Welcome to this course!

FUNCTIONS FOR MANIPULATING DATA IN SQL SERVER



Ana VoicuData Engineer



Topics covered

- The most important data types
- Functions for these types:
 - Date and time functions
 - String functions
 - Functions for numeric operations



Categories of data types

- Exact numerics
- Approximate numerics
- Date and time
- Character strings
- Unicode character strings
- Binary strings
- Other data types



Exact numerics

- Whole numbers
 - smallint
 - tinyint
 - int
 - bigint

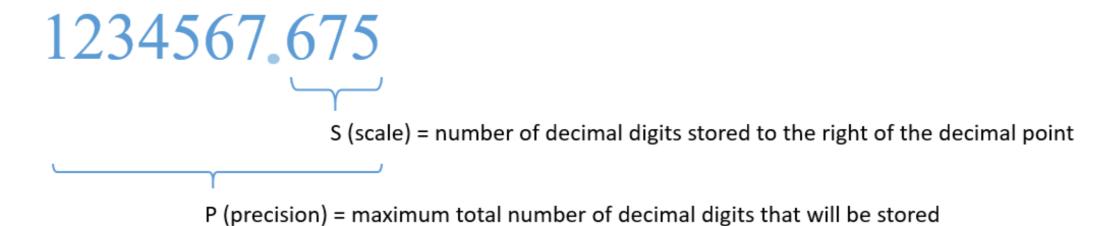
- Decimal numbers
 - numeric
 - decimal
 - money
 - smallmoney

Exact numerics - integers

Numbers without a decimal point

Data type	Storage
bigint	8 Bytes
int	4 Bytes
smallint	2 Bytes
tinyint	1 Byte

Exact numerics - decimals



Precision	Storage
1-9	5 Bytes
10 – 19	9 Bytes
20 – 28	13 Bytes
29 - 38	17 Bytes

Approximate numerics

- Float
- Real
- Store approximate numeric values



Date and time data types

Data type	Format	Accuracy	
time	hh:mm:ss[.nnnnnnn]	100 nanoseconds	
date	YYYY-MM-DD	1 day	
smalldatetime	YYYY-MM-DD hh:mm:ss	1 minute	
datetime	YYYY-MM-DD hh:mm:ss[.nnn]	0.00333 second	
datetime2	YYYY-MM-DD hh:mm:ss[.nnnnnnn]	100 nanoseconds	



Character and Unicode character data types

Character data types store character strings (ASCII)

char

varchar

text

Unicode data types are used for storing Unicode data (non-ASCII)

- nchar
- nvarchar
- ntext

Other data types

- binary
- image
- cursor
- rowversion
- uniqueidentifier
- xml
- Spatial Geometry / Geography Types

Let's see what you know!

FUNCTIONS FOR MANIPULATING DATA IN SQL SERVER



Implicit conversion

FUNCTIONS FOR MANIPULATING DATA IN SQL SERVER



Ana VoicuData Engineer



Data comparison

Keep in mind: for comparing two values, they need to be of the same type.

Otherwise:

- SQL Server converts from one type to another (IMPLICIT)
- The developer explicitly converts the data (EXPLICIT)

```
SELECT
    company
    bean_type,
    cocoa_percent
FROM ratings;
```



```
SELECT
    company
    bean_type,
    cocoa_percent
FROM ratings
WHERE cocoa_percent > 0.5;
```

```
SELECT
    company
    bean_type,
    cocoa_percent
FROM ratings
WHERE cocoa_percent > -2;
```

```
SELECT
    company
    bean_type,
    cocoa_percent
FROM ratings
WHERE cocoa_percent > GETDATE();
```

```
| company | bean_type | cocoa_percent |
|-----|----|-----|-----|
| ... | ... | ...
```

```
SELECT
    company
    bean_type,
    cocoa_percent
FROM ratings
WHERE cocoa_percent > 'A';
```

```
| result
|-----|
| Error converting data type varchar to numeric. |
```



```
SELECT
    company
    bean_type,
    cocoa_percent
FROM ratings
WHERE cocoa_percent > '0.5';
```

Data type precedence

```
1. user-defined data types (highest)
2. datetime
3. date
4. float
5. decimal
6. int
7. bit
8. nvarchar (including nvarchar(max))
9. varchar (including varchar(max))
10. binary (lowest)
```

Data type precedence

![Data type precedence, from highest to lowest



Implicit conversion between data types

To	DATETIME	FLOAT	DECIMAL	INT	BIT	NVARCHAR	VARCHAR
DATETIME		Х	X	Х	X	V	V
FLOAT	V		V	V	V	V	V
DECIMAL	V	V		V	V	V	V
INT	V	V	V		V	V	V
BIT	V	V	V	V		V	V
NVARCHAR	V	V	V	V	V		V
VARCHAR	V	V	V	V	V	V	

Performance impact of implicit conversion

- Implicit conversion is done for each row of the query
- Implicit conversion can be prevented with a good database schema design.



Let's practice!

FUNCTIONS FOR MANIPULATING DATA IN SQL SERVER



Explicit conversion

FUNCTIONS FOR MANIPULATING DATA IN SQL SERVER



Ana VoicuData Engineer



Implicit and explicit conversion

- IMPLICIT performed automatically, behind the scenes
- EXPLICIT performed with the functions CAST() and CONVERT()
 - CAST() and CONVERT() are used to convert from one data type to another



CAST()

```
CAST(expression AS data_type [(length)])
```

```
SELECT
    CAST(3.14 AS int) AS DECIMAL_TO_INT,
    CAST('3.14' AS decimal(3,2)) AS STRING_TO_DECIMAL,
    CAST(GETDATE() AS nvarchar(20)) AS DATE_TO_STRING,
    CAST(GETDATE() AS float) AS DATE_TO_FLOAT;
```



CONVERT()

```
CONVERT(data_type [(length)], expression [,style])
```

```
SELECT
    CONVERT(int, 3.14) AS DECIMAL_TO_INT,
    CONVERT(decimal(3,2), '3.14') AS STRING_TO_DECIMAL,
    CONVERT(nvarchar(20), GETDATE(), 104) AS DATE_TO_STRING,
    CONVERT(float, GETDATE()) AS DATE_TO_FLOAT;
```

```
| DECIMAL_TO_INT | STRING_TO_DECIMAL | DATE_TO_STRING | DATE_TO_FLOAT |
|------|
| 3 | 3.14 | 11.04.2019 | 43531.7052687886 |
```



CAST() vs. CONVERT()

- CAST() comes from the SQL standard and CONVERT() is SQL Server specific
- CAST() is available in most database products
- CONVERT() performs slightly better in SQL Server

Let's practice!

FUNCTIONS FOR MANIPULATING DATA IN SQL SERVER

