„Azure DevOps Pipelines as Code”, czyli budowanie pipeline w oparciu o YAML

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softserve

WHOAMI

Obecnie:

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Po pracy:

Mąż i ojciec,

Pasjonat lotnictwa,

Zapalony Azurowiec, 🔥🔥🔥🔥🔥🔥🔥🔥🔥🔥🔥🔥

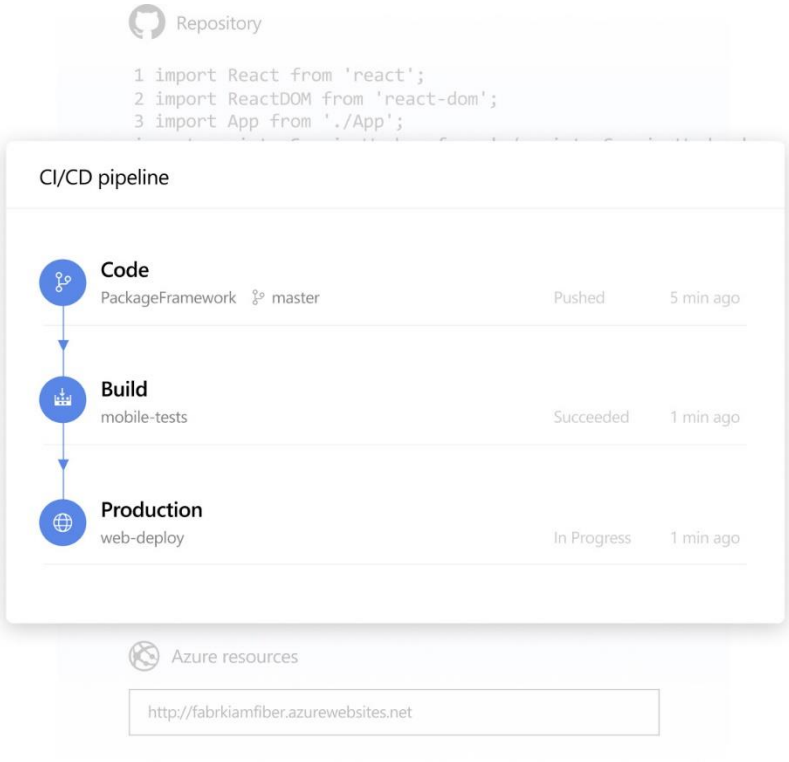
Agenda

1. Czym są Azure pipelines
2. Klasyczny edytor vs YAML
3. Zalety YAML
4. Koncepcja Multi-Stage Pipelines
5. YAML structure
6. Dema
7. Q & A

Microsoft Azure User Group Poland

Wrocław

Azure pipelines

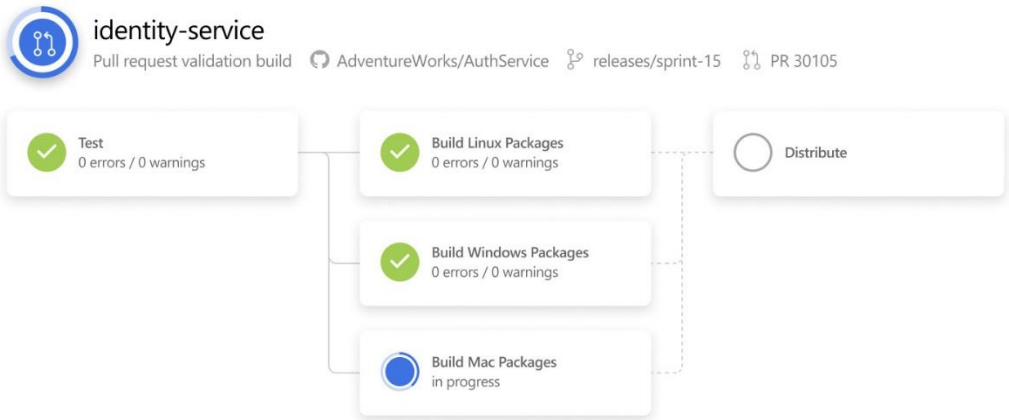


Azure Pipelines

Azure pipelines, dlaczego warto:

Czy warto używać?

- Darmowe***
- Dowolny język, dowolna platforma,
- Kontenery i platforma Kubernetes,
- Wdrażanie w dowolnej chmurze,
- Możecie robić deploy do różnych systemów jednocześnie,
- Agenci dla systemów Linux, macOS i Windows hostowani przez firmę Microsoft
- Integracja z GitHub



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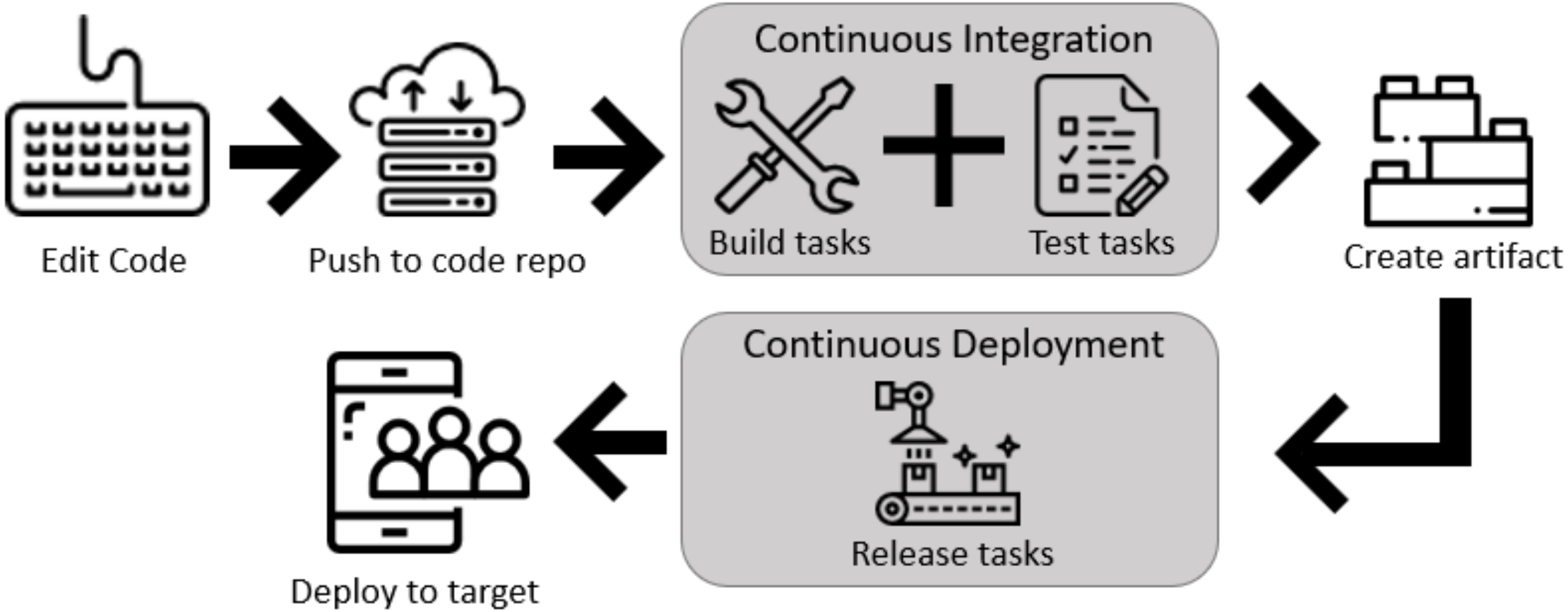
*** - dla publicznych projektów, bądź 1800min (30h) za darmo na miesiac dla projektów prywatnych

Klasyczny edytor



Klasyczny edytor - build

hotbee / Parts Unlimited / Pipelines

Search

PU

PartsUnlimitedE2E

Tasks Variables Triggers Options Retention History Save & queue Discard Summary Queue

Pipeline
Build pipeline

Get sources
PartsUnlimited master

Phase 1
Run on agent

NuGet restore
NuGet Installer

Build solution
Visual Studio build

Test Assemblies
Visual Studio Test

Copy Files
Copy files

Publish Artifact
Publish build artifacts

Name *
PartsUnlimitedE2E

Agent pool * | Pool information | Manage

Azure Pipelines

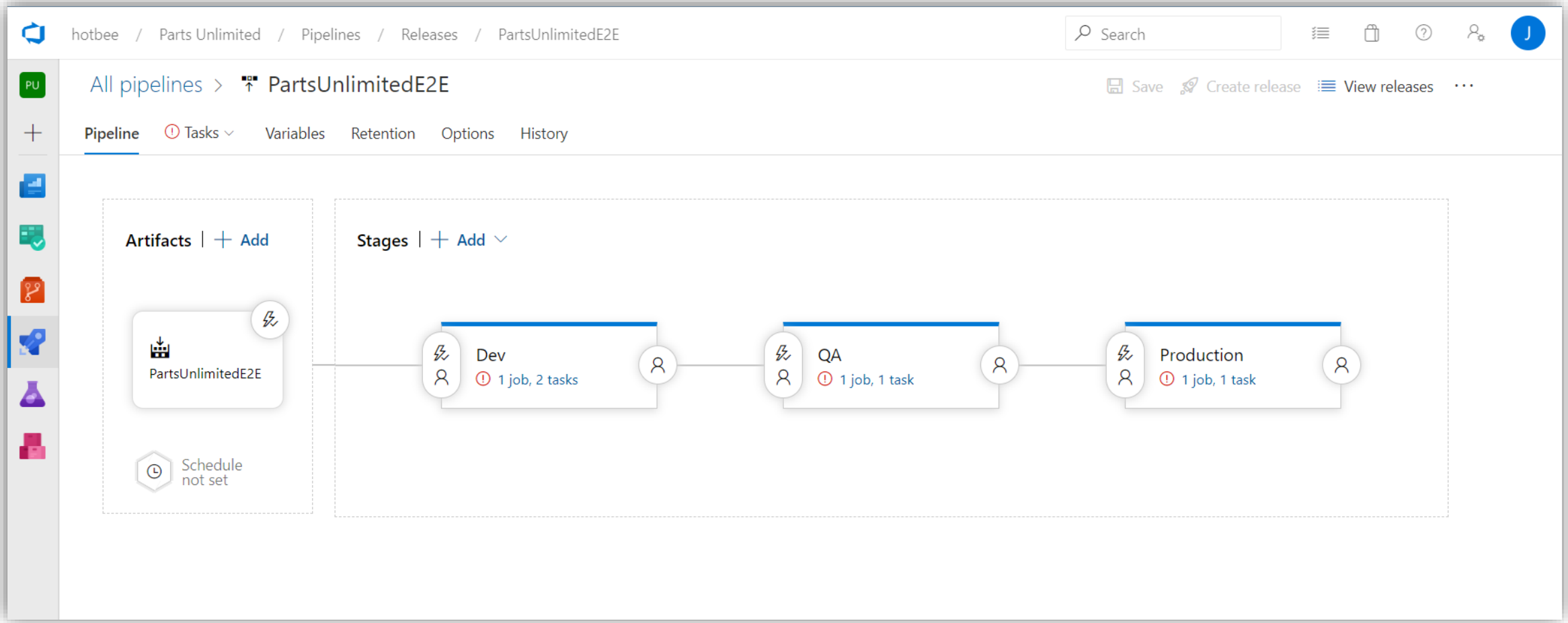
Agent Specification *
vs2017-win2016

Parameters

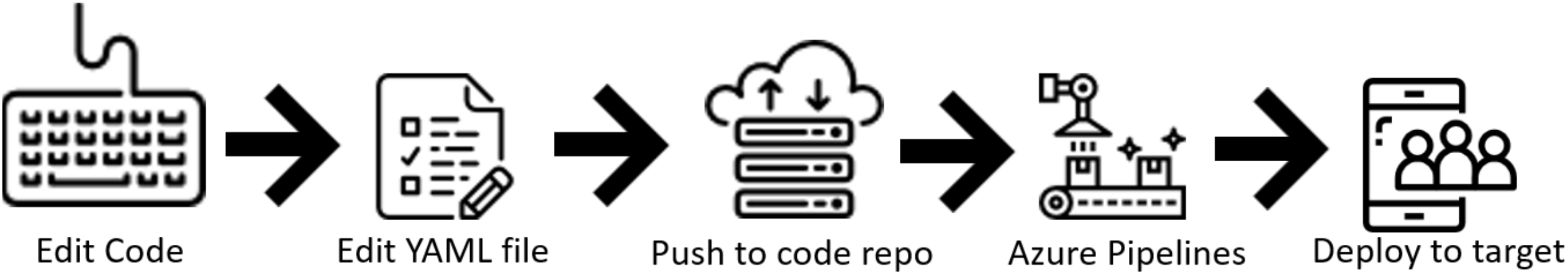
This pipeline doesn't have any pipeline parameters. Create them to share the most important settings between tasks and change them in one place.

Learn more

Klasyczny edytor - release



Azure Pipelines jako kod (YAML)



Azure Pipelines jako kod (YAML)

hotbee / Parts Unlimited YAML / Pipelines / Builds / PartsUnlimited / YAML

Search

PartsUnlimited

Variables | Run

master | PartsUnlimited / azure-pipelines.yml

```yaml
trigger:
- master

pool:
  vmImage: 'VS2017-Win2016'

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

steps:
Settings
- task: NuGetToolInstaller@0

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

Settings
- task: VSBuild@1
  inputs:
    solution: '$(solution)'
    msbuildArgs: '/p:DeployOnBuild=true /p:WebPublishMethod=Package /p:PackageAsSingleFile=true /p:SkipInvalidConfigurations=true /p:PackageLocation="$(build.artifactStagingDirectory)
    platform: '$(buildPlatform)'
    configuration: '$(buildConfiguration)'

Settings
- task: VSTest@2
  inputs:
    platform: '$(buildPlatform)'
    configuration: '$(buildConfiguration)'
Settings
- task: AzureRmWebAppDeployment@4
  inputs:
    ConnectedServiceName: ''
    WebAppName:
    Package: '$(build.artifactstagingdirectory)/*.zip'
```

Tasks

Search tasks

- .NET Core — Build, test, package, or publish a dotnet applicatio...
- Android signing — Sign and align Android APK files
- Ant — Build with Apache Ant
- App Center distribute — Distribute app builds to testers and users via Visu...
- App Center test — Test app packages with Visual Studio App Center
- Archive files — Compress files into .7z, .tar.gz, or .zip
- ARM Outputs — This task reads the output values of an ARM depl...
- ARM template deployment — Deploy an Azure Resource Manager (ARM) templ...
- Azure App Service deploy — Deploy to Azure App Service a web, mobile, or AP...
- Azure App Service manage — Start, stop, restart, slot swap, slot delete, install sit...
- Azure App Service Settings — Update/Add App settings an Azure Web App for ...
- Azure CLI — Run Azure CLI commands against an Azure subscr...
- Azure Cloud Service deployment — Deploy an Azure Cloud Service

Azure Pipelines jako kod (YAML)

hotbee / Parts Unlimited YAML / Pipelines / Builds / PartsUnlimited / YAML

Search

PartsUnlimited

Variables | Run

master | PartsUnlimited / azure-pipelines.yml

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Azure Pipelines jako kod (YAML)

hotbee / Parts Unlimited YAML / Pipelines / PartsUnlimited / 20200424.1

Search

Jobs in run #20200424.1
PartsUnlimited

Jobs

Job	1m 45s
Initialize job	8s
Checkout PartsUnlimite...	7s
NuGetToolInstaller	1s
NuGetCommand	35s
VSBuild	34s
VSTest	18s
AzureRmWebAppDep...	<1s
Post-job: Checkout Pa...	<1s

AzureRmWebAppDeployment

View raw log

```
Starting: AzureRmWebAppDeployment
==============================================================================
Task         : Azure App Service deploy
Description  : Deploy to Azure App Service a web, mobile, or API app using Docker, Java, .NET, .NET Core, Node.js, PHP, Python, or Ruby
Version      : 4.163.6
Author       : Microsoft Corporation
Help         : https://aka.ms/azureappservicetroubleshooting
==============================================================================
##[error]Error: Input required: ConnectedServiceName
Finishing: AzureRmWebAppDeployment
```

Demo 1 – pipeline github

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Dlaczego YAML?

- Znany z poprzednich projektów, puppet, ansible, kubernetes
- Łatwiejszy w utrzymaniu niż edytor graficzny,
- Pipeline jest pisane dekralatywne,
- Wszystko w trzymane w GIT,
- YAML podąża za konkretnym branchem,
- Prosty do kopiowania i utrzymania,
- Dodatek w Visual Studio code,
- Prosty w konwersji z obecnego edytora,

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Dostępne feature'y

Feature	YAML	Classic Build	Classic Release	Notes
Agents	Yes	Yes	Yes	Specifies a required resource on which the pipeline runs.
Approvals	Yes	No	Yes	Defines a set of validations required prior to completing a deployment stage.
Artifacts	Yes	Yes	Yes	Supports publishing or consuming different package types.
Caching	Yes	Yes	No	Reduces build time by allowing outputs or downloaded dependencies from one run to be reused in later runs. In Preview, available with Azure Pipelines only.
Conditions	Yes	Yes	Yes	Specifies conditions to be met prior to running a job.
Container jobs	Yes	No	No	Specifies jobs to run in a container.
Demands	Yes	Yes	Yes	Ensures pipeline requirements are met before running a pipeline stage. Requires self-hosted agents.
Dependencies	Yes	Yes	Yes	Specifies a requirement that must be met in order to run the next job or stage.
Deployment groups	Yes	No	Yes	Defines a logical set of deployment target machines.

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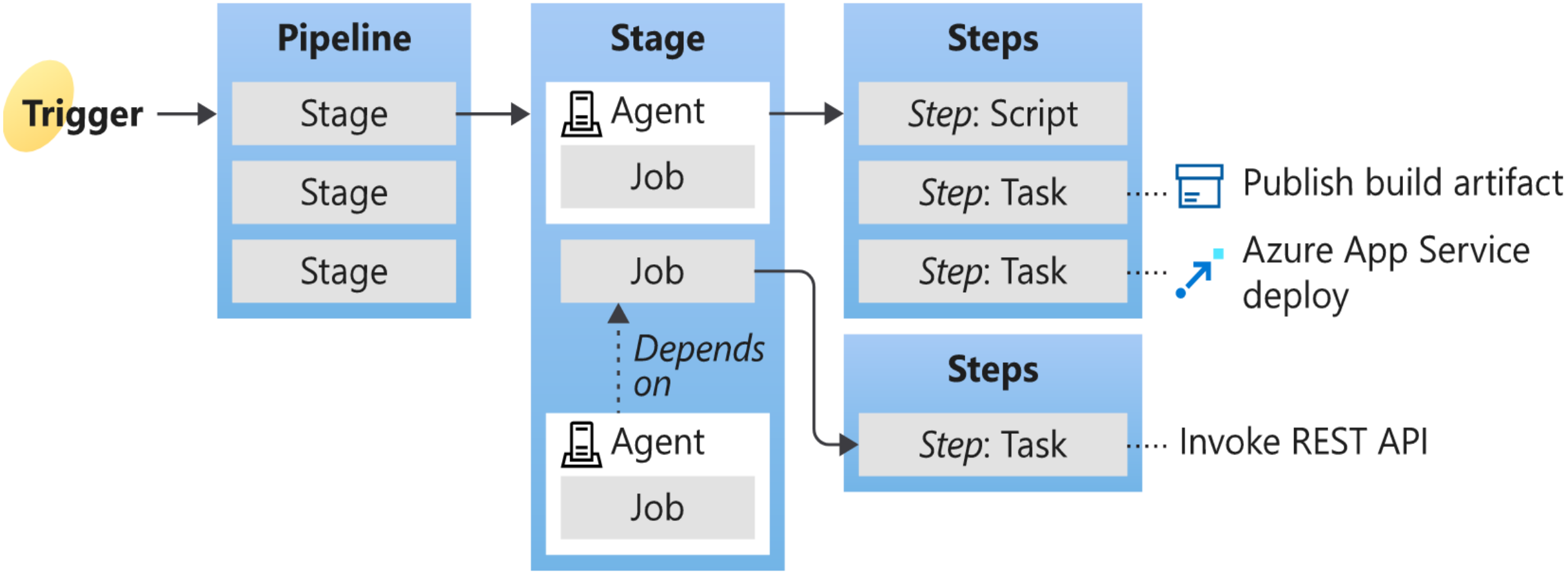
https://docs.microsoft.com/pl-pl/azure/devops/pipelines/get-started/pipelines-get-started?view=azure-devops

Koncept Azure DevOps pipeline



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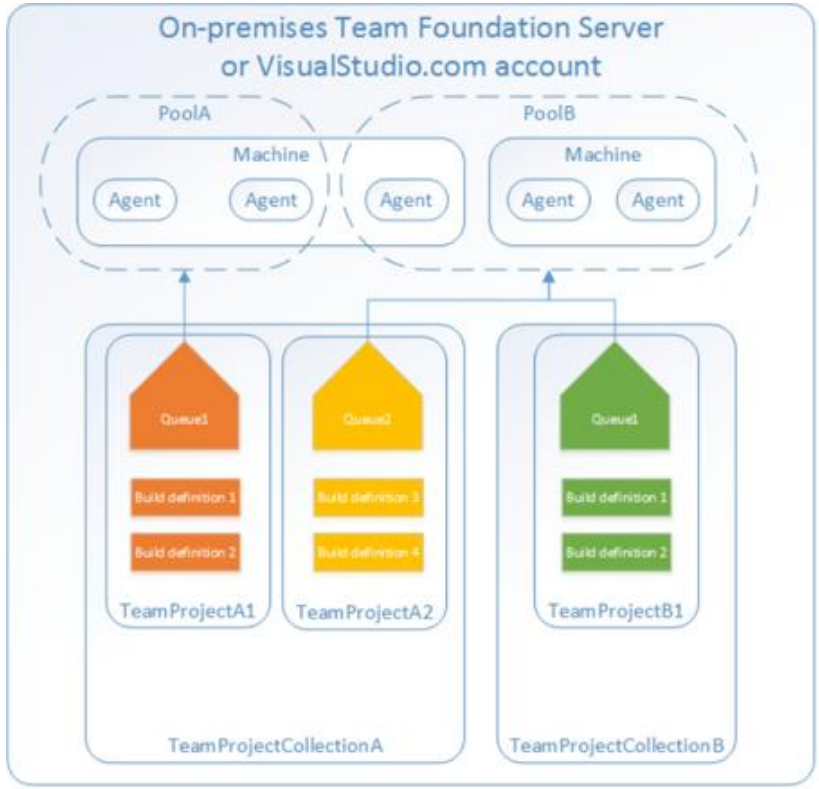
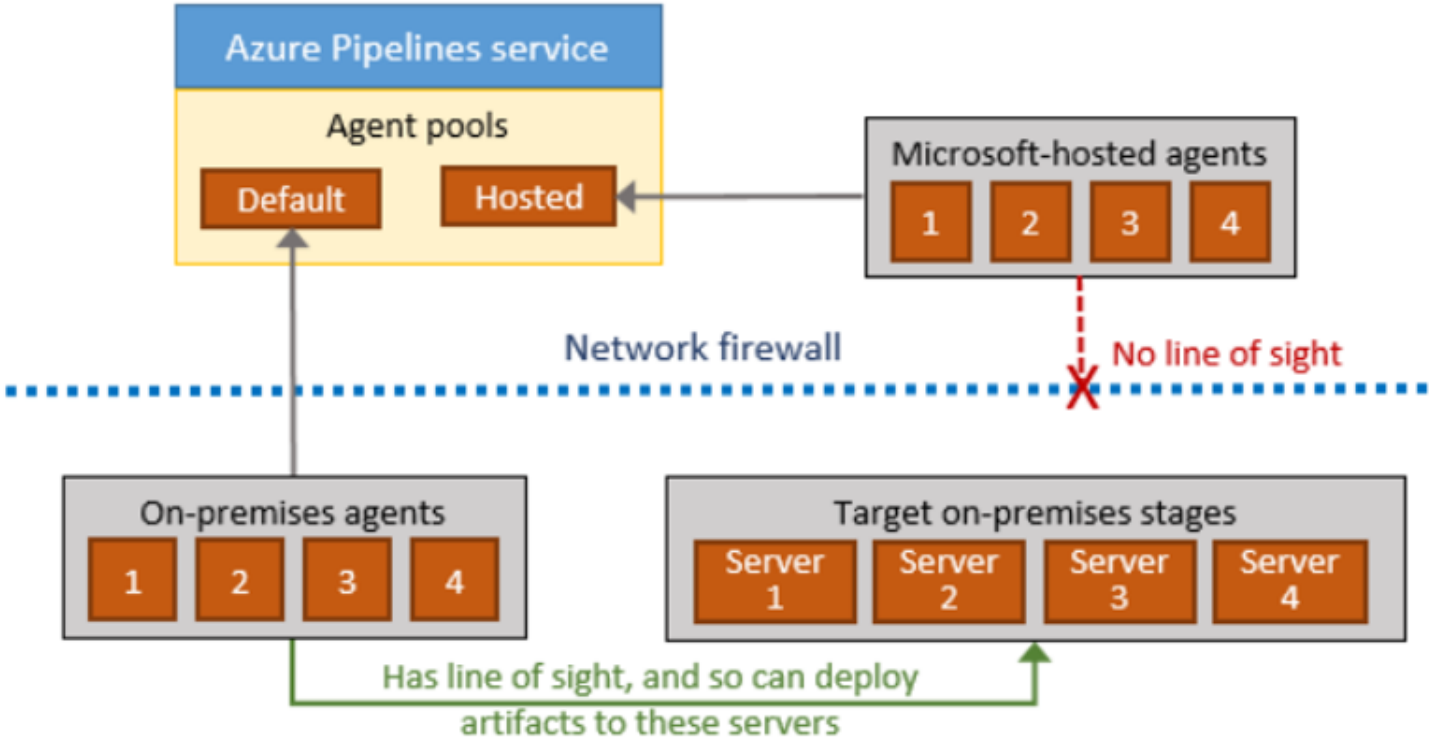
Agenci





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https://docs.microsoft.com/en-us/azure/devops/pipelines/agents/agents?view=azure-devops&tabs=browser

Agenci – hostowani przez Microsoft

Image	Classic Editor Agent Specification	YAML VM Image Label	Included Software
Windows Server 2019 with Visual Studio 2019	*windows-2019*	`windows-latest` OR `windows-2019`	Link
Windows Server 2016 with Visual Studio 2017	*vs2017-win2016*	`vs2017-win2016`	Link
Ubuntu 18.04	*ubuntu-18.04*	`ubuntu-latest` OR `ubuntu-18.04`	Link
Ubuntu 16.04	*ubuntu-16.04*	`ubuntu-16.04`	Link
macOS X Mojave 10.14	*macOS-10.14*	`macOS-10.14`	Link
macOS X Catalina 10.15	*macOS-10.15*	`macOS-latest` OR `macOS-10.15`	Link

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https://docs.microsoft.com/en-us/azure/devops/pipelines/agents/hosted?view=azure-devops

Struktura YAML

- Pipeline
  - Stage A
    - Job 1
      - Step 1.1
      - Step 1.2
      - ...
    - Job 2
      - Step 2.1
      - Step 2.2
      - ...
  - Stage B
    - ...

YAML

```yaml
name: string  # build numbering format
resources:
  pipelines: [ pipelineResource ]
  containers: [ containerResource ]
  repositories: [ repositoryResource ]
variables: # several syntaxes, see specific section
trigger: trigger
pr: pr
stages: [ stage | templateReference ]
```

YAML

```yaml
# ... other pipeline-level keywords
jobs: [ job | templateReference ]
```

YAML

```yaml
# ... other pipeline-level keywords
steps: [ script | bash | pwsh | powershell | checkout | task | templateReference ]
```

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Demo 2 – prosty pipeline

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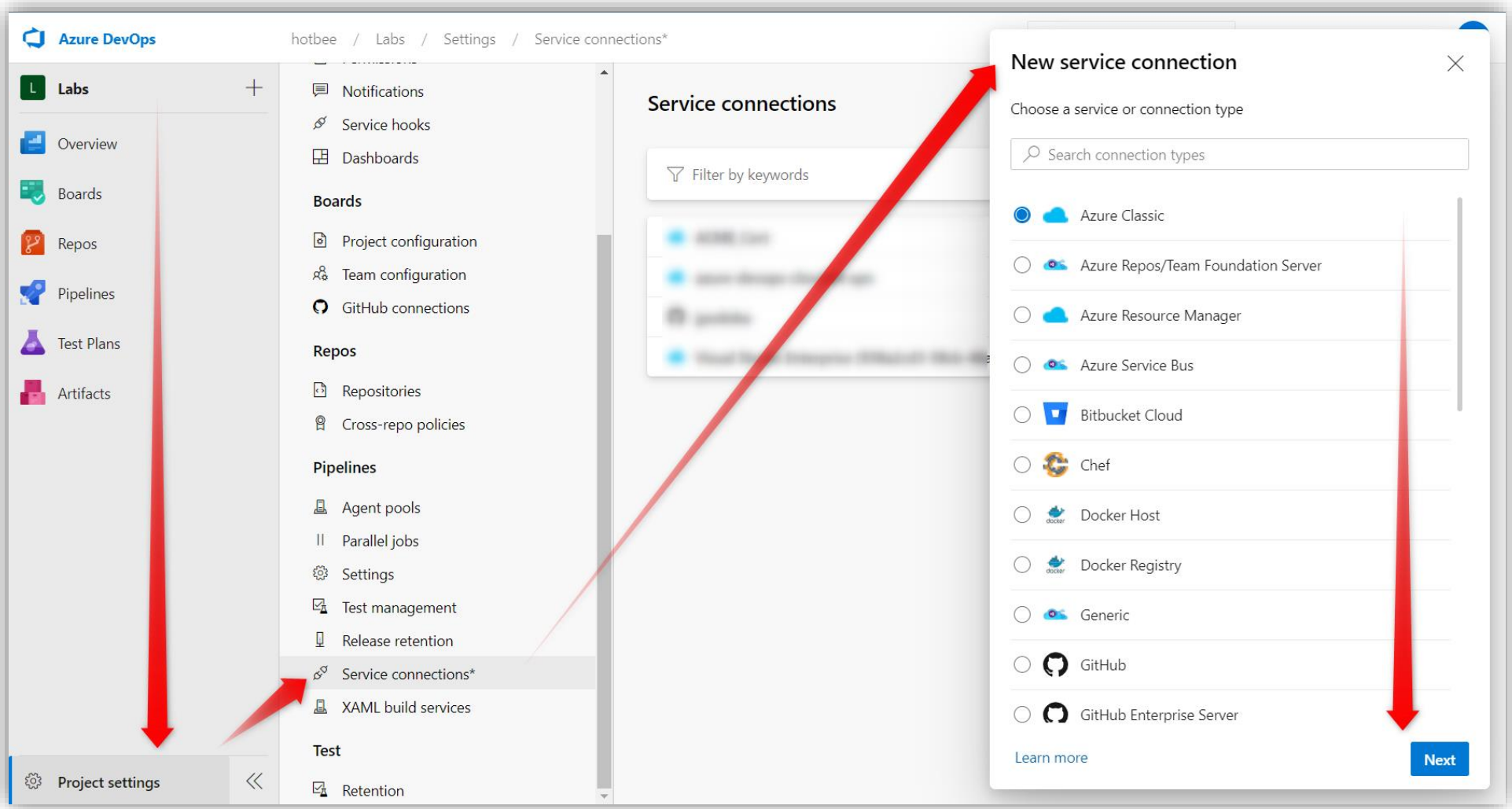
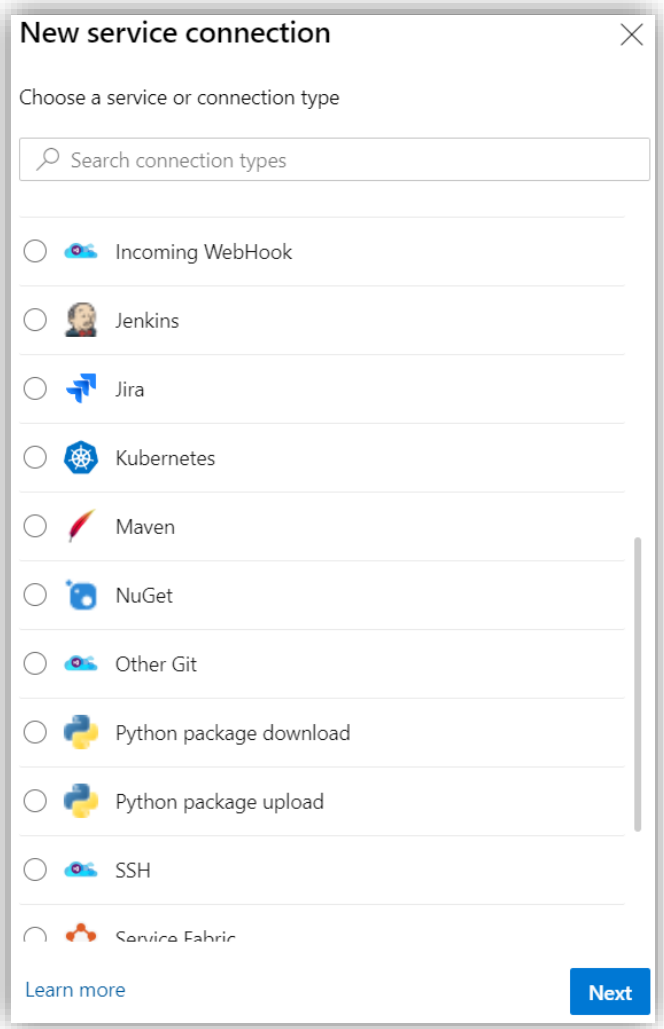
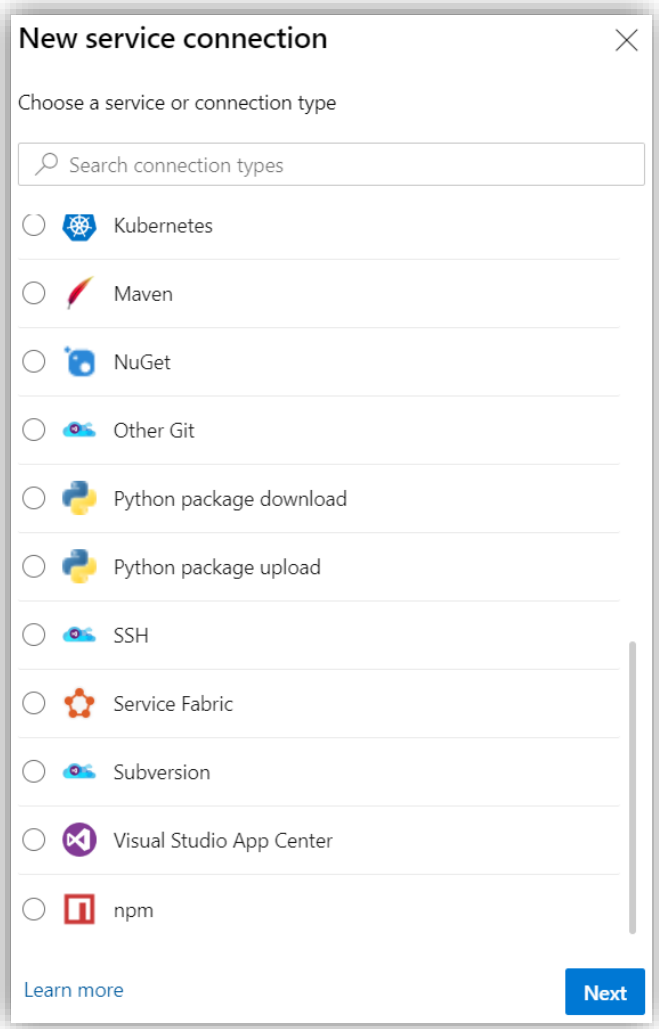
Service connection



Service connection





Nested YAML

- Steps,
- Jobs,
- Stage,
- Variables,

```yaml
# File: azure-pipeline-steps01.yml

jobs:
- job: Linux
  pool:
    vmImage: 'ubuntu-latest'

  steps:
  - script: npm install
  - script: yarn install
  - script: npm run compile

- job: Windows
  pool:
    vmImage: 'windows-latest'

  steps:
  - script: npm install
  - script: yarn install
  - script: npm run compile
```

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https://docs.microsoft.com/en-us/azure/devops/pipelines/process/templates?view=azure-devops

Nested YAML

- Steps,
- Jobs,
- Stage,
- Variables,

```yaml
# File: azure-pipeline-steps01.yml

jobs:
- job: Linux
  pool:
    vmImage: 'ubuntu-latest'

  steps:
  - script: npm install
  - script: yarn install
  - script: npm run compile

- job: Windows
  pool:
    vmImage: 'windows-latest'

  steps:
  - script: npm install
  - script: yarn install
  - script: npm run compile
```

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https://docs.microsoft.com/en-us/azure/devops/pipelines/process/templates?view=azure-devops

Nested - steps

```yaml
# File: azure-pipeline-steps02.yml

jobs:
- job: Linux
  pool:
    vmImage: 'ubuntu-latest'
  steps:
  - template: templates/include-npm-steps.yml  # Template reference
- job: Windows
  pool:
    vmImage: 'windows-latest'
  steps:
  - template: templates/include-npm-steps.yml  # Template reference
```

nested/templates

- include-npm-steps.yml
- azure-pipeline-steps01.yml
- azure-pipeline-steps02.yml

Contents | History | Compare | Blame

```yaml
# File: include-npm-steps.yml

steps:
- script: npm install
- script: yarn install
- script: npm run compile
```

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https://docs.microsoft.com/en-us/azure/devops/pipelines/process/templates?view=azure-devops

Demo 3 – nested pipeline

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Triggers

Classic build pipelines and YAML pipelines

Continuous integration (CI) triggers vary based on the type of repository you build in your pipeline.

- CI triggers in Azure Repos Git
- CI triggers in GitHub
- CI triggers in BitBucket Cloud
- CI triggers in TFVC

```yaml
# A pipeline with no CI trigger
trigger: none
```

Pull request validation (PR) triggers also vary based on the type of repository.

- PR triggers in Azure Repos Git
- PR triggers in GitHub
- PR triggers in BitBucket Cloud

```yaml
# specific path build
trigger:
  branches:
    include:
    - master
    - releases/*
  paths:
    include:
    - docs/*
    exclude:
    - docs/README.md
```

```yaml
# specific tag
trigger:
  tags:
    include:
    - v2.*
    exclude:
    - v2.0
```

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https://docs.microsoft.com/en-us/azure/devops/pipelines/build/triggers?view=azure-devops

Triggers - scheduled

```yaml
schedules:
- cron: "0 0 * * *"
  displayName: Daily midnight build
  branches:
    include:
    - master
    - releases/*
    exclude:
    - releases/ancient/*
- cron: "0 12 * * 0"
  displayName: Weekly Sunday build
  branches:
    include:
    - releases/*
  always: true
```

```yaml
# YAML file in the release branch
schedules:
- cron: "0 0 * * *"
  displayName: Daily midnight build
  branches:
    include:
    - master

# YAML file in the master branch with release added to the branches list
schedules:
- cron: "0 0 * * *"
  displayName: Daily midnight build
  branches:
    include:
    - master
    - release
```

```
mm HH DD MM DW
 \  \  \  \  \__ Days of week
  \  \  \  \____ Months
   \  \  \______ Days
    \  \________ Hours
     \__________ Minutes
```

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https://docs.microsoft.com/en-us/azure/devops/pipelines/process/scheduled-triggers?view=azure-devops

Triggers - pipeline

```yaml
# this is being defined in app-ci pipeline
resources:
  pipelines:
  - pipeline: securitylib   # Name of the pipeline resource
    source: security-lib-ci # Name of the triggering pipeline
    trigger:
      branches:
      - releases/*
      - master
```

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https://docs.microsoft.com/en-us/azure/devops/pipelines/process/pipeline-triggers?view=azure-devops

Variables

- Użytkownika,
- Systemowe, **(predefiniowane)**
- Środowiskowe, **(w zależności od OS)**

- Trzy poziomy definiowania:
- **Root level,**
- **Stage level,**
- **Job leve,**

```yaml
variables:
  global_variable: value    # this is available to all jobs

jobs:
- job: job1
  pool:
    vmImage: 'ubuntu-16.04'
  variables:
    job_variable1: value1    # this is only available in job1
  steps:
  - bash: echo $(global_variable)
  - bash: echo $(job_variable1)
  - bash: echo $JOB_VARIABLE1 # variables are available in the script environment too

- job: job2
  pool:
    vmImage: 'ubuntu-16.04'
  variables:
    job_variable2: value2    # this is only available in job2
  steps:
  - bash: echo $(global_variable)
  - bash: echo $(job_variable2)
  - bash: echo $GLOBAL_VARIABLE
```

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https://docs.microsoft.com/en-us/azure/devops/pipelines/build/variables?view=azure-devops&tabs=yaml

Conditions

- „by design” wszystko wyzwalane jest jednocześnie,
- „by design” nic od siebie nie zależy,
- Są po to aby ustalić zależności,
- I ograniczenia, (niezastąpione przy multi stage)

Run for the master branch, if succeeding

Copy

```
and(succeeded(), eq(variables['Build.SourceBranch'], 'refs/heads/master'))
```

Run if the branch is not master, if succeeding

Copy

```
and(succeeded(), ne(variables['Build.SourceBranch'], 'refs/heads/master'))
```

Run for user topic branches, if succeeding

Copy

```
and(succeeded(), startsWith(variables['Build.SourceBranch'], 'refs/heads/users/'))
```

- zagadka

```
  condition: and(succeeded(), ne(variables['Build.Reason'], 'PullRequest'))
```

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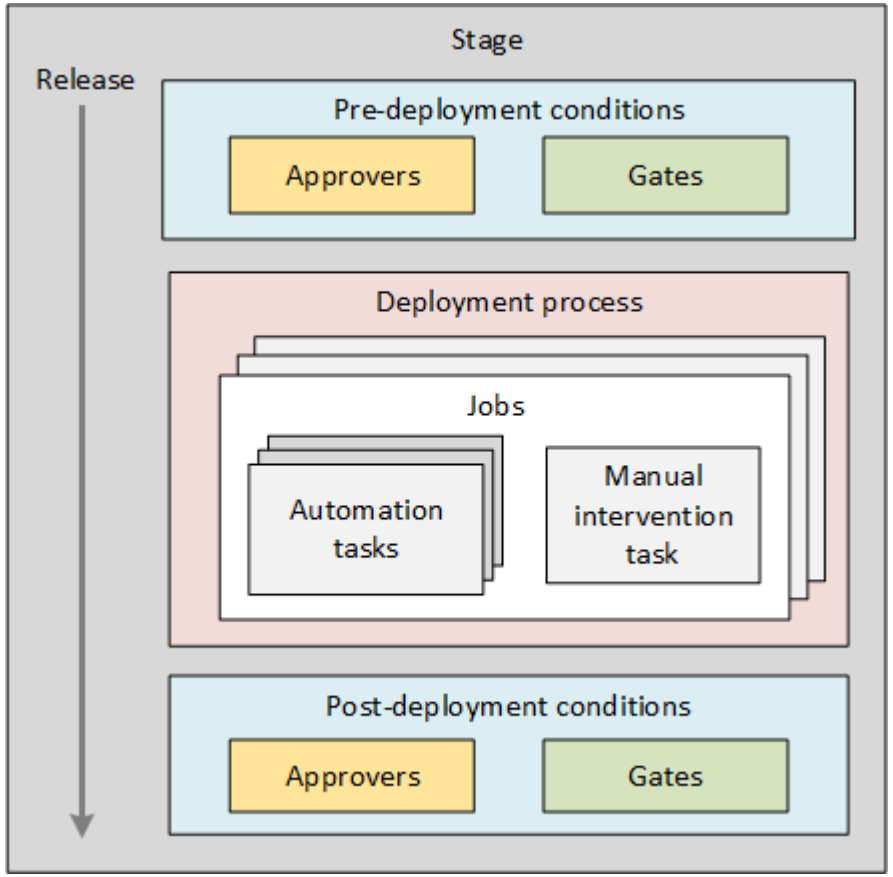
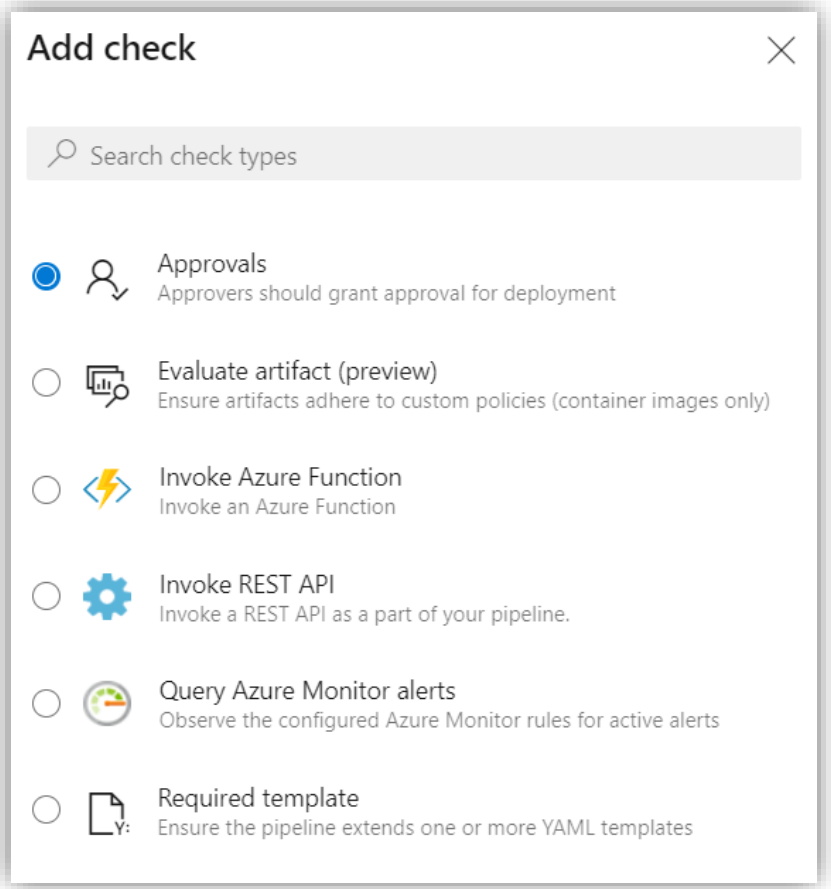
https://docs.microsoft.com/en-us/azure/devops/pipelines/process/conditions?view=azure-devops&tabs=yaml

Approvals





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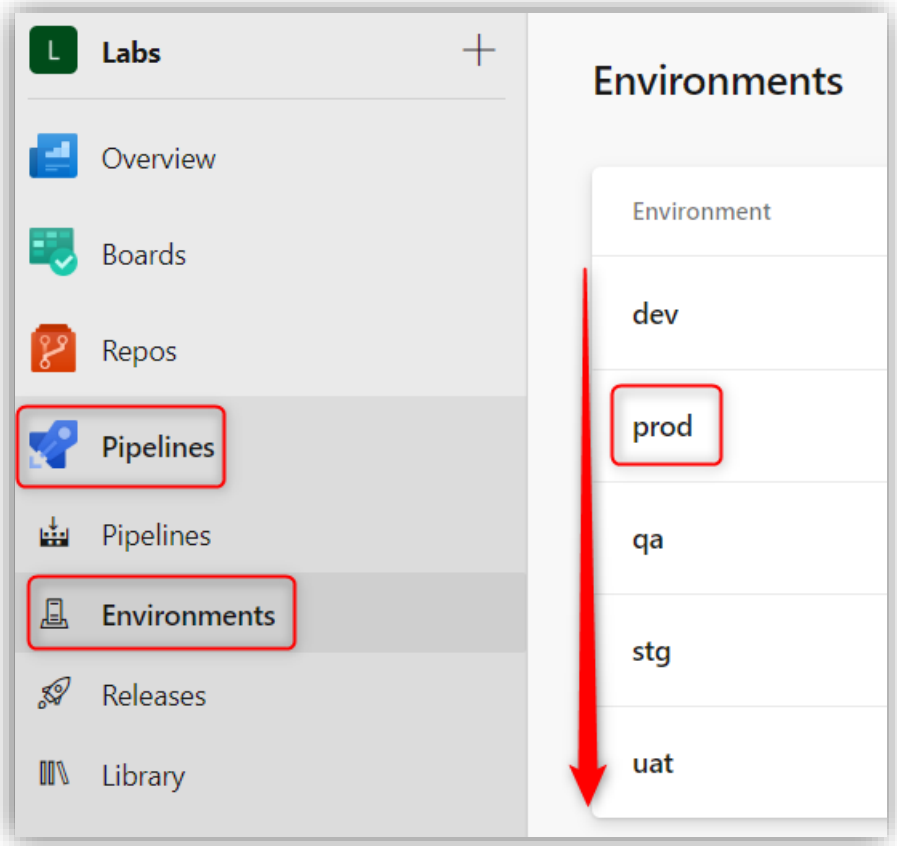
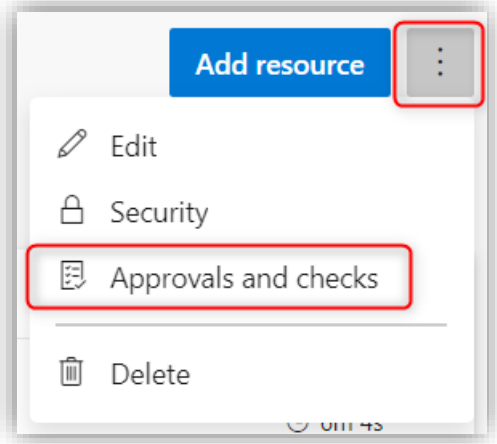
https://docs.microsoft.com/en-us/azure/devops/pipelines/release/approvals/?view=azure-devops

Approvals - manual





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https://docs.microsoft.com/en-us/azure/devops/pipelines/release/approvals/?view=azure-devops

Approvals - manual

```yaml
- stage: PROD
  displayName: 'PROD(CD)'
  condition: and(succeeded('STG'), eq(variables['Build.SourceBranch'], 'refs/heads/master'))
  dependsOn:
    - BLD
    - STG
  variables:
    stage: 'prod'
  jobs:
  - deployment: Primary_NorthErope
    pool:
      vmImage: $(vmImage)
    environment: prod
    strategy:
      runOnce:
        deploy:
          steps:
          - template: 'pipelines/infrastructure/deploy.yml'
            parameters: {type: 'primary', spn: 'azure-devops-cloud4it-spn', location: 'northeurope'}
          - template: 'pipelines/application/deploy.yml'
            parameters: {type: 'primary', spn: 'azure-devops-cloud4it-spn'}
```

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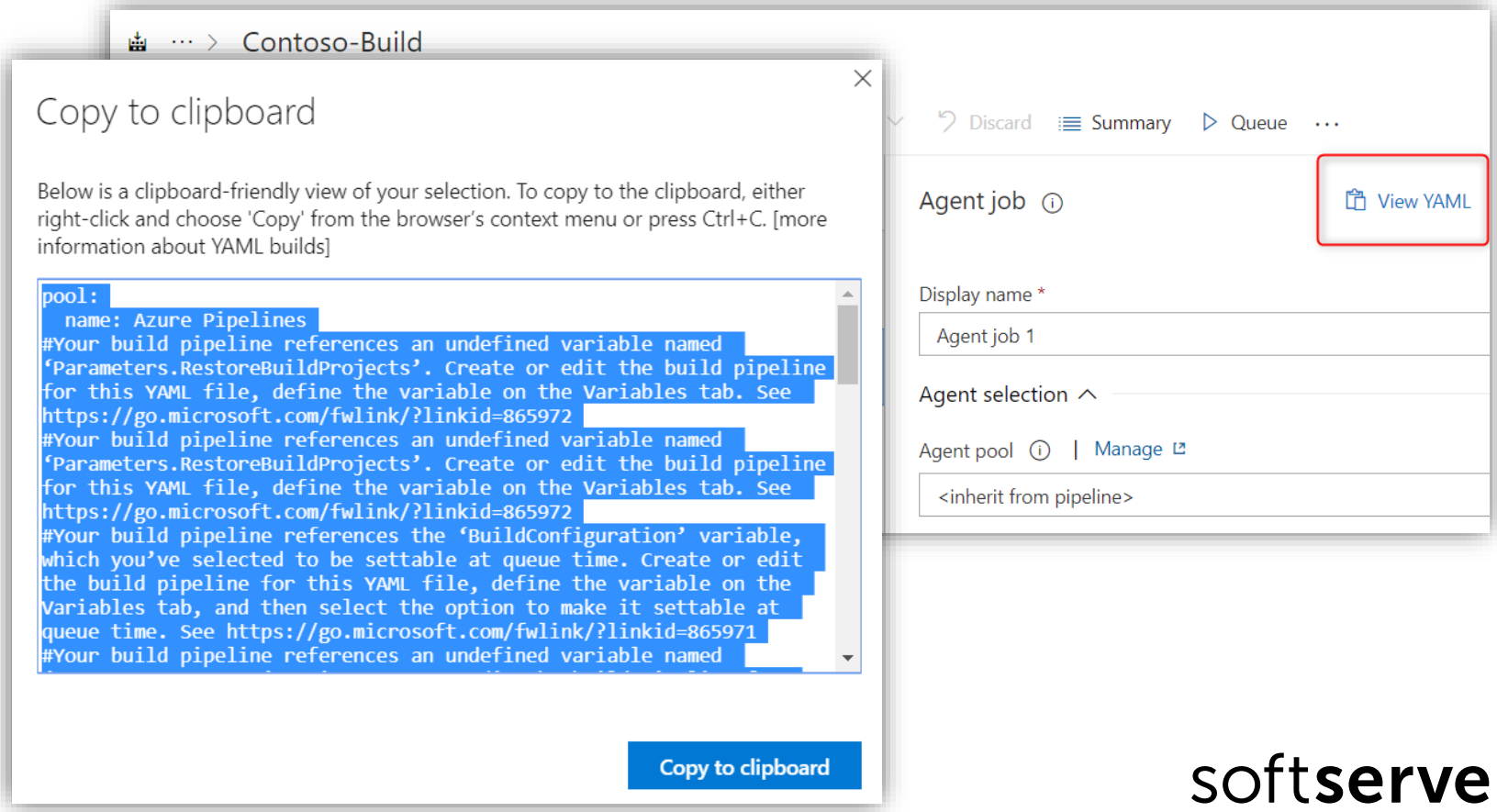
https://docs.microsoft.com/en-us/azure/devops/pipelines/release/approvals/?view=azure-devops

Migracja do YAML

- Prosta dla „build”,
- Prosta dla „release”
  - Ale nie aż tak



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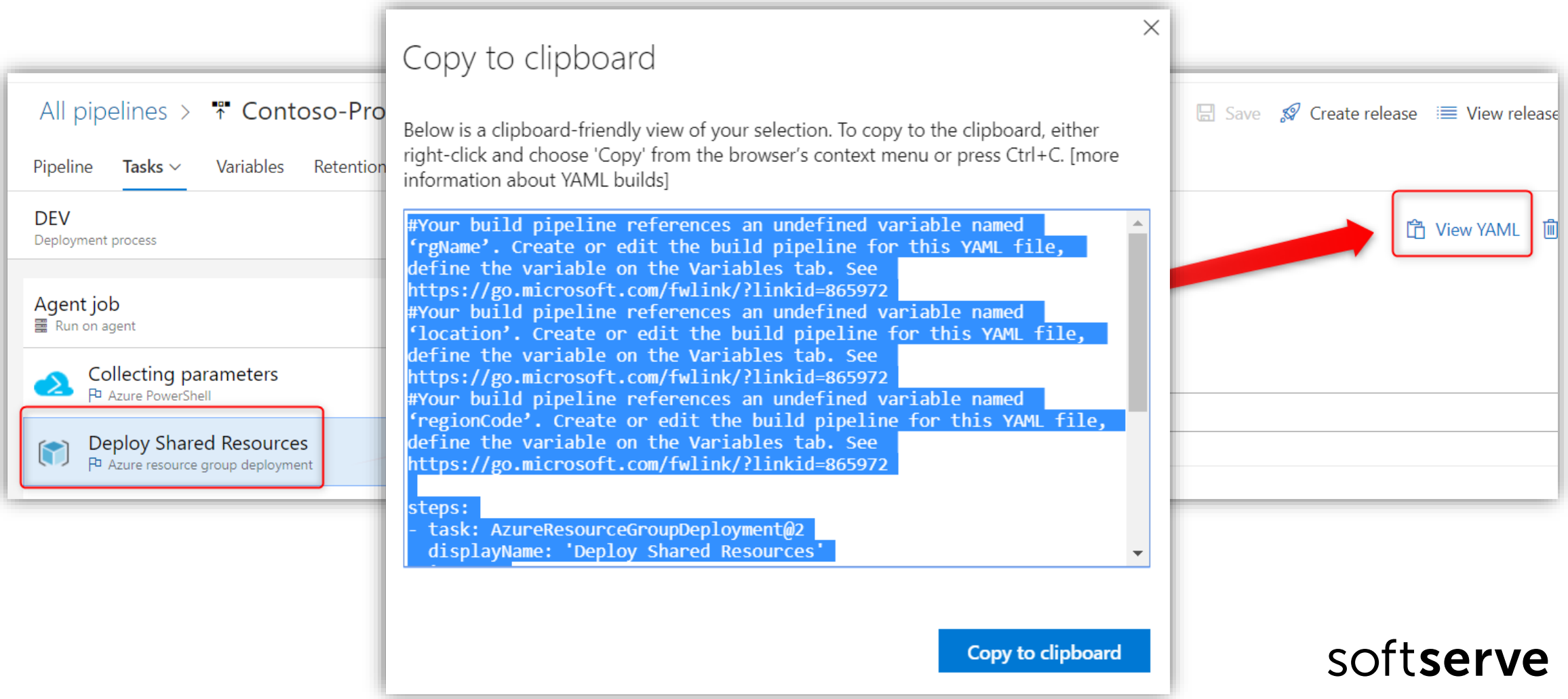
Migracja do YAML



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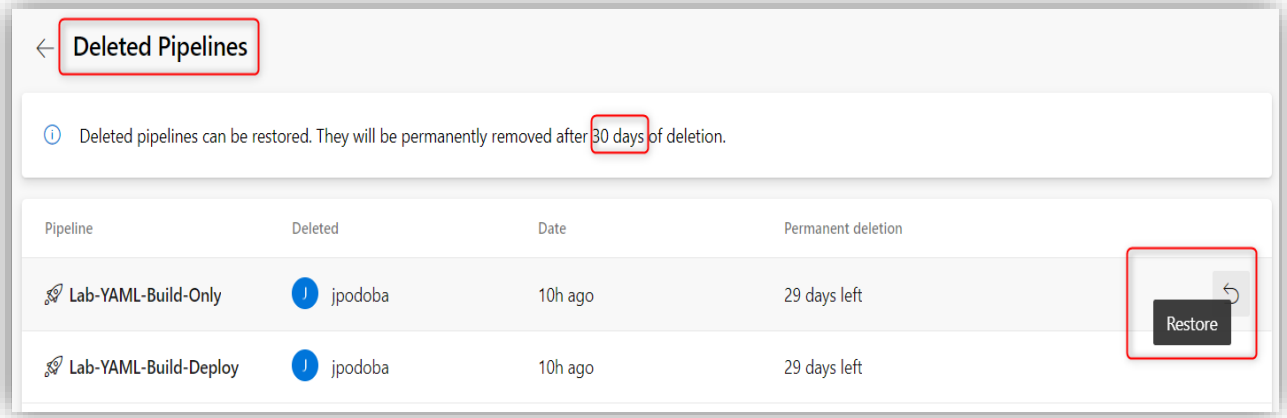
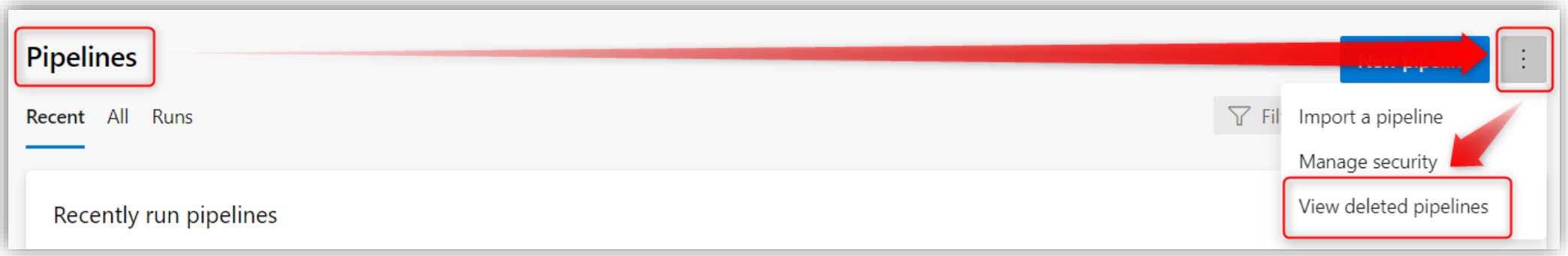
Historia i oddzyskiwanie

- „pipeline as code” – jest w GIT,
- proste w śledzeniu zmian,
- proste w cofaniu zmian,
- proste w oddzyskiwaniu po usunięciu,
- Ale co z **pipeline id** ???





softserve

Multi stage pipeline

```
Build
| * Infrastructure
| * Application
```

1

```
Build
| * Infrastructure
| * Application
|
|-> develop
|       |
|       |-> Deploy DEV (Primary Region)
|       |     * Primary Region
|       |
|       |-> Deploy QA (Primary Region)
|       |     * Primary Region
```

2

```
Build
| * Infrastructure
| * Application
|
|-> develop
|       |
|       |-> Deploy DEV (Primary Region)
|       |     * Primary Region
|       |
|       |-> Deploy QA (Primary Region)
|       |     * Primary Region
|
|- master
|       |
|       |-> Deploy UAT
|       |     * Primary Region
|       |
|       |-> Deploy STG
|       |     * Primary Region
|       |
|       |-> Deploy PROD
|       |     * Primary Region
|       |     * Secondary Region
```

3

softserve

Multi stage pipeline

```
Build
| * Infrastructure
| * Application
```

1

```
* Infrastructure
* Application

-> develop
     |
     |-> Deploy DEV (Primary Region)
     |      * Primary Region
     |
     |-> Deploy QA (Primary Region)
     |      * Primary Region
```

2

```
Build
| * Infrastructure
| * Application
|
|-> develop
|       |
|       |-> Deploy DEV (Primary Region)
|       |      * Primary Region
|       |
|       |-> Deploy QA (Primary Region)
|       |      * Primary Region
|
|- master
|       |
|       |-> Deploy UAT
|       |      * Primary Region
|       |
|       |-> Deploy STG
|       |      * Primary Region
|       |
|       |-> Deploy PROD
|       |      * Primary Region
|       |      * Secondary Region
```

3

softserve

Demo 4 – Multi stage pipeline

softserve

Pytania ???

Przydate linki:

- https://docs.microsoft.com/en-us/azure/devops/pipelines/?view=azure-devops
- https://github.com/microsoft/azure-pipelines-yaml
- https://azuredevopslabs.com/labs/azuredevops/yaml/

- https://github.com/jpodoba/Presentations/tree/master/2020-04-27-Cloud4it-Group

Ankieta prelegenta:

https://tinyurl.com/yamlwroclaw

Dziękuje za uwagę

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