r\n- Merge status: Succeeded\r\n- Merge commit: [eef717](https://fabrikam.visualstudio.com/DefaultCollection/\_apis/git/repositories/4bc14d40-c903-45e2-872e-0462c7748079/commits/eef717f69257a6333f221566c1c987dc94cc0d72)"
  },
  "resource": {
    "repository": {
      "id": "4bc14d40-c903-45e2-872e-0462c7748079",
      "name": "Fabrikam",
      "url": "https://fabrikam.visualstudio.com/DefaultCollection/\_apis/git/repositories/4bc14d40-c903-45e2-872e-0462c7748079",
      "project": {
        "id": "6ce954b1-ce1f-45d1-b94d-e6bf2464ba2c",
        "name": "Fabrikam",
        "url": "https://fabrikam.visualstudio.com/DefaultCollection/\_apis/projects/6ce954b1-ce1f-45d1-b94d-e6bf2464ba2c",
        "state": "wellFormed",
        "visibility": "unchanged",
        "lastUpdateTime": "2001-01-01T00:00:00"
      },
      "defaultBranch": "refs/heads/master",
      "remoteUrl": "https://fabrikam.visualstudio.com/DefaultCollection/\_git/Fabrikam"
    },
    "pullRequestId": 1,
    "status": "Completed",
    "createdBy": {
      "displayName": "Jamal Hartnett",
      "url": "https://fabrikam.vssps.visualstudio.com/\_apis/Identities/54d125f7-69f7-4191-904f-c5b96b6261c8",
      "id": "54d125f7-69f7-4191-904f-c5b96b6261c8",
      "uniqueName": "fabrikamfiber@hotmail.com",
      "imageUrl": "https://fabrikam.visualstudio.com/DefaultCollection/\_api/\_common/identityImage?id=54d125f7-69f7-4191-904f-c5b96b6261c8"
    },
    "creationDate": "2014-06-17T16:55:46.589889Z",
    "closedDate": "2014-06-30T18:59:12.3660573Z",
    "title": "my first pull request",
    "description": "- test2\r\n",
    "sourceRefName": "refs/heads/mytopic",
    "targetRefName": "refs/heads/master"
  }
}
```

k8sDemo

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← DevFun PR Cleanup

Variables

Run



master DevFun / .azure-pipelines/devfun-prcleanup.yml

Show assistant

```
1 trigger: none
2
3 pool:
4   vmImage: ubuntu-latest
5
6 resources:
7   # https://dev.azure.com/4tecture-demo/_apis/public/distributedtask/webhooks/prupdated?api-version=6.0-preview
8   webhooks:
9     - webhook: PRUpdated ..... ## Webhook alias
10       connection: PREventsConnection ..... ## Incoming webhook service connection
11       filters:
12         - path: eventType
13           value: git.pullrequest.updated
14         - path: publisherId
15           value: tfs
16         - path: resource.repository.name
17           value: DevFun
18
19 variables:
20   Validate
21   - template: templates/common_variables.yml
22   Validate
23   - template: templates/common_variables-cd.yml
24
25 stages:
26   - stage: CleanupPr
27     jobs:
28       - deployment: CleanupPrEnvironment
29         displayName: 'Cleanup PR environment'
30         environment: devfuncleanuppr
31         condition: or(eq('${{ parameters.PRUpdated.resource.status }}', 'completed'), eq('${{ parameters.PRUpdated.resource.status }}', 'abandoned'))
32         strategy:
33           runOnce:
34             deploy:
35               steps:
36                 - download: none
```

Incoming
WebHook as
resource with
trigger

Additional conditions for
dynamic payload evaluation

k8sDemo



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Variables

Run

...

Show assistant

master DevFun / .azure-pipelines/devfun-prcleanup.yml

```
strategy:
  runOnce:
    deploy:
      steps:
        - download: none
        - pwsh: |
            $prId = "${{ parameters.PRUpdated.resource.pullRequestId }}"
            $dbname = "devfun-pr$($prId)"
            Write-Host "##vso[task.setvariable variable=dbname;]$dbname"
            Write-Host "##vso[task.setvariable variable=k8sNamespace;]pr-$($prId)"
            Write-Host "##vso[task.setvariable variable=managedIdentityApi;]devfunapi-pr-$($prId)"
            Write-Host "##vso[task.setvariable variable=deploymentManagedIdentityApi;]devfunapi-deployment-pr-$($prId)"
            displayName: "Calculate PR related variables"
        validate:
        - template: templates/pr_DeleteK8sPrEnvironment.yml
          parameters:
            azureSubscription: '$(AzureSubscription)'
            clusterResourceGroup: '$(AzureResourceGroup)'
            clusterName: '$(KubernetesCluster)'
            clusterNamespace: '$(k8sNamespace)'
            continueOnError: true
        validate:
        - template: templates/sql_DeleteAzureSqlDatabase.yml
          parameters:
            AzureSubscription: '$(AzureSubscription)'
            ResourceGroup: '$(AzureResourceGroup)'
            AzureSqlName: '$(dbservername)'
            DbName: '$(dbname)'
            continueOnError: true
        validate:
        - template: templates/az_DeleteManagedIdentity.yml
          parameters:
            AzureSubscription: '$(AzureSubscription)'
            ManagedIdentity: '$(managedIdentityApi)'
            ManagedIdentityResourceGroup: '$(ManagedIdentityResourceGroup)'
            continueOnError: true
```

Calculate PR specific variables

Delete deployment

Delete database

Delete Identities

A close-up, low-angle shot of several rowers in a racing shell. They are wearing blue and red athletic gear. Their oars are extended, dipping into the water, creating white spray. The background is blurred, suggesting motion on a body of water.

Fast feedback with pull request deployments

Database Deployment

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SSDT - Characteristic

- SSDT Project Type for relational Database Development
- Integrated in Visual Studio IDE
- Others: SSMS, Redgate, DDL/DML Scripts
- SSDT Advantages:

IDE
MSBuild

IntelliSense
Validation

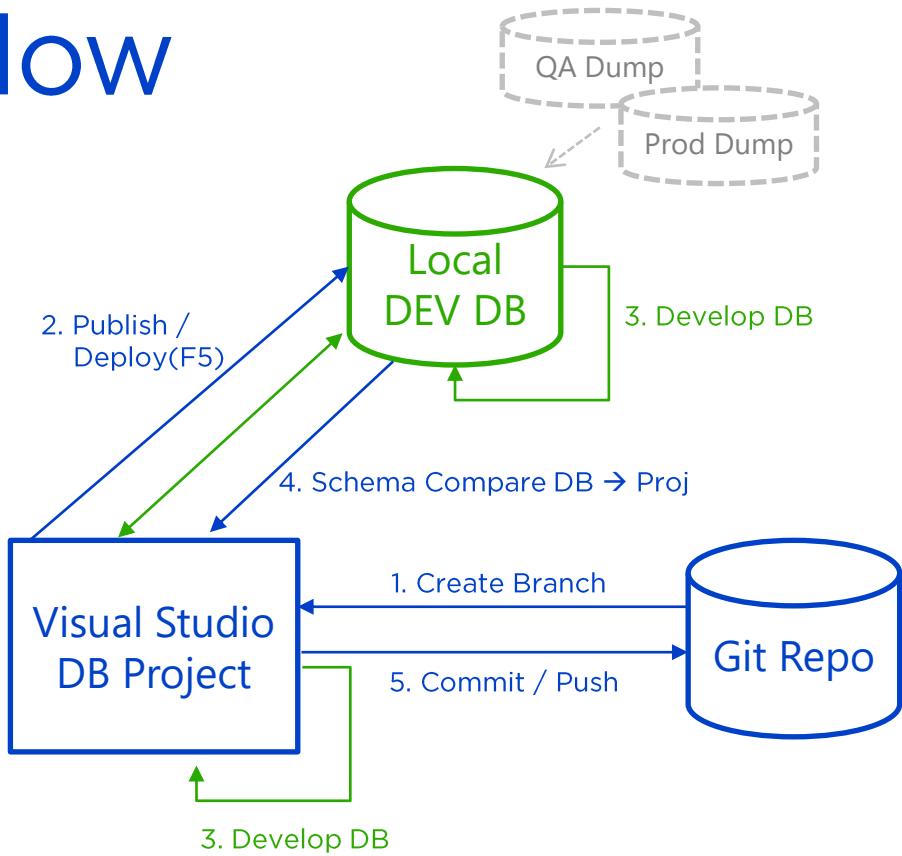
Code Base
Consistency

Design
Compare

CI
CD

Developer Workflow

1. Create a Feature Branch from Development
2. Publish/Deploy (F5) Database Project
3. Develop Database changes (Renames have to performed in SSDT)
4. Perform a Schema Compare from DB to Database Project, Sync.
5. Commit > PR > Review



SSDT is nice, but...

SSDT supports basic script extensibility

- Single Pre-Script
- Single Post-Script

Enterprise-grade migrations imply complexity

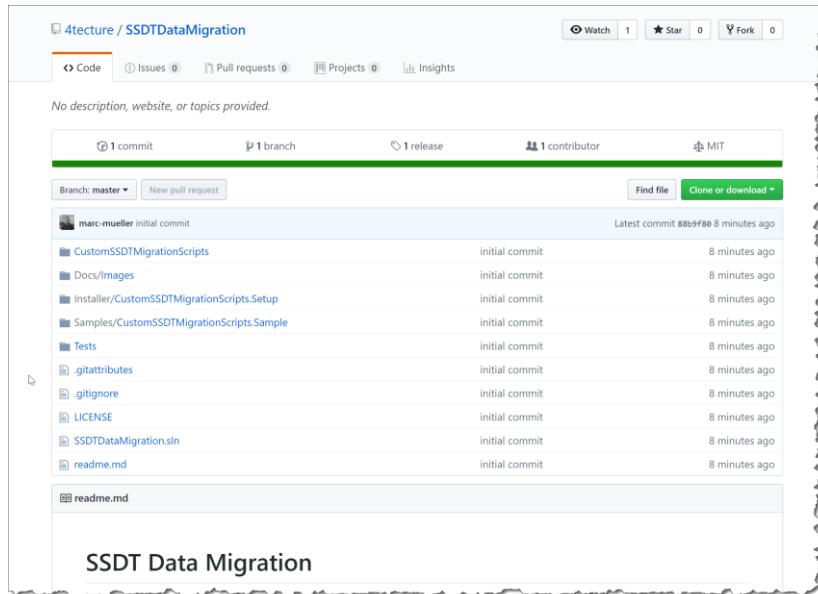
- Extended Script Management is needed
- State Tracking of Custom Migrations
- «DB Version» Tracking

SSDT can easily be extended....

Our Learnings combined...

We created a open-source extension providing a simple starting point for your projects.

<https://github.com/4tecture/SSDTDataMigration>



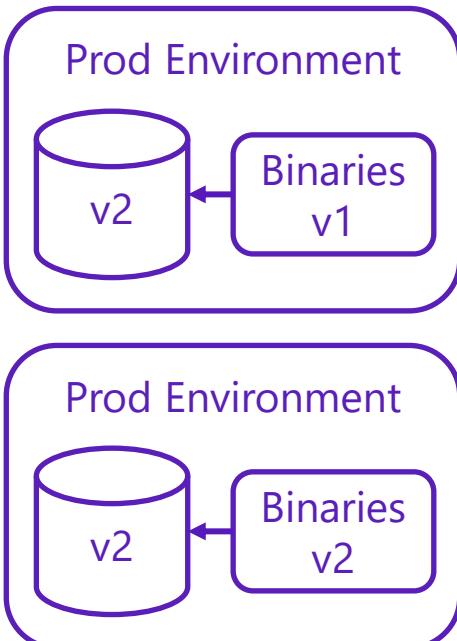
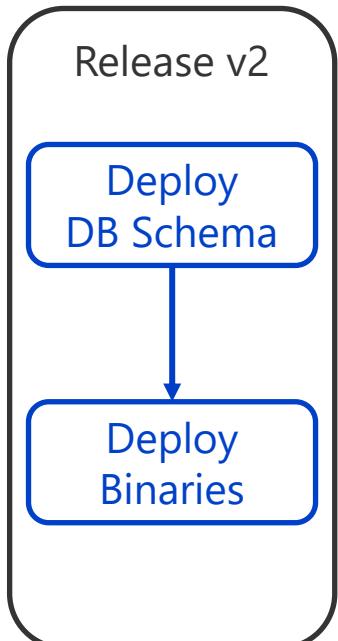
Features

- Configurable Setup and Naming Convention
- Logging / Full Transactional Scripts
- Custom execution filters
- Fully configurable Extension

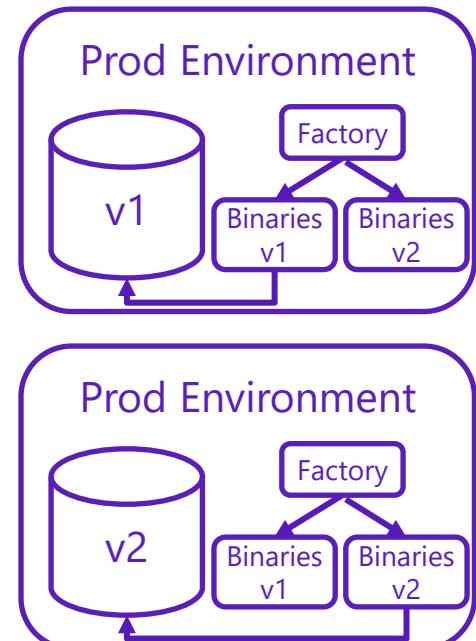
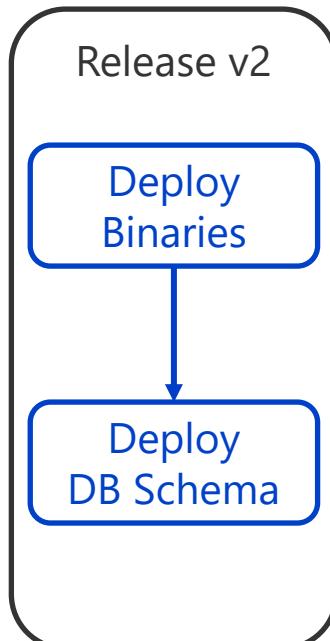
```
{  
  "PreScripts": {  
    "ScriptBaseDirectory": ".\\Scripts\\PreScripts",  
    "ScriptNamePattern": "^(\d{14})_(.*).sql",  
    "ScriptRecursiveSearch": true,  
    "GeneratedScriptPath": ".\\Scripts\\RunPreScriptsGenerated.sql",  
    "ExecutionFilterMode": "days", // "all", "count", "days", "date"  
    "ExecutionFilterValue": "100",  
  
    "TreatScriptNamePatternMismatchAsError": true,  
    "TreatHashMismatchAsError": true  
  },
```

Deployment Approaches

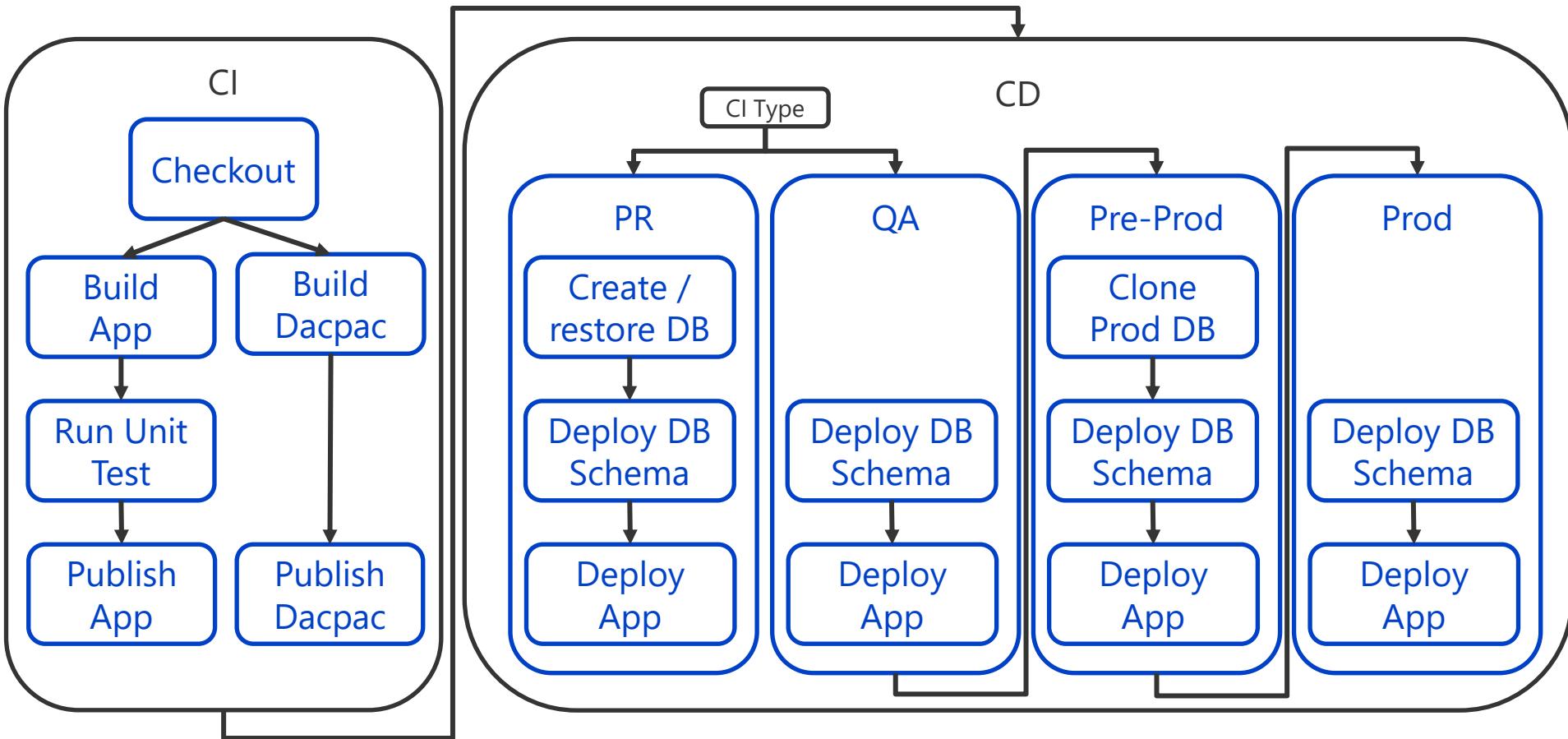
DB First



Code First



CI / CD Pipeline



A close-up, low-angle shot of several rowers in a racing shell. Their hands are gripping yellow and black oars, which are angled downwards. The water is visible at the bottom, creating a sense of motion. The rowers are wearing blue and red athletic gear.

Fast feedback with pull request deployments

Target Environment

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Hosting technology

- PR deployments work with any hosting technology
- Azure Webapps
 - Slots for PR deployments
 - Automatic routes and certificates
- Kubernetes
 - Namespace as isolation
 - Ingress and service routing within and across namespaces
 - Automatic certificate creation (i.e. cert manager with Let's Encrypt)
 - Complex routing strategies with service meshes

Integration Strategies

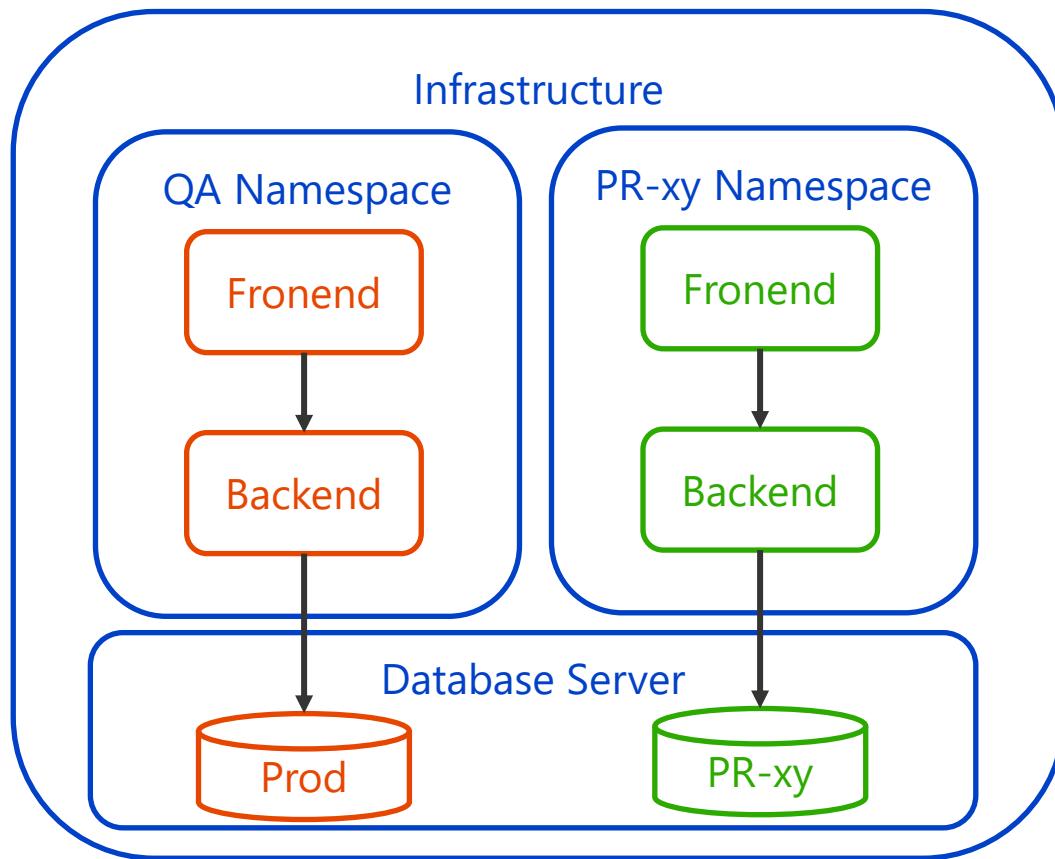
Full Deployment

- ✓ Easy to setup and manage
- ✓ Consistent test data / messaging
- ✗ More expensive

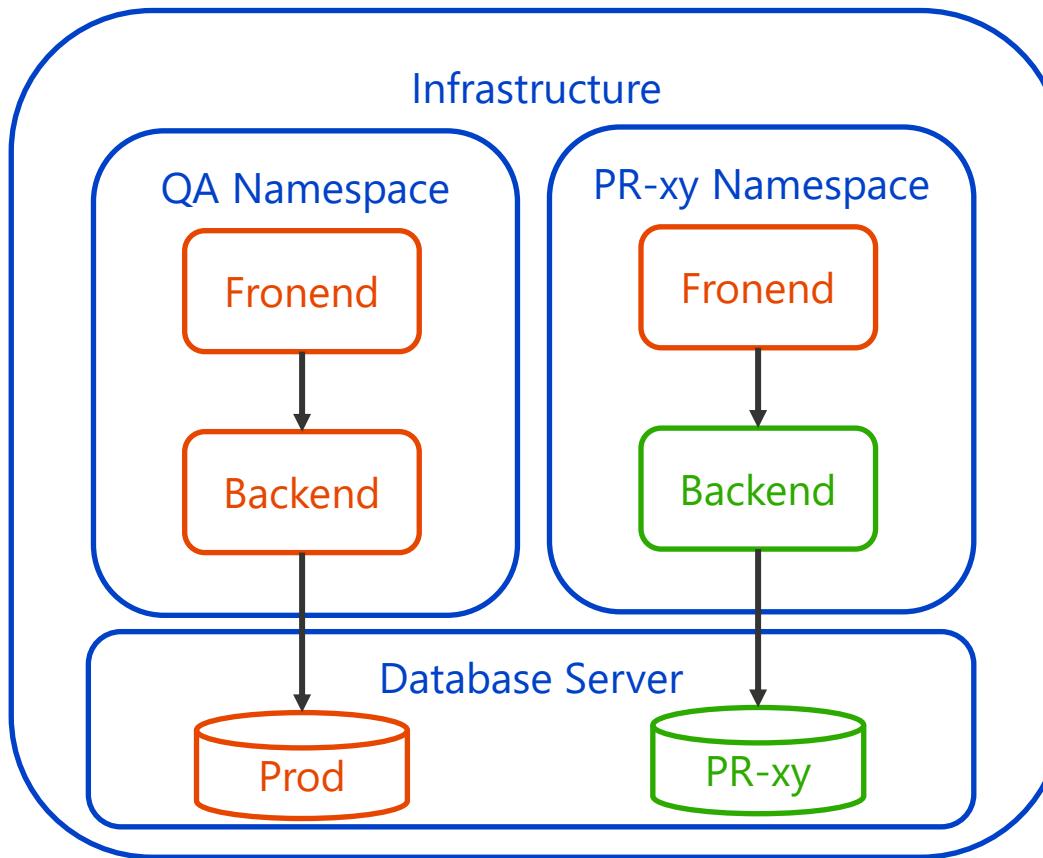
Subset Deployment

- ✓ Faster
- ✓ Cheaper
- ✗ Can be very complex in terms of routing
- ✗ Harder to test because of shared services

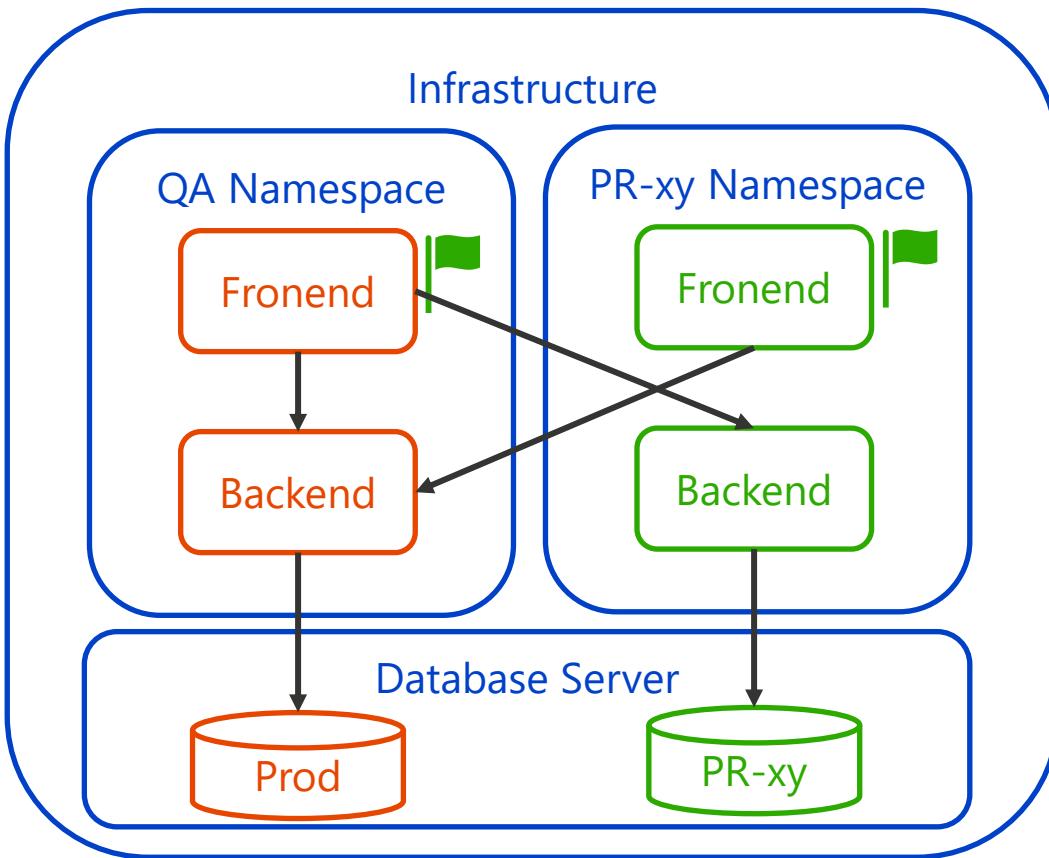
Full Deployment



Full Deployment Changes only



Subset Deployment



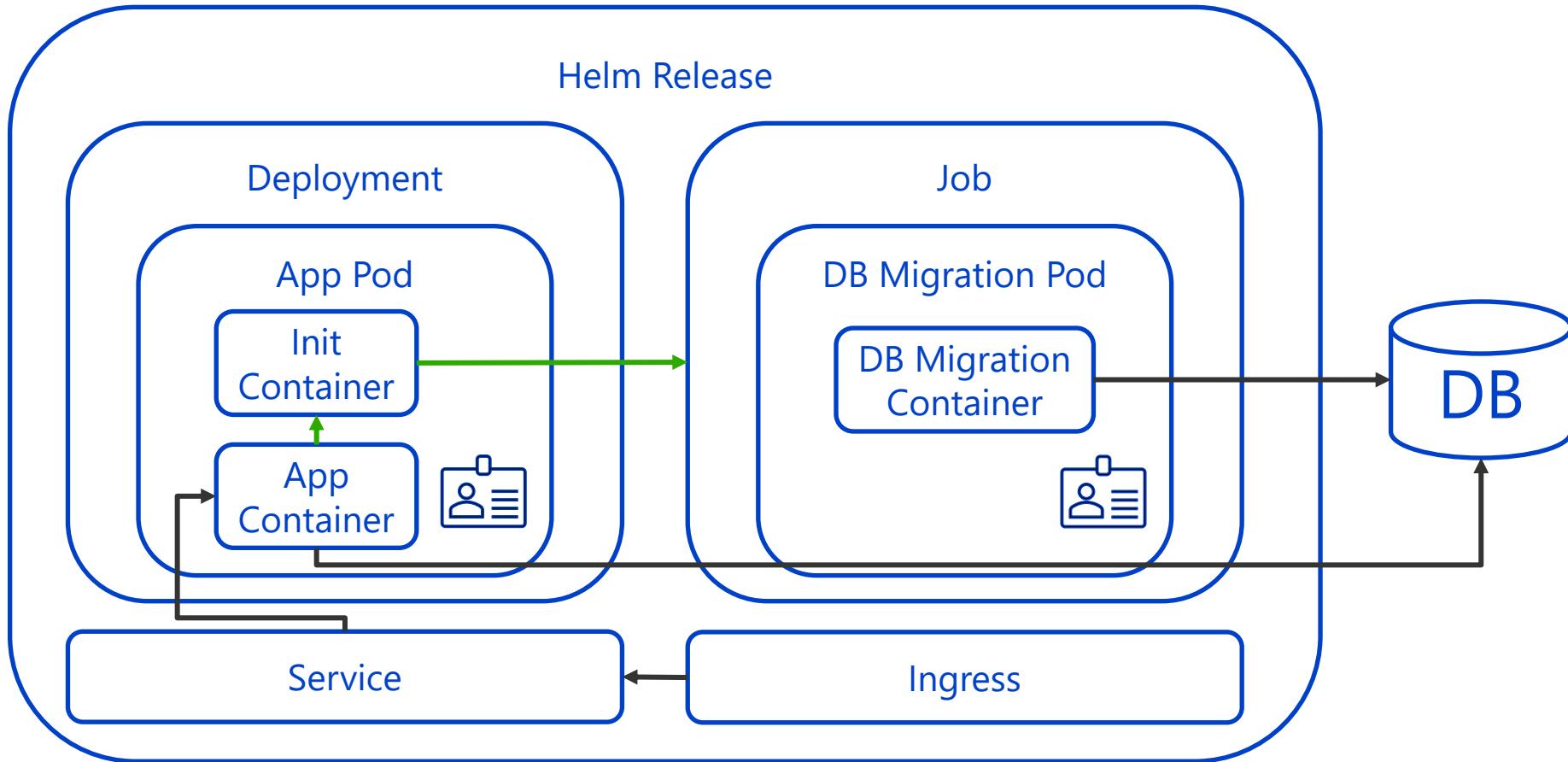
Subset can become very complex

- **Challenges**
 - Change 3 out of 10 services - mostly bidirectional communication
 - Message bus architecture - predictable routing
 - Conditional routing is complex and may defer from production routing logic
 - Etc.
- **Approaches**
 - Additional infrastructure costs vs. reduction of complexity
 - Full deployment - Services of PR and latest stable of others

Autonomous Application Packages

- CI/CD pipelines work great for internal services
- If an application package is distributed, the schema deployment should be part of it
- Logic from the CI/CD pipeline is moved to the application package
- CI/CD pipelines can be simplified

Helm Release



A close-up, dynamic shot of several rowers in a racing shell. They are wearing blue and red athletic gear. Their oars are extended, and water is splashing around the blades, conveying a sense of motion and effort. The background is blurred.

Fast feedback with pull request deployments

Container Jobs and Service Containers

CI Environment Challenges

- Storing all VM images need a lot of storage
- Build VM snapshots not integrated in standard process
- Where to store the VM configuration?



Container Jobs



- Work with hosted pools and private pools
- Pipeline Job runs inside the container
- Each step runs inside the container

Container Jobs

```
trigger:
- master

pool:
  #vmImage: 'windows-latest'
  default

  container: mcr.microsoft.com/dotnet/framework/sdk:4.7.2-windowsservercore-ltsc2019

variables:
  solution: '**/*.sln'
  buildPlatform: 'Any CPU'
  buildConfiguration: 'Release'

steps:
- task: NuGetToolInstaller@1

- task: NuGetCommand@2
  inputs:
    restoreSolution: '$(solution)'

- task: VSBuild@1
  inputs:
    solution: '$(solution)'
    platform: '$(buildPlatform)'
    configuration: '$(buildConfiguration)'

- task: VSTest@2
  inputs:
    testSelector: 'testAssemblies'
    searchFolder: '$(System.DefaultWorkingDirectory)'
    vstestLocationMethod: 'location'
    vstestLocation: 'C:\Program Files (x86)\Microsoft Visual Studio\2019\Enterprise\Extensions\Microsoft\VSTest\16.11.0\Agent\bin\Hosted\VSTest'
    platform: '$(buildPlatform)'
    configuration: '$(buildConfiguration)'

  - publish: $(System.DefaultWorkingDirectory)\ConsoleApp\bin\Debug\netcoreapp3.1\artifact: ConsoleApp
```

```
container:
  image: myprivate.azurecr.io/windowsservercore:1803
  endpoint: my_acr_connection
```

```
container:
  image: ubuntu:16.04
  options: --hostname container-test --ip 192.168.0.1
```

```
resources:
  containers:
    - container: pycontainer
      image: python:3.8

  steps:
    - task: SampleTask@1
      target: host
    - task: AnotherTask@1
      target: pycontainer
```

```
resources:
  containers:
    - container: u14
      image: ubuntu:14.04

    - container: u16
      image: ubuntu:16.04

    - container: u18
      image: ubuntu:18.04
```

```
jobs:
- job: RunInContainer
  pool:
    vmImage: 'ubuntu-16.04'
```

```
strategy:
  matrix:
    ubuntu14:
      containerResource: u14
    ubuntu16:
      containerResource: u16
    ubuntu18:
      containerResource: u18
```

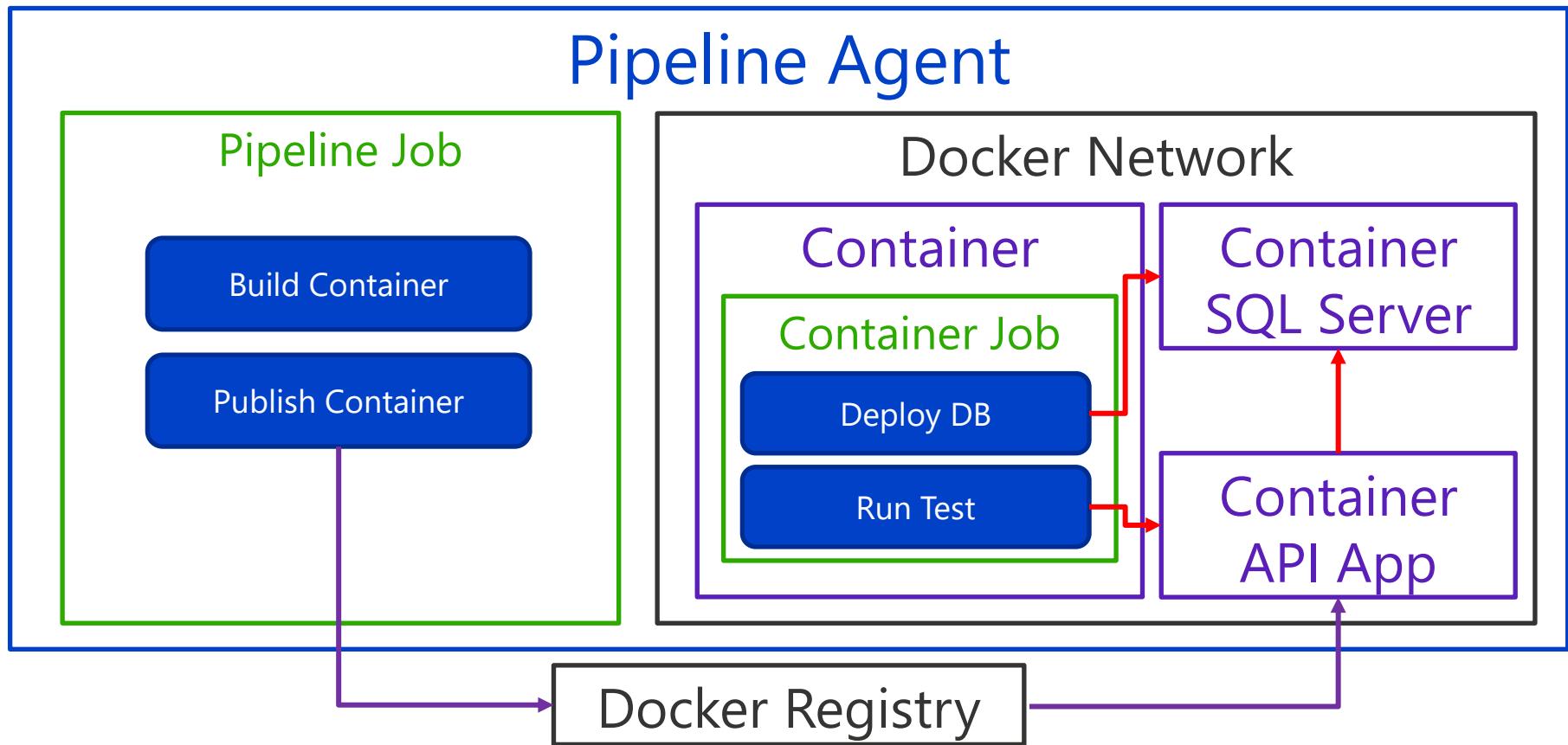
```
container: $[ variables['containerResource'] ]
```

CI Challenges

- Complex System Testing Environment Setup
- Shift-Left / Fast-Feedback
- Target multiple versions



Bringing all together – Shift left



k8sDemo

← DevFunApi-Cl

Variables

Save



```
26
27 resources:
28   containers:
29     - container: sql2022
30       image: mcr.microsoft.com/mssql/server:2022-latest
31       env:
32         - SA_PASSWORD: "$(containerdbpassword)"
33         - ACCEPT_EULA: "Y"
34     - container: sql2019
35       image: mcr.microsoft.com/mssql/server:2019-latest
36       env:
37         - SA_PASSWORD: "$(containerdbpassword)"
38         - ACCEPT_EULA: "Y"
39     - container: sql2017
40       image: mcr.microsoft.com/mssql/server:2017-latest
41       env:
42         - SA_PASSWORD: "$(containerdbpassword)"
43         - ACCEPT_EULA: "Y"
44     - container: api
45       image: '$(ImageName):$(Build.BuildNumber)'
46       endpoint: 4taksDemoAcr
47       env:
48         - DEVFUNOPTIONS__DEPLOYMENTENVIRONMENT: "Development"
49         - CONNECTIONSTRINGS__DEVFUNDATABASE: "Server=tcp:$(containerdbserver),1433;Database=$(containerdbname);User ID=$(containerdbuser);Password=$(containerdbpassword);Encrypt=True;TrustServerCertificate=False"
50         - LICENSE__LICENSEDATA: "$(LicenseData)"
51     - container: worker
52       image: 4taksdemocr.azurecr.io/linuxworker:latest
53       endpoint: 4taksDemoAcr
54
55 stages:
56   - stage: Build
57     jobs:
58       - job: CI_Build...
59       - job: DataInitializer_Build...
60
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```

Container
Resources

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Project settings <<

< DevFunApi-CI

Variables

Save

⋮

```
master DevFun / .azure-pipelines/devfunapi-ci.yml *
```

```
168     - stage: IntegrationTests
169       displayName: 'Run Integration Tests'
170       dependsOn: Build
171       jobs:
172         - job: SystemTest
173           displayName: 'System tests with SQL Server'
174           pool:
175             vmImage: 'ubuntu-latest'
176             name: Default
177             strategy:
178               matrix:
179                 sql2017:
180                   containerResource: sql2017
181                 sql2019:
182                   containerResource: sql2019
183                 sql2022:
184                   containerResource: sql2022
185             services:
186               sql: ${variables['containerResource']}
187               api: api
188             container: worker
189             steps:
190               - download: current
191                 artifact: SystemTests
192                 displayName: Download the SystemTests artifact
193               - download: current
194                 artifact: TestDataInitializer
195                 displayName: Download the TestDataInitializer artifact
196               - download: current
197                 artifact: dacpacs
198                 displayName: Download the Database artifact
199                 View template
200               - template: templates/sql_DeployDacPac.yml
201               parameters:
202                 dbServernameFqdn: sql
203                 dbName: $(containerdbname)
```

Matrix → run test in different environments in parallel

Dynamic service container selection based on matrix variable

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Project settings <

← DevFunApi-Cl

Variables

Save



```
181      sql2019:  
182      containerResource: sql2019  
183      sql2022:  
184      containerResource: sql2022  
185      services:  
186      sql: ${variables['containerResource']}  
187      api: api  
188      container: worker  
189      steps:  
190      download: current  
191      artifact: SystemTests  
192      displayName: Download the SystemTests artifact  
193      download: current  
194      artifact: TestDataInitializer  
195      displayName: Download the TestDataInitializer artifact  
196      download: current  
197      artifact: dacpacs  
198      displayName: Download the Database artifact  
  
View template  
199      template: templates/sql_DeployDacPac.yml  
200      parameters:  
201      dbServernameFqdn: sql  
202      dbName: $(containerdbname)  
203      dbUser: $(containerdbuser)  
204      dbPassword: $(containerdbpassword)  
205      dacpacFile: $(Dacpacfile)  
206      trustServerCertificate: true  
  
View template  
207      template: templates/test_runapitests.yml  
208      parameters:  
209      SystemTestArtifactLocation: $(Pipeline.Workspace)/SystemTests  
210      DatainitializerArtifactLocation: $(Pipeline.Workspace)/TestDataInitializer  
211      ApiUrl: http://api  
212      RunSettingsFileName: container.runsettings  
  
- stage: PullRequest
```

DB schema deployment

Run integration / system tests

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Save

...

Show assistant

```
181      sql2019:
182      containerResource: sql2019
183      sql2022:
184      containerResource: sql2022
185      services:
186      sql: ${variables['containerResource']}
187      api: api
188      container: worker
189      steps:
190      download: current
191      artifact: SystemTests
192      displayName: Download the SystemTests artifact
193      download: current
194      artifact: TestDataInitializer
195      displayName: Download the TestDataInitializer artifact
196      download: current
197      artifact: dacpacs
198      displayName: Download the Database artifact
View template
199      - template: templates/sql_DeployDacPac.yml
200      parameters:
201      dbServernameFqdn: sql
202      dbName: $(containerdbname)
203      dbUser: $(containerdbuser)
204      dbPassword: $(containerdbpassword)
205      dacpacFile: $(Dacpacfile)
206      trustServerCertificate: true
View template
207      - template: templates/test_runapitests.yml
208      parameters:
209      SystemTestArtifactLocation: $(Pipeline.Workspace)/SystemTests
210      DatainitializerArtifactLocation: $(Pipeline.Workspace)/TestDataInitializer
211      ApiUrl: http://api
212      RunSettingsFileName: container.runsettings
213
214      - stage: PullRequest
```

Docker network container alias

Docker network container alias

A close-up, dynamic shot of several rowers in a boat. They are wearing blue long-sleeved shirts and red and white striped athletic gear. Their yellow and black oars are pulled back in unison, creating a sense of teamwork and effort. Water splashes around the oars.

Fast feedback with pull request deployments

Q & A

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Recap

- Fail fast - learn fast & fix fast
- Only an integrated change provides clarity if it runs successfully in production
- Pull Request is single point of interaction / status for developers, testers and product owners
- Pipelines with conditions, templates and integration in PR API provide all the tools you need

Thank you for your attention!

If you have any questions do not hesitate to contact us:

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A background photograph showing four hands of different skin tones coming together to hold four interlocking wooden puzzle pieces. The pieces are light brown, white, red, and green. The hands are positioned in the upper half of the frame, with one hand at the top center, two on the left, and one on the right.

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