Felix Möller

PASS SQLSATURDAY

TFS / VSTS for ~~Continuous Integration~~ / Continuous Delivery for SSIS and database projects in a Data Warehouse environment

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About Me

Felix Möller

Business Intelligence Consultant at Avanade – joint venture of Microsoft and Accenture

Building enterprise data warehouses with a focus on financial data and SAP for more than 6 years

Contact Info

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Agenda

- Common Understanding
- Integration Services: Build, Deploy, Test, Demo
- Database Projects: Build, Deploy, Test
- Get started yourself

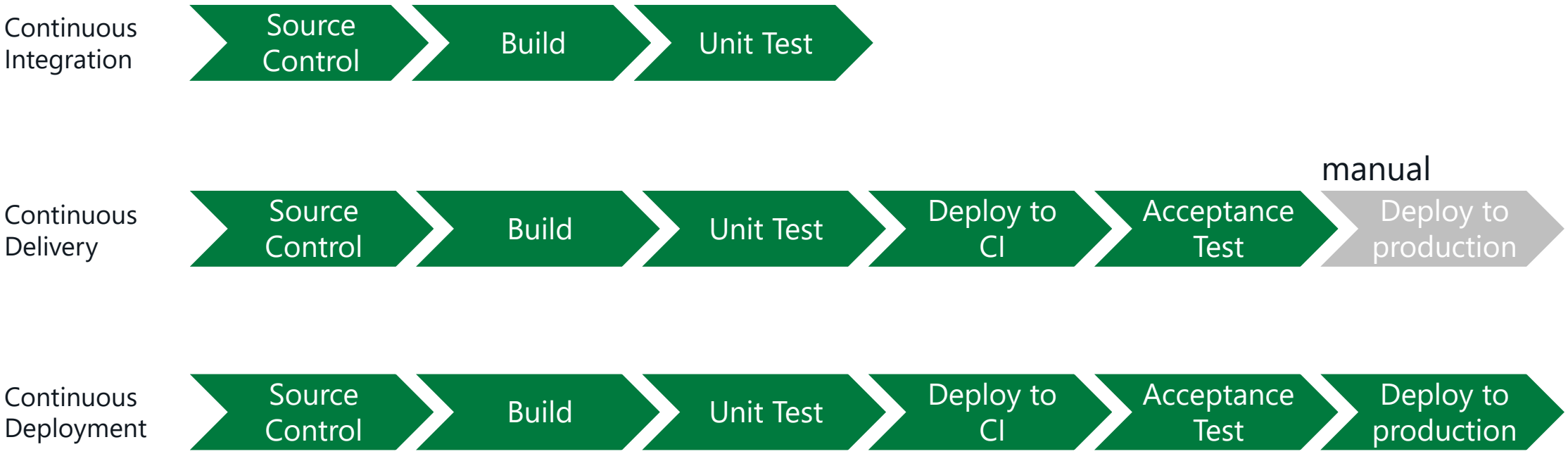
Common Understanding

What is Continuous Integration?

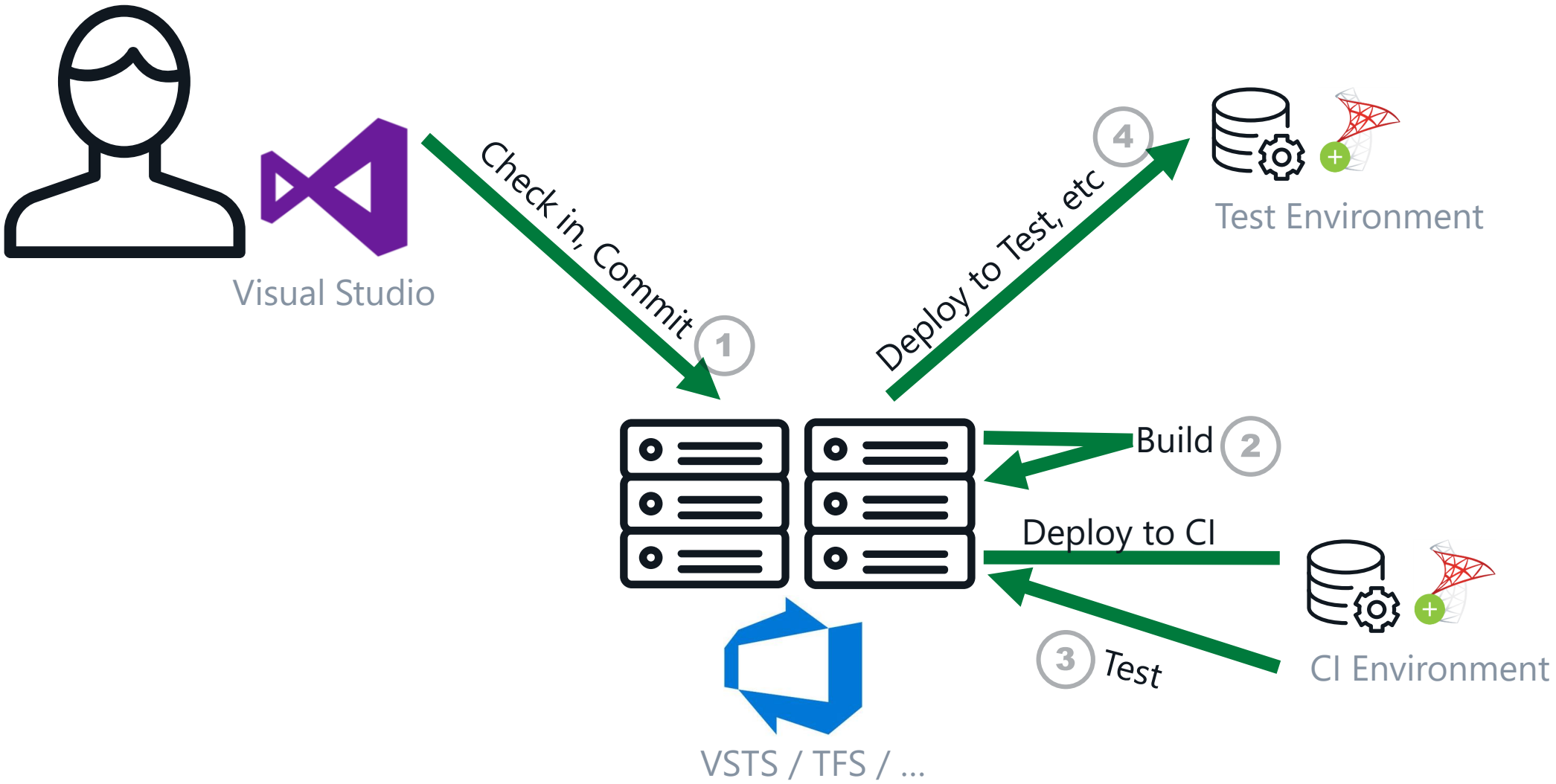
*"Continuous Integration (CI) is a **development practice** that requires developers to **integrate** code into a shared repository **several times a day**. Each check-in is then **verified** by an **automated build**, allowing teams to detect problems early."*

https://www.thoughtworks.com/continuous-integration

Distinction of Continuous Integration / Delivery / Deployment



Continuous Deployment Process



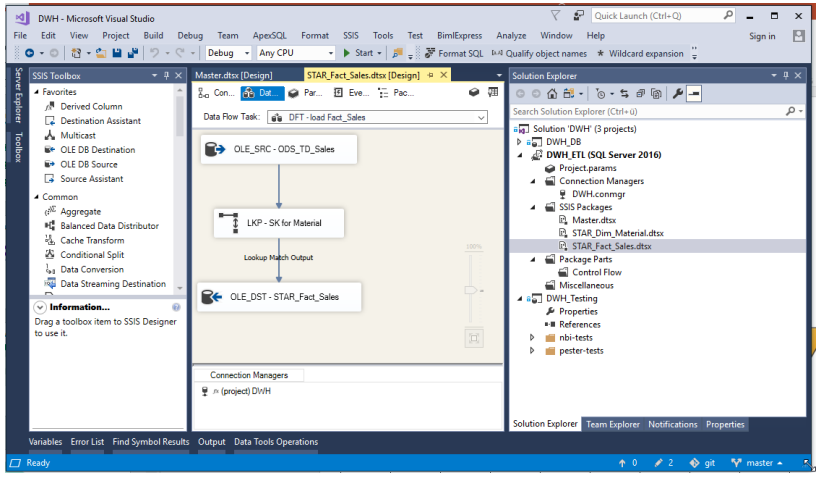
Solution works onPrem and on Azure

	onPrem	Azure (PaaS)
Database	SQL 2012 – 2017	Azure SQL DB
ETL	SSIS 2012 – 2017	Azure Data Factory v2 (SSIS)
Source control	TFS 2015	VSTS
Development Environment	Visual Studio (SSDT) 2015+	

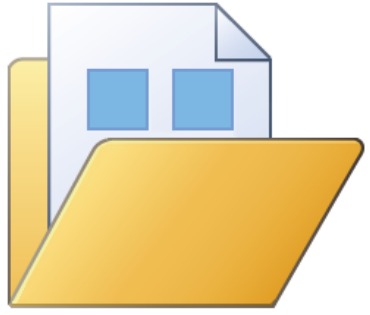
PASS Summit 2015

Integration Services

Process Overview

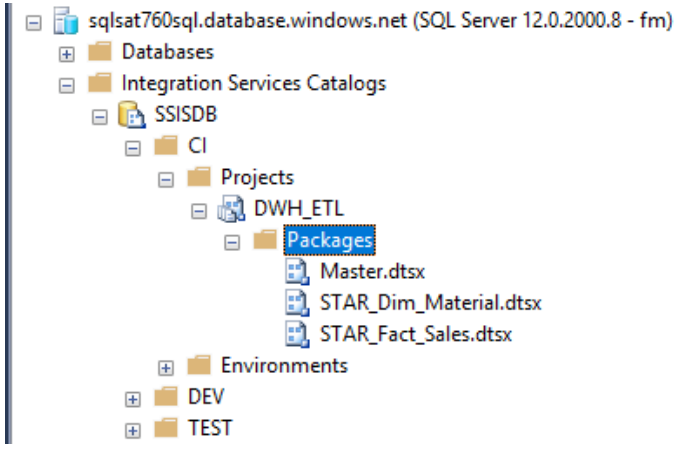


Build



DWH_ETL.ispac

Deploy



Options for Automatic Build

- Visual Studio
  - Full Visual Studio Installation needed. On VSTS Agent very, very slow.
- Msbuild (https://github.com/fmms/SSISMSBuild)
  - Msbuild does not support SSIS out of the Box. There is a custom msbuild tasks on Github.
  - Works onPrem. However, DLLs for SQL 2017 just registered on VS2015 agents, does not work in VS2017 agents
- Build with PowerShell (http://muxtonmumbles.blogspot.de/2013/11/ssis-project-deployment-and-visual.html)
  - Same DLL issue as with msbuild.
- ssis-build.exe (https://github.com/fmms/ssis-build)
  - Very small binary. No external dependencies.

Integration Services DLLs on VSTS build agents in GAC

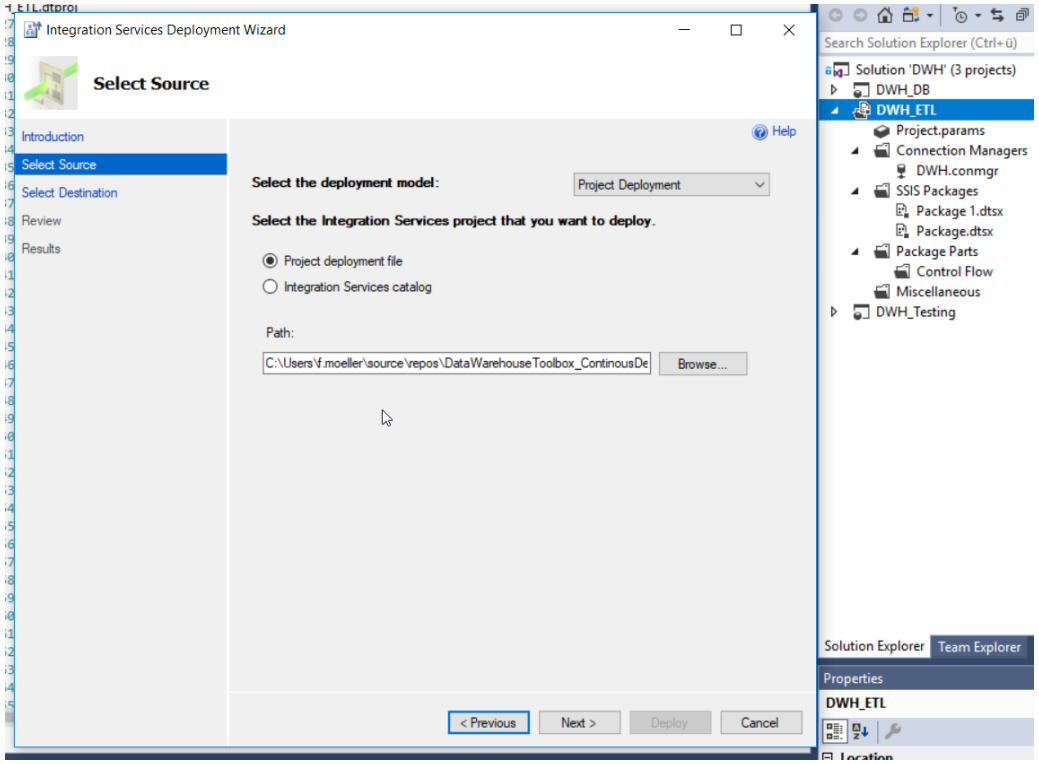
SQL Version	Visual Studio 2015		Visual Studio 2017	
2012	11.0.6020.0 ((SQL11_PCU_Main).151020-1525)	11.0.0.0	11.0.7001.0 ((SQL11_PCU_Main).170815-1005)	11.0.0.0
2014	12.0.4449.0 ((SQL14_SP1_QFE-CU).160413-1153)	12.0.0.0	12.0.5556.0 ((SQL14_SP2_QFE-CU).170817-1113)	12.0.0.0
2016	13.0.4001.0 ((SQL16_PCU_Main).161028-1734)	13.0.0.0	13.0.4451.0 ((SQL16_SP1_QFE-CU).170905-1437)	13.0.0.0
2017	14.0.600.250 ((SQL_Main).170510-1844)	14.0.0.0	*	

as of 20th May 2018

* An Integration Services class cannot be found. Make sure that Integration Services is correctly installed on the computer that is running the application. Also, make sure that the 64-bit version of Integration Services is installed if you are running a 64-bit application.

Deploy

Manual Way



Problems

- One does not know what version is deployed
- Local changes might be included in deployment
- Recent changes of other developers might be missing

Options for Automatic Deploy

- ISDeploymentWizard.exe
  - Has no parameters for password and username thus only for Windows Auth, not ADFv2 SSIS
- PowerShell with SMO (SQL Server Management Object)
  - Needs the integration services DLLs deployed to build agent
- ssis-deploy.exe
  - Very small binary that calls catalog.deployProject()

Testing

- Dataless checkes
  - Validating package naming, e.g.
    - packages must start with either „Dim“, „Fact“ or „Master“
  - Validating package content, e.g.
    - All Lookups should use the cache
    - No SELECT * should be used
  - Ensure all packages validate
- Checks with Data
  - Load golden data set to staging, execute packages, validate fact tables against predefined results
  - Compare result of SQL with execution of SSIS packages

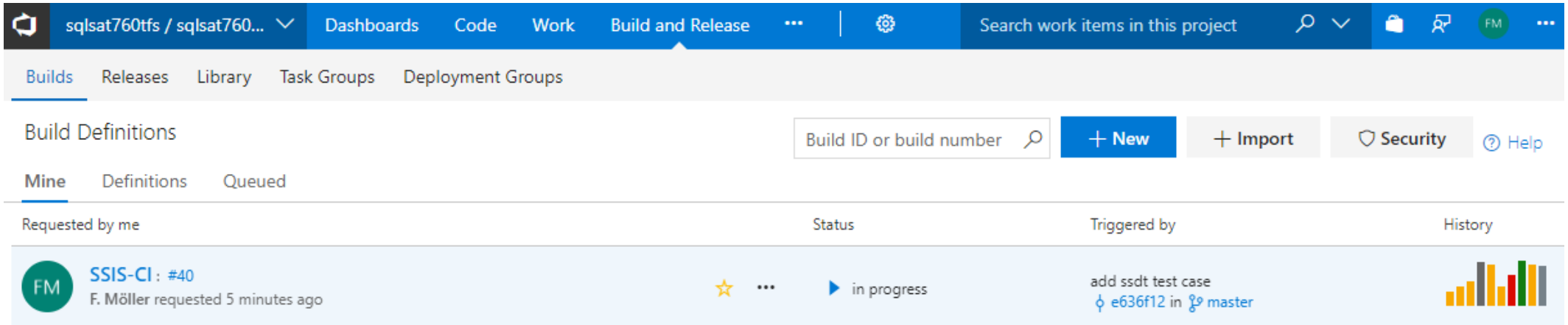
→ One cannot access the XML content of an SSIS package in the SSISDB via SQL (https://ask.sqlservercentral.com/questions/100651/querying-ssisdb-text-search-in-the-packet-definiti.html)

Options for Automatic Testing

- Nbi (https://github.com/Seddryck/NBi)
  - THE testing framework for BI projects (relational databases, SSAS cubes, SSRS reports, PowerBI dashboard , execute SSIS packages, etc)
  - Is based on nunit
- Pester (https://github.com/pester/Pester)
  - A testing framework for PowerShell. Can be used for testing PowerShell commandlets
  - Allows to output nunit test results

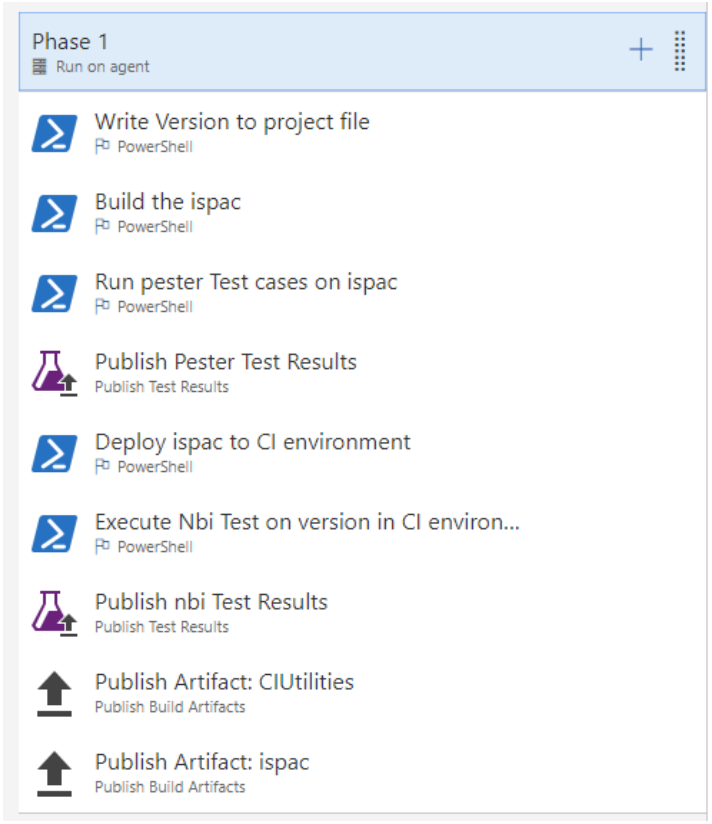
Demo SSIS Build

Manage build definitions in TFS



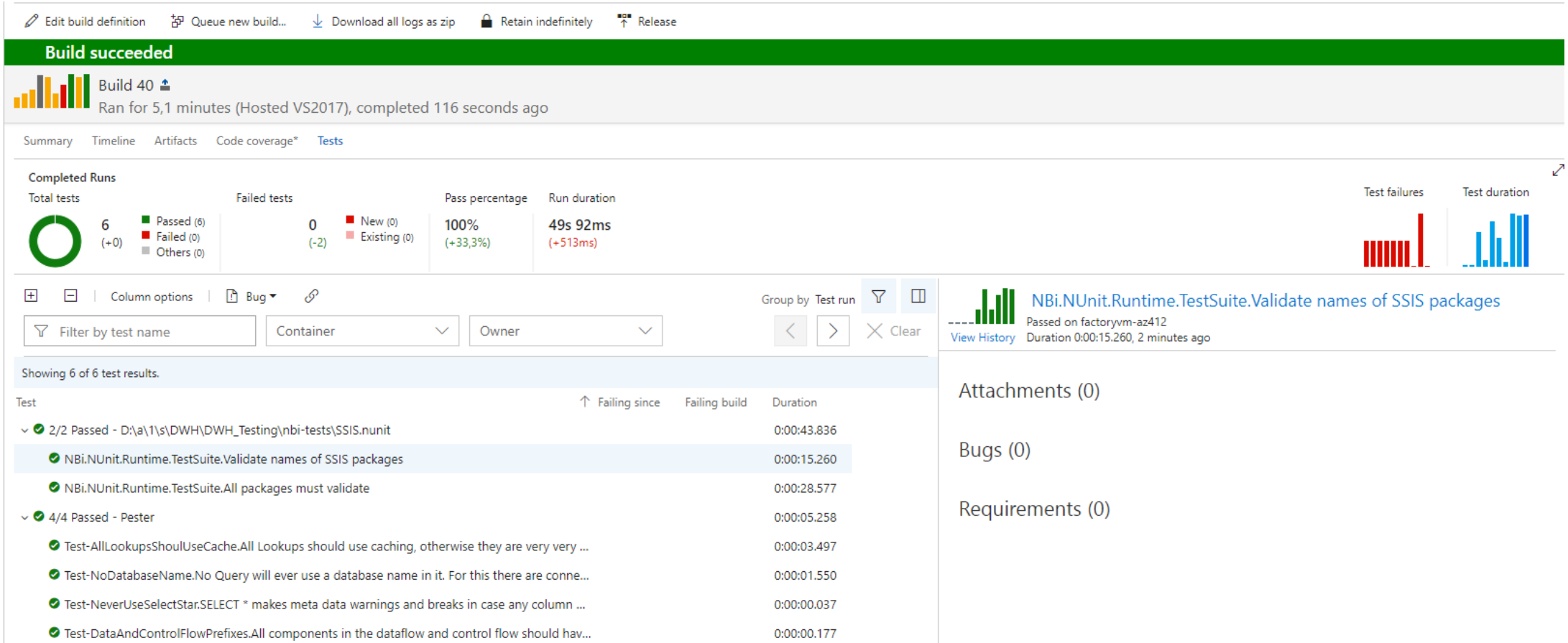
- Build Definition contains all steps needed to do a build
- It stores triggers (commit, schedule, manual)

Configure the steps



- Steps give the detailed instructions how to build and test artifacts
- Can use PowerShell, cmd and dozens of special tasks
- At the end they must publish items to be used by release step

Test results

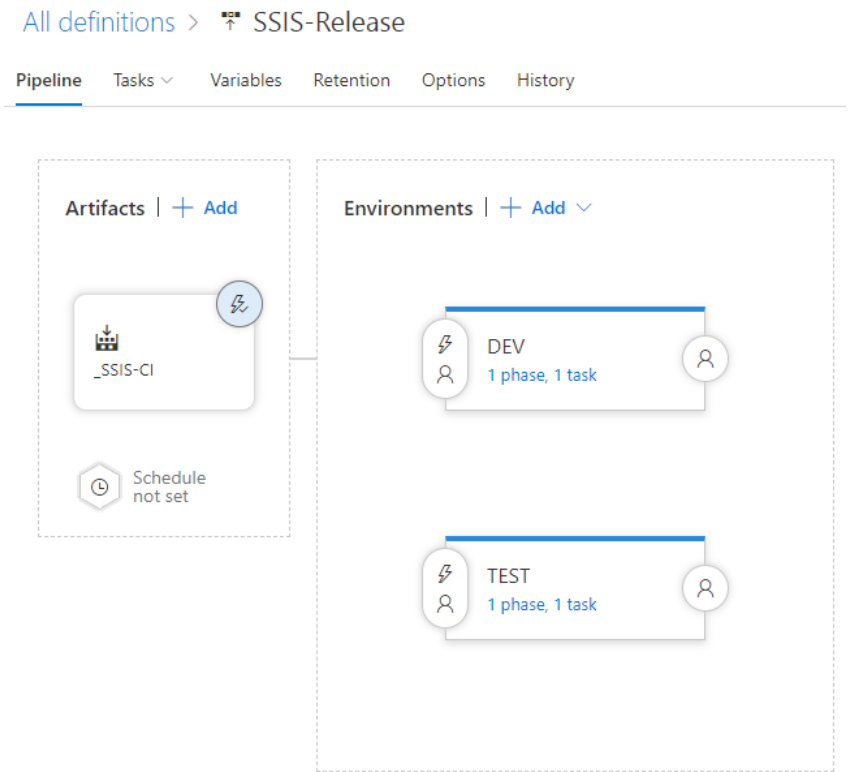


Tests results are shown graphically

Test cases prevent naming rule violation

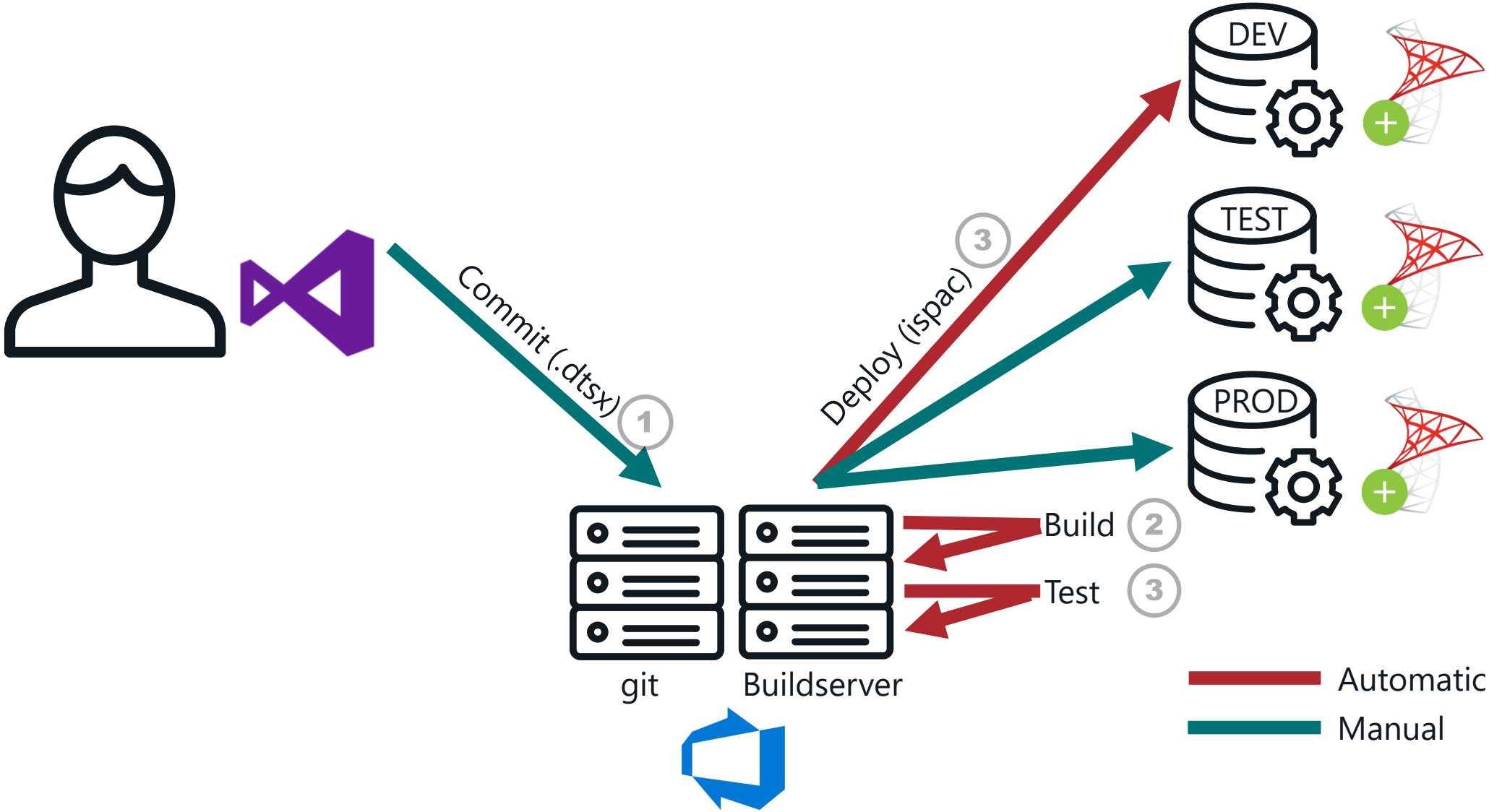
- Violation of SSIS Task naming validations is caught right after commit

Release Definition



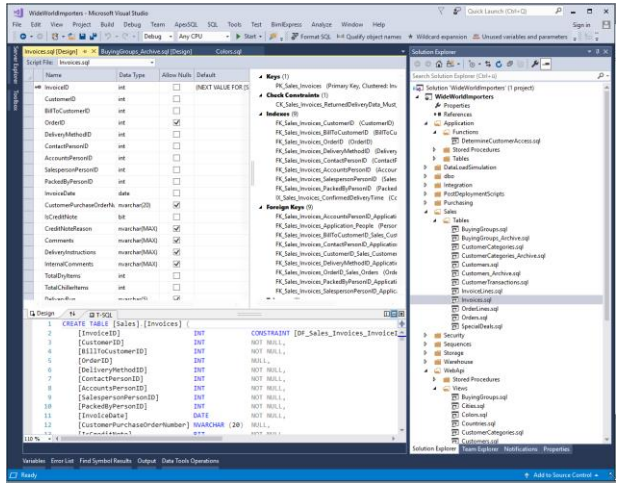
- Release definition provides steps to deploy to an environment
- One can define triggers or require sign-offs and other preconditions

Overview

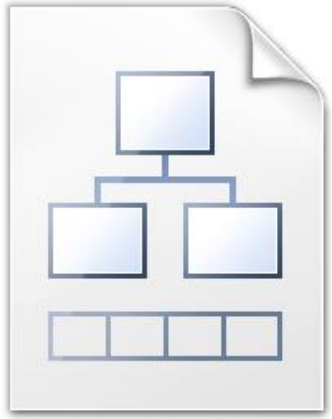

DEV
TEST
PROD
Commit (.dtsx)
1
Deploy (ispac)
3
Build
2
Test
3
git
Buildserver
Automatic
Manual

Databases

Process Overview

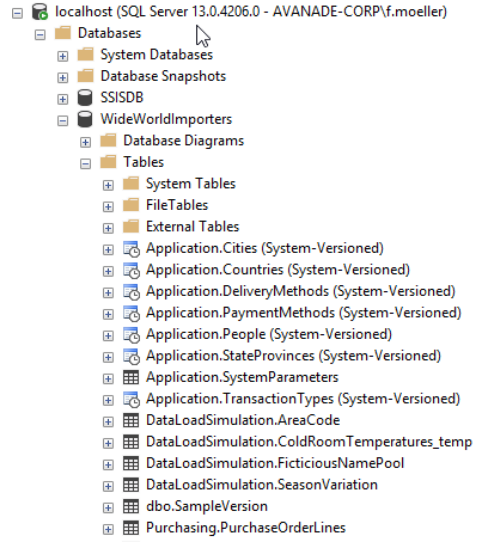


Build



WideWorldImporters.dacpac

Deploy



Options for Build

- Build (in case of onPrem install https://www.nuget.org/packages/Microsoft.Data.Tools.Msbuild/ or SSMS or SSDT)
  - *.sqlproj supported by msbuild
- Deploy
  - Sqlpackage.exe and a publish profile generated in SSDT

Test

- NBi used for validation of conventions
  - Testing of naming conventions
    - `Sys.tables`, `sys.columns`, `sys.objects`, `sys.foreign_key_columns`, …
- Static Code Analysis (example at https://github.com/davebally/TSQL-Smells)
  - Written in C#, depending on Visual Studio and SQL version

Test case example

```
-- all Primary Key should be named PK_<schema name>_<table name>
SELECT * FROM (
  SELECT
    CONCAT(TABLE_SCHEMA, '.', TABLE_NAME) AS [Table],
    CONSTRAINT_SCHEMA AS [SchemaName],
    CONSTRAINT_NAME AS [ActualName],
    CONCAT('PK_', TABLE_SCHEMA, '_', TABLE_NAME) AS [ExpectedName]
  FROM INFORMATION_SCHEMA.TABLE_CONSTRAINTS tc
  WHERE
    CONSTRAINT_TYPE = 'Primary Key’
) I
WHERE actualName != expectedName;
```

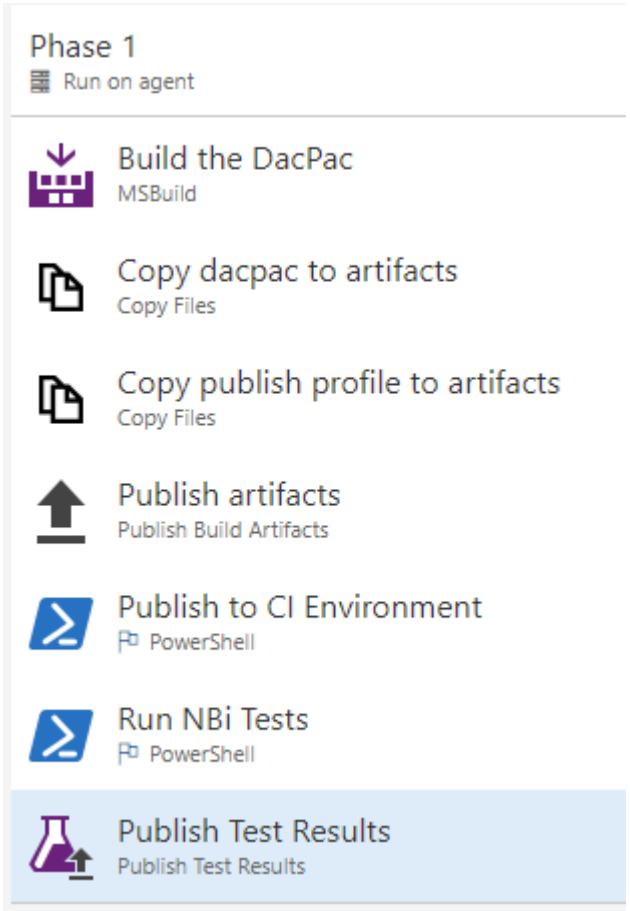
Nbi test cases

```
<?xml version="1.0" encoding="utf-8"?>
<testSuite name="Tests"
  xmlns="http://NBi/TestSuite">
  <settings>
    <reference name="
      <connectionString>Server=tcp database.windows.net,1433;Initial Catalog= ;Persist Security Info=False
    </reference>
  </settings>
  <group name="
    <test name="verify the names of Primary Keys">
      <system-under-test>
        <execution>
          <query connectionString="@ " file="..\ValidatePrimaryKeyName.sql" />
        </execution>
      </system-under-test>
      <assert>
        <row-count>
          <equal>0</equal>
        </row-count>
      </assert>
    </test>
```

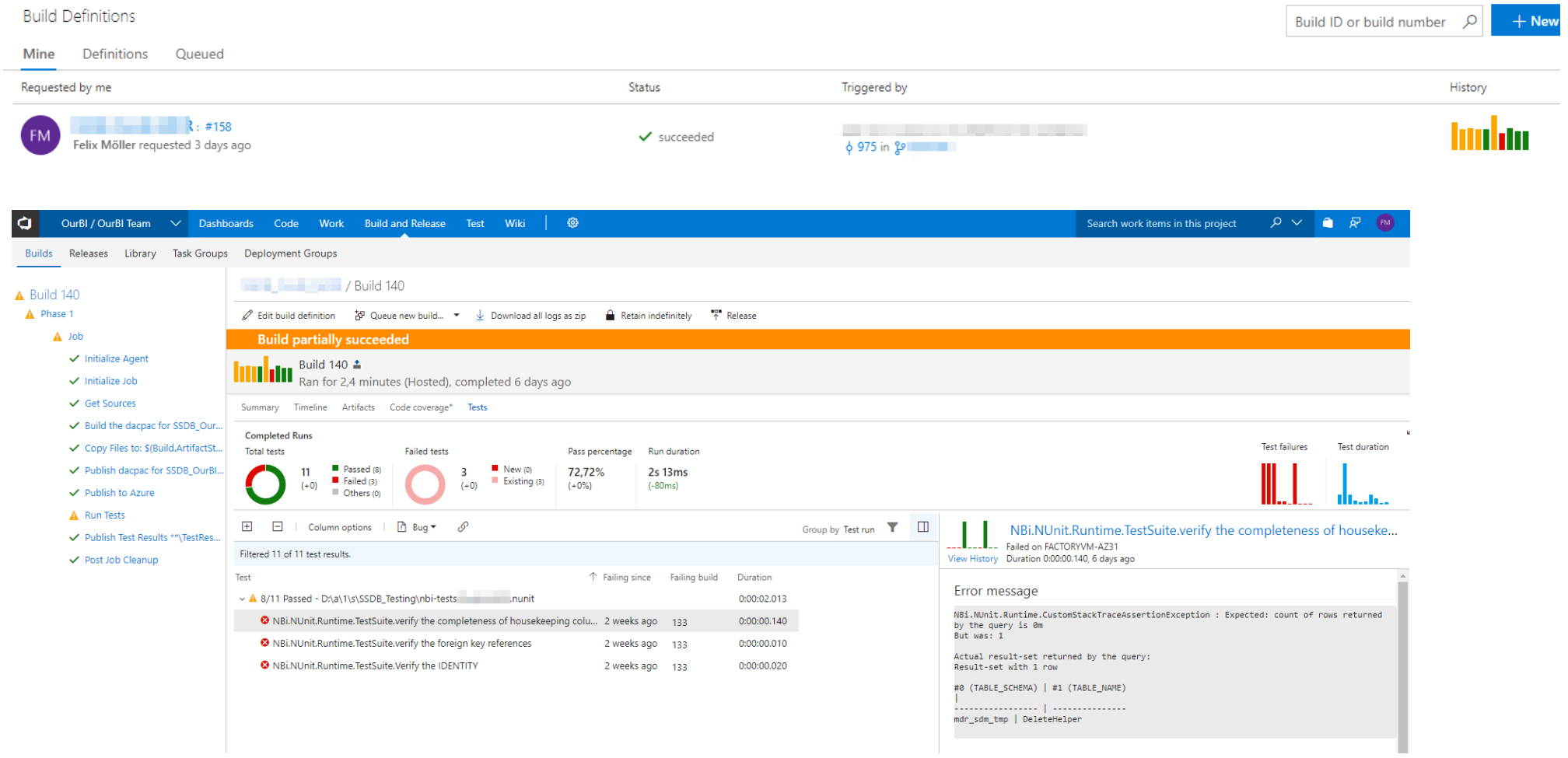
For more information look at the detailed documentation at http://www.nbi.io/.

Database Demo

Configure the steps



Test results are integrated into the build



Get started yourself

- Starting is very easy
  - VSTS is free for up-to five users
  - 240 minutes build time are included every month
- Expand the scope
  - Publish SSAS cubes with TabularEditor
  - Publish PowerBI reports with Power BI REST API
- Reach out to me in case of questions

Questions?

Slides should be available tomorrow on SQLSaturday website

Thanks for your attention

Many thanks to all volunteers!

Rafael Dabrowski

Volker Bachmann

Alexander Klein

Tobias Blödt

Ben Kettner

Dirk Hondong

Christian Gräfe

Cornelia Matthesius

Gabi Münster

Dominik Petri

Kai Michael Poppe

Kai Gerlach

Björn Peters

Christa Kurschat

Henrik Schütze

Klaus Betzing

Tanja Salwiczek

Nadine Witthöft

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27.10.2018

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