



inovex

SQL Server 2017

What's New with BI & Friends?



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ist Microsoft Certified Solution Expert für Business Intelligence und als Senior BI Consultant bei der inovex GmbH beschäftigt. Er beschäftigt sich seit SQL Server 2000 mit dem Produkt und seinen Komponenten und bringt zudem langjährige Erfahrung als .NET Entwickler und Datenbank-designer mit. Seit 2015 beschäftigt er sich mit der Azure Data Platform.

SQL Server 2017 CTP 2.1 Database Engine

Database Engine

New string functions

- **CONCAT_WS**

```
-- CONCAT_WS (with Seperator)
```

```
SELECT [Concat_WS] = CONCAT_WS(',', 'a', 'b', 'c'),
```

| Concat_WS |
|-----------|
| a,b,c |

Database Engine

New string functions

- TRANSLATE (inputString, characters, translations)

```
SELECT REPLACE(REPLACE('Das ist das Haus vom Nikolaus!', ' ', '_'), '!', '?')
```



```
SELECT TRANSLATE('Das ist das Haus vom Nikolaus!', ' !', '_?')
```



```
1 Das_ist_das_Haus_vom_Nikolaus?
```

Database Engine

New string functions

- TRIM()
= LTRIM() + RTRIM()

```
-- TRIM FUNCTION  
SELECT TRIM( '      test      ');
```

```
--Prior to SQL Server 2017:
```

```
SELECT RTRIM(LTRIM( '      test      '));|
```

Database Engine

New string functions

- **STRING_AGG()**
Concat über mehrere Zeilen

```
SELECT Firstname  
FROM AdventureWorks2017.Person.Person
```

| | Firstname |
|---|-----------|
| 1 | Syed |
| 2 | Catherine |
| 3 | Kim |

```
SELECT STRING_AGG (Firstname, ',')  
FROM AdventureWorks2017.Person.Person
```

| | CSV |
|---|--------------------|
| 1 | Syed,Catherine,Kim |

DEMO

Database Engine

Database Engine

In-Memory enhancements

- **Clustered Columnstore Indexes** now support `nvarchar(max)`, `varchar(max)`, `varbinary(max)`

Database Engine

In-Memory enhancements

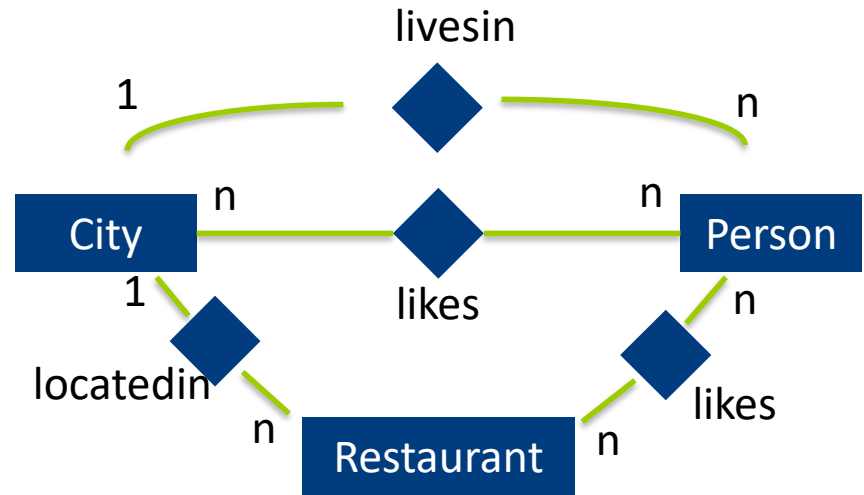
- Memory-Optimized tables (àka Hekaton)
 - CASE expressions are now supported for natively compiled T-SQL modules.
 - The limitation of 8 indexes on memory-optimized tables has been eliminated.
 - Support for computed columns in memory-optimized tables, including indexes on computed columns.
 - Memory-optimized filegroup files can now be stored on Azure Storage.

SQL Server 2017 CTP 2.1

Graph DB

Graph DB

Sehr gut in der Abbildung von komplexen Relationen



Relationale DB

Tabelle: City

Tabelle: Person

Tabelle: Person_likes_City

Tabelle: Restaurant

Tabelle: Person_likes_Restaurant

Tabelle: Restaurant_locatedin_City

Tabelle: Person_livesin_City

Graph DB

Node: City

Node: Person

Edge: Likes

Node: Restaurant

Edge: livesin

Edge: locatedin

Graph DB

Sehr gut in der Abfrage von komplexen Relationen!

Aufgabe:

„Gib mir alle Personen die in München wohnen und ein Restaurant in Berlin liken“

Relationale DB

```
SELECT *
FROM Person
INNER JOIN Person_livesin_City
    on Person.Person_ID = Person_livesin_City.Person_ID
INNER JOIN City as PersonCity
    on PersonCity.City_ID = Person_livesin_City.City_ID
INNER JOIN Person_likes_Restaurant
    on Person_likes_Restaurant.Person_ID = Person.Person_ID
INNER JOIN Restaurant
    on Restaurant.Restaurant_ID = Person_likes_Restaurant.Restaurant
INNER JOIN Restaurant_locatedin_City
    on Restaurant_locatedin_City.Restaurant_ID = Restaurant.Restaurant_ID
INNER JOIN City as RestaurantCity
    on RestaurantCity.City_ID = Restaurant_locatedin_City.City_ID
WHERE PersonCity = 'München'
AND RestaurantCity = 'Berlin'
```

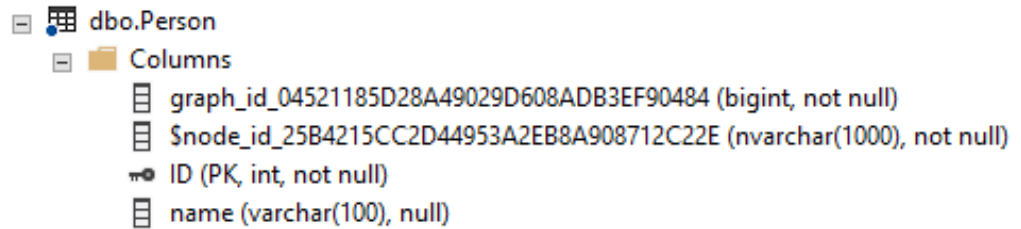
Graph DB

```
SELECT *
FROM Person, livesIn, City PersonCity
    ,likes, Restaurant, locatedIn, City RestaurantCity
WHERE MATCH (
    Person-(livesIn)->PersonCity
    AND
    Person-(likes)->Restaurant-(locatedIn)->RestaurantCity
)
AND PersonCity = 'München'
AND RestaurantCity = 'Berlin'
```

Graph DB

- Nodes

```
CREATE TABLE Person (  
  ID INTEGER PRIMARY KEY,  
  name VARCHAR(100)  
) AS NODE;
```



```
dbo.Person  
  Columns  
    graph_id_04521185D28A49029D608ADB3EF90484 (bigint, not null)  
    $node_id_25B4215CC2D44953A2EB8A908712C22E (nvarchar(1000), not null)  
    ID (PK, int, not null)  
    name (varchar(100), null)
```

```
INSERT INTO Person VALUES (1, 'John');
```


```
SELECT * FROM Person
```

| | \$node_id_1B1A5FF751DB424BB86473109084C7CF | ID | name |
|---|--|----|-------|
| 1 | {"type":"node","schema":"dbo","table":"Person","id":0} | 1 | John |
| 2 | {"type":"node","schema":"dbo","table":"Person","id":1} | 2 | Mary |
| 3 | {"type":"node","schema":"dbo","table":"Person","id":2} | 3 | Alice |

Graph DB

- Edges

```
CREATE TABLE likes  
AS EDGE;
```



| Column Name | Data Type |
|--|----------------------------|
| graph_id_61279BA7D1144D19880B4D22FAFC0144 | (bigint, not null) |
| \$edge_id_5B8E7D712F884B28A1F65AB2A10CB493 | (nvarchar(1000), not null) |
| from_obj_id_4AA5537F0E5A41FDA13C603BC2B6ED6F | (int, not null) |
| from_id_DF2C4BCE540343798EBC0C5B63BCF121 | (bigint, not null) |
| \$from_id_FDB1CEDDDFF3447BD9C687779A9A34F2B | (nvarchar(1000), null) |
| to_obj_id_F32867EA43294090816F852180E74B2A | (int, not null) |
| to_id_DECF4E3D1A0844F6B2AFA701958747D2 | (bigint, not null) |
| \$to_id_25AB2D9784C747EE8CA2386004D04AAB | (nvarchar(1000), null) |

```
INSERT INTO likes VALUES (  
    (SELECT $node_id FROM Person WHERE id = 1),  
    (SELECT $node_id FROM Restaurant WHERE id = 1));
```

```
SELECT * FROM likes
```

| | \$edge_id_5B8E7D712F884B28A1F65AB2A10CB493 | \$from_id_FDB1CEDDDFF3447BD9C687779A9A34F2B | \$to_id_25AB2D9784C747EE8CA2386004D04AAB |
|---|--|---|---|
| 1 | { "type": "edge", "schema": "dbo", "table": "likes", "id": 0 } | { "type": "node", "schema": "dbo", "table": "Person", "id": 0 } | { "type": "node", "schema": "dbo", "table": "Restaurant", "id": 0 } |

Graph DB

Limitations? - Aber gerne!

- No graph temporary tables
- No graph table variables
- No graph system-versioned temporal tables
- **Node and edge tables cannot be memory optimized tables** 😞
- No Edge Update (nur Attribute)
- No Cross DB Queries

DEMO

GraphDB

SQL Server 2017 CTP 2.1 Integration Services

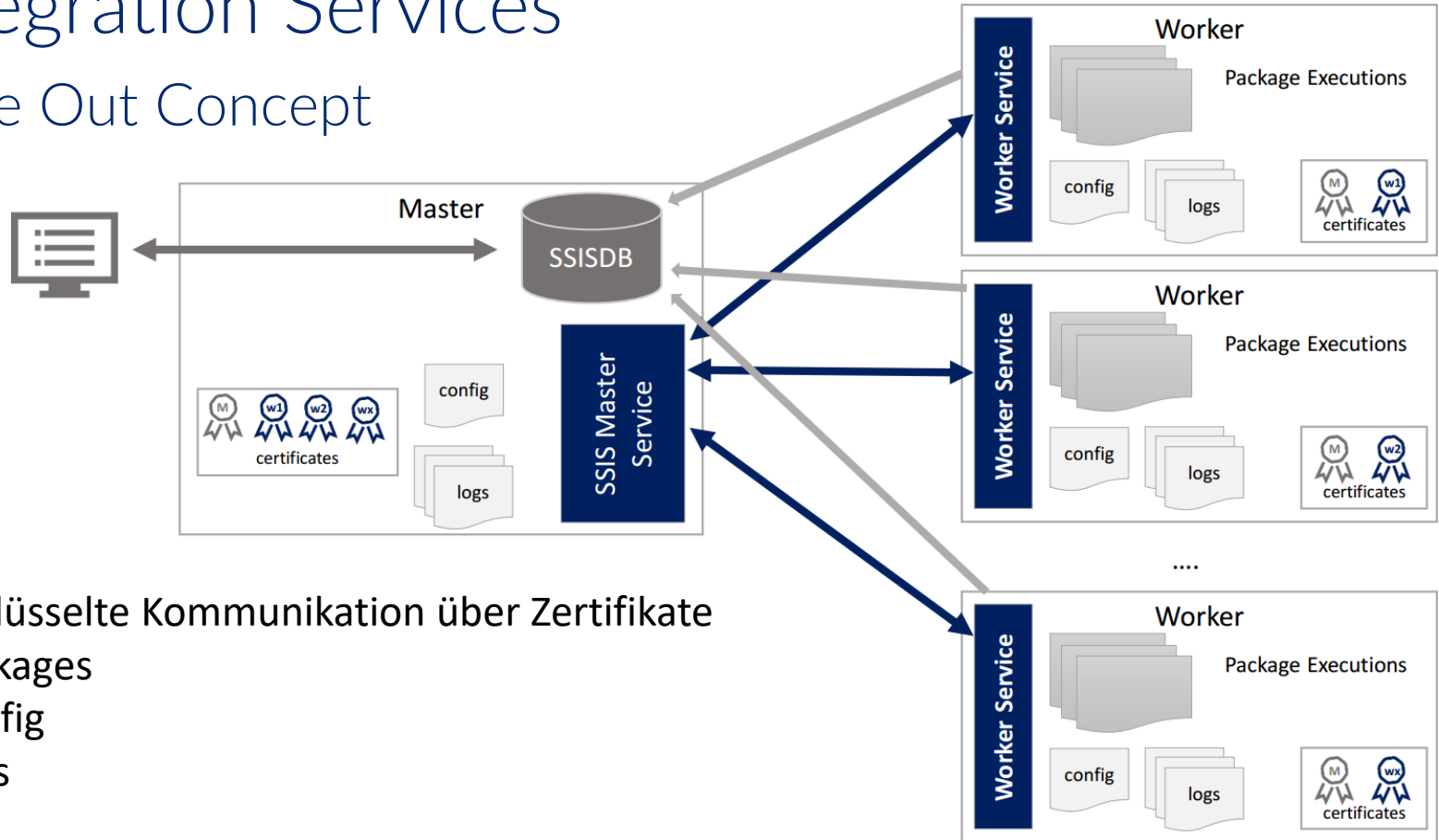
Integration Services

New features

- SQL Server 2017 Integration Services (SSIS) now supports **SQL Server on Linux**
- Scale Out for SSIS (on premise)
- SSIS in the cloud (ADF 2.0)

Integration Services

Scale Out Concept



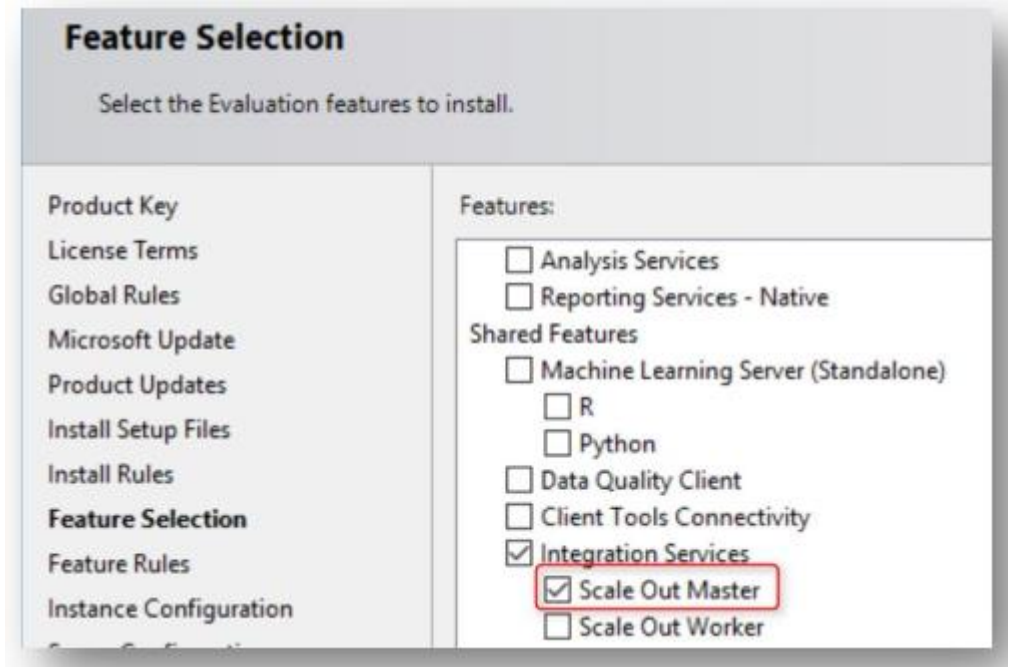
Verschlüsselte Kommunikation über Zertifikate

- Packages
- Config
- Logs

Integration Services

Scale Out

› Scale Out Master Installation



| | | | | |
|---|---|---------|-----------|----------------------------------|
| SQL Server Integration Services 14.0 | Provides management support for SSIS package storag... | Running | Automatic | NT Service\MsDtsServer140 |
| SQL Server Integration Services CEIP service 14.0 | CEIP service for Sql server Integration Services | Running | Automatic | NT Service\SSISTELEMETRY140 |
| SQL Server Integration Services Scale Out Master 14.0 | Scale Out Master for SQL Server Integration Services Sca... | Running | Automatic | NT Service\SSISScaleOutMaster140 |

Integration Services

Scale Out

Create Catalog

Ready

Select a page

General

Script | Help

To create and use the catalog, CLR integration must be enabled on the current SQL Server instance.

- Enable CLR Integration
- Enable automatic execution of Integration Services stored procedure at SQL Server startup.

Name of the catalog database:

SSISDB

The catalog protects data using encryption. A key is needed for this encryption. Enter a password to protect the encryption key, and save the password in a secure location.

Password:

Retype Password:

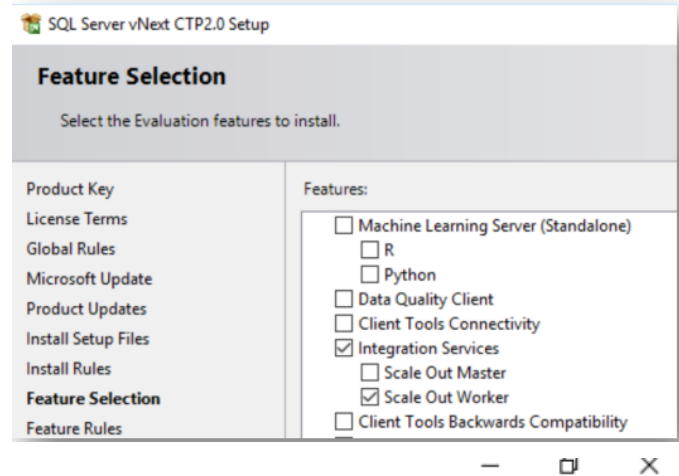
You can manage the encryption key by creating a backup. If you migrate or move the Integration Services catalog to another SQL Server instance, you can restore the key to regain access to encrypted content.

- Enable this server as SSIS scale out master

Integration Services

Scale Out

› Scale Out Worker Installation



SQL Server 2017 RC2 Setup

Integration Services Scale Out Configuration - Worker Node

Specify the master node endpoint and security certificate used by the Scale Out Worker node.

Product Key

License Terms

Global Rules

Microsoft Update

Product Updates

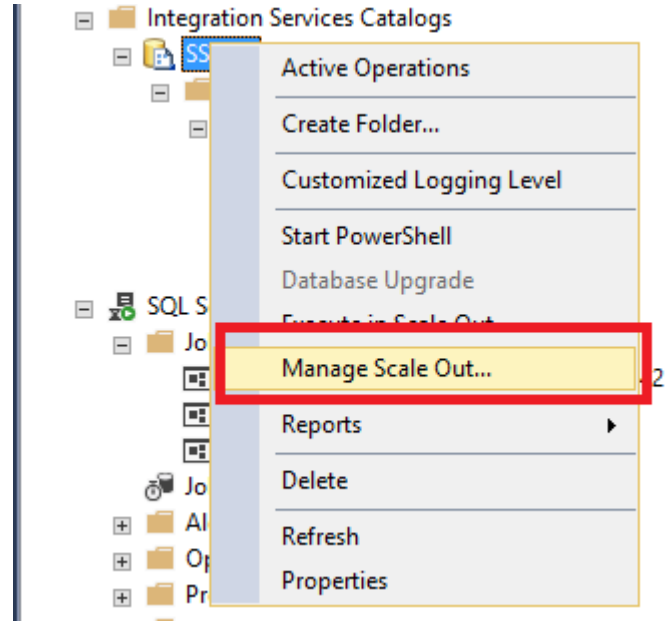
Provide the master node endpoint which the worker node needs to connect to (e.g. `https://[MasterNodeMachineName]:[Port]`):

`https://ssismaster:8391`

Integration Services

Scale Out

- › Scale Out Manager
 - › SSISB->Manage Scale Out (Run as Administrator!)



Integration Services

Scale Out

› Scale Out Manager

SQL Server Integration Services

Manage Scale Out

WIN-ADA37O7RFED\sgoetz

Dashboard

Worker Manager

(SQL Server 14.0.1000.169)

Scale Out has been enabled.

Master Properties

| | |
|---------------------|---|
| Machine name | Port |
| win-ada37o7rfed | 8391 |
| Machine IP | Last online time |
| 192.168.3.135 | Wed Dec 20 2017 13:41:44 GMT+0100 (...) |

Worker Status

WIN-ADA37O7RFED

SQL Server Integration Services

Manage Scale Out

WIN-ADA37O7RFED\sgoetz

Dashboard

Worker Manager

Search

1 nodes found

WIN-ADA37O7RFED

Enabled

Worker Properties

| | |
|---------------------|------------------------------|
| Machine name | User Account |
| WIN-ADA37O7RFED | NT Service\SSISScaleOutWo... |

Description

Running Packages

| Execution Id | Package Path | Start Time |
|--------------|--------------|------------|
|--------------|--------------|------------|

Integration Services

Scale Out

› Configuration Files

- › C:\Program Files\Microsoft SQL Server\140\DTS\Binn\

WorkerSettings.config

```
{  
  "PortNumber": 8391,  
  "SSLCertThumbprint": "4D09327C1ACF48B05487D014A425A6C9E12449C4",  
  "SqlServerName": ".",  
  "CleanupCompletedJobsIntervalInMs": 43200000,  
  "DealWithExpiredTasksIntervalInMs": 300000,  
  "MasterHeartbeatIntervalInMs": 30000,  
  "SqlConnectionTimeoutInSecs": 15  
}
```

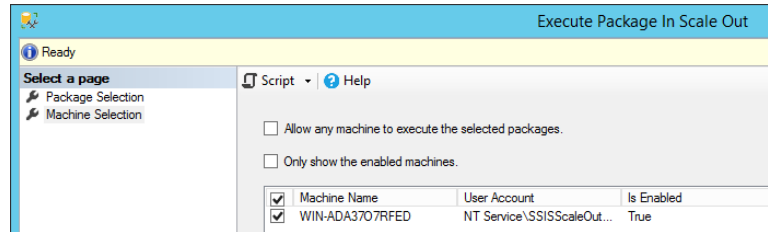
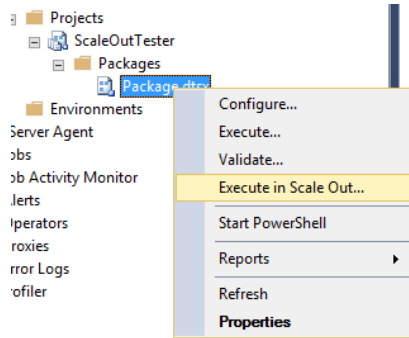
MasterSettings.config

```
{  
  "DisplayName": "SSISWORKER01",  
  "Description": "",  
  "MasterEndpoint": "https://ssismaster:8391",  
  "MasterHttpsCertThumbprint": "4D09327C1ACF48B05487D014A425A6C9E",  
  "WorkerHttpsCertThumbprint": "4A36BD5A182C195E03FCD091D5B99EEDB",  
  "StoreLocation": "LocalMachine",  
  "StoreName": "My",  
  "AgentHeartbeatInterval": "00:01:00",  
  "TaskHeartbeatInterval": "00:00:10",  
  "HeartbeatErrorTolerance": "00:10:00",  
  "TaskRequestMaxCPU": 70.0,  
  "TaskRequestMinMemory": 100.0,  
  "MaxTaskCount": 10,  
  "LeaseInterval": "00:01:00",  
  "TasksRootFolder": "",  
  "TaskLogLevel": 126,  
  "TaskLogSegment": "00:00:00",  
  "TaskLogEnabled": true,  
  "ExecutionLogCacheFolder": "",  
  "ExecutionLogMaxBufferLogCount": 10000,  
  "ExecutionLogMaxInMemoryBufferCount": 10,  
  "ExecutionLogRetryCount": 3,  
  "ExecutionLogRetryTimeout": "7.00:00:00",  
  "AgentId": "7596c69c-8f93-40d5-8c75-e404b359b8ef"  
}
```

Integration Services

Scale Out

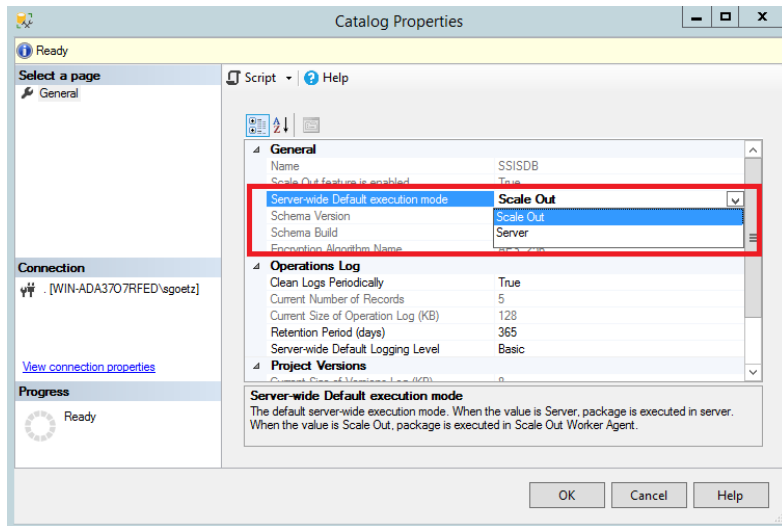
› Execute in Scale Out



Integration Services

Scale Out

- › SQL Agent Execute in Scale Out
 - › New property in SSISDB Config



Integration Services

Scale Out

› T-SQL Execute in ScaleOut

```
EXEC [SSISDB].[catalog].[create_execution]
@package_name=N'PackageLongRunning.dtsx',
@execution_id=@execution_id OUTPUT,
@folder_name=N'SampleFolder',
@project_name=N'ScaleOut',
@use32bitruntime=False,
@reference_id=NULL,
@useanyworker=False,
@runinscaleout=True;
```

Create execution

```
EXEC [SSISDB].[catalog].[set_execution_parameter_value]
@execution_id,
@object_type=50,
@parameter_name=N'LOGGING_LEVEL',
@parameter_value=@var0;
```

Set parameters

```
EXEC [SSISDB].[catalog].[add_execution_worker]
@execution_id,
@workeragent_id=N'e0b8f1e8-2bd5-46d3-9b3c-586c539e73d5';
```

Define workers

```
EXEC [SSISDB].[catalog].[start_execution]
@execution_id,
@retry_count=3;
```

Start execution

DEMO

Integration Services Scale Out

Integration Services

Scale Out

| Feature | Enterprise | Standard | Web | Express with Advanced Services | Express |
|---|------------|------------------|-----|---|---------|
| Scale Out Master | Yes | | | | |
| Scale Out Worker | Yes | Yes ¹ | TBD | TBD | TBD |
| Support for Microsoft Dynamics AX and Microsoft Dynamics CRM in OData components ² | Yes | Yes | | | |

¹ If you run packages that require Enterprise-only features in Scale Out, the Scale Out Workers must also run on instances of SQL Server Enterprise.

² This feature is also supported in SQL Server 2016 with Service Pack 1.

A photograph of a modern building facade. The building features a combination of white vertical panels and large glass windows. The glass windows reflect the sky and surrounding environment. A blue semi-transparent overlay is present on the left side of the image, and a bright green horizontal bar is at the bottom left. The word "Pizza" is written in white on the blue overlay.

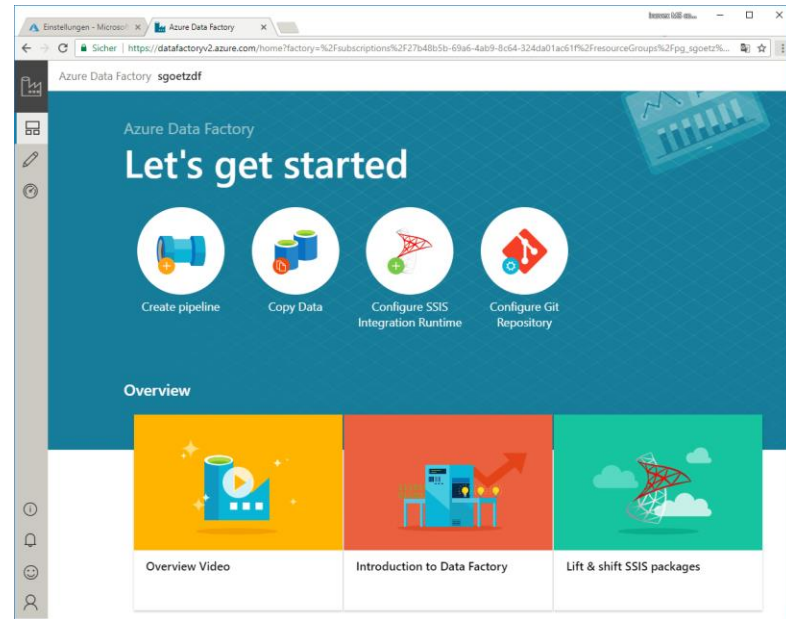
Pizza

Azure Data Factory 2.0 IS Runtime (Preview Feature)

Integration Services

SSIS in the cloud with Azure Data Factory 2.0

- › SSIS Pakete in einer managed Umgebung ausführen
- › Bereitstellung ISRuntime über PowerShell* oder „Author & Monitor“
- › Best practice:
Anbindung von on-premise Datenbanken über VNET->Local Network Gateway

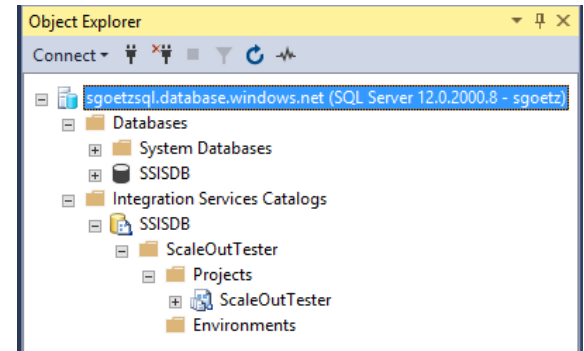


*<https://docs.microsoft.com/en-us/azure/data-factory/tutorial-deploy-ssis-packages-azure>

Integration Services

SSIS in the cloud with Azure Data Factory 2.0

- › Bereitstellung SSIDB in der Cloud
- › Scheduling
 - › On-Premiuse SQL Server Agent
 - › ADF 2.0 „Execute SQL“



Integration Services

SSIS in the cloud with Azure Data Factory 2.0

- › **Limitations? - Aber gerne!**
 - › Keine custom DLLs
 - › Keine Third Party Komponenten
 - › On-Premise daten nur über Classic VNETs (!!!)
 - › Nur Project Deployment model

DEMO

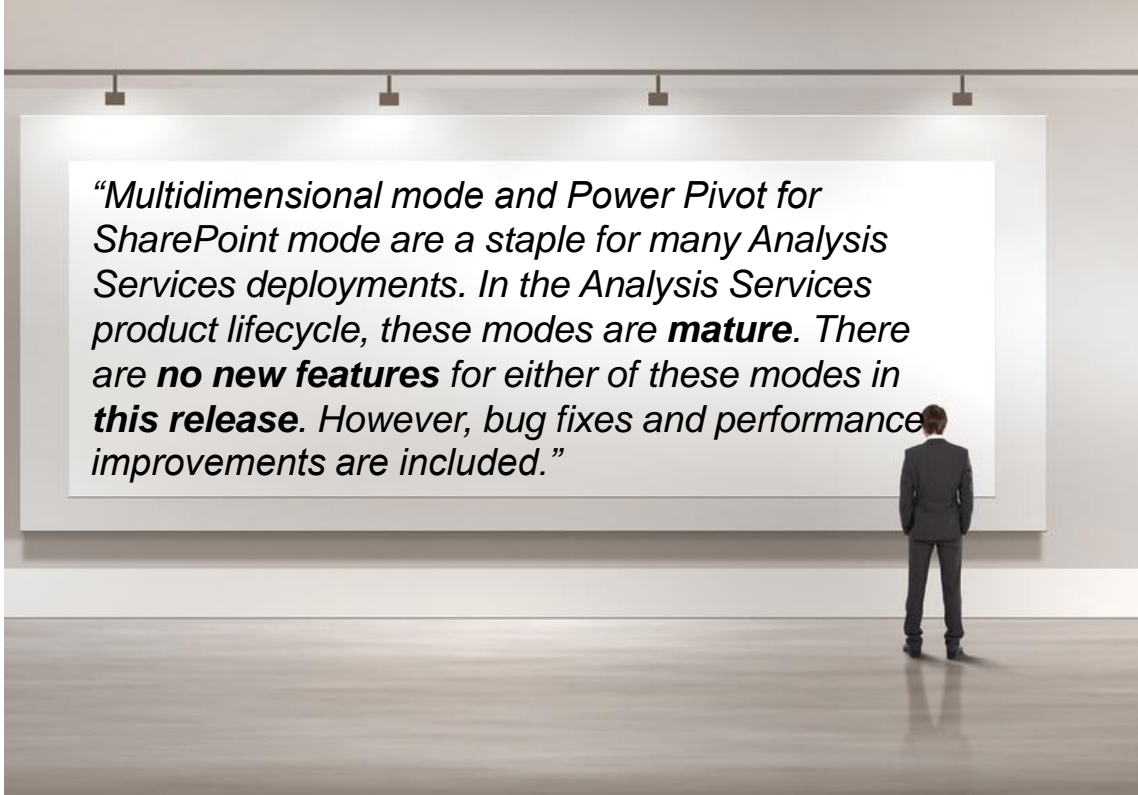
Azure Data Factory 2.0 IS Runtime

SQL Server 2017 CTP 2.1 Analysis Services

Analysis Services

Multidimensional

Neue Features:

A person in a dark suit stands with their back to the camera, looking at a large projection screen. The screen displays a message in italics. The room has a light-colored floor and a dark ceiling with track lighting.

*“Multidimensional mode and Power Pivot for SharePoint mode are a staple for many Analysis Services deployments. In the Analysis Services product lifecycle, these modes are **mature**. There are **no new features** for either of these modes in **this release**. However, bug fixes and performance improvements are included.”*

Analysis Services

Tabular

- › Tabular mode is now the **default installation option** for Analysis Services.

Analysis Services

New Get Data experience (Power Query)

- › Simple Transformationen in SSAS über Power Query möglich

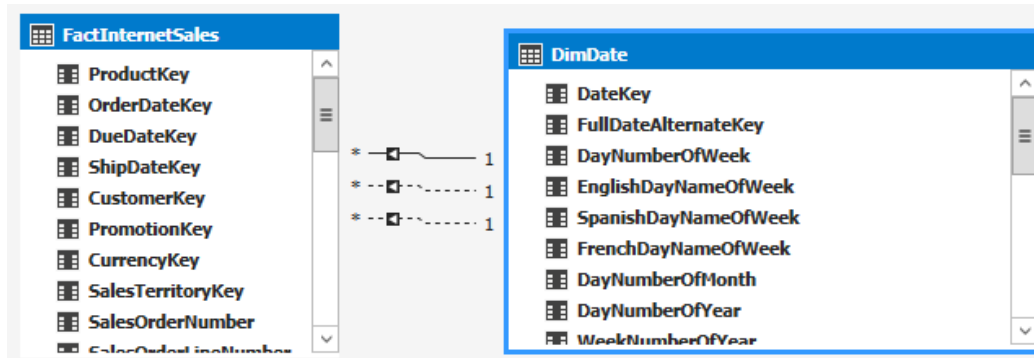
The first screenshot shows the 'Table Properties' menu option highlighted in red. The second screenshot shows the 'Edit Table Properties' dialog box with the 'Query Editor' switch selected and the 'Design...' button highlighted in red. The third screenshot shows the 'Query Editor' interface with a data preview table and the 'Applied Steps' pane.

| 13 | CurrencyKey | CurrencyAlternateKey | CurrencyName |
|----|-------------|----------------------|-------------------|
| 1 | 2 AFA | | Afghani |
| 2 | 2 DZD | | Algerian Dinar |
| 3 | 3 ARS | | Argentine Peso |
| 4 | 4 AMD | | Armenian Dram |
| 5 | 5 AWG | | Aruban Guilder |
| 6 | 6 AUD | | Australian Dollar |
| 7 | 7 AZM | | Azerbaijan Manat |
| 8 | 8 BSD | | Bahamian Dollar |
| 9 | 9 BHD | | Bahraini Dinar |
| 10 | 10 THB | | Baht |
| 11 | 11 PAB | | Balboa |
| 12 | 12 BBD | | Barbados Dollar |
| 13 | | | |

Analysis Services

New Date Relation features

› Multiple Relations Fact <-> Date Dimension



› DAX Formular with „USERRELATIONSHIP“-Hint

```
OrderAmountByOrderDate: =CALCULATE(SUM(FactInternetSales[SalesAmount]), USERRELATIONSHIP(FactInternetSales[OrderDateKey], DimDate[DateKey]))
```

```
OrderAmountByDueDate: =CALCULATE(SUM(FactInternetSales[SalesAmount]), USERRELATIONSHIP(FactInternetSales[DueDateKey], DimDate[DateKey]))
```

Analysis Services

DAX enhancements

› New >>IN<< Operation

```
Filtered Sales:=CALCULATE (  
    [Internet Total Sales],  
    'Product'[Color] = "Red"  
    || 'Product'[Color] = "Blue"  
    || 'Product'[Color] = "Black"  
)
```



```
Filtered Sales:=CALCULATE (  
    [Internet Total Sales], 'Product'[Color]  
    IN { "Red", "Blue", "Black" }  
)
```

DEMO

Analysis Services

SQL Server 2017 CTP 2.1

Reporting Services

Reporting Services

- › SQL Server Reporting Services is no longer available to install through SQL Server setup
- › RESTful API
<https://app.swaggerhub.com/apis/microsoft-rs/SSRS/2.0>

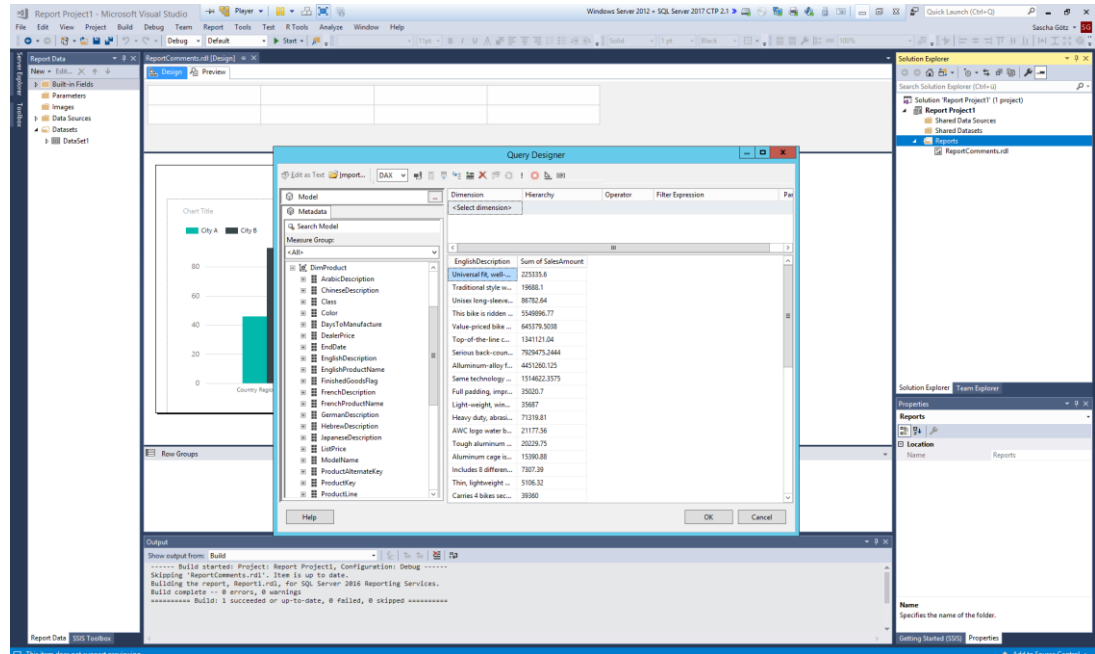
Reporting Services

- › Comments and attachments are now available for reports

The screenshot displays the Power BI Report Server interface in a browser window. The address bar shows the URL: localhost/Reports/report/Report%20Project1/ReportComments. The page title is "Power BI Report Server". The navigation bar includes "Stamm" > "Report Project1" > "ReportComments". The main content area features a bar chart titled "Chart Title" with a legend listing various cities and their corresponding colors. The Y-axis ranges from 0 to 1,000,000. The X-axis shows categories: AU, CA, DE, FR, GB, and US. The GB category has a prominent bar reaching approximately 800,000. To the right of the chart is a sidebar for adding comments, titled "Kommentar hinzufügen". It contains a text input field with the placeholder "Beginnen Sie hier mit der...", a "Date..." button, and a "Kommentar posten" button. Below this is a section for "Neueste" comments, showing a comment by "WIN-ADA3707RFED\sgoetz" posted "vor ein paar Sekunden". The comment text is "Does this make any sense?" and there is a "Hier antworten..." input field.

Reporting Services

- › Build-In DAX/MDX Query Designer



DEMO

Reporting Services

A photograph of a modern building facade. The lower portion features a large glass window reflecting the sky and trees. The upper portion has white panels with a grid of windows. A blue semi-transparent overlay covers the left side, containing contact information. A green bar is at the bottom left.

Sascha Götz

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