Microsoft

Getting started with Transact-SQL

Agenda

- Introduction to Transact-SQL

- SQL Server System Databases

- Using the SELECT Statement

1: Introduction to Transact-SQL

What is Transact-SQL?

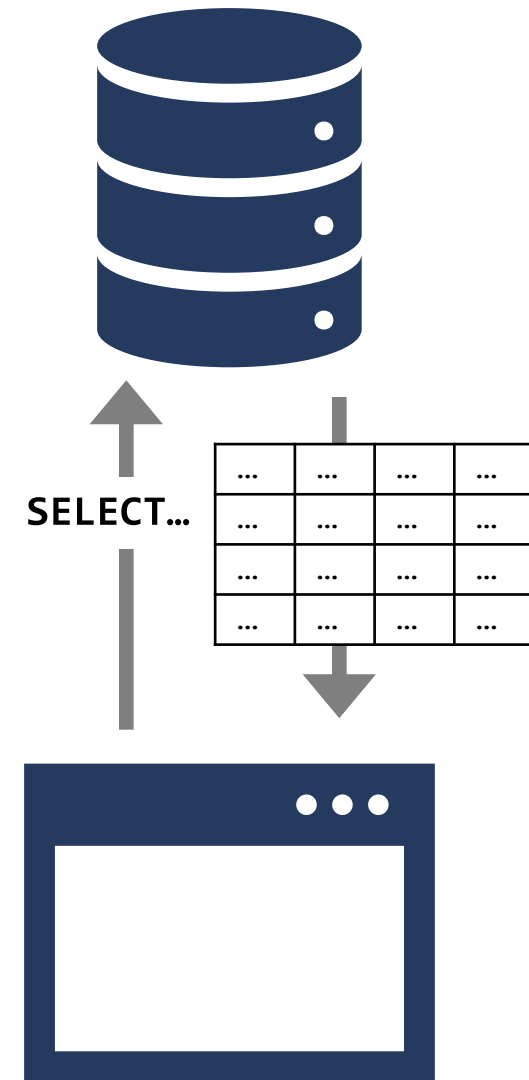**Structured Query Language (SQL)**

- Developed in the 1970s as a language for querying databases

- Adopted as a standard by ANSI and ISO standards bodies

- Widely used across multiple database systems

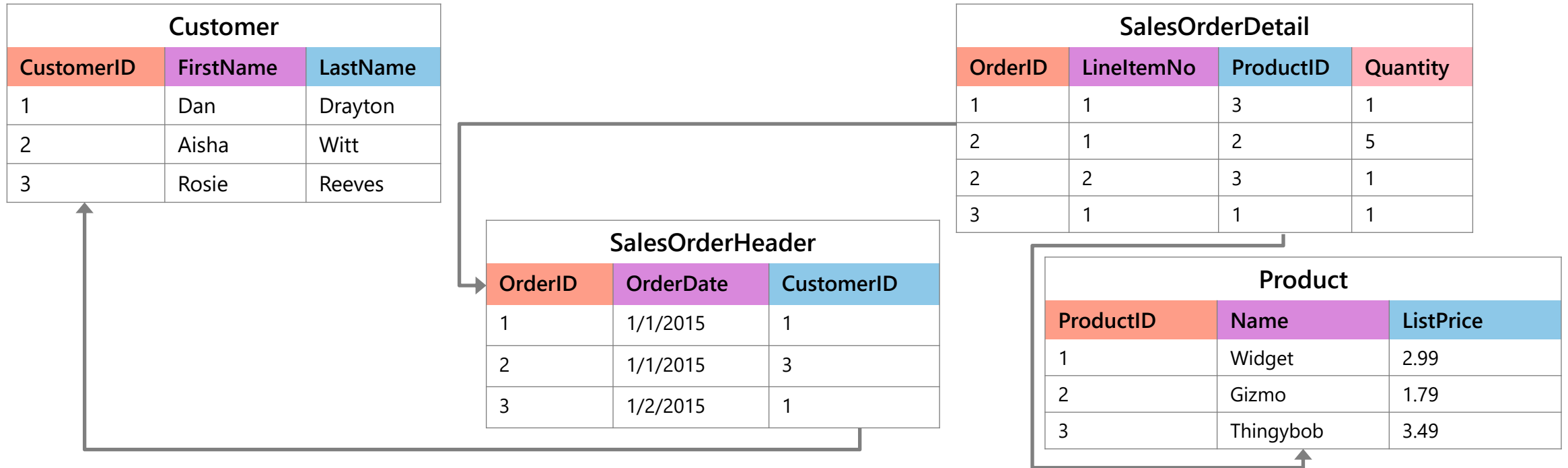**Microsoft's implementation is Transact-SQL**

- Often referred to as T-SQL

- Query language for SQL Server, Azure SQL Database, and other Microsoft relational database services

SQL is *declarative*, not *procedural*
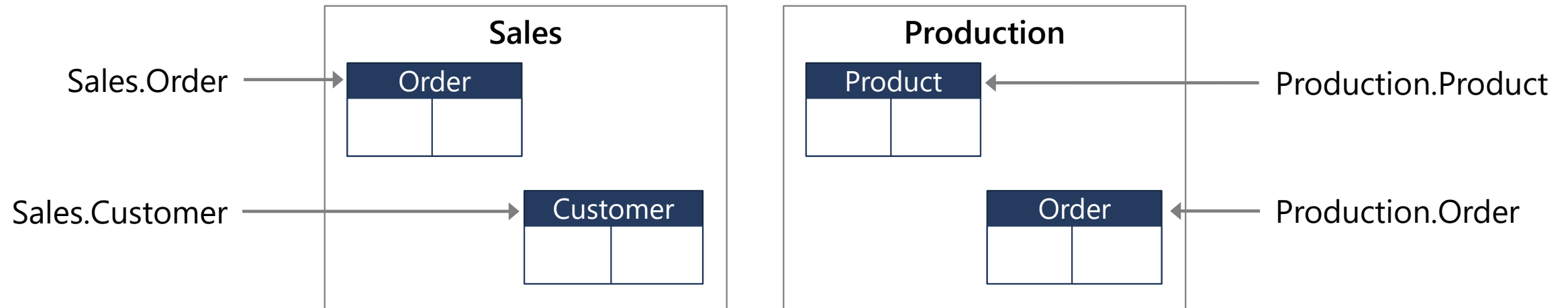
- Describe what you want, don't specify steps

SELECT…

Relational databases

Customer		
CustomerID	**FirstName**	**LastName**
1	Dan	Drayton
2	Aisha	Witt
3	Rosie	Reeves

SalesOrderDetail			
OrderID	**LineItemNo**	**ProductID**	**Quantity**
1	1	3	1
2	1	2	5
2	2	3	1
3	1	1	1

SalesOrderHeader		
OrderID	**OrderDate**	**CustomerID**
1	1/1/2015	1
2	1/1/2015	3
3	1/2/2015	1

Product		
ProductID	**Name**	**ListPrice**
1	Widget	2.99
2	Gizmo	1.79
3	Thingybob	3.49

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: • SELECT • INSERT • UPDATE • DELETE	Statements for defining database objects: • CREATE • ALTER • DROP	Statements for assigning security permissions: • GRANT • REVOKE • DENY

Focus of this course

2: SQL Server System Databases

System Databases

In SQL Server, **system databases** are essential for the operation and management of the database engine.

master

•Stores system-level information such as login accounts, system configuration settings, and information about all other databases.

•Critical for SQL Server startup.

model

•Serves as a template for all newly created databases.

•Any changes made to the model database (like default settings) will be inherited by new databases.

msdb

- Used by SQL Server Agent for scheduling jobs, alerts, and automation tasks.

- Stores backup and restore history.

tempdb

- A workspace for temporary objects like temp tables, cursors, and intermediate result sets.

- Recreated every time SQL Server restarts.

```sql
select * from sys.databases
```

```sql
SELECT name AS DatabaseName, physical_name, type_desc
FROM sys.master_files
WHERE database_id = 5; --AdventureWorks2022
```

```sql
use AdventureWorks2022;
SELECT * FROM Production.Product;
GO
```

3: Using the SELECT statement

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

```
SELECT OrderDate, COUNT(OrderID) AS Orders

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;
```

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

- Compatible data types can be implicitly converted

- Explicit conversion requires an explicit conversion function:
  ```
  CAST / TRY_CAST
  CONVERT / TRY_CONVERT
  PARSE / TRY_PARSE
  STR
  ```

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 + NULL = NULL`

  `'MyString: ' + NULL = NULL`

- Equality comparisons (=) always return false for NULL values, use IS NULL

  `NULL = NULL` returns false
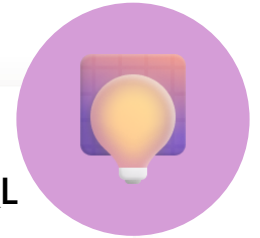
  `NULL IS NULL` returns true

Useful 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

Review

1 You must return the *Name* and *Price* columns from a table named *Product* in the *Production* schema. In the resulting rowset, you want the *Name* column to be named *ProductName*. Which of the following Transact-SQL statements should you use?

- ☐ `SELECT * FROM Product AS Production.Product;`
- ☑ `SELECT Name AS ProductName, Price FROM Production.Product;`
- ☐ `SELECT ProductName, Price FROM Production.Product;`

2 You must retrieve data from a column that is defined as char(1). If the value in the column is a digit between 0 and 9, the query should return it as an integer value. Otherwise, the query should return NULL.
Which function should you use?

- ☐ CAST
- ☐ NULLIF
- ☑ TRY_CONVERT

3 You must return the *Cellphone* column from the *Sales.Customer* table. *Cellphone* is a varchar column that permits NULL values. For rows where the *Cellphone* value is NULL, your query should return the text 'None'. What query should you use?

- ☑ `SELECT ISNULL(Cellphone, 'None') AS Cellphone FROM Sales.Customer;`
- ☐ `SELECT NULLIF(Cellphone, 'None') AS Cellphone FROM Sales.Customer;`
- ☐ `SELECT CONVERT(varchar, Cellphone) AS None FROM Sales.Customer;`

Tutorial

Lab: Get started with Transact-SQL

- [**Get Started with Transact-SQL | dp-080-Transact-SQL**](#)

  - Explore the *AdventureWorks* database

  - Use SELECT queries to retrieve data

  - Handle NULL values

  - Work with data types