Big Objects Implementation Guide

Version 48.0, Spring '20

@salesforcedocs

Last updated: June 9, 2020

CONTENTS

CHAPTER 1 Big Objects

In this chapter ...

A big object stores and manages massive amounts of data on the Salesforce platform. You can archive data from other objects or bring massive datasets from outside systems into a big object to get a full view of your customers. Clients and external systems use a standard set of APIs to access big object data. A big object provides consistent performance, whether you have 1 million records, 100 million, or even 1 billion. This scale gives a big object its power and defines its features.

There are two types of big objects.

- **Standard big objects**—Objects defined by Salesforce and included in Salesforce products. `FieldHistoryArchive` is a standard big object that stores data as part of the Field Audit Trail product. Standard big objects are available out of the box and cannot be customized.
- **Custom big objects**—New objects that you create to store information unique to your org. Custom big objects extend the functionality that Lightning Platform provides. For example, if you're building an app to track product inventory, create a custom big object called `HistoricalInventoryLevels` to track historical inventory levels for analysis and future optimizations. This implementation guide is for configuring and deploying custom big objects.

EDITIONS

Available in: both Salesforce Classic and Lightning Experience

Available in: **Enterprise**, **Performance**, **Unlimited**, and **Developer** Editions for up to 1 million records

Additional record capacity and Async SOQL query is available as an add-on license.

Custom Big Object Use Cases

- **360° view of the customer**—Extend your Salesforce data model to include detailed information from loyalty programs, feeds, clicks, billing and provisioning information, and more.
- **Auditing and tracking**—Track and maintain a long-term view of Salesforce or product usage for analysis or compliance purposes.
- **Historical archive**—Maintain access to historical data for analysis or compliance purposes while optimizing the performance of your core CRM or Lightning Platform applications.

Differences Between Big Objects and Other Objects

Because a big object can store data on an unlimited scale, it has different characteristics than other objects, like sObjects. Big objects are also stored in a different part of the Lightning Platform.

Big Objects	sObjects
Horizontally scalable distributed database	Relational database
Non-transactional database	Transactional database
Hundreds of millions or even billions of records	Millions of records

These big object behaviors ensure a consistent and scalable experience.

- Big objects support only object and field permissions, not regular or standard sharing rules.
- Features like triggers, flows, processes, and the Salesforce app are not supported on big objects.
- When you insert an identical big object record with the same representation multiple times, only a single record is created so that writes can be idempotent. This behavior is different from an sObject, which creates a record for each request to create an object.

SEE ALSO:

Release Notes: Field History Tracking Data Deleted After 18 Months

CustomObject

Salesforce Help: Big Object Support in Analytics

Big Objects Best Practices

A big object is unique because of its ability to scale for massive amounts of data.

EDITIONS

Available in: both Salesforce Classic and Lightning Experience

Available in: **Enterprise**, **Performance**, **Unlimited**, and **Developer** Editions for up to 1 million records

Additional record capacity and Async SOQL query is available as an add-on license.

Considerations When Using Big Objects

- To define a big object or add a field to a custom big object, use either Metadata API or Setup.
- Big objects support custom Lightning and Visualforce components rather than standard UI elements home pages, detail pages, list views, and so on.
- You can create up to 100 big objects per org. The limits for big object fields are similar to the limits on custom objects and depend on your org's license type.
- You can't use Salesforce Connect external objects to access big objects in another org.
- Big objects don't support encryption. If you archive encrypted data from a standard or custom object, it is stored as clear text on the big object.

Design with Resiliency in Mind

The big objects database stores billions of records and is a distributed system that favors consistency over availability. The database is designed to ensure row-level consistency.

When working with big data and writing batches of records using APIs or Apex, you can experience a partial batch failure while some records are written and others aren't. Because the database is highly responsive and consistent at scale, this type of behavior is expected. In these cases, simply retry until all records are written.

Keep these principles in mind when working with big objects.

- The best practice when writing to a big object is to have a retry mechanism in place. Retry the batch until you get a successful result from the API or Apex method.

  Tip: To add logging to a custom object and surface errors to users, use the `addError()` method. See An Introduction to Exception Handling.

  Tip: To verify that all records are saved, check the `Database.SaveResult` class. See SaveResult Class Reference.

- Don't try to figure out which records succeeded and which failed. Retry the entire batch.
- Big objects don't support transactions. If attempting to read or write to a big object using a trigger, process, or flow on a sObject, use asynchronous Apex. Asynchronous Apex has features like the `Queueable` interface that isolates DML operations on different sObject types to prevent the mixed DML error.
- Because your client code must retry, use asynchronous Apex to write to a big object. By writing asynchronously, you are better equipped to handle database lifecycle events.

SEE ALSO:

Salesforce Help: Big Objects

Define and Deploy Custom Big Objects

You can define custom big objects with Metadata API or in Setup. After you define and deploy a big object, you can view it or add fields in Setup. After you've deployed a big object, you can't edit or delete the index. To change the index, start over with a new big object. To define a big object in Setup, see Salesforce Help.

EDITIONS

Available in: both Salesforce Classic and Lightning Experience

Available in: **Enterprise**, **Performance**, **Unlimited**, and **Developer** Editions for up to 1 million records

Greater record capacity and Async SOQL query available as an add-on license.

Define a Custom Big Object

Define a custom big object through the Metadata API by creating XML files that contain its definition, fields, and index.

- `object` files—Create a file for each object to define the custom big object, its fields, and its index.
- `permissionset/profile` files—Create a permissionSet or profile file to specify permissions for each field. These files are not required, but is required to grant access to users. By default, access to a custom big object is restricted.
- `package` file—Create a file for the metadata package to specify the contents.

Note: While custom big objects use the "CustomObject" metadata type, some parameters are unique to big objects and others are not applicable. The specific metadata parameters that apply to big objects are outlined in this document.

Naming Conventions for Custom Big Objects

Object names must be unique across all standard objects, custom objects, external objects, and big objects in the org. In the API, the names of custom big objects have a suffix of two underscores immediately followed by a lowercase "b" (__b). For example, a big object named "HistoricalInventoryLevels" is seen as HistoricalInventoryLevels__b in that organization's WSDL. We recommend that you make object labels unique across all objects in the org - standard, custom, external and big objects.

CustomObject Metadata

Field Name	Field Type	Description
`deploymentStatus`	DeploymentStatus (enumeration of type string)	Custom big object's deployment status (`Deployed` for all big objects)
`fields`	CustomField[]	Definition of a field in the big object
`fullName`	string	Unique API name of the big object
`indexes`	Index[]	Definition of the index
`label`	string	Big object's name as displayed in the UI
`pluralLabel`	string	Field plural name as displayed in the UI

CustomField Metadata

Field Name	Field Type	Description
`fullName`	string	Unique API name of a field.
`label`	string	Field name as displayed in the UI.
`length`	int	Length of a field in characters (Text and LongTextArea fields only). The total number of characters across all text fields in an index can't exceed 100. To increase this value, contact Salesforce Customer Support. Note: Email fields are 80 characters. Phone fields are 40 characters. Keep these lengths in mind when designing your index because they count toward the 100 character limit.
`pluralLabel`	string	Field plural name as displayed in the UI.
`precision`	int	Number of digits for a number value. For example, the number 256.99 has a precision of 5 (number fields only).
`referenceTo`	string	Related object type for a lookup field (lookup fields only).
`relationshipName`	string	Name of a relationship as displayed in the UI (lookup fields only).
`required`	boolean	Specifies whether the field is required. All fields that are part of the index must be marked as required.
`scale`	int	Number of digits to the right of the decimal point for a number value. For example, the number 256.99 has a scale of 2 (number fields only).
`type`	FieldType	Field type. Supports DateTime, Email, Lookup, Number, Phone, Text, LongTextArea, and URL. Note: You can't include LongTextArea and URL fields in the index.

Note: Uniqueness is not supported for custom fields.

Index Metadata

Represents an index defined within a custom big object. Use this metadata type to define the composite primary key (index) for a custom big object.

Field Name	Field Type	Description
`fields`	IndexField[]	The definition of the fields in the index.
`label`	string	Required. This name is used to refer to the big object in the user interface. Available in API version 41.0 and later.

IndexField Metadata

Defines which fields make up the index, their order, and sort direction. The order in which the fields are defined determines the order fields are listed in the index.

Note: The total number of characters across all text fields in an index can't exceed 100. To increase this value, contact Salesforce Customer Support.

Field Name	Field Type	Description
`name`	string	Required. The API name for the field that's part of the index. This value must match the `fullName` value for the corresponding field in the fields section and be marked as required. Warning: When querying a big object record via SOQL and passing the results as arguments to the delete API, if any index field name has a leading or trailing white space, you can't delete the big object record.
`sortDirection`	string	Required. The sort direction of the field in the index. Valid values are `ASC` for ascending order and `DESC` for descending order.

Example: **Create Metadata Files for Deployment**

The following XML excerpts create metadata files that you can deploy as a package. Each Customer Interaction object represents customer data from a single session in an online video game. The `Account__c`, `Game_Platform__c`, and `Play_Date__c` fields define the index, and a lookup field relates the Customer Interactions to the Account object.

Customer_Interaction__b.object

```
<?xml version="1.0" encoding="UTF-8"?>
<CustomObject xmlns="http://soap.sforce.com/2006/04/metadata">
    <deploymentStatus>Deployed</deploymentStatus>

    <fields>
        <fullName>In_Game_Purchase__c</fullName>
        <label>In-Game Purchase</label>
        <length>16</length>
        <required>false</required>
        <type>Text</type>
        <unique>false</unique>
    </fields>

    <fields>
        <fullName>Level_Achieved__c</fullName>
        <label>Level Achieved</label>
        <length>16</length>
        <required>false</required>
        <type>Text</type>
        <unique>false</unique>
    </fields>

    <fields>
        <fullName>Lives_This_Game__c</fullName>
```

```
    <label>Lives Used This Game</label>
    <length>16</length>
    <required>false</required>
    <type>Text</type>
    <unique>false</unique>
</fields>

<fields>
    <fullName>Game_Platform__c</fullName>
    <label>Platform</label>
    <length>16</length>
    <required>true</required>
    <type>Text</type>
    <unique>false</unique>
</fields>

 <fields>
    <fullName>Score_This_Game__c</fullName>
    <label>Score This Game</label>
    <length>16</length>
    <required>false</required>
    <type>Text</type>
    <unique>false</unique>
</fields>

<fields>
    <fullName>Account__c</fullName>
    <label>User Account</label>
    <referenceTo>Account</referenceTo>
    <relationshipName>Game_User_Account</relationshipName>
    <required>true</required>
    <type>Lookup</type>
</fields>

<fields>
    <fullName>Play_Date__c</fullName>
    <label>Date of Play</label>
    <required>true</required>
    <type>DateTime</type>
</fields>

<fields>
    <fullName>Play_Duration__c</fullName>
    <label>Play Duration</label>
    <required>false</required>
    <type>Number</type>
    <scale>2</scale>
    <precision>18</precision>
</fields>

<indexes>
    <fullName>CustomerInteractionsIndex</fullName>
    <label>Customer Interactions Index</label>
    <fields>
```

```
            <name>Account__c</name>
            <sortDirection>DESC</sortDirection>
        </fields>
        <fields>
            <name>Game_Platform__c</name>
            <sortDirection>ASC</sortDirection>
        </fields>
        <fields>
        <name>Play_Date__c</name>
        <sortDirection>DESC</sortDirection>
        </fields>
    </indexes>

    <label>Customer Interaction</label>
    <pluralLabel>Customer Interactions</pluralLabel>
</CustomObject>
```

package.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<Package xmlns="http://soap.sforce.com/2006/04/metadata">
    <types>
        <members>*</members>
        <name>CustomObject</name>
    </types>
    <types>
        <members>*</members>
        <name>PermissionSet</name>
    </types>
    <version>41.0</version>
</Package>
```

Customer_Interaction_BigObject.permissionset

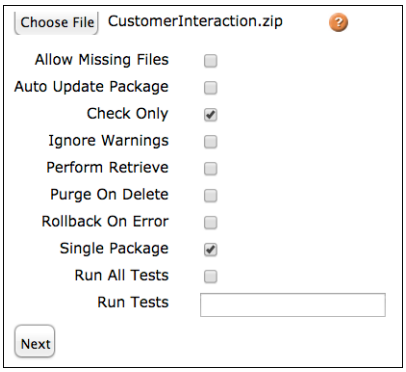
```
<?xml version="1.0" encoding="UTF-8"?>
<PermissionSet xmlns="http://soap.sforce.com/2006/04/metadata">

    <label>Customer Interaction Permission Set</label>

    <fieldPermissions>
        <editable>true</editable>
        <field>Customer_Interaction__b.In_Game_Purchase__c</field>
        <readable>true</readable>
    </fieldPermissions>

    <fieldPermissions>
        <editable>true</editable>
        <field>Customer_Interaction__b.Level_Achieved__c</field>
        <readable>true</readable>
    </fieldPermissions>

    <fieldPermissions>
        <editable>true</editable>
        <field>Customer_Interaction__b.Lives_This_Game__c</field>
        <readable>true</readable>
```

```
    </fieldPermissions>


    <fieldPermissions>
        <editable>true</editable>
        <field>Customer_Interaction__b.Play_Duration__c</field>
        <readable>true</readable>
    </fieldPermissions>

    <fieldPermissions>
        <editable>true</editable>
        <field>Customer_Interaction__b.Score_This_Game__c</field>
        <readable>true</readable>
    </fieldPermissions>


</PermissionSet>
```

Deploy Custom Big Objects as a Metadata Package

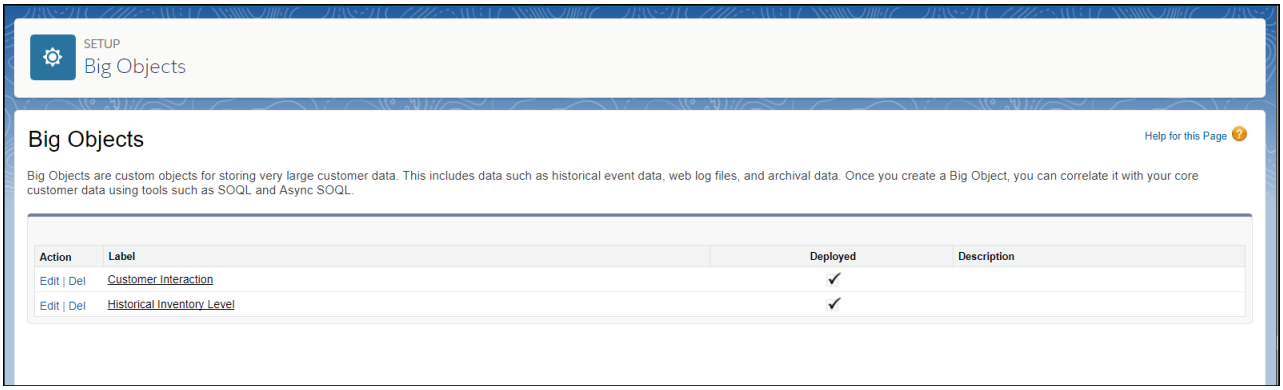
Use the Metadata API to deploy a custom big object. You can use several different tools, like Workbench or the Ant Migration Tool, to deploy. When building a package to deploy a custom big object, make sure the `object` file is in a folder called "objects" and the `permissionset` file is in a folder called "permissionsets". `package.xml` must be in the root directory, and not in a folder within the package.

Note: You can run a test deployment by using the `checkOnly` deployment option. In Workbench, select the **Check Only** option on the Deploy screen.

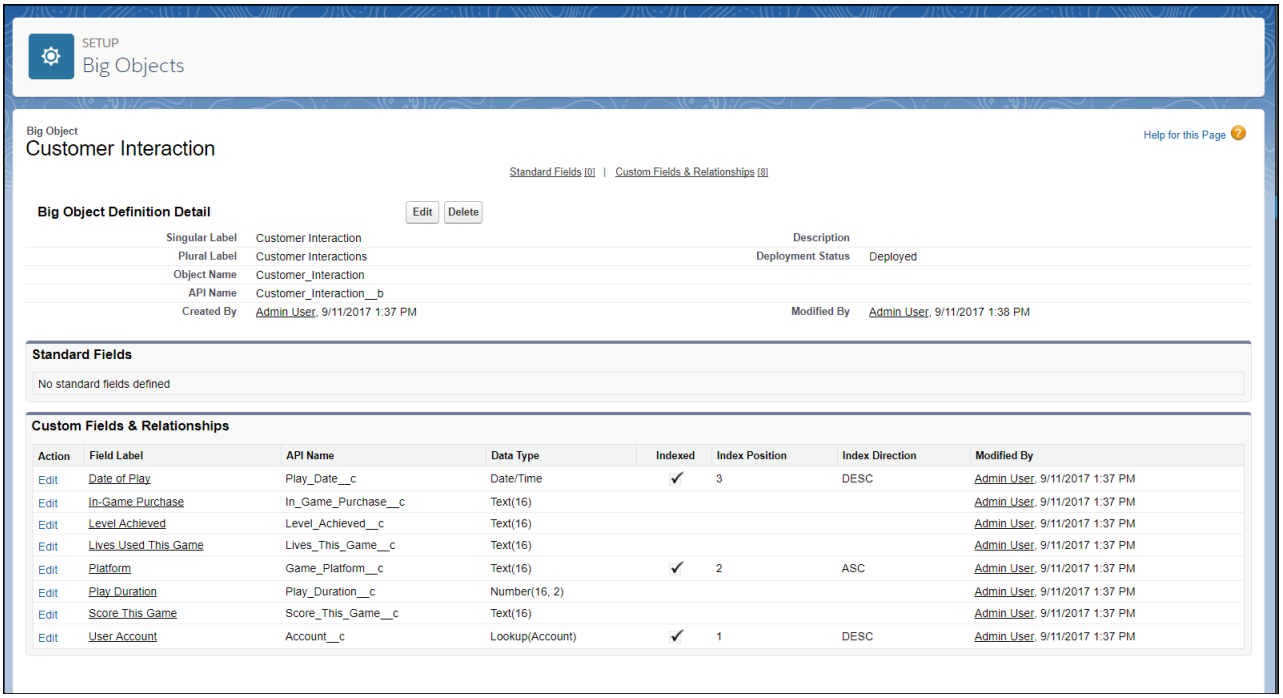


View a Custom Big Object in Setup

After you've deployed your custom big object, you can view it by logging in to your organization and, from Setup, entering *`Big Objects`* in the `Quick Find` box, then selecting **Big Objects**.



Click the name of a big object, to see its fields and relationships.



SEE ALSO:

- CustomObject
- PermissionSet
- Index
- Deploying and Retrieving Metadata with the Zip File
- *Salesforce Help:* Big Objects

Deploying and Retrieving Metadata with the Zip File

The `deploy()` and `retrieve()` calls are used to deploy and retrieve a .zip file. Within the .zip file is a project manifest (`package.xml`) that lists what to retrieve or deploy, and one or more XML components that are organized into folders.

Note: A component is an instance of a metadata type. For example, `CustomObject` is a metadata type for custom objects, and the `MyCustomObject__c` component is an instance of a custom object.

The files that are retrieved or deployed in a .zip file might be unpackaged components that reside in your org (such as *standard objects*) or packaged components that reside within named packages.

Note: You can deploy or retrieve up to 10,000 files at once. AppExchange packages use different limits. In API version 43.0 and 44.0, AppExchange packages can contain up to 12,500 files. In API version 45.0, AppExchange packages can contain up to 17,500 files. In API version 46.0, AppExchange packages can contain up to 22,000 files. In API version 47.0 and later, AppExchange packages can contain up to 30,000 files. The maximum size of the deployed or retrieved .zip file is 39 MB. If the files are uncompressed in an unzipped folder, the size limit is 400 MB.

- If using the Ant Migration Tool to deploy an unzipped folder, all files in the folder are compressed first. The maximum size of uncompressed components in an unzipped folder is 400 MB or less depending on the compression ratio. If the files have a high compression ratio, you can migrate a total of approximately 400 MB because the compressed size would be under 39 MB. However, if the components can't be compressed much, like binary static resources, you can migrate less than 400 MB.
- Metadata API base-64 encodes components after they're compressed. The resulting .zip file can't exceed 50 MB, which is the limit for SOAP messages. Base-64 encoding increases the size of the payload, so your compressed payload can't exceed approximately 39 MB before encoding.
- You can perform a `retrieve()` call for a big object only if its index is defined. If a big object is created in Setup and doesn't yet have an index defined, you can't retrieve it.

Every .zip file contains a project manifest, a file that's named `package.xml`, and a set of directories that contain the components. The manifest file defines the components that you're trying to retrieve or deploy in the .zip file. The manifest also defines the API version that's used for the deployment or retrieval.

Note: You can edit the project manifest, but be careful if you modify the list of components it contains. When you deploy or retrieve components, Metadata API references the components listed in the manifest, not the directories in the .zip file.

The following is a sample `package.xml` file. You can retrieve an individual component for a metadata type by specifying its `fullName` field value in a `members` element. You can also retrieve all components of a metadata type by using `<members>*</members>`.

```
<?xml version="1.0" encoding="UTF-8"?>
<Package xmlns="http://soap.sforce.com/2006/04/metadata">
    <types>
        <members>MyCustomObject__c</members>
        <name>CustomObject</name>
    </types>
    <types>
        <members>*</members>
        <name>CustomTab</name>
    </types>
    <types>
        <members>Standard</members>
        <name>Profile</name>
    </types>
    <version>48.0</version>
</Package>
```

The following elements can be defined in `package.xml`.

- `<fullName>` contains the name of the server-side package. If no `<fullName>` exists, the `package.xml` defines a client-side `unpackaged` package.
- `<types>` contains the name of the metadata type (for example, `CustomObject`) and the named members (for example, `myCustomObject__c`) to be retrieved or deployed. You can add multiple `<types>` elements in a manifest file.

- `<members>` contains the `fullName` of the component, for example `MyCustomObject__c`. The `listMetadata()` call is useful for determining the `fullName` for components of a particular metadata type if you want to retrieve an individual component. For many metadata types, you can replace the value in `members` with the wildcard character `*` (asterisk) instead of listing each member separately. See the reference topic for a specific type to determine whether that type supports wildcards.

  Note: You specify Security in the `<members>` element and Settings in the name element when retrieving the SecuritySettings component type.

- `<name>` contains the metadata type, for example `CustomObject` or `Profile`. There is one name defined for each metadata type in the directory. Any metadata type that extends Metadata is a valid value. The name that's entered must match a metadata type that's defined in the Metadata API WSDL. See Metadata Types for a list.
- `<version>` is the API version number that's used when the .zip file is deployed or retrieved. Currently the valid value is `48.0`.

For more sample `package.xml` manifest files that show you how to work with different subsets of metadata, see Sample `package.xml` Manifest Files.

To delete components, see Deleting Components from an Organization.

Populate a Custom Big Object

Use Salesforce APIs to populate a custom big object.

You can use a CSV file to load data into a custom big object via Bulk API. The first row in the CSV file must contain the field labels used to map the CSV data to the fields in the custom big object during import.

Note: Bulk API 2.0 doesn't support Big Objects.

Re-inserting a record with the same index but different data results in behavior similar to an upsert operation. If a record with the index exists, the insert overwrites the index values with the new data. Insertion is idempotent, so inserting data that already exists won't result in duplicates. Reinserting is helpful when uploading millions of records. If an error occurs, the reinsert reuploads the failed uploads without duplicate data. During the reinsertion, if no record exists for the provided index, a new record is inserted.

For example, this CSV file contains data for import into a Customer Interaction big object.

```
Play Start,In-Game Purchase,Level Achieved,Lives Used,Platform,Play Stop,Score,Account
2015-01-01T23:01:01Z,A12569,57,7,PC,2015-01-02T02:27:01Z,55736,001R000000302D3
2015-01-03T13:22:01Z,B78945,58,7,PC,2015-01-03T15:47:01Z,61209,001R000000302D3
2015-01-04T15:16:01Z,D12156,43,5,iOS,2015-01-04T16:55:01Z,36148,001R000000302D3
```

Populate a Custom Big Object with Apex

Use Apex to populate a custom big object.

You can create and update custom big object records in Apex using the `insertImmediate` method.

Warning: Apex tests that use mixed DML calls are not allowed and fail. If you write only to the Big Object, the test inserts bad data into the target big object that you have to delete manually. To contain test DML calls to the target big object, use a mocking framework with the batch Apex stub API instead.

Reinserting a record with the same index but different data results in behavior similar to an upsert operation. If a record with the index exists, the insert overwrites the index values with the new data. Insertion is idempotent, so inserting data that exists doesn't result in duplicates. Reinserting is helpful when uploading millions of records. If an error occurs, the reinsertion reuploads the failed uploads without duplicate data. During the reinsertion, if no record exists for the provided index, a new record is inserted.

Here is an example of an insert operation in Apex that assumes a table in which the index consists of `FirstName__c`, `LastName__c`, and `Address__c`.

```
// Define the record.
PhoneBook__b pb = new PhoneBook__b();
pb.FirstName__c = 'John';
pb.LastName__c = 'Smith';
pb.Address__c = '1 Market St';
pb.PhoneNumber__c = '555-1212';
database.insertImmediate(pb);
// A single record will be created in the big object.
```

```
// Define the record with the same index values but different phone number.
PhoneBook__b pb = new PhoneBook__b();
pb.FirstName__c = 'John';
pb.LastName__c = 'Smith';
pb.Address__c = '1 Market St';
pb.PhoneNumber__c = '415-555-1212';
database.insertImmediate(pb);
// The existing records will be "re-inserted". Only a single record will remain in the big
 object.
```

```
// Define the record with the different index values and different phone number
PhoneBook__b pb = new PhoneBook__b();
pb.FirstName__c = 'John';
pb.LastName__c = 'Smith';
pb.Address__c = 'Salesforce Tower';
pb.PhoneNumber__c = '415-555-1212';
database.insertImmediate(pb);
// A new record will be created leaving two records in the big object.
```

SEE ALSO:

Build a Mocking Framework with the Stub API

Delete Data in a Custom Big Object

Use Apex or SOAP to delete data in a custom big object.

The Apex method `deleteImmediate()` deletes data in a custom big object. Declare an sObject that contains all the fields in the custom big object's index. The sObject acts like a template. All rows that match the sObject's fields and values are deleted. You can specify only fields that are part of the big object's index. You must specify all fields in the index. You can't include a partially specified index or non-indexed field, and wildcards aren't supported.

In this example, `Account__c`, `Game_Platform__c`, and `Play_Date__c` are part of the custom big object's index. When specifying specific values after the `WHERE` clause, fields must be listed in the order they appear in the index, without any gaps.

```
// Declare sObject using the index of the custom big object -->
List<Customer_Interaction__b> cBO = new List<Customer_Interaction__b>();
cBO.addAll([SELECT Account__c, Game_Platform__c, Play_Date__c FROM Customer_Interaction__b
 WHERE Account__c = '001d000000Ky3xIAB']);

Database.deleteImmediate(cBO);
```

To use the SOAP call `deleteByExample()`, declare an sObject that contains the fields and values to delete. The sObject acts like a template. All rows that match the sObject's fields and values are deleted. You can only specify fields that are part of the big object's index. All fields in the index must be specified. You can't include a partially specified index or non-indexed field, and wildcards aren't supported. This example deletes all rows in which `Account__c` is 001d000000Ky3xIAB, `Game_Platform__c` is iOS, and `Play_Date__c` is 2017-11-28T19:13:36.000z.

Java example code:

```
public static void main(String[] args) {
  try{
       Customer_Interaction__b[] sObjectsToDelete = new Customer_Interaction__b[1];
       //Declare an sObject that has the values to delete
       Customer_Interaction__b customerBO = new Customer_Interaction__b();
       customerBO.setAccount__c ("001d000000Ky3xIAB");
       customerBO.setGame_Platform__c ("iOS");
       Calendar dt = new GregorianCalendar(2017, 11, 28, 19, 13, 36);
       customerBO.setPlay_Date__c(dt);
       sObjectsToDelete[0] = customerBO;
       DeleteByExampleResult[] result = connection.deleteByExample(sObjectsToDelete);
  }  catch (ConnectionException ce) {
       ce.printStackTrace();
  }
}
```

Note: Repeating a successful `deleteByExample()` operation produces a success result, even if the rows have already been deleted.

SEE ALSO:

`deleteByExample()`

Big Objects Queueable Example

To read or write to a big object using a trigger, process, or flow from a sObject, use asynchronous Apex. This example uses the asynchronous Apex `Queueable` interface to isolate DML operations on different sObject types to prevent the mixed DML error.

Example: This trigger occurs when a case record is inserted. It calls a method to insert a batch of big object records and demonstrates a partial failure case in which some records succeed and some fail. To create metadata files for the `Customer_Interaction__b` object in this example, use the XML excerpts in the Create Metadata Files for Deployment on page 6 example.

Tip: To add logging to a custom object and surface errors to users, use the `addError()` method. See An Introduction to Exception Handling.

```
// CaseTrigger.apxt

trigger CaseTrigger on Case (before insert) {
    if (Trigger.operationType ==
TriggerOperation.BEFORE_INSERT){
        // Customer_Interaction__b has three required fields
```

EDITIONS

Available in: both Salesforce Classic and Lightning Experience

Available in: **Enterprise**, **Performance**, **Unlimited**, and **Developer** Editions for up to 1 million records

Additional record capacity and Async SOQL query available as an add-on license.

```
 in its row key, in this order:
        // 1) Account__c - lookup to Account
        // 2) Game_Platform__c - Text(18)
        // 3) Play_Date__c - Date/Time
       List<Customer_Interaction__b> interactions = new List<Customer_Interaction__b>();


        // Assemble the list of big object records to be inserted
        for (Case c : Trigger.new) {
            Customer_Interaction__b ci = new Customer_Interaction__b(
                Account__c = c.AccountId,
                // In this example, the Case object has a custom field, also named
Game_Platform__c
                Game_Platform__c = c.Game_Platform__c,
                Play_Date__c = Date.today()
            );
            interactions.add(ci);
        }

        // CustomerInteractionHandler is an asynchronous queuable Apex class
        CustomerInteractionHandler handler = new
CustomerInteractionHandler(interactions);
        System.enqueueJob(handler);
    }
}
```

The trigger uses the `Queueable` Apex interface to asynchronously call a method to insert into a big object.

```
// CustomerInteractionHandler.apxc

public class CustomerInteractionHandler implements Queueable {

    private List<Customer_Interaction__b> interactions;

    public CustomerInteractionHandler(List<Customer_Interaction__b> interactions) {
        this.interactions = interactions;
    }

    /*
     * Here we insert the Customer Interaction big object records,
     * or log an error if insertion fails.
     */
    public void execute(QueueableContext context){

        List<ExceptionStorage__c> errors = new List<ExceptionStorage__c>();

        try {
            // We have to use insertImmediate() to insert big object records.
           List<Database.SaveResult> srList = Database.insertImmediate(interactions);


            // Check the save results from the bulk insert
            for (Database.SaveResult sr: srList) {
                if (sr.isSuccess()) {
                       System.debug('Successfully inserted Customer Interaction.');
```

```
                } else {
                       for (Database.Error err : sr.getErrors()) {
                        // Display an error message if the insert failed
                        System.debug(err.getStatusCode() + ': ' + err.getMessage() +
'; ' +
                                    'Error fields: ' + err.getFields());

                        // Write to a custom object, such as ExceptionStorage__c
                        // for a more durable record of the failure
                        ExceptionStorage__c es = new ExceptionStorage__c(
                               name = 'Error',
                            ExceptionMessage__c = (err.getMessage()).abbreviate(255),

                              ExceptionType__c = String.valueOf(err.getStatusCode()),

                            ExceptionFields__c =
(String.valueOf(err.getFields())).abbreviate(255)
                        );
                        errors.add(es);
                    }
                }
            }
        }
        catch (Exception e) {
            // Exception occurred, output the exception message
            System.debug('Exception: ' + e.getTypeName() + ', ' + e.getMessage());

            // Write any errors to a custom object as well
            ExceptionStorage__c es = new ExceptionStorage__c(
                   name = 'Exception',
                   ExceptionMessage__c = e.getMessage(),
                   ExceptionType__c = e.getTypeName()
            );
            errors.add(es);
        }

        // If any errors occurred, save the ExceptionStorage records
        if (errors.size() > 0) {
               insert errors;
        }
    }
}
```

SEE ALSO:

Queueable Apex

SOQL with Big Objects

You can query the fields in a big object's index using a subset of standard SOQL commands.

Build an index query starting from the first field defined in the index, without gaps between the first and last field in the query. You can use =, <, >, <=, or >=, or `IN` on the last field in your query. Any prior fields in your query can use only the = operator.

You can include the system fields `CreatedById`, `CreatedDate`, and `SystemModstamp` in queries.

The following queries assume that you have a table in which the index is defined by `LastName__c`, `FirstName__c`, and `PhoneNumber__c`.

This query specifies all three fields in the index. In this case, the filter on `PhoneNumber__c` can be a range.

```
SELECT LastName__c, FirstName__c, PhoneNumber__c
FROM Phone_Book__b
WHERE LastName__c='Kelly' AND FirstName__c='Charlie' AND PhoneNumber__c='2155555555'
```

This query specifies only the first two fields in the index. In this case, the filter on `FirstName__c` can be a range.

```
SELECT LastName__c, FirstName__c, PhoneNumber__c
FROM Phone_Book__b
WHERE LastName__c='Kelly' AND FirstName__c='Charlie'
```

This query specifies only the first field in the index. The filter on `LastName__c` can be a range.

```
SELECT LastName__c, FirstName__c, PhoneNumber__c
FROM Phone_Book__b
WHERE LastName__c='Kelly'
```

This query doesn't work because of a gap in the query where `FirstName__c` is required.

```
SELECT LastName__c, FirstName__c, PhoneNumber__c
FROM Phone_Book__b
WHERE LastName__c='Kelly' AND PhoneNumber__c='2155555555'
```

SOQL Operations Not Allowed with Big Objects

- When building an index query, do not leave gaps between the first and last field in the query.
- The `!=`, `LIKE`, `NOT IN`, `EXCLUDES`, and `INCLUDES` operators are not valid in any query.
- Aggregate functions are not valid in any query.
- To retrieve a list of results, do not use the `Id` field in a query. Including `Id` in a query returns only results that have an empty ID (000000000000000 or 000000000000000AAA).

  Note: When you use Developer Console to generate a query from a resource, the `Id` field is included automatically. To query big objects in Developer Console, remove `Id` from the generated query.

To perform operations not allowed with SOQL, use Async SOQL instead.

SEE ALSO:

Salesforce Object Query Language (SOQL)

CHAPTER 2 Async SOQL

In this chapter ...

Async SOQL is a method for running SOQL queries when you can't wait for immediate results. These queries are run in the background over Salesforce big object data. Async SOQL provides a convenient way to query large amounts of data stored in Salesforce.

Async SOQL is implemented as a RESTful API that enables you to run queries in the familiar syntax of SOQL. Because of its asynchronous operation, you can subset, join, and create more complex queries and not be subject to timeout limits. This situation is ideal when you have millions or billions of records and need more performant processing than is possible using synchronous SOQL. The results of each query are deposited into an object you specify, which can be a standard object, custom object, or big object.

The limit for Async SOQL queries is one concurrent query at a time.

EDITIONS

Available in: both Salesforce Classic and Lightning Experience

Available in: **Enterprise**, **Performance**, **Unlimited**, and **Developer** Editions for up to 1 million records

Extra record capacity and Async SOQL query available as an add-on license.

Async SOQL Versus SOQL

SOQL and Async SOQL provide many of the same capabilities. So when would you use an Async SOQL query instead of standard SOQL?

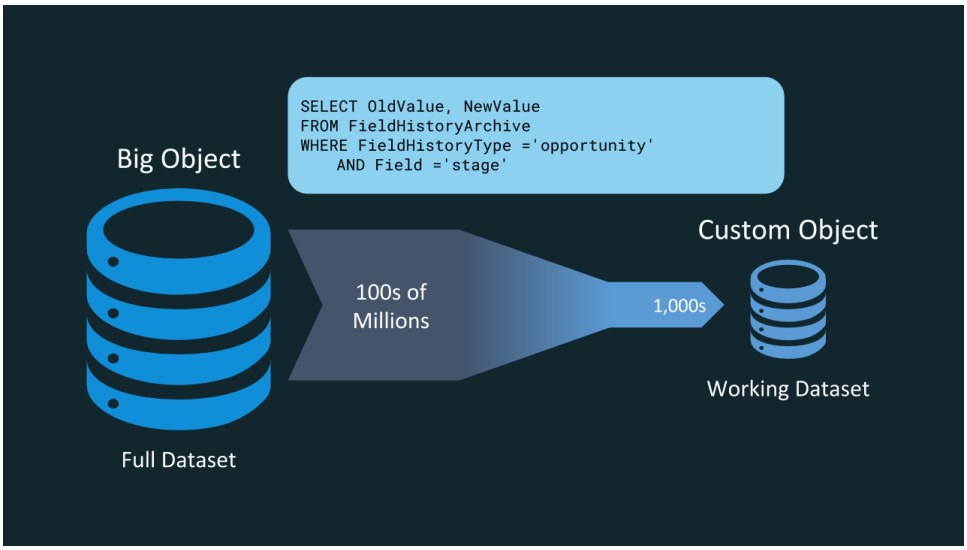
Use standard SOQL when:

- You want to display the results in the UI without having the user wait for results.
- You want results returned immediately for manipulation within a block of Apex code.
- You know that the query returns a small amount of data.

Use Async SOQL when:

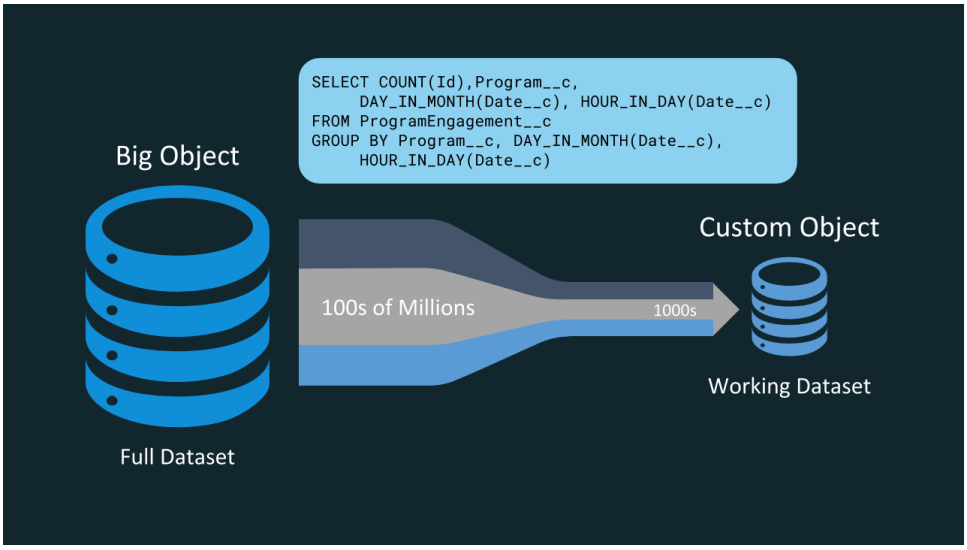
- You are querying against millions of records.
- You want to ensure that your query completes.
- You do not need to do aggregate queries or filtering outside of the index.

Use Case: Create a Working Dataset with Filtering



For example, let's say that you want to analyze the years and years of opportunity history collected by Salesforce. The results could help you identify which current and future opportunities are more likely to close and give you a better picture of your forecast. But because the opportunity history data is stored with all the field history data across the application, the volume of data is too large to query directly. That's where Async SOQL comes in! You can use it to write a query that extracts a smaller, representative subset of the data that you're interested. You can store this working dataset in a custom object and use it in reports, dashboards, or any other Lightning Platform feature.

Use Case: Create a Working Dataset with Coarse Aggregations



With big objects, you can now bring a much finer level of detail into your applications using data that you already have. For example, every interaction an individual has with your marketing campaign is stored as data that you can use, but it's unwieldy in its raw form. Async SOQL allows you to aggregate that data by campaign and day and to extract the relevant details of the full dataset into a smaller, usable dataset. As in the previous example, the smaller working set can live in a custom object and be used in your reports and dashboards.

SEE ALSO:

Salesforce Object Query Language (SOQL)

View Big Object Data in Reports and Dashboards

When working with big data and billions of records, it's not practical to build reports or dashboards directly from that data. Instead, use Async SOQL to write a query that extracts a smaller, representative subset of the data that you're interested in. You can store this working dataset in a custom object and use it in reports, dashboards, or any other Lightning Platform feature.

1. Identify the big object that contains the data for which you need a report. In this example, the `Ride__b` big object contains the full dataset.
2. Create a custom object. This object holds the working dataset for the big object data that you want to report on. In this example, we use the `Bike_Rental__c` custom object.
   a. Under Optional Features for the custom object, click **Allow Reports**.
   b. Add custom fields to the object that match the fields that you want to report on from the big object.
3. Create an Async SOQL query that builds your working dataset by pulling the data from your big object into your custom object.

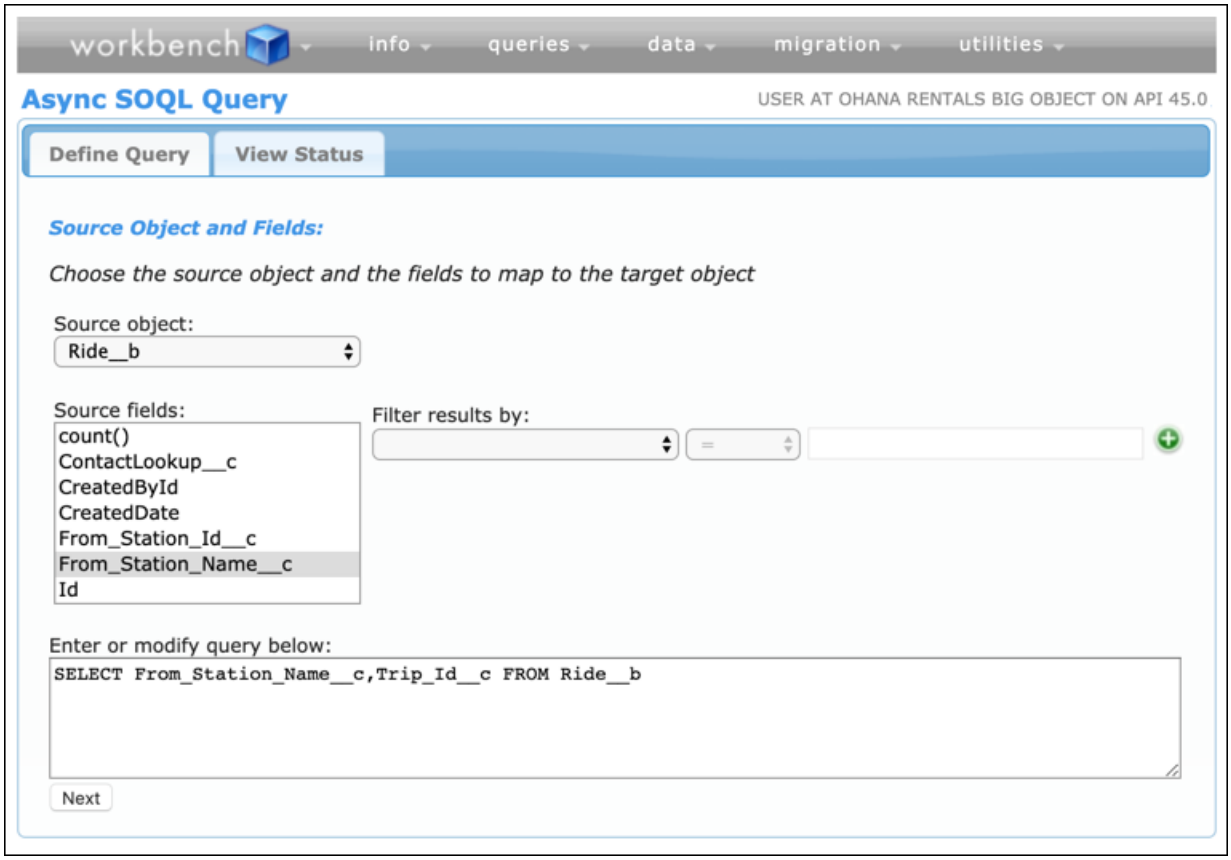
   Tip: To ensure that your working dataset is always up-to-date for accurate reporting, set this job to run nightly.

   a. Log in to Workbench.

      To access Workbench, log in to your org, then open a new browser tab and navigate to *`https://developer.salesforce.com/page/Workbench`*.

      Note: To see examples of running Async SOQL queries using REST API, see Running Async SOQL Queries.

   b. Select **Queries**, then **Async SOQL**.
   c. For the Source object, choose the big object from step 1. In this example, `Ride__b` is the source big object that holds the full dataset.

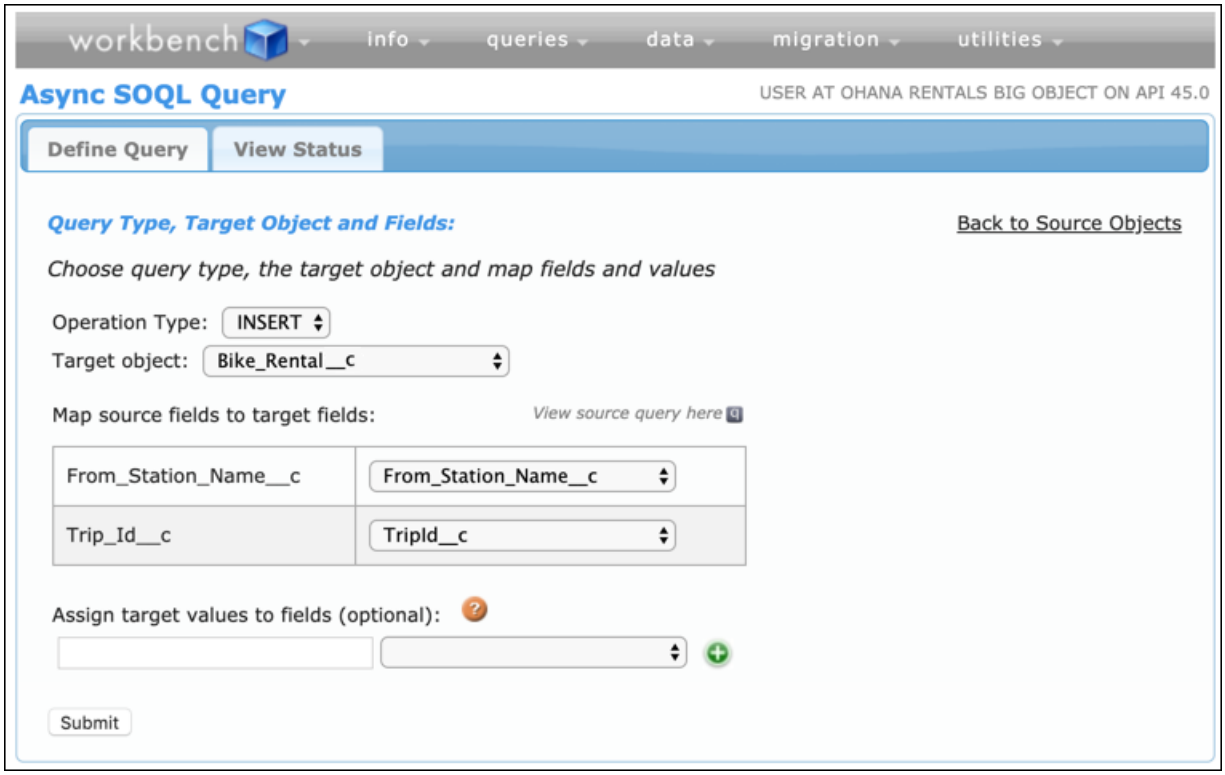


d. Select the source fields and filter criteria.

e. Set the operation type to **INSERT**.

f. For the Target object, choose the custom object from step 2, `Bike_Rental__c`.

g. Map the source fields from the big object to the target fields in the custom object. In this example, we are mapping the `From_Station_Name__c` and `Trip_Id__c` fields from the `Ride__b` source big object to the corresponding fields on the `Bike_Rental__c` target custom object.



h. Run the query and wait until it completes. Run time depends on how much data you have.

4. After the query runs, query the custom object in Workbench to see that the data is there.
5. Build a report using the working dataset you created.
   a. From Setup, enter `Report Types` in the Quick Find box, then select **Report Types**.
   b. Create a custom report type.
   c. For the Primary Object, select the custom object from step 2, `Bike_Rental__c`.
   d. Set the report to **Deployed**.
   e. Run the report.

You can now use the information from your working dataset not only in your reports, but also in dashboards or any other Lightning Platform feature.

SEE ALSO:

- Salesforce Help: Create Custom Objects
- Salesforce Help: Create Big Objects
- Salesforce Help: Create a Custom Report Type

Running Async SOQL Queries

Learn how to run Async SOQL queries on your objects and check on the status of your query using the Chatter REST API.

Formulating Your Async SOQL Query

To use Async SOQL effectively, it's helpful to understand its key component and other related concepts. Each query is formulated in the POST request as a JSON-encoded list of three or four key-value pairs.

Request body for POST

Name	Type	Description	Required or Optional	Available Version
`query`	String	Specifies the parameters for the SOQL query you want to execute. The `FROM` object must be a big object.	Required	35.0
`operation`	String	Specify whether the query is an insert or upsert. If the record doesn't exist, an upsert behaves like an insert. Note: Upsert is not supported for big objects	Optional	39.0
`targetObject`	String	A standard object, custom object, external object, or big object into which to insert the results of the query.	Required	35.0
`targetFieldMap`	Map<String, String>	Defines how to map the fields in the query result to the fields in the target object. Note: When defining the `targetFieldMap` parameter, make sure that the field type mappings are consistent. If the source and target fields don't match, these considerations apply. • Any source field can be mapped onto a target text field. • If the source and target fields are both numerical, the target field must have the same or greater number of decimal places than the source field. If not, the request fails. This behavior is to ensure that no data is lost in the conversion. • If a field in the query result is mapped more than once, even if mapped to different fields in the target object, only the last mapping is used.	Required	35.0
`targetValueMap`	Map<String, String>	Defines how to map static strings to fields in the target object. Any field or alias can be used as the `TargetValueMap` value in the SELECT clause of a query.	Optional	37.0

Name	Type	Description	Required or Optional	Available Version
		You can map the special value, $JOB_ID, to a field in the target object. The target field must be a lookup to the Background Operation standard object. In this case, the ID of the Background Operation object representing the Async SOQL query is inserted. If the target field is a text field, it must be at least 15–18 characters long. You can also include any field or alias in the SELECT clause of the `TargetValueMap`. They can be combined together to concatenate a value to be used.		
~~targetExternalIdField~~	String	The ID of the target sObject. Required for upsert operations.	Optional	39.0

This simple Async SOQL example queries `SourceObject__b`, a source big object, and directs the result to `TargetObject__c`, a custom object. You can easily map the fields in the source object to the fields of the target object in which you want to write the results.

Example URI

```
https://yourInstance.salesforce.com/services/data/v38.0/async-queries/
```

Example POST request body

```
{
   "query": "SELECT firstField__c, secondField__c FROM SourceObject__b",

   "operation": "insert",

   "targetObject": "TargetObject__c",

   "targetFieldMap": {"firstField__c":"firstFieldTarget__c",
                      "secondField__c":"secondFieldTarget__c"
                      },
   "targetValueMap": {"$JOB_ID":"BackgroundOperationLookup__c",
                      "Copy fields from source to
target":"BackgroundOperationDescription__c"
                     }
}
```

The response of an Async SOQL query includes the elements of the initial POST request.

Response body for POST

Property Name	Type	Description	Filter Group and Version	Available Version
`jobId`	String	The ID of the Async SOQL query. This ID corresponds to an entry in the Background Operation standard object. It matches the	Big, 35.0	35.0

Property Name	Type	Description	Filter Group and Version	Available Version
		ID that is used in the `targetValueMap` when $JOB_ID is used. To get the status of an async query job, use this ID in an Async Query, Status request (`/async-queries/`***`jobId`***).		
`message`	String	A text message that provides information regarding the query, such as an error message if the query failed.	Big, 37.0	37.0
`operation`	String	Specify whether the query is an insert or upsert. If the record doesn't exist, an upsert behaves like an insert. Note: Upsert is not supported for big objects	Big, 39.0	.39.0
`query`	String	Specifies the parameters for the SOQL query you want to execute. The `FROM` object must be a big object.	Big, 35.0	35.0
`status`	String	Status of an async query job. • `Canceled`—The job was canceled before it could be run. • `Complete`—The job was successfully completed. • `Failed`—The job failed after the system submitted it or because the request exceeded the Async SOQL limits. The message field provides details on the reason for failure. • `Running`—The job is running successfully, and the org hasn't exceeded any limits. • `Scheduled`—The new job has been created and scheduled, but is not yet running. • `New`—The job has been created but is not yet scheduled.	Big, 35.0	35.0
`targetExternalIdField`	String	The ID of the target sObject. Required for upsert operations.	Big, 39.0	39.0

Property Name	Type	Description	Filter Group and Version	Available Version
`targetFieldMap`	Map<String, String>	Defines how to map the fields in the query result to the fields in the target object. **Note:** When defining the `targetFieldMap` parameter, make sure that the field type mappings are consistent. If the source and target fields don't match, these considerations apply. • Any source field can be mapped onto a target text field. • If the source and target fields are both numerical, the target field must have the same or greater number of decimal places than the source field. If not, the request fails. This behavior is to ensure that no data is lost in the conversion. • If a field in the query result is mapped more than once, even if mapped to different fields in the target object, only the last mapping is used.	Big, 35.0	35.0
`targetValueMap`	Map<String, String>	Defines how to map static strings to fields in the target object. Any field or alias can be used as the `TargetValueMap` value in the SELECT clause of a query. You can map the special value, $JOB_ID, to a field in the target object. The target field must be a lookup to the Background Operation standard object. In this case, the ID of the Background Operation object representing the Async SOQL query is inserted. If the target field is a text field, it must be at least 15–18 characters long. You can also include any field or alias in the SELECT clause of the `TargetValueMap`. They can be combined together to concatenate a value to be used.	Big, 37.0	37.0
`targetObject`	String	A standard object, custom object, external object, or big object into which to insert the results of the query.	Big, 35.0	35.0

Example POST response body

```
{
   "jobId": "08PD000000003kiT",

   "message": "",

   "query": "SELECT firstField__c, secondField__c FROM SourceObject__b",

   "status": "New",

   "targetObject": "TargetObject__c",

   "targetFieldMap": {"firstField__c":"firstFieldTarget__c",
                      "secondField__c":"secondFieldTarget__c"
                     },
   "targetValueMap": {"$JOB_ID":"BackgroundOperationLookup__c",
                      "Copy fields from source to
target":"BackgroundOperationDescription__c"
                     }
}
```

Tracking the Status of Your Query

To track the status of a query, specify its jobID with an HTTP GET request.

```
https://yourInstance.salesforce.com/services/data/v38.0/async-queries/<jobID>
```

The response is similar to the initial POST response but with updated status and message fields to reflect the status.

Example GET response body

```
{
"jobId": "08PD000000000001",
"message": "",
"query": "SELECT firstField__c, secondField__c FROM SourceObject__b",
"status": "Complete",
"targetObject": "TargetObject__c",
"targetFieldMap": {"firstField__c":"firstFieldTarget__c",
"secondField__c":"secondFieldTarget__c" }
}
```

You can get status information for all queries with the following HTTP GET request.

```
https://yourInstance.salesforce.com/services/data/v38.0/async-queries/
```

Example GET response body

```
{
"asyncQueries" : [ {
"jobId" : "08PD00000000002",
"message" : "",
"query" : "SELECT String__c FROM test__b",
"status" : "Running",
```

```
"targetFieldMap" : {
"String__c" : "String__c"
},
"targetObject" : "test__b",
"targetValueMap" : { }
}, {
"jobId": "08PD000000000001",
"message": "Complete",
"query": "SELECT firstField__c, secondField__c FROM SourceObject__b",
"status": "Complete",
"targetObject": "TargetObject__c",
"targetFieldMap": {"firstField__c":"firstFieldTarget__c",
"secondField__c":"secondFieldTarget__c" }
}
}
```

Canceling a Query

You can cancel a query using an HTTP DELETE request by specifying its jobId.

```
https://yourInstance.salesforce.com/services/data/v38.0/async-queries/jobId
```

Note: Canceling a query that has already completed has no effect.

Handling Errors in Async SOQL Queries

Two different types of errors can occur during the execution of an Async SOQL query.

- An error in the query execution
- One or more errors writing the results into the target object

Problems in executing the job cause some errors. For example, an invalid query was submitted, one of the Async SOQL limits was exceeded, or the query caused a problem with the underlying infrastructure. For these errors, the response body includes a status of Failed. The message parameter provides more information on the cause of the failure.

Other times, the query executes successfully but encounters an error while attempting to write the results to the target object. Because of the volume of data involved, capturing every error is inefficient. Instead, subsets of the errors generated are captured and made available. Those errors are captured in the BackgroundOperationResult object and retained for seven days. You can query this object with the Async SOQL query jobID to filter the errors for the specific Async SOQL query. Async SOQL job info is retained for a year.

SEE ALSO:

- Async Query
- Async Query Resources
- Async Query, Status
- Async Query Input
- Async Query Collection
- Salesforce Object Query Language (SOQL)

Async SOQL Use Cases

Understand some of the common Async SOQL use cases.

Customer 360 Degree and Filtering

In this use case, administrators load various customer engagement data from external sources into Salesforce big objects and then process the data to enrich customer profiles in Salesforce. The goal is to store customer transactions and interactions, such as point-of-sale data, orders, and line items in big objects and then process and correlate that data with your core CRM data. Anchoring customer transactions and interactions with core master data provides a richer 360-degree view that translates into an enhanced customer experience.

The following example analyzes the customer data stored in the Rider record of a car-sharing service. The source big object, Rider_Record_b, has a lookup relationship with the Contact object, allowing for an enriched view of the contact's riding history. You can see that the query includes Rider__r.FirstName, Rider__r.LastName, Rider__r.Email as part of the `SELECT` clause. This example demonstrates the ability to join big object data (Rider_Record__b) with Contact data (FirstName, LastName, Email) in a single Async SOQL query.

Example URI

```
https://yourInstance—api.salesforce.com/services/data/v38.0/async-queries/
```

Example POST request body

```
{
   "query": "SELECT End_Location_Lat__c, End_Location_Lon__c, End_Time__c,
                    Start_Location_Lat__c, Start_Location_Lon__c, Start_Time__c,
                    Car_Type__c, Rider__r.FirstName, Rider__r.LastName,
                    Rider__r.Email
              FROM Rider_Record__b WHERE Star_Rating__c = '5'",

   "targetObject": "Rider_Reduced__b",

   "targetFieldMap": {"End_Location_Lat__c":"End_Lat__c",
                      "End_Location_Lon__c":"End_Long__c",
                      "Start_Location_Lat__c": "Start_Lat__c",
                      "Start_Location_Lon__c": "Start_Long__c",
                      "End_Time__c": "End_Time__c",
                      "Start_Time__c": "Start_Time__c",
                      "Car_Type__c": "Car_Type__c",
                      "Rider__r.FirstName": "First_Name__c",
                      "Rider__r.LastName": "Last_Name__c",
                      "Rider__r.Email": "Rider_Email__c"
                     }
}
```

Example POST response body

```
{
   "jobId": "08PB000000000NA",

   "message": "",

   "query": "SELECT End_Location_Lat__c, End_Location_Lon__c, End_Time__c,
                    Start_Location_Lat__c, Start_Location_Lon__c, Start_Time__c,
```

```
                    Car_Type__c, Rider__r.FirstName, Rider__r.LastName,
                    Rider__r.Email
             FROM Rider_Record__b WHERE Star_Rating__c = '5'",

   "status": "New",

   "targetFieldMap": {"End_Location_Lat__c":"End_Lat__c",
                      "End_Location_Lon__c":"End_Long__c",
                      "Start_Location_Lat__c": "Start_Lat__c",
                      "Start_Location_Lon__c": "Start_Long__c",
                      "End_Time__c": "End_Time__c",
                      "Start_Time__c": "Start_Time__c",
                      "Car_Type__c": "Car_Type__c",
                      "Rider__r.FirstName": "First_Name__c",
                      "Rider__r.LastName": "Last_Name__c",
                      "Rider__r.Email": "Rider_Email__c"
                     },

    "targetObject": "Rider_Reduced__b"
}
```

Field Audit Trail

Field Audit Trail lets you define a policy to retain archived field history data up to 10 years from the time the data was archived. This feature helps you comply with industry regulations related to audit capability and data retention.

You define a Field Audit Trail policy using the `HistoryRetentionPolicy` object for each object you want to archive. The field history data for that object is then moved from the History related list into the `FieldHistoryArchive` object at periodic intervals, as specified by the policy. For more information, see the Field Audit Trail Implementation Guide.

You can use Async SOQL to query archived fields stored in the `FieldHistoryArchive` object. You can use the `WHERE` clause to filter the query by specifying comparison expressions for the `FieldHistoryType`, `ParentId`, and `CreatedDate` fields.

Note: If platform encryption is enabled on the org, then AsyncSOQL on `FieldHistoryArchive` is not supported.

This example queries archived accounts created within the last month.

Example URI

```
https://yourInstance.salesforce.com/services/data/v38.0/async-queries/
```

Example POST request body

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

   "targetObject": "ArchivedAccounts__b",

   "targetFieldMap": {"ParentId": "ParentId__c",
                      "FieldHistoryType": "FieldHistoryType__c",
                      "Field": "Field__c",
                      "Id": "Id__c",
                      "NewValue": "NewValue__c",
```

```
                      "OldValue": "OldValue__c"
                     }
}
```

Example POST response body

```
{
              "jobId": "07PB000000006PN",
              "message": "",
             "query": "SELECT ParentId, FieldHistoryType, Field, Id, NewValue, OldValue

            FROM FieldHistoryArchive WHERE FieldHistoryType = 'Account' AND CreatedDate
 > LAST_MONTH",
              "status": "New",
              "targetObject": "ArchivedAccounts__b",
              "targetFieldMap": {"ParentId": "ParentId__c",
              "targetObject": "Rider_Reduced__b" }
              }
```

Note: All number fields 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.

Real-Time Event Monitoring

Real-Time Event Monitoring enables you to track who is accessing confidential and sensitive data in your Salesforce org. You can view information about individual events or track trends in events to swiftly identify unusual behavior and safeguard your company's data. These features are useful for compliance with regulatory and audit requirements.

With Real-Time Events, you can monitor data accessed through API calls, report executions, and list views. The corresponding event objects are called ApiEvent, ReportEvent, and ListViewEvent. Querying these events covers many common scenarios because more than 50% of SOQL queries occur using the SOAP, REST, or Bulk APIs. Key information about each query—such as the username, user ID, rows processed, queried entities, and source IP address—is stored in the event objects. You can then run SOQL queries on the event objects to find out details of user activity in your org.

For more information, see Real-Time Event Monitoring.

Let's say you've created a custom object called Patent__c that contains sensitive patent information. You want to know when users query this object using any API. Use the following Async SOQL query on the ApiEvent object to determine when Patent__c was last accessed, who accessed it, and what part of it was accessed. The WHERE clause uses the `QueriedEntities` field to narrow the results to just API queries of the Patent__c object.

Example URI

```
https://yourInstance.salesforce.com/services/data/v48.0/async-queries/
```

Example POST request body

```
{
  "query": "SELECT EventDate, EventIdentifier, QueriedEntities, SourceIp, Username,
UserAgent FROM ApiEvent
            WHERE QueriedEntities LIKE '%Patent__c%'",
  "targetObject": "ApiTarget__c",
  "targetFieldMap": {
    "EventDate": "EventDate__c",
    "EventIdentifier": "EventIdentifier__c",
    "QueriedEntities": "QueriedEntities__c",
```

```
    "SourceIp": "IPAddress__c",
    "Username": "User__c",
    "UserAgent": "UserAgent__c"
  }
}
```

Example POST response body

```
{
  "jobId" : "08PB00000066JRfMAM",
  "message" : "",
  "operation" : "INSERT",
  "query" : "SELECT EventDate, EventIdentifier, QueriedEntities, SourceIp, Username,
UserAgent FROM ApiEvent
            WHERE QueriedEntities LIKE &#39;%Patent__c%&#39;",
  "status" : "Complete",
  "targetExternalIdField" : "",
  "targetFieldMap" : {
    "EventDate" : "EventDate__c",
    "SourceIp" : "IPAddress__c",
    "EventIdentifier" : "EventIdentifier__c",
    "QueriedEntities" : "QueriedEntities__c",
    "Username" : "User__c",
    "UserAgent" : "UserAgent__c"
  },
  "targetObject" : "ApiTarget__c",
  "targetValueMap" : { }
}
```

Note: All number fields 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.

If you ask this question on a repeated basis for audit purposes, you can automate the query using a cURL script.

```
curl -H "Content-Type: application/json" -X POST -d
'{"query": "SELECT EventDate, EventIdentifier, QueriedEntities, SourceIp, Username, UserAgent
 FROM ApiEvent WHERE QueriedEntities LIKE '%Patent__c%'",
  "targetObject": "ApiTarget__c",
  "targetFieldMap": {"EventDate": "EventDate__c","EventIdentifier":
"EventIdentifier__c","QueriedEntities": "QueriedEntities__c","SourceIp":
"IPAddress__c","Username": "User__c","UserAgent": "UserAgent__c"}}'
  "https://yourInstance.salesforce.com/services/data/v48.0/async-queries/" -H
  "Authorization: Bearer 00D30000000V88A!ARYAQCZOCeABy29c3dNxRVtv433znH15gLWhLOUv7DVu.
 uAGFhW9WMtGXCul6q.4xVQymfh4Cjxw4APbazT8bnIfxlRvUjDg"
```

Another event monitoring use case is to identify all users who accessed a sensitive field, such as Social Security Number or Email. For example, you can use the following Async SOQL query to determine the users who saw social security numbers.

Example URI

```
https://yourInstance.salesforce.com/services/data/v48.0/async-queries/
```

Example POST request body

```
{
   "query": "SELECT Query, Username, EventDate, SourceIp FROM ApiEvent
```

```
            WHERE Query LIKE '%SSN__c%'",
   "targetObject": "QueryEvents__c",
   "targetFieldMap": {
      "Query":"QueryString__c",
      "Username":"User__c",
      "EventDate":"EventDate__c",
      "SourceIp" : "IPAddress__c"
   }
}
```

Example POST response body

```
{
   "jobId": "08PB000000001RS",
   "message": "",
   "query": "SELECT Query, Username, EventDate, SourceIp FROM ApiEvent
            WHERE Query LIKE &#39;%SSN__c%&#39;",
   "status": "Complete",
   "targetFieldMap": {"Query":"QueryString__c", "Username":"User__c",
                      "EventDate":"EventDate__c", "SourceIp" : "IPAddress__c"
                      },
   "targetObject": "QueryEvents__c"
}
```

Supported SOQL Commands

Async SOQL supports a subset of commands in the SOQL language. The subset includes the most common commands that are relevant to key use cases.

Note: For details of any command, refer to the SOQL documentation.

WHERE

Comparison operators

```
=, !=, <, <=, >, >=, LIKE
```

Logical operators

```
AND, OR
```

Date formats

```
YYYY-MM-DD, YYYY-MM-DDThh:mm:ss-hh:mm
```

Example

```
SELECT AnnualRevenue
FROM Account
WHERE NumberOfEmployees > 1000 AND ShippingState = 'CA'
```

Date Functions

Date functions in Async SOQL queries allow you to group or filter data by time periods, such as day or hour.

Method	Details
`DAY_ONLY()`	Returns a date representing the day portion of a dateTime field.
`HOUR_IN_DAY()`	Returns a number representing the hour in the day for a dateTime field.
`CALENDAR_MONTH()`	Returns a number representing the month for a dateTime field.
`CALENDAR_YEAR()`	Returns the year for a dateTime field.

Example

```
SELECT DAY_ONLY(date__c), HOUR_IN_DAY(date__c), COUNT(fieldname__c)
FROM FieldHistoryArchive
GROUP BY DAY_ONLY(date__c), HOUR_IN_DAY(date__c)
```

Aggregate Functions

```
AVG(field), COUNT(field), COUNT_DISTINCT(field), SUM(field), MIN(field), MAX(field)
```

Note: `MIN()` and `MAX()` do not support picklists.

Example

```
SELECT COUNT(field)
FROM FieldHistoryArchive
```

HAVING

Use this command to filter results from aggregate functions.

Example

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

GROUP BY

Use this option to avoid iterating through individual query results. Specify a group of records instead of processing many individual records.

Example

```
SELECT COUNT(fieldname__c) count, CreatedById createdBy
FROM FieldHistoryArchive
GROUP BY CreatedById
```

Relationship Queries

Single-level child-to-parent relationships are supported using dot notation. Use these queries with the SELECT, WHERE, and GROUP BY clauses.

Example

```
SELECT Account.ShippingState s, COUNT(fieldname__c) c
FROM Contact
GROUP BY Account.ShippingState
```

Using Aliases with Aggregates

Examples

```
{"query":"SELECT COUNT(fieldname__c) c, EventTime t FROM LoginEvent group by EventTime",
 "targetObject":"QueryEvents__c",
 "targetFieldMap":{"c":"Count__c", "t" : "EventTime__c"}
}
```

```
{"query":"SELECT COUNT(fieldname__c), EventTime FROM LoginEvent group by EventTime",

 "targetObject":"QueryEvents__c",
 "targetFieldMap":{"expr0":"Count__c","EventTime" : "EventTime__c"}
}
```

```
{"query":"SELECT COUNT(fieldname__c) c , firstField__c f FROM SourceObject__c",
 "targetObject":"TargetObject__c",
 "targetFieldMap":{"c":"countTarget__c","f":"secondFieldTarget__c"}
}
```

SEE ALSO:

Salesforce Object Query Language (SOQL)

INDEX