SQL Server 2012 – Database Development
Lesson 03: Beginning with Transact-SQL
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Lesson Objectives

In this lesson, you will learn:

- Transact-SQL Programming Language
- Types of Transact-SQL Statements
- Transact-SQL Syntax Elements
- Restricting rows
- Operators
- Functions String, Date, Mathematical, System, Others
- Grouping and summarizing data

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T-SQL Languages

- > SQL is a special-purpose language used to define, access, and manipulate data
- SQL is nonprocedural language, it only describes the necessary components like tables and desired results without specifying exactly how those results should be computed
- > SQL comes in many flavors
- Microsoft SQL Server makes use of Transact-SQL

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T-SQL Sub Language The Data Definition Language (DDL) Data Manipulation Language (DML) Data Control Language (DCL) Transactional Control Language (TCL)

T-SQL Sub Language - DDL

- It is the subset of SQL which contains the commands used to create and destroy databases and database objects
- DDL includes the commands for handling tasks such as creating tables, indexes, views, and constraints
- > The commands are
 - CREATE
 - ALTER
 - DROP
 - TRUNCATE

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T-SQL Sub Language - DML

- It is the subset of SQL used to access and manipulate data contained within the data structures previously defined via DDL
- > The Commands are:
 - INSERT
 - UPDATE
 - DELETE
 - MERGE
 - [SELECT]

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T-SQL Sub Language - DCL

- It is the subset of SQL Commands that control a database, including administering privileges and committing data
- > It is used to create roles, permissions, and to control access to database.
- > The Commands are
 - GRANT
 - REVOKE
 - DENY

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T-SQL Sub Language - Transactional Control Language It is used to manage different transactions occurring within a database. The commands are COMMIT ROLLBACK SAVE TRANSACTION

Transact-SQL Programming Language

- Transact SQL, also called T-SQL, is Microsoft's extension to the ANSI SQL language
- Structured Query Language(SQL), is a standardized computer language that was originally developed by IBM
- T-SQL expands on the SQL standard to include procedural programming, local variables, various support functions for string processing, date processing, mathematics, etc
- Transact-SQL is central to using SQL Server
- All applications that communicate with SQL Server do so by sending Transact-SQL statements to the server, regardless of the user interface of the application

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Transact-SQL Programming Language

T-SQL (Transact SQL) is a proprietary SQL extension used by Microsoft SQL Server. T-SQL adds extensions for procedural programming.

Transact-SQL is central to using SQL Server. All applications that communicate with an instance of SQL Server do so by sending Transact-SQL statements to the server, regardless of the user interface of the application.

Querying Data - SELECT Statement

- The Transact-SQL language has one basic statement for retrieving information from a database: the SELECT statement
- With this statement, it is possible to query information from one or more tables of a database
- The result of a SELECT statement is another table, also known as a result set
- SELECT Statement Syntax

SELECT [DISTINCT][TOP n] <columns >

[FROM]

[WHERE] <criteria that must be true for a row to be chosen>

[GROUP BY] < columns for grouping aggregate functions>

[HAVING] < criteria that must be met for aggregate functions>

[ORDER BY] < optional specification of how the results should be sorted>

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Querying Data - SELECT Statement

You wouldn't have any reason to store data if you didn't want to retrieve it. Relational databases gained wide acceptance principally because they enabled users to query, or access, data easily, without using predefined, rigid navigational paths. Indeed, the acronym SQL stands for Structured Query Language. Microsoft SQL Server provides rich and powerful query capabilities.

The SELECT statement is the most frequently used SQL command and is the fundamental way to query data. The SQL syntax for the SELECT statement is intuitive—at least in its simplest forms—and resembles how you might state a request in English. As its name implies, it is also structured and precise. However, a SELECT statement can be obscure or even tricky. As long as you write a query that's syntactically correct, you get a result.

The basic form of SELECT, which uses brackets ([]) to identify optional items, is shown in the slide.

Notice that the only clause that must always be present is the verb SELECT; the other clauses are optional. For example, if the entire table is needed, you don't need to restrict data using certain criteria, so you can omit the WHERE clause.

SELECT statements primary properties

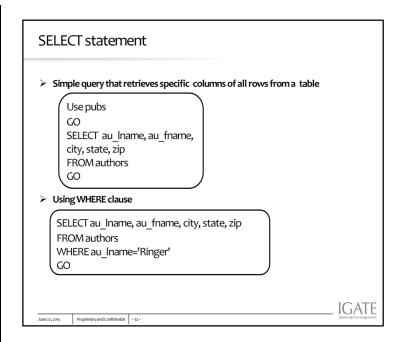
- > Number and attributes of the columns
- > The following attributes must be defined for each result set column
 - The data type of the column.
 - The size of the column, and for numeric columns, the precision and scale.
 - The source of the data values returned in the column
- > Tables from which the result set data is retrieved
- Conditions that the rows in the source tables must meet
- > Sequence in which the rows of the result set are ordered

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SELECT statements primary properties

The full syntax of the SELECT statement is complex, but most SELECT statements describe four primary properties of a result set:

- The number and attributes of the columns in the result set.
- The following attributes must be defined for each result set column:
 - The data type of the column.
 - The size of the column, and for numeric columns, the precision and scale.
 - The source of the data values returned in the column.
- The tables from which the result set data is retrieved, and any logical relationships between the tables.
- The conditions that the rows in the source tables must meet to qualify for the SELECT. Rows that do not meet the conditions are ignored.
- The sequence in which the rows of the result set are ordered.

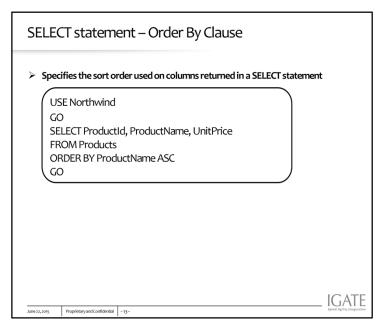


SELECT Statement

Here's a simple query that retrieves all columns of all rows from the *authors* table in the *pubs* sample database: SELECT au_Iname, au_fname, city, state, zip FROM author s

You can specify a query from one table return only certain columns or rows that meet your stated criteria. In the select list, you specify the exact columns you want, and then in the WHERE clause, you specify the criteria that determine whether a row should be included in the answer set. Still using the *pubs* sample database, suppose we want to find the first name and the city, state, and zip code of residence for authors whose last name is *Ringer*: SELECT au_Iname, au_fname, city, state, zip FROM authors WHERE au Iname='Ringer'

Retrieving only Anne Ringer's data requires an additional expression that is combined (AND'ed) with the original. In addition, we'd like the output to have more intuitive names for some columns, so the query would be: SELECT 'Last Name'=au_lname, 'First'=au_fname, city, stat e, zip FROM authors
WHERE au lname='Ringer' AND au fname='Anne'



SELECT Statement - Order By Clause

Specifies the sort order used on columns returned in a SELECT statement. Default is ASCending sort, DESC is used to sort in a descending manner SELECT ProductId, ProductName, UnitPrice FROM ProductS

ORDER BY ProductName DESC

ORDER BY is the last operation to be done, before the result set is submitted to the client, therefore ORDER BY cannot be used in certain places like subquery, SELECT INTO etc.

Use of DISTINCT

- > DISTINCT is used to eliminate duplicate rows
- Precedes the list of columns to be selected from the table(s)
- > The DISTINCT considers the values of all the columns as a
- single unit and evaluates on a row-by-row basis to eliminate any redundant rows

Example

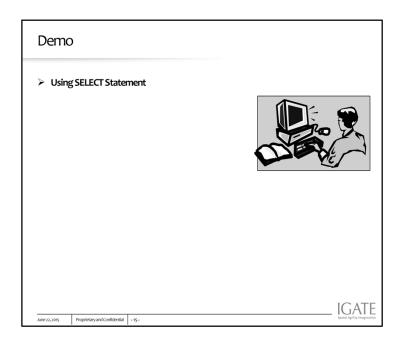
SELECT DISTINCT Region

FROM Northwind.dbo.Employees

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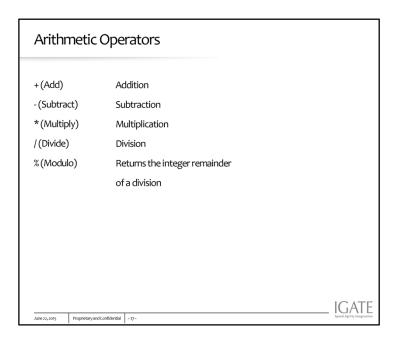
Use of Operators

- An operator is a symbol specifying an action that is performed on one or more expressions.
- Arithmetic Operators
- Logical Operators
- Assignment Operator
- String Concatenation Operator
- Comparison Operators
- Compound Assignment Operator

Use of Operators

An operator is a symbol specifying an action that is performed on one or more expressions. The following tables lists the operator categories that SQL Server 2008 uses.

- Arithmetic Operators
- Logical Operators
- Assignment Operator
- String Concatenation Operator
- Comparison Operators
- Compound Assignment Operator
- Bitwise Operators
- Unary Operators



Arithmetic operators perform mathematical operations on two expressions of one or more of the data types of the numeric data type category.

Operator Meaning

+ (Add)	Addition
- (Subtract)	Subtraction
* (Multiply)	Multiplication
/(Divide)	Division
% (Modulo)	Returns the integer
remainder of a division.	

For example, 12 % 5 = 2 because the remainder of 12 divided by 5 is 2. The plus (+) and minus (-) operators can also be used to perform arithmetic operations on **datetime** and **smalldatetime** values.

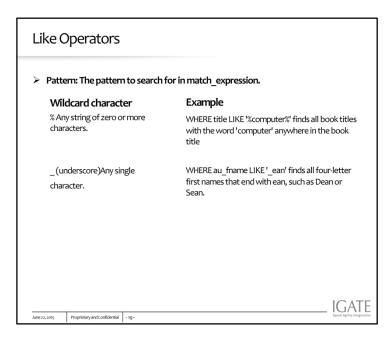
GO

Operator	Meaning	
• ALL	TRUE if all of a set of comparisons are TRUE	
• AND	TRUE if both Boolean expressions are TRUE	
• ANY	TRUE if any one of a set of comparisons are TRUE	
• BETWEEN	TRUE if the operand is within a range	
 EXISTS 	TRUE if a subquery contains any rows	
• IN	TRUE if the operand is equal to one of a list of expressions	
• LIKE	TRUE if the operand matches a pattern.	
 NOT 	Reverses the value of any other Boolean operator	
• OR	TRUE if either Boolean expression is TRUE.	
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Logical operators test for the truth of some condition. Logical operators, like comparison operators, return a **Boolean** data type with a value of TRUE, FALSE, or UNKNOWN.

type with a value of fittor, fitters, or offittion in			
Operator	Meaning		
ALL	TRUE if all of a set of comparisons are TRUE.		
AND	TRUE if both Boolean expressions are TRUE.		
ANY	TRUE if any one of a set of comparisons are		
TRUE.			
BETWEEN	TRUE if the operand is within a range.		
EXISTS	TRUE if a subquery contains any rows.		
IN	TRUE if the operand is equal to one of a list of		
expressions.			
LIKE	TRUE if the operand matches a pattern.		
NOT	Reverses the value of any other Boolean		
operator.			
OR	TRUE if either Boolean expression is TRUE.		
SOME	TRUE if some of a set of comparisons are		
TRUE.			
Example for IN:			
USE Northwind			

SELECT FirstName, LastName, Title FROM Employees WHERE Title IN ('Design Engineer', 'Tool Designer', 'Marketing Assistant'); GO



Determines whether a given character string matches a specified pattern. A pattern can include regular characters and wildcard characters. During pattern matching, regular characters must match exactly the characters specified in the character string. Wildcard characters, however, can be matched with arbitrary fragments of the character string. Using wildcard characters makes the LIKE operator more flexible than using the = and != string comparison operators.

For example to list out all titles which starts with a The , the query would be SELECT title, price FROM pubs.dbo.titles WHERE title LIKE 'The%'

The output will not be the same if the pattern is given as SELECT title, price FROM pubs.dbo.titles WHERE title LIKE '%The%' This would list all titles have the somewhere - beginning, middle or end

Working with NULL Values

- > NULL values are treated differently from other values
- > NULL is used as a placeholder for unknown or inapplicable values
- > We have to use the IS NULL and IS NOT NULL operators to test for NULL Values

SELECT LastName, FirstName, Address

FROM Persons

WHERE Address IS NULL

SELECT LastName,FirstName,Address

FROM Persons

WHERE Address IS NOT NULL

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Assignment Operator

- Can create a variable
- Sets a value returned by an expression
- Can be used to establish the relationship between a column heading and the expression that defines the values for the column

USE AdventureWorks;

GO

SELECT FirstColumnHeading = 'xyz',

SecondColumnHeading = ProductID

FROM Products;

GO

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The equal sign (=) is the only Transact-SQL assignment operator. In the following example, the @MyCounter variable is created, and then the assignment operator sets @MyCounter to a value returned by an expression.

DECLARE @MyCounter INT;

SET @MyCounter = 1;

The assignment operator can also be used to establish the relationship between a column heading and the expression that defines the values for the column. The following example displays the column headings FirstColumnHeading and SecondColumnHeading. The string xyz is displayed in the FirstColumnHeading column heading for all rows. Then, each product ID from the Product table is listed in the SecondColumnHeading column heading.

USE AdventureWorks;

GO

SELECT FirstColumnHeading = 'xyz',

SecondColumnHeading = ProductID

FROM Products;

GO

Comparison Operator

- = (Equals) Equal to
- > (Greater Than) Greater than
- < (Less Than) Less than
- >= (Greater Than or Equal To) Greater than or equal to
- <= (Less Than or Equal To) Less than or equal to
- <> (Not Equal To) Not equal to
- != (Not Equal To) Not equal to

Operator

- !< (Not Less Than) Not less than
- !> (Not Greater Than) Not greater than

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Comparison operators test whether two expressions are the same. Comparison operators can be used on all expressions except expressions of the **text**, **ntext**, or **image** data types. The following table lists the Transact-SQL comparison operators.

Meaning

```
(Equals) Equal to
                  (Greater Than) Greater than
                  (Less Than) Less than
<
                  (Greater Than or Equal To) Greater than or
equal to
<=
                  (Less Than or Equal To) Less than or equal to
                  (Not Equal To) Not equal to
<>
                  (Not Equal To) Not equal to (not SQL-92
standard)
!<
                  (Not Less Than) Not less than (not SQL-92
standard)
                  (Not Greater Than) Not greater than (not
SQL-92 standard)
Example:
use Northwind;
SELECT ProductID, ProductName, UnitPrice AS Price
FROM Products
WHERE SupplierID = 7 AND UnitsInStock < 25
ORDER BY ProductName ASC;
```

Compound Assignment Operators += Plus Equals -= Minus Equals *= Multiplication Equals /= Division Equals %= Modulo Equals %= Modulo Equals

Compound Assignment Operators

Compound assignment operators help abbreviate code that assigns a value to a column or a variable. The new operators are:

- · += (plus equals)
- ·-= (minus equals)
- · *= (multiplication equals)
- ·/= (division equals)
- \cdot %= (modulo equals)

You can use these operators wherever assignment is normally allowed—for example, in the SET clause of an UPDATE statement or in a SET statement that assigns values to variables. The following code example demonstrates the use of the += operator:

DECLARE @price AS MONEY = 10.00;

SET @price += 2.00;

SELECT @price;

This code sets the variable @price to its current value, 10.00, plus 2.00, resulting in 12.00.

Demo > Using LIKE operator > Working with commonly used operators | Image: Common of the common of

Using System Functions String Functions Date and Time Functions Mathematical Functions Aggregate Functions System Functions Proprietory.and.corrifornial -25-

Using System Functions

- String Functions Perform operations on a string (char or varchar) input value and return a string or numeric value.
- Date and Time Functions Perform operations on a date and time input values and return string, numeric, or date and time values.
- Mathematical Functions Perform calculations based on input values provided as parameters to the functions, and return numeric values.
- 4. Aggregate Functions You can use aggregate functions to calculate and summarize data.
- System Functions Perform operations and return information about values, objects, and settings in an instance of SQL Server.

Using System Functions - String Functions

- > STR Returns character data converted from numeric data
- REPLACE Replaces all occurrences of a specified string value with another string value
- LEFT Returns the left part of a character string with the specified number of characters
- RIGHT Returns the right part of a character string with the specified number of characters

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Examples

The following example replaces the string code in abcdefghi with xxx.

SELECT REPLACE('abcdefghicde','cde','xxx');

Here is the result set.

abxxxfghixxx

The following example converts an expression that is made up of five digits and a decimal point to a six-position character string. The fractional part of the number is rounded to one decimal place.

SELECT STR(123.45, 6, 1)

Here is the result set.

123.5 (1 row(s) affected)

The following example returns the five leftmost characters of each product name.

USE Northwind;

SELECT LEFT(ProductName, 5) FROM Products ORDER BY ProductID;

Using System Functions - String Functions

- SUBSTRING Returns part of a character, binary, text, or image expression
- LEN- Returns the number of characters of the specified string expression, excluding trailing blanks
- REVERSE Returns the reverse of a character expression
- LOWER Returns a character expression after converting uppercase character data to lowercase
- UPPER Returns a character expression with lowercase character data converted to uppercase
- + -- used for concatenating strings

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The following example returns the five rightmost characters of the first name for each contact

USE AdventureWorks

GO

SELECT RIGHT(FirstName, 5) AS 'First Name' FROM Person.Contact WHERE ContactID < 5 ORDER BY FirstName; GO

Here is the result set.

First Name

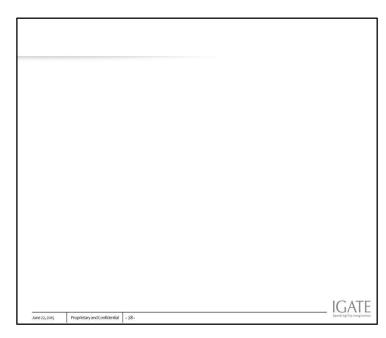
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use Northwind; Go

SELECT LastName, SUBSTRING(FirstName, 1, 1) AS Initial FROM Employees WHERE LastName like 'S%'

SELECT LEN(CompanyName) AS Length,CompanyName,city FROM Suppliers WHERE Country ='USA'

Some more string functions are:

ASCII, NCHAR, SOUNDEX, CHAR, PATINDEX, SPACE, CHARINDEX, QUOTENAME, DIFFERENCE, STUFF, REPLICATE, UNICODE, LTRIM, RTRIM.

All built-in string functions are deterministic. This means they return the same value any time they are called with a specific set of input values

Example of string concatenation SELECT TitleOfCourtesy+' '+LastName+','+FirstName FROM northwind.dbo.Employees ORDER BY TITLE

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Using System Functions – Date Functions

- ➢ GETDATE Returns the current database system timestamp as a datetime value without the database time zone offset
- ➢ GETUTCDATE Returns the current database system timestamp as a datetime value. The database time zone offset is not included
- CURRENT_TIMESTAMP Returns the current database system timestamp as a
 datetime value without the database time zone offset
- SYSDATETIME Returns a datetime2(7) value that contains the date and time of the computer on which the instance of SQL Server is running. The time zone offset is not included

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Date Functions Examples

GETDATE

SELECT GETDATE()

Result - 2012-03-10 13:56:36.620

GETUTCDATE

SELECT GETUTCDATE()

Result - 2012-03-10 13:56:36.620

CURRENT_TIMESTAMP

SELECT CURRENT_TIMESTAMP

Result - 2012-03-10 13:56:36.620

SYSDATETIME

Result - 2012-04-10 14:04:46.50

Using System Functions - Date Functions

- SYSDATETIMEOFFSET Returns a datetimeoffset(7) value that contains the date and time of the computer on which the instance of SQL Server is running. The time zone offset is included.
- SYSUTCDATETIME Returns a datetime2(7) value that contains the date and time of the computer on which the instance of SQL Server is running. The date and time is returned as UTC time (Coordinated Universal Time).

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<u>SYSDATETIMEOFFSET</u> – DATETIMEOFFSET Defines a date that is combined with a time of a day that has time zone awareness and is based on a 24-hour clock

SELECT SYSDATETIMEOFFSET()

Result - 2012-03-10 14:06:56.7418989 +05:30

SYSUTCDATETIME

SELECT SYSUTCDATETIME()

Result - 2012-03-10 08:39:06.94

Date Functions – To retrieve Date & Time Parts

- DATENAME Returns a character string that represents the specified datepart of the specified date
- DATEPART Returns an integer that represents the specified datepart of the specified date

datepart	Return value – DATEPART	Return Value - DATENAME
year, yyyy, yy	2007	2007
quarter, qq, q	4	4
month, mm, m	9	October
dayofyear, dy, y	303	303
day, dd, d	30	30
week, wk, ww	44	44
weekday, dw	3	Tuesday
hour, hh	12	12
minute, n	15	15
second, ss, s	32	32
millisecond, ms	123	123
microsecond, mcs	123456	123456

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Examples

The following example extracts the month name from the date returned by GETDATE.

SELECT DATENAME(month, GETDATE()) AS 'Month Name'; Result

Month Name

February

The following example extracts the month name from a column.

USE AdventureWorks

GC

SELECT StartDate, DATENAME(month,StartDate) AS StartMonth FROM Production.WorkOrder WHERE WorkOrderID = 1; GO

Result

StartDate StartMonth

2001-07-04 00:00:00.000 July

Try this:

SELECT DATENAME(YEAR,GETDATE())
SELECT DATEPART(YEAR,GETDATE())
SELECT DATENAME(MONTH,GETDATE())
SELECT DATEPART(MONTH,GETDATE())

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Using System Functions - Date Functions

- DATEDIFF Returns the count (signed integer) of the specified datepart boundaries crossed between the specified startdate and enddate.
- DATEADD- Returns a specified date with the specified number interval (signed integer) added to a specified datepart of that date.

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Examples DATEDIFF

CREATE TABLE dbo.Duration
(
startDate datetime2 ,endDate datetime2
)
INSERT INTO dbo.Duration(startDate,endDate)
VALUES('2007-05-06 12:10:09','2007-05-07 12:10:09')

SELECT DATEDIFF(day, startDate, endDate) AS 'Duration' FROM dbo.Duration;

-- Returns: 1

DATEADD-

The following example adds 2 days to each OrderDate to calculate a new PromisedShipDate.

USE AdventureWorks;

GO

SELECT SalesOrderID

,OrderDate

,DATEADD(day,2,OrderDate) AS PromisedShipDate FROM Sales.SalesOrderHeader;

Using System Functions – Mathematical Functions

- ABS A mathematical function that returns the absolute (positive) value of the specified numeric expression
- RAND Returns a random float value from 0 through 1
- > ROUND Returns a numeric value, rounded to the specified length or precision
- SQRT Returns the square root of the specified float value

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The following scalar functions perform a calculation, usually based on input values that are provided as arguments, and return a numeric value:

ABS - A mathematical function that returns the absolute (positive) value of the specified numeric expression.

RAND - Returns a random **float** value from 0 through 1. RAND ([seed])

ROUND - Returns a numeric value, rounded to the specified length or precision. ROUND (numeric_expression, length [,function])

SQRT - Returns the square root of the specified float value. SQRT (float_expression)

Examples:

SELECT ABS(-1.0), ABS(0.0), ABS(1.0); <u>Here is the result set.</u> 1.0 .0 1.0

SELECT ROUND(123.4545, 2); GO (Output: 123.4500) SELECT ROUND(123.45, -2); GO (Output: 100.00)

Some more mathematical functions are:

DEGREES, ACOS, EXP, ASIN, FLOOR, SIGN, ATAN, LOG, SIN, ATN2, LOG10, CEILING, PI, SQUARE, COS, POWER, TAN, COT, RADIANS

Using aggregate functions

The aggregate functions are: **sum, avg, count, min, max,** and **count(*)**. You can use aggregate functions to calculate and summarize data.

Examples:

use pubs;

select sum(ytd sales)

from titles;

Note that there is no column heading for the aggregate column.

An aggregate function take as an argument the column name on whose values it will operate. You can apply aggregate functions to all the rows in a table, to a subset of the table specified by a **where** clause, or to one or more groups of rows in the table. From each set of rows to which an aggregate function is applied, Adaptive Server generates a single value.

Here is the syntax of the aggregate function: aggregate function ([all|distinct]expression)

Expression is usually a column name. However, it can also be a constant, a function, or any combination of column names, constants, and functions connected by arithmetic or bitwise operators. You can also use a **case** expression or subquery in an expression.

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System Functions – To retrieve System Information

- CURRENT_TIMESTAMP Returns the current date and time, equivalent to GETDATE.
- CURRENT_USER Returns the name of the current user, equivalent to USER NAME().
- HOST_ID & HOST_NAME Returns the workstation identification number and name.

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The following functions perform operations on and return information about values, objects, and settings in SQL Server 2008

CURRENT_TIMESTAMP - Returns the current date and time. This function is the ANSI SQL equivalent to GETDATE. CURRENT_USER - Returns the name of the current user. This function is equivalent to USER NAME().

HOST_ID - Returns the workstation identification number. The workstation identification number is the process ID (PID) of the application on the client computer that is connecting to SQL Server.

HOST_NAME - Returns the workstation name.

System Functions – To retrieve System Information

- CAST and CONVERT Explicitly converts an expression of one data type to another
- CAST (expression AS data_type [(length)])
- CONVERT(data_type[(length)], expression[, style])

Example

Select CONVERT(char,100) --converts 100 to '100' Select CAST(100 as char)

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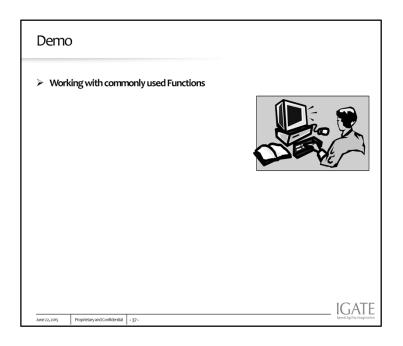
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CAST and CONVERT - Explicitly converts an expression of one data type to another. CAST and CONVERT provide similar functionality.

Syntax

Syntax for CAST: CAST (expression AS data_type [(length)
])

Syntax for CONVERT: CONVERT (data_type [(length)], expression [, style])



Organizing query results into groups: the group by clause The group by clause divides the output of a query into groups. You can group by one or more column names, or by the results of computed columns using numeric datatypes in an expression. When used with aggregates, group by retrieves the calculations in each subgroup, and may return multiple rows. The maximum number of columns or expressions you can use in a group by clause is 16. You cannot group by columns of text or image datatypes. While you can use group by without aggregates, such a construction has limited functionality and may produce confusing results. The following example groups the results by title type:

select type, advance from titles group by type, advance

type	advance
business	5,000.00
business	5,000.00
business	10,125.00
business	5,000.00
mod cook	0.00
mod_cook UNDECIDED popular_comp popular_comp popular_comp	15,000.00 NULL 7,000.00 8,000.00 NULL

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Groups By

- > SQL standards for group by are more restrictive
- > SQL standard requires that:
 - Columns in a select list must be in the group by expression or they must be arguments of aggregate functions
 - A group by expression can only contain column names in the select list

USE pubs;

GO

select pub_id, type, avg(price), sum(ytd_sales)
from titles

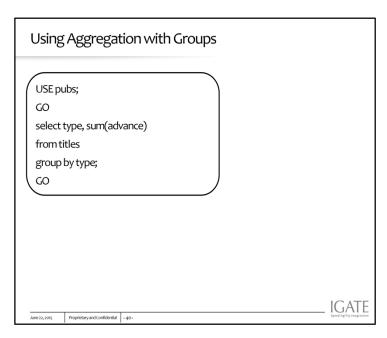
group by pub_id, type

GO

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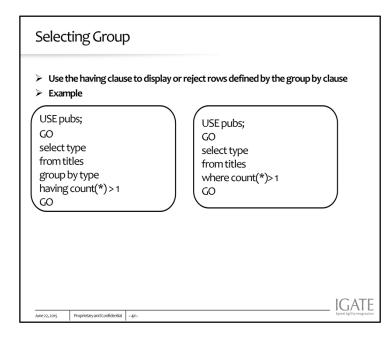


With an aggregate for the *advance* column, the query returns the sum for each group:

select type, sum(advance) from titles group by type

type	
UNDECIDED	NULL
business	25,125.00
mod_cook	15,000.00
popular_comp	15,000.00
psychology	21,275.00
trad_cook	19,000.00

The summary values in a **group by** clause using aggregates are called vector aggregates, as opposed to scalar aggregates, which result when only one row is returned.



Selecting groups of data: the having clause

Use the **having** clause to display or reject rows defined by the **group by** clause. The **having** clause sets conditions for the **group by** clause in the same way **where** sets conditions for the **select** clause, except **where** cannot include aggregates, while **having** often does.

How the having, group by, and where clauses interact When you include the having, group by, and where clauses in a query, the sequence in which each clause affects the rows determines the final results:

The **where** clause excludes rows that do not meet its search conditions.

The **group by** clause collects the remaining rows into one group for each unique value in the **group by** expression. Aggregate functions specified in the select list calculate summary values for each group.

The **having** clause excludes rows from the final results that do not meet its search conditions.

The following query illustrates the use of **where**, **group by**, and **having** clauses in one **select** statement containing aggregates:

select stor_id, title_id, sum(qty)
from salesdetail
where title_id like 'PS%'
group by stor id, title id having sum(qty) > 200

Grouping Sets

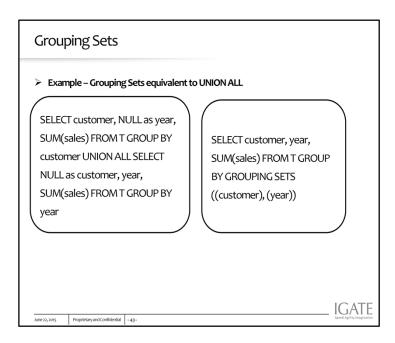
- SQL Server 2008 introduces several extensions to the GROUP BY clause that enable you to define multiple groupings in the same query
- We can use grouping set for single result set instead of using UNION ALL with multiple queries for various grouping sets for various calculations
- > SQL Server optimizes the data for access and grouping

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Grouping Sets

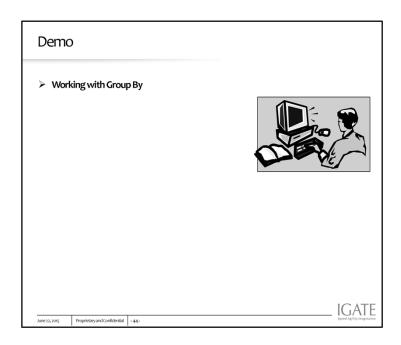
- SQL Server 2008 introduces several extensions to the GROUP BY clause that
- enable you to define multiple groupings in the same query. We can use grouping set for single result set instead of using UNION ALL with multiple queries for various grouping sets for various calculations. SQL Server optimizes the data for access and grouping.
- Without the extensions, a single query normally defines one "grouping set" (a set of attributes to group by) in the GROUP BY clause. If you want to calculate aggregates for multiple grouping sets, you usually need multiple queries. If you want to unify the result sets of multiple GROUP BY queries, each with a different grouping set, you must use the UNION ALL set operation between the queries.
- You might need to calculate and store aggregates for various grouping sets in a table. By preprocessing and materializing the aggregates, you can support applications that require fast response time for aggregate requests. However, the aforementioned approach, in which you have a separate query for each grouping set, is very inefficient. This approach requires a separate scan of the data for each grouping set and expensive calculation of aggregates.

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With the new GROUPING SETS subclause, you simply list all grouping sets that you need. Logically, you get the same result set as you would by unifying the result sets of multiple queries.

However, with the GROUPING SETS subclause, which requires much less code, SQL Server optimizes data access and the calculation of aggregates. SQL Server will not necessarily need to scan data once for each grouping set; plus, in some cases it calculates higher-level aggregates based on lower-level aggregates instead of re-aggregating base data.



Pagination

- > SQL Server 2012 enables Pagination.
- > The OFFSET with FETCH commands can limit the number of rows sent to the client.
- Instead of using the TOP command for paging, these new commands can be used to reduce complexity.
- > These new commands will normally be accompanied with ORDER BY.

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OFFSET and FETCH are two new clauses introduced in SQL Server 2012. Used together in your queries, they allow you to extract a portion of rows from your result set.

A great practical use for this is in applications and websites where you wish to display just a small selection of records.

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Pagination	
USE NORTHWIND	USE AdventureWorks
SELECT * FROM Products ORDER BY ProductName OFFSET 5 ROWS FETCH NEXT 10 ROWS ONLY	SELECT ProductID, Name FROM AdventureWorks.Production.Product ORDER BY NAME OFFSET 10 ROWS FETCH NEXT 5 ROWS ONLY
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Introduction

- SET operators are mainly used to combine the same type of data from two or more tables into a single result
- > SET Operators supported in SQL Server are
 - UNION/UNION ALL
 - INTERSECT
 - EXCEPT

UNION

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Combine two or more result sets into a single set, without duplicates.

UNION ALL

Combine two or more result sets into a single set, including all duplicates.

INTERSECT

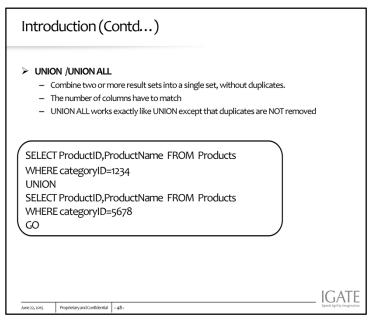
Takes the data from both result sets which are in common.

EXCEPT

Takes the data from first result set, but not the second (i.e. no matching to each other)

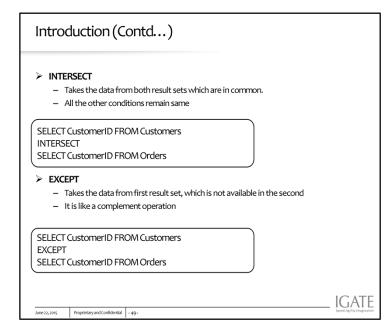
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The above query will list all products belonging to category 1234 and 5678

The number of columns in the SELECT clauses must be same . In case the result has to be sorted on any order , the last query can only have Order by clause



Here in this example using an INTERSECT operation I can find out all Customers who have placed orders

Using an EXCEPT operation , I can find out all Customers who havent placed any Orders $\,$

Rules of Set Operation

- > The result sets of all queries must have the same number of columns.
- In every result set the data type of each column must match the data type of its corresponding column in the first result set.
- In order to sort the result, an ORDER BY clause should be part of the last statement.
- The records from the top query must match the positional ordering of the records from the bottom query.
- The column names or aliases of the result set are given in the first select statement

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Summary

- > Transact-SQL is central to using SQL Server
- > SELECT is the basic & commonly used data retrieval statement used in SQL Server
- SQL Server provides variety of System functions which can help us in performing our day to day activities
- For example, String Functions, Date Functions, Mathematical functions, Aggregate Functions and so on
- We can make use of Group By to divide the SQL query result into groups
- We can use grouping set for single result set instead of using UNION ALL with multiple queries for various grouping sets for various calculations



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Summary

➤ In this lesson, you have learnt:

- Joins are used to fetch data from more than 2 tables.
- Join types: equijoin, non-equijoin, outer join, self join
- Data manipulation can be done using insert update and delete statements
- Subquery is query within a query or nested query
- Subquery types: single value, multivalue and exists



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Review Question

Question 1: The Set operation that will show all the rows from both the resultsets including

duplicates is _

- Option 1: Union All
- Option 2: Union
- Option 3: Intersect
- Option 4: Minus

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Question 2: The Except operator returns _____



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