Hewlett Packard
Enterprise

New Features

HPE Vertica Analytic Database

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Contents

New Features and Changes in Vertica 7.2.1

Read the topics in this section for information about new and changed functionality in Vertica 7.2.1.

Supported Platforms

This section contains information on updates to supported platforms for Vertica Analytic Database 7.2.x.

More Details

For complete information on platform support see Vertica 7.2.x Supported Platforms.

Software Download

For more information on changes to the operating system in the Red Hat 7 release, see the Red Hat Enterprise Linux 7 documentation.

Windows 10 Support for Client Drivers

Vertica has added Windows 10 support for the following client drivers:

- ADO.NET, both 32 and 64-bit
- JDBC
- ODBC, both 32 and 64-bit
- Vertica vsql

For more information see Vertica 7.2.x Client Drivers.

Security and Authentication

This section contains information on updates to security and authentication features for Vertica Analytic Database 7.2.x.

More Details

For more information see Security and Authentication.

Authentication Support for Chained Users and Roles

You can now enable authentication for a chain of users and roles, rather than enabling authentication for each user and role separately.

For more information see Implementing Client Authentication.

Restrict System Tables

The new security parameter RestrictSystemTables prohibits users from accessing sensitive information from some system tables.

For more information see System Table Restriction.

Query Optimization

This section contains information on updates to Optimization for Vertica Analytic Database 7.2.x.

More Details

For more information see Optimizing Query Performance.

Batch Export of Directed Queries

This release provides two new meta-functions that let you batch export directed queries from one database to another. These tools are useful for saving query plans before a scheduled version upgrade:

- `EXPORT_DIRECTED_QUERIES` batch exports query plans as directed queries to an external SQL file.
- `IMPORT_DIRECTED_QUERIES` lets you selectively import query plans that were exported by `EXPORT_DIRECTED_QUERIES` from another database.

For more information on using these tools, see Batch Export and Import Tools.

UTYPE hint

The `UTYPE` hint specifies how to combine `UNION ALL` input.

SQL Functions and Statements

This section contains information on updates to SQL Functions and Statements for Vertica Analytic Database 7.2.x.

More Details

For more information see the SQL Reference Manual.

THROW_ERROR Function

This release adds the function, throw_error, which allows you to generate arbitrary errors. For more information, see THROW_ERROR.

Management Console

This section contains information on updates to the Management Consol for Vertica Analytic Database 7.2.x.

More Details

For more information see Management Console.

Management Console Message Center Redesign

Management Console now brings focus to time-sensitive and high priority messages with a redesigned Message Center.

The new Recent Messages inbox displays your messages from the past week, while messages you have read are now archived in the Archived Messages inbox. You can also click Threshold Messages to view only alerts about exceeded thresholds in your database.

To help you prioritize the messages you view, Message Center displays the number of messages categorized as High Priority, Needs Attention, and Informational. You can click any of these values to filter by that priority.

For more information about Message Center, see Monitoring Database Messages in MC.

Password Requirements in Management Console

Starting with Vertica 7.2.1, Management Console (MC) passwords must contain 5 - 25 characters. Passwords created in previous versions of MC continue to work regardless of length. If you change a password after updating to 7.2.1, MC enforces the new length requirement.

System Table Updates

This section contains information on updates to System Tables for Vertica Analytic Database 7.2.x.

More Details

For more information see Vertica System Tables.

License Audits System Table

Vertica Concepts has changed the LICENSE_AUDITS system table column LICENSE_NAME to AUDITED_DATA.

Refer to the section, LICENSE_AUDITS in the SQL Reference Manual for more information.

Licenses System Table

Vertica Concepts has changed the LICENSES system table column IS_COMMUNITY_EDITION to IS_SIZE_LIMIT_ENFORCED.

Refer to the section, LICENSES in the SQL Reference Manual for more information.

SDK Updates

This section contains information on updates to the SDK for Vertica Analytic Database 7.2.x.

More Details

For more information see the Java SDK Documentation.

Enhancements for C++ User-Defined Function Parameters

This release adds new functionality for C++ user-defined function parameters. For more information, see:

- Defining the Parameters Your UDx Accepts
- Determining the Behavior of Passing Undeclared Parameters
- USER_FUNCTION_PARAMETERS

Management Console API Alert Filters

New filters are available for when you use the Vertica REST API to retrieve information on alerts configured in Management Console. For information on applying these category and sub-category filters, see:

- Thresholds Category Filter
- Combining Sub-Category Filters with Category Filters
- Database Name Category Filter

Text Search Updates

This section contains information on updates to Text Search for Vertica Analytic Database 7.2.x.

More Details

For more information see Using Text Search.

Text Search Features

This release adds the following functionality for text search:

- Tokenizers are now polymorphic and can accept any number and type of columns.
- Text indices can now contain multiple columns from their source table.

For more information see Using Text Search.

New Features and Changes in Vertica 7.2.0

Read the topics in this section for information about new and changed functionality in Vertica 7.2.0.

Supported Platforms

This section contains information on updates to supported platforms for Vertica Analytic Database 7.2.x.

More Details

For complete information on platform support see Vertica 7.2.x Supported Platforms.

Software Download

For more information on changes to the operating system in the Red Hat 7 release, see the Red Hat Enterprise Linux 7 documentation.

Support for Red Hat Enterprise Linux 7 and CentOS 7

This release adds support for Red Hat Enterprise Linux 7 and CentOS 7 on HPE Vertica Analytic Database and Management Console.

You cannot perform a direct upgrade with Vertica Analytic Database 7.2.x from Red Hat 6.x to 7 or CentOS 6.x to 7. For information on how to upgrade to Red Hat 7 or CentOS 7, see Migration Guide for Red Hat 7/CentOS 7.

Requirements Before Upgrading or Installing

This section contains updated information on the tasks you must complete before you install or upgrade Vertica.

Dialog Package

Vertica now requires the dialog package to be installed on all nodes in your cluster before installing or upgrading the database platform.

See Package Dependencies for more information.

Licensing and Auditing

Vertica 7.2.x has changed its licensing scheme and the way it audits licenses.

More Details

For complete license information see Managing Licenses.

Vertica Enterprise Edition License Is Now Premium Edition

Enterprise Edition is now Premium Edition.

- If you have a current Enterprise Edition license, it is still valid for use with Vertica 7.2.x.
- The new Premium Edition includes Flex Tables. You no longer need a separate license for Flex Zone. (The new Premium Edition does not include a Flex Table data limit; you can add Flex Table data up to your general license limit. Flex data counts as 1/10th the cost of regular data towards your license limits.)
- Premium Edition includes all Vertica functionality. Hadoop requires a separate license.

For more information see Understanding Vertica Licenses.

Vertica Database Audits

IMPORTANT: The changes in this section became effective with Vertica Release 7.1.2, except where noted.

Vertica has made storage changes related to licensing. As a result, the Vertica database audit size is calculated differently and is reduced from audit sizes calculated prior to Vertica Version 7.1.2.

Vertica now computes the effective size of the database based on the export size of the data.

- Vertica no longer counts a 1-byte delimiter value in the effective size of the database. Instead, the Vertica audit license size is now based solely on the data width.
- Vertica no longer adds a 1-byte value to account for each delimiter. Under the new sizing rules, null values are free. Thus, Vertica audit size may be greatly reduced from the previous version audit size.
- As of Vertica Release 7.2.x, Flex data counts as only 1/10th the cost of non-Flex data.

As a result of these changes, compression ratios show less compression than previous versions. You can find detailed information on how Vertica calculates database size in the Calculating the Database Size section of the Administrator's Guide.

Client Connectivity

This section contains information on updates to connection information for Vertica Analytic Database 7.2.x.

More Details

For more information see Connecting to Vertica.

Vertica Client Drivers and Tools for Windows

This release adds a new installer, Vertica Client Drivers and Tools for Windows, for connecting to Vertica. The installer is packaged as an .exe file. You can run the installer as a regular Windows installer or silently. The installer is compatible with both 32-bit and 64-bit machines.

The installer contains the following client drivers and tools:

- The ODBC Client Driver for Windows
- The OLE DB Client Driver for Windows
- The vsql Client for Windows
- The ADO.NET Driver for Windows
- The Microsoft Connectivity Pack for Windows
- The Visual Studio Plug-in for Windows

For more information on installing the Client Drivers and Tools for Windows, see The Vertica Client Drivers and Tools for Windows.

Download the latest Client Drivers and Tools for Windows from my.vertica.com (logon required).

Multiple Active Result Sets (MARS) Support

Vertica now supports multiple active result sets when you use a JDBC connection. For more information, see Multiple Active Result Sets (MARS).

VHash Class for JDBC

You can use the VHash class as an implementation of the Vertica built-in hash function when connecting to your database with a JDBC connection. For more information, see Pre-Segmenting Data Using VHash.

Binary Transfer with ADO.NET Connections

When connecting between your ADO.NET client application and your Vertica database, you can now use binary transfer instead of string transfer. See ADO.NET Connection Properties for more information.

Python Client

Vertica offers a Python client that allows you to interface with your database. For more information, see Vertica Python Client.

Security and Authentication

This section contains information on updates to security and authentication features for Vertica Analytic Database 7.2.x.

More Details

For more information see Security and Authentication.

Admintools Remote Calls

Previous to Vertica Analytic Database 7.2.x, you performed admintools remote calls using SSH to connect to a remote cluster and then running shell commands. This configuration allowed system database administration users to perform any system action without limitation.

This approach prevented organizations from auditing the complete set of actions that Admintools can perform.

Vertica Analytic Database 7.2.x addresses this with the following remote python module:

```
python -m <command>
```

Using this module allows organizations to limit the system database administration user to execute python modules under the `.../vertica/engine/api` directory.

CFS Security

You can now use the Connector Framework Service (CFS) to ingest indexed HPE IDOL data securely into the Vertica Analytic Database. This option allows you to use the Vertica Analytic Database to perform analytics on data indexed by HPE IDOL.

The new security features control access to specific documents using:

- Access Control Lists (ACL) indicating which users and groups can access a document.
- Security Information Strings that associate a user/group with a specific ACL.

For more information see Connector Framework Service.

Inherited Privileges

The new Inherited privileges feature allow you to grant privileges at the schema level. This approach automatically grants privileges to a new or existing table in the schema. By using inherited privileges, you can:

- Eliminate the need to apply the same privileges to each individual table in the schema.
- Quickly create new tables that have the necessary privileges for users to perform required tasks.

For more information see Inherited Privileges Overview in the Administrator's Guide.

LDAP Link

The new LDAP Link service allows the Vertica Server to tightly couple with an existing Directory service such as MS Active Directory or OpenLDAP. Using the LDAP link services, you can specify that the Vertica server synchronize:

- LDAP users to Vertica database users
- LDAP groups to Vertica groups
- LDAP user and group membership to Vertica users and roles membership

Any changes to the LDAP Link directory service are reflected in the Vertica database in near real time. For example, if you create a new user in LDAP, and LDAP Link is active, that user identity is sent to the Vertica database upon the next synchronization.

For more information see LDAP Link Service.

SYSMONITOR Role

The new System Monitor (SYSMONITOR) role grants access to specific monitoring utilities without granting full DBADMIN access. This role allows the DBADMIN user to delegate administrative tasks without compromising security or exposing sensitive information. A DBADMIN user has the System Monitor role by default.

For more information see SYSMONITOR Role in the Administrator's Guide.

Database Management

This section contains information on updates to database operations for Vertica Analytic Database 7.2.x.

More Details

For more information see Managing the Database.

Configuration Parameter ARCCommitPercentage

This parameter sets a threshold percentage of WOS to ROS rows. The specified percentage determines when to aggregate projection row counts and commit the result to the Vertica catalog. The default value is 3 (percent).

ARCCommitPercentage provides better control over expensive commit operations, and helps reduce extended catalog locks.

For more information see General Parameters in the Administrator's Guide.

Admintools Debug Option

Vertica has added a `--debug` option to the admintools command to assist customers and customer support. When you enable the debug option, Vertica adds additional information to associated log files.

Note: Vertica often changes the format or content of log files in subsequent releases to benefit both customers and customer support.

For information on admintools command options, refer to Writing Administration Tools Scripts in the Administrator's Guide.

Automatic Eviction of Unresponsive Nodes

This release adds a new capability to detect and respond to unhealthy nodes in an Vertica database cluster.

See Automatic Eviction of Unhealthy Nodes to learn more.

Reduced Catalog Size

Vertica 7.2.x reduces catalog size by consolidating statistics storage, removing unused statistics, and storing unsegmented projection metadata once per database, instead of once per node. More efficient catalog storage provides the following benefits:

- Smaller catalog footprint
- Better scalability with large clusters, facilitating faster analytics, backup, and recovery
- Reduced overhead and fewer bottlenecks associated with catalog size and usage.

For more information see Prepare Disk Storage Locations in Installing Vertica.

Unsegmented Projection Buddies Map to Single Name

Before Vertica 7.2.x, all instances (buddies) of unsegmented projections that were created by `CREATE PROJECTION UNSEGMENTED ALL NODES` had unique identifiers:

```
unseg-proj-name_nodeID
```

In this identifier `nodeID` indicated the node that hosted a given projection buddy.

With redesign of the database catalog in Vertica 7.2.x, a single name now maps to all buddies of an unsegmented projection. For more information, see Projection Naming.

Name Conversion Utility

When you upgrade your database to Vertica 7.2.x, all existing projection names remain unchanged and Vertica continues to support them. You can use the function `merge_projections_with_same_basename()` to consolidate unsegmented projection names so they conform to the new naming convention. This function takes a single argument, one of the following:

- An empty string specifies to consolidate all unsegmented projection buddy names under their respective projection base names. For example:

```
=> select merge_projections_with_same_basename('');
 merge_projections_with_same_basename
 -------------------------------------
                                    0
(1 row)
```

- The base name of the projection whose buddy names you want to convert.

Query Optimization

This section contains information on updates to Optimization for Vertica Analytic Database 7.2.x.

More Details

For more information see Optimizing Query Performance.

Database Designer

Database Designer performance and scalability on large (>100 nodes) clusters has been significantly improved.

For more information see About Database Designer in the Administrator's Guide.

Optimizer Memory Usage

Memory usage by Database Optimizer has been reduced. For more information on the Database Optimizer see Optimize Query Performance.

Directed Queries and New Query Hints

Directed queries encapsulate information that the optimizer can use to create a query plan. Directed queries serve two goals:

- Preserve current query plans before a scheduled upgrade.
- Enable you to create query plans that improve optimizer performance.

For more information about directed queries, see Directed Queries in the Administrator's Guide.

Directed queries rely on a set of new optimizer hints, which you can also use in vsql queries. For information about these and other hints, see Hints in the SQL Reference Manual.

JOIN Performance

Vertica 7.2.x improves the performance of hash join queries through parallel construction of the hash table.

For more information see Joins in Analyzing Data.

Terrace Routing Reduces Buffering Requirements

Terrace routing is a feature that can reduce the buffer requirements of large queries. Use terrace routing in situations where you have large queries and clusters with a large number of nodes. Without terrace routing, these situations would otherwise require excessive buffer space.

For more information see Terrace Routing in the Administrator's Guide.

Changed Behavior for Live Aggregate/Top-K Projections

Live aggregate and Top-K projections now conform to the behavior of other Vertica projections, as follows:

- Vertica's database optimizer automatically directs queries that specify aggregation to the appropriate live aggregate or Top-K projection. In previous releases, you could

access pre-aggregated data only by querying live aggregate/Top-K projections; now you can query the anchor tables.

- Live aggregate/Top-K projections no longer require anchor projections. Vertica now loads new data directly into live aggregate/Top-K projections.
- Live aggregate/Top-K projections must now explicitly specify the same level of K-safety or greater that is configured for the Vertica database. Otherwise, Vertica does not create buddy projections and cannot update projection data.

For more information see Creating Live Aggregate Projections in Analyzing Data.

Pre-Aggregation of UDx Function Results

You can create live aggregate projections that invoke user-defined transform functions (UDTFs). Vertica processes these functions in the background and stores their results on disk, to minimize overhead when you query those projections. For more information, see Pre-Aggregating UDTF Results in Analyzing Data.

A projection can also specify a user-defined scalar function like any other expression. When you load data into this projection, Vertica stores the function result set for faster access. See Support for User-Defined Scalar Functions in Analyzing Data.

Improved Queries in Flex Views

This release supports the flex query rewriting to occur more broadly anytime a `__raw__` column is present. With this new functionality, a view is a "flex" view is considered a flex view if it includes a `__raw__` column and thus supports rewriting.

For more information see Querying Flex Views.

JIT Support for Regular Expression Matching

Vertica has upgraded the PCRE library to version 8.37. This upgrade includes Just in Time (JIT) compilation for the functions used in regular expression matching in SQL queries. For more information, see the parameter PatternMatchingUseJIT in General Parameters.

Loading Data

This section contains information about loading data in flex tables, and using Kafka Integration for Vertica Analytic Database 7.2.x.

Vertica 7.2.x includes two new parsers for flex tables:

- Avro file parser, `favroparser`
- CSV (comma-separated values) parser, `fcsvparser`

This release also extends flex view and __raw__ column queries. Whenever you query a flex table, Vertica calls maplookup() internally to include any virtual columns. In this release, querying flex views, or any table with a __raw__ column, also invokes maplookup() internally to improve query results.

More Details

For more information see Integrating with Apache Kafka and Understanding Flex Tables.

Flex Parsers

Vertica 7.2.x introduces two new parsers.

Avro Parser

Use `favroparser` to load Avro files into flex and columnar tables.

For flex tables, this parser supports files with primitive and complex data types, as described in the Apache Avro 1.3 specification.

CSV Parser

Use the flex tables CSV parser, `fcsvparser`, to load standard and modified CSV files into flex and columnar tables.

For more information, see Flex Parsers Reference.

Vertica and Apache Kafka Integration

Vertica 7.2.x introduces the ability to integrate with Apache Kafka. This feature allows you to stream data from a Kafka message bus directly into your Vertica database. It uses the job scheduler feature included in the Vertica rpm package.

For more information, see Kafka Integration Guide.

Management Console

This section contains information on updates to the Management Consol for Vertica Analytic Database 7.2.x.

More Details

For more information see Management Console.

Connect to HPE IDOL Dashboard from Management Console

Vertica 7.2.x Management Console introduces the ability to create a mutual link between your Vertica Management Console and HPE IDOL dashboards. The new **HPE IDOL** button in MC displays the number of alerts you have in HPE IDOL. The button provides a clickable shortcut to your HPE IDOL dashboard. Point MC to your HPE IDOL dashboard in MC Settings.

For more information see Connecting to Dashboard in Using Management Console.

External Data Sources for Management Console Monitoring

You can now use Management Console (MC) to monitor Data Collector information copied into Vertica tables, locally or remotely.

In the MC Settings page, provide mappings to local schemas or to an external database that contains the corresponding DC data. MC can then render its charts and graphs from the new repository instead of from local DC tables. This offers the benefit of loading larger sets of data faster in MC, and retaining historical data long term.

Administrators can configure MC to monitor an external data source using the new Data Source tab on the MC Settings page.

See Monitoring External Data Sources in Management Console.

Configure Resource Pools Using Management Console

In this release, Management Console introduces more ways to configure your resource pools. With Management Console you can now create and remove resource pools, assign resource pool users, and assign cascading pools.

Database administrators can make changes to a database's resource pools in the Resource Pools Configuration page, accessible through the database's Settings page.

See Configuring Resource Pools in Management Console.

Threshold Monitoring Enhancements in Management Console

Vertica Management Console 7.2.x introduces more detailed, configurable notifications about the health of monitored databases.

Prioritize and customize your notifications and alert thresholds on the new Thresholds tab, which appears on the Database Settings page. The new Threshold Settings widget on the Overview Page now displays your prioritized alerts.

For more information, see Monitoring Database Messages in MC and Customizing Message Thresholds.

Management Console Message Center Enhancements

In this release, Management Console introduces filtering and performance enhancements to the Message Center that allow you to:

- View up to 10,000 messages by default
- Retrieve additional alerts from the past
- Use console.properties to increase the number of messages you can view in Message Center
- Delete all your alerts at once

In addition, improvements to filtering now allow you to sort messages by severity, database name, message description, and date.

For more information about messages in Management Console, see Monitoring Database Messages in MC.

Management Console Rest API

Vertica now provides API calls to interact with Management Console.

- GET alerts
- GET alertSummary

System Table Updates

This section contains information on updates to System Tables for Vertica Analytic Database 7.2.x.

More Details

For more information see Vertica System Tables.

System Tables for Constraint Enforcement

These system tables, under the V_CATALOG schema, include the new column IS_ENABLED:

- CONSTRAINT_COLUMNS
- TABLE_CONSTRAINTS
- PRIMARY_KEYS

Under the V_CATALOG schema, the PROJECTIONS system table includes the new column IS_KEY_CONSTRAINT_PROJECTION.

RESOURCE_POOL_MOVE System Table

Vertica 7.2.x includes the following changes to the RESOURCE_POOL_MOVE system table::

- The tables includes the MOVE_CAUSE column. This column displays the reason why the query attempted to move.
- The CAP_EXCEEDED column was removed.
- The REASON column is now called RESULT_REASON.

For more information see RESOURCE_POOL_MOVE in the SQL Reference Manual.

LICENSES System Table

The system table LICENSES, under the V_CATALOG schema, includes new columns:

- LICENSETYPE
- PARENT
- CONFIGURED_ID

TABLE_RECOVERIES System Table

Vertica 7.2.x now includes the TABLE_RECOVERIES system table. You can query this table to view detailed progress on specific tables during a Recovery By Table.

TABLE_RECOVERY_STATUS System Table

Vertica 7.2.x now includes the TABLE_RECOVERY_STATUS system table. You can query this table to view the progress of a Recovery By Table.

SQL Functions and Statements

This section contains information on updates to SQL Functions and Statements for Vertica Analytic Database 7.2.x.

More Details

For more information see the SQL Reference Manual.

Analytic Functions

Vertica now includes the NTH_VALUE analytic function.

NTH_VALUE is an analytic function that returns the value evaluated at the row that is the *n*th row of the window (counting from 1).

For more information see Analytic Functions in SQL Reference Manual.

Math Functions

Vertica now includes the following mathematical functions:

- COSH—Calculates the hyperbolic cosine.
- LOG10—Calculates the base 10 logarithm.
- SINH—Calculates the hyperbolic sine.
- TANH—Calculates the hyperbolic tangent.

Options for Routing Queries

Vertica 7.2.x introduces new functionality for moving queries to different resource pools. Now, as the database administrator, you can use the MOVE_STATEMENT_TO_RESOURCE_POOL meta-function to specify that queries move to different resource pools mid-execution.

For more information see Manually Moving Queries to Different Resource Pools.

Session Resource Functions

Vertica now includes new resource management functions:

- RESERVE_SESSION_RESOURCE
- RELEASE_SESSION_RESOURCE

Automatic Enforcement of Primary and Unique Key Constraints

Vertica can now automatically enforce primary and unique key constraints. Additionally, you can enable individual constraints using CREATE TABLE or ALTER TABLE.

You also have the option of setting parameters so that new constraints you create are, by default, disabled or enabled when you create them. If you have not specifically enabled or disabled constraints using CREATE TABLE or ALTER TABLE, the parameter default settings apply.

For information on automatic enforcement of PRIMARY and UNIQUE KEY constraints, refer to Enforcing PRIMARY and UNIQUE KEY Constraints Automatically in the Administrator's Guide.

When you upgrade to Vertica7.2.x, the primary and unique key constraints in any tables you carry over are disabled. Existing constraints are not automatically enforced. To enable existing constraints and make them automatically enforceable, manually enable each constraint using the ALTER TABLE ALTER CONSTRAINT statement. This statement triggers constraint enforcement for the existing table contents. Statements roll back if one or more violations occur.

Enabling and Disabling Individual Constraints

Two new modifiers allow you to set enforcement of individual constraints: ENABLED and DISABLED.

To enable or disable individual constraints, use the CREATE TABLE or ALTER TABLE statements. These syntaxes now include ENABLED and DISABLED options for PRIMARY and UNIQUE KEYS:

- Column-Constraint (as part of the CREATE TABLE statement)
- Table-Constraint (as part of CREATE TABLE or ALTER TABLE statements)

The ALTER TABLE statement also includes an ALTER CONSTRAINT option for enabling or disabling existing constraints.

Choosing Default Enforcement for Newly Declared or Modified Constraints

Two new parameters allow you to set the default for enabling or disabling newly created constraints. You set these parameters using the ALTER DATABASE statement. Setting a constraint as enabled or disabled when you create or alter it using CREATE TABLE or ALTER TABLE overrides the parameter setting. The default value for both of these new parameters is false (disabled).

- **EnableNewPrimaryKeysByDefault** lets you enable or disable constraints for primary keys.
- **EnableNewUniqueKeysByDefault** lets you enable or disable constraints for unique keys.

For general information about configuration parameters, refer to Configuration Parameters in the Administrator's Guide. For information about these new parameters and how to set them, refer to Constraint Enforcement Parameters in the Administrator's Guide and ALTER DATABASE in the SQL Reference Manual.

Behavior Not Changed from Previous Releases

NOT NULL constraints are always automatically enforced for primary keys. When you create a primary key, Vertica implicitly creates a NOT NULL constraint on the key set. It does so regardless of whether you enable or disable the key.

You can manually validate constraints using ANALYZE_CONSTRAINTS meta-function. ANALYZE_CONSTRAINTS does not depend upon nor does it consider the automatic enforcement settings of primary or unique keys. Thus, you can run ANALYZE_CONSTRAINTS on a table or schema that includes:

- Disabled key constraints
- A mixture of enabled and disabled key constraints

Recover by Table Functions

Vertica now includes new functions to configure and perform recovery on a per-table basis:

- SET_RECOVER_BY_TABLE
- SET_TABLE_RECOVER_PRIORITY

Backup, Restore, and Recovery

This section contains information on updates to backup and restore operations for Vertica Analytic Database 7.2.x.

More Details

For more information see Backing Up and Restoring the Database.

Backup to Local Host

Vertica does not support the Linux variable, localhost. However, it does allow you to direct backups to the local host without using an IP address.

Direct a backup to a location on the localhost by including square brackets and a path in the following form:

```
[Mapping]
NodeName = []:/backup/path
```

This example shows typical localhost mapping:

```
[Mapping]
v_node0001 = []:/scratch_drive/archive/backupdir
v_node0002 = []:/scratch_drive/archive/backupdir
v_node0003 = []:/scratch_drive/archive/backupdir
```

For more information see Types of Backups.

Restoring Individual Objects from a Full or Object-Level Backup

You can now restore individual tables or schemas from any backup that contains those objects without restoring the entire backup. This option is useful if you only need to restore a few objects and want to avoid the overhead of a larger scale restore. Your database must be running and your nodes must be UP to restore individual objects.

For more information see Restoring Individual Objects from a Full or Object-Level Backup.

Lightweight Partition Copy

Vertica now includes the COPY_PARTITIONS_TO_TABLE function.

Lightweight partition copy increases performance by sharing the same storage between two tables. The storage footprint does not increase as a result of shared storage. After the copy partition is complete, the tables are independent of each other. Users can perform operations on each table without impacting the other. As the tables diverge, the storage footprint may increase as a result of operations performed on these tables.

Object Restore Mode

You can now specify how Vertica should handle restored objects:

```
Object restore mode (coexist, createOrReplace or create)
(createOrReplace):
```

Vertica supports the following object restore modes:

- createOrReplace (default) — Vertica creates any objects that do not exist. If the object does exist, vbr overwrites it with the version from the archive.
- create — Vertica creates any objects that do not exist. If an object being restored does exist, Vertica displays an error message and skips that object.
- coexist — Vertica creates all restored objects with the form `<backup>_<timestamp>_<object_name>`. This approach allows existing and restored objects to exist simultaneously.

In all modes, Vertica restores data with the current epoch. Object restore mode settings do not apply to backups and full restores.

For more information see Restoring Object-Level Backups.

Recovery by Table

Vertica now supports node recovery on a per-table basis. Unlike a node-based recovery, recovering by table makes tables available as they recover, before the node itself is completely restored. You can prioritize your most important tables so that they become available as soon as possible. Recovered tables support all DDL and DML operations.

After a node fully recovers, it enables full Vertica functionality.

Recovery by table is enabled by default.

For more information see Recovery By Table and Prioritizing Table Recovery.

Hadoop Integration

This section contains information on updates to Hadoop-integration information for Vertica Analytic Database 7.2.x.

More Details

For more information see Integrating with Hadoop.

Hadoop HDFS Connector

The HDFS Connector is now installed with Vertica; you no longer need to download and install it separately. If you have previously downloaded and installed this connector, uninstall it before you upgrade to this release of Vertica to get the newest version.

For more information see Using the HDFS Connector in Integrating with Hadoop.

Vertica Place

This section contains information on updates to Vertica Place for Vertica Analytic Database 7.2.x.

More Details

For more information see Vertica Place.

WGS84 Support

WGS84 support has been added to the following functions:

- STV_Intersect Transform Function
- STV_Intersect Scalar Function
- ST_Distance

Vertica Place Functions

The following new functions have been added to Vertica Place:

- STV_AsGeoJSON
- STV_ForceLHR
- STV_Reverse

STV_Refresh_Index Removes Polygons From Spatial Indexes

STV_Refresh_Index can now remove deleted polygons from spatial indexes. For more information, see STV_Refresh_Index.

Vertica Pulse

This section contains information on updates to Pulse for Vertica Analytic Database 7.2.x.

More Details

For more information see Vertica Pulse.

Action Patterns

Vertica Pulse now supports the use of action patterns in white_list dictionaries. An action pattern enables Pulse to recognize phrases that denote action, intention, or interest, such as *going to buy*, *waiting to see*, and so on. Action patterns can identify behaviors associated with your sentiment analysis terms.

Action patterns can:

- **Connect Word Forms to a Root Word** — Vertica Pulse lemmatizes all words. *Lemmatization* recognizes different word forms and maps them to the root word. For example, Pulse would map *bought* and *buying* to buy. This ability extends to misspellings. For example, *tryiiiing and seeeeeing taaablets* would map to *trying and seeing tablets*.
- **Create Object-Specific Queries** — To identify only the attributes that are objects of action patterns, create a whitelist dictionary that contains only action patterns of interest. In your sentiment analysis query set the actionPattern and whiteListOnly parameters to true.

Concurrent User-Defined Dictionaries

In version 7.2.x and later, users can apply dictionaries on a per-user basis. Any number of Pulse users can concurrently apply different sets of dictionaries without conflicts and without disrupting the sessions of other users. Each user can have one dictionary of each type loaded at any given time. If a user does not specify a dictionary of a given type, Pulse uses the default dictionary for that type.

For more information see Dictionary and Mapping Labels in Vertica Pulse.

Case-Sensitive Sentiment Analysis

By default, Pulse is case insensitive. ERROR produces the same results as error. You can now specify a case setting for a single word using the `$Case` parameter. For example, to identify Apple, rather than apple, you would add the following:

```
=> INSERT INTO pulse.white_list_en VALUES('$Case(Apple)');

=> COMMIT;
```

For more information see Sentiment Analysis Levels in Vertica Pulse.

Dictionary And Mapping Labels

You can apply a label to any user-defined dictionary or mapping when you load that object. Labels enable to you perform sentiment analysis against a predetermined set of dictionaries and mappings without having to specify a list of dictionaries. For example, you might have a set of dictionaries labeled "music" and a set labeled "movies." The default user dictionaries automatically have a label of "default."

A single dictionary or mapping can have multiple labels. For example, you might label a white list of artists as both "painters" and "renaissance." You could load the dictionary by loading either label. A label can only apply to one dictionary of each type. For example, you cannot have two dictionaries of stop words that share the same label. If

you apply a label to multiple dictionaries of the same type, Pulse uses the most recently applied label.

You can view the labels associated with your current dictionaries using the GetAllLoadedDictionaries() function. You can also view the label associated with your current mapping using the GetLoadedMapping() function.

For more information, see Dictionaries and Mappings in Vertica Pulse.

Pulse Functions

Vertica 7.2.x includes the following new functions:

- UnloadLabeledDictionary()
- UnloadLabeledDictionarySet()
- UnloadLabeledMapping()

SDK Updates

This section contains information on updates to the SDK for Vertica Analytic Database 7.2.x.

More Details

For more information see the Java SDK Documentation.

SDK Enhancements

Vertica 7.2.x introduces these enhancements to the Java SDK:

- A new class named `StringUtil` helps you manipulate string data. See the StringUtils Class for more information.
- The new `PartitionWriter.setStringBytes` method lets you set the value of BINARY, VARBINARY, and LONG VARBINARY columns using a `ByteBuffer` object. See the Java UDx API documentation for more details.
- The `PartitionWriter` class has a new set of methods for writing output including `setLongValue`, `setStringValue`, and `setBooleanValue`. These methods set the output column value to NULL when passed a Java `null` reference. When you pass these methods a value, they save the value in the column. These methods save you the steps of checking for null references and calling the separate methods to store

nulls or values in the columns. For more information, see the entry for `PartitionWriter` in the Java API documentation.

- The `StreamWriter` class used with a User-Defined Parser has a new method, `setRowFromMap`. You can use this method to write a map of column-name/value pairs as a single operation with automatic type coercion. The JSON Parser example demonstrates this method. For more information, see Subclassing UDParser in Java, particularly the section titled "Writing Data".
- User-Defined Analytic Functions can now be written in Java in addition to C++. See Developing a User-Defined Analytic Function in Java.
- Multi-phase transform functions can now be written in Java in addition to C++. See Creating Multi-Phase UDTFs.

For more information see the Java SDK Documentation.

UDx Wildcards

Vertica now supports wildcard * characters in the place of column names in user-defined functions.

You can use wildcards when:

- Your query contains a table in the FROM clause
- You are using a Vertica-supported development language
- Your UDx is running in fenced or unfenced mode

For more information see Using User-Defined Extensions.

User-Defined Session Parameters

This release adds support for user-defined session parameters. Vertica now supports passing session parameters to a Java or C++ UDx at construction time.

For more information, see User-Defined Session Parameters in C++ and User-Defined Session Parameters in Java.

Documentation Updates

This section contains information on updates to the product documentation for Vertica Analytic Database 7.2.x.

More Details

For complete product documentation see Vertica® 7.2.x Documentation.

Documentation Changes

The following changes are effective for Vertica 7.2.x.

Document Additions and Revisions

The following additions and revisions have been made to the Vertica 7.2.x product documentation.

- The contents of the book *Vertica for SQL on Hadoop* have been folded into Integrating with Hadoop, which now explains both co-located and separate clusters. The book has been reorganized to make information easier to find and eliminate redundancies. The ORC Reader has been made more prominent.

  For more information, see Integrating with Hadoop, and in particular Cluster Layout and Choosing Which Hadoop Interface to Use.

- A new Security and Authentication guide consolidates all client/server authentication and security topics. Authentication information was removed from the Administrator's Guide and placed in the new document.

- Creation of a standalone Management Console guide. Management Console topics have been removed from the Administrator's Guide. Management Console topics remain in Installing Vertica (Installing and Configuring Management Console) and Getting Started (Using Management Console).

- A new Hints section in the SQL Reference Manual describes all supported query hints.

- A new Best Practices for DC Table Queries section in Analyzing Data describes how to optimize query performance when querying Data Collector Tables.

- A new Integrating with Apache Kafka document describes how to integrate Apache Kafka with Vertica.
- Documentation for the Microsoft Connectivity Pack now resides in the Connecting to Vertica document. See the Microsoft Connectivity Pack for Windows.

Removed from Documentation

The following documentation elements were removed from the Vertica 7.2.x product documentation.

- Documentation on partially sorted GROUPBY has been removed. This functionality is currently not included in the product.
- The VSQL environment variables page (vsql Environment Variables) listed `VSQL_DATABASE` and `SHELL`. These environment variables are no longer in use and have been removed from the documentation.
- The previously deprecated function `MERGE_PARTITIONS` was removed from the SQL Reference Manual.

Deprecated and Retired Functionality

This section describes the two phases HPE follows to retire Vertica functionality:

- **Deprecated.** Vertica declares a feature deprecated in a major or minor release. Deprecated features remain in the product and are functional. However, users accessing the feature receive messages informing them that the feature will be removed in the following major or minor release. Features are identified as deprecated in Vertica release notes and in feature documentation; all documentation remains accessible. HPE announces feature deprecation only in major and minor releases.
- **Removed.** HPE removes a feature in the major or minor release immediately following the deprecation announcement. Users can no longer access the functionality. The feature removal is announced in Vertica release notes. All feature documentation is removed.

Deprecated Functionality in This Release

In version 7.2., the following Vertica functionality has been deprecated.

- System-level parameter `ConstraintsEnforcedExternally`, and related SQL statement `SET SESSION CONSTRAINTS_ENFORCED_EXTERNALLY`
- The backup and restore configuration parameter `overwrite` is replaced by the `objectRestoreMode` setting.
- Support for any Vertica Analytic Database running the ext3 file system
- Prejoin projections
- Buddy projections with different sort order
- The --compat21 option of the admintools command

See Also

For information about the meaning of obsolete and deprecated functionality, see Deprecated and Retired Functionality.

Retired Functionality

The following functionality has been retired or deprecated in past and present versions:

Functionality	Component	Deprecated Version	Removed Version
Version 6.0 vbr configuration mapping	Server		7.2
Backup and restore `overwrite` configuration parameter	Server	7.2	
Prejoin projections	Server	7.2	
Buddy projections with different sort order	Server	7.2	
verticaConfig vbr.py configuration option	Server	7.1	
JavaClassPathForUDx configuration parameter	Server	7.1	
ADD_LOCATION()	Server	7.1	
bwlimit	Server	7.1	
Geospatial Package SQL Functions • `BB_WITHIN` • `BEARING` • `CHORD_TO_ARC` • `DWITHIN` • `ECEF_CHORD` • `ECEF_x` • `ECEF_y` • `ECEF_z` • `ISLEFT` • `KM2MILES`	Server	7.1	7.2

Functionality	Component	Deprecated Version	Removed Version
• LAT_WITHIN • LL_WITHIN • LLD_WITHIN • LON_WITHIN • MILES2KM • RADIUS_LON • RADIUS_M • RADIUS_N • RADIUS_R • RADIUS_Ra • RADIUS_Rc • RADIUS_Rv • RADIUS_SI • RAYCROSSING • WGS84_a • WGS84_b • WGS84_e2 • WGS84_f • WGS84_if • WGS84_r1			
EXECUTION_ENGINE_PROFILES counters file handles, memory allocated, and memory reserved	Server	7.0	

Functionality	Component	Deprecated Version	Removed Version
MERGE_PARTITIONS()	Server	7.0	
Administration Tools option check_spread	Server, clients	7.0	
krb5 client authentication method	All clients	7.0	
Pload Library	Server	7.0	
USE SINGLE TARGET	Server	7.0	7.1
scope parameter of CLEAR_PROFILING	Server	6.1	
IMPLEMENT_TEMP_DESIGN()	Server, clients	6.1	
USER_TRANSFORMS user table	Server	6.0	
UPDATE privileges on sequences	Server	6.0	
Query Repository, which includes: `SYS_DBA.QUERY_REPO` table Functions: • `CLEAR_QUERY_REPOSITORY()` • `SAVE_QUERY_REPOSITORY()` Configuration parameters: • `CleanQueryRepoInterval` • `QueryRepoMemoryLimit` • `QueryRepoRetentionTime` • `QueryRepositoryEnabled` • `SaveQueryRepoInterval` • `QueryRepoSchemaName` • `QueryRepoTableName`	Server		6.0

Functionality	Component	Deprecated Version	Removed Version
See **Notes** section below table.			
RESOURCE_ACQUISITIONS_HISTORY system table	Server		6.0
Volatility and NULL behavior parameters of CREATE FUNCTION	Server	6.1	
Ganglia on Red Hat 4	Server	6.0	
copy_vertica_database.sh	Server		
restore.sh	Server		
backup.sh	Server		
LCOPY (see Note section below table)	Server, clientsw	4.1 (Client) 5.1 (Server)	5.1 (Client)
MergeOutPolicySizeList	Server	4.1	5.0
EnableStrataBasedMrgOutPolicy	Server	4.1	5.0
ReportParamSuccess	All clients	4.1	5.0
BatchAutoComplete	All clients	4.1	5.0
use35CopyParameters	ODBC, JDBC clients	4.1	5.0
getNumAcceptedRows getNumRejectedRows	ODBC, JDBC clients	5.0	
MANAGED load (server keyword and related client parameter)	Server, clients	5.0	
EpochAdvancementMode	Server	4.1	5.0
VT_ tables	Server	4.1	5.0
RefreshHistoryDuration	Server	4.1	5.0

Notes

- While the Vertica Geospatial package has been deprecated, it has been replaced by Vertica Place. This analytics package is available on my.vertica.com/downloads.
- LCOPY: Supported by the 5.1 server to maintain backwards compatibility with the 4.1 client drivers.
- Query Repository: You can still monitor query workloads with the following system tables:
  - QUERY_PROFILES
  - SESSION_PROFILES
  - EXECUTION_ENGINE_PROFILES

  In addition, Vertica Version 6.0 introduced new robust, stable workload-related system table:
- QUERY_REQUESTS
- QUERY_EVENTS
- RESOURCE_ACQUISITIONS
- The RESOURCE_ACQUISITIONS system table captures historical information.
- Use the Kerberos gss method for client authentication, instead of krb5. See Configuring Kerberos Authentication.

Send Documentation Feedback

If you have comments about this document, you can contact the documentation team by email. If an email client is configured on this system, click the link above and an email window opens with the following information in the subject line:

Feedback on New Features (Vertica Analytic Database 7.2.x)

Just add your feedback to the email and click send.

If no email client is available, copy the information above to a new message in a web mail client, and send your feedback to vertica-docfeedback@hpe.com.

We appreciate your feedback!