Pivotal HAWQ

Version 1.2.0.1

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This document provides information related to the Pivotal HAWQ 1.2.0.1 release. It includes the following topics:

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Welcome to HAWQ 1.2.0.1

HAWQ extends the functionality of Pivotal Hadoop (HD) Enterprise, adding rich, proven parallel SQL processing facilities. These SQL processing facilities enhance productivity, rendering Hadoop queries faster than any Hadoop-based query interface on the market. HAWQ enables data analysis for a variety of Hadoop-based data formats using the Pivotal Extension Framework (PXF), without duplicating or converting source files.

HAWQ is a parallel SQL query engine with the scalability and convenience of Hadoop. Using HAWQ functionality, you can interact with petabyte range data sets. HAWQ provides users with a complete, standards compliant SQL interface. HAWQ consistently performs tens to hundreds of times faster than all Hadoop query engines in the market.

About HAWQ Components

HAWQ comprises the following components:

- HAWQ Parallel SQL Query Engine
- PXF
- MADlib

HAWQ Parallel SQL Query Engine

The HAWQ Parallel SQL Query Engine combines the key technological advantages of the industry-leading Greenplum Database with the scalability and convenience of Hadoop. It reads data from and writes data to HDFS natively. Using HAWQ functionality, you can interact with petabyte range data sets. It provides users with a complete, standards compliant SQL interface. Leveraging Greenplum Database's parallel database technology, it consistently performs tens to hundreds of times faster than all Hadoop query engines in the market.

PXF

PXF enables SQL querying on data in the Hadoop components such as HBase, Hive, and any other distributed data file types. These queries execute in a single, zero materialization and fully-parallel workflow. PXF also uses the HAWQ advanced query optimizer and executor to run analytics on these external data sources. PXF connects Hadoop-based components to facilitate data joins, such as between HAWQ tables and HBase table. Additionally, the framework is designed for extensibility, so that user-defined connectors can provide parallel access to other data storage mechanisms and file types.

PXF Interoperability

PXF operates as an integral part of HAWQ, and as a light add-on to Pivotal HD. On the database side, PXF leverages the external table custom protocol system. The PXF component physically lives on the Namenode and each or some Datanodes. It operates mostly as a separate service and does not interfere with Hadoop components internals.

MADlib

MADlib is an open-source library for scalable in-database analytics. It provides data-parallel implementations of mathematical, statistical and machine learning methods for structured and unstructured data. MADlib combines the efforts used in commercial practice, academic research, and open-source development. You can find more information at http://madlib.net .

New Features

Note

For specific information about a previous release, please refer to the associated release notes.

HAWQ 1.2 supports the following features:

- **PL/Java**: HAWQ 1.2 supports PL/Java
- **HAWQ expand**: You can add resources to an existing HAWQ system using gpexpand.
- **HDFS Namenode High Availability (HA)**: You can initialize HAWQ on HA HDFS. Initializing on HD HDFS helps you avoid query failure that can occur if you have a single Namenode.
- **Error tables**: The most common use of readable external tables is selecting data from them to load into regular database tables. This is typically done by issuing a CREATE TABLE AS SELECT or INSERT INTO SELECT command, where the SELECT statement queries external table data. By default, if the external table data contains an error, the entire command fails and no data is loaded into the target database table. To isolate data errors in external table data while still loading correctly formatted rows, you can define a readable external table with a SEGMENT REJECT LIMIT clause in the CREATE EXTERNAL TABLE command. HAWQ 1.2. supports single row error isolation where any rows with formatting errors are logged into an error table.

- **User-Defined Functions**: HAWQ 1.1.3 introduced support for User-Defined Functions (UDF). The UDF feature extends the functionality of the HAWQ database by providing functions that can be evaluated in SQL statements. With each release, Pivotal extends UDF feature support. This section lists the UDF functionality supported in each release, and explicitly calls out features that are not supported.
  - *UDF features supported in HAWQ 1.2*
    - User defined composite types
    - Set returning functions
    - PL/Java
    - Windows Derived Aggregate Functions
  - *UDF features not supported in HAWQ 1.2*
    - SECURITY DEFINER when creating functions
    - Nested functions error out during execution
    - User-Defined base type
    - SORTOP is not supported for UDAs
    - ALTER set encoding, set schema, and rename
    - Window functions
    - Enhanced table functions
    - PL/Java Type Maps

See the *Pivotal HAWQ Installation Guide* for information about requirements and installation.

See the *Pivotal HAWQ Administrator Guide* for detailed information about features and usage.

- **MADlib 1.5**: When upgrading to HAWQ 1.2, you must upgrade to MADlib version 1.5 to achieve the functionality of the previous version.
- **PXF**: Automated High Availability, Hive 0.12 connectivity.

Supported Platforms

HAWQ 1.2 supports the Pivotal HD 2.0.1 platform.

Installation options

There are two ways to install HAWQ.

- Stand alone install – You can install HAWQ without using the PivotalHD tools ICM and PCC. For more information, please see *HAWQ 1.2 Installation and Upgrade Guide*
- Pivotal Command Center Command Line Interface – Please see *Pivotal HD Enterprise 2.0 Installation and Administrator Guide.*

Upgrading HAWQ

For more information about upgrading HAWQ and other components, see the *HAWQ Installation and Upgrade Guide*.

Resolved Issues

The tables below list issues resolved in HAWQ 1.2.0.0 and 1.2.0.1.

Note

For issues resolved in prior releases, refer to the corresponding release notes available from Support Zone.

In HAWQ 1.2.0.1

Issue	Category	Description
HAWQ-1453	Transaction	Executing concurrent INSERT and ALTER TABLE statements, generates the following error: ERROR: read beyond eof in table "tbl_isolation" in file "hdfs://smdw:9000/hawq/gpdb20131226t190718-885441423/releng4/16385/16523/58847.1" (cdbbufferedread.c:199) (seg4 slice1 sdw2:31100 pid=316232) (cdbdisp.c:1571) This issue has been resolved.

In HAWQ 1.2.0.0

Issue	Category	Description
HAWQ-1834	Build and Installer	The plr_install.sh script failed with the error - *Platform not supported*. This issue has been resolved.
HAWQ-1721	Query Optimizer	The optimizer failed to process a query with join aliases. This issue has been resolved in the optimizer.
HAWQ-1706	Query Optimizer	For certain queries that have inner and outer joins, the optimizer failed while exploring alternative plans leading to a crash. This issue is now fixed in the optimizer.
HAWQ-1702	Query Optimizer	For some queries containing built-in functions such as: pg_stat_get_backend_pid, pg_stat_get_backend_activity_start, or pg_stat_get_backend_userid; the optimizer might generate incorrect plans. This was caused by function properties being mislabeled in the catalog. This issue is now fixed in the optimizer.
HAWQ-1694	HDFS Access Layer, Query Execution	In a kerberized cluster with a race condition, the master released the file system credentials before the segments reached the HDFS name node. This caused the entire query to fail. This issue has been resolved.
HAWQ-1692	Query Optimizer PXF	PXF Predicate Push-down did not work if Orca was enabled. This issue has been resolved.
HAWQ-1618	Infrastructure	YARN failed to load in SingleCluster This issue has been resolved.
HAWQ-1610	Build and Installer	PL/R package changes. Check the name of your plr package. If it is plr-1.1.4.0-5152.x86_64.tgz,download the latest version plr-1.1.4.0-5664.x86_64.tgz for HAWQ 1.1.4.0 from Pivotal. The new package contains the file plr.sql with the necessary PL/R helper functions. This issue has been resolved.
HAWQ-1527	Build and Installer	HAWQ and PXF version strings are now 4 digits.
HAWQ-1491	AO tables Column Store	After truncating a table, the HAWQ input format did not work with the truncated table. This issue has been resolved.
HAWQ-1490	AO tables Column Store	The function HAWQConvertUtil.bytesToDecimal was not thread safe. This is because decimalCharArray is a public static variable. This issue has been resolved.
HAWQ-1489		After truncating a table, gpextract did not work. This issue has been resolved.

Issue	Category	Description
	AO tables Column Store	
HAWQ-1488	AO tables Column Store	If the HAWQAORecord.getBoolean function encountered a column with boolean data type, it returned the incorrect result, false. This issue has been resolved.
HAWQ-1455	Dispatch	Signal re-entrant during session idle. QD crashes. This issue has been resolved.
HAWQ-1451	Query Exexcution	Explain analyze statistics are not correct for work files . This issue has been resolved.
HAWQ-1450	Infrastructure	SingleCluster hdfs tool was not working with Hadoop 2.2 This issue has been resolved.
HAWQ-1429	Default	Unable to start HAWQ master because recovery failed. The master failed to start during recovery mode because some files existed locally and were missing on the HDFS layer. This issue has been resolved.
HAWQ-1418	Catalog and Metadata	HAWQ 1.1.4.0 did not support aggregate derived functions. This issue has been resolved.
HAWQ-1379	Management Tools	hawq_toolkit cannot be used directly after upgrading from an old version. This is because toolkit related objects are not created in the old version. **Workaround**: for each existing database instance where a user wants to use hawq_toolkit, perform following steps as superuser: 1. create a new schema named hawq_toolkit: psql -q -c "CREATE SCHEMA hawq_toolkit" $DATABASE_NAME 2. create toolkit related objects: psql -q -f $INSTALL_DIR/share/postgresql/gp_toolkit.sql $DATABASE_NAME After performing the above operations on template1, every newly created database using template1 as template database, will have hawq_toolkit automatically, meaning no need to perform the above operation.
HAWQ-1358 1257	DDL Object	Received a confusing error when creating a table that distributes by text data type. This issue has been resolved.
HAWQ-1260	Query Execution	A certain class of uncorrelated subqueries are known to fail. The subquery should have a user defined object and a distributed table. For example: SELECT * FROM t1 WHERE t1.a < (SELECT foo(t2.b) FROM t2 LIMIT 1);

Issue	Category	Description
		In this example, the subquery "SELECT foo(t2.b) FROM t2 LIMIT 1" has no correlation with the outer query. The subquery also invokes the UDF "foo()" and queries a distributed table "t2". Another example: SELECT array(SELECT foo(t1.a) FROM t1); Such type of queries fail with the following error: ERROR cache lookedup failed for ... This issue has been resolved.
HAWQ-1184	DDL Object	ALTER TABLE ADD COLUMN with default NULL was not supported for append-only tables. This syntax is now supported.
HAWQ-1078	Query Execution	Continuously issued deepslice queries cause error in HDFS with kerberos. This issue has been resolved.
HAWQ-872	DDL Object	In certain cases, INSERT INTO SELECT from the same table might insert an incorrect number of tuples. This happens if the table is altered prior to the insert. This issue has been resolved.

In PXF

Issue	Category	Description
HAWQ-1482	PXF	gphdfilters created a filter in the reverse order This issue has been resolved.
HAWQ-1364	PXF	While copying data to a writable interface HDFS table, showed remote component error 500. This issue has been resolved.

Known Issues

In HAWQ 1.2.0.1

Issue	Category	Description
HAWQ-2143	Management Tools	You may encounter this issue after performing the following tasks: 1. Upgrading the HAWQ cluster from 1.1.x to 1.2.x. 2. Running gpexpand

Issue	Category	Description
		During the distribution phase, gpexpand logs the error: [TIMESTAMP] gpexpand:[MASTER_HOST]:[USER]-[ERROR]:-Table template1.pg_catalog.pg_remote_credentials failed to expand: error 'ERROR: permission denied: "pg_remote_credentials" is a system catalog' in 'ALTER TABLE ONLY "pg_catalog"."pg_remote_credentials" SET WITH(REORGANIZE=TRUE) DISTRIBUTED BY ("rcowner")' This happens because gpexpand tries to distribute a catalog table. This is a known issue. Note that, excluding any other errors, the upgraded cluster will be fully operational and that the expansion is successful. You can confirm this by connecting to the database and executing the following SQL command: `select dbname, fq_name, status from gpexpand.logical_status;` All the associated tables, except g_catalog.pg_remote_credentials, will show the status as "COMPLETED". **Note** This is not an issue in clean install of 1.2.x cluster.
HAWQ-1980	Query Optimizer	With ORCA enabled, queries that contain multiple join predicates with statistical correlations can cause an "Out of Memory" error. The work-around is to set the `optimizer_damping_factor_join` configuration parameter (GUC) to a low value (e.g. 0.001). For example: `set optimizer_damping_factor_join=0.001;` The `optimizer_damping_factor_join` GUC controls the impact of multiple predicates on the accuracy of row estimation. As the GUC value decreases, predicates do not result in heavy under-estimation of rows.
HAWQ-1920	Query Optimizer	In some cases, the system was getting stuck in recovery mode because segments continued to run plans with motion nodes during the recovery process. Such plans are now invalid during recovery, and are no longer being generated.
HAWQ-1918	Catalog and Metadata	Nested functions in any language are not supported in HAWQ 1.2.
HAWQ-1900	Management Tools Documentation	HAWQ does not support sending email alert notifications.
HAWQ-1868	DML	If a query does not have a FROM clause, and contains the random() function in the SELECT clause along with another function that returns multiple rows, then the results generate the same random number rather than generating different random numbers

Issue	Category	Description
HAWQ-1859	Build and Installer	Run plr_install.sh to copy the pgcrypto.so on the master and segments. To import these pgcrypto functions for another database, run the following: psql -d<TARGET_DATABASE> -f $GPHOME/share/postgresql/contrib/pgcrypto.sql
HAWQ-1728	Query Optimizer	If ORCA is on, the INSERT command fails, but works fine with ORCA off.
HAWQ-1543	Upgrade	In a single node setting, gpmigrator tries to create temporary directories twice using the same name under DATA_DIRECTORY and MASTER_DIRECTORY, set during gpinitsystem. The second time will fail.
HAWQ-1456	Transaction	Running DROP SCHEMA and CREATE TABLE on the same table makes the newly created table inaccessible.

In HAWQ 1.1.4.0

Issue	Category	Description
HAWQ-1369	Management Tool	When the underlying HDFS is online, hawq_size_of_database includes the data size on both HDFS and local storage of the master; when the HDFS is offline, that view only has the data size on local storage of the master.
HAWQ-1368	Management Tool	The view, hawq_size_of_database, does not check user permission of those databases and only reports sizes of all user databases.
HAWQ-1270	Management Tool	The user must have access permission to the view, hawq_size_of_schema_disk.

In HAWQ 1.1.3.0

Issue	Category	Description
HAWQ-1167	Performance	Enabling Kerberos shows a 10% downgrade in HAWQ performance.
HAWQ-1099	Connectivity	If you enable kerberos authentication, the ODBC function SQL GetInfo returns an incorrect version of HAWQ.
HAWQ-1056	DML	Inserting data into a temp table generates an Append-only Storage Write error.

In HAWQ 1.1.0.3

Issue	Category	Description
HAWQ-859	Query Optimizer	pg_dumpall test suite runs slowly

Issue	Category	Description
		The overhead is due to the command pg_dumpall. pg_dumpall generates multiple queries over the catalog tables. Since ORCA optimizes these queries. Although these are simple queries, ORCA adds the overhead. **Workaround** : Turn ORCA off.

In HAWQ 1.1.0.1

Issue	Category	Description
HAWQ-255	Network	HAWQ does not support the IPv6 protocol.
HAWQ-225	Storage	When the number of partitions or columns of a column oriented table is large or write concurrency is high, HAWQ encounters an HDFS concurrency write limitation. Data loading performance may degrade and fail. **Workaround:** for partitioned tables, load data partitions one by one, instead of loading all the data randomly to all the partitions.
HAWQ-224	Backup and Restore	Only non-parallel logical backup and restore is supported. Pivotal recommends that you use physical backup and restore.
HAWQ-26	DDL	duplicate key violates unique constraint pg_type_typname_nsp_indexWhen two sessions attempt to create a table with the same name and in the same namespace, one of the sessions will error out with a less user-friendly error message of the form "duplicate key violates unique constraint".

In PXF 2.x.x

Issue	Description
HAWQ-2124	PXF breaks in Namenode High-availability (HA) setups. This occurs in the following setup: The first Namenode (by alphabet order) is the standby. The Namenode is up and running (meaning that you can successfully ping it). The Namenode is HDFS security enabled. **Workarounds**: You can use one of the following: Switch Namenode roles in the configuration. You will need to update the main hdfs-site config and the hdfs-client.xml file on HAWQ. OR Bring down standby Namenode. However, Pivotal does not recommend this,
HAWQ-1739	PXF does not filter UTF8 encoded parameters correctly.

Issue	Description
HAWQ-1720	Error table has one extra error reported if the last row has an error
HAWQ-1649	Intermittent failures when using pxf_profile.
HAWQ-1481	PXF Filter pushdown handles badly constants values with embedded quotes .
HAWQ-1394	When using PXF to communicate with a kerberized Pivotal Hadoop, PXF assumes that P-HD is using port 8020. If that is not the case, PXF will fail to communicate and transfer data. You will see the following message: ERROR: fail to get filesystem credential for uri hdfs://<namenode>:8020/ (cdbfilesystemcredential.c:194)

Pivotal and HAWQ Interoperability

Pivotal releases a number of client tool packages on various platforms that can be used to connect to HAWQ. The following table describes the client tool package compatibility with HAWQ. Client tool packages are available at the EMC Download Center.

Table: Interoperability Matrix

Client package	Description	Operating system	Client version	HAWQ version
Connectivity	Standard PostgreSQL Database Drivers (ODBC, JDBC)	Windows 2008 RedHat 6.4 and 6.2, 64 bit	4.2.6SP	1.2.0.1
HAWQ Client	Command Line Interface	Windows 2008 RedHat 6.4 and 6.2, 64 bit	4.2.6SP	1.2.0.1
Pivotal Command Center	A web-based tool for managing and monitoring your Pivotal HD cluster. Note: Pivotal Command Center 2.0.x does not support DCA V1, DCA V2 or Greenplum Database.	Windows 2008 RedHat 6.4 and 6.2, 64 bit CentOS 6.4 and 6.2, 64 bit	2.2	1.2.0.1
PXF	Extensibility layer to provide support for external data formats such as HBase and Hive.	Windows 2008 RedHat 6.4 and 6.2, 64 bit CentOS 6.4 and 6.2, 64 bit	2.2	1.2.0.1
Pivotal HD	Pivotal Hadoop	RedHat 6.4 and 6.2, 64 bit CentOS 6.4 and 6.2, 64 bit	2.0.1	1.2.0.1
pgcrypto	A library of cryptographic functions	Windows 2008 RedHat 6.4 and 6.2, 64 bit	1.2.0.0 1.1.3.0-4609	1.2.0.1

Client package	Description	Operating system	Client version	HAWQ version
		CentOS 6.4 and 6.2, 64 bit		1.1.3.x and 1.1.4.x
PL/R	Ability to create and invoke user defined functions in R	Windows 2008 RedHat 6.4 and 6.2, 64 bit CentOS 6.4 and 6.2, 64 bit	1.2.0.0 1.1.4.0-5664	1.2.0.1 1.1.4.x
PL/Java	Ability to create and invoke user defined functions in Java	Windows 2008 RedHat 6.4 and 6.2, 64 bit CentOS 6.4 and 6.2, 64 bit	1.2.0.0	1.2.0.1

HAWQ 1.2.0.1 and Pivotal HD Documentation

The following HAWQ and related documentation is available in PDF format on our website at www.gopivotal.com.

PDF and HTML versions of our documentation are available at docs.gopivotal.com/pivotalhd/

You can still access previous versions of HAWQ and Pivotal HD product documentation from EMC's Support Zone.

Table: HAWQ Documentation

Title	Revision
Pivotal HAWQ 1.2 Release Notes (This document)	A01
Pivotal HAWQ 1.2 Installation and Upgrade Guide	A02
Pivotal HAWQ 1.2 Administrator Guide	A02
Pivotal HD Enterprise 2.0 Installation and Administrator Guide	A02
Pivotal HD 2.0 Stack and Tool Reference Guide	A02
Pivotal Command Center 2.2 User Guide	A02
Pivotal Extension Framework 2.2 Installation and User Guide	A02