Logi Ad Hoc Reporting
Using ActiveSQL

Version 12
July 2016

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What is ActiveSQL?

The original model for data retrieval in Logi applications involves retrieving *all* of the requested data from a data source and caching it, either in memory or to disk, for use by elements that will display the data. This generally works well and provides good performance when data volumes are modest.

However, there are situations where utilizing the power and functionality that exists in relational databases are a better option. For example, when:

1. SQL queries that return a large amount of data are displayed in a tabular form, it takes a long time to process and display the first page of data. In these situations, utilizing paging options that are supported by the SQL language and supported natively by the database is a much faster option.

2. Charts are generated by Ad Hoc, reading a large number of records in the entirety, then sorting and grouping them in the Logi Engine is less efficient than using the data base to sort, group and return a small number of records usually required by charts.

ActiveSQL is a special type of datalayer designed for these situations. It differs from conventional datalayers in that it does *not* retrieve all of the rows in the initial request and, in response to runtime manipulations of the interface by users, it dynamically modifies and resends its initial SQL query. These helps the tabular display element work with much larger data sets and still provide good and linear performance. It also increases the number and frequency of SQL queries the database server must handle (which, generally, does not prove to be a burden on the database server) but dramatically improves performance for the user.

The datalayer generates SQL queries that limit the number of rows returned, helping with paging and sorting. With Interactive Paging in use, the query requests a number of pages of records instead of all of the data, thereby improving perceived performance. As the user moves beyond the first set of pages, the database is queried again to get the next set of pages. ActiveSQL moves the bulk of the processing to the server instead of the client.

In that same vein, charts typically are based on aggregate information. ActiveSQL moves the data aggregation back to the reporting database instead of building large XML record sets that would need to be processed by the engine with the traditional SQL approach. The ActiveSQL query would return just the aggregate information needed by the chart.

Starting with Version 11.2 of Ad Hoc (engine version 11.2.40), the Ad Hoc instance may be configured to take advantage of the benefits offered by ActiveSQL.

Additional technical information about the ActiveSQL datalayer may be found in our DataLayer.ActiveSQL documentation. This document discusses the datalayer from a Logi Info perspective. All of the implementation details found in that paper are managed by the Ad Hoc application, making them transparent to the end user.

How is ActiveSQL Implemented?

The generation of ActiveSQL datalayers is controlled by the `ahUseActiveSQL` attribute found in the `<Ad Hoc>` element in the `_Definitions/_Settings.lgx` file of an Ad Hoc instance. If this attribute is set to *True*, Ad Hoc will generate ActiveSQL datalayers and the engine will wrap the traditional SELECT statements with SQL that returns a requested block of records. If the attribute is set to *False*, the traditional SQL datalayers will be generated by Ad Hoc and the engine will pass the SELECT statement unchanged to the data provider.

Note:
The `ahUseActiveSQL` attribute controls the generation and behavior of all datalayers for all reporting connections used in the Ad Hoc instance. If you are using reporting databases that are not in the list of supported databases for ActiveSQL, the ahUseActiveSQL value should be set to *False*. By default, the attribute will be set to *True* for new Ad Hoc instances created in version 12. The attribute will be set to *False* for instances upgraded to version 12. The ahUseActiveSQL attribute value can only be adjusted by manually editing the `_Settings.lgx` file.

Here are three examples that use a simple query from the Northwind database in SQL Server:

Example 1: Demonstrates the attribute disabled, the datalayer element generated by Ad Hoc, and the resultant SQL statement passed to the SQL Server database.

From the `_Settings.lgx` file: `<AdHoc ahUseActiveSQL="False" … />`

From the report definition file:

```
<DataLayer Type="SQL" ID="ahDataLayer" Source="SET ROWCOUNT 64000; SELECT
&#xD;&#xA;[O1].[CategoryID] AS [C1], &#xD;&#xA;[O1].[CategoryName] AS [C2],
&#xD;&#xA;[O1].[Description] AS [C3]&#xD;&#xA; FROM [Categories] [O1]; SET
ROWCOUNT 0; " ConnectionID="1" HandleQuotesInTokens="True" />
```

From a debug page:

```
SET ROWCOUNT 64000; SELECT
[O1].[CategoryID] AS [C1],
[O1].[CategoryName] AS [C2],
[O1].[Description] AS [C3]
FROM [Categories] [O1]; SET ROWCOUNT 0;
```

Example 2: For the same query, demonstrates the attribute enabled, the datalayer generated by Ad Hoc, and the resultant SQL statement passed to the SQL Server database.

From the `_Settings.lgx` file: `<AdHoc ahUseActiveSQL="True" … />`

From the report definition file:

```
<DataLayer Type="ActiveSQL" ID="ahDataLayer" Source="SELECT
&#xD;&#xA;[O1].[CategoryID] AS [C1], &#xD;&#xA;[O1].[CategoryName] AS [C2],
&#xD;&#xA;[O1].[Description] AS [C3]&#xD;&#xA; FROM [Categories] [O1]"
ConnectionID="1" HandleQuotesInTokens="True" SkipRowCount="True" FirstRow="1"
RowCount="15" rdResultsetGuid="e853b2a227414782b3c8709f8111c4d5"
rdSortColumn="" rdSortDirection="" />
```

From a debug page:

```
WITH PagedMembers AS (SELECT TOP 5000 [ahDataLayer].[C1], [ahDataLayer].[C2],
[ahDataLayer].[C3], ROW_NUMBER() OVER (ORDER BY [ahDataLayer].[C1]) as
[lgxLogiRowNumber] FROM (SELECT
[O1].[CategoryID] AS [C1],
[O1].[CategoryName] AS [C2],
[O1].[Description] AS [C3]
FROM [Categories] [O1]) [ahDataLayer]) SELECT * FROM PagedMembers WHERE
[lgxLogiRowNumber] >= 1 ORDER BY [lgxLogiRowNumber];
```

Example 3: For the same query with a sort sequence specified via the Ad Hoc interface, demonstrates the datalayer generated by Ad Hoc and the resultant SQL statement passed to the SQL Server database:

From the report definition file:

```
<DataLayer Type="ActiveSQL" ID="ahDataLayer" Source="SELECT
&#xD;&#xA;[O1].[CategoryID] AS [C1], &#xD;&#xA;[O1].[CategoryName] AS [C2],
&#xD;&#xA;[O1].[Description] AS [C3]&#xD;&#xA; FROM [Categories] [O1]"
ConnectionID="1" HandleQuotesInTokens="True" SkipRowCount="True" FirstRow="1"
RowCount="15" rdResultsetGuid="efda98c1f7d145958560663f1d72c3b8"
rdSortColumn="" rdSortDirection=""><SqlSort SortColumn="C1"
SortSequence="ASC" ID="" ahActiveSqlConverted="True" /></DataLayer>
```

From a debug page:

```
WITH PagedMembers AS (SELECT TOP 5000 [ahDataLayer].[C1], [ahDataLayer].[C2],
[ahDataLayer].[C3], ROW_NUMBER() OVER (ORDER BY [ahDataLayer].[C1]) as
[lgxLogiRowNumber] FROM (SELECT
[O1].[CategoryID] AS [C1],
[O1].[CategoryName] AS [C2],
[O1].[Description] AS [C3]
FROM [Categories] [O1]) [ahDataLayer]) SELECT * FROM PagedMembers WHERE
[lgxLogiRowNumber] >= 1 ORDER BY [lgxLogiRowNumber];
```

Which Reporting Databases are Supported?

ActiveSQL works with these databases:

- DB2
- Microsoft SQL Server 2005+
- MySQL
- Oracle
- PostgreSQL
- Redshift (Amazon)
- Vertica (HP)

ActiveSQL Performance Considerations

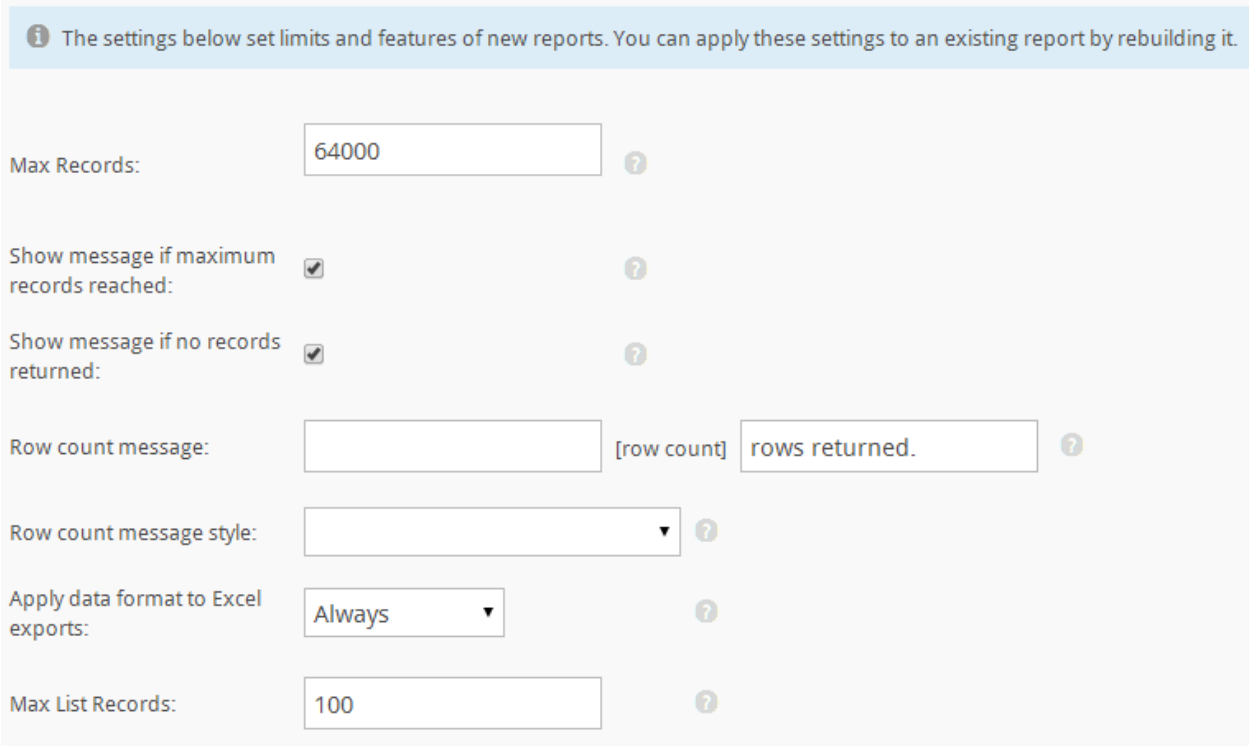
ActiveSQL depends on a well-designed and tuned database for its efficiency. For example, for aggregate queries usually necessary for charts, absence of supporting indices for aggregation will result in table scans and poor database performance. ActiveSQL uses the "ORDER BY <column>" clause in SQL as opposed the SORT being executed by the Logi engine. Lack of indices could result in the database using temp tables and increasing the time to sort and display the data.

Other Considerations When Using ActiveSQL

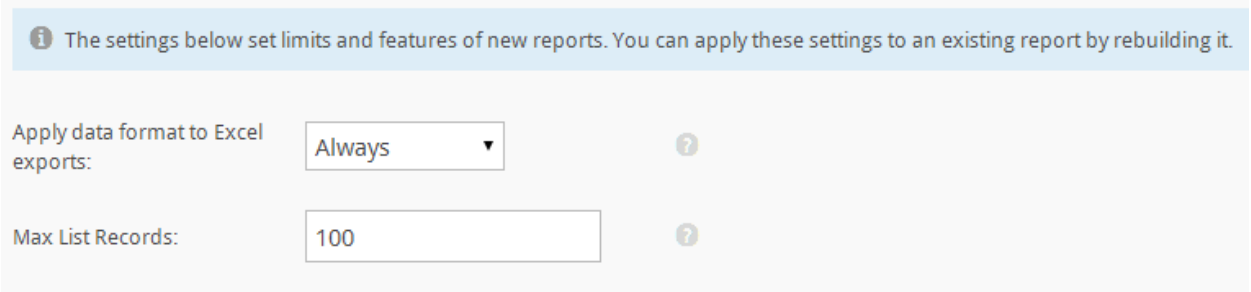
The primary restriction when ActiveSQL is enabled is that Stored Procedures cannot be used as a data objects.

The ActiveSQL behavior that limits the number of returned rows initially has an impact on the Ad Hoc user interface and behavior. It may also be locally disabled when certain reporting constructs are used that require a full recordset.

When ActiveSQL is not being used, this *Configuration* → *Report Configuration* → *Report Settings* page section looks like this:

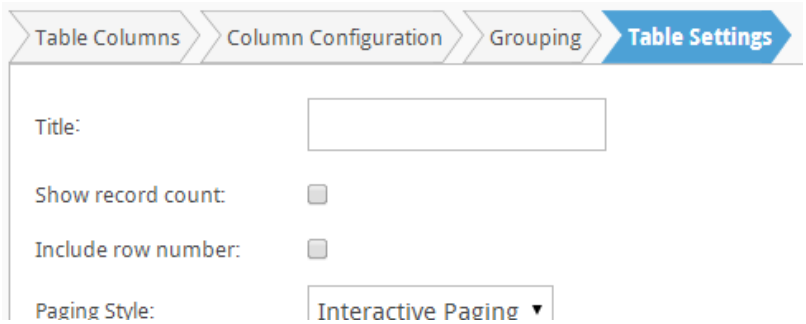


When ActiveSQL is enabled, the same section of the page appears as:

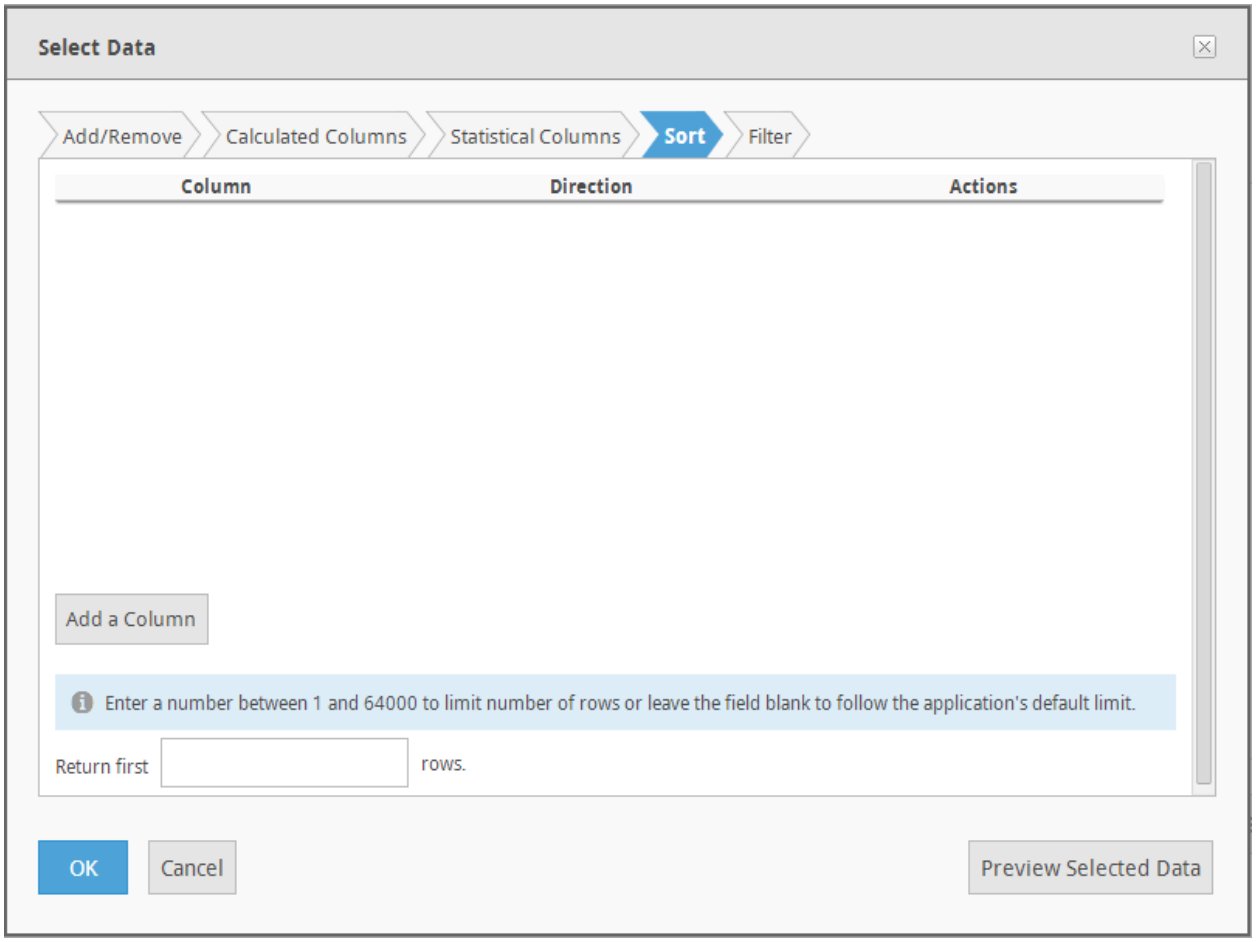


The hidden attributes reflect the fact that not all of the data will be returned at once; consequently information and messaging related to row counts is unnecessary.

In the *Report Builder* → *Table Settings* tab, the attributes **Include Row Number** and **Show record count** are also hidden when ActiveSQL is enabled:



In the **Select Data** dialog box, the *Sort* tab will not include the **Return first ___ rows** attribute because ActiveSQL processing is already returning a limited set of records to the report:



In the same dialog box, the inclusion of *Statistical Columns* in the report will cause Ad Hoc to generate a SQL datalayer instead of an ActiveSQL datalayer since the statistics may require a full set of records. When a Statistical Column is added to the report, a confirmation message will be issued.

If multiple data values, multiple label columns, summary row, or summary columns are requested in a crosstab, Ad Hoc will generate a SQL datalayer instead of an ActiveSQL datalayer.

Known Issues

With ActiveSQL enabled, there may be an issue with grouped/drill-style reports if the last sub-report shows only a "text/memo" column. A simple replicator using the same data source as our examples would be:

1) Select a data table display element or template.
2) Select the Categories object as a data source.
3) Include the three Category columns in the data table.
4) Build a group drill report and create a grouping level with the Category ID and Category Name columns. This will leave the Category Description column as the detail column.

When the report is run, the main report will appear as:

Category Grouping Error

Date: Friday, April 04, 2014
Time: 1:55:36 PM

Category ID	Category Name	Details
1	Beverages	1 Rows
2	Condiments	1 Rows
3	Confections	1 Rows
4	Dairy Products	1 Rows
5	Grains/Cereals	1 Rows
6	Meat/Poultry	1 Rows
7	Produce	1 Rows
8	Seafood	1 Rows

If you click on any drill label (1 Rows), the sub-report will display this error message:

Logi **Debugger Trace Report**

There was an error while processing your request.

The error was:

The text, ntext, and image data types cannot be compared or sorted, except when using IS NULL or LIKE operator.

Click here for more detailed information.