IBM SPSS Analytic Server
Version 2.1.0.1

# *Overview*

**Note**
Before using this information and the product it supports, read the information in "Notices" on page 5.

**Product Information**

This edition applies to version 2.1.0.1, release 1, modification 0 of IBM SPSS Analytic Server and to all subsequent releases and modifications until otherwise indicated in new editions.

# Contents

# 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

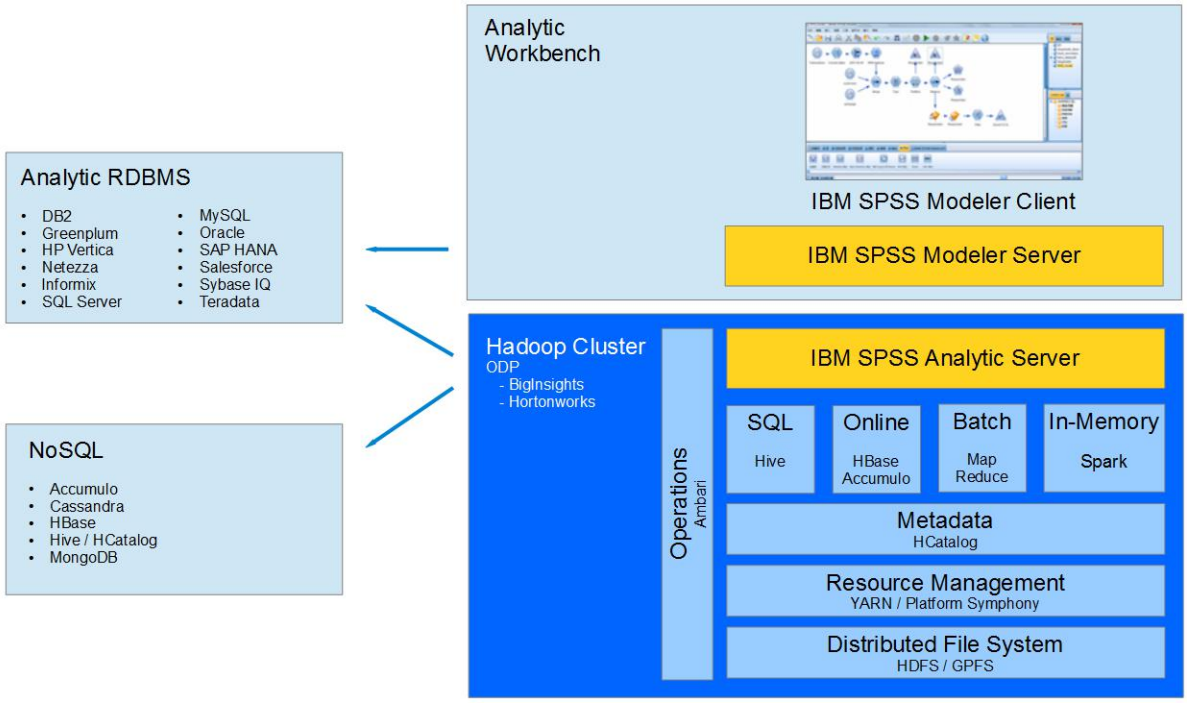


*Figure 1. Architecture*

Analytic Server sits between a client application and Hadoop cloud. Assuming that the data resides in the cloud, the general outline for working with 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 application is IBM SPSS Modeler.
3. When you run the analysis, the client application submits an Analytic Server execution request.
4. 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.

# Spark and Analytic Server

Analytic Server integrates with Apache Spark to increase performance.

## When Spark is and is not used

If Spark is installed as an Ambari service on the Hadoop cluster, then Analytic Server uses it to process big data jobs. The following guidelines apply to determine when Spark is not used.

1. If the data set is smaller than 128MB, then Analytic Server uses the embedded MapReduce function in the Analytic Server JVM and does not utilize Spark or the Hadoop cluster.
2. If Spark is not installed on the cluster, then Analytic Server uses MapReduce v2.
3. Analytic Server uses MapReduce v2 to build PSM models. When a job ends with a PSM model build, Analytic Server uses Spark to process the job through all steps leading to the model build, then write

to disk, and then use MapReduce to build the PSM model. For example, if a job includes a join followed by a PSM model build, the join runs in Spark and the PSM runs on the joined data in MapReduce.

### How Spark is used

When the Analytic Server service is started and discovers that Spark is available, it initializes a "Spark Hadoop job" that allows communication between distributed tasks across the cluster. This job runs for as long as the Analytic Server service runs, and is used for all Analytic Server executions. This approach improves performance relative to orchestrating multiple MapReduce Hadoop jobs, because it eliminates the overhead of reloading all Analytic Server components for each Hadoop Job.

Spark is capable of running MapReduce jobs. This allows Analytic Server to use "native" Spark algorithms such as join, sort, and union where available. At the same time, Analytic Server can run existing SPSS Map and Reduce algorithms in Spark, and without directly using the Hadoop API.

## What is new in version 2.1

### Analytics

**Spark integration**

When Analytic Server is installed as an Ambari service in a Hadoop cluster where Spark is installed, all Analytic Server jobs run in Spark, rather than MapReduce.

Additionally, you can include PySpark scripts in Modeler streams through the Custom Dialog Builder. See the Modeler Extensions for details on how to create custom Modeler nodes that call PySpark scripts.

**Support for new SPSS Modeler functionality**

**Generalized linear models**

Added support for distributed building and scoring of generalized linear models. See the GLE node in SPSS Modeler.

**Support vector machines (SVM)**

Added support for distributed building and scoring of linear support vector machines. See the LSVM node in SPSS Modeler.

**Random trees**

Added support for distributed building and scoring of random trees. See the Random Trees node in SPSS Modeler.

**Improved support for existing SPSS Modeler functionality**

**Restructure**

When large numbers of new fields are created, the Restructure node performs faster than before.

**Distinct**

The Distinct node performs faster than before.

**Predictor importance**

Models that compute predictor importance as part of the output perform faster than before.

**2.1.0.1 only. Merge**

Merging datasets in 2.1.0.1 performs faster than in previous versions, with greater increases in performance as the size of the data increases.

**2.1.0.1 only. Random trees**
Both building and scoring random trees performs faster than in previous versions. Scoring performance is comparable to native Spark scoring.

## Analytic Server console

**Data sources**

**Relational databases**
You can define data sources for Amazon Redshift, if Analytic Server has been configured to be able to use this data source.

**2.1.0.1 only.** Analytic Server now uses the Redshift driver instead of Postgres.

**NoSQL databases**
The names of the storage handlers have changed since version 2.0. For resources on setting up external Hive tables, see Using HCatalog data sources

**Reader role**
Within a tenant, you can assign users and groups to a Reader role that cannot log in to the Analytic Server, but can read Analytic Server data sources through the Analytic Server Source node in Modeler.

## Installation and configuration

Analytic Server is now installed and runs as an Apache Ambari service. This speeds and simplifies the installation and management of Analytic Server relative to earlier versions.

## Platform

Support for operating systems and Hadoop distributions is changed from version 2.

**Operating systems**
Analytic Server now runs on Red Hat Enterprise Linux (Power LE) in addition to existing operating system support.

**Hadoop distributions**
Analytic Server runs with Big Insights and Hortonworks, the distributions supported by Ambari. On these distributions, Analytic Server is configured as an Ambari service.

**2.1.0.1 only.** Analytic Server runs with Cloudera and MapR. On Cloudera, Analytic Server is configured using Cloudera Manager. On MapR, Analytic Server installation and configuration is a manual process.

**Metadata repository**
Analytic Server no longer supports Derby as the default metadata repository, and instead uses MySQL. DB2 is still supported as an alternative repository.

**Database data sources**
Data sources can be defined for Amazon Redshift, in addition to existing database support.

For the most up-to-date system requirements information, use the Detailed system requirements reports at the IBM Technical Support site: http://publib.boulder.ibm.com/infocenter/prodguid/v1r0/clarity/softwareReqsForProduct.html. On this page:

1. Type SPSS Analytic Server as the product name and click **Search**.
2. Select the wanted version and scope of report, then click **Submit**.

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