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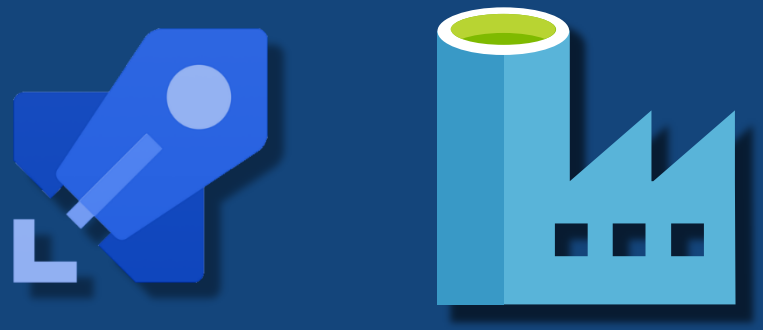
Azure Data Factory: A deployment challenges



Kamil Nowiński

Microsoft Data Platform **MVP**

Speaker, blogger, data enthusiast

Group Manager at Avanade UK&I (www.avanade.com)

>20 yrs experience as DEV/BI/(DBA)

Member of the Data Community PL

Founder of blog SQLPlayer (www.SQLplayer.net)

GitHub: #adftools, SCD Merge Wizard and more…

SQL Server Certificates:

MCITP, MCP, MCTS, MCSA, MCSE Data Platform,

MCSE Data Management & Analytics, DevOps Expert

Moreover: Bicycle, Running, Digital photography

@NowinskiK, @SQLPlayer

Blog

SQL Player

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www.SQLPlayer.net

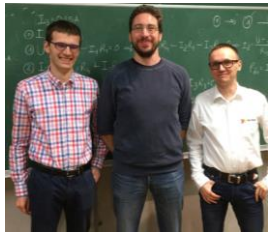
- Technical posts
- Various skill level
- Cheet sheets
- Recommended books
- Many useful other links
- Interviews (Podcast)
- YouTube Channel: www.SQLPlayer.net/YouTube

“Ask SQL Family” #podcast







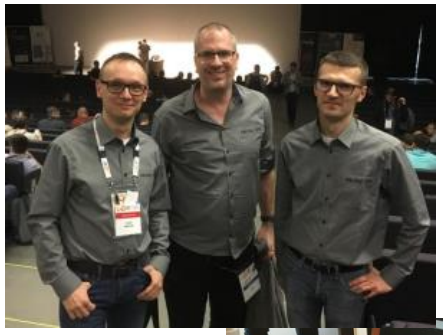
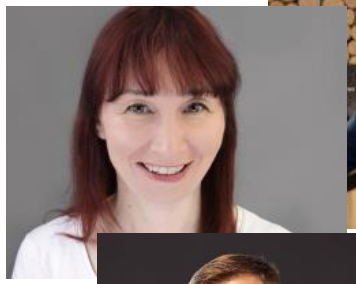


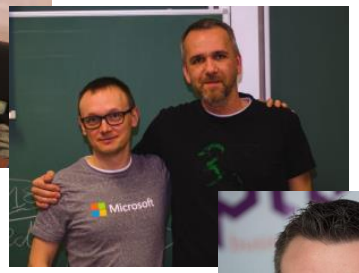


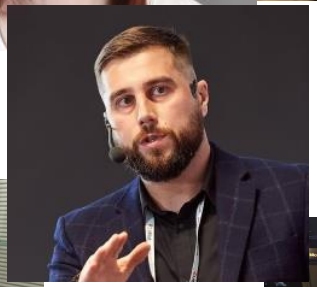


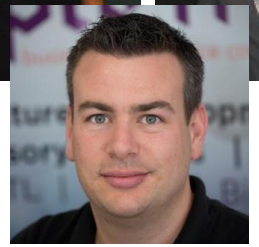


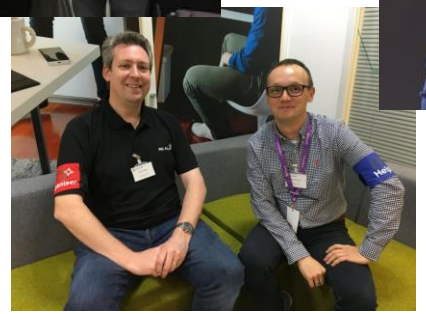







www.SQLPlayer.net/YouTube

Slides available:

https://sqlplayer.net/slides

AGENDA

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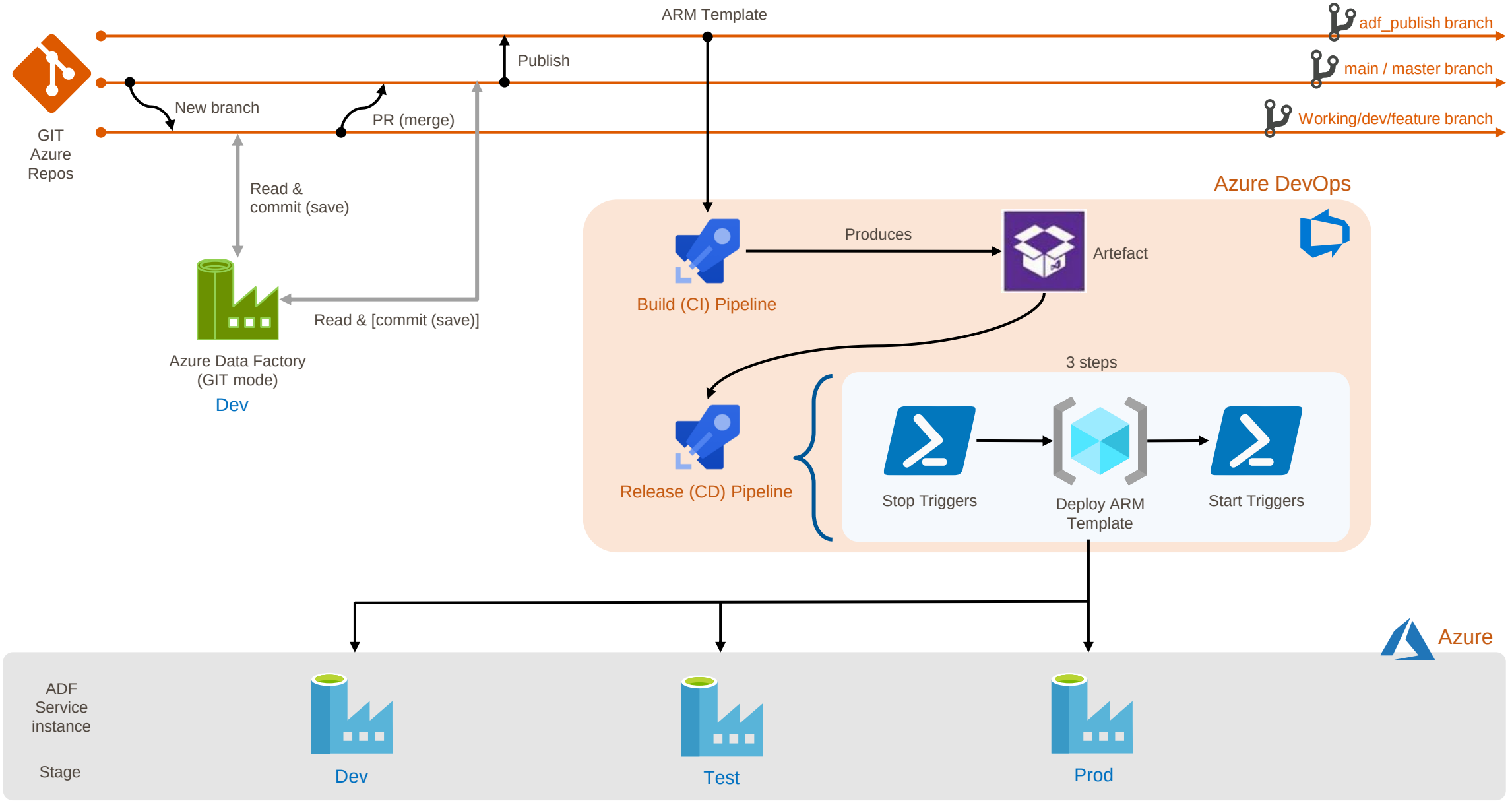
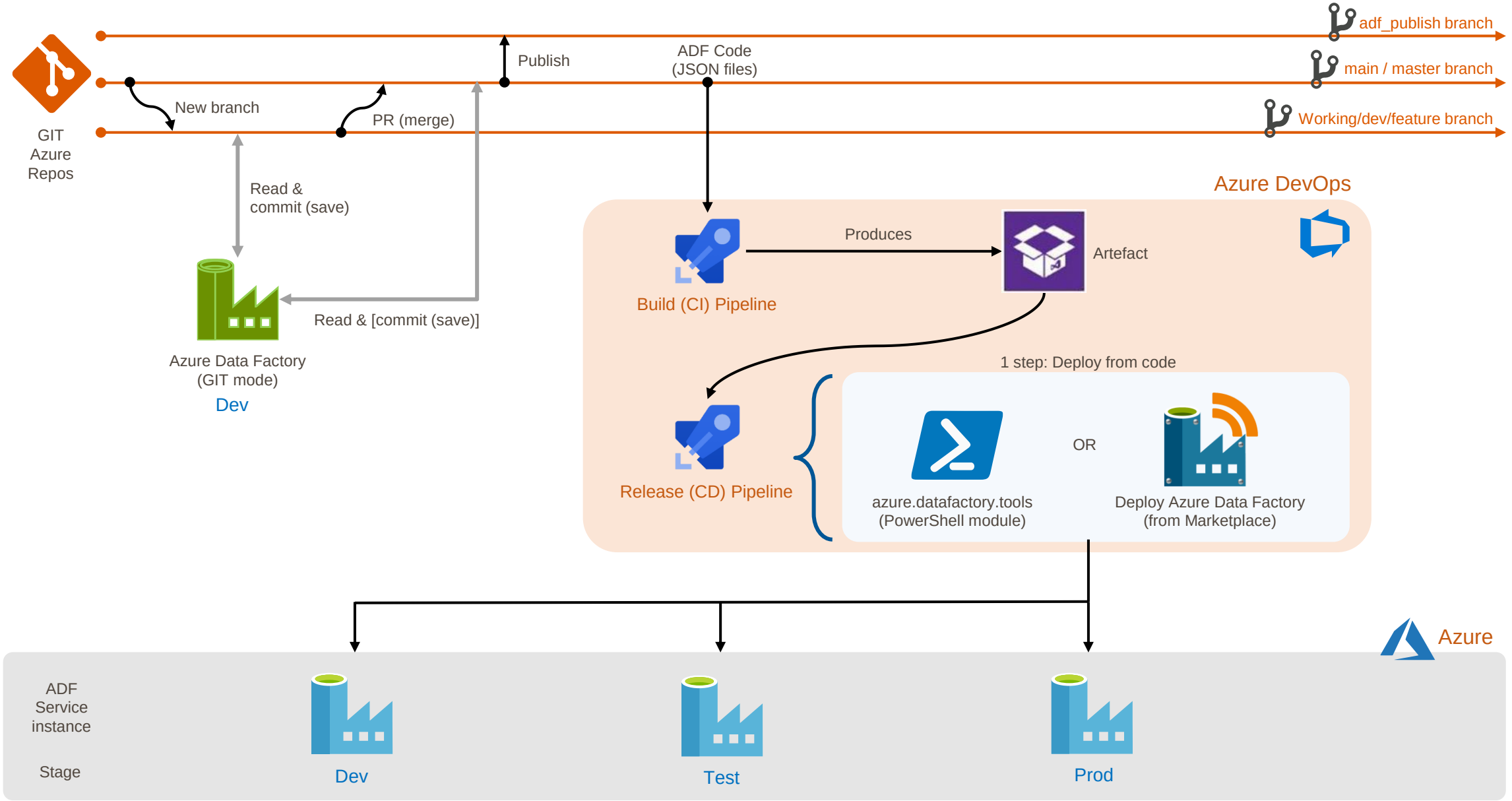
- Azure Data Factory – DEPLOYMENT only
- Two (three?) methods of ADF deployment
- How these methods work
- Differences
- npm module from Microsoft – now you can fully automate CI (build)
- #adftools – make your life easier!

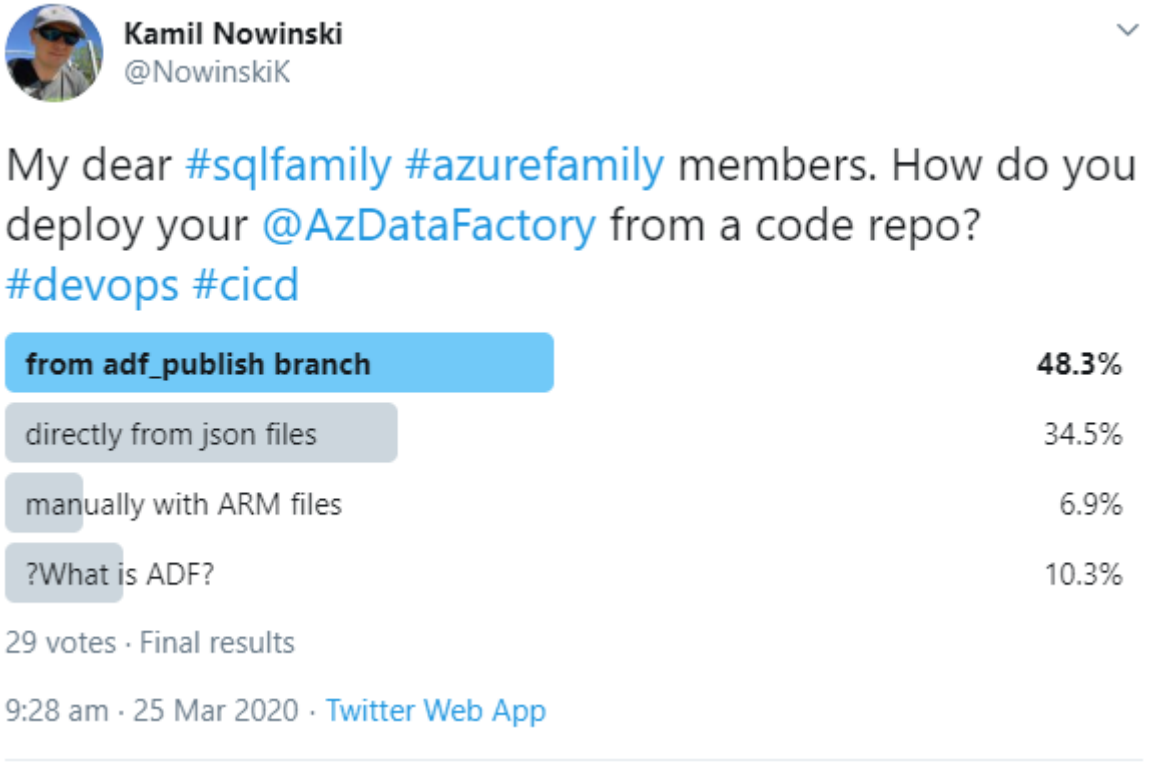
Deployment (1): Microsoft's method (ARM Template)



Deployment (2): Directly from code method



Who use what?



Kamil Nowinski
@NowinskiK

My dear #sqlfamily #azurefamily members. How do you deploy your @AzDataFactory from a code repo? #devops #cicd

from adf_publish branch	**48.3%**
directly from json files	34.5%
manually with ARM files	6.9%
?What is ADF?	10.3%

29 votes · Final results

9:28 am · 25 Mar 2020 · Twitter Web App

https://twitter.com/NowinskiK/status/1242745169394442240

ADF – Currently available methods of deployment – pros & cons

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ARM Template from “adf_publish” branch

- Faster, “incremental”
- Appears in „Deployments” for Resource Group

- Parametrize elements exposed within the ARM Template Parameter *
- Full ADF (all artefacts) can be deploy only
- Restriction of 256 parameters
- Limitation to one publish branch only (adf_publish)
- Manual “Publish” step

Before 2021

Rest-Api/PowerShell script from code (JSON objects)

- Slower
- Doesn’t appear in „Deployments” for Resource Group
- Parameterize any artefact of the Data Factory

- Selectively deploy a subset of artefacts
- Eliminates an enforcement to use only one (adf_publish) branch if company’s branches policy is much complex

Post: Two methods of deployment Azure Data Factory

ADF – ARM Template enhanced deployment method

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ARM Template from “adf_publish” branch

- Faster, “incremental”
- Appears in „Deployments” for Resource Group

- Parametrize elements exposed within the ARM Template Parameter *
- Full ADF (all artefacts) can be deploy only
- Restriction of 256 parameters
- ~~Limitation to one publish branch only (adf_publish)~~
- ~~Manual “Publish” step~~
- Not user-friendly npm library
- Requires adding “package” file to a repo

Since 2021

Rest-Api/PowerShell script from code (JSON objects)

- Slower
- Doesn’t appear in „Deployments” for Resource Group
- Parameterize any artefact of the Data Factory

- Selectively deploy a subset of artefacts
- Eliminates an enforcement to use only one (adf_publish) branch if company’s branches policy is much complex

Just a few small things...

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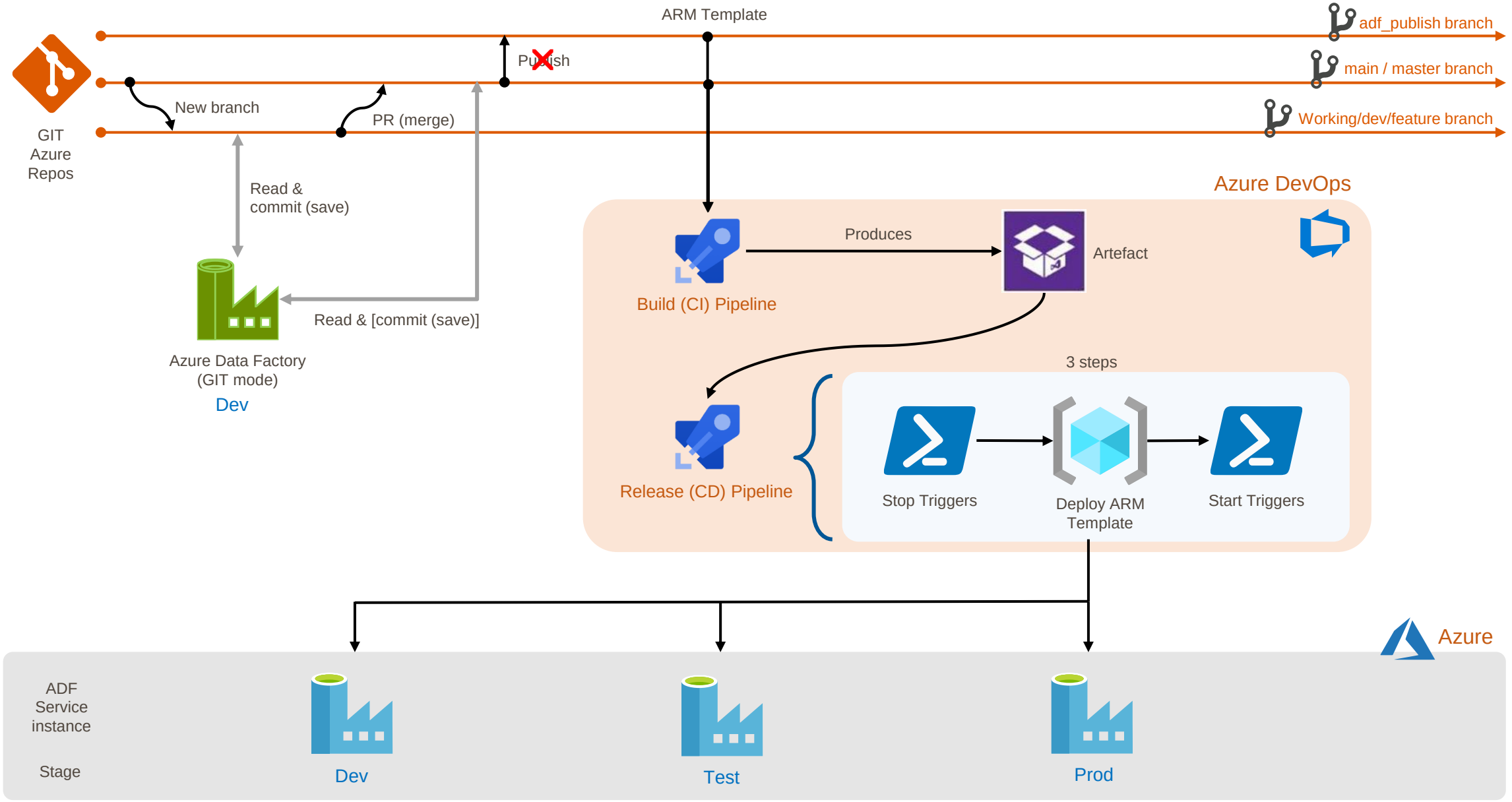
- Continuous integration and delivery in Azure Data Factory
- Automated publishing for continuous integration and delivery
- Use custom parameters with the Resource Manager template
- Sample pre- and post-deployment script

Automated publishing via CI/CD within npm & ARM Template



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DEMO
... in a minute;
a question first...

What do you prefer?

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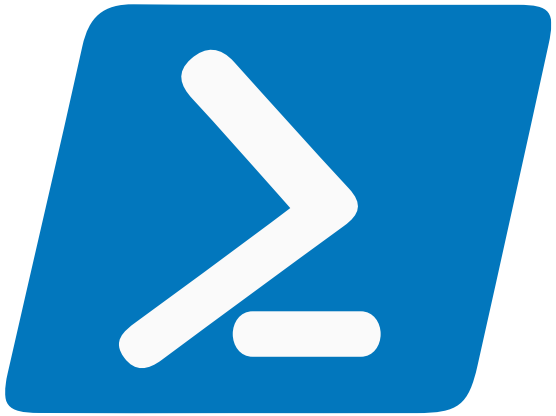

SQL Player
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DEMO #1
ARM Template deployment

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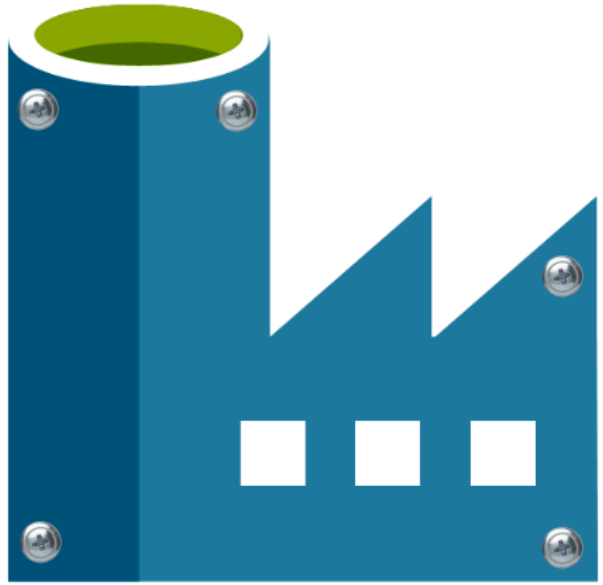
#adftools



#adftools

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Two tools:

PowerShell module (azure.datafactory.tools)

Azure DevOps extension (3 tasks)

https://sqlplayer.net/adftools/

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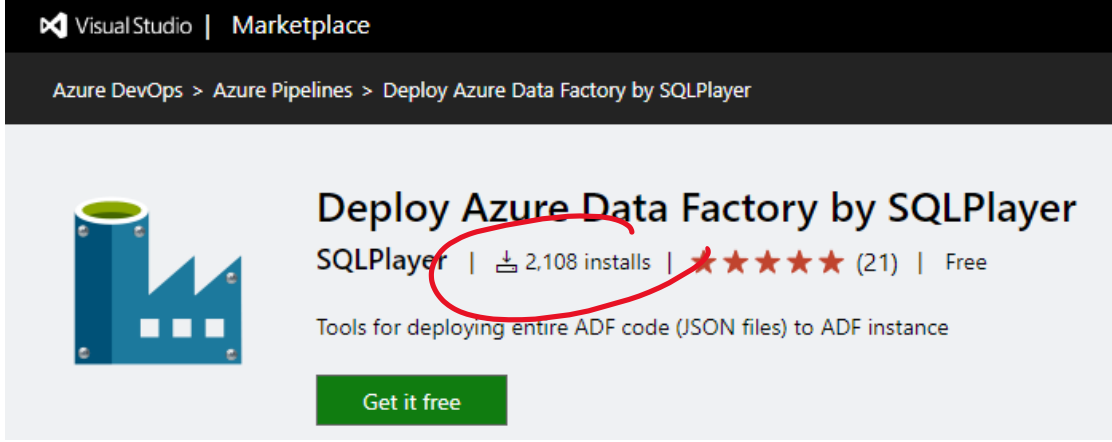
DEMO #2
Deployment with PowerShell

Azure DevOps: Custom Tasks



[Deploy Azure Data Factory]

Key concept:

- Free & Open-Source
- One task for everything when it comes to the publishing of ADF
- Basically, it is another (UI) layer on top of „azure.datafactory.tools" module
- Public Release (GA) since 23/12/2020
- Extension contains 3 tasks that cover full deployment life-cycle for ADF

Any ideas or questions? Leave it here:
https://github.com/SQLPlayer/azure.datafactory.tools/issues

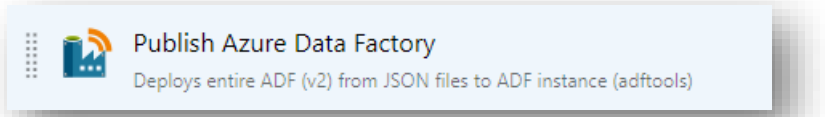
PowerShell module: azure.datafactory.tools

SQL Player
Play with data & have fun!

- Fully written in PowerShell, compatible with 5.1
- Uses Microsoft's PS module (Az.DataFactory) for management of ADF objects
- Available in PowerShell gallery
- `Publish-AdfV2FromJson` function - capabilities:
  - Creation of Azure Data Factory, if not exist (option)
  - Deployment of all type of objects: pipelines, datasets, linked services, data flows & power query, triggers, integration runtimes
  - Copes with dependencies (multiple levels) between objects when deploying (no more worrying about object names)
  - Build-in mechanism to replace the properties with the indicated values (CSV file)
  - Stop/start triggers (option)
  - Dropping objects when not exist in the source (code) (option)
  - Selective deployment: Filtering (include or exclude) objects to be deployed by name and/or type
  - Publish options allow you to control:
    - Whether stop and restarting triggers
    - Whether delete or not objects not in the source
    - Whether create or not a new instance of ADF if it not exist
- Free & Open-Source

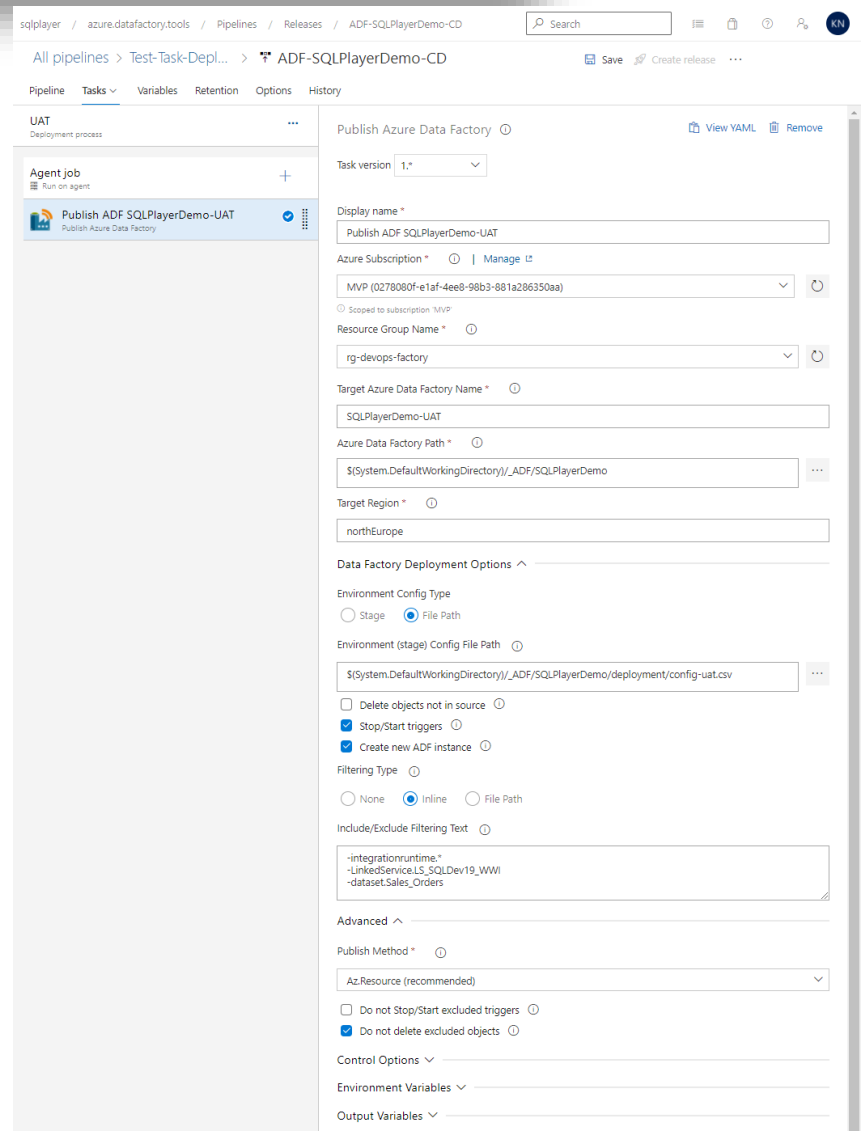
https://github.com/SQLPlayer/azure.datafactory.tools

Task in Azure DevOps: Publish ADF (CD)



Key capabilities:

- Creation of Azure Data Factory, if not exist (option)
- Deployment of all type of objects: pipelines, datasets, linked services, data flows, triggers, integration runtimes, Managed Virtual Network, Managed Private Endpoint
- Copes with dependencies (multiple levels) between objects when deploying (no more worrying about object names)
- Build-in mechanism to replace the properties with the indicated values (CSV & JSON file format)
- Update, add or remove any property of ADF artefact
- Selective deployment declared in-line or by pointed file
- Stop/start triggers (option)
- Dropping objects when not exist in the source (code) (option)
- Filtering (include or exclude) objects to be deployed by name and/or type and/or type
- Filtering supports wildcards
- Publish options allow you to control:
    - Whether stop and restarting triggers
    - Whether delete or not objects not in the source
    - Whether create or not a new instance of ADF if it not exist
- Tokenisation in config file allows replace any value by Environment Variable or Variable from DevOps Pipeline
- Global Parameters



Selective deployment with PowerShell module

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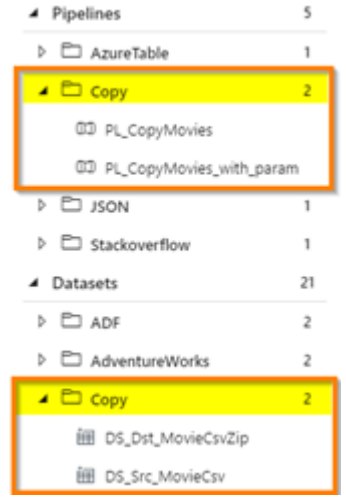
You can select objects by objects types & name using include or exclude option.

Allows to select the objects by belonging to a folder (picture)

Name can be wildcarded, so all such variants are possible:

```
trigger.*
dataset.DS_*
*.PL_*
linkedService.???KeyVault*
pipeline.ScdType[123]
*.*@testFolder
managedVirtualNetwork*.*
*managedPrivateEndpoint.*
```



Selective deployment in Azure DevOps

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☺ In Azure DevOps Task – the list can be provided either as (inline) **text** or from **file** in repo.

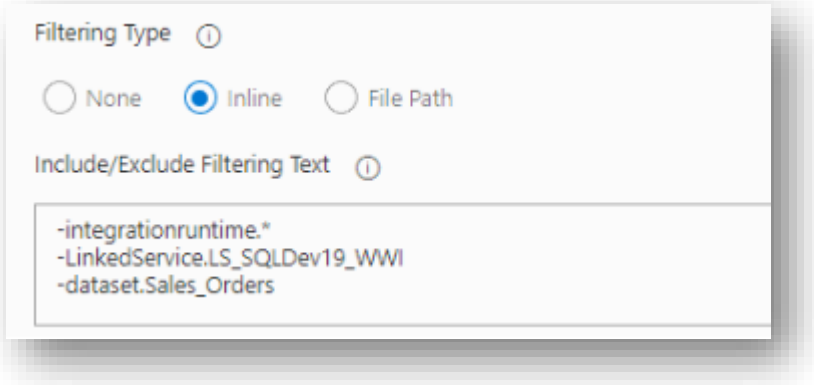
To simplify user experience – only one field is exposed in order to define include/exclude rules.

Therefore, an extra character should be provided before the name/pattern:

+ (plus) – for objects you want to include to a deployment

- (minus) - for objects you want to exclude from a deployment

If char is not provided – an inclusion rule would be applied.



DEMO #3
Deployment with Azure DevOps

PowerShell module: Parameters for Stages

How are parameters passed into the deployment? Config CSV File:

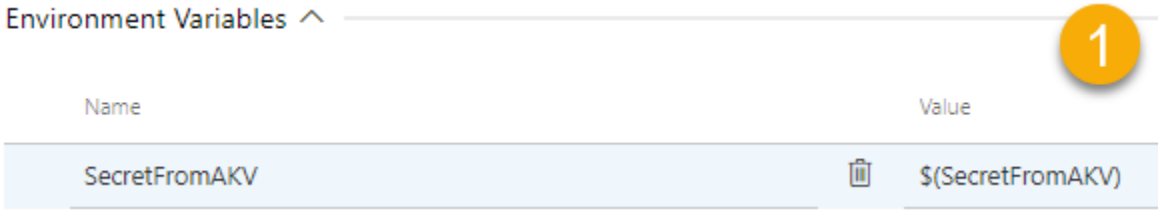
```
type,name,path,value
linkedService,LS_AzureKeyVault,typeProperties.baseUrl,"https://kv-blog-uat.vault.azure.net/"
# This is comment - the line will be omitted
linkedService,LS_BlobSqlPlayer,typeProperties.connectionString,"DefaultEndpointsProtocol=https;Acco
pipeline,PL_CopyMovies,activities[0].outputs[0].parameters.BlobContainer,UAT
pipeline,PL_CopyMovies_with_param,parameters.DstBlobContainer.defaultValue,"$($Env:Environment)"
pipeline,PL_Wait_Dynamic,parameters.WaitInSec,"{'type': 'int32','defaultValue': 22}"
# MINUS means the desired action is to REMOVE encryptedCredential:
linkedService,BlobSampleData,-typeProperties.encryptedCredential,
# PLUS means the desired action is to ADD new property with associated value:
linkedService,BlobSampleData,+typeProperties.accountKey,"$($Env:VARIABLE)"
```

Option 1:

Any variables can come from DevOps Pipeline, either normal as well as sensitive values.

To apply replacement for secret values:

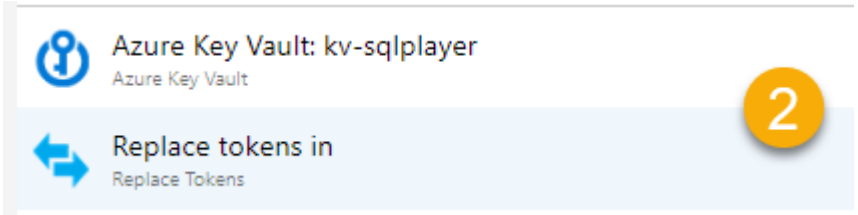
Environment Variables must be mapped (Microsoft recommendation).



Option 2:

Another option would be reading secrets directly from provided Azure Key Vault.

Therefore, "Replacement" task is still recommended here as an alternative as for now.



Bonus capabilities

New task in Azure DevOps: Build ADF (CI)

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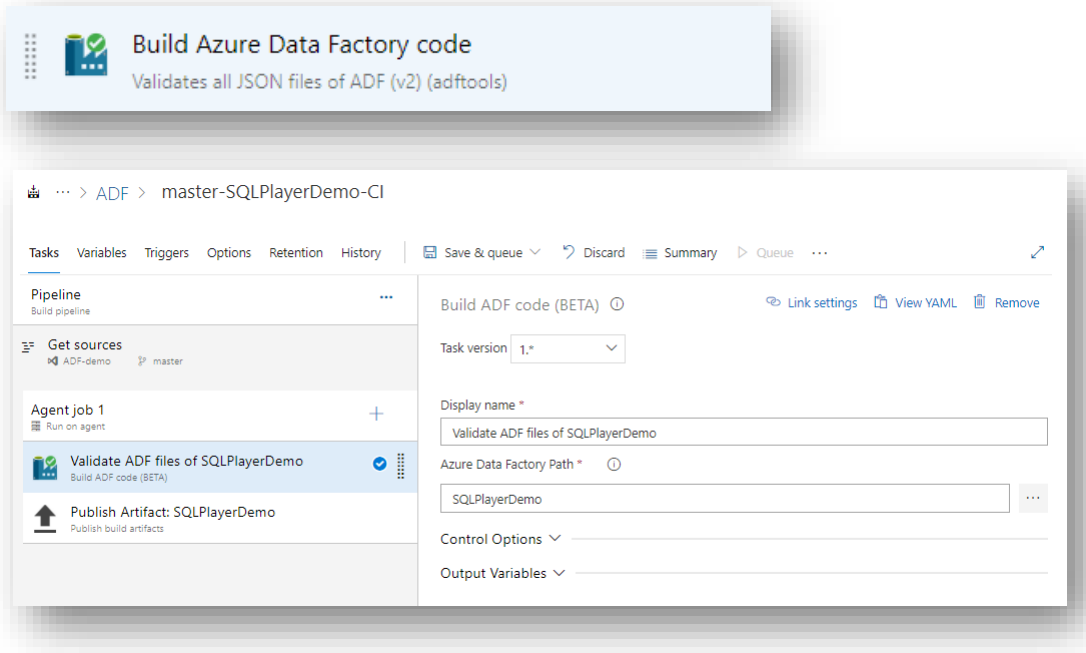
The task has 2 modes:

- **Build only**
  - Reads all files and validates its json format
  - Checks whether all dependant objects exist
  - Checks whether file name equals object name

- **Validate & Export ARM Template**
  - uses ADFUtilities NPM package provided by Microsoft
  - Counterpart of Validate all and Export ARM Template in ADF UI



New task in Azure DevOps: Test Connection

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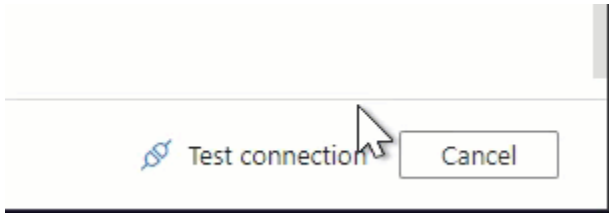
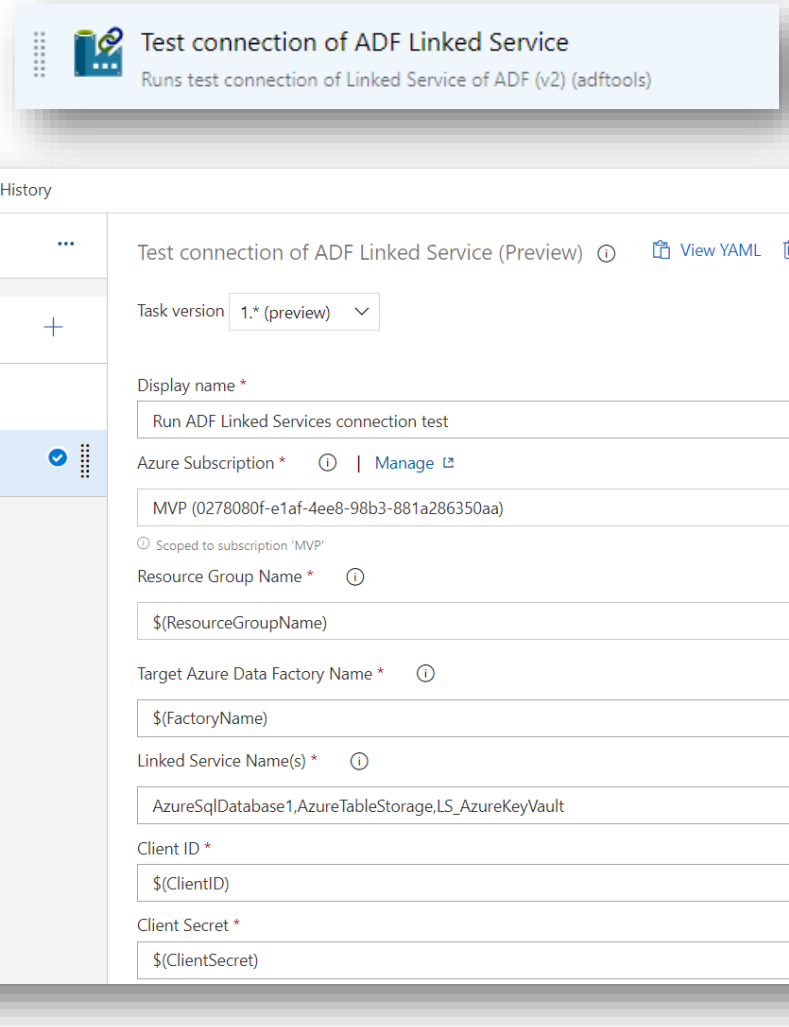
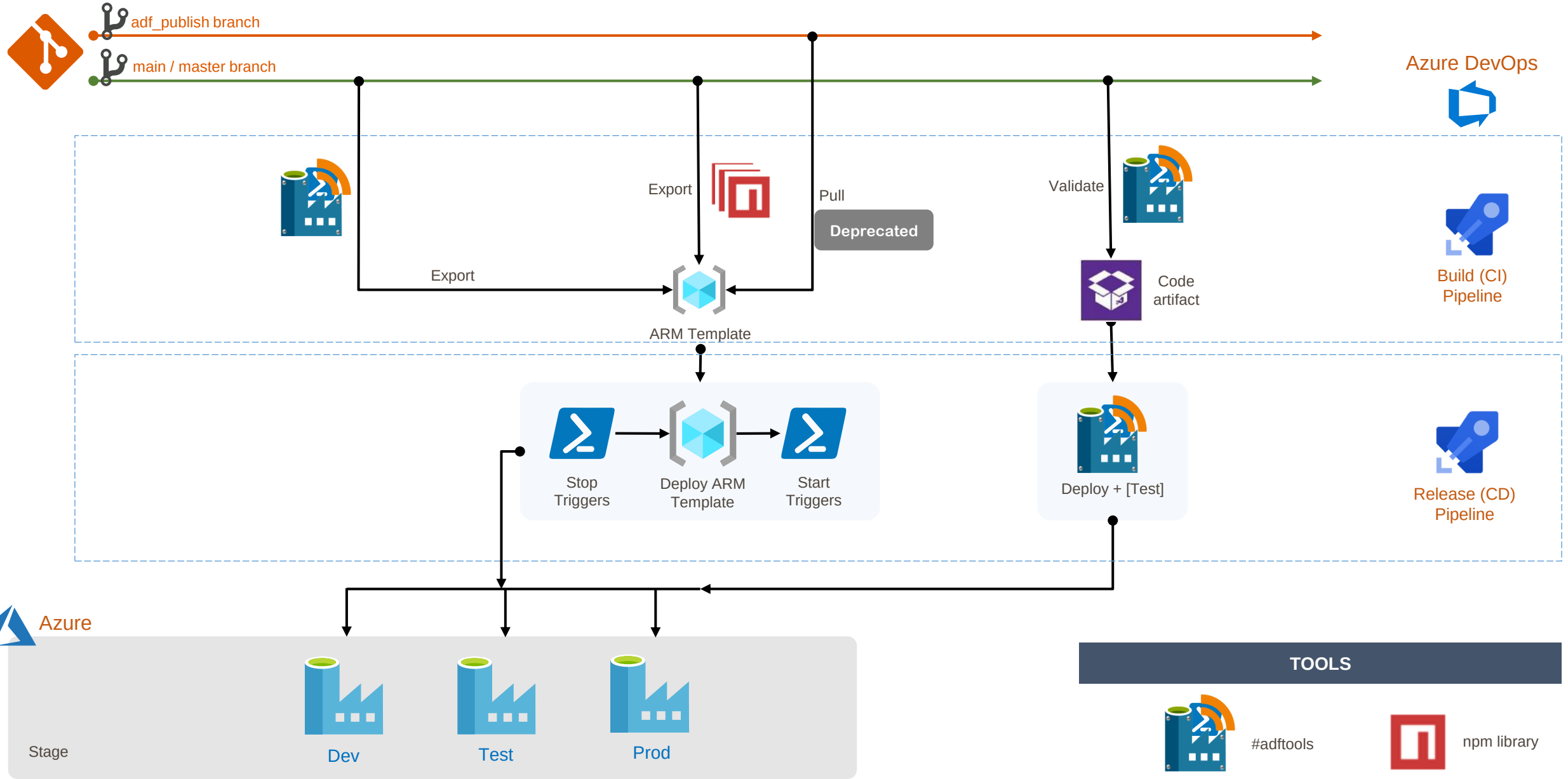
- Run „Test connection" for a Linked Service
- Smoke tests of (some) Linked Services
- In preview





Summary

Takeaway: ADF deployment - Possible paths



#Adftools - Resources

SQL Player
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- https://sqlplayer.net/adftools
- https://github.com/SQLPlayer/azure.datafactory.tools
  - Issues
  - Discussions, FAQ
- PowerShell Gallery: azure.datafactory.tools
- Marketplace: Deploy Azure Data Factory (extension for Azure DevOps)
- Microsoft ADF (npm) Utilities

- https://github.com/SQLPlayer/azure.**synapse**.tools (preview!)

Questions?

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Thank you!


kamil@sqlplayer.net


@NowinskiK @SQLPlayer


SQLPlayer.net


https://github.com/NowinskiK/CommunityEvents

Kamil Nowinski
Microsoft Data Platform MVP
Analytics Architect, Azure DevOps Engineer Expert