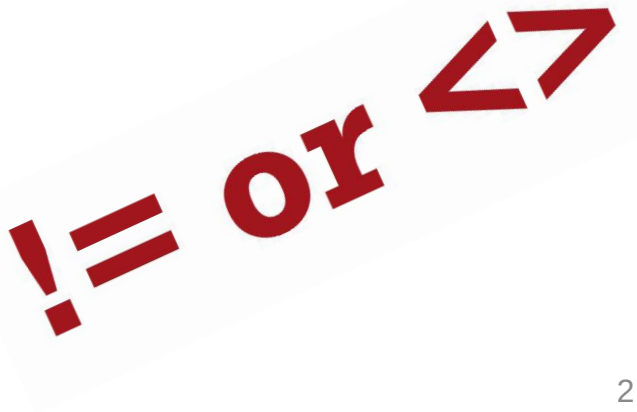
SQL DATA TYPES &

OPERATIONS

Learning Goals

By the end of this lecture students should be able to:

- Understand about the different types of data we can collect
- Use these data types while creating your tables
- Choose a appropriate data type for a table column based on your requirement
- Use operators to specify conditions in an SQL statement



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Section 1

MS SQL SERVER DATA TYPES

Ms SQL Server Data Types

Student:

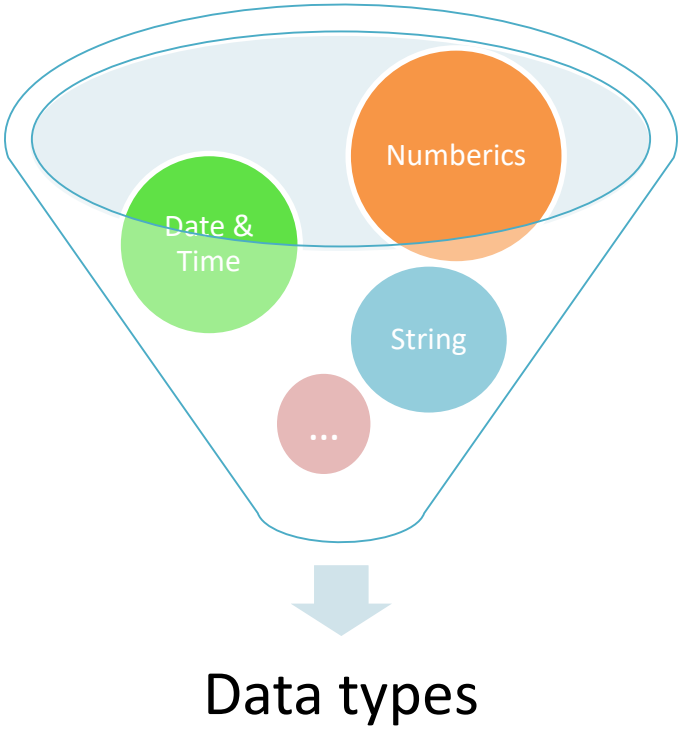
- ✓ Name
- ✓ Birthday
- ✓ Gender
- ✓ Address
- ✓ Marks…

Storage

What type of data each of field ???.....

Ms SQL Server Data Types

- **SQL Server supports below data types. NULL is default value for most data type:**
  - ✓ Exact Numerics
  - ✓ Approximate Numerics
  - ✓ Date and Time
  - ✓ Character Strings
  - ✓ Unicode Character Strings
  - ✓ Binary Strings
  - ✓ Other Data Types



Exact Numbers

- *Interger-based data type*

Data type	Size	Range of values
Bigint	8 Bytes	-2^63 to 2^63-1
Int	4 Bytes	-2^31 to 2^31-1
Smallint	2 Bytes	-2^15 to 2^15 - 1
Tinyint	1 Byte	0 to 255
Bit	1 Bit	0 to 1

Exact Numbers

Exact decimal-based data type

Data type	Size	Range of values
Decimal(p,s)	5 - 17 Bytes (depending on precision)	- Varies based on precision setting. - Maximum values are -10^38 +1 through 10^38 -1
(p is the maximum number of all digits (both sides of the decimal point), s is the maximum number of digits after the decimal point)		
Numeric(p,s)	…	Identical to ***Decimal type***
Smallmoney	4 Bytes	- 214,748.3648 to 214,748.3647
Money	8 Bytes	- 922,337,203,685,477.5808 To 922,337,203,685,477.5807

Approximate Numerics

Data type	Size	Range of values
Float	8 Bytes	- 1.79E+308 to 1.79E+308
Float(n)	*Depends on the value of n* If 1 ≤ n ≤ 24: 4 Bytes (**Precision:** 7 digits) If 25 ≤ n ≤ 53: 8 Bytes (**Precision: 15** digits)	4 Bytes: - 3.40E + 38 to 3.40E + 38 8 Bytes: - 1.79E+308 to 1.79E+308
Real	…	- 3.40E + 38 to 3.40E + 38

Note: *SQL Server treats n as one of two possible values. If **1**<=n<=**24**, n is treated as **24**. If **25**<=n<=**53**, n is treated as **53**.*

Date and Time

Data Type	Description	Example
Date	Stores dates between January 1, 0001, and December 31, 9999	2008-01-15
Datetime	Stores dates and times between January 1, 1753, and December 31, 9999, with an accuracy of 3.33 milliseconds	2008-01-15 09:42:16.142
Datetime2	Stores date and times between January 1, 0001, and December 31, 9999, with an accuracy of 100 nanoseconds	2008-01-15 09:42:16.1420221
Datetimeoffset	Similar to the datetime2 data type, but also expects an offset designation of –14:00 to +14:00	2008-01-15 09:42:16.1420221 +05:00
Smalldatetime	Stores dates and times between January 1, 1900, and June 6, 2079, with an accuracy of 1 minute	2008-01-15 09:42:00
Time	Stores times with an accuracy of 100 nanoseconds	09:42:16.1420221

Character Strings

- Non-Unicode string data types:

Data type	Description
Char(n)	- Fixed-length - Maximum length of 8,000 characters (1 ≤ n ≤ 8000)
Varchar(n)	- Variable-length - Maximum of 8,000 characters (1 ≤ n ≤ 8000)
Varchar(max)	- Variable-length - Maximum length of 2,147,483,647 characters
Text	- Variable-length - Maximum length of 2,147,483,647 characters - Use varchar(max) instead

Unicode Character Strings

- Unicode string data types are “double width”:

Data type	Description
Nchar(n)	- Fixed-length - Maximum specified length is 4,000 characters (1≤ n ≤ 4000)
Nvarchar(n)	- Variable-length - Maximum specified length is 4,000 characters (1≤ n ≤ 4000)
Nvarchar(max)	- Variable-length - Maximum length of 1,073,741,823 characters
Ntext	- Variable-length - Maximum length of 1,073,741,823 characters

Binary Strings

Data type	Description
Binary	- Fixed-length binary data - Maximum length of 8,000 bytes
Varbinary	- Variable length binary data - Maximum length of 8,000 bytes.
Image	- Variable length binary data - Maximum length of 2,147,483,647 bytes.

Other Data Types

Data Type	Description
Timestamp	Stores a database-wide unique number that gets updated every time a row gets updated
Hierarchyid	Special data type that maintains hierarchy positioning information
Uniqueidentifier	Stores a database-wide unique number that gets updated every time a row gets updated
Sql_variant	Stores values of various SQL Server-supported data types, except text, ntext, and timestamp
Xml	Stores XML data. You can store xml instances in a column or a variable (SQL Server 2005 only).
Table	Stores a result set for later processing

Section 2

SQL OPERATORS

What is an Operator in SQL?

- An operator is a reserved word or a character used primarily in an SQL statement's WHERE clause to perform operation(s), such as comparisons and arithmetic operations.
- Operators are used to specify conditions in an SQL statement and to serve as conjunctions for multiple conditions in a statement. Some types of most operators:

1. Arithmetic operators
2. Comparison operators
3. Logical operators.

SQL Arithmetic Operators

- Here is a list of the Arithmetic operators available in SQL

Operator	Description	Example
+	Addition	a + b → 30
-	Subtraction	a - b → -10
*	Multiplication	a * b → 200
/	Division	b / a → 2
%	Modulus	b % a → 0

*(Assume variable **a** holds **10** and variable **b** holds **20**)*

SQL Comparison Operators

- Here is a list of all the Comparison operators available in SQL

Operator	Description	Operator	Description
=	equal to	>=	greater than or equal to
!=, <>	not equal to	<=	less than or equal to
<	less than	!<	not less than
>	greater than	!>	not greater than

- Example

ID	NAME	AGE	ADDRESS	SALARY
1	Ramesh	32	Ahmedabad	2000.00
2	Khilan	25	Delhi	1500.00
3	kaushik	23	Kota	2000.00
4	Chaitali	25	Mumbai	6500.00
5	Hardik	27	Bhopal	8500.00
6	Komal	22	MP	4500.00
7	Muffy	24	Indore	10000.00

CUSTOMERS TABLE

SQL: *SELECT * FROM CUSTOMERS WHERE SALARY > 5000;*

ID	NAME	AGE	ADDRESS	SALARY
4	Chaitali	25	Mumbai	6500.00
5	Hardik	27	Bhopal	8500.00
7	Muffy	24	Indore	10000.00

SQL Logical Operators

Operator	Description
ALL	• Used to compare a value to all values in another value set.
AND	• **Used when both conditions are included**
ANY	• Used to compare a value to any applicable value in the list according to the condition
BETWEEN	• Used to limit the values in a range e.g.
EXISTS	• Used to search for the presence of a row in a specified table that meets certain criteria
IN	• Included in the list e.g.
LIKE	• Equal to some character (use quotes)
NOT	• **Opposite of the logical value**
OR	• **Used when either of the condition is true**
IS NULL	• This checks if the field has a null
UNIQUE	• Searches every row of a specified table for uniqueness

Summary

- ✓ Ms SQL Server Data Types
  - What is Ms SQL Server Data Type?
  - Some Ms SQL Server Data Types
- ✓ SQL Operators
  - What is an Operator in SQL?
  - Some category of Operators
- ✓ Demo
  - Ms SQL Server Data Types
  - Operators in SQL

Thank you