

IBM SPSS Analytic Server
Version 1

User's Guide

IBM

Note

Before using this information and the product it supports, read the information in "Notices" on page 19.

Product Information

This edition applies to version 1, release 0, modification 0 of IBM SPSS Analytic Server and to all subsequent releases and modifications until otherwise indicated in new editions.

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Chapter 1. Overview

IBM® SPSS® Analytic Server is a solution for big data analytics that combines IBM SPSS technology with big data systems and allows you to work with familiar IBM SPSS user interfaces to solve problems on a previously unattainable scale.

Why big data analytics matters

Data volumes collected by organizations are growing exponentially; for example, financial and retail businesses have all customer transactions for a year (or two years, or ten years), telco providers have call data records (CDR) and device sensor readings, and internet companies have the results of web crawls.

Big data analytics is needed where there exists:

- A large volume of data (terabytes, petabytes, exabytes), especially when it is a mixture of structured & unstructured data
- Rapidly changing/accumulating data

Big data analytics also assists when:

- A large number (thousands) of models are being built
- Models are frequently built/refreshed

Challenges

The same organizations that collect large volumes of data often have difficulty actually making use of it, for a variety of reasons:

- The architecture of traditional analytic products are not suited to distributed computation, and
- Existing statistical algorithms are not designed to work with big data (these algorithms expect the data to come to them, but big data is too costly to move), thus
- Performing state of the art analytics on big data requires new skills and intimate knowledge of big data systems. Very few analysts have these skills.
- In-memory solutions work for medium-size problems, but do not scale well to truly big data.

Solution

Analytic Server provides:

- A data-centric architecture that leverages big data systems, such as Hadoop Map/Reduce with data in HDFS.
- A defined interface to incorporate new statistical algorithms designed to go to the data.
- Familiar IBM SPSS user interfaces that hide the details of big data environments so that analysts can focus on analyzing the data.
- A solution that is scalable to any size problem.

Architecture

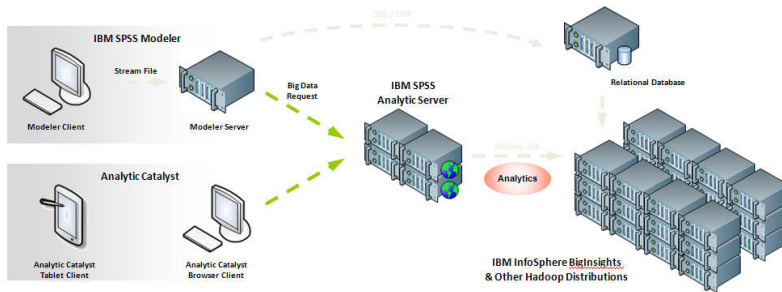


Figure 1. Architecture

The Analytic Server sits between a client application and Hadoop cloud. Assuming that the data resides in the cloud, the general outline for working with the Analytic Server is to:

1. Define Analytic Server data sources over the data in the cloud.
2. Define the analysis you want to perform in the client application. For the current release, the client applications are IBM SPSS Modeler and IBM SPSS Analytic Catalyst.
3. When you run the analysis, the client application submits an Analytic Server execution request.
4. The Analytic Server orchestrates the job to run in the Hadoop cloud and reports the results to the client application.
5. You can use the results to define further analyses, and the cycle repeats.

Chapter 2. SPSS Modeler Integration

SPSS Modeler is a data mining workbench that has a visual approach to analysis. Each distinct action in a job, from accessing a data source to merging records to writing out a new file or building a model, is represented by a node on the canvas. We link these actions together to form an analytical stream.

In order to construct a SPSS Modeler stream that can be run in HDFS, begin with an Analytic Server Source node. SPSS Modeler will push as much of the stream back to Analytic Server as possible, then, if necessary, pull a subset of the records down from HDFS to finish executing the stream "locally" in SPSS Modeler server. You can set the maximum number of records SPSS Modeler will download in the Analytic Server stream properties.

If your analysis ends with records written back to HDFS, finish the stream with an Analytic Server Export node.

Analytic Server Source

The Analytic Server source enables you to run a stream on Hadoop Distributed File System (HDFS). The information in an Analytic Server data source can come from a variety of places, including:

- Text files on HDFS
- Databases
- HCatalog

Typically, a stream with an Analytic Server Source will be executed on HDFS; however, if a stream contains a node that is not supported for execution on HDFS, then as much of the stream as possible will be "pushed back" to Analytic Server, and then SPSS Modeler Server will attempt to process the remainder of the stream. You will need to subsample very large datasets; for example, by placing a Sample node within the stream.

Data source. Assuming your SPSS Modeler Server administrator has established a connection, you select a data source containing the data you wish to use. A data source contains the files and metadata associated with that source. Click **Select** to display a list of available data sources. See the topic "Analytic Server Select data source" for more information.

If you need to create a new data source or edit an existing one, click **Launch Data Source Editor...** See "Data sources" on page 11 for details on creating and editing data sources.

Analytic Server Select data source

The Data Sources table displays a list of the available data sources. Select the source you want to use and click **OK**.

Click **Show Owner** to display the data source owner.

Filter by enables you to filter the data source listing on **Keyword**, which checks the filter criteria against the data source name and data source description, or **Owner**. You can enter a combination of string, numeric, or the wild card character (%) as a filter criteria. The search string is case sensitive. Click **Refresh** to update the Data Sources table.

Analytic Server Credentials

If your credentials for accessing Analytic Server are different from the credentials for accessing SPSS Modeler Server, you will need to enter the Analytic Server credentials when running a stream on Analytic Server. If you do not know your credentials, contact your server administrator.

Analytic Server Export

The Analytic Server Export enables you to write data from your analysis to an existing Analytic Server data source. This can, for example, be text files on Hadoop Distributed File System (HDFS) or a database.

Typically, a stream with an Analytic Server Export node also begins with Analytic Server Source nodes, and is submitted to the Analytic Server and executed on HDFS. Alternatively, a stream with "local" data sources can end with an Analytic Server Export node in order to upload relatively small datasets (no more than 100,000 records) for use with Analytic Server.

Data source. Select a data source containing the data you wish to use. A data source contains the files and metadata associated with that source. Click **Select** to display a list of available data sources. See the topic "Analytic Server Select data source" on page 3 for more information.

If you need to create a new data source or edit an existing one, click **Launch Data Source Editor...** See "Data sources" on page 11 for details on creating and editing data sources.

Mode. Select **Append** to add to the existing data source, or **Override** to replace the contents of the data source.

Generate an Import node for this data. Select to generate a source node for the data as exported to the specified data source. This node is added to the stream canvas.

Analytic Server stream properties

These settings provide a number of options for working with Analytic Server.

Maximum number of records to process outside of Analytic Server

Specify the maximum number of records to be imported into SPSS Modeler server from an Analytic Server data source.

Notification when a node can't be processed in Analytic Server

This setting determines what happens when a stream that would be submitted to Analytic Server contains a node that can't be processed in Analytic Server. Specify whether to issue a warning and continue processing the stream, or throw an error and stop processing.

Split Model Storage Settings

Store split models by reference on Analytic Server when model size (MB) exceeds

Model nuggets are typically stored as part of the stream. Split models with many splits can produce large nuggets, and moving the nugget back and forth between the stream and the Analytic Server can impact performance. As a solution, when a split model exceeds the specified size, it is stored on the Analytic Server, and the nugget in the SPSS Modeler contains a reference to the model.

Default folder to store models by reference on Analytic Server once execution is complete

Specify the default path where you want to store split models on Analytic Server. The path should start with a valid Analytic Server project name.

Folder to store promoted models

Specify the default path where you want to store "promoted" models. A promoted model is not cleaned up when the SPSS Modeler session is over.

Supported nodes

Many SPSS Modeler nodes are supported for execution on HDFS, but there may be some differences in the execution of certain nodes, and some are not currently supported. This topic details the current level of support.

General

- Some characters that are normally acceptable within a quoted Modeler field name will not be accepted by Analytic Server.
- For a Modeler stream to be run in Analytic Server, it must begin with one or more Analytic Server Source nodes and end in a single modeling node or Analytic Server Export node; merges are allowed, but forking is not.
- It is recommended that you set the storage of continuous targets as real rather than integer. Scoring models always write real values to the output data files for continuous targets, while the output data model for the scores follows the storage of the target. Thus, if a continuous target has integer storage, there will be a mismatch in the written values and the data model for the scores, and this mismatch will cause errors when you attempt to read the scored data.

Source

- A stream that begins with anything other than an Analytic Server source node will be run locally.

Record operations

All Record operations are supported. Further notes on those nodes' functionality follow.

Select

- Supports the same set of functions supported by the Derive node.

Sample

- Block-level sampling is not supported.
- Complex Sampling methods are not supported.

Aggregate

- Contiguous keys are not supported.
- Order statistics (Median, 1st Quartile, 3rd Quartile) are not supported.

Sort

- The Optimization tab is not supported.

In a distributed environment, there are a limited number of operations that preserve the record order established by the Sort node.

- A Sort followed by an Export node produces a sorted data source.
- A Sort followed by a Sample node with **First** record sampling returns the first *N* records.
- A Sort followed by a modeling node that has the **Optimize for very large datasets** objective (Neural Net, Linear, C&R Tree, Quest, or CHAID) is a useful pattern for randomly reshuffling records by sorting on a derived random number key in order to avoid bias that can be introduced into the model-building algorithm if the original records are ordered.

In general, you should place a Sort node as close as possible to the operations that need the sorted records.

Merge

- Merge by Order is not supported.
- Merge by Condition is not supported.
- The Optimization tab is not supported.

- It is currently unsupported to place a Sample node or model nugget between an Analytic Server Source node and a Merge node. It is usually possible to specify a Select node to replace the functionality of the Sample node.
- Analytic Server does not join on empty string keys; that is, if one of the keys you are merging by contains empty strings, then any records that contain the empty string will be dropped from the merged output.
- Merge operations are relatively slow. If you have available space in HDFS, it can be much faster to merge your data sources once and use the merged source in following streams than to merge the data sources in each stream.

Field operations

The Auto Data Prep, Type, Filter, Derive, Ensemble, Filler, Reclassify, Binning, RFM Analysis, Partition, SetToFlag, Restructure, and Field Reorder nodes are supported. Further notes on those nodes' functionality follow.

Auto Data Prep

- Training the node is not supported. Applying the transformations in a trained Auto Data Prep node to new data is supported.

Type

- The Check column is not supported.
- The Format tab is not supported.

Derive

- All Derive functions are supported, with the exception of sequence functions.
- Split fields cannot be derived in the same stream that uses them as splits; you will need to create two streams; one that derives the split field and one that uses the field as splits.
- A flag field cannot be used by itself in a comparison; that is, if (flagField) then ... endif will cause an error; the workaround is to use if (flagField=trueValue) then ... endif
- It is recommended when using the ** operator to specify the exponent as a real number, such as $x^{2.0}$, instead of x^2 , in order to match results in Modeler

Filler

- Supports the same set of functions supported by the Derive node.

Binning

The following functionality is not supported.

- Optimal binning
- Ranks
- Tiles -> Tiling: Sum of values
- Tiles -> Ties: Keep in current and Assign randomly
- Tiles ->Custom N: Values over 100, and any N value where $100 \% N$ is not equal to zero.

RFM Analysis

- The Keep in current option for handling ties is not supported. RFM recency, frequency, and monetary scores will not always match those computed by Modeler from the same data. The score ranges will be the same but score assignments (bin numbers) may differ by one.

Graphs

All Graph nodes are supported.

Modeling

A limited number of Modeling nodes are supported, including: Linear, Neural Net, C&RT, Chaid, Quest. Further notes on those nodes' functionality follow.

Linear When building models on big data, you will typically want to change the objective to Very large datasets, or specify splits.

- Continued training of existing PSM models is not supported.
- The Standard model building objective is only recommended if split fields are defined so that the number of records in each split is not too large, where the definition of "too large" is dependent upon the power of individual nodes in your Hadoop cluster. By contrast, you also need to be careful to ensure that splits are not defined so finely that there are too few records to build a model.
- The Boosting objective is not supported.
- The Bagging objective is not supported.
- The Very large datasets objective is not recommended when there are few records; it will often either not build a model or will build a degraded model. You may also have problems if the input records are ordered in some systematic way that violates the randomness assumptions behind the ensemble model building algorithms used.
- Automatic Data Preparation is not supported. This can cause problems when trying to build a model on data with many missing values; normally these would be imputed as part of automatic data preparation. A workaround would be to use a tree model or a neural network with the Advanced setting to impute missing values selected.
- The accuracy statistic is not computed for split models.

Neural Net

When building models on big data, you will typically want to change the objective to Very large datasets, or specify splits.

- Continued training of existing standard or PSM models is not supported.
- The Standard model building objective is only recommended if split fields are defined so that the number of records in each split is not too large, where the definition of "too large" is dependent upon the power of individual nodes in your Hadoop cluster. By contrast, you also need to be careful to ensure that splits are not defined so finely that there are too few records to build a model.
- The Boosting objective is not supported.
- The Bagging objective is not supported.
- The Very large datasets objective is not recommended when there are few records; it will often either not build a model or will build a degraded model. You may also have problems if the input records are ordered in some systematic way that violates the randomness assumptions behind the ensemble model building algorithms used.
- When there are many missing values in the data, use the Advanced setting to impute missing values.
- The accuracy statistic is not computed for split models.

C&R Tree, CHAID, and Quest

When building models on big data, you will typically want to change the objective to Very large datasets, or specify splits.

- Continued training of existing PSM models is not supported.
- The Standard model building objective is only recommended if split fields are defined so that the number of records in each split is not too large, where the definition of "too large" is dependent upon the power of individual nodes in your Hadoop cluster. By contrast, you also need to be careful to ensure that splits are not defined so finely that there are too few records to build a model.
- The Boosting objective is not supported.

- The Bagging objective is not supported.
- The Very large datasets objective is not recommended when there are few records; it will often either not build a model or will build a degraded model. You may also have problems if the input records are ordered in some systematic way that violates the randomness assumptions behind the ensemble model building algorithms used.
- Interactive sessions is not supported.
- The accuracy statistic is not computed for split models.

Model scoring

The following model nuggets are supported for scoring: C&RT, Quest, CHAID, Linear, Regression, Neural Net, C5.0, Logistic, Genlin, GLMM, Cox, SVM, Bayes Net, TwoStep, KNN, Decision List, Discriminant, Self Learning, Anomaly Detection, Apriori, Carma, K-Means, Kohonen, R, and Text Mining.

- No raw or adjusted propensities will be scored. As a workaround you can get the same effect by manually computing the raw propensity using a Derive node with the following expression:
if 'predicted-value' == 'value-of-interest' then 'prob-of-that-value' else 1-'prob-of-that-value'
endif
- When scoring a model, Analytic Server does not check to see if all fields used in the model are present in the dataset, so be sure that's true before running in Analytic Server

R The R syntax in the nugget should consist of record-at-a-time operations.

Output

The Matrix, Analysis, Data Audit, Transform, Statistics, and Means nodes are supported.

Export A stream can begin with an Analytic Server source node and end with an export node other than the Analytic Server export node, but data will move from HDFS to SPSS Modeler Server, and finally to the export location.

asimport Properties

The Analytic Server source enables you to run a stream on Hadoop Distributed File System (HDFS). See “Analytic Server Source” on page 3 for more information.

Example

```
create asimport
set :asimport.data_source = "Drug4n"

# Connection dialog
set :asimport.host = "123.4.56.789"
set :asimport.port = 8080
set :asimport.tenant = "ibm"
set :asimport.set_credentials = False
```

Table 1. *asimport* properties.

asimport properties	Data type	Property description
data_source	string	The name of the data source.
host	string	The name of the Analytic Server host.
port	integer	The port on which the Analytic Server is listening.
tenant	string	In a multi-tenant environment, the name of the tenant to which you belong. In a single-tenant environment, this defaults to ibm .
set_credentials	flag	If user authentication on the Analytic Server is the same as on SPSS Modeler server, set this to false . Otherwise, set to true .

Table 1. *asimport* properties (continued).

asimport properties	Data type	Property description
user_name	string	The user name for logging in to the Analytic Server. Only needed if set_credentials is true.
password	string	The password for logging in to the Analytic Server. Only needed if set_credentials is true.

asexport Properties

The Analytic Server export enables you to run a stream on Hadoop Distributed File System (HDFS). See “Analytic Server Source” on page 3 for more information.

Example

```
create asexport
set :asexport.data_source = "Drug4n"
set :asexport.export_mode = overwrite

# Connection dialog
set :asexport.host = "123.4.56.789"
set :asexport.port = 8080
set :asexport.tenant = "ibm"
set :asexport.set_credentials = False
```

Table 2. *asexport* properties.

asexport properties	Data type	Property description
data_source	string	The name of the data source.
export_mode	string	Specifies whether to append exported data to the existing data source, or to overwrite the existing data source.
host	string	The name of the Analytic Server host.
port	integer	The port on which the Analytic Server is listening.
tenant	string	In a multi-tenant environment, the name of the tenant to which you belong. In a single-tenant environment, this defaults to ibm .
set_credentials	flag	If user authentication on the Analytic Server is the same as on SPSS Modeler server, set this to false . Otherwise, set to true .
user_name	string	The user name for logging in to the Analytic Server. Only needed if set_credentials is true.
password	string	The password for logging in to the Analytic Server. Only needed if set_credentials is true.

Chapter 3. Analytic Server console

Analytic Server provides a thin client interface for managing data sources and projects, which can be accessed in two ways:

- Through the Analytic Server Source or Export node, which opens the console in a browser
- Directly through a browser
 1. Enter the URL of the Analytic Server in your browser's address bar. This can be obtained from your server administrator.
 2. Enter the user name with which to log on to the server.
 3. Enter the password associated with the specified user name.

After login, the default accordion is the Data sources accordion.

Navigating the console

The Analytic Server console has four components:

- The header displays the product name, the link to the help system, and the name of the currently logged in user. The name of the currently logged in user is the head of a dropdown list that includes the logout link and a link to general information about the product.
- The left column displays the available accordions, or functional groupings. The selected accordion determines what is shown in the content area.
- The content area. Displays the controls associated with the currently selected accordion. Details of each accordion's contents follow in the sections below.
- The footer displays the installed version of the Analytic Server.

Data sources

A data source is a collection of records, plus a data model, that define a data set for analysis. The source of records can be a file (delimited text, fixed width text, Excel) on HDFS, a database, or HCatalog. The data model defines all the metadata (field names, storage, measurement level, and so on) necessary for analyzing the data. Data source owners can grant or restrict access to data sources.

Left column

The left column displays the existing data sources under the accordion heading.

- Select a data source to display its details in the content area and edit its properties. Typing in the search area filters the listing to display only data sources with the search string in their name.
- Click the **New data source** button to create a new data source with the name and content type you specify in the **Add New Data Source** dialog.
 - Data source names must be case-sensitive. Leading and trailing white space is ignored. Certain names are rejected to protect against SQL injection.
 - The available content types are File, Database, and HCatalog.

Note: The content type cannot be edited once selected.

- Click the **Delete data source** button to remove the data source. This action leaves all files associated with the data source intact.

Content area

The content area is divided into several sections, which can depend on the content type of the data source. After you specify the settings for the data source, click Preview and Metadata to finalize the data source.

Data Source Properties

Settings common to all content types.

Name An editable text field that displays the name of the data source. Data source names must be case-sensitive. Leading and trailing white space is ignored. Certain names may be rejected to protect against SQL injection.

Description

An editable text field to provide explanatory text about the data source.

Is public

A check box that indicates whether anyone can see the data source (checked) or if users and groups must be explicitly added to the owners list (cleared).

Sharing

You can share ownership of a data source by adding users and groups as authors.

- Typing in the text box filters on users and groups with the search string in their name. Click the **Add participant** button to add them to the list of authors.
- To remove an author, select a user or group in the Author list and click the **Remove participant** button.

Note: Administrators have read and write access to every data source, regardless of whether they are listed as an Author.

File Input

Settings that are specific to defining data sources with file content type.

File Viewer

Shows available files for inclusion in the data source. Select **Projects** mode to view files within the Analytic Server project structure, or **HDFS** to view the rest of the Hadoop distributed file system. You can browse either folder structure, but HDFS is not editable at all, and the Analytic Server folder structure is only editable within defined projects. That is, you cannot add files, create folders, or delete items at the root level of the **Projects** mode. To create, edit, or delete a project, use the Projects accordion.

- Clicking the **Upload file to HDFS** button uploads a file to the current project/subfolder.
- Clicking the **Create a new folder** button creates a new folder under the current folder, with the name you specify in the New Folder Name dialog.
- Clicking the **Download file to the local filesystem** button downloads the selected files to the local file system.
- Clicking the **Delete the selected file(s)** button removes the selected files/folders.

Files included in data source definition

Use the move button to add selected files to or remove them from the data source. For each selected file in the data source, click Settings to define the specifications for reading the file.

File Output

Data sources with file content type can be appended to by output from streams that are run on Analytic Server. Select **Make writeable** to enable appending and choose an output folder where the new files are written.

Database Selections

Specify the connection parameters for the database that contains the record content.

Database

Select the type of database you want to connect to. Choose from: DB2, Oracle, SQL Server, TeraData, or Netezza.

Server address

Enter the URL of the server that hosts the database.

Server port

The port number that the database listens on.

Database name

The name of the database you want to connect to.

Username

If the database is password-protected, enter your user name.

Password

If the database is password-protected, enter your password.

Table name

Enter the name of a table from the database that you want to use.

Maximum concurrent reads

Enter the limit on the number of parallel queries that can be sent from Analytic Server to the database to read from the table specified in the data source.

Database Output

Data sources with database content type can be appended by output from streams that are run on Analytic Server. Select **Make writeable** to enable appending and choose an output database table where the output data are written.

HCatalog Selections

Specify the parameters for accessing data that are managed under Apache HCatalog.

Database

The name of the HCatalog database.

Table name

Enter the name of a table from the database that you want to use.

Filter The partition filter for the table, if the table was created as partitioned table.

HCatalog Schema

Displays the structure of the specified table. HCatalog can support a highly structured data set. To define an Analytic Server data source on such data, the structure must be flattened into simple rows and columns. Select an element in the schema and click the move button to map it to a field for analysis. Not all tree nodes can be mapped. For example, an array or map of complex types is considered a "parent" and cannot be mapped. These nodes can be identified by the label in the tree ending in ...:array:struct, or ...:map:struct.

HCatalog Field Mappings

Displays the mapping of an element in HCatalog to a field in the data source. Click **Preview Raw Data** to see the records as they are stored in HCatalog; this can help you determine how to map the HCatalog schema to fields.

HCatalog Element

Double-click a cell to edit. You must edit the cell when the HCatalog element is an array or map. With an array, specify the integer corresponding to the member of the array you want to map to a field. With a map, specify a quoted string

corresponding to the key you want to map to a field. See Figure 2 for an example of how the raw data preview can be used to determine the string corresponding to the map index.

Mapping Field

The field as it appears in the Analytic Server data source. Double-click a cell to edit. Duplicate values in the Mapping Field column are not allowed and result in an error.

Storage

The storage of the field. Storage is derived from HCatalog and cannot be edited.

Note: When you click Preview and Metadata to finalize an HCatalog data source, there are no editing options.

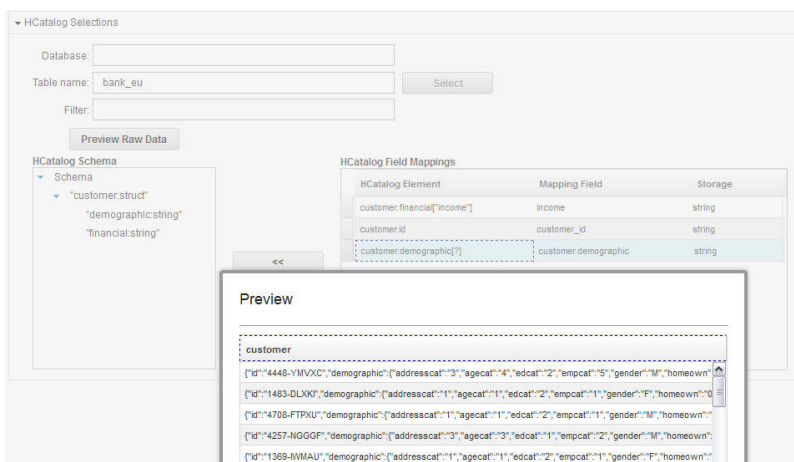


Figure 2. Data sources accordion, defining an HCatalog data source

Settings (file data sources)

Character set encoding

The character encoding of the file. Select or specify Java charset name such as "UTF-8", "ISO-8859-2", "GB18030". The default is "UTF-8".

Locale Defines a locale. Optional. Defaults to the server locale. The locale string should be specified as: <language>[_country[_variant]], where:

language

A valid, lower-case, two-letter code as defined by ISO-639. Required.

country

A valid, upper-case, two-letter code as defined by ISO-3166. Optional.

variant

A vendor or browser-specific code. Optional.

Trim white space

Removes white space characters from the beginning and/or end of the string fields. Defaults to None. The following values are supported:

None Does not remove white space characters.

Left Removes white space characters from the beginning of the string.

Right Removes white space characters from the end of the string.

Both Removes white space characters from the beginning and end of the string.

Grouping symbols

Sets whether or not the locale-specific character used for the thousands separator should be used.

Field delimiters

One or more characters marking field boundaries. Each character is taken as an independent delimiter. For example, ",\t" means either a comma or a tab marks field boundaries. If control characters delimit fields, the characters specified here are treated as delimiters in addition to control characters. Default is "," if control characters do not delimit fields and the empty string otherwise.

Control characters delimit fields

Sets whether ASCII control characters, except LF and CR, are treated as field delimiters. Defaults to **No**.

First row contains field names

Sets whether to use the first row to determine the field names. Defaults to **No**.

Number of initial characters to skip

The number of characters at the beginning of the file to be skipped. A non-negative integer. Default is zero.

Merge white space

Sets whether to treat multiple adjacent occurrences of space and/or tab as a single field delimiter. Has no effect if neither space nor tab is a field delimiter. Default is true.

End-of-line comment characters

One or more characters that mark end-of-line comments. The character and everything following it on the record are ignored. Each character is taken as an independent comment marker. For example, "/" means either a slash or an asterisk starts a comment. It is not possible to define multi-character comment markers like "/*". The empty string signals that no comment characters are defined. If defined, comment characters are checked for before quotes are processed or initial characters to skip are skipped. Default is the empty string.

Invalid characters

Determines how invalid characters (byte sequences that do not correspond to characters in the encoding) are to be handled. An empty string indicates they are to be discarded. A non-empty string (usually a single character) indicates they are to be replaced by the contents of the string. Default is the empty string.

Single quotes

Specifies handling of single quotes (apostrophes). Default is **Keep**.

Keep Single quotes have no special meaning and are treated as any other character.

Drop Single quotes are deleted unless quoted

Pair Single quotes are treated as quote characters and characters between pairs of single quotes lose any special meaning (they are considered quoted). Whether single quotes themselves can occur inside single-quoted strings is determined by the setting **Quotes can be quoted by doubling**.

Double quotes

Specifies handling of double quotes. Default is **Pair**.

Keep Double quotes have no special meaning and are treated as any other character.

Drop Double quotes are deleted unless quoted

Pair Double quotes are treated as quote characters and characters between pairs of double quotes lose any special meaning (they are considered quoted). Whether double quotes themselves can occur inside double-quoted strings is determined by the setting **Quotes can be quoted by doubling**.

Quotes can be quoted by doubling

Indicates whether double quotes can be represented in double-quoted strings and single quotes can be represented in single-quoted strings when set to **Pair**. If **Yes**, double quotes are escaped inside double-quoted strings by doubling and single quotes are escaped inside single-quoted strings by doubling. If **No**, there is no way to quote a double quote inside a double-quoted string or a single quote inside a single-quoted string. Default is **Yes**.

Preview and Metadata (data sources)

Clicking **Preview and Metadata** generates the data model for the data source, based on a sample of the records. Here you have a chance to review and edit the basic metadata information.

Preview

The Preview tab shows a small sample of records and their field values.

Edit

The Edit tab allows you fix the basic field metadata.

Field Double-click on the field name to edit it.

Measurement

This is the measurement level, used to describe characteristics of the data in a given field.

Role Used to tell modeling nodes whether fields will be Input (predictor fields) or Target (predicted fields) for a machine-learning process. Both and None are also available roles, along with Partition, which indicates a field used to partition records into separate samples for training, testing, and validation. The value Split specifies that separate models will be built for each possible value of the field.

Storage

Storage describes the way data are stored in a field. For example, a field with values of 1 and 0 stores integer data. This is distinct from the measurement level, which describes the usage of the data, and does not affect storage. For example, you may want to set the measurement level for an integer field with values of 1 and 0 to Flag. This usually indicates that 1 = True and 0 = False.

Projects

Projects are workspaces for storing inputs and accessing outputs of jobs. They provide the top-level organizational structure for containing files and folders. Projects can be shared with individual users and groups.

Left column

The left column displays the existing projects under the accordion heading.

- Select a project to display its details in the content area and edit its properties. Typing in the search area filters the listing to display only projects with the search string in their name.
- Click **New Project** to create a new project with the name you specify in the Add New Project dialog. Names are case-sensitive, ignore leading and trailing white space, and protect against SQL injection.
- Click **Delete Project** to remove the project. This action leaves all files that are associated with the data source intact.

Content area

The content area is divided into **Settings**, **Owners**, and **Version** tabs.

Settings

Project description

An editable text field to provide explanatory text about the project.

Is public

A check box that indicates whether anyone can see the project (checked) or if users and groups must be explicitly added to as owners (cleared).

Clicking **Save** saves the current state of the settings.

Project data sources

A non-editable area that lists all the data sources that are associated with the project.

Project structure pane

The right pane shows the project/folder structure for the currently selected project. You can browse the folder structure, but it is not editable, except through the buttons.

- Click **Download file to the local filesystem** to download a selected file to the local file system.
- Click **Delete the selected file(s)** to remove the selected file/folder.

Owners

Owners are full members of a project, and can modify the project as well as the folders and files within it.

The Available users and groups list displays users and groups in the active tenant that are not currently associated with this project.

- Typing in the search pane filters on users and groups with the search string in their name.
- Selecting the users icon above the list shows the available users. Clearing the icon hides the users. This icon is selected by default.
- Selecting the groups icon above the list shows the available groups. Clearing the icon hides the groups. This icon is selected by default.

Users and groups can be moved to the Project Users and Groups using the move button. These users and members of these groups have read (Analytic Server Source node) and write (Analytic Server Export node) access to this project when connecting to Analytic Server through IBM SPSS Modeler.

Note: Changes made on the Owners tab are immediately and automatically applied.

Note: Administrators have read and write access to every project, regardless of whether they are specifically listed as an owner.

Versions

Projects are versioned based on changes to the file and folder contents. Changes to a project's attributes, such as the description, whether it is public, and with whom it is shared, do not require a new version. Adding, modifying, or deleting files or folders does require a new version.

Project versioning table

The table displays the existing project versions, their creation and commit dates, the users responsible for each version, and the parent version. The parent version is the version upon which the selected version is based.

- Click **Lock** to make changes to the selected project version contents.
- Click **Commit** to save all changes that are made to a project and make this version the current visible state of the project.
- Click **Discard** to discard all changes that are made to a locked project and return the visible state of the project to the most recently committed version.
- Click **Delete** to remove the selected version.

Automatically clean up when number of versions exceeds

Automatically deletes the oldest committed project version when the number of versions exceeds the specified number.

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