Microsoft Azure

Build a Data Warehouse with SQL Database Projects

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Hello!

- Drew Skwiers-Koballa (*squire's – co – ball – ah*)
- Pronouns: he/him
- Twitter: @sysadmindrew
- Program Manager at Microsoft
- Former small company database "person" and developer
- Unrelated interests: pugs, chickens, gardening

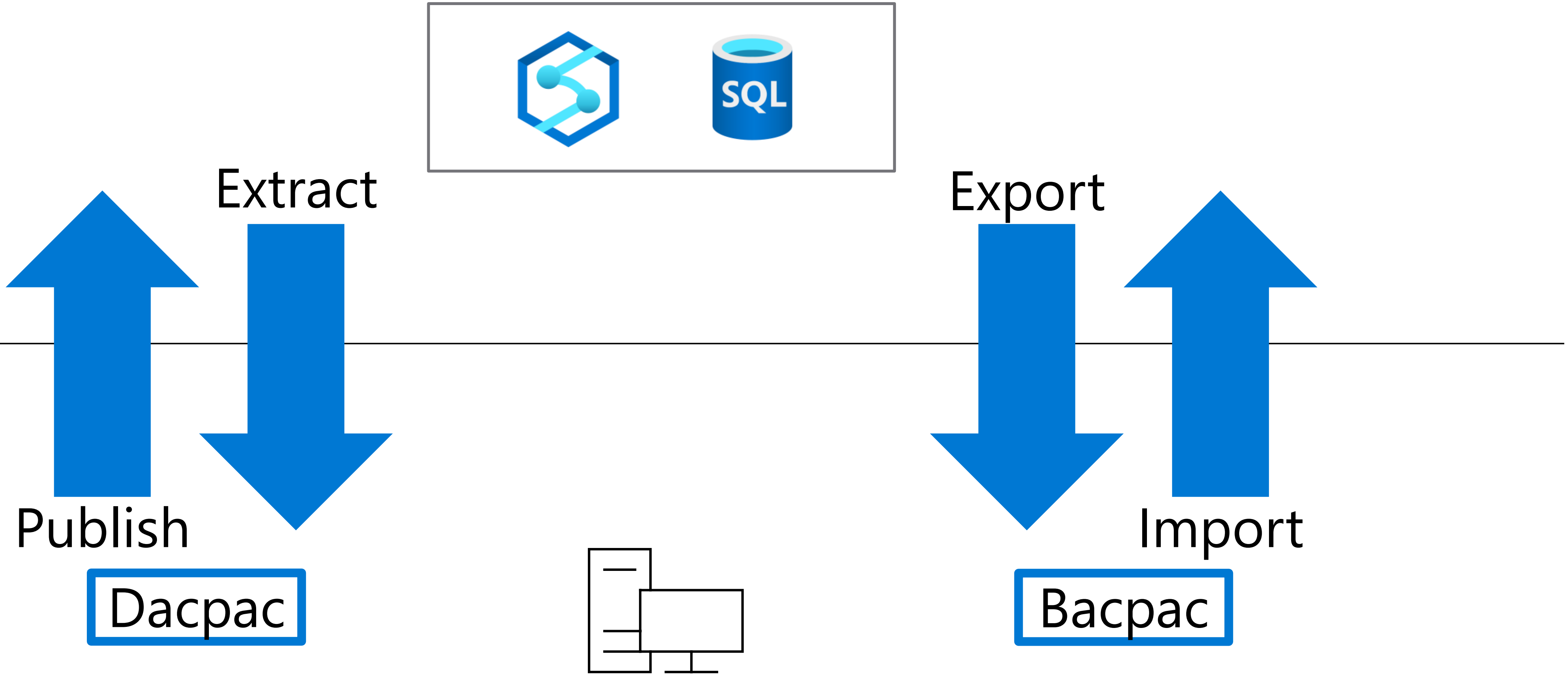
Agenda

1. SqlPackage
2. Azure Data Studio
3. Visual Studio

SqlPackage

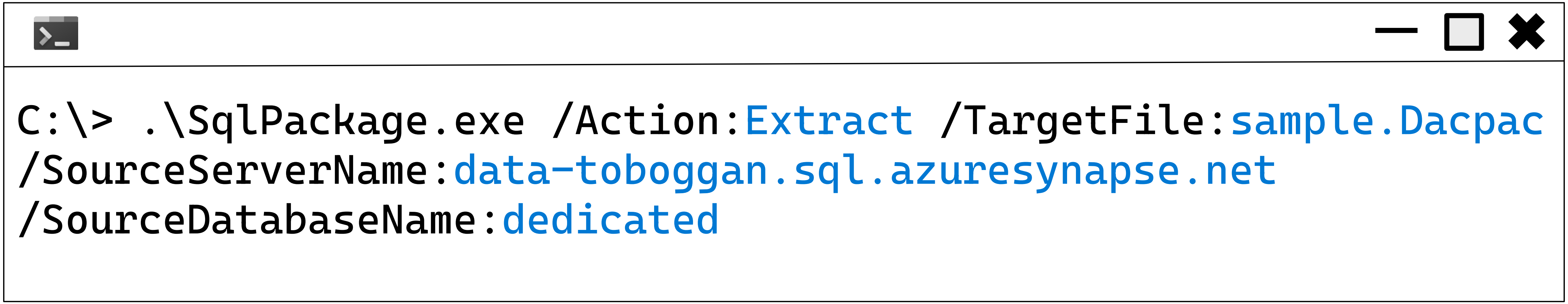
SqlPackage

Command line interface to data-tier application framework (DacFx)



http://aka.ms/sqlpackage

SqlPackage: Extract schema to dacpac

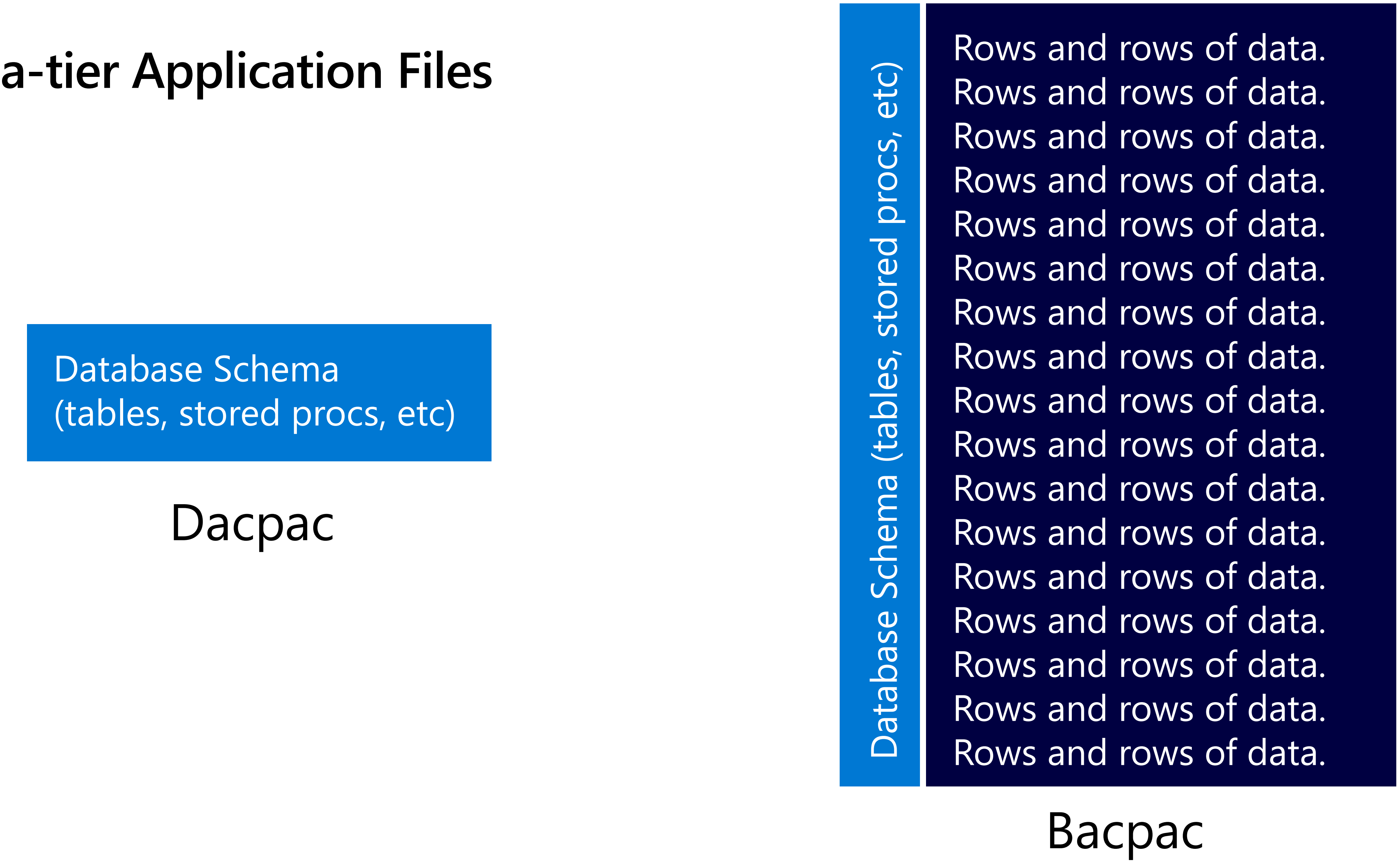


```
C:\> .\SqlPackage.exe /Action:Extract /TargetFile:sample.Dacpac
/SourceServerName:data-toboggan.sql.azuresynapse.net
/SourceDatabaseName:dedicated
```

Parameters have long and short form names

/Action:	/a:
/SourceServerName:	/ssn:
/TargetFile:	/tf:

Data-tier Application Files



Database Schema
(tables, stored procs, etc)

Dacpac

Database Schema (tables, stored procs, etc)

Rows and rows of data.
Rows and rows of data.
Rows and rows of data.
Rows and rows of data.
Rows and rows of data.
Rows and rows of data.
Rows and rows of data.
Rows and rows of data.
Rows and rows of data.
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Rows and rows of data.
Rows and rows of data.
Rows and rows of data.
Rows and rows of data.
Rows and rows of data.

Bacpac

Parquet Files

Flat file format with improvements for efficiency and performance

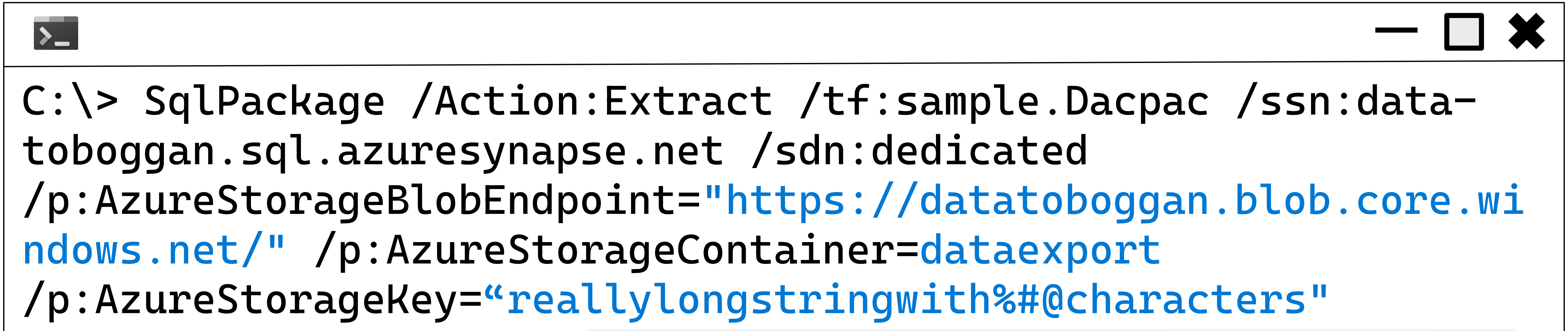
```
SELECT TOP 100 *
FROM OPENROWSET(
     BULK 'https://azuresynapsestorage.blob.core.windows.net/sampledata/NYCTaxiSmall/NYCTripSmall.parquet’,
     FORMAT='PARQUET'
) AS [result]
```

Parquet Files

Flat file format with improvements for efficiency and performance

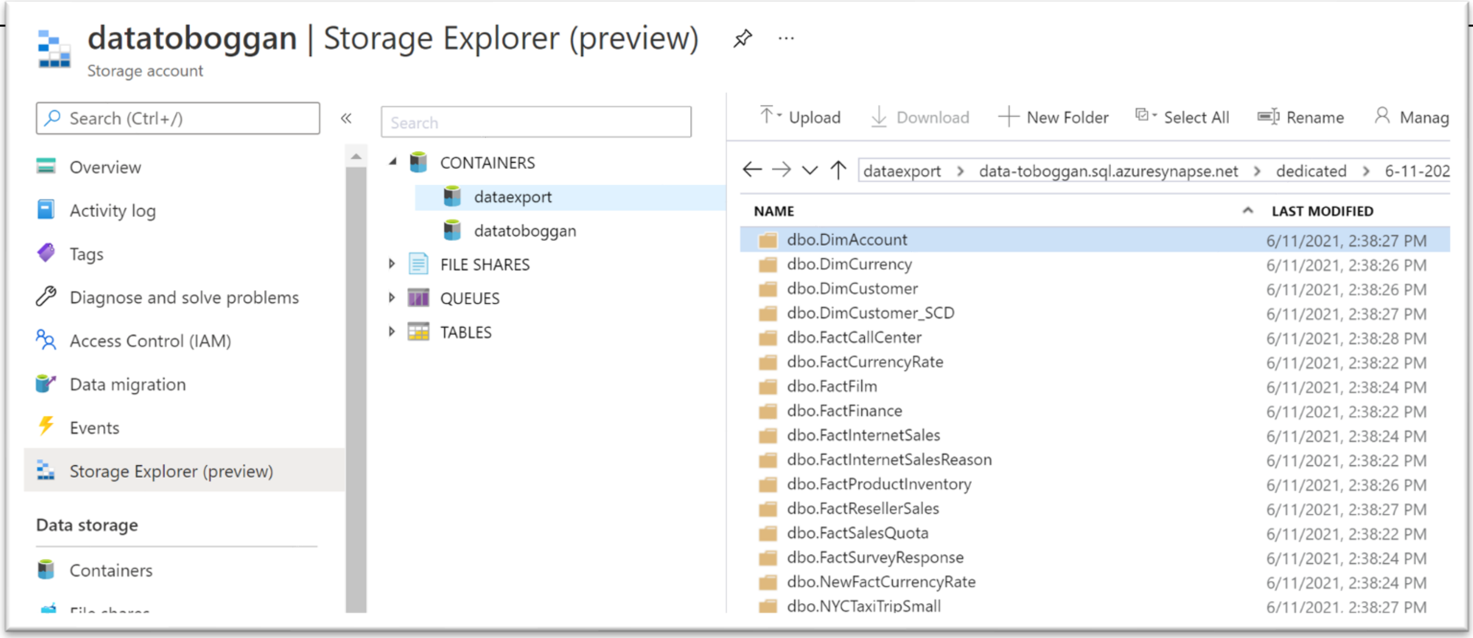
```
 COPY INTO dbo.NYCTaxiTripSmall
 (DateID 1, MedallionID 2, … TollsAmount 22,TotalAmount 23)
 FROM 'https://azuresynapsestorage.blob.core.windows.net/sampled
ata/NYCTaxiSmall/NYCTripSmall.parquet'
 WITH
 (
    FILE_TYPE = 'PARQUET'
    ,MAXERRORS = 0
    ,IDENTITY_INSERT = 'OFF'
 )
```

SqlPackage + Parquet



```
C:\> SqlPackage /Action:Extract /tf:sample.Dacpac /ssn:data-toboggan.sql.azuresynapse.net /sdn:dedicated /p:AzureStorageBlobEndpoint="https://datatoboggan.blob.core.windows.net/" /p:AzureStorageContainer=dataexport /p:AzureStorageKey=“reallylongstringwith%#@characters"
```

local dacpac +



datatoboggan | Storage Explorer (preview)

Storage account

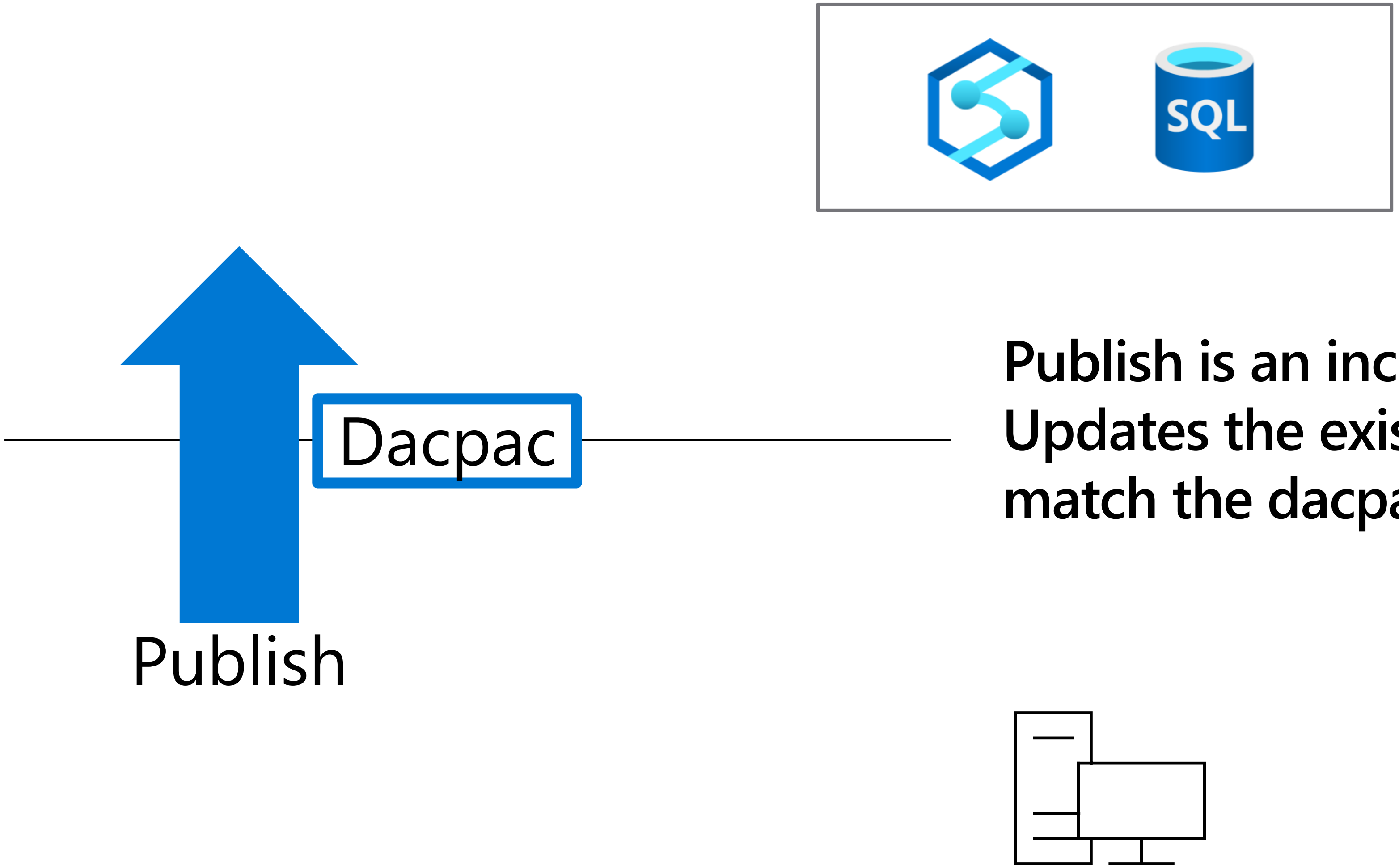
dataexport > data-toboggan.sql.azuresynapse.net > dedicated > 6-11-202

NAME	LAST MODIFIED
dbo.DimAccount	6/11/2021, 2:38:27 PM
dbo.DimCurrency	6/11/2021, 2:38:26 PM
dbo.DimCustomer	6/11/2021, 2:38:26 PM
dbo.DimCustomer_SCD	6/11/2021, 2:38:27 PM
dbo.FactCallCenter	6/11/2021, 2:38:28 PM
dbo.FactCurrencyRate	6/11/2021, 2:38:22 PM
dbo.FactFilm	6/11/2021, 2:38:24 PM
dbo.FactFinance	6/11/2021, 2:38:22 PM
dbo.FactInternetSales	6/11/2021, 2:38:24 PM
dbo.FactInternetSalesReason	6/11/2021, 2:38:22 PM
dbo.FactProductInventory	6/11/2021, 2:38:26 PM
dbo.FactResellerSales	6/11/2021, 2:38:27 PM
dbo.FactSalesQuota	6/11/2021, 2:38:22 PM
dbo.FactSurveyResponse	6/11/2021, 2:38:24 PM
dbo.NewFactCurrencyRate	6/11/2021, 2:38:24 PM
dbo.NYCTaxiTripSmall	6/11/2021. 2:38:27 PM

Developing a Data Schema

SqlPackage

Command line interface to DacFx framework



Publish is an incremental operation
Updates the existing database schema to match the dacpac

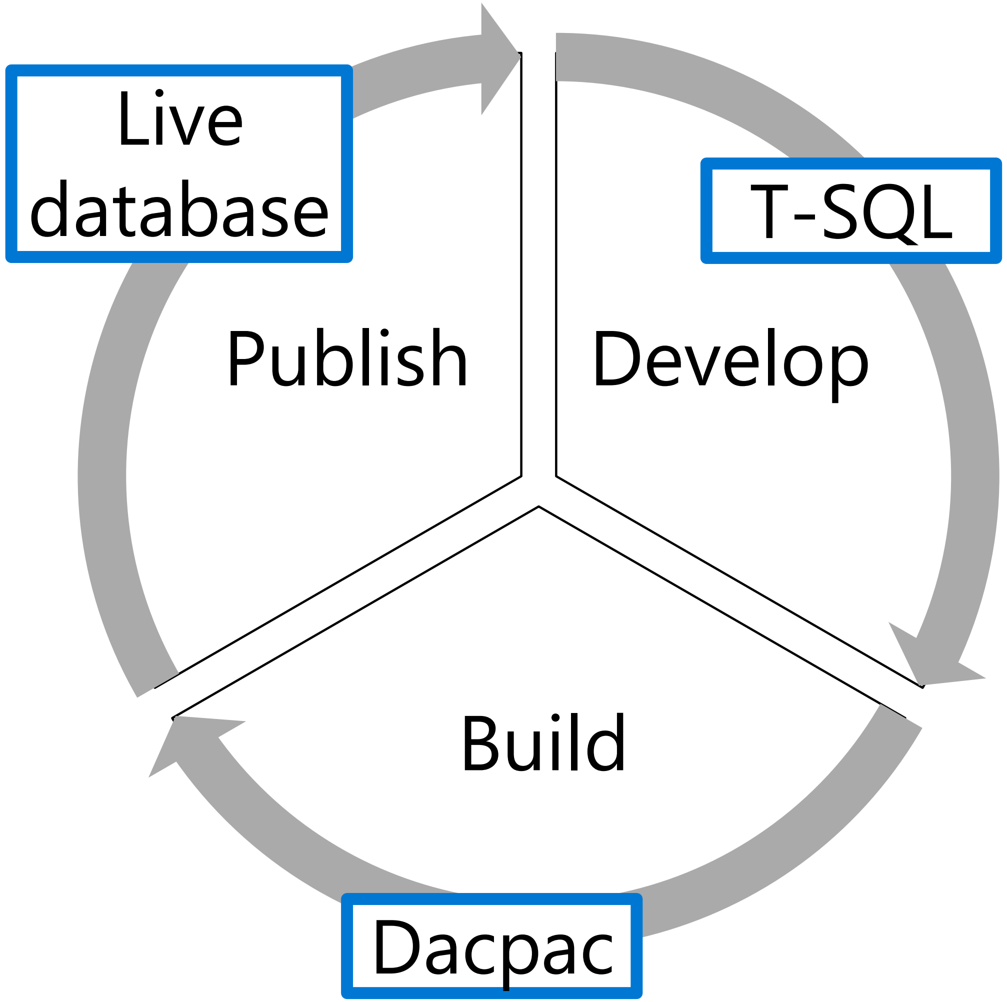
Declarative Database Development

Development of the desired end state

- Also known as state-based development
- Tooling manages change and migration during deployment

Facilitates version control

Dacpac is the result from building a database project



SQL Project Development

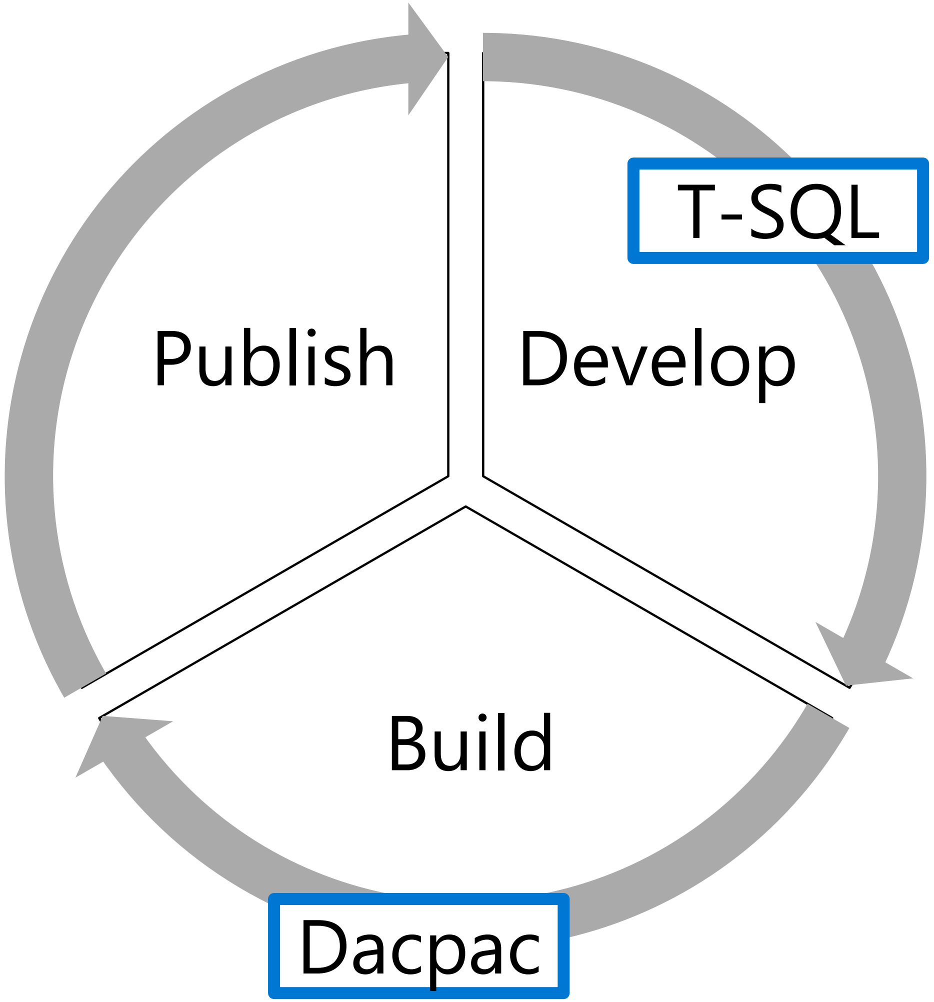
SQL Server Data Tools

Available in “Data Platform” workload of Visual Studio

SQL Database Projects extension

Extension in Azure Data Studio

Leverages .NET Core SDK to bring SQL Projects to macOS and Linux



https://aka.ms/azuredatastudio-sqlprojects

Database Projects in Azure Data Studio

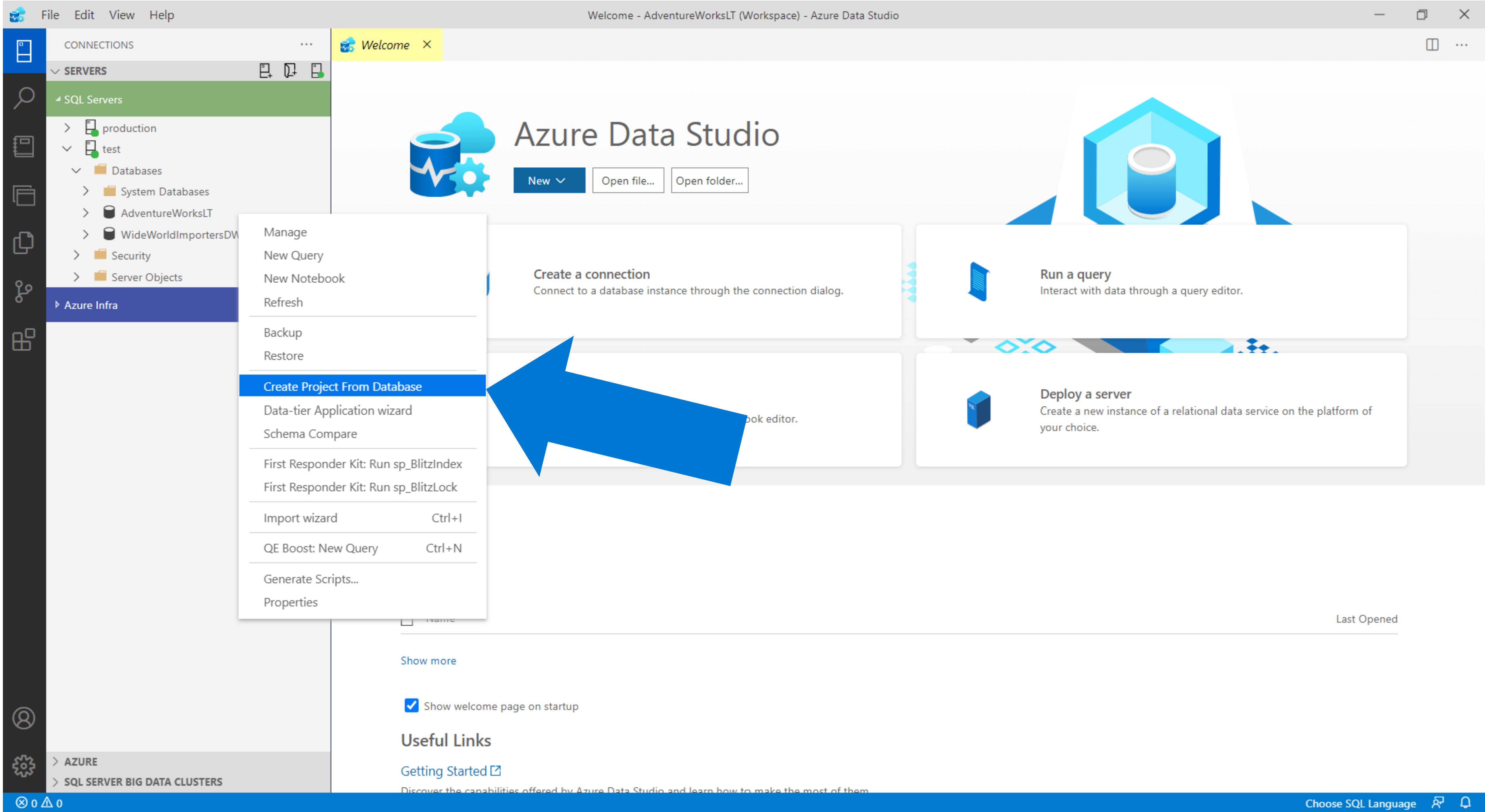
Working towards parity with SSDT features, currently:

- Pre/Post deployment
- Database references
- Deployment profile
- Schema compare

Backward compatibility with SSDT

Same project will work with ADS as well as with SSDT

Azure Data Studio



Connect to a database instance through the connection dialog.

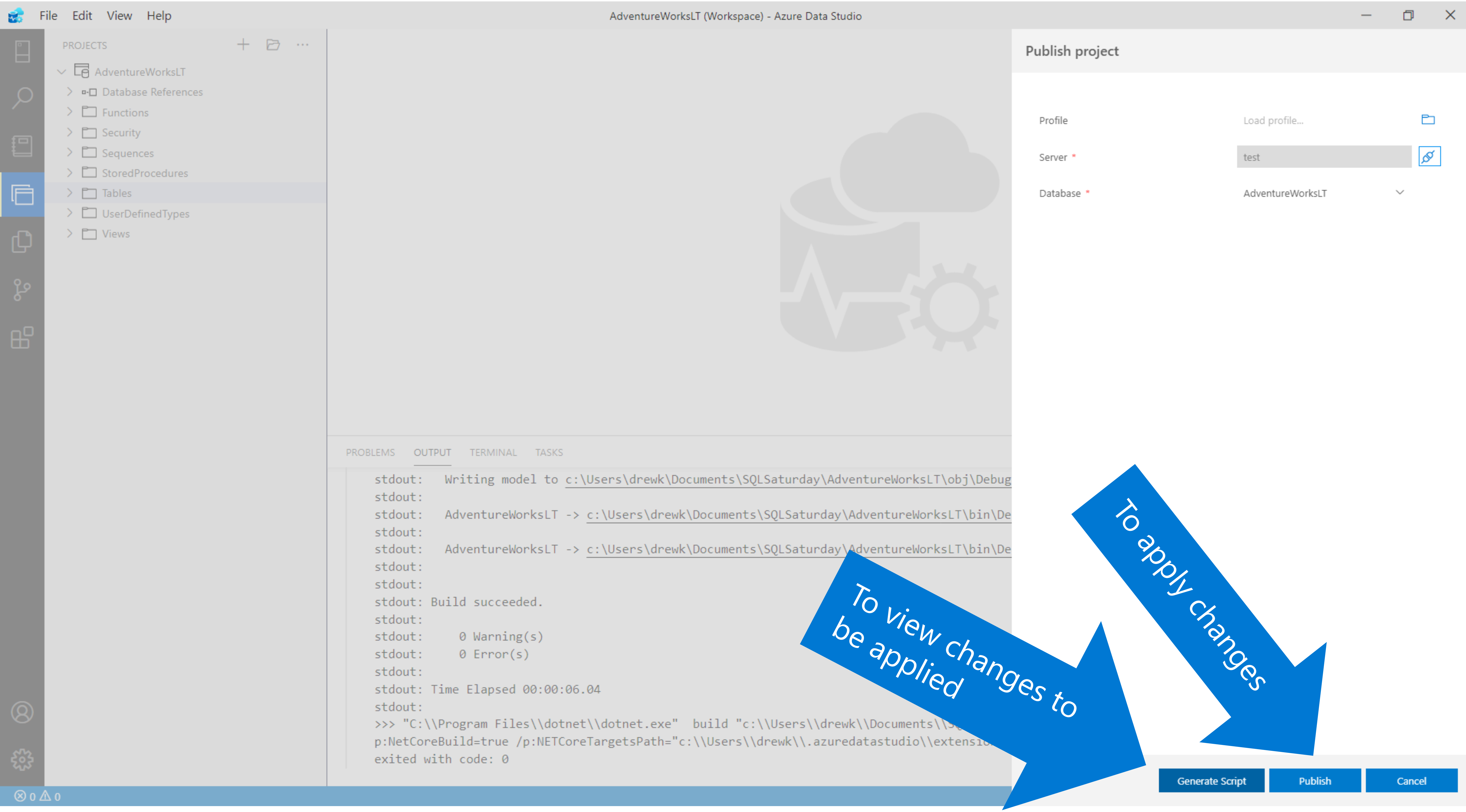
Interact with data through a query editor.

ook editor.

Create a new instance of a relational data service on the platform of your choice.

☑ Show welcome page on startup

Discover the capabilities offered by Azure Data Studio and learn how to make the most of them.



Publish project

Profile: Load profile...

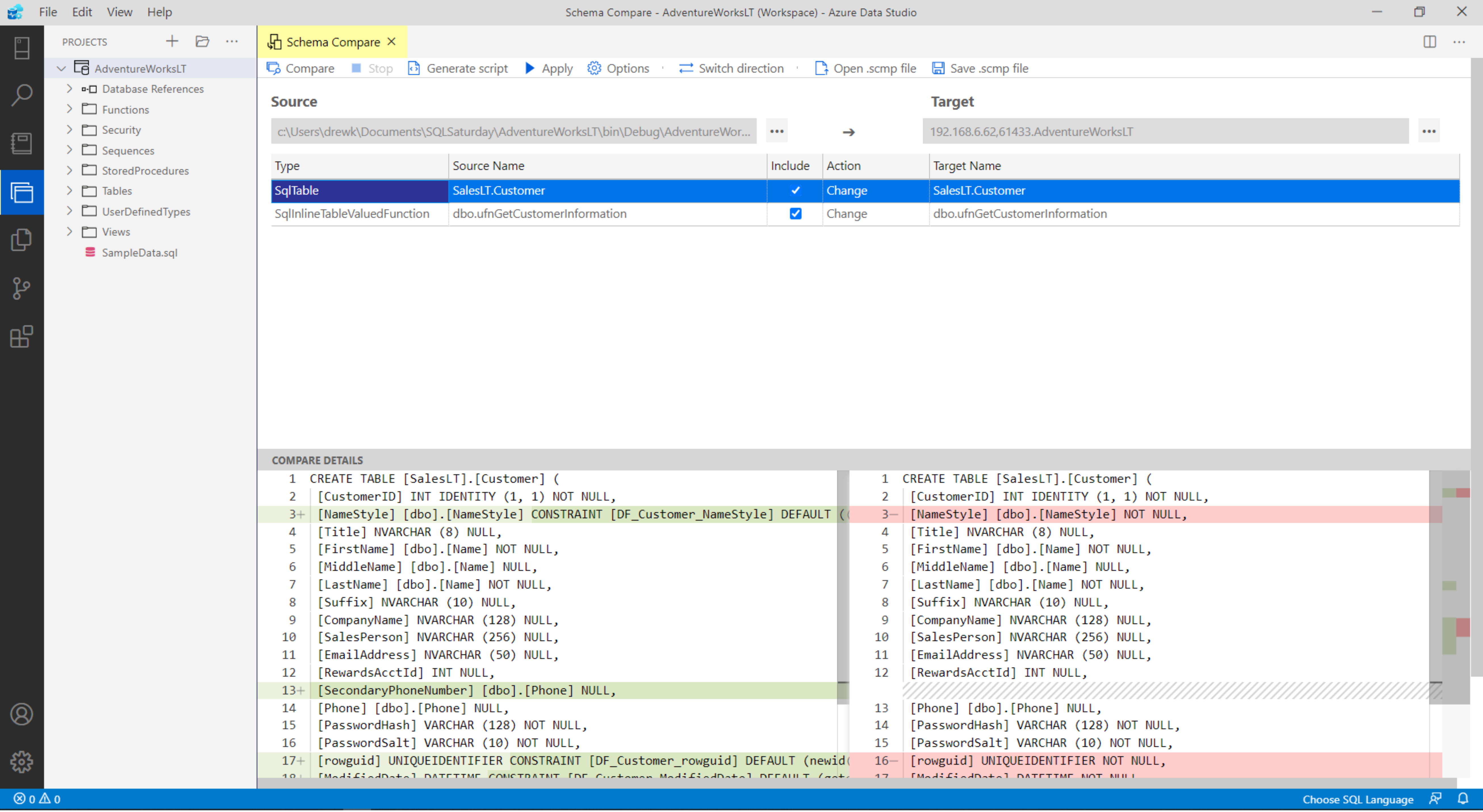
Server *: test

Database *: AdventureWorksLT

```
stdout:   Writing model to c:\Users\drewk\Documents\SQLSaturday\AdventureWorksLT\obj\Debug
stdout:
stdout:   AdventureWorksLT -> c:\Users\drewk\Documents\SQLSaturday\AdventureWorksLT\bin\De
stdout:
stdout:   AdventureWorksLT -> c:\Users\drewk\Documents\SQLSaturday\AdventureWorksLT\bin\De
stdout:
stdout:
stdout: Build succeeded.
stdout:
stdout:     0 Warning(s)
stdout:     0 Error(s)
stdout:
stdout: Time Elapsed 00:00:06.04
stdout:
>>> "C:\\Program Files\\dotnet\\dotnet.exe"  build "c:\\Users\\drewk\\Documents\\S
p:NetCoreBuild=true /p:NETCoreTargetsPath="c:\\Users\\drewk\\.azuredatastudio\\extensio
exited with code: 0
```

To view changes to be applied

To apply changes



Source

c:\Users\drewk\Documents\SQLSaturday\AdventureWorksLT\bin\Debug\AdventureWor...

Target

192.168.6.62,61433.AdventureWorksLT

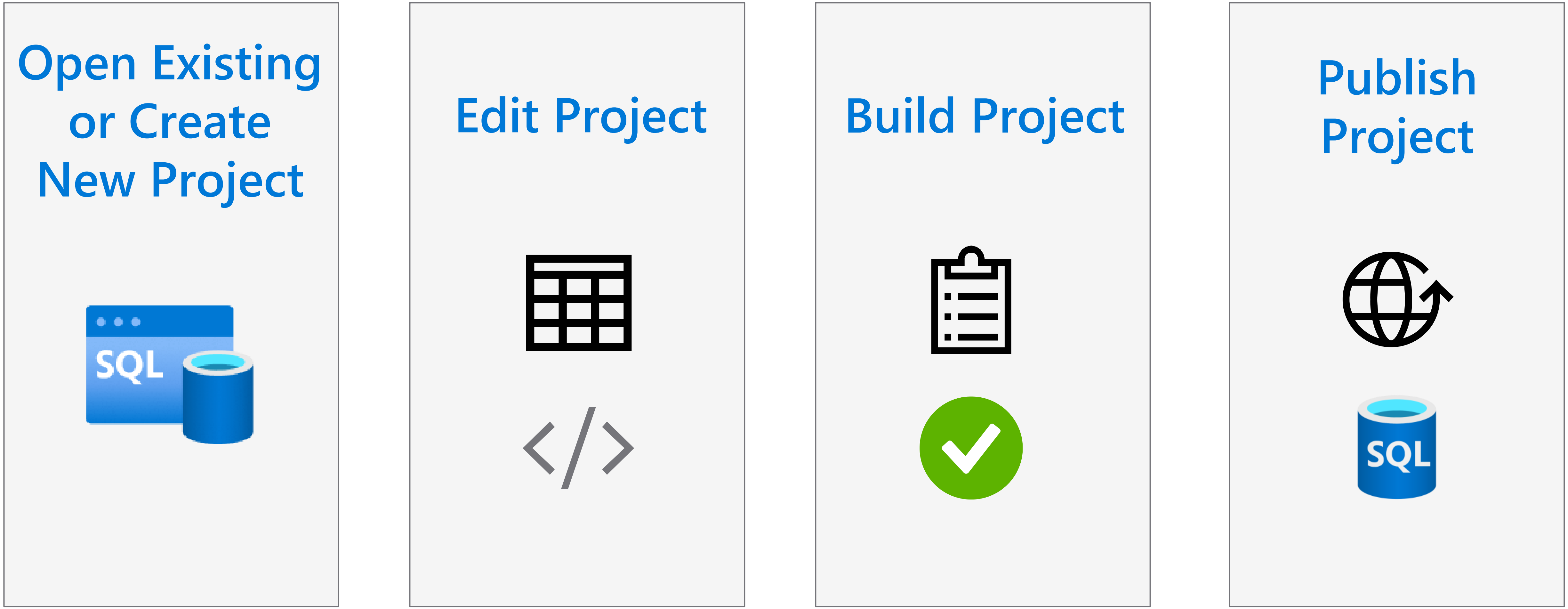
Type	Source Name	Include	Action	Target Name
SqlTable	SalesLT.Customer	✓	Change	SalesLT.Customer
SqlInlineTableValuedFunction	dbo.ufnGetCustomerInformation	☑	Change	dbo.ufnGetCustomerInformation

```
CREATE TABLE [SalesLT].[Customer] (
 [CustomerID] INT IDENTITY (1, 1) NOT NULL,
 [NameStyle] [dbo].[NameStyle] CONSTRAINT [DF_Customer_NameStyle] DEFAULT ((
 [Title] NVARCHAR (8) NULL,
 [FirstName] [dbo].[Name] NOT NULL,
 [MiddleName] [dbo].[Name] NULL,
 [LastName] [dbo].[Name] NOT NULL,
 [Suffix] NVARCHAR (10) NULL,
 [CompanyName] NVARCHAR (128) NULL,
 [SalesPerson] NVARCHAR (256) NULL,
 [EmailAddress] NVARCHAR (50) NULL,
 [RewardsAcctId] INT NULL,
 [SecondaryPhoneNumber] [dbo].[Phone] NULL,
 [Phone] [dbo].[Phone] NULL,
 [PasswordHash] VARCHAR (128) NOT NULL,
 [PasswordSalt] VARCHAR (10) NOT NULL,
 [rowguid] UNIQUEIDENTIFIER CONSTRAINT [DF_Customer_rowguid] DEFAULT (newid(
 [ModifiedDate] DATETIME CONSTRAINT [DF_Customer_ModifiedDate] DEFAULT (getd
```

```
CREATE TABLE [SalesLT].[Customer] (
 [CustomerID] INT IDENTITY (1, 1) NOT NULL,
 [NameStyle] [dbo].[NameStyle] NOT NULL,
 [Title] NVARCHAR (8) NULL,
 [FirstName] [dbo].[Name] NOT NULL,
 [MiddleName] [dbo].[Name] NULL,
 [LastName] [dbo].[Name] NOT NULL,
 [Suffix] NVARCHAR (10) NULL,
 [CompanyName] NVARCHAR (128) NULL,
 [SalesPerson] NVARCHAR (256) NULL,
 [EmailAddress] NVARCHAR (50) NULL,
 [RewardsAcctId] INT NULL,

 [Phone] [dbo].[Phone] NULL,
 [PasswordHash] VARCHAR (128) NOT NULL,
 [PasswordSalt] VARCHAR (10) NOT NULL,
 [rowguid] UNIQUEIDENTIFIER NOT NULL,
 [ModifiedDate] DATETIME NOT NULL,
```

SQL Database Projects extension for Azure Data Studio



Open Existing or Create New Project

Edit Project

Build Project

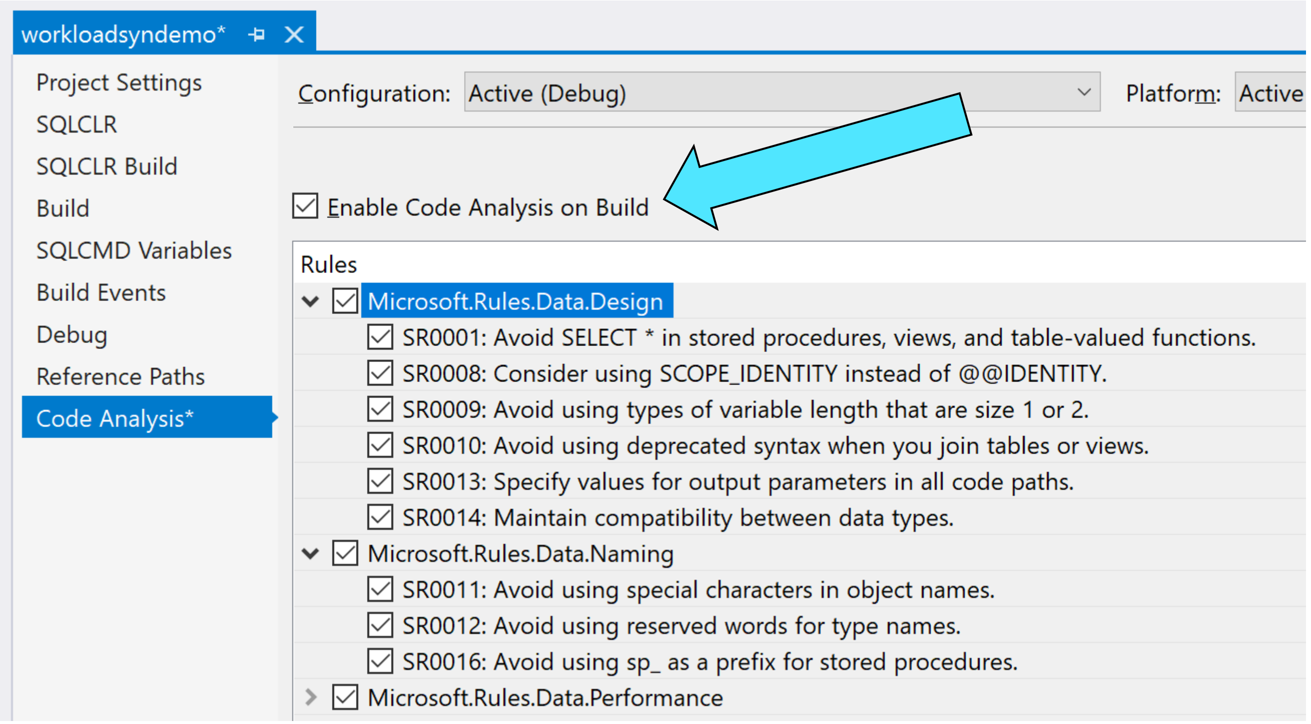
Publish Project

SQL Server Data Tools (SSDT)

SSDT Static Code Analysis

Default Rules

Project Properties > Code Analysis
Block or warn on build



workloadsyndemo*

Configuration: Active (Debug)   Platform: Active

☑ Enable Code Analysis on Build

Rules

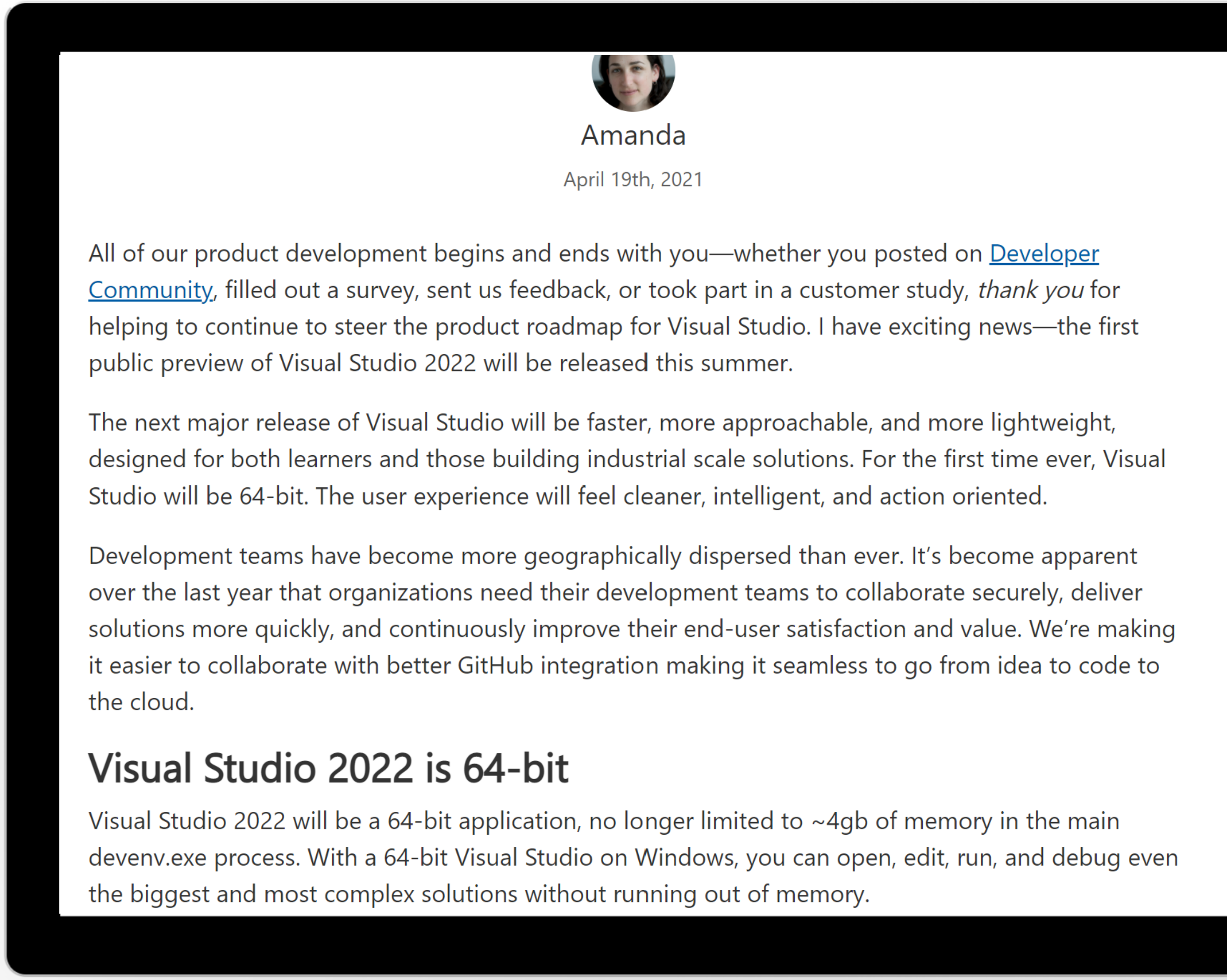
- ☑ Microsoft.Rules.Data.Design
  - ☑ SR0001: Avoid SELECT * in stored procedures, views, and table-valued functions.
  - ☑ SR0008: Consider using SCOPE_IDENTITY instead of @@IDENTITY.
  - ☑ SR0009: Avoid using types of variable length that are size 1 or 2.
  - ☑ SR0010: Avoid using deprecated syntax when you join tables or views.
  - ☑ SR0013: Specify values for output parameters in all code paths.
  - ☑ SR0014: Maintain compatibility between data types.
- ☑ Microsoft.Rules.Data.Naming
  - ☑ SR0011: Avoid using special characters in object names.
  - ☑ SR0012: Avoid using reserved words for type names.
  - ☑ SR0016: Avoid using sp_ as a prefix for stored procedures.
- ☑ Microsoft.Rules.Data.Performance

Rule Extensibility

Examples in github.com/Microsoft/DACExtensions
3rd-party examples: TSQL-Smells and SQLServer.Rules

Visual Studio 2022

Coming soon… Preview 1



Amanda

April 19th, 2021

All of our product development begins and ends with you—whether you posted on Developer Community, filled out a survey, sent us feedback, or took part in a customer study, *thank you* for helping to continue to steer the product roadmap for Visual Studio. I have exciting news—the first public preview of Visual Studio 2022 will be released this summer.

The next major release of Visual Studio will be faster, more approachable, and more lightweight, designed for both learners and those building industrial scale solutions. For the first time ever, Visual Studio will be 64-bit. The user experience will feel cleaner, intelligent, and action oriented.

Development teams have become more geographically dispersed than ever. It's become apparent over the last year that organizations need their development teams to collaborate securely, deliver solutions more quickly, and continuously improve their end-user satisfaction and value. We're making it easier to collaborate with better GitHub integration making it seamless to go from idea to code to the cloud.

Visual Studio 2022 is 64-bit

Visual Studio 2022 will be a 64-bit application, no longer limited to ~4gb of memory in the main devenv.exe process. With a 64-bit Visual Studio on Windows, you can open, edit, run, and debug even the biggest and most complex solutions without running out of memory.

Resources

https://docs.microsoft.com/sql/tools/sqlpackage/sqlpackage-for-azure-synapse-analytics

https://aka.ms/azuredatastudio-sqlprojects
https://github.com/microsoft/Dacextensions

https://github.com/Azure-Samples/Synapse
https://github.com/joe-plumb/mdw-azure-terraform

Microsoft Azure

Thank you!

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