

Querying with Transact-SQL



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Meet Your Instructors

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Course Topics

Querying with Transact-SQL

01 | Introduction to Transact-SQL

02 | Querying Tables with SELECT

03 | Querying Multiple Tables with Joins

04 | Using Set Operators

05 | Using Functions and Aggregating Data

06 | Using Subqueries and APPLY

07 | Using Table Expressions

08 | Grouping Sets and Pivoting Data

09 | Modifying Data

10 | Programming with Transact-SQL

11 | Error Handling and Transactions

Setting Expectations

- Target Audience
 - Aspiring database professionals
 - Application developers
 - Anyone preparing for SQL Server certification exams
- Course Materials
 - Online video presentations
 - Downloadable labs
- Suggested Approach
 - Complete each module and lab in turn
 - Engage with fellow students at Born To Learn

Course Lab Environment

- Labs are based on the **AdventureWorksLT** sample database in Azure SQL Database
 - Setup instructions are in the *Getting Started* guide
- There is a lab for each module, consisting of:
 - Challenges based on the techniques discussed in the module
 - References to relevant documentation
 - Suggested solution scripts

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Using Azure SQL Database

SQL Server Training and Certification

- Microsoft Virtual Academy
 - www.microsoftvirtualacademy.com
- Microsoft Official Curriculum
 - www.microsoft.com/learning
- Microsoft Press
 - www.microsoftpressstore.com
- Microsoft Certified Professional Program
 - www.microsoft.com/learning
- Born to Learn
 - borntolearn.mslearn.net

01 | Introduction to Transact-SQL



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Module Overview

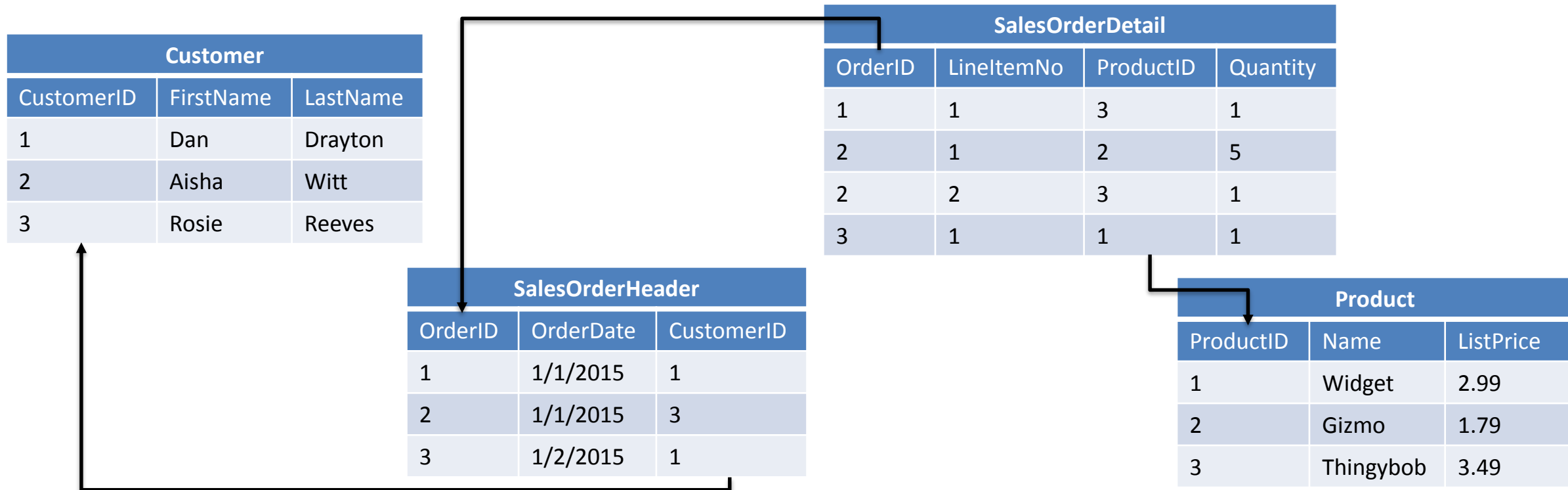
- What is Transact-SQL?
- Relational Databases
- Schemas and Object Names
- SQL Statement Types
- The SELECT Statement
- Working with Data Types
- Working with NULLs

What is Transact-SQL?

- Structured Query Language (SQL)
 - Developed by IBM in 1970s
 - Adopted as a standard by ANSI and ISO standards bodies
 - Widely used in industry
- Microsoft's implementation is Transact-SQL
 - Referred to as T-SQL
 - Query language for SQL Server and Azure SQL Database
- SQL is declarative, not procedural
 - Describe what you want, don't specify steps

Relational Databases

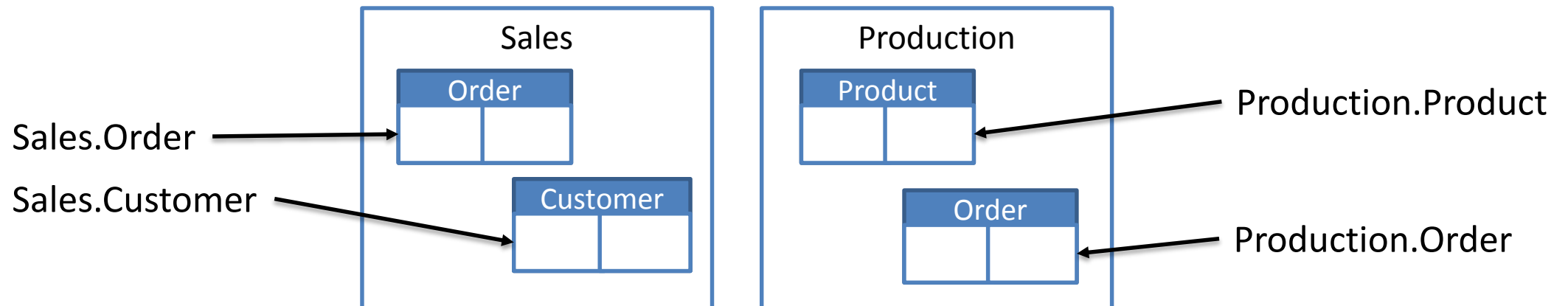
- Entities are represented as *relations* (tables), in which their attributes are represented as *domains* (columns)
- Most relational databases are *normalized*, with relationships defined between tables through *primary* and *foreign* keys



Schemas and Object Names

- Schemas are namespaces for database objects
- Fully-qualified names:
[server_name.][database_name.][schema_name.]object_name
- Within database context, best practice is to include schema name:

schema_name.object_name



SQL Statement Types

Data Manipulation Language (DML)	Data Definition Language (DDL)	Data Control Language (DCL)
Statements for querying and modifying data: <ul style="list-style-type: none">• SELECT• INSERT• UPDATE• DELETE	Statements for defining database objects: <ul style="list-style-type: none">• CREATE• ALTER• DROP	Statements for assigning security permissions: <ul style="list-style-type: none">• GRANT• REVOKE• DENY



Focus of this course

The SELECT Statement

	Element	Expression	Role
5	SELECT	<select list>	Defines which columns to return
1	FROM	<table source>	Defines table(s) to query
2	WHERE	<search condition>	Filters rows using a predicate
3	GROUP BY	<group by list>	Arranges rows by groups
4	HAVING	<search condition>	Filters groups using a predicate
6	ORDER BY	<order by list>	Sorts the output

Order of execution

```
SELECT OrderDate, COUNT(OrderID)
FROM Sales.SalesOrder
WHERE Status = 'Shipped'
GROUP BY OrderDate
HAVING COUNT(OrderID) > 1
ORDER BY OrderDate DESC;
```

Basic SELECT Query Examples

- All columns

```
SELECT * FROM Production.Product;
```

- Specific columns

```
SELECT Name, ListPrice  
FROM Production.Product;
```

- Expressions and Aliases

```
SELECT Name AS Product, ListPrice * 0.9 AS SalePrice  
FROM Production.Product;
```

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Basic SELECT Queries

Working with Data Types

Transact-SQL Data Types

Exact Numeric	Approximate Numeric	Character	Date/Time	Binary	Other
tinyint	float	char	date	binary	cursor
smallint	real	varchar	time	varbinary	hierarchyid
int		text	datetime	image	sql_variant
bigint		nchar	datetime2		table
bit		nvarchar	smalldatetime		timestamp
decimal/numeric		ntext	datetimeoffset		uniqueidentifier
numeric					xml
money					geography
smallmoney					geometry

Unusual (Unicode)
character (Japanese, ...)

Working with Data Types

Data Type Conversion

- Implicit Conversion
 - Compatible data types can be automatically converted
- Explicit Conversion
 - Requires an explicit conversion function



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Converting Data Types

Working with NULLs

NULL Values

- NULL represents a missing or unknown value
- ANSI behaviour for NULL values:
 - The result of any expression containing a NULL value is NULL
 - $2 + \text{NULL} = \text{NULL}$
 - `'MyString: ' + NULL = NULL`
 - Equality comparisons always return false for NULL values
 - $\text{NULL} = \text{NULL}$ returns *false*
 - NULL IS NULL returns *true*

Working with NULLs

NULL Functions

- ISNULL(*column/variable, value*)
 - Returns *value* if the column or variable is NULL
- NULLIF(*column/variable, value*)
 - Returns NULL if the column or variable is *value*
- COALESCE (*column/variable1, column/variable2,...*)
 - Returns the value of the first non-NULL column or variable in the list



Choose the left stated variable first

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Working with NULLs

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- Lab: Introduction to Transact-SQL



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