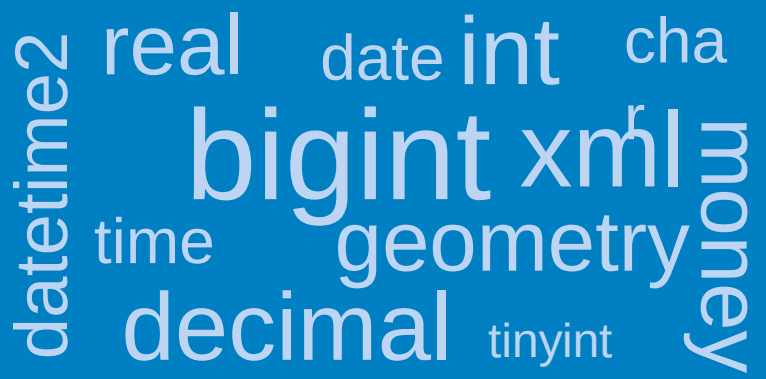
Data Types



Where do we use Data Types?

1. Query

```
SELECT
    productid
    , CAST(weight AS int )
FROM Production.Products
WHERE weight IS NOT NULL;
```

2. Table Columns

```
CREATE TABLE Persons.Players (
    playerID int,
    lastname nvarchar(30) NOT NULL,
    birthdate date NOT NULL,
    countryID smallint
);
```

3. Variable

```
DECLARE @id AS int = 12;

SELECT *
FROM Persons.Players
WHERE playerID = @id;
```

4. Stored Procedures, Functions, ...

```
CREATE PROCEDURE HR.EmpsInCountry
    @country AS nvarchar(30)
AS
SELECT * FROM HR.Employees
WHERE country = @country;
```

Data types 1/3

- Exact Numeric

data type	length	
bigint	8	whole number -2^63 - 2^63-1
int	4	whole number -2^31 - 2^31-1
smallint	2	whole number -2^15 - 2^15-1
tinyint	1	whole number 0 - 255
bit	1 bit	boolean: 0, 1, NULL
decimal(p,s)	5-17	numeric precision 1-38 (default18) scale 0-p (default 0)
numeric(p,s)	5-17	old, same as above
money	8	old, financial 4 decimals
smallmoney	4	old, financial 4 decimals

- Approximate Numeric

data type	length	
float(m)	4-8	mant = 1-24 bits = 4 bytes mant = 25-53 bits = 8 bytes
real	4	~= float(24)

- Binary String

data type	length	
binary(n)	1-8000	n bytes
varbinary(n)	1-8000	n bytes + 2
varbinary(max)	1-2.1 trillion	n bytes + 2

Data types 2/3

- Text

data type	length	
char(n)	1-8000	n bytes padded 256 characters
varchar(n)	1-8000	n bytes + 2 256 characters
nchar(n)	1-4000	2*n bytes padded > 65.000 characters
nvarchar(n)	1-4000	2*n bytes + 2 > 65.000 characters
varchar(max)	<= 2GB	replaces old text
nvarchar(max)	<= 2GB	replaces old ntext

- Date & Time

data type	length	
datetime	8	1 Jan 1753 - 31 Dec 9999 / .000, .003 of .007 sec.
smalldatetime	4	1 Jan 1900 - 6 Jun 2079 / 1 min.
datetime2	6-8	1 Jan 0001 - 31 Dec 9999 / 100 nano sec.
date	3	1 Jan 1900 - 6 Jun 2079 / 1 min.
time	3-5	only time / 100 nano sec.
datetimeoffset	8-10	1 Jan 0001 - 31 Dec 9999 / 100 nano sec. + Timezone Info

Data types 3/3

- Other

data type	length	
uniqueidentifier	16	64bit GUID
geometry	0-2GB	shape definition in Euclidian geometry
geography	0-2GB	shape definition in round-earth geometry
xml	0-2GB	XML in native hierarchical structure
sql_variant	0-8000	supports more data types iin one column
hierarchyid		position in a hierachy
cursor		not for storage, but for cursor operations (try not to use)
table		not for storage, but for query operations

Implicit Data Conversion

Data type precedence (Transact-SQL)

5. datetime2
6. datetime
7. smalldatetime
8. date
9. time
10. float
11. real
12. decimal
13. money
14. smallmoney
15. bigint
16. int
17. smallint
18. tinyint
19. bit
20. ntext
21. text

https://docs.microsoft.com/en-us/sql/t-sql/data-types/data-type-precedence-transact-sql

Explicit Data Conversion

- CAST() 👈
  - TRY_CAST()
- CONVERT() 👈
  - TRY_CONVERT()
- PARSE()
  - TRY_PARSE()