# Business Objects White Paper

## Connecting to Salesforce.com Data with Crystal Reports

**April 2007**


Business Objects™

**Introduction:**

The purpose of this document is to provide suggestions and guidance on how to maximize the capabilities of the Crystal Report Driver for Salesforce.com. This is the third version of the Salesforce.com Driver and it includes a number of enhancements and bug fixes:

- Supports the "Add Command" feature, which provides significant performance gains for specific types of queries.
- A number of customer requested bugs have been fixed.

**Prerequisites:**

The version 3 Crystal Reports for Salesforce.com driver can only work with Crystal Reports XI Release 2. If you using Crystal Reports XI, please upgrade to Crystal Reports XI Release 2. For details, please refer to: http://www.businessobjects.com/products/reporting/crystalreports/compatibility_vs2005.asp?ExtCmp=null

**Connection Options:**

The Salesforce.com Driver provides three ways to connect to Salesforce.com data. They are:

- Tables
- Add Command
- Stored procedures

**1) Tables**

Salesforce Objects are exposed as tables in Crystal Reports. You can add any tables and any fields to your report. In the link expert, you can join tables on arbitrary field. The support join types are inner join and left outer join.
As the join is performed on Crystal Reports data engine locally, the speed might not be as faster as the join on Salesforce.com server side, especially when you join tables with large data set.

**2) Add command**

If you expand Salesforce.com connection, you will find a new feature add command available in version 3 of Salesforce.com driver. In the command table window, you can type in any valid SOQL statement. Salesforce.com supports query on multiple objects with relationship query as part of the version 8 web service API. You can now type in a SOQL command to query multiple objects. 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.

Relationship query is a way to query on multiple objects as Salesforce.com does not support SQL join. As it is executed on server side, it has better performance compared with Crystal Reports local join.
For more information about relationship query, please refer to the Salesforce.com web service API.
http://wiki.apexdevnet.com/index.php/API

3) **Stored procedures**

Native Salesforce.com reports are exposed as stored procedures by the Crystal Reports Salesforce.com driver. Native reports can be created, modified and viewed through the Reports tab on the Salesforce.com website. With Salesforce.com stored procedures, you can leverage your existing native reports.

In general, designing your reports with tables is the easiest way. If you are reporting on a huge data set, the Add Command feature is an alternative method, but it requires advanced knowledge about Salesforce.com SOQL language.

**Best Practice Guide:**

The following section provides guidelines when designing and running Salesforce.com reports.

1. Maximizing filtering and confining datasets will significantly improve performance.

   As Salesforce.com is a web service based data source, it is recommended that you pull as small subset of all your data as possible in the report by adding filters in the report whenever possible. The more filters you add in the report, the less data will be fetched from salesforce.com, and the quicker response you will get when you view a report.

2. Schedule reports that have large datasets

   Scheduling reports that contain large sets of data is highly recommended, as scheduling can generate reports during off-hours when there is likely less overall load on the Salesforce.com system.

   As a general guideline, if the data in your Salesforce.com report is larger than 100,000 records it will likely take longer than 5 minutes to view your report in real time. In this scenario, we recommend scheduling the report to run during off-hours.

3. Increase JVM memory size

   If the tables you report against are large, such as 30,000+ records, it is recommended that you can increase the JVM memory size to get a quicker response. Increasing JVM memory size is not required to run your reports successfully, but it will help you view your large reports in shorter time.

The Crystal Reports salesforce driver is Java-based and executes in a Java environment. The default JVM memory size is typically 32MB-64MB. You can increase it by changing the Crystal Reports configuration of the JVM in the file, CRConfig.XML.

The recommended JVM memory size is 64MB – 512MB.To increase the memory size to 64MB – 512MB, modify the following entries in CRConfig.XML:

```
<JVMMaxHeap>512000000</JVMMaxHeap>
<JVMMinHeap>64000000</JVMMinHeap>
```

4. Configure HTTP proxy

   In CRConfig.XML file Sforce section, there are three tags used for configuring HTTP proxy.

   ```
   <UseProxy>FALSE</UseProxy>
   <ProxyAddress></ProxyAddress>
   <ProxyPort></ProxyPort>
   ```

   If you set UseProxy as TRUE, it will enable the HTTP proxy server. By default, the value is FALSE.

5. Configure Batch look-up value

   In CRConfig.xml file Sforce section, there is a tag
   <BatchLookupCacheJoinSize>200</BatchLookupCacheJoinSize>
   The value will impact the SOQL query string we pushed down to salesforce.com. If you get an error that suggests the query has timed out on the server size or the query string is too long, please try to reduce this value.

   The reason is that Salesforce.com has two restrictions on the SOQL query string.

   - Queries that take longer than two minutes to process will be timed out.
   - SOQL statements cannot exceed 10,000 characters.

**Known Issues and Limitations:**

1. Query Locator time out issue

   When joining large-sized tables, you may run into a query locator time out error. The query locator is a server-side cursor generated by Salesforce.com and is used to navigate the query result. It will expire in 15 minutes automatically without inactivity.

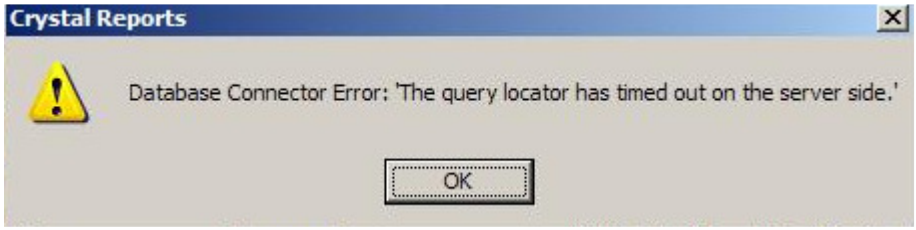
   In the case of joining two tables, the report processing engine will read one table partly, and then it will process the other table. If the processing time is longer than 15 minutes, the Salesforce.com driver will try to read the rest of the records in the first table and the cursor in that query will be time out. In

the case of joining multiple tables, the chance of running into a query locator time issue is higher as the report processing engine might have to return to handle the first table after finishing processing other tables, increasing the possibility of a query locator time out error in the first table.

If you run into query locator time out issue, it is recommended to add filters into your report to reduce the amount of records you fetch from Salesforce.com.

However, if that is not possible, you can try to reverse the link order in the case of joining two tables. For example, you linked table A to table B, then you can try to link table B to table A. Unfortunately, this tip will not succeed every time.

When you run into query locator time out error, you will get an error message as below:




2. Invalid query locator issue

   Note that Salesforce.com limits each named user to a maximum of five query cursors open at a time. This means that a single user can only have five concurrent requests against the Salesforce.com API. If five QueryLocator cursors are opened and a sixth query is added, then the oldest of the five cursors is released. Salesforce.com doesn't provide any notification that a query has been dropped.

   There are three scenarios where this issue may occur:

   - Joining more than 5 (exclusive) tables in a report query may exceed the Salesforce.com query limitations.
   - Several users sharing one Salesforce account may result in more than five concurrent queries.
   - If an Admin using the crystalreports.com scheduling feature schedules more than five reports to run concurrently. Schedulers should sequence scheduled reports throughout off hours to avoid this issue.

3. Operator limitation (minor issue)

   Crystal Reports offers a select expert feature by which report designers can add filters into their reports. However, Salesforce.com has query limitations on Reference type fields, ID fields and multipicklist, and as a result these types of fields can not work with the following operators: less than, greater than, between, less than or equal, greater than or equal and is not between.

4. Invalid Session ID

   If you encounter the below error message in the middle of viewing, refreshing or scheduling a report, it is because your Salesforce.com sessions expire automatically after a predetermined length of time, which can be configured at **Setup** | **Security Controls**. The default is 120 minutes (two hours).

   You can simply increase the predetermined length of time to overcome this issue.


5. Database Connector Error

   In BusinessObjects Enterprise, when too many users access salesforce.com concurrently, you might encounter this error.

   The most possible reason is query locator time out. When opening a query in a report, a server side cursor might be generated to iterate your query result depending on your total query result size. As the cursor will expire automatically in 15 minutes without inactivity, some reports might fail because threads scheduling increasing the waiting time of each report if there are too many concurrently request at a time. If the waiting time is large than 15 minutes, the report is likely to fail due to cursor time out. The workaround is you might have to try to run your report again at another time.

   The second reason is socket time out error (see the Salesforce Driver Report Pack Guide for more information). Another reason is you might run out of JVM memory. You can try to increase the JVM memory size.

**Finding more information:**

For more information and resources, refer to the product documentation and visit the support area of the web site at: http://www.businessobjects.com/.

If you're interested in providing feedback or enhancement requests for the Salesforce.com Driver, please contact Business Objects R&D at feedback.crdc@businessobjects.com.