



Informatica® PowerExchange for Amazon S3  
10.2.2

# User Guide

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# Preface

The *PowerExchange® for Amazon S3 Guide* contains information about how to set up and use PowerExchange for Amazon S3. The guide explains how organization administrators and business users can use PowerExchange for Amazon S3 to read from and write data to Amazon S3.

This guide assumes that you have knowledge of Amazon S3 and Informatica Data Services.

## Object Missing

This object is not available in the repository.

## Informatica Network

The Informatica Network is the gateway to many resources, including the Informatica Knowledge Base and Informatica Global Customer Support. To enter the Informatica Network, visit <https://network.informatica.com>.

As an Informatica Network member, you have the following options:

- Search the Knowledge Base for product resources.
- View product availability information.
- Create and review your support cases.
- Find your local Informatica User Group Network and collaborate with your peers.

## Informatica Knowledge Base

Use the Informatica Knowledge Base to find product resources such as how-to articles, best practices, video tutorials, and answers to frequently asked questions.

To search the Knowledge Base, visit <https://search.informatica.com>. If you have questions, comments, or ideas about the Knowledge Base, contact the Informatica Knowledge Base team at [KB\\_Feedback@informatica.com](mailto:KB_Feedback@informatica.com).

## Informatica Documentation

Use the Informatica Documentation Portal to explore an extensive library of documentation for current and recent product releases. To explore the Documentation Portal, visit <https://docs.informatica.com>.

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## Informatica Product Availability Matrices

Product Availability Matrices (PAMs) indicate the versions of the operating systems, databases, and types of data sources and targets that a product release supports. You can browse the Informatica PAMs at <https://network.informatica.com/community/informatica-network/product-availability-matrices>.

## Informatica Velocity

Informatica Velocity is a collection of tips and best practices developed by Informatica Professional Services and based on real-world experiences from hundreds of data management projects. Informatica Velocity represents the collective knowledge of Informatica consultants who work with organizations around the world to plan, develop, deploy, and maintain successful data management solutions.

You can find Informatica Velocity resources at <http://velocity.informatica.com>. If you have questions, comments, or ideas about Informatica Velocity, contact Informatica Professional Services at [ips@informatica.com](mailto:ips@informatica.com).

## Informatica Marketplace

The Informatica Marketplace is a forum where you can find solutions that extend and enhance your Informatica implementations. Leverage any of the hundreds of solutions from Informatica developers and partners on the Marketplace to improve your productivity and speed up time to implementation on your projects. You can find the Informatica Marketplace at <https://marketplace.informatica.com>.

## Informatica Global Customer Support

You can contact a Global Support Center by telephone or through the Informatica Network.

To find your local Informatica Global Customer Support telephone number, visit the Informatica website at the following link:

<https://www.informatica.com/services-and-training/customer-success-services/contact-us.html>.

To find online support resources on the Informatica Network, visit <https://network.informatica.com> and select the eSupport option.

# CHAPTER 1

## Introduction to PowerExchange for Amazon S3

This chapter includes the following topics:

- [PowerExchange for Amazon S3 Overview, 7](#)
- [Introduction to Amazon S3, 7](#)
- [Data Integration Service and Amazon S3 Integration, 8](#)

### PowerExchange for Amazon S3 Overview

You can use PowerExchange for Amazon S3 to read and write delimited flat file data and binary files as pass-through data from and to Amazon S3 buckets.

Amazon S3 is a cloud-based store that stores many objects in one or more buckets.

Create an Amazon S3 connection to specify the location of Amazon S3 sources and targets you want to include in a data object. You can use the Amazon S3 connection in data object read and write operations. You can also connect to Amazon S3 buckets available in Virtual Private Cloud (VPC) through VPC endpoints.

You can run mappings in the native or non-native environment. Select the Blaze or Spark engines when you run mappings in the non-native environment.

**Note:** PowerExchange for Amazon S3 does not support lookup.

#### Example

You are a medical data analyst in a medical and pharmaceutical organization who maintains patient records. A patient record can contain patient details, doctor details, treatment history, and insurance from multiple data sources.

You use PowerExchange for Amazon S3 to collate and organize the patient details from multiple input sources in Amazon S3 buckets.

### Introduction to Amazon S3

Amazon Simple Storage Service (Amazon S3) is storage service in which you can copy data from source and simultaneously move data to any target. You can use Amazon S3 to store and retrieve any amount of data at

any time, from anywhere on the web. You can accomplish these tasks using the AWS Management Console web interface.

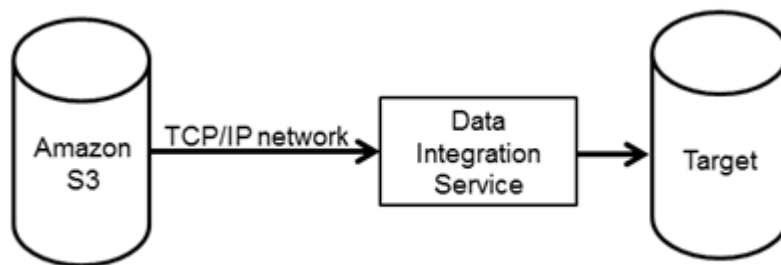
Amazon S3 stores data as objects within buckets. An object consists of a file and optionally any metadata that describes that file. To store an object in Amazon S3, you upload the file you want to store to a bucket. Buckets are the containers for objects. You can have one or more buckets. When using the AWS Management Console, you can create folders to group objects, and you can nest folders.

## Data Integration Service and Amazon S3 Integration

The Data Integration Service uses the Amazon S3 connection to connect to Amazon S3.

### Reading Amazon S3 Data

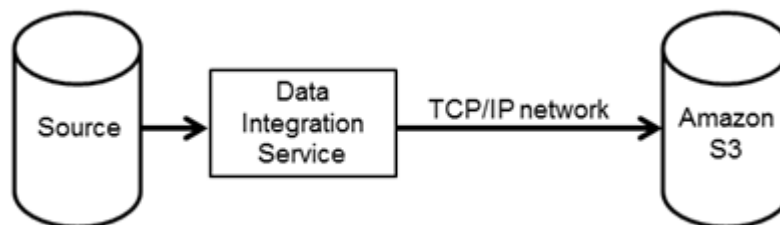
The following image shows how Informatica connects to Amazon S3 to read data:



When you run the Amazon S3 session, the Data Integration Service reads data from Amazon S3 based on the workflow and Amazon S3 connection configuration. The Data Integration Service connects and reads data from Amazon Simple Storage Service (Amazon S3) through a TCP/IP network. The Data Integration Service then stores data in a staging directory on the Data Integration Service host. Amazon S3 is a storage service in which you can copy data from source and simultaneously move data to any target. The Data Integration Service issues a copy command that copies data from Amazon S3 to the target.

### Writing Amazon S3 Data

The following image shows how Informatica connects to Amazon S3 to write data:



When you run the Amazon S3 session, the Data Integration Service writes data to Amazon S3 based on the workflow and Amazon S3 connection configuration. The Data Integration Service stores data in a staging directory on the Data Integration Service host. The Data Integration Service then connects and writes data to Amazon Simple Storage Service (Amazon S3) through a TCP/IP network. Amazon S3 is a storage service in which you can copy data from source and simultaneously move data to Amazon S3 clusters. The Data Integration Service issues a copy command that copies data from Amazon S3 to the Amazon S3 target file.



## CHAPTER 2

# PowerExchange for Amazon S3 Configuration Overview

This chapter includes the following topics:

- [PowerExchange for Amazon S3 Configuration Overview, 9](#)
- [Prerequisites , 9](#)
- [IAM Authentication, 10](#)

## PowerExchange for Amazon S3 Configuration Overview

PowerExchange for Amazon S3 installs with the Informatica Services. You can enable PowerExchange for Amazon S3 with a license key.

## Prerequisites

Before you can use PowerExchange for Amazon S3, perform the following tasks:

- Ensure that PowerExchange for Amazon S3 license is activated.
- Create an Access Key ID and Secret Access Key in AWS. You can provide these key values when you create an Amazon S3 connection
- Verify that you have write permissions on all the directories within the `<INFA_HOME>` directory.
- To run mappings on Hortonworks and Amazon EMR distributions that use non-Kerberos authentication, configure user impersonation.  
For information about configuring user impersonation, see the *Informatica Big Data Management™ Integration Guide*.
- To run mappings on MapR secure clusters, configure the MapR secure clusters on all the nodes.  
For information about configuring MapR secure clusters, see the *Informatica Big Data Management™ Integration Guide*.
- To successfully preview data from the Avro and Parquet files or run a mapping in the native environment with the Avro and Parquet files, you must configure the `INFA_PARSER_HOME` property for the Data

Integration Service in Informatica Administrator. Perform the following steps to configure the INFA\_PARSER\_HOME property:

- Log in to Informatica Administrator.
- Click the Data Integration Service and then click the **Processes** tab on the right pane.
- Click **Edit** in the **Environment Variables** section.
- Click **New** to add an environment variable.
- Enter the name of the environment variable as **INFA\_PARSER\_HOME**.
- Set the value of the environment variable to the absolute path of the Hadoop distribution directory on the machine that runs the Data Integration Service. Verify that the version of the Hadoop distribution directory that you define in the INFA\_PARSER\_HOME property is the same as the version you defined in the cluster configuration.
- To run mappings on Spark engine or to test connections through Administration tool using a secure domain, you must perform the following steps:
  - Download the Baltimore CyberTrust Root certificate file.
  - Provide the read, write, and execute permissions to the certificate file.
  - Run the following command to import the certificate file into the Informatica TrustStore location:

```
<INFA_HOME>/java/jre/bin/keytool -keystore <infa_trust_store_location> -importcert -alias <Alias_Name> -file <BaltimoreCyberTrustRoot certificate file path>/<certificate_filename> -storepass <Truststore_Password>
```
  - Restart the Data Integration Service.

## IAM Authentication

Optional. You can configure Amazon Identity and Access Management (IAM) authentication when the Data Integration Service runs on an Amazon Elastic Compute Cloud (EC2) system. Use IAM authentication for secure and controlled access to Amazon S3 resources when you run a session.

### Note:

Use IAM authentication when you want to run a session on an EC2 system. Perform the following steps to configure IAM authentication:

1. Create a minimal Amazon IAM Policy. For more information, see [“Create a Minimal Amazon IAM Policy” on page 11](#).
2. Create the Amazon EC2 role. Associate the minimal Amazon IAM policy while creating the EC2 role. The Amazon EC2 role is used when you create an EC2 system in the S3 bucket. For more information about creating the Amazon EC2 role, see the AWS documentation.
3. Create an EC2 instance. Assign the Amazon EC2 role that you created in step #2 to the EC2 instance.
4. Install the Data Integration Service on the EC2 system.

You can use Amazon IAM authentication when you run a mapping in the EMR cluster. To use Amazon IAM authentication in the EMR cluster, you must create the Amazon EMR Role. Create a new Amazon EMR Role or use the default Amazon EMR Role. You must assign the Amazon ERM Role to the EMR cluster for secure access to Amazon S3 resources.

**Note:** Before you configure IAM Role with EMR cluster, you must install the Informatica Services on an EC2 instance with the IAM Roles assigned.

## Create a Minimal Amazon IAM Policy

You can configure an IAM policy through the AWS console. Use Amazon IAM authentication to securely control access to Amazon S3 resources.

The following table describes the minimum Amazon S3 bucket policy required for users to successfully read data from or write data to Amazon S3 bucket:

S3 Policy	Description
PutObject	Writes the files to the Amazon S3 bucket. The Data Integration Service validates the bucket policy during runtime.
GetObject	Reads the files from the Amazon S3 bucket. The Data Integration Service validates the bucket policy during design time and runtime.
DeleteObject	Deletes the files from the Amazon S3 bucket. The Data Integration Service validates the bucket policy during runtime.
ListBucket	Lists the files that are available in the Amazon S3 bucket. The Data Integration Service validates the bucket policy during design time and runtime.

You can use the following sample minimal Amazon IAM policy:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "s3:PutObject",
        "s3:GetObject",
        "s3:DeleteObject",
        "s3:ListBucket",
      ],
      "Resource": [
        "arn:aws:s3:::<bucket_name>/*",
        "arn:aws:s3:::<bucket_name>"
      ]
    }
  ]
}
```

## CHAPTER 3

# Amazon S3 Connections

This chapter includes the following topics:

- [Amazon S3 Connections Overview, 12](#)
- [Amazon S3 Connection Properties, 13](#)
- [Creating an Amazon S3 Connection, 14](#)

## Amazon S3 Connections Overview

Amazon S3 connections enable you to read data from or write data to Amazon S3.

When you create an Amazon S3 connection, you define connection attributes. You can create an Amazon S3 connection in the Developer tool or the Administrator tool. The Developer tool stores connections in the domain configuration repository. Create and manage connections in the connection preferences. The Developer tool uses the connection when you create data objects. The Data Integration Service uses the connection when you run mappings.

You can use AWS Identity and Access Management (IAM) authentication to securely control access to Amazon S3 resources. If you have valid AWS credentials and you want to use IAM authentication, you do not have to specify the access key and secret key when you create an Amazon S3 connection.

When you run a mapping that reads data from an Amazon S3 source and writes data to an Amazon S3 target on the Spark engine, the mapping fails if the AWS credentials such as Access Key or Secret Key are different for source and target.

# Amazon S3 Connection Properties

When you set up an Amazon S3 connection, you must configure the connection properties.

The following table describes the Amazon S3 connection properties:

Property	Description
Name	The name of the connection. The name is not case sensitive and must be unique within the domain. You can change this property after you create the connection. The name cannot exceed 128 characters, contain spaces, or contain the following special characters:~`!\$%^&*()-+={ }\:;'"<,>.?/
ID	String that the Data Integration Service uses to identify the connection. The ID is not case sensitive. It must be 255 characters or less and must be unique in the domain. You cannot change this property after you create the connection. Default value is the connection name.
Description	Optional. The description of the connection. The description cannot exceed 4,000 characters.
Location	The domain where you want to create the connection.
Type	The Amazon S3 connection type.
Access Key	The access key ID for access to Amazon account resources. <b>Note:</b> Required if you do not use AWS Identity and Access Management (IAM) authentication.
Secret Key	The secret access key for access to Amazon account resources. The secret key is associated with the access key and uniquely identifies the account. <b>Note:</b> Required if you do not use AWS Identity and Access Management (IAM) authentication.
Folder Path	The complete path to Amazon S3 objects. The path must include the bucket name and any folder name. Do not use a slash at the end of the folder path. For example, <bucket name>/<my folder name>.
Master Symmetric Key	Optional. Provide a 256-bit AES encryption key in the Base64 format when you enable client-side encryption. You can generate a master symmetric key using a third-party tool.

Property	Description
Customer Master Key ID	<p>Optional. Specify the customer master key ID or alias name generated by AWS Key Management Service (AWS KMS). You must generate the customer master key for the same region where Amazon S3 bucket reside.</p> <p>You can specify any of the following values:</p> <p><b>Customer generated customer master key</b></p> <p>Enables client-side or server-side encryption.</p> <p><b>Default customer master key</b></p> <p>Enables client-side or server-side encryption. Only the administrator user of the account can use the default customer master key ID to enable client-side encryption.</p> <p><b>Note:</b> Applicable when you run a mapping in the native environment or on the Spark engine.</p>
Region Name	<p>Select the AWS region in which the bucket you want to access resides.</p> <p>Select one of the following regions:</p> <ul style="list-style-type: none"> <li>- Asia Pacific (Mumbai)</li> <li>- Asia Pacific (Seoul)</li> <li>- Asia Pacific (Singapore)</li> <li>- Asia Pacific (Sydney)</li> <li>- Asia Pacific (Tokyo)</li> <li>- AWS GovCloud (US)</li> <li>- Canada (Central)</li> <li>- China (Beijing)</li> <li>- China (Ningxia)</li> <li>- EU (Ireland)</li> <li>- EU (Frankfurt)</li> <li>- EU (London)</li> <li>- EU (Paris)</li> <li>- South America (Sao Paulo)</li> <li>- US East (Ohio)</li> <li>- US East (N. Virginia)</li> <li>- US West (N. California)</li> <li>- US West (Oregon)</li> </ul> <p>Default is US East (N. Virginia).</p>

## Creating an Amazon S3 Connection

Create an Amazon S3 connection before you create an Amazon S3 data object.

1. In the Developer tool, click **Window > Preferences**.
2. Select **Informatica > Connections**.
3. Expand the domain in the **Available Connections**.
4. Select the connection type **Enterprise Application > Amazon S3**, and click **Add**.
5. Enter a connection name and an optional description.
6. Select Amazon S3 as the connection type.
7. Click **Next**.
8. Configure the connection properties.
9. Click **Test Connection** to verify the connection to Amazon S3.

10. Click **Finish**.

## CHAPTER 4

# PowerExchange for Amazon S3 Data Objects

This chapter includes the following topics:

- [Amazon S3 Data Object Overview, 16](#)
- [Amazon S3 Data Object Properties, 17](#)
- [Amazon S3 Data Object Read Operation, 17](#)
- [Amazon S3 Data Object Write Operation, 23](#)
- [FileName Port Overview, 28](#)
- [Data Compression in Amazon S3 Sources and Targets, 32](#)
- [Hadoop Performance Tuning Options for EMR Distribution, 34](#)
- [Creating an Amazon S3 Data Object, 34](#)
- [Creating an Amazon S3 Data Object Read or Write Operation, 36](#)
- [Creating an Amazon S3 Target, 37](#)
- [Filtering Metadata, 39](#)

## Amazon S3 Data Object Overview

An Amazon S3 data object is a physical data object that uses Amazon S3 as a source or target. An Amazon S3 data object is the physical data object that represents data based on an Amazon S3 resource.

You can configure the data object read and write operation properties that determine how data can be read from Amazon S3 sources and loaded to Amazon S3 targets.

Create an Amazon S3 data object from the Developer tool. PowerExchange for Amazon S3 creates the data object read operation and data object write operation for the Amazon S3 data object automatically. You can edit the advanced properties of the data object read or write operation and run a mapping.

**Note:** To view the list of files available in a bucket, you must select the bucket name instead of expanding the bucket name list in the **Object Explorer** view.



# Amazon S3 Data Object Properties

Specify the data object properties when you create the data object.

The following table describes the properties that you configure for the Amazon S3 data objects:

Property	Description
Name	Name of the Amazon S3 data object.
Location	The project or folder in the Model Repository Service where you want to store the Amazon S3 data object.
Connection	Name of the Amazon S3 connection.
Resource Format	<p>You can create an Amazon S3 file data object from the following data source in Amazon S3:</p> <ul style="list-style-type: none"><li>- Avro</li><li>- Binary</li><li>- Flat</li><li>- JSON</li><li>- ORC</li><li>- Parquet</li><li>- Intelligent Structure Model. It reads any format that an intelligent structure parses.</li></ul> <p><b>Note:</b> The Intelligent Structure Model is available for technical preview. Technical preview functionality is supported but is unwarranted and is not production-ready. Informatica recommends that you use in non-production environments only.</p> <p>You must choose the appropriate source format to read data from the source or write data to the target. Default is binary.</p> <p>The Avro, ORC, and Parquet file formats are applicable when you run a mapping in the native environment and on the Spark engine. The JSON and Intelligent Structure Model file formats are applicable when you run a mapping on the Spark engine.</p>

## Amazon S3 Data Object Read Operation

Create a mapping with an Amazon S3 data object read operation to read data from Amazon S3.

You can download Amazon S3 files in multiple parts, specify the location of the staging directory, and compress the data when you read data from Amazon S3.

### Directory Source in Amazon S3 Sources

You can select the type of source from which you want to read data.

You can select the following type of sources from the **Source Type** option under the advanced properties for an Amazon S3 data object read operation:

- File
- Directory

**Note:** Applicable when you run a mapping in the native environment or on the Spark engine.

You must select the source file during the data object creation to select the source type as **Directory** at the run time. PowerExchange for Amazon S3 provides the option to override the value of the **Folder Path** and **File**

**Name** properties during run time. When you select the **Source Type** option as **Directory**, the value of the **File Name** is not honored.

For read operation, if you provide the **Folder Path** value during run time, the Data Integration Service considers the value of the **Folder Path** from the data object read operation properties. If you do not provide the **Folder Path** value during run time, the Data Integration Service considers the value of the **Folder Path** that you specify during the data object creation.

Use the following rules and guidelines to select **Directory** as the source type:

- All the source files in the directory must contain the same metadata.
- All the files must have data in the same format. For example, delimiters, header fields, and escape characters must be same.
- All the files under a specified directory are parsed. The files under subdirectories are not parsed.

When you run a mapping to read multiple files and if the Amazon S3 data object is defined using file with header option on the Spark engine, the mapping runs successfully. However, the Data Integration Service does not generate a validation error for the files with no header.

## Wildcard Character Overview

When you run a mapping to read data from an Avro, flat, JSON, ORC, or Parquet file, you can use wildcard characters to specify the source file name.

To use wildcard characters for the source file name, select the **Allow Wildcard Characters** option in the advanced read properties of the Amazon S3 data object.

### Wildcard Characters for Reading Data from Flat Files

When you run a mapping in the native environment to read data from a flat, you can use an asterisk (\*) wildcard character to specify the source file name.

You can use the asterisk (\*) wildcard to fetch all the files or only the files that match the name pattern. Specify the wildcard character in the following format:

```
abc*.txt  
abc.*
```

For example, if you specify `result*.txt`, all the file names starting with the term `result` and ending with the `.txt` file extension are read. If you specify `result.*`, all the file names starting with the term `result` are read regardless of the extension.

**Note:** You can use only one asterisk (\*) wildcard character to specify the source file name.

Use the wildcard character to specify files from a single folder. For example,

```
{  
  "fileLocations": [{  
    "URIs": [  
      "automation/manual/AmazonS3_Input.csv"  
    ],  
    {  
      "URIPrefixes": [  
        "automation/lookup/"  
      ],  
    },  
    {  
      "WildcardURIs": [  
        "automation/new/**n*.csv"  
      ]  
    }  
  ]  
}
```

```
}  
}
```

You cannot use the wildcard characters to specify folder names. For example,

```
{ "WildcardURIs": [ "multiread_wildcard/dir1*/", "multiread_wildcard/*/ " ] }
```

## Wildcard Characters for Reading Data from Complex Files

When you run a mapping in the native environment or Spark engine to read data from an Avro, JSON, ORC, or Parquet file, you can use an asterisk (?) and (\*) wildcard characters to specify the source file name.

You can use the following wildcard characters:

### ? (Question mark)

The question mark character (?) allows one occurrence of any character. For example, if you enter the source file name as `a?b.txt`, the Data Integration Service reads data from files with the following names:

- `a1b.txt`
- `a2b.txt`
- `aab.txt`
- `acb.txt`

### \* (Asterisk)

The asterisk mark character (\*) allows zero or more than one occurrence of any character. If you enter the source file name as `a*b.txt`, the Data Integration Service reads data from files with the following names:

- `aab.txt`
- `a1b.txt`
- `ab.txt`
- `abc11b.txt`

**Note:** When you read data from the Avro, JSON, ORC, or Parquet file that contains a colon (:) character in the file name, the mapping fails.

## Amazon S3 Data Object Read Operation Properties

Amazon S3 data object read operation properties include run-time properties that apply to the Amazon S3 data object.

The Developer tool displays advanced properties for the Amazon S3 data object operation in the **Advanced** view. The following table describes the advanced properties for an Amazon S3 data object read operation:

Property	Description
Source Type	<p>Select the type of source from which you want to read data. You can select the following source types:</p> <ul style="list-style-type: none"><li>- File</li><li>- Directory</li></ul> <p>Default is <b>File</b>. Applicable when you run a mapping in the native environment or on the Spark engine.</p> <p>For more information about source type, see <a href="#">"Directory Source in Amazon S3 Sources" on page 17</a>.</p>
Folder Path	<p>Bucket name or folder path of the Amazon S3 source file that you want to overwrite.</p> <p>If applicable, include the folder name that contains the source file in the <code>&lt;bucket_name&gt;/&lt;folder_name&gt;</code> format.</p> <p>If you do not provide the bucket name and specify the folder path starting with a slash (/) in the <code>&lt;folder_name&gt;</code> format, the folder path appends with the folder path that you specified in the connection properties.</p> <p>For example, if you specify the <code>&lt;my_bucket1&gt;/&lt;dir1&gt;</code> folder path in the connection property and <code>/&lt;dir2&gt;</code> folder path in this property, the folder path appends with the folder path that you specified in the connection properties in <code>&lt;my_bucket1&gt;/&lt;dir1&gt;/&lt;dir2&gt;</code> format.</p> <p>If you specify the <code>&lt;my_bucket1&gt;/&lt;dir1&gt;</code> folder path in the connection property and <code>&lt;my_bucket2&gt;/&lt;dir2&gt;</code> folder path in this property, the Data Integration Service reads the file from the <code>&lt;my_bucket2&gt;/&lt;dir2&gt;</code> folder path that you specify in this property.</p>
File Name	<p>Name of the Amazon S3 source file that you want to overwrite.</p>
Allow Wildcard Characters	<p>Indicates whether you want to use wildcard characters for the source directory name or the source file name.</p> <p>When you run a mapping in the native environment to read a flat file and select this option, you can use the * wildcard character for the source file name.</p> <p>When you run a mapping in the native environment or on the Spark engine to read an Avro, JSON, ORC, or Parquet file and select this option, you can use the ? and * wildcard characters for the source directory name or the source file name.</p> <p>The question mark character (?) allows one occurrence of any character. The asterisk character (*) allows zero or more than one occurrence of any character.</p>

Property	Description
Staging Directory	<p>Amazon S3 staging directory.</p> <p>Ensure that the user has write permissions on the directory. In addition, ensure that there is sufficient space to enable staging of the entire file.</p> <p>Default staging directory is the <code>/temp</code> directory on the machine that hosts the Data Integration Service.</p> <p><b>Note:</b> Applicable when you run a mapping in the native environment.</p>
Hadoop Performance Tuning Options	<p>Provide semicolon separated name-value attribute pairs to optimize performance when you copy large volumes of data between Amazon S3 and HDFS.</p> <p><b>Note:</b> Applicable to the Amazon EMR cluster.</p> <p>For more information about Hadoop performance tuning options, see <a href="#">“Hadoop Performance Tuning Options for EMR Distribution” on page 34.</a></p>
Compression Format	<p>Decompresses data when you read data from Amazon S3.</p> <p>You can decompress the data in the following formats:</p> <ul style="list-style-type: none"> <li>- <b>None.</b> Select <b>None</b> to decompress files with the deflate, snappy, and zlib formats.</li> <li>- <b>Bzip2</b></li> <li>- <b>Gzip</b></li> <li>- <b>Lzo</b></li> </ul> <p>Default is None.</p> <p>You can read files that use the deflate, snappy, zlib, Gzip, and Lzo compression formats in the native environment and on the Spark engine.</p> <p>You can read files that use the Bzip2 compression format on the Spark engine.</p> <p>For more information about compression formats, see <a href="#">“Data Compression in Amazon S3 Sources and Targets” on page 32.</a></p>
Download Part Size	<p>Downloads an Amazon S3 object in multiple parts.</p> <p>Default is 5 MB.</p> <p>When the file size of an Amazon S3 object is greater than 8 MB, you can choose to download the object in multiple parts in parallel. By default, the Data Integration Service downloads the file in multiple parts.</p> <p><b>Note:</b> Applicable when you run a mapping in the native environment.</p>
Multiple Download Threshold	<p>Minimum threshold size to download an Amazon S3 object in multiple parts.</p> <p>Default is 10 MB.</p> <p>To download the object in multiple parts in parallel, you must ensure that the file size of an Amazon S3 object is greater than the value you specify in this property.</p> <p><b>Note:</b> Applicable when you run a mapping in the native environment.</p>

## Column Projection Properties

The Developer tool displays the column projection properties for Amazon S3 file sources in the **Properties** view of the **Read** operation.

The following table describes the column projection properties that you configure for Amazon S3 file sources:

Property	Description
Enable Column Projection	Displays the column details of the Amazon S3 file sources.
Schema Format	<p>Displays the schema format that you selected while creating the Amazon S3 file data object. You can change the schema format and provide respective schema.</p> <p>You can select one of the following Amazon S3 file formats:</p> <ul style="list-style-type: none"><li>- Avro</li><li>- JSON</li><li>- ORC</li><li>- Parquet</li></ul> <p>You can change the Amazon S3 file format without losing the column metadata even after you configure the column projection properties for another Amazon S3 file format.</p>
Schema	<p>Displays the schema associated with the Amazon S3 file. You can select a different schema.</p> <p><b>Note:</b> If you disable the column projection, the schema associated with the Amazon S3 file is removed. If you want to associate schema again with the Amazon S3 file, enable the column projection and click <b>Select Schema</b>.</p>
Use Intelligent Structure Model	<p>Select this option to associate an intelligent structure model with Amazon S3 files.</p> <p><b>Warning:</b> Do not associate an intelligent structure model with a Write data object operation. If you use a Write operation that is associated with an intelligent structure model in a mapping, the mapping will not be valid.</p>
Model	<p>Displays the intelligent structure model associated with the Amazon S3 file. You can select a different model.</p> <p><b>Note:</b> If you disable the column projection, the intelligent structure model associated with the data object is removed. If you want to associate an intelligent structure model again with the data object, enable the column projection and click <b>Select Model</b>.</p>
Column Mapping	<p>Displays the mapping between input and output ports.</p> <p><b>Note:</b> If you disable the column projection, the mapping between input and output ports is removed. If you want to map the input and output ports, enable the column projection and click <b>Select Schema</b> to associate a schema to the Amazon S3 file.</p>
Project Column as Complex Data Type	<p>Displays columns with hierarchical data as a complex data type, such as, array, map, or struct. Select this property when you want to process hierarchical data on the Spark engine.</p> <p><b>Note:</b> If you disable the column projection, the data type of the column is displayed as binary type.</p>

**Note:** If you disable the column projection, the mapping between input and output ports is removed. If you want to map the input and output ports, enable the column projection and click **Edit Schema** to associate a schema to the Amazon S3 file.

# Amazon S3 Data Object Write Operation

Create a mapping to write data to Amazon S3. Change the connection to an Amazon S3 connection, and define the write operation properties to write data to Amazon S3.

There is no control over the number of files created or file names written to the directory on the Spark engine. The Data Integration Service writes data to multiple files based on the source or source file size to the directory provided. You must provide the target file name and based on target file name, the Data Integration Service adds suffix characters such as MapReduce or Split information to the target file name.

If the file size is greater than 256 MB, the Data Integration Service creates multiple files inside the target folder. For example, `output.txt-m-00000`, `output.txt-m-00001`, and `output.txt-m-00002`.

## Amazon S3 Data Encryption

To protect data, you can enable server-side encryption or client-side encryption to encrypt data inserted in Amazon S3 buckets.

You can encrypt data by using the master symmetric key or customer master key. Do not use the master symmetric key and customer master key together.

**Note:** You cannot read KMS encrypted data when you use the IAM role with an EC2 system that has a valid KMS encryption key and a valid Amazon S3 bucket policy.

You can select type that you want to use to encrypt data in the **Encryption Type** advanced properties for the data object write operation. You can select the following encryption type you want to use to encrypt data:

### None

The data is not encrypted.

### Server Side Encryption

Select **Server Side Encryption** as the encryption type if you want Amazon S3 encrypts data using Amazon S3-managed encryption keys when you write the files to the target.

### Server Side Encryption With KMS

Select **Server Side Encryption With KMS** as the encryption type if you want Amazon S3 to encrypt the data using AWS KMS-managed customer master key encryption keys when you write the files to the target.

The AWS KMS-managed customer master key specified in the connection property must belong to the same region where Amazon S3 is hosted. For example, if Amazon S3 is hosted in the **US West (Oregon)** region, you must use the AWS KMS-managed customer master key enabled in the same region when you select the **Server Side Encryption With KMS** encryption type.

**Note:** The Data Integration Service supports the **Server Side Encryption With KMS** encryption type on Amazon EMR version 5.16 and Cloudera CDH version 5.15, and 5.16.

### Client Side Encryption

Select **Client Side Encryption** as the encryption type if you want the Data Integration Service to encrypt the data when you write the files to the target. Client-side encryption uses a master symmetric key or customer master key that you specify in the Amazon S3 connection properties to encrypt data.

**Note:** Applicable only when you run a mapping in the native environment.

If you specify both the master symmetric key and customer master key ID in the connection properties, and select a client-side encryption, the Data Integration Service uses the customer master key ID to encrypt data.

To enable client-side encryption, perform the following tasks:

1. Ensure that an organization administrator creates a master symmetric key or customer master key ID when you create an Amazon S3 connection.  
**Note:** The administrator user of the account can use the default customer master key ID to enable the client-side encryption.
2. Select **Client Side Encryption** as the encryption type in the advanced properties of the data object write operation.
3. Ensure that an organization administrator updates the security JAR files, required by the Amazon S3 client encryption policy, on the machine that hosts the Data Integration Service.

**Note:** When you select a client-side encryption and run a mapping to read or write an Avro, ORC, or Parquet file, the mapping runs successfully. However, the Data Integration Service ignores the client-side encryption.

The following table lists the encryption types for the support for various environments:

Encryption Type	Native Environment	Blaze Environment	Spark Environment
Server Side Encryption	Yes	Yes	Yes
Client Side Encryption	Yes	No	No
Server Side Encryption With KMS	Yes	No	Yes

For information about the Amazon S3 client encryption policy, see the *Amazon S3 documentation*.

## Overwriting Existing Files

You can choose to overwrite the existing files.

Select the **Overwrite File(s) If Exists** option in the Amazon S3 data object write operation properties to overwrite the existing files. By default, the value of the **Overwrite File(s) If Exists** check box is true.

If you select the **Overwrite File(s) If Exists** option, the Data Integration Service deletes the existing files with same file name and creates a new files with the same file name in the target directory.

If you do not select the **Overwrite File(s) If Exists** option, the Data Integration Service does not delete the existing files in the target directory. The Data Integration Service adds time stamp at the end of each target file name in the following format: `YYYYMMDD_HHMMSS_millisecond`. For example, the Data Integration Service renames the target file name in the following format: `output.txt-20170413_220348_164-m-00000`.

If you select the **Overwrite File(s) If Exists** option on the Spark engine, the Data Integration Service splits the existing files into multiple files with same file name. Then the Data Integration Service deletes the split files and creates new files in the target directory.

When you select the **Overwrite File(s) If Exists** option to overwrite an Avro file on the Spark engine, the Data Integration Service overwrites the existing file and appends `_avro` to the folder name. For example, `targetfile_avro`



## Object Tag

You can add a tag to the object stored on the Amazon S3 bucket when you run a mapping in the native environment or on the Spark and Databricks Spark engine. Each tag contains a key value pair. Tagging an object helps to categorize the storage.

You can add the object tags in the **Object Tags** field under the advanced properties of the data object write operation. Enter the object tag in the `Key=Value` format. You can also enter multiple object tags in the following format:

```
key1=Value1;key2=Value2
```

You can either enter the key value pairs or the specify the file path that contains the key value pairs. For example, you can specify the file path in the `C:\object\tags.txt` format. You can specify any file path on which the Data Integration Service is installed.

When you upload new objects in the Amazon S3 bucket, you can add tags to the new objects or add tags to the existing objects. If the Data Integration Service overrides a file that contains a tag in the Amazon S3 bucket, the tag is not retained. You must add a new tag for the overridden file. If you upload multiple files to the Amazon S3 bucket, each file that you upload must have the same set of tags associated with the multiple objects.

To add tags in the Amazon S3 target object, you must add the `s3:PutObjectTagging` permission in the Amazon S3 policy. Following is the sample policy:

```
{
  "Version": "2012-10-17",
  "Id": "Policy1500966932533",
  "Statement": [
    {
      "Sid": "Stmt1500966903029",
      "Effect": "Allow",
      "Action": [
        "s3:DeleteObject",
        "s3:GetObject",
        "s3:ListBucket",
        "s3:PutObject",
        "s3:PutObjectTagging"
      ],
      "Resource": [
        "arn:aws:s3:::<bucket_name>/*",
        "arn:aws:s3:::<bucket_name>"
      ]
    }
  ]
}
```

The following table lists the special characters that PowerExchange for Amazon S3 supports during entering the key value pair:

Special Characters	Support
+	Yes
-	Yes
=	No
.	Yes
-	Yes

Special Characters	Support
:	Yes
/	Yes

## Amazon S3 Data Object Write Operation Properties

Amazon S3 data object write operation properties include run-time properties that apply to the Amazon S3 data object.

The Developer tool displays advanced properties for the Amazon S3 data object operation in the **Advanced** view.

**Note:** By default, the Data Integration Service uploads the Amazon S3 file in multiple parts.

The following table describes the Advanced properties for an Amazon S3 data object write operation:

Property	Description
Folder Path	<p>Bucket name or folder path of the Amazon S3 source file that you want to overwrite.</p> <p>If applicable, include the folder name that contains the target file in the <code>&lt;bucket_name&gt;/&lt;folder_name&gt;</code> format.</p> <p>If you do not provide the bucket name and specify the folder path starting with a slash (/) in the <code>/&lt;folder_name&gt;</code> format, the folder path appends with the folder path that you specified in the connection properties.</p> <p>For example, if you specify the <code>&lt;my_bucket1&gt;/&lt;dir1&gt;</code> folder path in the connection property and <code>/&lt;dir2&gt;</code> folder path in this property, the folder path appends with the folder path that you specified in the connection properties in <code>&lt;my_bucket1&gt;/&lt;dir1&gt;/&lt;dir2&gt;</code> format.</p> <p>If you specify the <code>&lt;my_bucket1&gt;/&lt;dir1&gt;</code> folder path in the connection property and <code>&lt;my_bucket2&gt;/&lt;dir2&gt;</code> folder path in this property, the Data Integration Service writes the file in the <code>&lt;my_bucket2&gt;/&lt;dir2&gt;</code> folder path that you specify in this property.</p>
File Name	<p>Name of the Amazon S3 source file that you want to overwrite.</p> <p><b>Note:</b> When you run a mapping on the Blaze engine to write data to a target, do not use a semi-colon in file name to run the mapping successfully.</p>
Encryption Type	<p>Method you want to use to encrypt data.</p> <p>Select one of the following values:</p> <ul style="list-style-type: none"> <li>- None</li> <li>- Client Side Encryption</li> <li>- Server Side Encryption</li> <li>- Server Side Encryption with KMS</li> </ul> <p>For more information, see <a href="#">“Amazon S3 Data Encryption” on page 23</a>.</p>
Staging Directory	<p>Amazon S3 staging directory.</p> <p>Ensure that the user has write permissions on the directory. In addition, ensure that there is sufficient space to enable staging of the entire file.</p> <p>Default staging directory is the <code>/temp</code> directory on the machine that hosts the Data Integration Service.</p> <p><b>Note:</b> Applicable when you run a mapping in the native environment.</p>
File Merge	<p>Merges the target files into a single file.</p> <p><b>Note:</b> Applicable when you run a mapping on the Blaze engine.</p>

Property	Description
Hadoop Performance Tuning Options	<p>Provide semicolon separated name-value attribute pairs to optimize performance when you copy large volumes of data between Amazon S3 and HDFS. Applicable to the Amazon EMR cluster.</p> <p><b>Note:</b> Applicable when you run a mapping in the native environment.</p> <p>For more information about Hadoop performance tuning options, see <a href="#">“Hadoop Performance Tuning Options for EMR Distribution” on page 34.</a></p>
Compression Format	<p>Compresses data when you write data to Amazon S3.</p> <p>You can compress the data in the following formats:</p> <ul style="list-style-type: none"> <li>- <b>None</b></li> <li>- <b>Bzip2</b></li> <li>- <b>Deflate</b></li> <li>- <b>Gzip</b></li> <li>- <b>Lzo</b></li> <li>- <b>Snappy</b></li> <li>- <b>Zlib</b></li> </ul> <p>Default is None.</p> <p>You can write files that use the deflate, Gzip, snappy, Lzo, and zlib compression formats in the native environment and on the Spark engine.</p> <p>You can write files that use the Bzip2 compression format on the Spark engine.</p> <p>For more information about compression formats, see <a href="#">“Data Compression in Amazon S3 Sources and Targets” on page 32.</a></p>
Object Tags	<p>Add single or multiple tags to the objects stored on the Amazon S3 bucket.</p> <p>You can either enter the key value pairs or specify the file path that contains the key value pairs.</p> <p><b>Note:</b> Applicable when you run a mapping in the native environment to write a flat file to the target.</p> <p>For more information about the object tags, see <a href="#">“Object Tag” on page 25.</a></p>
TransferManager Thread Pool Size	<p>The number of threads to write data in parallel. Default is 10.</p> <p>PowerExchange for Amazon S3 uses the AWS TransferManager API to upload a large object in multiple parts to Amazon S3.</p> <p>When the file size is more than 5 MB, you can configure multipart upload to upload object in multiple parts in parallel. If you set the value of the <b>TransferManager Thread Pool Size</b> to greater than 50, the value reverts to 50.</p> <p><b>Note:</b> Applicable when you run a mapping in the native environment to write a flat file to the target.</p>
Part Size	<p>The part size in bytes to upload an Amazon S3 object. Default is 5 MB.</p> <p><b>Note:</b> Applicable when you run a mapping in the native environment to write a flat file to the target.</p>
Overwrite File(s) If Exists	<p>Overwrite the existing files.</p> <p>Select the check box if you want to overwrite the existing files. Default is true.</p> <p>For more information Overwrite File(s) If Exists, see <a href="#">“Overwriting Existing Files” on page 24.</a></p>

## Column Projection Properties

The Developer tool displays the column projection properties for Amazon S3 file targets in the **Properties** view of the **Write** operation.

The following table describes the column projection properties that you configure for Amazon S3 file targets:

Property	Description
Enable Column Projection	Displays the column details of the Amazon S3 files sources.
Schema Format	<p>Displays the schema format that you selected while creating the complex file data object. You can change the schema format and provide respective schema.</p> <p>You can select one of the following Amazon S3 file formats:</p> <ul style="list-style-type: none"><li>- Avro</li><li>- JSON</li><li>- ORC</li><li>- Parquet</li></ul> <p>You can change the Amazon S3 file format without losing the column metadata even after you configure the column projection properties for another Amazon S3 file format.</p>
Schema	<p>Displays the schema associated with the Amazon S3 file. You can select a different schema.</p> <p><b>Note:</b> If you disable the column projection, the schema associated with the Amazon S3 file is removed. If you want to associate schema again with the Amazon S3 file, enable the column projection and click <b>Select Schema</b>.</p>
Column Mapping	<p>Displays the mapping between input and output ports.</p> <p><b>Note:</b> If you disable the column projection, the mapping between input and output ports is removed. If you want to map the input and output ports, enable the column projection and click <b>Select Schema</b> to associate a schema to the Amazon S3 file.</p>
Project Column as Complex Data Type	<p>Displays columns with hierarchical data as a complex data type, such as, array, map, or struct. Select this property when you want to process hierarchical data on the Spark engine.</p> <p><b>Note:</b> If you disable the column projection, the data type of the column is displayed as binary type.</p>

## FileName Port Overview

A FileName port is a string port with a default precision of 1024 characters that contains an endpoint name and source path of a file.

You cannot configure the FileName port. You can delete the FileName port if you do not want to read or write the data in the FileName. When you create a data object read or write operation for all the Amazon S3 files, the FileName port is displayed by default.

For a flat file, the FileName port appears when you run a mapping in the native environment. For an Avro, JSON, ORC, and Parquet file, the FileName port appears when you run a mapping in the native environment or on the Spark engine.

The Data Integration Service reads the FileName port for the Amazon S3 file formats in the following format:  
`<end point>/<bucket name>/<file name path>/<file>` format.

Here, `<end point>` indicates the region name of the Amazon S3 bucket.

For example, `s3-us-west-2.amazonaws.com /infa.qa.bucket/automation/file.parquet`.

**Note:** The Data Integration Service displays the value of the endpoint incorrectly when you run a mapping on the Spark engine. For example, the Data Integration Service displays the endpoint value as `s3a` instead of `s3-us-west-2.amazonaws.com`.

## Working with FileName Port

You can use the data in the FileName port when you create a data object read or write operation.

When you run a mapping to read or write an Amazon S3 file using the FileName port, the result varies based on the type of the Amazon S3 file that you use and the engine where you run the mapping. For example, when you run a mapping in the native environment to read or write an Avro, JSON, ORC, or Parquet file, the Data Integration Service appends a period (.) to the directory name and appends an underscore (\_) to the directory name when you run a mapping on the Spark engine.

When you run a mapping in the native environment to read or write a flat file using the FileName port, the Data Integration Service creates separate files for each entry in the FileName port in the following format:

```
<valueoftheNativeNamepropertyorFileNameDataObjectWriteOperation>=<valueComingToFileNamePort>
```

When you run a mapping in the native environment or on the Spark engine to read or write an Avro, JSON, ORC, or Parquet file using the FileName port, the Data Integration Service creates separate directories for each entry in the FileName port and adds the files within the directories in the following format:

- On the Spark engine, the Data Integration Service creates the directory in the `<valueoftheNativeNamepropertyorFileNameDataObjectWriteOperation>_<fileextention>` format and creates the file in the `<valueoftheNativeNamepropertyorFileNameDataObjectWriteOperation>_<fileextention>=<valueComingToFileNamePort>` format.
- In the native environment, the Data Integration Service creates the directory in the `<valueoftheNativeNamepropertyorFileNameDataObjectWriteOperation>.<fileextention>` format and creates the file in the `<valueoftheNativeNamepropertyorFileNameDataObjectWriteOperation>.<fileextention>=<valueComingToFileNamePort>` format.

## Creating the Directories in the Same Format

When you run a mapping in the native environment or on the Spark engine to read or write an Avro, JSON, ORC, or Parquet file, you can enable the Data Integration Service to create the directories in the same format.

To create the directories in the same format, you must add the `DSparkS3TargetNameWithUnderscore` custom property and set the value to `true`.

Perform the following steps to add and set the `DSparkS3TargetNameWithUnderscore` custom property to `true`:

1. In the **Administrator Console**, navigate to the Data Integration Service.  
The **Data Integration Service** page appears.
2. Click the **Processes** tab.  
The **Processes** page appears.
3. Click the pencil icon to edit the custom property in the **Custom Properties** section.  
The **Edit Custom Properties** dialog box appears.
4. Click **New** to add a new custom property.  
The **New Custom Property** dialog box appears.
5. In the **Name** field, enter `DSparkS3TargetNameWithUnderscore` as the name of the custom property.

6. In the **Value** field, enter `true` as the value of the custom property.
7. Click **OK**.
8. Restart the Data Integration Service.

You can also add the custom property in the **Custom Properties** section under the **Properties** tab.

## Rules and Guidelines for Using FileName Port

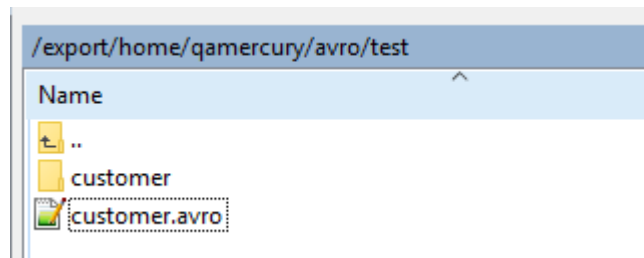
Use the following rules and guidelines when you run a mapping to read or write data using the FileName port:

- When you run a mapping to read an Amazon S3 file and if one of the values in the FileName port does not contain any value, the Data Integration Service creates the file in the following format:  
`<valueoftheNativeNamepropertyorFileNameDataObjectWriteOperation>_<fileextention>=<>`  
 However, if you run a mapping to read the newly created file, the mapping fails with the following error message:

```
java.lang.AssertionError: assertion failed: Empty partition column value in '< >'
at scala.Predef$.assert(Predef.scala:170)
```

You must ensure that all entries in the FileName port contains a value to read the newly created file successfully.

- Do not use a colon (:) and forward slash (/) character in the file name data of the FileName port of the source or target object to run a mapping.
- If you connect the FileName port to the target empty zero KB files are created in the target folder.
- When you use wildcard character \* to read data from a complex file source, the Data Integration Service reads data only from folders or files matching the selection criteria.  
 For example, if the file path is `/export/home/qamercury/avro/test/cust*` and **Allow Wildcard Characters** option is selected:



The Data Integration Service ignores all the other folders and only reads `customer.avro` and the files present inside the customer folder.

- Do not connect FileName port to a FileName port because the FileName port in the source might contain colon (:) and forward slash (/) characters.
- When you run a mapping in the native environment to read or write an Amazon S3 file and if there are multiple entries with the same name in the source port, you must use a Sorter transformation.  
 Use the Sorter transformation to sort the source port that you want to map to the FileName port of the Target transformation. After you sort the source port, map the port of the Sorter transformation to the FileName port of the Target transformation. The Data Integration Service creates only one file for each entry with the same name. If you do not use the Sorter transformation, the Data Integration Service creates multiple files for each entry with the same name.

For example, you want to map the following `Employee` source port to the `FileName` port of the Target transformation and write the data to an Avro target file `target1`:

Name	ID	SSN
Anna	1	1
John	4	4
Smith	4	4
John	5	5
Anna	2	2

Add a Sorter transformation to sort the source port and map the source port to the port of the Sorter transformation. Then, map the port of the Sorter transformation to the `FileName` port of the Target transformation. The Data Integration Service creates the following directories along with a single file within each directory:

Directory	Description
<code>target1.avro=Anna</code>	In <code>target1.avro=Anna</code> directory, the Data Integration Service creates one file with the following value: 1,1,1,2,2,2.
<code>target1.avro=John</code>	In <code>target1.avro=John</code> directory, the Data Integration Service creates one file with the following values: 4,4,4,5,5,5.
<code>target1.avro=Smith</code>	In <code>target1.avro=Smith</code> directory, the Data Integration Service creates one file with the following values: 4,4,4.

If you do not add a Sorter transformation, the Data Integration Service creates the following directories along with multiple files within each directories:

Directory	Description
<code>target1.avro=Anna</code>	In <code>target1.avro=Anna</code> directory, the Data Integration Service creates two files with the following value: 1,1,1 and 2,2,2
<code>target1.avro=John</code>	In <code>target1.avro=John</code> directory, the Data Integration Service creates two files with the following value: 4,4,4 and 5,5,5.
<code>target1.avro=Smith</code>	In <code>target1.avro=Smith</code> directory, the Data Integration Service creates one file with the following value: 4,4,4.

# Data Compression in Amazon S3 Sources and Targets

You can decompress the data when you read data from Amazon S3 or compress data when you write data to Amazon S3.

Data Compression is applicable when you run a mapping in the native environment or on the Spark engine.

Configure the compression format in the **Compression Format** option under the advanced properties for an Amazon S3 data object read and write operation. The source or target file in Amazon S3 contains the same extension that you select in the **Compression Format** option.

When you perform a read operation, the Data Integration Service decompresses the data and then sends the data to Amazon S3 bucket. When you perform a write operation, the Data Integration Service compresses the data.

The following table lists the compression formats for the support for various operations and file formats in the native environment or on the Spark engine:

Compression format	Read	Write	Avro File	JSON File	ORC File	Parquet File
None	Yes	Yes	Yes	No	Yes	Yes
Bzip2	No	No	No	Yes	No	No
Deflate	Yes	Yes	Yes	Yes	No	No
Gzip	Yes	Yes	No	Yes	No	Yes
Lzo	Yes	Yes	No	No	No	Yes
Snappy	Yes	Yes	Yes	Yes	Yes	Yes
Zlib	Yes	Yes	No	No	Yes	No

You can compress or decompress a flat file that use the none, deflate, gzip, snappy, and zlib compression formats when you run a mapping in the native environment. You can compress or decompress a flat file that use the none, gzip, bzip2, and lzo compression formats when you run a mapping on the Spark engine.

When you run a mapping on the Spark engine to write multiple Avro files of different compression formats, the Data Integration Service does not write the data to the target properly. You must ensure that you use the same compression format for all the Avro files.

**Note:** In the native environment, when you create a mapping to read or write an ORC file and select Lzo as the compression format, the mapping fails.

To read a compressed file from Amazon S3 on the Spark engine, the compressed file must have specific extensions. If the extensions used to read the compressed file are not specific or not valid, the Data Integration Service does not process the file.



The following table describes the extensions that are appended based on the compression format that you use:

Compression Format	File Name Extension
Gzip	.GZ
Deflate	.deflate
Bzip2	.BZ2
Lzo	.LZO
Snappy	.snappy
Zlib	.zlib

## Configuring Lzo Compression Format

To write the .jar files in the lzo compression format on the Spark engine, you must copy the .jar files for the lzo compression in the lib folder of the distribution directory on the machine on which the Data Integration Service runs.

Perform the following steps to copy the .jar files from the distribution directory to the Data Integration Service:

1. Copy the lzo.jar file from the cluster to the following directories on the machine on which the Data Integration Service runs:
  - <Informatica installation directory>/<distribution>/lib
  - <Informatica installation directory>/<distribution>/infalib
2. Copy the lzo native binaries from the cluster to the following directory on the machine on which the Data Integration Service runs:  
<Informatica installation directory>/<distribution>/lib/native
3. In the Administrator Console, navigate to the Data Integration Service.  
The Data Integration Service page appears.
4. Click the **Processes** tab.  
The **Processes** page appears.
5. Click the pencil icon to edit the environment variables in the **Environment Variables** section.  
The **Edit Environment Variables** dialog box appears.
6. Click **New** to add a new environment variable.  
The **New Environment Variables** dialog box appears.
7. Enter the value of the **Name** field as LD\_LIBRARY\_PATH.
8. Enter the following path in the **Value** field:  
<infahome>/services/shared/bin:/<infahome>/services/shared/Hadoop/<distributionType>/lib/native
9. Restart the Data Integration Service.

# Hadoop Performance Tuning Options for EMR Distribution

You can use Hadoop Performance Tuning Options to optimize the performance in the Amazon EMR distribution when you copy large volumes of data between Amazon S3 buckets and HDFS.

You must provide semicolon separated name-value attribute pairs for Hadoop Performance Tuning Options.

Use the following parameters for Hadoop Performance Tuning Options:

- `mapreduce.map.java.opts`
- `fs.s3a.fast.upload`
- `fs.s3a.multipartthreshold`
- `fs.s3a.multipartsize`
- `mapreduce.map.memory.mb`

The following sample shows the recommended values for the parameter:

```
mapreduce.map.java.opts=-Xmx4096m;fs.s3a.fast.upload=true;fs.s3a.multipart.threshold=33554432;fs.s3a.multipart.size=33554432;mapreduce.map.memory.mb=4096
```

## Creating an Amazon S3 Data Object

Create an Amazon S3 data object to add to a mapping.

**Note:** PowerExchange for Amazon S3 supports only UTF-8 encoding to read or write data.

1. Select a project or folder in the **Object Explorer** view.
2. Click **File > New > Data Object**.
3. Select **Amazon S3 Data Object** and click **Next**.  
The **Amazon S3 Data Object** dialog box appears.
4. Enter a name for the data object.
5. In the **Resource Format** list, select any of the following formats:
  - **Intelligent Structure Model:** to read any format that an intelligent structure parses.  
**Note:** The Intelligent Structure Model is available for technical preview. Technical preview functionality is supported but is unwarranted and is not production-ready. Informatica recommends that you use in non-production environments only.
  - **Binary:** to read any resource format.
  - **Flat:** to read a flat resource.
  - **Avro:** to read an Avro resource.
  - **ORC:** to read an ORC resource.
  - **JSON:** to read a JSON resource.
  - **Parquet:** to read a Parquet resource.
6. Click **Browse** next to the **Location** option and select the target project or folder.

7. Click **Browse** next to the **Connection** option and select the Amazon S3 connection from which you want to import the Amazon S3 object.
8. To add a resource, click **Add** next to the **Selected Resources** option.  
The **Add Resource** dialog box appears.
9. Select the check box next to the Amazon S3 object you want to add and click **OK**.  
**Note:** To use an intelligent structure model, select the appropriate `.amodel` file.
10. Click **Next**.
11. Choose **Sample Metadata File**.  
You can click **Browse** and navigate to the directory that contains the file.  
**Note:** The **Delimited** and **Fixed-width** format properties are not applicable for PowerExchange for Amazon S3.
12. Click **Next**.
13. Configure the format properties.

Property	Description
Delimiters	Character used to separate columns of data. If you enter a delimiter that is the same as the escape character or the text qualifier, you might receive unexpected results. Amazon S3 reader and writer support Delimiters.
Text Qualifier	Quote character that defines the boundaries of text strings. If you select a quote character, the Developer tool ignores delimiters within pairs of quotes. Amazon S3 reader supports Text Qualifier.
Import Column Names From First Line	If selected, the Developer tool uses data in the first row for column names. Select this option if column names appear in the first row. The Developer tool prefixes "FIELD_" to field names that are not valid. Amazon S3 reader and writer support Import Column Names From First Line.
Row Delimiter	Specify a line break character. Select from the list or enter a character. Preface an octal code with a backslash (\). To use a single character, enter the character. The Data Integration Service uses only the first character when the entry is not preceded by a backslash. The character must be a single-byte character, and no other character in the code page can contain that byte. Default is line-feed, \012 LF (\n).
Escape Character	Character immediately preceding a column delimiter character embedded in an unquoted string, or immediately preceding the quote character in a quoted string. When you specify an escape character, the Data Integration Service reads the delimiter character as a regular character.

**Note:** The **Start import at line**, **Treat consecutive delimiters as one**, and **Retain escape character in data** properties in the **Column Projection** dialog box are not applicable for PowerExchange for Amazon S3.

14. Click **Next** to preview the flat file data object.
15. Click **Finish**.

The data object appears under the Physical Data Objects category in the project or folder in the **Object Explorer** view. A read and write operation is created for the data object. Depending on whether you want

to use the Amazon S3 data object as a source or target, you can edit the read or write operation properties.

**Note:** Select a read transformation for a data object with an intelligent structure model. You cannot use a write transformation for a data object with an intelligent structure model in a mapping.

16. For a read operation with an intelligent structure model, specify the path to the input file or folder. In the **Data Object Operations** panel, select the **Advanced** tab. In the **File path** field, specify the path to the input file or folder.

## Projecting Columns Manually

After sampling the metadata, you can manually edit the projected columns.

Perform the following steps to project columns manually:

1. Go to **Column Projection** tab.
2. Click **Edit Column Projection**.
3. Click **New** icon and add fields manually.

## Filtering Metadata

You can filter the metadata to optimize the search performance.

1. Select a project or folder in the **Object Explorer** view.
2. Select an Amazon S3 data object and click **Add**.
3. Click **Next**.
4. Click **Add** next to the **Selected Resources** option.  
The **Add Resource** dialog box appears.
5. Select the bucket or the folder from where you want to search the data.
6. Type the name of the file or any regular expressions in the **Name** field to search for the metadata available in the selected bucket or the folder in the following format: `abc*` or `[0-9]*`.
7. Click **Go**.

The list of all the file names starting with the alphabet or the number that you entered in the **Name** field is displayed.

## Creating an Amazon S3 Data Object Read or Write Operation

You can add an Amazon S3 data object read or write operation to a mapping or mapplet as a source.

Before you create an Amazon S3 data object read or write operation, you must create at least one Amazon S3 data object. You can create the data object read or write operation for one or more Amazon S3 data objects.

Perform the following steps to create an Amazon S3 data object read or write operation:

1. Select the data object in the **Object Explorer** view.
2. Right-click and select **New > Data Object Operation**.

The **Data Object Operation** dialog box appears.

3. Enter a name for the data object read or write operation.
4. Select **Read** or **Write** as the type of data object operation.
5. Click **Add**.

The **Select Resources** dialog box appears.

6. Select the Amazon S3 object for which you want to create the data object read or write operation and click **OK**.
7. Click **Finish**.

The Developer tool creates the data object read or write operation for the selected data object.

## Rules and Guidelines for Creating an Amazon S3 Data Object Operation

Use the following rules and guidelines when you create an Amazon S3 data object operation:

- In the **Data Object Operations** tab, you can select the **View Operation** link next to the data object read or write operation name to open the operation directly after you create the data object read or write operation.
- When you create a data object read or write operation, you can add new columns or modify the columns in the **Ports** tab directly.
- To modify the columns of a flat file, you must reconfigure the column projection properties.
- To modify the columns of an Avro, JSON, ORC, or Parquet file, change the Amazon S3 file format in the **Schema** field of the column projection properties.
- When you create a mapping to read or write an Avro, JSON, ORC, or Parquet file, you can copy the columns of the Source transformations, Target transformations, or any other transformations from the **Ports** tab. Then, you can paste the columns in the data object read or write operation directly.
- When you copy the columns from any transformation to the data object read or write operation, you can change the data type of the columns. The Data Integration Service resets the precision value of the data type to the default value.  
However, the Data Integration Service does not change the precision value of the String data type to the default value.

## Creating an Amazon S3 Target

You can create an Amazon S3 target using the **Create Target** option.

1. Select a project or folder in the **Object Explorer** view.
2. Select a source or a transformation in the mapping.
3. Delete the FileName port from the **Ports** properties of the data object read operation and save.  
**Note:** If you do not want to delete the FileName port, you must add a transformation and map the fields to the Source transformation. Then, right-click on the transformation and select **Create Target** option to create an Amazon S3 target.
4. Right-click on the Source transformation or the transformation and select **Create Target**.  
The **Create Target** dialog box appears.

5. Select **Others** and then select **AmazonS3 Data Object** from the list in the **Data Object Type** section.
6. Click **OK**.  
The **New AmazonS3 Data Object** dialog box appears.
7. Enter a name for the data object.
8. In the **Resource Format** list, select any of the following formats to create the target type:
  - Avro
  - Flat
  - JSON
  - ORC
  - Parquet
9. Click **Finish**.

The new target appears under the **Physical Data Objects** category in the project or folder in the **Object Explorer** view.

## Rules and Guidelines for Creating a new Amazon S3 Target

Use the following rules and guidelines when you create a new Amazon S3 target:

- If you right-click on a Source transformation directly to create an Amazon S3 target, the Data Integration Service fails to create an Amazon S3 target with the following error message:  

```
Cannot create a AmazonS3 because the transformation contains a port with the name
FileName. FileName is a reserved word in the data object.
```
- You must specify a connection for the newly created Amazon S3 target in the **Connection** field to run a mapping.
- When you write an Avro or Parquet file using the **Create Target** option, you cannot provide a Null data type.
- When you select a flat resource format that contains different data types and select the **Create Target** option to create an Amazon S3 target, the Data Integration Service creates string ports for all the data types with a precision of 256 characters.
- When you select a flat resource format to create an Amazon S3 target, the Data Integration Service maps all the data types in the source file to the String data type in the target file. You must manually map the data types in the source and target files.
- For a newly created Amazon S3 target, the Data Integration Service considers the value of the folder path that you specify in the **Folder Path** connection property and file name from the **Native Name** property in the Amazon S3 data object details.  
Provide a folder path and file name in the Amazon S3 data object read and write advanced properties to overwrite the values.
- When you use a flat resource format to create a target, the Data Integration Service considers the following values for the formatting options:

Formatting Options	Values
Delimiters	Comma (,)
Text Qualifier	No quotes

Formatting Options	Values
Import Column Names From First Line	Generates header
Row Delimiter	Backslash with a character n (\n)
Escape Character	Empty

If you want to configure the formatting options, you must manually edit the projected columns. For more information about editing the projecting columns manually, see [“Projecting Columns Manually” on page 36](#).

## Filtering Metadata

You can filter the metadata to optimize the search performance.

1. Select a project or folder in the **Object Explorer** view.
2. Select an Amazon S3 data object and click **Add**.
3. Click **Next**.
4. Click **Add** next to the **Selected Resources** option.  
The **Add Resource** dialog box appears.
5. Select the bucket or the folder from where you want to search the data.
6. Type the name of the file or any regular expressions in the **Name** field to search for the metadata available in the selected bucket or the folder in the following format: `abc*` or `[0-9]*`.
7. Click **Go**.

The list of all the file names starting with the alphabet or the number that you entered in the **Name** field is displayed.

## CHAPTER 5

# PowerExchange for Amazon S3 Mappings

This chapter includes the following topics:

- [PowerExchange for Amazon S3 Mappings Overview, 40](#)
- [Mapping Validation and Run-time Environments, 40](#)
- [Amazon S3 Dynamic Mapping Overview, 41](#)
- [Amazon S3 Dynamic Mapping Example, 43](#)

## PowerExchange for Amazon S3 Mappings Overview

After you create an Amazon S3 data object read or write operation, you can create a mapping.

You can create an Informatica mapping containing an Amazon S3 data object read operation as the input, and a relational or flat file data object operation as the target. You can create an Informatica mapping containing objects such as a relational or flat file data object operation as the input, transformations, and an Amazon S3 data object write operation as the output to load data to Amazon S3 buckets.

Validate and run the mapping. You can deploy the mapping and run it or add the mapping to a Mapping task in a workflow.

## Mapping Validation and Run-time Environments

You can validate and run mappings in the native environment, Blaze, or Spark engine.

The Data Integration Service validates whether the mapping can run in the selected environment. You must validate the mapping for an environment before you run the mapping in that environment.

### Native environment

You can configure the mappings to run in the native or non-native environment. When you run mappings in the native environment, the Data Integration Service processes the mapping and runs the mapping from the Developer tool.



## Blaze Engine

When you run mappings on the Blaze engine, the Data Integration Service pushes the mapping to a compute cluster and processes the mapping on a Blaze engine. The Data Integration Service generates an execution plan to run mappings on the Blaze engine.

The Blaze engine execution plan simplifies the mapping into segments. The plan contains tasks to start the mapping, run the mapping, and create and cleanup the temporary files and file required to run the mapping. The plan contains multiple tasklets and the task recovery strategy. The plan also contains pre and post grid task preparation commands for each mapping before running the main mapping on a compute cluster. A pre-grid task can include a task such as copying data to HDFS. A post-grid task can include tasks such as cleaning up temporary files or copying data from HDFS.

You can view the plan in the Developer tool before you run the mapping and in the Administrator tool after you run the mapping. In the Developer tool, the Blaze engine execution plan appears as a workflow. You can click on each component in the workflow to get the details. In the Administrator tool, the Blaze engine execution plan appears as a script.

## Spark Engine

When you run mappings on the Spark engine, the Data Integration Service pushes the mapping to a compute cluster and processes the mapping on a Spark engine. The Data Integration Service generates an execution plan to run mappings on the Spark engine.

**Note:** When the tracing level is none and you run a mapping on the Spark engine, the Data Integration Service does not log the PowerExchange for Amazon S3 details in Spark logs.

For more information about the non-native environment, Blaze, and Spark engines, see the *Informatica Big Data Management™ Administrator Guide*.

# Amazon S3 Dynamic Mapping Overview

You can use Amazon S3 data objects as dynamic sources and targets in a mapping.

Use the Amazon S3 dynamic mapping to accommodate changes to source, target, and transformation logics at run time. You can use an Amazon S3 dynamic mapping to manage frequent schema or metadata changes or to reuse the mapping logic for data sources with different schemas. Configure rules, parameters, and general transformation properties to create the dynamic mapping.

If the data source for a source and target changes, you can configure a mapping to dynamically get metadata changes at runtime. If a source changes, you can configure the Read transformation to accommodate changes. If a target changes, you can configure the Write transformation accommodate target changes.

You do not need to manually synchronize the data object and update each transformation before you run the mapping again. The Data Integration Service dynamically determine transformation ports, transformation logic in the ports, and the port links within the mapping.

There are the two options available to enable a mapping to run dynamically. You can select one of the following options to enable the dynamic mapping:

- In the **Data Object** tab of the data object read or write operation, select the **At runtime, get data object columns from data source** option when you create a mapping.  
When you enable the dynamic mapping using this option, you can refresh the source and target schemas at the runtime.

- In the **Ports** tab of the data object write operation, select the value of the **Columns defined by** property as **Mapping Flow** when you configure the data object write operation properties.  
When you enable the dynamic mapping using this option, you can add all the Source transformation or transformation ports to the target dynamically and the Data Integration Service creates a target file with the ports at runtime.

**Note:** Dynamic mapping is applicable when you run the mapping in the native environment or on the Spark engine.

For information about dynamic mappings, see the *Informatica Developer Mapping Guide*.

## Refresh Schema

You can refresh the source or target schema at the runtime when you enable a mapping to run dynamically. You can refresh the imported metadata before you run the dynamic mapping.

You can enable a mapping to run dynamically using the **At runtime, get data object columns from data source** option in the **Data Object** tab of the Read and Write transformations when you create a mapping.

When you add or override the metadata dynamically, you can include all the existing source and target objects in a single mapping and run the mapping. You do not have to change the source schema to update the data objects and mappings manually to incorporate all the new changes in the mapping.

You can use the mapping template rules to tune the behavior of the execution of such pipeline mapping.

When the Source or Target transformation contains updated ports such as changes in the port names, data types, precision, or scale, the Data Integration Service fetches the updated ports and runs the mapping dynamically. You must ensure that at least one of the column name in the source or target file is the same as before refreshing the schema to run the dynamic mapping successfully.

Even though the original order of the source or target ports in the table changes, the Data Integration Service displays the original order of the ports in the table when you refresh the schemas at runtime.

If there are more columns in the source file as compared to the target file, the Data Integration Service does not map the extra column to the target file and loads null data for all the unmapped columns in the target file.

If the Source transformation contains updated columns that do not match the Target transformation, the Data Integration Service does not link the new ports by default when you refresh the source or target schema. You must create a run-time link between the transformations to link ports at run time based on a parameter or link policy in the **Run-time Linking** tab. For information about run-time linking, see the *Informatica Developer Mapping Guide*.

Even though you delete the FileName port from the Source or Target transformation, the Data Integration Service adds the FileName port when you refresh the source or target schema.

**Note:** When you refresh a schema of a flat file, the Data Integration Service writes all data types as String data types.

## Mapping Flow

You can add all the Source transformation or transformation ports to the target dynamically when enable a mapping to run dynamically using the **Mapping Flow** option. You can then use the dynamic ports in the Write transformation.

When you select the **Mapping Flow** option, the Data Integration Service allows the Target transformation to override ports of the Write transformation with all the updated incoming ports from the pipeline mapping and loads the target file with the ports at runtime.

To enable a dynamic mapping using the **Mapping Flow** option, select the value of the **Columns defined by** property as **Mapping Flow** in the **Ports** tab in the Write transformation.

When you use the **Mapping Flow** option to read data from a flat file that contains a port of Integer or Double data type, the mapping runs successfully. However, the Data Integration Service does not write the data of the port with Integer or Double data type and the consecutive ports regardless of the data type.

**Note:** When you run a dynamic mapping on the Spark engine using the **Mapping Flow** option to fetch the metadata changes from any source that contains a FileName port, the mapping fails. You must add a transformation and configure the **Input Rules** in the **Ports** tab of the transformation to exclude the FileName port from the Write transformation. Then, map the rest of the ports.

## Amazon S3 Dynamic Mapping Example

Your organization has a large amount of data that keeps changing. Your organization needs to incorporate all the updated data in a short span of time. Create a dynamic mapping, where you can refresh the source schema dynamically to fetch the updated data. Add all the dynamic ports to the target to override the metadata of the existing ports.

1. Import the Amazon S3 read and write data objects.
2. Select a project or folder in the **Object Explorer** view.
3. Click **File > New > Mapping**.  
The **Mapping** dialog box appears.
4. Enter the name of the mapping in the **Name** field.
5. Click **Finish**.
6. Drag the data object into a mapping.  
The **AmazonS3 Data Object Access** dialog box appears.
7. Select the **Read** option and click **OK**.
8. In the **Data Object** tab, select the **At runtime, get data object columns from data source** check box.
9. Drag the data object into a mapping.  
The **AmazonS3 Data Object Access** dialog box appears.
10. Select the **Write** option and click **OK**.
11. In the **Ports** tab, select the value of the **Columns defined by** as **Mapping Flow**.
12. Select all the source ports and add the ports to the target.
13. Save and run the mapping.

## APPENDIX A

# Amazon S3 Datatype Reference

This appendix includes the following topics:

- [Datatype Reference Overview, 44](#)
- [Amazon S3 and Transformation Data Types, 44](#)
- [Avro Amazon S3 File Data Types and Transformation Data Types, 45](#)
- [JSON Amazon S3 File Data Types and Transformation Data Types, 46](#)
- [Intelligent Structure Model Data Types and Transformation Types, 47](#)
- [ORC Data Types and Transformation Data Types, 47](#)
- [Parquet Amazon S3 File Data Types and Transformation Data Types, 49](#)

## Datatype Reference Overview

When you run the session to read data from or write data to Amazon S3, the Data Integration Service converts the transformation data types to comparable native Amazon S3 data types.

## Amazon S3 and Transformation Data Types

The following table lists the Amazon S3 flat file data types that the Data Integration Service supports and the corresponding transformation data types:

Amazon S3 Flat File Data Type	Transformation Data Type	Description
BIGINT	Bigint	Precision of 19 digits, scale of 0
NUMBER	Decimal	For transformations that support precision up to 28 digits, the precision is 1 to 28 digits, and the scale is 0 to 28. If you specify the precision greater than the maximum number of digits, the Data Integration Service converts decimal values to double in high precision mode.

Amazon S3 Flat File Data Type	Transformation Data Type	Description
STRING	String	1 to 104,857,600 characters
NSTRING	String	1 to 104,857,600 characters

## Avro Amazon S3 File Data Types and Transformation Data Types

Avro Amazon S3 file data types map to transformation data types that the Data Integration Service uses to move data across platforms.

The following table lists the Avro Amazon S3 file data types that the Data Integration Service supports and the corresponding transformation data types:

Avro Amazon S3 File Data Type	Transformation Data Type	Range and Description
Array	Array	Unlimited number of characters <b>Note:</b> Applicable when you run a mapping on the Spark engine.
Boolean	Integer	TRUE (1) or FALSE (0)
Bytes	Binary	Precision 4000
Double	Double	Precision 15
Fixed	Binary	1 to 104,857,600 bytes
Float	Double	Precision 15
Int	Integer	-2,147,483,648 to 2,147,483,647 Precision 10, scale 0
Long	Bigint	-9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 Precision 19, scale 0
Map	Map	Unlimited number of characters <b>Note:</b> Applicable when you run a mapping on the Spark engine.
Null	Integer	-2,147,483,648 to 2,147,483,647 Precision 10, scale 0
Record	Struct	Unlimited number of characters <b>Note:</b> Applicable when you run a mapping on the Spark engine.

Avro Amazon S3 File Data Type	Transformation Data Type	Range and Description
String	String	1 to 104,857,600 characters
Union	Corresponding data type in a union of ["primitive_type complex_type", "null"] or ["null", "primitive_type complex_type"].	Dependent on primitive or complex data type. <b>Note:</b> Applicable when you run a mapping on the Spark engine.

## JSON Amazon S3 File Data Types and Transformation Data Types

JSON Amazon S3 file data types map to transformation data types that the Data Integration Service uses to move data across platforms.

The following table lists the JSON Amazon S3 file data types that the Data Integration Service supports and the corresponding transformation data types:

JSON Amazon S3 File Data Type	Transformation Data Type	Range and Description
Array	Array	Unlimited number of characters.
Double	Double	Precision 15
Integer	Integer	-2,147,483,648 to 2,147,483,647 Precision of 10, scale of 0
Object	Struct	Unlimited number of characters.
String	String	-1 to 104,857,600 characters

**Note:** The Developer tool does not support the following JSON data types:

- Date/Timestamp
- Enum
- Union

# Intelligent Structure Model Data Types and Transformation Types

Intelligent structure model data types map to transformation data types that the Data Integration Service uses to move data across platforms.

The following table lists the intelligent structure model data types that the Data Integration Service supports and the corresponding transformation data types:

Intelligent Structure Model Complex File Data Type	Transformation Data Type	Range and Description
Array	Array	Unlimited number of characters.
Bigint	Bigint	Precision of 19 digits, scale of 0.
Datetime	Date/Time	Jan 1, 0001 A.D. to Dec 31, 9999 A.D. (precision to the nanosecond)
Double	Double	Precision of 15 digits.
Int	Integer	-2,147,483,648 to 2,147,483,647.
Number	Decimal	Precision 1 to 28, scale 0 to 28
String	String	1 to 104,857,600 characters
Struct	Struct	Unlimited number of characters.

## ORC Data Types and Transformation Data Types

ORC file data types map to transformation data types that the Data Integration Service uses to move data across platforms.

The following table lists the ORC file data types that the Data Integration Service supports and the corresponding transformation data types:

ORC File Data Type	Transformation Data Type	Range and Description
BigInt	BigInt	-9223372036854775808 to 9,223,372,036,854,775,807
Boolean	Integer	TRUE (1) or FALSE (0)
Char	String	1 to 104,857,600 characters

ORC File Data Type	Transformation Data Type	Range and Description
Date	Date/Time	Jan 1, 1753 A.D. to Dec 31, 4712 A.D. (precision to microsecond)
Double	Double	Precision of 15 digits
Float	Double	Precision of 15 digits
Integer	Integer	-2,147,483,648 to 2,147,483,647
SmallInt	Integer	-32,768 to 32,767
String	String	1 to 104,857,600 characters
Timestamp	Date/Time	1 to 19 characters Precision 19 to 26, scale 0 to 6
TinyInt	Integer	-128 to 127
Varchar	String	1 to 104,857,600 characters

When you run a mapping on the Spark engine to write an ORC file to a target, the Data Integration Service writes the data of the Char and Varchar data types as String.

**Note:** The Developer tool does not support the following ORC data types:

- Map
- List
- Struct
- Union



# Parquet Amazon S3 File Data Types and Transformation Data Types

Amazon S3 file data types map to transformation data types that the Data Integration Service uses to move data across platforms.

The following table lists the Amazon S3 file data types that the Data Integration Service supports and the corresponding transformation data types:

Parquet Amazon S3 File Data Type	Transformation	Description
Byte_Array	Binary	Arbitrarily long byte array.
Binary	Binary	1 to 104,857,600 bytes <b>Note:</b> Applicable when you run a mapping on the Spark engine.
Binary (UTF8)	String	1 to 104,857,600 characters <b>Note:</b> Applicable when you run a mapping on the Spark engine.
Boolean	Integer	-2,147,483,648 to 2,147,483,647 Precision of 10, scale of 0
Double	Double	Precision of 15 digits
Fixed Length Byte Array	Decimal	Decimal value with declared precision and scale. Scale must be less than or equal to precision. <b>Note:</b> Applicable when you run a mapping on the Spark engine.
Float	Double	Precision of 15 digits <b>Note:</b> Applicable when you run a mapping on the Spark engine.
group (LIST)	Array	Unlimited number of characters. <b>Note:</b> Applicable when you run a mapping on the Spark engine.
Int32	Integer	-2,147,483,648 to 2,147,483,647 Precision of 10, scale of 0
Int64	Bigint	-9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 Precision of 19, scale of 0
Map	Map	Unlimited number of characters. <b>Note:</b> Applicable when you run a mapping on the Spark engine.

Parquet Amazon S3 File Data Type	Transformation	Description
Struct	Struct	Unlimited number of characters. <b>Note:</b> Applicable when you run a mapping on the Spark engine.
Union	Corresponding primitive data type in a union of ["primitive_type", "null"] or ["null", "primitive_type"].	Dependent on primitive data type. <b>Note:</b> Applicable when you run a mapping on the Spark engine.

The Parquet schema that you specify to read or write a Parquet file must be in smaller case. Parquet does not support case-sensitive schema.

### Parquet Union Data Type

A union indicates that a field might have more than one data type. For example, a union might indicate that a field can be a string or a null. A union is represented as a JSON array containing the data types. The Developer tool only interprets a union of ["primitive\_type", "null"] or ["null", "primitive\_type"]. The Parquet data type converts to the corresponding transformation data type. The Developer tool ignores the null.

### Unsupported Parquet Data Types

The Developer tool does not support the following Parquet data types:

- int96 (TIMESTAMP\_MILLIS)
- date
- time
- timestamp

# APPENDIX B

## Troubleshooting

This appendix includes the following topics:

- [Troubleshooting Overview, 51](#)
- [Troubleshooting for PowerExchange for Amazon S3, 51](#)

### Troubleshooting Overview

Use the following sections to troubleshoot errors in PowerExchange for Amazon S3.

### Troubleshooting for PowerExchange for Amazon S3

**How to solve the following error that occurs while running an Amazon S3 mapping on the Spark engine to write a Parquet file and then run another Amazon S3 mapping or preview data in the native environment to read that Parquet file: "The requested schema is not compatible with the file schema."**

For information about the issue, see

<https://kb.informatica.com/solution/23/Pages/58/497835.aspx?myk=497835>

**What are the performance tuning guidelines to read data from or write data to Amazon S3?**

For information about performance tuning guidelines, see

<https://docs.informatica.com/data-integration/powerexchange-adapters-for-informatica/h2l/0990-performance-tuning-guidelines-to-read-data-from-or-write-da/abstract.html>

**How to solve the out of disk space error that occurs when you use PowerExchange for Amazon S3 to read and preview data?**

For information about the issue, see

<https://kb.informatica.com/solution/23/Pages/62/516321.aspx?myk=516321>

**How to solve the following error that occurs when you enable server-side encryption with KMS and run an Amazon S3 mapping on the Spark engine with EMR 5.16 distribution: "[java.lang.RuntimeException: java.lang.ClassNotFoundException: Class com.amazon.ws.emr.hadoop.fs.EmrFileSystem not found]"**

For information about the issue, see

<https://kb.informatica.com/solution/23/Pages/69/570023.aspx?myk=570023>

**How to solve the following error that occurs when you run an Amazon S3 mapping on the Spark engine and then run another mapping in the native environment with Server-side Encryption with KMS enabled: "The encryption method specified is not supported"**

For information about the issue, see

<https://kb.informatica.com/solution/23/Pages/69/571479.aspx?myk=571479>

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