Force.com SOQL and SOSL Reference

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@salesforcedocs

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CHAPTER 1 Introduction to SOQL and SOSL

If you've built a custom UI for Salesforce, you can use the Salesforce Object Query Language (SOQL) and Salesforce Object Search Language (SOSL) APIs to search your organization's Salesforce data.

This guide explains when to use SOQL and SOSL and outlines the syntax, clauses, limits, and performance considerations for both languages. It is intended for developers and assumes knowledge and experience working with APIs to interact with data.

Deciding Which to Use

A SOQL query is the equivalent of a `SELECT` SQL statement and searches the org database. SOSL is a programmatic way of performing a text-based search against the search index.

Whether you use SOQL or SOSL depends on whether you know which objects or fields you want to search, plus other considerations.

Use SOQL when you know which objects the data resides in, and you want to:

- Retrieve data from a single object or from multiple objects that are related to one another.
- Count the number of records that meet specified criteria.
- Sort results as part of the query.
- Retrieve data from number, date, or checkbox fields.

Use SOSL when you don't know which object or field the data resides in, and you want to:

- Retrieve data for a specific term that you know exists within a field. Because SOSL can tokenize multiple terms within a field and build a search index from this, SOSL searches are faster and can return more relevant results.
- Retrieve multiple objects and fields efficiently where the objects might or might not be related to one another.
- Retrieve data for a particular division in an organization using the divisions feature.
- Retrieve data that's in Chinese, Japanese, Korean, or Thai. Morphological tokenization for CJKT terms helps ensure accurate results.

Performance Considerations

To increase the efficiency of queries and searches, keep in mind:

- Both SOQL `WHERE` filters and SOSL search queries can specify text you should look for. When a given search can use either language, SOSL is generally faster than SOQL if the search expression uses a `CONTAINS` term.
- SOSL can tokenize multiple terms within a field (for example, multiple words separated by spaces) and builds a search index off this. If you're searching for a specific distinct term that you know exists within a field, you might find SOSL is faster than SOQL for these searches. For example, you might use SOSL if you were searching for "John" against fields that contained values like "Paul and John Company".

- Keep the number of fields to be searched or queried to a minimum. Using a large number of fields leads to a large number of permutations, which can be difficult to tune.

For more information, see *Best Practices for Deployments with Large Data Volumes*.

Sending Queries

Use the REST and SOAP protocols to execute queries and searches:

- `Query` (REST) and `query()` (SOAP)—Executes a SOQL query against the specified object and returns data that matches the specified criteria.
- `Search` (REST) and `search()` (SOAP)—Executes a SOSL text string search against your org's data.

More resources to perform other common search tasks, like auto-suggesting records, articles, and queries, are also available.

In Apex, you can use SOQL or SOSL on the fly by surrounding the statement in square brackets. You can also use a Search Class to perform dynamic SOSL queries and a Search Namespace for getting search results and suggestion results.

Note: Apex requires that you surround SOQL and SOSL statements with square brackets to use them on the fly. You can use Apex script variables and expressions when preceded by a colon (`:`).

CHAPTER 2 Salesforce Object Query Language (SOQL)

In this chapter ...

- Typographical Conventions in This Document
- Quoted String Escape Sequences
- Reserved Characters
- Alias Notation
- SOQL SELECT Syntax
- Relationship Queries
- Change the Batch Size in Queries
- SOQL Limits on Objects
- Syndication Feed SOQL and Mapping Syntax
- Location-Based SOQL Queries

Use the Salesforce Object Query Language (SOQL) to search your organization's Salesforce data for specific information. SOQL is similar to the SELECT statement in the widely used Structured Query Language (SQL) but is designed specifically for Salesforce data.

With SOQL, you can construct simple but powerful query strings in the following environments:

- In the `queryString` parameter in the `query()` call
- In Apex statements
- In Visualforce controllers and getter methods
- In the Schema Explorer of the Force.com IDE

Similar to the SELECT command in Structured Query Language (SQL), SOQL allows you to specify the source object (such as Account), a list of fields to retrieve, and conditions for selecting rows in the source object.

Note: SOQL doesn't support all advanced features of the SQL SELECT command. For example, you can't use SOQL to perform arbitrary join operations, use wildcards in field lists, or use calculation expressions.

SOQL uses the SELECT statement combined with filtering statements to return sets of data, which can optionally be ordered:

```
SELECT one or more fields
FROM an object
WHERE filter statements and, optionally, results are ordered
```

For example, the following SOQL query returns the value of the `Id` and `Name` field for all Account records if the value of `Name` is `Sandy`:

```
SELECT Id, Name
FROM Account
WHERE Name = 'Sandy'
```

Note: Apex requires that you surround SOQL and SOSL statements with square brackets to use them on the fly. You can use Apex script variables and expressions when preceded by a colon (`:`).

For a complete description of the syntax, see SOQL SELECT Syntax.

When to Use SOQL

Use SOQL when you know which objects the data resides in, and you want to:

- Retrieve data from a single object or from multiple objects that are related to one another.
- Count the number of records that meet specified criteria.
- Sort results as part of the query.
- Retrieve data from number, date, or checkbox fields.

Note: With archived data and BigObjects, you can use only some SOQL features. For more information, see SOQL with Archived Data on page 71.

Typographical Conventions in This Document

This SOQL reference uses custom typographical conventions.

Convention	Description
`SELECT Name FROM Account`	Courier font indicates items that you should type as shown. In a syntax statement, Courier font also indicates items that you should type as shown, except for curly braces, square brackets, ellipsis, and other typographical markers explained in this table.
`SELECT` ***`fieldname`*** `FROM` ***`objectname`***	Italics represent a variable or placeholder. You supply the actual value.
`{}`	Curly braces group elements to remove ambiguity. For example, in the clause `UPDATE {TRACKING|VIEWSTAT}[,...]`, the curly braces indicate that the pipe shows a choice between `TRACKING` and `VIEWSTAT` after `UPDATE`, rather than a choice between `UPDATE TRACKING` and `VIEWSTAT`.
`|`	The pipe character separates alternate elements. For example, in the clause `UPDATE {TRACKING|VIEWSTAT}[,...]`, the `|` character indicates that you can use either `TRACKING` or `VIEWSTAT` after `UPDATE`.
`[]`	Square brackets indicate an optional element. For example, `[LIMIT rows]` means that you can specify zero or one `LIMIT` clause. Don't type square brackets as part of a SOQL command. Nested square brackets indicate elements that are optional and can only be used if the parent optional element is present. For example, in the clause `[ORDER BY fieldOrderByList [ASC | DESC] [NULLS {FIRST | LAST}]]` , `ASC`, `DESC`, or the `NULLS` clause cannot be used without the `ORDER BY` clause.

`[...]` and `[,...]`	Square brackets containing an ellipsis indicate that the preceding element can be repeated up to the limit for the element. If a comma is also present, the repeated elements must be separated by commas. If the element is a list of choices grouped with curly braces, you can use items from the list in any order. For example, in the clause `UPDATE {TRACKING|VIEWSTAT}[,...]`, the `[,...]` indicates that you can use `TRACKING`, `VIEWSTAT`, or both:
	`UPDATE TRACKING`
	`UPDATE VIEWSTAT`
	`UPDATE TRACKING, VIEWSTAT`

Quoted String Escape Sequences

SOQL defines several escape sequences that are valid in queries so that you can include special characters in your queries. You can escape new lines, carriage returns, tabs, quotes, and more. The escape character for SOQL is the backslash (\) character.

You can use the following escape sequences with SOQL:

Sequence	Meaning
`\n` or `\N`	New line
`\r` or `\R`	Carriage return
`\t` or `\T`	Tab
`\b` or `\B`	Bell
`\f` or `\F`	Form feed
`\"`	One double-quote character
`\'`	One single-quote character
`\\`	Backslash
LIKE expression only: `\_`	Matches a single underscore character (_)
LIKE expression only:`\%`	Matches a single percent sign character (%)

If you use a backslash character in any other context, an error occurs.

Escaped Character Examples

`SELECT Id FROM Account WHERE Name LIKE 'Ter%'`
Select all accounts whose name begins with the three character sequence 'Ter'.

`SELECT Id FROM Account WHERE Name LIKE 'Ter\%'`
Select all accounts whose name exactly matches the four character sequence 'Ter%'.

`SELECT Id FROM Account WHERE Name LIKE 'Ter\%%'`
Select all accounts whose name begins with the four character sequence 'Ter%'

Reserved Characters

The single quote (') and backlash (\) characters are reserved in SOQL queries and must be preceded by a backslash to be properly interpreted.

Reserved characters, if specified in a `SELECT` clause as a literal string (between single quotes), must be escaped (preceded by the backslash \ character) in order to be properly interpreted. An error occurs if you do not precede reserved characters with a backslash.

The following characters are reserved:

```
' (single quote)
\ (backslash)
```

For example, to query the Account `Name` field for "Bob's BBQ," use the following SELECT statement:

```
SELECT Id
FROM Account
WHERE Name LIKE 'Bob\'s BBQ'
```

Alias Notation

You can use alias notation in SELECT queries.

```
SELECT count()
FROM Contact c, c.Account a
WHERE a.name = 'MyriadPubs'
```

To establish the alias, first identify the object, in this example a contact, and then specify the alias, in this case "c." For the rest of the SELECT statement, you can use the alias in place of the object or field name.

The following are SOQL keywords that can't be used as alias names: `AND, ASC, DESC, EXCLUDES, FIRST, FROM, GROUP, HAVING, IN, INCLUDES, LAST, LIKE, LIMIT, NOT, NULL, NULLS, OR, SELECT, WHERE, WITH`

SOQL SELECT Syntax

SOQL query syntax consists of a required `SELECT` statement followed by one or more optional clauses, such as `TYPEOF`, `WHERE`, `WITH`, `GROUP BY`, and `ORDER BY`.

The SOQL SELECT statement uses the following syntax:

```
SELECT fieldList [subquery][...]
[TYPEOF typeOfField whenExpression[...] elseExpression END][...]
FROM objectType[,...]
    [USING SCOPE filterScope]
[WHERE conditionExpression]
[WITH [DATA CATEGORY] filteringExpression]
[GROUP BY {fieldGroupByList|ROLLUP (fieldSubtotalGroupByList)|CUBE
(fieldSubtotalGroupByList)}
    [HAVING havingConditionExpression] ]
[ORDER BY fieldOrderByList {ASC|DESC} [NULLS {FIRST|LAST}] ]
[LIMIT numberOfRowsToReturn]
[OFFSET numberOfRowsToSkip]
[FOR {VIEW  | REFERENCE}[,...] ]
      [ UPDATE {TRACKING|VIEWSTAT}[,...] ]
```

Note: `TYPEOF` is currently available as a Developer Preview as part of the SOQL Polymorphism feature. For more information on enabling `TYPEOF` for your organization, contact Salesforce.

Syntax	Description
fieldList subquery	Specifies a list of one or more fields, separated by commas, that you want to retrieve from the specified *object*. The bold elements in the following examples are *fieldlists*: • `SELECT **Id, Name, BillingCity** FROM Account` • `SELECT **count()** FROM Contact` • `SELECT **Contact.Firstname, Contact.Account.Name** FROM Contact` You must specify valid field names and must have read-level permissions to each specified field. The *fieldList* defines the ordering of fields in the query results.

Syntax	Description
	fieldList can include a subquery if the query traverses a relationship. For example: `SELECT Account.Name, (SELECT Contact.LastName FROM Account.Contacts) FROM Account` The *fieldlist* can also be an aggregate function, such as `COUNT()` and `COUNT(fieldName)`, or be wrapped in Translating Results.
typeOfField	A polymorphic relationship field in ***objectType*** or a polymorphic field in a parent of ***objectType*** that can reference multiple object types. For example, the `What` relationship field of an Event could be an Account, a Campaign, or an Opportunity. ***typeOfField*** cannot reference a relationship field that is also referenced in ***fieldList***. See `TYPEOF` for more information.
whenExpression	A clause of the form `WHEN` ***whenObjectType*** `THEN` ***whenFieldList***. You can have one or more ***whenExpression*** clauses inside a `TYPEOF` expression. See `TYPEOF` for more information.
elseExpression	A clause of the form `ELSE` ***elseFieldList***. This clause is optional inside a `TYPEOF` expression. See `TYPEOF` for more information.
objectType	Specifies the type of object that you want to `query()`. You must specify a valid object, such as Account, and must have read-level permissions to that object.
filterScope	Available in API version 32.0 and later. Specifies the `filterScope` for limiting the results of the query.
conditionExpression	If `WHERE` is specified, determines which rows and values in the specified object (*objectType*) to filter against. If unspecified, the `query()` retrieves all the rows in the object that are visible to the user.
filteringExpression	If `WITH DATA CATEGORY` is specified, the `query()` only returns matching records that are associated with the specified data categories and are visible to the user. If unspecified, the `query()` returns the matching records that are visible to the user. The `WITH DATA CATEGORY` clause only filters objects of type: • `Question`—to query questions. • `KnowledgeArticleVersion`—to query articles. For more information about the `WITH DATA CATEGORY` clause, see `WITH DATA CATEGORY` *filteringExpression*.
fieldGroupByList	Available in API version 18.0 and later. Specifies a list of one or more fields, separated by commas, that are used to group the query results. A `GROUP BY` clause is used with aggregate functions to summarize the data and enable you to roll up query results rather than having to process the individual records in your code. See `GROUP BY`.
fieldSubtotalGroupByList	Available in API version 18.0 and later. Specifies a list of up to three fields, separated by commas, that are used to group the query results. The results include extra subtotal rows for the grouped data. See `GROUP BY ROLLUP` and `GROUP BY CUBE`.

Syntax	Description
havingConditionExpression	Available in API version 18.0 and later. If the query includes a `GROUP BY` clause, this conditional expression filters the records that the GROUP BY returns. See `HAVING`.

fieldOrderByList	Specifies a list of one or more fields, separated by commas, that are used to order the query results. For example, you can query for contacts and order the results by last name, and then by first name:
	`SELECT Id, LastName, FirstName`
	`FROM Contact`
	`ORDER BY LastName, FirstName`

Note the following implementation tips:

- **Statement Character Limit**—By default, SOQL statements cannot exceed 20,000 characters in length. For SOQL statements that exceed this maximum length, the API returns a `MALFORMED_QUERY` exception code; no result rows are returned.

  Note: Long, complex SOQL statements, such as statements that contain many formula fields, can sometimes result in a `QUERY_TOO_COMPLICATED` error. The error occurs because the statement is expanded internally when processed by Salesforce, even though the original SOQL statement is under the 20,000 character limit. To avoid this, reduce the complexity of your SOQL statement.

- **Localized Results**—SELECT statements can include the Translating Results, `convertCurrency()`, and `FORMAT()` functions in support of localized fields.
- **Dynamic SOQL in Apex**—Apex requires that you surround SOQL and SOSL statements with square brackets to use them on the fly. You can use Apex script variables and expressions when preceded by a colon (`:`).
- **Ordered Results**—The order of results is not guaranteed unless you use an `ORDER BY` clause in a query.

Condition Expression Syntax (`WHERE` Clause)

The syntax of the condition expression in a `WHERE` clause of a SOQL query includes one or more field expressions. You can specify multiple field expressions to a condition expression by using logical operators.

The *`conditionExpression`* in the `WHERE` clause in a SOQL statement uses the following syntax:

```
fieldExpression [logicalOperator fieldExpression2][...]
```

You can add multiple field expressions to a condition expression by using logical operators.

The condition expressions in SOQL `SELECT` statements appear in bold in these examples:

- `SELECT Name FROM Account` **`WHERE Name LIKE 'A%'`**
- `SELECT Id FROM Contact` **`WHERE Name LIKE 'A%' AND MailingState='California'`**

You can use date or datetime values, or date literals. The format for date and dateTime fields are different.

- `SELECT Name FROM Account` **`WHERE CreatedDate > 2011-04-26T10:00:00-08:00`**
- `SELECT Amount FROM Opportunity` **`WHERE CALENDAR_YEAR(CreatedDate) = 2011`**

For more information on date functions, such as `CALENDAR_YEAR()`, see Date Functions.

You can use parentheses to define the order in which *fieldExpression*s are evaluated. For example, the following expression is `true` if `fieldExpression1` is `true` and either `fieldExpression2` or `fieldExpression3` are `true`:

```
fieldExpression1 AND (fieldExpression2 OR fieldExpression3)
```

However, the following expression is `true` if either `fieldExpression3` is `true` or both `fieldExpression1` and `fieldExpression2` are `true`.

```
(fieldExpression1 AND fieldExpression2) OR fieldExpression3
```

Client applications must specify parentheses when nesting operators. However, multiple operators of the same type do not need to be nested.

Note: `WHERE` clauses cannot exceed 4,000 characters.

Using `null` in SOQL Queries

You can search for null values by using the `null` keyword.

Use `null` to represent null values in SOQL queries.

For example, the following statement would return the account IDs of all events with a non-null activity date:

```
SELECT AccountId
FROM Event
WHERE ActivityDate != null
```

Note: The `WHERE` clause behaves in two different ways, depending on the version, when handling null values in a parent field for a relationship query. In a `WHERE` clause that checks for a value in a parent field, if the parent does not exist, the record is returned in version 13.0 and later but is not returned in versions before 13.0

```
SELECT Id
FROM Case
WHERE Contact.LastName = null
```

Case record `Id` values are returned in version 13.0 and later, but are not returned in versions before 13.0.

Translating Results

Use toLabel(*fields*) to translate SOQL query results into the user's language.

A client application can have results from a query returned that are translated into the user's language, using `toLabel()`:

```
toLabel(object.field)
```

Use `toLabel()` on regular, multi-select, division, or currency code picklist fields (any field that has picklist values returned by the relevant describe call), data category group and data category unique name fields or RecordType names. Any organization can use `toLabel()`. It is particularly useful for organizations that have the Translation Workbench enabled.

For example:

```
SELECT Company, toLabel(Recordtype.Name) FROM Lead
```

This query returns lead records with the record type name translated into the language for the user who issued the query.

Note: You cannot filter on the translated name value from a record type. Always filter on the master value or the ID of the object for record types.

You can use `toLabel()` to filter records using a translated picklist value. For example:

```
SELECT Company, toLabel(Status)
FROM Lead
WHERE toLabel(Status) = 'le Draft'
```

Lead records are returned where the picklist value for Status is 'le Draft.' The comparison is made against the value for the user's language. If no translation is available for the user's language for the specified picklist, the comparison is made against the master values.

Note: The `toLabel()` method cannot be used with ORDER BY. Salesforce always uses the picklist's defined order, just like reports. Also, you can't use `toLabel()` in the `WHERE` clause for division or currency ISO code picklists.

Filtering on Boolean Fields

You can use the Boolean values `TRUE` and `FALSE` in SOQL queries.

To filter on a Boolean field, use the following syntax:

```
WHERE BooleanField = TRUE

WHERE BooleanField = FALSE
```

Querying Multi-Select Picklists

You can search for individual values in multi-select picklists, which are regularly used in client applications.

Client applications use a specific syntax for querying multi-select picklists (in which multiple items can be selected).

The following operators are supported for querying multi-select picklists:

Operator	Description
`=`	Equals the specified string.
`!=`	Does not equal the specified string.
`includes`	Includes (contains) the specified string.
`excludes`	Excludes (does not contain) the specified string.
`;`	Specifies AND for two or more strings. Use `;` for multi-select picklists when two or more items must be selected. For example: `'AAA;BBB'`

Examples

The following query filters on values in the `MSP1__c` field that are equal to `AAA` and `BBB` selected (exact match):

```
SELECT Id, MSP1__c FROM CustObj__c WHERE MSP1__c = 'AAA;BBB'
```

In the following query:

```
SELECT Id, MSP1__c from CustObj__c WHERE MSP1__c includes ('AAA;BBB','CCC')
```

the query filters on values in the `MSP1__c` field that contains either of these values:

- AAA and BBB selected.
- CCC selected.

A match will result on any field value that contains 'AAA' and 'BBB' or any field that contains 'CCC'. For example, the following will be matched:

- matches with ' AAA;BBB':

```
'AAA;BBB'
'AAA;BBB;DDD'
```

- matches with ' CCC':

```
'CCC'
'CCC;EEE'
        'AAA;CCC'
```

Filtering on Polymorphic Relationship Fields

You can search polymorphic relationship fields on a SQL query. A polymorphic relationship is one where the current object can be one of several object types depending on a related Event.

To filter on a polymorphic relationship field, use the Type qualifier.

```
WHERE polymorphicRelationship.Type comparisonExpression
```

Syntax	Description
polymorphicRelationship	A polymorphic relationship field in object being queried that can reference multiple object types. For example, the What relationship field of an Event could be an Account, a Campaign, or an Opportunity.
comparisonExpression	The comparison being made against the object type in the polymorphic relationship. For more information, see *fieldExpression* Syntax. Note that the type names returned by Type are string values, like 'User'.

The following example only returns records where the What field of Event is referencing an Account or Opportunity. If an Event record referenced a Campaign in the What field, it would not be returned as part of this SELECT.

```
SELECT Id
FROM Event
WHERE What.Type IN ('Account', 'Opportunity')
```

See Understanding Polymorphic Keys and Relationships for more details on polymorphic relationships, and additional filtering examples.

fieldExpression Syntax

The field expression syntax of the WHERE clause in a SOQL query consists of a field name, a comparison operator, and a value that's used to compare with the value in the field name.

fieldExpression uses the following syntax:

```
fieldName comparisonOperator value
```

where:

Syntax	Description
fieldName	The name of a field in the specified object. Use of single or double quotes around the name will result in an error. You must have at least read-level permissions to the field. It can be any field except a long text area field, encrypted data field, or base64-encoded field. It does not need to be a field in the *fieldList*.
comparisonOperator	Case-insensitive operators that compare values.
value	A value used to compare with the value in *fieldName*. You must supply a value whose data type matches the field type of the specified field. You must supply a native value—other field names or calculations are not permitted. If quotes are required (for example, they are not for dates and numbers), use single quotes. Double quotes result in an error.

Comparison Operators

Comparison operators, such as =, !=, <, >, LIKE, and IN, can be used in the field expression of the `WHERE` clause in a `SELECT` statement in a SOQL query. You can also create more complex queries with semi-joins and anti-joins.

The following table lists the *comparisonOperator* values that are used in *fieldExpression* syntax. Comparisons on strings are case-sensitive for unique case-sensitive fields and case-insensitive for all other fields.

Operator	Name	Description
=	`Equals`	Expression is true if the value in the specified *fieldName* equals the specified *value* in the expression. String comparisons using the equals operator are case-sensitive for unique case-sensitive fields and case-insensitive for all other fields.
!=	`Not equals`	Expression is true if the value in the specified *fieldName* does not equal the specified *value*.
<	`Less than`	Expression is true if the value in the specified *fieldName* is less than the specified *value*.
<=	`Less or equal`	Expression is true if the value in the specified *fieldName* is less than, or equals, the specified *value*.
>	`Greater than`	Expression is true if the value in the specified *fieldName* is greater than the specified *value*.
>=	`Greater or equal`	Expression is true if the value in the specified *fieldName* is greater than or equal to the specified *value*.
`LIKE`	`Like`	Expression is true if the value in the specified *fieldName* matches the characters of the text string in the specified *value*. The `LIKE` operator in SOQL and SOSL is similar to the `LIKE` operator in SQL; it provides a mechanism for matching partial text strings and includes support for wildcards. • The `%` and _ wildcards are supported for the `LIKE` operator. • The `%` wildcard matches zero or more characters. • The _ wildcard matches exactly one character. • The text string in the specified *value* must be enclosed in single quotes.

Operator	Name	Description

		• The `LIKE` operator is supported for string fields only.
		• The `LIKE` operator performs a case-insensitive match, unlike the case-sensitive matching in SQL.
		• The `LIKE` operator in SOQL and SOSL supports escaping of special characters `%` or `_`.
		• Don't use the backslash character in a search except to escape a special character.
		For example, the following query matches Appleton, Apple, and Appl, but not Bappl:
		`SELECT AccountId, FirstName, lastname`
		`FROM Contact`
		`WHERE lastname LIKE 'appl%'`

`IN`	`IN`	If the value equals any one of the specified values in a `WHERE` clause. For example:
		`SELECT Name FROM Account`
		`WHERE BillingState IN ('California', 'New York')`
		The values for `IN` must be in parentheses. String values must be surrounded by single quotes.
		`IN` and `NOT IN` can also be used for semi-joins and anti-joins when querying on ID (primary key) or reference (foreign key) fields.

`NOT IN`	`NOT IN`	If the value does not equal any of the specified values in a `WHERE` clause. For example:
		`SELECT Name FROM Account`
		`WHERE BillingState NOT IN ('California', 'New York')`
		The values for `NOT IN` must be in parentheses, and string values must be surrounded by single quotes.
		There is also a logical operator `NOT`, which is unrelated to this comparison operator.

`INCLUDES` `EXCLUDES`		Applies only to multi-select picklists.

Semi-Joins with `IN` and Anti-Joins with `NOT IN`

You can query values in a field where another field on the same object has a specified set of values, using `IN`. For example:

```
SELECT Name FROM Account
WHERE BillingState IN ('California', 'New York')
```

In addition, you can create more complex queries by replacing the list of values in the `IN` or `NOT IN` clause with a subquery. The subquery can filter by ID (primary key) or reference (foreign key) fields. A semi-join is a subquery on another object in an `IN` clause to restrict the records returned. An anti-join is a subquery on another object in a `NOT IN` clause to restrict the records returned.

Sample uses of semi-joins and anti-joins include:

- Get all contacts for accounts that have an opportunity with a particular record type.
- Get all open opportunities for accounts that have active contracts.

- Get all open cases for contacts that are the decision maker on an opportunity.
- Get all accounts that do not have any open opportunities.

If you filter by an ID field, you can create parent-to-child semi- or anti-joins, such as `Account` to `Contact`. If you filter by a reference field, you can also create child-to-child semi- or anti-joins, such as `Contact` to `Opportunity`, or child-to-parent semi- or anti-joins, such as `Opportunity` to `Account`.

ID field Semi-Join

You can include a semi-join in a `WHERE` clause. For example, the following query returns account IDs if an associated opportunity is lost:

```
SELECT Id, Name
FROM Account
WHERE Id IN
  ( SELECT AccountId
    FROM Opportunity
    WHERE StageName = 'Closed Lost'
  )
```

This example is a parent-to-child semi-join from `Account` to `Opportunity`. Notice that the left operand, `Id`, of the `IN` clause is an ID field. The subquery returns a single field of the same type as the field to which it is compared. A full list of restrictions that prevent unnecessary processing is provided at the end of this section.

Reference Field Semi-Join

The following query returns task IDs for all contacts in `Twin Falls`:

```
SELECT Id
FROM Task
WHERE WhoId IN
  (
    SELECT Id
    FROM Contact
    WHERE MailingCity = 'Twin Falls'
  )
```

Notice that the left operand, `WhoId`, of the `IN` clause is a reference field. An interesting aspect of this query is that `WhoId` is a polymorphic reference field as it can point to a contact or a lead. The subquery restricts the results to contacts.

ID field Anti-Join

The following query returns account IDs for all accounts that do not have any open opportunities:

```
SELECT Id
FROM Account
WHERE Id NOT IN
  (
    SELECT AccountId
    FROM Opportunity
    WHERE IsClosed = false
  )
```

Reference Field Anti-Join

The following query returns opportunity IDs for all contacts whose source is not `Web`:

```
SELECT Id
FROM Opportunity
WHERE AccountId NOT IN
  (
```

```
    SELECT AccountId
    FROM Contact
    WHERE LeadSource = 'Web'
  )
```

This example is a child-to-child anti-join from `Opportunity` to `Contact`.

Multiple Semi-Joins or Anti-Joins

You can combine semi-join or anti-join clauses in a query. For example, the following query returns account IDs that have open opportunities if the last name of the contact associated with the account is like the last name "Apple":

```
SELECT Id, Name
FROM Account
WHERE Id IN
  (
    SELECT AccountId
    FROM Contact
    WHERE LastName LIKE 'apple%'
  )
  AND Id IN
  (
    SELECT AccountId
    FROM Opportunity
    WHERE isClosed = false
  )
```

You can use at most two subqueries in a single semi-join or anti-join query. Multiple semi-joins and anti-join queries are also subject to existing limits on subqueries per query.

Semi-Joins or Anti-Joins Evaluating Relationship Queries

You can create a semi-join or anti-join that evaluates a relationship query in a `SELECT` clause. For example, the following query returns opportunity IDs and their related line items if the opportunity's line item total value is more than $10,000:

```
SELECT Id, (SELECT Id from OpportunityLineItems)
FROM Opportunity
WHERE Id IN
  (
    SELECT OpportunityId
    FROM OpportunityLineItem
    WHERE totalPrice > 10000
  )
```

Because a great deal of processing work is required for semi-join and anti-join queries, Salesforce imposes the following restrictions to maintain the best possible performance:

- **Basic limits:**
  - No more than two `IN` or `NOT IN` statements per `WHERE` clause.
  - You cannot use the `NOT` operator as a conjunction with semi-joins and anti-joins. Using it converts a semi-join to an anti-join, and the reverse. Instead of using the `NOT` operator, write the query in the appropriate semi-join or anti-join form.
- **Main query limits:**

  The following restrictions apply to the main `WHERE` clause of a semi-join or anti-join query:

- The left operand must query a single ID (primary key) or reference (foreign key) field. The selected field in a subquery can be a reference field. For example:

```
SELECT Id
 FROM Idea
 WHERE (Id IN (SELECT ParentId FROM Vote WHERE CreatedDate > LAST_WEEK AND
Parent.Type='Idea'))
```

- The left operand can't use relationships. For example, the following semi-join query is invalid due to the `Account.Id` relationship field:

```
SELECT Id
FROM Contact
WHERE Account.Id IN
  (
   SELECT ...
  )
```

- **Subquery limits:**
  - A subquery must query a field referencing the same object type as the main query.
  - There is no limit on the number of records matched in a subquery. Standard SOQL query limits apply to the main query.
  - The selected column in a subquery must be a foreign key field, and cannot traverse relationships. This limit means that you cannot use dot notation in a selected field of a subquery. For example, the following query is valid:

```
SELECT Id, Name
FROM Account
WHERE Id IN
  (
    SELECT AccountId
    FROM Contact
    WHERE LastName LIKE 'Brown_%'
  )
```

    Using `Account.Id` (dot notation) instead of AccountId is not supported. Similarly, subqueries like `Contact.AccountId FROM Case` are invalid.

  - You cannot query on the same object in a subquery as in the main query. You can write such *self semi-join queries* without using semi-joins or anti-joins. For example, the following self semi-join query is invalid:

```
SELECT Id, Name
FROM Account
WHERE Id IN
  (
    SELECT ParentId
    FROM Account
    WHERE Name = 'myaccount'
  )
```

    However, it is simple to rewrite the query in a valid form, for example:

```
SELECT Id, Name
FROM Account
WHERE Parent.Name = 'myaccount'
```

  - You cannot nest a semi-join or anti-join statement in another semi-join or anti-join statement.

- You can use semi-joins and anti-joins in the main `WHERE` statement, but not in a subquery `WHERE` statement. For example, the following query is valid:

```
SELECT Id
 FROM Idea
 WHERE (Idea.Title LIKE 'Vacation%')
AND (Idea.LastCommentDate > YESTERDAY)
AND (Id IN (SELECT ParentId FROM Vote
            WHERE CreatedById = '005x0000000sMgYAAU'
             AND Parent.Type='Idea'))
```

  The following query is invalid since the nested query is an extra level deep:

```
SELECT Id
 FROM Idea
 WHERE
  ((Idea.Title LIKE 'Vacation%')
  AND (CreatedDate > YESTERDAY)
  AND (Id IN (SELECT ParentId FROM Vote
              WHERE CreatedById = '005x0000000sMgYAAU'
               AND Parent.Type='Idea')
  )
  OR (Idea.Title like 'ExcellentIdea%'))
```

- You cannot use subqueries with `OR`.
- `COUNT`, `FOR UPDATE`, `ORDER BY`, and `LIMIT` are not supported in subqueries.
- The following objects are not currently supported in subqueries:
  - ActivityHistory
  - Attachments
  - Event
  - EventAttendee
  - Note
  - OpenActivity
  - Tags (AccountTag, ContactTag, and all other tag objects)
  - Task

Logical Operators

Logical operators can be used in the field expression of the WHERE clause in a SOQL query. These operators are AND, OR, and NOT.

The following table lists the logical operator values that are used in *`fieldExpression`* syntax:

Operator	Syntax	Description
`AND`	***`fieldExpressionX`*** `AND` ***`fieldExpressionY`***	`true` if both *`fieldExpressionX`* and *`fieldExpressionY`* are true.
`OR`	***`fieldExpressionX`*** `OR` ***`fieldExpressionY`***	`true` if either *`fieldExpressionX`* or *`fieldExpressionY`* is true. Relationship queries with foreign key values in an `OR` clause behave differently depending on the version of the API. In a `WHERE` clause that uses `OR`, if the

Operator	Syntax	Description
		foreign key value in a record is null, the record is returned in version 13.0 and later, but not returned in versions before 13.0. `SELECT Id FROM Contact WHERE LastName = 'foo' or Account.Name = 'bar'` The contact with no parent account has a last name that meets the criteria, so it is returned in version 13.0 and later.
`NOT`	`not` ***`fieldExpressionX`***	`true` if *`fieldExpressionX`* is false. There is also a comparison operator `NOT IN`, which is different from this logical operator.

Date Formats and Date Literals

In a SOQL query you can specify either a particular date or a date literal. A date literal is a fixed expression that represents a relative range of time, such as last month, this week, or next year.

dateTime field values are stored as Coordinated Universal Time (UTC). When a dateTime value is returned in Salesforce, it's adjusted for the time zone specified in your org preferences. SOQL queries, however, return dateTime field values as UTC values. If you want to process these values in different time zones, your application might need to handle the conversion.

Date Formats

A *`fieldExpression`* uses different date formats for date and dateTime fields. If you specify a dateTime format in a query, you can filter only on dateTime fields. Similarly, if you specify a date format value, you can filter only on date fields.:

Format	Format Syntax	Example
Date only	`YYYY-MM-DD`	`1999-01-01`
Date, time, and time zone offset	• `YYYY-MM-DDThh:mm:ss+hh:mm` • `YYYY-MM-DDThh:mm:ss-hh:mm` • `YYYY-MM-DDThh:mm:ssZ`	• `1999-01-01T23:01:01+01:00` • `1999-01-01T23:01:01-08:00` • `1999-01-01T23:01:01Z`

The zone offset is always from UTC. For more information, see:

- `http://www.w3.org/TR/xmlschema-2/#isoformats`
- `http://www.w3.org/TR/NOTE-datetime`

Note: For a *`fieldExpression`* that uses date formats, the date is not enclosed in single quotes. Don't use quotes around the date. For example:

```
SELECT Id
FROM Account
WHERE CreatedDate > 2005-10-08T01:02:03Z
```

Note: The `SELECT` clause supports formatting of standard and custom number, date, time, and currency fields. These fields reflect the appropriate format for the given user locale. The field format matches what appears in the Salesforce Classic user interface.

Date Literals

A *`fieldExpression`* can use a date literal to compare a range of values to the value in a `date` or `dateTime` field. Each literal is a range of time beginning with midnight (00:00:00). To find a value within the range, use `=`. To find values on either side of the range, use `>` or `<`. The following table shows the available list of date literals, the ranges they represent, and examples.

Date Literal	Range	Example
`YESTERDAY`	Starts 00:00:00 the day before and continues for 24 hours.	`SELECT Id FROM Account WHERE CreatedDate = YESTERDAY`
`TODAY`	Starts 00:00:00 of the current day and continues for 24 hours.	`SELECT Id FROM Account WHERE CreatedDate > TODAY`
`TOMORROW`	Starts 00:00:00 after the current day and continues for 24 hours.	`SELECT Id FROM Opportunity WHERE CloseDate = TOMORROW`
`LAST_WEEK`	Starts 00:00:00 on the first day of the week before the most recent first day of the week and continues for seven full days. Your locale determines the first day of the week.	`SELECT Id FROM Account WHERE CreatedDate > LAST_WEEK`
`THIS_WEEK`	Starts 00:00:00 on the most recent first day of the week before the current day and continues for seven full days. Your locale determines the first day of the week.	`SELECT Id FROM Account WHERE CreatedDate < THIS_WEEK`
`NEXT_WEEK`	Starts 00:00:00 on the most recent first day of the week after the current day and continues for seven full days. Your locale determines the first day of the week.	`SELECT Id FROM Opportunity WHERE CloseDate = NEXT_WEEK`
`LAST_MONTH`	Starts 00:00:00 on the first day of the month before the current day and continues for all the days of that month.	`SELECT Id FROM Opportunity WHERE CloseDate > LAST_MONTH`
`THIS_MONTH`	Starts 00:00:00 on the first day of the month that the current day is in and continues for all the days of that month.	`SELECT Id FROM Account WHERE CreatedDate < THIS_MONTH`
`NEXT_MONTH`	Starts 00:00:00 on the first day of the month after the month that the current day is in and continues for all the days of that month.	`SELECT Id FROM Opportunity WHERE CloseDate = NEXT_MONTH`
`LAST_90_DAYS`	Starts 00:00:00 of the current day and continues for the past 90 days.	`SELECT Id FROM Account WHERE CreatedDate = LAST_90_DAYS`
`NEXT_90_DAYS`	Starts 00:00:00 of the current day and continues for the next 90 days.	`SELECT Id FROM Opportunity WHERE CloseDate > NEXT_90_DAYS`

Date Literal	Range	Example
`LAST_N_DAYS:n`	For the number *n* provided, starts 00:00:00 of the current day and continues for the past *n* days.	`SELECT Id FROM Account WHERE CreatedDate = LAST_N_DAYS:365`
`NEXT_N_DAYS:n`	For the number *n* provided, starts 00:00:00 of the current day and continues for the next *n* days.	`SELECT Id FROM Opportunity WHERE CloseDate > NEXT_N_DAYS:15`
`NEXT_N_WEEKS:n`	For the number *n* provided, starts 00:00:00 of the first day of the next week and continues for the next *n* weeks.	`SELECT Id FROM Opportunity WHERE CloseDate > NEXT_N_WEEKS:4`
`LAST_N_WEEKS:n`	For the number *n* provided, starts 00:00:00 of the last day of the previous week and continues for the past *n* weeks.	`SELECT Id FROM Account WHERE CreatedDate = LAST_N_WEEKS:52`
`NEXT_N_MONTHS:n`	For the number *n* provided, starts 00:00:00 of the first day of the next month and continues for the next *n* months.	`SELECT Id FROM Opportunity WHERE CloseDate > NEXT_N_MONTHS:2`
`LAST_N_MONTHS:n`	For the number *n* provided, starts 00:00:00 of the last day of the previous month and continues for the past *n* months.	`SELECT Id FROM Account WHERE CreatedDate = LAST_N_MONTHS:12`
`THIS_QUARTER`	Starts 00:00:00 of the current quarter and continues to the end of the current quarter.	`SELECT Id FROM Account WHERE CreatedDate = THIS_QUARTER`
`LAST_QUARTER`	Starts 00:00:00 of the previous quarter and continues to the end of that quarter.	`SELECT Id FROM Account WHERE CreatedDate > LAST_QUARTER`
`NEXT_QUARTER`	Starts 00:00:00 of the next quarter and continues to the end of that quarter.	`SELECT Id FROM Account WHERE CreatedDate < NEXT_QUARTER`
`NEXT_N_QUARTERS:n`	Starts 00:00:00 of the next quarter and continues to the end of the *n*th quarter.	`SELECT Id FROM Account WHERE CreatedDate < NEXT_N_QUARTERS:2`
`LAST_N_QUARTERS:n`	Starts 00:00:00 of the previous quarter and continues to the end of the previous *n*th quarter.	`SELECT Id FROM Account WHERE CreatedDate > LAST_N_QUARTERS:2`
`THIS_YEAR`	Starts 00:00:00 on January 1 of the current year and continues through the end of December 31 of the current year.	`SELECT Id FROM Opportunity WHERE CloseDate = THIS_YEAR`
`LAST_YEAR`	Starts 00:00:00 on January 1 of the previous year and continues through the end of December 31 of that year.	`SELECT Id FROM Opportunity WHERE CloseDate > LAST_YEAR`
`NEXT_YEAR`	Starts 00:00:00 on January 1 of the following year and continues through the end of December 31 of that year.	`SELECT Id FROM Opportunity WHERE CloseDate < NEXT_YEAR`
`NEXT_N_YEARS:n`	Starts 00:00:00 on January 1 of the following year and continues through the end of December 31 of the *n*th year.	`SELECT Id FROM Opportunity WHERE CloseDate < NEXT_N_YEARS:5`

Date Literal	Range	Example
`LAST_N_YEARS:n`	Starts 00:00:00 on January 1 of the previous year and continues through the end of December 31 of the previous *n*th year.	`SELECT Id FROM Opportunity WHERE CloseDate > LAST_N_YEARS:5`
`THIS_FISCAL_QUARTER`	Starts 00:00:00 on the first day of the current fiscal quarter and continues through the end of the last day of the fiscal quarter. The fiscal year is defined on the Fiscal Year page in Setup.	`SELECT Id FROM Account WHERE CreatedDate = THIS_FISCAL_QUARTER`
`LAST_FISCAL_QUARTER`	Starts 00:00:00 on the first day of the last fiscal quarter and continues through the end of the last day of that fiscal quarter. The fiscal year is defined on the Fiscal Year page in Setup.	`SELECT Id FROM Account WHERE CreatedDate > LAST_FISCAL_QUARTER`
`NEXT_FISCAL_QUARTER`	Starts 00:00:00 on the first day of the next fiscal quarter and continues through the end of the last day of that fiscal quarter. The fiscal year is defined on the Fiscal Year page in Setup.	`SELECT Id FROM Account WHERE CreatedDate < NEXT_FISCAL_QUARTER`
`NEXT_N_FISCAL_QUARTERS:n`	Starts 00:00:00 on the first day of the next fiscal quarter and continues through the end of the last day of the *n*th fiscal quarter. The fiscal year is defined on the Fiscal Year page in Setup.	`SELECT Id FROM Account WHERE CreatedDate < NEXT_N_FISCAL_QUARTERS:6`
`LAST_N_FISCAL_QUARTERS:n`	Starts 00:00:00 on the first day of the last fiscal quarter and continues through the end of the last day of the previous *n*th fiscal quarter. The fiscal year is defined on the Fiscal Year page in Setup.	`SELECT Id FROM Account WHERE CreatedDate > LAST_N_FISCAL_QUARTERS:6`
`THIS_FISCAL_YEAR`	Starts 00:00:00 on the first day of the current fiscal year and continues through the end of the last day of the fiscal year. The fiscal year is defined on the Fiscal Year page in Setup.	`SELECT Id FROM Opportunity WHERE CloseDate = THIS_FISCAL_YEAR`
`LAST_FISCAL_YEAR`	Starts 00:00:00 on the first day of the last fiscal year and continues through the end of the last day of that fiscal year. The fiscal year is defined on the Fiscal Year page in Setup.	`SELECT Id FROM Opportunity WHERE CloseDate > LAST_FISCAL_YEAR`
`NEXT_FISCAL_YEAR`	Starts 00:00:00 on the first day of the next fiscal year and continues through the end of the last day of that fiscal year. The fiscal year is defined on the Fiscal Year page in Setup.	`SELECT Id FROM Opportunity WHERE CloseDate < NEXT_FISCAL_YEAR`
`NEXT_N_FISCAL_YEARS:n`	Starts 00:00:00 on the first day of the next fiscal year and continues through the end of the last day of the *n*th fiscal year. The fiscal year is defined on the Fiscal Year page in Setup.	`SELECT Id FROM Opportunity WHERE CloseDate < NEXT_N_FISCAL_YEARS:3`

Date Literal	Range	Example
`LAST_N_FISCAL_YEARS:n`	Starts 00:00:00 on the first day of the last fiscal year and continues through the end of the last day of the previous *n*th fiscal year. The fiscal year is defined on the Fiscal Year page in Setup.	`SELECT Id FROM Opportunity WHERE CloseDate > LAST_N_FISCAL_YEARS:3`

Note: If you've defined custom fiscal years in the Salesforce user interface and in any `FISCAL` date literals that you specify a range that is outside the years you've defined, an invalid date error is returned.

Minimum and Maximum Dates

Only dates within a certain range are valid. The earliest valid date is 1700-01-01T00:00:00Z GMT, or just after midnight on January 1, 1700. The latest valid date is 4000-12-31T00:00:00Z GMT, or just after midnight on December 31, 4000. These values are offset by your time zone. For example, in the Pacific time zone, the earliest valid date is 1699-12-31T16:00:00, or 4:00 PM on December 31, 1699.

USING SCOPE

The optional `USING SCOPE` clause of a SOQL query returns records within a specified scope. For example, you can limit the records to return only objects that the user owns or only records in the user's territory.

With API version 32.0 and later, you can use `USING SCOPE` to limit the results of a query to a specified `filterScope`. The syntax is:

```
[USING SCOPE filterScope]
```

ORDER BY

Use the optional `ORDER BY` in a `SELECT` statement of a SOQL query to control the order of the query results, such as alphabetically beginning with z. If records are null, you can use `ORDER BY` to display the empty records first or last.

You can use `ORDER BY` in a `SELECT` statement to control the order of the query results. There is no guarantee of the order of results unless you use an `ORDER BY` clause in a query. The syntax is:

```
[ORDER BY fieldOrderByList {ASC|DESC} [NULLS {FIRST|LAST}] ]
```

Syntax	Description
`ASC` or `DESC`	Specifies whether the results are ordered in ascending (`ASC`) or descending (`DESC`) order. Default order is ascending.
`NULLS FIRST` or `NULLS LAST`	Orders null records at the beginning (`NULLS FIRST`) or end (`NULLS LAST`) of the results. By default, null values are sorted first.

For example, the following query returns a query result with Account records in alphabetical order by first name, sorted in descending order, with accounts that have null names appearing last:

```
SELECT Name
FROM Account
ORDER BY Name DESC NULLS LAST
```

The following factors affect results returned with `ORDER BY`:

- Sorting is case insensitive.
- `ORDER BY` is compatible with relationship query syntax.
- Multiple column sorting is supported, by listing more than one *`fieldExpression`* clause.
- Relationship queries with foreign key values in an `ORDER BY` clause behave differently depending on the version of the Force.com API. In an `ORDER BY` clause, if the foreign key value in a record is null, the record is returned in version 13.0 and later, but not returned in versions before 13.0.

  ```
  SELECT Id, CaseNumber, Account.Id, Account.Name
  FROM Case
  ORDER BY Account.Name
  ```

  Any case record for which `AccountId` is empty is returned in version 13.0 and later.
- Sort order is determined by current user locale. For English locales, Salesforce uses a sorting mechanism based on the UTF-8 values of the character data. For Asian locales, Salesforce uses a linguistic sorting mechanism based on the ISO 14651 and Unicode 3.2 standards.

The following limitations apply to data types when using `ORDER BY`:

- These data types are not supported: multi-select picklist, rich text area, long text area, encrypted (if enabled), and data category group reference (if Salesforce Knowledge is enabled).
- All other data types are supported, with the following caveats:
  - Corporate currency always sorts using corporate currency value, if available.
  - `phone` data does not include any special formatting when sorting, for example, non-numeric characters such as dash or parentheses are included in the sorting.
  - `picklist` sorting is defined by the picklist sort determined during setup.

External objects have the following limitations for the `ORDER BY` clause.

- The following limits apply only to the OData 2.0 and 4.0 adapters for Salesforce Connect.
  - `NULLS FIRST` and `NULLS LAST` are ignored.
  - External objects don't support the `ORDER BY` clause in relationship queries.
- The following limits apply only to custom adapters for Salesforce Connect.
  - `NULLS FIRST` and `NULLS LAST` are ignored.

You can use `ORDER BY` with the optional LIMIT qualifier, in a `SELECT` statement:

```
SELECT Name
FROM Account
WHERE industry = 'media'
ORDER BY BillingPostalCode ASC NULLS LAST LIMIT 125
```

LIMIT

`LIMIT` is an optional clause that can be added to a `SELECT` statement of a SOQL query to specify the maximum number of rows to return.

The syntax for `LIMIT` is:

```
SELECT fieldList
FROM objectType
[WHERE conditionExpression]
  [LIMIT numberOfRows]
```

For example:

```
SELECT Name
FROM Account
WHERE Industry = 'Media' LIMIT 125
```

This query returns the first 125 Account records whose Industry is `Media`.

You can use `LIMIT` with `count()` as the *`fieldList`* to count up to the maximum specified.

You can't use a `LIMIT` clause in a query that uses an aggregate function, but does not use a `GROUP BY` clause. For example, the following query is invalid:

```
SELECT MAX(CreatedDate)
FROM Account LIMIT 1
```

OFFSET

When expecting many records in a query's results, you can display the results in multiple pages by using the `OFFSET` clause on a SOQL query. For example, you can use `OFFSET` to display records 51 to 75 and then jump to displaying records 301 to 350. Using `OFFSET` is an efficient way to handle large results sets.

Use `OFFSET` to specify the starting row offset into the result set returned by your query. Because the offset calculation is done on the server and only the result subset is returned, using `OFFSET` is more efficient than retrieving the full result set and then filtering the results locally. `OFFSET` is available in API version 24.0 and later.

```
SELECT fieldList
FROM objectType
[WHERE conditionExpression]
ORDER BY fieldOrderByList
LIMIT numberOfRowsToReturn
OFFSET numberOfRowsToSkip
```

As an example, if a SOQL query normally returned 50 rows, you could use `OFFSET 10` in your query to skip the first 10 rows:

```
SELECT Name
FROM Merchandise__c
WHERE Price__c > 5.0
ORDER BY Name
LIMIT 100
OFFSET 10
```

The result set for the preceding example would be a subset of the full result set, returning rows 11 through 50 of the full set.

Considerations When Using OFFSET

Here are a few points to consider when using OFFSET in your queries:

- The maximum offset is 2,000 rows. Requesting an offset greater than 2,000 will result in a NUMBER_OUTSIDE_VALID_RANGE error.
- OFFSET is intended to be used in a top-level query, and is not allowed in most sub-queries, so the following query is invalid and will return a MALFORMED_QUERY error:

```
SELECT Name, Id
FROM Merchandise__c
WHERE Id IN
   (
     SELECT Id
     FROM Discontinued_Merchandise__c
     LIMIT 100
     OFFSET 20
   )
ORDER BY Name
```

  A sub-query can use OFFSET only if the parent query has a LIMIT 1 clause. The following query is a valid use of OFFSET in a sub-query:

```
SELECT Name, Id
    (
        SELECT Name FROM Opportunity LIMIT 10 OFFSET 2
    )
FROM Account
ORDER BY Name
LIMIT 1
```

  OFFSET cannot be used as a sub-query in the WHERE clause, even if the parent query uses LIMIT 1.

  Note: Using OFFSET in sub-queries is a pilot feature that is subject to change in future releases, and is not intended for use in a production setting. There is no support associated with this pilot feature. For more information, contact Salesforce

- We recommend using an ORDER BY clause when you use OFFSET to ensure that the result set ordering is consistent. The row order of a result set that does not have an ORDER BY clause will have a stable ordering, however the ordering key is subject to change and should not be relied on.
- Similarly, we recommend using a LIMIT clause in combination with OFFSET if you need to retrieve subsequent subsets of the same result set. For example, you could retrieve the first 100 rows of a query using the following:

```
SELECT Name, Id
FROM Merchandise__c
ORDER BY Name
LIMIT 100
OFFSET 0
```

  You could then retrieve the next 100 rows, 101 through 201, using the following query:

```
SELECT Name, Id
FROM Merchandise__c
ORDER BY Name
LIMIT 100
OFFSET 100
```

- `OFFSET` is applied to the result set returned at the time of the query. No server-side cursor is created to cache the full result set for future `OFFSET` queries. The page results may change if the underlying data is modified during multiple queries using `OFFSET` into the same result set. As an example, suppose the following query normally returns a full result set of 50 rows, and the first 10 rows are skipped using an `OFFSET` clause:

  ```
  SELECT Name
  FROM Merchandise__c
  ORDER BY Name
  OFFSET 10
  ```

  After the query is run, 10 new rows are then inserted into Merchandise__c with Name values that come early in the sort order. If the query is run again, with the same `OFFSET` value, a different set of rows is skipped. If you need to query multiple pages of records with a consistent server-side cursor, use the `queryMore()` in SOAP API.
- Offsets are not intended to be used as a replacement for using `queryMore()`, given the maximum offset size and lack of a server-side cursor. Multiple queries with offsets into a large result set will have a higher performance impact than using `queryMore()` against a server-side cursor.
- When using `OFFSET`, only the first batch of records will be returned for a given query. If you want to retrieve the next batch you'll need to re-execute the query with a higher offset value.
- The `OFFSET` clause is allowed in SOQL used in SOAP API, REST API, and Apex. It's not allowed in SOQL used within Bulk API or Streaming API.

Update an Article's Keyword Tracking with SOQL

Track keywords that are used in Salesforce Knowledge article searches with the UPDATE TRACKING optional clause on a SOQL query. `UPDATE TRACKING` is an optional clause that can be added to a `SELECT` statement of a SOQL query to report on article searches and views. Developers can use `UPDATE TRACKING` to track the keywords that are used in Salesforce Knowledge article searches.

Example: You can use this syntax to track a keyword that are used in Salesforce Knowledge article search:

```
SELECT Title FROM FAQ__kav
WHERE Keyword='Apex' and
Language = 'en_US' and
KnowledgeArticleVersion = 'ka230000000PCiy'
UPDATE TRACKING
```

Update an Article Viewstat with SOQL

Determine how many hits a Salesforce Knowledge article has had by using the `UPDATE VIEWSTAT` optional clause on a SOQL query. You can get a view count for every article that you have access to online.

The `UPDATE VIEWSTAT` clause is used in a `SELECT` statement to report on Salesforce Knowledge article searches and views. It allows developers to update an article's view statistics.

You can use this syntax to increase the view count for every article you have access to online:

```
SELECT Title FROM FAQ__kav
   WHERE PublishStatus='online' and
   Language = 'en_US' and
   KnowledgeArticleVersion = 'ka230000000PCiy'
   UPDATE VIEWSTAT
```

WITH *filteringExpression*

You can filter records based on field values, for example, to filter according to category or to query and retrieve changes that are tracked in a user's profile feed by using `WITH`*`filteringExpression`*. This optional clause can be added to a `SELECT` statement of a SOQL query.

Unlike the `WHERE` clause which only supports fields from the object specified in the `FROM` clause, `WITH` allows you to filter by other related criteria. For example, you can use the `WITH` clause to filter articles based on their classification in one or more data category groups. The `WITH` clause can only be used in the following cases:

- To filter records based on their categorization. See `WITH DATA CATEGORY` *`filteringExpression`*.
- To query and retrieve record changes tracked in a user profile feed. See UserProfileFeed in the Object Reference for Salesforce and Force.com.

If `WITH` is specified, the query returns only records that match the filter and are visible to the user. If unspecified, the query returns only the matching records that are visible to the user.

The filtering expression in the statements below is highlighted in bold. The syntax is explained in the following sections.

- `SELECT Title FROM KnowledgeArticleVersion WHERE PublishStatus='online'` **`WITH DATA CATEGORY Geography__c ABOVE usa__c`**
- `SELECT Id FROM UserProfileFeed` **`WITH UserId='005D0000001AamR'`** `ORDER BY CreatedDate DESC, Id DESC LIMIT 20`

WITH DATA CATEGORY *filteringExpression*

You can search for Salesforce Knowledge articles and questions by their data category in a SOQL query. `WITH DATA CATEGORY` is an optional clause in a `SELECT` statement that's used to filter records that are associated with one or more data categories and are visible to users.

If `WITH DATA CATEGORY` is specified, the `query()` returns only matching records that are associated with the specified data categories and are visible to the user. If unspecified, the `query()` only returns the matching records that are visible to the user.

Important: CategoryData is an object and DATA CATEGORY is syntax in a SOQL `WITH` clause. `WITH DATA CATEGORY` is valid syntax, but `WITH CategoryData` is not supported.

A SOQL statement using a `WITH DATA CATEGORY` clause must also include a `FROM` ***`ObjectTypeName`*** clause where *`ObjectTypeName`* equals:

- KnowledgeArticleVersion to query all article types
- an article type `API Name` to query a specific article type
- `Question` to query questions

When *`ObjectTypeName`* equals to KnowledgeArticleVersion or any article type `API Name` in the `FROM` clause, a `WHERE` clause must be specified with one of the following parameters:

- `PublishStatus` to query articles depending on their status in the publishing cycle:
  - `WHERE PublishStatus='online'` for published articles
  - `WHERE PublishStatus='archived'` for archived articles
  - `WHERE PublishStatus='draft'` for draft articles
- `Id` to query an article based on its id

For information on article types or questions, see "Knowledge Article Types" and "Finding and Viewing Questions" in the Salesforce Help.

Note: The `WITH DATA CATEGORY` clause does not support bind variables.

filteringExpression

The *filteringExpression* in the `WITH DATA CATEGORY` clause uses the following syntax:

```
dataCategorySelection [AND [dataCategorySelection2][...]
```

The examples in this section are based on the following data category group:

```
Geography__c
    ww__c
        northAmerica__c
            usa__c
            canada__c
            mexico__c
        europe__c
            france__c
            uk__c
        asia__c
```

The category filtering in the statements below is highlighted in bold. The syntax is explained in the following sections.

- `SELECT Title FROM KnowledgeArticleVersion WHERE PublishStatus='online'` **`WITH DATA CATEGORY Geography__c ABOVE usa__c`**
- `SELECT Title FROM Question WHERE LastReplyDate > 2005-10-08T01:02:03Z` **`WITH DATA CATEGORY Geography__c AT (usa__c, uk__c)`**
- `SELECT UrlName FROM KnowledgeArticleVersion WHERE PublishStatus='draft'` **`WITH DATA CATEGORY Geography__c AT usa__c AND Product__c ABOVE_OR_BELOW mobile_phones__c`**

You can only use the `AND` logical operator. The following syntax is incorrect as `OR` is not supported:

```
WITH DATA CATEGORY Geography__c ABOVE usa__c OR Product__c AT mobile_phones__c
```

dataCategorySelection

The syntax of the data category selection in a `WITH DATA CATEGORY` clause in a SOQL query includes a category group name to use as a filter, the filter selector, and the name of the category to use for filtering.

The *dataCategorySelection* uses the following syntax:

```
dataCategoryGroupName filteringSelector dataCategoryName
```

Syntax	Description
dataCategoryGroupName	The name of the data category group to use as a filter. `Geography__c` is the data category group in the following example. You cannot use the same data category group more than once in a query. As an example, the following command is incorrect: `WITH DATA CATEGORY Geography__c ABOVE usa__c AND Geography__c BELOW europe__c`
filteringSelector	The selector used to filter the data in the specified data category. See Filtering Selectors for a list of valid selectors.

Syntax	Description
dataCategoryName	The name of the data category for filtering. You must have visibility on the category you specify. For more information on category visibility, see "Data Category Visibility" in the Salesforce Help. You can use parentheses to apply the filtering operator to more than one data category. Each data category must be separated by a comma. Example: `WITH DATA CATEGORY Geography__c AT (usa__c,france__c,uk__c)` You can't use the `AND` operator instead of parentheses to list multiple data categories. The following syntax does not work `WITH DATA CATEGORY Geography__c AT usa__c AND france__c`

Filtering Selectors

When specifying filters for a `WITH CATEGORY` clause of a SOQL query, you can use AT to select the specified category, ABOVE to select the category and all its parent categories, BELOW to select the category and all its subcategories, and ABOVE_OR_BELOW to select the category, its parent categories, and its subcategories.

The following table lists the *filteringSelector* values that are used in the *dataCategorySelection* syntax.

The examples in this section are based on the following data category group:

```
Geography__c
    ww__c
        northAmerica__c
            usa__c
            canada__c
            mexico__c
        europe__c
            france__c
            uk__c
        asia__c
```

Selector	Description
`AT`	Select the specified data category. For example, the following syntax selects `asia__c`. `WITH DATA CATEGORY Geography__c AT asia__c`
`ABOVE`	Select the specified data category and all its parent categories. For example, the following syntax selects `usa__c`, `northAmerica__c`, and `ww__c`. `WITH DATA CATEGORY Geography__c ABOVE usa__c`
`BELOW`	Select the specified data category and all its subcategories. For example the following selects `northAmerica__c`, `usa__c`, `canada__c`, and `mexico__c`. `WITH DATA CATEGORY Geography__c BELOW northAmerica__c`

Selector	Description
`ABOVE_OR_BELOW`	Select the specified data category and: • all its parent categories • all its subcategories For example the following selects `ww__c`, `europe__c`, `france__c` and `uk__c`. `WITH DATA CATEGORY Geography__c ABOVE_OR_BELOW europe__c`

Note: For more information on data category groups, data categories, parent and subcategories, see "Data Categories in Salesforce.com" in the Salesforce Help.

Example `WITH DATA CATEGORY` Clauses

Here are examples of `WITH DATA CATEGORY` clauses in a `SELECT` statement in a SOQL query.

Type of Search	Example(s)
Select the title from all questions classified with the `mobile_phones__c` data category in the `Product__c` data category group	`SELECT Title FROM Question WHERE LastReplyDate < 2005-10-08T01:02:03Z WITH DATA CATEGORY Product__c AT mobile_phones__c`
Select the title and summary from all published Knowledge articles classified: • above or below `europe__c` in the `Geography__c` data category group • below `allProducts__c` in the `Product__c` data category group	`SELECT Title, Summary FROM KnowledgeArticleVersion WHERE PublishStatus='Online' AND Language = 'en_US' WITH DATA CATEGORY Geography__c ABOVE_OR_BELOW europe__c AND Product__c BELOW All__c`
Select the ID and title from draft articles of type "Offer__kav" classified : • with the `france__c` or `usa__c` data category in the `Geography__c` data category group • above the `dsl__c` data category in the `Product__` data category group	`SELECT Id, Title FROM Offer__kav WHERE PublishStatus='Draft' AND Language = 'en_US' WITH DATA CATEGORY Geography__c AT (france__c,usa__c) AND Product__c ABOVE dsl__c`

GROUP BY

You can use the `GROUP BY` option in a SOQL query to avoid iterating through individual query results. That is, you specify a group of records instead of processing many individual records.

With API version 18.0 and later, you can use `GROUP BY` with aggregate functions, such as `SUM()` or `MAX()`, to summarize the data and enable you to roll up query results rather than having to process the individual records in your code. The syntax is:

```
[GROUP BY fieldGroupByList]
```

`fieldGroupByList` specifies a list of one or more fields, separated by commas, that you want to group by. If the list of fields in a `SELECT` clause includes an aggregate function, you must include all non-aggregated fields in the `GROUP BY` clause.

For example, to determine how many leads are associated with each `LeadSource` value without using `GROUP BY`, you could run the following query:

```
SELECT LeadSource FROM Lead
```

You would then write some code to iterate through the query results and increment counters for each `LeadSource` value. You can use `GROUP BY` to get the same results without the need to write any extra code. For example:

```
SELECT LeadSource, COUNT(Name)
FROM Lead
GROUP BY LeadSource
```

For a list of aggregate functions supported by SOQL, see Aggregate Functions.

You can use a `GROUP BY` clause without an aggregated function to query all the distinct values, including `null`, for an object. The following query returns the distinct set of values stored in the `LeadSource` field.

```
SELECT LeadSource
FROM Lead
GROUP BY LeadSource
```

Note that the `COUNT_DISTINCT()` function returns the number of distinct non-`null` field values matching the query criteria.

Considerations When Using `GROUP BY`

When you're creating SOQL queries with the `GROUP BY` clause, there are some considerations to keep in mind.

- Some object fields have a field type that does not support grouping. You can't include fields with these field types in a `GROUP BY` clause. The Field object associated with DescribeSObjectResult has a `groupable` field that defines whether you can include the field in a `GROUP BY` clause.
- You must use a `GROUP BY` clause if your query uses a `LIMIT` clause and an aggregated function. For example, the following query is valid:

  ```
  SELECT Name, Max(CreatedDate)
  FROM Account
  GROUP BY Name
  LIMIT 5
  ```

  The following query is invalid as there is no `GROUP BY` clause:

  ```
  SELECT MAX(CreatedDate)
  FROM Account LIMIT 1
  ```

- You can't use child relationship expressions that use the `__r` syntax in a query that uses a `GROUP BY` clause. For more information, see Understanding Relationship Names, Custom Objects, and Custom Fields on page 57.

`GROUP BY` and `queryMore()`

For queries that don't include a `GROUP BY` clause, the query result object contains up to 500 rows of data by default. If the query results exceed 500 rows, then your client application can use the `queryMore()` call and a server-side cursor to retrieve additional rows in 500-row chunks.

However, if a query includes a `GROUP BY` clause, you can't use `queryMore()`. You can increase the default size up to 2,000 in the QueryOptions header. If your query results exceed 2,000 rows, you must change the filtering conditions to query data in smaller chunks. There is no guarantee that the requested batch size will be the actual batch size. This is done to maximize performance. See Change the Batch Size in Queries for more details.

`GROUP BY` and Subtotals

If you want a query to do the work of calculating subtotals so that you don't have to maintain that logic in your code, see GROUP BY ROLLUP. If you want to calculate subtotals for every possible combination of grouped field (to generate a cross-tabular report, for example), see GROUP BY CUBE instead.

Using Aliases with `GROUP BY`

You can use an alias for any field or aggregated field in a `SELECT` statement in a SOQL query. Use a field alias to identify the field when you're processing the query results in your code.

Specify the alias directly after the associated field. For example, the following query contains two aliases: `n` for the `Name` field, and `max` for the `MAX(Amount)` aggregated field.

```
SELECT Name n, MAX(Amount) max
FROM Opportunity
GROUP BY Name
```

Any aggregated field in a `SELECT` list that does not have an alias automatically gets an implied alias with a format `expr`***i***, where *i* denotes the order of the aggregated fields with no explicit aliases. The value of *i* starts at 0 and increments for every aggregated field with no explicit alias.

In the following example, `MAX(Amount)` has an implied alias of `expr0`, and `MIN(Amount)` has an implied alias of `expr1`.

```
SELECT Name, MAX(Amount), MIN(Amount)
FROM Opportunity
GROUP BY Name
```

In the next query, `MIN(Amount)` has an explicit alias of `min`. `MAX(Amount)` has an implied alias of `expr0`, and `SUM(Amount)` has an implied alias of `expr1`.

```
SELECT Name, MAX(Amount), MIN(Amount) min, SUM(Amount)
FROM Opportunity
GROUP BY Name
```

GROUP BY ROLLUP

Use the `GROUP BY ROLLUP` optional clause in a SOQL query to add subtotals for aggregated data in query results. This action enables the query to calculate subtotals so that you don't have to maintain that logic in your code.

With API version 18.0 and later, you can use `GROUP BY ROLLUP` with aggregate functions, such as `SUM()` and `COUNT(`***fieldName***`)`. The syntax is:

```
[GROUP BY ROLLUP (fieldName[,...])]
```

A query with a `GROUP BY ROLLUP` clause returns the same aggregated data as an equivalent query with a `GROUP BY` clause. It also returns multiple levels of subtotal rows. You can include up to three fields in a comma-separated list in a `GROUP BY ROLLUP` clause.

The `GROUP BY ROLLUP` clause adds subtotals at different levels, aggregating from right to left through the list of grouping columns. The order of rollup fields is important. A query that includes three rollup fields returns the following rows for totals:

- First-level subtotals for each combination of *`fieldName1`* and *`fieldName2`*. Results are grouped by *`fieldName3`*.
- Second-level subtotals for each value of *`fieldName1`*. Results are grouped by *`fieldName2`* and *`fieldName3`*.
- One grand total row

Note:

- You can't combine `GROUP BY` and `GROUP BY ROLLUP` syntax in the same statement. For example, `GROUP BY ROLLUP(field1), field2` is not valid as all grouped fields must be within the parentheses.
- If you want to compile a cross-tabular report including subtotals for every possible combination of fields in a `GROUP BY` clause, use GROUP BY CUBE instead.

Grouping By One Rollup Field

This simple example rolls the results up by one field:

```
SELECT LeadSource, COUNT(Name) cnt
FROM Lead
GROUP BY ROLLUP(LeadSource)
```

The following table shows the query results. Note that the aggregated results include an extra row with a `null` value for `LeadSource` that gives a grand total for all the groupings. Since there is only one rollup field, there are no other subtotals.

LeadSource	cnt
Web	7
Phone Inquiry	4
Partner Referral	4
Purchased List	7
null	22

Grouping By Two Rollup Fields

This example rolls the results up by two fields:

```
SELECT Status, LeadSource, COUNT(Name) cnt
FROM Lead
GROUP BY ROLLUP(Status, LeadSource)
```

The following table shows the query results. Note the first-level subtotals and grand total rows. The **Comment** column explains each row.

Status	LeadSource	cnt	Comment
Open - Not Contacted	Web	1	One lead with Status = Open - Not Contacted and LeadSource = Web
Open - Not Contacted	Phone Inquiry	1	One lead with Status = Open - Not Contacted and LeadSource = Phone Inquiry
Open - Not Contacted	Purchased List	1	One lead with Status = Open - Not Contacted and LeadSource = Purchased List
Open - Not Contacted	null	3	First-level subtotal for all leads with Status = Open - Not Contacted
Working - Contacted	Web	4	Four leads with Status = Working - Contacted and LeadSource = Web
Working - Contacted	Phone Inquiry	1	One lead with Status = Working - Contacted and LeadSource = Phone Inquiry
Working - Contacted	Partner Referral	3	Three leads with Status = Working - Contacted and LeadSource = Partner Referral
Working - Contacted	Purchased List	4	Four leads with Status = Working - Contacted and LeadSource = Purchased List
Working - Contacted	null	12	First-level subtotal for all leads with Status = Working - Contacted
Closed - Converted	Web	1	One lead with Status = Closed - Converted and LeadSource = Web
Closed - Converted	Phone Inquiry	1	One lead with Status = Closed - Converted and LeadSource = Phone Inquiry
Closed - Converted	Purchased List	1	One lead with Status = Closed - Converted and LeadSource = Purchased List
Closed - Converted	null	3	First-level subtotal for all leads with Status = Closed - Converted
Closed - Not Converted	Web	1	One lead with Status = Closed - Not Converted and LeadSource = Web
Closed - Not Converted	Phone Inquiry	1	One lead with Status = Closed - Not Converted and LeadSource = Phone Inquiry
Closed - Not Converted	Partner Referral	1	One lead with Status = Closed - Not Converted and LeadSource = Partner Referral
Closed - Not Converted	Purchased List	1	One lead with Status = Closed - Not Converted and LeadSource = Purchased List
Closed - Not Converted	null	4	First-level subtotal for all leads with Status = Closed - Not Converted
null	null	22	Grand total of 22 leads

These examples use the `COUNT(fieldName)` aggregate function, but the syntax works with any aggregate function. You can also group by three rollup fields, which returns even more subtotal rows.

Using `GROUPING(fieldName)` to Identify Subtotals

You can use the `GROUPING(fieldName)` function to determine whether a row is a subtotal or field when you use `GROUP BY ROLLUP` or `GROUP BY CUBE` in SOQL queries.

The GROUP BY ROLLUP or GROUP BY CUBE clause adds the subtotals, and then the `GROUPING(fieldName)` function identifies whether the row is a subtotal for a field.

If you are iterating through the query result to create a report or chart of the data, you have to distinguish between aggregated data and subtotal rows. You can use `GROUPING(fieldName)` to do this. Using `GROUPING(fieldName)` is more important for interpreting your results when you have more than one field in your `GROUP BY ROLLUP` or `GROUP BY CUBE` clause. It is the best way to differentiate between aggregated data and subtotals.

`GROUPING(fieldName)` returns `1` if the row is a subtotal for the field, and `0` otherwise. You can use `GROUPING(fieldName)` in `SELECT`, `HAVING`, and `ORDER BY` clauses.

The easiest way to understand more is to look at a query and its results.

```
SELECT LeadSource, Rating,
    GROUPING(LeadSource) grpLS, GROUPING(Rating) grpRating,
    COUNT(Name) cnt
FROM Lead
GROUP BY ROLLUP(LeadSource, Rating)
```

The query returns subtotals for combinations of the `LeadSource` and `Rating` fields. `GROUPING(LeadSource)` indicates if the row is an aggregated row for the `LeadSource` field, and `GROUPING(Rating)` does the same for the `Rating` field.

The following table shows the query results. The **Comment** column explains each row.

LeadSource	Rating	grpLS	grpRating	cnt	Comment
`Web`	`null`	0	0	5	Five leads with `LeadSource = Web` with no `Rating`
`Web`	`Hot`	0	0	1	One lead with `LeadSource = Web` with `Rating = Hot`
`Web`	`Warm`	0	0	1	One lead with `LeadSource = Web` with `Rating = Warm`
`Web`	`null`	0	1	7	Subtotal of seven leads with `LeadSource = Web` (`grpRating = 1` indicates that result is grouped by the `Rating` field)
`Phone Inquiry`	`null`	0	0	4	Four leads with `LeadSource = Phone Inquiry` with no `Rating`
`Phone Inquiry`	`null`	0	1	4	Subtotal of four leads with `LeadSource = Phone Inquiry` (`grpRating = 1` indicates that result is grouped by the `Rating` field)
`Partner Referral`	`null`	0	0	4	Four leads with `LeadSource = Partner Referral` with no `Rating`
`Partner Referral`	`null`	0	1	4	Subtotal of four leads with `LeadSource = Partner Referral` (`grpRating = 1` indicates that result is grouped by the `Rating` field)

LeadSource	Rating	grpLS	grpRating	cnt	Comment
`Purchased List`	`null`	0	0	7	Seven leads with `LeadSource = Purchased List` with no `Rating`
`Purchased List`	`null`	0	1	7	Subtotal of seven leads with `LeadSource = Purchased List` (`grpRating = 1` indicates that result is grouped by the `Rating` field)
`null`	`null`	1	1	22	Grand total of 22 leads (`grpRating = 1` and `grpLS = 1` indicates this is the grand total)

Tip: The order of the fields listed in the `GROUP BY ROLLUP` clause is important. For example, if you are more interested in getting subtotals for each `Rating` instead of for each `LeadSource`, switch the field order to `GROUP BY ROLLUP(Rating, LeadSource)`.

GROUP BY CUBE

Use the `GROUP BY CUBE` clause in a SOQL query to add subtotals for all combinations of a grouped field in the query results. This action is useful for compiling cross-tabular reports of data. For example, you can create a cross-tabular query to calculate a sum, an average, or another aggregate function and then group the results by two sets of values: one horizontally, the other, vertically.

With API version 18.0 and later, you can use `GROUP BY CUBE` with aggregate functions, such as `SUM()` and `COUNT(`***`fieldName`***`)`.

The syntax is:

```
[GROUP BY CUBE (fieldName[,...])]
```

A query with a `GROUP BY CUBE` clause returns the same aggregated data as an equivalent query with a `GROUP BY` clause. It also returns additional subtotal rows for each combination of fields specified in the comma-separated grouping list, as well as a grand total. You can include up to three fields in a `GROUP BY CUBE` clause.

Note:

- You can't combine `GROUP BY` and `GROUP BY CUBE` syntax in the same statement. For example, `GROUP BY CUBE(field1), field2` is not valid as all grouped fields must be within the parentheses.
- If you only want subtotals for a subset of the grouped field combinations, you should use GROUP BY ROLLUP instead.

The following query returns subtotals of accounts for each combination of `Type` and `BillingCountry`:

```
SELECT Type, BillingCountry,
    GROUPING(Type) grpType, GROUPING(BillingCountry) grpCty,
    COUNT(id) accts
FROM Account
GROUP BY CUBE(Type, BillingCountry)
ORDER BY GROUPING(Type), GROUPING(BillingCountry)
```

The following table shows the query results. The query uses `ORDER BY GROUPING(Type), GROUPING(BillingCountry)` so that the subtotal and grand total rows are returned after the aggregated data rows. This is not necessary, but it can help you when you are iterating through the query results in your code. The **Comment** column explains each row.

Type	BillingCountry	grpType	grpCty	accts	Comment
Customer - Direct	null	0	0	6	Six accounts with Type = Customer - Direct with BillingCountry = null
Customer - Channel	USA	0	0	1	One account with Type = Customer - Channel with BillingCountry = USA
Customer - Channel	null	0	0	2	Two accounts with Type = Customer - Channel with BillingCountry = null
Customer - Direct	USA	0	0	1	One account with Type = Customer - Direct with BillingCountry = USA
Customer - Channel	France	0	0	1	One account with Type = Customer - Channel with BillingCountry = France
null	USA	0	0	1	One account with Type = null with BillingCountry = USA
Customer - Channel	null	0	1	4	Subtotal of four accounts with Type = Customer - Channel (grpCty = 1 indicates that result is grouped by the BillingCountry field)
Customer - Direct	null	0	1	7	Subtotal of seven accounts with Type = Customer - Direct (grpCty = 1 indicates that result is grouped by the BillingCountry field)
null	null	0	1	1	Subtotal of one account with Type = null (grpCty = 1 indicates that result is grouped by the BillingCountry field)
null	France	1	0	1	Subtotal of one account with BillingCountry = France (grpType = 1 indicates that result is grouped by the Type field)
null	USA	1	0	3	Subtotal of three accounts with BillingCountry = USA (grpType = 1 indicates that result is grouped by the Type field)
null	null	1	0	8	Subtotal of eight accounts with BillingCountry = null (grpType = 1 indicates that result is grouped by the Type field)
null	null	1	1	12	Grand total of 12 accounts (grpType = 1 and grpCty = 1 indicates this is the grand total)

You can use these query results to present a cross-tabular reports of the results.

Type/BillingCountry	USA	France	null	Total
Customer - Direct	1	0	6	7
Customer - Channel	1	1	2	4

Type/BillingCountry	USA	France	null	Total
null	1	0	0	1
Total	3	1	8	12

HAVING

HAVING is an optional clause that can be used in a SOQL query to filter results that aggregate functions return.

With API version 18.0 and later, you can use a HAVING clause with a GROUP BY clause to filter the results returned by aggregate functions, such as SUM(). The HAVING clause is similar to a WHERE clause. The difference is that you can include aggregate functions in a HAVING clause, but not in a WHERE clause. The syntax is:

```
[HAVING havingConditionExpression]
```

havingConditionExpression specifies one or more conditional expressions using aggregate functions to filter the query results.

For example, you can use a GROUP BY clause to determine how many leads are associated with each LeadSource value with the following query:

```
SELECT LeadSource, COUNT(Name)
FROM Lead
GROUP BY LeadSource
```

However, if you are only interested in LeadSource values that have generated more than 100 leads, you can filter the results by using a HAVING clause. For example:

```
SELECT LeadSource, COUNT(Name)
FROM Lead
GROUP BY LeadSource
HAVING COUNT(Name) > 100
```

The next query returns accounts with duplicate names:

```
SELECT Name, Count(Id)
FROM Account
GROUP BY Name
HAVING Count(Id) > 1
```

For a list of aggregate functions supported by SOQL, see Aggregate Functions.

Considerations When Using HAVING

When you're creating SOQL queries with a HAVING clause, there are some considerations to keep in mind.

- A HAVING clause can filter by aggregated values. It can also contain filter by any fields included in the GROUP BY clause. To filter by any other field values, add the filtering condition to the WHERE clause. For example, the following query is valid:

  ```
  SELECT LeadSource, COUNT(Name)
  FROM Lead
  GROUP BY LeadSource
  HAVING COUNT(Name) > 100 and LeadSource > 'Phone'
  ```

The following query is invalid as `City` is not included in the `GROUP BY` clause:

```
SELECT LeadSource, COUNT(Name)
FROM Lead
GROUP BY LeadSource
HAVING COUNT(Name) > 100 and City LIKE 'San%'
```

- Similar to a `WHERE` clause, a `HAVING` clause supports all the comparison operators, such as `=`, in conditional expressions, which can contain multiple conditions using the logical `AND`, `OR`, and `NOT` operators.
- A `HAVING` clause can't contain any semi- or anti-joins. A semi-join is a subquery on another object in an `IN` clause to restrict the records returned. An anti-join is a subquery on another object in a `NOT IN` clause to restrict the records returned.

TYPEOF

`TYPEOF` is an optional clause that can be used in a `SELECT` statement of a SOQL query when you're querying data that contains polymorphic relationships. A `TYPEOF` expression specifies a set of fields to select that depend on the runtime type of the polymorphic reference.

Note: `TYPEOF` is currently available as a Developer Preview as part of the SOQL Polymorphism feature. For more information on enabling `TYPEOF` for your organization, contact Salesforce.

`TYPEOF` is available in API version 26.0 and later.

```
SELECT [fieldList,]
    [TYPEOF typeOfField
        {WHEN whenObjectType THEN whenFieldList}[...]
        [ELSE elseFieldList]
    END][...]
FROM objectType
```

You can use more than one `TYPEOF` expression in a single `SELECT` statement, if you need to query multiple polymorphic relationship fields.

You can provide as many `WHEN` clauses as needed, one per object type. The `ELSE` clause is optional and used if the object type for the polymorphic relationship field in the current record doesn't match any of the object types in the provided `WHEN` clauses. The syntax specific to `TYPEOF` is as follows.

Syntax	Description
fieldList	Specifies a list of one or more fields, separated by commas, that you want to retrieve from the specified ***objectType***. This is the standard list of fields used in a `SELECT` statement and used regardless of polymorphic relationship object types. If you're only interested in fields from objects referenced by polymorphic relationships, you can omit this list from your `SELECT` statement. This list of fields cannot reference relationship fields that are also referenced in any ***typeOfField*** fields used in the same query.
typeOfField	A polymorphic relationship field in ***objectType*** or a polymorphic field in a parent of ***objectType*** that can reference multiple object types. For example, the `What` relationship field of an Event could be an Account, a Campaign, or an Opportunity. ***typeOfField*** cannot reference a relationship field that is also referenced in ***fieldList***.

Syntax	Description
whenObjectType	An object type for the given `WHEN` clause. When the `SELECT` statement runs, each object type associated with the polymorphic relationship field specified in the ***typeOfField*** expression is checked for a matching object type in a `WHEN` clause.
whenFieldList	A list of one or more fields, separated by commas, that you want to retrieve from the specified ***whenObjectType***. These are fields in the referenced object type or paths to related object fields, not fields in the primary object type for the `SELECT` statement.
elseFieldList	A list of one or more fields, separated by commas, that you want to retrieve if none of the `WHEN` clauses match the object type associated with the polymorphic relationship field specified in ***typeOfField***. This list may only contain fields valid for the Name object type, or paths to related object fields in Name.
objectType	Specifies the type of object you want to query. This is the standard object type required in a `SELECT` statement.

Note the following considerations for using `TYPEOF`:

- `TYPEOF` is only allowed in the `SELECT` clause of a query. You can filter on the object type of a polymorphic relationship using the Type qualifier in a `WHERE` clause, see Filtering on Polymorphic Relationship Fields for more details.
- `TYPEOF` isn't allowed in queries that don't return objects, such as `COUNT()` and aggregate queries.
- `TYPEOF` can't be used in SOQL queries that are the basis of Streaming API PushTopics.
- `TYPEOF` can't be used in SOQL used in Bulk API.
- `TYPEOF` expressions can't be nested. For example, you can't use `TYPEOF` inside the `WHEN` clause of another `TYPEOF` expression.
- `TYPEOF` isn't allowed in the `SELECT` clause of a semi-join query. You can use `TYPEOF` in the `SELECT` clause of an outer query that contains semi-join queries. The following example is not valid:

```
SELECT Name FROM Account
WHERE CreatedById IN
    (
    SELECT
        TYPEOF Owner
            WHEN User THEN Id
            WHEN Group THEN CreatedById
        END
    FROM CASE
    )
```

The following semi-join clause is valid because `TYPEOF` is only used in the outer `SELECT` clause:

```
SELECT
    TYPEOF What
        WHEN Account THEN Phone
        ELSE Name
    END
FROM Event
WHERE CreatedById IN
    (
    SELECT CreatedById
```

```
    FROM Case
    )
```

- `GROUP BY`, `GROUP BY ROLLUP`, `GROUP BY CUBE`, and `HAVING` aren't allowed in queries that use `TYPEOF`.

The following example selects specific fields depending on whether the `What` field of an Event references an Account or Opportunity.

```
SELECT
  TYPEOF What
    WHEN Account THEN Phone, NumberOfEmployees
    WHEN Opportunity THEN Amount, CloseDate
    ELSE Name, Email
  END
FROM Event
```

See Understanding Polymorphic Keys and Relationships for more details on polymorphic relationships, and additional examples of `TYPEOF`.

FORMAT ()

Use `FORMAT` with the `SELECT` clause to apply localized formatting to standard and custom number, date, time, and currency fields.

When the `FORMAT` function is applied these fields reflect the appropriate format for the given user locale. The field format matches what appears in the Salesforce Classic user interface. For example, the date December 28, 2015 can appear numerically as 2015-12-28, 28-12-2015, 28/12/2015, 12/28/2015, or 28.12.2015, depending on the org's locale setting.

This example is for an org that has multiple currencies enabled.

```
SELECT FORMAT(amount) Amt, format(lastModifiedDate) editDate FROM Opportunity
editDate = "7/2/2015 3:11 AM"
Amt = "AED 1,500.000000 (USD 1,000.00)"
```

The `FORMAT` function supports aliasing. In addition, aliasing is required when the query includes the same field multiple times. For example:

```
SELECT Id, LastModifiedDate, FORMAT(LastModifiedDate) formattedDate FROM Account
```

You can also nest it with aggregate or `convertCurrency()` functions. For example:

```
SELECT amount, FORMAT(amount) Amt, convertCurrency(amount) editDate,
FORMAT(convertCurrency(amount)) convertedCurrency FROM Opportunity where id = '12345'
SELECT FORMAT(MIN(closedate)) Amt FROM opportunity
```

FOR VIEW

Salesforce stores information about record views in the interface and uses the information to generate a list of recently viewed and referenced records, such as a list of records in a sidebar and for a list of records as auto-complete options in search. You can update objects with information about when they were last viewed by using the `FOR VIEW` clause in a SOQL query.

Consider using the `FOR VIEW` clause in conjunction with the `FOR REFERENCE` clause to update recent usage data for retrieved objects.

When this clause is used with a query, two things happen:

- The `LastViewedDate` field for the retrieved record is updated.
- A record is added to the RecentlyViewed object to reflect the recently viewed data for the retrieved record.

Note:

- Use this clause only when you are sure that the retrieved records will definitely be viewed by the logged-in user, else the clause falsely updates the usage information for the records. Also, the user won't recognize any falsely updated records when they display in the Recent Items and the global search auto-complete lists.
- The RecentlyViewed object is updated every time the logged-in user views or references a record. It is also updated when records are retrieved using the `FOR VIEW` or `FOR REFERENCE` clause in a SOQL query. To ensure that the most recent data is available, RecentlyViewed data is periodically truncated down to 200 records per object.

This is an example of a SOQL query that retrieves one contact to show to the current user and uses `FOR VIEW` to update the last viewed date of the retrieved contact. The same statement both retrieves the record and updates its last viewed date.

```
SELECT Name, ID FROM Contact  LIMIT 1 FOR VIEW
```

FOR REFERENCE

`FOR REFERENCE` is an optional clause that can be used in a SOQL query to notify Salesforce when a record is referenced from a custom interface, such as in a mobile application or from a custom page. Consider using this clause with the `FOR VIEW` clause to update recent usage data for retrieved objects.

A record is referenced every time a related record is viewed. For example, when a user views an account record, all related records (such as contacts, owner, leads, opportunities) are referenced. Consider using the `FOR REFERENCE` clause with the `FOR VIEW` clause to update recent usage data for retrieved objects.

When this clause is used with a query, two things happen:

- The `LastReferencedDate` field is updated for any retrieved records.
- A record is added to the RecentlyViewed object to reflect the recently referenced data for each retrieved record.

Note:

- Use this clause only when you're certain that the records affected by the query will be referenced, else the clause falsely updates the recently referenced information for any retrieved records. Also, the user won't recognize any falsely updated records when they display in the Recent Items and the global search auto-complete lists.
- The RecentlyViewed object is updated every time the logged-in user views or references a record. It is also updated when records are retrieved using the `FOR VIEW` or `FOR REFERENCE` clause in a SOQL query. To ensure that the most recent data is available, RecentlyViewed data is periodically truncated down to 200 records per object.

This is an example of a SOQL query that retrieves a contact and uses `FOR REFERENCE` to update the `LastReferencedDate` field of the retrieved contact.

```
SELECT Name, ID FROM Contact  LIMIT 1 FOR REFERENCE
```

FOR UPDATE

In Apex, you can use `FOR UPDATE` to lock sObject records while they're being updated in order to prevent race conditions and other thread safety problems.

While an sObject record is locked, no other client or user is allowed to make updates either through code or the Salesforce user interface. The client locking the records can perform logic on the records and make updates with the guarantee that the locked records won't be changed by another client during the lock period. The lock gets released when the transaction completes.

To lock a set of sObject records in Apex, embed the keywords `FOR UPDATE` after any inline SOQL statement. For example, the following statement, in addition to querying for two accounts, also locks the accounts that are returned:

```
Account [] accts = [SELECT Id FROM Account LIMIT 2 FOR UPDATE];
```

Note: You can't use the `ORDER BY` keywords in any SOQL query that uses locking.

Locking Considerations

- While the records are locked by a client, the locking client can modify their field values in the database in the same transaction. Other clients have to wait until the transaction completes and the records are no longer locked before being able to update the same records. Other clients can still query the same records while they're locked.
- If you attempt to lock a record currently locked by another client, your process waits for the lock to be released before acquiring a new lock. If the lock isn't released within 10 seconds, you will get a `QueryException`. Similarly, if you attempt to update a record currently locked by another client and the lock isn't released within 10 seconds, you will get a `DmlException`.
- If a client attempts to modify a locked record, the update operation might succeed if the lock gets released within a short amount of time after the update call was made. In this case, it is possible that the updates will overwrite those made by the locking client if the second client obtained an old copy of the record. To prevent this from happening, the second client must lock the record first. The locking process returns a fresh copy of the record from the database through the `SELECT` statement. The second client can use this copy to make new updates.
- When you perform a DML operation on one record, related records are locked in addition to the record in question. For more information, see the Record Locking Cheat Sheet.

Warning: Use care when setting locks in your Apex code. See Avoiding Deadlocks in the Apex Guide for more information.

Aggregate Functions

Use aggregate functions in a `GROUP BY` clause in SOQL queries to generate reports for analysis. Aggregate functions include `AVG()`, `COUNT()`, `MIN()`, `MAX()`, `SUM()`, and more.

You can also use aggregate functions *without* using a `GROUP BY` clause. For example, you could use the `AVG()` aggregate function to find the average `Amount` for all your opportunities.

```
SELECT AVG(Amount)
FROM Opportunity
```

However, these functions become a more powerful tool to generate reports when you use them with a `GROUP BY` clause. For example, you could find the average `Amount` for all your opportunities by campaign.

```
SELECT CampaignId, AVG(Amount)
FROM Opportunity
GROUP BY CampaignId
```

This table lists all the aggregate functions supported by SOQL.

Aggregate Function	Description

`AVG()`	Returns the average value of a numeric field. For example:
	`SELECT CampaignId, AVG(Amount)`
	`FROM Opportunity`
	`GROUP BY CampaignId`

Aggregate Function	Description
	Available in API version 18.0 and later.

`COUNT()` and `COUNT(fieldName)`	Returns the number of rows matching the query criteria. For example using `COUNT()`:
	`SELECT COUNT()`
	`FROM Account`
	`WHERE Name LIKE 'a%'`
	For example using `COUNT(fieldName)`:
	`SELECT COUNT(Id)`
	`FROM Account`
	`WHERE Name LIKE 'a%'`
	Note: `COUNT(Id)` in SOQL is equivalent to `COUNT(*)` in SQL.
	The `COUNT(fieldName)` syntax is available in API version 18.0 and later. If you are using a GROUP BY clause, use `COUNT(fieldName)` instead of `COUNT()`. For more information, see `COUNT()` and `COUNT(fieldName)`.

`COUNT_DISTINCT()`	Returns the number of distinct non-`null` field values matching the query criteria. For example:
	`SELECT COUNT_DISTINCT(Company)`
	`FROM Lead`
	Note: `COUNT_DISTINCT(fieldName)` in SOQL is equivalent to `COUNT(DISTINCT fieldName)` in SQL. To query for all the distinct values, including `null`, for an object, see GROUP BY.
	Available in API version 18.0 and later.

`MIN()`	Returns the minimum value of a field. For example:
	`SELECT MIN(CreatedDate), FirstName, LastName`
	`FROM Contact`
	`GROUP BY FirstName, LastName`
	If you use the `MIN()` or `MAX()` functions on a picklist field, the function uses the sort order of the picklist values instead of alphabetical order.
	Available in API version 18.0 and later.

`MAX()`	Returns the maximum value of a field. For example:
	`SELECT Name, MAX(BudgetedCost)`
	`FROM Campaign`
	`GROUP BY Name`
	Available in API version 18.0 and later.

Aggregate Function	Description

`SUM()`	Returns the total sum of a numeric field. For example:
	`SELECT SUM(Amount)`
	`FROM Opportunity`
	`WHERE IsClosed = false AND Probability > 60`
	Available in API version 18.0 and later.

You can't use a `LIMIT` clause in a query that uses an aggregate function, but does not use a `GROUP BY` clause. For example, the following query is invalid:

```
SELECT MAX(CreatedDate)
FROM Account LIMIT 1
```

`COUNT()` and `COUNT(fieldName)`

`COUNT()` is an optional clause that can be used in a `SELECT` statement in a SOQL query to discover the number of rows that a query returns.

There are two versions of syntax for `COUNT()`:

- `COUNT()`
- `COUNT(fieldName)`

If you are using a GROUP BY clause, use `COUNT(fieldName)` instead of `COUNT()`.

`COUNT()`

`COUNT()` returns the number of rows that match the filtering conditions.

For example:

```
SELECT COUNT()
FROM Account
WHERE Name LIKE 'a%'
```

```
SELECT COUNT()
FROM Contact, Contact.Account
WHERE Account.Name = 'MyriadPubs'
```

For `COUNT()`, the query result `size` field returns the number of rows. The `records` field returns `null`.

Note the following when using `COUNT()`:

- `COUNT()` must be the only element in the `SELECT` list.
- You can use `COUNT()` with a `LIMIT` clause.
- You can't use `COUNT()` with an `ORDER BY` clause. Use `COUNT(fieldName)` instead.
- You can't use `COUNT()` with a `GROUP BY` clause for API version 19.0 and later. Use `COUNT(fieldName)` instead.

COUNT(*fieldName*)

`COUNT(fieldName)` returns the number of rows that match the filtering conditions and have a non-`null` value for *`fieldName`*. This syntax is newer than `COUNT()` and is available in API version 18.0 and later.

For example:

```
SELECT COUNT(Id)
FROM Account
WHERE Name LIKE 'a%'
```

`COUNT(Id)` returns the same count as `COUNT()`, so the previous and next queries are equivalent:

```
SELECT COUNT()
FROM Account
WHERE Name LIKE 'a%'
```

Note: `COUNT(Id)` in SOQL is equivalent to `COUNT(*)` in SQL.

For `COUNT(fieldName)`, the AggregateResult object in the `records` field returns the number of rows. The `size` field does not reflect the count. For example:

```
SELECT COUNT(Id)
FROM Account
WHERE Name LIKE 'a%'
```

For this query, the count is returned in the `expr0` field of the AggregateResult object. For more information, see Using Aliases with `GROUP BY`.

There are advantages to using `COUNT(fieldName)` instead of `COUNT()`. You can include multiple `COUNT(fieldName)` items in a `SELECT` clause. For example, the following query returns the number of opportunities, as well as the number of opportunities associated with a campaign.

```
SELECT COUNT(Id), COUNT(CampaignId)
FROM Opportunity
```

Unlike `COUNT()`, you can use a `GROUP BY` clause with `COUNT(fieldName)` in API version 18.0 and later. This allows you to analyze your records and return summary reporting information. For example, the following query returns the number of leads for each `LeadSource` value:

```
SELECT LeadSource, COUNT(Name)
FROM Lead
GROUP BY LeadSource
```

Support for Field Types in Aggregate Functions

Using aggregate functions in SOQL queries is a powerful way to analyze records, but the functions aren't relevant for all field types. For example, base64 fields don't support aggregate functions, because they wouldn't generate any meaningful data.

Aggregate functions are supported for several primitive data types and field types. The following table lists support by the aggregate functions for the primitive data types.

Data Type	AVG()	COUNT()	COUNT_DISTINCT()	MIN()	MAX()	SUM()
base64	No	No	No	No	No	No
boolean	No	No	No	No	No	No

Data Type	AVG()	COUNT()	COUNT_DISTINCT()	MIN()	MAX()	SUM()
byte	No	No	No	No	No	No
date	No	Yes	Yes	Yes	Yes	No
dateTime	No	Yes	Yes	Yes	Yes	No
double	Yes	Yes	Yes	Yes	Yes	Yes
int	Yes	Yes	Yes	Yes	Yes	Yes
string	No	Yes	Yes	Yes	Yes	No
time	No	No	No	No	No	No

In addition to the primitive data types, the API uses an extended set of field types for object fields. The following table lists support by the aggregate functions for these field types.

Data Type	AVG()	COUNT()	COUNT_DISTINCT()	MIN()	MAX()	SUM()
address	No	No	No	No	No	No
anyType	No	No	No	No	No	No
calculated	Depends on data type*	Depends on data type*	Depends on data type*	Depends on data type*	Depends on data type*	Depends on data type*
combobox	No	Yes	Yes	Yes	Yes	No
currency**	Yes	Yes	Yes	Yes	Yes	Yes
DataCategoryGroupReference	No	Yes	Yes	Yes	Yes	No
email	No	Yes	Yes	Yes	Yes	No
encryptedstring	No	No	No	No	No	No
location	No	No	No	No	No	No
ID	No	Yes	Yes	Yes	Yes	No
masterrecord	No	Yes	Yes	Yes	Yes	No
multipicklist	No	No	No	No	No	No
percent	Yes	Yes	Yes	Yes	Yes	Yes
phone	No	Yes	Yes	Yes	Yes	No
picklist	No	Yes	Yes	Yes	Yes	No
reference	No	Yes	Yes	Yes	Yes	No
textarea	No	Yes	Yes	Yes	Yes	No
url	No	Yes	Yes	Yes	Yes	No

* Calculated fields are custom fields defined by a formula, which is an algorithm that derives its value from other fields, expressions, or values. Therefore, support for aggregate functions depends on the type of the calculated field.

** Aggregate function results on currency fields default to the system currency.

Tip: Some object fields have a field type that does not support grouping. You can't include fields with these field types in a `GROUP BY` clause. The Field object associated with DescribeSObjectResult has a `groupable` field that defines whether you can include the field in a `GROUP BY` clause.

Date Functions

Date functions in SOQL queries allow you to group or filter data by date periods such as day, calendar month, or fiscal year.

For example, you could use the `CALENDAR_YEAR()` function to find the sum of the `Amount` values for all your opportunities for each calendar year.

```
SELECT CALENDAR_YEAR(CreatedDate), SUM(Amount)
FROM Opportunity
GROUP BY CALENDAR_YEAR(CreatedDate)
```

Date functions are available in API version 18.0 and later.

Note: SOQL queries in a client application return dateTime field values as Coordinated Universal Time (UTC) values. To convert dateTime field values to your default time zone, see Converting Time Zones in Date Functions.

This table lists all the date functions supported by SOQL.

Date Function	Description	Examples
`CALENDAR_MONTH()`	Returns a number representing the calendar month of a date field.	• `1` for January • `12` for December
`CALENDAR_QUARTER()`	Returns a number representing the calendar quarter of a date field.	• `1` for January 1 through March 31 • `2` for April 1 through June 30 • `3` for July 1 through September 30 • `4` for October 1 through December 31
`CALENDAR_YEAR()`	Returns a number representing the calendar year of a date field.	`2009`
`DAY_IN_MONTH()`	Returns a number representing the day in the month of a date field.	`20` for February 20
`DAY_IN_WEEK()`	Returns a number representing the day of the week for a date field.	• `1` for Sunday • `7` for Saturday
`DAY_IN_YEAR()`	Returns a number representing the day in the year for a date field.	`32` for February 1
`DAY_ONLY()`	Returns a date representing the day portion of a dateTime field.	`2009-09-22` for September 22, 2009 You can only use `DAY_ONLY()` with dateTime fields.

Date Function	Description	Examples
`FISCAL_MONTH()`	Returns a number representing the fiscal month of a date field. This differs from `CALENDAR_MONTH()` if your organization uses a fiscal year that does not match the Gregorian calendar. Note: This function is not supported if your organization has custom fiscal years enabled. See "Define Your Fiscal Year" in the Salesforce Help.	If your fiscal year starts in March: • `1` for March • `12` for February See "Set the Fiscal Year" in the Salesforce online help.
`FISCAL_QUARTER()`	Returns a number representing the fiscal quarter of a date field. This differs from `CALENDAR_QUARTER()` if your organization uses a fiscal year that does not match the Gregorian calendar. Note: This function is not supported if your organization has custom fiscal years enabled. See "Define Your Fiscal Year" in the Salesforce Help.	If your fiscal year starts in July: • `1` for July 15 • `4` for June 6
`FISCAL_YEAR()`	Returns a number representing the fiscal year of a date field. This differs from `CALENDAR_YEAR()` if your organization uses a fiscal year that does not match the Gregorian calendar. Note: This function is not supported if your organization has custom fiscal years enabled. See "Define Your Fiscal Year" in the Salesforce Help.	`2009`
`HOUR_IN_DAY()`	Returns a number representing the hour in the day for a dateTime field.	`18` for a time of 18:23:10 You can only use `HOUR_IN_DAY()` with dateTime fields.
`WEEK_IN_MONTH()`	Returns a number representing the week in the month for a date field.	`2` for April 10 The first week is from the first through the seventh day of the month.
`WEEK_IN_YEAR()`	Returns a number representing the week in the year for a date field.	`1` for January 3 The first week is from January 1 through January 7.

Note the following when you use date functions:

- You can use a date function in a `WHERE` clause to filter your results even if your query doesn't include a `GROUP BY` clause. The following query returns data for 2009:

```
SELECT CreatedDate, Amount
FROM Opportunity
WHERE CALENDAR_YEAR(CreatedDate) = 2009
```

- You can't compare the result of a date function with a date literal in a `WHERE` clause. The following query doesn't work:

```
SELECT CreatedDate, Amount
FROM Opportunity
WHERE CALENDAR_YEAR(CreatedDate) = THIS_YEAR
```

- You can't use a date function in a `SELECT` clause unless you also include it in the `GROUP BY` clause. There is an exception if the field used in the date function is a date field. You can use the date field instead of the date function in the `GROUP BY` clause. This doesn't work for dateTime fields. The following query doesn't work because `CALENDAR_YEAR(CreatedDate)` is not in a `GROUP BY` clause:

```
SELECT CALENDAR_YEAR(CreatedDate), Amount
FROM Opportunity
```

  The following query works because the date field, `CloseDate`, is in the `GROUP BY` clause. This wouldn't work for a dateTime field, such as `CreatedDate`.

```
SELECT CALENDAR_YEAR(CloseDate)
FROM Opportunity
GROUP BY CALENDAR_YEAR(CloseDate)
```

Converting Time Zones in Date Functions

SOQL queries in a client application return dateTime field values as Coordinated Universal Time (UTC) values. You can use `convertTimezone()` in a date function to convert dateTime fields to the user's time zone.

For example, you could use the `convertTimezone(`***`dateTimeField`***`)` function to find the sum of the `Amount` values for all your opportunities for each hour of the day, where the hour is converted to the user's time zone.

```
SELECT HOUR_IN_DAY(convertTimezone(CreatedDate)), SUM(Amount)
FROM Opportunity
GROUP BY HOUR_IN_DAY(convertTimezone(CreatedDate))
```

Note that you can only use `convertTimezone()` in a date function. The following query doesn't work because there is no date function.

```
SELECT convertTimezone(CreatedDate)
FROM Opportunity
```

Querying Currency Fields in Multi-currency Orgs

Use `convertCurrency()` in the `SELECT` statement of a SOQL query to convert currency fields to the user's currency. This action requires that the org has multiple currencies enabled.

The following syntax is for using `convertCurrency()` with the `SELECT` clause:

```
convertCurrency(field)
```

For example:

```
SELECT Id, convertCurrency(AnnualRevenue)
FROM Account
```

Use an ISO code that your org has enabled and made active. If you don't put in an ISO code, the numeric value is used instead of comparative amounts. Using the previous example, opportunity records with `JPY5001`, `EUR5001`, and `USD5001` would be returned. If you use IN in a `WHERE` clause, you can't mix ISO code and non-ISO code values.

To format currencies according to the user's local, use `FORMAT()` with `SELECT()` statements. In this example, `convertedCurrency` is an alias for the returned amount, which is formatted appropriately in the user interface.

```
SELECT amount, FORMAT(amount) Amt, convertCurrency(amount) editDate,
FORMAT(convertCurrency(amount)) convertedCurrency FROM Opportunity where id = <>
SELECT FORMAT(MIN(closedate)) Amt FROM opportunity
```

If an org has enabled advanced currency management, dated exchange rates are used when converting currency fields on opportunities, opportunity line items, and opportunity history. With advanced currency management, `convertCurrency` uses the conversion rate that corresponds to a given field (for example, `CloseDate on opportunities`). When advanced currency management isn't enabled, the most recent conversion date entered is used.

Considerations and Workarounds

You can't use the `convertCurrency()` function in a `WHERE` clause. If you do, an error is returned. Use the following syntax to convert a numeric value to the user's currency from any active currency in your org.

```
WHERE Object_name Operator ISO_CODEvalue
```

For example:

```
SELECT Id, Name
FROM Opportunity
WHERE Amount > USD5000
```

In this example, opportunity records are returned if the record's currency `Amount` value is greater than the equivalent of USD5000. For example, an opportunity with an amount of `USD5001` is returned, but not `JPY7000`.

You can't convert the result of an aggregate function into the user's currency by calling the `convertCurrency()` function. If a query includes a `GROUP BY` or `HAVING` clause, currency data returned by using an aggregate function, such as `SUM()` or `MAX()`, is in the org's default currency.

For example:

```
SELECT Name, MAX(Amount)
FROM Opportunity
GROUP BY Name
HAVING MAX(Amount) > 10000
```

You can't use *`ISO_CODEvalue`* to represent a value in a particular currency, such as USD, when you use an aggregate function. For example, the following query doesn't work.

```
SELECT Name, MAX(Amount)
FROM Opportunity
GROUP BY Name
HAVING MAX(Amount) > USD10000
```

You can't use `convertCurrency()` with ORDER BY. Ordering is always based on the converted currency value, just like in reports.

Example `SELECT` Clauses

The following are examples of text searches that use SOQL.

Type of Search	Example(s)
Simple query	`SELECT Id, Name, BillingCity FROM Account`
`WHERE`	`SELECT Id FROM Contact WHERE Name LIKE 'A%' AND MailingCity = 'California'`
`ORDER BY`	`SELECT Name FROM Account ORDER BY Name DESC NULLS LAST`
`LIMIT`	`SELECT Name FROM Account WHERE Industry = 'media' LIMIT 125`
`ORDER BY` with `LIMIT`	`SELECT Name FROM Account WHERE Industry = 'media' ORDER BY BillingPostalCode ASC NULLS LAST LIMIT 125`
`count()`	`SELECT COUNT() FROM Contact`
`GROUP BY`	`SELECT LeadSource, COUNT(Name) FROM Lead GROUP BY LeadSource`
`HAVING`	`SELECT Name, COUNT(Id) FROM Account GROUP BY Name HAVING COUNT(Id) > 1`
`OFFSET` with `ORDER BY`	`SELECT Name, Id FROM Merchandise__c ORDER BY Name OFFSET 100`
`OFFSET` with `ORDER BY` and `LIMIT`	`SELECT Name, Id FROM Merchandise__c ORDER BY Name LIMIT 20 OFFSET 100`
Relationship queries: child-to-parent	`SELECT Contact.FirstName, Contact.Account.Name FROM Contact` `SELECT Id, Name, Account.Name FROM Contact WHERE Account.Industry = 'media'`
Relationship queries: parent-to-child	`SELECT Name, (SELECT LastName FROM Contacts) FROM Account` `SELECT Account.Name, (SELECT Contact.LastName FROM Account.Contacts) FROM Account`
Relationship query with `WHERE`	`SELECT Name, (SELECT LastName FROM Contacts WHERE CreatedBy.Alias = 'x') FROM Account WHERE Industry = 'media'`
Relationship query: child-to parent with custom objects	`SELECT Id, FirstName__c, Mother_of_Child__r.FirstName__c FROM Daughter__c WHERE Mother_of_Child__r.LastName__c LIKE 'C%'`
Relationship query: parent to child with custom objects	`SELECT Name, (SELECT Name FROM Line_Items__r) FROM Merchandise__c WHERE Name LIKE 'Acme%'`
Relationship queries with polymorphic key	`SELECT Id, Owner.Name FROM Task WHERE Owner.FirstName like 'B%'` `SELECT Id, Who.FirstName, Who.LastName FROM Task WHERE Owner.FirstName LIKE 'B%'`

Type of Search	Example(s)
	`SELECT Id, What.Name FROM Event`
Polymorphic relationship queries using `TYPEOF`	`SELECT TYPEOF What WHEN Account THEN Phone, NumberOfEmployees WHEN Opportunity THEN Amount, CloseDate ELSE Name, Email END FROM Event` Note: `TYPEOF` is currently available as a Developer Preview as part of the SOQL Polymorphism feature. For more information on enabling `TYPEOF` for your organization, contact Salesforce.
Relationship queries with aggregate	`SELECT Name, (SELECT CreatedBy.Name FROM Notes) FROM Account` `SELECT Amount, Id, Name, (SELECT Quantity, ListPrice, PricebookEntry.UnitPrice, PricebookEntry.Name FROM OpportunityLineItems) FROM Opportunity`
Simple query: the UserId and LoginTime for each user	`SELECT UserId, LoginTime from LoginHistory`
Relationship queries with number of logins per user in a specific time range	`SELECT UserId, COUNT(Id) from LoginHistory WHERE LoginTime > 2010-09-20T22:16:30.000Z AND LoginTime < 2010-09-21T22:16:30.000Z GROUP BY UserId`

Note: Apex requires that you surround SOQL and SOSL statements with square brackets to use them on the fly. You can use Apex script variables and expressions when preceded by a colon (`:`).

Relationship Queries

Client applications need to be able to query for more than a single type of object at a time. SOQL provides syntax to support these types of queries, called *relationship queries*, against standard objects and custom objects. Relationship queries traverse parent-to-child and child-to-parent relationships between objects to filter and return results.

Relationship queries are similar to SQL joins. However, you cannot perform arbitrary SQL joins. The relationship queries in SOQL must traverse a valid relationship path as defined in the rest of this section.

You can use relationship queries to return objects of one type based on criteria that applies to objects of another type, for example, "return all accounts created by Bob Jones and the contacts associated with those accounts." There must be a parent-to-child or child-to-parent relationship connecting the objects. You can't write arbitrary queries such as "return all accounts and users created by Bob Jones."

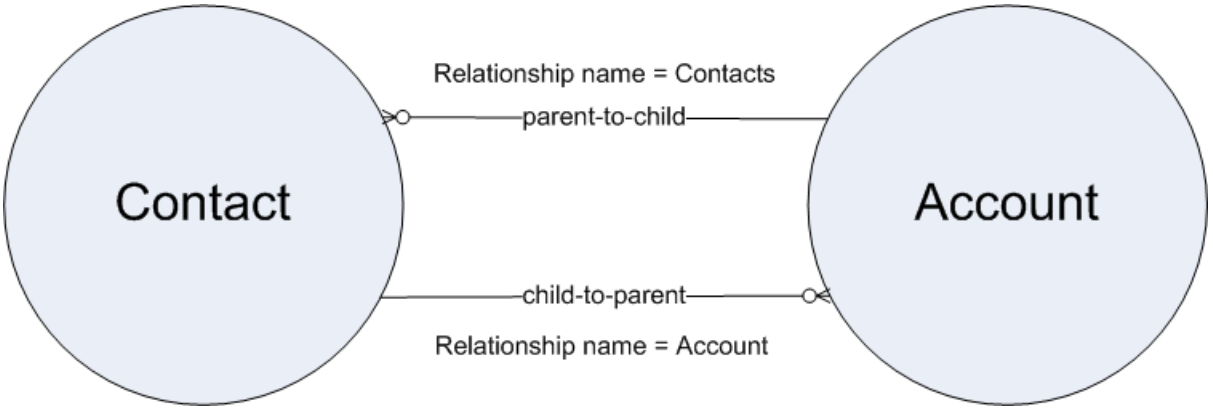
Use the following topics to understand and use relationship queries in SOQL.

- Understanding Relationship Names
- Using Relationship Queries
- Understanding Relationship Names, Custom Objects, and Custom Fields
- Understanding Query Results
- Lookup Relationships and Outer Joins

- Identifying Parent and Child Relationships
- Understanding Polymorphic Keys and Relationships
- Understanding Relationship Query Limitations
- Using Relationship Queries with History Objects
- Using Relationship Queries with Data Category Selection Objects
- Using Relationship Queries with the Partner WSDL

Understanding Relationship Names

Parent-to-child and child-to-parent relationships exist between many types of objects. For example, Account is a parent of Contact.



To be able to traverse these relationships for standard objects, a relationship name is given to each relationship. The form of the name is different, depending on the direction of the relationship:

- For child-to-parent relationships, the relationship name to the parent is the name of the foreign key, and there is a `relationshipName` property that holds the reference to the parent object. For example, the Contact child object has a child-to-parent relationship to the Account object, so the value of `relationshipName` in Contact is `Account`. These relationships are traversed by specifying the parent using dot notation in the query, for example:

  ```
  SELECT Contact.FirstName, Contact.Account.Name from Contact
  ```

  This query returns the first names of all the contacts in the organization, and for each contact, the account name associated with (parent of) that contact.

- For parent-to-child relationships, the parent object has a name for the child relationship that is unique to the parent, the plural of the child object name. For example, Account has child relationships to Assets, Cases, and Contacts among other objects, and has a `relationshipName` for each, `Assets`, `Cases`, and `Contacts`.These relationships can be traversed only in the `SELECT` clause, using a nested SOQL query. For example:

  ```
  SELECT Account.Name, (SELECT Contact.FirstName, Contact.LastName FROM Account.Contacts)
   FROM Account
  ```

  This query returns all accounts, and for each account, the first and last name of each contact associated with (the child of) that account.

Warning: You must use the correct naming convention and `SELECT` syntax for the direction of the relationship. For information about how to discover relationship names via your organization's WSDL or `describeSObjects()`, see Identifying Parent and Child Relationships. There are limitations on relationship queries depending on the direction of the relationship. See Understanding Relationship Query Limitations for more information.

Relationship names are somewhat different for custom objects, though the `SELECT` syntax is the same. See Identifying Parent and Child Relationships for more information.

Using Relationship Queries

Use SOQL to query several relationship types.

You can query the following relationships using SOQL:

- Query child-to-parent relationships, which are often many-to-one. Specify these relationships directly in the `SELECT`, `FROM`, or `WHERE` clauses using the dot (`.`) operator.

  For example:

  ```
  SELECT Id, Name, Account.Name
  FROM Contact
  WHERE Account.Industry = 'media'
  ```

  This query returns the ID and name for only the contacts whose related account industry is media, and for each contact returned, the account name.

- Query parent-to-child, which are almost always one-to-many. Specify these relationships using a subquery (enclosed in parentheses), where the initial member of the `FROM` clause in the subquery is related to the initial member of the outer query `FROM` clause. Note that for subqueries, you should specify the plural name of the object as that is the name of the relationship for each object.

  For example:

  ```
  SELECT Name,
    (
      SELECT LastName
      FROM Contacts
    )
  FROM Account
  ```

  The query returns the name for all the accounts, and for each account, the last name of each contact.

- Traverse the parent-to-child relationship as a foreign key in an aggregate query:

  For example:

  ```
  SELECT Name,
    (
      SELECT CreatedBy.Name
      FROM Notes
    )
  FROM Account
  ```

  This query returns the accounts in an organization, and for each account, the name of the account, the notes for those accounts (which can be an empty result set if there were no notes on any accounts) with the name of the user who created each note (if the result set is not empty).

- In a similar example, traverse the parent-to-child relationship in an aggregate query:

  ```
  SELECT Amount, Id, Name,
    (
      SELECT Quantity, ListPrice,
   PricebookEntry.UnitPrice, PricebookEntry.Name
      FROM OpportunityLineItems
  ```

```
  )
FROM Opportunity
```

Using the same query, you can get the values on Product2 by specifying the product family (which points to the field's data):

```
SELECT Amount, Id, Name, (SELECT Quantity, ListPrice,
  PriceBookEntry.UnitPrice, PricebookEntry.Name,
  PricebookEntry.product2.Family FROM OpportunityLineItems)
  FROM Opportunity
```

- Any query (including subqueries) can include a `WHERE` clause, which applies to the object in the `FROM` clause of the current query. These clauses can filter on any object in the current scope (reachable from the root element of the query), via the parent relationships.

  For example:

  ```
  SELECT Name,
    (
      SELECT LastName
      FROM Contacts
      WHERE CreatedBy.Alias = 'x')
   FROM Account WHERE Industry = 'media'
  ```

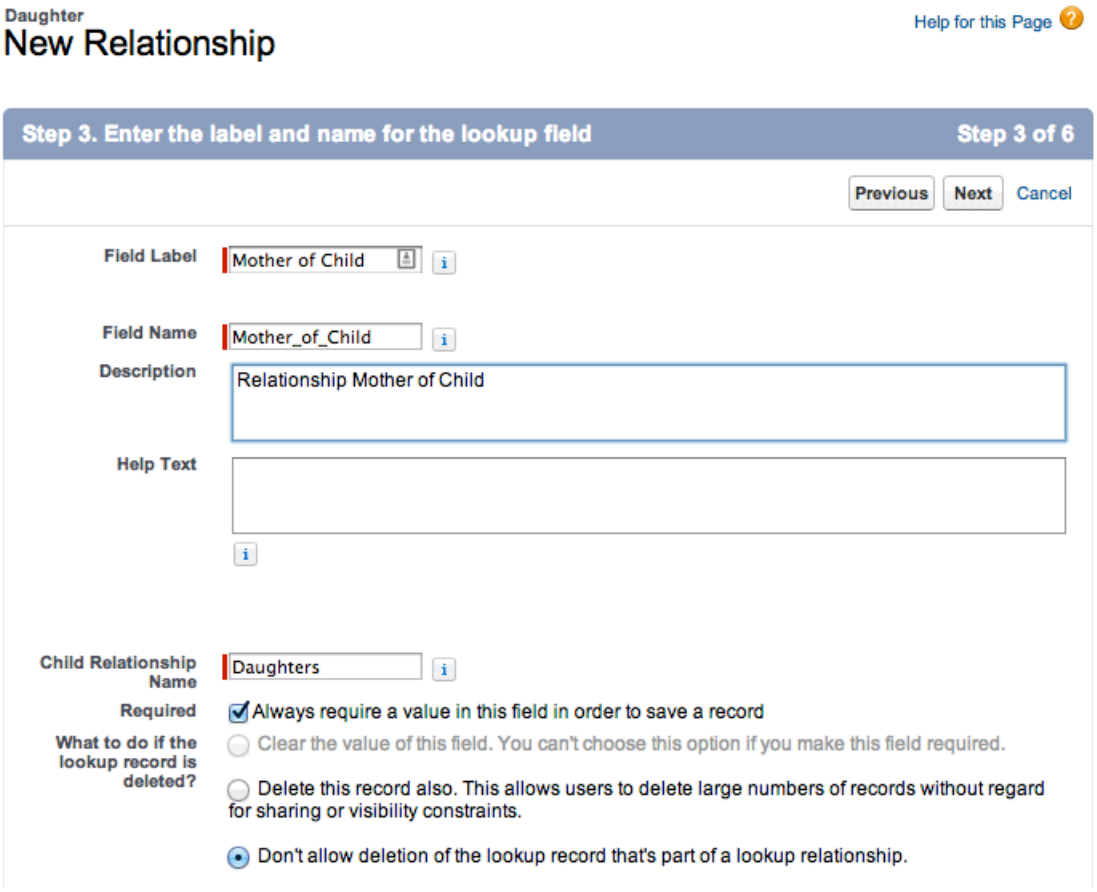
  This query returns the name for all accounts whose industry is media, and for each account returned, returns the last name of every contact whose created-by alias is 'x.'

Understanding Relationship Names, Custom Objects, and Custom Fields

Custom objects can participate in relationship queries. Salesforce ensures that your custom object names, custom field names, and the relationship names that are associated with them remain unique, even if a standard object with the same name is available now or in the future. Having unique relationship queries is important in cases where the query traverses relationships that use the object, field, and relationship names.

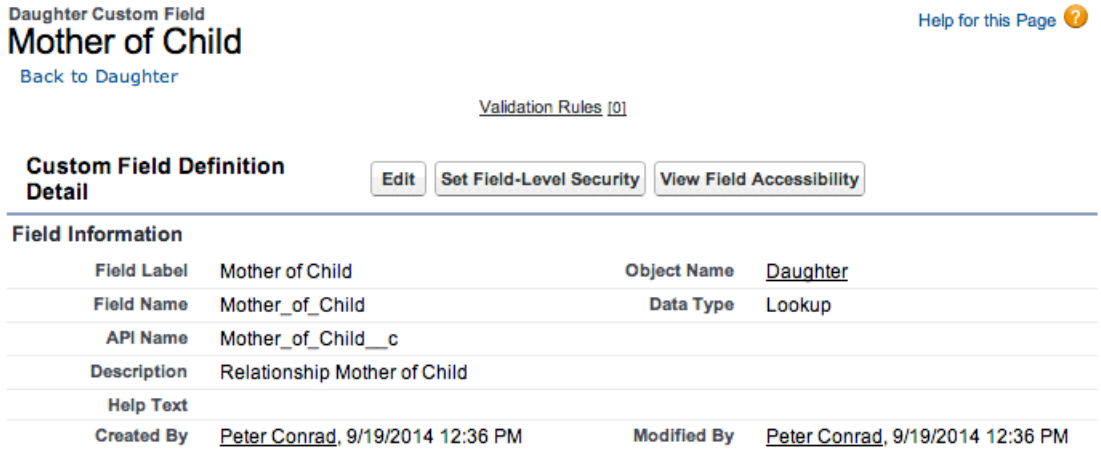
This topic explains how relationship names for custom objects and custom fields are created and used.

When you create a new custom relationship in the Salesforce user interface, you are asked to specify the plural version of the object name, which you use for relationship queries:



Notice that the `Child Relationship Name` (parent to child) is the plural form of the child object name, in this case Daughters.

Once the relationship is created, notice that it has an `API Name`, which is the name of the custom field you created, appended by `__c` (underscore-underscore-c):



When you refer to this field via the API, you must use this special form of the name. This prevents ambiguity in the case where Salesforce can create a standard object with the same name as your custom field. The same process applies to custom objects—when they are created, they have an `API Name`, the object named appended by `__c`, which must be used.

When you use a relationship name in a query, you must use the relationship names without the `__c`. Instead, append an `__r` (underscore underscore r).

For example:

- When you use a child-to-parent relationship, you can use dot notation:

```
SELECT Id, FirstName__c, Mother_of_Child__r.FirstName__c
FROM Daughter__c
WHERE Mother_of_Child__r.LastName__c LIKE 'C%'
```

  This query returns the ID and first name of daughter objects, and the first name of the daughter's mother if the mother's last name begins with 'C.'

- Parent-to-child relationship queries do not use dot notation:

```
SELECT LastName__c,
  (
    SELECT LastName__c
    FROM Daughters__r
  )
FROM Mother__c
```

  The example above returns the last name of all mothers, and for each mother returned, the last name of the mother's daughters.

Understanding Query Results

Query results are returned as nested objects. The primary or "driving" object of the main `SELECT` statement in a SOQL query contains query results of subqueries.

For example, you can construct a query using either parent-to-child or child-to-parent syntax:

- Child-to-parent:

```
SELECT Id, FirstName, LastName, AccountId, Account.Name
FROM Contact
WHERE Account.Name LIKE 'Acme%'
```

  This query returns one query result (assuming there were not too many returned records), with a row for every contact that met the `WHERE` clause criteria.

- Parent-to-child:

```
SELECT Id, Name,
  (
    SELECT Id, FirstName, LastName
    FROM Contacts
  )
FROM Account
  WHERE Name like 'Acme%'
```

  This query returns a set of accounts, and within each account, a query result set of Contact fields containing the contact information from the subquery.

Subquery results are like regular query results in that you might need to use `queryMore()` to retrieve all the records if there are many children. For example, if you issue a query on accounts that includes a subquery, your client application must handle results from the subquery as well:

1. Perform the query on Account.
2. Iterate over the account QueryResult with `queryMore()`.
3. For each account object, retrieve the contacts QueryResult.
4. Iterate over the child contacts, using `queryMore()` on each contact's QueryResult.

The following sample illustrates how to process subquery results:

```
private void querySample() {
  QueryResult qr = null;
  try {
    qr = connection.query("SELECT a.Id, a.Name, " +
      "(SELECT c.Id, c.FirstName, " +
      "c.LastName FROM a.Contacts c) FROM Account a");
    boolean done = false;
    if (qr.getSize() > 0) {
      while (!done) {
        for (int i = 0; i < qr.getRecords().length; i++) {
        Account acct = (Account) qr.getRecords()[i];
        String name = acct.getName();
        System.out.println("Account " + (i + 1) + ": " + name);
        printContacts(acct.getContacts());
        }
        if (qr.isDone()) {
          done = true;
        } else {
          qr = connection.queryMore(qr.getQueryLocator());
        }
      }
    } else {
      System.out.println("No records found.");
    }
    System.out.println("\nQuery succesfully executed.");
  } catch (ConnectionException ce) {
    System.out.println("\nFailed to execute query successfully, error message " +
    "was: \n" + ce.getMessage());
  }
}

private void printContacts(QueryResult qr) throws ConnectionException {
  boolean done = false;
  if (qr.getSize() > 0) {
    while (!done) {
    for (int i = 0; i < qr.getRecords().length; i++) {
      Contact contact = (Contact) qr.getRecords()[i];
      String fName = contact.getFirstName();
      String lName = contact.getLastName();
      System.out.println("Child contact " + (i + 1) + ": " + lName
      + ", " + fName);
    }
    if (qr.isDone()) {
      done = true;
    } else {
      qr = connection.queryMore(qr.getQueryLocator());
    }
```

```
    }
  } else {
    System.out.println("No child contacts found.");
  }
}
```

Lookup Relationships and Outer Joins

Beginning with API version 13.0, relationship SOQL queries return records, even if the relevant foreign key field has a null value, as with an outer join.

The change in behavior applies to the following types of relationship queries.

- In an `ORDER BY` clause, if the foreign key value in a record is null, the record is returned in version 13.0 and later, but not returned in versions before 13.0. For example:

  ```
  SELECT Id, CaseNumber, Account.Id, Account.Name
  FROM Case
  ORDER BY Account.Name
  ```

  Any case record for which `AccountId` is empty is returned in version 13.0 and later.

  The following example uses custom objects:

  ```
  SELECT ID, Name, Parent__r.id, Parent__r.name
  FROM Child__c
  ORDER BY Parent__r.name
  ```

  This query returns the `Id` and `Name` values of the Child object and the `Id` and name of the Parent object referenced in each Child, and orders the results by the parent name. In version 13.0 and later, records are returned even if `Parent__r.id` or `Parent__r.name` are null. In earlier versions, such records are not returned by the query.

- In a `WHERE` clause that uses `OR`, if the foreign key value in a record is null, the record is returned in version 13.0 and later, but not returned in versions before 13.0. For example, if your organization has one contact with the value of its `LastName` field equal to `foo` and the value of its `AccountId` field equal to `null`, and another contact with a different last name and a parent account named `bar`, the following query returns only the contact with the last name equal to `bar`:

  ```
  SELECT Id FROM Contact WHERE LastName = 'foo' or Account.Name = 'bar'
  ```

  The contact with no parent account has a last name that meets the criteria, so it is returned in version 13.0 and later.

- In a `WHERE` clause that checks for a value in a parent field, if the parent does not exist, the record is returned in version 13.0 and later but is not returned in versions before 13.0. For example:

  ```
  SELECT Id
  FROM Case
  WHERE Contact.LastName = null
  ```

  Case record `Id` values are returned in version 13.0 and later, but are not returned in versions before 13.0.

- In a `WHERE` clause that uses a Boolean field, the Boolean field never has a null value. Instead, `null` is treated as `false`. Boolean fields on outer-joined objects are treated as false when no records match the query.

Identifying Parent and Child Relationships

Identify parent-child relationships by viewing Entity Relationship Diagrams (ERD) or by examining the enterprise WSDL for your organization.

You can identify parent-child relationships by viewing the ERD diagrams in the Data Model section of the *Salesforce Object Reference* at `www.salesforce.com/us/developer/docs/object_reference/index.htm`. However, not all parent-child relationships are exposed in SOQL, so to be sure you can query on a parent-child relationship by issuing the appropriate describe call. The results contain parent-child relationship information.

You can also examine the enterprise WSDL for your organization:

- To find the names of child relationships, look for entries that contain the plural form of a child object and end with `type="tns:QueryResult"`. For example, from Account:

```
<complexType name="Account">
   <complexContent>
     <extension base="ens:sObject">
       <sequence>
         ...
         <element name="Contacts" nillable="true" minOccurs="0"
                        type="tns:QueryResult"/>
         ...
       </sequence>
     </extension>
   </complexContent>
 </complexType>
```

  In the example above, the child relationship name `Contacts` is in the entry for its parent Account.

- For the parent of an object, look for a pair of entries, such as `AccountId` and `Account`, where the ID field represents the parent object referenced by the ID, and the other represents the contents of the record. The parent entry has a non-primitive type, `type="ens:Account"`.

```
<complexType name="Opportunity">
  <complexContent>
    <extension base="ens:sObject">
      <sequence>
        ...
        <element name="Account" nillable="true" minOccurs="0"
                type="ens:Account"/>
        <element name="AccountId" nillable="true" minOccurs="0"
                type="tns:ID"/>
        ...
      </sequence>
    </extension>
   </complexContent>
 </complexType>
```

  Note: Not all relationships are exposed in the API. The most reliable method for identifying relationships is to execute a `describeSObjects()` call. You can use the AJAX Toolkit to quickly execute test calls.

- For custom objects, look for a pair of entries with the relationship suffix `__r`:

```
<complexType name="Mother__c">
 <complexContent>
  <extension base="ens:sObject">
   <sequence>
     ...
    <element name="Daughters__r" nillable="true" minOccurs="0"
          type="tns:QueryResult"/>
```

```
        <element name="FirstName__c" nillable="true" minOccurs="0"
              type="xsd:string"/>
        <element name="LastName__c" nillable="true" minOccurs="0"
              type="xsd:string"/>
        ...
       </sequence>
      </extension>
     </complexContent>
     </complexType>
```

```
<complexType name="Daughter__c">
 <complexContent>
  <extension base="ens:sObject">
   <sequence>
     ...
     <element name="Mother_of_Child__c" nillable="true" minOccurs="0"
           type="tns:ID"/>
     <element name="Mother_of_Child__r" nillable="true" minOccurs="0"
           type="xsd:string"/>
     <element name="LastName__c" nillable="true" minOccurs="0"
           type="ens:Mother__c"/>
     ...
    </sequence>
   </extension>
  </complexContent>
 </complexType>
```

Understanding Polymorphic Keys and Relationships

In a polymorphic relationship, the referenced object of the relationship can be one of several objects.

For example, the `What` relationship field of an Event could be an Account, a Campaign, or an Opportunity. When making queries or updating records with polymorphic relationships, you need to check the actual object type set for the relationship, and act accordingly. You can access polymorphic relationships several ways.

- You can use the polymorphic key for the relationship.
- You can use a `TYPEOF` clause in a query.
- You can use the Type qualifier on a polymorphic field.

You can also combine these techniques for complex queries. Each of these techniques are described below.

Note: `TYPEOF` is currently available as a Developer Preview as part of the SOQL Polymorphism feature. For more information on enabling `TYPEOF` for your organization, contact Salesforce.

Using Polymorphic Keys

A polymorphic key is an ID that can refer to more than one type of object as a parent. For example, either a Contact or a Lead can be the parent of a task. In other words, the `WhoId` field of a task can contain the ID of either a Contact or a Lead. If an object can have more than one type of object as a parent, the polymorphic key points to a Name object instead of a single object type.

Executing a `describeSObjects()` call returns the Name object, whose field `Type` contains a list of the possible object types that can parent the queried object. The `namePointing` field in the DescribeSObjectResult indicates that the relationship points to

the Name object, needed because the relationship is polymorphic. For example, the value in the `WhoId` field in aTask record can be a Contact or Lead.

Note: If your organization has the SOQL Polymorphism feature enabled, polymorphic relationship fields reference sObjects, and not Names.

In order to traverse relationships where the object type of the parent is not known, you can use these fields to construct a query:

- `owner`: This field represents the object of a parent who owns the child object, regardless of the parent's object type. For example:

  ```
  SELECT Id, Owner.Name
  FROM Task
  WHERE Owner.FirstName like 'B%'
  ```

  This example query works for task records whose owners are either calendars or users.

- `who`: This field represents the object type of the parent associated with the child:

  ```
  SELECT Id, Who.FirstName, Who.LastName
  FROM Task
  WHERE Owner.FirstName LIKE 'B%'
  ```

  This example query works for task records whose owners can be either calendars or users, and whose “who” parent can be either contacts or leads.

  If you'd like to know the type of object returned in a query, use `who.Type`. For example:

  ```
  SELECT Id, Who.Id, Who.Type
  FROM Task
  ```

  Using this example, you could also query all the tasks associated with Contacts:

  ```
  SELECT Id, Who.Id, Who.Type
  FROM Task
  WHERE Who.Type='Contact'
  ```

- `what`: This field represents the object type of a parent that is associated with the child where the object represents something other than a person (that is, not a contact, lead, or user):

  ```
  SELECT Id, What.Name
  FROM Event
  ```

  This example query works for events whose parent can be an account or a solution, or any of another number of object types.

You can also use `describeSObjects()` to obtain information about the parents and children of objects. For more information, see `describeSObjects()` and especially `namePointing`, which, if set to `true`, indicates the field points to a name.

Using `TYPEOF`

SOQL supports polymorphic relationships using the `TYPEOF` expression in a `SELECT` statement. `TYPEOF` is available in API version 26.0 and later.

Use `TYPEOF` in a `SELECT` statement to control which fields to query for each object type in a polymorphic relationship. The following `SELECT` statement returns a different set of fields depending on the object type associated with the What polymorphic relationship field in an Event.

```
SELECT
  TYPEOF What
```

```
    WHEN Account THEN Phone, NumberOfEmployees
    WHEN Opportunity THEN Amount, CloseDate
    ELSE Name, Email
  END
FROM Event
```

At run time this `SELECT` statement checks the object type referenced by the What field in an Event. If the object type is Account, the referenced Account's Phone and NumberOfEmployee fields are returned. If the object type is Opportunity, the referenced Opportunity's Amount and CloseDate fields are returned. If the object type is any other type, the Name and Email fields are returned. Note that if an `ELSE` clause isn't provided and the object type isn't Account or Opportunity, then `null` is returned for that Event.

Note the following considerations for `TYPEOF`.

- `TYPEOF` is only allowed in the `SELECT` clause of a query. You can filter on the object type of a polymorphic relationship using the Type qualifier in a `WHERE` clause, see Filtering on Polymorphic Relationship Fields for more details.
- `TYPEOF` isn't allowed in queries that don't return objects, such as `COUNT()` and aggregate queries.
- `TYPEOF` can't be used in SOQL queries that are the basis of Streaming API PushTopics.
- `TYPEOF` can't be used in SOQL used in Bulk API.
- `TYPEOF` expressions can't be nested. For example, you can't use `TYPEOF` inside the `WHEN` clause of another `TYPEOF` expression.
- `TYPEOF` isn't allowed in the `SELECT` clause of a semi-join query. You can use `TYPEOF` in the `SELECT` clause of an outer query that contains semi-join queries. The following example is not valid:

  ```
  SELECT Name FROM Account
  WHERE CreatedById IN
      (
      SELECT
          TYPEOF Owner
              WHEN User THEN Id
              WHEN Group THEN CreatedById
          END
      FROM CASE
      )
  ```

  The following semi-join clause is valid because `TYPEOF` is only used in the outer `SELECT` clause:

  ```
  SELECT
      TYPEOF What
          WHEN Account THEN Phone
          ELSE Name
      END
  FROM Event
  WHERE CreatedById IN
      (
      SELECT CreatedById
      FROM Case
      )
  ```

- `GROUP BY`, `GROUP BY ROLLUP`, `GROUP BY CUBE`, and `HAVING` aren't allowed in queries that use `TYPEOF`.

Using the Type qualifier

You can use the Type qualifier on a field to determine the object type that's referenced in a polymorphic relationship. Use the Type qualifier in the `WHERE` clause of a `SELECT` statement to conditionally control what's returned from the query depending on the referenced object type. The following `SELECT` statement uses Type to filter the query based on the What field in Event.

```
SELECT Id
FROM Event
WHERE What.Type IN ('Account', 'Opportunity')
```

At run time this `SELECT` statement returns the IDs for Events that reference Accounts or Opportunities in the What field. If an Event referenced a Campaign in the What field, it wouldn't be returned as part of this `SELECT`. Unlike the `TYPEOF` expression, object types are returned as strings from Type. You can apply any `WHERE` comparison operator to the object type strings, such as `=` (Equals) or `LIKE`.

Combining `TYPEOF` and Type

You can combine `TYPEOF` and Type in a `SELECT` statement. The following `SELECT` statement uses both `TYPEOF` and Type to filter the query and refine the set of returned fields based on the What field in Event.

```
SELECT Id,
  TYPEOF What
    WHEN Account THEN Phone
    WHEN Opportunity THEN Amount
  END
FROM Event
WHERE What.Type IN ('Account', 'Opportunity')
```

At run time this `SELECT` statement always returns the ID for an Event, and then either Account.Phone, or Opportunity.Amount, depending on the object type referenced by the Event's What field. Note that no `ELSE` clause has been provided. Since this statement filters based on the What field in the `WHERE` clause, only Events that reference either an Account or Opportunity are returned, so the `ELSE` clause is not needed. If an `ELSE` clause was included in this case, it would be ignored at run time.

Understanding Relationship Query Limitations

When you design SOQL relationship queries, there are several limitations to consider.

- Relationship queries are not the same as SQL joins. You must have a relationship between objects to create a join in SOQL.
- No more than 35 child-to-parent relationships can be specified in a query. A custom object allows up to 25 relationships, so you can reference all the child-to-parent relationships for a custom object in one query.
- No more than 20 parent-to-child relationships can be specified in a query.
- In each specified relationship, no more than five levels can be specified in a child-to-parent relationship. For example, `Contact.Account.Owner.FirstName` (three levels).
- In each specified relationship, only one level of parent-to-child relationship can be specified in a query. For example, if the `FROM` clause specifies Account, the `SELECT` clause can specify only the Contact or other objects at that level. It could not specify a child object of Contact.
- You can query notes and attachments to get information about them, but you can't filter on the body of the note or attachment. You can't filter against the content of textarea fields, blobs, or Scontrol components in any object. For example, this query is valid, and it returns all account names and the owner ID for any notes associated with the account.

  ```
  SELECT Account.Name, (SELECT Note.OwnerId FROM Account.Notes) FROM Account
  ```

However, this query isn't valid, because it attempts to evaluate information stored in the body of the note.

```
SELECT Account.Name, (SELECT Note.Body FROM Account.Notes WHERE Note.Body LIKE 'D%')
FROM Account
```

If you remove the `WHERE` clause, the query is valid and returns the contents of the body of the note.

```
SELECT Account.Name, (SELECT Note.Body FROM Account.Notes) FROM Account
```

- Consider these limitations for external objects.
  - A subquery that involves external objects can fetch up to 1,000 rows of data.
  - Each SOQL query can have up to 4 joins across external objects and other types of objects.

    Each join requires a separate round trip to the external system when executing the query. Expect longer response times for each join in a query.
  - External objects don't support the `ORDER BY` clause in relationship queries. This limit applies only when the external data is accessed via the OData 2.0 adapter for Salesforce Connect.
  - If the primary or "driving" object for a `SELECT` statement is an external object, `queryMore()` supports only that primary object and doesn't support subqueries.

Using Relationship Queries with History Objects

Custom objects and some standard objects have an associated history object that tracks changes to an object record. You can use SOQL relationship queries to traverse a history object to its parent object.

For example, the following query returns every history row for `Foo__c` and displays the name and custom fields of `Foo`:

```
SELECT OldValue, NewValue, Parent.Id, Parent.name, Parent.customfield__c
FROM foo__history
```

This example query returns every Foo object row together with the corresponding history rows in nested subqueries:

```
SELECT Name, customfield__c, (SELECT OldValue, NewValue FROM foo__history)
FROM foo__c
```

Using Relationship Queries with Data Category Selection Objects

Data categories are used to classify records. In SOQL, you can use the *Article*__DataCategorySelection or QuestionDataCategorySelection objects. You can also build a relationship query with the `DataCategorySelections` relationship name in a `FROM` clause.

Imagine an `Offer` article type. The following query returns the ID of any categorization associated with an offer and the ID of the categorized article.

```
SELECT Id,ParentId
FROM Offer__DataCategorySelection
```

The following example uses the `DataCategorySelections` relationship name to build a relationship query that returns the ID of published offers and the ID of all the categorizations associated to these offers.

```
SELECT Id, Title
  (
    SELECT Id
    FROM DataCategorySelections
```

```
  )
FROM Offer__kav WHERE publishStatus='online';
```

Using Relationship Queries with the Partner WSDL

The partner WSDL doesn't contain the detailed type information that's available in the enterprise WSDL which you need for a relationship SOQL query. You must first execute a `describeSObjects()` call, and from the results, gather the information you need to create your relationship query:

- The `relationshipName` value for one-to-many relationships, for example, in an Account object, the relationship name for the asset child is `Assets`.
- The reference fields available for the relevant object, for example, `whoId`, `whatId`, or `ownerId` on a Lead, Case, or custom object.

For an example of using the partner WSDL with relationship queries, see the examples on developer.salesforce.com (requires login).

Change the Batch Size in Queries

You can change the batch size (the number of rows that are returned in the query result object) that's returned in a `query()` or `queryMore()` call from the default 500 rows.

WSC clients can set the batch size by calling `setQueryOptions()` on the connection object. C# client applications can change this setting by specifying the batch size in the call QueryOptions portion of the SOAP header before invoking the `query()` call. The maximum batch size is 2,000 records. However this setting is only a suggestion. There is no guarantee that the requested batch size will be the actual batch size. This is done to maximize performance.

Note: The batch size will be no more than 200 if the SOQL statement selects two or more custom fields of type long text. This is to prevent large SOAP messages from being returned.

The following sample Java (WSC) code demonstrates setting the batch size to two hundred and fifty (250) records.

```
public void queryOptionsSample() {
  connection.setQueryOptions(250);
}
```

The following sample C# (.NET) code demonstrates setting the batch size to two hundred and fifty (250) records.

```
private void queryOptionsSample()
{
    binding.QueryOptionsValue = new QueryOptions();

    binding.QueryOptionsValue.batchSize = 250;
    binding.QueryOptionsValue.batchSizeSpecified = true;
}
```

SOQL Limits on Objects

SOQL applies specific limits to objects and situations in search results. SOQL limits are defined for the ContentDocumentLink object, ContentHubItem object, external objects, NewsFeed, KnowledgeArticleVersion, RecentlyViewed, TopicAssignment, UserRecordAccess, UserProfileFeed, and Vote.

Some objects or situations have specific limits on SOQL.

Object	Description
ContentDocumentLink	A SOQL query must filter on one of `Id`, `ContentDocumentId`, or `LinkedEntityId`.
ContentHubItem	A SOQL query must filter on one of `Id`, `ExternalId`, or `ContentHubRepositoryId`.

Custom metadata types	Custom metadata types support the following SOQL query syntax.
	`SELECT fieldList [...]`
	`FROM objectType`
	`[USING SCOPE filterScope]`
	`[WHERE conditionExpression]`
	`[ORDER BY field {ASC|DESC} [NULLS {FIRST|LAST}] ]`
	• You can use metadata relationship fields in the *fieldList* and *conditionExpression*.
	• `FROM` can include only 1 object.
	• You can use the following operators.
	– `IN` and `NOT IN`
	– =, >, >=, <, <=, and `!=`
	– `LIKE`, including wild cards
	– `AND`
	• You can use `ORDER BY` only with non-relationship fields.
	• You can use `ORDER BY`, `ASC`, and `DESC` with multiple (non-relationship) fields.
	• You can only use `ORDER BY` when the ordered field is a selected field.
	• Metadata relationship fields support all standard relationship queries.

External objects	• A subquery that involves external objects can fetch up to 1,000 rows of data. • Each SOQL query can have up to 4 joins across external objects and other types of objects. Each join requires a separate round trip to the external system when executing the query. Expect longer response times for each join in a query. • External objects don't support the following aggregate functions and clauses. – `AVG()` function – `COUNT(fieldName)` function (however, `COUNT()` is supported) – `HAVING` clause – `GROUP BY` clause – `MAX()` function – `MIN()` function – `SUM()` function • External objects also don't support the following. – `EXCLUDES` operator – `FOR VIEW` clause – `FOR REFERENCE` clause

Object	Description
	– `INCLUDES` operator – `LIKE` operator – `toLabel()` function – `TYPEOF` clause – `WITH` clause The following limits apply only to the OData 2.0 and 4.0 adapters for Salesforce Connect. • External objects have the following limitations for the `ORDER BY` clause. – `NULLS FIRST` and `NULLS LAST` are ignored. – External objects don't support the `ORDER BY` clause in relationship queries. • The `COUNT()` aggregate function is supported only on external objects whose external data sources have `Request Row Counts` enabled. Specifically, the response from the external system must include the total row count of the result set. The following limits apply only to custom adapters for Salesforce Connect. • Location-based SOQL queries of external objects aren't supported. • If a SOQL query of an external object includes the following, the query fails. – `convertCurrency()` function – `UPDATE TRACKING` clause – `UPDATE VIEWSTAT` clause – `USING SCOPE` clause • In an `ORDER BY` clause, the following are ignored. – `NULLS FIRST` syntax – `NULLS LAST` syntax The following limits apply only to external objects associated with a SharePoint 2010/2013 external data source using SecureAgent. • In SOQL queries of external objects, `IN` clauses with more than approximately 15 IDs return the error "This operation is too complicated for Secure Agent." The exact `IN` clause limit varies based on SharePoint ID length.
KnowledgeArticleVersion	• Always filter on a single value of `PublishStatus` unless the query filters on one or more primary key IDs. To support security, only users with the "Manage Articles" permission see articles whose `PublishStatus` value is `Draft`. • Archived article versions are stored in the articletype_kav object. To query archived article versions, specify the article `Id` and set `IsLatestVersion='0'`. • Always filter on a single value of `Language`. However, in SOQL, you can filter on more than one `Language` if there is a filter on `Id` or `KnowledgeArticleId`.
NewsFeed	• No SOQL limit if logged-in user has "View All Data" permission. If not, specify a LIMIT clause of 1,000 records or fewer.

Object	Description
	• SOQL ORDER BY on fields using relationships is not available. Use ORDER BY on fields on the root object in the SOQL query.
RecentlyViewed	The RecentlyViewed object is updated every time the logged-in user views or references a record. It is also updated when records are retrieved using the `FOR VIEW` or `FOR REFERENCE` clause in a SOQL query. To ensure that the most recent data is available, RecentlyViewed data is periodically truncated down to 200 records per object.
TopicAssignment	No SOQL limit if logged-in user has "View All Data" permission. If not, do one of the following: • Specify a LIMIT clause of 1,100 records or fewer. • Filter on `Id` or `Entity` when using a `WHERE` clause with "=".
UserRecordAccess	• Always use the query formats specified in the SOAP API Developer's Guide. • May include an `ORDER BY` clause. You must `ORDER BY HasAccess` if you `SELECT HasAccess`, and `ORDER BY MaxAccessLevel` if you `SELECT MaxAccessLevel`. • Maximum number of records that can be queried is 200.
UserProfileFeed	• No SOQL limit if logged-in user has "View All Data" permission. If not, specify a LIMIT clause of 1,000 records or fewer. • SOQL ORDER BY on fields using relationships is not available. Use ORDER BY on fields on the root object in the SOQL query. Also, a SOQL query must include `WITH UserId = {userId]`.
Vote	• `ParentId = [single ID]` • `Parent.Type = [single type]` • `Id = [single ID]` • `Id IN = [list of IDs]`

SOQL with Archived Data

You can use SOQL to query archived fields.

The allowed subset of SOQL commands lets you retrieve archived data for finer-grained processing. You can use the `WHERE` clause to filter the query by specifying comparison expressions for the `FieldHistoryType`, `ParentId`, and `CreatedDate` fields, as long as you specify them in that order. That is, if you filter by using `ParentId` or `CreatedDate`, you must also filter by using the preceding fields. The final comparison expression in the query can use any one of the comparison operators =, <, >, <=, or >=. Any other comparison expression can use only the = operator. You can't use the != operator.

You can use the `LIMIT` clause to limit the number of returned results. If you don't use the `LIMIT` clause, a maximum of 2,000 results are returned. You can retrieve additional batches of results by using `queryMore()`.

```
SELECT fieldList
FROM FieldHistoryArchive
[WHERE FieldHistoryType expression [AND ParentId expression[AND CreatedDate expression]]
```

```
 ]
[LIMIT rows]
```

Examples: Allowed Queries

Unfiltered

```
SELECT ParentId, FieldHistoryType, Field, Id, NewValue, OldValue FROM FieldHistoryArchive
```

Filtered on FieldHistoryType

```
SELECT ParentId, FieldHistoryType, Field, Id, NewValue, OldValue FROM FieldHistoryArchive
 WHERE FieldHistoryType = 'Account'
```

Filtered on FieldHistoryType and ParentId

```
SELECT ParentId, FieldHistoryType, Field, Id, NewValue, OldValue FROM FieldHistoryArchive
 WHERE FieldHistoryType = 'Account' AND ParentId='906F00000008unAIAQ'
```

Filtered on FieldHistoryType, ParentId, and CreatedDate

```
SELECT ParentId, FieldHistoryType, Field, Id, NewValue, OldValue FROM FieldHistoryArchive
 WHERE FieldHistoryType = 'Account" AND ParentId='906F00000008unAIAQ' AND CreatedDate
> LAST_MONTH
```

The following table describes the SOQL functions that are available for querying archived fields.

Note: All number fields that are returned from a SOQL query of archived objects are in standard notation, not scientific notation as in the number fields in the entity history of standard objects.

Table 1: SOQL Functions Available for Archived Fields

Functionality	Details
DATE LITERALS	*yesterday*, *last_week*, and so on
LIMIT	
WHERE	Filtering only on `FieldHistoryType`, `ParentId`, and `CreatedDate`

Syndication Feed SOQL and Mapping Syntax

Syndication feed services use a SOQL query and mapping specification that allows applications to point to sets of objects and individual objects and to traverse relationships between objects. Several options can be added as query string parameters to filter and control how the data is presented. Syndication feeds can be defined for public sites.

For full information about the limitations on SOQL in query feed definitions, see the Salesforce online help for syndication feeds.

Location-Based SOQL Queries

Location-based SOQL queries let you compare and query location values stored in Salesforce. You can calculate the distance between two location values, such as between a warehouse and a store. Or you can calculate the distance between a location value and fixed latitude-longitude coordinates, such as between a warehouse and 37.775°, -122.418°—also known as San Francisco.

The geolocation custom field type allows you to create a field to store location values. A geolocation field identifies a location by its latitude and longitude. Standard addresses on Salesforce objects also include a geolocation field that, when populated, can be used in similar ways—with a few restrictions. You can compare and query the locations of both types, for example, to find the 10 closest accounts.

For more information and considerations to keep in mind, see "Compound Fields" in the *SOAP API Developer's Guide*.

Field Types That Support Location-Based SOQL Queries

SOQL supports using simple numeric values for latitude and longitude using the GEOLOCATION function. These values can come from standard numeric fields, user input, calculations, and so on. They can also come from the individual components of a geolocation field, which stores both latitude and longitude in a single logical field. If a geocoding service has populated the geolocation field of a standard address, you can also use latitude and longitude values directly from an address.

SOQL queries made using the SOAP and REST APIs also support using geolocation fields, including address fields that have a geolocation component, directly in SOQL statements. This often results in simpler SOQL statements. Compound fields can *only* be used in SOQL queries made through the SOAP and REST APIs.

SELECT Clause

Retrieve records with locations saved in geolocation or address fields as individual latitude and longitude values by appending "__latitude__s" or "__longitude__s" to the field name, instead of the usual "__c". For example:

```
SELECT Name, Location__latitude__s, Location__longitude__s
FROM Warehouse__c
```

This query finds all the warehouses that are stored in the custom object Warehouse. The results include each warehouse's latitude and longitude values individually. To select the latitude and longitude components individually, use separate field components for `Location__c`.

SOQL executed using the SOAP or REST APIs can SELECT the compound field, instead of the individual elements. Compound fields are returned as structured data rather than primitive values. For example:

```
SELECT Name, Location__c
FROM Warehouse__c
```

This query retrieves the same data as the previous query, but the *`Location__c`* field is a compound geolocation field, and the results combine the two primitive values. Here are sample results from a REST API request.

```
{
  "totalSize" : 10,
  "done" : true,
  "records" : [ {
    "attributes" : {
      "type" : "Warehouse__c",
      "url" : "/services/data/v30.0/sobjects/Warehouse__c/a06D0000017O4nIAE"
    },
    "Name" : "Ferry Building Depot",
    "Location__c" : {
```

```
      "latitude" : 37.79302,
      "longitude" : -122.394507
    }
  }, {
    "attributes" : {
      "type" : "Warehouse__c",
      "url" : "/services/data/v30.0/sobjects/Warehouse__c/a06D00000017O4oIAE"
    },
    "Name" : "Aloha Warehouse",
    "Location__c" : {
      "latitude" : 37.786108,
      "longitude" : -122.430152
    }
  },
  ...
  ]
}
```

WHERE Clause

Retrieve records with locations within or outside of a certain radius with distance conditions in the `WHERE` clause of the query. To construct an appropriate distance condition, use the following functions.

DISTANCE

Calculates the distance between two locations in miles or kilometers.

Usage: `DISTANCE(`***`mylocation1, mylocation2,`*** `'unit')` and replace *`mylocation1`* and *`mylocation2`* with two location fields, or a location field and a value returned by the GEOLOCATION function. Replace *`unit`* with mi (miles) or km (kilometers).

GEOLOCATION

Returns a geolocation based on the provided latitude and longitude. Must be used with the DISTANCE function.

Usage: `GEOLOCATION(`***`latitude, longitude`***`)` and replace *`latitude`* and *`longitude`* with the corresponding geolocation, numerical code values.

Compare two field values, or a field value with a fixed location. For example:

```
SELECT Name, Location__c
FROM Warehouse__c
WHERE DISTANCE(Location__c, GEOLOCATION(37.775,-122.418), 'mi') < 20
```

ORDER BY Clause

Sort records by distance using a distance condition in the `ORDER BY` clause. For example:

```
SELECT Name, StreetAddress__c
FROM Warehouse__c
WHERE DISTANCE(Location__c, GEOLOCATION(37.775,-122.418), 'mi') < 20
ORDER BY DISTANCE(Location__c, GEOLOCATION(37.775,-122.418), 'mi')
LIMIT 10
```

This query finds up to 10 of the warehouses in the custom object Warehouse that are within 20 miles of the geolocation 37.775°, -122.418°, which is San Francisco. The results include the name and address of each warehouse, but not its geocoordinates. The nearest warehouse is first in the list. The farthest location is last.

How SOQL Treats Null Location Values

Geolocation fields are compound fields that combine latitude and longitude values to describe a specific point on Earth. Null values are valid only if *both* latitude and longitude are null.

A record that has an invalid geolocation field value is treated as though both values are null when used in SOQL `WHERE DISTANCE()` and `ORDER BY` clauses. A record that has a geolocation field in which either the latitude or longitude is null is treated as though the field has not been set.

When a compound geolocation field is used in a `SELECT` clause, invalid geolocation values return null. For example:

```
SELECT Name, Location__c
FROM Warehouse__c
LIMIT 5
```

Values such as the ones in this table are returned from API calls.

Name	Location__c
Ferry Building Depot	*null*
Aloha Warehouse	(37.786108,-122.430152)
Big Tech Warehouse	*null*
S H Frank & Company	*null*
San Francisco Tech Mart	(37.77587,-122.399902)

These results include three null geolocation values. It's not possible to tell which values are genuinely null, and which are invalid data.

When the individual field components of that same geolocation field are used in a `SELECT` clause, the saved values are returned as before. Non-null values are returned as that value, and null values return as null. For example:

```
SELECT Name, Location__latitude__s, Location__longitude__s
FROM Warehouse__c
LIMIT 5
```

These values are sample query results.

Name	Location__latitude__s	Location__longitude__s
Ferry Building Depot	*null*	-122.394507
Aloha Warehouse	37.786108	-122.430152
Big Tech Warehouse	*null*	*null*
S H Frank & Company	37.763662	*null*
San Francisco Tech Mart	37.77587	-122.399902

In these results, only one geolocation field is genuinely null. The other two, with partial nulls, are invalid.

When you create formula fields that you plan to use for `DISTANCE` calculations, select **Treat blank fields as blanks** in the Blank Field Handling section. If you select **Treat blank fields as zeros**, distances are calculated from 0°, 0°—the point where the equator intersects

the prime meridian—when your geolocation fields have null values. On record detail pages, null geolocation values in `DISTANCE` formula fields that are set to **Treat blank fields as zeros** cause the formula fields to display as empty.

How SOQL Calculates and Compares Distances

The `DISTANCE` function approximates the haversine, or "great circle," distance calculation within 0.0002%. This formula assumes that the Earth is a perfect sphere, when in fact it's an ellipsoid: an irregular one. Errors from this assumption can be up to 0.55% crossing the equator, but are usually below 0.3%, depending on latitude and direction of travel.

The `DISTANCE` function is fine for calculating the 10 stores closest to a customer's current location. But don't fuel your plane for a flight from San Francisco to Sydney based on it.

Another implication of this approximation is that geolocations and distances have no notion of "equal." You can't check locations or distances for equality. You can only determine whether one location is farther away or closer than another location, or one distance is greater or smaller than another. To verify that two locations are "the same," treat their distance as a floating point number and compare the difference to a tolerance value. For example, this `WHERE` clause finds other records within 25 feet of `testLocation`.

```
WHERE ( DISTANCE(Location__c, testLocation) < 0.05 )
```

Although the errors are small for nearly identical distances, the errors can cause a location query to include or exclude expected locations. If your application requires precise distance calculations and comparisons, we recommend that you do your own math.

Location-Based SOQL Query Considerations

Location-based queries are supported in SOQL in Apex and in the SOAP and REST APIs. Keep in mind these considerations.

- `DISTANCE` and `GEOLOCATION` are supported in `WHERE` and `ORDER BY` clauses in SOQL, but not in `GROUP BY`. `DISTANCE` is supported in `SELECT` clauses.
- `DISTANCE` supports only the logical operators > and <, returning values within (<) or beyond (>) a specified radius.
- When using the `GEOLOCATION` function in SOQL queries, the geolocation field must precede the latitude and longitude coordinates. For example, `DISTANCE(warehouse_location__c, GEOLOCATION(37.775,-122.418), 'km')` works but `DISTANCE(GEOLOCATION(37.775,-122.418), warehouse_location__c, 'km')` doesn't work.
- Apex bind variables aren't supported for the units parameter in `DISTANCE` or `GEOLOCATION` functions. This query doesn't work.

```
String units = 'mi';
List<Account> accountList =
    [SELECT ID, Name, BillingLatitude, BillingLongitude
     FROM Account
     WHERE DISTANCE(My_Location_Field__c, GEOLOCATION(10,10), :units) < 10];
```

For more information, see "Compound Field Considerations and Limitations" in the *SOAP API Developer's Guide*.

CHAPTER 3 Salesforce Object Search Language (SOSL)

In this chapter ...

- Typographical Conventions in This Document
- SOSL Limits
- SOSL Limits on External Objects
- SOSL Syntax
- Example Text Searches
- convertCurrency()
- FIND {SearchQuery}
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- RETURNING FieldSpec
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- Update an Article's Keyword Tracking with SOSL
- Update an Article's Viewstat with SOSL
- WHERE conditionExpression
- WITH DATA CATEGORY DataCategorySpec
- WITH DivisionFilter
- WITH METADATA
- WITH NETWORK NetworkIdSpec
- WITH PricebookId
- WITH SNIPPET

Use the Salesforce Object Search Language (SOSL) to construct text-based search queries against the search index.

You can search text, email, and phone fields for multiple objects, including custom objects, that you have access to in a single query in the following environments.

- SOAP or REST calls
- Apex statements
- Visualforce controllers and getter methods
- Schema Explorer of the Eclipse Toolkit

Note: If your org has relationship queries enabled, SOSL supports SOQL relationship queries.

When to Use SOSL

Use SOSL when you don't know which object or field the data resides in, and you want to:

- Retrieve data for a specific term that you know exists within a field. Because SOSL can tokenize multiple terms within a field and build a search index from this, SOSL searches are faster and can return more relevant results.
- Retrieve multiple objects and fields efficiently where the objects might or might not be related to one another.
- Retrieve data for a particular division in an organization using the divisions feature.
- Retrieve data that's in Chinese, Japanese, Korean, or Thai. Morphological tokenization for CJKT terms helps ensure accurate results.

Performance Considerations

If your searches are too general, they are slow and return too many results. Use the following clauses to define efficient text searches.

- `IN`: Limits the types of fields to search, including email, name, or phone.
- `LIMIT`: Specifies the maximum number of rows to return.
- `OFFSET`: Displays the search results on multiple pages.
- `RETURNING`: Limits the objects and fields to return.
- `WITH DATA CATEGORY`: Specifies the data categories to return.
- `WITH DivisionFilter`: Specifies the division field to return.
- `WITH NETWORK`: Specifies the community ID to return.
- `WITH PricebookId`: Specifies the price book ID to return.

Navigating This Document

- To see a list of available resources, see SOSL Syntax.
- To get started working with SOSL, see Example Text Searches.

Typographical Conventions in This Document

This SOSL reference uses specific typographical conventions.

Use the following typographical conventions:

Convention	Description
`FIND Name IN Account`	Courier font indicates items that you should type as shown. In a syntax statement, Courier font also indicates items that you should type as shown, except for curly braces, square brackets, ellipsis, and other typographical markers explained in this table.
`FIND` ***`fieldname`*** `IN` ***`objectname`***	Italics represent a variable or placeholder. You supply the actual value.
`|`	The pipe character separates alternate elements. For example, in the clause `UPDATE TRACKING|VIEWSTAT[,...]`, the `|` character indicates that you can use either `TRACKING` or `VIEWSTAT` after `UPDATE`.
`[LIMIT` *`n`*`]`	Square brackets indicate an optional element. For example, `[LIMIT` **`n`**`]` means that you can specify a `LIMIT` clause. Don't type square brackets as part of a SOSL command. Nested square brackets indicate elements that are optional and can only be used if the parent optional element is present. For example, in the clause `[ORDER BY` *`fieldname`* `[ASC | DESC] [NULLS {FIRST | LAST}]]` ,`ASC`, `DESC`, or the `NULLS` clause cannot be used without the `ORDER BY` clause.

`[...]` and `[,...]`	Square brackets containing an ellipsis indicate that the preceding element can be repeated up to the limit for the element. If a comma is also present, the repeated elements must be separated by commas. If the element is a list of choices grouped with curly braces, you can use items from the list in any order. For example, in the clause `[ [ [ UPDATE [TRACKING|VIEWSTAT][,...]]`, the `[,...]` indicates that you can use `TRACKING`, `VIEWSTAT`, or both:
	`UPDATE TRACKING`
	`UPDATE VIEWSTAT`
	`UPDATE TRACKING, VIEWSTAT`

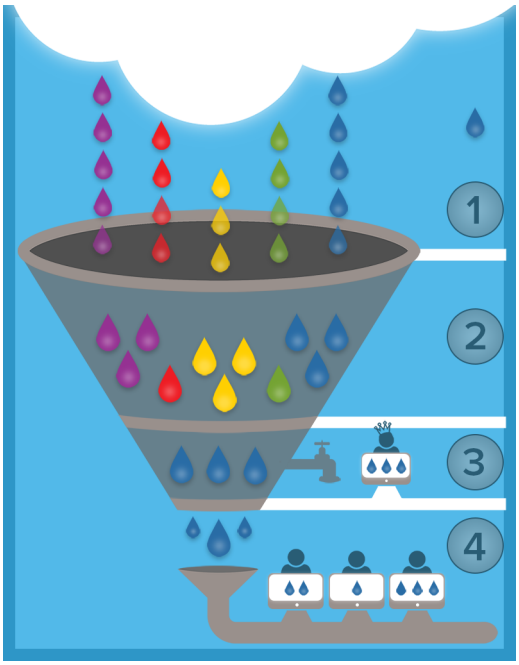
SOSL Limits

The search engine limits the number of records analyzed at each stage of the search process. Sometimes, these limits cause a matching record to be excluded from a user's results.

This image illustrates how the search engine processes SOSL searches and limits results. Each color represents an object, and each raindrop represents some records. The numbers correspond to this flow:

1. The search engine looks for matches to the search term across a maximum of 2,000 records (this limit starts with API version 28.0).
2. SOSL applies different limits for a given object or situation. If the search is for a single object, the full record limit is applied. If the search is global across multiple objects, each object has individual limits that total 2,000 records.
3. Admins (users with the View All Data permission) see the full set of results returned.

4. For all other users, SOSL applies user permission filters. Individual users see only those records that they have access to. Results sets and order vary by the user issuing the search and can change throughout the day as records are added or removed from the index.



Example: Joe Smith, a sales executive at Acme, Inc., wants to find the account record for Industrial Computing. He types *Industrial* into the search bar. Because so many records match the search term Industrial, a limit is imposed on the results. Unfortunately for Joe, the record he wanted is outside the limit. This concept is illustrated in the image as the single raindrop outside of the filter.

Because Joe used a global search, limits are applied to each object type to make up the 2,000 record limit. The illustration shows five blue raindrops going into the filter, but only three make it to the next stage. If Joe limited his search to just one object, the limit would apply to only that object, increasing the chance that the record he wanted would be returned.

Joe retries his search by typing *Industrial Computing San Francisco*. With a more specific search term, the search engine is able to return better matches, even with the same limits applied. In this scenario, the record Joe's looking for is one of the blue raindrops that makes it from the top of the filter all the way through to Joe's search results page.

To avoid search crowding and truncation:

Encourage users to use more specific search terms

Searches work best when users enter a unique search term. `Acme Company San Francisco` returns more relevant results than `Acme`.

Encourage users to narrow the search scope

When users are on the search results page, limit the search scope to the object type for the record desired. The search is rerun. Potentially, users could see more results, because the full result set limit is applied against a single object.

Create list views

Create a list view for a specific set of contacts, documents, or other object records that you search for repeatedly. List views have no limits to the number of records and have a set order. Sharing rules are also applied.

SOSL Limits on External Objects

SOSL applies specific limits to external objects in search results.

- To include an external object in SOSL and Salesforce searches, enable search on both the external object and the external data source. However, syncing always overwrites the external object's search status to match the search status of the external data source.
- Only text, text area, and long text area fields on external objects can be searched. If an external object has no searchable fields, searches on that object return no records.
- External objects don't support the following.
  - `INCLUDES` operator
  - `LIKE` operator
  - `EXCLUDES` operator
  - `toLabel()` function
- External objects also don't support Salesforce Knowledge-specific clauses, including the following.
  - `UPDATE TRACKING` clause
  - `UPDATE VIEWSTAT` clause
  - `WITH DATA CATEGORY` clause
- External objects must be specified explicitly in a `RETURNING` clause to be returned in search results. For example:

```
FIND {MyProspect} RETURNING MyExternalObject, MyOtherExternalObject
```

The following limits apply only to the OData 2.0 and 4.0 adapters for Salesforce Connect.

- The OData adapters for Salesforce Connect don't support logical operators in a `FIND` clause. We send the entire search query string to the external system as a case-sensitive single phrase after removing all ASCII punctuation characters except hyphens (-). For example, `FIND {MyProspect OR "John Smith"}` searches for the exact phrase "MyProspect OR John Smith".

The following limits apply only to custom adapters for Salesforce Connect.

- The `convertCurrency()` function isn't supported in SOSL queries of external objects.
- `WITH` clauses aren't supported in SOSL queries of external objects.

SOSL Syntax

A SOSL query begins with the required `FIND` clause. You can then add optional clauses to filter the query by object type, fields, data categories, and more. You can also determine what is returned. For example, you can specify the order of the results and how many rows to return.

After the required `FIND` clause, you can add one or more optional clauses in the following order.

```
FIND {SearchQuery}
[ IN SearchGroup ]
[ RETURNING FieldSpec [[ toLabel(fields)] [convertCurrency(Amount)] [FORMAT()]] ]
[ WITH DivisionFilter ]
[ WITH DATA CATEGORY DataCategorySpec ]
[ WITH SNIPPET[(target_length=n)] ]
[ WITH NETWORK NetworkIdSpec ]
[ WITH PricebookId ]
[ WITH METADATA ]
[ LIMIT n ]

[ UPDATE [TRACKING], [VIEWSTAT] ]
```

Note: `OFFSET n` and `WHERE conditionExpression` are included within `RETURNING FieldSpec`.

where:

Syntax	Description
`convertCurrency()`	Optional. If an org has multicurrency enabled, converts currency fields to the user's currency.
`FIND {SearchQuery}`	Required. Specifies the text (words or phrases) to search for. Enclose the search query with curly braces. If the `SearchQuery` string is longer than 10,000 characters, no result rows are returned. If `SearchQuery` is longer than 4,000 characters, any logical operators are removed. For example, the `AND` operator in a statement with a `SearchQuery` that's 4,001 characters will default to the `OR` operator, which could return more results than expected.
`FORMAT()`	Optional. Use `FORMAT` with the `FIND` clause to apply localized formatting to standard and custom number, date, time, and currency fields. The `FORMAT` function supports aliasing. In addition, aliasing is required when the query includes the same field multiple times.
`IN SearchGroup`	Optional. Scope of fields to search. One of the following values: • `ALL FIELDS` • `NAME FIELDS` • `EMAIL FIELDS` • `PHONE FIELDS` • `SIDEBAR FIELDS` If unspecified, the default is `ALL FIELDS`. You can specify the list of objects to search in the `RETURNING FieldSpec` clause. Note: This clause doesn't apply to articles, documents, feed comments, feed items, files, products, and solutions. If these objects are specified in the RETURNING clause, the search is not limited to specific fields, and all fields are searched.
`LIMIT n`	Optional. Specifies the maximum number of rows to return in the text query, up to 2,000. If unspecified, the default is 2,000, the largest number of rows that can be returned. These limits apply to API version 28.0 and later. Previous versions support a maximum of 200 rows.
`OFFSET n`	Optional. When expecting many records in a query's results, you can display the results in multiple pages by using the `OFFSET` clause in a SOSL query. For example, you can use `OFFSET` to display records 51–75 and then jump to displaying records

Syntax	Description
	301–350. Using `OFFSET` is an efficient way to handle large results sets.
`ORDER BY`	Optional. Specifies the order in which search results are returned using the `ORDER BY` clause. You can also use this clause to display empty records at the beginning or end of the results.
`RETURNING` *`FieldSpec`*	Optional. Information to return in the search result. List of one or more objects and, within each object, list of one or more fields, with optional values to filter against. If unspecified, the search results contain the IDs of all objects found.
`toLabel(fields)`	Optional. Results from a query are returned translated into the user's language.
`[ UPDATE [TRACKING | VIEWSTAT][,...] ]`	Optional. If an org uses Salesforce Knowledge: • `UPDATE TRACKING` tracks keywords used in Salesforce Knowledge article search. • `Update an Article's Viewstat with SOSL` updates an article's view statistics. • `UPDATE TRACKING, VIEWSTAT` does both.
`WHERE conditionExpression`	Optional. By default, a SOSL query on an object retrieves all rows that are visible to the user. To limit the search, filter the search result by specific field values.
`WITH DATA CATEGORY` ***`DataCategorySpec`***	Optional. If an org uses Salesforce Knowledge articles or answers, filters all search results based on one or more data categories.
`WITH` *`DivisionFilter`*	Optional. If an org uses divisions, filters all search results based on values for the `Division` field.
`WITH METADATA`	Optional. Specifies if metadata is returned in the response. The default setting is no, meaning no metadata is returned.
`WITH NETWORK` ***`NetworkIdSpec`***	Optional. Filters search results by community ID.
`WITH PricebookId`	Optional. Filters product search results by a single price book ID.
`WITH SNIPPET [(target_length=`*`n`*`)]`	Optional. If an org uses Salesforce Knowledge articles, displays contextual snippets and highlights the search term for each article in the search results. By default, each snippet displays up to about 300 characters, which is usually about three lines of text in a standard browser window. Add the optional `target_length` parameter to specify an alternate target length, which can be from 100 and 500 characters.

Note: The SOSL statement character limit is tied to the SOQL statement character limit defined for your org. By default, SOQL and SOSL queries cannot exceed 20,000 characters. For SOSL statements that exceed this maximum length, the API returns a `MALFORMED_SEARCH` exception code, and no result rows are returned.

Example Text Searches

The following are examples of text searches that use SOSL.

Look for `joe` anywhere in the system. Return the IDs of the records where `joe` is found.

```
FIND {joe}
```

Look for the name `Joe Smith` anywhere in the system, in a case-insensitive search. Return the IDs of the records where `Joe Smith` is found.

```
FIND {Joe Smith}
```

Look for the name `Joe Smith` in the name field of a lead, return the ID field of the records.

```
FIND {Joe Smith}
IN Name Fields
RETURNING lead
```

Look for the name `Joe Smith` in the name field of a lead and return the name and phone number.

```
FIND {Joe Smith}
IN Name Fields
RETURNING lead(name, phone)
```

Look for the name `Joe Smith` in the name field of a lead and return the name and phone number of any matching record that was also created in the current fiscal quarter.

```
FIND {Joe Smith}
IN Name Fields
RETURNING lead (name, phone Where createddate = THIS_FISCAL_QUARTER)
```

Look for the name `Joe Smith` or `Joe Smythe` in the name field of a lead or contact and return the name and phone number. If an opportunity is called `Joe Smith` or `Joe Smythe`, the opportunity should not be returned.

```
FIND {"Joe Smith" OR "Joe Smythe"}
IN Name Fields
RETURNING lead(name, phone), contact(name, phone)
```

Wildcards:

```
FIND {Joe Sm*}
FIND {Joe Sm?th*}
```

Delimiting “and” and “or” as literals when used alone:

```
FIND {"and" or "or"}
FIND {"joe and mary"}
FIND {in}
FIND {returning}
FIND {find}
```

Escaping special characters & | ! ( ) { } [ ] ^ " ~ * ? : \'

```
FIND {right brace \}}
FIND {asterisk \*}
FIND {question \?}
```

```
FIND {single quote  \'}
FIND {double quote  \"}
```

Note: Apex requires that you surround SOQL and SOSL statements with square brackets to use them on the fly. You can use Apex script variables and expressions when preceded by a colon (`:`).

convertCurrency()

Use `convertCurrency()` in a SOSL query to convert currency fields to the user's currency. This action requires that the organization is multi-currency enabled.

Use this syntax for the `RETURNING` clause:

`convertCurrency(`***`Amount`***`)`

For example,

```
FIND {test} RETURNING Opportunity(Name, convertCurrency(Amount))
```

If an org has enabled advanced currency management, dated exchange rates are used when converting currency fields on opportunities, opportunity line items, and opportunity history. With advanced currency management, `convertCurrency` uses the conversion rate that corresponds to a given field (for example, `CloseDate on opportunities`). When advanced currency management isn't enabled, the most recent conversion date entered is used.

You can't use the `convertCurrency()` function in a `WHERE` clause. If you do, an error is returned. Use the following syntax to convert a numeric value to the user's currency from any active currency in your org.

```
WHERE Object_name Operator ISO_CODEvalue
```

For example:

```
FIND {test} IN ALL FIELDS RETURNING Opportunity(Name WHERE Amount>USD5000)
```

In this example, opportunity records are returned if the record's currency `Amount` value is greater than the equivalent of USD5000. For example, an opportunity with an amount of `USD5001` is returned, but not `JPY7000`.

Use an ISO code that your org has enabled and made active. If you don't put in an ISO code, the numeric value is used instead of comparative amounts. Using the previous example, opportunity records with `JPY5001`, `EUR5001`, and `USD5001` would be returned. If you use IN in a `WHERE` clause, you can't mix ISO code and non-ISO code values.

Note: Ordering is always based on the converted currency value, just like in reports. Thus, `convertCurrency()` cannot be used with the ORDER BY *Clause*.

The `currentCurrency()` function supports aliasing. In addition, aliasing is required when the query includes the same field multiple times. For example:

```
FIND {Acme} RETURNING Account(AnnualRevenue, convertCurrency(AnnualRevenue) AliasCurrency)
```

FIND *{SearchQuery}*

Use the required `FIND` clause of a SOSL query to specify the word or phrase to search for. A search query includes the literal word or phrase and can also include wildcards and logical operators (AND, OR, and AND NOT).

A search query includes:

- The literal text (single word or a phrase) to search for

- Optionally, Wildcards
- Optionally, logical Operators, including grouping parentheses

Searches are evaluated from left to right and use Unicode (UTF-8) encoding. Text searches are case-insensitive. For example, searches for `Customer`, `customer`, and `CUSTOMER` return the same results.

You can't enter special types of text expressions (such as macros, functions, or regular expressions) that are evaluated at run time in the `FIND` clause.

Note: Surround the `SearchQuery` with curly brackets to distinguish the search expression from other clauses in the text search.

Search Terms

A `SearchQuery` can contain:

- Single words, such as `test` or `hello`
- Phrases that include words and spaces surrounded by double quotes, such as `"john smith"`

The search engine splits record information separated by spaces or punctuation into separate tokens.

The search engine returns accurate search results from searches in East Asian languages that don't include spaces between words using morphological tokenization.

Example: Consider the problem of indexing the term "Tokyo Prefecture" and a subsequent search for `Kyoto` in Japanese.

Index	Search
東京都 Tokyo Prefecture	**京都** Kyoto

Morphological tokenization segments the term **東京都** (Tokyo Prefecture) into two tokens.

東京 Tokyo	**都** Prefecture

This form of tokenization ensures that a search for **京都** (Kyoto) returns only results that include **京都** (Kyoto) and not **東京都** (Tokyo Prefecture).

Wildcards

You can specify the following wildcard characters to match text patterns in your search:

Wildcard	Description
*	Asterisks match zero or more characters at the middle or end of your search term. For example, a search for *john** finds items that start with *john*, such as, *john*, *johnson*, or *johnny*. A search for *mi* meyers* finds items with *mike meyers* or *michael meyers*. If you are searching for a literal asterisk in a word or phrase, then escape the asterisk (precede it with the `\` character).

Wildcard	Description
?	Question marks match only one character in the middle or end of your search term. For example, a search for *jo?n* finds items with the term *john* or *joan* but not *jon* or *johan*. You can't use a ? in a lookup search.

When using wildcards, consider the following notes:

- The more focused your wildcard search, the faster the search results are returned, and the more likely the results will reflect your intention. For example, to search for all occurrences of the word `prospect` (or `prospects`, the plural form), it is more efficient to specify `prospect*` in the search string than to specify a less restrictive wildcard search (such as `prosp*`) that could return extraneous matches (such as `prosperity`).
- Tailor your searches to find all variations of a word. For example, to find `property` and `properties`, you would specify `propert*`.
- Punctuation is indexed. To find `*` or `?` inside a phrase, you must enclose your search string in quotation marks and you must escape the special character. For example, `"where are you\?"` finds the phrase `where are you?`. The escape character (\) is required in order for this search to work correctly.

Operators

Combine multiple words with logic and grouping by using operators to form a more complex query. You can use the following special operators to focus your text search. Operator support is case-insensitive.

Operator	Description
`" "`	Use quotation marks around search terms to find an exact phrase match. This can be especially useful when searching for text with punctuation. For example, `"acme.com"` finds items that contain the exact text `acme.com`. A search for `"monday meeting"` finds items that contain the exact phrase `monday meeting`. To include the words “and,” “or,” and “and not” in your search results, surround those words in double quotes. Otherwise they’re interpreted as the corresponding operators.
`AND`	Finds items that match all of the search terms. For example, `john AND smith` finds items with both the word `john` and the word `smith`. In most cases if an operator isn't specified, `AND` is the default operator. When searching articles, documents, and solutions, `AND` must be specified because `OR` is the default operator.
`OR`	Finds items with at least one of the search terms. For example, `john OR smith` finds items with either `john` or `smith`, or both words.
`AND NOT`	Finds items that do not contain the search term. For example, `john AND NOT smith` finds items that have the word `john` but not the word `smith`.
( )	Use parentheses around search terms in conjunction with logical operators to group search terms. For example, you can search for: • `("Bob" and "Jones") OR ("Sally" and "Smith")`—searches for either Bob Jones or Sally Smith. • `("Bob") and ("Jones" OR "Thomas") and Sally Smith`—searches for documents that contain Bob Jones and Sally Smith or Bob Thomas and Sally Smith.

`SearchQuery` Character Limits

If the `SearchQuery` string is longer than 10,000 characters, no result rows are returned. If `SearchQuery` is longer than 4,000 characters, any logical operators are removed. For example, the `AND` operator in a statement with a `SearchQuery` that's 4,001 characters will default to the `OR` operator, which could return more results than expected.

When you combine multiple operators in a search string, they're evaluated in this order:

1. Parentheses
2. AND and AND NOT (evaluated from right to left)
3. OR

Reserved Characters

The following characters are reserved:

```
? & | ! { } [ ] ( ) ^ ~ * : \ " ' + –
```

Reserved characters, if specified in a text search, must be escaped (preceded by the backslash \ character) in order to be properly interpreted. An error occurs if you do not precede reserved characters with a backslash. This is true even if the `SearchQuery` is enclosed in double quotes.

For example, to search for the following text:

```
{1+1}:2
```

insert a backslash before each reserved character:

```
\{1\+1\}\:2
```

Example FIND Clauses

Type of Search	Example(s)

Single term examples	`FIND {MyProspect}`
	`FIND {mylogin@mycompany.com}`
	`FIND {FIND}`
	`FIND {IN}`
	`FIND {RETURNING}`
	`FIND {LIMIT}`

Single phrase	`FIND {John Smith}`
Term OR Term	`FIND {MyProspect OR MyCompany}`
Term AND Term	`FIND {MyProspect AND MyCompany}`
Term AND Phrase	`FIND {MyProspect AND "John Smith"}`
Term OR Phrase	`FIND {MyProspect OR "John Smith"}`

Type of Search	Example(s)
Complex query using AND/OR	`FIND {MyProspect AND "John Smith" OR MyCompany}` `FIND {MyProspect AND ("John Smith" OR MyCompany)}`
Complex query using AND NOT	`FIND {MyProspect AND NOT MyCompany}`
Wildcard search	`FIND {My*}`
Escape sequences	`FIND {Why not\?}`
Invalid or incomplete phrase (will not succeed)	`FIND {"John Smith}`

FIND Clauses in Apex

The syntax of the `FIND` clause in Apex differs from the syntax of the `FIND` clause in the SOAP API and REST API :

- In Apex, the value of the `FIND` clause is demarcated with single quotes. For example:

```
FIND 'map*' IN ALL FIELDS RETURNING Account (Id, Name), Contact, Opportunity, Lead
```

- In the Force.com API, the value of the `FIND` clause is demarcated with braces. For example:

```
FIND {map*} IN ALL FIELDS RETURNING Account (Id, Name), Contact, Opportunity, Lead
```

The *Force.com Apex Code Developer's Guide* has more information about using SOSL and SOQL with Apex.

FORMAT()

Use `FORMAT` with the `FIND` clause to apply localized formatting to standard and custom number, date, time, and currency fields.

When the `FORMAT` function is applied these fields reflect the appropriate format for the given user locale. The field format matches what appears in the Salesforce Classic user interface. For example, the date *December 28, 2015* can appear numerically as *2015-12-28*, *28-12-2015*, *28/12/2015*, *12/28/2015*, or *28.12.2015*, depending on the org's locale setting.

The `FORMAT` function supports aliasing. In addition, aliasing is required when the query includes the same field multiple times. For example:

```
FIND {Acme} RETURNING Account(Id, LastModifiedDate, FORMAT(LastModifiedDate) FormattedDate)
```

You can also nest it with aggregate or `convertCurrency()` functions.

```
FIND {Acme} RETURNING Account(AnnualRevenue, FORMAT(convertCurrency(AnnualRevenue))
convertedCurrency)
```

IN *SearchGroup*

Specify which types of text fields to search for on a SOSL query by using the IN *SearchGroup* optional clause. For example, you can search for name, email, phone, sidebar, or all fields.

You can specify one of the following values (note that numeric fields are not searchable). If unspecified, the default behavior is to search all text fields in searchable objects.

Note: This clause doesn't apply to articles, documents, feed comments, feed items, files, products, and solutions. If these objects are specified in the RETURNING clause, the search is not limited to specific fields, and all fields are searched.

Valid SearchGroup Settings

Scope	Description
`ALL FIELDS`	Search all searchable fields. If the `IN` clause is unspecified, then this is the default setting.
`EMAIL FIELDS`	Search only email fields.
`NAME FIELDS`	Search only name fields. In addition to the standard Name field on most standard objects, these fields are also searched when using `IN NAME FIELDS` for these standard objects: • Account: Website, Site, NameLocal • Asset: SerialNumber • Case: SuppliedName, SuppliedCompany, Subject • Contact: AssistantName, FirstNameLocal, LastNameLocal • Event: Subject • Lead: Company, CompanyLocal, FirstNameLocal, LastNameLocal • Note: Title • PermissionSet: Label • Report: Description • TagDefinition: NormName • Task: Subject • User: CommunityNickname In custom objects, fields that are defined as "Name Field" are searched. In standard and custom objects, name fields have the `nameField` property set to `true`. (See the Field array of the `fields` parameter of the DescribeSObjectResult for more information.)
`PHONE FIELDS`	Search only phone number fields.
`SIDEBAR FIELDS`	Search for valid records as listed in the Sidebar drop-down list. Unlike search in the application, the asterisk (*) wildcard is not appended to the end of a search string.

While the `IN` clause is optional, it is recommended that you specify the search scope unless you need to search all fields. For example, if you're searching only for an email address, you should specify `IN EMAIL FIELDS` in order to design the most efficient search.

Example IN Clauses

Search Type	Example(s)
No search group	`FIND {MyProspect}`
`ALL FIELDS`	`FIND {MyProspect} IN ALL FIELDS`

Search Type	Example(s)
EMAIL FIELDS	FIND {mylogin@mycompany.com} IN EMAIL FIELDS
NAME FIELDS	FIND {MyProspect} IN NAME FIELDS
PHONE FIELDS	FIND {MyProspect} IN PHONE FIELDS
SIDEBAR FIELDS	FIND {MyProspect} IN SIDEBAR FIELDS
Invalid search (will not succeed)	FIND {MyProspect} IN Accounts

LIMIT *n*

LIMIT is an optional clause that can be added to a SOSL query to specify the maximum number of rows that are returned in the text query, up to 2,000 results. If unspecified, the default is the maximum 2,000 results.

The default 2,000 results is the largest number of rows that can be returned for API version 28.0 and later. Previous versions return up to 200 results.

You can set limits on individual objects or on an entire query.

When you set a limit on the entire query, results are evenly distributed among the objects returned. For example, let's say you set an overall query limit of 20 and don't define any limits on individual objects. If 19 of the results are accounts and 35 are contacts, then only 10 accounts and 10 contacts are returned.

```
FIND {test} RETURNING Account(id), Contact LIMIT 20
```

Setting individual object limits allows you to prevent results from a single object using up the maximum query limit before other objects are returned. For example, if you issue the following query, at most 20 account records can be returned, and the remaining number of records can be contacts.

```
FIND {test} RETURNING Account(id LIMIT 20), Contact LIMIT 100
```

If you specify a limit of 0, no records are returned for that object.

OFFSET *n*

When expecting many records in a query's results, you can display the results in multiple pages by using the OFFSET clause in a SOSL query. For example, you can use OFFSET to display records 51 to 75 and then jump to displaying records 301 to 350. Using OFFSET is an efficient way to handle large results sets.

Use the optional OFFSET to specify the starting row offset into the result set returned by your query. Because the offset calculation is done on the server and only the result subset is returned, using OFFSET is more efficient than retrieving the full result set and then filtering the results locally. OFFSET can be used only when querying a single object. OFFSET must be the last clause specified in a query. OFFSET is available in API version 30.0 and later.

```
FIND {conditionExpression} RETURNING objectType(fieldList ORDER BY fieldOrderByList
LIMIT number_of_rows_to_return
OFFSET number_of_rows_to_skip)
```

As an example, if a query normally returned 50 rows, you could use OFFSET 10 in your query to skip the first 10 rows:

```
FIND {test} RETURNING Account(id LIMIT 10 OFFSET 10)
```

The result set for the preceding example would be a subset of the full result set, returning rows 11 through 20 of the full set.

Considerations When Using OFFSET

Consider these points when using `OFFSET` in your queries:

- The maximum offset is 2,000 rows. Requesting an offset greater than 2,000 will result in a `MALFORMED_SEARCH: SOSL offset should be between 0 to 2000` error.
- We recommend using a `LIMIT` clause in combination with `OFFSET` if you need to retrieve subsequent subsets of the same result set. For example, you could retrieve the first 100 rows of a query using the following:

  ```
  FIND {test} RETURNING Account(Name, Id ORDER BY Name LIMIT 100)
  ```

  You could then retrieve the next 100 rows, 101 through 200, using the following query:

  ```
  FIND {test} RETURNING Account(Name, Id ORDER BY Name LIMIT 100 OFFSET 100)
  ```

- When using `OFFSET`, only the first batch of records will be returned for a given query. If you want to retrieve the next batch, you'll need to re-execute the query with a higher offset value.
- Consecutive SOSL requests for the same search term but with a different OFFSET aren't guaranteed to return a different subset of the same data if the data being searched has been updated since the previous request.
- The `OFFSET` clause is allowed in SOSL used in SOAP API, REST API, and Apex.

ORDER BY *Clause*

You can specify the order in which search results are returned from a SOSL query using the `ORDER BY` clause. You can also use the clause to display empty records at the beginning or end of the results.

Use one or more `ORDER BY` clauses in a SOSL statement.

Syntax

```
ORDER BY fieldname [ASC | DESC] [NULLS [first | last]]
```

Syntax	Description
`ASC` or `DESC`	Orders the results in ascending or descending order. The default is ascending. You can have more than one `ORDER BY` clause.
`NULLS [first | last]`	Orders null records at the beginning (NULLS FIRST) or end (NULLS LAST) of the results. By default, null values are sorted first.

Examples

This example orders the account names in ascending ID order.

```
FIND {MyName} RETURNING Account(Name, Id ORDER BY Id)
```

This example, which shows multiple `ORDER BY` clauses, orders contacts in ascending order by name and by account description.

```
FIND {MyContactName} RETURNING Contact(Name, Id ORDER BY Name), Account(Description, Id
ORDER BY Description)
```

This search returns account records in descending alphabetical order by name, with accounts that have null names appearing last.

```
FIND {MyAccountName} IN NAME FIELDS RETURNING Account(Name, Id ORDER BY Name DESC NULLS
last)
```

This search returns custom objects that contain "San Francisco" in any field and have geolocation or address fields with locations that are within 500 miles of the latitude and longitude coordinates 37 and 122, respectively. The results are sorted in descending order by the locations' distance from the coordinates.

```
FIND {San Francisco} RETURNING My_Custom_Object__c (Name, Id WHERE
DISTANCE(My_Location_Field__c,GEOLOCATION(37,122),'mi') < 500 ORDER BY
DISTANCE(My_Location_Field__c,GEOLOCATION(37,122),'mi') DESC)
```

RETURNING *FieldSpec*

`RETURNING` is an optional clause that can be added to a SOSL query to specify the information to be returned in the text search result.

If unspecified, then the default behavior is to return the IDs of all objects that are searchable in advanced search as well as custom objects (even if they don't have a custom tab), up to the maximum specified in the `LIMIT n` clause or 2,000 (API version 28.0 and later), whichever is smaller. In the results, objects are listed in the order specified in the clause. For information on searchable fields in advanced and global search, see "Searchable Objects and Fields" in the Salesforce Help. API version 27.0 and earlier support a maximum of 200 results.

Note: External objects, articles, documents, feed comments, feed items, files, products, and solutions must be specified explicitly in a `RETURNING` clause to be returned in search results. For example:

```
FIND {MyProspect} RETURNING MySampleExternalObject, KnowledgeArticleVersion, Document,
 FeedComment, FeedItem, ContentVersion, Product2, Solution
```

Use the `RETURNING` clause to restrict the results data that is returned from the search() call. For information on IDs, see ID Field Type.

Syntax

In the following syntax statement, square brackets [] represent optional elements that can be omitted. A comma indicates that the indicated segment can appear more than one time.

```
RETURNING ObjectTypeName
[(FieldList [WHERE conditionExpression] [ORDER BY Clause] [LIMIT n] [OFFSET n])]
[, ObjectTypeName [(FieldList [WHERE conditionExpression] [ORDER BY Clause] [LIMIT n]
[OFFSET n])]]
```

RETURNING can contain the following elements:

Name	Description
ObjectTypeName	Object to return. If specified, then the search() call returns the IDs of all found objects matching the specified object. Must be a valid sObject type. You can specify multiple objects, separated by commas. If you specify more than one *ObjectTypeName*, each object must be distinct; you can't repeat

Name	Description
	an *ObjectTypeName* within a single RETURNING clause. Objects not specified in the RETURNING clause are not returned by the search() call.
FieldList	Optional list of one or more fields to return for a given object, separated by commas. If you specify one or more fields, the fields are returned for all found objects.

WHERE *conditionExpression*	Optional description of how search results for the given object should be filtered, based on individual field values. If unspecified, the search retrieves all the rows in the object that are visible to the user.
	Note that if you want to specify a WHERE clause, you must include a *FieldList* with at least one specified field. For example, this is not legal syntax:
	`RETURNING Account (WHERE name like 'test')`
	But this is:
	`RETURNING Account (Name, Industry WHERE Name like 'test')`
	See *conditionExpression* for more information.

ORDER BY *Clause*	Optional description of how to order the returned result, including ascending and descending order, and how nulls are ordered. You can supply more than one ORDER BY clause.
	Note that if you want to specify an ORDER BY clause, you must include a *FieldList* with at least one specified field. For example, this is not legal syntax:
	`RETURNING Account (ORDER BY id)`
	But this is:
	`RETURNING Account (Name, Industry ORDER BY Name)`

LIMIT *n*	Optional clause that sets the maximum number of records returned for the given object. If unspecified, all matching records are returned, up to the limit set for the query as a whole.
	Note that if you want to specify a LIMIT clause, you must include a *FieldList* with at least one specified field. For example, this is not legal syntax:
	`RETURNING Account (LIMIT 10)`
	But this is:
	`RETURNING Account (Name, Industry LIMIT 10)`

OFFSET *n*	Optional clause used to specify the starting row offset into the result set returned by your query. OFFSET can be used only when querying a single object. OFFSET must be the last clause specified in a query.
	Note that if you want to specify an OFFSET clause, you must include a *FieldList* with at least one specified field. For example, this is not legal syntax:
	`RETURNING Account (OFFSET 25)`
	But this is:
	`RETURNING Account (Name, Industry OFFSET 25)`

Note: The `RETURNING` clause affects whether external objects are searched. For other objects, the `RETURNING` clause affects what data is returned, not what data is searched. The `IN` clause affects what data is searched.

Example RETURNING Clauses

Search Type	Example(s)
No Field Spec	`FIND {MyProspect}`
One sObject, no fields	`FIND {MyProspect} RETURNING Contact`
Multiple sObject objects, no fields	`FIND {MyProspect} RETURNING Contact, Lead`
One sObject, one or more fields	`FIND {MyProspect} RETURNING Account(Name)`
	`FIND {MyProspect} RETURNING Contact(FirstName, LastName)`
Custom sObject	`FIND {MyProspect} RETURNING CustomObject_c`
	`FIND {MyProspect} RETURNING CustomObject_c(CustomField_c)`
Multiple sObject objects, one or more fields, limits	`FIND {MyProspect} RETURNING Contact(FirstName, LastName LIMIT 10), Account(Name, Industry)`
Multiple sObject objects, mixed number of fields	`FIND {MyProspect} RETURNING Contact(FirstName, LastName), Account, Lead(FirstName)`
Unsearchable sObject objects	`FIND {MyProspect} RETURNING RecordType`
	`FIND {MyProspect} RETURNING Pricebook`
Invalid sObject objects	`FIND {MyProspect} RETURNING FooBar`
Invalid sObject field	`FIND {MyProspect} RETURNING Contact(fooBar)`
Single object limit	`FIND {MyProspect} RETURNING Contact(FirstName, LastName LIMIT 10)`
Multiple object limits and a query limit	`FIND {MyProspect} RETURNING Contact(FirstName, LastName LIMIT 20), Account(Name, Industry LIMIT 10), Opportunity LIMIT 50`
Single object offset	`FIND {MyProspect} RETURNING Contact(FirstName, LastName OFFSET 10)`

Note: Apex requires that you surround SOQL and SOSL statements with square brackets to use them on the fly. You can use Apex script variables and expressions when preceded by a colon (`:`).

toLabel(fields)

Use toLabel(*fields*) to translate SOSL query results into the user's language.

A client application can have results from a query returned that are translated into the user's language, using `toLabel()`:

```
toLabel(object.field)
```

For example:

```
FIND {Joe} RETURNING Lead(company, toLabel(Recordtype.Name))
```

This query returns lead records with the record type name translated into the language for the user who issued the query.

Note: You cannot filter on the translated name value from a record type. Always filter on the master value or the ID of the object for record types.

You can use `toLabel()` to filter records using a translated picklist value. For example:

```
FIND {test} RETURNING Lead(company, toLabel(Status) WHERE toLabel(Status) =
'le Draft' )
```

Lead records are returned where the picklist value for Status is 'le Draft.' The comparison is made against the value for the user's language. If no translation is available for the user's language for the specified picklist, the comparison is made against the master values.

Note: The `toLabel()` method cannot be used with the ORDER BY *Clause*. Salesforce always uses the order defined in the picklist, just like reports.

The `toLabel` function supports aliasing. In addition, aliasing is required when the query includes the same field multiple times. For example:

```
FIND {Joe} RETURNING Lead(company, toLabel(Recordtype.Name) AliasName)
```

Update an Article's Keyword Tracking with SOSL

Track keywords that are used in Salesforce Knowledge article searches with the `UPDATE TRACKING` optional clause on a SOSL query. You can use the language attribute to search by locale.

The `UPDATE TRACKING` clause is used to report on Salesforce Knowledge article searches and views. It allows developers to track the keywords used in Salesforce Knowledge article searches. Also, the language attribute can be used to search by a specific language (locale). However, only one language can be specified in a single query. Make a separate query for each language that you want. Use the Java format, which uses the underscore (for example, fr_FR, jp_JP, and so on), to supply locales. Search the Web for "java locale codes" to get a list of supported locales.

You can use this syntax to track a keyword used in Salesforce Knowledge article search:

```
FIND {Keyword}
RETURNING KnowledgeArticleVersion (Title WHERE PublishStatus="Online" and language="en_US")
UPDATE TRACKING
```

Update an Article's Viewstat with SOSL

Determine how many hits a Salesforce Knowledge article has had by using the `UPDATE VIEWSTAT` optional clause on a SOSL query. You can use the language attribute to search by locale.

The optional `UPDATE VIEWSTAT` clause is used to report on Salesforce Knowledge article searches and views. It allows developers to update an article's view statistics. Also, the language attribute can be used to search by a specific language (locale). However, only one language can be specified in a single query. Make a separate query for each language that you want. Use the Java format, which

uses the underscore (for example, fr_FR, jp_JP, and so on), to supply locales. Search the Web for "java locale codes" to get a list of supported locales.

You can use this syntax to increase the view count for every article you have access to online in US English:

```
FIND {Title}
RETURNING FAQ__kav (Title WHERE PublishStatus="Online" and
language="en_US" and
KnowledgeArticleVersion = 'ka230000000PCiy')
UPDATE VIEWSTAT
```

WHERE *conditionExpression*

By default, a SOSL query on an object retrieves all rows that are visible to the user. To limit the search, you can filter the search result by specific field values.

conditionExpression

The *conditionExpression* of the `WHERE` clause uses the following syntax:

```
fieldExpression [logicalOperator fieldExpression2 ... ]
```

You can add multiple field expressions to a condition expression by using logical operators.

The condition expressions in SOSL FIND statements appear in bold in these examples:

- `FIND {test} RETURNING Account (id WHERE createddate = THIS_FISCAL_QUARTER)`
- `FIND {test} RETURNING Account (id WHERE cf__c includes('AAA'))`

You can use parentheses to define the order in which *fieldExpression*s are evaluated. For example, the following expression is `true` if `fieldExpression1` is `true` and either `fieldExpression2` or `fieldExpression3` are `true`:

```
fieldExpression1 AND (fieldExpression2 OR fieldExpression3)
```

However, the following expression is `true` if either `fieldExpression3` is `true` or both `fieldExpression1` and `fieldExpression2` are `true`.

```
(fieldExpression1 AND fieldExpression2) OR fieldExpression3
```

Client applications must specify parentheses when nesting operators. However, multiple operators of the same type do not need to be nested.

fieldExpression

A *fieldExpression* uses the following syntax:

```
fieldName comparisonOperator value
```

where:

Syntax	Description
fieldName	The name of a field in the specified object. Use of single or double quotes around the name will result in an error. You must have at least read-level permissions to the field. It can be any field except a long text area field, encrypted data field, or base64-encoded field. It does not need to be a field in the `fieldList`.
comparisonOperator	Case-insensitive operators that compare values.
value	A value used to compare with the value in `fieldName`. You must supply a value whose data type matches the field type of the specified field. You must supply a native value—other field names or calculations are not permitted. If quotes are required (for example, they are not for dates and numbers), use single quotes. Double quotes result in an error.

Comparison Operators

The following table lists the *comparisonOperator* values that are used in `fieldExpression` syntax. Comparisons on strings are case-insensitive.

Operator	Name	Description
`=`	`Equals`	Expression is true if the value in the specified `fieldName` equals the specified `value` in the expression. String comparisons using the equals operator are case-sensitive for unique case-sensitive fields and case-insensitive for all other fields.
`!=`	`Not equals`	Expression is true if the value in the specified `fieldName` does not equal the specified `value`.
`<`	`Less than`	Expression is true if the value in the specified `fieldName` is less than the specified `value`.
`<=`	`Less or equal`	Expression is true if the value in the specified `fieldName` is less than, or equals, the specified `value`.
`>`	`Greater than`	Expression is true if the value in the specified `fieldName` is greater than the specified `value`.
`>=`	`Greater or equal`	Expression is true if the value in the specified `fieldName` is greater than or equal to the specified `value`.
`LIKE`	`Like`	Expression is true if the value in the specified `fieldName` matches the characters of the text string in the specified `value`. The `LIKE` operator in SOQL and SOSL is similar to the `LIKE` operator in SQL; it provides a mechanism for matching partial text strings and includes support for wildcards. • The `%` and _ wildcards are supported for the `LIKE` operator. • The `%` wildcard matches zero or more characters. • The _ wildcard matches exactly one character. • The text string in the specified `value` must be enclosed in single quotes. • The `LIKE` operator is supported for string fields only. • The `LIKE` operator performs a case-insensitive match, unlike the case-sensitive matching in SQL.

Operator	Name	Description
		• The `LIKE` operator in SOQL and SOSL supports escaping of special characters `%` or `_`. • Don't use the backslash character in a search except to escape a special character. For example, the following query matches Appleton, Apple, and Appl, but not Bappl: `SELECT AccountId, FirstName, lastname FROM Contact WHERE lastname LIKE 'appl%'`
`IN`	`IN`	If the value equals any one of the specified values in a `WHERE` clause. For example: `SELECT Name FROM Account WHERE BillingState IN ('California', 'New York')` The values for `IN` must be in parentheses. String values must be surrounded by single quotes. `IN` and `NOT IN` can also be used for semi-joins and anti-joins when querying on ID (primary key) or reference (foreign key) fields.
`NOT IN`	`NOT IN`	If the value does not equal any of the specified values in a `WHERE` clause. For example: `SELECT Name FROM Account WHERE BillingState NOT IN ('California', 'New York')` The values for `NOT IN` must be in parentheses, and string values must be surrounded by single quotes. There is also a logical operator `NOT`, which is unrelated to this comparison operator.
`INCLUDES` `EXCLUDES`		Applies only to multi-select picklists.

Logical Operators

The following table lists the logical operator values that are used in *`fieldExpression`* syntax:

Operator	Syntax	Description
`AND`	***`fieldExpressionX`*** `AND` ***`fieldExpressionY`***	`true` if both *`fieldExpressionX`* and *`fieldExpressionY`* are true.
`OR`	***`fieldExpressionX`*** `OR` ***`fieldExpressionY`***	`true` if either *`fieldExpressionX`* or *`fieldExpressionY`* is true. Relationship queries with foreign key values in an `OR` clause behave differently depending on the version of the API. In a `WHERE` clause that uses `OR`, if the foreign key value in a record is null, the record is returned in version 13.0 and later, but not returned in versions before 13.0. `SELECT Id FROM Contact WHERE LastName = 'foo' or Account.Name = 'bar'`

Operator	Syntax	Description
		The contact with no parent account has a last name that meets the criteria, so it is returned in version 13.0 and later.
NOT	`not` ***`fieldExpressionX`***	`true` if *`fieldExpressionX`* is false. There is also a comparison operator `NOT IN`, which is different from this logical operator.

Quoted String Escape Sequences

You can use the following escape sequences with SOSL:

Sequence	Meaning
`\n` or `\N`	New line
`\r` or `\R`	Carriage return
`\t` or `\T`	Tab
`\b` or `\B`	Bell
`\f` or `\F`	Form feed
`\"`	One double-quote character
`\'`	One single-quote character
`\\`	Backslash
LIKE expression only: `\_`	Matches a single underscore character (_)
LIKE expression only:`\%`	Matches a single percent sign character (%)

If you use a backslash character in any other context, an error occurs.

Example WHERE Clauses

Example(s)

```
FIND {test}
    RETURNING Account (id WHERE createddate = THIS_FISCAL_QUARTER)
```

```
FIND {test}
    RETURNING Account (id WHERE cf__c includes('AAA'))
```

Example(s)

```
FIND {test}
    RETURNING Account (id), User(Field1,Field2 WHERE Field1 = 'test' order by id ASC,
Name DESC)
```

```
FIND {test} IN ALL FIELDS
    RETURNING Contact(Salutation, FirstName, LastName, AccountId WHERE Name = 'test'),
        User(FirstName, LastName),
        Account(id WHERE BillingState IN ('California', 'New York'))
```

```
FIND {test}
    RETURNING Account (id WHERE (Name = 'New Account')
        or (Id = '001z00000008Vq7'
        and Name = 'Account Insert Test')
        or (NumberOfEmployees < 100 or NumberOfEmployees = null)
        ORDER BY NumberOfEmployees)
```

To search for a Salesforce Knowledge article by ID:

```
FIND {tourism}
    RETURNING KnowledgeArticleVersion (Id, Title WHERE id = 'ka0D0000000025eIAA')
```

To search for multiple Salesforce Knowledge articles by ID:

```
FIND {tourism}
    RETURNING KnowledgeArticleVersion
        (Id, Title WHERE id IN ('ka0D0000000025eIAA', 'ka0D000000002HCIAY'))
```

To search for "San Francisco" in all fields of all `My_Custom_Object__c` objects that have a geolocation or address location within 500 miles of the latitude and longitude coordinates 37 and 122, respectively:

```
FIND {San Francisco}
    RETURNING My_Custom_Object__c (Id
        WHERE DISTANCE(My_Location_Field__c,GEOLOCATION(37,122),'mi') < 100)
```

WITH DATA CATEGORY *DataCategorySpec*

`WITH DATA CATEGORY` is an optional clause that can be added to a SOSL query to filter all search results that are associated with one or more data categories and are visible to users. This clause is used in searches of Salesforce Knowledge articles and questions.

The `WITH DATA CATEGORY` clause can be used in API version 18.0 or later.

Syntax

The `WITH DATA CATEGORY` syntax is:

```
WITH DATA CATEGORY DataCategorySpec [logicalOperator DataCategorySpec2 ... ]
```

Where *DataCategorySpec* consists of a *groupName*, *Operator*, and *category*.

Name	Description
groupName	The name of the data category group to filter. For information on category groups, see "Create and Modify Category Groups" in the Salesforce Help.
Operator	Use one of the following operators: • AT—Queries the specified data category. • ABOVE—Queries the specified data category and all of its parent categories. • BELOW—Queries the specified data category and all of its subcategories. • ABOVE_OR_BELOW—Queries the specified data category, all of its parent categories, and all of its subcategories.
category	The name of the category to filter. To include multiple data categories, enclose them in parentheses, separated by commas. For information on categories, see "Add Data Categories to Category Groups" in the Salesforce Help.

You can add multiple data category specifiers by using the logical operator AND. Other operators, such as OR and AND NOT, are not supported.

A SOSL statement using the WITH DATA CATEGORY clause must also include a RETURNING ***ObjectTypeName*** clause, with a WHERE clause that filters on the PublishStatus field.

In the RETURNING clause, specify one of the following for *ObjectTypeName*:

- To search a specific article type, use the article type name with the suffix *__kav*
- To search all article types, use KnowledgeArticleVersion
- To search questions, use Question

For information on article types, see "Knowledge Article Types" in the Salesforce Help.

The WHERE clause must use one of the following publish statuses:

- `WHERE PublishStatus='online'` for published articles
- `WHERE PublishStatus='archived'` for archived articles
- `WHERE PublishStatus='draft'` for draft articles

Examples

Search Type	Example
Search all published (online)Salesforce Knowledge articles with a category from one category group.	`FIND {tourism} RETURNING KnowledgeArticleVersion (Id, Title WHERE PublishStatus='online') WITH DATA CATEGORY Location__c AT America__c`
Search online FAQ articles with categories from two category groups.	`FIND {tourism} RETURNING FAQ__kav (Id, Title WHERE PublishStatus='online')`

Search Type	Example
	`WITH DATA CATEGORY Geography__c ABOVE France__c AND Product__c AT mobile_phones__c`
Search archived FAQ articles from one category group.	`FIND {tourism} RETURNING FAQ__kav (Id, Title WHERE PublishStatus='archived') WITH DATA CATEGORY Geography__c AT Iceland__c`
Search all draft Salesforce Knowledge articles from one category group.	`FIND {tourism} RETURNING KnowledgeArticleVersion (Id, Title WHERE PublishStatus='draft') WITH DATA CATEGORY Geography__c BELOW Europe__c`

For information on the `WITH DATA CATEGORY` clause, see the *`WITH DATA CATEGORY filteringExpression`*.

Tip: You can also search for articles by ID, without using the `WITH DATA CATEGORY` clause. For more information, see Example WHERE Clauses.

WITH *DivisionFilter*

`WITH DivisionFilter` is an optional clause that can be added to a SOSL query to filter all search results based on the division field. It pre-filters all records based on the division before applying other filters. You can also specify a division by its name rather than by its ID.

For example:

```
FIND {test} RETURNING Account (id where name like '%test%'),
                      Contact (id where name like '%test%')
             WITH DIVISION = 'Global'
```

Note:

- Users can perform searches based on division regardless of whether they have the "Affected by Divisions" permission enabled.
- All searches within a specific division also include the global division. For example, if you search within a division called Western Division, your results will include records found in both the Western Division and the global division.

WITH METADATA

Specifies if metadata is returned in the response. Optional clause.

No metadata is returned by default. To include metadata in the response, use the `LABELS` value, which returns the display label for the fields returned in search results. For example:

```
FIND {Acme} RETURNING Account(Id, Name) WITH METADATA='LABELS'
```

WITH NETWORK *NetworkIdSpec*

You can search for community users and feeds by using the `WITH NETWORK` optional clause on a SOSL query. When you're filtering search results by community, each community is represented by a community ID (`NetworkId`).

You can use the following syntax.

- `WITH NETWORK IN ('NetworkId1', 'NetworkId2', ...)` supports filtering by one or more communities.
- `WITH NETWORK = 'NetworkId'` supports filtering by a single community only.

For objects other than users and feeds, search results include matches across all communities and internal company data, even if you use network filtering in your query.

- You can run searches against multiple objects in the same community.
- You can't run scoped and unscoped searches in the same query. For example, you can't search users from a community along with accounts from the entire organization.

To filter search results for *groups* or *topics* by community, use the `WHERE` clause with a NetworkId value. If you want to search for an internal community, use an all zero value for NetworkId.

Example WITH NETWORK *NetworkIdSpec* Clauses

To search multiple communities for users and feed items containing the string "test" and to sort feed items from the newest to the oldest:

```
FIND {test} RETURNING User (id),
                      FeedItem (id, ParentId WHERE CreatedDate =
                                THIS_YEAR Order by CreatedDate DESC)
            WITH NETWORK IN ('NetworkId1', 'NetworkId2', 'NetworkId3')
```

To search the NetworkId community for users and feed items containing the string "test" and to sort feed items from the newest to the oldest:

```
FIND {test} RETURNING User (id),
                      FeedItem (id, ParentId WHERE CreatedDate =
                                THIS_YEAR Order by CreatedDate DESC)
            WITH NETWORK = 'NetworkId'
```

To search in an internal community for users and feed items containing the string "test" and to sort feed items from newest to oldest:

```
FIND {test} RETURNING User (id),
                      FeedItem (id, ParentId WHERE CreatedDate =
                                THIS_YEAR Order by CreatedDate DESC)
            WITH NETWORK = '00000000000000'
```

WITH PricebookId

Filters product search results by a single price book ID.

Only applicable for the Product2 object. The price book ID must be associated with the product that you're searching for. For example:

```
Find {laptop} RETURNING Product2 WITH PricebookId = '01sxx0000002MffAAE'
```

WITH SNIPPET

`WITH SNIPPET` is an optional clause that can be added to a SOSL query for article, case, feed, and idea searches to provide users with more context for the record in the search results. Snippets make it easier for users to identify the content that they're looking for in the search results when the search term isn't included in the summary field.

Search highlights and snippets are generated from the following field types.

- Email
- Text
- Text Area
- Text Area (Long)
- Text Area (Rich)

Search highlights and snippets are *not* generated from the following field types.

- Checkbox
- Currency
- Date
- Date/Time
- File
- Formula
- Lookup Relationship
- Number
- Percent
- Phone
- Picklist
- Picklist (Multi-Select)
- URL

Example: The following SOSL statement returns snippets for articles that match the search term *`San Francisco`*.

```
FIND {San Francisco} IN ALL FIELDS RETURNING KnowledgeArticleVersion(id, title WHERE
PublishStatus = 'Online' AND Language = 'en_US') WITH
      SNIPPET (target_length=120)
```

The search term is highlighted with `<mark>` tags within the context of the snippet results. Stemmed forms of the term and any synonyms defined are also highlighted.

Example:

```
[ {
  "attributes" : {
    "type" : "KnowledgeArticleVersion",
   "url" : "/services/data/v32.0/sobjects/KnowledgeArticleVersion/kaKD00000000001MAA"

  },
  "Id" : "kaKD00000000001MAA"
  "Title" : "San Francisco"
  "Summary" : "City and County of San Francisco"
```

```
  "snippet.text" : "<mark>San</mark> <mark>Francisco</mark>, officially the City and
County of <mark>San</mark> <mark>Francisco</mark> is the... City and County of
<mark>San</mark> <mark>Fran</mark>"
  "snippet.whole.Title" : "<mark>San</mark> <mark>Francisco</mark>"
}, {
   "attributes" : {
     "type" : "KnowledgeArticleVersion",
    "url" : "/services/data/v32.0/sobjects/KnowledgeArticleVersion/kaBD0000000007DMAQ"

   },
   "Id" : "kaBD0000000007DMAQ",
   "Title" : "San Francisco Bay Area",
   "Summary" : "Nine county metropolitan area",
   "snippet.text" : "The <mark>SF</mark> Bay Area, commonly known as the Bay Area, is
 a populated region that"
   "snippet.whole.Title" : "<mark>San</mark> <mark>Francisco</mark> Bay Area"
}, {
   "attributes" : {
     "type" : "KnowledgeArticleVersion",
    "url" : "/services/data/v32.0/sobjects/KnowledgeArticleVersion/ka3D0000000042OIAQ"

   },
   "Id" : "ka3D0000000042OIAQ",
   "Title" : "California",
   "Summary" : "State of California",
   "snippet.text" : "(Greater Los Angeles area and <mark>San</mark>
<mark>Francisco</mark> Bay Area, respectively), and eight of the nation's 50 most"
  } ]
```

Note: In this example, "SF" (as a synonym defined for "San Francisco") and "San Fran" (as a stemmed form of "San Francisco") are also highlighted in the results as matching search terms.

Usage

For SOSL statements using the `WITH SNIPPET` clause, we recommend using a `RETURNING` ***`ObjectTypeName`*** clause, with a `WHERE` clause that filters on the `PublishStatus` field.

In the `RETURNING` clause, specify one of the following for *`ObjectTypeName`*:

- To search a specific article type, use the article type name with the suffix *__kav*.
- To search all article types, use KnowledgeArticleVersion.
- To search case, case comment, feed, feed comment, idea, and idea comment types, use `Case`, `CaseComment`, `FeedItem`, `FeedComment`, `Idea`, and `IdeaComment`. For example:

```
FIND {San Francisco} IN ALL FIELDS RETURNING FeedItem, FeedComment WITH SNIPPET
(target_length=120)
```

Other objects that are included in searches that contain `WITH SNIPPET` don't return snippets.

Snippets aren't displayed for search terms that contain a wildcard, when the search doesn't return any articles, or if the user doesn't have access to the field that contains the snippet. Even if you add the `WITH SNIPPET` clause, searches that don't return snippets don't return snippets.

Snippets are only displayed when 20 or fewer results are returned on a page.

Tip: Use the `LIMIT` or `OFFSET` clause to return only 20 results at a time.

Escaped HTML Tags

When matching search terms within HTML tags are returned in a snippet, the HTML tags are escaped and the matched search terms are highlighted in the results.

Example: A search for *`salesforce`* returns an article with the text, "For more information, visit salesforce.com". The original hyperlink tags from the article are escaped (encoded) and "salesforce" is highlighted in the snippet result.

```
For more information, visit &lt;a
href='http://salesforce.com'&gt;salesforce.com&lt;/a&gt;
```

Target Snippet Length

By default, each snippet displays up to approximately 300 characters, which is usually three lines of text in a standard browser window display.

Snippets consist of one or more *fragments* of text that contain the search term up to a *target length*, within a statistically insignificant degree of variance. If the returned snippet includes multiple text fragments (for example, for matches within multiple fields), the target length is the maximum total length of all the returned fragments.

To specify an alternate target length, add the optional `target_length` parameter to the `WITH SNIPPET` clause. You can specify a target length from 50 and 1,000 characters. When the `target_length` is set to an invalid number, such as *`0`* or a negative number, the length defaults to *`300`*.

Example: The `target_length` parameter is useful for displaying a snippet of approximately three lines of text in a standard mobile interface.

```
FIND {San Francisco} IN ALL FIELDS RETURNING KnowledgeArticleVersion(id, title WHERE
PublishStatus = 'Online' AND Language = 'en_US') WITH
      SNIPPET(target_length=120)
```

Supported APIs

The `WITH SNIPPET` clause can be used in API version 32.0 or later. The `WITH SNIPPET` clause in SOSL is supported in SOAP API, REST API, and Apex.

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