

# Apache Iceberg Overview

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# CLOUDERA

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# Contents

**Iceberg overview.....4**  
**Apache Iceberg Feature Support Matrix..... 5**

## Iceberg overview

Apache Iceberg is a table format for huge analytics datasets that defines how metadata is stored and data files are organized. Iceberg is also a library that compute engines can use to read/write a table.

You can efficiently query large Iceberg tables on object stores. Iceberg supports concurrent reads and writes on all storage media. You can use Iceberg when a single table contains tens of petabytes of data, and you can read these tables without compromising performance. By default, Hive and Impala use the Iceberg HiveCatalog for Metastore management of Iceberg tables. The catalog stores Iceberg metadata, including the location of the table. Iceberg catalog use of Hive metastore (HMS) for catalog operations is lightweight. Iceberg relieves HMS pressure by storing partition information in metadata files on the file system/object store instead of within the HMS. This architecture supports rapid scaling without performance hits.

If your environment uses HDFS HA, you must enable it before creating Iceberg tables. For instructions, see [Enable HDFS HA before you create Iceberg tables](#).

### Key features overview

From Hive and Impala, you can read and write V1 or V2 Iceberg tables. The following features are included:

- Reads of Iceberg V2 tables that have had row-level deletes or updates makes Apache Iceberg ACID-compliant with serializable isolation and an optimistic concurrency model
- Materialized views of Iceberg tables
- Enhanced maintenance features, such as expiring and removing old snapshots and compaction of small files
- Performance and scalability enhancements

### Iceberg table security and visualization

Apache Iceberg integrates Apache Ranger for security. You can use Ranger integration with Hive and Impala to apply fine-grained access control to sensitive data in Iceberg tables. Iceberg is also integrated with Cloudera Data Visualization for creating dashboards and other graphics of your Iceberg data.

### Supported ACID transaction properties

Iceberg supports atomic and isolated database transaction properties. Writers work in isolation, not affecting the live table, and perform an atomic swap for metadata pointers only when the transactions are committed, making the changes in one atomic commit.

Iceberg uses snapshots to guarantee isolated reads and writes. You see a consistent version of table data without locking the table. Readers always see a consistent version of the data without the need to lock the table. Writers work in isolation, not affecting the live table.

### Iceberg partitioning

The Iceberg partitioning technique has performance advantages over conventional partitioning, such as Apache Hive partitioning. Iceberg hidden partitioning is easier to use. Iceberg supports in-place partition evolution; to change a partition, you do not rewrite the entire table to add a new partition column, and queries do not need to be rewritten for the updated table. Iceberg continuously gathers data statistics, which supports additional optimizations, such as partition pruning.

Iceberg uses multiple layers of metadata files to find and prune data. Impala, Spark, and Flink keep track of data at the folder level and not at the file level, performing file list operations when working with data in a table. Performance problems occur during the execution of multiple directory listings. Iceberg keeps track of a complete list of files within a table using a persistent tree structure. Changes to an Iceberg table use an atomic object/file level commit to update the path to a new snapshot file. The snapshot points to the individual data files through manifest files.

The manifest files track data files across partitions, storing partition information and column metrics for each data file. A manifest list is an additional index for pruning entire manifests. File pruning increases efficiency.

Iceberg relieves Hive metastore (HMS) pressure by storing partition information in metadata files on the file system/object store instead of within the HMS. This architecture supports rapid scaling without performance hits.

**Related Information**

[Iceberg support from Spark in Cloudera Data Engineering](#)

[Apache Software Foundation Iceberg Docs](#)

[Using Apache Iceberg](#)

## Apache Iceberg Feature Support Matrix

Apache Iceberg is a cloud-native, high-performance open table format for organizing petabyte-scale analytic datasets on a file system or object store. Combined with Cloudera, you can build an Open Data Lakehouse architecture for multi-function analytics and deploy large-scale end-to-end pipelines. Cloudera Iceberg supports Hive, Impala, and Spark engines. The Iceberg feature support matrix table lists the Iceberg features and the engines supported.

Open Data Lakehouse on Cloudera simplifies advanced analytics on all data with a unified platform for structured and unstructured data and integrated data services to enable any analytics use case, from ML and BI to stream analytics and real-time analytics. Apache Iceberg is the foundational technology of the Open Lakehouse architecture.



**Note:** Cloudera supports the v1 and v2 versions of the Iceberg specification for Hive, Impala, and Spark.

The [Apache Iceberg format specification](#) describes the following versions of tables:

- v1: Defines large analytic data tables using open format files.
- v2: Specifies ACID-compliant tables, including row-level deletes and updates.

The following tabs list the latest Iceberg features, supported engines, and their earliest supported version of Cloudera and Cloudera Data Services:

For Features			
Table 1: Iceberg feature support matrix			
Iceberg feature	Hive	Impala	Spark
Create table	✓	✓	✓
Select	✓	✓	✓
Insert	✓	✓	✓
Update	✓	✓	✓
Delete	✓	✓	✓
Merge	✓	✓	✓
Schema evolution	✓	✓	✓
Partition evolution	✓ (Hidden partition)	✓ (Hidden partition)	✓

Iceberg feature	Hive	Impala	Spark
Drop partition	✓	✓	✗
Transaction support	✓	✓	✓
Parquet support	✓	✓	✓
Compaction	✓	✓	✓
Equality deletes	✓ (read-only)	✓ (read-only)	✓ (read-only)
Positional deletes	✓	✓	✓ (read and write)
Merge-on-read	✓	✓	✓
Copy-on-write	✓	✗	✓
Optimistic concurrency control	✓	✓	✓
Time travel	✓	✓	✓
Rollback	✓	✓	✓
Optimized Row Columnar (ORC)	✓	✓ (read-only)	✓
Avro support	✓	✓ (read-only)	✓
Snapshot isolation level	✓	✓	✓
Serializable isolation level	✗	✗	✓
Branching	✓	✗	✓
Tagging	✓	✗	✓
Fine-grained access control (Ranger)	✓ (HWC)	✓	✗
Table statistics	✓	✓	✓
Partition statistics	✗	✓ (no Number of Distinct Values)	✗
Geospatial types	✓	✗	✗

Iceberg feature	Hive	Impala	Spark
Partition pruning	✓	✓	✓
Z-Ordering	✗	✓	✓
Bucket map join	✓	✗	✓ (Storage partitioned join)
Migration from external table	✓	✓	✓
Load data inpath	✓	✓	✗

**For Hive**

**Table 2: Hive feature availability**

Iceberg feature	Form factor	Version introduced in
Create	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Select	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Insert	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Update	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Delete	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Merge	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Schema evolution	Cloudera on cloud	7.2.17

Iceberg feature	Form factor	Version introduced in
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Partition evolution	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Drop Partition	Cloudera on cloud	7.3.1
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.8.5
	Cloudera Data Warehouse on premises	1.5.4
Transaction support	Cloudera on cloud	7.2.18
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Parquet support	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Compaction	Cloudera on cloud	7.3.1 500
	Cloudera Base on premises	7.3.1 500
	Cloudera Data Warehouse on cloud	1.9.1
	Cloudera Data Warehouse on premises	1.5.4 SP1
Equality deletes	Cloudera on cloud	7.3.1 500
	Cloudera Base on premises	7.3.1 500
	Cloudera Data Warehouse on cloud	1.9.1
	Cloudera Data Warehouse on premises	1.5.4 SP1
Positional deletes	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Merge-on-read	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Copy-on-write	Cloudera on cloud	7.3.1 500
	Cloudera Base on premises	7.3.1 500
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4

Iceberg feature	Form factor	Version introduced in
Optimistic concurrency control	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Time travel	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Rollback	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Optimized row columnar support	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Avro support	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.1
	Cloudera Data Warehouse on premises	1.5.4
Snapshot isolation level	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Avro support	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.1
	Cloudera Data Warehouse on premises	1.5.4
Branching	Cloudera on cloud	7.3.1 500
	Cloudera Base on premises	7.3.1 500
	Cloudera Data Warehouse on cloud	1.9.1
	Cloudera Data Warehouse on premises	1.5.4
Tagging	Cloudera on cloud	7.3.1 500
	Cloudera Base on premises	7.3.1 500
	Cloudera Data Warehouse on cloud	1.9.1
	Cloudera Data Warehouse on premises	1.5.4
Fine-grained access control (Ranger)	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.6.1

Iceberg feature	Form factor	Version introduced in
	Cloudera Data Warehouse on premises	1.5.2
Table statistics	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Geospatial types	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Partition pruning	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Bucket map join	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Migration from external table	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4
Load data inpath	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.9.3
	Cloudera Data Warehouse on premises	1.5.4

**For Impala**

**Table 3: Impala feature availability**

Iceberg feature	Form factor	Version introduced in
Create	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Select	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Insert	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9

Iceberg feature	Form factor	Version introduced in
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Update	Cloudera on cloud	7.3.1.500
	Cloudera Base on premises	7.3.1.500
	Cloudera Data Warehouse on cloud	1.8.5
	Cloudera Data Warehouse on premises	1.5.4
Delete	Cloudera on cloud	7.2.18
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.8.1
	Cloudera Data Warehouse on premises	1.5.4
Merge	Cloudera on cloud	7.3.1.500
	Cloudera Base on premises	7.3.1.500
	Cloudera Data Warehouse on cloud	1.10.1
	Cloudera Data Warehouse on premises	1.5.5
Schema evolution	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Partition evolution	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Drop Partition	Cloudera on cloud	7.3.1.500
	Cloudera Base on premises	7.3.1.500
	Cloudera Data Warehouse on cloud	1.8.5
	Cloudera Data Warehouse on premises	1.5.4
Single statement transaction support	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Parquet support	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Major compaction	Cloudera on cloud	7.2.18
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.8.5
	Cloudera Data Warehouse on premises	1.5.4
Sophisticated compaction	Cloudera on cloud	7.3.1.500

Iceberg feature	Form factor	Version introduced in
	Cloudera Base on premises	7.3.1.500
	Cloudera Data Warehouse on cloud	1.10.1
	Cloudera Data Warehouse on premises	1.5.5
Equality deletes	Cloudera on cloud	7.3.1.500
	Cloudera Base on premises	7.3.1.500
	Cloudera Data Warehouse on cloud	1.9.1
	Cloudera Data Warehouse on premises	1.5.4
Positional deletes	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Merge-on-read	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Optimistic concurrency control	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Time travel	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Rollback	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Optimized row columnar support	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Avro support	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Snapshot isolation level	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2

Iceberg feature	Form factor	Version introduced in
Fine-grained access control (Ranger)	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Table statistics	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Partition statistics	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Partition pruning	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Z-Ordering	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2
Migration from external table	Cloudera on cloud	7.2.18
	Cloudera Base on premises	7.3.1
	Cloudera Data Warehouse on cloud	1.7.1
	Cloudera Data Warehouse on premises	1.5.2
Load data inpath	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Warehouse on cloud	1.6.1
	Cloudera Data Warehouse on premises	1.5.2

**For Spark**

**Table 4: Spark feature availability**

Iceberg feature	Form factor	Version introduced in
Create	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Select	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19

Iceberg feature	Form factor	Version introduced in
Insert	Cloudera Data Engineering on premises	1.5.2
	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Update	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Delete	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Merge	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Schema evolution	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Partition evolution	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Transaction support	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Parquet support	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Compaction	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Equality delete (read-only)	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9

Iceberg feature	Form factor	Version introduced in
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Positional deletes	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Merge-on-read	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Copy-on-write	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Optimistic concurrency control	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Time travel	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Rollback	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Optimized row columnar support	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Avro support	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Snapshot isolation level	Cloudera on cloud	7.3.1
	Cloudera Base on premises	7.3.1
	Cloudera Data Engineering on cloud	1.22
	Cloudera Data Engineering on premises	1.5.4-h5
Serializable isolation level	Cloudera on cloud	7.3.1

Iceberg feature	Form factor	Version introduced in
	Cloudera Base on premises	7.3.1
	Cloudera Data Engineering on cloud	1.22
	Cloudera Data Engineering on premises	1.5.4-h5
Branching	Cloudera on cloud	7.3.1
	Cloudera Base on premises	7.3.1
	Cloudera Data Engineering on cloud	1.22
	Cloudera Data Engineering on premises	1.5.4-h5
Tagging	Cloudera on cloud	7.3.1
	Cloudera Base on premises	7.3.1
	Cloudera Data Engineering on cloud	1.22
	Cloudera Data Engineering on premises	1.5.4-h5
Table statistics	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Partition pruning	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2
Z-Ordering	Cloudera on cloud	7.3.1
	Cloudera Base on premises	7.3.1
	Cloudera Data Engineering on cloud	1.22
	Cloudera Data Engineering on premises	1.5.4-h5
Bucket map join	Cloudera on cloud	7.2.18
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.20
	Cloudera Data Engineering on premises	1.5.2
Migration from external table	Cloudera on cloud	7.2.17
	Cloudera Base on premises	7.1.9
	Cloudera Data Engineering on cloud	1.19
	Cloudera Data Engineering on premises	1.5.2

**Related Information**

[Cloudera Runtime Release Notes](#)