



**MariaDB<sup>®</sup>**

**MariaDB ColumnStore Java API Usage  
Documentation**

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**MariaDB Corporation**

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## LICENSING

### 1.1 Documentation Content



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### 1.2 MariaDB ColumnStore Java API

The MariaDB ColumnStore Java API (jvamcsapi) is licensed under the [GNU Lesser General Public License, version 2.1](https://www.gnu.org/licenses/old-licenses/lgpl-2.1.html).

## VERSION HISTORY

This is a version history of Java API interface changes. It does not include internal fixes and changes.

Version	Changes
1.1.6	<ul style="list-style-type: none"><li>• Java documentation added</li><li>• Added <code>ColumnStoreDriver.getJavaMcsapiVersion</code> to return version information about the java wrapper library <code>javamcsapi.jar</code></li><li>• Windows support added (Alpha)</li></ul>
1.1.5	<ul style="list-style-type: none"><li>• Added overloaded functions of <code>ColumnStoreBulkInsert.setColumn</code> and <code>ColumnStoreBulkInsert.setNull</code> to return additional status information</li></ul>
1.1.4	<ul style="list-style-type: none"><li>• Make <code>ColumnStoreSystemCatalog.getTable</code> and <code>ColumnStoreSystemCatalogTable.getColumn</code> case insensitive</li><li>• Add <code>ColumnStoreDriver.setDebug</code> to enable debugging output to stderr</li></ul>
1.1.1	<ul style="list-style-type: none"><li>• Add <code>ColumnStoreBulkInsert.isActive</code></li><li>• Make <code>ColumnStoreBulkInsert.rollback</code> fail without error</li><li>• Add <code>ColumnStoreBulkInsert.resetRow</code></li><li>• <code>ColumnStoreDateTime</code> now uses <code>uint32_t</code> for every parameter</li><li>• <code>ColumnStoreSystemCatalog</code> now uses <code>const</code> for the sub-class strings</li></ul>
1.1.0 $\beta$	<ul style="list-style-type: none"><li>• First beta release</li></ul>

## USING JAVAMCSAPI

### 3.1 Usage Introduction

The Java bulk insert API (`javamcsapi`) is a wrapper around the C++ bulk insert API (`mcsapi`) generated by [SWIG](#). As a result Java programmers can utilize the same functions to insert data into `ColumnStore` tables as C++ developers can do. `javamcsapi` is available for Java 8 and upwards.

### 3.2 Basic Bulk Insert

In this example we will insert 1000 rows of two integer values into table `test.t1`. The full code for this can be found in the `example/Basic_bulk_insert.java` file in the `mcsapi` codebase.

You will need the following table in the test database to execute this:

Listing 1: `example/basic_bulk_insert.sql`

```
1 CREATE TABLE `t1` (  
2   `a` int(11) DEFAULT NULL,  
3   `b` int(11) DEFAULT NULL  
4 ) ENGINE=Columnstore;
```

Listing 2: `example/Basic_bulk_insert.java`

```
23 import com.mariadb.columnstore.api.*;
```

We need to import all classes from the package `com.mariadb.columnstore.api` to use `mcsapi`.

Listing 3: `example/Basic_bulk_insert.java`

```
25 public class Basic_bulk_insert {  
26  
27     public static void main(String[] args) {  
28         try {  
29             ColumnStoreDriver d = new ColumnStoreDriver();
```

A new instance of `ColumnStoreDriver` is created which will attempt to find the `Columnstore.xml` configuration file by first searching for the environment variable `COLUMNSTORE_INSTALL_DIR` and then the default path of `/usr/local/mariadb/columnstore/etc/Columnstore.xml`. Alternatively we could provide a path as a parameter to `ColumnStoreDriver`.

Listing 4: example/Basic\_bulk\_insert.java

```
30 ColumnStoreBulkInsert b = d.createBulkInsert("test", "t1", (short)0, 0);
```

Once we have the ColumnStore installation's configuration in the driver we use this to initiate a bulk insert using `ColumnStoreDriver.createBulkInsert`. We are using the `test` database and the `t1` table. The remaining two parameters are unused for now and set to 0.

Listing 5: example/Basic\_bulk\_insert.java

```
31     for (int i=0; i<1000; i++){
32         b.setColumn(0, i);
33         b.setColumn(1, 1000-i);
34         b.writeRow();
35     }
```

A “for” loop is used to loop over 1000 arbitrary inserts in this example. We use `ColumnStoreBulkInsert.setColumn` to specify that column 0 (column a) should be set to the integer from the “for” loop and column 1 (column b) is set to 1000 minus the integer from the “for” loop.

When we have added something to every column `ColumnStoreBulkInsert.writeRow` is used to indicate we are finished with the row. The library won't necessarily write the row at this stage, it buffers up to 100,000 rows by default.

Listing 6: example/Basic\_bulk\_insert.java

```
36         b.commit();
37     }
```

At the end of the loop we execute `ColumnStoreBulkInsert.commit` which will send any final rows and initiate the commit of the data. If we do not do this the transaction will be implicitly rolled back instead.

Listing 7: example/Basic\_bulk\_insert.java

```
38     catch (ColumnStoreException e) {
39         System.err.println("Error caught: " + e.getMessage());
40     }
41 }
```

If anything fails then we should catch `ColumnStoreException` to handle it.

### 3.3 Advanced Bulk Insert

In this example we will insert 2 rows in a more complex table. This will demonstrate using different kinds of data types, chained methods and getting the summary information at the end of a transaction.

You will need the following table in the test database to execute this:

Listing 8: example/advanced\_bulk\_insert.sql

```
1 CREATE TABLE `t2` (
2   `id` int(11) DEFAULT NULL,
3   `name` varchar(40) DEFAULT NULL,
4   `dob` date DEFAULT NULL,
5   `added` datetime DEFAULT NULL,
```

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```

6  `salary` decimal(9,2) DEFAULT NULL
7  ) ENGINE=Columnstore;

```

Listing 9: example/Advanced\_bulk\_insert.java

```

23 import com.mariadb.columnstore.api.*;
24
25 public class Advanced_bulk_insert {
26
27     public static void main(String[] args) {
28         try {
29             ColumnStoreDriver d = new ColumnStoreDriver();
30             ColumnStoreBulkInsert b = d.createBulkInsert("test", "t2", (short)0, 0);

```

As with the basic example we create an instance of the driver and use it to create a bulk insert instance.

Listing 10: example/Advanced\_bulk\_insert.java

```

31         b.setColumn(0, 1);
32         b.setColumn(1, "Andrew");
33         b.setColumn(2, "1936-12-24");
34         b.setColumn(3, "2017-07-07 15:14:12");
35         b.setColumn(4, "15239.45");
36         b.writeRow();

```

This demonstrates setting several different data types using strings of data. The second column (column 1) is a VARCHAR(40) and is set to “Andrew”. The third column is a DATE column and the API will automatically convert this into a binary date format before transmitting it to ColumnStore. The fourth is a DATETIME and the fifth a DECIMAL column which again the API will convert from the strings into the binary format.

Listing 11: example/Advanced\_bulk\_insert.java

```

37         b.setColumn(0, 2).setColumn(1, "David").setColumn(2, new
↳ ColumnStoreDateTime("1972-05-23", "%Y-%m-%d")).setColumn(3, new ColumnStoreDateTime(
↳ "2017-07-07 15:20:18", "%Y-%m-%d %H:%M:%S")).setColumn(4, new
↳ ColumnStoreDecimal(2347623, (short)2)).writeRow();

```

Many of the *ColumnStoreBulkInsert* methods return a pointer to the class and a return status which means multiple calls can be chained together in a similar way to ORM APIs. Here we use additional datatypes *ColumnStoreDateTime* and *ColumnStoreDecimal*.

*ColumnStoreDateTime* is used to create an entry for a DATE or DATETIME column. It can be used to define custom formats for dates and times using the *strptime* format.

A decimal is created using the *ColumnStoreDecimal* class. It can be set using a string, double or a pair of integers. The first integer is the precision and the second integer is the scale. So this number becomes 23476.23.

Listing 12: example/Advanced\_bulk\_insert.java

```

38         b.commit();
39         ColumnStoreSummary summary = b.getSummary();
40         System.out.println("Execution time: " + summary.getExecutionTime());
41         System.out.println("Rows inserted: " + summary.getRowsInsertedCount());
42         System.out.println("Truncation count: " + summary.getTruncationCount());
43         System.out.println("Saturated count: " + summary.getSaturatedCount());
44         System.out.println("Invalid count: " + summary.getInvalidCount());
45     }

```

After a commit or rollback we can obtain summary information from the bulk insert class. This is done using the `ColumnStoreBulkInsert.getSummary` method which will return a reference `ColumnStoreSummary` class. In this example we get the number of rows inserted (or would be inserted if there was a rollback) and the execution time from the moment the bulk insert class is created until the commit or rollback is complete.

Listing 13: example/Advanced\_bulk\_insert.java

```
46         catch (ColumnStoreException e) {
47             System.err.println("Error caught: " + e.getMessage());
48         }
49     }
50 }
```

At the end we clean up in the same way as the basic bulk insert example.



## COMPILING WITH JAVAMCSAPI

### 4.1 Pre-requisites

To link javamcsapi to your application and to execute it you first need install the following mcsapi pre-requisites:

#### 4.1.1 Ubuntu

```
sudo apt-get install libuv1
```

#### 4.1.2 CentOS 7

```
sudo yum install epel-release  
sudo yum install libuv
```

### 4.2 Compiling

To compile a Java program from command line you have to explicitly state where to find javamcsapi.jar. Its path can differ depending on your operating system.

#### 4.2.1 Ubuntu

```
javac -classpath ".:usr/lib/javamcsapi.jar" Basic_bulk_insert.java  
java -classpath ".:usr/lib/javamcsapi.jar" Basic_bulk_insert
```

#### 4.2.2 CentOS 7

```
javac -classpath ".:usr/lib64/javamcsapi.jar" Basic_bulk_insert.java  
java -classpath ".:usr/lib64/javamcsapi.jar" Basic_bulk_insert
```

### 4.2.3 Windows 10 (x64)

```
javac -classpath ".;%mcsapiInstallDir%\lib\java\javamcsapi-1.1.6.jar" Basic_bulk_
↪insert.java
java -classpath ".;%mcsapiInstallDir%\lib\java\javamcsapi-1.1.6.jar" -Djava.library.
↪path="%mcsapiInstallDir%\lib" Basic_bulk_insert
```

The variable `%mcsapiInstallDir%` represents the base installation directory of the Bulk Write SDK. (e.g. `C:\Program Files\MariaDB\ColumnStore Bulk Write SDK`)

If you don't want to change the `java.library.path` you can copy `javamcsapi`'s DLLs `libiconv.dll`, `libuv.dll`, `libxml2.dll`, `mcsapi.dll` and `javamcsapi.dll` from `%mcsapiInstallDir%\lib` to the directory of the Java class to execute.

## JAVAMCSAPI API REFERENCE

### 5.1 ColumnStoreBulkInsert

public class **ColumnStoreBulkInsert**

#### 5.1.1 Fields

**swigCMemOwn**

protected transient boolean **swigCMemOwn**

#### 5.1.2 Constructors

**ColumnStoreBulkInsert**

protected **ColumnStoreBulkInsert** (long *cPtr*, boolean *cMemoryOwn*)

#### 5.1.3 Methods

**addReference**

protected void **addReference** (*ColumnStoreDriver columnStoreDriver*)

**commit**

public void **commit** ()

**delete**

public synchronized void **delete** ()

**finalize**

protected void **finalize** ()

### **getCPtr**

protected static long **getCPtr** (*ColumnStoreBulkInsert obj*)

### **getColumnCount**

public int **getColumnCount** ()

### **getSummary**

public *ColumnStoreSummary* **getSummary** ()

### **isActive**

public boolean **isActive** ()

### **resetRow**

public *ColumnStoreBulkInsert* **resetRow** ()

### **rollback**

public void **rollback** ()

### **setBatchSize**

public void **setBatchSize** (long *batchSize*)

### **setColumn**

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, *String value*, int[] *status*)

### **setColumn**

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, *String value*)

### **setColumn**

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, *java.math.BigInteger value*, int[] *status*)

### **setColumn**

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, *java.math.BigInteger value*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, long *value*, int[] *status*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, long *value*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, int *value*, int[] *status*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, int *value*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, short *value*, int[] *status*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, short *value*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, byte *value*, int[] *status*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, byte *value*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, double *value*, int[] *status*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, double *value*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, *ColumnStoreDateTime* *value*, int[] *status*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, *ColumnStoreDateTime* *value*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, *ColumnStoreDecimal* *value*, int[] *status*)

### setColumn

public *ColumnStoreBulkInsert* **setColumn** (int *columnNumber*, *ColumnStoreDecimal* *value*)

### setNull

public *ColumnStoreBulkInsert* **setNull** (int *columnNumber*, int[] *status*)

### setNull

public *ColumnStoreBulkInsert* **setNull** (int *columnNumber*)

### setTruncateIsError

public void **setTruncateIsError** (boolean *set*)

### writeRow

public *ColumnStoreBulkInsert* **writeRow** ()

## 5.2 ColumnStoreDateTime

public class **ColumnStoreDateTime**

### 5.2.1 Fields

#### swigCMemOwn

protected transient boolean **swigCMemOwn**

### 5.2.2 Constructors

#### ColumnStoreDateTime

protected **ColumnStoreDateTime** (long *cPtr*, boolean *cMemoryOwn*)

### ColumnStoreDateTime

public `ColumnStoreDateTime` ()

### ColumnStoreDateTime

public `ColumnStoreDateTime` (SWIGTYPE\_p\_tm *time*)

### ColumnStoreDateTime

public `ColumnStoreDateTime` (long *year*, long *month*, long *day*, long *hour*, long *minute*, long *second*, long *microsecond*)

### ColumnStoreDateTime

public `ColumnStoreDateTime` (long *year*, long *month*, long *day*, long *hour*, long *minute*, long *second*)

### ColumnStoreDateTime

public `ColumnStoreDateTime` (long *year*, long *month*, long *day*, long *hour*, long *minute*)

### ColumnStoreDateTime

public `ColumnStoreDateTime` (long *year*, long *month*, long *day*, long *hour*)

### ColumnStoreDateTime

public `ColumnStoreDateTime` (long *year*, long *month*, long *day*)

### ColumnStoreDateTime

public `ColumnStoreDateTime` (String *dateTime*, String *format*)

## 5.2.3 Methods

### delete

public synchronized void `delete` ()

### finalize

protected void `finalize` ()

### getCPtr

protected static long `getCPtr` (*ColumnStoreDateTime obj*)

**set**

public boolean **set** (SWIGTYPE\_p\_tm *time*)

**set**

public boolean **set** (String *dateTime*, String *format*)

## 5.3 ColumnStoreDecimal

public class **ColumnStoreDecimal**

### 5.3.1 Fields

**swigCMemOwn**

protected transient boolean **swigCMemOwn**

### 5.3.2 Constructors

**ColumnStoreDecimal**

protected **ColumnStoreDecimal** (long *cPtr*, boolean *cMemoryOwn*)

**ColumnStoreDecimal**

public **ColumnStoreDecimal** ()

**ColumnStoreDecimal**

public **ColumnStoreDecimal** (long *value*)

**ColumnStoreDecimal**

public **ColumnStoreDecimal** (String *value*)

**ColumnStoreDecimal**

public **ColumnStoreDecimal** (double *value*)

**ColumnStoreDecimal**

public **ColumnStoreDecimal** (long *number*, short *scale*)



### 5.3.3 Methods

#### **delete**

public synchronized void **delete** ()

#### **finalize**

protected void **finalize** ()

#### **getCPtr**

protected static long **getCPtr** (*ColumnStoreDecimal obj*)

#### **set**

public boolean **set** (long *value*)

#### **set**

public boolean **set** (*String value*)

#### **set**

public boolean **set** (double *value*)

#### **set**

public boolean **set** (long *number*, short *scale*)

## 5.4 ColumnStoreDriver

public class **ColumnStoreDriver**

### 5.4.1 Fields

#### **swigCMemOwn**

protected transient boolean **swigCMemOwn**

### 5.4.2 Constructors

#### **ColumnStoreDriver**

protected **ColumnStoreDriver** (long *cPtr*, boolean *cMemoryOwn*)

## ColumnStoreDriver

public **ColumnStoreDriver** (*String path*)

## ColumnStoreDriver

public **ColumnStoreDriver** ()

### 5.4.3 Methods

#### createBulkInsert

public *ColumnStoreBulkInsert* **createBulkInsert** (*String db*, *String table*, *short mode*, *int pm*)

#### delete

public synchronized void **delete** ()

#### finalize

protected void **finalize** ()

#### getCPtr

protected static long **getCPtr** (*ColumnStoreDriver obj*)

#### getJavaMcsapiVersion

public *String* **getJavaMcsapiVersion** ()

#### getSystemCatalog

public *ColumnStoreSystemCatalog* **getSystemCatalog** ()

#### getVersion

public *String* **getVersion** ()

#### setDebug

public void **setDebug** (*boolean enabled*)

## 5.5 ColumnStoreException

public class **ColumnStoreException** extends *java.lang.RuntimeException*

## 5.5.1 Constructors

### ColumnStoreException

```
public ColumnStoreException ()
```

### ColumnStoreException

```
public ColumnStoreException (String message)
```

### ColumnStoreException

```
public ColumnStoreException (String message, Throwable cause)
```

### ColumnStoreException

```
public ColumnStoreException (Throwable cause)
```

## 5.6 ColumnStoreSummary

```
public class ColumnStoreSummary
```

### 5.6.1 Fields

#### swigCMemOwn

```
protected transient boolean swigCMemOwn
```

### 5.6.2 Constructors

#### ColumnStoreSummary

```
protected ColumnStoreSummary (long cPtr, boolean cMemoryOwn)
```

#### ColumnStoreSummary

```
public ColumnStoreSummary ()
```

#### ColumnStoreSummary

```
public ColumnStoreSummary (ColumnStoreSummary summary)
```

### 5.6.3 Methods

#### **delete**

public synchronized void **delete** ()

#### **finalize**

protected void **finalize** ()

#### **getCPtr**

protected static long **getCPtr** (*ColumnStoreSummary obj*)

#### **getExecutionTime**

public double **getExecutionTime** ()

#### **getInvalidCount**

public java.math.BigInteger **getInvalidCount** ()

#### **getRowsInsertedCount**

public java.math.BigInteger **getRowsInsertedCount** ()

#### **getSaturatedCount**

public java.math.BigInteger **getSaturatedCount** ()

#### **getTruncationCount**

public java.math.BigInteger **getTruncationCount** ()

## 5.7 ColumnStoreSystemCatalog

public class **ColumnStoreSystemCatalog**

### 5.7.1 Fields

#### **swigCMemOwn**

protected transient boolean **swigCMemOwn**

## 5.7.2 Constructors

### ColumnStoreSystemCatalog

protected **ColumnStoreSystemCatalog** (long *cPtr*, boolean *cMemoryOwn*)

### ColumnStoreSystemCatalog

public **ColumnStoreSystemCatalog** ()

### ColumnStoreSystemCatalog

public **ColumnStoreSystemCatalog** (*ColumnStoreSystemCatalog obj*)

## 5.7.3 Methods

### addReference

protected void **addReference** (*ColumnStoreDriver columnStoreDriver*)

### delete

public synchronized void **delete** ()

### finalize

protected void **finalize** ()

### getCPtr

protected static long **getCPtr** (*ColumnStoreSystemCatalog obj*)

### getTable

public *ColumnStoreSystemCatalogTable* **getTable** (String *schemaName*, String *tableName*)

## 5.8 ColumnStoreSystemCatalogColumn

public class **ColumnStoreSystemCatalogColumn**

### 5.8.1 Fields

#### swigCMemOwn

protected transient boolean **swigCMemOwn**

## 5.8.2 Constructors

### ColumnStoreSystemCatalogColumn

protected **ColumnStoreSystemCatalogColumn** (long *cPtr*, boolean *cMemoryOwn*)

### ColumnStoreSystemCatalogColumn

public **ColumnStoreSystemCatalogColumn** ()

### ColumnStoreSystemCatalogColumn

public **ColumnStoreSystemCatalogColumn** (*ColumnStoreSystemCatalogColumn obj*)

## 5.8.3 Methods

### compressionType

public short **compressionType** ()

### delete

public synchronized void **delete** ()

### finalize

protected void **finalize** ()

### getCPtr

protected static long **getCPtr** (*ColumnStoreSystemCatalogColumn obj*)

### getColumnName

public **String** **getColumnName** ()

### getDefaultValue

public **String** **getDefaultValue** ()

### getDictionaryOID

public long **getDictionaryOID** ()

### getOID

public long **getOID** ()

### **getPosition**

public long **getPosition** ()

### **getPrecision**

public long **getPrecision** ()

### **getScale**

public long **getScale** ()

### **getType**

public *columnstore\_data\_types\_t* **getType** ()

### **getWidth**

public long **getWidth** ()

### **isAutoincrement**

public boolean **isAutoincrement** ()

### **isNullable**

public boolean **isNullable** ()

## **5.9 ColumnStoreSystemCatalogTable**

public class **ColumnStoreSystemCatalogTable**

### **5.9.1 Fields**

#### **swigCMemOwn**

protected transient boolean **swigCMemOwn**

### **5.9.2 Constructors**

#### **ColumnStoreSystemCatalogTable**

protected **ColumnStoreSystemCatalogTable** (long *cPtr*, boolean *cMemoryOwn*)

## ColumnStoreSystemCatalogTable

```
public ColumnStoreSystemCatalogTable ()
```

## ColumnStoreSystemCatalogTable

```
public ColumnStoreSystemCatalogTable (ColumnStoreSystemCatalogTable obj)
```

### 5.9.3 Methods

#### delete

```
public synchronized void delete ()
```

#### finalize

```
protected void finalize ()
```

#### getCPtr

```
protected static long getCPtr (ColumnStoreSystemCatalogTable obj)
```

#### getColumn

```
public ColumnStoreSystemCatalogColumn getColumn (String columnName)
```

#### getColumn

```
public ColumnStoreSystemCatalogColumn getColumn (int columnNumber)
```

#### getColumnCount

```
public int getColumnCount ()
```

#### getOID

```
public long getOID ()
```

#### getSchemaName

```
public String getSchemaName ()
```

#### getTableName

```
public String getTableName ()
```



## 5.10 columnstore\_data\_convert\_status\_t

public enum `columnstore_data_convert_status_t`

### 5.10.1 Enum Constants

#### CONVERT\_STATUS\_INVALID

public static final *columnstore\_data\_convert\_status\_t* `CONVERT_STATUS_INVALID`

#### CONVERT\_STATUS\_NONE

public static final *columnstore\_data\_convert\_status\_t* `CONVERT_STATUS_NONE`

#### CONVERT\_STATUS\_SATURATED

public static final *columnstore\_data\_convert\_status\_t* `CONVERT_STATUS_SATURATED`

#### CONVERT\_STATUS\_TRUNCATED

public static final *columnstore\_data\_convert\_status\_t* `CONVERT_STATUS_TRUNCATED`

## 5.11 columnstore\_data\_types\_t

public enum `columnstore_data_types_t`

### 5.11.1 Enum Constants

#### DATA\_TYPE\_BIGINT

public static final *columnstore\_data\_types\_t* `DATA_TYPE_BIGINT`

#### DATA\_TYPE\_BIT

public static final *columnstore\_data\_types\_t* `DATA_TYPE_BIT`

#### DATA\_TYPE\_BLOB

public static final *columnstore\_data\_types\_t* `DATA_TYPE_BLOB`

#### DATA\_TYPE\_CHAR

public static final *columnstore\_data\_types\_t* `DATA_TYPE_CHAR`

## **DATA\_TYPE\_CLOB**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_CLOB**

## **DATA\_TYPE\_DATE**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_DATE**

## **DATA\_TYPE\_DATETIME**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_DATETIME**

## **DATA\_TYPE\_DECIMAL**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_DECIMAL**

## **DATA\_TYPE\_DOUBLE**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_DOUBLE**

## **DATA\_TYPE\_FLOAT**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_FLOAT**

## **DATA\_TYPE\_INT**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_INT**

## **DATA\_TYPE\_MEDINT**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_MEDINT**

## **DATA\_TYPE\_SMALLINT**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_SMALLINT**

## **DATA\_TYPE\_TEXT**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_TEXT**

## **DATA\_TYPE\_TINYINT**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_TINYINT**

#### **DATA\_TYPE\_UBIGINT**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_UBIGINT**

#### **DATA\_TYPE\_UDECIMAL**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_UDECIMAL**

#### **DATA\_TYPE\_UDOUBLE**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_UDOUBLE**

#### **DATA\_TYPE\_UFLOAT**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_UFLOAT**

#### **DATA\_TYPE\_UINT**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_UINT**

#### **DATA\_TYPE\_UMEDINT**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_UMEDINT**

#### **DATA\_TYPE\_USMALLINT**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_USMALLINT**

#### **DATA\_TYPE\_UTINYINT**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_UTINYINT**

#### **DATA\_TYPE\_VARBINARY**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_VARBINARY**

#### **DATA\_TYPE\_VARCHAR**

public static final *columnstore\_data\_types\_t* **DATA\_TYPE\_VARCHAR**

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