Vertica® Analytic Database 5.0

Troubleshooting Guide

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Contents

Technical Support

To submit problem reports, questions, comments, and suggestions, use the Technical Support page on the Vertica Web site.

Notes:

- You must be a registered user in order to access the ***MyVertica Portal http://myvertica.vertica.com/v-zone/overview***.
- If you are not a registered user, you can request access at the ***Technical Support Web page http://www.vertica.com/support***.

Before you report a problem, run the ***Diagnostics Utility*** (page 32) described in the Troubleshooting Guide and attach the resulting `.zip` file to your ticket.

About the Documentation

This section describes how to access and print Vertica documentation. It also includes ***suggested reading paths*** (page 4).

Where to Find the Vertica Documentation

You can read or download the Vertica documentation for the current release of Vertica® Analytic Database from the ***Product Documentation Page http://www.vertica.com/v-zone/product_documentation***. You must be a registered user to access this page.

The documentation is available as a compressed tarball (`.tar`) or a zip archive (`.zip`) file. When you extract the file on the database server system or locally on the client, contents are placed in a `/vertica50_doc/` directory.

Notes:

- The documentation on the Vertica Web site is updated each time a new release is issued.
- A more recent version of the product documentation might be available online. To check for critical product or document information added after the product release, see the Vertica Product Documentation downloads site. You can download the PDF version or browse books online
- If you are using an older version of the software, refer to the documentation on your database server or client systems.

See Installing Vertica Documentation in the Installation Guide.

Reading the Online Documentation

Reading the HTML documentation files

The Vertica documentation files are provided in HTML browser format for platform independence. The HTML files require only a browser that displays frames properly with JavaScript enabled. The HTML files do not require a Web (HTTP) server.

The Vertica documentation is supported on the following browsers:

- Mozilla FireFox
- Internet Explorer
- Apple Safari
- Opera
- Google Chrome (server-side installations only)

The instructions that follow assume you have installed the documentation on a client or server machine.

Mozilla Firefox

1. Open a browser window.
2. Choose one of the following methods to access the documentation:
   - Select **File** > **Open File**, navigate to `..\HTML-WEBHELP\index.htm`, and click **Open**.
   - OR drag and drop `index.htm` into a browser window.
   - OR press **CTRL+O**, navigate to `index.htm`, and click **Open**.

Internet Explorer

Use one of the following methods:

1. Open a browser window.
2. Choose one of the following methods to access the documentation:
   - Select **File** > **Open** > **Browse**, navigate to `..\HTML-WEBHELP\index.htm`, click **Open**, and click **OK**.
   - OR drag and drop `index.htm` into the browser window.
   - OR press **CTRL+O**, Browse to the file, click **Open**, and click **OK**.

Note: If a message warns you that Internet Explorer has restricted the web page from running scripts or ActiveX controls, right-click anywhere within the message and select **Allow Blocked Content**.

Apple Safari

1. Open a browser window.
2. Choose one of the following methods to access the documentation:
   - Select **File** > **Open File**, navigate to `..\HTML-WEBHELP\index.htm`, and click Open.
   - OR drag and drop `index.htm` into the browser window.
   - OR press **CTRL+O**, navigate to `index.htm`, and click **Open**.

Opera

1. Open a browser window.
2. Position your cursor in the title bar and right click > **Customize** > **Appearance**, click the **Toolbar** tab and select **Main Bar**.
3. Choose one of the following methods to access the documentation:
   - Open a browser window and click Open, navigate to `..\HTML-WEBHELP\index.htm`, and click **Open**.
   - OR drag and drop `index.htm` into the browser window.
   - OR press **CTRL+O**, navigate to `index.htm`, and click **Open**.

Google Chrome

Google does not support access to client-side installations of the documentation. You'll have to point to the documentation installed on a server system.

1 Open a browser window.
2 Choose one of the following methods to access the documentation:

   In the address bar, type the location of the `index.htm` file on the server. For example: `file://<servername>//vertica50_doc//HTML/Master/index.htm`

   - OR drag and drop `index.htm` into the browser window.
   - OR press **CTRL+O**, navigate to `index.htm`, and click **Open**.

Notes

The `.tar` or `.zip` file you download contains a complete documentation set.

The documentation page of the ***Downloads Web site http://www.vertica.com/v-zone/download_vertica*** is updated as new versions of Vertica are released. When the version you download is no longer the most recent release, refer only to the documentation included in your RPM.

The Vertica documentation contains links to Web sites of other companies or organizations that Vertica does not own or control. If you find broken links, please let us know.

Report any script, image rendering, or text formatting problems to ***Technical Support*** (on page 1).

Printing Full Books

Vertica also publishes books as Adobe Acrobat™ PDF. The books are designed to be printed on standard 8½ x 11 paper using full duplex (two-sided) printing.

Note: Vertica manuals are topic driven and not meant to be read in a linear fashion. Therefore, the PDFs do not resemble the format of typical books.

Open and print the PDF documents using Acrobat Acrobat Reader. You can download the latest version of the free Reader from the ***Adobe Web site*** (***http://www.adobe.com/products/acrobat/readstep2.html***).

The following list provides links to the PDFs.

- Concepts Guide
- Installation Guide
- Getting Started Guide
- Administrator's Guide
- Programmer's Guide
- SQL Reference Manual
- Troubleshooting Guide

Suggested Reading Paths

This section provides a suggested reading path for various users. Vertica recommends that you read the manuals listed under All Users first.

All Users

- New Features — Release-specific information, including new features and behavior changes to the product and documentation
- Concepts Guide — Basic concepts critical to understanding Vertica
- Getting Started Guide — A tutorial that takes you through the process of configuring a Vertica database and running example queries
- Troubleshooting Guide — General troubleshooting information

System Administrators

- New Features — Release-specific information, including new features and behavior changes to the product and documentation
- Installation Guide — Platform configuration and software installation

Database Administrators

- Installation Guide — Platform configuration and software installation
- Administrator's Guide — Database configuration, loading, security, and maintenance

Application Developers

- Programmer's Guide — Connecting to a database, queries, transactions, and so on
- SQL Reference Manual — SQL and Vertica-specific language information

Where to Find Additional Information

Visit the ***Vertica Web site*** (***http://www.vertica.com***) to keep up to date with:

- Downloads
- Frequently Asked Questions (FAQs)
- Discussion forums
- News, tips, and techniques
- Training

Typographical Conventions

The following are the typographical and syntax conventions used in the Vertica documentation.

Typographical Convention	Description
Bold	Indicates areas of emphasis, such as a special menu command.
Button	Indicates the word is a button on the window or screen.
`Code`	SQL and program code displays in a monospaced (fixed-width) font.
`Database objects`	Names of database objects, such as tables, are shown in san-serif type.
Emphasis	Indicates emphasis and the titles of other documents or system files.
`monospace`	Indicates literal interactive or programmatic input/output.
`monospace italics`	Indicates user-supplied information in interactive or programmatic input/output.
`UPPERCASE`	Indicates the name of a SQL command or keyword. SQL keywords are case insensitive; `SELECT` is the same as `Select`, which is the same as `select`.
`User input`	Text entered by the user is shown in bold san serif type.
↵	indicates the Return/Enter key; implicit on all user input that includes text
Right-angle bracket >	Indicates a flow of events, usually from a drop-down menu.
Click	Indicates that the reader clicks options, such as menu command buttons, radio buttons, and mouse selections; for example, "Click OK to proceed."
Press	Indicates that the reader perform some action on the keyboard; for example, "Press Enter."

Syntax Convention	Description
`Text without brackets/braces`	Indicates content you type as shown.
`< Text inside angle brackets >`	Placeholder for which you must supply a value. The variable is usually shown in italics. See Placeholders below.
`[ Text inside brackets ]`	Indicates optional items; for example, CREATE TABLE [*schema_name.*]*table_name* The brackets indicate that the *schema_name* is optional. Do not type the square brackets.
`{ Text inside braces }`	Indicates a set of options from which you choose one; for example: `QUOTES { ON | OFF }` indicates that exactly one of ON or OFF must

	be provided.You do not type the braces: `QUOTES ON`
Backslash \	Continuation character used to indicate text that is too long to fit on a single line.
Ellipses . . .	Indicate a repetition of the previous parameter. For example, `option[,...]` means that you can enter multiple, comma-separated options. Note: Showing an ellipses in code examples might also mean that part of the text has been omitted for readability, such as in multi-row result sets.
`Indentation`	Is an attempt to maximize readability; SQL is a free-form language.
`Placeholders`	Items that must be replaced with appropriate identifiers or expressions are shown in italics.
Vertical bar |	Is a separator for mutually exclusive items. For example: `[ASC | DESC]` Choose one or neither. You do not type the square brackets.

Preface

This guide describes how to solve problems that you might encounter with Vertica database setup and maintenance.

Prerequisites

This document assumes that you have become familiar with the concepts discussed in the Concepts Guide.

> **Note:** Vertica recommends that you follow the tutorial in the Getting Started Guide to practice setting up an example database before you configure a production database.

Audience

This document is intended for anyone with responsibility for configuring, loading, securing, and maintaining a Vertica database.

Troubleshooting Overview

Most Vertica problems are the result of Linux or network configuration errors. Begin by making sure that you have completed the steps listed in Before You Install.

Note: It is essential to Configure Hostname Resolution as described in the Installation Guide. Invalid hostname resolution is a common source of problems. Your Vertica database does not work unless the hostname resolution is correct.

Profiling Database Performance

To determine how the database is performing, you can profile the areas listed in the following table:

Profile Operator	Description
`Session`	Provides basic session parameters and lock time out data
`Query`	Provides general information about queries that ran, such as the query strings used and the duration of queries
`EE`	Provides detailed information about the execution run of each query

Enabling and Disabling Profiling

Vertica can collect profiling data for a single statement, a single session, or for all sessions on all nodes. Real-time profiling is always "on", without profiling being explicitly enabled.

This section describes how to enable and disable profiling for the current session and for all sessions.

Tip: To quickly determine if profiling is enabled, use the following command:

```
=> SELECT SHOW_PROFILING_CONFIG();

            SHOW_PROFILING_CONFIG
----------------------------------------
 Session Profiling: Local off, Global off
 EE Profiling:      Local on, Global on
 Query Profiling:   Local off, Global off
(1 row)
```

Enabling Profiling for the Current Session

To enable profiling for the current session, issue the following command:

```
=> SELECT ENABLE_PROFILING('type_of_profiling')
```

Where *type_of_profiling* is one of the following:

- `session` — Establishes profiling for sessions.
- `query` — Establishes profiling for queries.
- `ee` — Establishes profiling for query execution runs.

Examples

```
=> SELECT ENABLE_PROFILING('ee');
   ENABLE_PROFILING
----------------------
 EE Profiling Enabled
(1 row)
```

Disabling Profiling for the Current Session

To disable profiling for the current session, issue the following command:

```
=> SELECT DISABLE_PROFILING('type_of_profiling')
```

Where *type_of_profiling* is one of the following:

- `session` — Establishes profiling for sessions.
- `query` — Establishes profiling for queries.
- `ee` — Establishes profiling for query execution runs.

Examples

```
=> SELECT DISABLE_PROFILING('ee');
  DISABLE_PROFILING
----------------------
 EE Profiling Disabled
(1 row)
```

Enabling Profiling for All Sessions

To enable profiling for all sessions on all nodes, enter the following command:

```
=> SELECT SET_CONFIG_PARAMETER('global_profiling_type', 1)
```

Where *global_profiling_type* is one of the following

- `GlobalSessionProfiling` — Establishes profiling for sessions.
- `GlobalQueryProfiling` — Establishes profiling for queries.
- `GlobalEEProfiling` — Establishes profiling for query execution runs.

Example

The following command enables query profiling for all sessions and nodes:

```
=> SELECT SET_CONFIG_PARAMETER('GlobalQueryProfiling',1);
```

Disabling Profiling for All Sessions

To enable profiling for all sessions on all nodes, enter the following command:

```
=> SELECT SET_CONFIG_PARAMETER('global_profiling_type', 0)
```

Where *global_profiling_type* is one of the following:

- `GlobalSessionProfiling` — Establishes profiling for sessions.

- `GlobalQueryProfiling` — Establishes profiling for queries.
- `GlobalEEProfiling` — Establishes profiling for query execution runs.

Example

The following command disables query query profiling for all sessions and nodes:

```
=> SELECT SET_CONFIG_PARAMETER('GlobalQueryProfiling' ,0);
```

Profiling a Single Statement

To profile a single statement add the PROFILE keyword to the beginning of the statement:

```
=> PROFILE SELECT customer_name, annual_income
   FROM public.customer_dimension
   WHERE (customer_gender, annual_income) IN (
     SELECT customer_gender, MAX(annual_income)
     FROM public.customer_dimension
     GROUP BY customer_gender);
```

PROFILE < SELECT ...> saves profiling information for future analysis.

A hint is written to `stderr` (the standard error stream and default destination for error messages and other diagnostic warnings, which are typically output to the screen) while the statement is executing:

```
NOTICE:  Statement is being profiled.
HINT:  select * from v_monitor.execution_engine_profiles where
transaction_id=45035996273740886 and statement_id=10;
NOTICE:  Initiator memory estimate for query:
[on pool general: 1418047 KB, minimum: 192290 KB]
NOTICE:  Total memory required by query: [1418047 KB]
   customer_name    | annual_income
--------------------+---------------
 Meghan U. Miller   |        999960
 Michael T. Jackson |        999981
(2 rows)
```

Tip: Use the statement returned by the hint as a starting point for reviewing the query's profiling data.

To see what counters are available, issue the following command:

```
=> SELECT DISTINCT(counter_name) FROM EXECUTION_ENGINE_PROFILES;
```

Real-time Profiling

The real-time profiling data provides a means for monitoring long-running statements.

Real-time profiling counters are available for all currently-executing statements—including internal operations such as mergeout, recovery, and refresh—but only while the statements are executing. Unless profiling has explicitly been enabled using the keyword PROFILE or `enable_profiling()` (page 11), the profiling counters are not present after the statement completes.

The EXECUTION_ENGINE_PROFILES system table lets you view profiling counters, and the following list shows some of the most useful counters:

- execution time (µs)
- rows produced
- total merge phases
- completed merge phases
- current size of temp files (bytes)

For more information about counters, see EXECUTION_ENGINE_PROFILES in the SQL Reference Manual.

Tip: In order to view real-time profiling data, you need, at a minimum, the transaction_id for the transaction of interest. If multiple statements have been executed within the transaction, then you also need the statement_id. The transaction IDs for internal operations can be found in the `vertica.log` files.

Example

To monitor a refresh operation that was initiated on node0001, find the "select start_refresh()" entry in the `vertica.log` file on node0001, which will be similar to the following log fragment:

```
2010-04-21 13:34:56.494 Refresh:0xb9ab5e0 [Refresh] <INFO> Refreshing projection public.fact_p from
buddy
2010-04-21 13:34:56.494 Refresh:0xb9ab5e0 [Refresh] <INFO> Refreshing projection public.fact_p from
buddy, historical epochs 0-12, oid 45035996273713164
2010-04-21 13:34:56.497 nameless:0xb972330 [Txn] <INFO> Begin Txn: a0000000000227 'Refresh through
recovery'
2010-04-21 13:34:56.497 nameless:0xb972330 [Command] <INFO> Performing refresh through recovery on
projection fact_p (45035996273713164) 0-12
2010-04-21 13:34:56.497 nameless:0xb972330 <LOG> @v_db_node0001: 00000: Recover alterSpec
45035996273713164 0-12
2010-04-21 13:34:56.500 nameless:0xb972330 [Command] <INFO> (a0000000000227) Executing the recovery
plan
```

The transaction ID for this recovery operation is a0000000000227.

To monitor the profiling counters, you can run a command like the following:

```
=> SELECT * FROM execution_engine_profiles
   WHERE TO_HEX(transaction_id)='a000000000027'
   AND counter_name = 'execution time (us)'
   ORDER BY node_name, counter_value DESC;
```

In this example, find the operators with the largest execution time on each node:

```
=> SELECT node_name, operator_name, counter_value execution_time_us
   FROM v_monitor.execution_engine_profiles
   WHERE counter_name='execution time (us)'
   ORDER BY node_name, counter_value DESC;
```

You can use the Linux watch command to monitor long-running queries with one-second updates:

```
WATCH -n 1 -d "vsql -c \"select node_name, operator_name, counter_value execution_time_us ... \""
```

See Also

EXECUTION_ENGINE_PROFILES in the SQL Reference Manual

Viewing Profiling Data

Vertica provides the profiling information it collects in the form of system tables that you can query using full SELECT support.

System (Virtual) Tables

The system tables for profiling are described in the SQL Reference Manual. They are as follows:

Virtual Table	Description
EXECUTION_ENGINE_PROFILES	Provides profiling information for query execution runs.
QUERY_PROFILES	Provides profiling information for queries.
SESSION_PROFILES	Provides profiling information for sessions.

Notes

The `EXECUTION_ENGINE_PROFILES` table contains the data for each profiling counter as a row within the table. For example the `execution time (us)` counter is in one row, and the `rows produced` counter is in a second row. Since there are many different profiling counters, many rows of profiling data exist for each operator. Some sample views are installed by default to simplify the viewing of profiling counters.

The following script creates the `v_demo` schema and places the views in that schema.

```
/opt/vertica/scripts/demo_eeprof_view.sql
```

There is one view for each of the profiling counters to simplify viewing of a single counter value. For example, to view the execution time for all operators, issue the following command:

```
=> SELECT * FROM v_demo.eeprof_execution_time_us;
```

To view all counter values available for all profiled queries:

```
=> SELECT * FROM v_demo.eeprof_counters;
```

To select all distinct operators available for all profiled queries:

```
=> SELECT * FROM v_demo.eeprof_operators;
```

These views can easily be combined:

```
=> SELECT * FROM v_demo.eeprof_execution_time_us
   NATURAL LEFT OUTER JOIN v_demo.eeprof_rows_produced;
```

To view the execution time and rows produced for a specific transaction and `statement_id` ranked by execution time on each node:

```
=> SELECT * FROM v_demo.eeprof_execution_time_us_rank
   WHERE transaction_id=45035996273709699
   AND statement_id=1 order by transaction_id, statement_id, node_name, rk;
```

To view the top five operators by execution time on each node:

```
=> SELECT * FROM v_demo.eeprof_execution_time_us_rank
   WHERE transaction_id=45035996273709699
   AND statement_id=1 AND rk<=5
```

```
   ORDER BY transaction_id, statement_id, node_name, rk;
```

If you see large amounts of time spent in GroupByHash operators, you might want to revisit the projection designs so that GroupByPipeline can be used. Use the Database Designer for these optimizations. (See Designing a Physical Schema and Creating Custom Designs in the Administrator's Guide.)

Profiling data can also show data skews if some nodes are processing more data than others. The `rows produced` counter in the EXECUTION_ENGINE_PROFILES table shows how many rows have been processed by each of the operators. Comparing the `rows produced` across all nodes for a given operator would reveal if there is a data skew issue.

Note: Some of the profiling operators shown in EXECUTION_ENGINE_PROFILES are generic, such as Join. The EXPLAIN plan includes more details about the specific join that is executing.

Viewing Real-time Profiling Data

You can query real-time profiling data while a long-running query or other operation is executing. The demo view `v_demo.eeprof_execution_time_us_rank` is helpful for viewing the current top five operators by execution time prior to the query completing:

```
=> SELECT * FROM v_demo.eeprof_execution_time_us_rank
   WHERE transaction_id=45035996273709699 AND statement_id=1 AND rk<=5
   ORDER BY transaction_id, statement_id, node_name, rk;
```

The Linux `watch` command is useful for long-running queries or long-running internal operations by observing which part of the query plan is currently active:

```
=> watch -d -n 2 "vsql -c \"
=> SELECT * FROM v_demo.eeprof_execution_time_us_rank
   WHERE transaction_id=45035996273709699 AND statement_id=1 AND rk<=5
   ORDER BY transaction_id, statement_id, node_name, rk;\" "
```

This `watch` command executes the query every two seconds and highlights the differences between successive updates.

Tip: Using `watch` is a convenient way to monitor the currently-executing operators within the plan on each nodes in the Vertica cluster. `watch` is also a convenient way to monitor workloads that might be unbalanced between nodes; for example, if some nodes have become idle while other nodes are still active. Such imbalances could be caused by data skews or by hardware issues.

Clearing Profiling Data

Profiling data is stored in memory. Therefore, profiling can be memory intensive depending on how much data you collect.

To clear profiling data, enter the following SQL function:

```
=> SELECT CLEAR_PROFILING('type_of_ profiling','scope')
```

Where:

- `type_of_profiling` is one of the following:
  `session` — Establishes profiling for sessions.
  `query` — Establishes profiling for queries.
  `ee` — Establishes profiling for query execution runs.
- `scope` is either GLOBAL (all sessions on all nodes) or LOCAL (the current session only).

Examples

The following example clears profiling for all execution runs in the current session:

```
=> SELECT CLEAR_PROFILING('ee','local');
```

The following example clears query profiling for all sessions on all nodes:

```
=> SELECT CLEAR_PROFILING('query','global');
```

The following example clears session profiling for all sessions on all nodes:

```
=> SELECT CLEAR_PROFILING('session','global');
```

See Also

Collecting Query Information (page 23)

Correlating EXPLAIN Plan Output with Error Messages

EXPLAIN plans are correlated with join error messages and EE profiling counters. These mechanisms enhance your database's usability by letting you quickly troubleshoot issues, such as providing insight into what part of your plan failed.

Each operation in a plan contains a numeric ID; for example, `(PATH ID: 1)`.

The following sample command returns the EXPLAIN plan's textual output with a PATH ID for each operation:

```
=> EXPLAIN SELECT * FROM fact JOIN dim ON x=y JOIN ext on y=x;

 Access Path:
 +-JOIN HASH [Cost: 41K, Rows: 10K (NO STATISTICS)] (PATH ID: 1)
 | Join Filter: (dim.y = fact.x)
 | Materialize at Input: fact.x
 | +-- Outer -> JOIN MERGEJOIN(inputs presorted) [Cost: 1K, Rows: 10K (NO
STATISTICS)] (PATH ID: 2)
 | | Join Cond: (fact.x = dim.y)
 | | +-- Outer -> STORAGE ACCESS for fact [Cost: 604, Rows: 10K (NO STATISTICS)]
(PATH ID: 3)
 | | | Projection: public.fact_super
 | | | Materialize: fact.x
 | | +-- Inner -> STORAGE ACCESS for dim [Cost: 604, Rows: 10K (NO STATISTICS)]
(PATH ID: 4)
 | | | Projection: public.dim_super
 | | | Materialize: dim.y
 | +-- Inner -> STORAGE ACCESS for ext [Cost: 604, Rows: 10K (NO STATISTICS)] (PATH
ID: 6)
 | | Projection: public.ext_super
```

```
 | | Materialize: ext.z
```

Any error messages that refer to joins also include the PATH ID number:

```
ERROR: Join inner did not fit in memory ((B x A)
using B_sp and A_sp (PATH ID: 1))
```

The PATH ID is also available via the EXEUTION_ENGINE_PROFILES profiling counters, letting you correlate EE operations with the corresponding portion of the EXPLAIN plan's tectual output.

For example, the following series of sample commands occur in three parts:

1. Run an EXPLAIN command
2. Run a PROFILE command
3. Query the EXECUTION_ENGINE_PROFILES system table to show the counters with path_id

The following command outputs the query plan description:

Part 1: run EXPLAIN

```
=> EXPLAIN SELECT * FROM fact JOIN dim ON x=y JOIN ext on y=z;
 Access Path:
 +-JOIN MERGEJOIN(inputs presorted) [Cost: 815, Rows: 10K (NO STATISTICS)] (PATH
ID: 1)
 | Join Cond: (dim.y = ext.z)
 | Materialize at Output: fact.x
 | Execute on: All Nodes
 | +-- Outer -> JOIN MERGEJOIN(inputs presorted) [Cost: 408, Rows: 10K (NO
STATISTICS)] (PATH ID: 2)
 | | Join Cond: (fact.x = dim.y)
 | | Execute on: All Nodes
 | | +-- Outer -> STORAGE ACCESS for fact [Cost: 202, Rows: 10K (NO STATISTICS)]
(PATH ID: 3)
 | | | Projection: public.fact_super
 | | | Materialize: fact.x
 | | | Execute on: All Nodes
 | | +-- Inner -> STORAGE ACCESS for dim [Cost: 202, Rows: 10K (NO STATISTICS)]
(PATH ID: 4)
 | | | Projection: public.dim_super
 | | | Materialize: dim.y
 | | | Execute on: All Nodes
 | +-- Inner -> STORAGE ACCESS for ext [Cost: 202, Rows: 10K (NO STATISTICS)] (PATH
ID: 5)
 | | Projection: public.ext_super
 | | Materialize: ext.z
 | | Execute on: All Nodes
```

Part 2: run PROFILE

Now profile the query:

```
=> PROFILE select * from fact JOIN dim ON x=y JOIN ext on y=z;
```

Part 3: query the system table

Run the EXECUTION_ENGINE_PROFILES system table to show the counters with path_id:

```
=> SELECT node_name, operator_name, counter_name, path_id
   FROM execution_engine_profiles
   WHERE operator_name LIKE 'Join%' AND counter_name LIKE '%rows%';
 node_name | operator_name    | counter_name            | path_id
-----------+------------------+-------------------------+---------
 e0        | JoinManyFewMerge | rows produced           | 1
 e0        | JoinManyFewMerge | rle rows produced       | 1
 e0        | JoinManyFewMerge | estimated rows produced | 1
 e0        | JoinManyFewMerge | rows produced           | 2
 e0        | JoinManyFewMerge | rle rows produced       | 2
 e0        | JoinManyFewMerge | estimated rows produced | 2
 e1        | JoinManyFewMerge | rows produced           | 1
 e1        | JoinManyFewMerge | rle rows produced       | 1
 e1        | JoinManyFewMerge | estimated rows produced | 1
 e1        | JoinManyFewMerge | rows produced           | 2
 e1        | JoinManyFewMerge | rle rows produced       | 2
 e1        | JoinManyFewMerge | estimated rows produced | 2
 initiator | JoinManyFewMerge | rows produced           | 1
 initiator | JoinManyFewMerge | rle rows produced       | 1
 initiator | JoinManyFewMerge | estimated rows produced | 1
 initiator | JoinManyFewMerge | rows produced           | 2
 initiator | JoinManyFewMerge | rle rows produced       | 2
 initiator | JoinManyFewMerge | estimated rows produced | 2
(18 rows)
```

See Also

EXPLAIN, PROFILE, and EXECUTION_ENGINE_PROFILES in the SQL Reference Manual

Retaining Monitoring Information

Vertica system tables provide information about currently running queries, the state of various components, and other run-time information. When you run a query against one of these tables, Vertica examines the current state of the system and makes the data is available to the query.

The Data Collector extends system table functionality by providing a general framework for recording events and making the information available in monitoring tables with few configuration parameter tweaks and negligible performance impact. You can query the past state of system tables and extract aggregate information. Data Collector collects and retains history of important system activities and records essential performance and resource utilization counters. You can use the information the data collector retains to do the following:

- see what actions users have taken
- locate performance bottlenecks
- identify potential improvements to Vertica configuration

Note: Data Collector works in conjunction with the Workload Analyzer, an advisor tool that intelligently monitors the performance of SQL queries and workloads and recommends tuning actions based on observations of the actual workload history.

Notes

- Data Collector is on by default, but database administrators can disable it, under ***Technical Support*** (on page 1) guidance, if they notice performance issues. See ***Enabling and Disabling Data Collector*** (page 20).
- Retention policies are configurable. See ***Configuring Data Retention Policies*** (page 21).

See Also

- V_MONITOR.DATA_COLLECTOR in the SQL Reference Manual
- ANALYZE_WORKLOAD( ) and V.MONITOR_TUNING_RECOMMENDATIONS in the SQL Reference Manual
- Analyzing Workloads in the Administrator's Guide

Enabling and Disabling Data Collector

Data Collector is on by default and retains information for all sessions. If the database administrator notices performance issues related to Data Collector, he or she can disable it.

Note: Vertica strongly recommends that you change this setting only under the guidance of ***Technical Support*** (on page 1).

To disable the Data Collector:

```
=> SELECT SET_CONFIG_PARAMETER('EnableDataCollector', '0');
```

To enable the Data Collector:

```
=> SELECT SET_CONFIG_PARAMETER('EnableDataCollector', '1');
```

Viewing Current Data Retention Policy

To view the current retention policy for a component, use the GET_DATA_COLLECTOR_POLICY() function, replacing the *component* variable with the component name:

```
GET_DATA_COLLECTOR_POLICY( 'component' );
```

The following command returns the retention policy for component `NodeState`:

```
=> SELECT get_data_collector_policy('NodeState');
        get_data_collector_policy
-----------------------------------------
 10KB kept in memory, 100KB kept on disk.
(1 row)
```

Note: The most convenient method for viewing the list of all Data Collector components, their current retention policies, and statistics about how much data is retained is by querying the V_MONITOR.DATA_COLLECTOR system table. See the SQL Reference Manual for details.

See Also

GET_DATA_COLLECTOR_POLICY in the SQL Reference Manual

Configuring Data Retention Policies

Only the superuser can configure the Data Collector, which consists of specifying:

- which component to monitor
- how much memory to retain
- how much disk space to retain

To change the amount of data the Data Collector retains, use the SET_DATA_COLLECTOR_POLICY() function:

```
SET_DATA_COLLECTOR_POLICY('component', 'memoryKB', 'diskKB' )
```

The following example specifies that the `NodeState` component be allocated 50KB of memory and 250KB of disk space:

```
=> SELECT SET_DATA_COLLECTOR_POLICY('NodeState', '50', '250');
 SET_DATA_COLLECTOR_POLICY
---------------------------
 SET
(1 row)
```

To verify the setting you just made, call the GET_DATA_COLLECTOR_POLICY() function on the specified component:

```
=> SELECT GET_DATA_COLLECTOR_POLICY('NodeState');
        GET_DATA_COLLECTOR_POLICY
-----------------------------------------
 50KB kept in memory, 250KB kept on disk.
```

```
(1 row)
```

See Also

SET_DATA_COLLECTOR_POLICY in the SQL Reference Manual

Monitoring Data Collection Components

A list of the data collector components and some statistics can be viewed by querying the V_MONITOR.DATA_COLLECTOR system table. For example, this table shows the data collector components, their current retention policies, and statistics about how much data is retained and how much has been discarded for various reasons. This table also calculates the approximate collection rate, to aid in sizing calculations.

Note: Querying the DATA_COLLECTOR table is the most convenient way to get a list of all supported and enabled collection components.

See V_MONITOR.DATA_COLLECTOR in the SQL Reference Manual for details.

```
=> \x
Expanded display is on.
=> SELECT * FROM data_collector;

-[ RECORD 1 ]----------+-----------------------------------------
node_name              | v_vmartdb_node0001
component              | AllocationPoolStatistics
table_name             | dc_allocation_pool_statistics
description            | Information about global memory pools, ...
in_db_log              | f
in_vertica_log         | f
memory_buffer_size_kb  | 64
disk_size_kb           | 256
record_too_big_errors  | 0
lost_buffers           | 0
lost_records           | 0
retired_files          | 120
retired_records        | 53196
current_memory_records | 0
current_disk_records   | 1454
current_memory_bytes   | 0
current_disk_bytes     | 214468
first_time             | 2011-05-26 12:25:52.001109-04
last_time              | 2011-05-26 12:31:55.002762-04
kb_per_day             | 49640.4151810525
-[ RECORD 1 ]----------+-----------------------------------------
...
```

Collecting Query Information

The Vertica query repository collects information about the SQL queries that Vertica processes. You can provide this information to the Database Designer to maximize the performance of the projections it creates. You can also use the information for performance and security analysis.

The query repository analyzes queries from client sessions, as well as internal Vertica queries, such as Tuple Mover and recovery tasks to collect data. The query repository also collects data captured through query profiling. (See ***Profiling Database Performance*** (page 11)).

The data that the query repository collects is moved into a repository table in persistent storage. This differs from query profiling data, which is stored in memory only and is accessible through system tables.

Enabling and Disabling Query Repository

The Database Administrator can enable and disable the query repository. When enabled, the query repository collects data for all sessions. It also automatically enables query profiling on a global level if it is not already enabled. This allows query profiling to collect data that the query repository requires for all sessions.

To enable the query repository to collect data, use the following SQL command:

```
=> SELECT SET_CONFIG_PARAMETER('QueryRepositoryEnabled', '1');
```

All the data that query repository collects is stored in the QUERY_REPO table within the SYS_DBA schema.

To disable the query repository from collecting data, use the following SQL command:

```
=> SELECT SET_CONFIG_PARAMETER('QueryRepositoryEnabled', '0');
```

Note: Disabling the query repository does not disable query profiling. If you are concerned about the amount of memory used by query profiling, either disable it globally or occasionally clear the query profiling data. See ***Profiling Database Performance*** (page 11).

See Also

Configuration Parameters in the Administrator's Guide

Database Management Functions and QUERY_PROFILES in the SQL Reference Manual

Monitoring the QUERY_REPO Table

The data that the query repository collects is moved into a repository table in persistent storage within the `SYS_DBA` schema. This differs from query profiling data, which is stored in memory only and is accessible through system tables. See `QUERY_PROFILES` in the SQL Reference Manual.

The entire collection of data in the `QUERY_REPO` table consists of the following attributes:

Column Name	Data Type	Description
START_TIME	TIMESTAMP(8) NOT NULL	The time the query was started.
EPOCH_ID	INTEGER	The epoch in which the query ran.
NODE_NAME	VARCHAR(128)	The name of the node that is reporting the requested information.
USER_NAME	VARCHAR(128)	The name of the user who initiated the query.
SESSION_ID	VARCHAR(80)	The identification of the session for which query data is captured. This identifier is unique within the cluster at any point in time but can be reused when the session closes.
QUERY_IDENTIFIER	VARCHAR(65000)	A string to identify the query in system (virtual) tables. Appears in output for DML statements only. For SELECT column is null.
QUERY	VARCHAR(65000)	The query string used for the query.
SEARCH_PATH	VARCHAR(4000)	The contents of the search path.
DURATION	INTEGER(8)	The duration of the query in microseconds.
SCHEMA_NAME	VARCHAR(4000)	The schema name that data is loaded into. Appears in output for DML statements only. For SELECT column is null.
TABLE_NAME	VARCHAR(4000)	The table name that data is loaded into. Appears in output for DML statements only. For SELECT column is null.
PROJECTIONS	VARCHAR(4000)	The qualified projection names.
EXTRA_MEMORY	INTEGER(8)	Extra memory is the amount of memory allocated to the query by the Resource Manager but not assigned to a particular operator. This is the memory from which unbounded operators pull first. If they acquire all of the extra memory, then the plan must go back to the Resource Manager for more memory.
TYPE	INTEGER(8)	Identifies the type of query: ▪ 0 UNKNOWN ▪ 1 SELECT ▪ 2 UPDATE ▪ 3 INSERT ▪ 4 DELETE ▪ 5 UTILITY (commands such as CREATE, COPY, and so on) ▪ 6 NOTHING (a dummy command) ▪ 7 SELECT_CATALOG (a SELECT statement from the catalog view)

ERROR_CODE	INTEGER(8)	The error code reported by Vertica.
NUM_ROWS	INTEGER(8)	The number of rows processed for the query as part of a SELECT, UPDATE, OR INSERT. (INSERT is always 1.)

Notes

- The QUERY_REPO table is created when you ***enable the query repository*** (page 23).

  It could take a few minutes for the table to appear unless you manually force a save; for example:

```
=> SELECT SAVE_QUERY_REPOSITORY();
 SAVE_QUERY_REPOSITORY
-----------------------
 Query Repository Saved
(1 row)
```

- If the query repository has been saved to a table (SYS_DBA.QUERY_REPO by default) in Vertica 4.0 or prior, the table does not contain the following columns:
  - QUERY_IDENTIFIER
  - EXTRA_MEMORY
  - SCHEMA NAME
  - TABLE NAME

  To save these new columns, you must drop the table and recreate it to get the latest table definition.

  If the query repository has never been saved, or this is a new cluster, the above four columns are available in QUERY_REPO and no further action is required.
- In Vertica 3.5, the QUERY_REPO table definition changed to reflect a new maximum object length of 128 characters; thus, several of the VARCHAR columns increased in size. If you used the QUERY_REPO table before Vertica 3.5, you must drop and then recreate the table to get the latest table definition.
- Users are restricted to viewing information about their own queries, which they access using the SYS_DBA.QUERY_REPO view. See Implementing Views in the Administrator's Guide.

Example

Enable the query repository:

```
=> SELECT SET_CONFIG_PARAMETER('QueryRepositoryEnabled', '1');
```

Force a quick save on the query repository:

```
=> SELECT SAVE_QUERY_REPOSITORY();
```

Now query the QUERY_REPO table:

```
=> SELECT * FROM SYS_DBA.QUERY_REPO;
```

The following results are a fragment. Note that Record 37, which is for a COPY statement, shows all column output (no nulls).

```
-[ RECORD 29 ]---+-------------------------------------------------------------------------------
```

```
START_TIME       | 2010-10-14 12:20:02.614976
EPOCH_ID         | 434
NODE_NAME        | v_vmartdb_node01
USER_NAME        | dbadmin
SESSION_ID       | raster-s1-17172:0x10
QUERY_IDENTIFIER |
QUERY            | SELECT SET_CONFIG_PARAMETER('QueryRepositoryEnabled', '1');
SEARCH_PATH      | "$user", public, v_catalog, v_monitor, v_internal
DURATION         | 2668
SCHEMA_NAME      |
TABLE_NAME       |
PROJECTIONS      |
EXTRA_MEMORY     | 0
TYPE             | 1
ERROR_CODE       | 0
NUM_ROWS         | 0
-[ RECORD 30 ]---+-------------------------------------------------------------------------------
...
-[ RECORD 32 ]---+-------------------------------------------------------------------------------
START_TIME       | 2010-10-14 12:25:02.012997
EPOCH_ID         | 434
NODE_NAME        | v_vmartdb_node01
USER_NAME        | dbadmin
SESSION_ID       | raster-s1-17172:0xa53
QUERY_IDENTIFIER |
QUERY            | CREATE SCHEMA sys_dba;
SEARCH_PATH      | "$user", public, v_catalog, v_monitor, v_internal
DURATION         | 6822
SCHEMA_NAME      |
TABLE_NAME       |
PROJECTIONS      |
EXTRA_MEMORY     | 0
TYPE             | 5
ERROR_CODE       | 0
NUM_ROWS         | 0
-[ RECORD 33 ]---+-------------------------------------------------------------------------------
START_TIME       | 2010-10-14 12:25:02.030016
EPOCH_ID         | 434
NODE_NAME        | v_vmartdb_node01
USER_NAME        | dbadmin
SESSION_ID       | raster-s1-17172:0xa54
QUERY_IDENTIFIER |
QUERY            | GRANT USAGE ON SCHEMA sys_dba TO PUBLIC ;
SEARCH_PATH      | "$user", public, v_catalog, v_monitor, v_internal
DURATION         | 5906
SCHEMA_NAME      |
TABLE_NAME       |
PROJECTIONS      |
EXTRA_MEMORY     | 0
TYPE             | 5
ERROR_CODE       | 0
NUM_ROWS         | 0
-[ RECORD 34 ]---+-------------------------------------------------------------------------------
START_TIME       | 2010-10-14 12:25:02.042181
EPOCH_ID         | 434
NODE_NAME        | v_vmartdb_node01
USER_NAME        | dbadmin
SESSION_ID       | raster-s1-17172:0xa55
QUERY_IDENTIFIER |
QUERY            | CREATE TABLE sys_dba.query_repo (START_TIME TIMESTAMP NOT NULL,EPOCH_ID INT,
                   NODE_NAME VARCHAR(128),USER_NAME VARCHAR(128),SESSION_ID
VARCHAR,QUERY_IDENTIFIER
                   VARCHAR(65000),QUERY VARCHAR(65000),SEARCH_PATH VARCHAR(4000),DURATION INT,
                   SCHEMA_NAME VARCHAR(4000),TABLE_NAME VARCHAR(4000),PROJECTIONS VARCHAR(4000),
                   EXTRA_MEMORY INT,TYPE INT,ERROR_CODE INT,NUM_ROWS INT ) PARTITION BY cast
                   (START_TIME as date);
SEARCH_PATH      | "$user", public, v_catalog, v_monitor, v_internal
DURATION         | 52789
```

```
SCHEMA_NAME      |
TABLE_NAME       |
PROJECTIONS      |
EXTRA_MEMORY     | 0
TYPE             | 5
ERROR_CODE       | 0
NUM_ROWS         | 0
-[ RECORD 35 ]---+-------------------------------------------------------------------------------
START_TIME       | 2010-10-14 12:25:02.12363
EPOCH_ID         | 434
NODE_NAME        | v_vmartdb_node01
USER_NAME        | dbadmin
SESSION_ID       | raster-s1-17172:0xa56
QUERY_IDENTIFIER |
QUERY            | CREATE VIEW sys_dba.QUERY_REPOSITORY AS SELECT * FROM sys_dba.query_repo WHERE
                   USER_NAME=CURRENT_USER;
SEARCH_PATH      | "$user", public, v_catalog, v_monitor, v_internal
DURATION         | 8625
SCHEMA_NAME      |
TABLE_NAME       |
PROJECTIONS      |
EXTRA_MEMORY     | 0
TYPE             | 5
ERROR_CODE       | 0
NUM_ROWS         | 0
-[ RECORD 36 ]---+-------------------------------------------------------------------------------
START_TIME       | 2010-10-14 12:25:02.142114
EPOCH_ID         | 434
NODE_NAME        | v_vmartdb_node01
USER_NAME        | dbadmin
SESSION_ID       | raster-s1-17172:0xa57
QUERY_IDENTIFIER |
QUERY            | GRANT SELECT ON sys_dba.QUERY_REPOSITORY TO PUBLIC;
SEARCH_PATH      | "$user", public, v_catalog, v_monitor, v_internal
DURATION         | 6634
SCHEMA_NAME      |
TABLE_NAME       |
PROJECTIONS      |
EXTRA_MEMORY     | 0
TYPE             | 5
ERROR_CODE       | 0
NUM_ROWS         | 0
-[ RECORD 37 ]---+-------------------------------------------------------------------------------
START_TIME       | 2010-10-14 12:25:02.155941
EPOCH_ID         | 434
NODE_NAME        | v_vmartdb_node01
USER_NAME        | dbadmin
SESSION_ID       | raster-s1-17172:0xa58
QUERY_IDENTIFIER | query_repo-4
QUERY            | COPY sys_dba.query_repo (NODE_NAME,
SESSION_ID,QUERY_IDENTIFIER,QUERY,SEARCH_PATH,

DURATION,EPOCH_ID,START_TIME,PROJECTIONS,EXTRA_MEMORY,SCHEMA_NAME,TABLE_NAME,TYPE,
                   ERROR_CODE,USER_NAME,NUM_ROWS) FROM STDIN DELIMITER '|' DIRECT;
SEARCH_PATH      | "$user", public, v_catalog, v_monitor, v_internal
DURATION         | 125483
SCHEMA_NAME      | sys_dba
TABLE_NAME       | query_repo
PROJECTIONS      | sys_dba.query_repo_node01 sys_dba.query_repo_node02 sys_dba.query_repo_node03
                   sys_dba.query_repo_node04
EXTRA_MEMORY     | 0
TYPE             | 5
ERROR_CODE       | 0
NUM_ROWS         | 25
-[ RECORD 38 ]---+-------------------------------------------------------------------------------
...
```

See Also

Query Repository Parameters in the Administrator's Guide

Database Management Functions and QUERY_PROFILES in the SQL Reference Manual

Configuring Query Repository

Only the superuser can configure the query repository, which consists of:

- Configuring how and when data is saved to the query repository
- Configuring how and when data is cleared from the query repository
- Optionally setting the memory limit for the query repository

Configuring how and when data is saved to the query repository

The following parameters control how data is saved to the query repository:

Configuration Parameter	Default Value	Description
SaveQueryRepoInterval	300	Determines how frequently, in seconds, query data is saved to the query repository. The default is five minutes (300 seconds). **Note:** This parameter cannot be set to less than 300 seconds.
QueryRepoRetentionTime	7	Determines the maximum number of days of data that is saved in the query repository. This parameter also determines how much data, in days, Vertica retains in the query repository when it is cleared. The default value of this parameter is seven (7) days.
QueryRepoMemoryLimit	67108864	Determines the maximum memory available for the query repository and for storing database profiling data. The default is 64MB. When the cache becomes full, query repository data is dumped to a table. Profiling data is cleared from the cache. See ***Profiling Database Performance*** (page 11).

The following example determines that data is saved to the query repository every ten minutes (600 seconds).

```
=> SELECT SET_CONFIG_PARAMETER('SaveQueryRepoInterval', '600');
```

Note: Use the SAVE_QUERY_REPOSITORY function to trigger Vertica to save query data to the query repository immediately. Vertica saves data based on the established configuration parameters. For example, it uses the value of the QueryRepoRetentionTime parameter to determine the maximum number of days of queries to save. The SAVE_QUERY_REPOSITORY function resets the clock for the SaveQueryRepoInterval back to zero (0).

Configuring how and when data is cleared from the query repository

The following parameters control how data is cleared from the query repository:

Configuration Parameter	Default Value	Description
CleanQueryRepoInterval	86400	Determines how frequently, in seconds, query data is cleared from the query repository. The default is one day (86,400 seconds). This means that once daily any data that exceeds the query retention policy is cleared from the query repository.
QueryRepoRetentionTime	100	Determines the maximum number of days of query data to retain in the query repository each time data is saved. This parameter also determines how much data, in days, Vertica retains in the query repository when it is cleared. The default value of this parameter is seven (7) days.

The following example sets the QUERYREPORETENTIONTIME to 50 days:

```
=> SELECT SET_CONFIG_PARAMETER('QueryRepoRetentionTime', '50');
```

See Also

Configuration Parameters in the Administrator's Guide

Managing And Viewing Query Repository

Access to the query repository is strictly controlled. Full query repository data is available to the superuser only. Additionally, only the superuser has the ability to manage or monitor the query repository via:

- Configuration parameters
  See ***Configuring Query Repository*** (page 28) and Configuration Parameters.
- Configuration functions
  See CLEAR_QUERY_REPOSITORY and SAVE_QUERY_REPOSITORY.
- SELECT, DROP, and CREATE statements
  See the SQL Reference Manual.

Users are restricted to viewing information about their own queries, which they access through the SYS_DBA.QUERY_REPO view. See Using Views in the Administrator's Guide.

Clearing the query repository immediately

The frequency with which the query repository is cleared is based on the CleanQueryRepoInterval parameter. You can also empty the query repository immediately.

To manually clear the query repository:

1. Note the value of the QueryRepoRetentionTime parameter.
2. Set the QueryRepoRetentionTime parameter to zero (0).
   ```
   => SELECT SET_CONFIG_PARAMETER('QueryRepoRetentionTime','0');
   ```
3. Use the CLEAR_QUERY_REPOSITORY function to empty the query repository.
   ```
   => SELECT CLEAR_QUERY_REPOSITORY();
   ```
4. Set the QueryRepoRetentionTime parameter back to its original value before you changed it to zero. (The default value is 7.)

```
=> SELECT SET_CONFIG_PARAMETER('QueryRepoRetentionTime','100');
```

Using Diagnostic Tools

Vertica provides several diagnostic tools. In this section, you'll learn how to identify which version of Vertica you are running, use the Diagnostics utility, and export a catalog.

Determining the Version Number

To determine which version of Vertica is installed on a host, log in to that host and type:

```
# rpm -qa | grep vertica
<package-name>
```

The name of the rpm package that is installed contains the version and build numbers.

Diagnostics Utility

The diagnostics utility gathers database logs along with other useful information into a single `.zip` file.

Syntax

`/opt/vertica/bin/diagnostics [ command... ]`

Parameters

command	`-h --help`	Shows a help message and exits.
	`-l --listdbs`	Lists the running databases.
	`-s --local_diags`	Gathers diagnostics for local machine only.
	`-d dbname` `--database dbname`	Retrieves information about the database *dbname.* **Note:** Both the -d and -n parameters are required to father the Vertica log from a specific node; otherwise only host-level information is obtained.

	`-o OUTPUT_DIR,`
	`--output_dir`
	`OUTPUT_DIR`
		Redirects output to somewhere other than `/opt/vertica/`log.

	`-n HOST_LIST,` `--hosts HOST_LIST`	Gathers diagnostics for these hosts only.
	`-z [ all | n ]`	Takes `all` or any positive integer value specifying how many `vertica.log-*.gz` files to include in diagnostics. The default is 1.

Notes

- In most cases, running `/opt/vertica/bin/diagnostics` without arguments is sufficient; the command reports on all databases and all nodes.
- The diagnostics utility writes the results into a file named `/opt/vertica/log/VerticaDiagnostics.date.zip` where *date* is replaced with a numeric date representation so that multiple calls to diagnostics result in different files being created.

- If you are having trouble with an installation, run the diagnostics utility as root or sudo. See ***Running Diagnostics Utility for failed Installation*** (page 49) for more information. For other situations, run the diagnostics utility as the database administrator.
- To include all `*.gz` files in diagnostics, use the `all` parameter, otherwise specify a number. The gzipped log files are included in the order in which they were last modified, with the most recent first.

  The following command, for example, includes all `vertica*gz` file in the diagnostics:

  ```
  $ /opt/vertica/bin/diagnostics -d PROD01 -z all
  ```

  The following command includes only the last three *.gz* files in the diagnostics:

  ```
  $ /opt/vertica/bin/diagnostics -d PROD01 -z 3
  ```
- Both the -d and -n parameters are required to gather the Vertica log from a specific node; otherwise only host-level information is obtained. Here's an example of a proper command:

  ```
  $ /opt/vertica/bin/diagnostics -n host01.acme.com,host02.acme.com -d
    mydatabase
  ```
- The diagnostics utility uses a `diagnostics-<username>.log` file instead of the *a*`dminTools-<username>.log` file for logging to allow for improved readability of log files collected during diagnostics.

Exporting a Catalog

When you export a catalog you can quickly move a catalog to another cluster. Exporting a catalog transfers schemas, tables, constraints, projections, and views. System tables are not exported.

Exporting catalogs can also be useful for support purposes.

See the EXPORT_CATALOG function in the SQL Reference Manual for details.

Exporting Profiling Data

The diagnostics audit script gathers system table contents, design, and planning objects from a running database into a single `.tar.gz` file for off-site analysis. You send this file to ***Technical Support*** (on page 1) for troubleshooting.

Syntax

```
/opt/vertica/scripts/collect_diag_dump.sh [ command... ]
```

Parameters

command	`-U`	User name, typically the database administrator account, dbadmin
	`-w`	Database password
	`-c`	Includes a compression analysis, resulting in a longer script execution time.

Notes

- The diagnostics audit script writes the results into a file named `./diag_dump_<timestamp>.tar.gz`, where <timestamp> denotes when you ran the script.
- If you run the script without parameters, you will be prompted for a database password.

Example

```
$ /opt/vertica/scripts/collect_diag_dump.sh -U dbadmin -w password -c
```

Failure Recovery

Failure recovery is the process of restoring the database to a fully-functional state after one or more nodes in the system has experienced a software or hardware related failure. Vertica recovers nodes by querying replicas of the data stored on other nodes. For example, a hardware failure could cause a node to lose database objects or to miss changes made to the database (INSERTs, UPDATEs, and so on) while offline. When the node comes back online, it recovers lost objects and catches up with changes by querying the other nodes.

K-safety is a measure of fault tolerance in the database cluster. The value K represents the number of replicas of the data in the database that exist in the database cluster. These replicas allow other nodes to take over for failed nodes, allowing the database to continue running while still ensuring data integrity. If more than K nodes in the database fail, some of the data in the database may become unavailable. In that case, the database is considered unsafe and automatically shuts down.

It is possible for a Vertica database to have more than K nodes fail and still safely continue running. The database continues to run as long as every data segment is available on at least one functioning node in the cluster. Potentially, up to half the nodes in a database with a K-safety level of 1 could fail without causing the database to shut down. As long as the data on each failed node is available from another active node, the database continues to run.

Note: If half or more of the nodes in the database cluster fail, the database will automatically shut down even if all of the data in the database is technically available from replicas. This behavior prevents issues due to network partitioning.

In Vertica, the value of K can be zero (0), one (1), or two (2). The physical schema design must meet certain requirements. To create designs that are K-safe, Vertica recommends using the Database Designer.

Note: You can monitor the cluster state through the **View Database Cluster** state menu option.

Recovery Scenarios

Recovery comes into play when a node or the database is started. Depending upon how the node or database was shut down, there are three possibilities for a K-Safe database:

- **Recovery of failed nodes**: One or more nodes have failed, but the database continues to run since the remaining nodes in the database are able to fill in for the failed nodes. The failed nodes can be restarted through the Administration Tools using the Restart Vertica on host option. The nodes being restarted show a status of 'RECOVERING' while they rebuild some of the data from the remaining nodes and, once finished, transition to an UP status. Transactions can continue to commit during the recovery process, except for a short period at the end of the recovery.

- **Recovery after a Clean Shutdown**: The database had been shut down cleanly via the Administration Tools Stop Database option. In this case, the database should be restarted using the Start Database option. Upon restart all nodes that were 'UP' at the time of shutdown immediately transition to 'UP'. It is possible that at the time of shutdown, the database had one or more failed nodes. If these nodes are now available, they go through the 'RECOVERING' state as described in 'Recovery of failed nodes" case above.
- **Recovery after an Unclean Shutdown (Manual Recovery)**: The database was not shut down cleanly, which means that the database became unsafe due to a failure. In this case, the database possibly did not write all the data from the WOS to disk. There are several reasons for unclean shutdowns, such as:
  - A critical node failed, leaving part of the database's data unavailable.
  - A site-wide event, such as a power failure that causes all nodes to reboot.
  - Vertica processes on the nodes exited due to a software or hardware failure.

  When the database is started through the Administration Tools Start Database option, recovery determines that a normal startup is not possible. It goes on to determine a point in time in which the data was consistent on all nodes. This is called the Last Good Epoch. As part of Start Database processing, the administrator is prompted to accept recovery with the suggested epoch. If accepted, the database recovers and any data changes made after the Last Good Epoch are lost. If not accepted, startup is aborted and the database is not started on any of the nodes.

  Instead of accepting the given epoch, the administrator can instead choose to recover from a backup or select an epoch for an even earlier point using the Roll Back Database to Last Good Epoch option in the Administration Tools Advanced Menu. This is useful in special situations, for example if the failure occurs during a batch of loads, for which it is easier to go back to the beginning of the batch, rather than starting in the middle, even though some of the work must be repeated. In most scenarios, it is sufficient and recommended to accept the given epoch.

Notes

- In Vertica 5.0, manual recovery is possible as long as the nodes that are being started can supply all of the partition segments in the database. This means that more than K nodes can remain down at startup, and the database can still successfully start as long as all of the data is available from the remaining nodes in the cluster.
- In Vertica 4.1, the default for the `HistoryRetentionTime` configuration parameter changed to 0, which means that Vertica only keeps historical data when nodes are down. This default setting effectively prevents the use of the Administration Tools 'Roll Back Database to Last Good Epoch' option because the AHM remains close to the current epoch and a rollback is not permitted to an epoch prior to the AHM. If you rely on the Roll Back option to remove recently loaded data, consider setting a day-wide window for removing loaded data; for example:

  ```
  => SELECT SET_CONFIG_PARAMETER ('HistoryRetentionTime', '86400');
  ```

  See Epoch Management Parameters in the Administrator's Guide.
- Starting in 4.0, manual recovery is possible even if up to K nodes are out of commission; for example, physically removed for repair or not reachable at the time of recovery. Once the nodes are back in commission, they recover and rejoin the cluster, as described in the "Recovery after failure of up to K nodes" section above.

- **IMPORTANT:** When a node is down, it can take a full minute or more for the Vertica processes to time out during its attempt to form a cluster when manual recovery is needed. Wait approximately one minute until the system returns the manual recovery prompt. Do not press CTRL-C during database startup.

For information on troubleshooting recovery problems, refer to the following sections in the Troubleshooting Guide:

- ***Startup Problems*** (page 41)
- ***Shutdown Problems*** (page 37)

See Also

High Availability and Recovery in the Concepts Guide.

Shutdown Problems

A Database shuts down when one of the following events occurs:

- The administrator uses the Stop Database command.
- The cluster becomes unsafe and the database shuts down to prevent data loss.

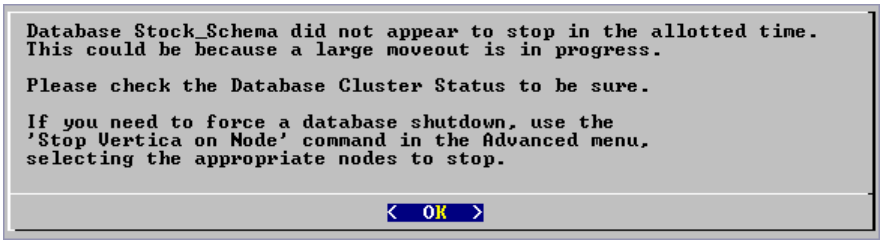
If a problem prevents the database from shutting down, the Administration Tools display a dialog containing the following error message:

```
Database ... did not appear to stop...
```

The message is followed by a description of the problem. This section describes some of the known problems that can occur when stopping a database.

... large moveout is in progress

If there is a Tuple Mover operation in progress, the Administration Tools displays a message similar to the one shown below:



This particular message indicates that the Tuple Mover needs more time to complete a moveout operation, which is an internal session. (See Managing Sessions in the Administrator's Guide for more information.)

Note: Vertica recommends that you wait as long as possible before taking action. You can cause data loss by, for example, interrupting a database that is still performing a moveout.

1. If you cannot wait any longer, disconnect and select Advanced > Stop Vertica on Host from the Administration Tools.
2. If Stop Vertica on Node fails, select Advanced > Killing a Vertica Process on Host.

This forces the cluster to go through recovery at startup.

... users are connected

Error

If users are connected during shutdown operations, the Administration Tools displays a message similar to the following:

```
Database Stock_Schema did not appear to stop in the allotted time.
NOTICE: Cannot shut down while users are connected
        shutdown
------------------------------
Shutdown: aborting shutdown
(1 row)

If you need to force a database shutdown, use the
'Stop Vertica on Node' command in the Advanced menu,
selecting the appropriate nodes to stop.
```

Description

The message indicates that there are active user connections (sessions). See Managing Sessions in the Administrator's Guide for more information.

Resolution

The following examples were taken from a different database.

1 To see which users are connected, connect to the database and query the `SESSIONS` system table described in the SQL Reference Manual. For example:

```
=> \pset expanded
Expanded display is on.
=> SELECT * FROM SESSIONS;

-[ RECORD 1 ]
node_name               | site01
user_name               | dbadmin
client_hostname         | 127.0.0.1:57141
login_timestamp         | 2009-06-07 14:41:26
session_id              | rhel5-1-30361:0xd7e3e:994462853
transaction_start       | 2009-06-07 14:48:54
transaction_id          | 45035996273741092
transaction_description | user dbadmin (select * from session;)
statement_start         | 2009-06-07 14:53:31
statement_id            | 0
last_statement_duration | 1
current_statement       | select * from sessions;
ssl_state               | None
authentication_method   | Trust
-[ RECORD 2 ]
node_name               | site01
user_name               | dbadmin
client_hostname         | 127.0.0.1:57142
login_timestamp         | 2009-06-07 14:52:55
session_id              | rhel5-1-30361:0xd83ac:1017578618
transaction_start       | 2009-06-07 14:53:26
transaction_id          | 45035996273741096
transaction_description | user dbadmin (COPY ClickStream_Fact FROM
```

```
'/data/clickstream/1g/ClickStream_Fact.tbl' DELIMITER '|' NULL '\\n' DIRECT;)
   statement_start         | 2009-06-07 14:53:26
   statement_id            | 17179869528
   last_statement_duration | 0
   current_statement       | COPY ClickStream_Fact FROM '/data/clickstream/1g/ClickStream_Fact.tbl'
DELIMITER '|' NULL '\\n' DIRECT;
   ssl_state               | None
   authentication_method   | Trust
```

The current statement column of Record 1 shows that session is the one you are using to query the system table. Record 2 shows the session that must end before the database can be shut down.

2 If a statement is running in a session, that session must be closed. Use the function `CLOSE_SESSION` or `CLOSE_ALL_SESSIONS` described in the SQL Reference Manual.

Note: `CLOSE ALL SESSIONS` is the more common command because it forcefully disconnects all user sessions.

```
=> SELECT * FROM SESSIONS;

-[ RECORD 1 ]
node_name                 | site01
user_name                 | dbadmin
client_hostname           | 127.0.0.1:57141
client_pid                | 17838
login_timestamp           | 2009-06-07 14:41:26
session_id                | rhel5-1-30361:0xd7e3e:994462853
client_label              |
transaction_start         | 2009-06-07 14:48:54
transaction_id            | 45035996273741092
transaction_description   | user dbadmin (select * from sessions;)
statement_start           | 2009-06-07 14:53:31
statement_id              | 0
last_statement_duration_us | 1
current_statement         | select * from sessions;
ssl_state                 | None
authentication_method     | Trust
-[ RECORD 2 ]
node_name                 | site01
user_name                 | dbadmin
client_hostname           | 127.0.0.1:57142
client_pid                | 17839
login_timestamp           | 2009-06-07 14:52:55
session_id                | rhel5-1-30361:0xd83ac:1017578618
client_label              |
transaction_start         | 2009-06-07 14:53:26
transaction_id            | 45035996273741096
transaction_description   | user dbadmin (COPY ClickStream_Fact FROM
                            '/data/clickstream/1g/ClickStream_Fact.tbl'
                            DELIMITER '|' NULL '\\n' DIRECT;)
statement_start           | 2009-06-07 14:53:26
statement_id              | 17179869528
last_statement_duration_us | 0
current_statement         | COPY ClickStream_Fact FROM
                            '/data/clickstream/1g/ClickStream_Fact.tbl'
                            DELIMITER '|' NULL '\\n' DIRECT;
ssl_state                 | None
authentication_method     | Trust


=> SELECT CLOSE_SESSION('rhel5-1-30361:0xd83ac:1017578618');
-[ RECORD 1 ]
close_session | Session close command sent. Check sessions for progress.
=> SELECT * FROM SESSIONS;

-[ RECORD 1 ]
```

```
node_name                 | site01
user_name                 | dbadmin
client_hostname           | 127.0.0.1:57141
client_pid                | 17838
login_timestamp           | 2009-06-07 14:41:26
session_id                | rhel5-1-30361:0xd7e3e:994462853
client_label              |
transaction_start         | 2009-06-07 14:48:54
transaction_id            | 45035996273741092
transaction_description   | user dbadmin (select * from sessions;)
statement_start           | 2009-06-07 14:54:11
statement_id              | 0
last_statement_duration_us | 98
current_statement         | select * from sessions;
ssl_state                 | None
authentication_method     | Trust
```

3 Query the SESSIONS table again. For example, two columns have changed:

- stmtid is now 0, indicating that no statement is in progress.
- stmt_duration now indicates how long the statement ran in milliseconds before being interrupted.

The SELECT statements that call these functions return when the interrupt or close message has been delivered to all nodes, not after the interrupt or close has completed.

4 Query the SESSIONS table again. When the session no longer appears in the SESSION table, disconnect and run the Stop Database command.

Controlling Sessions

The database administrator must be able to disallow new incoming connections in order to shut down the database. On a busy system, database shutdown is prevented if new sessions connect after the CLOSE_SESSION or CLOSE_ALL_SESSIONS() command is invoked — and before the database actually shuts down.

One option is for the administrator to issue the `SHUTDOWN('true')` command, which forces the database to shut down and disallow new connections. See SHUTDOWN in the SQL Reference Manual.

Another option is to modify the `MaxClientSessions` parameter from its original value to 0, in order to prevent new non-dbadmin users from connecting to the database.

1 Determine the original value for the `MaxClientSessions` parameter by querying the V_MONITOR.CONFIGURATIONS_PARAMETERS system table:

```
=> SELECT CURRENT_VALUE FROM CONFIGURATION_PARAMETERS WHERE
   parameter_name='MaxClientSessions';
 CURRENT_VALUE
---------------
 50
(1 row)
```

2 Set the `MaxClientSessions` parameter to 0 to prevent new non-dbadmin connections:

```
=> SELECT SET_CONFIG_PARAMETER('MaxClientSessions', 0);
```

Note: The previous command allows up to five administrators to log in.

3 Issue the `CLOSE_ALL_SESSIONS()` command to remove existing sessions:

```
=> SELECT CLOSE_ALL_SESSIONS();
```

4 Query the `SESSIONS` table:

```
=> SELECT * FROM SESSIONS;
```

When the session no longer appears in the `SESSIONS` table, disconnect and run the Stop Database command.

5 Restart the database.

6 Restore the `MaxClientSessions` parameter to its original value:

```
=> SELECT SET_CONFIG_PARAMETER('MaxClientSessions', 50);
```

See Also

CLOSE_SESSION, CLOSE_ALL_SESSIONS, CONFIGURATION_PARAMETERS, and SESSIONS in the SQL Reference Manual

Managing Sessions and Configuration Parameters in the Administrator's Guide

No running statement, that session is idle

Error

```
No running statement, that session is idle
```

Description

The INTERRUPT_STATEMENT function failed. The session exists but is not running a statement and the session ID can't be found.

Resolution

Not required.

Startup Problems

This section describes some of the known problems that can occur when starting a database. Startup fails on one or more nodes either due to communication problems between nodes or when recovery fails to recover the data on the node(s) for any reason.

Note: If a database fails to start before it can write messages into `vertica.log`, check the file `catalog-path/database-name/dbLog`.

Startup successful, but some nodes are recovering

Error

```
Startup successful, but some nodes are recovering. You can use the
View Database Cluster State option to check progress.
Press RETURN to continue
```

Description

This message typically indicates an abnormal shutdown of one or more nodes. If any nodes in the database are UP, the database is fully operational. Note however that if you start load processing on the database the recovery node could take additional time to become operational

Resolution

None required

Error starting database, no nodes are up

Error

```
Error starting database, no nodes are up
Press RETURN to continue
```

Description

An unknown problem is preventing the database from starting.

Resolution

Reboot the hosts and try to start the database. If unsuccessful, run diagnostics and contact ***Technical Support*** (on page 1).

Database startup successful, but it could be incomplete

Error

```
Database startup successful, but it may be incomplete.
```

Description

Some nodes are in a transitional state: not up but not recovering.

Resolution

If this error persists, try using the Stop Vertica on Host command in the Advanced menu to stop Vertica on all nodes. Then use the Roll Back Database With Catalog Version command.

Error

```
Database startup successful, but it may be incomplete.
Some nodes remain in a transitional state.
See Database Cluster State in Main Menu for details.
Press RETURN to continue
```

Description

This message indicates that the Database Administrator chose not to wait when prompted and that the database cannot start.

Resolution

If this error persists, contact ***Technical Support*** (on page 1).

Database did not start cleanly on initiator node!

Error

```
ERROR: Database did not start cleanly on initiator node!
Stopping all nodes
Issuing shutdown command to database
```

Description

Configuration problems can cause this error.

Resolution

1. Check hostname resolution as described in Configure Hostname Resolution section of the Installation Guide.
2. Examine `/etc/hosts` on each node and specify a fully qualified domain name and an unqualified hostname. For example:

   ```
   192.168.1.99 node01.fqdname.com node01
   ```
3. Verify that there is no firewall running.

TIMEOUT ERROR: Could not login with SSH

Error

```
TIMEOUT ERROR: Could not login with SSH. Here is what SSH said:
Last login: Sat Dec 15 18:05:35 2007 from node01
```

Description

Installing Vertica on a host that is missing the mount point `/dev/pts` could result in the error when creating a database.

Resolution

Make sure that `/dev/pts` is mounted.

Good epoch logs are available on all nodes

Error

```
Database startup failed. Good epoch logs are available on all nodes.
WARNING: if you say 'yes.' changes made to the database after
'2007-07-04 03:58:03-04' (epoch 265) will be permanently lost.
Do you really want to restart the database from '2007-07-04 03:58:03-04' (epoch
265)?
```

Explanation

A startup attempt failed due to database inconsistency across the cluster. Vertica has determined that it can probably restart and continue running at an earlier epoch.

Workaround

Restarting from the suggested epoch erases any changes made to the database subsequent to that epoch, across the cluster. It is likely that these changes were incomplete and erasing them allows the cluster to proceed normally using the data saved prior to the epoch.

No good epoch log available on node

Error

```
Database startup failed. No good epoch log available on node stock_multi_node_0.
Please run diagnostics and contact Vertica
```

Description

There are a number of possible reasons for this error message, including an abnormal startup or shutdown. Every node in the cluster must be started with the same recovery epoch.
Non-matching recovery epochs occur when a cluster has experienced an unsafe shutdown.

Resolution

1. Make sure that all nodes are powered on.
2. Start the database again.
3. Make sure that all nodes have Spread running. If necessary, restart Spread where it is not running and start the database.
4. On each node that did not start up, examine dbLog for the cause of the failure.
5. If the cause cannot be determined, it is likely that a node has no catalog version or epoch log from which to recover. Run diagnostic tests (see ***Using Diagnostic Tools*** (page 31)) and contact ***Technical Support*** (on page 1).

Nodes stuck in INITIALIZING state

Error

In rare cases, some or all nodes can get stuck in the INITIALIZING state when trying to start the database.

Description

This issue is known to happen due to network configuration problems, corrupted catalogs or disks, missing database directories or some other fatal problem in the database setup. Incorrect use of the Administration Tools Advanced Menu options could also lead to this condition.

Resolution

1. Open the Administration Tools.
2. Select Advanced > Stopping Vertica on Host to stop all nodes.
3. Go back to the Main Menu and click Start Database.
4. If the error persists, run diagnostics and contact ***Technical Support*** (on page 1)

Node does not recover because of lock timeouts

Error

Upon starting a node, it stays in RECOVERING state for a long time and eventually shuts down again. Examination of the *vertica.log* on the node reveals an error:

```
Locking failure: Timed out S locking Table.
```

Description

The final stage of recovering a node requires a S lock on the table. If you have a continuous stream of COPY commands in progress, recovery might not be able to get this lock even after multiple re-tries.

Resolution

If you see this situation, either momentarily stop the loads or pick a time when the cluster is not busy to restart the node and let recovery proceed.

Spread Problems

This section describes some of the known problems that can occur when using spread.

Spread is not running

Error

```
admintools View Cluster State shows "Could not connect to spread.
Spread is configured as part of database creation".
spread dead but pid file exists
```

Resolution

Verify that spread is not running and then restart the spread daemon.

1. Verify that spread is not running:
   ```
   ps ax | grep spread
   ```
2. Examine `/tmp/spread*.log` and `/var/log/spreadd.log` for problems. Permission problems and syntax problems are identified in these log files.
3. Issue the `ifconfig` command to check the current IP addresses of the hosts and verify that those IP addresses are listed in `/opt/vertica/config/vspread.conf`.
4. Check for Vertica processes that might be running, even though spread is down:
   ```
   ps ax | grep vertica
   ```
5. Kill the Vertica process. Alternatively, use the Admintools Advanced Menu > **Kill Vertica Process on Host**.
6. Restart spread:
   1. Log in as root:
      ```
      $ su - root
      password: <root-password>
      #
      ```

You can use sudo (if enabled) if you do not have the root password.

2. Restart the spread daemon:

```
# /etc/init.d/spreadd restart
```

3. Ensure the daemon is running:

```
# ps ax | grep spread
```

Administration Tools shows node state as UNKNOWN

Error

The Administration Tools 'View Cluster State' shows one or more nodes with an `UNKNOWN` status

Description

Under certain conditions, Vertica nodes can go into the `UNKNOWN` state yet still be processing. In most cases, after some time, they return to `UP` status. However, if you see a persistent `UNKNOWN` state that does not resolve to an `UP` state after several minutes, follow the instructions in this section.

Resolution

Likely cause of this issue is a sub-optimally configured I/O subsystem leading to high contention that causes Vertica to be unresponsive to messages from the spread daemon. You might notice this problem occurs more readily when running several large join queries that spill to disk. Check for high I/O waits and other symptoms of I/O problems and if unable to resolve, contact ***Technical Support*** (on page 1) with I/O statistics and sar data.

See Also

Spread is not running (page 45) for restarting spread

Diagnosing spread problems

Spread Panic

Error

```
Error while starting/enabling multicasting to all hosts
Spread panic during re-init on the following hosts: ['vertica01']
```

Description

Vertica automatically sets up a spread configuration for the cluster when you use the Create Database command in the Administration Tools, and starts spread. Various other configuration errors can cause the spread startup to fail.

Resolution

Do not attempt to change the spread configuration. Contact ***Technical Support*** (on page 1).

Spread Dead but pid File Exists

Error

```
spread dead but pid file exists
```

Description

If spread ends abnormally, the pid and lock file are left behind.

Resolution

Restart spread.

1. Log in as root:
   ```
   $ su - root
   password: <root-password>
   #
   ```
   You can use sudo (if enabled) if you do not have the root password.
2. Restart the spread daemon:
   ```
   # /etc/init.d/spreadd restart
   ```
3. Ensure the daemon is running:
   ```
   # ps ax | grep spread
   ```

To diagnose issues related to starting Spread, "status" option has been enhanced to provide guidance .

Example

The following example checks on the spread status.

```
$ sudo /etc/init.d/spreadd status

spread is stopped
```

If you are having trouble starting spread, check `/opt/vertica/config/vspread.conf` and spread logs in `/tmp/spread_*` and `/var/log/spreadd.log`.

```
 $ sudo /etc/init.d/spreadd start
Starting spread daemon: spread (pid 24290) is running...
                                                           [ OK ]
 $ sudo /etc/init.d/spreadd status
spread (pid 24290) is running...
```

Installation Problems

This section describes installation issues you might encounter.

Failed Dependencies

Error

```
ERROR: Failed dependencies:
```

Description

One or more the software products required by the Vertica rpm package is missing.

Resolution

Install the missing product. For example:

Python

A Python interpreter must be installed on any host on which you want to use the Administration Tools.

Note: Red Hat and Fedora Linux automatically install Python.

If you do not already have Python installed on all hosts, you can download python from the http://www.vertica.com (***http://www.vertica.com***).

Suse10 and libtermcap.so

On SUSE 10, the Vertica install could fail due to a failed dependency check for missing libtermcap.so:

```
ERROR: Failed dependencies:
libtermcap.so.2()(64bit) is needed by vertica-4.0.11-20100503180005.x86_64
```

To resolve this issue:

1. Download the `termcap*.rpm` from the ***openSUSE Web site http://software.opensuse.org***.
2. Install the rpm on the SUSE cluster as root or sudo:

   ```
   # sudo rpm -ivh termcap-2.0.8-910.x86_64.rpm
   ```

Vertica Web Monitoring (Ganglia)

The Vertica Monitoring (Ganglia) rpm install could fail if it encounters a missing dependency. These dependencies come pre-installed on most Linux distributions; however, some could be missing on older Linux distributions.

The following is an example of a failed dependency:

```
error: Failed dependencies:
       ganglia-gmetad is needed by vertica-ganglia-1.1.0-1.noarch
       ganglia-gmond is needed by vertica-ganglia-1.1.0-1.noarch
       php is needed by vertica-ganglia-1.1.0-1.noarch
```

```
php-gd is needed by vertica-ganglia-1.1.0-1.noarch
```

See Required Packages in the Administrator's Guide for guidelines on resolving missing dependencies.

SSH Already Configured

Error

```
SSH already configured
If root does not have password-less you are prompted three times for each host
```

Description

This error occurs when using `install_vertica`. It indicates that SSH is already configured for root so that each connection requires a password.

Resolution

It is possible that dba-ssh-config succeeded. Log in to the administrative account and test SSH by connecting to each other host. If unsuccessful, log in to the console on each host and perform the Enable Secure Shell (SSH) Logins procedure in the Installation Guide.

Running Diagnostics Utility for Failed Installation

Description

To troubleshoot an installation problem, run the diagnostics utility as root with the `--hosts` option.

Example

```
/opt/vertica/sbin/diagnostics
--hosts node01,node02,node03
```

SSH logins must be enabled on all nodes in order for the diagnostics utility to run.

If the `install_vertica` script failed to enable SSH logins, then run the ***diagnostics utility*** (page 32) as root or sudo individually on each node.

Diagnostics

Contact ***Technical Support*** (on page 1) and provide the diagnostics `.zip` files.

Passwordless SSH Access to Other Sites Failed

Error

```
Passwordless SSH access to other sites ... FAILED
```

Description

For database administration to function properly, Vertica requires that passwordless authentication for SSH be configured for the Vertica DBA user. The Vertica install script attempts to set this up automatically for the DBA user during installation. However, this process could fail if:

- The Vertica DBA user already exists and has conflicting SSH keys.
- SSH is not configured correctly to allow passwordless authentication.
- Permissions changed on the home directory for dbadmin (`/home/dbadmin`) to allow others to modify (e.g., 755); thus, sshd refuses to allow passwordless authentication using public (ssh) keys (although identification using normal password works).

Resolutions

- Verify that `/etc/ssh/sshd_config` is configured properly to allow passwordless authentication using public keys.
- Verify that the AuthorizedKeysFile setting in /etc/ssh/sshd_config is either set to "authorized_keys2" or commented out. After changing the value of AuthorizedKeysFile, you will need to restart sshd:
  ```
  /etc/init.d/sshd restart
  ```
- Reset permissions on the home directory so that it is read-write-execute by user dbadmin only. For example:
  ```
  # chmod 700 ~
  ```

See Also

Enable Secure Shell (SSH) Logins and Provide Root SSH Access to the Cluster in the Installation Guide

Misleading Message Due to IP/hostname Mismatch

Error

```
Installation Tool EOF ERROR: Could not login with SSH. Here is what SSH said:
ssh: connect to host ellis port 22: Connection refused
User root cannot login to ellis
Installation failed.
```

Description

Vertica requires IP addresses for communication among cluster hosts to be statically assigned.

If you happened to be using DHCP and the IP addresses in your /etc/hosts do not match the actual IP address assigned by DHCP for the hosts, you could get an error as described above.

Resolution

Do not use DHCP to assign IP addresses for network interfaces used to communicate between Vertica hosts.

If you use separate public and private interfaces for external and internal network communications to the host, you can directly specify the private IP addresses as parameters to `install_vertica` eliminating the dependency on hostnames defined in `/etc/hosts`.

Host Key Verification Failure

Error

```
EOF ERROR: Could not login with SSH. Here is what SSH said:
WARNING: REMOTE HOST IDENTIFICATION HAS CHANGED!
...
Host verification failed.
```

Description

After a host is lost and replaced in the Verticacluster, the host key will change and the `known_hosts` files on the surviving nodes have an old value. Therefore, when you use the Administration Tools to restart the newly-added node, the system returns the above warning.

Resolution

Remove the old host key from `~dbadmin/.ssh/known_hosts`.

Permission denied even after providing correct root password

Error

During the installation, you were prompted three times for the root password, but even after password was supplied, access was denied. You see the following error message:

```
ERROR: Permission denied. Incorrect password. Please check that your password is
correct and that the user has permission to login via ssh
```

Resolution

The PermitRootLogin setting in /etc/ssh/sshd_config must be set to "yes" or the PermitRootLogin setting must be commented out.

After changing the value of PermitRootLogin, you will need to restart sshd:

```
/etc/init.d/sshd restart
```

Installation runs as sudoer when run using sudo root

Error

When logged in as a normal user (for example, myuser), if installation was run by issuing `sudo su root` to change to root user, it appears to still run as myuser.

The *admintools.log* shows that SSH is being done as myuser rather than root:

```
Sep 25 22:50:05 [adminExec.__init__] Unique Ports: False
Sep 25 22:50:05 [SSH.login data dev2]
Sep 25 22:50:05 ssh -l myuser dev2
Sep 25 22:50:05 [SSH.login ssh -l myuser dev2 ]
Sep 25 22:50:06 Password attempt #2 2
Sep 25 22:50:06 Password attempt #4 0
Sep 25 22:50:15 Password attempt #3 -1
Sep 25 22:50:15 myuser@dev2: sudo [ -f /etc/SuSE-release ]
```

```
Sep 25 22:50:16 myuser@sdev2: ['1', ['']]
Sep 25 22:50:16 Error code 1 ['']
...
```

Resolution

`sudo su root`, `sudo -i`, and `sudo /opt/vertica/sbin/install_vertica` all end up having the SUDO_UID values set to the sudoer user, such as myuser in the above example. The installation script uses the presence of this environment variable to determine if it should run in 'sudo' mode or standard "root" mode. In these instances, it thinks it is running as the SUDO_UID user and assumes that the root password is not available; thus it runs all commands under the sudo user.

When switching to root or another user using sudo, use the - (hyphen), which completely replaces the environment and SUDO_UID is not set.

Managing Large Grouped ROS Containers

If you upgrade your database from Vertica 4.0.x to 4.0 Patchset 1, check for large grouped ROS containers, especially if you used `COPY AUTO` or `COPY` [no keyword] for bulk loads. Note that this issue does not affect a 3.5.x database.

Small Partitioned Tables

Small unpartitioned tables can be merged entirely using the following statement:

```
=> SELECT DO_TM_TASK('mergeout', 'table-name');
```

Important: For large unpartitioned tables, contact Vertica ***Technical Support*** (on page 1).

Large Partitioned Tables

On large partitioned tables, re-merge partitions with grouped ROS containers using the MERGE_PARTITIONS() command. This command eliminates grouped ROSes.

1 Create two views to identify grouped ROS containers that require re-merging:

```
=> CREATE VIEW large_grouped_roses AS SELECT * FROM ( SELECT s.*,
   TO_CHAR(100.0*grouped_bytes::FLOAT/
         (grouped_bytes::FLOAT+NON_GROUPED_BYTES), '999.99') AS PCT
      FROM (
       SELECT sc.schema_name, sc.projection_name,
       SUM(CASE WHEN GROUPING = 'ALL' THEN USED_BYTES ELSE 0 END)
          AS GROUPED_BYTES,
       SUM(CASE WHEN GROUPING = 'ALL' THEN 0 ELSE USED_BYTES END)
          AS NON_GROUPED_BYTES
     FROM storage_containers SC
     GROUP BY sc.schema_name, sc.projection_name) AS S ) AS Q
   WHERE q.grouped_bytes > 1024000 AND Q.PCT > 10
   ORDER BY Q.GROUPED_BYTES DESC;
=> CREATE VIEW proj_to_merge AS SELECT distinct schema_name,
   projection_name, partition_key
    FROM (
     SELECT gr.schema_name, gr.projection_name, sc.storage_oid,
```

```
   used_bytes, partition_key
FROM large_grouped_roses GR
NATURAL LEFT JOIN storage_containers SC
LEFT JOIN partitions P
ON sc.storage_oid = p.ros_id
WHERE sc.grouping = 'ALL') Q;
```

2 Execute the following command to identify any large grouped ROS containers:

```
=> SELECT * FROM large_grouped_roses;
```

The following example output identifies two projections:

```
-[ RECORD 1 ]-----+-----------------------------------------
schema_name       | public
projection_name   | product_dimension_DBD_14_seg_vmartdb_design
grouped_bytes     | 1979034
non_grouped_bytes | 0
pct               | 100.00
-[ RECORD 2 ]-----+-----------------------------------------
schema_name       | public
projection_name   | product_dimension_DBD_2_seg_vmartdb_design
grouped_bytes     | 1979034
non_grouped_bytes | 0
pct               | 100.00
```

3 Execute the following command to identify the partition key that belongs to the containers you want to merge:

```
=> SELECT * FROM proj_to_merge;
```

If the table is partitioned, the results should return the affected partition key. If the table is not partitioned, as in the following example, no partition key is returned:

```
-[ RECORD 1 ]---+-----------------------------------------
schema_name     | public
projection_name | product_dimension_DBD_14_seg_vmartdb_design
partition_key   |
-[ RECORD 2 ]---+-----------------------------------------
schema_name     | public
projection_name | product_dimension_DBD_2_seg_vmartdb_design
partition_key   |
```

4 Do one of the following:

1. If a partition_key is listed, execute the following command on the projection/partition:

```
=> SELECT merge_partitions('table_name', 'from_key', 'to_key');
```

2. If no partition key is returned, execute the following command:

```
=> SELECT DO_TM_TASK('mergeout');
DO_TM_TASK | mergeout for projection 'product_dimension_node0001'
mergeout for projection 'product_dimension_node0002'
mergeout for projection 'product_dimension_node0003'
mergeout for projection 'product_dimension_node0004'
mergeout for projection
   'call_center_dimension_DBD_32_seg_vmartdb_design'
...
```

IMPORTANT: Do not perform step 4b on large partitioned tables. Contact ***Technical Support*** (on page 1) for guidance.

See Also

DO_TM_TASK and MERGE_PARTITIONS in the SQL Reference Manual

Backup and Restore Problems

This section describes backup and restore issues you might encounter.

Errors found in SAL or Catalog

Error

```
Errors found in SAL or Catalog, check log for details
```

Description

A catalog snapshot file that you attempted to use to restore a database is corrupt. This can occur for a number of reasons, which include:

- The snapshot file is bad.
- The correct data files were not copied to the correct locations.

Resolution

See the `bootstrap-catalog.log` for details.

Cannot bootstrap catalog on top of existing catalog

Error

```
Cannot bootstrap catalog on top of existing catalog
```

Description

A catalog directory with catalog information exists in the location specified for the new catalog (dbdir/catalog).

Resolution

Verify that you want to replace the original catalog. To force a replacement, use the `-O` flag when you initialize the backup catalog:

```
bootstrap-catalog -O -D <dbdir> -F <snapshotfile>
```

Using the `-O` flag renames the existing catalog directory to a temporary name (`Catalog-old-<pid>`), initializes the new catalog, and then removes the old catalog directory. If the new catalog fails to bootstrap, the old catalog directory is not removed, thus allowing you to restore the database node to its original state.

Restore fails if files present in catalog directory

Description

The restore (`restore.sh`) script fails to restore the database if core files are present in Vertica database directory.

Resolution

Certain files names are allowed to be present in the top-level catalog directory for a successful bootstrap/restore. Any other files cause the bootstrap/restore to fail.

Be sure no core files are present with the exception of the following files, which are allowed and/or needed:

- Anything starting with vertica.log
- Epoch.log
- vertica.pid
- not-yet-initialized
- global
- ErrorReport.txt
- SAL
- tmp
- CopyErrorLogs
- Snapshots
- Anything starting with Catalog-old-
- bootstrap-catalog.log
- Anything ending in .conf

Configuration Problems

This section describes configuration issues you might encounter.

Cannot Allocate Memory

Error

```
Cannot allocate memory
```

Description

There are four known causes for this:

1. max_map_count set too low. See Increase the max_map_count Parameter.
2. max memory size (ulimit -m) set too low.
3. virtual memory (ulimit -v) set too low.
4. /proc/sys/vm/overcommit_memory set to 2 and CommitLimit (see /proc/meminfo) set too low.

Resolution

For Vertica to function properly, max memory size and virtual memory should be unlimited and `/proc/sys/vm/overcommit_memory` should be set to 0.

See your operating system documentation for how to set these values. You need to set them such that the value you specify is used even after reboot.

Cannot find IP Address for Host...

Error

```
Cannot find IP address for host...
```

Description

If you encounter this error when creating a new database, `/etc/hosts` might not be configured properly.

Resolution

1. See Configure Hostname Resolution in the Installation Guide.
2. Do not use the loopback address or associated hostname.
3. Check `/opt/vertica/config/dbname.conf` for `unknown`. This means Vertica cannot resolve the hostname.

Clock Skew Detected

Error

```
WARNING Clock skew detected; this node is at least nnn seconds fast
```

Description

Vertica has detected that one or more hosts require system clock adjustment.

Resolution

Use NTP or some other time-synchronization mechanism to keep all hosts synchronized. Time variances can cause inconsistent query results when using Date/Time Functions.

To verify that the Network Time Protocol Daemon (NTPD) is operating correctly, issue the following command on all nodes in the cluster:

```
/usr/sbin/ntpq -c rv | grep stratum
```

A stratum level of 16 indicates that NTP is not synchronizing correctly.

See Also

To configure the system time, date, and the Network Time Protocol in the graphical interface: http://kbase.redhat.com/faq/docs/DOC-6731 ***http://kbase.redhat.com/faq/docs/DOC-6731***

To synchronize the system clock to Network Time Protocol: http://kbase.redhat.com/faq/docs/DOC-6902 ***http://kbase.redhat.com/faq/docs/DOC-6902***

To synchronize the system clock to a Network Time Protocol server immediately: http://kbase.redhat.com/faq/docs/DOC-6991 ***http://kbase.redhat.com/faq/docs/DOC-6991***

Could Not Log in with SSH

Error

```
EOF ERROR: Could not login with SSH. Here is what SSH said:
ssh: \033[D\033[Ctest01_node02: Name or service not known
```

Description

If you get this message when entering a hostname for a node in the Administration Tools (defining a cluster), the hostname might not be in the list of known hosts.

Resolution

Log in to the host from the command line:

```
> ssh node01
Warning: Permanently added '...' (RSA) to the list of known hosts.
Last login: Thu Feb 22 21:29:31 2007 from ...
> exit
```

If the workaround does not solve the problem, check your SSH configuration as described in Enable Secure Shell (SSH) Logins in the Installation Guide.

Could Not Open Configuration File

Error

```
vsql: FATAL:  could not open configuration file "<filename>":
No such file or directory
```

Resolution

Make sure that PostgreSQL is not installed on any host.

Create Database Fails

Error

```
create DB failed due to node connectivity issues
```

Description

The first time you connect, ssh asks if you want to accept the unknown fingerprint from the new node.

Resolution

When setting up passwordless ssh, connect to each node once to establish the fingerprint. See dba-ssh-config and Enable Secure Shell (SSH) Logins in the Installation Guide for more information.

Design Not Generated

Error

```
ERROR: Design not generated.
There is not enough memory available to run the Database Designer.
You must have at least 3GB of memory available.
```

Description

In previous releases, Vertica reserved a set amount of memory for the Database Designer so that it could generate an optimal design. Occasionally, the system had less memory than it required, such as on a virtual machine, and the design would fail.

Now, instead of reserving all the memory up front, the Database Designer reserves memory resource incrementally, as needed. If the system has less memory than it requires, the Database Designer prints a warning and generates a suboptimal design. It no longer fails to create a design.

Tip: If your design finishes with a warning, consider customizing projections manually. See Writing and Deploying Custom Projections in the Administrator's Guide.

Denied. Not a super user. Cannot create a schema

Error

```
Denied. XX is not a superuser, so cannot create a schema for YY
```

Description

A user other than the superuser attempted to assign ownership of a schema to another user. Only the superuser can assign ownership of a schema to another user.

Resolution

The superuser assigns ownership of the schema to the user.

Error Detected During Node Verification

Error

```
Error detected during node verification, host: hostname
Cannot create database on hostname
```

Resolution

Check Configure Hostname Resolution in the Installation Guide.

Insufficient Privilege USAGE on SCHEMA

Error

```
Insufficient privilege: USAGE on SCHEMA XX not granted for current user
```

Description

A user who has not been granted the USAGE privilege for the schema attempted to access a table within the schema. To access schema objects, the user must be granted USAGE privilege on the schema in addition to privileges for specific objects within the schema.

Resolution

Grant the user USAGE on the schema.

Not Enough Open File Handles Allowed...

Description and Resolution

Vertica requires a large number of file handles. To avoid "too many files open" errors:

1 Check the current limit:

```
$ ulimit -n
```

2 If necessary, permanently increase this limit for all users by editing the file `/etc/security/limits.conf` as root, and adding the lines:

```
* soft NOFILE <value>
* hard NOFILE <value>
```

where `<value>` = 1 file per MB of RAM, or 65536, whichever is higher.

Note: The leading asterisk means that the setting applies to all users.

3 Set `file-max` to 1 file per 1 MB of RAM, or 65536, whichever is higher.

If you see many error messages about running out of file handles, try increasing this value; for example:

```
echo 100000 > /proc/sys/fs/file-max
```

For further details, see the `file-max` section on the ***Linux man proc page http://linux.die.net/man/5/proc***.

4 Log out and log in again. The new shell has the new `ulimit` setting.

If you used sudo to install Vertica:

1 View the /etc/security/limits.conf on each node in the cluster and verify that Vertica inserted the following lines at the end of the file:

```
* soft NOFILE <value>
* hard NOFILE <value>
```

where <value> = 1 file per MB of RAM, or 65536, whichever is higher.

Note: The leading asterisk means that the setting applies to all users.

2 Log in as root and restart the system to ensure the settings are implemented:

 # etc/init.d/sshd restart

If restart is not an option, stop and start sshd:

 # etc/init.d/sshd stop; etc/init.d/sshd start

3 Verify the number of open files is 65536 (or 1024 on some operating systems):

 # ulimit -n

```
65536
```

4 Log in as the dbadmin user:

 # su dbadmin

5 SSH from one node to another; for example, from host01:

 # ssh host2

6 Check the current file limit:

 # ulimit -n

```
65536
```

Notes

- If the correct number of open files has not been established, reboot the host:

```
# sync
# reboot
```

If the settings still do not take effect, enable UsePAM (set value to yes) in `/etc/ssh/sshd_config` and restart SSH once again.

- If the nofile parameter is less than 32768, Vertica fails and logs the following message:
  `Not enough open file handles allowed (1024 available/32768 required); see 'ulimit -n'.`

See Also

Verify that Kernel and User Parameters Were Set

Linux man proc page http://linux.die.net/man/5/proc

Using sudo NOFILE Parameters Not Saved in limits.conf

Issue and Resolution

During installation, Vertica attempts to set various OS level parameters as shown in the Table below.

Location	Setting	Value	Comment
`/etc/security/limits.conf`	`NOFILE`	65536	Sets the maximum number of open files for the user.
`/etc/security/limits.conf`	`NPROC`	Total RAM on the node in MB (e.g., on 1GB machine, set NPROC to 1000)	Controls the maximum number of threads and processes for each user.
`/etc/sysctl.conf`	`fs.file-max`	65536	Sets the maximum number of file handles that the Linux kernel will allocate.
`/etc/sysctl.conf`	`vm.max_map_count`	Total RAM on the node in KB/16	The maximum number of memory map areas a process might have.
`/etc/rc.local`	`blockdev --setra`	2048	Sets the readahead parameter.
`/etc/sysctl.conf`	`vm.min_free_kbytes`	4096	Changes the page reclaim thresholds. When this number is increased the system starts reclaiming memory earlier, when its lowered it starts reclaiming memory later.
`/etc/security/limits.conf`	`fsize`	unlimited	Sets the maximum file size to the OS limit

After installation is complete, check that the above parameters were correctly set. If for any reason, the installation script failed to do so, you might see warning messages in `adminTools-dbadmin.log`, similar to the following:

```
Feb 5 13:28:56 dbadmin@host01: /opt/vertica/bin/vertica --status -D
/vertica/dbs//amdaily/v_amdaily_node0001_catalog
Feb 5 13:28:56 dbadmin@nohost01: ['1', ["Not enough open file handles allowed (1024 available/32768
required); see 'ulimit -n'."]]
Feb 5 13:28:56 Error code 1 ["Not enough open file handles allowed (1024 available/32768 required);
see 'ulimit -n'."]
```

You can verify and fix the settings manually using the examples in Troubleshooting the Install.

- Increase the Maximum Number of Files Open - use this procedure for any settings in `/etc/security/limits.conf` settings.
- Increase the max_map_count Parameter - use this procedure for any settings in `/etc/sysctl.conf`.

Unable to drop table. Must be Owner of Relation

Error

```
Must be owner of relation XX
```

Description

A user attempted to drop a table without the appropriate privilege. To drop a table, the user must be granted ALL privileges on the schema and must own the table.

Resolution

The table owner with ALL privileges on the schema drops the table.

I/O Error: Permission Denied

Error

```
I/O error(13): Permission denied
```

Description

The configuration directory is writable only by root.

Resolution

1 Log in as root:

```
$ su - root
password: <root-password>
#
```

2 Change the permissions on the configuration directory:

```
# chmod a+rw /opt/vertica/config
```

Permission Denied for Relation

Error

```
Permission denied for relation XX
```

Description

A user attempted to perform a SELECT, UPDATE, or DELETE operation on a table without the appropriate privilege. The user must be granted appropriate privileges on the schema and table before the user can perform the operation.

Resolution

Grant the user appropriate privileges on the schema and table.

One or More Nodes Did Not Open a Data Connection to this Node

Error

```
ROLLBACK: One or more nodes did not open a data connection to this node.
```

Description

This could indicate a network configuration problem. Check that the private interfaces used for communication among the cluster hosts reside in the same subnet and are returned first by host address lookup. If using */etc/hosts* for host name resolution, place the private interfaces used by the database above any other addresses with the same host names in */etc/hosts*. You can verify the host names by logging in to each node and pinging each of the other nodes. Verify that the host name reported back by ping matches the node's host name and is the same as any host name you used for your configuration when you installed Vertica.

Resolution

All nodes in the database cluster must be in complete agreement about host names and addresses.

Spread Dead but pid File Exists

Error

```
spread dead but pid file exists
```

Description

If spread ends abnormally, the pid and lock file are left behind.

Resolution

Restart spread.

1. Log in as root:

   ```
   $ su - root
   password: <root-password>
   #
   ```

   You can use sudo (if enabled) if you do not have the root password.
2. Restart the spread daemon:

   ```
   # /etc/init.d/spreadd restart
   ```
3. Ensure the daemon is running:

   ```
   # ps ax | grep spread
   ```

To diagnose issues related to starting Spread, "status" option has been enhanced to provide guidance .

Example

The following example checks on the spread status.

```
$ sudo /etc/init.d/spreadd status
spread is stopped
```

If you are having trouble starting spread, check `/opt/vertica/config/vspread.conf` and spread logs in `/tmp/spread_*` and `/var/log/spreadd.log`.

```
 $ sudo /etc/init.d/spreadd start
Starting spread daemon: spread (pid 24290) is running...
                                                           [ OK ]
 $ sudo /etc/init.d/spreadd status
spread (pid 24290) is running...
```

Administration Tools Errors

This section describes you might encounter related to the Administration Tools.

Administration Tools Fails Under Nonstandard Shell Prompt

Description

The Vertica administration tools expect the user's prompt to have standard bash type characters. If the prompt does not match, the regular expression string is `"][#$]|~[#$]|bash.*?[#$]|[#$] ")`. the Administration Tools fails and blames SSH.

Resolution

Change the shell prompt to use standard bash type characters.

External Procedures Fails Using Administration Tools

Description

A small terminal window results in failure to run external procedures.

Resolution

Resize your terminal window to a larger width and height.

Connection Problems

This section describes connection issues you might encounter.

Could Not Connect to Database

Error

```
could not connect to database
connection refused
server closed the connection unexpectedly
```

Description

You probably have hostname resolution problems.

Resolution

Make sure you have followed the instructions in Configure Hostname Resolution in the Installation Guide.

Could Not Connect to Server: Connection Refused

Error

```
could not connect to database
connection refused
```

Description

The database is not up or not listening on the port you are connecting to, or there are hostname resolution problems on the network interface used to connect to the database by the client.

Resolution

Check View Cluster State to ensure that the database node you are connecting to is UP.

Make sure you have followed the Configure Hostname Resolution instructions in the Installation Guide.

New Session Rejected Due to Limit

Error

```
New session rejected due to limit, already 50 sessions active
```

Description

By default Vertica allows 50 client sessions and an additional 5 administrator sessions. The system returns a message if the database exceeds the limit.

Resolution

Modify the `MaxClientSessions` parameter. For example, to increase the number of `MaxClientSessions` to 100, issue the following series of commands at a vsql prompt:

1 Determine the original value for the `MaxClientSessions` parameter:

```
=> SELECT CURRENT_VALUE FROM CONFIGURATION_PARAMETERS WHERE
   parameter_name='MaxClientSessions';
 CURRENT_VALUE
---------------
 50
(1 row)
```

2 Increase the `MaxClientSessions` parameter to 100.

```
=> SELECT SET_CONFIG_PARAMETER('MaxClientSessions', 100);
```

To set `MaxClientSessions` to the original value, issue the following command.

```
=> SELECT SET_CONFIG_PARAMETER('MaxClientSessions', 50);
```

See Also

... users are connected (page 38)

Managing Sessions and Configuration Parameters in the Administrator's Guide

CLOSE_SESSION, CLOSE_ALL_SESSIONS, CONFIGURATION_PARAMETERS, and SESSIONS in the SQL Reference Manual

Firewall Configuration

Vertica does not recommend using firewalls between nodes. If you are running your cluster on a private interface, a firewall is not needed. A firewall on the public side should only need port 5433 open.

A database cluster should depend on an external firewall provided by a gateway, not Linux. For optimal performance, the host in the cluster machines must work together as though they were a single powerful machine. Firewalls prevent this from happening.

If you must use firewalls, open the following ports on each.

Vertica

5433 TCP (All connections)

Spread

4803 TCP (Client connections)

4803 UDP (Daemon <-> Daemon)

4804 UDP (Daemon <-> Daemon)

4805 UDP (Monitor to Daemon) (optional and only if "DangerousMonitor = yes" in config file)

Note: On the private interface, in addition to those listed, all the dynamic ports, which are often between 32768 and 61000 but depend on the OS configuration, would need to be open. Also SSH (port 22). Again, Vertica does not recommend having firewall rules for the private (Vertica) networks.

Firewall inactivity timeout hit (Insufficient KEEPALIVE value)

Issue

The connection between the server and client is killed prematurely by a firewall timeout. This could happen when a long-running query is in progress but no data is being passed back to the client, and the firewall timeout is less than the TCP KEEPALIVE setting on the database server. (On some Linux distributions, the default is 2 hours or 7200 seconds.)

Resolution

Setting the KEEPALIVE setting to a value lower than the firewall timeout might help. In the following example, it is being set to 10 minutes (600 seconds).

```
echo 600 > /proc/sys/net/ipv4/tcp_keepalive_time
```

Database Designer Errors

This section describes Database Designer errors you might encounter.

No Such File or Directory ... super_projections.tmp.sql

Error

```
No such file or directory:
'/tmp/vertica_test_new/super_projections.tmp.sql'
```

Resolution

Create the directory manually. For example:

```
> mkdir /tmp/vertica_test_new
```

Error creating design

In rare circumstances, a user design space (workspace) might not be dropped, such as if the terminal window closes mid design. The following issues describe the different error messages you might see and how to resolve them.

Issue 1

A workspace is left behind after the design process stopped running, such as if the terminal window closes. When you next start the Administration Tools and try to recreate the design, the system returns an message that multiple workspaces are not allowed.

Error

```
Error creating design <design name>: Multiple workspaces are not allowed.
Design workspace ("<workspace name>") exists.
HINT: Drop existing workspace and try again
```

Resolution

1. Drop the Database Designer workspace tables manually using the following statement:

```
=> SELECT dbd_drop_all_workspaces();
```

2. Open the Administration Tools and select Configuration Menu > Run Database Designer again.

Issue 2

The design process is running and a second user tries to create a design on a database where a workspace already exists.

Error 1

```
Design '<design name>' is running
To check progress: execute select * from v_internal.vs_designs
```

```
To Cancel: execute select dbd_cancel_populate_design('<workspace
   name>','<design name');
```

Error 2

```
The design cannot be created because another design session is in progress
```

Resolution

Check the progress of the design by querying the internal table vs_designs using the following command:

```
=> SELECT * FROM v_internal.vs_designs;
```

Cancel the design using the following command:

```
=> SELECT dbd_cancel_populate_design('<workspace name>','<design
   name');
```

Hint: The output from the vs_designs table returns the workspace and design names.

Startup Problems

This section describes startup issues you might encounter.

KeyError: 'getpwuid(): uid not found: <uid>'

Error

```
KeyError: 'getpwuid(): uid not found: <uid>'
```

Description

A database that needed automatic system recovery was started through the Administration Tools, but timed out when the prompt to start the server at the last good epoch was ignored. This occurred because the idle time exceeded the value of the SSH daemon configuration file (`sshd_config`).

Resolution

Log out and then log back in to start a fresh session.

(LOSTCONTACT) Slow Database Startup when Node is Down

Error

No message.

Description

When a node is down, it can take a full minute or more for the Vertica processes to time out during its attempt to form a cluster when manual recovery is needed.

Resolution

Wait approximately one minute until the system returns the manual recovery prompt. Do not press CTRL-C during database startup.

Vertica Fails to Start (verticad and pam_limits)

Description

On some systems the pam module called `pam_limits.so` is not set in the file `/etc/pam.d/su`. When it is not set, it prevents the conveying of limits (such as open file descriptors) to any command started with `su -`

In particular, the verticad init script would fail to start Vertica because it calls the Administration Tools to start a database with the `su -` command. This problem was first noticed on Debian systems, but the configuration could be missing on other Linux distributions.

Resolution

Modify the `install_vertica` script and append this line to the `/etc/pam.d/su` file:

```
session required pam_limits.so
```

See Also

pam_limits http://man.he.net/man8/pam_limits man page.

Storage Location Problems

This section describes storage location issues you might encounter.

Could Not Open Directory

Error

```
could not open directory
<directory_path>: Not a directory
```

Description

You cannot add a location to a non-existent directory

Resolution

Verify the directory path where you want to create the storage location. If the directory doesn't exist, create it before attempting to create the storage location.

Could Not Create Directory

Error

```
could not create directory
<directory_path>: Permission denied
```

Description

You do not have sufficient permission to create a directory.

Resolution

The person who creates the directory must have system privileges for creating directories.

Could Not Add Location (Permission)

Error

```
could not add location
<directory_path>: Permission denied
```

Description

You cannot add a storage location because you do not have read/write permission on the parent directory.

Resolution

The person who creates the storage location must have read/write permission on the parent directory.

Could Not Add Location (Unavailable)

Error

```
could not add location
<directory_path>: Directory not empty
```

Description

You cannot add a storage location to a directory that already contains files.

Resolution

Either create a new directory in which to create a storage location or move the existing files to another directory.

Usage Cannot be an Empty String

Error

```
usage cannot be an empty string
```

Description

When using the ALTER_LOCATION_USE function to alter the use of a storage location, you did not specify its new use.

Resolution

Be sure to specify the usage string.

The following example alters the storage location on node3 to store data only:

```
=> SELECT ALTER_LOCATION_USE ('/thirdVerticaStorageLocation/' , 'node3' ,
'DATA');
```

Usage Cannot be Changed to Data

Error

```
ROLLBACK: <storage_location> cannot be changed to data. There will be no storage
locations for temporary files.
```

Description

You attempted to change the usage for the only storage location that stores temporary files.

Resolution

At least one storage location must be available to store temporary files. Create a new location to store temporary files before you attempt to change the usage of this one. See ADD_LOCATION.

Usage Cannot be Changed to Temp

Error

```
ROLLBACK: <storage_location> cannot be changed to temp. There will be no storage
locations for data files.
```

Description

You attempted to change the usage for the only storage location that stores data files.

Resolution

At least one storage location must be available to store data files. Create a new location to store data files before you attempt to change the usage of this one. See ADD_LOCATION.

Usage of Storage Location Cannot be Changed

Error

```
Usage of <storage_location> cannot be changed. It has been retired.
```

Description

You attempted to change the usage for a storage location that has been retired. Vertica prohibits this.

Throughput Should be Greater Than (>) Zero (0)

Error

```
throughput should be > 0
```

Description

When specifying the performance for the storage location, you specified a throughput of less than 1.

Resolution

The throughput of the storage location performance must be 1 or more. See SET_LOCATION_PERFORMANCE.

Latency Should be Greater Than (>) One (1)

Error

```
latency should be > 0
```

Description

When specifying the performance for the storage location, you specified a latency of less than 1.

Resolution

The latency of the storage location performance must be 1 or more. See SET_LOCATION_PERFORMANCE.

Cannot be Retired

Error

```
ROLLBACK: <storage_location> cannot be retired.
There will be no storage locations for temporary/data files.
```

Description

You attempted to retire the only storage location that stores temporary or data files.

Resolution

At least one storage location must be available to store temporary or data files. Create a new location to store temporary or data files before you attempt to retire this one. See ADD_LOCATION.

DROP_LOCATION for Data Locations is not Supported

Error

```
drop_location for DATA locations is not supported.
```

Description

You attempted to drop a location that is being used to store data files. Vertica prohibits dropping locations for which the usage is set to DATA or DATA,TEMP.

Resolution

Change the usage of the location to TEMP and verify that no data files remain. If one or more data files remain, you can perform a manual moveout of the data files, wait for the ATM to merge out the data files automatically, or you can drop partitions. Deleting data files does not work.

Note: At least one storage location must be available to store data files.

Location Cannot be Dropped

Error

```
Location cannot be dropped as it stores data files.
```

Description

You attempted to drop a location that contains data files. This occurs when the usage for a storage location used to be set to DATA or DATA,TEMP and the location still contains data files.

Resolution

If one or more data files remain, you can perform a manual mergeout of the data files, wait for the ATM to merge out the data files automatically, or you can drop partitions. Deleting data files does not work.

Execution Problems

This section contains error messages related to SQL execution issues.

Attempted to Create Too Many ROS Containers

Error

```
Attempted to create too many ROS containers for projection
```

Description

Heavy data load conditions can cause the Tuple Mover to fall behind in performing moveout or mergeout operations. The resulting large number of ROS containers can cause some requests to exhaust all available system resources. Vertica detects this problem and prevents load transactions until the Tuple Mover has time to catch up.

Resolution

You might need to adjust the Tuple Mover's configuration parameters to compensate for the load pattern or rate. See Tuning the Tuple Mover in the Administrator's Guide for details.

You can query the TUPLE_MOVER_OPERATIONS table to monitor mergeout activity. However, the Tuple Mover does not immediately start a mergeout when a projection reaches the limit of ROS containers, so you may not see a mergeout in progress when receiving this error.

If waiting for a mergeout does not resolve the error, the problem probably is related to insufficient RAM. In that case, contact ***Technical Support*** (on page 1). A good rule of thumb is that system RAM in MB divided by 6 times the number of columns in the largest table should be greater than 10. For example, for a 100 column table you would want at least 6GB of RAM (6144MB / (6 * 100) = 10.24) to handle continuous loads.

Cannot Drop Partition with Nodes Down

Error

```
ROLLBACK: Can't drop a partition with nodes down
```

Description

This error is obsolete. If a node fails during drop operations, DROP_PARTITION commits the dropped partition during recovery.

See Also

DROP_PARTITION in the SQL Reference Manual

Partitioning Tables in the Administrator's Guide

Case-sensitive System Table Queries Return 0 Records

Some system table data may be stored in mixed case. For instance, Vertica stores mixed-case identifier names as they were specified in the CREATE statement, even though the case is ignored when they are referenced in queries. See Identifiers. When these object names appear as data in the system tables, it is error prone to retrieve them with the equality (=) predicate because the case must match exactly to what is stored. It is much easier to use the case-insensitive operator ILIKE instead.

Example:

Given the following schema:

```
=> CREATE SCHEMA SS;
=> CREATE TABLE SS.TT (c1 int);
=> CREATE PROJECTION SS.TTP1 AS SELECT * FROM ss.tt UNSEGMENTED ALL NODES;
=> INSERT INTO ss.tt VALUES (1);
```

If you run a query using the = predicate, Vertica returns 0 rows:

```
=> SELECT table_schema, table_name FROM v_catalog.tables WHERE table_schema ='ss';
table_schema | table_name
--------------+------------
(0 rows)
```

Using the case-insensitive ILIKE predicate returns the expected results:

```
=> SELECT table_schema, table_name FROM v_catalog.tables WHERE table_schema ILIKE
'ss';
 table_schema | table_name
--------------+------------
 SS           | TT
(1 row)
```

Column Definition Changed to NOT NULL

Error

```
WARNING:  column "..." definition changed to NOT NULL
```

Description

In an ALTER TABLE statement, you must specify NOT NULL on columns that are given PRIMARY constraints. Otherwise, Vertica sets the column to NOT NULL and issues a warning.

Resolution

Always specify NOT NULL on columns that are given PRIMARY constraints.

COPY, DELETE, UPDATE, or INSERT Hangs When Server Idle

Issue

COPY, DELETE, UPDATE, or INSERT operations fail when the server is idle.

Resolution

Check for an idle session with an active transaction that is holding a share (S) lock on the table you are trying to modify. The S lock indicates a SELECT statement in a SERIALIZABLE transaction.

Review all of the sessions and locks shown by:

```
=> SELECT * FROM SESSIONS;
=> SELECT * FROM LOCKS;
```

Consider using the READ COMMITTED transaction mode for queries. You can get a similar effect in a SERIALIZABLE transaction by using AT EPOCH queries to avoid taking table share locks.

For additional details, see the following topics in the SQL Reference Manual:

- LOCKS system table
- SESSIONS system table
- AT EPOCH clause in the SELECT statement

Could Not Write To Filename

Error

```
ROLLBACK, ERRCODE_DISK_FULL
Could not write to filename: reason
where the reason is of the form:
Volume path has amount in bytes bytes free (amount in bytes unreserved).
Minimum free space is amount in bytes (type of limit)
where the type of limit is one of:
   Catalog
   Table Data
   Temporary Data
```

Description

The database has detected a low disk space condition.

Resolution

See Managing Disk Space in the Administrator's Guide

Ctrl-C Distorts Query Result Set Output

Description

If you interrupt an interactive query by typing Ctrl-c after the result set starts to display, your terminal settings could be adversely affected. This is caused by vsql sending its output to an external pager program. For more information about pagers, see:

- -P assignment --pset assignment
- \pset parameter [value]

Resolution

- `\pset pager` — enables and disables (toggles) the pager program.
- `\!reset` — resets (clears) the query buffer.

Deleting Records from Table with PK with Associated FK

Error

```
Deleting the records from a table with a primary key does not delete the records
from a table with the associated foreign key
```

Description

If you delete records from a dimension table, any records in a fact table or an associated dimension table are not automatically deleted

Errors that Result in a Statement-Level Rollback

A statement-level rollback reverses just the effects made by a particular statement. Most errors caused by a statement result in a statement-level rollback to undo the effects of the erroneous statement. Vertica uses ERROR messages to indicate this type of error.

See Transactions.

Errors that Result in a Transaction-Level Rollback

DDL errors, systemic failures, deadlocks, and resource constraints result in transaction-level rollback, which discards all modifications made by a transaction. Vertica uses ROLLBACK messages to indicate this type of error.

See Transactions.

Execution Error on External Procedures

Error

```
INFO: Procedure reported:
```

```
Could not execute procedure, errno=8
ERROR: Procedure execution error: exit status=1
```

Description

When executing an external procedure from the command line, the client returns an error.

Resolution

- Make sure there are no extraneous spaces before the command `#!/bin/bash`.
- If you are using programs within the external procedure, such as vsql, make sure the program is fully pathed in the script—even if it's already in the search path; for example `/opt/vertica/bin/vsql`.

Function <function-name>(<data-type>, ...) does not exist

Error

```
ERROR:  function convert(varchar, timestamptz, int) does not exist
```

Description

Vertica returns a syntax error if anything is entered that appears to have a type as an argument, rather than an expression as an argument.

Resolution

Use only expressions as arguments to SQL functions.

Function with specified name and parameters does not exist

Error

```
ROLLBACK: Function with specified name and parameters does not exist
```

Description

When you create SQL Macros, Vertica allows multiple user-defined functions to share the same name with different argument types. Therefore, if you try to alter or drop a function without specifying the argument data type, the system returns the following error message:

```
=> DROP FUNCTION my_function();
ROLLBACK:  Function with specified name and parameters does not exist: my_function
```

Resolution

Specify the argument type when you alter or drop a SQL Macro function; for example:

```
=> DROP FUNCTION my_function(x INT);
```

Tip: To view a list of all SQL Macro functions on which you have EXECUTE privileges, (which returns their argument types), query the V_CATALOG.USER_FUNCTIONS system table.

See the following topics in the SQL Reference Manual:

- CREATE FUNCTION
- ALTER FUNCTION
- DROP FUNCTION
- USER_FUNCTIONS

Hash Table Out of Memory on COPY and REFRESH Operations

Error

```
ERROR: Join inner did not fit in memory
ERROR: HASH JOIN inner did not fit in memory
ERROR: Hash table out of memory
```

Description

A hash join table that is too large to fit in memory triggers an error that can occur on joins that execute using a hash join (rather than a merge join) where the inner relation is large, such as a dimension table or outer join and while loading data into a pre-join projection for COPY and REFRESH operations

Resolution

1 Enable join spill by trying one or more of the following:

- To enable join spilling for a session:

```
=> SELECT add_vertica_options('EE', 'ENABLE_JOIN_SPILL');
```

- To disable join spilling for a session:

```
=> SELECT clr_vertica_options('EE', 'ENABLE_JOIN_SPILL');
```

- To enable join spilling for a single query, use hint syntax:

```
=> SELECT /*+set_vertica_options(EE, ENABLE_JOIN_SPILL)*/ <rest of the
   query>;
```

Only one hint can be used in a statement. For example, in an "`INSERT /*+direct*/ SELECT ...`" query where the select list includes a join that requires ENABLE_JOIN_SPILL, set ENABLE_JOIN_SPILL with the following:

=> SELECT add_vertica_options('EE', 'ENABLE_JOIN_SPILL'); and

```
=> SELECT clr_vertica_options('EE', 'ENABLE_JOIN_SPILL')
```

- To globally enable this option for all new sessions started in the database:

```
=> SELECT
   set_config_parameter('EEVerticaOptions','ENABLE_JOIN_SPILL');
```

IMPORTANT: Setting ENABLE_JOIN_SPILL globally or leaving it on can degrade performance for subsequent queries, especially for queries that do not need it. Thus, Vertica recommends that you enable the join spill mechanism only when needed and then disable it immediately after the query successfully runs.

2 Re-execute the query.

I/O Error

Description

Under some circumstances, an I/O error caused by a failed disk could cause the server to terminate with a SIGBUS error.

Resolution

If a bus error is received, check the operating system logs, such as *dmesg*, to see if information about a hardware error is present.

Insufficient Projections to Answer Query

Error

```
Insufficient Projections to answer query
```

Description

Possible causes:

- There is no projection that has all of the columns needed by a query.
- A node is down and you have not defined a K=1 physical schema.

Resolution

- If you are using custom projections, make sure that you have met all the superprojection requirements listed in Defining Custom Projections.
- Make sure that all nodes are running.

LIKE Predicate Referred to as ~~

Error

```
ERROR:  Operator ~~ (1209) ...
```

Description

Error messages caused by the LIKE-predicate could refer to it as ~~ (two consecutive tilde characters).

Resolution

None

Loading Data While a Node is Down

You might see the following warning while executing a COPY command:

Error

```
WARNING: the number of rows reported as loaded may be incorrect if a node is down.
```

Description

If you load data while a node is down, the number of rows reported as loaded in vsql is incorrect. The *vertica.log* file correctly reports the actual number of rows loaded, which can also be confirmed through `SELECT COUNT(*)` on the table being loaded.

Load Stream Could Appear Complete While Sorting in Progress

Description

When loading data, the load stream appears complete even though the data is still being sorted. VT_STREAMS table might show 100% completed as it is tracking the data parsed and does not account for sorting.

Lock Timeout Error Reports Incorrect Transaction Isolation Level

Error

```
ERROR: Locking failure: Timed out I locking Table:tab. S held by
[user release (select min(col) from tab;)]. Your current transaction isolation
level is SERIALIZABLE
```

Description

If you set the session characteristics as `TRANSACTION ISOLATION LEVEL READ COMMITTED` and execute some DDL or run refresh or Tuple Mover operations, you might see the above error, which shows your isolation setting to be different from what you set.

Vertica internal processes and DDL operations are run at `SERIALIZABLE` isolation to ensure consistency.

Resolution

None. Behaves as expected. To confirm your sessions transaction isolation level, use the `SHOW` command:

```
=> SHOW TRANSACTION ISOLATION LEVEL;
```

Missing FROM-clause Entry for Table

Description

An alias is specified for a table but not used in the WHERE clause gives an error.

Example:

```
SELECT *
FROM   PRODUCT_DIMENSION P
WHERE  PRODUCT_DIMENSION.WEIGHT < 10;
```

Resolution

Do not mix aliases and table names in the same query. Correct examples:

```
SELECT *
FROM PRODUCT_DIMENSION P
WHERE P.WEIGHT < 10;


SELECT *
FROM PRODUCT_DIMENSION
WHERE PRODUCT_DIMENSION.WEIGHT < 10;
```

Operator Does Not Exist

Issue

Vertica does not automatically convert date type values to a character string when they are used in an expression. For example, the following query, which tries to return the `date_column` column surrounded by spaces and single quotes, returns an error.

```
SELECT ' '''||date_column||''' ' from T1;
ERROR: operator does not exist: "unknown" || date
HINT: No operator matches the given name and argument type(s). You may need to add
explicit type casts.
```

Resolution

Explicitly cast the `date_column` column to a character string:

```
SELECT ' '''||date_column::varchar||''' ' from T1;
```

Out of Memory

Error

```
Out of memory
```

Description

Queries that return extremely large result sets can cause a memory error to occur.

Resolution

Limit your queries to the specific columns you need. In other words, do not use `SELECT *` on large tables.

Pattern Partitioning Errors

Errors

```
pattern partition will not fit into memory
too many matches in a single partition
```

Description

The maximum number of rows or matches for a pattern match query is set by the pattern matching partition configuration parameters. If these limits are exceeded (e.g., limits imposed by your system), Vertica returns a run-time error.

Workaround

Increase the limits using the configuration parameter that corresponds with the run-time error message.

The following command increases the number of rows per partition:

```
=> SELECT set_config_parameter ('PatternMatchingMaxPartition', 'NUMBER_OF_ROWS');
```

The default for PatternMatchingMaxPartition is 20,971,520 rows (or 20MB).

The following command increases the number of matches per partition:

```
=> SELECT set_config_parameter ('PatternMatchingMaxPartitionMatches', 'NUMBER_OF_MATCHES');
```

The default for PatternMatchingMaxPartitionMatches is 3,932,160 matches (or 60MB).

See Also

Pattern Matching Partition Parameters in the Administrator's Guide

MATCH Clause in the SQL Reference Manual

Projection Errors

Case 1

The following error message can occur when you try to create projections.

- CREATE PROJECTION fails if the projection does not include the columns it needs for partitioning and returns a message:
  `ROLLBACK: Attribute "month" in the projection anchor table "fact" must be included in the projection`
  Vertica recommends that you load data on a partition-by-partition basis to avoid the additional step of force partitioning the data later on.

Case 2

The following error messages can occur when you try to drop projections.

- If the projection you want to drop is the projection with the longest history, Vertica returns a message:

```
drop projection mytable_p1;
ROLLBACK: Projection cannot be dropped because history after AHM
would be lost
DETAIL: Current AHM epoch = 10
```

To resolve this issue, use MAKE_AHM_NOW, which sets the Ancient History Mark to the greatest allowable value and lets you drop any projections that existed before the issue occurred.

- If the projection you want to drop is the last superprojection on the table, Vertica returns a message:

```
drop projection A_p2;
ROLLBACK: No up-to-date super projection left on the anchor table
of projection a_p2
HINT: Use DROP TABLE ... CASCADE to drop the anchor table and its
last projection, or create a replacement super projection instead
```

To resolve this issue, drop the anchor table using the CASCADE keyword or create another superprojection.

See Also

DROP_PARTITION in the SQL Reference Manual

Partitioning Tables in the Administrator's Guide

Projection Refresh Doesn't Start Until a Buddy Projection is Created

Error

```
Starting refresh background process
```

Description

A projection is not refreshed until after a buddy projection is created.

After CREATE PROJECTION is executed, if you execute `'select start_refresh()'`, Vertica returns an error.

The refresh, however, does not actually begin until after a buddy projection is created.

Resolution

You can monitor the refresh operation by examining the `vertica.log` file or view the final status of the projection refresh by using:

```
=> SELECT GET_PROJECTIONS('table_name');
```

Notes

Vertica internal operations (mergeout, refresh, and recovery) maintain partition separation except in certain cases:

- Recovery of a projection when the buddy projection from which the partition is recovering is identically sorted. If the projection is undergoing a full rebuild, it is recovered one ROS container at a time. The projection ends up with a storage layout identical to its buddy and is, therefore, properly segmented.

  Note: In the case of a partial rebuild, all recovered data goes into a single ROS container and must be partitioned manually.
- Manual tuple mover operations often output a single storage container, combining any existing partitions; for example, after executing any of the `PURGE()` operations.

Optimizer Does Not Select the Best Projection

Error

EXPLAIN plan could show that the optimizer is not selecting the best projection for a query.

Resolution

Run ANALYZE_STATISTICS() for the tables involved:

```
=> SELECT ANALYZE_STATISTICS('table_name');
```

Query Continues to Execute on the Server When the Client is Killed

Description

When a vsql or JDBC client is killed or crashes, any executing query continues to execute on the server until it attempts to communicate with the client.

Resolution

You can terminate the server portion of the query using the INTERRUPT_STATEMENT function in the Session Management API.

See Also

INTERRUPT_STATEMENT in the SQL Reference Manual

Query Required More Resources Than Initiator Resource Manager Estimated

Error

```
Query required more resources than initiator resource manager estimated,
likely due to high storage container counts or a heavier workload on node <...>
```

Description

Heavy data load conditions can cause the Tuple Mover to fall behind in performing moveout or mergeout operations. The resulting large number of ROS containers can cause some requests to exhaust all available system resources. Vertica detects this problem and prevents load transactions until the Tuple Mover has time to catch up.

Resolution

You might need to adjust the Tuple Mover's configuration parameters to compensate for the load pattern or rate. See Tuning the Tuple Mover in the Administrator's Guide for details.

You can query the TUPLE_MOVER_OPERATIONS table to monitor mergeout activity. However, the Tuple Mover does not immediately start a mergeout when a projection reaches the limit of ROS containers, so you may not see a mergeout in progress when receiving this error.

If waiting for a mergeout does not resolve the error, the problem probably is related to insufficient RAM. In that case, contact ***Technical Support*** (on page 1). A good rule of thumb is that system RAM in MB divided by 6 times the number of columns in the largest table should be greater than 10. For example, for a 100 column table you would want at least 6GB of RAM (6144MB / (6 * 100) = 10.24) to handle continuous loads.

Querying Monitoring Table When a Node is Recovering

Description

Currently querying the monitoring tables on a node that is recovering is not supported.

Record Terminator for COPY When Loading Data from a Windows Client

Description

The default record terminator for COPY is `'\n'`. If you are loading data from a Windows client, you must specify RECORD TERMINATOR `'\r\n'`.

If you are using JDBC, Vertica recommends that you use use the value from

```
System.getProperty("line.separator")
```

for the RECORD TERMINATOR

Referential Integrity Load Violation

Description

Vertica checks for constraint violations when queries are executed, not when data is loaded.

If you have a pre-joined projection defined on the table being loaded, Vertica checks for constraint violations (duplicate primary keys or non-existent foreign keys) during the join operation and reports errors. If there are no pre-joined projections, Vertica performs no such checks.

To avoid constraint violations, load data without committing it and then perform a post-load check of your data using the ANALYZE_CONSTRAINTS function. If the function finds constraint violations, you can roll back the load because you have not committed it.

See Also

Analyzing Constraints (Detecting Constraint Violations) in the Administrator's Guide

COPY NO COMMIT and ANALYZE_CONSTRAINTS in the SQL Reference Manual

Table Partitioning Errors

The following error messages could occur when you trying to partition tables.

Error

```
ROLLBACK: Table is used as a dimension in a prejoined projection
```

Description

DROP_PARTITION fails if the table specified is used as a dimension table in a pre-join projection

Error

```
Too many ROS containers
```

Description

If the table has too many partitions, Vertica can return a "Too many ROS containers" message.

Resolution

1. Create a new table with proper partitioning.
2. Reload the data using INSERT...SELECT operations.
3. Drop the original table.

You could also run DO_TM_TASK to perform a Tuple Mover operation (moveout) on one or more projections defined on a specified table.

Alternatively, you can perform a manual mergeout using ALTER PROJECTION mergeout, but if the partitioned data is too granular you could encounter the issue again. Therefore, it is best to plan by defining fewer than 12 partitions. Otherwise, restructure the table or contact ***Technical Support*** (on page 1) if you encounter errors.

Caution: ALTER PROJECTION mergeout and PURGE() operations ignore partitions and partition boundaries while merging ROS containers. So after a manual mergeout/purge, DROP_PARTITION could cause the system to force partition the data. Vertica recommends that you use DO_TM_TASK(moveout) instead.

See Also

Cannot drop partition with nodes down (page 79)

Managing Large Grouped ROS Containers (page 52)

CREATE PROJECTION fails if projection excludes columns needed for partitioning (page 88)

ALTER PROJECTION, DROP_PARTITION, PARTITION_TABLE, and PARTITIONS in the SQL Reference Manual

Partitioning Tables in the Administrator's Guide

Too Many ROS Containers

Error

```
Too many ROS containers exist for the following projections:
toomanyros_projection(969 ROSs).
Please wait for the tuple mover to catch up. Use 'select *
from tuple_mover_operations' to monitor.
```

Description

Heavy data load conditions can cause the Tuple Mover to fall behind in performing moveout or mergeout operations. The resulting large number of ROS containers can cause some requests to exhaust all available system resources. Vertica detects this problem and prevents load transactions until the Tuple Mover has time to catch up.

Resolution

You might need to adjust the Tuple Mover's configuration parameters to compensate for the load pattern or rate. See Tuning the Tuple Mover in the Administrator's Guide for details.

You can query the TUPLE_MOVER_OPERATIONS table to monitor mergeout activity. However, the Tuple Mover does not immediately start a mergeout when a projection reaches the limit of ROS containers, so you may not see a mergeout in progress when receiving this error.

If waiting for a mergeout does not resolve the error, the problem probably is related to insufficient RAM. In that case, contact ***Technical Support*** (on page 1). A good rule of thumb is that system RAM in MB divided by 6 times the number of columns in the largest table should be greater than 10. For example, for a 100 column table you would want at least 6GB of RAM (6144MB / (6 * 100) = 10.24) to handle continuous loads.

Update and Delete Performance

Description

Updates and deletes of large numbers of rows in a large WOS can be slow.

Resolution

Commit the data so that it can be moved to the ROS, where delete and update processing is faster.

See Also

Best practices for DELETE and UPDATE in Administrator's Guide

Using Stream Name Parameter while Loading Data from STDIN

Description

When using COPY to load data from STDIN, always use the STREAM NAME parameter. This lets you distinguish between multiple loads from STDIN when you view the VT_LOAD_STREAMS table, and also lets you easily associate messages in the log file with specific data loads.

Variable Hash Join Performance

Description

A hash join to an inner relation could require additional memory than was initially allocated to the query. If memory is available, the hash join executes the query without needing to spill to disk. If memory is not available, the query automatically re-executes with join spill enabled (ENABLE_JOIN_SPILL), but query performance will be slower.

Resolution

If you notice performance degradation or variable performance for a hash join, try one of the following:

- Confirm that all tables involved in the join or joins have statistics:

  ```
  => SELECT * FROM PROJECTIONS WHERE NOT has_statistics;
  ```

- Look in the `vertica.log` for the following messages:

  When the query is planned and has no statistics for projections used:

  ```
  2010-08-15 04:19:57.824 Init Session:0xc2972d0 [Command]
  <INFO> Query being replanned with ENABLE_JOIN_SPILL used
  projections with no statistics: lineorder_node01 cust_p1
  ```

```
2010-08-15 04:19:57.824 Init Session:0xc2972d0 [Command]
<INFO> Query Retry: Setting
   add_vertica_options('EE','ENABLE_JOIN_SPILL');
```

Note: If the table has statistics, the optimizer might chose a different inner table for the join.

When the query is planned and has statistics for projections used:

```
2010-08-15 04:19:57.824 Init Session:0xc2972d0 [Command]
<INFO> Query Retry: Setting
   add_vertica_options('EE','ENABLE_JOIN_SPILL');
```

The following message displays when a query cannot be replanned; for example, when query results are output on one node before another node runs out of memory for its hash table. This can happen when there is a data skew (one node has more data than another or a subquery has differing amounts of data on different nodes):

```
2010-08-16 16:37:39.170 Init Session:0x2aaab4019190 [Command]
<INFO> Query can't be replanned due to partial output from initial
   execution
```

If you want more predictable results:

1. Profile the query to look for the minimum memory required for the query to run:

   ```
   => PROFILE SELECT ... FROM ...;
   ```

   A profiled query returns the following message before the results:

   ```
   NOTICE:  Initiator memory estimate for query: [on pool general: 22660
      KB,
   minimum: 22660 KB]
   ```

2. Create a standalone resource pool, which specifies at a minimum the amount of memory that the PROFILE command showed; for example, the following resource pool allocates 30MB of memory:

   ```
   CREATE RESOURCE POOL <pool_name> MEMORYSIZE '30M';
   ```

3. Check `vertica.log` and to make sure there is no message about a query retry, such as in the following fragment:

   ```
   2010-08-16 16:37:39.170 Init Session:0x2aaab4019190 [Command] <INFO>
   Query can't be replanned due to partial output from initial execution
   ```

See Also

CREATE RESOURCE POOL and Built-in Pools in the SQL Reference Manual

Platform Problems

This section describes platform-specific issues you might encounter.

Data Disk Spontaneously Remounts

Description

A temporary data storage disk using an ext3 file system could spontaneously dismount and remount as read-only under heavy load.

Workaround

To increase free memory perform the following steps:

1. Add the following line to `/etc/sysctl.conf` (the kernel sysctl configuration file):
   `vm.min_free_kbytes = 4096`
2. At the root command line prompt, enter:
   `# echo 4096 > /proc/sys/vm/min_free_kbytes`

Setting the Device Readahead Parameter for Improved Performance

Error

During installation you might see

```
Readahead parameter is set too high for some devices on the host
      Consider adding the following lines to /etc/rc.local file for better
performance
      blockdev --setra 2048 /dev/sda2 # old value 12024
```

Description

The default device readahead parameter could be too high, resulting in contention for disk cache space and slowing down the `mergeout` process. If you see the above message during the installation, Vertica strongly recommends that you follow the instructions to add the `blockdev` command to the `/etc/rc.local` file.

Move Core File to a Specified Location

Explanation

To control where core files are placed, explicitly specify their location by setting /proc/sys/kernel/core_pattern.

Note: This is a SYSTEM WIDE setting that requires root access to change. The precise format available can be retrieved from "man proc" or at this web page: http://www.ncsa.uiuc.edu/UserInfo/Resources/Hardware/CommonDoc/core.html

By default, the core_pattern is just "core," which results in a file named core.pid. This file resides in the current working directory, which by default, is the catalog directory for Vertica.

SUSE 10/11 Install Fails During Spread Configuration

Description

If a SUSE system does not have NTP running on startup, the Vertica installation could fail during spread configuration.

Resolution

To resolve this issue, run the following command:

```
chkconfig --list ntp
```

The output resembles the following:

```
ntp 0:off 1:off 2:on 3:on 4:off 5:on 6:off
```

If the output does not look like the above example, run the following command:

```
chkconfig ntp on
```

SUSE users can now run `install_vertica` without spread configuration issues.

SSL Problems

This section describes SSL issues you might encounter.

Unsafe permissions on private key file

Error

```
Unsafe permissions on private key file <filename>. File must be owned by the
database user and must have no permissions for "group" or "other"
```

Description

The permissions for the specified key file are too permissive. This is a fatal error, and the database fails to start.

Resolution

Remove any "group" or "other" permissions for the specified file.

Could not access server public certificate file

Error

```
Could not access server public certificate file "<filename>": No such file or
directory
```

Description

The SSL stack could not be initialized because server.crt is missing or corrupted. This is a fatal error, and the database fails to start.

Resolution

See SSL Prerequisites and verify that a valid server certificate file is located in the appropriate directory.

Could not access server private key file

Error

```
Could not access server private key file: <detail>
```

Description

The SSL stack could not be initialized because server.key is missing or corrupted. This is a fatal error, and the database fails to start.

Resolution

See SSL Prerequisites and verify that a valid server key file is located in the appropriate directory.

Check of private key failed

Error

```
Check of private key failed: <error_detail>
```

Description

The public certificate and private key file are not a pair. If, for example, the public certificate is from key pair A and the private key is from key pair B, they do not form a pair. This is a fatal error, and the database fails to start.

Resolution

See SSL Prerequisites to set up an appropriate public certificate and private key file pair.

Virtual IP Server Problems

This section describes issues you might encounter related to Vertica Load Balancer. See Also Load Balancing in the Administrator's Guide.

Users Cannot Connect to the VIP

Issue

Users cannot connect to the database through the Virtual IP (VIP) address.

Resolution

1 Check if spread is running:

```
$ ps ax | grep spread
11895 ?        S<s    4:30 /opt/vertica/spread/sbin/spread -n
  N192168051055 -c
                           /opt/vertica/config/vspread.conf
29617 pts/3    S+     0:00 grep spread
```

1. If spread is not running, start spread as root or using sudo:

```
[root@node01]# /etc/init.d/spreadd start
```

2. If spread is running, restart spread as root or using sudo:

```
[root@node01]# /etc/init.d/spreadd restart
```

3. Check the spread status as root or using sudo:

```
[root@node01]# /etc/init.d/spreadd status
```

4. Issue the `ifconfig` command to check the current IP addresses of the hosts, and verify that those IP addresses are listed in `/opt/vertica/config/vspread.conf`.

```
[root@node01]# ifconfig
```

If spread fails to start, examine the following files for problems:

```
/tmp/spread*.log
/var/log/spreadd.log
```

Permission problems and syntax problems are identified in the log files.

2 Check if keepalived is running:

```
$ ps ax | grep keepalived
29622 pts/3    S+     0:00 grep keepalived
```

1. If keepalived is not running, start keepalived as root or using sudo:

```
# /etc/init.d/keepalived start
```

2. If keepalived is running, restart keepalived as root or using sudo:

```
# /etc/init.d/keepalived restart
```

Issue

Users cannot connect to the database.

Resolution

Try to telnet to the VIP and port:

```
# telnet 10.10.51.180 5433
```

If telnet reports no route to host, recheck your `/etc/keepalived/keepalived.conf` file to make sure you entered the correct VIP and RIPs.

Errors and informational messages from the keepalived daemon are written to the `/var/log/messages` file, so check the messages file first:

```
# tail -f /var/log/messages
May 18 09:04:32 dell02 Keepalived_vrrp: VRRP_Instance(VI_1) Sending gratuitous
ARPs on eth0 for 10.10.10.100
May 18 09:04:32 dell02 avahi-daemon[3191]: Registering new address record for
10.10.10.100 on eth0.
May 18 09:04:32 dell02 Keepalived_healthcheckers: Netlink reflector reports IP
10.10.10.100 added
```

Expected e-mail messages from the keepalived daemon

- Upon startup:
  `Subject: [node01] VRRP Instance VI_1 - Entering MASTER state`
  `=> VRRP Instance is now owning VRRP VIPs <=`
- When a node fails:
  `Subject: [node01] Realserver 10.10.10.1:5433 - DOWN`
  `=> MISC CHECK failed on service <=`
- When a node comes back up:
  `Subject: [node02] Realserver 10.10.10.1:5433 - UP`

=> MISC CHECK succeed on service <=

Resolving Keepalived Issues

If there are connection or other issues related to the Virtual IP server and Keepalived, try some of the following tips:

- Set `KEEPALIVED_OPTIONS="-D -d"` in the `/etc/sysconfig/keepalived` file to enable both debug mode and dump configuration.
- Monitor the system log in `/var/log/messages`. If `keepalived.conf` is incorrect, the only indication is in the messages log file. For example:
  `$ tail /var/log/messages`
  Errors and informational messages from the keepalived daemon are also written to the `/var/log/messages` files.
- Type `ip addr list` and see the configured VIP addresses for eth0. For example:

```
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 16436 qdisc noqueue
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
```

```
    inet 10.10.51.180/32 brd 127.255.255.255 scope global lo:0
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast qlen
   1000
    link/ether 84:2b:2b:55:4b:be brd ff:ff:ff:ff:ff:ff
    inet 10.10.51.55/24 brd 10.10.51.255 scope global eth0
    inet6 fe80::862b:2bff:fe55:4bbe/64 scope link
       valid_lft forever preferred_lft forever
3: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast
   qlen 1000
    link/ether 84:2b:2b:55:4b:bf brd ff:ff:ff:ff:ff:ff
    inet 192.168.51.55/24 brd 192.168.51.255 scope global eth1
    inet6 fe80::862b:2bff:fe55:4bbf/64 scope link
       valid_lft forever preferred_lft forever
4: sit0: <NOARP> mtu 1480 qdisc noop
    link/sit 0.0.0.0 brd 0.0.0.0
```

- Check `iptables` and notice the PREROUTING rule on the BACKUP (slave) director. Even though `ipvsadm` has a complete list of real servers to manage, it does not route anything as the prerouting rule redirects packets to the loopback interface.

```
# /sbin/iptables -t nat -n -L
Chain PREROUTING (policy ACCEPT)
target     prot opt source               destination
Chain POSTROUTING (policy ACCEPT)
target     prot opt source               destination
Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
```

Note: On some kernels, the `nat` tables does not show by default without the `-t` parameter, and `-n` is used to avoid long DNS lookups. See the ***iptables(8) - Linux man page http://linux.die.net/man/8/iptables*** for details.

- During failover, it is normal to expect delay in new connection establishment until the slave node takes control. The delay could be several minutes depending on the load on the cluster. If you cannot connect to the database, try to telnet to the VIP and port:

```
# telnet 10.10.51.180 5433
```

If telnet reports no route to host, recheck the keepalived configuration file (`/etc/keepalived/keepalived.conf`) to make sure you entered the correct VIP and RIPs.

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bzip2/libbzip2 version 1.0 of 21 March 2000

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Daemonize

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- lib/gssapi/generic/gssapi_err_generic.et
- lib/gssapi/mechglue/g_accept_sec_context.c
- lib/gssapi/mechglue/g_acquire_cred.c
- lib/gssapi/mechglue/g_canon_name.c
- lib/gssapi/mechglue/g_compare_name.c
- lib/gssapi/mechglue/g_context_time.c
- lib/gssapi/mechglue/g_delete_sec_context.c
- lib/gssapi/mechglue/g_dsp_name.c
- lib/gssapi/mechglue/g_dsp_status.c
- lib/gssapi/mechglue/g_dup_name.c
- lib/gssapi/mechglue/g_exp_sec_context.c
- lib/gssapi/mechglue/g_export_name.c
- lib/gssapi/mechglue/g_glue.c
- lib/gssapi/mechglue/g_imp_name.c

- lib/gssapi/mechglue/g_imp_sec_context.c
- lib/gssapi/mechglue/g_init_sec_context.c
- lib/gssapi/mechglue/g_initialize.c
- lib/gssapi/mechglue/g_inquire_context.c
- lib/gssapi/mechglue/g_inquire_cred.c
- lib/gssapi/mechglue/g_inquire_names.c
- lib/gssapi/mechglue/g_process_context.c
- lib/gssapi/mechglue/g_rel_buffer.c
- lib/gssapi/mechglue/g_rel_cred.c
- lib/gssapi/mechglue/g_rel_name.c
- lib/gssapi/mechglue/g_rel_oid_set.c
- lib/gssapi/mechglue/g_seal.c
- lib/gssapi/mechglue/g_sign.c
- lib/gssapi/mechglue/g_store_cred.c
- lib/gssapi/mechglue/g_unseal.c
- lib/gssapi/mechglue/g_userok.c
- lib/gssapi/mechglue/g_utils.c
- lib/gssapi/mechglue/g_verify.c
- lib/gssapi/mechglue/gssd_pname_to_uid.c
- lib/gssapi/mechglue/mglueP.h
- lib/gssapi/mechglue/oid_ops.c
- lib/gssapi/spnego/gssapiP_spnego.h
- lib/gssapi/spnego/spnego_mech.c

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The basic library functions are written in C and are freestanding. Also included in the distribution is a set of C++ wrapper functions.

THE BASIC LIBRARY FUNCTIONS

Written by: Philip Hazel

Email local part: ph10
Email domain: cam.ac.uk
University of Cambridge Computing Service,
Cambridge, England.

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Python 2.7

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A. HISTORY OF THE SOFTWARE

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
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2.7	2.6	2010	PSF	yes

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