#### Felix Möller

Avanade



## CI/CD for your Cloud Data Platform from Data Lake to Power BI





# Microsoft

#### For the Venue



- About me
   Cloud Data Platform
- **3** Continuous Integration & Azure DevOps
- 4 Build
- 5 Deploy
- 6 Q&A





1	About me
2	Cloud Data Platform
3	Continuous Integration & Azure DevOps
4	Build
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6	Q&A



#### About Me

#### **Felix Möller**

Senior Azure Analytics Architect at Avanade – joint venture of Microsoft and Accenture.

Currently Building an Azure data platform with use cases thyssenkrupp.

Building data warehouses with a focus on financial data and SAP for more than 7 years. Focus shifted to Azure Architectures.

#### **Contact Info**

E-Mail: f.moeller@avanade.com



thyssenkrupp

https://news.microsoft.com/transform/thysse

nkrupp-materials-services-keeps-calm-and-

carries-on/

Satya Nadella 🥹

@satyanadella A fantastic example of the power of AI to help an organization maximize the value of its most important asset – its data – to.

maximize the value of its most important asset – its data – to optimize operations and better serve customers. news.microsoft.com/transform/thys...



thyseenkrupp Materials Services 'keeps calm and carries on' – wi... The alfred AI solution, powered by Microsoft Azure, helps thyssenkrupp Materials Services analyze and process more than two million orders news.microsoft.com

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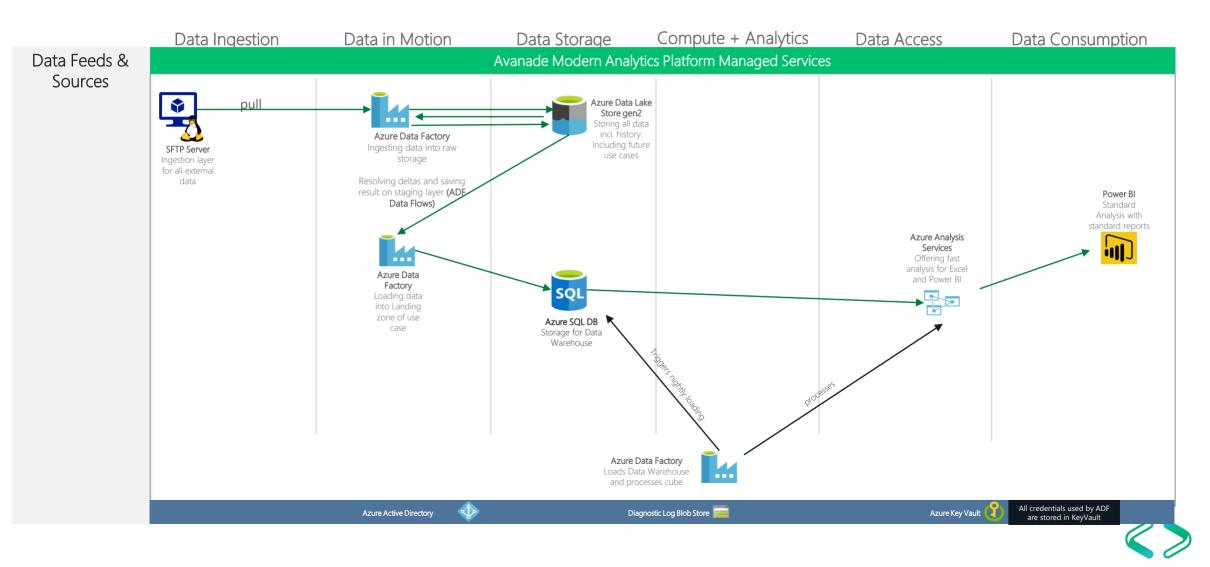




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#### alfred.SimOne: Platform Technical Data Flow (original)





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#### Definitions

**Continuous Integration:** is a **development practice** that requires developers to **integrate** code into a shared repository **several times a day**. Each check-in is then **verified** by an **automated build**, allowing teams to detect problems early.

**Continuous Delivery:** on top of having CI, you also have automated your release process and you can **deploy** your application at any point of time by **clicking on a button**.

**Continuous deployment:** There's **no human intervention**, and only a **failed test** will prevent a new change to be deployed to **production**.

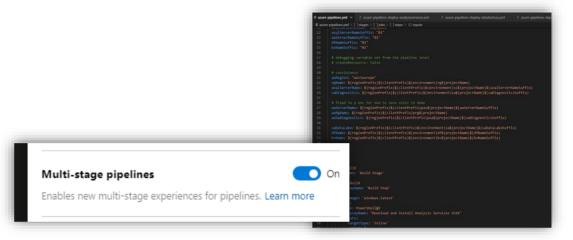


#### **Continuous Deployment Process** Deploy to TEST, PROD neck in Commit **Test Environment Visual Studio** Build 2 Deploy to INT 3 Test **INT Environment Azure DevOps**

#### Classic vs YAML

Σ	Adjust Path in ADF Data Flows. Th PowerShell	ey are not exposable	e as		Adjust Path in ADF Data Flows. They are not exposable as PowerShell						
2	Azure PowerShell script: Stop Active Triggers										
	Azure Deployment: Deploy ADF co P <sup>ta</sup> Azure resource group deployment	ontent									
	Azure Deployment: Deploy ADF co Pa Azure resource group deployment	ontent _Executing ag	ain								
2	Azure PowerShell script: Start A	Releases Deployr	nents Analytic	s							
<b>P</b>	File Copy ADF Custom Activities	Releases		Created	Stages						
		AS Release-		10/11/2019, 3:32:34 PM	O DEV	TEST	O PROD				
		AS Release-		10/10/2019, 5:22:13 PM	O DEV	TEST	O PROD				

- Graphical creation
- Well established
- Not part of source



- Code driven
- Previously only for build not for release. Now preview.
- Documentation still lacking
- Frequent fixes



#### Self hosted vs Microsoft-Hosted

#### **Self-Hosted CI/CD**

#### MS Hosted CI/CD

- Full flexibility what to install
- SSMS can be installed
- Visual Studio Extensions can be installed easily

- Pure PaaS philosophy
- Nothing to maintain
- Additional software must be installed on each build

#### Cost

• Cost of VM (ca. 150 EUR per month)

#### Cost

• 29 EUR /agent per month

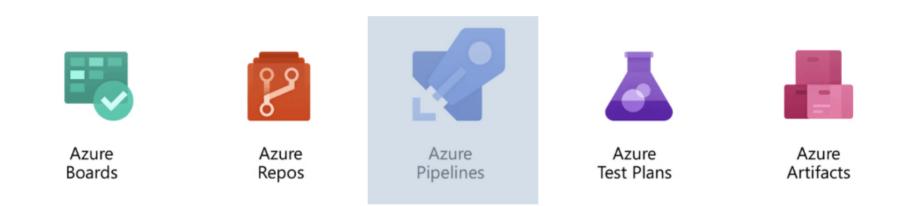


#### Benefits of DevOps

- **Higher productivity**: deployments do not create manual work
- Higher Quality: everything source controlled
- Faster time to market: features deployed very quickly
- Less errors: connection strings and configuration up to date
- Automatic Testing: find regressions



#### Demo: Azure DevOps Overview





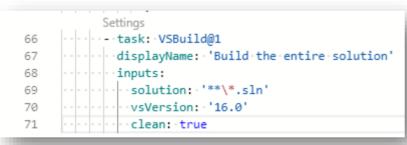


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#### Build

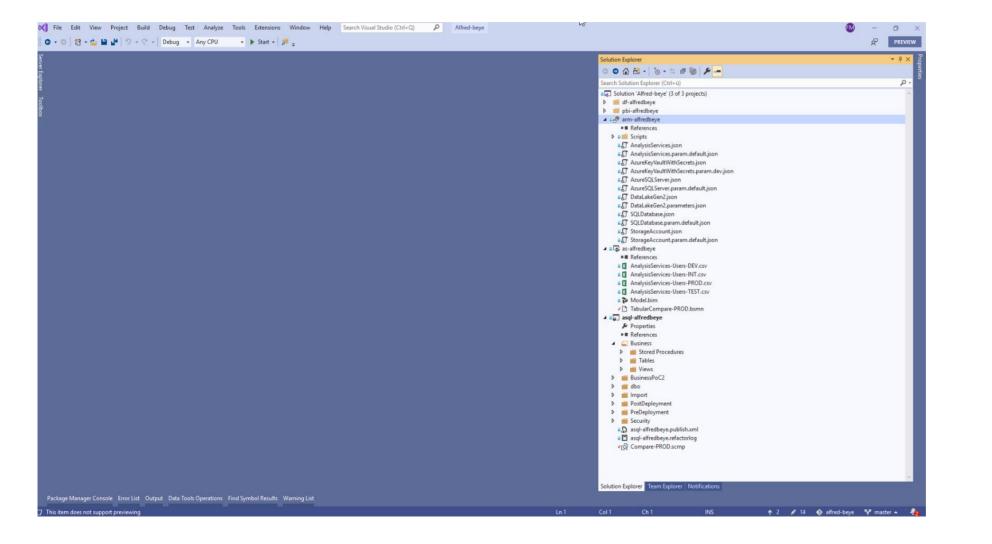
- Build is simple!
- Build the solution



#### Copy everything to release artifact

Name	Size
∨ 🖬 beye	7 MB
> 🗀 arm	37 KB
> 🗀 as	2 MB
> 🗀 asql	99 KB
> 🗀 df	53 KB
> 🗀 pbi	5 MB







## What happens during "build"

Component	Source Code	Deployment artifact
SQL Database	*.sql	*.dacpac
Analysis Services	Model.bim	Model.asdatabase
Azure Data Factory	*.json (available with configured git integration)	ARM template (created during publish)
Power BI	*.pbix	*.pbix
Integration Services	*.dtsx	*.ispac



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	5.4 Power BI						
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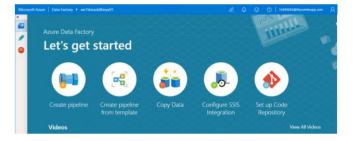


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## Data Factory

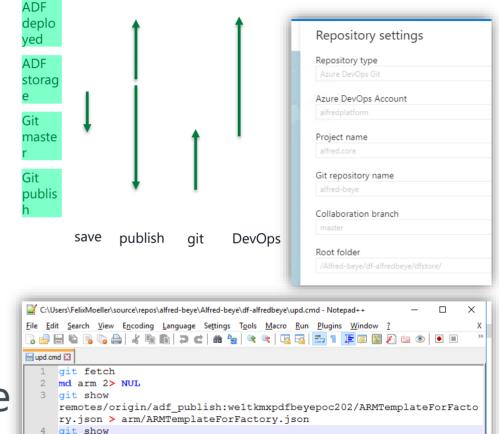
- Resource
  - Can be created with a few lines of PowerShell upfront (Set-AzDataFactoryV2)
- Content
  - One Data Factory should be linked to git repository
  - Parameters can be explicitly exposed via arm-template-parameters-definition.json
  - All needed secrets should be part of key Vault





## git integrated data factory

- Git integration is essential
- Save All saves one json file per object into the repository
- Pressing Publish commits ARM templates to the adf\_publish branch
- Short script allows to integrate in master branch (see right)



remotes/origin/adf\_publish:weltkmxpdfbeyepoc202/ARMTemplateParamete
rsForFactory.json > arm/ARMTemplateParametersForFactory.json



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#### Azure SQL Server

- Resource
  - A simple ARM template
- Content
  - managed in Visual Studio database project
  - Use Post Deployment Scripts
  - Use Merge Generator (cf. https://github.com/readvroll/generate-sgl-merge)

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#### Demo: ARM template

Azure Resource
 Manager templates

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## Database deployment

- sqlpackage.exe works in the following sequence
  - 1. compares dacpac to database
  - 2. generates a deploy script
  - 3. runs pre-deployment script
  - 4. runs deploy script (generated in step 2)
  - 5. runs post-deploy script
- Thus you need a pre-pre-deployment script



## Hundreds of Options in Publish Profile

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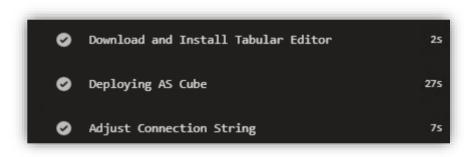


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#### **Azure Analysis Services**

- Resource
  - A simple ARM template
- Content
  - Microsoft.AnalysisServices.Depl oyment.exe part of SSMS not available on Build Agents
  - Use Tabular Editor (cf. https://github.com/otykier/TabularEditor)
  - Credentials must be configured on every deployment (Invoke-ASCmd)





### Tabular Editor

- Way faster
- Keeps file structure stable
- Can validate best practices
- Integration with DaxFormatter.com
- Great author
- Command line ready for automation
- Fully functional when using Provider Datasources

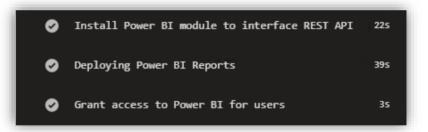
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	5.3	Analysis Services		
	5.4	Power BI		
	5.5	Summary		
6	Q&/	4		

#### Power BI

- Resource
  - Workspaces can be created via PowerShell
- Content
  - Reports can be uploaded via PowerShell (cf. https://github.com/Microsoft/powerbi-powershell )
  - Each report has an internal GUID if this changes, depending objects (e.g. dashboards) break



#### PowerShell cmdlets lack functionalities

- Only a subset of Power BI REST API has its own PowerShell cmdlets
  - REST API: <u>https://docs.microsoft.com/en-</u> us/rest/api/power-bi/
  - Cmdlets: <u>https://github.com/microsoft/powerbi-</u> powershell
- These can be called via Invoke-PowerBIRestMethod



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	5.5	Summary	
6	Q&/	Α	





Component	Resource	Content
Azure Data Factory	PowerShell	ARM
Azure SQL Database	ARM	dacpac
Azure Analysis Services	ARM	PowerShell, Tabular Editor, Invoke-ASCmd
Power BI	(REST API)	PowerShell, REST-API



#### Demo

Az	zure DevOps     : / alfred.core / Pipelines / alfred-b       Runs     Branches       Analytics	Search	
+	#alfred-beye_master_20191018.9 disabled pinning cards to dashboard ⊘ Individual CI <sup>8</sup> master ae048d5	🖉 - 🔕 - 🕥 - 🕥	<ul> <li>☐ Yesterday</li> <li>⊙ 7m 34s</li> </ul>
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Invoke-ASCmd -InputFile "\$(System.DefaultWor sk: PowerShell@2 splayName: "Download the DLLs to access a tabu	#alfred-beye_master_20191018.7 :)  ⊘ Individual CI <sup>go</sup> master d806183	0 - 0 - 0 - 0	<ul><li>Yesterday</li><li>25m 36s</li></ul>
<pre>stargetType: 'inline' script:   # https://docs.microsoft.com/en-us/azure/analysis-service \$ProgressPreference = 'SilentlyContinue' \$amo = "https://go.microsoft.com/fwlink/?linkid=829578" \$amopath = Join-Path \$env:TEMP "x64_15.0.2000.20_SQL_AS \$log = Join-Path \$env:TEMP "log.log" Invoke-WebRequest -Uri \$amo -OutFile \$amopath Write-Output "installing \$amopath" Start-Process \$amopath -ArgumentList "/q /li \$log" -Wait Get-Content \$log</pre>	S_AMO.msi"		
sk: AzurePowerShell@4 splayName: Grant access to SSAS for users puts: azureSubscription: 'Footprint (c1ee313e-1ec1-4a43-b44d-f4f ScriptType: 'InlineScript'	f03641bca5)'		
Inline:	ervicesPermissions.ps1 -USER "\$(asAdminUser)" -PWD "\$(asAdminPassword)" -SERVER "asazure:	11	



1	About me
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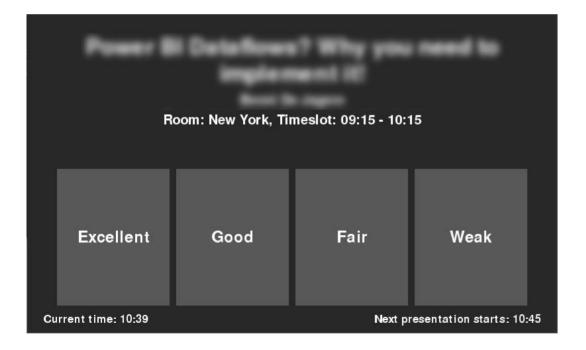




#### **Evaluations**

#### Please rate this session!

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